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PASSAIC RIVER BASIN

HOHOKUS BROOK, BERGEN COUNTY

NEW JERSEY

WHITE'S POND DAM

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NJ00233

Approved for public release;
distribution unlimited

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

JUNE 1978

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: NJ00233

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle): ~~Phase I Inspection Report~~ National Dam Safety Program. White's Pond Dam (Bergen County), Hohokus Brook, New Jersey. ~~Phase I Inspection Report.~~ Passaic River Basin.

5. TYPE OF REPORT & PERIOD COVERED: FINAL rept.

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s): Robert Gershowitz P.E.

8. CONTRACT OR GRANT NUMBER(s): DACW61-78-C-0100

9. PERFORMING ORGANIZATION NAME AND ADDRESS
Harris - ECI Associates
453 Amboy Avenue
Woodbridge, N.J. 07095
New 410824

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS
U.S. Army Engineer District, Philadelphia
Custom House, 2d & Chestnut Streets
Philadelphia, Pennsylvania 19106

12. REPORT DATE: June 1978

13. NUMBER OF PAGES: ~~85~~ 91 p.

14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)

15. SECURITY CLASS. (of this report): Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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
White's Pond Dam, N.J.

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-D

31 JUL 1978

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

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for White's Pond Dam in Bergen 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 pages of the report.

Based on visual inspection, available records, calculations and post operational performance, White's Pond Dam is judged to be in good condition. However, the dam's spillway is considered seriously inadequate as 18 percent of the Probable Maximum Flood (PMF) would overtop the dam. To insure adequacy of the structure, the following actions, as a minimum, are recommended.

a. Studies should be undertaken and completed by the owner to determine the most effective means of increasing the spillway capacity within six months from the date of approval of this report. Implementation of corrective measure should begin within one year from the date of approval of this report. Due to the potential for overtopping of the dam, detailed emergency operation, warning and evacuation plans should be developed and placed in operation within two months from the date of approval of this report.

b. A study consisting of a piezometric survey to determine water levels in the left abutment and its effect on the abutment stability should be completed within one year from the date of approval of this report. Any required remedial work as a result of this study should be initiated within calendar year 1979.

c. The following remedial actions should be undertaken and completed within six months from the date of approval of this report:

(1) Heightening of the left spillway training wall to prevent overtopping during high spillway discharges.

(2) Regrade and protect the present eroded areas in back of this wall.

(3) Repair sloughed riprap bank protection downstream of the left spillway training wall damaged by the November 8, 1977 overtopping.

(4) Anchor the 36-inch dia. low level outlet gate frame firmly in order to eliminate presently observed leakage.

(5) A gage should be installed at the dam and read during severe rainstorms and at routine operating and maintenance visits to the dam. A permanent log should be kept of all maintenance and operating events of the dam, the pond and the low level outlet gate.

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 Andrew McGuire of the Seventh District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, thirty days after the date of this letter.

Additional copies of this report may be obtained from the National Tachnical Information Services (NITS), 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 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.

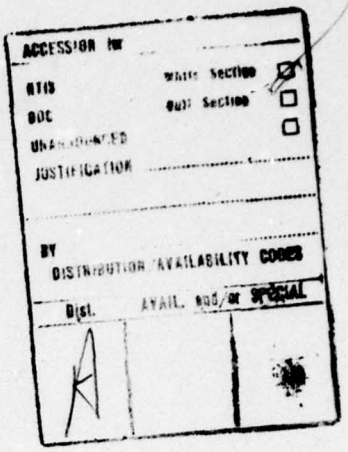
Sincerely yours,

Harry V. Dutchyshyn

HARRY V. DUTCHYSHYN
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Cy furn:
Mr. Dirk C. Hofman, P.E.
Department of Environmental Protection



PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	White's Pond Dam, I.D. NJ 00233
State Located:	New Jersey
County Located:	Bergen
Stream:	Hohokus Brook
Date of Inspection:	May 2, 5 and 6, 1978

Assessment of General Condition of Dam with respect to Safety and Recommended Action with Degree of Urgency

The physical condition of White's Pond Dam is good because of a recently completed (1976) reconstruction of the facility. The spillway is seriously inadequate since it cannot pass the routed PMF and can only pass approximately 17 percent of the PMF without overtopping the dam. A recent serious rainstorm event which occurred on November 8, 1977 has verified the spillway's insufficiency, overtopping the dam's left and right abutments by one to three inches, causing some damages. The watershed of the dam is still in an increasing state of urbanization and ordinary storm event discharges are expected to increase in the future.

It is recommended that a study be undertaken immediately to determine the most effective means of increasing the dam spillway capacity. This study should be completed within 6 months and corrective measures implemented within the year. The present left spillway training wall is poorly oriented and permits spillway discharge water to overtop it and erode the abutment embankment material behind it. This wall should be raised and the abutment regraded and protected with stone riprap. This work should be completed within six months. The source of seepage in the left abutment should be investigated by means of a piezometric survey of this area. This study should be completed within 12 months and corrective measures developed.

Robert Gershowitz, P.E. 20812

(CONTINUED)

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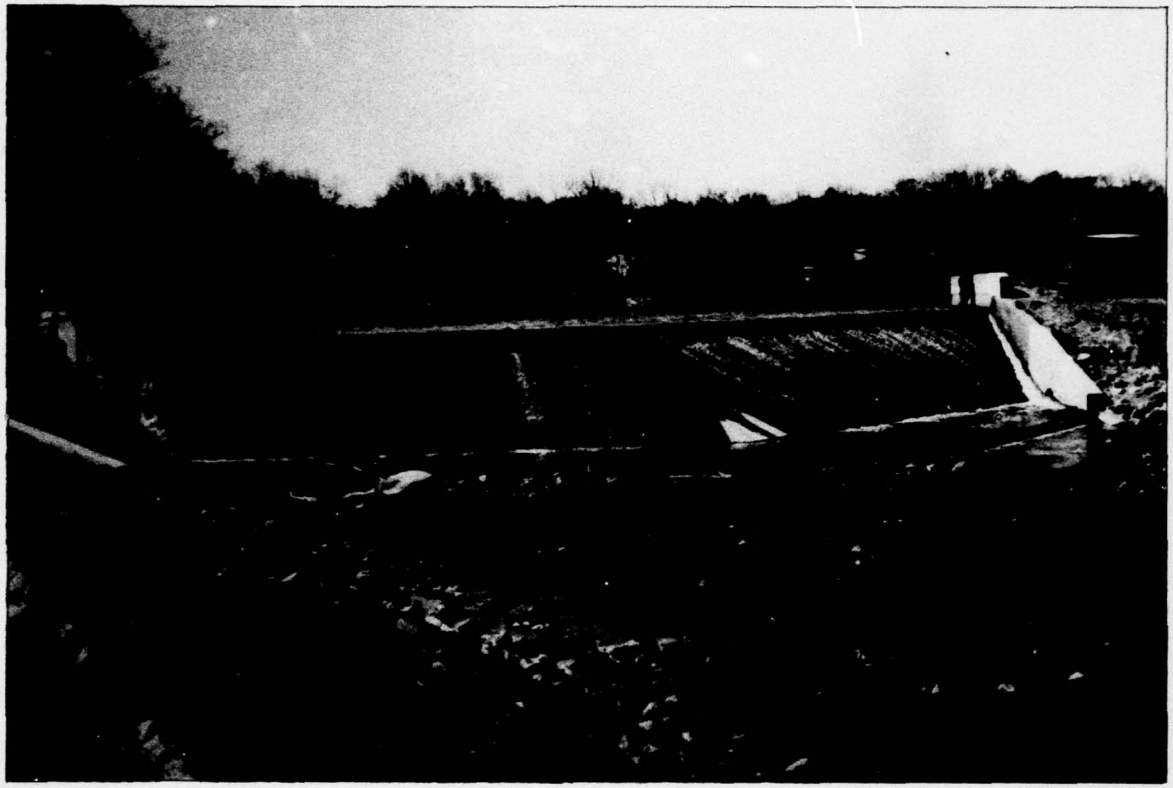
APPROVED: Harry V. Dutchyshyn
HARRY V. DUTCHYSHYN
Colonel, Corps of Engineers
District Engineer

DATE: 31 July 1978



May 1978

WHITE'S POND DAM

PASSAIC RIVER BASIN
WHITE'S POND DAM
BERGEN COUNTY, NEW JERSEY
INVENTORY NUMBER: NJ00233

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Prepared by
HARRIS-ECI ASSOCIATES
Woodbridge, New Jersey
for
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA
JUNE 1978

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PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

WHITE'S POND DAM, I.D. NJ 00233

S E C T I O N 1

1. PROJECT INFORMATION

1.1 General

a. Authority

The Dam Inspection Act, Public Law 92-367 of August 1972 authorizes the Secretary of the Army, through the Corps of Engineers to initiate a national program of dam inspections. The inspection of White's Pond Dam was carried out under Contract DACW61-78-C-0100 to the Department of the Army, Philadelphia District, Corps of Engineers by the engineering firm of Harris-ECI Associates of Woodbridge, New Jersey.

b. Purpose of Inspection

The purpose of the inspection and evaluation is to identify conditions which threaten the public safety and thus permit the correction of the conditions in a timely manner by the owners. The National Inventory of Dams will be updated by the data acquired during the inspection.

1.2 Description of Project

a. General Description of Dam and Appurtenances

White's Pond Dam consists of a central broad crested ungated spillway section between earth abutments. The spillway is vee-shaped in plan. The central spillway section consists of a center concrete core wall varying

in thickness from 18 inches at the top to 4 feet at the base and trenches into the foundation subgrade to a depth of 3 feet. The upstream fill behind the core wall consists of puddled earth laid on a 2 horizontal on 1 vertical slope and terminating at an upstream concrete gravity heel cut-off wall, approximately 8-foot high and founded on the subgrade. The downstream slope of the spillway consists of stone fill laid on a 2 horizontal on 1 vertical slope terminating at its downstream end on a 4-foot high concrete gravity toe retaining wall founded on the subgrade. According to data in the New Jersey Department of Environmental Protection files, the spillway is founded on hardpan. The 8-foot wide flat crest and upper 2 ft.-6 in. of the upstream and downstream spillway slopes between the toe and heel slope retaining walls is paved with a 12 to 15-inch slab of reinforced concrete. The lower portion of the slopes consists of boulders with an unreinforced concrete facing of unknown thickness. The total length of the spillway is 133.5 feet between the wingwalls and the crest is at elevation 229.7 MSL.

The right abutment was rebuilt in 1976, to provide a new low level outlet. The reservoir cut-off on the right abutment is achieved by a 12-foot wide clay core extending down to elevation 212. The right abutment has nominal top width of 10 feet at elevation 232, and is composed of selected backfill on either side of the clay core. The upstream right abutment slope is 2 horizontal on 1 vertical and is surmounted by a concrete cap and low gravity wall whose top elevation is 233 MSL. The right abutment upstream slope is overlain by a 2-foot thick clay blanket extending in elevation between 228 MSL at the top and 217 MSL at the bottom. The cap wall connects to the right abutment spillway wingwall on one end, and to the slightly higher ground forming the right shore

line of the pond on the other. The clay blanket has also been installed on the upstream face of the spillway section on top of the concrete face slab and behind the heel slope retaining wall between the same elevation limits as on the right abutment. The spillway blanket was also placed as part of the 1976 reconstruction. The left abutment is approximately in the same condition as indicated in the original construction plans dating to 1939, consisting of a wide earth section protected at the reservoir side by a concrete gravity cut-off wall approximately 50-ft long.

Downstream of the spillway, a short 14-foot stilling basin has been provided in the 1976 reconstruction containing chute blocks, baffle blocks and a sloping end sill, keyed approximately 3 feet into the channel bottom of Hohokus Creek. A short 7-foot wide section of the downstream spillway chute concrete protection slab was replaced in 1976 to provide a proper connection between the original construction and the new stilling basin (see Section D-D on Drawing 7).

The right abutment spillway wingwall has been extended to provide an outlet for a 54-inch diameter diversion pipe used to control brook water during the 1976 reconstruction. This pipe is now plugged at its upstream end. This wall also serves as the outlet head wall for a 36-inch dia. low level outlet. The low level outlet is controlled by a face mounted 36-inch diameter slide gate. The intake end of the low level outlet rests on the upstream slope of spillway section, and is flared. Local riprap protection has been provided at the low level inlet area.

Downstream of the weir, the channel banks of the Hohokus Brook have been protected with dumped stone riprap for a distance of approximately 200 feet.

The reservoir rim has very gentle and flat slopes to approximately 4 ft. above spillway crest level. The reservoir is subject to considerable sedimentation and has been dredged twice in the last six years.

b. Location

White's Pond Dam is located on Hohokus Brook in the Borough of Waldwick, Bergen County, New Jersey, upstream of the brook crossing at Hopper Ave. Hohokus Brook is a tributary of Saddle Brook, and part of the Passaic River drainage basin.

c. Size Classification

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

d. Hazard Classification

The dam has been classified as having High Hazard Potential in the National Inventory of Dams, on the basis that failure of the dam and its appurtenances would result in excessive damage damage to downstream property together with the possibility of the loss of more than a few lives.

e. Ownership

White's Pond Dam is owned by the Borough of Waldwick.

f. Purpose of Dam

The dam is operated as a Borough recreation facility for small non-powered boating and fishing.

g. Design and Construction History

The dam was designed before 1939 by J. Paul Savage of Oradell, New Jersey, and completed under WPA auspices. The dam was destroyed in 1975 by a combination of previous vandalism and flood damage in the right abutment

area, leaving the spillway and left abutment intact and salvageable. In 1975, the dam was redesigned by Boswell Engineering Company, of Waldwick, New Jersey, and the rebuilding was completed in 1977.

h. Normal Operating Procedures

The normal operating procedure is to allow the stream water to flow over the weir, keeping the low level outlet closed. The low level outlet is not opened during rain storms. The low level outlet is used to draw-down the water level in the reservoir for reservoir dredging purposes.

1.3 Pertinent Data

The Hohokus River watershed above White's Pond Dam is in a hilly area with sparse cultivated areas and woodland mixing with low density residential area. A drainage map of the watershed of the White's Pond Dam is presented on Plate 1, Appendix D.

a. Drainage Areas

At dam axis, drainage area is 14.85 square miles.

b. Discharge at Dam Site

Maximum known flood at dam site:	Estimated at 3200 cfs on Nov. 8, 1977, dam abutments were overtopped
Warm water outlet at pool elevation:	43 cfs at pool elevation 229.7 (low level outlet)
Diversion tunnel low pool outlet at pool elevation:	NA
Diversion tunnel outlet at pool elevation:	NA
Gated spillway capacity at pool elevation:	NA
Gated spillway capacity at maximum pool elevation:	NA
Ungated spillway capacity at maximum pool elevation:	3100 cfs at elevation 233.0
Total spillway capacity at maximum pool elevation:	3100 cfs at elevation 233.0

c. Elevation (feet above MSL)

Top dam:	Elevation 233.0
Maximum flood control pool:	NA
Full flood control pool:	NA

Recreation pool:	229.7
Spillway crest:	229.7
Upstream portal invert diversion tunnel:	NA
Downstream portal invert diversion tunnel:	NA
Streambed at centerline of dam:	219.2±
Maximum tailwater:	Elevation 223.2 at Q = 2310 cfs; no other rating stages available

d. Reservoir

Length of maximum pool:	1,600 feet (estimated)
Length of recreation pool:	1,000 feet
Length of flood control pool:	NA

e. Storage (acre-feet)

Recreation pool:	56.8 AF
Flood control pool:	NA
Design surcharge:	82.7 AF at elevation 233
Top of dam:	82.7 AF at elevation 233

f. Reservoir Surface (acres)

Top dam:	Area = 7.5 acres at elev. 233
Maximum pool:	Area = 7.5 acres at elev. 233
Flood-control pool:	NA
Recreation pool:	Area = 7.1 acres at elev. 229.7
Spillway crest:	Area = 7.1 acres at elev. 229.7

g. Dam

Type:	Earth and cobble fill with earth abutment
Length:	250 feet
Height:	10.5 feet maximum
Top width:	8 feet (spillway section)
Side slopes - Upstream:	1 on 2 (spillway)
- Downstream:	1 on 2 (spillway)
Zoning:	Puddled earth U/S; cobble fill D/S
Impervious core:	18-in. thickness concrete core wall (min.)
Cutoff:	None
Grout curtain:	None

h. Diversion and Regulating Tunnel

Type:	54-inch diameter, plugged
Length:	NA
Closure:	NA
Access:	NA
Regulating Facilities:	NA

i. Spillway

Type:	Ungated, paved, earth and cobble fills
Length of weir:	133.5 feet
Crest elevation:	229.7
Gates:	None
U.S. Channel:	None
D/S Channel:	Stilling basin - 14-ft.long

j. Regulating Outlets

Low level outlet:	36-inch diameter
Controls:	36-inch diameter slide gate, manually operated
Emergency gate:	None
Outlet:	Into stilling basin

SECTION 2

2. ENGINEERING DATA

2.1 Design

A complete set of drawings exists for White's Pond Dam reconstruction, dated September 1976. This set concerns itself only with reconstruction aspects and does not show pertinent details of the original construction. Several other drawings relating to the original dam designed were recovered from the files of the New Jersey Department of Environmental Protection. No design computations for either the reconstructed or original dam were made available for this inspection. A selection of design drawings relating to the original and reconstructed dam are included in Appendix B. A check list for Engineering Data is included in Appendix A.

2.2 Construction

The available data on construction uncovered for this report are the reports in the files of the N.J. Department of Environmental Protection relating to the progress of the reconstructed dam facility. Colored photographs depicting the progress of the reconstruction of White's Pond Dam in 1976 were available and inspected in the offices of the design engineer, Boswell Engineering Company, of Waldwick, New Jersey.

2.3 Operation

No records are kept of the water level in the reservoir behind the dam. The reservoir is not regulated and water is allowed to flow over the spillway according to the reservoir inflow. The low level outlet is normally never opened except to lower the reservoir surface to accomplish pond dredging. The owners have stated that the gate is operable.

2.4 Evaluation

a. Availability

The availability of engineering data is not considered fully adequate to assess the safety of the structure for the Phase I inspection. Missing data pertains to the length of the upstream reservoir wall on the left abutment and the properties of the soil in the left abutment section. Additional data is needed pertaining to the tailwater rating curve. A check list of Engineering, Construction, and Maintenance Data is included in Appendix A.

b. Adequacy

The engineering data assembled is not considered fully adequate for the Phase I inspection. Additional data is needed to assess the seriousness of the left bank seepage which was observed to be daylighting downstream of the left spillway training wall.

c. Validity

There is no reason to suspect that the engineering data acquired is not valid or representative of the dam as it stands. We have checked the available contract plans visually with what is actually built and cannot detect any significant deviations without a full scale detailed as built survey, which is not considered necessary for this phase.

SECTION 3

3. VISUAL INSPECTION

3.1 Findings

a. General

White's Pond Dam as recently reconstructed is in relatively good condition, but has suffered some damage due to overtopping during the rainstorm of November 8, 1977, and exhibits some leakage on the left abutment. The visual inspection check list is included in Appendix A.

b. Dam

1. Seepage and Leakage

Seepage was observed coming out of the left channel bank, some 20 feet downstream of the end of the left spillway training wall and is 10 feet in lateral extent. The seepage volume is estimated at 1-2 gpm. The source of the water is thought to be the reservoir, passing through the left abutment.

2. Structures to Abutment Section

The spillway is separated from the abutment sections by training walls. On the left abutment, the upstream reservoir wall connects to the wingwall and is meant to achieve reservoir cutoff. On the right abutment, a clay core extends from the spillway training wall to naturally higher ground. Leakage in the left abutment raises doubts about the effectiveness of head-water cut-off.

3. Drains

A series of drains were installed in 1976 in the toe of the spillway to drawdown the water level in the cobble fill downstream of the cutoff wall and to discharge the water flow into the stilling basin. These drains appear to be performing adequately.

4. Foundation

No information as to the subgrade is available on the contract drawings. Data in the files of the New Jersey Department of Environmental Protection list the foundation in the 1976 reconstruction application as "Sandstone and bedrock". The original permit application in 1939 lists the foundation as hard pan. No rock was uncovered in the 1976 reconstruction in the right abutment. The clay cut-off core on the right abutment adjacent to the spillway went down to elevation 212, the level of the concrete core wall at the center of the spillway. The clay cutoff did not encounter hardpan and terminated in a sandy material.

The dam and reservoir at some depth are underlain by red, fine-grained sandstone (Brunswick Formation). No outcrops were noted, but what appears to be residual red sand lines the reservoir shore. Materials occurring downstream of the left abutment are either residual sands, fill or river deposited gravels and sand. The latter origin is least likely at this time.

5. Surface Cracks on Concrete Surfaces

Small isolated cracks were noted on right downstream face of the Vee shaped spillway section. Spillway facing concrete is in fair or serviceable condition. The existing upstream reservoir wingwall on the left abutment has been raised since the original construction and is in fair serviceable condition. The construction joint at the interface between new and old concrete is poorly formed and misaligned. The stilling basin floor chute blocks and end sill were under tailwater and could not be observed. There was no structural cracking observed any place, and all horizontal and vertical alignments seemed acceptable.

6. Embankment Sections at Both Abutments

- Left Abutment

The leakage in the left abutment has been described above. The left abutment is a massive low lying wide fill area and has served in effect as an

auxiliary spillway when the dam was overtopped, eroding the downstream channel bank riprap by undermining it. The resulting sloughing and slumping can be noticed in a local area 10-foot long. The poor geometric orientation of the left spillway training wall causes spillway water at high discharges to jump over the wall and erode the fill behind it. This action is potentially dangerous to the stability of spillway section and left abutment, if left uncorrected.

- Right Abutment

No signs of distress or leakage were observed, even though the area was overtopped in November 8, 1977.

7. Outlet Works

The concrete surfaces were all in good condition.

White's Pond Dam contains a single manually operated 36-inch diameter circular sluice gate located on the extension of the right spillway training wall on the right side of the spillway. The gate is a handwheel operated rising stem type, designed for unseating pressure (Armco Model No. 20-100), and can be used for by-pass or reservoir drawdown.

This gate is located at the end of a 36-inch diameter reinforced concrete pipe leading from the flared intake on the upstream face of the embankment, invert elevation 221.0 MSL.

There was a leak of approximately 10 gpm coming from between the sluice gate frame and the face of the concrete spillway training wall extension to which the frame was anchored. No structural failure of anchor bolts or concrete could be found. The leakage is most likely due to failure of grouting or caulking compound.

In general, the sluice gate was in good condition. The gate operating mechanism was protected from unauthorized operation by a chain link fence enclosure. The gate wheel is stored with the Waldwick Borough Department of Public Works.

A 54-inch diameter reinforced concrete pipe passes under the right abutment and exits in the right spillway training wall extension to the right of the 36-inch low level outlet. This pipe was used for stream diversion and has been plugged at its upstream end. It appears to be conveying a very small amount of leakage water of undetermined origin. This leakage is not considered serious. The grating planned in 1976 was missing at the time of the visual inspection.

c. Appurtenant Structures

There are none in this installation.

d. Reservoir Area

The reservoir rim is very flatly sloped approximately up to the top of dam level, elevation 233. During the November 8, 1977 storm, the reservoir rim was overtopped on the left pond shore. This area has subsequently been regraded to prevent the recurrence of such an overtopping. There has been considerable sedimentation in the pond and it has been dredged twice in the last six years.

e. Downstream Channel

The downstream channel is well defined and has had dumped riprap bank slope protection installed in the 1976 reconstruction for a distance of approximately 200 feet downstream of the stilling basin. The riprap has slumped locally due to undercutting by overtopping water on the left abutment. The channel is clean and generally unobstructed.

3.2 Evaluation

The principal weakness in the dam exists in the left abutment area:

- There is seepage water apparently coming through the abutment and existing in downstream stream bank.

- The left spillway training wall is too low, and has been overtopped causing considerable erosion behind the wall and tending to endanger the stability of the left abutment and the spillway section.

- The left abutment has been overtopped within the last year and has caused local bank riprap failure.

- The left abutment, as well as the right one, is of insufficient height to pass moderately severe floods safely over the spillway without overtopping.

SECTION 4

4. OPERATIONAL PROCEDURES

4.1 Procedures

White's Pond Dam is operated as simple overflow structure. There is no attempt to regulate flows by means of the low level outlet gate. The dam is maintained and attended in conjunction with the recreational facilities at the pond by the Waldwyck Borough Department of Public Works.

4.2 Dam Maintenance

There is no regularly scheduled dam maintenance program due to the newness of the reconstruction.

4.3 Maintenance of Operating Facilities

The operating controls are maintained in conjunction with normal visits to the recreation facilities at White's Pond Dam.

4.4 Description of any Warning System in Effect

No warning system has been established to alert downstream residents of possible dam misfunction, overtopping or high stream stages.

4.5 Evaluation

Operational procedures are simple in line with the simple facilities. A formal annual inspection should be initiated utilizing the current format of the Corps of Engineers check list. Logs should be kept of the operation and maintenance of the low level outlet gate. Records should be kept of water levels during unusual storm events and pond dewaterings. A staff gage should be installed to aid in these loggings, keyed to the crest elevation of the spillway.

SECTION 5

5. HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

The evaluation of the hydraulic and hydrologic features of the White's Pond Dam was based on criteria set forth in the Corps' Guidelines and additional guidance provided by the Philadelphia District, Corps of Engineers. The Probable Maximum Flood (PMF) was calculated from the Probable Maximum Precipitation (PMP) using Hydrometeorological Report #33 with standard reduction factors. The Snyder method was adopted for deriving the unit hydrograph. The Snyder unit hydrograph coefficients of C_t = 2.7 and 640 Cp = 400 were used.

Initial and infiltration loss rates were applied using SCS procedure to the Probable Maximum Storm rainfall to obtain rainfall excess. The rainfall excess was then applied to the unit hydrograph utilizing the computer program HEC-1.

The computed peak discharge of PMF and one half of the PMF are 15,829 cfs and 7,914 cfs respectively.

Both the PMF and one half PMF inflow hydrographs were routed through the reservoir by the modified Puls method,also utilizing computer program HEC-1. The peak outflow discharges for the PMF and one half of PMF are 15,587 cfs and 7,908 cfs respectively. Both the PMF and one half of the PMF result in overtopping of the dam.

A spillway rating curve was derived using spillway dimensions and characteristics provided in the construction drawing. The reservoir stage-capacity curve above the spillway crest was obtained from available

data provided by Boswell Engineering Company, Ridgefield Park, New Jersey, and supplemented by planimetering U.S.G.S. 7.5 minutes quarangle sheets. The spillway rating curve and the reservoir stage-capacity curve are presented in Plates 2 and 3 of Appendix D respectively.

b. Experience Data

The only significant flood since the reconstruction of the dam occurred on November 8, 1977, and had an estimated discharge of 3,200 cfs and a reservoir elevation of 233.1 (estimated), overtopping the dam by approximately one inch.

c. Visual Observations

It was noted the sluice gate was leaking. There was no evidence of excessive sedimentation due to recent developments in the drainage basin which could cause a sudden increase in sediment load which may pose danger to the dam. The reservoir has been dredged periodically. Severe erosion was observed at the back of the left spillway training wall which occurred as a result of the November 1977 flood.

d. Overtopping Potential

An indicated in item a. above, both the Probable Maximum Flood and the one half of the Probable Maximum Flood, when routed through White's Pond reservoir, result in overtopping the dam. The PMF and one half PMP overtopped the dam by 1.65 feet and 0.7 feet respectively.

The spillway is only capable of passing a flood equal to about 17 percent of the PMF without overtopping the dam. Since PMF is the Spillway Design Flood (SDF) for this dam according to the Recommended Guidelines for Inspection of Dams by the Corps, the spillway capacity of the White's Pond Dam is considered"inadequate".

SECTION 6

6. STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The spillway weir has withstood floods since its construction in 1939. The addition of a small stilling basin downstream of the toe enhances its ability to withstand potential progressive failure by undercutting of the downstream channel invert. The earth abutments are wide and massive and structurally stable provided they are not overtopped or weakened by loss of material by seepage.

b. Design and Construction Data

There are no computations available for review to assess the stability or how the configuation was arrived at. No engineering design parameters are available for the cobble fill downstream of the core wall or the earthfill on the upstream side. No data is available for the location of the phreatic line through the spillway section. The addition of drains at the toe of the downstream cobble fill slope, draining any leakage through the core wall into the stilling basin is a further positive step enhancing the stability. The clay blanket installed at the right abutment and spillway also improves the stability of these two sections.

The stability has been reviewed for this report and on the basis of the configuration, slopes, core wall, and fill zoning, combined with the small height of dam lead to the conclusion that the stability of the spillway section is not in question. However, a more definitive and quantified analysis can only be made on the basis of further data acquisition pertaining to the embankment and foundation materials.

c. Operating Records

No operating records are available to further assess the stability of the dam.

d. Post Construction Changes

The stability of the spillway has been enhanced in 1976 reconstruction by the addition of the following features:

- A stilling basin was added downstream of the spillway to control erosion of the downstream channel invert.
- The downstream slope cobble fill was drained by the addition of drains at the toe of the fill draining into the stilling basin.
- A 2-foot thick clay blanket was placed over the upstream concrete facing slab to improve the water tightness of the structure.

e. Seismic Stability

In general, projects located in Seismic Zone 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.

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 Phase I Report.

The safety of White's Pond Dam is in question because the dam does not have adequate spillway capacity to pass the PMF or even one half of the PMF. When reservoir inflows exceed the spillway discharge capacity, the adjacent left abutment is overtopped and acts as an auxiliary spillway with attendant dangers of eroding the abutment. The top of the right abutment cap wall is only one or two inches above the left abutment surface and can also be easily overtopped.

Previous history of dam structures at the site show that a structure of the particular design and details now standing there is vulnerable to damage at high reservoir inflows. The most recent storm event in November 1977 overtopped both abutments and caused some damage which fortunately did not lead to serious failure. In this event, the overtopping was a matter of one or two inches, but overtoppings of greater depth having greater kinetic energy could seriously erode the abutments and lead to dam failure. The geometry of the left spillway training wall is poor, allowing spillway water to overtop it and erode the abutment embankment material behing it. Even though the seepage in the left abutment is not of great quantity, it adds to the uncertainties in regard to safety of the left abutment.

b. Adequacy of Information

Information available at this report writing is adequate for formulating the assessment made above. Information on the fill and foundation material properties of the spillway section would allow a quantified stability assessment to be made but this part of the dam is not thought to be the weakest link at the present.

A piezometric survey of the left abutment is needed to establish the phreatic surface in order to properly assess the source of the seepage emanating from the left stream channel bank, and its effect on the stability of the abutment.

c. Urgency

The studies to augment the spillway discharge capacity should be undertaken immediately and a recommended plan of action should be formulated within a twelve-month period. A piezometric survey to determine water levels in the left abutment should be undertaken to determine the source of seepage and its effect on the abutment stability. This survey should be completed within twelve months. Modification of the left spillway training wall and repair of channel bank erosion and sloughing in back of it should be completed within a six-month period.

d. Necessity for Additional Studies

Based on the findings above, it is recommended that the owner engage a consultant to undertake further studies to provide for augmenting the spillway capacity of White's Pond Dam and the determination of the source of seepage in the left abutment and its effect on the stability. A study evaluating the effect of a dam break during PMF should also be made.

7.2 Remedial Measures

a. Alternatives

The alternatives available in increasing the spillway capacity are:

1. Increasing the dam height at the abutments thus permitting a higher discharge to flow over the spillway without overtopping the abutments.

2. Providing for an auxiliary spillway on the left abutment by "hardening" the top of the abutment and reentry path to the downstream brook channel sufficiently to withstand emergency flows of PMF or one half PMF magnitude.

3. Providing for a new service spillway, adjacent to the existing spillway, possibly gated, and utilizing the present spillway as an auxiliary discharge facility.

Other recommended actions are:

- Heightening of the left spillway training wall to prevent overtopping during high spillway discharges.

- Regrade and protect the present eroded areas in back of this wall.

- Repair sloughed riprap bank protection downstream of the left spillway training wall damaged by the November 8, 1977 overtopping.

- Anchor the 36-inch dia. low level outlet gate frame firmly in order to eliminate presently observed leakage.

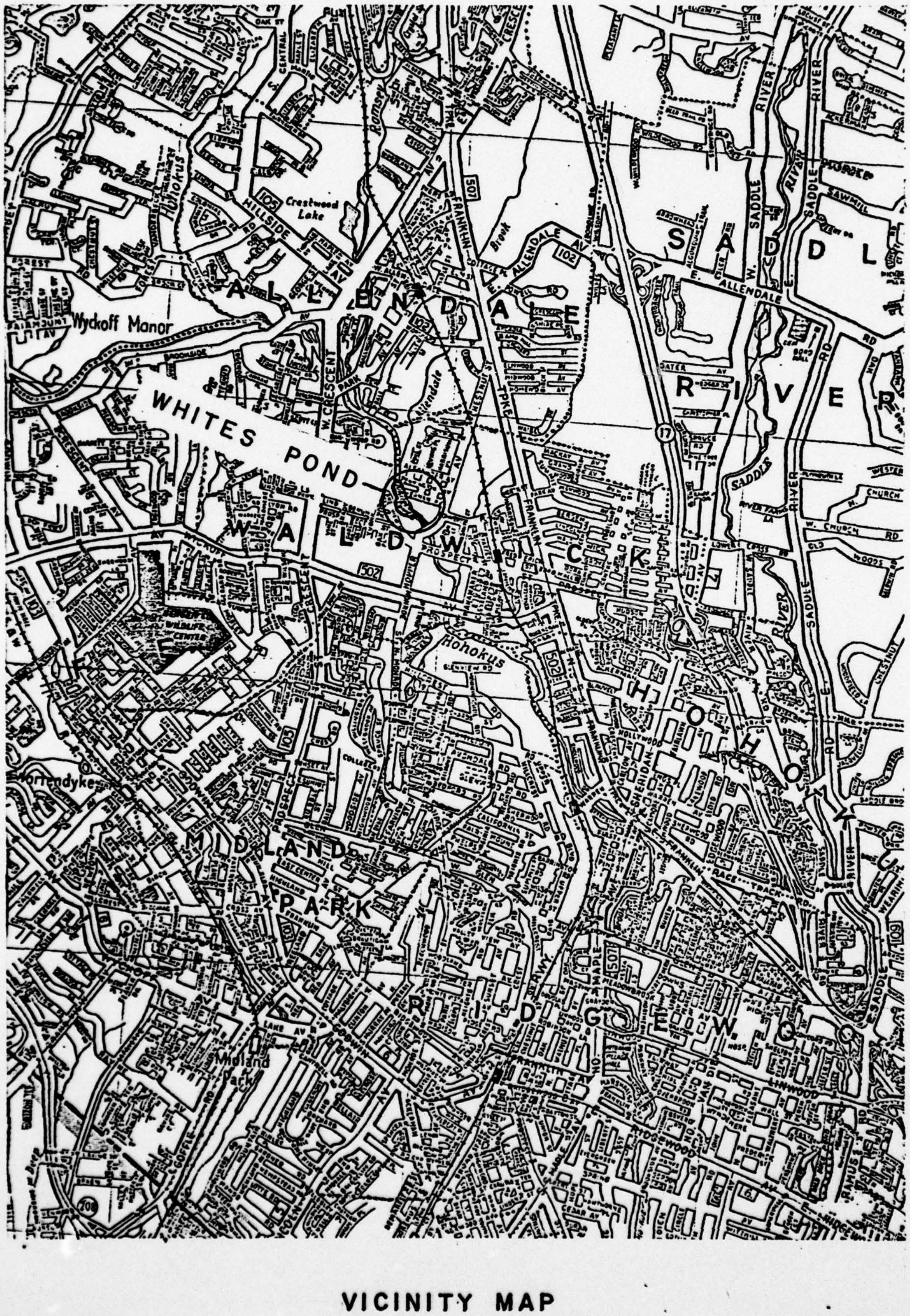
b. O & M Procedures

The owner should initiate a program of annual inspection of the dam utilizing the standard visual check list used in this report. The stilling basin should be dewatered at 5-year invervals and inspected for damage to the energy dissipating elements. The first such inspection should be made within twelve months.

A gage should be installed at the dam and read during severe rainstorms and at routine operating and maintenance visits to the dam. A permanent log should be kept of all maintenance and operating events of the dam, the pond and the low level outlet gate.

Access to the facility during flooding would be difficult.

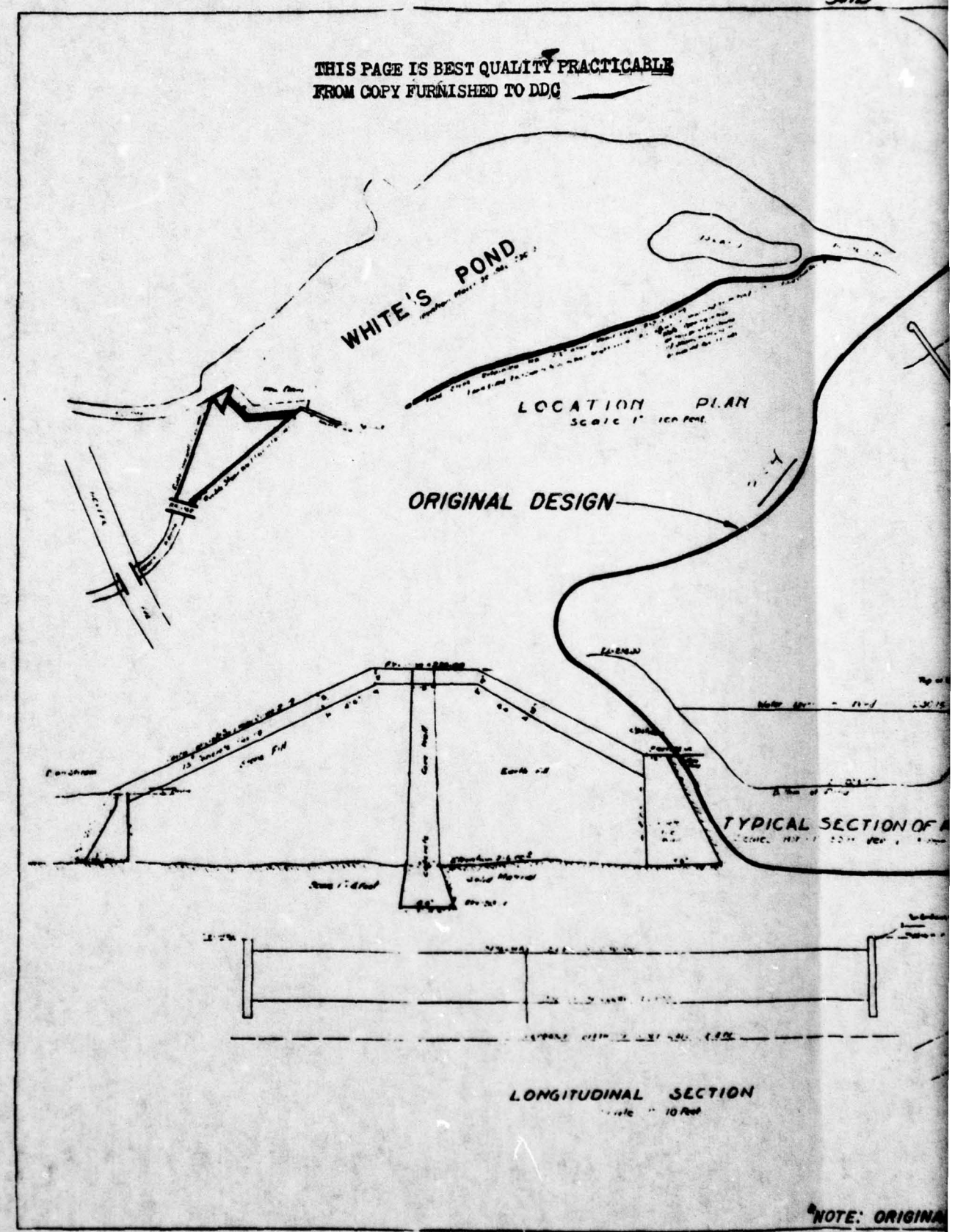
PLATES



VICINITY MAP

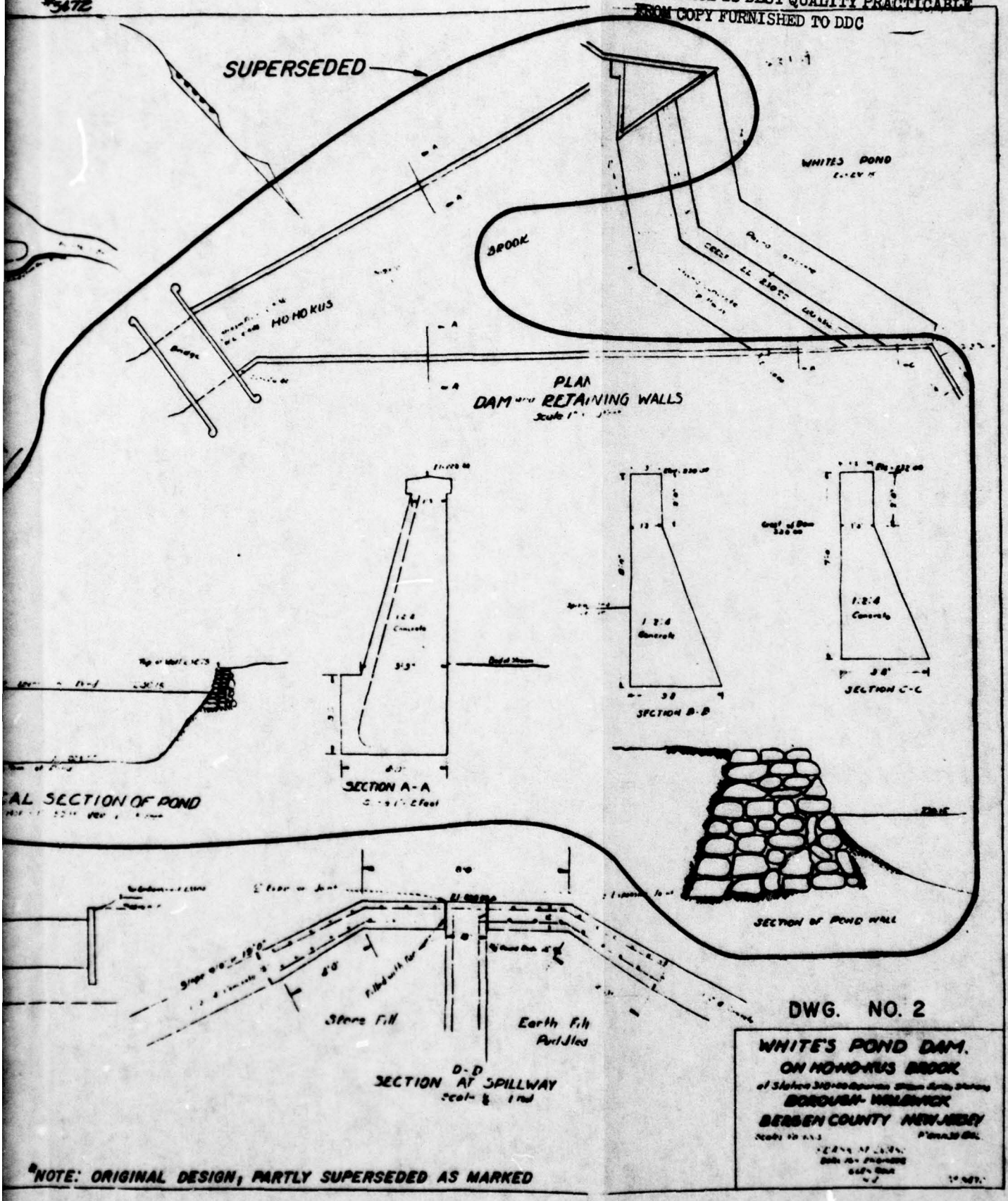
DWG. NO. I

#3472



NOTE: ORIGINA

#3672

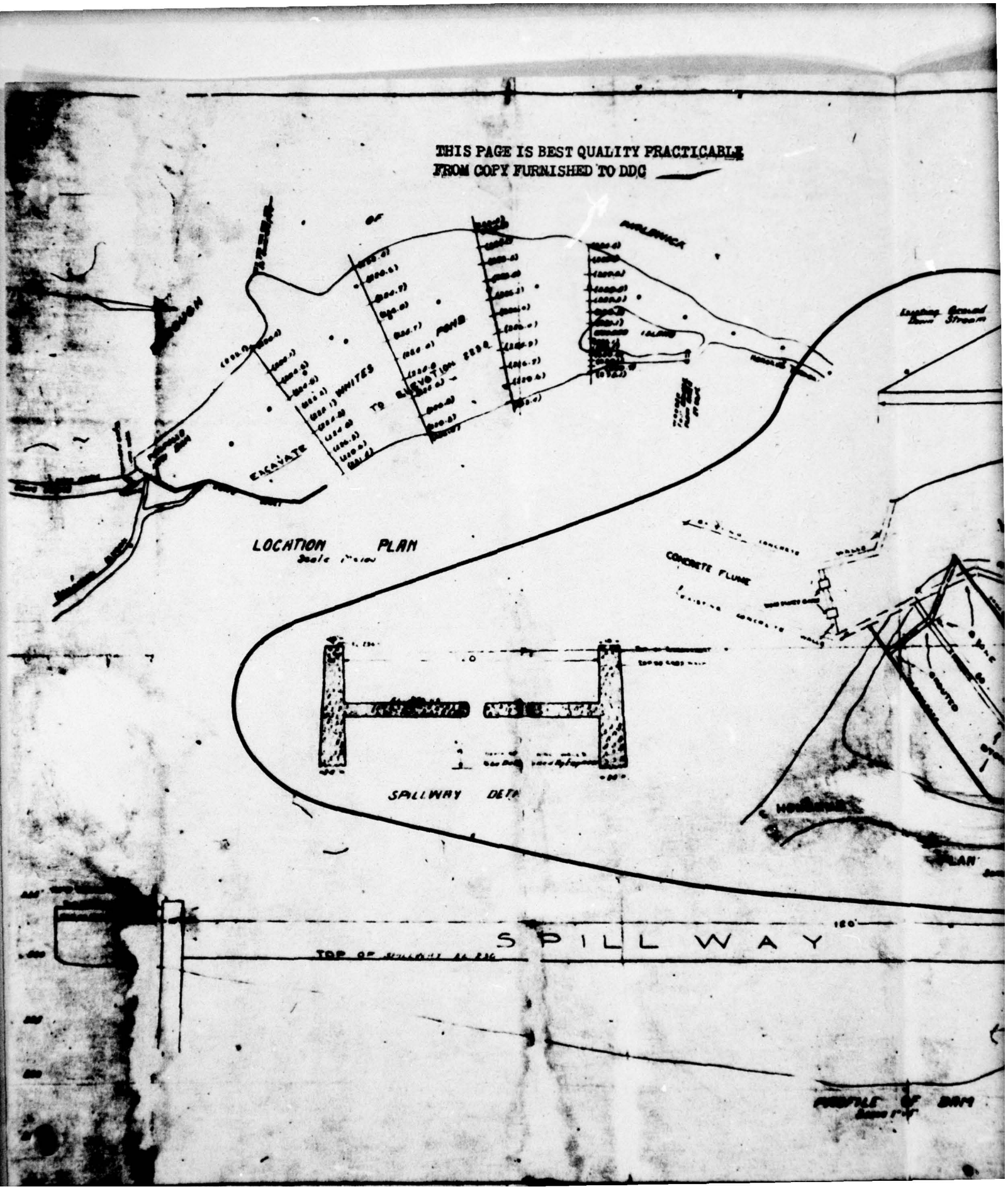


DWG. NO. 2

WHITE'S POND DAM.
ON HOHOKUS BROOK
BOROUGH- WALDWICK
BERGEN COUNTY NEW JERSEY

*NOTE: ORIGINAL DESIGN, PARTLY SUPERSEDED AS MARKED

2



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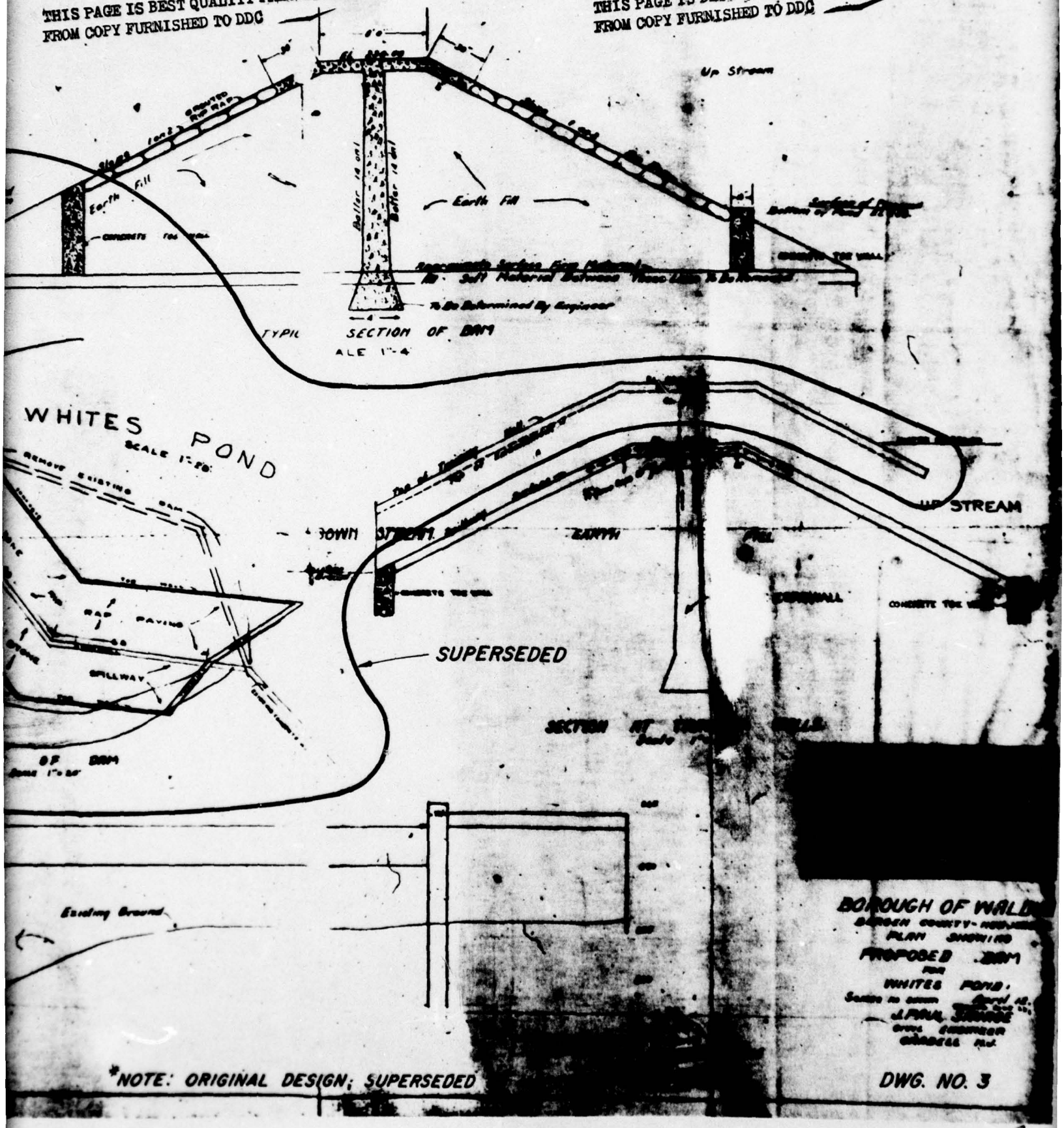
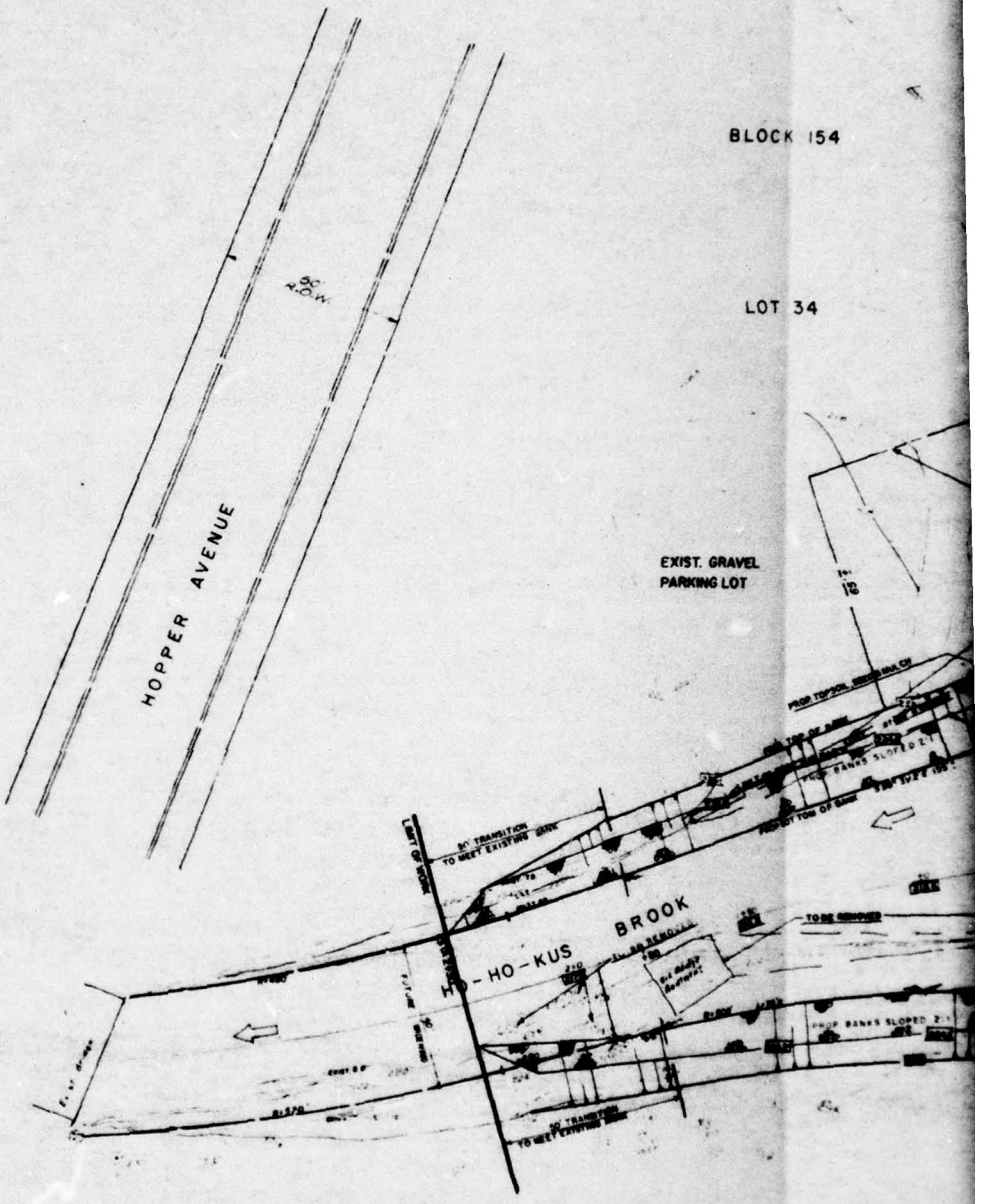
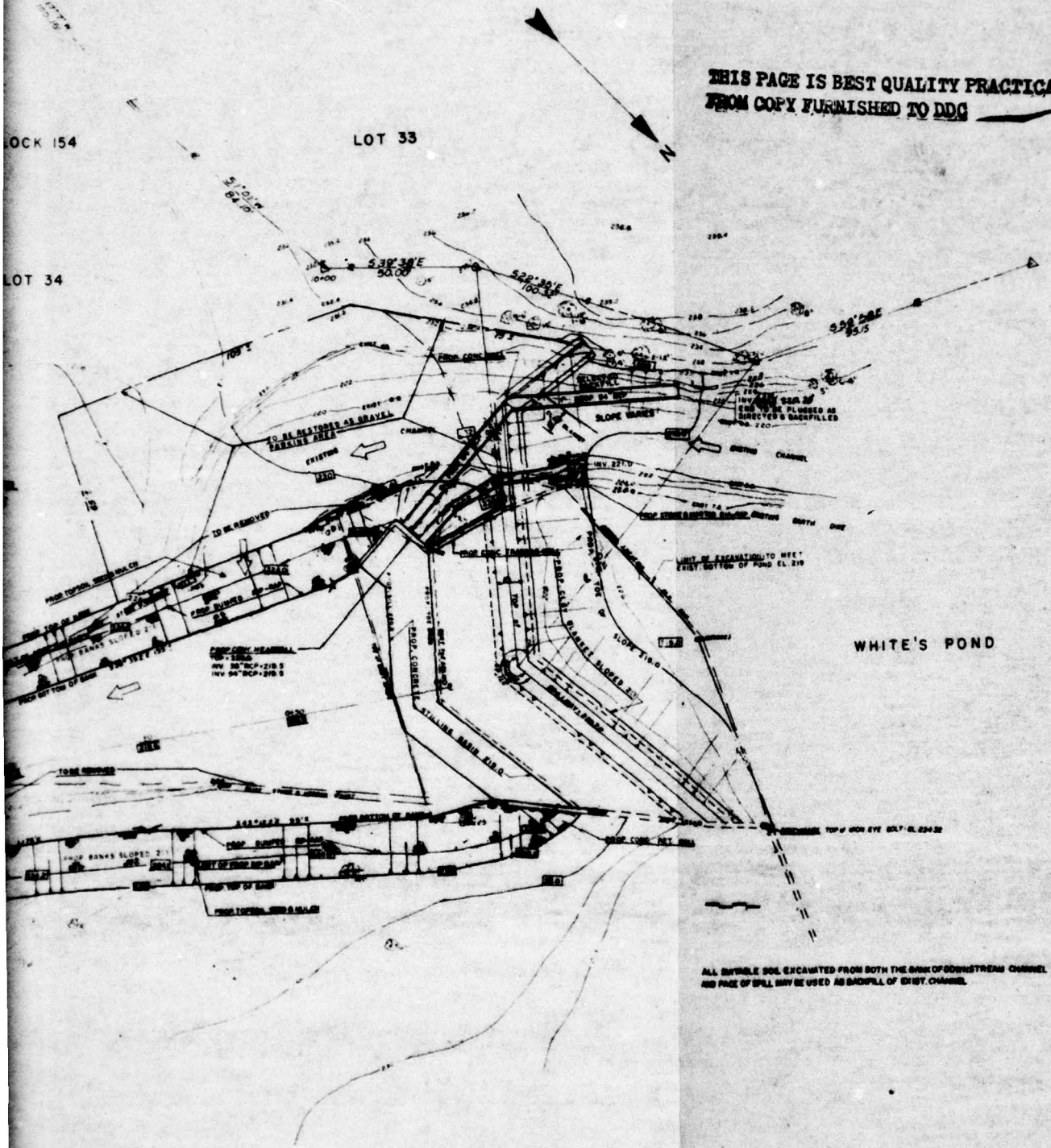


BOROUGH OF WALD
BERGEN COUNTY - NEW JERSEY
PLAN SHOWING
PROPOSED DAM
FOR
WHITES POND.
Scale as shown April 19
J. PAUL SHORE
CIVIL ENGINEER
GARFIELD N.J.

*NOTE: ORIGINAL DESIGN; SUPERSEDED

DWG. NO. 3





DWG. NO. 4

RECONSTRUCTION OF WHITES POND DAM
BOROUGH OF WALDWICK
BERGEN COUNTY, NEW JERSEY
SITE PLAN

SCALE 1"=20'

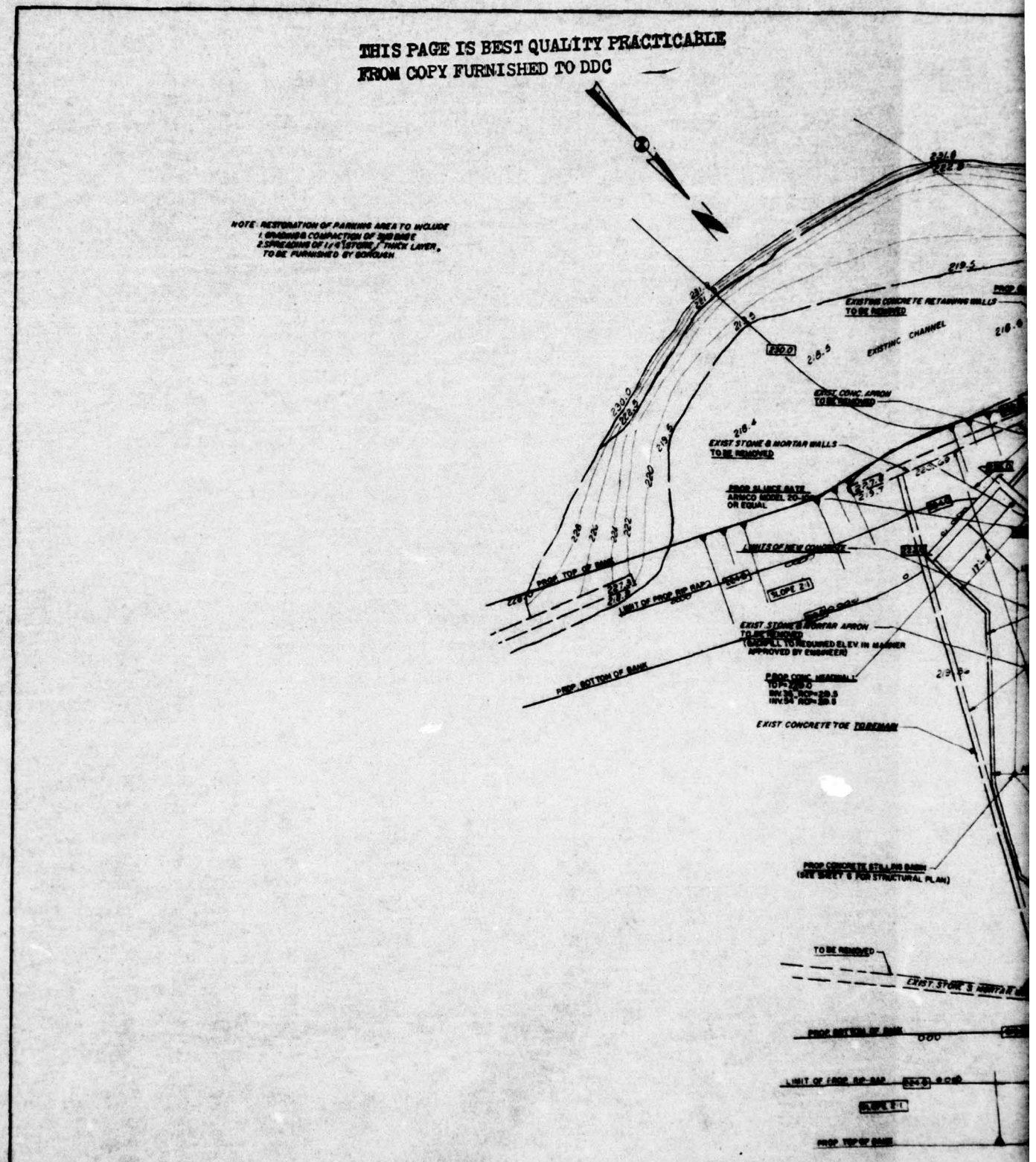
BOSWELL ENGINEERING CO.
CONSULTING ENGINEERS

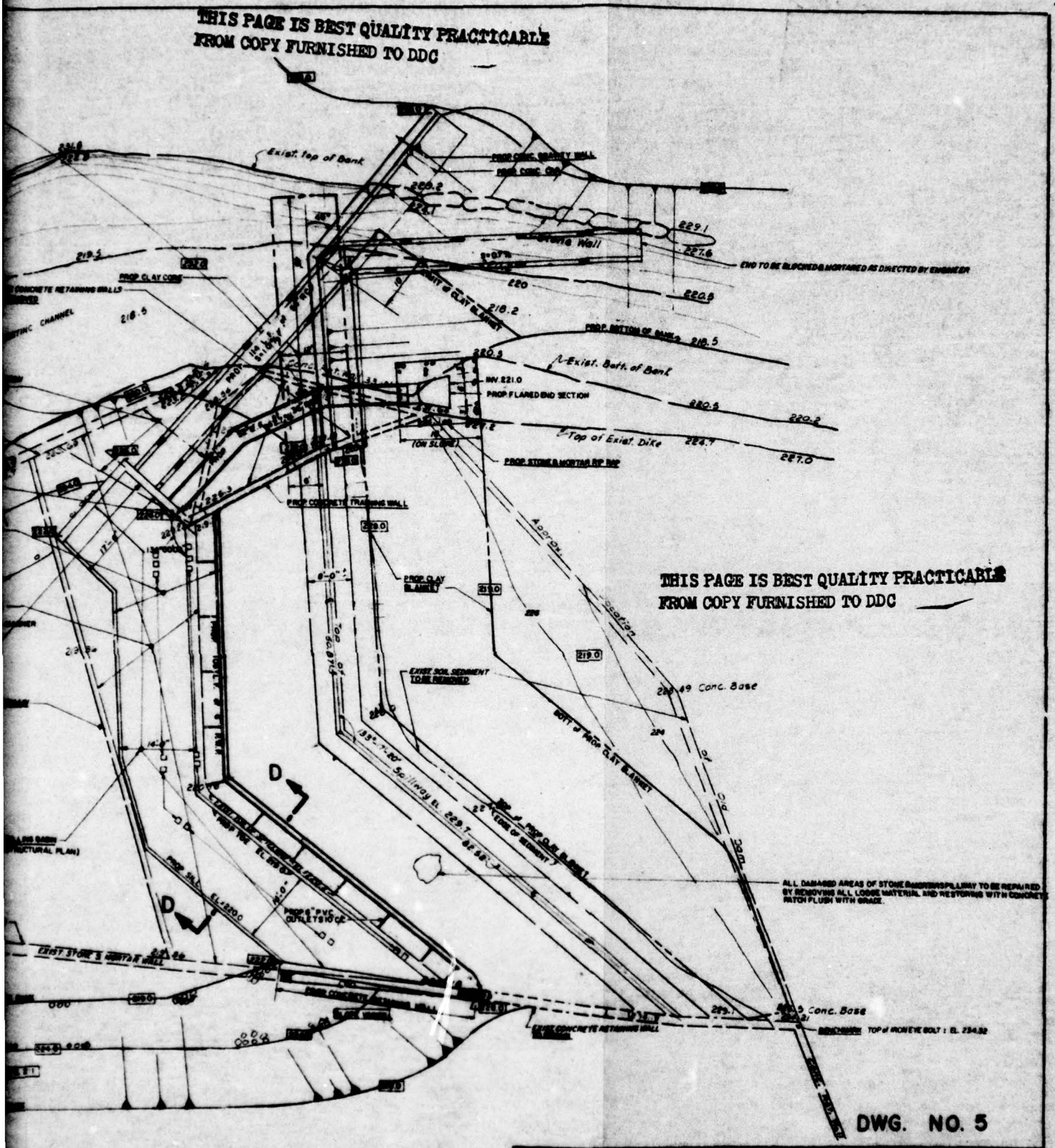
HOWARD L. BOSWELL N.J.P.E.&L.S. NO. 7613

JOB NO. WA - 719

SHEET NO. 2 of 8

2





DWG. NO. 5

RECONSTRUCTION OF WHITES POND DAM
BOROUGH OF WALDWICK
BERGEN COUNTY, NEW JERSEY
PLAN VIEW

SCALE: 1" = 10'

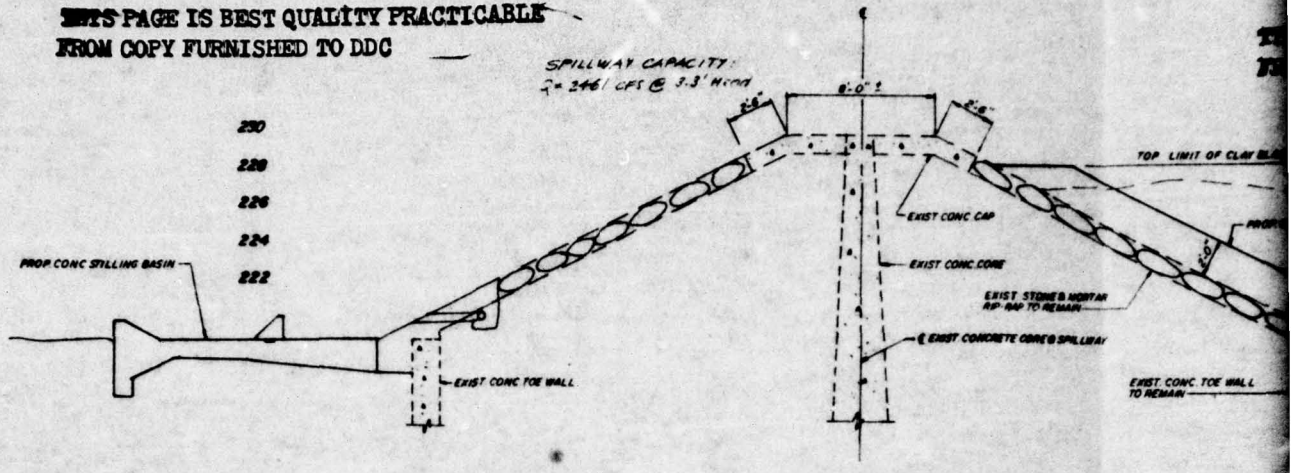
BOSWELL ENGINEERING CO.
CONSULTING ENGINEERS

HOWARD L. BOSWELL N.J.P.E. & L.S. 7813

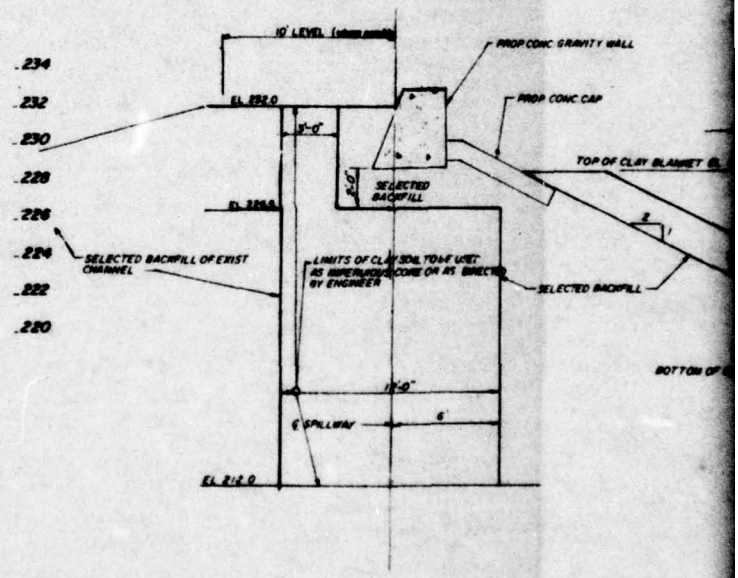
JOB NO. WA-719

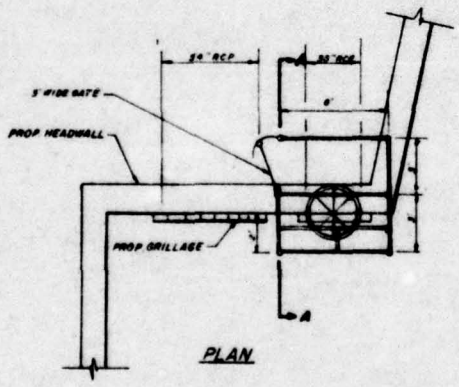
SHEET NO. 3 of 8

2



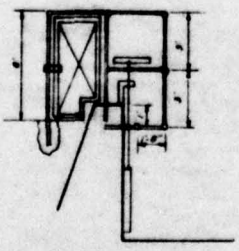
TYPICAL SECTION – EXISTING SPILLWAY
SCALE 1"=4'-0"





PLAN

TYPICAL SECTION - SOUTH OF EXISTING SPILLWAY
SCALE 1"=4'-0"
NOTE: ALL SELECTED BACKFILL & CLAY TO BE COMPACTED TO 95% STANDA



1 ALL POSTS EMBEDDED IN CONCRETE - 3" DIA.
2 ALL OTHER POSTS - 2 1/2" DIA.

SECTION A-A

PROPOSED CAGE SLUICE GATE PROTECTION
SCALE 1"=4'

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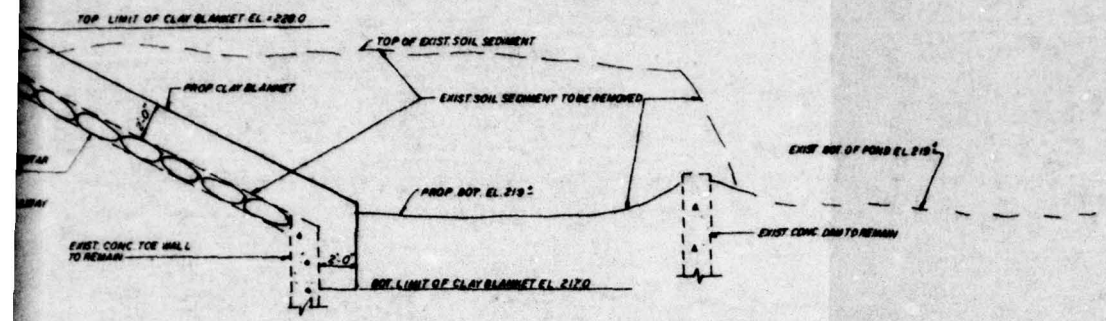
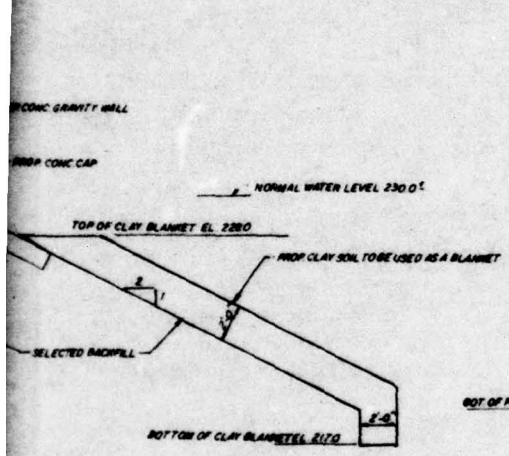
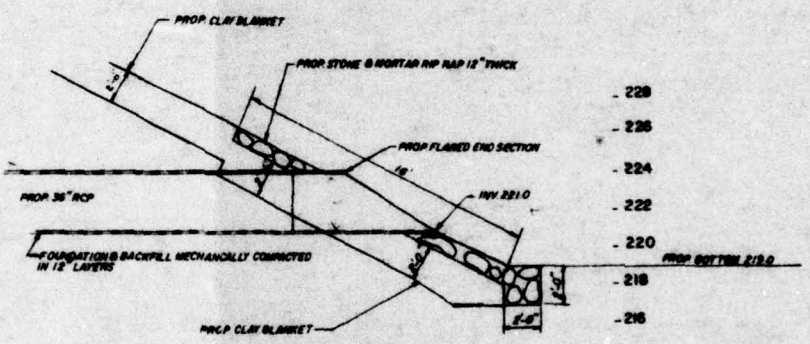
NOTE: EXIST SEDIMENT TO BE REMOVED FROM FACE OF SPILLWAY TO ALLOW PLACEMENT OF CLAY BLANKET AS SHOWN







DETAIL - STONE & MORTAR RIP-RAP ADJACENT TO INLET 36" RCP

SCALE 1"=4'

TING SPILLWAY

BE TO BE COMPACTED TO 95% STANDARD PROCTOR

DWG. NO. 6

REVISIONS	BY	DATE

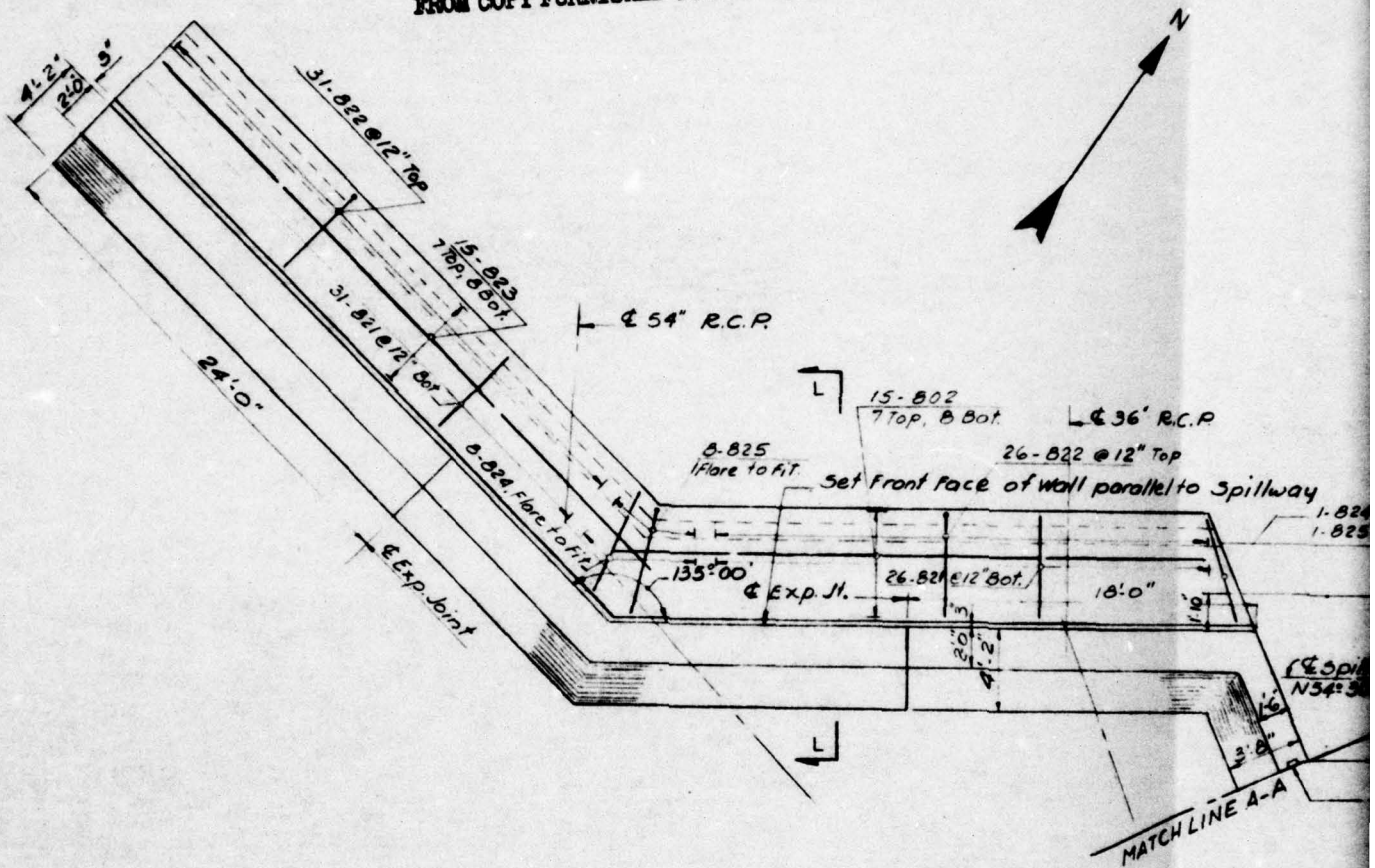
RECONSTRUCTION OF WHITES POND DAM
BOROUGH OF WALDWICK
BERGEN COUNTY, NEW JERSEY
TYPICAL SECTIONS

SCALE AS SHOWN

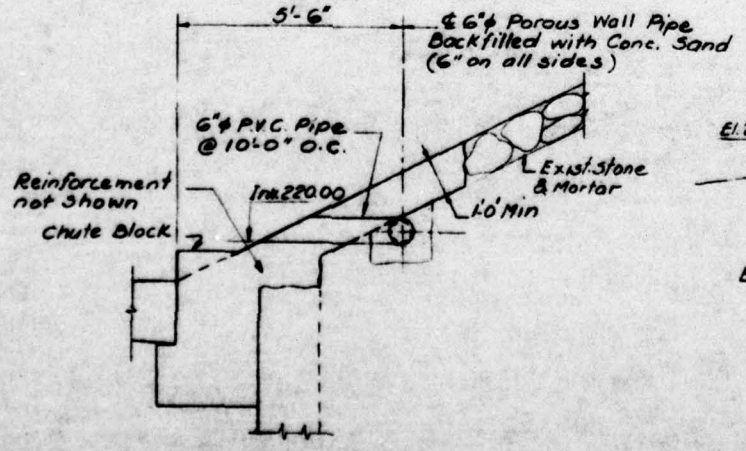
DEC. 1978

BOSWELL ENGINEERING CO
CONSULTING ENGINEERS
HOWARD L. BOSWELL N.J. P.E. & L.S. No 7613
WALDWICK, N.J. RIDGEFIELD PARK, N.J.

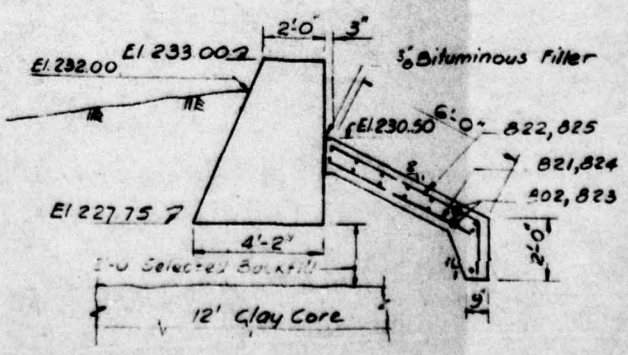
JOB No WA - 719 | SHEET NO. 4 of 8



PLAN
Scale: 1/4" = 1'-0"



SECTION H-H
Scale: 1/2" = 1'-0"



SECTION L-L
Scale: 3/8" = 1'-0"

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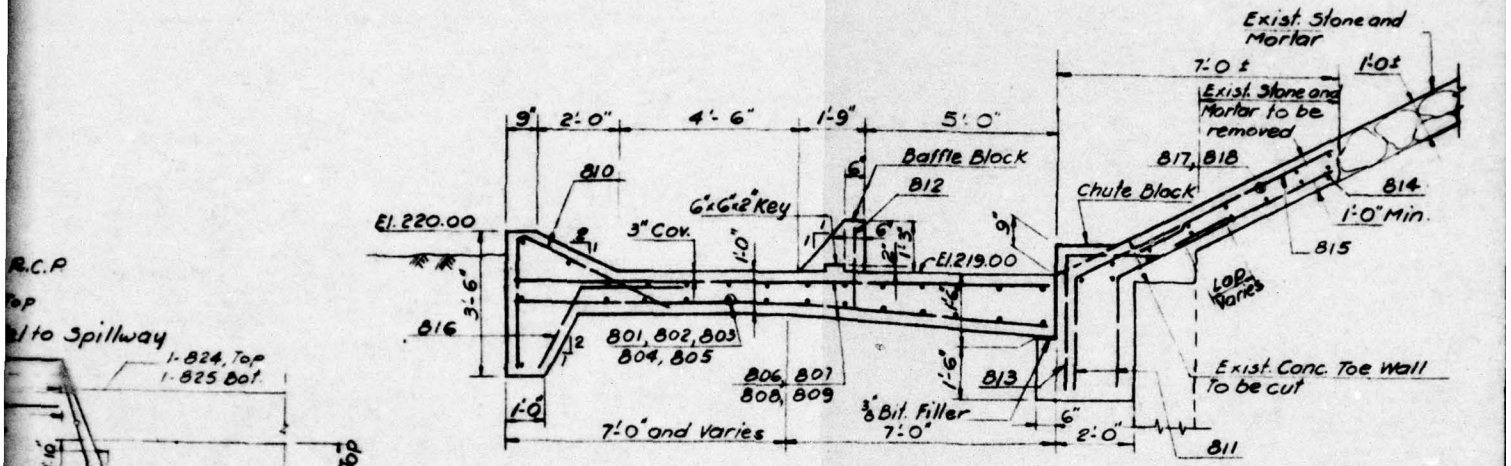
NOTE:
SLOPE OF PROPOSED PORTION OF SPILLWAY TO FOLLOW SAME SLOPE AS EXISTING SPILLWAY



SECTION D-D
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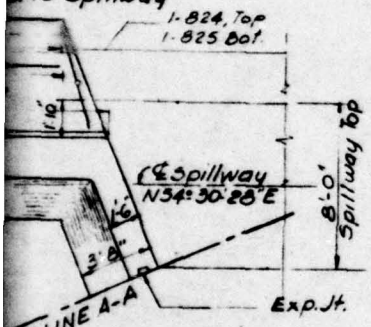

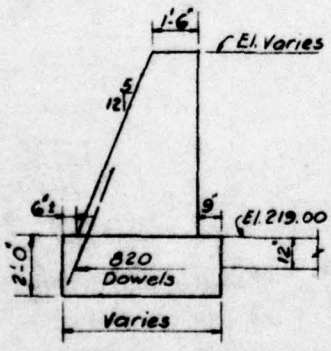

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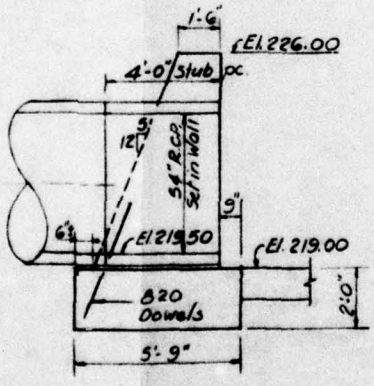

SECTION F-F
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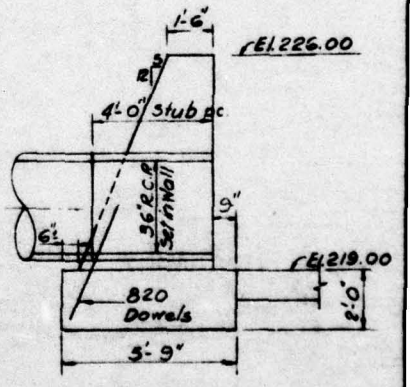

SECTION G-G
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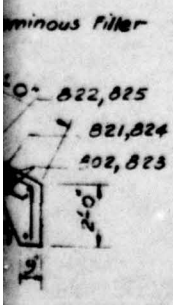


REINFORCEMENT STEEL LIST

MARK	LENGTH	TYPE	NUMBER
B20	4'-0	Str.	47
B21	5'-6"	Str.	37
B22	7'-3"	II	37
B23	34'-0"	Str.	13
B24	6'-0"	Str.	9
B25	7'-9"	II	9

TYPE II

Book	W.L.		
CHKED	BY	CHKD	DATE

DWG. NO. 7

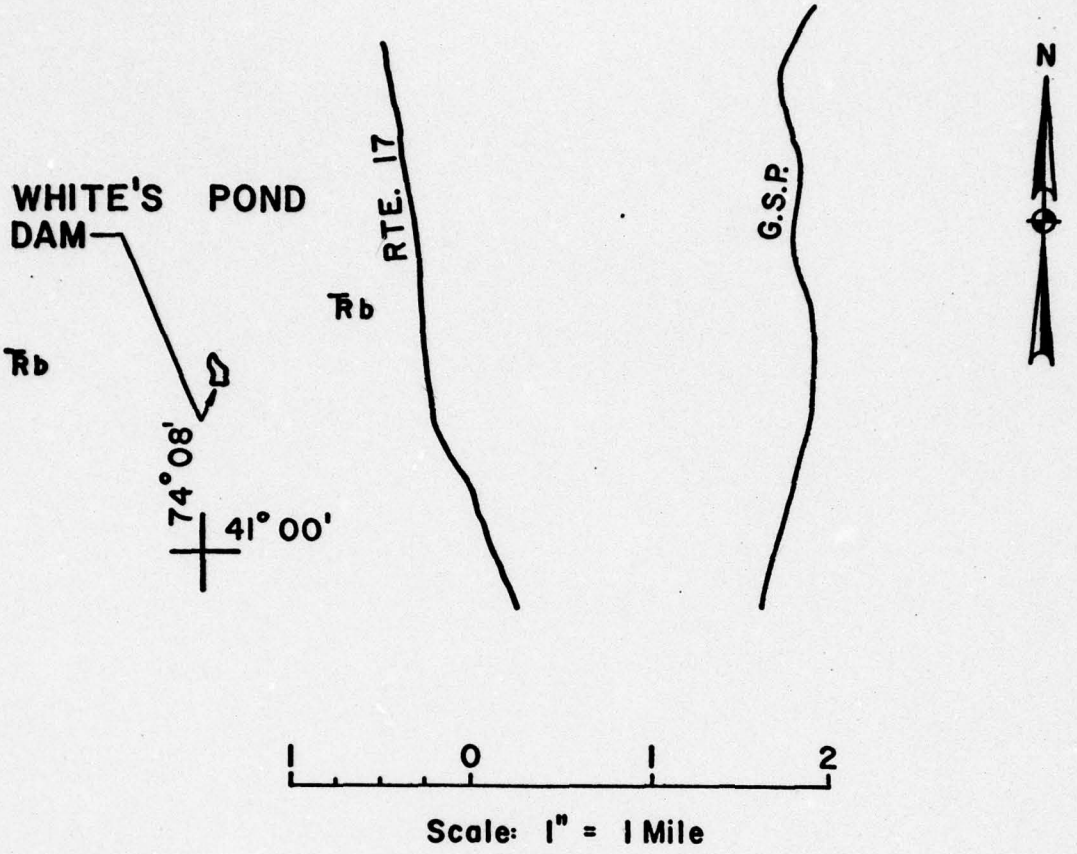
RECONSTRUCTION OF WHITES POND DAM

MUNICIPALITY WALDWICK COUNTY BERGEN

PLAN AND SECTIONS

DOUWELL ENGINEERING CO.
WEST ORANGE, NEW YORK
BROOKFIELD PARK, NEW JERSEY WA 7-19

Date DEC. 1962 Scale AS SHOWN
Sheet 7 of 8



Scale: 1" = 1 Mile

LEGEND:

TERTIARY

Tb Brunswick Formation
Soft, Red Shale with Interbeds of Red Sandstone

GEOLOGIC MAP
WHITE'S POND

DWG. NO. 8

APPENDIX A

CHECK LIST - VISUAL OBSERVATIONS

CHECK LIST - ENGINEERING, CONSTRUCTION MAINTENANCE DATA

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam WHITE'S POND DAM County Bergen State New Jersey Coordinators

Date(s) Inspection	Weather	Temperature
May 2, 1978 (AM)	Fair	60°F
May 3, 1978 (PM)	Fair	65°F
May 6, 1978 (AM)	Raining	55°F

Pool Elevation at Time of Inspection 229.8 M.S.L. (1 1/2" above crest)

Tailwater at Time of Inspection 220± M.S.L.

Inspection Personnel:

Seymour Roth, May 2 and 3
David Kerkes, May 2, 3 and 6
Yin Au-Yeung, May 2
William Flynn, May 2
Lynn Brown, May 6
Larry Woscyna, NJ-DEP, May 2

Recorder: Seymour M. Roth

Owner: Borough of Waldwyck - Representing the Owner: Mr. William Williams, Waldwyck office
Boswell Engineering
19 West Prospect Street
Waldwyck, NJ 07463
(201) 447-2055

SPILLWAY (1)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
SEE PAGE ON LEAKAGE	Isolated spot on left downstream channel area, approximately 20 ft. downstream of abutment wingwall at toe of channel bank slope. The wet spot is approximately 10-ft. long; leaking clear water at a rate of 1-2 gpm.	Ascertain source of leakage. Monitor amount on weekly schedule to determine stability.
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Concrete wingwalls on both ends of rubble masonry spillway section. There is no cut-off on left abutment. The right abutment has been reconstructed adding a clay core cut-off. and clay blanket on the upstream slope. The back of the left spillway wall has been severely eroded by spillway discharges on November 8, 1977, due to insufficient wall height and poor wall geometry.	Regrade fill in back of wingwall. Add riprap protection. Raise downstream end of wingwall.
DRAINS	Plastic pipe drains have been added to downstream toe of rubble masonry spillway venting into the stilling basin. Addition dates to 1976.	
WATER PASSAGES	None through masonry rubble spillway.	
FOUNDATION	No information available on original dam, a WPA project built in 1939. On reconstruction in 1976, no ledge rock was uncovered in placing the clay core on the right abutment. The clay core terminated in a sandy material.	

(1) Note: Dam is a V-shaped (in plan) earth fill spillway structure with concrete core wall and concrete upstream and downstream face slope.

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Small isolated cracks observed on right downstream face of the V shaped spillway. The facing concrete is in fair/ serviceable condition. Existing wingwall on left abutment is in fair condition, has been raised. Stilling basin floor sill and blocks added in 1976, not clearly visible due to high tailwater.	Dewater stilling basin for inspection within 12 months.
STRUCTURAL CRACKING	No significant cracking observed.	
VERTICAL & HORIZONTAL ALIGNMENT	No misalignment observed.	
MONOLITH JOINTS	No major joints visible in structure, no visible offsets.	
CONSTRUCTION JOINTS	No bad construction joints observed, except for poor form-work on left reservoir wall where additional concrete has been added.	No action required.

EMBANKMENT (1)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Some sloughing on embankment and downstream channel face. Riprap armoring has moved down from top of slope. There is erosion of the left abutment bank, immediately in back of and downstream of the left spillway training wall caused by flood of Nov. 8, 1977, due to training wall overtopping and general left abutment overtopping flow.	Regrade area in back of left spillway wall; add stone riprap protection.
VERTICAL & HORIZONTAL ALIGNMENT OF THE CREST	On left abutment, embankment is apparently 1 to 2 inches below the top of the right abutment wall, or between elevations 232.86 to 232.92. During the storm of Nov. 8, 1977, this area was overtopped by 2 to 3 inches of water, serving in effect as an auxiliary spillway. The safety of the structure was not endangered by the Nov. 8th event, but could be serious for higher flows.	Investigate raising of right abutment wall by at least 12 in. Harden left abutment embankment top and channel slope to serve as an auxiliary spillway.
RIPRAP FAILURES	Noted above under "Sloughing or Erosion...."	

(1) Note: No formal embankment section exists. There are two earth abutment sections either side of rubble masonry spillway.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Right abutment has been reconstructed in 1976 using a 12-ft. wide clay core as a cut-off, capped by a concrete wall and a narrow upstream concrete cap wall. The upstream face of the right abutment has a 2-ft. thick clay face blanket over the fill on a 2 on 1 slope.	
ANY NOTICEABLE SEEPAGE	Covered under "Spillway".	
STAFF GAGE AND RECORDER	None observed.	Install gage and take readings.
DRAINS	None in abutment embankments.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
CRACKING & SPALLING OF CONCRETE SURFACES IN STILLING BASIN	New placed concrete (1976) is in good condition.	
INTAKE STRUCTURE	No intake structure as such, the outlet pipe is resting on the reservoir bottom. There is no track rack provision.	
OUTLET CHAMBER IN DAM	A 36-inch diameter mounted slide gate has been provided, combined with the right spillway wingwall. The 36-inch diameter low level outlet gate has sprung away from the wall and is leaking at approximately10 gpm when fully closed.	Reattach 36-inch gate frame to concrete headwall to stop leakage.
OUTLET FACILITIES	No formal outlet channel. Discharge from 36-inch diameter low-level outlet discharges into stilling basin of spillway.	
EMERGENCY GATE	None provided.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
CONCRETE WEIR	Rubble masonry weir, V shaped in plan; crest is approximately 8-ft. wide and has 2:1 upstream and downstream slopes. The crest and the upper 2-1/2 feet of the upstream and downstream slopes is constructed of reinforced concrete. The lower portion of the slopes is a grouted riprap. The upstream face has been overlain in 1976 by a 2-ft. thick clay blanket.	
APPROACH CHANNEL	None.	
DISCHARGE CHANNEL	A small stilling basin has been provided at toe of spillway, containing baffle blocks and an end sill. No appreciable cut-off wall exists at end of new stilling basin.	Dewater and examine stilling basin within next 12 months and make soundings D/S of stilling basin to determine if undercutting of stilling basin exists.
BRIDGE AND PIERS	None.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
CONCRETE SILL	NA	
APPROACH CHANNEL	NA	
DISCHARGE CHANNEL	NA	
BRIDGE AND PIERS	NA	
GATES & OPERATION EQUIPMENT	NA	

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 RECOMMENTATIONS
SLOPES	Very gentle to flat slopes, generally to elevation 233 or approximately 4 feet above spillway crest. On Nov. 8, 1977 storm, there was some overtopping of the left reservoir rim, but this area has since been regraded to elevation 233 ±.	
SEDIMENTATION	Considerable sedimentation; the reservoir bottom has been dredged twice in the last 6 years, according to the Borough's engineering representative.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Generally well defined stream channel with no obstructions. The bank slopes are protected by stone for approximately 350 feet downstream of the dam axis to Hopper Avenue. Riprap failure on left bank has been noted under "Concrete/ Masonry Dams".	Repair of riprap covered under "Concrete/Masonry Dams"
SLOPES	Channel bank slopes are approximately 2 horizontal on 1 vertical.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	Three homes are located 400 to 1,000 feet downstream of dam axis. Downstream of Hopper Avenue, there are homes on left bank and a school on the right bank. Many additional homes downstream of Prospect Avenue could be affected by high stages of Hohokus Brook. On Nov. 8, 1977, the Brook Stage was 9 in. above the soffit of the Hopper Avenue bridge on the upstream side.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	Some original dam construction plans are available dating to 1939 (WPA project). Resonstruction of White's Pond Dam dates to 1975; plans are available.
REGIONAL VICINITY MAP	Available.
CONSTRUCTION HISTORY	Available in oral form from Mr. William Williams of Boswell Engineering, of Waldwyck, NJ. Photographs of various stages of the reconstruction are in the files of Boswell Engineering Company.
TYPICAL SECTIONS OF DAM	Available.
HYDROLOGIC/HYDRAULIC DATA	Area capacity-curve available.
OUTLETS - PLAN	Available.
- DETAILS	
- CONSTRAINTS	
- DISCHARGE RATINGS	Not available
RAINFALL / RESERVOIR RECORDS	Not being taken at dam site. USGS partial record gage since 1969 exists on Hohokus Brook at Allendale, NJ upstream of the dam site.

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

ITEM	REMARKS
DESIGN REPORTS	Not available.
GEOLOGY REPORTS	Not available.
DESIGN COMPUTATIONS	Not available.
HYDROLOGY & HYDRAULICS	Area capacity curve for reservoir available
DAM STABILITY	Not available.
SEEPAGE STUDIES	
MATERIALS INVESTIGATIONS	Not available.
BORING RECORDS	
LABORATORY	
FIELD	
POST-CONSTRUCTION SURVEYS OF DAM	Available in form of reconstruction plans for White's Pond Dam dated 1975.
BORROW SOURCES	Not known.
SPILLWAY PLAN - SECTIONS	Available as reconstructed in 1976.
- DETAILS	

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

ITEM	REMARKS
OPERATING EQUIPMENT PLANS AND DETAILS	Available as reconstructed in 1976.
MONITORING SYSTEMS	None.
MODIFICATIONS	None proposed since reconstructed in 1976.
HIGH POOL RECORDS	Not available at dam site except for oral data from Mr. W. Williams of Boswell Engineering on the event of November 8, 1977, described below.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Redesign and reconstruction contract drawings available, dated 1975.
PRIOR ACCIDENTS OF FAILURE OF DAM - DESCRIPTION - REPORTS	No formal report. On Nov. 8, 1977, high water reached to one inch above the right abutment wall and flowed over the left abutment area to a depth of 2 to 3 inches, causing damage to the left abutment and channel riprap, and eroding material behind the left spillway training wingwall.
MAINTENANCE OPERATION RECORDS	None taken systematically.

APPENDIX B

PHOTOGRAPHS

ALL PHOTOGRAPHS WERE TAKEN IN MAY 1978

Photo 1 - View of dam from downstream; low level outlet facilities are on the left side of picture (right abutment)

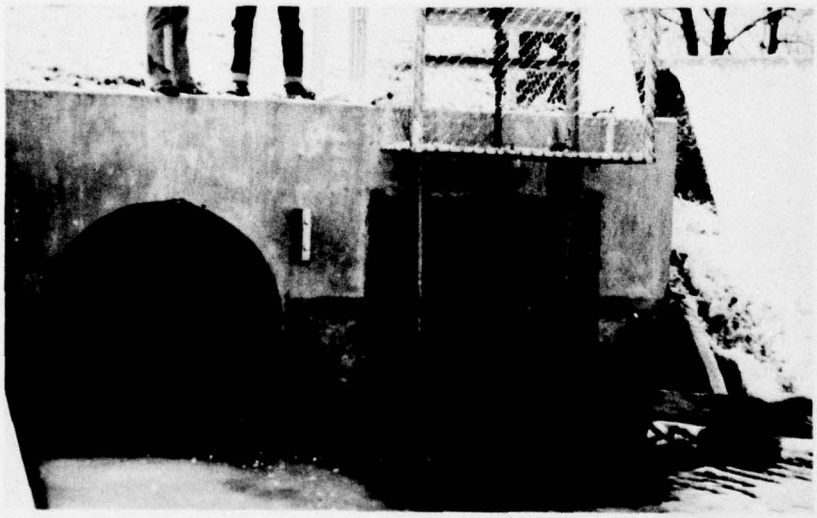


Photo 2 - Close-up of downstream face of right abutment wingwall showing plugged 54-inch dia. diversion pipe used during construction, and face mounted 36-in. dia.low level outlet gate

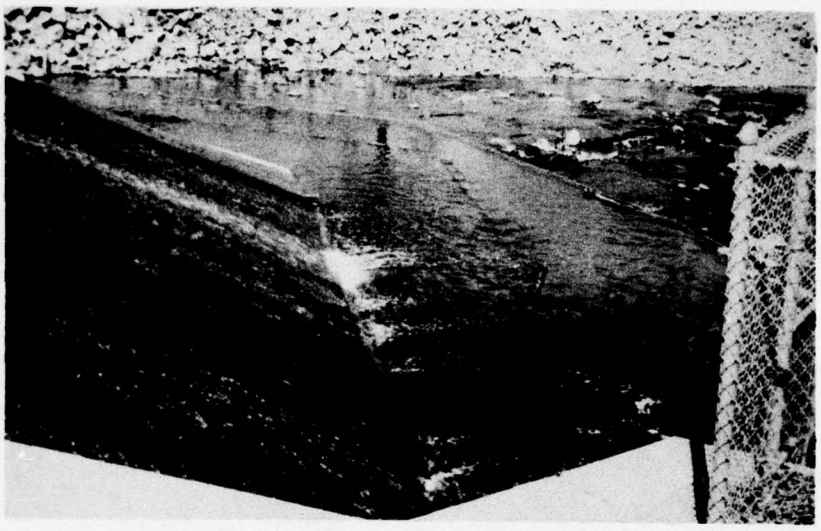


Photo 3 - View of the toe of the spillway and the stilling basin; the view is toward the left downstream channel bank; the 36-inch dia. low level outlet discharges into the stilling basin

Photo 4 - View of eroded area behind the left abutment wingwall; abutment seepage observed in the area of crouching figure, approximately 20 ft. downstream of end of spillway wingwall

Photo 5 - View of damaged and slumping channel bank protection at the left channel bank caused by overtopping of the left abutment area by storm of November 7, 1977; the damaged area is at end of the stilling basin end sill visible in this picture

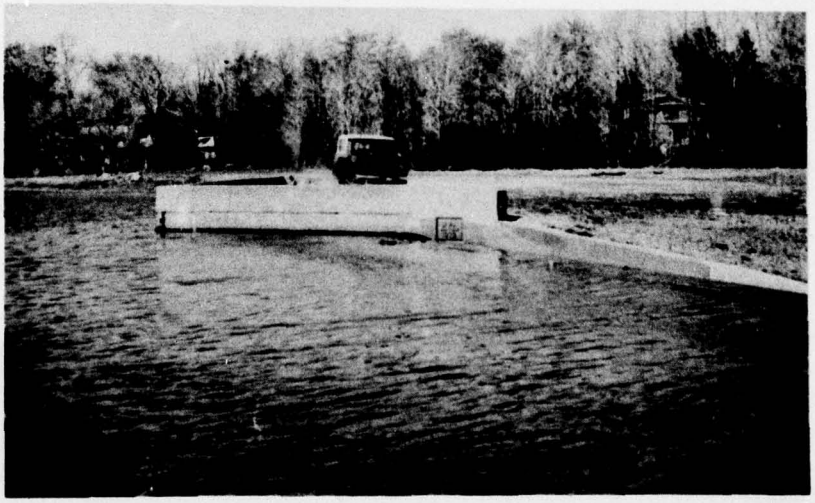


Photo 6 - View of the right abutment area overtopped on November 7, 1977, looking across the ungated weir crest and at the upstream abutment wing-walls

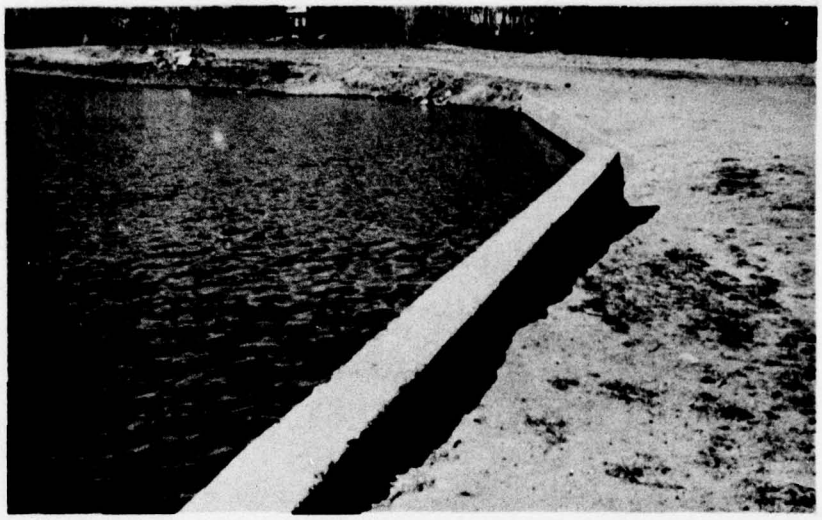


Photo 7 - View of left abutment upstream wingwall topped on November 8, 1977. The upstream shore of White's Pond can also be seen

Photo 8 - View of White's Pond, looking toward the left shore line upstream of dam

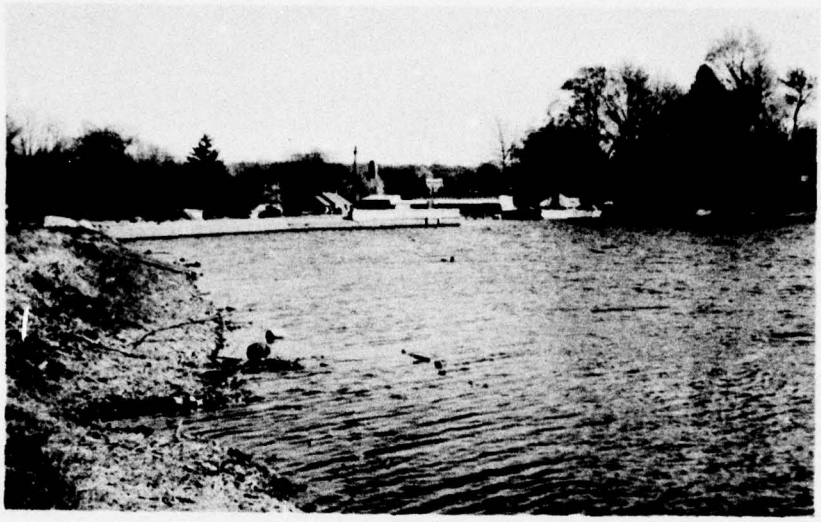


Photo 9 - Upstream face of the dam from left shore of White's Pond Dam

Photo 10 - Right abutment gravity cap wall added in the 1976 reconstruction; this wall was topped by one inch on November 7, 1977

Photo 11 - View of downstream channel of Hohokus Brook; looking from right abutment area toward Hopper Avenue. The fenced enclosure in the foreground is to protect the 36-inch slide gate hoist stand on the low level outlet conduit.

APPENDIX C

SUMMARY OF ENGINEERING DATA

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

Name of Dam: WHITE'S POND DAM

Drainage Area Characteristics: 14.85 square miles on the Hohokus Brook

Elevation Top Normal Pool (Storage Capacity): 229.7

Elevation Top Flood Control Pool (Storage Capacity): NA

Elevation Maximum Design Pool: 232.7

Elevation Top Dam: 233.0 nominal (the lowest point on embankment next to the left spillway wall is one or two inches lower)

SPILLWAY CREST:

a. Elevation 229.7

b. Type Uncontrol concrete overflow weir (triangular in plan)

c. Width 8 feet

d. Length 133.39 feet

e. Location Spillover Right end of the reservoir, 250 ft. upstream from Hooper Road

f. No. and Type of Gates None

OUTLET WORK:

a. Type 36 ft. RCP with sluice gate (Armco m 20-100) at head wall

b. Location Adjacent to the right side of spillway crest

c. Entrance Inverts 221.0

d. Exit Inverts 219.5

e. Emergency Draindown Facilities As above

HYDROMETEOROLOGICAL GAGES:

a. Type Not known

b. Location Hohokus Brook at White's Lake Dam, Waldwyck

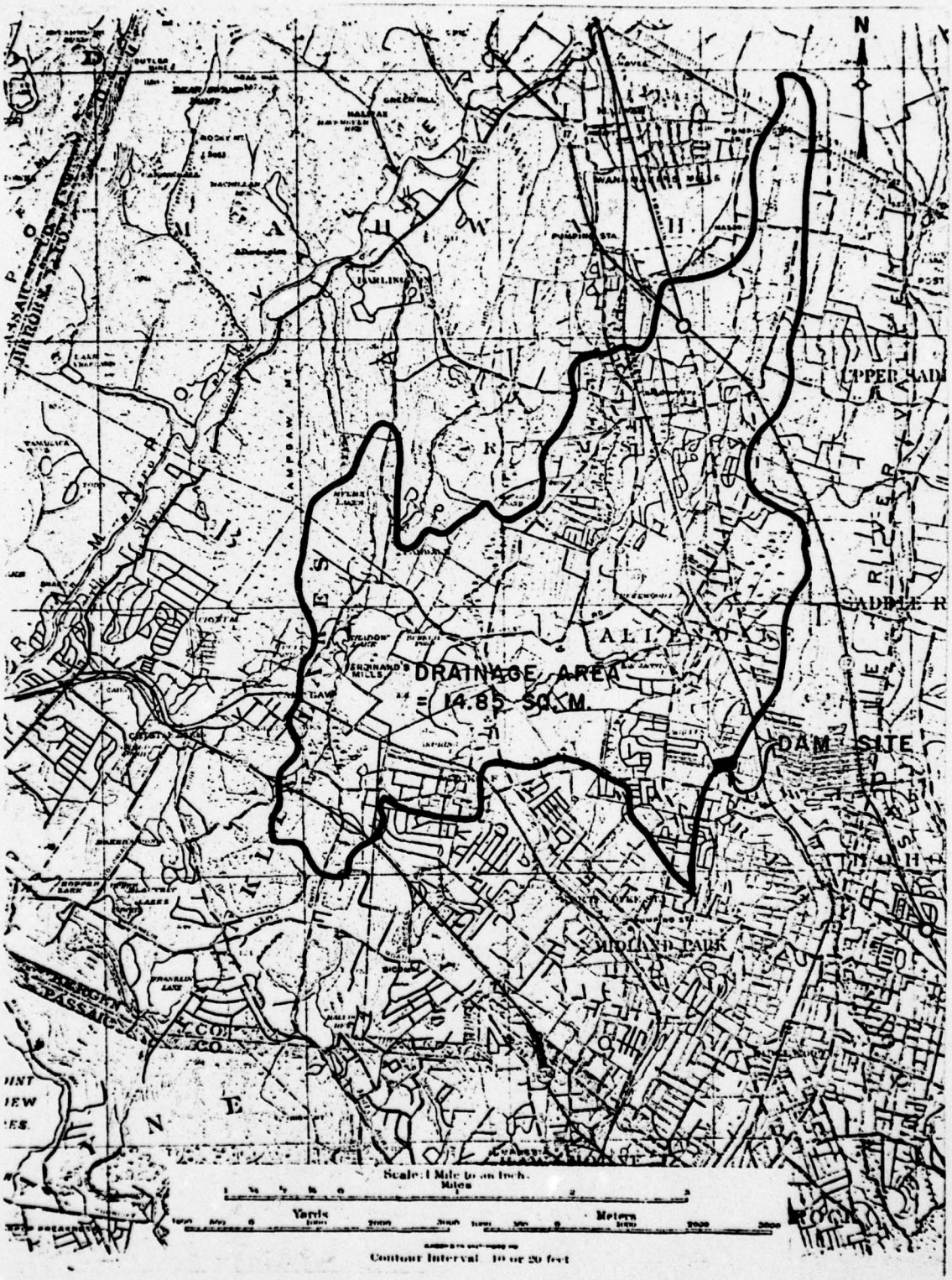
c. Records NA; from U.S.G.S. WRC #13. Known max. discharge of 3010 cfs was recorded on June 23, 1948 (Station #3905-discontinued)

MAXIMUM NON-DAMAGING DISCHARGE: 2310 cfs at Elevation 232.7

APPENDIX D

HYDROLOGIC COMPUTATIONS

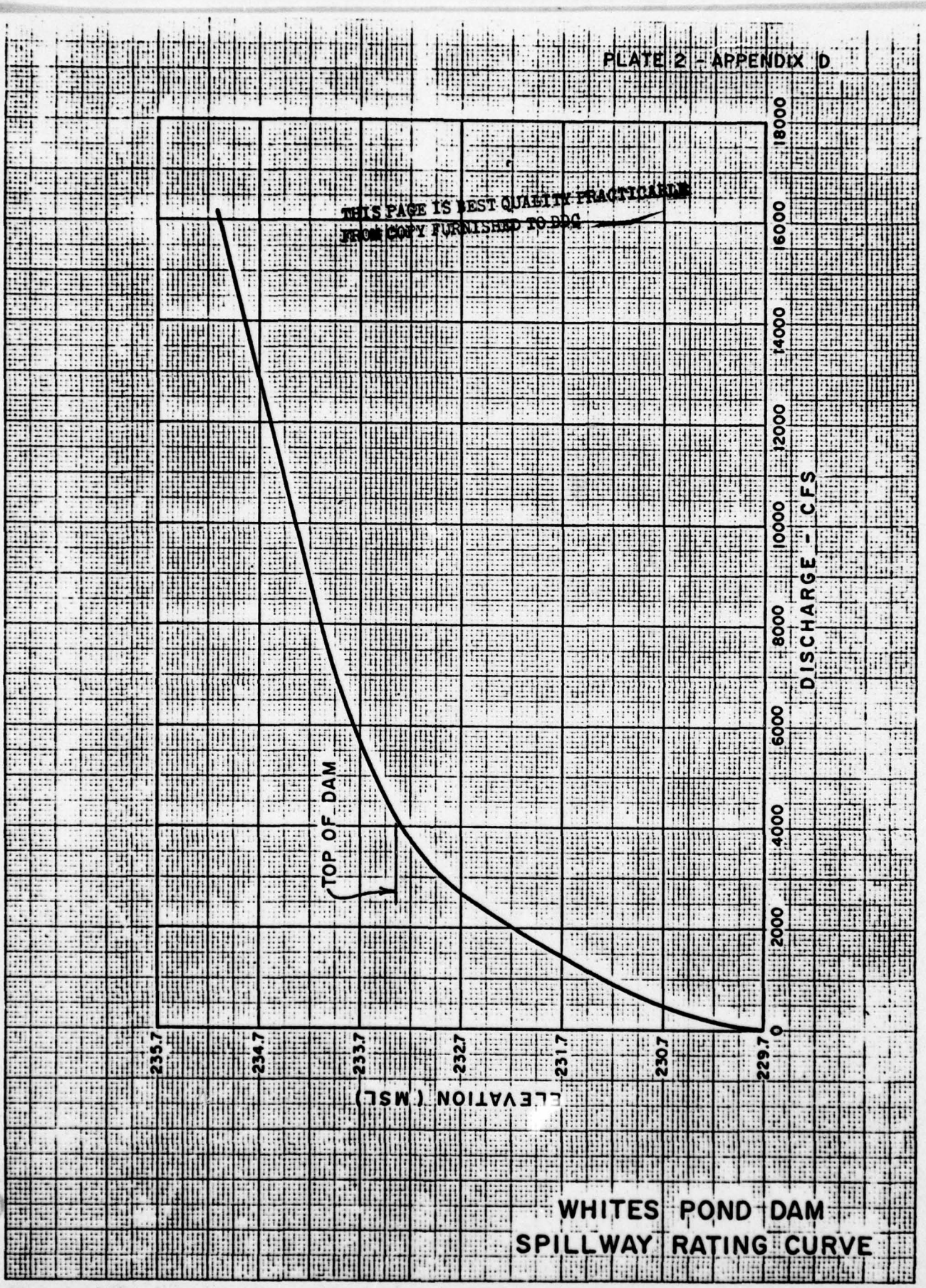
PLATE I APPENDIX D



WHITES POND DAM
DRAINAGE BASIN

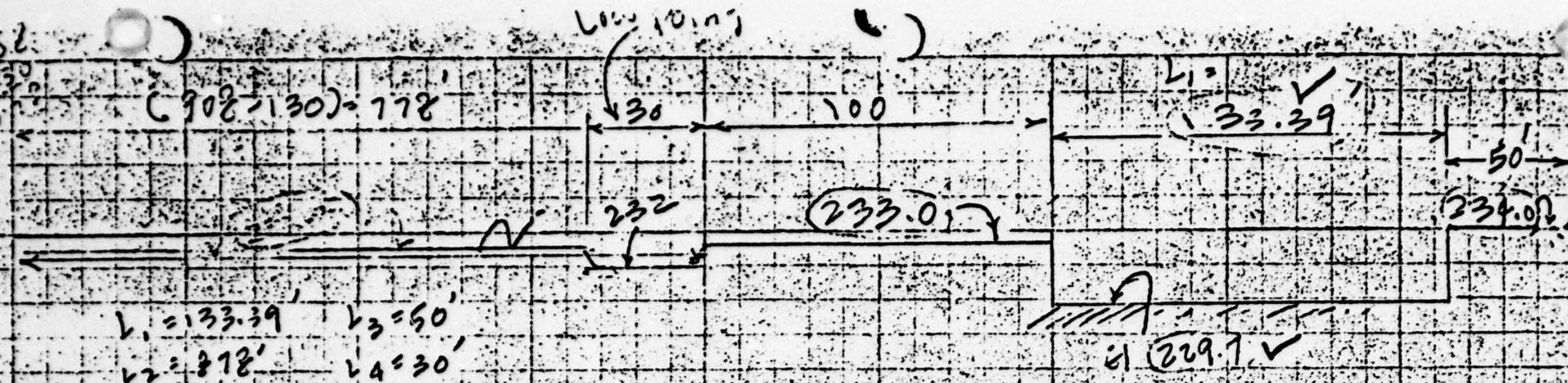
1

PLATE 2 - APPENDIX D



WHITES POND DAM
SPILLWAY RATING CURVE

SPILLWAY RATING CURVE – WHITE'S POND / BACK UP BY YJW DATE Ma



L_1 = 133.39' L_3 = 50'
L_2 = 878' L_4 = 30'

ELEVATION	H_1	H_2	H_3	H_4	L_1	L_2	L_3	L_4	C_1	C_2	C_3	C_4	Q
229.7	0	/	/	/	133.39	/	/	/	3.6	/	/	/	0
230.7	1.0	/	/	/	133.39	/	/	/	3.65	/	/	/	487
232.0	2.3	0	/	/	133.39	/	/	/	3.70	/	/	/	1722
233.0	3.3	1	0	/	133.39	30	/	/	3.75	3.1	/	/	3092
234.0	4.3	2	1	0	133.39	30	878	/	3.80	3.2	3.1	/	7514
235.0	5.3	3	2	1	133.39	30	878	50	3.85	3.4	3.2	3.4	15628

PLATE 3 APPENDIX D

WHITES POND DAM
RESERVOIR CAPACITY CURVE

77% PMF FLOOD ROUTING

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
40	1	0	0	0	0	0	0	4	0

JOPER NWT
3 0

FLOOD ROUTING PRIOR TO OVERTOPPING

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

SUB-AREA RUNOFF COMPUTATION

INPUT SNYDER COEFFICIENTS THEN MULTIPLY 0.17

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
7	0	0	0	0	0	1

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	1	14.82	0.00	14.82	0.00	0.170	0	0	0

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 5.61 CP=0.62 NTA= 0

RECESSION DATA
STRTQ= 0.00 QRCSN= 0.00 RTIOR= 1.00

MATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 6.10 AND R= 5.40 INTERVALS

END-OF-PERIOD FLOW

	TIME	RAIN	EXCS	COMP Q
SUM		16.24	16.24	154486.

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

HYDROGRAPH ROUTING

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
7	1	0	0	0	0	1

ROUTING DATA

WLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.000	0.00	1	0

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

ORAGE=	0.	2.	9.	16.	24.	33.	44.	150.	0.
TFLOW=	0.	120.	700.	1800.	5200.	7200.	15200.	18750.	0.

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

RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	7	2691.	2359.	1068.	656.	14.82
ROUTED TO	7	2683.	2359.	1068.	656.	14.82

APPENDIX

HYDROLOGIC COMPUTATION

BOSWELL ENGINEERING CO.

Ridgewood Park, N.J. Waldwick, N.J. West Nyack, N.J. Mineola, N.Y.

By P. Date Aug. 9, 74 Sheet No. of

Chkd. Date Project WA-721

Subject WHITES POND VOLUME CURVE

PLANIMETERED FROM 1"=50' MAP ; 1 S.I. = 2500 S.F.

CONTOUR	READING (S.I.)	AREA (S.F.)	MEAN AREA	VOLUME(C.F.) INCREMENT	VOLUME (C.F.)
			64,025	64,025	
219	51.22	128,050			64,025
			145,450	145,450	
220	65.14	162,850			209,475
			173,475	173,475	
221	73.64	184,100			382,950
			193,600	193,600	
222	81.24	203,100			576,550
			210,387	210,387	
223	87.07	217,675			786,937
			225,438	225,438	
224	93.28	233,200			1,012,375
			240,050	240,050	
225	98.76	246,900			1,252,425
			253,987	253,987	
226	104.43	261,075			1,506,412
			268,700	268,700	
227	110.53	276,325			1,775,112
			284,288	284,288	
228	116.90	292,250			2,059,400
			301,563	301,563	
229	124.35	310,875			2,360,963

ECI-4 ENGINEERING CONSULTANTS, INC.

NEW JERSEY DAM SAFETY INSPECTION — SHEET NO. 1 OF 1
WHITES POND DAM — JOB NO. 1209-001
RESERVOIR AREA CAPACITY DATA — BY MAS DATE July 7, 76

BACKUP.

WHITES POND DAM

RESERVOIR AREA CAPACITY DATA

SUMMARY

Elevation (Feet)	Reservoir Surface Area (Acres)	Reservoir Volume (AC-FT)	Net Vol. of Reservoir Above El. 229.7	Remarks
229.7	7.1	58.6	0	Area at El 229.7 is assumed to be same as at El 229. Volume values are from extension of exist. data
230		60.4	1.8	Volume figures are from extension of existing data
231		68.0	9.4	"
232		75.1	16.5	"
233	7.5	82.7	24.1	Assumed area at top of Dam ≈ 7.5 Acres. Volume figures are from extension of exist. data.
234		91.8	33.2	Volume figures are from extension of exist. data
235		101.0	42.4	"

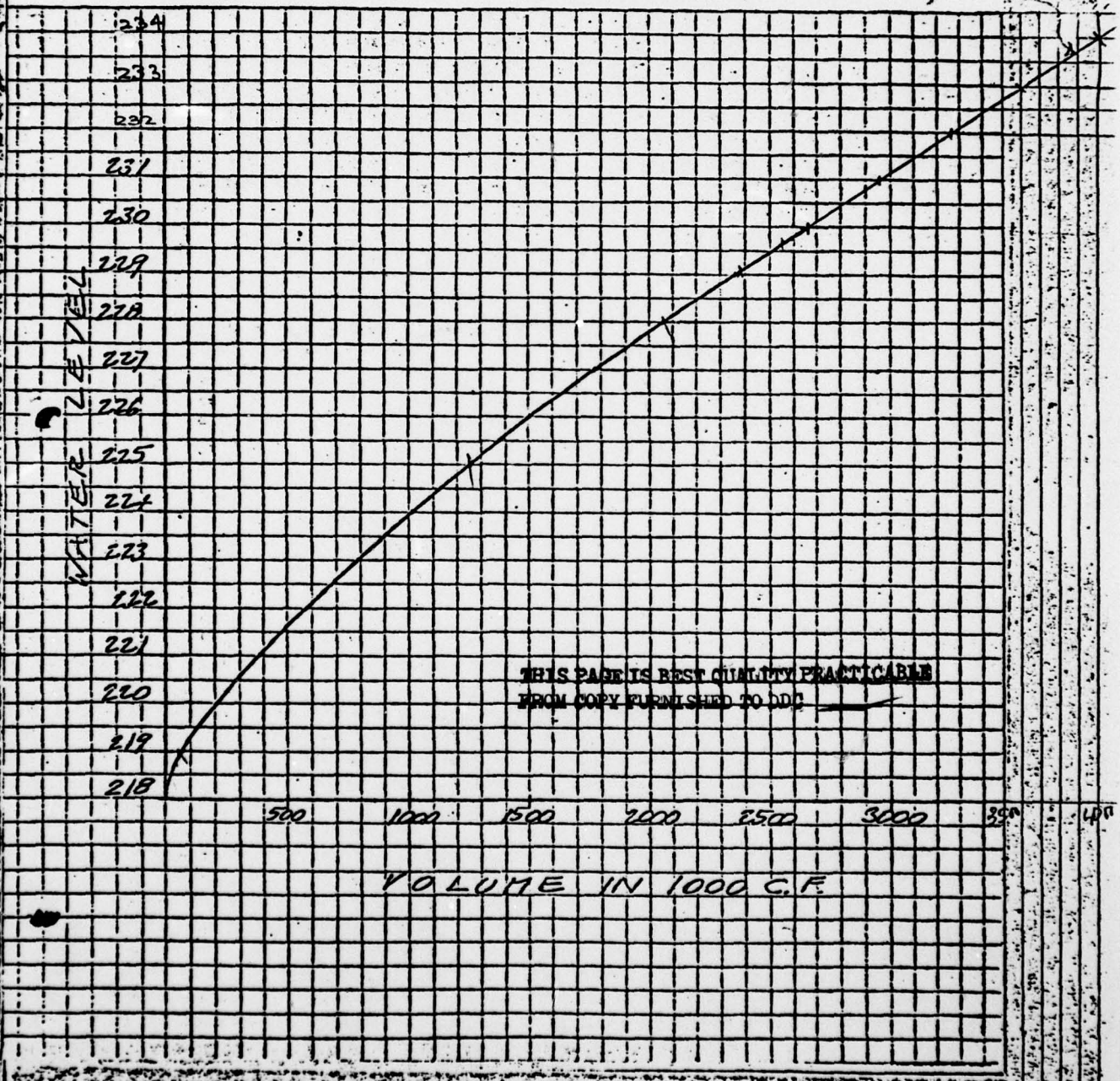
BOSWELL ENGINEERING CO.

Ridgefield Park, N.J. Waldwick, N.J. West Nyack, N.J. Mineola, N.Y.

By P. D. Date Aug. 14, 74 Sheet No. ____ of ____

Chkd. ____ Date ____ Project WA-721

Subject: WHITES POND VOLUME CURVE



PROBABLE MAXIMUM FLOOD CALCULATION (PMF)

DRAINAGE AREA = 14.85 square Miles.
From Hydrometeorological Report #33
" Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Duration of 6, 12, 24 and 48 Hours" 1956.

For Drainage Area 10 square Miles
the 6 Hour duration PMP is 25 inches for Zone "6" at White's Pond watershed.

Since the drainage area is larger than 10 square miles, an area reduction factor of (0.96 is applied.

The reduced 6 Hour PMP is 0.96 × 25 = 24 inches.

PMP values for rainfall durations of 6, 12, 24, 48 hours are:

Duration (Hrs)	PMP (inches)	
6 Hr	1 × 24 = 24.00	
12 Hr.	1.09 × 24 = 26.16	Negligible
24 Hr.	1.17 × 24 = 28.08	
48 Hr.	1.27 × 24 = 30.48	

PMP values shown above are reduced by 19.3% to account for misalignment of basin and rainfall isohaytals.

The PMP for deriving PMF are therefore as following:

Duration (Hrs)	PMP (inches)	
6	19.37	
12	21.11	Negligible
24	22.66	
48	24.60	

ECI-4 ENGINEERING CONSULTANTS, INC.

NEW JERSEY DAM SAFETY INSPECTION — SHEET NO. ____ OF ____
x IF DERIVATION - White's Pond Dam — JOB NO. 209
PROBABLE MAXIMUM FLOOD - UNIT — BY YIN DATE May, 1978

DERIVATION OF UNIT HYDROGRAPH:

This dam is located on the Hohokus Brook portion of the Passaic River Basin. D.A. = 14.85 sq mi

Synder method is adopted for the derivation of UHG with.

$C_t = 2.7$ and

$640 C_p = 400$; or $C_p = 0.625$

From topographic map we have

$L = 6.5$ mi

$L_c = 1.7$ mi

$S = .00755$

Therefore

$t_p = C_t (L L_c)^{0.3}$
$= 2.7(6.5 \times 1.7)^{0.3}$
$= \underline{5.60 \text{ hr.}}$

$t_r = t_p / 5.6 = 5.6/5.5 = \underline{1.02 \text{ hr.}}$

$q_p = 640 C_p / t_p = 400/5.6 = \underline{71.4 \text{ cfs}}$

For $t_R = 1$ Hr.

$t_{pR} = t_p + .25(t_R - t_r) = \underline{5.61 \text{ hrs.}}$

$q_{pR} = 640 C_p / t_{pR} = 400/5.61 = \underline{71.3 \text{ cfs}}$

$Q_{\gamma} = 71.3 + 14.85 = \underline{1059 \text{ cfs}}$

Use HEC-1 Results.

ECI-4 ENGINEERING CONSULTANTS, INC.

NEW JERSEY DAM SAFETY INSPECTION — SHEET NO. 1 OF 2

WHITES POND — JOB NO. 1209-01

SMP. — BY SMAS DATE 5/19

{ SOIL GROUP "B".
CN = 80 }

AMC II, CN = 80 ⇒ S = 2.50

Thus:

$$Q = \frac{(P - .50)^2}{P + 2.00}$$

ECI-4 ENGINEERING CONSULTANTS, INC.

NEW JERSEY DAM SAFETY INSPECTION
SHEET NO. ____ OF ____
SPF DETERMINATION - WHITE'S POND DAM
JOB NO. ____
PROBABLE MAXIMUM PRECIP.
BY YLC DATE May 1978

PMP Rainfall Distribution (Max 6 Hrs)

Distribution according to EC 1110-2-1163.

Time (Hr)	Total 6 hr %	Total Rainfall Depth (inches)	Incremental Rainfall Depth (inches)
1	30	1.94	1.94
2	22	4.27	2.33
3	37	7.18	2.91
4	75	14.55	7.37
5	89	17.27	2.72
6	100	19.34	2.07

DIRECT RUNOFF INCREMENT FOR COMPUTING PMF (Use CN = 80)

Assume Soil Group B min. loss rate 0.24"/hr

Time ending (Hr)	Incremental Design Rainfall (in)	Accumulative design Rainfall (in)	Direct Runoff Accumulative	Direct Runoff Incremental	Incremental loss
1	1.94	1.94	0.53	0.53	1.41
2	2.33	4.27	2.27	1.74	0.59
3	2.91	7.18	4.86	2.54	0.32
4	7.37	14.55	11.93	7.07	0.30
5	2.72	17.27	14.59	2.48	0.24 *
6	2.07	19.34	16.63	1.93	0.24

* The remainder incremental runoff is computed with minimum loss rate 0.24"/hr.

HEC 1 - COMPUTATIONS

WHITES POND DAM — SHEET NO. 1 OF
REDO VOLUME - CAPACITY CURVES - BACKUP — JOB NO. 1209-001-1
BY KLB — DATE 7-6-
Cim

	#	ELEVATION (Ft.)	Y2 Volume (AC-FT)	Y3 Discharge (CFS)
SPILLWAY CREST	1	229.7	0.	0.
	2	231.0	9.3	700.
	3	231.5	12.8	1200.
	4	232.0	16.4	1900.
	5	232.5	20.2	2400.
TOP OF DAM	6	233.0	24.0	3200.
	7	233.5	28.4	4800.
	8	234.0	33.0	7200.
	9	234.5	38.4	11200
	10	235.5	150.2	18750.

DAM SAFETY INSPECTION - NEW JERSEY
WHITES POND DAM
PMF ROUTING

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
40	1	0	0	0	0	0	0	0	0

JOPER NWT
3 0

SUB-AREA RUNOFF COMPUTATION

INPUT SNYDER COEFFICIENTS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
7	0	0	0	0	0	1

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	1	14.82	0.00	14.82	0.00	0.000	0	0	0

PRECIP DATA

NP	STORM	DAJ	DAK
6	0.00	0.00	0.00

PRECIP PATTERN

0.53 1.74 2.59 7.07 2.48 1.83

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 5.61 CP=0.62 NTA= 0

RECESSION DATA

STRTQ= 0.00 QRCSN= 0.00 RTIOR= 1.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 6.10 AND R= 5.40 INTERVALS

UNIT HYDROGRAPH 32 END-OF-PERIOD ORDINATES. LAG= 5.63 HOURS, CP= 0.62 VOL= 0.99

75.	278.	549.	820.	1008.	1066.	973.	811.	675.	559.
464.	385.	320.	266.	221.	183.	152.	126.	105.	87.
72.	60.	50.	41.	34.	28.	23.	19.	16.	13.
11.	9.								

END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP Q
1	0.53	0.53	80.
2	1.74	1.74	279.
3	2.59	2.59	972.
4	7.07	7.07	2648.
5	2.48	2.48	5539.
6	1.83	1.83	9159.
7	0.00	0.00	12652.
8	0.00	0.00	15053.
9	0.00	0.00	15829.
10	0.00	0.00	14941.
11	0.00	0.00	13064.
12	0.00	0.00	11017.
13	0.00	0.00	9155.
14	0.00	0.00	7604.
15	0.00	0.00	6315.
16	0.00	0.00	5245.
17	0.00	0.00	4357.
18	0.00	0.00	3618.
19	0.00	0.00	3005.
20	0.00	0.00	2496.
21	0.00	0.00	2073.
22	0.00	0.00	1722.
23	0.00	0.00	1430.
24	0.00	0.00	1188.
25	0.00	0.00	986.
26	0.00	0.00	819.
27	0.00	0.00	680.
28	0.00	0.00	565.
29	0.00	0.00	469.
30	0.00	0.00	390.
31	0.00	0.00	323.
32	0.00	0.00	269.
33	0.00	0.00	219.
34	0.00	0.00	166.
35	0.00	0.00	119.
36	0.00	0.00	44.
37	0.00	0.00	17.
38	0.00	0.00	0.
39	0.00	0.00	0.
40	0.00	0.00	0.
SUM	16.24	16.24	154486.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	15829.	13759.	6287.	3862.	154485.
INCHES		8.63	15.78	16.16	16.16
AC-FT		6826.	12477.	12774.	12774.

HYDROGRAPH ROUTING

ROUTE PMF HYDROGRAPH WHITES POND DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
7	1	0	0	2	0	1

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.000	0.00	1	0

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

STORAGE=	0.	2.	9.	16.	24.	33.	44.	50.	0.	0.
OUTFLOW=	0.	120.	700.	1800.	3200.	7200.	15200.	18750.	0.	0.

TIME	EOP STOR	AVG IN	EOP OUT
1	0.	40.	40.
2	3.	159.	213.
3	10.	625.	871.
4	20.	1810.	2511.
5	29.	4094.	5463.
6	35.	7349.	9076.
7	40.	10905.	12614.
8	44.	13853.	15010.
9	55.	15441.	15537.
10	48.	15385.	15353.
11	40.	14002.	12843.
12	38.	12040.	11291.
13	35.	10085.	8961.
14	33.	8379.	7836.
15	30.	6960.	6161.
16	29.	5780.	5439.
17	26.	4801.	4229.
18	25.	3987.	3771.
19	22.	3312.	2920.
20	20.	2751.	2620.
21	17.	2285.	2027.
22	16.	1897.	1798.
23	13.	1576.	1414.
24	12.	1309.	1232.
25	11.	1087.	981.
26	10.	903.	846.
27	9.	750.	692.
28	7.	623.	590.
29	6.	517.	477.
30	5.	429.	403.
31	4.	357.	331.
32	4.	296.	277.
33	3.	244.	225.
34	3.	193.	176.
35	2.	144.	126.
36	1.	81.	65.
37	0.	30.	18.
38	0.	8.	5.
39	0.	0.	0.
40	0.	0.	0.
SUM			154496.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	15587.	13783.	6285.	3862.	154496.
INCHES		8.65	15.78	16.16	16.16
AC-FT		6838.	12474.	12774.	12774.

DAM SAFETY INSPECTION - NEW JERSEY
UNITES POND DAM
ONE HALF PMF FLOOD ROUTING

JOB SPECIFICATION

NE	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
40	1	0	0	0	0	0	0	0	0

JOPER NWT
3 0

SUB-AREA RUNOFF COMPUTATION

INPUT SNYDER COEFFICIENTS THEN MULTIPLY BY 0.5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
7	0	0	0	0	0	1

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	1	14.62	0.00	14.62	0.00	0.500	0	0	0

PRECIP DATA

NP	STORM	DAJ	DAK
6	0.00	0.00	0.00

PRECIP PATTERN

0.53	1.74	2.59	7.07	2.46	1.83

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIOR
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 9.61 CP=0.62 NTA= 0

RECESSION DATA
STRTQ= 0.00 QRCSN= 0.00 RTIOR= 1.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 6.18 AND R= 5.40 INTERVALS

UNIT HYDROGRAPH 32 END-OF-PERIOD ORDINATES. LAG= 5.63 HOURS. CP= 0.62 VOL= 0.99

79.	278.	549.	820.	1068.	1366.	973.	811.	673.	559.
464.	385.	320.	266.	221.	183.	152.	126.	105.	87.
72.	60.	50.	41.	34.	29.	23.	19.	16.	13.
11.	9.								

END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP Q
1	0.53	0.53	40.
2	1.74	1.74	279.
3	2.59	2.59	972.
4	7.07	7.07	2648.
5	2.46	2.46	5539.
6	1.83	1.83	9159.
7	0.00	0.00	12652.
8	0.00	0.00	15093.
9	0.00	0.00	15829.
10	0.00	0.00	14961.
11	0.00	0.00	13064.
12	0.00	0.00	11017.
13	0.00	0.00	9195.
14	0.00	0.00	7684.
15	0.00	0.00	6315.
16	0.00	0.00	5245.
17	0.00	0.00	4357.
18	0.00	0.00	3613.
19	0.00	0.00	3005.
20	0.00	0.00	2496.
21	0.00	0.00	2073.
22	0.00	0.00	1722.
23	0.00	0.00	1430.
24	0.00	0.00	1188.
25	0.00	0.00	986.
26	0.00	0.00	819.
27	0.00	0.00	680.
28	0.00	0.00	565.
29	0.00	0.00	469.
30	0.00	0.00	390.
31	0.00	0.00	323.
32	0.00	0.00	269.
33	0.00	0.00	219.
34	0.00	0.00	168.
35	0.00	0.00	119.
36	0.00	0.00	84.
37	0.00	0.00	37.
38	0.00	0.00	0.
39	0.00	0.00	0.
40	0.00	0.00	0.
SUM	16.26	16.26	134466.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	19429.	15739.	6287.	3862.	134483.
INCHES		8.63	15.78	16.16	16.15
AC-FT		6826.	12677.	12776.	12776.

RUNOFF MULTIPLIED BY 0.50

20.	139.	466.	1320.	2749.	4579.	6326.	7526.	7914.	7978.
8332.	9508.	9577.	9867.	9157.	7822.	6178.	4809.	3582.	2748.
1896.	461.	715.	594.	491.	409.	340.	282.	234.	193.
161.	134.	109.	89.	59.	22.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7914.	6879.	3143.	1931.	77242.
INCHES		4.71	7.89	8.08	8.08
AC-FT		3813.	6338.	6387.	6387.

ROUTE HALF OF PMF HYDROGRAPH THRU WHITE'S POND DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
7	1	0	0	2	0	1

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.000	0.00	1	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA
0	0	0	0.000	0.000	0.000	-1.

STORAGE=	0.	2.	9.	16.	24.	33.	44.	150.	0.	0.
OUTFLOW=	0.	120.	700.	1800.	3200.	7200.	15200.	18750.	0.	0.

TIME	EOP STOR	AVG IN	EOP OUT
1	0.	20.	20.
2	2.	79.	100.
3	6.	312.	427.
4	12.	905.	1222.
5	21.	2047.	2667.
6	27.	3674.	4539.
7	30.	5452.	6272.
8	33.	6926.	7519.
9	34.	7720.	7908.
10	33.	7692.	7490.
11	31.	7001.	6856.
12	29.	6020.	5539.
13	27.	5043.	4598.
14	25.	4189.	3823.
15	23.	3490.	3173.
16	21.	2890.	2672.
17	18.	2400.	2191.
18	16.	1993.	1842.
19	14.	1656.	1519.
20	12.	1375.	1270.
21	11.	1142.	1049.
22	10.	948.	875.
23	9.	785.	724.
24	8.	654.	613.
25	6.	543.	505.
26	5.	451.	422.
27	5.	375.	349.
28	4.	311.	290.
29	3.	258.	241.
30	3.	214.	200.
31	2.	178.	156.
32	2.	148.	138.
33	2.	122.	114.
34	1.	96.	91.
35	1.	72.	65.
36	0.	40.	32.
37	0.	15.	9.
38	0.	4.	2.
39	0.	0.	0.
40	0.	0.	0.
SUM			77248.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7908.	6881.	3142.	1931.	77248.
INCHES		4.31	7.89	8.08	8.08
AC-FT		3413.	6236.	6387.	6387.