GEOTECHNICAL REPORT

for

CONTRACT NUMBER DACW 33-83-D-0006
WORK ORDER NUMBER 0021

SUBSURFACE INVESTIGATION

TOWNSEND DAM
TOWNSEND, VERMONT

&

NORTH SPRINGFIELD DAM
NORTH SPRINGFIELD, VERMONT

Prepared for:

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

EGA

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October 25, 1985

U.S. ARMY CORPS OF ENGINEERS
New England Division
424 Trapelo Road
Waltham, Massachusetts

Attention: Terry Wong

RE: Contract DACW-33-83-D-0006
Work Order No. 0021

Dear Mr. Wong:

In accordance with Work Order No. 0021, dated October 18, 1984, attached are two preliminary copies of our Engineering Report for the subsurface investigation performed at Townsend Dam in Townsend, Vermont and North Springfield Dam in North Springfield, Vermont for piezometer installations to determine the phreatic surface within the embankment and foundation for all pool elevations and to determine pore pressures and average permeabilities of the embankment and foundation soils.

If you have any questions or comments, please do not hesitate to call.

Very truly yours,

David S. Campbell, P.E.
President

DSC:cc
Attachments

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1.0 GENERAL

1.1 Authorization

The work reported herein was performed under Contract DACW33-83-D-0006, Delivery Order Number 0021, dated 18 October 1984.

1.2 Project Site

There were two dam sites in this project. The sites were located in southern Vermont. The first dam was the Townsend Dam located in Townsend, Vermont. The second dam was the North Springfield Dam located in North Springfield, Vermont.

1.3 Purpose

The purpose of this work order was to install piezometers to determine the phreatic surface within the embankment and foundation for all pool elevations and determine pore pressures and average permeabilities of the embankment and foundation soils.

1.4 Scope of Investigation

Inspection and exploration instructions, which were provided by the Army Corps of Engineers, New England Division, are included in Appendix A. The subsurface investigation program employed Standard Penetration Tests in accordance with ASTM D-1586, rock coring and piezometer installation.

Work under this delivery order consisted of the inspection of the test borings and casagrande piezometer installations. At each piezometer location falling head permeability tests were run. The test boring and piezometer locations were surveyed in by the Army Corps of Engineers. The Army Corps of Engineers also provided the drill rig and crew to perform the test borings.

The drive sample borings were performed in accordance with paragraphs "6A & 7" under Part II, Specifications For Services And Equipment Necessary For Conducting Geotechnical Exploratory Work, Various Locations In New England, Proposal No. DACW33-83-R-0005, dated Feb 18, 1983. A two or five foot spoon sampler was driven two or five feet at a time continuosly to refusal or to the specified depth. When refusal was encountered prior to the specified depth a rock core was taken. The field logs for the test borings are included in Appendix D. Upon completion of the boreholes, casagrande piezometers were installed at the specified depths. Double piezometer installations were set at FD-E, FD-F, FD-G, FD-H, FD-J, and FD-K at the elevations specified in the delivery order. Single piezometers were set at FD-A, FD-B, FD-C, FD-D and FD-I also at the elevations specified in the delivery order. After the installation of the piezometers, falling head permeability tests were run on all the piezometers.

2.0 QUALITY CONTROL

2.1 Equipment

The following equipment and tools were used to perform the work:

a. Core Drill: The core drill used was a truck mounted hydraulically driven rotary head unit manufactured by Holemaster Co. Inc.

b. Drive Hammer: The drive hammers used to advance the two and five foot spoon sampler weighed 140 and 300 lbs, respectively.

c. Casing and Rods: 6 and 4 inch casing was used for advancing the bore-holes. NW sized rods were used to drill and to advance the spoon sampler. The drive hammer used to advance the casing weighed 300 lbs.

d. Drill Bits: Diamond casing shoe bits and roller bits were used to spin and advance the 6" and 4" casing. Appropriately sized roller bits were used to clean out the 6 and 4 inch casing. HX and NX double tubed core barrels were used to core boulders and bedrock.

e. Piezometer Equipment: The piezometers installed were casagrande porous tip piezometers with 3/4" diameter schedule 80 PVC riser pipe. The piezometers were surrounded in clean Ottawa sand according to specifications.

2.2 Records

Records were kept of all activities and field procedures. Test boring logs included the following information:

(1) Name of the project.

(2) Site location designation.

(3) Ground elevation at location of exploration.

(4) Date exploration performed.

(5) Method of penetration.

(6) Depth of penetration.

(7) Density of materials encountered.

(8) Names of drillers and inspector.

(9) Blows per six inches of penetration.

(10) Hole number and designation.

(11) Make and manufacturer's model designation of equipment.

(12) Type of drilling and sampling operation by depth.

(13) Dates and time when drilling and sampling operations were performed.

(14) Depths at which samples or cores were recovered or attempts made to sample including top and bottom depths of each sampling interval. Classification or description including geologic and common usage designation such as till, fluvial deposits, etc., by depths of materials sampled or penetrated including a description of moisture conditions, color and conditions of compactness or stiffness of soils materials encountered. Record of penetration resistance such as drive hammer blows given in blows per six inches of penetration depth for driving sample spoons.

(15) Depth at which drill water is lost and regained.

(16) Depth to bottom of hole.

(17) Percentage of sample of core recovered per run.

(18) Installation of piezometers and falling head permeability test results.

(19) Other pertinent information.

2.3 Procedures

a. Boring locations and elevations were supplied by the Army Corps of Engineers.

b. Bore holes were advanced by sampling with a 1-3/8 inch ID by 2.0 foot split spoon sampler and a five foot solid spoon sampler. The sampler was advanced two or five feet at a time to the required depth or until refusal with a 140 lb or 300 lb hammer falling 30 or 18 inches respectively. Refusal was defined as 100 blows with no penetration or bouncing refusal. The sample spoon shoes were kept reasonably sharp at all times. Dull, bent or otherwise damaged samplers were not used. Following sampling, the casing was advanced and cleaned out using an appropriately sized roller rock bit. Six and four inch flush joint casing was used in conjunction with the sampling.

c. Upon encountering refusal the bore hole was advanced by coring operations. Coring was accomplished with a five foot HX and NX size core barrel. When break through occured prior to the specified depth the bore hole was enlarged with a larger sized barrel and cased to allow for the continuation of the hole. Core samples were taken as specified by the Army Corps of Engineers.

d. Samples were classified in the field immediately following the taking of the sample. Classification was in accordance with ASTM D-2487 and D-2488. Representative samples were taken from each soil sampling run and placed in 16 oz. glass jars with hermetically sealed lids. Jars were labeled with sample number, sampling interval, boring number, date, location, and soil description. The rock core samples were also classified immediatly following sampling and placed in wooden core boxes according to the specifications. All field classifications were verified in our laboratory. Chain of custody logs were maintained documenting custody between the field and transportation and delivery to the lab at NED. The chain of custody logs are included in Appendix C.

3.0 QUALITY CONTROL CERTIFICATION

I hereby certify that the abovementioned records, equipment, and procedures were used to perform the subsurface exploration description herein. I also certify that the work was performed in a professional manner and meets the requirements set forth in the delivery order.

Certified 25 October 1985

David S. Campbell
President

WORK ORDER #21

TABLE 1

SUMMARY OF ACTIVITIES
1984

DATE	ACTIVITY
05 & 06 Nov	Monday & Tuesday: Checked the site area along with the proposed locations of future test borings. Waited for the drillers to arrive at the site. Worked 8 hours on Monday, 8 hours on Tuesday.
07 Nov	Wednesday: Started Boring FD-84-1. The setting-up operation lasted 6 hours. Worked 8 hours.
08 Nov	Thursday: Installed 10 ft. of casing. The two drillers on the site had to pick up the third driller. Worked 8 hours.
09 Nov	Friday: The water left inside the hoses and tank was frozen. The threads on the 6 inch I.D. casing did not match some of the other 6 inch I.D. casings. The piezometers provided by the Corps of Engineers were the slotted PVC type, which were not the correct type (porous stone). Worked 8 hours and Geotechnical Inspector travelled home.
13 Nov	Tuesday: Continue drilling the same hole (FD-84-1). Wait for the porous stone tip (Cassagrande) piezometers to arrive. Called Mr. Jim Harte at the Corps of Engineers to notify him about the situation and the delay in delivering the required equipment. Geotechnical Inspector returned from home to site and worked 10 hours.
14 Nov	Wednesday: Lacking filter sand for the installation of piezometers. Purchased concrete sand from a local supplier. Worked 10 hours.
15 Nov	Thursday: Completed Boring FD-84-1 and the installation of Piezometers #9 and #10. Worked 10 hours.
16 Nov	Friday: Started Boring FD-84-2. The purchased concrete sand was delivered and stored inside a garage. Worked 10 hours.

17 Nov	Saturday: Missing 3/4 inch I.D. Schedule 80 PVC couplings. Also missing 100 ft. of PVC, piezometer tips, bentonite and casing caps. Finish Boring FD-84-2 and installed Piezometer #15. Worked 10 hours.
18 Nov	Sunday: Geotechnical Inspector stayed overnight at site.
19 Nov	Monday: Looking for 3/4 inch I.D. Schedule 80 PVC couplings. Worked 8 hours.
20 Nov	Tuesday: Installed Piezometer #16. Worked 8 hours.
21 Nov	Wednesday: Geotechnical Inspector returned home from site.
26 Nov	Monday: Geotechnical Inspector returned to site.
27 Nov	Tuesday: Started the third Borehole FD-84-3 with 2 drillers. Brakes on the supply truck were frozen and would not release. Worked on the brakes. Went to Keene, N.H. to pick up the third helper. Worked 10 hours.
28 Nov	Wednesday: Supply truck is not available. Getting set up to pump the water from the river. Missing hose couplings. Performed the falling head test on Piezometers #15 and 16. Worked 10 hours.
29 Nov	Thursday: Continue drilling Borehole FD-84-3. Purchased hose couplings from a local supplier. Off and on rainfall. Worked 10 hours.
30 Nov	Friday: Finished the third Borehole FD-84-3. Worked 10 hours.
01 Dec	Saturday: Installed piezometers #11 and #12. The casing caps never arrived at the site. Worked 10 hours.
02 Dec	Sunday: Geotechnical Inspector returned home from the site.
03 Dec	Monday: Set up on Boring FD-84-4 and drilled 7.1 ft. Geotechnical Inspector returned to site and worked 10 hours.

04 Dec	Tuesday: Spent 2 hours in the morning thawing out the equipment. Then drilled and recovered 18" of quartz. The last hour of the day was spent draining equipment. Worked 10 hours.
05 Dec	Wednesday: Continued the coring, recovered 16" of Quartz and 8" of wood. Two hours were spent thawing equipment and one hour draining equipment at the end of the day. Contractor also picked up piezometer equipment in the morning. Worked 10 hours.
06 Dec	Thursday: Lost because of snow. No work done.
07 Dec	Friday: Two hours spent thawing equipment in the morning and one hour at end of day draining equipment. Sampled 3 ft. of material and roller rocked another 2 ft. of rock. Worked 10 hours.
08 Dec	Saturday: Started to thaw out equipment in the morning and found that one of the hoses going from the pump to the river was frozen. Decided to call it quits and demobilize. 15 ft. of casing was left in place. Worked 10 hours.
09 Dec	Sunday: Returned to home.

WORK ORDER #21
SUMMARY OF ACTIVITIES
1985

DATE	ACTIVITY
12 June	Wednesday: A standby time of 8.0 hours was used to mobilize rig and crew from Hodges Village Dam, Oxford, MA to Townshend Lake Dam, Townshend, VT.
13 June	Thursday: Set up and began Boring FD-85-1 (A). Total drill footage of 14.0 ft. Standby time of 4.0 hours for set-up and rain delay.
14 June	Friday: Continuation of Boring FD-85-1 (A). Total drill footage 26.0 ft. No standby time.
17 June	Monday: Continuation of Boring FD-85-1 (A). Total drill footage 19.0 ft. No standby time.
18 June	Tuesday: Completion of Boring FD-85-1 (A). Total drill footage 14.0 ft. Standby time of 3.0 hours due to rain.
19 June	Wednesday: Set up and began Boring FD-85-2 (B). Total drill footage 18.0 ft. Standby time of 2.0 hours used for set-up.
20 June	Thursday: Continuation of Boring FD-85-2 (B). Total drill footage of 36.0 ft. No standby time.
21 June	Friday: Completion of Boring FD-85-2 (B). Total drill footage of 19.0 ft. No standby time.
24 June	Monday: Began Boring FD-85-3 (C). Total drill footage of 10.0 ft. Standby time of 3.0 hours used to repair clutch in rig and for set-up.
25 June	Tuesday: Continuation of Boring FD-85-3 (C). Total drill footage of 30.0 ft. Standby time of 2.0 hours used to replace shield pin on rig.
26 June	Wednesday: Completion of Boring FD-85-3 (C). Total drill footage of 15.5 ft. No standby time.
27 June	Thursday: Assembled equipment and began demobilization to North Springfield Lake Dam, North Springfield, VT.

09 July	Tuesday: Completed mobilization to No. Springfield Lake Dam. Standby time of 8.0 hours used to complete mobilization and set-up on Boring FD-85-1 (K).
10 July	Wednesday: Began Boring FD-85-1 (K). Total drill footage of 12.0 ft. Standby time of 4.0 hours to complete set-up.
11 July	Thursday: Continuation of Boring FD-85-1 (K). Total drill footage of 34.0 ft. No standby time.
12 July	Friday: Continuation of Boring FD-85-1 (K). Total drill footage of 26.0 ft. No standby time.
15 July	Monday: Completion of Boring FD-85-1 (K). Casing footage of 30.0 ft. for piezometer protection. Standby time of 4.0 hours used to install piezometers #10 and 11.
16 July	Tuesday: Began boring FD-85-2 (J). Total drill footage of 20.0 ft. Standby time of 4.0 hours used to test piezometers and set up on boring.
17 July	Wednesday: Continuation of Boring FD-85-2 (J). Total drill footage of 40.0 ft. No standby time.
18 July	Thursday: Completion of Boring FD-85-2 (J). Total drill footage of 10.0 ft. Casing footage of 30.0 ft. for piezometer projector pipe. No standby time.
19 July	Friday: Standby time of 8.0 hours used to install piezometer #8 and #9. Mobilized rig to dam office to begin clutch and pump repairs.
22 July	Monday: Standby time of 8.0 hours used to test piezometers and continue repairs to rig.
23 July	Tuesday: Standby time of 8.0 hours used to complete rig repairs and set up on boring FD-85-3 (I).
24 July	Wednesday: Began Boring FD-85-3 (I). Total drill footage of 36.0 ft. No standby time.
25 July	Thursday: Completed Boring FD-85-3 (I). Total drill footage of 40.0 ft. Standby time of 1.0 hour to install piezometer #12.
26 July	Friday: Standby time of 8.0 hours used to grout in protector piping for piezometers and test piezometer #12. Assemble equipment for demobilization.

29 July	Monday: Mobilized Rig and Crew backt o Townshend Lake Dam, Townshend, VT. Set up on boring FD-1-85-4 (G). Standby time of 8.0 hours used to mobilize and set up on Boring FD-85-4 (G).
30 July	Tuesday: Began Boring FD-85-4 (G). Hole terminated due to casing breakage. Moved boring and set up on boring FD-85-4 (G). Total drill footage 32.0'. Standby time of 3.0 hours used to set up on boring FD-85-4 (G),
31 July	Wednesday began and completed boring FD-85-4 (G). Total drill footage 45.0'. No standby time.
01 Aug	Thursday: All personnel assembled and mobilized to Waterbury Lake Dam, Waterbury, VT to pick up mule truck for future setups at Townshend Lake Dam. Standby time of 8.0 hours to pick up mule truck and return to Townshend Lake Dam.
02 Aug	Friday: Installation and testing of piezometers #13 and #14 Boring FD-85-4 (G). Set up on Boring FD-85-5 (D). Standby time of 8.0 hours to install and test piezometers and set up on Boring FD-85-5 (D).
05 Aug	Monday: Began Boring FD-85-5 (D). Total drill footage of 44.0'. No standby time.
06 Aug	Tuesday: Completed Boring FD-85-5 (D). Installed and tested piezometer 8. Began set up on Boring FD-85-6 (C). Total drill footage 6.0'. Standby time of 5.0 hours to install and test PZ-8 as well as begin set up on boring FD-85-6 (C).
07 Aug	Wednesday: Continued set up on Boring FD-85-6 (C). Stabilizer bar snapped on rig. Rig demobilized off the side of dam. Standby time of 8.0 hours used to demobilize rig off dam and begin repairs.
08 Aug	Thursday: Continued repairs on Rig. Standby time of 8.0 hours for repairs.
09 Aug	Friday: Completed repairs on rig stabilizer bar. Set up and began boring FD-85-6 (C). Total drill footage 5.0'. Standby time of 6.0 hours used to complete rig repairs and setup.

12 Aug Monday: Arrived at the dam at 7:15. Mark Owens reviewed the project with me (Don Ellison). The drillers started FD-85-6 (C) by driving 6" casing to 5 ft. Once we got past the casing, we lost drilling fluid and had to continuously fill the tub with water. We ended up driving 6" casing to 15' and taking the first sample at 16'. We are still losing drilling fluid. We drove 5' more of 6" casing to 20 ft to try to seal off the hole, but we still lost drilling fluid past the casing. Today we drilled 20 ft.

13 Aug Tuesday: We took sample 2 at 20'. From 22 ft to 30.8 ft was boulders and cobbles and drilling was very slow and rough. There are too many boulders to try and sample. We hit a boulder at 30.8 ft which the roller bit couldn't cut. We ended up coring it with an (R) barrel after setting 30 ft of 4" casing. We cored from 30.8 ft to 33.1 ft. Today we took 2 split spoon samples, drove 20 ft of 6" casing and 30 ft of 4" casing, and drilled 13.1 ft. Also cored 3 ft through a boulder.

14 Aug Wednesday: Arrived at 7:15 and started sampling. Took samples 3-12 and drilled 24.9 ft. Set piezometer at 56 ft backfilled with 30 ft of silica sand and put bentonite seal from 26 ft to 20 ft. Installed protective pipe and cemented the outside. Then we mobilized on FD-85-7).

15 Aug Thursday: Arrived at 7:15 and the crew was preparing the mule truck to take back to Waterbury, VT. The two helpers returned at 10:30. We had to put the muffler back on the water pump before we could start drilling FD-85-7 (B). We then ran the falling head test on FD-85-6. Started the hole by digging with a hand shovel to about 2 ft. Then we drilled with a 6" roller bit to about 4 ft and set a 5 ft piece of 6" casing to 4 ft. The casing stopped on a boulder and we spent the rest of the afternoon drilling the boulder with a 5-5/8" roller bit and water. We drilled a total of 5 ft today. I spoke to John Hart and relayed the information to him.

16 Aug Friday: Arrived at 7:15 and the crew was preparing to drill. After drilling to 20 ft with a 5-5/8" roller bit, we drove 20 ft of 4" casing to seal off the casing. Took the first sample at 28 ft. We had to keep driving casing after every drive to keep the fluid, but we were still losing some fluid. Today we took 4 split spoon samples (1-4), drove 34 ft of 4" casing, and drilled 36 ft. It rained off and on during the morning and started raining constantly after lunch.

19 Aug Monday: Arrived at the dam at 7:15 and the crew was preparing to drill. It was raining lightly and we took two split spoon samples (5 and 6) before lunch. Drilling was very difficult because there were a lot of cobbles and boulders and we were losing all the drilling fluid. Today we took 2 split spoon samples, drilled from 36 ft to 44 ft for a total of 8 ft, and drove 4" casing to 44 ft before it started raining hard at 12:30. We waited till 2:45 for the rain to stop and decided to go home.

20 Aug Tuesday: Arrived at the dam at 7:00 and the crew was ready to drill. We were still hitting a lot of boulders and losing all the drilling fluid. We had to drive casing every 2 to 3 ft to try and stop the drilling fluid loss and to keep the hole open. I called Paul to see if it was okay to sample every 5 ft and he okayed it. We took split spoon samples 7-11, drove the 4" casing from 44 ft to 70 ft and drilled from 44 ft to 71 ft for a total of 27 ft. Then we installed the piezometer and ran the falling head test.

21 Aug Wednesday: Arrived at the dam at 7:00 and the crew was preparing to mobilize on FD-85-8 (A). They cemented the protective pipe on FD-85-7 (B), and then moved to FD-85-8 (A). They started drilling after lunch and hit a boulder 5 ft down which they had to core to get through. I called Waltham to let them know we were done on FD-85-7 and to find out how much protective pipe they want on FD-85-8 left in place. Paul L'Hereux said to leave 100 ft of 4" casing. Today we drilled to 8 ft and drove 10 ft of 6" casing.

22 Aug Thursday: Arrived at the dam at 7:00. Raymond went to Waterbury, VT to pick up some 4" casing. We drilled with a 6" roller bit until we hit a boulder at 20 ft. We had to core it to get through and ended up coring boulders at 25 ft, 30 ft, and 37 ft. At 40 ft we lost all the drilling fluid. We tried to stop the leak with bentonite but had no luck. They then mixed cement and grouted up the bottom of the hole to seal off the leak. Today we drilled from 8 ft to 40 ft for a total of 32 ft.

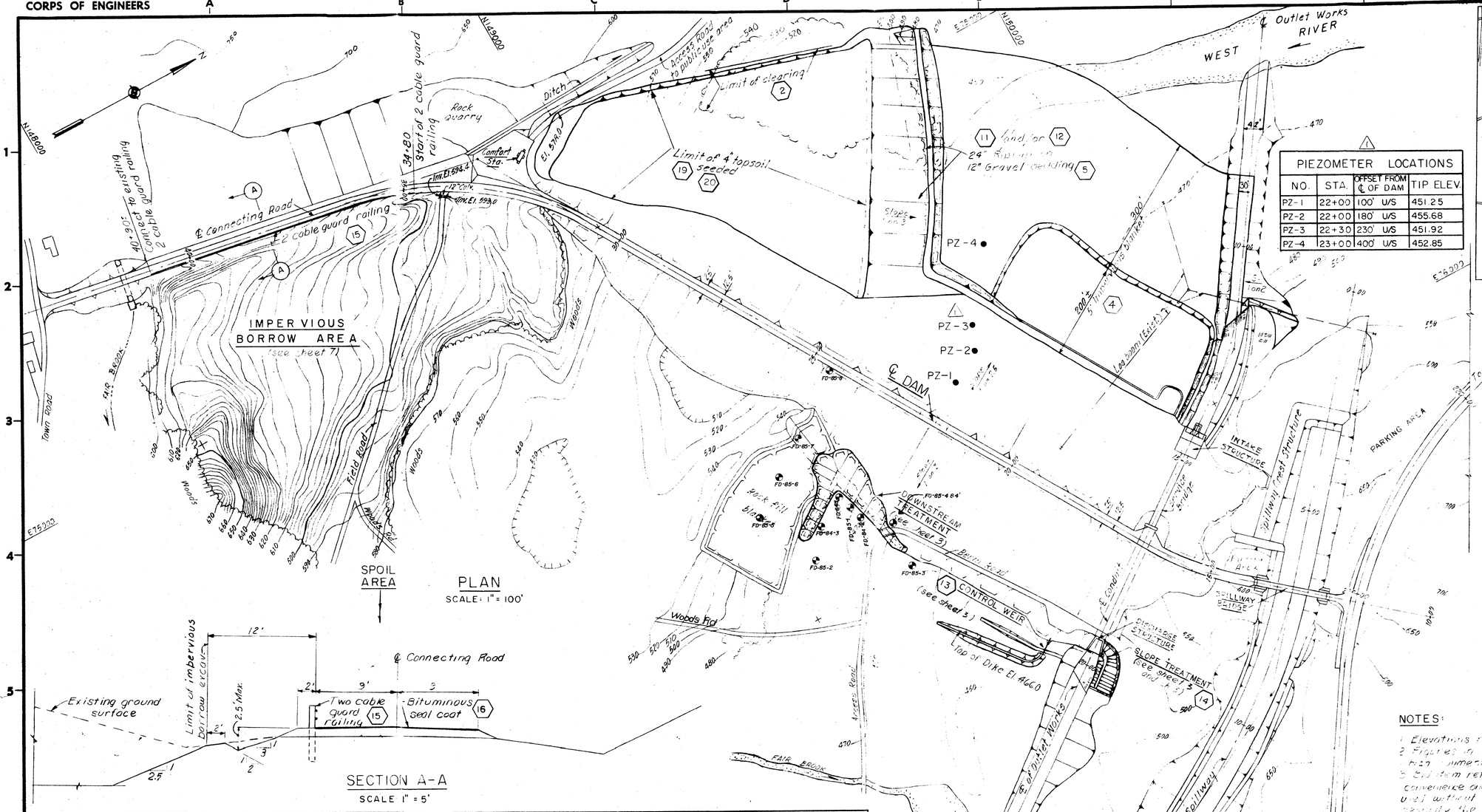
23 Aug Friday: Arrived at the dam at 7:00. The cement sealed off the hole and they were getting drilling fluid back. We started drilling at 40 ft and got to 65 ft for a total of 25 ft. However., we wore out the roller bit and the last 10 ft was very slow. There were numerous boulders and cobbles which wore out the bit. They didn't have any more bits that would fit in the 6" casing. They had two roller bits marked 5-5/8" but they were mismarked and turned out to be 6", which wouldn't fit in the casing. Raymond said he would try to get some new bits from Mobile by Monday. One hour standby time while Raymond called Mobile to order the bits.

26 Aug Monday: Arrived at the dam at 7:15. It was raining hard so we waited for it to stop. They called Mobile to find out where the bits were, and they were told they should get them today. The crew went to pick up the bits in Brattleboro; they all went since it was raining so hard. I waited at the dam. The bits came by by Federal Express at 12:30. However, it was raining too hard to work. Today we had 8 hours of standby time because of rain.

27 Aug Tuesday: Arrived at the dam at 7:00. They started at 65 ft with a 5-3/8" roller bit. Drilling was slow and rough. At 70 ft they lost all the drilling fluid. We ended up driving 4" casing to 71 ft to try and seal off the leak. The casing stopped on a boulder and we couldn't advance it any further. We ended up putting a bucket of bentonite balls down the hole to seal off the leak. This worked for a while and we were able to take our first sample at 85 ft so we cemented up the bottom of the hole to stop the leak. I called Paul to see if it would be okay to take a drive every 5 ft for the first 4 drives, and he said yes. Today we drilled 20 ft.

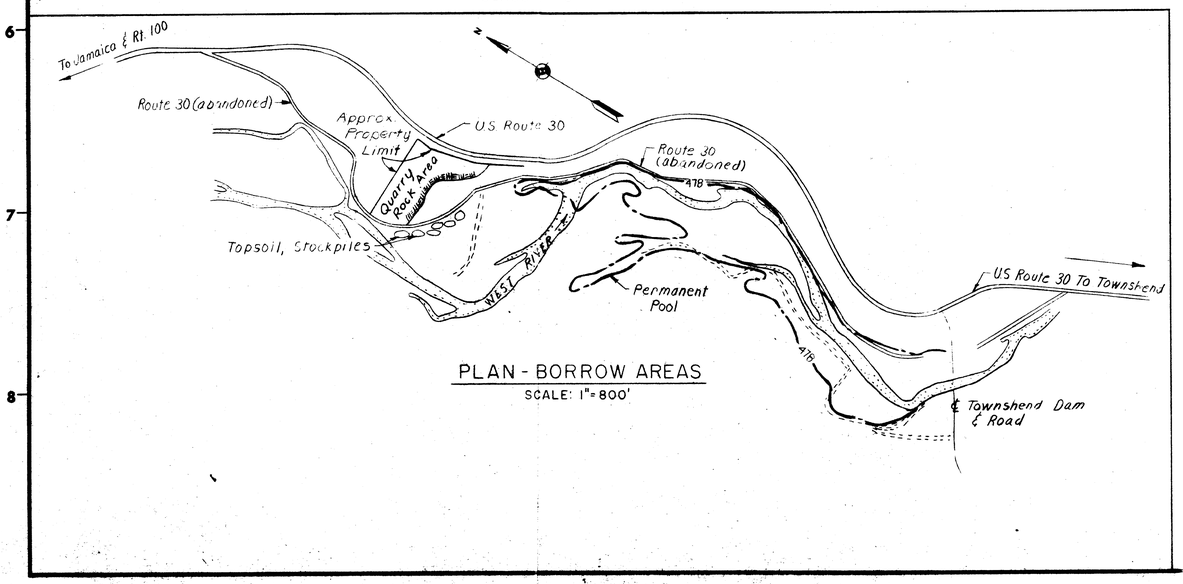
28 Aug Wednesday: I arrived at the dam at 7:00. The crew was getting fluid back but they were still in the cement. Once they got through the cement, they started losing some fluid. We took the second sample at 90 ft and then lost all the drilling fluid at 94.8 ft. After taking the third sample at 95 ft they tried to seal off the leak with bentonite balls but had no luck. I went to tell Paul that we were having a lot of problems and we needed 3" casing to finish the hole. Paul decided that we should call the hole off until later. We put a cap and a horse plug on the 4" casing. We then cleaned up the drilling site and loaded up all their equipment. The boring was cancelled until further notice and the crew and myself demobilized from the site.

CORPS OF ENGINEERS — U. S. ARMY

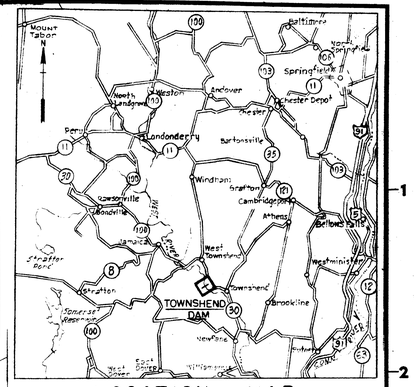


PLAN
SCALE: 1" = 100'

SECTION A-A
SCALE 1" = 5'



PLAN - BORROW AREAS
SCALE: 1" = 800'



LOCATION MAP
SCALE IN MILES

PIEZOMETER LOCATIONS			
NO.	STA.	OFFSET FROM ℄ OF DAM	TIP ELEV.
PZ-1	22+00	100' U/S	451.25
PZ-2	22+00	180' U/S	455.68
PZ-3	22+30	230' U/S	451.92
PZ-4	23+00	400' U/S	452.85

INDEX TO DRAWINGS

DRAWING NO.	SHEET NO.	TITLE
CON-87	1	PLANS AND INDEX
"	2	UPSTREAM BLANKET-PLAN AND SECTIONS
"	3	DOWNSTREAM TREATMENT-PLAN
"	4	DOWNSTREAM TREATMENT-SECTIONS
"	5	CONTROL WEIR AND DIKE-OUTLET CHANNEL SLOPE TREATMENT
"	6	PAVING AND SEALING OF PAVED AREA
"	7	PLAN OF SUBSURFACE EXPLORATIONS IMPERVIOUS BORROW AREA
"	8	RECORD OF EXPLORATIONS

DRAWINGS INCLUDED WITH SPECIFICATIONS

DRAWING NO.	SHEET NO.	TITLE
STD-36	1	SAFETY SIGN

NOTES:

1. Elevations refer to Mean Sea Level Datum.
2. Figures in hexagons indicate item numbers under which payment will be made.
3. Bid item references are shown on the drawings for convenience only. Under no circumstances should they be used without reference to the specifications which describe the work and bid items. Should there be any discrepancies between the work covered by the bid item numbers as shown on the drawings and in the specifications, the specifications shall govern.

33-70C-0131

REVISION	DATE	DESCRIPTION	BY
	6-19-72	Final field corrections	
1	4-12-72	Piezometers added by N.E.D.	

SAFETY PAYS

GRAPHIC SCALES
1" = 5' 5' 0 5' 10'
1" = 100' 100' 0 100' 200
1" = 800' 800' 0 800' 1600'

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

DES. BY M.Z. | DR. BY J.A.M. | CK. BY M.Z.

SUBMITTED: CHIEF, LAYOUT SECTION
APPROVAL RECOMMENDED: CHIEF, TECH. ENG. BRANCH
REVIEWED: PROJECT ENGINEER

CONNECTICUT RIVER FLOOD CONTROL
TOWNSHEND DAM
REMEDIAL WORK
PLANS AND INDEX

WEST RIVER VERMONT

APPROVED: CHIEF, ENGINEERING DIVISION — DATE FEB. 1970

SCALE AS NOTED | SPEC. NO. DACW33-70-B-0018

DRAWING NUMBER
CON-87

EASTERN GEOTECHNICAL ASSOC
BORING LOCATION PLAN
SHEET 2 OF 2

APPENDIX A

Inspection & Exploration Instructions

ATTACHMENT NO.1
GEB REQUISITION NO. 84-93
DELIVERY ORDER NO. 0021

INSPECTION, EXPLORATION PIEZOMETER INSTALLATION AND SURVEY INSTRUCTIONS

PROJECT: Subsurface Explorations and Piezometer Installation

SITES: Townshend Dam, Townshend, VT; No. Springfield Dam, No. Springfield, Vermont

PURPOSE Explorations to determine characteristics and distribution of foundation soils. Installation of piezometers to determine the phreatic surface within the embankment and foundation for all pool elevations, determine pore pressures and average permeabilities of the embankment and foundation soils. Final survey to locate installed piezometer standpipes.

1. SCOPE OF INVESTIGATION

a. Investigations include eleven (11) drive sample borings and installation of five (5) single piezometers and six (6) double piezometers to be performed by the Government.

b. Borings designated FD-A thru FD-K shall be located by the Government in accordance with the inclosed plans. These boring locations shall be staked in the field immediately prior to commencement of drilling. Ground surface elevations at the location of each of these borings shall be provided by the Government prior to drilling.

c. (1) Overburden sampling shall be performed using a 300 lb. hammer driving a five foot solid sample spoon. Sampling shall be to refusal or to final overburden sampling depth as specified in Attachment No. 2.

(2) Refusal is defined as 100 blows with no penetration or bouncing refusal.

d. (1) When refusal is encountered prior to reaching the specified overburden sampling depth, the boring shall be advanced by core barrel drilling. When rock is encountered, 15 feet of rock shall be cored. If a break-through occurs before reaching the specified overburden sampling depth, continuous sampling shall be resumed.

(2) Casing size shall be no smaller than HX size (4"ID) at the bottom elevation of the boring. One solid ten foot piece of casing will be left in place for each boring except FD-A, FD-J and FD-K. FD-A shall be cased 2 feet below rockfill/natural ground interface. FD-J and FD-K shall have 30 feet of casing left in place. Stick up shall be between 3.0 feet ± .5 feet. A threaded cap shall be installed on top of casing.

e. Casagrande open-type piezometers (provided by Government) shall be installed and shall consist of fine-grade porour stone piezometer tip or similar , 3/4-in. Schedule 80 PVC pipe and fittings and fill materials consisting of graded filter sand, bentonite pellete impervious (clay-type) soil and cement-bentonite grout mix. Installations shall conform to cross sections provided in Attachment No. 5. Piezometer tip elevations are shown in Attachment No. 2.

f. A geotechnical inspector (provided by EGA) shall act as field inspector while performing the borings and installing piezometers. The inspector shall provide telephone reports to Mr. Blair, Corps of Engineers, at 617-647-8396 at least every two working days and upon encountering refusal or completion of each boring prior to piezometer installation.

g. The installed piezometer standpipes shall be located by EGA surveyors. Top elevation of piezometer standpipe cap shall be determined by level 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. 457.0 at Thomaston Dam and Elev. 452.0 at North Springfield Dam.

h. All samples shall be delivered by EGA 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 617-647-8367/8392.

2. SITE CONDITIONS.

The sites are Townshend Dam in Townshend, VT and North Springfield Dam in North Springfield, VT owned and operated by the Corps of Engineers.

a. At Townshend Dam, the drilling operations shall be performed on the crest of the dam, on a downstream slope (1V on 3H) and at the downstream toe of the dam. (See Attachment No. 3) The boring on the crest shall be located on the downstream side of the cable guard rail. Anticipated subsurface materials are shown on Attachement No. 3.

b. At North Springfield Dam, the drilling operations shall be performed on the crest of the dam and at the top of a natural slope (approximately 1V on 1 H) which is moderately wooded (1" to 4" trees) located downstream from the dam (see Attachment 4). The boring on the crest shall be located on the downstream side of the cable guard rail. Anticipated subsurface materials are shown in Attachment No. 4.

3. RIGHTS OF ENTRY.

The geotechnical inspector shall coordinate drilling and secure rights of entry by contacting the project manager at each dam:

Townshend Dam - Proj. Mgr. Raymond Ballentine (802) 365-7703
No. Springfield Dam - Proj. Mgr. Thomas Coen (802) 886-7775

4. COORDINATION.

Mr. James Blair, Corps of Engineers, 617-647-8396, shall be contacted five days prior to start of work and at least every two working days or on completion of each boring whichever is more frequent. The geotechnical inspector shall report on how work is progressing and what types of material are being encountered.

5. EXPLORATION NUMBERS.

The drive sample borings designated FD-A thru FD-H shown on Attachment No. 3 shall be numbered FD-84-1 thru FD-84-8 in order of their completion. Borings designated FD-I thru FD-K shown on Attachment No. 4 shall be numbered FD-84-1 thru FD-84-3. The new numbers shall be indicated on the exploration logs and shown on the plan of exploration.

Piezometers shall be numbered as shown on Attachment No. 2. The numbers shall be indicated on the piezometer log and shown on the plan of exploration.

6. COMPLETION SCHEDULE.

Services under this delivery order shall start on 22 October 1984. Duration of field work is estimated to be 35 work days. The geotechnical report shall be submitted in draft format for review by the Government no later than seven calendar days after completion of the field work. Review will take approximately ten calendar days from receipt of draft report. The final geotechnical report shall be submitted no later than seven calendar days after receipt of draft report including the action taken on possible 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 effort required for that submission, (b) elimination of conflicts, errors and omission, 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.

ATTACHMENT #2
CASING REQUIREMENTS
SAMPLING RANGES AND PIEZOMETER TIP ELEVATIONS

TOWNSHEND DAM BORING I.D.	TOTAL APPROX DEPTH	CASING LENGTH REQ'D 4"	6"	CASING SIZE & LENGTH LEFT IN PLACE	SAMPLING RANGE (ELEV)	1ST PZ ID & TIP ELEV	2ND PZ ID & TIP ELEV
FD-A	123 FT+	123 FT+	0 FT	4" -100 FT	500. - 460.	#5 460. *	NONE
FD-B	65 FT	65 FT	0 FT	4" - 10 FT	500. - 460.	#6 460.	NONE
FD-C	65 FT	65 FT	0 FT	4" - 10 FT	500. - 460.	#7 460.	NONE
FD-D	65 FT	65 FT	0 FT	4" - 10 FT	500. - 460.	#8 460.	NONE
FD-E	45 FT	15 FT	30 FT	6" - 10 FT	GR. SUR. - 430.	#9 430.	#10 450.
FD-F	45 FT	15 FT	30 FT	6" - 10 FT	GR. SUR. - 430.	#11 430.	#12 450.
FD-G	45 FT	15 FT	30 FT	6" - 10 FT	GR. SUR. - 430.	#13 430.	#14 450.
FD-H	45 FT	15 FT	30 FT	6" - 10 FT	GR. SUR. - 430.	#15 430.	#16 450.

* TO BE FIELD LOCATED

NO. SPRINGFIELD DAM BORING I.D.	TOTAL APPROX DEPTH	CASING LENGTH REQ'D 4"	6"	CASING SIZE & LENGTH LEFT IN PLACE	SAMPLING RANGE (ELEV)	1ST PZ ID & TIP ELEV	2ND PZ ID & TIP ELEV
FD-I	75 FT	75 FT	0 FT	4" - 10 FT	540. - 495.	#12 495.	NONE
FD-J	70 FT	15 FT	55 FT	6" - 30 FT	GR. SUR. - 450.	#8 450.	#9 470.
FD-K	70 FT	15 FT	55 FT	6" - 30 FT	GR. SUR. - 450.	#10 450.	#11 470.

CASING REQUIREMENTS:

CASING LEFT IN PLACE

FOURTEEN 10 FT LENGTHS OF 4" CASING
TEN 10 FT LENGTHS OF 6" CASING

CASING FOR DRILLING

100 FT OF 4" CASING
100 FT OF 6" CASING

TOTAL REQUIREMENTS

250 FT OF 4" CASING
200 FT OF 6" CASING
SUFFICIENT SAMPLE AND WASH RODS
VARIOUS DIAMETER 5 FT SAMPLE SPOONS
VARIOUS DIAMETER SPLIT SPOON SAMPLER
CORE BARREL BITS

TOWNSHEND DAM - EMBANKMENT MAT'L - (Extract from Contract Specs.)

6-04. MATERIALS. - a. General. - Materials for embankment fills shall be secured from required excavations and from the borrow areas indicated on the drawings. The intention is to use the most suitable materials obtainable from these sources. As the work progresses, the Contracting Officer may modify the embankment zoning in order to better utilize materials available from required excavations. Material to be wasted will be specifically designated by the Contracting Officer at the time the material is exdavated. Materials containing brush, roots, sod, or other perishable materials will not be considered suitable. The suitability of the materials shall be subject to the approval of the Contracting Officer and their disposition in the embankment will be as directed by the Contracting Officer. The Contractor shall excavate in the borrow areas in the location determined by the Contracting Officer, whenever such control is necessary to obtain the type of material required for the embankment. Mixing of materials during the excavating process at the borrow area may be required.

b. Impervious Fill. -

(1) Inclined Impervious Diaphragm. - Material for compacted impervious diaphragm shall consist of impervious glacial till materials (generally silty sand, gravelly sandy silt and gravelly sandy clay) obtained from connecting road excavation or borrow area "A."

(2) Upstream Impervious Blanket. - In addition to above, material for the upstream impervious blanket will include sandy silt alluvium obtained from borrow area "B" or other suitable material of an impervious nature, in the opinion of the Contracting Officer, obtained from stripping or required excavations.

c. Pervious Fill. - Pervious fill shall consist of sands and gravels or other essentially granular materials obtained from required excavation or the borrow areas and approved by the Contracting Officer.

d. Backfill. - Backfill shall consist of material of a type and quality conforming to that specified for the contiguous embankment fill material, unless otherwise directed by the Contracting Officer or shown on the drawings.

e. Rock Fill. - Material for rock fill for dam shall consist of stone obtained from required rock excavations, from oversize stones encountered in the borrow areas, from other required excavations and from required cobble stripping in the river section of the embankment. The rock shall be reduced to such sizes that will permit placement as specified in paragraph 6-06d and will provide a reasonably free-draining mass in place.

ATTACHMENT 3

TOWNSHEND DAM - EMBANKMENT MAT'L

6-05. PREPARATION OF FOUNDATION. - After excavation or stripping of the embankment foundation to the extent indicated on the drawings or otherwise required, the sides of stump holes, test pits, and other similar cavities or depressions shall be broken down, where so directed, so as to flatten out the slopes, and the sides of the cut or hole shall be scarified to provide bond between the foundation material and the fill. Unless otherwise directed, each depression shall be filled with either pervious, impervious, or rock material dependent upon the type of material which is to be placed immediately above the foundation or drainage layers. The fill shall be placed in layers, moistened, and compacted in accordance with the applicable provisions of paragraphs 6-06, 6-07, and 6-08. Materials which cannot be compacted by roller equipment because of inadequate clearances shall be spread in 4-inch layers and compacted with power tampers to an extent equal to that of the contiguous undisturbed foundation material. After filling of depressions and immediately prior to placement of compacted fill in any section of the embankment, the foundation of such section shall be loosened thoroughly by scarifying, plowing, or harrowing to a depth of 4 inches, except in areas where this requirement is waived by the Contracting Officer. After removal of roots or other debris turned up in the process of loosening, the entire surface of the embankment foundation area shall be compacted by 8 complete passes of the compaction equipment as hereinafter specified for impervious fill. No separate payment will be made for loosening and rolling the foundation area, but the entire cost thereof shall be included in the contract price for impervious fill.

6-06. PLACEMENT. - a. General. - No fill shall be placed on any part of the embankment foundation until such areas have been inspected and approved. The gradation and distribution of materials throughout the compacted earth fill section of the dam shall be such that the embankment will be free from lenses, pockets, streaks, and layers of material differing substantially in texture or gradation from surrounding material of the same class. Successive loads of material shall be dumped at locations on the fill as directed or approved by the Contracting Officer. No fill shall be placed upon a frozen surface, nor shall snow, ice, or frozen earth be incorporated in the embankment.

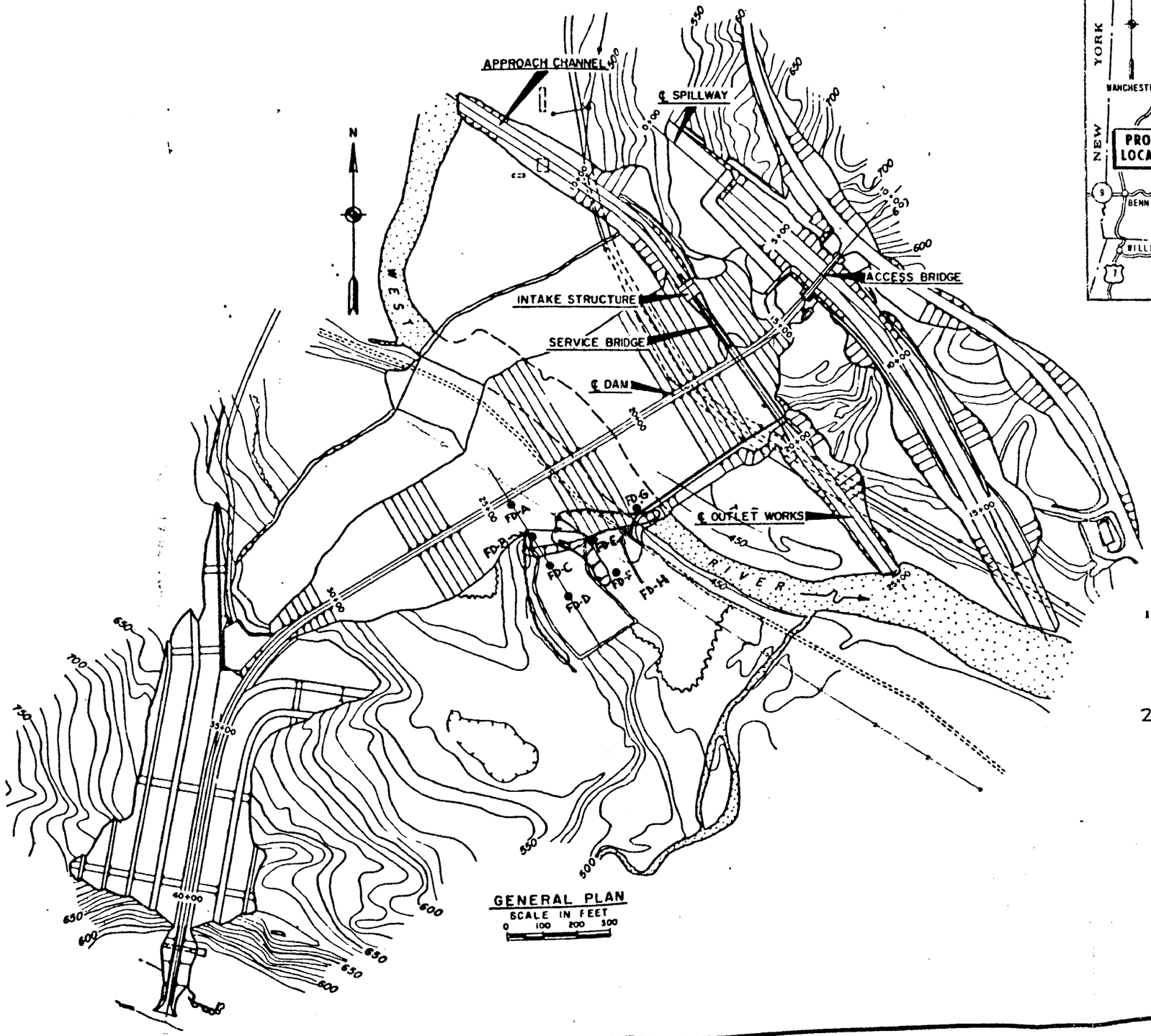
b. Rate of Placement. - Except for the slopes required for drainage, the pervious and impervious fill zones shall be maintained at approximately the same level so as to permit passage of compacting equipment along the zone boundaries. Variations in level may be permitted within the downstream pervious zone provided such variations occur at least 20 feet downstream of the downstream boundary of the impervious fill zone. Changes in level in the pervious zone of more than one lift thickness shall be sloped at approximately 1 vertical to 4 horizontal. The entire upstream rockfill and the downstream rockfill above Elev. 549 shall be maintained at a level not more than 5 feet below below that of the adjacent pervious fill. Changes in rate of placement may be made as directed by the Contracting Officer.

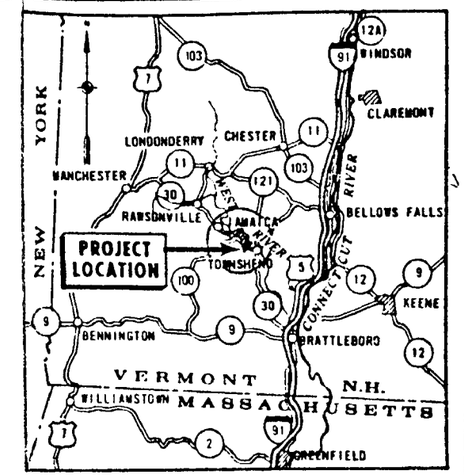
TOWNSHEND DAM - EMBANKMENT MAT'L

c. Pervious Fill. - In general the coarser and more pervious materials shall be placed adjacent to the rock fill and the finer and less pervious materials shall be placed adjacent to the impervious fill.

d. Rock Fill. - The upstream and downstream sections of the embankment shall be constructed of quarry run sizes of durable rock dumped and bulldozed into place in lifts not less than two (2) feet or more than five (5) feet thick to the lines and grades shown on the drawings or as staked in the field and in such a manner as to produce a reasonably well-graded mass with the smaller stones adjacent to the pervious fill and the larger sizes on the faces of the embankment, with no objectionable pockets of small stones or clusters of larger stones. The maximum allowable size of any single piece of rock will be equal to the layer thickness. Selected fine rockfill shall be placed adjacent to the downstream inclined pervious fill zone to the lines shown on the drawings. Rock for this zone shall be free-draining and shall be graded for proper filter action between gravel fill and quarry run rockfill. Rock for this zone shall have a maximum size of 12 inches. Placement of rock in the upstream rockfill zone shall be accomplished in such a manner as to provide adjacent to the outer slope rock of average individual stone size at least 18 inches average diameter. A tolerance of plus 12 inches and minus 6 inches from the slope lines and grades shown on the drawings will be allowed in the finished surfaces of the dumped rockfills, except that the extreme minus tolerance shall not be continuous over an area greater than 200 square feet. All bridging in rockfills shall be broken as well as all slabs and slabby rock. Special care shall be exercised in placing dumped rockfill in all areas within 3 feet of structures to avoid damage to such structures. Compaction of rockfill will be accomplished by routing the hauling equipment over the entire surface of the lift.

e. Spreading. - After dumping, the materials shall be spread by bulldozers or other approved means in approximately horizontal layers over the entire fill areas. Unless otherwise directed, the thickness of these layers before compaction with tamping-type rollers shall not be more than eight (8) inches for impervious materials. Unless otherwise directed, the thickness of layers before compaction with rubber-tired rollers shall not be more than twelve (12) inches for impervious materials, nor more than eighteen (18) inches for pervious materials. The thickness of layers before compaction with tractors, if directed, shall be not more than twelve (12) inches for pervious materials. As soon as practicable after commencement of construction of any section of the embankment, the downstream portion of the impervious fill shall be raised in order to produce grades not to exceed ten (10) percent normal to the axis of the dam, so that the surface of the impervious fill will drain freely and shall be so maintained throughout construction. If the compacted surface of any layer of impervious material is determined to be too smooth to bond properly with the succeeding layer, it will be loosened by harrowing, or by any other approved method, before the succeeding layer is placed thereon. During the dumping and spreading processes, the Contractor shall maintain at all times a force of men adequate to remove all roots and debris from all embankment materials and all stones of greater than six (6) inches in maximum dimension from impervious materials and greater than twelve (12) inches in maximum





VICINITY MAP
SCALE IN MILES
5 0 5 10 15

NOTES:

1. FD-A IS LOCATED ON THE CREST, ON THE DOWNSTREAM SIDE OF THE GUARD RAIL, IN LINE WITH FD-B, FD-C AND FD-D
2. SEE ATTACHMENT 3 SHEET 2 FOR DETAILED LOCATION PLAN

CONNECTICUT RIVER FLOOD CONTROL

TOWNSHEND DAM

PLAN

WEST RIVER, VERMONT

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS WALTHAM, MASS.

CORPS OF ENGINEERS — U. S. ARMY

DOWNSTREAM TREATMENT

FT 3 El 503.9
N 149,010
E 75,355
FT 4 El 501.5
N 149,090
E 75,465

STONE WALL

FD-B
FD-C
FD-D
FD-E
FD-F
FD-G
FD-H

Note: For Typical Sections see Sheet 4

Excavation line
Slopes shown are new slopes
Slope transition
CL OF DAM OFFSET BASE LINE OFFSET LEFT 228.12'
Radius Pt 5' off end of wall
OUTLET
SCALE 1" = 10'
Offset 250
Offset 275
Offset 300
Offset 320
Offset 340
Offset 360
Offset 361
El 474.0
El 469.0
El 468.0
El 466.0
El 464.0
El 460
70'
75' CO
115'
100'
Gravel Filter over filter stone in this area
12" BCCMP riser w/tee and cap
OUTLET CHANNEL-SLOPE TREATMENT
TOWNSHEND DAM
CONTRACT DACW. 33-70-C-0131
℄ CHANNEL
Match to existing ground
℄ DIKE
Top of Dike El. 466.0
Match line A
GRAVEL ACCESS ROAD
℄ Outlet Works (existing)
Repair erosion-left bank downstream of outlet structure by use of large rock from quarry placed across bed of river
PLAN
SCALE 1" = 20'

As Built Drawing
Contract No DACW 33 70C-0131

⊕ PROPOSED BORING LOCATION
● FD-1 - Test boring - drive - sample
■ FT-1 - Test pit - hand excavated
▬ FTT-1 - Test trench - hand excavated
▰ Bedrock exposure

NOTES:
1. Test pits FT-3 and FT-4 are located at toe of dam beyond limits of this survey, see PLATE 1.
2. Elevations refer to M.S.L. Datum.
3. All work in connection with Control Weir and Dike will be paid for under Item No 13.
4. All work in connection with Outlet Channel Slope Treatment and Concrete Retaining Wall will be paid for under Item No. 14.

NOTE
BORINGS FD-E, FD-F & FD-H SHALL BE LOCATED ON THE EDGE OF THE REMEDIAL WORK.

(14) OUTLET CHANNEL SLOPE TREATMENT
(13) CONTROL WEIR
Existing weir (wood) to be removed
℄ CHANNEL
℄ DIKE
Top of Dike and Wall El. 466.0
WEST RIVER
Slope 1:1.5
R = 25'
Match line A

12"ø BCCMP Riser w/tee and cap
12" Perf BCCMP
Plug
Tee
El. 458.3
El. 458.2
El. 458
SECTION A-A'
Scale 1" = 5'

12"ø Perf BCCMP
El. 464
El. 463
El. 458.1
SECTION B-B'
Scale 1" = 5'

PLAN
SCALE 1" = 20'

GRAPHIC SCALE
1" = 20'
20' 0 20' 40'

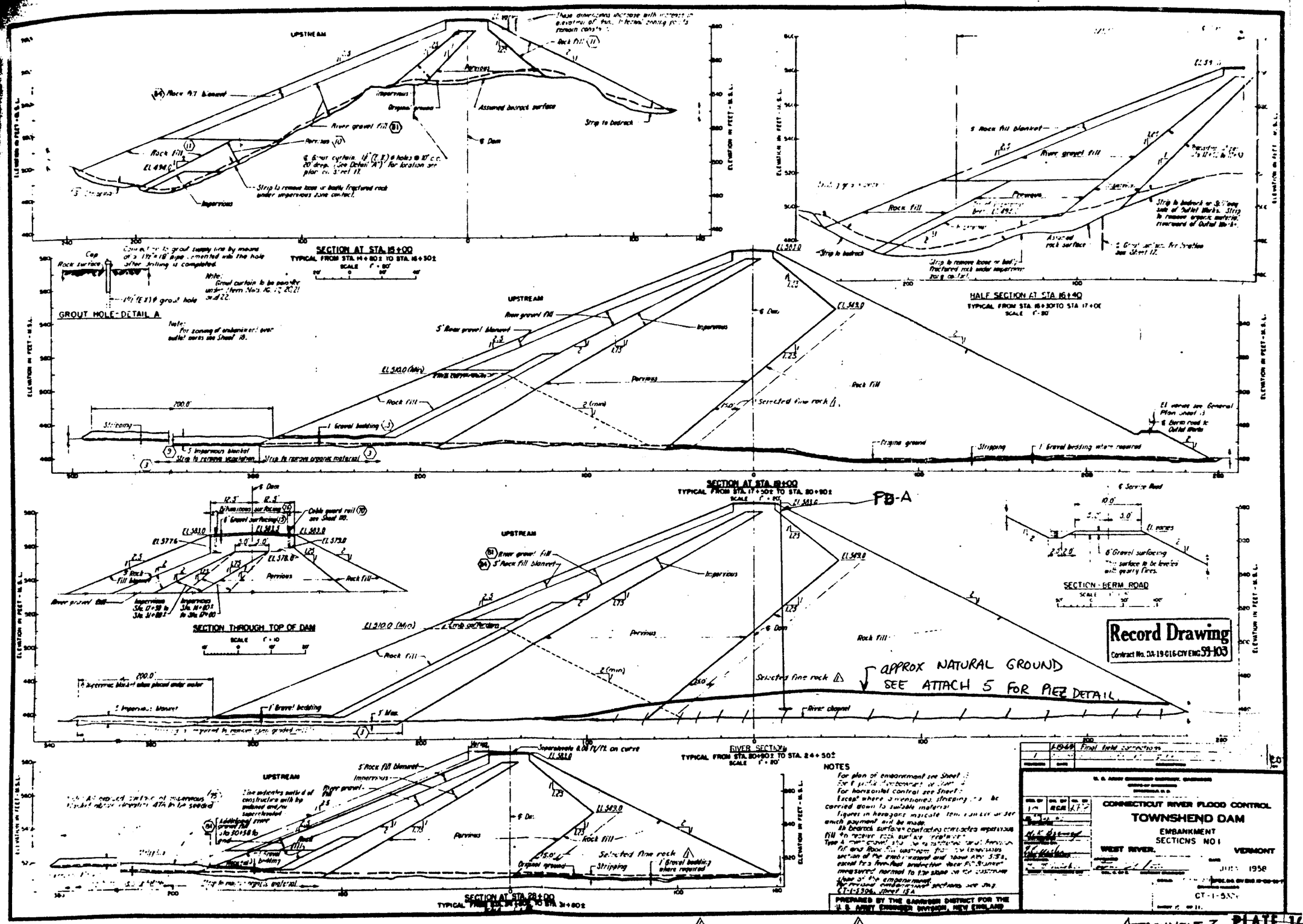
6-19-72	Final field correction	

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

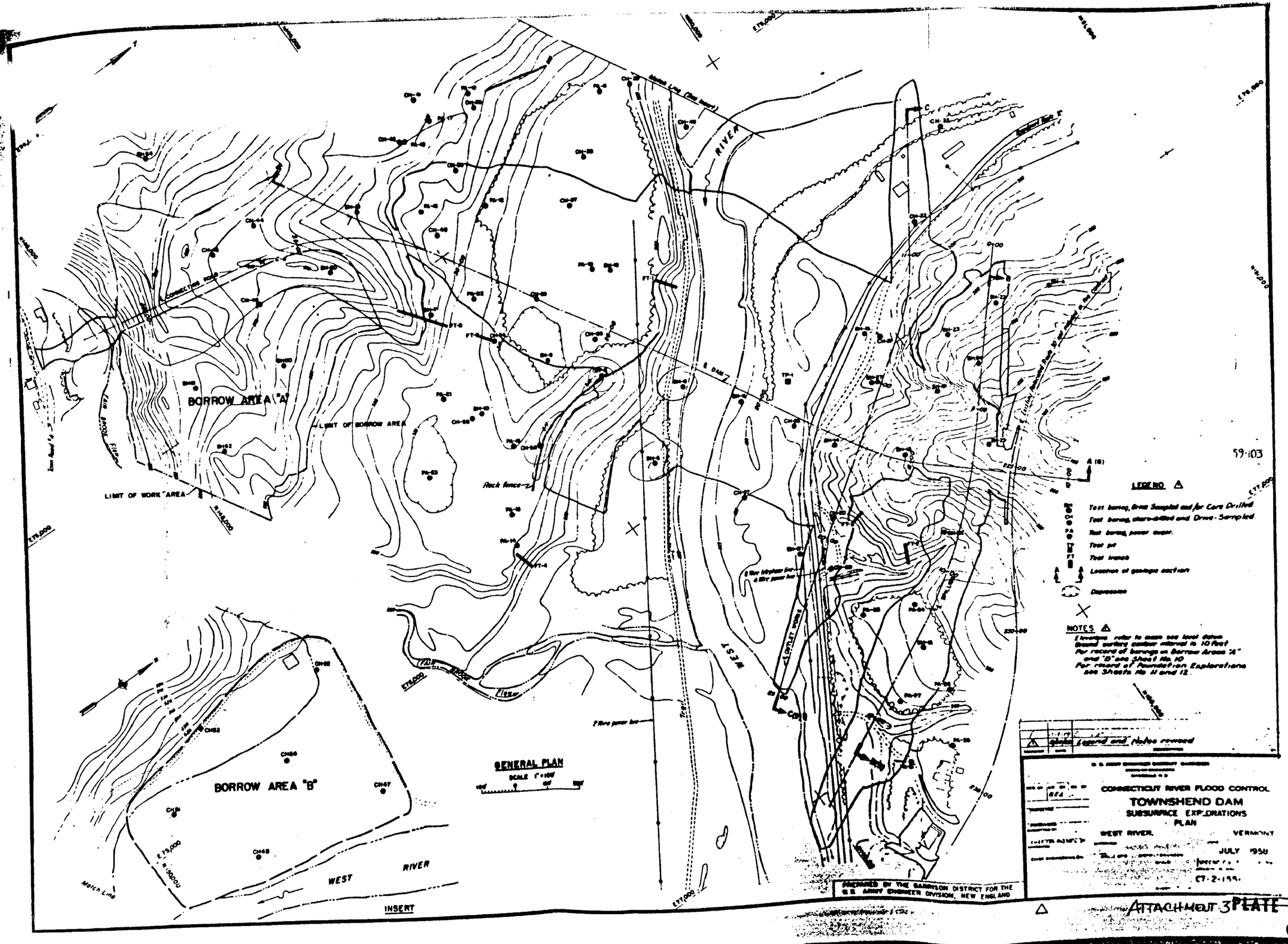
CONNECTICUT RIVER FLOOD CONTROL
TOWNSHEND DAM
REMEDIAL WORK
DOWNSTREAM TREATMENT - PLAN
WEST RIVER — VERMONT
DATE FEB. 1970
SCALE 1" = 20' — SPEC. NO. DACW 33-70-B-0019
CON-87
SHEET 3

ATTACHMENT 3

②

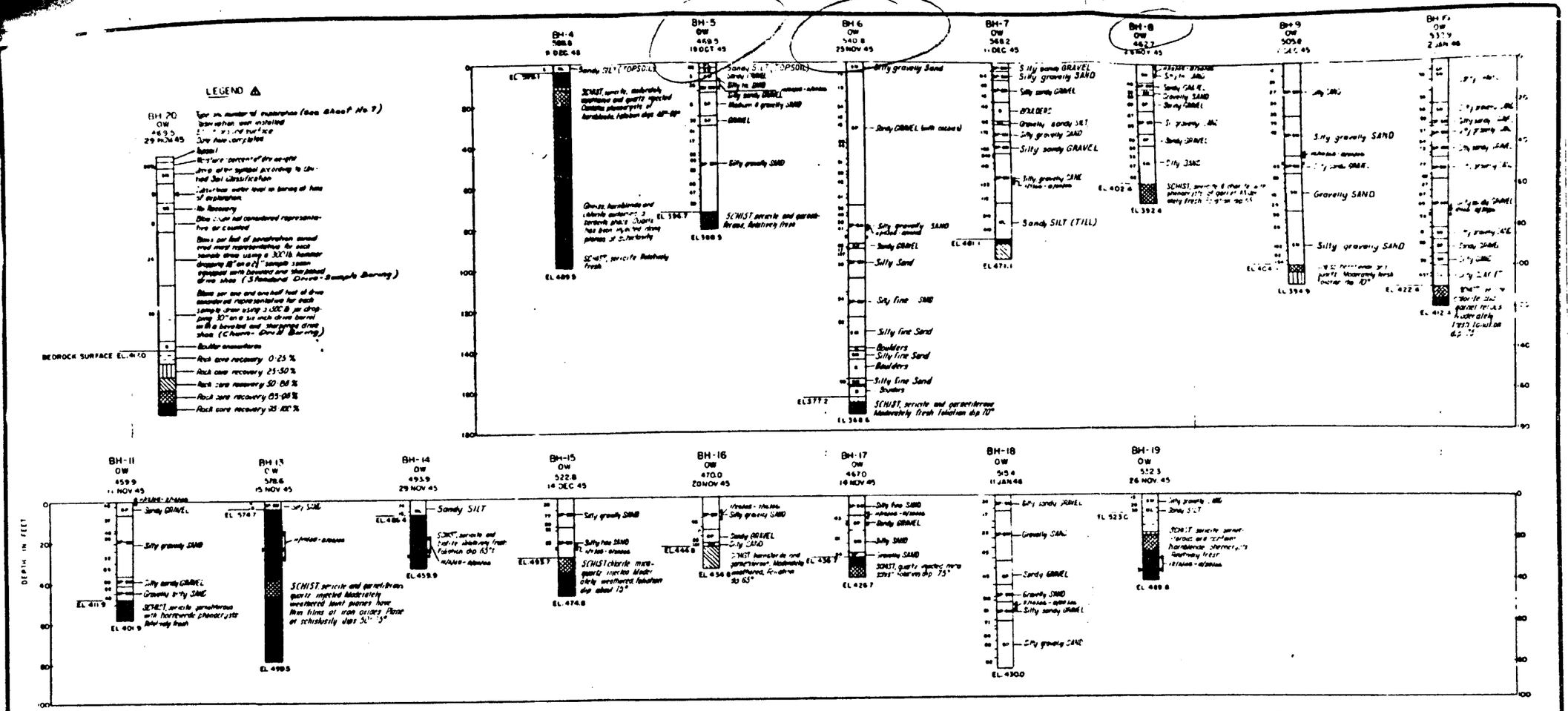


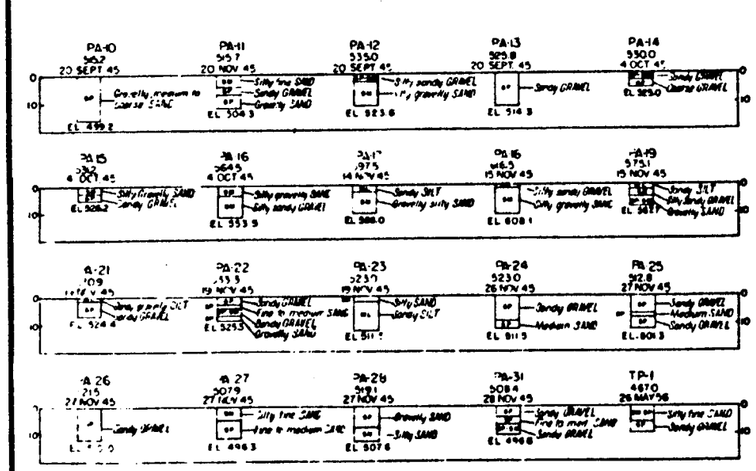
ATTACHMENT 3 PLATE 16

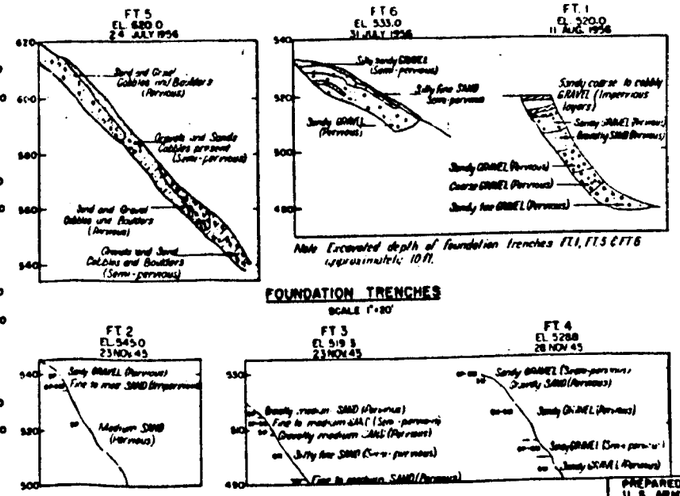


ATTACHMENT 3 ~~PLATE 2~~

4







Note Excavated depth of foundation trenches FT1, FT5 & FT6 approximately 10 ft.

NOTES

For location of borrow areas see Sheet

The indicated ground water levels are those encountered during drilling. Water levels so encountered seldom correspond with the natural ground water except in extensive and thick deposits of sand and gravel which are sufficiently pervious to permit rapid stabilization of water levels in the exploratory hole. Absence of subsurface water even in the pervious zones of any exploration is not necessarily to be construed that pervious water will not be encountered in excavations at that location.

While the borings are representative of subsurface conditions at their respective location and for their respective vertical reaches, considerable minor variations characteristic of the subsurface materials in the region are anticipated, and if encountered, such variations should be considered as differing materials within the [illegible] Article II of the contract.

Range and dates of subsurface water level during period of observation

Legend notes and record of borings revised

Record Drawing

Contract No. [illegible] 59-103

U. S. ARMY ENGINEER DISTRICT, GARRISON

CONNECTICUT RIVER FLOOD CONTROL

TOWNSHEND DAM

SUBSURFACE EXPLORATIONS

RECORD OF BORINGS

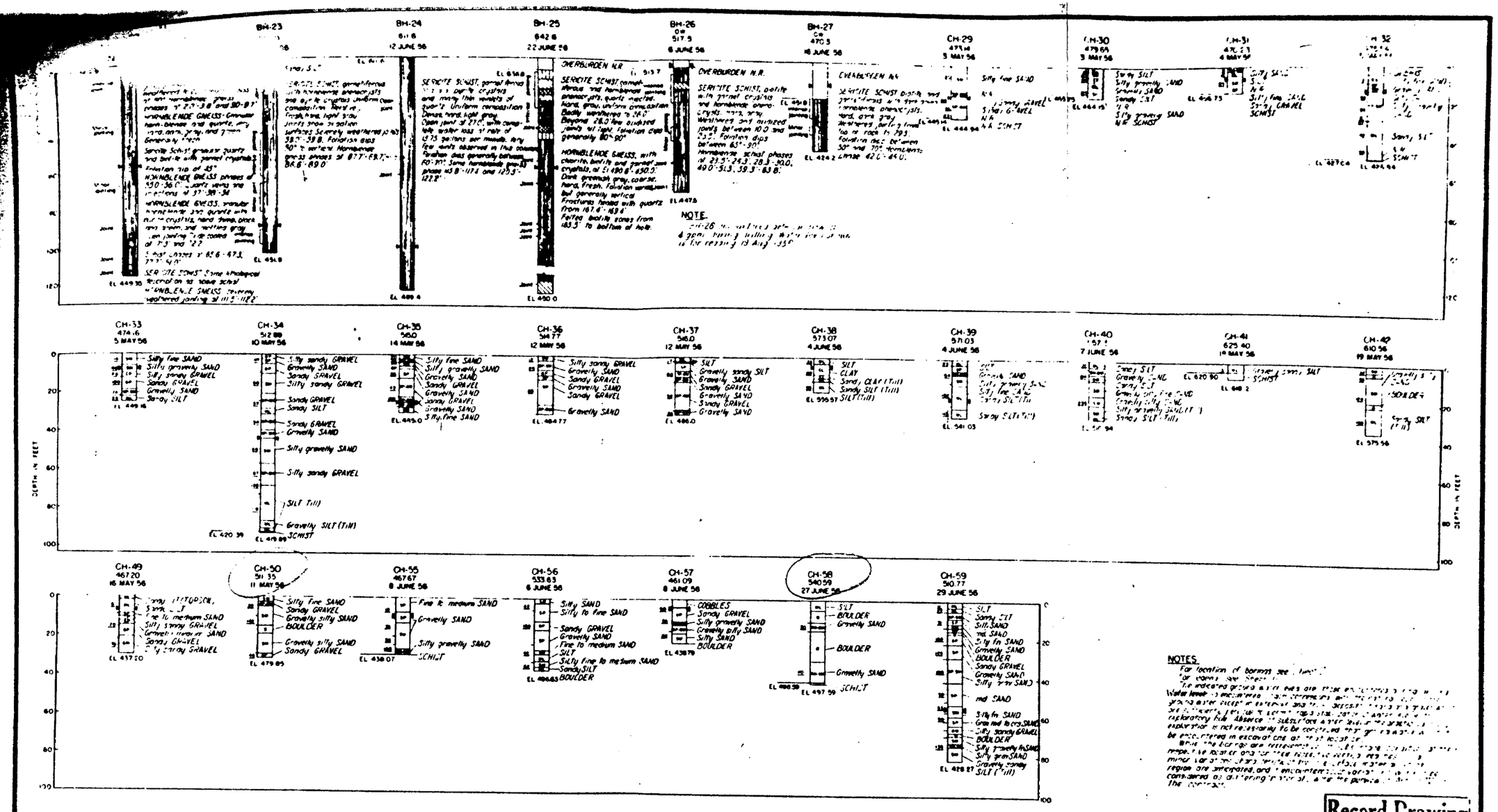
SHEET NO. 1

WEST RIVER, VERMONT

CT-2-1515

PREPARED BY THE GARRISON DISTRICT FOR THE U. S. ARMY ENGINEER DIVISION, NEW ENGLAND

ATTACHMENT 3 PLATE 5



NOTES.

For location of borings see ...

For coring see ...

The indicated ground surfaces are those encountered ...

Water levels encountered ... ground water except in ... are considerably lower than ... exploratory hole. Absence of subsurface water ... exploration is not reasonably to be considered ... be encountered in excavation at ...

While the borings are representative ... respective locations and ... minor variations ... region are anticipated, and ... considered as differing ... the contract.

Record Drawing

Contract No. ... Drawing 59-103

U. S. ARMY ENGINEER DISTRICT, BALTIMORE

CORPS OF ENGINEERS

BALTIMORE, MD.

CONNECTICUT RIVER FLOOD CONTROL

TOWNSHEND DAM

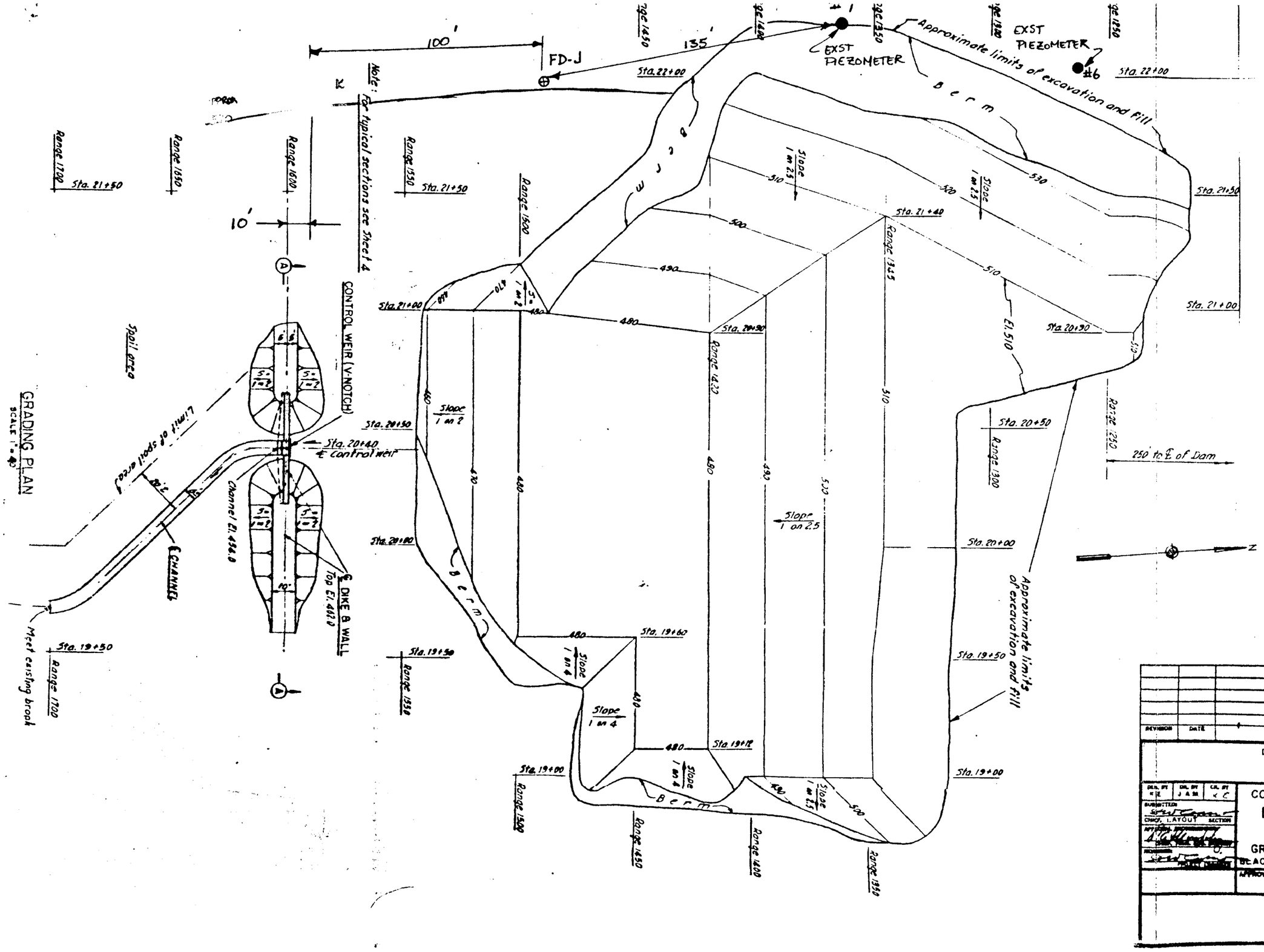
SUBSURFACE EXPLORATION

RECORD DRAWING

WEST RIVER, VERMONT

PREPARED BY THE BARRISON DISTRICT FOR THE U.S. ARMY ENGINEER DIVISION, NEW ENGLAND

ATTACHMENT 3 PLATE 76



BORING I
ON CREST OF DAM @ STA 22+00

NOTES

1. BORINGS FD-J & FD-K ARE LOCATED 5 FEET BACK FROM THE EDGE OF THE NATURAL SLOPE.

REVISION	DATE	DESCRIPTION	BY

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

DES. BY K E | DR. BY J A M | CK. BY K C

SUBMITTED: CHIEF, LAYOUT SECTION

RECOMMENDED: CHIEF, DESIGN BRANCH

APPROVED: CHIEF, ENGINEERING DIVISION

CONNECTICUT RIVER FLOOD CONTROL
NORTH SPRINGFIELD DAM
REMEDIAL WORK
GRADING PLAN-CONTROL WEIR DETAILS
BLACK RIVER VERMONT

DATE FEB. 1970

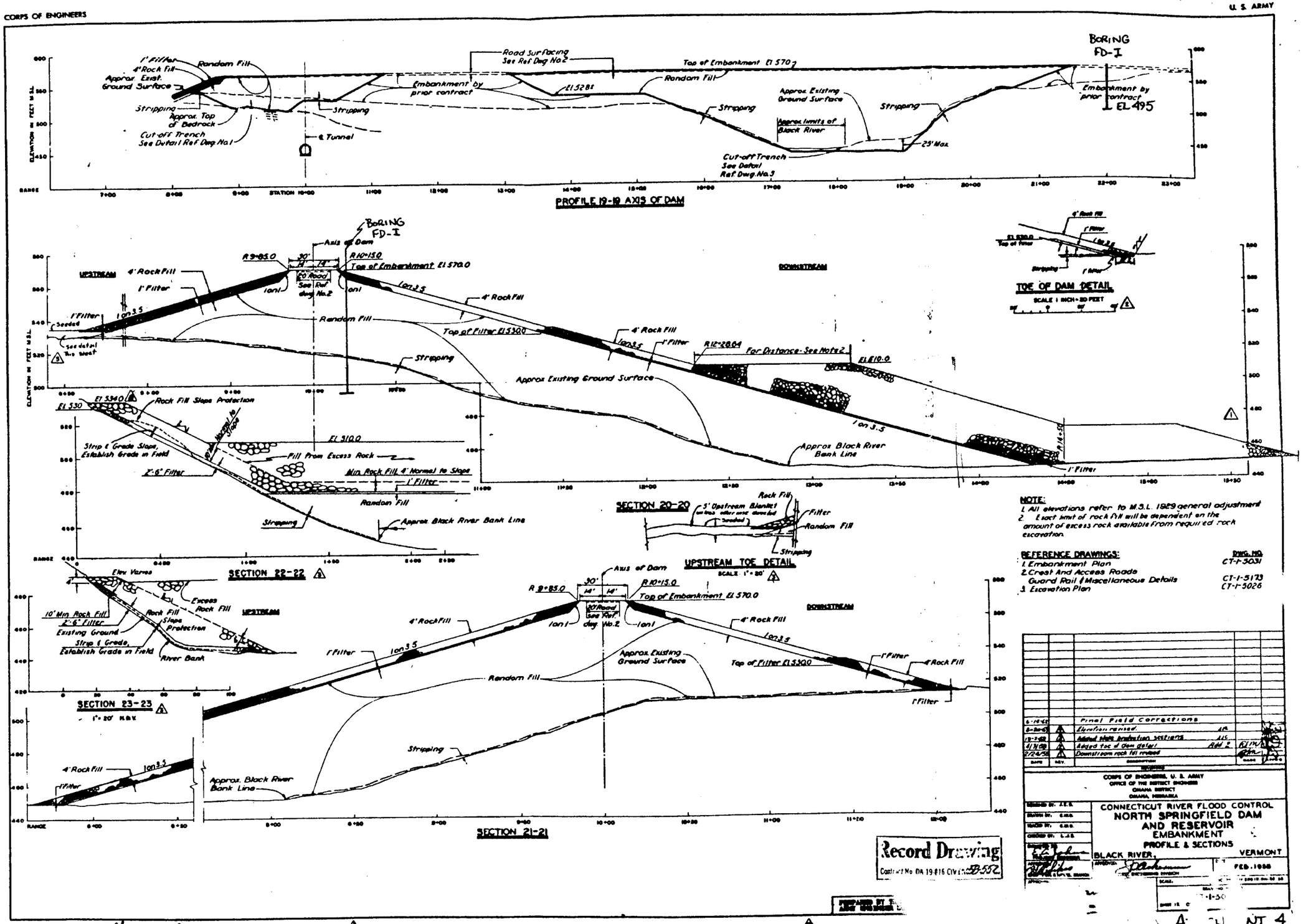
SCALE AS SHOWN | SPEC. NO. DACW 33-70-B-0018

DRAWING NUMBER
CON- 88
SHEET 3

ATTACHMENT 4

CORPS OF ENGINEERS

U. S. ARMY



NOTE:

1. All elevations refer to M.S.L. 1929 general adjustment
2. Exact limit of rock fill will be dependent on the amount of excess rock available from required rock excavation.

REFERENCE DRAWINGS:

	DWG. NO.
1. Embankment Plan	CT-1-5031
2. Crest And Access Roads Guard Rail & Miscellaneous Details	CT-1-5173
3. Excavation Plan	CT-1-5026

DATE	REV.	DESCRIPTION		
6-18-55	1	Final Field Corrections		
8-8-55	2	Elevation revised	AR	
10-2-55	3	Added slope protection 34+18 to 75	JLS	
4/14/58	4	Added toe of dam detail	Add 2	RJ Pitt
2/24/58	5	Downstream rock fill revised		

COPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
OMAHA DISTRICT
OMAHA, NEBRASKA

DESIGNED BY J.E.S.
DRAWN BY G.M.B.
TRACED BY G.M.B.
CHECKED BY L.J.S.

CONNECTICUT RIVER FLOOD CONTROL
NORTH SPRINGFIELD DAM AND RESERVOIR
EMBANKMENT
PROFILE & SECTIONS
BLACK RIVER, VERMONT

FEB. 1958

SCALE: 1" = 20'

A T NT 4

3

No. Springfield Dam - Embankment Mat'l (Extract from Contract Specs)

remove, at his own expense, any embankment material placed outside of prescribed slope lines. Haul roads shall be located and constructed as approved by the Contracting Officer. They shall be designed to be free draining and shall be maintained in good condition throughout the contract period, unless otherwise directed. Haul roads within the limits of the embankment shall be reworked as directed to conform with paragraph 4-06 - Placement before being incorporated in the embankment.

When the excavation from required excavations progresses at a faster rate than placement in the fill is being accomplished, such excavated materials shall be stockpiled at approved locations adjacent to the work until their use is authorized. No separate payment will be made for such stockpiling nor for the reloading and hauling of this material to its final position in the embankment.

4-04. Materials.

a. General. The origin of any random fill material in no way determines where it may be used in the embankment. Materials for embankment fills shall be secured from the required excavation areas indicated on the drawings. Material to be wasted will be specifically designated by the Contracting Officer at the time the material is excavated. Materials containing brush, roots, sod or other perishable materials will not be considered suitable. The suitability of the materials shall be subject to the approval of the Contracting Officer and their disposition in the embankment shall be as directed.

b. Random Fill. Random fill material shall consist of all material encountered in the required common excavation except:

(1) Material declared unsuitable by the Contracting Officer.

(2) Stripping material consisting of rank growth of vegetation, debris, sod and/or other cover.

(3) The products of rock or boulder excavation as hereinbefore specified.

(4) Stones or boulders of a dimension greater than specified in subparagraph 4-06c Spreading.

4-05. Preparation of Foundation. After excavation or stripping of the embankment foundation, the sides of stump holes, test pits, and other similar cavities or depressions shall be broken down, where so directed, so as to flatten out the slopes, and the sides of the cut or holes shall be scarified to provide bond between foundation material and the fill. Unless otherwise directed, each depression shall be filled with type of material which is to be placed immediately above the

§3

No Springfield Dam - Embankment Mat'l

foundation. The fill shall be placed in layers, moistened, and compacted in accordance with the applicable provisions of paragraphs 4-07 and 4-08. Materials which cannot be compacted by roller equipment because of inadequate clearances shall be spread in 4-inch layers and compacted with power tampers to an extent equal to that of the contiguous undisturbed foundation material. After filling of depressions and immediately prior to placement of random fill in any section of the embankment, the foundation of such section shall be loosened thoroughly by scarifying, plowing, or harrowing to a depth of 4 inches, except in areas where this requirement is waived by the Contracting Officer. After removal of roots or other debris turned up in the process of loosening, the entire surface of the embankment foundation area shall be compacted by 8 complete passes of the compaction equipment hereinafter specified for random fill. No separate payment will be made for loosening and rolling the foundation area, but the entire cost thereof shall be included in the contract price for random fill.

4-06. Placement.

a. General. No fill shall be placed on any part of the embankment foundation until such areas have been inspected and approved. The gradation and distribution of materials throughout the random fill section of the dam shall be such that the embankment will be free from lenses, pockets, streaks, and layers of material differing substantially in texture or gradation from surrounding material of the same class. Successive loads of materials shall be dumped at locations on the fill as directed or approved. Where variations in the texture of the "Common Excavation" are encountered the more impervious materials shall be placed in the upstream portion and the more pervious to the downstream portion of the embankment as directed. No fill shall be placed upon a frozen surface, nor shall snow, ice, or frozen earth be incorporated in the embankment.

b. Rate of Placement. Unless otherwise directed, the embankment shall be maintained at approximately the same level, except a slight transverse slope to drain.

c. Spreading. After dumping, the materials shall be spread by bulldozers or other approved means in approximately horizontal layers over the entire fill areas. Unless otherwise directed, the thickness of these layers before compaction with tamping type rollers shall not be more than 8 inches. Unless otherwise directed, the thickness of layers before compaction with rubber-tired rollers shall not be more than 12 inches. If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layer, it shall be loosened by harrowing, or by any other approved method, before the succeeding layer is placed thereon. During the dumping and spreading processes, the Contractor shall maintain at all times a force of men adequate to remove all roots and debris from all embankment materials and all stones of greater than 6 inches

Hole No. PZ-6

DRILLING LOG	DIVISION New England	INSTALLATION Foundation & Materials	SHEET 2 OF 3 SHEETS

1. PROJECT North Springfield Dam	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station) STA- 22+00 Range 12+50	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
DRILLING AGENCY Sprague & Henwood Inc	12. MANUFACTURER'S DESIGNATION OF DRILL 40-C Low Mount
4. HOLE NO. (As shown on drawing title and file number) PZ-6	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN — DISTURBED U — UNDISTURBED
5. NAME OF DRILLER Austin	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 10/12/70 — COMPLETED 10/12/70
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR [signature]

~~ELEVATION~~ a	~~DEPTH~~ b	~~LEGEND~~ c	~~CLASSIFICATION OF MATERIALS (Description)~~ d	~~% CORE RECOVERY~~ e	~~BOX OR SAMPLE NO.~~ f	~~REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)~~ g
1" = 5' DEPTH			REMARKS			CLASSIFICATION
			Drove 4" casing 0.0' to 15.0' & cleaned out			Brown, Medium Compact, Gravelly Coarse to Fine SAND (SP) Moist w/ cobbles
15.0			Drove NX Flush Coupled casing 15.0' to 33.0' & cleaned out. Drove 2" ID x 5' solid spoon 33.0' to 38.0' & took sample. Drove NX casing to 38.0' & cleaned out. Drove 2" ID x 5' solid spoon 38.0' to 43.0' & took sample. Drove NX casing to 45.0' & cleaned out			
33.0						Grey, Medium Compact Silty Gravelly SAND (SP-SM) Moist w/cobbles
38.0						Grey, Medium Compact Coarse to Fine SAND (SP) Moist
43.0						
45.0			BOTTOM OF EXPLORATION & DEPTH CONSIDERED PERMANENT			45.0

ENG FORM 1836 1 APR 63 PREVIOUS EDITIONS MAY BE USED (EM 1110-1-1801) GPO 1963 : OF—712-275 PROJECT HOLE NO. PZ-6

ATTACHMENT 4

Hole No. PZ

DRILLING LOG	DIVISION New England	INSTALLATION [illegible]	SHEET 2 OF 3 SHEETS

1. PROJECT North Springfield Dam	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station) STA - 22+00 - RANGE 13+50	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) 530.0
3. DRILLING AGENCY SPRAGUE & HENWOOD INC	12. MANUFACTURER'S DESIGNATION OF DRILL 40-C LOW MOUNT
4. HOLE NO. (As shown on drawing title and file number) PZ-7	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN — DISTURBED ✓ — UNDISTURBED
5. NAME OF DRILLER HUSTIN	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 10/15/70 — COMPLETED 10/16/70
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR [signature]

~~ELEVATION~~ a	DEPTH b	~~LEGEND~~ c	~~CLASSIFICATION OF MATERIALS (Description)~~ d	~~% CORE RECOVERY~~ e	~~BOX OR SAMPLE NO.~~ f	~~REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)~~ g
1"=.5' DEPTH			REMARKS			CLASSIFICATION
1.0			Dug w/ hand shovel 0.0' to 1.0' Drilled w/ 4X5½ Bit 1.0' to 6.1' Drove 4" casing to 10.0' & cleaned out. Drove NX Flush Coupled casing to 27.0' & cleaned out. Drove 2" IDX5' solid spoon 27.0' to 32.0' & took sample Drove NX casing to 32.0' & cleaned out Drove 2" IDX5' solid spoon 32.0' to 37.0' & took sample Drove NX casing to 37.0' & cleaned out.			Boulder
6.1						
27.0						Brown, Medium Compact Coarse to Fine SAND (SP) Moist w/ occasional piece of Gravel & Trace of Silt
32.0						Grey, Medium Compact, Coarse to Fine SAND (SP) Moist w/ occasional piece of Gravel
37.0						Bottom of Exploration @ 37.0' Dept Considered Sufficient

ENG FORM 1836 1 APR 63 PREVIOUS EDITIONS MAY BE USED (EM 1110-1-1801) GPO 1963 : OF—712-275 | PROJECT | HOLE NO.

ATTACHMENT 4

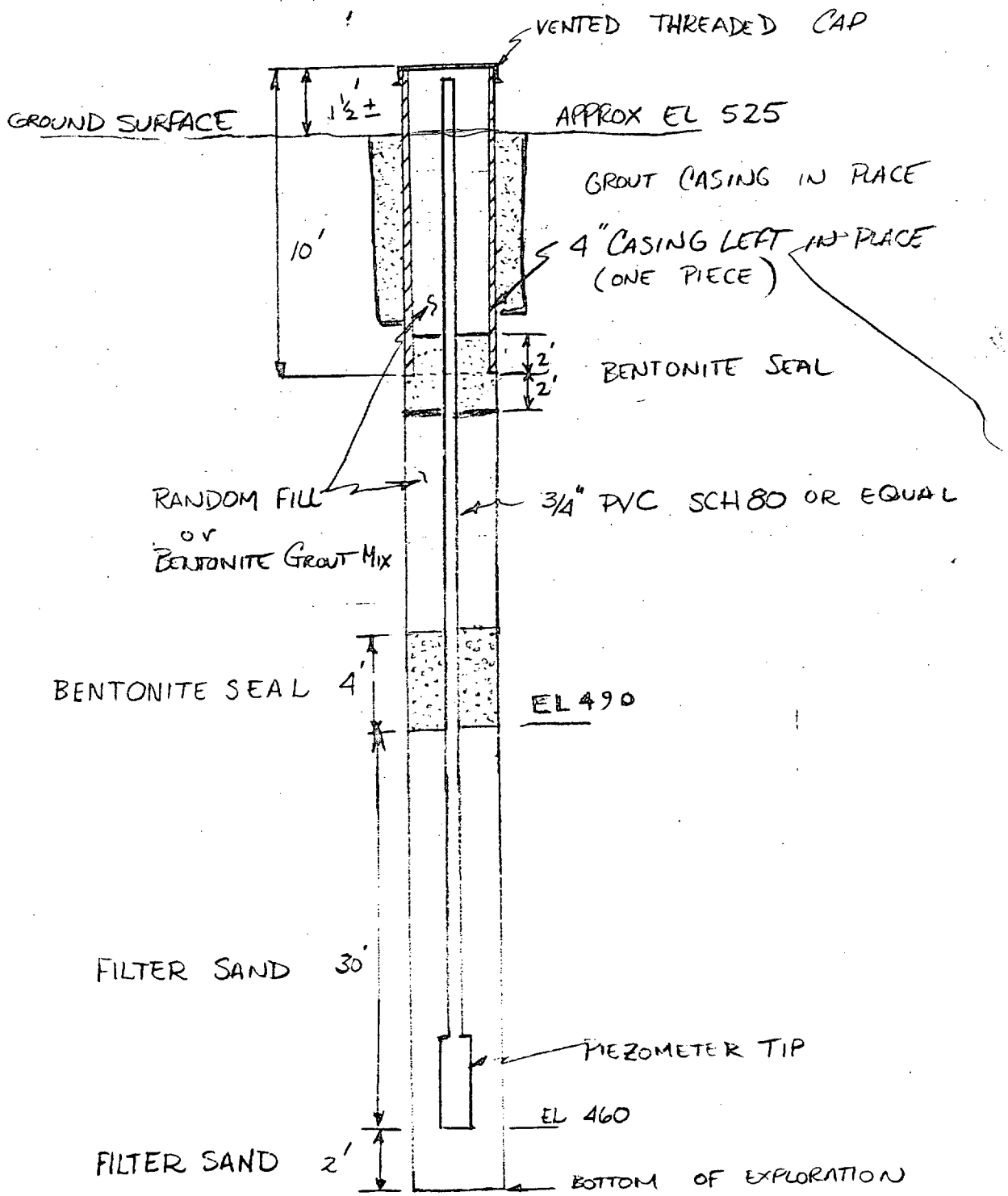
NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S ARMY

PAGE

SUBJECT: TOWNSHEND DAM - PIEZOMETER INSTALLATION
COMPUTATION: TYPICAL CROSS-SECTION
COMPUTED BY: R CHECKED BY: DATE: 1 OCT 84

TYPICAL SECTIONS FOR PZ 6, 7 & 8



NOT TO SCALE

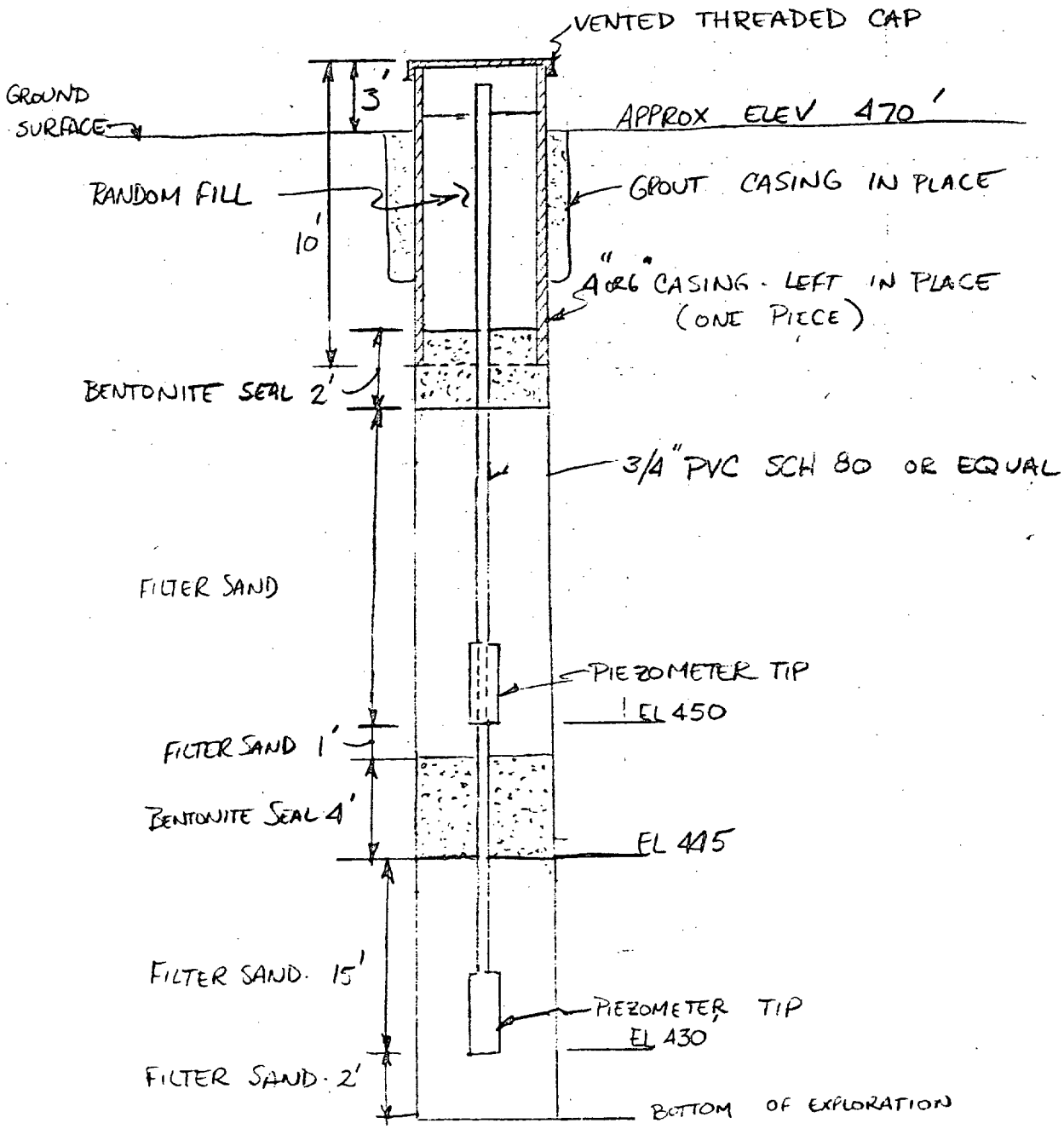
NED FORM 223
27 Sept 49

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

PAGE

SUBJECT: TOWNSHEND DAM - PIEZOMETER INSTALLATION
COMPUTATION: TYPICAL CROSS-SECTION
COMPUTED BY: PR CHECKED BY: DATE: 1 OCT 84

TYPICAL SECTIONS FOR PZ 9 & 10, PZ 11 & 12, PZ 13 & 14 and PZ 15 & 16



ALL TO SCALE

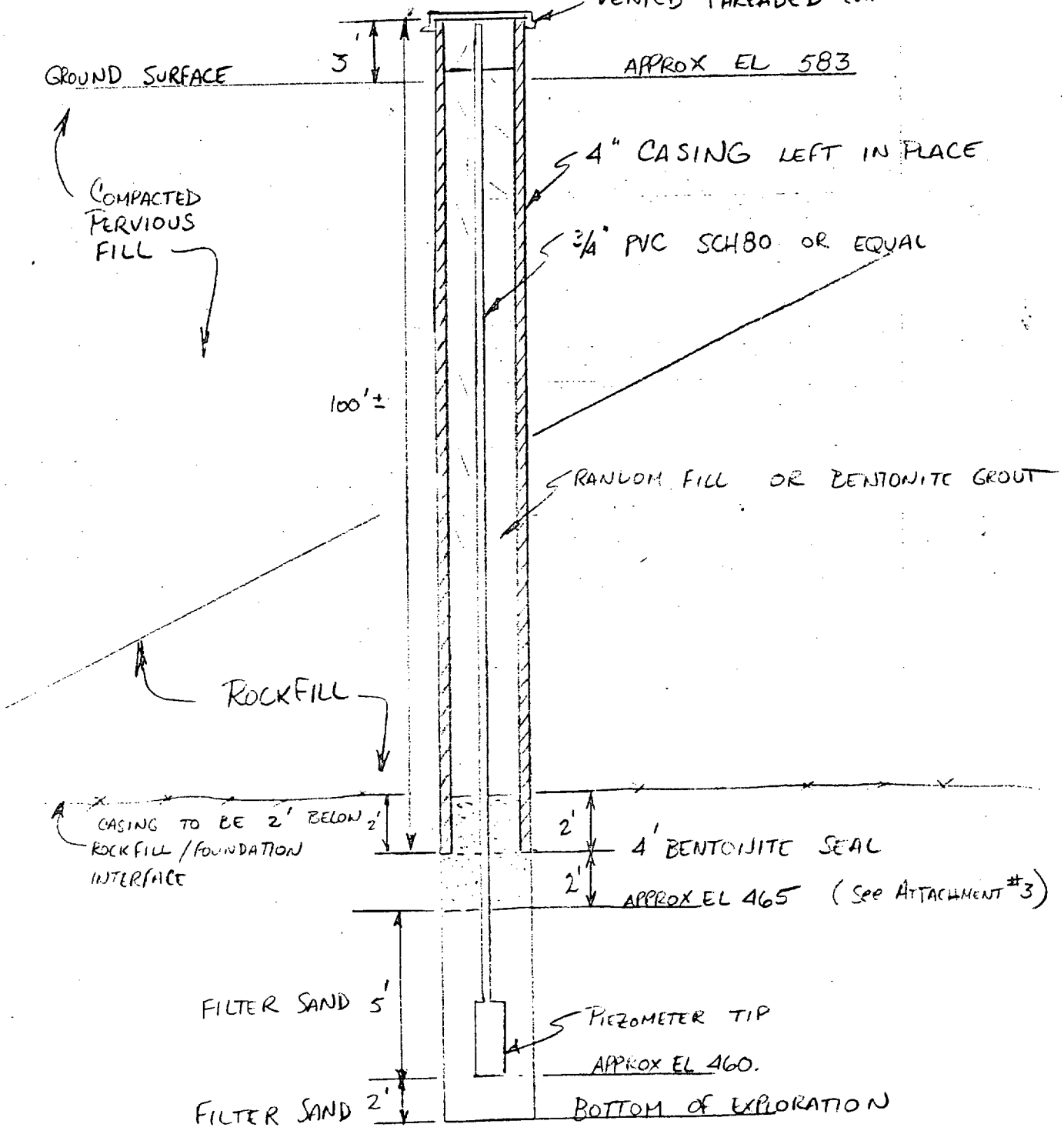
NED FORM 223
27 Sept 49

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

PAGE

SUBJECT: TOWNSHEND DAM – PIEZOMETER INSTALLATION
COMPUTATION: PIEZOMETER CROSS-SECTION
COMPUTED BY: PL
CHECKED BY:
DATE: 1 OCT 84

SECTION FOR PZ #5 (CREST PIEZOMETER)



NOTE: BOTTOM OF EXPLORATION SHALL BE ELEVEN (11) FEET BELOW THE ROCKFILL / FOUNDATION INTERFACE AS DETERMINED IN THE FIELD.

NOT TO SCALE

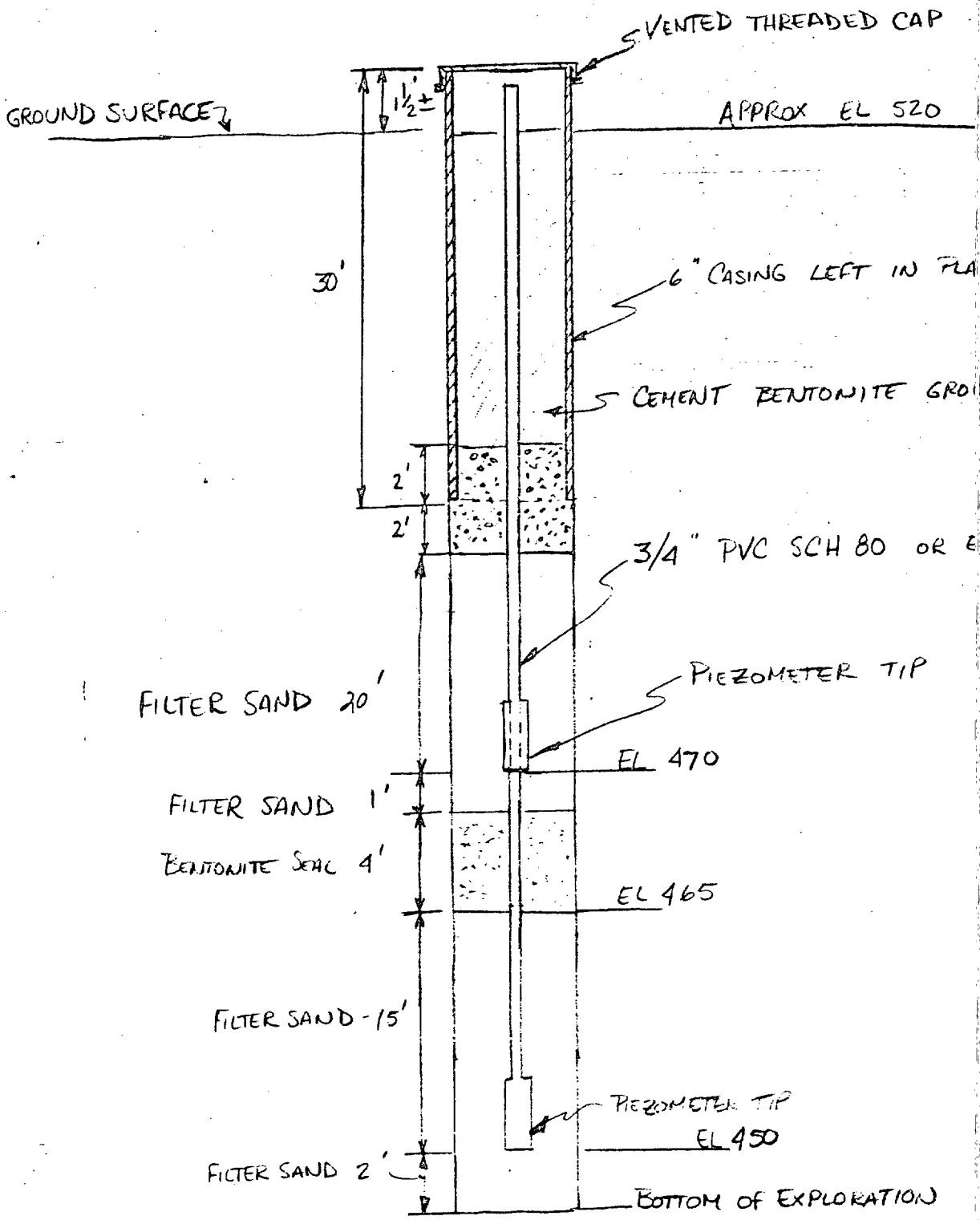
NED FORM 223
27. Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U S ARMY

PAGE

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

TYPICAL SECTIONS FOR PZ 8 & 9 AND PZ 10 & 11



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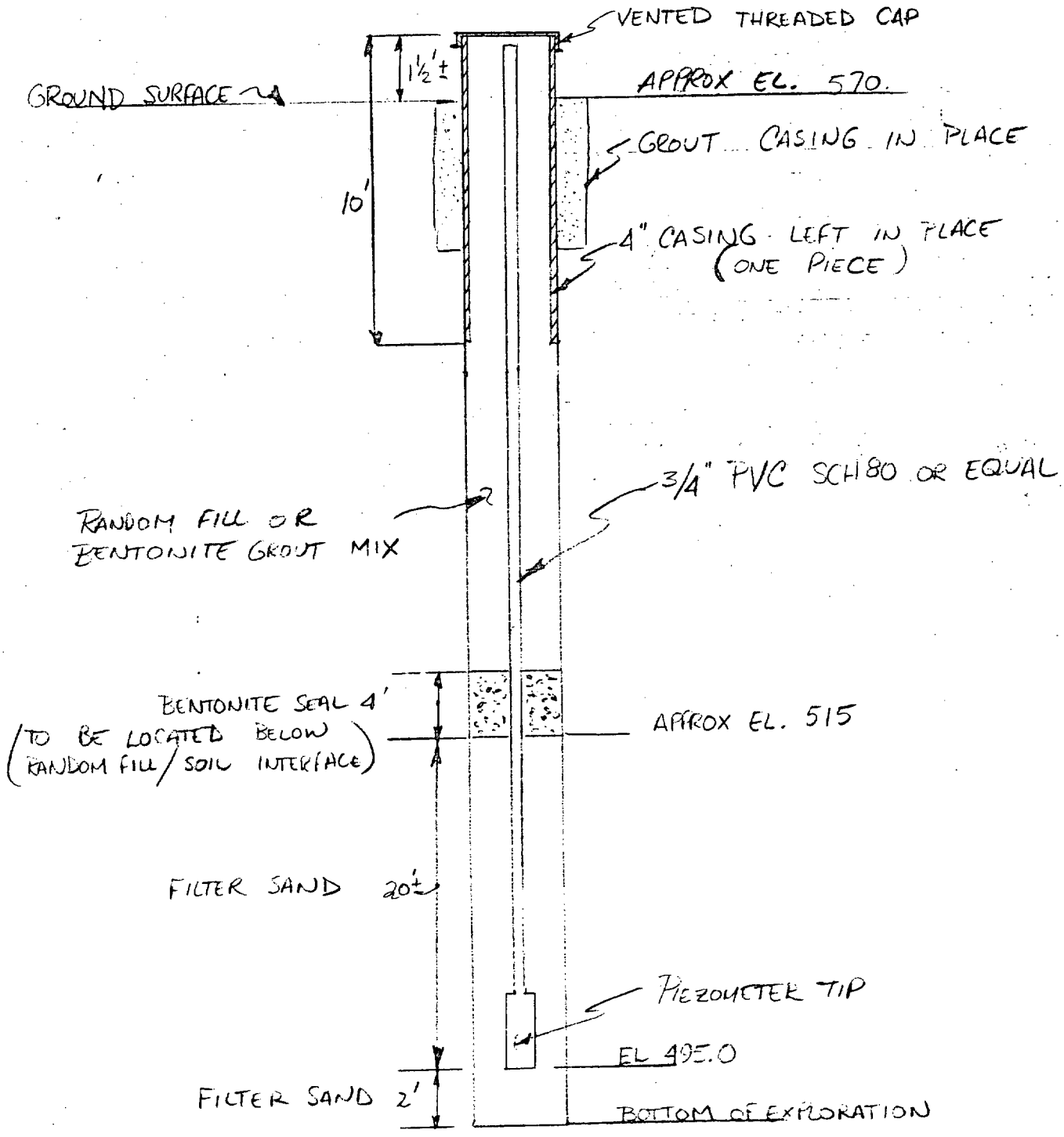
NED FORM 223
27 Sept 49

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

PAGE

SUBJECT: No SPRINGFIELD DAM - PIEZOMETER INSTALLATION
COMPUTATION: PIEZOMETER CROSS-SECTION
COMPUTED BY: FR CHECKED BY: DATE: 1 OCT 84

SECTION FOR PZ12 (CREST PIEZOMETER)



NOT TO SCALE

APPENDIX B

Safety Reports

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held November 7,1984

THRU: Project Engineer

Time 0700 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Laleh Daraie
James Sanders
and Two Helpers

Conducted By: Laleh Daraie

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

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

Prepared by: Laleh Daraie
Field Engineer

2. Exposure:

Day 3, on site job hours, total: 4 man-hours, 1 person.

Signature: Charles R. Thom
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held November 13,1984

THRU: Project Engineer

Time 0700 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Laleh Daraie
James Sanders
and Two Helpers

Conducted By: Laleh Daraie

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

xIndividual Protective Equipment - Ear protection, hard hats
Prevention or Falls -
Safe Lifting Techniques -
Emergency Communications -
Fire Prevention -
xSanitation, First Aid -
Tripping Hazards - trash, hose, nails in lumber -
Staging, Ladders, Concrete Forms -
xHand Tools -
Portable Power Tools -
xWoodworking Machinery -
Equipment Maintenance (Zero defects) -
Hoisting Equipment -
xRopes, Hooks, Chains and Slings -
Electrical Grounding, Temporary Wiring -
Lockouts for safe clearance procedures -
Electrical, pressure, moving parts -
Welding -
Excavations -
Loose Rock and Steep Slopes -
Explosives -
Water Safety -
Other -

Prepared by: Laleh Daraie
Field Engineer

2. Exposure:

Day 6, period covers previous safety meeting hours plus: November 7-9 (No work weekend of November 11-12, 1984.) On-site job hours, total: 84 man-hours, November 7-9, 1984, 3 people.

Signature: Charles R. [illegible]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held November 20,1984

THRU: Project Engineer

Time 0700 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Laleh Daraie
James Sanders
and Two Helpers

Conducted By: Laleh Daraie

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

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

Prepared by: Laleh Daraie
Field Engineer

2. Exposure:

Day 12, period covers previous safety meeting hours plus: November 13 through 17, 19, 1984. No work Sunday November 18, 1984. On site job hours, total: 316 man-hours. November 13 through 17, and 19, 1984, 4 people.

Signature: [signature]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held Nov. 27,1984

THRU: Project Engineer

Time 0700 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Laleh Darie
James Sanders
Ronald Reeves
and a 2nd Helper

Conducted By: Laleh Darie

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

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

Prepared by: Laleh Darie
Field Engineer

2. Exposure:

Day 14, period covers previous safety meeting hours plus: November 20, 1984. No work November 21 through 26, 1984. On site job hours, total: 348 man-hours, November 20, 1984, 4 people.

Signature: Charles S. Gross
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held Dec. 3, 1984

THRU: Project Engineer

Time 1500 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No.21

Personnel present:
Philip McBain
James Sanders
Ronald Reeves
and a 2nd Helper

Conducted By: Philip McBain

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

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

Prepared by: Philip McBain
Field Engineer

2. Exposure:

Day 20, Period covers previous safety meeting hours plus: November 27 through 30, and December 1 and 3, 1984. No work sunday, December 2, 1984. On site job hours, total: 564 man-hours; November 27, 1984, 3 people; November 28, 29, 30 and December 1 and 3, 1984, 4 people.

Signature: Charles [illegible]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held Dec. 8, 1984

THRU: Project Engineer

Time 0700 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Conducted By: Philip McBain

Personnel present:
Philip McBain
James Sanders
Ronald Reeves
and a 2nd Helper

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

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

Prepared by: Philip McBain
Field Engineer

2. Exposure:

Day 24, period covers previous safety meeting hours plus: December 4 through 8, 1984. No work sunday December 9, 1984. On site hours, total: 702 man-hours; December 4, 5, 7, and 8, 1984, 4 people.

Signature: Charles [illegible]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

Townshend Lake Dam, Vermont

TO: Safety Office, NED

FROM: Field Engineer

Date held June 18, 1985

THRU: Project Engineer

Time 0730 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Mark Owens
Raymond Brown
Glenn Holmes
James Williams

Conducted By: Mark Owens

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

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

Prepared by: Mark Owens
Field Engineer

2. Exposure:

Start of Work Order #21. (Phase I) Exposure hours = 128 hours/4 men.
Total work order exposure hours = 128.

Signature: [signature]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

Townshend Lake Dam, Vermont

TO: Safety Office, NED

FROM: Field Engineer

Date held June 25, 1985

THRU: Project Engineer

Time 0730 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Mark Owens
Raymond Brown
Glenn Holmes
James Williams

Conducted By: Mark Owens

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

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

Prepared by: Mark Owens
Field Engineer

2. Exposure:

Exposure for week of June 18 to 24, 1985 = 160 hours/4 men. Total exposure to date = 288 hours. Total work order (Phase I) exposure = 352 hours.

Signature: [illegible]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held July 9, 1985

THRU: Project Engineer

Time 1030 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Mark Owens
Raymond Brown
Dave Chavous

Conducted By: Mark Owens

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

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

Prepared by: Mark Owens
Field Engineer

2. Exposure:

Start of Work Order #21 (Phase II), 3 men.

Signature: [signature]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held July 16, 1985

THRU: Project Engineer

Time 0730 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Mark Owens
Raymond Brown
Dave Chavous
Willie Kyser

Conducted By: Mark Owens

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

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

Prepared by: Mark Owens
Field Engineer

2. Exposure:

Exposure for week of July 9 to 15, 1985 (3 to 4 men) = 152 exposure hours. Total exposure to date (Phase II) = 152.

Signature: [signature]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held July 23, 1985

THRU: Project Engineer

Time 0730 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Mark Owens
Raymond Brown
Dave Chavous
Alfred Lacap

Conducted By: Mark Owens

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

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

Prepared by: Mark Owens
Field Engineer

2. Exposure:

Exposure for week of July 16 to 24, 1985 (4 to 5 men) = 168 exposure hours. Total exposure to date (Phase II) = 352. Total work order exposure (Phase II) = 454 hours.

Signature: [signature]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

THRU: Project Engineer

Date held July 29, 1985

Time 0730 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Mark Owens
Raymond Brown
Dave Chavous
Dave Fultz

Conducted By: Mark Owens

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

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

Prepared by: Mark A. Owens
Field Engineer

2. Exposure:

Start of seperate phase of W.O. #21

Signature: [signature]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

Date held August 6, 1985

THRU: Project Engineer

Time 0730 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Personnel present:
Mark Owens
Raymond Brown
Dave Chavous
Dave Fultz

Conducted By: Mark Owens

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

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

Prepared by: Mark A. Owens
Field Engineer

2. Exposure:

No previous exposure + 152 hours = 152 hours exposure.

Signature: [signature]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

THRU: Project Engineer

Townshend Dam
Date held August 13, 1985

Time 0700 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. 0. No. 21

Conducted By: Don Ellison

Personnel present:
Raymond Brown
David Chavous
David Fultz
Don Ellison

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

xIndividual Protective Equipment - Ear protection, hard hats
xPrevention of Falls -
xSafe Lifting Techniques -
xEmergency Communications -
xFire Prevention -
xSanitation, First Aid -
xTripping Hazards - trash, hose, nails in lumber -
xStaging, Ladders, Concrete Forms -
xHand Tools -
xPortable Power Tools -
xWoodworking Machinery -
xEquipment Maintenance (Zero defects) -
xHoisting Equipment -
xRopes, Hooks, Chains and Slings -
xElectrical Grounding, Temporary Wiring -
xLockouts for safe clearance procedures -
xElectrical, pressure, moving parts -
xWelding -
xExcavations -
xLoose Rock and Steep Slopes -
xExplosives -
xWater Safety -
Other -

Prepared by: Donald L. Ellison
Field Engineer

2. Exposure:

8-6-85 4 men 8 hours exposure, 8-7-85 4 men 8 hours exposure,
8-8-85 4 men 8 hours exposure, 8-9-85 4 men 8 hours exposure;
8-10-85 Sat. no exposure, 8-11-85 Sun. no exposure,
8-12-85 5 men 8 hours exposure.
184 hours previous exposure + 168 hours = 352 hours total exposure.

Signature: Charles R. Thom
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

THRU: Project Engineer

Townshend Dam
Date held August 20, 1985

Time 0700 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. O. No. 21

Conducted By: Don Ellison

Personnel present:
Raymond Brown
David Chavous
David Fultz
Don Ellison

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

xIndividual Protective Equipment - Ear protection, hard hats
xPrevention of Falls -
xSafe Lifting Techniques -
xEmergency Communications -
xFire Prevention -
xSanitation, First Aid -
xTripping Hazards - trash, hose, nails in lumber -
xStaging, Ladders, Concrete Forms -
xHand Tools -
xPortable Power Tools -
xWoodworking Machinery -
xEquipment Maintenance (Zero defects) -
xHoisting Equipment -
xRopes, Hooks, Chains and Slings -
xElectrical Grounding, Temporary Wiring -
xLockouts for safe clearance procedures -
xElectrical, pressure, moving parts -
xWelding -
xExcavations -
xLoose Rock and Steep Slopes -
xExplosives -
xWater Safety -
Other -

Prepared by: Donald L. Ellison
Field Engineer

2. Exposure:

8-13-85 4 men 8 hours exposure, 8-14-85 4 men 8 hours exposure,
8-15-85 4 men 8 hours exposure, 8-16-85 4 men 8 hours exposure;
8-17-85 Sat. no exposure, 8-18-85 Sun. no exposure,
8-19-85 4 men 8 hours exposure.
352 hours previous exposure + 160 hours = 512 hours total exposure.

Signature: [illegible]
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

THRU: Project Engineer

Townshend Dam
Date held August 27, 1985

Time 0700 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. 0. No. 21

Conducted By: Don Ellison

Personnel present:
Raymond Brown
David Chavous
David Fultz
Don Ellison

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

xIndividual Protective Equipment - Ear protection, hard hats
xPrevention of Falls -
xSafe Lifting Techniques -
xEmergency Communications -
xFire Prevention -
xSanitation, First Aid -
xTripping Hazards - trash, hose, nails in lumber -
xStaging, Ladders, Concrete Forms -
xHand Tools -
xPortable Power Tools -
xWoodworking Machinery -
xEquipment Maintenance (Zero defects) -
xHoisting Equipment -
xRopes, Hooks, Chains and Slings -
xElectrical Grounding, Temporary Wiring -
xLockouts for safe clearance procedures -
xElectrical, pressure, moving parts -
xWelding -
xExcavations -
xLoose Rock and Steep Slopes -
xExplosives -
xWater Safety -
Other -

Prepared by: Donald L. Ellison
Field Engineer

2. Exposure:

8-20-85 4 men 8 hours exposure, 8-21-85 4 men 8 hours exposure,
8-22-85 4 men 8 hours exposure, 8-23-85 4 men 8 hours exposure;
8-24-85 Sat. no exposure, 8-25-85 Sun. no exposure,
8-26-85 4 men 8 hours exposure.
512 hours previous exposure + 160 hours = 672 hours total exposure.

Signature: Charles D. Hron
Project Engineer

3. Forwarded: NED, Waltham, MA

EASTERN GEOTECHNICAL ASSOCIATES

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer

THRU: Project Engineer

Townshend Dam
Date held August 29, 1985

Time 0700 Hours

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-83-D-0006, W. 0. No. 21

Personnel present:
Raymond Brown
David Chavous
David Fultz
Don Ellison

Conducted By: Don Ellison

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

xIndividual Protective Equipment - Ear protection, hard hats
xPrevention of Falls -
xSafe Lifting Techniques -
xEmergency Communications -
xFire Prevention -
xSanitation, First Aid -
xTripping Hazards - trash, hose, nails in lumber -
xStaging, Ladders, Concrete Forms -
xHand Tools -
xPortable Power Tools -
xWoodworking Machinery -
xEquipment Maintenance (Zero defects) -
xHoisting Equipment -
xRopes, Hooks, Chains and Slings -
xElectrical Grounding, Temporary Wiring -
xLockouts for safe clearance procedures -
xElectrical, pressure, moving parts -
xWelding -
xExcavations -
xLoose Rock and Steep Slopes -
xExplosives -
xWater Safety -
Other -

Prepared by: Donald L. Ellison
Field Engineer

2. Exposure:

8-28-85 4 men 8 hours exposure, 8-29-85 4 men 8 hours exposure, (Last day of job).
672 hours previous exposure + 64 hours = 736 hours total exposure.

Signature: [signature]
Project Engineer

3. Forwarded: NED, Waltham, MA

APPENDIX C

Chain of Custody Logs

EASTERN GEOTECHNICAL ASSOCIATES

CHAIN OF CUSTODY LOG

Project: TOWNSHEND DAM (VERMONT)

Contract DACW-33-83-D-0006, W.O. # 21

Items: Jar Samples 4 BOXES

Bottles

Core Boxes

Sampling Logs

	Date & Time Received	Date & Time Transfered	Comments	Condition
1.	AS SAMPLED	11/26/84 3:00 PM	Ralph Darie	
2.	11-26-84 3:00		Forest Knowles	
3.				
4.				
5.				

EASTERN GEOTECHNICAL ASSOCIATES

CHAIN OF CUSTODY LOG

Project: NORTH SPRINGFIELD DAM NO. SPRINGFIED VT.

Contract DACW-33-83-D-0006, W.O. # 50747

Items: Jar Samples 8 BOXES 12 JARS EACH FD-85-1, 2 + 3

Bottles

Core Boxes

Sampling Logs

Bag Samples

	Date & Time Received	Date & Time Transfered	Comments	Custodian
1.	AS SAMPLED	9-24-85	11.30	[illegible]
2.	9/24/85	Joseph A. Colucci		
3.				
4.				
5.				

EASTERN GEOTECHNICAL ASSOCIATES

CHAIN OF CUSTODY LOG

Project: TOWNSHEND LAKE DAM TOWNSHEND, VT.

Contract DACW-33-83-D-0006, W.O. #_____

Items: Jar Samples 15 Box Samples, Borings 1(A), 2(B), 3(C), 4(G), 4'(G), 5(D), 6(L), 7(B), 8(A)

Bottles _____

Core Boxes _____

Sampling Logs _____

Date & Time Received	Date & Time Transfered	Comments	Condition	CUSTODIAN
1. As Sampled	Steven McKay 10-3-85 11.00		Good	John Grant
2.	Richard Berger 10/3/85 11.00			
3.				
4.				
5.				

APPENDIX D

Field Logs of Test Borings

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

FIELD LOG OF TEST BORING

PROJECT NO. 6021

Site NO. SPRINGFIELD DAM, VT. — Page 1 of 14 Pages

Hole No. FD-85-XX Diam. (Casing) 6" — Boring Started 7/10/85

Co-ordinates: N _____ E _____ — Boring Completed 7/15/85

Drilled by MOBILE DISTRICT — Report Submitted _____

Purpose of Exploration TO DETERMINE PHREATIC SURFACE WITHIN THE EMBANKMENT and FOUNDATIONS FOR ALL pad ELEVATIONS, DETERMINE PORE PRESSURES AND PERMEABILITIES OF EMBANKMENT AND FOUNDATION SOILS.

Elevation Top of Hole 517.0'± M.S.L. — Casing Left in Place 27.0' BELOW EXIST. GROUND Feet

Total Overburden Drilled 72.0' Feet

Elevation Top of Rock — M.S.L.

Elevation Bottom of Hole 445.0' M.S.L.

Total Rock Drilled — Feet

Total Depth of Hole 72.0 Feet

Core Recovered — %

Core Recovered _____ Ft.: _____ Diam. _____ in.

Soil Samples 1 7/8" in. Diam. 35 No.

Soil Samples _____ in. Diam. _____ No. — Water Table Depth 40.0'±

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0'	12.0'	DRILLED WITH 5.0" OD x 12.0' AUGER
0.0'	12.0'	DRILLED 6" CASING
12.0'	67.5	DRILLED WITH 5 7/8" FISHTAIL AND WASHED OUT.
0.0'	67.5'	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON WITH 300 LB HAMMER
67.5	72.0'	CORED WITH 2 3/4" x 3 7/8" x 5.0' CORE BARREL.

INDEX

Ground Water	Back of Page 12
Boring Location Sketch	Back of Page 12
Overburden Record	Page 1-10
Rock Drilling	Page 11
PIEZOMETER INSTALLATIONS	Page 13+14
	Page
	Page

Prepared by Mark A. Owens — Field Data — Lab. Data

Submitted by Mark A. Owens

FORM NED 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 NO. SPRINGFIELD LAKE DAM, VT. Page 2 of 17 Pages

Boring No. [redacted] Basis: [redacted] Diam. (Casing) [redacted]

Co-ordinates: N _____ E _____

Elevation Top of Boring 517.0'± M.S.L.
Total Overburden Drilled 72.0' Feet
Elevation Top of Rock — M.S.L.
Total Rock Drilled — Feet
Elevation Bottom of Boring 445.0' M.S.L.
Total Depth of Boring 72.0' Feet
Core Recovered — % No. Boxes —
Core Recovered ____ Ft: ____ Diam. ____ In.
Soil Samples 1 7/8" In. Diam. 35 No.
Soil Samples ____ In. Diam. ____ No.

Hammer Wt. 300LB. Boring Started 7/10/85
Hammer Drop 18"
Casing Left 27.0' EXG GROUND Boring Completed 7/15/85
Subsurface Water Data ____ Page 12
Obs. Well ____
Drilled By MOBILE DISTRICT
Mfg. Des. Drill ____
Inspected By: Mark A. Owens
Classification By: Mark A. Owens
Classification By: ____

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			0.0'	1	AUGERED WITH 5.0" OD X 2.0' AUGER FLIGHT FROM 0.0' - 2.0' WITHOUT.	SILTY SAND FINE GRAINED. 25-35% NON PLASTIC FINES. SOME GRAVEL, WOOD FRAGS, ROOTS. BROWN, DRY (POROUS) (SM)
				1		
1	1	1 7/8"	TO			
				1		
				1		
2			2.0'	6" REC 1	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 2.0' TO 4.0' WITH 300LB HAMMER	SILTY SAND FINE GRAINED. 25-35% NON PLASTIC FINES. TRACE ORGANICS. BROWN, DRY (SM)
				1	AUGERED WITH 5.0" OD X 2.0' AUGER FLIGHT FROM 2.0' TO 4.0'.	
3	2	1 7/8"	TO			
				1		
				2		
4			4.0'	22" REC 3	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 4.0' TO 6.0' WITH 300 LB. HAMMER	SAND FINE GRAINED. 25% NON PLASTIC FINES. LIGHT BROWNISH - GRAY, DRY (SP)
				3	AUGERED WITH 5.0" OD X 2.0' AUGER FLIGHT FROM 4.0' TO 6.0'.	
5	3	1 7/8"	TO			

GENERAL REMARKS: * ALL SAMPLING OPERATIONS PERFORMED WITH A 300LB HAMMER.

Boring No. FD-85-1(A)

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-1 (K)	Page 3 of 14

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				2		
				4		
6			6.0'	16" rec. 4	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 6.0' TO 8.0' WITH 300LB HAMMER.	SILTY SAND FINE GRAINED, TRACE MEDIUM 25-30% NON PLASTIC FINES. TRACE ORGANICS. BROWN, DRY (SM)
	4	1 7/8"	TO	8	AUGERED WITH 5.0" OD x 2.0'. AUGER FLIGHT FROM 6.0' TO 8.0'.	
7			7.0'	6		SILTY GRAVELLY SAND MEDIUM TO FINE MOSTLY FINE. 10-20% SUB ANGULAR GRAVEL 5-15% NON PLASTIC FINES ABUNDANT QUARTZ COBBLES. GRAY, DRY (SP-SM)
	5	1 7/8"	TO	7		
8			8.0'	20" rec. 9	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 8.0' TO 10.0' WITH 300LB HAMMER	GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 10-20% SUB ANGULAR GRAVEL. <5% NON PLASTIC FINES. SOME WEATHERED ROCK FRAGS. DARK GRAYISH BROWN, DRY (SP)
				5	AUGERED WITH 5.0" OD x 2.0' AUGER FLIGHT FROM 8.0' TO 10.0'	
9	6	1 7/8"	TO	7		
				9		
10			10.0'	21" rec. 8	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 10.0' TO 12.0' WITH 300LB. HAMMER.	GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 10-20% SUB ANGULAR TO ANGULAR GRAVEL. <5% NON PLASTIC FINES. QUARTZ COBBLE. GRAY-BROWN, DRY (SP)
34				9	AUGERED WITH 5.0" OD x 2.0' AUGER FLIGHT FROM 10.0' TO 12.0'	
11	7	1 7/8	TO	7	DRILLED 6" CASING FROM 0.0' - 12.0'.	
18				7		
12			12.0'	23" rec. 5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 12.0' TO 14.0' WITH 300LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 10-20% SUB ANGULAR GRAVEL. 5-15% NON PLASTIC FINES BROWN TO GRAY BROWN, DAMP. (SP-SM)
18				3	FISHTAILED WITH 5 7/8" FISH TAIL FROM 12.0' TO 14.0' AND WASHED OUT.	
13	8	1 7/8"	TO	3		
13						

58A(Test)

Boring No. FD-85-1 (R)

FIG. No. 2C

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-BS-1 (K)	Page 4 of 14

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
					4		
18	14			14.0'	3" Rec. 3	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 14.0' TO 16.0' WITH 300LB HAMMER.	NO SAMPLE RECOVERED
					3	WITH 5 7/8" FISHTAIL FROM 14.0' TO 16.0' AND WASHED OUT.	
17	15	9	1 7/8"	TO	3		
					4		
19	16			16.0	0" Rec. 4	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 16.0' TO 18.0' WITH 300 LB HAMMER	SAND FINE GRAINED. <7% NON PLASTIC FINES. QUARTZ COBBLES. GRAYISH BROWN. DAMP. (SP)
					3	WITH 5 7/8" FISHTAIL FROM 16.0' TO 18.0' AND WASHED OUT.	
20	17	10	1 7/8"	TO	4		
					2		
15	18			18.0'	3" Rec. 3	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 18.0' TO 20.0' WITH 300LB HAMMER.	GRAVELLY SAND MEDIUM TO FINE, MOSTLY FINE. ~~<7% NON PLASTIC FINES~~, 10-15% SUB ANGULAR GRAVEL. <7% NON PLASTIC FINES. GRAYISH BROWN, DRY (SP)
					4	WITH 5 7/8" FISHTAIL FROM 18.0' TO 20.0' AND WASHED OUT.	
20	19	11	1 7/8"	TO	3		
					3		
16	20			20.0	3" Rec. 3	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 20.0' TO 22.0' WITH 300LB HAMMER.	SILTY GRAVELLY SAND MEDIUM TO FINE, MOSTLY FINE. 10-20% SUB ANGULAR GRAVEL. 5-10% NON PLASTIC FINES. GRAYISH BROWN, DAMP. (SP-SM)
					2	WITH 5 7/8" FISHTAIL FROM 20.0' - 22.0' AND WASHED OUT.	
25	21	12	1 7/8"	TO	3		
					4		
	22			22.0'			

FIG. No. 2C

Site NO. SPRINGFIELD LAKE DAM, NO. SPRINGFIELD, VT.

Boring No. FD-85-1 (K)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
26, 21	13	1 7/8"	22.0' TO 24.0'	3, 3, 2, 4	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 22.0' TO 24.0' WITH 300LB HAMMER. WITH 5 7/8" FISHTAIL FROM 22.0' TO 24.0' AND WASHED OUT.	SAND. FINE GRAINED. 25% NON PLASTIC FINES. SOME COBBLES. BROWNISH GRAY, DRY. (SP)
18, 28	14	1 7/8"	24.0' TO 26.0'	8" rec., 7, 5, 6, 7	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 24.0' TO 26.0' WITH 300 LB HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 24.0' TO 26.0' AND WASHED OUT.	GRAVELLY SAND. COARSE TO FINE. 10-20% SUBANGULAR TO ANGULAR GRAVEL. 25% NON PLASTIC FINES. BROWNISH GRAY, DAMP (SW)
28, 28	15	1 7/8"	26.0' TO 28.0'	10" rec., 5, 7, 8, 9	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 26.0' TO 28.0' WITH 300LB. HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 26.0' TO 28.0' AND WASHED OUT.	GRAVELLY SAND. SAME AS SAMPLE #14 (SW)
	16	1 7/8"	28.0' TO 30.0'	5, 5, 6, 9	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 28.0' TO 30.0' WITH 300LB HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 28.0' TO 30.0' AND WASHED OUT.	GRAVELLY SAND. SAME AS SAMPLE #14 (SW)
			30.0'	6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 30.0' TO 32.0' WITH 300LB. HAMMER.	SAND. COARSE TO FINE. 25% NON PLASTIC FINES. TRACE SUBANGULAR GRAVEL. BROWNISH GRAY, DRY. (SW)

FIG. No. 2C

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, MT.	Boring No. FD-85-1 (K)	Page 6 of 14

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				7	DRILLED WITH 5 7/8" FISHTAIL FROM 30.0' - 32.0' AND WASHED OUT.	
31	17	1 7/8"	TO	7		
				8		
32			32.0'	6" Rec. 8	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 32.0' TO 34.0' WITH 300LB. HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 32.0 TO 34.0' AND WASHED OUT.	SILTY GRAVELLY SAND COARSE TO FINE, 15-25% SUB ANGULAR TO SUB ROUNDED GRAVEL 5-10% NON PLASTIC FINES. BROWNISH GRAY, MOIST. (SW-SM)
				11		
33	18	1 7/8"	TO	11		
				10		
34			34.0'	9" Rec. 9	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 34.0' TO 36.0' WITH 300LB HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 34.0' TO 36.0' AND WASHED OUT.	GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 10-15% SUB ROUNDED GRAVEL. <5% NON PLASTIC FINES. BROWNISH - GRAY, DRY. (SP)
				7		
35	19	1 7/8"	TO	8		
				10		
36			36.0	6	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 36.0' TO 38.0' WITH 300LB. HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 36.0' TO 38.0' AND WASHED OUT.	SAND COARSE TO FINE. <5% NON PLASTIC FINES. TRACE GRAVEL. BROWNISH GRAY, DRY. (SW)
				8		
37	20	1 7/8"	TO	7		
				8		
38			38.0'	8	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 38.0' TO 40.0' WITH 300LB HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 38.0' TO 40.0' AND WASHED OUT.	SAND SAME AS SAMPLE #20 (SW) * QUARTZ COBBLE AT 39.0'
39	21	1 7/8"	TO	9		

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-1 (K)	Page 7 of 14

DEPTH ft.	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				8		
				9		
40			40.0'	11" Rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 40.0' TO 42.0' WITH 300LB HAMMER.	SAND SAME AS SAMPLE #20 *MOIST (SW)
				6		
				8	DRILLED WITH 5 7/8" FISHTAIL FROM 40.0' TO 42.0' AND WASHED OUT.	
41	22	1 7/8"	TO			
				8		
				8		
42			42.0'	6" Rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 42.0' TO 44.0' WITH 300LB HAMMER.	SAND SAME AS SAMPLE #20 *DRY (SW)
				8		
				7	DRILLED WITH 5 7/8" FISHTAIL FROM 42.0' TO 44.0' AND WASHED OUT.	
43	23	1 7/8"	TO			
				8		
				9		
44			44.0		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 44.0' TO 46.0' WITH 300LB HAMMER.	SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE. <5% NON PLASTIC FINES. GRAY-BROWN, MOIST (SP)
				10		
				8	DRILLED WITH 5 7/8" FISHTAIL FROM 44.0' TO 46.0' AND WASHED OUT.	
45	24	1 7/8"	TO			
				10		
				10		
46			46.0'		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 46.0' TO 48.0' WITH 300LB HAMMER.	SAND COARSE TO FINE, MOSTLY FINE. <5% NON PLASTIC FINES. GRAY-BROWN, MOIST. (SP)
				5		
				7	DRILLED WITH 5 7/8" FISHTAIL FROM 46.0' TO 48.0' AND WASHED OUT.	
47	25	1 7/8"	TO			
				8		

Site NO. SPRING FIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-1 (K)	Page 8 of 14

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				5		
48			48.0'	6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 48.0' TO 50.0' WITH 300LB HAMMER.	SAND MEDIUM TO FINE, MOSTLY FINE. <5% NONPLASTIC FINES. GRAY, DAMP (SP)
				8	DRILLED WITH 5 7/8" FISHTAIL FROM 48.0' TO 50.0' AND WASHED OUT.	
49	26	1 7/8"	TO	11		
				13		
50			50.0'	8" Rec. 7	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 50.0' TO 52.0' WITH 300LB HAMMER.	SAND FINE TO VERY FINE. <5% NON PLASTIC FINES. GRAY, DRY. (SP)
				8	DRILLED WITH 5 7/8" FISHTAIL FROM 50.0' TO 52.0' AND WASHED OUT.	
51	27	1 7/8"	TO	9		
				8		
52			52.0'	8" Rec. 5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 52.0' TO 54.0' WITH 300LB HAMMER.	SAND FINE TO VERY FINE. TRACE MEDIUM. <5% NON PLASTIC FINES. GRAY, MOIST. (SP)
				5	DRILLED WITH 5 7/8" FISHTAIL FROM 52.0' TO 54.0' AND WASHED OUT.	
53	28	1 7/8"	TO	8		
				7		
54			54.0'	8" Rec. 6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 54.0' TO 56.0' WITH 300LB HAMMER	SAND MEDIUM TO FINE. TRACE COARSE. 5-10% NON PLASTIC FINES. TRACE SUB ROUNDED GRAVEL. GRAY, MOIST. (SP-SM)
				7	DRILLED WITH 5 7/8" FISHTAIL FROM 54.0' TO 56.0' AND WASHED OUT.	
55	29		TO	7		
				9		
56			56.0'			

FIG. No. 2C

Site NO. SPRINGFIELD LAKE DAM
NO. SPRINGFIELD, VT.

Boring No. FD-85-1 (K)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			56.0'	6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 56.0' TO 58.0' WITH 300LB HAMMER	SILTY SAND MEDIUM TO VERY FINE. TRACE COARSE. 10-15% NON PLASTIC FINES. GRAY, TRACE GRAVEL MOIST. (SM)
57	30	1 7/8"	TO	5	DRILLED WITH 5 7/8" FISHTAIL FROM 56.0' TO 58.0' AND WASHED OUT.	
				6		
				7		
58			58.0'	12" rec. 6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 58.0' TO 60.0' WITH 300 LB. HAMMER.	SILTY SAND SAME AS SAMPLE #30 (SM)
				4	DRILLED WITH 5 7/8" FISHTAIL FROM 58.0' TO 60.0' AND WASHED OUT.	
59	31	1 7/8"	TO	6		
				7		
60			60.0'	9" rec. 8	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 60.0' TO 62.0' WITH 300LB HAMMER.	SILTY SAND SAME AS SAMPLE #30 (SM)
				6	DRILLED WITH 5 7/8" FISHTAIL FROM 60.0' TO 62.0' AND WASHED OUT.	
61	32	1 7/8"	TO	7		
				7		
62			62.0'	6" rec. 3	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 62.0' TO 64.0' WITH 300LB HAMMER.	SILTY SAND SAME AS SAMPLE #30 (SM)
				5	DRILLED WITH 5 7/8" FISHTAIL FROM 62.0' TO 64.0' AND WASHED OUT.	
63	33		TO	7		
				8		
64			64.0'	6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 64.0' TO 66.0' WITH 300LB HAMMER	SILTY SAND SAME AS SAMPLE #30 (SM)

FIG. NO. 2C

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD VT.	Boring No. FD-85-1 (K)	Page 10 of 14

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
65	34	1 7/8"	TO	7	DRILLED WITH 5 7/8" FISHTAIL FROM 64.0' TO 66.0' AND WASHED OUT.	
				7		
				9		
66			66.0'	19	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 66.0' TO 67.5' WITH 300LB HAMMER.	SILTY SAND COARSE TO FINE. 20-25% NON PLASTIC FINES. SOME GRAVEL. VERY ABUNDANT WEATHERED ROCK FRAGS. GRAY-BROWN, MOIST. (SM)
	35	1 7/8"	TO	21	* Refusal AT 67.5'	
67				100+ ref.		
	RUN 1		67.5'		CORED WITH 3 3/4" ID x 3 7/8" OD x 5.0' CORE BARREL FROM 67.0' TO 72.0'.	ABUNDANT WEATHERED ROCK, COBBLES, BOULDERS
68					DROVE 6" CASING FROM 10.0' TO 30.0' WITH 300LB HAMMER.	
69						
		3 3/4"	TO			
70						
71						
72			72.0'	NO Recovery	END OF OVERBURDEN SAMPLING AND CORING OPERATIONS	BOTTOM OF BORING 72.0'

FIELD LOG OF TEST BORING IN ROCK

SITE No. SPRINGFIELD LAKE DAM, VT. HOLE NO. FO-85-1 (12) PAGE 11 of 14

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
7/12/85	67.5'	72.0'	5.0'	–	–	continuous	NO LOSS		59 min / 5.0'	2 3/4" ID 3 7/8" OD 5.0' LENGTH	WEATHERED ROCK ABUNDANT COBBLES AND BOULDERS

TOTAL BED ROCK DRILLED – FEET

TOTAL BED ROCK RECOVERED – FEET

BED ROCK RECOVERY _____ PERCENT

DRILLER Raymond Brown

INSPECTOR Mark A. Owens

NED FORM 130

FIG. No. 5

Site: NO. SPRINGFIELD LAKE DAM, VT.
Boring No: FD-85-1 (K)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
7/15/85	7:30	10.0'	72.0'	40.0'	477.0'	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

PIEZOMETER INSTALLATION REPORT

PROJECT: NO. SPRINGFIELD LAKE DAM, VT. DATE: 7/15/85

LOCATION (STA): FD-85-1(K) OFFSET FROM CENTER LINE: PIEZ NO.: 10

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: 63.0'± RISER PIPE DIAM: 6"

PIEZ TIP SET IN (SOIL TYPE): SILTY SAND SOIL SAMPLE NO.: 33 BORING DIAM: 6"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 30.0' OF 6" CASING VENT:

GROUND ELEV.: 517.0'± ELEV. TOP OF RISER: 520.0'± ELEV PIEZ TIP: 454.0'±

FILTER: BLAST SAND (BLACK) FROM ELEV: 449.5'± TO ELEV: 465.0'

SEAL: BENTONITE FROM ELEV: 465.0'± TO ELEV: 470.0'

INSTALLED BY: MOBILE DISTRICT CONTRACT NO.: FOREMAN: RAYMOND BROWN

DATE OF INSTALLATION: 7/15/85 DATE OF OBSERVATIONS: 7/16/85

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
8:48	1	30.0'						
8:53	5	41.0'						
8:58	10	46.0'						
9:03	15	48.0'						
9:18	30	49.0'						

REMARKS: TOP OF PIEZOMETER RAISED TO ELEVATION 454.0'±

WATER LEVEL AT 54.0' AT START OF TEST (0-MIN)

Mark A. Owens
INSPECTOR

PIEZOMETER INSTALLATION REPORT

PROJECT: NO. SPRINGFIELD LAKE DAM, VT. DATE: 7/15/85

LOCATION (STA): FD-F5-1(K) OFFSET FROM CENTER LINE: 100' WEST PIEZ NO.: 11

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: -43.0'± RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN SOIL TYPE): SAND SOIL SAMPLE NO.: 23 BORING DIAM: 6"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 30.0'+ 6" CASING VENT:

GROUND ELEV.: 517.0'± ELEV. TOP OF RISER: 520.0' ELEV PIEZ TIP: 474.0'± 46

FILTER: BLAST SILICA SAND (BLACK) FROM ELEV: 470.0' TO ELEV: 483.0'±

SEAL: BENTONITE FROM ELEV: 483.0'± TO ELEV: 490.0'±

INSTALLED BY: MOBILE DISTRICT CONTRACT NO.: FOREMAN: RAYMOND BROWN

DATE OF INSTALLATION: 7/15/85 DATE OF OBSERVATIONS: 7/16/85

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
:08	1	31.0'						
:12	5	35.0'						
:17	10	36.0'						
:22	15	36.0'						
:37	30	36.0'						

REMARKS: DEPTH OF WATER 38.0' AT START OF TEST (0 min)

Mark R. Owens
INSPECTOR

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

FIELD LOG OF TEST BORING

PROJECT NO. 0021

Site NO. SPRINGFIELD LAKE DAM, VT. — Page 1 of 13 Pages

Hole No. ED-85-2/2 Diam. (Casing) 6" — Boring Started 7/16/85

Co-ordinates: N _____ E _____ — Boring Completed 7/19/85

Drilled by MOBILE DISTRICT — Report Submitted _____

Purpose of Exploration TO DETERMINE THE PHREATIC SURFACE WITHIN THE EMBANKMENT AND FOUNDATIONS FOR ALL POOL ELEVATIONS. DETERMINE PORE PRESSURES AND PERMEABILITIES OF EMBANKMENT AND FOUNDATION SOILS

Elevation Top of Hole 519.0'± M.S.L. — Casing Left in Place 27.0' INGROUND Feet

Total Overburden Drilled 70.0' Feet

Elevation Top of Rock — M.S.L.

Elevation Bottom of Hole 449.0' M.S.L.

Total Rock Drilled — Feet

Total Depth of Hole 70.0' Feet

Core Recovered — %

Core Recovered _____ Ft.: _____ Diam. _____ In.

Soil Samples 1 3/8" In. Diam. 36 No.

Soil Samples _____ In. Diam. _____ No. — Water Table Depth 40.0'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0'	12.0'	DRILLED WITH 5'-0" OD X 2.0' AUGER FLIGHT
0.0'	10.0'	DROVE 6" CASING WITH 300LB HAMMER
12.0'	50.0'	DRILLED WITH 5 7/8" FISHTAIL AND WASHED OUT.
50.0'	70.0'	DRILLED WITH 6" ROLLER ROCK AND WASHED OUT.
0.0'	70.0'	SAMPLED WITH 1 3/8" X 2.0' SPLIT SPOON WITH 300LB HAMMER
10.0'	27.0'	DROVE 6" CASING

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Ground Water	Back of Page 11
Boring Location Sketch	Back of Page 11
Overburden Record	Page 1-10
Rock Drilling	Page ____
	Page ____
	Page ____
	Page ____

Prepared by Mark R. Owens — Field Data — Lab. Data

Submitted by Mark R. Owens

ED 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 NO. SPRINGFIELD LAKE DAM, VT. Page 2 of 13 Pages

Boring No. FD-PS-2 Desig. 5 Diam. (Casing) 6"

Co-ordinates. N _____ E _____

Elevation Top of Boring 519.0' M.S.L.
Total Overburden Drilled 70.0' Feet
Elevation Top of Rock — M.S.L.
Total Rock Drilled — Feet
Elevation Bottom of Boring 449.0' M.S.L.
Total Depth of Boring 70.0 Feet
Core Recovered — % No. Boxes _____
Core Recovered — Ft. _____ Diam. _____ In.
Soil Samples 1 7/8" In. Diam. 36 No.
Soil Samples _____ In. Diam. _____ No.

Hammer Wt. 300 LB. Boring Started 7/16/85
Hammer Drop _____
Casing Left 30.0' Boring Completed 7/19/85
Subsurface Water Data _____ Page 11
Obs. Well _____
Drilled By MOBILE DISTRICT
Mfg. Des. Drill _____
Inspected By: Mark A. Owens
Classification By: Mark A. Owens
Classification By: _____

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			0.0	2 1 1 1	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 0.0' TO 2.0' WITH 300 LB HAMMER.	SILTY SAND COARSE TO FINE, MOSTLY FINE 20-30% NON PLASTIC TO SLIGHTLY PLASTIC FINES. ABUNDANT ROOTS, STEMS ETC. LIGHT BROWN, DRY [LOESS] (SM)
1	1	1 7/8"	TO			
2			2.0	3"rec. 3	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 2.0' TO 4.0' WITH 300 LB HAMMER.	SILTY SAND SAME AS SAMPLE #1 (SM)
	2	1 7/8"	TO	4	AUGERED WITH 6" x 2.0' AUGER FLIGHT FROM 0.0' TO 4.0'	
3			3.0'	7"rec. 7 6		SILTY SAND FINE TO VERY FINE 15-25% NON PLASTIC FINES. LIGHT BROWN, POWDERY. (SM)
	3	1 7/8"	TO			
4			4.0'	7"rec. 7 6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 4.0' TO 6.0' WITH 300 LB HAMMER. AUGERED WITH 5.0" OD x 2.0' AUGER FLIGHT FROM 4.0' TO 6.0'	SILTY SAND SAME AS SAMPLE #3 (SM) * SOME COLORATION BANDING
5	4	1 7/8"	TO			

GENERAL REMARKS:

Boring No. FD-PS-2(5)

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-2 (J)	Page 3 of 13

DEPTH	1"	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
					6		
					7		
	6			6.0'	14" rec. 6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 6.0' TO 8.0' WITH 300LB. HAMMER.	SILTY SAND SAME AS SAMPLE #3 (SM)
					6	AUGERED WITH 5.0" OD x 2.0' AUGER FLIGHT FROM 6.0' TO 8.0'.	
	7	5		TO	5		
					7		
	8			8.0'	12" rec. 5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 8.0' TO 10.0' WITH 300LB. HAMMER.	SILTY SAND FINE TO VERY FINE, TRACE MEDIUM. 25-30% NON PLASTIC TO SLIGHTLY PLASTIC FINES. BROWN, DAMP. (SM)
					4	AUGERED WITH 5.0" OD x 2.0' AUGER FLIGHT FROM 8.0' TO 10.0'	
	9	6	1 7/8"	TO	4		
					6		
65	10			10.0'	13" rec. 5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 10.0' TO 12.0' WITH 300LB. HAMMER.	SILTY SAND FINE TO VERY FINE. 10-20% NON PLASTIC FINES. LIGHT BROWN, DAMP. (SM)
					5	AUGERED WITH 5.0" OD x 2.0' AUGER FLIGHT FROM 10.0' TO 12.0'.	
64	11	7	1 7/8"	TO	6	DROVE 6" CASING FROM 0.0' TO 10.0' WITH 300LB HAMMER.	
					6	DRILLED WITH 5 7/8" FISHTAIL FROM 0.0' TO 12.0' AND WASHED OUT.	
65	12			12.0'	10" rec. 4	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 12.0' TO 14.0' WITH 300LB. HAMMER.	NO RECOVERY
					6	DRILLED WITH 5 7/8" FISHTAIL FROM 12.0' TO 14.0' AND WASHED OUT.	
78	13	8		TO	6		

58A(Test)

Boring No. FD-85-2(J)

FIG. No. 2C

Site No. SPRINGFIELD LANE DAM, NO. SPRINGFIELD, VT.

Boring No. FD-85-2 (J)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				7		
14			14.0'	5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 14.0' TO 16.0' WITH 300 LB HAMMER	SAND FINE TO VERY FINE. 5-15% NON PLASTIC FINES LIGHT BROWN, DRY (sp-sm)
99				5	DRILLED WITH 5 7/8" FISHTAIL FROM 14.0' TO 16.0' AND WASHED OUT.	
15	9	1 7/8"	TO	5		
94				6		
16			16.0'	5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 16.0' TO 18.0' WITH 300 LB HAMMER.	SAND SAME AS SAMPLE #9 (sp-sm)
79				5	DRILLED WITH 5 7/8" FISHTAIL FROM 16.0' TO 18.0' AND WASHED OUT.	
17	10	1 7/8"	TO	6		
90				6		
18			18.0'	6 (14" rec.)	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 18.0' TO 20.0' WITH 300 LB HAMMER	SILTY SAND FINE TO VERY FINE. 10-15% NON PLASTIC FINES LIGHT BROWN, DAMP (sm)
96				5	DRILLED WITH 5 7/8" FISHTAIL FROM 18.0' TO 20.0' AND WASHED OUT.	
19	11	1 7/8"	TO	7		
106				8		
20			20.0'	7	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 20.0' TO 22.0' WITH 300 LB HAMMER.	SILTY SAND SAME AS SAMPLE #11 (sm)
70				7	DRILLED WITH 5 7/8" FISHTAIL FROM 20.0' TO 22.0' AND WASHED OUT.	
21	12	1 7/8"	TO	9		
22			22.0'	7		

8th run

FIG. No. 2C

Site	Boring No.	Page
NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	FD-PS-2 (5)	5 of 13

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			22.0'	4	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 22.0' TO 24.0' WITH 300 LB HAMMER	SILTY SAND SAME AS SAMPLE #11 (SM)
				5	DRILLED WITH 5 7/8" FISHTAIL FROM 22.0' TO 24.0' AND WASHED OUT.	
23	13	1 7/8"	TO	4		
				6		
24			24.0'	9" Rec. 4	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 24.0' TO 26.0' WITH 300 LB. HAMMER.	SAND FINE TO VERY FINE. 5-15% NON PLASTIC FINES LIGHT BROWNISH GREY, DRY (SP-SM)
				5	DRILLED WITH 5 7/8" FISHTAIL FROM 24.0' TO 26.0' AND WASHED OUT.	
25	14	1 7/8"	TO	5		
				6		
26			26.0'	5" Rec. 5	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 26.0' TO 28.0' WITH 300 LB HAMMER.	SILTY SAND FINE TO VERY FINE, SOME MEDIUM. 10-15% NON PLASTIC TO VERY SLIGHTLY PLASTIC FINES. BROWN TO REDDISH BROWN, DAMP. (SM)
				5	DRILLED WITH 5 7/8" FISHTAIL FROM 26.0' TO 28.0' AND WASHED OUT.	
27	15	1 7/8"	TO	8		
				7		
28			28.0'	6	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 28.0' TO 30.0' WITH 300 LB. HAMMER.	SILTY SAND FINE TO VERY FINE. 15-25% NON PLASTIC TO VERY SLIGHTLY PLASTIC FINES. BROWN, DAMP (SM)
				7	DRILLED WITH 5 7/8" FISHTAIL FROM 28.0' TO 30.0' AND WASHED OUT.	
29	16	1 7/8"	TO	7		
				7		
30			30.0'	8	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 30.0' TO 32.0' WITH 300 LB HAMMER.	GRAVELLY SILTY SAND COARSE TO FINE, MOSTLY FINE. 15-25% NON PLASTIC TO VERY SLIGHTLY PLASTIC FINES 5-15% SUB ANGULAR GRAVEL. BROWN, MOIST (SM)

FIG. No. 2C

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-2 (J)	Page 6 of 13

DEPTH ft.	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE RECV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
31	17	1 7/8"	TO	8	DRILLED WITH 5 7/8" FISHTAIL FROM 30.0' TO 32.0' AND WASHED OUT.	
				8		
				10		
32			32.0'	12	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 32.0' TO 34.0' WITH 300LB HAMMER.	GRAVELLY SILTY SAND COARSE TO FINE, MOSTLY FINE. 10-20% NON PLASTIC FINES. 10-15% SUBANGULAR GRAVEL. COBBLE AND ROCK FRAGMENTS/FLOUR. LIGHT BROWN TO MEDIUM BROWN, DRY (sm)
				36	DRILLED WITH 5 7/8" FISHTAIL FROM 32.0' TO 34.0' AND WASHED OUT.	
33	18	1 7/8"	TO	18		
				14		
34			34.0'	10" rec. 6	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 34.0' TO 36.0' WITH 300LB HAMMER.	SILTY SAND COARSE TO FINE, MOSTLY FINE. 15-25% NON PLASTIC TO VERY SLIGHTLY PLASTIC FINES. <5% SUBANGULAR GRAVEL. BROWN, DAMP. (sm)
				6	DRILLED WITH 5 7/8" FISHTAIL FROM 34.0' TO 36.0' AND WASHED OUT.	
35	19	1 7/8"	TO	5		
				7		
36			36.0'	14" rec. 4	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 36.0' TO 38.0' WITH 300LB HAMMER.	SILTY SAND SAME AS SAMPLE #19 (sm)
				5	DRILLED WITH 5 7/8" FISHTAIL FROM 36.0' TO 38.0' AND WASHED OUT.	
37	20	1 7/8"	TO	6		
				5		
38			38.0'	6" rec. 5	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 38.0' TO 40.0' WITH 300LB HAMMER.	SAND FINE GRAINED. TRACE NON PLASTIC FINES. GRAY, MOIST (sp)
				6	DRILLED WITH 5 7/8" FISHTAIL FROM 38.0' TO 40.0' AND WASHED OUT.	
39	21	1 7/8"	TO			

Site No. SPRINGFIELD LAKE DAM NG. SPRINGFIELD, VT.	Boring No. FD-85-2 (J)	Page 7 of 13

DEPTH 1"	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				5		
				6		
40			40.0'	6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 40.0' TO 42.0' WITH 300LB. HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 40.0' TO 42.0' AND WASHED OUT.	SAND COARSE TO FINE, MOSTLY FINE TO VERY FINE. 5-15% NON PLASTIC FINES TRACE GRAVEL. LIGHT BROWN, DRY (SP-SM)
				7		
41	22	1 7/8"	TO	8		
				13		
42			42.0'	17	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 42.0' TO 44.0' WITH 300LB. HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 42.0' TO 44.0' AND WASHED OUT.	SILTY SANDY GRAVEL ANGULAR TO SUBANGULAR 20-30% COARSE TO FINE SAND. 5-12% NON PLASTIC FINES. ROCK FRAGS., COBBLES BROWN, MOIST (GP-GM)
				22		
43	23	1 7/8"	TO	23		
				24		
44			44.0'	19	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 44.0' TO 46.0' WITH 300LB HAMMER. DRILLED WITH 5 7/8" FISHTAIL FROM 44.0' TO 46.0' AND WASHED OUT.	SILTY SANDY GRAVEL SAME AS SAMPLE #23 (GP-GM)
				20		
45	24	1 7/8"	TO	17		
				30		
46			46.0'	25	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 46.0' TO 48.0' WITH 300LB. HAMMER DRILLED WITH 5 7/8" FISHTAIL FROM 46.0' TO 48.0' AND WASHED OUT.	SILTY SANDY GRAVEL SAME AS SAMPLE #23 (GP-GM)
				25		
47	25	1 7/8"	TO	25		

FIG. No. 2C

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-2 (5)	Page 8 of 13

DEPTH 1"	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				31		
48			48.0'	11" rec. 15	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 48.0' TO 50.0' WITH 300LB. HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE. 30-40% SUB ROUNDED TO SUB ANGULAR GRAVEL. 5-15% NON PLASTIC FINES. BROWN, MOIST. (SP-SM)
				19	DRILLED WITH 5 7/8" FISHTAIL FROM 48.0' TO 50.0' AND WASHED OUT.	
49	26	1 7/8"	TO	17		
				18		
50			50.0'	15" rec. 21	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 50.0' TO 52.0' WITH 300LB HAMMER. DRILLED WITH 6" ROLLER ROCK FROM 50.0' TO 52.0' AND WASHED OUT.	GRAVELLY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE. 25-30% SUB ROUNDED TO SUB ANGULAR GRAVEL. < 7% NON PLASTIC FINES. BROWN, DRY. (SP)
				19		
51	27	1 7/8"	TO	23		
				22		
52			52.0'	13" rec. 16	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 52.0' TO 54.0' WITH 300LB. HAMMER. DRILLED WITH 6" ROLLER ROCK FROM 52.0' TO 54.0' AND WASHED OUT.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 20-30% ANGULAR TO SUB ROUNDED GRAVEL. 10-20% NON PLASTIC FINES. BROWN, DAMP (SM)
				23		
53	28	1 7/8"	TO	24		
				27		
54			54.0'	14" rec. 19	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 52.0' TO 54.0' WITH 300LB HAMMER. DRILLED WITH 6" ROLLER ROCK FROM 54.0' TO 56.0' AND WASHED OUT.	GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 15-20% SUBROUNDED GRAVEL <5% NON PLASTIC FINES LIGHT BROWN, DRY (SP)
				21		
55	29	1 7/8"	TO	25		
				24		
56			56.0'			

58A(Test)

Boring No. FD-85-2(5)

FIG. No. 2C

Site No. SPRINGFIELD LAKE DAM, No. SPRINGFIELD, VT.	Boring No. FD-85-2 (J)	Page 9 of 13

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
56.			56.0'	7	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 56.0' TO 58.0' WITH 300LB. HAMMER.	SAND COARSE TO FINE, MOSTLY FINE. TRACE GRAVEL, TRACE NON PLASTIC FINES GRAY, MOIST. (sp)
				9	DRILLED WITH 6" Roller Rock FROM 56.0' TO 58.0' AND WASHED OUT.	
57	30	1 7/8"	TO	14		
				13		
58			58.0'	12" Rec. 16	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 58.0' TO 60.0' WITH 300LB. HAMMER	GRAVELLY SILTY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE. 15-25% NON PLASTIC FINES. 10-15% SUB ROUNDED TO SUB ANGULAR GRAVEL. BROWN, MOIST. (sm)
				14	DRILLED WITH 6" Roller Rock FROM 58.0' TO 60.0' AND WASHED OUT.	
59	31	1 7/8"	TO	20		
				22		
60			60.0	4" Rec. 14	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 60.0 TO 62.0' WITH 300LB HAMMER	GRAVELLY SILTY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE. 10-15% NONPLASTIC FINES 5-15% SUBANGULAR TO SUBROUNDED GRAVEL. BROWN TO GRAY BROWN (sm)
				11	DRILLED WITH 6" Roller Rock FROM 60.0' TO 62.0' AND WASHED OUT.	
61	32	1 7/8"	TO	14		
				12		
62			62.0	6" Rec. 13	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 62.0' TO 64.0' WITH 300LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 10-15% SUBROUNDED GRAVEL 5-10% NON PLASTIC FINES. GRAY, MOIST. (sp-sm)
				15	DRILLED WITH 6" Roller Rock FROM 62.0' TO 64.0' AND WASHED OUT	
63	33	1 7/8"	TO	14		
				17		
64			64.0'	12" Rec. 5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 64.0' TO 66.0' WITH 300LB HAMMER	SAND FINE GRAINED, 5-12% NON PLASTIC FINES, BROWN, MOIST. (sp-sm)

FIG. No. 2C

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-2. (5)	Page 10 of 13

DEPTH ft.	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				6	DRILLED WITH 6" ROLLER ROCK FROM 64.0' TO 66.0' AND WASHED OUT.	
65	34	1 7/8"	TO	7		
				8		
66			66.0'	7" rec. 7	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 66.0' TO 68.0' WITH 300LB HAMMER	SAND SAME AS SAMPLE # 34 (sp-sm)
				6	DRILLED WITH 6" ROLLER ROCK FROM 66.0' TO 68.0' AND WASHED OUT.	
67	35		TO	8		
				10		
68			68.0'	8" rec. 7	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 68.0' TO 70.0' WITH 300LB. HAMMER.	SAND COARSE TO FINE, MOSTLY FINE 5-10% NON PLASTIC FINES TRACE GRAVEL. GRAY BROWN, MOIST (sp-sm)
				4	DRILLED WITH 6" ROLLER ROCK FROM 68.0' TO 70.0' AND WASHED OUT.	
69	36	1 7/8"	TO	5	DROVE 6" CASING FROM 0.0' TO 70.0' WITH 300LBS HAMMER	
				8		
70			70.0'		END OF OVERBURDEN SAMPLING OPERATIONS 70.0'	BOTTOM OF BORING 70.0'

FIG. No. 2C

Site: No. Springfield Lakeham, VT.
Boring No: FD-85-2 (J)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
7/18/85	2:30pm	27.0'	70.0'	40.0' ±	479.0'	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

FORM 59 (Test)

Boring No. FD-85-2(J)

PIEZOMETER INSTALLATION REPORT

PROJECT: NO. SPRINGFIELD LAKE DAM, VT. DATE: 7/19/85

LOCATION (STA): FD-85-2(3) OFFSET FROM CENTER LINE: PIEZ NO.: PZ-9

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: 48.0' RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN SOIL TYPE): SILTY SANDY GRAVEL SOIL SAMPLE NO.: 25 BORING DIAM: 6"

METHOD OF INSTALLATION:

TYPE OF PROTECTION OR PIEZ: 6" CASING VENT:

GROUND ELEV.: 519.0' ELEV. TOP OF RISER: 522.0' ELEV PIEZ TIP: 471.0'+

FILTER: SILICA SAND FROM ELEV: 468.0' TO ELEV: 478.0'

SEAL: BENTONITE FROM ELEV: 478.0' TO ELEV: 485.0'+

INSTALLED BY: MOBILE DISTRICT CONTRACT NO.: FOREMAN: Raymond L. Brown

DATE OF INSTALLATION: 7/19/85 DATE OF OBSERVATIONS: 7/19/85

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
:49	0	—	10:19	30	7.0'	0		
:50	1	.5'						
:54	5	1.25'						
:59	10	2.50'						
:04	15	3.75'						

REMARKS:

Mark A. Owens
INSPECTOR

PIEZOMETER INSTALLATION REPORT

ROJECT: NO. SPRINGFIELD LAKE DAM, VT. DATE: 7/19/85

OCATION (STA): ED-85-2(J) OFFSET FROM CENTER LINE: PIEZ NO.: PZ-8

IEZ TYPE: CASAGRANDE DEPTH OF PIEZ: -68.0' RISER PIPE DIAM: 3/4"

IEZ TIP SET IN SOIL TYPE): SAND SOIL SAMPLE NO.: 36 BORING DIAM: 6"

ETHOD OF INSTALLATION:

YPE OF PROTECTION OR PIEZ: 6" Casing VENT:

ROUND ELEV.: 519.0' ELEV. TOP OF RISER: 522.0+ ELEV PIEZ TIP: 451.0'±

ILTER: SILICA SAND FROM ELEV: 449.0' TO ELEV: 463.0'

EAL: BENTONITE FROM ELEV: 463.0' TO ELEV: 468.0'

NSTALLED BY: MABLE DISTRICT CONTRACT NO.: FOREMAN: Raymond L. Brown

ATE OF INSTALLATION: 7/19/85 DATE OF OBSERVATIONS: 7/19/85

ETHOD OF STING PIEZ.:

ME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
52	0	—	10:22	30	6.75'			
53	1	.5'						
57	5	1.25'						
02	10	2.50'						
07	15	4.0'						

EMARKS:

Mark A. Owens
INSPECTOR

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

FIELD LOG OF TEST BORING

PROJECT NO. 6021

Site: NO. SPRINGFIELD LAKE DAM, VT.
Page 1 of 13 Pages

Hole No. FD-85-3(2) Diam. (Casing) 6"
Boring Started 7/24/85

Co-ordinates: N _____ E _____
Boring Completed 7/26/85

Drilled by MOBILE DISTRICT
Report Submitted _____

Purpose of Exploration: TO DETERMINE THE PHREATIC CONDITIONS OF EMBANKMENT AND FOUNDATION. DETERMINE PORE PRESSURES AND Permeabilities OF FOUNDATION AND EMBANKMENT SOILS

Elevation Top of Hole 570.0' M.S.L.
Total Overburden Drilled 76.0' Feet
Elevation Top of Rock — M.S.L.
Elevation Bottom of Hole 494.0' M.S.L.
Total Rock Drilled — Feet
Total Depth of Hole 76.0' Feet
Core Recovered — %
Core Recovered _____ Ft.; _____ Diam. _____ in.
Soil Samples 1 7/8" in. Diam. 35 No.
Soil Samples _____ in. Diam. _____ No.

Casing Left in Place _____ Feet

Water Table Depth 72.0'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0'	3.0'	DRILLED 6" CASING
3.0'	40.0'	DRILLED WITH 6 3/8" ROLLER ROCK BIT AND WASHED OUT
0.0'	74.0'	SAMPLED WITH 1 7/8" O.D. SPLIT SPOON WITH 300LB HAMMER
40.0'	66.0'	DRILLED WITH 7" FISHTAIL AND WASHED OUT.
66.0'	76.0'	DRILLED WITH 6 3/8" ROLLER ROCK BIT AND WASHED OUT

INDEX

Ground Water _____ Back of Page 12
Boring Location Sketch _____ Back of Page 12
Overburden Record _____ Page 1-11
Rock Drilling _____ Page ____
PIEZOMETER INSTALLATION _____ Page 13
_____ Page ____
_____ Page ____

Prepared by Mark A. Owens
Field Data
Lab. Data

Submitted by Mark A. Owens

FORM NED DEC 69 121

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 NO. SPRINGFIELD LAKE DAM, VT. Page 2 of 13 Pages

Boring No. FD-85-3 Desig. I Diam. (Casing) 6"

Co-ordinates. N _____ E _____

Elevation Top of Boring 570.0'± M.S.L.
Total Overburden Drilled 76.0' Feet
Elevation Top of Rock — M.S.L.
Total Rock Drilled _____ Feet
Elevation Bottom of Boring 494.0' M.S.L.
Total Depth of Boring 76.0' Feet
Core Recovered — % No. Boxes —
Core Recovered _____ Ft: _____ Diam. _____ In.
Soil Samples 1 7/8" In. Diam. 23 No.
Soil Samples _____ In. Diam. _____ No.

Hammer Wt. 300LB Boring Started 7/24/85
Hammer Drop _____
Casing Left _____ Boring Completed 7/26/85
Subsurface Water Data _____ Page _____
Obs. Well _____
Drilled By MOBILE DISTRICT
Mfg. Des. Drill _____
Inspected By: Mark A. Owen
Classification By: Mark A. Owen
Classification By: _____

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1					DUG OUT AND SET CASING FROM 0.0' TO 3.0'. DRILLED WITH 6 3/8" ROLLER ROCK FROM 0.0' - 30.0' AND WASHED OUT.	
2						
3						
4						
5						

GENERAL REMARKS: OVERBURDEN SAMPLING INITIATED AT ELEVATION 540.0'± AT A DEPTH OF 30.0'. SPLIT SPOON RECOVERIES IN VIRGIN GROUND WERE LOW AS IN BORINGS FD-85-1(K) and FD-85-2(J)

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-3 (I)	Page 3 of 13

DEPTH		CORE/SAMPLE			BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1"	NO.	SIZE	DEPTH RANGE			
	6						
	7						
	8						
	9						
	10						
	11						
	12						
	13						

558A(Test)

Boring No. FD-85-3(I)

FIG. No. 2C

Site NO. SPRINGFIELD LAKE DAM	Boring No. FD-85-3 (I)	Page 4 of 13

DEPTH		CORE/SAMPLE			BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1"	NO.	SIZE	DEPTH RANGE			
	14						
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						

58A(Test)

Boring No. FD-85-3 (I)

FIG. No. 2C

Site No. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. ED-85-3 (I)	Page 5 of 13

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
23						
24						
25						
26						
27						
28						
29						
30				6	INITIATION OF OVERBURDEN SAMPLING PROCEDURES 30.0' Sampled with 1 7/8" x 2.0' Split Spoon from 30.0' to 32.0' with 300LB Hammer.	GRAVELLY SILTY SAND medium to fine, mostly fine, trace coarse, 25-30% non plastic to very slightly plastic fines, 15-20% angular gravel, red brown, damp (FILL MATERIAL) (SM)

Site No. SPRINGFIELD LAKE DAM, NO. SPRINGFIELD, VT.

Boring No. FD-85-3 (I)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE RECV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				13	DRILLED WITH 6 3/8" Roller Rock FROM 30.0' TO 32.0' AND WASHED OUT.	
31	1	1 7/8"	TO	13		
			31.5'			SILTY SAND FINE GRAINED, TRACE medium. 10-15% NON PLASTIC FINES LIGHT BROWN, DRY. (sp-sm)
	2	1 7/8"	TO	14		
32			32.0'	15"rec. 9	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 32.0' TO 34.0' WITH 300LB. HAMMER.	SILTY SAND SAME AS SAMPLE #2 (sp-sm)
				10	DRILLED WITH 6 3/8" Roller ROCK FROM 32.0' TO 34.0' AND WASHED OUT.	
33	3	1 7/8"	TO	7		
				9		
34			34.0'	12"rec. 8	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON. FROM 34.0' TO 36.0' WITH 300LB. HAMMER.	SILTY SAND SAME AS SAMPLE #2 (sp-sm)
				7	DRILLED WITH 6 3/8" Roller ROCK FROM 34.0' TO 36.0' AND WASHEDOUT.	
35	4	1 7/8"		10		
				9		
36			36.0'	9"rec. 9	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 36.0' TO 38.0' WITH 300LB. HAMMER.	SAND FINE TO VERY FINE. 5-10% NON PLASTIC FINES. LIGHT BROWN, DRY (sp-sm)
				9	DRILLED WITH 6 3/8" Roller ROCK FROM 36.0' TO 38.0' AND WASHED OUT.	
37	5	1 7/8"	TO	11		
				10		
38			38.0'	7"rec. 10	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 38.0' TO 40.0' WITH 300LB. HAMMER.	SAND SAME AS SAMPLE #5 (sp-sm)
				10	DRILLED WITH 6 3/8" Roller ROCK FROM 38.0' TO 40.0' AND WASHED OUT.	
39	6	1 7/8"	TO			

Site NO. SPRINGFIELD LAKE DAM
NO. SPRINGFIELD, VT.

Boring No. FD-85-3 (I)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				9		
				9		
40			40.0'	8 blows	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 40.0' TO 42.0' WITH 300LB HAMMER	SAND FINE TO VERY FINE. TRACE MEDIUM. 5-10% NON PLASTIC FINES LIGHT BROWN DRY. (SP-SM)
				13	DRILLED WITH 7" FISHTAIL FROM 40.0' TO 42.0' AND WASHED OUT.	
				14		
41	7	1 7/8"	TO			
				14		
				16		
42			42.0'	5 blows	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 42.0' TO 44.0' WITH 300 LB. HAMMER	SAND FINE TO VERY FINE. 5-10% NON PLASTIC FINES LIGHT BROWN, DRY (SP-SM)
				14	DRILLED WITH 7" FISHTAIL FROM 42.0' TO 44.0' AND WASHED OUT.	
				15		
43	8	1 7/8"	TO			
				15		
				15		
44			44.0'	7 blows	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 44.0' TO 46.0' WITH 300LB. HAMMER.	SAND SAME AS SAMPLE #8 DAMP (SP-SM)
				7		
				6	DRILLED WITH 7" FISHTAIL FROM 44.0' TO 46.0' AND WASHED OUT.	
45	9	1 7/8"	TO			
				8		
				8		
46			46.0'	3 blows	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 46.0' TO 48.0' WITH 300LB. HAMMER.	SAND SAME AS SAMPLE #6 DAMP (SP-SM)
				9		
				7	DRILLED WITH 7" FISHTAIL FROM 46.0' TO 48.0' AND WASHED OUT.	
47	10	1 7/8"	TO			
				11		

FIG. NO. 2C

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-3 (I)	Page 8 of 13

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				10		
48			48.0'	9" Rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 48.0' TO 50.0' WITH 300LB HAMMER.	SAND FINE TO VERY FINE, MOSTLY VERY FINE. 5-12% NON PLASTIC FINES. LIGHT BROWN, DAMP (SP-SM)
				6	DRILLED WITH 7" FISHTAIL FROM 48.0' TO 50.0' AND WASHED OUT.	
				6		
49	11	1 7/8"	TO			
				9		
				10		
50			50.0'	8" Rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 50.0' TO 52.0' WITH 300LB. HAMMER.	SAND FINE TO VERY FINE, MOSTLY VERY FINE. 5-12% NON PLASTIC FINES. TRACE SUB ANGULAR GRAVEL. LIGHT BROWN, DAMP. (SP-SM)
				7	DRILLED WITH 7" FISHTAIL FROM 50.0' TO 52.0' AND WASHED OUT.	
				7		
51	12	1 7/8"	TO			
				8		
				9		
52			52.0'	6" Rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 52.0' TO 54.0' WITH 300LB. HAMMER.	SAND FINE TO VERY FINE. 5-12% NON PLASTIC FINES LIGHT BROWN, DAMP (SP-SM)
				6	DRILLED WITH 7" FISHTAIL FROM 52.0' TO 54.0' AND WASHED OUT.	
				10		
53	13	1 7/8"	TO			
				12		
				12		
54			54.0'	7" Rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 54.0' TO 56.0' WITH 300LB. HAMMER.	SAND FINE TO VERY FINE 5-12% NON PLASTIC FINES. VERY LIGHT BROWN, DAMP (SP-SM)
				8	DRILLED WITH 7" FISHTAIL FROM 54.0' TO 56.0' AND WASHED OUT.	
				11		
55	14	1 7/8"	TO			
				13		
56			56.0'	14		
				7" Rec.		

Site No. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.

Boring No. FD-85-3 (2)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			56.0'	8	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 56.0' TO 58.0' WITH 300LB. HAMMER. DRILLED WITH 7" FISHTAIL FROM 56.0' TO 58.0' AND WASHED OUT.	SILTY SAND FINE TO VERY FINE. 10-15% NON PLASTIC FINES BROWN, DAMP. (SP-SM)
				9		
57	15	1 7/8"	TO	10		
				10		
58			58.0'	4" rec 9	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 58.0' TO 60.0' WITH 300LB HAMMER. DRILLED WITH 7" FISHTAIL FROM 58.0' TO 60.0' AND WASHED OUT.	SILTY SAND FINE TO VERY FINE. 10-15% NON PLASTIC FINES. 2-5% SUB ROUNDED GRAVEL. BROWN, DAMP (SP-SM)
				10		
59	16	1 7/8"	TO	10		
				10		
60			60.0'	6" rec 6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 60.0' TO 62.0' WITH 300LB HAMMER	SILTY SAND ~~Some~~ FINE TO VERY FINE 10-15% NON PLASTIC FINES. MED. BROWN, DAMP (SP-SM)
				8	DRILLED WITH 7" FISHTAIL FROM 60.0' TO 62.0' AND WASHED OUT.	
61	17	1 7/8"	TO	7		
				12		
62			62.0'	8	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 62.0' TO 64.0' WITH 300LB HAMMER.	SAND COARSE TO FINE. TRACE NON PLASTIC FINES. TRACE GRAVEL. LIGHT BROWN, DRY. (SW)
				8	DRILLED WITH 7" FISHTAIL FROM 62.0' TO 64.0' AND WASHED OUT.	
63	18	1 7/8"	TO	12		
				13		
64			64.0'	9	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 64.0' TO 66.0' WITH 300LB HAMMER	GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 10-20% SUBROUNDED TO ROUNDED GRAVEL. 2-7% NON PLASTIC FINES. MED. BROWN, MOIST (SP)

Site NO. SPRINGFIELD LAKE DAM NO. SPRINGFIELD, VT.	Boring No. FD-85-3 (I)	Page 10 of 13

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				14	DRILLED WITH 6 3/8" Roller Rock FROM 64.0' TO 66.0' AND WASHED OUT.	
65	19	1 7/8"	TO	13		
				12		
66			66.0'	11	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 66.0' TO 68.0' WITH 300LB. HAMMER.	GRAVELLY SAND SAME AS SAMPLE #19 * ABUNDANT ROCK FRAGS. (SP)
				12	DRILLED WITH 6 3/8" Roller Rock FROM 66.0' TO 68.0' AND WASHED OUT.	
67	20	1 7/8"	TO	16		
				15		
68			68.0'	8	Sampled WITH 1 7/8" x 2.0' SPLIT SPOON FROM 68.0' TO 70.0' WITH 300LB HAMMER.	NO RECOVERY
				6	DRILLED WITH 6 3/8" roller Rock FROM 68.0' TO 70.0' AND WASHED OUT.	
69	21	1 7/8"	TO	7		
				10		
70			70.0'	0" rec. 9	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 70.0' TO 72.0' WITH 300LB HAMMER	SILTY SAND MEDIUM TO VERY FINE, MOSTLY FINE TO VERY FINE. 10-15% NONPLASTIC FINES. TRACE GRAVEL TRACE WEATHERED ROCK BROWN, DAMP (SP-SM)
				9	DRILLED WITH 6 3/8" roller Rock FROM 70.0' TO 72.0' AND WASHED OUT.	
71	22	1 7/8"	TO	8		
				9		
72			72.0'	8" rec. 8	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 72.0' TO 74.0' WITH 300LB. HAMMER.	SILTY SAND SAME AS SAMPLE # 22 (SP-SM)
73	23	1 7/8"	TO	8	DRILLED WITH 6 3/8" Roller Rock FROM 72.0' TO 74.0' AND WASHED OUT.	

FIG. No. 2C

Site NORTH SPRINGFIELD LAKE DAM, VT

Boring No. FD-85-3 (I)

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				11		
				10		
74			74.0'			
75						
76			76.0'			76.0'
					END OF OVERBURDEN SAMPLING OPERATIONS	Bottom of Boring 76.0'

FIG. No. 2C

Site: NO. SPRINGFIELD LAKE DAM, VT.
Boring No: FO-85-3(I)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
7/26/85	12:00pm	10.0'	96.0'	72.0'	498.0'	READING TAKEN IN P2-

Note: Depths are in feet below original ground.

BORING LOCATION SKETCH

PIEZOMETER INSTALLATION REPORT

PROJECT: NO. SPRINGFIELD LAKE DAM, VT. DATE: 7/25/85

LOCATION (STA): FD-85-3(I) OFFSET FROM CENTER LINE: PIEZ NO.: 12

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: 74.0' RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN SOIL TYPE): SILTY SAND SOIL SAMPLE NO.: 25 BORING DIAM: 6 3/8 - 7"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 10.0' of 4" DIAMETER CASING VENT:

GROUND ELEV.: 570.0' ELEV. TOP OF RISER: 573.0'± ELEV PIEZ TIP: 496.0'

FILTER: SILICA BLAST SAND (BLACK) FROM ELEV: 494.0' TO ELEV: 536.5'

SEAL: BENTONITE FROM ELEV: 536.0' TO ELEV: 545.0'

INSTALLED BY: MOBILE DISTRICT CONTRACT NO.: FOREMAN: Raymond Brown

DATE OF INSTALLATION: 7/25/85 DATE OF OBSERVATIONS: 7/26/85

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
:30	0	—	10:00		72.0			
:31		51.0'						
:35		72.0						
:40		72.0						
:45		72.0						

REMARKS:

Mark A. Owens
INSPECTOR

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

FIELD LOG OF TEST BORING

PROJECT NO. W.O. 21

Site TOWNSHEND DAM VERMONT — Page 1 of 8 Pages

Hole No. FD-84-1 (FD-E) Diam. (Casing) _____ — Boring Started 11/7/84

Co-ordinates: N _____ E _____ — Boring Completed 11/14/84

Drilled by EASTERN GEOTECH. ASSOC — Report Submitted _____

Purpose of Exploration PIEZOMETER INSTALLATION

Elevation Top of Hole 476.2 M.S.L.
Total Overburden Drilled 48.9 Feet
Elevation Top of Rock — M.S.L.
Elevation Bottom of Hole 427.3 M.S.L.
Total Rock Drilled — Feet
Total Depth of Hole 48.9 Feet
Core Recovered — %
Core Recovered _____ Ft.: _____ Diam. _____ in.
Soil Samples 3 in. Diam. _____ No.
Soil Samples _____ in. Diam. _____ No.

Casing Left in Place 10 Feet

Water Table Depth 18.9 ft

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	15	SAMPLING w/ Std. sample spoon every foot
		feet and cleaning the hole on each
		interval using the auger.
15	ON	USE slurry (bentonite) in location
		hole open while washing the hole w/
		Rolling Rock bit. PLACING 30 ft OF
		10" CASING AND 48.8 ft OF 4" CASING

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Boring Location Sketch		Back of Page ____
Overburden Record		Page ____
Rock Drilling		Page ____
		Page ____
		Page ____
		Page ____

Prepared by [signature] Field Data — Lab. Data

Submitted by _____

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site TOWNSHEND DAM, VERMONT Page 2 of 11 Pages
FD-84-1
Boring No. (FD-E) Desig. _____ Diam. (Casing) 6"
Co-ordinates. N _____ E _____

Elevation Top of Boring 476.2 M.S.L.
Total Overburden Drilled 48.9 Feet
Elevation Top of Rock — M.S.L.
Total Rock Drilled — Feet
Elevation Bottom of Boring 427.3 M.S.L.
Total Depth of Boring 48.9 Feet
Core Recovered _____ % No. Boxes 2
Core Recovered _____ Ft: _____ Diam. _____ In.
Soil Samples 3 In. Diam. _____ No.
Soil Samples _____ In. Diam. _____ No.

Hammer Wt. 300 Boring Started 11/9/84
Hammer Drop 18
Casing Left 10 ft Boring Completed 11/14/84
Subsurface Water Data _____ Page _____
Obs. Well _____
Drilled By JAMES SANDERS
Mfg. Des. Drill HOLE MASTER
Inspected By: LALEH DARAIE
Classification By: LALEH DARAIE
Classification By: _____

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1" =						
	1a	3"	0	1	SAMPLED BY SOLID SPOON SAMPLER 5' x 3 in. I.D. using 300 lb hammer	LAYERED TOPSOIL: 1 inch OF GRASS. SANDY GRAVEL: Well graded, subangular to subrounded gravel, with max size of 2.0 inches 80-90% fine sand, <5% non plastic fines, dark brown moist (GW) 1.0 ft
1.0				100		
					AUGERED THE HOLE TO BREAK UP THE REFUSAL FROM 1.5' to 2.0'	
2.0	1b			23	SAMPLED USING A SOLID SPOON SAMPLER 5' x 3 in I.D.	GRAVELLY SAND: Medium to fine sand, 15-20%, subrounded gravel to 1.5 in. max, <5% fines, moist, brown (SP)
3.0				32		
4.0				25		
5.0			5.0	R.C 2'		

GENERAL REMARKS:

56 (Test)

Boring No. FD-84-1
(FD-E)

Site TOWNSHEND DAM VERMONT	Boring No. FD-84-1 (FD-E)	Page 3 of 11

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	2a	3"	5.0	4	SOLID SPOON SAMPLER 5x3" I.D. w/ 300 lb hammer	SILT; nonplastic, <5% very fine sand, very loose moist, light brown (ML)
6.0				4		
7.0	2b		7.5	5		SILTY SAND; uniform, mostly fine sand, 20-30% nonplastic fines, loose, moist, light brown (SM)
8.0				10		
9.0				18	Pull the spoon out at 10' clean the hole using an auger	
10.0	3a		10.0	REL 3" 11	SOLID SPOON SAMPLER 5'x 3" ID w/ 300 lb hammer (Safty hammer)	SAND: coarse to fine sand, mostly medium sand, <5% nonplastic fines, loose to medium dense, moist, light brown (SW)
11.0				24		
12.0	3b			52		SANDY GRAVEL; well graded to max. size of 2.0 inches, subrounded, 30-40% mostly coarse to medium sand, <5% nonplastic fines, dark brown, saturated, very dense (GW)
13.0				48		

58A(Test)

Boring No. _____

FIG. No. 2C

Site TOWNSHEND DAM VERMONT	Boring No. FD-84-1 (FD-E)	Page 4 of 11

DEPTH ft.	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		8"				
14.0				77	pull the spoon out at 15.0 ft. Use auger to clean the hole ALSO use Rolling Rock Bit to wash the whole at the casing line, using revert mud to keep the hole open.	
15.0	4a		15.0	39	SAMPLED W/ SOLID SPOON SAMPLER STARTING @ 15.0 ft	GRAVELLY SILTY SAND: coarse to fine, 20-30% subangular to subrounded gravel, 15-20% non plastic fines, micaceous brown, saturated, very dense. (SW-SM)
16.0				94	Boulder @ 16.7 ft preventing the casing from advancing down. USING CORE BARREL 4½ in I.D. FROM 15.0 ft to 19.0 ft.	
17.0	4b			42	BOULDER FOUND TO BE ABOUT 20 inches thick	
18.0				82	LOST WATER @ 18.0 ft may be indicative of a sandy layer at that depth	
19.0				49	Drilled w/ 5 5/8" Roller Rock Bit from 15.0 ft to 20.0 ft. Kept hole open w/ revert mud. Drove 20 ft of 6" casing using the driving Shoe Bit.	
20.0	5a		20.0	Rec. 2.5' 15	SAMPLED USING A SOLID SPOON SAMPLER 5' x 3" ID	GRAVELLY SAND: poorly graded, 15-20% subangular to subrounded gravel to 0.6 in. max, subangular sand, 10-15% non plastic fines, dense, saturated, brown, some fragments of black Basalt (SW-SM)
21.0				47		
22.0						

Site	Boring No.	Page 5 of 11
TOWNSHEND DAM	FD-84-1 (FD-E)	

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VT	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		3"				
	5b			76		GRAVELLY SAND: Poorly graded, 20-25% subangular to subrounded gravel to 1.5 in. max, subangular sand, <5% fines, dense, saturated, medium brown trace of granite-Mica Schist (SP).
23.0				48		
24.0				22	DRILLED W/ 5 5/8" ROLLER ROCK BIT FROM 20.0-25.0'. KEPT THE HOLE OPEN USING REVERT MUD. DROVE 10 MORE FEET OF 6" CASING TO MAKE A TOTAL OF 30.4 ft OF CASING.	
25.0	6a		25.0	Rec 2.5	SAMPLED USING SOLID SPOON SAMPLER.	SAME AS S-5b W/ 15 TO 20% GRAVEL
				21	PIECES OF WOOD WAS TRACED IN THE WASH MUD SOMEWHERE BETWEEN 26.0 TO 28.0 FEET.	
26.0				32		
27.0				27		
	6b					SAME AS S-6a
28.0				30		
29.0				34	DRILLED W/ 5 5/8" ROLLER ROCK BIT, FROM 25.0 ft to 30.0 ft USING REVERT MUD TO KEEP THE HOLE OPEN.	
30.0	7a			Rec 3.5	SAMPLED W/ SOLID SAMPLE SPOON FROM 30.0 ft to 35.0 ft.	GRAVELLY SAND, medium to fine, mostly medium subangular sand, 20-25%

A(Test)

Boring No. FD-84-1

FIG. No. 2C

Site TOWNSHEND DAM	Boring No. FD-84-1 (FD-E)	Page 6 of 11

DEPTH ft.	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		3"				subangular to subrounded gravel of 1.5 in. max, <5% fines, dense, sat, medium brown (SP).
31.0				41		
32.0						
	7b			23		SAME AS S-7a Gravel increased to 25-30%.
33.0						
				56		
34.0					DRILLED w/ 3 7/8" ROLLER ROCK BIT. TO WASH THE HOLE TO 35.0 ft. USING REVERT MUD TO KEEP THE HOLE OPEN.	
				53		
35.0	8a		35.0	Rec 2.5'	SAMPLED USING SOLID SAMPLE SPOON FROM 35.0 ft TO 40.0 ft.	SAME AS S-7b Gravel increased to 30-40%.
				63		
36.0						
	8b			59		same as S-8a
37.0						
				49		
38.0	8c					Same as S-8b w/ 20-25% Gravel.
				38		
39.0						

Site TOWNSHEND DAM	Boring No. FD-84-1 (E)	Page 7 of 11

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		3"		25	DRILLED W/ 3 7/8" ROLLER ROCK BIT TO WASH THE HOLE TO 40.0 ft USING REVERT MUD TO KEEP THE HOLE OPEN.	
40.0	9a		40.0	Rec 3.51	SAMPLED USING SOLID SAMPLE SPOON, FROM 40.0 ft TO 45.0 ft.	SAME as S-8c
				22		
41.0						
	9b			31		SAME as S-9a
42.0						
				34		
43.0	9c					Same as S-9b
				40		
44.0					DRILLED W/ 3 7/8" ROLLER ROCK BIT TO WASH THE HOLE TO 45.0 ft USING REVERT MUD TO KEEP THE HOLE OPEN	
				36		
45.0	10a		45.0	Rec 3.0	SAMPLED USING SOLID SPOON SAMPLER, FROM 45.0 ft TO 48.5.	SAME as S-9c.
				31		
46.0						
				46		
47.0	10b					
				44		SAME AS S-10a

Fig. No. 2C

Site	Boring No.	Page 8 of 11
TOWNSHEND DAM	FD-84-1 (E)	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
48.0						
				31	DRILLED w/ 3 7/8" ROLLER ROCK BIT FROM 48.0 ft to 48.9 ft	
48.5						
					BOTTOM OF BORING @ 48.9 ft	

FIG. No. 2C

Site: TOWNSHEND DAM
Boring No: FD-84-1 (FD-E)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
11/7/84	15.00	0	15.0	13.2	463.6'±	NO CASING IN PLACE
11/14/84	13:30	48.2	48.9	8.9	467.3'±	YET. HOLE IS NOT
						FINISHED YET.

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

PIEZOMETER INSTALLATION REPORT

PROJECT: TOWNSHED DAM | DATE: 11/15/84

LOCATION (STA): FA-84-1 (FD-E) | OFFSET FROM CENTER LINE: ½ inch | PIEZ NO.: PZ #9

PIEZ TYPE: CASAGRANDE 1½" OD 1" ID 24" LONG | DEPTH OF PIEZ: 46.2 ft | RISER PIPE DIAM: 3/4" PVC

PIEZ TIP SET IN (SOIL TYPE): CONCRETE SAND | SOIL SAMPLE NO.: 10 | BORING DIAM: 6" ID

METHOD OF INSTALLATION: SET PIEZOMETER IN CONCRETE SAND

TYPE OF PROTECTION FOR PIEZ: 10 ft of 6" I.D. CASING PROTECTED BY 5 ft OF GROUT | VENT:

GROUND ELEV.: 476.2 ± | ELEV. TOP OF RISER: 478.7 ± | ELEV PIEZ TIP: 430.3 ±

FILTER: CONCRETE SAND | FROM ELEV: 427.3 ± | TO ELEV: 476.2 ±

SEAL: BENTONITE | FROM ELEV: 445.0 ± | TO ELEV: 449.0 ±

INSTALLED BY: EASTERN GEOTECHNICAL ASS. | CONTRACT NO.: W.O. 21 | FOREMAN: JAMES SANDERS

DATE OF INSTALLATION: 11/14/84 | DATE OF OBSERVATIONS: 11/30/84

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
2:30	0	11.83	4:16	60	11.83			
2:31	1:00	5.83						
2:36	5.00	8.21						
2:46	16	9.92						
3:16	30	11.50						

REMARKS: 2.5 ft OF CASING STICK OUT

PZ # 10 IS ALSO IN FD-84-1 (FD-E)

X IN FD-84-1 (FD-E) THE GREY PVC IS PZ #9

Ralph Daran
INSPECTOR

PIEZOMETER INSTALLATION REPORT

PROJECT: TOWNSHEND DAM | DATE: 11/15/84

LOCATION (STA): FA-84-1 (FD-E) | OFFSET FROM CENTER LINE: 1/2 incl | PIEZ NO.: #10

PIEZ TYPE: CASAGRANDE 1 1/2" OD 1" ID 24" LONG | DEPTH OF PIEZ: 26.2 | RISER PIPE DIAM: 3/4" PVC

PIEZ TIP SET IN (SOIL TYPE): CONCRETE SAND | SOIL SAMPLE NO.: 6 | BORING DIAM: 6" ID

METHOD OF INSTALLATION: SET PIEZOMETER IN CONCRETE SAND

TYPE OF PROTECTION FOR PIEZ: 6" I.D. CASING & SFT GROUTING AROUND THE CASING | VENT:

GROUND ELEV.: 476.2 ± | ELEV. TOP OF RISER: 478.7 ± | ELEV PIEZ TIP: 450 ±

FILTER: CONCRETE SAND | FROM ELEV: 449 ± | TO ELEV: 476.2 ±

SEAL: BENTONITE | FROM ELEV: 467.7 ± | TO ELEV: 469.7 ±

INSTALLED BY: EGA | CONTRACT NO.: W.O. 21 | FOREMAN: J. SANDERS

DATE OF INSTALLATION: 11/14/84 - 11/15/84 | DATE OF OBSERVATIONS: 11/30/84

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
3:00	0	11.83						
3:01	1	10.17						
3:06	5	11.83						
3:16	10	11.83						
3:46	30	11.83						

REMARKS: 2.5 ft OF CASING STICK OUT

THERE IS ALSO PIEZOMETER #9 IN FD-84-1 (FD-E)

* IN BORING FD-84-1 (FD-E) WHITE COLOR PVC IS PZ # 10

Ralph Daare
INSPECTOR

PG 1/10

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

FIELD LOG OF TEST BORING

PROJECT NO. W.O. 21

Site TOWNSHEND DAM — Page 1 of ___ Pages

Hole No. FD-84-2 (FD-H) Diam. (Casing) ___ — Boring Started 11/15/84

Co-ordinates: N ___ E ___ — Boring Completed 11/21/84

Drilled by CORPS OF ENG. — Report Submitted ___

Purpose of Exploration INSTULATION OF PIEZOMETERS

Elevation Top of Hole 469.1 M.S.L. — Casing Left in Place 10 Feet

Total Overburden Drilled 42.6 Feet

Elevation Top of Rock — M.S.L.

Elevation Bottom of Hole 426.5 M.S.L.

Total Rock Drilled — Feet

Total Depth of Hole 42.6 Feet

Core Recovered — %

Core Recovered ___ Ft.: ___ Diam. ___ In.

Soil Samples 3 In. Diam. ___ No.

Soil Samples ___ In. Diam. ___ No. — Water Table Depth 6 ft

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	15	SAMPLED W/ SOLID SPOON SAMPLER 15'x3 in ID
		FOR EVERY 5 ft INTERVALS. AUGER CLEAN
		THE HOLE AFTER EACH SAMPLING. REFUSAL
		@ 8.5 ft.
15	ON	PUT THE 6" CASING IN. HITS REFUSAL @
		8.5 ft. WHILE TRYING TO WASH THE HOLE
		W/ ROLLER ROCK BIT USING REVERT MUD
		TRY CORE BARREL 4½ ID @ 8.5 ft

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Boring Location Sketch ___ Back of Page ___

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___ Page ___

___ Page ___

___ Page ___

Prepared by Nalin Hawe — Field Data — Lab. Data

Submitted by ___

NED FORM EC 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 TOWNSHEND DAM Page 2 of 10 Pages

Boring No. FD-84-2 (FD-H) Desig. _____ Diam. (Casing) _____

Co-ordinates: N _____ E _____

Elevation Top of Boring 469.1 M.S.L.
Total Overburden Drilled _____ Feet
Elevation Top of Rock _____ M.S.L.
Total Rock Drilled _____ Feet
Elevation Bottom of Boring _____ M.S.L.
Total Depth of Boring _____ Feet
Core Recovered _____ % No. Boxes _____
Core Recovered _____ Ft: _____ Diam. _____ In.
Soil Samples _____ In. Diam. _____ No.
Soil Samples _____ In. Diam. _____ No.

Hammer Wt. 300 lbs Boring Started 11/15/84
Hammer Drop 18 ft Boring Completed _____
Casing Left _____
Subsurface Water Data _____ Page _____
Obs. Well _____
Drilled By J. SANDERS
Mfg. Des. Drill HOLE MASTER
Inspected By: LALEH DARAIE
Classification By: _____
Classification By: _____

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1a	3"	0.0	4	SAMPLED W/SOLID SPOON SAMPLER. 3 in. I.D x 5 ft FROM THE GROUND SURFACE TO 5.0 ft DEEP.	LAYERED TOPSOIL: grass, 1 in thick. GRAVELLY SAND, uniform fine sand, 15-20% subrounded gravel to 0.6 in. max, 10-15% nonplastic fines, dark brown, damp, (SP-SM).
1.0	1b			18		GRAVELLY SAND: medium to fine, mostly fine sand, 25-30% subangular gravel to 1.2 in. max, 10-15% nonplastic fines, dark brown, damp, (SP-SM)
2.0				11		
3.0	1c			18		SANDY SILT: nonplastic, 25-30% fine sand, ≤5% subrounded gravel to 0.4 in max, damp, grayish brown (ML).
4.0				35	USED AUGER TO CLEAN THE HOLE TO 5.0 ft	
5.0			5.0			

GENERAL REMARKS:

Site: TOWNSHEND DAM	Boring No. FD-84-2 (FD-H)	Page 3 of 10

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	2a	3"	5.0	28	SAMPLED W/ SOLID SPOON SAMPLER. 3" ID. FROM 5.0 ft TO 8.5 ft.	SILT: slightly plastic, 5-10% very fine sand, damp, dark gray (ML).
6.0	2b			33		SAME AS S-2a, yellowish gray.
7.0				34		
8.0	2c			100	WATER TABLE AROUND 8.0 ft. REFUSAL @ 8.5'	SAME AS S-2b.
8.5			8.5	Rec 3½ ft	USED AUGER TO BREAK THE REFUSAL. GO AHEAD AND SAMPLE FROM 10.0-15.0 ft. SAMPLE 2d TAKEN FROM THE AUGER CLEANOUT. CASING HITS REFUSAL @ 8.5 ft. USE ROLLER ROCK BIT TO WASH THE HOLE. IT DOES NOT WORK. USE CORE BARREL 4½ ID. FROM 8.5' TO 13.3'.	
9.0	2d					GRAVELLY SILT: slightly plastic, 10-15% subrounded gravel to 0.8 in. max, 5-10% fine sand, sat, brown (ML)
10.0	3a		10.0	16	SAMPLED USING THE SOLID SPOON SAMPLER 10.0 ft TO 15.0 ft.	GRAVELLY SANDY SILT: slightly plastic, 10-15% subangular gravel to 0.5 in max, 20-30% fine to medium subangular sand, sat, brown (ML).
11.0	3b			25		GRAVELLY SAND, coarse to fine, mostly medium sand, 30-40% subangular gravel to 1.3 in. max, <5% nonplastic fines, sat, dark brown (SW)
12.0				20		
13.0	3c			32		SANDY GRAVEL, well graded subangular to 2.0 in max, 10-15% mostly medium sand, <5% nonplastic fines, sat, brown (GW)

Site: TOWNSHIEND DAM	Boring No. FD-84-2 (FD-H)	Page 4 of 10

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		3"				
14.0	4a			—	DRILLING w/ 5-3/8 in Roller ROCK BIT TO WASH THE HOLE TO 15.0 ft. USING REVERT MUD TO KEEP THE HOLE OPEN.	SANDY GRAVEL: well graded, subangular to subrounded to 0.8 in max, 30-40% fine to medium sand, mostly medium sand, <5% non-plastic fines, sat, brown. (GW).
				34		
15.0				Rec 4'	SAMPLED USING A 3" ID BY 5 ft LONG SOLID SPOON SAMPLER, TO SAMPLE FROM 15.0 ft TO 20.0 ft.	
	4b			25		SAME AS S-4a. Fines increased to 5-7%. (GW-GM)
16.0						
				32		
17.0	4c					GRAVELLY SAND: medium to fine, mostly medium sand, 15-20% subrounded to 1.8 in. max. <5% non-plastic fines, saturated, brown (SP)
				18		
18.0						
				22		
19.0						
				26	DRILLED w/ 5-3/8 in. ROLLER ROCK BIT TO WASH THE HOLE TO 20.0 ft. USING REVERT MUD TO KEEP THE HOLE OPEN.	
20.0	5a			Rec 3.5'	DRIVE 5 ft OF 6" CASING, TO A TOTAL OF 20 ft OF CASING	SANDY GRAVEL: well graded subangular to subrounded to 1.0 in. max. 20-30% coarse to fine sand, mostly medium sand, <5% non-plastic fines, sat, brown (GW).
				22	SAMPLED USING 3" I.D x 5 ft LONG SOLID SPOON SAMPLER TO SAMPLE FROM 20.	
21.9						
	5b			28		SAME AS S-5a
22.0						

Site TOWNSHEND DAM VERMONT	Boring No. FD-84-2 (FD-H)	Page 5 of 10

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				28		
23.0	5C					SAME AS S-5b
				29		
24.0					DRILLED W/ 5-3/8 in. ROLLER ROCK BIT TO WASH THE HOLE TO 25.0 ft. DRIVE A 6 in x 5 ft LONG CASING TOTAL OF 25 ft OF 6 in. CASING.	
				23		
25.0	6a			Rec 20"	SAMPLED W/ 3 in I.D. X 5 ft LONG SOLID SPOON SAMPLER FROM 25.0 ft TO 30 ft.	SANDY GRAVEL: well graded, subangular to subrounded to 1.0 in. max. 30-40%, coarse to fine sand, mostly medium sand, <5%, nonplastic fines, sat, brown (GW)
				25		
26.0						
				33		
27.0	6b					SAME AS S-6a. Gravel to 1.2 in. max.
				33		
28.0					DRILLED W/ 5-3/8 in ROLLER ROCK BIT TO WASH THE HOLE TO 25.0 ft. DRIVE A 6 in x 5 ft LONG CASING TO A TOTAL OF 30 ft OF 6 IN. CASING. WASHED INSIDE THE CASING W/ 5-3/8 IN ROLLER ROCK BIT.	
				37		
29.0						
				35		
30.0	7a			Rec 1.5'	SAMPLED W/ 3 IN I.D. X 5 ft LONG SOLID SPOON SAMPLER FROM 30.0-35.0 ft	SANDY GRAVEL: well graded, angular to

Site TOWNSHEND DAM	Boring No. FD-84-2 (FD-H)	Page 6 of 10

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
31.0				19		subangular to 2.0 in max, 30-40% coarse to fine sand, mostly medium sand, 2-4% nonplastic fines sat, brown (GW)
	7b			35		SAME AS S-7a w/ gravel to 1.0 in max.
32.0				26		
33.0	7c			Rec 2.5'		SAME AS S-7b w/ gravel to 2.0 in max, <5% nonplastic fines
				26	DRILLED w/ 5-3/8 in ROLLER ROCK BIT TO 35.0 FT	
34.0				29		
35.0	8				SAMPLED w/ 3 in I.D x 5 ft LONG SOLID SPOON SAMPLER FROM 35.0 TO 36.8 (REFUSAL	LAYERED SILTY SAND & WEATHERED ROCK: SILTY SAND: poorly graded, 10-15% gravel to 0.5 in max, mostly fine sand, 15-25% slightly plastic fines, saturated, brown, 60% of sample; weathered rock, schist (SM)
				20		
36.0				100		
37.0				Refusal Rec 1.0'	DRILLED w/ 5-3/8 IN I.D. x 5 FT LONG SOLID SPOON SAMPLER FROM 36.8 FT TO 39.0 ft.	
38.0						
39.0						

FIG. No. 2C

Site:	Boring No.	Page 7 of 10

DEPTH (Ft.)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
39.0	9a			16	SAMPLED w/ 3 in. ID x 5 ft LONG SOLID SPOON SAMPLER. SAMPLED FROM 39.0 TO 42.6 FT.	GRAVELLY SILTY SAND: medium to fine sand, 20-30%, subangular gravel to 0.8 in. max, 20-25% nonplastic fines, saturated, brown mica particles (SM)
40				27		
41	9b			55		GRAVELLY SANDY SILT: moderately plastic, 25-30% fine to medium sand, 10-20% subrounded gravel to 0.6 in max. saturated, grey (ML)
42				38		
43				Rec 2.0'	BOTTOM OF BORING @ 42.6 ft	

Boring No. _____

Site: TOWNSHEND DAM

Boring No: FD-84-2 (FD-H)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
11/15/84	17:00	—	15	8	461.1	
11/16/84	8:00	—	15	7.6	461.5	
11/19/84	9:00	42.5	42.6	6	463.1	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

PIEZOMETER INSTALLATION RT

PG 9/10

PROJECT: TOWNSHEND DAM | DATE: 11/20/1984

LOCATION (STA): FD 84-2 (FD-H) | OFFSET FROM CENTER LINE: ½ inch | PIEZ NO.: #15

PIEZ TYPE: CASAGRANDE 1½ in OD 1 in ID 24" LONG | DEPTH OF PIEZ: 39.1 | RISER PIPE DIAM: 3/4 in

PIEZ TIP SET IN (SOIL TYPE): CONCRETE SAND | SOIL SAMPLE NO.: S-8C | BORING DIAM: 6 in I.D.

METHOD OF INSTALLATION: SET PIEZOMETER IN CONCRETE SAND

TYPE OF PROTECTION FOR PIEZ: 6 in. I.D. CASING & 5 ft GROUTING | VENT:

GROUND ELEV.: 469.1 ± | ELEV. TOP OF RISER: 472.0 ± | ELEV PIEZ TIP: 430.0 ±

FILTER: CONCRETE SAND | FROM ELEV: 426.5 ± | TO ELEV: 469.1 ±

SEAL: BENTONITE | FROM ELEV: 445 ± | TO ELEV: 449 ±

INSTALLED BY: EGA | CONTRACT NO.: W.O. 21 | FOREMAN: J. SANDERS

DATE OF INSTALLATION: 11/19/84 | DATE OF OBSERVATIONS: 11/28/84

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
11:00	0	5.50	1:40	64	5.50			
11:01	1	3.83						
11:06	5	5.50						
11:16	10	5.50						
11:36	30	5.50						

REMARKS: 3.1 ft of casing (6 in I.D) STICKOUT

* GREY PIEZ IN FD-84-2 (FD-8) IS PIEZ #15

Lahh Dwane

INSPECTOR

PIEZOMETER INSTALLATION REPORT

PROJECT: TOWNSHEND DAM | DATE: 11/20/84

LOCATION (STA): FD-84-2 (FD-H) OFFSET FROM CENTER LINE: ½ in PIEZ NO.: #16

PIEZ TYPE: CASAGRANDE 1½" OD 1" I.D 24" LONG DEPTH OF PIEZ: 19.1 RISER PIPE DIAM: 3/4 in

PIEZ TIP SET IN (SOIL TYPE): CONCRETE SAND SOIL SAMPLE NO.: S-4C BORING DIAM: 6 in I.D.

METHOD OF INSTALLATION: SET PIEZOMETER IN CONCRETE SAND

TYPE OF PROTECTION FOR PIEZ: 6" I.D CASING + 5 ft GROUT VENT:

GROUND ELEV.: 469.1 ELEV. TOP OF RISER: 470 ± ELEV PIEZ TIP: 450 ±

FILTER: CONCRETE SAND FROM ELEV: 449 ± TO ELEV: 469.1 ±

SEAL: BENTONITE FROM ELEV: 461.1 ± TO ELEV: 463.5 ±

INSTALLED BY: EGA CONTRACT NO.: W.O. 21 FOREMAN: J. SANDERS

DATE OF INSTALLATION: 11/20/84 DATE OF OBSERVATIONS: 11/28/84

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
11:50	0	5.50	1:36	60	5.50			
11:51	1	4.33						
11:56	5	5.50						
12:06	10	5.50						
12:36	30	5.50						

REMARKS: 3.1 ft of 6 in. I.D. CASING STICKOUT

* IN BORING FD-84-2 (FD-H) WHITE COLOR PVC IS PZ #16

Kalh Daare
INSPECTOR

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

FIELD LOG OF TEST BORING

PROJECT NO. W.O. 21

Site TOWNSHEND DAM

Page 1 of 11 Pages

Hole No. FD-84-3 Diam. (Casing) 6 in
FD-84-F

Boring Started 11/26/84

Co-ordinates: N _____ E _____

Boring Completed _____

Drilled by U.S. CORE OF ENG.

Report Submitted _____

Purpose of Exploration INSTALL PIEZOMETERS

Elevation Top of Hole 477.5 M.S.L.

Casing Left in Place 10 Feet

Total Overburden Drilled 50.0 Feet

Elevation Top of Rock — M.S.L.

Elevation Bottom of Hole 427.5 M.S.L.

Total Rock Drilled — Feet

Total Depth of Hole 50.0 Feet

Core Recovered — %

Core Recovered _____ Ft.: _____ Diam. _____ In.

Soil Samples 3 In. Diam. _____ No.

Soil Samples _____ In. Diam. _____ No.

Water Table Depth 13.2 FT

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	50	SAMPLED W/ SOLID SPOON SAMPLER
		8 IN x 5 FT LONG EVERY 5 FT INTERVALS
0	10	CLEAN THE HOLE W/ AUGER
0	30	CLEAN THE HOLE W/ 5-5/8 IN ROLLER
		ROCK BIT INSIDE 6 IN CASING
30	50	CLEAN THE HOLE W/ 3-3/4 IN ROLLER
		ROCK BIT FROM 30 FT TO 50 FT
		INSIDE 4 IN CASING .09 FT EXTRA WASH.

INDEX

Ground Water P619 Back of Page _____

Boring Location Sketch _____ Back of Page _____

Overburden Record 2 - 8 Page _____

Rock Drilling _____ Page _____

_____ Page _____

_____ Page _____

_____ Page _____

Prepared by Ralph Daraie
Field Date Lab. Date

Submitted by _____

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 TOWNSHEND DAM — Page 2 of 11 Pages

Boring No. FD-84-3 / FD-F Desig. _____ Diam. (Casing) 6"

Co-ordinates. N _____ E _____

Elevation Top of Boring 477.5 M.S.L.
Total Overburden Drilled 50.0 Feet
Elevation Top of Rock — M.S.L.
Total Rock Drilled — Feet
Elevation Bottom of Boring 427.5 M.S.L.
Total Depth of Boring 50.0 Feet
Core Recovered — % No. Boxes _____
Core Recovered _____ Ft : _____ Diam. _____ In.
Soil Samples 3 In. Diam. _____ No.
Soil Samples _____ In. Diam. _____ No.

Hammer Wt. 300 lbs Boring Started 11/27/84
Hammer Drop 18 inches Boring Completed 12/1/84
Casing Left 10 FT
Subsurface Water Data _____ Page 9
Obs. Well _____
Drilled By ARMY CORPS OF ENGINEERS
Mfg. Des. Drill HOLEMASTER
Inspected By: LALEH DARAIE (EGA)
Classification By: Laleh Daraie (EGA)
Classification By: _____

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		S-1a	3"	0.0		DIG THE GRASS SURFACE OUT.	Layered Topsoil: 1 inch of Grass
					20	SAMPLED USING A 3 in x 5 ft LONG SOLID SPOON SAMPLER FROM 0.4 FT TO 5.0 ft	Gravelly Silty Sand, gap graded, 20-25% sub-rounded gravel to 0.8 in max, mostly fine sand, 20-30%, nonplastic fines, damp, dark brown (SP-SM)
	1.0				29		
	2.0				19		
	3.0	S-1b			11		SILT: nonplastic, 5-10%, very fine sand, damp, reddish brown (ML)
	4.0				12	AUGER CLEAN THE HOLE TO 5.0 ft DEEP.	
	5.0			5.0	Rec. 4'		

GENERAL REMARKS:

Site	Boring No.	Page 3 of 17
TOWNSHEND DAM	FD-84-3 (FD-F)	

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	S-2a	3"	5.0	3	SAMPLED USING A 3 in x 5 ft LONG SOLID SPOON SAMPLER FROM 5.0 ft TO 10 FT	SAME AS S-1b
6.0	S-2b			12		LAYERED SILT & SAND: SILT, SAME AS S-2a Sand, medium to fine, mostly fine, subrounded, 2-5%, nonplastic fines, damp, brown (ML, SP)
7.0				19		
8.0	S-2c			33		GRAVELLY SAND; poorly graded, subrounded sand, 15-20% subrounded gravel to 1.0 in max, <5% nonplastic fines, damp, greyish brown (SP)
9.0				49.	USE AUGER TO CLEAN THE HOLE TO 10.0 FT.	
10.0	S-3a		10.0	Rec 3.5' 24	SAMPLED USING A 3 in x 5 ft SOLID SPOON SAMPLER FROM 10.0 FT TO 15.0 FT.	SAME AS S-2c, 15-20%, freshly broken fragments, subangular gravel to 1.2 in max.
11.0					DRIVING 10 FT OF 6 IN CASING.	
	S-3b			32		Gravelly Sand: well graded, coarse to fine, mostly medium sand, 15-20% subrounded to subangular gravel to 1.0 in max, damp, brown (SW)
12.0				42		
13.0	S-3c					SAME AS S-3b, SOME QUARTZ PARTICLES.

58A (Test)

Boring No. _____

FIG. No. 2C

Site	Boring No.	Page 4 of 11
TOWNSHEND DAM	FD-84-3 (FD-F)	

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		3"		36	DRILL W/ 5-5/8 in ROLLER ROCK BIT WHILE USING REVERT MUD TO KEEP THE HOLE OPEN TO 15.0 FT.	
14.0				31	DRIVING ANOTHER 5 FT OF 6 IN. CASING MAKING A TOTAL OF 15 FT.	
15.0	S-4a		15.0	Rec 5'	WASH INSIDE THE CASING W/ 5-5/8 IN ROLLER ROCK BIT TO 15 FT. SAMPLE USING A 3 IN X 5 FT LONG SOLID SPOON SAMPLER FROM 15.0 FT TO 20.0 FT.	Gravelly sand, well graded, coarse to fine, mostly medium sand, 25-35% subrounded gravel to 1.0 in max, 5-10% non plastic fines, saturated, brown (SW, SM)
				27		
16.0						
				39		
17.0						
	S-4b			37		SAME AS S-4a
18.0					DRILLED W/ 5-5/8 IN ROLLER ROCK BIT. TO 20.0 FT WHILE KEEPING THE HOLE OPEN W/ REVERT MUD.	
				43		
19.0					DRIVE ANOTHER 6 IN CASING 5 FT LONG TO MAKE A TOTAL OF 20 FT.	
				45	WASH INSIDE THE CASING W/ 5-5/8 IN ROLLER ROCK BIT TO 20 FT.	
20.0	S-5a		20.0	Rec 1.5	SAMPLED W/ 5 FT LONG B/ 3 IN SOLID SPOON SAMPLER FROM 20.0 FT TO 25.0 FT	Gravelly sand, well graded coarse to medium, mostly medium sand, 20-30% subrounded gravel to 1.2 in max, <5% non plastic fines, sat, brown (SW)
				20		
21.0					A LOT OF WATER LOSS AROUND 20.0 FT.	
				26		
22.0						

Boring No. _____

FIG. No. 2C

Site TOWNSHEND DAM	Boring No. FD-84-3 (FD-F)	Page 5 of 11

DEPTH ft.	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		3			DRILL w/ 5-5/8 IN ROLLER ROCK BIT WHILE KEEPING THE HOLE OPEN w/ REVERT MUD, TO 25.0 FT.	
	S-5b			25		SAME AS S-5a
23.0					DRIVE A 5 FT LONG x 6 IN CASING TO MAKE A TOTAL OF 25.0 FT.	
				27		
24.0						
				24		
25.0	S-6a		25.0	Rec 1.5' 38	SAMPLE w/ 5 FT LONG x 3 IN SOLID SPOON SAMPLER FROM 20.0 TO 25.0 FT	SAME A S-5b
26.0						
				34		
27.0						
	S-6b			26		Gravelly Sand, well graded mostly medium sand, 15-20% subrounded gravel to 0.8 in max size, 10-15% non plastic fines, soft, brown (SW-SM)
28.0					DRILLED w/ 5-5/8 IN ROLLER ROCK BIT WHILE KEEPING THE HOLE OPEN w/ REVERT MUD TO 30.0 FT.	
				23		
29.0					DRIVE A 5 FT LONG BY 6 IN CASING TO A TOTAL OF 30 FT.	
				44	WASH THE INSIDE OF CASING w/ 5-5/8 IN ROLLER ROCK BIT TO 30.0 FT.	
30.0	S-7a		30.0	Rec 2.5'	SAMPLE w/ A 5 FT LONG BY 3 IN SOLID SPOON SAMPLER FROM	Sandy Silty Gravel, subrounded to 1.2 in max, 30-40% coarse to fine, mostly medium sand, 15-20% non-

FD-84-3

Boring No. _____

8A (Test)

FIG. No. 2C

Site	Boring No.	Page 6 of 11
TOWNSHEND DAM	FD-84-3 (FD-F)	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		3"		33		non plastic fines, sat, brown (GM-SM)
31.0						
				26		
32.0						
	S-7b			27		SAME AS S-7a
33.0					DRILL w/ 5-5/8 IN ROLLER ROCKBIT TO 35.0 FT.	
				28		
34.0						
				20		
35.0	S-8a		35.0	Rec. 1.5 / 21	SAMPLED W/A 5 FT LONG BY 3 IN SOLID SPOON SAMPLER FROM 35.0 TO 40.0 FT.	Gravelly Sand, coarse to fine, mostly coarse sand, 20-30% subrounded gravel to 0.6 in max, <5% nonplastic fines, sat, brown (SW)
36.0						
	S-8b			20		SAME AS S-8a
37.0						
				18		
38.0	S-8c			21	DROP IN 42 FT OF 4 IN CASING ABOUT 10 FT OF STICKOUT. DRIVE THE 4 INCH CASING w/ 300 lbs HAMMER. END UP w/ 40 FT 4 IN IN THE HOLE W/ 2 FT STICKOUT.	Silty Sand, medium to fine, mostly medium sand, 20-30% nonplastic fines, sat, brown (SM)
39.0						

FIG. No. 2C

Site	Boring No.	Page 7 of 11
TOWNSHEND DAM	FD-84-3 (FD-F)	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		3"			DRILL w/ 3-3/4 IN ROLLER ROCK BIT TO 40 FT.	
				30		
40.0	S-9a		40.0	Rec 3.5'	SAMPLED USING A 3 IN X 5 FT LONG SOLID SPOON SAMPLER FROM 40.0 FT TO 45.0 FT.	Sandy Gravel, subangular to subrounded to 1.2 in max, 20-30%, medium to fine sand, < 5%, nonplastic fines, 20-30% decomposed mica particles, Sat, blackish brown, mica particles to 1.0 in max (GW)
				54		
41.0						
				58		
42.0						
	S-9b			39		Gravelly Sand, well graded mostly medium sand, 25-30%, subrounded gravel to 0.8 in max, 10-15%, nonplastic fines, Sat, brown (SW-SM)
43.0						
				31		
44.0					DRILL w/ 3-7/8 IN ROLLER ROCK BIT TO 45.0 FT.	
				29	DRIVE ANOTHER 4 FT OF 4 IN CASING TO A TOTAL OF 46 FT w/ 1 FT STICKOUT.	
45.0	S-10a		45.0	Rec 4'	SAMPLED w/ 5 FT LONG BY 3 IN SOLID SPOON SAMPLER FROM 45.0 FT TO 50.0 FT	Sand, medium to fine, mostly fine sand, 10-15%, nonplastic fines, Sat, brown (SM)
				42		
46.0						
	S-10b			33		Same As S-10a
47.0						

FIG. No. 2C

Site	Boring No.	Page 8 of 11
TOWNSHEND DAM	FD-84-3 (FD-F)	

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				31		
48.0	S-10C					Gravelly Sand: medium to fine, mostly medium sand, 20-30%, subrounded gravel to 1.0 in max, 10-15% nonplastic fines, sat, brown, trace of mica particles (SP-SM)
				47		
49					WASH W/ 3-3/4 IN ROLLER ROCK BIT TO 50 FT.	
				70	TOTAL OF 51 FT OF 4 IN CASING W/ ABOUT 1 FT STICKOUT.	
50						
					BOTTOM OF BORING @ 50.9 FT	

(Test)

Boring No. FD-84-3

FIG. No. 2C

Site: TOWNSHEND DAM
Boring No: FD-84-3 (FD-F)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
11/29	7:10	20	25	13.0	464.5	
11/30	7:15	30	35	11.8	465.7	
12/1	7:30	50	50.9	13.2	464.3	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

PIEZOMETER INSTALLATION REPORT

PROJECT: TOWNSHIEND DAM / VERMONT | DATE: 12/1/84

LOCATION (STA): FD-84-3 (FD-F) | OFFSET FROM CENTER LINE: $\frac{1}{2}$ IN | PIEZ NO.: #11

PIEZ TYPE: CASAGRANDE | DEPTH OF PIEZ: 47.5 | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): CONCRETE SAND | SOIL SAMPLE NO.: S-10C | BORING DIAM: 6" ID

METHOD OF INSTALLATION: INSTAL PIEZOMETER IN CONCRETE SAND

TYPE OF PROTECTION FOR PIEZ: 6 IN I.D CASING & 4.5 FT GROUTING | VENT:

GROUND ELEV.: 477.5 ± | ELEV. TOP OF RISER: 480 ± | ELEV PIEZ TIP: 430 ±

FILTER: CONCRETE SAND | FROM ELEV: 426.6 + | TO ELEV: 477.5 ±

SEAL: Bentonite | FROM ELEV: 445 ± | TO ELEV: 449 ±

INSTALLED BY: EGIZ | CONTRACT NO.: W.O. 21 | FOREMAN: J. SANDERS

DATE OF INSTALLATION: 12/1/84 | DATE OF OBSERVATIONS: 12/14/84

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
min 50 Gal. of water was pumped in. The rate of water								
dissipation exceeds the rate of pumping								
∴ no measurements could be taken								

REMARKS: * Grey riser pipe is Pz #11

INSPECTOR

PIEZOMETER INSTALLATION REPORT

PG 11

PROJECT: TOWNSHEND DAM | VERMONT | DATE: 12/1/84

LOCATION (STA): FD-84-3 (FD-F) OFFSET FROM CENTER LINE: ½ IN PIEZ NO.: #12

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: 27.5 RISER PIPE DIAM: 3/4 IN

PIEZ TIP SET IN (SOIL TYPE): CONCRETE SAND SOIL SAMPLE NO.: S-6(a,b) BORING DIAM: 6" ID

METHOD OF INSTALLATION: INSTAL PIEZOMETER IN CONCRETE SAND

TYPE OF PROTECTION FOR PIEZ: 6 IN I.D CASING 4.5 FT GROUTING VENT:

GROUND ELEV.: 477.5 ELEV. TOP OF RISER: 480 ± ELEV PIEZ TIP: 450 ±

FILTER: CONCRETE SAND FROM ELEV: 449 ± TO ELEV: 477.5 ±

SEAL: Bentonite FROM ELEV: 469.5 ± TO ELEV: 471.5 ±

INSTALLED BY: EGA CONTRACT NO.: W.O. 21 FOREMAN: J. Sanders

DATE OF INSTALLATION: 12/1/84 DATE OF OBSERVATIONS:

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
min 50 gal of water was pumped in. The rate of water desipation exceeds the rate of pumping in no measurements could be taken.								

REMARKS: * White riser pipe is Pz #12

INSPECTOR

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

FIELD LOG OF TEST BORING

PROJECT NO. 0021

Site: Townsend Dam — Page 1 of 5 Pages

Hole No. FD-84-4G — Diam. (Casing) 6"/4" — Boring Started: 3 Dec 1984

Co-ordinates: N _____ E _____ — Boring Completed: TO BE CONTINUED

Drilled by: Corp of Engineers — Report Submitted _____

Purpose of Exploration: To install peizometers, 13 and 14.

Elevation Top of Hole: 470.4 M.S.L. — Casing Left in Place _____ Feet

Total Overburden Drilled: HOLE NOT COMPLETED YET Feet

Elevation Top of Rock _____ M.S.L.

Elevation Bottom of Hole: 428.0 M.S.L.

Total Rock Drilled _____ Feet

Total Depth of Hole _____ Feet

Core Recovered _____ %

Core Recovered _____ Ft.; _____ Diam. _____ In.

Soil Samples: 3 In. Diam. _____ No.

Soil Samples _____ In. Diam. _____ No. — Water Table Depth: 8.0 FT

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	16	Took Samples with 5 ft x 5" Solid
		Spoon sampler.
7.1	11	Cored 36" of Quarts and 8" of
		wood.
14	16	Roller rocked a 24" Boulder.

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Prepared by: Phil McBain — Field Data — Lab. Data

Submitted by _____

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U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site Townsend Dam — Page 2 of 5 Pages

Boring No. ~~FD-844~~ FD-G Desig. _____ Diam. (Casing) _____

Co-ordinates. N _____ E _____

Elevation Top of Boring 470.0 M.S.L. — Hammer Wt. 300 lb. — Boring Started _____

Total Overburden Drilled _____ Feet — Hammer Drop _____ — Boring Completed _____

Elevation Top of Rock — M.S.L. — Casing Left _____

Total Rock Drilled — Feet — Subsurface Water Data _____ Page 5

Elevation Bottom of Boring 428.0 M.S.L. — Obs. Well _____

Total Depth of Boring NOT COMPLETED YET Feet — Drilled By CORPS OF ENGINEERS

Core Recovered — % — No. Boxes — — Mfg. Des. Drill HOLEMASTER

Core Recovered — Ft: — Diam. — In. — Inspected By: Phil McBain

Soil Samples _____ In. Diam. ____ No. — Classification By: PHIL McBAIN

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

DEPTH (1"=)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6 IN / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			0.0		Sample from 0.0 to 5.0' taken with a 5 ft x 3' ID solid spoon with 300 lb hammer.	Silty GRAVEL: gap-graded, 30-40% freshly fractured subrounded gravel, 25-35% non-plastic fines, 5-10% sand, damp, dark brown. (GM)
				10		
1	1A			10		
				20		
			1.6			Gravelly SILT: gap-graded, mostly 30 to 40% nonplastic fines, 20-30% freshly fractured subangular gravel, 0-5% sand, brownish black and damp. (ML)
2				27		
	1B			17		
3				10		
			3.2			Gravelly Sandy SILT: poorly graded, mostly 30-40% nonplastic fines, 20-25% subrounded gravel, 20-30% sand, brown ish black, damp (ML)
				12		
4	1C			20		
				12		
5				24		

GENERAL REMARKS:

Boring No. _____

Site	Boring No.	Page 4 of 5
Townsend Dam	FD-84-4G	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6 IN / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
					106	Drove 4" Flush casing from 0 to 15.0 ft. with 300 lb hammer.	
	14			14.0		Used 6" Roller rock bit to drill through rock	Roller Rocked Boulder (24")
24	15					Drove 4" casing from 0.0' to 15.0' with 300 lb hammer after it was washed out with roller rock bit.	
	16					Work stopped until further notice.	
	17						

FORM 58A (Test)

Boring No. _____

FIG. No. 2C

Site	Boring No.	Page 3 of 5
Townsend Dam	FD-84-4 G	

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6 IN / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1B			15	Sample from 5.0 to 7.0 taken with a 5' x 3' solid spoon with a 300 lb hammer.	Gravelly Sandy SILT: poorly graded, mostly 30 to 40% non plastic fines, 25-30% subangular gravel, 20-25% sand, brown, damp (ML)
6			6.0	24		
	2B			30		Gravelly SILT; poorly graded, 30-40% non-plastic fines, 30-35% subangular gravel, 10-15% sand. (ML)
7			7.0	36		
				100+	Rock cored with 6" core bit.	Cored Quartz Boulder (36")
8						
9						
10						
						Cored 8" of wood.
11			11.0			
	1C			11	Samples from 11.0 to 14.0 ft with 5 ft x 2' ID solid spoon with 300 lb hammer.	SILT: Poorly graded, 50-70% non plastic fines, 10-15% fine sand, 5-10% subrounded gravel, 0-5% organics, brownish gray, wet. (OL)
12				75		
			12.5	11		SAND: Poorly graded, 70-85% fine sand, 5-10% silt, 10-15% boulders, brown, wet. (SP-SM)
13	2C			8		
				16		

(Test)

Boring No. _____

FIG. No. 2C

Site: Townsend Dam

Boring No: FD-84-46

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
7 Dec	12:15	7.0'	11.0	7.'10"	462.6	
8 Dec	9:00	7.0' of 6" 15' of 4"	16.0	8.0'	462.4	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

FORM 9(st)

Boring No. _____

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

FIELD LOG OF TEST BORING

PROJECT NO. 0001

Site TOWNSHEND LAKE TOWNSHEND, VT. Page 1 of 12 Pages

Hole No. FD-85-1(A) Diam. (Casing) 6" Boring Started 6/13/85

Co-ordinates: N _____ E _____ Boring Completed 6/18/85

Drilled by MOBILE DISTRICT Report Submitted _____

Purpose of Exploration TO DETERMINE SUBSURFACE CONDITIONS IN REGARDS TO THE INSTALLATION OF 24" DIAMETER RELIEF WELLS.

Elevation Top of Hole 472.0'± M.S.L. Casing Left in Place — Feet

Total Overburden Drilled 60.5' Feet

Elevation Top of Rock 405.5' M.S.L.

Elevation Bottom of Hole 400.0'± M.S.L.

Total Rock Drilled 1.5' Rotten Rock 4.0' Core Feet

Total Depth of Hole 72.0' Feet

Core Recovered 57.5 %

Core Recovered 3.5 Ft.: ____ Diam. ____ In.

Soil Samples 1 3/8" In. Diam. 38 No.

Soil Samples _____ In. Diam. ____ No. Water Table Depth 8.0'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0'	66.0'	SAMPLED WITH 1 3/8" x 2.0' SPLIT SPOON WITH 140LB HAMMER.
0.0'	2.5	DRILLED WITH 6" ROTTEN ROCK
0.0'	5.0	DRILLED 6" CASING AND WASHED OUT
2.5	68.0'	DRILLED WITH 6" ROTTEN ROCK AND WASHED OUT.
68.0'	72.0'	CORED WITH 2 3/4 x 3 7/8" x 5.0' AW CORE BARREL.

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Prepared by Michael A. Owens
Field Data Lab. Data

Submitted by Michael A. Owens

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 TOWNSHEND DAM TOWNSHEND, VT. Page 2 of 12 Pages

Boring No. ED-85-1 Desig. A Diam. (Casing) 6"

Co-ordinates. N _____ E _____

Elevation Top of Boring 472.0'± M.S.L.
Total Overburden Drilled 66.5' Feet
Elevation Top of Rock 405.5' M.S.L.
Total Rock Drilled 2.0' Roller Rock 4.0' CORE Feet
Elevation Bottom of Boring 400.0'± M.S.L.
Total Depth of Boring 72.0' Feet
Core Recovered 87.5 % No. Boxes —
Core Recovered 3.5' Ft : 2.25" Diam. 42 In.
Soil Samples 1 7/8" In. Diam. 38 No.
Soil Samples _____ In. Diam. ____ No.

Hammer Wt. 140 LB. Boring Started 6/13/85
Hammer Drop _____ Boring Completed 6/18/85
Casing Left —
Subsurface Water Data _____ Page 11
Obs. Well _____
Drilled By MOBILE DISTRICT
Mfg. Des. Drill _____
Inspected By: Mark A. Owens
Classification By: Mark A. Owens
Classification By: _____

DEPTH (Ft.)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			0.0	5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 0.0 - 2.0' WITH 140 LB HAMMER.	GRAVELLY SAND MEDIUM TO FINE, MOSTLY FINE. 15-20% SUB ROUNDED GRAVEL, 5-15% NON PLASTIC FINES. BROWN, DRY (SP+SM)
				26		
1	1	1 7/8"	TO	24		
				50		
2			2.0'	13" rec. 42		SAND FINE GRAINED. TRACE GRAVEL, TRACE NON PLASTIC FINES. SOME GNEISSIC COBBLES. BROWN, DRY (SP)
				39		
3	2	1 7/8"	TO	32	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 2.0' - 4.0' WITH 140 LB. HAMMER. 10" ROLLER ROCK FROM 0.0 - 2.5'	
				55	DRILLED 6" CASING FROM 0.0' TO 5.0' 6" ROLLER ROCK FROM 3.0'-4.0' AND WASHED OUT. SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 4.0' TO 6.0' WITH 140 LB HAMMER.	SAND SAME AS SAMPLE #2 (SP)
4			4.0'	18" rec. 21		
5	3	1 7/8"	TO	13		

GENERAL REMARKS: TOP OF BEDROCK ELEVATION 405.5'

Site TOWNSHEND LAKE TOWNSHEND, VT.

Boring No. FD-85-1 (A)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				11	6" Roller Rock from -1.0' to 6.0' and washed out.	
				25		
6			6.0'	25	Sampled with 1 7/8" x 2.0' split spoon from 6.0' to 8.0' with 140 LB. Hammer.	SAND Fine grained, trace medium, <5% angular gravel, trace non plastic fines, black to brown, dry (SP)
	4	1 7/8"	to	26	6" Roller Rock from 6.0' to 7.0' and washed out.	
7			7.0			
				22		GRAVELLY SAND Coarse to fine. 30-30% sub angular to sub rounded gravel, trace non plastic fines, brown, dry (SW)
	5	1 7/8"	to	33		
8			8.0	30" Rec. 24	Sampled with 1 7/8" x 2.0' split spoon from 8.0' to 10.0' with 140 LB Hammer.	
					6" Roller Rock from 8.0' to 10.0' and washed out.	
9	6	1 7/8"	to	11		
				8		
				14		
10			10.0'	0" Rec. 8	Sampled with 1 7/8" x 2.0' split spoon from 10.0' to 12.0' with 140 LB. Hammer.	GRAVELLY SAND Coarse to fine, mostly med. to fine, 30-30% sub angular to sub rounded gravel. <5% non plastic fines, brown, damp (SP)
					6" Roller Rock from 10.0' to 12.0' and washed out.	
				20		
11	7	1 7/8"	to	22		
				19		
12			12.0'	21	Sampled with 1 7/8" x 2.0' split spoon from 12.0' to 14.0' with 140 LB Hammer.	SILTY SAND Medium to fine, mostly fine. 10-15% non plastic fines. 10% sub rounded gravel, grayish brown, dry (SM)
					6" Roller Rock from 12.0' to 14.0' and washed out.	
				24		
13	8	1 7/8"	to	26		
			13.5'			

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-1 (A)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	9	1 7/8"	13.5' TO			SAND MEDIUM TO FINE MOSTLY FINE TRACE NON PLASTIC FINE ABUNDANT MICA FLAKES POSSIBLE DECAYED SCHIST DARK BROWN, DRY (SP)
14	10	1 7/8"	13.75' TO 14.0'	26	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 14.0' TO 16.0' WITH 140LB HAMMER [NO RECOVERY]	GRAVELLY SILTY SAND MEDIUM TO FINE, MOSTLY FINE. 20-25% NON PLASTIC FINES 10-20% SUBROUNDED GRAVEL. LIGHT BROWN, DAMP (SM)
				13		
				17	6" ROLLER ROCK FROM 14.0' TO 16.0' AND WASHED OUT.	
15	11	1 7/8"	TO	18		
				23		
16			16.0	0" REC.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 16.0' TO 18.0' WITH 140 LB. HAMMER	GRAVELLY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE. 20-25% SUB ANGULAR GRAVEL 5-10% NON PLASTIC FINES BROWN, MOIST (SP-SM)
				25		
				18	6" ROLLER ROCK FROM 16.0' TO 18.0' AND WASHED OUT.	
17	12	1 7/8"	TO	21		
				24		
18			18.0'	27	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 18.0' TO 20.0' WITH 140LB HAMMER.	GRAVELLY SAND SAME AS SAMPLE #12 (SP-SM)
				43	6" ROLLER ROCK FROM 18.0' TO 20.0' AND WASHED OUT.	
19	13	1 7/8"		21		
				17		
20			20.0	11" REC.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 20.0' TO 22.0' WITH 140LB HAMMER.	SAND COARSE TO FINE, MOSTLY FINE. 5-10% SUBROUNDED GRAVEL. TRACE NON PLASTIC FINES. BROWN, DAMP (SP)
				20		
	14	1 7/8"	TO	17	6" ROLLER ROCK FROM 20.0' TO 22.0' AND WASHED OUT.	
21				17		
	15	1 7/8"	21.5' TO 22.0'	27		SAND FINE GRAINED, UNIFORM. TRACE NON PLASTIC FINES. BROWN, DAMP (SP)
22						

22" REC.

(Test)

Boring No. FD-85-1(A)

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.	Boring No. FD-85-1 (A)	Page 5 of 12

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
23	16	1 7/8"	22.0' TO 24.0'	12, 10, 16, 18	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 22.0' TO 24.0' WITH 140 LB HAMMER. 6" ROLLER ROCK FROM 22.0' TO 24.0' AND WASHED OUT.	SAND: MEDIUM TO FINE, MOSTLY FINE. < 10% SUB ROUNDED GRAVEL. TRACE NON PLASTIC FINES. BROWN, DAMP (SP)
24	17	1 7/8"	24.0' TO 26.0'	20 in rec., 22, 30, 29, 50	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 24.0' TO 26.0' WITH 140 LB HAMMER. 6" ROLLER ROCK FROM 24.0' TO 26.0' AND WASHED OUT.	GRAVELLY SAND: MEDIUM TO FINE MOSTLY FINE, 15-25% SUB ROUNDED GRAVEL. < 5% NON PLASTIC FINES. BROWN, DAMP (SP)
26	18	1 7/8"	26.0' TO 28.0'	23, 46, 28, 28	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 26.0' TO 28.0' WITH 140 LB HAMMER. 6" ROLLER ROCK FROM 26.0' TO 28.0' AND WASHED OUT.	SANDY GRAVEL: SUB ANGULAR TO SUB ROUNDED 30-40% MED. TO FINE SAND 10-15% NON PLASTIC FINES. LIGHT BROWN, MOIST. (GP-GM)
28	19	1 7/8"	28.0' TO 30.0'	22, 34, 37, 33	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 28.0' TO 30.0' WITH 140 LB HAMMER. 6" ROLLER ROCK FROM 28.0' TO 30.0' AND WASHED OUT.	SANDY GRAVEL: SAME AS SAMPLE #18 (GP-GM)
30			30.0'	14" rec., 25	SAMPLED WITH 1 7/8" x 2.0 SPLIT SPOON FROM 30.0 TO 32.0 WITH 140 LB HAMMER.	SANDY GRAVEL: SAME AS SAMPLE #18 (GP-GM)

Site: TOWNSHEND LAKE DAM TOWNSHEND, VT.	Boring No. FD-85-1 (A)	Page 6 of 12

DEPTH 1" =	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
31	20	1 7/8"	to	31		
				29		
				43		
32			32.0'	4" rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 32.0' TO 34.0' WITH 140 LB HAMMER	GRAVELLY SAND COARSE TO FINE MOSTLY FINE. 30-40% SUB ANGULAR TO SUB ROUNDED GRAVEL <5% NON PLASTIC FINES MED. BROWN, MOIST. (SP)
				30	6" ROLLER ROCK FROM 32.0' TO 34.0' AND WASHED OUT	
				20		
33	21	1 7/8"	TO			
				40		
				83		
34			34.0'	21" rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 34.0' TO 36.0' WITH 140 LB HAMMER.	GRAVELLY SAND COARSE TO FINE MOSTLY FINE. 25-35% SUB ANGULAR TO SUB ROUNDED GRAVEL <5% NON PLASTIC FINES MEDIUM BROWN AND BLACK, MOIST (SP)
				31	6" ROLLER ROCK FROM 34.0' TO 36.0' AND WASHED OUT.	
				42		
35	22	1 7/8"	TO			
				29.5		
				29		
36			36.0	33" rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 36.0' TO 38.0' WITH 140 LB HAMMER.	SANDY GRAVEL ANGULAR TO SUB ROUNDED 35-45% med. TO FINE SAND <5% NON PLASTIC FINES BROWN, MOIST (GP)
				21	6" ROLLER ROCK FROM 36.0' TO 38.0' AND WASHED OUT.	
				24		
37	23	1 7/8"	TO			
				23		
				27		
38			38.0		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 38.0' TO 40.0' WITH 140 LB HAMMER.	GRAVELLY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE. 25-30% SUB ANGULAR TO SUB ROUNDED GRAVEL, TRACE NON PLASTIC FINES. BROWN, MOIST (SP)
				20	6" ROLLER ROCK FROM 38.0' TO 40.0' AND WASHED OUT.	
				28		
39						

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-1 (A

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	24	1 7/8"	TO	28		
				29		
40			40.0'	25	Sampled with 1 7/8" x 2.0' split spoon from 40.0' to 42.0' with 140 LB hammer. 6" roller rock from 40.0' to 42.0' and washed out.	GRAVELLY SAND Coarse to fine, mostly fine. 20-30% sub angular to sub rounded gravel. 2-5% non plastic fines. Mainly brown, some black. Damp. (SP)
				28		
41	25	1 7/8"	TO	69		
				125		
42			42.0'	12" Rec.	Sampled with 1 7/8" x 2.0' split spoon from 42.0' to 44.0' with 140 LB. hammer. 6" roller rock from 42.0' to 44.0' and washed out.	SANDY GRAVEL Sub rounded to sub angular 30-40% coarse to fine, mostly fine sand. 5-15% non plastic fines. Gray-brown, moist (GP-GM)
				70		
				63		
43	26	1 7/8"	TO	58		
				84		
44			44.0'	59	Sampled with 1 7/8" x 2.0' split spoon from 44.0' to 46.0' with 140 LB hammer. 6" roller rock from 44.0' to 46.0' and washed out.	SILTY GRAVELLY SAND Medium to fine, mostly fine. 25-35% sub angular to sub rounded gravel. 10-20% non plastic fines. Gray-brown, moist (SP-SM)
				63		
45	27	1 7/8"	TO	82		
				110		
46			46.0'	13" Rec.	Sampled with 1 7/8" x 2.0' split spoon from 46.0' to 48.0' with 140 LB hammer. 6" roller rock from 46.0' to 48.0' and washed out.	SILTY SANDY GRAVEL Sub rounded, some sub angular. 25-35% coarse to fine, mostly fine. 15-20% non plastic fines. Some quartz cobbles. Grayish brown, moist. (GM)
				35		
				61		
47	28	1 7/8"	TO	46		

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-55-1 (A)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				70		
48			48.0'	13" Rec.	SAMPLED WITH 1 3/8" x 2.0' SPLIT SPOON FROM 48.0' TO 49.0' WITH 140 LB HAMMER.	SILTY SANDY GRAVEL MOSTLY SUB ANGULAR TO ANGULAR. 25-35% MEDIUM TO FINE, MOSTLY FINE SAND. 10-20% NON PLASTIC FINES. FAIRLY ABUNDANT VERY WEATHERED SCHIST AND GNEISSIC SCHIST COBBLES. BROWN, GRAY TO DARK BROWN-GRAY, MOIST. (Gp-Gm)
	29	1 3/8"	TO	46	6" Roller Rock FROM 48.0' TO 50.0' AND WASHED OUT.	
				150+	* BOUNCING REFUSAL ENCOUNTERED AT 49.0' WITH NO PENETRATION Roller Rocked past REFUSAL AHEAD TO 50.0'.	
49			49.0'	6" Rec.		
				—		
				—		
50			50.0'		SAMPLED WITH 1 3/8" x 2.0' SPLIT SPOON FROM 50.0' TO 51.0' WITH 140LB HAMMER.	SILTY SANDY GRAVEL SAME AS SAMPLE #29 (Gp-Gm)
				38		
	30	1 3/8"	TO		6" Roller Rock FROM 50.0' TO 52.0' AND WASHED OUT.	
				160+	* BOUNCING REFUSAL ENCOUNTERED AT 51.0' NO penetration Roller Rocked AHEAD TO 52.0'.	
51			51.0'	3" Rec.		
				—		
				—		
52			52.0'			52.0'
				—		CORED SCHIST + QUARTZ COBBLES AND BOULDERS
				—	CORED OVERBURDEN 2.75" ID x 5.0' AW CORE BARREL. FROM 52.0' TO 57.0'.	
53				—		
		2"	TO	—		
54				—		
				—		
55			55.0		SAMPLED WITH 1 3/8" x 2.0' SPLIT SPOON FROM 55.0' TO 57.0' WITH 140LB HAMMER.	55.0' SILTY SANDY GRAVEL SUB ANGULAR TO SUBROUNDED 30-35% COARSE TO VERY FINE MOSTLY FINE TO VERY FINE SAND. 15-20% NON PLASTIC FINES. ABUNDANT QUARTZ COBBLES. GRAY-BROWN, MOIST. (Gm-Gp)
				30	6" Roller Rock FROM 55.0' TO 57.0' AND WASHED OUT.	
56	31	1 3/8"	TO	67		

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-1 (A)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				37		
				33		
57			57.0'		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 57.0' TO 57.75' WITH 140 LB HAMMER	SILTY SANDY GRAVEL SAME AS SAMPLE #33 (GM-GP)
				90		
	32	1 7/8"	TO	100+	6" roller rock from 57.0' to 57.75' and washed out. (No roller rock penetration)	
			57.75'	ref.		57.75'
58			RUN 2		* REFUSAL ENCOUNTERED AT 57.75' CORED WITH 2.75" ID x 5.0' AW CORE BARREL FROM 57.75' TO 59.0'	CORED QUARTZ BOULDER
	33	2.75" ID	TO	—		
				—		
59			59.0'		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 59.0' TO 61.0' WITH 140 LB HAMMER	59.0' SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 20-30% SUBROUNDED GRAVEL. 5-15% NON PLASTIC FINES. BROWN TO BROWNISH GRAY, DAMP. (SP-SM)
				72		
					6" roller rock from 59.0' to 61.0' and washed out.	
				62		
60			TO			
				51		
				54		
61			61.0'		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 61.0' TO 61.5' WITH 140 LB HAMMER.	SILTY GRAVELLY SAND SAME AS SAMPLE #35 (SP-SM)
				100+		
	34	1 7/8"	TO 61.5'	5" rec.	* REFUSAL ENCOUNTERED AT 61.5'. 5" roller rocked ahead from 61.0' to 63.0' and washed out.	
62				—		
				—		
6						
				—		
63			63.0'		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 63.0' TO 63.5' WITH 140 LB HAMMER.	SAND FINE GRAINED, TRACE MEDIUM. TRACE NON PLASTIC FINES. BROWN, MOIST. (SP)
	35	1 7/8"	TO	110+	* Refusal encountered at 63.5'. 5" roller rocked ahead from 63.0' to 65.0' and washed out.	
			63.5'	5" rec.		
				—		
64						
				—		

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT

Boring No. FD-85-1. (A)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
65			65.0	—	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 65.0' TO 66.5' WITH 140LB HAMMER.	SAND SAME AS SAMPLE #37 (SP)
				28	*REFUSAL ENCOUNTERED AT 66.5' 5" roller rocked AHEAD FROM 66.5 TO 68.0' AND WASHED OUT.	
	38	1 7/8"	TO	63		
66				104		
			66.5'	11" rec.		
				—		ABUNDANT WEATHERED ROCK
67				—		
				—		
68					CORED WITH 2.75" x 5.0' AW CORE BARREL FROM 68.0' TO 72.0'.	68.0' SCHIST
					* CONFIRMATION OF BEDROCK	GARNETIFEROUS, ABUNDANT BIOTITE AND MUSCOVITE SOME CHLORITE, PREVELANT INTRUSIONS OF QUARTZ AND GNEISSIC FACIES. FINE GRAINED, FRESH. FOLIATION DIP 75° E
69						
70						
71						
72					END OF SAMPLING AND CORING OPERATIONS 72.0'	72.0' BOTTOM OF BORING 72.0'
73						

(Test)

Boring No. FD-85-1(A)

Site: TOWNSHEND LAKE DAM

Boring No: FD-85-1 (A)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
6/19	7:30am	8.0'	72.0'	8.0'	464.0'±	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

FIELD LOG OF TEST BORING IN ROCK

SITE TOWNSHEND LAKE DAM TOWNSHEND, VT. HOLE NO. FD-FS-1 (A) PAGE 12 of 12

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 min/ft.	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
6/17/65	52.0'	55.0'	3.0'	1.0'	33%	~~continuous~~	NO LOSS	JAMMED CORE BARREL	33 min/3.0'	2.75"x5.0' AW CORE BARREL.	Schist and QUARTZ COBBLES AND BOULDERS.
6/18/65	57.95'	59.0'	1.25'	.50'	40%	~~Continuous~~	NO LOSS	JAMMED CORE BARREL	60 min/1.25'	"	QUARTZ BOULDER
6/18/65	68.0'	72.0'	4.0'	3.5'	87.5% RQD 67.5	CONTINUOUS	NO LOSS		105 min/4.0'		SCHIST GARNETIFEROUS, ABUNDANT BIOTITE AND MUSCOVITE, SOME CHLORITE INTRUSIONS OF QUARTZ AND GNEISS FINE GRAINED, MODERATELY FRESH. FOLIATION DIP 75°±

TOTAL ~~BED ROCK~~ DRILLED 4.0' FEET

TOTAL BED ROCK RECOVERED 3.5 FEET

BED ROCK RECOVERY _____ PERCENT

DRILLER Raymond L. Brown

INSPECTOR Mark A. Owens

NED FORM 130

FIG. No. 5

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

FIELD LOG OF TEST BORING

PROJECT NO. 0041

Site TOWNSHEND LAKE DAM TOWNSHEND, VT — Page 1 of 12 Pages

Hole No. FD-65-3(6) Diam. (Casing) 6" — Boring Started 6/19/65

Co-ordinates: N _____ E _____ — Boring Completed 6/21/65

Drilled by MOBILE DISTRICT — Report Submitted _____

Purpose of Exploration TO DETERMINE THE SUBSURFACE CONDITIONS REGARDING THE INSTALLATION OF 24" DIAMETER RELIEF WELLS

Elevation Top of Hole 474.5'± M.S.L.
Total Overburden Drilled 71.5' Feet
Elevation Top of Rock 403.0'± M.S.L.
Elevation Bottom of Hole 401.5' M.S.L.
Total Rock Drilled 3.0' Feet
Total Depth of Hole 73.0' Feet
Core Recovered 100 %
Core Recovered _____ Ft.: _____ Diam. _____ In.
Soil Samples 1 3/4" In. Diam. 33 No.
Soil Samples _____ In. Diam. _____ No.

Casing Left in Place — Feet

Water Table Depth 13.5'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0'	2.0'	DRILLED WITH 10" rotten rock
0.0'	5.0'	DRILLED 6" CASING AND WASHED OUT
0.0'	66.0'	SAMPLED WITH 1 3/8" x 2.0' split spoon WITH 140 LB HAMMER.
66.0'	68.5	CORED WITH 2 3/4" x 3 3/8" x 6.0' AW CORE BARREL.
68.5	71.5	DRILLED WITH 6" rotten rock AND WASHED OUT.
71.5	73.0	CORED WITH 2 3/4" x 3 3/8" x 6.0' AW CORE BARREL.

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Rock Drilling	Page 12
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	Page
	Page

Prepared by Mark A. Owens — Field Data — Lab. Data

Submitted by Mark A. Owens

ENG 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 TOWNSHEND LAKE DAM TOWNSHEND, VT. Page 2 of 12 Pages

Boring No. FD-55-2(B) Desig. B Diam. (Casing) 6"

Co-ordinates. N _____ E _____

Elevation Top of Boring 474.5'± M.S.L.
Total Overburden Drilled 72.5' Feet
Elevation Top of Rock 403.0' M.S.L.
Total Rock Drilled 1.5' Feet
Elevation Bottom of Boring 401.5' M.S.L.
Total Depth of Boring 73.0' Feet
Core Recovered 100 % No. Boxes —
Core Recovered _____ Ft. _____ Diam. _____ In.
Soil Samples 1 7/8" In. Diam. 33 No.
Soil Samples _____ In. Diam. _____ No.

Hammer Wt. 140LB. Boring Started 6/19/05
Hammer Drop 30"
Casing Left —
Boring Completed 6/21/05
Subsurface Water Data _____ Page 11
Obs. Well _____
Drilled By MOBILE DISTRICT
Mfg. Des. Drill _____
Inspected By: Mark A. Owens
Classification By: Mark A. Owens
Classification By: _____

DEPTH (Ft.)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			0.0'	2	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 0.0' - 2.0' WITH 140LB HAMMER. 10" ROLLER ROCK FROM 0.0'-2.0'. DRILLED 6" CASING FROM 0.0' TO 8.0'.	TOPSOIL GRASS + ROOT COVERED, SOME SILTY SAND BROWN, DRY (SM)
				10		SILTY SAND (LOESS) FINE GRAINED, TRACE MEDIUM. 15-20% NON PLASTIC FINES. <10% SUB ROUNDED GRAVEL. BROWN, DRY (SM)
1	1	1 7/8"	TO	16		
				21		
2			2.0'	22" REC.	6" ROLLER ROCK FROM 2.0' - 4.0' AND WASHED OUT.	
3						
4			4.0'	19	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 4.0' TO 6.0' WITH 140LB. HAMMER. 6" ROLLER ROCK FROM 4.0' TO 6.0' AND WASHED OUT.	SILTY SANDY GRAVEL ANGULAR TO SUB ROUNDED 20-30% COARSE TO FINE MOSTLY FINE SAND. 5-15% NON PLASTIC FINES. GRAY BROWN, DAMP (GP-GM)
5	2	1 7/8"	TO	26		

GENERAL REMARKS:

SPLIT SPOON RECOVERIES LESS THAN ANTICIPATED DUE TO ABUNDANT COBBLES PRESENT.

Site TOWNSHEND LANE DAM TOWNSHEND, VT.

Boring No. FD-85-2 (B)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				32		
				51		
6			6.0'		SAMPLED WITH 1 7/8" X 3.0' SPLIT SPOON FROM 6.0' TO 8.0' WITH 140 LB. HAMMER.	SANDY GRAVEL SUB ANGULAR TO SUBROUNDED 20-30% COARSE TO FINE MOSTLY MEDIUM TO FINE SAND. <5% NON PLASTIC FINES. ABUNDANT QUARTZ COBBLES. LIGHT BROWN, DRY (GP)
				23		
					6" Roller Rock FROM 6.0' TO 8.0' AND WASHED OUT.	
				35		
7			TO			
				32		
				61		
8			8.0'		SAMPLED WITH 1 7/8" X 3.0' SPLIT SPOON FROM 8.0' TO 10.0' WITH 140LB. HAMMER.	SANDY GRAVEL SAME AS SAMPLE #3 (GP)
	4	1 7/8"	TO	115+		
			9.5'		6" Roller Rock FROM 8.0' TO 10.0' AND WASHED OUT.	
				+	* BOUNCING REFUSAL ENCOUNTERED AT 9.5', Roller Rocked THROUGH COBBLES AND BOULDERS.	
9						
				-		
				-		
10			10.0'		SAMPLED WITH 1 7/8" X 3.0' SPLIT SPOON FROM 10.0' TO 11.5' WITH 140 LB HAMMER.	SANDY GRAVEL SAME AS SAMPLE #3 (GP)
				80		
	5	1 7/8"	TO	52	6" Roller Rock FROM 10.5' TO 12.0' AND WASHED OUT.	
11				135+	* REFUSAL ENCOUNTERED AT 11.5' ROLLER ROCKED THROUGH COBBLES AND BOULDERS.	
			11.5'			
				-		
12			12.0'		SAMPLED WITH 1 7/8" X 3.0' SPLIT SPOON FROM 12.0' TO WITH 140LB. HAMMER.	SILTY SANDY GRAVEL SUB ANGULAR TO SUB ROUNDED 20-30% COARSE TO FINE MOSTLY FINE SAND. 5-15% NON PLASTIC FINES. GRAY-BROWN, DAMP (GP-GM)
				26		
				35	6" Roller Rock FROM 12.0' TO 14.0' AND WASHED OUT.	
13	6	1 7/8"	TO			
				30		

Site: TOWNSHEND LAKE DAM TOWNSHEND, VT.

Boring No. FD-85-2 (B)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				25		
14			14.0	11" Rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 14.0' TO 16.0' WITH 140LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE, 25-35% SUB ANGULAR TO SUBROUNDED GRAVEL. 5-15% NONPLASTIC FINES, GRAY BROWN TO BROWN, MOIST. (SP-SM)
				24	6" Roller rock from 14.0' to 16.0' and washed out.	
				21		
15	7	1 7/8"	TO			
				20		
				23		
16			16.0		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 16.0' TO WITH 140LB HAMMER	SILTY GRAVELLY SAND COARSE TO FINE MOSTLY FINE 10-20% SUB ROUNDED GRAVEL. 5-15% NON PLASTIC FINES. BROWN, MOIST (SP-SM)
				22	6" Roller rock from 16.0' to 18.0' and washed out.	
				18		
17	8	1 7/8"	TO			
				12		
				15		
18			18.0		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 18.0' TO 20.0' WITH 140LB HAMMER	SILTY GRAVELLY SAND SAME AS SAMPLE #8 (SP-SM)
				18	DRIVED 6" CASING FROM 8.0' TO 10.0'. (SEALED HOLE OFF)	
				23		
19	9	1 7/8"	TO		6" Roller rock from 18.0' to 20.0' and washed out.	
				14		
				22		
20			20.0'	14.0 Rec	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 20.0' TO 22.0' WITH 140LB HAMMER.	SILTY GRAVELLY SAND SAME AS SAMPLE #8 (SP-SM)
				24		
				32	6" Roller rock from 20.0' to 22.0' and washed out.	
21	10	1 7/8"	TO			
				35		
				36		
22			22.0'	12" Rec.		

(Test)

Boring No. FD-85-2 (B)

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-2 (B)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE RECV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			22.0	29	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 22.0' TO' WITH 140LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE, 15-25% SUBANGULAR TO SUBROUNDED GRAVEL, 10-20% NONPLASTIC FINES, BROWN, MOIST (SP-SM)
				21	6" Roller Rock FROM 22.0' TO 24.0' AND WASHED OUT.	
23	11	1 7/8"	TO	17		
				15		
24			24.0'	15" Rec 22	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 24.0' TO 26.0' WITH 140LB. HAMMER	SILTY GRAVELLY SAND SAME AS SAMPLE #11 (SP-SM)
				24	6" Roller Rock FROM 24.0' TO 26.0' AND WASHED OUT.	
25	12	1 7/8"	TO	15		
				23		
26			26.0'	3" Rec 19	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 26.0' TO WITH 140LB HAMMER	SILTY GRAVELLY SAND COARSE TO FINE MOSTLY FINE 20-25% SUBROUNDED TO SUBANGULAR GRAVEL 5-15% NON PLASTIC FINES. BROWN, MOIST. (SP-SM)
				14	6" Roller Rock FROM 26.0' TO 28.0' AND WASHED OUT.	
27	13	1 7/8"	TO	13		
				30		
28			28.0'	31	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 28.0' TO WITH 140LB HAMMER	SILTY GRAVELLY SAND COARSE TO FINE MOSTLY FINE. 30-40% SUBROUNDED TO SUBANGULAR GRAVEL. 10-20% NON PLASTIC FINES BROWN, MOIST. (SP-SM)
				23	6" Roller Rock FROM 28.0' TO 30.0' AND WASHED OUT.	
29	14	1 7/8"	TO	17		
				21		
30			30.0'	8" Rec 32	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 30.0 TO 32.0' WITH 140LB. HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 20-25% SUBROUNDED TO SUBANGULAR GRAVEL. 10-20% NON PLASTIC FINES BROWN, MOIST. (SP-SM)

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-FS-2 (B)

DEPTH (1"=)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				36	6" Roller Rock from 30.0' to 32.0' and washed out	
31	15	1 7/8"	TO	33		
				39		
32			32.0	46	Sampled with 1 7/8" x 2.0' split spoon from 32.0' to 34.0' with 140 LB Hammer	SILTY GRAVELLY SAND SAME AS SAMPLE #15 (sp-sm)
				39	6" Roller Rock from 32.0' to 34.0' and washed out,	
33	16	1 7/8"	TO	48		
				52		
34			34.0'	53	Sampled with 1 7/8" x 2.0' split spoon from 34.0' to with 140 LB Hammer	SILTY GRAVELLY SAND SAME AS SAMPLE #15 (sp-sm)
				32	6" Roller Rock from 34.0' to 36.0' and washed out.	
35	17	1 7/8"	TO	25		
				32		
36			36.0'	31	Sampled with 1 7/8" x 2.0' split spoon from 36.0' to 38.0' with 140 LB. Hammer	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 25-35% SUB ANGULAR TO SUB ROUNDED GRAVEL 10-20% NON PLASTIC FINES BROWN, MOIST (sp-sm)
				21	6" Roller Rock from 36.0' to 38.0' and washed out	
37	18	1 7/8"	TO	27		
				26		
38			38.0'	22	Sampled with 1 7/8" x 2.0' split spoon from 38.0' to with 140 LB Hammer	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 20-30% SUB ROUNDED TO SUB ANGULAR GRAVEL 10-20% NON PLASTIC FINES. BROWN MOIST. (sp-sm)
				22	6" Roller Rock from 38.0' to 40.0' and washed out.	
39	19	1 7/8"	TO			

(Test)

Boring No. FD-FS-2(B)

Site TOWNSHEAD LAKE DAM TOWNSHEND, VT.

Boring No. FD-85-2 (B)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				27		
				49		
40			40.0		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 40.0' TO WITH 140LB HAMMER	SILTY GRAVELLY SAND SAME AS SAMPLE #19 (sp-sm)
				27	6" Roller Rock FROM 40.0' TO 42.0' AND WASHED OUT.	
				32		
41	20	1 7/8"	TO			
				29		
				32		
42			42.0	12" rec	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 42.0' TO WITH 140LB HAMMER.	SILTY GRAVELLY SAND SAME AS SAMPLE #19 *WEATHERED SCHIST IN TIP OF SPOON. (sp-sm)
				24		
				26	6" Roller Rock FROM 42.0' TO 44.0' AND WASHED OUT.	
43	21	1 7/8"	TO			
				36		
				47		
44			44.0	12" rec	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 44.0' TO WITH 140LB HAMMER	SAND FINE, TRACE MEDIUM. <10% SUB ROUNDED GRAVEL, TRACE NON PLASTIC FINES. MEDIUM BROWN, DAMP (SP)
				27		
	22	1 7/8"	TO		6" Roller Rock FROM 44.0' TO 46.0' AND WASHED OUT.	
				24		
45			45			SILTY SAND COARSE TO FINE, MOSTLY FINE 15-25% NON PLASTIC FINES <10% SUB ROUNDED GRAVEL BROWN, MOIST (sm)
				30		
	23	1 7/8"	TO			
				35		
46			46.0		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 46.0' TO 48.0' WITH 140LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINES 15-25% SUB ROUNDED TO SUB ANGULAR GRAVEL 10-20% NON PLASTIC FINES, BROWN, MOIST (sp-sm)
				32	6" Roller Rock FROM 46.0' TO 48.0' AND WASHED OUT.	
				22		
47	24	1 7/8"	TO			
				23		

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-2 (B)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				29		
48			48.0'	25	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 48.0' TO WITH 140LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 25-35% SUB ROUNDED TO SUB ANGULAR GRAVEL. 10-20% NON PLASTIC FINES. BROWN, MOIST. (SP-SM)
				26	6" ROLLER ROCK FROM 48.0' TO 50.0' AND WASHED OUT.	
49	25	1 7/8"	TO	30		
				38		
50			50.0'	35	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 50.0' TO WITH 140LB. HAMMER.	SILTY GRAVELLY SAND SAME AS SAMPLE #25 *MEDIUM BROWN COLORATION (SP-SM)
				28	6" ROLLER ROCK FROM 50.0' TO 52.0' AND WASHED OUT.	
51	26	1 7/8"	TO	25		
				26		
52	27	1 7/8"	52.0'	16	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 52.0' TO 54.0' WITH 140LB HAMMER	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 20-30% SUB ROUNDED TO SUB ANGULAR GRAVEL 15-25% NON PLASTIC FINES BROWN, MOIST (SP-SM)
				13	6" ROLLER ROCK FROM 52.0' TO 54.0' AND WASHED OUT.	
53	27	1 7/8"	TO	28		
				33		
54			54.0'	30	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 54.0' TO WITH 140LB HAMMER	SILTY GRAVELLY SAND SAME AS SAMPLE #27 (SP-SM)
				32	6" ROLLER ROCK FROM 54.0' TO 56.0' AND WASHED OUT	
55	28	1 7/8"	TO	29		
				38		
56			56.0'			

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.	Boring No. FD-85-2 (D)	Page 9 of 12

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			56.0'	30	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 56.0' TO WITH 140 LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 25-35% SUB ROUNDED TO SUB ANGULAR GRAVEL. 10-20% NON PLASTIC FINES BROWN, MOIST. (Sp-Sm)
				34	6" ROLLER ROCK FROM 56.0' TO 58.0' AND WASHED OUT.	
57	29	1 7/8"	TO	44		
				51		
58			58.0'	36" REC 52	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 58.0' TO WITH 140 LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 25-35% ANGULAR TO SUB ROUNDED GRAVEL. 10-20% NON PLASTIC FINES. SCHIST FRAGMENTS CONTAINING GARNET. BROWN, MOIST. (Sp-Sm)
				40	6" ROLLER ROCK FROM 58.0' TO 60.0' AND WASHED OUT.	
59	30	1 7/8"	TO	40		
				47		
60			60.0'	16" REC 49	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 60.0' TO WITH 140 LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 25-35% ANGULAR TO SUB ROUNDED GRAVEL. 15-20% NON PLASTIC FINES. SCHIST FRAGMENTS. BROWN, MOIST. (Sp-Sm)
				41	6" ROLLER ROCK FROM 60.0' TO 63.0' AND WASHED OUT.	
61	31	1 7/8"	TO	74	*6" ROLLER ROCK FROM 62.0' TO 62.0' DUE TO PRESENCE OF COBBLES AND BOULDERS.	
				100+		
62			62.0	17" REC —		
				—		
63			63.0'	54	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 63.0' TO 65.0' WITH 140 LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE MOSTLY FINE. 20-35% SUB ROUNDED GRAVEL 5-15% NON PLASTIC FINES. BROWN, DAMP (Sp-Sm)
				29	6" ROLLER ROCK FROM 65.0' TO 66.0' AND WASHED OUT.	
64	32	1 7/8"	TO	42	*6" ROLLER ROCK FROM 66.0' DUE TO BOULDERS AND COBBLES	

Site: TOWNSHEND LAKE DAM TOWNSHEND, VT.

Boring No. FD-85-2 (B)

DEPTH (Ft.)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
65			65.0	96		
				—		
				—		
66			66.0	47	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 66.0' TO 66.0' WITH 140LB HAMMER. 6" ROLLER ROCK FROM 66.0' TO 68.0' AND WASHED OUT	GRAVELLY SILTY SAND COARSE TO FINE, MOSTLY FINE. 15-20% NON PLASTIC FINES. 10-15% SUBANGULAR GRAVEL BROWN, MOIST. (SM-SP)
				75		
67	33	1 7/8"	TO	61		
				46		
68			68.0	—	CORED WITH 2.75" x 5.0' AW CORE BARREL FROM 68.0' TO 68.5'. CORED QUARTZ + GNEISSEL BOULDERS	68.0'
				—		COBBLES + BOULDERS
69				—		
				—		
70				—		
				—		
71				—		71.5'
72						SCHIST GARNETIFEROUS. ABUNDANT BIOTITE AND MUSCOVITE, SOME CHLORITE. PREVALENT INTRUSIONS OF QUARTZ AND GNEISS FINE GRAINED, FRESH FOLIATION DIP 70°±
73						

END OF SAMPLING AND CORING OPERATIONS

BOTTOM OF BORING 73.0'

(Test)

Boring No. FD-85-2 (B)

Site: TOWNSHEND LAKE DAM, VT.
Boring No: FD-85-2(B)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
6/21/85	2:00pm	5.0'	73.0'	13.5'	460.5'	

Note: Depths are in feet below original ground.

BORING LOCATION SKETCH

FIELD LOG OF TEST BORING IN ROCK

SITE TOWNSHEND LAKE DAM TOWNSHEND, VT. HOLE NO. FO-85-2 (B) PAGE 12

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
6/21/85	68.0'	69.5'	1.5'	1.5'	100%	Continuous	NO LOSS	BROKE THROUGH BOULDERS	45 min/1.5'	2.75" ID x 5.0' AW CORE Barrel	QUARTZ COBBLES AND BOULDERS
6/21/85	71.5'	73.0'	1.5'	1.5'	100%	continuous	NO LOSS	VERIFIED TOP OF ROCK	45 min/1.5'	2.75" ID x 5.0' AW CORE BARREL	SCHIST GARNETIFEROUS ABUNDANT BIOTITE AND MUSCOVITE SOME CHLORITE. PREVALANT INTRUSIONS OF GNEISS AND QUARTZ. FINE GRAINED, FRESH, FOLIATION DIP 70°±

TOTAL BED ROCK DRILLED 1.5 FEET

TOTAL BED ROCK RECOVERED 1.5 FEET

BED ROCK RECOVERY 100% PERCENT

DRILLER Raymond BROWN

INSPECTOR Merle A. Owens

NED FORM 130

FIG. No. 5

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

FIELD LOG OF TEST BORING

PROJECT NO. 0021

Site TOWNSHEND LAKE DAM, TOWNSHEND, VT. Page 1 of 9 Pages

Hole No. FD-65-3(C) Diam. (Casing) 6" Boring Started 6/24/65

Co-ordinates: N _____ E _____ Boring Completed 6/26/65

Drilled by MOBILE DISTRICT Report Submitted _____

Purpose of Exploration TO DETERMINE SUB SURFACE CONDITIONS IN REGARDS TO THE INSTALLATION OF 24" RELIEF WELLS.

Elevation Top of Hole 465.5' ± M.S.L. Casing Left in Place — Feet

Total Overburden Drilled 55.5' Feet

Elevation Top of Rock 410.0' ± M.S.L.

Elevation Bottom of Hole 410.0' M.S.L.

Total Rock Drilled — Feet

Total Depth of Hole 55.5' Feet

Core Recovered — %

Core Recovered — Ft.: — Diam. — In.

Soil Samples 1 7/8" In. Diam. 30 No.

Soil Samples _____ In. Diam. ____ No. Water Table Depth 5.0' ±

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0'	55.5'	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON WITH 140 LB. HAMMER.
0.0'	1.5'	DRILLED WITH 10" ROLLER BOCK
0.0'	5.0'	DRILLED 6" CASING AND WASHED OUT.
1.5'	55.0'	DRILLED 6" ROLLER BOCK AND WASHED OUT.

Remarks

Ground Water _____ Back of Page 9

Boring Location Sketch _____ Back of Page 9

Overburden Record _____ Page 1-8

Rock Drilling _____ Page —

_____ Page ____

_____ Page ____

_____ Page ____

Prepared by Mark A. Owen Field Data _____ Lab. Data _____

Submitted by Mark A. Owen _____

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 TOWNSHEND LAKE DAM, TOWNSHEND, VT Page 2 of 9 Pages

Boring No. FD-85-3 Desig. (c) Diam. (Casing) 6"

Co-ordinates. N _____ E _____

Elevation Top of Boring 465.5' M.S.L.
Total Overburden Drilled 55.5' Feet
Elevation Top of Rock 410.5'± M.S.L.
Total Rock Drilled — Feet
Elevation Bottom of Boring 410.0'± M.S.L.
Total Depth of Boring 55.5' Feet
Core Recovered ____ % No. Boxes ____
Core Recovered — Ft : — Diam. ____ In.
Soil Samples 1 7/8" In. Diam. 30 No.
Soil Samples ____ In. Diam. ____ No.

Hammer Wt. 140 LB Boring Started 6/24/85
Hammer Drop 30"
Casing Left — Boring Completed ____
Subsurface Water Data ____ Page 9
Obs. Well ____
Drilled By MOBILE DISTRICT
Mfg. Des. Drill ____
Inspected By: Mark A. Owen
Classification By: Mark A. Owen
Classification By: ____

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1	1 7/8"	0.0' TO 0.5'	3	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 0.0' TO 2.0' WITH 140 LB. HAMMER.	TOPSOIL LEAF, GRASS AND ROOT COMPOSED, COARSE TO FINE SAND, 25-35% N.P. FINES MED. BROWN, DRY (SM)
				11		SILTY SAND MEDIUM TO FINE, MOSTLY FINE. 25-35% NON PLASTIC FINES. 10% SUB ANGULAR GRAVEL. SOME SCHISTIC ROCK FRAGMENTS, TRACE ORGANICS DARK BROWN TO MEDIUM BROWN DRY (SM)
1	2	1 7/8"	TO	17		
				14		
2			2.0'	24" RC 14	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 2.0' TO 4.0' WITH 140 LB HAMMER,	SILTY SAND COARSE TO FINE, MOSTLY FINE. 20-25% NON PLASTIC FINES. 10% SUB ANGULAR TO SUB ROUNDED GRAVEL. ABUNDANT SCHISTIC ROCK FRAGMENTS. DARK BROWN, DAMP. (SM)
				14	6" ROLLER ROCK FROM 0.0' TO 1.5'	
3	3	1 7/8"	TO	35	DRILLED 6" CASING FROM 1.5' TO 5.0' 6" ROLLER ROCK FROM 1.5' TO 4.0' AND WASHED OUT.	
				37		
4			4.0'	24	SAMPLED WITH 1 7/8" X 2.0' SPLIT SPOON FROM 4.0' TO 5.5' WITH 140 LBS. HAMMER. *REFUSAL ENCOUNTERED AT 5.5'	COBBLES + BOULDERS
5	4	1 7/8"	TO	26	6" ROLLER ROCK FROM 4.0' TO 6.0' AND WASHED OUT.	

GENERAL REMARKS: HOLE HAS BEEN OFFSET 5.0' SOUTH. SUB SURFACE CONDITIONS LESS COMPACT THAN FD-85-1 + 2.

Site: TOWNSHEND LAKE DAM
TOWNSHEND, VT.

Boring No. FD-F5-3 (c)

DEPTH (1"=)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			5.5	100+ Ref. / 1" rec.		
6			6.0'	—	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 6.0' TO 6.5' WITH 140LB HAMMER. *REFUSAL AT 6.5' (BOUNCING) 6" Roller Rock FROM 6.0' TO 8.0' AND WASHED OUT	
	5	1 7/8"	TO 6.5'	100+ Ref. / 0" rec.		
7				—		
				—		
				—		
8			8.0'	8	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 8.0' TO 10.0' WITH 140LB HAMMER. 6" Roller Rock FROM 8.0' TO 10.0' AND WASHED OUT.	SILTY SAND MEDIUM TO FINE, MOSTLY FINE. 15-20% NON PLASTIC FINES. 10-15% SLIGHTLY PLASTIC SILT. <10% SUB ROUNDED GRAVEL DARK BROWN AND DARK GRAY, MOIST. SILT IN LAYERS. SOME ORGANICS (ROOTS, STEMS) (SM-ML)
9	6	1 7/8"	TO	12 / 11		
10			10.0'	100+ / 9" rec. / 16	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 10.0' TO 11.0' WITH 140LB HAMMER. *BOUNCING REFUSAL AT 11.0'	SILTY SANDY GRAVEL ANGULAR TO SUB ANGULAR 35-30% COARSE TO FINE, MOSTLY FINE SAND. 15-25% NON PLASTIC FINES. RED BROWN TO GRAY, SATURATED, (GM)
	7	1 7/8"	TO	100+ Ref.		
11			11.0'	—	DRILLED 6" CASING FROM 5.0' TO 10.0' (ATTEMPT TO SEAL OFF) 6" Roller Rock FROM 10.0' TO 12.0' AND WASHED OUT.	
				—		
12			12.0	15	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 12.0' TO 14.0' WITH 140LB HAMMER. 6" ROLLER ROCK FROM 12.0' TO 14.0' AND WASHED OUT	SAND FINE GRAINED, TRACE MEDIUM. TRACE NON PLASTIC FINES. GRAYISH BROWN, MOIST (SP)
13	8	1 7/8"	TO	9 / 9		

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-3 (c)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				10		
14			14.0'	17" rec. 8	SAMPLED WITH 1 3/8" x 2.0' split spoon from 14.0' to with 140 LB hammer.	SAND COARSE TO FINE, MOSTLY FINE. <10% SUB ROUNDED GRAVEL. TRACE NON PLASTIC FINES. LIGHT BROWN, MOIST. (Sp)
				9	6" roller rock from 14.0' to 16.0' and washed out.	
15	9	1 3/8"	TO	10		
				10		
16			16.0'	21" rec. 8	SAMPLED WITH 1 3/8" x 2.0' split spoon from 16.0' to 18.0' with 140 LB hammer.	SAND FINE GRAINED, TRACE MEDIUM. 5-10% NON PLASTIC FINES. BROWN, MOIST. (Sp-Sm)
				10	6" roller rock from 16.0' to 18.0' and washed out.	
17	10	1 3/8"	TO	11		
				15		
18			18.0'	30" rec. 5	SAMPLED WITH 1 3/8" x 2.0' split spoon from 18.0' to 20.0' with 140 LB hammer.	SAND SAME AS SAMPLE #10 (Sp-Sm)
				8	6" roller rock from 18.0' to 20.0' and washed out.	
19	11	1 3/8"	TO	10		
				10		
20			20.0'	18" rec. 5	SAMPLED WITH 1 3/8" x 2.0' split spoon from 20.0' to with 140 LB hammer	SAND SAME AS SAMPLE #10 (Sp-Sm)
				5	6" roller rock from 20.0' to 22.0' and washed out.	
21	12	1 3/8"	TO	5		
				8		
22			22.0'	30" rec.		

(Test)

Boring No. FD-85-3(c)

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-3 (C)

DEPTH (1"=)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			22.0"	8	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 22.0' TO 24.0' WITH 140LB HAMMER	SILTY SAND COARSE TO FINE, MOSTLY FINE. 15-25% NON PLASTIC FINES. 5-15% SUB ROUNDED GRAVEL. RED BROWN TO BROWN, MOIST. (SM)
				10	6" ROLLER ROCK FROM 22.0' TO 24.0' AND WASHED OUT.	
23	13	1 7/8"		16		
				16		
24			24.0'	14" REC 16	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 24.0' TO 26.0' WITH 140LB. HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE, 30-35% SUB ANGULAR TO SUB ROUNDED GRAVEL. 15-25% NON PLASTIC FINES. BROWN, MOIST (SM)
				13	6" ROLLER ROCK FROM 24.0' TO 26.0' AND WASHED OUT.	
25	14	1 7/8"	TO	10		
				16		
26			26.0'	12" REC. 13	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 26.0' TO 28.0' WITH 140LB HAMMER	SILTY GRAVELLY SAND SAME AS SAMPLE #14 (SM)
				11	6" ROLLER ROCK FROM 26.0' TO 28.0' AND WASHED OUT.	
27	15	1 7/8"		20		
				20		
28			28.0'	6" REC. 13	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 28.0' TO WITH 140LB HAMMER	SILTY GRAVELLY SAND SAME AS SAMPLE #14 * LARGE ROUNDED COBBLE IN SAMPLE. (SM)
				8	6" ROLLER ROCK FROM 28.0' TO 30.0' AND WASHED OUT.	
29	16	1 7/8"	TO	13		
				17		
30			30.0'	14" REC. 21	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 30.0' TO WITH 140LB. HAMMER	SILTY GRAVELLY SAND SAME AS SAMPLE #14 * ABUNDANT QUARTZ COBBLES (SM)

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-3 (C)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				19	6" Roller Rock from 30.0' to 32.0' and washed out.	
31	17	1 7/8"	TO			
				18		
				21		
32			32.0'	13" rec.	Sampled with 1 7/8" x 2.0' split spoon from 32.0' to with 140 lb hammer	SAND Fine grained, trace medium. 5-10% non plastic fines. Brown, moist. (SP-SM)
				10		
				10	6" Roller Rock from 32.0' to 34.0' and washed out.	
33	18	1 7/8"	TO			
				10		
				10		
34			34.0'	17" rec.	Sampled with 1 7/8" x 2.0' split spoon from 34.0' to 36.0' with 140 lb hammer	SAND Same as sample #18 (SP-SM)
				8		
				9	6" Roller Rock from 34.0' to 36.0' and washed out.	
35	19	1 7/8"	TO			
				10		
				10		
36			36.0'	12" rec.	Sampled with 1 7/8" x 2.0' split spoon from 36.0' to 38.0' with 140 lb hammer.	SAND Coarse to fine, mostly fine. 5-10% non plastic fines, trace gravel. Brown, moist. (SP-SM)
				9		
				9	6" Roller Rock from 36.0' to 38.0' and washed out.	
37	20	1 7/8"	TO			
				10		
				13		
38			38.0'	15" rec.	Sampled with 1 7/8" x 2.0' split spoon from 38.0' to 40.0' with 140 lb. hammer.	SAND Same as sample #20 (SP-SM)
	21	1 7/8"	TO	13		
			38.5'		6" Roller Rock from 38.0' to 40.0' and washed out.	
				23		
39			TO			

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-65-3 (c)

DEPTH (Ft.)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	22	1 7/8"	TO	14		SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 20-30% SUBANGULAR TO SUB ROUNDED GRAVEL. 15-25% NON PLASTIC FINES. BROWN, MOIST (SM)
				21		
40			40.0'	25	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 40.0' TO 42.0' WITH 140LB. HAMMER. 6" ROLLER ROCK FROM 40.0' TO 42.0' AND WASHED OUT.	GRAVELLY SILTY SAND COARSE TO FINE, MOSTLY FINE. 15-25% NON PLASTIC FINES. 10-20% SUBANGULAR GRAVEL. BROWN, MOIST. (SM)
				20		
41	23	1 7/8"	TO	19		
				15		
42			42.0'	15" REC. 11	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 42.0' TO 44.0' WITH 140LB HAMMER. 6" ROLLER ROCK FROM 42.0' TO 44.0' AND WASHED OUT.	SAND FINE GRAINED, TRACE MEDIUM AND COARSE. 5-12% NON PLASTIC FINES. BROWN, MOIST. (SP-SM)
				9		
43	24	1 7/8"	TO	9		
				10		
44			44.0'	12" REC. 10	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 44.0' TO 46.0' WITH 140LB HAMMER. 6" ROLLER ROCK FROM 44.0' TO 46.0' AND WASHED OUT.	SAND FINE GRAINED, TRACE MEDIUM 5-15% SUB ROUNDED GRAVEL 5-12% NON PLASTIC FINES BROWN, MOIST. (SP-SM)
				12		
45	25	1 7/8"	TO	13		
				20		
46			46.0'	18" REC. 10	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 46.0' TO 48.0' WITH 140LB HAMMER. 6" ROLLER ROCK FROM 46.0' TO 48.0' AND WASHED OUT.	SILTY SAND FINE TO VERY FINE, TRACE COARSE AND MEDIUM. 25-30% NON PLASTIC FINES. < 10% SUB ROUNDED GRAVEL. BROWN, MOIST (SM)
				15		
47	26	1 7/8"	TO	25		

(Test)

Boring No. FD-65-3(c)

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-65-3 (C)

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				27		
48			48.0'		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 48.0' TO WITH 140LB HAMMER.	SILTY SAND FINE TO VERY FINE, MOSTLY VERY FINE, 25-35% NON PLASTIC FINES. BROWN, MOIST. (SM)
				15	6" ROLLER ROCK FROM 48.0' TO 50.0' AND WASHED OUT.	
49	27	1 7/8"	TO	17		
				21		
				25		
50			50.0'	13" REC. 13	SAMPLED WITH 1 7/8" x 2.0', SPLIT SPOON FROM 50.0' TO 52.0' WITH 140LB HAMMER	SAND FINE GRAINED. 5-15% NON PLASTIC FINES. BROWN MOIST. (SP-SM)
				14	6" ROLLER ROCK FROM 50.0' TO 52.0' AND WASHED OUT	
51	28		TO			
				15		
				22		
52			52.0'		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 52.0' TO 54.0' WITH 140 LB HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 20-30% SUBANGULAR TO SUBROUNDED GRAVEL 15-25% NON PLASTIC FINES. SOME ROCK FRAGS. BROWN, MOIST. (SM)
				10	6" ROLLER ROCK FROM 52.0' TO 53.0' AND WASHED OUT.	
53	29	1 7/8"		10	* ROLLER ROCKED AHEAD TO 55.0' (COBBLE OR BOULDER AT 54.0)	
				12		
				30		
54			54.0'			
				-		
				-		
55			55.0'		SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 55.0' TO 55.5' WITH 140 LBS HAMMER.	55.0' WEATHERED ROCK FRAGS.
	30	1 7/8"	TO	35		
55.5			55.5			55.5'
				100+ Ref NO PEN.	END OF OVERBURDEN SAMPLING OPERATION 55.5'	TOP OF BED ROCK 55.5' BOTTOM OF BORING
56						

(Test)

Boring No. FD-65-3(C)

Site: TOWNSHEND LAKE DAM, VT.

Boring No: FD-85-3(c)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
6/26/85	10:30am	5.0'	50.0'	5.0'	460.5'±	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

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

FIELD LOG OF TEST BORING

PROJECT NO. 00 21

Site TOWNSHEND LAKE DAM VT. — Page 1 of 7 Pages

Hole No. FO-85-4 (A) Diam. (Casing) 4" — Boring Started 7/29/85

FOR LOCATION SEE SKETCH ON PAGE 7 OF 7

Co-ordinates: N _____ E _____ — Boring Completed TERMINATED

Drilled by MOBILE DISTRICT (ARMY CORP. OF ENG.) — Report Submitted _____

Purpose of Exploration DETERMINE CHARACTERISTICS AND DISTRIBUTIONS OF FOUNDATION SOILS. INSTALL PIEZOMETER TO DETERMINE THE PHREATIC SURFACE WITHIN THE EMBANKMENT AND FOUNDATION FOR ALL POOL ELEVATIONS, DETERMINE PORE PRESSURES AND AVE. PERMEABILITIES.

Elevation Top of Hole 470.0'± M.S.L. — Casing Left in Place NONE Feet

Total Overburden Drilled 32 Feet

Elevation Top of Rock NONE M.S.L.

Elevation Bottom of Hole 438.0'± M.S.L.

Total Rock Drilled NONE Feet

Total Depth of Hole 32 Feet

Core Recovered NONE %

Core Recovered — Ft.: — Diam. — In.

Soil Samples 1-3/8 In. Diam. 6 No.

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

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0'	20'	CLEANED OUT PREVIOUS BORING WITH
		5" ROLLER BIT AND REVERT
0.0	15.5	DROVE 4" CASING WITH 300lb. HAMMER
20'	32'	TOOK 6 SPLIT SPOON SAMPLES AND
		DRILLED WITH 3-7/8" ROLLER BIT
0	25'	HOLE TERMINATED AT 32' AFTER
		DRIVING CASING TO 25 ft.. CASING
		BROKE OFF AT BASE

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Overburden Record _____ Page 1-6

Rock Drilling NONE Page _____

_____ Page _____

_____ Page _____

_____ Page _____

Prepared by Mark R. Owens
Field Data — Lab. Data

Submitted by Mark R. Owens

ED 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 TOWNSHEND LAKE DAM VT. Page 2 of 7 Pages

Boring No. FD-85-4 Desig. G Diam. (Casing) 4"

FOR LOCATION SEE SKETCH ON PAGE 7 OF 7

Co-ordinates. N _____ E _____

Elevation Top of Boring 470.0'± M.S.L.
Total Overburden Drilled 32 Feet
Elevation Top of Rock NONE M.S.L.
Total Rock Drilled NONE Feet
Elevation Bottom of Boring 438.0'± M.S.L.
Total Depth of Boring 32 Feet
Core Recovered NONE % No. Boxes NONE
Core Recovered — Ft : — Diam. — In.
Soil Samples 1 - 3/8" In. Diam. 6 No.
Soil Samples — In. Diam. — No.

Hammer Wt. 300 Boring Started 7/29/85
Hammer Drop 30 IN.
Casing Left NONE Boring Completed _____
Subsurface Water Data _____ Page 7 of 7
Obs. Well NONE
Drilled By MOBILE DISTRICT
Mfg. Des. Drill FAILING HOLE MASTER
Inspected By: Mark A. Owens
Classification By: Mark A. Owens
Classification By: _____

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
					CLEANED OUT PREVEOUS BORING WITH 5" Roller Rock From 0.0' - 20.0' AND WASHED OUT.	
1'					RESET 4" CASING FROM 0.0' TO 15.5'	
2'						
3'						
4'						
5'						

GENERAL REMARKS: COMPLETION OF BORING STARTED 11/84. STARTED FROM EL. 458.0'±.

Site TOWNSHEND LAKE DAM TOWNSHEND VT.	Boring No. FD-85-4 (G)	Page 3 of 7

DEPTH	CORE/SAMPLE			BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1" = 1'	NO.	SIZE	DEPTH RANGE			
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						

Site TOWNSHEND LAKE DAM TOWNSHEND VT.	Boring No. FD-85-4 (a)	Page 4 of 7

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RUN	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
14'						
15'						
16'						
17'						
18'						
19'						
20'			20.0'		SAMPLED WITH 1 3/8" x 2.0' SPLIT SPOON FROM 20.0' TO 22.0' WITH 300LB HAMMER	GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 15-25% SUB ROUNDED TO SUB ANGULAR GRAVEL. 5-12% NON PLASTIC FINES. BROWN, MOIST. (SP-SM)
				4		
				3	DRILLED WITH 3 7/8" ROLLER ROCK FROM 20.0' TO 22.0' AND WASHED OUT.	
21'	1	1 7/8"	TO			
				3		
				5		
22'			22.0'			

Site TOWNSHEND LAKE DAM TOWNSHEND VT.	Boring No. FD-85-4 (G)	Page 5 of 7

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			22.0'	3	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 22.0' TO 24.0' WITH 300 LB HAMMER	GRAVELLY SAND SAME AS SAMPLE #1 SATURATED (SP-SM)
				4	DRILLED WITH 3 7/8" ROLLER ROCK FROM 22.0' TO 24.0' AND WASHED OUT.	
23'	2	1 7/8"	TO	5		
				4		
24'			24.0'	5" rec. 4	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 24.0' TO 26.0' WITH 300 LB. HAMMER.	GRAVELLY SAND SAME AS SAMPLE #1 * COBBLE IN TIP (SP-SM) SATURATED
				3	DRILLED WITH 3 7/8" ROLLER ROCK FROM 24.0' TO 26.0' AND WASHED OUT.	
25'	3	1 7/8"	TO	5		
				6		
26'			26.0'	2" rec. 4	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 26.0' TO 28.0' WITH 300 LB. HAMMER.	NO RECOVERY
				4	DRILLED WITH 3 7/8" ROLLER ROCK FROM 26.0' TO 28.0' AND WASHED OUT.	
27'	4	1 7/8"	TO	5		
				4		
28'			28.0	0" rec. 5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 28.0' TO 30.0' WITH 300 LB. HAMMER.	GRAVELLY SILTY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE. 10-20% NON PLASTIC FINES. 5-15% SUB ROUNDED TO SUB ANGULAR GRAVEL. BROWN, MOIST. (SM)
				8	DRILLED WITH 3 7/8" ROLLER ROCK FROM 28.0' TO 30.0' AND WASHED OUT.	
29'	5	1 7/8"	TO	11		
				13		
30'			30.0'	9	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 30.0' TO 32.0' WITH 300 LB. HAMMER	

Site TOWNSHEND LAKE DAM TOWNSHEND VT.	Boring No. FD-85-4 (a)	Page 6 of 7

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
31'	6	1 7/8"	TO	10	DRILLED WITH 3 7/8" Roller Rock From 30.0' TO 32.0' AND WASHED OUT.	SILTY SANDY GRAVEL Sub ANGULAR TO SUB ROUNDED. 20-30% COARSE TO FINE SAND 10-20% NON PLASTIC FINES. BROWN, MOIST. (GM)
				12		
				13		
32'			32.0'	7" Rec	CASING BROKE OFF IN BORING	HOLE TERMINATION
33'						
34'						
35'						
36'						
37'						
38'						
39'						

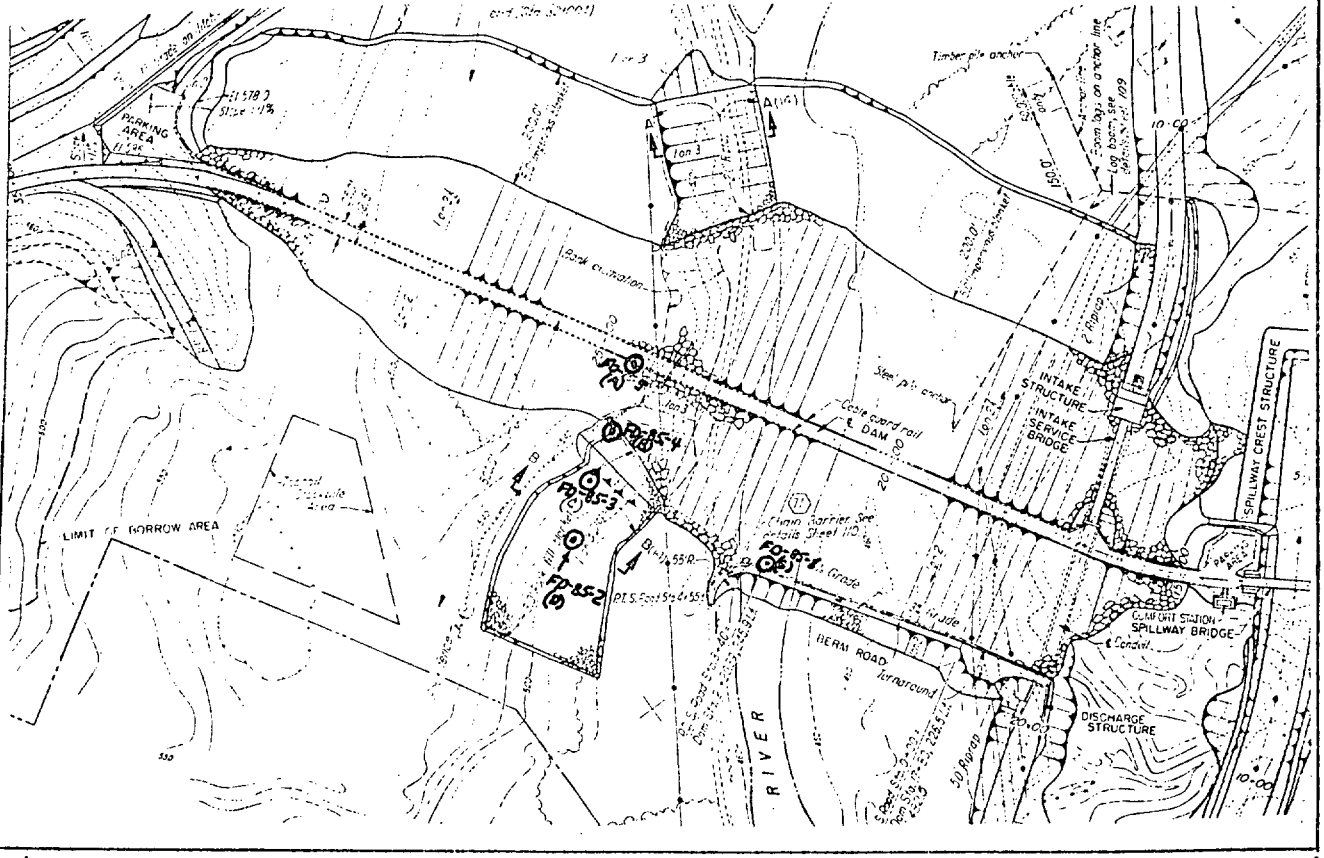
Site: JONSHEND LAKE DAM VT.
Boring No: FD-85-1 (G)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
						NO Reading TAKEN
						Terminated BORING

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



Boring No FD-85-1(G)

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

FIELD LOG OF TEST BORING

PROJECT NO. 0041

Site TOWNSHEND LAKE DAM TOWNSHEND, VT. **Page** 1 **of** 10 **Pages**

Hole No. FD-85-4(6) **Diam. (Casing)** 6" **Boring Started** 7/29/85

FOR LOCATION SEE SKETCH ON PAGE 8 OF 10

Co-ordinates: N _____ E _____ **Boring Completed** 8/2/85

Drilled by Mobile DISTRICT **Report Submitted** _____

Purpose of Exploration DETERMINE CHARACTERISTICS AND DISTRIBUTIONS OF FOUNDATION SOILS. INSTALL PIEZOMETER TO DETERMINE THE PHREATIC SURFACE WITHIN THE EMBANKMENT AND FOUNDATION FOR ALL POOL ELEVATIONS, DETERMINE PORE PRESSURES AND AVERAGE PERMEABILITIES.

Elevation Top of Hole 470.0' ± **M.S.L.** **Casing Left in Place** 5 ft. of STEEL PIPE **Feet**

Total Overburden Drilled 45 **Feet**

Elevation Top of Rock NONE **M.S.L.**

Elevation Bottom of Hole 425.0' **M.S.L.**

Total Rock Drilled NONE **Feet**

Total Depth of Hole 45 **Feet**

Core Recovered NONE TAKEN **%**

Core Recovered — **Ft.:** — **Diam.** — **in.**

Soil Samples 1-3/8 **in. Diam.** 4 **No.**

Soil Samples _____ **in. Diam.** ____ **No.** **Water Table Depth** 8.0'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	17.0'	DRILLED WITH 6-5/8" ROLLER BIT AND
		REVERT THEN STARTED DRIVING
		6" CASING
17'	32'	DRILLED WITH 5-5/8" ROLLER BIT
32'	45'	TOOK SAMPLES 1-4 AND DRILLED
		WITH 5-5/8" ROLLER BIT

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Rock Drilling NONE	Page	
PIEZOMETER INSTALLATION	Page	9+10
	Page	
	Page	

Prepared by Mark H. Owens
Field Data

Submitted by Mark H. Owens

Lab. Data _____

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U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site TOWNSHEND LAKE DAM, VT. Page 2 of 10 Pages

Boring No. FD-85-1' Desig. G' Diam. (Casing) 6"

FOR LOCATION SEE DIAGRAM ON PAGE 8 OF 9

Co-ordinates. N _____ E _____

Elevation Top of Boring 470.0' ± M.S.L.
Total Overburden Drilled 45 Feet
Elevation Top of Rock NONE M.S.L.
Total Rock Drilled NONE Feet
Elevation Bottom of Boring 425.0 M.S.L.
Total Depth of Boring 45 Feet
Core Recovered — % No. Boxes —
Core Recovered — Ft. — Diam. — In.
Soil Samples 1-3/8 In. Diam. 4 No.
Soil Samples — In. Diam. — No.

Hammer Wt. 300 Boring Started 7/29/85
Hammer Drop 30 IN.
Boring Completed _____
Casing Left _____
Subsurface Water Data _____ Page 8 of 9
Obs. Well PZ-1 CASAGRANDE
Drilled By MOBILE DISTRICT ARMY CORP of ENG.
Mfg. Des. Drill FAILING HOLE MASTER
Inspected By: MARK OWENS
Classification By: MARK OWENS
Classification By: _____

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
					DRILLED WITH 6 5/8" Roller Rock FROM 0.0' TO 3.0' AND WASHED OUT.	
					DROVE 6" CASING FROM 0.0' TO 17.0' WITH 300 LB. HAMMER	
1'						
2'						
3'					DRILLED WITH 5/8" Roller Rock FROM 3.0' TO 32.0' AND WASHED OUT.	
4'						
5'						

GENERAL REMARKS: BORING FD-85-1'(G) IS OFFSET 3.0'± EAST OF PREVIOUSLY TERMINATED BORING FD-85-1(G)

Site TOWNSHEND LAKE DAM TOWNSHEND, VT.	Boring No. FD-85-4' (4')	Page 3 of 10

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1" = 1'						
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						

Site Townshend Lake Dam Townshend Vt.	Boring No. FD-85-4' (6')	Page 4 of 10

DEPTH	CORE/SAMPLE			BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
Ft.	NO.	SIZE	DEPTH RANGE			
14'						
15'						
16'						
17'						
18'						
19'						
20'						
21'						
22'						

Site TOWNSHEND LAKE DAM TOWNSHED VT.	Boring No. FO-85-4' (G')	Page 5 of 10

DEPTH		CORE/SAMPLE			BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1" = 1'	NO.	SIZE	DEPTH RANGE			
	23'						
	24'						
	25'						
	26'						
	27'						
	28'						
	29'						
	30'						

Site	Boring No.	Page
TOWNSHEND LAKE DAM TOWNSHEND VT.	FD-85-4' (G)	6 of 10

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
31'						
32'			32.0'		REINSTATEMENT OF OVERBURDEN SAMPLING	
				4	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 32.0' TO 34.0 WITH 300LB HAMMER.	SAND COARSE TO FINE. 5-15% NON PLASTIC FINES. TRACE SUB ROUNDED GRAVEL. BROWN, MOIST. (SW-SM)
				5	DRILLED WITH 6 5/8" Roller Rock FROM 32.0' TO 34.0' AND WASHED OUT.	
33'	1	1 7/8"	TO	7		
				8		
34'			34.0'	6" Rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 34.0' TO 36.0' WITH 300LB. HAMMER.	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 15-25% SUB ROUNDED GRAVEL. 10-15% NON PLASTIC FINES. BROWN, MOIST. (SP-SM)
				7		
				8	DRILLED WITH 6 5/8" Roller Rock FROM 34.0' TO 36.0' AND WASHED OUT.	
35'	2	1 7/8"	TO	8		
				7		
36'			36.0'	8" Rec.	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 36.0' TO 38.0' WITH 300LB. HAMMER	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY MEDIUM TO FINE. 20-30% SUB ROUNDED TO ANGULAR GRAVEL. 10-15% NON PLASTIC FINES. BROWN, MOIST. (SP-SM)
				9		
				10	DRILLED WITH 6 5/8" Roller Rock FROM 36.0' TO 38.0' AND WASHED OUT.	
37'	3	1 7/8"	TO	11		
				12		
38'			38.0'	11	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 38.0' TO 40.0' WITH 300LB. HAMMER	SILTY SANDY GRAVEL SUB ANGULAR TO SUB ROUNDED 20-30% MEDIUM TO FINE SAND. 15-20% NON PLASTIC FINES. BROWN, MOIST (GM)
				11	DRILLED WITH 6 5/8" ROLLER ROCK FROM 38.0' TO 40.0' AND WASHED OUT	
39'	4	1 7/8"	TO			

Site TOWNSHEND LAKE DAM TOWNSHEND VT.	Boring No. FD-85-4' (G)	Page 7 of 10

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				13		
				12		
40'					DRILLED WITH 6 5/8" Roller Rock FROM 40.0' TO 45.0' AND WASHED OUT.	
41'						
42'						
43'						
44'						
45'					END OF OVERBURDEN SAMPLING OPERATIONS 45.0'	BOTTOM OF BORING 45.0'

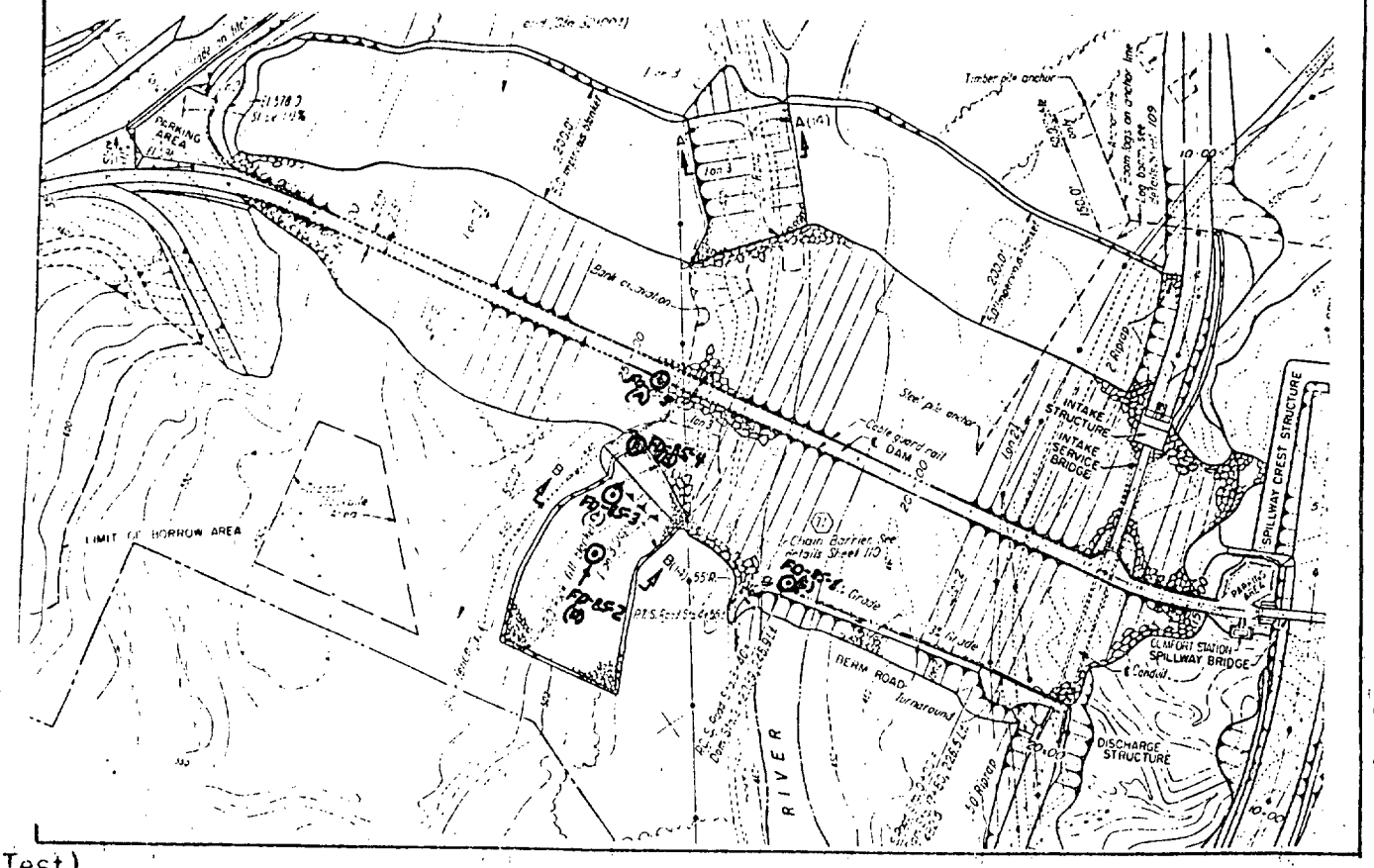
Site: TOWNSHEND LAKE DAM Vt.
Boring No: FD-85-1' (G')

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
8/2/85	7:30AM	17.0'	45.0'	8.0'	462.0'±	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



Test)

Boring No. FD-85-4' (B)

PIEZOMETER INSTALLATION REPORT

PROJECT: TOWNSHEND LAKE DAM VT. DATE: 8/2/85

LOCATION (STA): FOR LOCATION SEE DIAGRAM ON PAGE OF OFFSET FROM CENTER LINE: PIEZ NO.: 14

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: 40 ft. RISER PIPE DIAM: 3/4" SCH 80 PVC

PIEZ TIP SET IN SOIL TYPE): SILTY SANDY GRAVEL SOIL SAMPLE NO.: 4 BORING DIAM: 4"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 5 ft. of 4" STEEL PIPE VENT: 1/8" HOLE IN THE CAP

GROUND ELEV.: 470.0' ELEV. TOP OF RISER: 473 MSL ELEV PIEZ TIP: 430 MSL

FILTER: CASAGRANDE TIP SET IN SILICA POOL SAND FROM ELEV: 425 MSL TO ELEV: 444 MSL

SEAL: BENTONITE BALLS FROM ELEV: 444 MSL TO ELEV: 448 MSL

INSTALLED BY: MOBILE DISTRICT, ARMY CORP. OF ENGINEERS CONTRACT NO.: 0021 FOREMAN: RAYMOND BROWN

DATE OF INSTALLATION: 8/2/85 DATE OF OBSERVATIONS: 8/2/85

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
1:05	0	UNABLE TO FILL						

REMARKS: COULDN'T FILL PIEZOMETER

MARK OWENS
INSPECTOR

PIEZOMETER INSTALLATION REPORT

PROJECT: TOWNSHEND LAKE DAM VT. DATE: 8/2/85

LOCATION (STA): FOR LOCATION SEE Diagram ON Page of OFFSET FROM CENTER LINE: PIEZ NO.: 13

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: -20 ft. RISER PIPE DIAM: 3/4" SCH 80 PVC

PIEZ TIP SET IN (SOIL TYPE): GRAVELY SAND SOIL SAMPLE NO.: SAMPLE 1 FROM FIRST HOLE FO-85-1 BORING DIAM: 4"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 5 ft. of 4" STEEL PROTECTIVE PIPE VENT: 1/8" HOLE IN CAP

GROUND ELEV.: 470.0 MSL ELEV. TOP OF RISER: 473 MSL ELEV PIEZ TIP: 450 MSL

FILTER: SILICA POOL SAND FROM ELEV: 448 MSL TO ELEV: 458 MSL

SEAL: BENTONITE BALLS FROM ELEV: 458 MSL TO ELEV: 462 MSL

INSTALLED BY: MOBILE DISTRICT ARMY CORP. OF ENG. CONTRACT NO.: 0021 FOREMAN: RAYMOND BROWN

DATE OF INSTALLATION: 8/2/85 DATE OF OBSERVATIONS: 8/2/85

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
10:31	0	—	11:01	30	23.5'			
10:32	1	23.0'						
10:36	5	23.25'						
10:41	10	23.5'						
10:46	15	23.5'						

REMARKS:

MARK OWENS
INSPECTOR

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

FIELD LOG OF TEST BORING

PROJECT NO. 0021

Site TOWNSHEND LAKE DAM, VT. — Page 1 of 9 Pages

Hole No. FD-85-3(D) Diam. (Casing) 6" — Boring Started 8/5/85

Co-ordinates: N _____ E _____ — Boring Completed 8/6/85

Drilled by MOBILE DISTRICT — Report Submitted _____

Purpose of Exploration TO DETERMINE PHREATIC SURFACE WITHIN THE EMBANKMENT AND FOUNDATION FOR FULL POOL ELEVATIONS, DETERMINE PORE PRESSURES AND AVERAGE PERMEABILITIES OF THE EMBANKMENT AND FOUNDATION SOILS

Elevation Top of Hole 506.0' M.S.L. GROUND SURFACE Rip-Rap — Casing Left in Place _____ Feet

Total Overburden Drilled 46.0' Feet

Elevation Top of Rock — M.S.L.

Elevation Bottom of Hole 460.0' M.S.L.

Total Rock Drilled — Feet

Total Depth of Hole 46.0' Feet

Core Recovered — %

Core Recovered _____ Ft.: _____ Diam. _____ in.

Soil Samples 1 7/8" in. Diam. 18 No.

Soil Samples _____ in. Diam. _____ No. — Water Table Depth —

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0	5.0	DRILLED WITH 6 5/8" Roller Rock
5.0'	10.0'	DRILLED 6" CASING
5.0	46.0'	DRILLED WITH 5 7/8" Roller ROCK AND WASHED OUT.
10.0'	46.0'	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON WITH 300LB HAMMER

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Rock Drilling	Page _____
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	Page _____

Prepared by Mark A. Owens — Field Data — Lab. Data

Submitted by Mark A. Owens

FORM ED 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 TOWNSHEND LAKE DAM, VT. Page 2 of ___ Pages

Boring No. FD-FS-5 Desig. D Diam. (Casing) 6"

Co-ordinates. N ___ E ___

Elevation Top of Boring 50.0' ± M.S.L.
Total Overburden Drilled 46.0' Feet
Elevation Top of Rock — M.S.L.
Total Rock Drilled — Feet
Elevation Bottom of Boring 46.0' M.S.L.
Total Depth of Boring 46.0' Feet
Core Recovered ___ % No. Boxes ___
Core Recovered ___ Ft. ___ Diam. ___ In.
Soil Samples 1 7/8" In. Diam. 18 No.
Soil Samples ___ In. Diam. ___ No.

Hammer Wt. 300LB. Boring Started 8/5/85
Hammer Drop ___
Casing Left ___ Boring Completed 8/6/85
Subsurface Water Data 8 Page 9
Obs. Well ___
Drilled By MOBILE DISTRICT
Mfg. Des. Drill ___
Inspected By: Mark A. Owens
Classification By: Mark A. Owens
Classification By: ___

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1					DRILLED WITH 6 5/8" ROLLER ROCK FROM 0.0' - 2.0'	
					DROVE 6" CASING FROM 0.0' TO 10.0' WITH 300LB. HAMMER.	
2					DRILLED WITH 5 7/8" ROLLER ROCK FROM 2.0' - 10.0' AND WASHED OUT.	
3						
4						
5						

GENERAL REMARKS: TOP OF BORING ELEVATION IS OFFSET 5.0' EAST OF STAKE BETWEEN LARGE SECTIONS OF RIP RAP.

Boring No. FA-85-5(D)

Site TOWNSHEND LAKE DAM TOWNSHEND, VT.	Boring No. FD-85-5 (0)	Page 3 of ___

DEPTH (Ft.)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
6						
7						
8						
9						
10			10.0'	6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 10.0' TO 12.0' WITH 300LB HAMMER.	GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 10-20% ANGULAR TO SUBROUNDED GRAVEL. <5% NON PLASTIC FINES. LIGHT BROWN, DRY (SP)
				6	DRILLED WITH 5 7/8" ROLLER ROCK FROM 10.0' TO 12.0' AND WASHED OUT.	
11	1	1 7/8"	TO	6		
				11		
12			12.0	14" Rec. 7	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 12.0' TO 14.0' WITH 300LB. HAMMER	GRAVELLY SAND COARSE TO FINE. 10-15% ROUNDED TO SUB ANGULAR GRAVEL. 2-7% NON PLASTIC FINES. LIGHT BROWN, DRY (SP-SM)
				10	DRILLED WITH 5 7/8" ROLLER ROCK FROM 12.0' TO 14.0' AND WASHED OUT	
13	2	1 7/8"	TO	11		

FIG. No. 2C

Site TOWNSHEND LAKE DAM — TOWNSHEND, VT.

Boring No. FD-85-5 (D)

Page 4 of ____

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
14			14.0'	11	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 14.0' TO 16.0' WITH 300LB HAMMER.	GRAVELLY SAND SAME AS SAMPLE #2 (SP-SM)
				10" Rec. 9	DRILLED WITH 5 7/8" ROLLER ROCK FROM 14.0' TO 16.0' AND WASHED OUT.	
15	3	1 7/8"	TO	10		
				12		
				12		
16			16.0'	11" Rec. 6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 16.0' TO 18.0' WITH 300LB. HAMMER.	SAND MEDIUM TO FINE, MOSTLY FINE. TRACE COARSE 45% NON PLASTIC FINES TRACE GRAVEL. LIGHT BROWN, DAMP (SP)
				6	DRILLED WITH 5 7/8" ROLLER ROCK FROM 16.0' TO 18.0' AND WASHED OUT.	
17	4	1 7/8"	TO	6		
				9		
18			18.0'	Rec. 6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 18.0' TO 20.0' WITH 300LB. HAMMER.	GRAVELLY SAND COARSE TO FINE, MOSTLY FINE. 5-15% SUBROUNDED GRAVEL. 45% NON PLASTIC FINES. LIGHT BROWN, DRY (SP)
				7	DRILLED WITH 5 7/8" ROLLER ROCK FROM 18.0' TO 20.0' AND WASHED OUT.	
19	5	1 7/8"	TO	10		
				10		
20			20.0'	Rec. 5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 20.0' TO 22.0' WITH 300LB HAMMER	GRAVELLY SAND SAME AS SAMPLE #5 (SP)
				6	DRILLED WITH 5 7/8" ROLLER ROCK FROM 20.0' TO 22.0' AND WASHED OUT.	
21	6	1 7/8"	TO	7		
22			22.0'	10		

12" Rec.

58A (Test)

Boring No. FD-85-5(D)

FIG. No. 2C

Site TOWNSHEND LAKE DAM TOWNSHEND, VT.	Boring No. FD-85-5 (D)	Page 5 of ___

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			22.0'	7	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 22.0' TO 24.0' WITH 300LB HAMMER.	GRAVELLY SAND COARSE TO FINE. 10-20% SUBROUNDED TO ANGULAR GRAVEL. <5% NON PLASTIC FINES VERY LIGHT BROWN, DRY (SW)
23	7	1 7/8"		10	DRILLED WITH 5 7/8" ROLLER ROCK FROM 22.0' TO 24.0' AND WASHED OUT.	
				11		
				14		
24			24.0'	10" Rec. 5	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 24.0' TO 26.0' WITH 300LB. HAMMER	SAND MEDIUM TO FINE, MOSTLY FINE. TRACE COARSE. <5% NON PLASTIC FINES LIGHT BROWN, DAMP (SP)
				6	DRILLED WITH 5 7/8" ROLLER ROCK FROM 24.0' TO 26.0' AND WASHED OUT.	
25	8	1 7/8"	TO	7		
				14		
26			26.0'	5" Rec. 6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 26.0' TO 28.0' WITH 300LB. HAMMER.	GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 10-15% SUBROUNDED GRAVEL. <5% NON PLASTIC FINES. LIGHT BROWN, DAMP (SP)
				7	DRILLED WITH 5 7/8" ROLLER ROCK FROM 26.0' TO 28.0' AND WASHED OUT.	
27	9	1 7/8"	TO	9		
				13		
28			28.0'	18" Rec. 6	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 28.0' TO 30.0' WITH 300LB. HAMMER.	GRAVELLY SAND SAME AS SAMPLE #9 (SP)
				8	DRILLED WITH 5 7/8" ROLLER ROCK FROM 28.0' TO 30.0' AND WASHED OUT.	
29	10	1 7/8"	TO	8		
				17		
30			30.0'	7" Rec. 7	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 30.0' TO 32.0' WITH 300LB. HAMMER.	GRAVELLY SAND SAME AS SAMPLE #9 (SP)

FIG. No. 2C

Site TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-5 (D)

Page 6 of ____

DEPTH (ft)	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				8	DRILLED WITH 5 7/8" Roller Rock FROM 30.0' TO 32.0' AND WASHED OUT.	
31	11	1 7/8"	TO	10		
				15		
32			32.0'	10" Rec. 17	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 32.0' TO 34.0' WITH 300 LB. HAMMER.	SILTY GRAVELLY SAND. COARSE TO FINE, MOSTLY FINE 15-25% SUBROUNDED TO SUB ANGULAR GRAVEL. 10-15% NON PLASTIC FINES LIGHT BROWN, MOIST. (SM)
				18	DRILLED WITH 5 7/8" Roller Rock FROM 32.0' TO 34.0' AND WASHED OUT.	
33	12	1 7/8"	TO	16		
				48		
34			34.0'	11" Rec. 20	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 34.0' TO 36.0' WITH 300 LB HAMMER	SILTY GRAVELLY SAND COARSE TO FINE, MOSTLY FINE 30-40% SUB ANGULAR TO SUB ROUNDED GRAVEL. 10-15% NON PLASTIC FINES LIGHT BROWN, MOIST. (SM)
				22	DRILLED WITH 5 7/8" Roller Rock FROM 34.0' TO 36.0' AND WASHED OUT.	
35	13	1 7/8"	TO	17		
				31		
36			36.0'	11" Rec. 10	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 36.0' TO 38.0' WITH 300 LB. HAMMER	SILTY GRAVELLY SAND SAME AS Sample #13 (SM)
				9	DRILLED WITH 5 7/8" Roller Rock FROM 36.0' TO 38.0' AND WASHED OUT.	
37	14	1 7/8"	TO	10		
				18		
38			38.0'	11" Rec. 12	SAMPLED WITH 1 7/8" x 2.0' SPLIT SPOON FROM 38.0' TO 40.0' WITH 300 LB. HAMMER.	Gravelly Sand COARSE TO FINE, MOSTLY FINE. 25-30% SUBANGULAR TO SUB ROUNDED GRAVEL. 5-10% NON PLASTIC FINES. LIGHT BROWN, DRY (SP-SM)
				16	DRILLED WITH 5 7/8" Roller Rock FROM 38.0' TO 40.0' AND WASHED OUT.	
39	15	1 7/8"	TO			

6

58A(Test)

Boring No. FD-85-5(D)

FIG. No. 2C

Site: TOWNSHEND LAKE DAM TOWNSHEND VT.	Boring No. FO-85-5 (D)	Page 7 of ____

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				19		
				17		
40'			40.0'	7	SAMPLED WITH 1 3/8" x 2.0' SPLIT SPOON FROM 40.0' TO 42.0' WITH 300LB HAMMER. DRILLED WITH 5 7/8" ROLLER ROCK FROM 40.0' TO 41.0' AND WASHED OUT.	GRAVELLY SAND: SAME AS 15
6" REC'VY				22		
41'	16	1 3/8"	TO	17		
				13		
42'			42.0'	9	SAMPLED WITH 1 3/8" x 2.0' SPLIT SPOON FROM 42.0' TO 44.0' WITH 300LB HAMMER DRILLED WITH 5 7/8" ROLLER ROCK FROM 42.0' TO 44.0' AND WASHED OUT.	GRAVELLY SAND: SAME AS 15
7" REC'VY				15		
43'	17	1 3/8"	TO	20		
				20		
44'			44.0'	10	SAMPLED WITH 1 3/8" x 2.0' SPLIT SPOON FROM 44.0' TO 46.0' WITH 300LB HAMMER DRILLED WITH 5 7/8" ROLLER ROCK FROM 44.0' TO 46.0' AND WASHED OUT.	SAND: MEDIUM TO FINE, MOSTLY MEDIUM SAND, 10-15% NON PLASTIC FINES <5% SUB ROUNDED GRAVEL. LIGHT BROWN, DAMP. (SP)
				11		
45'	18	1 3/8"	TO	13		
14" REC'VY				20		
46'			46.0'		END OF OVERBURDEN SAMPLING OPERATIONS	BOTTOM OF BORING 46.0'
47'						

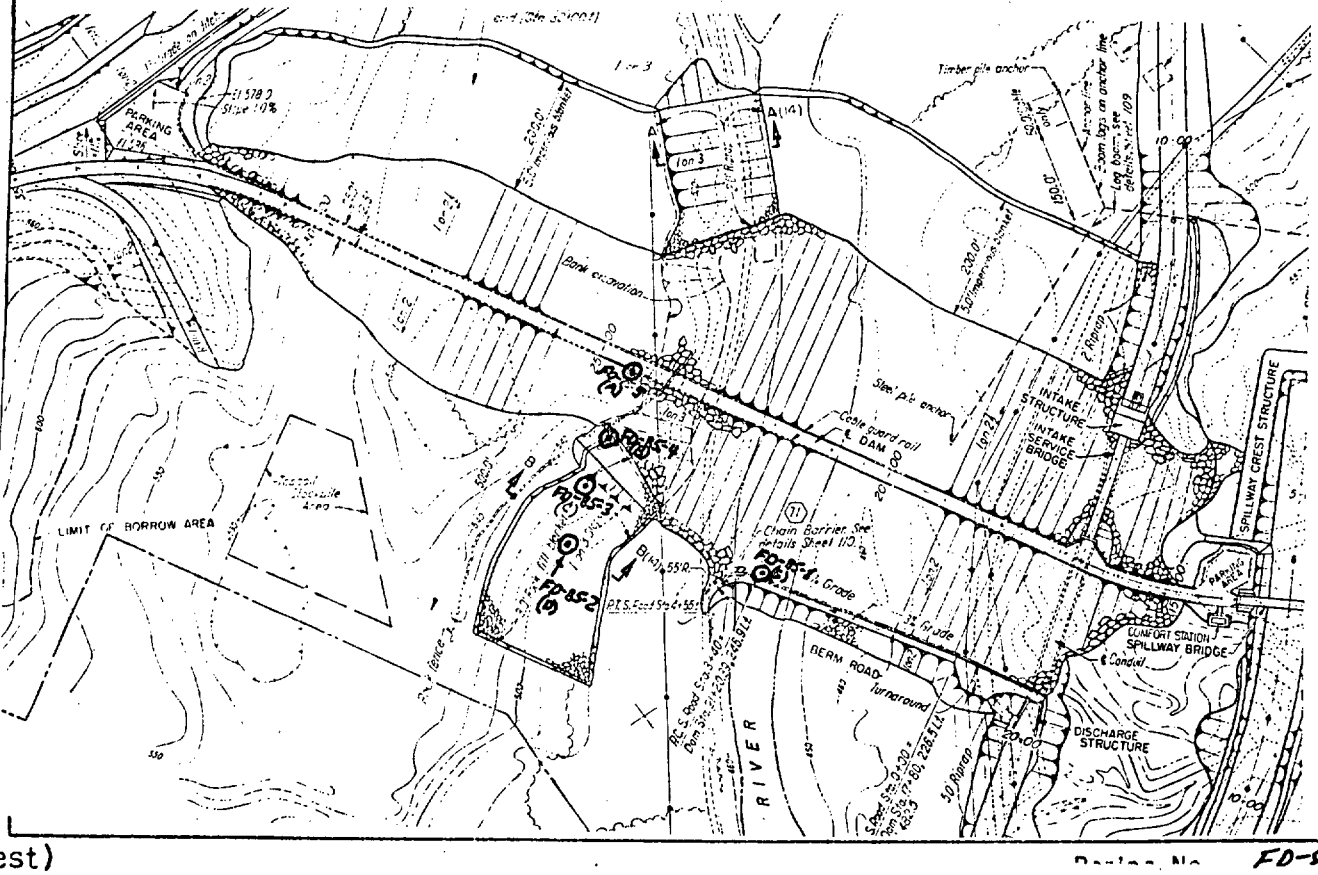
Site: TOWNSHEND LAKE DAM, VT.
Boring No: FD-85-5 (D)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
8/6/85	3:04pm	10.0'	46.0'	—	—	WATER TABLE BELOW BOTTOM OF BORING

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



PIEZOMETER INSTALLATION REPORT

PROJECT: TOWNSHEND LAKE DAM, VT. DATE: 8/6/85

LOCATION (STA): FD-85-2(3) OFFSET FROM CENTER LINE: PIEZ NO.: 8

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: -44.0' RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): SAND SOIL SAMPLE NO.: 18 BORING DIAM: 6"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" STEEL CASING VENT:

GROUND ELEV.: 506.0' ELEV. TOP OF RISER: 508.0'± ELEV PIEZ TIP: 462.0'

FILTER: SILICA SAND FROM ELEV: 460.0' TO ELEV: 470.0'

SEAL: BENTONITE FROM ELEV: 470.0' TO ELEV: 475.0'

INSTALLED BY: MOBILE DISTRICT CONTRACT NO.: FOREMAN: Raymond L. Brown

DATE OF INSTALLATION: 8/6/85 DATE OF OBSERVATIONS: 8/6/85

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
3:00	—	—	3:30	30	41.0'			
3:01	1	7.0'						
3:05	5	13.0'						
3:10	10	20.0'						
3:15	15	26.0'						

REMARKS:

Mark P. Owens
INSPECTOR

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

FIELD LOG OF TEST BORING

PROJECT NO. 0021

Site TOWNSHEND DAM, TOWNSHEND VT. Page 1 of 10 Pages

Hole No. FD-85-6 Diam. (Casing) 20ft, 6"; 30ft, 4" Boring Started 8/12/85

FOR LOCATION SEE SKETCH ON PAGE 10 OF 10

Co-ordinates: N _____ E _____ Boring Completed 8/14/85

Drilled by RAYMOND BROWN MOBILE DISTRICT Report Submitted _____

Purpose of Exploration DETERMINE CHARACTERISTICS AND DISTRIBUTION OF FOUNDATION SOILS. INSTALL PIEZOMETERS TO DETERMINE PHREATIC WITH IN THE EMBANKMENT AND FOUNDATION FOR ALL POOL ELEVATIONS, AND DETERMINE PORE PRESSURES & AVE PERMEABILI

Elevation Top of Hole 516.8' M.S.L. Casing Left in Place 5ft. OF 4" CASING Feet

Total Overburden Drilled 57' Feet

Elevation Top of Rock NONE M.S.L.

Elevation Bottom of Hole 459' M.S.L.

Total Rock Drilled NONE Feet

Total Depth of Hole 57' Feet

Core Recovered NONE %

Core Recovered — Ft.: — Diam. — In.

Soil Samples 1-3/8" In. Diam. 12 No.

Soil Samples _____ In. Diam. ____ No. Water Table Depth BELOW 58 ft.

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	6'	USED 6" ROLLER BIT AND REVERT THEN
		DROVE 6" CASING TO 5 ft.
6'	20'	DRILLED WITH 5-7/8" ROLLER BIT
		AND REVERT DROVE 20 ft of 6"
20'	30'	DRILLED WITH 3-7/8" ROLLER BIT AND
		REVERT THEN DROVE 30' OF 4"
30	58'	DRILLED WITH 3-7/8" ROLLER BIT AND
		REVERT

INDEX

Ground Water _____ Back of Page 10 of 1

Boring Location Sketch _____ Back of Page 10 of 10

Overburden Record _____ Page 1-8

Rock Drilling _____ Page NONE

PIEZOMETER INSTALLATION _____ Page 9 of 10

_____ Page ____

_____ Page ____

Prepared by Donald L Ellison
Field Data Lab. Data

Submitted by Charles H. Gross

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 TOWNSHEND LAKE DAM, VT. Page 2 of 10 Pages

Boring No FD-85-6 Desig. Q Diam. (Casing) 6"

FOR LOCATION SEE SKETCH ON PAGE 10 OF 10

Co-ordinates. N _____ E _____

Elevation Top of Boring 516.8 M.S.L.
Total Overburden Drilled 58' Feet
Elevation Top of Rock NONE M.S.L.
Total Rock Drilled NONE Feet
Elevation Bottom of Boring 459 M.S.L.
Total Depth of Boring 58 Feet
Core Recovered — % No. Boxes —
Core Recovered — Ft : — Diam. — In.
Soil Samples 1-3/8 In. Diam. 12 No.
Soil Samples — In. Diam. — No.

Hammer Wt. 300 lb. Boring Started 8/12/85
Hammer Drop 30 IN. Boring Completed 8/14/85
Casing Left 5ft.
Subsurface Water Data _____ Page 10 of 10
Obs. Well 3/4 SCH 80 PVC
Drilled By MOBILE DISTRICT (RAYMOND BROWN)
Mfg. Des. Drill FAILING
Inspected By: DON Ellison
Classification By: DON Ellison
Classification By: _____

DEPTH 1"=1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1'						
2'		6"			DRILLED WITH 6" ROLLER BIT TO 6 ft THEN DROVE 5 ft. OF 6" CASING. LOST DRILLING FLUID (REVERT) PAST THE CASING	
3'						
4'						
5'						

GENERAL REMARKS:

NED FORM 4.58(Test)

Boring No. FD-85-6(c)

Site: TOWNSHEND LAKE DAM TOWNSHEND, VT.	Boring No. FD-85-6 (c)	Page 3 of 10

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATER ALS
					DRILLED WITH 5-5/8" ROLLER BIT TO 10 ft. AND LOST DRILLING FLUID.	
6'		5-5/8"				
					WE DROVE 5 ft. MORE OF 6" CASING FOR A TOTAL OF 10 ft.	
7'						
					WASHED OUT THE CASING WITH 5-5/8" ROLLER BIT TO 15 ft. THERE ARE A LOT OF BOULDERS AND COBBLES.	
8'						
		5-5/8"			LOST DRILLING FLUID PAST THE CASING AT 10 ft.	
9'						
					DROVE 5 ft MORE OF 6" CASING FOR A TOTAL OF 15 ft. AND WASHED IT OUT WITH A 5-5/8" ROLLER BIT.	
10'						
11'						
12'		5-5/8"			DRILLED WITH 5-5/8" ROLLER BIT	
13'						

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-6 (c)

DEPTH REC'VY	DEPTH 1" = 1'	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	14'		5-5/8"				
	15'			15'		BOTTOM OF CASING 6"	
	16'		5-5/8"	16'		LOST DRILLING FLUID PAST CASING, DRILLED WITH 5-5/8" ROLLER BIT, THERE WAS A LOT OF GRAVEL COBBLES AND BOULDERS.	
.7' REC'VY	17'	1	1-3/8"	17'	8 100	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SPOON WITH 15 ft. OF (N) RODS; USED 300 lb. HAMMER REFUSAL ON A BOULDER	SILTY GRAVEL: COARSE TO FINE, MOSTLY FINES AND GRAVELS, 30-40% SUB-ANGULAR GRAVEL, 20-25% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, BROWN, (GM-GC)
	18'		5-5/8"			DROVE 5 ft. MORE OF 6" CASING FOR A TOTAL OF 20 ft. WASHED OUT THE CASING WITH A 5-5/8" ROLLER BIT.	
	19'					STARTED LOSING DRILLING FLUID AT 19.9'	
	20'			20'		BOTTOM OF 6" CASING	
.4' REC'VY	21'	2	1-3/8"		11 13 18	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SPOON WITH 20 ft OF (N) RODS, USED 300 lb. HAMMER.	SANDY GRAVEL: COARSE TO FINE, MOSTLY COARSE SAND AND GRAVEL, 30-35% ANGULAR GRAVEL 5-10% NON-PLASTIC FINES, 5-10% FRAGMENTS OF COBBLES, DARK GRAY, (SP)
	22'			22'	8		

Site: TOWNSHEND LAKE DAM TOWNSHEND, VT.	Boring No. FD-85-6 (c)	Page 5 of 10

DEPTH REC'VY	DEPTH 1" = 1'	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			3-7/8"			DRILLED WITH 5-5/8" ROLLER BIT HIT A LOT OF BOULDERS, COBBLES, AND GRAVEL.	
	23'					LOST ALL THE DRILLING FLUID AT 21 ft.	
	24'					HIT SOME 2'-3' BOULDERS; DRILLING IS VERY ROUGH AND SLOW	
	25'					DROVE 30 ft OF 4" CASING TO SEAL OF THE LEAK, WASHED OUT THE CASING WITH 3-7/8" ROLLER BIT	
			3-7/8"				
	26'						
	27'						
						HIT A LOT OF BOULDERS AND COBBLES	
	28'		3-7/8"				
	29'						
	30'			30'		BOTTOM OF 4" CASING	
			3-7/8"			DRILLED WITH 3-7/8" ROLLER BIT AND HIT A BOULDER	

Site: TOWNSHEND LAKE DAM TOWNSHEND, VT.	Boring No. FD-85-6 (c)	Page 6 of 10

DEPTH REC'VY	DEPTH 1" = 1'	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				30.8'		AT 30.2'. ROLLER BIT COULDN'T CUT IT SO WE USED A CORE BARREL	
0.5' REC'VY	31' 32' 33'		3-7/8"	33.1'		CORED WITH (R) BARREL TOOK 55 MIN. TO GET THROUGH IT. BOTTOM OF BOULDER	BOULDER: PINK QUARTZ
	34'		3-7/8"	34'		DRILLED WITH 3-7/8" ROLLER BIT HIT A COBBLE AT 33.4 ft.	
1.0' REC'VY	35' 36'	3	1-3/8"	36'	12 12 16 18	SAMPLED WITH 2' x 1-3/8" I.D. SPLIT SPOON WITH 35' OF (N) RODS, USED 300 lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT.	SANDY GRAVEL: COARSE TO FINE, MOSTLY MEDIUM, 35-40% ANGULAR GRAVEL AND SUB-ANGULAR AND 3-4 CM. BIG COBBLE FRAGMENTS), 10-15% NON-PLASTIC FINES, BROWNISH GRAY, (SP)
0.7' REC'VY	37' 38'	4	1-3/8"	38'	8 15 16 21	SAMPLED WITH 2' x 1-3/8" I.D. SPLIT SPOON WITH 35' OF (N) RODS, USED 300 lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT.	SILTY SANDY GRAVEL: COARSE TO FINE, MOST COARSE SAND, 30-35% SUB ANGULAR GRAVEL, 25-30% NON-PLASTIC FINES, DARK GRAY, (GM-GC)
0.8' REC'VY	39'	5	1-3/8"		9 18	SAMPLED WITH 2' x 1-3/8" I.D. SPLIT SPOON WITH 40 ft. OF (N) RODS, USED 300 lb. HAMMER	SANDY GRAVEL: COARSE TO FINE, MOSTLY MEDIUM SAND, 25-30% SUB-ANGULAR GRAVEL, 10-15% NON-PLASTIC FINES, LIGHT BROWN, (SP)

Site: TOWNSHEND LAKE DAM, TOWNSHEND, VT.

Boring No. FD-85-6 (c)

DEPTH REC'VY	DEPTH ft./'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	40'	5 CONT.		40'	19 20	DRILLED WITH 3-7/8" ROLLER BIT TO 40'	
1.1' REC'VY	41' 42'	6	1-3/8"	42'	15 18 24 36	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 40 ft. (N) RODS, USED 300lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT TO 42 ft.	SANDY GRAVEL: COARSE TO FINE, MOSTLY MEDIUM SAND, 25-30% ANGULAR TO SUB-ANGULAR GRAVEL, 5-10% NON-PLASTIC FINES, LIGHT BROWN, (SP)
0.9' REC'VY	43' 44'	7	1-3/8"	44'	29 32 25 28	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SPOON WITH 45 ft. OF (N) RODS, USED 300lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT TO 44'	SILTY SANDY GRAVEL: COARSE TO FINE, MOSTLY COARSE TO MEDIUM SAND, 20-25% SUB-ANGULAR GRAVEL, 15-20% NON-PLASTIC FINES, DARK GRAY, (GM-GC)
0.6' REC'VY	45' 46'	8	1-3/8"	46'	13 88 38 36	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 45 ft. OF (N) RODS, USED 300lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT TO 46 ft. HIT A BOULDER AT 44.5'. BENT THE SPOON ON THIS BOULDER.	SILTY SANDY GRAVEL: COARSE TO FINE, MOSTLY FINES, 15-20% SUB-ROUNDED GRAVEL, 25-30% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, DARK GRAY, (GM-GC)
0.5' REC'VY	47'	9	1-3/8"		33 39 28	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SPOON WITH 45 ft. OF (N) RODS, USED 300lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT HIT A BOULDER AT 47.7 ft.	SILTY GRAVEL: COARSE TO FINE, MOSTLY FINE, 25-30% SUB-ANGULAR GRAVEL, 20-25% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, DARK BROWN, (GM-GC)

Site: TOWNSHEND DAM TOWNSHEND, VT.	Boring No. FD-85-6 (c)	Page 8 of 10

DEPTH REC'VY	DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	48'	9 CONT.	1-3/8"	48'	25		
0.5' REC'VY	49'	10	1-3/8"	50'	32, 35, 29, 31	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SPOON WITH 50 ft. OF (N) RODS; USED 300 lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT TO 50 ft.	SANDY SILTY GRAVEL: COARSE TO FINE, MOSTLY MEDIUM SAND, 30-35% SUB-ANGULAR TO ANGULAR GRAVEL AND FRAGMENTS OF COBBLES, 15-20% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, TANNISH BROWN, (GM-GC)
0.0' REC'VY	51'	11	1-3/8"	52'	100	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SPOON WITH 50 ft. OF (N) RODS; USED 300 lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT TO 57 ft. HIT BOULDERS AND COBBLES. DRILLING IS SLOW AND ROUGH. HIT A BOULDER AT 52.1'	NO RECOVERY, HAD REFUSAL ON A BOULDER AT 50.5'
	53'		3-7/8"	54'		HIT A BOULDER AT 53 ft. DRILLING WAS SLOW AND ROUGH	
0.9' REC'VY	55'	12	1-3/8"	56'	41, 35, 21, 17	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SPOON WITH 55 ft. of (N) RODS; USED 300 lb. HAMMER. DRILLED TO 58 ft.	SILTY SANDY GRAVEL: FINE TO COARSE, MOSTLY MEDIUM AND FINE SAND, 25-30% SUBANGULAR GRAVEL AND FRAGMENTS OF COBBLES, 15-20% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, TANNISH BROWN, (GM-GC)
	56'					BOTTOM OF HOLE	

PIEZOMETER INSTALLATION REPORT

PROJECT: TOWNSHEND DAM, TOWNSHEND VT. DATE: 8/14/85

LOCATION (STA): FOR LOCATION SEE SKETCH ON PAGE 10 OF 10 OFFSET FROM CENTER LINE: PIEZ NO.: 3

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: 56 ft. RISER PIPE DIAM: 3/4" SCH 80 PVC

PIEZ TIP SET IN (SOIL TYPE): SILTY GRAVEL AND BOULDERS SOIL SAMPLE NO.: #12 BORING DIAM: 4"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 5 ft of 4" STEEL PIPE VENT: 1/8" HOLE IN CAP

GROUND ELEV.: 516.8' MSL ELEV. TOP OF RISER: 518.3' MSL ELEV PIEZ TIP: 460' MSL

FILTER: SILICA SAND WASHED FROM ELEV: 460' MSL TO ELEV: 490'

SEAL: BENTONITE BALLS FROM ELEV: 490' MSL TO ELEV: 495' MSL

INSTALLED BY: MOBILE DISTICT RAYMOND BROWN CONTRACT NO.: 0021 FOREMAN: RAYMOND BROWN

DATE OF INSTALLATION: 8/14/85 DATE OF OBSERVATIONS: 8/14/85

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
12:30	0.5 MIN	12 ft		30	45.1 ft.			
	2	28 ft.						
	5	39.5 ft						
	10	43.7 ft.						
	15	43.9 ft.						

REMARKS: GROUND WATER LEVEL WAS BELOW PIEZOMETER TIP BEFORE FALLING HEAD TEST AND BELOW THE TIP THE DAY AFTER THE FALLING HEAD TEST

Donald L Ellison
INSPECTOR

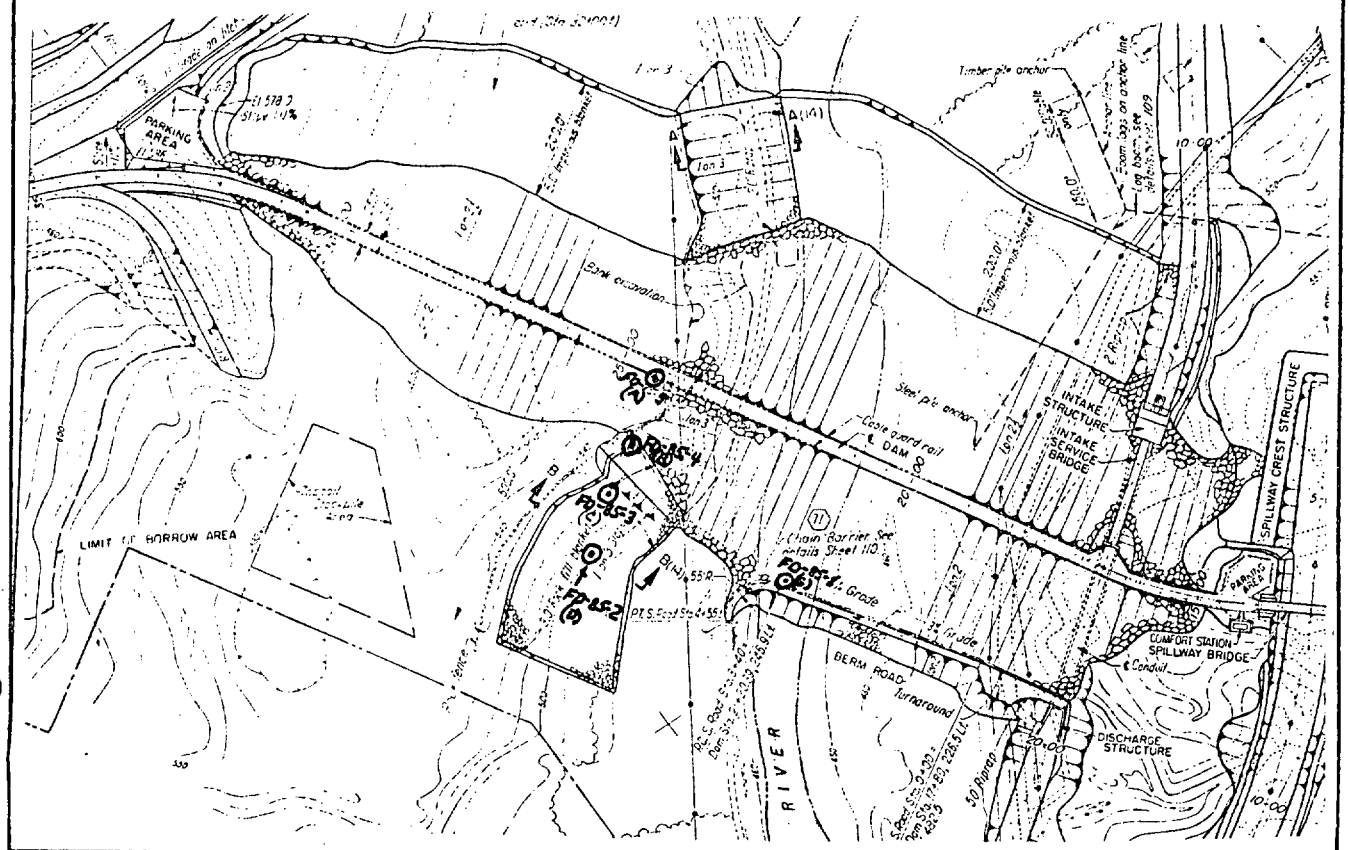
Site: TOWNSHEND DAM, VT.
Boring No: FD-85-6(c)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
8/14/85	12:00	5 ft.	58 ft.	NO WATER IN PIEZOMETER	BELOW PIEZ TIP	CHECKED PIEZ PRIOR TO FALLING HEAD TEST
8/15/85	7:30	5 ft.	58 ft.	NO WATER IN PIEZOMETER	"	CHECKED PIEZOMETER THE DAY AFTER THE FALLING HEAD TEST

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



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

FIELD LOG OF TEST BORING

PROJECT NO. 0021

Site TOWNSHEND DAM, TOWNSHEND VT — Page 1 of 12 Pages

Hole No. FD-85-7 (B) Diam. (Casing) 6" — Boring Started 8/15/85

FOR LOCATION SEE SKETCH ON PAGE 11 OF 12

Co-ordinates: N _____ E _____ — Boring Completed 8/20/85

Drilled by MOBILE DISTRICT ARMY CORP OF ENG. RAYMOND BROWN — Report Submitted _____

Purpose of Exploration DETERMINE CHARACTERISTICS AND DISTRIBUTION OF FOUNDATION SOILS. INSTALL PIEZOMETER TO DETERMINE THE PHREATIC SURFACE WITHIN THE EMBANKMEN AND FOUNDATION, DETERMINE PORE PRESSURES AND AVERAGE PERMEABILITIES

Elevation Top of Hole 528.4 M.S.L.

Total Overburden Drilled 71 Feet

Elevation Top of Rock NONE M.S.L.

Elevation Bottom of Hole 457.4 M.S.L.

Total Rock Drilled NONE Feet

Total Depth of Hole 71 Feet

Core Recovered — %

Core Recovered — Ft.: — Diam. — In.

Soil Samples 1-3/8" In. Diam. 9 No.

Soil Samples — In. Diam. — No.

Casing Left in Place 5 ft. 4" STEEL PIPE Feet

Water Table Depth BELOW 69 ft. WHICH IS TIP OF THE PIEZOMETER

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	20'	DRILLED WITH 5-3/8" ROLLER BIT AND REVERT
		DROVE 6" CASING TO 4 ft AND
		THEN DROVE 4" CASING TO 20 ft.
20'	71'	DRILLED WITH 3-7/8" ROLLER BIT
		AND REVERT, HAD TO DRIVE
		4" CASING AS WE DRILLED TO
		SEAL OFF THE LEAKS. BUT
		WE STILL LOST FLUID.

INDEX

Ground Water	Back of Page	10 of 12
Boring Location Sketch	Back of Page	10 of 12
Overburden Record	Page	1-9
Rock Drilling NONE	Page	
PIEZOMETER INSTALLATION	Page	11 OF 12
	Page	
	Page	

Prepared by DONALD L ELLISON
Field Data — Lab. Data

Submitted by _____

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 TOWNSHEND DAM, VT. Page 2 of 12 Pages

Boring No. FD-85-7 (B) Desig. _____ Diam. (Casing) 6" & 4"

FOR LOCATION SEE SKETCH ON PAGE 11 OF 12

Co-ordinates: N _____ E _____

Elevation Top of Boring 528.4 M.S.L.
Total Overburden Drilled 71 Feet
Elevation Top of Rock NONE M.S.L.
Total Rock Drilled NONE Feet
Elevation Bottom of Boring 457.4 M.S.L.
Total Depth of Boring 71 Feet
Core Recovered NONE % No. Boxes —
Core Recovered — Ft : — Diam. — In.
Soil Samples 1-3/8" In. Diam. 9 No.
Soil Samples — In. Diam. — No.

Hammer Wt. 300lb. Boring Started 8/15/85
Hammer Drop 30"
Boring Completed 8/20/85
Casing Left 5 ft. 4" STEEL PIPE
Subsurface Water Data _____ Page 10 of 11
Obs. Well CASAGRANDE, 3/4" PVC SCH 80
Drilled By MOBILE DISTRICT ARMY CORP OF ENG.
Mfg. Des. Drill FAILLING HOLE MASTER
Inspected By: DONALD L ELLISON
Classification By: DONALD L ELLISON
Classification By: _____

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1'					USED HAND SHOVEL TO CLEAR OUT THE BOULDERS TO TWO ft.	
2'		6"			THEN WE DRILLED WITH A 6" ROLLER BIT TO 4 ft. AND DROVE A 5 ft. PILE OF 6" CASING TO 4 ft.	
3'					WHERE IT HIT A BOULDER AND STOPPED.	
4'			4'		BOTTOM OF 6" CASING	
5'					DRILLED WITH 5-5/8" ROLLER BIT THROUGH A BOULDER FROM 4'-5.5'	

GENERAL REMARKS:

Site: TOWNSHEND DAM, VT.	Boring No. FD-85-7 (B)	Page 3 of 12

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATER ALS
6'		5-5/8"			DRILLED WITH 5-5/8" ROLLER BIT, HIT BOULDERS 0.5' TOO 1.0' THICK, COBBLES AND GRAVELS. DRILLING WAS SLOW AND ROUGH. STARTED LOOSING SOME DRILLING FLUID (REVERT) AT 7.5 ft..	
7'						
8'						
9'						
10'		5-5/8"			DRILLED WITH 5-5/8" ROLLER BIT; STILL HITTING BOULDERS, COBBLES AND GRAVELS. STILL LOOSING SOME DRILLING FLUID.	
11'						
12'						
13'						

Site: TOWNSHEND DAM, VT.	Boring No. FD-85-7 (B)	Page 4 of 12

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
14'		5-5/8"			CONT. DRILLING WITH 5-5/8" ROLLER BIT; STILL LOOSING SOME DRILLING FLUID. STILL HITTING SOME COBBLES, GRAVELS, AND A OCCASIONAL BOULDER	
15'						
16'						
17'						
18'						
19'		5-5/8"			STILL DRILLING WITH 5-5/8" ROLLER BIT AND LOOSING SOME DRILLING FLUID. DROVE 20 ft. OF 4" CASING WITH A 1 ft. SHOE. USED A 300 lb. HAMMER.	
20'		3-7/8"			DRILLED WITH 3-7/8" ROLLER BIT. DRILLING WAS SLOW AND ROUGH.	
21'						
22'						

Site: TOWNSHEND DAM, VT.	Boring No. FD-85-7 (B)	Page 5 of 12

DEPTH REC'VY	DEPTH 1" = 1'	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	23'		3-7/8"			STARTED LOOSING DRILLING FLUID AT 22.5 ft.	
	24'						
	25'					DRILLED WITH 3-7/8" ROLLER BIT, STILL HITTING COBBLES, GRAVELS AND A OCCASIONAL BOULDER. LOST ALL THE DRILLING FLUID AT 25 ft.	
	26'		3-7/8"				
	27'						
	28'			28'			
1.3' REC'VY	29'	1	1-3/8"		11	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 30 ft. OF (N) RODS; USED 300 lb. HAMMER. DROVE 10 ft. MORE OF 4" CASING FOR A TOTAL OF 30 ft. DRILLED WITH 3-5/8" ROLLER BIT TO 30 ft.	SILTY GRAVEL: COARSE TO FINE, MOSTLY FINE, 35-40% SUB-ANGULAR TO ANGULAR GRAVEL, 10-15% NON-PLASTIC FINES, GRAYISH BROWN, (GC)
					15		
					21		
	30'			30'	17		
		2			6		

Site: TOWNSHEND DAM, VT.	Boring No. FD-85-7 (B)	Page 6 of 12

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1.5' REC'VY	31' – 32' (1" = 1')	2 CONT.	1-3/8"	32'	7, 7, 9	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 35 ft. OF (N) RODS, USED 300 lb. HAMMER. DRILLED TO 32 ft. WITH 3-7/8" ROLLER BIT. STARTED LOSING DRILLING FLUID (REVERT) AGAIN.	SILTY SANDY GRAVEL: COARSE TO FINE, MOSTLY FINE, 30-35% SUB-ANGULAR TO ANGULAR GRAVEL, SOME FRAGMENTS OF COBBLES, 15-20% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, DARK GRAY, (GM)
0.8' REC'VY	32' – 34'	3	1-3/8"	34'	10, 27, 15, 17	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 35 ft. OF (N) RODS; USED 300 lb. HAMMER. DROVE 5 ft. MORE OF 4" CASING FOR A TOTAL OF 34 ft. IN THE GROUND. DRILLED WITH 3-7/8" ROLLER BIT AND LOST ALL THE DRILLING FLUID AT 34'	SILTY SANDY GRAVEL: COARSE TO FINE, MOSTLY FINE, 25-30% SUB-ANGULAR TO ANGULAR GRAVEL, SOME FRAGMENTS OF COBBLES, 10-15% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, DARK GRAY, (GM)
1.0' REC'VY	34' – 36'	4	1-3/8"	36'	10, 15, 13, 20	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 35 ft OF (N) RODS; USED 300 lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT AND WE ARE STILL LOSING FLUID. AT 35.8 ft. WE HIT A BOULDER THAT TOOK 50 MIN. TO GET THROUGH	SANDY GRAVEL: COARSE TO FINE, MOSTLY COARSE TO MED., 50-55% SUB-ANGULAR GRAVEL, SOME FRAGMENTS OF COBBLES, 5-10% NON-PLASTIC FINES, GRAY, (SP)
	36' – 38'		3-7/8"	38'		WE FINALLY GOT THROUGH THE BOULDER AT 36.3 ft. SO WE DRILLED TO 38 ft. FOR THE NEXT SAMPLE. DROVE 3 MORE ft. OF 4" CASING FOR A TOTAL OF 37 ft. AND WASHED OUT WITH A 3-7/8" ROLLER BIT	
0.0' REC'VY	38' – 39'	5	1-3/4"		15, 30	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON, USED 300 lb. HAMMER. DRILLED TO 40 ft. WITH 3-7/8" ROLLER BIT AND	NO RECOVERY PUSHED A STONE

Site: TOWNSHEND DAM, VT.	Boring No. FD-85-7 (B)	Page 7 of 12

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATER ALS
	1" = 1'						
	40'	5 CONT	1-3/8"	40'	22 52	HIT A LOT OF COBBLES AND A BOULDER AT 39.3 ft. DRILLED TO 40' WITH A 3-7/8" ROLLER BIT AND LOST ALL THE DRILLING FLUID. DROVE 3 ft. MORE OF 4" CASING.	
0.8' REC'VY	41' 42'	6	1-3/8"	42'	11 16 15 14	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 40 ft OF (N) RODS; USED 300 lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT TO 44 ft. HIT A LOT OF COBBLES AND BOULDERS AND LOST ALL THE DRILLING FLUID, DROVE 5 ft MORE OF 4" CASING FOR A TOTAL	SILTY SANDY GRAVEL: COARSE TO FINE, MOSTLY MEDIUM TO FINE, 50-55% SUB ANGULAR GRAVEL, SOME FRAGMENTS OF COBBLES, 15-20% NO PLASTIC TO SLIGHTY PLASTIC FINES, DARK GRAY, (GM-GC)
	43' 44'		3-7/8"	44'		OF 44 ft IN THE GROUND. DIDN'T TRY TO SAMPLE, THERE WAS TOO MANY BOULDERS WHICH THE ROLLER BIT HAD A HARD TIME CUTTING AND WE WERE LOOSING ALL THE DRILLING FLUID.	
0.2' REC'VY	45' 46'	7	1-3/8"	46'	5 10 12 13	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 45 ft. OF (N) RODS; USED 300 lb. HAMMER. DRILLED WITH 3-7/8" ROLLER BIT TO 48 ft AND HIT A LOT OF COBBLES AND BOULDERS ALSO LOST ALL THE DRILLING FLUID.	SANDY GRAVEL: COARSE TO FINE, MOSTLY MEDIUM, 80% SUB-ANGULAR GRAVEL AND FRAGMENT OF COBBLES, DARK GRAY, (GP)
	47'					CONT. DRILLING WITH 3-7/8" ROLLER BIT AND HIT A LOT OF COBBLES AND BOULDERS WHICH THE ROLLER BIT TOOK A LONG TIME TO CUT.	

Site: TOWNSHEND DAM, VT	Boring No. FO-85-7 (B)	Page 8 of 12

DEPTH REC'VY	DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	48'			48'		DROVE CASING TO 48 ft. TO SEAL OFF THE LEAK.	
0.0' REC'VY	49'	8	1-3/8"	1-3/8"	30 / 35 / 25 / 22	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 50 ft OF (N) RODS; USED 300 lb. HAMMER.	NO RECOVERY
	50'			50'			
	51' / 52' / 53' / 54'		3-7/8"			DRILLED WITH 3-7/8" ROLLER BIT. WE HIT A LOT OF BOULDERS AND COBBLES WHICH THE ROLLER BIT HAD A HARD TIME CUTTING. WE HAD TO ADVANCE THE CASING EVERY 2 ft. TO TRY AND STOP THE LEAK. DROVE THE CASING TO 55 ft..	
	55'			55'			
1.2' REC'VY	56'	9	1-3/8"		24 / 19	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 55 ft. OF (N) RODS; USED 300 lb. HAMMER.	SILTY SAND & GRAVEL: COARSE TO FINE, MOSTLY MEDIUM, 35-40% SUB-ANGULAR TO ANGULAR GRAVEL, SOME FRAGMENTS OF COBBLES,

Site: TOWNSHEND DAM, VT.	Boring No. FD-85-7 (B)	Page 9 of 12

DEPTH REC'VY	DEPTH 1" = 1'	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	57'	9 CONT.	1-7/8"	57'	36 40		5-10% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, DARK GRAY (GM)
	58' 59' 60'		3-7/8"	60'		DRILLED WITH 3-7/8" ROLLER BIT TO 60'. HIT A LOT OF BOULDERS AND COBBLES. STILL LOOSING ALL THE DRILLING FLUID. DROVE CASING TO 60 ft.	
0.2' REC'VY	61' 62'	10	1-7/8"	62'	2 4 7 7	SAMPLED WITH 2'x1-3/8" I.D. SPLIT SPOON WITH 60 ft. OF (N) RODS; USED 300 lb. HAMMER.	SILTY SANDY GRAVEL: COARSE TO FINE, MOSTLY FINE, 75-80% SUB-ANGULAR GRAVEL, 5-10% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, DARK BROWN, (GM)
	63' 64'		3-7/8"			DRILLED WITH 3-7/8" ROLLER BIT TO 69' HIT BOULDERS AND COBBLES AND LOST ALL THE DRILLING FLUID. DROVE CASING EVERY 3-4 ft. TO KEEP THE HOLE OPEN.	

Site: TOWNSHEND DAM, VT	Boring No. FD-85-7 (B)	Page 10 of 12

DEPTH Rec'vy	DEPTH 1" = 1'	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	65'					DIDN'T SAMPLE AT 65 ft., THERE WAS A BOULDER AT 64.8' to 65.4 ft. AND MORE BOULDERS AND COBBLES AFTER IT.	
	66'						
	67'		3-7/8"			DRILLING BECAME EASIER AT 67.6'. BUT WE WERE STILL LOOSING ALL THE DRILLING FLUID.	
	68'						
	69'			69'			
2.0' REC'VY	70'	11	1-3/8"		15	SAMPLED WITH 2' x 1-3/8" I.D. SPLIT SPOON WITH 70 ft. OF (N) RODS. USED 300 lb. HAMMER. WE HAD TO DRIVE THE SPOON FROM 60 ft to 69 ft. BECAUSE THE HOLE WAS CROOKED AND FALLING IN. DRILLED WITH 3-7/8" ROLLER BIT TO 71' AND LOST DRILLING FLUID.	SILTY SAND: COARSE TO FINE, MOSTLY FINE SAND, 1-5% SUB-ANGULAR GRAVEL, 25-30% NON-PLASTIC FINE, LIGHT GRAY (SM)
					20		
					19		
	71'			71'	22		
	72'					BOTTOM OF HOLE	

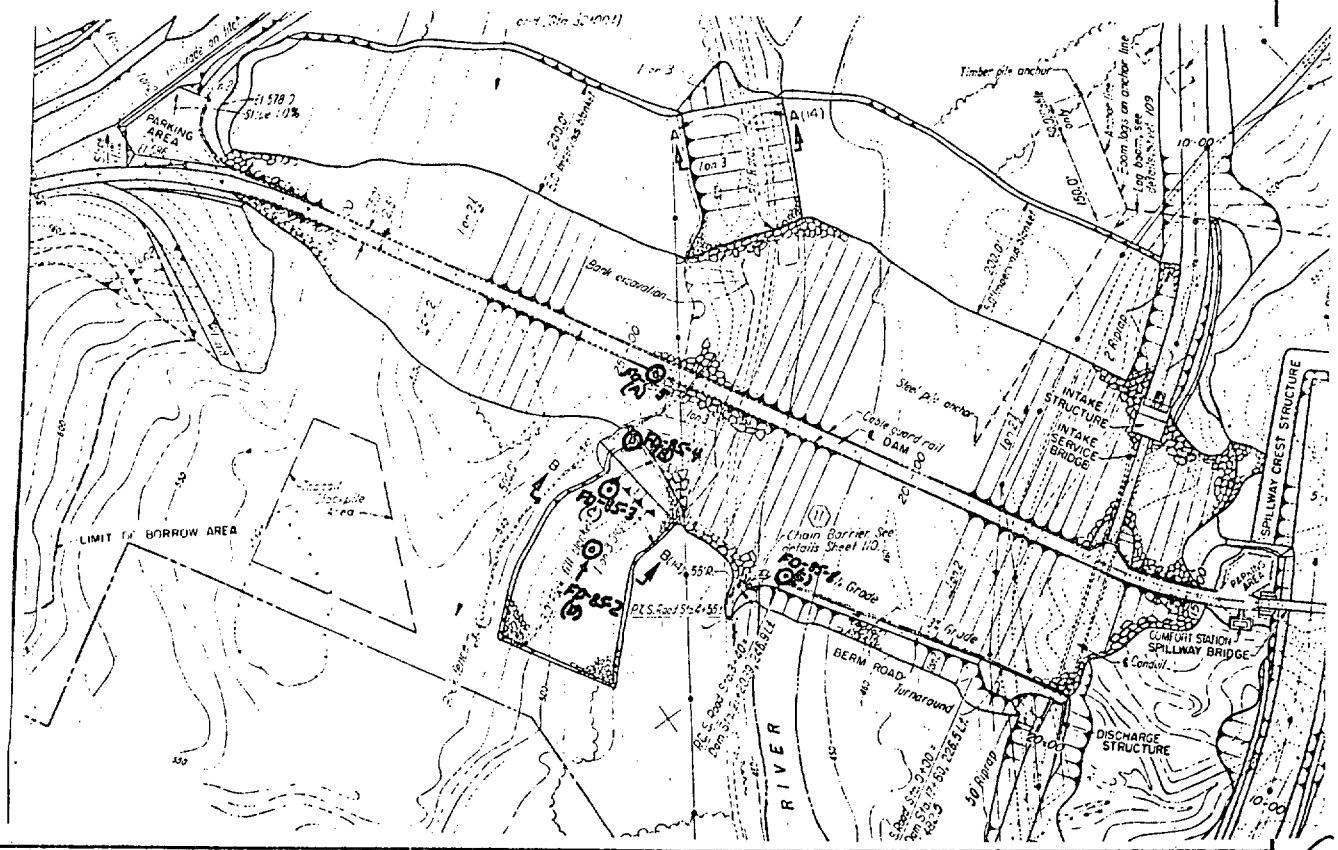
Site: TOWNSHEND DAM, VT.
Boring No: FO-85-4 (B)

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
8/20/85	2:20	5 ft.	71 ft.	PIEZ. WAS EMPTY		PIEZ WAS EMPTY PRYOR TO FALLINGHEAD TEST

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



PIEZOMETER INSTALLATION REPORT

PROJECT: TOWNSHEND DAM, TOWNSHEND VT. DATE: 8/20/85

LOCATION (STA): FOR LOCATION SEE SKETCH ON PAGE 11 OF 12 OFFSET FROM CENTER LINE: PIEZ NO.: 4

PIEZ TYPE: CASAGRANDE DEPTH OF PIEZ: 69 ft. RISER PIPE DIAM: 3/4" SCH80 PVC

PIEZ TIP SET IN (SOIL TYPE): SILTY SAND SOIL SAMPLE NO.: 9 BORING DIAM: 3-7/8"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 5 ft. OF 4" STEEL PIPE VENT: WELDED A STEEL PLATE ON A HINGE WITH A LOCK, NO VENT NEEDED

GROUND ELEV.: 528.4' MSL ELEV. TOP OF RISER: 529.9' MSL ELEV PIEZ TIP: 459.4' MSL

FILTER: DRY SAND FROM ELEV: 457.4' MSL TO ELEV: 490' MSL

SEAL: BENTONITE FROM ELEV: 490' MSL TO ELEV: 495' MSL

INSTALLED BY: RAYMOND BROWN (MOBILE DIST) CONTRACT NO.: 0021 FOREMAN: D. ELLISON RAYMOND BROWN

DATE OF INSTALLATION: 8/20/85 DATE OF OBSERVATIONS: 8/20/85

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
2:30	0	EMPTY, 69 ft.		10 MIN				
	1/2 MIN			15 MIN				
	1 MIN			30 MIN				
	2 MIN							
	5 MIN							

REMARKS: WE COULDN'T FILL THE PIEZOMETER TO THE TOP. IT LOST WATER FASTER THAN WE COULD FILL IT.

DON ELLISON
INSPECTOR

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

FIELD LOG OF TEST BORING

PROJECT NO. _____

Site TOWNSHEND DAM, VT.

Page 1 of 10 Pages

Hole No. FD-85-8 (A) Diam. (Casing) 6" AND 4"

Boring Started 8/21/85

FOR LOCATION SEE DIAGRAM ON PAGE OF

Co-ordinates: N _____ E _____

Boring Completed _____

Drilled by RAYMOND BROWN MOBILE DISTRICT (ARMY CORP OF ENG.)

Report Submitted _____

Purpose of Exploration DETERMINE CHARACTERISTICS AND DISTRIBUTION OF FOUNDATION SOILS. INSTALL PIEZOMETERS TO DETERMINE THE PHREATIC SURFACE WITHIN THE EMBANKMENT AND FOUNDATION FOR ALL POOL ELEVATIONS AND DETERMINE PORE PRESSURES AND PERMEABILITIES

Elevation Top of Hole 583 M.S.L.

Total Overburden Drilled _____ Feet

Elevation Top of Rock _____ M.S.L.

Elevation Bottom of Hole _____ M.S.L.

Total Rock Drilled _____ Feet

Total Depth of Hole _____ Feet

Core Recovered _____ %

Core Recovered _____ Ft.: _____ Diam. _____ in.

Soil Samples _____ in. Diam. _____ No.

Soil Samples _____ in. Diam. _____ No.

Casing Left in Place _____ Feet

DRILLING ON FD-85-8 (A) WAS STOPPED ON 8/28/85. THEY WILL COMPLETE THE HOLE IN ABOUT A MONTH

Depth From	Depth To	Method of Drilling and Type of Bit Used

Gr

Bo

Ov

Roc

Page _____

Page _____

Prepared by _____ Field Data _____ Lab. Data

Submitted by _____

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 TOWNSHEND DAM VT — Page 2 of 10 Pages

Boring No. FD-85-9(A) Desig. _____ Diam. (Casing) 4" & 6"

FOR LOCATION SEE SKETCH ON Pg. of

Co-ordinates: N _____ E _____

Elevation Top of Boring 583 M.S.L. — Hammer Wt. 300 lb — Boring Started 5/21/85

Total Overburden Drilled _____ Feet — Hammer Drop 30 IN

Elevation Top of Rock _____ M.S.L. — Casing Left _____ — Boring Completed _____

Total Rock Drilled _____ Feet — Subsurface Water Data _____ Page _____

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

Total Depth of Boring _____ Feet — Drilled By MOBILE DISTRICT ARMY CORP OF ENG.

Core Recovered _____ % No. Boxes _____ — Mfg. Des. Drill FAILING HOLE MASTER

Core Recovered _____ Ft. _____ Diam. _____ In. — Inspected By: DON ELLISON

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

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

DEPTH 1" = 10'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		5-7/8"			DRILLED WITH 6" ROLLER BIT TO 5 ft. AND DRIVE 5 ft. OF 6" CASING. CORED THROUGH A BOULDER AT 5 ft.	
10'						
20'		5-7/8"			CORED THROUGH A BOULDER AT 20 ft. WITH R BARREL DRILLED WITH 5-7/8" ROLLER BIT TO 25 ft.	
					CORED A BOULDER AT 25 ft. WITH R BARREL DRILLED WITH 5-7/8" ROLLER BIT	
30'					CORED A BOULDER AT 30 ft. WITH R BARREL	
					DRILLED WITH 5	
					CORED A BOULDER AT 37 ft.	
40'		5-7/8"			CORED A BOULDER AT 40 ft. LOST ALL DRILLING FLUID AT 40 ft. HAD TO CEMENT THE BOTTOM OF THE HOLE TO STOP THE LEAK.	
50'						

GENERAL REMARKS: THE SCALE FOR THE FIRST 80 ft. IS 1" = 10 ft. FROM 80 ft TO 126 ft. THE SCALE IS 1" = 1'.

Site: TOWNSHEND DAM, TOWNSHND VT.	Boring No. FD-85-8 (A)	Page 3 of ____

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
					DRILLED WITH 5-7/8" ROLLER BIT AND HIT NUMEROUS BOULDERS AND COBBLES.	
		5-7/8"				
60'						
		5-7/8"			DRILLED WITH A 5-7/8" ROLLER BIT FROM 65 ft. to 70 ft. AND HIT A LOT OF BOULDERS AND COBBLES. AT 70 ft. THEY LOST ALL THE DRILLING FLUID. WE DROVE 4" CASING UNTILL IT HIT A BOULDER AT 71 ft.. SEALED OFF THE LEAK BELOW THE CASING WITH BENTONITE BALLS.	
70'		3-7/8"				
80'						
81'					DRILLED WITH 3-7/8" ROLLER BIT FROM 70 ft. to 85 ft. AND LOST SOME FLUID.	
		3-7/8"				
82'						
83'						
		3-7/8"				
84'						
85'			85'			
	1	1-3/8"		12	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SADDN. WITH 90 Ft of (N) RODS; USED	SILTY SANDY GRAVEL: (ROCK FILL) COARSE TO FINE, MOSTLY FINE SAND, 25-35% SUB-

Site: TOWNSHEND DAM TOWNSHEND VT	Boring No. FD-85-8 (A)	Page 4 of 10

DEPTH REC'VY	DEPTH 1" = 1'	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1.2' REC'VY	86' – 87'	1 CONT.	1-3/8"	87'	17, 22, 34	300 lb. HAMMER.	ANGULAR GRAVEL AND FRAGMENTS OF COBBLES, 20-25% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, LIGHT BROWN, (SP-GM)
	87' – 90'		3-7/8"	90'		DRILLED WITH 3-7/8" ROLLER BIT AND LOST ALL DRILLING FLUID AT 87.5 ft., WE CEMENTED THE BOTTOM OF THE HOLE TO SEAL OFF THE LEAK.	
1.3' REC'VY	90' – 92'	2	1-3/8"	92'	8, 16, 22, 30	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SPOON WITH 95 ft. OF (N) RODS; USED 300 lb. HAMMER.	SANDY GRAVEL (ROCK FILL) COARSE TO FINE, MOSTLY MEDIUM AND FINE SAND, 15-20% SUB-ANGULAR GRAVEL, 25-30% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, DARK BROWN, (SP)
	92' – 94'		3-7/8"			DRILLED WITH 3-7/8" ROLLER BIT AND LOST SOME DRILLING FLUID FROM 92 ft to 94 ft.	

Site: TOWNSHEND DAM TOWNSHEND VT.	Boring No. FO-85-8 (A)	Page 5 of 10

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
95'			95'		LOST ALL THE DRILLING FLUID (REVERT) AT 94.8 ft.	
96'	3	1-3/8"	97'	100	SAMPLED WITH A 2'x1-3/8" I.D. SPLIT SPOON WITH 100 ft OF (N) RODS; USED 300lb. HAMMER. HAD REFUSAL ON A BOULDER AT 95.5 ft.	SANDY GRAVEL: COARSE TO FINE, MOSTLY COARSE SAND, 35-40% SUB-ANGULAR GRAVEL AND FRAGMENTS OF COBBLES, 5-10% NON-PLASTIC TO SLIGHTLY PLASTIC FINES, GRAY, (SP)
97' 98' 99'					TRIED TO SEAL OFF THE LEAK AT 94.8 ft. WITH BENTONITE BALLS BUT HAD NO LUCK. STOPPED DRILLING UNTILL THEY GET SOME 3" CASING.	
100' 101' 102'						

.1' RECVY

Site: TOWNSHEND DAM TOWNSHEND VT.	Boring No. FD-85-8 (A)	Page 6 of 10

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
103'						
104'						
105'						
106'						
107'						
108'						
109'						
110'						
111'						

Site: TOWNSHEND DAM TOWNSHEND VT.	Boring No. FD-85-8 (A)	Page 7 of 10

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
112'						
113'						
114'						
115'						
116'						
117'						
118'						
119'						

Site: TOWNSHEND DAM TOWNSHEND VT,	Boring No. FD-85-8 (A)	Page 8 of 10

DEPTH 1" = 1'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
120'						
121'						
122'						
123'						
124'						
125'						

Site: _____

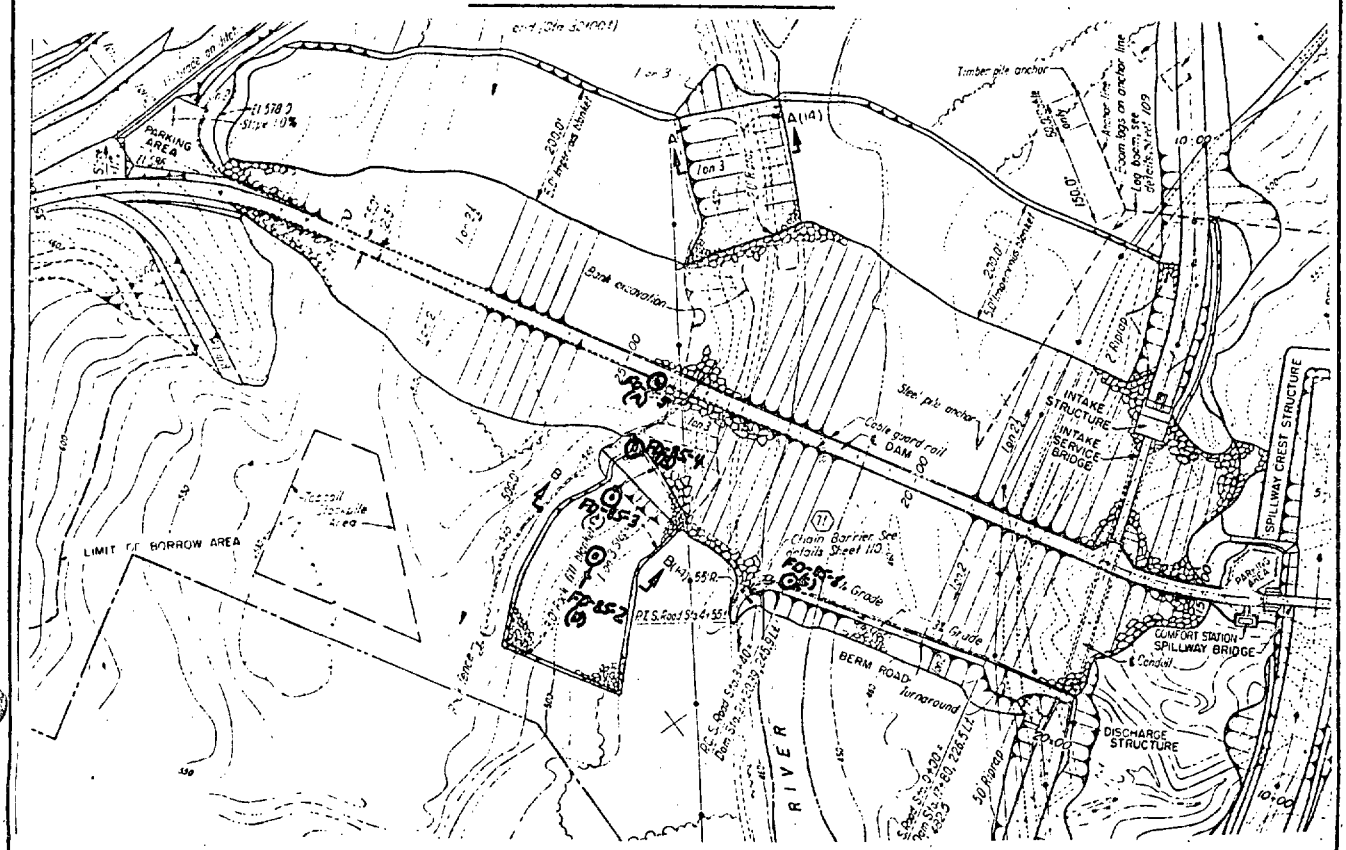
Boring No: _____

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



Test)

Boring No

PIEZOMETER INSTALLATION REPORT

PROJECT: DATE:

LOCATION (STA): OFFSET FROM CENTER LINE: PIEZ NO.:

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: CONTRACT NO.: FOREMAN:

DATE OF INSTALLATION: DATE OF OBSERVATIONS:

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

REMARKS:

INSPECTOR