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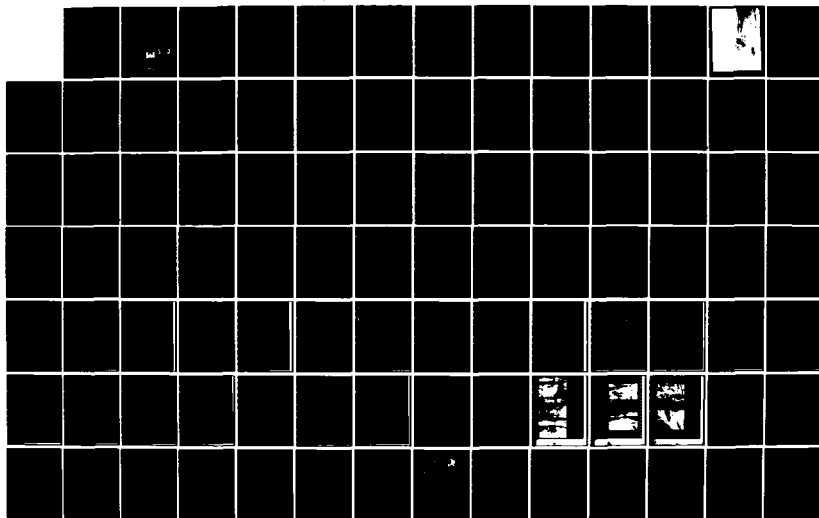
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
WASHINGTON MOUNTAIN L. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV DEC 79

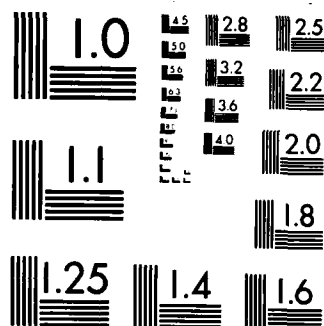
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AD-A154 531

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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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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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 with 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.		



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



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.

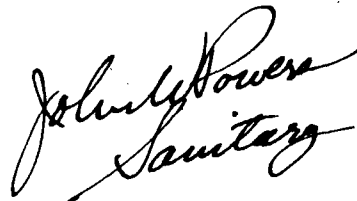
The dike has not impounded a normal pool of water to date due to the existence of an underground telephone cable in the pool area which is scheduled to be relocated in the near future. Some flood runoff is impounded periodically but eventually released through the pond drain sluice gate at the dam which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

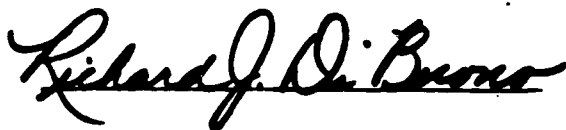
foundation drain system, clean out the sand and gravel from the culvert under Navin Road, repair top surface of the dike to prevent further erosion from vehicle traffic and develop a formal written emergency flood warning system.

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.

A handwritten signature in cursive script, reading "John W. Powers" on the top line and "Sanitary" on the bottom line.

John W. Powers
Massachusetts Registration 23106

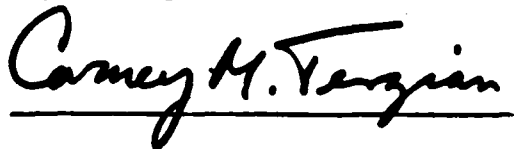
This Phase I Inspection Report on Washington Mountain Lake Dike has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment 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 not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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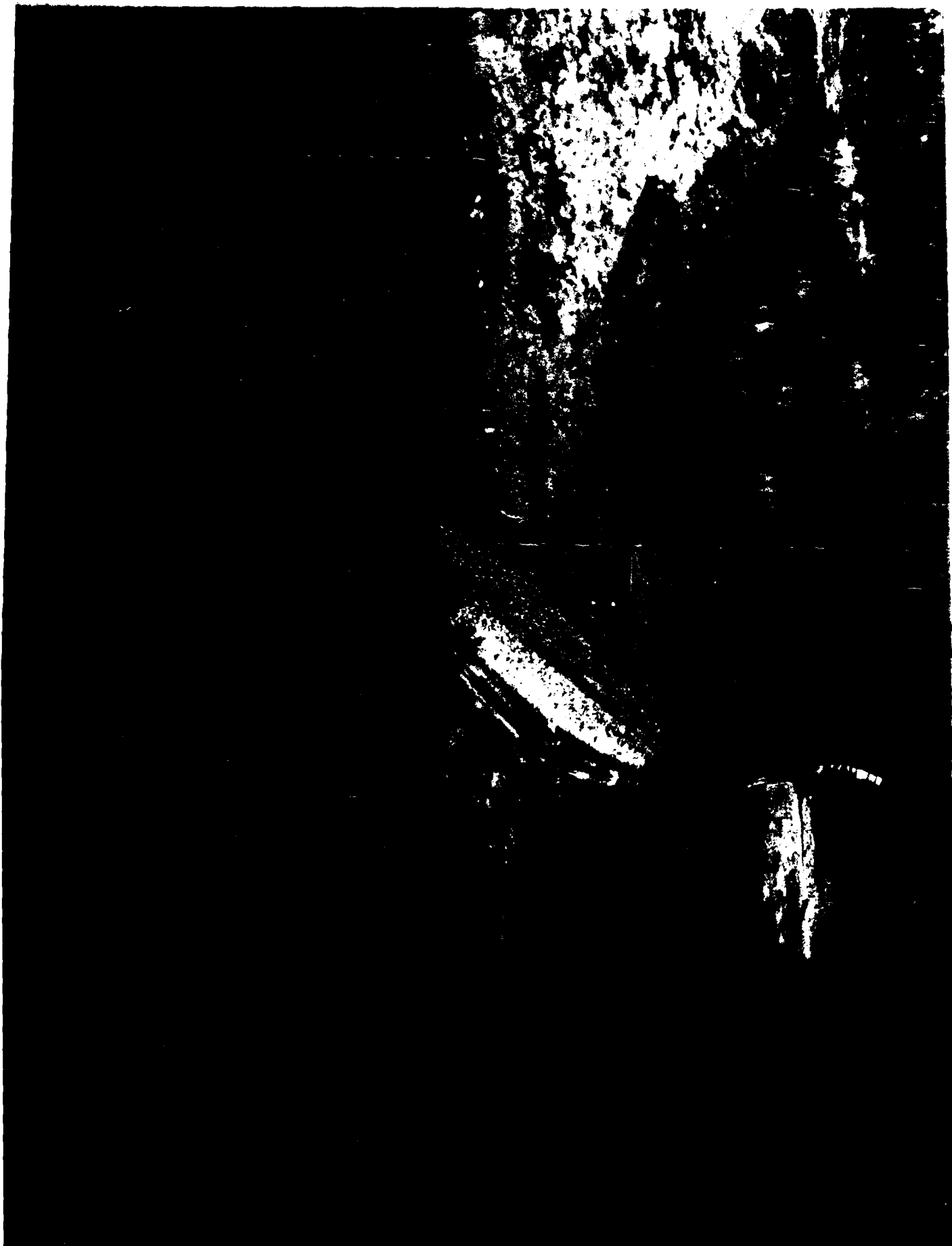
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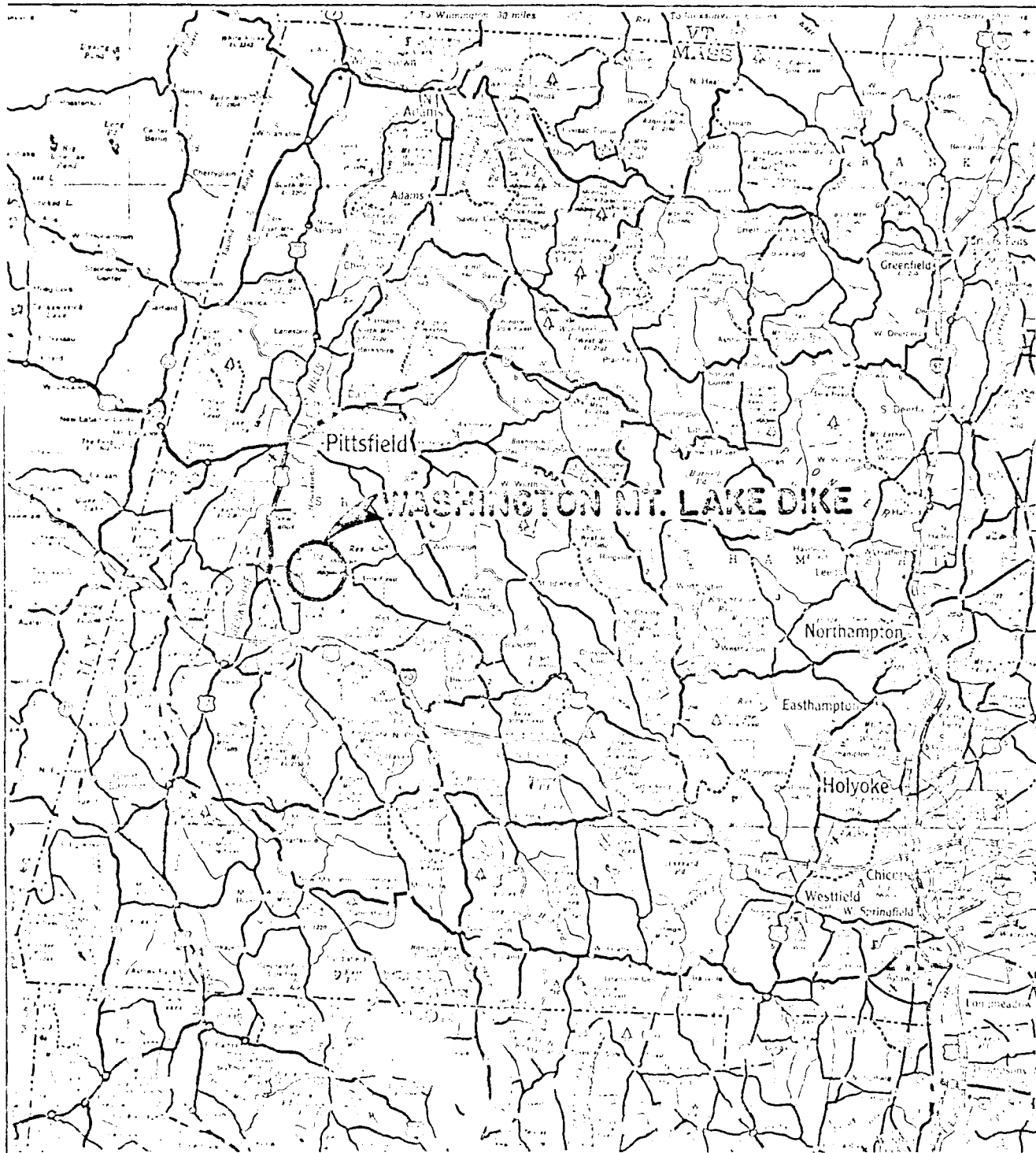
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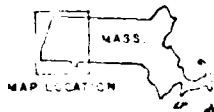
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SCALE IN MILES



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 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 csm 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 1974.

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 and 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 regulation 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 evaluation 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 Prevention 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 Drainage (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.

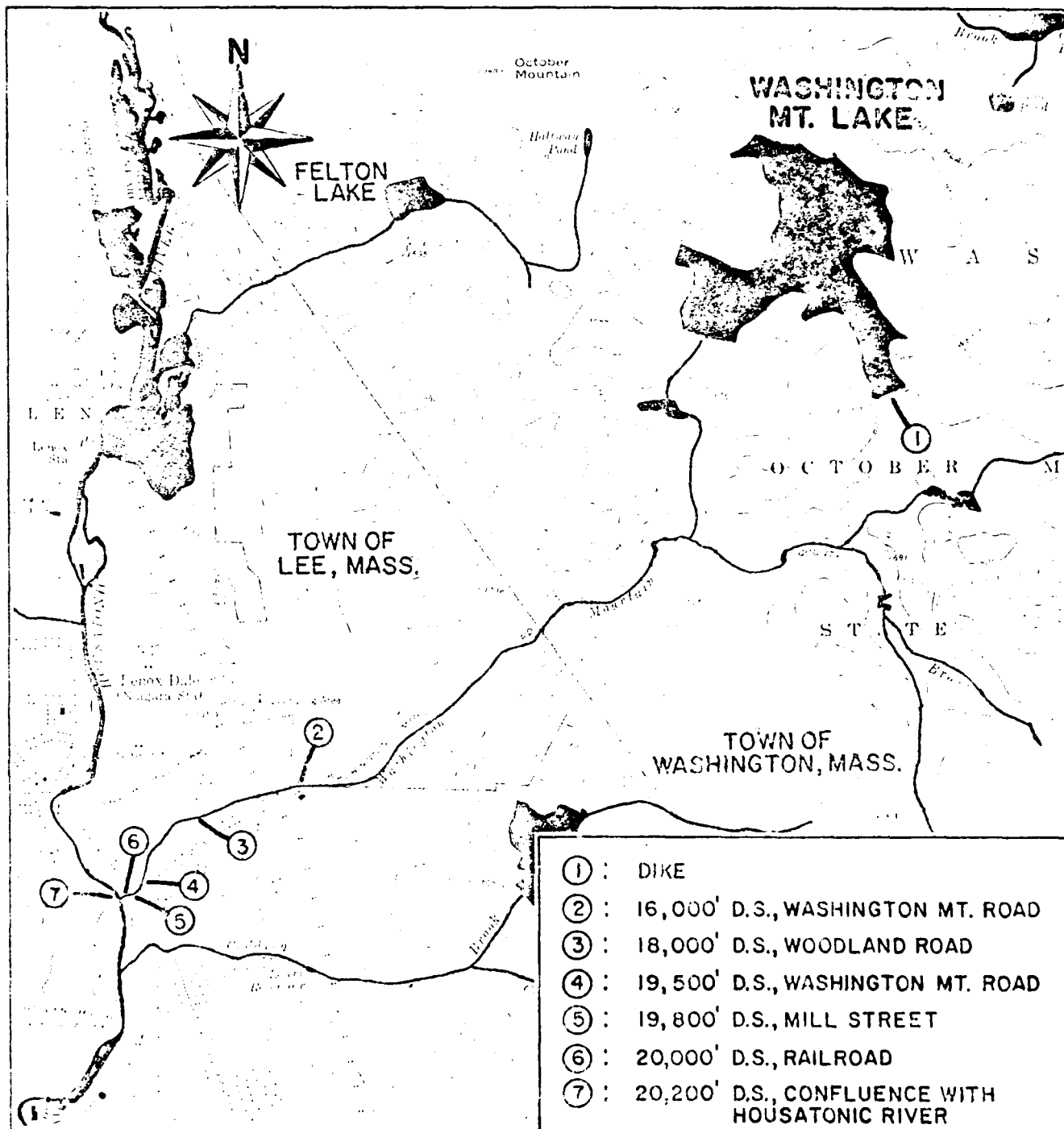
The next reach is about 2000 feet long and the area to be impacted by the flood includes four houses, a house trailer, two road bridges and a railroad bridge. The attenuated failure flow of 34,300 cfs would cause a stage of 9.5 feet in this reach. In addition, because the railroad bridge cannot carry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

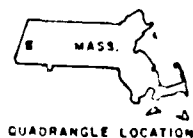
The next area impacted would be an area along Mill Street to the south where the flood water would overflow. This area contains two houses that would experience high velocity, shallow flooding as the water flows to the Housatonic River. There is a potential for loss of life and extensive property damage.

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.



-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) (After Failure)	Brook Stage (Ft.) (Before Failure) (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 in-undated.
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 in-undated.
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 Inspector Report.

7.2 Recommendations

The recommendations of this Phase 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

TIDE 11:00 A.M.

WEATHER Cloudy and Cool

W.S. ELEV. 1771 U.S. 1760 EN.S.

PARTY:

- | | |
|---|-----------|
| 1. <u>J.W. Powers, P.E., Proj. Manager</u> | 6. _____ |
| 2. <u>G.H. McDonnell, P.E., Hydrology/
Hydraulics</u> | 7. _____ |
| 3. <u>D.M. Lenart, P.E., Civil</u> | 8. _____ |
| 4. <u>E.A. Moe, P.E., Soils/Hydraulics</u> | 9. _____ |
| 5. <u>H.A. Koski, Civil</u> | 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
<u>DAM EMBANKMENT</u>	
Crest Elevation	1804 MSL
Current Pool Elevation	Brook (no impoundment)
Maximum Impoundment to Date	1793 [±]
Surface Cracks	None
Favement 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	Brush growing in toe channel and between some rocks
Vegetation on Slopes	
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 DikeDATE 11/2/79PROJECT FEATURE All features

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u> a. Approach Channel General Condition Loose Rock Overhanging Channel 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	N/A

INSPECTION CHECK LIST

PROJECT Washington Mountain Lake DikeDATE 11/2/79PROJECT 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 DikeDATE 11/2/79PROJECT FEATURE All features

NAME _____

DISCOMPLEE _____

NAME _____

AREA EVALUATED

CONDITION

CURTAIN 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 DikeDATE 11/2/79PROJECT FEATURE All features

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - CONTROL TOWER</u>	
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	
Warning and Lighting System in Gate Chamber	

INSPECTION CHECK LIST

PROJECT Washington Mt. Lake DikeDATE 11/2/79PROJECT FEATURE All features

NAME _____

PRINCIPLE _____

NAME _____

AREA EVALUATED	CONDITION
<u>WATER WORKS - APPROACH CHANNEL AND INTAKE STRUCTURE</u>	
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	

Recd of Mr. J. B. ...
 Sept 11/75
 6/12/75

Thank you for ...
 7/13/75

11/12/75

Examiners

- 1 ✓ Thompson (B. ...)
- 2 ✓ ... (Chairman)
- 3 ✓ ... (Chairman)
- 4 ✓ ... (Chairman)

Examiners

- 8 ✓ ... (original) ...
- 9 ✓ ...
- 10 ✓ ... (Chairman)
- 11 ✓ ... (Chairman)

- 12 ✓ ... (Chairman)
- 13 ✓ ...
- 14 ✓ ...

...
 ...
 ...

- 15 ✓ ...
- 16 ✓ ...
- 17 ✓ ...
- 18 ✓ ...

...

Recommendations:

Undisturbed 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 resodded. Also, the erosion taking place at the left end of the millway should be corrected. Seeding six acres should be equivalent to that originally specified.

Submitted by:

E. H. Thompson

E. H. Thompson,
District Conservationist
USF, Pittsfield, Mass.

cc:

cc: Curtis Eklund, Otis

June 12, 1975

REPORT OF ANNUAL INSPECTION
WASHINGTON MOUNTAIN BROOK WATERSHED

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

Jim Hannon	Soil Conservation Service-Otis
Robert Trunzio	Water Resources Commission-Boston
Carl Curtin	Department of Natural Resources-Pitts.
Tom Isenel	Department of Natural Resources-Pitts.
Rick DeVerdillo	Soil Conservation Service-Pittsfield

THE DAM

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

Hydrologic 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 reseeded of the top of the dam is needed.

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

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

More erosion is taking place just west of outlet.

Vehicular traffic is causing some erosion upon side slope of spill area.

Submitted by:

Richard J. Hannon
Soil Conservation Service
OTIS, PITTSFIELD, MA

rmk

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
Douglas Poland
Carl Curtin
Rick DeVergilio
James J. Blasmar

Water Resources Commission-Boston
Department of Natural Resources-Pittsfield
Department of Natural Resources-Pittsfield
Soil Conservation Service-Pittsfield
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 Davis Road leading away from tee drain.
7. Replace barricade cable at Jam.

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 Agonomic conditions will be submitted by Ronald Thompson.

Submitted by:

James J. Blasmar
James J. Blasmar
Project Engineer
Otis, Pa.

Or in draft

list of Washington Mt Lake & Shore

Washington Mt Lake

1. T. Lee (Chairman, Board of
Selections)
2. Berkshire Co. Const. (Chairman)
c/o Pittsfield R.R.
3. C. Kennedy, Secy of Water Res. Com.
4. Commissioner Mass Dept of
Enl. Mt 7 (Bette
Wiley)
5. ~~State~~ District Government (Thompson)
(Pittsfield field office)
6. Prof. Eng. - A. T. - E. L. -
7. A. V. - "original"
8. (Curry) State Cons. Eng. / Eng. file
9. Attorneys
10. Route copy to Miller / Christensen / Mountain
Engines
11. Prof. Forests & Parks. James Lambert E. B. B. B.
(and some other letters (Bette Wiley))

WASH-100-100
5/17/76

VEGETATION AND MAINTENANCE
INSPECTION RECORD

U.S. Dept. of Agriculture
Soil Conservation Service

Project WASHINGTON MOUNTAIN BROOK Inspection Date 5/27/76

Site Name/No. 3 (WASHINGTON MT. LAKE) Type MULTI-PURPOSE

Type of Inspection: Special ☐ Annual ☒ Structure Operation: Satisfactory ☐ Unsatisfactory ☐

Sponsoring Local Organization: _____

Present for Inspection: Edward A. Cahalan CARL L. CURTIS

Ernest Thompson W. Ronald Thompson James E. Thompson

ITEM	Condi- tion * S or U	Maintenance & Needed Repairs	Esti- mated Costs	Agreed Rep. Repairs to be Completed
1. Vegetation	U	REWORK VETCH FERTILIZE 400# - 0-20-20 S. AND ADJOINING AREA. FERTILIZE 40# - 10-10-10	200.00	5-27-1976
2. Fences	S			
3. Principal Spillway	S			
4. Emergency Spillway	S	REMOVE BRUSH & FALLEN TREE	100.00	5-27-1976
5. Embankment & Riprap	S			
6. Reservoir Area	S	AREA BEING CLEARED		
7. Gates or Valves	S			
8. Outlet Channels	S			
9. Structure Foundation Culverts	S	REMOVE LOGS & brush INSTALL ROENT GUARD - DEBRIS PIPE	100.00	5-27-1976
10. Access Rd.	S	REGRADE AND USE GRAVEL WHERE NECESSARY		5-27-1976
SPILL AREA	S	CRUSHED STONE IN THREE AREAS (1000)	150.00	5-27-1976

Remarks: (over) S = Satisfactory; U = Unsatisfactory

When clearing contract complete, record topog. data and replace gate.

Paul R. Thompson James E. Thompson Ernest Thompson
(District Conservation Engineer) (Project Engineer) (Site Representative)
(District Supervisor) (District Supervisor)

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 506)

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

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

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

Chairman, Board of Selectmen
Town Hall
Lee, Mass. 01236

Chairman, Berkshire Cons. District
c/o Pittsfield SOE

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
for the sites listed below: (watershed)

<u>Site</u>	<u>Date Inspection Performed</u>
Washington Mountain Lake	5/27/76

Sincerely,

C. E. Thompson
Dr. Benjamin Isaac, *1/1/76*
State Conservationist

Enclosure/



U.S. Dept. of Agriculture
Soil Conservation Service

Present for Inspection: (1) Ernest Stueben, Plans & Engineering

Janet Emerson

(S = Satisfactory; U = Unsatisfactory)

1. Paul H. Longman June 17, 1968
 (1968-1969) (1968-1969) (1968-1969)
 (1968-1969) (1968-1969) (1968-1969)

Emil Stangor
(910) 799-1111

NO. SERIAL
37-1/76

CE STATION AND MAINTENANCE
INSPECTION REPORT

S. Dep. of Agriculture
Soil Conservation Service

Project Washington Mountain Brook Inspection Date 8/17/1978

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

Type of Inspection: Special ☐ Structure Operation: Satisfactory ☒

Annual ☒ Unsatisfactory ☐

Sponsoring Local Organization: Berkshire Conservation Dist. WRC

Present for Inspection: Edward C. Collier, Sup. of Watersheds, USFS, 10000
Hwy. 24, Concord, N.H. W.M. Buckley, G. B. Sullivan, T. Donahue, 10000
Rte. 11, Thompson's DC, Rte. 11, JAMES ELASHAR, SEC

ITEM	Condi- tion S or U	Maintenance & Needed Repairs	Esti- mated Costs	Agreed Date Repairs to be Complete
1. Vegetation	S	LIME, FERTURE TOP DAN, 3 TON/acre 10-10-10.	2,500-	SEPT 30, 78
2. Fences	S			
3. Principal Spillway	S			
4. Emergency Spillway	S			
5. Embankment + Riprap	S	PILE, PULL HARDY OLD VEGETATION ON SLOPES, OR CUT + TREAT W/ 2-4-0 HERBICIDE. CUT + TREAT W/ 2-4-0 HERBICIDE SLOPES OF DAM	2,000 -	OCT 30, 1978
6. Reservoir Area	S			
7. Gates or Valves	S			
8. Outlet Channels	S	REMOVE GROWTH CHANNEL + SLOPES	500 -	OCT 30, 1978
9. Structure Drainage Outlet	S	INSTALL ANTIWIND BOARD AT DRAIN PIPE (SEEP HOLE TO BE PLUGGED)	200 -	OCT 30, 1978
10. Access Rd.	S	Needs grading	650 -	OCT 30, 1978
11. Spill Area	S			

By (Inspector) S = Satisfactory; U = Unsatisfactory

James Elashar
(Inspector, Conservation District, Project Engineer)
(Project due, any other date)

Thomas P. Donahue
(Site Representative)

OHIO FOREST SERVICE
P. MASSACHUSETTS

OPERATION AND MAINTENANCE
INVESTIGATION RECORD

U-15/U-16
(Pres. File)
Revised 9/79
File Code 52-11-15

Location: WASHINGTON MOUNTAIN BROOK W/S Inspection Date: 10/15/79

Name/No. WASH MTH 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 CAHALAN & D.C. CURTIN; DENNIS - Ed. STEUBER; R. CURTAN; GARY PETER - S.C.S.; W.M. MURPHY; LEE, J. EGAN - EAGLE; P. SCOTTK; DR. LEE; MARIA B. TEGA - Chm. Bd. Secretary

ITEM	Condi- tion * (S or U)	Maintenance & Needed Repairs	Esti- mated 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 1980
6. Reservoir Area	S			
7. Gates and "lives"	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

[Signature] (OHIO FOREST SERVICE)
[Signature] (OHIO FOREST SERVICE)
[Signature] (OHIO FOREST SERVICE)

<u>3. Drawings</u>	<u>Title</u>	<u>Page No.</u>
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

<u>Date</u>		<u>Page No.</u>
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 DikeDATE 11/2/79PROJECT FEATURE All features

NAME _____

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>QUIET WORKS - SERVICE BRIDGE</u>	
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 Cadenelli
Kevin Maguire
William Annable
James J. Elasmar

Department of Natural Resources
Water Resources Commission-Boston
Soil Conservation Service-Ashcroft
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

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.

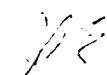
Hydrologic Conditions and Recommendation... (6/14/74)

The top of the dam is being used as a road which has resulted in the loss of vegetation. The spillway needs to be moved and one fallen tree removed. The entire needed 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

F. Thompson
District Conservationist
SCS, Pittsfield, Mass.

WASHINGTON MOUNTAIN BROOK WATERSHED PROJECT

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

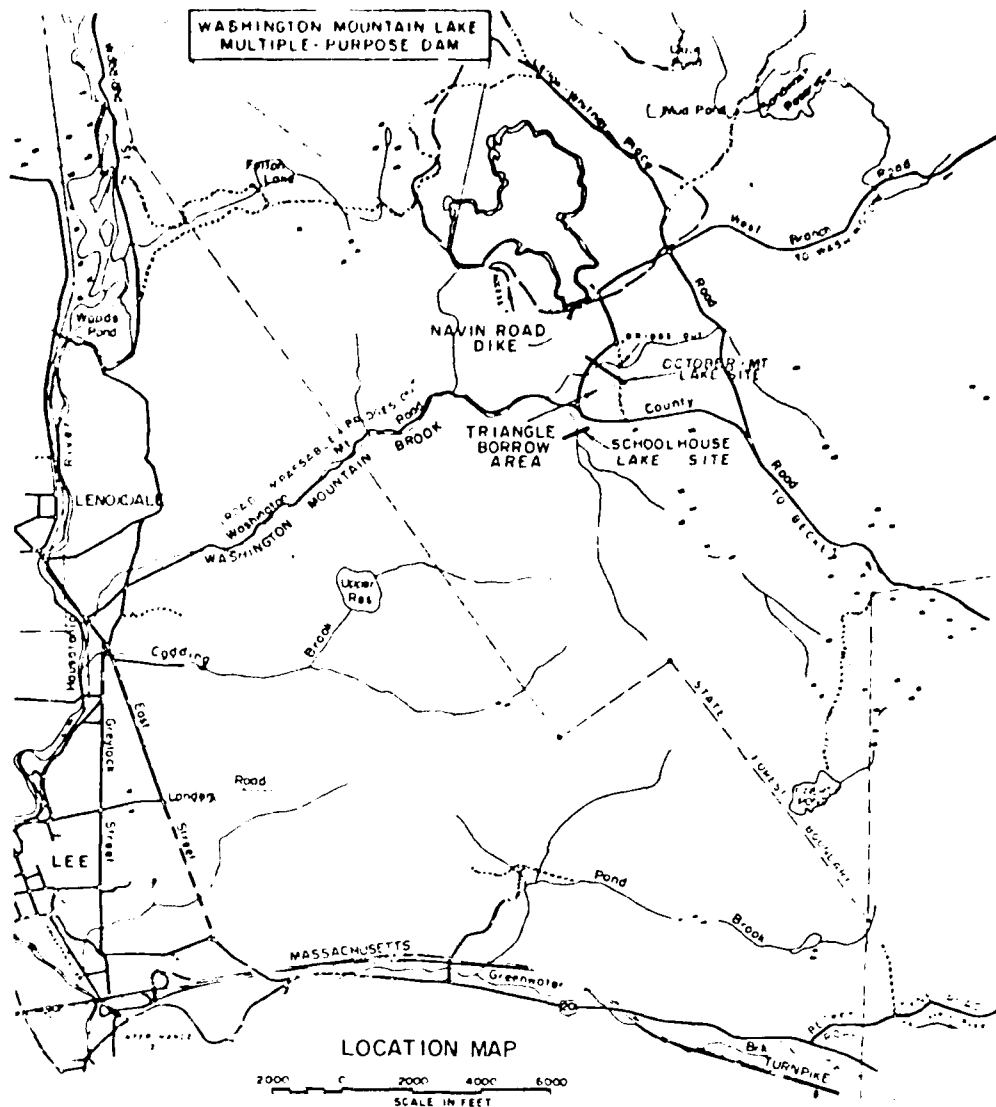
INDEX

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

OBJECT

AM

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



Washington
 Mountain
 Brook
 Watershed

MASSACHUSETTS

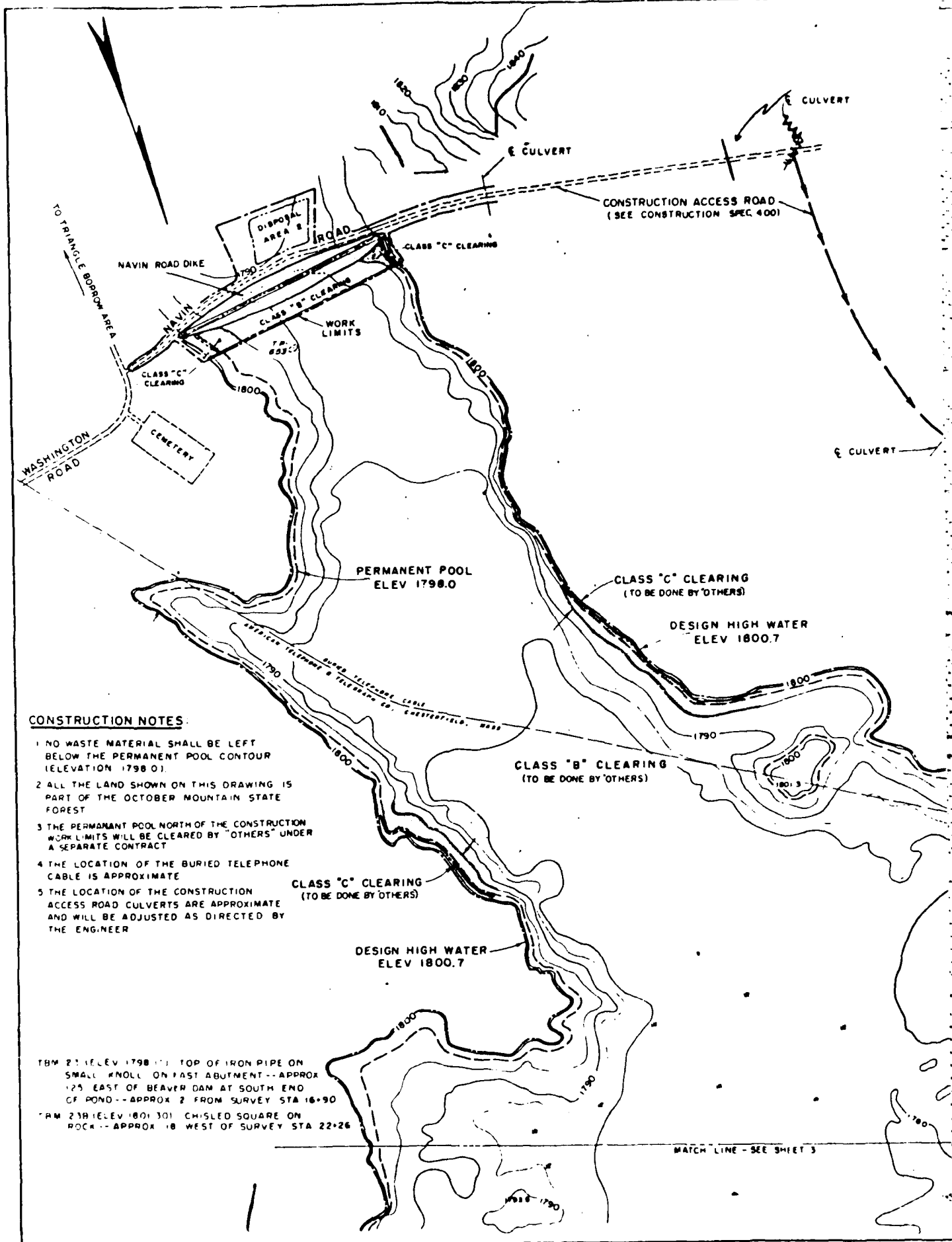


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 8. N. DETAILS
 9. N. DETAILS
 10. N. DETAILS

2

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: 7-72 Designed: J. A. TIBBETTS Drawn: F. J. WILDA Traced: J. ELASHMAR Checked: C. M. DODGE	
Prepared: John F. Palmer Checked: Samuel J. NeasMAC Reviewed: [Signature]		Date: 11/11/71 2/15/74 6-17-72 Drawing No. MA 361-P	

Design B-12



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 PERMANENT 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 21 (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

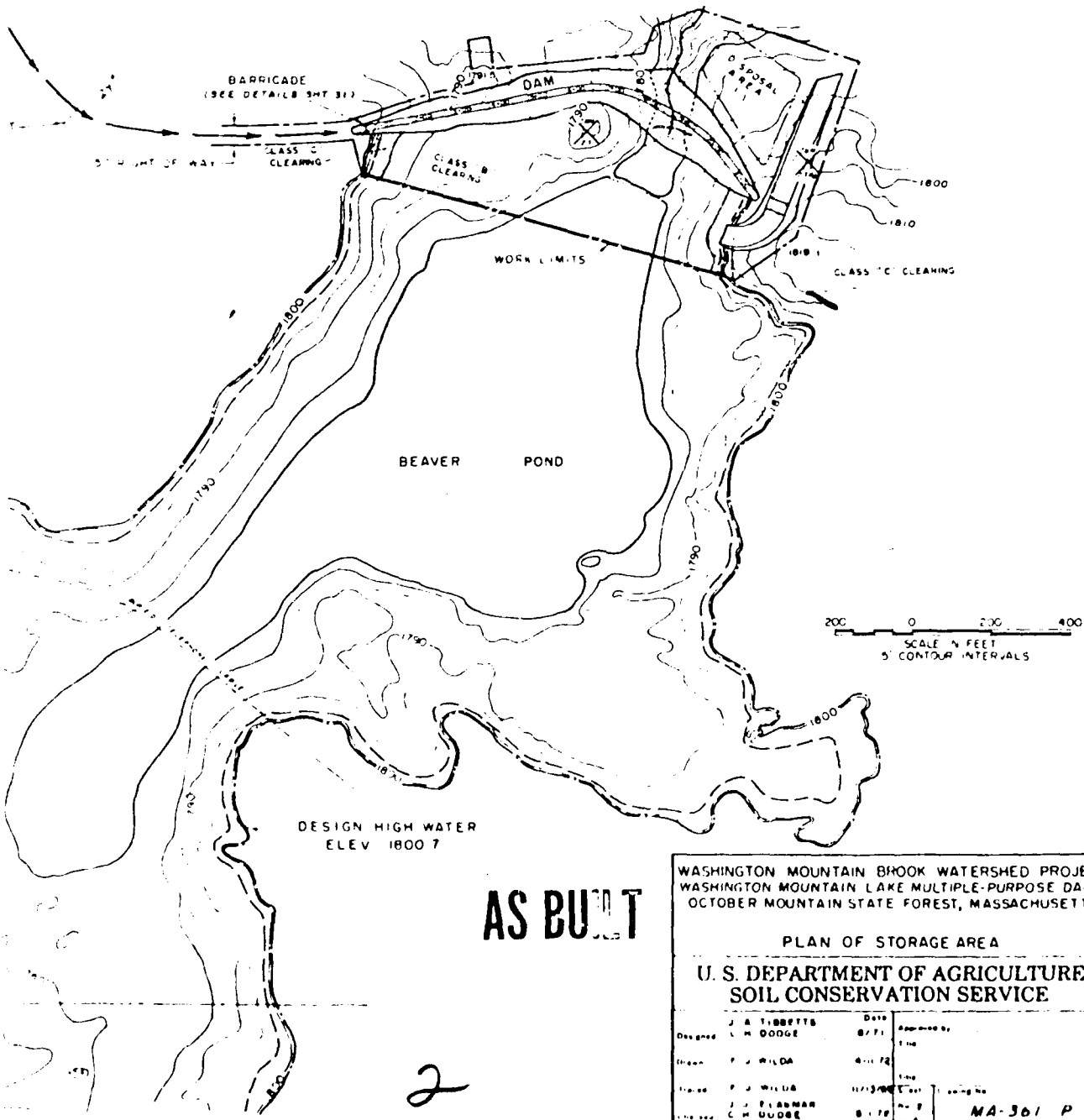
TBM 21B (ELEV 1801.30) CHISELED SQUARE ON ROCK--APPROX 18' WEST OF SURVEY STA 22+26

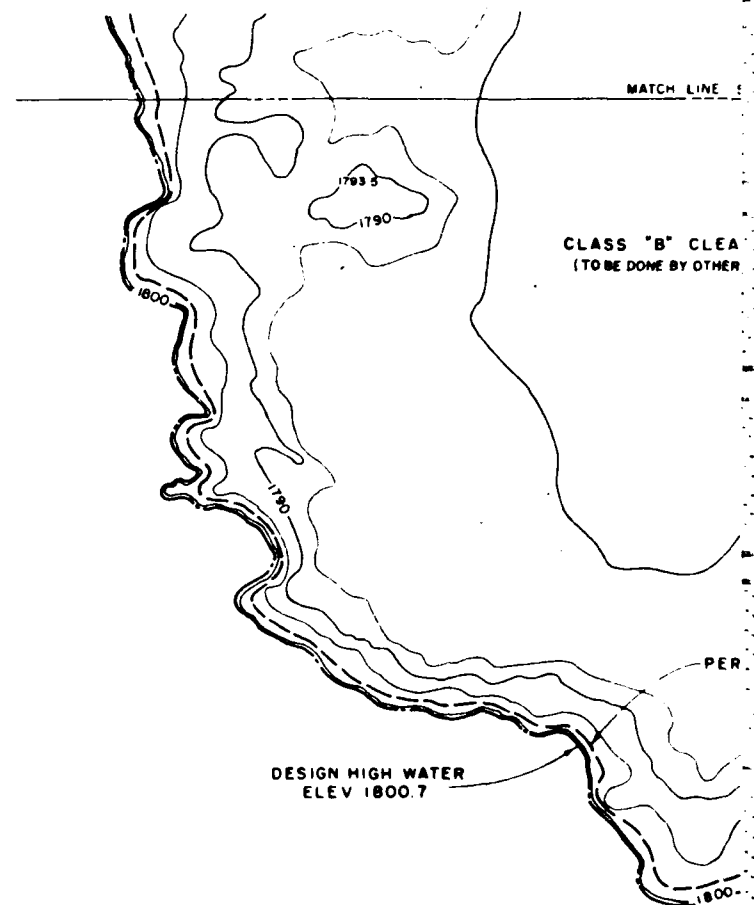
CLEARING REQUIREMENTS	
CLEARING CLASS 'C'	ALONG THE EDGE OF THE PERMANENT POOL FROM THE 1795.0 CONTOUR TO 10' HORIZONTALLY BEYOND THE 1795.0 CONTOUR, IN AREAS INDICATED
CLEARING CLASS 'B'	WITHIN THE DISPOSAL AREAS AND WITHIN THE PERMANENT POOL BELOW ELEVATION 1795.0, IN AREAS INDICATED
CLEARING CLASS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

- SEE SHEETS 1 and 2 FOR CLEARING LIMITS
SEE SHEETS 1, 2, and 3 FOR CLEARING & GRUBBING LIMITS

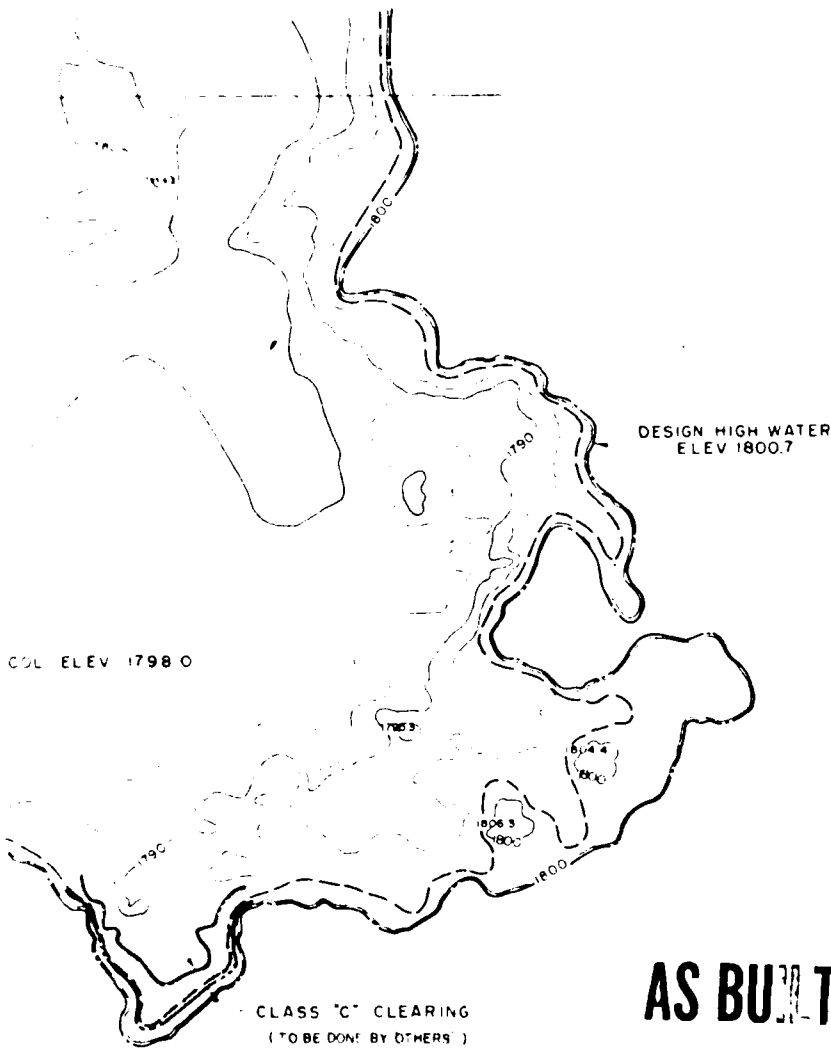
LEGEND

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









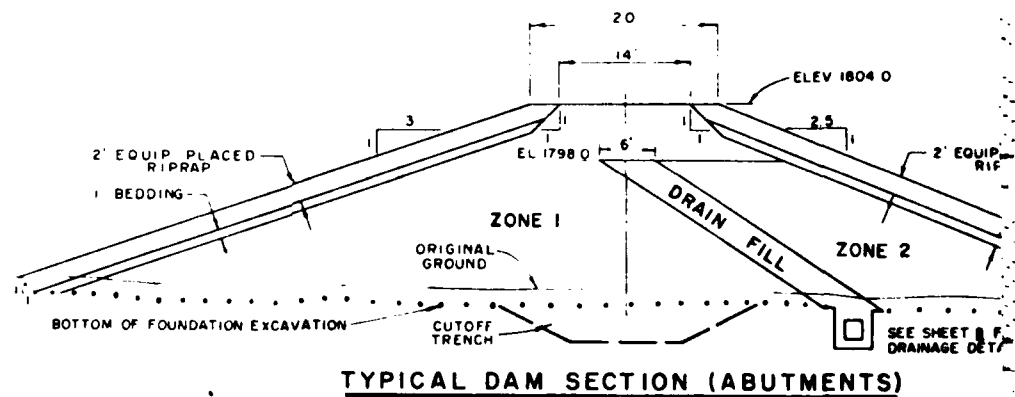
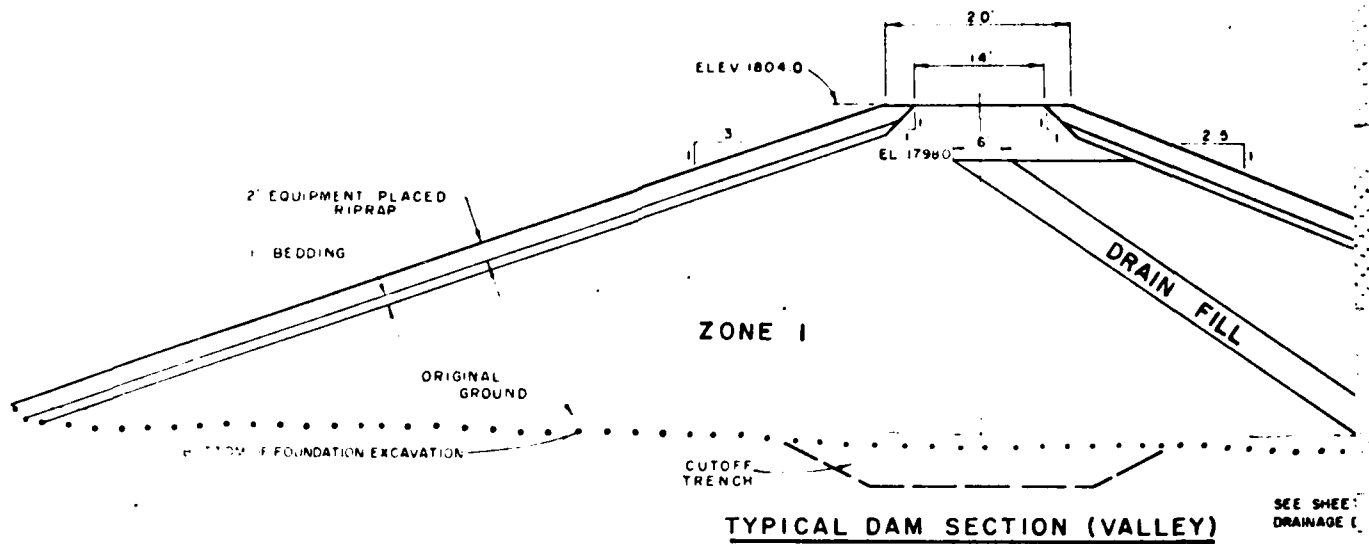
200 0 200 400
SCALE IN FEET
5 CONTOUR INTERVALS

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

Designed	J. A. TIBBETTS	Date	8/71	Approved by	
Drawn	C. M. DORR	Date	8/19/71	Title	
Traced	F. J. WILDA	Date	11/10/71	Sheet	
Checked	J. J. ELAMAR	Date	4/19/72	Drawing No.	MA-361 P

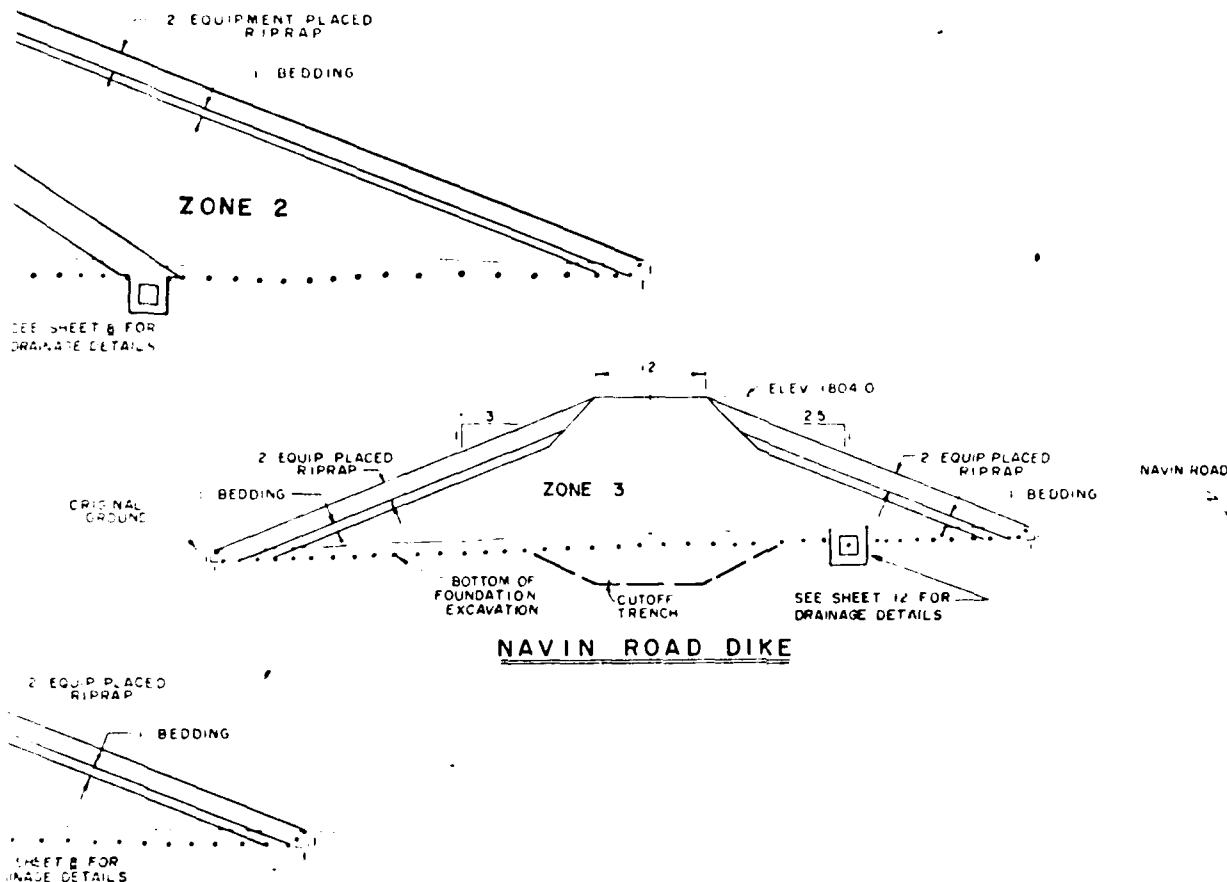


EARTH FILL REQUIREMENTS

ZONE	MATERIAL	MAXIMUM ROCK SIZE	MAXIMUM LIFT 1	MINIMUM 2 WATER CONTENT	COMPACTION	
					CLASS	DEFINITION
1	SAND, SILTY WITH GRAVEL, COBBLES AND BOULDERS REPRESENTED BY TR 10 (1-12), TR 16 (1-14), TR 22 (1-16), TR 28 (1-18), TR 34 (1-20), TR 40 (1-22), TR 46 (1-24), TR 52 (1-26), TR 58 (1-28), TR 64 (1-30), TR 70 (1-32), TR 76 (1-34), TR 82 (1-36), TR 88 (1-38), TR 94 (1-40), TR 100 (1-42), TR 106 (1-44), TR 112 (1-46), TR 118 (1-48), TR 124 (1-50), TR 130 (1-52), TR 136 (1-54), TR 142 (1-56), TR 148 (1-58), TR 154 (1-60), TR 160 (1-62), TR 166 (1-64), TR 172 (1-66), TR 178 (1-68), TR 184 (1-70), TR 190 (1-72), TR 196 (1-74), TR 202 (1-76), TR 208 (1-78), TR 214 (1-80), TR 220 (1-82), TR 226 (1-84), TR 232 (1-86), TR 238 (1-88), TR 244 (1-90), TR 250 (1-92), TR 256 (1-94), TR 262 (1-96), TR 268 (1-98), TR 274 (1-100), TR 280 (1-102), TR 286 (1-104), TR 292 (1-106), TR 298 (1-108), TR 304 (1-110), TR 310 (1-112), TR 316 (1-114), TR 322 (1-116), TR 328 (1-118), TR 334 (1-120), TR 340 (1-122), TR 346 (1-124), TR 352 (1-126), TR 358 (1-128), TR 364 (1-130), TR 370 (1-132), TR 376 (1-134), TR 382 (1-136), TR 388 (1-138), TR 394 (1-140), TR 400 (1-142), TR 406 (1-144), TR 412 (1-146), TR 418 (1-148), TR 424 (1-150), TR 430 (1-152), TR 436 (1-154), TR 442 (1-156), TR 448 (1-158), TR 454 (1-160), TR 460 (1-162), TR 466 (1-164), TR 472 (1-166), TR 478 (1-168), TR 484 (1-170), TR 490 (1-172), TR 496 (1-174), TR 502 (1-176), TR 508 (1-178), TR 514 (1-180), TR 520 (1-182), TR 526 (1-184), TR 532 (1-186), TR 538 (1-188), TR 544 (1-190), TR 550 (1-192), TR 556 (1-194), TR 562 (1-196), TR 568 (1-198), TR 574 (1-200), TR 580 (1-202), TR 586 (1-204), TR 592 (1-206), TR 598 (1-208), TR 604 (1-210), TR 610 (1-212), TR 616 (1-214), TR 622 (1-216), TR 628 (1-218), TR 634 (1-220), TR 640 (1-222), TR 646 (1-224), TR 652 (1-226), TR 658 (1-228), TR 664 (1-230), TR 670 (1-232), TR 676 (1-234), TR 682 (1-236), TR 688 (1-238), TR 694 (1-240), TR 700 (1-242), TR 706 (1-244), TR 712 (1-246), TR 718 (1-248), TR 724 (1-250), TR 730 (1-252), TR 736 (1-254), TR 742 (1-256), TR 748 (1-258), TR 754 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TR 5554 (1-1860), TR 5560 (1-1862), TR 5566					

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 $\frac{3}{4}$ " OF THE DEPTH SHOWN.
2. BEDDING SHALL BE WELL GRADED BETWEEN $\frac{3}{16}$ " AND $\frac{3}{8}$ " WITH 30% TO 70% PASSING THE $\frac{3}{4}$ " SIEVE.
3. REPRESENTATIVE ROCK SAMPLES FROM THIS WATERSHED HAVE BEEN TESTED. ALL SAMPLES TESTED CONFORM TO MATERIAL SPECIFICATION 523.



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

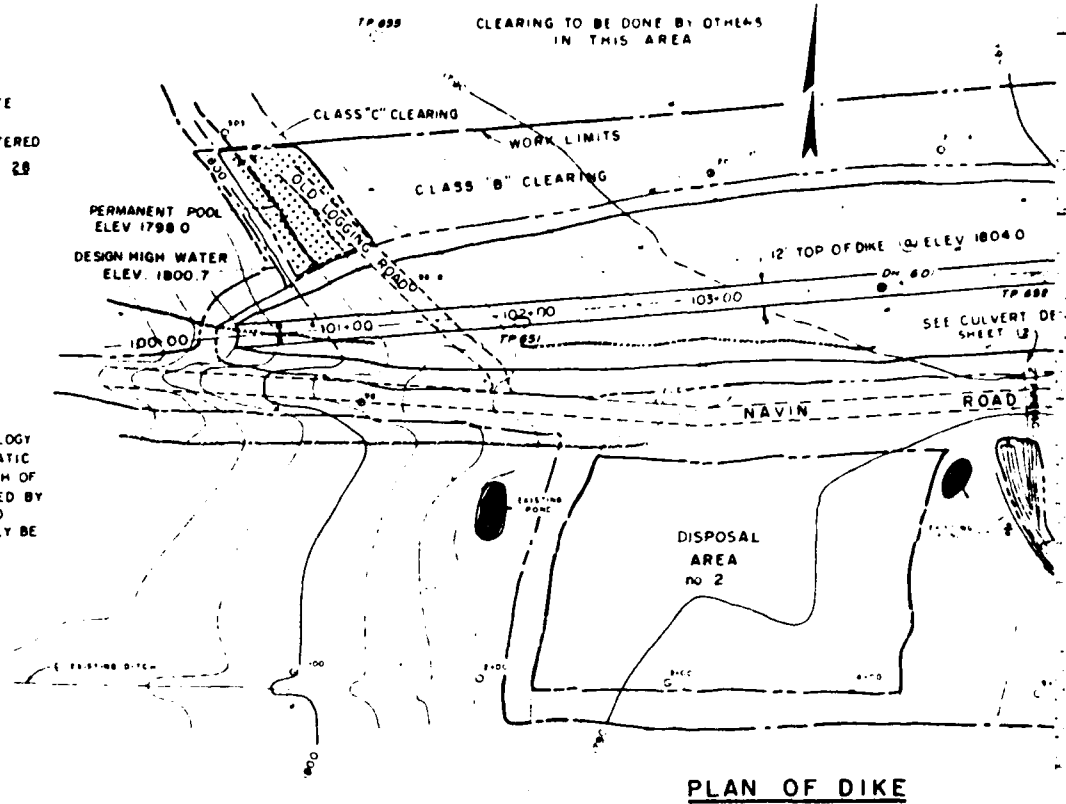
Designed	J. A. TIPPETT	Date	8-78	Approved by	
Drawn	G. W. HOBBS				
Drawn	F. J. WILDA		6/12/78		
Traced					
Traced	J. P. FORAN				
Entered	G. M. BODDE		8-78		
				Sheet No.	MA 361-P

CONSTRUCTION NOTES

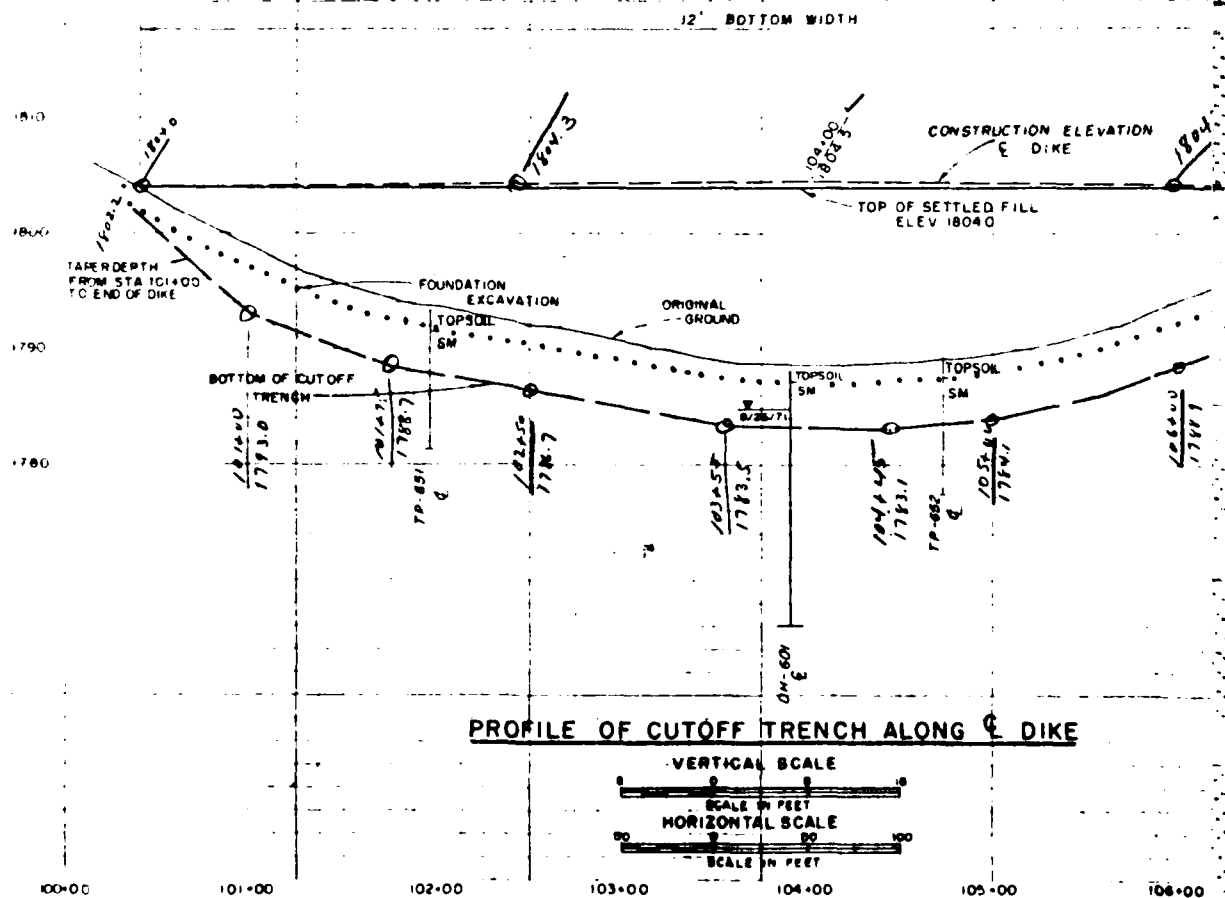
- 1 THE EXCAVATION LIMITS ARE APPROXIMATE AND WILL BE ADJUSTED BY THE ENGINEER IN ACCORDANCE WITH CONDITIONS ENCOUNTERED
- 2 FOR LOGS OF TEST HOLES SEE SHEET 28

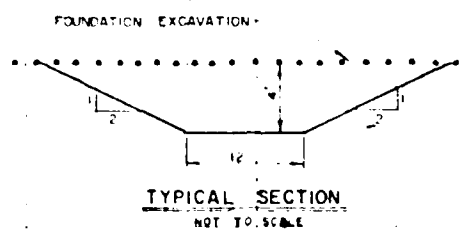
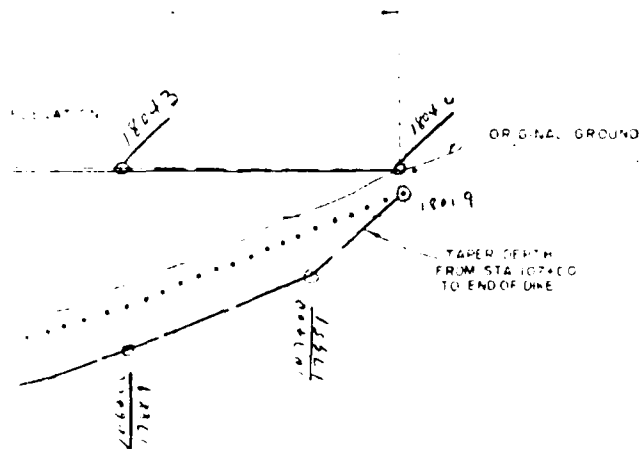
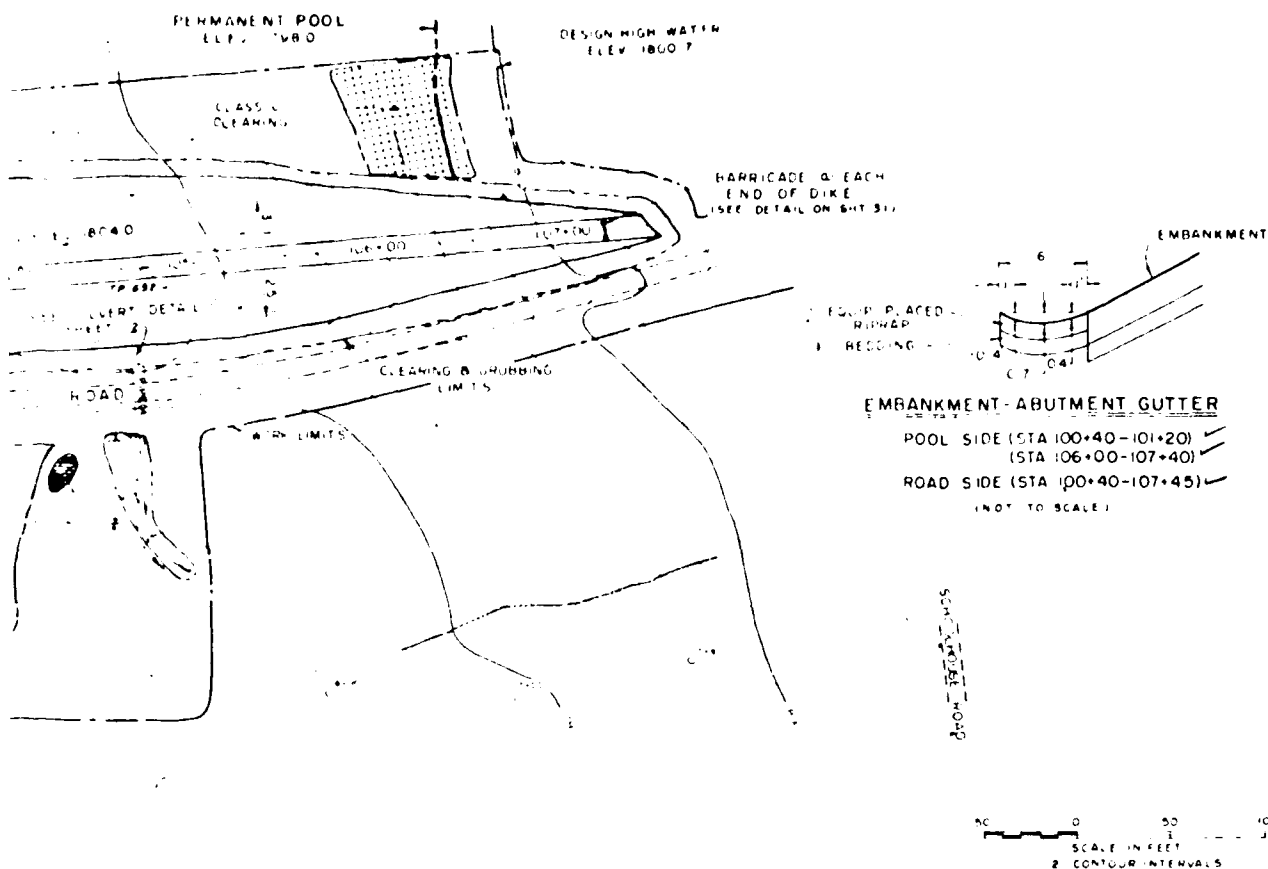
LEGEND

- ▼ 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



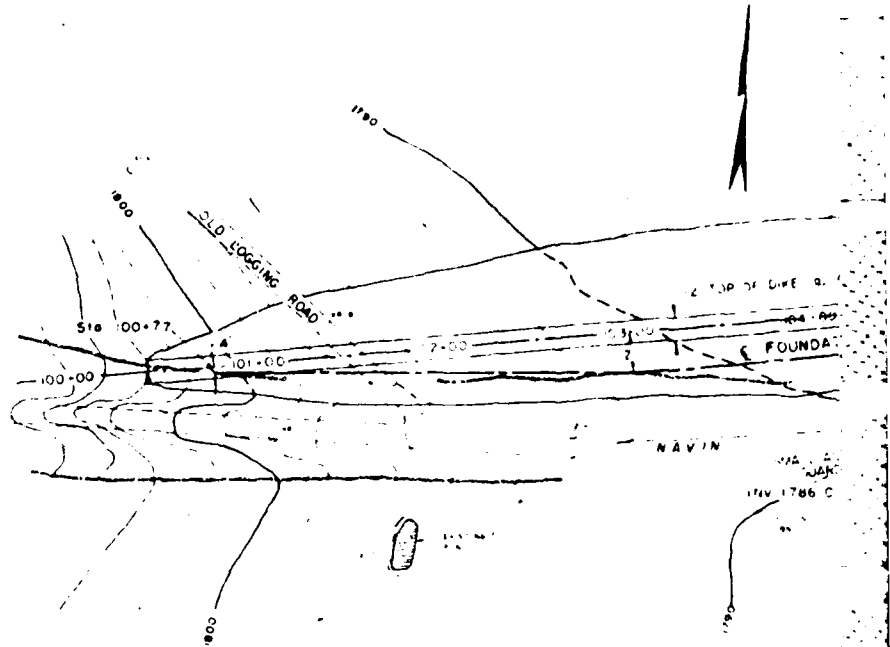


AS BUILT

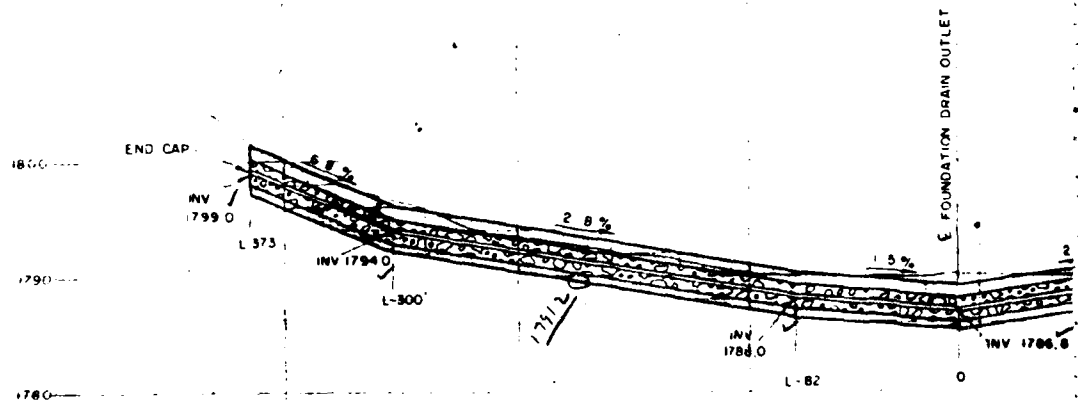
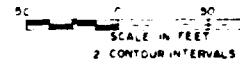
WASHINGTON MOUNTAIN BROOK WATERSHED PROJ.		
WASHINGTON MOUNTAIN LAKE MULTIPLE-PURPOSE DAM		
OCTOBER MOUNTAIN STATE FOREST, MASSACHUSETTS		
NAVIN ROAD DIKE		
U.S. DEPARTMENT OF AGRICULTURE		
SOIL CONSERVATION SERVICE		
Approved by	Date	Approved by
J. A. TIBBETTS	8/7/72	
C. H. DODGE		
Checked by	Date	Checked by
G. HOGUE	8/8/72	
P. J. WILDA		
Drawn by	Date	Drawn by
Project #	Sheet	Project #
10404	10 of 11	
10404	10 of 11	
		MA-361 P

CONSTRUCTION NOTES

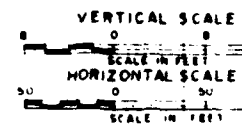
1. ALL CEMENT PIPE SHALL CONFORM TO SPECIFICATION 545 AND SHALL BE 4" DIA. CLASS 2400
2. PERFORATED ASPHALT CEMENT PIPE SHALL BE PERFORATED WITH 1/4" HOLES. THE LOCATION AND NUMBER OF THESE HOLES SHALL BE SIMILAR TO THOSE IN ASPHALT CEMENT UNDERDRAIN PIPE OF THE SAME DIAMETER. THE OUTLET SECTION (170') 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 6 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

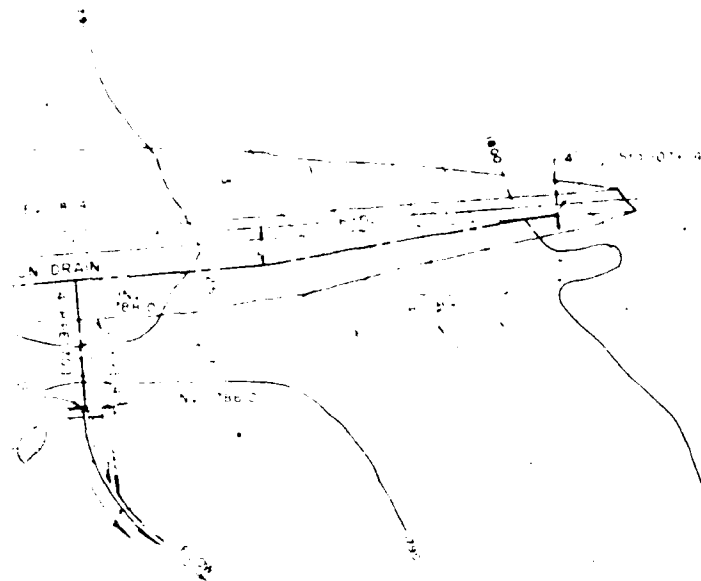


PLAN OF DIKE FOUNDATION

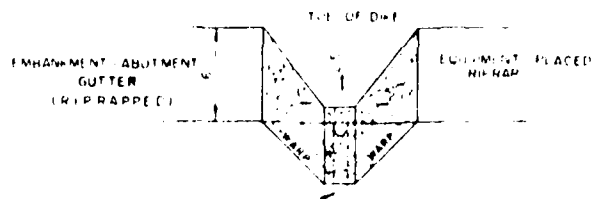


FOUNDATION DRAIN PROFILE





ON DRAIN

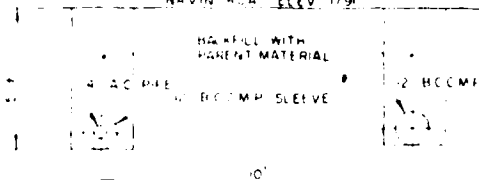


12" CULVERT

DETAIL OF CULVERT

NOT TO SCALE

NAVIN ROAD ELEV. 1790



DETAIL OF CULVERT LOCATION

NOT TO SCALE

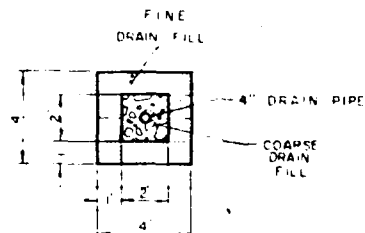
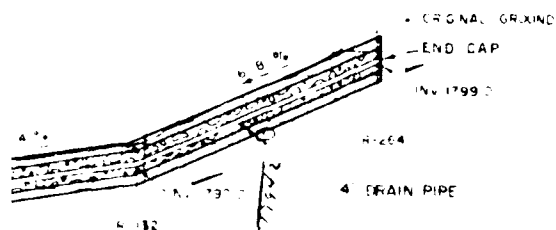
1/4" BOLT 1/4" LONG
WITH FLAT WASHER

1/4" WIDE
1/4" THICK

1/4" WOVEN GALV.
WITH MESH NO. 12 GALV.
LAPPED TO PIPE

DETAIL OF SMALL ANIMAL GUARD
SCREEN AND OUTLET OF DRAIN PIPE

SCALE IN FEET



TYPICAL SECTION

(1/2" PIPE)
NOT TO SCALE

OF FILE

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

1/4" BOLT 1/4" LONG

1/4" WIDE 1/4" THICK

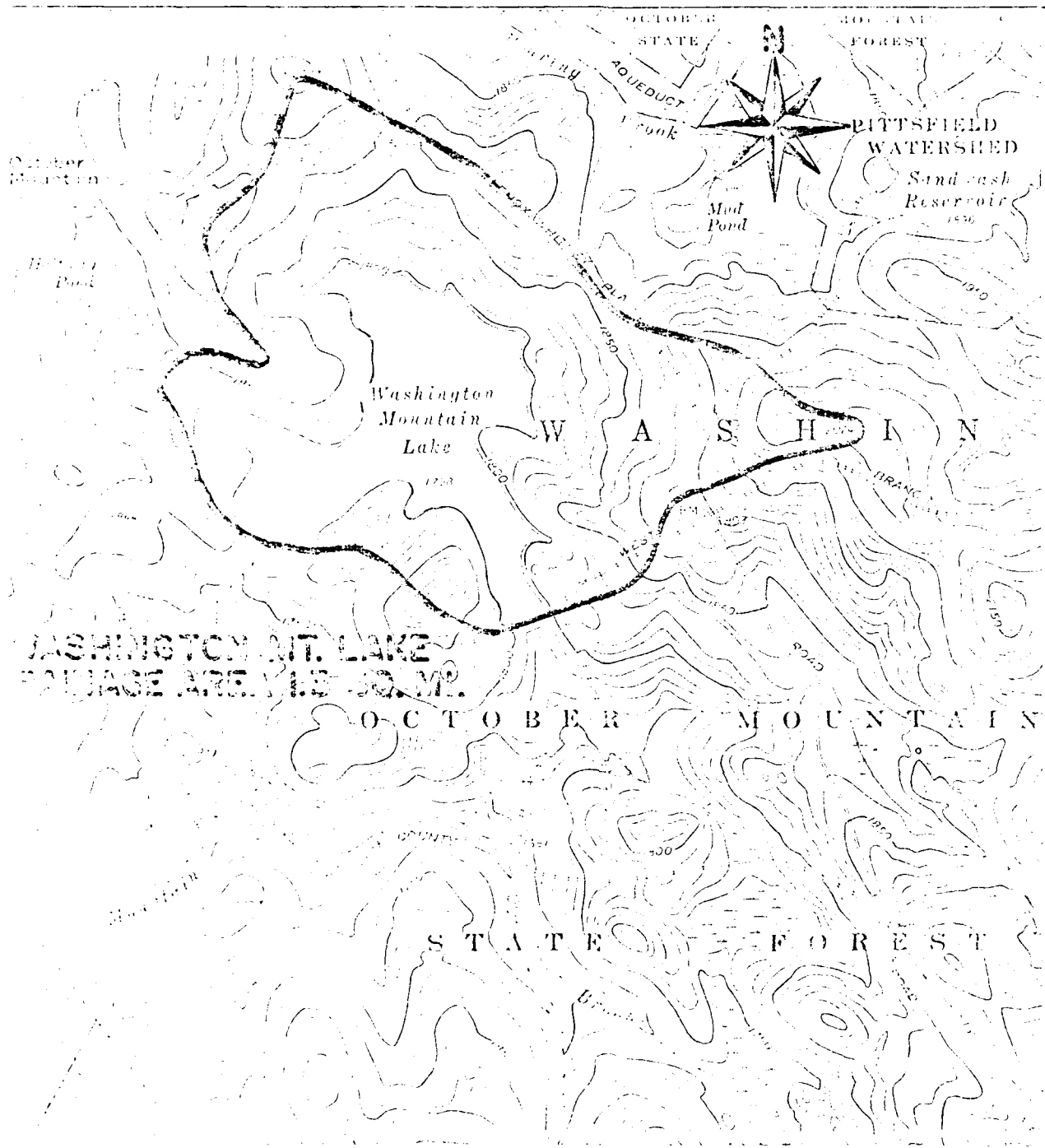
1/4" WOVEN GALV.
WITH MESH NO. 12 GALV.
LAPPED TO PIPE

U.S. S-117 (November 1955)

MA - 361 P

B-17

APPENDIX D



SCALE -
 0 1000' 2000' 3000'
 FROM: USGS EAST LEE, MASS.
 QUADRANGLE MAP

TIGHE & BOND / SCI CONSULTING ENGINEERS EAST HAMPTON, 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	



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.

Photo #4 Overview of
impoundment area
looking northerly
from crest of dike



Photo #5 View of dike
crest looking westerly
from left abutment.
Note wheel ruts and
ridges.





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



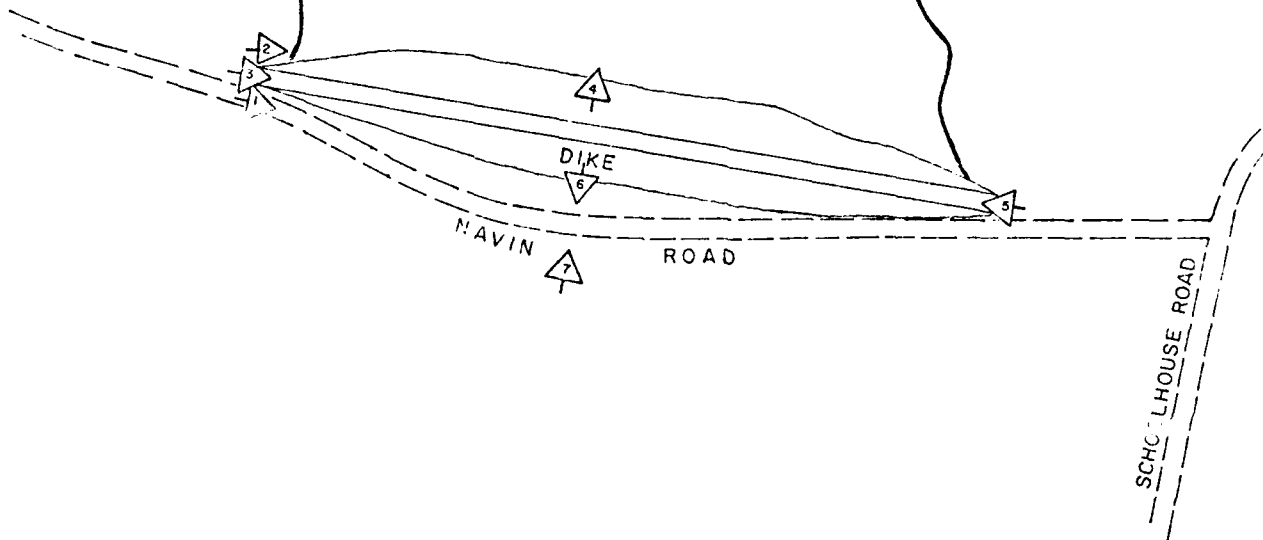
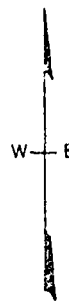
Photo #2 Overview of upstream side of dike looking easterly from right abutment



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



WASHINGTON MT. LAKE



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

LTPH

TEST HOLE INFORMATION

Centerline of dam
 Bridge Area
 Emergency Highway
 Centerline of Outlet Structure
 Stream Channel
 Hatched Area

1-99
 101-104
 201-204
 301-304
 401-404
 501-504
 601-604
 701-704

Drill holes
 by Test Hole

UNIFIED SOIL CLASSIFICATION SYSTEM (U.S.C.S.)

GM Well graded gravel; gravel-sand mixtures
 GP Poorly graded gravel
 GM Silty gravel; gravel-sand mixtures
 GC Clayey gravel; gravel-sand mixtures
 SM Well graded sand; sand-gravel mixtures
 SP Poorly graded sand
 SM Silty sand; sand-silt mixtures
 SC Clayey sand; sand-silt mixtures
 MC Silty clay; very fine sand; sandy or clayey silt
 CL Clay of low to medium plasticity; silty, sandy or gravelly clay
 CH Clay of high plasticity; fat clay
 MH Elastic silt; silty clay or diatomaceous silt
 OL Organic silt and organic silty clay of low plasticity
 OH Organic clay or clay of medium to high plasticity

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

When drilling, all holes were advanced by continuous drive casing. The casing was then advanced by 10 diameters driving between drive casing. Drive casing was then with a 10 diameters, 10 foot section.

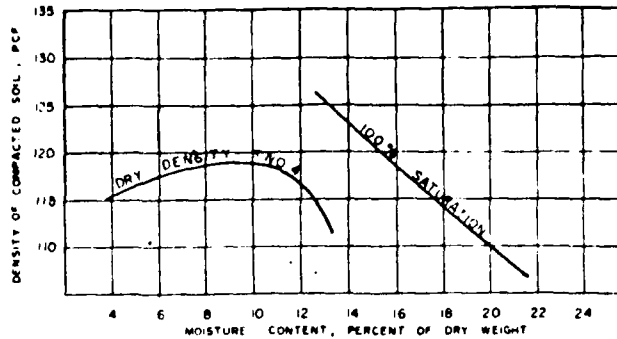
Location of test hole shown on plan view.

Water levels do not necessarily represent static water levels.

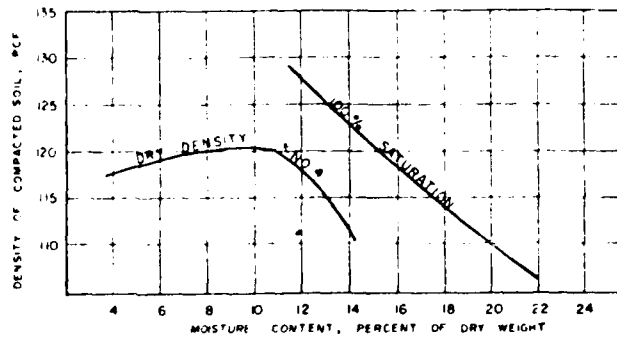
Flow in pounds per square inch water pressure
 Quantity of water in gallons per minute
 Permeability in feet per day
 Soil disturbed sample

The Unified Soil Classification System (U.S.C.S.) is only of use material with a size smaller than 0.075 mm.

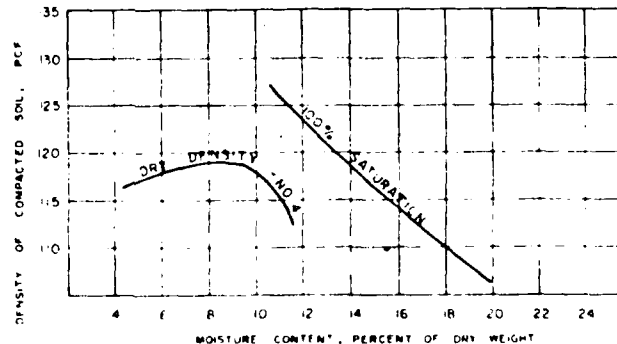
SM SAMPLE FROM TP 152, 3' TO 14'



SM SAMPLE FROM TP 156, 3' TO 12'



SM SAMPLE FROM TP 159, 3' TO 12'



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

INVESTIGATED: L. M. L. S. 12-69
 TYPED: H. L. ORCZAK 1-70
 C. H. DODGE 6-17-72
 MA-361-P

NOV 10 1969

REPRODUCED AT GOVERNMENT EXPENSE

1/2 - 11/4/69

NOT RAT.

1/2 gravel, about 45% fines,
10% medium sand, 10%
fine sand, angular, gray,
permeability, dense to very
TILL.

1/2, hornblende gneiss with
slightly fractured, fractures
inches apart. Most fractures
50 degrees.

Station Tests	
1/2	100
1/2	90
1/2	80
1/2	70
1/2	60
1/2	50

% Recovery

Level at 5.5 feet on 11/7/69.

1/2/69

NOT RAT.

1/2 gravel, about 45% fines,
10% medium sand, 10%
fine sand, sub-round, gray,
permeability, dense to very
TILL.

1/2, hornblende, gneiss with
slightly fractured, fractures
inches apart. Most fractures
50 degrees.

Station Tests	
1/2	100
1/2	100
1/2	90
1/2	80
1/2	70
1/2	60
1/2	50

Level not recorded.

1/2 - DEN

1/2 gravel, cobbles and
10% fines, 20% fine
sand, 10% coarse sand,
angular, 18-inch maximum
size, low permeability,
TILL, 20% cobbles and

1/2 - making water at

1/2 - DEN

1/2 gravel, cobbles and
10% fines, 20% fine
sand, 10% coarse sand,
angular, 18-inch maximum
size, low permeability,
TILL, 20% cobbles and

1/2 - 3 to 4 feet.
water at 2 feet.

1/2 - DEN

1/2 gravel, cobbles, and
10% fines, 20% fine
sand, 10% coarse sand,
angular, 2 foot maximum size,
low permeability, dense,
of cobbles and boulders.

1/2 - making water at 3 feet.

TP-154 ELEV. 1752.8

12/1/69

DEN

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.

12.0

Bottom of Pit.

Note: Sample 154.1 -- 3.0 to 12.0 ft.

TP-155 ELEV. 1759.1

12/1/69

DEN

0.0 1.0

TOPSOIL.

1.0 12.0

SAND, silty with gravel, cobbles
and boulders, about 40% fines, 21%
fine sand, 10% medium sand, 11%
coarse sand, 20% gravel, angular,
10-inch maximum size, olive, damp,
low permeability, dense, GLACIAL
TILL, est. 20% cobbles and boulders.

12.0

Bottom of Pit.

Note: No Sample.

TP-156 ELEV. 1734.2

12/1/69

DEN

0.0 1.0

TOPSOIL.

1.0 12.0

SAND, silty with gravel, cobbles
and boulders, about 40% fines, 21%
fine sand, 10% medium sand, 11%
coarse sand, 20% gravel, angular,
10-inch maximum size, olive, damp,
low permeability, dense, GLACIAL
TILL, est. 20% cobbles and boulders.

12.0

Bottom of Pit.

Note: Sample 156.1 -- 3.0 to 12 feet.

TP-157 ELEV. 1734.0

12/1/69

DEN

0.0 1.0

TOPSOIL.

1.0 12.0

SAND, silty with gravel, cobbles
and boulders, about 40% fines, 21%
fine sand, 10% medium sand, 11%
coarse sand, 20% gravel, angular,
12-inch maximum size, olive, damp,
low permeability, dense, GLACIAL
TILL, est. 15% cobbles and boulders.

12.0

Bottom of Pit.

Note: No Sample.

TP-158 ELEV. 1767.3

12/1/69

DEN

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.

12.0

Bottom of Pit.

Note: Sample 158.1 -- 3 to 12 feet.

TP-159 ELEV. 1754.0

12/1/69

DEN

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.

12.0

Bottom of Pit.

Note: Sample 159.1 at 3.0 to 12.0 ft.

TP-160 ELEV. 1745.1

12/1/69

DEN

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.

13.0

Bottom of Pit.

Note: No Sample.

TP-161 ELEV. 1733.6

12/1/69

DEN

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.

LOCATED

TEST HOLE SUBMITTING LISTING

Centerline of dam	1-99
Borrow Area	101-100
Emergency Highway	201-200
Centerline of Outlet Structure	301-300
Stream Channel	401-400
Relief Wells	501-500
	601-600
	701-700

Drill Holes
Test Pits

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GW	Well graded gravel; gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-silt mixtures
GC	Clayey gravels; gravel-and-clay mixtures
GM	Well graded sands; sand-gravel mixtures
GP	Poorly graded sands
GM	Silty sands; sand-silt mixtures
GC	Clayey sands; sand-clay mixtures
ML	Silt; silty, very fine sands; sandy or clayey silt
CL	Clays of low to medium plasticity; silty, sandy or gravelly clays
CH	Clays of high plasticity; fat clays
EH	Elastic silts; micaceous or distentionous 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 1/2 inch diameter drilling between drive samples. Drive samples taken with a 3/4-inch 0.1 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/gm - quantity of water in gallons per minute
K/f/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.

~~IN-101~~	ELEV. 1703.2	11/1/69 - 11/6/69	DB
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.	
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.	
<u>Standard Penetration Tests</u>			
No.	Depth	Blows/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.	6.0 - 7.5'	73	70
6.	7.5 - 9.0'	90	65
7.	9.0 - 10.5'	113	50
<u>Rock Core Run</u>			
No.	Depth	% Recovery	
1.	25.0 - 30.0'	80	
NOTE: Water level at 5.5 feet on 11/7/69.			

IN-102	ELEV. 1755.4	11/10/69	DB
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.	
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	Blows/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.	6.0 - 7.5'	95	50
6.	7.5 - 9.0'	93	60
7.	9.0 - 10.5'	110/6" ref.	50
8.	10.5 - 12.0'	131	50
NOTE: Water level not recorded.			

<u>TP-51</u>	<u>ELEV. 1735.8</u>	<u>12/1/69</u>	<u>DBM</u>
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.	
14.0		Bottom of Pit.	
NOTE: No sample -- making water at 2 feet.			

TP-152	ELEV.	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, 18-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, 20% cobbles and boulders.	
14.0		Bottom of Pit.	
		NOTE: Sample 152.1 -- 3 to 14 feet. Making water at 2 feet.	

<u>TP-53</u>		<u>ELEV. 1748.7</u>	<u>12/1/69</u>	<u>DBM</u>
...	2.0	TOPSOIL AND PMAT.		
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, 25% cobbles and boulders.		
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.		
12.0		Bottom of Pit.		
Note: Sample 154.1 -- 3.0 to 12.0 ft.				DB-Dr TP-Dr

TP-155	ELEV. 1759.3	12/1/69	DBM	UNIF.
0.0	1.0	TOPSOIL.		ON 1
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, 14-inch maximum size, olive, moist, water at 12.0 feet, low permeability, dense, GLACIAL TILL, est. 20% cobbles and boulders.		ON 2 ON 3 ON 4 ON 5 ON 6 ON 7 ON 8 ON 9 ON 10 ON 11 ON 12 ON 13 ON 14 ON 15 ON 16 ON 17 ON 18 ON 19 ON 20 ON 21 ON 22 ON 23 ON 24 ON 25 ON 26 ON 27 ON 28 ON 29 ON 30 ON 31 ON 32 ON 33 ON 34 ON 35 ON 36 ON 37 ON 38 ON 39 ON 40 ON 41 ON 42 ON 43 ON 44 ON 45 ON 46 ON 47 ON 48 ON 49 ON 50 ON 51 ON 52 ON 53 ON 54 ON 55 ON 56 ON 57 ON 58 ON 59 ON 60 ON 61 ON 62 ON 63 ON 64 ON 65 ON 66 ON 67 ON 68 ON 69 ON 70 ON 71 ON 72 ON 73 ON 74 ON 75 ON 76 ON 77 ON 78 ON 79 ON 80 ON 81 ON 82 ON 83 ON 84 ON 85 ON 86 ON 87 ON 88 ON 89 ON 90 ON 91 ON 92 ON 93 ON 94 ON 95 ON 96 ON 97 ON 98 ON 99 ON 100 ON 101 ON 102 ON 103 ON 104 ON 105 ON 106 ON 107 ON 108 ON 109 ON 110 ON 111 ON 112 ON 113 ON 114 ON 115 ON 116 ON 117 ON 118 ON 119 ON 120 ON 121 ON 122 ON 123 ON 124 ON 125 ON 126 ON 127 ON 128 ON 129 ON 130 ON 131 ON 132 ON 133 ON 134 ON 135 ON 136 ON 137 ON 138 ON 139 ON 140 ON 141 ON 142 ON 143 ON 144 ON 145 ON 146 ON 147 ON 148 ON 149 ON 150 ON 151 ON 152 ON 153 ON 154 ON 155 ON 156 ON 157 ON 158 ON 159 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ON 732 ON 733 ON 734 ON 735 ON 736 ON 737 ON 738 ON 739 ON 740 ON 741 ON 742 ON 743 ON 744 ON 745 ON 746 ON 747 ON 748 ON 749 ON 750 ON 751 ON 752 ON 753 ON 754 ON 755 ON 756 ON 757 ON 758 ON 759 ON 760 ON 761 ON 762 ON 763 ON 764 ON 765 ON 766 ON 767 ON 768 ON 769 ON 770 ON 771 ON 772 ON 773 ON 774 ON 775 ON 776 ON 777 ON 778 ON 779 ON 780 ON 781 ON 782 ON 783 ON 784 ON 785 ON 786 ON 787 ON 788 ON 789 ON 790 ON 791 ON 792 ON 793 ON 794 ON 795 ON 796 ON 797 ON 798 ON 799 ON 800 ON 801 ON 802 ON 803 ON 804 ON 805 ON 806 ON 807 ON 808 ON 809 ON 810 ON 811 ON 812 ON 813 ON 814 ON 815 ON 816 ON 817 ON 818 ON 819 ON 820 ON 821 ON 822 ON 823 ON 824 ON 825 ON 826 ON 827 ON 828 ON 829 ON 830 ON 831 ON 832 ON 833 ON 834 ON 835 ON 836 ON 837 ON 838 ON 839 ON 840 ON 841 ON 842 ON 843 ON 844 ON 845 ON 846 ON 847 ON 848 ON 849 ON 850 ON 851 ON 852 ON 853 ON 854 ON 855 ON 856 ON 857 ON 858 ON 859 ON 860 ON 861 ON 862 ON 863 ON 864 ON 865 ON 866 ON 867 ON 868 ON 869 ON 870 ON 871 ON 872 ON 873 ON 874 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<u>TP-156</u>	<u>ELEV. 1734.2</u>	<u>12/2/69</u>	<u>DBM</u>	OH OL OH
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, 20-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL, est. 20% cobbles and boulders.		AI by v.
12.0		Bottom of Pit.		156.0 156.1 156.2 156.3
		Note: Sample 156.1 -- 3.0 to 12 feet.		L

<u>TP-157</u>	<u>ELEV. 1734.0</u>	<u>12/2/69</u>	<u>DBM</u>	<u>NOTE:</u>
0.0	1.0	TOPSOIL.		Pat
1.0	12.0	SAND, silty with gravel, cobbles and boulders, about 45% 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.		S/geo E/T D.S. TH MAT
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.	
12.0		Bottom of Pit.	
		Note: Sample 158.1 -- 3 to 12 feet.	

TP-159	ELEV. 1754.0	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, 18-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL. est. 15% cobbles and boulders.	
12.0		Bottom of Pit.	
		Note: Sample 159.1 at 3.0 to 12.0 ft.	

TP-160	ELEV. 1749.3	12/1/6	DBM
0.0	1.0	TOP SOIL.	
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.	
13.0		Bottom of Pit. Note: No Sample.	

<u>TP-161</u>	<u>ELEV. 1730.6</u>	12/1/69	DBM
0.0	1.0	TOPSOIL.	
1.0	14.0	SAND, silty with gravel, cobbles, and boulders, about 1% fines, 20% fine sand, 10% medium sand, 10% coarse sand, 20% 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.			

H-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. 1791.5	11/24/69	DBM
0.0	7.0		COBBLES AND BOULDERS heaved with SM Matrix slightly organic.	
7.0	9.0		SAND, silty with gravel and cobbles, about 70% fines, 12% fine sand, 1% medium sand, 1% coarse sand, 1% gravel, 5% cobbles, sub-angular, or 0-inch maximum size, olive, damp, SM low permeability, dense, GLACIAL TILL.	
9.0			Bottom of Pit.	
			Note: No Sample -- Same as 252.1.	
TP-252		Elev. 1783.3	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, 1% medium sand, 1% coarse sand, 3% gravel, 1% cobbles, or sub-angular, 10-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL. est. 35% + 0%.	
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	11.0		SAND, silty with gravel, cobbles and boulders, about 3% fines, 2% fine sand, 1% medium sand, 1% coarse sand, 2% gravel, sub-angular, 2-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL. Estimated 2% + 0%.	
11.0			Bottom of Pit.	
			Note: Sample 151.1 -- 3' to 12.0'.	
TP-251		Elev. 1782.0	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, 1% medium sand, 2% coarse sand, 1% gravel, sub-angular, 3-inch maximum size, olive-brown, moist, low permeability, dense, GLACIAL TILL.	
10.0			Bottom of Pit.	
			Sample 252.1 -- 2 to 10 feet.	
H-152		Elev. 1782.9	9/16/71	DBM
0.0	0.5		TOPSOIL.	
0.5	10.0		SAND, silty with gravel and cobbles, about 40% fines, 1% fine sand, 1% medium sand, 2% coarse sand, 1% gravel, sub-angular, 1-inch maximum size, olive-brown, moist, low permeability, dense, GLACIAL TILL.	
10.0			Bottom of Pit.	
			No Sample.	
TP-254		Elev. 1787.6	9/16/71	DBM
0.0	0.5		TOPSOIL.	
0.5	10.0		SAND, silty with gravel, about 40% fines, 1% fine sand, 1% medium sand, 2% coarse sand, 1% gravel, sub-angular, 12-inch maximum size, olive-brown, moist, low permeability, dense, GLACIAL TILL.	
10.0			Bottom of Pit.	
			Sample 254.1 -- 2 to 10 feet.	
TP-251		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, 1% medium sand, 2% coarse sand, 1% gravel, sub-angular, 12-inch maximum size, olive-brown, moist, low permeability, dense, GLACIAL TILL.	
10.0			Bottom of Pit.	
			Sample No. 251.1 -- 2 to 10 feet.	
TP-251		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, 1% medium sand, 2% coarse sand, 1% gravel, sub-angular, 12-inch maximum size, olive-brown, moist, low permeability, dense, GLACIAL TILL.	
7.0			Bottom of Pit.	
			Sample No. 251.1 -- 2 to 10 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

DATE	9/7/71
BY	N. LONCZAK
MA-361 P	

<u>DM-204 (Cont'd)</u>	<u>Elev. 1001.1</u>	<u>8/24 to 8/25/71</u>	<u>DM</u>
14.5	Septennial Hole.		
<u>Drive Samples</u>			
<u>No.</u>	<u>Depth</u>	<u>Blk./Ft.</u>	<u>% Recovery</u>
1.	0.0 - 1.5'	4	100
2.	5.5 - 6.5'	04/2' ref.	50
<u>Rock Core Runs</u>			
<u>No.</u>	<u>Depth</u>	<u>% Recovery</u>	
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.			

DM-205	Elev. 1810.2	8/19 to 8/20/71	J1
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. CM	
5.5	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, ~~intersected by thin-bedded dykes~~ 24.0 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.	
<u>Drive Samples</u>			
No.	Depth	Blk./Ft.	% Recovery
1.	0.0 - 1.5'		100
2.	1.5 - 2.8'	60/10'	75
3.	5.0 - 6.3'	137/10'	75
<u>Rock Core Runs</u>			
No.	Depth		% Recovery
1.	6.5 - 8.0'		80
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.			

DM-206	Elev. 1808.5	8/23 to 8/23/71	DM
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.	
7.0	12.0	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.	
Bottom of Hole.			
<u>Drive Samples</u>			
No.	Depth	Blk./Ft.	% Recovery
1.	0.0 - 1.5'	9	100
2.	1.5 - 2.3'	58/8'	ref. 100
3.	4.5 - 6.0'	54	100
<u>Rock Core Runs</u>			
No.	Depth	% Recovery	
1.	7.0 - 9.0'	75	
2.	9.0 - 10.5'	65	
3.	10.5 - 12.0'	100	
NOTE: water level dry on 8/24/71.			

1.0-2.1	Elev. 1806.7	8/24 to 8/24/71	DM
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.	
7.5	12.5	Boulder.	
12.5	12.5	BEDROCK, gray, biotite, hornblende feldspar gneiss, moderately fractured, fractures 3 to 8-inches apart, all horizontal, except one which is dipping about 60° hard.	
12.5		Bottom of Hole.	
<u>Drive Samples</u>			
No.	Log U.	Blk./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
<u>Rock Core Runs</u>			
No.	Depth	% Recovery	
1.	7.5 - 11.5'	100	
2.	11.5 - 14.5'	100	
NOTE: Water level at 2.3 on 8/24/71			

May be drill water --

DM-301		Elev. 1764.8		8/20 to 8/21/71		J1
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.				
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.				
<u>Drive Samples</u>						
No.	Depth	Blk./Ft.	% Recovery			
1.	5.0 - 6.5'	78	75			
2.	6.5 - 8.0'	96	100			
<u>Rock Core Runs</u>						
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.						

DM-501	Elev. 1788.2	8/25 to 8/26/71	DM
0.0	1.0	TOPSOIL.	
1.0	22.0	SAND, silty with gravel, about 40% 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, GLACIAL TILL.	
22.0		Bottom of Hole.	
		<u>Drive Samples</u>	
		<u>No.</u> <u>Depth</u> <u>Blk./ft.</u> <u>% Recovery</u>	
		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	12/24/69	DM
0.0	1.0	TOPSOIL.	
1.0	11.0	SAND, silty with cobbles and boulders, about 35% fines, 25% fine sand, 25% medium sand, 15% coarse sand, 15% 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.	
11.0		Bottom of Pit.	
		Notes: Sample 1.1 -- 3' to 11.0'.	
TP-2	Elev. 1787.0	11/24/69.	DM
0.0	1.0	TOPSOIL.	
1.0	12.0	SAND, silty with cobbles and boulders, about 35% fines, 15% fine sand, 15% medium sand, 15% coarse sand, 15% gravel, angular, 1 1/2-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.	
		Notes: Sample 2.1 -- 3' to 12.0'.	
TP-3	Elev. 1773.7	11/24/69	DM
0.0	3.0	ORGANIC SAND, and gravel with about 35% fines, 15% fine sand, 25% medium sand, 15% coarse sand, 25% gravel, 15% cobbles, linear, wet, medium permeability, loose.	
3.0	12.0	SAND, silty with gravel and cobbles, about 25% fines, 15% fine sand, 15% medium sand, 15% coarse sand, 15% gravel, 35 cobbles, angular, 1 foot maximum size, brown to olive, damp, low permeability, very dense, GLACIAL TILL. Est. 25% cobbles.	
12.0		Bottom of Pit.	
		Notes: No Sample -- Same as No. 1.	
TP-4	Elev. 1768.5	11/24/69	DM
0.0	1.0	TOPSOIL.	
1.0	12.0	SAND, silty with cobbles and boulders, about 25% fines, 15% fine sand, 15% medium sand, 15% coarse sand, 15% gravel, 35 cobbles, angular, 1 1/2-inch maximum size, brown to olive brown, damp, low permeability, very dense, GLACIAL TILL. Est. 25% cobbles.	

IM-211 Cont'd

Rock Core Run	No.	Length	% Recovery
1.	15.0 - 25.0	100	
2.	18.0 - 23.0	95	
3.	23.0 - 25.0	100	

Pressure Tests

No.	Length	Hole Size	Flow	Loss
1.	15.5 - 25.0	3"	20	5.5 gal./min.

NOTE: Water level at 0.5 feet on 8/24/71.

8/23 to 8/24/71 IM

IM-8	Elev. 178.6		
0.0	1.0	TOPSOIL and CORREL.	
1.0	9.0	SAND, silty with gravel, 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 to very dense, GLACIAL TILL.	IM
9.0	20.0	BECK, gray, biotite hornblende, feldspar gneiss, highly fractured to 15 feet; moderately fractured fractures spaced 1/2 to 3/4 inches from 9 to 16 feet then 8 to 12" hard with quartz lenses, most fractures not foliation dipping about 60°.	
20.0		Bottom of Hole.	

Drive Samples

No.	Length	Blk./ft.	% Recovery
1.	0.0 - 1.0	3/32" ref.	100
2.	2.5 - 3.5	50/1" ref.	100
3.	5.5 - 7.0	73	80

Rock Core Run

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

Permeability Test

No.	Length	Hole Size	H	Loss
1.	9.0 - 21.0	3"	OF	14 gal./min.

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

IM-1	Elev. 1801.2	8/24 to 8/25/71	IM
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, 8-inch maximum size, olive-brown, damp, low permeability, dense to very dense, GLACIAL TILL.	IM
7.0	10.0	BECK, gray, 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.	
		Bottom of Hole.	

Drive Samples

No.	Length	Blk./ft.	% Recovery
1.	0.0 - 1.5	3	100
2.	1.5 - 3.0	54	60
3.	4.5 - 6.0	90	100

Rock Core Run

No.	Length	% Recovery
1.	7.0 - 10.0	100
2.	10.0 - 14.0	5

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

IM-2	Elev. 1812.0	8/14 to 8/15/71	IM
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 to very dense, GLACIAL TILL.	
8.0	10.0	BECK, gray, hard, feldspar, quartz, biotite gneiss with foliation dipping about 70°. weathered and highly fractured from 8.0 to 10.0 feet, fractures are horizontal to dipping 70°, spaced 2 to 3-inches apart, and are weathered rusty. From 10.0 to 12.0 feet, fractures are horizontal, spaced 2 to 3-inches apart, and are rusty weathered.	
10.0		Bottom of Hole.	

Drive Samples

No.	Length	Blk./ft.	% Recovery
1.	0.0 - 1.5	3	100
2.	1.5 - 4.5	54/1" ref.	100
3.	4.5 - 6.5	100	100
4.	7.0 - 7.5	7/32" ref.	100

Rock Core Run	No.	Length	% Recovery
1.	8.0 - 12.0	100	
2.	12.0 - 16.0	100	
3.	16.0 - 18.0	100	

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

IM-212	Elev. 1819.0	8/10 to 8/17/71	IM
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, 16-inch maximum size, olive-brown, damp, low permeability, dense, GLACIAL TILL.	IM
10.6	22.0	BECK, gray, hard, feldspar-quartz-biotite-garnet gneiss with foliation dipping 70°, 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.	Length	Blk./ft.	% Recovery
1.	0.0 - 1.5	3	100
2.	1.5 - 2.5	60/1" ref.	100
3.	5.0 - 6.0	60/1" ref.	70
4.	6.0 - 10.1	205/1" ref.	60

Rock Core Run

No.	Length	% Recovery
1.	10.5 - 12.0	70
2.	12.0 - 15.5	100
3.	15.5 - 20.6	100
4.	20.6 - 22.0	100

NOTE: Dry hole on 8/15/71. (Lost water at 16.0 feet)

IM-213	Elev. 1822.8	8/16 to 8/17/71	IM
0.0	1.0	TOPOIL with topsoil.	
1.0	7.0	TOPOIL with silty sand and gravel.	IM
7.0	20.0	BECK, 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.	Length	Blk./ft.	% Recovery
1.	0.0 - 3.5	60	100

Rock Core Run

No.	Length	% Recovery
1.	7.0 - 10.0	100
2.	10.0 - 12.0	100
3.	12.0 - 15.5	100
4.	16.5 - 20.0	100

NOTE: Water level at 2.0 feet on 8/15/71.

IM-214	Elev. 1831.1	8/24 to 8/25/71	IM
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, 8-inch maximum size, olive-brown, damp, low permeability, dense to very dense, GLACIAL TILL.	IM
7.5	14.5	BECK, gray, biotite, hornblende quartz gneiss, weathered and highly fractured from 7.5 to 14.5 feet, then moderately fractured, fractures spaced from 1-inch to 4-inches apart, mostly horizontal with some fractures dipping about 60° soft to hard.	

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	8/7/71	BY	D. MILLS
DATE	8/21/71	BY	N. LONCZAK
MA-361 P			

U.S. GPO: 1969 O-344-441

Washington Mountain Creek
Site 3
Lee, Massachusetts
Berkshire County

2-1	Elev. 1771.6	10/5 to 10/7/70	DEM	
4.0		SAND, some silt and organic, about 15% fines, 15% fine sand, 30% medium sand, 15% coarse sand, 10% gravel, sub-angular, 1/4-maximum size, gray-black, wet, medium permeability, dense, VALLEY TILL.		
6.0		SAND, some silt, about 25% fines, 60% fine sand, 10% medium sand, gray, wet, low permeability, dense, VALLEY TILL.		
15.0		SAND, silty, about 35% fines, 20% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, sub-angular, 3/4-maximum size, brown to olive, damp, low permeability, very dense, GLACIAL TILL.		
23.5		BEHMOCK, dark gray, biotite hornblende granitic gneiss, moderately to highly fractured in top 5 feet, most fractures dipping about 65°, some horizontal fractures tight.		
		Bottom of Hole.		
<u>Drive Samples</u>				
No.	Depth	Rel./Ft.	% Recovery	
1.	0.0 - 1.5'	31	50	
2.	1.5 - 3.0'	72	35	
3.	3.0 - 6.0'	26	90	
4.	6.0 - 11.0'	86	50	
<u>Permeability Test</u>				
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
<u>Rock Core Runs</u>				
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 qt./minute

P-2	Elev. 1790.5	10/8 to 10/9/70	DEM	
11.5		SAND, silty with gravel, about 30% fines, 20% fine sand, 15% medium sand, 15% coarse sand, 15% gravel, 5% cobbles, sub-angular, 1/2-maximum size, olive, damp, low permeability, dense, GLACIAL TILL.		
20.5		BEHMOCK, dark gray-biotite hornblende granitic gneiss, highly fractured, in top 3 feet then moderately fractured most fractures dipping about 65°, some horizontal fractures. Tight below 10.5 feet.		
24.5		Bottom of Holes		
<u>Drive Samples</u>				
No.	Depth	Rel./Ft.	% Recovery	
1.	0.0 - 1.5'	22'	70	
2.	1.5 - 5.0'	32'	60	
<u>Permeability Test</u>				
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
<u>Rock Core Runs</u>				
No.	Depth	% Recovery		
1.	10.5' - 14.5'	83		
2.	14.5' - 20.5'	95		
NOTE: Low circulation at 3 feet in boulders regained circulation at 0.5 feet, lost circulation at 10.5 feet.				

NOTE: Low circulation at 3 feet in boulders regained circulation at 8.5 feet, lost circulation at 10.5 feet.

Elev. 1788.3		10/12 to 10/14/70	DEM	
11.0		SAND, silty with gravel and boulders, about 35% fines, 20% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, angular, 1/2-maximum size, gray-green, damp, low permeability, very dense, GLACIAL TILL.		
20.0		BEHMOCK, dark gray, biotite hornblende granitic gneiss, moderately fractured, fractures spaced 12 to 16-inches apart. Most fractures horizontal, one dipping about 65°, fractures tight.		
25.0		Bottom of Hole. 1 foot topsoil removed.		
<u>Drive Samples</u>				
No.	Depth	Rel./Ft.	% Recovery	
1.	0.0 - 1.5'	74	70	
2.	1.5 - 5.0'	5	70	
3.	5.0 - 6.0'	421 ft. ref.	50	
<u>Permeability Test</u>				
No.	Depth	Hole Size	Stick Up	Loss
1.	5.0'	3"	Ground	None
<u>Rock Core Runs</u>				
No.	Depth	% Recovery		
1.	7.0' - 9.5'	8		
2.	9.5' - 13.0'	10		
3.	13.0' - 15.6'	10		
NOTE: Water level dry at 7/13/70.				

NOTE: Water level dry at 7/13/70.

<u>Elev. 1781.6</u>		10/16 to 10/17/70	DEM
0.0	5.5	TOPSOIL and BEHMOCK 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.	
19.0	21.0	BEHMOCK, dark gray, biotite hornblende, granitic gneiss, moderately fractured, fractures horizontal, tight.	
21.0		Bottom of Hole.	
<u>Drive Samples</u>			
<u>No.</u>	<u>Depth</u>	<u>Rel./Ft.</u>	<u>% Recovery</u>
1.	6.0 - 7.5'	307	70
2.	11.0 - 12.5'	39	70
<u>Permeability Test</u>			
<u>No.</u>	<u>Depth</u>	<u>Hole Size</u>	<u>Pipe Stick Up</u>
1.	5.5'	3"	Ground 12 gal./min.
2.	10.0'	3"	Ground None
<u>Rock Core Runs</u>			
<u>No.</u>	<u>Depth</u>	<u>% Recovery</u>	
1.	19-21'	10	
NOTE: Water level at 5.5 feet on 10/15/70.			

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

M-5	Elev. 1790.1	10/15 to 10/16/70	DEM
0.0	7.0	SAND, silty with gravel, about 35% fines, 20% fine sand, 15% medium sand, 20% coarse sand, 10% gravel, angular, 1/2-inch maximum size, olive, damp, low permeability, dense, GLACIAL TILL.	3M
7.0	18.0	BEHMOCK, dark gray, 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.	
<u>Drive Samples</u>			
No.	Depth	Rel./Ft.	% Recovery
1.	0.0 - 1.5'	36	10
2.	1.5 - 3.0'	5	10
<u>Rock Core Runs</u>			
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.			

NOTE: Water level 3.5 feet on 10/14/70.

DM-6	Elev. 1779.6	8/15 to 8/16/71	DEM	
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, 15% gravel, sub-angular, 1/2-maximum size, olive-brown, damp, low permeability, dense to very dense, GLACIAL TILL.	SM	
8.7	18.7	BEHMOCK, gray 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.		
<u>Drive Samples</u>				
No.	Depth	lbs./Ft.	% Recovery	
1.	0.0 - 1.5'	5	100	
2.	1.5 - 3.0'	35	10	
3.	5.0 - 6.5'	07	30	
4.	8.0 - 8.7'	307.7 ref.	40	
<u>Permeability Test:</u>				
No.	Depth	Hole Size	Head	Loss
1.	8.7'	3"	Ground	Tight
<u>Rock Core Runs</u>				
No.	Depth	% recovery		
1.	8.7' - 11.0'	100		
2.	11.0 - 15.5'	1A		
3.	15.5 - 18.7'	100		
Tried Pressured Test, but could not seat packer.				
NOTE: water level at 8.0 feet on 8/16/71.				

Tried Pressured Test, but could not seat packer.

NOTE: water level at 5.0 feet on 8/10/71.

TH-7	Elev. 1758.3	8/15 to 8/16/71	DEM																									
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, 20% coarse sand, 10% gravel, sub-angular, 3/4-maximum size, olive-brown, damp, low permeability, dense, GLACIAL TILL.	SM																									
15.0	25.0	Boulder																										
		BEHMOCK, light gray, hard, strongly to weakly foliated, biotite-quartz-biotite gneiss with foliation dipping about 45°, fractures mostly subhorizontal, pyrite-enriched and rusty weathered, generally spaced 4-inches to 12-inches apart. Highly fractured and weathered, some between 15.0 and 18.0 feet.																										
25.0		Bottom of Hole.																										
<table><tr><th>Drive Samples</th><th>No.</th><th>Depth</th><th>Rel./Ft.</th><th>% Recovery</th></tr><tr><td>1.</td><td>0.0 - 1.5'</td><td>4</td><td></td><td>75</td></tr><tr><td>2.</td><td>1.5 - 3.0'</td><td>53</td><td></td><td>75</td></tr><tr><td>3.</td><td>7.5 - 9.0'</td><td>0</td><td></td><td>75</td></tr><tr><td>4.</td><td>13.0 - 14.5'</td><td>6</td><td></td><td>75</td></tr></table>				Drive Samples	No.	Depth	Rel./Ft.	% Recovery	1.	0.0 - 1.5'	4		75	2.	1.5 - 3.0'	53		75	3.	7.5 - 9.0'	0		75	4.	13.0 - 14.5'	6		75
Drive Samples	No.	Depth	Rel./Ft.	% Recovery																								
1.	0.0 - 1.5'	4		75																								
2.	1.5 - 3.0'	53		75																								
3.	7.5 - 9.0'	0		75																								
4.	13.0 - 14.5'	6		75																								

APPENDIX D

OUTLINE OF DRAINAGE AREA AND
HYDRAULIC COMPUTATIONS

COMPUTATIONS

PAGE NO.

Drainage Area Map
Size Clasification, Hazard Potential and
Test Flood Determination
Flood Routing, PMF
Dike Failure Analysis

D-1

D-2

D-4

D-8

hydrology/Hydrology Computed by D. Lenon
Date: 4/1979 Computations Checked by Moe

10-18

Washington Mt Lake Dike

Drainage Area = 932 Acres = 1.3 SM

Water Surface Area = 224 Acres (Pond Pool)

Size Classification

Height of Dike = 15.25' (Small)

Storage at crest = 3985 Acre Ft (Intermediate)

∴ Use Intermediate

Hazard Potential = High

Test Flood = PMF

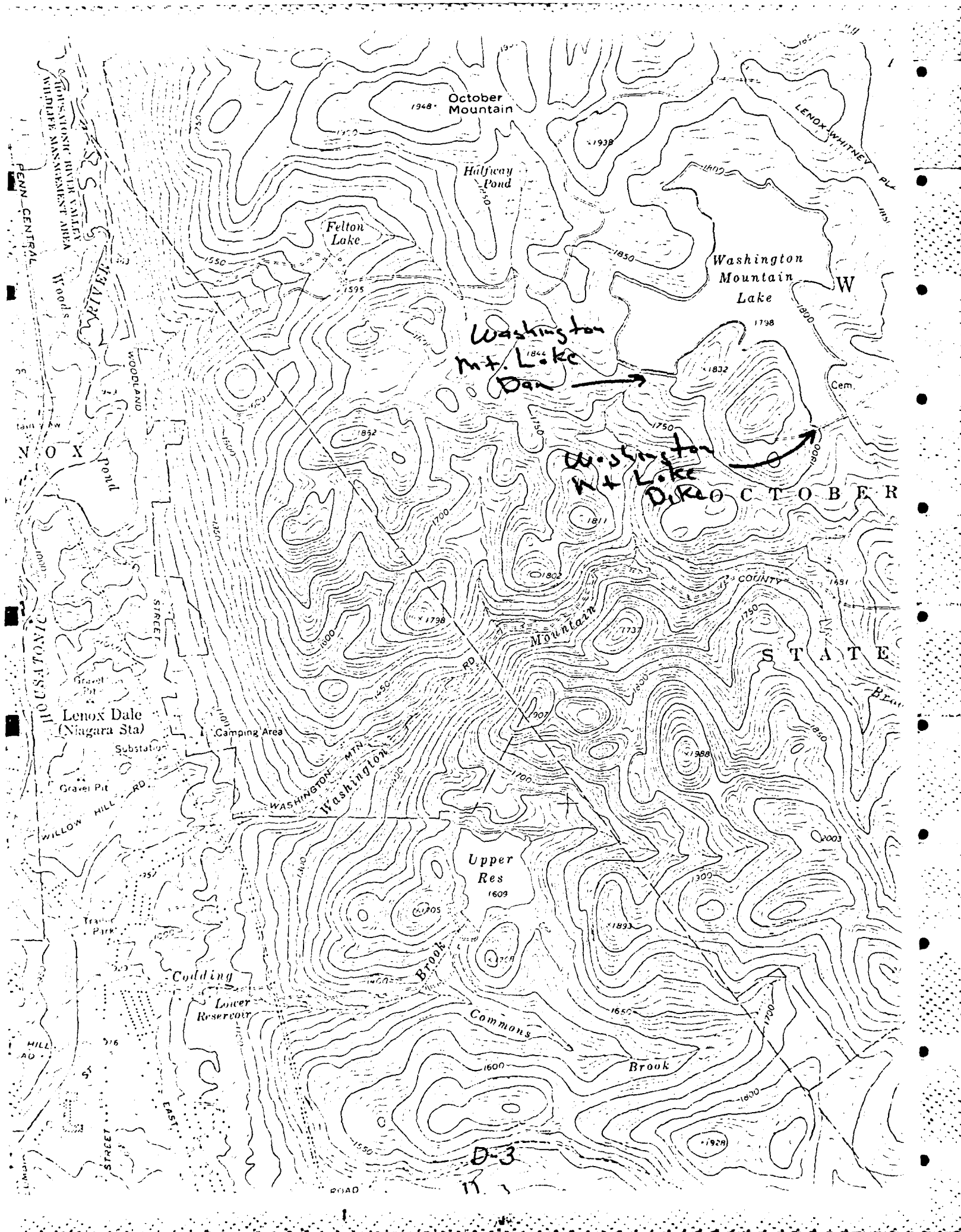
Drainage Area

Basin has rolling hills toward 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

$$\text{PMF } Q = (2300 \text{ CFS/SM})(1.3 \text{ SM}) = 2990 \text{ CFS}$$

Use 3000 CFS



Recch Outflow

For Q_{p1} 24,974 cfs

$$y = 8.5'$$

$L = 2000$ ft

$$\begin{aligned} \text{Volume} &= (2000) \left((20(8.5)^2) \right) \div 43560 \\ &= 66.3 \text{ AF} \end{aligned}$$

$$Q_{p2}(\text{trial}) = 24,953 \left(1 - \frac{66.3}{3985} \right) =$$

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

$$y = 8.25'$$

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

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

$$Q_{p2} = 24,570 \text{ cfs}$$

$$y = 8.25$$

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

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

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

$$C = 26 \quad L = 1300 \text{ ft} \quad H = ?$$

December 14, 1978

Computations

Checked By Moe

170-1

Over Flow Cross Section



Trial = 1

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

$$H^{3/2} = 6.3$$

$$H = 3.3'$$

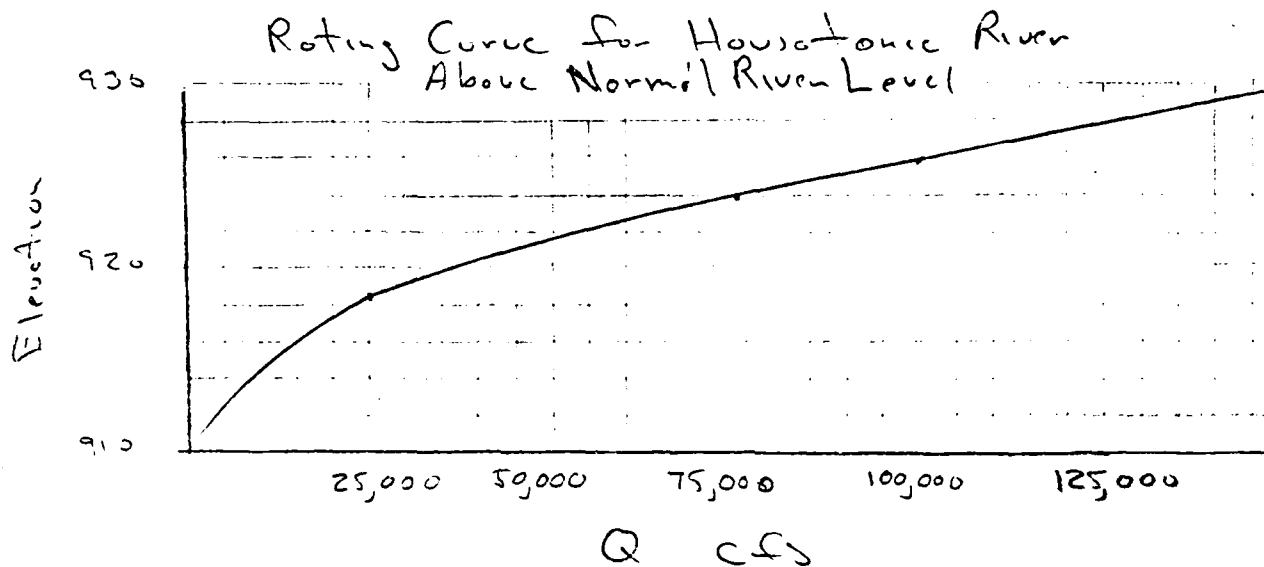
with this spill over elevation
about 5 hours will be flooded
in with a maximum shallow high
velocity flooding

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

December 14, 1977 - Computations

Checked By Mac

1801



Houston D.A. $\approx$ 223 SM
at Confluence of West N +
Brook

$$PIF = 780 \text{ CFS/SM}$$

$$\text{Total PIF} = 173,940 \text{ CFS}$$

The dike failure Q_p (24,570 cfs) is
not significant beyond the confluence.

Hydrology/Hydraulics

February 17, 1980

Computation

Computer R. D. Leland

Summary of Flow and Stage

	M.P.E. Adj. Area (CFS)	Jan. Failure (CFS)	Total (CFS)	Stage (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 Over-flow
at PP Bridge

$$Q = CL H^{3/2}$$

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

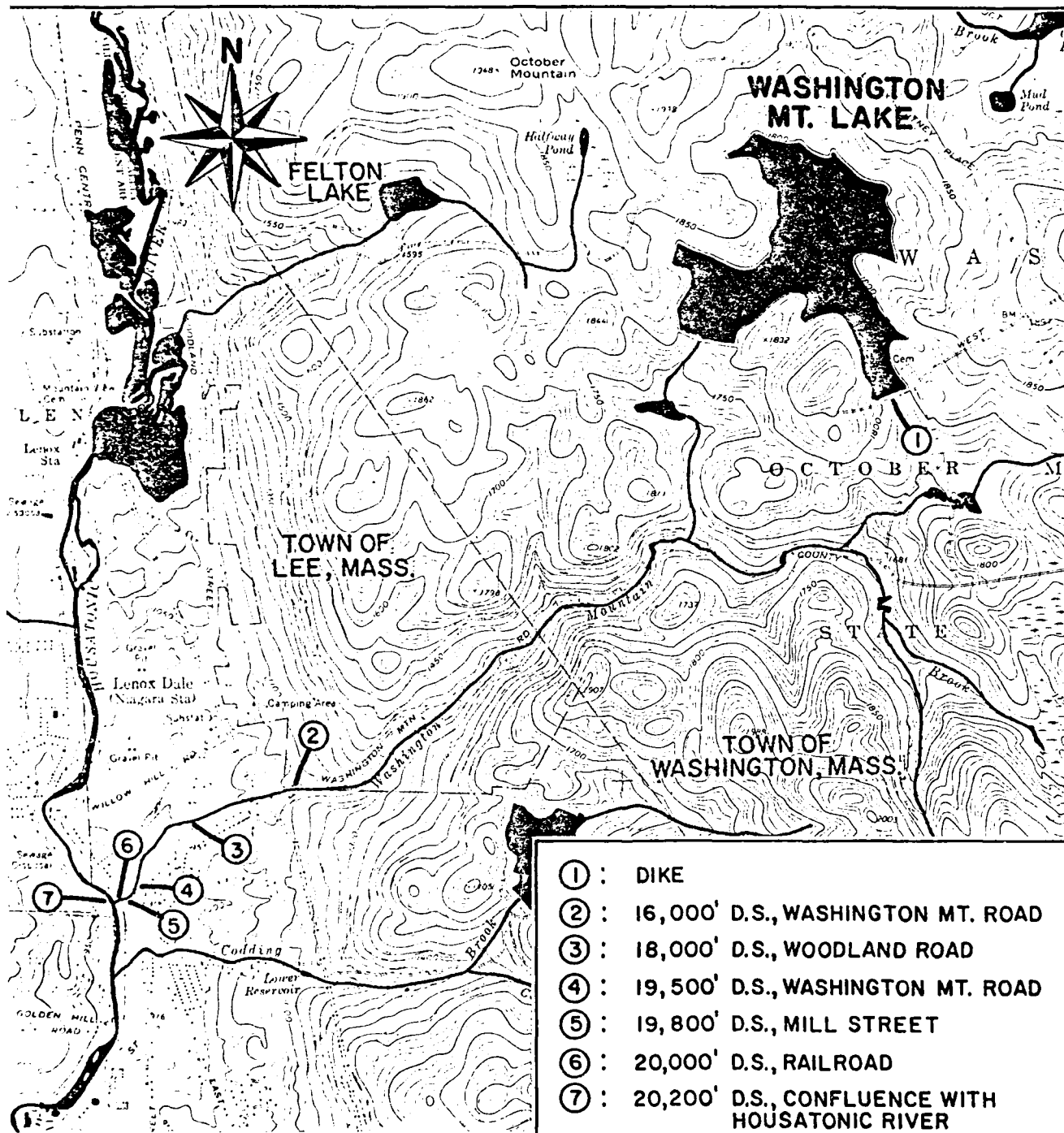
$$34,300 - 22,441 = (2.6)(1300)(H^{3/2})$$

$$H^{3/2} = (34,300 - 22,441) / (2.6)(1300)$$

$$H = 3.8'$$

$$\text{Stage} = H + \text{Channel Stage} = 3.8' + 9.5' = 13.3' \pm$$

D-22



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



QUAORANGLE 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

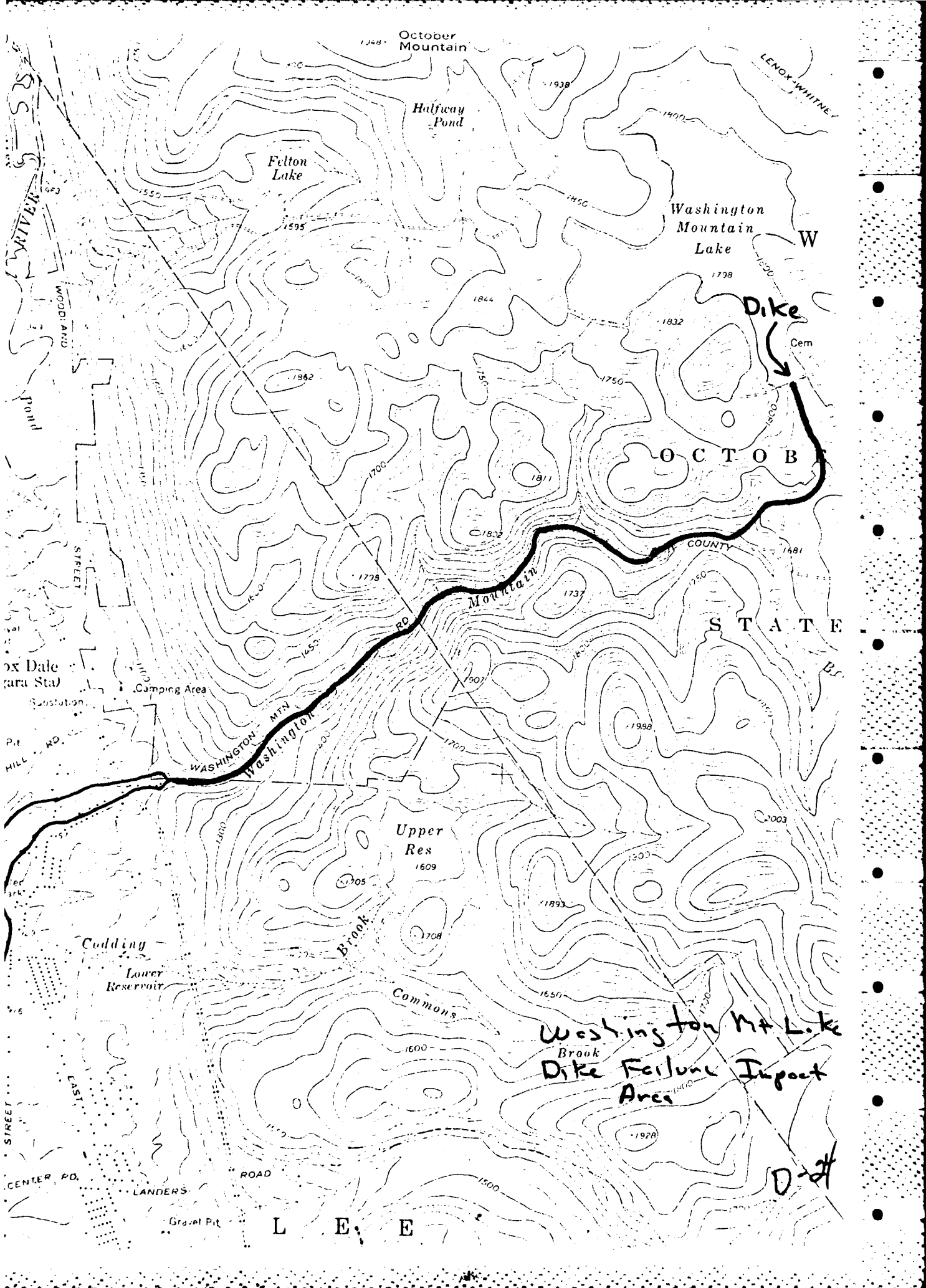
LOCATION AND DOWNSTREAM HAZARD MAP

WASHINGTON MOUNTAIN LAKE DIKE (MA 319)
BERKSHIRE COUNTY

MASSACHUSETTS

SCALE: AS NOTED

DATE: DECEMBER 1979



APPENDIX E

Information as Contained in
THE NATIONAL INVENTORY OF DAMS

Dam Spillway and Conduit Rating

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

Set orifices are down stream 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 Mt 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.

June 3, 1979

Hydrologic / Hydraulic

Computations

Checked By: Moe

3 of 18

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 SCS. 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	18.6
.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

D-5

Oct 3, 1979

Computations

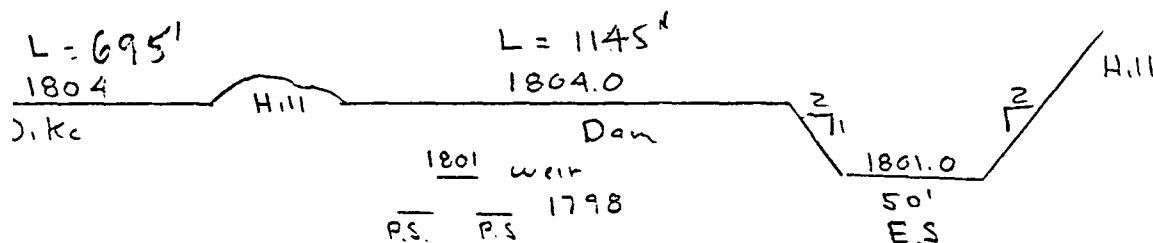
Checked By:

Moo

4 of 13

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.

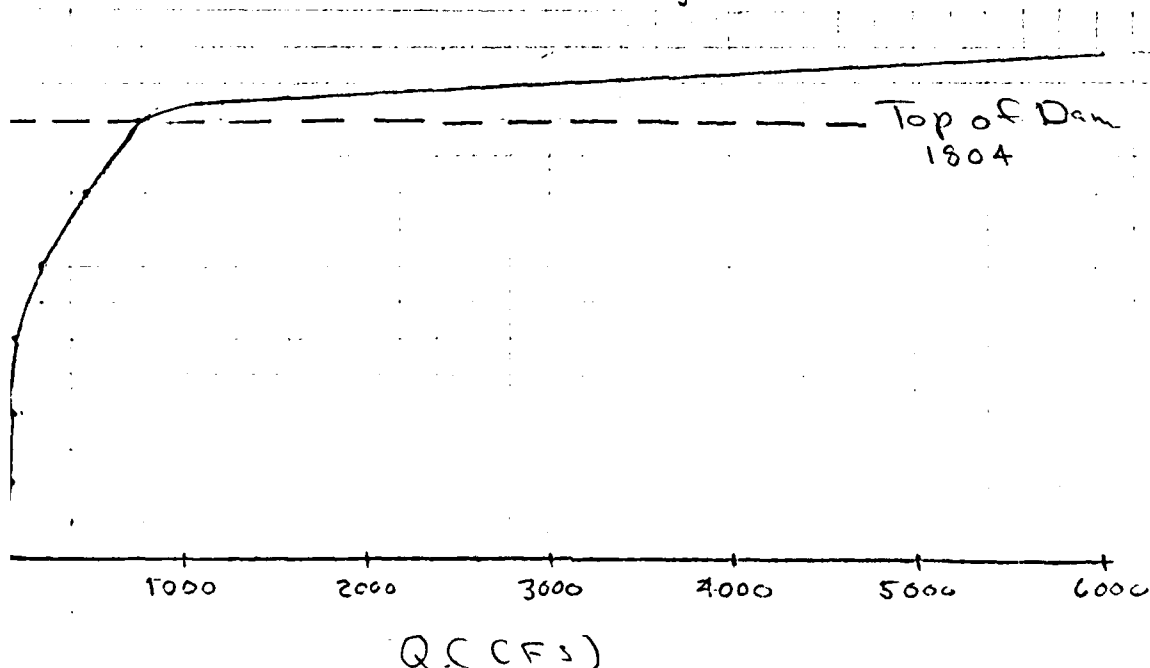


$$Q \text{ over dam} = C L H^{3/2}, C = 2.6$$

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

Supplemental Rating

Orifice		Risen Weir		Conduit		Emerg. Spill	Dam + Dike		Total
h	Q	h	Q	h	Q	h	Q	h	Q cfs
10.5	28.1	4.0	372	38.0	139.6	4.0	1100	10.0	5985
					limiting factor				



Reservoir Routing

Surcharge elevation to pass 3000 cfs
is 1804.5

$$\begin{array}{r} \text{Surcharge height} \quad 1804.5 \\ - 1798.0 \\ \hline 6.5 \text{ ft} \end{array}$$

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

$$\begin{aligned} \text{Volume of surcharge} &= \left(\frac{263 + 224}{2} \right) (6.5) \\ &= 1582.8 \text{ AF} \end{aligned}$$

$$DA = 1.35M = 832A$$

$$\text{Stor}_1 = \frac{1582.8 \text{ AF}}{832 A} = 1.90 \text{ ft} = 22.8''$$

$22.8'' > 15'$ 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
WASHINGTON MOUNTAIN L. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV DEC 79

2/2

UNCLASSIFIED

F/G 13/13

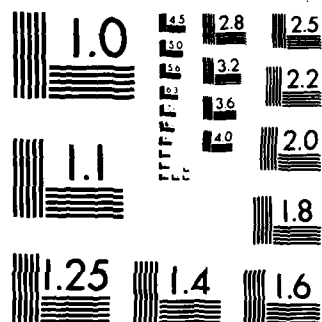
NL



END

FILMED

ETC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

February 12, 1960

Hydrology/Hydraulics

Comps

Computed by: D. L. Lenz

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

$7.7 \text{ SM} \times 2200 \text{ CFS/SM} \approx 17,000$

Spillway + Adj. Area = $17,000 + 788 \approx 18,000$

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, Sand 6	6.5'
7	5.0'

February 13, 1980

Hydrologic/Hydraulic

Comp

Computed by D. L. Leland

Determine Reservoir Stage
Use figure 17.11 from SCJ
National Engineering Handbook entitled
Section 4 - Hydrology

Data: Res. vol. - 4555 ¹³⁵⁰ to 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

<u>Res. Vol (AF)</u>	<u>Stage (Ft)</u>		<u>Out flow (CFS)</u>
	<u>Stor</u>	<u>Spillway</u>	
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. L. Leland

D-7B

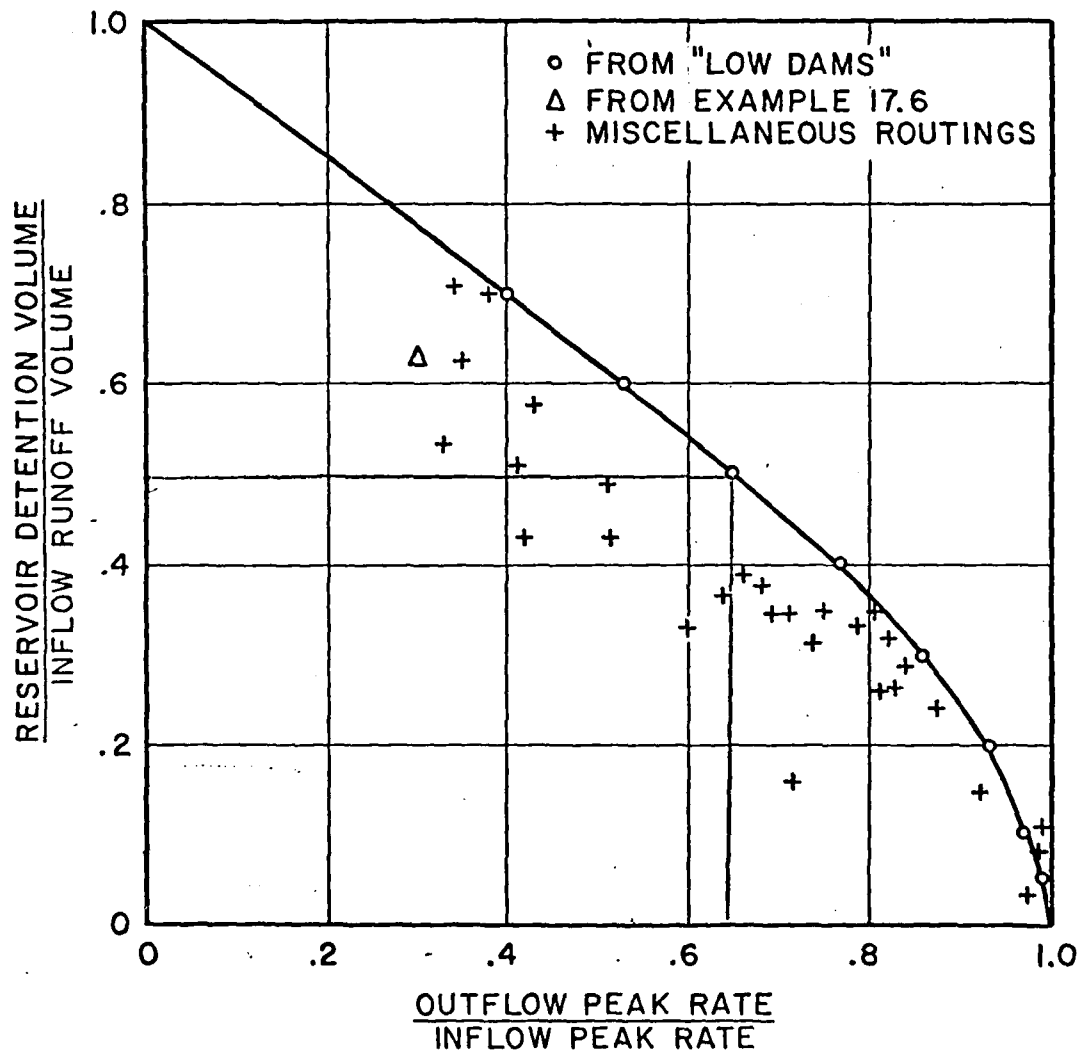


FIGURE 17.11

D-7C

December 14, 1952 Computation Sheet No. 1106

Dike Failure Analysis

$$Q_p = \frac{8}{27} W_b \sqrt{g} Y_o^{3/2}$$

Dike failure is assumed to occur

$$\text{height of dam } (40\% \text{ } 475) = 190'$$

Y_o = Height from River bed to point of failure

Water level will be at dam crest

when failure occurs because spillway

is probably not designed to carry

P.M.F.

$$Y_o = 15.5'$$

$$Q_{pi} = \frac{8}{27} (190)(5.675)(59.6)$$

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

The first downstream hazard is a bridge
on Washington Rd. E. east of Cloudland Rd.

Apply Downstream Failure Hydrograph

$$\text{Reservoir } 10,000 \text{ A.D.}$$

Neglect outflow from dam since

the flow will only be $1000 \pm$ cfs

which is 5% of failure flow

Include M.P.F. from 4.5 sq. mi. of

adjacent tributary D.A. ($Q = 8300 \text{ cfs}$) D-8

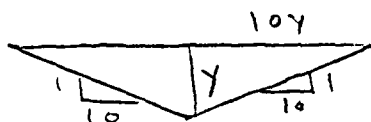
December 14, 1959

Hydrologic/Hydraulic
Computations

Computed by J. L. Lauer
Checked By: Moe

7-18

Cross-Section of Reach Above
Bridge in Narrow Part of Valley



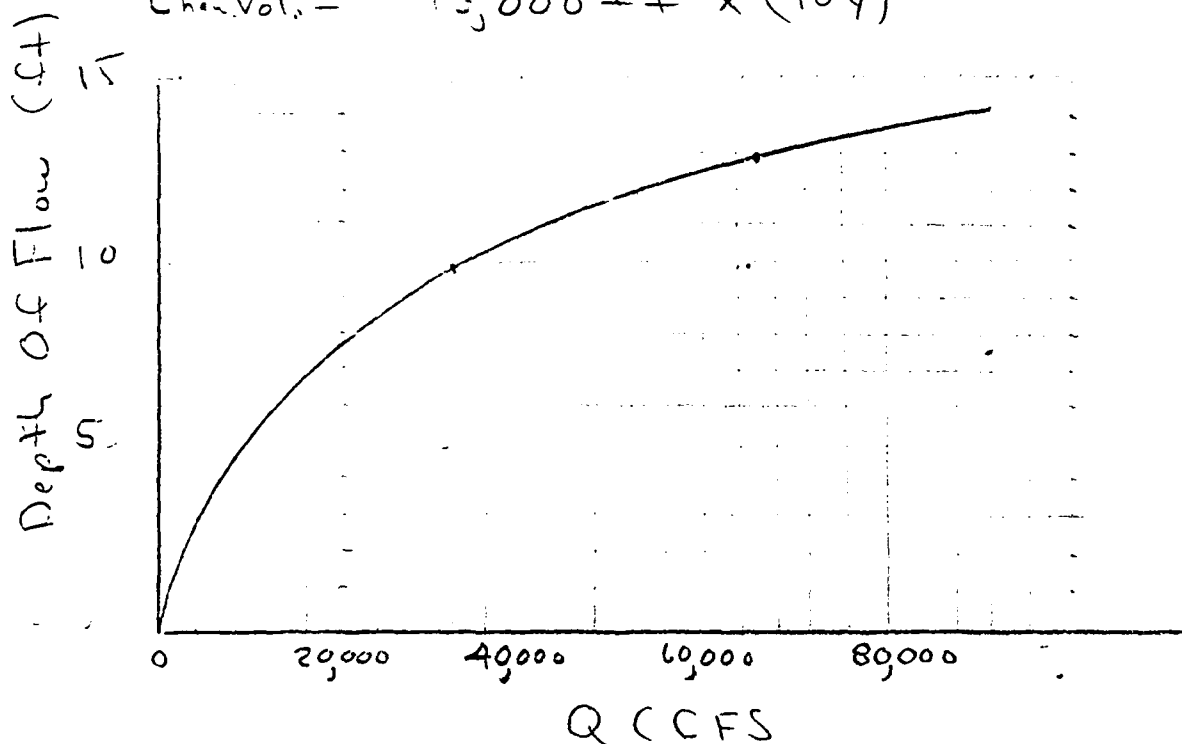
$$A = 10y^2$$

$$R = 0.498y$$

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

$$S = 0.05 \text{ or } 5\%$$

$$Chen Vol. = 15,000 \text{ ft} \times (10y)$$



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 $y = 10'$ $A = 1000 \text{ SF}$
 $R = 4.98$ $WP = 201 \text{ F}$

$$Q = 32,485 \text{ CFS}$$

D-9



Try $y = 13'$

$$Q = 1108 (1000) (3.45) = 45,050.8 \text{ CFS}$$

Estimate Reach Out-Flow

For $Q_{pi} (27,341 \text{ CFS}) \quad y = 9'$

$$V = (10000) (9) (90) \div 43,560 = 298 \text{ AF}$$

$S = 3985 \text{ AF}$ Dike storage to crest

$$Q_{p1} (Frac) = Q_{pi} (1 - \frac{V_1}{S})$$

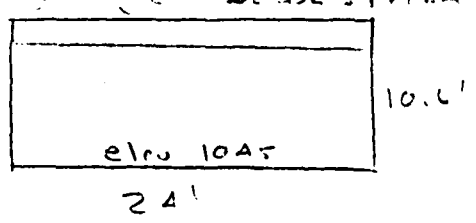
$$= (27,341) (1 - \frac{298}{3985}) =$$

$$= 25,296 \text{ CFS}, \quad y = 8.5'$$

$$V = (10,000) (8.5) (85) \div 43,560 = 30 \text{ TAF}$$

$$Q_{p2} = (27,341) (1 - \frac{282}{3985}) = \quad V_{ave} = \frac{265 + 298}{2}$$

- First Bridge Downstream On Washington R.R. Road East of Goodland, KS



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

$n = 0.03 \quad A = 254.4 \text{ SF}$

$S = 0.03 \quad R = 5.63$

$Q = 6,473 \text{ cfs}$

D11

December 19, 1957

Engineering

Control Co.

Moe

9-11

Full capacity of bridge above
 the second crossing. The
 road will be overtopped and
 flow will overflow the road on
 the southerly approach to the
 bridge.

Estimate Reach Outflow For
 the Second Crossing
 Channel 45Y above Second Crossing



$n = 0.03$
 $S = 0.03$

$A = 67.5Y^2$
 $WP = 135Y$
 $R = 0.5Y$

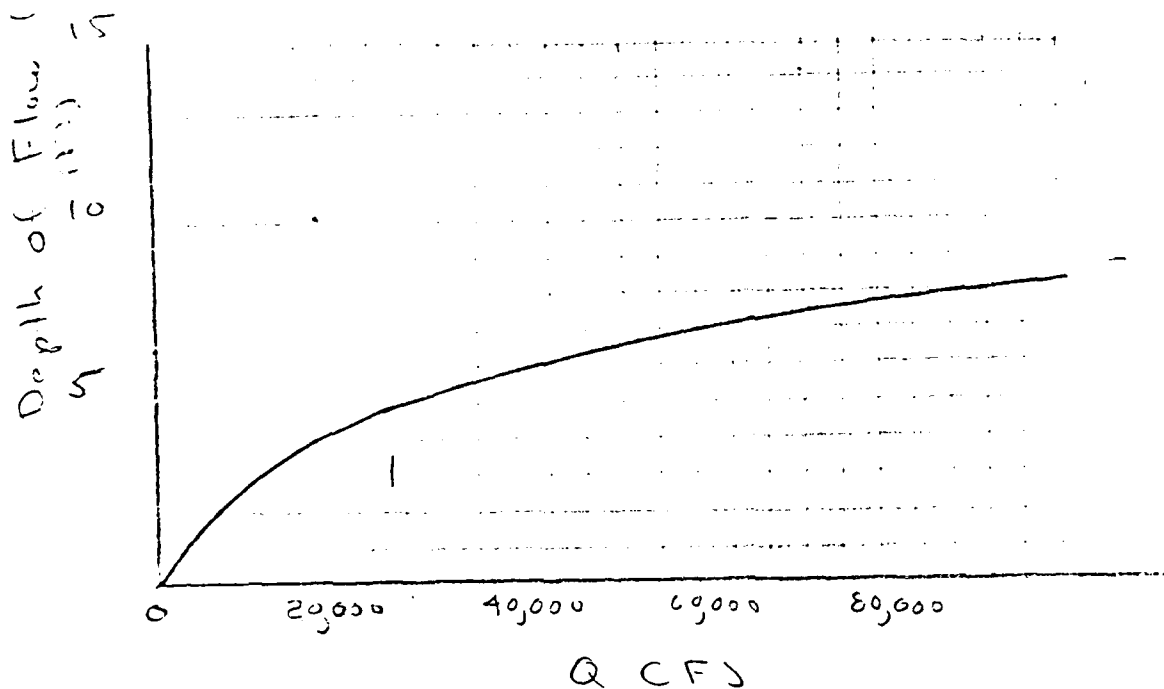
D-12

March 1, 1973 Computations Checked By Moe 12515

Second Reach Below West
+ Rd Bridge and Above Woodland Rd

$$L = 2000 \text{ ft}$$

$$V = 3000 (0.75) = \text{volume}$$



Computation of points on curve for
reach 2

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

Try $Y = 5$

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

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

Try $Y = 8$

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

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

D-13

For $G_p = 1$, $y = 4.75'$

$V = (2000)(67.5y^2) \div 43560 \text{ SF/A} = 69.94 \text{ F}$

$Q_{p2(n2)} = 25,406 \text{ CFS} (1 - \frac{69.9}{3985}) =$

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

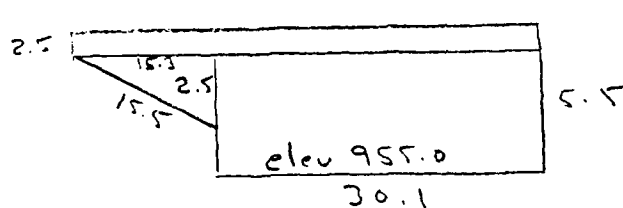
$V = 65.5 \text{ AF } V_{ave} = \frac{69.9 + 65.5}{2}$

$Q_{02} (25,406) (1 - \frac{67.7}{3985}) =$

$= 24,974 \text{ CFS}$

$y = 4.6'$

Flow Through Second Bridge Crossing



5.5
30.1
5.5
2.5
15.5
59.1

$n = 0.03 \quad A = 184.7 \text{ SF}$

$S = 0.03 \quad WP = 59.1 \text{ Ft}$

$R = 3.12$

$Q = 3369.1 \text{ CFS (bridge capacity)}$

The second crossing can not handle the flow through due to failure. Therefore the bridge will be overtopped and the flow will be over the south side of the bridge.

D-14

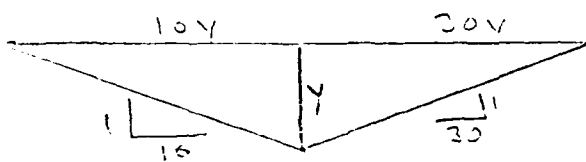
Hydrographs prepared by
 12/4/55 Computations checked by Mow

12-10

The 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 stage of the stream above.

$$R_{min} = 2000 \text{ cfs}$$

Cross section of ~~E~~-Reach Above
 B-1 Bridge



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

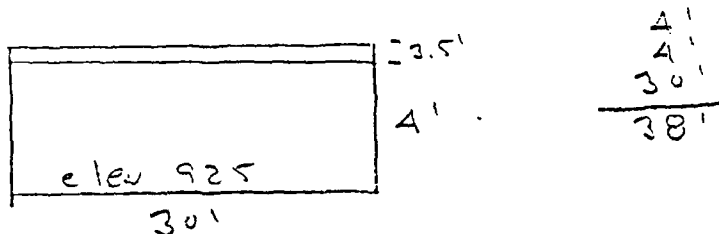
$$WP = 40.1y$$

$$R = 0.498y$$

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

D-15

The Third Downstream Crossing
 On Washington Ave Pool Near
 Mill St



$$A = 120 \text{ SF}$$

$$h = 0.03$$

$$WP = 38 \text{ Ft}$$

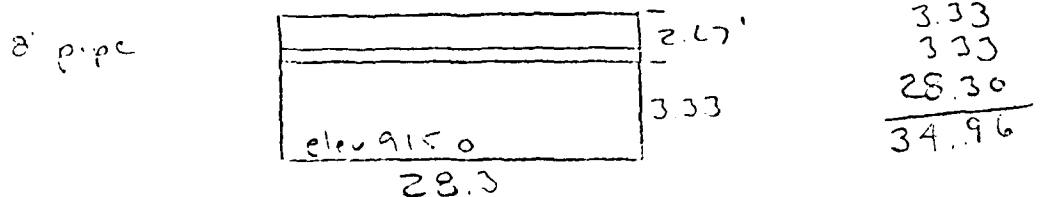
$$S = 0.013$$

$$R = 3.15$$

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

$$Q = 1472 \text{ CFS}$$

The Fourth Crossing
 On Mill St



$$A = 93.4 \text{ SF}$$

$$h = 0.03$$

$$WP = 34.96 \text{ Ft}$$

$$S = 0.013$$

$$R = 2.67$$

$$Q = 1015.5 \text{ CFS}$$

D-16

Hand-drawn sketch of a rectangular structure. The width is labeled as 18.8' and the height as 10.5'. The elevation is noted as elev 915.00.

$$\begin{array}{r} 10.5 \\ 10.5 \\ 18.8 \\ \hline 39.8 \end{array}$$

$A = 157.4 \text{ SE}$

u.p. 398.

$R = 4.96$

$$Q = \frac{1.486}{0.07} (197.4) (4.96)^{2/3} (0.013)^{1/2}$$

Q: 3244 CFS

December 7, 1938

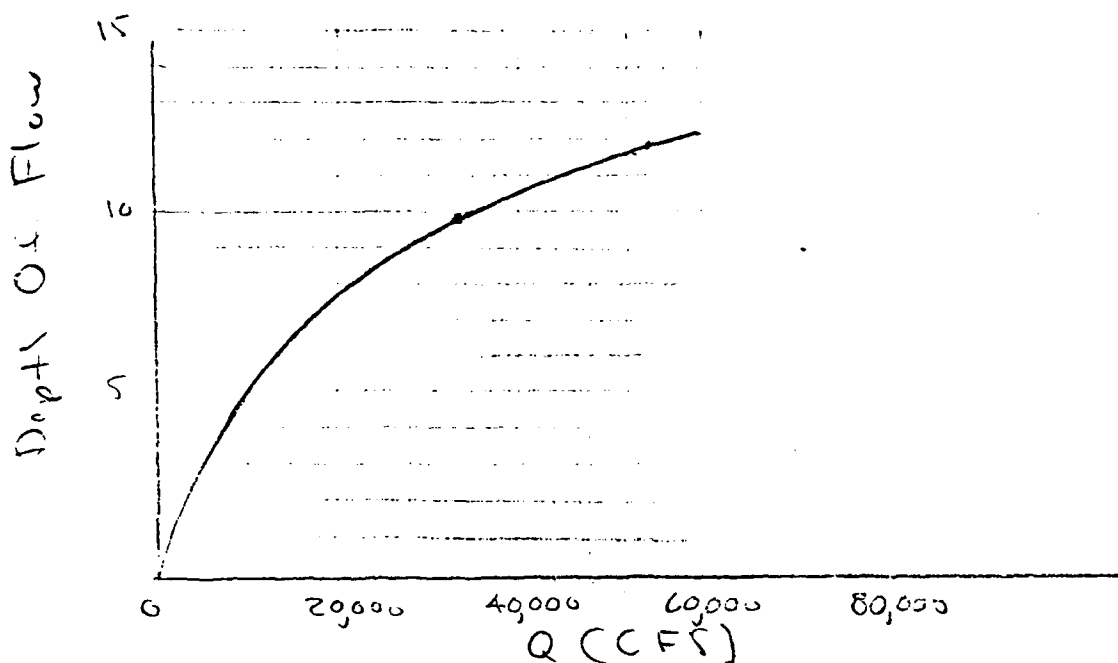
Hydrology / Hydraulic

Computations

Computed by U. L. L. L.

Checked by Moe

150-15



Computation of Points On Curve
For Rect 3

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

Try $y = 10$

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

$$= 33,130 \text{ CFS}$$

Try $y = 12'$

$$Q = (5.65)(2980)(0.498 \times 12)^{2/3}$$

$$Q = 53,418 \text{ CFS}$$

D-18

NOT AVAILABLE AT THIS TIME

END

FILMED

7-85

DTIC