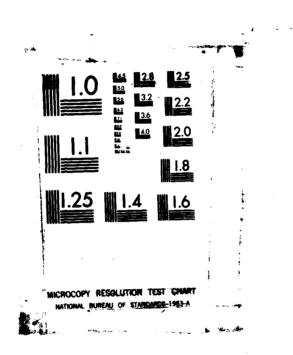
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DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION. CORPS OF ENGINEERS 424 TRAPELO ROAD WALTHAM, MASSACHUSETTS 02254

REPLY TO ATTENTION OF: NEDED

JAN 06 1981

Honorable Edward J. King Governor of the Commonwealth of Massachusetts State House Boston, Massachusetts 02133

Dear Governor King:

Inclosed is a copy of the Clam Lake (MA-01052) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam.

The brief assessment included at the beginning of the report contains a discussion of two serious deficiencies relating to the condition of the principal spillway and to the emergency spillway side slopes. Because of this the dam has been rated in poor condition. Both the Commonwealth of Massachusetts and the U.S. Department of Agriculture, Soil Conservation Service are aware of these problems and design of corrective modifications is currently underway.

I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely. WILLIAN & HODGSON, JR.

Incl As stated

Colonel, Corps of Engineers Acting Division Engineer



DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS 424 TRAPELO ROAD WALTHAM, MASSACHUSETTS 02254

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Incl As stated

CLAM LAKE DAM MA 01052

CONNECTICUT RIVER BASIN SANDISFIELD, MASSACHUSETTS

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PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM PHASE I INSPECTION REPORT

Identification No.: Mass. D.P.W. No: Name of Dam: Town: County and State: Stream: Date of Inspection: MA 01052 1-2-260-11 Clam Lake Sandisfield Berkshire County, Massachusetts Clam River November 1, 1979 and November 7, 1979

BRIEF ASSESSMENT

The Clam Lake Dam, No. MA 01052, is located on the Clam River, a tributary of the West Branch of the Farmington River, in the Town of Sandisfield, Massachusetts. The dam site is approximately three miles upstream of the Village of West New Boston and is located off of Montville-Beech Plain Road. The dam is a multiple purpose recreation and flood protection facility which is owned by the Massachusetts Division of Water Resources. It was designed by the U.S. Department of Agriculture, Soil Conservation Service and construction was completed in 1977. The dam is an earthfill embankment about 950 feet in length, and 94 feet in height, has a reinforced concrete principal spillway which is designed to maintain the recreation pool level and control the release of stored floodwater, and a 385 foot wide earth fill and earth excavated emergency spillway channel around the left abutment. No water is presently impounded by the dam because of serious deficiencies related to the soundness of the principal spillway structure and emergency spillway side slopes. Both of these deficiencies were noted by SCS prior to the completion of construction.

The dam and appurtenances were found to be in POOR condition. The visual inspection indicated that the emergency spillway side slopes are unstable, the downstream emergency spillway slopes have eroded, the principal spillway structure is failing at the transition, the pond drain intake structure is defective and the upstream and downstream slopes of the dam show erosion. The defective pond drain structure, erosion of the dam embankment and the erosion of the emergency spillway channel warrant additional investigations. The side slope instability and failure of the principal spillway has been investigated thoroughly by the Soil Conservation Service. The summary, conclusions, and recommendations of the SCS investigation reports are reproduced herein in Appendix B.

The test flood for this dam has been determined to be the Probable Maximum Flood (PMF), based on a classification of <u>INTERMEDIATE</u> size and <u>HIGH</u> hazard. The drainage area is 10.8 square miles and the test flood is 21,060 CFS. A Routing the test flood through the reservoir, with the initial pool level at the normal recreation stage, resulted in test flood outflow of 14,960 CFS which does not exceed the capacity of the spillways. Total discharge capacity with water at top of dam is 16,150 CFS. Failure of the dam will pose a serious threat to approximately 25 houses and buildings, one major road bridge, one secondary road bridge, 9000 feet of major road, and a cemetery in addition to damage caused by the PMF flow through the spillway and tributary drainage areas.

A great deal of maintenance and major remedial work as listed in Section 7 must be undertaken by the Owner. Listed items include: repair of riser structure, develop access to top of dam, determine cause of and correct slope failures and causes of erosion of slopes.

The recommendations for additional investigations and recommended remedial measures as listed in Section 7 should be implemented within one year of receipt of this report by the Owner.



John W. Powers Massachusetts Registration 23106 This Phase I Inspection Report on Clam Lake Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the <u>Recommended Guidelines for Safety Inspection of</u> <u>Dams</u>, and with good engineering judgment and practice, and is hereby submitted for approval.

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CARNEY M. TERZIAN, MEMBER Design Branch Engineering Division

RICHARD DIBUONO, MEMBER Water Control Branch Engineering Division

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ARAMAST MAHTESIAN, CHAIRMAN Geotechnical Engineering Branch Engineering Division

APPROVAL RECONDENDED:

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Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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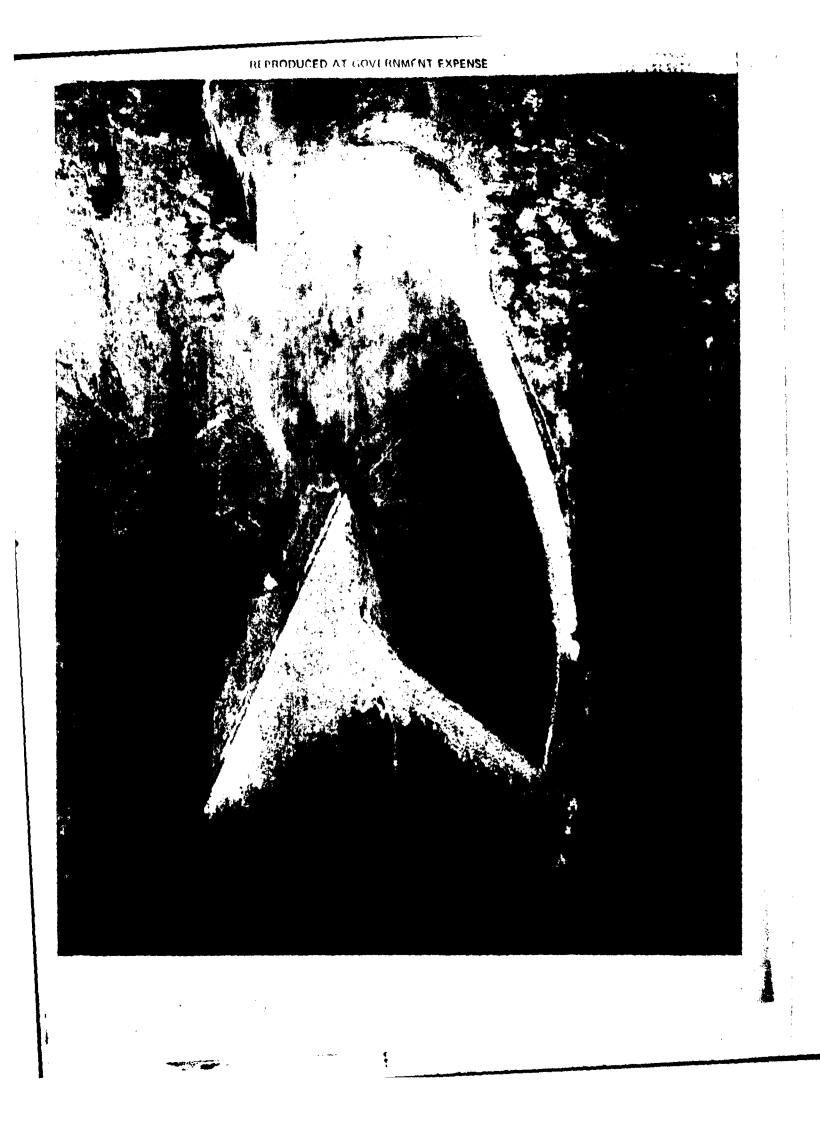
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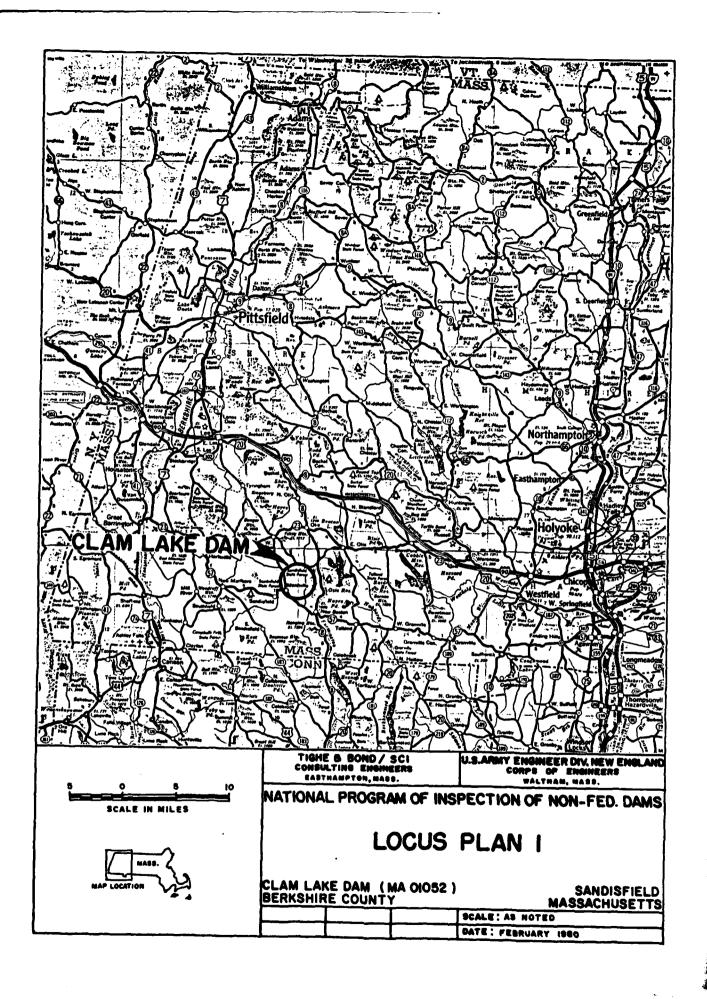
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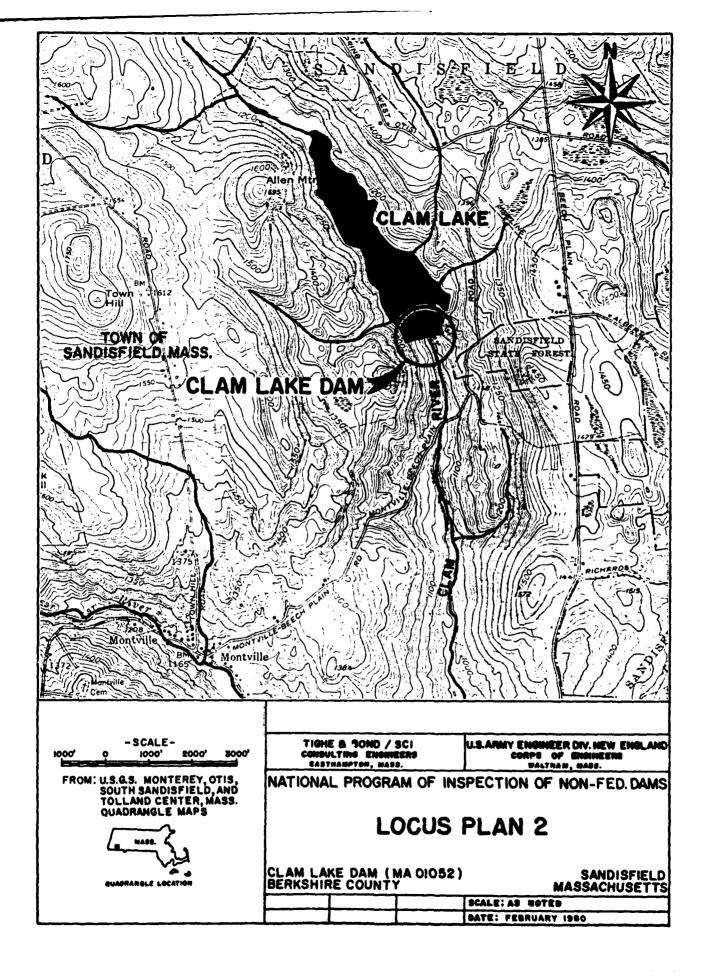
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NATIONAL DAM INSPECTION PROGRAM PHASE I INSPECTION REPORT

CLAM LAKE DAM

SECTION 1

PROJECT INFORMATION

1.1 General

(a) <u>Authority</u>

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Tighe & Bond/SCI has been retained by the New England Division to inspect and report on selected dams in Massachusetts. Authorization and notice to proceed were issued to Tighe & Bond/SCI under a letter of October 24, 1979 from Colonel William E. Hodgson, Jr., Corps of Engineers. Contract No. DACW-33-80-C-0005 has been assigned by the Corps of Engineers for this work.

(b) Purpose

1) Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

2) Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.

3) Update, verify, and complete the National Inventory of Dams.

(c) <u>Scope</u>

The program provides for the inspection of non-federal dams in the high hazard potential category based upon location of the dams, and those dams in the significant hazard potential category believed to represent an immediate danger based on condition of the dams.

1.2 Description of Project

(a) Location

The Clam Lake Dam is located within the Town of Sandisfield, Massachusetts, on the Clam River about three miles upstream from West New Boston. The Clam River is a tributary of the West

Branch of the Farmington River. The dam is accessible by way of Montville-Beech Plain Road from West New Boston.

The dam is located on the U.S.G.S. Otis, Mass., quadrangle at longitude N $42^{\circ}-08^{\circ}-18^{\circ}$ and latitude W $73^{\circ}-06^{\circ}-24^{\circ}$. Refer to the location plan, and Appendix B for additional information.

(b) Description of Dam & Appurtenances

The dam consists of an earthfill embankment, a principal spillway consisting of a reinforced concrete drop inlet structure having a two stage riser section, a 60-inch diameter reinforced concrete outlet conduit, and a plunge pool excavated in ledge at the conduit outlet. An emergency spillway is located on the left abutment and consists of a grass covered, partly earth excavated through natural ground and partly earth filled channel. The crest of the spillway is provided with a 12" wide concrete weir.

1) Embankment (See pages B-5, B-6, B-7, B-9 and B-10)

The following information has been taken from the Construction Drawings dated 1972.

The dam embankment is approximately 950 feet long and has a maximum structural height of 94 feet. The upstream slope is 3 horizontal on 1 vertical and has a 20 foot terrace (horizontal section) at elev. 1145.0, which is the approximate level of the normal recreation pool. The downstream slope is 2.5 horizontal on 1 vertical, and the width of the top of dam is 26 feet. The upper portion of the upstream slope surface is covered with dumped riprap from 5 feet below the normal pool elevation to the top of the dam.

The embankment material is sand, silty with gravel. A 10' wide section of drain fill beginning 41' from the dam centerline, extends from about elevation 1156.0 on a slope of 1.5 horizontal to 1 vertical to the foundation, which is bedrock and glacial till. The drain fill extends the full length of the dam and is provided with a foundation drain conduit which outlets at each side of the 60" conduit at the endwall. A cutoff trench consisting of the sand, silty with gravel is located beneath the embankment along the centerline of the dam.

The downstream embankment, and upper portion of the upstream embankment are covered with riprap.

2) Principal Spillway (See pages B-9, B-10, and B-12)

The principal spillway consists of a reinforced concrete drop inlet structure with a sluice gate controlled inlet pipe at invert elevation 1100.00 for the pond drain, a sluice gate controlled orifice inlet at invert elevation 1141.3 for the low level bottom release, an uncontrolled orifice at elevation 1143.3 for the high level bottom release, uncontrol weirs at elevation 1144.3 for the normal pool level and uncontrolled weirs at elevation 1153.0 for the high stage outlet.

The riser structure is $59\frac{1}{2}$ feet high from the base of the foundation to the top of the structure. The inside dimensions are 5 feet x 15 feet.

The structure is provided with a gate well having dimensions of 2.5 feet x 5.5 feet which extends from elevation 1097.0 to 1143.3. Provision for stop logs exist from 1143.3 to 1144.3. The purpose of the gate well is to provide facilities for gating the pond drain and to provide a bottom release of water when the impoundment level is below the normal pool elevation of 1144.3.

The walls of the riser normal to the centerline of the dam vary in thickness from 36" beginning at the base to a height of 9 feet and decrease in thickness by 3" every 5 feet to a height of 44 feet above the base. From 44 feet above the base to the crest of the high stage weir the walls are 12" thick. The walls of the riser parallel to the centerline of the dam, including the gate well walls are 12" thick from top to bottom. (See Sheet B-12)

The top of the riser is provided with flared out walls, 45° to the horizontal, parallel to the centerline of the dam, from 45.5 feet above the base to 55.5 feet. At 55.5 feet above the base to 59.5 feet the walls are vertical.

Trash racks of galvanized steel angles are provided between the flared walls to prevent the clogging of the high stage weir. Also, a galvanized steel angle trash rack is formed over the top of the gate well to prevent debris from clogging that opening.

The bottom of the riser is formed to make a transition from the rectangular vertical section to a 60" diameter outlet pipe.

The inside bottom elevation of the riser structure is 1097.0. The low level and high level bottom release orifices are located on the upstream side of the riser inside the gate well. The low level orifice is $17" \times 12"$ and the high level orifice is 4 feet \times 12 inches. These orifices are at elevations 1141.3 and 1143.3 respectively. The normal pool level orifice is located on the side faces of the riser and measures 53 inches wide \times 12 inches high with an invert elevation of 1144.3. The high level overflow weirs are formed by the tops of the riser section walls and have a total length of 30 feet with a crest elevation of 1153.0. The two flared walls of the riser act as anti-vortex walls perpendicular to and across the top of the weir walls with a solid concrete platform bridging the two walls and acting as the support for the sluice gate operator stands.

The sluice gate which controls the 48 inch diameter pond drain is a 48 inch square gate mounted on a 12 inch deep wall thimble. The gate is operated by a rising stem, crank operated, gear assisted floor stand located on the top of the riser structure.

The sluice gate which controls the low stage bottom release is a $12^{\circ} \times 17^{\circ}$ gate which opens downward. The gate is operated by a rising stem, hand wheel operated, floor stand located on top of the riser.

The pond drain pipe consists of about 120 feet of 48 inch diameter reinforced concrete water pipe conduit with a concrete bedding and reinforced concrete inlet structure. This conduit enters the riser structure through the upstream side of the gate well on the riser.

The principal spillway structure has a 60 inch diameter outlet conduit which discharges to a plunge pool located at the downstream toe of the dam. The 60 inch diameter conduit consists of reinforced concrete water pipe with a continuous concrete bedding and nine reinforced concrete anti-seep collars. The pipe has an inlet invert elevation of 1097.0 and an outlet invert elevation of 1088.0 with an overall length of 312 feet.

The plunge pool is constructed from excavated ledge and is approximately 50 feet long x 12 feet wide with a toe wall spanning across the downstream end of the flow path to dissipate the energy from the high velocity outlet flow from the 60 inch diameter conduit during flood flows.

3) Emergency Spillway (See pages B-6 and B-11)

The emergency spillway consists of a grass covered earth fill and earth excavated channel on the left abutment of the dam. The spillway channel has a control section approximately at elevation 1172.0 which is 385 feet wide and 50 feet long. A 12 inch wide buried concrete curb weir is located at the downstream end of the flat crest of the spillway. The spillway approach channel, along the centerline, slopes upward at 4% from the impoundment area. The discharge channel slopes downward at 3% to the edge of a steeper discharge slope. The spillway discharges down a 2 horizontal to 1 vertical slope at the toe of which is original ground downstream of the dam. The side slopes of the spillway channel are at 2 horizontal to 1 vertical. The maximum depth of excavation is just upstream of the control section and is about 32 feet. The control section is approximately 6 feet below the top of the dam.

The maximum depth of fill in the discharge channel of the emergency spillway is about 48 feet.

The toe of the emergency spillway left side slope is provided with a drain composed of sand and gravel with a 6" drainpipe discharging at both ends of the spillway. The drain is not continuous through the crest of the spillway being interrupted by the emergency spillway weir control section.

4) Foundation and Embankment Drainage (See page B-)

A trench drain of clean sand and gravel extends into the foundation at the toe of the drainfill. The trench drain extends from the principal spillway conduit left about 490 ft. and right about 240 ft., with a 4 inch diameter A.C. perforated drain pipe extending 425 ft. left and 175 feet right of the principal spillway. Both 4 inch diameter trench drain outlet pipes discharge into the plunge pool basin through the end wall at the outlet of the principal spillway. Also, a blanket drain is provided at the valley floor section about 140ⁱ wide and extending horizontally from the toe of the drain fill to the toe of the dam.

(c) Size Classification

The dam's maximum impoundment (computed to the top of the dam) of about 3800 acre-feet and structural height of 94 feet place it in the INTERMEDIATE size classification.

(d) Hazard Classification

The hazard potential classification for this dam is <u>HIGH</u> because of the significant potential for loss of human life and property which may occur in the event of a failure. There is a high potential for damaging about 25 houses with attendant probable loss of more than a few lives, as well as one major bridge, one secondary bridge, 9000 feet of major road and a cemetery.

(e) <u>Ownership</u>

The Clam Lake dam is owned by the Commonwealth of Massachusetts, Division of Water Resources. The address is as follows:

> Commonwealth of Massachusetts Department of Environmental Management Division of Water Resources 100 Cambridge Street Boston, Massachusetts 02202 Telephone No.: 617-727-3170

(f) Operator

The operation of the Clam Lake Dam is the responsibility of the Commonwealth of Massachusetts, Department of Environmental Management, Division of Forests and Parks. The regional office responsible for the dam is as follows: Commonwealth of Massachusetts Department of Environmental Management Division of Forests and Parks Pittsfield State Forest Cascade Street Pittsfield, Massachusetts 01201

Mr. Douglas G. Poland is the Regional Supervisor. The telephone number is 413-442-8992.

(g) Purpose of Dam

The Clam Lake Dam is a multiple-purpose dam which is designed to maintain a low level recreation pool and provide flood water storage to reduce downstream flooding from the dam's drainage area. Stored flood water would be gradually released through low and high level inlets of the principal spillway.

(h) Design and Construction History

The Clam Lake Dam was designed by the U.S. Department of Agriculture, Soil Conservation Service. It was completed in the fall of 1977 and has not been in operation since that time because of deficiencies in the emergency spillway slope stability and the principal spillway riser. The Owner, Commonwealth of Massachusetts, and the SCS are presently planning corrective measures deemed necessary by them as reported in investigations conducted in early 1978. (See Page B-1)

(i) Normal Operation Procedure

The Clam Lake Dam would normally be self regulating with the only controlled outlets being the pond drain and the low level bottom release. These outlets are operated only as part of infrequent maintenance checks.

1.3 Pertinent Data

(a) Drainage Area

The drainage area for the Clam Lake Dam covers approximately 10.8 square miles. The upper portion of the drainage area has some swamps and existing natural and manmade impoundments from which the Clam River originates, and the surrounding perimeter areas are primarily mountainous woodland with some open areas. There is some development of farms and homes within the watershed area.

(b) Discharge at Dam Site

Normal discharge at the site is via the low level and high level inlets to the principal spillway and through the 60 inch diameter outlet conduit to the downstream channel. If flood flows occur of sufficient magnitude and duration to fill the flood water

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storage available, then excess flow will be discharged around the dam via the emergency spillway channel.

- 1) Outlet works (conduit) size 60 inch, Invert Elev. 1097.0 and Discharge Capacity 950 cfs at Elevation 1178.
- 2) Maximum known flood at dam site Unknown
- 3) Ungated spillway capacity, principal and emergency, at top of dam 16,150 cfs at 1178 elev.
- 4) Ungated spillway capacity at test flood elevation 14,960 cfs at 1177.7 elev.
- 5) Gated spillway capacity at normal pool elevation: None
- 6) Gated spillway at test flood elevation: None
- 7) Total spillway capacity at test flood elevation 14,960 cfs at 1177.7 elev. (Same as #4)
- Total project discharge (principal and emergency spillways) at top of dam - 16,150 cfs at 1178.0 elev. (Same as #3)
- 9) Total project discharge at test flood elevation 14,960 cfs at 1177.7 elev. (Same as #4)
- (c) Elevation (ft. above MSL)
 - 1) Streambed at toe of dam 1084±
 - 2) Bottom of cutoff 1079±
 - 3) Maximum tailwater Unknown
 - 4) Normal Recreation pool 1144.3
 - 5) Full flood control pool 1172
 - 6) Emergency spillway crest crest elev. = 1172 ungated
 - 7) Design surcharge 1173.68
 - 8) Top of dam 1178.0
 - 9) Test flood surcharge 1177.7
- (d) Reservoir (Length in feet)

- 1) Normal pool 3500 ft±
- 2) Flood Control pool 6600 ft±
- 3) Emergency spillway crest pool (Same as 2)

- 4) Top of dam 7000 ft±
- 5) Test flood pool (Same as 4)
- (e) <u>Storage</u> (acre-feet)
 - 1) Normal pool 750
 - 2) Flood control pool 3060
 - 3) Spillway crest pool
 - a) Low stage crest 750
 - b) High stage crest 1310
 - c) Emergency spillway 3060
 - 4) Top of dam 3840
 - 5) Test flood pool 3800
- (f) <u>Reservoir Surface</u> (acres)
 - 1) Normal pool 47
 - 2) Flood-control pool 120.5
 - 3) Spillway crest
 - a) Low stage crest 47
 - b) High stage crest 67
 - c) Emerg. spillway crest 120.5
 - 4) Test flood pool 139
 - 5) Top of dam 140
- (g) <u>Dam</u>

- 🝎

- 1) Type Earth embankment
- 2) Length 950 ft±
- 3) Height 94 ft±
- 4) Top Width 26 ft
- 5) Side Slopes 3 hor. on 1 vert. on upstream face, with 20 ft. terrace at elev. 1143.0 of upstream embankment. 2.5 hor. on 1 vert. on downstream face.

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- Zoning Homogeneous, semi-pervious sand, silty with 6) gravel
- 7) Impervious Core - None
- Cutoff Variable width and depth, sand, silty with gravel earthfill 8)
- 9) Grout curtain - None

(h) Diversion and Regulating Tunnel

Not applicable

- (i) <u>Spillways</u>
 - 1)

1)	Тур	be:						
	a)	Principal spillway:	Reinforced concrete drop inlet					
	b)	Emergency spillway:	Grass covered, earth fill and excavated channel with level control section. Buried concrete curb weir at downstream end of level section at same elevation					
2)	Leng	gth of weir:						
	a)	Pond drain inlet:	48 inch diameter pipe					
	b)	Low stage bottom release (gated):	Rectangular orifice 17 inches wide x 12 inches high					
	c)	High stage bottom release (ungated):	Rectangular orifice 4 feet wide x 1 foot high					
	d)	Low stage inlet:	Two rectangular orifices 4.4 feet wide x 1 foot high					
	e)	High stage inlet:	Two weirs 15 ft. long = 30 ft.					
	f)	Emergency spillway:	385 ft.					
(3)	(3) Crest Elevation							
	a)	Pond drain inlet:	1100.0 inv.					
	p)	Low stage bottom release	1141.3					

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	c)	High stage bottom release	1143.3				
	d)	Low stage inlet:	1144.3				
	e)	High stage inlet:	1153.0				
	f)	Emergency spillway:	1172.0				
(4)	Gate	Gates: 48 inch square sluice gate on pond drain inle and 17 inch x 12 inch open down, low stage bottom release					
(5)	Upstream channel:						
	a)	Principal Spillway:	Stream bed (no impound- ment)				
	b)	Emergency Spillway:	Grass covered earth fill and excavated channel.				
(6)	Downstream Channel:						
	a)	Principal Spillway:	Ledge excavated plunge pool to natural stream channel through narrow valley				
	b)	Emergency Spillway:	Grass covered, earth fill and excavated channel				

(j) Regulating Outlets

The regulated outlets from the dam include the pond drain and the low stage bottom re'ease. The pond drain is controlled by a manually operated 48 inch square sluice gate. This gate is located on the outside face of the principal spillway riser inside the gate well with its invert at elevation 1098. The floor stand operator is located on the top of the principal spillway riser. The gate is a Rodney Hunt, seating type, with a rising stem gear assisted operator having the following identification:

43939-2 S-5020A

The gate would normally be in the closed position, if the reservoir was functional and would only be operated for maintenance checks and normal (permanent) pool dewatering purposes.

The low stage bottom release is controlled by a manually operated rectangular 17 inch x 12 inch sluice gate. This gate is located on the inside of the face of the principal spillway riser with its invert at elevation 1141.3. The floor stand operator is located on the top of the principal spillway riser. The gate is a

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Rodney Hunt, non-seating type, open down and the operator has the following identification:

43939-2 S-2600A

The gate is normally in the closed position and would only be operated for maintenance checks and when the normal pool is below the high stage bottom release elevation.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

The design data for the Clam Lake Dam provided by the Soil Conservation Service includes hydrologic and hydraulic computations and summaries, structural calculations, a geological report, soil laboratory test data, a summary of embankment slope stability analysis, and other design information all contained within a "Design Report" dated January 1971. The design of the dam and appurtenances is based primarily on a number of Soil Conservation Service Publications which are listed in the General Section of the Design Report.

2.2 Construction Data

Design drawings were available for the Clam Lake Dam. These drawings have been reviewed and found to show good agreement with the visual inspection. Since deficiencies have been noted by the Owner and the Soil Conservation Service, "As Built" record drawings have not been issued pending the completion of remedial measures. Completed record drawings may be reviewed at the USDA Soil Conservation Service Office, Cottage Street, Amherst, Massachusetts 01002.

Appendix B contains copies of the more important design drawings. These copies have been made from originals provided by the Soil Conservation Service.

2.3 Operational Data

The dam has not been put into service due to a number of recognized deficiencies. Therefore, no operational data is available. Under normal operating conditions, the hydraulics of the principal spillway would maintain a low level recreation pool.

2.4 Evaluation of Data

(a) Availability

Sufficient data is available to permit an evaluation of the dam when combined with findings of the visual inspection.

(b) Adequacy

There is sufficient design and construction data to permit an assessment of dam safety when combined with the visual inspection, past performance, and sound engineering judgment.

(c) <u>Validity</u>

Since the observations of the inspection team generally confirm the available data, a satisfactory evaluation for validity is indicated.

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SECTION 3 - VISUAL INSPECTION

3.1 Findings

(a) <u>General</u>

The Clam Lake Dam, No MA 01052 was in \underline{POOR} condition at the time of the inspection.

(b) Dam

1) Earth Embankment

There are many areas on the downstream slope of the dam where the riprap bedding has washed out. Many areas around the outlet conduit headwall and the swale formed by the intersection of the dam embankment and the emergency spillway embankment showed signs of similar erosion of the bedding material.

The upstream slope near the top of the dam is not uniform due either to improper grading during construction or subsequent settlement.

Some trespassing was noted on the upstream slope between the base of the dam and the beginning of the riprap protective cover. The trespassing appeared to be of the 4 wheel drive vehicle and motorcycle type. Unprotected earth slope areas of the upstream face of the embankment (below elevation 1145.0) are exposed to surface water erosion. There were signs that the reservoir pool has been as high as elevation 1134; whether due to flood flows exceeding the capacity of the 48 inch drain or to unauthorized closing of the pond drain sluice gate is unknown.

Flowing water was noted in the drainage channel at the right toe of the downstream face of the embankment. Since there was no water impounded at the time of the inspection, it can be concluded that the source of this water is ground water from the right abutment area.

There was no discharge in either foundation drain outlet. The ends of the drain pipes have been damaged by vandals; the right drain pipe was broken off inside the sleeve through the headwall.

A serious condition exists relative to the accessibility of the top of the dam. Access is by way of Montville Beech Plain Road to the toe of the dam or across the emergency spillway from Beech Plain Road; access by vehicle by either of these routes is difficult to impossible; neither route would be available during flood conditions since these routes would be blocked by impounded water in the reservoir.

2) Emergency Spillway

The emergency spillway is in poor condition.

The left slope of the spillway channel is unstable due to the existence of a stream diverted along the top of the slope. The slope is saturated and slippage has occurred in many areas. It is reported that this stream has overflowed the diversion channel eroding the side slope of the spillway channel.

Trespassing by four wheel drive vehicles and motorcycles has aggravated the condition of the slope. During construction of the dam and spillway, the unstable condition of the slope was recognized and crushed stone was placed on the slope as a remedial measure. This has proven to be less than effective.

Erosion of the downstream face of the emergency spillway training wall embankment was noted between the crest and the beginning of the riprap. Small channels have been eroded by runoff because of the lack of vegetation cover.

The spillway at the transition from the discharge channel to the riprap protected discharge slope is severely eroded and the riprap is being undercut by runoff. Failure of the slope at the transition due to local runoff indicates that serious erosion problems will result when the emergency spillway is in operation.

The right training dike embankment of the emergency spillway, downstream of the spillway crest, is eroding under the riprap cover.

The right downstream training dike does not have sufficient vegetative cover to prevent erosion when the spillway is operating. Also, the right side of spillway floor downstream of the spillway crest slopes about 6 inches in 100 feet toward the training dike. This will result in an imbalanced flow against the training wall and erosion could cause the dike to fail.

The vegetative growth on the spillway floor and slopes is inadequate to prevent surface water erosion or erosion due to spillway flood flows.

The crest and weir wall are in good condition and the grade along the centerline of the emergency spillway appears to conform to the construction plans.

c) Appurtenant Structure

1) Drop Inlet Principal Spillway

The principal spillway riser to the top of the transition section is in poor condition. Cracks, up to 1/16 inch wide were found running continuous from the floor up the walls and running across the transition section ceiling, indicating probable structural weakening of the integrity of the transition section at the base of the riser. Some form ties have either not been cut off, have been poorly patched after being cut off, or have not been patched at all.

The riser structure above the transition section appeared to be in good condition.

The stems and guides for the pond drain sluice gate have been damaged. Guides are broken and the stem is distorted. This damage appears to be the work of vandals.

The gate operators appear to be in good condition, but require some lubrication. Most of the nuts used to fasten the bottom release operator and the pond drain operator are loose.

Vandals have removed the manhole cover at the top of the riser and dropped it into the riser structure.

2) Pond Drain Inlet Structure and Conduit

The pond drain inlet structure is in poor condition. The headwall and wing walls are cracked. Evidence of vertical and horizontal movement of the wing walls suggest foundation failure and shear or moment failure at the interface joint between the head and wing walls. The trash rack bars on the pond drain inlet opening are damaged and cannot function as intended.

The 48 inch diameter pond drain pipe appeared to be in good condition with no visible misalignment or defective joints.

3) Outlet Conduit

The 60 inch diameter conduit was found to be in good condition. The first joint downstream of the riser structure appears to have been grouted. All other joints were found to be evenly spaced and no evidence of prior leakage was observed in the conduit.

4) Plunge Pool and End Wall

The plunge pool which as cut in ledge appears to be in good condition and functioning as intended.

The end wall at the outlet of the 60 inch diameter conduit is in fair condition. There is vertical crack from the top of the outlet conduit to the top of the wall. Also, the right top corner of the endwall has been fractured by vandals.

(d) Reservoir Area

The shore of the reservoir is generally medium sloping woodland. It appears stable and in good condition.

(e) Downstream Channel

The downstream channel is in good condition with no vegetation encroachment. The channel immediately downstream of the dam is unobstructed. Riprap protection of the channel is in good condition and appears to be adequate.

3.2 Evaluation

The dam is in poor condition with areas for additional investigation and/or remedial work being as follows:

- a) Bedding material is eroding from beneath the riprap slope protection on the downstream face of the embankment.
- b) Unprotected earth surfaces on the upstream face of the embankment (submerged by normal pool under operating conditions) are subject to surface water erosion as well as erosion due to fill and draw cycles during high runoff periods.
- c) The upstream slope surface is not uniform.
- d) There appears to be frequent trespassing on the embankment and the emergency spillway channel side slopes.
- e) The outlet ends of the foundation drain pipe are damaged.
- f) There is no reasonable access to the top of the dam at any time and no access at all in full flood time.
- g) The left slope of the emergency spillway channel is unstable.
- h) The transition from emergency spillway discharge channel to the riprap protected discharge is severely eroded.
- i) The right training wall of the emergency spillway discharge channel is not protected against erosion.

- j) The downstream end of the emergency spillway channel floor slopes toward the right training wall.
- k) The inlet structure at the entrance to the pond drain conduit is structurally unsound.
- 1) The principal spillway transition section is structurally unsound.
- m) The stem guides for the pond drain sluice gate have been damaged.
- n) Most of the nuts on the sluice gate operating stands are loose.
- o) The first joint in the 60-inch outlet conduit downstream of the riser structure appears to have been grouted.
- p) The end wall at the outlet of the 60 inch diameter conduit is cracked.
- q) The emergency spillway pitches back towards the face of dam. In the event of overtopping or erosion of emergency spillway training dike erosion of the unprotected dam face could occur.
- r) The reservoir was not storing water and therefore other possible problems, such as leakage, could not be viewed.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

(a) General

No written operational procedures are available for this dam. The dam would be self regulating when in operation. The sluice gate on the pond drain and the low stage bottom release would normally be closed and would not routinely be operated.

(b) Description of Warning System In Effect

There is no written warning system in effect.

4.2 Maintenance Procedures

(a) General

An annual inspection is made by the Soil Conservation Service and recommendations resulting from this inspection would normally be implemented by the Massachusetts Division of Forests and Parks if the dam was in service.

Typical maintenance items assigned to the Division of Forests and Parks includes liming and fertilizing, mowing, clearing of accumulated debris, etc. At the time of this Phase I inspection some items of maintenance such as liming and fertilizing are not being carried out because of the proposed major modification work which is anticipated.

(b) Operational Facilities

Discussions with Division of Forests and Parks personnel indicated that the sluice gate for the pond drain is <u>not</u> operated but remains in the open position because they are aware of the poor condition of the dam's emergency and principal spillways. Also, the low stage bottom release is not operated because there is no requirement to do so at this time. A visual inspection of the gate operators indicated that lubrication is required.

There are no other facilities which require operation.

4.3 Evaluation

Since the dam is not in service and will not be placed in service until such time as the spillway problems are resolved, a valid evaluation of the operation and maintenance procedures cannot be made. It must be pointed out, however, that if a major storm event occurs before remedial repairs are completed, in which the capacity of the low level outlet weir was exceeded, the dam would impound water up to the elevation of the high level outlet weir or possibly the emergency spillway crest level. If such an event should occur, it could, in turn, result in

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a significant increase in the loading on the spillway riser, thus aggrevating the previously discussed evidence of structural instability of the riser transition section.

A formal, written downstream emergency flood warning system should be developed for this dam before it is placed in service.

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SECTION 5 - EVALUATION OF HYDRAULIC/ HYDROLOGIC FEATURES

5.1 General

Clam Lake Dam, No. \land 01052, is a multiple-purpose recreation and floodwater storage facility which was designed by the Soil Conservation Service (SCS), as part of the overall Clam River flood protection project.

The dam is located on the Clam River about 3 miles upstream of the Village of West New Boston in the Town of Sandisfield, Massachusetts and is about 4.5 miles upstream from the confluence of the Clam River with the West Branch of the Farmington River.

The drainage area upstream of the dam is 10.8 square miles with generally mountainous topography.

Development within the watershed is very limited and consists of only a few structures which appear on the USGS quadrangle sheet. The area is mostly wooded with only a minor amount of open fields and ponds.

The dam itself is about 950 feet long and 94 feet high, and is an earthfill embankment. The facility has a principal spillway which maintains a low stage recreation pool and discharges all normal stream flows via a 60-inch diameter conduit through the dam. An emergency spillway, consisting of a 385 ft. wide earth fill and excavated channel with a grass cover, is designed to carry flood flows which exceed the storage capacity, at elevation 1172, of the impoundment around the dam to the downstream channel.

5.2 Design Data

The hydraulic features of the Clam Lake Dam have been designed by the S.C.S. to retard a 100 year frequency storm without discharge occurring in the emergency spillway. The calculations included in the SCS Design Report include storage vs. elevation, stage discharge curves for the combined spillways, and routing of the 100 year frequency storm through the reservoir. These calculations are dated 1971.

The SCS has established the elevation of the low stage outlet as 1144.3 which provides 750 acre-feet of storage including 2 acre-feet of sediment storage. The high stage storage was set at elevaton 1153.0 providing an additional 560 acre-feet of storage, and the emergency spillway crest set at elevation 1172 providing an additional 1750 acre-feet of storage above the 1153 level pool, resulting in a total flood storage pool of 2310 acre-feet.

5.3 Experience Data

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No records of flow or stage are known to be available for the Clam Lake Dam since it has just recently been completed and has not been placed in service.

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5.4 Test Flood Analysis

The selection of the test flood is based on the Corps of Engineers, "Recommended Guidelines for Safety Inspection of Dams," dated November 1976. These guidelines state that dams classified as "Intermediate" in size, and "High" in hazard potential be tested against the "Probable Maximum Flood" for the region within which the dam is located.

The determination of the PMF for the Clam Lake Dam is based on the Corps of Engineers "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations" dated March 1978. The test flood was determined by reference to the mountainous curve in this "Guidance" for a drainage area of 10.2 square miles.

The unit flow of 1,950 cfs per square mile which results in an PMF of 21,060 cfs for the Clam Lake Dam.

The purpose of this Phase I investigation is to assess the dam's overtopping potential and its ability to store and/or discharge the test flood. This requires determing the storage characteristics of the impoundment area and the stage vs. discharge characteristics of the spillway. The SCS design report tabulates all of this data, and our review has determined the information to be in accordance with standard design practices, therefore, as noted in the computations included in Appendix D, this information has been utilized in performing the test flood analysis.

The test flood has been routed through the reservoir using the iteration process as outlined in the Corps of Engineers, "Preliminary Guidance for Estimating Probable Maximum Discharges in Phase 1 Dam Safety Inspections." The results of routing the PMF through the reservoir indicate that the storage capacity of the impoundment area will reduce the PMF inflow of 21,060 cfs to a reservoir outflow of approximately 14,960 cfs. This assumes that the level of the recreation pond is at elevation 1143.3 at the start of the storm, and the entire flood storage volume is available. Elevation 1,153.0 is the crest elevation of the high stage overflow weirs.

The combined spillways have a discharge capacity with the water level at the top of the dam of 16,150 cfs which is sufficient to pass the calculated PMF outflow ot 14,960.

5.5 Dam Failure Analysis

A dam failure analysis using the procedures in the Corps of Engineers, "Rule of Thumb Guidance for Estimating Downstream Failure Hydrographs" dated April, 1978, was performed for the Clam Lake Dam. The assumed conditions are as follows:

- 1. Water level prior to breach is at top of dam elevation.
- 2. Stream flow at time of breach is PMF test flood for the reach in question.

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3. Stream flow at confluence, is PMF for tributary watershed.

Prior to dam failure the PMF outflow from the dam and the PMF from tributary drainage areas will cause significant damage downstream and possibly the lose of a few lives. The damage that will result includes 11 houses, four bridges and 13,000 feet of roadway.

For an assumed breach equal to 40 percent of the dam width computed at half height, the breached width is 236 ft. The resulting dam failure flow using a water height of 94 ft. is 361,975 cfs.

The first area impacted by the dam failure is at a crossing of Montville-Beech Plain Road. There is a steel beam-wood deck bridge at the crossing. The roadway will be severely overtopped and the structure inundated by about 34 feet of water. The structure can be expected to fail and the roadway washed out.

The second and major area impacted by the dam failure is the Village of West New Boston at the confluence of the Clam River and the Buck River. The failure of the dam would result in potential lose of lives, homes, out buildings, private property, major roadways and a bridge. The area will be inundated with as much as 19 feet of water.

The third area to be impacted would be an area west of New Boston near the intersection of Beech Plain Road and New Boston-New Hartford Road. The failure of the dam in this area will result in potential loss of lives, homes, outbuildings, private property, major roadways, a cemetery and a major road bridge. The area would be inundated by as much as 11 feet of water.

The fourth area to be impacted by the dam failure would be the Village of Roosterville, which is on the West Branch of the Farmington River. The failure of the dam in this area will result in potential lose of life, homes, outbuildings, private property, a major roadway and a bridge. The area would be inundated by as much as 26 feet of water.

The fifth area to be impacted by the failure of the dam would be downstream of Roosterville on the West Branch of the Farmington River where Rt. 8 and a secondary road crosses the River. This area would experience damage to the secondary road and the secondary road bridge. Since Rt. 8 has recently been constructed, it would be expected that the bridge would adequately pass the flood due to failure of the dam. The area would be inundated with about 26 feet of water.

The sixth area to be impacted by the dam failure flood in the Colebrook Reservoir. It is estimated that sufficient storage would be available to retard any additional flooding downstream. The surface elevation is estimated to rise about 8 feet due to the volume of flood water from the dam failure.

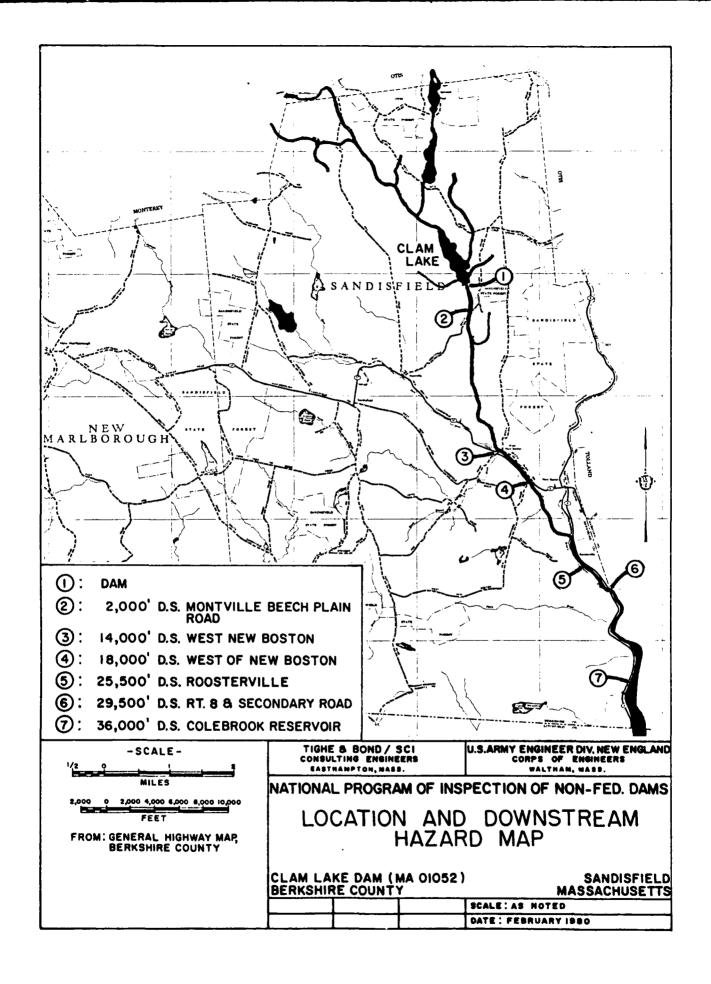
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		Comments	No downstream damage prior to dam failure.	Montville Beech Plain Rd. is a secondary road. Before dam failure 1 bridge inundated.	Roadway and bridge are major. Before dam fail- ure no damage.	Roadway and bridge are major. Before dam failure no damage.	Bridge and roadway are major. Before dam failure 11 houses, 1 bridge & 13,000 ft. of road inundated.	One bridge is major, one bridge is secondary. Before failure 2 bridges inundated.	Flood attenuated by being rou.ed through Cole- brook Reservoir. Dam Failure will result in reservoir rising 8'±. Befor failure no affect.
R E tream	ige Dam Ire	Other	Dam	1 Bridge	1 Bridge 5000' of road	1 Bridge 4000' of road 1 cemeterv	1 Bridge 13,000' of road	2 Bridges	!
DAM FAILURE Downstream	Damage After Dam Failure	No. of Houses	0	0	19±	6±	7	0	:
DOWNSTREAM IMPACT OF D CLAM LAKE DAM MA 01052	Stage After Dam	Failure (Ft.) (cfs)	Dam Failure	34	19	ħ	26	26	;
	Flood	Flow After Dam Failure	362,000	242,000	151,500	184,000	225,000	255,000)
PROBABLE	Stage Prior to Dam	Failure (Ft.)	5.7'	æ	თ	ω	21	21	:
	Flood Flow	Prior to Dam Failure (cfe)	15,000	15,000	20,500	53,000	135,000	135,000	;
		Impact <u>Area</u>	# #	-	2	რ	ব	ß	٥
		Area II <u>Location</u>	1 Dam	2 2000'DS	3 14,000'DS	4 18,000 ¹ DS	5 25,500 ['] DS	6 29,500'DS	7 36000'DS

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SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observation

The visual inspection of the dam embankments identified irregularities in the grade of the upstream slope embankment which are cause for concern. Erosion of sand and silt from beneath the riprap, protective layer on the downstream embankment slope was also noted.

The principal spillway structure was found to be unstable. Cracks were noted in the transition section and those cracks showed displacement.

The inlet structure wingwalls for the pond drain are cracked and displacement indicates differential movement of the sections.

The left slope of the emergency spillway is unstable due to a diversion ditch at the top of slope combined with the steep side slopes. The area of the emergency spillway at the transition from the grass surface to the riprap slope is eroded and the riprap is undercut.

The poor condition of the vegetative cover on slopes and channel bottom of the emergency spillway indicates that soil erosion could occur if the structure was in service.

6.2 Design and Construction Data

Design data for the emergency spillway side slopes and the spillway channel is not included in the SCS Design Report. From the design plans, it appears that a slope design at 2 horizontal to 1 vertical was utilized but under the field conditions at the site, this slope is too steep.

6.3 Post Construction Changes

There have been no post construction modifications to the structure but, due to the many embankment and structural problems recognized to date, extensive studies have been made by the Soil Conservation Service to determine the source of the problems and to recommend corrective actions.

6.4 Seismic Stability

The Clam Lake Dam is located in seismic zone 1. According to the recommended Corps of Engineers Guidelines, a seismic analysis is not warranted.

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SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

(a) Condition

The dam and its appurtenances are in <u>POOR</u> condition due to the recognized deficiencies in the emergency spillway and principal spillway as well as numerous other deficiencies noted during this inspection.

(b) Adequacy of Information

There is sufficient design and construction data to permit an assessment of dam safety when combined with visual inspection, past performance, and sound engineering judgment.

(c) Urgency

The recommendations and remedial measures described herein should be implemented by the owner within one year upon receipt of this Phase I Inspection Report.

7.2 Recommendations

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The recommendations of this Phase I investigation are that the following additional studies be made, under the supervision of a qualified registered engineer:

- a) Determine the cause of erosion problems throughout the project site including:
 - i. Erosion of soil from beneath riprap on the downstream embankment slopes.
 - ii. Surface erosion on the upstream face of the dam.
 - iii. Erosion of the left slope of the emergency spillway.

and determine what corrective measures are required and implement those corrective measures.

- b) Determine causes of the slope stability problems throughout the project site including:
 - i. Undercutting of the riprap slope at the transition section from the emergency spillway.
 - ii. Left slope of emergency spillway.

and determine what corrective measures are required and implement those corrective measures.

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- c) Determine the cause of the upstream embankment slope irregularities and what corrective measures are required and implement those corrective measures.
- d) Finalize and implement a suitable design for a new riser structure or a suitable repair of the existing structure.
- e) Develop reliable means of access to the top of the dam at all conditions of runoff.
- f) Determine why grout was placed in the first joint of the 60" diameter pipe out of the riser structure, determine what corrective measures are required and implement them.
- g) Determine what corrective measures are required to pitch side slope of emergency spillway away from face of dam and implement those corrective measures.
- h) Develop and implement a method to routinely monitor seepage through the dam embankment.

7.3 Remedial Measures

The recommendation of this Phase I investigation is that the following remedial and/or maintenance items be carried out:

- a) Repair right foundation drain outlet pipe at the endwall.
- b) Repair the right corner of the end wall.
- c) After erosion and stability problems are solved by a qualified registered engineer, place topsoil where necessary and seed all exposed earth surfaces on the dam embankment, spillway channel and spillway training dike embankment to prevent erosion of soil.
- d) Rebuild the inlet structure and trash racks.
- e) Repair and replace the stem guides for the pond drain gate.
- f) Lubricate and exercise the two gate operators on a regular basis.
- g) Prepare a formal written downstream emergency flood warning system.
- h) Implement measures to ensure 48 inch gate on low level spillway is kept in a fully open position and the reservoir normally kept "dry" until all of the above recommendation and remedial measures can be implemented. A program of monitoring during periods of intense rainfall should be initiated.

7.4 <u>Alternatives</u>

There are no meaningful alternatives to the above recommendations.

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APPENDIX A

VISUAL CHECK LIST WITH COMMENTS

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INSPECTION CHECK LIST PARTY ORGANIZATION			
RCJECT Clam Lake Dam	DATE 11/1/79		
	TDE 11:30 A.M.		
	WEATHER Clear and cool		
	W.S. ELEV. 1100- U.S. 1084- DN.S.		
ARTY:			
J.W. Powers, P.E., Project Manager 6.	-		
G.H. McDonnell, P.E., Hydrology/Hydraulics	s		
. D.M. Lenart, P.E., Civil 8.			
PROJECT FEATURE	INSPECTED BY REMARKS		
 All features inspected by inspection 			
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	PART	ORGANIZATIC	N.	
CJECT Clam Lake Da	am.		DATE 11/7/79*	_
			TDE 1:00 P.M.	
			WEATHER Sunny an	d Cool
			W.S. ELEV. 1100 ⁺	
<u> 31Y</u> :				
E.J. Harvey, P.1	E., Structural	6		
O.H, Dumais, Ci				
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PROJECT FEAS			INSPECTED BY	
1. Interior of pri	ncipal spillway	structure	Dumais & Harvey	
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<pre>5</pre>	owup inspection lway; arrangemen tion previously es for this insp	with SCS pers ts made to ac scheduled by ection are in	sonnel to inspect : company SCS person	Interior of anel on this
<pre>5. 5. 7. 6. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9.</pre>	owup inspection lway; arrangemen tion previously es for this insp for our 11/1/79	with SCS pers ts made to ac scheduled by ection are in inspection.	sonnel to inspect : company SCS person SCS. ncorporated on the	Interior of anel on this
<pre>7. 5. 7. 6. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9.</pre>	owup inspection lway; arrangemen tion previously es for this insp for our 11/1/79 C. Dodge D. Wallin	with SCS pers ts made to ac scheduled by ection are in inspection. S.C.S. Ami S.C.S. Per	sonnel to inspect : company SCS person SCS. ncorporated on the nerst, MA office nn. office	Interior of anel on this
<pre></pre>	owup inspection lway; arrangemen tion previously es for this insp for our 11/1/79 C. Dodge	with SCS pers ts made to ac scheduled by ection are in inspection. S.C.S. Am S.C.S. Per S.C.S. Per S.C.S. Vas	sonnel to inspect : company SCS person SCS. ncorporated on the nerst, MA office nn. office	Interior of mel on this following pages

	on Check list
RCJECT Clam Lake Dam	DATE 11/1/79
PROJECT FEATURE All Features	NAME
ISCIPLINE	NAME
AREA EVALUATED	CONDITIONS
M EMBANKMENT	No access to gates if flood condition
Crest Elevation	1178.0
Current Pool Elevation	1100 (Invert of drain inlet)
Maximum Impoundment to Date	1134 (Debris and wave scars)
Surface Cracks	None
Pavement Condition (Rip Rap Faces)	Downstream slope good but some erosion under rock. Upstream slope near crest not uniform.
Movement or Settlement of Crest	None apparent
Lateral Movement	None apparent
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Intersection of dam & spillway slopes show erosion. Sand & silt washed from under rip rap at both abutments & around discharge end wall
Indications of Movement of Structural Items on Slopes	None apparent
Trespassing on Slopes Vegitation on Slopes Sloughing or Erosion of Slopes or Abutments	None apparent on rock slope, but below upstream face shows some vehicular traff Poor with add'l. vegetation required. Gravel washed out from under rip rap and rock has settled 396 ft. from right abut ment.
Rock Slope Protection - Riprap Failures	
Unusual Movement or Cracking at or near Toes	None apparent
Unusual Embankment or Downstream Seepage	Flow of water running right toe channel
Piping or Boils	None (No water impounded)
Foundation Drainage Features	Foundation drain outlet pipes dry & ends damaged by vandals.
Toe Drains	End of pipes damaged and pipes dry
Instrumentation System Access to Crest	None In event of flood no access to riser

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INSPECT		
PROJECT Clam Lake Dam .	DATE 11/1/79	
PROJECT FEATURE All Features	NAME	
DISCIPLE	NAME	
AREA EVALUATED	CONDITION	
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS		
a. Approach Channel		
General Condition	Good condition, needs grass cover	
Loose Rock Overhanging Channel	None	
Trees Overhanging Channel	None	
Floor of Approach Channel	Good condition but more grass required	
c. Weir and Training Walls	Concrete crest flush with spillway floor No erosion protection on training wall slope. Good with some chips	
General Condition of Concrete		
Rust or Staining	None apparent	
Spilling	None	
Ary Visible Reinforcing	None	
Any Seepage or Efflorescence	None	
Drain Holes	None	
c. Discharge Channel	Channel floor good until the transition between soil floor and riprap. Under cutting noted & sloped section shows failure of rockfill.	
General Condition		
Loose Rock Overhanging Channel	None	
Trees Overhanging Channel	None	
Floor of Channel	Good grade but requires more grass	
Other Obstructions	Left slopes of spillway failing due to drainage ditch diversion along crest. Vehicular traffic noted on slopes far left. Slip outs & failures noted on left side. Training wall right no erosion protection Also, s.w. floor pitch 6" in 100' to wall to cause rapid erosion.	

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PROJECT Clam Lake Dam	DATE 11/1/79	ł
PROJECT FEATUREAll Features	NAME	
DISCIPLINE		l
	· · · · · · · · · · · · · · · · · · ·	
AREA EVALUATED	CONDITION]
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL		1
General Condition of Concrete	End wall cracked at centerline of pipe. Right corner cracked from vandals.	
Rust or Staining	None	
Spelling	None	
Erosion or Cavitation	None	
Visible Reinforcing	None	
Any Seepage or Efflorescence	None	l
Condition at Joints	' Good	
Drain holes	None	
Channel		Į
Loose Rock or Trees Overhanging Channel	None	
Condition of Discharge Channel	Good	Ì
Conduit	Good condition. Joints in good condition.	
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INSPEC	TICN CHECK LIST
PROJECT Clam Lake Dam	DATE 11/1/79
PROJECT FEATURE All Features	NAME
DISCIPLEE	NAME
AREA EVALUATED	CONDITION
UTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	Above embankment good. Cracks noted in transition section.
Rust or Staining on Concrete	Extensive staining in transition. Form ties exposed.
Spalling	No spalling noted in entire structure.
Erosion or Cavitation	Concrete eroded at sluice gate at base of riser.
Cracking	Numerous cracks in transition area.
Alignment of Monoliths	Good
Alignment of Joints	Pipe joints are in good condition. First joint out of riser grouted on 60" pipe.
Numbering of Monoliths	N/A
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INSI	ECTION CHECK LIST
FROJECT Clam Lake Dam	DATE <u>11/1/79</u>
PROJECT FEATURE All Features	NAME
DISCIPLINE	NAME
AREA EVALUATED	CONDITION
DUTLET WORKS - ITTAKE CHANNEL AND INTAKE STRUCTURE	
A. Approach Channel	Good condition
Slope Conditions	Good
Bottom Conditions	Good
Rock Slides or Falls	None
Log Boom	N/A
Debris	None
Condition of Concrete Lining	N/A
Drains or Weep Holes	N/A
. Intake Structure	
Condition of Concrete	Wing walls are cracked
Stop Logs and Slots	Trash racks are damaged and debris cou enter conduit.

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	INSPEC	TION CHECK LIST
	PRCJECT Clam Lake Dam	DATE 11/1/79
)	PROJECT FEATURE All Features	NAME
	DISCIPLINE	NAME
•	AREA EVALUATED	CONDITION
	OUTLET WORKS - CONTROL TOWER	
	a. Concrete and Structural	
	General Condition	Good
	Condition of Joints	Good
	Spalling	None
	Visible Reinforcing	None
	Rusting or Staining of Concrete	None
	Any Seepage or Efflorescence	None
	Joint Alignment	Good
	Unusual Seepage or Leaks in Gate Chamber	Structure not in use.
	Cracks	None visible (no access to lower sections at time of first inspection) Second in-
	Rusting or Corrosion of Steel	spection noted numerous cracks None
	b. Mechanical and Electrical	
	Air Vents	N/A
	Float Wells	N/A .
	Crane Hoist	N/A
	Elevator	N/A
	Hydreulic System	N/A
	Service Gates	Rodney Hunt 43939-2 S-2600A One nut of 4 tight
	Emergency Gates	Rodney Hunt 43939-2 Gear Assisted S-5020A (2 of 4 nuts on) both gates open.
	Lightning Protection System	N/A
>	Inergency Power System	N/A
	Wiring and Lighting System in Date Chamber	N/A

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PROJECT Clam Lake Dam	DATE <u>11/1/79</u>	
PRCJECT FEATURE All Features	NAME	- <u></u>
DISCIPLIE	NAME	
AREA EVALUATED	CONDITION	<u></u>
CUTLET WORKS - SERVICE BRIDGE		
a. Super Structure		
Bearings	N/A	
Anchor Bolts	N/A	
Bridge Seat	N/A	
Longitudinal Members	N/A	
Under Side of Deck	N/A	
Secondary Bracing	N/A	
Deck	N/A	
Drainage Dystem	N/A	
Railings	N/A	
Expansion Joints	N/A	
Paint	N/A	
o. Abutment & Piers		
General Condition of Concrete	N/A	
Alignment of Abutment	N/A	
· Approach to Bridge	N/A	
Condition of Seat & Backwall	N/A	

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APPENDIX B

ENGINEERING DATA

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APPENDIX B

ENGINEERING DATA

INDEX

List of Available Documents

1. Design and Construction Records

Design records include the following:

construction drawings construction specifications construction revisions design criteria layout hydraulic design foundation and embankment design geology report soil testing report structural computations quantity estimates inspector's notes seeding schedule

Construction records include the following:

inspector's and engineer's diaries soil testing reports concrete testing reports material certifications equipment guarantees correspondence quantities pay estimates

2. Reports on problems with riser and emergency spillway slope

The following records are kept on file by the U.S. Department of Agriculture, Soil Conservation Service, and may be obtained through their office located on Cottage Street in Amherst, Massachusetts.

- 1/19/78 Final Report of the committee investigating potential deficiencies in the emergency spillway and associated areas, Clam Lake Dam Site, Clam River Watershed, Mass.
- 3/24/78 Engineering Investigation Report Clam River Watershed Project Clam Lake Site.

A brief summary of these reports is appended hereto.

B-1

Construction Drawings

Copies of the following drawings are appended hereto:

3.	Drawings	Title	Page No.
	1	Cover sheet	B-3
	2	Plan of Storage Area	B-4
	5	Plan of dam site	B-5
	6	Plan of Emergency Spillway	B-6
	7	Fill Placement	B-7
	9	Foundation Drain Detail	B-8
	10	Principal Spillway plan and profile	
	11	Principal Spillway details	B-10
	13	Emergency Spillway Profiles	B-11
	18	Riser Details	B-12
	25 & 26 30, 31, 32	Reservoir drain inlet detail	B-13,14
	33, 34	Logs of test holes	B-15,16,17,18,19

B-2

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From U.S.D.A. Soil Conservation Service, Amherst, Massachusetts, March 24, 1978, "Engineering Investigation Report Clam River Watershed Project Clam Lake Site."

CONCLUSIONS AND RECOMMENDATIONS

1. At the time this riser was designed (late 1971) the horizontal embankment loading used in design was assumed to be that developed by active earth pressures. Design Note No. 17, published on April 1977, shows that active pressure assumptions underestimate the embankment moment when used in the design of a riser with a monolithic transition elbow. The vertical earth load imparted to the cantilevered transition elbow causes a restraining force which results in higher moments. Design Note No. 17 recommends that "at rest" lateral pressures be used for the embankment loading assumptions.

The Committee concludes that the effects of this loading condition, dealt with as item 3 on page 4 of Mr. Alling's memorandum, were the main cause of the cracking observed in the transition elbow.

Although it seems reasonable to use the At Rest Lateral Pressure Theory in this case, the Committee nevertheless recommends that future structures of this type be constructed in a manner that will allow movement of the vertically projected structural member. This will reduce the horizontal load to a minimum.

- 2. The November 23, 1977 memo by Alling notes several problem areas, either within the design computations or not covered in the design computations. Although the Committee has centered on cantilever embankment loading as the main cause of structural failure, these other areas should be taken into consideration in any design work for repair or reconstruction of this riser, or on future designs of this type.
- 3. The Committee recommends a follow-up check of the riser be made as soon as weather and terrain conditions permit. Sufficient additional measurements and photographs should be made so that detailed drawings can be prepared showing the location and sizes of the cracks. These should be similar to the drawings prepared as Exhibits 23 through 27 of the Engineering Investigation Report for Site 3A, Newton-Hoffman Creek Watershed, New York, September 15, 1976. This would include drawings showing any cracking that may have developed in the vertical Dection of the riser, at elevations above the special elbow, subsequent to earlier checks (which found no cracking in that section).

It is recommended that a grid system be marked off on the affected portions of the riser to assist in locating damage, preparing drawings, and providing a key to photographic records. This would speed up subsequent checks also.



An attempt should also be made to measure any displacement of the riser that may have taken place. Reports from earlier meetings indicate concern that displacement had taken place, but no measurements have been made.

The recommended documentation is needed to establish the severity extent of the damage to the riser and to correlate structure performance with that predicted from analysis of the design and with performance of other afflicted structures (e.g. Site 3A, Newton-Hoffman).

4. Concurrent with the Committees' work, studies of corrective measures for repair of the riser have been underway. Details of the current proposal for repair are contained in a March 2, 1978 memo to Cletus J. Gillman from Benjamin Isgur. Inasmuch as this proposal is well-grounded and has reached an advanced stage of discussion, the Committee spent little time on recommendations for repair and supports the proposal noted above. From "Final Report of the Committee investigating potential deficiencies in the emergency spillway and associated areas, Clam Lake Site, Clam River Watershed, Massachusetts, January 10, 1978."

FINAL REPORT

"This is the final report of the committee investigating stability problems of the emergency spillway side slopes at Clam Lake Site in the Clam River Watershed, Berkshire County, Massachusetts. Construction was completed and the final inpection conducted on October 14, 1977. A copy of the memo from Dr. Isgur to Peter G. Waldo, October 7, 1977, which established this committee is in appendix C.

Nine problem areas were identified in a preliminary report (see memo from the committee to Cecil B. Currin, dated October 20, 1977, included in appendix C). These problem areas are located in figure 1 which is a plan view of the emergency spillway area. These nine problems were divided into two groups with the more serious labeled as primary problems. Table 1 presents the primary problems and lists apparent causes of these problems. Table 2 is similar and presents the less serious, or secondary, problems.

The committee thinks that the basic cause of the stability problems of the side slopes and the diversion channel was the design decision to leave Beech Plain Road undisturbed. In order to keep away from Beech Plain Road, the design called for 2:1 side slopes throughout a large portion of the outside edge of the spillway. These steep side slopes have since proven to be inadequate considering the proximity of the diversion to the spillway and the severe winter conditions at the site. The extent and history of these problems are documented in appendices A and B.

It is apparent to the committee that any solution to the primary problems will call for relocation of the road or installation of expensive retaining devices such as cribbing. The economics of installing such devices should be weighted against relocating portions of the road. Additional surveying and subsurface investigations appear to be necessary before a final design can be prepared."

REPRODUCED AT GOVERNMENT EXPENSE

CLAM RIVER WATERSHE CLAM LAKE MULTIPLE-PUR RECREATION AND FLOOD PRE

DRAINAGE AREA TOTAL STORAGE FLOODWATER RETARDING STORAGE TO EMERGENCY SPILLWAY CREST WATER SURFACE AREA AT PERMANENT POOL

HEIGHT OF DAM

VOLUME OF FILL

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BUILT UNDER THE WATERSHED PR(

FLOOD PREVENTION A

by

MASSACHUSETTS DEPARTMENT of NATURA

and

MASSACHUSETTS WATER RESOURCES

and

BERKSHIRE CONSERVATION DIST

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COMMONWEALTH of MASSACHUS

with the assistance of

SOIL CONSERVATION SERVIC

of the

UNITED STATES DEPARTMENT of AGI

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INDEX

SHEET I - COVER SHEET	SHEET 14 - EME
SHEET 2 - PLAN OF STORAGE AREA	SHEET IS - EME
SHEET 3 - AERIAL PLAN	SHEET IS - ROCI
SHEET 4 - SITE LAYOUT DETAILS	SHEET IT - FAR
SHEET 5 - PLAN OF DAMBITE	SHEETS 18 10 23 -
SHEET 6 - PLAN OF EMERGENCY SPILLWAY	SHEET 24 HIGH
SHEET 7 - FILL PLACEMENT	SHEETS 25 8 26 -
SHEET PROFILE OF CUTOFF TRENCH	SHEET 27 CON
SHEET 9 - FOUNDATION DRAIN DETAILS	SHEET 20 HEA
SHEET 10 - PRINCIPAL SPILLWAY PLAN AND PROFILE	SHEET 29 - EME
SHEET II - PRINCIPAL SPILLWAY DETAILS	SHEETS 30 10 34 -
SHEET 12 - PRINCIPAL SPILLWAY EXCAVATION & E.S.FILL SECTION	SHEET 35 STAL
SHEET 13 - EMERGENCY SPILLWAY PROFILES	SHEET 36 JUT

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RSHED PROJECT E-PURPOSE DAM OD PREVENTION

6900	ACRE	S
3050	ACRE	FEET
2300	ACRE	FEET

47 ACRES

88 FEET 525,000 CUBIC YARDS

HED PROTECTION AND **FION ACT**

IF NATURAL RESOURCES

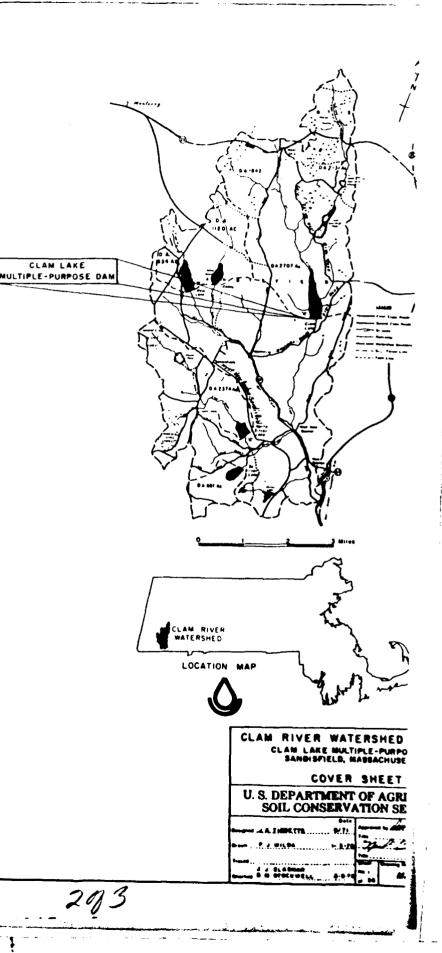
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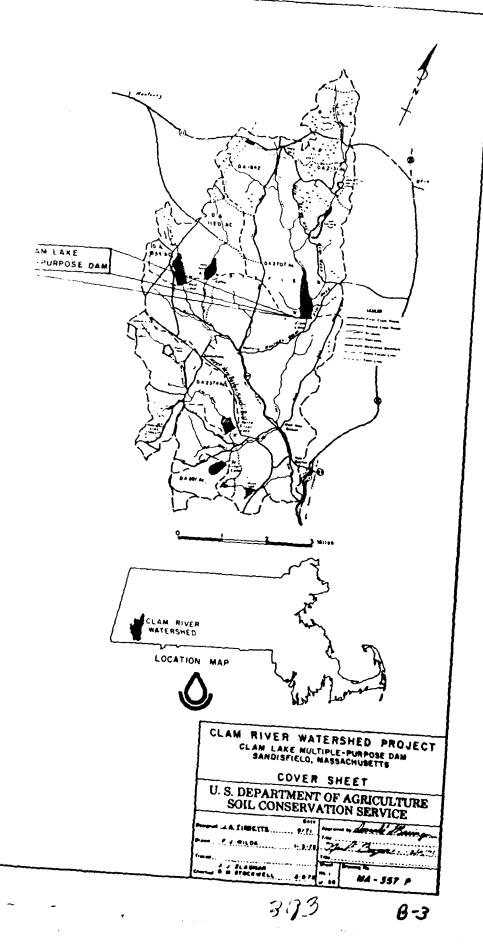
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HHEFT 14 - EMERGENCY SPILLWAY DRAIN EMERGENCY SPILLWAY DRAINAGE DETAILS 15 -ROCK TREATMENT DETAILS FIELD FENCE DETAILS RISER DETAILS STAGE TRASH RACK DETAILS 0. DRAIN INLET DETAILS OULT DETAILS WALL DETAILS ENCY SPILLWAY WEIR DETAILS 30 to 34 - LOUS OF TEST HOLES SHEET 35 STABILIZATION OF STRUCTURES SHEET M JUTE NETTING & CHAIN LINK FENCE DETAILS



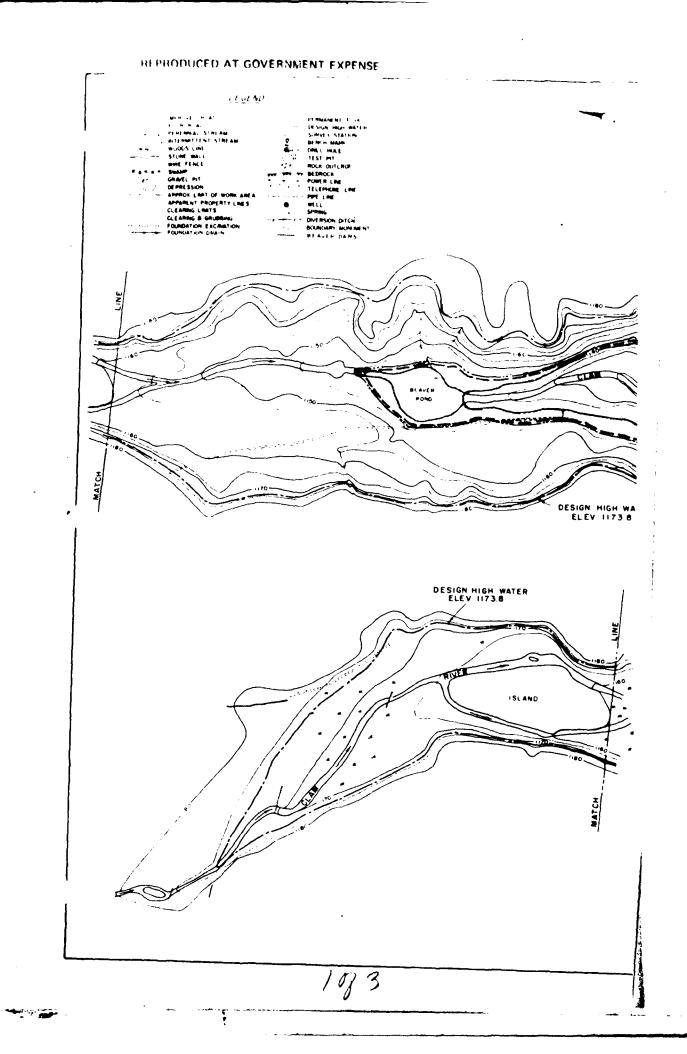
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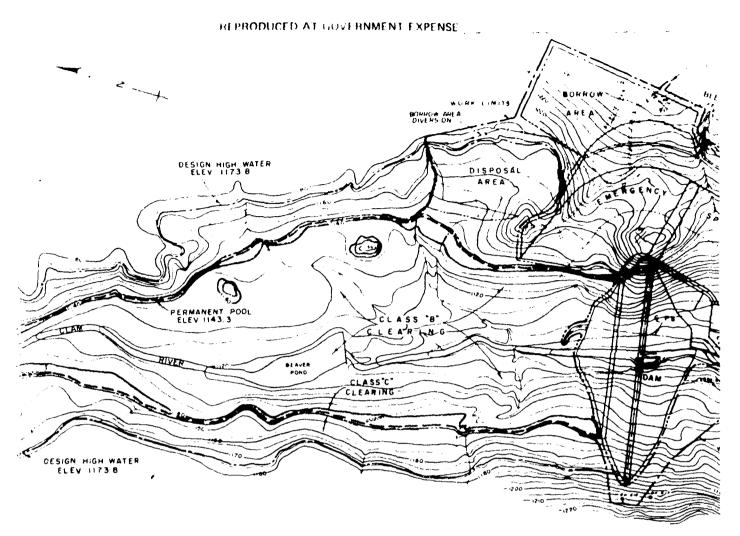


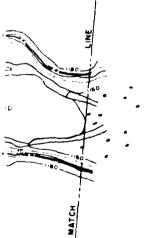
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CLEARING	ALONG THE EDGE OF THE PERMANENT POOL
CLASS "C"	FROM THE 1140 3 CONTOUR TO 10' HORIZONTALLY BEYOND THE 1143 3 CONTOUR
	WITHIN THE DISPOSAL AREAS AND WITHIN THE PERMANENT POOL BELOW ELEVATION 1140.3
8	DAM, ENERGENCY SPILLWAY, BORROW AREA, Diversion, inlet & outlet channels and Rock Disposal

TBM 1 (ELEV 1210 56) TOP OF 2' BOULDER 60' U/S OF 574 9+25

TBN 251 (ELEV)E77 72) TOP OF 2's 4' BOULDER APPROX 90' WEST OF BEECH PLAIN ROAD. TBN 341 (ELEV 1099 76) TOP OF 2's 5' ROCK WEST SIDE CLAM RIVER, EAST SIDE LOGGING ROAD

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NOTES

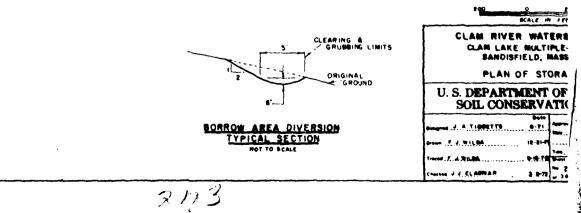
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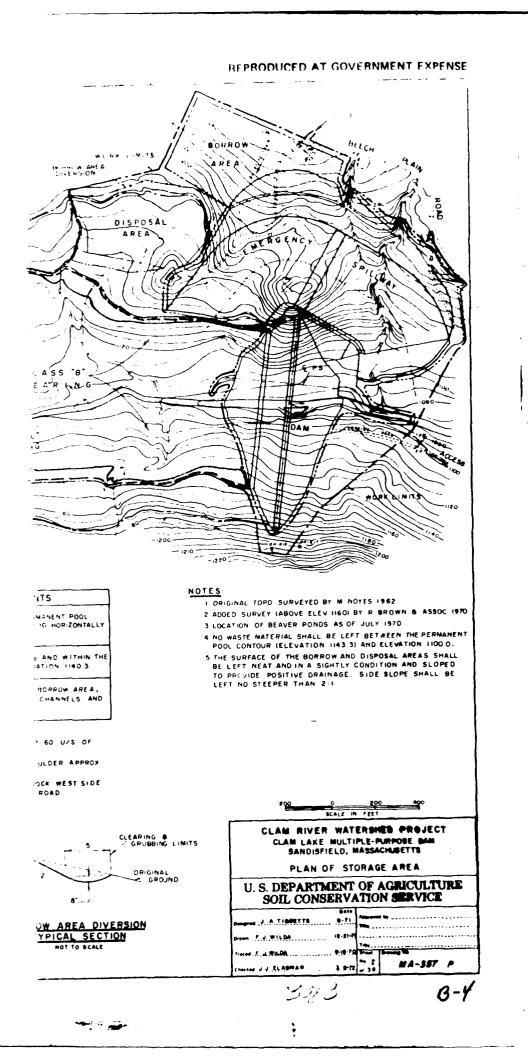
3 LOCATION OF BEAVER PONDS AS OF JU

4 NO WASTE MATERIAL SHALL BE LEFT & POOL CONTOUR (ELEVATION 1143.3) AN

5 THE SURFACE OF THE BORROW AND DI BE LEFT NEAT AND IN A SIGHTLY CON TO PROVIDE POSITIVE DRAINAGE. SIL LEFT NO STEEPER THAN 2:1

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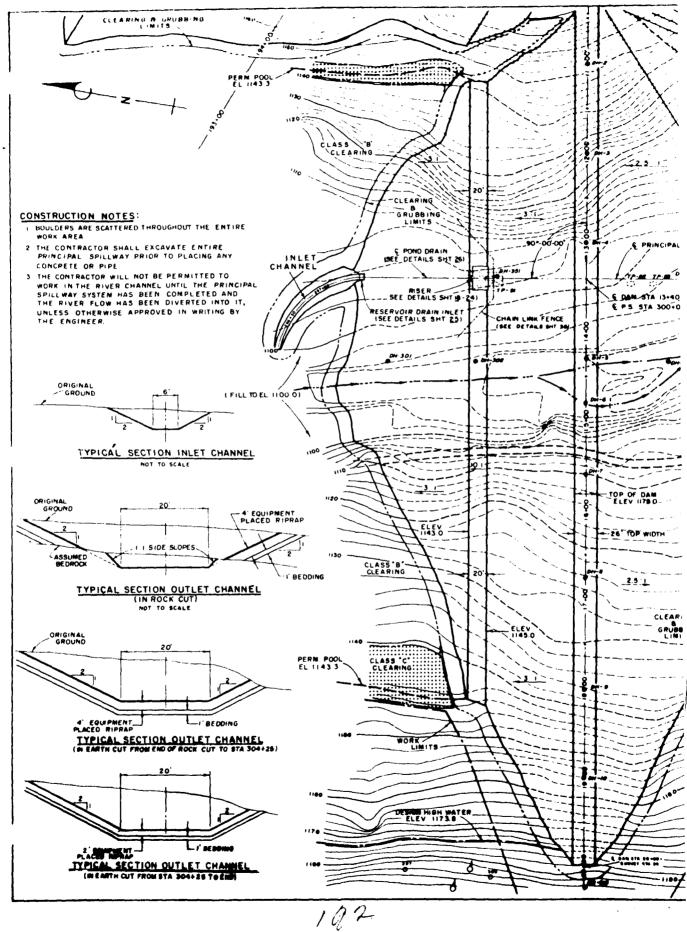




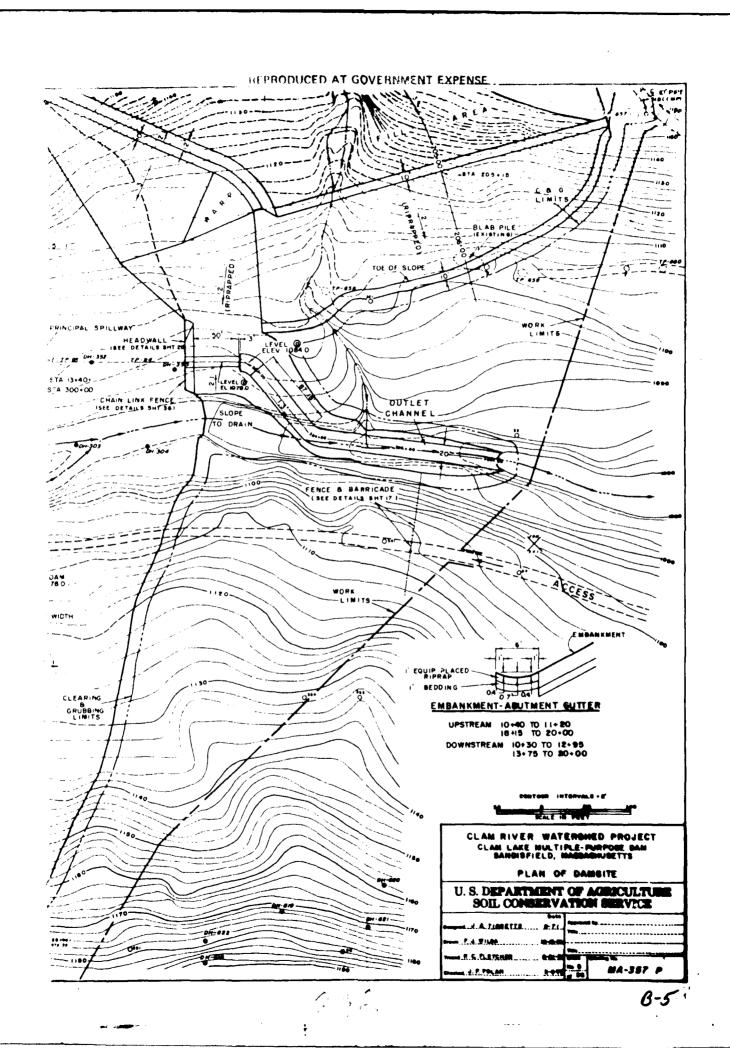
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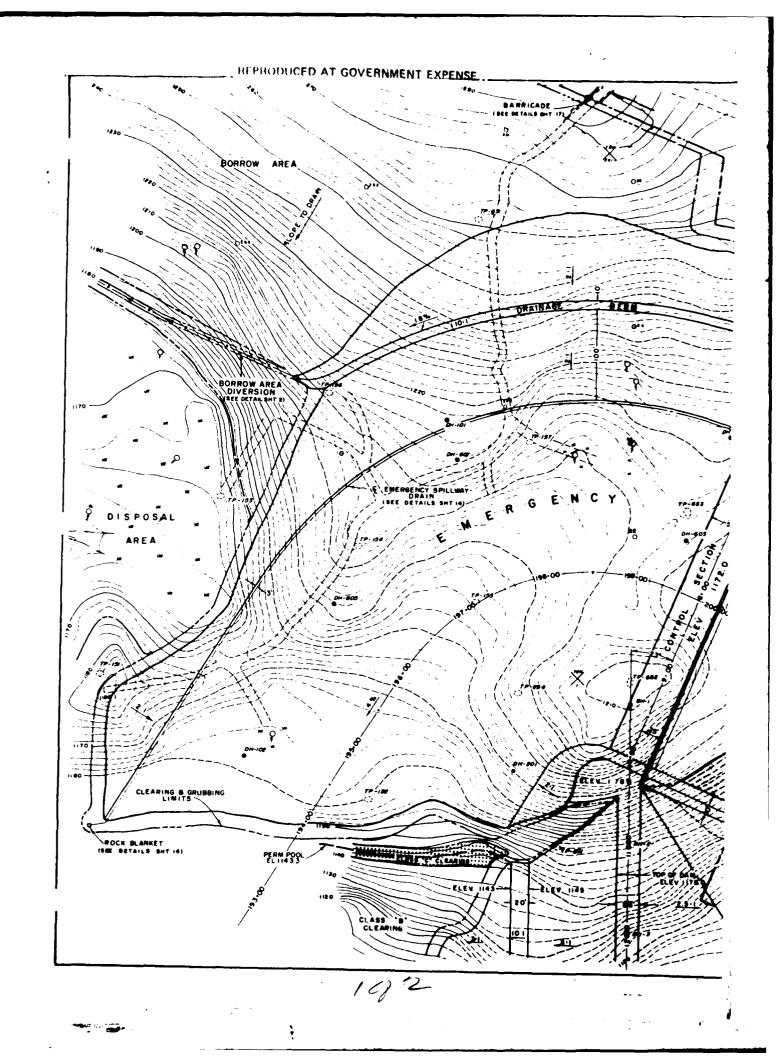
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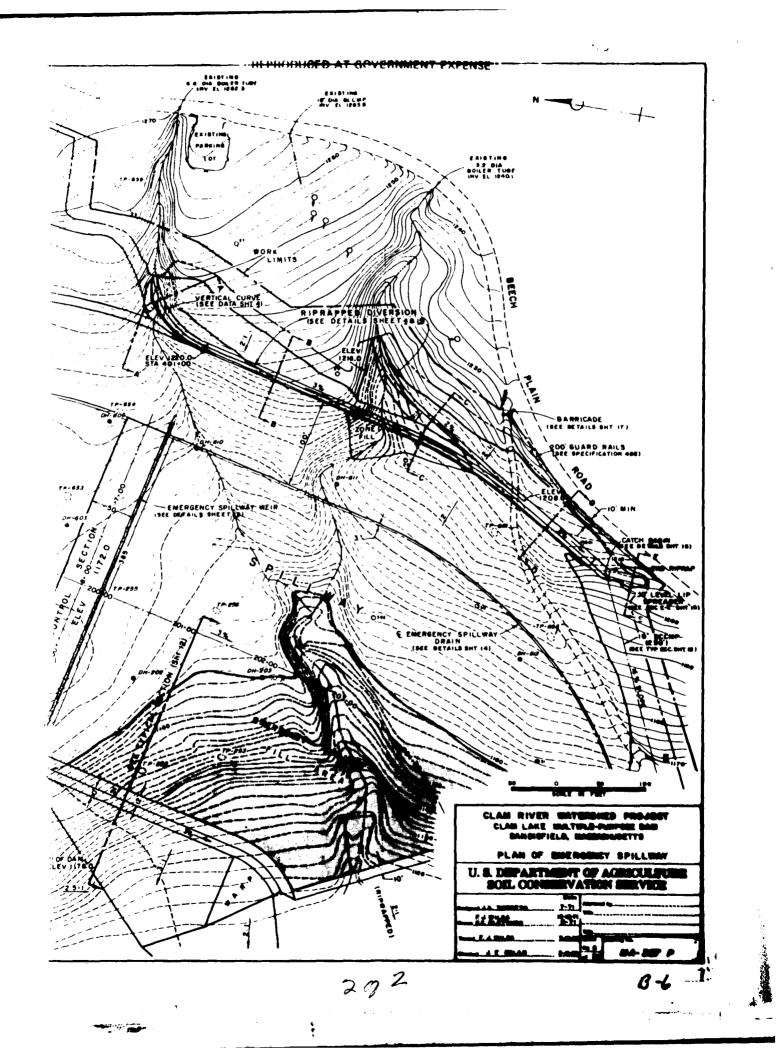
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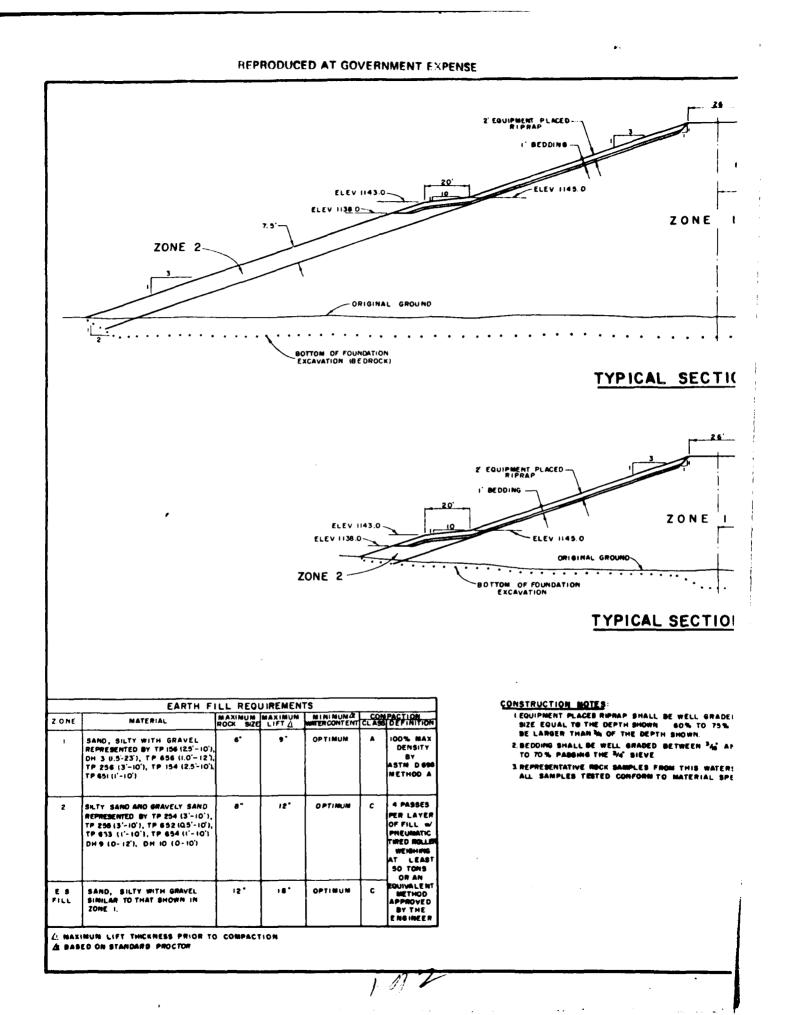


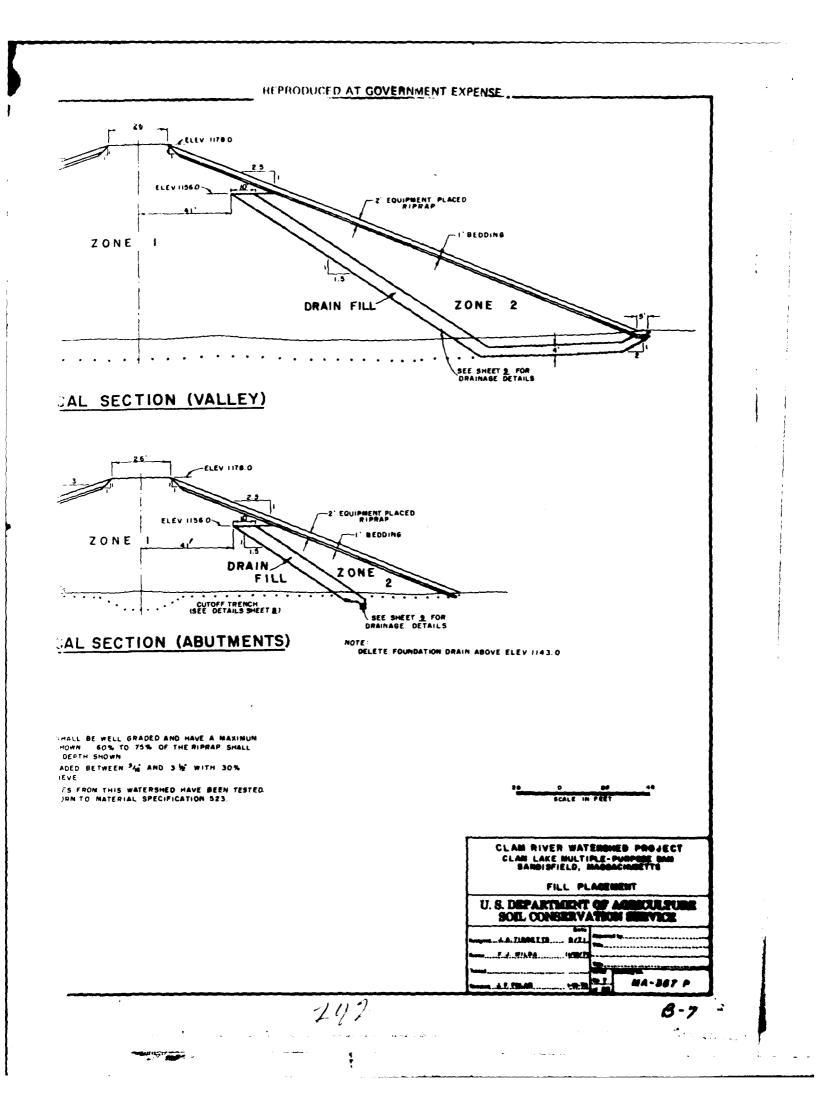
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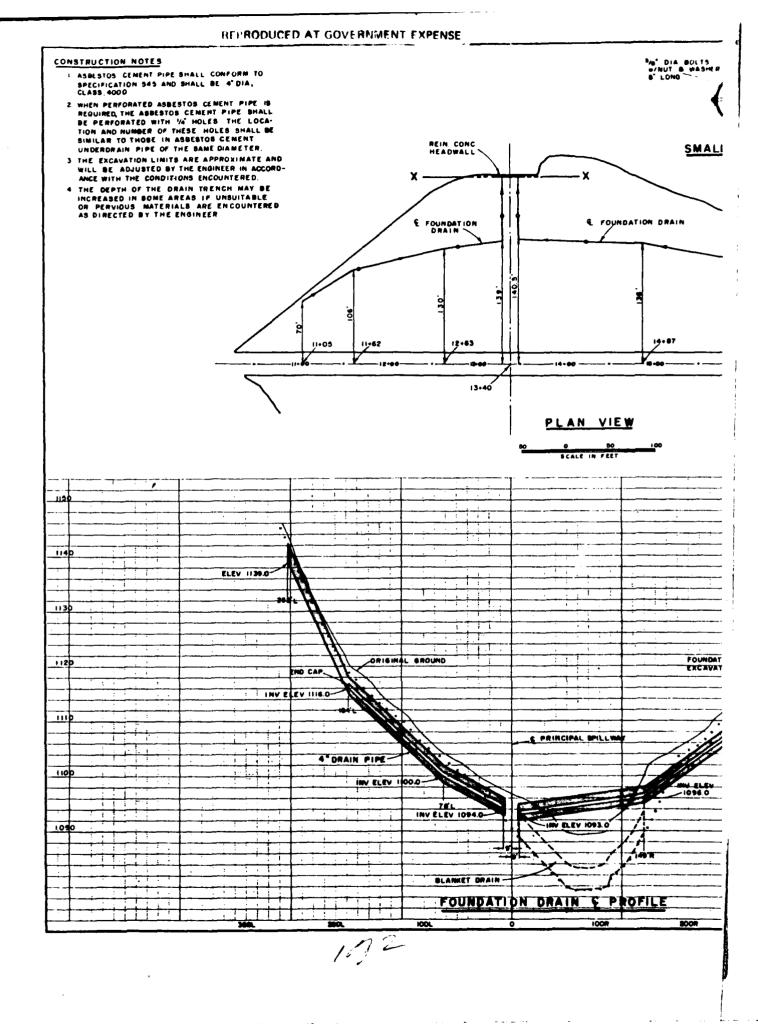
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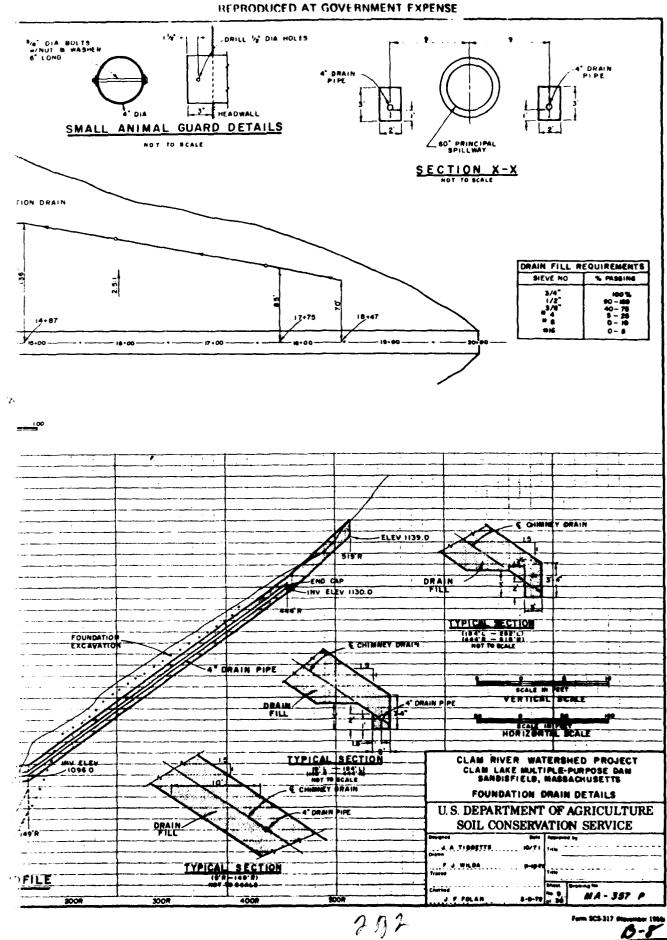
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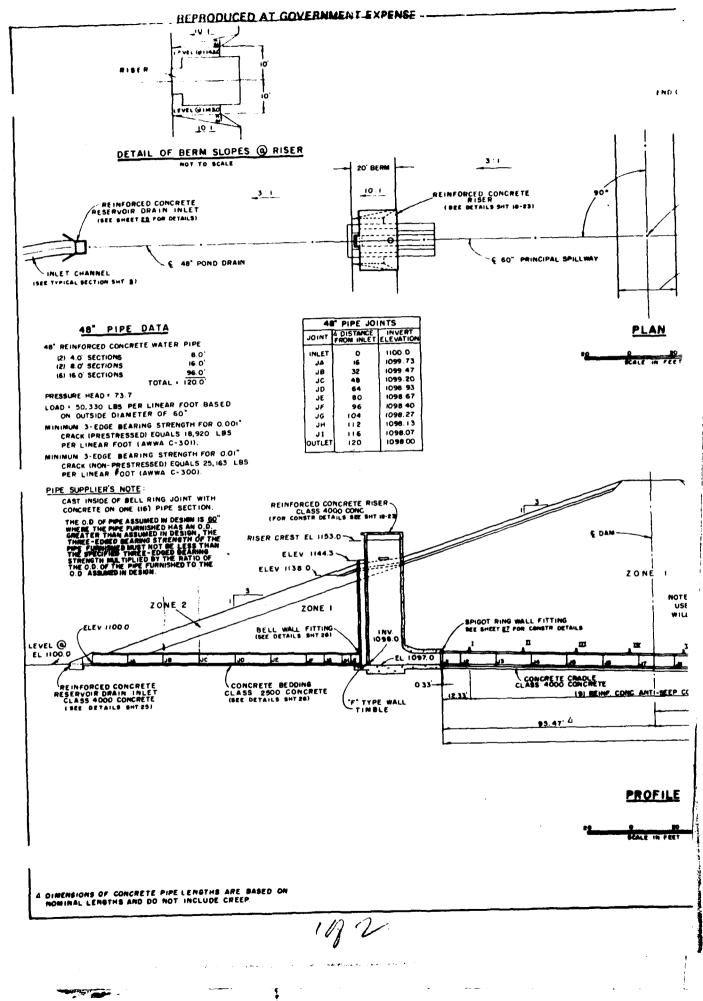


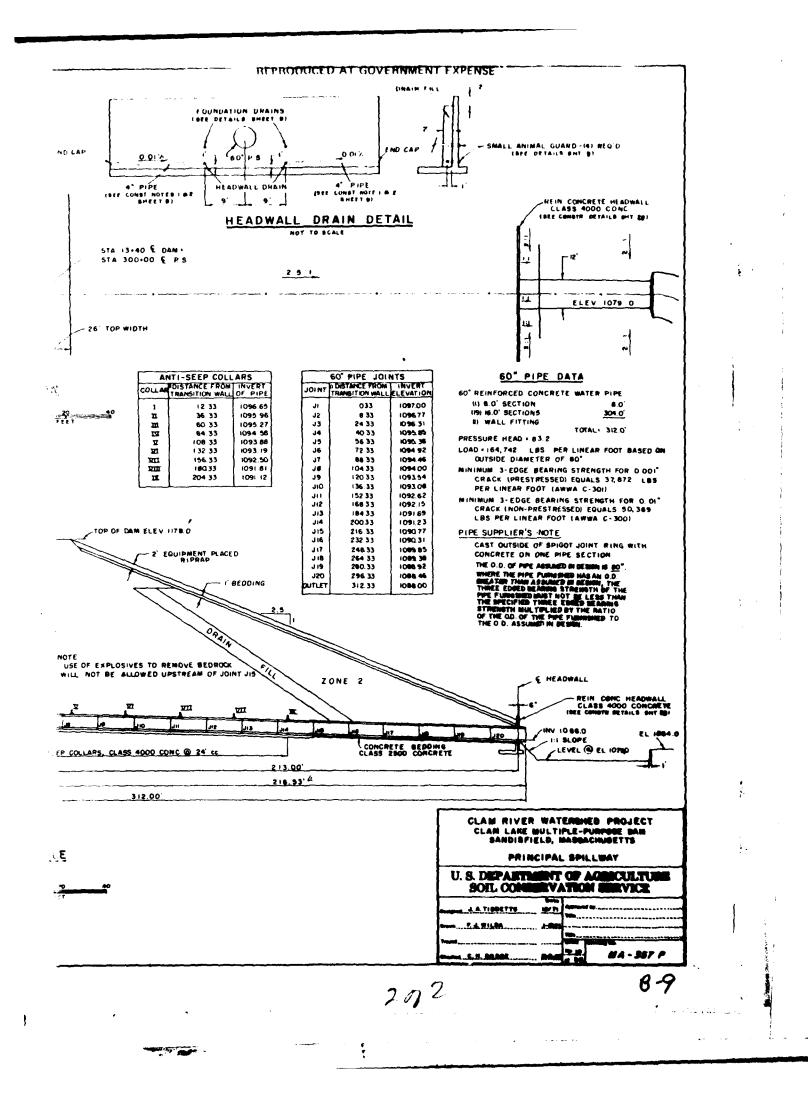
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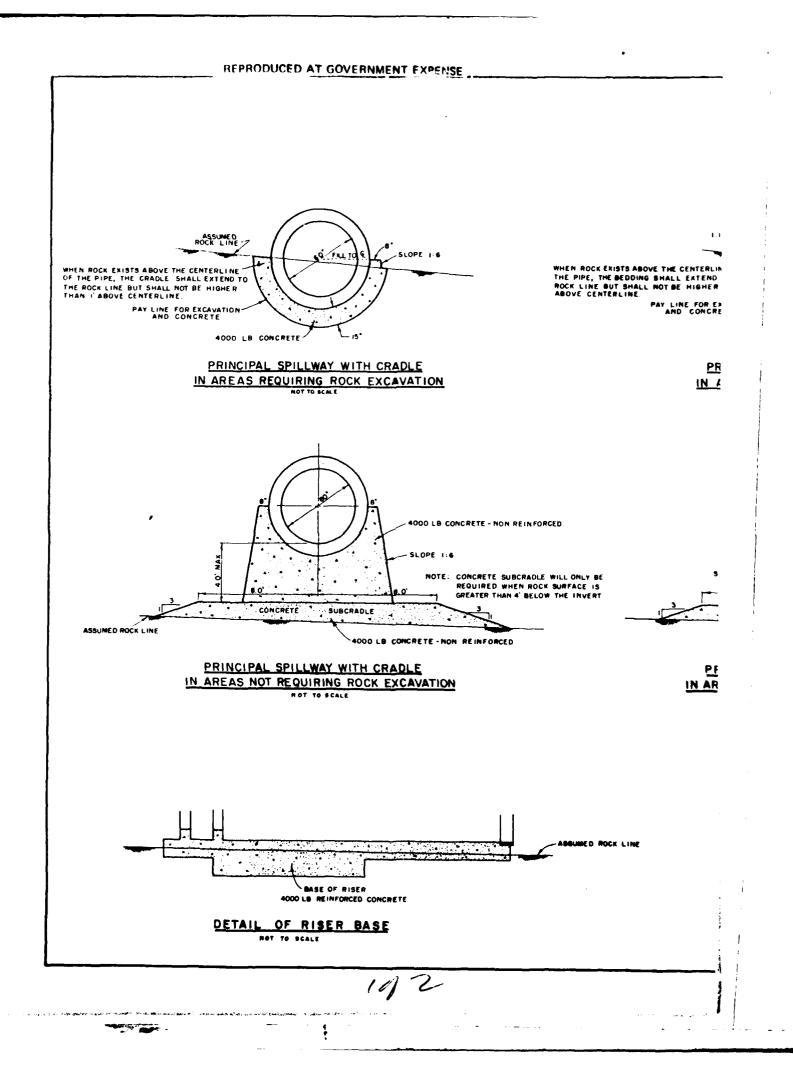


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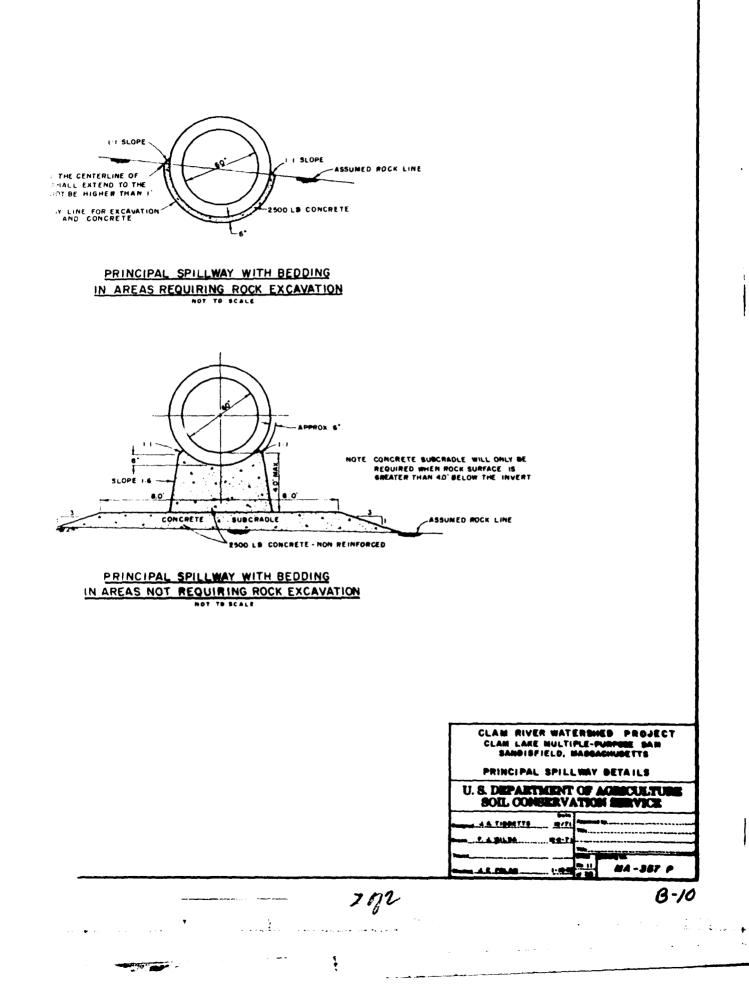
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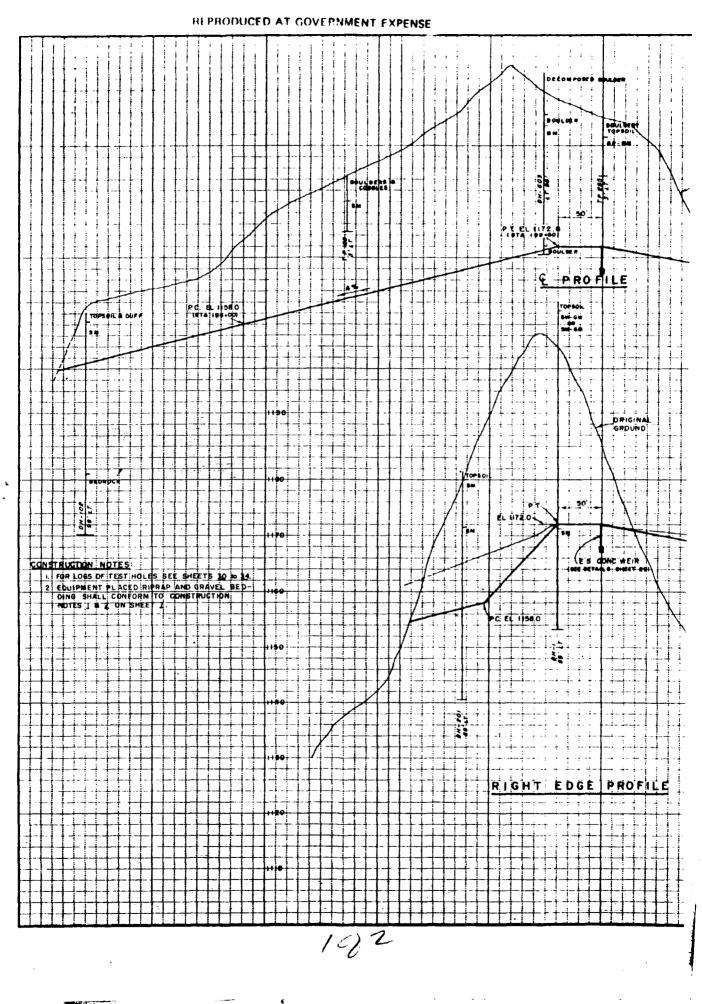




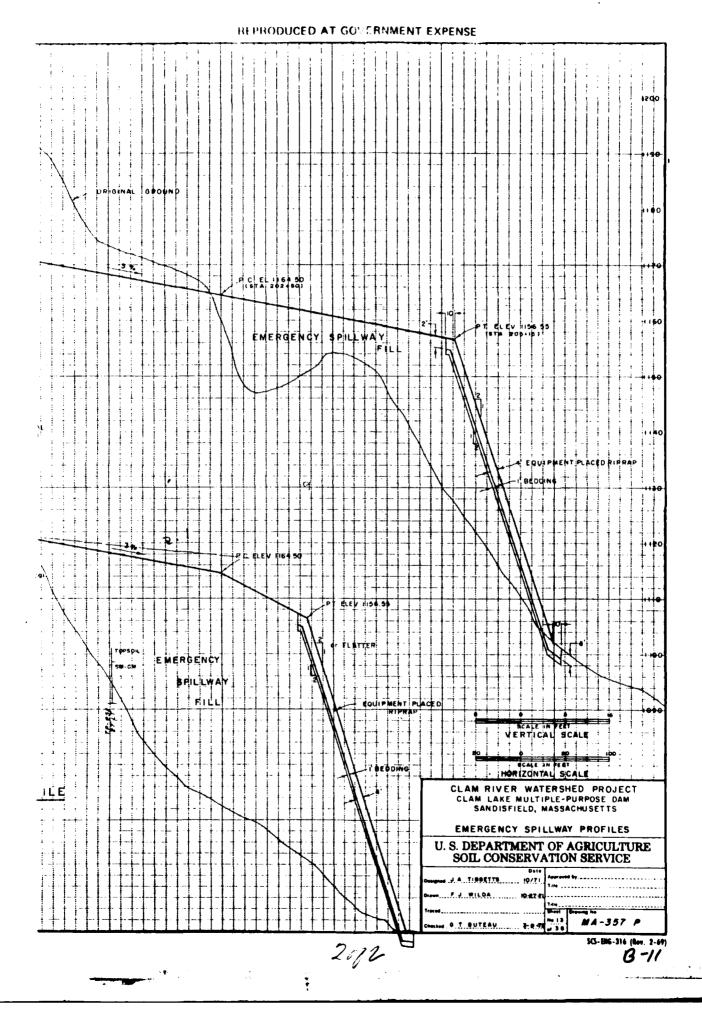


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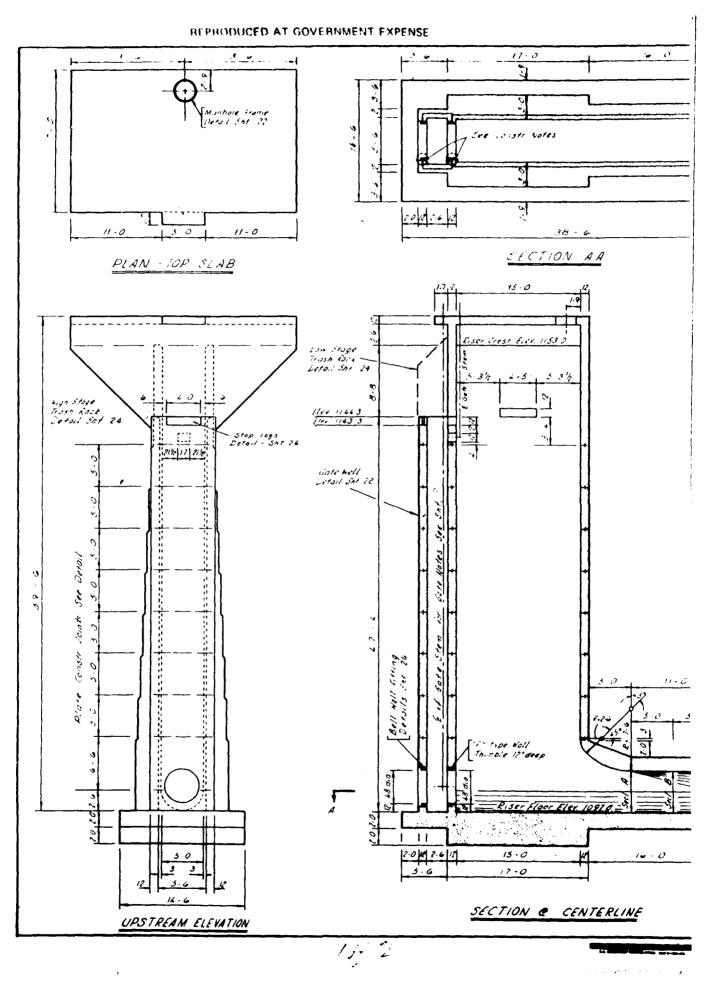
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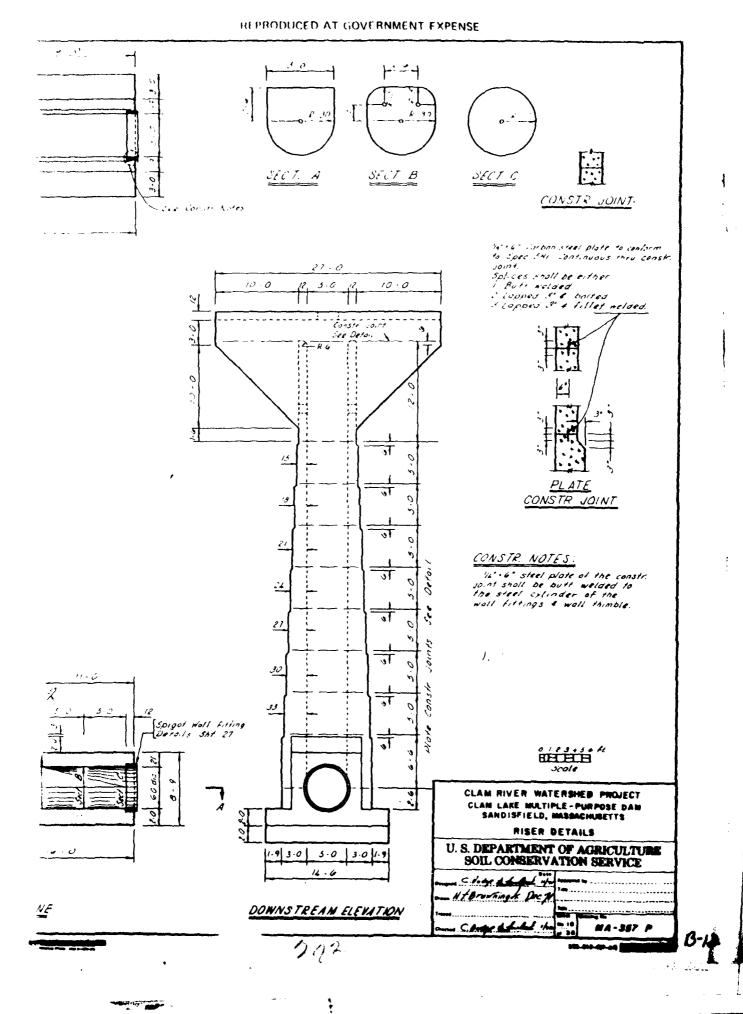


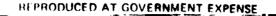
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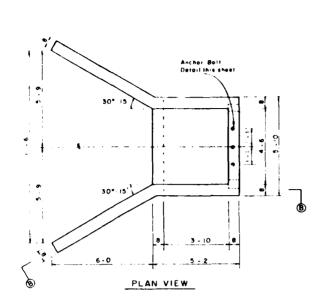
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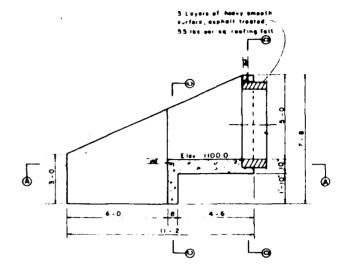
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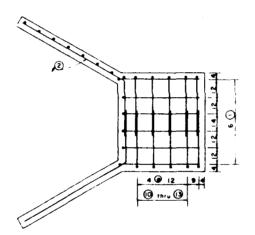


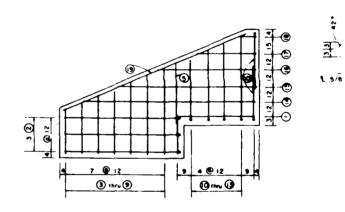






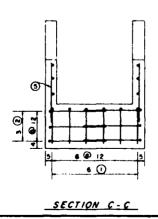
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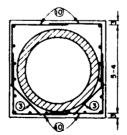
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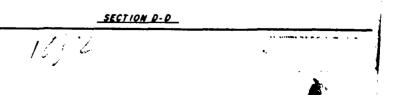
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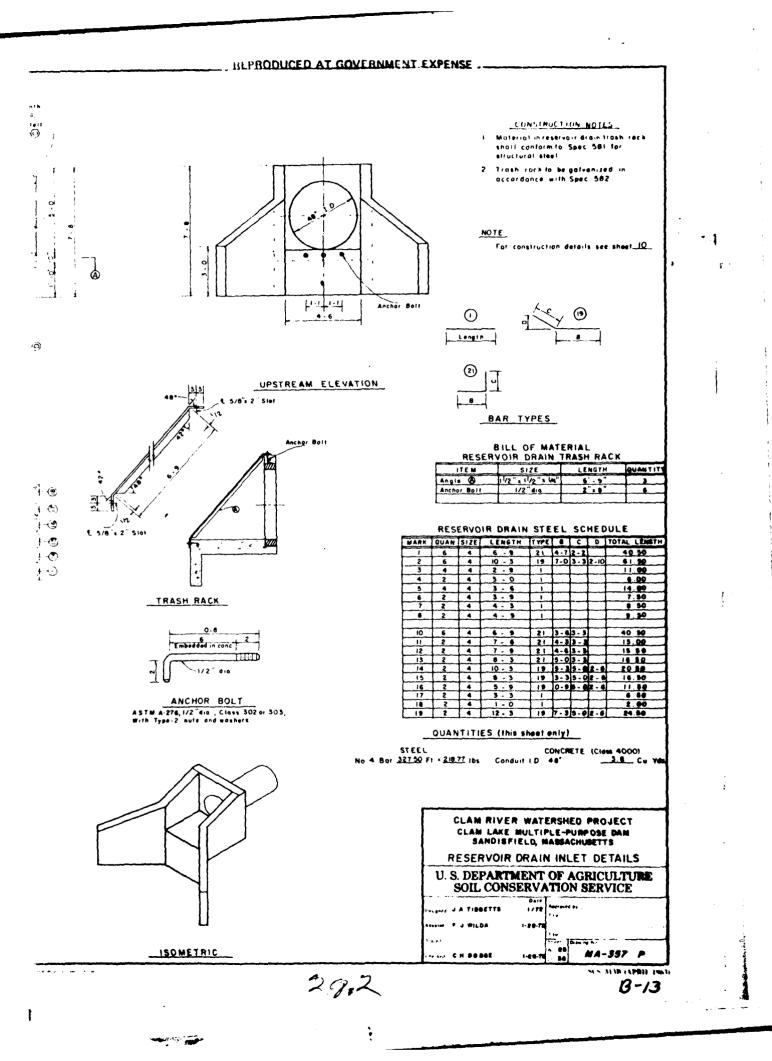


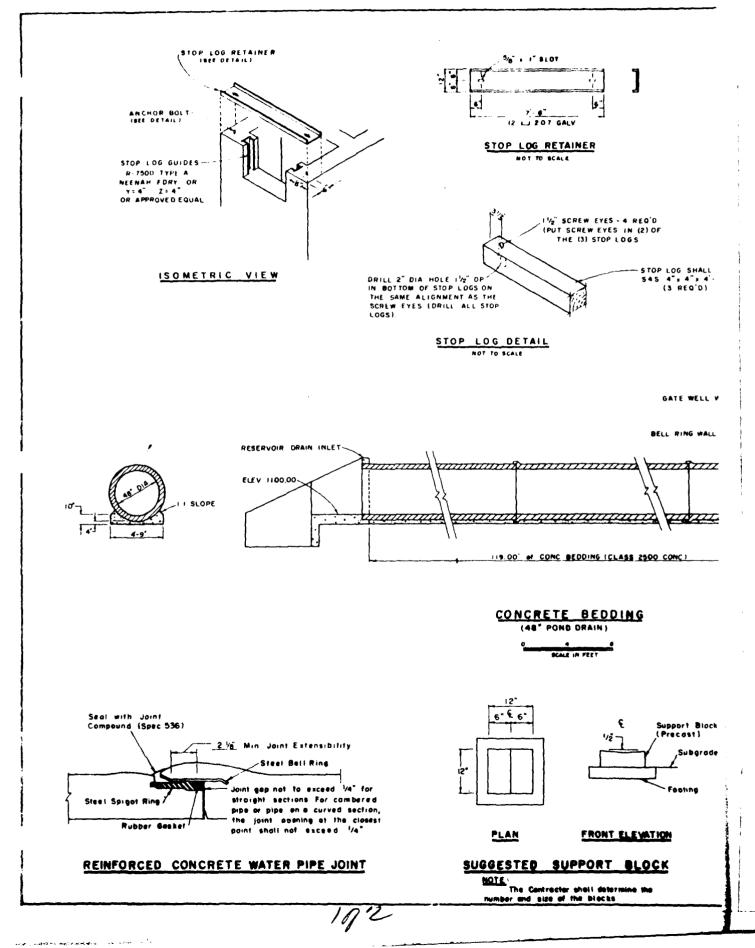
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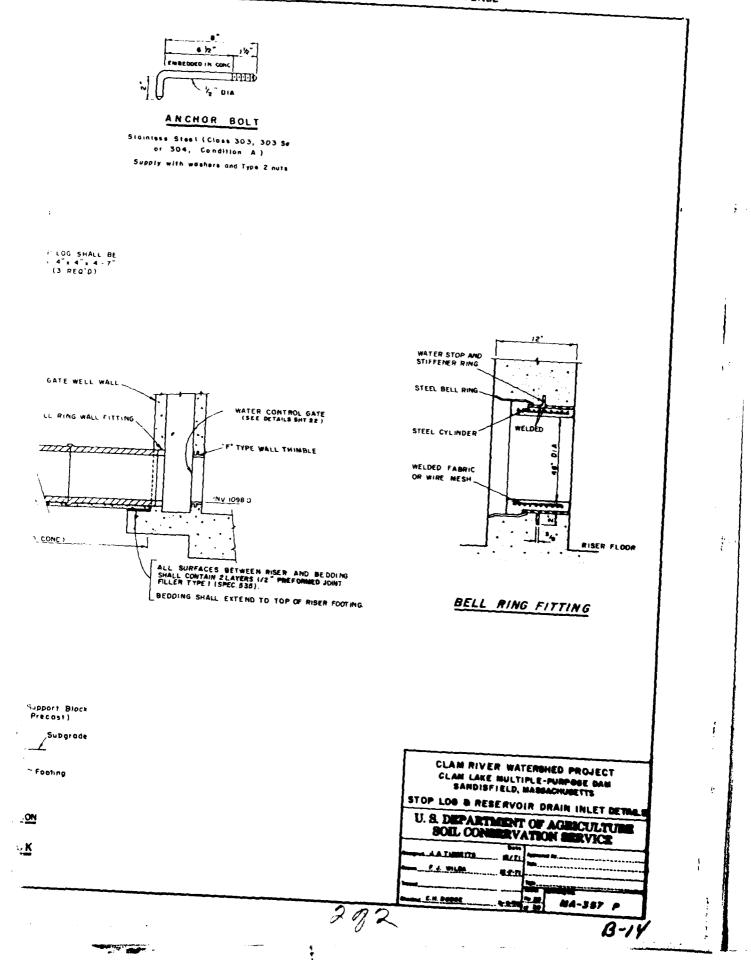








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	fine cand, 25% medi %cobblue, 1% boulder	ium sand, 15% co	erae sand, 13% gri	ovel,	
	ta impermable, der	itve-brown, domp	, lou permesbilit;	7.	
39.0	Bottom of Hold-		•••		
	Standard Panattatio	m Test			
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	2. 1.5 - 3.0	315/6	50 33		
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	NUTE: Nator lavel at 28 feet a	m 8/16/65. Cast	ing 28 feet. Hold dry at 40 feet (
	\$/21/65. Pi	pe to 40 fest.	Gould not get to	pa Pa	
	below 35 fee	t on 7/14/65.			
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	fine sand, 25% medi gravel, angular, he	um sand, 15% con rd, maximum sist	irse sand, 10% 3", brown, damp,	,	
	to moist at 4.0, 10 glacial till.	w permability,	dense to very det	nse,	17.0
16.5 52.0	SAND, eilty with gr sand, 15% medium se	avel, about 30% and, 5% coarse a	fines, 35% fine and, 10% gravel.	SM	
	51 cobbles, angular brown, damp, imperm	, bard, maximum	sise S", olive-		
52.0 54.0	BEDROCK, hard, unwe fractures mostly be	athered Pre-Cam	orian Goaiss,		
39.0.	apart, failation di Bottom of Hola-	pping about 45 e	1481965.		
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	Ho. Depths 1. 0.0 - 1.5	<u>Blows/it.</u> 37 84	67		
	2. 1.5 - 3.0 3. 3.0 - 4.5	63 22	78		
	4. 4.5 - 6.0 5. 12.0 -13.0	160/8	56 67		DH-6, E
	6. 22.0 -23.6 7. 27.0 -28.5 8. 32.0 -33.0	172	86 77		1.5
	9. 42.0 -42.3	323/9 200/7	100		
	10. 47.5 -48.5	903/10	100		9.0 2
	Rock Core				
	No. <u>Depths</u> 1. 52.0 - 54.0	100			23.0
	1. 52.0 - 54.0 2. 54.0 - 59.0	100			
	NOTE: Weter level at 13 fact e		4/65, water level		
DH-3_ ELEV. 112		6/18-21/65	K.G.L.		
0.0 1.5 1.5 13.0	TOPSOIL SAND, silty with gr	avel, about 18%	fines, 23% fine	SM	
	sand, 10% medium sa angular, bard, with	md, 15% coarse a	and, 32% gravel,		
13.0 23.0	damp, low permeabil SAND, silty with gr.	ity, dense to ve	ry dense, colluvi	una. SM	
	sand, 25% medium sa cobbins, 10% boulder	ad, 10% cearse s	and, 15% gravel,	52, 2",	
23.0 39.0	gray, domp, importan- BEDROCK, gray, hard	able, very dense	, glacial till.		
	folistion dipping a fractured, fracture	bout 45 degrees,	moderstely to be	dly	
9.0	and dipping about 4 Bottom of Nole.				
7.0	Standard Penetration	<u>n Test</u>			
	He. Basthe 1.5	Bieve/ft.	<u>1 Ancov</u> 78	•17	
	2. 1.3 - 3.0 3. 3.0 - 4.0	50 100/3	89 67		
	4. 10.0 -11.5 5. 16.5 -17.0	84 100/3	45 95		
	Rock Core				
	He. Besthe 1. 23.0 -24.0	1 Becevery 100			
	2, 24,0 -29,0 3, 29.0 -34.0	100			
	4. 34.0 -39.0 <u>Pressure Teat</u>	100			
	No. Septhe 1, 21,3-34.0	<u>Hole Sise</u> 3 inches	7±1 <u>0/atm</u> 25 18.3		
	2. 28.0 -34. [^] 3. 35.0 -39.0	3 inches 3 inches	25 15.3 25 .02		
	NOTE: Mager level /	t 20.5 fort en	7/34/65, He la		
	dey to 14 fo weber st 27.	Het of 6/21/63. .● feet .	Lest drilling		

MLEY102			16/63),\$.u.	DHI-7	// 14
2.8 16.0		t, bard, unm arts and bie lpring about	atharad, gray Lita, fractur 60 dagrass, j	anolas, ing most ultation	containing ly horisontal, dipping shout		1.3
	45 deas	af Bols.					
	S ₂ ender	d Panatratia	. <u>Teat</u>			12.0	32.0
	He. 1. 2.	Bupthe 9.0 - 1.5 1.5 - 2.3	 <u>B]eve/(s</u> 106/7	Ŧ	<u>1 Recovery</u> 67 100	22.0	
	Nech G	<u></u>					
	He. 1. 2. 3. 4.	Papths 2.0 - 6.0 6.0 - 8.5 8.3 -13.0 13.0 -16.0	<u>3 Ancover</u> 88 300 100 94	2			
	Prebou	ra Test					
	He. 1.	Dapths 6.3 -16.0	P+1 23	9/ 6			
		.Vater lavel	nt 2 fast an	7/13/65	•		
ELEV. 1084 7.0 17.0	hard, o BEDROG folist: herise inches	NF, and cobul maximum aise K, gray, hard Lon dipping a neal and dipp	14", high per , quarts, bie bout 60 dages	il and bi maabiil stits, fo as, Joj	iy, alluvium. Idoper gneiso,	<u>0.0</u> 1.5	<u>el ev</u> 1.5 5.0
	Rock G						
	No. 1. 2. 3.	Depths 7.0 - 8.0 8.0 -13.6 13.0 -17.0	1 Ascover 100 100 100	1		5.0	18.0
		re_Test				18.0	
	Me. 1. 2.	Depths 9.0 -17.0 12.0 -17.0	Nole Size 3 Inches 3 Inches	25 25	0/2000 14.4 0.86		
	NOT 2 :	Water level		m 7/13/0	15		
ELEV. 1090		6/1	6/65		D.E.N.		
1.5 9.0	SAND, fine grave round	IL and BOULDE silty with g sand, 15% med 1, 2% cobblem ed, maximum s	ravel, about ium sand, 307 , 1% boulder: ine 14", tan-	L coarse , angul: -brawn, v	sand, 7% sr to sub- met, low to		
23.0	BEDRO With dippi inche	<pre>m permeabilit CX, hard, gra fractures mas ng about 60 d e apart, feli m of Hole.</pre>	y, dense, ve y, biotite g tly horisont/ egrees, fraci	lley fil: weiss, w hi and ti turas spi	l. nuesthered, ight but some sced 10 to 18		
	Stand	ard Penetrari	on Test				
	No.	Depths	Blows/1	<u>it.</u>	1 Accovery		
	1.	1.3 - 3.0 3.0 - 4.5 7.0 - 8.5	36 59		77 0	DH-9_	12.
	3.		33		6.6		
	Reck						
	<u>No.</u>	Depths	<u>2 Reco</u>			12.0	30.
	1. 2. 3. 4.	9.0 -12.0 12.0 -13.0 13.0 -18.0 18.0 -23.0	100 10 100 100			14 -	
		ure Test				30.0	
		Depths	Pal	9/48			

No. Depths 1. 10.0 - 23.0 Pai 9/68

NOTE: Water level at 0.5 feet on 7/13/65.

.

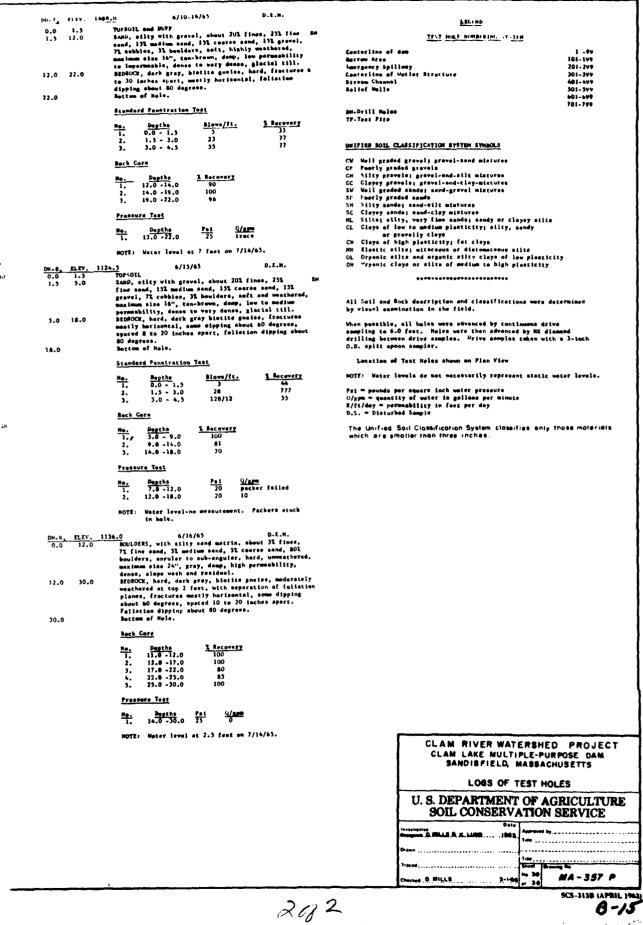
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				M- 201_		1101,3	6/23-24/6			
	34.0	/17-10/65	R.G.L.		1.5	TOPSOL				
-10, 41 TV. 11	CUBBLES, CRAVEL and I	MULDERS, about 3	L fimes, 72	1.5	10.0	BAND, 11	ity with gravel, abo	ut 182 fines, 322 fim		7.0
	fine sand, 3% medium	sand, 3% coarse	sand, \$91			sand, 25	A medium sand, 15% c	cores sand, 72 gravel,	. n	7.0
	gravel, 30% cabbles, angular, hard, slope		b-Tound to			allve-hr	ant, done, law serve	r, bard, masteum ataa ability, densa, alapa	10", 	
.0 20.0	BEDBOCE, gray, hard,	quarts, biotite	fa)dapar	10.0	42.0	UAND, 41	lty with grovel, about	ut 701 Einas, 25% Eina		
	gasiss, foliation dip	ping about 43 de	groos, joints			aand, 201	4 modium sond, 15% cr	serae cond. 154 grovel	. 41	
_	spaced 1/2 to 16 inch	es dipping about	30 degrees.			cebbles,	1% boulders, hard, /	angular, to sub-angula , damp, imperimable, v	.	17.0
.0	Bottom of Hole.					dense, g	lacial till.	, eamp, impermenter, v		
	Back Core			42.0		Betten a				
	No. Depthe	1 Lecovery				Standard	Panetration Test			
	1. 10.0 -12.0 2. 12.0 -15.0	100				He	Bapthy Blow	e/ft. 3 Recover		
	3. 15.0 -17.0	100				п. (0.0 - 1.5 7	67		
	4. 17.0 -20.0	100					1.5 - 3.0 26	77		
							3.0 - 4.5 38 4.5 - 6.0 50	77		
	Pressure Test						0.0 -11.5 40			
	No. Depths No.	la Sine Pat	Q/apt				3.0 -16.5 44	39		
	1. 12.0 -20.0 5	Inches 25	<u>4.8</u>				0.0 -21.5 59	•		
	2. 16.5 -20.0 3	Inches 23	4.20				5.0 -26.5 96 D.0 -31.5 73	55 34		DH . 3
	NOTE: Water level at	11 feet on 7/14	/63				5.0 -36.5 61	34		0.0
-101, ELEV. 1	214,2	6/18-24/65	D.2.M.			NOTE: W	iter level at 3 feet	on 6/24/65, water lev	•1	.0
.0 1.3	TOPSOLL					•1	18.5 [ert on 7/14/6			
.5 40.0	SAND, silty with grav sand, 20% medium sand									
	42 cobbles, 11 boulde	Th, angular to a	ub-rounded, soft.	DH-202	ELEV. 1	1182.5	6/23-24/65) K.G.L.		
	maximum size 42", oli	ve-breve, damp,		0.0	4.0	TOPSOIL				18.0
	dense to very dense,	glacial till.		4.0	14.0	SAND, #11	ity with gravel. abou	it 15% fines, 20% fine	511	
.0	Bottom of Hole.					eend, 251	i medium send, 20% co	stee sand, 15% grovel		
	Standard Penetration	<u>Test</u>				5% cobble	in, angular, bard, ma	simum size 5", elive-		
						to dense	imp, low permeability, kome terrace,	to impermeable, modi	-	
	Ho. Depths 1. 0.0 - 1.5	Blows/ft. 17	2 Recovery 77	12.0	42.0	SAND, #11	ity with gravel, abou	t 20% fines, 25% fine	54	
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	17	77 88			send, 201	i medium sand, 13% co	Arse send, 151 gravel		
	3. 3.0 - 4.5	212	\$3			4% cobble	18. 1% boulders, hard	. encular, maximum at	na 18".	
	4. 4.5 - 3.2	196/8	33			elive-bre till.	wn, damp, impermeabl	a, very dense, glacia	1	
	5. 10.0 -11.5 6. 15.0 -16.5	176	84 50	42.0		Botten of	Hele.			
	6. 15.0 -16.5 7. 20.0 -20.1	176	50 0							
	8. 30.0 -30.9	198/9	10			Scondard	Penetration Test			
	9. 35.0 -36.5	154	61			<u>Ne.</u> B	opths Blown	/ft. 1 Becover	_	
	10. 38.5 -40.0	276	33			1. 0.	0 - 1.5 2	74	L	DH-3
	MOTE: Water leval at	25 feet as 6/24	/65, weter level			7. 1.	5 - 3.0 4	70		0.0
			ders from 35.0-38.5 feet.	•		3. 3.	9 - 4.5 4 5 - 6.0 5	78 78		
	,					5. 10.	0 -11.5 29	78		
-102, ELEV. 1		0/21-24/63	p.E.M.			6. 15.	0 -16.3 130/	8 67		
.0 1.3	TOPSOIL and DUPP SAND, milty with grave) about 207 44-	es. 25% fine 5H				0 -21,5 96	77		9.0
	sand, 20% medium sand,	15% coarse sand	, 15% gravel, 41				0 -26.5 110 0 -31.5 131	100 67		
	cobbles, 1% bouldars,	angular to sub-r	ounded, maximum			10. 35.	0 -36,5 116	77		19.0
	size 24", elive-brown,	damp, low perme	ability to impermeable,				5 -42,0 143	34		14.0
.0 40.0	very dense, glacial ti BEDROCK, grey biotite :		ACTUSED BRACEA A			-				
	to 18 inches spart, mo	stly horizontal.	some dipuing about			HV161 188	ter level at 13 feet	•• //14/03		
	70 degrees, foliation	dipping about 70	degrees.							
.0	Bottom of Hole.			DH-203	ELEV. 11	163.1	6/24/63	D.E.N.		
	Standerd Penetration T	est		0.0		TOPSOIL				
				1.5			with spenal shares	20% fines, 25% fime	SM	
	No. Deptha	Blows/ft.	1 Becovery			sand, 20%	medium sand, 15% cos	ras sand, 10% gravel.		
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	71	72			7% cobblas	s, 3% boulders, angul	ar, hard, maximum ais		
	3. 3.0 - 4.5	71	67 77			brown, das		membility, loose to w		
	4. 4.5 - 6.0	74	94	41.5		dense. Bottom of	Nole			
	5. 10.0 -11.5	53	77	2		PALLON OL	mete.			
	6. 13.0 -16.3 7. 20.0 -21.5	697	94			Scandard P	emetration Test			
	***************	683	84					· · -		
	Rock Core						Depths Blows/	ft. <u>1 Recovery</u> 88		
	NOLE VOTE						5-3.0 2	67		
	No. Depths	1 Recovery				3. 3,	.0 - 4.5 6	67		
	1. 30.0 -34.0	100				4. 4.	.3 - 6.0 8	84		DH-3 0.0
	2. 34.0 -40.0	100				5. 15. 6. 20.	0 -16,5 16 0 -21,5 36	73 77		1.5
							0 - 26,5 42	50		•••
	NOTE: Mater level at 7	/ feet on 6/23/6: 14/65, weter love				8. 30.	0 -31,5 34	ñ		
	en 7/14/65.						0 -36.5 101	44		
						10. 40.	0 -41,5 137	"		13.0
					1	HOTE: Wat	or level at 15 fast	on 7/14/65.		
						NOTE: Wat	er level at 15 feet	on 7/14/63.		23.0



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	DN - 301.	R IV. 10	93.6 6/21-22/63 B.G.L.			1951 1 1 1 5
	0.0	7.0	CRAVEL, CUBBLES and Boulders in a silty sand matrix, angular to hard, maximum size 14",	17-151	ELEV. 118	4.7 6/24/65 K.C.L. TOPSOLL
510	7.0	17.0	modium to high permeability, slluvium. BEDROCK, quarta bistita foldapar gnoiss, moder-	7.0	10.0	GRAVEL, sandy with silt, cobbies and bouldess. Get about 152 fines, 102 fine and, 102 wedlum sand,
1			ately hard from 7 to 12 then hard, seamy from 7 to 12, foliation disping about 80 degrees.			about 172 rines, 102 rine and, 102 matima same, 103 cabine sand, 303 gravel, 173 cobbies, 83 boulders, engular, hard, masimus size 18", brown,
84 84			Joints burisontal sparod 1 to 24 inches, with a 6" wathared soon at 11 feet.	10.0		damp, low permainility, very dense, ground motoine. Betten of Fit.
-1	17.0		Bottom of Hole.			D.5. 151.1 2.0 to 10.0 (2 bags), 15% larger than 6" discarded.
•			Rock Core			NOTE: Water level-no pipe.
			No. Depths <u>3. Becovery</u> 1. 7.0 - 52.0 - 50	17.132,	ELEV. 116	
			2. 12.0 - 17.0 100	0.0	3.0	TOPSOIL SAND, silty with gravel, about 30% fines, 35% SM
			Rock Pressure Test No. Depthe Note Sine Poi V/am 1. 7.2. 1.0. Sinches 12 11.7			fine sand, 17% medium sand, 3% coarse sand, 18% gravel, 5% cobbles, 5% boulders, angular, hard,
			1. 7.2 If.0 3 turkes 12 11.7 2. Could not place packer below 11.0 feet.			maximum size 14", elive-brown, damp to molet, low permaability, dense, gistial till.
			NOTE: Water level at 3.5 feet on 7/14/65.	10.0		Bottom of Pit. D.S. 152.1 3.0 to 10.0 6% larger then 6" discarded.
	DH- 302	ELEV. 109	1.8 6/21/65 K.G.L.			MDTE: Seepege st 9.5 feet, Estimated flow loss
	0.0	A.0	GRAVEL, COBRLFS and BOULDERS with solity sand matrix, angular, hard, maximum size 14", medium to high permeability, alluvium.			then .5 gpm. Water level dry on 7/14/65.
	8.0	18.0	BEDROCK, dark gray, bistite quarts, feldspar gneiss, moderately hard to hard below 11.0 feet, foliation	0.0	BLEV. 117 3.0	0.0 b/24/65 K.G.L. BOULEKS and COBBLES, in an organic silty send matrix, about 31 fines, 31 fine sand, 53 medium
			dipping about \$5 degrees, fractures spaced 1 to 18 inches generally horizontal with a few dipping about			sand, 5% coarse sand, 10% gravel, 20% cobbles, 50% boulders, sub-rounded to angular, maximum size
	18.0		30 degrees. Bottom of Hele.	5.0	10.0	30", black, wet, high permeability, loss, alluvium. SAND, silty with gravel, about 183 fines, 221 GM-SH
SM			Rock Core			fine sand, 102 medium sand, 5% coarse sand, 35% gravel,5% cobbies, 5% boulders, angular, hard, maxi-
			No. Depths % Recevery			wam size 14", gray, moist, impermeable, very dense, glacial till.
			1, 8.0 - 9.5 86 2, 9.0 -11.5 109	10.0		Bottom of Pit.
SH			3. 11.0 -16.0 86 4. 16.9 -18.0 100			D.5. 153.1, 5.0-10.0 6% larger than 6" discarded.
18",			Rock Pressure Test			HOTE: Mater entering pit at 3.0. Estimated flow 3.5 gpc. Water level at 5 feet on 7/34/05.
			No. Depths Hole \$180 Poi Q/ame 1. 9.5 -18.0 3 inches 25 3.7		ELEV. 120	18.7 6/24/65 K.C.L.
			HOTE: Water level at surface on 7/14/65	TP-154, 0.0 2.5	2.5 10.0	 8.7 6/24/65 K.C.L. BOULDERY TOFSOIL SAND, silty with prevel, about 152 fines, 35% SM
	DH-303,	ELEV. 104	18.7 6/15-16/65 D.E.H.	,	10.0	fine sand, 152 medium sand, 32 coarse sand, 307 gravel, 52 cobbies, 32 boulders, anylar, bard,
	0.0	9.0	SAND, silty with gravel, about 15% fines, 15% SH fine sand, 30% medium sand, 25% coarse sand, 10%			maximum size 16", light brown, damp, low, very dense, ground morsine.
			gravel, 41 cobbles, 14 boulders, angular te sub- angular, hard, maximum size 18 inches, tan-brown,	10.0		Bottom of Pit. D.S. 134.1, 2.3-10.0 6% inrger then b" discorded.
	۹.0	19.0	fet, high permeability, very dense. BEDROCK, hard, gray biotite gmeiss, fractures			NOTE: Mater level dry on 7/14/65.
			nearly horizontal some dipping 60 degrees, spaced 8 to 20 inches spart, foliation dipping about 80 degrees.	17-135.	ELEV. 118	
	19.0		Battom of Hole. Standard Penetra <u>tion Test</u>	0.0	4.5	BOULDERS AND COBPLES, in an organic silty sand matrix, about 5% fines, 2% fine sand, 2% medium
			No. Depths Blows/ft. I Recovery			aand, 2% coarse sand, 4% gravel, 10% cobbles, 75% boulders, angular to sub-rounded, hard, maximum
			1. 0.0 - 1.5 220/8 33 2. 6.0 - 7.5 141 35	4.3	10.0	size 36", black, wet, medium, loose, elluvium. SAND, silty with gravel, about 18% fines, 25%. SM
			Bock Çere			fine sand, 15% medium sand, 5% coarse sand, 20% gravel, 15% cabbies, 2% boulders, angular to sub-
5M			No. Depths 2 Becovery 1. 9.0 -14.5 100	10.0		angular, hard, maximum size 14", brown, moist, low permeability, very dansa, ground moraine.
16".			2. 14.0 -19.0 100	10.0		Bettom of Fit. D.S. 155.1, 4.5-10.0 10% larger then 6" discorded.
			Pressure Test			MOTE: Water entering pit 1.0-4.5. Estimated flow
			No. Depths Pol Q/mm 1, 9.5-19.0 25 23			less than 1 gpm. Water level at 3.3 on 7/14/05
			2. 14.0 - 19.0 23 0	TP-156.	ELEV. 121	<u>4.1</u> 6/24/65 K.C.L.
			NOTE: Water level at surface on 7/14/63	0.0	2.5	TOPSOIL SAND, siley with gravel, about 15% fines, 25% SH
	DH-304	ELEV. 10 1.5 13.0	90.6 6/11/65 D.E.M. TUPSOIL and DUFF SAND, silty with gravel, about 182 fines, 223 5H			fine sand, 132 medium sand, 82 coarse sand, 302 gravel, 52 cobbles, 22 bruiders, sngular, hard, mariams size 13", olive-brown, damp, low permeability,
		13.0	fine sand, 40% medium sand, 10% cearse sand, 10% gravel, angular to sub-rounded, maximum size 1",	10.0		wery dense, placial till. Bottom of Pit.
			tan-brown, low to medium permeability, wet, firm to wery dense, valley fill.			D.5. 136.1, 2.3-10.0 5% larger than 6" discarded.
	13.1	23.0	BEDROCK, firm, dark, gray biotize gneiss, with quarts stringers, fractures nearly horisontal, spaced 8 to 20			NOTE: Water level dry on 7/14/65.
	23.0		inches spart, foliation dipping about 80 degrees. Bottom of Hole.			
			Standard Penetration Test			
			No. Depths Blows/ft. <u>3 Recovery</u> 1. 0.0 - 1.5 <u>4</u> 77			
			2. 1.5 - 3.0 34 47 3. 3.0 - 4.5 34 67		C	LAM RIVER WATERSHED PROJECT
			6. 5.0 - 6.5 132 72		1	CLAM LAKE MULTIPLE-PURPOSE DAM
			Rock Core			SANDISFIELD, MASSACHUSETTS
			No. Depthe <u>3 Recovery</u> 1, 13.0 - 14.0 83 2, 14.0 - 13.0 100			LOGS OF TEST HOLES
			2. 14.0 - 13.0 100 3. 15.0 - 70.0 85 4. 20.0 - 23.0 100			. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE
			Pressure Test		· · · · · · · · · · · · · · · · · · ·	Bill B & K LUND (000 Approved by
			No. Depths Pol Q/apm 1. 14.0 -19.0 25 10		Drawn	Tele
			2. 19.0 -23.0 25 trace		Traced	T-tto
			NOTE: Water level at 6 feet on 6/14/63, at 3 feet on 7/14/63		Checked B.	HILLS 3-146 - 36 MA 357 P
			5012			SCS-JIJB (APRIL INJ R=//L
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		CLAN KEVER				·····
·			<u>101-619</u>	Ber. 12	17.7 7/29 W 7/31/70 MM	∭ 1-6 1)
(H6-)	-		0.0	2.0	107 SUIL,	0.0
6.0	Elet. 1203. 7.5	0 7/29 to 8/3/10 PAR/DBM Decomposed builder, gueise Tan brown, drg. low permeability, dense, Decomposed Buch	2.0	26.0	BAND, silty with graval, about 205 fines, 155 fine and, 155 modium and, 355 course and, 155 graval, subangular, BA highly accomposed rock bits, light	1.0
8.5 9.5	90.0	Builder. SAND, silty with gravel, about 20% fines,			bits wright, the set of the set o	
		10% fine eand, 20% andium sand, 35% coarse sand, 15% gravel, subarguiar, decomposed SM rock bits, JJ-inch maximum size, gray, molst, low permeability, very dense, GLACIAL TILL.	26.0	5 . فيا	OLACIAL TILL. SAMD, silty, about 45% fines, 75% fine sand, 20% medium mand, 7% searce mand, gm 3% gravel, olive gray, mmist, low permeability, very demas, Galagial Will.	26.0
¥.0	32.5	Boulder.	0.46	35.0	Builder.	
32.5		Bottom of Huje.	46.5	-	Bottem of Hole.	
		Brive Seeples Biove/ft. I Recovery No. 0.0-135 54 100 2. 1.5-3.0 101 78 3. 3.0-4.5 134 72 2. 1.5-3.0 101 78 3. 3.0-4.5 134 72 2. 1.5-3.0 105 67 3. 3.0-4.5 134 72 2. 3.5-3.0 105 67 3. 3.0-4.5 105 67 4.7 2.5.0 87 34 7. 25.0-25.3 100/3* ref. 0 8. 30.0-31.5 70 50 9. 32.5-3.0 1000/6* ref. 1000 MOTE: 104 ref. 1 the feet 8 inches on 8/3/70.			Drive Samplas Blocs/ft. Stacovery No. Dap Un Blocs/ft. Stacovery 1. 0-1.5' 16 67 2. 16-3.0'' 18 67 3. L0-5.5' 91/6''' ref. 61 4. 18.0-11.5'' 92 56 5. 15.0-15.5' 50/6'' ref. 0 6. 16.5-17.5' 125/6' ref. 50 7. 20.0-21.5' 125/6' ref. 50 9. 90.0-31.5' 100/0'' ref. 61 8. 25.0-26.5' 100/0'' ref. 0 10. 35.0'' 100/0'' ref. 7 11. 30.0-39.0'' 160/12'' ref. 87	ДИ-615 D.D 1.0 3.0
DH-605	Elev. 1194.9				13. 45.0-46.51 130 100	ł
C.0	1.0	8/10 to 8/11/70 DBM TOPSOIL and SILT.			Parmeebility Testa No. Dupth Hole Size Head Loss	15.0
1.5		SAMD, allty with gravel, about 15% fines, SM 15% fine sand, 20% medium sand, 10% coarse sand, 10% gravel, subangular, 3/k-imch marimum dise, gray, demp, medium permeshi- 14ty, leese to danse, 00TMASM.			1. 6' 3" Ground Failed 2. 10' 3" Ground Silpht 3. 11.5' 2" x 10 Ground Silpht 4. 15' 3" Ground Failed 5. 20' 3" Ground Failed	18.0
12.5	ы.s	SMD, silty with gravel, about 40% fines, 15% fine sand, 15% medium sand, 20% SM scares sand, 10% gravel, subangular, Mu-nach maximum sine, gravygrass, damp, low parmaskility, dense to very dense, giaClal Till.	<u>m-610</u>	<u>12.0v. 1199</u> 3.0	e Head - Pipe above ground. HOTE: Whiter level at 17.5 fest on 8/k/70. .5 8/3 to 8/6/70 MMR TOPSOIL and SLOPEMASH.	29- 0
۵.5		Bottom of Hole. Bottom of Hole. Ho. Dupts 10.0,001.5; 10.0,01.	3.0 36.5	36.5	SAUD, silty with graval, shout 20% fines, 15% fine sand, 20% motium send, 30% coarse each, 15% graval, subsequer, SM 2-inch maximum site, beyon to blue-gray st 6 fest, dump, medium permashility, dences to very dence, dia/Clai TL with decrease is coarse send and graval at 22 fest. Dottom of Hole. <u>Drive demoles</u> 1. 0.0-1.5; <u>11</u> <u>10</u> <u>100</u>	
<u>DH-607</u>	Elev. 1213.8	8/5 to 8/7/70 DBM			3. 3.0-4.5' 36 80 4. 4.5-6.0' 47 70	
c.o 1.0	51.5	RUFSOIL. LAND, silty with gravel, about 20% fines, 15% fine mand, 15% medium samd, 30% compre- send, 20% gravel, subscriptlar, 2-imah Maximum sime, tan to gray-grown at 6 feet, 1000 interventit of set.		3	5. 10.0-11.5' 20 70 6. 15.0-16.5' 22 67 7. 20.0-21.5' 73 90 8. 25.0-26.5' 66 80 9. 30.0-31.5' 59 67 10. 35.0-36.5' 59 100	<u>98-616</u> 0.0 2.0
	1	imp. low permaability, danse, Wathared Till to 6 feet, GLACIAL TILL.	<u>188-611</u>	Elev. 1189.	8/11 to 8/11/70 mm	4.0
51.5		istian of Hole.	0.0	1.0	TOPSOIL.	4.0
	3	<u>rrive 3emplas</u> <u>6. Displa</u> <u>Ris./ft.</u> <u>5 Becovery</u> . 0.0-1.5; 10 100 . 1.5-3.0; 26 95 . 3.0-4.5; 88 80 . 5.0-4.5; 102 60	1.0		SAND, with gravel, about Of fines, 12% fine eand, 30% modium sens, 40% coarse and, 10% gravel, subangular, 2-inch SP-SM maximums, group, andiam permeakility, 10000 to damase, 007MASH.	8.0
	5. 6. 7. 8. 9. 10.	. 10,0-11,5' 10 70 . 15,0-14,5' 74 67 . 20,0-20,9' 129/11' ref. 60 . 25,0-25,1' 100/1" ref. 0 . 30,0-30,9' 14441" ref. 100 . 55,0-25,1' 100/1" ref. 0	5.0	30.0	SAND, silty with gravel, about hOM fines, 15% fine sand, 15% modium sand, 20% course sand, 10% gravel, subangular, 1/k-inch SH maximum size, silve te graves_grav, deep, low permeability, dense, GLACIAL TILL.	15.0
	12.	. 40.0-41.5' 163 68 . 45.0-45.5' 100/6" par. 67	30.0		Bottom of Nole.	
	13.	. 50.0-50,5' 102/6* ref. 100			Dirive Supplex Bas./ft. \$ Booovery 1. 0.0 - 1.5' 14 100 2. 1.5 - 3.0' 44 70 3. 5.0 - 6.5' 33 70 4. 1.00 - 11.6' 72 67 5. 1.5.0' 1.6.5' 6.4 67 5. 20.0 - 22.5' 96 67 67	28.0

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6.0	Elev. 11	81.7 8/6 to 8/10/70 ban 10₽5011.	134-61] 0.0	Elev. 11	
.0	28.0		3.0	3.0 16.0	
, 0		SAND, silly with gravel, about 45% fines, 10% fine send, 10% modium send, 30% coarse send, 5% gravel, subsequiar, 50 l-iach maximum sise, olive-brown, damp,	,	10.0	SAMD, slity with gravel, about 20% fines, 25% fine send, 25% medium send, 15% moarse sand, 15% gravel, decomposed rook, 1-lach maximum sise, clive-brown, wet,
		low permeability, dense to very dense, GLAPIAL TILL.			medium permanbility, very dense, GLACIAL TILL.
		Datum of Hole.		to 10. 0	BOULDER.
		Brive Bamples Ro. Depth His./ft. S Recovery		le 16.0	DULD .
		B6. Dap h. H.a./ft. f Recovery 1. 0.0 1.00 7 100 2. 1.5 3.0 6 100 3. 3.0 - h.5 11 90 4. 4.5 - 6.0 22 90 5. 10.0 - 11.5 30 80	16.0	28.0	MEMOCX, grey, bistite hornblands gnains. Poliations dipping about 70° Rodmarainj fractured speced about 12 to 18 inches apart mostly horisontal; all tight.
		6, 15.0 - 15.8' 165/9" ref. 67 7. 20.0 - 20.9' 17'.40" ref. 70 8. 25.0 - 25.5' 100/6" ref. 60	28-01		Bottom of Hole.
H-615	Elev. 11	83.28 8/3 to 8/4700 PAB			Drive Samples 10. Depth Blows/ft. & Amouvery 1. 0.5 & 2.0' 23 78
0.0	1.0	Collinat.			2. 2.0 - 3.0' 96 AP rot. 33
1.0	3.0	TOF 50 11.			$\begin{array}{cccccccccccccccccccccccccccccccccccc$
3.0	15.0	SAND, silty with gravel, about 25% fines,			Bock Core Ains
		15% fine sand, 10% medium send, 10% coarse sand, 10% gravel, sebangular, SM some particles decomposed, plive-brown, moist, low perseability, very dense,			1. 14.9 - 18.0, 91 2. 18.0 - 23.0, 100 3. 23.0 - 28.0, 100
5 6	18.0	Weathered Till.			HOTE: Water level at 5.5 feet on $8/6/70$.
5.0	20.0	SAND, ality with gravel, about 25% fines, 15% fine sand, 10% medium sand, 30% coarse sand, 20% gravel, Decomposed	10.618	Elev. 118	5.72 8/10 to 8/11/70 PAB
		coarse sand, 20% graval, Decomposed rock particles, olive-gray, moist, low permeability, very dense, GLACIAL TILL.	0.0	3.5	10P 30 1L.
8.0	29.0	BERNOEL, grey, biotite hornhlands gnaiss,	3.5	10.0	Samp, milty with gravel, about 15% fines, 20% fine sand, 25% medium sand, 25% 284
		foliations dipping about 70°. Prom 18 to 21 feet, highly fractured. Fractures			coarse sand, 15% gravel, subangular, with some decomposed rock bits, 3/hutach
		mpaced about 1/2-inch to 2-inches spart. 21 to 29 feet moderately fractures.			low permeability, very dense, MLACIAL
		Practures spaces about 8 to 14 inches.	6.0	8.0	TILL. Cobbles and Buildare.
9.0		Bottom of Hole.	10.0	26.0	MEROX grey bistite horphlands gasies,
		Drive Samples Ne. Depth <u>Blows/ft.</u> <u>S Recovery</u> 1. 1.0 - 2.1, ¹ - 58/57 ref. <u>66</u> 2. 1,0 - 515 101 65			folicions dipping about 70. Hoderstelly, fractured. Fractures spaced about 6 to 14 inches spart, mostly horizontal.
		3. 10.0 - 11.5: 71 LL 4. 15.0 - 16.5: 131/6* ref. 66 Bock Core Rung 50. Degub. Recovery 50. Degub. Recovery	26.0		Rotton of Hols. <u>Brity Samplas</u> <u>Br.</u> Depth Blass /ft. 5 Bacomer
		2. 19.0 -20.0' 90 3. 20.0 -24.0' 100			1. 0.0 - 1.5; 18 66 2. 1.5 - 2.9; 101/11° ref. 78 3. 5.0 - 6.5; 129 66
		k. 24.0 -29.0' 90 Parmachility Test Ro. Depth Hole Size Head Loss 1. 10.5' 2" x 18" Ground Slight Slight			Bock Core Buna Boc Days Boc Days
		 head = pipe above ground 			3. 18.5 - 23.5 100 4. 23.5 - 26.0 100
DH-616	Eev. 13				MDTE: Water level at 6.92 feet on b/11/70.
0.0	2.0	No drilling - Removed bouldars by hand.			011270.
2.0	4.0	10P301L.			
4.0	8.0	SAMD, silty with gravel, about 25% fines,			
		25% fine sand, 20% medium sand, 15%			
		coarse sand, 15% gravel, subangular, SM some decomposed rock particles, 1%-inch maximum sise, olive-brown, moist, low			
•	N -	some decomposed rock particles, lig-inch matimum size, olive-brown, moist, low permeability, dense, Weathered Till.			
8.0	15.0	some decomposed rock particles, lepinch maximum size, olive-brown, moist, low permaability, dense, Weathered Till. SILT, sandy with about 55% fines, 22% fine sand, 15% medium sand, 5% coarse sand, 3% gravel, 1/2-inch maximum size, ML olive brown, moist, low paramebility,			
	15.0 28.0	accessible of the second secon			
5.0	-	some decomposed rock particles, lepinch maximum sins, olive-brown, moist, low permeability, dense, Weathered Till. SILT, sandy with about 55% fines, 22% fine eard, 15% modium send, 5% course sand, 5% gravel, 1/2-inch maximum size, HL olive brown, moist, low parmeability, medium dense, GLAITAL TIL. BERNCE, gray bistik hornhighde gneiss, folitations disping about 70°. Fractures are about 12 to 18-inches apart mostly horisontal; all tight.			
5.0	-	some decomposed rock particles, lepinch maximum size, olive-brown, moist, low permeability, dense, Meethered Till. SILT, sandy with about 55% fines, 22% fine eard, 15% motium send, 5% course sand, 5% gravel, 1/2-inch maximum size, ML olive brown, moist, low parmeability, motium dense, GidzTalt TilL. BERNCE, gray biotits herehignde gneiss, folitations disping shout 70°. Fractures are about 12 to 16-inches apart == mostly herisontal; all tight. Bottem of Hole.	F		
8.0 5.0 8.0	-	some decomposed rock particles, lepinch maximum size, olive-brown, moist, low permaability, dense, Maathared Till. SILT, sandy with about 55% fines, 22% fine eard, 15% medium send, 5% course sand, 5% gravel, 1/2-inch maximum size, HL olive brown, moist, low parameability, medium dense, Gidzīdi TILL. BERNCE, gray bistits hermhlande gneiss, folitations disping about 70°. Fractures are about 12 to 16-inches apart mostly herisontal; all tight. Bottem of Hole. <u>Drive Samples Bo. Bustin Blows/ft. § Bessynery</u> 1. 2.0 - 3.5 ¹ 39 2. 1.5 ¹ - 5.0 50 64	ſ	CLAM	RIVER WATERSHED PROJECT Lake Nultiple-Purpose Dam Disfield, Massachusetts
5.0	-	<pre>scome decomposed rock particles, lepinch matianm size, olive-brown, moist, low permaability, dense, Mathered Till. SLT, sandy with about 55% fines, 27% fine sand, 35% gravel, 1/2-iseh matianm size, ML olive brown, moist, low permeability, medium dense, Glattil TilL. BETHOCE, gray bistis herehignde gneiss, folitations displing about 70°. Fractures are about 12 to 18-isshee apart mostly herisontal; all tight. Bottem of hole. <u>Drive Samples Bo. Mapth Blowe/ft. § Resevery 1. 2.0 - 3.51 39 63 3.10.0'-11.5' 29 bit</u></pre>	ſ	CLAM	LAKE NULTIPLE-PURPOSE DAM
5.0	-	<pre>scome decomposed rock particles, lepinch matching size olive-brown, moist, low permeability, dense, Weathered Till. SILT, sandy with about 55% fines, 22% fine sand, 15% modum send, 5% course sand, 35% modum send, 5% course (and, 5% gravel, 1/2-iseh marimum size, HL olive brown, moist, lew parmeability, medium dense, 044Cill TILL. BERNOLE, gray bistic hermhlands gneise, folitations disping about 70°. Practures are about 12 to 18-inches apart mostly horisontal; all tight. Bottom of Hole. Drive Samples Ho. Mouth Blove/ft. S Resovery 1. 2.0 - 3.5' 35 61 2. 3.5'-5.0' 58 66 3. 10.0'-11.5' 29 bit Rock Care Bang</pre>	F	CLAM SAN	LAKE NULTIPLE-PURPOSE DAN DISFIELD, MASSACHUSETTS LOGS OF TEST HOLES
5.0	-	<pre>scome decomposed rock particles, lepinch matianm size, olive-brown, moist, low permaability, dense, Mathered Till. SLT, sandy with about 55% fines, 22% fine eard, 15% medium send, 5% coarse sand, 5% gravel, 1/2-inch matianm size, ML olive brown, moist, low permeability, medium dense, GlatCill TILL. BERNOCE, gray bistic herehignde gneise, folitations disping about 70°. Fractures are about 12 to 18-inches apart mostly herisontal; all tight. Bottes of hole. <u>Drive Samples Bo. Bouch Blows/ft. § Resevery 1. 2.0 - 3.51 35 66 3. 10.0'-11.5' 29 bit Botte Gray Bistic Additional Statements Botte Botte Bot</u></pre>		U. S. DEP SOIL (LAKE NULTIPLE-PURPOSE DAN DISFIELD, MASSACHUSETTS LOGS OF TEST HOLES ARTMENT OF AGRICULTURE CONSERVATION SERVICE
5.0	-	<pre>scome decomposed rock particles, lepinch matimum site, olive-brown, moist, low permeability, dense, Weathered Till. SHLT, sandy with about 55% fines, 22% fine eard, 15% modum semd, 5% course sand, 5% gravel, 1/2-insh marinum site, HL olive brown, moist, low parmeability, medium dense, GlatCill THL. BERNCE, gray bistite hornhighde gneise, folitations disping about 70°. Fractures are about 12 to 18-inshes apart mostly horisontal; all tight. Bottom of Hole. <u>Prive Samples Ho. Bouch 50° 66</u> 3. 10:0'-11:5' 27 bit Act 12:0 50 66 3. 10:0'-11:5' 27 bit Act 12:0 50 50 3. 20:0 - 3:0'' 20 55 3. 20:0 - 3:0'' 100 </pre>		U. S. DEP SOIL (LAKE NULTIPLE-PURPOSE DAN DISFIELD, MASSACHUSETTS LOGS OF TEST HOLES ARTMENT OF AGRICULTURE CONSERVATION SERVICE
5.0	-	<pre>scome decomposed rock particles, lepinch matimum site, olive-brown, moist, low permeability, dense, Weathered Till. SHLT, sandy with about 55% fines, 22% fine eard, 15% modum semd, 5% course sand, 5% gravel, 1/2-insh marinum site, HL olive brown, moist, low parmeability, medium dense, GlatCill THL. BERNCE, gray bistite hornhighde gneise, folitations disping about 70°. Fractures are about 12 to 18-inshes apart mostly horisontal; all tight. Bottom of Hole. <u>Prive Samples Ho. Bouch 50° 66</u> 3. 10:0'-11:5' 27 bit Act 12:0 50 66 3. 10:0'-11:5' 27 bit Act 12:0 50 50 3. 20:0 - 3:0'' 20 55 3. 20:0 - 3:0'' 100 </pre>		U. S. DEP SOIL (LAKE NULTIPLE-PURPOSE DAN DISFIELD, NASSACHUSETTS LOGS OF TEST HOLES ARTMENT OF AGRICULTURE CONSERVATION SERVICE
5.0	-	<pre>scome decomposed rock particles, lepinch matimum site, olive-brown, moist, low permeability, dense, Weathered Till. SHLT, sandy with about 55% fines, 22% fine eard, 15% modum semd, 5% course sand, 5% gravel, 1/2-insh marinum site, HL olive brown, moist, low parmeability, medium dense, GlatCill THL. BERNCE, gray bistite hornhighde gneise, folitations disping about 70°. Fractures are about 12 to 18-inshes apart mostly horisontal; all tight. Bottom of Hole. <u>Prive Samples Ho. Bouch 50° 66</u> 3. 10:0'-11:5' 27 bit Act 12:0 50 66 3. 10:0'-11:5' 27 bit Act 12:0 50 50 3. 20:0 - 3:0'' 20 55 3. 20:0 - 3:0'' 100 </pre>		U. S. DEP. SOIL (LAKE NULTIPLE-PURPOSE DAN DISFIELD, NASSACHUSETTS LOGS OF TEST HOLES ARTMENT OF AGRICULTURE CONSERVATION SERVICE BILL BILL BILL Internation Internation
5.0	-	<pre>scome decomposed rock particles, lepinch matimum site, olive-brown, moist, low permeability, dense, Weathered Till. SHLT, sandy with about 55% fines, 22% fine eard, 15% modum semd, 5% course sand, 5% gravel, 1/2-insh marinum site, HL olive brown, moist, low parmeability, medium dense, GlatCill THL. BERNCE, gray bistite hornhighde gneise, folitations disping about 70°. Fractures are about 12 to 18-inshes apart mostly horisontal; all tight. Bottom of Hole. <u>Prive Samples Ho. Bouch 50° 66</u> 3. 10:0'-11:5' 27 bit Act 12:0 50 66 3. 10:0'-11:5' 27 bit Act 12:0 50 50 3. 20:0 - 3:0'' 20 55 3. 20:0 - 3:0'' 100 </pre>		U. S. DEP SOIL (LAKE NULTIPLE-PURPOSE DAN DISFIELD, MASSACHUSETTS LOGS OF TEST HOLES ARTMENT OF AGRICULTURE CONSERVATION SERVICE
5.0	-	<pre>scome decomposed rock particles, lepinch matimum site, olive-brown, moist, low permeability, dense, Weathered Till. SHLT, sandy with about 55% fines, 22% fine eard, 15% modum semd, 5% course sand, 5% gravel, 1/2-insh marinum site, HL olive brown, moist, low parmeability, medium dense, GlatCill THL. BERNCE, gray bistite hornhighde gneise, folitations disping about 70°. Fractures are about 12 to 18-inshes apart mostly horisontal; all tight. Bottom of Hole. <u>Prive Samples Ho. Bouch 50° 66</u> 3. 10:0'-11:5' 27 bit Act 12:0 50 66 3. 10:0'-11:5' 27 bit Act 12:0 50 50 3. 20:0 - 3:0'' 20 55 3. 20:0 - 3:0'' 100 </pre>	1.0	U. S. DEP. SOIL (LAKE NULTIPLE-PURPOSE DAN DISFIELD, MASSACHUSETTS LOGS OF TEST HOLES ARTMENT OF AGRICULTURE XONSERVATION SERVICE

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U.0	3.0	TUPIDEL AND MANTMAT,	101-1-1	R1-+	. 1101.8	
3.0	22.5		9.0		0/12 to 8/12/70 DB	
		SLITT SANL, gravally, shout 15% fines, 20% fine mand, 25% medium sand, 30%	. 1.5	1.5	TOPSUIL and BOOTMAT.	
		coarse sand, 20% gravel, subsugular, 3/4-11ch marting all gravel, subsugular,	1 1.5	6.5	SAND, with gravel, about is fires,	_
		molat, medium-juy permaktitie			Sol contain and a medium pand,	<u>17</u>
6 to 3	יט		•			0.
10.5 to	11.5	BOULDER. BOULDER.			fed-brown, damp, medium persemblility, dense, FLOOMFLAIM,	à.(
11.5	25.0		6.5	16.5	BEDROCK, groy, biotite hornblande	
	().V	BEIMUCE, grey, bisite hornblende gregtes, foliations dipping about 70			gialas, medarataly fractured, fractures	
		70 . Highly fractured. Practures			dipping about 60 degrees. Some horizontal. All fractures tight. BERNO	
		apaced about 1 to 8 inches apart. Practures are not all tight.	16.5		Bottom of Hola.	X .
25.0		Buttom of Hula.			Deriver Sumatra	
					No. Depth Manus/fa d a	10.0
		Drive Samples			7. 1.5 - 1.01	<u>n-</u>
		1. 0.5 2.0 26			3. 3.0 - 4.5 24	0.0
		2. 4.0 - 5.5' 99 66			41 5.0 - 5.3 100/4" ref. 100	U.5
		Rock Cobe Runa No. Depth S. Recovery			Rock Core Runs	
		1. 6.0 - 10.0			1. 16.5 - 10.5' St.	
		1. 16.5 97			2. 10.5 - 16.5, 70	
		L. 21.5 - 25.0 100	D . 340		MOTE: Water level at 2.75 on 8/12/70.	
DH-620	Elev.	1-50 -	DH-352	Elev. 1	1098.1 A/T	
0.0	1.5	PAN	0.0	2.0	TOPSOIL.	
1.5		TOPSOIL, ROOTS.	2.0	3.5		10.0
	5.0	BOULDER.		212	SAND, milty with gravel, about 25g	
5.0	9.5	SAND, silty, with gravel, about			20% coarse hand had, 25% medium sand, Se	17-6 5
		sand, but constitute sand, 255 medium			medium permeability	0.0
		mitheomites in and in gravel. SH			Floodplain Deposite.	1.0
		olive-brown, moist, madium-low permeability, dense, GLACIAL TILL.	3.6	14.5	foliations dipping about 800 us gamise,	
	17.5	PERSONAL TILL.			fractured for the second to the Highly	
		BEIROCK, gray, biotite, hurnblende, gneiss. Folistions dipping about 70°.			epaced about 3 to 5 inches Fractures	
		Highly fractured addition apping about 70"), =		epsced about 3 to 5 inches apart. Yery elightly frectured from 8'6" to 14'6".	
		Practures spaced 1/2-inch to 5 inches	14.5		Bottom of Hole	
.5		Bottom of Hole,			Mrive Samples	
		Drive Samples			No. Deth Bowert. SRecovery	
		no. Denth market			3. 3.0 - 1.5 100 (4)	1-654
	/	1. 1.0 - 1.5, 18 ABCOVERY			100/D Baf. 27	0.0
		50/10" ref. 78			Rock Core Bung	1.0
		Rock Core Runs			1. 3.5 - 0.5	
		2. 12.5 - 17.5' 83			NOTE: Mater level at 4.58 feet on 8/13/70.	
		MOTE: Mater level at 9.5 feet on 8/12/20	DH-353	Elev. 1095.	2 8/12 4 8/11 10	
67)		0/12/70.	0.0	1.5		
621	Elev. 11	71.82 8/13 to 8/13/70 DBM	1.5	7.0	TOPSOIL and HOOT MAT.	16 -
	1.5	TOPSOIL.		1.0	SAND, with gravels, about 5% fines, 15% fines,	10.0
	9.0				COarse sand 10d sand, 308	1-655
		COBBLES and BOULDERS, with some silt and gravel materix, BROLACIAL DRIFT.			Ju-inch mannum size, red-brown, SP damp, high permability, dense,	
2					Floodplais Baposits.	0.0
-		BEIROCK, gray, biotita hornblanda gneisa, moderately fractured, fractures spaced 12 to 18 inches the startures	7.0	17.0	BEIROTE	1.0
		spaced 12 to 18 inches spart, nost			foliations display fractured.	
		fractures dipping about 70 degrees, some horisontal.			fractures are horisontal Most	
		Bottom of Hole.	17.0		BEIROCE. All tight.	
			17.0		Botton of Boring.	
		Drive Samples No. Droth Blows (c			Drive Samples	
		No. Depth Blova/st. & Hecovery		1		12.0
				1	2. 1.5 - 1.0	
		Bock: Core Runs		1	3. 3.0 - 4.5, 98 63	79-656
		No. Depth & Recovery 1. 9.0 - 11.0: 75			4. 5.0 - 5.5' 100/6" ref. 33	0.0
		2. 11.0 - 16.0, 100		2	Acck Core Buns	1.0
		3. 16.0 - 21.0, 93		1	1. 7.0 - 12.0 100	
		NOTE: Water level at 9 feet on $6/13/70$.		2	2. 12.0 - 17.0, 100	
B	w. 1179.					
		~~ (15) W 0/ 11/ 10 DISK				
ц.		COBBLES and BOULDERS, with some silt				15.0
		and gravel matrix, unable to obtain drive samples. MULACIAL DELFT.				_
21.	0					<u>IF-651</u>
		BERNOCK, gray, biolite bornblende gneiss, moderately fractured. Prectures spaced 12 to 15 inches month				0.0
		12 to 18 inches spart. Nost fractures dipping about 70 . Some herisontal.				3.0
		appling about 70". Some horisontal.				
		Bottom of Hole.				
		Rock Core Run				
		to. Depth & Recovery				
		11.0 - 10.0				10.0
		10.0 - 21.0 100				
		2. 16.0 - 21.0 100				1
		-, 10.0 - 21.0, 100				2
		- 10.0 - 21.0 100				2

. م_حيدو الع

		THAT HAT.			Inst Fils (iont'd)	Jan Kiv	or Material	•
	u	LAN LARE, CLAN REVER WATERCORE			TF-618		6/19/4	
<u>PP-651</u> 0.0		6/8 to 6/8/11	ſ	D PN	0.0	1.0	(DHEES and HAULTHO, with an gravel, matrix water entering	1/194 Widi Aund Egitt
1.0					7.0		at set, 5 gpm. Bedrers and bettem of pit.	
		10.0 SAND, silty with gravel, 2% firms, 1% fine sand sand, 30% coarse soul, 1			B' -41.9			
		sub-erguier, 10-inch max		36	0.0	1.0	6/10/11 TUPIDIL and HERT MAT.	20 MM
		nlive-brown, damy, low ; very dense, GLACIAL TILL 6-inch size.	est. 201 +		1.0	3.0	SAND, slity with gravel and co about 25% films, 15% film ass	obblee,
		Disturbed Samples 3 to	y feet,					
10.3		Bottom of Pit.					gravel, mil-augular, li-inch ; alza, red-brown, wet, medium ; blitty, komas, WhATHHED OLAC	
<u></u>		6/8 tr 6/8//1	179	21	TP-John		6/10/71	1424
2.5		0.0 SAND and graval, some al		_	0.0 1.0		TUPSOIL AND HART.	
		fines, 10% fine sand, 15 35% coarse sand, 30% gran		۱,			SAND, silty with gravel and co about 25% fines, 15% fine sand	1 2/147
		brown, dwwn, aediumshish	size, tan-	SP-SM or			medium sand, 3.2 comres sand, gravel, sub-augular, 36-fuch m size, rad-brown, wet, medium p	ax) mun
		with cobbies and bouldars	und gravel	·, Ο₽-ΩΗ	5.0	•	VILLY, 10086, WEATHERED GLACI	AL TILL.
		about 25% • 6-inch size.	ders then				BEIRUCK and HOTTOM OF PIT.	
13.0		Disturbed Sample: 3 to 1			TP-661		6/10/71	DEM
TP-653		Bottom of Pit.			0.0	1.0	TOPSOIL and HOOT MAT.	
0.0		6/8 to 6/8/71	DB	٩	1.0	11.0 5	SANE, silty with gravel, and co	ubbles,
1.0	1.	totoola and acornar.					nout 25% lines, 1°% fine sand, Indium sand, 30% comme sand, 1 (Pave), sub-augular, 22.15%	,201% 101% S24
	10.	fines, 10% fine sand, 15%	And the second			-	ravel, mio-angular, 22-inch ma bize, olive-brown, damp, low pe bility, very dense, GLACIAL TIL	
		rounded, 18-inch maximum	ol, mub-	S17-514	11.0		bitos of Pit.	<i>.</i> .
		contast and and gravel	dense, Ice	017-014				
		highly weathered.	aments					
		Distarbed Sample: 2 to 9 Bottom of Pit.	Seet.					
IP-654		50 trom of Pit.						
2.0	1.0		DEM					
1.0	10.0	0 SAND and DELAURT what	silt, about					
		sand, 35% coarse and 30%	15% medium	5P-5H				
		brown, damn, medium-high a	em mize, tan-	OP-OM				
		est. 25% + 6-inch eite.		-				
		ments highly weathered. Disturbed Sample: 3 to 10						
.0		Bottom of Pit.						
P-655		6/10/71	DEM					j
••	1.0	TOPSOIL and HOOTHAT.						
	16.0	SAND, silty with gravel and about 25% fines, 15% fine a						
		gravel, sub-angular, 15-incl	d, 10 %	9 4				{
		grey, damp to wet, low perms	then blue-	S#;				
		very dense, GLACIAL TILL wer 7 foot with water. Seer at	sthemed s -					
2.0		Disturbed Sample 7 to 11 fee	et.					1
-656		Bottom of Pit.						1
0	1.0	- 6/10/71 TUPSDIL and HOOTMAT.	DEM					1
9	12.0	SAND, silty with gravel and	cobh) ==					
		medium sand, 30% corase sand	nd, 2015 . 1015	51				1
		sise. Olive-brown dawn law						
		bility, vary dense, GLACIAL ' Disturbed Sample 2 to 12 fee	TILL.					Į
		Bottom of Pit.	••					{
657		6/10/71	DEM		CLAN	M BILLE	B WATE COMPE	
,	3.0	TOPSOIL and ROOTHAT and FILL.			GLA	M LAKE	R WATERSHED PRO	
	10.0	SAND, silty with gravel and c about 25% fines, 15% fine sen	d. 20£		s s	SANDISF	IELD, MASSACHUSETTS	···· {
		gravel, sub-angular, lu-inch	105 Marinus	51		LOG	S OF TEST HOLES	
		bility, very dense, GLACIAL T	Dermen. ILL.		U.S.DE	EPART	MENT OF AGRICIT	TIRE
		Disturbed Sample: 3 to 9 fee	t.		SOU	L CONS	SERVATION SERVIC	E
		Bottom of Pit.			******		Dole Approved by	
					trand N LONG		Tale	
					Traces	• • • •	1.00 Shirt Branun In	
						en en ser i se		
					Checked C H DOG	DGE	N- 33	7-0
					1	DOE	No 33 MA 35	7-P
					1	DØE	No 33 MA 35	APRIL 19631
					1	DGE	No 33 MA 35	

f

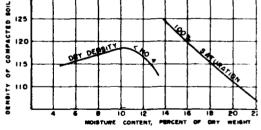
19-91

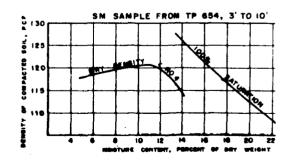
. 5.0 17-97 0.0 1.0 5.0 TP-93 0.0 1.0 5.0 TP - 94 0.0 1.5 4.0

: 0.0 1.0

Auge of the stand (Ja/A) E.4.1 Div. Aug. Aug. Aug. Silv with growin, shout BE first, Barton, Bar	No. Jone Jone Jone 0.0 1.0 Marking, Structure, and Structure, Marken and Structure, Str			REPRODUCED AT GOVERNM
 All, Ann. James Constrained and the second of the	 N. J. M. Marken Marken and State of the series and the first part of the series and the first part of the series and the first part of the series and the series of the series and the series of the series and the series of the serie	-		
 Bettem of Pit. Bettem of Pit. B.S. 137.1, 3.0.10.0 63 larger than b[*] discreted. BOTH. Water level at 7.3' or 7/14/63 T.731. BIV. 1187.1 4/24/65 E.G.L. D.O. DPSOLL D.O. DPSOLL B.G. 13. ordin and 131 catters and, 231 fits and and 131 catters and, 231 fits and and 131 catters and, 231 gravel, and and 131 catters and, 231 fits. B.S. 231.1, 3.0.10.0 31 larger than b[*] discreted. BOTH. Votor level at 8' on 7/14/65 T.232, ELV. 1131.6 4/23/65 E.C.L. D.O. Solid State of Pit. D.S. 231.1, 3.0.10.0 31 larger than b[*] discreted. BOTH. Votor level at 8' on 7/14/65 T.233. 10.0 S.MOT, gravelly with silt, about 101 fixes, 231 fixe SH-GM and and the first state of Pit. S.S. 232.1 (2 hags) 2.5-10.0 FL larger than 6" discreted. BOTH. Votor level at 0.3' on 7/14/65. T.233. FLIV. 1153.3 BOTH. Votor level at 0.3' on 7/14/65. T.233. FLIV. 1153.3 BOTH. Votor level at 0.3' on 7/14/65. T.233. FLIV. 1153.3 BOTH. Votor level, 31 fixes, 331 fixes SH and and the first state state	 10.0 Entime of Pit. L. 1, 13, 1, 1, 0, 10, 0 & 1 larger than 1⁴ discarded. DOT. Nature level at 7.5³ as 7/14/83 T. 731, E.T. 1139. 1.0		3.0	The second secon
BUTE, Water lavel at 7.3' an 7/14/83 T1.731, HAT. 118.1 6/24/65 E.G.L. 0.0 10.0 FDSOIL and, 513 motion solid, 33 caters and, 03 gravel, descript, bard, and gravel, showt 155 fines, 275 fine and, 153 motion solid, 30 caters and, 000 gravel, descript, bard, and gravel, store and, 000 gravel, descript, bard, and gravel, grawd maters. Sec.L. 10.0 Batton of 71s. D.S. 231.1, 3.0-10.0 31 larger than 8" discarded. KOTE: Vacer level at 8" on 7/14/65 T2.232, HIT 1151.6 6/23/65 E.G.L. 0.0 2.3 TOPSOIL and, 133 motion sol, 37 catter and, 37 fine table, 37 boditar, angulat to the barded and mater etc. 28", brown, weigt to wt, low to motion permethility, descript, ongulat to the barded and mater etc. 28", brown, weigt to wt, low to motion permethility, descript, grand margins. 10.0 Sector of fit. B.S. 232.1 (2 bags) 2.3-10.0 %L larger than 6" discarded. MOTE: Water level at 0.3" on 7/14/65. T2.233, HIV. 1195.3 8/23/65 E.G.L. 0.0 3.0 TOPSOIL 3.0 S.2.23.1, 3.0-10.0 %L larger than 6" discarded. MOTE: Water level dry or 7/14/65. T2.234, HLV. 1195.3 8/23/65 E.G.L. 0.0 3.0 TOPSOIL 3.0 S.2.23.1, 3.0-10.0 %L larger than 6" discarded. MOTE: Water level dry or 7/14/65. T2.234, HLV. 1199.3 K.G.L. S.5.23.1, 3.0-10.0 %L larger than 6" discarded. MOTE: Water level dry or 7/14/65.	Definition of the set of	10.0		Bottom of Pit.
10,731, EUV. 118.11 10/403 E.G.I. 0.0 3.0 Hall, Status, Januar, Janu	NUMBER OF LINEARNAMES. C. S. C.			
<pre>17.771. EIV. 110.1</pre>	<pre>NT.11. LINE. Note: Note:</pre>			
 J.G. 10.0 J.G. 10.0	 S.a. 10.0 S.A. 10.0			
BOTH: Mater level at 8° on 7/14/65 T7-232, ELTV. 1131.0 4/23/65 C.C.L. 0.0 2.3 DOTE: Solution sond, 31 coarse sond, 301 fines, 231 fine Coarse sond, 301 coarse sond, 301 fines, 231 fine Solution: sond, 31 coarse sond, 301 fines, 231 fine Coarse sond, 321 coarse sond, 301 fines, 310 fines, 321 fine Solution: sond, 31 coarse sond, 321 fine Solution: sond, 32 coarse sond, 321 fine Solution: sond, 32 coarse sond, 321 fine Solution: sond, 32 coarse sond, 321 fine Solution: sond, 321 coarse sond, 321 fine Solution: sond, 321 coarse sond, 321 fine Colspan="2">Colspan="2">Colspan="2">Colspan="2" Solution: sond, 321 coarse sond, 321 fine Solution: sond, 330 coarse sond, 331 gravel, 331 Colspan="2" Solution: sond, 330 coarse sond, 331 gravel, 331 Solution: sond, 330 coarse sond, 331 gravel, 331 Solution: sond, 330 coarse sond, 331 gravel, 331 Solution: sond, 100 coarse sond, 331 gravel, 331 Solut	Distance level at every device TATUM Algent Lett TATUM Algent Lett TATUM TATUM Algent Lett Lett Lett TATUM Algent Lett Lett Lett Lett TATUM Algent Lett Lett Lett Lett TATUM Algent Lett Lett Lett Lett TATUM Lett Lett Lett Lett Lett <tr< td=""><td>3.0</td><td></td><td>SAND, slity with gravel, about 132 fines, 272 fine 300 annd, 132 modium sode, 132 cohres and, 203 gravel, Charles and and the granesh, 103 cobbles, 33 boulders, angular, hard, mariams size 1aⁿ, slitesbrown, demp, low permubblicy, very dense, gravam moralme.</td></tr<>	3.0		SAND, slity with gravel, about 132 fines, 272 fine 300 annd, 132 modium sode, 132 cohres and, 203 gravel, Charles and and the granesh , 103 cobbles, 33 boulders, angular, hard, mariams size 1a ⁿ , slitesbrown, demp, low permubblicy, very dense, gravam moralme.
17-292, LUT. 119110 Description Description 0.0 2.3 TOPSOIL Samo, 33 medium seed, 31 carea seed, 30 gravel, 107 cabbies, 33 beciders, 31 carea seed, 30 gravel, 107 cabbies, 33 beciders, 31 carea seed, 30 gravel, 107 cabbies, 33 beciders, and uptate to settermedide, maximum time 24°, brown, which to wet, how to medium permetbility, 36 and, 10 medium appears that 5° discorded. 10.0 Bettern of Fit. B.3. 232.1 (2 bags) 2.3-10.0 BR larger than 5° discorded. 10.0 Bettern of Fit. B.3. 232.1 (2 bags) 2.3-10.0 BR larger than 5° discorded. 10.0 Bettern of Fit. B.3. 232.1 (2 bags) 2.3-10.0 BR larger than 5° discorded. 10.0 Samo, gravel, startum ster 33 gravel, 31 fit. Samo, 33 gravel, 31 fit. 10.0 TOPSOIL Sacord, 133 gravel, showt 231 fit. Samo, 31 gravel, 31 carrow stere stere, 31 fit. 10.0 Samo, gravel, stere level dry or 7/14/65. Tr.234, FLFV. 1199.3 6/23/63 K.G.L. 10.0 Samo, fit.y with gravel, showt 10% fit.esc.231 fit.e. CP-CM 10.0 Samo, 10% mediam stere, showt 10% fit.esc.231 fit.e. CP-CM 10.0 Samo, gravel, 9% fit.e. Samo, gravel, 9% fit.e. 10.0 Samo, gravel, 9% fit.e. Samo, gravel, 9% fit.e. 10.0 Samo, gravel, 9% fit.e. Samo, 10% cacards and,	 J. 2017. 1977. 197701. J. 2017. 197701. J.			
17-222, LUT. 1121-10 Description Description 0.0 2.3 10.0 Samo, gravelly with silt, about 101 finas, 231 fina Buck 2.3 10.0 Samo, gravelly with silt, about 101 finas, 231 fina Buck 10.0 Samo, gravelly with silt, about 101 finas, 231 fina Buck 10.0 Samo, gravelly with silt, about 101 finas, 231 fina Buck 10.0 Samo, gritt to wit, low to andium permetbility, samo, gritt to wit, low to andium permetbility, samo, gritter to with gravel, start start to with gravel, stare to with gravel, stare to with gravel, start to with gravel, sta	 J. 2017. 1977. 197701. J. 2017. 197701. J.			
 2.3 10.0 and, 135 media sad, 35 Caraca sad, 350 Gravel, 107 cables, 35 boolders, angular to sub-reached, and sum of the 20°, brown, swint to wet, low to mediam permeability, 50 means, growed morpian. 10.0 bettem of Fit. a. 232.1 (2 bags) 2.3.10.0 ft larger than 6° discorded. mOTE: Water level at 0.3° on 7/14/65. Tr.233, ELEV. 1145.3 6/23/63 E.G.L. 0.0 3.0 5005011 3.0 10.0 5005011 3.0 10.0 5005011 3.0 10.0 5005011 a.d. 235.1, 3.0.10.0 51 larger than 6° discorded. mOTE: Water level at 0.3° on 7/14/65. Tr.233, ELEV. 1145.3 6/23/63 E.G.L. 0.0 3.0 5005011 3.0 10.0 5005012 a.d. 100 mediam and, 51 ceres sand, 153 gravel, 31 each 15°, elive-brown, demy, impermentation, warry dense, glacial till. b.5. 253.1, 3.0.10.0 31 larger than 6° discorded. mOTE: Water level dry on 7/14/63. Tr.234, FLV. 1199.3 6/23/63 K.G.L. 0.0 5.0 7075011 3.0 10.0 5401, 91100 mediam and, 107 ceres and, 353 gravel, 31 each 10° mediam and, 10° ceres and, 350 gravel, 40°, 40°, 40°, 40°, 40°, 40°, 40°, 40°	 2.3 10.0 and provide vite and the about 102 finan, 323 fina Encode and 33 cather and 34 cather and 35 cather and 35 finan 35 molithment, 35 molithme			
 10.0 Bettem of Fit. B.S. 252.1 (2 bags) 2.5-10.0 SL larger than 6" discarded. ROTE: Mater level at 0.5' or 7/14/65. TT-233, FLFV. 1145.3 6/23/65 E.C.L. 0.0 3.0 TOFSOLL 3.0 10.0 SamB, slity with gravel, about 25% fines, 35% fine order, 15% methods, 3% corres cand, 15% gravel, 3% cobbles, 2% besiders, engular, hard, mathem size 13", cobbles, 2% besiders, engular, hard, mathem size 15", discarded. BUTE: Mater level dry on 7/14/65. TT-254, FLFV. 1199.3 6/23/65 K.C.L. 0.0 3.0 TOFSOLL 3.0 10.0 SamB, slity with gravel, about 16% fines, 25% fine f% cobbles, 2% besiders, engular, hard, mathem size 14", brown, damp, lev permabbility, very dense, grawnd moraine. BUTE: Mater level dry on 7/14/65. TT-253, FLFV. 1199.4 6/23/65 K.C.L. 0.0 3.0 MENDART TOFSOLL 3.0 10.0 SamB, permit with cobbles, about 7% fines, 20% CP-CM fine end, 13% medum end, 16% coarse end, 35% gravel, 13% cobbles, 7% besiders, ender f% 10.0 Bestem of Fit. B.S. 235.1 (2 bags) 3.0-10.0 % larger than 6" discarded. BUTE: Mater level dry on 7/14/65. TT-235, FLFV. 1170.4 6/23/65 K.C.L. 0.8 3.0 IN.0 Exampler, mathem end, 16% coarse end, 35% gravel, 13% cobbles, 7% besuders, beaut terract. BUTE: Mater dry on 7/14/65. TT-235.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BUTE: Mater dry on 7/14/65. TT-235, FLFV. 1170.4 6/23/65 K.C.L. 0.8 3.0 TOFFOIL 3.0 10.0 Sattem of Fit. B.S. 235.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BUTE: Mater dry on 7/14/65. TT-235, FLFV. 1170.4 6/23/65 K.C.L. 0.0 Sattem of Fit. B.S. 235.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BUTE: Water dry on 7/1	 10.0 Bettem of Fit. B.S. 232.1 (2 heap) 2.3-10.0 fR larger than 6" discerded. BCTT: Water level at 0.3' or 7/14/63. 17.233, TLV. 1145.3 6/33/63 E.C.L. 0.0 10.0 SP050LL 3.00 10.0 Second stress and 132 grownl.3T cobbies, 73 besiders, englist, bard, maximum statist it). 10.0 Bettem of fit. 3.0 10.0 SJ016 Stress and 132 grownl.3T cobbies, 73 besiders, englist, bard, 31 ceress and 132 grownl.3T cobbies, 73 besiders, englist, bard, maximum statist it). 10.0 Bettem of fit. 3.0 10.0 SJ016 Stress and 123 grownl.3T cobbies, 73 besiders, englist, bard, 53 ceress. 17.254, ELV. 1199.3 6/39/63 E.C.L. 0.0 3.0 TOFSOLL 3.00 10.0 SJ02 of the permission of discarded. 10.0 Bettem of fit. 10.1 Bettem of fit. 10.0 Bettem of fit. 10.0 Bettem of fit. 10.0 Bettem of fit. 10.1 Better dry on 7/14/65. 10.0 Bettem of fit. 10.1 Better dry on 7/14/65. 10.0 Bettem of fit. 10.0 Stress fit. 10.0 Bettem of fit. 10.1 Better dry on 7/14/65. 10.0 Bettem of fit. 10.0 Bettem of fit. 10.0 Stress fit. 10.0 Bettem of fit. 10.0 Bettem of fit. 10.1 Better dry on 7/14/65. 10.0 Bettem of fit. 10.1 Better lovel dry on 7/14/65. 10.1 Better lovel dry on 7/14/65. 10.2 Bettem of fit. 10.3 Better lovel dr 7.0' on 7/14/65. <td></td><td></td><td>SAMD, gravelly with silt, about 10% fines, 23% fine SH-CH sand, 13% modium sand, 5% cearse sand, 30% gravel, 10% cobbles, 5% boulders, angular to sub-rounded, maximum size 24", brown, units to wat, low to andium parensbility,</td>			SAMD, gravelly with silt, about 10% fines, 23% fine SH-CH sand, 13% modium sand, 5% cearse sand, 30% gravel, 10% cobbles, 5% boulders, angular to sub-rounded, maximum size 24", brown, units to wat, low to andium parensbility,
ROTE: Nater level at 0.3' os 7/14/63. T-233, ELEV. 1145.3 0/23/63 S.G.L. 0.0 3.0 TOPSOIL S.G.L. Colspan="2">S.G.L. Colspan="2">S.G.L. Colspan="2">S.G.L. S.G.L. S.G.L. <td>Arts: Nature 1 arts: 1 (1) (1)</td> <td>10.0</td> <td></td> <td>Bottom of Pit.</td>	Arts: Nature 1 arts: 1 (1) (1)	10.0		Bottom of Pit.
T7-233, FLFV. 1145.3 b/23/63 E.C.L. 0.0 3.0 TOPSOLL SARB, siley with gravel, showt 235 fines, 335 fine SM 3.0 10.0 SARB, siley with gravel, showt 235 fines, 335 fine SM saad, 133 medum and, 31 corres and, 153 gravel, 31 10.0 SARB, siley with gravel, angular, hard, mathem size 13", alive-brems, damp, impresentit, very dense, glacial till. 10.0 Satter of Fit. S.5, 255.1, 3.0-10.0 31 larger than 6" discarded. 10.0 Satter of Fit. S.5, 255.1, 3.0-10.0 32 larger than 6" discarded. 10.0 Satter of Fit. S.6/28/63 K.C.L. 0.0 3.0 TOPSOLL Satter of Fit. Satter of Fit. 0.0 3.0 TOPSOLL Satter of Fit. Satter of Fit. 0.0 3.0 TOPSOLL Satter of Fit. Satter of Fit. 0.0 Satter of Fit. Satter of Fit. Satter of Fit. 0.0 3.0 BULDERT TOPSOLL Satter of Fit. 3.0 10.0 BULDERT TOPSOLL Satter of Fit. 3.0 10.0 BULDERT TOPSOLL Satter of Fit. 0.1 Satter of Fit. S.1255.1 (2 bags) 3.0.10.0, R1 larger	1,733, LIV. 1145.3 1/349 1.4.1 0.0 3.0 10.0 Mail of 151 with gravel, is heat 231 fixen, 333 fixen, is in each 313 with with gravel, is heat 231 fixen, 333 fixen, is in the intervent is in the intervent is in the intervent is intervent. 1.0 1.0.0 Mail of 151 with gravel, is heat 231 fixen, 333 fixen, is intervent. 1.0 1.0.0 Mail of 151 with gravel, is heat 231 fixen, 333 fixen, is intervent. 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.0 1.1.1 1.1.1 1.1 1.1.1 1.1.1 1.1 1.1.1 1.1.1 1.1 1.1.1 1.1.1 1.1 1.1.1 1.1.1 1.1 1.1.1 1.1.1 1.1 1.1.1 1.1.1 1.1 <td></td> <td></td> <td></td>			
0.0 3.0 TOFSOLL 3.0 10.0 SABD, siley with gravel, showt 231 fines, 331 fine SM saad, 131 medum and, 31 cores and, 151 gravel, 31 cobbles, 21 boulders, engular, hard, manfamm size 13", alive-brewn, damp, im-sreachin, very dense, placial till. 10.0 Bettem of Hit. 3.0 10.0 SABD, siley with gravel, showt 101 fines, 231 fine Gr-GM and, 102 medum and, 102 cores and, 331 gravel, FI cobbles, 21 boulders, angular, hard, maximum size 14", brewn, damp, low permubility, very danse, gravel, FI cobbles, 21 boulders, angular, hard, maximum size 14", brewn, damp, low permubility, very danse, gravel, FI cobbles, 21 boulders, angular, hard, maximum size 14", brewn, damp, low permubility, very danse, gravel, FI cobbles, 21 boulders, angular, hard, maximum size 14", brewn, damp, low permubility, very danse, gravel, FI cobbles, 21 boulders, angular, hard, maximum size 14", brewn, damp, low permubility, very danse, gravel, FI cobbles, 21 boulders, angular, hard, maximum size 14", brewn, damp, low permubility, very danse, gravel, FI cobbles, 21 boulders, sub-cound to b.5, 236.1, 3.0-10.0 &1 larger than 6" discarded. MOTE: Mater level dry on 7/14/65. TTP233, MAT. 1194.6 6/23/63 K.G.L. 0.0 3.0 BetLDEFT TOFSOIL 3.0 10.0 BetLDEFT TOFSOIL 5.2 (cobbles, 71 boulders, sub-reund to oub-angular, maximum size 12", brewn, damp, high permusbility, danse, how terrace. DOTE: Mater dry on 7/14/65. TF-236, MAT. 1174.6 6/23/63 K.C.L. 0.0 Bottem of Fit. 5.2 (cobble, 71 boulder, angular, hard, maximum size 18", - (cobbles, 71 boulder, angular, bar, fine 50, 35% fine 50 (cobbles, 71 boulder, maximum size 10.0, 5% fines, 35% fine 50 (cobbles, 7% boulder, angular, bar, bar, fig fines, 19%, - (cobbles, 7% boulder, angular, bar, dere, glacial till. 10.0 Bettem of Fit. 5.2 (cobbles, 7% boulder, angular, bar, bar, fig fines, 10", - (cobbles, 7% boulder, angular, bar, dere, glacial till. 10.0 Bettem of Fit. 5.3 (cobbles, 7% boulder, angular, bar, deree, glacial till. 10.0 Bettem of Fit. 5.3 (cobbles, 7% boulder, angula	 3.0 J.O. NOFOLL 3.0 JO.O. NOFOLL 3.0 JO.O. NOFOLL 3.0 JO.O. SAUD. stilly with gravel, shows 231 fines, 331 fram. Sn made, 53 corres and, 133 provel.31, cobles, 73 besiders, nagular, hard, mathema size 137, alteriaters, may day, increaselit, vary dense, 131 million, alternative, and for a file. 3.0 JO.O. S.(11, 3.0, 10.0, 0.3 larger than 6" discarded. 3.0 JO.O. SAUD. alter of file. 3.0 JO.O. SAUD. alter of the former of 333 gravel. 3.0 JO.O. SAUD. alter of the former of 333 gravel. 3.0 JO.O. SAUD. alter of the former of 333 gravel. 3.0 JO.O. SAUD. alter of the former of 333 gravel. 3.0 JO.O. SAUD. alter of the former of 333 gravel. 3.0 JO.O. SAUD. Alter of the former of 333 gravel. 3.0 JO.O. SAUD. Alter of 714/45. 3.0 JO.O. SAUD. Saud. TOFOOL. 3.0 JO.O. SAUD. SAUD. SAUD. SAUD. Alter of 714/45. 3.0 JO.O. SAUD. Sa	m 711	1	
 3.0 10.0 SARD, eiley with gravel, showt 255 fines, 355 fine SH end, 151 enders and, 152 gravel, 33 cohes and 152 gravel, 33 cohes and 152 gravel, 34 cohes and 152 gravel, 35 core and 35 gravel, 35 core and 35 gravel, 37 cohes and 35 gravel, 35 core and 35 gravel, 35 core and 35 gravel, 37 cohes and 35 core and 35 core and 35 gravel, 37 cohes and 35 core and 35 core and 35 core and 35 core and 35 gravel, 37 cohes and 35 core and 3	 3.0 10.0 SAND. officy with gravel, shout 235 fines, 335 fine SA and SA			TOPS011.
UTE: Water lavel dry en 7/14/63. K.C.L. 0.0 3.0 TOFSOLL 3.0 10.0 SapD, silty with growel, showt 10% fines, 23% fine GP-GM aaad, 10% modum andd, 10% coarse sand, 33% grawel, JE cobbins, 2% beelders, angular, hard, max ham siles 14", brews, damp, low parmshility, vory danse, greend morains. 10.0 Bettem of Pit. 9.5, 254.1, 3.0-10.0 6% larger than 6" discarded. MOTE: Mater level dry on 7/14/65. TTP2233, MLW. 1194.6 6/23/65 K.G.L. 0.0 3.0 BEELDERT TOFSOLL 3.0 10.0 BEELDERT TOFSOLL 3.0 10.0 BEELDERT TOFSOLL 3.0 10.0 BEELDERT TOFSOLL 3.0 10.0 SadD, greenily with cobbles, about 7% fines, 20% GP-GM fine sand, 13% medium and, 10% coarse sand, 33% growel, 35% cobbles, 7% boulders, obser state 0.0 Bettem of Pit. 9.5, 235.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BOTE: Mater dry on 7/14/65. T7-236, MLW. 1174.6 6/25/63 K.C.L. 0.0 Sold THE Mater dry on 7/14/65. 10.0 Bettem of Pit. 9.5, 235.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BOTE: Mater dry on 7/14/65. 10.0 Soltem of Pit. 9.5, 235.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BOTE: Mater dry on 7/14/65. 10.0 Soltem of Pit. 9.5, 235.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BOTE: Mater dry on 7/14/65. 10.0 Soltem of Pit. 9.5, 255.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BOTE: Mater dry on 7/14/65. 10.0 Soltem of Pit. 9.5, 255.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BOTE: Mater dry on 7/14/65. 10.0 Soltem of Pit. 9.6 3.0 THEFOLL 3.0 10.9 Soltem of Pit. 9.6 3.0 THEFOLL 3.0 10.9 Soltem of Pit. 9.6 3.0 Soltem of Pit. 9.6 3.0 Soltem of Pit. 9.7 cobbles, 7% beelders, amgular, hard, maximum site 18", - 0.10 Soltem of Pit. 9.5, 256.1, 3.6-10.0 % larger them 6" discorded.	 EUT: Nater level dry on 7/14/65. C.C.L. 0.0 3.0 10.0 10.0<td>3.0</td><td></td><td>pand, 133 medium pand, 53 conros pand, 133 graval, 35 cobbles, 23 boulders, angular, hard, maximum size 13", alive-brown, damp, imcormoble, wary dense, glacial till.</td>	3.0		pand, 133 medium pand, 53 conros pand, 133 graval, 35 cobbles, 23 boulders, angular, hard, maximum size 13", alive-brown, damp, imcormoble, wary dense, glacial till.
0.0 3.0 TOPSOIL 3.0 10.0 SADD, silty with gravel, showt 10% fines, 23% fine CP-CM asad, 10% modum sond, 10% coarse sand, 33% gravel, SE cobles, 7% benifter, asguiar, hard, maximum size 14", brown, damp, lew paramability, very danse, grawnd moraime. bottem of Fit. B.5. 234.1, 3.0-10.0 4% larger than 6" discarded. MOTE: Mater level dry on 7/14/63. Tre233, MLW. 1194.4 6/23/85 8.0 SADD, gravely with cobles, about 7% fines, 20% CP-CM 70.0 BUELDERT TOPSOIL 3.0 10.0 3.0 BUELDERT TOPSOIL 3.0 S.0 S.0 BUELDERT TOPSOIL 3.0 BUELDERT TOPSOIL 3.0 S.0 S.0 BUELDERT TOPSOIL S.2 S.2 BUELDERT TOPSOIL S.2 S.2 S.2 S.2 S.2 BUTE: Water dry on 7/14/63.	 0.0 3.0 TOPSOIL 3.0 10.0 SARD, slity with gravel, showt ist fines, 231 fize CP-CH and, 100 methods with gravel, showt ist, maximum size 10", Streem, damp, low permability, very dense, grawnid moralise. 10.0 Bettem of Fit. 8.1. 234.1, 3.0.10.0 62 larger than 6" discarded. MOTE: Mater level dry on 7/14/63. TT2253, MAW, 1194.6 6/23/65 k.C.L. 0.0 3.0 SARD, gravely with cobbies, showt TE fines, 20% CP-CM fine and, 13% cobbies, 33% gravel, 33% gravel, 13% cobbies, 7% boulders, sub-reved to out-angeler, maximum slice 12%, from, damp, high permability, dams, know terrace. 10.0 Bettem of Fit. 8.1. 235.1 (2 bags) 3.0.10.0, 6% larger than 6" discarded. MOTE: Mater dry on 7/14/65. TT-2350, MAY. 1174.6 6/23/63 K.C.L. 0.0 Bettem of Fit. 8.1. 235.1 (2 bags) 3.0.10.0, 6% larger than 6" discarded. MOTE: Mater dry on 7/14/65. TT-336, MAY. 1174.6 6/23/63 K.C.L. 0.0 The term of Fit. 9.10.0 SARD, slip with gravel, showt 23% fine, 33% fine SH and, 10% contains and, 23% gravel, 31% cobbies, 7% boulders, angular, mark at 10% is 10.0 files, 35. 150.13. 0.000 files, 35% discarded. MOTE: Mater dry on 7/14/65. TT-336, MAY. 1174.6 6/23/63 K.C.L. 0.0 The term of Fit. 9.10.0 SARD, slip with gravel, showt 23% fine, 33% fine SH and, 10% main and, 32% gravel, 37% contains and, 32% gravel, 31% contains and, 32% gravel, 31% cobbies, 7% boulders, angular, mark at 10", olive-brave, dam, 10% main and, 32% contains and, 32% gravel, 31% cobbies, 31% contains and, 32% contains and, 32% gravel, 31% cobbies, 7% boulders, angular, mark at 10% cobbies, 7% boulders, angular, mark and the discarded. MOTE: Mater level at 7.0° on 7/14/65. 			D.S. 253.1, 3.0-10.0 3% larger than 6" discarded. MOTE: Water level dry em 7/14/65.
 3.0 10.0 SAND, siley with grovel, about 10% fines, 23% fine CP-CM and 10% modelum cond, 10% modelum condition. B. S. 236.1, 3.0-10.0 6% larger than 6" discarded. BOTE: Mater level dry on 7/14/65. TTP233, MLW. 1170.6 6/23/65 K.G.L. 0.0 3.0 BODLDENT TOFSOIL 3.0 10.8 SAND, grownly with cobles, about 7% fines, 20% CP-CM fine sond, 33% growed, 13% modelum conditions. 10.0 Bottom of Pit. 0.0 SAND, grownly with cobles, about 7% fines, 20% CP-CM fine sond, 13% modelum conditions. 10.0 Bottom of Pit. 0.10.8 SAND, grownly with cobles, shout 7% fines, 20% CP-CM fine sond, 13% modelum cond, 13% modelum cond, 13% colored to out-angular, maximum sides 12", brown, damp, high permusbility, danae, hume terrace. 10.0 Bottom of Pit. 0.5. 235.1 (2 bags) 3.0-10.0, % larger than 6" discarded. BOTE: Mater dry on 7/14/65. 17-236, MLW. 1174.4 6/25/63 K.C.L. 0.0 Tarboli addm, and, 32 coarse cand, 33% fine SH dow, 10.0 shout one file sond to and, 10% modelum cand, 12% coarse cand, 23% gravel, 3% cobbles, 7% bendders, angular, hard, maximum site 10", - alive-brown, damp, impermesbile, very dense, glacial till. 10.0 Bottom of Pit. 0.0 Solden, 7% bendders, angular, hard, maximum site 10", - alive-brown, damp, impermesbile, very dense, glacial till. 0.0 Bottom of Pit. 0.10.9 Solden, 7% bendders, angler, hard, maximum site 10", - alive-brown, damp, impermesbile, very dense, glacial till. 	 3.0 10.0 SAMD, silty with gravel, about 10% fines, 23% fine CP-CM and, 10% modul not and, 10% modul, 30% morel, 30% gravel, BT combles, law permutbility, very dense, gravmin mire 10°, brown, damp, law permutbility, very dense, gravmin moraine. 10.0 Bettes of Fit. 8.8. 234.1, 3.0-10.0 6% larger than 6° discarded. MOTE: Mater level dry on 7/14/65. TT-2353, MAT., 1194.6 6/23/65 k.C.L. 0.0 S.0 BetLEET TOPSOLL 3.0 10.6 SAMD, gravely with cobbies, about 7% fines, 20% CP-CM fine and, 13% cobbies, 7% boulders, sub-reved to sub-appler, matuma site 127, brown, damp, high permubbisty, dense, haw terrace. 10.0 Bettem of Fit. 9.3. 235.1 (2 bags) 3.0-10.0, 6% larger than 6° discarded. MOTE: Mater dry on 7/14/65. T7-236, MAT., 1174.6 6/23/63 K.C.L. 8.4 3.0 Terroll 3.6 10.0 Terroll. 3.0 10.7 Terroll. 3.0 10.8 Terroll. 3.0 10.9 Terroll. 9.4 (25/63 K.C.L. 9.5. 235.1 (2 bags) 3.0-10.0, 9% larger than 6° discarded. MOTE: Mater dry on 7/14/65. 17-236, MAT., 1174.6 6/25/63 K.C.L. 8.4 10.0 Terroll. 9.5 105.2 Boulders, sugalar, hand in circ 10°, olive-brown, damp, impermuble, very dense, glactal till. 9.6 3.0 Terroll. 9.6 3.0 Terroll. 9.7 cobbies, 7% boulders, angle, hand in circ 10°, olive-brown, damp, impermuble, very dense, glactal till. 9.5 156.1, 3.4-10.0 % larger than 6° discarded. MOTE: Mater level at 7.0° on 7/14/63. 			117712
HOTE: Mater level dry on 7/14/63. TT0233, ELW. 1194.6 6/23/65 K.G.L. 0.0 3.0 BOOLDENT TOPSOIL 3.0 10.0 SAMD, grewelly with cobbles, about 72 fines, 201 CP-CM fine send, 133 medum need, 181 courses send, 333 grevel, 132 cobbles, 72 boulders, sub-reured to oub-angular, maximum sites 12°, brown, damp, high permeability, danae, hume terrace. 10.0 Bottom of Pit. 9.5. 235.1 (2 bags) 3.0-10.0, 81 larger than 6° discarded. HOTE: Mater dry on 7/14/65. 17-236, ELW. 1174.6 6/25/65 K.G.L. 0.0 Solo TMPSOIL 3.0 10.0 AddD, silty with grevel, about 275 fines, 355 fine SH 9.5. cobbles, 75 boulders, mayler, hard, maximum site 18°, - 0.0 Determ of Pit. 9.6 5.0 TMPSOIL 3.0 10.0 sadD, 57 boulders, angular, hard, maximum site 18°, - 0.0 abottom of Pit. 9.5. 256.1, 3.6-10.0 % larger them 6° discorded.	<pre>Definition of the set of the</pre>	3.0		SAMD, silty with gravel, about 10% finas, 23% fine GP-CM acod, 10% medium and, 10% cearse acod, 35% gravel, 3% cobbles, 2% boulders, angular, hard, maximum size 14", brown, damp, low permeshility, very danse, greend moralme.
TTP 2233, MLFF, 1194.6 6/23/65 k.G.L. 0.0 3.0 DEMLDENT TOPSOIL SAMD, gravelly with cobbies, about 75 fines, 201 GP-GN fine seed, 131 meture seed, 191 costse seed, 333 gravel, 132 cobbies, 75 boulders, sub-round to oub-angular, maniant site 12°, breves, damp, high permeability, dense, knew terrace. CP-GN 10.0 Bottom of Pit. S.S. 235.1 (2 bags) 3.0-10.0, 81 larger than 6° discarded. 10.0 Bottom of Pit. S.S. 235.1 (2 bags) 3.0-10.0, 81 larger than 6° discarded. 10.0 Bottom of Pit. S.S. 235.1 (2 bags) 3.0-10.0, 81 larger than 6° discarded. 10.0 Bottom of Pit. S.S. 235.1 (2 bags) 3.0-10.0, 81 larger than 6° discarded. 10.0 Bottom of Pit. S.S. 235.1 (2 bags) 3.0-10.0, 81 larger than 6° discarded. 10.0 Bottom of Pit. S.S. 235.1 (2 bags) 3.0-10.0, 81 larger than 6° discarded. 10.0 Bottom of Pit. S.S. 235.1 (2 bags) 3.0-10.0, 92 larger than 6° discarded. 10.0 SadD, silty with gravel, about 235 fines, 335 fine 84 each j028 gravel, 37 cobbies, 37 benjders, emplay, impermeable, very dense, glacial till. 10.0 Bottom of Pit. S.S. 256.1, 3.6-10.0 35 larger than 6° discorded.	172233, REF. 119.4 1/2/67 1.4.1 0.0 3.0 MELDET TOFSOIL 1.4.1 3.0 10.0 MELDET TOFSOIL 1.4.1 3.0 10.1 1.1.2 MELDET TOFSOIL 3.0 10.1 1.1.2 1.1.2 3.0 10.1 1.1.2 1.1.2 3.0 10.0 MELT dynamics size 127, breve, same, 215, fixe.stost 3.0 10.0 Metter dry or 7/18/63. 3.0 10.0 Metter dry or 1170 3.0 10.0 Metter dry or 118/75. 3.10 10.0	• •		B.S. 256.1, 3.0-10.0 6% larger than 6" discarded.
0.0 3.0 BERLDERT TOPSOIL 3.0 10.0 SARD, gravelly with cobbies, about 7% fines, 20% GP-GM fine seed, 13% medium and, 10% coerse sand, 33% gravel, 13% cobbies, 7% boulders, sub-round ta oub-angular, maximum size 12", brees, damp, high permeability, dense, know terrace. 10.0 Better of Pit. 10.0 Softward, the permeability of the second seco	 0.0 3.0 Definition and 10 control of the second state of			BOTE: Water level dry on 7/14/65.
 3.0 10.0 SAND, gravelly with cobbins, about 75 fines, 201 CP-CH fine end, 133 matium sund, 192 cosres sand, 331 gravel, 135 cobbies, 72 houlders, sub-round ta oub-angular, maximum size 12", brown, damp, high permusbility, danae, huma tarrace. 10.0 Dettem of Fit. 8.5. 255.1 (2 hugs) 3.0-10.0, 62 larger than 6" discarded. BOTE: Water dry on 7/14/63. 17-236, MLFV. 1174.6 6/25/63 K.C.L. 8.6 3.0 THFOLL 8.6 3.0 THFOLL 8.6 10.0 SaMD, altry with gravel, about 235 fines, 335 fine SH end, 105 medium and, 12 coarse eaed, 235 gravel, 35 cobbes, 75 bendérs, engulat, herd, maximum size 18", - altro-brown, damp, impermenble, very dense, glatiat till. 10.0 Dettem of Fit. 9.5. 256.1, 3.6-10.0 35 larger than 6" discorded. 	 3.0 10.0 SAND, gravelly with cobbies, about 75 fines, 207. CP-CH fine end, 133 mathem sumd, 104 Coarse send, 333 gravel, 135 cobbies, 23 boulders, sub-rayed to oub-angular, danas, ham terrace. 10.0 Dettem of Fit. 8.3. 235.1 (2 bags) 3.0-10.0, 02 larger than 6" discarded. BOTH: Mater dry on 7/14/65. 17-236, M.FV. 1176.4 6/23/63 K.C.L. 8.400, silty with gravel, about 23% fines, 33% fine fit and, 10% modium samd, 23 coarse send, 23% gravel, 37 cobbies, 75 boulders, maylor, hard, marinem size 18", - alive-brave, damp, impressible, very dense, glatial till. 10.0 Dettem of Fit. 9.10.0 Samp, 200, 200, 200, 200, 200, 200, 200, 20	17=25),	B.W.	1194.6 \$/23/65 K.C.L.
BOTE: Mater dry on 7/14/65. 17-236, ELTV. 1174.6 6/25/65 K.C.L. 0.6 3.0 YUPPOLL 3.0 10.0 SAMD, silty with gravel, about 25% fines, 35% fine SH sound, 10% modium samd, 2% coarse send, 25% gravel, 3% cobbles, 7% boulders, engular, hard, maximum size 10", - elitur-brown, damp, impermeable, very dense, glacial till. 10.0 Bottom of Pit. 8.5, 256.1, 3.6-10.0 % larger them 6" discorded.	RUTE: Mater dry os 7/14/63. E7-236, M.RV. 1174.4 6/23/63 K.C.L. 0.0 3.0 TOPOLL 3.0 10.0 Margonic samed, 22 coarse samed, 232 gravel, B cobbles, 75 beniders, maguier, hard, marken size 18", . alive-brown, damy, imperametric, very denses, glacial till. 0.0 Mestam of Pit. B.S. 256.1, 3.6-10.0 32 larger than 6" discorded. HOTE: Mater level at 7.8" os 7/14/65.	3.0		SAND, growily with cobbins, about 72 fines, 202 CP-CH fine sead, 132 mains and, 104 Contros sead, 333 growal, 132 cobbins, 22 boulders, sub-round to sub-angular, maximum size 127, brown, damp, high permashility, damae, huma terrect.
17-234, HLFY. 1174.4 6/25/63 K.G.L. 0.0 3.0 TOPSOIL 3.0 10.0 SAMD, siley with gravel, about 23% fines, 33% fine SH and, 10% modium samd, 2% coarse samd, 23% gravel, 3% coblem, 3% coblem, 3% coblem, 3% collider, angular, hard, maximum size 16", - alive-brown, damp, impermetable, vory dense, glacial till. 10.0 Sottem of Pit. p.5, 256.1, 3.0-10.0 3% inverse them 6" discorded.	17-236, MLRY. 1176.4 6/25/63 K.C.L 0.0 3.0 TOPPOLL 3.0 10.0 Manda, silty with gravel, shows 25% fines, 35% fine fin and, 15% module and, 22 carses eased, 22% gravel, 18.0 Science of Pit. 0.3 236.1, 3.6-10.0 3% larger than 6" discorded. HUTE: Mater level at 7.0" on 7/16/05.			B.S. 255.1 (2 bags) 3.0-10.0, 0% larger than 6" discarded.
9.6 3.0 THEFOIL 3.0 10.0 SAMD, olicy with growtl, about 25% fines, 35% fine SH omd, 10% modium samd, 2% coarse cand, 22% growtl, 3% cobbles, 2% beelders, engular, harimon site 18", - alive-breve, damp, impermemble, very denam, glacial till. 10.0 Bettem of PHL 9.5, 256.1, 3.6-10.0 % inrger them 6" discorded.	 9.6 3.0 THEFOIL Start, shows 275 fixes, 355 fixe SH and, 10.0 SAMD, silty with growth, shows 275 fixes, 355 fixe SH and, 155 coeffices, engular, herd, maximum size 10", - alive-brown, damp, impermethis, very dense, glatist till. 10.0 Sector of Fit. 9.5. 256.1, 3.6-10.0 35 larger than 6" discorded. HTTE: Water loval at 7.0" on 7/14/05. 			BOTE: Water dry on 7/14/65.
3.0 10.0 statu, silvy with growel, about 23% fines, 33% fine 24 ound, 10% modium name, 31% coarse sand, 23% growel, 3% cobbleo, 2% besiders, engular, hard, maximum site 10", - alive-browe, damp, impermeable, very dense, glacial till. 10.0 Sector of Pit. p.S. 256.1, 3.0-10.0 % inrger them 6" discorded.	3.6 10.0 samp, silvy with growel, shewt 23% fine, 35% fine 54 and, 10% modium samd, 32% coarse and, 23% growel, 3% cobbles, 3% beniders, mayner, hard, maximum sine 10", - alive-forwar, damp, impermethic, very dense, glatial till. 0.0 Better of Pit. 9.3, 256.1, 3.6-10.0 % larger than 6" discorded. MOTE: Unter lovel at 7.0" on 7/14/05.	17-234 ,	HLIV.	
	DETE, Water level at 7.0' en 7/14/63.	3.0		Add0, silty with gravel, about 255 fines, 335 fine SH samd, 105 modium samd, 23 coarse samd, 235 gravel, 35 cobbles, 35 boulders, enguler, herd, mariame size 18", - olive-brown, damp, impermoble, very desse, glatial till.
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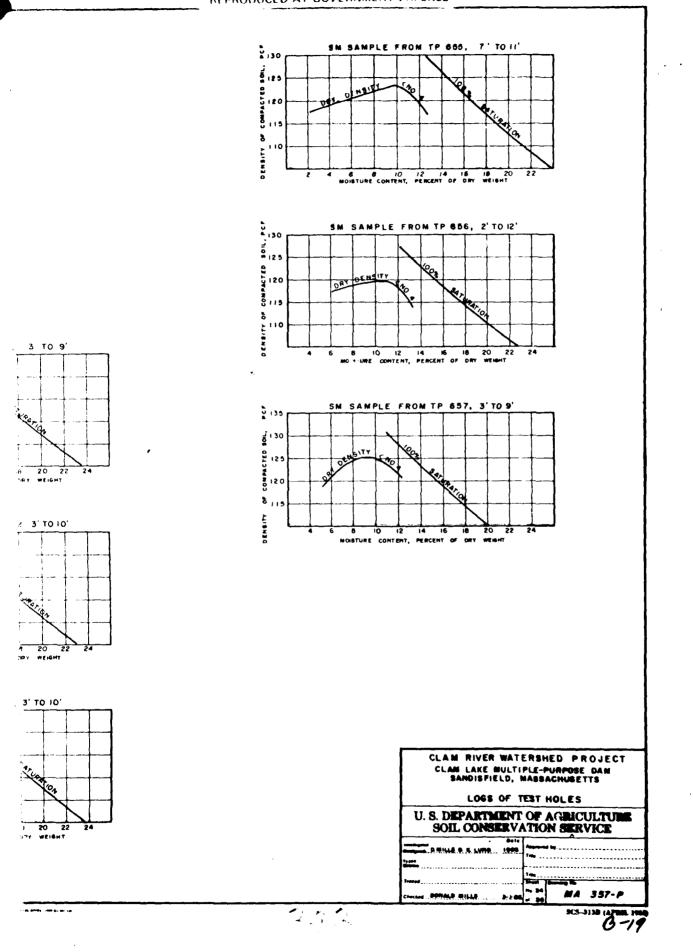
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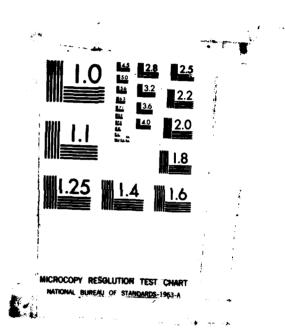
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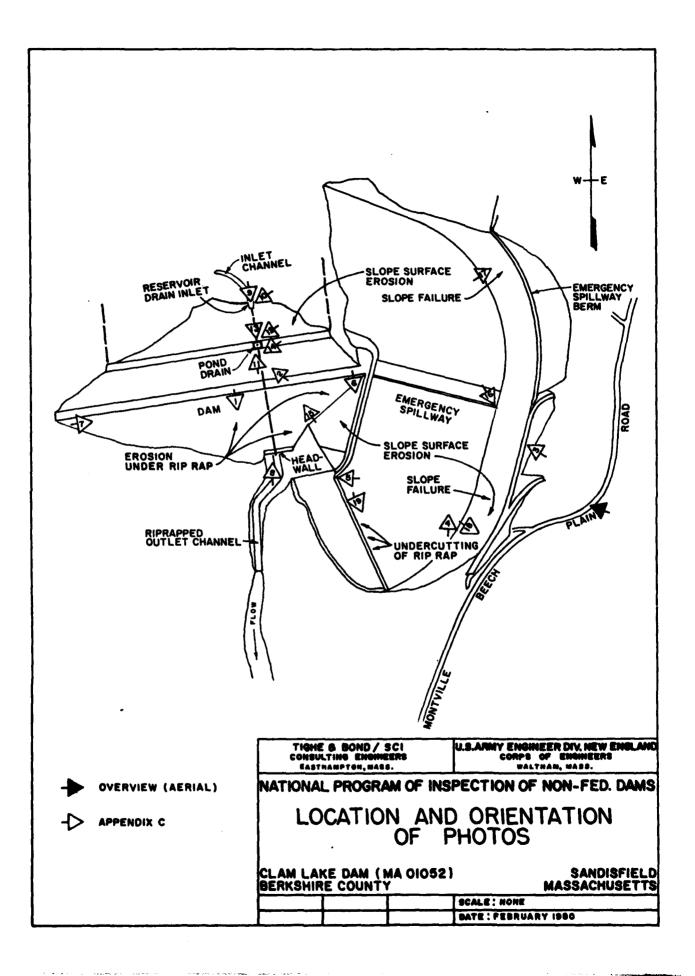
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APPENDIX C SELECTED PHOTOGRAPHS OF PROJECT

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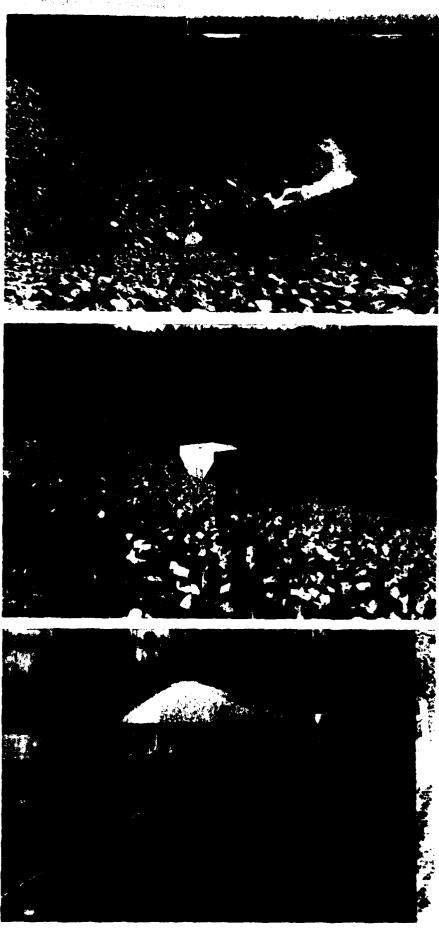


Photo 1

Overview of downstream channel looking south from top of dam.

Photo 2

Overview of reservoir area, upstream embankment and principal spillway structure looking northwesterly from embankment.

Photo 3

Overview of emergency spillway crest, weir wall and dam crest looking west from top of left slope of emergency spillway. oto 4

Photo 5

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Gverview of emergency spillway approach channel looking Northerly from toe of spillway discharge channel.

Overview of downstream embankment

è emergency spillway.

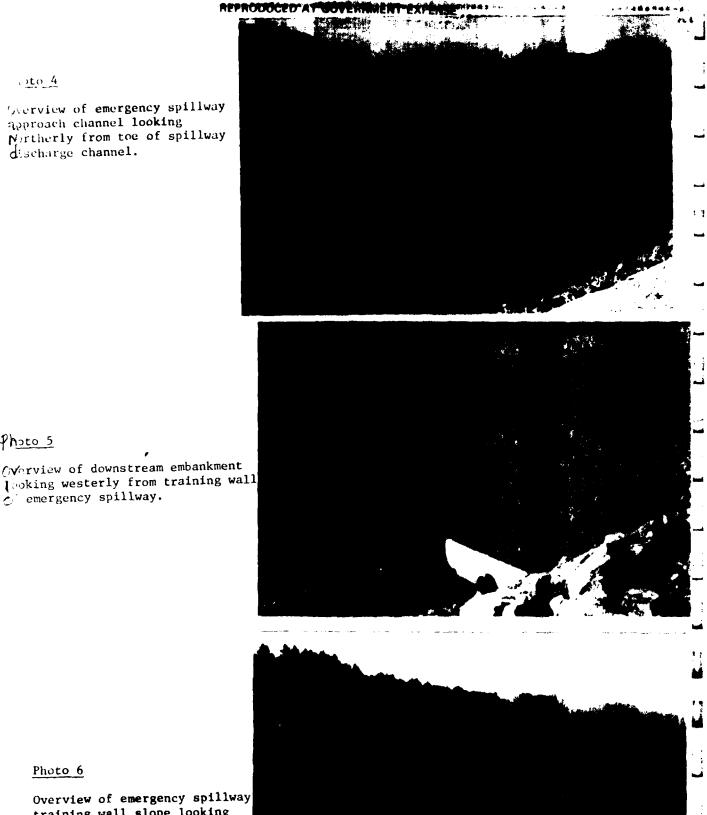


Photo 6

Overview of emergency spillway training wall slope looking southerly from dam crest. Note: Erosion of slope.

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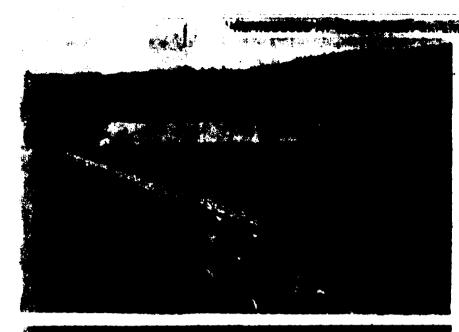


Photo 7

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Overview of downstream embankment, spillway discharge channel and left slope of emergency spillway. Note: The sloughing of left spillway slope.



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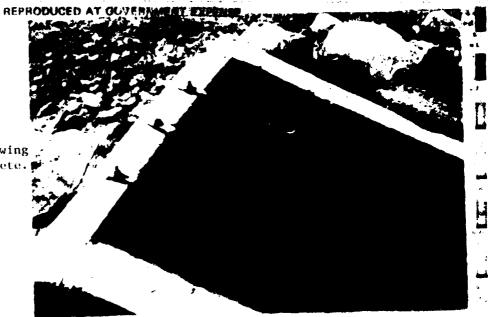
Photo 8

60-inch outlet conduit and end wall. Note the crack above pipe and missing foundation drain pipe outlet to the left of the 60-inch conduit.

Photo 9

Pond drain inlet structure. Note damaged trash racks.

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Photo 10

Pond drain inlet structure wing wall. Note cracks in concrete.



Gate well of principal spillway structure. Note the lower two Stem guides are damaged.



Photo 12

Crack on right wall of riser transition.

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Photo 13

Cracks and efflorescence on transition of principal spillway riser.



Photo 14

Crack in transition near the vertical downstream face of the principal spillway riser.



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Photo 15

Closeup of silt from beneath rip rap on downstream side of embankment.

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REPRODUCED AT GOVERNMENT EXPENSE



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torarup of left slope toe of margency spillway at crest. ate groundwater seepage from dop.



hoto 17

Left slope of emergency spillway. Note slope failure and erosion.

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Photo 18

Left slope of emergency spillway. Note erosion.



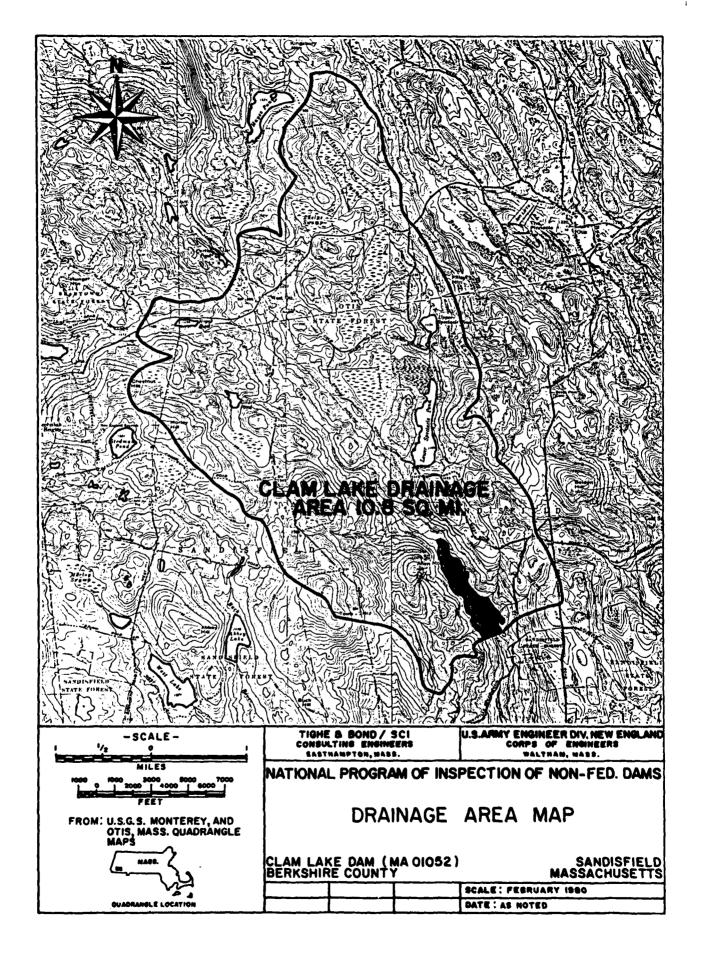
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Photo 19

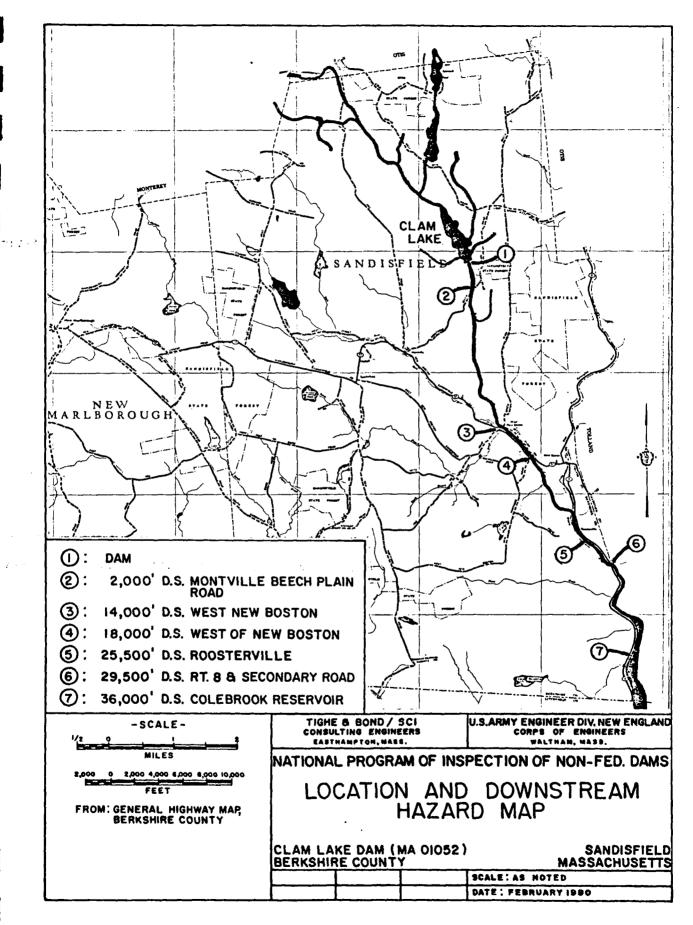
Transition of grass covered channel to riprap slope of emergency spillway. Note erosion and undercutting of rip rap by runoff.

APPENDIX D

OUTLINE OF DRAINAGE AREA AND COMPUTATIONS



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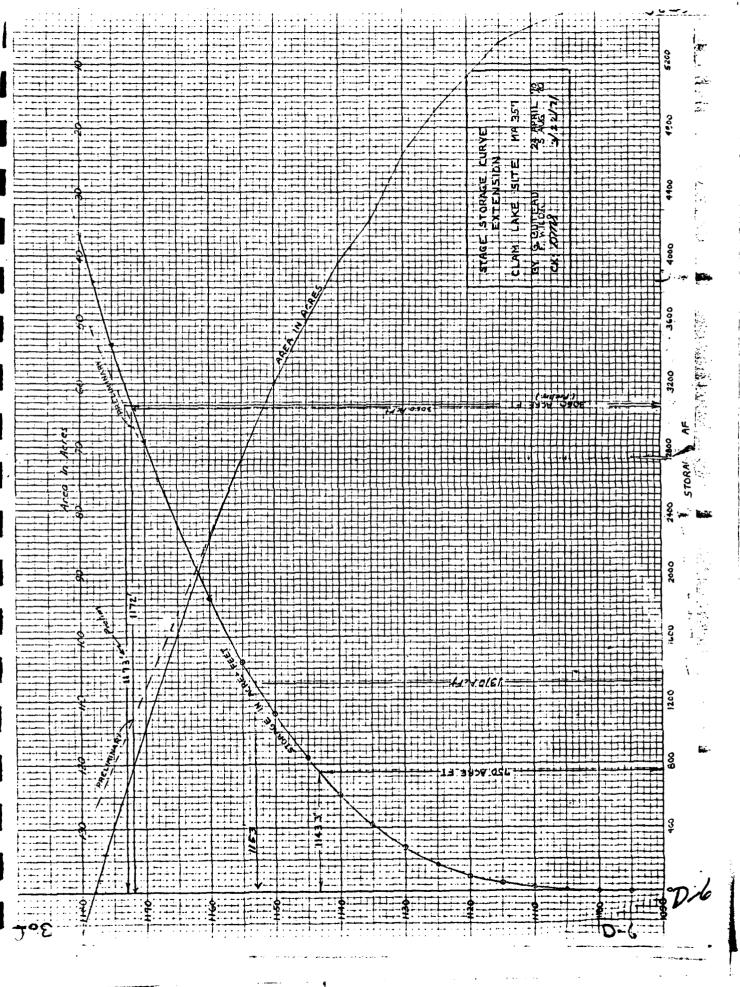


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Hydrallic/Hydrologic | competer by unenert 120 January 2, 1980 Compitations Checked by Moe 107: Clan Lake Dan Sandisfield Mass. Drainage Area = 6900 Acres = 10,85m Water surface = 47 Acres Size Classification To Spilling (Height of Dan = 88ft (Interedicte) Storage of E.S Crest = 3050 A.F. (Intermidicte) Top of Dan (Height of Dan = 94 ft Storage = 3840 A = g Intermedicte) Use Intermedicte 2 119 100 Suris 3 50 Hezard Potential - High Test Flood - PNF Dreineye Area Basin has mostly steep slope, 1 with some hilly terren. Vie the mountainous curve to Find the PNF PhF = 1950 CFS × 10.8 SK 51' 0.00 Ct? -D-1

and whatened the barrier and the prevent January 3, 1980 Competetions Checked By Zafi Reservoir Routing Computation, Elevetion Data Dam Crest - 1178 Emergency Spill. Crest - 1172 Riser Crest - 11 53 Orifice - 1143.3 Sectiment Pool - 1107.0 Original Ground - 1097.6 15 300 16 300 Storage Data Sedimint storage (1097-1107) - 12AF Multi Porpose Poul (1107 - 1143.3) -738 AF Flood Stor (1) (1143.32 - 1153 - 560 AF Flood Stor(2) (1153- 1172) - 1750 AF Area Data Sectiment Storage - 3A mult. Po-pose - A7 A Flood Stori - 67A - 120,5A Flood Stor 2 Store - Storeje and spilling roting information contained in the hydroclic/ hydrology section at the Design Folder prepared by the Soil Conservation Saving has been revenued and found ,-5 valief for this civilizers. D.r



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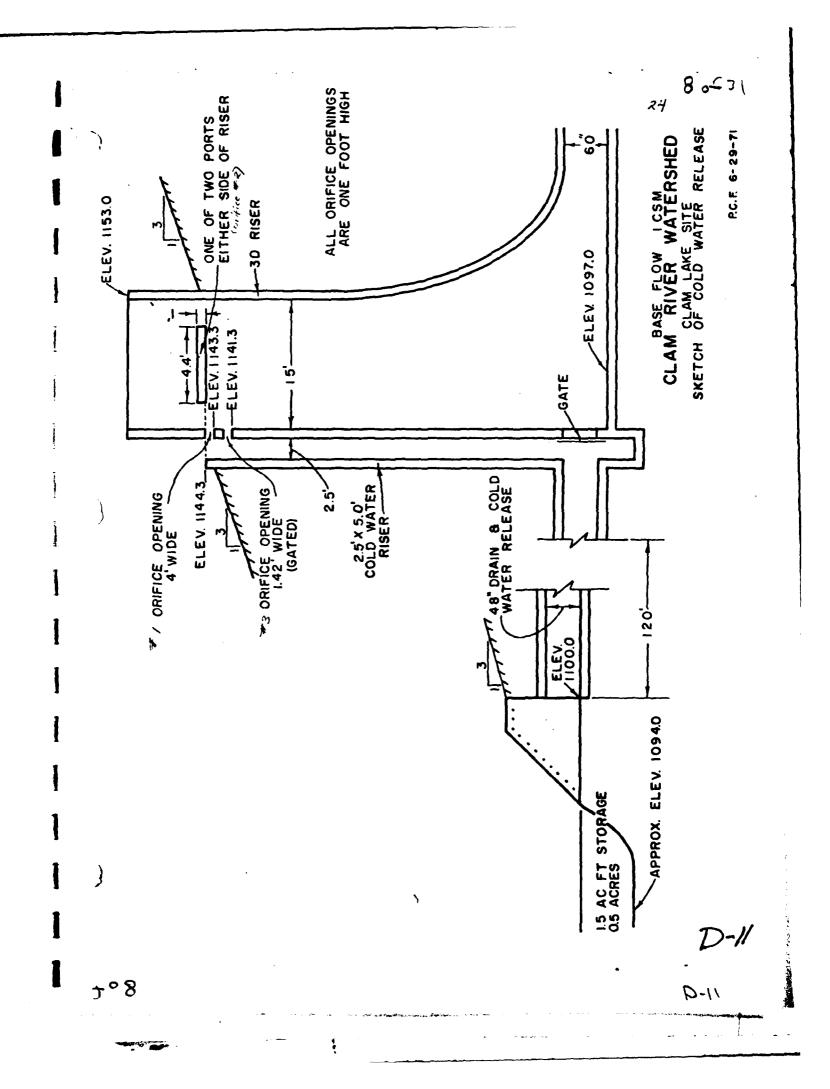
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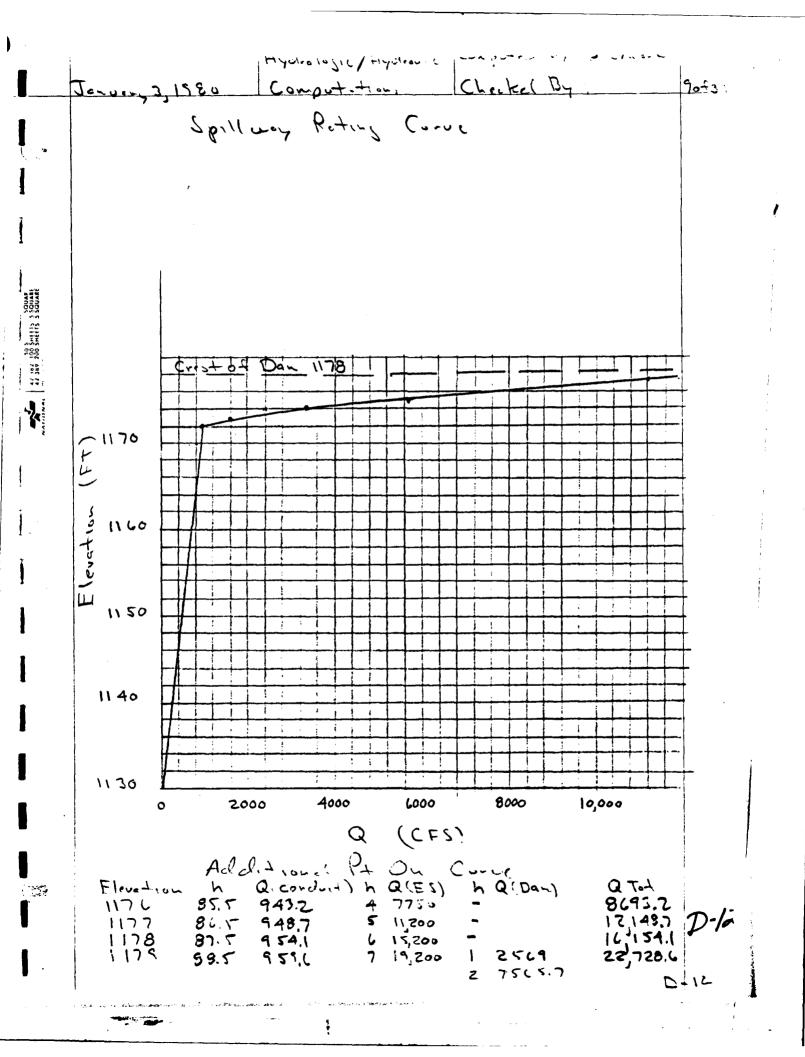
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Hydroiogic/ Hydreu ic ---- une une un January 7, 1980 Conputation Chicked By 605 Spilling and Conduct Riting The principal spillway has three sets of onfices for water release at normal poul elevations. The first orfice (geted) is set at elevation 1141.3 and 10 1'× 1.42'. The second onfice is HEETS set at 1143.3 and is 1'x Alis The 42 382 third orfice 15 Set at 1144.3 **K** and consists of two (2) openings 1' × A.A' All one foot diminsions being the height of the openings The visco also hese a first stage flood weir at 1153.0 on each side of the visco. The war on each side of the river is 15' long. This were acts as an office once the stage gets to 1156. The energency spillway for the dan is out into the left abutment ond is 385 for unde. The approach channel has a slope of - 2,3% from the crest and the clischarge chonnel here style of 1.8% owen from P-9

Hydralogic/Hydroslic Computer by Willman January 3, 1980 Compodation Chickedby 7.5: the crest. The crest is flat for 50' and a concrete were is at the down stream edge at the flat crest. Slopes to each side of the syill way The ES creat is set at elevation 1172.0 MSL A 5' diancter could sit carries auter fron the principal spillaron 42 382 under the day to a pluge pool ľk, on the down streen side. The discharge of the principal spilling is limited by the copacity of the conduct. A 18" poul drein cornes unter to the riser from the inlet structure but normally the gate will be closed and the only contribution this conduct will have to discharge is the release of bottom water thru the gate well on the up strion side of the riser. D-19





., 1000 January - 1850 -10-5 Checked by: 100-3 Conputit Computation of additional points Conduct Q: CPHK (1143.3) Q : 102 H1/2 Q - 102(85,5) 1 = 943.2 Q 102(85.5)1/2 948.7 12 182 200 SHEETS 550 AR Q. 102(B).5) 1/2 = 954.1 Q - 102(89.5)/2. 955,C Spillary QICLH (1172) (using deta in SCS Folder) HR Q 1 4 7750 5 11,200 15,200 C 19,200 7 Q= C L H3/2 (1178) C=Z.C, L- 988 FL Dan Q. (2.1) (988) (1) $\frac{3}{2}$: 2568.2 1179 Q. (2.6) (988) (2) = 75(5,7 1180 Q - (21) (988) (3) - 13,347.9 1191 Dyis

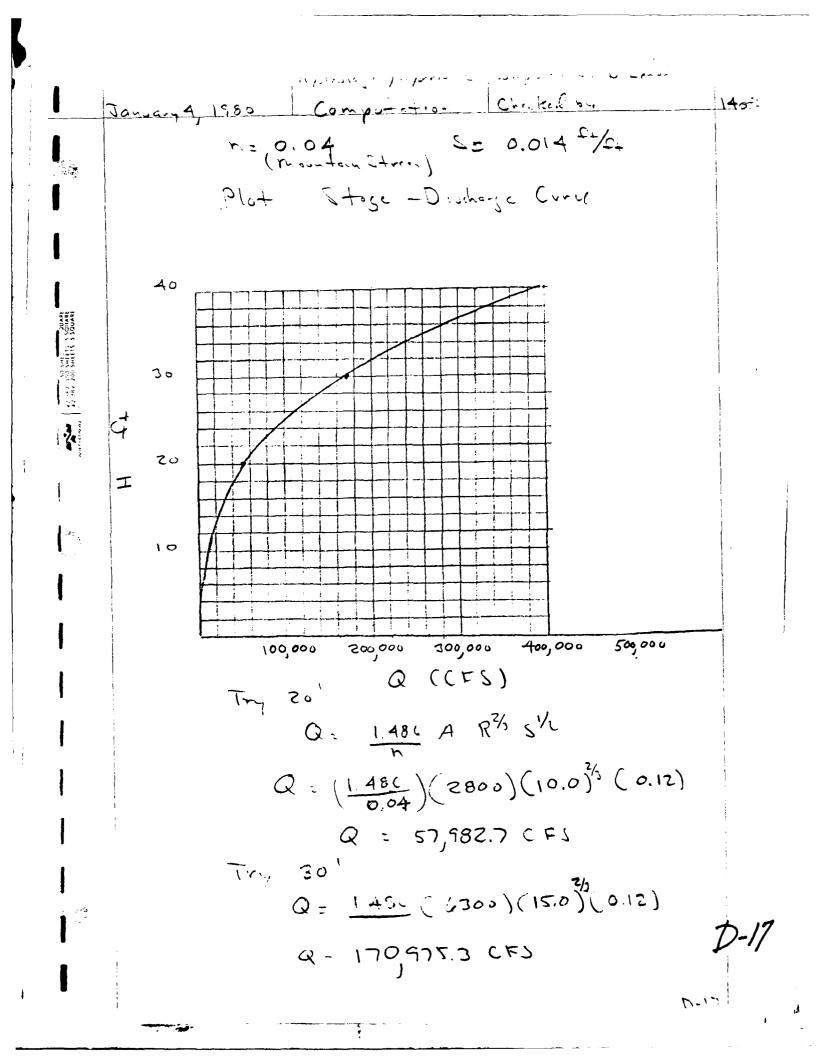
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January A 1980 Computetion Chritich Py Moe 120 H for Qpz and Qps =gree ,* • • Surcharge Height H: 34.4 0- 1143,3+34,4 = 1177.70 Crest of den 15 et 1178.00 therefore the day will not be overtopped 12 Jug 200 Shitis and the spilling : one official. K

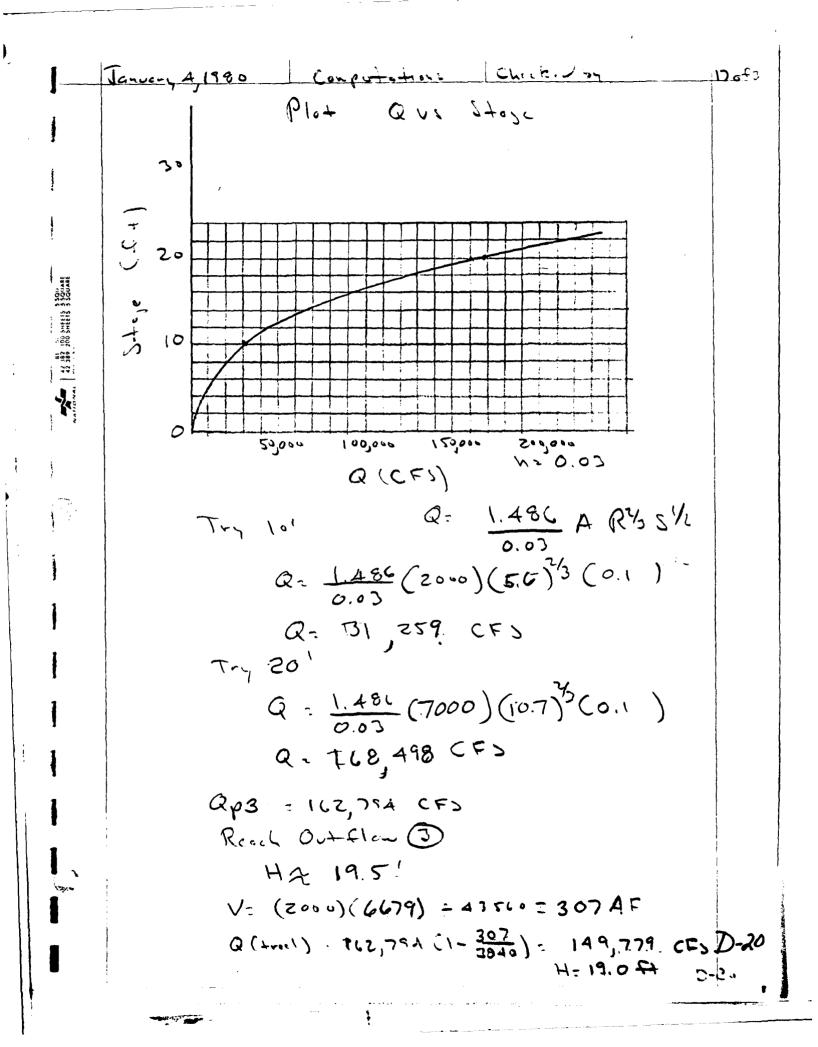
January A, 1980 | Computations Checked by Moe Qp = 8 W b US Yor Wb = breach width et mil height of dan (40% of 590) = 236 Yo - height from riverbed to pool at failure Assume what dan crest 1178,0 $Q_{P_1} = \frac{8}{27} (231) (5.18) (94)^{3/2}$ Qp1= 3(1,975 CFS The first major import area to be considered is the Town of West New Boston at the confluence of the Clan River, Silver Brook and the Buck River. The reach is 14,000 fr long Looking up Velley $A: \frac{1}{2}(a_{y^2}+a_{y^2}): 7y^2$ WP= V37. y2+ VGTY2 Aueroje × Section R: 0.5 Y D-16 5-16

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January dy 1980 Computation Checked By 150-2 Reach Outflow D Qp1 = 3(1, 875 Cfs Y= 391 Use only /2 veach (Uniform x sect.) V= (7000)(39)(7) + 43,500 = 1711 AF 42 382 100 SHEETS 5 SOUM Storage at Dan Cresh = 3840 AF $Q(truel) = 3(1,975(1-\frac{V_1}{5}))$ * = 301977 (1- 1711)= = 200,089 CFS , Y=32' V2 = (7000)(32)(7) = A3560 - 1152 AF Vaue = (1711 + 1152) - 2 = = 1432 $Q_{p2} = (3(1, 975)(1 - \frac{1432}{7840}) =$ Qpz: 226,589 ... Y= 33' * Real Out + low (2). Qp2 - 22(98) y2 33' V= (7000)(33) (7) - 43560 = 12254F $Q+n-l = 22L, 989(1-\frac{1225}{3840}) = 154, 577 CFJ$ y=zzi V2 = (7000)(25)2(7) - 43560 = 946 AF Vaue (1225+941)=2 = 1086AF aps = 226,989 (1-1081) = 162,794 CFS D-18 Op3: 162, 794 (F) YZ 30 D-14

Hydraune, mydraceste, wasser with the second Tanver, 4, 1980 Competetion, Chietellon 16043 The third reach that is of inficour 13 2000 ft down stream the Clan River below West New Poston . Since the Buck River water shiel is not large the MPF flow from that area will not be reladed in this analysis and due to existing flood control structures (dand the flood is port will not be significant. The Op from the A Summer Book River is negalible composed to the Qy of the day forlow. Reach X Section (looking up velley) 10 ۲ 20 A = 50y + 1 (20y2+ 10y2) 2 Soy + 13y2 (50+154) WP = 50 + 1 401 y2 + 1001 y2 = 50 + 30.14 R -50 + 30.14 50 + 30.14 50 + 30.14 50 + 30.14 N= 0.03 5 = 0.01



rologic / marrie proportion of a month Computations Checkelby Moe 186f: January 2 1980 = (200 0)(6365) = 43560 = 292 AF Qp4 = 162,794(1-300) = 150,074 CES Q84 = 150,074 CFS H219. 4 The forth reach is 2000' down stores of West New Boston on the Cler River This reach is 5000 ft downstream of the premous 154 Y 50 A= 504+1 (1245+2045) = A(20+35A) WP = 50 + VIASY2 + VAOIY2 = 50 + 32.1y R = Y (50 + 32y) 1050 (50 + 32,14) N= 0.03 5= 0.01 Determine Points on Styr US Flow Q = 1.481 (3700) (9.97) (0.1) Try 10' Q= (84,963 CF) Q = 1.481 (1050) (A.9) (0.1) Q= 15,012 CFS 5` Try

January A 1880 One in fing Comput. - 100 19efr Plat Staje VS Flow Com 21 - د ار 10 50,000 (CF3) 200,000 flow k QPA: 150 074 CFS HZ 11 FL Reach out flow (4) V= (5000')(4422) = 4356 = 508 AF Q(trial) = 150,074 (1- 508) = 130,221CFJ Ha 10.5' V = (5000) (4053) = 43560 = 465A= Veve (508+415)-2 487AF $QPT = (150,074)(1 - \frac{487}{3840}) =$ QPT- 131,041 CF3 H& 10151 \star The fifty week will extend from 7000' down stree of West New Boston to the conflorance of the Clan River with the Went Branch of the Farming ton Rover and . clougthe WAF Rive to a bridge

- y love extagoring a Christed by. 2003 January - 1520 Conp. Just south of Pig The vecch is 8500 fr long. The PIPE for the WDF River and the Clan River 13, from COE Curve 1500 (fs/in × 85 ju = 110,400ct) X Jaction Looking up the Velley 1 20 Y * 100 A = 100 y + 1 (20y2 + 2.5 y 2) = 100 y + 1125 y2 WP: 100+ VA0142 + U7.25y2 = 100+227y R -100 y + 11.25 y2 100 + 22.7 y S= 0.0054 n= 0.03 Determine Store VS Flow Curve for Reach Try H- 101 Q - 1.48L (A)(R) (SK) $Q: \frac{1.481}{0.03} (2125) (0.5)^{2/3} (0054)^{1/2}$ (0.07) Q ZS, LTE CFS

myours of 1 - you ran Checitin D January 4, 1380 212-<u>Comps</u> Try H: 20' Q: 1.486 (6500) (5.11) (0.07) Q: IICZGT CFJ ALL STORE STORE STORE Plot Star VS Discharge + 4 エマッ 1010 0 51,000 150,000 CFJ 200000 100000 QpT= 131,041 CES HZ 20.5ft Real Outflow (3) V= (8500) (6778) + 43500 = 1323 AF Qp(4...1) 131,041 (1-132) - 85,893 CFS H= 18' V=(8500)(5448)=40760= 1063AF $Q_{10} = (323 \pm 100)^{-1} = 1193$ $Q_{10} = 131,041(1 - \frac{1193}{3040}) = 90,338$ CFS D-240750

alist madares e Janver 4, 1980 Computations Checkert by. 2204 Qp(= 90,330 CF) H== 18.25 * (lethout Phi F of Formington Rive-and other adjournt areas.) The attended flow from the fith vicel is 90,330 CES without the 2004 PNF from the Formington River. U. +1 the Fernington River PMF the flou would be 225,330 CFS.

Hyuround Hyprologic , -on porr 1 by . D. Lencer Jenvery A, 1980 Compitations Children 2325 Reyond the Situreach is the Cole Brock Res. The dan foilure flow from Clan Loke will amount to 3840 AF. The normal Surface area of the Cole Brock Res 15 about 460 A. Therefore, the Colebrook Reservoir surface will vise about 8 ft to store <u>c</u>: the failure volume of J840 AF. The normal good elevation of Cole Brook Res is 701 and the crest of the dan is about 780. Therefore the store requirement of 8 ft for the follow volume is loss than 10 % of the flood storage avoilable for flood detention. D-26

Mydrologic popping a server · Feb 8, 1980 Comps Checked Sup 255major roadways, and a conchary. 4) The day forlow flow in the Sift much will result in a stope of about 1825ft with an ettenuited Slow of 90,330 CFS. If the PNF of the W. Brench . + the Formington Piver is included the styre will be about 26fr and the flow will be 225,330 CFS. This flood will result in danage to about 11 homes and buildings two major highway bridges, one secondary road bridge ander bout 13000 fect of road. 5) Decevie of the existence of Cole Brook Reservoir , a flood control stracture, the forlure flue will be stored and re Souther downstress domage will dikely or wo D-27

Hydronlee/ Hydrologics - import to Diencin Chroteling 260-Feb E iser 1 anp-Summery of Electro Dur to Dan Failur F1000 CF3 361, 575 Area Location \bigcirc A+Da~ 2000 25 225,989 \bigcirc 6 14000° D) 162,794 θ 18 000 DS 131,041 5 90,330 52,500 DS 29,500 03 90,330 6 12: 24,000 05 $\tilde{\mathcal{D}}$ Fisal Stored }

Hydrologic/Hydrovice Computeriby DiLonary · February 81980 Comps Checked by 245 (Not including PMF for adjourned DAS) 1) The spillways for the dan are adaptive to bandle the PRF and the characture will not be our topped. 2) Dan forlore flow is in the first + Second reachestron the day to the confluence of the Clan River and the Buck River will result in a stage of 30 to 33' with an attenuated foilure flow from 220,989 to 162,794 CFS . The foilore flow will result in the loss of a wooden bridge on mintuille Decch-Plain R.L. 3) The dan follow Stor in the third and fourth reach from the confluence of the Clan and Buck River in West New Doston to the confluence of the Clan River with the West Brench of the Formanto- Pour all risult in a charge at about 194011 and - ++++++++ -150,074 to 131,041 CFS The flee will real anose to about 25 ± hours and weldings, two D-29 major Ericlic, about 9000 ft of

mand and a supplicitience Survey live Mre Fascings 23412 270-Significant Triboriary Drangic Area Data Location DA PN.F (SK) (CF)DEron Don, To Confluence Chan Breet River with ANAL 12 DE TOU SHUE S CUAR 9) Clan Rivin 10.8 Sm 1) Todon 15,000 2.2 SN 21 TO Buck R 5,500 13.0 SN 20 500 From confluence of 2) Duck River in W Brach of Franciston Murs 20,500 13.0 sh al Clamto Buck 2,55m 6,200 b) Clan Buckto LoBFarm. 5.0 sn c) Silven Brook 11,220 14,900 8.6 Sm d) Duck River 52,850 29.1 SM 3) W Bronch Fermington River to Colebrook Rey a) Clan River 15.5 Sn 26,700 5.0 Sn b) Silve Brook 11,250 cl Buck River 8.6 sm 14,900 d) Earnington River 62.9 Sm 81,000 92 0 Sm 134,620 D-30 'n <u>n</u>a '

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Hydren's 1 tydroland j 101-1- VLonget Feb 2 1980 Comps Chrotel by 29-53 Bridge Crossing Data 1 Montville- Beach Plain Road Bridge Streamber elevition the Arealise 1000 2 Road had elevation of 1070 Dan forlore flood + PMF elevation 72 1093 Dan forlore flood + PMF elevation 72 1094 k 2) West New Boston - Sandisfield Rd Bridgic - 2 868 Stream bed elevition Arc. L.c - 2 887 3 Road ball elevation Dan forture flood elevotion - 2 887.0 Dan followe foul + Ph Februation - 7 897.0 3) New Boston - New Hartford Rel Dr. dyc Areabou Streambol elevation -& BZ7 Road bol elevation - 2837 Day fallow find elevation -2837.5" Dan forlune + PKF elevation 2837.5 A) Bridge -+ Roostmuile Fraise intrombod elevation -2765 ...معمر ب Predice alimiting -277 Danvailing flood elevation - 20786 - D-32 Dan failure flow 0 = 2,791

Hydronichungserengie jungen by simmer Comp Checked by: Fel 8, 1980 30 ---5) R+8 Bridge over W Branch Farming ton R Arrilie Streambell elevation - A 744 Road bed elevation - 2 758 Danfeiture FlooDales - 2 765 Danfollove + Pr. F clau - A 770 Access Roal Indge Lout of R+ 8 (م 42 142 100 50 5 ArreLoc Streambel elevotion 7 740 6 Rudbed devetion as 750 Dan failure floidelos or 761 Dan foilure + Phipeles 2 766

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

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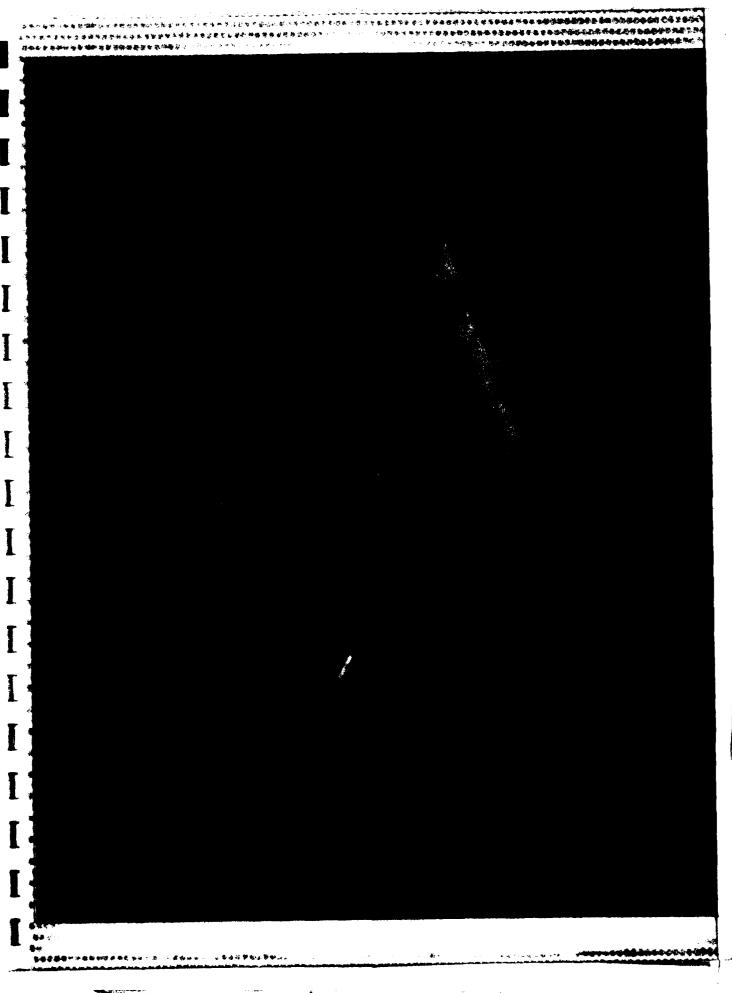
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CLAM RIVER WATERSHED PROJECT CLAM LAKE MULTIPLE-PURPOSE DAM RECREATION AND FLOOD PREVENTION

DRAINAGE AREA6900ACRESTOTAL STORAGE3050ACRE FEETFLOODWATER RETARDING STORAGE2300ACRE FEETTO EMERGENCY SPILLWAY CREST2300ACRE FEETWATER SURFACE AREA47ACRESAT PERMANENT POOL88FEETHEIGHT OF DAM88FEETVOLUME OF FILL525,000CUBIC YARDS

BUILT UNDER THE WATERSHED PROTECTION AND FLOOD PREVENTION ACT

by

MASSACHUSETTS DEPARTMENT of NATURAL RESOURCES

and

MASSACHUSETTS WATER RESOURCES COMMISSION

and

BERKSHIRE CONSERVATION DISTRICT

of the

COMMONWEALTH of MASSACHUSETTS

with the assistance of

SOIL CONSERVATION SERVICE

of the

UNITED STATES DEPARTMENT of AGRICULTURE

1972

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SHEET 3 - AERIAL PLAN	SHEET IS - ROCK TREATMENT DETAILS
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EL DE COLL METHIC D'EFFIN CINE FENCE DETRICA

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D PROJECT

ENTION

900 ACRES 050 ACRE FEET 300 ACRE FEET

47 ACRES

88 FEET 000 CUBIC YARDS

TECTION AND

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L RESOURCES

COMMISSION

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ICULTURE

GENCY SPILLWAY DRAIN GENCY SPILLWAY DRAINAGE DETAILS TREATMENT DETAILS FIELD FENCE DETAILS ISER DETAILS

B LOW STAGE TRASH RACK DETAILS

ESERVOIR DRAIN INLET DETAILS

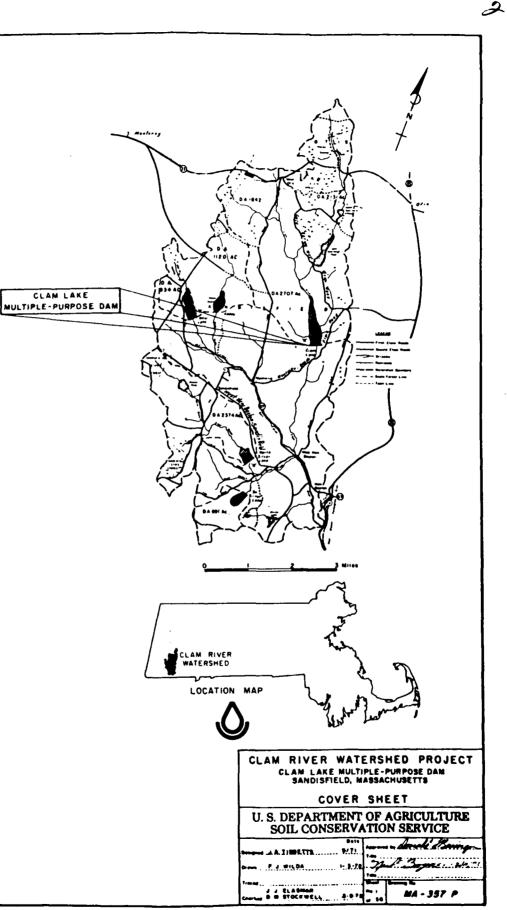
UIT DETAILS

WALL DETAILS GENCY SPILLWAY WEIR DETAILS

OGS OF TEST HOLES

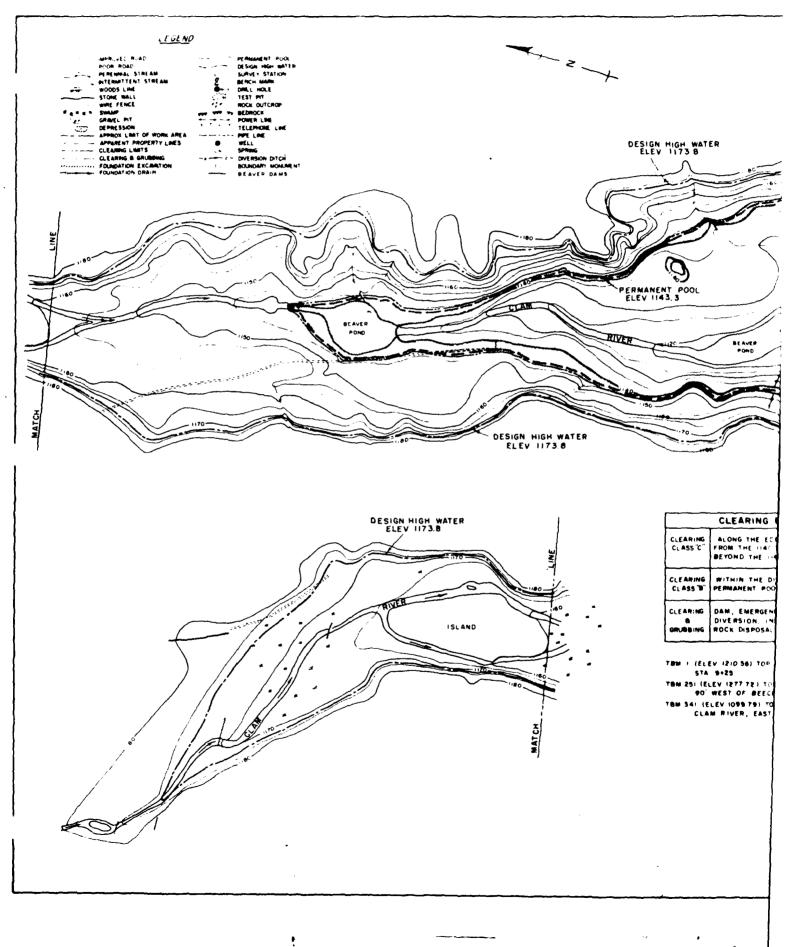
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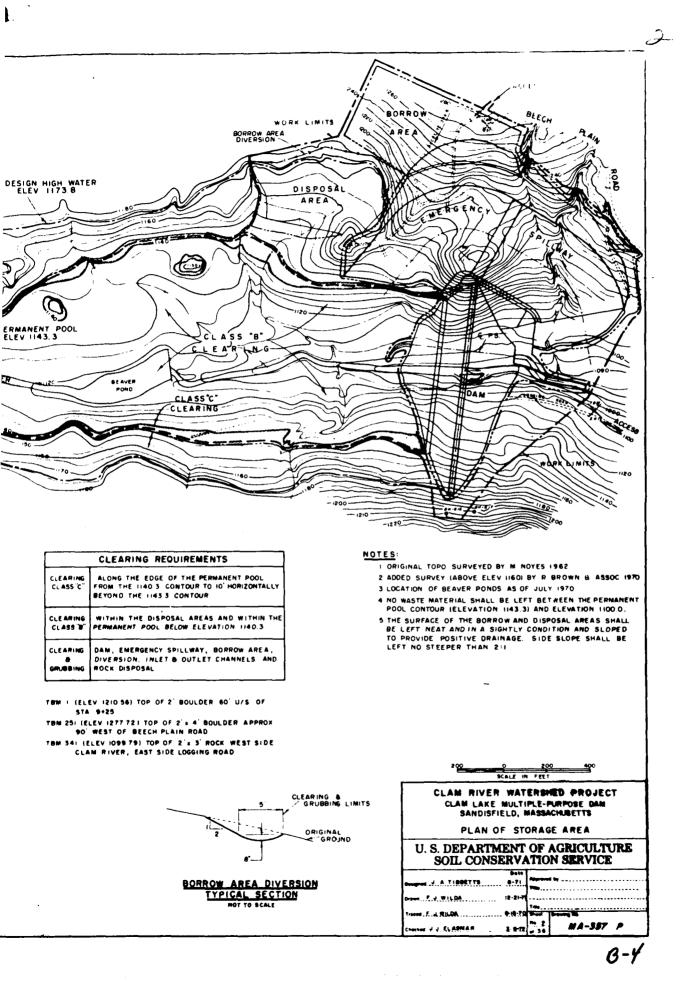
NETTING & CHAIN LINK PENCE DETAILS



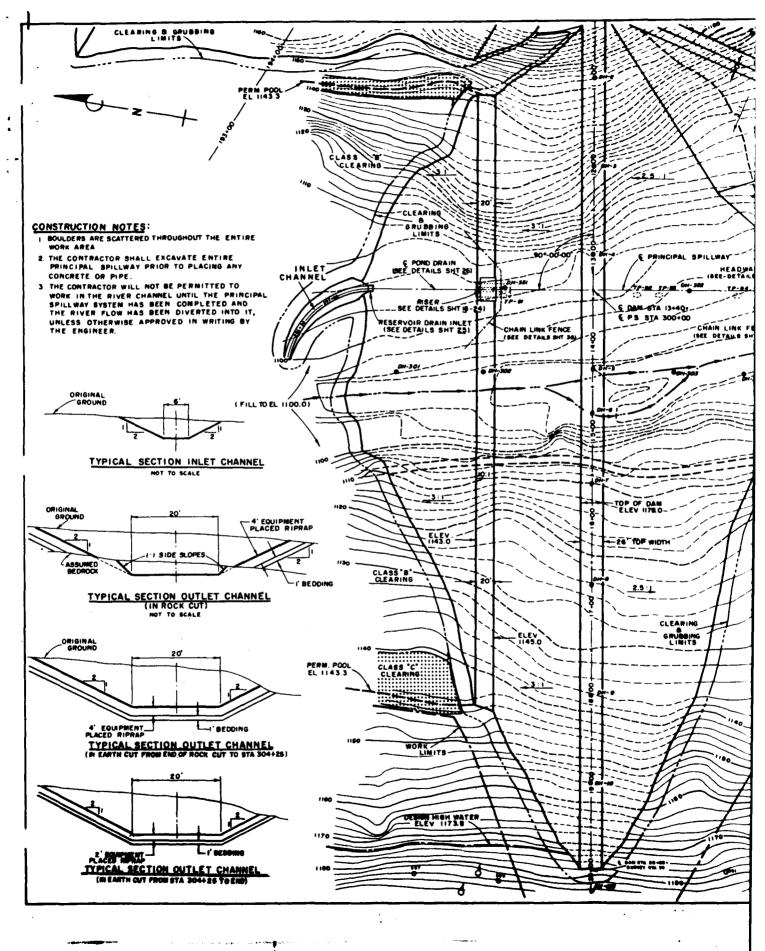
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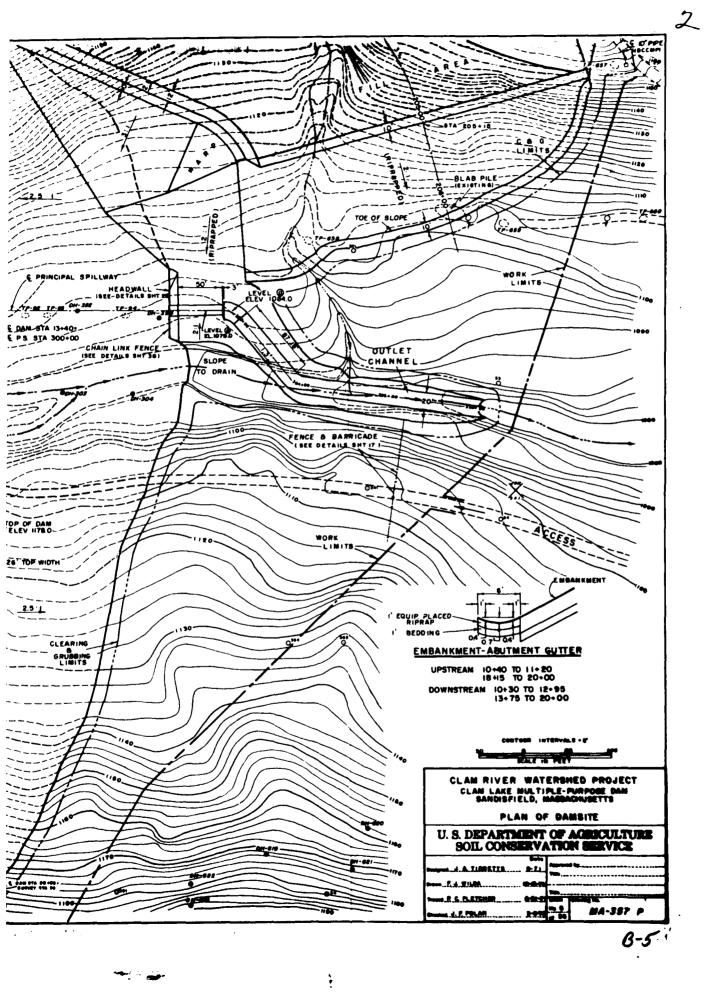
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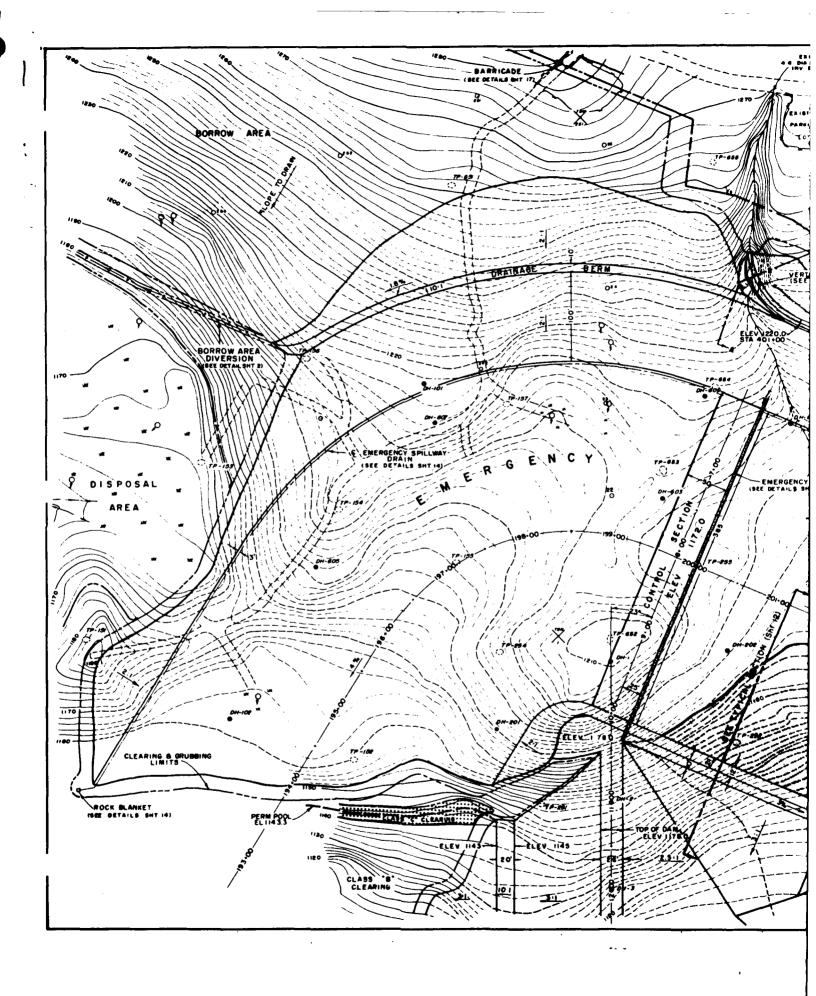


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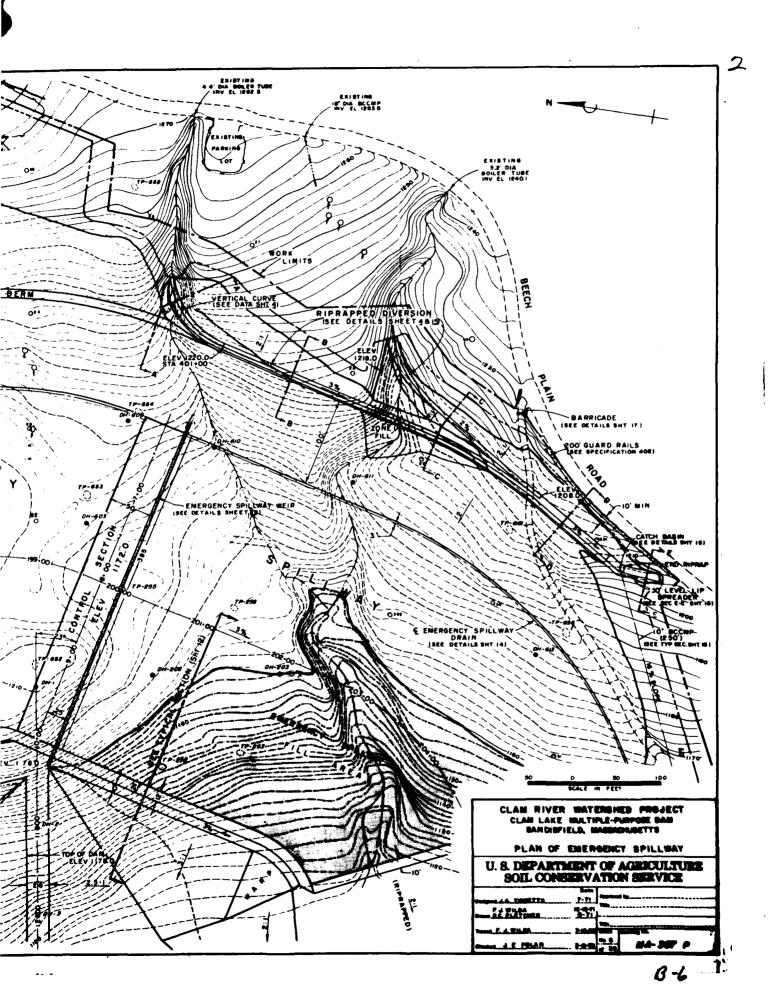




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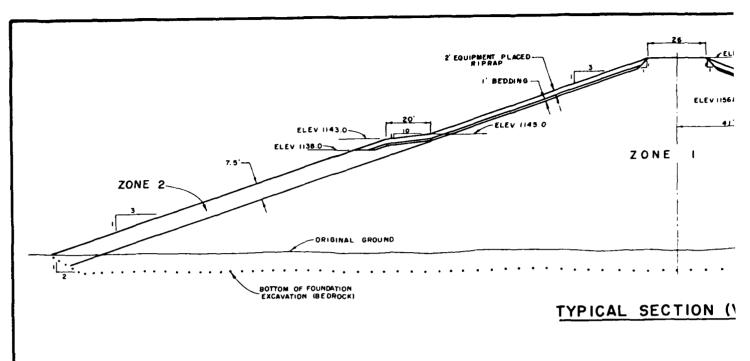


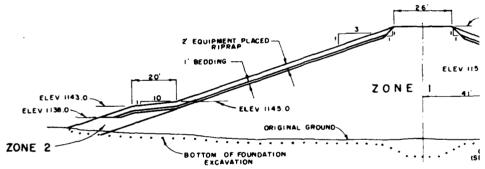
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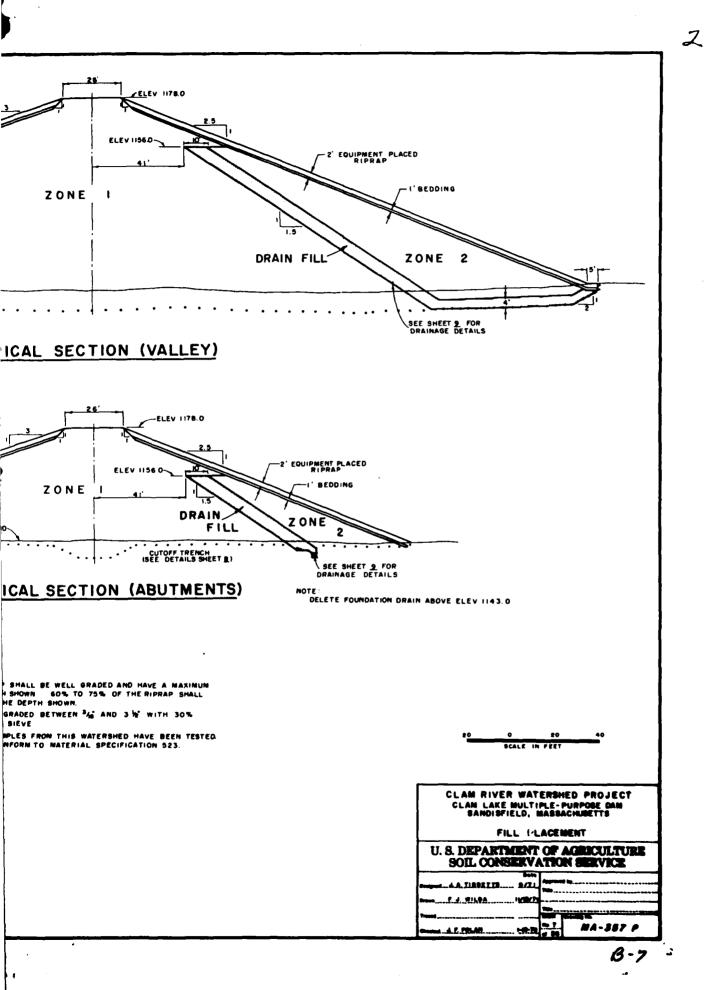
TYPICAL SECTION (AE

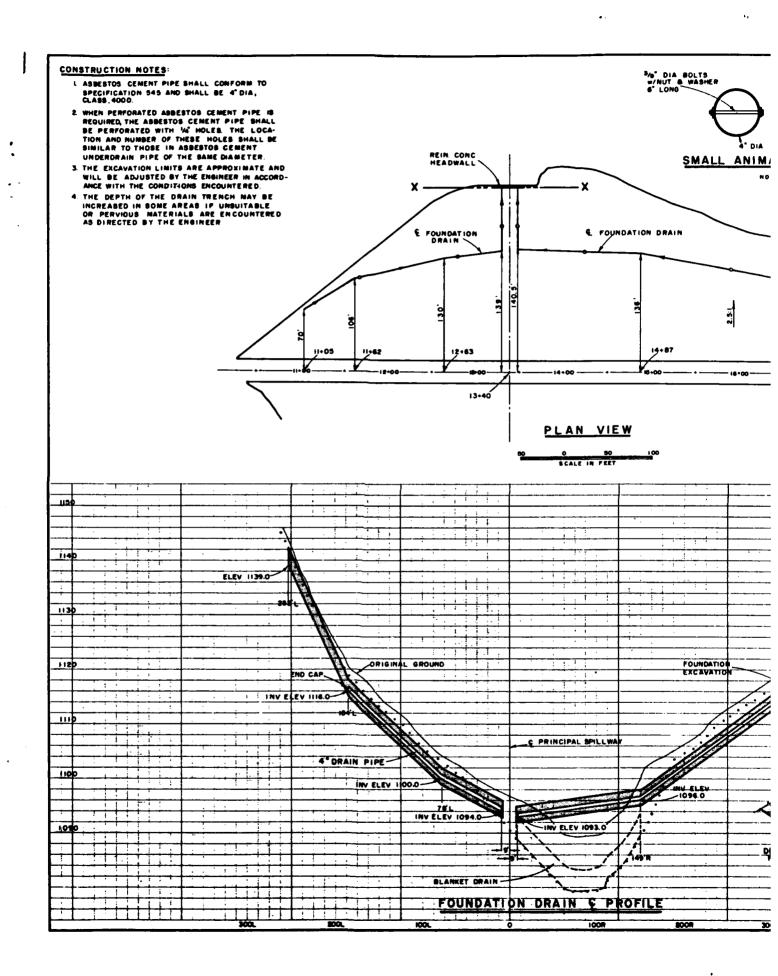
	EARTH FI				6044	DACTION
ZONE	MATERIAL	MAXINUM ROCK SIZE	LIFT 1	MININUN &	CL ASS	DEFINITION
1	SAND, SILTY WITH GRAVEL REPRESENTED BY TP 156 (2.5'-10'), DH 3 (1.5'-23'), TP 656 (1.0'-12), TP 256 (3'-10'), TP 154 (2.5'-10'), TP 651 (1'-10')	1	9.	OPTINUM	•	IOO% MAX DENSITY BY ASTN D696 METHOD A
2	SHITY SAND AND GRAVELY SAND REPRESENTED BY TP 254 (3-10'), TP 259 (3'-10'), TP 652 (05'-10'), TP 653 (1'-10'), TP 654 (1'-10') DH 9 (0-12'), DH 10 (0-10')		12*	OPTINUM	c	4 PASSES PER LAYER OF FILL #/ PNEUMATIC TIRED ROLLD WEIGHING AT LEAST 50 TONS OR AN
E.S. FILL	SAND, SILTY WITH GRAVEL SIMILAR TO THAT SHOWN IN ZONE 1.	12*	18*	OPTIMUM	c	EQUIVALENT METHOD APPROVED BY THE ENGINEER

A MAXIMUN LIFT THICKNESS PRIOR TO COMPACTION & BASED ON STANDARD PROCTOR.

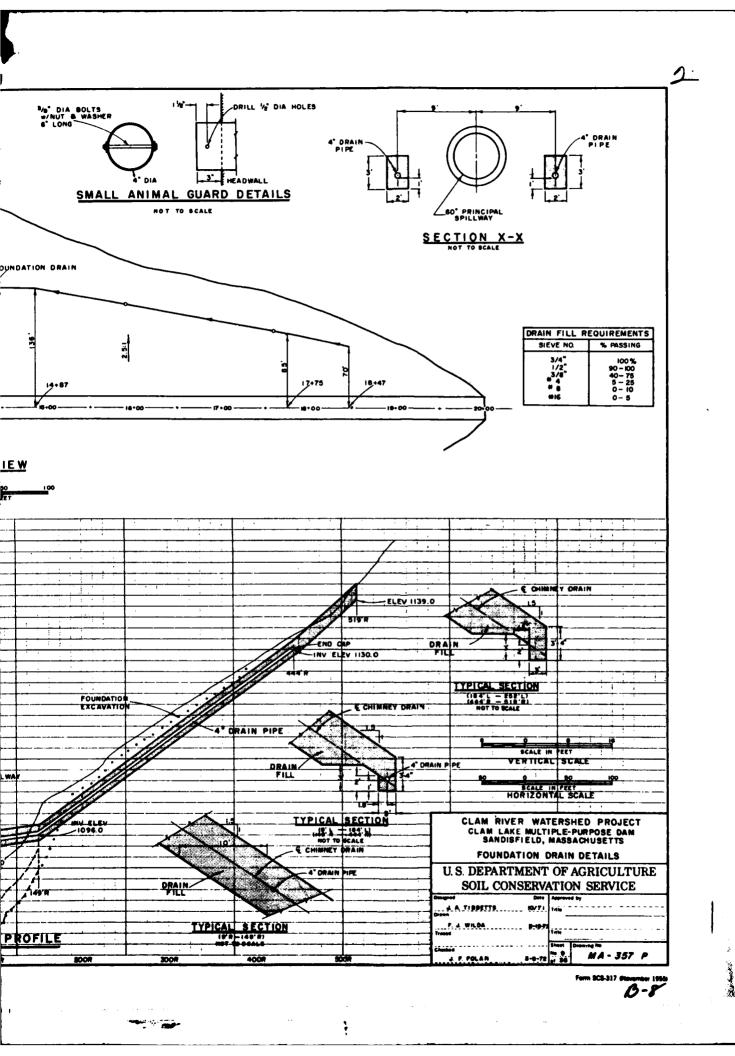
CONSTRUCTION NOTES

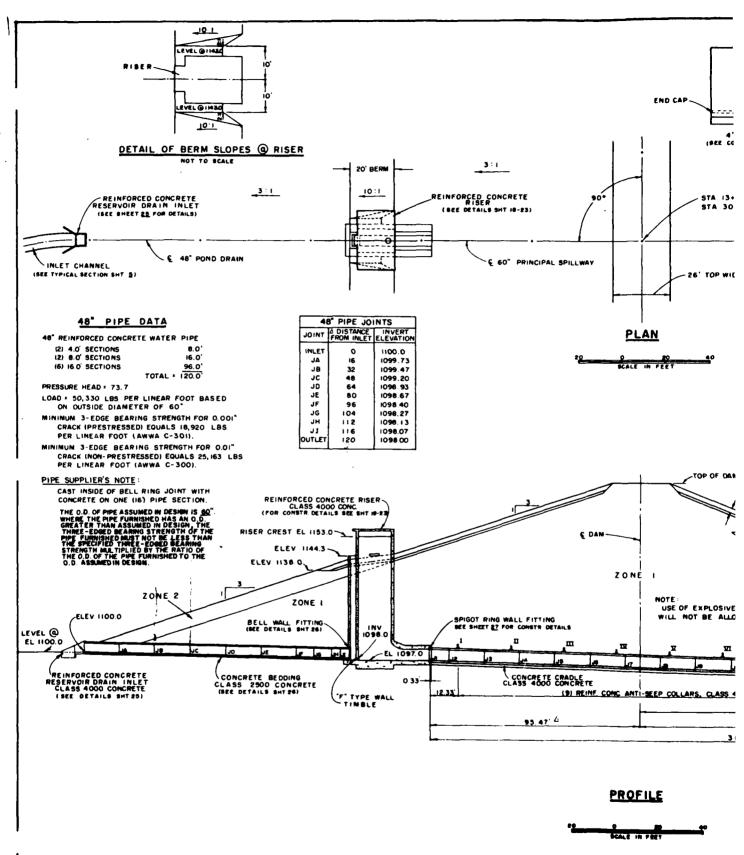
- I EQUIPMENT PLACED RIPRAP SHALL BE WELL GRADED AND HAV SIZE EQUAL TO THE DEPTH SHOWN 60% TO 75% OF THE R BE LARGER THAN % OF THE DEPTH SHOWN.
- 2. BEDDING SHALL BE WELL GRADED BETWEEN 34 AND 3 1 Y TO 70 % PASSING THE 34 SIEVE
- 3 REPRESENTATIVE ROCK SAMPLES FROM THIS WATERSHED HAVE ALL SAMPLES TESTED CONFORM TO MATERIAL SPECIFICATIO



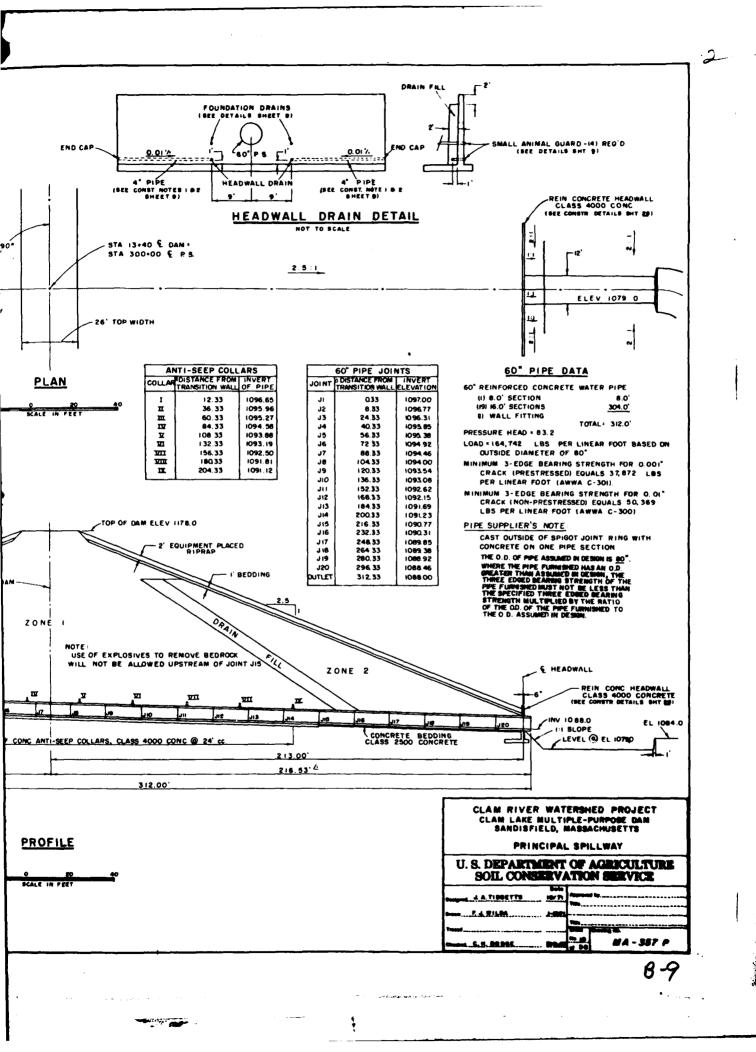


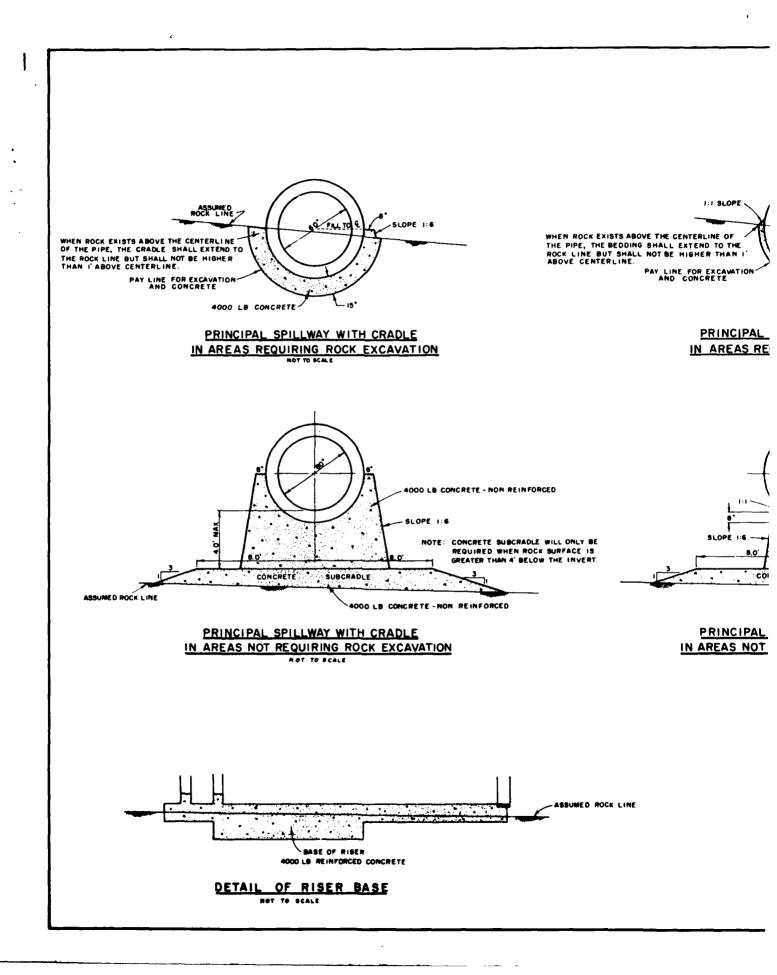
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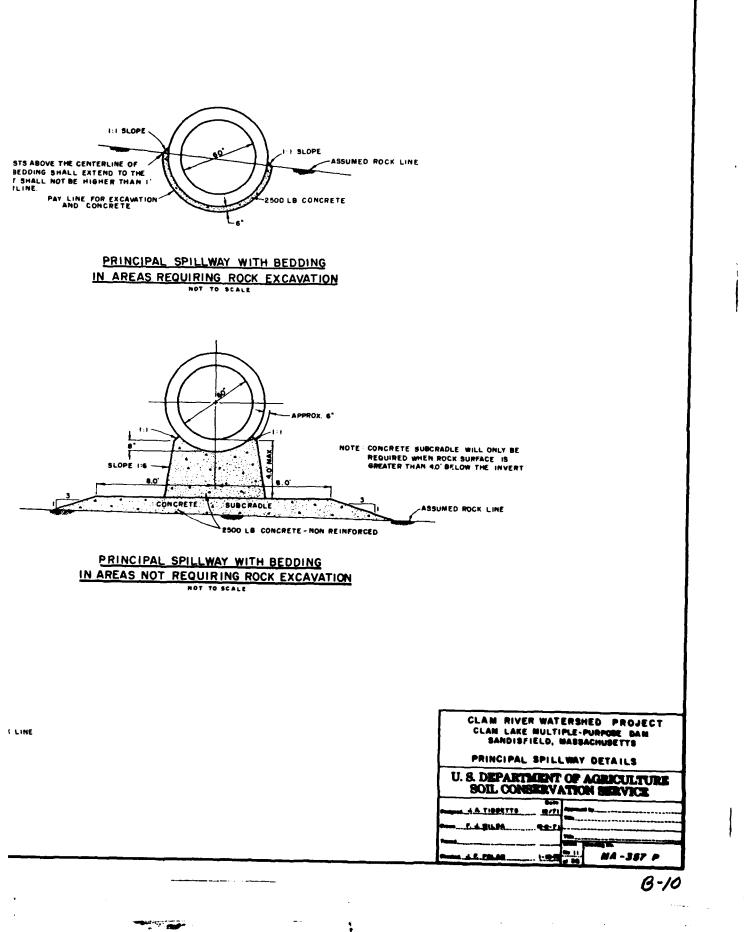




A DIMENSIONS OF CONCRETE PIPELENSTHS ARE BASED ON Nominal lensths and do not include creep **†** ≁

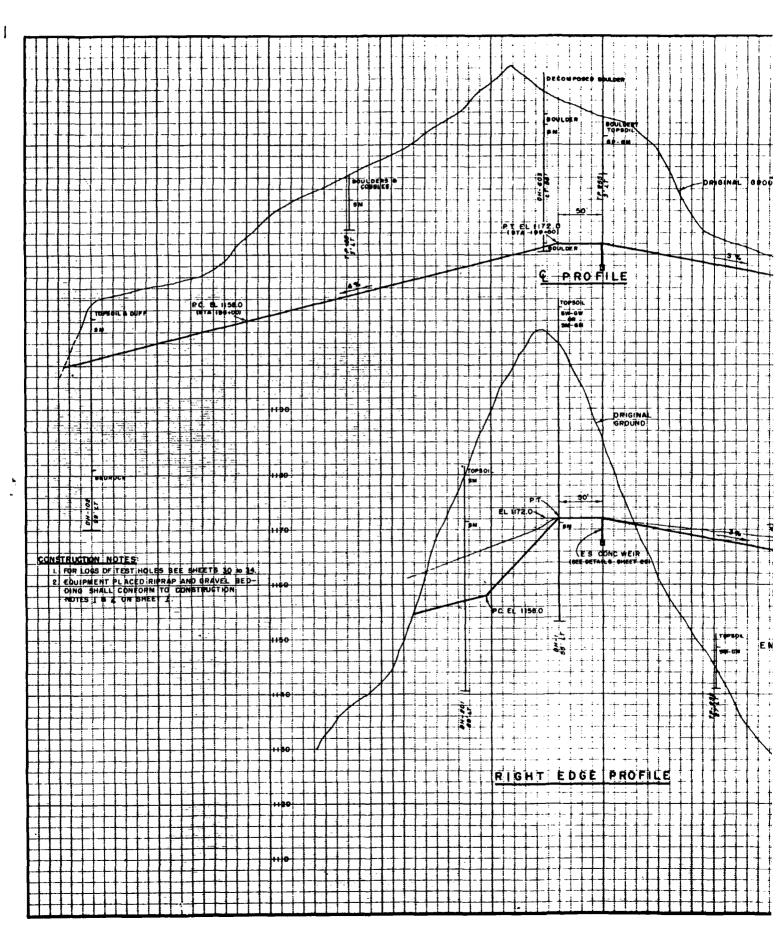


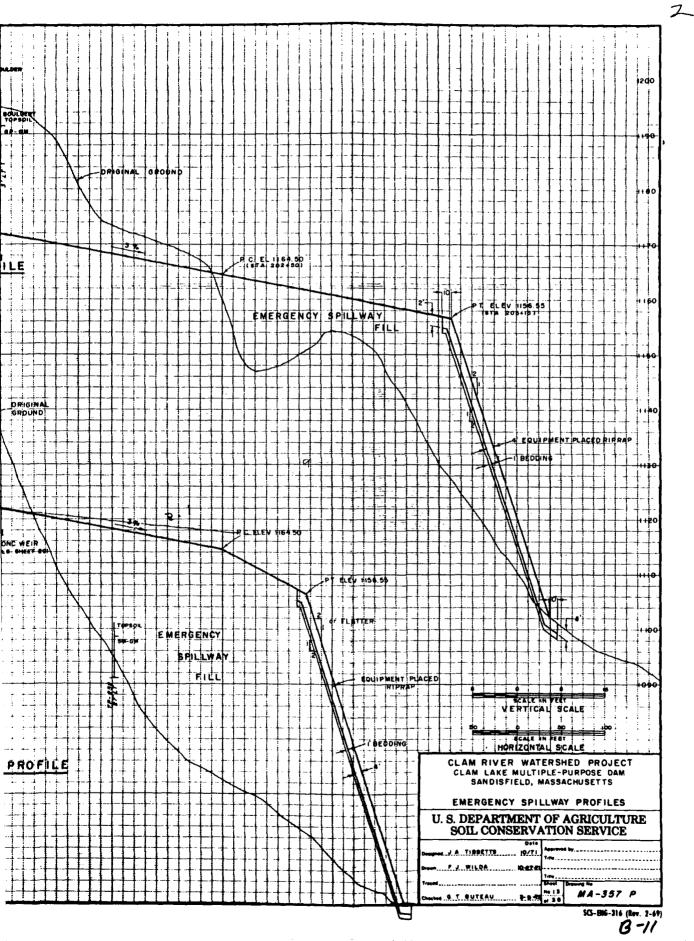




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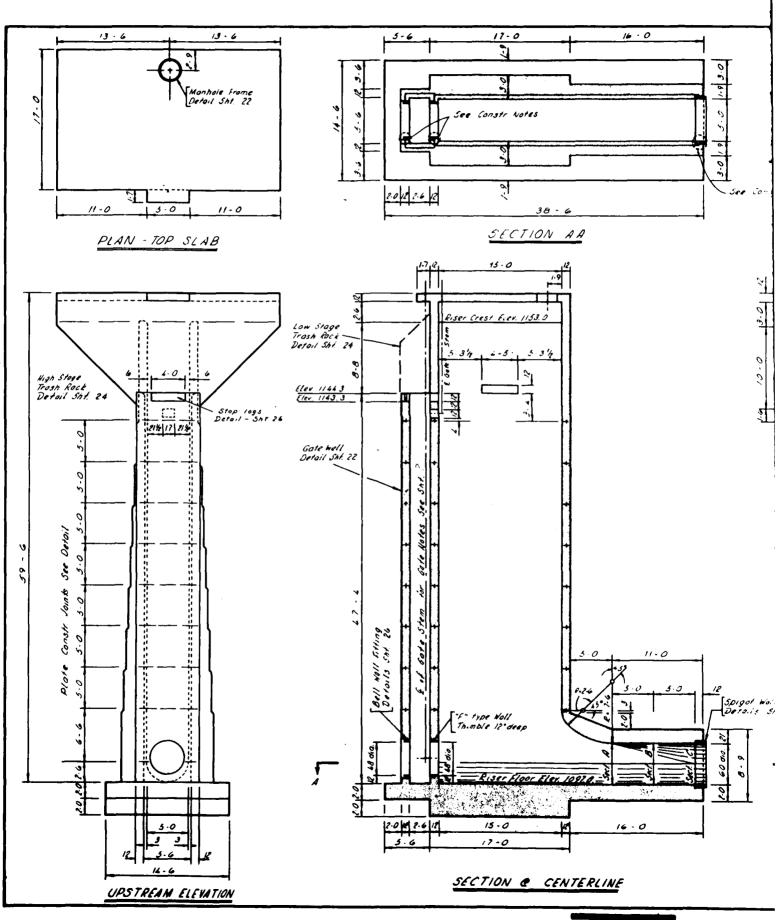
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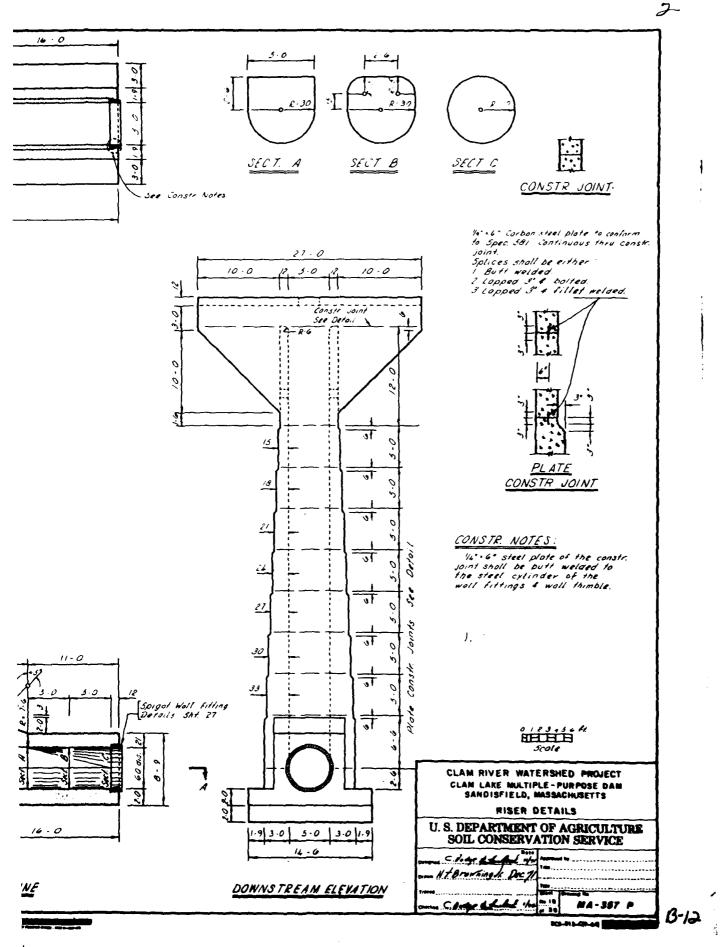
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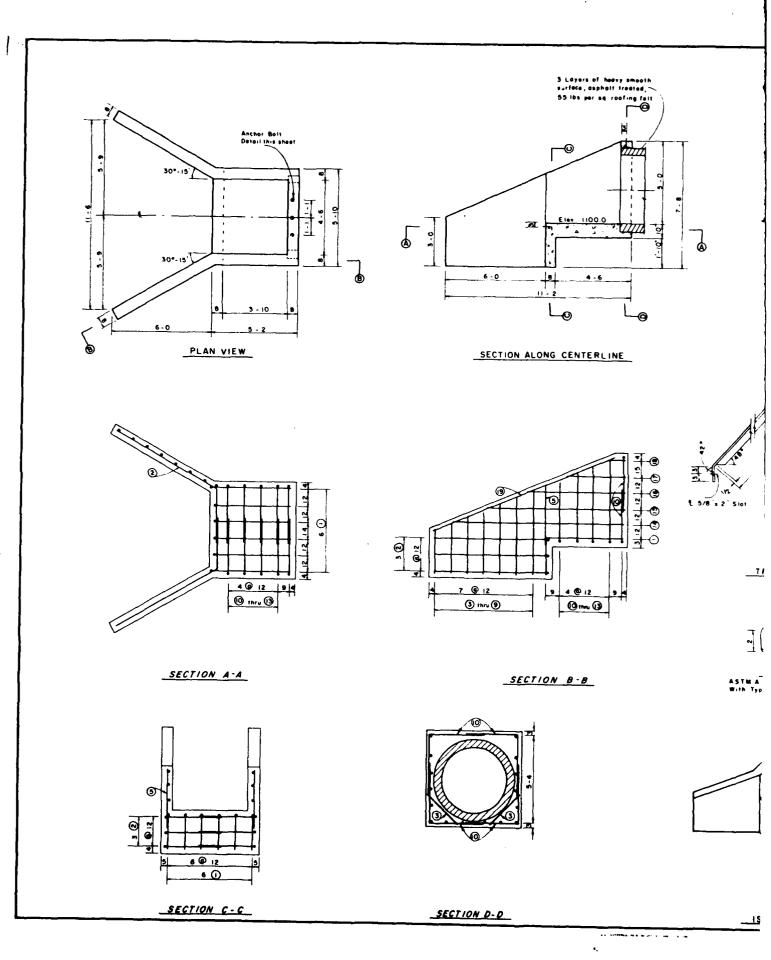
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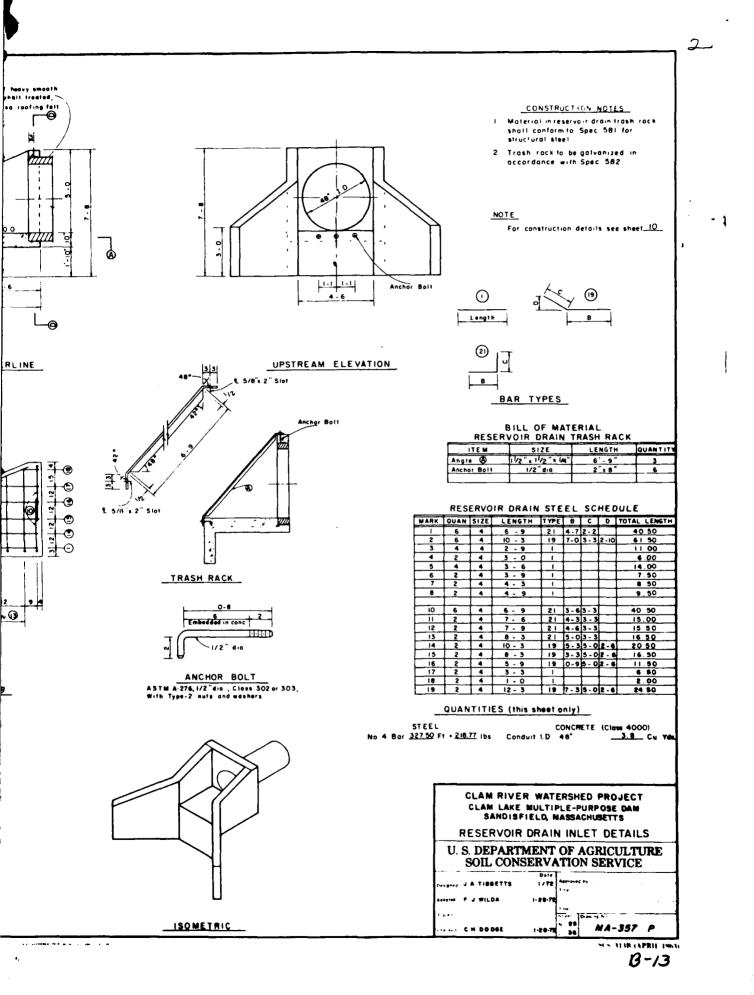
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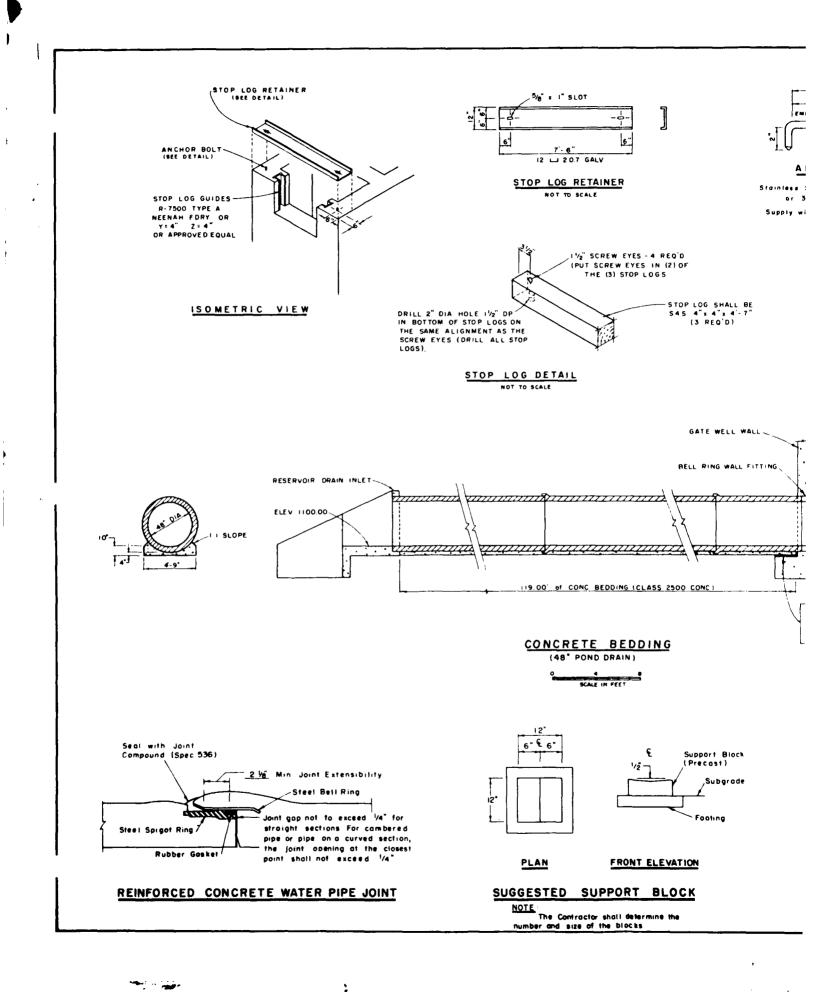
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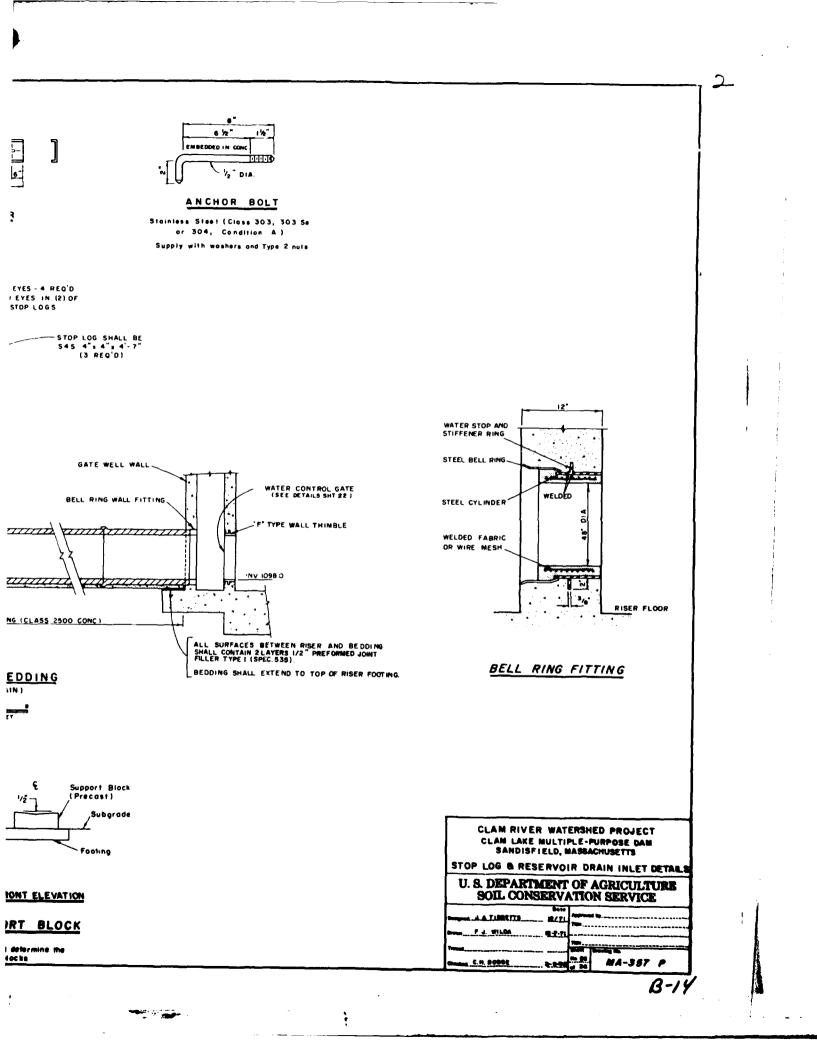
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LOG OF TEST BOLD	5		
88-1, ELEV. 13	217.0	6/8/65	D.8.M.
BR-1, ELEV. 12 0.0 1.5 1.3 42.0	TOPSOIL	about 10% fines, 15%	
1.5 •2.0	sand, 20% medium set	nd, 302 coarse sand, 25 boulders, angula	15% er r ta sub- SM-GN
	gravel, 8% cobbles, Tounded, maximum sin	22 boulders, angula 8a 14", tan-brown, d	emp, high
42.0 39.0	permembility, dense,	, kame terrace. nvel, about 20% fine	
	fine sand, 25% modi-	um eand, 15% coarse	sand, 15% grovel.
	4% cobbles, 1% boulder maximum size 6", sl	ive-brown, damp, low	permeability,
39.0	te impermeable, dem Bottom of Hole.	se to very dense, gl	eciel till.
	Standard Panetratio	a Teat	
			1 Becovery
	<u>He.</u> <u>Depths</u> 1. 0.0 - 1.5	Blown/ft.	84
	2. 1.5 - 3.0 3. 10.0 -11.5	115/6 31	50 33
	NOTE: Water level (nt 4.5 faot on 6/15/	65. Hole dry
	At 28 feet e	n 6/16/65. Casing 2 n 6/15/65. Hole dry	8 feet. Hole
	6/21/65. Pi	pe to 40 feet. Coul t on 7/14/65.	d not get tape
DH-2, ELEV. 1	134.0	6/22/65	K.G.L.
0.0 2.0 2.0 16.5	TOPSOIL SAND, silty with gra	evel, about 18% fine	s. 321 SM
	fine sand, 25% media gravel, angular, has to moist at 4.0, low	am sand, 13% coarse	sand, 10%
	to moist at 4.0, los	permeability, dens	e to very dense,
16.5 52.0	SAND, silty with gro	evel, about 30% fime	s, 35 ¹ fine SK
	51 cobbles, angular,	nd, 51 coarse sand, , hard, maximum size	8", alive.
52.0 59.0	brown, damp, imperme BEDROCK, hard, unwer	nable, very dense, g athered Pre-Cambrian	lacial till. Gneiss,
	fractures mostly bo apart, foliation di	risontal, spaced 18	to 30 inches
59.0'	Netton of Nole.	hind moor as andre	
	Standard Panatration	Test	
	No. Depths	Blows/ft.	2 Becovery
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	37	67 56
	3. 3.0 - 4.5 4. 4.5 - 6.0	63 22	78 56
	5. 12.0 -13.0	160/8 172	67 AB
	6. 22.0 -23.6 7. 27.0 -28.5	180	77
	8. 32.0 -33.0 9. 42.0 -42.5	323/9 200/7	100 94
	10. 47.5 -48.5	903/10	100
	Beck Core		
	Re. Depths	1 Recovery	
	1. 52.0 -54.0 2. 54.0 -59.0	100	
	NOTE: Water level a		weber level
	at 13 feet of	7/14/65	, watar rever
DH-3. ELEV. 11	24.8	6/18-21/65	E.G.L.
0.0 1.5 1.5 13.0	TOPSOIL SAND, silty with gra	wel, showt 18% fine	, 25% fine SM
	aand, 10% medium sas angular, hard, with	wd, 15% coarse saud,	32% gravel,
13.0 23.0	damp, low permeabilt SAND, silty with gra	lty, dense to very de	ense, celluvium.
	sand, 25% modium sat	id, 10% coarse sand,	15% gravel, 5%
	cobbles, 10% bouldes gray, damp, imperment	ible, very damoe, gla	icial cill.
23.0 39.0	BEDROCK, gray, bard, foliation dipping ab	, quarts, biotite, fo mout 45 degrees, mode	hidapar gneiss, mrately to badly
	fractured, fractures and dipping about 45	i spaced 1 to 8 inch	s, mearly herisontal
39.0	Settem of Hele.	-	
	Standard Penetration No. Depths		3 Recovery
	$\begin{array}{cccc} 1. & 0.0 & -1.3 \\ 2. & 1.5 & -3.0 \end{array}$	<u>Bieus/ft.</u> 18 30	78
	3. 3.0 - 4.0	100/5	67
	4. 10.0 -11.5 5. 16.5 -17.0	100/5	45 95
	<u>Rock Core</u> No. Douths	1 Because	
	He. Depths 1. 23.0 -24.0	100	
	2. 24.0 -29.0 3. 29.0 -34.0	100	
	4, 34,0-39,0 Pressure Test	100	
	Pressure Test No. Supthe 1, 23.5 -34.0	Hele Size Pai Jinches 25	<u>9/875</u> 18.3
	2. 28.0 -34.0	3 Inches 25	15.3
). 35.6 -39.0 NOTE: Water level 4	3 inches 25 12 20.5 feet on 7/14/	.02 (4)- Hele
	dry to 14 fe	at an 6/21/65. Loui	drilling
ł	water at 27,	W 1991 .	
1			

<u>DH-4.</u>	ELEV.	1102.4	6/10	/65	l I			DH-7.	ELEV.	1408.0
0.0	2.0	TOPSOI		tered are		containing		0.0	1.5	107501
2.0	16.0	much e	K, <mark>bard, unve</mark> at uarts and bioti	te, fractu	ring mos	tly herisontal		1.5	12.0	SAND, sand,
		sum d 63 dag	ipping about 64	degrees,	felistic	n dipying abou	rt.			75. ank
16.0		Jetten	of Nole.							nerim to im
		Second a	rd Penetration	Test				12.0	22.0	AEDBOC
										te 30 dippis
		He. 1.	Depths 0.0 - 1.5	31000/L	<u>t.</u>	1 Recevery 67		22.0		Nottes
		2.	1.5 - 2.1	106/7		100				Acunda
		Reck G	676							No.
				1 Receve						1.
		<u>₩0.</u> 1.	Depths 2.0 - 0.0		12					2.
		2.	6.0 - 8.5 8.5 -13.0	100						
		4.	13.0 -16.0	94						Rech (
		Pressu	r <u>a</u> Ta <u>st</u>							No.
				•						1. 2.
		<u><u></u></u> <u></u>	Depths 6.5 -16.0	Pe1 23	<u>9/spa</u> 12					3.
			Water level a		7/13/44					Press
		PULLI	atter level a		· / ,	•				He.
<u>DH-5,</u>	ELEV.	1089.7		18/65		K.G.L.				1.
0.0	7.0	boulds hard.	25, and cobble maximum size 2-	o with grav 6", bigh po	el and s gmesbill	and, angular, cy, alluvium,				NOTE :
7.0	17.0	BEDROC	K, gray, bard,	quarts, bi	otite, f	eldspar gneiss	1 ,			
		folist herise	ion dipping shatal and dipping	ng about 45	i degraes	ints nearly , spaced 1 to	30	0.0	1.3	1124.5 TOPSOI
		inches	•	-	-	• •		1.5	5.0	SAND, Eine e
17.0		Bottem	of Hole.							Eravel
		Rock C	ere							Bax (mi permen
		He. 1.	<u>Depthe</u> 7.0 - 8.0	100	TY			5.0	18.0	BEDROC
		2.	8.0 -13.0	100						mestly spaced
		3.	13.0 -17.0	100						BO deg
		Pressu	re Test					18.0		Betton
		No.	Depths	lole Size	Pa1 23	9/11				Standa
		1.	9.0 -17.0	inches inches	23	14.4				He.
										1.
		NOTE:	Water level a	t 0.3 feet	on 7/13/	65				3.
DH-6.	ti.tv.	1090.2	6/16			D.E.H.				Rock C
0.0	1.5	TOPSC SAND.	IL and BOULDER silty with gr	B evel, About	201. E 1n	es, 25%	SM			
		fine	sand, 15% modt	m sand, 30	/L coerse	sand, 7%				<u>Ne.</u> 1.
		round	1, 2% cobbles, led, maximum si	pe 14", taq	n-brown,	wet, low to				2.
		mediu	m permeability	, dense, vo	illey til	1.				3.
9.0	23.0	with	CF, hard, gray fractures most	ly horison	al and t	ight but some				Pressu
		dippi	ing about 60 de 18 spart, follo	grees, free	cures sp	aced 10 to 18				No.
23.0			m of Hole.		•					1.
		Stand	ard Fenetratie	n Test						
						1 Recovery				NOTE :
		<u>80.</u> 1.	Depths 1.5 - 3.0	<u>Blavs</u> 36		1 Kecovery 77				
		2.	3.0 - 4.3	59		0		DH-9,	12.0	1136.0 SOULDI
		3.	7.0 - 8.3	33		44				7% f 1+
		Reck	Cere							bould: maxim
		No.	Depths	1 Reco				12.0	30.0	dense, BEDRO
		1.	9.0 -12.0	100				12.0	30.0	weath
		2.	12.0 -13.0	10						plane
		3. 4.	13.0 -18.0 18.0 -23.0	100 100						Polta:
								30.0		Bettor
		Press	wre Test							Rock
		<u>Me.</u> 1.	Depche	25	9/10	!				No.
			10.0 - 23.0		-					1. 2.
		NOTE	Weter level	at 0.5 fee	t en 7/13	/65.				3.
										4. 5.
										Press
										<u>Mo.</u> 1.
										NOTE :

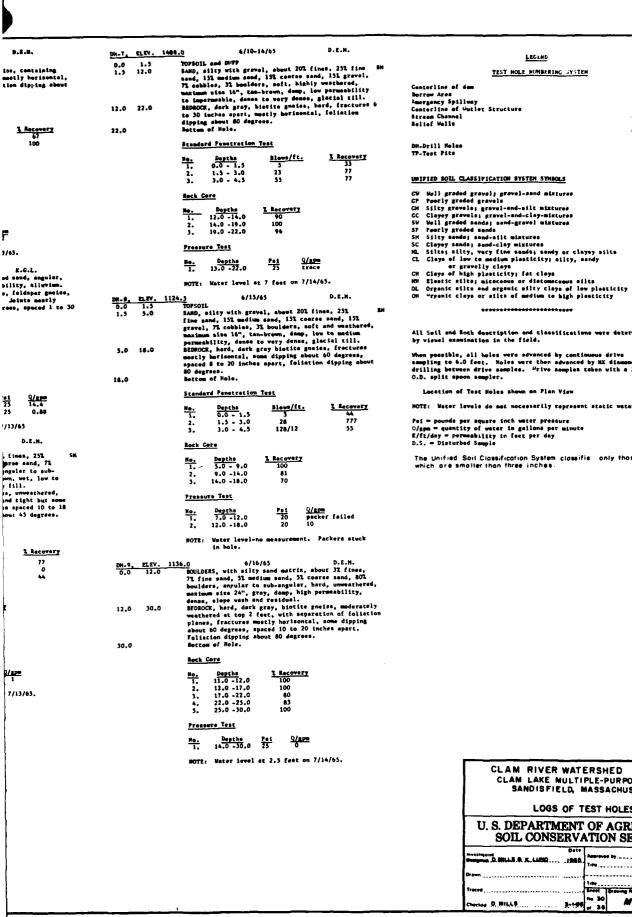
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LEGEND

TEST HOLE NUMBERING SYS	TEM
nterline of dam	1 -99
rrow Ares	101-199
ergency Spillway	201-299
nterline of Wetlet Structure	301-399
reas Channel	401-499
lief Wells	501-599
	601-699
	701-799
Detli Heles	

UNIFIED SOLL CLASSIFICATION SYSTEM SYMBOLS

All Soil and Rock description and classifications were determined by visual examination in the field.

When possible, all heles were advanced by continuous drive sampling to 6.0 feet. Holes were then advanced by NX diamond drilling between drive samples. Drive samples taken with a J-inch 0.D. split spoon sampler.

Location of Test Holes shown on Plan View

NOTE: Water levels do not necessarily represent static water levels.

Fai - pounds per square inch water pressure O/gpm = quentity of water in gallons per minute K/ft/day = permeability in feet per day D.S. = Disturbed Sample

The Unified Soil Classification System classifie only those materials which are smaller than three inches.

CLAM RIVER WATERSHED PROJECT CLAM LAKE MULTIPLE-PURPOSE DAM SANDISFIELD, MASSACHUSETTS LOGS OF TEST HOLES U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE Approved by late -----nung No 3-1-06 or 36 NA - 357 P D. MILLS

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9CS-3150 (APRIL 1963) 8-15

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		M-201	A.W.	1101.3		6/23-24/63	p.2.H.
0,6 (8.5	1134.0 5/17-10/65 E.O.L. CODBLIS, GRAVEL and HOULDERS, obsuit 3% Fines, 7% Fine sand, 3% matter sand, 3% course sand, 30% gravel, 30% cobbies, 30% builders, out-round to	8.8 1.3	1.5 30.0	eand	, silty with gr. , 25% modium se	erol, about 18 ² (nd, 15 ² conton bo	ines, 371 finn ad, 71 grovel, 21 . maridum siss 18",
19.9 20.9	angular, hard, alaps weah. MDBACCF, gray, hard, guarte, biotite faldapar gaolas, foliatian dipping abaut 43 dagroos, jointo apaced 1/2 to 30 inches dipping about 30 dagroos.	18.0	62.8	eliv BAND sand cobb	n-brown, damp, , allty with gr. , 202 medium and 200, 12 houlder	low permeability, prel, about 201 (mé, 35% costos es s, hord, anguler,	dance, slave week.
20.0	Bettan of Hole.	42.0		done	e, glocial till me of Nule.	·	
	Rect Core				dard Prestration	Test	
	He. Bepths <u>1. Ascovery</u> 1. 10.0 - 12.0 100 2. 12.0 - 13.0 300					Bleve/ft.	1 Recovery
	3. 13.0 -17.0 190 A. 17.0 -20.0 190			* :	<u>Peyths</u> 0.0 - 1.3 1.3 - 3.0	2	67 77
	Pressure Tapt			3.	3.0 - 4.5 4.5 - 6.0	38 30	77 44
				5. 6.	10.0 -11.5	48 44	44 39
	He. Bopthe Hole Size Pel (JAppe 1, 12,0-20.0) inches 25 14.8 2. 16.5-20.0 3 inches 25 4.20			7. •.	20.0 -21.5		55
	NOTE: Nator level at 11 feat on 7/14/65			Þ. 10.	30.0 -31.5 35.0 -36.5	23 61	34 34
DH-101, KLEV.				HOLE	Nator Lovel o at 18.5 fast		/63, weter level
0.0 1.3	TOPSOIL BAND, silty with gravel, about 20% fines, 25% fine BN						
	and, 20% medium sand, 13% coarse sand, 13% gravel, 4% cobbles, 1% boulders, angular to mub-rounded, soft, maximum size 4%, slive-brown, damp, low permability,		RLEV.	1182,3		/23-24/65	E.G.L.
40.0	danse to very danse, glacial till. Agnes to very danse, glacial till. Aptems of Hels. Scandard Panatration Test	0.0 4.8	4.0 12.0	sand, 52 ci	, silty with gra , 23% andium say obbies, angular,	ivel, ebout 15% f id, 20% coerse sa bard, maximum s	nd, 15% gravel, ing 6", elive-
	Ro. Depths Blows/ft. 3. Becovery			E0 4	ense, kame cerre		• -
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	12.0	42.0	#22d 42 ci	, 20% medium sam pbblas, 1% beuld	ivel, shout 20% f id, 15% coarse na iers, hard, angul impermeable, very	nd, 15% gravel, ar, maximum size 18°
	4. 4.5 - 5.2 196/8 33 3. 10.0 -11.5 176 80	42.0		£111 .	, m of Hole.		adina, Bracial
	6. 13.0 -16.5 176 50 7. 20.0 -20.1 300/1 0				lard Penetration	Test	
	8. 30.0 - 30.9 198/9 10 9. 33.0 - 36.5 154 61 10. 38.5 - 40.0 276 33			٩.	Depths	Blows/ft.	1 Recovery
	NOTR: Water level at 25 feet on 6/24/65, water level			2.	0.0 - 1.5 1.3 - 3.0		76 78
	at 13.5 feet on 7/14/65. Moulders from 35.0-38.5 feet.			3.	3.0 - 4.5 4.5 - 6.0	4	78 78
DH-102, MLEV.	1160.0 6/21-24/65 D.E.M. TOPSOIL and DUPP			5. 6. 7.	10.0 -11.5 13.0 -16.3 20.0 -21.5	29 130/8	78 67
1.5 30.0	SAND, silty with gravel, about 20% fines, 25% fine SM sand, 20% medium pand, 15% coarse send, 15% gravel, 4%			8.	25.0 -26.3	96 110 131	77 100 67
	cobbles, 12 bouldars, angular to sub-rounded, maximum size 24", olive-brown, damp, low permeability to impermeable,			10.	33.0 -36.3 40.3 -42.0	116	77 34
30.0 40.0	very dense, glacial till. REDROCK, gray biogite gnaiss, hard, fractures spaced 8 ts 18 inches apart, mostly harisontal, some diprimg about 70 degrees, foliation dipping about 70 degrees.			NOTE		t 13 feet ou 7/14	-
40.0	Bacton of Hole.	DH-203.	nev.	163.1	6,	/24/65	D.E.H.
	Standard Penetration Test	0.0	1.5	TOPSO SAND.		ral, about 20% fi	nes. 23% fine Si
	Hea. Depths Blows/ft. % Recovery 1. 0.0 - 1.5 71 72 2. 1.5 - 3.0 145 67 3. 3.0 - 4.5 71 77			sand. 71 ce	20% medium sam bblas, 3% bould , damp, low to s	d, 15% coarse sen rs, angular, bar	d, 10% gravel, d, maximum size 16", ty, loose to very
	4, 4,5 - 6,0 74 94 3, 10,0 -11,5 53 77	41.5			m of Hole.		
	6, 15.0-16,5 697 94 7, 20.0-21.5 683 88			Scand	ard Penetration	Teet	
	Rock Care			No. 1.	0.0 - 1.5	Blows/ft.	1 Recevery
				2.	1.5 - 3.0 3.0 - 4.5	2	67 67
	He. <u>Depths</u> <u>3 Recovery</u> 1. 30.0 - 34.0 100 2. 34.0 -40.0 100			4. 5.	4.5 - 6.0 13.0 -16.5	8 16	88 73
	MOTE: Water level at 7 feet on 6/23/65, water level			6. 7.	20.0 -21.5	36 42	77 50 72
	at # feet on 6/24/65, water level at 7.5 feet an 7/14/63.			8. 9. 10,	30.0 -31.5 33.0 -36.5 40.0 -41.5	34 101 137	72 44 77
						: 13 fort on 7/14	
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		3. 15.0 -20.0 85 4. 20.0 -23.0 100	[0.	S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE
		He. Depthe <u>3. Recovery</u> 1. 13.0 - 14.0 8 3 2. 14.0 - 13.0 100	├ ., -	S DEDADTMENT OF ACDICILI TIDE
		Rock Core		
		4. 5.0 - 6.5 152 72		CLAM LAKE MULTIPLE-PURPOSE DAM SANDISFIELD, MASSACHUSETTS
		$\begin{array}{cccccccccccccccccccccccccccccccccccc$		CLAM RIVER WATERSHED PROJECT
		No. Depths Blows/ft. 7 Recovery		
	23.0	Bottam of Hole. Scandard Penetration Test		
	13.0 23.0	stringers, fractures nearly horizontal, spaced 8 to 20 inches spart, foliation dipping about 80 degrees.		NOTE: Water level dry on 7/14/63.
		tan-brown, low to medium permeability, wet, firm to wery denne, vallay fill.		D.S. 156.1, 2.3+10.0 5% larger than 6" discarded.
		fine send, AOL medium send, 10% coarse sand, 10% evenue, anewler to sub-rounded, maximum size 1",	10.0	very dense, glacial till. Bettom of Pit.
	DH-304, ELEV 0.0 1.1 1.5 13.0	TOPSOIL and DUPT SAND allow with gravel, about 10% fines, 22% \$H		fine sand, 15% medium sand, 8% conrae sand, 30% gravel, 5% cobbles, 2% boulders, angular, hard, umminum size 13", olive-brown, damp, low permeability
		NOTE: Water level at surface on 7/14/65	0.0 2.5 2.5 10.0	TOPSOIL SAND, silty with gravel, about 15% fines, 25% SM
		2. 14.0 -19.0 25 0	TP-156, ELEV.)	1214.1 6/24/65 K.G.L.
		He. Depths Psi Q/spm 1. 9.3 -19.0 25 23		NOTE: Water entering pit 1.0-4.5. Estimated flow less than 1 gpm. Water level at 3.5 on 7/14/
		Pressure Test		p.S. 155.1, 4.3-10.0 10% larger than 6" discarded.
		No. Depths <u>5 Recovery</u> 1. 9.0 - 14.3 100 2. 14.0 - 19.0 100	10.0	permeability, very danse, ground moraine. Bottom of Fit.
		Rock Core No. Denthe S. Recevery		gravel, 15% cobbles, 2% boulders, angular to sub- angular, hard, maximum size 14", brown, moist, low
		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	4.5 10.0	SAND, silty with gravel, about 18% fines, 25% SH fine sand, 15% medium sand, 5% coarse sand, 20%
		No. Dopths Blows/ft. 3 Recovery		aand, 21 coarse sand, 42 gravel, 107 cobbles, /31 boulders, angular to sub-rounded, hard, maximum sise 36", black, wet, medium, looss, alluvium.
		Standard Penetration_Tast	0,0 4,5	BOULDERS AND COBRLES, in an organic silty sand matrix, about 5% fines, 2% fine sand, 2% medium sand, 2% coarse sand, 4% gravel, 10% cobbles, 75%
	19.0	nearly horizontal some dipping 60 degrees, spaced 8 to 20 inches apart, follation dipping about 80 degrees. Bottom of Mels.	TP-155, ELEV. 1	1189.6 6/24/65 K.G.L.
	9.0 19	wet, high permeability, very dense. 0 BEDROCK, hard, gray biotite gneiss, fractures		D.S. 134,1, 2.3-10.0 6% larger than 6" discorded. NOTE: Water level dry on 7/14/63.
		gravel, 4% cobbles, 14 boulders, angular to sub- angular, hard, maximum size 18 inches, tan-brown,	10.0	dense, ground morainu. Bottom of Pit.
	DR-303, ELEV.	1098.7 6/15-16/65 D.Z.M. SAND, silty savel, about 151 fines, 152 SM fine sand, 30% medium sawd, 25% coares sand, 10 ²		gravel, 5% cobbles, 5% boulders, anyular, hard, maximum size 16", light brown, damp, low, very
		NOTE: Water level at surface on 7/14/65	0.0 2.5 2.5 10.0	BOULDERY TOPSOLL BAND, silty with pravel, about 152 fines, 352 53 fine sand, 152 medium samd, 52 coarse sand, 207
		<u>Ko. Depthe Hole Sime Pai Q/Rpm</u> 1. 9.5 -18.0 3 inches 25 3.7	TP-154, ELEV. 1	208.7 6/24/65 K.G.L.
•		Rock Pressure Test		NOTE: Mater entering pit at 3.0. Estimated flow 1.5 gpc. Mater level at 5 feet on 7/14/05.
м		3. 11.0 -16.0 88 4. 16.0 -18.0 100		D.5. 153.1, 5.0-10.0 6% imrger them 6" discarded.
		1. 8.0 - 9.5 68 2. 9.0 +11.5 100	10.0	Bottom of Pit.
134		<u>Rock Core</u> No. <u>Deptha <u>3 Recovery</u></u>		grovel,52 cobbles, 52 boulders, engular, bard, maxi- mum sise 14", grey, moist, impermosble, very dense, alacial till.
	18.0	Battom of Hole.	5.0 10.0	SAND, silty with gravel, about 18% fines, 22% GM- fine sand, 10% medium sand, 5% course sand, 35%
		dipping about 85 degrees, fractures spaced 1 to 18 inches generally horisontal with a few dipping about 30 degrees.		sand, 5% cosree samd, 10% gravel, 20% cobbles, 50% boulders, emb-rounded to angular, maximum dise 30%, black, wet, high permaability, leoss, alluvium-
	8.0 . 18.) BEDROCK, dark groy, biotite quarts, feldspar gmeiss, moderately hard to hard below 11.0 feet, foliation	0.0 3.0	BOULDERS and COBBLES, in an organic silty sand matrix, about 52 finas, 52 fine sand, 52 madium
	0.0 B.	angular, hard, maximum aise 14", medium to bigh permeability, alluvium.	17-153, ELEV. 1	170.8 6/24/65 K.G.L.
	DH-302, BLEV.			NOTE: Seepage at 9.5 feet. Astimated flow less then .5 gpm. Water level dry on 7/14/65.
		2. Could not place packer below 11.0 feet. HOTE: Water level at 3.5 feet on 7/14/63.	10.0	permachility, dense, glocial till. Bottom of Pit. D.S. 152.1 3.0 to 10.0 6% larger than 6" discorded.
		He. Bepths Hels Biss Pei O/gpm 1. 7.2 - 17.0 3 inches 12 11.7 2. Culder blow subst below 14		gravel, 5% cobbles, 5% boulders, angular, hard, maximum size 14", olive-brown, damp to moist, low
		Beck Pressure Test	3.0 10.0	SAND, silty with gravel, about 30% fines, 35% SM fine sand, 12% medium sand, 3% coarse sand, 10%
		No. Depths 3. Recovery 1. 7.0 12.0 60 2. 12.0 17.0 100	77-152, ELEV. 11	160.0 6/24/65 K.C.L. TOPSOIL
		<u>Rock Cora</u> Ho. Do <u>ptho <u>I Rocovery</u></u>		NOTE: Water level-me pipe.
	17.0	Bottom of Hole.	10.0	Bottom of Pit. D.S. 151.1 2.0 to 10.0 (2 begs), 152 larger than 6" discarded.
		7 to 12, foliation dipping about 80 degrees. Jainto borizontal opaced 1 to 24 inches, with a 6" washared room at 11 feat.		boulders, angular, hard, maximum size 18", brown, damp, low permeability, very dense, ground moraine.
81	7.0 17.0	REDROCK, quarts biotite feldaper gnoiss, moder- ately bard from 7 to 12 then hard, seamy from	2.0 10.0	GRAVEL, sandy with silt, cobbles and boulders about 132 fines, 102 fine aand, 102 msdium sand, 103 coarse aand, 305 gravel, 173 cobbles, \$2
	0.0 7.0	GRAVEL, COBBLES and Bouldors in a silty sand matrix, angular to hard, marinum size 14", andium to high percentifity, alluvium.	TP-131, ELEV. 11 0.0 2.0	TOPSOIL

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		CLAN RIVER	DH-609	E.er. 12	122.2 7/29 to 7/31/70 DBM	DH-61)	ELev.
			0.0	2.0	30 7591). .	0.0	1.0
<u>DK-603</u> 0.0 7.5	<u>81av. 1203.0</u> 7.5 9.5	Decomposed boulder, choise Tan brown, dry, low permeability, dense, Decomposed Bock Boulder.	2.0	26.0	SAND, cilty with gravel, about 205 fines, 155 fine mand, 155 modium mand, 355 coares sand, 155 gravel, subsayılar, SM highly decomposed rock bits, light olive hrown, modély-mindium permedhility, loose, Mesthered Till, és 5 fost olive- hrown, wei, low permeshility, very dense,	1.0 28.0	28.0.
9.5	30.0	SAUD, slip with gravel, about 705 fines, 105 fine sand, 705 medium sand, 355 coarse sand, 135 gravel, subangular, decomposed 20 rock bits, 3/s-inch maximum sise, gray, moist, low parasability, very dense, GLACIAL TIL.	%6.0	ية.5	GLACIAL TILL. SAND, silty, about 45% fines, 25% fine sand, 20% medium sand, 7% coares sand, BM 3% graval, olive-gray, moist, low parmeebility, very dense, Qlacial Till.	20.0	
	32.5	Boulder.	0.بلار	35.0	Boulder.		
2.5		Bottom of Hole.	46.5		Bottom of Hole.		
		Drive Samples Elowa/ft. # Recovert 1. 0.0.215: 50 100 2. 1.5-3.0 101 78 3. 3.0-4.5: 134 72 4. 9.5-10.0 111 76 5. 15.0 16.5: 105 67 6. 20.0-21.6 105 51 7. 25.0-25.3 100/3" ref. 0 9. 32.5-33.0: 100/6" ref. 100 NOTE: Matr layel at 14 fest 8 inches as 8/3/70.			Drive Samplas Blows/ft. Shecovery 10. 0-1.5" Blows/ft. Shecovery 2. 16.3.0 18 67 3. 40-5.5' 91.6' ref. 67 5. 15.0-15.5' 92.6' ref. 67 5. 15.0-15.5' 92.6' ref. 0 6. 16.5-17.5' 125.6' ref. 50 7. 20.0-26.5' 125.6' ref. 51 9. 30.0-21.5' 126 61 8. 25.0-26.5' 135 61 9. 30.0-31.5' 140' ref. 50 10. 35.0' 100/07 ref. 51 12. 40.0-40.9' 100' 100' ref. 51 52 13. 45.0-40.5' 130' 100' 100' 100' 100' 100' 100' 100	DH-515 8.0 1.0 3.0	1.0 3.0 15.0
8-605	Elev. 1194-9	8/10 to 8/11/?0 pmt			Permeability Tests	15.0	18.0
0.0 1.0	1.0 12.5	TOPSOIL and SILT. SAUD, milty with gravel, about 15% fines, SH 15% fine wand, 20% wedium sand, 40% course and, 10% gravel, subsequiar, 3/4-iach			Io. Depth Hole Size Heads Loss J. 50 J. Ground Falled 2. 10° J. Revound Slight 3. 11.5° 2° x 18° Ground Slight 4. 15° J. Ground Falled	16.0	29.0
.5	نی .5	maximum size, grey, damp, medium permeabi- lity, loose to danse, OUTNASE.			5. 20' j# Ground Pailed a Haad = Pips above ground. HOTE: Watar level at 17,5 feet on 8/k/70.		
.,	44 , J	SAUD, silty with gravel, about 40% fines, 15% fine sand, 15% modium sand, 20% SH wearse sand, 10% gravel, subangular, 3/h-inch maximum size, gray-graen, damp, low parmeability, dense to vary danse, glatial fill.	<u>01-610</u>	11-1- 11 3.0		29.0	
4.5		Botton of Hole. Drive Samples Mo. Depth Mis./ft. # Recovery 1. 0.0-1.5' 3 100 2. 1.5-5.0' 16 100 3. 3.0-4.5! 12 200 4. 5.0-5.3' 100/3' waf. 0 5. 1011.5' 23 70	3-0 36.5	36.5	SATD, milty with gravel, about 20% fines, 15% fine eand, 20% medium sand, 30% coarse eand, 15% gravel, subsaugular, SM 2-inch maximum size, brown to blue-gray at 6 feet, damp, medium persembility, dense to very dense, GLACIAL TILL with decrease in coarse sand and gravel at 22 feet. Bottom of Hole.		
-607	Elev. 1213.8	6. 15.0-15.1' 100/1' ref. 0 7. 20.0-25.5' 10.3/6' ref. 60 8. 25.0-25.5' 10.0/8' ref. b0 9. 30.0-30.1' 100/8' ref. 0 10. 35.0-35.8' 137/10' 60 8/5 to 8/7/70 Davi			Drive Samples So. Empla: M.s./ft. § Incovary 1. 0.0-1.5' 21 100 2. 1.5-3.0' 19 72 3. 3.0-4.5' 36 80 4. 4.5-6.0' 47 70		
.0 .0	1.0	NDFSOIL. SAMD, silty with gravel, about 20% fince, 15% fine wand, 15% modium sand, 30% comrse and, 20% gravel, subangular, 2-imah maringm Sise, ian to gray-graven at 6 feet,			5, 10,0-13,5' 20 70 6, 15,0-16,5' 22 67 7, 20,0-20,5' 73 90 8, 25,0-26,5' 66 80 9, 30,0-31,5' 59 67 10, 35,0-36,5' 59 100	0.0 2.0	2.0 2.0
		damp, low permaability, damse, Weathered fill to 6 foot, GLACIAL TILL.	<u>198-611</u>	<u></u>	89-9 8/11 to 8/11/70 1158	k. 0	8.0
.5		hottom of Hole.	0.0	1.0	10F301L.		
		Drive Samples Bits./ft. \$ Recover 1.0.0-1.5: 10 10 2.1.5-3.0: 26 30 3.3.0-4.5: 88 80 4.5.0-6.5: 102 60	1.0	5.0	BARD, with gravel, about 6% fines, 12% fine send, 30% medium and, 40% course anne, 10% gravel, subargular, 2-inch 5P-5M matimum gise, gray, dawp, medium permeability, locar to danse, 007MASH.	8.0	15.0
		5. 10.0-11.5' 40 70 6. 15.0-16.5' 74 67 7. 20.0-20.9' 129AF ref. 60 8. 25.0-25.1' 100/1" ref. 0 9. 30.0-30.9' 14544 ref. 100	5.0	30.0	SHED, cilly with graval, about bOS fines, 155 fine samt, 155 medium sand, 205 coarse sand, 105 gravel, subangular, Mu-inch 30 mathem size, slive to graced-gray, damp, low permeability, dance, GLACIAL FILL.	15.0	25.0
		10. 55.0-55.1 100/1 ref. 0 11. 10.0-11.5 163 60	30.0		Bottom of Rola.		
		11. 10.0-11.5' 157 68 12. 15.0-15.5' 100/6" ref. 67 13. 50.0-50.5' 102/6" ref. 100			Drive Amples MAs./ft. S. Bocovery 1. 0.0 -1.5' 14 100 2. 1.5 3.6 70 3.5 70 3. 5.0 -6.5' 33 70 4.10.0 -11.6' 72 67 5. 15.0 -21.5' 94 67 67 6.10.0 -21.5' 95 67	28.0	

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	<u>0.0</u>	Elev. 118	1.7 8/6 to 8/10/70 DBN BDPSDIL.	<u>114-617</u> 0.0	Elev. 1191 3.0	.98 TOPSOIL.	8/6 to 8/7/70 PAB
.	1.0	28.0,	SAND, all to with gravel, about 45% fines,	3.0	16.0		with gravel, about 20% fir
			105 fine send, 105 medium send, 305 coarse send, 55 gravel, subangular, 28			25% Eine aan	d. 255 medium mend. 155
			1-inch maximum size, olive-brown, damp, low permeability, dense to very dense,			1-1000 0411	15% gravel, decomposed re am sise, olive-brown, wet,
			displat TT11.			OLACIAL TILL	Ability, very dense.
	28.0		Dotten of Hole.	8.5 te	10.0	HOULDER.	
				14.9 te	16.0	IDULD III.	
54			Brive Samples 50. Depth His./ft. <u>S Recovery</u> 1. 0.0 - 1.9 2 100	16.0	28.0		
			$\begin{array}{cccccccccccccccccccccccccccccccccccc$		1010	gneiss. Fol	y, biotits hormblends istions dipping about 70.
			3. 3.0 - 4.5' 11 90 4. 4.5 - 6.0' 22 90			Hoderately f	ractured spaced about hes spart mostly
			5. 10.0 -11.5' 30 80			horisontal;	all tight.
			6. 15.0 -15.8' 165/9" ref. 67 7. 20.0 -20.9' 175/0" ref. 70	28.00		Botton of Ho:	10.
			8. 25.0 -25.5' 100/6" ref. 60			Drive Samples	
	DH-615	Elev. 118	3.28 8/3 to 8/4720 PAB			1. 0.5 4.	Blows/ft. & Recovery
	0.0	1.0	C1000.24			2. 2.0 - 3	3.0' % A2" rot. 33
						3. 4.5 - 6 4. 10.0 - 11	
	1.0	3.0	10/301L.			Rock Core Rus	
	3.0	15,0	SAND, milty with gravel, about 25% fines, 15% fine sand, 10% medium sand, 40%			1. 14.9 - 10	5 Bacovery
			coarse sand, 10% gravel, subangular, SM			2. 18.0 - 23	100
			some particles decomposed, olive-brown, moist, low permeability, wary dense,			3. 23.0 - 20	1.0' 100
			Weathered Till.			NOTE: Water	level at 5.5 feet on 8/6/
	15.0	18.0	SAND, silty with gravel, about 25% fines,	DH-618	Elev. 1185.	72	8/10 to 8/11/70 PAB
			15% fine sand, 10% medium sand, 30% SW coarse sand, 20% gravel, Decomposed SW	0.0			8/10 to 8/11/70 PAB
			rock particles, olive-gray, moist, low permeability, very dense, GLACIAL TILL.		3.5	TOPSOIL.	
	18 0	~ ~		3.5	10.0	SAND, silty w	th gravel, about 15% find , 25% median send, 25%
	18.0	29.0	BEROCI, grey, biotite hornblende gneiss, foliations dipping about 70°, From			coares sand.	155 grown mikenessies
			18 to 21 feet, highly fractured. Fractures spaced about 1/2-inch to 2-inches spart.			with some dec maximum size.	imposed rock bits, 3/4-inc light elive-brown, moist.
.			21 to 29 feet moderately fractured.			low permeabil	ity, very dense, QLACIAL
			Practures spaces about 8 to 14 inches.	6.0	8.0	Cobbles and B	wilders.
	29.0		Notton of Nole.	10.0	26.0		
			Drive Samples			foliations di	ey biotite horpblands gnei pping about 70°. Hoderate
			No. Depth Blows/ft. S Recovery 1. 1.0 - 2.4 98/5" Fef. 66			fractured. P	ractures spaced about 6 to rt, mostly horisontal.
SN.			2. 4.0 - 5/5' 101 665 3. 10.0 - 11.5' 71 bb	26.0			
			4. 15.0 -16.5' 131/6" ref. 66	2000		Notton of Hol	
			Apole Care Runs			Drive Samples	
			Rock Core Rans Ro. Depth Recovery 1. 18.0 -19.0 [™] 50 2. 19.0 -20.0 [™] 90			1. 0.0 - 1.	
						2. 1.5 - 2. 3. 5.0 - 6.	
			3. 20.0 ~24.0' 100 4. 24.0 ~29.0' 90			Rock Core Ren	• •
			Parmashility Test			Rock Core Rund Ro. Depth 1. 10.0 - 1	
			No. Depth Hole Size Head Lose			2. 13.5 - 1	95
						3. 18.5 - 23 4. 23.5 - 20	3.5° 100 6.0° 100
			• head - pipe above ground				Level at 6.92 feet on
	<u>18-616</u>	Elev. 119	6.03 8/5 to 8/6/70 PAB			6/11/70	
	0.0	2.0	No drilling - Removed bouldars by hand.				
	2.0	¥-0	10PS01L.				
	4.0	8.0	SAND, silty with gravel, about 25% fines,				
			25% fine sand, 20% medium sand, 15% course sand, 15% gravel, subangular, St				
			som decomposed rock partibles, ly-inch				
			maximum sise, olive-brown, moist, low permeability, dense, Wasthered Till.				
SM	8.0	16.0					
	9.0	15.0	SILT, sandy with about 55% fines, 22% fine sand, 15% medium sand, 5% coarse				
			sand, 35 gravel, 1/2-inch maximum sise, ML olive brown, moist, low permeability,				
) 511			medium dense, GLACIAL TILL.				
••	15.0	26.0	MEMOCE, gray biotite hereblands gneiss,				
			are about 12 to 18-inches spart mostly				
	- 6		horisontal; all tight.				
	58 .0		Bottom of Hole.				
			Drive Samples		CLAM R	IVER WATE	RSHED PROJEC
			1. 2.0 - 3.5 39 83	1	CLAM L	AKE MULTIP	LE-PURPOSE DAM
			2. 3.5'- 5.0' 58 66 3. 10.0'-11.5' 29 LL	1	SAND	DISFIELD, M	ASSACHUSETTS
			· -	1		LOGS OF T	EST HOLES
			Boak Cor + Dans Bo. Dapth & Resovury				
			1. 15.0 - 15.9 ⁴ 58 2. 15.9 - 20.07 95	1	U. S. DEPA	KIMENT	OF AGRICULTUR
			3. 20.0 - 25.0 100	L	SOIL C		TION SERVICE
			k. 25.0 - 20.0" 100				Approval by
				1	ad bo	1	Y###
					n		7#F
					ad bo		Yala Tala Matin Distanti In
				17-00 77-00	nd hy nd <u>1, 13, 1400057688 .</u>		Heat Branning He
		<u> </u>		17-00 77-00			MA - 357 P
				17-00 77-00	nd hy nd <u>1, 13, 1400057688 .</u>		Hart Braung Ha

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<u>m-619</u>	Eler. 11		<u>DH-351</u>	Elev. 110		
0.0	3.0	TOPSOIL AND HOUTHAT.	0.0	1.5	TOPSOIL and BOOTHAT.	19-651
3.0	11.5	SILTI SAND, gravelly, about 15% fines, 10% fine sand, 25% medium sand, 30% SN	1.5	6.5	SAND, with gravel, about 15 fines, 105 fine sand, 105 medium sand,	<u>47-021</u> 0.0
		coarse sand, 20% graval, subangular, 3/4-inch maximum size, clive-brown,			56% coarse sand, 20% gravel, 27 subangular, 2-inch maximum sise,	
		moist, medium-low permeability, very dense, GLACIAL TILL.			red-brown, damp, medium parmeability, dense, FLOODPLAIM.	1.0
6 to 10	101	GLACIAL TILL. BOULDER.		- * *		
10.5 20		JOULDER.	6.5	16.5	BEROCK, grey, bistite hornblende gneiss, moderately fractured, fractures	
1.5	25.0	SEIRCE, gray, biotite hornblande			dipping about 60 degrees. Some horizontal. All fractures tight. BEROCK.	
	-	gngiss, foliations dipping about 70 . Highly fractured. Fractures	16.5		Bottem of Hole.	
		spaced about 1 to 8 inches apart. Fractures are not all tight.			Drive Samples	10.0
		• • • • • • •			1. 0.0 - 1.5' 15 100	17-652
25.0		Bottom of Hols.			2. 1.5 - 3.0' 82 70 3. 3.0 - 4.5' 24 80	0.0
		Drive Samples No. Depth Elovs/ft. S Recovery 1. 0.5 - 2.01 26 66			$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.5
		$\begin{array}{cccccccccccccccccccccccccccccccccccc$			Bock Core Runs	
		Rock Cope Jhans			No. Depth <u>S Recovery</u> 1. 16.5 - 10.5' 95	
		No. 50 - 10.0' 68			2. 10.5 - 16.5' 70	
		2. 11.5 - 16.5' 97			MOTE: Water level at 2.75 on 8/12/70.	
		3. 16.5 - 21.5' 100 6. 21.5 - 25.0' 100	<u>DH-352</u>	Elev. 10	098.4 8/13 to 8/13/70 PAB	
	- •		0.0	2.0	10≥30L.	10.0
<u>DH-620</u>	1.5	1158.73 8/12 to 8/12/70 PAB TOPSOIL, BOOTS.	2.0	3.5	SAND, milty with gravel, about 25%	12-653
0. 0	1.5		-	-	fines, 20% fine sand, 25% medium sand, 3M 20% coarse sand, 10% gravel, subangular,	0.0
1.5	5.0	BOULDER.			3/4-inch marinum sise, red-brown, damp, medium permeability, medium denme,	
5.0	9.5	SAND, silty, with gravel, about 20% fines, 15% fine mand, 25% medium			medium permeability, medium dense, Floodplain Deposite.	1.0
		sand, 30% coarse sand, 10% gravel, SM subagular, 1-inch maximus sise,	3.8	14.5	BEROCK, grey, biotite hornblande gneiss,	
		olive-brown, moist, medium-low	-		foliations dipping about 80°. Highly fractured from 3'6" to 8'6". Fractures	
		permeability, dense, GLACIAL TILL.			speed about 3 to 5 inches apart. Very slightly fractured from 8'6" to 14'6".	
9.5	17.5	METROCK, grey, biotite, hornblande, gnaiss. Foliations dipping about 70°.	-1 -1			
		Highly fractured with sand seams. Fractures spaced 1/2-inch to 6 inches	14.5		Bottom of Hole. Drive Samples	
		Practures spaced 1/2-inch to 0 inches spart.			No. Depth Blows/ft. SRecovery 1. 0.0-1.5 17 78	TP-654
17.5		Notton of Hole.			2. 1.5 - 3.0' 26 83 3. 3.0 - 3.5' 100/6 met. 27	<u>19-054</u> 0.0
		Drive Samples				0.0 1.0
		1. 1.0 - 1.5, 18 1000			Rock Core Rung No. Depth & Recovery	A
		2. 5.0 - 5.8' 60/10" ref. 78			1. 3.5 - 8.5' 73 2. 8.5 -14.5' 100	
		Rock Core Bans			MOTE: Water level at 4.58 feet on	
		Bo. Depth <u>§ Recovery</u> 1. 9.5 - 12.5' 93 2. 12.5' 83			8/13/70.	
		2. 12.5 - 17.5 83	<u>DH-353</u>	Elev. 109	95.2 8/13 to 8/14/70 PAB	
		2072: Mater level at 9.5 feet on 8/12/70.	0.0	1.5	TOPSOIL and BOOT MAT.	10.0
			1.5	7.0	SAMD, with gravels, about 5% fines, 16% fine and, 35% medium cand, 30%	90-ACS
<u>DH-621</u>		<u>_1171.82</u> 8/13 to 8/13/70 DBN			15% fine mand, 35% medium sand, 30% coarse sand, 15% gravel, subargular, SP	<u>19-655</u>
0.0	1.5	70P301.			3/4-inch maximum sine, red-brown, Sm damp, high permeability, dense,	0.0
1.5	9.0	(DEELS and EOULDERS, with some silt and gravel materia, DECLACIAL SELFT.			Floodplain Deposits.	1.0
	•	•	7.0	17.0	BEEROCE, grey, biotite hornblande	
9.0	21.0	BENDOX, grey, biotite hornblands gneiss, moderately fractured, fractures			gnaiss, moderately fractured, foliations dipping about 60 . Nost	
		spaced 12 to 18 inches spart, most fractures dipping about 70 degrees,			fractures are horisontal. All tight. BEDROCK.	
		prectures apping about /U degrees, some horisontel.	17 0		Bottom of Boring.	
21.0		Bottom of Hole.	17.0			12.0
					Drive Samples No. Depth Blows/ft. S. Recovery	
		Drive Samples No. Depth Hows/ft. S Recovery 1. 0.0 - 1.5 4 100			$\begin{array}{cccccccccccccccccccccccccccccccccccc$	<u>19-656</u>
		1. 0.0 - 1.5 4 100 2. 1.5 - 2.2 41/7" ref. 40			3. 3.0 - 4.5' 98 83 4. 5.0 - 5.5' 100/6" ref. 33	0.0
		Book: Core Buns			A. S.O - S.S. JON'S" Her. 33	1.0
		Bo. Depth <u>\$ Recovery</u> 1. 9.0 - 11.0' 75			Ho. Depth & Recovery	
		2. 11.0 - 16.0 100 3. 16.0 - 21.0 93			$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
					••	
		HOTE: Water level at 9 feet on 8/13/70.				12.0
DH-622	ELev.	1179-3 8/13 to 8/14/70 DBH				
0.0	11.0	COBREES and BOWLDERS, with some silt				<u>37-657</u>
V + V	_	and graval matrix, unable to obtain drive samples. BRLACIAL DRIFT.				0.0 3.0
	~ 0					
11.0	21.0	SERICZ, gray, bistite burnbleade gneiss, moderately frectured. Frectures spaced				
		12 to 18 inches spart. Most fractures dipping about 70°. Sume horisontal.				
		Botton of pole.				
~~ .		DICE OF PAS,				10.0
21.0		- •				
21.0		Book Core Run Bo. Dopth ≰ Recovery 1. 11.0 - 16.0' 80				

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8/12/70 DBN		(7. AM 1	, TEST PITS AKE, CLAN RIVER WATERSHED			ontid) Clem Riv	ver Watershed Class Lake Site
			nnd, ular alven watersel		<u>77-658</u> 0.0		6/10/71 DIM
ut hS fines, ium sand,	<u>17-651</u>		6/8 to 6/8/71 DI	94 94	0.0	7.0	COBMLES and EDULDERS, with eard and gravel, matrix water entering pit at est. 5 gpm.
ravel, gr	0.0	1.0	TOPSOIL AND ROOTHAT.		7.0		Bedrock and bottom of pit.
permeability,	1.0	10,0	SAND, silty with gravel, about				
			25% fines, 15% fine sand, 20% medium sand, 30% coarse sand, 10% gravel,		<u> 19-659</u> 0.0		6/10/71 DBH
hormblende tured, fractures			sub-angular, 18-inch maximum size, olive-brown, damp, low permeability,	514	1.0	1.0 3.0	TOPSOIL and ROOT MAT.
s. Some			very dense, GLACIAL TILL est. 20% +		<u>ر</u>	3.0	SAND, silty with gravel and cobbles, about 25% fines, 15% fine sand, 20%
res tight. BEDROCK.			6-inch size. Disturbed Sample: 3 to 9 feet.				medium sand, 30% coarse sand, 10% S gravel, sub-angular, 14-inch maximum
	10.0		Bottom of Pit.				size, red-brown, wet, medium permea-
. S Recovery							bility, loose, WEATHIRED GLACIAL TILL.
100 70	TP-652		6/8 to 6/8/71 DE	M	<u>17-660</u> 0.0		6/10/71 DEN
80	0.0	0.5	TOPSOIL and ROOTMAT,		1.0	1.0 5.0	TOPSOIL and HOOT MAT.
ref. 100	0.5	10.0	SAND and gravel, some silt, about 10% fines, 10% fine sand, 15% medium sand			,	SAND, silty with gravel and cobbles, about 25% fines, 15% fine sand, 20%
-			35% coarse sand, 30% gravel, sub-	SP-54			medium sand, 30% coarse sand, 10% SP gravel, sub-angular, 36-inch maximum
I			rounded, 22-inch maximum size, tan- brown, damp, medium-high permeability	or OP-OH			sise, red-brown, wet, medium permea-
			dense, Ice contact sand and gravel	,	5.0		bility, loose, WEATHERED GLACIAL TILL. BEDROCK and BOTTUM OF PIT.
75 on 8/12/70.			with cobbles and boulders to P 6' est. 40% cobbles and boulders then		210		BELIEVER and BUTTON OF PIT.
70 PAB			about 25% + 6-inch aise. Some rock		TP-661		6/10/71 DEM
	10.0		fragments highly weathered. Disturbed Sample: 3 to 10 feet.				
	10.0		Bottom of Pit.		0.0	1.0	TOPSOIL and ROOT MAT.
about 25% Smedium sand, 5%	TP-653	<u></u>	. 6/8 to 6/8/71 DE	1	1.0	11.0	SAND, silty with gravel, and cobbles,
vel, subangular,	0.0	1.0	TOPSOIL and ROOTMAT.				about 25% fines, 15% fine sand, 20% medium sand, 30% coarse sand, 10% SH
ed-brown, damp, Hum dense,							gravel, sub-angular, 22-inch maximum
-	1.0	10.0	SAND and GRAVEL, some silt, about 10% fines, 10% fine sand, 15% medium sand,				size, olive-brown, damp, low permea- bility, very dense, GLACIAL TILL.
bornblende gneiss,			35% coarse sand, 30% gravel, sub-	SP-SH	11.0		Bottom of Pit.
t SC [°] . Highly B'6". Fractures			rounded, 18-inch maximum size, tan- brown, damp, medium-high, dense, Ice	70 MD-90			
ws apart. Verv			contast sand and graval, est. 25% .				
8'6" to 14'6".			6-inch sise. Some rock fragments highly weathered.				
			Distarbed Samples 2 to 9 feet.				
ft. SRecovery			Bottom of Pit.				
	TP-654		6/8 to 6/8/71 DB	1			
6" zof. 27	0.0						
	1.0	1.0 10.0	TOPSOIL and ROOTMAT.				
Tery .		10.0	SAND and GRAVEL, with some silt, about 10% fines, 10% fine sand, 15% medium				
3			sand, 35% coarse sand, 30% gravel, sub-rounded, 20-inch maximum size, tar	SP-5M			
.58 feet on			brown, damp, medium-high permeability.	- or 012-014			
			dense, Icescontact sand and gravel, est. 25% + 6-inch size. Some rock fra				
70 PAB			ments highly weathered.	C-			
			Disturbed Sample: 3 to 10 feet.				
	10.0		Bottom of Pit.				
t 5% fines, m sand, 30%	TP-655		6/10/71 DB				
subangular, SP ed-brown, SN	0.0						
dense,	0.0	1.0	TOPSOIL and ROOTMAT.				
	1.0	12.0	SAND, silty with gravel and cobbles,				
ornblende			about 25% fines, 15% fine sand, 20% medium sand, 30% coarse sand, 10%				
ared, . 60 . Nost			gravel, sub-angular, 15-inch maximum size, olive-brown to 7 foot then blue-	91			
. All tight.			grey, damp to wet, low permeability,				
			very dense, GLACIAL TILL weathered to 7 foot with water. Seer at 7 foot.				
			Disturbed Sample 7 to 11 feet.				
ft. S Recovery	12.0		Bottom of Pit.				
88	TP-656		6/10/71 00				
83 83	0.0	1.0	TOPSOIL and ROOTMAT.				
6" rof. 33	1.0						
		12.0	SAND, silty with gravel and cobbles, about 25% fines, 15% fine sand, 20%				
<u></u>		1	medium sand, 30% corase sand, 10%	SM			
			gravel, sub-angular, 9-inch maximum size, olive-brown, damp, low permea-				
		1	bility, very dense, GLACIAL TILL.				
	12.0		Disturbed Sample 2 to 12 feet.				
	22.00		Bottom of Pit.				
	1-65 7		6/10/71 099	1		CLAM R	IVER WATERSHED PROJECT
	0.0	3.0	TOPSOIL and ROOTMAT and Fill.				AKE MULTIPLE-PURPOSE DAM
	3.0	10.0	SAND, silty with gravel and cobbles.		1	SANC	SFIELD, MASSACHUSETTS
		4	about 25% fines, 15% fine sand, 20%	3 1		1	LOGS OF TEST HOLES
			revel, sub-angular, 14-inch maximum				
		1	tise, olive-brown, damp, low persua-				RTMENT OF AGRICULTURE
			Disturbed Sample: 3 to 9 feet.			SOIL C	ONSERVATION SERVICE
	10.0		Dottom of Pit.			elugetad	Dote
						0. MILLS	Riverdan ACTO
					1.79	N. NONSZAK.	
						ced	Title
					I ···-		······································
						Ithes C.H. DODGE	11 33 MA 357-P

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t			1. 1 P	t
	L48 97 1	BIT HELD		1 9-9
	Thin.			<u>17-91</u>
-	8.0 3.0	3.0 10.0	SAMD, siley with growel, about 305 fines, 305 fine IM	1.0
			pend, 23% undian cond, 10% coarse seed, 13% grows), 3% aobbles, 3% benidere, angeler, hard, maximum hise 10°, damp, her permethility, vary dones, glacial till.	5.0
۲ ^۲	10.0		Dettom of Pit.	17-92
			D.B. 157.1, 3.0-10.0 42 larger than 6" discorded.	0.0 1.0
1			HOTE: Water lavel at 7.3' on 7/14/63	5.0
*	17-231,	BLEV. 1127	6/24/65 E.C.L.	TP-93
	0.0 3.0	3.0 10.0	TOPSOIL SAND, milty with gravel, about 15% fines, 22% fine SH	0.0
r.,			sand, 15% medium sand, 15% coarse sand, 20% graves,	1.0
-			engular, hard, meriaam alse 14", olive-brown, damp, low permaability, very dense, ground meraine-	5.0
ŕ	10.0		Dottem of Pit. D.S. 231.1, 3.0-10.0 % larger than 6" disearded.	17-94
			ROTE: Weter level at 8' am 7/14/65	0.0 1.5
i				L. 0
	17-252,		-	
	0.0 2.5	2.5	TOPSOIL SAMD, growelly with silt, about 10% finas, 13% fina EM.GH sond, 13% modium sand, 7% coarse sand, 30% gravel, 10% cabbles, 5% believe, engular to sub-rounded, maximum size 24°, brown, moist to wet, iow to madium permeshility, donae, grown mortiss.	,
	10.0		lottem of Pit.	
			D.S. 252.1 (2 bags) 2.5-10.0 SL larger then 6" discarded. NOTE: Water level at 0.5' on 7/16/65.	
	17-233.	ELEV. 114		
	0.0 3.0	3.0	TOPSOIL SAND, silty with gravel, about 25% fises, 35% fise	
	10.0	10.0	sond, 13, mediam sond, 52 course sond, 152 gravel, 32 cobles, 32 believes, engular, bard, maximum size 13", olive-brown, damp, impermeble, very dense, glocial till. Dottem of Rt.	
			D.S. 253.1, 3.0-10.0 3% larger than 6" discorded. ROTE: Mater Level dry on 7/14/65.	
	<u>17-254</u> ,	81.EV. 119		
	0.8 3.8 10.8	3.0 10.0	TOPSOIL SAMD, silty with gravel, about 10% fines, 25% fine GP.GN send, 10% modéan send, 10% cantes eand, 35% gravel, 6% cabbles, 2% boulders, angular, hard, maximum size 14", brown, damy, law paymobility, very dense, ground moraine. Dottem of Pit.	
			D.S. 254.1, 3.0-10.0 62 larger than 6" discurded.	
			2012: Vatar isvel dry on 7/14/63.	
I	17+235	EW , 119	<u>6.6</u> 6/23/63 K.G.L.	
	•.• 3.•	3.0 10.0	NULLERY TOPSOIL IAUD, gravelly with cobbles, about 71 fines, 201 GP.GM fine cond, 132 motions and, 101 costre and, 333 gravel, 132 cobbles, 22 builders, oub-round to sub-cognier, sufficient size 12°, brown, damp, high permoduling, down, ham terrotot.	
	10.4		lotten of Pit.	
	ł		9.5. 255.5 (2 begs) 3.0-10.0, 5% harger than 6" discarded.	
i			1078: Water dry en 7/14/65. 5.4 6/25/63 K.G.J	
	3-134 0.0	<u> </u>	4.6 6/23/63 R.C.L. Toposti	
		10.0	Adde, silty with growel, about 25% fines, 35% fine 26 and 16% and 10% and 10% and 10% and 10% atomic	
•	19.4		75 coldies, 22 boulders, equir, berd, maximu size 18", '- elive-brun, damp, impermable, very dense, glatial till. Bottam of Pit. D.S. 250-1, 3.0-10.0 32 larger than 6" discorded.	
			Suffer Mater 14761 at 7.8" on 7/14/65.	1
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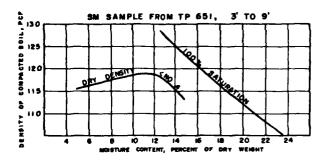
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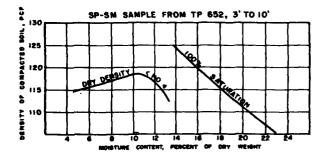
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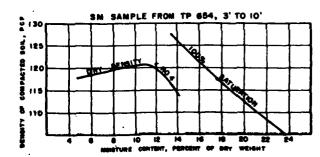
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n	11.	6/21/66 III. :
	1.0 5.0	TOFOIL. AAD, eilty, sobbles and builders, dart, ALINTAL VALAN FIL. Bedrede at bottem of babt pit.
92	slet.	
)))		TOPBOFL. BAND, eilty, growel, cobbles and bouldars, grey, ALMUTIAL VALLEY FIL. Bottom of pit. Bodreck. Mater uppering at 5.0.
-93	ELET.	
0	1.0 5.0	TOPSOIL. SAMD, silty, gravel, cobbles and bouldare, gray, MUNYMI, FILL. Bottom of pit. Bodarock, Mater entering at 5.0.
-94	ELET.	•
0 5 0	1.5 k.0	

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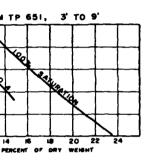
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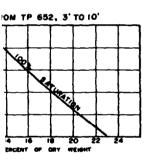
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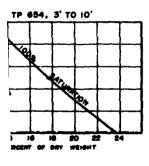


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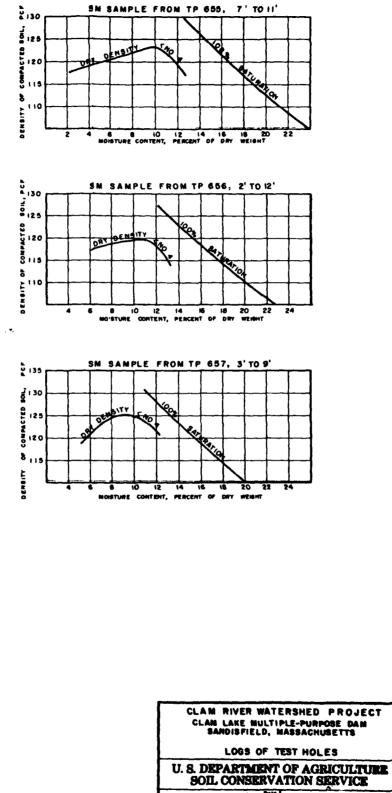




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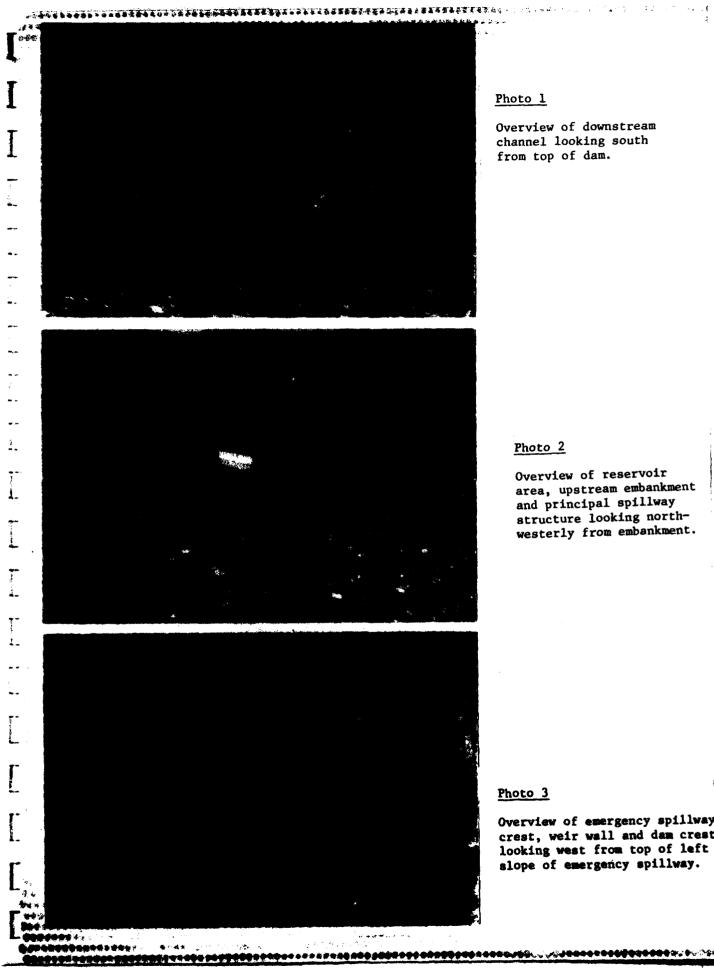
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Photo 1

Overview of downstream channel looking south from top of dam.

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Photo 2

Overview of reservoir area, upstream embankment and principal spillway structure looking northwesterly from embankment.

Photo 3

Overview of emergency spillway crest, weir wall and dam crest looking west from top of left slope of emergency spillway.

Photo 4

Overview of emergency spillway approach channel looking northerly from toe of spillway discharge channel.





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Overview of downstream embankment looking westerly from training wall of emergency spillway.





Photo 6

Overview of emergency spillway training wall slope looking southerly from dam crest. Note: Erosion of slope.

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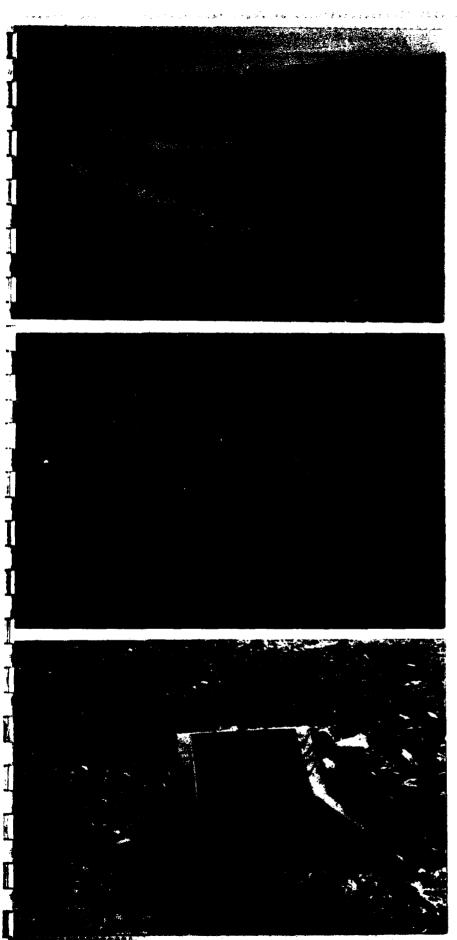


Photo 7

Overview of downstream embankment, spillway discharge channel and left slope of emergency spillway. Note: The sloughing of left spillway slope.

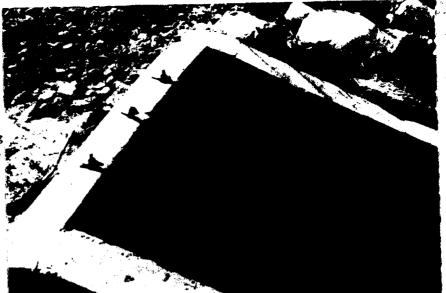
Photo 8

60-inch outlet conduit and end wall. Note the crack above pipe and missing foundation drain pipe outlet to the left of the 60-inch conduit.

Photo 9

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Pond drain inlet structure. Note damaged trash racks.



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Photo 10

Pond drain inlet structure wing wall. Note cracks in concrete.

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Gate well of principal spillway structure. Note the lower two stem guides are damaged.



Photo 12

Crack on right wall of riser transition.

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Photo 13

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Cracks and efflorescence on transition of principal spillway riser.

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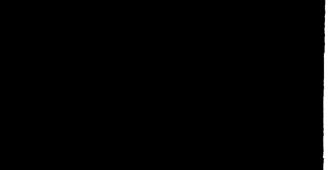
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Crack in transition near the vertical downstream face of the principal spillway riser.

Photo 15

Closeup of silt from beneath rip rap on downstream side of embankment.



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Photo 16

Closeup of left slope toe of emergency spillway at crest. Note groundwater seepage from slope.

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Photo 17

Left slope of emergency spillway. Note slope failure and erosion.



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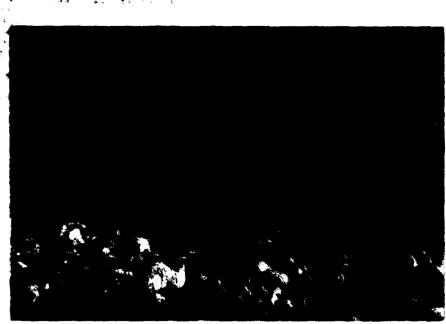
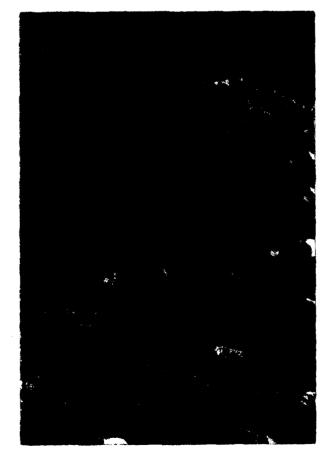


Photo 18

Left slope of emergency spillway. Note erosion.



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Photo 19

Transition of grass covered channel to riprap slope of emergency spillway. Note erosion and undercutting of rip rap by runoff.

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