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NATIONAL DAM SAFETY PROGRAM. LINDYS LAKE DAM (NJ00201), PASSAIC--ETC(U)
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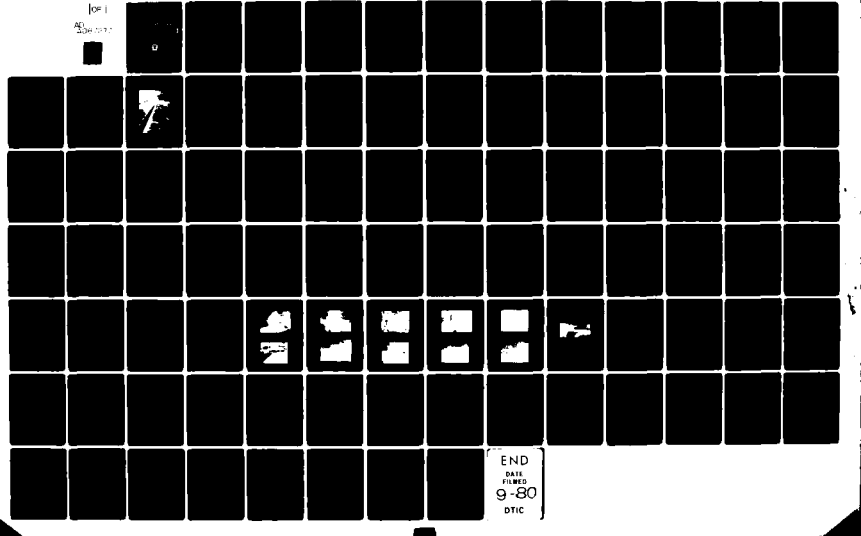

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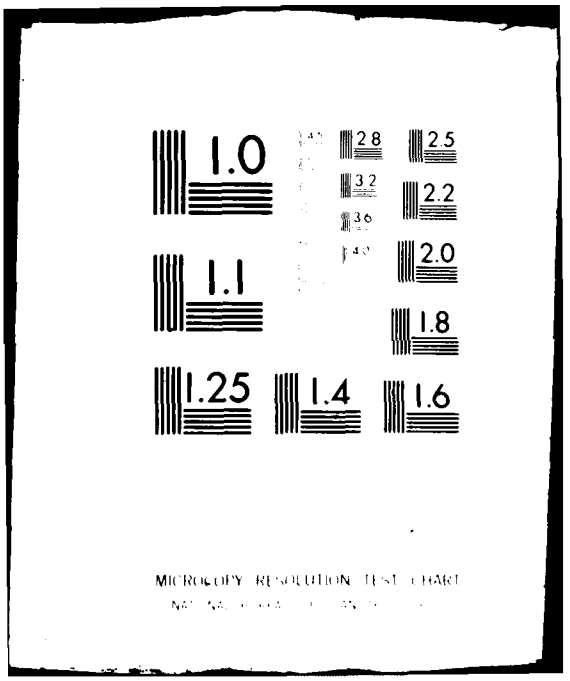
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AD A087277

PASSAIC RIVER BASIN
BRANCH OF WEST BROOK,
PASSAIC COUNTY
NEW JERSEY

LINDYS LAKE DAM
NJ 00201

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

FEBRUARY 1980

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

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2. GOVT ACCESSION NO.: AD-A087277
3. RECIPIENT'S CATALOG NUMBER:

4. TITLE (and Subtitle): ~~Phase I Inspection Report~~ National Dam Safety Program. Lindys Lake Dam (NJ00201), Passaic River Basin, Branch of West Brook, Passaic County, New Jersey. Phase I Inspection Report.
5. TYPE OF REPORT & PERIOD COVERED: FINAL rept.
6. PERFORMING ORG. REPORT NUMBER:

7. AUTHOR(s): ~~John Talerico~~
8. CONTRACT OR GRANT NUMBER(s): DACW61-79-C-0011

9. PERFORMING ORGANIZATION NAME AND ADDRESS:
Frederic R. Harris, Inc.
453 Amboy Ave.
Woodbridge, N.J. 07095
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
John Talerico

11. CONTROLLING OFFICE NAME AND ADDRESS:
NJ Department of Environmental Protection
Division of Water Resources
P.O. Box CN029
Trenton, NJ 08625
12. REPORT DATE: Feb 1980
13. NUMBER OF PAGES: 77

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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	Spillways
Dam Safety	Slope
Visual Inspection	National Dam Safety Program
Structural Analysis	Lindys Lake Dam, NJ

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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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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

IN REPLY REFER TO
NAPEN-N

22 JUL 1980

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

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Lindys Lake Dam in Passaic 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 in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Lindys Lake Dam, a high hazard potential structure, is judged to be in good overall condition. However, the spillway is considered seriously inadequate because a flow equivalent to twelve percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard of loss of life downstream from the dam. To ensure 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 within six months from the date of approval of this report. The ability of the dam to withstand overtopping should also be studied. Within three months of the consultant's findings, remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within twelve months from the date of approval of this report, engineering studies and analyses should be performed to:

(1) Repair all cracked and spalled spillway concrete.

(2) Remove the existing sidewalk and restore the stone wall to its original condition using grout to prevent cavities or voids and movement in the wall. If the sidewalk is to be replaced, provide a joint between the sidewalk and the core wall.

(3) Clean out stones and concrete debris from the channel around the low-level outlet pipe and build a headwall to keep embankment slope from sloughing.

(4) All trees should be removed from the downstream slope to avoid problems which may develop from roots. The embankment face should then be seeded to develop a growth of grass for surface erosion protection.

(5) Remove all vegetation from the discharge channel and between stones on the core wall. Also, seal the joint between the new and old crest.

c. Within three months from the date of approval of this report, the following actions should be initiated:

(1) The owner should develop an emergency action plan (if one is not already available) outlining actions to be taken by the operator to minimize downstream effects of an emergency and establish a flood warning system for the downstream communities.

(2) Consider providing additional low-level outlet facilities to decrease drawdown time.

d. Within one year from the date of approval of this report, the owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

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 Roe of the Eighth District. Under the provision 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.

NAPEN-N
Honorable Brendan T. Byrne

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.

An important aspect of the Dam Inspection 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,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

LINDYS LAKE DAM (NJ00201)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 20 November 1979 by Harris-ECI, Associates, Inc. under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Lindys Lake Dam, a high hazard potential structure, is judged to be in good overall condition. However, the spillway is considered seriously inadequate because a flow equivalent to twelve percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard of loss of life downstream from the dam. To ensure 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 within six months from the date of approval of this report. The ability of the dam to withstand overtopping should also be studied. Within three months of the consultant's findings, remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within twelve months from the date of approval of this report, engineering studies and analyses should be performed to:

(1) Repair all cracked and spalled spillway concrete.

(2) Remove the existing sidewalk and restore the stone wall to its original condition using grout to prevent cavities or voids and movement in the wall. If the sidewalk is to be replaced, provide a joint between the sidewalk and the core wall.

(3) Clean out stones and concrete debris from the channel around the low-level outlet pipe and build a headwall to keep embankment slope from sloughing.

(4) All trees should be removed from the downstream slope to avoid problems which may develop from roots. The embankment face should then be seeded to develop a growth of grass for surface erosion protection.

(5) Remove all vegetation from the discharge channel and between stones on the core wall. Also, seal the joint between the new and old crest.

c. Within three months from the date of approval of this report, the following actions should be initiated:

(1) The owner should develop an emergency action plan (if one is not already available) outlining actions to be taken by the operator to minimize downstream effects of an emergency and establish a flood warning system for the downstream communities.

(2) Consider providing additional low-level outlet facilities to decrease drawdown time.

d. Within one year from the date of approval of this report, the owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

APPROVED: _____
JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 7 July 1980

C

UNSAFE DAM
NATIONAL PROGRAM OF INSPECTION OF DAMS

a. NAME: Lindys Lake Dam

b. ID NO.: NJ00201

c. LOCATION State: New Jersey, County: Morris.
River or Stream: Branch of West Brook.
Nearest D/S City or Town: West Milford.

d. HEIGHT: 24 feet

e. MAXIMUM IMPOUNDMENT CAPACITY: 135 ac. ft.

f. TYPE: Earthfill.

g. OWNER: Lindys Lake Association.

h. DATE GOVERNOR NOTIFIED OF UNSAFE CONDITIONS:

i. CONDITION OF DAM RESULTING IN UNSAFE ASSESSMENT:
Preliminary report calculations indicate 12% of the PMF would overtop the dam.

l. URGENCY CATEGORY: High Hazard, UNSAFE, Non-Emergency.

m. EMERGENCY ACTIONS TAKEN:
Gov. notified of this condition by District Engineer's letter of 19 May 1980

j. DESCRIPTION OF DANGER INVOLVED:
Overtopping and failure of the dam would significantly increase hazard potential to loss of life and property downstream of dam.

n. REMEDIAL ACTIONS TAKEN:
N.J.D.E.P. will notify dam's owner upon receipt of our letter.

k. RECOMMENDATIONS GIVEN TO GOVERNOR:
Within 30 days of the date of the District Engineer's letter the owner should do the following:
a. Engage the services of a qualified professional consultant to more accurately determine the spillway adequacy by using more detailed and sophisticated hydrologic and hydraulic analyses, and to recommend any remedial measures required to prevent overtopping of the dam.
b. In the interim, a detailed emergency operation plan and downstream warning system should be developed. Also, around-the-clock surveillance should be provided during periods of unusually heavy precipitation.

o. REMARKS: Final report, to be issued within six weeks, will have WHITE cover.

T.B. HEVERIN, Coordinator
Dam Inspection Program
U.S.A.E.D., Philadelphia

PASSAIC RIVER BASIN

BRANCH OF WEST BROOK, PASSAIC COUNTY

NEW JERSEY

LINDYS LAKE DAM

NJ00201

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED.

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PHILADELPHIA, PENNSYLVANIA 19106

FEBRUARY 1980

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Name:	Lindys Lake Dam, I.D. NJ 00201
State Located:	New Jersey
County Located:	Passaic County
Stream:	Branch of West Brook
River Basin:	Passaic River
Date of Inspection:	November 20, 1979

Assessment of General Conditions

Lindys Lake Dam is an earthfill dam containing a broad crested concrete weir spillway at the left end of the dam. The overall condition of the dam is good. The concrete sidewalk along the embankment crest is in a severely deteriorated condition, with heavy spalling, cracking and a section missing. The sidewalk on the section of dam along Lindys Drive has settled approximately 3 inches. The underlying stone wall in that section has many areas of missing stones at the upstream face of the wall. There is minor spalling and cracking of the weir. The downstream channel has stones and concrete debris blocking the low-level outlet pipe. The operation of the low-level outlet was not demonstrated at the time of the inspection since the owner's representative did not have the key to unlock the gate valve chamber, but the valve was open at the time since the lake was being lowered for the winter. The hazard potential is rated as "high".

The adequacy of Lindys Lake Dam is considered questionable in view of its lack of spillway capacity to pass the SDF (1/2 PMF) without overtopping the dam. The spillway is capable of passing a flood equal to 11 percent of the PMF (22 percent of the 1/2 PMF), and is assessed as "seriously inadequate".

At present, the engineering data available is not sufficient to make a definitive statement on the stability of the dam, but based on the findings of the visual inspection, the preliminary assessment of static stability is that it is satisfactory. The following actions, are recommended along with a timetable for their completion. All recommended actions should be conducted under the supervision of an Engineer who is experienced in the design, construction and inspection of dams.

1. Carry out a more precise hydrologic and hydraulic analysis of the dam within twelve months, to determine the need and type of mitigating measures necessary. If required, conduct a study of the means of increasing spillway discharge capacity and develop alternative schemes for construction. This should include the installation of headwater and tailwater gages. The ability of the dam to withstand overtopping should also be studied.

2. Observation wells or piezometers should be installed in the embankment to determine the locations of the phreatic surface and the paths of the reported seepage. This should be done within twelve months.

3. Repair all cracked and spalled spillway concrete within twelve months.

4. Remove existing sidewalk and restore stone wall to original condition using grout to prevent cavities or voids and movement in the wall. If the sidewalk is to be replaced, provide a joint between the sidewalk and core wall.

5. Clean out stones and concrete debris from channel around low-level outlet pipe and build a headwall to keep embankment slope from sloughing.

6. All trees should be removed from the downstream slope to avoid problems which may develop from roots. The embankment face should then be seeded to develop a growth of grass for surface erosion protection. This program should be started within twelve months.

7. Remove all vegetation from the discharge channel between stones on core wall, seal joint between new and old crest within twelve months.

8. The owner should develop an emergency action plan (if one is not already available) outlining actions to be taken by the operator to minimize downstream effects of an emergency and establish a flood warning system for the downstream communities within three months.

Furthermore, while of a less urgent nature, the following additional action is recommended and should be carried out within twenty four months.

1. Consider providing additional low-level outlet facilities to decrease the drawdown time.

2. The owner should develop within one (1) year after formal approval of the report, written operating procedures and a periodic maintenance plan to insure the safety of the dam.

John P. Talerico

John P. Talerico, P.E.
HARRIS-ECI ASSOCIATES

Photo taken January 20, 1980

L I N D Y S L A K E D A M

View looking toward right abutment of spillway, embankment and beach beyond.

PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

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

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APPENDICES

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

LINDYS LAKE DAM, I.D. NJ 00201

SECTION 1

1. PROJECT INFORMATION

1.1 General

a. Authority

The National Dam Inspection Act (Public Law 92-367, 1972) provides for the National Inventory and Inspection Program by the U.S. Army Corps of Engineers. This inspection was made in accordance with this authority under Contract C-FDM No. 35 with the State of New Jersey who, in turn, is contracted to the Philadelphia District of the Corps of Engineers, and was carried out by the engineering firm of Harris-ECI Associates, Woodbridge, New Jersey.

b. Purpose of Inspection

The visual inspection of Lindys Lake Dam was made on November 20, 1979. The purpose of the inspection was to make a general assessment as to the structural integrity and operational adequacy of the dam embankment and its appurtenant structures.

c. Scope of Report

The report summarizes available pertinent data relating to the project; presents a summary of visual observations made during the field inspection; presents an evaluation of hydrologic and hydraulic conditions at the site; presents an evaluation as to the structural adequacy of the various project features; and assesses the general condition of the dam with respect to safety.

1.2 Description of Project

a. Description of Dam and Appurtenances

Lindys Lake Dam is an earthfill dam approximately 649 feet long and 24 feet high with a concrete core wall. A plastic impervious liner is along the downstream face of the core wall. There is a 32 foot wide concrete ogee spillway at the left end of the dam. The crest of the spillway is 0.5 feet below the top of the dam.

Along the top of the embankment is a concrete sidewalk of varying widths. The average width being 7 to 8 feet. The sidewalk rests on a 2 foot high rock wall and also it appears to have been poured across the top of the core wall. Embedded in the concrete over the core wall are boulders varying from 1 foot to 2 feet in size. The exposed portion of the upstream face has a slope of 4H:1V and has riprap protection while the downstream slope is 1.5H to 1V except by the beach area where it flattens out. Since the original construction, Lindys Drive was constructed across the downstream area in the vicinity of the spillway creating a benched section in that area.

The low-level outlet consists of a 12-inch cast iron pipe through the dam approximately 45 feet right of the spillway. The flow through the pipe is controlled by a manually operated gate valve located in the downstream side of the embankment. The inlet end of the pipe is located at the upstream toe of the slope. The outlet discharges into the downstream channel on the other side of Lindys Drive. From there the flow continues in a southerly direction approximately 300 feet to a 3-foot diameter R.C.P. passing under a private driveway.

The downstream spillway channel is 32 feet wide at the spillway and narrows to approximately 13 feet where it crosses under Lindys Drive through 2-15 inch corrugated metal pipes, 38 feet from the spillway The channel has a very coarse aggregate concrete bottom and rock sidewalls. The wall on the left is 2 feet high and on the right only 6 inches high.

There are no borings or test pits available that describe the dam's foundation.

A generalized description soil condition is contained in Report No. 3, Passaic County, Engineering Soil Survey of New Jersey, by Rutgers University. The report describes the lake's left shore as rock with the remaining shore being classified as shallow ground moraine over rock. The downstream channel is described as swamp.

The rock is described on Geologic Overlay Sheet 22, as hornblende granite and gneiss. The ground moraine in this area is variable in thickness. It is composed of unstratified heterogenous material including clay, silt and sand sizes, with varying amounts of gravel and boulders.

b. Location

Lindys Lake Dam is located on a branch of West Brook in the Township of West Milford, Passaic County, New Jersey. It is accessible by way of Otterhole Road and Lindys Drive.

c. Size Classification

According to the "Recommended Guidelines for Safety Inspection of Dams" by the U.S. Department of Army, Office of the Chief of Engineers, the dam is classified in the dam size category as being "small", since its storage volume of 150 acre-feet is less than 1,000 acre-feet. The dam is also classified as small because its height of 24 feet is less than 40 feet. The overall size classification of Lindys Lake Dam is small.

d. Hazard Classification

A hazard potential classification of "high" has been assigned to the dam on the basis that a hypothetical failure would result in execessive damage to a road and several habitable buildings immediately downstream of the dam. The possibility exists of the loss of more than a few lives in the event of dam failure.

e. Ownership

Lindys Lake Dam is owned by:

Lindys Lake Association
P.O. Box J
West Milford, NJ 07480

Attention: Mr. Walter Toews
(201) 697-1318

f. Purpose

Lindys Lake Dam is presently used for recreational purposes only.

g. Design and Construction History

No information is available on the original design of the dam which was built prior to 1927. Information, available in the files of the N.J. Department of Environmental Protection (NJ-DEP), indicating that underground springs were uncovered along the downstream side of the core wall and that pipes were placed in the embankment to drain the areas is the only data concerning the construction. Photos taken in 1932 do not show the concrete sidewalk and no data is available to its construction. Also, according to the owner, the original spillway was modified by removing the flashboards and raising the crest approximately one foot. There is no record of this on file.

h. Normal Operating Procedures

The discharge from the lake is unregulated and is allowed to naturally balance the inflow into the lake. The low-level outlet is used to lower the lake level each fall to prevent ice damages to the property owners waterfront property.

1.3 Pertinent Data

a. Drainage Area	0.14 sq. mi.
b. Discharge at Dam Site	
Ungated spillway capacity at elevation of top of dam:	36 cfs (1002 NGVD)
Total spillway capacity at maximum pool elevation (SDF):	561 cfs (1002.42 NGVD)
c. Elevation (Feet above NGVD)	
Top of dam:	1002.
Maximum pool design surcharge (SDF):	1002.42
Recreation pool:	1001.5
Spillway crest:	1001.5
Streambed at centerline of dam:	970 (estimated)
Maximum tailwater:	975 (estimated)
d. Reservoir	
Length of maximum pool:	2,000 ft. (estimated)
Length of recreation pool:	1,900 ft. (estimated)
e. Storage (acre-feet)	
Spillway Crest:	131
Top of dam:	141
Maximum pool (SDF):	150
f. Reservoir Surface (acres)	
Top of dam:	19.9 (estimated)
Maximum pool (SDF):	20.0 (estimated)
Recreation pool:	19.7
Spillway crest:	19.7

g. Dam

Type:	Earthfill with concrete weir
Length:	649 ft. (effective)
Height (Structural):	24 ft.
Top width:	7 to 8 ft., Average
Side slopes - Upstream:	4H:1V (Exposed portion of slope only)
- Downstream:	1.5H:1V
Zoning:	Unknown
Impervious core:	450 ft. concrete core
Cutoff:	Unknown
Grout curtain:	None

h. Diversion and Regulating Tunnel

N/A

i. Spillway

Type:	Broadcrest concrete weir
Length of weir:	32 ft.
Crest elevation:	1001.5
Gates:	None
U/S Channel:	Lindys Lake
D/S Channel:	Natural channel

j. Regulating Outlets

Low level outlet:	12-inch C.I.P.
Controls:	Manually operated
Emergency gate:	None
Outlet:	972.5 NGVD

SECTION 2

2. ENGINEERING DATA

2.1 Design

There are no drawings or design computations for Lindys Lake Dam available. No data from soil borings, soil tests, or other geotechnical data is available. The only information relating to the design of the dam is a copy of the application to build the dam on file at the Trenton, NJ offices of the N.J. Department of Environmental Protection(NJ-DEP).

2.2 Construction

The only data available concerning the construction of the dam is reference to underground springs being uncovered along the downstream face of the core wall and that pipes were placed in the embankment to drain the water.

2.3 Operation

Formal operation records are not kept for the dam and reservoir. The lake is allowed to operate naturally without regulation.

2.4 Evaluation

a. Availability

The availability of engineering data is very poor. The stated information concerning the dam is available from the NJ-DEP.

b. Adequacy

The engineering data available from the application together with that obtained in the field, were adequate to perform hydrologic and hydraulic computations. The data was insufficient to perform a stability analysis, but preliminary evaluation could be made based on visual observations.

c. Validity

Information contained in the application and checked by limited field measurements appears valid for the spillway only. The length of the dam is listed as 450 feet but measured 649 feet and the upstream slope is given 2H:1V, but measured 4H:1V for the exposed portion of the slope.

SECTION 3

3. VISUAL INSPECTION

3.1 Findings

a. General

The visual inspection of Lindys Lake Dam revealed the dam including the spillway to be in good condition but in need of repairs. The lake level was 3 feet below the spillway crest at the time of inspection.

b. Dam

The concrete sidewalk on the crest of the dam is in a severely deteriorated condition. It is severely spalled, cracked and a large section is missing along the Lindys Drive section. The 2-foot high ungrouted stone wall on which the sidewalk rests has many voids in the upstream face along the Lindys Drive section of the dam. In addition, the entire stone wall is missing along with that section of missing sidewalk.

According to the owner, the major cause for the deteriorated condition of the sidewalk and wall is that, during one winter, the previous owner did not lower the lake level, and the ice caused the damages.

The earth embankment appears to be sound. No other surface cracking on the embankment or at the toe was noted. Sloughing or erosion of the embankment slopes was not visible. No horizontal misalignment of the embankment was observed. The sidewalk, in addition to resting on the stone wall, is also resting on the core wall. The section of sidewalk on the portion of the dam by Lindys Drive has cracked at the core wall and settled approximately 3 inches, indicating the possibility of settlement in the embankment. No riprap failures were noted. No seepage was observed at the time of inspection with the lake level down, but according to the owner, there has been seepage noted along the embankment on Otterhole Road and leakage through a hole at the top of the core wall near the junction of Otterhole Road and Lindys Drive. The seepage occurs whenever the lake level is high; when the lake's level approaches the bottom of the sidewalk. A series of test pits were dug along the downstream face of the core wall for locating the seepage; they were dry during the inspection. A section of the core wall, opposite the inlet on Otterhole Road, appears to have been reinforced by added concrete from the bottom of the sidewalk to a depth of about 2 feet. The above mentioned inlet has a 4-inch diameter pipe coming from the direction of the dam that was draining water continuously. It is possible that the pipe is part of the underdrain system installed during the original construction to handle the underground springs. Large evergreen trees are growing along the downstream embankment and toe while vegetation is growing out of the cracks in the sidewalk and between the stones on the core wall and in the crack between the core wall and sidewalk. No evidence of burrowing animals was observed.

c. Appurtenance Structures

1. Spillway

No seepage or leakage was noticed at the concrete spillway. Spalling was visible along the upstream face of the weir. At the junction of the weir and the left abutment, the weir is cracked and missing concrete. Minor cracking was visible along the downstream face of the spillway but the cracks were tight. The joint between the old crest and new weir is opened approximately 1/4 inch.

There is a 4-inch diameter pipe from the lake through the left abutment for fire department use, that is in good condition.

2. Outlet Works

The inlet end of the low-level outlet was under water and could not be observed at the time of the inspection. The outlet discharges at the toe of the downstream slope of Lindys Drive, but could not be observed since there were large rocks and chunks of concrete covering the pipe. The gate valve is located in a locked concrete manway on the embankment crest. At the time of the inspection, the owner did not have the key to unlock the cover so the valve could not be inspected, or demonstrated but the valve was open at the time for lowering the lake-level for the winter.

d. Reservoir Area

Houses and boat landings circle the lake. Also, there is a beach along the right end of the dam. The side slopes are flat with no signs of instability. The lake appeared clean with no sign of surface growth.

e. Downstream Channel

The downstream channel from the spillway to Lindys Drive has a coarse aggregate concrete bottom with vegetation and shrubs growing through it. The stone retaining walls are in good condition. The channel crosses under Lindys Drive through two 15-inch corrugated metal pipes into the natural downstream channel. The channel has boulders and concrete debris along the bottom. Side slopes are very steep until the channel crosses under a private driveway, approximately 300 feet away, then they flatten out. The channel then crosses under Broadway approximately 100 feet downstream from the driveway.

There is one house on the left bank at the driveway and another four houses along the channel downstream.

SECTION 4

4. OPERATIONAL PRECEDURES

4.1 Procedures

Lindys Lake Dam is used to impound water for recreational activities. The level of the lake is maintained through the unregulated flow over the spillway and the lake is lowered every fall approximately 3 feet to prevent ice damge to the residents lakefront property.

4.2 Maintenance of the Dam

There is no regular inspection and maintenance program for the dam and appurtenant structures. The Lindys Lake Association is responsible for the maintenance of the dam.

4.3 Maintenance of Operating Facilities

The low level outlet operating facilities consist of the one manually operated 12-inch gate valve. At the time of inspection, operation of the valve was not demonstrated because the gate valve cover was locked and the owner's representative did not have the key.

4.4 Evaluation

The present operational and maintenance procedures are fair with the dam and spillway being maintained in a serviceable condition.

SECTION 5

5. HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design

The drainage area above Lindys Lake Dam is approximately 0.14 square miles. A drainage map of the watershed of the dam site is presented on Plate 1, Appendix D.

The topography within the basin is moderately sloped. Elevations range from approximately 1,130 feet above NGVD at the west portion of the watershed to about 1,002 feet at the dam site. Houses occupy most of the land within the watershed and about the lake.

The evaluation of the hydraulic and hydrologic features of the dam and lake was based on criteria set forth in the Corps Guidelines and additional guidance provided by the Philadelphia District, Corps of Engineers. The Spillway Design Flood for the dam is equal to the 1/2 PMF.

The probable maximum flood (PMF) was calculated from the probable maximum precipitation using Hydrometeorological Report No. 33 with standard reduction factors. Due to the small drainage area, the SCS triangular hydrograph transformed to a curvilinear hydrograph was adopted for developing the unit hydrograph, with the aid of the HEC1-DB Flood Hydrograph Computer Program.

Initial and infiltation loss rates were applied to the Probable Maximum Precipitation to obtain rainfall excesses. The rainfall excesses were applied to the unit hydrograph to obtain the PMF and various ratios of PMF utilizing program HEC-1DB.

The SDF peak outflow calculated for the dam is 561 cfs. This value is derived from the 1/2 PMF, and results in overtopping of the dam, assuming that the lake was originally at the spillway crest elevation.

The stage-outflow relation for the spillway was determined from the geometry of the spillway and dam, utilizing HEC1-DB program.

The reservoir stage-storage capacity relationship was computed directly by the conic method, utilizing the HEC-1DB program. The reservoir surface areas at various elevations were measured by planimeter from a U.S.G.S. Quadrangle topographic map. Reservoir storage capacity included surcharge levels exceeding the top of the dam, and the spillway rating curve was based on the assumption that the dam remains intact during routing.

A breach analysis indicates that the stage of the stream where it crosses Broadway is 4.1 feet higher, due to dam failure from overtopping at 20 percent PMF than it would be without failure at 20 percent PMF. This is likely to jeopardize the well traveled road and four houses downstream of the road significantly more than without failure. The discharge facility is thus rated "seriously inadequate".

Drawdown calculations indicate that to empty the lake to an elevation of 981.5 NGVD through the one low-level outlet would take 5 days. This is considered to be an excessive drawdown period, and provision of additional outlets should be considered.

b. Experience Data

No records of reservoir stage or spillway discharge are maintained for this site.

c. Visual Observation

The downstream channel at the other side of Lindys Drive is a natural channel with stones and some debris with very steep side slopes. Approximately 300 feet from Lindys Drive, the channel crosses under a private driveway through a 36-inch reinforced concrete pipe; the other side of the driveway the slopes flatten out. The channel then crosses under Broadway approximately 100 feet from the driveway. There is one house on the left bank at the driveway and four houses at Broadway.

The slopes of the reservoir are flat and do not exhibit signs of instability. The drainage area is wooded, moderately flat sloped and developed for residential use around the lake.

d. Overtopping Potential

A storm of magnitude equivalent to the SDF would cause overtopping of the dam to a height of 0.42 feet. Computations indicate that the dam can pass approximately 11 percent of the PMF without overtopping the dam crest. Since the 1/2 PMF is the Spillway Design Flood (SDF) for this dam, according to the Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers, the spillway capacity of the dam is assessed as "seriously inadequate".

SECTION 6

6. STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The concrete sidewalk along the crest of the dam is in a very deteriorated condition. The sidewalk on the portion of the dam along Lindys Drive is cracked in many areas and settled approximately 3 inches. This condition of the sidewalk indicates that the underlying stone wall and/or earth embankment has been subject to either settlement, undermining or distress through ice action. The downstream embankment of the dam and Lindys Drive show no signs of movement, erosion or sloughing to indicate instability.

Seepage was not observed during the inspection but reports from the owner and the N.J. Department of Environmental Protection (NJ-DEP) representative state that this past fall when lake level was very high, there was seepage along Otterhole Road, and leakage at the top of the core wall from a section of the dam near the intersection of Otterhole Road and Lindys Drive. Numerous large evergreen trees are growing on the downstream slope of the embankment. The spillway is in good condition with minor spalling and cracking observed on the weir.

b. Design and Construction Data

No design computations relating to embankment stability were uncovered during the report preparation phase. No embankment or foundation soil parameters are available for carrying out a conventional stability analysis on the embankment.

c. Operating Records

No operating records are available relating to the stability of the dam. The dam and spillway have served satisfactorily since its construction in the late 1920's.

d. Post-Construction Changes

The sidewalk was added and the spillway modified since the original construction. Dates of changes are unknown.

e. Static Stability

A static stability analysis was not performed on the Lindys Lake Dam because the lack of data on which to base assumptions of material properties inside embankment zones might produce misleading results, but based on the finding of the visual inspection, the preliminary assessment of static stability is that it is satisfactory.

f. Seismic Stability

The dam is located in Seismic Zone 1, as defined in the Recommended Guidelines for Safety Inspection of Dams, prepared by the Corps of Engineers. In general, projects located in Seismic Zones 0, 1 and 2 may be assumed to present no hazard from earthquake, provided the static stability conditions are satisfactory and conventional safety margins exist. Since static stability safety factors have not been confirmed, it cannot be stated that seismic stability is satisfactory.

SECTION 7

7. ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety

The dam has been inspected visually and a review has been made of the available engineering data. This assessment is subject to the limitations inherent in the visual inspection procedures stipulated by the Corps of Engineers for a Phase I report.

The safety of Lindys Lake is in question because the dam does not have adequate spillway capacity to pass the SDF which is the 1/2 PMF without overtopping. Overtopping of the dam carries with it the danger of possible progressive failure of the dam. The present spillway capacity of the dam is approximately 11 percent of the PMF.

No definitive statement pertaining to the safety of the embankment can be made without acquisition of embankment material engineering properties and determination of phreatic levels in the downstream part of the embankment, but based on the findings of the visual inspection, the preliminary assessment of static stability is that it is satisfactory.

b. Adequacy of Information

The information uncovered was adequate to perform hydrologic and hydraulic computations. The data was insufficient to perform even an approximate computation of the stability of the dam. A preliminary assessment of the dam could be made by visual observation only.

c. Urgency

Carry out a more precise hydrologic and hydraulic analysis of the dam within twelve months, to determine the need and type of mitigating measures necessary. If required, conduct a study of the means of increasing spillway discharge capacity and develop alternative schemes for construction. This should include the installation of headwater and tailwater gages. The ability of the dam to withstand overtopping should also be studied.

Observation wells, or piezometers should be installed in the embankment to determine the location of the phreatic surface and the paths of the reported seepage. This should be done within twelve months.

Conduct a complete topographic survey of the dam and surrounding area, in order to develop a detailed plan and several cross-sections of the dam within twelve months.

7.2 Remedial Measures

a. Alternatives for Increasing Spillway Capacity

Alternatives for increasing spillway capacity are as follows:

1. Increase the embankment height of the dam thus permitting a higher discharge to pass over the spillway and reducing the possibility of overtopping.

2. Lower the spillway crest elevation.

3. Increase the effective spillway crest length.

4. A combination of any of the above alternatives.

b. Recommendations

1. Repair all cracked and spalled spillway concrete within twelve months.

2. Remove existing sidewalk and restore stone wall to original condition using grout to prevent cavities or voids and movement in the wall. If the sidewalk is to be replaced, provide a joint between the sidewalk and core wall.

3. Clean out stones and concrete debris from channel around low-level outlet pipe and build a headwall to keep embankment slope from sloughing.

4. All trees should be removed from the downstream slope to avoid problems which may develop from roots. The embankment face should then be seeded to develop a growth of grass for surface erosion protection. This program should be started within twelve months.

5. Remove all vegetation from the discharge channel and between stones on core wall, seal joint between new and old crest within twelve months.

The following additional actions are recommended:

1. The owner should develop an emergency action plan (if one is not already available) outlining actions to be taken by the operator to minimize downstream effects of an emergency and establish a flood warning system for the downstream communities within three months.

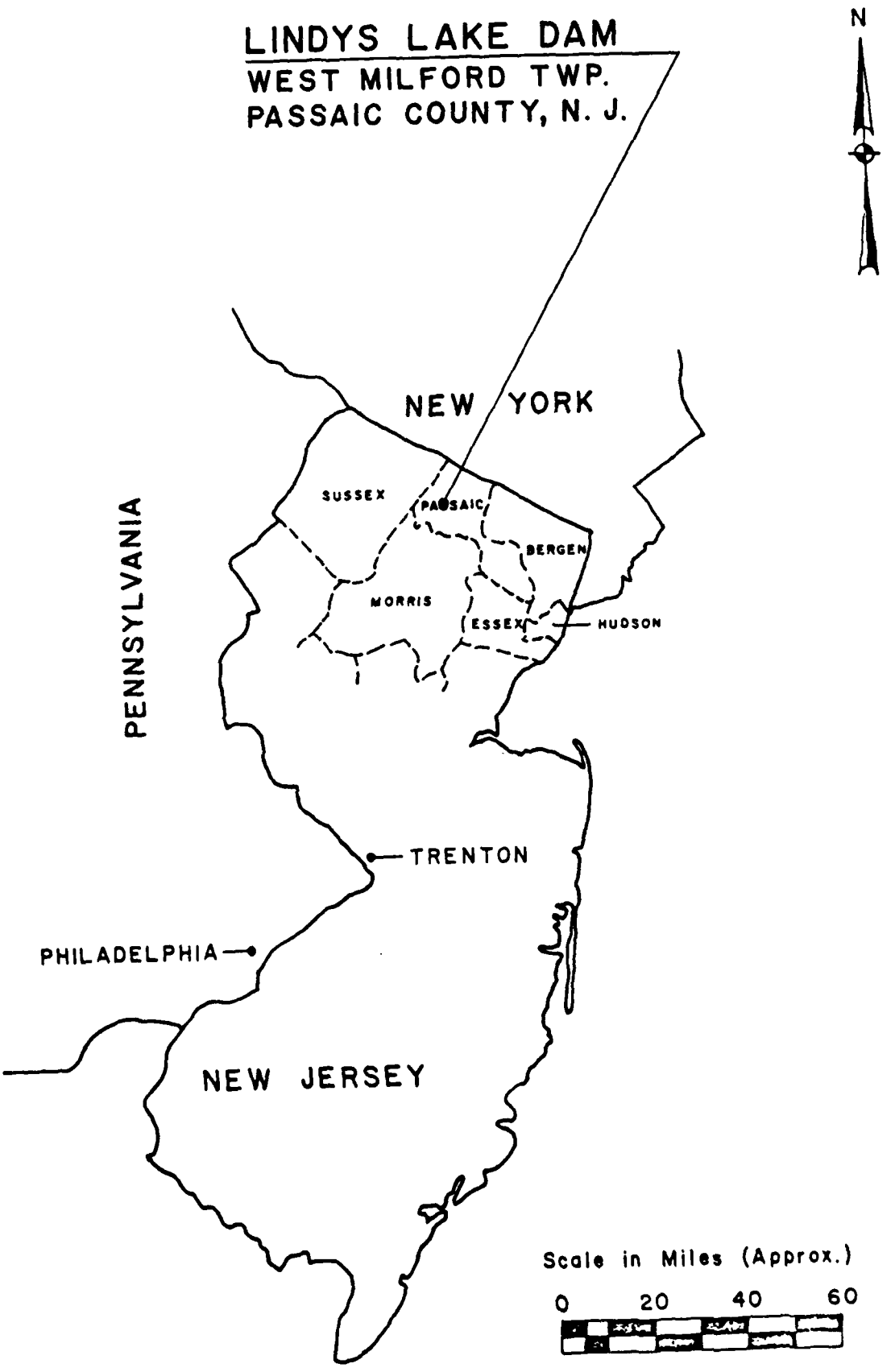
2. Consider providing additional low-level outlet facilities to decrease drawdown time.

c. O & M Procedures

The owner should develop, within one (1) year after formal approval of the report, written operating procedures and a periodic maintenance plan to insure the safety of the dam.

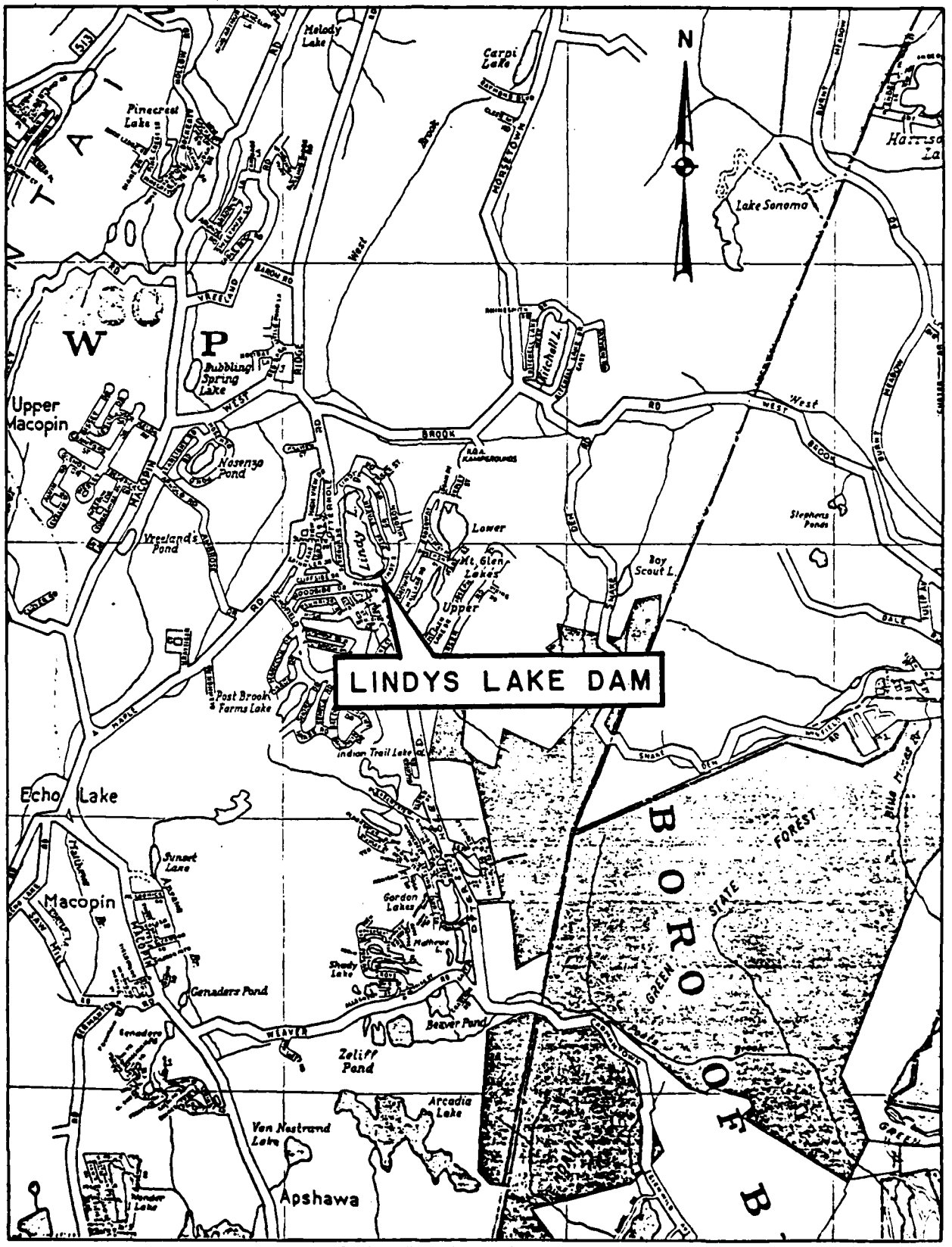
PLATES

LINDYS LAKE DAM
WEST MILFORD TWP.
PASSAIC COUNTY, N. J.



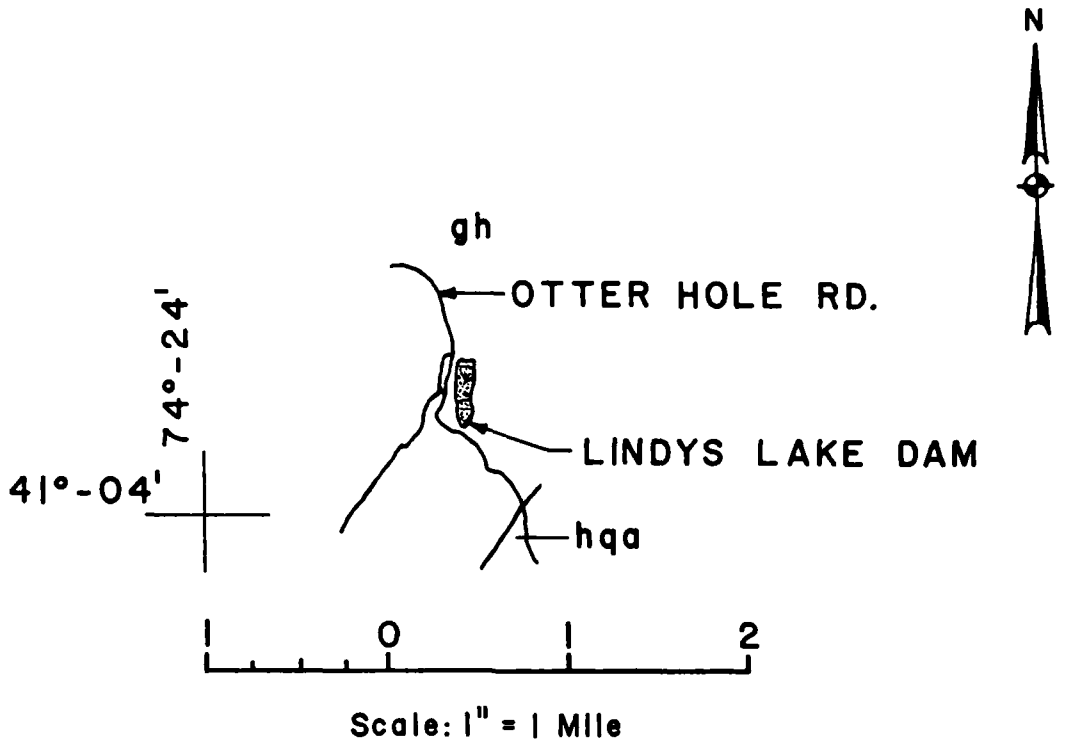
KEY MAP

PLATE 1



VICINITY MAP

PLATE 1A



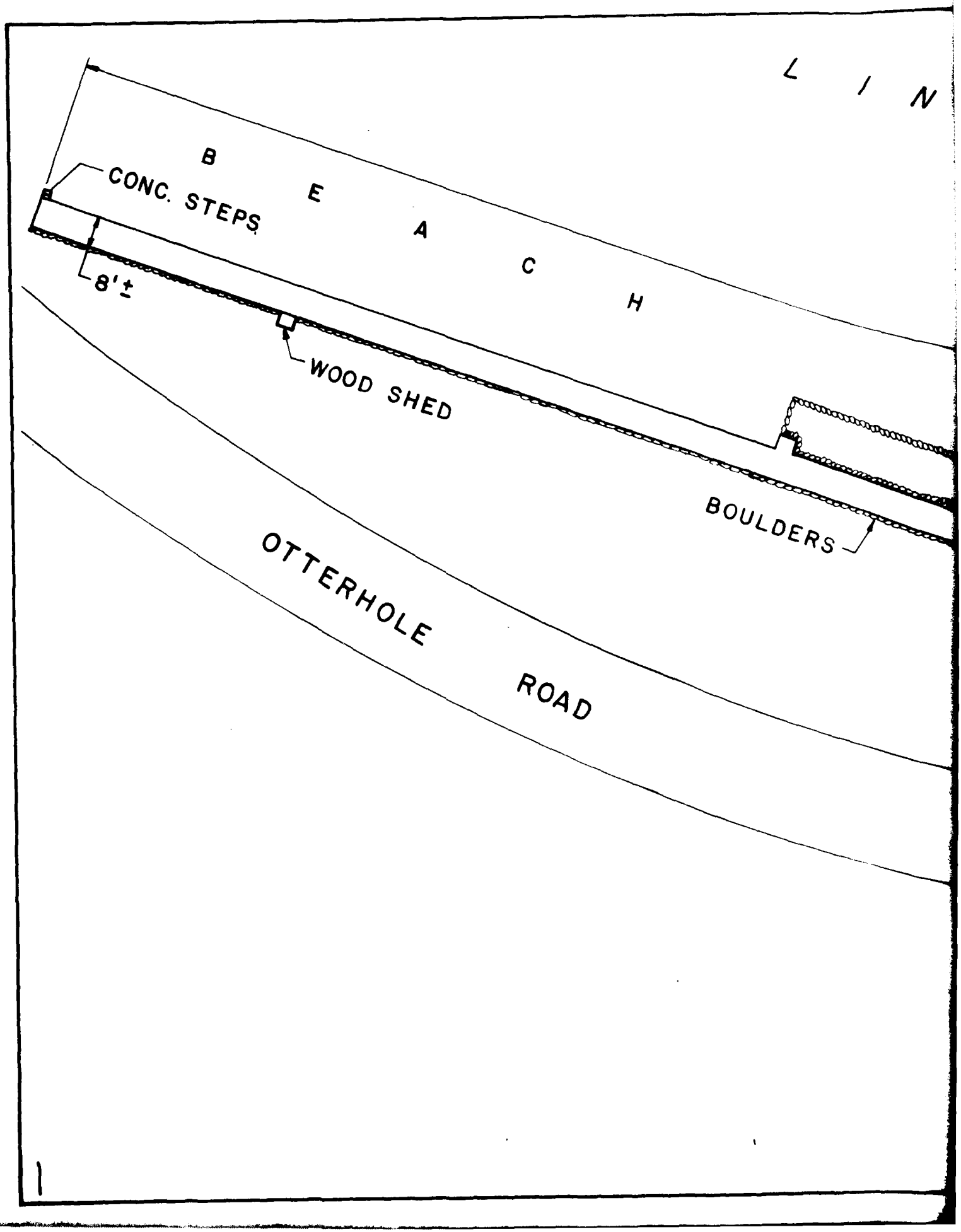
LEGEND:

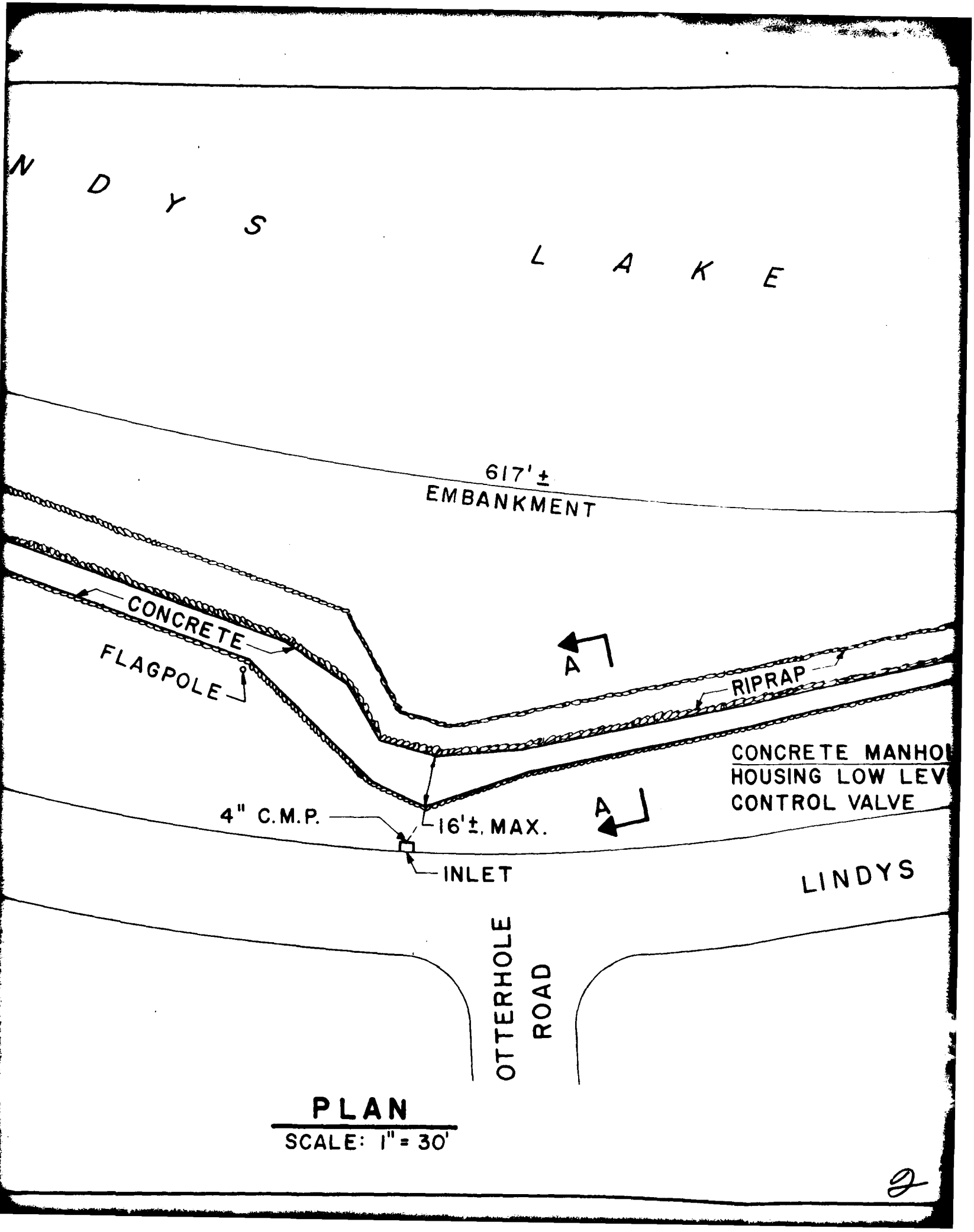
PRECAMBRIAN

gh	Mostly Hornblende Granite and Gneiss.
hqa	Hyperstene-Quartz-Andesine-Gneiss.

GEOLOGIC MAP
LINDYS LAKE DAM

PLATE 2

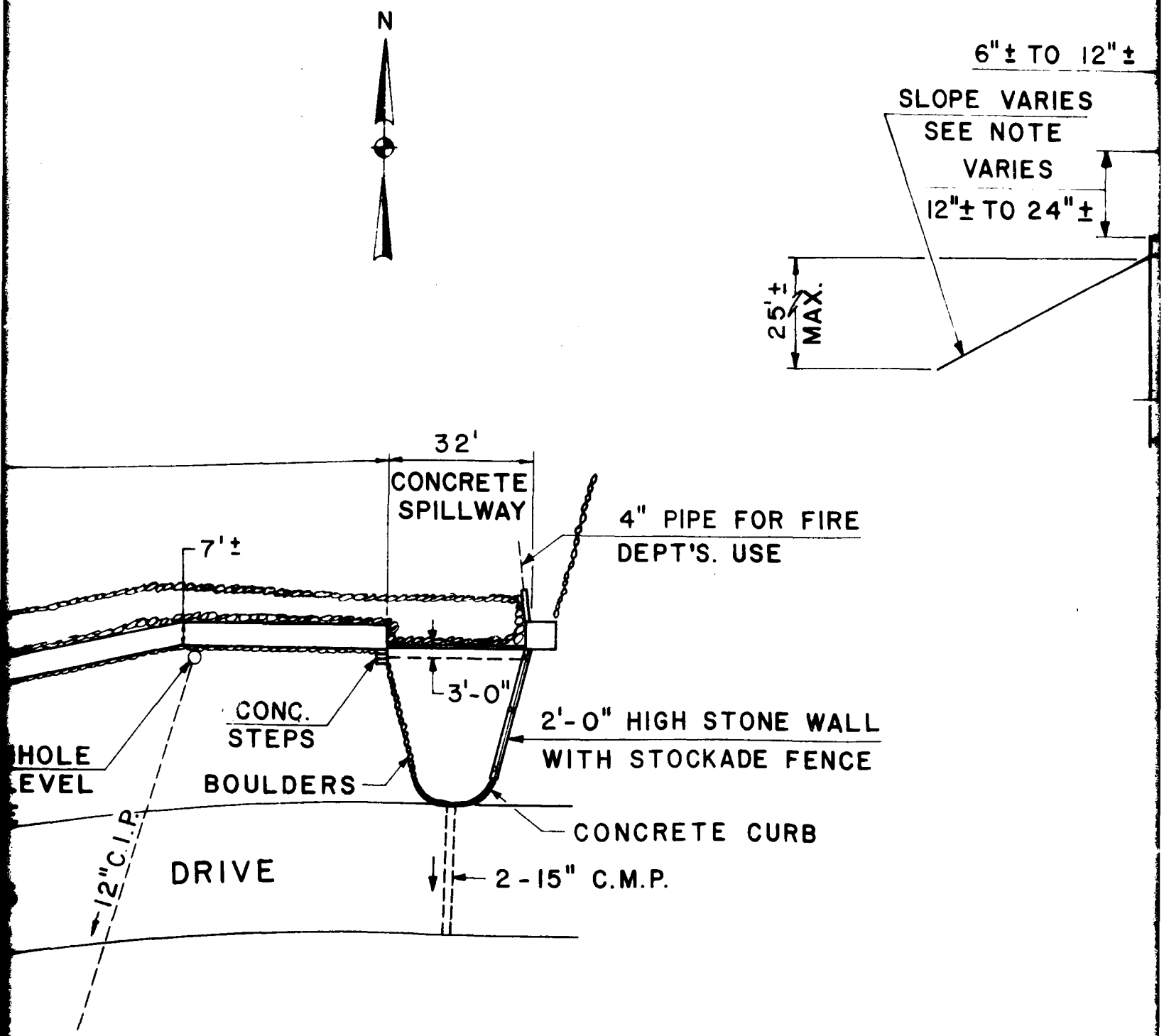

L I N
B E A C H
CONC. STEPS
8'±
WOOD SHED
BOULDERS
OTTERHOLE ROAD

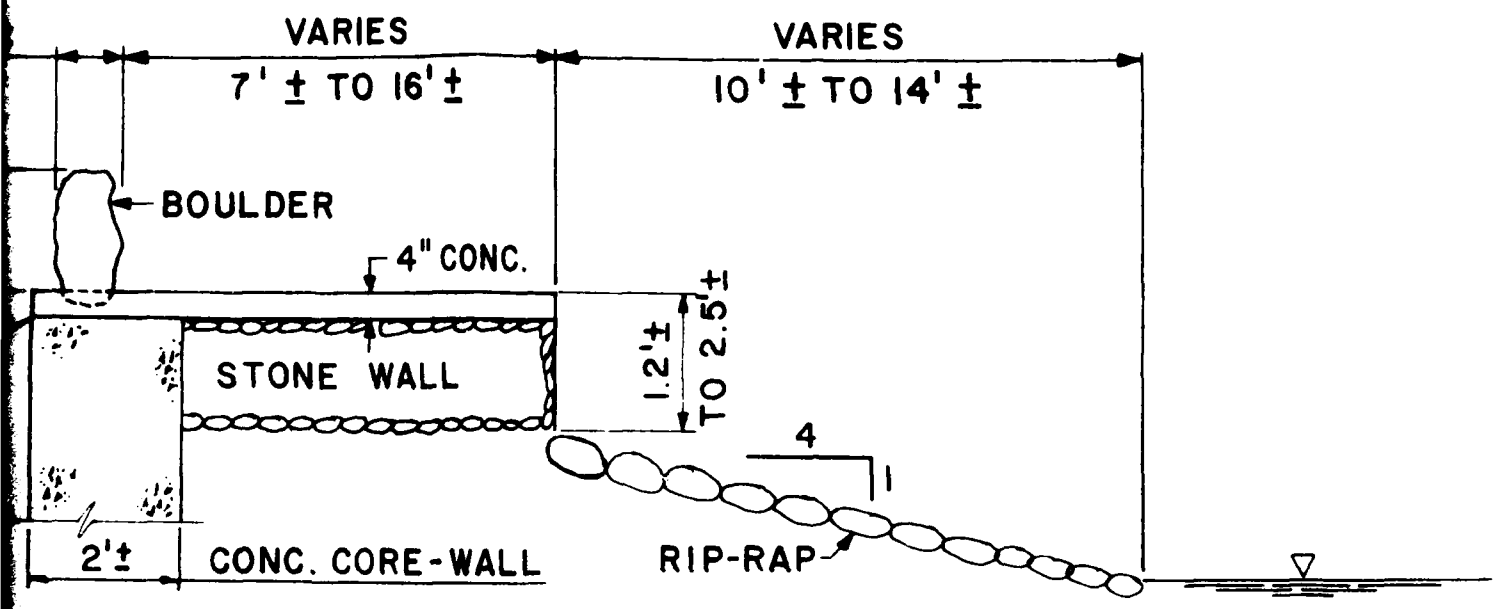


PLAN

SCALE: 1" = 30'

2


N
6" ± TO 12" ±
SLOPE VARIES
SEE NOTE
VARIES
12" ± TO 24" ±
25' ±
MAX.
32'
CONCRETE
SPILLWAY
4" PIPE FOR FIRE
DEPT'S. USE
7' ±
3'-0"
CONC.
STEPS
2'-0" HIGH STONE WALL
WITH STOCKADE FENCE
HOLE
EVEL
BOULDERS
CONCRETE CURB
12" C.I.P.
DRIVE
2-15" C.M.P.



NOTE:

SLOPE IS MOSTLY 1.5 HOR. TO 1.0 VERT. EXCEPT OPPOSITE THE BEACH AREA WHERE SLOPE IS FLATTER.

SECTION A-A

SCALE: 1" = 3'

LINDYS LAKE DAM

WEST MILFORD TWP., PASSAIC COUNTY, N. J.

SKETCHES OF PLAN AND SECTION
PREPARED FROM FIELD NOTES TAKEN
DURING INSPECTION ON NOV. 20, 1979

BY:
HARRIS - ECI ASSOCIATES
WOODBRIDGE, NEW JERSEY

SCALE: AS SHOWN
DATE: JAN. 25, 1980
SHEET: 1 OF 1

4

PLATE 3

APPENDIX A

CHECK LIST - VISUAL OBSERVATIONS

CHECK LIST - ENGINEERING, CONSTRUCTION MAINTENANCE DATA

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam LINDYS LAKE DAM County Passaic State New Jersey Coordinators NJ-DEP

Date(s) Inspection November 20, 1979 Weather Partly Sunny Temperature 55°F

Pool Elevation at Time of Inspection 999. NGVD Tailwater at Time of Inspection 970 NGVD

Inspection Personnel:

November 20, 1979:

Chuck Chin
Henry King
Thomas Lakovich
Joseph Sirianni (Recorder)

Owner/Representative:

Larry Little
Lindys Lake Association
P.O. Box J
West Milford, NJ 07480

James Kearns
NJ Department of Environmental Protection(NJ-DEP)
Division of Water Resources
P.O. Box CN-029
Trenton, NJ 08625

CONCRETE/MASONRY DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
SEEPAGE OR LEAKAGE N/A		
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS N/A		
DRAINS N/A		
WATER PASSAGES N/A		
FOUNDATIONS N/A		

CONCRETE/MASONRY DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES N/A		
STRUCTURAL CRACKING N/A		
VERTICAL AND HORIZONTAL ALIGNMENT N/A		
MONOLITH JOINTS N/A		
CONSTRUCTION JOINTS N/A		

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
SURFACE CRACKS	Along top of embankment is a concrete sidewalk which is in a badly deteriorated condition, with severly spalled, cracked, broken and missing sections. Sidewalk rests on 2 foot high rock wall.	Sidewalk should be replaced with a new sidewalk.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	No visible movement or cracking at or beyond toe was noticed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None was observed on the slopes, but sections of the stone crest wall have deteriorated and washed out.	Restore stone wall to original grade.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal alignment good. Vertical alignment of crest shows signs of settlement.	Determine cause of settlement.
RIPRAP FAILURES	None.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
EARTH EMBANKMENT	Numerous large evergreen trees are growing on downstream side of the embankment.	Remove trees.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No differential settlement was noted.	
ANY NOTICEABLE SEEPAGE	None noticed. However, leakage was reported in September 1979, when lake level was high. The area of leakage was approximately 220 feet right of spillway. Leakage was from a hole near the top of the core wall. At the time of the inspection, there were test pits along downstream face of core wall to determine if there is any other leakage. At that time, they were all dry. Pits showed a plastic impervious liner along downstream face of core wall.	Determine cause of leakage and correct.
STAFF GAGE AND RECORDER	None.	
DRAINS	According to files of N.J. Department of Environmental Protection (NJ-DEP), perforated pipes were placed at the downstream toe of core wall to drain underground springs uncovered during construction. Inlet on Otterhole Road has 4-inch pipe coming from dam area. There was constant flow of water pipe during inspection.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACE IN STILLING BASIN	Surface of stilling basin of low-level outlet could not be seen because it was under water and covered with debris.	
INTAKE STRUCTURE	Low level drain under water in lake. Not visible.	
OUTLET STRUCTURE	A 12-inch cast iron pipe, is the low-level outlet drain. Outlet covered with stones and concrete debris, could not see its condition. Operation of valve could not be performed because the cover for the concrete manhole housing the valve was locked and owner's representative did not have key. Valve was open at time as lake was being lowered for winter.	Remove rocks and debris from outlet to allow full use of opening and construct headwall.
OUTLET FACILITIES	None	
EMERGENCY GATE	None	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
CONCRETE WEIR	Original weir had flash boards-boards which were removed and the crest raised approximately 1 foot. Spalling along upstream face of weir, cracked and broken junction of new weir with left abutment wall. Minor cracking along downstream face of weir. Joint between new and old weir open 1/4 inch.	Repair cracks, spalling and seal joint between new and old weirs.
APPROACH CHANNEL	Reservoir	
DISCHARGE CHANNEL	Vegetation growing along bottom of channel. Concrete on bottom in good condition.	Remove vegetation.
BRIDGE AND PIERS	None.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
CONCRETE SILL N/A		
APPROACH CHANNEL N/A		
DISCHARGE CHANNEL N/A		
BRIDGE AND PIERS N/A		
GATES AND OPERATION EQUIPMENT N/A		

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
MONUMENTATION/SURVEYS None		
OBSERVATION WELLS None		
WEIRS None		
PIEZOMETERS None		
OTHER None		

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
SLOPES Flat. No indication of slope instability.		
SEDIMENTATION None visible.		

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Cobblestones and boulders and concrete debris in channel near outlet. Scattered debris in channel.	Remove cobblestones and boulders from outlet area. Remove debris.
SLOPES	Steep, 2H:1V or steeper until cross private driveway approximately 300 feet from dam then slopes became flat.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	Five homes are downstream of dam along the channel with another opposite the dam on the far side of Otterhole Road.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	None available.
REGIONAL VICINITY MAP	Available-Passaic County Map and U.S.G.S. Quadrangle Sheet for Wanaque, New Jersey.
CONSTRUCTION HISTORY	Dam built prior to 1927, no other history available.
TYPICAL SECTIONS OF DAM	Not available.
HYDROLOGIC/HYDRAULIC DATA	Not available.
OUTLETS - PLAN	Not available.
- DETAILS	Not available.
- CONSTRAINTS	None.
- DISCHARGE RATINGS	Not available.
RAINFALL / RESERVOIR RECORDS	Not available.

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
(continued)

ITEM	REMARKS
DESIGN REPORTS	None
GEOLOGY REPORTS	Available U.S.G.S. Geologic overlay sheet for Passaic County and Engineering Soils Survey of New Jersey, Report No. 3--Passaic County, by Rutgers University (New Brunswick, N.J.).
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available.
POST-CONSTRUCTION SURVEYS OF DAM	None
BORROW SOURCES	Unknown
SPILLWAY PLAN - SECTIONS - DETAILS	Not available.

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
(continued)

ITEM	REMARKS
OPERATING EQUIPMENT PLANS AND DETAILS	None available.
MONITORING SYSTEMS	None available.
MODIFICATIONS	Existing spillway raised,(year unknown).
HIGH POOL RECORDS	Not kept.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available.
PRIOR ACCIDENTS OF FAILURE OF DAM - DESCRIPTION - REPORTS	None known to exist.
MAINTENANCE OPERATION RECORDS	None known to exist.

APPENDIX B

PHOTOGRAPHS

(Photos taken on November 20, 1979
and on January 20, 1980)

Photo 1 - View of upstream side of that section of dam along Lindys Drive. Note voids in upstream face of the stone wall. (Photo taken on January 20, 1980).

Photo 2 - View of that section of dam along Otterhole Drive. Note beach in upper right of photo. (Photo taken on November 20, 1979).

Photo 3 - View of the downstream face of the spillway and embankment along Lindys Drive. (Photo taken on January 20, 1980).

Photo 4 - View from upstream showing spillway, left abutment, discharge channel, and pipes crossing under Lindys Drive. Note open construction joint at the base of spillway and cracked concrete at the junction with left abutment. (Photo taken on January 20, 1980).

Photo 5 - View of section of the sidewalk and stone wall that is missing. Note that the remainder of sidewalk has broken away from the core wall and settled. Lindys Drive is in upper left of the photo. (Photo taken on January 20, 1980).

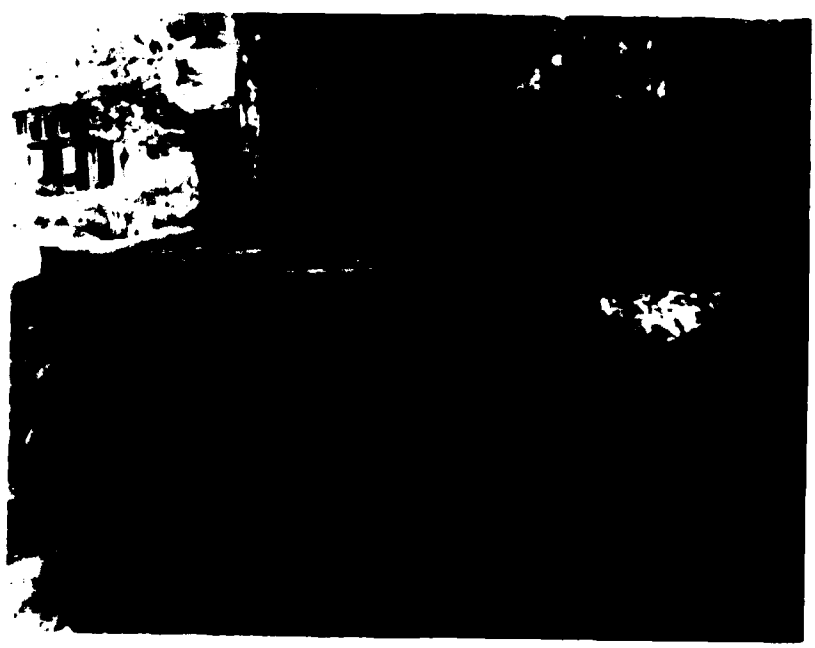


Photo 6 - Close up view of the voids in the upstream face of the stone wall. (Photo taken on November 20, 1979).

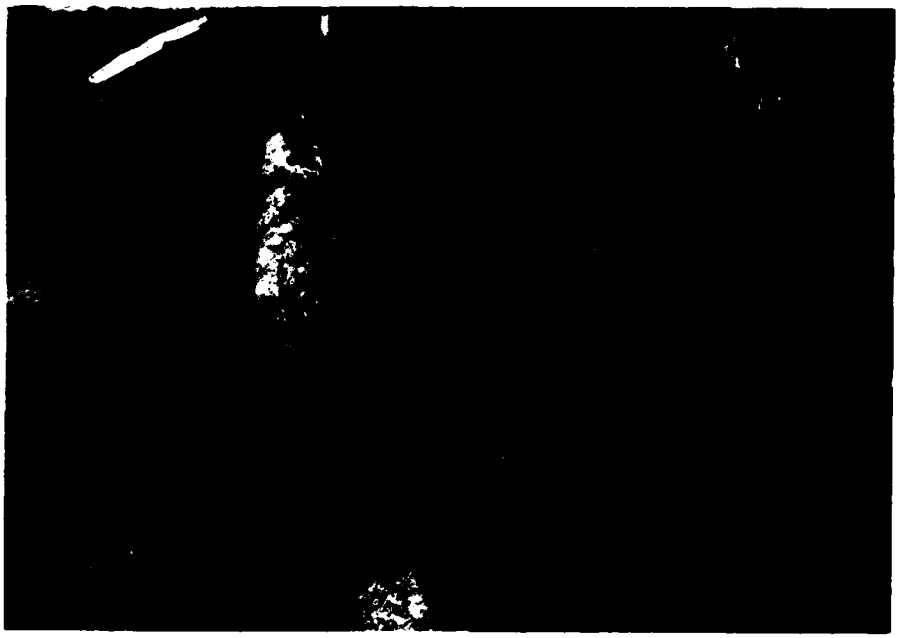


Photo 7 - View of the low-level outlet valve chamber at downstream face of the core wall. (Photo taken on January 20, 1980).

Photo 8 - Close up view of the hole in the upstream face of the core wall where reported leakage was observed. (Photo taken on November 20, 1979).

Photo 9 - View of discharge from the low-level outlet in the downstream channel. (Photo taken on November 20, 1979).

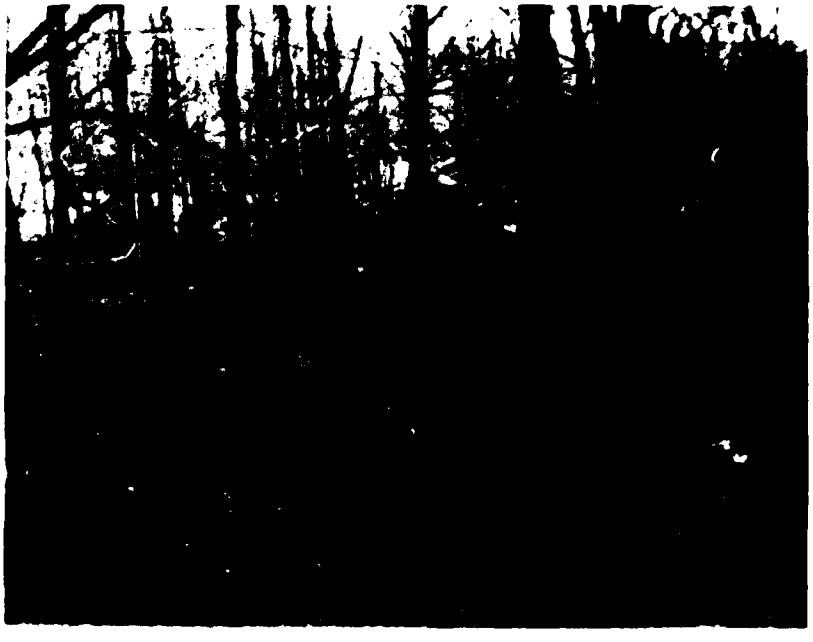


Photo 10 - View of the downstream channel crossing under private driveway. (Photo taken on November 20, 1979).

Photo 11 - View of Lindys Lake taken from spillway.
(Photo taken on January 20, 1980).

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

Name of Dam: LINDYS LAKE DAM

Drainage Area Characteristics: 0.14 square miles

Elevation Top Normal Pool (Storage Capacity): 1001.5 NGVD (131 acre-feet)

Elevation Top Flood Control Pool (Storage Capacity): N/A

Elevation Maximum Design Pool: 1002.42 NGVD (SDF pool: 150 acre-feet)

Elevation Top Dam: 1002 NGVD (141 acre-feet)

SPILLWAY CREST:

a. Elevation 1001.5 NGVD

b. Type Broardcrest concrete weir

c. Width 0.5 feet

d. Length 32 feet

e. Location Spillover Unknown as lake level down 3 feet.

f. No. and Type of Gates None

OUTLET WORKS:

a. Type 12-inch C.I.P.

b. Location 45 feet right of spillway.

c. Entrance Inverts 981.5 NGVD (estimated)

d. Exit Inverts 972.5 NGVD

e. Emergency Draindown Facilities Gate valve 12-inch dia. C.I.P.

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location None

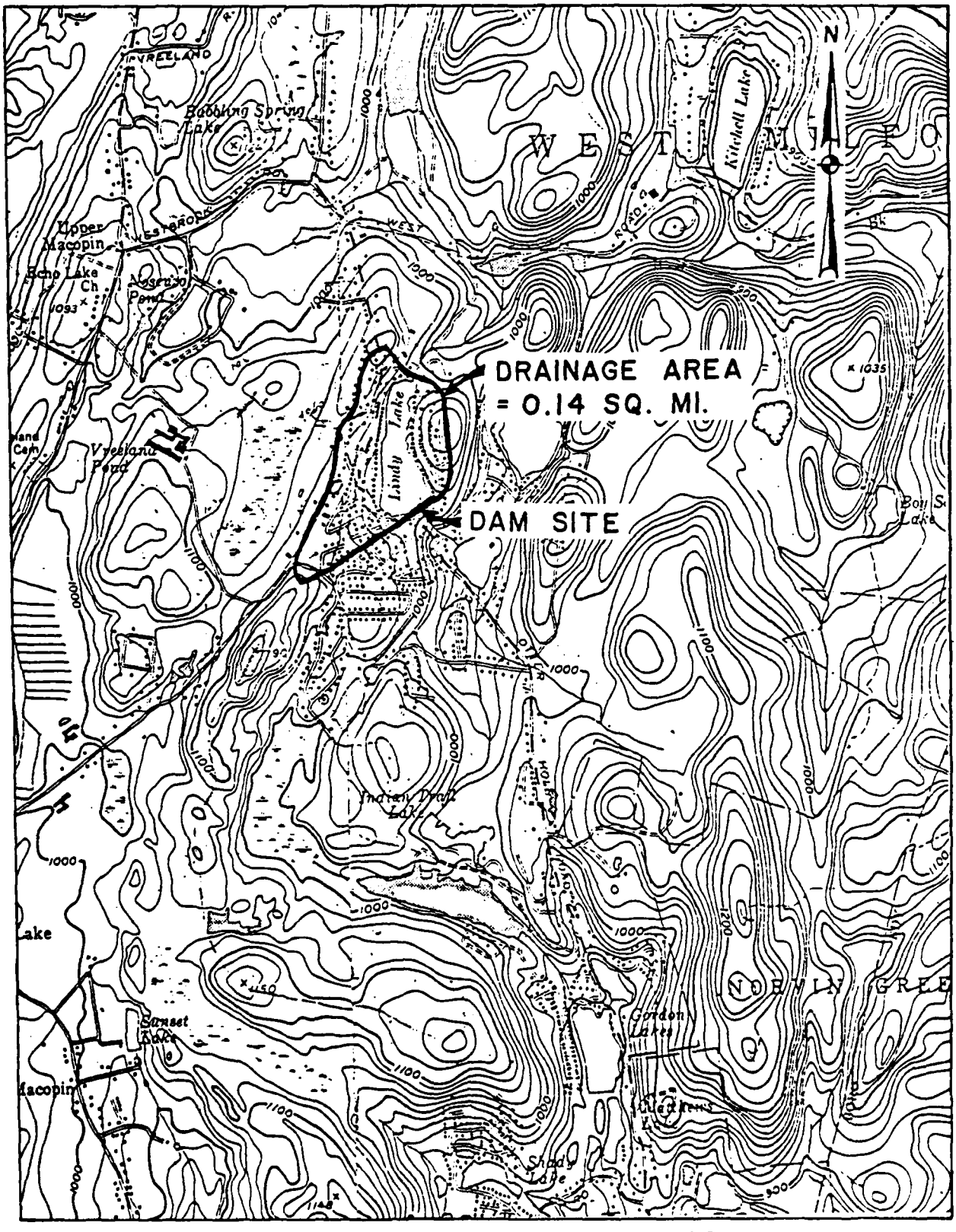
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: 36 cfs at elevation 1002.0 NGVD

APPENDIX D

HYDROLOGIC COMPUTATIONS

PLATE I, APPENDIX D



LINDYS LAKE DAM
DRAINAGE BASIN

PRC Harris, Inc.
CONSULTING ENGINEERS

SUBJECT N.J. DAM SAFETY INSPECTION — LINDYS LAKE DAM
SHEET NO. 1 OF 10
JOB NO. 10-A33-01
COMPUTED BY C.L.C. CHECKED BY RHL
DATE 1-15-90

GROUP XVII | LINDYS LAKE DAM (N.J. 00201)

SIZE CLASSIFICATION

Main Impoundment Surface Area	19.7 Acres
Average Depth of Lake	6 ft*
Structural Height of Dam	24 ± ft*
Size Classification	Small

* Based on owner information

HAZARD POTENTIAL CLASSIFICATION

Houses approx. 1.5 D/S	
Hazard Potential	High
Recommended SDF	½ PMF

HYDROLOGIC ANALYSIS

Flood Routing will be computed by HEC-1 DB computer Program using SCS Triangular Unit Hydrograph with Curvilinear Transformation.

D.A. = 0.14 SQ. MI.

PRC Harris, Inc.
CONSULTING ENGINEERS

SUBJECT N.J. DAM SAFETY INSPECTION
LINDYS LAKE DAM
COMPUTED BY C.L.C. CHECKED BY BK

JOB NO. 10-AS3-01
DATE 1-15-80

PRECIPITATION

From fig. 15 (Ref.: 'Design of Small Dam' p.48), the Drainage basin is located at Zone 1 & Zone 6 where the probable max. precipitation = 25 inches based on 6 Hrs. duration and a 10 SQ. MI. basin.

DURATION (HRS.)	% OF PMF ZONE 1	ZONE 6	AVG.
6	99	100	100
12	111	109	110
24	119	117	118
48	127	126	127

Note: Values are reduced by 20% to account for mis-alignment of basin & storm isohyetals.

INFILTRATION DATA

Drainage Area Consists of approx. 2/3 GMX2UR/Mi... + 1/3 Mr...

Hydrologic Soil Group (C/D

initial infiltration 1.0 inch

constant infiltration 0.1 in/HR.

Ref.: 'Engineering Soil Survey of N.J. Report 3, Passaic County', by Rutgers University, July, 1951.

3

TIME OF CONCENTRATION

1) From Velocity & Water course lengths :

	Slope (%)	Vel. (fps)	Remark
Overland Flow	$\frac{1100-1005}{1300} = 7.3$	3.0	Woodland

Ref. Small Dam Pg. 70

$t_c = 1300 / 3.0 < 3600 = 0.12$ hr

2) From Nomograph " Design of Small Dam", P 71

$\Delta H = 1100 - 1005 = 95$ $\quad L = 1300$

$t = 0.09$ hr (estimated) Ref. Nomograph of Small Dam Pg. 71

3) Using FAA Formula for Surface Flow (Airport Drainage)

$$T_c = \frac{1.8(1.1-C)\sqrt{D}}{\sqrt[3]{S}} = \frac{1.8(1.1-0.5)\sqrt{1300}}{\sqrt[3]{7.3}\,(60)} = 0.33 \text{ HR.}$$

Use $T_c = 0.18$ hr

$LAG = 0.6\,T_c = 0.6(0.18) = 0.11$ HR.

PRC Harris, Inc.
CONSULTING ENGINEERS

SUBJECT N.J. DAM SAFETY INSPECTION — SHEET NO 4 OF 10
LINDYS LAKE DAM — JOB NO 10-A33-91
COMPUTED BY G.A.G. — CHECKED BY [illegible] — DATE 5-30

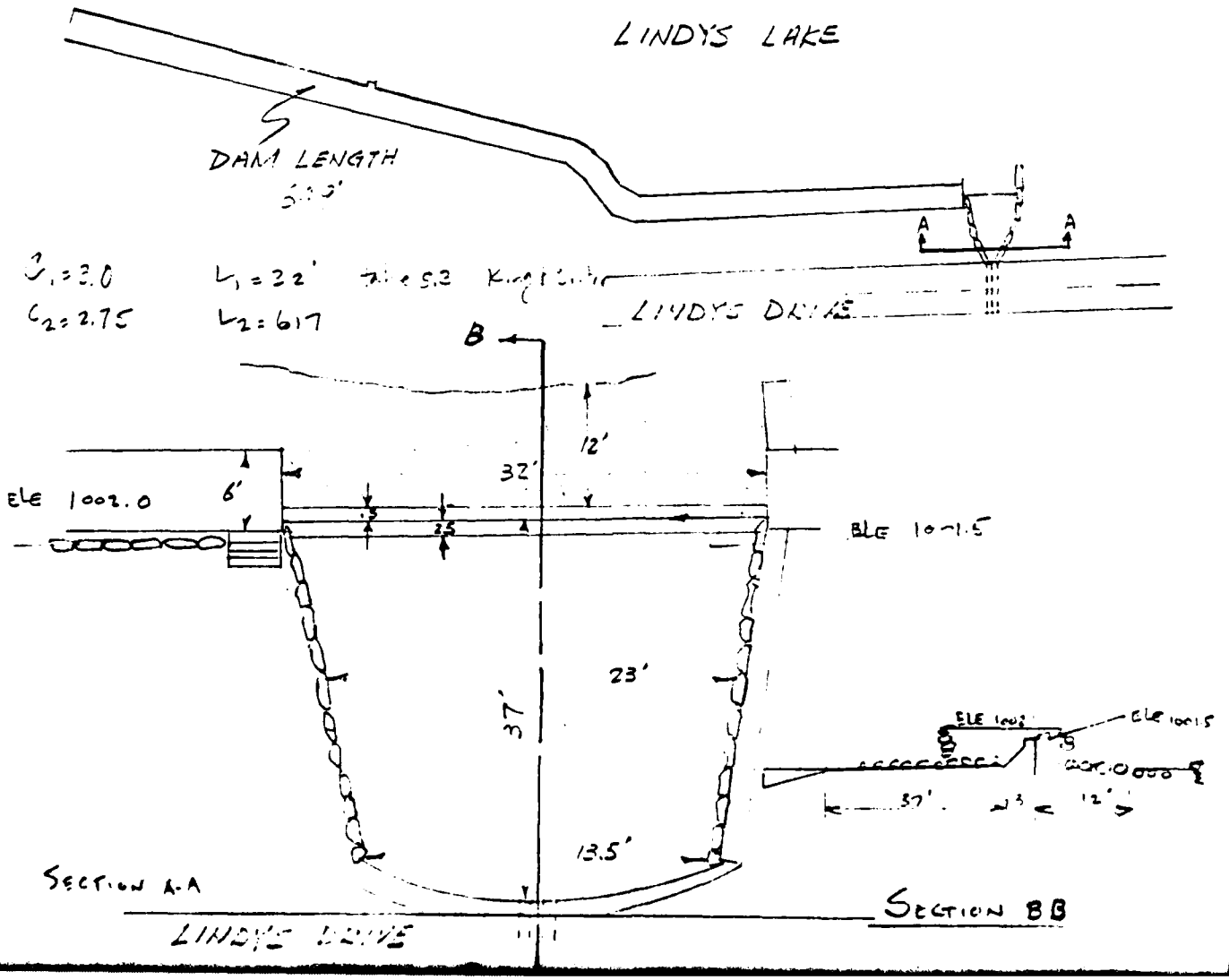
ELEVATION - AREA - CAPACITY RELATIONSHIP

Data Estimated From U.S.G.S. Map

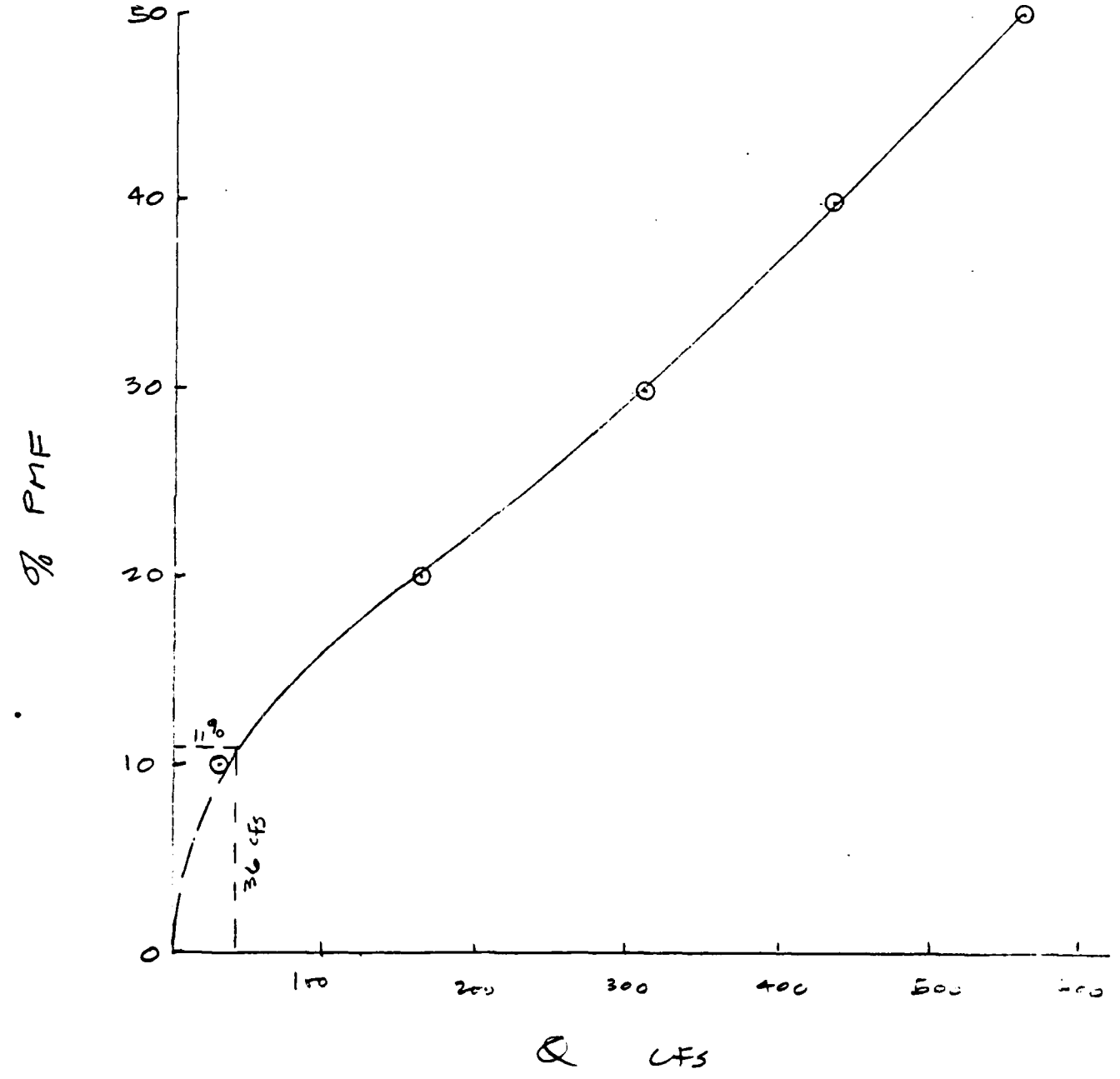
Elevation (ft)	931.5 *	1001.5	1020	1040
Surface Area (Ac.)	0	19.7	26.6	39.5

* Estimated lake bottom elevation at spillway

HEC-1 DB program will develope storage - capacity relationship from surface area & elevation data.



Overtopping Potential



Overtopping of Dam Occurs @ Ele 1002.0 with

Q = 36 cfs (~ 11% PMF)

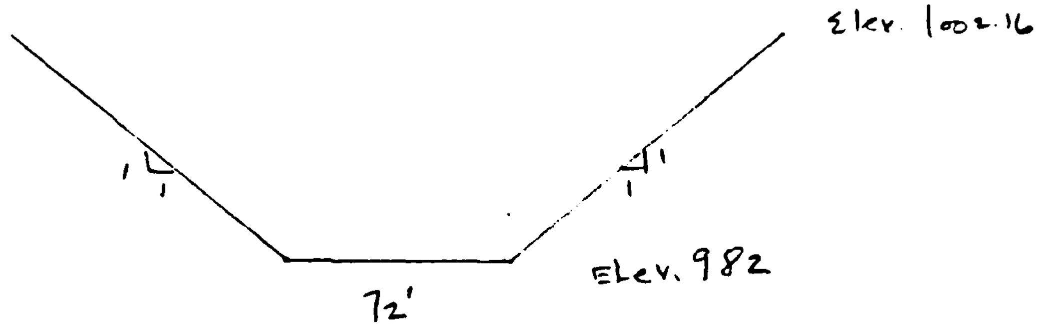
PRC Harris, Inc.
CONSULTING ENGINEERS

SUBJECT: N J Dam Safety Prog. Group XVII
Lindys Lake
COMPUTED BY: L K CHECKED BY: C.L.G.

JOB NO. [illegible]
DATE: 3/13/81

Breach analysis

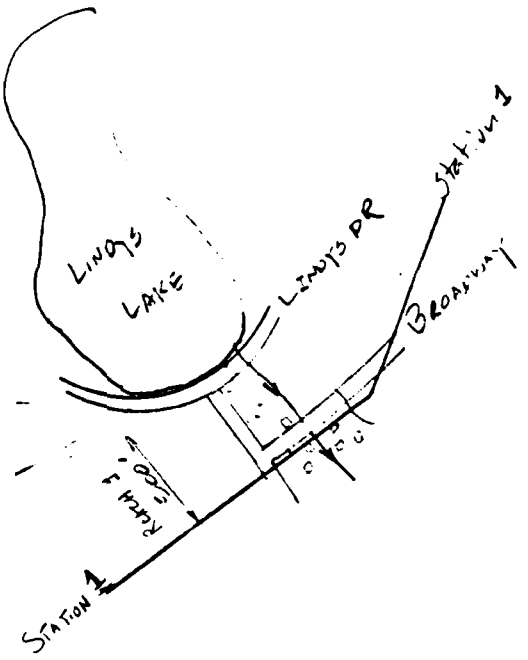
The breach analysis begins to develop when Lake Stage reaches Elev. 1002.16 @ 20% PMF with failure time = 0.5 hr.



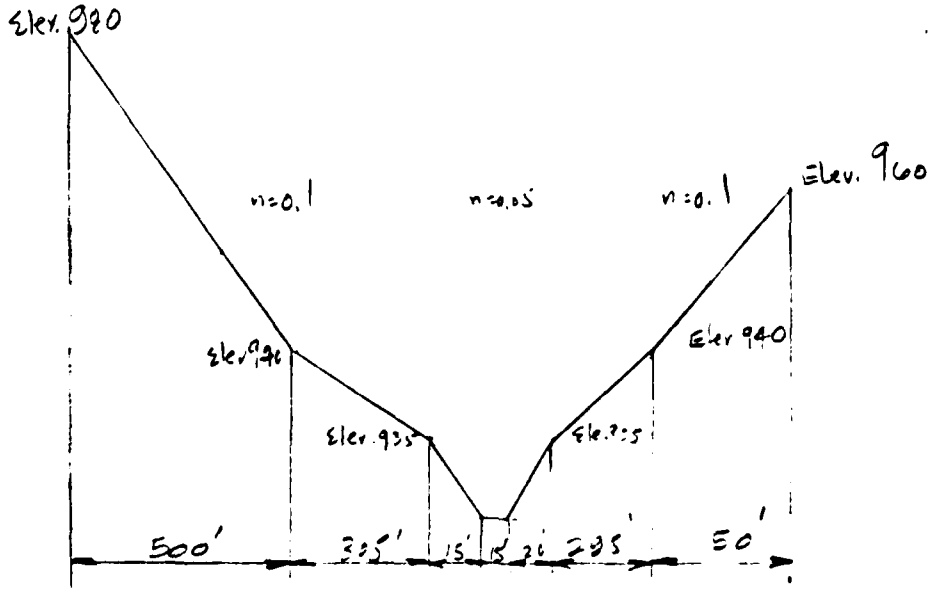
PRC Harris, Inc.
CONSULTING ENGINEERS

SUBJECT NJDAM INUNDATION PROGRAM
Lindy's Lake
COMPUTED BY RK CHECKED BY C.L.C.

SHEET NO 7 OF 10
JOB NO 10-A13-01
DATE 1/23/86



Assume bridge across the stream fails instantly upon impact of Flood Wave. The resulting energy loss is negligible.

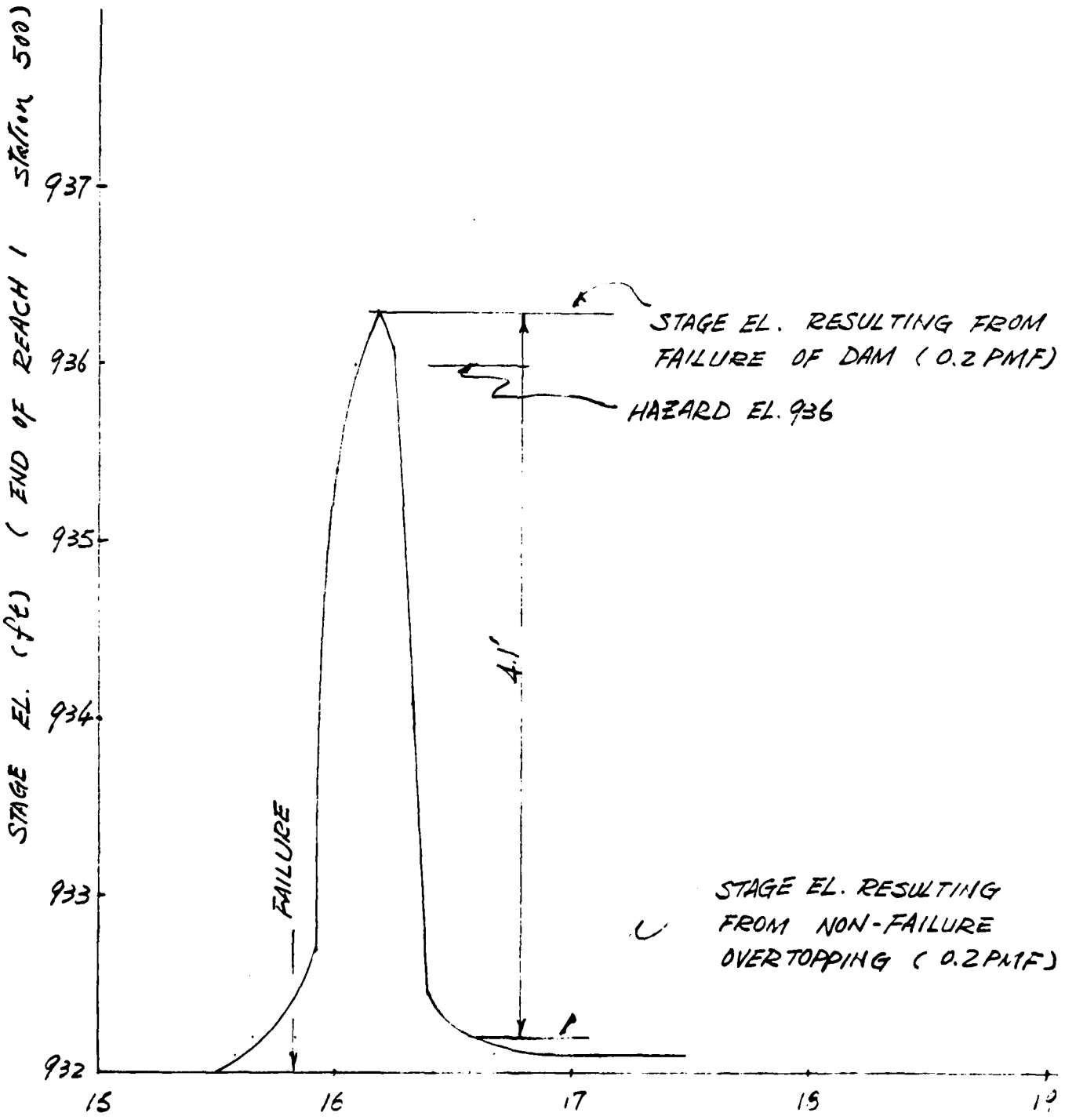


X - Section Elevation 1

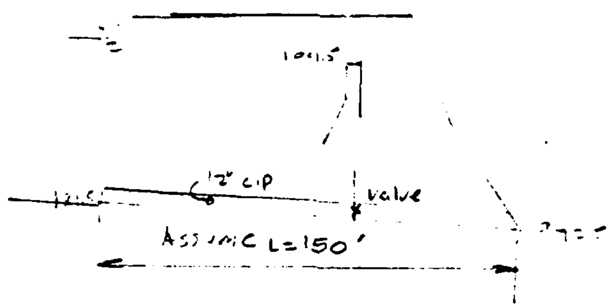
S = 0.13

PRC Harris, Inc.
CONSULTING ENGINEERS

SUBJECT N.J. DAM SAFETY INSPECTION — SHEET NO 8 OF 10
LINDYS LAKE DAM — JOB NO 10-AB3-01
COMPUTED BY C.L.C. CHECKED BY RK — DATE 3/12/80



Drawdown computation



Assume Ke = 0.5 , K valve = 0.19 (full open)

ε = 0.00085 and complete turbulence

$\frac{\epsilon}{D} = 0.00085 \Rightarrow f = 0.0188$ (complete turbulence rough pipe)

$H = \left(Ke + K_{valve} + \frac{fL}{D} + 1\right)\frac{V^2}{2g} = \left(0.5 + 0.19 + \frac{0.0188 \times 150}{1} + 1\right)\frac{V^2}{2g}$

$= 4.06 \frac{V^2}{2g}$

$\therefore V = 0.5\sqrt{2gh}$ (Assume this formula is applicable for all heads)

$Q = VA = 0.5A\sqrt{2gh} = 3.15\sqrt{h}$

Assume water starts to drain @ el 1001.5

D.A = 0.16 sq mi

Inflow 2 cfs/sm = 0.28 cfs neglected

—— 1001.5

For ... , Assume T.W.
@ half depth ...
= 993 - ... = 992.5

PRC Harris, Inc.
CONSULTING ENGINEERS

SUBJECT: NO DAM INSPECTION Group XVII
LANDYS LAKE
COMPUTED BY: EK CHECKED BY: CLC

JOB NO. 10-A83-01
DATE: 1/26 83

Drawdown computation continued.

Res. Ele.	Area Ac	Ave Area Ac	Vol Ac-Ft	H Res ELE	Q Ave Outlet $Q=3.13\sqrt{h}$	t_1 time of Drawdown $\frac{vol \times 24}{1.98Q}$	Cul time
1001.5	19.7						
		18.28	27.4	1000.75	16.44	20.2	20.2
1000.0	16.86						
		12.92	64.6	997.5	15.43	50.7	70.9
995.0	8.98						
		6.27	31.4	992.5	13.73	27.7	98.6
990.0	3.56						
		2.08	10.4	981.5	11.79	10.7	109.3
985.0	0.6						
		0.3	1.05	983.25	9.84	1.3	110.6
981.5	0						

Time of complete drawdown with no inflow = 110.6 ≅ 5 days

$A_1 = \frac{A_2}{\left(\frac{h}{H}+1\right)^2}$ $h + H_T = 20'$ $A_2 = 19.7$

```
A1              N J DAM SAFETY INSPECTION PROGRAM---GROUP XVII  10A8301
A2              N J 00201 LINDYS LAKE, PASSAIC COUNTY, NJ
A3              MULT RATIO ROUTING,PRC-HARRIS INC., WOODBRIDGE, N J
B     200       0       5                               0       0       3
B1      5
J       1       5       1
J1      5      .4       3      .2      .1
K       0    LAKE                       0       0       1
K1              INFLOW HYDROGRAPH THROUHG LINDYS LAKE
M       1       2     .14             .14     0.8                       1
P              25    99.5     110     118
T                                                     1.0    0.10
W2           0.11
X      -1    -.05       2
K       1     DAM                       0       0       1
K1              ROUTING DISCHARGE THROUGH DAM
Y                               1       1
Y1      1                                         -1001.5       0
$A      0    19.7    26.6    39.5
$E 981.5   1001.5    1020    1040
$$1001.5       32     3.2     1.5
$D1002.0     2.75     1.5     617
K      99
A
A
A
A
A
$
```

N J DAM SAFETY INSPECTION PROGRAM---GROUP XVII 10A8301
N J 00201 LINDYS LAKE, PASSAIC COUNTY, NJ
MULT RATIO ROUTING,PRC-HARRIS INC., WOODBRIDGE, N J

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
200	0	5	0	0	0	0	0	3	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 5 LRTIO= 1

RTIOS= .50 .40 .30 .20 .10

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

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH THROUHG LINDYS LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
LAKE	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	.14	0.00	.14	.80	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	25.00	99.50	110.00	118.00	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .11

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 2.00

TIME INCREMENT TOO LARGE--(NHQ IS GT LAG/2)

UNIT HYDROGRAPH 9 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .11 VOL= 1.00

253.	444.	230.	93.	38.	16.	6.	3.	0.

END OF PERIOD FLOW

MO. DA	HR. MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO. DA	HR. MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	0.00	.01	0.	1.01	12.05	145	.17	.16	.01	57.
1.01	.10	2	.01	0.00	.01	0.	1.01	12.10	146	.17	.16	.01	118.
1.01	.15	3	.01	0.00	.01	0.	1.01	12.15	147	.17	.16	.01	149.
1.01	.20	4	.01	0.00	.01	0.	1.01	12.20	148	.17	.16	.01	162.
1.01	.25	5	.01	0.00	.01	0.	1.01	12.25	149	.17	.16	.01	167.
1.01	.30	6	.01	0.00	.01	0.	1.01	12.30	150	.17	.16	.01	169.
1.01	.35	7	.01	0.00	.01	0.	1.01	12.35	151	.17	.16	.01	170.
1.01	.40	8	.01	0.00	.01	0.	1.01	12.40	152	.17	.16	.01	171.
1.01	.45	9	.01	0.00	.01	0.	1.01	12.45	153	.17	.16	.01	171.
1.01	.50	10	.01	0.00	.01	0.	1.01	12.50	154	.17	.16	.01	171.
1.01	55	11	.01	0.00	.01	0	1.01	12.55	155	.17	.16	.01	171

1.01	1.00	12	.01	0.00	.01	0.	1.01	13.00	156	.17	.16	.01	171.
1.01	1.05	13	.01	0.00	.01	0.	1.01	13.05	157	.20	.19	.01	179.
1.01	1.10	14	.01	0.00	.01	0.	1.01	13.10	158	.20	.19	.01	194.
1.01	1.15	15	.01	0.00	.01	0.	1.01	13.15	159	.20	.19	.01	201.
1.01	1.20	16	.01	0.00	.01	0.	1.01	13.20	160	.20	.19	.01	205.
1.01	1.25	17	.01	0.00	.01	0.	1.01	13.25	161	.20	.19	.01	206.
1.01	1.30	18	.01	0.00	.01	0.	1.01	13.30	162	.20	.19	.01	206.
1.01	1.35	19	.01	0.00	.01	0.	1.01	13.35	163	.20	.19	.01	207.
1.01	1.40	20	.01	0.00	.01	0.	1.01	13.40	164	.20	.19	.01	207.
1.01	1.45	21	.01	0.00	.01	0.	1.01	13.45	165	.20	.19	.01	207.
1.01	1.50	22	.01	0.00	.01	0.	1.01	13.50	166	.20	.19	.01	207.
1.01	1.55	23	.01	0.00	.01	0.	1.01	13.55	167	.20	.19	.01	207.
1.01	2.00	24	.01	0.00	.01	0.	1.01	14.00	168	.20	.19	.01	207.
1.01	2.05	25	.01	0.00	.01	0.	1.01	14.05	169	.25	.24	.01	219.
1.01	2.10	26	.01	0.00	.01	0.	1.01	14.10	170	.25	.24	.01	241.
1.01	2.15	27	.01	0.00	.01	0.	1.01	14.15	171	.25	.24	.01	253.
1.01	2.20	28	.01	0.00	.01	0.	1.01	14.20	172	.25	.24	.01	257.
1.01	2.25	29	.01	0.00	.01	0.	1.01	14.25	173	.25	.24	.01	259.
1.01	2.30	30	.01	0.00	.01	0.	1.01	14.30	174	.25	.24	.01	260.
1.01	2.35	31	.01	0.00	.01	0.	1.01	14.35	175	.25	.24	.01	260.
1.01	2.40	32	.01	0.00	.01	0.	1.01	14.40	176	.25	.24	.01	261.
1.01	2.45	33	.01	0.00	.01	0.	1.01	14.45	177	.25	.24	.01	261.
1.01	2.50	34	.01	0.00	.01	0.	1.01	14.50	178	.25	.24	.01	261.
1.01	2.55	35	.01	0.00	.01	0.	1.01	14.55	179	.25	.24	.01	261.
1.01	3.00	36	.01	0.00	.01	0.	1.01	15.00	180	.25	.24	.01	261.
1.01	3.05	37	.01	0.00	.01	0.	1.01	15.05	181	.15	.14	.01	236.
1.01	3.10	38	.01	0.00	.01	0.	1.01	15.10	182	.30	.29	.01	231.
1.01	3.15	39	.01	0.00	.01	0.	1.01	15.15	183	.30	.29	.01	276.
1.01	3.20	40	.01	0.00	.01	0.	1.01	15.20	184	.45	.45	.01	340.
1.01	3.25	41	.01	0.00	.01	0.	1.01	15.25	185	.53	.52	.01	436.
1.01	3.30	42	.01	0.00	.01	0.	1.01	15.30	186	1.29	1.28	.01	700.
1.01	3.35	43	.01	0.00	.01	0.	1.01	15.35	187	2.12	2.11	.01	1280.
1.01	3.40	44	.01	0.00	.01	0.	1.01	15.40	188	.83	.82	.01	1512.
1.01	3.45	45	.01	0.00	.01	0.	1.01	15.45	189	.53	.52	.01	1131.
1.01	3.50	46	.01	0.00	.01	0.	1.01	15.50	190	.45	.45	.01	791.
1.01	3.55	47	.01	0.00	.01	0.	1.01	15.55	191	.30	.29	.01	574.
1.01	4.00	48	.01	0.00	.01	0.	1.01	16.00	192	.30	.29	.01	430.
1.01	4.05	49	.01	0.00	.01	0.	1.01	16.05	193	.23	.22	.01	346.
1.01	4.10	50	.01	0.00	.01	0.	1.01	16.10	194	.23	.22	.01	288.
1.01	4.15	51	.01	0.00	.01	0.	1.01	16.15	195	.23	.22	.01	259.
1.01	4.20	52	.01	0.00	.01	0.	1.01	16.20	196	.23	.22	.01	249.
1.01	4.25	53	.01	0.00	.01	0.	1.01	16.25	197	.23	.22	.01	245.
1.01	4.30	54	.01	0.00	.01	0.	1.01	16.30	198	.23	.22	.01	243.
1.01	4.35	55	.01	0.00	.01	0.	1.01	16.35	199	.23	.22	.01	243.
1.01	4.40	56	.01	0.00	.01	0.	1.01	16.40	200	.23	.22	.01	243.
1.01	4.45	57	.01	0.00	.01	0.	0.00	0.00	201	.23	.22	.01	243.
1.01	4.50	58	.01	0.00	.01	0.	0.00	0.00	202	.23	.22	.01	243.
1.01	4.55	59	.01	0.00	.01	0.	0.00	0.00	203	.23	.22	.01	243.
1.01	5.00	60	.01	0.00	.01	0.	0.00	0.00	204	.23	.22	.01	243.
1.01	5.05	61	.01	0.00	.01	0.	0.00	0.00	205	.18	.17	.01	230.
1.01	5.10	62	.01	0.00	.01	0.	0.00	0.00	206	.18	.17	.01	208.
1.01	5.15	63	.01	0.00	.01	0.	0.00	0.00	207	.18	.17	.01	196.
1.01	5.20	64	.01	0.00	.01	0.	0.00	0.00	208	.18	.17	.01	192.
1.01	5.25	65	.01	0.00	.01	0.	0.00	0.00	209	.18	.17	.01	190.
1.01	5.30	66	.01	0.00	.01	0.	0.00	0.00	210	.18	.17	.01	189.
1.01	5.35	67	.01	0.00	.01	0.	0.00	0.00	211	.18	.17	.01	189.
1.01	5.40	68	.01	0.00	.01	0.	0.00	0.00	212	.18	.17	.01	189.
1.01	5.45	69	.01	0.00	.01	0.	0.00	0.00	213	.18	.17	.01	189.
1.01	5.50	70	.01	0.00	.01	0.	0.00	0.00	214	.18	.17	.01	189.
1.01	5.55	71	.01	0.00	.01	0.	0.00	0.00	215	.18	.17	.01	189.
1.01	6.00	72	.01	0.00	.01	0.	0.00	0.00	216	.18	.17	.01	189.
1.01	6.05	73	.03	0.00	.03	0.	0.00	0.00	217	.01	.00	.01	146.
1.01	6.10	74	.03	0.00	.03	0.	0.00	0.00	218	.01	.00	.01	75.
1.01	6.15	75	.03	0.00	.03	0.	0.00	0.00	219	.01	.00	.01	70.
1.01	6.20	76	.03	0.00	.03	0.	0.00	0.00	220	.01	.00	.01	66.
1.01	6.25	77	.03	0.00	.03	0.	0.00	0.00	221	.01	.00	.01	61.

1.01	6.30	78	.03	0.00	.03	0.	0.00	0.00	222	.01	.00	.01	57.
1.01	6.35	79	.03	0.00	.03	0.	0.00	0.00	223	.01	.00	.01	53.
1.01	6.40	80	.03	0.00	.03	0.	0.00	0.00	224	.01	.00	.01	50.
1.01	6.45	81	.03	0.00	.03	0.	0.00	0.00	225	.01	.00	.01	46.
1.01	6.50	82	.03	0.00	.03	0.	0.00	0.00	226	.01	.00	.01	43.
1.01	6.55	83	.03	0.00	.03	0.	0.00	0.00	227	.01	.00	.01	40.
1.01	7.00	84	.03	0.00	.03	0.	0.00	0.00	228	.01	.00	.01	38.
1.01	7.05	85	.03	.01	.02	3.	0.00	0.00	229	.01	.00	.01	35.
1.01	7.10	86	.03	.02	.01	11.	0.00	0.00	230	.01	.00	.01	33.
1.01	7.15	87	.03	.02	.01	18.	0.00	0.00	231	.01	.00	.01	31.
1.01	7.20	88	.03	.02	.01	21.	0.00	0.00	232	.01	.00	.01	29.
1.01	7.25	89	.03	.02	.01	22.	0.00	0.00	233	.01	.00	.01	27.
1.01	7.30	90	.03	.02	.01	22.	0.00	0.00	234	.01	.00	.01	25.
1.01	7.35	91	.03	.02	.01	22.	0.00	0.00	235	.01	.00	.01	23.
1.01	7.40	92	.03	.02	.01	23.	0.00	0.00	236	.01	.00	.01	22.
1.01	7.45	93	.03	.02	.01	23.	0.00	0.00	237	.01	.00	.01	20.
1.01	7.50	94	.03	.02	.01	23.	0.00	0.00	238	.01	.00	.01	19.
1.01	7.55	95	.03	.02	.01	23.	0.00	0.00	239	.01	.00	.01	18.
1.01	8.00	96	.03	.02	.01	23.	0.00	0.00	240	.01	.00	.01	16.
1.01	8.05	97	.03	.02	.01	23.	0.00	0.00	241	.01	.00	.01	15.
1.01	8.10	98	.03	.02	.01	23.	0.00	0.00	242	.01	.00	.01	14.
1.01	8.15	99	.03	.02	.01	23.	0.00	0.00	243	.01	.00	.01	13.
1.01	8.20	100	.03	.02	.01	23.	0.00	0.00	244	.01	.00	.01	12.
1.01	8.25	101	.03	.02	.01	23.	0.00	0.00	245	.01	.00	.01	12.
1.01	8.30	102	.03	.02	.01	23.	0.00	0.00	246	.01	.00	.01	11.
1.01	8.35	103	.03	.02	.01	23.	0.00	0.00	247	.01	.00	.01	10.
1.01	8.40	104	.03	.02	.01	23.	0.00	0.00	248	.01	.00	.01	9.
1.01	8.45	105	.03	.02	.01	23.	0.00	0.00	249	.01	.00	.01	9.
1.01	8.50	106	.03	.02	.01	23.	0.00	0.00	250	.01	.00	.01	8.
1.01	8.55	107	.03	.02	.01	23.	0.00	0.00	251	.01	.00	.01	8.
1.01	9.00	108	.03	.02	.01	23.	0.00	0.00	252	.01	.00	.01	7.
1.01	9.05	109	.03	.02	.01	23.	0.00	0.00	253	.01	.00	.01	7.
1.01	9.10	110	.03	.02	.01	23.	0.00	0.00	254	.01	.00	.01	6.
1.01	9.15	111	.03	.02	.01	23.	0.00	0.00	255	.01	.00	.01	6.
1.01	9.20	112	.03	.02	.01	23.	0.00	0.00	256	.01	.00	.01	5.
1.01	9.25	113	.03	.02	.01	23.	0.00	0.00	257	.01	.00	.01	5.
1.01	9.30	114	.03	.02	.01	23.	0.00	0.00	258	.01	.00	.01	5.
1.01	9.35	115	.03	.02	.01	23.	0.00	0.00	259	.01	.00	.01	5.
1.01	9.40	116	.03	.02	.01	23.	0.00	0.00	260	.01	.00	.01	5.
1.01	9.45	117	.03	.02	.01	23.	0.00	0.00	261	.01	.00	.01	5.
1.01	9.50	118	.03	.02	.01	23.	0.00	0.00	262	.01	.00	.01	5.
1.01	9.55	119	.03	.02	.01	23.	0.00	0.00	263	.01	.00	.01	5.
1.01	10.00	120	.03	.02	.01	23.	0.00	0.00	264	.01	.00	.01	5.
1.01	10.05	121	.03	.02	.01	23.	0.00	0.00	265	.01	.00	.01	5.
1.01	10.10	122	.03	.02	.01	23.	0.00	0.00	266	.01	.00	.01	5.
1.01	10.15	123	.03	.02	.01	23.	0.00	0.00	267	.01	.00	.01	5.
1.01	10.20	124	.03	.02	.01	23.	0.00	0.00	268	.01	.00	.01	5.
1.01	10.25	125	.03	.02	.01	23.	0.00	0.00	269	.01	.00	.01	5.
1.01	10.30	126	.03	.02	.01	23.	0.00	0.00	270	.01	.00	.01	5.
1.01	10.35	127	.03	.02	.01	23.	0.00	0.00	271	.01	.00	.01	5.
1.01	10.40	128	.03	.02	.01	23.	0.00	0.00	272	.01	.00	.01	5.
1.01	10.45	129	.03	.02	.01	23.	0.00	0.00	273	.01	.00	.01	5.
1.01	10.50	130	.03	.02	.01	23.	0.00	0.00	274	.01	.00	.01	5.
1.01	10.55	131	.03	.02	.01	23.	0.00	0.00	275	.01	.00	.01	5.
1.01	11.00	132	.03	.02	.01	23.	0.00	0.00	276	.01	.00	.01	5.
1.01	11.05	133	.03	.02	.01	23.	0.00	0.00	277	.01	.00	.01	5.
1.01	11.10	134	.03	.02	.01	23.	0.00	0.00	278	.01	.00	.01	5.
1.01	11.15	135	.03	.02	.01	23.	0.00	0.00	279	.01	.00	.01	5.
1.01	11.20	136	.03	.02	.01	23.	0.00	0.00	280	.01	.00	.01	5.
1.01	11.25	137	.03	.02	.01	23.	0.00	0.00	281	.01	.00	.01	5.
1.01	11.30	138	.03	.02	.01	23.	0.00	0.00	282	.01	.00	.01	5.
1.01	11.35	139	.03	.02	.01	23.	0.00	0.00	283	.01	.00	.01	5.
1.01	11.40	140	.03	.02	.01	23.	0.00	0.00	284	.01	.00	.01	5.
1.01	11.45	141	.03	.02	.01	23.	0.00	0.00	285	.01	.00	.01	5.
1.01	11.50	142	.03	.02	.01	23.	0.00	0.00	286	.01	.00	.01	5.
1.01	11.55	143	.03	.02	.01	23	0.00	0.00	287	.01	.00	.01	5.

1 01	12 00	144	.03	.02	.01	23.	0.00	0.00	288	.01	.00	.01	5.

SUM 23.60 20.90 2.70 23391.
(599.)(531.)(69.)(662.36)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1512.	288.	81.	81.	23371.
CMS	43.	8.	2.	2.	662.
INCHES		19.15	21.57	21.57	21.57
MM		486.51	547.82	547.82	547.82
AC-FT		143.	161.	161.	161.
THOUS CU M		176.	199.	199.	199.

HYDROGRAPH ROUTING

ROUTING DISCHARGE THROUGH DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
DAM	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1002.	0

SURFACE AREA=	0.	20.	27.	40.
CAPACITY=	0.	131.	558.	1215.
ELEVATION=	982.	1002.	1020.	1040.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1001.5	32.0	3.2	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1002.0	2.8	1.5	617.

STATION DAM, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	1.	2.	2.	2.	2.	2.	2.	2.	2.
3.	3.	3.	3.	3.	3.	3.	4.	4.	4.
4.	4.	4.	4.	4.	5.	5.	5.	5.	5.
5.	5.	5.	6.	6.	6.	6.	6.	6.	6.
6.	6.	7.	7.	7.	8.	9.	11.	12.	14.
16.	18.	20.	22.	24.	26.	28.	30.	32.	35.
38.	47.	57.	67.	75.	82.	87.	91.	95.	100.
107.	113.	117.	121.	124.	126.	127.	128.	129.	129.
128.	124.	125.	134.	152.	196.	309.	476.	561.	523.
441.	359.	293.	242.	204.	178.	160.	148.	140.	134.
130.	128.	126.	124.	123.	119.	114.	109.	105.	102.
100.	99.	98.	97.	96.	96.	92.	83.	72.	64.
57.	52.	48.	44.	41.	39.	37.	36.	35.	35.
34.	33.	33.	32.	31.	31.	30.	29.	29.	28.
27.	27.	26.	26.	25.	24.	24.	23.	23.	22.
21.	21.	20.	20.	19.	19.	18.	18.	18.	17.
17.	16.	16.	16.	15.	15.	15.	14.	14.	14.
13.	13.	13.	13.	12.	12.	12.	12.	11.	11.
11.	11.	11.	10.	10.	10.	10.	10.		

STORAGE

131.	131.	131.	131.	131.	131.	131.	131.	131.	131.
131.	131.	131.	131.	131.	131.	131.	131.	131.	131.
131.	131.	131.	131.	131.	131.	131.	131.	131.	131.
131.	131.	131.	131.	131.	131.	131.	131.	131.	131.
131.	131.	131.	131.	131.	131.	131.	131.	131.	131.
131.	131.	131.	131.	131.	131.	131.	131.	131.	131.
131.	131.	131.	131.	131.	131.	131.	131.	131.	131.
131.	131.	131.	131.	131.	131.	131.	131.	131.	131.
131.	131.	131.	131.	131.	131.	131.	131.	132.	132.
132.	132.	132.	132.	132.	132.	132.	132.	132.	132.
132.	132.	133.	133.	133.	133.	133.	133.	133.	133.
133.	133.	133.	133.	133.	133.	133.	133.	133.	134.
134.	134.	134.	134.	134.	134.	134.	134.	134.	134.
134.	134.	134.	134.	134.	134.	134.	134.	134.	134.
134.	134.	134.	135.	135.	135.	135.	136.	136.	137.
137.	138.	138.	138.	139.	139.	140.	140.	140.	141.
141.	142.	142.	142.	143.	143.	143.	143.	143.	143.
143.	143.	144.	144.	144.	144.	144.	144.	144.	144.
144.	144.	144.	144.	144.	145.	147.	149.	150.	149.
148.	147.	146.	146.	145.	145.	144.	144.	144.	144.
144.	144.	144.	144.	144.	144.	143.	143.	143.	143.
143.	143.	143.	143.	143.	143.	143.	143.	143.	142.
142.	142.	142.	142.	142.	141.	141.	141.	141.	141.
141.	141.	141.	140.	140.	140.	140.	140.	140.	140.
140.	139.	139.	139.	139.	139.	139.	139.	139.	138.
138.	138.	138.	138.	138.	138.	138.	138.	137.	137.
137.	137.	137.	137.	137.	137.	137.	137.	137.	136.
136.	136.	136.	136.	136.	136.	136.	136.	136.	136.
136.	136.	136.	136.	136.	136.	135.	135.		

STAGE

1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5
1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5
1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5
1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5
1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5
1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5
1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5
1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5
1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5
1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.5	1001.6
1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6
1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6
1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6
1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.6	1001.7	1001.7	1001.7
1001.7	1001.7	1001.7	1001.7	1001.7	1001.7	1001.7	1001.7	1001.7	1001.8
1001.8	1001.8	1001.8	1001.9	1001.9	1001.9	1001.9	1001.9	1002.0	1002.0
1002.0	1002.0	1002.0	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1
1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1
1002.1	1002.1	1002.1	1002.1	1002.1	1002.2	1002.3	1002.4	1002.4	1002.4
1002.4	1002.3	1002.3	1002.2	1002.2	1002.2	1002.2	1002.1	1002.1	1002.1
1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1
1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1	1002.1
1002.0	1002.0	1002.0	1002.0	1002.0	1002.0	1002.0	1002.0	1002.0	1002.0
1002.0	1002.0	1002.0	1002.0	1002.0	1001.9	1001.9	1001.9	1001.9	1001.9
1001.9	1001.9	1001.9	1001.9	1001.9	1001.9	1001.9	1001.9	1001.9	1001.9
1001.9	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8
1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8	1001.8
1001.8	1001.8	1001.8	1001.7	1001.7	1001.7	1001.7	1001.7	1001.7	1001.7
1001.7	1001.7	1001.7	1001.7	1001.7	1001.7	1001.7	1001.7		

PEAK OUTFLOW IS 561. AT TIME 15.75 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	561.	133.	38.	38.	11088.
CMS	16.	4.	1.	1.	314.
INCHES		8.82	10.23	10.23	10.23
MM		223.95	259.90	259.90	259.90
AC-FT		66.	76.	76.	76.
THOUS CU M		81.	94.	94.	94.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .50	RATIO 2 .40	RATIO 3 .30	RATIO 4 .20	RATIO 5 .10
HYDROGRAPH AT	LAKE	.14	1	756.	605.	453.	302.	151.
		(36)		(21.40)(	17.12)(	12.84)(	8.56)(	4.28)(
ROUTED TO	DAM	14	1	561	435	310.	166.	28.
		(36)		(15.88)(	12.32)(	8.78)(	4.70)(	.81)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1001.50	1001.50	1002.00
STORAGE	131.	131	141.
OUTFLOW	0.	0	36.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1002.42	.42	150.	561.	5.58	15.75	0.00
.40	1002.35	.35	148.	435.	5.00	15.75	0.00
30	1002.27	.27	147	310	4.00	15.75	0.00
20	1002.16	.16	144.	166	2.67	15.83	0.00
10	1001.93	0.00	140.	28.	0.00	16.17	0.00

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
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N J DAM SAFETY INSPECTION PROGRAM---GROUP XVII  10A8301
N J 00201 LINDYS LAKE, PASSAIC COUNTY, NJ
MULT RATIO ROUTING,PRC-HARRIS INC., WOODBRIDGE, N J
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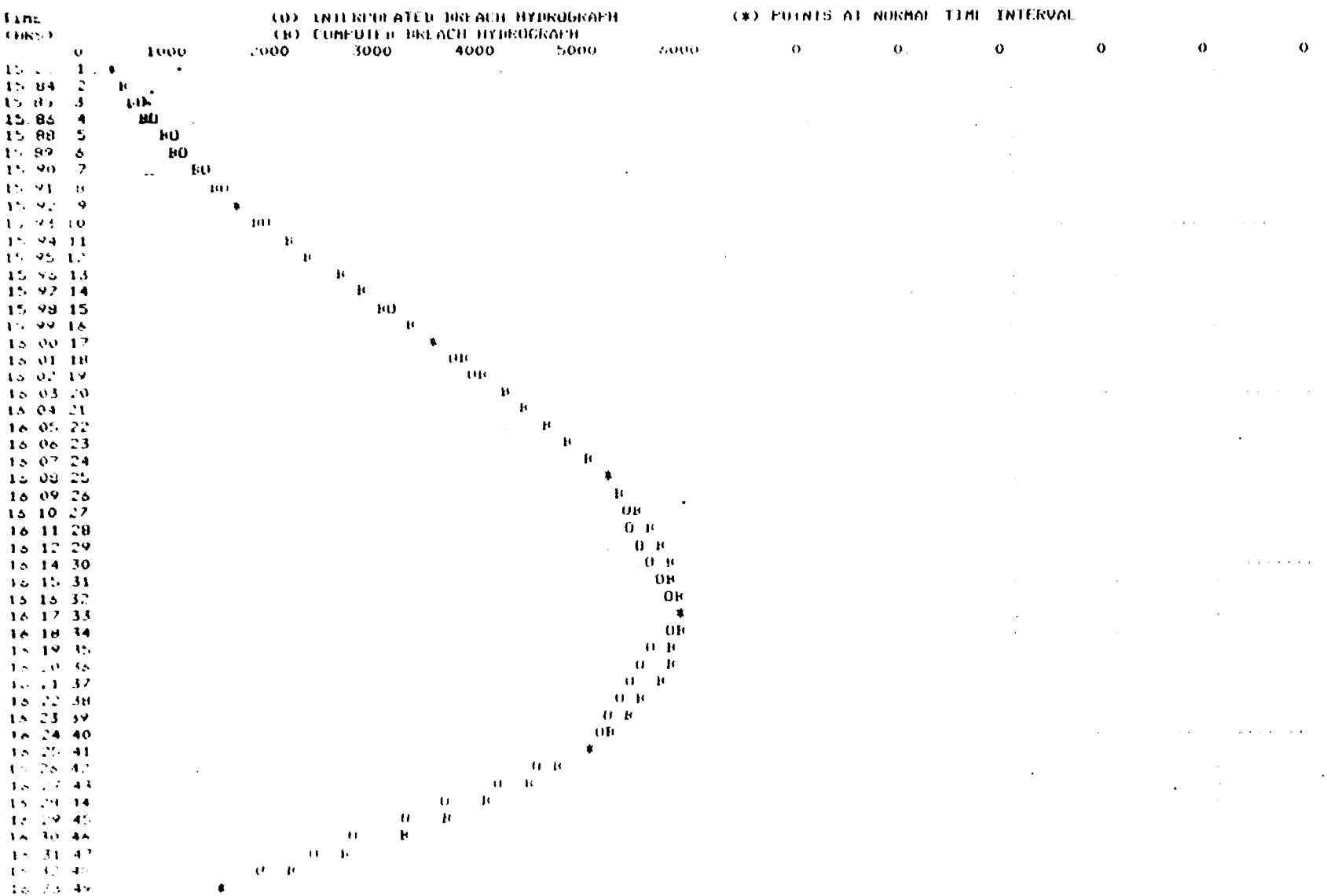
K	200	0	5				0	0	1		
KI	5										
J	2	1	1								
JI	2										
K	0	LAKE			0	0	1				
KI		INFLOW HYDROGRAPH THROUHG LINDYS LAKE									
A	1	2	14		14	0.8				1	
		25	99.5	110	118						
							1.0	0.10			
K		0 11									
A	-1	- 05	2								
K	1	DAM			0	0	1				
KI		ROUTING DISCHARGE THROUGH DAM									
Y				1	1						
YI	1						-1001.5	0			
$A	0	19.7	26.6	39.5							
$	981.5	1001.5	1020	1040							
$$	1001.5	32	3.2	1.5							
$B	1002.0	2.75	1.5	617							
$R	72	1	982	0.5	1001.5	1040.00					
$R	72	1	982	0.5	1001.5	1002.16					
K	1	REACH1					1				
KI		CHANNEL ROUTING									
Y				1	1						
YI	1										
YS	1	05	1	932	940	500	0.13				
X	1000	980	1500	940	1805	935	1820	931	1835	931	
X	1055	930	2150	940	2200	960					
N	99										

STATION DAM


TIME (HRS)
(O) INTERPOLATED BREACH HYDROGRAPH
(B) COMPUTED BREACH HYDROGRAPH
(*) POINTS AT NORMAL TIME INTERVAL
0
1000
2000
3000
4000
5000
6000
0
0
0
0
0
0

SUMMARY OF DAM SAFETY ANALYSIS

		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1001.50	1001.50	1002.00
	STORAGE	131.	131.	141.
	OUTFLOW	0.	0.	36.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
20	1002.16	16	144.	166.	2.67	15.83	0.00

		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1001.50	1001.50	1002.00
	STORAGE	131.	131.	141.
	OUTFLOW	0.	0.	36.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
20	1002.16	16	144.	5677.	.41	16.17	15.83

PLAN 1 STATION REACH1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
20	166.	932.2	15.83

PLAN 2 STATION REACH1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
20	5693.	936.3	16.17