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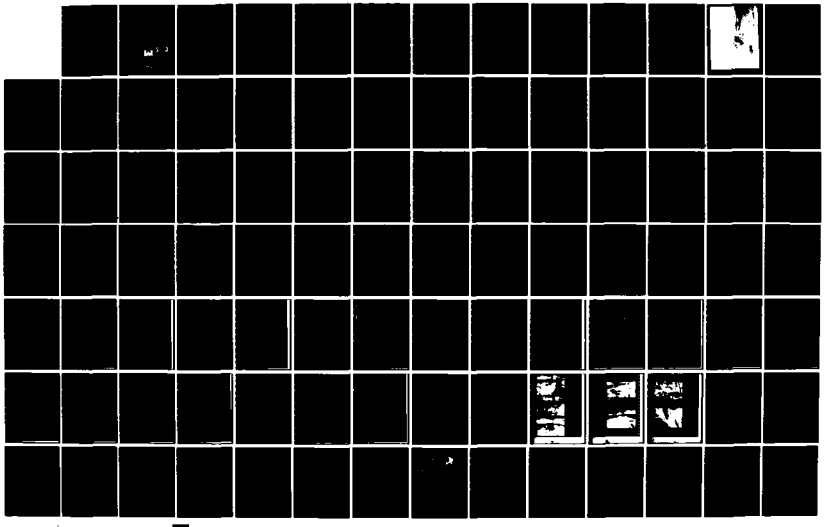

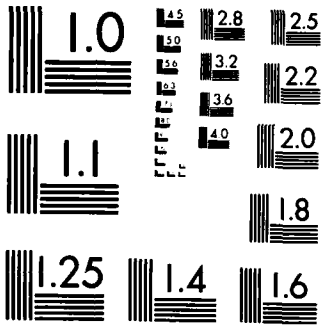

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HOUSATONIC RIVER BASIN
WASHINGTON, MASSACHUSETTS

WASHINGTON MOUNTAIN LAKE DIKE
MA 00319

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

DECEMBER 1979

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Housatonic River Basin
Washington, Massachusetts
Washington Mountain Brook

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dike is an earth embankment with service spillways, outlet conduit and emergency spillway is designed to impound the water to form the lake in conjunction woth the dike. The dike is found to be in good condition. The dike is intermediate in size and its hazard potential is high, because of this the test flood for the dam is the Probable Maximum Flood.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF
NEDED

AUG 06 1980

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

Dear Governor King:

Inclosed is a copy of the Washington Mountain Lake Dike 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. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendation described in Section 7 and ask that you keep me informed of the action 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. In addition, a copy of the report has also been furnished the owner, Commonwealth of Massachusetts, Division of Forests & Parks, 100 Cambridge Street, Boston, Massachusetts 02202.

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,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

WASHINGTON MOUNTAIN LAKE DIKE

MA 00319

HOUSATONIC RIVER BASIN

WASHINGTON, MASSACHUSETTS

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM
PHASE I REPORT

Identification No.:	MA 00319
Mass. DPW No.:	1-2-313-11
Name of Dam:	Washington Mountain Lake Dike
Town:	Washington
County and State:	Berkshire County, Massachusetts
Stream:	Washington Mountain Brook (Tributary of the Housatonic River)
Date of Inspection:	November 2, 1979

BRIEF ASSESSMENT

The Washington Mountain Lake Dike is located in the watershed of Washington Mountain Brook, a tributary of the Housatonic River, approximately 3.8 miles upstream of the confluence of Washington Mountain Brook with the Housatonic River in Lee, Massachusetts. The dike is an earth embankment 695 feet long and 14 feet high. There are no service spillway structures, outlet conduits, or emergency spillways. A dam consisting of an earth embankment with service spillways, outlet conduit and emergency spillway is designed to impound the water to form the lake in conjunction with the dike. The dam is located approximately 3,500 feet west of the dike. This dam is the subject of a separate report.

The dike is owned by the Commonwealth of Massachusetts, Division of Forests and Parks. It was designed by the Soil Conservation Service for the purpose of flood protection and recreation in the October Mountain State Forest.

The drainage area of the dike is 1.3 square miles and is made up primarily of rolling hill woodland. The dike impounds 2635 acre-feet at low stage but has a maximum impoundment of 3,985 acre-feet at top of dike. The dike is INTERMEDIATE in size and its hazard classification is HIGH since significant property damage and loss of life could result in the event of a dike failure.

The dike has not impounded a normal pool of water to date due to the existence of an underground telephone cable in the pool area which is scheduled to be relocated in the near future. Some flood runoff is impounded periodically but eventually released through the pond drain sluice gate at the dam which to date has been left open.

The test flood for the dam is the Probable Maximum Flood. The peak inflow for this flood is 3,000 cfs. Because of storage and the spillway capacity the runoff volume will be contained in the reservoir. The reservoir stage would be at elevation 1803 feet (MSL).

The dike was found to be in GOOD condition. Remedial measures to be undertaken by the owner include: excavation of an outlet channel below the foundation drain outlet to allow unrestricted flow from the

foundation drain system, clean out the sand and gravel from the culvert under Navin Road, repair top surface of the dike to prevent further erosion from vehicle traffic and develop a formal written emergency flood warning system.

The remedial measures outlined above should be implemented within two years of receipt of this report by the owner. The program of annual technical inspections should be continued.

John W. Powers
Sanitary

John W. Powers
Massachusetts Registration 23106

This Phase I Inspection Report on Washington Mountain Lake Dike has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
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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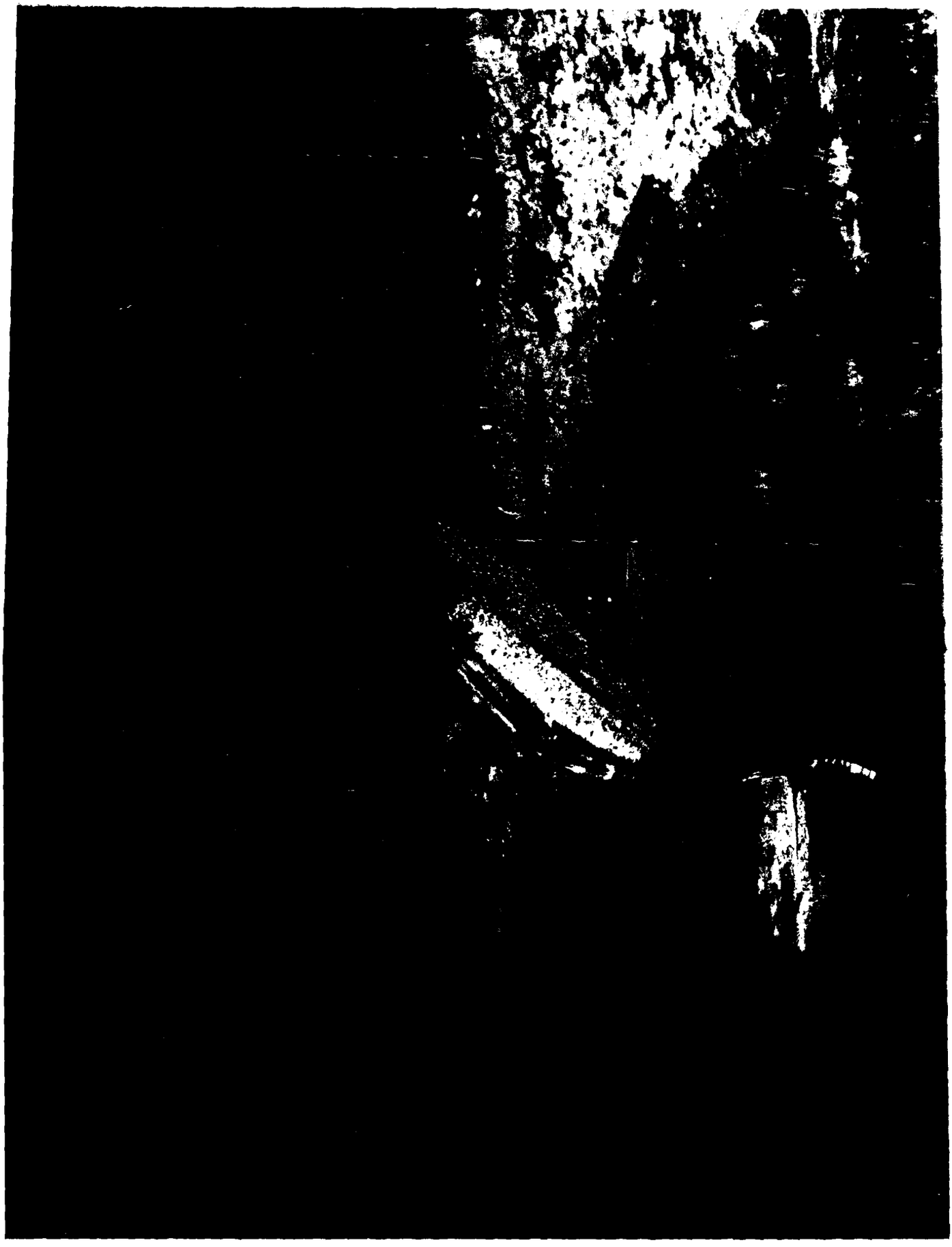

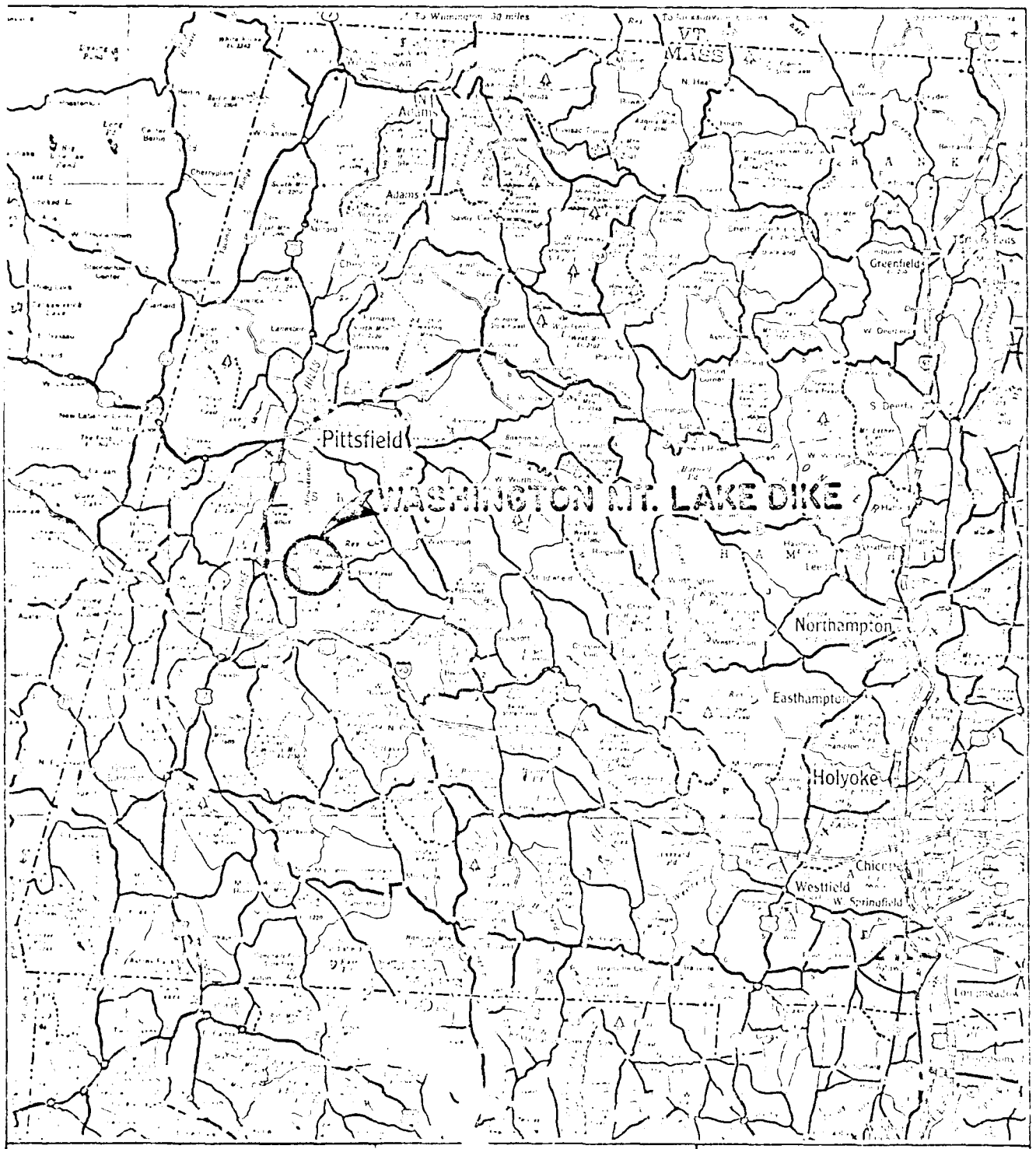

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EASTHAMPTON, MASS.

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

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SCALE IN MILES

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCUS PLAN I

WASHINGTON MOUNTAIN LAKE DIKE (MA 319)
BERKSHIRE COUNTY MASSACHUSETTS

			SCALE: AS NOTED
			DATE: DECEMBER 1979

As part of their hydraulic and hydrologic design calculations for the dam, the SCS created a "Freeboard Hydrograph" and routed it through the reservoir using a storage router. The peak inflow is 10,601.2 cfs, which is 8154.7 csm on a 1.3 square mile drainage area. This, as compared to the 2300 csm given on the Corps of Engineers' "Maximum Probable Peak Flow Rates" curve assuming rolling topography, means the SCS design exceeds the Corps of Engineers MPF at peak flow period.

The SCS storage routing results in a peak outflow of 485 cfs, with the water surface at 1803± feet MSL, 1± foot below the dam crest and 5± feet above normal pool. This analysis assumes a starting water surface elevation of 1797.98 (MSL).

The combined spillway capacity is 788 cfs with water level at the crest of the dam.

5.6 Dike Failure Analysis

The peak outflow that would result from the failure of Washington Mountain Lake Dike is estimated using the procedure suggested in the Corps of Engineers, New England Division's "Rule of Thumb Guidelines for Estimating Downstream Dam Failure Hydrographs." The procedure is carried out with dike failure occurring when the water surface is at the top of the dike (1804.0 MSL).

For an assumed breach width of 40% of the dam length at half height, the failure would be 190 feet wide. The resulting flood flow would be 19,000 cfs. Also, because it is assumed that the breach of the dam would occur during a flood condition, the adjacent drainage area tributary to the Washington Mt. Brook will contribute flow of about 18,000 cfs at the downstream impact areas.

Prior to the dam failure, the flow of 18,000 cfs will result in damage to five bridges and not more than two homes.

The first major area to be impacted by the failure would be three houses and a bridge about 16,000 feet downstream of the dike. The bridge is on Washington Mt. Road and the houses are adjacent to the road near the bridge. The attenuated failure flow of 35,500 cfs would create a stage of 10.5 feet above the brook bed. This would cause shallow flooding at the houses but with the narrow reach the velocity would be high. Thus, there is a potential for loss of life and extensive property damage.

The next area to be impacted by the failure would be a reach about 2000 feet long where Washington Mountain Brook parallels Washington Mountain Road. At the end of the reach the brook passes under a bridge on Woodland Road. The attenuated failure flow of 34,700 cfs would create a stage of 5.5' above the brook bed.

The stage would cause extensive property damage to the seven houses along Washington Mountain Road in this reach and potential loss of life because of the high velocity flow around the houses.

Downstream from the confluence of the tributary with Washington Mt. Brook, Washington Mountain Brook runs about 8,000 feet before reaching the first development, three houses about 10 feet above the streambed. The brook passes under Washington Mountain Road, a lightly traveled road, through a bridge with a low chord 10.6 feet above the streambed.

For the next 2,000 feet Washington Mountain Brook parallels Washington Mountain Road to the north, until the brook passes under Woodland Road. Seven houses exist from 5 to 10 feet above the brook. The bridge on Woodland Road has a low chord of 5.5 feet above the brook bed.

The next 2,000 feet along Washington Mountain Brook impacts four houses and a house trailer that are less than 10 feet above the brook bed. Also, the stream passes under bridges on Washington Mountain Road, Mill Street and a railroad. The low chord of the bridge on Washington Mountain Road is 4 feet above the brook bed, the low chord of the Mill Street bridge is 3.33 feet above the brook bed and the low chord of the railroad bridge is 10.5 feet above the brook bed.

The brook then flows a few hundred feet across flood plain to the Housatonic River which has a drainage area of about 240 square miles above the point of confluence.

5.5 Test Flood Analysis

The hydrologic conditions of interest in this Phase I investigation are those required to assess the dike's overtopping potential and its ability to safely allow an appropriately large flood to pass. This requires using the discharge and storage characteristics of the structure to evaluate the impact of an appropriately sized Test Flood. The original hydraulic and hydrologic design calculations of the SCS are available for the dam.

Guidelines for establishing a recommended Test Flood based on the size and hazard classification of a dam are specified in the "Recommended Guidelines" of the Corps of Engineers. The impoundment of between 1,000 and 50,000 acre feet classify this dike as INTERMEDIATE.

The appropriate hazard classification for this dike is HIGH because of the significant economic losses and potential for loss of more than a few lives downstream in the event of dike failure.

As shown in Table 3 of the Corps of Engineers' "Recommended Guidelines," the appropriate Test Flood for a dam classified as INTERMEDIATE in size with a HIGH hazard potential would be the probable maximum flood (MPF). The Maximum Probable Peak Flow Rate, given on the Corps of Engineers curve, assuming rolling topography is 2300 CSM. The continuous flow of 2300 cfsm routed through the reservoir results in an outflow which does not exceed the combined spillway capacity. Therefore, the dike is safe from overtopping.

SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

The Washington Mountain Lake Dike is a Soil Conservation Service (SCS) flood control and recreation dike in conjunction with a dam, having a 1.3 square mile drainage, on Washington Mountain Brook in Washington, Massachusetts. The dike is about 3.8 miles upstream from the confluence of Washington Mountain Brook and the Housatonic River in Lee, Massachusetts.

The dike itself is a 695 foot long earthen embankment. The dike does not have any service spillway, conduit or emergency spillway.

5.2 Design Data

The data sources available for Washington Mountain Lake Dike include the Soil Conservation Service's (SCS) "Hydrology and Hydraulics" Design Calculations. These calculations include Storage-Elevation and Stage-Discharge curves for the dam, and the routing of storms of various magnitudes through the reservoir. These calculations are dated 1971 and 1972.

Also available are Soil Conservation Service "As Built" plans dated 1973 and 174.

The SCS established the elevation of the low stage outlet of the dam at 1797.98 feet MSL. The elevation of the high stage and emergency spillway (1801.0 feet MSL) was established at the 100-year flood stage in the reservoir. The tops of the dam and dike (1804 feet MSL) were set slightly above the highest elevation of the Design High Water (1,803.1 MSL).

5.3 Experience Data

No records of flow or stage are known to be available for Washington Mountain Lake Dam and Dike, with the exception of debris on the upstream slope of the dam indicating the maximum level reached elevation 1793± MSL.

5.4 Visual Observations

The dike is placed at a drainage area divide. Navin Road parallels the toe of the dike. Downstream of the dike and road the area is shallow sloping in a southerly direction toward a tributary of Washington Mt. Brook. The dike is about 2000 feet northwest from the tributary stream.

The tributary stream of the Washington Mt. Brook flows through a narrow channel across shallow sloping land about 2000 feet to Washington Mt. Brook.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

No written operational procedures are available for this dike.

4.2 Maintenance Procedures

An annual inspection is made by the Soil Conservation Service and recommendations resulting from this inspection are implemented by the Commonwealth of Massachusetts Division of Forests and Parks (see copies of inspection reports in Appendix B).

4.3 Evaluation

There is need for an improved routine maintenance program as evidenced by the deficiencies noted during the visual inspection (see Section 3.2).

A formal, written, downstream emergency flood warning system should be developed for this dike.

3.2 Evaluation

The dike is generally in good condition. The foundation drain and surface drainage systems in poor condition. The potential problems noted during the visual inspection are listed below:

1) The foundation drain is submerged/buried at the outlet.

2) The drainage culvert under Navin Road is 2/3 plugged with sand and gravel.

3) There is excessive vehicular traffic on the top of the dike.

4) Surface drainage is poor just east of and at the easterly end of the dike.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

(a) General

The Washington Mountain Lake Dike was in GOOD condition at the time of the inspection.

(b) Dam

1) Earth Embankment (see photo #1, 2, 3, 4, 5, 6 and 7)

The top of the dike has been traveled upon by vehicles and wheel ruts have developed. The ruts contain rainwater and continuous use as a road has caused erosion.

The foundation drain outlet located to the right of the culvert under Navin Road is a 4" AC pipe and is buried about 12" deep in mud due to sediment deposits; these sediment deposits result from the lack of an outlet channel for the foundation drain outlet; the source of the deposits could not be determined due to the submerged/buried condition of the inlet.

The culvert under Navin Road is about 2/3 plugged with sand and gravel.

The riprap slope protection was in good condition. No seepage was noted during the inspection.

There is some vegetation growing in the downstream drainage channel.

Poor surface drainage was noted just east of an at the easterly end of the dike.

2) Emergency Spillway Not applicable

(c) Appurtenant Structures - Not applicable

The dike is not provided with any service spillways, conduits or emergency spillways.

(d) Reservoir Area (See Photo #4)

The shore of the reservoir is shallow sloping and is stable.

(e) Downstream Channel

The downstream channel is a broad swampy area passing over a shallow sloping hillside.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

Design data available from the Soil Conservation Service are hydrologic and hydraulic computations, structural computations, a geological report, soil laboratory test results, and embankment slope stability analysis computations. This data was reviewed and found to be substantially correct and valid. Therefore, it was used extensively in the computations presented in Section 5 and Appendix D of this report.

2.2 Construction Data

"As built" plans are available for this dike and show good agreement with the design plans and the visual inspection. Records show the top of dam and dike elevations to be the same (1,804.0 MSL). Because of the remoteness of the dam and dike from each other, the elevations of the tops were not verified in the field.

2.3 Operational Data

No operational data is available as the dike does not accomplish any type of regulationg and as of this date does not impound a normal pool of water.

2.4 Evaluation of Data

(a) Availability

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

(b) Adequacy

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

(c) Validity

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

c) Emergency spillway: 242

4) Test flood: Less than 262

5) Top of dike: 262

(g) Dike

1) Type: Earth embankment with riprap slope surface protection and earth cutoff trench.

2) Length: 695 ft.

3) Height: 15.5 ft.

4) Top width: 12 ft.

5) Side slopes: Upstream: 3 to 1
Downstream: 2.5 to 1

6) Zoning: Sand, silty with gravel and boulders

7) Impervious core: None

8) Cutoff: Variable width, earthfill

9) Grout curtain: None

(h) Diversion and Regulating Tunnel Not applicable

(i) Spillways: Not applicable

1) Type:

a) Principal spillway: Not applicable

b) Emergency spillway: Not applicable

2) Length of weir: Not applicable

3) Crest Elevation (ft. above MSL):
Not applicable

4) Gates: Not applicable

5) Upstream channel: Reservoir

6) Downstream channel: Broad swampy channel through gently sloping hillside.

(j) Regulating Outlet

Not applicable. No regulating outlets are provided on the dike.

5) Full flood control pool: 1801±

6) Spillway crest: N/A

7) Design surcharge - 1803.1

8) Top of dike - 1804

9) Test flood surcharge - 1803

(d) Reservoir

1) Length of normal pool: 4,000± ft.

2) Length of flood control pool: 4,400± ft.

3) Length of emergency spillway crest pool: 4,400± ft.

4) Length of pool top of dike: 4,500± ft.

5) Length of test flood pool: less than 4,500± ft.

(e) Storage (acre feet)

1) Normal pool: 2635

2) Flood control pool: 3320 (spillway crest at dam)

3) Dam spillway crest pool (Dike impoundments at dam spillway elevations):

a) Low stage inlet: 2,635

b) High stage inlet: 3,320

c) Emergency spillway: 3,320

4) Top of dike: 3,985 (Base of dike to crest)

5) Test flood pool: 3,735

(f) Reservoir Surface (acres)

1) Normal pool: 224

2) Flood control pool: 242

3) Dam spillway crest pool:

a) Low stage inlet: 242

b) High stage inlet: 242

(i) Normal Operating Procedure

The dike has no regulating facilities; impoundment levels are controlled at the dam.

The Washington Mountain Lake Dam is designed to be normally self regulating. The pond drain gate would be operated only as part of infrequent maintenance checks. At the time of this inspection, the gate was open to preclude impoundment of water.

1.3 Pertinent Data

(a) Drainage Area

The drainage area for this dike covers approximately 1.3 square miles. It is made up primarily of rolling hill woodland.

(b) Discharge at Dike Site

1) Outlet Works

The dike is not provided with any outlet works. The dam is provided with service spillways, conduit and an emergency spillway.

2) Maximum Known Flood

There is no data available for the maximum known flood at this dikesite. Signs of debris on the dam embankment indicate that the water surface has been as high as elevation 1793.0 (MSL).

3) Ungated Spillway Capacity at Top of Dam - N/A

4) Ungated Spillway Capacity at Test Flood - N/A

5) Gated Spillway Capacity at Normal Pool - N/A

6) Gated Spillway Capacity at Test Flood - N/A

7) Total Spillway Capacity at Test Flood - N/A

(c) Elevation (feet above MSL, NGVD)

1) Streambed at toe of dike. There is no stream through dike area. Original grade at toe of dike is 1790±.

2) Bottom of cutoff: 1,783±.

3) Maximum tailwater: Not applicable.

4) Recreation pool: 1798±

(c) Size Classification

The dike's maximum impoundment (computed to the top of the dike) of 3,985 acre feet places it in the INTERMEDIATE size category according to the Corps of Engineers' Recommended Guidelines.

(d) Hazard Classification

The hazard potential classification for this dike is HIGH because of the significant economic losses and potential for loss of life downstream which may occur in the event of dike failure. There is a high potential for severely damaging about twelve (12) homes with possible loss of more than a few lives, as well as four road bridges, one railroad bridge, and a secondary road.

(e) Ownership

The Washington Mountain Lake Dike is owned by the Commonwealth of Massachusetts, Division of Forests and Parks, 100 Cambridge Street, Boston, Massachusetts. They can be reached by telephone at 617-727-3180.

(f) Operator

The operation of the Washington Mountain Lake Dike is controlled by the Commonwealth of Massachusetts, Division of Forests and Parks. The regional office responsible for the dam is as follows:

Commonwealth of Massachusetts
Division of Forest and Parks
Pittsfield State Forest
Cascade Street
Pittsfield, Massachusetts

Mr. Douglas G. Poland is the Regional Supervisor. The telephone number is 1-413-442-8992.

(g) Purpose of the Dike

The Washington Mountain Lake Dike, in conjunction with the dam, is designed to form a multiple purpose recreation pool and flood water storage to reduce downstream flooding from the upstream drainage area. Stored water is gradually released through low and high level inlets of the principal spillway at the dam.

(h) Design and Construction History

The Washington Mountain Lake Dike was designed by the U.S. Department of Agriculture, Soil Conservation Service. The dike was built under the Watershed Protection and Flood Preventin Act by the Massachusetts Department of Natural Resources, which is currently the Department of Environmental Management, the Massachusetts Water Resources Commission, the Berkshire Conservation District and the Town of Lee, Mass.

State Rt. 20 to Becket Road, Becket Road to Tyne Road, Tyne Road to Yokum Pond Road, Yokum Pond Road to County Road, County Road to Lenox-Whitney Place Road and Lenox-Whitney Place Road to West Branch Road. The dike is shown on USGS East Lee, Massachusetts quadrangle at approximately coordinates N-42°-21.1', W-73°-11.4'. (See location map on page v). Also, see Page B-13 and B-14.

(b) Description of Dike and Appurtenances

The dike consists of an earth embankment with an earthfill cutoff trench below the embankment. The length of the embankment is 695 feet. There are no spillways at or around the dike. An earth embankment dam having service spillways, conduits and emergency spillway impounds water in conjunction with the dike and records indicate that the tops of the dam and dike are at the same elevation. The dam is the subject of a separate report (Washington Mountain Lake Dam, MA 00318).

1) Embankment (See pgs. B-16 and B-17)

The embankment is made up primarily of sand, silty with gravel and boulders with a maximum stone size of 6". It is 695 feet long and is 14 feet high. The upstream slope is 3 horizontal to 1 vertical; the downstream slope is 2.5 horizontal to 1 vertical; and the width of the top of dike is 12 feet.

Beneath the embankment is an earthfill cutoff trench of variable width at the bottom. According to available plans, it is constructed of the same material as the embankment. The cutoff trench was designed and constructed to extend through disturbed top soil to glacial till.

2) Principal Spillway

The dike does not have any principal spillways. The dam is provided with a principal spillway.

3) Emergency Spillway

The dike does not have an emergency spillway. The dam is provided with an emergency spillway.

4) Foundation Drainge (See Pg. B-17)

A 4" AC pipe bedded in coarse drain fill is provided in the foundation near the toe of the dike to collect water and outlets at a single location to the right of the culvert under Navin Road.

PHASE I INSPECTION REPORT

WASHINGTON MOUNTAIN LAKE DIKE

SECTION 1

PROJECT INFORMATION

1.1 General

(a) Authority

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 issues 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-005 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.

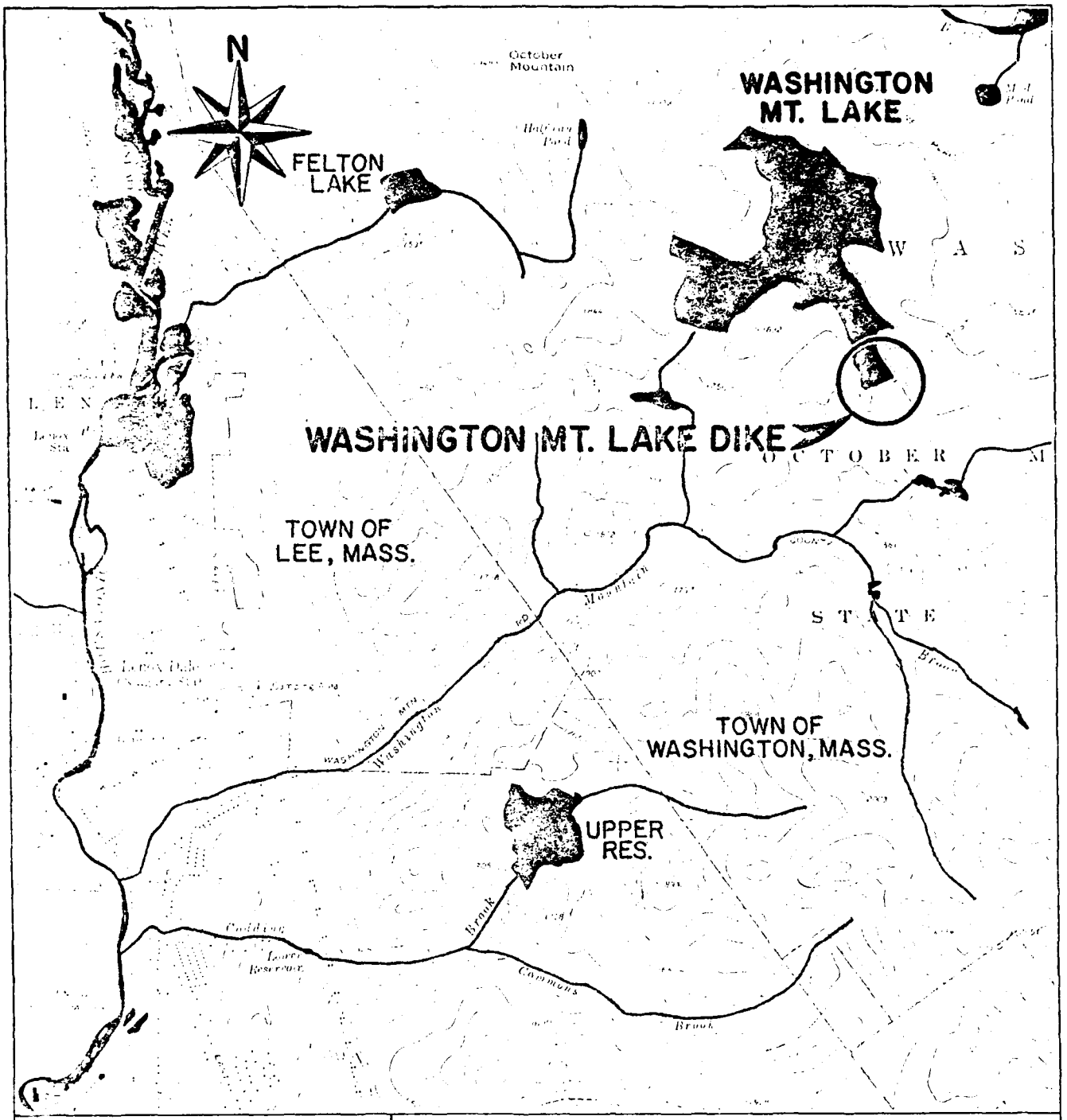
(c) Scope

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 Washington Mountain Lake Dike is located in the watershed of Washington Mountain Brook approximately 3.8 miles upstream of the confluence of the Housatonic River and Washington Mountain Brook in Lee, Massachusetts. It can be reached by way of Mass.



-SCALE-

1000' 0 1000' 2000' 3000' 4000'

FROM: U.S.G.S EAST LEE, MASS. QUADRANGLE MAP

QUADRANGLE LOCATION

TIGHE & BOND / SCI CONSULTING ENGINEERS EASTHAMPTON, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCUS PLAN 2

WASHINGTON MOUNTAIN LAKE DIKE (MA319)
BERKSHIRE COUNTY MASSACHUSETTS

SCALE: AS NOTED

DATE: DECEMBER 1979

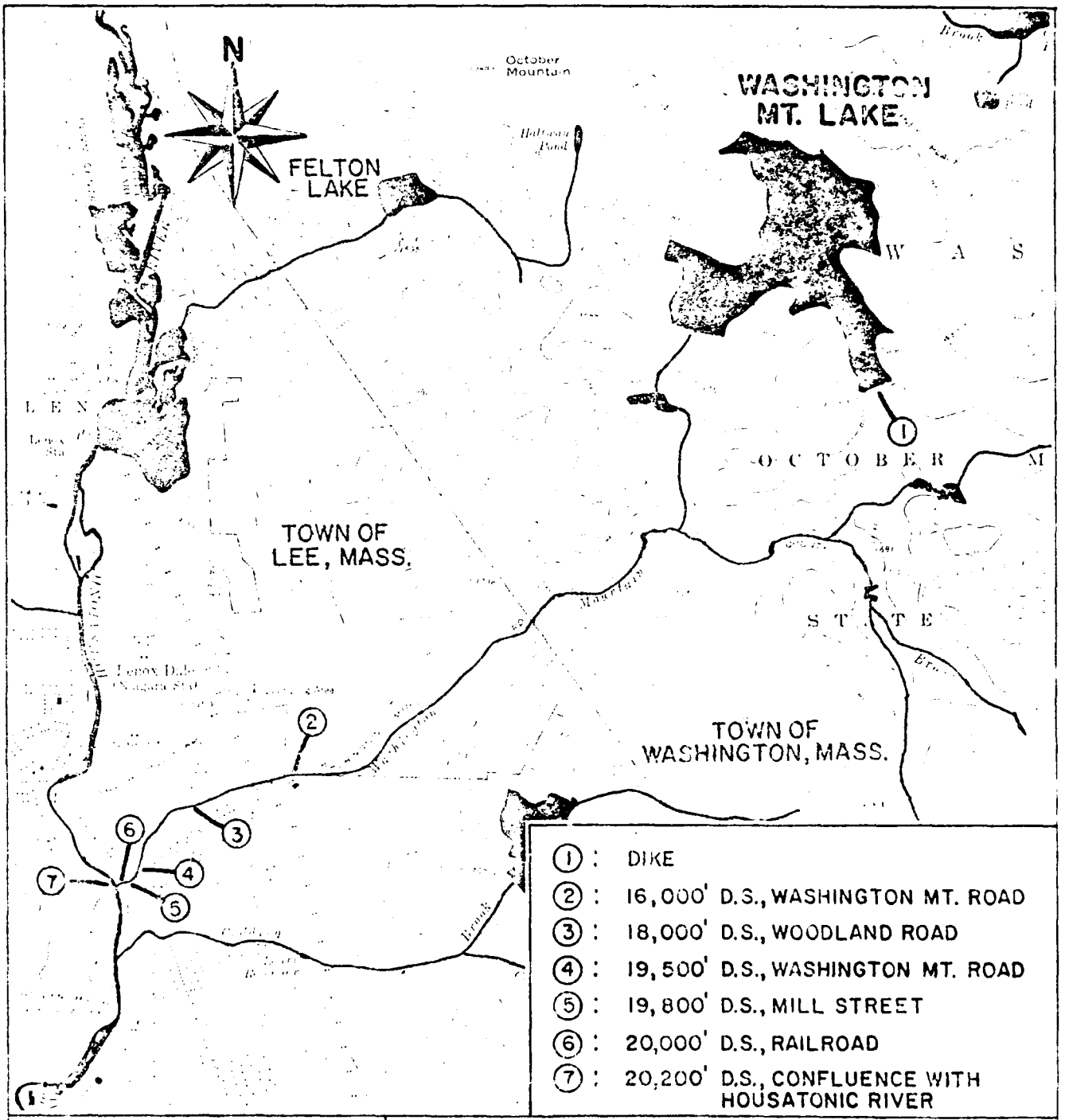
The next reach is about 2000 feet long and the area to be impacted by the flood includes four houses, a house trailer, two road bridges and a railroad bridge. The attenuated failure flow of 34,300 cfs would cause a stage of 9.5 feet in this reach. In addition, because the railroad bridge cannot carry the flow, the railroad bed would be overtopped. Also flood water would overflow Mill Street to the south.

The flood flow over the railroad bed and Mill Street would have an estimated depth of 3.8 feet which would cause the depth of water at the railroad to be 13 feet above the brook bed. The flood flow would cause extensive property damage and potential loss of life in this reach.

The next area impacted would be an area along Mill Street to the south where the flood water would overflow. This area contains two houses that would experience high velocity, shallow flooding as the water flows to the Housatonic River. There is a potential for loss of life and extensive property damage.

Once the failure flow passes the railroad bridge and Mill Street, the flow enters the Housatonic River. The peak dike failure flow and MPF of 34,300 cfs would be attenuated rapidly in the river channel.

The following chart summarizes the downstream impacts of the failure of the Washington Mountain Lake Dike.



① : DIKE
② : 16,000' D.S., WASHINGTON MT. ROAD
③ : 18,000' D.S., WOODLAND ROAD
④ : 19,500' D.S., WASHINGTON MT. ROAD
⑤ : 19,800' D.S., MILL STREET
⑥ : 20,000' D.S., RAILROAD
⑦ : 20,200' D.S., CONFLUENCE WITH HOUSATONIC RIVER

-SCALE-
1000' 0 1000' 2000' 3000' 4000'
FROM: U.S.G.S EAST LEE, MASS.

QUADRANGLE LOCATION

TIGHE & BOND / SCI
CONSULTING ENGINEERS
EASTHAMPTON, MASS.

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

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION AND DOWNSTREAM HAZARD MAP

WASHINGTON MOUNTAIN LAKE DIKE (MA 319)
BERKSHIRE COUNTY MASSACHUSETTS

SCALE: AS NOTED
DATE: DECEMBER 1979

Probable Downstream Impact of Dike Failure
Washington Mountain Lake Dike

Location	No. of Houses Affected (After Dam Failure)	Other Damage (After Dam Failure)	Attenuated Flow (CFS) (Before Failure)	Attenuated Flow (CFS) (After Failure)	Brook Stage (Ft.) (Before Failure)	Brook Stage (Ft.) (After Failure)	Comments
1. Dike	0	1 secondary rd.	18,000	19,000(Dike failure)	--	--	No significant damage before dam failure
2. 12,000' Downstream of Dam at W. Mt. Rd.	3	1 bridge	18,000	35,500(Dike failure plus MPF)	6.5	10.5	Wash. Mt. Rd. is a secondary road. Before dam failure bridge inundated.
3. 2,000' Downstream at Woodland Rd.	7	1 bridge	18,000	34,700 "	3.5	5.5	Woodland Rd. is a secondary road. Before dam failure bridge inundated.
4. 2,000' Downstream at Railroad	2	1 R.R. bridge 2 Rd. bridges (Mill St. & W.M. Rd.)	18,000	34,300 "	6.5	9.5 13.0 (overflow)	R.R. line is major; Mill St. is a major road. Washington Mt. Road is a secondary road. Before dam failure, 2 road bridges & 1 R.R. bridge damaged.
5. Downstream of R.R. and Mill St.	2	0	18,000	34,300 "	5.0	Shallow high velocity flow	Before dam failure, 2 houses experience shallow-high velocity flooding.

SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

There has been no significant displacement or distress which would warrant the preparation of structural stability calculations.

6.2 Design and Construction Data

1) Embankment

Analysis carried out during the design and construction phase included an embankment slope stability analysis by the swedish circle method. Based on this analysis a 3 to 1 upstream slope and a 2.5 to 1 downstream slope were utilized.

2) Appurtenant Structures

Not applicable. The dike is not provided with any service spillways, conduits or emergency spillways.

6.3 Post Construction Changes

There have been no known modifications to the dike since construction.

6.4 Seismic Stability

The Washington Mountain Lake Dike is located in seismic zone No. 2. According to the recommended Corps of Engineers guidelines, a seismic analysis is not warranted.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dike Assessment

(a) Condition

The dike is generally in GOOD condition with the exception of the foundation drain and surface drainage systems which are in POOR condition.

(b) Adequacy of Information

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

(c) Urgency

The recommendations and remedial measures described herein should be implemented by the owner within two years of receipt of this Phase I Inspecton Report.

7.2 Recommendations

The recommendations of this Phas 1 Investigation are that the following additional studies be made under the supervision of a registered professional engineer:

1) Monitor the dike during and after initial filling of the upstream pool with particular attention paid to the foundation drainage system.

7.3 Remedial Measures

It is recommended that the owner institute the following remedial and/or maintenance measures:

1) Gravel the surface of the top of the dike to prevent ruts and erosion if the top is to be used as a road. Otherwise, block off access to the top to prevent trespassing.

2) Provide an adequate channel for the foundation drain to discharge to in order to prevent blockage.

3) The culvert under Navin Road should be cleaned to allow full flow.

4) Channel and divert surface water from and at east end of the dike to the Navin Rd. gutter.

5) Remove vegetation growing in the downstream drainage channel.

6) Prepare a formal written downstream emergency flood warning system.

7) Continue the program of annual periodic technical inspection.

7.4 Alternatives

There are no meaningful alternatives to the above recommendations.

APPENDIX A

Visual Checklist With Comments

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Washington Mt. Lake Dike
MA 00319

DATE 11/2/79

TIME 11:00 A.M.

WEATHER Cloudy and Cool

W.S. ELEV. 1771 U.S. 1760 D.S.

PARTY:

1. J.W. Powers, P.E., Proj. Manager
2. G.H. McDonnell, P.E., Hydrology/Hydraulics
3. D.M. Lenart, P.E., Civil
4. E.A. Moe, P.E., Soils/Hydraulics
5. H.A. Koski, Civil
6.
7.
8.
9.
10.

PROJECT FEATURE	INSPECTED BY	REMARKS
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Also present:

L. Curran, U.S.D.A., Soil Conservation Service

C. Curtin, Massachusetts Division of Forests & Parks

INSPECTION CHECK LIST

PROJECT Washington Mt. Lake Dike DATE 11/2/79

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	1804 MSL
Current Pool Elevation	Brook (no impoundment)
Maximum Impoundment to Date	1793 ±
Surface Cracks	None
Pavement Condition	Good both faces some brush
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	N/A
Indications of Movement of Structural Items on Slopes	None Wheel ruts on crest and erosion
Trespassing on Slopes Vegitation on Slopes	Brush growing in toe channel and between some rocks
Sloughing or Erosion of Slopes or Abutments	None
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	None
Piping or Boils	None
Foundation Drainage Features	Drain outlet buried 12"± below mud
Toe Drains	Good condition but culvert under Navin Rd. 2/3 plugged
Instrumentation System	None

INSPECTION CHECK LIST

PROJECT Washington Mt. Lake Dike DATE 11/2/79

PROJECT FEATURE All features NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	
Loose Rock Overhanging Channel	N/A
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Concrete	
Rust or Staining	
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	
c. Discharge Channel	
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Channel	
Other Obstructions	

INSPECTION CHECK LIST

PROJECT Washington Mountain Lake Dike DATE 11/2/79

PROJECT FEATURE All features NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	
Rust or Staining	N/A
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	
Channel	
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

INSPECTION CHECK LIST

PROJECT Washington Mt. Lake Dike DATE 11/2/79

PROJECT FEATURE All features NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	N/A
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

INSPECTION CHECK LIST

PROJECT Washington Mt. Lake Dike DATE 11/2/79

PROJECT FEATURE All features NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
INTAKE WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	
Condition of Joints	N/A
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System in Gate Chamber	

INSPECTION CHECK LIST

PROJECT Washington Mt. Lake Dike DATE 11/2/79

PROJECT FEATURE All features NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - ENGINE CHAMBER AND INTAKE STRUCTURE	
a. Approach Channel	
Slope Conditions	
Bottom Conditions	N/A
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	
Stop Logs and Slots	

[illegible]

[illegible]

1 ✓ [illegible] (Bombay Mutual)
2 ✓ [illegible] (Chinese)
3 ✓ [illegible] (Chinese)
4 ✓ [illegible] (Chinese)
5 ✓ [illegible] (Chinese)
6 ✓ [illegible] (Chinese)

7 ✓ [illegible] (original) [illegible]
9 ✓ [illegible]
10 ✓ [illegible] (Chinese) ✓
11 ✓ [illegible] (Chinese) ✓
[illegible]
12 ✓ (Chinese)
13 [illegible] (Chinese)
14 ✓ (Chinese)

15 ✓ (Chinese)
16 ✓ [illegible]
17 [illegible]
18 ✓ [illegible]

Recommendations:

Vegetated areas should be limed with 3 tons/acre and fertilized with 400 lbs of 5-10-10/acre. Areas being used as roads should be protected. Also, the erosion taking place at the left end of the walkway should be corrected. Seeding mixture should be equivalent to that originally specified.

Submitted by:

R. E. Thompson,
District Conservationist
SCS, Pittsfield, Mass.

cc:
cc: James Blaeser, Otis

June 12, 1975

REPORT OF ANNUAL INSPECTION

WASHINGTON MOUNTAIN BROOK WATERSHED

On June 5, 1975, the following met at the Washington Mountain Dam Site, Washington Mountain Brook Watershed in the Town of Washington, Massachusetts for the purpose of conducting the annual inspection.

Jim Kleczar	Soil Conservation Service-Otis
Robert Tsumpanis	Water Resources Commission-Boston
Carl Curtin	Department of Natural Resources-Pittsfield
Tom Leland	Department of Natural Resources-Pittsfield
Rick DeVardilio	Soil Conservation Service-Pittsfield

OWNER

The Massachusetts Department of Natural Resources is responsible for the operation and maintenance of this site.

Emergency Conditions and Recommendations: (6-5-75)

The top of the dam is being used as a roadway. Very little vegetation is established on this area. A reseeding of the top of the dam is needed.

Erosion is taking place within the roadway along the southeast side of the spillway. Water diverting and reseeding is needed. The area in general should be closed to vehicular traffic.

A fallen tree needs to be removed from spillway. Spillway and other roadway areas should be mowed once a year.

Some erosion is taking place just west of outlet.

Vehicular traffic is causing some erosion upon side slope of spillway.

Submitted by:

[illegible]
Soil Conservation Service
Otis, Massachusetts, [illegible]

[illegible]

June 5, 1975

REPORT OF ANNUAL INSPECTION

WASHINGTON MOUNTAIN BROOK WATERSHED

On June 4, 1975, the following met at the Washington Mountain Lake Site, Washington Mountain Brook Watershed in the town of Washington, Massachusetts for the purpose of conducting the annual inspection.

Ernest Struzziero	Water Resources Commission-Boston
Douglas Poland	Department of Natural Resources-Pittsfield
Carl Curtin	Department of Natural Resources-Pittsfield
Rick DeVergilio	Soil Conservation Service-Pittsfield
James J. Elasmar	Soil Conservation Service-Otis

General

The Massachusetts Department of Natural Resources is responsible for the operation and maintenance of this site.

Structural Conditions and Recommendations

1. Remove debris from inlet channel.
2. Remove logs and debris from inlet channel.
3. Clean out silt from inlet channel.
4. Replace animal guard, outlet of drain at impact basin.
5. Clean out 4" drain outlets at impact basin.
6. Clean out 2 culverts under Navin Road leading away from toe drain.
7. Replace barricade cable at dam.

Douglas Poland and Carl Curtin suggested that large boulders be placed as a barricade in lieu of the cable.

The riprap at the outlet looks very good.

Report on Agronomic conditions will be submitted by Ronald Thompson.

Submitted by:

James J. Elasmar

James J. Elasmar
Project Engineer
Otis, Ma.

Attendees

Dist of Washington Mt Baker to S Shelton

Washington Mt Lake

1. Tommy Lee (Chairman, Bradley Allentown)
2. Barbara Condiot (Chairman) c/o Littlefield SCS
3. C Kennedy, Dept of Water Res. Olympia
4. Commissioner Mens Dept of Ecol Mgt (Bette Wendy)
5. ~~[illegible]~~ Sierra Conservation (Thompson) (Littlefield field office)
6. Reg Engr - Olympia - Clarence
7. A Verde Olympia - "original"
8. (Carrie) State Cons Engr / Eng Tech
9. Attendees
10. Lentz copy to Mills/Hawkins/Manolis Tacoma
11. Pres Senate & Cons. James Lindert Senator (not come yet) Centralia (Little Hill)

PILOT-TRIAL
[illegible]

OPERATION AND MAINTENANCE INSPECTION RECORD

U.S. Dept. of Agriculture
Soil Conservation Service

Project: WASHINGTON MOUNTAIN BROOK Inspection Date: [illegible]

Site Name/No.: 3 (WASHINGTON MT. LAKE Type: MULTIPURPOSE

Type of Inspection: Special ☐ Annual ☑

Structure Operation: Satisfactory ☐ Unsatisfactory ☐

Sponsoring Local Organization:

Present for Inspection: Edward Carhalan, CARL L. CURTIN, Ronald Thompson, [illegible]

ITEM	Condition * S or U	Maintenance & Needed Repairs	Estimated Costs	Agreed Date Repairs to be Completed
1. Vegetation	U	CROWN VETCH FERTILIZE 400# - 0-20-20 E.S. AND ADJACENT AREA. REFURBISH 40# - 10-10-10	2000.	SEPT 30, 1976
2. Fences	S			
3. Principal Spillway	S			
4. Emergency Spillway	S	REMOVE BRUSH & FALLEN TREE	100.00	SEPT 1976
5. Embankment & Riprap	S			
6. Reservoir Area	S	AREA BEING CLEARED		
7. Gates or Valves	S			
8. Outlet Channels	S			
9. Structure Footings Cutwater	S	Remove logs + brush INSTALL RODENT GUARD - DRAIN PIPE	100.00	SEPT 1976
10. Access Rd.	S	REGRADE AND USE GRAVEL WHERE NECESSARY		SEPT 1976
SPOIL AREA	S	CRUSHED STONE IN THREE AREA (ROAD)	50.00	SEPT 1976

Remarks (over) S = Satisfactory; U = Unsatisfactory

When clearing contract complete, remove top of dam and replace gate.

[illegible] [illegible] [illegible]

(District Conservationist) (Project Engineer) (SWD Representative)

(Project Sponsoring Official)

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

29 Cottage Street, Amherst, Massachusetts

Date: June 2, 1976

SUBJECT: AS - Distribution of Operation and Maintenance Inspection Report/s (PL 566)

TO: 1. Charles Kennedy (2 copies)
Director and Chief Engineer
Division of Water Resources
Mass. Dept. of Environmental Mgt.
100 Cambridge Street
Boston, MA 02202

Betty Woody, Commissioner
Mass. Dept. of Environmental Mgt
100 Cambridge St.
Boston, MA 02202

2. Soil Conservation Service
District Conservationist/s
P. Thompson
Project Engineer
Elsmer
State Administrative Officer
(file copy)
State Conservation Engineer

Chairman, Board of Selectmen
Town Hall
Lee, Mass. 01238

Chairman, Berkshire Cons. District
c/o Pittsfield SCS

C. Curtin
Mass. Div. of Forests and Parks
Pittsfield State Forest
Cascade Street
Pittsfield, MA 01201

Enclosed are reports of the O&M inspection held in the Washington Mt. Brook (watershed) for the sites listed below:

Site	Date Inspection Performed
Washington Mountain Lake	5/27/76

Sincerely,

Dr. Benjamin Isgur, Ag
State Conservationist

Enclosure/s

[illegible] MATERIAL: [illegible]
[illegible]

OPERATION AND MAINTENANCE
INSPECTION RECORD

U.S. Dept. of Agriculture
Soil Conservation Service

Project WASHINGTON MOUNTAIN BROOK W/S Inspection Date 5/10/77

Site Name/No. [illegible] MOUNTAIN LAKE Type MULTI-PURPOSE

Type of Inspection: Special [ ] Annual [X]

Structure Operation: Satisfactory [X] Unsatisfactory [ ]

Sponsoring Local Organization: BERKSHIRE CONSERVATION DISTRICT W.R.C.

Present for Inspection: ([illegible]) Ernest Stugzen Ron Thompson
James Elsmore

ITEM	Condition * S or U	Maintenance & Needed Repairs	Estimated Costs	Approx. Date Repairs to be Completed
1. Vegetation	U	LIME + FERTILIZE 10-10-10, 1400# per ACRE	2,000	Sept. 1977
2. Fences	S			
3. Principal Spillway	S			
4. Emergency Spillway	S	Remove dead spruce trees + brush	100.00	Sept 1977
5. Embankment & Riprap	S	Place gravel top of dam, - Cut growth D/S slope + treat with 2-4-D	1,500.00	Sept 1977
6. Reservoir Area	S	Remove brush edge of water	500.00	Sept 1977
7. Gates or Valves	S			
8. Outlet Channels	S			
9. Structure Inflow Conduit	S	Remove brush. Install animal guard (Drain Pipe)	150.00	Sept 1977
10. Access Rd.	S			
11. Spillway	S			

(Attach sheet if more space needed)

* S = Satisfactory; U = Unsatisfactory

[illegible] James Elsmore Ernest Stugzen
(District Conservationist) (Project Engineer) (SCS Representative)

(Form Approved: [illegible])

WATERSHED
3/1/76

OPERATION AND MAINTENANCE
INSPECTION REPORT

U.S. Dept. of Agriculture
Soil Conservation Service

Project Washington Mountain Brook w/ Inspection Date 8/17/1978

Site Name/No. Wash. Mount. Lake Type Multi-Purpose

Type of Inspection: Special [ ] Structure Operation: Satisfactory [X]

Annual [X] Unsatisfactory [ ]

Sponsoring Local Organization: Berkshire Conservation Dist. WRC

Present for Inspection: Edward Carbolan Supt. Attleboro, Robert Hess Jr. Owner, DPW W.M. Murray Co. Rep/Subcontractor, T. Dowd Tree Expert, Ted Bird, Thomas D.C. Ray Owen, JAMES FLASHAR, SCS

ITEM	Condition * S or U	Maintenance & Needed Repairs	Estimated Costs	Agreed Date Repairs to be Completed
1. Vegetation	S	LIME, FERTILIZE TOP DAM. 3 TON/ACRE 10-10-10.	2,500 -	SEPT 30, 19
2. Fences	S			
3. Principal Spillway	S			
4. Emergency Spillway	S			
5. Embankment w/Riprap	S	RAKE, PULL HARDWOOD VEGETATION ON SLOPES, OR CUT + TREAT W/2-4-D HERBICIDE. CUT + TREAT W/2-4-D HERBICIDE SLOPES OF DAM	2,000 -	OCT 30, 19
6. Reservoir Area	S			
7. Gates or Valves	S			
8. Outlet Channels	S	REMOVE GROWTH CHANNEL + SLOPES	500 -	OCT 30, 19
9. Structure Drainage Outlets	S	INSTALL ANIMAL GUARD AT DRAIN PIPE (SEEP HOLE TO BE PLUGGED)	200 -	OCT 30, 19
10. Access Rd.	S	Needs grading	650 -	OCT. 30, 19
11. SPOIL AREA	S			

* Rate (over) S = Satisfactory; U = Unsatisfactory

(Sponsoring Company Official) (Project Engineer) (SCS Representative)

(Present due, approximately July 1)

U-15/U-16
(Prev. File)

SOIL CONSERVATION SERVICE
U.S.D.A. MASSACHUSETTS

OPERATION AND MAINTENANCE
DAM TECH RECORD

Revised 9/79
File Code 52-11-15

Dam No. WASHINGTON MOUNTAIN BROOK W/S Inspection Date 10/15/79

Name/No. WASH MTN LAKE Purpose MULTI-PURPOSE

Type of Inspection: Special ☐ Annual ☒

Structure Operation: Satisfactory ☒ Unsatisfactory ☐

Sponsoring Local Organization: BERKSHIRE CONSERVATION DIST W.R.C.

Present for Inspection: TED CAHALANE, P.C. CURTIN, DEWGT - EP SIGGERSHEED, Roy CURRAN, GARY PARKER - SCS, W.M. MURPHY, LEE, J. EGAN - EAGLE, P. SCOLFORO, BILL LEE, MARIA BETTEGA - Chm. Bd Selectman

ITEM	Condition * (S or U)	Maintenance & Needed Repairs	Estimated Costs	Agreed Date Repairs to be completed
1. Vegetation	S			
2. Fences	—			
3. Principal Spillway	S			
4. Emergency Spillway	S			
5. Embankment & Riprap	S	PLACE GRAVEL ON TOP OF DAM OR FILL & SEED. REMOVE HARDWOOD GROWTH ON DIKE	$1000	MAY 198
6. Reservoir Area	S			
7. Gates and Valves	S			
8. Outlet Channels	S	REMOVE GROWTH ON CHANNEL & SLOPES	$1300	MAY '80
9. Structure Drainage Outlets	S			
10. Access Rd.	S	MINOR GRADING	$250	MAY '80
11.				

REMARKS: (over) * S = Satisfactory; U = Unsatisfactory

(District Conservationist) (Prep. Engineer) (SCS Representative)

3. Drawings	Title	Page No.
1	Cover Sheet	B-12
2	Plan of Storage Area	B-13
3	Plan of Storage Area	B-14
6	Fill Placement	B-15
11	Navin Road Dike	B-16
12	Navin Road Dike Drain Details	B-17
27, 28, 29	Logs of Test Holes	B-18-20

APPENDIX B

ENGINEERING DATA

INDEX

List of Available Documents

1. Design and Construction Records

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

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
- "As Built" drawings

2. Prior Inspection Reports

Date		Page No.
10/15/79	Soil Conservation Service Annual Report	B-1
8/17/78	Soil Conservation Service Annual Report	B-2
5/10/77	Soil Conservation Service Annual Report	B-3
5/27/76	Soil Conservation Service Annual Report	B-4
6/4/75	Soil Conservation Service Annual Report	B-7
6/5/75	Soil Conservation Service Annual Report	B-8
7/2/74	Soil Conservation Service Annual Report	B-11

APPENDIX B

Engineering Data

INSPECTION CHECK LIST

PROJECT Washington Mt. Lake Dike DATE 11/2/79

PROJECT FEATURE All features NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	N/A
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

July 2, 1974

REPORT OF ANNUAL INSPECTION
WASHINGTON MOUNTAIN BROOK WATERSHED

On June 27, 1974, the following met at the Washington Mountain Lake Site, Washington Mountain Brook Watershed in the Town of Washington, Massachusetts for the purpose of conducting the annual inspection.

Bruno Calcavalli	Department of Natural Resources
Kevin Maguire	Water Resources Commission-Boston
William Annable	Soil Conservation Service-Amherst
James J. Elasmar	Soil Conservation Service-Otis

OWNER

The Massachusetts Department of Natural Resources is responsible for the operation and maintenance of this site.

Structural Conditions and Recommendations

Clear debris from inlet channel.
Remove fallen tree from Emergency Spillway.
Remove excess mulch left side of Emergency Spillway.
Replace animal guard, outlet of drain at impact basin.
Clean out 4 drain outlets at impact basin.
Replace barricade cable at dam.
Clean out 2 culverts under Navin Road leading away from the toe drain at the dike.

The condition of the concrete and the riprap at the outlet channel looks good.

Emergency Conditions and Recommendations. (6/24/74)

The top of the dam is being used as a road which has resulted in the loss of vegetation. The spillway needs to be mowed and one fallen tree removed. The entire seeded area should be limed with two tons of lime and fertilized with 400 pounds of 5-10-10.

Some erosion is taking place to the left of the spillway at the end. This is being caused by vehicular traffic.

The trash rack needs cleaning and sediment needs to be removed.

Submitted by:

James J. Elasmar
Project Engineer

R. Thompson
District Conservationist
SCS, Pittsfield, Mass.

REPRODUCED AT GOVERNMENT EXPENSE

WASHINGTON MOUNTAIN BROOK WATERSHED PROJEC

WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM RECREATION AND FLOOD PREVENTION

DRAINAGE AREA	832	A
TOTAL STORAGE	3910	A
FLOODWATER RETARDING STORAGE TO EMERGENCY SPILLWAY CREST	685	A
WATER SURFACE AREA	224	A
HEIGHT OF DAM	34	F
VOLUME OF FILL	70,000	C

BUILT UNDER THE WATERSHED PROTECTION AND FLOOD PREVENTION ACT

by

MASSACHUSETTS DEPARTMENT OF NATURAL RESOURCES

and

MASSACHUSETTS WATER RESOURCES COMMISSION

and

BERKSHIRE CONSERVATION DISTRICT

and

TOWN OF LEE

of the

COMMONWEALTH OF MASSACHUSETTS

with the assistance of

SOIL CONSERVATION SERVICE

of the

UNITED STATES DEPARTMENT OF AGRICULTURE

1972

INDEX

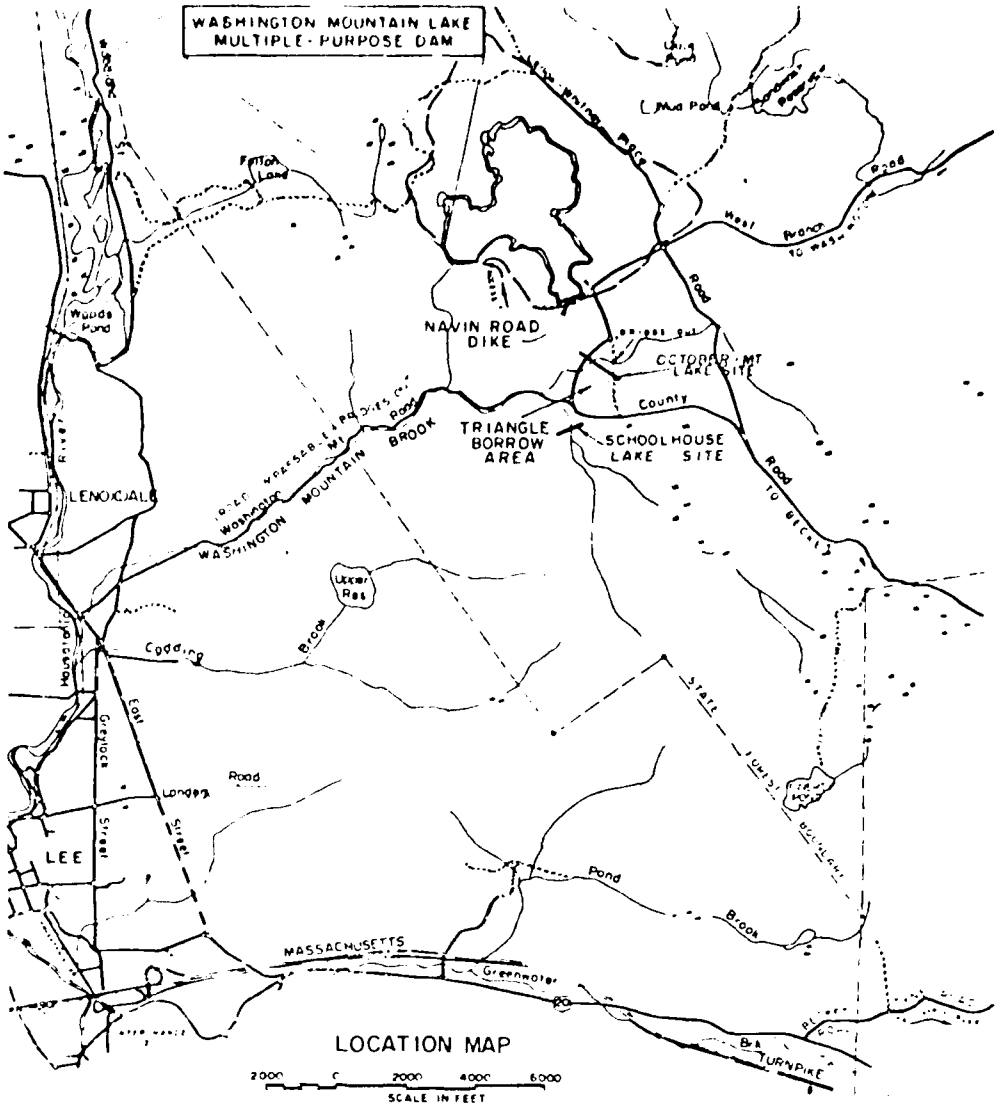
Sheet 1 - COVER SHEET
Sheet 2 - PLAN OF STORAGE AREA
Sheet 3 - PLAN OF STORAGE AREA
Sheet 4 - TRIANGLE BORROW AREA
Sheet 5 - PLAN OF DAMSITE & EMERGENCY SPILLWAY
Sheet 6 - FILL PLACEMENT
Sheet 7 - DAM CUTOFF TRENCH PROFILE
Sheet 8 - DAM FOUNDATION DRAIN DETAILS
Sheet 9 - PRINCIPAL SPILLWAY - PLAN & PROFILE
Sheet 10 - EMERGENCY & PRINCIPAL SPILLWAY PROFILES
Sheet 11 - NAVIN ROAD DIKE PLAN & CUTOFF TRENCH PROFILE
Sheet 12 - NAVIN ROAD DIKE FOUNDATION DRAIN
Sheet 13 - RISER DETAILS
Sheet 14 - RISER DETAILS
Sheet 15 - RISER DETAILS
Sheet 16 - RISER DETAILS
Sheet 17 - RISER DETAILS
Sheet 18 - RISER TRASH RACK DETAILS
Sheet 19 - CONDUIT DETAILS
Sheet 20 - RESERVOIR DRAIN INLET DETAILS
Sheet 21 - IMPACT BASIN DETAILS
Sheet 22 - IMPACT BASIN DETAILS
Sheet 23 - IMPACT BASIN DETA
Sheet 24 - IMPACT BASIN DETA
Sheet 25 - IMPACT BASIN DETA
Sheet 26 - IMPACT BASIN GRAT
Sheet 27 - LOGS OF TEST HOLE
Sheet 28 - LOGS OF TEST HOLE
Sheet 29 - LOGS OF TEST HOLE
Sheet 30 - STABILIZATION OF S
Sheet 31 - STABILIZATION OF S

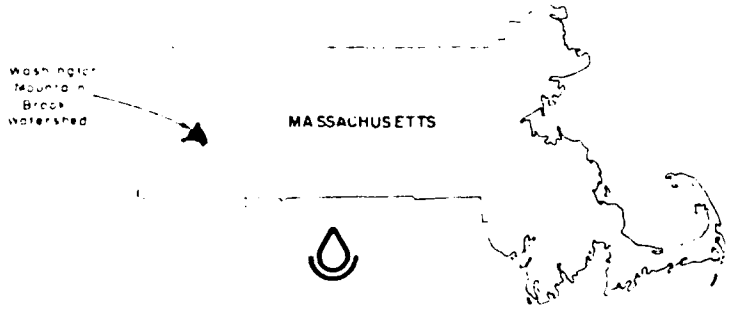
REPRODUCED AT GOVERNMENT EXPENSE

.OJECT

.M

32	ACRES
910	ACRE FEET
85	ACRE FEET
24	ACRES
34	FEET
00	CUBIC YARDS





AS BUILT

WASHINGTON MOUNTAIN BROOK WATERSHED PROJECT
WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM
OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS

COVER SHEET

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date		
Prepared	JOHN E. FALLON	12/29/73	Designed J. A. TIBBETTS	2-72
Checked	JAMES J. WEASMAR	1/4/74	Drawn F. J. WILDA	2-29-72
Reviewed		2/5/74	Traced	
			Checked J. J. ELASMAR, C. H. DODGE	6-17-72

Approved by
Title State Conservation Engineer
Title Head, E. & W.P. Unit

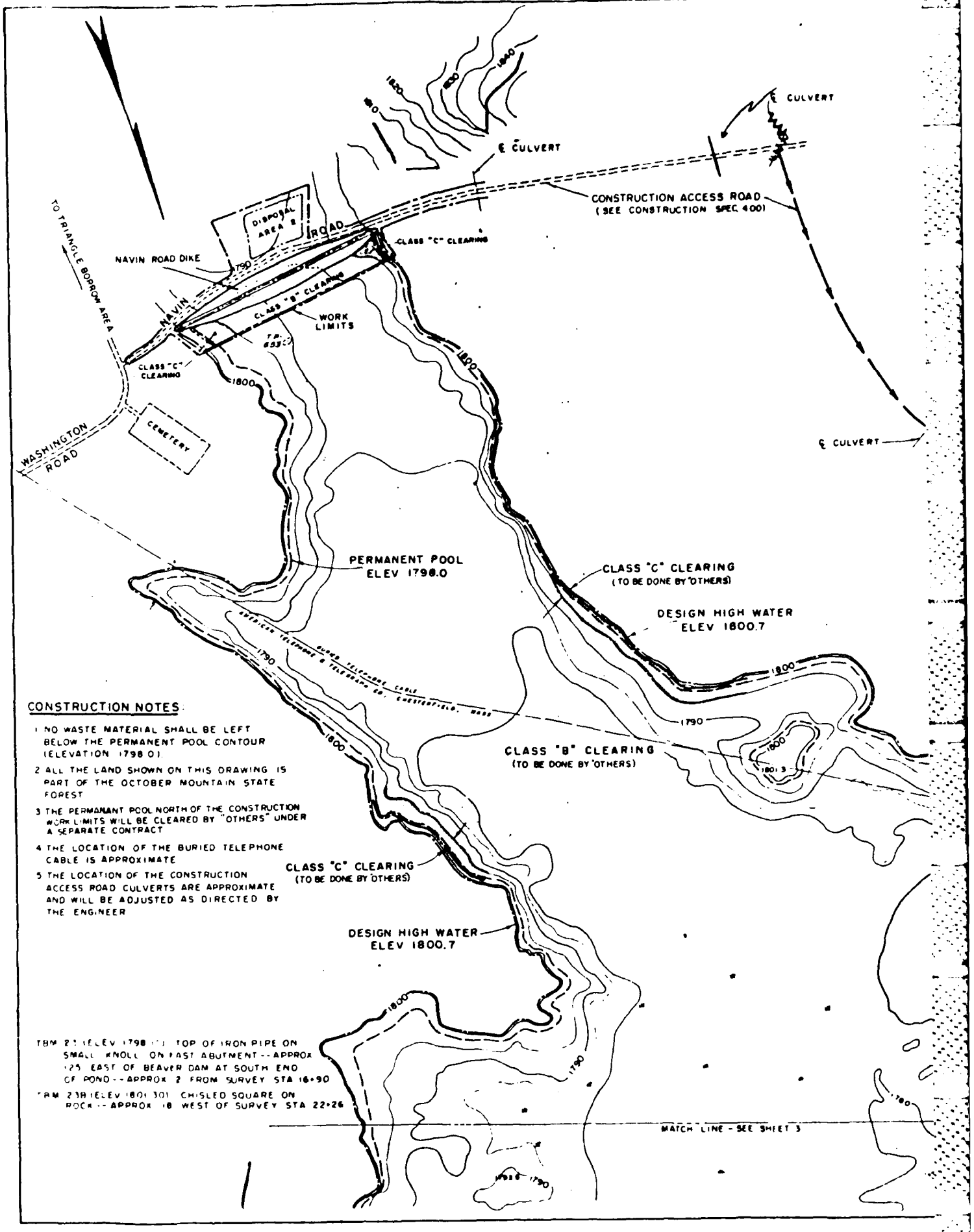
Sheet No. 1 of 3 — Drawing No. MA 361-P

2

Design

B-12

REPRODUCED AT GOVERNMENT EXPENSE



CONSTRUCTION NOTES

1. NO WASTE MATERIAL SHALL BE LEFT BELOW THE PERMANENT POOL CONTOUR (ELEVATION 1798.0).
2. ALL THE LAND SHOWN ON THIS DRAWING IS PART OF THE OCTOBER MOUNTAIN STATE FOREST
3. THE PERMANANT POOL NORTH OF THE CONSTRUCTION WORK LIMITS WILL BE CLEARED BY "OTHERS" UNDER A SEPARATE CONTRACT
4. THE LOCATION OF THE BURIED TELEPHONE CABLE IS APPROXIMATE
5. THE LOCATION OF THE CONSTRUCTION ACCESS ROAD CULVERTS ARE APPROXIMATE AND WILL BE ADJUSTED AS DIRECTED BY THE ENGINEER

TBM 2? (ELEV 1798.0?) TOP OF IRON PIPE ON SMALL KNOLL ON EAST ABUTMENT -- APPROX 125 EAST OF BEAVER DAM AT SOUTH END OF POND -- APPROX 2 FROM SURVEY STA 16+90

TBM 23B (ELEV 1801.30) CHISLED SQUARE ON ROCK -- APPROX 18 WEST OF SURVEY STA 22+26

REPRODUCED AT GOVERNMENT EXPENSE

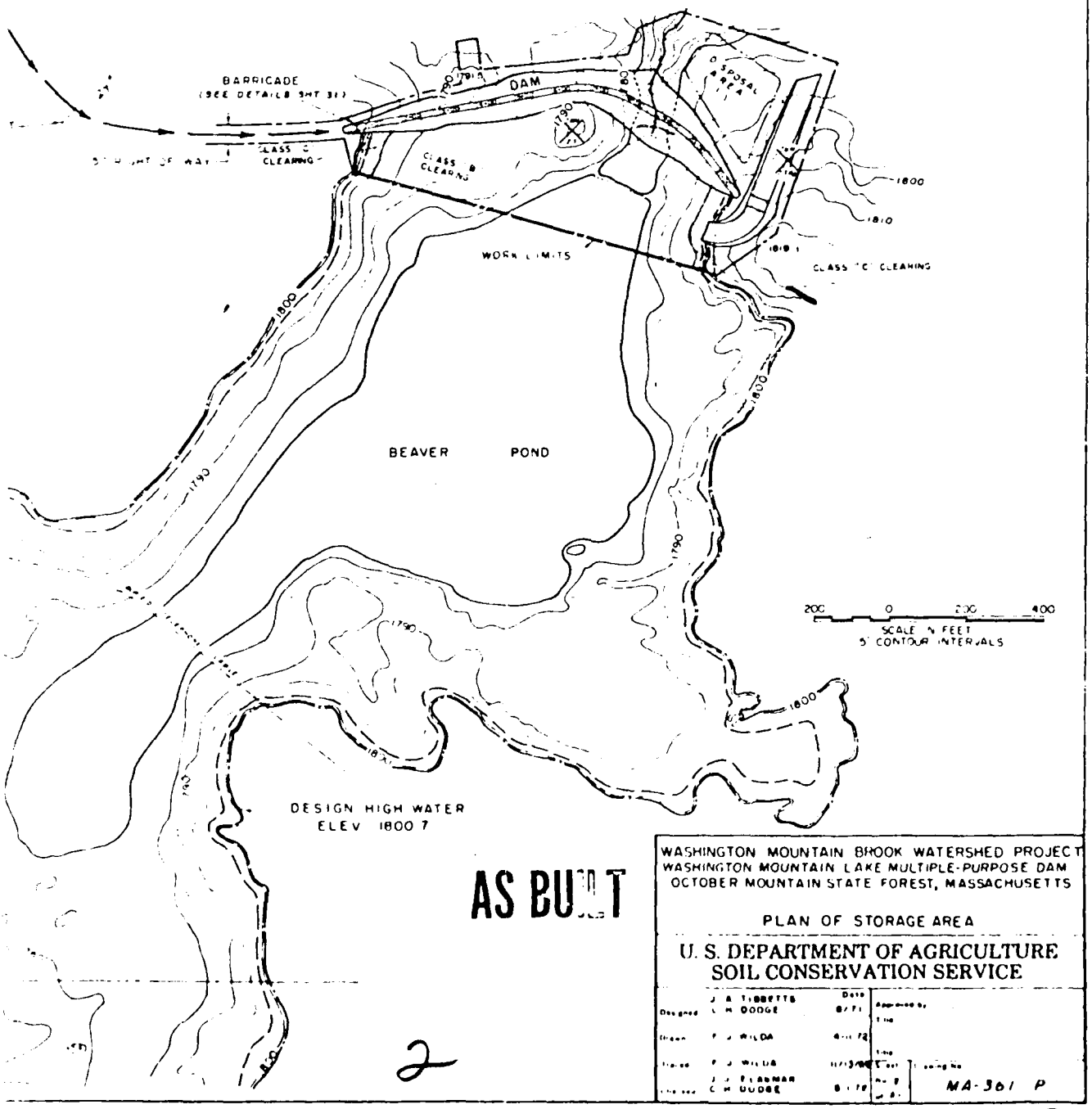
CLEARING REQUIREMENTS	
CLEARING CLASS "C"	ALONG THE EDGE OF THE PERMANENT POOL FROM THE 1795.0 CONTOUR TO 10' HORIZONTALLY BEYOND THE 1798.0 CONTOUR, IN AREAS INDICATED
CLEARING CLASS "B"	WITHIN THE DISPOSAL AREAS AND WITHIN THE PERMANENT POOL BELOW ELEVATION 1795.0, IN AREAS INDICATED
CLEARING & GRUBBING	DAM, EMERGENCY SPILLWAY, INLET & OUTLET CHANNELS, TRIANGLE BORROW AREA, DIKE.

SEE SHEETS 3 and 11 FOR CLEARING LIMITS

SEE SHEETS 4, 5, and 11 FOR CLEARING & GRUBBING LIMITS

LEGEND

- IMPROVED ROAD
- POOR ROAD
- PERENNIAL STREAM
- INTERMITTENT STREAM
- WOODS LINE
- STONE WALL
- WIRE FENCE
- SWAMP
- GRAVEL PIT
- DEPRESSION
- APPROX LIMIT OF WORK AREA
- APPARENT PROPERTY LINES
- CLEARING LIMITS
- CLEARING & GRUBBING
- FOUNDATION EXCAVATION
- CONSTRUCTION ACCESS
- PERMANENT POOL
- DESIGN HIGH WATER
- SURVEY STATION
- BENCH MARK
- DRILL HOLE
- TEST PIT
- ROCK OUTCROP
- BEDROCK
- POWER LINE
- TELEPHONE LINE
- PIPE LINE
- WELL
- SPRING
- DIVERSION DITCH
- BOUNDARY MONUMENT
- BARRICADE



AS BUILT

WASHINGTON MOUNTAIN BROOK WATERSHED PROJECT
WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM
OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS

PLAN OF STORAGE AREA

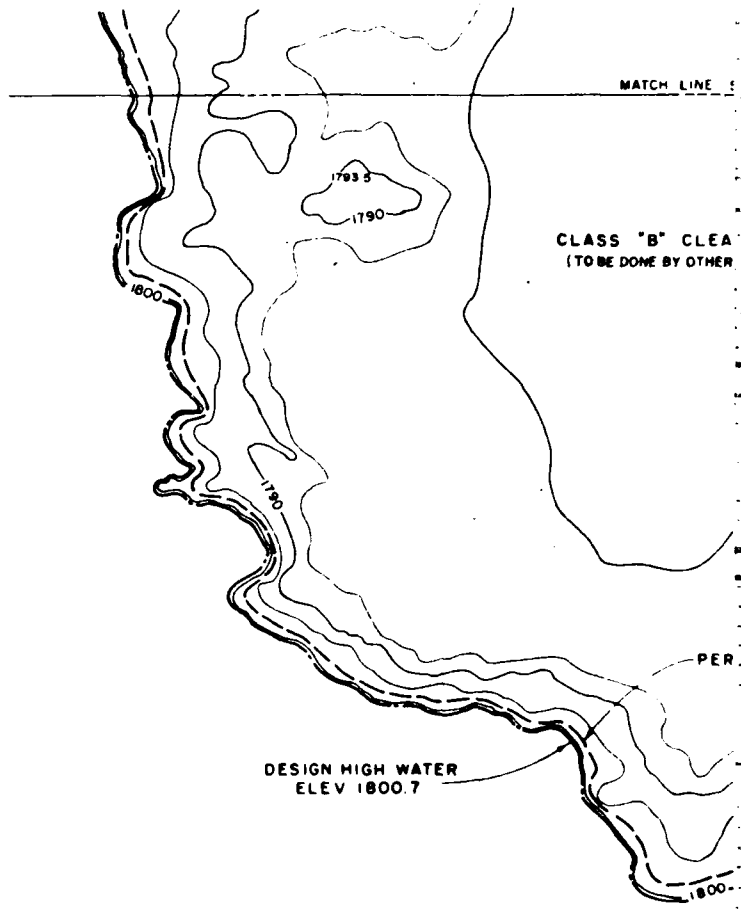
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date
Designed	J. A. TIBBETTS, C. H. DODGE	8/71
Drawn	F. J. WILDA	4/72
Traced	F. J. WILDA	11/13/72
Checked	J. J. BLAUMAR, C. H. DODGE	8/72

Approved by
Title
Date
Symbol No. MA-361 P

2

REPRODUCED AT GOVERNMENT EXPENSE



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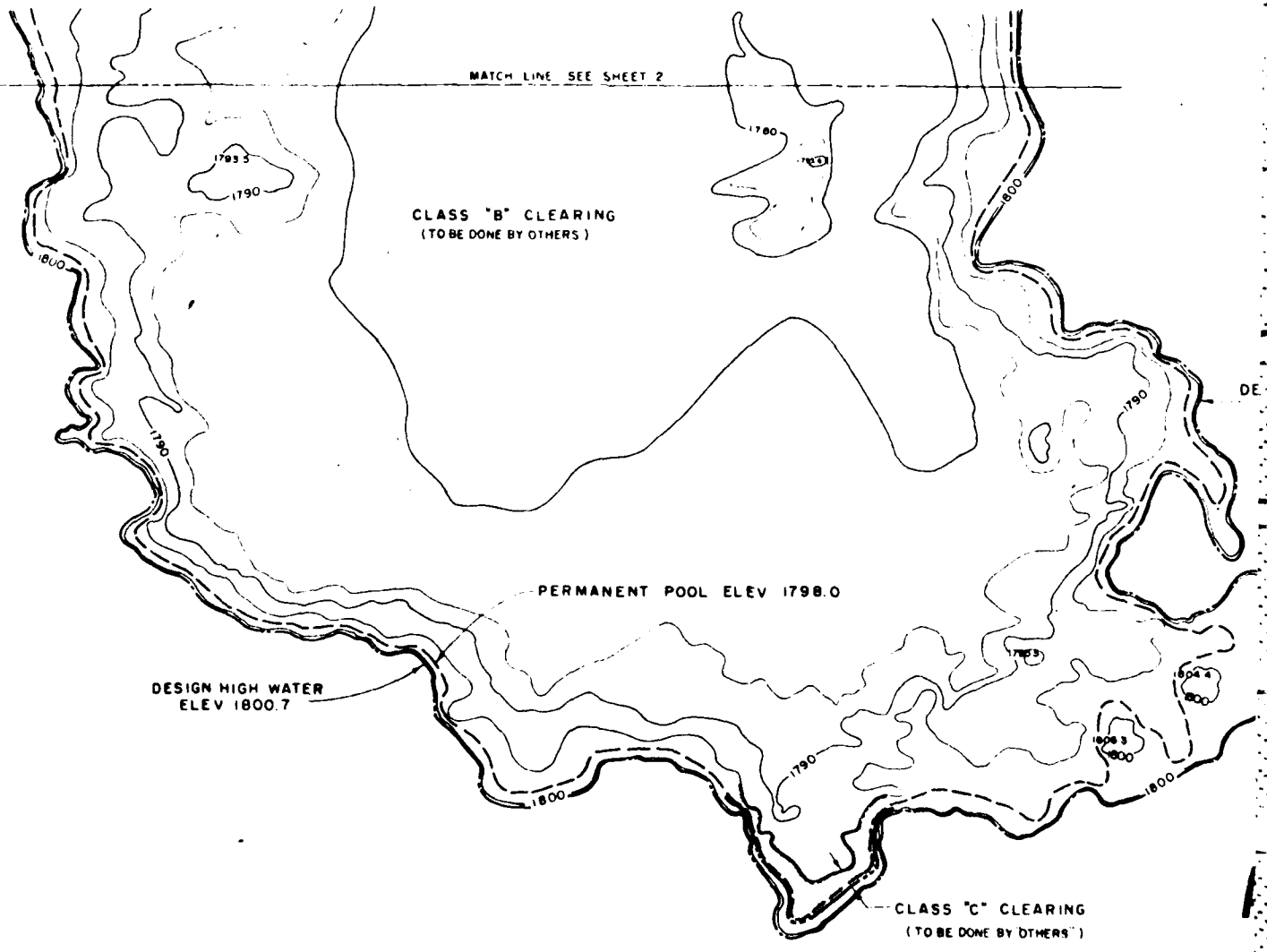

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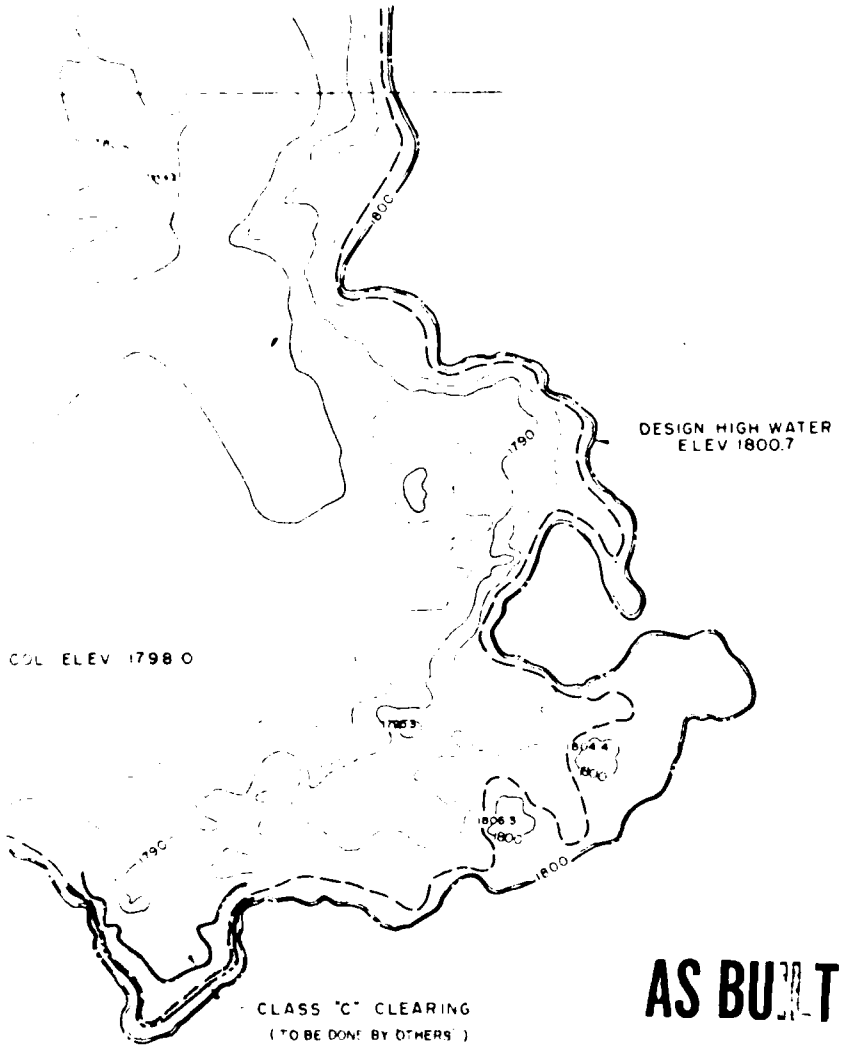

200 0 200 400
SCALE IN FEET
5 CONTOUR INTERVALS

AS BUILT

WASHINGTON MOUNTAIN BROOK WATERSHED PROJECT
WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM
OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS

PLAN OF STORAGE AREA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date		
Designed	J. A. TIBBETTS C. H. DODGE	8/71	Approved by	
Drawn	F. J. WILDA	8/18/71	Title	
Traced	F. J. WILDA	11/16/71	Title	
Checked	J. J. ELASMAR C. H. DODGE	4/17/78	Sheet No. 3 of 3	Drawing No. MA-361 P

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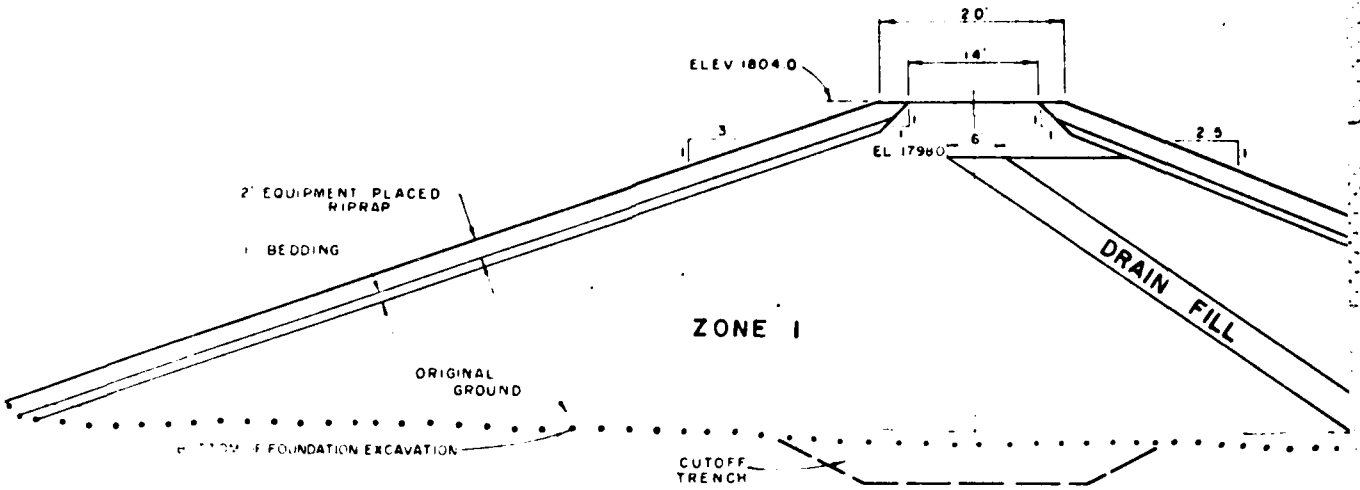
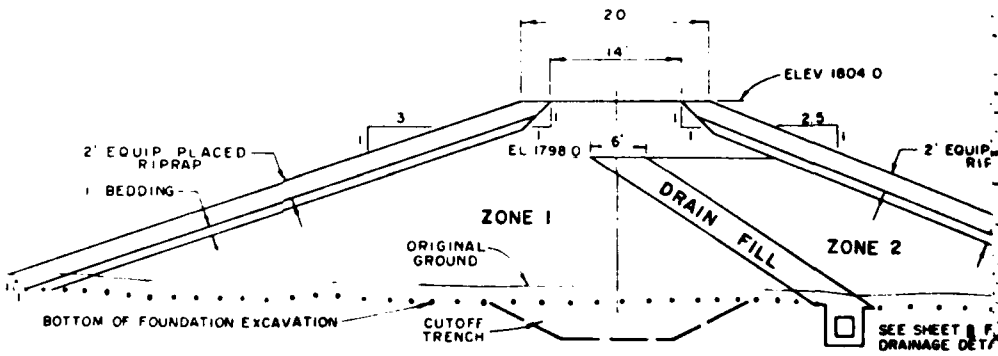


TYPICAL DAM SECTION (VALLEY)

SEE SHEET
DRAINAGE



TYPICAL DAM SECTION (ABUTMENTS)

EARTH FILL REQUIREMENTS

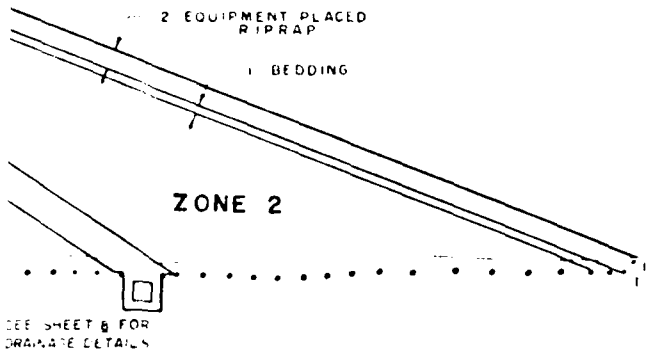
ZONE	MATERIAL	MAXIMUM ROCK SIZE	MAXIMUM LIFT Δ	MINIMUM Δ WATER CONTENT	COMPACTION CLASS	COMPACTION DEFINITION
	SAND, SILTY WITH GRAVEL, COBBLES AND BOULDERS REPRESENTED BY TP [illegible] (12'), TP [illegible] (3'-14') AND [illegible] TP 52 (3'-14'), TP 56 (3'-12'), TP 59 (3'-12') (SM)	6"	9"	OPTIMUM	A	95% MAX DENSITY BY ASTM D698 METHOD A
2	SAND, SILTY WITH GRAVEL AND BOULDERS REPRESENTED BY DH 3 (0'-7'), DH 6 (1'-8.7'), DH 9 (1'-7'), DH 204 (1'-7.5'), DH 206 (1'-7'), DH 207 (1'-7.5') AND TP [illegible] (SM)	12"	18"	OPTIMUM	C	4 PASSES PER LAYER OF FILL w/ PNEUMATIC TIRED ROLLER WEIGHING AT LEAST 50 TONS
1	SAND, SILTY WITH GRAVEL, COBBLES AND BOULDERS SIMILAR TO ZONE 1	6"	9"	OPTIMUM	A	95% MAX DENSITY ASTM D698 METHOD A

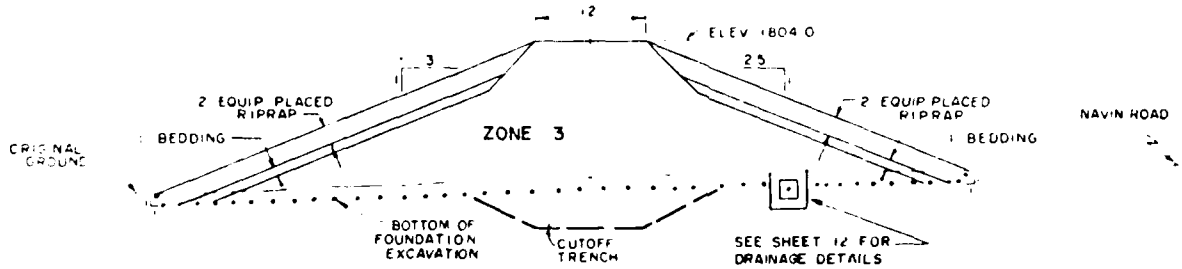
MAXIMUM LIFT THICKNESS PRIOR TO COMPACTION
2 PASSES ON STANDARD PROCTOR

REPRODUCED AT GOVERNMENT EXPENSE

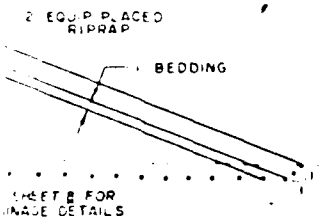
CONSTRUCTION NOTES:

1. EQUIPMENT PLACED RIPRAP SHALL BE WELL GRADED AND HAVE A MAXIMUM SIZE EQUAL TO THE DEPTH SHOWN. 60% TO 75% OF THE RIPRAP SHALL BE LARGER THAN 3/4 OF THE DEPTH SHOWN.
2. BEDDING SHALL BE WELL GRADED BETWEEN 3/16" AND 3 1/2" WITH 30% TO 70% PASSING THE 3/4" SIEVE.
3. REPRESENTATIVE ROCK SAMPLES FROM THIS WATERSHED HAVE BEEN TESTED. ALL SAMPLES TESTED CONFORM TO MATERIAL SPECIFICATION 523.





NAVIN ROAD DIKE



10 0 10 20
SCALE IN FEET

AS BUILT

WASHINGTON MOUNTAIN BROOK WATERSHED PROJECT
WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM
OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS

FILL PLACEMENT

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date		
Designed	J. A. TIBBETTS	8-78	Approved By	
	B. W. HOGUE		Title	
Drawn	P. J. WILDA	4/18/78		
Traced			Sheet No. of	Drawing No. MA 361-P
Checked	J. P. FOLAN / G. H. BOPPOS	8-8-78		

2

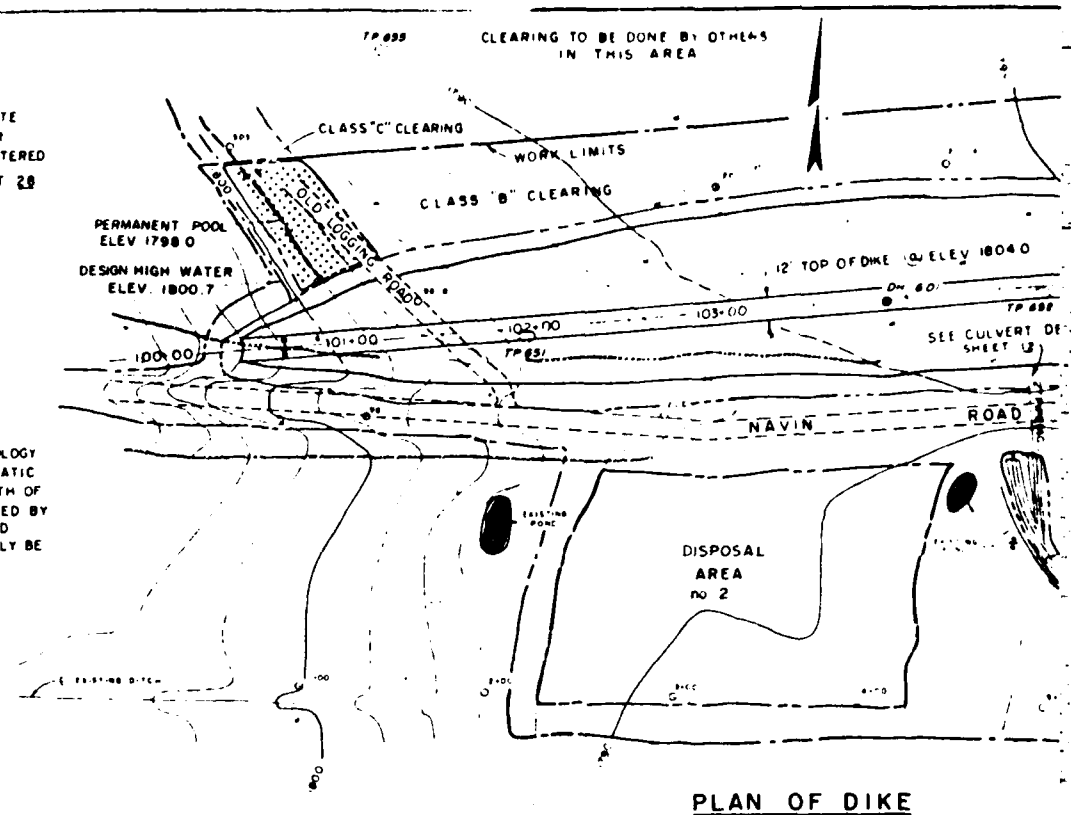
REPRODUCED AT GOVERNMENT EXPENSE

CONSTRUCTION NOTES

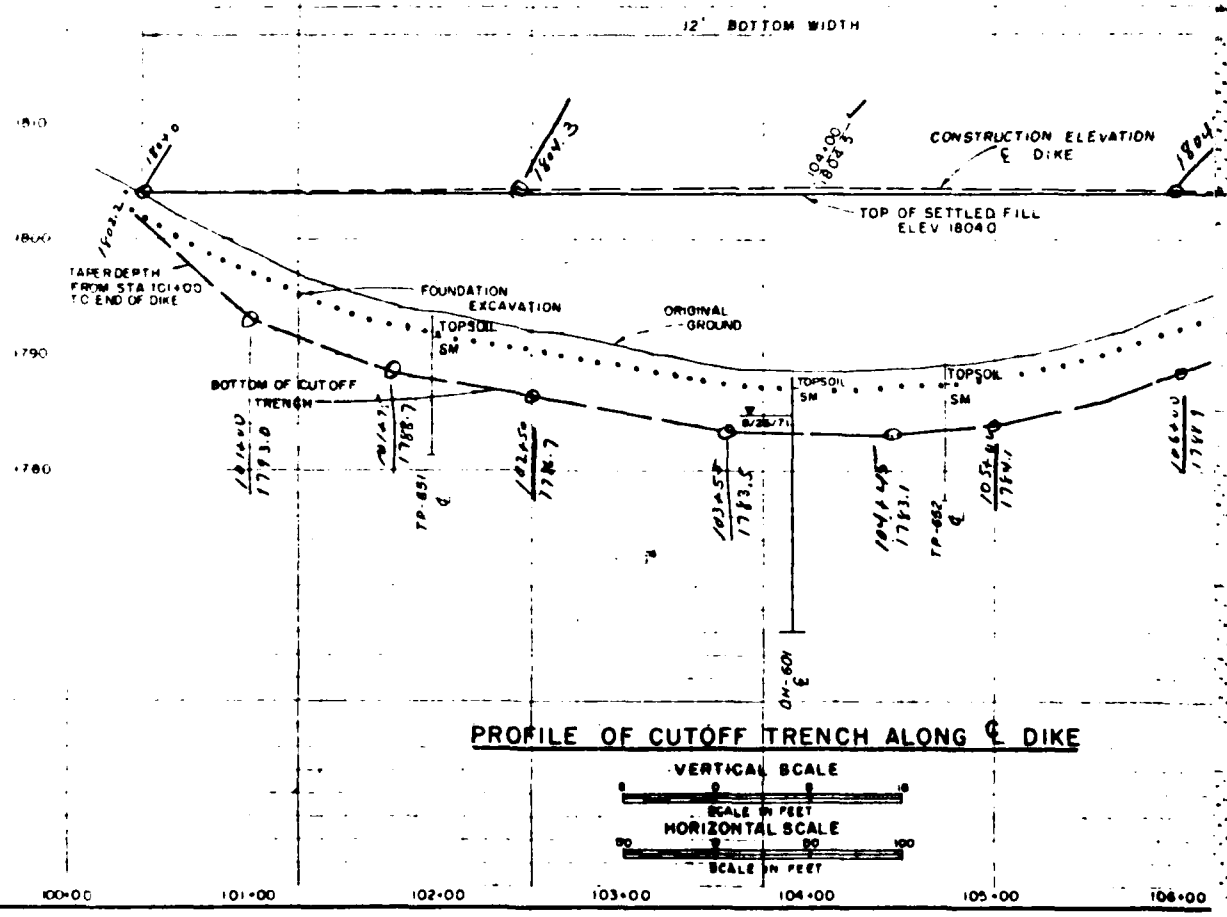
1. THE EXCAVATION LIMITS ARE APPROXIMATE AND WILL BE ADJUSTED BY THE ENGINEER IN ACCORDANCE WITH CONDITIONS ENCOUNTERED
2. FOR LOGS OF TEST HOLES SEE SHEET 28

LEGEND

▼ 1. WATER LEVELS TAKEN DURING GEOLOGY INVESTIGATION AND REPRESENT STATIC WATER LEVEL FOR THE ENTIRE DEPTH OF HOLE. WATER LEVELS ENCOUNTERED BY THE CONTRACTOR DURING PLANNED EXCAVATION WILL NOT NECESSARILY BE SHOWN BY THIS SYMBOL



PLAN OF DIKE



PROFILE OF CUTOFF TRENCH ALONG ℄ DIKE

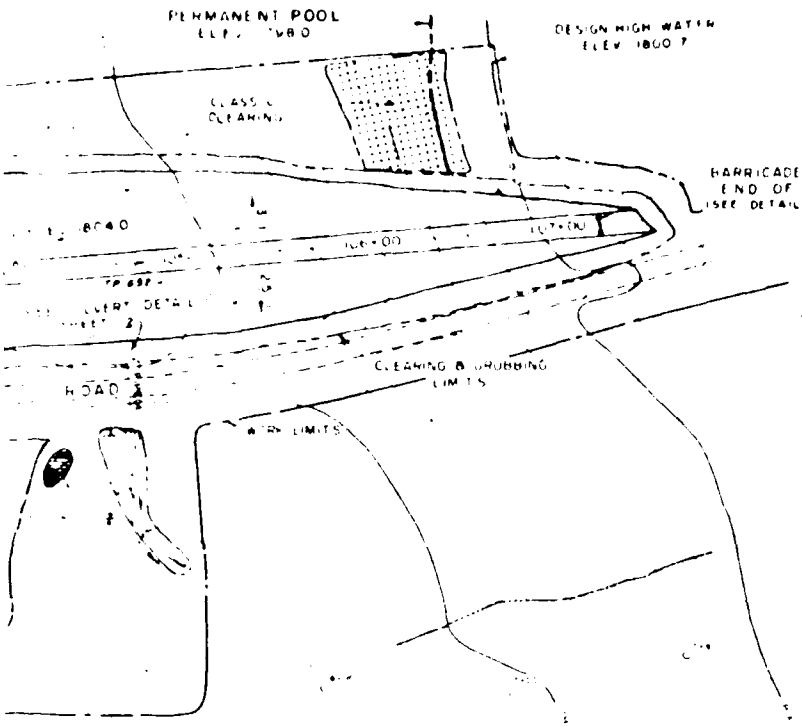
VERTICAL SCALE

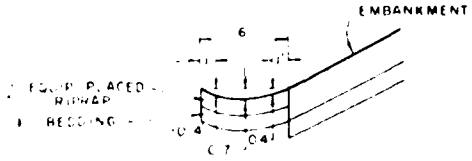
SCALE IN FEET

HORIZONTAL SCALE

SCALE IN FEET

REPRODUCED AT GOVERNMENT EXPENSE



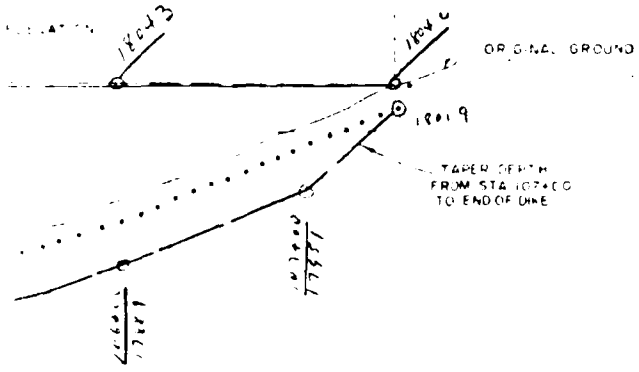


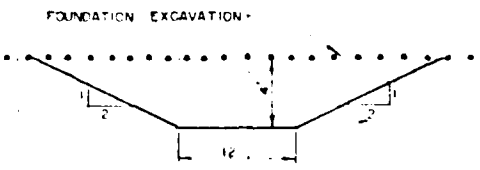
EMBANKMENT-ABUTMENT GUTTER

POOL SIDE (STA 100+40-101+20)
(STA 106+00-107+40)

ROAD SIDE (STA 100+40-107+45)

(NOT TO SCALE)





TYPICAL SECTION

NOT TO SCALE

SCALE IN FEET
2 CONTOUR INTERVALS

AS BUILT

WASHINGTON MOUNTAIN BROOK WATERSHED PROJ
WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM
OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS

NAVIN ROAD DIKE

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

J. A. TIBBETTS
C. H. DODGE 8/71
G. HOGUE
F. J. WILDA 4/5/72
J. F. POLAN
C. H. DODGE 8-4-72

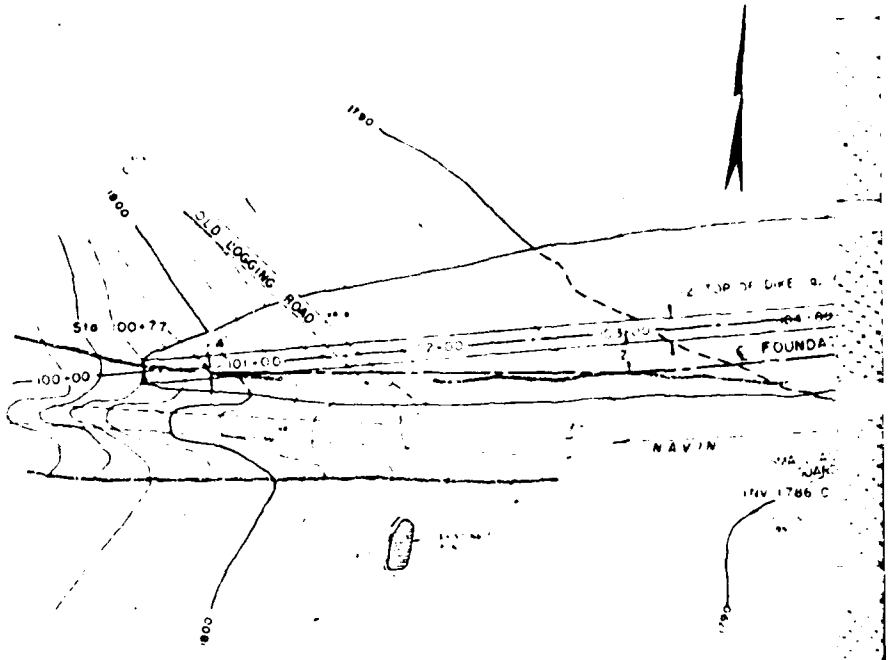
MA-361 P

Form SCS-317 (November 1955)

REPRODUCED AT GOVERNMENT EXPENSE

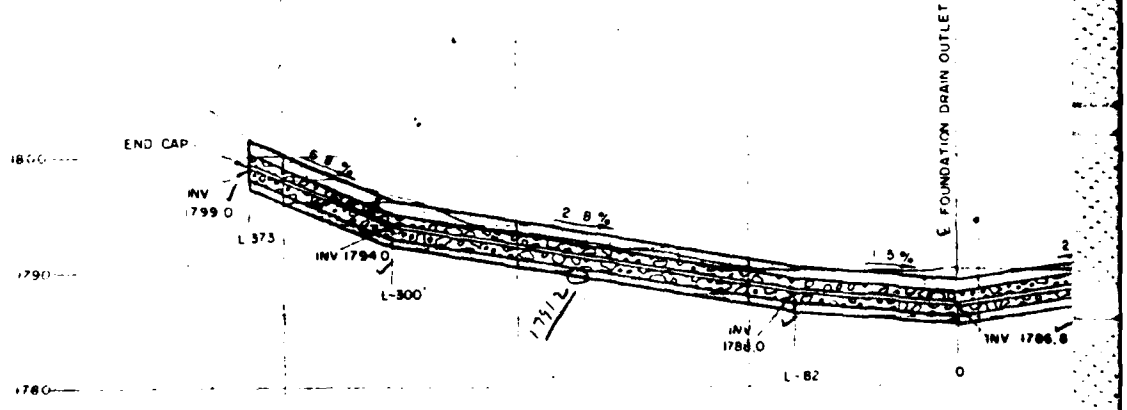
CONSTRUCTION NOTES

1. ASBESTOS CEMENT PIPE SHALL CONFORM TO SPECIFICATION 545 AND SHALL BE 4" DIA, CLASS 2400
2. PERMANENT ASBESTOS CEMENT PIPE SHALL BE PERFORATED WITH 1/4" HOLES. THE LOCATION AND NUMBER OF THESE HOLES SHALL BE SIMILAR TO THOSE IN ASBESTOS CEMENT UNDERDRAIN PIPE OF THE SAME DIAMETER. THE OUTLET SECTION (70') SHALL BE NON-PERFORATED
3. THE EXCAVATION LIMITS ARE APPROXIMATE AND WILL BE ADJUSTED BY THE ENGINEER IN ACCORDANCE WITH THE CONDITIONS ENCOUNTERED
4. THE DEPTH OF THE DRAIN TRENCH MAY BE INCREASED IN SOME AREAS IF UNSUITABLE IMPERVIOUS MATERIALS ARE ENCOUNTERED AS DIRECTED BY THE ENGINEER
5. FOR DRAIN FILL GRADATIONS SEE SHEET 8
6. THE CULVERT UNDER NAVIN ROAD SHALL CONFORM TO SPECIFICATION 551 AND SHALL BE 12" DIA, 16 GAUGE, SHAPE 1, CLASS 1, COATING G NON-PERFORATED PIPE
7. THAT PORTION OF THE FOUNDATION DRAIN OUTLET SECTION WHICH PASSES UNDER NAVIN ROAD (40' LENGTH) SHALL BE PLACED WITHIN A 12" CORRUGATED METAL PIPE SLEEVE OF THE TYPE USED FOR THE ROAD CULVERT. THE ENDS OF THE 12" CULVERT SHALL BE PLUGGED WITH FINE DRAIN FILL
8. THE DRAIN PIPE SHALL BE PLACED WITH THE PERFORATIONS DOWN

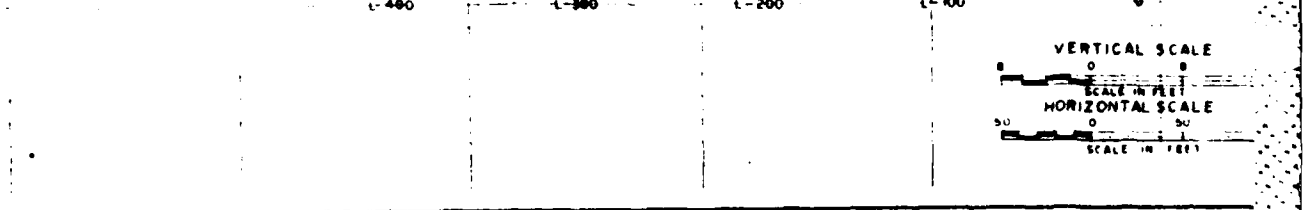


PLAN OF DIKE FOUNDAT

SCALE IN FEET
2 CONTOUR INTERVALS

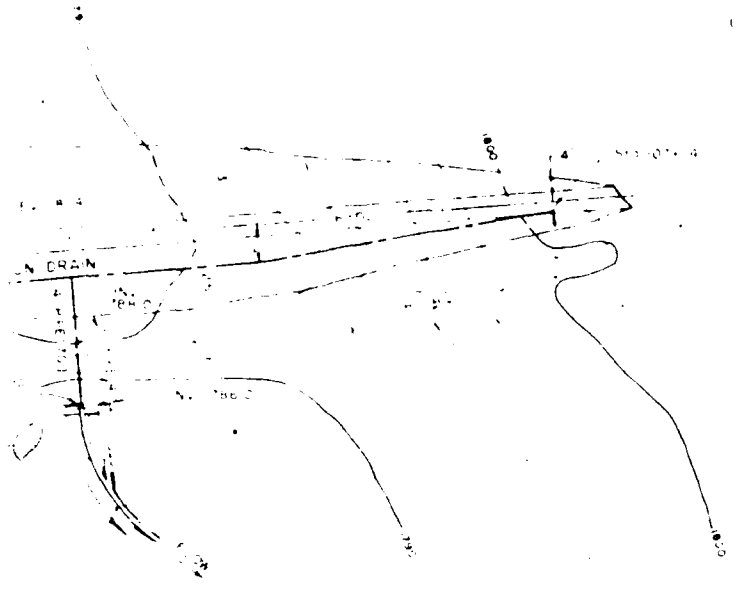


FOUNDATION DRAIN PR

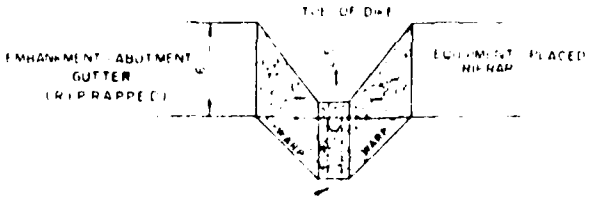


VERTICAL SCALE
SCALE IN FEET
HORIZONTAL SCALE
SCALE IN FEET

REPRODUCED AT GOVERNMENT EXPENSE

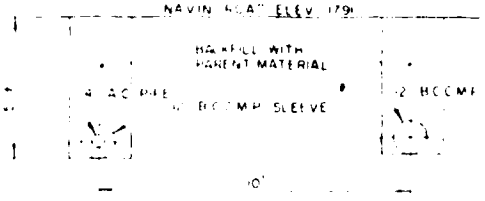


ON DRAIN

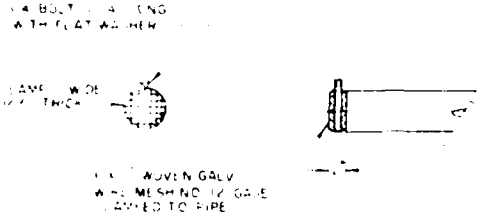


12" CULVERT

DETAIL OF CULVERT
NOT TO SCALE

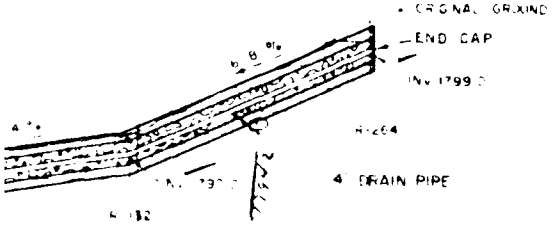


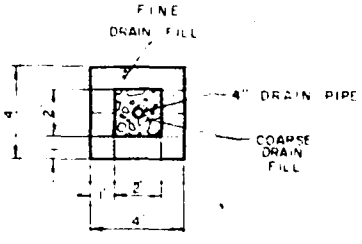
DETAIL OF CULVERT LOCATION
NOT TO SCALE



DETAIL OF SMALL ANIMAL GUARD SCREEN AND OUTLET OF DRAIN PIPE

SCALE IN FEET





TYPICAL SECTION
(w / PIPE)
NOT TO SCALE

OFILE

AS BUILT

WASHINGTON MOUNTAIN BROOK WATERSHED PROJECT
WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM
OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS
NAVIN ROAD DIKE FOUNDATION DRAIN DETAILS

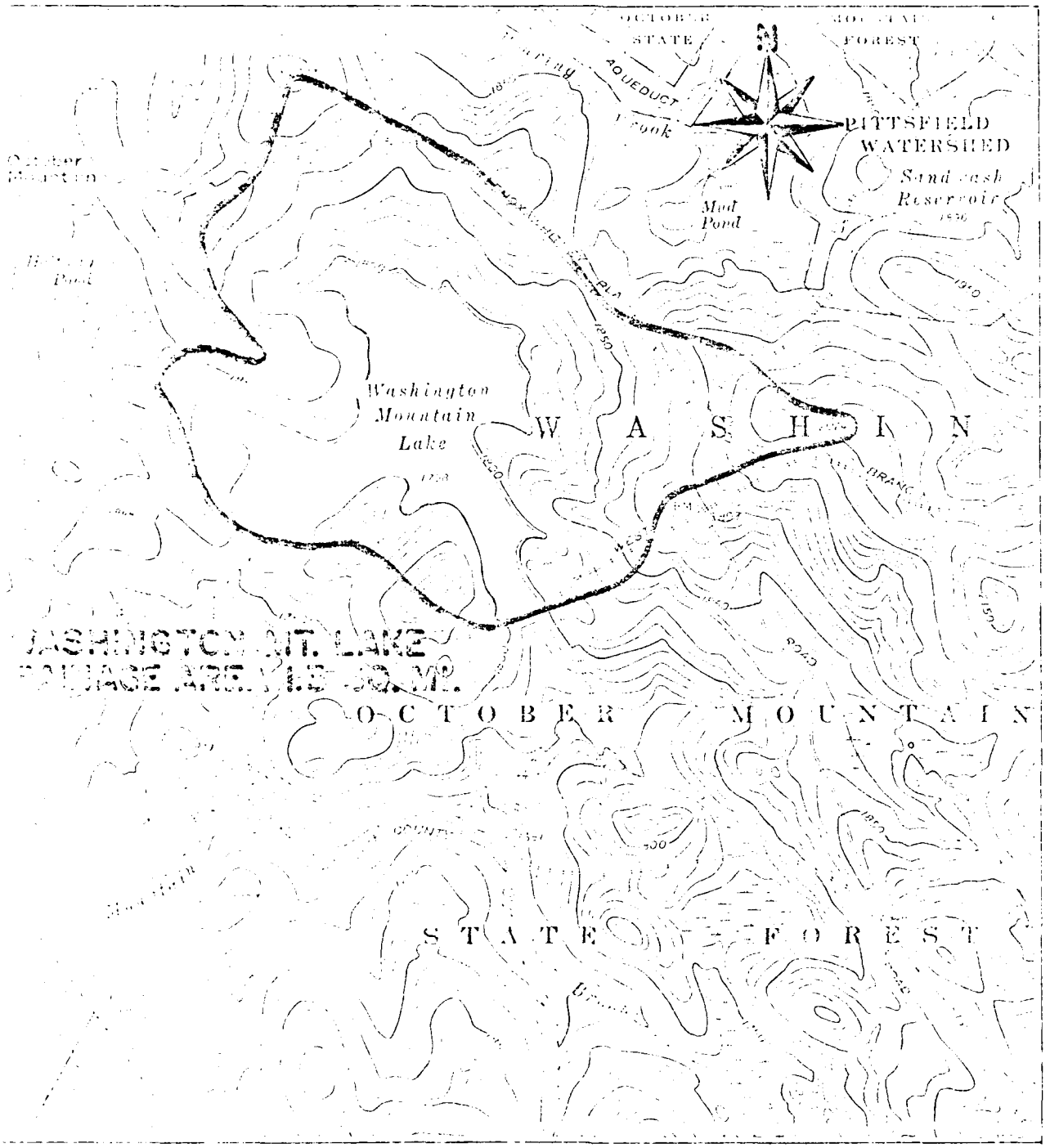
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

MA - 361 P

2

B-17

APPENDIX D



WASHINGTON MT. LAKE
DRAINAGE AREA 1.8 SQ. MI.

SCALE
0 1000' 2000' 3000'

FROM : USGS EAST LEE, MASS.
QUADRANGLE MAP

TIGHE & BOND / SCI CONSULTING ENGINEERS EASTHAMPTON, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

DRAINAGE AREA MAP

WASHINGTON MOUNTAIN LAKE DIKE (MA 319)
BERKSHIRE COUNTY MASSACHUSETTS

			SCALE : AS NOTED
			DATE : DECEMBER 1979

REPRODUCED AT GOVERNMENT EXPENSE

Photo #6 View of upstream end of culvert under Navin Rd. looking southerly from toe of dike. Note culvert 2/3 plugged

Photo #7 View of buried outlet of foundation drain looking northerly from downstream end. Note excavation was necessary to locate end of pipe.

REPRODUCED AT GOVERNMENT EXPENSE

hoto #4 Overview of
ampoundment area
ooking northerly
rom crest of dike

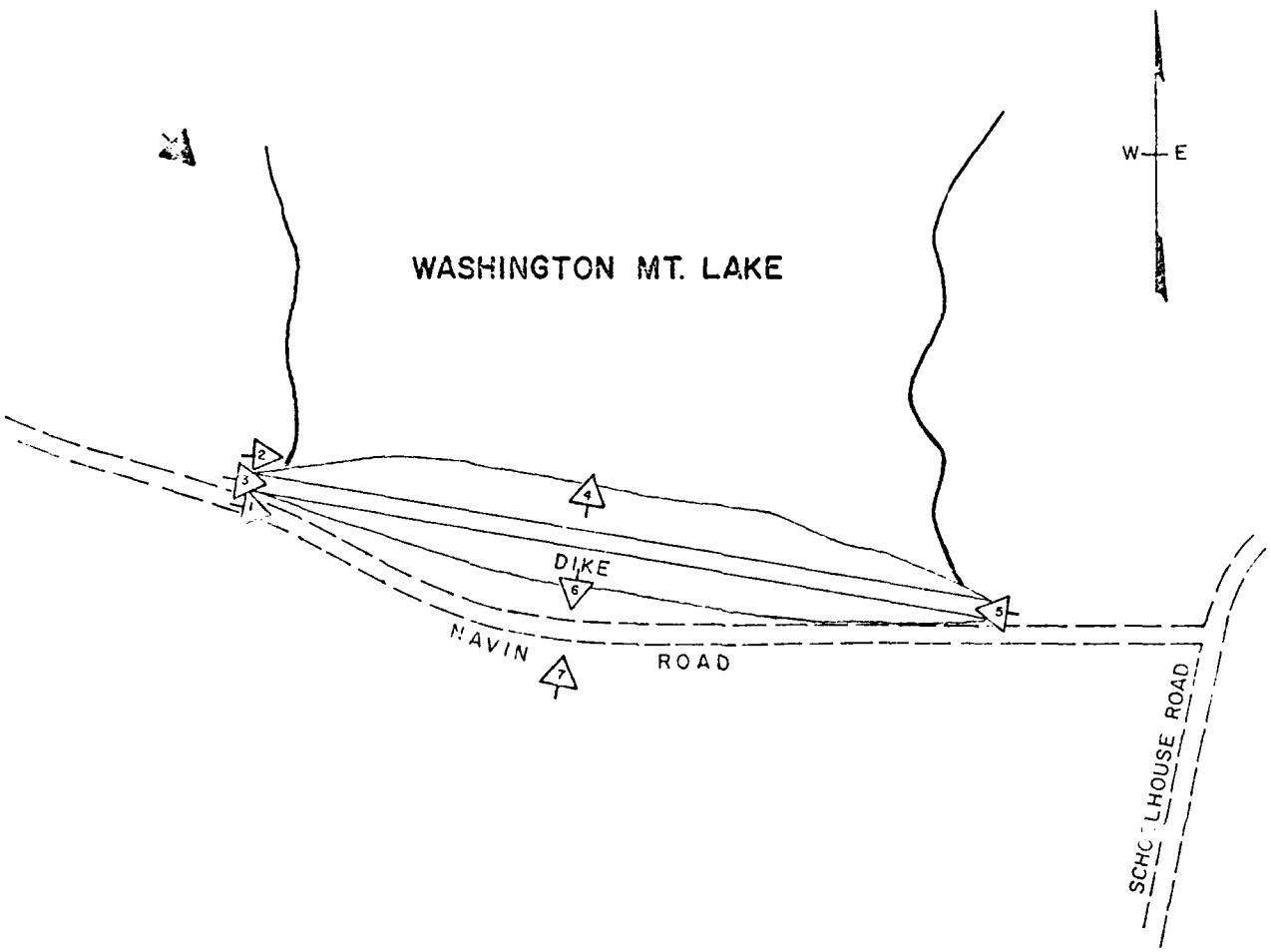
oto #5 View of dike
est looking westerly
om left abutment.
ote wheel ruts and
iddles.

REPRODUCED AT GOVERNMENT EXPENSE

Photo #1 Overview of downstream side of dike looking easterly from right abutment

Photo #2 Overview of upstream side of dike looking easterly from right abutment

Photo #3 Overview of dike crest looking easterly from right abutment



OVERVIEW (AERIAL)

APPENDIX C

TIGHE & BOND / SCI CONSULTING ENGINEERS EASTHAMPTON, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION AND ORIENTATION OF PHOTOS

WASHINGTON MOUNTAIN LAKE DIKE (MA 319)
BERKSHIRE COUNTY MASSACHUSETTS

			SCALE: NONE
			DATE: DECEMBER 1979

APPENDIX C

Photographs

REPRODUCED AT GOVERNMENT EXPENSE

LEGEND

TEST HOLE NUMBERING SYSTEM

Centerline of dam	1-99
Borrow Area	101-199
Emergency Spillway	201-299
Centerline of Outlet Structure	301-399
Stream Channel	401-499
Relief wells	501-599
	601-699
	701-799

Drill Holes
TP Test Pits

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GW Well graded gravel; gravel-sand mixtures
GP Poorly graded gravels
GM Silty gravels; gravel-sand-silt mixtures
GC Clayey gravels; gravel-sand-clay mixtures
SW Well graded sands; sand-gravel mixtures
SP Poorly graded sands
SM Silty sands; sand-silt mixtures
SC Clayey sands; sand-clay mixtures
ML Inorganic silts, very fine sands; sandy or clayey silts
CL Clays of low to medium plasticity; silty, sandy or gravelly clays
CH Clays of high plasticity; fat clays
MH Elastic silts, micaceous or diatomaceous silts
OL Organic silts and organic silty clays of low plasticity
OH Organic clays or silts of medium to high plasticity

****

All soil and rock description and classification were determined by visual examination in the field.

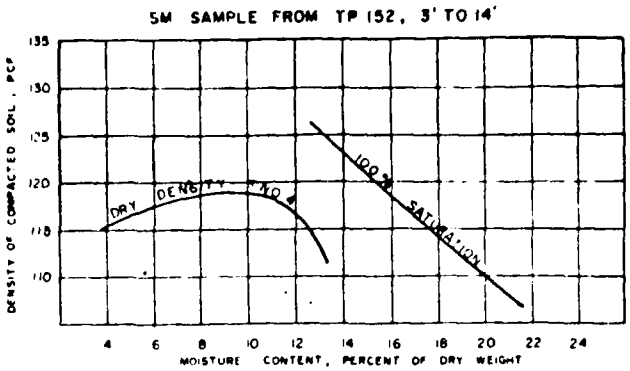
[illegible], all holes were advanced by continuous drive sampling [illegible] holes were then advanced by [illegible] drilling between drive samples. Drive samples taken with a [illegible] spoon sampler.

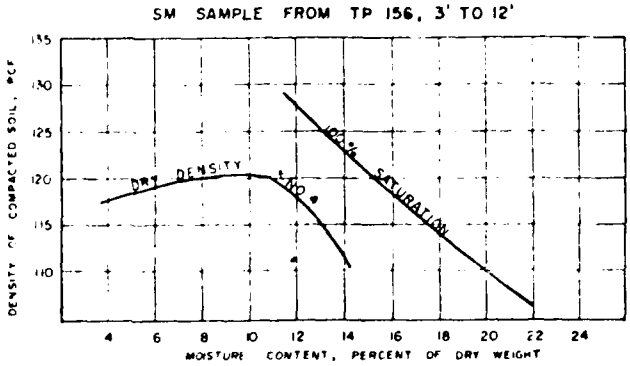
[illegible] shown on Plan view

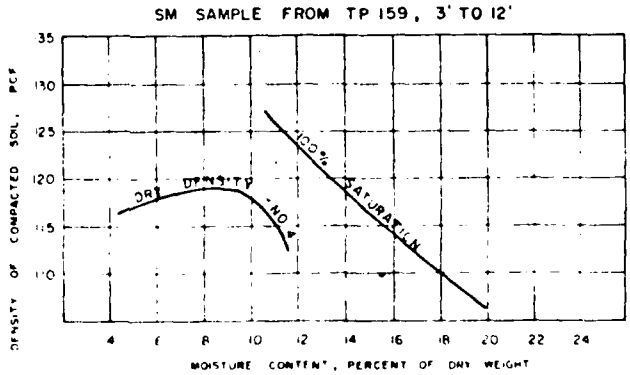
[illegible] water levels do not necessarily represent static water levels.

PSI - pounds per square inch water pressure
[illegible] - quantity of water in gallons per minute
[illegible] - permeability in feet per day
[illegible] - disturbed sample

THE UNIFIED SOIL CLASSIFICATION SYSTEM CLASSIFIES ONLY THE MATERIAL WHICH IS SMALLER THAN THREE INCHES.







COMPACTION CURVES- STANDARD PROCTORS

WASHINGTON MOUNTAIN BROOK WATERSHED PROJECT
WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM
OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS

LOGS OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date	
INVESTIGATED	L. MILLS	12-69	
TYPED	N. LONCZAK	1 TO	
	C. H. DODGE	6-17-72	MA-361-P

REPRODUCED AT GOVERNMENT EXPENSE

/6- 11/6/69 DB

NOT MAT.

ith gravel, about 45% fines, 10% medium sand, 10% 5% gravel, angular, gray, permeability, dense to very TILL. SM

ite, hornblende gneiss with slightly fractured, fractures inches apart. Most fractures 50 degrees.

tration Tests

Blows/Ft.	% Recovery
7	100
16	90
36	90
35	85
73	70
90	65
113	50

% Recovery
85

level at 5.5 feet on 11/7/69.

/69 DB

NOTMAT.

ch gravel, about 45% fines, 15% medium sand, 10% 55% gravel, sub-round, gray, permeability, dense to very TILL. SM

ite, hornblende, gneiss with slightly fractured, fractures inches apart. Most fractures 60 degrees.

tration Tests

Blows/Ft.	% Recovery
[illegible]	100
7	100
30	100
42	90
95	50
73	60
110/6" ref.	50
13[illegible]	50

level not recorded.

/69 DBM

% gravel, cobbles and 40% fines, 20% fine sand, 10% coarse sand, angular, 18-inch maximum damp, low permeability, TILL, 25% cobbles and SM

ole -- making water at

69 DBM

% gravel, cobbles and 40% fines, 20% fine sand, 10% coarse sand angular, 18-inch maximum damp, low permeability, TILL, 20% cobbles and SM

102.1 -- 3 to 14 feet. water at 2 feet.

/69 DBM

MAT.

% gravel, cobbles, and 40% fines, 20% fine sand, 10% coarse sand, angular, 2 foot maximum size, est. low permeability, dense, 5% cobbles and boulders. SM

ole -- making water at 3 feet.

TP-154	ELEV. 1752.8	12/1/69	DBM
0.0	1.5	TOPSOIL.	
1.5	12.0	SAND, silty with gravel, cobbles, and boulders about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 2.5 feet maximum size, olive, damp, low permeability, dense, GLACIAL TILL, 20% cobbles and boulders.	SM
12.0		Bottom of Pit.	
		Note: Sample 154.1 -- 3.0 to 12.0 ft.	

TP-155	ELEV. 1759.1	12/1/69	DBM
0.0	1.0	TOPSOIL.	
1.0	12.0	SAND, silty with gravel, cobbles and boulders, about 40% fines, 21% fine sand, 8% medium sand, 11% coarse sand, 20% gravel, angular, 14-inch maximum size, olive, moist, water at 12.0 feet, low permeability, dense, GLACIAL TILL, est. 20% cobbles and boulders.	SM
12.0		Bottom of Pit.	
		Note: No Sample.	

TP-156	ELEV. 1734.2	12/1/69	DBM
0.0	1.0	TOPSOIL.	
1.0	12.0	SAND, silty with gravel, cobbles and boulders, about 40% fines, 21% fine sand, 8% medium sand, 11% coarse sand, 20% gravel, angular, 20-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 20% cobbles and boulders.	SM
12.0		Bottom of Pit.	
		Note: Sample 156.1 --3.0 to 12 feet.	

TP-157	ELEV. 1734.0	12/1/69	DBM
0.0	1.0	TOPSOIL.	
1.0	12.0	SAND, silty with gravel, cobbles and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 12-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est, 15% cobbles and boulders.	SM
12.0		Bottom of Pit.	
		Note: No Sample.	

TP-158	ELEV. 1767.3	12/1/69	DBM
0.0	1.0	TOPSOIL.	
1.0	12.0	SAND, silty, with gravel, cobbles, and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 24-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 15% cobbles and boulders.	SM
12.0		Bottom of Pit.	
		Note: Sample 158.1 -- 3 to 12 feet.	

TP-159	ELEV. 175[illegible]	12/1/69	DBM
0.0	1.0	TOPSOIL.	
1.0	12.0	SAND, silty with gravel, cobbles, and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 18-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL. est. 15% cobbles and boulders.	SM
12.0		Bottom of Pit.	
		Note: Sample 159.1 at 3.0 to 12.0 ft.	

TP-160	ELEV. 1749.3	12/1/69	DBM
0.0	1.0	TOPSOIL.	
1.0	13.0	SAND silty with gravel, cobbles and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20 gravel, angular, 28-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 15% cobbles and boulders.	SM
13.0		Bottom of Pit.	
		Note: No Sample.	

TP-161	ELEV. 17[illegible].6	12/1/69	DBM
0.0	1.0	TOPSOIL.	
1.0	14.0	SAND, silty with gravel, cobbles, and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 16-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 15% cobbles and boulders.	
14.0		Bottom of Pit.	
		Note: Sample 161.1 at 3.0 to 14.0 ft.	

LEGEND

TEST HOLE NUMBERING SYSTEM

Centerline of dam	1- 99
Borrow Area	1[illegible]-1[illegible]
Emergency Spillway	2[illegible]-299
Centerline of Outlet Structure	3[illegible]-399
Stream Channel	4[illegible]-499
Relief Wells	5[illegible]-599
	6[illegible]-6[illegible]
	7[illegible]-7[illegible]

DH-Drill Holes
TP-Test Pits

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GW Well graded gravel; gravel-sand mixtures
GP Poorly graded gravels
GM Silty gravels; gravel-and-silt mixtures
GC Clayey gravels; gravel-and-clay-mixtures
SW Well graded sands; sand-gravel mixtures
SP Poorly graded sands
SM Silty sands; sand-silt mixtures
SC Clayey sands; sand-clay mixtures
ML Silts; silty, very fine sands; sandy or clayey silts
CL Clays of low to medium plasticity; silty, sandy or gravelly clays
CH Clays of high plasticity; fat clays
MH Elastic silts; micaceous or diatomaceous silts
OL Organic silts and organic silty clays of low plasticity
OH Organic clays or silts of medium to high plasticity

All soil and rock description and classifications were determined by visual examination in the field.

When possible, all holes 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 3-inch O.D. split spoon sampler.

Location of Test Holes shown on Plan View

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

Psi - pounds per square inch water pressure
G/gpm - quantity of water in gallons per minute
K/ft/day - permeability in feet per day
D.S. - Disturbed Sample

THE UNIFIED SOIL CLASSIFICATION SYSTEM CLASSIFIES ONLY THOSE MATERIALS WHICH ARE SMALLER THAN THREE INCHES.

2

REPRODUCED AT GOVERNMENT EXPENSE

DH-101 ELEV. 1763.7 11/4/69 - 11/6/69 MB

0.0 – 2.0 TOPSOIL AND ROOT MAT.

2.0 – 25.0 SAND, silty with gravel, about 45% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 15% gravel, angular, gray, damp, medium permeability, dense to very dense, GLACIAL TILL. SM

25.0 – 30.0 BEDROCK, biotite, hornblende gneiss with some pyrite, slightly fractured, fractures spaced 12-18 inches apart. Most fractures dipping about 60 degrees.

30.0 Bottom of Hole.

Standard Penetration Tests

No.	Depth	Blo./Ft.	% Recovery
1.	0.0 - 1.5'	7	100
2.	1.5 - 3.0'	16	90
3.	3.0 - 4.5'	36	90
4.	4.5 - 6.0'	35	85
5.	10.0 -11.5'	73	70
6.	15.0 -16.5'	90	65
7.	20.0 -21.5'	113	50

Rock Core Runs

No.	Depth	% Recovery
1.	25.0 -30.0'	80

NOTE: Water level at 5.5 feet on 11/7/69.

DH-102 ELEV. 1755.4 11/10/69 MB

0.0 – 2.0 TOPSOIL AND ROOTMAT.

2.0 – 28.0 SAND, silty with gravel, about 45% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 15% gravel, sub-round, gray, damp, medium permeability, dense to very dense, GLACIAL TILL. SM

28.0 – 29.0 BEDROCK, biotite, hornblende, gneiss with some pyrite, slightly fractured, fractures spaced 12-18 inches apart. Most fractures dipping about 60 degrees.

29.0 Bottom of Hole.

Standard Penetration Tests

No.	Depth	Blo./Ft.	% Recovery
1.	0.0 - 1.5'	4	100
2.	1.5 - 3.0'	7	100
3.	3.0 - 4.5'	30	100
4.	4.5 - 6.0'	42	90
5.	10.0 -11.5'	95	50
6.	15.0 -16.5'	93	60
7.	20.0 -20.5'	110/6" ref.	50
8.	25.0 -26.5'	111	50

NOTE: Water level not recorded.

TP-151 ELEV. 1735.8 12/2/69 DBM

0.0 – 1.0 TOPSOIL.

1.0 – 14.0 SAND, silty with gravel, cobbles and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 18-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, 25% cobbles and boulders. SM

14.0 Bottom of Pit.

NOTE: No sample -- making water at 2 feet.

TP-152 ELEV. 12/2/69 DBM

0.0 – 1.0 TOPSOIL.

1.0 – 14.0 SAND, silty with gravel, cobbles and boulders, about 40% fines, 20% fine sand, 15% medium sand, 10% coarse sand 20% gravel, angular, 18-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, 20% cobbles and boulders. SM

14.0 Bottom of Pit.

NOTE: Sample 152.1 -- 3 to 14 feet. Making water at 2 feet.

TP-153 ELEV. 1748.7 12/2/69 DBM

0.0 – 2.0 TOPSOIL AND MAT.

2.0 – 12.0 SAND, silty with gravel, cobbles, and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 2 foot maximum size, blue-gray, moist, low permeability, dense, GLACIAL TILL, SM cobbles and boulders. SM

12.0 Bottom of Pit.

NOTE: No Sample -- making water at 3 feet.

TP-154 ELEV. 1752.8 12/1/69 DBM

0.0 – 1.5 TOPSOIL.

1.5 – 12.0 SAND, silty with gravel, cobbles, and boulders about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 2.5 foot maximum size, olive, damp, low permeability, dense, GLACIAL TILL, 20% cobbles and boulders. SM

12.0 Bottom of Pit.

Note: Sample 154.1 -- 3.0 to 12.0 ft.

TP-155 ELEV. 1759.1 12/1/69 DBM

0.0 – 1.0 TOPSOIL.

1.0 – 12.0 SAND, silty with gravel, cobbles and boulders, about 40% fines, 21% fine sand, 8% medium sand, 11% coarse sand, 20% gravel, angular, 14-inch maximum size, olive, moist, water at 12.0 feet, low permeability, dense, GLACIAL TILL, est. 20% cobbles and boulders. SM

12.0 Bottom of Pit.

Note: No Sample.

TP-156 ELEV. 1734.2 12/1/69 DBM

0.0 – 1.0 TOPSOIL.

1.0 – 12.0 SAND, silty with gravel, cobbles and boulders, about 40% fines, 21% fine sand, 8% medium sand, 11% coarse sand, 20% gravel, angular, 20-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 20% cobbles and boulders. SM

12.0 Bottom of Pit.

Note: Sample 156.1 --3.0 to 12 feet.

TP-157 ELEV. 1734.0 12/1/69 DBM

0.0 – 1.0 TOPSOIL.

1.0 – 12.0 SAND, silty with gravel, cobbles and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 12-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est, 15% cobbles and boulders. SM

12.0 Bottom of Pit.

Note: No Sample.

TP-158 ELEV. 1767.3 12/1/69 DBM

0.0 – 1.0 TOPSOIL.

1.0 – 12.0 SAND, silty, with gravel, cobbles, and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 24-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 15% cobbles and boulders. SM

12.0 Bottom of Pit.

Note: Sample 158.1 -- 3 to 12 feet.

TP-159 ELEV. 1754.5 12/1/69 DBM

0.0 – 1.0 TOPSOIL.

1.0 – 12.0 SAND, silty with gravel, cobbles, and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% gravel, angular, 18-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 15% cobbles and boulders. SM

12.0 Bottom of Pit.

Note: Sample 159.1 at 3.0 to 12.0 ft.

TP-160 ELEV. 1745.3 12/1/5 DBM

0.0 – 1.0 TOPSOIL.

1.0 – 13.0 SAND silty with gravel, cobbles and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20 gravel, angular, 28-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 15% cobbles and boulders. SM

13.0 Bottom of Pit.

Note: No Sample.

TP-161 ELEV. 1730.6 12/1/69 DBM

0.0 – 1.0 TOPSOIL.

1.0 – 14.0 SAND, silty with gravel, cobbles, and boulders, about 40% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 10% gravel, angular, 10-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 15% cobbles and boulders.

14.0 Bottom of Pit.

Note: Sample 161.1 at 3.0 to 14.0 ft.

REPRODUCED AT GOVERNMENT EXPENSE

TP-4 Cont'd	Elev. 1788.5		11/24/69	DBM
12.0		Bottom of Pit.		
		Note: No Sample -- Same as 252.1		

TP-251	Elev. 1793.5		11/24/69	DBM
0.0	7.0	COBBLES AND BOULDERS heated with SM Matrix slightly organic.		
7.0	9.0	SAND, silty with gravel and cobbles, about 20% fines, 12% fine sand, 14% medium sand, 14% coarse sand, 35% gravel, 5% cobbles, sub-angular, 8-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL.		SM or OM
9.0		Bottom of Pit.		
		Note: No Sample -- Same as 252.1.		

TP-252	Elev. 1788.0		11/24/69	DBM
0.0	1.0	TOPSOIL.		
1.0	10.0	SAND, silty with gravel, cobbles and boulders, about 20% fines, 12% fine sand, 14% medium sand, 18% coarse sand, 35% gravel, 5% cobbles, sub-angular, 18-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL. est. 35% + 8".		SM or OM
10.0		Bottom of Pit.		
		Note: Sample 252.1 -- 3' to 10.0'.		

TP-151	Elev. 1791.8		11/24/69	DBM
0.0	1.0	TOPSOIL.		
1.0	12.0	SAND, silty with gravel, cobbles and boulders, about 3[illegible]% fines, 2[illegible]% fine sand, 15% medium sand, 1[illegible]% coarse sand, 25% gravel, sub-angular, 24-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL. Estimated 30% + 8".		SM
12.0		Bottom of Pit.		
		Note: Sample 151.1 -- 3' to 12.0'.		

TP-55	Elev. 1789.0		9/16/71	DBM
0.0	1.5	TOPSOIL and ROOT.		
1.5	10.0	SAND, silty with gravel, and cobbles, about 40% fines, 15% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, sub-angular, 8-inch maximum size, olive-brown, moist, low permeability, dense, GLACIAL TILL		SM
10.0		Bottom of Pit.		
		Sample 052.1 -- 2 to 10 feet.		

TP-56	Elev. 1783.9		9/16/71	DBM
0.0	0.5	TOPSOIL.		
0.5	10.0	SAND, silty with gravel and cobbles, about 40% fines, 15% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, sub-angular, 10-inch maximum size, olive-brown, moist, low permeability, dense, GLACIAL TILL.		
		Bottom of Pit.		
		No Sample.		

TP-056	Elev. 1789.6		9/16/71	DBM
0.0	0.5	TOPSOIL.		
0.5	10.0	SAND, silty with gravel, about 40% fines, 15% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, sub-angular, 12-inch maximum size, olive-brown, moist, low permeability, dense, GLACIAL TILL.		SM
		Bottom of Pit. Sample 056.1 -- 2 to 10 feet.		

TP-057	Elev. 1793.4		9/16/71	DBM
0.0	1.5	TOPSOIL and ROOT		
1.5	10.0	SAND, silty with gravel and cobbles, about 40% fines, 15% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, sub-angular, 12-inch maximum size, olive-brown, moist, low permeability dense, GLACIAL TILL.		SM
		Bottom of Pit.		
		Sample No. 057.1 -- 2 to 10 feet.		

TP-058	Elev. 1790.7		9/16/71	DBM
0.0	1.5	TOPSOIL.		
1.5	7.0	SAND, silty with gravel and cobbles, about 40% fines, 15% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, sub-angular, 12-inch maximum size, olive-brown, moist, low permeability, dense, GLACIAL TILL		SM
		Bottom of Pit		
		Sample No. 058.1 -- 2 to 7 feet.		

WASHINGTON MOUNTAIN BROOK WATERSHED PROJECT
WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM
OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS

LOGS OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

D. MILLS 9/71
N. LONCZAK 9/21/71

MA-361 P

REPRODUCED AT GOVERNMENT EXPENSE

DH-204 (Cont'd) Elev. 1001.1 — 8/24 to 8/25/71 — DEM

14.5 — Sectembaf Hole.

Drive Samples

No.	Depth	Blo./Ft.	% Recovery
1.	0.0 - 1.5'	4	100
2.	5.5 - 6.5'	86/1' ref.	50

Rock Core Runs

No.	Depth	% Recovery
1.	7.5 - 12.0'	95
2.	12.0 - 14.0'	90
3.	14.0 - 14.5'	100

NOTE: Water level at 5.4 feet on 8/25/71.

DH-205 Elev. 1810.2 — 8/19 to 8/20/71 — JI

0.0 — 1.0 — TOPSOIL and ROOTS.

1.0 — 6.5 — SAND, silty, with gravel, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, cobble-sub-angular, 6-inch maximum size, olive-brown, damp, low permeability, dense, GLACIAL TILL. SM

6.5 — 17.0 — BEDROCK, gray, very hard, feldspar-quartz-biotite gneiss with foliation dipping 65° to 90°, intruded by quartz-feldspar pegmatite vein between 6.5 feet and 11.0 feet. Highly fractured from 6.5 feet to 11.0 feet, [illegible] 11.0 to 17.0 feet. Fractures generally horizontal, spaced 1 to 4-inches apart from 6.5 to 11.0 feet, and 1 to 12 inches apart from 11.0 to 17.0 feet. A few fractures dip 45° to 90°.

17.0 — Bottom of Hole.

Drive Samples

No.	Depth	Blo./Ft.	% Recovery
1.	0.0 - 1.5'	7	100
2.	1.5 - 2.8'	60/10" ref.	75
3.	5.0 - 6.3'	137/10" ref.	75

Rock Core Runs

No.	Depth	% Recovery
1.	6.5 - 8.0'	85
2.	8.0 -11.0'	80
3.	11.0 -14.5'	100
4.	14.5 -16.5'	80

NOTE: Water level at 13.3 feet on 8/20/71.

DH-206 Elev. 1808.5 — 8/23 to 8/23/71 — DEM

0.0 — 1.0 — TOPSOIL.

1.0 — 7.0 — SAND, silty with gravel and cobbles, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, sub-angular, 8-inch maximum size, olive-brown, damp, low permeability, dense, GLACIAL TILL. SM

7.0 — 14.0 — BEDROCK, gray, biotite hornblende feldspar gneiss, moderately fractured except a zone from 9.0 to 10.5, that is highly fractured. Most fractures horizontal, some dipping about 50° hard.

14.0 — Bottom of Hole.

Drive Samples

No.	Depth	Blo./Ft.	% Recovery
1.	0.0 - 1.5'	9	100
2.	1.5 - 2.3'	58/8' ref.	100
3.	4.5 - 6.0'	84	100

Rock Core Runs

No.	Depth	% Recovery
1.	7.0 - 9.0'	75
2.	9.0 -10.5'	65
3.	10.5 -14.0'	100

NOTE: Water level dry on 8/24/71.

DH-207 Elev. 1806.7 — 8/24 to 8/24/71 — DEM

0.0 — 1.0 — TOPSOIL and ROOT MAT.

1.0 — 7.5 — SAND, silty with gravel, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, sub-angular, 3/4-inch maximum size, olive-brown, damp, low permeability, dense to very dense, GLACIAL TILL. SM

7.0 — 7.5 — Boulder.

7.5 — 14.5 — BEDROCK, gray, biotite, hornblende feldspar gneiss, moderately fractured, fractures 3 to 6-inches apart, all horizontal, except one which is dipping about 60° hard.

14.5 — Bottom of Hole.

Drive Samples

No.	Depth	Blo./Ft.	% Recovery
1.	0.0 - 1.5'	11	100
2.	1.5 - 2.8'	97/8' ref.	100
3.	4.5 - 6.0'	76	90

Rock Core Runs

No.	Depth	% Recovery
1.	7.5 - 11.5'	100
2.	11.5 - 14.5'	100

May be drill water -- NOTE: Water level at 2.3 on 8/24/71

DH-301 Elev. 1764.8 — 8/20 to 8/21/71 — JI

0.0 — 1.0 — TOPSOIL and ROOTS with BOULDERS.

1.0 — 9.0 — SAND, silty with gravel, cobbles and boulders, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, boulders, sub-angular, hard to partially weathered, 24-inch maximum size, olive-brown, damp, low permeability, dense, GLACIAL TILL. SM

9.0 — 19.0 — BEDROCK, dark gray, hard, feldspar-quartz-biotite gneiss with thin veinlets of pyrite. Foliation sub-horizontal to dipping 30°. Generally moderately fractured with a few highly fractured zones. Fractures, rusty weathered, horizontally to dipping 60°, spaced 2 to 9-inches apart, except in highly fractured intervals.

19.0 — Bottom of Hole.

Drive Samples

No.	Depth	Blo./Ft.	% Recovery
1.	5.0 - 6.5'	78	75
2.	6.5 - 8.0'	98	100

Rock Core Runs

No.	Depth	% Recovery
1.	9.0 - 14.0'	90
2.	14.0 - 19.0'	90

NOTE: Water level at 2.0 feet on 8/23/71.

DH-601 Elev. 1788.2 — 8/25 to 8/26/71 — DEM

0.0 — 1.0 — TOPSOIL.

1.0 — 22.0 — SAND, silty with gravel, about 40% fines, 15% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, sub-angular, 3/4-inch maximum size, olive-brown, damp, low permeability, dense, GLACIAL TILL. SM

22.0 — Bottom of Hole.

Drive Samples

No.	Depth	Blo./Ft.	% Recovery
1.	0.0 - 1.5'	8	100
2.	1.5 - 3.0'	31	100
3.	3.0 - 4.5'	16	100
4.	4.5 - 6.0'	40	100
5.	10.0 -11.5'	75	90
6.	15.0 -16.5'	137	90
7.	20.0 -21.0'	182/1' ref.	90

NOTE: Water level at 6.3 feet on 8/26/71. Drill Water

TEST PITS

TP-1 Elev. 1799.1 — 11/24/69 — DEM

0.0 — 1.0 — TOPSOIL.

1.0 — 11.0 — SAND, silty with cobbles and boulders, about 35% fines, 20% fine sand, 20% medium sand, 15% coarse sand, 10% gravel, angular, 3' maximum size, brown to olive, damp, low permeability, very dense, GLACIAL TILL weathered to about 3 feet. Est. 40% cobbles and boulders. SM

11.0 — Bottom of Pit.

Note: Sample 1.1 -- 3' to 11.0'.

TP-2 Elev. 1787.0 — 11/24/69 — DEM

0.0 — 1.0 — TOPSOIL.

1.0 — 12.0 — SAND, silty with cobbles and boulders, about 13% fines, 17% fine sand, 17% medium sand, 19% coarse sand, 32% gravel, angular, 10-inch maximum size, brown to olive, damp, low permeability, very dense, GLACIAL TILL weathered to 3 feet, about 40% cobbles and boulders.

12.0 — Bottom of Pit.

Note: Sample 2.1 -- 3' to 12.0'.

TP-3 Elev. 1773.7 — 11/24/69 — DEM

0.0 — 3.0 — ORGANIC SAND, and gravel with about 3% fines, 1% fine sand, 20% medium sand, 30% coarse sand, 25% gravel, 12% cobbles, black, wet, medium permeability, loose.

3.0 — 12.0 — SAND, silty with gravel and cobbles, about 20% fines, 15% fine sand, 17% medium sand, 15% coarse sand, 30% gravel, 3% cobbles, angular, 3 feet maximum size, brown to olive, damp, low permeability, very dense. GLACIAL TILL. Est. 2% > 6". SM

12.0 — Bottom of Pit.

Note: No Sample -- Same as No. 1.

TP-4 Elev. 1788.5 — 11/24/69 — DEM

0.0 — 1.0 — TOPSOIL.

1.0 — 12.0 — SAND, silty with cobbles and boulders, about 22% fines, 12% fine sand, 12% medium sand, 18% coarse sand, 35% gravel, 3% cobbles, angular, 12-inch maximum size, brown to olive brown, damp, low permeability, very dense. GLACIAL TILL. Est. 3% > 6". SM

REPRODUCED AT GOVERNMENT EXPENSE

Rock Core Runs

No.	Depth	% Recovery
1.	13.0 - 18.0'	100
2.	18.0 - 23.0'	95
3.	23.0 - 25.0'	100

Pressure Tests

No.	Depth	Hole Size	PSI	Loss
1.	15.5 - 25.0'	3"	20	5.5 gal./ 5 min.

NOTE: Water level at 0.5 feet on 8/20/71.

DH-8 Elev. 1784.6 8/23 to 8/24/71 DM

Depth	Elev.	Description
0.0	1.0	TOPSOIL and COBBLES.
1.0	9.0	SAND, silty with gravel, cobbles, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, sub-rounded, 8-inch maximum size, olive-brown, damp, low permeability, dense to very dense, GLACIAL TILL. SM
9.0	20.0	BEDROCK, grey, biotite hornblende, feldspar gneiss, highly fractured to 15 feet; then moderately fractured fractures spaced ½ to 3-inches from 9 to 16 feet then 8 to 12" hard with quartz leases, most fractures horizontal, but some dipping about 60°. Foliation dipping about 50°.
20.0		Bottom of Hole.

Drive Samples

No.	Depth	Blows/Ft.	% Recovery
1.	0.0 - 1.0'	3/73/1' ref.	100
2.	2.5 - 3.5'	50/1' ref.	100
3.	5.5 - 7.0'	73	80

Rock Core Runs

No.	Depth	% Recovery
1.	9.0 - 14.0'	20
2.	14.0 - 19.0'	90
3.	19.0 - 20.0'	100

Permeability Test

No.	Depth	Hole Size	H	Loss
1.	9.0 - 21.0'	3"	6ft.	19 gal./ min.

NOTE: Lost drilling water at 11.5 ft. water level at 11.5' on 8/24/71.

DH-9 Elev. 1801.2 8/24 to 8/25/71 DM

Depth	Elev.	Description
0.0	1.0	TOPSOIL and ROOT MAT.
1.0	7.0	SAND, silty with gravel, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, sub-angular, 9-inch maximum size, olive-brown, damp, low permeability, dense to very dense, GLACIAL TILL. SM
7.0	14.0	BEDROCK, grey, biotite, hornblende, quartz gneiss, moderately fractured. Fractures 3 to 18-inches apart. Most fractures horizontal, 3 fractures dipping about 60°. Foliation not well defined. Soft to hard.
14.0		Bottom of Hole.

Drive Samples

No.	Depth	Blows/Ft.	% recovery
1.	0.0 - 1.5'	3	100
2.	1.5 - 3.0'	54	60
3.	4.5 - 6.0'	90	70

Rock Core Runs

No.	Depth	% Recovery
1.	7.0 - 12.5'	[illegible]
2.	12.5 - 14.0'	5

NOTE: Water level at 4.2 feet on 8/25/71. Probably drill water.

DH-2[illegible] Elev. 1812.0 8/16 to 8/17/71 JI

Depth	Elev.	Description
0.0	1.0	TOPSOIL and ROOT MAT.
1.0	8.0	SAND, silty with gravel and cobbles, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, sub-angular, 8-inch maximum size, olive-brown, damp, low permeability, dense. GLACIAL TILL.
8.0	13.0	BEDROCK, grey, hard, feldspar, quartz, biotite gneiss with foliation dipping about 70°. Weathered and highly fractured from 8.0 to 11.0 feet, fractures are horizontal to dipping 70°, spaced 2 to 3-inches apart, and are weathered rusty. From 13.0 to 16.0 feet, fractures are horizontal, spaced 2 to 12-inches apart, and are rusty weathered.
16.0		Bottom of Hole.

Drive Samples

No.	Depth	Blows/Ft.	% Recovery
1.	0.0 - 1.0'	[illegible]	100
2.	1.0 - 2.5'	50/1' ref.	[illegible]
3.	5.0 - 6.5'	100	100
4.	7.0 - 7.[illegible]	7/0.8' ref.	100

DH-2[illegible] Cont'd

Rock Core Runs

No.	Depth	% Recovery
1.	8.0 - 12.0'	100
2.	12.0 - 16.0'	100
3.	16.0 - 16.0'	100

NOTE: Water level at 10.4 feet on 8/19/71.

DH-2[illegible]2 Elev. 1819.0 8/16 to 8/17/71 JI

Depth	Elev.	Description
0.0	1.0	TOPSOIL, root mat and boulders.
1.0	10.6	SAND, silty with boulders, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, sub-angular, 18-inch maximum size, olive-brown, damp, low permeability, dense, GLACIAL TILL. SM
10.6	22.0	BEDROCK, gray, hard, feldspar-quartz-biotite-garnet gneiss with foliation dipping 90°, highly fractured between 10.6 to 20.6 feet, more solid from 20.6 to 22.0 feet. Fractures rusty stained, horizontal to vertical, spaced 1-inch to 12-inches apart. Very badly fractured and weathered from 12.0 to 13.0 feet and 16.0 to 17.0 feet.
22.0		Bottom of Hole.

Drive Samples

No.	Depth	Blows/ft.	% Recovery
1.	0.0 - 1.5'	3	100
2.	1.5 - 2.5'	60/1' ref.	100
3.	5.0 - 6.0'	68/1' ref.	70
4.	9.0 -10.1'	245/1.1' ref.	60

Rock Core Runs

No.	Depth	% Recovery
1.	10.6 - 12.0'	70
2.	12.0 - 15.5'	100
3.	15.0 - 20.6'	100
4.	20.6 - 22.0'	100

NOTE: Dry hole on 8/18/71. (Lost water at 16.0 feet)

DH-2[illegible] Elev. 1809.8 8/16 to 8/17/71 DM

Depth	Elev.	Description
0.0	1.0	BOULDERS with topsoil.
1.0	7.0	BOULDERS with silty sand and [illegible] SM
7.0	20.0	BEDROCK, gray, quartz, biotite, hornblende granitic gneiss, highly fractured from 7.0 to 15.0 feet. Most fractures spaced 1/2-inch to 2-inches apart, horizontal and dipping about 70°, then slightly fractured with horizontal fractures, hard.
20.0		Bottom of Hole.

Drive Samples

No.	Depth	Blows/ft.	% Recovery
1.	2.0 - 3.5'	62	[illegible]

Rock Core Runs

No.	Depth	% Recovery
1.	7.0 - 10.0'	100
2.	10.0 - 12.0'	100
3.	12.0 - 16.5'	100
4.	16.5 - 20.0'	100

NOTE: Water level at 2.0 feet on 8/18/71.

DH-2[illegible] Elev. 1801.1 8/24 to 8/25/71 DM

Depth	Elev.	Description
0.0	1.0	TOPSOIL AND ROOT MAT.
1.0	7.5	SAND, silty with gravel, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, sub-angular, 2-inches maximum size, olive-brown, damp, low permeability, dense to very dense, GLACIAL TILL. SM
7.5	14.5	BEDROCK, gray, biotite, hornblende quartz gneiss, weathered and highly fractured from 9.0 to 11.0 feet, then moderately fractured, fractures spaced from 1-inch to 4-inches apart, mostly horizontal with some fractures dipping about 60° soft to hard.

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OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS

LOGS OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Surveyed: D. MILLS 9/71
Drawn: N. LONCZAK 9/21/71

MA-361 P

REPRODUCED AT GOVERNMENT EXPENSE

Washington Mountain Creek
Site 3
Lee, Massachusetts
Berkshire County

DH-1 Elev. 1771.6 — 10/5 to 10/7/70 — DBM

0.0	4.0	SAND, some silt and organic, about 4% fines, 16% fine sand, 40% medium sand, 30% coarse sand, 10% gravel, sub-angular, 3/4-maximum size, grey-black, wet, medium permeability, dense, VALLEY FILL.	SP
4.0	6.0	SAND, some silt, about 2% fines, 60% fine sand, 30% medium sand, grey, wet, low permeability, loose, VALLEY FILL.	SP
6.0	15.0	SAND, silty, about 35% fines, 20% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, sub-angular, 3-inch maximum size, brown to olive, damp, low permeability, very dense, GLACIAL TILL.	SM
15.0	23.5	BEDROCK, dark grey, biotite hornblende granitic gneiss, moderately to highly fractured in top 5 feet, most fractures dipping about 65°, some horizontal fractures tight.	
23.5		Bottom of Hole.	

Drive Samples

No.	Depth	Blows/Ft.	% Recovery
1.	0.5 - 1.5'	31	50
2.	1.5 - 3.0'	72	35
3.	4.5 - 6.0'	26	90
4.	9.5 -11.0'	86	50

Permeability Test No.	Depth	Hole Size	Pipe Stick up	Loss
1.	5.0'	3"	Ground	None
2.	10.0	3"	Ground	None
3.	15.0'	3"	Ground	Slight

Rock Core Runs

No.	Depth	% Recovery
1.	15.0 - 18.5'	75
2.	18.5 - 23.5'	90

NOTE: Water flowing at 19.0 feet 10/5/70. Flow 1 pt./minute

DH-2 Elev. 1790.5 — 10/8 to 10/9/70 — DBM

0.0	14.5	SAND, silty with gravel, about 30% fines, 20% fine sand, 15% medium sand, 15% coarse sand, 15% gravel, 5% cobbles, sub-angular, 8-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL.	SM
14.5	23.5	BEDROCK, dark grey-biotite hornblende granitic gneiss, higly fractured, is top 3 feet then moderately fractured most fractures dipping about 65°, some horizontal fractures. Tight below 14.5 feet.	
23.5		Bottom of Holes	

Drive Samples

No.	Depth	Blows/Ft.	% Recovery
1.	0.0 - 1.5'	22'	70
2.	7.5 - 9.0'	32'	60

Permeability Test No.	Depth	Hole Size	Pipe Stick Up	Loss
1.	3.0'	3"	Ground	14 gal./min. plus
2.	10.5'	3"	Ground	14 gal./min. plus

Rock Core Runs

No.	Depth	% Recovery
1.	10.5 - 14.5'	85
2.	14.5 - 23.5'	95

NOTE: Lost circulation at 3 feet in boulders Regained circulation at 6.5 feet, lost circulation at 10.5 feet.

DH-3 Elev. [illegible] — 10/12 to 10/14/70 — DBM

0.0	[illegible]	SAND, silty with gravel and boulders, about 35% fines, 20% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, angular, 2 foot maximum size, grey-green, damp, low permeability, very dense, GLACIAL TILL.	SM
[illegible]	[illegible]	BEDROCK, dark grey, biotite hornblende granitic gneiss, moderately fractured, fractures spaced 12 to 18-inches apart. Most fractures horizontal, one dipping about 65°, fractures tight.	
[illegible]		Bottom of Hole. 1 foot topsoil removed.	

Drive Samples

No.	Depth	Blows/Ft.	% Recovery
1.	[illegible] - 1.5'	[illegible]	70
2.	3.5 - 5.0'	5[illegible]	70
3.	5.0 - 6.[illegible]	42/1 ft. ref.	50

Permeability Test No.	Depth	Hole Size	Pipe Stick Up	Loss
[illegible]	5.0'	3"	Ground	None

Rock Core Runs

No.	Depth	% Recovery
1.	7.[illegible] - 8.5'	95
2.	8.5 -13.4'	100
3.	13.4 -15.6'	100

NOTE: Water level dry at 7/23/70.

DH-4 Elev. 1781.6 — 10/14 to 10/15/70 — DBM

0.0	5.5	TOPSOIL and BOULDERS with a silty sand matrix.	
5.5	19.0	SAND, silty, about 35% fines, 20% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, angular, 2-inch maximum size, olive-brown, damp, low permeability, very dense, GLACIAL TILL.	SM
19.0	21.0'	BEDROCK, dark grey, biotite hornblende, granitic gneiss, moderately fractured, fractures horizontal, tight.	
21.0		Bottom of Hole.	

Drive Samples

No.	Depth	Blows/Ft.	% Recovery
1.	6.0 - 7.5'	302	80
2.	11.0 -12.5'	39	70

Permeability Test No.	Depth	Hole Size	Pipe Stick Up	Loss
1.	5.5'	3"	Ground	12 gal/min.
2.	10.0'	3"	Ground	None

Rock Core Runs

No.	Depth	% Recovery
1.	19-21'	100

NOTE: Water level at 5.5 feet on 10/15/70.

DH-5 Elev. 1790.1 — 10/15 to 10/16/70 — DBM

0.0	7.0	SAND, silty with gravel, about 35% fines, 20% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, angular, 1½-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL.	SM
7.0	18.0	BEDROCK, dark grey, biotite, hornblende gneiss, moderately fractured, fractures spaced 4-inches to 12-inches apart; most fractures horizontal, some dipping about 60°, fractures are tight; rock hard, but slightly weathered in top 3 feet.	
18.0		Bottom of Hole.	

Drive Samples

No.	Depth	Blows/Ft.	% Recovery
1.	0.0 - 1.5'	36	100
2.	1.5 - 3.0'	54	100

Rock Core Runs

No.	Depth	% Recovery
1.	7.0 - 10.0'	75
2.	10.0 - 15.0'	75
3.	15.0 - 18.0'	100

NOTE: Water level 3.5 feet on 10/16/70.

DH-6 Elev. 1779.6 — 8/16 to 8/18/71 — DBM

0.0	1.0	TOPSOIL and ROOT MAT.	
1.0	8.7	SAND, silty with gravel, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, sub-angular, 8-inch maximum size, olive-brown, damp, low permeability, dense to very dense, GLACIAL TILL.	SM
8.7	18.7	BEDROCK, grey quartz, biotite, hornblende granitic gneiss, moderately fractured to 9.0 feet, fractures horizontal, one dipping about 70° then slightly fractured, fractures 8 to 20-inches apart, and horizontal, hard all fractures tight.	
18.7		Bottom of Hole.	

Drive Samples

No.	Depth	Blows/Ft.	% Recovery
1.	0.0 - 1.5'	5	100
2.	1.5 - 3.0'	35	100
3.	5.0 - 6.5'	07	30
4.	8.0 - 8.7'	30/.7 ref.	[illegible]

Permeability Test No.	Depth	Hole Size	Head	Loss
1.	8.7'	3"	Ground	Slight

Rock Core Runs

No.	Depth	% recovery
1.	8.7 to 11.0'	100
2.	11.0 - 15.5'	100
3.	15.5 - 18.7'	100

Tried Pressured Test, but could not seat packer.

NOTE: water level at 5.0 feet on 8/18/71.

DH-7 Elev. 1758.3 — 8/19 to 8/[illegible]/71 — DBM

0.0	1.0	TOPSOIL and ROOT MAT.	
1.0	15.0	SAND, silty, micaceous with boulders and cobbles, about 35% fines, 15% fine sand, 15% medium sand, 25% coarse sand, 10% gravel, sub-angular, 36-inch maximum size, olive-brown, damp, low permeability, dense, GLACIAL TILL.	SM
3.0	6.0	Boulder	
15.0	25.0	BEDROCK, light grey, hard, strongly to weakly foliated, feldspar-quartz-biotite gneiss with foliation dipping about 40°, fractures mostly subhorizontal, pyrite-encrusted and rusty weathered, generally spaced 4-inches to 12-inches apart. Highly fractures and weathered, some between 18.0 and 18.0 feet.	
25.0		Bottom of Hole.	

Drive Samples

No.	Depth	Blows/Ft.	% Recovery
1.	0.0 - 1.5'	2[illegible]	75
2.	1.5 - 3.0'	53	75
3.	7.5 - 9.0'	0[illegible]	75
4.	13.0 -14.5'	6	75

APPENDIX D

OUTLINE OF DRAINAGE AREA AND HYDRAULIC COMPUTATIONS

COMPUTATIONS	PAGE NO.
Drainage Area Map	D-1
Size Clasification, Hazard Potential and Test Flood Determination	D-2
Flood Routing, PMF	D-4
Dike Failure Analysis	D-8

Washington Mt Lake Dike

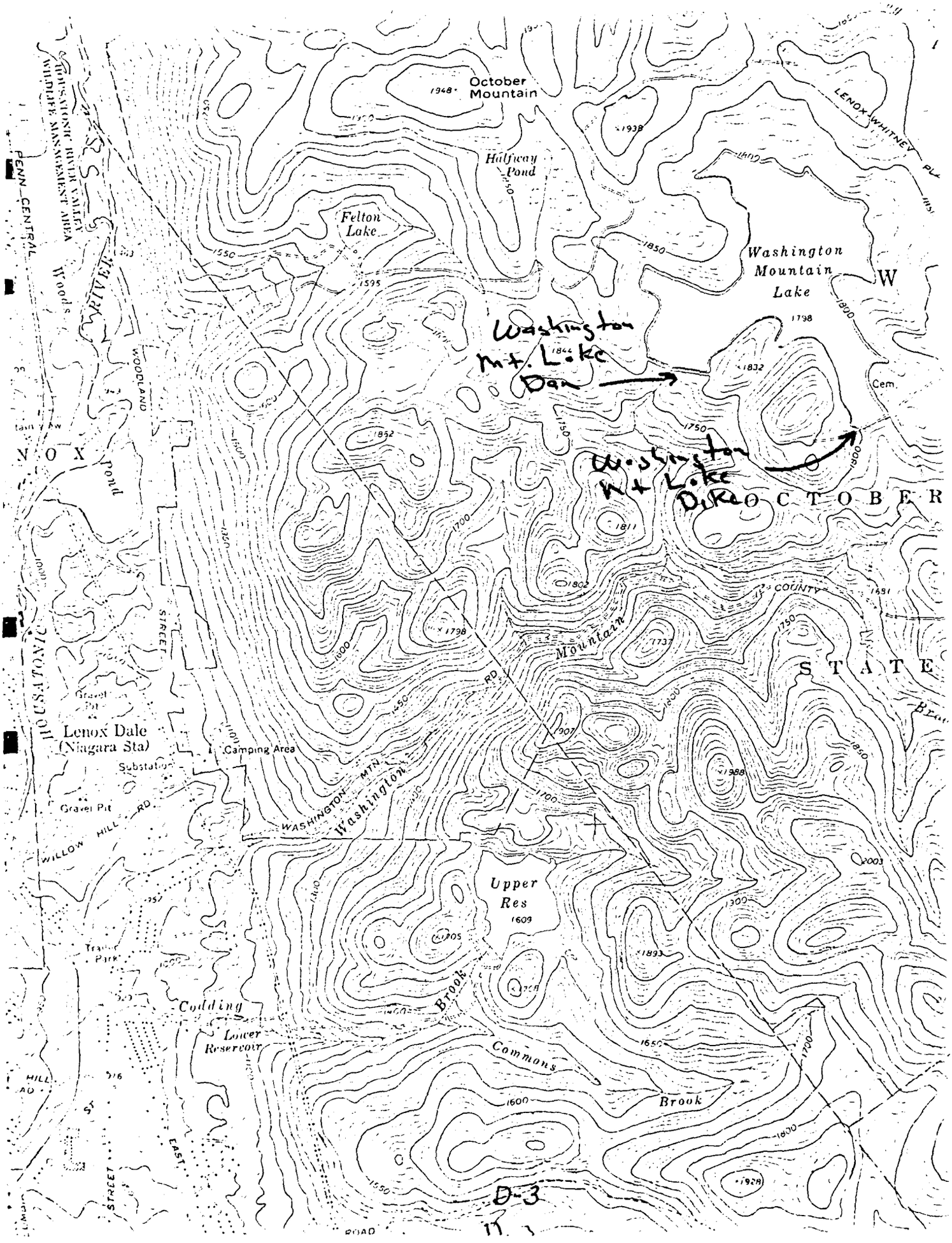
Drainage Area = 532 Acres = 1.3 SM
Water Surface Area = 224 Acres (Pool)

Size Classification:
Height of Dike = 15.25' (Small)
Storage at crest = 3985 Acre Ft (Intermediate)
∴ Use Intermediate

Hazard Potential = High
Test Flood = PMF
Drainage Area:
Basin has rolling hills around the lake. The lake is located in the upper portion of the basin and the hills drain into the lake by way of multiple streams
∴ Use rolling curve to determine PMF

PMF Q = (2300 CFS/SM)(1.3 SM) = 2990 CFS

Use 3000 CFS


October Mountain
1948
1938
Halfway Pond
Felton Lake
1595
Washington Mountain Lake
1798
1832
Cem.
Washington Mt. Lake Dam
Washington Mt. Lake Dike
1844
1852
1811
1802
1798
1737
1907
1988
2003
1893
1928
1705
1609
Upper Res
Mountain
RD
COUNTY
STATE
OCTOBER
LENOX WHITNEY PL
WOODLAND
STREET
Pond
Lenox Dale (Niagara Sta)
Substation
Camping Area
Gravel Pit
WILLOW HILL RD
WASHINGTON MTN
Washington
Trailer Park
Codding
Lower Reservoir
Brook
Commons
Brook
EAST
STREET
ROAD
PENN CENTRAL
HOUSATONIC RIVER VALLEY WILDLIFE MANAGEMENT AREA
Woods
D-3

Reach Outflow

For Q_{p1} 24,974 cfs

$y = 8.5'$

$L = 2000$ ft

Volume $= (2000)((20(8.5)^2)) \div 43560$

$= 66.3$ AF

$Q_{p2}(\text{trial}) = 24{,}553\left(1 - \frac{66.3}{3985}\right) =$

$Q_{p2}(\text{trial}) = 24{,}974$ cfs

$y = 8.25'$

$V = 62.5$ AF Vave. $\frac{62.5 + 66.3}{2}$

$Q_{p2} = 24{,}974\left(1 - \frac{64.4}{3985}\right)$

$Q_{p2} = 24{,}570$ CFS

$y = 8.25$

The RR bridge will not handle the failure flow. Therefore the RR bed and a portion of Mill St in the south will be overtopped

Using Broad Crested Weir Formula the flow over the RR bed and Mill St can be approximated

$Q = C L H^{3/2}$

$C = 2.6$ $L = 1300$ ft $H = ?$

Over Flow Cross Section

Trial = 1

$(24,570 - 3244) = (2.6)(1300)(H)^{3/2}$

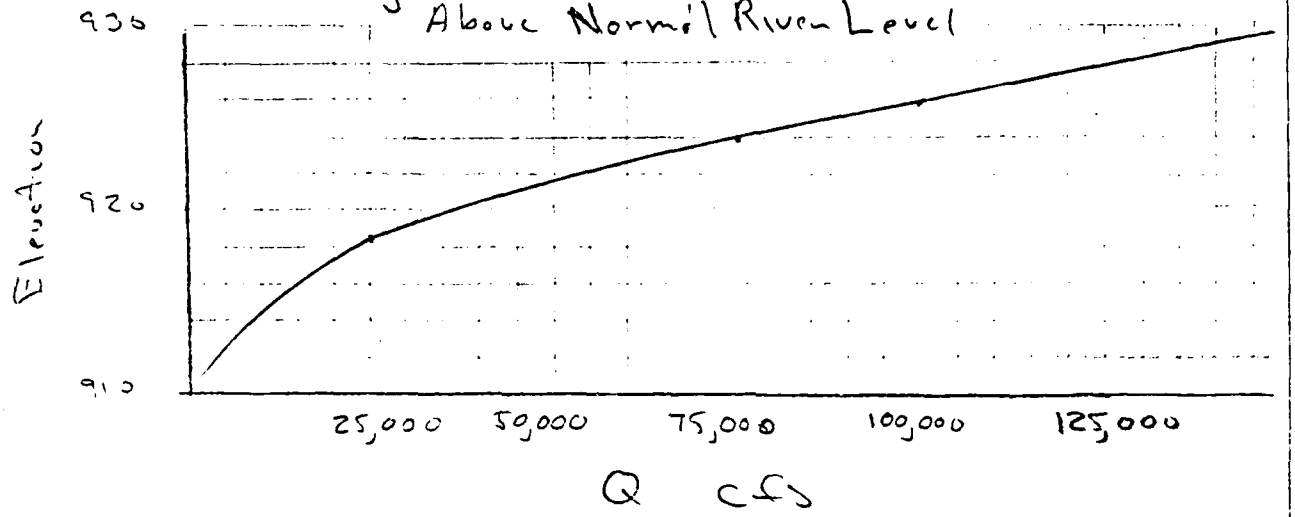
$H^{3/2} = 6.3$

$H = 3.3'$

with this spill over elevation about 7 homes will be flooded [illegible] shallow high velocity flooding

The out flow from the dike failure is 24,570 cfs in Washington Rd Brook as compared to the PMF for the Housatonic River

Rating Curve for Housatonic River
Above Normal River Level



Housatonic D.A. ≈ 223 SM
at confluence of West Nt Brook

PMF = 780 CFS/SM

Total PMF = 173,940 CFS

The dam failure Qpi (≈ 4,570 cfs) is not significant beyond the confluence.

Hydrology/Hydraulics

February [illegible], 198[illegible] Computation Campbell's Island

Summary of Flows and Stages

	NPF Adj Area (CFS)	Dam Failure (CFS)	Total (CFS)	Stage (RM=[illegible]) (ft)
1	9,700	27,300	37,000	—
2	9,700	25,800	35,500	10.5
3	9,700	25,000	34,700	5.5
4	9,700	24,600	34,300	9.5
5	9,700	24,600	34,300	9.5
6	9,700	24,600	34,300	9.5
7	9,700	24,600	34,300	—

Computation of Overflow at PP Bridge

$Q = CLH^{3/2}$

$C = 2.6$ $L = 1300$ $H = ?$

$34,300 - 22,444) = (2.6)(1300)(H^{3/2})$

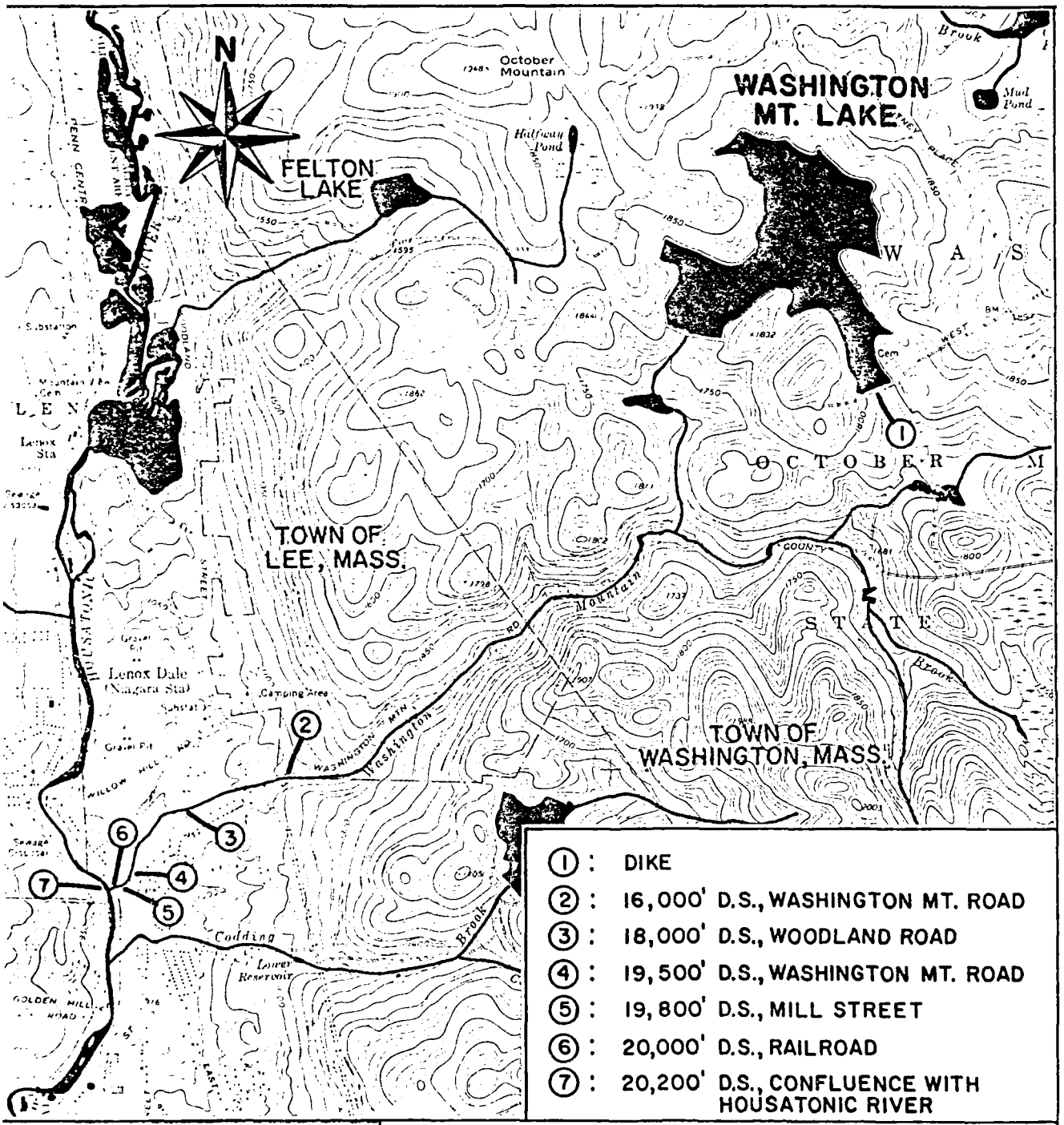
$H^{3/2} = (34,300 - 22,444)/(2.6)(1300)$

$H = 3.8'$

Stage = Hd + Channel Stage

= 3.8 + 9.5 = 13.3 ft

D-22



① :	DIKE	
② :	16,000'	D.S., WASHINGTON MT. ROAD
③ :	18,000'	D.S., WOODLAND ROAD
④ :	19,500'	D.S., WASHINGTON MT. ROAD
⑤ :	19,800'	D.S., MILL STREET
⑥ :	20,000'	D.S., RAILROAD
⑦ :	20,200'	D.S., CONFLUENCE WITH HOUSATONIC RIVER

-SCALE-

1000' 0 1000' 2000' 3000' 4000'

FROM: U.S.G.S EAST LEE, MASS.

QUADRANGLE LOCATION

TIGHE & BOND / SCI
CONSULTING ENGINEERS
EASTHAMPTON, MASS.

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

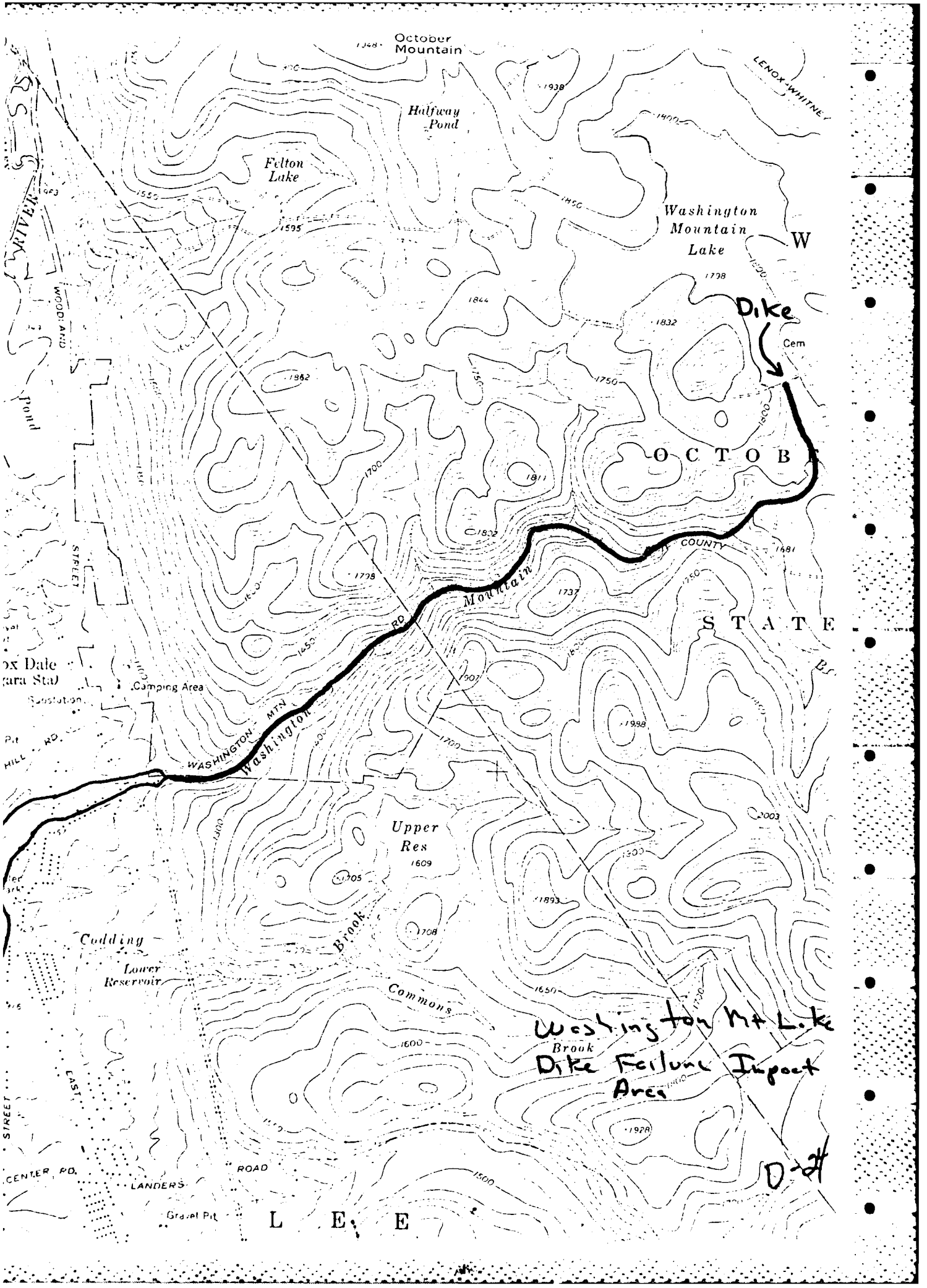
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION AND DOWNSTREAM HAZARD MAP

WASHINGTON MOUNTAIN LAKE DIKE (MA 319)
BERKSHIRE COUNTY MASSACHUSETTS

SCALE: AS NOTED

DATE: DECEMBER 1979


October Mountain
Halfway Pond
Felton Lake
Washington Mountain Lake
LENOX-WHITNEY
Dike
Cem
O C T O B
COUNTY
S T A T E
Mountain
RD.
WASHINGTON MTN
Washington
Camping Area
Upper Res
Cadding
Lower Reservoir
Brook
Commons
Brook
Washington Mt Lake
Dike Failure Impact Area
D-24
CENTER RD.
LANDERS
ROAD
Gravel Pit
L E E
WOODLAND
STREET
EAST
HILL RD.
RIVER

APPENDIX E

Information as Contained in
THE NATIONAL INVENTORY OF DAMS

Da. Spillway and Conduit Rating

The principal spillway has a weir length of 30.8' and is at elevation 1798.0

Set orifices are downstream of the weir in the riser structure and are 1' X 1.25'. Two on each side of the riser

High stage weirs exist at the top of the riser, Two exist and are 7.5' in length. The elevation of the weir is 1801.0
A 30" Conduit carries the water from the riser under the dam and this conduit limits the capacity of the spillway
The dam is provided with an emergency spillway which is 50' wide and has side slopes sloping at 2 horiz. to 1 vert. The approach channel slopes up to the crest at 2% and the discharge channel slopes away from the crest at 4%. The E.S. spillway elevation is 1801.0

The information used to establish the elevations of Washington Nt Lake Dam was determined from Record Plans and Design Data provided by the SCS.

There exists a 20" ID conduit for the pond drain. It is assumed that the drain will be closed for this analysis.

D-4

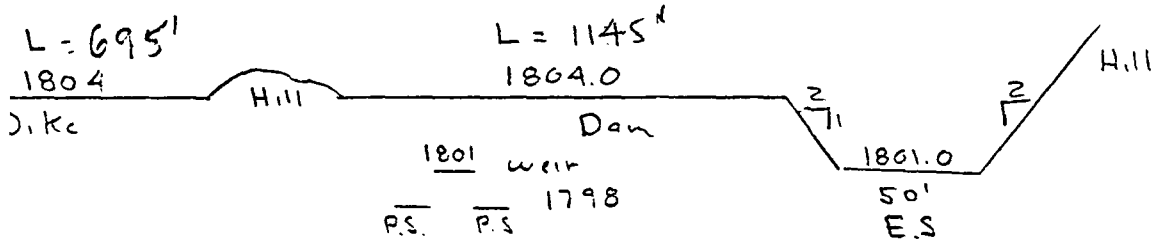
The following spillway and conduit rating information was taken from the hydraulic section of the Design Folder for the W.M. Lake Site, prepared by the S.C.S. The following information is only a portion of the Stage - Discharge Data found on pg 13 of the hydraulic section.

Stage - Discharge

Elevation	Q (CFS)
1798.1	3.0
.2	8.6
.3	15.3
.4	23.9
.5	33.4
.6	43.9
.7	49.4
.8	49.9
.9	50.0
1799.0	51.1
.2	52.3
.4	53.3
.6	54.5
.8	55.4
1800.0	56.4
.5	59.0
1801.0	61.5
.2	66.6
.4	75.0
.6	112.5
.8	162.1
1802.0	210.5
.5	335.1
1803.0	466.0
.5	626.9
1804.0	787.8

Stage - Discharge (Continued)

SCS comps do not extend to 3000 cfs therefore for the purpose of testing this structure flows over the dam and dike must be computed.

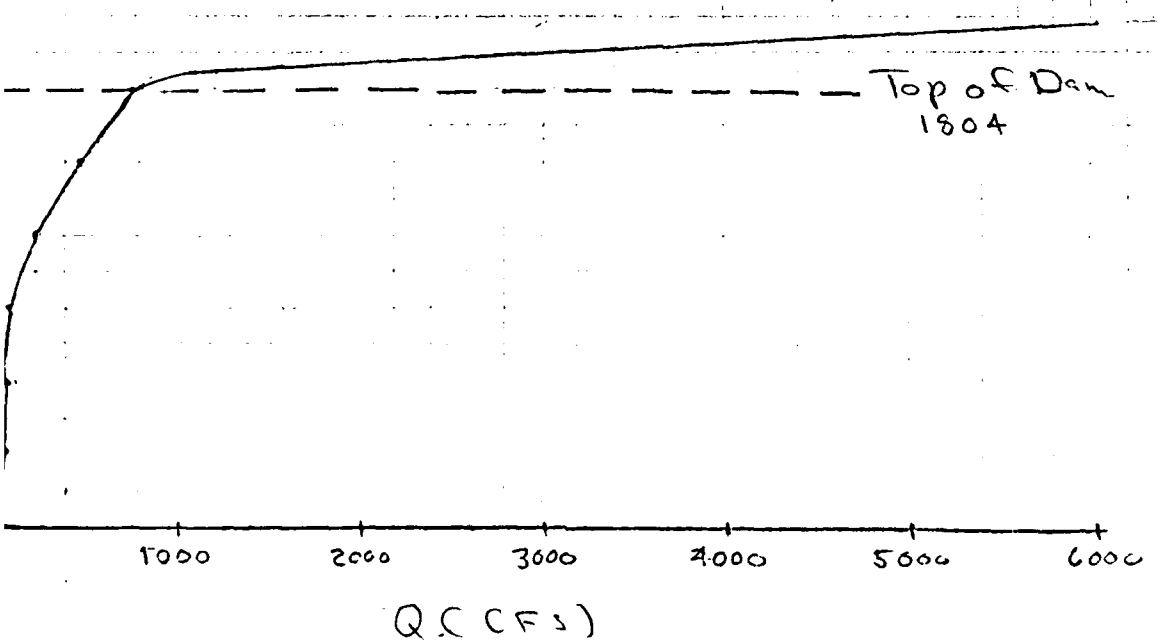


Q over dam = $C L H^{3/2}$, C = 2.6

$(2.6)(1825)(1)^{3/2}$ =

Supplemental Rating

	Orifice		Riser weir		Conduit		Emerg Spill		Dam + Dike		Total
	h	Q	h	Q	h	Q	h	Q	h	Q	Q cfs
.0	10.5	28.1	4.0	372	38.0 limiting factor	139.6	4.0	1100	1.0	4745	5985



Reservoir Routing

Surcharge elevation to pass 3000 cfs
is 1804.5

Surcharge height 1804.5
− 1798.0
6.5 ft

From SCS Surface Area – Elevation curve
in hydraulic design section of
Design Folder A = 263 Acres

Surface Area at principal spillway
from same source A = 224 Acres

Volume of surcharge = $\left(\frac{263 + 224}{2}\right)(6.5)$

= 1582.8 AF

DA = 1.3 SM = 832 A

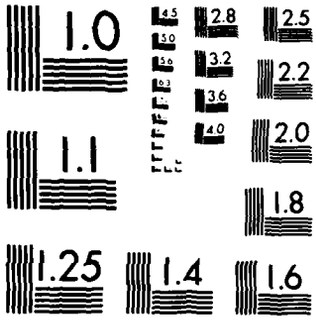
Stor, = $\frac{1582.8 \text{ AF}}{832 \text{ A}}$ = 1.90 ft = 22.8"

22.8" > 19" Therefore the
Storage exceeds the runoff volume.
The reservoir storage and spillway
capacity is adequate.

AD-A154 531 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 2/2
WASHINGTON MOUNTAIN L..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV DEC 79

UNCLASSIFIED F/G 13/13 NL

END
FILMED
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

February 17, 1980 | Hydrology/Hydraulics Comps | Computed by: D. Lemont

Supplemental Data
On Flows From Adjacent Drainage
Areas

Total Drainage Area Before Hazard
Area = 9.0 SM
Area of WML 1.3 SM
Net DA 7.7 SM

DA is Mountainous
∴ use Mountainous curve for
PMF From Corp. Guidelines
Mountainous = 2200 CFS/SM
PMF From Adjacent Area
7.7 SM × 2200 CFS ≈ 17,000
Spillway + Adj Area = 17,000 + 788 ≈ 18,000

Since All Hazard Areas are within
close proximity of each other
we will use 18,000 CFS for all.

From Stage Curve at Hazard Areas
The Following Data Was Found

Location	Stage
2	6.5'
3	3.5'
4, 5 and 6	6.5'
7	5.0'

D-7A

Determine Reservoir Stage
Use figure 17.11 from SCS
National Engineering Handbook entitled
Section 4 – Hydrology

Data: Resvol. – 4555 to 1350 3225 AF
Inflow PMF – 1320 AF
Out flow – < 788 cfs
Inflow Peak – 3000 cfs

Using 100 AF increments we will
run trials for matching storage-stage
vs. Spillway capacity vs stage

Res Vol (AF)	Stage (Ft) Stor	Stage (Ft) Spwy Disc	Outflow (CFS)
3325	1798.0	1804.45	2940
3425	1798.5	1804.40	2820
3525	1799.0	1804.35	2700
3625	1799.5	1804.30	2550
3725	1800.1	1804.25	2400
3825	1800.5	1804.20	1950
3925	1801.2	1804.15	1800
4025	1801.5	1804.10	1530
4125	1802.0	1804.05	1140
4225	1802.5	1804.00	750
PMF Stage → 4325	1803.0	1803.00	600 ← match

D-7B

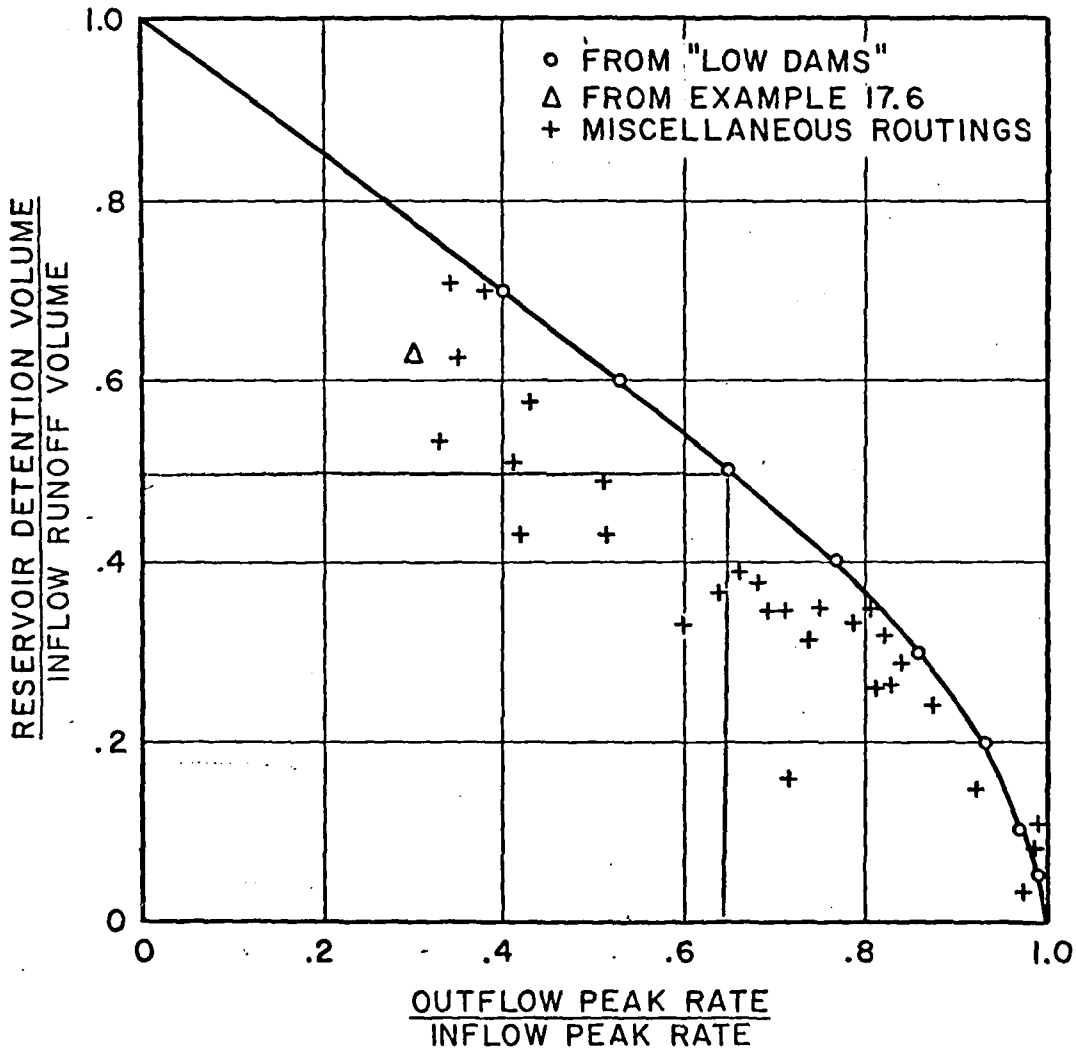

o FROM "LOW DAMS"
Δ FROM EXAMPLE 17.6
+ MISCELLANEOUS ROUTINGS
RESERVOIR DETENTION VOLUME / INFLOW RUNOFF VOLUME
OUTFLOW PEAK RATE / INFLOW PEAK RATE
0
.2
.4
.6
.8
1.0

FIGURE 17.11

Dike Failure Analysis

$$Q_p = \frac{8}{27} W b \sqrt{g} \; Y_0^{3/2}$$

[illegible] breach

[illegible] (40% 475) = 190'

Y_0 = Height from Riverbed to point of failure

Water level will be at dam crest when failure occurs because spillway [illegible] to carry PMF.

$Y_0 = 15.5'$

$$Q_{pi} = \frac{8}{27}(190)(5.677)(59.6)$$

$$Q_{pi} = 19{,}041 \text{ CFS}$$

The first downstream hazard is a bridge on Washington [illegible] east of Woodland [illegible]

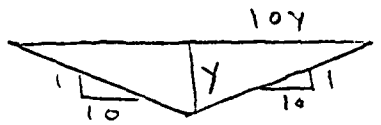
Apply Downstream Failure Hydrograph

Reach [illegible] 1,000 [illegible]

Neglect outflow from dam since the flow will only be 1000 ± cfs which is 5% of failure flow

Include MPF from 4.5 sm of adjacent tributary D.A (Q = 8300 CFS)

Cross-Section Of Reach Above Bridge In Narrow Part of Valley



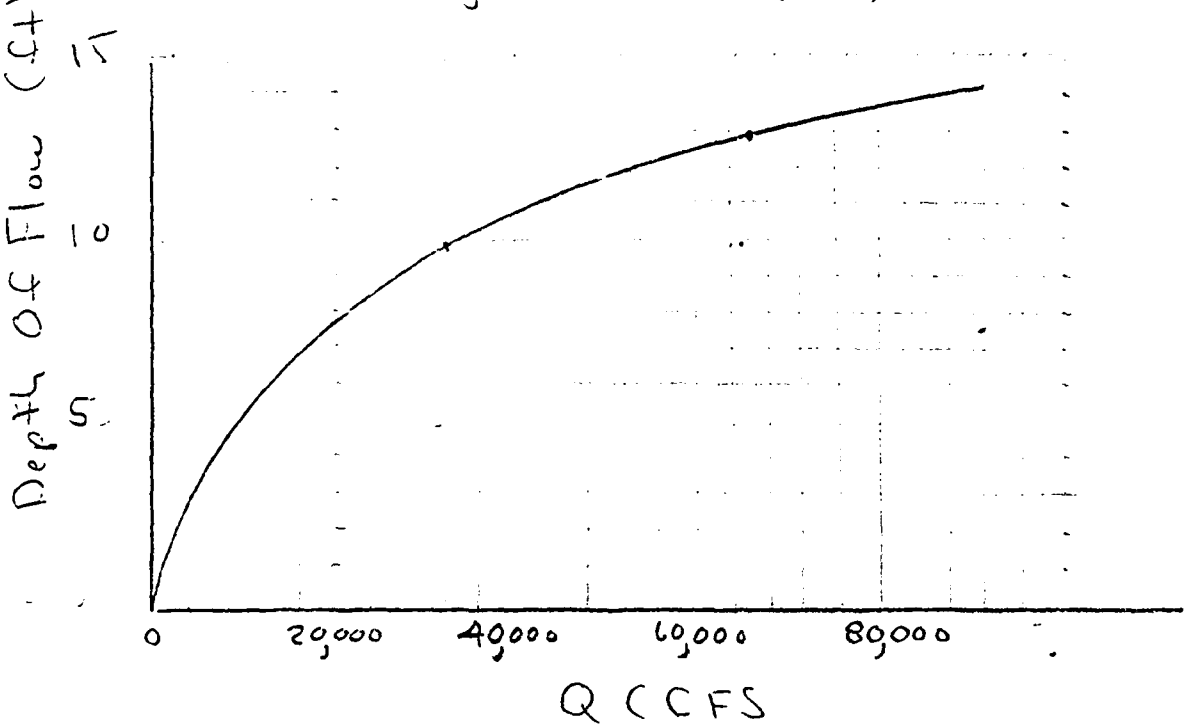
$A = 10y^2$

$R = 0.498y$

$WP = 2\sqrt{101 \cdot y^2} = 20.08y$

$S = 0.05$ or 5%

Chan. Vol. = 15,000 ft × (10y)



Computation of points for curve on reach 1

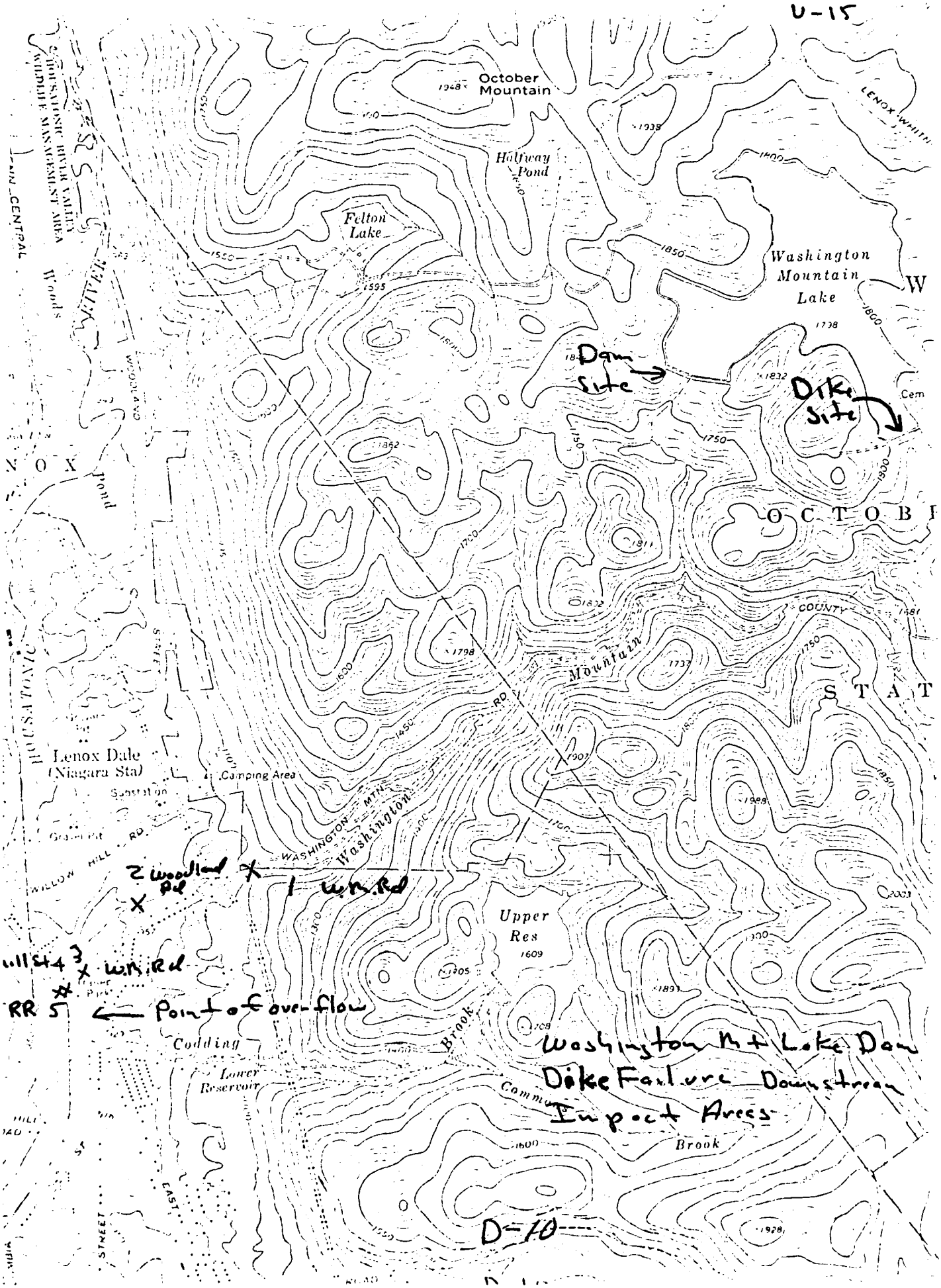
$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = 11.08 A R^{2/3}$$

Try $Y = 10'$ $A = 1000$ SF

$R = 4.98$ $WP = 201$ F

$Q = 32,485$ CFS


U-15
October Mountain
Halfway Pond
Felton Lake
Washington Mountain Lake
Dam Site
Dike Site
Lenox Dale (Niagara Sta)
Camping Area
Washington Mtn Rd
Upper Res
Lower Reservoir
Codding
Brook
Point of Over-flow
Washington Mt Lake Dam
Dike Failure Downstream
Impact Areas
D-10

Try Y = 13'

Q 1109 (1600) (3.49) = 65,050.9 CFS

Estimate Reach Outflow

For Q_{pi} (27,341 CFS) Y = 9'

V = (16000)(9)(90) ÷ 43,560
= 298 AF

S = 3985 AF Dike Storage to crest

Q_{p} (Final) = $Q_{pi}\left(1 - \frac{V_1}{S}\right)$

$= (27,341)\left(1 - \frac{298}{3985}\right) =$

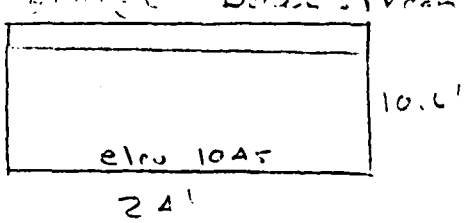
= 25,296 CFS , Y = 8.5'

V = (16,000)(8.5)(85) - 43500 = 265 AF

Q_{pi} $(27,341)\left(1 - \frac{282}{3985}\right)$ = Vave = $\frac{265 + 298}{2}$

Q_{p} 25,406 CFS Y = 9'

- First Bridge Downstream On Washington Rd
Rd Fast ...
Doubt ...



$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

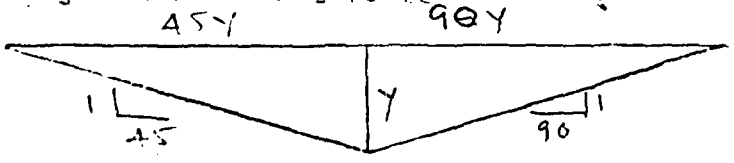
n = 0.03 A = 254.4 SF
S = 0.03 R = 5.63
Q = 6,[illegible]

D11

Full capacity of bridge [illegible]
[illegible] Opel
[illegible] will be over-topped and
flow will overtop the road on
the southerly approach to the
bridge.

Estimate Reach Outflow For
the Second Crossing

Channel dimension above second crossing



n = 0.03
S = 0.03

A = 67.5y²
WP = 135Y
R = 0.5Y

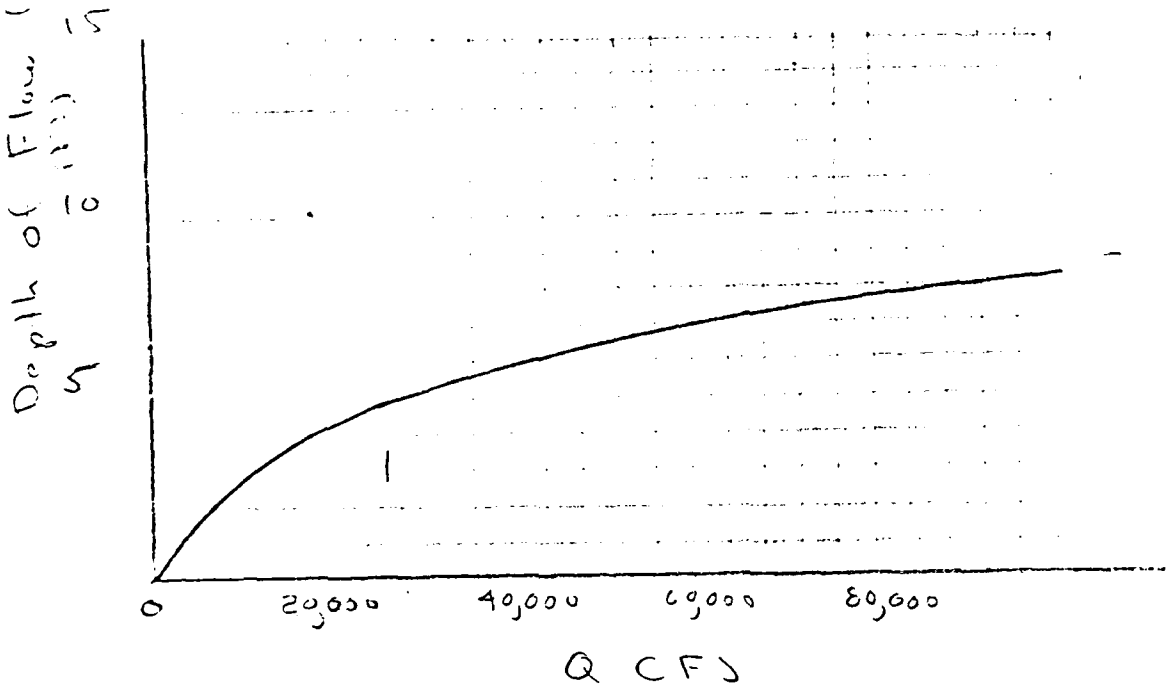
D12

Computation Checked By Moe

Second Reach Below [illegible]
[illegible] Bridge and Aboutwoodland Rd

L = 2000 ft

V = (2000)(67.5 Y) = Volume



Computation of points on curve for reach 2

$$Q = \frac{1.486}{0.03}(A)(R^{2/3})(0.03)^{1/2}$$

Try Y = 5.

$$Q = \frac{1.486}{0.03}(67.5 \times 25)(0.5 \times 5)^{2/3}(0.03)^{1/2}$$

49.5

$$= 26{,}670 \quad \text{CFS}$$

Try Y = 8'

$$Q = 49.5(67.5 \times 64)(4)^{2/3}(0.03)^{1/2}$$

$$Q = 92{,}815.5 \text{ CFS}$$

[illegible] Computed by [illegible]

[illegible] Computation [illegible] Checked By: Moe 11-[illegible]

For Q_{p1}, $y = 4.75'$

$V = (2000 + 67.5y^2) \div 43560$ SF/A = 69.9 AF

$Q_{p(final)} = 25{,}406 \text{ CFS}\left(1 - \frac{69.9}{3985}\right) =$

$= 24{,}960$ CFS $y = 4.6'$

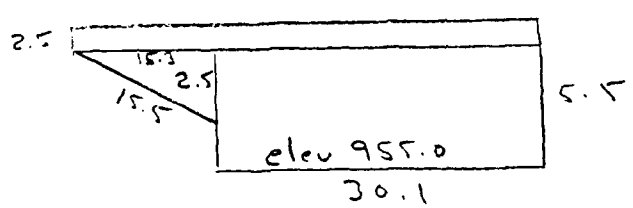
$V = 65.5$ AF $V_{ave} = \frac{69.9 + 65.5}{2}$

$Q_{p2} = (25{,}406)\left(1 - \frac{67.7}{3985}\right) =$

$= 24{,}974$ CFS

$y = 4.6'$

Flow Thru Second Bridge Crossing



5.5
30.1
5.5
2.5
15.5
59.1

$n = 0.03$ A = 184.7 SF

$S = 0.03$ WP = 59.1 Ft

R = 3.12

Q = 3369.1 CFS (bridge capacity)

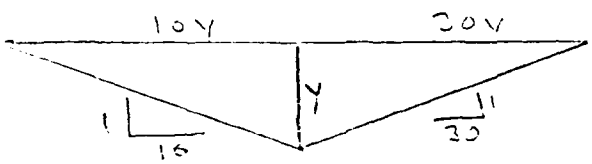
The second crossing can not handle the flow from dam failure. Therefore the bridge will be overtopped and the flow will overtop the southbound [illegible] of the bridge.

[illegible] Computations Checked by MOV 12-[illegible]

[illegible] next reach includes two bridges and a railroad crossing. Since the railroad crossing has the narrowest channel of the three crossings, that crossing will govern the [illegible] of the stream above.

Reach = 2000 ft

Cross section of Reach Above Rail Bridge



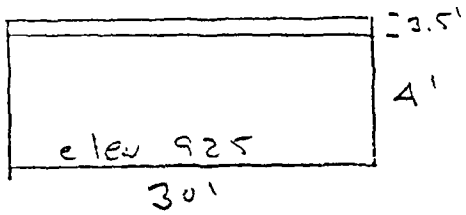
$WP = \sqrt{101y^2} + \sqrt{901y^2}$

$WP = 40.1\,y$

$R = 0.498\,y$

$A = \left(\frac{1}{2}\right) 10y^2 + \frac{1}{2}\, 30y^2 = 20y^2$

The Third Downstream Crossing
On Washington Mill Pond near
Mill St



4'
4'
30'
38'

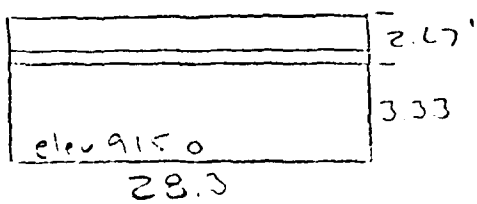
A = 120 SF n = 0.03
W.P. = 38 Ft S = 0.013
R = 3.15

$$Q = \frac{1.486}{0.03}(120)(3.15)^{2/3}(0.013)^{1/2}$$

Q = 1472 CFS

The Fourth Crossing
On Mill St

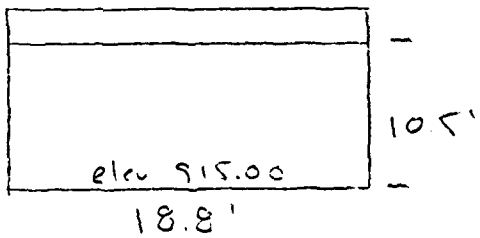
8' pipe



3.33
3.33
28.30
34.96

A = 93.4 SF n = 0.03
W.P. = 34.96 Ft S = 0.013
R = 2.67
Q = 1015.5 CFS

The Fifth Crossing.
R-R Bridge Between Housatonic River and Mill St



10.5
10.5
18.8
39.8

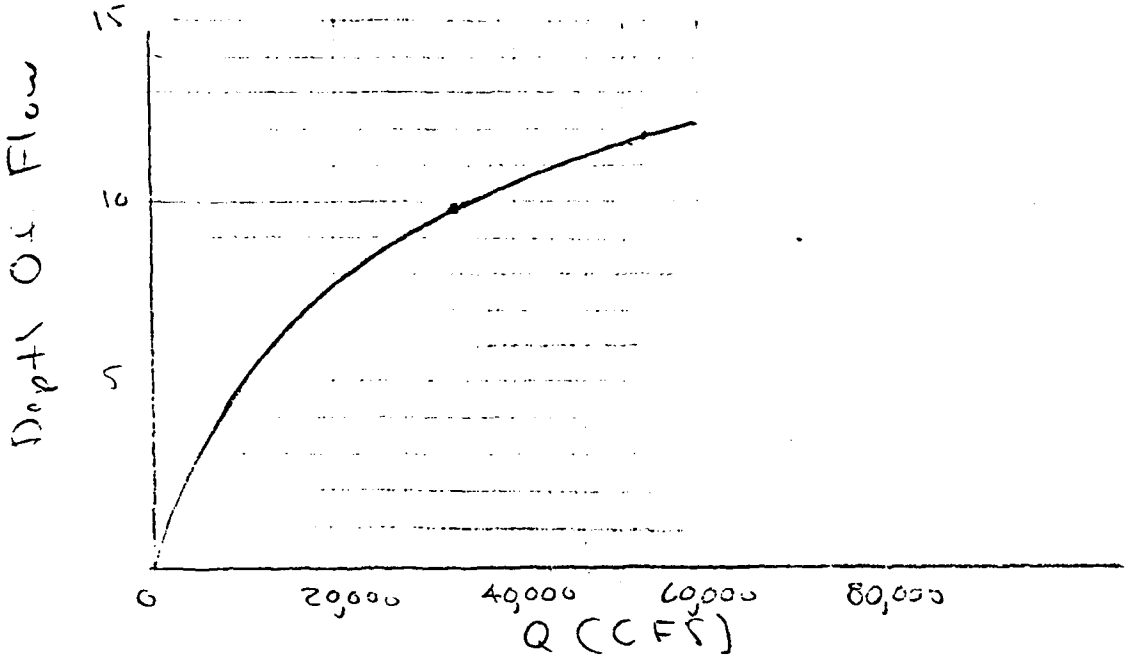
$n = 0.03$ $A = 197.4$ SF

$S = 0.013$ $WP = 39.8$

$R = 4.96$

$$Q = \frac{1.486}{0.03}(197.4)(4.96)^{2/3}(0.013)^{1/2}$$

$Q = 3244$ CFS



Computation of Points On Curve For Reach 3

$Q = 5.65\ A\ R^{2/3}$

Try $y = 10$

$Q = (5.65)(2000)(4.98)^{2/3}$

$= 33,130$ CFS

Try $y = 12'$

$Q = (5.65)(2880)(0.498 \times 12)^{2/3}$

$Q = 53,418$ CFS

NOT AVAILABLE AT THIS TIME

END

FILMED

7-85

DTIC