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NATIONAL DAM SAFETY PROGRAM. SYLVA LAKE DAM (NJ00391), PASSAIC --ETC(U).
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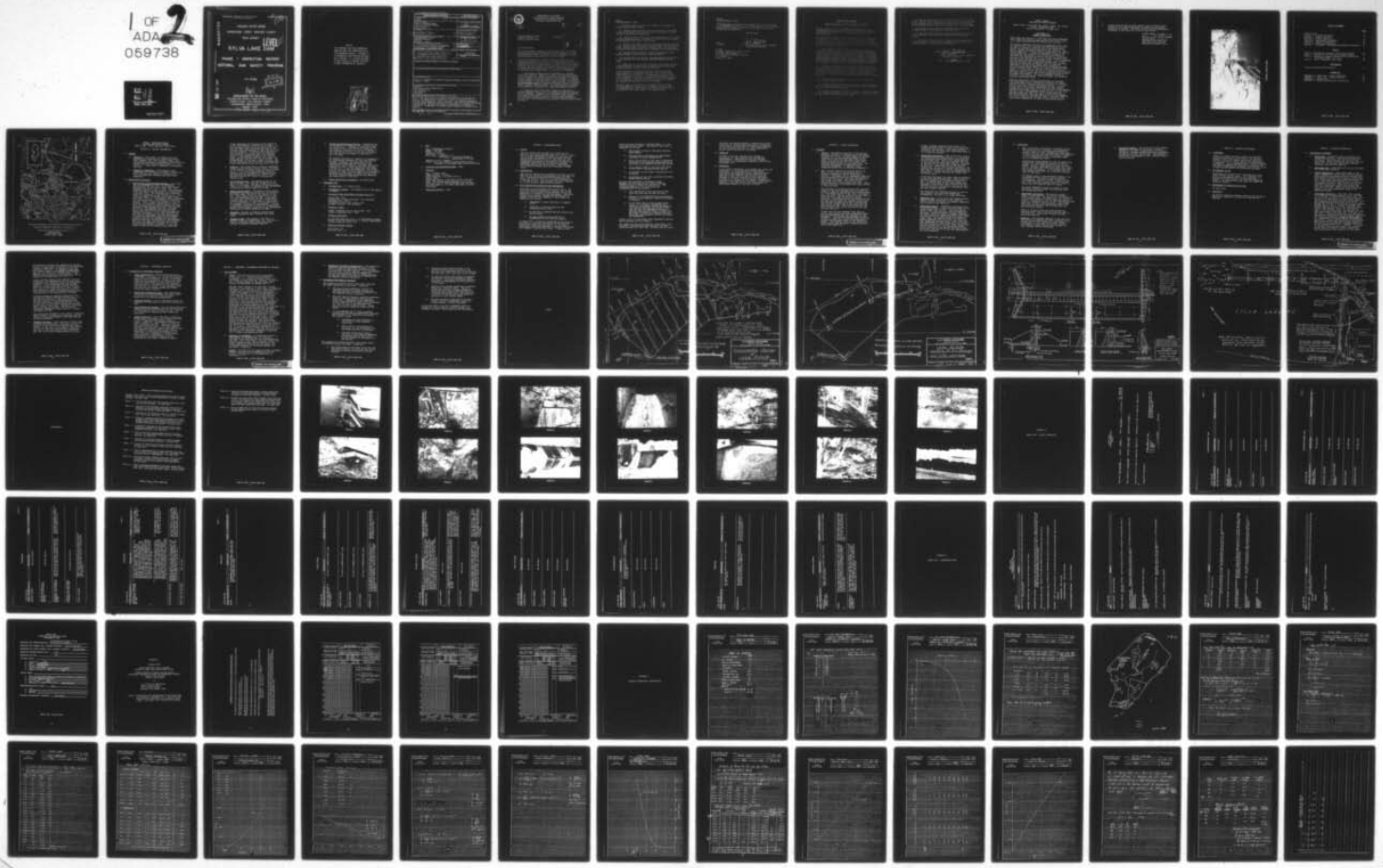

PASSAIC RIVER BASIN

SHABAKUNK CREEK, MERCER COUNTY

NEW JERSEY

LEVEL II

SYLVA LAKE DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NJ 00391

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

AUGUST 1978

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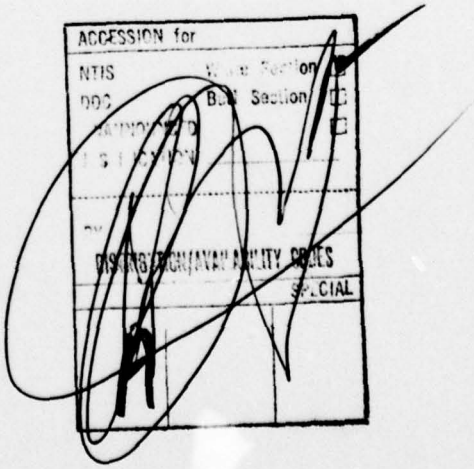

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

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National Dam Safety Program
Sylva Lake Dam
Mercer County, N.J.

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7. AUTHOR(s): (10) Michael Baker, III P.E.

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9. PERFORMING ORGANIZATION NAME AND ADDRESS
Michael Baker, Jr. Inc.
4301 Dutch Ridge Rd.
Box 280
Beaver Pa. 15009

410 795

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15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES
Copies are obtainable from National Technical Information Service, Springfield, Virginia, 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)
Dams--N.J.
National Dam Safety Program Phase I
Sylva Lake Dam, N.J.
Dam Inspection
Dam Safety

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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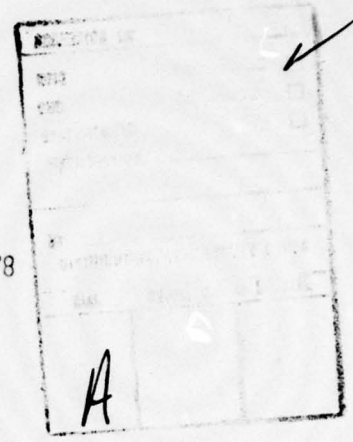
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-D

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

19 SEP 1978



Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Sylva Lake Dam in Mercer County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given on the first four pages of the report.

Based on visual inspection, available records, calculations and past operational performance, Sylva Lake Dam initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's spillway is considered inadequate since 85 percent of the 100-year Flood would overtop the dam. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant, engaged by the owner, using more sophisticated methods, procedures and studies initiated within one month and completed within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1979. In the interim, detailed emergency operation, drawdown and evacuation plans and a warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. Within one month from the date of approval of this report, a detailed topographic survey of the left abutment and reservoir slope area should be initiated. Subsequent to the topographic survey, plans should be prepared and implemented to raise the dike to the same elevation (El. 93.9) as top of dam or higher and to provide proper drainage for adjacent areas. These remedial measures should be initiated within calendar year 1979.

c. Within six months from the date of approval of this report the following actions should be taken.

(1) Extensive repairs should be made to all spalled and deteriorated concrete on the spillway weir, downstream face of the spillway, spillway wing walls, and discharge channel apron.

(2) The gate and outlet works should be repaired as necessary to provide emergency drawdown facilities. Maintenance procedures should be developed and implemented for this facility in the future.

(3) Improve outlet channel conditions by removing deposition, trees and debris. The left stream bank should be cleared, shaped and stabilized with properly designed riprap to withstand high stream flows. The scour hole at the end of the spillway apron should be repaired to avoid further damage.

(4) The bare slightly eroded area on the downstream slope of the embankment should be properly graded, treated and seeded.

(5) The eroded areas at both ends of the spillway should be filled in to top of dam (El. 93.9), and properly seeded and treated to prevent erosion.

d. Within one year from the date of approval of this report the earth embankment should be cleared of trees and shrubs, properly graded, and reseeded with grass, which should be well maintained.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Frank Thompson, Jr. of the Fourth District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia, 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

NAPEN-D
Honorable Brendan T. Byrne

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely yours,

JOEL T. CALLAHAN
Lieutenant Colonel, Corps of Engineers
Acting District Engineer

1 Incl
As stated

Cy furn:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N. J. Dept. of Environmental Protection
P.O. Box 2809
Trenton, NJ 08625

SYLVA LAKE DAM (NJ00391)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 24 June 1978 by Michael Baker, Jr., Inc. Consulting Engineers under contract to the U. S. Army Engineer District, Philadelphia, in accordance with the National Dam Inspection Act, Public Law 92-367.

The Sylva Lake Dam initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's spillway is considered inadequate since 85 percent of the 100 year Flood would overtop the dam. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant, engaged by the owner, using more sophisticated methods, procedures and studies initiated within one month and completed within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1979. In the interim, detailed emergency operation, drawdown and evacuation plans and a warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. Within one month from the date of approval of this report, a detailed topographic survey of the left abutment and reservoir slope area should be initiated. Subsequent to the topographic survey, plans should be prepared and implemented to raise the dike to the same elevation (El. 93.9) as top of dam or higher and to provide proper drainage for adjacent areas. These remedial measures should be initiated within calendar year 1979.

c. Within six months from the date of approval of this report the following actions should be taken.

(1) Extensive repairs should be made to all spalled and deteriorated concrete on the spillway weir, downstream face of the spillway, spillway wing walls, and discharge channel apron.

(2) The gate and outlet works should be repaired as necessary to provide emergency drawdown facilities. Maintenance procedures should be developed and implemented for this facility in the future.

(3) Improve outlet channel conditions by removing deposition, trees and debris. The left stream bank should be cleared, shaped and stabilized with properly designed riprap to withstand high stream flows. The scour hole at the end of the spillway apron should be repaired to avoid further damage.

(4) The bare slightly eroded area on the downstream slope of the embankment should be properly graded, treated and seeded.

(5) The eroded areas at both ends of the spillway should be filled in to top of dam (El. 93.9), and properly seeded and treated to prevent erosion.

d. Within one year from the date of approval of this report the earth embankment should be cleared of trees and shrubs, properly graded, and reseeded with grass, which should be well maintained.

APPROVED: Joel T. Callahan

JOEL T. CALLAHAN
Lieutenant Colonel, Corps of Engineers
Acting District Engineer

DATE: 19 September 1978

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam - Sylva Lake Dam, Mercer County, New Jersey
Stream - Shabakunk Creek
Date of Inspection - 24 June 1978

ASSESSMENT OF GENERAL CONDITIONS

Sylva Lake Dam consists of a 400 feet long earth embankment and 76 feet long concrete ogee spillway with outlet works. It is owned and maintained by Trenton State College.

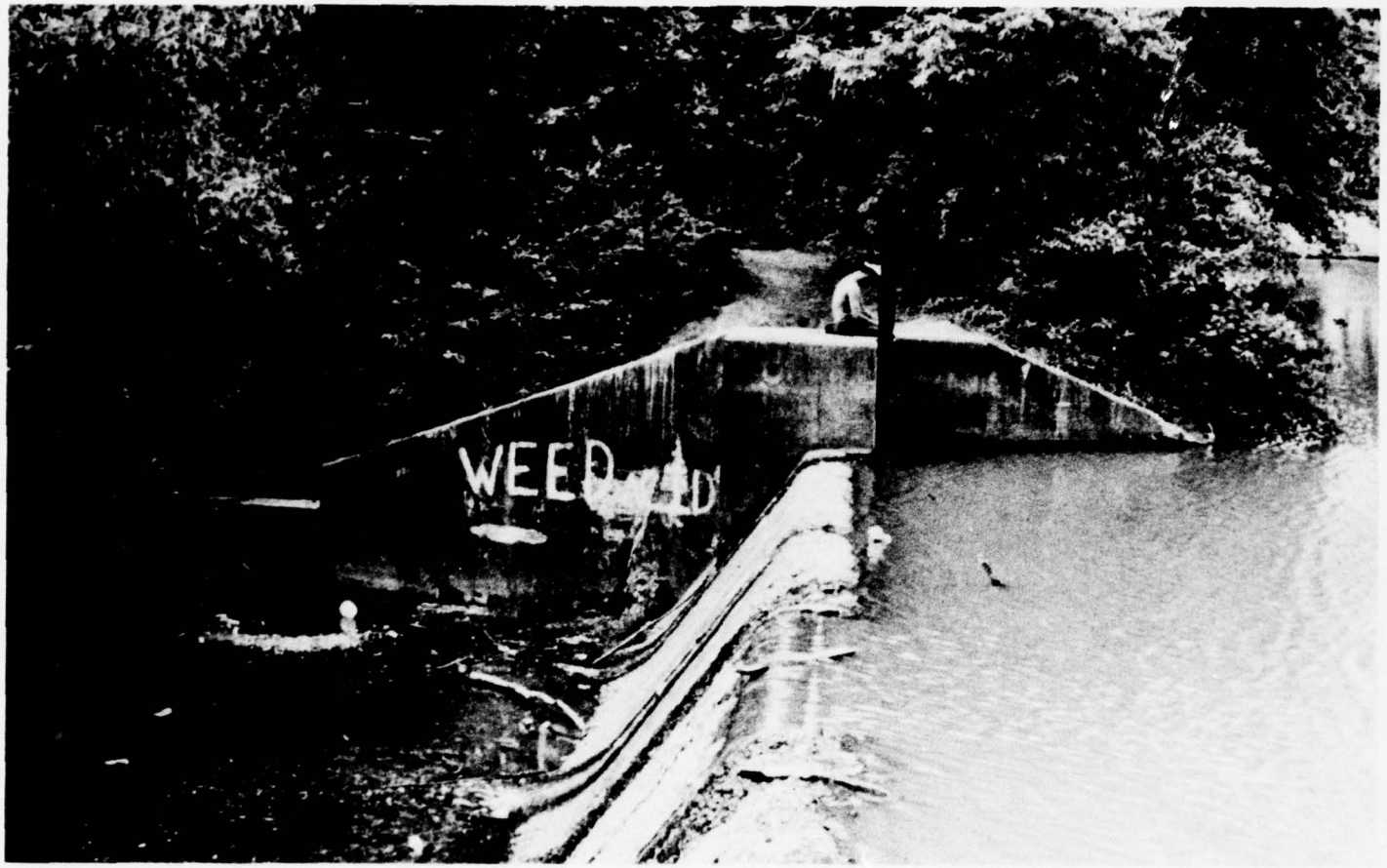
The visual inspection and review of engineering data, made in June and July 1978, indicate that deficiencies exist in the dam to a degree warranting correction without undue delay, although emergency attention is not required. The dam was found to be in poor overall condition at the time of visual inspection. A detailed topographic survey of the left abutment and reservoir area should be performed to determine the appropriate location required to reconstruct the top of the existing dike to top of dam elevation and to provide proper drainage for adjacent areas. It is recommended that the seriously spalled and deteriorated areas on the concrete spillway weir, downstream spillway face, spillway wing walls, and discharge channel apron be repaired. Obstructions should be removed from the downstream channel. The left stream channel should be cleared, shaped and stabilized. The scour hole at the end of the apron should be repaired. Facilities for draining the lake should be restored. The bare slightly eroded area on the downstream slope should be graded and reseeded. The earth embankment should be cleared of trees and shrubs, properly graded, and replanted with well maintained grass.

Hydraulic/hydrologic evaluations performed in accordance with established Corps of Engineers procedures for Phase I Inspection Reports revealed that the spillway will not pass the 100 year flood without overtopping the dam. A flood routing using the existing conditions with flow passing through the low dike areas at the left portion of the reservoir indicated the maximum reservoir level will be 0.5 foot below the top of dam. An additional flood routing using the expected conditions after the repair of the dike to proper top of dam elevation indicated the dam will be overtopped by 0.3 foot of water by the 100 year flood. Therefore, the owner should immediately initiate an engineering study to

further evaluate the spillway capacity and to develop recommendations for remedial measures to reduce the overtopping potential of the dam. The owner should also provide emergency procedures in the event of a flood or dam failure.

MICHAEL BAKER, JR., INC.

Michael Baker, III, P.E.
Chairman of the Board and
Chief Executive Officer
Registration Number 13385



OVERALL VIEW OF DAM

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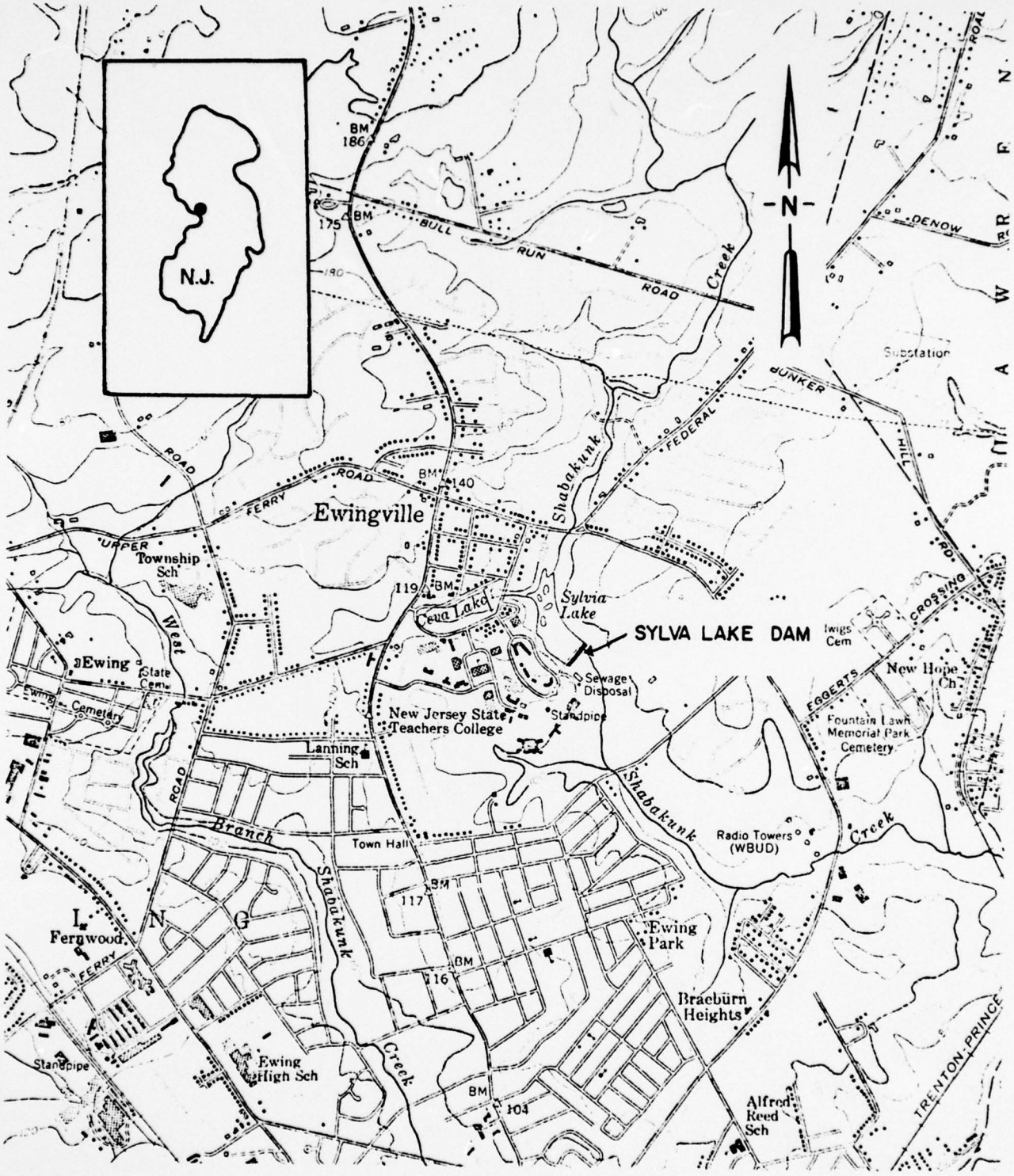

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LOCATION PLAN
SYLVA LAKE DAM

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM: SYLVA LAKE DAM, ID# NJ 00391

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority - This report is authorized by the National Dam Inspection Act, Public Law 92-367, 92nd Congress, H.R. 15951 enacted 8 August 1972 and has been prepared in accordance with Contract No. DACW61-78-C-0141 between Michael Baker, Jr., Inc. and the U.S. Army Corps of Engineers, Philadelphia District.

b. Purpose of Inspection - The purpose of this inspection is to evaluate the general condition of Sylva Lake Dam with respect to safety of the facility based upon available data and visual inspection.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances - Sylva Lake Dam is a homogeneous earth fill embankment, approximately 400 feet long, and a concrete ogee spillway with outlet works 76 feet long. The embankment height is about 10 feet. The downstream slope has been filled and graded to an approximate 10 percent slope. The upstream slope is approximately two horizontal to one vertical (2:1). This slope was capped with Belgian block when reconstructed in 1937. It is presently heavily vegetated with trees and brush. The spillway is located in the left (north) valley area adjacent to the left abutment. Outlet works, consisting of a cast in place 24 inch diameter concrete opening with gate, were constructed at the right end of the spillway adjacent to the embankment section of the dam. The 71 feet long ogee spillway and five feet section for outlet works are located between the concrete wing walls. A 10.5 feet long concrete core wall is connected to the left wing wall of the spillway and extends into the left abutment. A similar core wall is connected to the right spillway wing wall and extends into the embankment section of the dam. The spillway, outlet works and walls are supported by wood piles, 12 feet long and eight inches in diameter. A two inch tongue and groove wood sheet piling cutoff was

placed underneath the spillway at the centerline of the dam extending to twelve feet in depth. A similar sheet piling cutoff was placed from two to four feet deep under the downstream edge of the concrete apron and extended for about 40 feet from the left abutment. A concrete wall extending to "hard material" was placed under the remaining section of the downstream edge of the concrete apron. A dike extends along the left reservoir slope upstream from the left end of the dam. The maximum height of the dike is about two feet, and it was constructed with the intent of keeping high flows from passing around the left end of the dam.

b. Location - Sylva Lake Dam is located on Shabakunk Creek in Ewing Township, Mercer County, New Jersey on the property of Trenton State College at Ewingville. It is located approximately 2.2 miles upstream from the confluence of Shabakunk Creek and West Branch Shabakunk Creek, and 4.1 miles upstream from the U.S. Route 1 crossing near Colonial Lake.

c. Size Classification - The maximum height of the dam is 10 feet. The reservoir volume to top of dam is 64 acre-feet. The dam is therefore in the "Small" size category as defined by the "Recommended Guidelines for Safety Inspection of Dams."

d. Hazard Classification - The Trenton State College maintenance building and parking lot is located on the right slope, 200 feet to 500 feet below the dam. Local roads cross the stream about .34 and 1.1 miles downstream from the dam. A few homes and some small businesses are also located downstream of the dam. In the event of a dam failure, it is estimated that a "few" lives would be lost and economic loss would be "appreciable." The dam is therefore classified to be in the "Significant" hazard classification as defined by the "Recommended Guidelines for Safety Inspection of Dams."

e. Ownership - The dam is owned by Trenton State College, Pennington Road, Trenton, New Jersey 08618.

f. Purpose of Dam - The purpose of the dam is to provide a lake for recreational use. This use is greatly restricted under present conditions because of excessive sediment deposits.

g. Design and Construction History - Information was not available with regard to the original design and construction. Information contained in the microfiche files of the New Jersey Department of Environmental Protection (N.J.D.E.P.) indicate that the dam had failed in 1925 and was repaired that same year by the owner, at that time, a Mr. C. V. Hill.

The present structure is a result of a redesign by Mr. Kirkpatrick, engineer for the State Teachers College. Evidently, the State Water Policy Commission provided many design details and construction specifications. The basic design was completed in 1935. After construction had begun in March 1937, it was determined that the foundation for the spillway was inadequate. After auger borings were made, the State Water Policy Commission designed a piling system to support the spillway. The Works Progress Administration then completed the construction in late 1937.

h. Normal Operational Procedures - Not Applicable

1.3 PERTINENT DATA

a. Drainage Area - 4.2 square miles

b. Discharge at Damsite - The maximum flow at the damsite is unknown.

c. Elevation [feet above Mean Sea Level (M.S.L.)] -

Top of Dam - 93.9
Maximum Pool (Design Discharge) - Not available
Recreaton Pool - 90.4
Streambed at Centerline of Dam - 83.5
Maximum Tailwater - Not available

d. Reservoir (feet) -

Length of Maximum Pool at Top of Dam - 2500
Length of Recreaton Pool - 1300

e. Storage (acre-feet) -

At Spillway Crest (El. 90.4) - 16 (according to hydrographic survey performed by A. D. Pistilli Associates)
At Top of Dam (El. 93.9) - 64

f. Reservoir Surface (acres) -

Top of Dam - 16
Spillway Crest - 11

g. Dam -

Type - Homogeneous earthfill
Length - 475 feet
Height - 10 feet
Top Width - 10 feet
Side Slopes - Upstream - 2:1
Downstream - Filled and graded to approximate 10 percent
Impervious Core - Unknown
Cutoff - Two inch tongue and groove sheet piling extending 12 feet deep under concrete spillway

h. Diversion and Regulating Tunnel - None

i. Spillway -

Type - Concrete ogee
Length of Weir - 71 feet
Crest Elevation - 90.4 feet (M.S.L.)
Gates - None
Downstream Channel - The apron outlet is 82 feet wide. The stream channel narrows to a 43 feet width less than 10 feet downstream from the apron, and then tapers to a 20 feet width about 150 feet downstream.

j. Regulating Outlets - None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The only design data available for review was the material from the microfiche files of N.J.D.E.P. There was no design information available for the dam that was initially constructed or for its repair in 1925. Design plans from the N.J.D.E.P. files for the 1937 reconstruction consist of two sheets; one showing the embankment cross sections and the other showing structural details for the spillway. Some hydraulic and foundation designs were also contained in these files.

2.2 CONSTRUCTION

There was no construction information available for the dam that was initially constructed or for its repair in 1925. Construction reports were reviewed from the microfiche files of N.J.D.E.P. for the reconstruction of the dam in 1937. This reconstruction was completed as a Works Progress Administration project.

2.3 POST-CONSTRUCTION INSPECTION AND ENGINEERING

According to the microfiche files of N.J.D.E.P., the Sylva Lake Dam was inspected in February 1970 at the direction of the Bureau of Water Control, New Jersey Department of Conservation and Development. The owner, Trenton State College, engaged Trenton Engineering Company to perform the inspection. This report is summarized as follows:

1) "Embankment in good condition; no seepage noted."

2) "Concrete is spalling along top and downstream face of dam."

3) No scouring or undercutting was noted in the outlet channel.

4) No other condition was noted and no recommendations were made for repairs.

In August 1973, a study was authorized by the State of New Jersey to evaluate the feasibility and costs to rehabilitate Lakes Ceva and Sylva. A. D. Pistilli Associates, Consulting Engineers of Wenonah, New Jersey were engaged to perform this study. A copy of this

report was made available to Michael Baker, Jr., Inc. for preparing this report. The scope of the study is summarized as follows:

1) Hydrographic surveys to determine existing water depths.

2) Hand probings to determine the approximate thickness of recent sedimentation.

3) Three core borings in each lake to determine the physical and chemical characteristics of materials to be removed from the lake bottom.

4) Water samples taken at the inlet and outlet of each lake to determine water quality.

5) An estimate of the volume of materials to be excavated.

6) An estimate of the cost to perform the recommended rehabilitation.

The work was performed in September through November 1973 and resulted in a report entitled "Rehabilitation of Lakes Ceva and Sylvia." The following summarizes the conclusions and recommendations of this report:

1) Over two-thirds of the lake area of Lake Sylva has less than two feet of water.

2) Materials to be excavated and water quality present no environmental concern with respect to disposal.

3) In the event that no work is done in the lakes, it is strongly recommended that preventive maintenance work be performed on the concrete spillways and aprons of both dams and that the embankment adjacent to spillway structures be raised to permit the spillways to function to the peak flow for which they were designed without overtopping the embankments.

Plates 1 and 2 of this report were reproduced from the above mentioned Pistilli report.

The inspection team interviewed Mr. Peter Mills, Vice-President, Administration and Financing at Trenton State College on 23 June 1978. At that time, Mr. Mills

indicated that Ewing Township is considering hiring a consultant to redesign Lake Sylva Dam to incorporate flood control for protection of downstream properties. He also indicated that the U.S. Soil Conservation Service may be involved in its design.

2.4 OPERATION

As owner of the dam, Trenton State College is responsible for the maintenance of the dam and appurtenances. There were no records available pertaining to the maintenance operation, lake levels, discharges, etc.

2.5 EVALUATION

Little design information was available for review and evaluation. It is evident that little design information was generated for the rehabilitation of Lake Sylva since extensive design plans were not required at that time for this size of structure. Although it would be desirable to have additional information to review, the information available is believed to be adequate for the Phase I investigation, especially since the facility has functioned in a satisfactory manner for the past 20 years.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General - The general condition of the dam and spillway indicates that deterioration has become progressively worse. Although immediate remedial treatment is not considered necessary, major repair work should be undertaken without undue delay to avoid failure that could occur from continued deterioration of the structures. The observed deficiencies are described in the following paragraphs. A complete visual inspection check list is included in Appendix A.

b. Dam - Serious erosion has occurred behind the walls at both ends of the spillway due to excessive pedestrian traffic and because of rainfall. Settlement due to inadequate compaction during construction may also have contributed to this grade deficiency. The grade difference to top of dam is as much as four feet on the downstream side of the concrete core wall. This erosion continues on the downstream slope adjacent to the wing walls.

The dike that is located along the left reservoir slope from the left abutment does not extend far enough to keep the floodwaters from flowing behind it. The maximum height of this dike is probably about two feet. The top elevation of this dike is below the top of dam elevation at several locations. Floodwaters could flow behind the dike and left spillway wing wall through a ditch that has been dug to remove flow from a construction area several hundred feet up the slope from the left end of the dam. This flow would enter the outlet channel over the low section of the left spillway wing wall.

A small flow of clear seepage (less than one g.p.m.) was noted on the right stream bank about 100 feet downstream from the centerline of the embankment. The seepage zone extended for about 20 feet in length on a horizontal plane about six inches above the water level of the downstream channel. The seepage occurs at the contact of a natural dense sand and gravel stratum overlying very stiff clayey silt.

A bare, slightly eroded area was noted on the downstream slope about 125 feet to 150 feet right (south) of the spillway. This slope has been flattened from its previously constructed slope of 2:1 to about 10 percent.

c. Appurtenant Structures - Most of the weir surface of the spillway was badly spalled. In two places, the deterioration was about four inches deep and over two feet wide. Much of the downstream face of the spillway was also badly spalled. One area to the left of the center weir notch was found to be about six inches wide and two and one-half inches deep. At the joint between the base of the spillway and the apron; a section approximately 25 feet long, 14 inches wide and five inches deep was eroded away. Surface spalling was present over the entire apron.

A hairline crack about 54 inches long was observed on the right spillway wing wall. This crack may have been caused by earth pressure behind the wall. A spalled area of about nine square feet was noted at the base of the right spillway wall adjacent to the 24 inch outlet. The top of the left spillway wall adjacent to the spillway crest was also slightly spalled.

The facilities for operating the gate to the two feet diameter drain have been dismantled; consequently, the gate is no longer functional.

d. Reservoir Area - It was noted that heavy sediment deposition had taken place in the reservoir. Several islands of sediment and aquatic vegetation were located in the lake area.

e. Downstream Channel - Immediately downstream from the spillway apron, a large hole has formed in the stream channel due to scour. This hole may be three to four feet deep and could be undermining the apron. Extensive debris, sediment deposits, and fallen trees and brush were present downstream from the scour hole, obstructing both normal and flood flows. The channel slopes were severely eroded, especially the left slope, for about 150 feet downstream from the apron. Small trees have been undermined and much sloughing of the stream bank had occurred in this area. Minor erosion was noted below this area. The downstream channel narrows immediately from the 82 feet apron width to 43 feet, and then to 20 feet wide approximately 150 feet downstream.

3.2 EVALUATION

a. Dam - The erosion and possible settlement behind the spillway walls, currently, do not present a serious threat to early overtopping because the concrete core wall would prevent this from happening. If this condition were left uncorrected; however, it would undoubtedly worsen to the point where early overtopping may occur.

Flood waters flowing behind or over the dike would probably not cause imminent failure of the dam because its flat swampy condition would act as a buffer. However, any quantity of water that would flow in the ditch from the construction area could prove quite detrimental. It is possible that the left abutment area might fail from heavy eroding flows in the ditch.

The seepage noted in the downstream channel is not considered serious enough to warrant further investigation. The bare slightly eroded area on the downstream slope is also not a serious condition, but corrective measures should be taken to insure that the condition does not worsen.

The earth embankment should be cleared of trees and shrubs, properly graded, and replanted with well maintained grass.

b. Appurtenant Structures - The spalled concrete areas, for the most part, are serious enough to require repair work. The spalling is not considered to be serious enough to warrant immediate action; however, continued flow over the existing deteriorated areas will aggravate erosive action. The freeze-thaw cycle in the winter months has added to the deteriorating effects of the concrete that has been seriously spalled.

There is no way to drain the lake through the operating facilities of the dam since the gate is not functional. Facilities to drain the lake should be restored.

c. Reservoir - The sediment deposits in the lake area have seriously affected the lake's intended recreational use and also reduced its water volume. Consequently, in the event of failure, there is less volume of water that would be released to cause damaging affects downstream.

d. Downstream Channel - The scour hole in the channel adjacent to the apron could cause a stability problem to the apron if undermining is occurring. The debris, sediment deposits and fallen vegetation causes serious flow restrictions. The immediate narrowing of the channel is also a serious restriction to outflows.

SECTION 4 - OPERATION PROCEDURES

4.1 PROCEDURES

There is no formal written procedure for emergency downstream evacuation in the event of dam failure; however, local civil defense and police authorities would be notified if such a failure was determined to be imminent. It is recommended that a formal emergency procedure be prepared and prominently displayed, and furnished to appropriate personnel, particularly to the college grounds keepers and maintenance personnel.

4.2 MAINTENANCE OF DAM

Maintenance of the dam is the responsibility of the owner, Trenton State College. It is apparent that structural maintenance has not been performed. However, the right slope of the lake and downstream slope of the dam have been kept mowed and seeded for aesthetic reasons.

4.3 MAINTENANCE OF OPERATING FACILITIES

Not Applicable

4.4 EVALUATION

The current ongoing maintenance practice for the dam is apparently inadequate, and should be upgraded and improved.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data - Design data was not available for review and evaluation. Some design calculations included in the microfiche files of N.J.D.E.P. were noted. These calculations indicated that the design met the criteria used at that time and therefore received state approval.

b. Experience Data - Experience data was not available for review and evaluation.

c. Visual Observations - Observations made at the time of inspection indicate that there was considerable spalling and deterioration on the spillway. This condition causes the low flows to utilize the deteriorated areas and cause additional deterioration. High flows would spread into a low flat area behind the dike on the left side of the lake upstream from the dam. These flows could then enter the downstream channel after passing the left end of the dam. Excessive flows could cause damage to the left abutment and slope of the downstream channel.

d. Overtopping Potential - Sylva Dam, with a height of 10 feet and a storage capacity of 64 acre-feet to top of dam, is classified as "Small" size. The dam is also classified as a "Significant" hazard structure for the reasons stated in paragraph 1.2.d. The recommended Spillway Design Flood (S.D.F.) is between the 100 year flood and the one-half Probable Maximum Flood (P.M.F.). Because the height and storage capacity are both at the lower end of the "Small" size category, the S.D.F. selected was equal to the 100 year flood. The spillway is a 71 feet long concrete ogee type with a crest El. 90.4 feet M.S.L. The top of dam is El. 93.9 feet M.S.L. The spillway rating curve was developed by computing weir flow as presented in Design of Small Dams; a U.S. Department of Interior, Bureau of Reclamation publication. Design information and field measurements were used to obtain the spillway dimensions. The spillway rating reflects a maximum capacity at the top of dam of 1757 c.f.s. However, a low area in the dike along the left side of the reservoir allows water to overflow through a swampy area when the reservoir level rises to El. 91.8 feet.

The hydrologic analysis was completed by the use of the U.S. Army Corps of Engineers Flood Hydrograph Computer Package HEC-1 in conjunction with the procedures outlined in the Design of Small Dams. The rainfall depths were obtained from Technical Paper No. 40, by the U.S. Weather Bureau. The maximum inflow obtained by this method for the 4.2 square mile drainage basin is 2138 c.f.s.

A flood routing starting with reservoir level at normal pool, was computed for the 100 year flood estimating flow through the dike area by Manning's equation. It was determined that the maximum reservoir elevation attained would be 93.4 feet, which is 0.5 foot below the top of dam. However, this condition is undesirable because flow over the dike section enters a drainage ditch and would cause erosion of the downstream left abutment.

A second routing was computed assuming no flow exiting the reservoir through the dike area, i.e., the dike was elevated to top of dam elevation. From this routing, it was determined that the 100 year flood would overtop the dam by 0.3 foot. In this case, the spillway can pass about 84 percent of the 100 year flood. Therefore, based upon these routings and analyses, the spillway is considered inadequate to pass the S.D.F. without overtopping the dam.

The conclusions presented in this Phase I Inspection Report pertain to present day conditions, and the effect of future development on the hydrology has not been considered.

e. Emergency Drawdown - Since the gate to the 24 inch outlet is not operational, there are no facilities provided in the structure to drawdown the lake. However, if the silt in the reservoir were removed and the 24 inch drain was returned to operation, the time to draw the reservoir down from normal pool (El. 90.9) would be approximately two days.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations - The deficiencies noted in paragraphs 3.1.b. and 3.1.c. could rapidly develop into stability problems for the dam, if remedial measures are not performed. A major flood could cause the left abutment to fail should the flows from the construction area move into the ditch behind the dike. The erosion of the concrete on the spillway, as a result of the continuous flow over the weir and natural weathering effects, could also cause a failure.

b. Design and Construction Data - The limited data available for review indicates that there should be no cause for concern of the structural stability of the dam and appurtenances.

c. Operating Records - Since no operating records are available, an evaluation in this area could not be made.

d. Post-Construction Changes - The only post-construction change noted was the dismantling of the facilities for operating the gate to drain the lake. This is not considered to adversely affect structural stability.

e. Seismic Stability - Sylva Lake Dam is located in Seismic Zone 1 according to the "Seismic Zone Map of the Contiguous United States" given in Figure 1, page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of very low seismic activity. Experience indicates that dams in Seismic Zone 1 will have adequate stability under seismic loading conditions if they have adequate stability under static loading conditions. As indicated in paragraph 6.1.b., Sylva Lake Dam is considered to have adequate static stability; consequently, further consideration of seismic stability is not warranted for this Phase I Inspection Report.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSSSMENT

a. Safety - The deficiencies noted in paragraphs 3.1.b. and 3.1.c., and their evaluations in paragraph 6.1.a. indicate potential concern for the safety of Sylva Lake Dam. However, the dam is not in imminent danger of failure unless some unusual circumstances are imposed upon it.

The dam, with a height of 10 feet and a storage capacity of 64 acre-feet to top of dam, is classified as "Small" size. The dam is also classified as a "Significant" hazard structure for the reasons stated in paragraph 1.2.d. The recommended S.D.F. is between the 100 year flood and the one-half P.M.F. Because the height and storage capacity are both at the lower end of the "Small" size category, the S.D.F. selected was equal to the 100 year flood. The spillway capacity was analyzed using the criteria presented in the "Recommended Guidelines for Safety Inspection of Dams" and according to the procedures presented in paragraph 5.1.d. The first flood routing analyzed the dam under existing conditions with flow passing through a low dike area along the left side of the reservoir. The results of this analysis determined the maximum reservoir elevation attained would be El. 93.4 feet, which is 0.5 foot below the top of dam. However, these conditions are undesirable because flow passing through the low dike areas would cause erosion of the left abutment. The second flood routing analyzed the dam with the dike area repaired and raised to the same elevation as the top of dam (El. 93.4 feet). This analysis determined that the 100 year flood would overtop the dam by 0.3 foot. Therefore, based upon these routings and analyses, the spillway is considered inadequate to pass the S.D.F. without overtopping the dam.

b. Adequacy of Information - As indicated earlier in this report, a limited amount of historical information was available for the investigation of this dam. Due to the "Small" size and "Significant" hazard classifications, and the results of the visual inspection contained in this report; the information obtained is considered adequate for the Phase I inspection.

c. Urgency - The dam will not require remedial treatment. However, the owner should immediately initiate further investigation, as discussed below in paragraph 7.1.d.

d. Necessity for Further Investigation - The hydraulic/hydrologic analysis performed as a part of this Phase I Inspection Report has indicated the need for additional spillway capacity. It is recommended that the owner of Sylva Lake Dam immediately initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial action as necessary.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection revealed certain items which should be performed immediately by the owner. These are:

1) The owner should immediately initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial action as necessary.

2) The owner should initiate a detailed topographic survey of the left abutment and reservoir slope area. Subsequent to the topographic survey, plans should be prepared and implemented to raise the dike to the same elevation (El. 93.9) as top of dam or higher. These repairs should be completed within the near future.

3) It is recommended that a formal emergency procedure be prepared and prominently displayed and furnished to all appropriate personnel. This should include:

   a) Procedures for rapid drawdown of the reservoir under emergency conditions.

   b) Who to notify, including public officials, in case evacuation from the downstream area is necessary.

   c) The owner should assist public officials in developing an emergency evacuation plan for areas which will be affected in the event of a dam failure.

The inspection revealed additional items which should be performed soon by the owner. These are:

1) The eroded areas at both ends of the spillway should be filled in to top of dam (El. 93.9), and properly seeded and treated to prevent erosion.

2) Extensive repairs should be made to all spalled and deteriorated concrete on the spillway weir, downstream face of the spillway, spillway wing walls, and apron outlet channel.

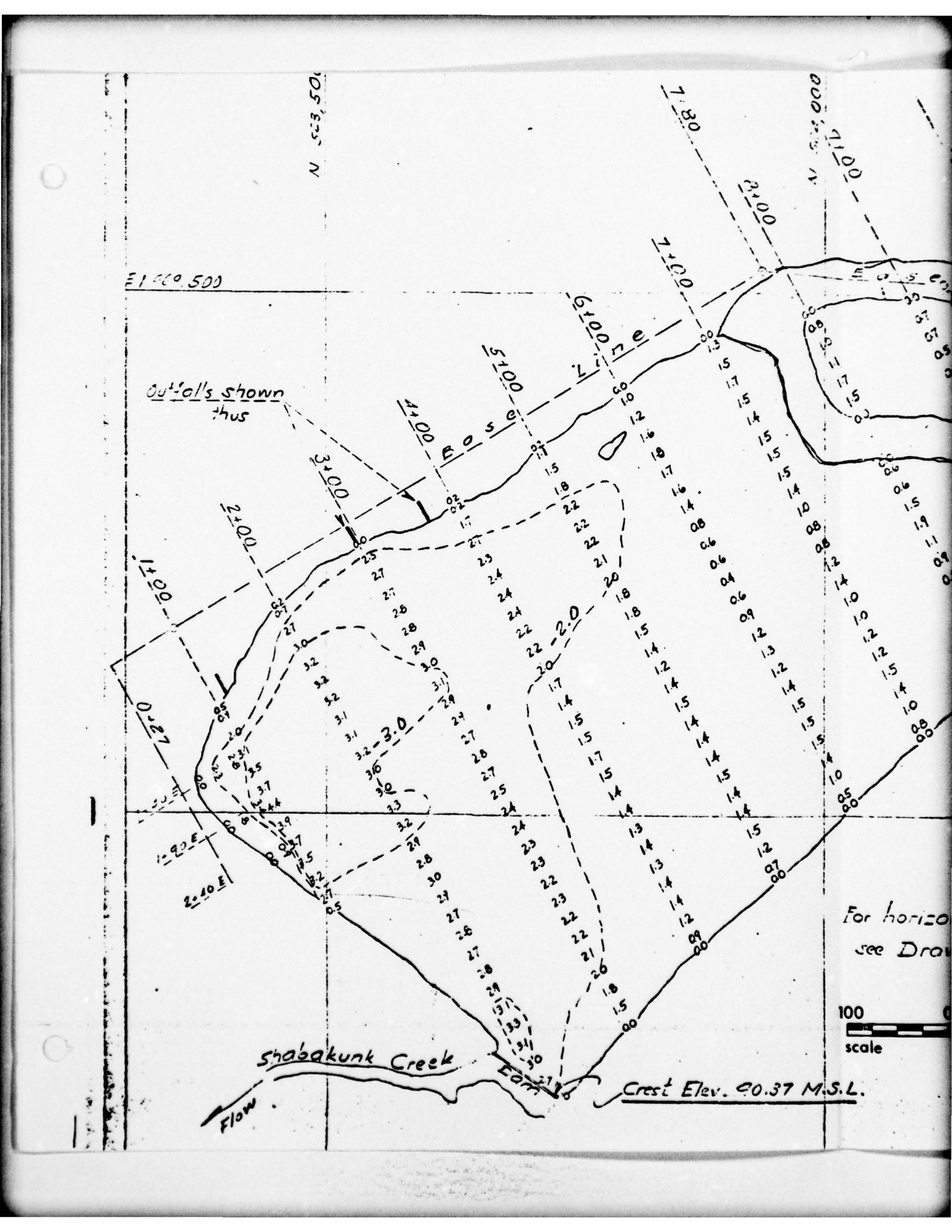
3) The gate and outlet works should be repaired as necessary to provide emergency drawdown facilities. Maintenance procedures should be developed and implemented for this facility in the future.

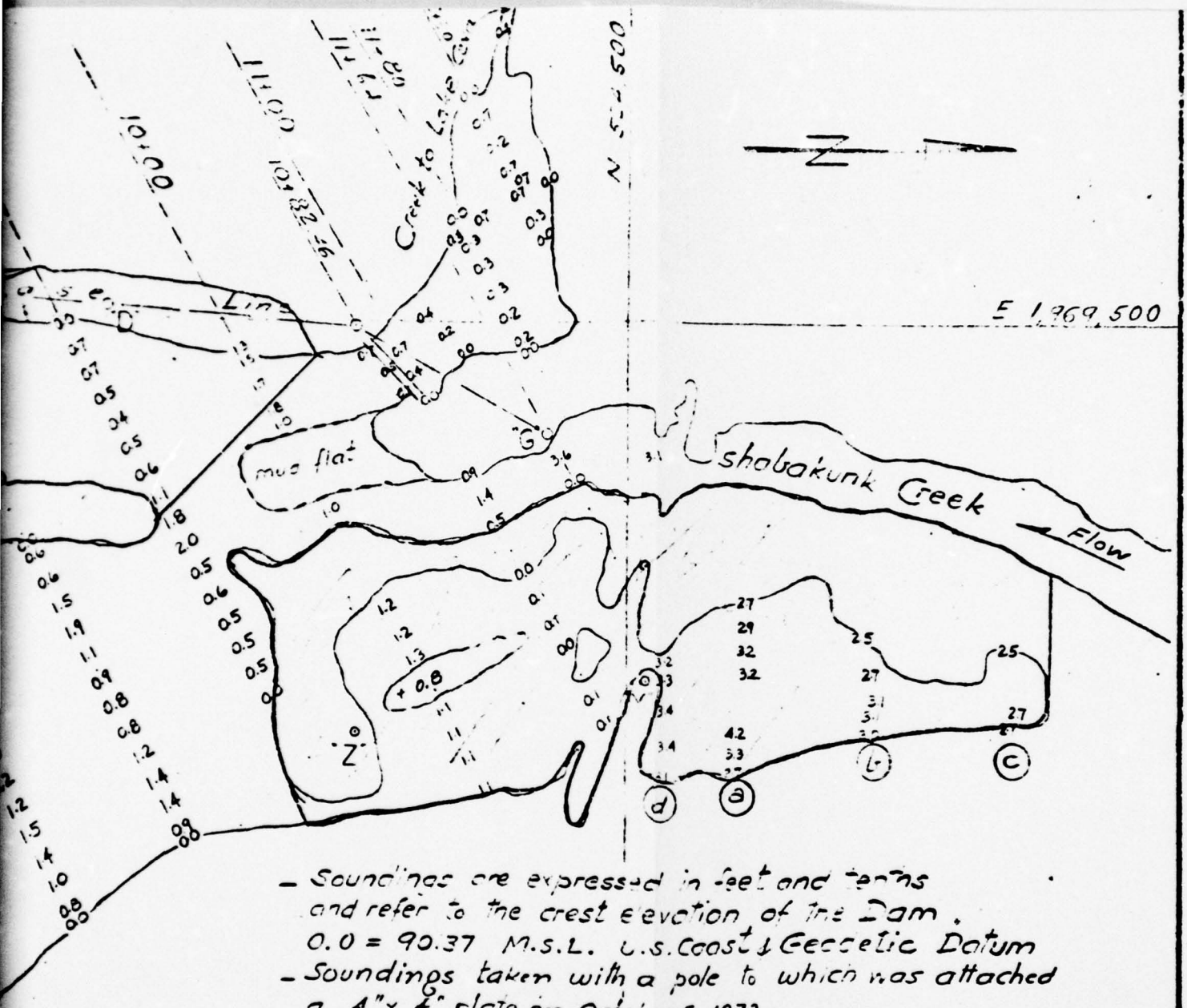
4) Improve outlet channel conditions by removing deposition, trees and debris. The left stream bank should be cleared, shaped and stabilized with properly designed riprap to withstand high stream flows. The scour hole at the end of the spillway apron should be repaired to avoid further damage.

5) The bare slightly eroded area on the downstream slope of the embankment should be properly graded, treated and seeded.

In the near future, the earth embankment should be cleared of trees and shrubs, properly graded, and reseeded with grass, which should be well maintained.

PLATES


E 1 460 500
7+80
7+00
6+00 Line
5+00
4+00 Base
3+00
2+00
1+00
0+27
Outfalls shown thus
2.0
3.0
1+90 E
2+40 E
Shabakunk Creek
Flow
Crest Elev. 90.37 M.S.L.
For horizo
see Drav
100
scale



- Soundings are expressed in feet and tenths and refer to the crest elevation of the Dam. 0.0 = 90.37 M.S.L. U.S. Coast & Geodetic Datum
- Soundings taken with a pole to which was attached a 4" x 4" plate, on October 5, 1973.
- Grid based on New Jersey rectangular grid system 1927 N.A. Datum.

horizontal control data
e Drawing No. 106

0 100 200
feet

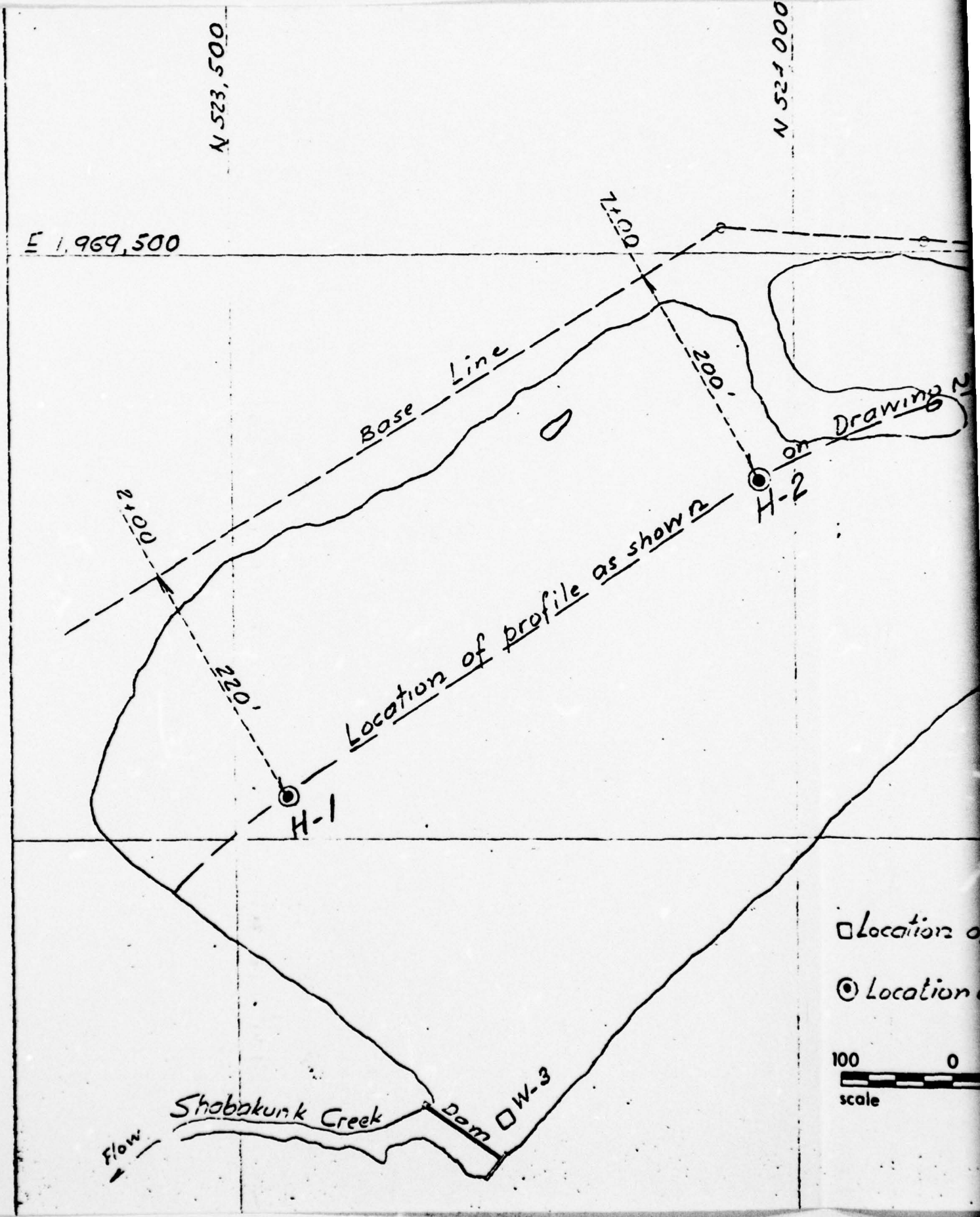
A. D. PISTILLI ASSOCIATES
CONSULTING ENGINEERS
309 E. Mantua Avenue • Woodbury, New Jersey 08096

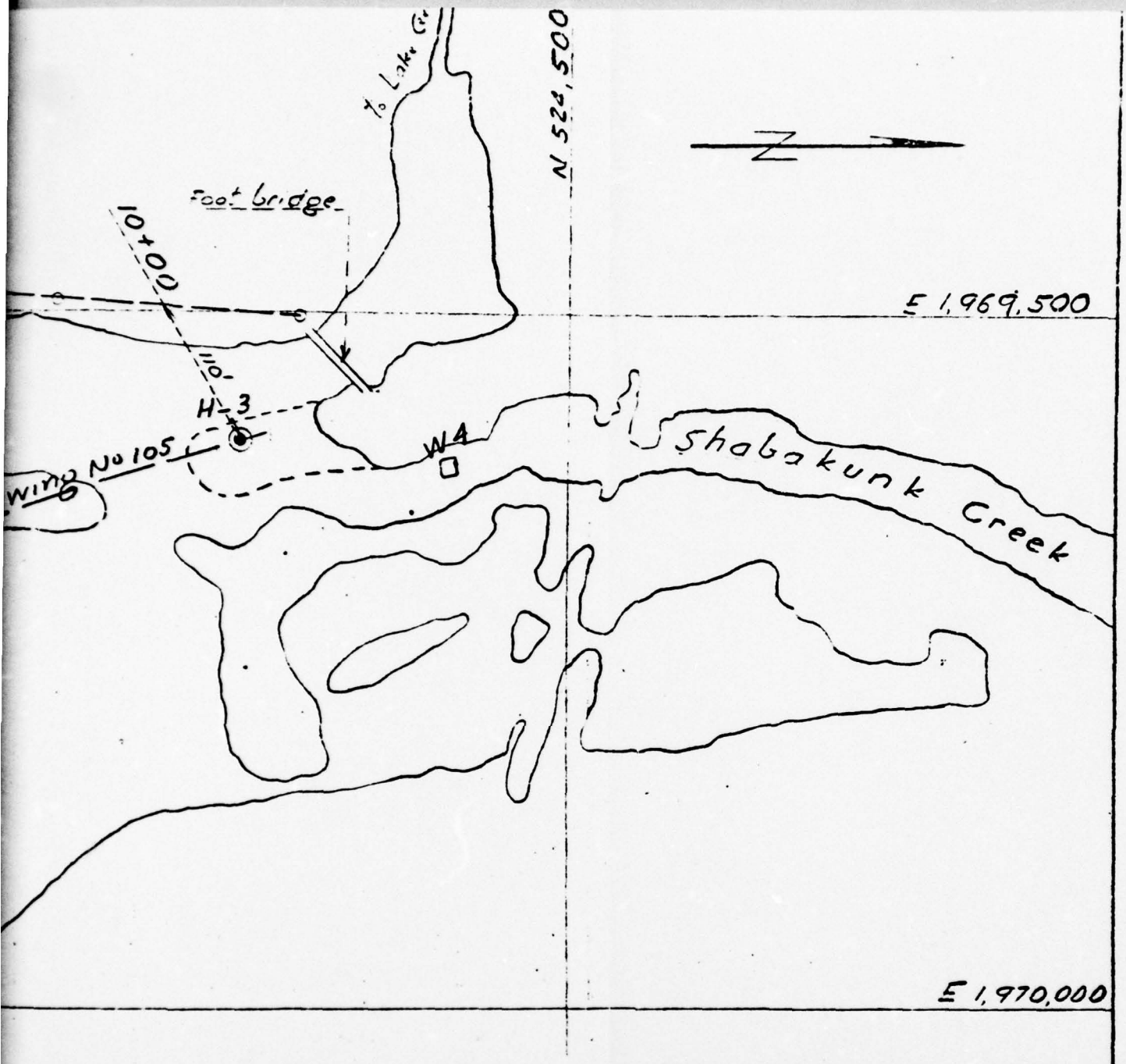
Hydrographic Survey of Lake Sylvia

PLATE 1

Designed by	Drawn by	Date	Scale	Drawing No.
Surveyed by		Nov. 5	1" = 100'	101

2


N 523,500
N 524,000
E 1,969,500
7+00
200'
Base Line
H-2
on Drawing
2+00
220'
Location of profile as shown
H-1
Location o
Location
100
0
scale
Shobakunk Creek
Dam
W-3
Flow



cation of water samples

ocation of core borings

0 100 200
feet

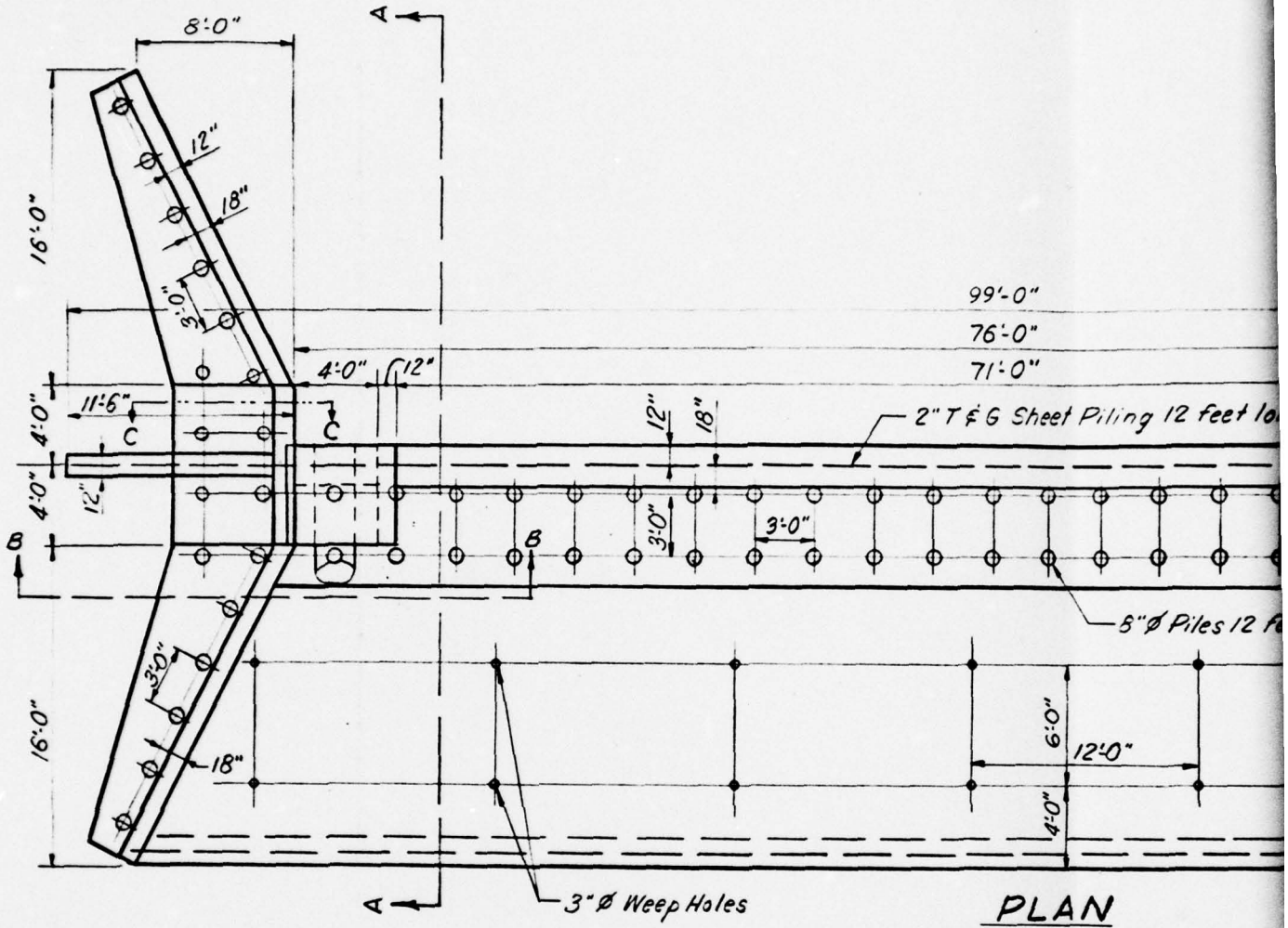
A. D. PISTILLI ASSOCIATES
CONSULTING ENGINEERS
309 E. Mantua Avenue • Runnemede, New Jersey 08090

Lake Sylvia
Location of core borings and water samples

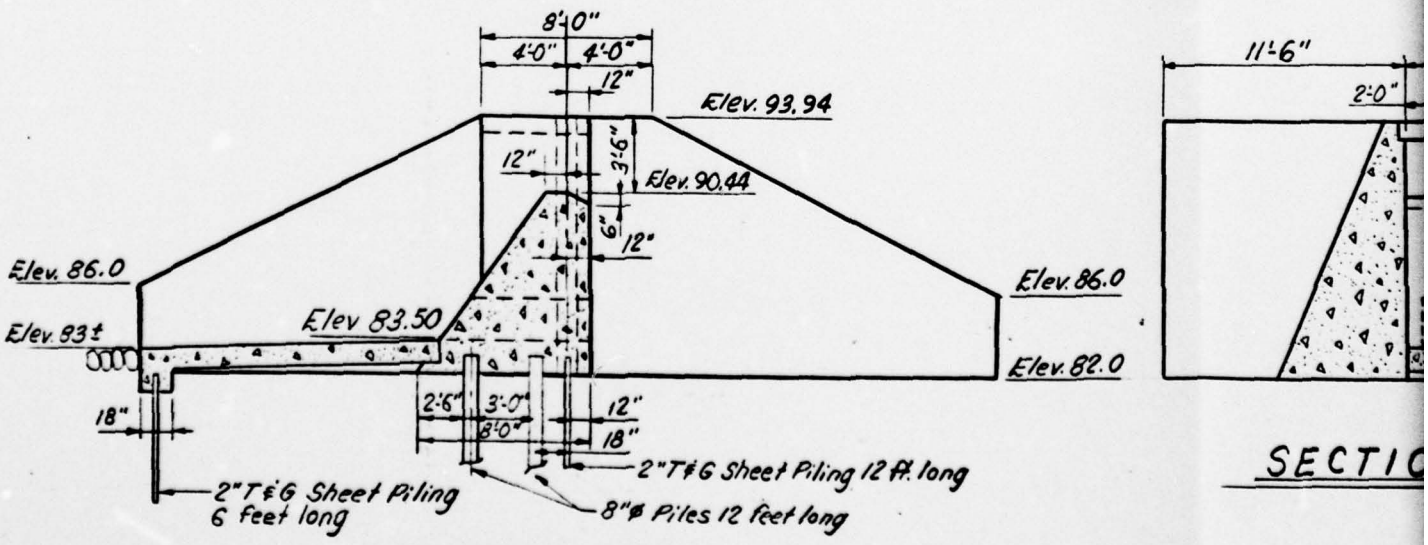
PLATE 2

Designed by	Drawn by	Date	Scale	Drawing No.
	L.B.	11-26-73	1"=100'	103

2

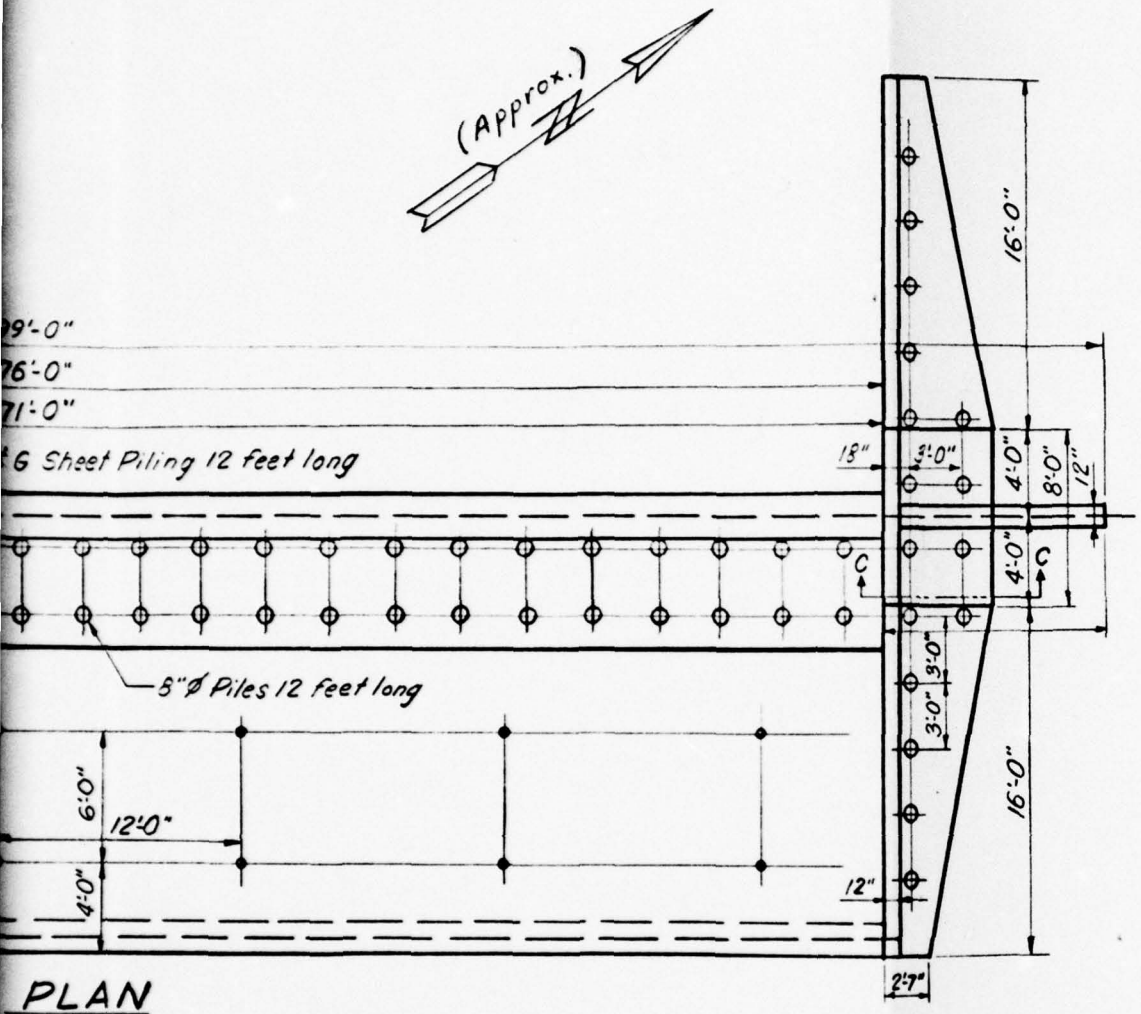


PLAN



SECTION A-A

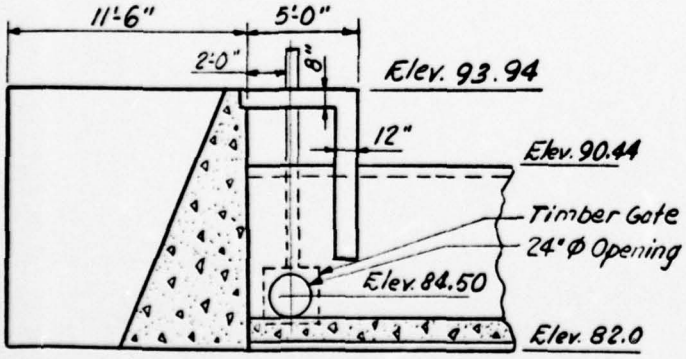
SECTI



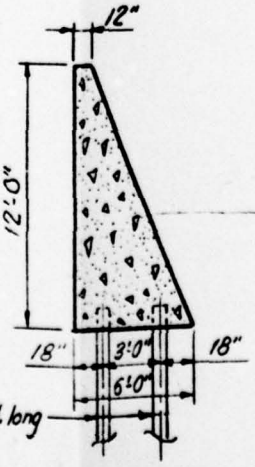
PLAN

NOTES

- No jetting of piles shall be permitted.
- All construction joints shall be vertical with proper keys and concrete shall be monolithic between such joints.
- No horizontal construction joints shall be permitted above Elev. 84.0



SECTION B-B

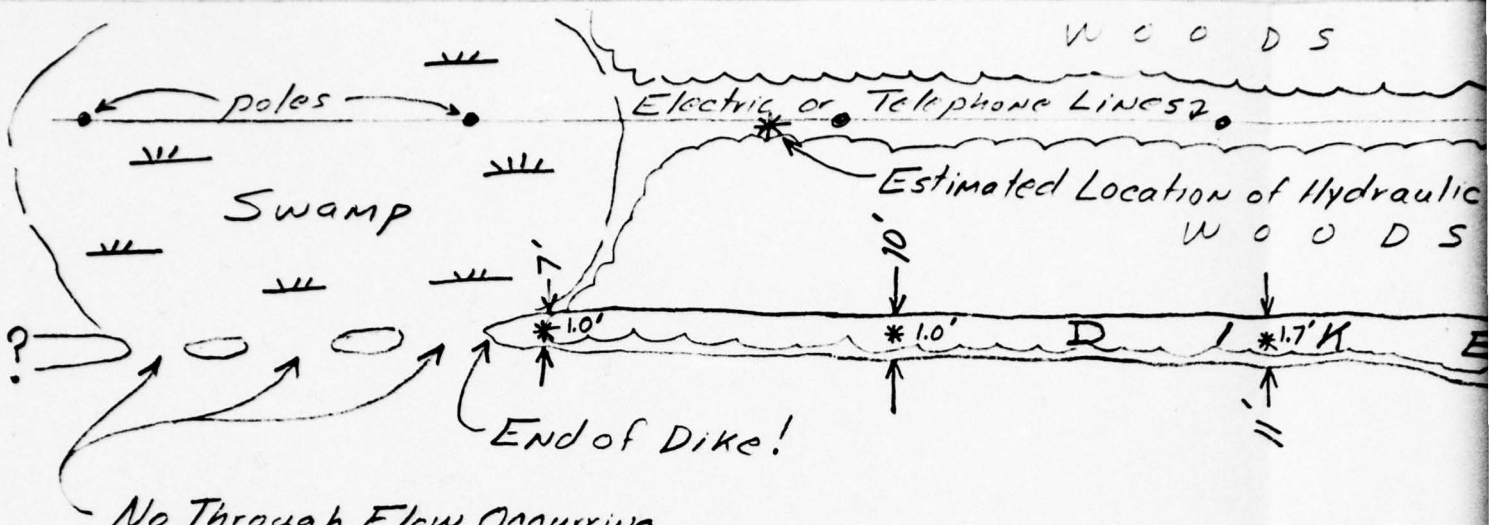


SECTION C-C

PLATE 3

TRACING OF ORIGINAL DESIGN DRAWINGS BY:
Michael Baker, Jr., Inc. Aug. 1978

NEW JERSEY
STATE TEACHERS COLLEGE
SYLVA LAKE DAM
SPILLWAY
SCALE: 1" = 4' APRIL 1937



Note: Cres
Gentl

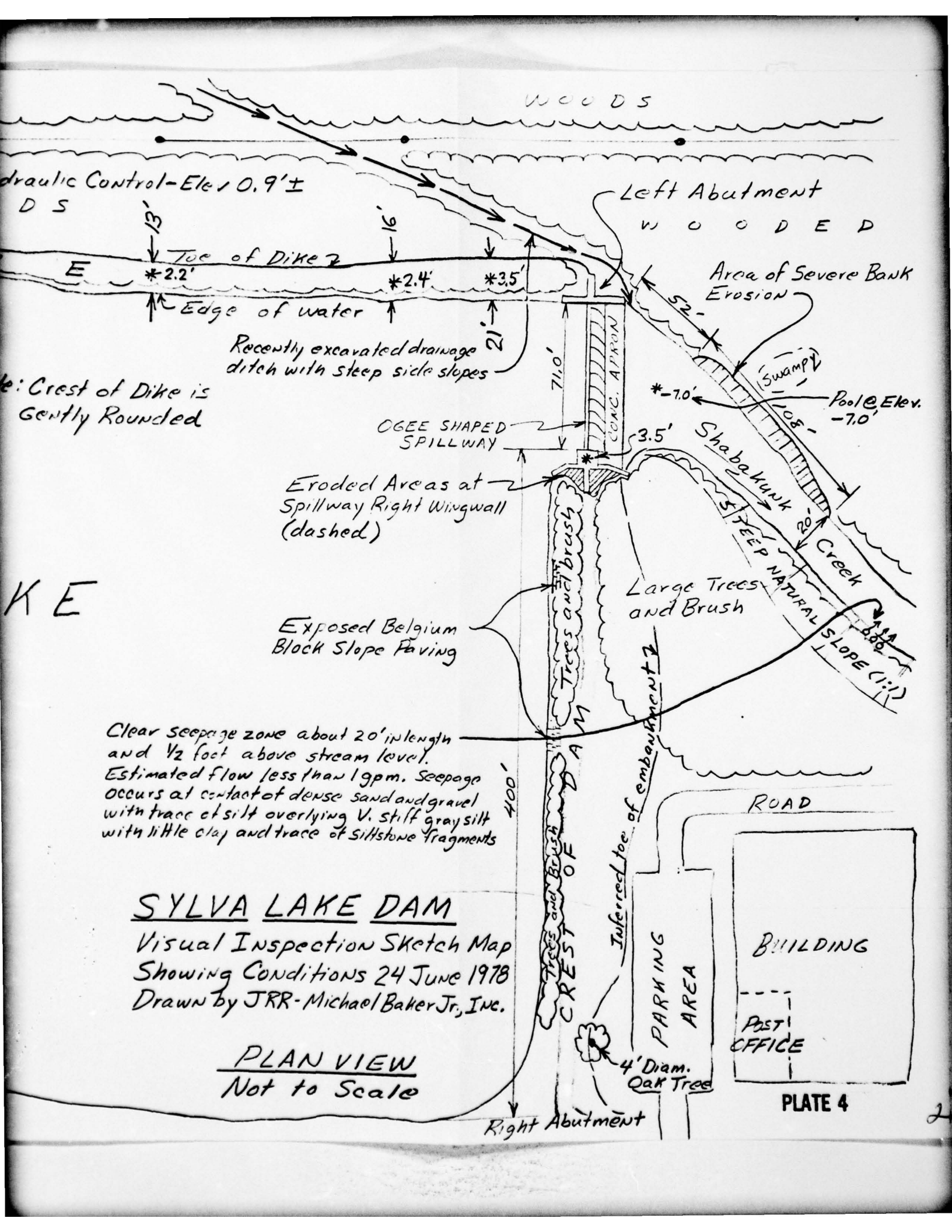
SYLVA LAKE

Approx. North

Note: All elevations shown with an asterisk are referenced to an assigned lake elevation of 0.0 feet at the time of inspection.

Edge of Water

1



SYLVA LAKE DAM

Visual Inspection Sketch Map
Showing Conditions 24 June 1978
Drawn by JRR - Michael Baker Jr, Inc.

PLAN VIEW

Not to Scale

PLATE 4

PHOTOGRAPHS

DETAILED PHOTOGRAPH DESCRIPTIONS

Overall View of Dam - View Looking Southwestward Toward Right Abutment Wing Wall (Tree Covered Embankment Is Shown in Back-Ground) - 24 June 1978.

Photo 1 - View of Spillway and Left Abutment Wing Wall Looking Toward Northeast - 24 June 1978.

Photo 2 - Picture of Left Abutment Wing Wall and Core Wall Showing Low Ground Surface Probably Caused by Erosion and Possibly Some Settlement - 24 June 1978.

Photo 3 - Close-Up of Low Ground Surface at Junction of Wing Wall (Left) and Core Wall - 24 June 1978.

Photo 4 - Picture of Recently Excavated Drainage Ditch Which Connects With Downstream Channel Adjacent to Left Abutment Wing Wall (Dike Retaining Lake Sylva Is Located Toward Left of Picture) - 24 June 1978.

Photo 5 - Close-Up of Drainage Ditch Discharge Over Small Downstream Channel Wall Adjacent to End of Left Abutment Wing Wall - 24 June 1978.

Photo 6 - View of Spillway Showing Badly Spalled Concrete and Pool in Foreground Formed by Scour of Channel Bottom - 24 June 1978.

Photo 7 - Close-Up of Spillway Adjacent to Right Abutment Showing Badly Spalled Concrete - 24 June 1978.

Photo 8 - Picture of Portion of Spillway and Right Abutment Showing 24 Inch Diameter Outlet Cast in Concrete - 24 June 1978.

Photo 9 - View of Downstream End of Right Abutment Wing Wall (Note Eroded Gully Behind Wing Wall, and Heavy Tree and Brush Cover on Embankment) - 24 June 1978.

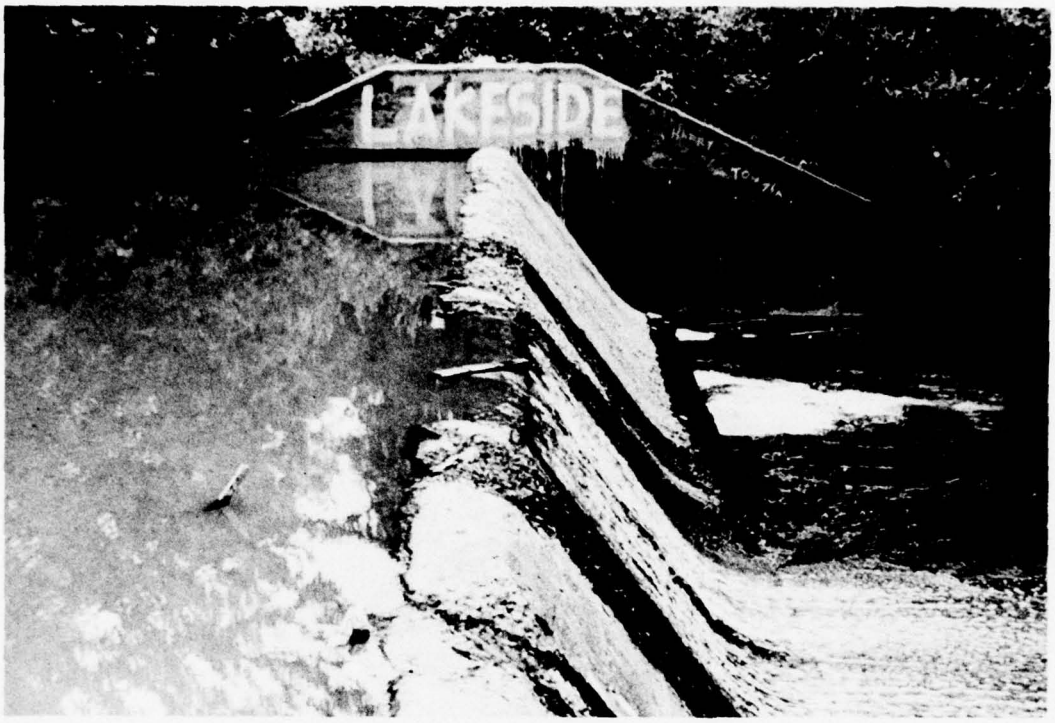
Photo 10 - Close-Up of Right Abutment Wing Wall and Core Wall (at Right) Showing Low Ground Surface Probably Caused by Erosion and Possibly Some Settlement - 24 June 1978.

Photo 11 - View of Upstream Embankment Slope Near Right Abutment (Note Belgian Block Slope Paving, Mostly Covered With Soil, and Large and Small Trees - 24 June 1978.

Photo 12 - Picture of Downstream Channel Looking Downstream (Note Erosion and Undercutting of Bank Causing Collapse of Tree Root Systems) - 24 June 1978.

Photo 13 - Picture of Very Slight Clear Seepage (Less Than One G.P.M.) From Contact of Dense Sand and Gravel With Little Silt (Above) With Underlying Very Stiff Gray Silt Exposed Just Above Stream Level on Right Bank About 100 Feet Downstream From Dam - 24 June 1978.

Photo 14 - View of Upper End of Lake Sylva Showing Aquatic Growth Resulting From Heavy Siltation of Lake - 24 June 1978.



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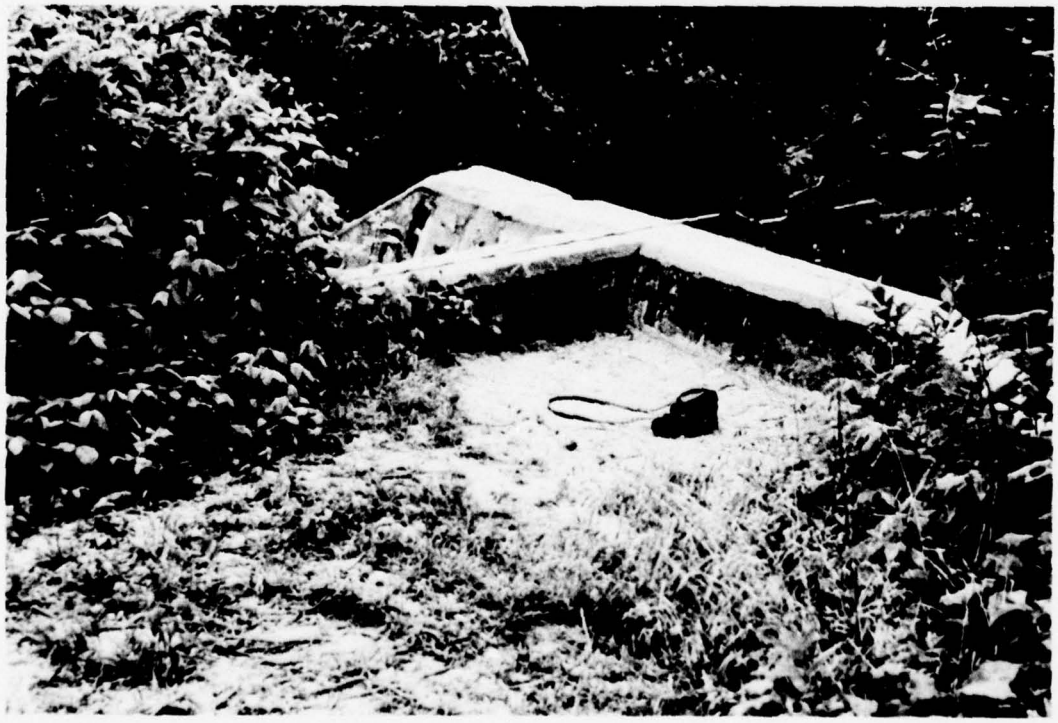
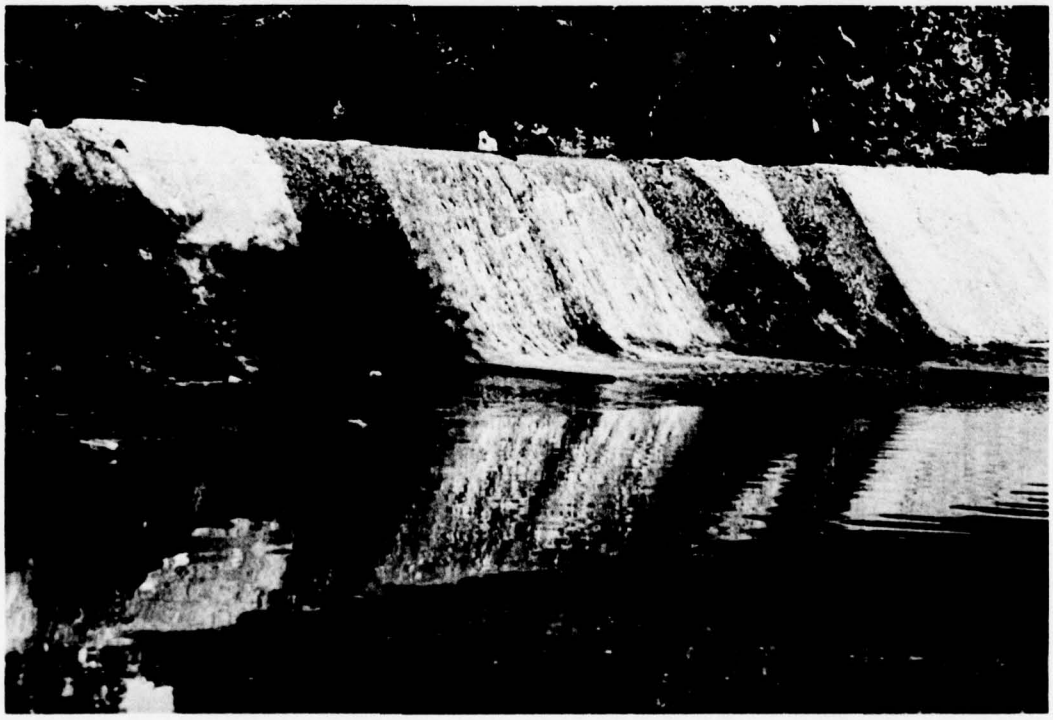


PHOTO 2

PHOTO 3

PHOTO 4

PHOTO 5



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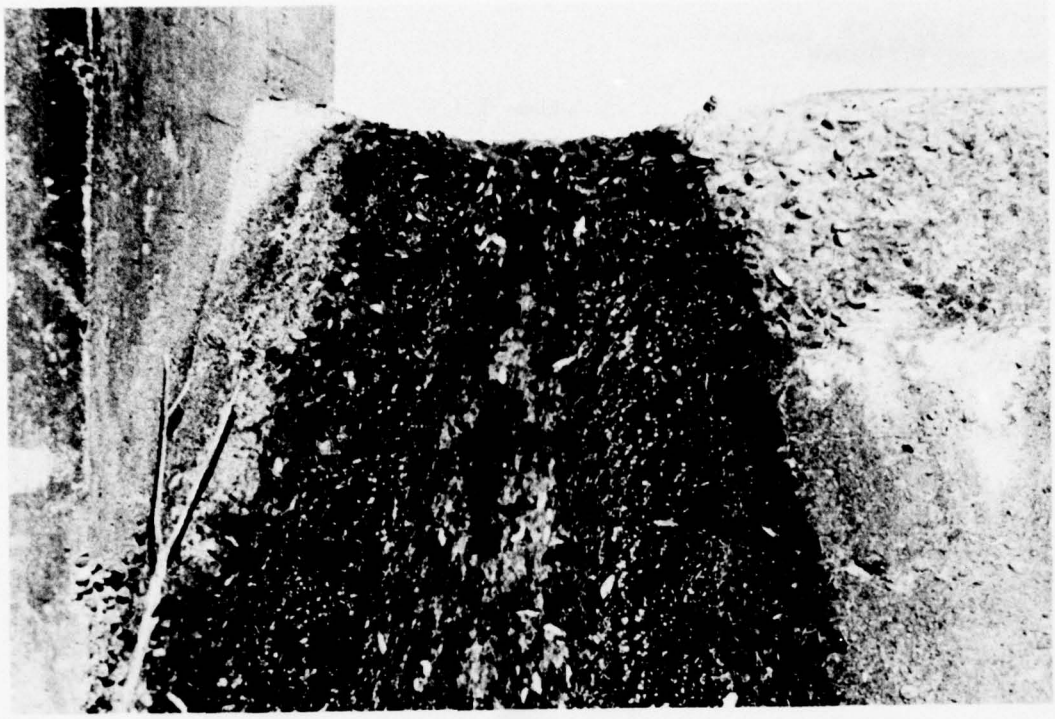


PHOTO 7

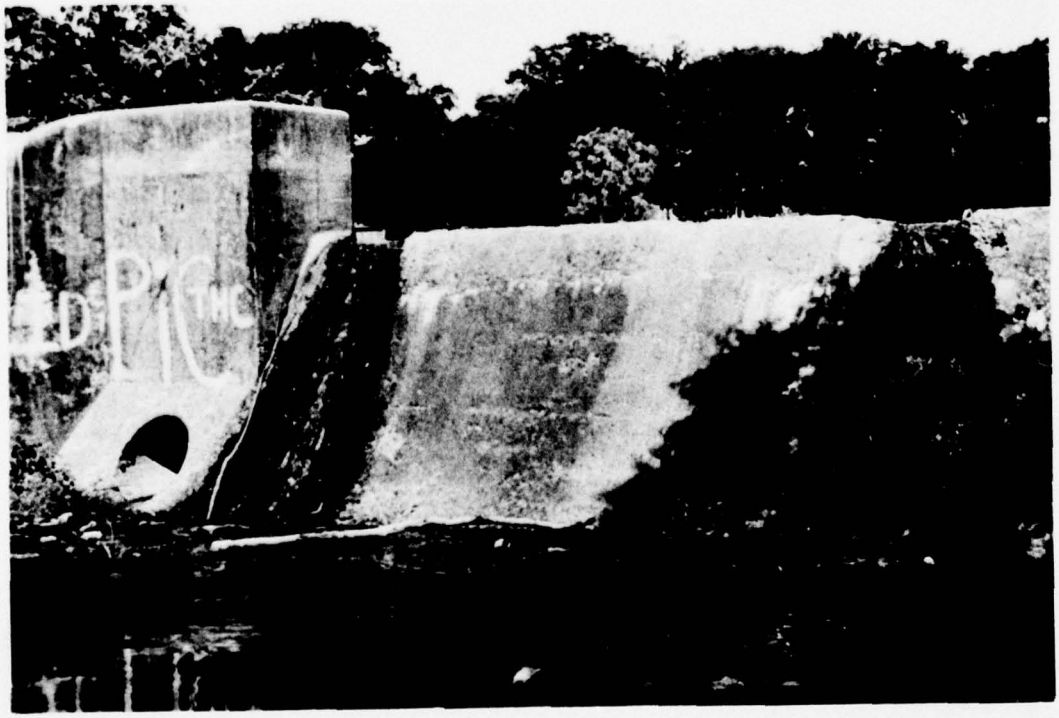


PHOTO 8

PHOTO 9

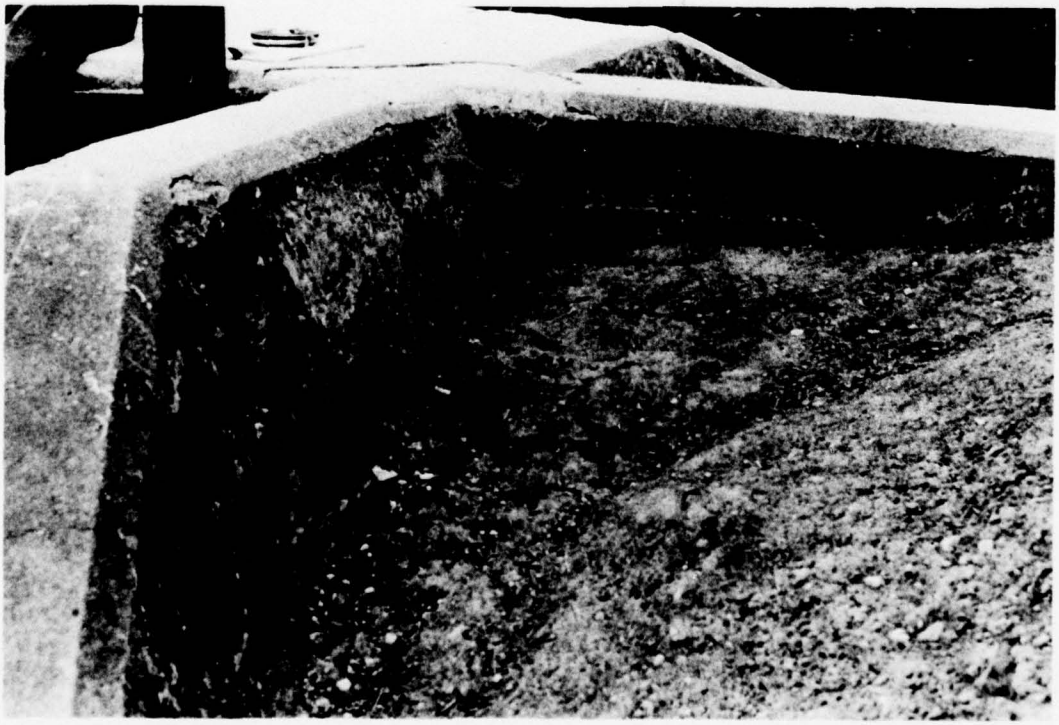


PHOTO 10

PHOTO 11

PHOTO 12

PHOTO 13

PHOTO 14

APPENDIX A

CHECK LIST - VISUAL INSPECTION

Check List
Visual Inspection
Phase 1

Name Dam Sylva Lake Dam County Mercer State New Jersey Coordinates Lat. 40°16.3'N Long. 74°46.4'W

Date Inspection 24 June 1978 Weather Partly Sunny Temperature 75°-80°F.

Pool Elevation at Time of Inspection 90.4 M.S.L. Tailwater at Time of Inspection 83.2 M.S.L.

Inspection Personnel:

MICHAEL BAKER, JR., INC.:

E. U. Gingrich
T. J. Dougan
J. R. Rapp

Representatives of the owner did not accompany the inspection team during the inspection.

E. U. Gingrich Recorder

CONCRETE/MASONRY DAMS

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEE PAGE ON LEAKAGE	Not Applicable	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Not Applicable	
DRAINS	Not Applicable	
WATER PASSAGES	Not Applicable	
FOUNDATION	Not Applicable	

CONCRETE/MASONRY DAMS

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Not Applicable	
STRUCTURAL CRACKING	Not Applicable	
VERTICAL AND HORIZONTAL ALIGNMENT	Not Applicable	
MONOLITH JOINTS	Not Applicable	
CONSTRUCTION JOINTS	Not Applicable	

EMBANKMENT

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None were observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None were observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Some erosion has occurred on the downstream slope about 125 to 150 feet right (south) of spillway. Slope has been graded to approximately 10 percent.	Area should be graded, treated and seeded with appropriate seeding mixture to stabilize soil.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	No problems were observed.	
RIPRAP FAILURES	Belgian block slope protection was provided on upstream slope. Blocks were placed loosely resulting in much tree and shrub growth over the years. No actual failures were noted.	

EMBANKMENT

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	1) Serious erosion has occurred at both ends of the spillway due to excessive pedestrian traffic (students) and rainfall. Some of the grade deficiency may be due to settlement because of inadequate compaction during construction. The downstream side of the core wall extending into the left abutment has eroded about three feet deep and the upstream side has eroded about eight-tenths of a foot deep. On the embankment side of the spillway the downstream side of the core wall has eroded about four feet deep and the upstream side has eroded about one foot deep.	1) Fill eroded areas and compact adequately and seed to establish vegetative growth. Limit the pedestrian traffic.
	2) Dike along left reservoir slope does not extend upstream far enough to keep floodwaters from flowing behind it. Floodwaters would flow behind the dike and left spillway wall and enter the spillway outlet channel through the ditch constructed to carry water from the construction area several hundred feet north of the end of dam. Top of dike was below top of dam elevation at several locations.	2) Extend embankment from the spillway to top of dam elevation on left abutment or raise and extend dike to top of dam elevation.
ANY NOTICEABLE SEEPAGE	Seepage was noted in the right stream bank about 100 feet downstream from centerline of embankment. The seepage was clear and extended for about 20 feet on a horizontal plane about six inches above water level. Flow was estimated at less than one g.p.m.	Since the seepage is of small volume and clear, it is not considered to be of any significance to the safety of the dam at this time. This condition should be checked periodically.
STAFF GAGE AND RECORDER	There are none.	

EMBANKMENT

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
DRAINS	No embankment drains noted, however, weep holes were noted in spillway apron under flow coming from spillway. No problems were evident.	

OUTLET WORKS

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	See notes on "UNGATED SPILLWAY" Sheet.	
INTAKE STRUCTURE	See notes on "UNGATED SPILLWAY" Sheet.	
OUTLET STRUCTURE	See notes on "UNGATED SPILLWAY" Sheet.	
OUTLET CHANNEL	See notes on "UNGATED SPILLWAY" Sheet.	
EMERGENCY GATE	A two feet diameter drain opening was constructed in the base of the spillway on the right end. A gate was evidently installed over the intake end. The facilities for operating the gate have been dismantled so that the gate is no longer functional.	Emergency drain gate should be made operational or install new facilities for draining the lakes.

UNGATED SPILLWAY

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Most of the weir surface is badly spalled as deep as four inches in two places and over two feet wide. Much of the downstream face of spillway is also spalled badly. One hole to the left of the center weir notch is about six inches wide two and one-half inches deep. A section approximately 25 feet long, 14 inches wide and five inches deep has eroded away at the joint between the base of the spillway and the apron on the left side. Surface spalling is present over the entire apron.	Repair all spalled, deteriorated and eroded areas.
APPROACH CHANNEL	There is none.	
DISCHARGE CHANNEL	A large scour hole has eroded at the end of the apron. This is estimated to be three to four feet deep and may be undermining the apron. Much debris and sediment deposits partially blocking flow.	Determined by probing or other means if undermining of apron has occurred and repair it if needed. Place large sized riprap in the scour hole to avoid further scour. Remove debris and sediment deposits to allow free flow.
BRIDGE AND PIERS	There are none.	
SPILLWAY WALLS	Right wall has a hairline crack 54 inches long adjacent to the earth embankment--probably caused by earth pressure. There is about a three feet square spalled area at the base of the right wall adjacent to the 24 inch outlet. The left wall is slightly spalled on the top, adjacent to the crest of the spillway.	Repair all spalled areas. The hairline crack does not appear serious enough for repair at this time. Periodic inspections should be made to monitor this condition and repair it as needed.

GATED SPILLWAY

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not Applicable	
APPROACH CHANNEL	Not Applicable	
DISCHARGE CHANNEL	Not Applicable	
BRIDGE AND PIERS	Not Applicable	
GATES AND OPERATION EQUIPMENT	Not Applicable	

INSTRUMENTATION

SYLVA LAKE DAM

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	No monumentation was noted. A hydrographic survey was conducted by A. D. Pistilli Associates in October 1975.	
OBSERVATION WELLS	There are none.	
WEIRS	There are none.	
PIEZOMETERS	There are none.	
OTHER		

RESERVOIR

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The slopes of the lake are very flat to gently sloping and well vegetated.	
SEDIMENTATION	The capacity of the lake is greatly reduced because of deposition of sediment. Islands of sediment were noted along with much aquatic vegetation.	The lake should be dredged to restore it for recreational uses with desirable aesthetics.

DOWNSTREAM CHANNEL

SYLVA LAKE DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Debris, fallen trees and sediment deposits obstruct normal and flood flows.	The obstructions should be removed.
SLOPES	Channel slopes severely eroded, especially on the left slope, for about 150 feet downstream from apron. Small trees have been undermined, and there is much sloughing of stream bank in this area. Minor erosion to stable conditions prevail below this section.	Downstream channel should be stabilized with properly designed riprap, especially on the left slope, for about 150 feet downstream from the apron.
APPROXIMATE NO. OF HOMES AND POPULATION	The college maintenance building and a parking lot is on the right slope, 200 feet to 500 feet below the dam. Two local roads cross the stream about .34 and 1.1 miles downstream, respectively. A few homes and businesses may potentially be affected in the event of a dam failure.	

APPENDIX B

CHECK LIST - ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

SYLVA LAKE DAM

ITEM	REMARKS
PLAN OF DAM	Plan of lake shown on college property map and detailed spillway plan were received from the microfiche files of N.J.D.E.P.
REGIONAL VICINITY MAP	See Location Plan included in this report.
CONSTRUCTION HISTORY	Information was received from the microfiche files of N.J.D.E.P. Dates of construction of the original dam are not available. The dam failed and was rebuilt in 1925 and was again rebuilt in 1937 as a Works Progress Administration project.
TYPICAL SECTIONS OF DAM	Sections of the dam were obtained from the microfiche files of N.J.D.E.P.
HYDROLOGIC/HYDRAULIC DATA	See Hydrologic and Hydraulic data check list at the end of this Appendix.
OUTLETS - PLAN	Plan and design details for the spillway were obtained from the microfiche files of N.J.D.E.P.
- DETAILS	
- CONSTRAINTS	There are none.
- DISCHARGE RATINGS	None were available.
RAINFALL/RESERVOIR RECORDS	None were available.

SYLVA LAKE DAM

ITEM	REMARKS
DESIGN REPORTS	None were available.
GEOLOGY REPORTS	None were available. Certain foundation information is contained in the microfiche files of N.J.D.E.P.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Some design computations for hydrology, hydraulics and foundation for the spillway are contained in the microfiche files of N.J.D.E.P.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None were available.
POST-CONSTRUCTION SURVEYS OF DAM	Hydrographic survey of lake was conducted by A. D. Pistilli Associates, Wenonah, New Jersey on 5 October 1973.
BORROW SOURCES	No information was available.

SYLVA LAKE DAM

ITEM	REMARKS
MONITORING SYSTEMS	There are none.
MODIFICATIONS	According to information received from the microfiche files of N.J.D.E.P., the dam and spillway were rebuilt in 1925 and again in 1937. No modifications have been made since 1937.
HIGH POOL RECORDS	No records were available.
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Hydrographic survey, borings and report made by A. D. Pistilli Associates, Wenonah, New Jersey to determine extent of siltation and cost estimates for dredging. Work was performed in the fall of 1973.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	The original dam had failed in 1925 according to the microfiche files of N.J.D.E.P. No description or reports are available of the failure.
MAINTENANCE OPERATION RECORDS	None were available.

SYLVA LAKE DAM

ITEM	REMARKS
SPILLWAY PLAN	Design plan, sections and details for the reconstruction performed in 1937 were obtained from the micro-fiche files of N.J.D.E.P.
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	There is no operating equipment.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 4.2 square miles of gently rolling terrain heavily developed.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 90.44 (16 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): Not Applicable

ELEVATION MAXIMUM DESIGN POOL: 93.9

ELEVATION TOP DAM: 93.9

SPILLWAY CREST:

a. Elevation 90.44
b. Type Concrete ogee
c. Width Not Applicable
d. Length 71.0 feet
e. Location Spillover Valley area at left abutment
f. Number and Type of Gates None

OUTLET WORKS:

a. Type 24 inch circular conduit with gate for draindown (not operational)
b. Location Right end of spillway
c. Entrance inverts 83.5
d. Exit inverts 83.5
e. Emergency draindown facilities None operational

HYDROMETEOROLOGICAL GAGES: None

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE Not available

NAME OF DAM: SYLVA LAKE DAM

APPENDIX C

EXERPTS FROM

LEGEND SHEET AND LOGS OF BORINGS
DRILLED IN LAKE SYLVA FROM REPORT TITLED

"REHABILITATION OF LAKES CEVA AND SYLVIA,
ENGINEERING FEASIBILITY STUDY AND HYDROGRAPHIC SURVEY"
Trenton State College
Trenton, New Jersey

by

A. D. Pistilli Associates
Consulting Engineers
308 E. Mantua Avenue
Wenonah, New Jersey 08090

Notes: Feasibility and hydrographic survey field work was completed 6 November 1973. Lake Sylva was misspelled as Lake Sylvia in the above listed report. See Plate 2 for locations of borings.

LEGEND FOR CROSS SECTIONS OF LAKES SYLVIA AND CEVA

Elevations shown refer to Mean Sea Level U. S. Coast & Geodetic Datum. (1929)

92.9 indicates bottom of lake elevations.
20 indicates distance in feet from Base Line.

94.3 indicates refusal elevation of hand probings
40 indicates distance in feet from Base Line.

Bottom of lake elevations taken with a pole, 4" x 4" plate attached.

Probings taken with a 1/2" diameter aluminum rod pushed to refusal.

Water elevation as shown corresponds to the lowest crest elevation of the dams:
Lake Sylvia : 90.37 M.S.L. (USC&G)
Lake Ceva : 107.81 M.S.L. "

Estimated limit of excavation is 2 feet below elevation of hand probe resufal and has been determined by correlating depths to which sampler spoon could be pushed shown on Borings H-1 through H-6,with refusal elevations of hand probes at the same location, see Drawing No. 105.

A.D. PISTILLI ASSOCIATES Consulting Engineers 308 E. Mantua Avenue Wenonah, N.J. 08090	CLIENT: State of New Jersey Trenton State College	SHEET 1 OF 6 HOLE NO. H-1
	PROJECT NO. 73-3	BORING LOCATION Lake Sylvia
	PROJECT NAME Study & Hydrographic Survey of	B.L. Sta. 2+00
	LOCATION Lakes Sylvia & Ceva, Trenton, N.J.	OFFSET 220' East
GROUND WATER OBSERVATIONS AT ____ FT. AFTER ____ HOURS AT ____ FT. AFTER ____ HOURS	TYPE H.D. / S.S. / CORE BAR SIZE I.D. 2 1/2" / 1 3/8" / ____ HAMMER WT. 140 lb. / 140 lb. / BIT HAMMER FALL 24" / 30"	DATE START 11/7/73 DATE FIN. 11/7/73 SURFACE ELEV. 90.4 M.S.L. WATER ELEV 90.4 M.S.L.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	SAMPLE TYPE	SAMPLE PEN.	SAMPLE REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOIST	STRATA CHANGE DEPTH ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
												87.4	Water
	WOC	1	SS	24		5.0	P	P	P	P			
	WOC											85.4	Very soft gray silt
5	WOC	2	SS	24		7.0	P	P	P	P			
	P												
	P	3	SS	24		9.0	P	P	P	P			Soft gray silty clay
	P											81.4	
10	5	4	SS	24		11.0	11	11	13	14			Stiff red clay, broken stone & gravel
	47												
		5	SS	24		13.0	11	11	9	12		77.4	Trace of Wood
15													Sampling Terminated
20													
25													
30													
35													
40													

GROUND SURFACE TO ____ FT. USED ____" CASING TO ____ FT. THEN ____"CASING TO ____ FT. HOLE NO. H-1

D = DRY W = WASHED P = Pushed A = AUGER UDP = UNDISTURBED PISTON C = COARSE
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST M = MEDIUM
O.E. = OPEN END SAMPLER S.S. = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER F = FINE

PROPORTIONS USED TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50% DRILLER D.R.

W.C.C. Weight of Casing

A.D. PISTILLI ASSOCIATES
Consulting Engineers

308 E. Mantua Avenue
Wenonah, N.J. 08090

CLIENT: State of New Jersey
Trenton State College

SHEET 3 OF 6
HOLE NO. H-3

PROJECT NO. 73-3

PROJECT NAME: Study & Hydrographic Survey of

LOCATION: Lakes Sylvia & Ceva, Trenton, N.J.

BORING LOCATION: Lake Sylvia

OFFSET: B.L. Sta. 10+00 110' East

GROUND WATER OBSERVATIONS
AT ____ FT AFTER ____ HOURS
AT ____ FT AFTER ____ HOURS

	H.S.A.	SAMPLER	CORE BAR
TYPE	H.D.	S.S.	
SIZE I.D.	2 1/2"	1 3/8"	
HAMMER WT.	140 lb.	140 lb.	BIT
HAMMER FALL	24"	24"-30"	

DATE START 11/8/73 DATE FIN 11/8/73
SURFACE ELEV. 90.4 M.S.L.
GROUND WATER ELEV. 90.4 M.S.L.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE TYPE	SAMPLE PEN.	SAMPLE REC.	SAMPLE DEPTH = BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
	P	1	SS	24		2.0	P	P	P	P			Soft gray silt & clay
	P												
	P	2	SS	24		4.0	P	P	P	P			trace of vegetation
	P												
5	P	3	SS	24		6.0	P	P	P	P			
	P												
	P	4	SS	24		8.0	P	P	P	P			
	P												
		5	SS	24		10.0	2	10	17	24		81.3	
10												80.7	Hard red clay & broken stone
													Sampling Terminated
15													
20													
25													
30													
35													
40													

GROUND SURFACE TO ____ FT. USED ____" CASING TO ____ FT. THEN ____" CASING TO ____ FT. HOLE NO. H-3

D = DRY W = WASHED P = Pushed A = AUGER UP = UNDISTURBED PISTON C = COARSE
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST M = MEDIUM
O.E. = OPEN END SAMPLER S.S. = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER F = FINE

PROPORTIONS USED TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50% DRILLER D.R.

A.D. PISTILLI ASSOCIATES
Consulting Engineers

308 E. Mantua Avenue
Wenonah, N.J. 08090

CLIENT: State of New Jersey
Trenton State College

SHEET 2 OF 6
HOLE NO. H-2

PROJECT NO. 73-3

PROJECT NAME Study & Hydrographic Survey of

LOCATION Lakes Sylvia & Ceva, Trenton, N.J.

BORING LOCATION Lake Sylvia

OFFSET B.L. Sta. 7+00 200' East

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	H.D.	S.S.	
SIZE I.D.	2 1/2"	1 3/8"	
HAMMER WT.	140 lb.	140 lb.	DIT
HAMMER FALL	24"	30"	

DATE START 11/7/73 DATE FIN 11/7/73
SURFACE ELEV. 90.4 M.S.L.
XXXXX WATER ELEV. 90.4 M.S.L.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	SAMPLE TYPE	SAMPLE PEN.	SAMPLE REC.	SAMPLE DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
	WOC P	1	SS	24		3.3	P	P	P	P		89.1	Water
	P P	2	SS	24		5.3	P	P	P	P		87.0	Soft gray silt
5	P P	3	SS	24		7.3	P	P	P	P		84.1	Soft gray clay
	5 21	4	SS	24		9.3	P	P	18	14		81.4	Soft to hard gray clay
10		5	SS	24		11.3	2	9	24	22		79.1	Stiff to hard red clay some sand and broken stone
													Sampling Terminated
15													
20													
25													
30													
35													
40													

GROUND SURFACE TO ____ FT. USED ____" CASING TO ____ FT. THEN ____"CASING TO ____ FT. HOLE NO. H-2

D = DRY W = WASHED P = Pushed A = AUGER UP=UNDISTURBED PISTON C=COARSE
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST M = MEDIUM
O.E. = OPEN END SAMPLER S.S. = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER F = FINE

PROPORTIONS USED TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50% DRILLER D.R.

W.O.C. Weight of Casing

APPENDIX D

HYDRAULIC/HYDROLOGIC CALCULATIONS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE DAM S.O. No.

Sheet No. of

TABLE OF CONTENTS Drawing No.

Computed by TWS Checked by Date 8-25-78

TABLE OF CONTENTS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject NJ DAM INSPECTION S.O. No.
SYLVAN LAKE DAM Sheet No. 1 of 29
DEPTH VS. DURATION COMPS Drawing No.
Computed by RCH Checked by TWS Date 8/23/78

100 YEAR FREQUENCY EVENT TAKEN FROM T.P. 40

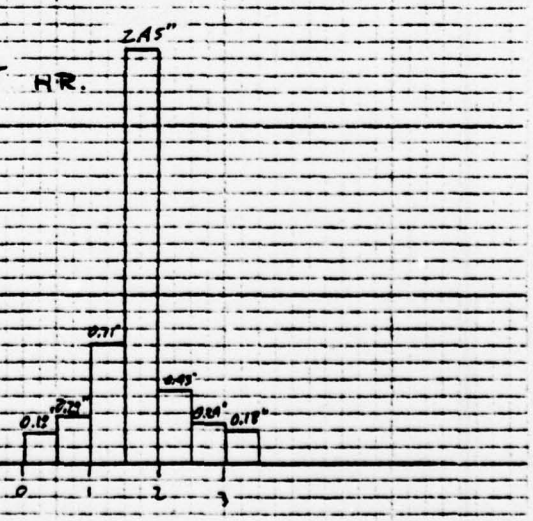
D.A. = 4.2 MI²
AREA ADJUSTMENT = 1.00

(1.)

DURATION	DEPTH(IN)
5 MIN	.91
10	1.40
15	1.76
30	2.45
1 HR	3.16
2	3.88
3	4.30
6	5.20
12	6.27
24	7.24

T_c = 3.5 HR.

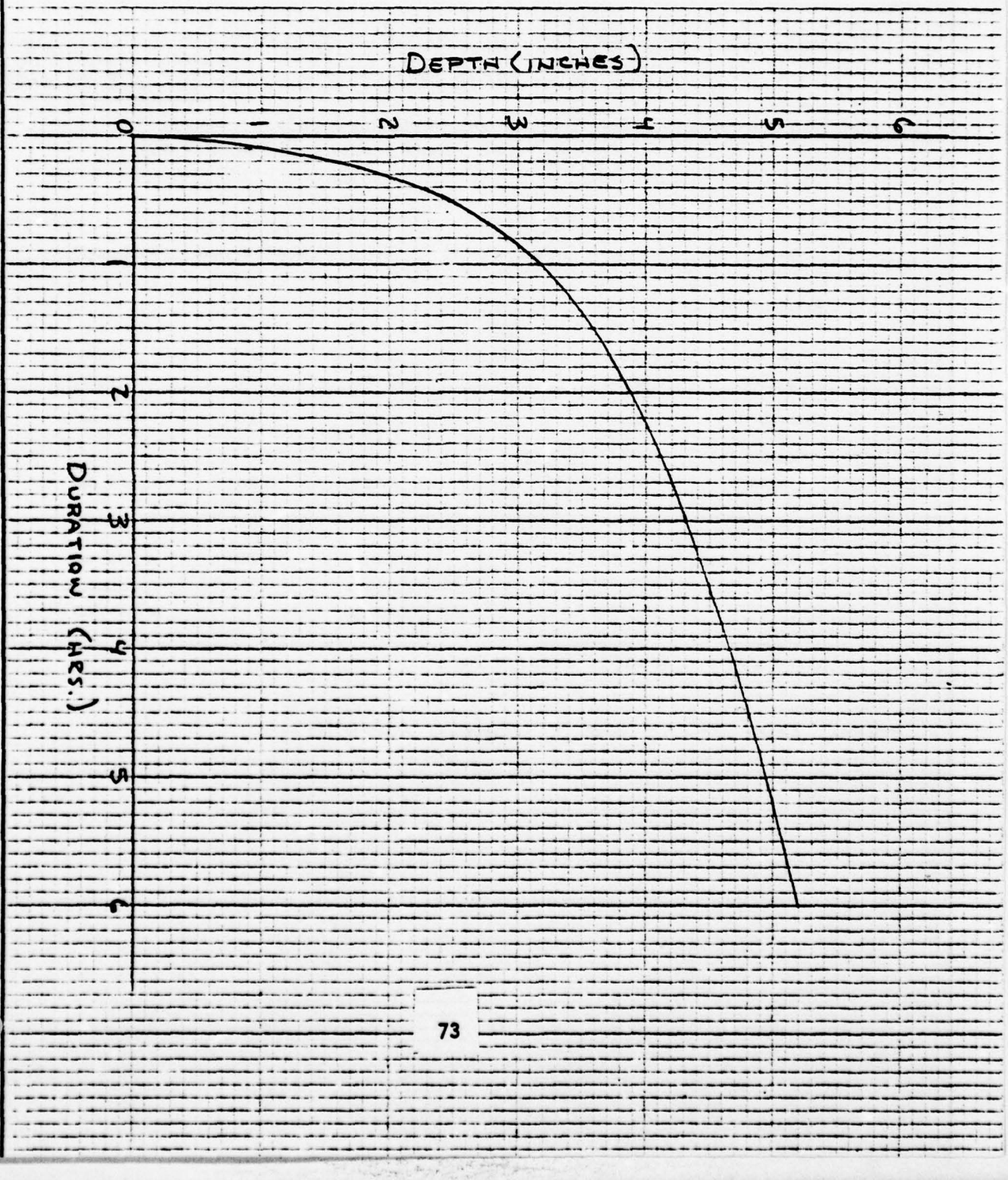
DURATION	RAINFALL	Rearranged Rainfall
.50 HR	2.45	0.18
1.00	.71	0.29
1.50	.43	0.71
2.00	.29	2.45
2.50	.24	0.43
3.00	.18	0.24
3.50	.18	0.18
4.00	.17	
4.50	.14	
5.00	.14	
5.50	.13	
6.00	.12	



MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject NJ DAM INSPECTION S.O. No.
SYLVA LAKE DAM Sheet No. 2 of 29
DEPTH VS. DURATION CURVE Drawing No.
Computed by RCH Checked by TWS Date 8/23/78



MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject Sylva Lake — S.O. No.
CN COMPUTATIONS — Sheet No. 3 of 29
Drawing No.
Computed by ALB — Checked by TWS — Date 02/23/78

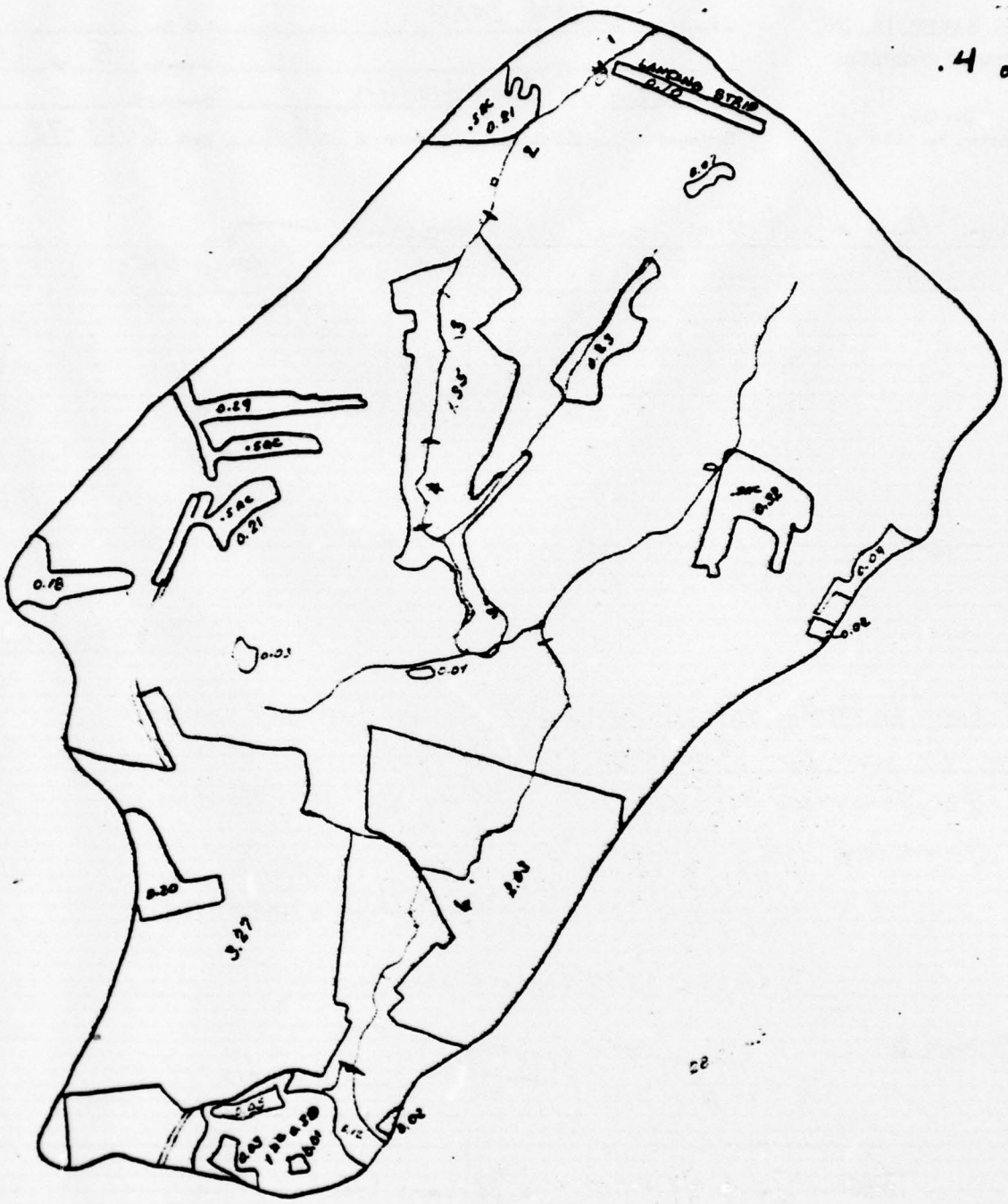
Drainage Area planimetered from quad = 4.03 mi² } agrees within 4%
" " taken from design data = 4.2 } USE 4.2 sq miles

DRAINAGE AREA 28.77 IN² WITH LAKE INCLUDED = 4.03 MI²
28.63 IN² W/O LAKE INCLUDED = 4.01 MI²

LAND USE	SQ. IN.	SOIL CLASS	%	CURVE NO.	PRODUCT
RESIDENTIAL					
1 AC	0.50	B	1.75	68	119.00
1/2 AC	1.03	B	3.20	70	252.00
1/4 AC	5.30	B	18.50	75	1387.50
WOODS	2.00	B	6.98	60	418.80
ROADS					
HARD	0.52	B	1.82	90	163.80
WATER	0.10		035	100	35.00
OPEN AREAS	19.20	B	67.00	65	4355.00
			100.00		6731.10

CN = 6731.10 / 100 = 67.31 ≈ 67

TAKEN FROM TR-55 and SCS Hydrology Handbook


LANDING STRIP
0.75
.5AC
0.21
0.29
.5AC
.5AC
0.21
0.18
1.35
0.33
0.32
0.09
0.02
0.03
0.07
0.20
3.27
2.03
0.02
0.12

SYLVA LAKE

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS
Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE S.O. No.
Sheet No. 5 of 29
Time of Concentration Drawing No.
Computed by TWS Checked by JRM Date 8-23-78

From "Design of Small Dams" page 70 average velocities →

Segment	Length	Elevation	Slope %	Average Velocity FPS	t (hrs)
1	900	3	0.33	1.5	0.17
2	2600	40	1.54	2.0	0.36
3	3200	20	0.63	1.5	0.59
4	1200	20	1.67	2.0	0.17
5	3900	20	0.59	1.5	0.63
6	7300	30	0.91	1.3	1.56
	18,600				3.48

Say 3.5 hours

SCS Curve No. Method from TR55 p 3-7 (for watershed under 2000 acres)

use for upper part of watershed (Segments 1-5)

$l = 18,600 - 7300 = 11,300$ ft, $S = \frac{1000}{CN} - 10$, $CN = 67$, $S = 4.93$

Y = ave land slope $\approx 103/11,300 = 1\%$

$$L = \frac{l^{0.8}(S+1)^{0.7}}{1900\,Y^{0.5}} = \frac{(11,300)^{0.8}(4.93+1)^{0.7}}{1900(1)^{0.5}} = 3.20$$

$T_c = 1.67\,L = 1.67(3.20) = 5.34$ hr

Segment 6

$$T_c = \left(\frac{11.9\,L^3}{H}\right)^{0.385} = \left[\frac{11.9\left(\frac{1800}{5280}\right)^3}{30}\right]^{0.385} = 1.02 \text{ hrs}$$

Total $T_c = 5.34 + 1.02 = 6.36$ hours (too high)

use $T_c = 3.5$ hours

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS
Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE S.O. No.
Sheet No. 6 of 29
Duration and Time to Peak Drawing No.
Computed by TWS Checked by JRM Date 8-23-78

"Design of Small Dams" p. 74

Duration

$D \cong \frac{1}{5} T_c = \frac{1}{5}(3.5) = 0.7$ try 0.5 hours (30 minutes)

Time to Peak

$T_p = \frac{D}{2} + 0.6\, T_c$

$T_c = 3.5$ hours

$D = 0.5$ hours

$T_p = \frac{0.5}{2} + 0.6(3.50)$

$= 0.25 + 2.10$

$= 2.35$ hours

UNIT GRAPH PEAK

$q = \frac{484AQ}{T_p} = \frac{484(9.2)(1)}{2.35} = 865$ cfs

D.A = 9.2 sq mi

Q = 1" for unit graph

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE — S.O. No.

Sheet No. 7 of 29

UNIT HYDROGRAPH — Drawing No.

Computed by TWS — Checked by JRM — Date 8-24-78

$T_c = 3.50$ $D = 0.5$ $T_p = 2.35$ $T/T_p = 0.5/2.35 = 0.2128$ hr

from SCS curvilinear hydrograph
Design of Small Dams p. 74 fig 32

$q = 865$ cfs

T/T_p	T(hr)	q/q_p	q
0.21	0.5	0.08	69
0.43	1.0	0.325	281
0.64	1.5	0.665	575
0.85	2.0	0.937	810
1.06	2.5	1.000*	865
1.28	3.0	0.86	744
1.49	3.5	0.667	577
1.70	4.0	0.485	420
1.91	4.5	0.363	314
2.13	5.0	0.266	229
2.34	5.5	0.195	169
2.55	6.0	0.143	124
2.77	6.5	0.102	88
2.98	7.0	0.076	66
3.19	7.5	0.057	49
3.40	8.0	0.043	37
3.62	8.5	0.032	28
3.83	9.0	0.024	21
4.04	9.5	0.018	16
4.26	10.0	0.013	11
4.47	10.5	0.010	9
4.68	11.0	0.007	6
4.89	11.5	0.004	3
5.11	12.0	0.002	2

$\Sigma 5513$ cfs = 1.02 in O.K. ✓

* actually 0.99, but peak moved to 2.5

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject: Sylvan Lake
S.O. No.
Sheet No. 8 of 29
Spillway discharge only
Drawing No.
Computed by: REH Checked by: TWS Date: 8/1/78

"Design of Small Dams" P. 378

design head - 2.5' = H_o

10 foot section

	H	$H^{3/2}$	C_o	H/H_o	C/C_o	C	L	Q
90.5	0.39	0.24	3.52	0.16	0.84	2.96	10	7
91.0	0.89	0.84		0.36	0.89	3.13		26
91.5	1.39	1.64		0.56	0.93	3.27		54
92.0	1.89	2.60		0.76	0.96	3.38		88
92.5	2.39	3.69		0.96	0.99	3.48		128
93.0	2.89	4.91		1.16	1.02	3.59		176
93.5	3.39	6.24		1.36	1.04	3.66		228
93.94	3.83	7.50		1.56	1.06	3.73		280
94.44	4.33	9.01	3.52	1.73	1.08	3.80		342

61 foot section

	H	$H^{3/2}$	C_o	H/H_o	C/C_o	C	L	Q
90.5	0.06	0.01	3.52	0.02	0.80	2.82	61	2
91.0	0.56	0.42		0.22	0.85	2.99		77
91.5	1.06	1.09		0.42	0.90	3.17		211
92.0	1.56	1.95		0.62	0.94	3.31		394
92.5	2.06	2.96		0.82	0.97	3.41		616
93.0	2.56	4.10		1.02	1.00	3.52		880
93.5	3.06	5.35		1.22	1.03	3.63		1183
93.94	3.50	6.55		1.40	1.05	3.70		1477
94.44	4.00	8.00	3.52	1.60	1.07	3.77	61	1840

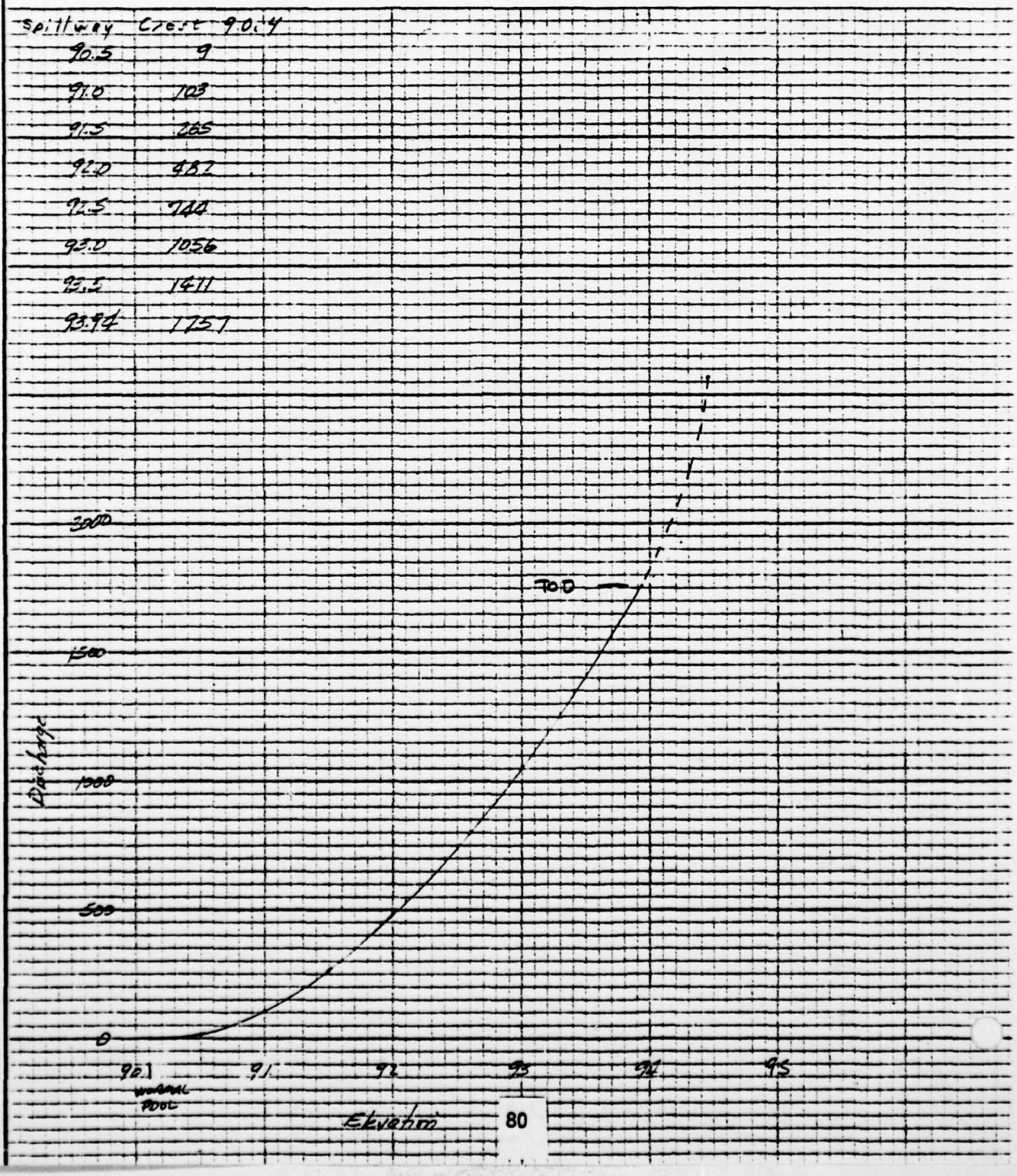
Max discharge = 1757 sec-ft @ TOD elev

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE S.O. No.
Sheet No. 9 of 29
Spillway discharge only Drawing No.
Computed by REH Checked by JWS Date 8-1-78

Spillway Crest 90.4	
90.5	9
91.0	103
91.5	265
92.0	482
92.5	744
93.0	1056
93.5	1411
93.94	1757



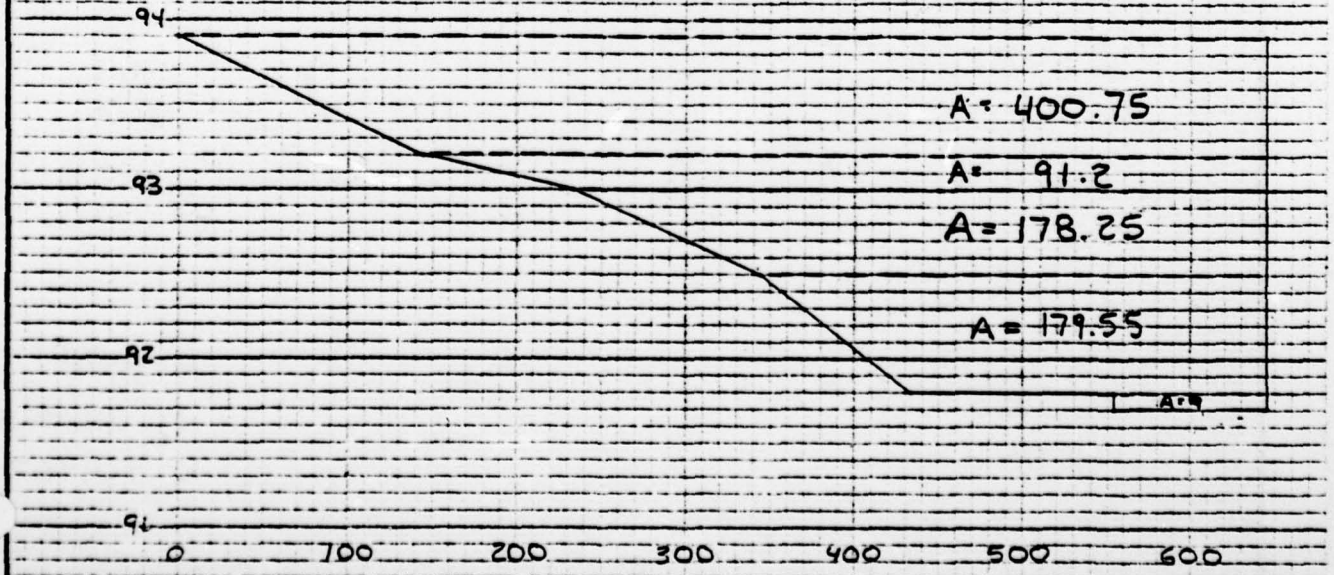
MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject NJ DAM INSPECTION S.O. No.
DIKE PROFILE - LEFT Sheet No. 10 of 29
SYLVA LAKE Drawing No.
Computed by RCH Checked by JRM Date 8/25/78

STATIONING FROM SPILLWAY

STATION	ELEVATION	
0	93.94	.9
145	93.15	.2
233	92.95	.0
344	92.45	.5
433	91.75	.8
555	91.75	.8
555	91.65	.7
645	91.65	.7
645	93.94	.9



MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE — S.O. No.
DIKE PROFILE — Sheet No. 11 of 29
Drawing No.
Computed by RCH — Checked by JRM — Date

USING MANNINGS EQUATION $Q = \frac{1.49}{N} A R^{2/3} S^{1/2}$.

$N = .080$.

$S = .005$ FT/FT.

FOR 91.8 MSL $D = .1$ FT.

$Q = \frac{1.49}{.080}(9)(.215)(.005)^{1/2}$

$Q = 2.5$ CFS

$R = \frac{A}{P_w}$.

$R = \frac{9}{90.2}$.

$R = .09978$.

$R^{2/3} = .215$.

FOR 92.5 MSL $D = .8$ FT

$Q = \frac{1.49}{.080}(188.6)(.731)(.005)^{1/2}$

$Q = 181$ CFS

$R = \frac{A}{P_w}$.

$R = \frac{188.5}{301.9}$.

$R = .624379$.

$R^{2/3} = .730520$.

FOR 93.0 MSL $D = 1.3$ FT.

$Q = \frac{1.49}{.080}(344.8)(.924)(.005)^{1/2}$

$Q = 446$ CFS

$R = \frac{344.8}{412.9}$

$R = .888348$

$R^{2/3} = .924107$

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE — S.O. No.
DIKE PROFILE — Sheet No. 12 of 29
Drawing No.
Computed by RCH — Checked by JRM — Date

FOR 93.2 MSL D = 1.5 FT

$Q = \frac{1.49}{0.080}(458.0)(.942)(.005)^{1/2}$

$R = \frac{458.0}{501.1}$

$R = .913989$

$R^{2/3} = .941809$

$Q = 568$ CFS

FOR 93.9 MSL D = 2.2 FT

$Q = \frac{1.49}{.080}(858.8)(1.208)(.005)^{1/2}$

$R = \frac{858.8}{646.8}$

$R = 1.32$

$R^{2/3} = 1.208038$

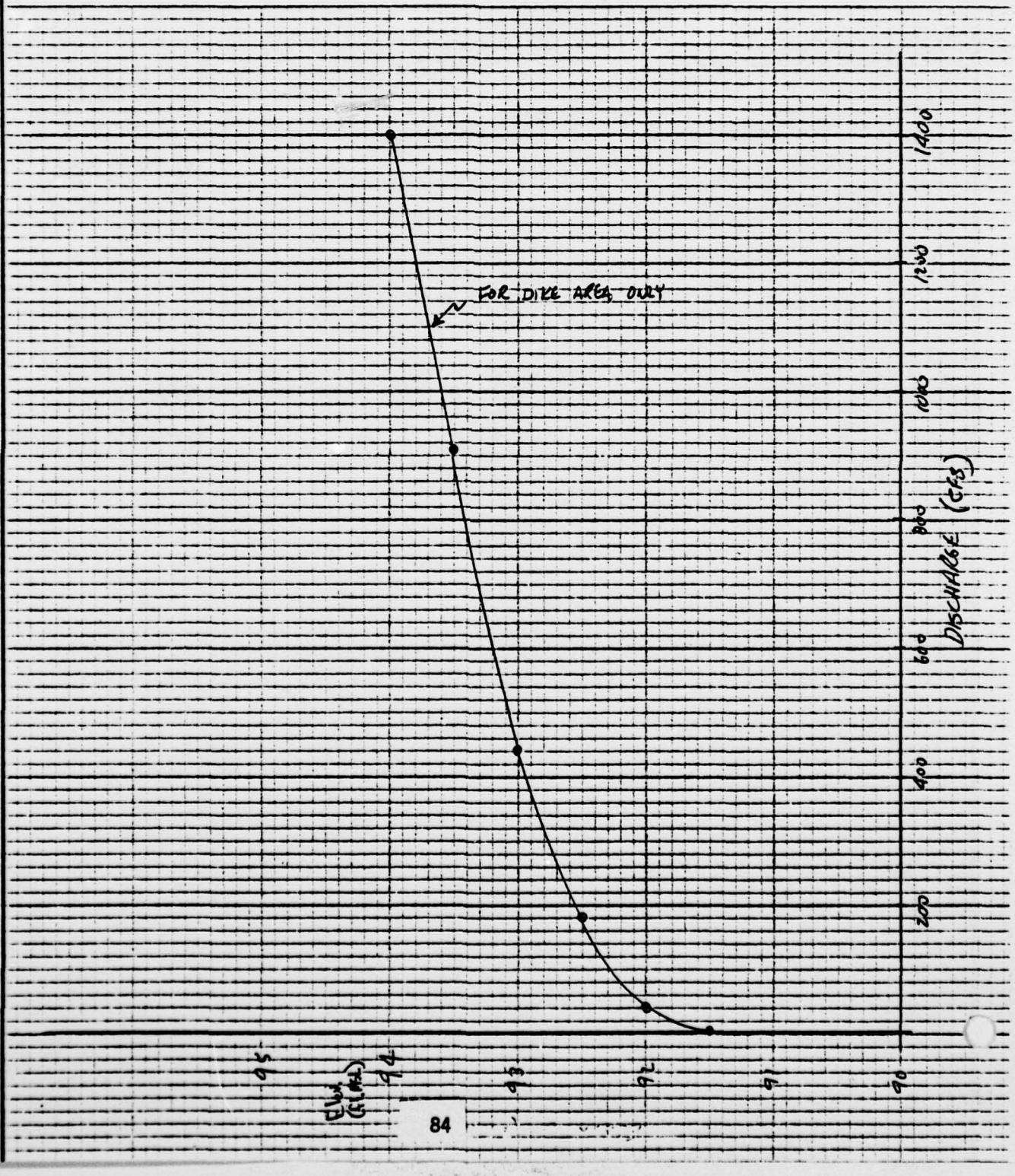
$Q = 1366$ CFS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE
ELEVATION VS. DISCHARGE
THRU DIKE AREA ONLY

S.O. No.
Sheet No. 13 of 29
Drawing No.
Computed by TWS Checked by Date 8-25-78



MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE S.O. No.
Sheet No. 14 of 29
Drawing No.
Computed by TWJ Checked by JRM Date 8-25-78

Extension of RATING for flow over top of dam

use top of dam elevation 93.94

approximate length of embankment = 400'

using the broad crested weir formula to approximate flow over dam

$Q = CLH^{3/2}$ assume wide breadth b = 15'

Elev.	H	$H^{3/2}$	C	L	Q
94.04	0.1	0.03	2.68	400	34
94.14	0.2	0.09	2.68	400	96
94.24	0.3	0.16	2.69	400	177
94.34	0.4	0.25	2.70	400	273
94.44	0.5	0.35	2.70	400	382

RATING TABLE SYLVA LAKE (SUMMARY)

	ELEVATION (MSL)	FLOW (CFS) SPILLWAY 10' section	SPILLWAY 61' section	OVER EMBANKMENT	TOTAL DISCHARGE (cfs)	STORAGE (Acre-Ft)	DISCHARGE THRU AND OVER LEVEE ON LEFT SIDE OF RESERVOIR (cfs)	TOTAL FLOW including discharge thru levee (cfs)
NORMAL POOL	90.44	—	—	—	0 (2)	0 *(1)(2)	—	0 (1)
	90.5	7	2	—	9 (2)	1 (1)(2)	—	9 (1)
	91.0	26	77	—	103 (2)	6 (1)(2)	—	103 (1)
	91.5	54	211	—	265 (2)	12 (1)(2)	2	267 (1)
	92.0	88	394	—	482 (2)	19 (1)(2)	43	525 (1)
	92.5	128	616	—	744 (2)	26 (1)(2)	181	925 (1)
	93.0	176	880	—	1056 (2)	33 (1)(2)	446	1502 (1)
	93.5	228	1183	—	1411 (2)	40 (1)(2)	910	2321 (1)
TOP OF DAM	93.94	280	1477	0	1757 (2)	48 (1)(2)	1400	3157 (1)
	94.44	342	1840	382	2564 (2)	56 (2)		

(2) actual storage discharge values used in routing thru spillway and over dam (no flow thru dike)
(1) actual storage discharge values used in routing thru spillway, over dam, and thru dike
* start 0 storage at normal pool (storage below normal pool = 16 acre-ft)

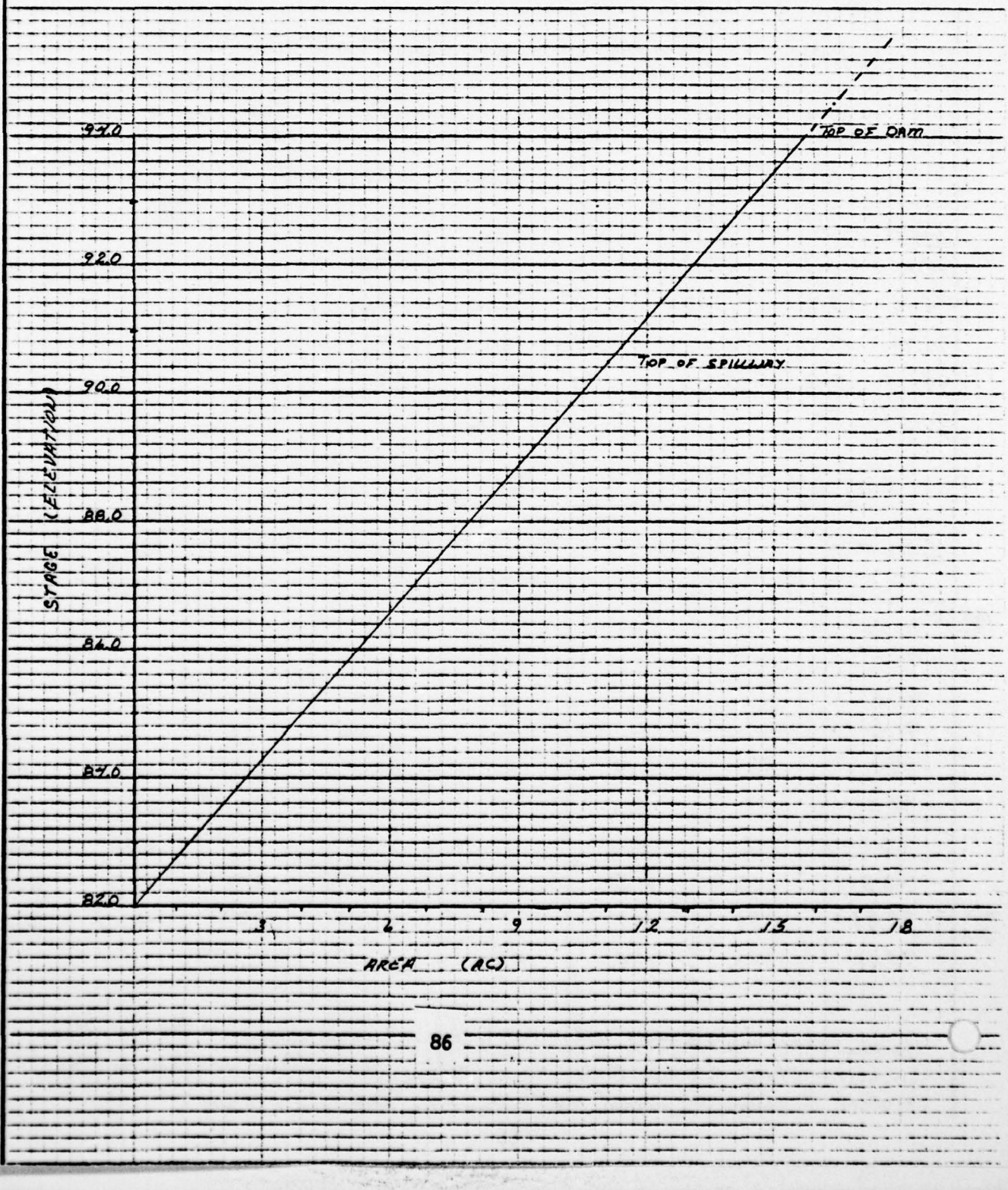
MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE
STAGE VS AREA CURVE

S.O. No.
Sheet No. 15 of 29
Drawing No.

Computed by ALB Checked by TWB Date 02/24/78



MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject: Sylva Lake
Stage vs Storage

S.O. No.
Sheet No. 16 of 29
Drawing No.
Computed by ALB Checked by TWS Date 02/24/78

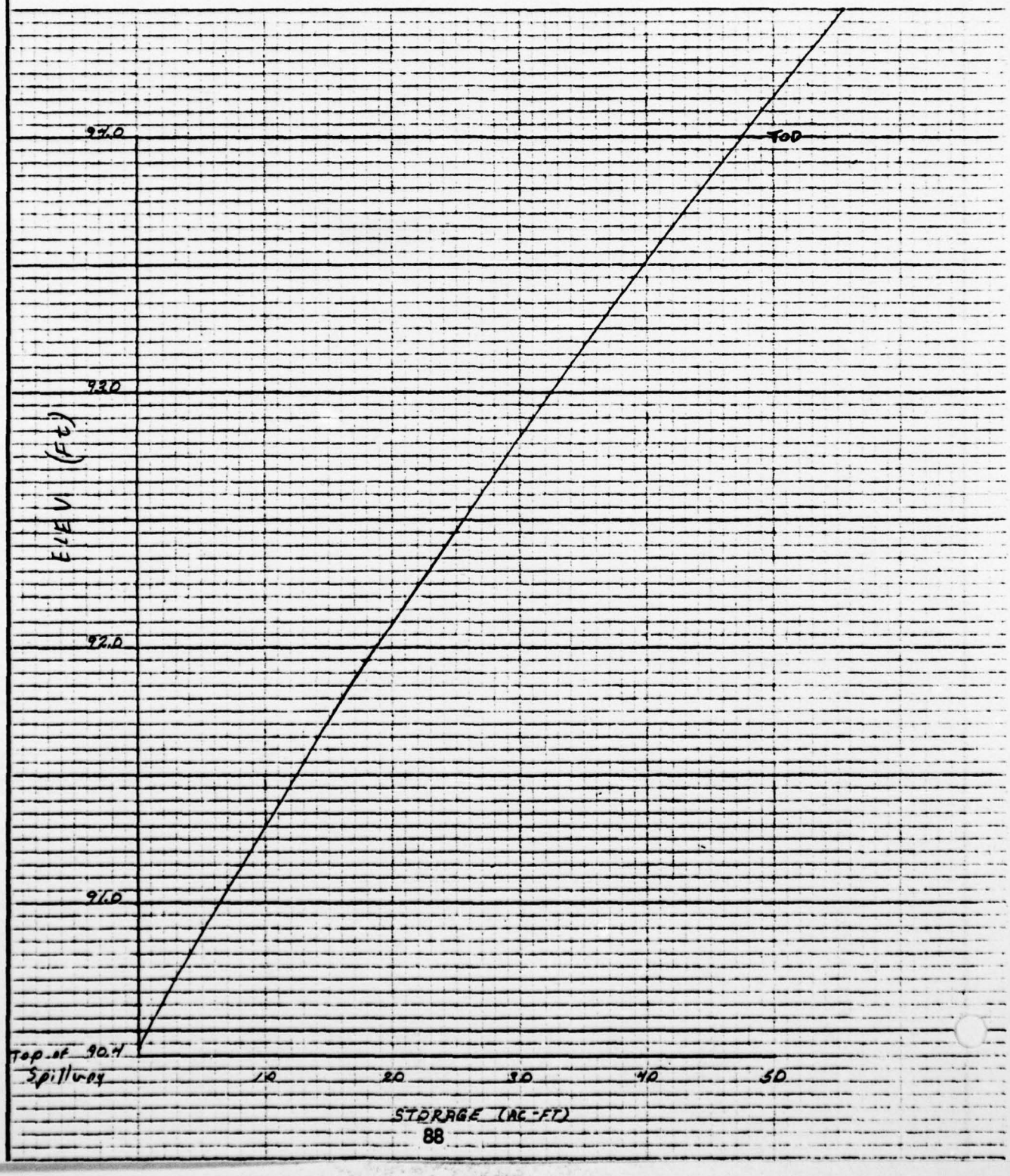
ELEVATION	SURFACE AREA	AVERAGE SURFACE AREA	INCREMENTAL STORAGE (AC-FT)	CUMULATIVE STORAGE (AC-FT)
NORMAL POOL 90.44	12.02			
90.5	12.34	11.19	2.91 ✓	2.91 ✓
91.00	12.73	12.52	3.42 ✓	6.38 ✓
91.5	12.40	12.08	6.04 ✓	12.42 ✓
92.00	13.06	12.73	6.39 ✓	18.81 ✓
92.5	13.71	13.39	7.67 ✓	26.48 ✓
93.00	14.32	14.02	7.02 ✓	32.50 ✓
93.5	14.02	14.29	7.35 ✓	39.85 ✓
94.00	13.67	13.85	7.67 ✓	47.52 ✓
94.5	16.40	16.04	8.02	55.54

TOP

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

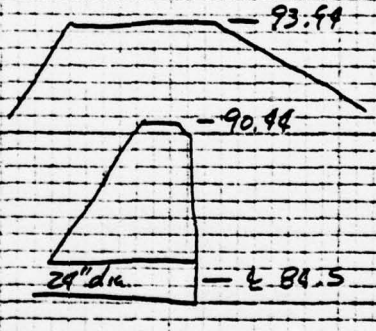
Subject SYLVA LAKE — S.O. No.
STAGE VS STORAGE — Sheet No. 17 of 29
Drawing No.
Computed by ALB — Checked by TWS — Date 07/24/78



MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS
Box 280
Beaver, Pa. 15009

Subject SYLVA LAKE DAM
Drawdown
S.O. No.
Sheet No. 18 of 29
Drawing No.
Computed by TWS Checked by Date 8-29-78

The 24" opening design as a drain for Sylva Lake was closed off and is beneath the silt in the reservoir. Therefore at present it is not functional. However if the silt in the reservoir would be removed and the drain again made operational, the following drawdown would apply.



ACTUAL EXISTING STORAGE = 64 acre-ft
STORAGE WITH SILT REMOVED = 16 acre-ft

Using "Design of Small Dams" nomograph for concrete culverts with entrance control

H = Q, V - 84.5 — 24" dia.

Elev	H	H/D	Q(cfs)
90.4	5.9	2.95	33
88	3.5	1.75	23
86	1.5	0.75	9
84	0	0	0

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject: SYLVA LAKE DAM — Drawdown

S.O. No.:

Sheet No. 19 of 29

Drawing No.:

Computed by: TWS — Checked by: — Date: 8-29-78

ELEV	SURFACE AREA	AVE SURFACE AREA	INC. STORAGE ACRE-FT	CUM. STORAGE ACRE-FT
82	0			0
		1.3	2.6	
84	2.6			3
		3.9	7.8	
86	5.2			10
		6.45	12.9	
88	7.7			23
		9.35	22.94	
EMS CREST 90.4	11			46

Reservoir Emptying Potential

ELEV	AVAILABLE STORAGE acre-ft	A STORAGE acre-ft	ACTUAL DISCHARGE cfs	AVERAGE DISCHARGE cfs	AVE DISCH AC-FT/DAY	DRAWDOWN TIME (Days)
normal pool 90.4	46		33			
		23		28	55.54	0.41
89	23		23			
		13		16	31.74	0.41
86	10		9			
		7		9.5	8.93	0.78
84	3		0			1.6 days

Drawdown from normal pool = 1.6 days under the following conditions

1. Silt in reservoir is removed so that the storage at normal pool = 46 acre-ft
2. The drain is made operational

```
A                                SYLVA LAKE   considering flow thru dike area
A                                NEW JERSEY   ie. conditions existing in field
A                                HYDROGRAPH
B     60               30
1      3
K              1                           2         1
M      0      -1     4.20
O      7
1   0.18    0.29     0.71     2.45     0.43      0.24     0.18
T                                                         1.5      0.2
U     24
1     69     281      575      810      865       744      577      420      314      229
1    169     124       88       66       49        37       28       21       16       11
1      9       6        3        2
Y                       1
K      1       1                           2         1
Y                                1
1      1
2      0       1        6       12       19        26       33       40       48
3      0       9      103      267      525       925     1502     2321     3157
K     99
A
```

AD-A059 738 BAKER (MICHAEL) JR INC BEAVER PA F/G 13/2
NATIONAL DAM SAFETY PROGRAM. SYLVA LAKE DAM (NJ00391), PASSAIC --ETC(U)
AUG 78 M BAKER DACW61-78-C-0141
UNCLASSIFIED NL

2 OF 2
ADA
059738

END
DATE
FILMED
12-78
DDC

This routing applies to existing conditions. This was routed with flow through the left side of the reservoir considered.

****
HEC-1 VERSION DATED JAN 1973

****

SYLVA LAKE
NEW JERSEY
HYDROGRAPH
100 YEAR

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
60	0	30	0	0	0	0	0	0	0

JOPER	NWT
3	0

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
1	0	0	0	2	1	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOM	ISAME	LOCAL
0	-1	4.20	0.0	0.0	0.0	0.0	0	0	0

PRECIP DATA

NP	STORM	DAJ	DAK
7	0.0	0.0	0.0

PRECIP PATTERN

0.18	0.29	0.71	2.45	0.43	0.24	0.18

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.0	0.0	1.00	0.0	0.0	1.00	1.50	0.20	0.0	0.0

GIVEN UNIT GRAPH, NUHGQ= 24

69.	281.	575.	810.	865.	744.	577.	420.	314.	229.
169.	124.	88.	66.	49.	37.	28.	21.	16.	11.
9.	6.	3.	2.						

UNIT GRAPH TOTALS 5513. CFS OR 1.02 INCHES OVER THE AREA

RECESSION DATA

STRTQ= 0.0 QRCSN= 0.0 RTIOR= 1.00

END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP Q
1	0.18	0.00	0.
2	0.29	0.00	0.
3	0.71	0.00	0.
4	2.45	2.04	141.
5	0.43	0.33	597.
6	0.24	0.14	1277.
7	0.18	0.08	1889.
8	0.0	0.0	2138.
9	0.0	0.0	1965.
10	0.0	0.0	1610.
11	0.0	0.0	1222.
12	0.0	0.0	920.
13	0.0	0.0	676.

14	0.0	0.0	498.
15	0.0	0.0	366.
16	0.0	0.0	263.
17	0.0	0.0	195.
18	0.0	0.0	144.
19	0.0	0.0	108.
20	0.0	0.0	82.
21	0.0	0.0	61.
22	0.0	0.0	46.
23	0.0	0.0	33.
24	0.0	0.0	26.
25	0.0	0.0	18.
26	0.0	0.0	10.
27	0.0	0.0	7.
28	0.0	0.0	2.
29	0.0	0.0	1.
30	0.0	0.0	0.
31	0.0	0.0	0.
32	0.0	0.0	0.
33	0.0	0.0	0.
34	0.0	0.0	0.
35	0.0	0.0	0.
36	0.0	0.0	0.
37	0.0	0.0	0.
38	0.0	0.0	0.
39	0.0	0.0	0.
40	0.0	0.0	0.
41	0.0	0.0	0.
42	0.0	0.0	0.
43	0.0	0.0	0.
44	0.0	0.0	0.
45	0.0	0.0	0.
46	0.0	0.0	0.
47	0.0	0.0	0.
48	0.0	0.0	0.
49	0.0	0.0	0.
50	0.0	0.0	0.
51	0.0	0.0	0.
52	0.0	0.0	0.
53	0.0	0.0	0.
54	0.0	0.0	0.
55	0.0	0.0	0.
56	0.0	0.0	0.
57	0.0	0.0	0.
58	0.0	0.0	0.
59	0.0	0.0	0.
60	0.0	0.0	0.
SUM	4.48	2.59	14295.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2138.	1119.	298.	238.	14296.
INCHES		2.48	2.64	2.64	2.64
AC-FT		555.	591.	591.	591.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
1	1	0	0	2	1	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	0.

STORAGE=	0.	1.	6.	12.	19.	26.	33.	40.	48.	0.
OUTFLOW=	0.	9.	103.	267.	525.	925.	1502.	2321.	3157.	0.

TIME	EOP STOR	AVG IN	EOP OUT
1	0.	0.	0.
2	0.	0.	0.
3	0.	0.	0.
4	2.	70.	32.
5	12.	369.	255.
6	26.	937.	922.
7	35.	1583.	1786.
8	38.	2014.	2108.
9	37.	2051.	2028.
10	35.	1788.	1688.
11	31.	1416.	1325.
12	27.	1071.	1005.
13	23.	798.	770.
14	20.	587.	572.
15	17.	432.	442.
16	14.	314.	332.
17	11.	229.	247.
18	9.	169.	191.
19	8.	126.	144.
20	6.	95.	109.
21	5.	71.	87.
22	4.	54.	68.
23	3.	40.	52.
24	3.	29.	39.
25	2.	22.	30.
26	2.	14.	21.
27	1.	8.	14.
28	1.	4.	9.
29	1.	1.	6.
30	0.	0.	4.
31	0.	0.	3.
32	0.	0.	2.
33	0.	0.	1.
34	0.	0.	1.
35	0.	0.	1.
36	0.	0.	0.
37	0.	0.	0.
38	0.	0.	0.
39	0.	0.	0.
40	0.	0.	0.
41	0.	0.	0.
42	0.	0.	0.

43	0.	0.	0.
44	0.	0.	0.
45	0.	0.	0.
46	0.	0.	0.
47	0.	0.	0.
48	0.	0.	0.
49	0.	0.	0.
50	0.	0.	0.
51	0.	0.	0.
52	0.	0.	0.
53	0.	0.	0.
54	0.	0.	0.
55	0.	0.	0.
56	0.	0.	0.
57	0.	0.	0.
58	0.	0.	0.
59	0.	0.	0.
60	0.	0.	0.
SUM			14295.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2108.	1103.	298.	238.	14295.
INCHES		2.44	2.64	2.64	2.64
AC-FT		547.	591.	591.	591.

```
A                          SYLVA LAKE     considering no flow thru dike area
A                          NEW JERSEY     i.e. dike area filled to TOD elevation
A                          HYDROGRAPH
B     60               30
1      3
K              1                           2         1
M      0      -1     4.20
O      7
1   0.18    0.29     0.71     2.45     0.43      0.24      0.18
T                                                           1.5       0.2
U     24
1     69     281      575      810      865       744       577       420       314       229
1    169     124       88       66       49        37        28        21        16        11
1      9       6        3        2
X                       1
K      1       1                            2         1
Y                                1
1      1
2      0       1        6       12       19        26        33        40        48        56
3      0       9      103      265      482       744      1056      1411      1757      2564
K     99
A
```

This routing would apply if the dike on the left side of the reservoir would be filled in and raised to an elevation higher than top of dam
This routing shows that under these conditions the dam would be overtopped by 0.2 feet

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**********
HEC-1   RSION DATED JAN 1973

**********

                                    SYLVA LAKE
                                    NEW JERSEY
                                    HYDROGRAPH
                                    100 YEAR
                                    JOB SPECIFICATION
      NQ   NHR  NMIN  IDAY   IHR  IMIN METRC  IPLT  IPRT NSTAN
      60     0    30     0     0     0     0     0     0     0
                                  JOPER       NWT
                                      3         0

**********          **********          **********          **********          **********

                                 SUB-AREA RUNOFF COMPUTATION
                  ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME
                      1       0       0       0       2       1       0

                                    HYDROGRAPH DATA
            IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO  ISNOW  ISAME  LOCAL
                0      -1    4.20     0.0     0.0     0.0     0.0      0      0      0

                                    PRECIP DATA
                                      NP  STORM     DAJ     DAK
                                       7    0.0     0.0     0.0
                                    PRECIP PATTERN
    0.18      0.29      0.71      2.45      0.43      0.24      0.18

                                    LOSS DATA
          STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
            0.0     0.0    1.00     0.0     0.0    1.00    1.50    0.20     0.0     0.0

                                 GIVEN UNIT GRAPH, NUMGQ=  24
   69.     281.     575.     810.     865.     744.     577.     420.     314.     229.
  169.     124.      88.      66.      49.      37.      28.      21.      16.      11.
    9.       6.       3.       2.
          UNIT GRAPH TOTALS   5513. CFS OR 1.02 INCHES OVER THE AREA

                                    RECESSION DATA
                  STRTQ=     0.0     QRCSN=     0.0     RTIOR= 1.00

                                 END-OF-PERIOD FLOW
                                TIME   RAIN   EXCS    COMP Q
                                   1   0.18   0.00        0.
                                   2   0.29   0.00        0.
                                   3   0.71   0.00        0.
                                   4   2.45   2.04      141.
                                   5   0.43   0.33      597.
                                   6   0.24   0.14     1277.
                                   7   0.18   0.08     1889.
                                   8    0.0    0.0     2138.
                                   9    0.0    0.0     1965.
                                  10    0.0    0.0     1610.
                                  11    0.0    0.0     1222.
                                  12    0.0    0.0      920.
                                  13    0.0    0.0      676.
```

14	0.0	0.0	498.
15	0.0	0.0	366.
16	0.0	0.0	263.
17	0.0	0.0	195.
18	0.0	0.0	144.
19	0.0	0.0	108.
20	0.0	0.0	82.
21	0.0	0.0	61.
22	0.0	0.0	46.
23	0.0	0.0	33.
24	0.0	0.0	26.
25	0.0	0.0	18.
26	0.0	0.0	10.
27	0.0	0.0	7.
28	0.0	0.0	2.
29	0.0	0.0	1.
30	0.0	0.0	0.
31	0.0	0.0	0.
32	0.0	0.0	0.
33	0.0	0.0	0.
34	0.0	0.0	0.
35	0.0	0.0	0.
36	0.0	0.0	0.
37	0.0	0.0	0.
38	0.0	0.0	0.
39	0.0	0.0	0.
40	0.0	0.0	0.
41	0.0	0.0	0.
42	0.0	0.0	0.
43	0.0	0.0	0.
44	0.0	0.0	0.
45	0.0	0.0	0.
46	0.0	0.0	0.
47	0.0	0.0	0.
48	0.0	0.0	0.
49	0.0	0.0	0.
50	0.0	0.0	0.
51	0.0	0.0	0.
52	0.0	0.0	0.
53	0.0	0.0	0.
54	0.0	0.0	0.
55	0.0	0.0	0.
56	0.0	0.0	0.
57	0.0	0.0	0.
58	0.0	0.0	0.
59	0.0	0.0	0.
60	0.0	0.0	0.
SUM	4.48	2.39	14295.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2138.	1119.	298.	238.	14296.
INCHES		2.48	2.64	2.64	2.64
AC-FT		555.	591.	591.	591.

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HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
1	1	0	0	2	1	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	0.

STORAGE=	0.	1.	6.	12.	19.	26.	33.	40.	48.	56.
OUTFLOW=	0.	9.	103.	265.	482.	744.	1056.	1411.	1757.	2564.

TIME	EOP STOR	AVG IN	EOP OUT
1	0.	0.	0.
2	0.	0.	0.
3	0.	0.	0.
4	2.	70.	32.
5	12.	369.	254.
6	28.	937.	830.
7	44.	1583.	1572.
8	51.	2014.	2089.
9	51.	2051.	2038.
10	47.	1788.	1717.
11	41.	1416.	1433.
12	33.	1071.	1065.
13	27.	798.	809.
14	22.	587.	610.
15	18.	432.	458.
16	15.	314.	346.
17	12.	229.	255.
18	9.	169.	194.
19	8.	126.	149.
20	6.	95.	109.
21	5.	71.	87.
22	4.	54.	68.
23	3.	40.	52.
24	3.	29.	40.
25	2.	22.	30.
26	2.	14.	21.
27	1.	8.	14.
28	1.	4.	9.
29	1.	1.	6.
30	0.	0.	4.
31	0.	0.	3.
32	0.	0.	2.
33	0.	0.	1.
34	0.	0.	1.
35	0.	0.	1.
36	0.	0.	0.
37	0.	0.	0.
38	0.	0.	0.
39	0.	0.	0.
40	0.	0.	0.
41	0.	0.	0.
42	0.	0.	0.

- peak elev 94.2 (TOD = 94.0) 0.3' overtop

43	0.	0.	0.
44	0.	0.	0.
45	0.	0.	0.
46	0.	0.	0.
47	0.	0.	0.
48	0.	0.	0.
49	0.	0.	0.
50	0.	0.	0.
51	0.	0.	0.
52	0.	0.	0.
53	0.	0.	0.
54	0.	0.	0.
55	0.	0.	0.
56	0.	0.	0.
57	0.	0.	0.
58	0.	0.	0.
59	0.	0.	0.
60	0.	0.	0.
SUM			14295.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2089.	1102.	298.	238.	14295.
INCHES		2.44	2.64	2.64	2.64
AC-FT		947.	591.	591.	591.

100