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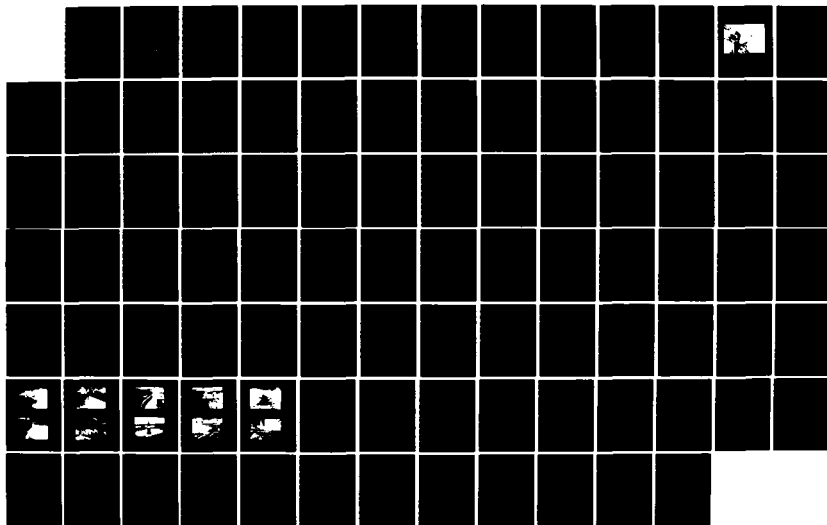
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MA NEW ENGLAND DIV JUN 79

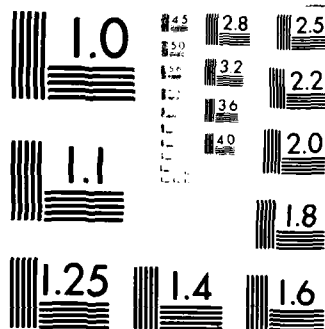
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MERRIMACK RIVER BASIN
CAMPTON, NEW HAMPSHIRE

CAMPTON POND DAM
N.H. 00130

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

JUNE 1979

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| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is composed of three main sections including an earth dike with stone masonry retaining wall, a concrete dike section and a solid concrete spillway section. It is small in size with a significant hazard classification. The dam was found to be in fair condition based on a limited spillway capacity of only 52 percent of the test flood. | | |

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CAMPTON POND DAM

NH00130

CAMPTON, NEW HAMPSHIRE

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No: NH 00130
Name of Dam: Campton Pond Dam
Town: Campton
County and State: Grafton, New Hampshire
Stream: Mad River
Date of Inspection: May 2, 1979

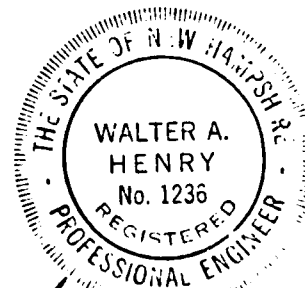
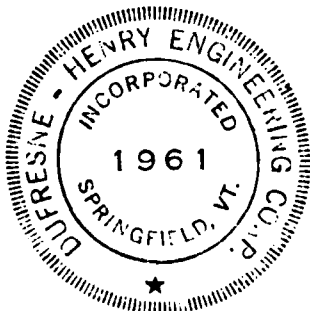
BRIEF ASSESSMENT

The Campton Pond Dam is composed of three main sections including an earth dike with stone masonry retaining wall, a concrete dike section and a solid concrete spillway section. The overall length of the dam is approximately 300 feet and the maximum height at the spillway is 39 feet. The dam is equipped with flashboards, but they are not in use. The reservoir has a drainage area of 58 square miles and impounds approximately 350 acre-feet which is used for recreation purposes.

The dam is classified as small and has a significant hazard classification. Based on size and hazard classification a test flood of one-half the probable maximum (1/2 PMF) was selected. The test flood inflow was calculated at 30,900 CFS (536 CSM). Since this is a run-of-the-river type dam, there was no adjustment for surcharge storage and outflow was assumed to equal inflow. The spillway capacity with the highway stop logs in place is 16,000 CFS which is 52 percent of the test flood which would overtop the dam by 3.5 feet.

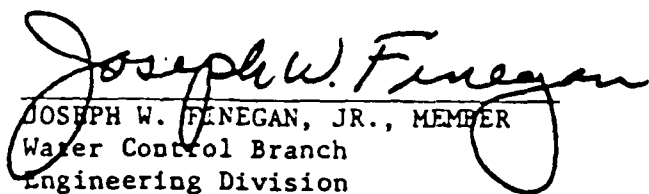
The dam was found to be in fair condition based on a limited spillway capacity of only 52 percent of the test flood. The new concrete cutoff wall installed in 1978 to seal a high water leak through a stone masonry wall has not yet been tested under high head conditions. This should be inspected during the next high floodwater condition. Minor spalling of concrete is occurring at several locations and should be repaired during the next inspection and maintenance. Periodic technical inspections should be performed at least every two years.

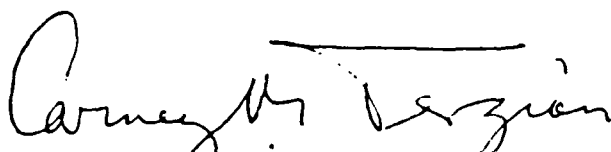
Since the spillway capacity is only 52 percent of the computed test flood, it is recommended that formal written procedures be established for the installation of the highway stop logs and evacuation of downstream residents.

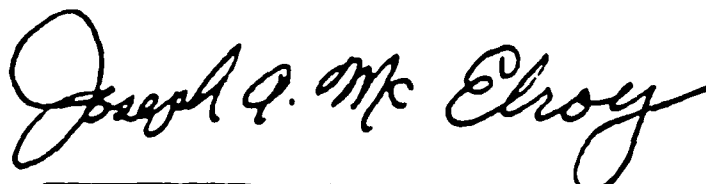


Walter A. Henry

This Phase I Inspection Report on Campton Pond Dam 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 judgement and practice, and is hereby submitted for approval.


JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division


CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division


JOSEPH A. MCELROY, CHAIRMAN
Chief, NED Materials Testing Lab.
Foundations & Materials 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 aid 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.

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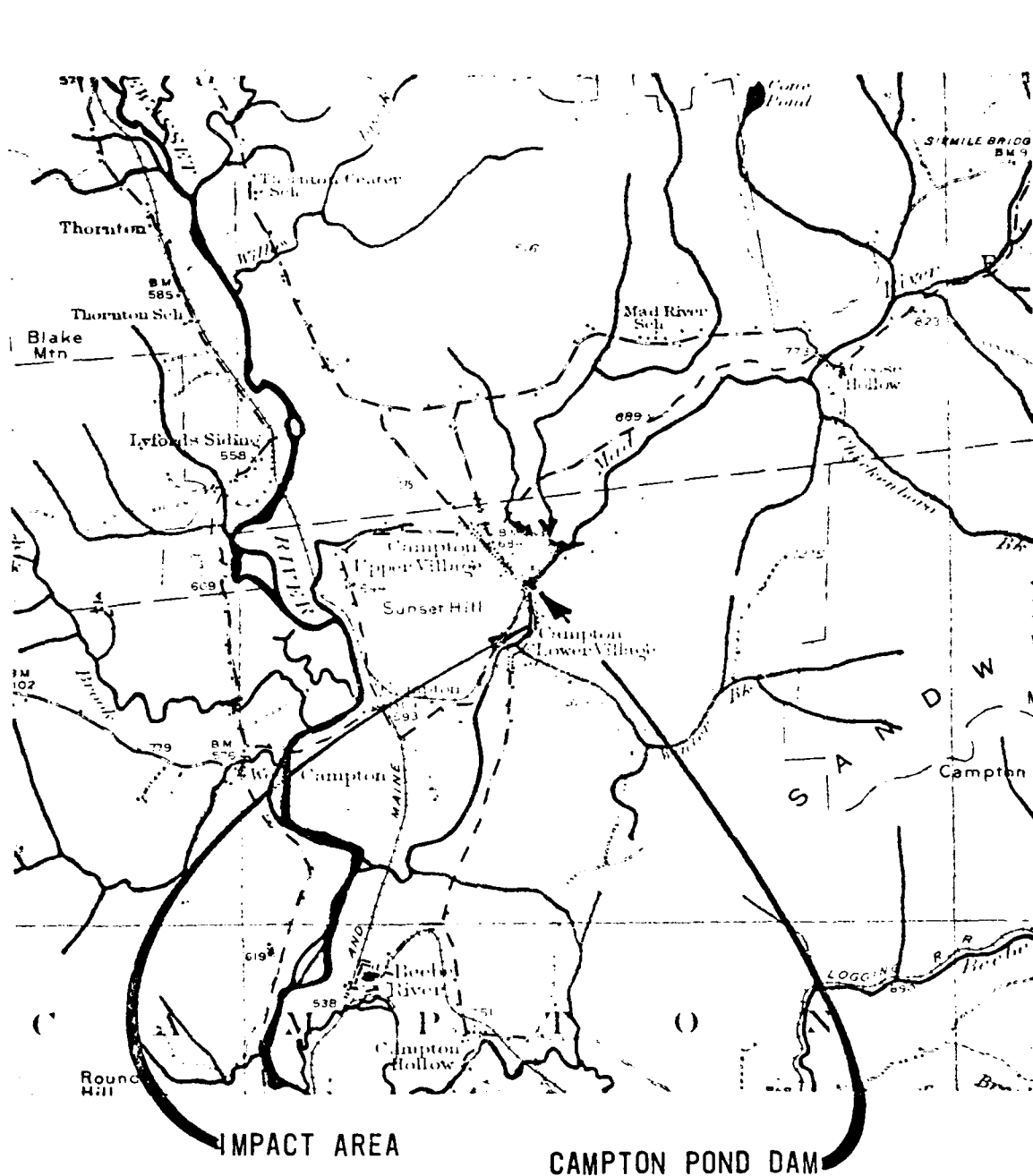
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OVERVIEW OF
CAMPTON POND DAM
CAMPTON, NEW HAMPSHIRE



SOURCE:

USGS QUADRANGLE
PLYMOUTH, N.H. 1928
1"=5208'

DUFRESNE-HENRY ENGINEERING CORP.

ARCHITECT-ENGINEER

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

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION MAP
CAMPTON POND DAM

CLIENT NO. 04-0088
ENGR. J.D.

SCALE 1" = 1 MILE
DATE

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
NAME OF DAM: CAMPTON POND

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. Dufresne-Henry Engineering Corporation has been retained by the New England Division to inspect and report on selected dams in the State of New Hampshire. Authorization and notice to proceed were issued to Dufresne-Henry Engineering Corporation under a letter of November 20, 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0010 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 nonfederal interests.
- (2) Encourage and prepare the states to initiate quickly effective dam safety programs for nonfederal dams.
- (3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

The Campton Pond Dam is located at 43°51.7' north latitude and 71°38.0' west longitude in central New Hampshire in the Town of Campton, Grafton County. The dam is on the Mad River which is tributary to the Pemigewasset River which is in turn tributary to the Merrimack River.

b. Description of Dam and Appurtenances

The dam consists of three types of structures. Beginning from the left abutment they are: an earth dike with upstream

masonry retaining wall; a short section of concrete dike; and a concrete run-of-the-river type dam (main dam). The dam has an overall length of 300 feet and has a maximum height of 39 feet at the main spillway.

c. Size Classification

The Campton Pond Dam has a maximum height of 39 feet and a maximum storage of 650 acre-feet. United States Corps of Engineers (USCE) guidelines place dams with maximum heights between 25 and 40 feet and maximum storage between 50 and 1000 acre-feet in the small category. Therefore the size classification of the Campton Pond Dam is small.

d. Hazard Classification

A failure of the Campton Pond Dam would route a flood wave into the lower channel of the Mad River. The flood wave would impact one residence and an old factory which is being renovated, resulting in significant economic damage and possible loss of life. Approximately one mile downstream, in the Town of Campton Station, the river passes within 300 feet of a trailer park. Although this area would most likely be flooded during a major storm, the additional flow due to a dam failure may cause additional economic damage and possible loss of life. The hazard classification is therefore significant.

e. Ownership

The present owner of the Campton Pond Dam is:

United States Forest Service
Main Street
P.O. Box 638
Laconia, New Hampshire 03246

Telephone: 603-524-6450

f. Operator

The operation of the dam is under the supervision of the forest supervisor:

Mr. Leonard Houston

g. Purpose

The dam was constructed for public recreation purposes.

h. Design and Construction History

The original dam at this site was a log crib dam constructed in 1892 by the Winnepesaukee Paper Company and was used for hydroelectric power. This dam was reported to have been washed out in the 1927 flood and reconstructed shortly thereafter. In the early 1930's the dam ceased its hydroelectric operations. In order to preserve the reservoir, the U. S. Forest Service took over the site and constructed a concrete replacement dam in 1935.

The dam itself has remained relatively unchanged since its initial construction. In 1969 a State highway project breached the right concrete abutment, lowering it by approximately four feet.

In order to maintain the maximum capacity of the spillway, a temporary stop log closure was constructed which would be set in place only during a major flood threat (see Photo 6).

During the June 30, 1973 flood a leak developed through the left abutment wall upstream of the dam. In 1978 a concrete cut-off wall was constructed along the upstream face of the abutment wall effectively sealing the leak. The new wall can be seen in Photo 3.

i. Normal Operating Procedures

Since the dam impounds water for recreational purposes there are no routine operating procedures other than periodic inspections and maintenance by the Forest Service. During the threat of major flooding, the dam is continually monitored by Forest Service and Public Works personnel in the event that the stop log structure across Waterville Road (Route 49) is required.

Although the dam was designed for 3-foot flashboards, they are not being used at the present time.

1.3 Pertinent Data

a. Drainage Area

The drainage basin above Campton Pond includes approximately 58 square miles with land in two counties and five towns. Most of the land is undeveloped mountain terrain within the White Mountain National Forest. Elevations vary from a low of 647 at Campton Pond to a high of 4000 along the mountain ridges. The average slopes are very steep and runoff due to rainfall and snowmelt is rapid and sometimes unpredictable.

b. Discharge at the Dam Site

(1) Outlet Works

The only discharge at the dam site other than the spillway is a 30-inch diameter sluice gate. The manual gate operator is located on a concrete service platform on the left side of the dam (see Photo 1). The sluice gate has a capacity of 103 CFS with the water level at the spillway crest; 126 CFS at the top of dam.

(2) Maximum Known Flood at Dam Site

The maximum known flood at the dam site occurred in early October 1959 when a three-day storm struck the New England area. Total rainfall intensities varied from 6 to 10 inches in the White Mountain area. The flow over the Campton Pond spillway reached a maximum height of 8 feet which represents a discharge of approximately 13,000 CFS. (See special report in Appendix B.) Other storms of high magnitude occurred in 1927, 12,000 CFS and 1938, 8,000 CFS.

(3) Spillway Capacity

The Campton Pond spillway is a 151.3-foot long ogee spillway with a maximum height of 9 feet. During the highway construction of 1969 the right abutment was breached. The elevation of the road surface is 652.2 reducing the maximum height (without overtopping) to 5.2 feet. The breach in the right abutment is equipped so that a stop log closure can be installed in the event of a flood threat. The maximum capacity of the spillway without the stop logs in place is approximately 7,000 CFS. With the stop logs in place the capacity increases to approximately 16,000 CFS.

c. Elevations

| | <u>Feet above MSL</u> |
|--|-----------------------|
| Streambed at centerline of dam (estimated) | 617 ± |
| Maximum tailwater | Not known |
| Recreation pool | 647.5 ± |
| Full flood control pool | Not applicable |
| Spillway crest | 647.00 |
| Design surcharge | 656.00 |
| Top of dam | 656.00 |
| Test flood surcharge | 659.50 |

- | | |
|---|-------------------|
| d. <u>Reservoir</u> | <u>Feet*</u> |
| Length of maximum pool | 3000 |
| Length of recreation pool | 2000 |
| Length of flood control pool | Not applicable |
| e. <u>Storage</u> | <u>Acre-feet*</u> |
| Recreation | 350 |
| Flood control pool | Not applicable |
| Test flood pool | 980 |
| Spillway crest pool | 350 |
| Top of dam | 650 |
| f. <u>Reservoir Surface</u> | <u>Acres*</u> |
| Top of dam | 60 |
| Test flood pool | 70 |
| Flood control pool | Not applicable |
| Recreation pool | 43 |
| Spillway crest | 43 |
| g. <u>Dam</u> | |
| (1) <u>Type</u> | |
| a. Earth dike with stone masonry retaining wall. Approximate length of 120 feet. | |
| b. Concrete dike section, approximate length of 30 feet. | |
| c. Main concrete dam, run-of-the-river type, length of 151.3 feet. | |
| (2) <u>Length (overall)</u> | |
| 300 feet. | |

*Estimated based on USGS topographic maps, overhead photographs and visual observations.

(3) Height

39 feet maximum.

(4) Top Width

Not applicable (ogee spillway).

(5) Side Slopes

Not applicable.

(6) Zoning

None known.

(7) Impervious Core

Concrete.

(8) Cutoff

Concrete wall in both abutments.

(9) Grout Curtain

Not applicable.

h. Diversion and Regulating Tunnel

Not applicable.

i. Spillway

(1) Type

Concrete ogee.

(2) Length

151.3 feet.

(3) Crest Elevation

647.00

(4) Gates

30" diameter outlet gate.

(5) Upstream Channel

Campton Pond.

(6) Downstream Channel

Mad River.

j. Regulating Outlet

The 30" diameter outlet gate operator is located on a concrete platform above the spillway (see Photo 1). The gate has been used in past years to regulate the water level of Campton Pond.

SECTION 2 - ENGINEERING DATA

2.1 Design

The Campton Pond Dam was designed by the United States Forest Service under the supervision of Perley M. Burnham. The design and subsequent construction were reviewed by Samuel J. Lord of the New Hampshire Public Service Commission.

The dam was designed as a replacement of a log crib dam which was originally constructed in 1892 and was utilized for hydroelectric power. The new dam is a solid concrete dam designed as a spillway for its entire width between abutments. An ogee spillway design was utilized.

2.2 Construction

The dam was constructed in 1935. There is very little data on file with the New Hampshire Water Resources Board of the actual construction.

In 1969 a State Highway project breached the right abutment core wall, lowering it by approximately four feet. The core wall was terminated level with the new roadway and equipped with stanchion supports so that a stop log structure could be erected across the roadway in the event of a flood threat (see Photo 6).

The left abutment wall experienced some significant leakage during the 1973 storm. This portion of the wall is constructed of stone masonry with a concrete top. The masonry joints apparently deteriorated to a point where leakage occurred during water levels in excess of the crest elevation. The condition was corrected in 1978 with the construction of a 2-foot thick concrete facing on the upstream side of the wall (see Photo 3).

2.3 Operation

Since the dam impounds water for recreational purposes there are no established operation procedures other than periodic inspection and maintenance.

The outlet gate was used in the mid-1970s to control the water level in order to minimize the leakage through the left abutment wall. Since this condition has been corrected the gate is no longer utilized on a regular basis.

2.4 Evaluation

a. Availability

The design and construction drawings for this dam are on file with the U. S. Forest Service.

b. Adequacy

Based on visual observations and available engineering data, the information is sufficient for a Phase I inspection.

c. Validity

The available engineering data are considered valid on the basis of the visual inspection.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General

The on-site inspection of the Campton Pond Dam was performed on May 2, 1979. The dam was found to be in good condition.

At the time of inspection, the water level in the reservoir was 8 feet 2 inches below the top of the left training wall. Photo 2 illustrates the flow conditions at the time of the inspection.

b. Dam

The dam consists of three types of structures. Beginning from the left abutment they are: an earth dike with upstream masonry retaining wall; a short section of concrete dike (training wall); and a concrete run-of-the-river type dam.

(1) Earth Dike with Upstream Training Wall

Photo 3 illustrates the earth dike. Due to seepage through the dike, the Forest Service installed a drain system on the downstream side of the dike in 1977 and constructed an 8-foot deep concrete cutoff wall on the upstream side of the masonry retaining wall in 1978. At the time of inspection, the dike showed no signs of leakage. It could not be ascertained whether there was any discharge from the downstream drain because the drain connects with a culvert that also contains the flow from a stream.

(2) Concrete Dike (Training Wall)

The concrete dike connects the earth dike with the main dam. Apart from minor spalling of concrete from the downstream face, the dike remains in good condition.

(3) Main Dam

The main dam consists of a concrete run-of-the-river type dam with a 30-inch diameter outlet gate controlled from a concrete superstructure. There are provisions for a stop log system along the crest of the dam. The dam spillway spans a natural stream channel in bedrock as evidenced by the natural stream below, illustrated in Photos 1 and 8. The concrete of the dam, as it can be observed through the flowing water, appears in good condition (see Photo 2).

Both left and right sides of the downstream channel include concrete and masonry retaining walls which support paved roadways. Photo 5 illustrates the left downstream retaining wall as viewed from the gate structures. As the photo indicates, bedrock provides foundations for the wall. The rock strikes almost perpendicular to the dam and dips approximately 70° toward the stream (west). The angularity of the rock surfaces indicates stable foundation material. Photo 4 illustrates the right downstream retaining wall. As the photo indicates, the wall also rests on bedrock. The masonry section of the wall rests on a concrete foundation poured on rock. The rock strikes almost perpendicular to the dam and dips approximately 85° toward the stream (east). Considerable spalling is occurring at both the concrete footing and the concrete-rock interface, but should not impair its stability. Similarly, some minor spalling of concrete is also evident around the construction joints in the concrete section of the wall near the dam. Some small local depressions in the ground surface behind the wall indicate some consolidation of the backfill probably has occurred. No openings in the wall were observed that could have produced loss of backfill through the wall. There is no apparent tilting of the wall.

Route 49, which traverses the west bank of Campton Pond, crosses the right abutment of the dam at an elevation a few feet below the top of the dam. To prevent the road from becoming an "emergency spillway" the highway department installed provisions for an emergency stop log type dam across the road. Photo 6 illustrates the foundation and key for the emergency dam as viewed from the right training wall of the spillway.

c. Appurtenant Structures

Photo 7 illustrates the condition of the outlet gate control superstructure. Water flowing over the dam precluded inspection of the outlet pipe, but all exposed concrete appears in good condition.

d. Reservoir Area

The reservoir area is known as Campton Pond and has existed since 1890 when the original dam was constructed. As shown on the overhead photo, the reservoir has undergone major siltation since its original formation. Several islands have been formed by the sediment load deposited by the Mad River. In 1969 Route 49 was constructed along the right bank of Campton Pond. The strip of reservoir bank between the road and water level is stone riprap.

e. Downstream Channel

The downstream channel consists of the natural river bed of the Mad River. The river banks immediately downstream of the dam are formed by concrete and stone retaining walls which support paved roadways. Approximately 150 feet downstream of the dam, the channel is spanned by a concrete arch highway bridge.

3.2 Evaluation

On the basis of the visual inspection, the dam is judged to be in good overall condition. The water level in Campton Pond at the time of inspection did not permit evaluation of the effectiveness of cutoff wall recently constructed on the upstream side of the left earth dike.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

Since the dam and reservoir are being used for passive recreation the dam is not operated according to established procedures.

4.2 Maintenance of Dam

The existing maintenance of the dam consists of periodic inspections and repairs as required, including general clean-up and removal of debris.

4.3 Maintenance of Operating Facilities

The outlet gate is maintained in good operating condition and has been used in recent years to regulate the pond level.

4.4 Description of Warning System in Effect

The flow over the Campton Pond Dam is monitored by U.S.C.E. gauge No. 39, located along the left abutment. The flow data is transmitted via radio directly to the U.S.C.E. reservoir control headquarters in Waltham, Massachusetts. In the event of major flood flow predictions, the appropriate civil defense personnel would be notified.

On the local level, the dam is monitored by local Public Works and Forest Service personnel during major rainfall so that the stop log structure across Route 49 can be erected in the event of a flood threat.

4.5 Evaluation

The visual inspection and review of the file data indicates that the operation and maintenance of this dam is more than adequate. A formal written procedure for the installation of the highway stop logs should be established.

SECTION 5 - HYDRAULIC AND HYDROLOGIC EVALUATION

5.1 Evaluation of Features

a. General

The Campton Pond Dam is a concrete run-of-the-river type dam. It is a low surcharge storage-high spillage dam designed for continuous overtopping. The concrete spillway of ogee section is 151.3 feet long and is 9 feet below the top of the abutments.

b. Design Data

There is no design data available for the Campton Pond Dam. Hydraulic/hydrologic calculations were based on field measurements.

c. Experience Data

From the records available, there is no known incident when the Campton Pond Dam was overtopped. However, in a localized storm of 1959 the water level was within 1 foot of overtopping, (8 feet above crest elevation). The flow was estimated at 13,000 CFS. Another significant flow was during the 1927 flood during which an estimated flow of 12,000 CFS was recorded.

d. Visual Observations

The visual inspection of the dam revealed it to be generally in good condition. The sluice gate for the 30-inch low-level outlet was in good operable condition. The stop log key way runs from the right abutment across Route 49 and partially up the slope beyond. It appeared in good condition also. The rough downstream channel is a natural stream bed carved into ledge rock formations. As can be seen from the overview photo, the upstream channel has been substantially filled with silt, which reduces the effective storage of the dam considerably.

e. Test Flood Analysis

Based on a size classification of small and a hazard classification of significant, the test flood was selected to be one-half the probable maximum flood (1/2 PMF). The test flood was developed, using the computer program HEC-1 from the U.S. Army Corps of Engineers and was found to be 30,900 CFS (536 CSM). This inflow was not adjusted for surcharge storage as this is a run-of-the-river type dam, with low storage capacity and therefore test flood outflow equals test flood inflow. During the test flood, assuming the stop logs were installed across Route 49, there would be 3.5 feet of water flowing over the

top of the abutments. This would mean 12.5 feet of water above the spillway crest elevation. If, however, the stop logs were not installed across Route 49, the road would act as an emergency spillway. The majority of the water flowing down Route 49 would re-enter the channel immediately downstream of the bridge, approximately 200 feet below the dam. Without the stop logs in place during the test flood, approximately 3.2 feet of water would flow over the top of the abutments. This would be 12.2 feet above the spillway crest elevation. It is apparent that the placement of the stop logs would have little effect during a flood as severe as the test flood. The spillway has a capacity of 15,932 CFS, with the stop logs in place, which is 52 percent of the test flood.

f. Dam Failure Analysis

If the Campton Pond Dam were to fail under normal conditions, a 17-foot wave would be released. The flow would be approximately 13,500 CFS. The flood wave would be contained within the channel until it reached a point approximately 900 feet downstream of the dam. At this location a house and a mill are located along the left bank. The house which sits on the river bank would be undermined and probably destroyed. The mill would have water up to the ground floor and would be susceptible to serious undermining also.

With the water level at the top of the dam, elevation 656.0, the flow within the river would be 15,900 CFS. A failure of the dam with water at this stage would release an additional 14,700 CFS, for a total flow of 30,600 CFS at the instant of failure. Due to the relatively close locations of the house and the mill downstream of the dam, the initial flow of 30,600 CFS would only be reduced to a flow of 30,300 CFS at these points. From rating curves developed for several cross sections downstream of the dam, water elevations can be determined at the mill location. For a dam failure and a flow of 30,300 CFS the water level at the mill would be approximately 5 feet above the ground floor of the mill and about 3 feet above the road adjacent to the mill as opposed to the flood conditions prior to failure which would be 4 feet lower. The house just upstream of the mill would be undermined and seriously damaged, with possible loss of life. The mill would also be seriously undermined and flooded, sustaining major damage. Approximately 2 miles downstream of the dam a trailer park is located about 10 feet above the normal water elevation of the river. Although this area would probably be flooded during the 1/2 PMF from the Pemigewasset River, it would appear that some additional damage may result from a dam failure to the trailer park. A more intensive study would have to be performed to determine how severe the damage would be. Still the hazard classification of the dam is significant due to the location of the house and the mill and potential for high economic damage and possible loss of life.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

Visual observation of the dam and appurtenances did not disclose any stability problems.

b. Design and Construction Data

The available data concerning design, construction and existing structural condition was not sufficient for a formal stability analysis.

c. Operating Records

The operating records include reference to leakage of the left abutment and breaching of the right abutment by road construction. Post-construction changes discussed below apparently have eliminated these problems.

d. Post-Construction Changes

Post-construction activities include several changes in dam characteristics and surrounding topography, including: complete dam reconstruction in 1934-1935 (from wood to concrete); rerouting of adjacent Route 49 in 1969 which breached the right abutment; clearing of trees on the left abutment; erection of a stop log structure over the road at the right abutment in 1970; installation of an underdrain on the downstream side of the earth dike in 1977; and construction of a concrete cutoff wall on the upstream side of the earth dike.

e. Seismic Stability

The dam is located in Seismic Zone 2 and in accordance with the recommended Phase I guidelines does not warrant seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/ REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

On the basis of visual inspection and a review of available data, the dam appears in fair condition because of the limited spillway capacity.

b. Adequacy of Information

The available information proved sufficient for a Phase I inspection, but not for a complete analysis of dam stability.

c. Urgency

The recommendations presented in Sections 7.2 and 7.3 should be instituted within one year of the receipt of this report.

d. Need for Additional Investigations

The dam requires no further investigation.

7.2 Recommendations

The following recommendations should be performed under the guidance of a qualified professional engineer.

1. Observe the performance of the earth dike during high water conditions.
2. Investigate the need for increased spillway capacity.
3. Establish formal written procedures for installing the highway stop logs and for evacuating downstream residents in the event of an impending dam failure.

7.3 Remedial Measures

The following remedial measures should be undertaken:

1. Institute a program of annual periodic technical inspections. Inspections should be performed during low water conditions and concentrate on the condition of the concrete spillway, seepage or undermining and the pond outlet works.
2. Repair the spalling concrete.

7.4 Alternatives

Not applicable.

APPENDIX A

VISUAL INSPECTION CHECK LIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT CAMPTON POND DAM

DATE May 2, 1979

TIME _____

WEATHER _____

W.S. ELEV. _____ U.S. _____ DN.S. _____

PARTY:

- | | | |
|----------------------------|------------|--|
| 1. <u>Walter A. Henry</u> | <u>D-H</u> | 6. <u>Forest Service Representative</u> |
| 2. <u>James A. Dohrman</u> | <u>D-H</u> | 7. <u>Ken Stearns, New Hampshire Water</u> <u>Resources Board</u> |
| 3. <u>Wayne A. Leonard</u> | <u>D-H</u> | 8. _____ |
| 4. <u>Gonzalo Castro</u> | <u>GEI</u> | 9. _____ |
| 5. <u>Roger Gardner</u> | <u>GEI</u> | 10. _____ |

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

PERIODIC INSPECTION CHECK LIST

PROJECT CAMPTON POND DAM DATE May 2, 1979
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

| AREA EVALUATED | CONDITION |
|---|--|
| <u>DAM SECTION</u> | |
| Crest Elevation | 647 |
| Current Pool Elevation | 647.8 |
| Maximum Impoundment to Date | |
| Surface Cracks | Could not observe - water flowing over dam |
| Pavement Condition | Not applicable. |
| Movement or Settlement of Crest | Not applicable. |
| Lateral Movement | None observed. |
| Vertical Alignment | Good. |
| Horizontal Alignment | Good. |
| Condition at Abutment and at Concrete Structures | Good. |
| Indications of Movement of Structural Items on Slopes | Not applicable. |
| Trespassing on Slopes | Not applicable. |
| Sloughing or Erosion of Slopes or Abutments | Not applicable. |
| Rock Slope Protection - Riprap Failures | Not applicable. |
| Unusual Movement or Cracking at or Near Toes | Not applicable. |
| Unusual Embankment or Downstream Seepage | Not applicable. |
| Piping or Boils | Not applicable. |
| Foundation Drainage Features | Not applicable. |
| Toe Drains | Not applicable. |
| Instrumentation System | USCE gauging station. |

PERIODIC INSPECTION CHECK LIST

PROJECT CAMPTON POND DAM DATE May 2, 1979
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

| AREA EVALUATED | CONDITION |
|---|--|
| <u>OUTLET WORKS - CONTROL TOWER</u> | <u>OUTLET GATE CONTROL</u> |
| a. Concrete and Structural | |
| General Condition | Good. |
| Condition of Joints | Good. |
| Spalling | None. |
| Visible Reinforcing | None. |
| Rusting or Staining of Concrete | None observed. |
| Any Seepage or Efflorescence | None observed. |
| Joint Alignment | Good. |
| Unusual Seepage or Leaks in Gate Chamber | Flooded with water, could not observe. |
| Cracks | None observed. |
| Rusting or Corrosion of Steel | None. |
| b. Mechanical and Electrical | |
| Air Vents | Not applicable (open platform). |
| Float Wells | Not applicable. |
| Crane Hoist | Not applicable. |
| Elevator | Not applicable. |
| Hydraulic System | Not applicable. |
| Service Gates | Manual gate operator. |
| Emergency Gates | Not applicable. |
| Lightning Protection System | None. |
| Emergency Power System | None. |
| Wiring and Lighting System in Control Chamber | Not applicable. |
| | A-3 |

PERIODIC INSPECTION CHECK LIST

PROJECT CAMPTON POND DAM

DATE May 2, 1979

PROJECT FEATURE

NAME _____

DISCIPLINE _____

NAME _____

| AREA EVALUATED | CONDITION |
|--|--|
| <u>OUTLET WORKS - TRANSITION AND CONDUIT</u> | |
| General Condition of Concrete | (Could not observe, buried in concrete section.) |
| Rust or Staining on Concrete | |
| Spalling | |
| Erosion or Cavitation | |
| Cracking | |
| Alignment of Monoliths | |
| Alignment of Joints | |
| Numbering of Monoliths | |

PERIODIC INSPECTION CHECK LIST

PROJECT CAMPTON POND DAM DATE May 2, 1979
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

| AREA EVALUATED | CONDITION |
|---|--|
| <u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u> | Discharge into natural rock stream channel. |
| General Condition of Concrete | |
| Rust or Staining | |
| 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 | |

PERIODIC INSPECTION CHECK LIST

PROJECT CAMPTON POND DAM DATE May 2, 1979
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

| AREA EVALUATED | CONDITION |
|--|------------------------------------|
| <u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u> | |
| a. Approach Channel | |
| General Condition | Good. |
| Loose Rock Overhanging Channel | None. |
| Trees Overhanging Channel | None. |
| Floor of Approach Channel | Natural river bed. |
| b. Weir and Training Walls | |
| General Condition of Concrete | Good. |
| Rust or Staining | Minor. |
| Spalling | Minor. |
| Any Visible Reinforcing | None. |
| Any Seepage or Efflorescence | Minor. |
| Drain Holes | None observed. |
| c. Discharge Channel | |
| General Condition | Good. |
| Loose Rock Overhanging Channel | None. |
| Trees Overhanging Channel | None. |
| Floor of Channel | Natural river channel, ledge rock. |
| Other Obstructions | None. |

PERIODIC INSPECTION CHECK LIST

PROJECT CAMPTON POND DAM DATE May 2, 1979
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

| AREA EVALUATED | CONDITION |
|---|-----------|
| <u>OUTLET WORKS - INTAKE CAHNNEL AND</u> <u>INTAKE STRUCTURE</u> | |
| a. Approach Channel | |
| Slope Conditions | |
| Bottom Conditions | |
| 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 | |

PERIODIC INSPECTION CHECK LIST

PROJECT CAMPTON POND DAM DATE May 2, 1979
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

| AREA EVALUATED | CONDITION |
|--------------------------------------|---|
| <u>OUTLET WORKS - SERVICE BRIDGE</u> | Concrete Bridge to Outlet Gate Operator |
| a. Super Structure | |
| Bearings | Good. |
| Anchor Bolts | Not applicable. |
| Bridge Seat | Good. |
| Longitudinal Members | Good. |
| Under Side of Deck | Concrete, good condition. |
| Secondary Bracing | Not applicable. |
| Deck | Concrete, good condition. |
| Drainage System | Not applicable. |
| Railings | Good. |
| Expansion Joints | None observed. |
| Paint | Good. |
| b. Abutments and Piers | |
| General Condition of Concrete | Good. |
| Alignment of Abutment | Good. |
| Approach to Bridge | Good, steel ladder. |
| Condition of Seat and Backwall | Good. |

PERIODIC INSPECTION CHECK LIST

PROJECT CAMPTON POND DAM DATE May 2, 1979
 PROJECT FEATURE _____ NAME _____
 DISCIPLINE _____ NAME _____

| AREA EVALUATED | CONDITION |
|---|--|
| <u>RESERVOIR</u> | |
| Stability of Shoreline | Some fallen trees and floating debris. |
| Sedimentation | Extensive - see overhead photo. |
| Changes in Watershed Runoff Potential | None known. |
| Upstream Hazards | None observed. |
| Downstream Hazards | Several buildings, one residence, trailer park. |
| Alert Facilities | USCE gauge - transmitted to USCE in Waltham. |
| Hydrometeorological Gauges | Yes - rapid transmitter. |
| Operational and Maintenance Regulations | Routine inspection by Forest Service, visual monitoring during major storms. |

PERIODIC INSPECTION CHECK LIST

PROJECT CAMPTON POND DAM

DATE May 2, 1979

PROJECT FEATURE _____

NAME _____

DISCIPLINE _____

NAME _____

| AREA EVALUATED | CONDITION |
|---|--------------------------------|
| <u>DIKE EMBANKMENT</u> | |
| Crest Elevation | ~ 656. |
| Current Pool Elevation | 647.8 |
| Maximum Impoundment to Date | See dam section. |
| Surface Cracks | None visible. |
| Pavement Condition | Not applicable. |
| Movement or Settlement of Crest | None visible. |
| Lateral Movement | None visible. |
| Vertical Alignment | Too irregular to judge. |
| Horizontal Alignment | Too irregular to judge. |
| Condition at Abutment and at Concrete Structures | Good. |
| Indications of Movement of Structural Items on Slopes | None visible. |
| Trespassing on Slopes | None. |
| 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 | |
| Toe Drains | Underdrain downstream of dike. |
| Instrumentation System | Water gauging station. |
| Vegetation | Grass. |
| | A-10 |

APPENDIX B

PROJECT RECORDS AND PLANS

A. Listing of design, construction and maintenance records:

1. New Hampshire Public Service Commission design questionnaire-statement, April 22, 1934.
2. Letter to New Hampshire Public Service Commission from Forest Service, May 21, 1934.
3. Data sheet on 1938 flood.
4. Report on 1959 flood from Forest Service.

B. Copies of Past Inspection Reports:

1. Inspection by New Hampshire Water Resources Board, August 1, 1936.
2. Dam record from Public Service Commission, July 21, 1936.
3. Data tabulation by New Hampshire Water Control Commission, October 31, 1938.
4. Inspection memo, November 3, 1969.
5. Inspection letter to Forest Service, December 30, 1969.
6. Inspection memo, July 17, 1973.
7. Inspection letter to Forest Service, February 10, 1977.

C. Listing of Plans:

1. Campton Pond Dam - Plan and Section.

New Hampshire Public Service Commission

QUESTIONNAIRE - STATEMENT

Concerning Mills and their repairs,
Dams and Flowage

RECEIVED

APR 13 1934

Chapter 218, Public Laws of New Hampshire

N. H. Public Service Commission

LOCATION

1. In what town? Campton, N. H.
2. On what stream? Mad River.
3. Give location definite as possible by description and by indication on plan or map Campton Pond, shown on attached map.

ERECTION:

4. Is it proposed to erect a new dam on a new location? No.
5. Is it proposed to erect a new dam on a location previously occupied? Yes.

REPAIRS:

6. Is it proposed to make minor repairs (repairs that can be made without lowering the pond level, diverting flow and interfering with operation)? If possible will construct new dam on the down stream side of present dam; old dam will remain as is.

RECONSTRUCTION:

7. Is it proposed to make major repairs, (requiring a lowering of pond level, diverting flow and interfering with operation)? _____
8. Is it proposed to increase the height of the dam permanently? No.
9. Is it proposed to increase the height of the dam by flashboards? No.

20. Power ()
21. Recreation
- (a) Private ()
- (b) Commercial ()
- Public - - - - - XX
22. Transportation ()

DIMENSIONS:

23. What is or will be the area of the pond created by the dam? 38 acres.
24. What is or will be the length of the pond from the dam upstream? 2,300 feet.
25. What is or will be the length of the dam? 153 feet.
26. What is or will be the height of the dam above the bed of the stream? 35 feet.
27. What is or will be the length and depth of the spillway? 5 feet by 150 feet.
28. What is or will be the number and size of openings? one gate, 2 feet.

MATERIALS:

29. Of what materials is the dam constructed? Timber.
30. Of what materials will the dam be constructed? Concrete.
31. What is the nature of the foundation where or upon which the dam is or will be built? (Ledge - hardpan - sand gravel - clay - etc. and extent)? 90% Ledge.

TIME:

32. When will the job be begun? April 23, 1934.
33. When will the job be completed? October 1934.

ANS AND SPECIFICATIONS:

Submit plans (plan, elevations, cross sections) of
dam, giving information as to foundations, showing
dimensions, etc.

PERSONNEL:

Who will be Engineer?

Name Perley M. Burnham

Address U. S. Forest Service, Laconia, N. H.

Who will be contractor or constructor?

Name U. S. Forest Service

Address Laconia, N. H.

KS: Plans and specifications will be submitted as soon
as they are drawn, which is being done by our Wash-
ington Office.

Date:

April 10, 1934.

Signed: M. A. MATTOON, Forest Supervisor.

By: P. M. Burnham, Acting.
P. M. Burnham.

1-2-104
UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
WHITE MOUNTAIN NATIONAL FOREST



RECEIVED

MAY 22 1934

N. H. Public Service Commission

ADDRESS REPLY TO
FOREST SUPERVISOR
AND REFER TO

E-Dams
Campton Dam
White Mtn.

LACONIA, NEW HAMPSHIRE
May 21, 1934

New Hampshire Public Service Commission

Concord, New Hampshire

Gentlemen:

Attention Mr. Lord

I am enclosing one blue brint of each drawing number M-8601 topographic map of Campton Dam site showing location of new dam and drawing M-8604 showing cross section or profile of proposed concrete gravity dam. There is also enclosed one copy of "Specifications for Minor Road Construction" containing on pages 15 to 25 specifications for concrete.

The dam is to be designed for surcharge of 10 feet and resultant pressure falls within the middle third, assuming an upward pressure at the heel of P/2. You will note that the entire section from Station 81 to 233 has been utilized as overflow or spillway section, thereby increasing the spillway capacity over what was provided by the old dam. With the proposed spillway crest elevation of 112 ft., the spillway will have a capacity of approximately 13,000 second feet, with water elevation of 121 feet, which is the elevation reached by the 1927 flood. This is a 4,000 second feet greater than the discharge of the 1927 flood as reported by the U. S. Geological Survey.

The dam is to have 3 ft. of flash boards designed to go out when the water reaches elevation of approximately 118 ft., so that the normal reservoir level will be elevation 115 ft. This is a reproduction of conditions existing with the old dam.

I will send you the plans for the gate and flash boards just as soon as I receive them from Washington.

I would appreciate it very much if you would give me authority to begin construction at once as the construction season is very short and it is necessary that this dam be completed by October, 1934.

If at any time you need any help from this office just call Laconia

Public Service Commission - 2

908W and I will arrange to have Mr. Burnham our engineer call on you and discuss any questions that may come up.

Very truly yours,

M. J. Mattoon
M. J. MATTOON
Forest Supervisor

PMB:lg

RECEIVED
MAY 22 1934
N. H. Public Service Commission

WATER CONTROL COMMISSION

STATE OF NEW HAMPSHIRE

Concord, New Hampshire

October 26, 1938.

1438
FLOOD

White Mountain Nat Forest
Laconia N H

RE: Canton Lake Dam. W. C. C. No. 25.01

Gentlemen:

In order that we may determine the magnitude and extent of the flood of September 21-24 just passed, we are requesting the various dam owners in the State to supply us with the following information:

1. Was this dam injured? Ans. No
2. If so, to what extent? Ans. _____
3. Did all flashboards go out? Ans. No - Only one 6" section on this structure - Half that with head badly bent (i.e. pins bent)
4. What was the maximum height of water over the permanent crest of spillway? Ans. (Approx 6'0") 8,000 cfs
5. At what day and hour did the maximum flood height reach your dam? Ans. Between 3 AM & 5 AM
Sept 21
6. Any other interesting information regarding the flood or rain fall may be given on the back of this sheet, or attach sheets.

Will you please return this letter with as much information as you can give us as promptly as possible. A self-addressed envelope is attached hereto.

We thank you for your cooperation.

Very truly yours,

Richard S. Holmgren

Richard S. Holmgren -
Chief Engineer

CDC:GMB

Stevens

STORM DAMAGE

of

OCTOBER 23-25, 1959

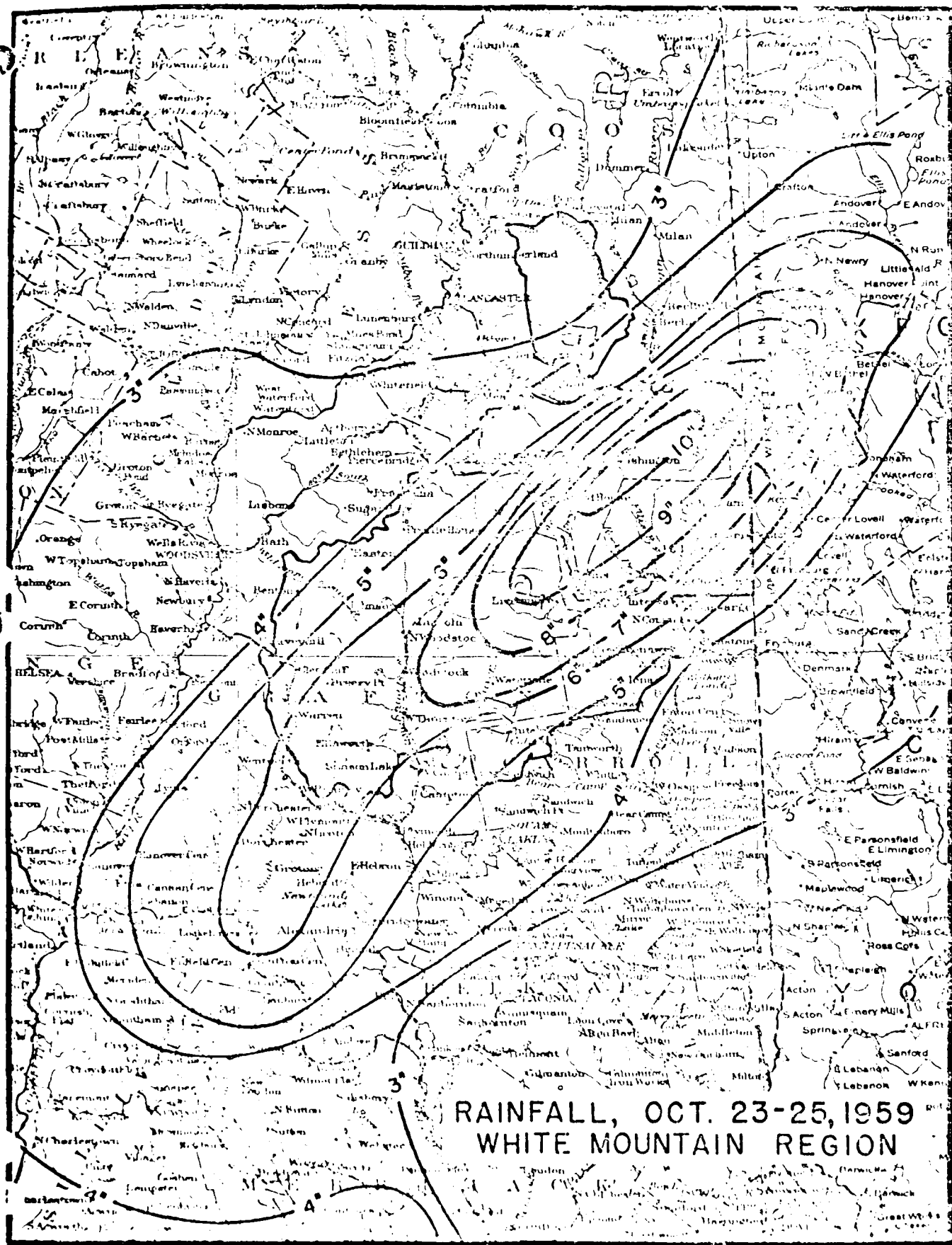
White Mountain National Forest

New Hampshire

U. S. Forest Service

Eastern Region

December 1959



RAINFALL, OCT. 23-25, 1959
WHITE MOUNTAIN REGION

FIG. 1

THE STORM - Rainfall

Between the early morning of Friday, October 23 and noon on Sunday, October 25 a storm, centered over the White Mountains of New Hampshire, produced greater rainfall and runoff than had ever before been recorded at many stations in the area.

Although there were outlying centers of heavy rainfall in southern New Hampshire and western Maine, the area of very heavy precipitation was confined to a narrow belt extending from southwest to northeast across the White Mountain National Forest. - See Cover Map. The greatest recorded precipitation was 10.79 inches at Pinkham Notch. Of this, 8.0 inches fell between 4:00 A.M. and 6:00 P.M. on Saturday, October 24. - See Figure 2.

October was a month of heavy rainfall. From October 1 through 22 there had been nearly four inches of precipitation. It had rained eleven days out of twenty-two - four of these occurring in the ten days before the big storm. The slow, steady rain of October 23 soaked the soil to a nearly saturated condition. As a result, there was little storage capacity in the soil to contain the very heavy bursts of rainfall that occurred on October 24.

THE STORM - Runoff

Runoff was very rapid and an unusually high proportion of Saturday's rainfall was converted to immediate runoff. This can be seen by comparing the times of rainfall at Pinkham Notch in Figure 2, and the concentration of runoff at Campton Pond Dam - Figure 3. Based on limited data, it is estimated that between 70 and 80 percent of the rain that fell on the Mad River drainage basin Saturday afternoon, ran off through the spillway at Campton Pond Dam within a period of ten hours.

The unusual intensity and behaviour of the storm is shown by the measured and estimated discharge rates of several streams within the area - (see Table 1). Even though some of these estimates are based on rather crude measurements, they indicate the violence of the storm. It is especially interesting to note that the measurements of high discharge on the Baker River and the record discharge on the Ammonoosuc River were made at gage points well outside the area of highest intensity rainfall. In each case the measurement represented runoff from only a part of the watershed. The figures for the East Branch Pemigewasset River, Mad River, and Wild River, all wholly within the area of high intensity, are probably more typical of actual stream behaviour within the major storm area.

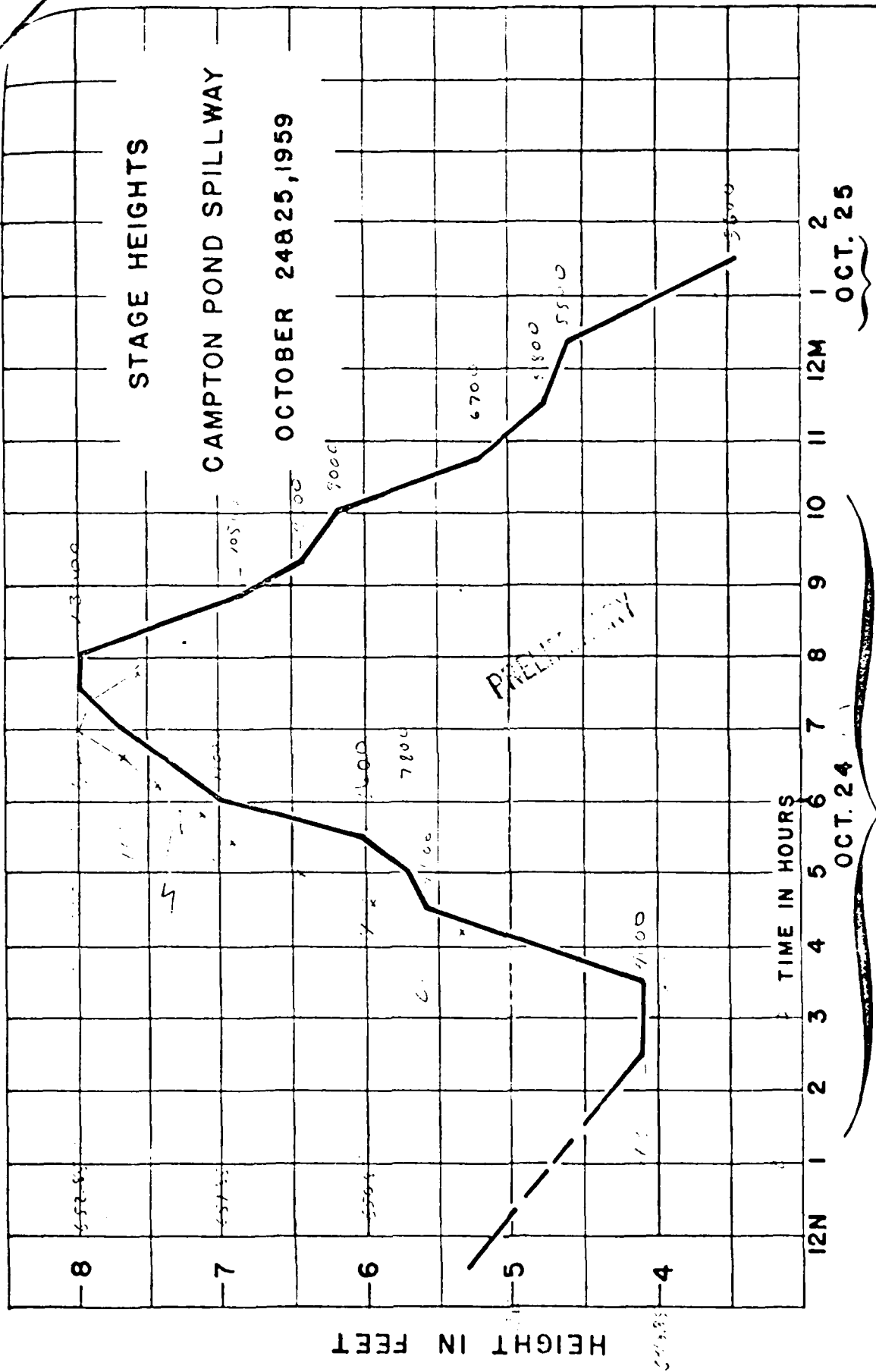


FIG 3

INVENTORY OF TIDES AND WATER POWER DEVELOPMENTS

Co-ordinates from AE.
43° 50' + 16,400 ft.
71° 40' - 8900 ft.

101-5-77001-1217

Remarks: Minnesota Dept. of Ag., P&B Inactive dam at this site 1970.
Washed out 1927 - floods. Timber pond 16 acres area - track size
present + pond. Old wood mill part present. Structure
A.S. Pitt in 1900-1910 shown J.D. Pitt, Supr. Const., CCC admin.
Thompson. Plans present + dam prepared by U.S. Dept. Agriculture

DATE 3-6

PUBLIC SERVICE COMMISSION OF NEW HAMPSHIRE—DAM RECORD

I-5201

| | | | | | |
|-------------------------------------|--|--------------------------------|---------------------|---------------|------|
| OWN | CALPTON | TOWN NO. | 1 | STATE NO. | 2501 |
| RIVER & STREAM | Mad River - Calpton Lake | | | | |
| RAINAGE AREA | POND AREA 38 Acres | | | | |
| DAM TYPE | Gravity | FOUNDATION NATURE OF | Ledge | | |
| MATERIALS OF CONSTRUCTION | Concrete | | | | |
| PURPOSE OF DAM | POWER—CONSERVATION—DOMESTIC—RECREATION—TRANSPORTATION—PUBLIC UTILITY | | | | |
| EIGHTS, TOP OF DAM TO BED OF STREAM | 35' | TOP OF DAM TO SPILLWAY CRESTS | 5' | | |
| SPILLWAYS, LENGTHS | | | | LENGTH OF DAM | 133' |
| DEPTH BELOW TOP OF DAM | 150' | | | | |
| FLASHBOARDS | | | | | |
| TYPE, HEIGHT ABOVE CREST | 1' | | | | |
| OPERATING HEAD | 31' | TOP OF FLASHBOARDS TO N. T. W. | | | |
| WHEELS, NUMBER | | | | | |
| WINDS & H. P. | | | | | |
| GENERATORS, NUMBER | | | | | |
| WINDS & K. W. | | | | | |
| L. P. 90 P. C. TIME | | | H. P. 75 P. C. TIME | | |
| 100 P. C. EFF. | | | 100 P. C. EFF. | | |
| REFERENCES, CASES. | I-3404 | | | | |
| PLANS, INSPECTIONS | | | | | |
| REMARKS | | | | | |

OWNER - White Mountain National Forest

CONDITION- Good

DANGER - Yes. Will be subject to periodic inspection.

To the Public Service Commission:

The foregoing memorandum on the above dam is submitted covering inspection made July 6, 1936, according to notification to owner dated June 29, 1936, and bill for same is enclosed.

D. Waldo White
Chief Engineer

July 21, 1936
Copy to Owner

NEW HAMPSHIRE WATER CONTROL COMMISSION
DATA ON DAMS IN NEW HAMPSHIRE

LOCATION

STATE NO. 5421

Town Granby : County Crafton

Stream

Basin-Primary Penigewasset : Secondary Mac River

Local Name Cannon Lake-Upper Dam

Coordinates—Lat. 43° 50' 10.60" : Long. 71° 40' 7.00"

GENERAL DATA

Drainage area: Controlled Sq. Mi.: Uncontrolled Sq. Mi.: Total 57.3 Sq. Mi.

Overall length of dam 155 ft.: Date of Construction 1935

Height: Stream bed to highest elev. 55 ft.: Max. Structure 32 ft.

Cost—Dam : Reservoir

DESCRIPTION

Gravity-Ledge Foundation

Waste Gates

Type

Number : Size ft. high x ft. wide

Elevation Invert : Total Area sq. ft.

Hoist

Waste Gates Conduit

Number : Materials

Size ft.: Length ft.: Area sq. ft.

Embankment

Type

Height—Max. ft.: Min. ft.

Top—Width : Elev. ft.

Slopes—Upstream on : Downstream on

Length—Right of Spillway : Left of Spillway

Spillway

Materials of Construction Concrete

Length—Total ft.: Net 150 ft.

Height of permanent section—max. 30 ft.: Min. ft.

Flashboards—Type : Height 1 ft.

Elevation—Permanent Crest : Top of Flashboard

Flood Capacity 3235 cfs.: 103 cfs/sq. mi.

Abutments

Materials:

Freeboard: Max. 5 ft.: Min. ft.

Headworks to Power Devel.—(See "Data on Power Development")

OWNER White Mt. National Forest-Laconia N.H.

REMARKS

Recreation

NEW HAMPSHIRE WATER CONTROL COMMISSION DATA ON RESERVOIRS & PONDS IN NEW HAMPSHIRE

LOCATION AT DAM NO. 35,001

Town Campton County Campton

Stream Campton Lake

Basin—Primary Campton Lake Secondary Mad River

Local Name Upper Dam

RAINAGE AREA

Controlled Sq. Mi.: Uncontrolled Sq. Mi.: Total 57.6 Sq. Mi.

RELATION vs. WATER SURFACE AREA vs. VOLUME

| Point | Head Feet | Surface Area Acres | Volume Acre Ft. |
|------------------------|---------------------|--------------------|-----------------|
| (1) Max. Flood Height | | | |
| (2) Top of Flashboards | | | |
| (3) Permanent Crest | | | |
| (4) Normal Drawdown | <u>31</u> | <u>58</u> | |
| (5) Max. Drawdown | | | |
| (6) Original Pond | <u>U.S.G.S. 647</u> | | |

Base Used: Coef. to change to U.S.G.S. Base

RESERVOIR CAPACITY

| | Total Volume | Useable Volume |
|----------------------|--------------|----------------|
| Drawdown |ft. |ft. |
| Volume |ac. ft. |ac. ft. |
| Acre ft. per sq. mi. | | |
| Inches per sq. mi. | | |

USE OF WATER Recreation

OWNER White Mtn National Forest- Laconia N H

REMARKS

Tabulation By Date

DATE: November 3, 1969

FROM: Francis C. Moore

SUBJECT: Campton Pond Dam Inspection

TO: Vernon A. Knowlton
Chief Water Resources Engineer

On October 30, 1969, I inspected Campton Pond dam, owned by U. S. Department of Agriculture Forest Service with headquarters at Laconia, New Hampshire. The following report is made:

There are numerous trees and brush on the pond side of the east earth embankment of the dam. In the section northeasterly of the end of the concrete cutoff wall, overturning of these trees could seriously weaken the embankment. They should be removed as some trees are over 10 inches in diameter.

The west (or right) abutment has been breached during the construction of Federal Land Highway FLH 9-1 (2), New Hampshire Project No. S75426 - Waterville Road. The concrete cutoff wall from the right abutment has either been unearthed or cut off to make way for this new highway. The gravel fill on the roadway is about six feet below the top of dam abutments. As the roadway is about 54 feet wide from concrete cutoff wall to side slope, an emergency spillway has been created. At the present time, a flow of over 8,800 cubic feet per second by Campton Pond Dam would run down this emergency spillway.

This road should either be raised six feet at the dam or a concrete cutoff wall be constructed from ledge to road surface with provisions for a strong stoplog closure at times of high water to prevent the cutting of a serious channel down this road and possibly causing trouble to houses and roads downstream.

FCM/jb

December 30, 1969

White Mountain National Forest
U. S. Forest Service
719 Main Street
Laconia, New Hampshire 03246

Gentlemen:

Dam No. 35.01, known as Campton Pond dam on Mad River owned by you was inspected by the New Hampshire Water Resources Board on October 30, 1969 per the provisions of Chapter 432, RSA. As a result of this inspection, this dam classified as a menace, was found to have had its discharge capacity radically reduced as a result of the reconstruction of the Waterville Road. This reconstruction was financed as a Federal Land Highway FLN 2-1 (2), New Hampshire Project No. 575426.

This reduction in discharge capacity at Campton Pond dam is the result of breaching the right (looking downstream) abutment concrete cutoff wall for a distance of over fifty feet. The level of the highway now is at least five feet below the top of spillway abutments. It is estimated that discharge would flow down this highway once in about four and one half years. The resulting damage and possible threat to life could be serious if corrective measures are not taken.

The reconstruction of Dam No. 35.01 by you or your agent is in violation of Chapter 434-B, 4, Laws of 1950. It is requested that you immediately take corrective measures to eliminate this menace to the public safety.

No corrective measure employing sand bags will be permitted due to the lack of time to erect and the large area of closure. Some stop-log type structure should be constructed with removable stanchions capable of erection upon short notice. A structure of this type was constructed by the U. S. Army Corps of Engineers at Northampton, Mass. across U.S. Highway Route 95 closing the flood control dike at the south end of the city. A concrete cutoff wall must be constructed from the old concrete cutoff wall to the surface of the ground.

It is requested that your agency reply showing the method of correcting this discharge deficiency.

White Mountain National Forest

It was also noted that there were several large trees and larger brush on the left (west) side of the embankment, which might cause a breach in the embankment. These trees, at least, should be removed as soon as possible as a safety measure.

-2-

December 30, 1969

SMG/Vakie
cc: P.W. & H.

George M. McGee, Sr.
Chairman

Very truly yours,
The

MEMORANDUM

DATE: July 17, 1973

FROM: Pattu D. Kesavan, Water Resources Engineer

SUBJECT: Campton Pond Dam - Owned by Forestry Dept. - Dam #35.01

TO: Vernon A. Knowlton, Chief Engineer, Water Resources Board

On July 2, 1973, I made an inspection of the Campton Pond Dam which is owned by the Forestry Dept. in Campton. Mr. John Dole, Postmaster of Campton, accompanied me during my inspection.

Dole told me that on June 30 during the flood, the left bank or the easterly side of the dam leaked and flooded the so-called Pond Road. The road was temporarily closed.

On the right side of the dam on Rte. 49 there is an arrangement to install plank barricades across the pavement. This indicates that the Highway Dept. and the Town are aware of the flooding of Rte. 49 during high water. In my opinion, this plank barricade on the right bank, when used, raises the water level in the pond, thereby exerting tremendous pressure on the left bank. The left bank is wide enough to hold the water pressure but seems to be very porous to let a large quantity of water leak through.

To prevent leakage in the future, I recommend that a cut-off trench with impervious material be provided for the entire length (approx. 90 feet shown in the photos).

The existing 90 feet length of concrete wall is 2 1/2 feet wide and about three feet in depth and sits on rocks and earth. A Class A reinforced cement concrete wall should be constructed in the upstream side for the entire length below the existing three feet deep wall and preferably face this wall on the upstream side.

PDK:js

February 10, 1977

United States Forest Service
Federal Building
Laconia, NH 03246

Dear Sir:

Under the provisions of N.H. RSA Chapter 432, Sections 8 through 15 on February 8, 1977 an engineer of the Water Resources Board staff inspected the Campton dam on the Mad River. This dam, #35.01 is classified in the files of this office as a menace structure and as such must be maintained in a manner not to endanger public safety nor become a dam in disrepair.

This was only a partial inspection concerning only the east embankment and waste gate. The rest of the structure will be inspected as conditions permit.

As a result of this inspection it was noted that several items of maintenance or repair are in need of attention.

1. East embankment (Pond Road Side) is leaking approximately in the area where the old concrete wall (pre 1934) and new wall meet. This is permitting water to flow at full pond onto Pond Road and then onto the state highway. Because of the cold weather this makes for a dangerous situation. If this wall were to fail in this area at the time of a high flow this could endanger the property and possibly the lives of the people living directly downstream from this area. The leak is to be taken care of as soon as possible.

2. At the time of inspection the waste gate appeared to be closed but there was still considerable water being discharged. This should be taken care of to permit the proper operation of gate.

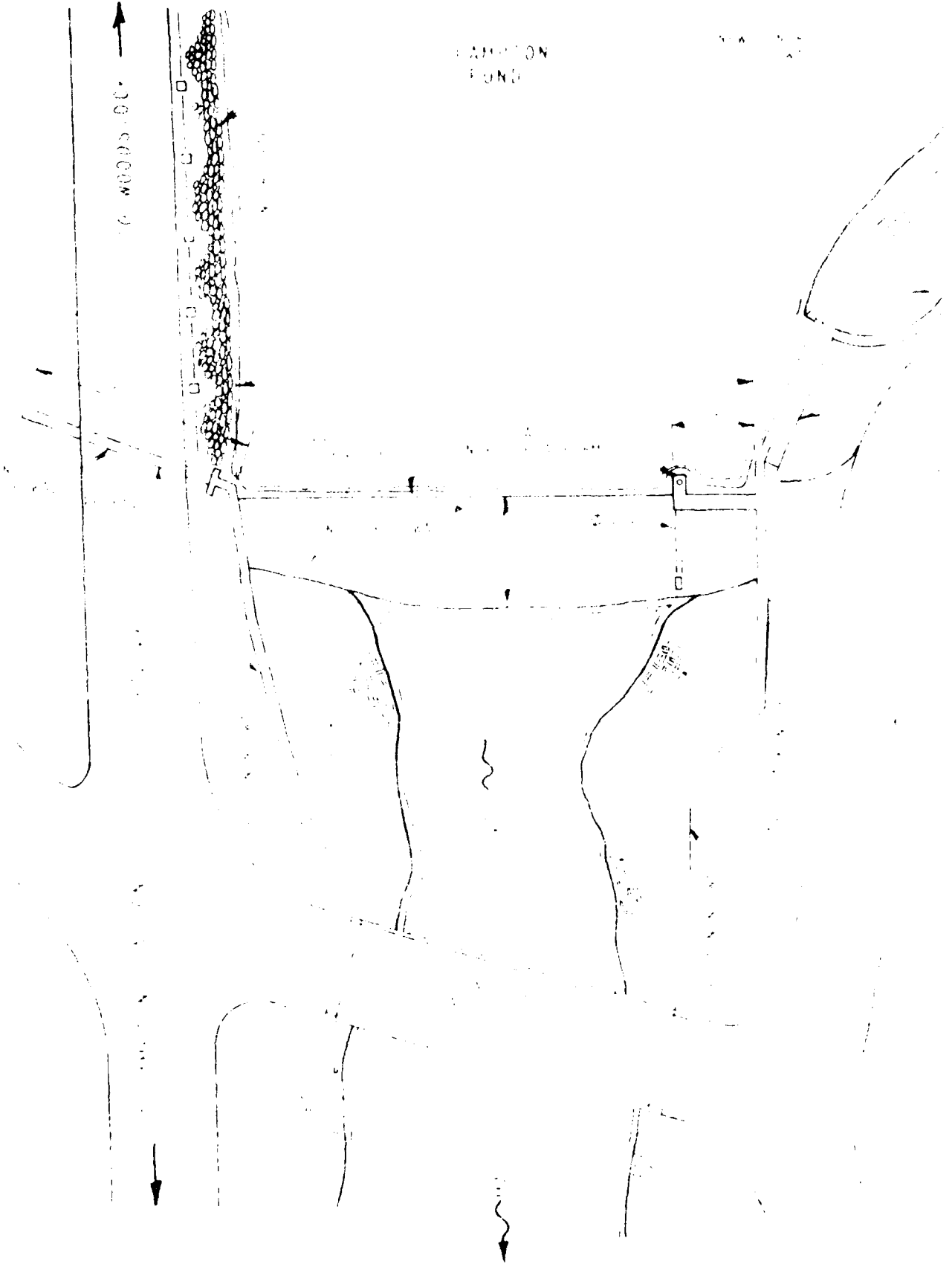
Because this dam is classified as a menace structure we require that you send us a proposed schedule of repairs within 30 days. If you have any questions please contact us at your convenience.

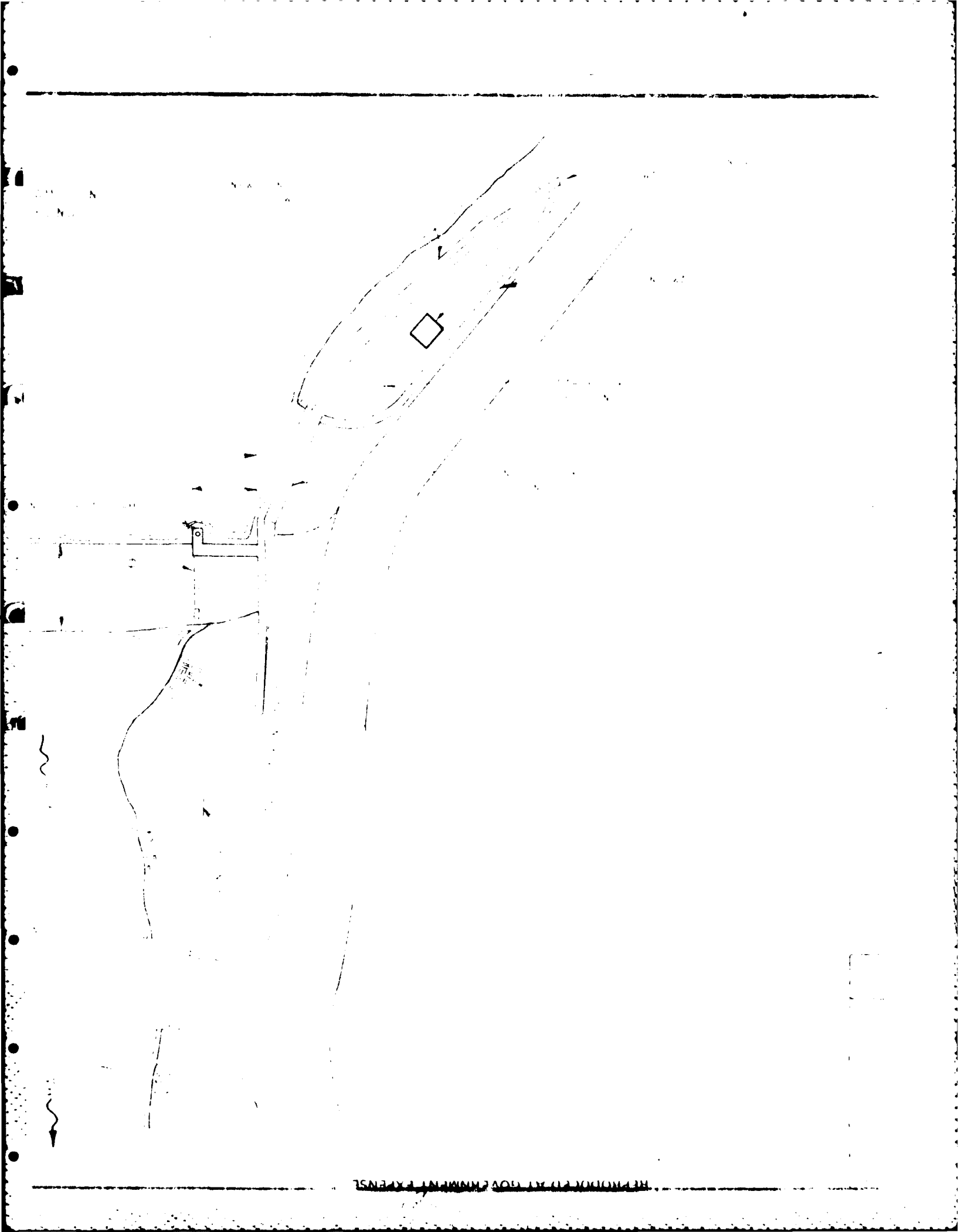
Very truly yours,

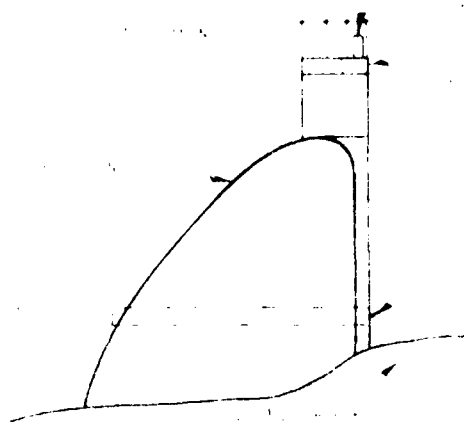
George M. McGee, Sr.
Chairman

HAMILTON
FUND

TO WOODS-00







TYPICAL CROSS SECTION

SECTION FUND TAV
AN

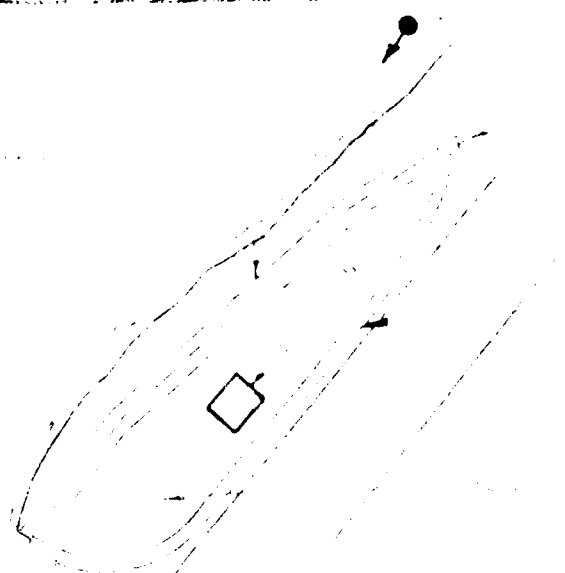
APPENDIX C

PHOTOGRAPHS

CHURCH
FOND

100.000000

100-100000



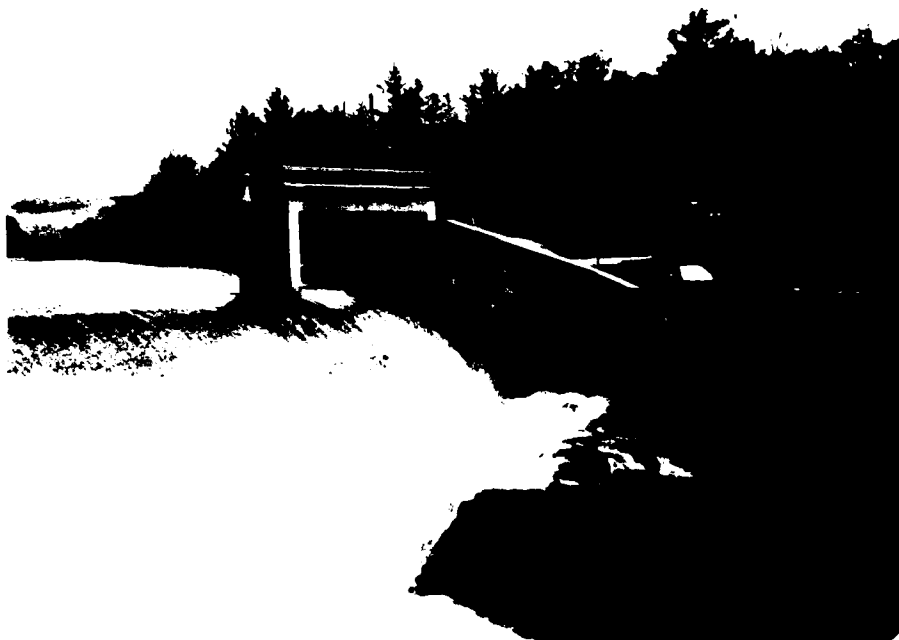
100-100000

ONE HUNDRED
AND

ONE

AMOUNT PAID
BY

RECORDED AT DEPARTMENT EXPENSE



#1. VIEW OF LEFT SIDE SPILLWAY AND OUTLET GATE
OPERATOR PLATFORM



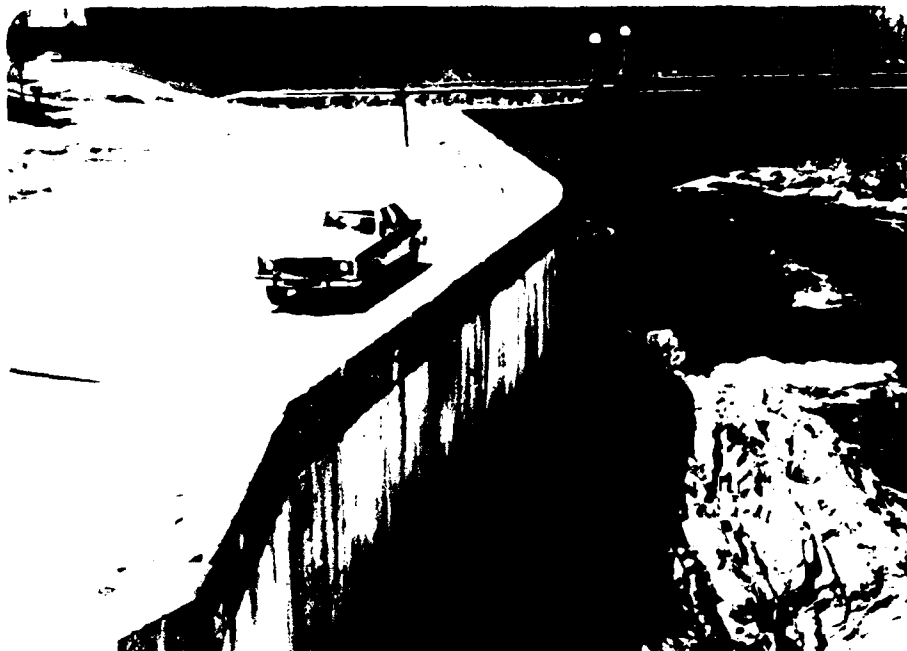
#2. VIEW OF RIGHT SIDE SPILLWAY AND ABUTMENT



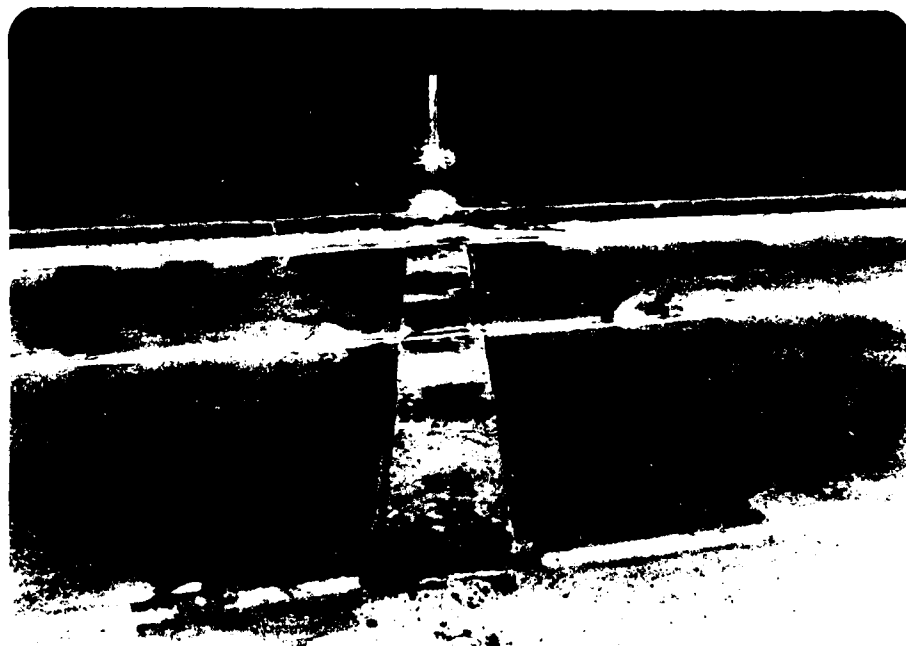
#3. VIEW OF LEFT ABUTMENT AND CORE WALL SHOWING
NEW CONCRETE FACING



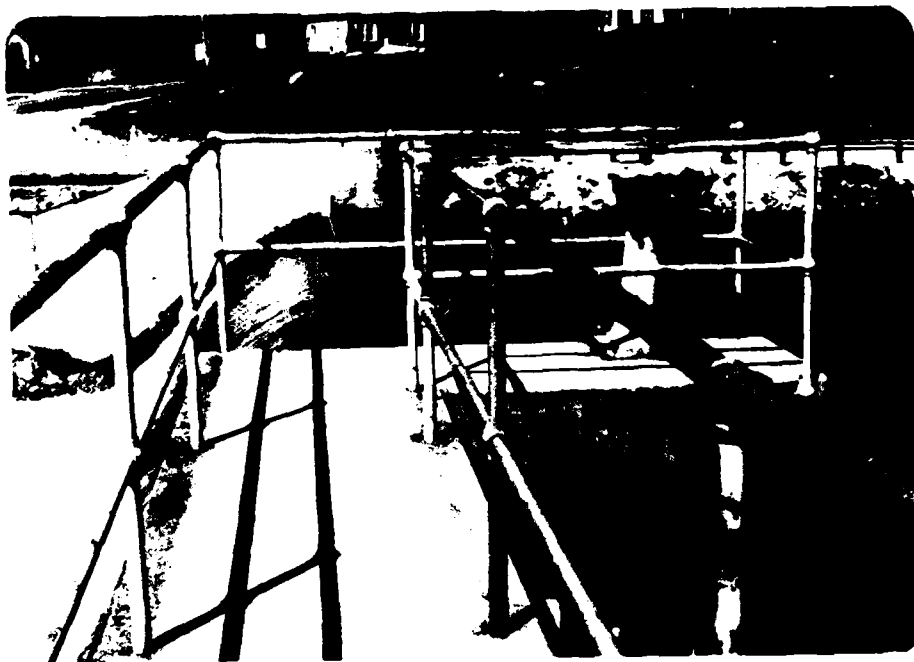
#4. VIEW OF RIGHT ABUTMENT AND DOWNSTREAM
RETAINING WALL



#5. VIEW OF LEFT SIDE DOWNSTREAM RETAINING WALL



#6. VIEW OF RIGHT SIDE ABUTMENT WALL BREACH AND
STOP LOG STANCHION SUPPORTS



#7. VIEW OF OUTLET GATE OPERATOR AND PLATFORM



#8. VIEW OF DOWNSTREAM HIGHWAY BRIDGE



#9. VIEW OF DOWNSTREAM CHANNEL



#10. VIEW OF DOWNSTREAM IMPACT AREA

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

DUFRESNE-HENRY ENGINEERING CORPORATION

BY W.H.L.
DATE 3-22-79

SUBJECT CAMPBELL POND
DRAINAGE AREA - CLASSIFICATION

SHEET NO. 1 OF 1
JOB NO. 04-0002

DRAINAGE AREA

SCALE 1:62500
FACTOR .98

PLANIMETER READING 57.62

$$(57.62)(.98) = 56.27 \text{ SQ MI}$$

SCALE 1:29000
FACTOR (.144)

PLANIMETER READING 9.46

$$(9.46)(.144) = 1.36 \text{ SQ MI}$$

TOTAL 57.62 SQ MI

POND AREA

43 ACRES

STORAGE (NORMAL WATER ELEV)

350 AC-FT

CLASSIFICATION

SIZE

HEIGHT 35'
STORAGE 350 AC-FT

SMALL

HAZARD

SIGNIFICANT

1 HOUSE & 4 MILL 700 DOWNSTREAM

TEST FLOOD

FOR SMALL, SIGNIFICANT HAZARD \Rightarrow 100 YEAR TO $\frac{1}{2}$ PMF
USE $\frac{1}{2}$ P.M.F

FROM HEC 1 $\frac{1}{2}$ PMF = 30,919 CFS

ROUTING

RESERVOIR ROUTING WAS NOT CONSIDERED AS SURCHARGE
STORAGE WOULD PRODUCE INSIGNIFICANT IN FLOOD PEAKS

DUFRESNE-HENRY ENGINEERING CORPORATION

BY W.A.L.

SUBJECT CAMPION POND

SHEET NO. 2 OF

DATE 3-22-79

DISCHARGE CURVES

JOB NO. 04-0068

WITH STOP LOGS IN PLACE
ACROSS ROUTE #49

SPILLWAY LENGTH 151.3'

CREST ELEV 647.00

NEGLECT LOW LEVEL OUTLET

ELEV ABUTMENTS & WINGWALLS 656.00

ASSUME $C=3.9$ FOR SPILLWAY

$Q = CLH^{3/2}$

| ISEL | H | Q SPILLWAY | | | | | | Q TOTAL |
|------|----|------------|---------------------------|-------------|--------|--------------|---------|---------|
| 47 | 0 | 0 cfs | FOR OVERBANK FLOW | | | | | 0 |
| 48 | 1 | 590 | LEFT WALL $C=2.6$ | | | | | 590 |
| 49 | 2 | 1669 | RIGHT (STOP LOGS) $C=3.3$ | | | | | 1669 |
| 50 | 3 | 3066 | $Q = CLH^{3/2}$ | | | | | 3066 |
| 51 | 4 | 4721 | | | | | | 4721 |
| 52 | 5 | 6597 | | | | | | 6597 |
| 53 | 6 | 8672 | | | | | | 8672 |
| 54 | 7 | 10,928 | | | | | | 10,928 |
| 55 | 8 | 13,352 | OVERBANK | LENGTH LEFT | Q LEFT | LENGTH RIGHT | Q RIGHT | 13,352 |
| 56 | 9 | 15,932 | 0 | 170 | 0 | 60 | 0 | 15,932 |
| 57 | 10 | 18,660 | 1 | 170 | 442 | 60 | 198 | 19,300 |
| 58 | 11 | 21,527 | 2 | 180 | 1324 | 62 | 579 | 23,430 |
| 59 | 12 | 24,529 | 3 | 190 | 2567 | 64 | 1097 | 28,193 |
| 60 | 13 | 27,658 | 4 | 200 | 4160 | 66 | 1742 | 33,560 |
| 61 | 14 | 30,910 | 5 | 210 | 6104 | 68 | 2509 | 39,523 |

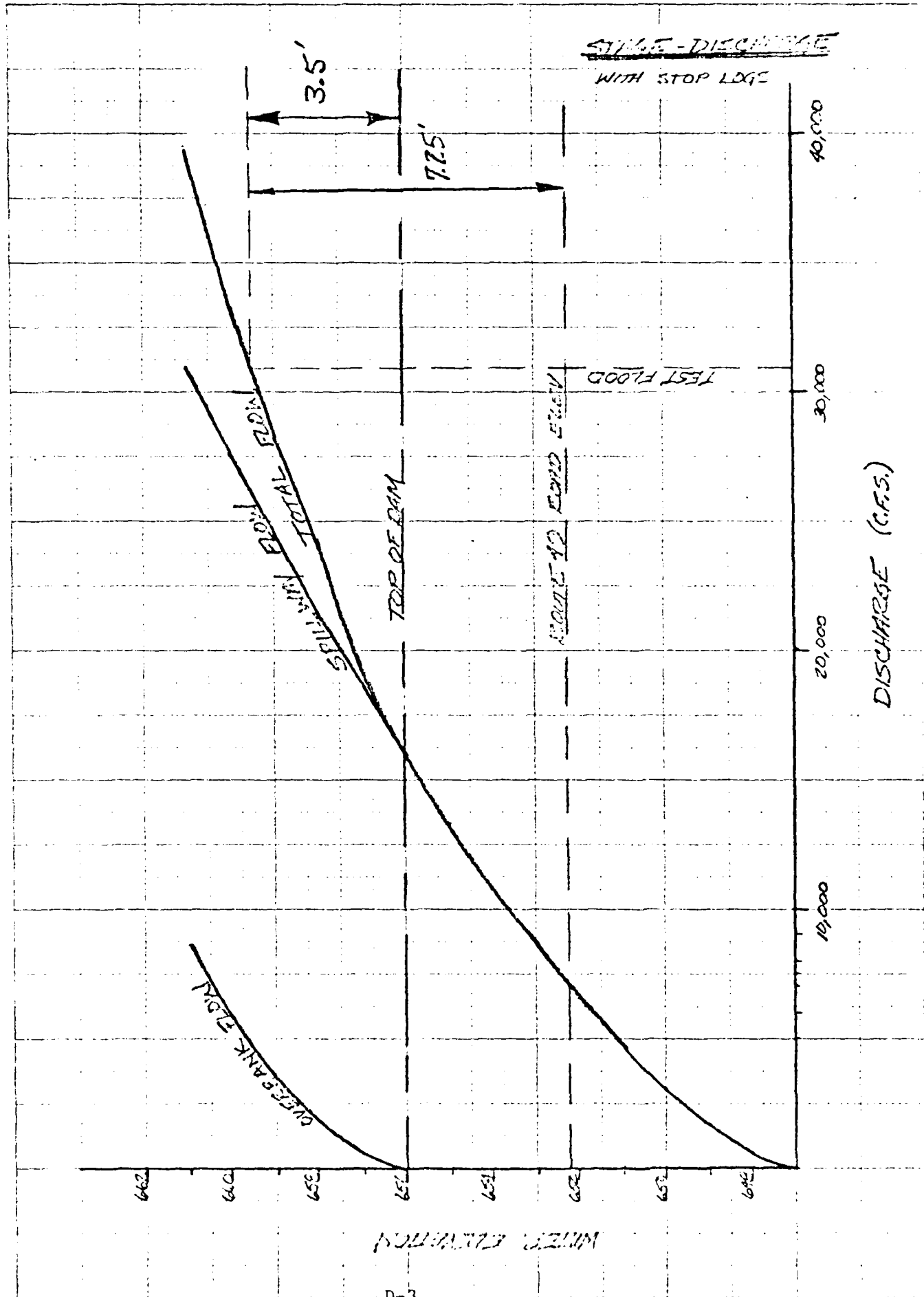
STORAGE

NORMAL RESERVOIR STORAGE 350 ACRE-Feet

POND AREA 43 ACRES

ASSUME INCREASE OF 50 ACRE-Feet OF STORAGE PER 1 FOOT INCREASE IN WATER ELEV.

| ISEL | STORAGE |
|------|---------|
| 47 | 350 |
| 48 | 400 |
| 49 | 450 |
| 50 | 500 |
| 51 | 550 |
| 52 | 600 |
| 53 | 650 |
| 54 | 700 |
| 55 | 750 |
| 56 | 800 |
| 57 | 850 |
| 58 | 900 |
| 59 | 950 |
| 60 | 1000 |
| 61 | 1050 |



DUFRESNE-HENRY ENGINEERING CORPORATION

BY W.A. LEONARD

SUBJECT CAMPTON POND

SHEET NO. 4 OF

DATE 5-15-79

DISCHARGE CURVE

JOB NO. 04-COEB

WITHOUT STOP LOGS

SPILLWAY LENGTH 151.3'
CREST ELEV 647.00
NEGLECT LOW LEVEL OUTLET

ELEV ABUTMENTS & WING WALLS 656.00
ASSUME $C = 3.9$ FOR SPILLWAY
 $Q = CLH^{3/2}$

FOR OVERBANK FLOW

LEFT WALL $C = 2.6$

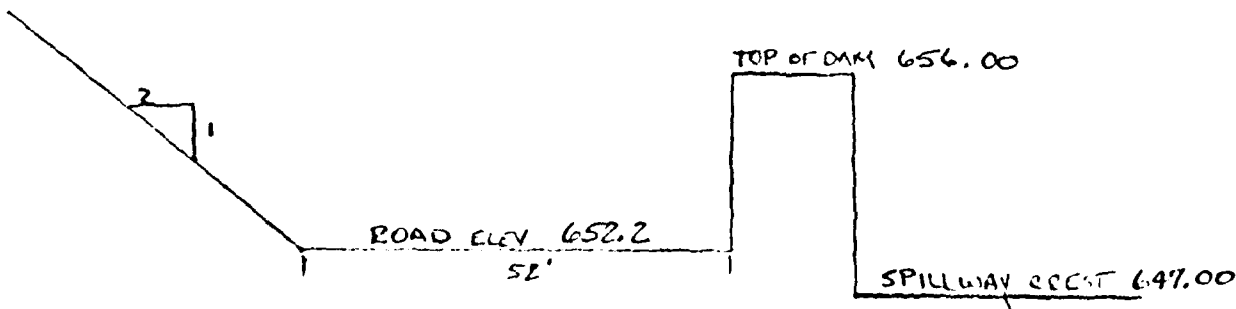
RIGHT WALL $C = 2.5$

$Q = CAH^{3/2}$

| WSEL | H _{SPILLWAY} | Q _{SPILLWAY} | | | | | | | Q TOTAL |
|------|-----------------------|-----------------------|--|--|--|--|--|--|---------|
| 647 | 0 | 0 (CFS) | | | | | | | 0 |
| 648 | 1 | 590 | | | | | | | 590 |
| 649 | 2 | 1669 | | | | | | | 1669 |
| 650 | 3 | 3066 | | | | | | | 3066 |
| 651 | 4 | 4721 | | | | | | | 4721 |
| 652 | 5 | 6597 | | | | | | | 6597 |
| 653 | 6 | 8692 | | | | | | | 8692 |
| 654 | 7 | 10,928 | | | | | | | 10,928 |
| 655 | 8 | 13,352 | | | | | | | 13,352 |
| 656 | 9 | 15,932 | | | | | | | 15,932 |
| 657 | 10 | 18,660 | | | | | | | 18,660 |
| 658 | 11 | 21,527 | | | | | | | 21,527 |
| 659 | 12 | 24,529 | | | | | | | 24,529 |
| 660 | 13 | 27,658 | | | | | | | 27,658 |
| 661 | 14 | 30,910 | | | | | | | 30,910 |

| h LEFT | AREA LEFT | Q LEFT | h RIGHT | AREA RIGHT | Q RIGHT |
|--------|-----------|--------|---------|------------|---------|
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0.8 | 42.24 | 94 | 0.8 | 42.24 | 94 |
| 1.8 | 96.84 | 325 | 1.8 | 96.84 | 325 |
| 2.8 | 153.44 | 642 | 2.8 | 153.44 | 642 |
| 3.8 | 212.04 | 1033 | 3.8 | 212.04 | 1033 |
| 4.8 | 272.64 | 1493 | 4.8 | 272.64 | 1493 |
| 5.8 | 335.24 | 2018 | 5.8 | 335.24 | 2018 |
| 6.8 | 397.84 | 2607 | 6.8 | 397.84 | 2607 |
| 7.8 | 466.44 | 3257 | 7.8 | 466.44 | 3257 |
| 8.8 | 535.04 | 3968 | 8.8 | 535.04 | 3968 |

WITHOUT STOP LOGS ON RIGHT ABUTMENT — ROAD ELEV \approx 652.2



$$AREA = 52h + \left(\frac{1}{2}\right)(h)(2h)$$

$$\Rightarrow 52h + h^2$$

WATER ELEVATION

D-5

DISCHARGE (C.F.S.)

10,000 20,000 30,000 40,000

TEST FLOOD

STAGE - DISCHARGE
WITHOUT STOP LOGS

ROUTE 49 ROAD ELEV

TOP OF DAM

3.15'

7.0'

TOTAL FLOW

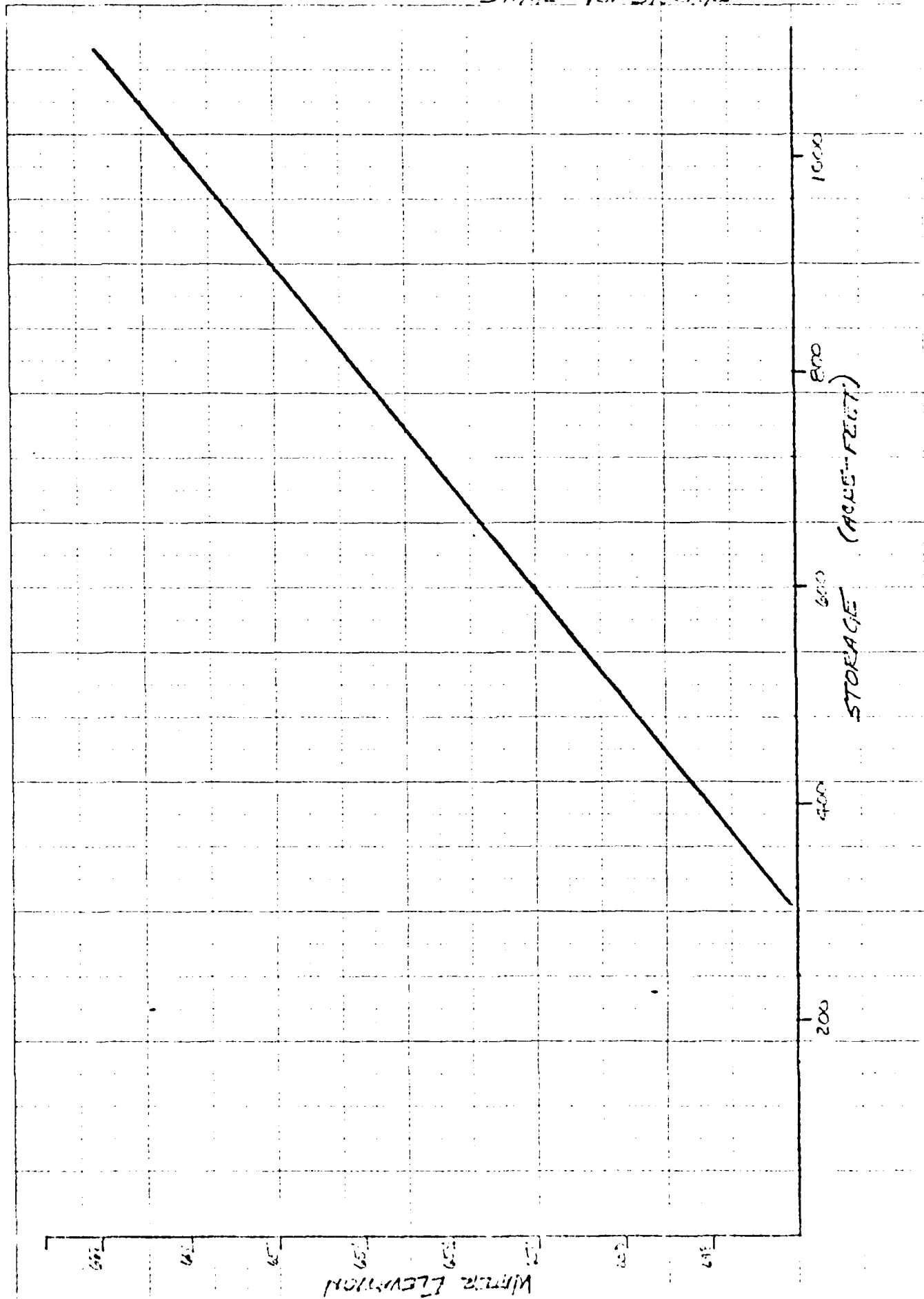
SPILLWAY FLOW

FLOW OVER LEFT ABUT.
FLOW OVER ROUTE 49

64.8 65.0 65.2 65.4 65.6 65.8 66.0

1 2 3

STAGE VS. STORAGE



DUFRESNE-HENRY ENGINEERING CORPORATION

BY WAL
 DATE 5-2-79

SUBJECT LYMAN RND
CHURCH INLET

SHEET NO. 7 OF
 JOB NO. 44-CC88

SOIL CLASSIFICATION

DOMINANT SOILS OF THE LYMAN-BEEKSHIRE-HERRON,
 MFCOW-LYMAN ASSOCIATION

HYDROLOGIC SOIL GROUP "C"

FROM S.C.S. FOR GROUP "C" SOIL RUSSET CURVE NO 73

LAND USE — WOODS

MODERATELY STEEP, SHALLOW OVER BEDROCK, WELL
 DRAINED TO EXCESSIVELY DRAINED STONY LOAMY SOIL
 ON UPLANDS & MOUNTAINS

INITIAL DRAINAGE LOSSES (ASSUME WET CONDITION)

FROM TABLE 10.1 = .30 INCHES

INFILTRATION RATE FROM S.C.S.
 FOR GROUP "C" SOIL = .12 INCHES/HOUR

AVERAGE SLOPE

$$\frac{1780-715}{10.5794} = \underline{\underline{100.67 \text{ FT/MILE}}}$$

ELEV @ 10% 715
 ELEV @ 85% 1780

TOTAL LENGTH 14.1059 MILES
 DIST BETWEEN 10% & 85% PTS 10.5794 MILES

$$\bar{P} = 2.2 \left(\frac{L L_c}{13} \right)^{.37} = 2.2 \left[\frac{14.1059 (.6)(14.1059)}{\sqrt{100.67}} \right]^{.37} = \underline{\underline{5.50}}$$

DUFRESNE-HENRY ENGINEERING CORPORATION

BY W.A.L. SUBJECT CHANNEL POND SHEET NO. 8 OF 8
 DATE 5-2-70 DAM FAILURE ANALYSIS JOB NO. 04-0000

DAM FAILURE WITH WATER LEVEL AT CREST ELEV

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

$$Y_o = 24$$

$$Q_p = 8/27 (.4)(151.3) \sqrt{32.2} (24)^{3/2} = \underline{\underline{13,490 \text{ cfs}}}$$

DAM FAILURE WITH WATER LEVEL AT 20' ABOVE CREST ELEV

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

$$Y_o = 35$$

$$Q_p = 8/27 (.4)(151.3) \sqrt{32.2} (35)^{3/2} = \underline{\underline{21,070 \text{ cfs}}}$$

DUFRESNE-HENRY ENGINEERING CORPORATION

BY V.L.L. SUBJECT DAM FAILURE ANALYSIS SHEET NO. 9 OF
 DATE 5/10/55 JOB NO. 22-0033

FOR DAM FAILURE - WATER AT TOP OF DAM (ABUTMENTS) 656.00

WATER @ 656.00 CREST ELEV 647.00
 WIDTH OF SPILLWAY 151.3' $Y_0 = 35'$

WIDTH OF BREACH = $(.4)(151.3) = 60.5'$

DISCHARGE @ TOP OF DAM = 15,932

DISCHARGE THRU BREACH = $\frac{8}{27} W_b \sqrt{g} Y_0^{3/2} = \frac{8}{27} (60.5) (5.67) (35)^{3/2} = 21,046$

DISCHARGE OVER REMAINING SPILLWAY = $CLH^{3/2} = 3.9(90.8)(9)^{3/2} = 9,561$

TOTAL FLOW DURING FAILURE $9,561 + 21,046 = 30,607$ CFS.

INCREASE OF FLOW DUE TO FAILURE $30,607 - 15,932 = 14,675$
(Q_P)

STORAGE @ FAILURE 800 AC-FT
 HYDRAULIC CAPACITY OF BREACH = $Q = 3.08(60.5)(H)^{3/2} = 15,932$

$$H = \left[\frac{15,932}{3.08(60.5)} \right]^{2/3} = 19.7'$$

WATER ELEV WOULD DROP TO $(621 + 19.7) = 640.7$
 STORAGE AT THIS ELEV = $(350 - 576.8) = 35$ AC-FT

VOLUME RELEASED = $800 - 35 = 765$ AC-FT (S)

STAGE = 638.4
 X-SECTION # 21 FOR 30,600 CFS STAGE = 620.1

FOR 30,600 CFS
 STORAGE AT 638.4 38.1
 620.1 0
 38.1 AC-FT

FOR 15,932 CFS
 STORAGE AT 633.0 22.2
 615.9 0
 22.2 AC-FT

DIFFERENCE = ADDITIONAL VOLUME CAUSED BY DAM FAILURE = $38.1 - 22.2 = 15.9$ AC-FT
(V_1)

$$Q_{P_2} = Q_{P_1} \left(1 - \frac{V_1}{S}\right) = 14,675 \left(1 - \frac{15.9}{765}\right) = 14,370 \text{ cfs}$$

∴ USE Q_{P_2} BECAUSE OF SUCH MINOR REDUCTION

$$Q_{TOTAL} = 15,932 + 14,370 = 30,302 \text{ CFS}$$

DUFRESNE-HENRY ENGINEERING CORPORATION

BY W.A.L.
DATE 5-24-79

SUBJECT DAM FAILURE ANALYSIS
(CONTINUED)

SHEET NO. 10 OF
JOB NO. 04-0088

CONCLUSION:

FOR A DAM FAILURE WITH THE WATER ELEVATION AT TOP OF DAM (ELEV 656.00) THE TOTAL FAILURE FLOW WOULD BE 30,300 CFS. THIS REPRESENTS AN ADDITIONAL FLOW DUE TO FAILURE OF APPROXIMATELY 14,400 CFS.

AT THE BRIDGE JUST DOWNSTREAM OF THE DAM THE WATER ELEVATION WOULD BE 633.4 WHICH WOULD BE WELL WITHIN THE LIMITS OF THE ARCH ON THE BRIDGE.

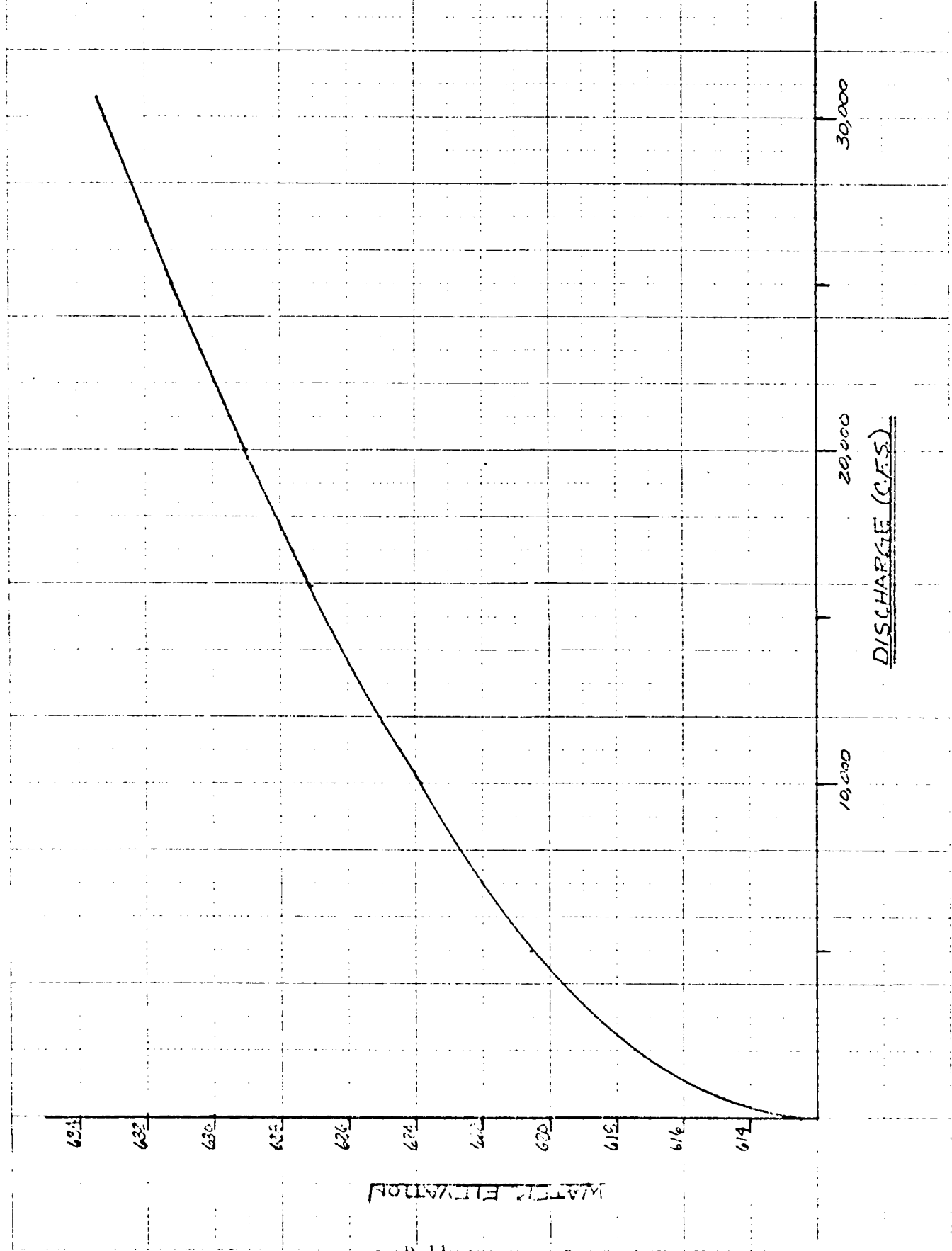
AT CROSS-SECTION #20 SITE OF THE OLD DAM STRUCTURE THE WATER ELEVATION WOULD BE 627.0 WHICH WOULD PUT THE WATER SURFACE ELEVATION 3 FEET ABOVE THE GROUND FLOOR OF THE HOUSE LOCATED ON THE RIVER BANK. THIS HOUSE WOULD BE DEFINITELY DESTROYED BY UNDERMINING OF THE EXPOSED REAR OF THE BUILDING.

THE DOLE'S MILL AT CROSS-SECTION #21 WOULD BE SERIOUSLY DAMAGED DUE TO A WATER ELEVATION OF 620.1 WHICH IS APPROXIMATELY 3 FEET ABOVE THE GROUND FLOOR OF THE BUILDING AND ABOVE THE ROAD BY 3 FEET. THIS STRUCTURE TOO WOULD BE UNDERMINED AND SEVERELY DAMAGED.

THEREFORE THE HAZARD OF THIS DAM IS SIGNIFICANT

Y-SECT 19

BRIDGE RATING CURVE

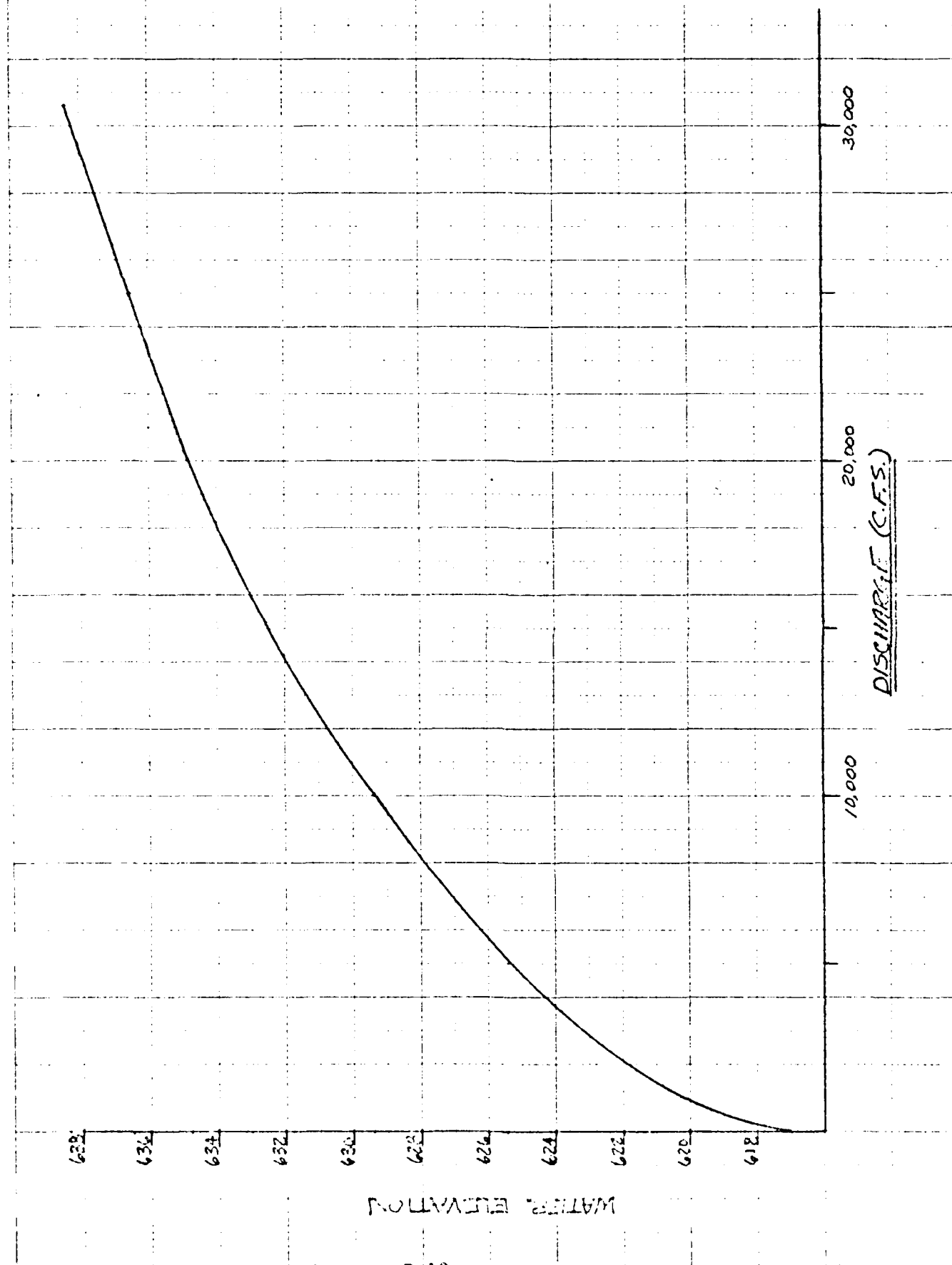


WATER ELEVATION

DISCHARGE (CFS)

LESSON 10 F

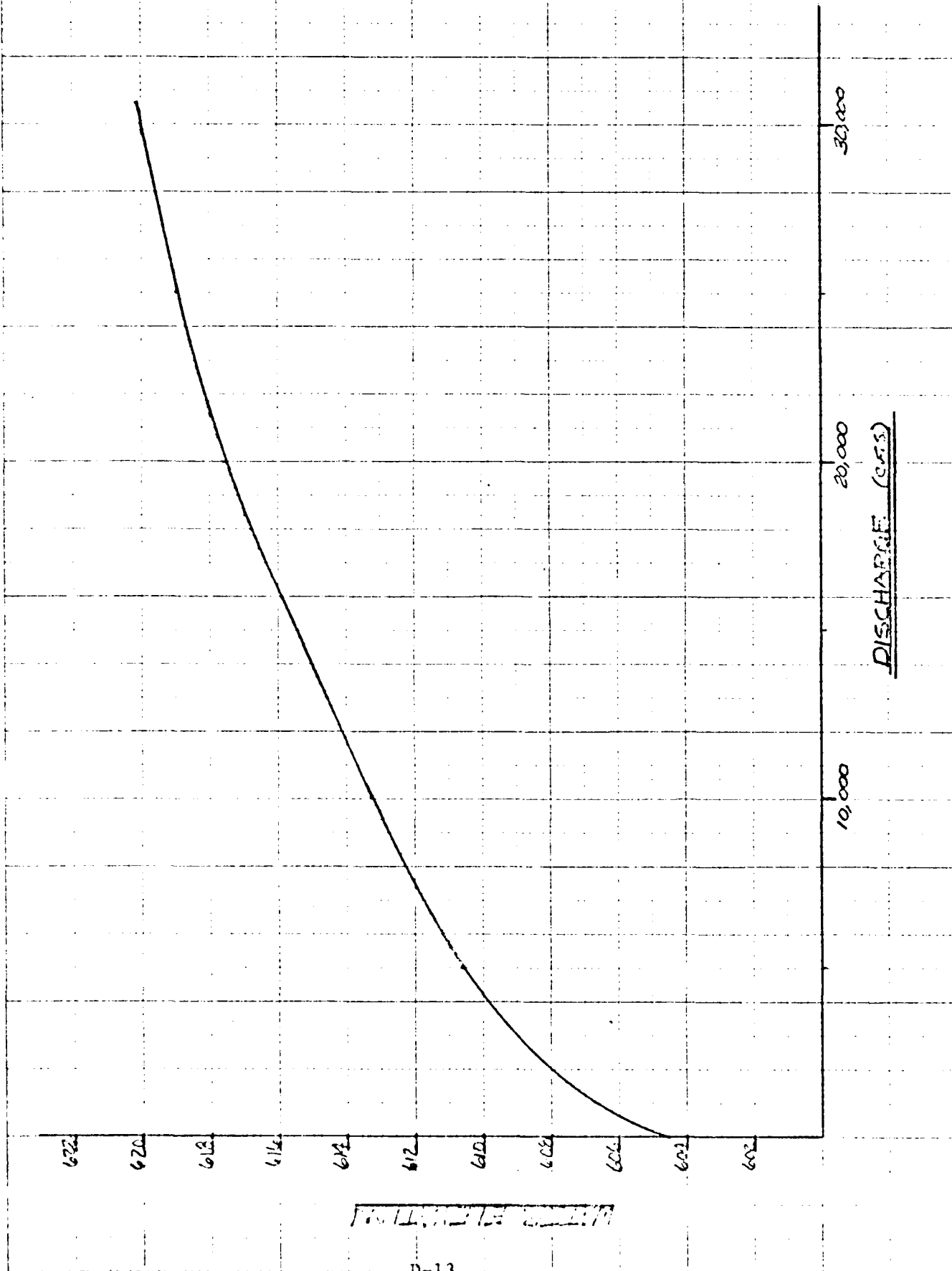
70' DS. OF DAM



WATER ELEVATION

DISCHARGE (C.F.S.)

X-5017 21
DOLE'S MILL



10-11-12-13-14-15-16-17-18-19-20-21-22

MEC-1 VERSION DATED JAN 1973
 UPDATED 1.15.74
 CHANGE N7.01

CAMPTON POND
 CAMPTON NEA HAMPSHIRE
 RESERVOIR ROUTING PROGRAM

JOB SPECIFICATION
 NO NHR NMH IDAY IMF IMH METRC IPLE IPRT NSTAN
 72 1 0 1 0 0 0 2 0 0
 JOPER NHT
 3 0

SUB-AREA RUNOFF COMPUTATION

WATERSHED RUNOFF
 ESTAQ ICOMP IECON ITAPE JPLY JPRT IMARE
 1 0 0 0 0 0 1

HYDROGRAPH DATA
 EHYDG EHYG TAREA SNAP TRSDA TRSPC RATIO ISNOV ISARE LOCAL
 1 1 57.63 0.0 57.63 0.0 0.500 0 0 0

PRECIP DATA
 SPPE PMS R6 R12 R24 R48 R72 R96
 0.0 10.00 92.00 105.00 116.00 123.00 0.0 0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.853

LOSS DATA
 STRKR OLTKR RTIOI ERAIN STRKS RTICK STRTL CNSTL ALSME RTIMP
 0.0 0.0 1.00 0.0 0.0 1.00 0.30 0.12 0.0 0.0

UNIT HYDROGRAPH DATA
 TPD 5.50 CPO0.75 RTAB 3

RECESSION DATA

SYRTOP 114.00 DRCNSH -0.10 RTIOIB 1.50
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TCR 6.96 AVG RD 3.26 INTERVALS

UNIT HYDROGRAPH 22 END-OF-PERIOD ORIGINATES, LAG 5.53 HOURS, CPO 0.75 VOLR 1.00
 301. 1379. 2595. 3834. 4735. 5056. 6794. 3899. 2823. 2072.
 1521. 1114. 819. 601. 441. 324. 238. 174. 126. 96.
 89. 51.

END-OF-PERIOD FLOW

| TIME | RAIN | EXCS | COMP Q |
|--------|------|------|--------|
| 1 1 0 | 0.01 | 0.03 | 109. |
| 1 2 0 | 0.01 | 0.00 | 105. |
| 1 3 0 | 0.01 | 0.00 | 101. |
| 1 4 0 | 0.01 | 0.00 | 97. |
| 1 5 0 | 0.01 | 0.00 | 93. |
| 1 6 0 | 0.01 | 0.00 | 89. |
| 1 7 0 | 0.02 | 0.03 | 86. |
| 1 8 0 | 0.02 | 0.00 | 82. |
| 1 9 0 | 0.02 | 0.00 | 79. |
| 1 10 0 | 0.02 | 0.00 | 76. |
| 1 11 0 | 0.02 | 0.00 | 73. |
| 1 12 0 | 0.02 | 0.00 | 70. |
| 1 13 0 | 0.09 | 0.00 | 67. |
| 1 14 0 | 0.10 | 0.00 | 65. |
| 1 15 0 | 0.13 | 0.01 | 65. |
| 1 16 0 | 0.32 | 0.20 | 144. |
| 1 17 0 | 0.12 | 0.00 | 155. |
| 1 18 0 | 0.09 | 0.00 | 165. |
| 1 19 0 | 0.01 | 0.00 | 173. |
| 1 20 0 | 0.01 | 0.00 | 187. |
| 1 21 0 | 0.01 | 0.00 | 197. |
| 1 22 0 | 0.01 | 0.00 | 207. |
| 1 23 0 | 0.01 | 0.00 | 217. |
| 2 0 0 | 0.01 | 0.00 | 227. |
| 2 1 0 | 0.11 | 0.03 | 476. |
| 2 2 0 | 0.11 | 0.00 | 359. |
| 2 3 0 | 0.11 | 0.00 | 272. |
| 2 4 0 | 0.11 | 0.00 | 209. |
| 2 5 0 | 0.11 | 0.00 | 161. |
| 2 6 0 | 0.11 | 0.00 | 126. |
| 2 7 0 | 0.33 | 0.21 | 181. |
| 2 8 0 | 0.33 | 0.21 | 451. |
| 2 9 0 | 0.33 | 0.21 | 989. |
| 2 10 0 | 0.33 | 0.21 | 1794. |
| 2 11 0 | 0.33 | 0.21 | 2793. |
| 2 12 0 | 0.33 | 0.21 | 3803. |
| 2 13 0 | 1.41 | 1.29 | 5281. |
| 2 14 0 | 1.70 | 1.58 | 7663. |
| 2 15 0 | 2.12 | 2.00 | 11611. |
| 2 16 0 | 5.37 | 5.25 | 18741. |
| 2 17 0 | 1.98 | 1.86 | 29483. |
| 2 18 0 | 1.55 | 1.43 | 41816. |
| 2 19 0 | 0.17 | 0.05 | 51118. |
| 2 20 0 | 0.17 | 0.05 | 60291. |
| 2 21 0 | 0.17 | 0.05 | 61892. |
| 2 22 0 | 0.17 | 0.05 | 57612. |
| 2 23 0 | 0.17 | 0.05 | 48559. |
| 3 0 0 | 0.0 | 0.0 | 38219. |
| 3 1 0 | 0.0 | 0.0 | 29014. |
| 3 2 0 | 0.0 | 0.0 | 21711. |
| 3 3 0 | 0.0 | 0.0 | 16273. |
| 3 4 0 | 0.0 | 0.0 | 12187. |
| 3 5 0 | 0.0 | 0.0 | 9086. |
| 3 6 0 | 0.0 | 0.0 | 6732. |
| 3 7 0 | 0.0 | 0.0 | 5032. |
| 3 8 0 | 0.0 | 0.0 | 3763. |
| 3 9 0 | 0.0 | 0.0 | 2834. |
| 3 10 0 | 0.0 | 0.0 | 2114. |
| 3 11 0 | 0.0 | 0.0 | 1603. |
| 3 12 0 | 0.0 | 0.0 | 1202. |
| 3 13 0 | 0.0 | 0.0 | 906. |
| 3 14 0 | 0.0 | 0.0 | 6519. |
| 3 15 0 | 0.0 | 0.0 | 4119. |
| 3 16 0 | 0.0 | 0.0 | 2817. |
| 3 17 0 | 0.0 | 0.0 | 2021. |
| 3 18 0 | 0.0 | 0.0 | 1482. |
| 3 19 0 | 0.0 | 0.0 | 1089. |
| 3 20 0 | 0.0 | 0.0 | 814. |
| 3 21 0 | 0.0 | 0.0 | 602. |
| 3 22 0 | 0.0 | 0.0 | 457. |
| 3 23 0 | 0.0 | 0.0 | 347. |
| 4 0 0 | 0.0 | 0.0 | 261. |

0000

ENCLOS
AC-PT

0.00
28499.

12.11
44430.

10.00
51875.

10.00
51825.

STATION 1

| | | INFLOW, OUTFLOW, AND OBSERVED FLOW | | | | | | | | | PRECIPITATION AND EXCESS | |
|---|----|------------------------------------|--------|--------|--------|--------|--------|--------|--------|----|--------------------------|----|
| | | 0. | 10000. | 20000. | 30000. | 40000. | 50000. | 60000. | 70000. | 0. | 0. | 0. |
| | | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1 | 1 | 01 | | | | | | | | | | |
| 1 | 2 | 01 | | | | | | | | | | |
| 1 | 3 | 01 | | | | | | | | | | |
| 1 | 4 | 01 | | | | | | | | | | |
| 1 | 5 | 01 | | | | | | | | | | |
| 1 | 6 | 01 | | | | | | | | | | |
| 1 | 7 | 01 | | | | | | | | | | |
| 1 | 8 | 01 | | | | | | | | | | |
| 1 | 9 | 01 | | | | | | | | | | |
| 1 | 10 | 01 | | | | | | | | | | |
| 1 | 11 | 01 | | | | | | | | | | |
| 1 | 12 | 01 | | | | | | | | | | |
| 1 | 13 | 01 | | | | | | | | | | |
| 1 | 14 | 01 | | | | | | | | | | |
| 1 | 15 | 01 | | | | | | | | | | |
| 1 | 16 | 01 | | | | | | | | | | |
| 1 | 17 | 01 | | | | | | | | | | |
| 1 | 18 | 01 | | | | | | | | | | |
| 1 | 19 | 01 | | | | | | | | | | |
| 1 | 20 | 01 | | | | | | | | | | |
| 1 | 21 | 01 | | | | | | | | | | |
| 1 | 22 | 01 | | | | | | | | | | |
| 1 | 23 | 01 | | | | | | | | | | |
| 2 | 0 | 01 | | | | | | | | | | |
| 2 | 1 | 01 | | | | | | | | | | |
| 2 | 2 | 01 | | | | | | | | | | |
| 2 | 3 | 01 | | | | | | | | | | |
| 2 | 4 | 01 | | | | | | | | | | |
| 2 | 5 | 01 | | | | | | | | | | |
| 2 | 6 | 01 | | | | | | | | | | |
| 2 | 7 | 01 | | | | | | | | | | |
| 2 | 8 | 01 | | | | | | | | | | |
| 2 | 9 | 01 | | | | | | | | | | |
| 2 | 10 | 01 | | | | | | | | | | |
| 2 | 11 | 01 | | | | | | | | | | |
| 2 | 12 | 01 | | | | | | | | | | |
| 2 | 13 | 01 | | | | | | | | | | |
| 2 | 14 | 01 | | | | | | | | | | |
| 2 | 15 | 01 | | | | | | | | | | |
| 2 | 16 | 01 | | | | | | | | | | |
| 2 | 17 | 01 | | | | | | | | | | |
| 2 | 18 | 01 | | | | | | | | | | |
| 2 | 19 | 01 | | | | | | | | | | |
| 2 | 20 | 01 | | | | | | | | | | |
| 2 | 21 | 01 | | | | | | | | | | |
| 2 | 22 | 01 | | | | | | | | | | |
| 2 | 23 | 01 | | | | | | | | | | |
| 3 | 0 | 01 | | | | | | | | | | |
| 3 | 1 | 01 | | | | | | | | | | |
| 3 | 2 | 01 | | | | | | | | | | |
| 3 | 3 | 01 | | | | | | | | | | |
| 3 | 4 | 01 | | | | | | | | | | |
| 3 | 5 | 01 | | | | | | | | | | |
| 3 | 6 | 01 | | | | | | | | | | |
| 3 | 7 | 01 | | | | | | | | | | |
| 3 | 8 | 01 | | | | | | | | | | |
| 3 | 9 | 01 | | | | | | | | | | |
| 3 | 10 | 01 | | | | | | | | | | |
| 3 | 11 | 01 | | | | | | | | | | |
| 3 | 12 | 01 | | | | | | | | | | |
| 3 | 13 | 01 | | | | | | | | | | |
| 3 | 14 | 01 | | | | | | | | | | |
| 3 | 15 | 01 | | | | | | | | | | |
| 3 | 16 | 01 | | | | | | | | | | |
| 3 | 17 | 01 | | | | | | | | | | |
| 3 | 18 | 01 | | | | | | | | | | |
| 3 | 19 | 01 | | | | | | | | | | |
| 3 | 20 | 01 | | | | | | | | | | |
| 3 | 21 | 01 | | | | | | | | | | |
| 3 | 22 | 01 | | | | | | | | | | |
| 3 | 23 | 01 | | | | | | | | | | |
| 4 | 0 | 01 | | | | | | | | | | |

•OVN•

| | | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| 55. | 53. | 50. | 48. | 47. | 45. | 43. | 41. | 40. | 38. |
| 36. | 35. | 34. | 32. | 33. | 76. | 177. | 307. | 436. | 528. |
| 559. | 526. | 426. | 318. | 238. | 179. | 136. | 104. | 81. | 63. |
| 91. | 226. | 494. | 897. | 1397. | 1931. | 2641. | 3831. | 5906. | 9371. |
| 20908. | 26559. | 30147. | 30846. | 28706. | 26279. | 19109. | 14507. | 10856. | 2450. |
| 14742. | 6093. | 3366. | 3001. | 2887. | 2767. | 2657. | 2552. | 1701. | 1633. |
| 2353. | 2259. | 2170. | 2083. | 1921. | 1845. | | | | |
| 1569. | | | | | | | | | |

RUNOFF MULTIPLIED BY 0.50

| | | | | |
|--------|--------|---------|---------|--------------|
| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
| CFS | 13836. | 25037. | 11698. | 11111. |
| CFS | 30846. | 26901. | 11698. | 31332. |
| INCHES | | 4.34 | 7.55 | 8.43 |
| AC-FT | 13349. | 23215. | 25913. | 25913. |



CAMPTON POND DAM

DRAINAGE AREA
BOUNDARY

SOURCE:

GUND SECTIONAL SHEETS
PORTLAND, ME. - N.H..
LEWISTON, ME.
SERIES V501 1956
REV. 1972

DUFRESNE-HENRY ENGINEERING CORP.
ARCHITECT-ENGINEER

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

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

CAMPTON POND DAM
DRAINAGE AREA MAP

CLIENT NO. 04-0090
ENGINEER JAD

SCALE 1"=4 MILES
DATE

APPENDIX E

Information as Contained in the National Inventory of Dams

END

FILMED

8-85

DTIC