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NATIONAL DAM SAFETY PROGRAM. BUTLER STORAGE RESERVOIR DAM, (NY---ETC(U)
SEP 78 E A NOWATZKI, G S SALZMAN DACW51-78-C-0035
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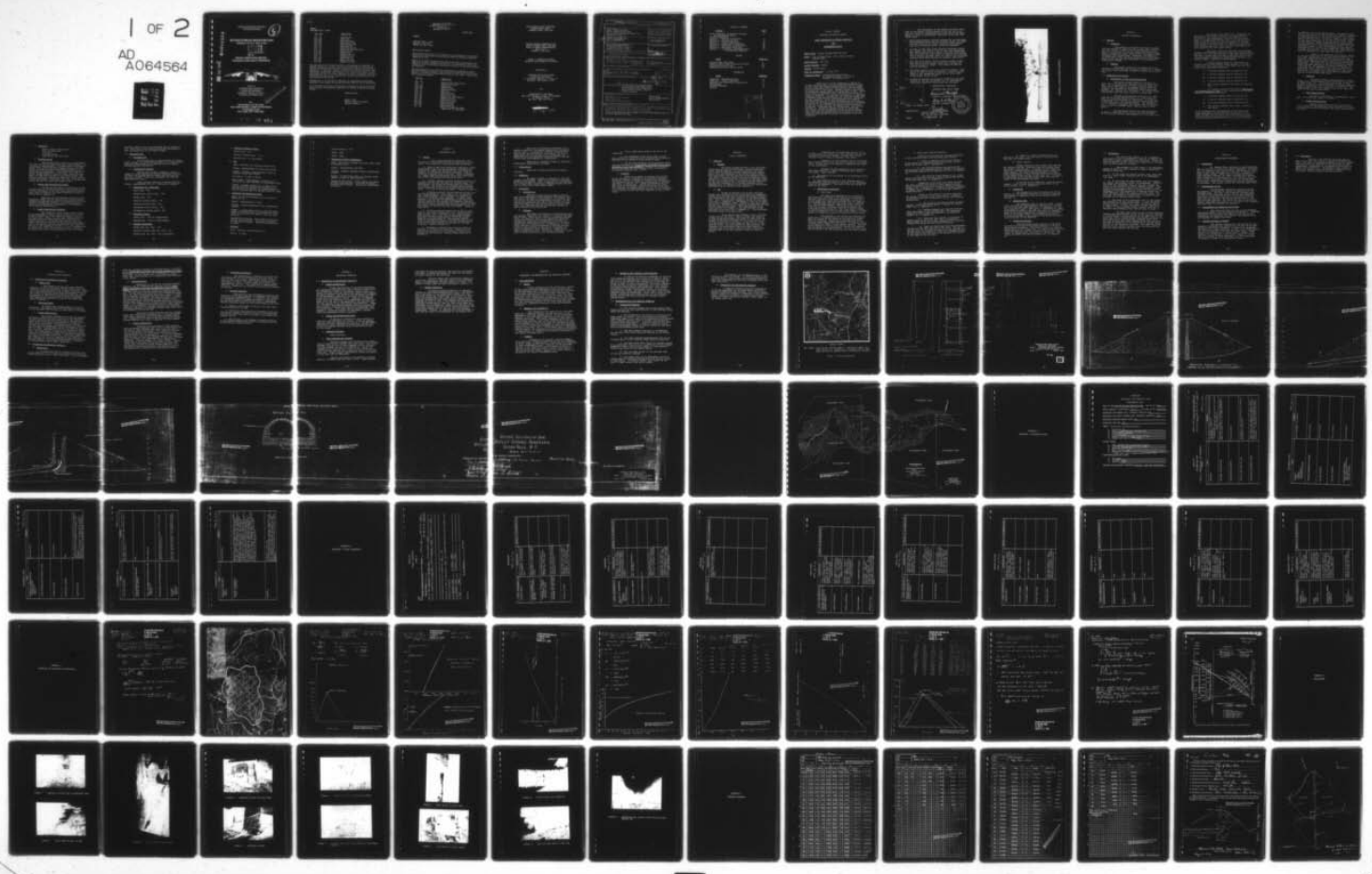


UPPER HUDSON RIVER WATERSHED
BUTLER BROOK BASIN

(5)

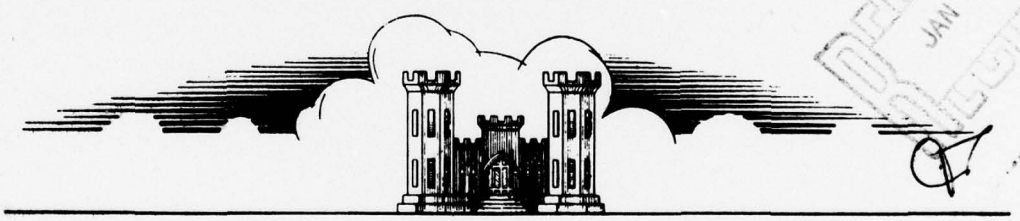
BUTLER STORAGE RESERVOIR DAM

WARREN COUNTY, NEW YORK

LEVEL II

NY 13

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



Prepared by

CONVERSE WARD DAVIS DIXON
CONSULTING ENGINEERS
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CALDWELL, NEW JERSEY 07006

For

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

NANEN-F
Honorable Hugh L. Carey

I.D. NO.	NAME OF DAM
N.Y. 49	Pocantico Dam
N.Y. 445	Attica Dam
N.Y. 658	Cork Center Dam
N.Y. 153	Jackson Creek Dam
N.Y. 172	Lake Algonquin Dam
N.Y. 318	Sixth Lake Dam
N.Y. 13	Butlet Storage Dam
N.Y. 90	Putnam Lake (Bog Brook Dam)
N.Y. 166	Pecks Lake Dam
N.Y. 674	Bradford Dam
N.Y. 75	Sturgeon Pool Dam
N.Y. 414	Skaneateles Dam
N.Y. 155	Indian Lake Dam
N.Y. 472	Newton Falls Dam
N.Y. 362	Buckhorn Lake Dam

The classification of "unsafe" applied to a dam because of a seriously inadequate spillway is not meant to connote 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 to loss of life downstream from the dam.

Consequently, it is advisable to implement the recommendations previously furnished in the reports for the above-mentioned dams as soon as practicable.

It is requested that owners of these dams be furnished a copy of this letter and that copies be permanently appended to all reports previously furnished to you.

Sincerely yours,

CLARK H. BENN
Colonel, Corps of Engineers
District Engineer

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, NEW YORK
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

2 OCT 1978

NANEN-F

Honorable Hugh L. Carey
Governor of New York
Albany, New York 12224

Dear Governor Carey:

The purpose of this letter is to inform you of a clarification of the guidelines used by this office in assessing dams under the National Program of Inspection of Dams.

Office of the Chief of Engineers has recently provided a clarification that dams with seriously inadequate spillways are to be assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The following dams in your state have previously been assessed as having seriously inadequate spillways, with capability to pass safely only the percentage of the probable maximum flood as noted in each report. They are now to be assessed as unsafe:

I.D. NO.	NAME OF DAM
N.Y. 59	Lower Warwick Reservoir Dam
N.Y. 4	Salisbury Mills Dam
N.Y. 45	Amawalk Dam
N.Y. 418	Jamesville Dam
N.Y. 685	Colliersville Dam
N.Y. 6	Delta Dam
N.Y. 421	Oneida City Dam
N.Y. 39	Croton Falls Dam
N.Y. 509	Chadwick Dam (Plattenkill)
N.Y. 66	Boyds Corner Dam
N.Y. 397	Cranberry Lake Dam
N.Y. 708	Seneca Falls Dam
N.Y. 332	Lake Sebago Dam
N.Y. 338	Indian Brook Dam
N.Y. 33	Lower(S) Wiccopee Dam (Lower Hudson W.S. for Peekskill)

UPPER HUDSON RIVER WATERSHED
BUTLER BROOK BASIN
WARREN COUNTY, NEW YORK

BUTLER STORAGE RESERVOIR DAM
CITY OF GLENS FALLS, NEW YORK
BOARD OF WATER COMMISSIONERS
NDS # NY 13
NYSDEC # 223C-1165

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Prepared by

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For

DEPARTMENT OF THE ARMY
New York District, Corps of Engineers
26 Federal Plaza
New York, New York 10007

[redacted]
21 Sep. 1978

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Gary S. Salzman, P.E.

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Warren County
Butler Storage Reservoir
Butler Brook

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Butler Storage Reservoir Dam was judged to be unsafe-non-emergency due to a seriously inadequate spillway.

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PLATES

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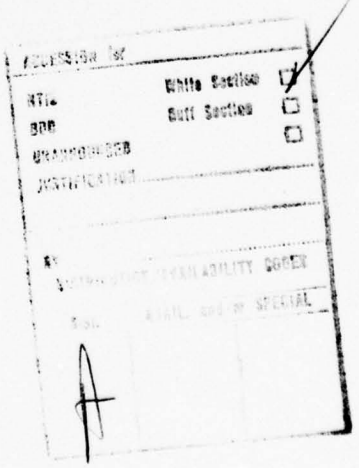


PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam: Butler Storage Reservoir Dam

Owner: City of Glens Falls, N.Y.; Board of Water Commissioners

State Located: New York

County Located: Warren

Stream: Butler Brook

Date of Inspection: 17 July 1978

Inspection Team: Converse Ward Davis Dixon
91 Roseland Avenue, P. O. Box 91
Caldwell, New Jersey 07006

Based on our visual inspection, a review of limited available data, and calculations performed as part of this study, the Butler Storage Reservoir Dam is judged to be in acceptable condition structurally and functioning satisfactorily at this time. However, based on the screening guidelines established by the Department of Army, Office of the Chief of Engineers (OCE), the spillway capacity is rated as inadequate. In addition, the spillway is seriously inadequate since it satisfies all the conditions established by the OCE guidelines for determining seriously inadequate spillway capacity. Since this assessment was based on OCE screening criteria, a detailed hydrologic and hydraulic evaluation of the watershed and spillway should be performed by the use of more precise and sophisticated methods and procedures. Following such an investigation, the need for, and type of, mitigating measures should be determined. Until such a study is completed and the spillway adequacy issue resolved, around-the-clock surveillance of the dam should be provided during periods of unusually heavy precipitation.

Our assessment of the general physical condition of the Butler Storage Reservoir Dam has led us to make the following recommendations which should be implemented as soon as practicable, certainly within the next three years:

1. The concrete-gunite junction between the spillway/gate house superstructure and the concrete apron, and deteriorated areas of all other concrete appurtenances such as the concrete apron, should be repaired.

2. In areas of the drop inlet overflow structure (spillway, shaft, and tunnel) where it has been determined that delamination of the gunite cover has taken place, the cover and wire mesh should be removed and replaced with a special concrete cover to protect the structural concrete from water erosion or spalling under frost.

3. The gate house shaft, which provides access to the pipe inlet control valves, should be lighted, and railings should be added. This should be done as soon as possible.

4. Low woody growth on the dam should be removed. This should be done as soon as possible. Shallow rooted trees on the embankment should be cut down; deep rooted trees should remain.

5. A specific program for periodic inspection and maintenance of the dam embankment and its appurtenant structures should be established and followed.

Respectfully submitted,

CONVERSE WARD DAVIS DIXON

Edward A. Nowatzki

Edward A. Nowatzki, Ph.D., P.E.

Gary S. Salzman

Gary S. Salzman, P.E.

Date: 28 August 1978

Approved by:

Colonel Clark H. Benn
New York District Engineer

Date: 21 September 78

OVERVIEW - BUTLER STORAGE RESERVOIR

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority

The authority to conduct this Phase I inspection and evaluation comes from the National Dam Inspection Act (P.L. 92-367) of 1972 in which the Secretary of the Army was authorized to initiate, through the Corps of Engineers, a program of safety inspections of non-federal dams throughout the United States. Management and execution of the program within the State of New York has been undertaken by the New York State Department of Environmental Conservation (NYSDEC).

b. Purpose

The primary purpose of the inspection is to evaluate available data and to give an opinion as to whether the subject dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Description of Dam and Appurtenances

The Butler Storage Reservoir was built in 1909, and is an earth fill structure with a concrete core wall. It is approximately 470 feet in length along its crest and 83 feet high at its deepest section (near the middle). The upstream and downstream faces slope at approximately 1 vertical to 2 horizontal. An unpaved access road extends over the crest, which is 16 feet wide.

The top of the concrete core wall is 2 feet wide and is located approximately 2 to 3 feet below the crest of the dam and along its centerline. It tapers at 1 horizontal to 30 vertical on both its upstream and downstream sides and is of variable height. Its foundation is "... spread as necessary for bearing, and all pervious soil cut off by increased depth, sheet piling or other means."

The downstream face of the earth embankment is heavily vegetated and has a stand of red pine about 40 to 50 feet in height (approximately 40 to 50 years old).

The outlet works consist of a reinforced concrete drop inlet overflow spillway and outlet conduit. The crest of the overflow spillway is 5 feet below the crest of the earth embankment. The weir of the spillway crest is rounded and is 25 feet long, with the box inlet being 25 feet x 18 feet at the weir elevation. The box inlet tapers to about 25 feet x 10 feet at a point 52 feet below the spillway crest, where the drop inlet begins to join gradually with the outlet tunnel.

The outlet tunnel is also made of reinforced concrete with vertical side walls 4 feet high and an arched ceiling. It is 10 feet wide and 7 feet high invert-to-crown. The tunnel extends from the base of the drop inlet to the natural stream, a distance of approximately 180 feet, on a slope of about 1 vertical to 20 horizontal.

A design sketch (Plate II) shows that controlled inlet to the overflow shaft consists of the following cast iron, valved pipes, that empty into the drop inlet at the indicated elevations:

i. A 16-inch diameter pipe at elevation 758.

ii. A 12-inch diameter pipe at elevation 748.

iii. A 12-inch diameter pipe at elevation 731.

iv. A 12-inch diameter pipe at elevation 715.

v. Two 12-inch diameter "mud" pipes at elevation 699.

In a sketch filed with the initial Application for Construction of a Dam in 1909, the following discharge pipes and elevations are shown:

i. A 16-inch diameter pipe at elevation 754.

ii. A 12-inch diameter pipe at elevation 723.

iii. A 12-inch diameter pipe at elevation 708.

iv. Two 12-inch diameter "mud" pipes - elevation not shown.

In our conversations with personnel of the Glens Falls Water Department, we were told that one of the 12-inch pipes had been cut off inside the gate house shaft, and does not empty into the drop inlet. Our visual inspection of the structure indicates that this is the 12-inch pipe

at elevation 731 of the design sketch. The sketch accompanying the application for construction (Refer to Appendix E) indicates that it is the pipe at elevation 748 in the original design sketch. Obviously, there is some discrepancy in the location of the cut off 12-inch pipe. There is also some discrepancy in the elevations of all pipes on both sketches. These discrepancies are apparently not too important since the 16-inch pipe and the 12-inch pipe immediately below it have been plugged and only the two mud pipes and the 12-inch pipe immediately above them are operable at this time. In this report all pipe elevations will be referenced to those shown on Plate II.

Inlets to all pipes are controlled by valves in the gate house which is located above an 8-foot by 18-foot shaft immediately to the right of the drop inlet spillway. Access to the valves is obtained by a vertical steel ladder extending down the shaft to the appropriate elevations. The valves for the mud pipes are at approximately the same elevation as the pipes themselves. The valve stem for the operable 12-inch pipe is located on a platform about 6 feet below top floor elevation of the gate house. The valve is at pipe elevation. The inlet portals on the upstream face of the dam are apparently also at the elevations noted above.

b. Location

The dam is located on Butler Brook in Warren County, N.Y., approximately 5 miles northwest of the City of Glens Falls, N.Y. The location of the dam is shown on Plate I which is a portion of USGS 7.5 minute Quadrangle Sheet of Glens Falls, N.Y., N34°15'00", W73°37'30". The nearest major river is the Hudson River, which flows just south of the City of Glens Falls.

c. Size Classification

The dam is classified as "intermediate" (storage = 378 acre-feet; height = 83 feet).

d. Hazard Classification

Because there are at least 10 homes within 1 to 1½ miles of the downstream face, and many more homes in the valley farther downstream, the hazard classification is "high".

e. Ownership

Board of Water Commissioners
City of Glens Falls
City Hall
42 Ridge Street
Glens Falls, New York 12801

f. Purpose of Dam

The dam was built to act as a storage reservoir for the City of Glens Falls water supply system. Its watershed is approximately 2.6 square miles and includes Butler Pond, a 860-acre-foot storage facility, 275 feet higher in elevation than Butler Storage Reservoir and less than a mile upstream. Flow from Butler Pond to the Butler Storage Reservoir is controlled. Flow from the Butler Storage Reservoir goes to a small detention basin about 140 feet from the exit of the outlet portal, and then to the Butler Distribution Reservoir, about 230 feet farther downstream. From there, the water is treated and enters the City of Glens Falls supply lines.

g. Design and Construction History

The dam was designed and constructed for the Commissioners of the Board of Water, City of Glens Falls, in 1909, presumably by the then superintendent, Howard M. West (Refer to Plate IV and forms filled by Mr. West on 16 May 1912 in Appendix E).

There are no other records of design or construction, except that the concrete drop inlet overflow spillway was repaired (gunited) in 1948 and again in 1972 (pressure grouted and covered with reinforced gunite). (Refer to correspondence in Appendix E.) No details of these repairs were available.

h. Normal Operational Procedure

The system-wide water levels are maintained by the Department of Water, City of Glens Falls, in response to demand put on the system by usage in the City of Glens Falls. There is a full time caretaker and his assistant who check water levels daily, and visually inspect the dams in the system from time to time. The normal operational procedure for the Butler Storage Reservoir is to maintain the pool elevation at that noted on the day of the inspection (745 MSL). This is accomplished by controlling inflow from Butler Pond and by allowing discharge from Butler Storage Reservoir into the outlet

structure through the 12-inch diameter pipe at elevation 715. This flow is then controlled farther downstream to meet the demands put on the supply system.

1.3 Pertinent Data

a. Drainage Area

The drainage area is approximately 2.6 square miles; however, as indicated previously, it includes Butler Pond from which there is a controlled inflow to Butler Storage Reservoir downstream.

b. Discharge at Damsite

Maximum known flood at damsite: Unknown. (Based on visual observations made by caretaker over past 12 years, the highest depth of water over the spillway was 3 to 4 inches. This would correspond to a flow of approximately 16 cfs.)

Total spillway capacity at maximum pool elevation: approximately 900 cfs. (Spillway is ungated.)

c. Elevations (ft. above MSL)

Top of dam: 768.

Maximum pool (top of dam): 768.

Normal pool: 745.

Overflow spillway crest: 763.

Upstream sluice invert: 693.

Downstream sluice invert: 684.

Streambed at sluice outlet: 682.

d. Reservoir Length

Normal pool: 1000 ft (approximate).

Maximum pool: 1300 ft (approximate).

e. Storage (acre-feet)

Normal pool (El. 745): 175.

Spillway overflow pool (El. 763): 378.

Maximum pool (El. 768): 440 (estimated).

f. Reservoir Surface (acres)

Normal pool: 9.4.

Spillway overflow pool: 13.6.

Maximum pool: 15 (estimated).

g. Dam

Type: Earthfill with concrete cutoff wall.

Length: Approximately 470 feet along crest.

Height: Variable; approximately 83 feet at greatest height near center.

Top width: 16 feet at crest.

Side slopes: Approximately 1 vertical to 2 horizontal on both upstream and downstream faces.

Cutoff: Concrete cutoff wall, 2 feet wide at top and tapering upstream and downstream at 1 horizontal to 30 vertical to variable depths to rock as required and to a maximum width of 8 feet.

h. Diversion and Regulating Works

Type: One 12-inch diameter cast iron pipe at elevation 715.

Length: Approximately 90 feet.

Closure: Manually-operated valve; manufacturer unknown.

Access: In gate house shaft via vertical steel ladder to platform about 6 feet below dam crest. Riser at this elevation leads to valve at pipe elevation.

Regulating facilities: Pipe outfalls into shaft of drop inlet spillway. Flow then discharges through outlet conduit. Regulation accomplished by valve.

i. Spillway

Type: Concrete, round crested weir.

Length: 25 feet.

Crest elevation: 763.

Gates: None.

Piers: None.

j. Regulating Outlets (emergency)

Type: Two 12-inch diameter cast iron "mud" pipes at elevation 699.

Length: Approximately 190 feet.

Closure: Manually operated valves; manufacturer unknown.

Access: In gate house shaft via vertical steel ladder to valve at pipe elevation.

Regulating facilities: Pipes outfall into shaft of drop inlet spillway. Flow then discharges through outlet conduit. Regulation accomplished by valve.

SECTION 2

ENGINEERING DATA

2.1 Design

Very little engineering design data were available for the subject dam and its appurtenant structures. The sources of the available data are mainly:

a. State of New York Conservation Commission (NYSCC) forms dated 16 May 1912 giving general information and sketches of "waste" and section of dam, with greatest heights, top thickness and bottom thickness. Also provided are a general plan of the dam. (Refer to Appendix E.) These forms were apparently filed with NYSCC three years after construction of the dam in 1909.

b. A sketch showing a section through the drop inlet overflow spillway and the shaft of the gate house. The elevations of the controlled outlet pipes are shown on this sketch. The sketch is not labelled and is assumed to have comprised a portion of the original design documents. It is not on file with NYSDEC. (Refer to Plate II.)

c. A drawing entitled "Revised Sections of Dam, Butler Storage Reservoir, Glens Falls, N.Y." by Howard M. West, Superintendent. It is undated but assumed to be part of the original design drawings. It shows three sections: one through the embankment at the drop inlet overflow spillway; one through the embankment showing a typical section of the concrete core wall; and one through the outlet culvert perpendicular to the direction of flow. This drawing is also not on file with NYSDEC. (Refer to Plate III.)

d. A drawing entitled "Reservoirs on Butler Brook Owned by the City of Glens Falls, N.Y., Warren County," dated 12 Sept. 1913, by Howard M. West, Superintendent. This drawing shows a plan view of the Butler Storage Reservoir, and the detention basin and distribution reservoir downstream from it. The drawing contains contours of the area downstream of the dam and what appear to be surface area contours of the pool at five-foot intervals. (Refer to Plate IV.)

e. Information regarding pool area and reservoir capacity as a function of elevation. These data were obtained by planimetry and by computing volumes using average end area methods. Summary sheets are given in Appendix E.

There was no information available on the nature or extent of the repairs performed on the dam in 1948 or 1972. It is possible, however, that more engineering data are available in the files of the City of Glens Falls, but at the time of the inspection, the depository for such materials was being rebuilt and many of the files were temporarily inaccessible.

There are no structural design or hydraulic/hydrological computations available.

2.2 Construction

There are no formal construction records available.

2.3 Operation

No formal records of operation or flow discharges are available. There is no recording instrumentation at the damsite. Flow is regulated by the caretaker, Mr. Wilford Tucker, according to demands imposed upon the City of Glens Falls water supply system.

2.4 Evaluation

a. Availability

Engineering data were provided by the New York State Department of Environmental Conservation (NYSDEC) and by the owner's representative, Mr. Stephen Howe of the City of Glens Falls Department of Water. At the time of the inspection the City of Glens Falls City Hall was under repair and some records were not easily accessible. Mr. Howe went through considerable trouble to make available the existing data.

b. Adequacy

The nature and amount of the engineering data are limited, especially with regard to stability and seepage analyses. There are no stability or seepage computations. In addition, there is no information regarding the material from which the embankment was made, its strength and permeability characteristics, or the procedures used in the construction. Consequently, no meaningful analyses could be performed to evaluate the stability of the structure or the amount of seepage that could be expected to occur through it. There are no hydraulic/hydrologic data. The overall assessment, therefore, is based primarily on the following factors:

1. Visual observations made on the day of the inspection.

2. The embankment design which seems to have been performed in accordance with conventional engineering practice for the design of small earthfill dams.

3. The analyses performed using hydrologic modelling data available in Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models, prepared for the Department of the Army, New York District Corps of Engineers, by Resource Analysis, Inc. in 1976.

c. Validity

There is no reason to question the validity of the information contained on the available drawings. There are, however, a number of discrepancies regarding the elevations of the controlled outlet pipes as indicated previously in Section 1.2a. These discrepancies are not felt to be of importance. Identification of the outlet pipe that was not brought through to the drop inlet overfall structure was established on the day of the inspection; it was found to differ from that suggested by data in the files.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General

The Butler Storage Reservoir is a controlled inflow facility fed by Butler Pond. The discharge from Butler Storage Reservoir is also controlled, and flows into a small reinforced concrete detention basin approximately 140 feet downstream of the outlet conduit portal. Flow takes place over the spillway of the detention basin into the 0.5 acre-feet Butler Distribution Reservoir which serves as an intake basin for a portion of the water supply of the City of Glens Falls. The Butler Storage Reservoir was the only component of the system inspected, and it appeared to be in generally good condition and functioning satisfactorily on the day of the inspection.

b. Dam

Access to the dam is via a dirt road that extends from the Butler Distribution Reservoir diagonally across the downstream face of the Butler Storage Reservoir and terminates at the right abutment of the earth embankment. This road was badly eroded on the day of the inspection (Fig. 1, Appendix D). Personnel of the City of Glens Falls Water Department (GFWD) informed us that this erosion was due to a combination of rutting by recreational vehicles and the flow of rain runoff. This road narrows at the right abutment and extends to the left abutment across the crest of the dam (Fig. 2, Appendix D). This extension provides access to the gate house.

As is obvious from Figures 1 and 2, the downstream slope of the dam is heavily wooded, and supports a stand of red pine trees. The roots of these trees can be seen extending transversely across the surface of the roadway on the crest in Figure 2. Also shown in Figure 2 is the beginning of some brush and tree growth on the upstream slope. We were informed by GFWD personnel that vegetation on the upstream face was trimmed annually, although trees more than 10 feet tall were noted on the upstream face at the left abutment (Refer to Overview Photo).

Inspection of the downstream face of the embankment near its junction with the abutments and toe did not reveal evidence of seepage. Several small animal burrows, about 2 inches in diameter, were noted.

Inspection of the upstream face of the embankment revealed that the rip rap was in generally good condition. In some areas soil supporting vegetation was noted in the interstices.

Although the dam appeared to be in functionally good condition, a number of moderate deficiencies were noted. These include:

1) The erosion of the roadway on the downstream slope of the embankment.

2) The vegetative growth on the upstream slope of the embankment and the stand of red pine on the downstream slope of the embankment, with some of the root system exposed on the crest.

c. Appurtenant Structures

1) Gate House

The gate house appeared to be in generally good condition, although it was obvious from markings on the door lock that it had been vandalized. On the day of the inspection, there was discharge from the lower 12-inch diameter pipe into the drop inlet (Fig. 3, Appendix D). The caretaker manually closed the control valve to this pipe in a few minutes. The turning nuts for the valve are located in the gate house on a platform about 6 feet below crest elevation. The valve control platform is easily accessible via a vertical steel ladder. A slight amount of leakage was noted in the packing of this valve.

The controls to the two 12-inch diameter mud pipes were not operated because of difficulty of access. They are located at the bottom of the gate house shaft which is unlighted. Access can be obtained only by the vertical steel ladder mentioned above. It would be unsafe to traverse this ladder without proper lighting. The caretaker informed us that the mud pipe valves were operated and maintained on a regular basis. The top two pipes visible in Figure 3 are not operational and have been plugged.

2) Drop Inlet Overflow Spillway

Inspection of the spillway and apron portions of this structure led to the following observations:

i) There is moderate spalling and cracking of the apron, with vegetation beginning to grow in the spalls and cracks (Fig. 4, Appendix D).

ii) The junction between the apron and the spillway/gate house superstructure is cracked with portions of previously applied gunite breaking off (Fig. 5, Appendix D).

iii) The spillway itself appears to be in generally good condition with only minor cracking and scaling of the left pier (Fig. 4, Appendix D).

Inspection of the drop inlet shaft from the dam crest revealed that there is minor cracking of the gunite on the walls of the shaft and evidence of moderate leakage (Fig. 3, Appendix D). Bulging, previously reported by NYSDEC, was not observed, but may have been masked by recent guniting.

Access to the bottom of the drop inlet box was gained by walking up the outlet tunnel. Inspection of the shaft from that vantage point led to the following observations:

i) The gunite at the base of shaft is badly spalled. Wire mesh reinforcement is exposed in several areas (Fig. 6, Appendix D).

ii) Moderate seepage was occurring from beneath the gunite in the spalled areas. The structural concrete in those areas was observed to be moderately eroded (Fig. 7, Appendix D).

iii) There are small bulges in the gunite at certain areas of the shaft wall (Fig. 8, Appendix D). These bulges may be due to poor workmanship or structural distress from water build-up behind the gunite.

iv) There are three weep hole pipes extending through the wall near the base of the shaft. Two are on the left wall of the shaft and one is on the upstream wall. On the day of the inspection, there was a moderate amount of flow coming from the pipe on the upstream wall and one of the pipes on the left wall.

v) There is a severely eroded section of concrete at the base of the left side of the downstream face near the outlet tunnel.

3) Outlet Conduit

Several sections of the conduit wall and roof are severely spalled. There are many minor spalls along the length of the conduit. On the day of the inspection, there was a moderate amount of seepage coming through the larger spalls. The worst condition existed at a large spall approximately 33 feet upstream from the exit portal of the tunnel about half way up the right wall. This point is downstream of the concrete cutoff wall that runs the length of the dam beneath the crest.

On the day of the inspection, there was approximately 1 inch of water flowing along the floor of the outlet conduit (Fig. 9, Appendix D).

d. Foundation

The foundation of this structure was not observed, but our geologic evaluation of the site indicates that bedrock is generally close to the surface (Refer to Appendix F).

e. Reservoir Area

The reservoir area is heavily wooded. Slopes along the banks are approximately 3 vertical to 4 horizontal up to the high water mark (Fig. 10, Appendix D). They then increase to about 1 vertical to 1 horizontal and there is evidence of creep at the tree line (Fig. 11, Appendix D). Based on our field observations and examination of stereo pairs of air photos, there is no evidence of sloughing or sliding failures of the slopes or indications of significant siltation of the reservoir.

f. Downstream Channel

The downstream channel leading to the detention basin and Butler Distribution Reservoir is clear of obstructions and debris. The channel itself is a natural stream about 10 to 15 feet wide. It flows to the downstream basin and reservoir through a widening valley with side slopes of approximately 1 vertical to 2 horizontal. The valley and slopes are heavily wooded (Fig. 12, Appendix D).

3.2 Evaluation

The subject dam appears to be in generally good condition and is expected to continue to perform satisfactorily under normal operating conditions. There was nothing observed at the time of the inspection to indicate that the dam structure is unsafe.

The presence of large trees on the embankment slopes of earthfill dams ordinarily poses a potentially dangerous condition.

a. If the trees are shallow rooted, they could blow over in a major storm, carrying part of the embankment with them.

b. If the trees are deep rooted, the root systems may extend transversely through the embankment. Death of the trees and subsequent decay of the root systems may result in the formation of water passages (pipes). Such pipes provide natural channels for the seepage of water through the embankment; this may result in erosion of the embankment or in the generation of seepage forces that would adversely affect the stability of the slope. For this dam, the danger is substantially mitigated by the presence of the concrete cutoff wall.

c. The trees on the downstream face of the subject dam appeared to be well established. A study should be made to establish whether the trees are shallow rooted or deep rooted. If they are shallow rooted, removal is in order; if they are deep rooted, removal would be potentially more dangerous than leaving them in place.

The drop inlet shaft is not in good condition. Although the deterioration of the gunite that was observed is not expected to be detrimental to the operation of the dam today, water trapped beneath delaminated surfaces will cause spalling of the structural concrete under frost. This may provide additional seepage points for the water and lead to weakening of the structure by further deterioration of the structural concrete. The same evaluation applies to the outflow conduit since its walls and roof are also badly spalled and leaking.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures

Mr. Stephen Howe, assistant to the Superintendent of the City of Glens Falls Water Department, indicated that the reservoir pool was carefully controlled on a daily basis to meet the requirements of the City of Glens Falls water supply system. There were no written procedures made available; however, Mr. Howe indicated that certain water levels had to be maintained in all parts of the system to assure continuous supply to the city during peak usage hours. Water levels, therefore, are monitored daily by caretakers, who adjust inflows and outflows accordingly.

4.2 Maintenance of Dam

The embankment apparently receives periodic maintenance in the form of cutting of vegetation on the upstream slope. The drop inlet overflow structure does not seem to be maintained as well as the dam embankment. Spalls and cracks that occurred in the gunite since the last time the structure was gunited and grouted in 1972 have not been repaired. The walls and roof of the outlet conduit leak badly and there is no indication that attempts are being made to mitigate the condition.

4.3 Maintenance of Operating Facilities

The valve and riser for the 12-inch diameter inlet pipe appear to be maintained satisfactorily. Although the packing of the valve was leaking on the day of the inspection, the caretaker was aware of the condition and was prepared to repair the valve.

4.4 Warning Systems in Effect

The general condition of the dam and its appurtenant structures are checked daily as part of the pool elevation monitoring procedure. In case of an emergency, the police have been instructed to call any of three people who have the authority to lower the water level. These people are available on a 24-hour basis. Access to the controls is maintained in the winter. There is a snowmobile available to GFWD personnel, and the access road is plowed in winter on a high priority basis.

4.5 Evaluation

The drop inlet overflow structure does not seem to be subject to a formal, periodic maintenance program. This lack of maintenance apparently has not reached the point where the integrity of the structure has been compromised. Maintenance of the operating facilities appears to be satisfactory. The emergency alert system in effect also appears to be satisfactory, although we were not shown a written emergency warning procedure.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Hydraulic Features

a. Design Data

The dimensions of the drop inlet overflow spillway, the drop inlet shaft and the outlet tunnel are found on, or can be scaled from, Plates II and III. There are no detailed drawings of any of these structures or of the valves controlling inflow from the reservoir. There are no data or computations available on the hydraulic performance of any of the inlet or outlet structures. Flow computations performed as part of this study are found in Appendix C.

b. Experience Data

No formal data or measurements of flow are available. The maximum flow over the spillway observed by the caretaker over the past 12 years was 3 to 4 inches.

c. Visual Observations

The 12-inch diameter pipe inlet was observed to function satisfactorily on the day of the inspection. The pool elevation was well below that of the spillway crest so the spillway was not observed in operation; however, there is no reason to believe that it would not function satisfactorily. The maximum height of water that the spillway can accommodate without overtopping of the dam is 5 feet. Because there was no flow over the spillway, the drop inlet shaft could not be observed in operation. The large spalls in the gunite at the base of the shaft are not expected to affect its hydraulic performance seriously under normal conditions. The outlet tunnel had only about 1 inch of flow on the day of the inspection and, although its floor is moderately eroded and its walls and roof spalled, its hydraulic performance is expected to be satisfactory under normal conditions.

5.2 Evaluation of Hydrologic Features

a. Design Data

No hydrologic data or analyses could be found in the NYSDEC or City of Glens Falls records for the Butler Storage Reservoir and its local watershed. To our knowledge,

there are no gaging stations in the local basin. According to the Recommended Guidelines for Safety Inspection of Dams, Department of the Army, OCE, the recommended Spillway Design Flood (SDF) for the subject dam is the Probable Maximum Flood (PMF) since the dam is of intermediate size and poses a high hazard.

b. Experience Data

Information on the PMF for the Butler Storage Reservoir and its watershed was obtained from the Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models prepared in 1976 for the New York District of the U.S. Army Corps of Engineers (USACE) by Resource Analysis, Inc. In this study, the rainfall-runoff mathematical model HEC-1 was used to reconstitute the major historical floods and to simulate the Standard Project Flood (SPF). In addition to the SPF simulation, the rainfall pattern for Tropical Storm Agnes was transposed to fall directly on the basins under study, and the discharges resulting from this rainfall were determined by an application of the calibrated model. In a telephone conversation with Mr. Thomas Smyth, USACE New York District, we were informed that for Phase I hydrologic analyses, the Probable Maximum Flood (PMF) could be considered as twice the SPF.

The Butler Storage Reservoir and its drainage basin were located within Subarea 257 of the Upper Hudson River Basin, Sacandoga River Confluence to Green Island, N.Y. Computations for routing the PMF through the Butler Storage Reservoir are found in Appendix C of this report.

c. Visual Observations

Interviews with personnel of GFWD revealed that the maximum observed flood in their recollection over the past 12 years occurred when water rose only about 3 to 4 inches above the spillway. This appears to be verified by observable high water marks on the gate house superstructure (Fig. 5, Appendix D). It was also revealed that the pool of the Butler Storage Reservoir is normally kept at elevation 745, approximately 18 feet below spillway elevation. This may explain why little overflow was noted even in years of heavy rain (early 1970s). Another factor that contributes to the lack of high flows over the spillway is that the Butler Storage Reservoir is a controlled inlet-outlet facility, and about one half of the basin drains in Butler Pond, the upstream control.

d. Overtopping Potential

The computations in Appendix C indicate that the subject dam will be overtopped by the PMF, which is also the SDF in this case. The maximum height of water that can flow over the spillway without the dam being overtopped is 5 feet. At that height the spillway passes approximately 1100 cfs. The routed PMF is approximately 3220 cfs. Therefore, the spillway can pass only 34 percent of the PMF.

e. Spillway Adequacy

The results of the hydrological analysis indicate that the spillway capacity is inadequate with respect to passing the recommended SDF. In addition, the spillway is considered seriously inadequate because it satisfies all of the following conditions set forth in DAEN-CWE-HY Engineer Technical Letter No. 1110-2-234 dated 10 May 1978:

1. There is high hazard to loss of life from large flows downstream of the dam.

2. Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

3. The spillway is not capable of passing one-half of the Probable Maximum Flood without overtopping the dam and potentially causing failure.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

Visual observations of the earth embankment and reinforced concrete drop inlet overflow structure did not disclose any signs of structural instabilities, although the drop inlet box and outlet conduit were leaking and badly spalled. The vertical and horizontal alignments of the embankment appeared to have been maintained, and there was no evidence of cracks. There was no seepage noted along the junctions of the embankment and the abutments or at the toe of the embankment; the concrete cutoff wall appears to be functioning satisfactorily. There was, however, considerable seepage occurring through the outlet conduit roof and walls at points downstream from the cutoff wall. This would seem to indicate that local seepage is occurring through the embankment, perhaps along the embankment-conduit interface.

b. Design and Construction Data

No design or construction data relating to stability were available for review. Since no information was available regarding the nature of the embankment materials or their engineering properties, neither stability nor seepage analyses could be performed as part of this study.

c. Operating Records

None available.

d. Post Construction Changes

The major change that occurred since completion of construction concerns the inlet pipes. The 16-inch diameter pipe and the 12-inch diameter pipe at elevation 748 were plugged and are now inoperative. The 12-inch diameter pipe at elevation 731 was cut off inside the gate house and does not exit through the wall of the drop inlet box. These changes substantially reduce the amount of flow that can be controlled.

Repairs were made to the reservoir spillway section, the gate house and ramp in 1972. These repairs

consisted of pressure grouting and guniting (reinforced wire mesh) of those structures, but they did not entail any major change of the structure.

The only other post construction change involves the planting of red pine trees on the downstream face of the embankment sometime during the 1930s. The effect of these trees has been discussed in Section 3.2.

e. Seismic Stability

The Butler Storage Reservoir is nominally located on the border between Seismic Zone 1 and Seismic Zone 2 according to the Algermissen Seismic Risk Map. The USACE guidelines suggest that in the event of doubt about the proper zone, the higher zone should be used. Although earthquakes that cause moderate damage can be expected to occur in Zone 2, the design and construction practices conventionally used for small earth dams are considered to be adequate in areas of low seismicity and the safety factors used for static conditions should preclude major damage for all but the most catastrophic earthquakes. However, no computations were performed to evaluate the effect of earthquakes on the subject dam.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety

Visual inspection of the system and a review of the little available engineering data indicate that the dam embankment and the overflow spillway at the entry to the drop inlet are in generally good condition and functioning satisfactorily at this time. The drop inlet shaft and outlet conduit are in need of repair, but are apparently still functioning satisfactorily at this time. Our approximate hydrologic/hydraulic calculations indicate that the discharge capacity of the drop inlet spillway is seriously inadequate according to the OCE screening criteria.

b. Adequacy of Information

The information available to us is not adequate for a detailed analysis of the stability of the embankment including seepage effects, or for a detailed analysis of the structural stability of the drop inlet overflow structure. The safety assessment made above is based almost entirely upon visual observation on the day of the inspection and the fact that the information available indicates that the dam appears to have been designed according to conventional engineering practice (reasonable slopes, cutoff wall, etc.). Since there were no hydrologic data available, our assessment of the overtopping potential is based solely on transpositioning modelling results to the subject drainage basin.

c. Urgency

Inasmuch as the spillway capacity appears to be seriously inadequate according to the OCE screening criteria, there is some urgency in performing the additional study recommended below. Likewise, since continued neglect of the spalled gunite and leakage occurring in the drop inlet shaft and outlet conduit could lead to serious structural damage, there is also some urgency in performing the repairs recommended below.

d. Necessity for Further Investigations

In view of the serious inadequacy of the drop inlet overflow spillway in its ability to pass at least one half of the computed PMF without overtopping the dam, and in view of the fact that overtopping in the case of earthfill dams is usually disastrous, the actual capacity of the spillway should be determined using more precise and sophisticated methods and procedures. This further investigation should be performed as soon as possible. Following this study, the need for and type of mitigating measures should be determined. Until such a study is completed, around-the-clock surveillance of the structure should be provided during periods of unusually heavy precipitation.

7.2 Recommendations and Remedial Measures

a. Alterations/Repairs

1) The junction between the spillway/gate house superstructure and the concrete apron on the upstream slope should be repaired.

2) The soundness of the gunite in the drop inlet shaft should be tested. The gunite should be stripped completely where it is found to be delaminating and replaced with a special concrete cover to protect the structural concrete from water erosion. Injection grouting for leaks should also be undertaken. A specific grouting program should be performed around the outlet conduit at the location of the concrete cutoff wall.

3) The same remedial measures as recommended for the drop inlet shaft should be applied to the outlet conduit.

4) All other concrete appurtenances such as the concrete apron on the upstream slope should be repaired.

5) The gate house shaft should be lighted, either by an electrical circuit or by a system of battery operated emergency lights, and railings added, so that access to outlet pipe valves can be gained safely.

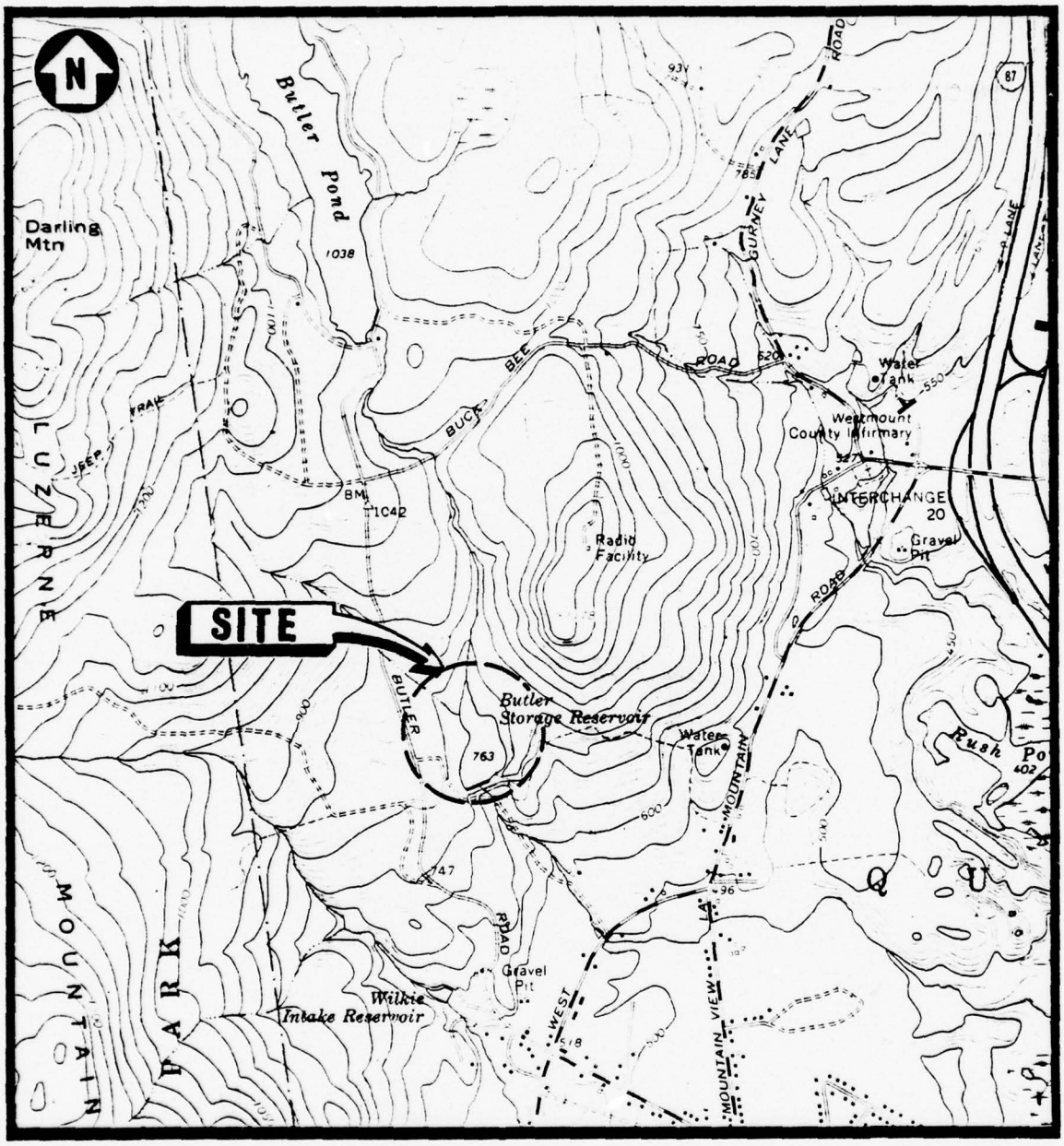
6) The low woody growth on the upstream face of the dam should be removed.

7) The large trees on the embankment should be investigated to determine whether they are shallow rooted or deep rooted. If shallow rooted, they should be cut down; if deep rooted, they should remain.

The remedial work recommended above is not critical in terms of urgency. It should be done as soon as practicable. Items 5 and 6 can be accomplished this year; all recommendations should be completed within the next three years.

b. Operations and Maintenance Programs

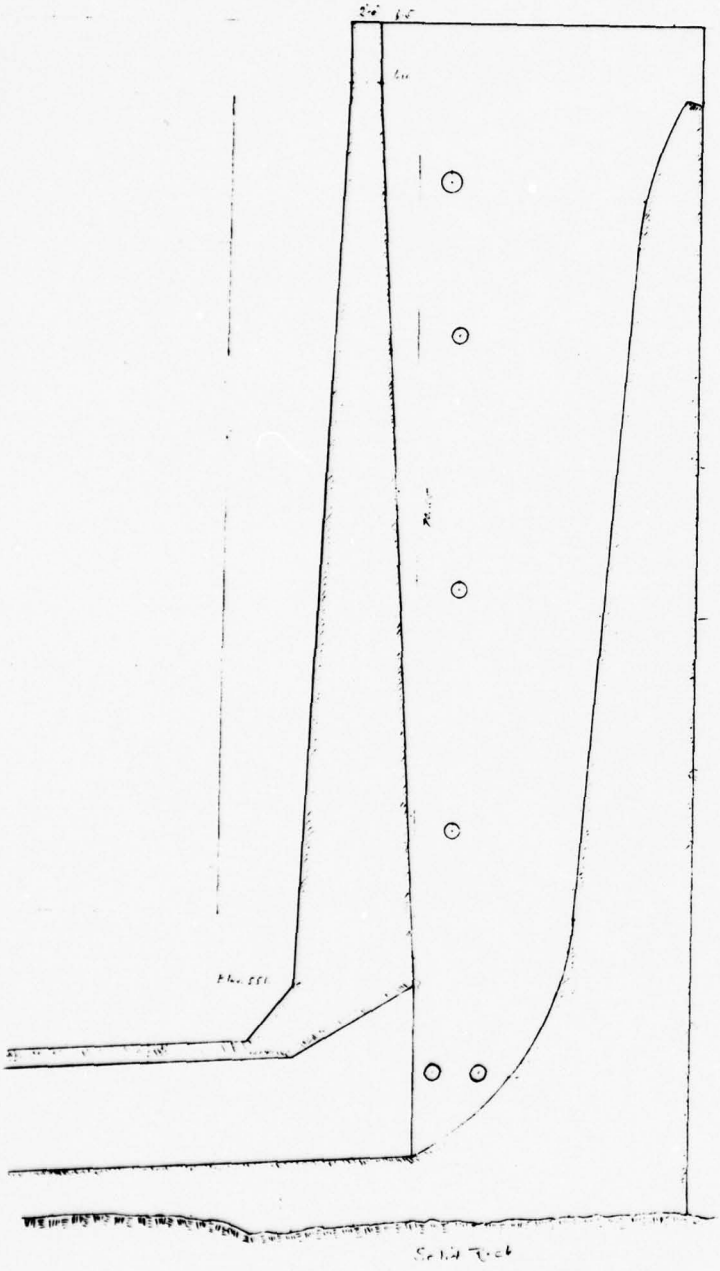
A specific program of periodic maintenance of the dam embankment and its appurtenant structures should be established and followed. This would include definite times for trimming of vegetation on the upstream slope, inspection and repair of concrete structures, testing of control valves for leakage, timely repair of the access road, etc.



SCALE 1"=2000'

MAP SOURCE: BASE MAP WAS ADAPTED FROM U.S. GEOLOGICAL SURVEY MAP, GLENS FALLS, N.Y. QUADRANGLE, 7.5 MINUTE SERIES, 1966. (BASE MAP MAY NOT REFLECT RECENT CARTOGRAPHIC CHANGES)

PLATE I - SITE LOCATION MAP



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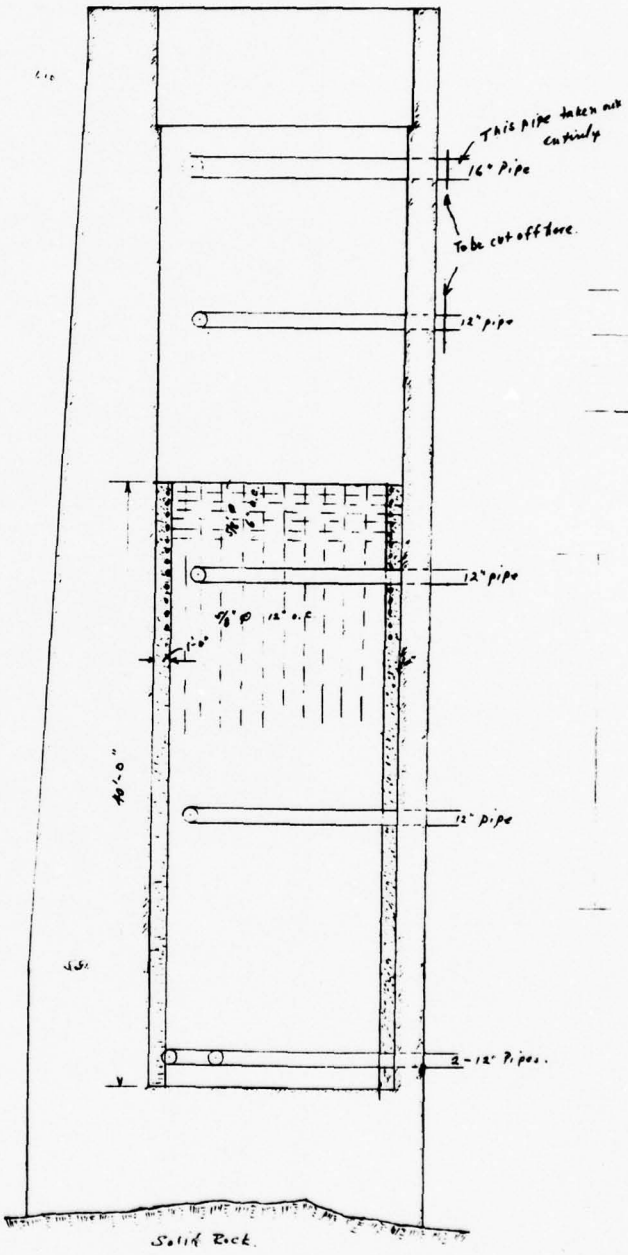

SECTION THROUGH GATE CHAMBER

Scale 3/16 inch = 1 foot

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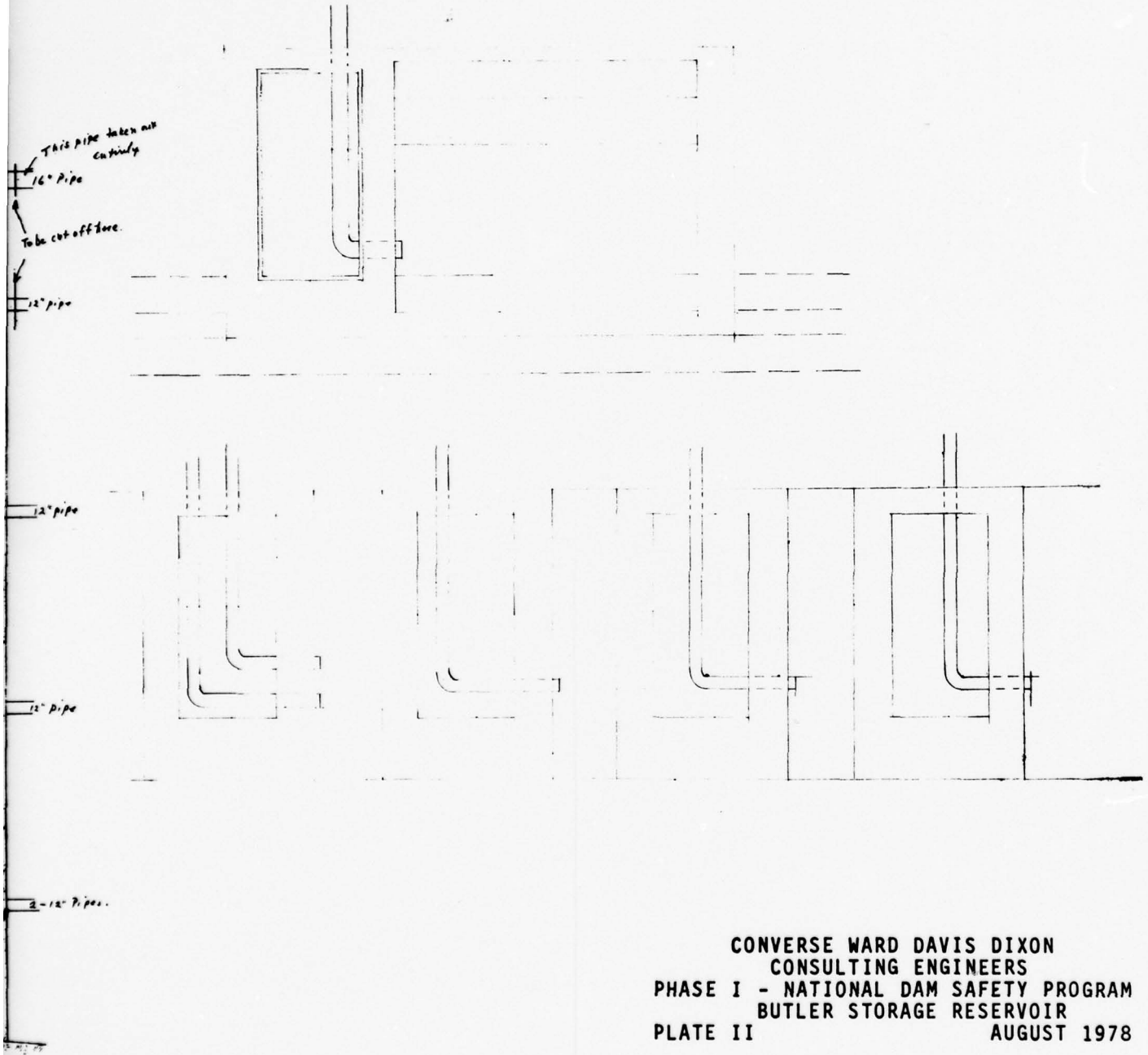

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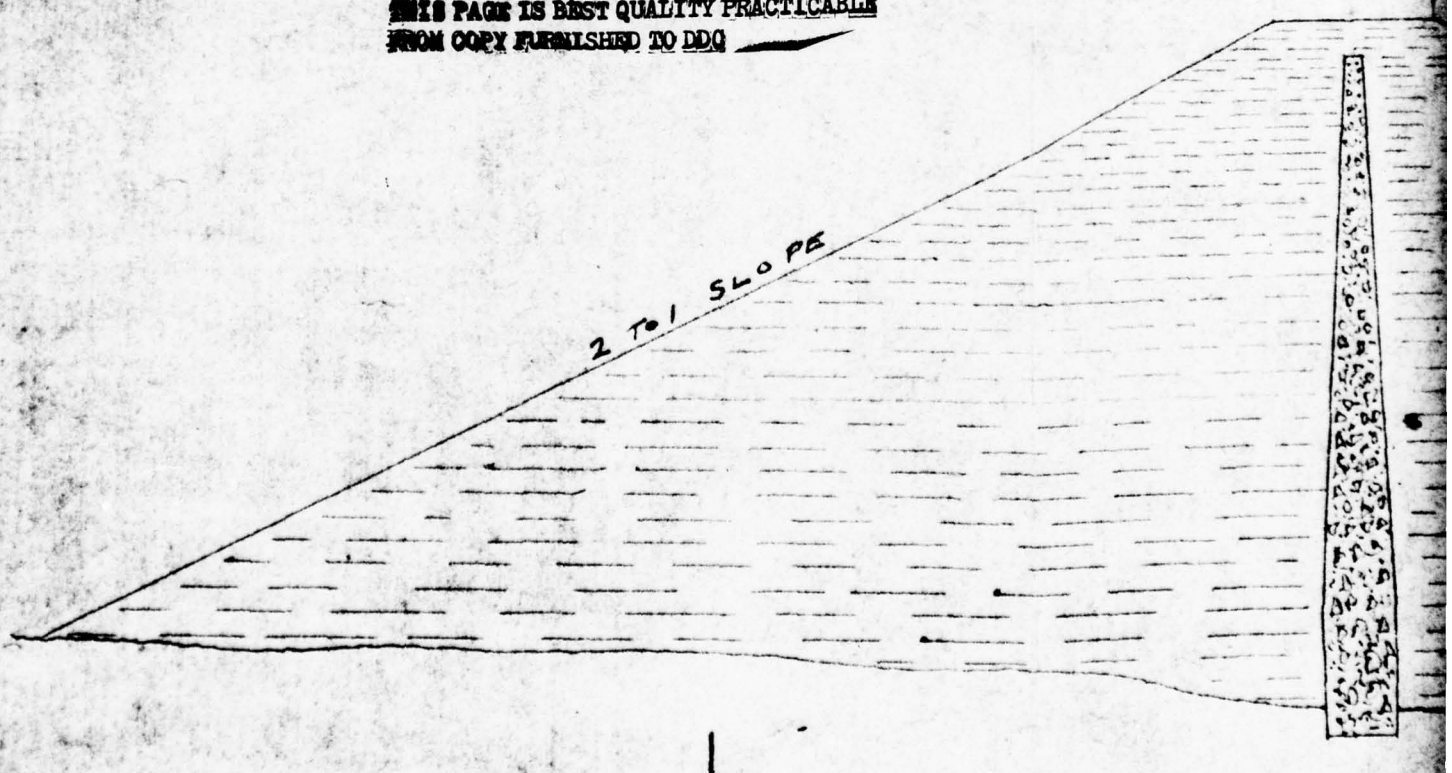
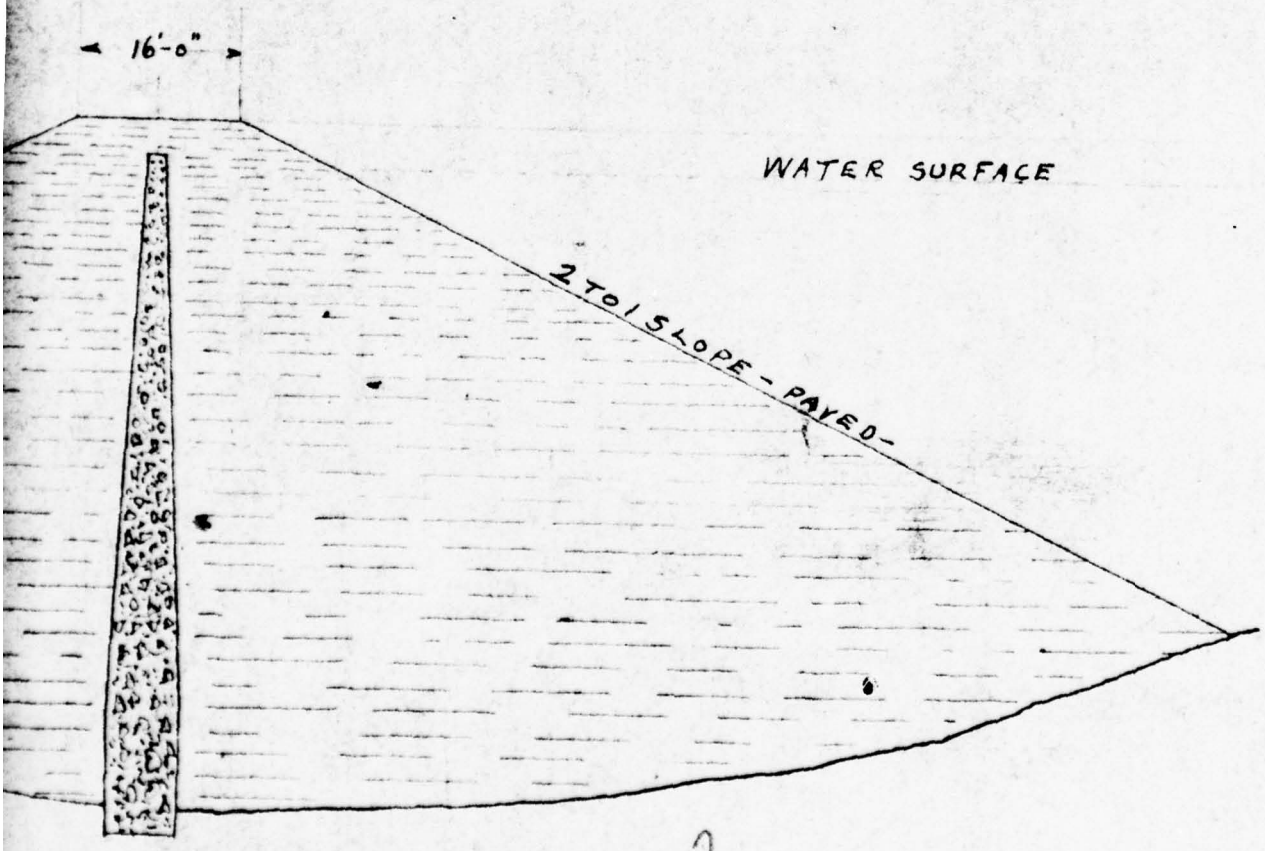
PHASE I - NATIONAL DAM SAFETY PROGRAM
BUTLER STORAGE RESERVOIR
PLATE II AUGUST 1978

Ruth Schaaf

RD-03

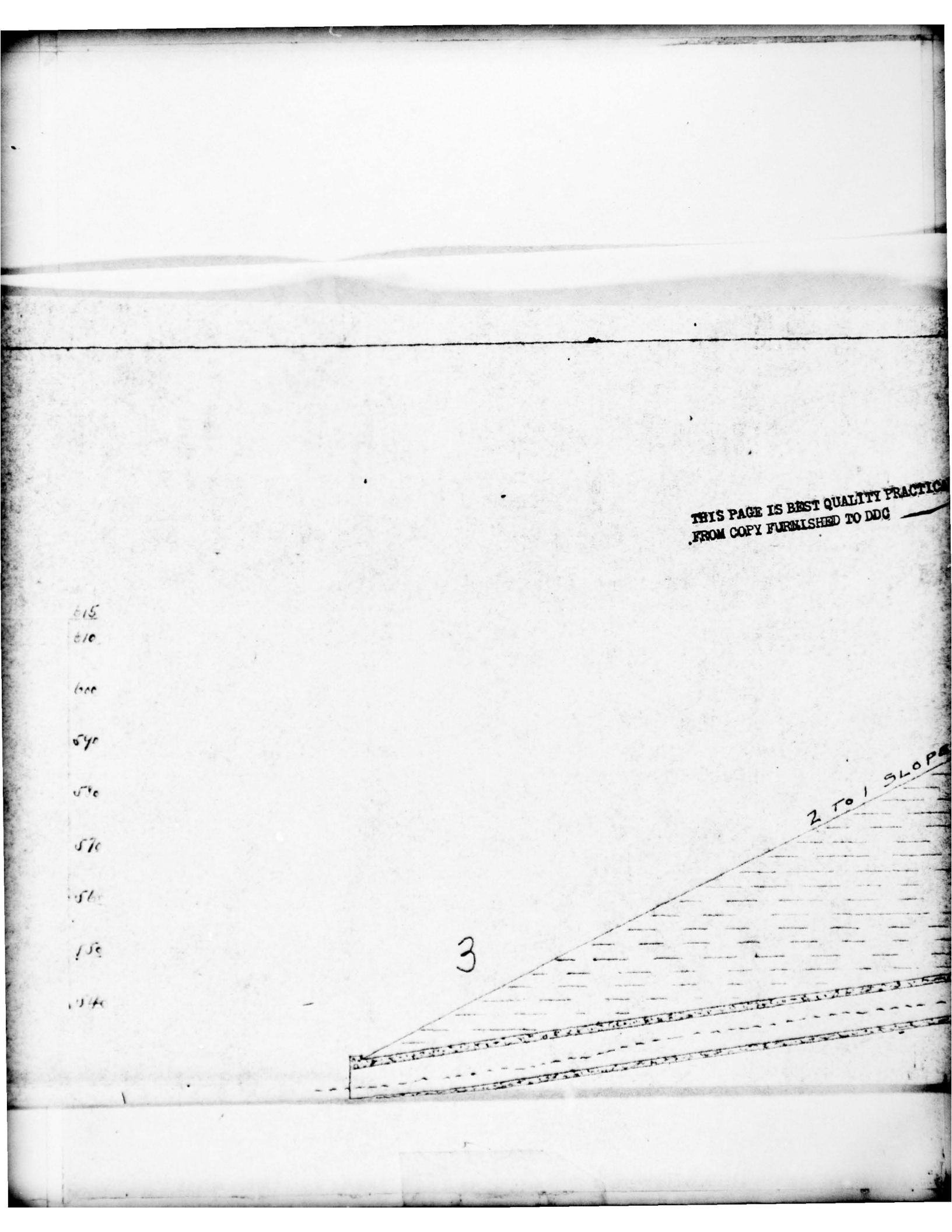
2

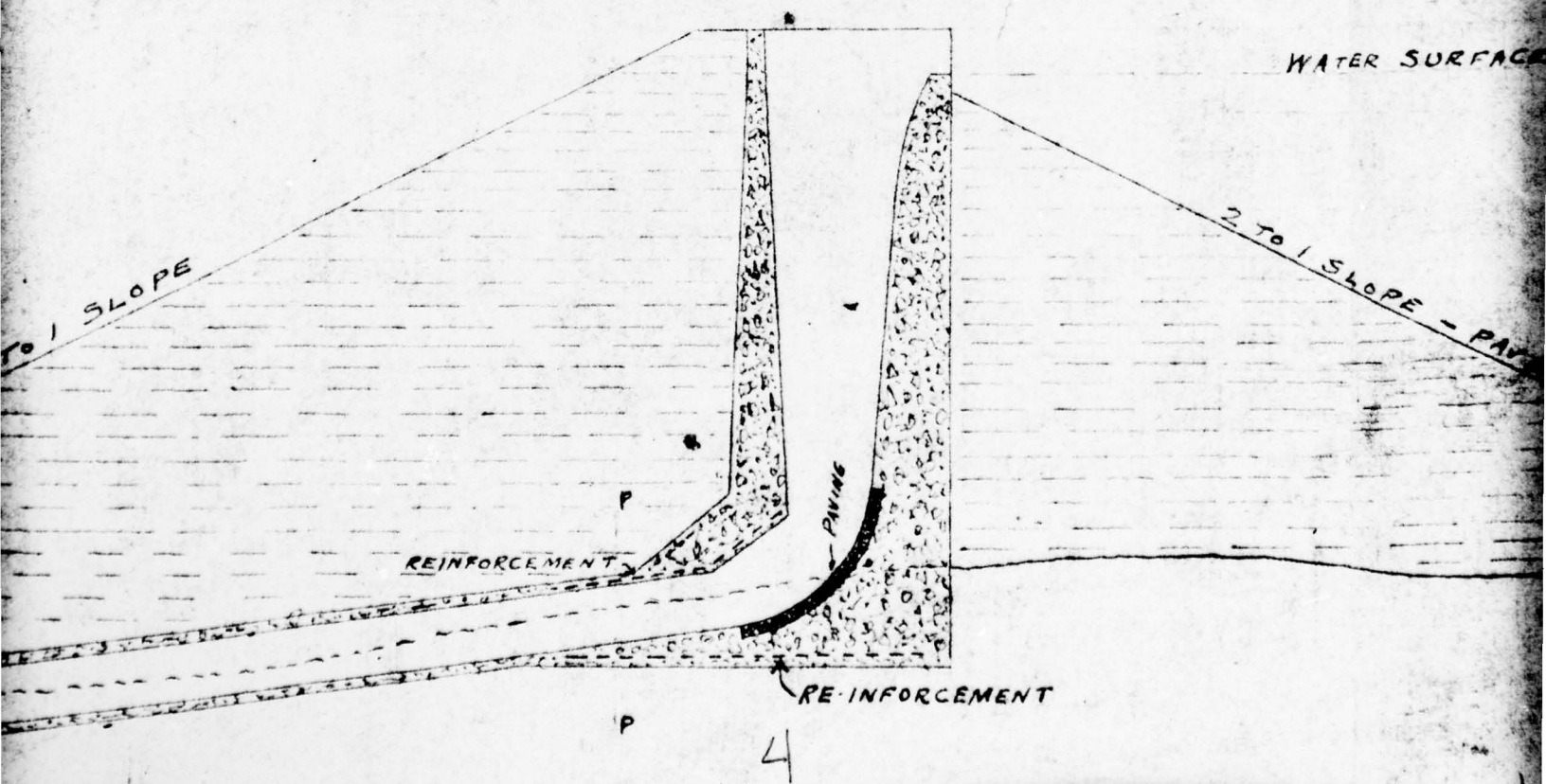


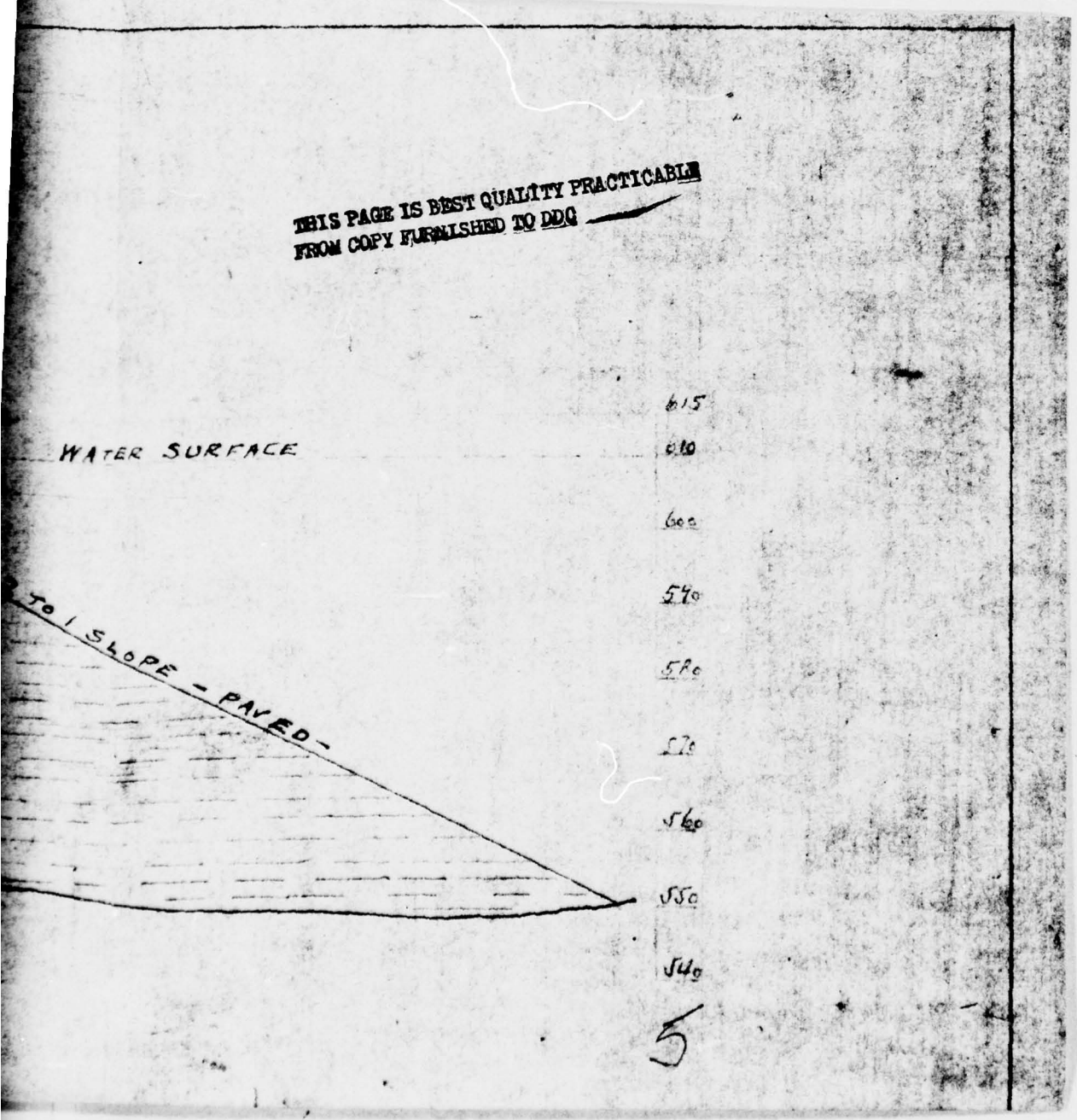


2

FOUNDATION TO BE SPREAD AS NECESSARY FOR BEARING, AND ALL PERVIOUS SOIL CUT OFF BY INCREASED







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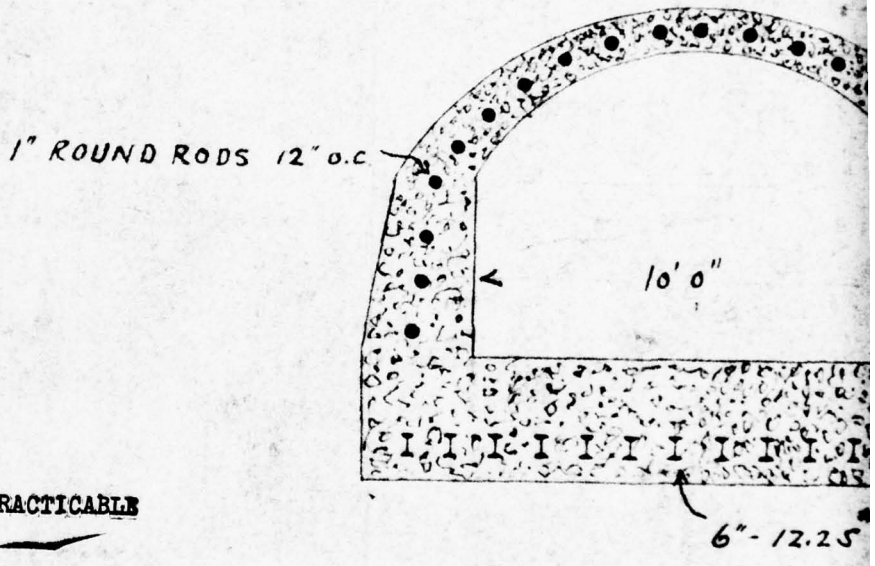
DEPTH, S

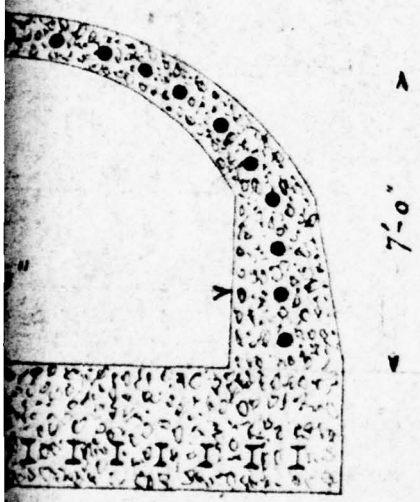
SECTION A-A.



SECTION P-P

DEPTH, SHEET PILING OR OTHER MEANS.

A-A.



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REVIS
BUTLER
GL

APPROVED BY WATER

Fred G. Aiell

J. R. McHug
Egbert W. West
Orville C.

8

REVISED SECTIONS OF DAM, BUTLER STORAGE RESERVOIR, GLENS FALLS, N. Y.

SCALES 20' = 1" & 4' = 1"

BY WATER COMMISSION.

G. [illegible] Pres. Common Council. Howard M. West

[illegible] SUPE

[illegible] McHugh

W. West

[illegible] C. Smith

9

Drier

SUPERINTENDENT.

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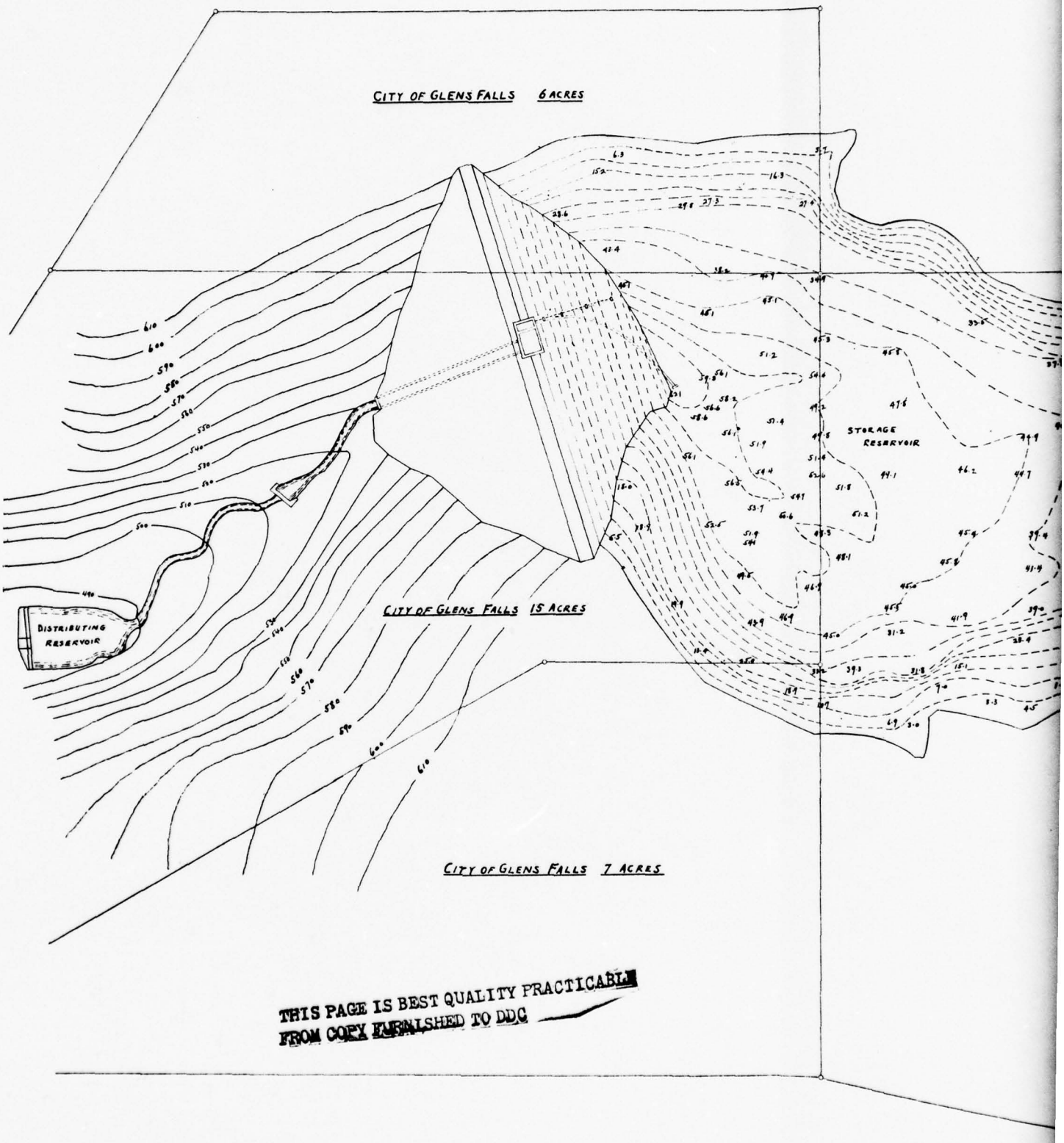
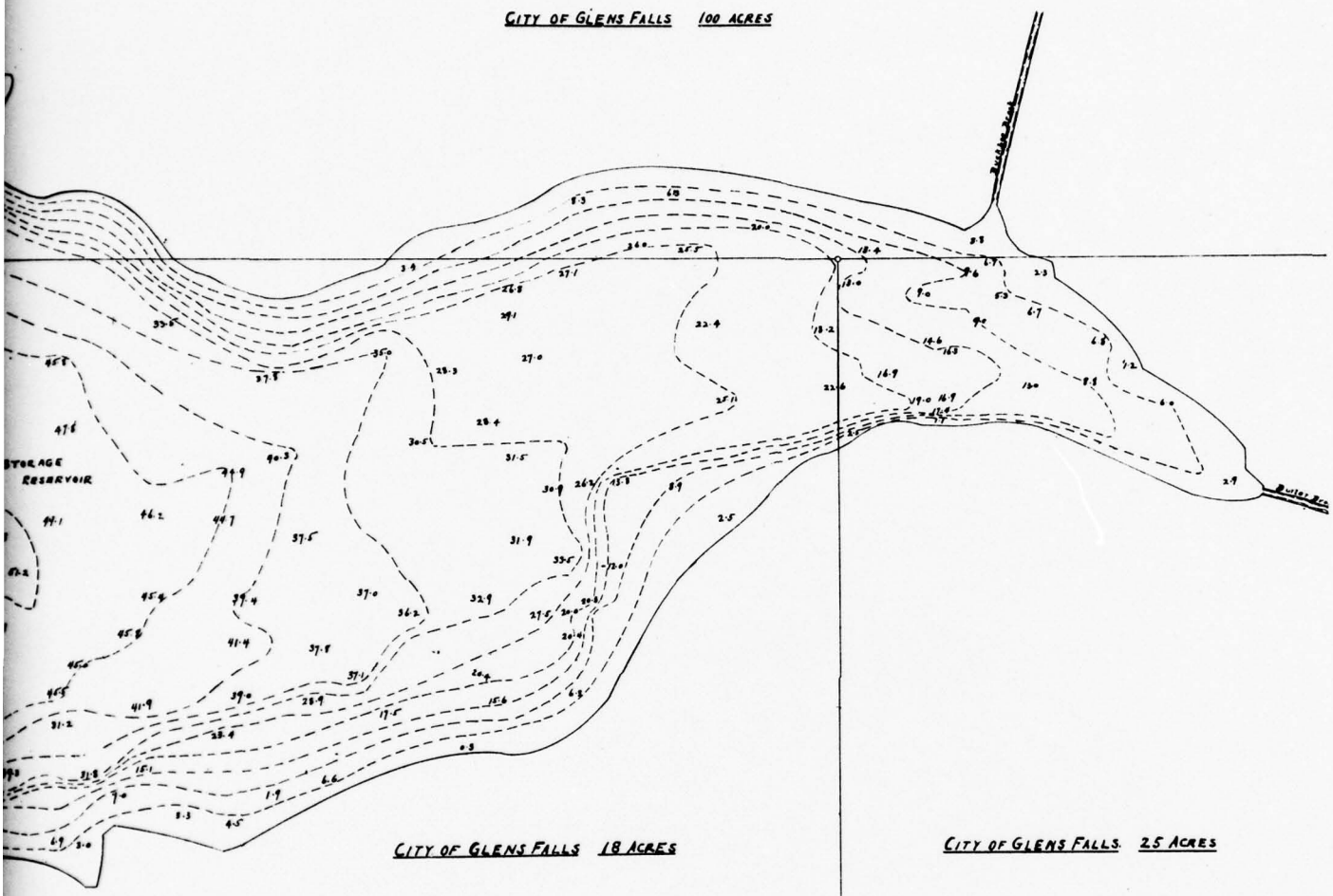
BUTLER STORAGE RESERVOIR
PLATE III AUGUST 1978





0 60 120 180
SCALE IN FEET

RESERVOIRS ON BUTLER BROOK
OWNED BY
THE CITY OF GLENS FALLS N.Y.
WARREN COUNTY.
SCALE 1 IN. = 60 FT
SEPT. 12, 1913. Howard M. Keator SUPT.

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BUTLER STORAGE RESERVOIR
PLATE IV AUGUST 1978

APPENDIX A

CHECKLIST - ENGINEERING DATA

CHECKLIST

HYDROLOGIC AND HYDRAULIC DATA

ENGINEERING DATA

NAME OF DAM: Butler Storage Reservoir Dam NDS ID NO.: NY13

RATED CAPACITY (ACRE-FEET) 378 NYS DEC ID NO.: 223C-1165

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 745

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 763

ELEVATION MAXIMUM DESIGN POOL: 768

ELEVATION TOP DAM: 768

CREST: (Drop Inlet Overflow Spillway)

a. Elevation 763
b. Type Concrete gunite; rounded-crest
c. Width 1 foot (nominal)
d. Length 25 feet
e. Location Spillover Near center of dam
f. Number and Type of Gates None

OUTLET WORKS:

a. Type Arched roof rectangular conduit
b. Location At base of drop inlet shaft
c. Entrance inverts 693
d. Exit inverts 684
e. Emergency draindown facilities 2-12" diameter "mud" pipes elev. 699; 1-12" diameter drain, elev. 715.

HYDROMETEOROLOGICAL GAGES:

a. Type None
b. Location None
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: Unknown; 1000 cfs (estimated)

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: Butler Storage REservoir

NDS ID NO.: NY13 NYS DEC ID NO.: 223C-1165

ITEM	REMARKS
DRAWINGS	One sketch of drop inlet overflow structure (undated): Plate II Two Drawings: 1) Sections through dam and outlet conduit (Refer to Sheet 5)
REGIONAL VICINITY MAP	Dam shown on USGS 7 1/2 minute quadrangle sheet of Glens Falls, NY (N4315.0-W7337.5)
CONSTRUCTION HISTORY	None available
TYPICAL SECTIONS OF DAM	No details; two sections shown on undated drawing of Plate III.
HYDROLOGIC/HYDRAULIC DATA	USACE Hydrologic Model for Upper Hudson River Basin and computed capacity vs pool elevation are the only hydrologic data available. No Hydraulic data available.

ENGINEERING DATA

ITEM	REMARKS
OUTLETS: Plan Details Constraints Discharge Ratings	See "SPILLWAY" on Sheet 4
RAINFALL/RESERVOIR RECORDS	None available
DESIGN REPORTS	None available
GEOLOGY REPORTS	None available
DESIGN COMPUTATIONS: Hydrology & Hydraulics Dam Stability Seepage Studies	None available

ENGINEERING DATA

ITEM	REMARKS
MATERIALS INVESTIGATIONS Boring Records Laboratory Field	None available
POST-CONSTRUCTION SURVEYS OF DAM	None available
BORROW SOURCES	None available
MONITORING SYSTEMS	None
MODIFICATIONS	Visual observations indicate that 16" diameter and 2 of the 12" diameter inlet pipes were plugged. Gunite covering put on drop inlet overflow structure in 1972 - no details available. Trees planted on downstream slope in 1930's.

ENGINEERING DATA

ITEM	REMARKS
HIGH POOL RECORDS	No formal record available; some hearsay report for past 14 years.
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM Description Reports	None reported.
MAINTENANCE AND OPERATION RECORDS	Records available for repairs in 1972 and 1948 (guniting and grouting.)
SPILLWAY: Plan Sections Details	Plan and section available in drawings on file with City of Glens Falls. No details available.

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT: Plans Details	None available
PREVIOUS INSPECTION Date: Findings	Inspections are performed periodically by NYSDEC. The last inspection report on file is dated 31 July 1970. The findings of the inspection are summarized in a State of New York Conservation Department Memorandum from G. Van Etten and R. Ryczek to E. Rich dated 17 August 1970. (Appendix E.) This inspection was conducted prior to the repairs made in 1972 in which many of the deficiencies were apparently corrected. A reinspection seems to have been scheduled for 7 March 1974, but no record of the report of that inspection was found in NYSDEC files. (Refer to letter from G. Tripp to G. Van Etten dated 21 February 1974 in Appendix E.)
DRAWINGS	(undated): Plate III 2) Plan showing terrain contours downstream and pool elevation contours upstream (1913): Plate IV. Other drawings and sketches of system on file with City of Glens Falls, Board of Water Commissioners.

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

NAME OF DAM: Butler Storage Reservoir County: Warren State: NY NDS ID No.: NY13

Butler Brook NYS DEC ID No.: 223C-1165

Type of Dam: Earthfill - Concrete Core Hazard Category: High

Date(s) Inspection: 17 July 1978 Weather: Overcast - rainy Temperature: 72°F

Pool Elevation at Time of Inspection: 745 msl

Tailwater at Time of Inspection: 682 msl (Stream elevation at outlet conduit exit)

Inspection Personnel:

E. A. Nowatzki (JSW)	W. Tucker (GFWD)	
G. S. Salzman (JSW)	R. Brochu (GFWD)	
S. Howe (GFWD)		

E. A. Nowatzki Recorder

Remarks:

EMBANKMENT

Sheet 1 of 3

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None visible; animal burrows (2" diameter) on downstream face.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None visible - heavily wooded downstream and thick ground cover.	
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes	Dirt roadway (access to detention basin) on downstream face is eroded.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Looks OK; red pine tree roots clearly visible and protruding transverse to crest.	
RIPRAP FAILURES	None visible; soil in spaces between 6-8 inch size rock, therefore, not a solid rip rap face. For concrete-covered section, see "SPILLWAY."	

EMBANKMENT

Sheet 2 of 3

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	Abutment: OK both sides. Spillway: concrete aprons are cracked and irregular. Signs of patching evident. Vegetation growing through cracks.	
ANY NOTICEABLE SEEPAGE	None through embankment. See "SPILLWAY."	
RECORDING INSTRUMENTATION	None	
DRAINS	Three weepholes (1 1/2" daimeter) at bottom of drop inlet. 2 on left (oneflowing) and 1 upstream (flowing.)	
OTHER	Downstream face heavily wooded with red pine; roots visible across crest. Left side of embankment (upstream face) tree growth to 10 feet,	

(Refer to Sheet 3)

EMBANKMENT

Sheet 3 of 3

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
OTHER	deciduous and evergreen. Some shrubs on right upstream face.	

OUTLET WORKS

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Outlet tunnel; concrete eroded on floor and on some sections on wall. Moderate seepage from walls and ceilings in many areas. (Refer to Sheet 2)	
INTAKE STRUCTURE	Three remaining active intake pipes. 1-12" diameter main pipe. 2-12" daimeter "mud" pipes. Other pipes (Refer to Sheet 2)	
OUTLET STRUCTURE	Spillway crest: recently gunited, appears satisfactory. Spillway TROUGH : spalled concrete, exposed (Refer to Sheet 2)	
OUTLET CHANNEL	See "DOWNSTREAM CHANNEL."	
EMERGENCY GATE	None except 3 pipe valves noted above. Saw main pipe valve operated. Informed mud pipes OK. Access to mud pipe valves difficult-need lights and rails in gate house.	

OUTLET WORKS

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Significant seepage from spall half way up right side wall, about 33' from exit portal. Signs of previous patching evident.	
INTAKE STRUCTURE	(1-16", 1-12") non functioning. Packing nut of valve on 12" main pipe is leaking; simple correction required. New bolts on valve bonnet installed in Fall of 1977.	
OUTLET STRUCTURE	wire; gunited at least twice. Water seeping from under gunite on downstream face; severely eroded concrete section at base of left side on downstream face near outlet tunnel.	

UNGATED SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Recently gunited - appears satisfactory. Maybe higher than original elevation by about 1" at crest because of guniting. (W. Tucker)	
APPROACH CHANNEL	See "CONCRETE APRONS"	
DISCHARGE CHANNEL	See "OUTLET WORKS"	
BRIDGE AND PIERS	None	
CONCRETE APRONS	Upstream adjacent to gate-house and spillway. Irregularities in concrete; cracks; recently partially gunited.	

INSTRUMENTATION

Sheet 1 of 1

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

RESERVOIR

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Slopes about 3 horizontal to 2 vertical up to high water mark. Above that slopes are steep, about 1 horizontal to 1 vertical. Heavily vegetated (See Below)	
SEDIMENTATION	None visible. In 1973± lake drained; negligible sedimentation visible. Inlet to 2 mud pipes visible. Related by W. Tucker.	
SLOPES	and stable. Some signs of creep.	

DOWNSTREAM CHANNEL

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION Obstructions Debris Other	Obstructions: none visible. Debris: none visible Other: Intermediate dam silted in. Water supply intake and overflow spillway (See Below)	
SLOPES Cover Stability	Cover: heavily wooded (deciduous and evergreen mix.) Stability: appears stable. Access roadway extends from downstream face into downstream channel.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	About 10 homes within 1 to 1 1/2 miles of downstream face; more homes in valley farther downstream. Daily inspection by caretaker, W. Tucker. Agree with "high" hazard classification.	
CONDITION Obstructions Debris Other	seem to be OK; spillway constricts natural channel (Wooden bridge over spillway.)	

APPENDIX C

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

By: EAN Date: 8/2/78
Checked: NDS Date: 8/3/78
Subject: Hydrology
Butler Storage
Reservoir

CONVERSE WARD DAVIS DIXON, INC.
91 ROSELAND AVENUE
P. O. BOX 91
CALDWELL, N. J. 07006

Job # A1825-116
Page 1 of 2

Planimetered area on USGS quad = 17.64 in^2
Conversion 6.9 in^2 = 1 square mile
∴ Area of drainage basin ≅ 2.6 mi^2 including both Butler Pond and Butler Storage Reservoir

Use Upper Hudson River Basin Hydrological Model
p149-153 (Subdivision 257)

Sub	Area	SPF (cfs)	PMF (cfs)
257	84 (p.152)	23823 (p.160)	47646 (SPF = PMF/2)

General Transposition Formula provided by NY District USACE

$$\left(\frac{A_1}{A_2}\right)^{0.75} = \frac{PMF_1}{PMF_2}$$

$$\left(\frac{2.6}{84}\right)^{0.75} \times (47646) = \text{PMF for Butler Watershed}$$

$$0.074 \times 47646 = 3526 \text{ cfs} = \text{PMF}$$

Water surface acreage Butler Pond ≅ 93 acres
" " " Butler Storage Res = 14 acres
107 acres = 0.17 negligible

Butler Pond
STATE
PARK
GEORGE
Butler Pond
Darling Mtn
Darling Mtn
Gravel Pit
Wildwood Lake Camp
Wilkie Reservoir
LUZERNE
BUCK
GURNEY LANE
ROAD
Westmount County Infirmary
INTERCHANGE 20
Gravel Pit
Radio Facility
Butler Storage Reservoir
Water Tank
Water Tank
MOUNTAIN
BUTLER

CONVERSE WARD DAVIS DIXON, INC.
91 ROSELAND AVENUE
P. O. BOX 91
CALDWELL, N. J. 07006

BY: PGM 7/2/78
CHECKED: AOD 8/3/78
SUBJECT: HYDROLOGY
BUTLER STORAGE RESERVOIR

JOB # A7805-11C
PAGE 2 OF 8

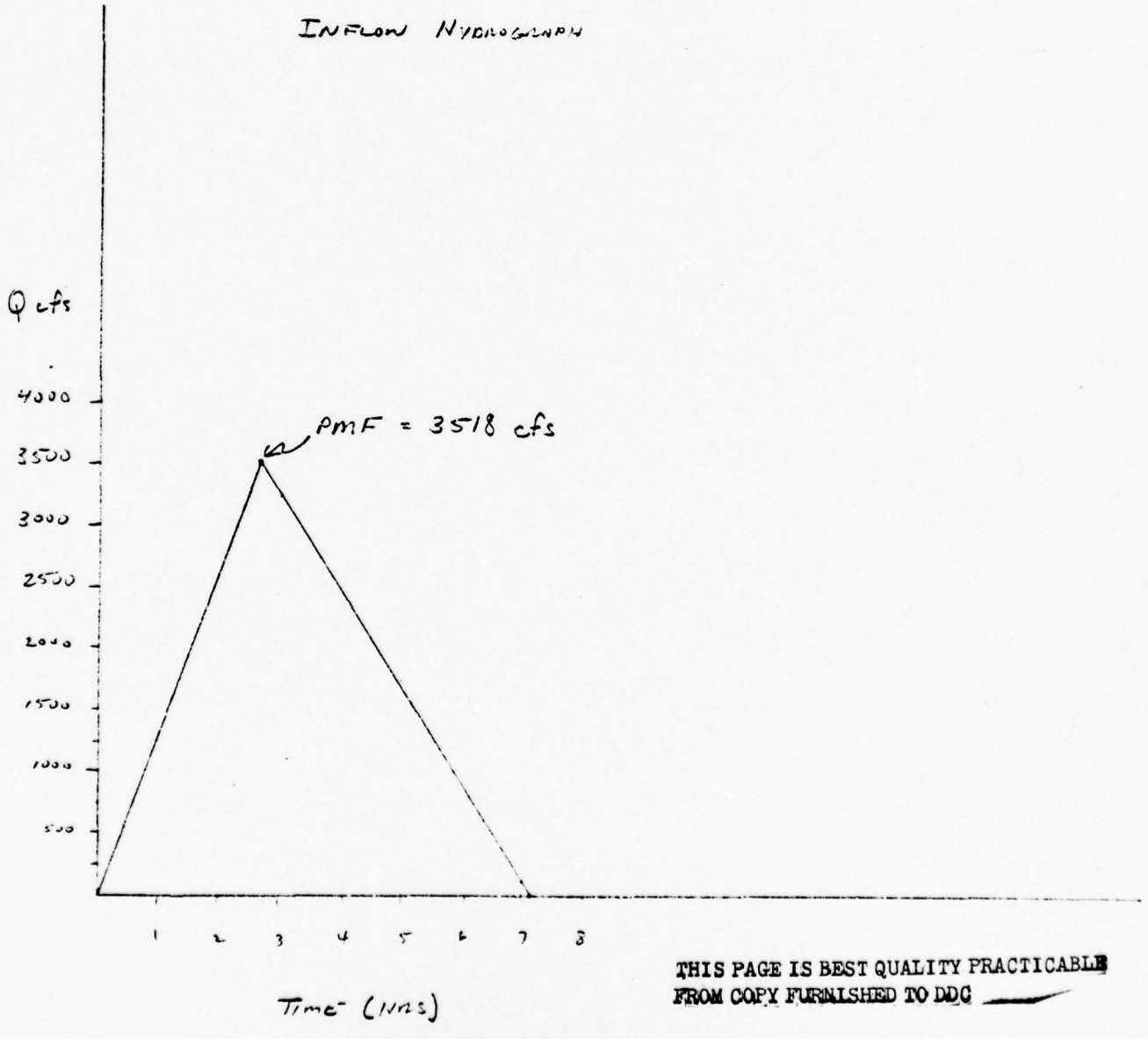
$T_{P_1} = \frac{d_1}{d_2} T_{P_2}$ $\quad T_{P_2} = 15$ hrs from U. Nudson R. P 152

$= \frac{1.82}{10.3}(15)$ $\quad A_1 = \frac{\pi}{4} d_1^2$ $\quad A_2 = \frac{\pi}{4} d_2^2$

$d_1 = \sqrt{\frac{4}{\pi}(2.6)}$ $\quad d_2 = \sqrt{\frac{4(84)}{\pi}}$

$= 2.65$ hrs. $\quad = 1.82$ mi. $\quad = 10.3$ mi.

$T_b = 267 T_p = 7.1$ hrs.



CONVERSE WARD DAVIS DIXON, INC.
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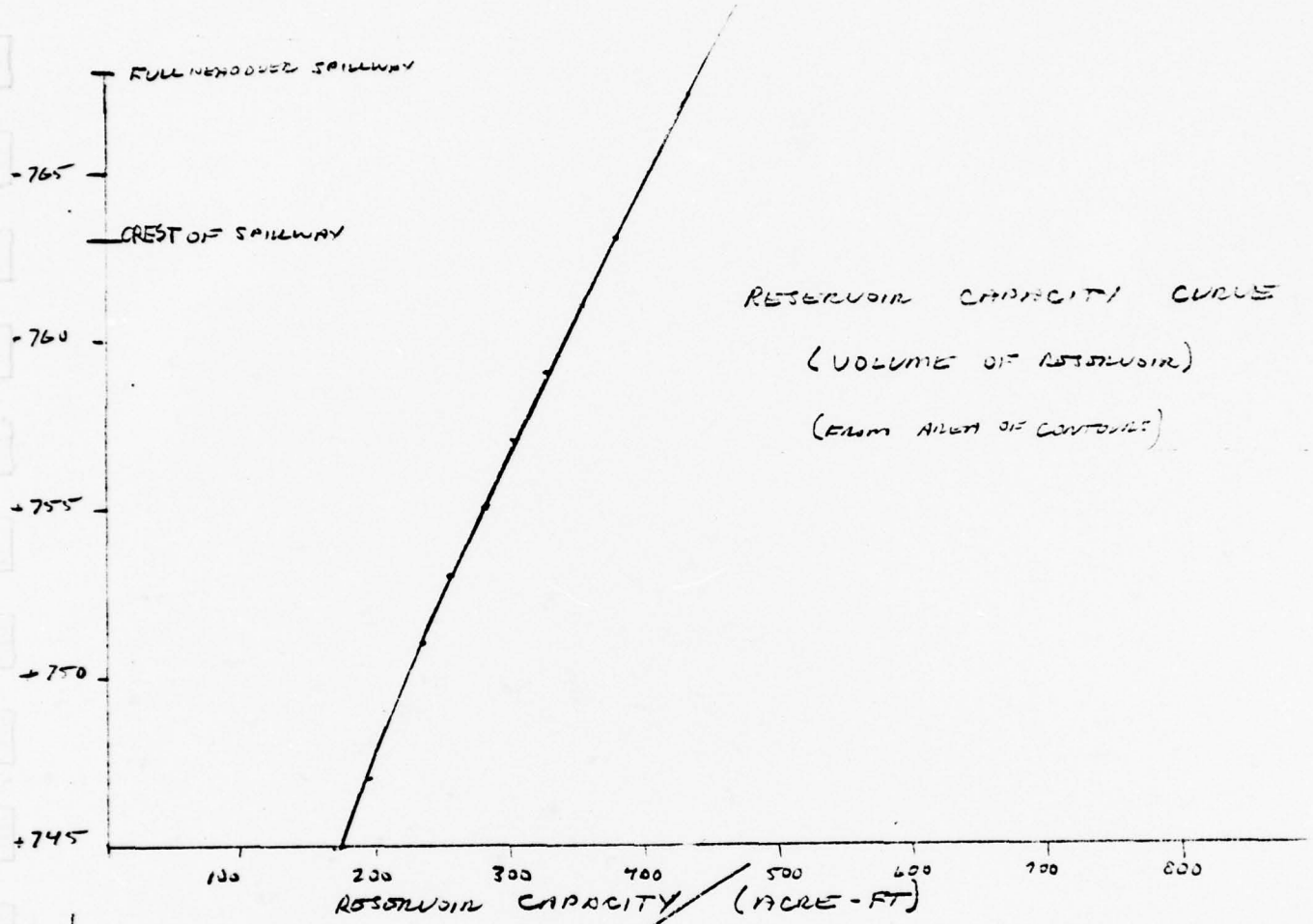
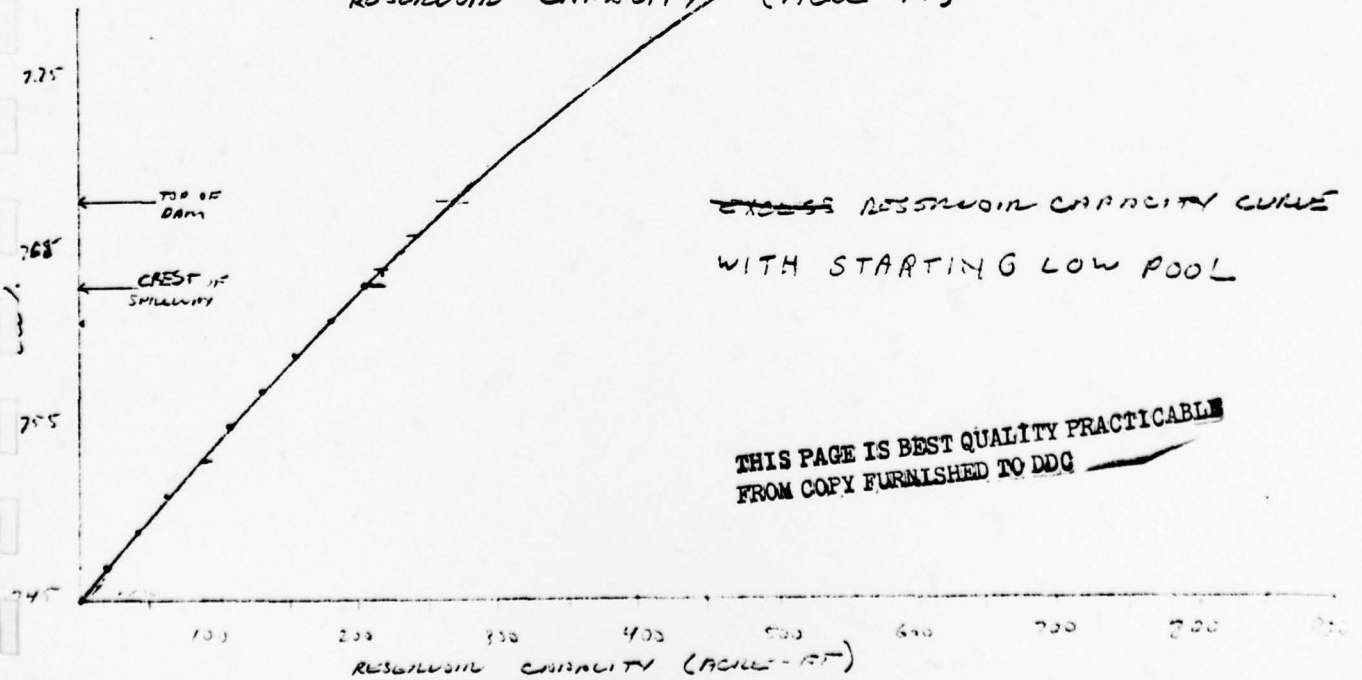
CALDWELL, N. J. 07006

BY: PGM 2/2/78
CHECKED BY: HDD 2/3/78
SUBJECT HYDROLOGY
BUTLER STORAGE RESERVOIR

JOB # A7805-11C
PAGE 3 OF 8

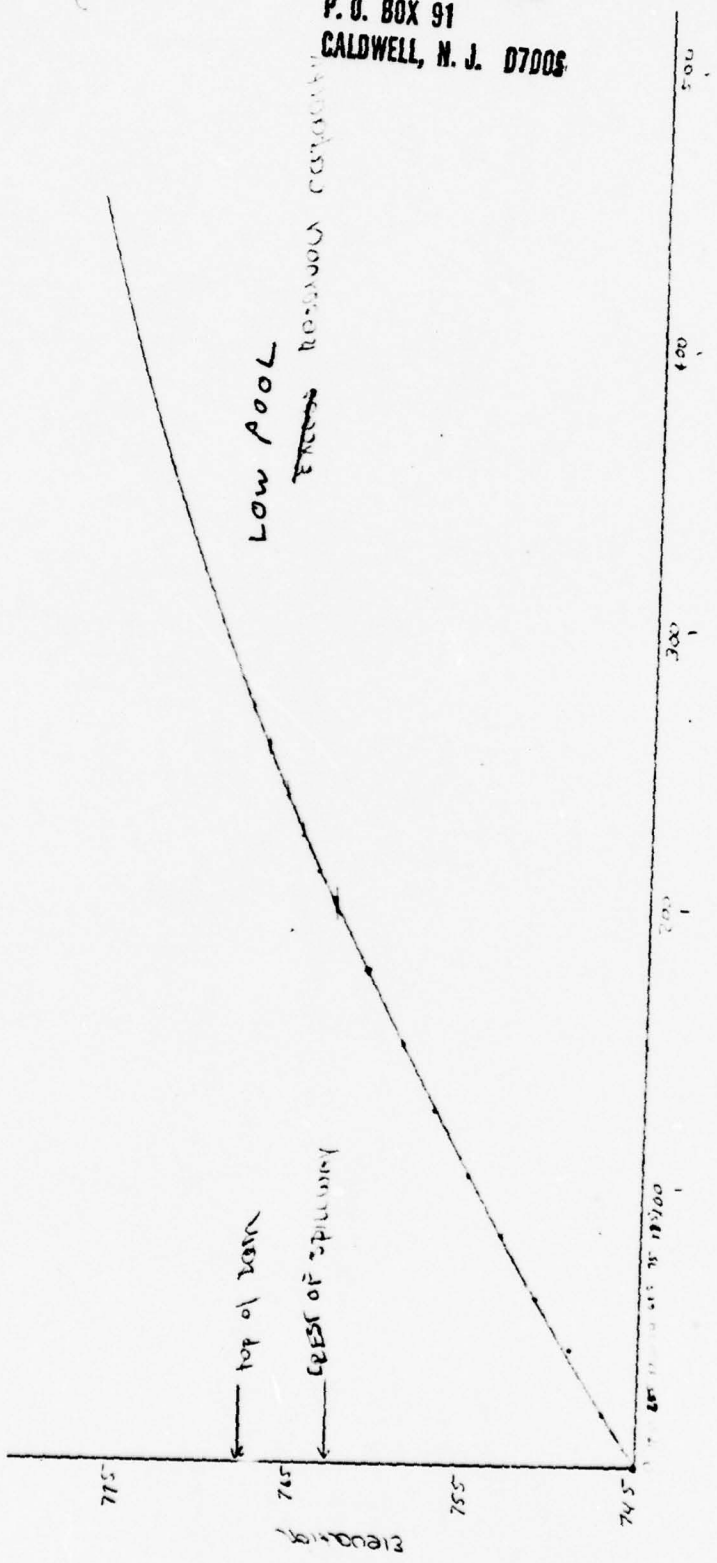


RESERVOIR CAPACITY CURVE
(VOLUME OF RESERVOIR)
(FROM AREA OF CONTOURS)



~~EXCESS~~ RESERVOIR CAPACITY CURVE
WITH STARTING LOW POOL

CONVERSE WARD DAVIS DIXON, INC.
91 ROSELAND AVENUE
P. O. BOX 91
CALDWELL, N. J. 07006



BY: PGM 8/3/78 Checked by: MDD 8/8/78 SUBJECT: HYDROLOGY - FLOOD ROUTING
BUTLER STORAGE RESERVOIR

CONVERSE WARD DAVIS DIXON, INC
91 ROSELAND AVENUE
P. O. BOX 91
CALDWELL, N. J. 07006

A-7805-11C

DISCHARGE OVER SPILLWAY

$Q = C_o L H_e^{3/2}$ WHERE C_o TAKEN FROM FIG 7-25 P 7-47

$L = 25'$ } FROM DESIGN PLANS
$P = 5'$ }

FOR H_e; Q =

763 1.0 = $3.2\ (25)\ 1^{3/2}$

= 82.50

20 = $3.39\ (25)\ 2^{3/2}$

= 240

3.0 = $3.48\ (25)\ 3^{3/2}$

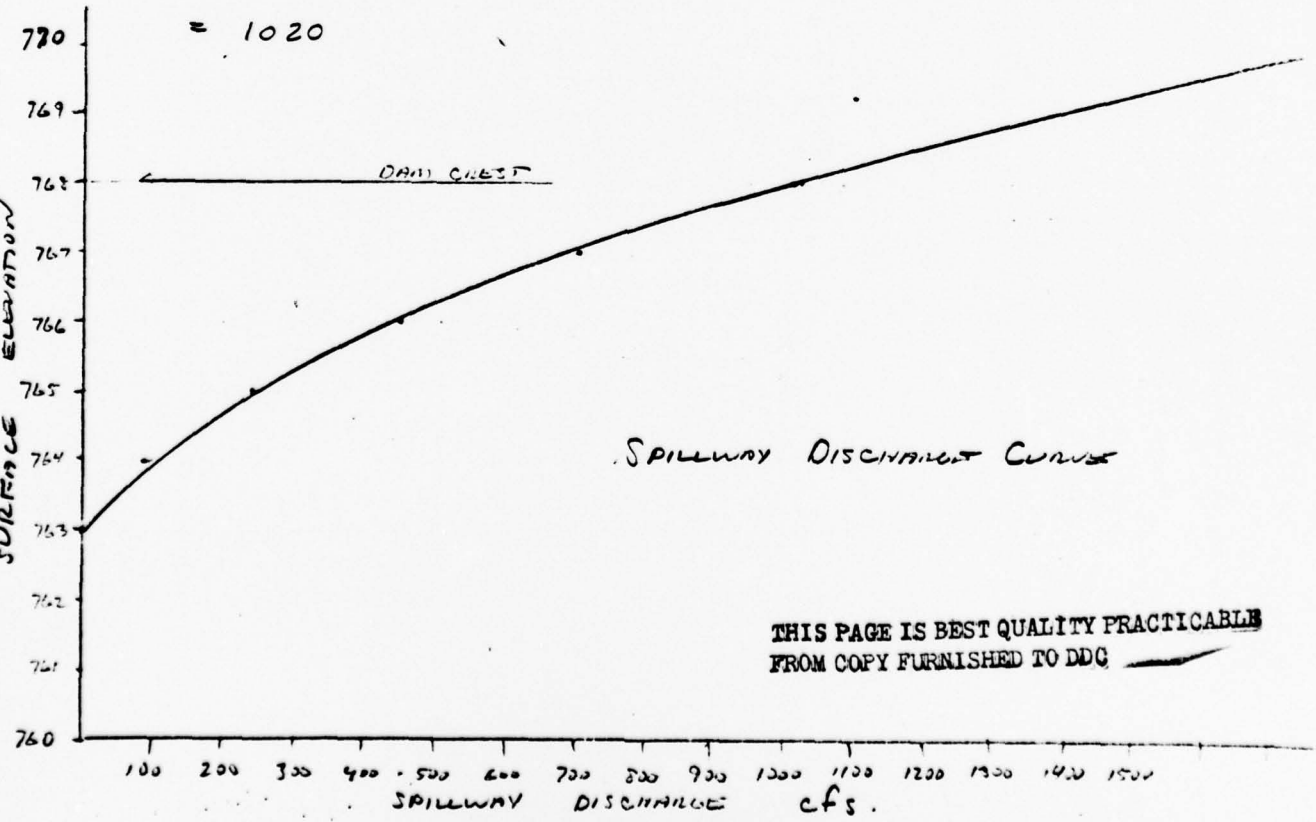
= 452

4.0 = $3.55\ (25)\ 4^{3/2}$

= 710

5.0 = $3.65\ (25)\ 5^{3/2}$

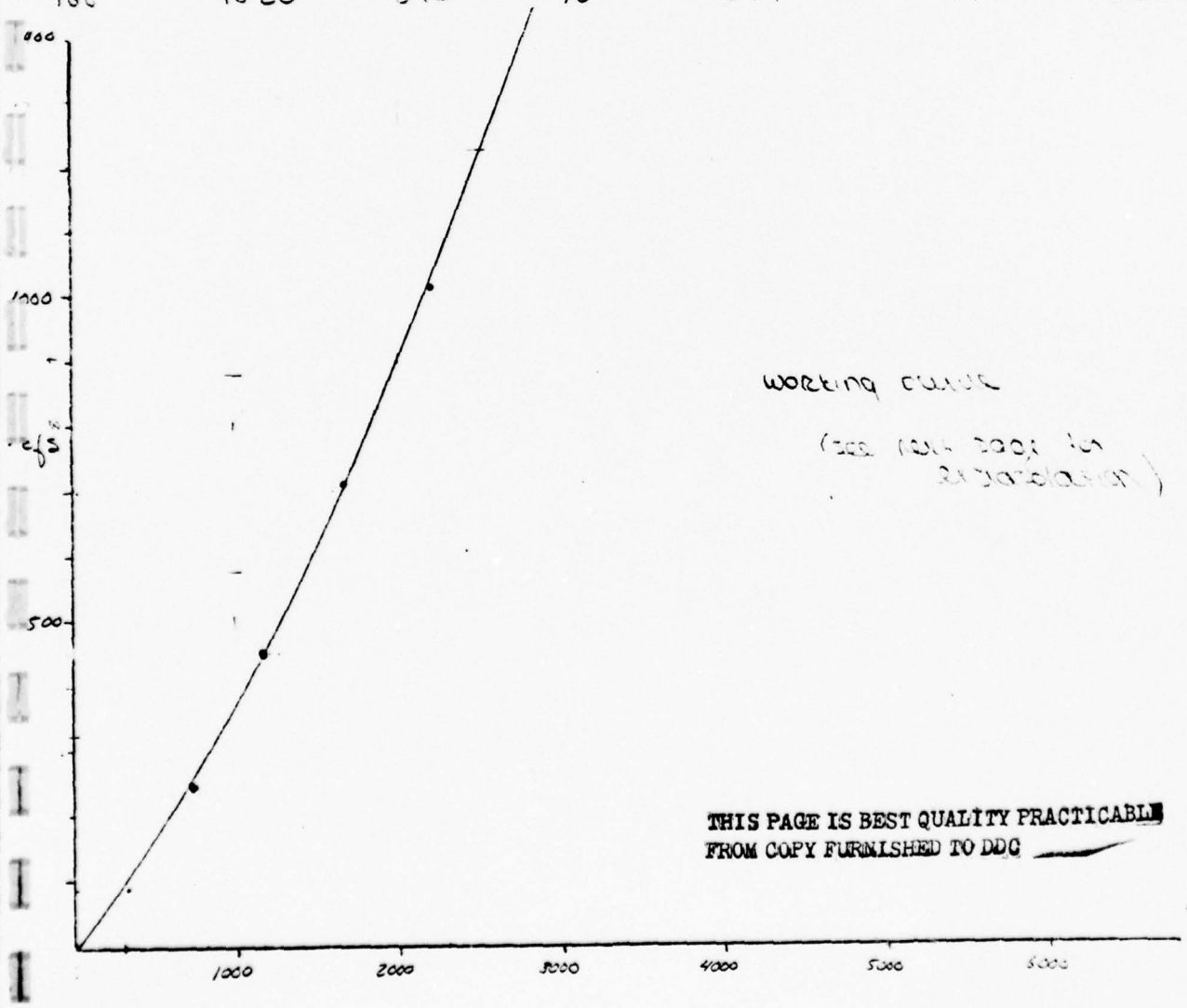
= 1020



SPILLWAY DISCHARGE CURVE

BY ASD 8/4/78 CKD: PCM CONVERSE WARD DAVIS DIXON, INC. Job # [illegible]
91 ROSELAND AVENUE
P. O. BOX 91
CALDWELL, N. J. 07006

Reach	Qcfs	Q/2 cfs	Flood Vol (acre-ft)	Flood Stor (cfs-hr)	S/Δt (0.5 hr)	I = O/2 + S/Δt
763	0	0	0	0	0	0
764	82.5	41	12.5	151	303	344
765	240	120	25	303	605	725
766	452	226	38	460	920	1146
767	710	355	54	653	1307	1662
768	1020	510	70	847	1694	2204



working curve

(see [illegible] for
[illegible])

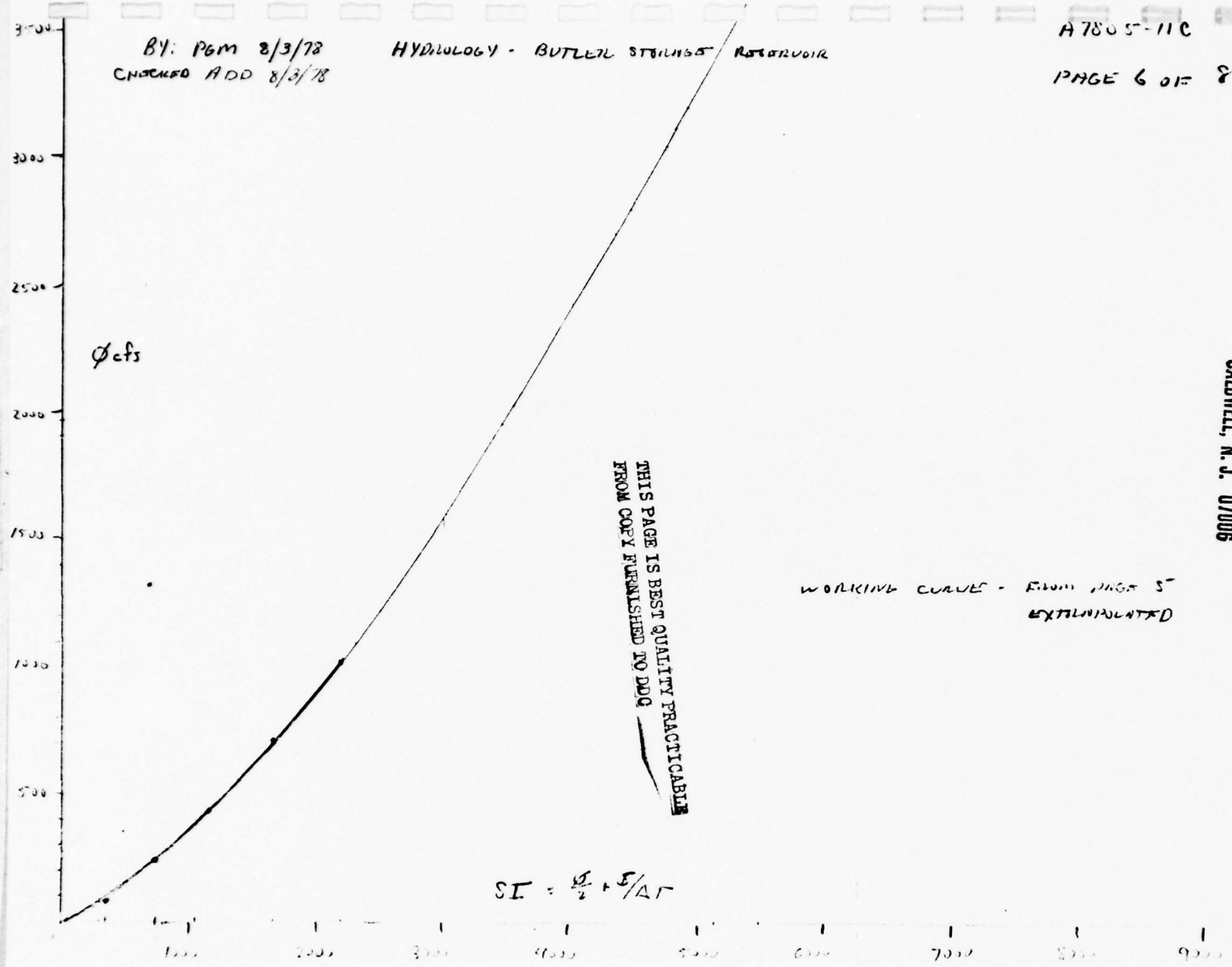
SI

BY: PGM 8/3/78
CHECKED ADD 8/3/78

HYDROLOGY - BUTLER STORAGE RESERVOIR

A7805-11C

PAGE 6 OF 8



$SI = \frac{S}{2} + \frac{S}{\Delta T}$

WORKING CURVE - FROM PAGE 5
EXTRAPOLATED

E. WARD DAVIS DIXON, INC.
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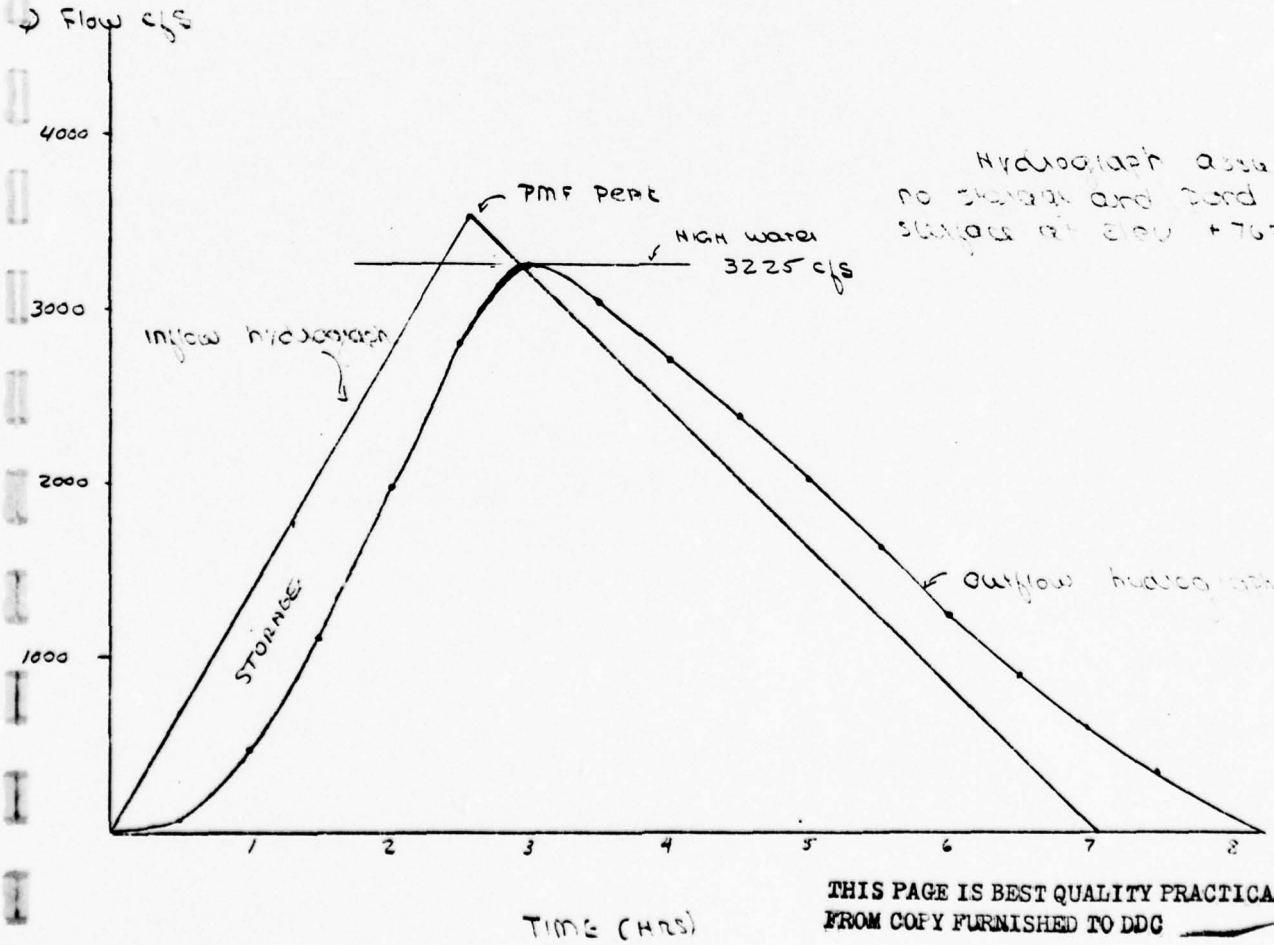
CONVERSE WARD DAVIS DIXON, INC.
91 ROSELAND AVENUE
P. O. BOX 91
CALDWELL, N. J. 07006

TIME (HRS)	I cfs	I	ΣI	Φ	Σ(I − Φ) + ΣI(n−1) = ΣI(n)
0	0	0	0	0	0 - 0 + 300 = 300
0.5	600	300	300	80	300 - 80 + 925 = 1145
1.0	1250	925	1145	470	1145 - 470 + 1600 = 2275
1.5	1970	1600	2295	1100	2295 - 1100 + 2275 = 3470
2.0	2600	2275	3470	1970	3470 - 1970 + 2950 = 4450
2.5	3300	2950	4450	2800	4450 - 2800 + 3275 = 4925
3.0	3250	3275	4925	3220	4925 - 3220 + 3025 = 4730
3.5	2800	3025	4730	3040	4730 - 3040 + 2650 = 4340
4.0	2500	2650	4340	2700	4340 - 2700 + 2350 = 3990
4.5	2200	2350	3990	2400	3990 - 2400 + 1950 = 3540
5.0	1700	1950	3540	2020	3540 - 2020 + 1500 = 3020
5.5	1300	1500	3020	1620	3020 - 1620 + 1100 = 2500
6.0	900	1100	2500	1225	2500 - 1225 + 700 = 1975
6.5	500	700	1975	875	1975 - 875 + 312 = 1412
7.0	125	312	1412	575	1412 - 575 + 62 = 899
7.5	0	62	899	325	899 - 325 + 0 = 574



BY: PGM

SUBJECT: HYDROLOGY - FLOOD ROUTING
BUTLER STORAGE RESERVOIR

JOB # 7501-11C
PAGE 8 OF 8

CHECKED BY ADD 8/3/78

BY BACK CALCULATIONS DETERMINE THE ELEV. OF THE POOL SURFACE ASSUMING SPILLWAY WIDTH IS INFINITE AND DAM CREST INFINITE

$Q = CLH^{3/2}$ ASSUME C TO BE 3.43 ($\frac{P}{H_0} \geq 0.7$ FOR $H_0 \approx 10$ ft)

$3225 = 3.43(25) H^{3/2}$

$H = \left(\frac{3225}{3.43(25)}\right)^{2/3} = 11.23$ ft

∴ PMF WILL RAISE POOL SURFACE FROM 763' TO 774' OR OVERTOP THE DAM BY ≈6±'.

TO DETERMINE THE % OF PMF THAT CAN BE PASSED:

THE PEAK OUTFLOW (WHICH TOPS DAM) = 3220 cfs

FOR H_2O AT DAM CREST MAXIMUM OUTFLOW = 1087 cfs → 1100 cfs

∴ % OF PMF THAT CAN BE PASSED IS:

$\frac{1100}{3225} \times 100 = 34\%$

CONVERSE WARD DAVIS DIXON, INC.
91 ROSELAND AVENUE
P. O. BOX 91
CALDWELL, N. J. 07006

BY: EAN

DATE 31 July 1978

CHECKED BY: SDD 8/3/78

Page 1 of 2

Hydraulics - Butler Storage Reservoir Drop Inlet Spillway

1) Maximum known flood at spillway ($H = 4''$)

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

$P = 5'$, (height of spillway)

$L = 25'$

$H = 4/12 = 1/3'$

$C \simeq 3.50$ for $H/P = 1/3/5 = 1/15 = 0.07$ (p. 7-46 of V.T. Chow, Handbook of Applied Hydrology)

$Q = 3.50\,(25)(1/3)^{3/2} = 29$ cfs

2) Total spillway capacity at maximum pool ($H = 5'$)

$P = 5'$

$L = 25'$

$H = 5'$; $H/P = 1$

$C \simeq 3.64$ for $H/P = 1$ (p. 7-46 of V.T. Chow)

$Q = 3.64\,(25)(5)^{3/2} = 1017$ cfs.

3) Assume outlet conduit is rectangle $10' \times 5' = 50\ ft^2$

Assume entrance loss coef of 0.5 (gradual transition)

Length = 180'

From attached chart, for a flow of 1000 cfs, all that is required is 12 ft of head.

Head available is > 60'

∴ Spillway, not outlet tunnel controls.

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CALDWELL, N. J. 07006

Page 2 of 2

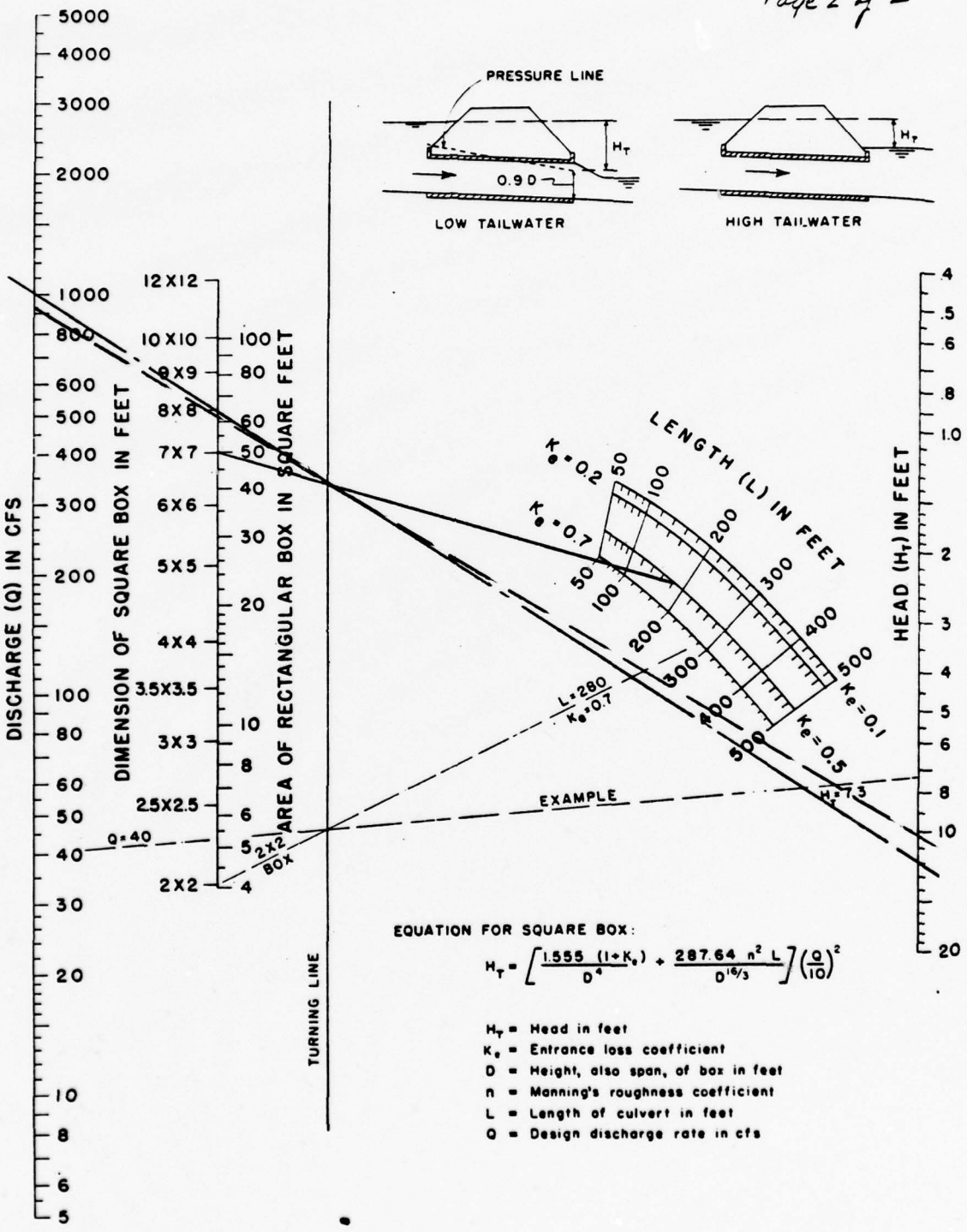

Figure B–13. Head for concrete box culverts flowing full, n=0.013. (U.S. Bureau of Public Roads.) 288–D–2913.

APPENDIX D

PHOTOGRAPHS

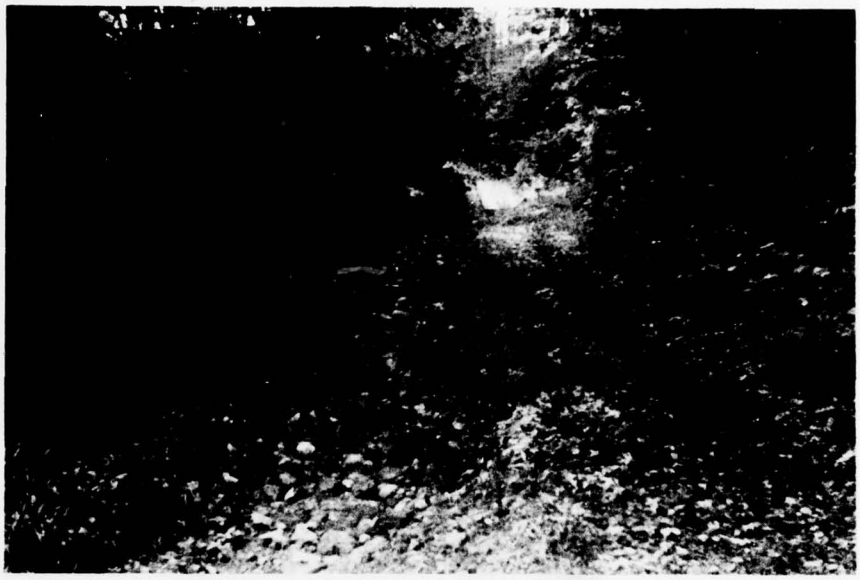

FIGURE 1 EROSION OF ACCESS ROAD ON DOWNSTREAM FACE

FIGURE 2 ACCESS ROAD ON CREST OF DAM

FIGURE 3 OUTLET PIPES IN DROP INLET

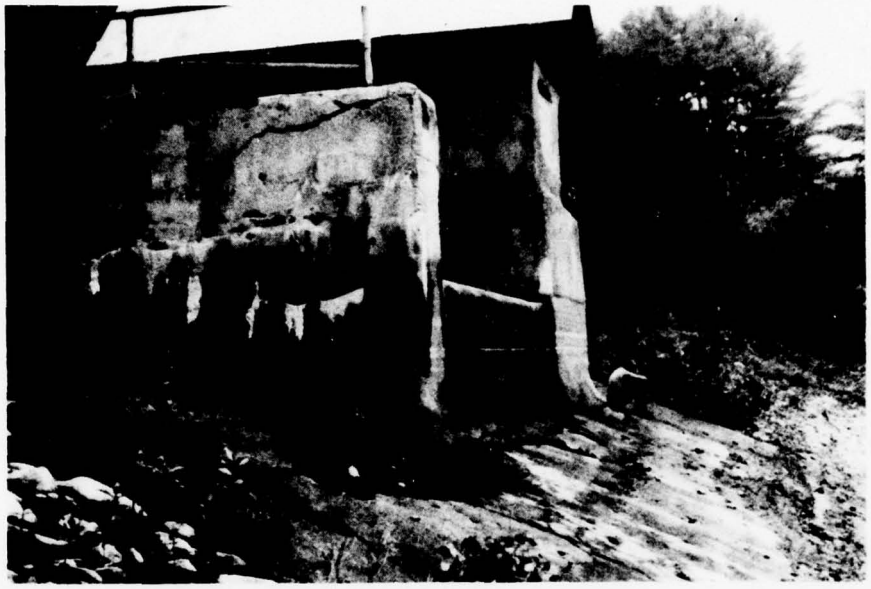

FIGURE 4 OVERFLOW SPILLWAY AND GATE HOUSE

FIGURE 5 OVERFLOW SPILLWAY

FIGURE 6 GUNITE SPALLS WITH EXPOSED WIRE MESH?

FIGURE 7 SEEPAGE UNDER GUNITE AND EROSION OF STRUCTURAL CONCRETE

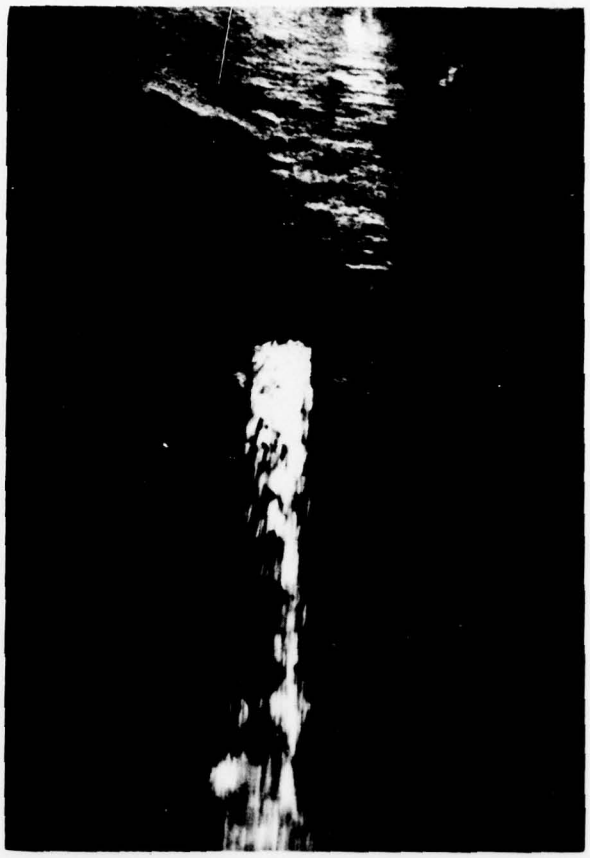

FIGURE 8 SMALL BULGES IN SHAFT WALL

FIGURE 9 EXIT PORTAL OF OUTLET TUNNEL

FIGURE 10 SLOPES ALONG RIGHT SHORELINE

FIGURE 11 SLOPE ON RIGHT BANK AT TREE LINE

FIGURE 12 DOWNSTREAM AREA LOOKING FROM DETENTION BASIN TOWARDS DAM

APPENDIX E

RELATED DOCUMENTS

Butler Storage

COMP'N. BY

CH'KD. BY

DATE JAN - - 1941

DETAIL MEMO Areas of contours

Refer Text – 2.1c

(Planimeter set at 211.8)

Elev.	Sec. I Plan Trap	Sec. II	Sec. III	Sec. IV	Sec. V	Sec. VI	Total PR.	x360 = Sq. Ft.
762.9	31.66	16.32	20.84	30.55	45.31	19.75	164.43	59,194.8
61.0	30.38	15.70	19.59	29.94	44.09	17.84	157.54	56,714.4
59	29.25	15.15	18.51	29.29	43.07	16.76	151.51	54,543.6
57	28.03	14.46	16.99	28.52	42.09	14.71	144.30	51,948.0
55	27.13	14.00	15.81	27.65	41.23	13.05	138.87	49,993.2
53	26.19	13.41	14.50	27.00	40.51	11.90	133.51	48,063.6
51	25.31	12.89	13.33	26.41	39.82	10.48	128.24	46,166.4
49	24.50	12.40	12.19	25.93	39.22	9.62	123.86	44,589.6
47	23.57	11.81	10.61	25.20	38.41	8.51	118.11	42,519.6
45	22.27	11.23	9.80	24.62	37.65	7.82	113.39	40,820.4
43	22.04	10.73	9.02	23.95	36.76	7.10	109.60	39,456.0
41	21.36	10.37	6.98	23.26	36.17	5.57	103.71	37,335.6
39	20.68	10.05	5.33	22.63	35.39	4.43	98.51	35,463.6
37	19.77	8.82	1.67	21.86	34.35	3.25	89.72	32,299.2
35	19.02	7.45	0.05	21.11	33.51	1.97	83.11	29,919.6
33	18.31	6.62		20.61	31.14	0.64	77.32	27,835.2
31	16.43	5.61		19.96	27.92		69.50	25,020.0
29	14.88	4.66		19.32	24.74		63.60	22,896.0
27	13.62	3.06		18.56	20.70		55.94	20,138.4
25	12.50	2.03		17.95	17.37		49.85	17,946.0
23	11.24	1.54		17.43	14.58		44.79	16,124.4
21	9.52	1.09		16.67	11.70		38.98	14,032.8

COMP'N. BY

CH'KD. BY

DATE JA[illegible] - - 1941

DETAIL MEMO

Refer Text - 2.1e

Elev.	Sec I	Sec II	Sec III	Sec IV	Sec V	Sec VI	Total Pt	×3600 = Sq.ft.	
7190	814	074		1601	931		3420	12 3120	3[illegible]
17	659	030		1491	526		2706	974 16	312 11 [illegible]
15	547			1351	168		2066	74376	272 [illegible]
13	420			1037			1457	524 52	[illegible]
11	320			620			940	338 40	[illegible]
09	209			337			576	207 36	[illegible]
07	151			105			256	92 16	[illegible]
05	109			047			156	56 16	[illegible]
03	74			019			093	33 48	[illegible]
015	0						0	0	

COMP'N. BY

CH'KD. BY

DATE JAN - - 1941

DETAIL MEMO Contents

Refer Text — 2.1e

Elev.	Area	Sum	÷	×	Cu. ft.	Acre-Ft	
7629	591948					Top of Spillway	377.6
		1159092	2	1.9	1101137	25.3	
610	567144						352.3
		1112580	2	2	1112580	25.5	
59	565436						326.8
		1064916	2	2	1064916	24.4	
57	519480						302.4
		1019412	2	2	1019412	23.4	
55	499932						279.0
		980568	2	2	980568	22.5	
53	480636						256.5
		942300	2	2	942300	21.6	
51	461664						234.9
		907560	2	2	907560	20.8	
49	445896						214.1
		871092	2	2	871092	20.0	
47	425196						194.1
		833400	2	2	833400	19.1	
45	408204						175.0
		802764	2	2	802764		
43	394560						
		767916	2	2	767916		
41	373356						
		727992	2	2	727992		
39	354636						
		677628	2	2	677628		
37	322992						
		622188	2	2	622188		
35	299196						
		577548	2	2	577548		
33	278352						
		528552	2	2	528552		
31	250200						
		479160	2	2	479160		
29	228960						
		430344	2	2	430344		
27	201384						
		388044	2	2	388044		
25	179460						
		346704	2	2	346704		
23	161244						
		301572	2	2	301572		
21	140328						

COMP'N. BY

CH'KD. BY

DATE JAN - - 1947

DETAIL MEMO

Refer Text - 2.1c

Elev.			÷	x	Cu. ft.
721.0		16 0328			
			263248	2	263248
19		12 3120			
			220536	2	220536
17		9716			
			171792	2	171792
15		7436			
			126828	2	126828
13		5352			
			86292	2	86292
11		3380			
			54576	2	54576
09		2036			
			29952	2	29952
07		916			
			14832	2	14832
05		516			
			8964	2	8964
03		3348			

Area of 703 contour = 3348 sq. ft.
Apex of pyramid = 701.5

$\frac{3348 \times 1.5}{3}$ = 1674

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377.6

16449071 x 7.4805 = 123,047,276 gallons

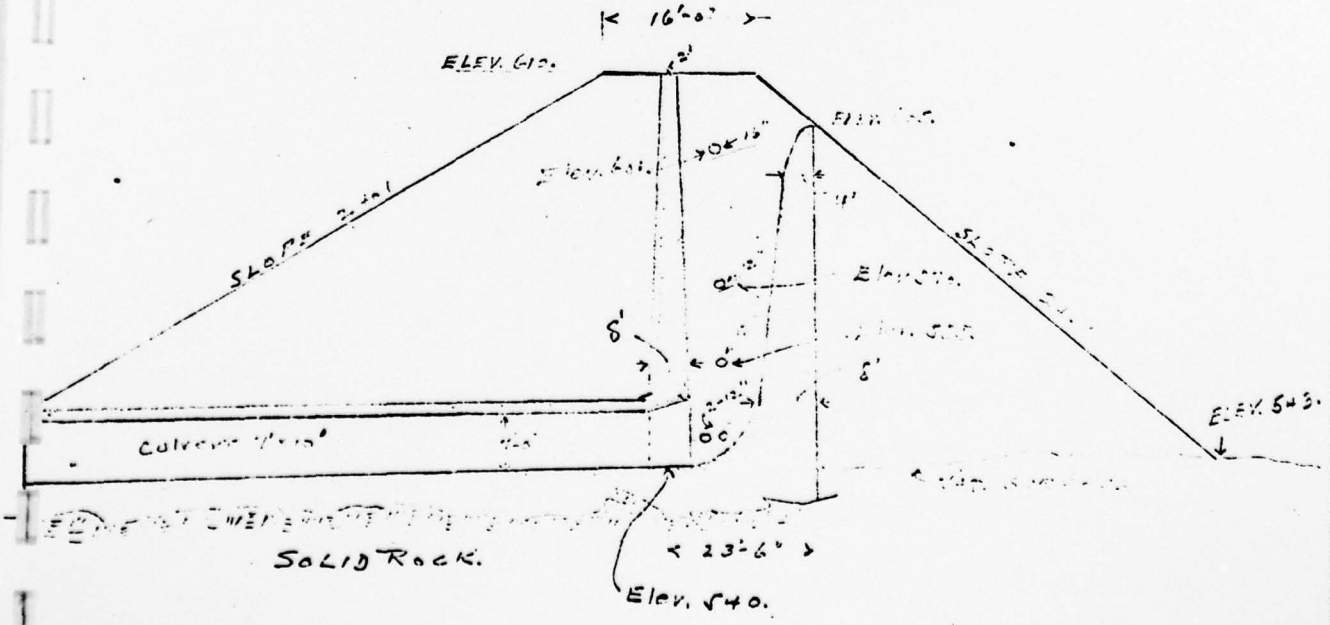
1165 Lk Chom Butler 1165 6013

18-20-11-3000 (16-10652)

Fill out a form as complete as possible for each dam in your district and send to State Conservation Commission, Albany, N. Y.

1. Name and address of owners City of Glens Falls
2. Date of construction 1909
3. Uses of impounded water City Water Supply
4. Character of foundation bed Rock, Sandpan, gravel
5. Material of waste spill Concrete
6. Length of waste and depth below dam 25 ft long. 5 feet
7. Total length of dam including waste 470 ft
8. Material of dam Earth with concrete core
9. Discharges, size and location Four 12 inch pipes — One 16 inch pipe

Below sketch section of waste and section of dam, with greatest heights and top thickness and bottom thickness. On opposite side sketch general plan of dam and give distance from a bridge or from a tributary stream.



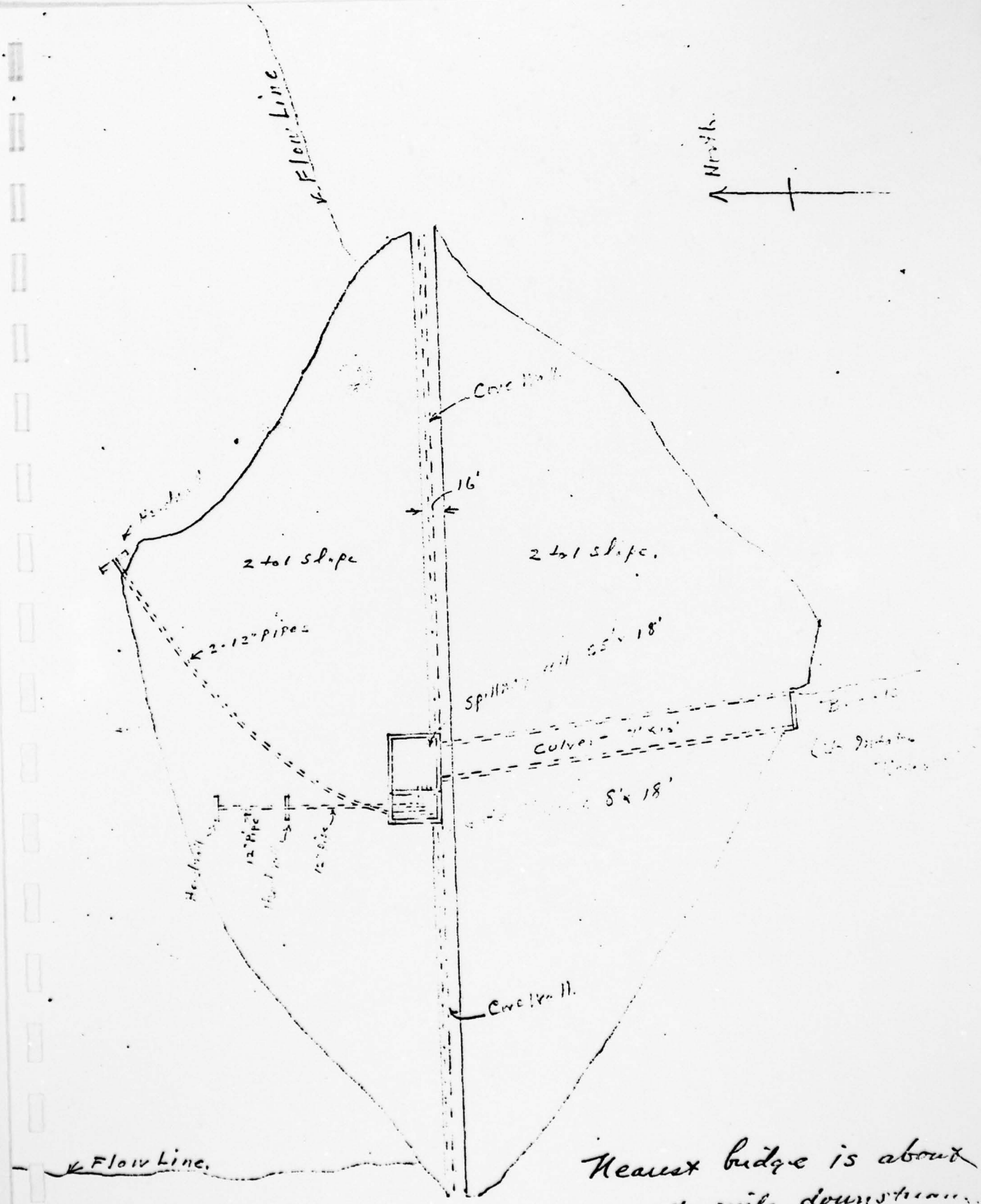
Nearest town Glens Falls 5 miles.

Howard M. West Supt. Waterworks.

(Signature, address and date.)

Glens Falls N.Y.

May 16. 1912



Nearest bridge is about
½ mile downstream.

116 Cl...

AD-A064 564 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/2
NATIONAL DAM SAFETY PROGRAM. BUTLER STORAGE RESERVOIR DAM, (NY---ETC(U)
SEP 78 E A NOWATZKI, G S SALZMAN DACW51-78-C-0035
UNCLASSIFIED NL

2 OF 2
AD A064564

END
DATE FILMED
4-79
DDC

1165 Chem

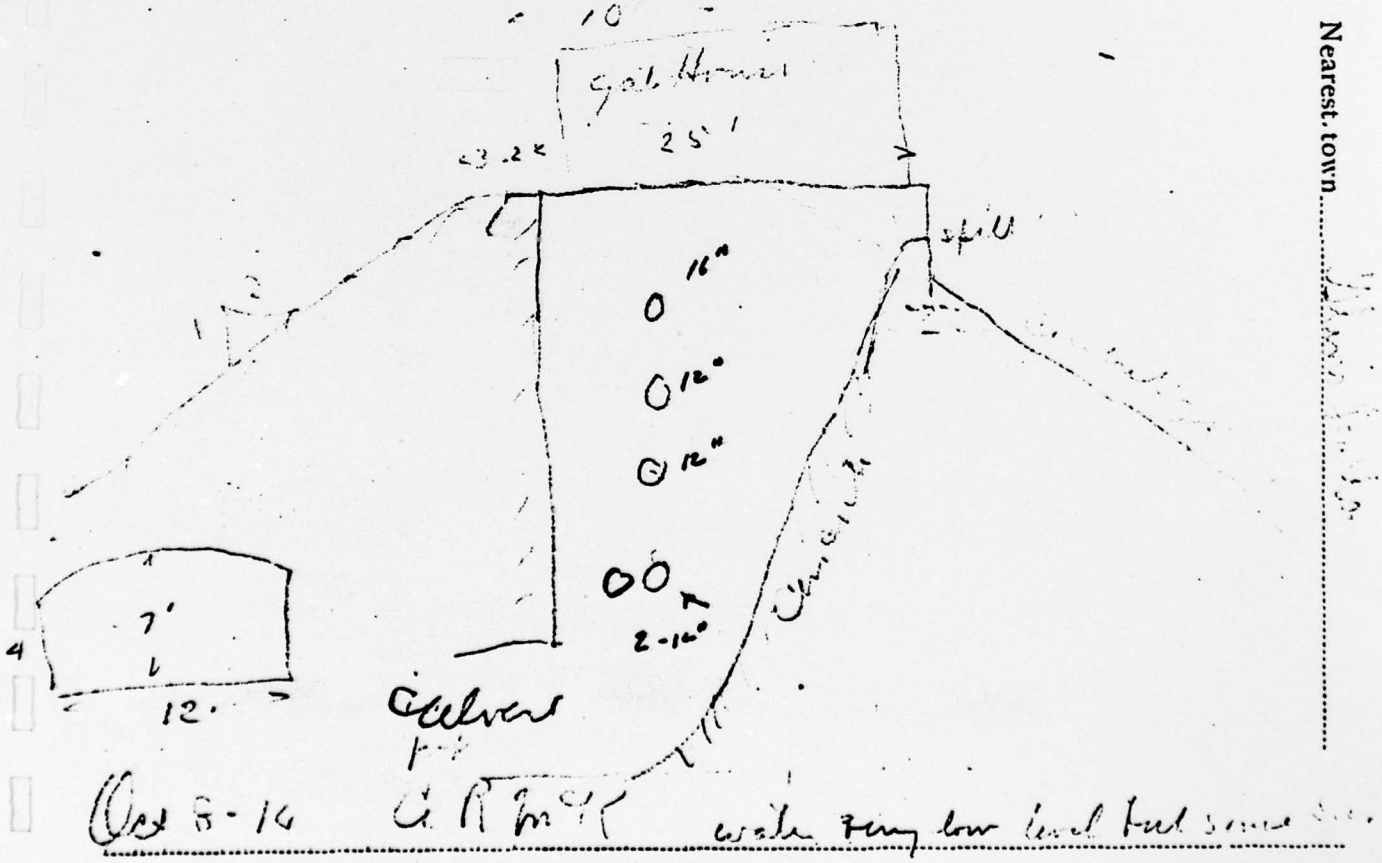
Bullen Res.

19-30-11-3000 (16-10058)

Fill out a form as complete as possible for each dam in your district and send to State Conservation Commission, Albany, N. Y.

1. Name and address of owners C/o Glen Falls
2. Date of construction
3. Uses of impounded water Water supply
4. Character of foundation bed Earth (sandy)
5. Material of waste spill Concrete
6. Length of waste and depth below dam 25' x 5' deep
7. Total length of dam including waste 330'
8. Material of dam Embankment
9. Discharges, size and location

Below sketch section of waste and section of dam, with greatest heights and top thickness and bottom thickness. On opposite side sketch general plan of dam and give distance from a bridge or from a tributary stream.



Nearest town

Ops 8-16 C. R. Smith with very low level but some [illegible]

(Signature, address and date.)

2-Smp? Warren — DWR DAM INSPECTION REPORT

04	57	13	011658	310776	003	4
RB	CTY	YR AP.	DAM NO.	INS. DATE	USE	TYPE

AS BUILT INSPECTION

1	Location of Sp'way and outlet	1	Elevations
1	Size of Sp'way and Outlet	1	Geometry of Non-overflow section

1 GENERAL CONDITION OF NON-OVERFLOW SECTION

2	Settlement	2	Cracks	2	Deflections
2	Joints	2	Surface of Concrete	2	Leakage
1	Undermining	1	Settlement of Embankment	2	Crest of Dam
1	Downstream Slope	1	Upstream Slope	1	Toe of Slope

1 GENERAL COND. OF SP'WAY AND OUTLET WORKS

4	Auxiliary Spillway	2	Service or Concrete Sp'way	4	Stilling Basin
2	Joints	2	Surface of Concrete	2	Spillway Toe
2	Mechanical Equipment	4	Plunge Pool	2	Drain

1	Maintenance	B	Hazard Class
3	Evaluation	34	Inspector

COMMENTS:

1165 unsafe
all in same file.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

PART I – INVENTORY OF DAMS IN THE UNITED STATES
(PURSUANT TO PUBLIC LAW 92–367)

See reverse side for instructions.

FORM APPROVED
OMB NO. 49-S-73001

Reports Control Symbol
DAEN-CWE-17

STATE	IDENTITY NUMBER
NY	1[illegible]

IDENTIFICATION

(2) DIVISION	(3) STATE	(4) COUNTY	(5) CONGR DIST	(6) STATE	(7) COUNTY	(8) CONGR DIST	(9) NAME	(10) LATITUDE (North)	(11) LONGITUDE (West)	(12) REPORT DATE DAY MO YR	
NAD	NY	057	29				NYNONAME3	43[illegible]0.[illegible]	0734[illegible].[illegible]	13JUL73	0

IDENTIFICATION (Continued)

(13) POPULAR NAME	(14) NAME OF IMPOUNDMENT	
		1

LOCATION

(15) REGION	(16) BASIN	(17) RIVER OR STREAM	(18) NEAREST DOWNSTREAM CITY – TOWN – VILLAGE	(19) DIST. FROM DAM (mi)	(20) POPULATION	
		BUTLER BROOK	QUEENSBURY	1	14506	2

STATISTICS

(21) TYPE OF DAM	(22) YEAR COMPLETED	(23) PURPOSES	(24) STRUCTURAL HEIGHT (ft)	(25) HYDRAULIC HEIGHT (ft)	(26) IMPOUNDING CAPACITIES MAXIMUM (acre – ft.)	(27) IMPOUNDING CAPACITIES NORMAL (acre – ft.)	BLANK	
PG	1913S		70	65		300		3

REMARKS

(28) REMARKS	
1-04-1165 22-ADDITIONAL CONSTRUCTION	4

ENG FORM 1474 (ER 1110-2-106)

PART II – INVENTORY OF DAMS IN THE UNITED STATES
(PURSUANT TO PUBLIC LAW 92-367)

See reverse side for instructions.

FORM APPROVED
OMB NO. 22-S-73001

Reports Control Symbol
DAEN-CWE-17

STATE	IDENTITY NUMBER
NY	

STATISTICS

(29) D/S HAZ	(30) CREST LENGTH (ft)	(31) SPILLWAY TYPE	(32) SPILLWAY WIDTH (ft)	(33) SPILLWAY MAXIMUM DISCHARGE (cfs)	(34) VOLUME OF DAM (CY)	(35) POWER CAPACITY INSTALLED (MW)	(36) POWER CAPACITY PROPOSED (MW)	(37) NAVIGATION LOCKS NO	(38) LENGTH (ft)	(39) WIDTH (ft)	(40) LENGTH (ft)	(41) WIDTH (ft)	(42) LENGTH (ft)	(43) WIDTH (ft)	(44) LENGTH (ft)	(45) WIDTH (ft)	BLANK
1	4700		18		31681												5

MISC DATA

(46) OWNER	(47) ENGINEERING BY	(48) CONSTRUCTION BY
CITY OF GLENS FALLS		

MISC. DATA (Continued)

(49) REGULATORY AGENCY: DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
DEC	DEC	DEC	DEC

MISC. DATA (Continued)

(53) INSPECTION BY	(54) INSPECTION DATE DAY	MO	YR	(55) AUTHORITY FOR INSPECTION
DEC	31	JUL	70	EN CON LAW SECT 15-0597

REMARKS

(56) REMARKS
1-04-1165 33-FOUR 12 INCH & ONE 16 INCH PIPES

Change DER DAM INSPECTION REPORT Unsafe

RB	CTY	YR AP.	DAM NO.	INS. DATE	USE	TYPE
64	57	13	1165	310770	003	2

AS BUILT INSPECTION

1	Location of Sp'way and outlet	1	Elevations
1	Size of Sp'way and Outlet	1	Geometry of Non-overflow section

1	GENERAL CONDITION OF NON-OVERFLOW SECTION				
2	Settlement	2	Cracks	2	Deflections
2	Joints	2	Surface of Concrete	2	Leakage
1	Undermining	2	Settlement of Embankment	3	Crest of Dam
3	Downstream Slope Trees planted on dam	2	Upstream Slope	2	Toe of Slope

2	GENERAL COND. OF SP'WAY AND OUTLET WORKS				
4	Auxiliary Spillway	3	Service or Concrete Sp'way	2	Stilling Basin
3	Joints	3	Surface of Concrete	2	Spillway Toe
2	Mechanical Equipment	2	Plunge Pool	2	Drain

1	Maintenance	C	Hazard Class
1	Evaluation	34	Inspector

COMMENTS:

Concrete inside spillway badly cracked
Red pine about 25 years old ~~are~~ have been planted on crest and downstream slope of dam
Due to height of dam and water area behind this dam would Have hazard class of C
Work should be done inside spillway

GA-15(9/66)

TO:	Eldred Rich	State of New York Conservation Department
FROM:	George VanEtten and Robert Ryczek	MEMORANDUM
SUBJECT:	Dam Inspection Report - DOT Registered Dam #1165 Lake Champlain River Basin, Glens Falls, New York	
DATE:	August 17, 1970	

On July 31, 1970 an inspection of the above subject dam was made by Principal Engineering Technicians, George VanEtten and Robert Ryczek of this department. The following is a report of our findings on the existing condition of the dam.

1. General Condition of Non-overflow Section

   This dam consists of earth with a concrete core. Red pine trees have been planted on the downstream slope and appear to be about 25 years old. The roots of these trees can be observed on the surface of the crest of the dam, extending through the dam.

2. General Condition of Outlet Works

   The concrete apron on the upstream slope of the spillway shows signs of erosion and cracking. Inside the drop spillway the concrete is spald, exposing the reinforcing steel. The concrete also shows si s of bulging inward.

3. Evaluation and Hazard Class

   This dam is approximately 50' high and due to the amount of water it holds and the homes downstream, we classify it as a Class C hazard.

GV:RR:r

AUG 70 10: 30

December 16, 1970

Mr. Garner Tripp, Jr.
Superintendnet of the Glens Falls
Board of Water Commissioners
Glens Falls, New York

Dear Mr. Tripp:

Department of Transportation Dam No. 1165
Lake Champlain River Basin, Glens Falls, New York

This is a follow up to the visit of Mr. Frank Dwyer and I to your office in early October. As we indicated at that time, the Department has undertaken a county-by-county inspection survey of existing dams in accordance with its responsibilities under Conservation Law, Section 429-e (excerpt enclosed).

All of the dams in the Glens Falls Water Supply System were included in an inspection on July 31, 1970. Only one of the dams was found to have any serious defects. This dam is an earth-fill dam about 50 feet high and is situated on Butler Brook. It is identified as Dam No. 1165 in old State records. The following defects were found:

1. The concrete aprons on the upstream slope of the spillway show signs of erosion and cracking. Inside the drop spillway the concrete is spalled, exposing the reinforcing steel. The concrete also shows signs of bulging inward.

2. Red pine trees have been planted on the downstream slope and appear to be about 25 years old. The roots of these trees can be observed on the surface of the crest of the dam extending through the dam.

It was evident that the conditions described above are detrimental to the safety of the structure and that repairs will be necessary to prevent further deterior of the dam. Moreover, due to the height of the dam and the character of the do stream area, we feel that a failure of the dam would result in a serious hazard to life and property.

We urge that the Board of Water Commissioners give early consideration to repai this structure and of keeping continued surveillance over the structural integr of all the dams in the system.

We recommend that you contact a licensed professional engineer to determine the extent of the necessary repairs and submit an application for permit together with the required plans and specifications to this office for review. I am enclosing copies of our permit application forms, dam design guidelines and rules and regulations.

Very truly yours,

T. P. Curran
Central Permit Agent
Division of Water Resources

Enclosures

cc: Mr. Eldred Rich

October 5-1948

I hereby certify that the work to be performed by the PRESSURE CONCRETE COMPANY of 193 Emmett Street, Newark (5), New Jersey, under two contract agreements made with this Board of Water Commissioners, dated August 6-1948 and September 13-1948 respectively, has, to the best of my knowledge and belief, been completed within the intent and meaningof the Plans and Specifications as attached to and made a part of said contract agreements. I therefor approve for payment the amounts now due said PRESSURE CONCRETE COMPANY, under the terms and conditions as set forth in said contract agreements, as follows:

Total value of work performed to date	$12971.91
LESS 5% to be retained for 6 months	-648.60
Amounts now due and payable	$12323.31

Superintendent.

cm/m

PRESSURE CONCRETE CO.,

193 Emmett St., Newark (5), New Jersey.

1948

Oct. 6 To amount due for "Guniting" work performed under contracts dated August 6th. 1948 and September 13th. 1948, as follows:

"A"	AT BUTLER INTAKE:(Basin)		
	Bottom 3" thick - 6127.08 sq.ft. at 0.97¢		5943.27
	Sides 2" thick - 2096.11 sq.ft. at 0.84¢ (Spillway section)		1760.73
	Bottom 3" thick - 1390.87 sq.ft. at 0.97¢		1349.14
	Sides 2" thick - 1478.02 sq.ft. at 0.84¢		1241.54
"A"	AT BUTLER POND SPILLWAY and CHANNEL:(downstream from flag-boards - balance to be completed).		
	Bottom 3" thick - 462.19 sq.ft. at 0.97¢		448.32
	Sides 2" thick - 670.95 sq.ft. at 0.84¢		563.60
"B"	AT WILKIE INTAKE RESERVOIR: (Spillway apron)		
	Bottom and Sides 3" thick - 858.05 sq.ft. at 0.97¢		832.31
	2" thick - 558.33 sq.ft. at 0.84¢		469.00
	Necessary grouting 56 bags cem. at 6.50		364.00
			12971.91
	LESS 5% to be retained for 6 months		648.60
	Amount due and payable as of this date upon execution of this voucher (to be audited at meeting of Bd of Water Comrs Oct. 19-1948)		$12323.31

"A" Under contract dated August 6-1948

"B" Under contract dated September 13-1948.

RNER C. TRIPP, JR.
SUPERINTENDENT

DIAL 2-2770
OR 2-3141

'74 FEB 25 AM 11:18 City of Glens Falls
NEW YORK

WATER DEPARTMENT

February 21, 1974

New York State Department of Environmental Conservation
Albany, N.Y. 12201
Bur. of Facilities & Construction Management
Room 601

Attention: George A. Van Etten
Principal Engineering Technician
Dam Inspection Program

Dear Mr. Van Etten:

In reference to your letter of Feb.8, 1974 regarding the condition of the Butler Storage Reservoir, please be advised that this reservoir spillway section, gate-house and ramp were pressure grouted and covered with reinforced gunite in the fall of 1972.

I think it would be advantageous for your department to make a reinspection of this reservoir so that your records can properly reflect conditions as they now exist. Kindly advise me of any date you would like to make an inspection.

Very truly yours,

Garner C. Tripp, Jr.

Garner C. Tripp, Jr.
Superintendent

GCT:c

Tom Monroe would like to inspect with us
March 7th meet at Exit 19 Howard Johnson

APPENDIX F

GEOLOGY

APPENDIX F

GEOLOGY

Butler Storage Reservoir Dam

1. General Geology

The damsite and reservoir lie in Warren County, just west of Glens Falls.

The bedrock consists of biotite-quartz plagioclase paragneiss, and amphibolite and related migmatite. There is a normal fault just west of Glens Falls, with the dam and reservoir on the upthrown side.

The region had been subjected to glaciation during the Wisconsin stage, and a thin veneer of glacial deposits mantle the bedrock. The site is part of the glaciated Adirondacks.

2. Site Geology (Interpreted from stereo-pair air photos)

The upstream channel leads to Butler Pond, about 6000 feet upstream of the dam. The channel is fairly straight and steep. There are no obstructions in the channel.

The dam itself is an earth structure with a thick growth of trees on the downstream slope.

The downstream channel was clear and dry at the time of the photos, 18 March 1968. There is a highway bridge or culvert about 2200 feet downstream of the dam. No siltation is visible in the lake.

The left bank of the lake rises steeply. The right bank is fairly flat for about 1000 feet before rising steeply.

Rock is high in the general area; however, there may be a moderately thick (10- to 15-foot ±) soil cover on the right bank. Rock will be a biotite quartz gneiss.

There is a circular linement northwest of the dam (8500± feet); however, this is not a fault. It is probably similar to a ring dike common in some mountainous metamorphosed areas. It should not influence the safety of the dam.

There are several houses within a mile or two of the downstream toe.

There were no geologic features (stratification, faults, cavities, etc.) detected or suspected that could be expected to adversely affect the dam or its appurtenant structures.