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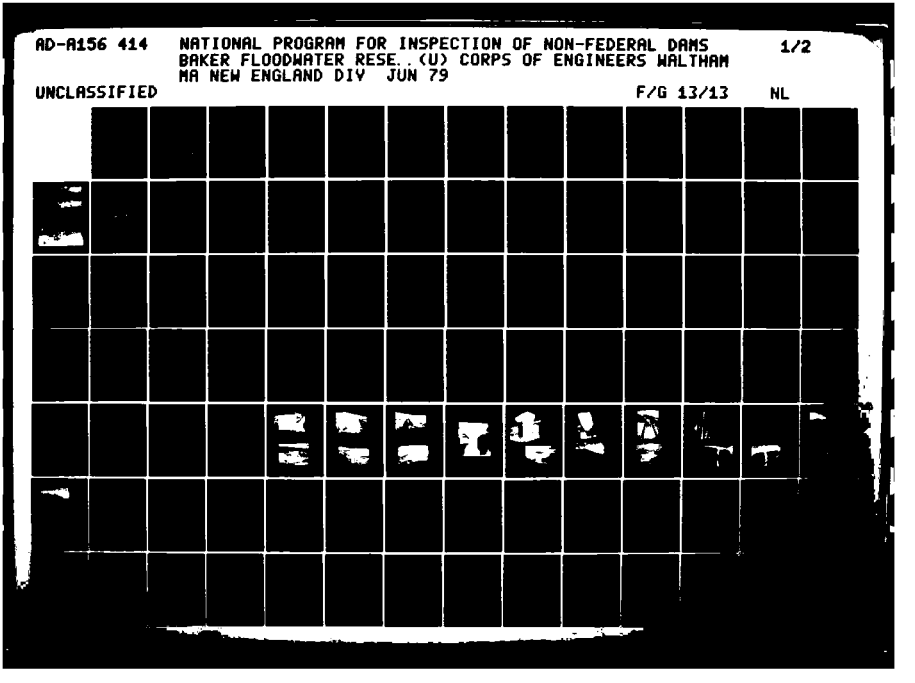
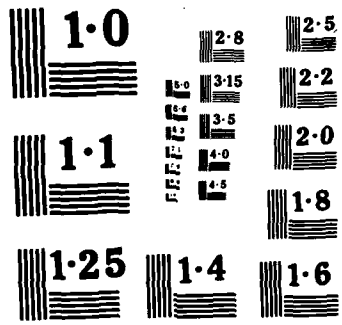




NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

MERRIMACK RIVER BASIN

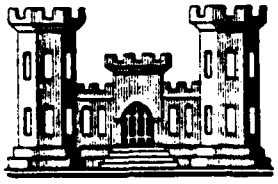
DORCHESTER, NEW HAMPSHIRE

BAKER FLOODWATER RESERVOIR
SITE 8

NH 00178

NHWRB NO. 66.08

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JUNE 1979

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Merrimack River Basin,
Dorchester, New Hampshire,
South Branch Baker River.

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

The dam is a 1462 ft. long 62 ft. high earthen structure. The dam is judged to be in good condition. It is intermediate in size with a high hazard potential classification. Debris on the low stage trash rack and separation of the wingwall and training of the outlet works structure were noted during the inspection.

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REPLY TO
ATTENTION OF:

NEDED

OCT 2 1979

Honorable Hugh J. Gallen
Governor of the State of New Hampshire
State House
Concord, New Hampshire 03301

Dear Governor Gallen:

I am forwarding to you a copy of the Baker Floodwater Reservoir Site-8 Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Water Resources Board, the cooperating agency for the State of New Hampshire. In addition, a copy of the report has also been furnished the owner, New Hampshire Water Resources Board, Concord, New Hampshire 03301.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Water Resources Board for your cooperation in carrying out this program.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

BAKER FLOODWATER RESERVOIR SITE 8

NH 00178

NHWRB 66.08

MERRIMACK RIVER BASIN
DORCHESTER, NEW HAMPSHIRE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LETTER OF TRANSMITTAL

FROM THE CORPS OF ENGINEERS TO THE STATE

TO BE SUPPLIED BY THE CORPS OF ENGINEERS

NATIONAL DAM INSPECTION PROGRAM
PHASE I - INSPECTION REPORT
BRIEF ASSESSMENT

Identification No.: 00178

Name of Dam: Baker Floodwater Reservoir Site 8

Town: Dorchester

County and State: Grafton, New Hampshire

Stream: South Branch Baker River

Date of Inspection: May 17, 1979

Baker River Floodwater Reservoir Site 8 is a 1,462 foot long 62 foot high earthen structure. There are four different fill zones in the dam including a cutoff wall. Top width of the dam is 14 feet. The upstream and downstream embankments are on a 2½ horizontal to 1 vertical slope. Appurtenant structures consist of a principal spillway, Saint Anthony's Falls (SAF) type stilling basin and an emergency spillway. The principal spillway has two inlets, a low stage orifice and a high stage, covered top spillway. The inlets discharge through a riser to a 5 foot diameter concrete pipe. There is a 30 inch diameter gated pond drain. The dam construction was completed in September of 1968. Plans, design calculations, and construction data were prepared by the Soil Conservation Service and are available for inspection.

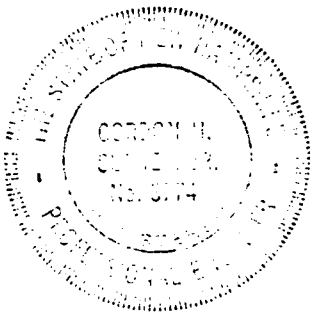
The visual inspection revealed that the dam is in good condition. The inspection revealed the following: surface deterioration of the concrete of the riser structure, debris on the low stage trash rack, and separation of the wingwall and training wall of the outlet works structure.

Based on the intermediate size of the dam and its high hazard classification and in accordance with Corp of Engineers guidelines, the test flood inflow is equal to the Probable Maximum Flood (PMF) or 29,000 cfs. The routed test flood outflow of 20,500 cfs overtops the dam by 0.4 foot. With the water surface at the top of the dam, the spillways will pass 84 percent of the routed test flood outflow. As there is a high hazard to loss of life from large flows downstream a review of the capacity of the spillways for thier ability to pass ½ the PMF was made. The results indicate that the ½ PMF inflow of 14,500 cfs would result in a routed ½ PMF

outflow of 7,000 cfs. As the total capacity of the spillways is 17,310 cfs, there will be a freeboard of 2.6 feet. The hydraulic design calculations indicate that the principal spillway was designed for a 100 year frequency flood. The crest elevation of the dam was designed using a total watershed runoff of 10.1 inches.

It is recommended that the owner engage a qualified engineer to investigate the separation of the wingwall and training wall of the outlet works structure and to design modifications to that structure to alleviate the problem. Remedial measures include development of a downstream warning system in the event of emergency conditions, and repair of the deteriorating concrete surface of the riser structure.

The recommendations and remedial measures are described in Section 7 and should be addressed within two years after receipt of this Phase I - Inspection Report by the owner.



Gordon H. Slaney, Jr., P.E.
Project Engineer

HOWARD NEEDLES TAMMEN & BERGENDOFF
Boston, Massachusetts

PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there by any chance that unsafe conditions be detected.

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

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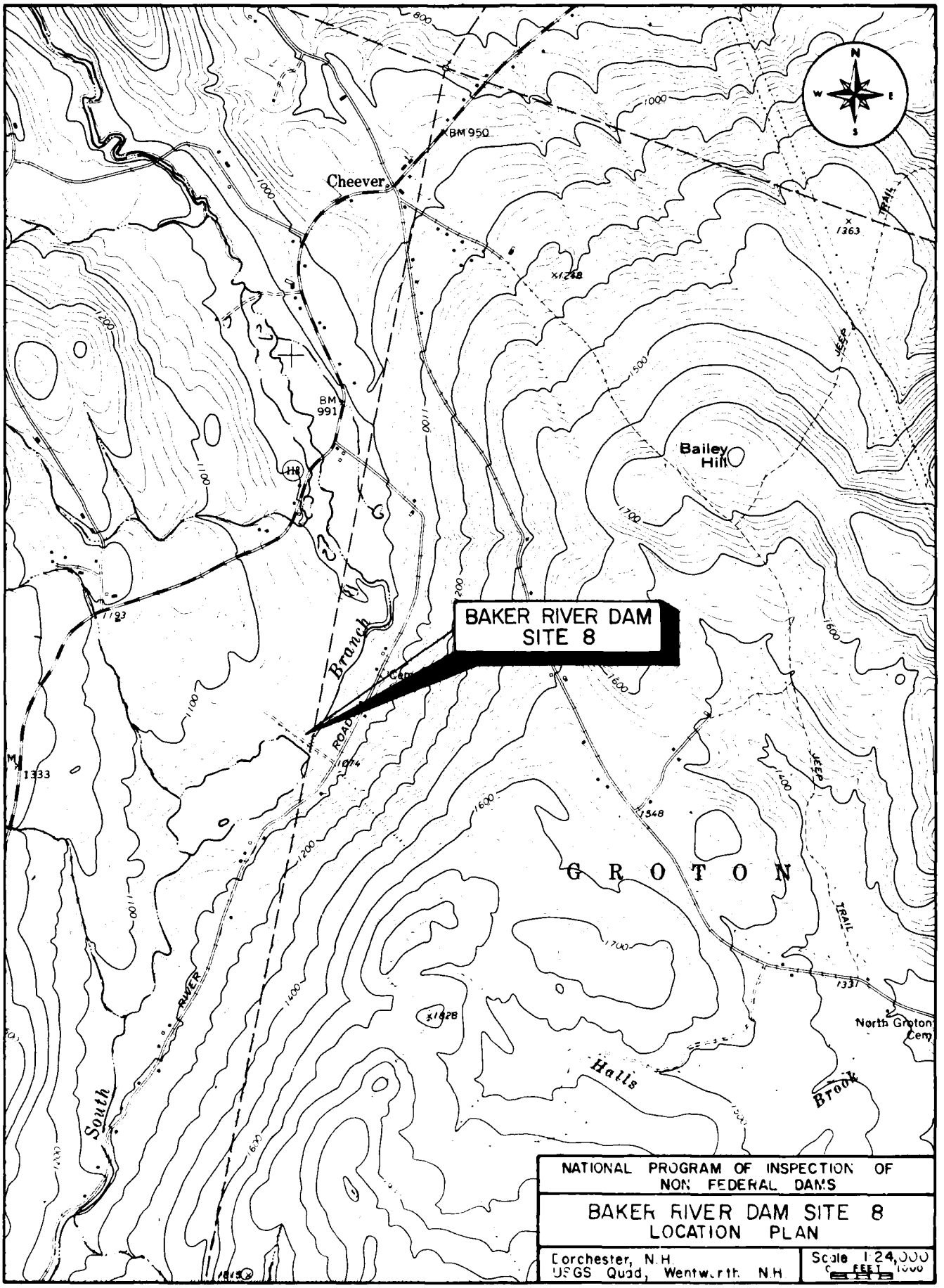
APPENDIXES

BAKER RIVER DAM SITE 8 - Overview looking upstream



NATIONAL PROGRAM OF INSPECTION OF NON FEDERAL DAMS

BAKER RIVER DAM SITE 8
LOCATION PLAN

Dorchester, N.H.
USGS Quad, Wentworth, N.H.

Scale 1:24,000
0 FEET 1000

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
BAKER FLOODWATER RESERVOIR SITE 8

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Howard, Needles, Tammen & Bergendoff has been retained by the New England Division to inspect and report on selected dams in the State of New Hampshire. Authorization and notice to proceed were issued to Howard, Needles, Tammen & Bergendoff under a letter of March 30, 1979 from John P. Chandler, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0060 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) To encourage and prepare the states to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. Baker Floodwater Reservoir Site 8 (Baker Dam Site 8 also known as South Branch Dam) is located on the South Branch Baker River approximately 1 mile upstream from Route 118 in the Town of Dorchester, New Hampshire. The dam is shown on U.S.G.S. Quadrangle Wentworth, New Hampshire, with approximate coordinates N43°46'30", W71°54'54", Grafton County, New Hampshire. The location of Baker Dam Site 8 is shown on the preceding page.

b. Description of Dam and Appurtenances. Baker Dam Site 8 is an earthen embankment structure. Total length of the dam according to existing drawings is 1,462 feet. Maximum structural height is 73 feet, and the height from the top of dam to the streambed is 62 feet. According to the plans there are four different fill zones in the structure, which include a cutoff wall. Top width of the dam is 14 feet. The embankment is on a 2½ horizontal to 1 vertical slope both up and downstream.

Appurtenant structures consist of a concrete riser and pipe principal spillway with a covered top inlet. There are two stages to the inlet structure, a low stage orifice and a high stage covered inlet. The riser discharges through a 5.0 foot diameter concrete pipe and Saint Anthony's Falls (SAF) Type stilling basin. The emergency spillway is located on the left side of the dam and has a width of 400 feet. It is an excavated earthen structure with a vegetative cover. A 30 inch diameter pond drain can be operated from the riser structure to drain the pond by a 30 inch gate valve.

Figures 1 and 2, located in Appendix B, show a plan of the dam and appurtenant structures. Photographs of each structure are shown in Appendix C.

c. Size Classification. Intermediate (hydraulic height - 62 feet, storage - 4,784 acre-feet) classification based on height being between 40 and 100 feet and storage being between 1,000 acre-feet and 50,000 acre-feet as given in Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. The potential for hazard posed by this dam is classified as high. Failure of the dam at maximum pool elevation (top of dam) would probably result in a total flood wave averaging approximately 20 feet high through the reach studied. About 8 dwellings would probably be inundated and two major roads would be affected.

e. Ownership. This dam is owned by the New Hampshire Water Resources Board, 37 Pleasant Street, Concord, New Hampshire.

f. Operator. This dam is maintained and operated by the New Hampshire Water Resources Board. Chairman of the Water Resources Board is Mr. George McGee, Sr.; Mr. Vernon Knowlton is Chief Engineer, Telephone No. 603/271-1110.

g. Purpose of Dam. This dam is used for floodwater control. The normal pool is maintained by the low stage intake in the riser. The storage between the low stage outlet and the emergency spillway crest is used to retard flood flows of up to a 100 year frequency.

h. Design and Construction History. The construction of this dam was completed in September of 1968. Design and construction inspection of this dam were done by the Soil Conservation Service, Durham, New Hampshire. The construction contractor was Landers and Griffin, Inc., Portsmouth, New Hampshire. In 1977, drain fill was added to the fill behind the wingwalls immediately downstream of the SAF stilling basin.

i. Normal Operating Procedures. The normal pool is maintained by the low stage inlet on the riser. Under flood conditions, when the capacity of the low stage orifice is exceeded, the storage is utilized. The high stage outlet will reach maximum design discharge before the reservoir reaches the crest of the emergency spillway. The dam does not require any manual operation in order to function.

1.3 Pertinent Data

a. Drainage Area. The area tributary to Baker Dam Site 8 consists of 16.04 square miles of wooded, mountainous terrain. There is little upstream development. Maximum elevation in the watershed is 2,564 feet MSL. The design flood pool elevation is 1,060.2 feet.

The shoreline and banks of the reservoir are clear of trees. However, the land surrounding this area is heavily wooded and mountainous. There are no cottages, docks or recreational facilities on the reservoir.

b. Discharge at Dam Site

(1) Outlet works for Baker Dam Site 8 consist of an emergency spillway, a riser with a low stage orifice and a high stage covered top spillway, and a 30 inch pond drain pipe controlled by a 30 inch gate valve. Invert of the pond drain is at 1,012.0 feet. Maximum discharge of the pipe when the reservoir is at the normal pool level of 1,023.0 feet is about 91 cfs. The low stage orifice has two openings each 36 inch by 17 inches in size set at invert 1,023.0. Capacity of the low stage inlet when the reservoir is at the crest of high stage inlet (1,050.0 ft.) is 236 cfs. The high stage covered inlet crest set at elevation 1,050.0 feet has a capacity of 628 cfs when the water level is at the emergency spillway crest of 1,064.5 feet. The 400 foot wide emergency spillway has a crest at elevation of 1,064.5 feet. When the water surface is at the top of dam (elevation 1,070.5) the spillway will have a capacity of 16,560 cfs.

(2) There are no records available of maximum dishcarge at the site. However, during the inspection of the dam on May 17, 1979, it was noted that debris on the face of the dam reached to about elevation 1,040.4 which would correspond to a discharge of about 190 cfs.

(3) The spillway and riser capacity with the water surface at the top of the dam is approximately 17,310 cfs at elevation 1,070.5.

(4) Spillway and riser capacity with the water surface elevation at the test flood elevation of 1,070.9 feet is approximately 19,360 cfs.

(5) The total project discharge at the test flood elevation of 1,070.9 feet is 20,500 cfs.

c. Elevation (feet above MSL)

(1) Streambed at centerline of dam - 1,007.5.

(2) Maximum tailwater - unknown.

(3) Upstream portal invert pond drain - 1,012.0.

(4) Normal pool - 1,023.0.

(5) Full flood control pool - 1,060.2.

(6) Spillway crest (emergency spillway) - 1,064.5.
(riser crest) - 1,050.0.

(7) Design surcharge - 1,060.2.

(8) Top Dam - 1,070.5.

(9) Test Flood Surcharge - 1,070.9.

d. Reservoir (miles)

(1) Length of Maximum Pool - 1.23.

(2) Length of Normal Pool - 0.5.

(3) Length of Flood Control Pool - 1.14.

e. Storage (gross acre-feet)

(1) Normal Pool- 143.0.

(2) Flood Control Pool - 3,150.

(3) Emergency Spillway Crest - 3,760.

(4) Top Dam - 4,784.

f. Reservoir Surface (acres)

(1) Normal Pool - 30.

(2) Flood Control Pool - 140.

(3) Emergency Spillway Crest - 161.

(4) Test Flood Pool - 177.

(5) Top Dam - 177.

g. Dam

(1) Type - earth.

(2) Length - 1,462 feet.

(3) Height - 62 feet hydraulic
73 feet structural

(4) Top Width - 14 feet.

(5) Side Slopes - 2½ horizontal to 1 vertical
up and downstream.

(6) Zoning - 4 zones of fill.

(7) Impervious core - none.

(8) Cutoff - zone 1 fill.

(9) Grout Curtain - none.

(10) Other - none.

h. Diversion and Regulating Tunnel

See Section j below.

i. Principal Spillway

(1) Type - Concrete Riser Covered Top - 60 inch diameter discharge pipe through dam.

(2) Length of Weir - 30 feet total.

(3) Crest Elevation - 1,050.0.

(4) Gates - none.

(5) U/S Channel - none.

Emergency Spillway

(1) Type-Earth, overflow

(2) Length of Weir - 400 feet

(3) Crest Elevation - 1,064.5

(4) Gates - none

(5) U/S Channel - Approach channel from reservoir is 400 feet wide with 4:1 side slopes.

(6) Downstream Channel. Immediately downstream of the dam a channel was constructed for a distance of 350 feet and lined with riprap on the bottom and sides. The natural channel downstream is about 20 feet wide. There are trees on both sides of the channel. Erosion due to high flows was vident along the banks.

j. Regulating Outlets. The normal level of the reservoir is controlled by two 36 inch by 17 inch orifice inlets set in the riser at invert elevation 1,023.0. There is a trash rack for each opening but no control gates. The 30 inch pond drain pipe set at invert 1,012.0 extends 176 feet into the reserovir from the riser and has a trash rack at the intake. The pipe is controlled at the riser by a 30 inch gate valve.

SECTION 2
ENGINEERING DATA

2.1 Design

A complete set of design data including layout, hydraulic design, foundation and embankment design, geology and soils reports, structural design, quantities and specifications are available for Baker Dam Site 8. In addition, there are construction drawings available. Design of the dam was done by the Soil Conservation Service, Durham, New Hampshire.

2.2 Construction

The dam construction was completed in September of 1968. A complete record of construction documents were made available. These documents include as-built plans, job diaries, surveying records, test drilling logs, compaction test results, concrete tests and certificate of completion. Construction was by Landers and Griffin, Inc., Portsmouth, New Hampshire, and was inspected by the soil conservation Service, Durham, New Hampshire.

In 1977, drain fill was added behind the wingwalls at the downstream end of the discharge channel.

2.3 Operation

Normally, the pond drain line gate is closed. The normal level of 1,023.0 is maintained by the low stage orifice openings. The principal spillway riser and reservoir storage is designed to retard runoff from up to a 100 year frequency storm without discharge occurring in the emergency spillway (crest 1,064.5).

2.4 Evaluation

a. Availability. Engineering data available for Baker Dam Site 8 consists of the information outlined in Sections 2.1 and 2.2. The plans, design data and construction records are available at the offices of the Soil Conservation Service, Federal Building, Durham, New Hampshire 03824.

b. Adequacy. A complete set of design and construction data did allow for a definative review within the confines of this Phase I - Inspection Report. Therefore, the adequacy

of this dam is based on the design and construction data reviewed, visual inspection, past performance history and sound engineering judgment.

c. Validity. The field investigation indicated that the external features of Baker Dam Site 8 substantially agree with those shown on the available plans.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The field inspection of Baker Dam Site 8 was made on May 17, 1979. The inspection team consisted of personnel from Howard, Needles, Tammen & Bergendoff and Geotechnical Engineers, Inc. A representative of the New Hampshire Water Resources Board was also present during the inspection. Inspection checklists, completed during the inspection, are included in Appendix A. At the time of inspection the water level was 0.4 feet above the invert of the low stage intake. The upstream face of the dam could only be inspected above this water level.

b. Dam. Visual inspection indicates the dam is in excellent condition.

The dam is an earth embankment 1,462 feet long and 62 feet high. The embankment consists of a wide upstream zone of sand and silty sand and a downstream zone of poorly-graded gravel. A cutoff trench extends below the central portion of the dam. There is a trench drain and blanket drain beneath the downstream section of the dam.

An unpaved emergency spillway has been cut into the left abutment and an outlet works consisting of a drop inlet structure, a concrete conduit through the dam and an outlet structure is located near the right abutment.

Upstream Slope

The upstream slope is 2.5 horizontal to 1 vertical. Reservoir storage was such that the entire upstream slope was inspected. The slope is well turfed and in good condition, as shown in Photo No. 3.

Crest

The crest of dam is 14 feet wide and is grass covered with grass with the exception of an unpaved roadway which is shown in Photo No. 5. No significant misalignment of the crest was observed.

Downstream Slope

The downstream slope is 2.5 horizontal to 1 vertical. The slope shown in Photos No. 4 and 6 is grass covered and in good condition.

No seepage or damp areas were observed along the toe of the dam.

The dam has a trench drain and blanket drain which exit the discharge channel just below the stilling basin. At the time of inspection, these drain pipes were clear and dry.

c. Appurtenant Structure. Visual inspection of the concrete riser spillway structure, emergency spillway and outlet works structure did not reveal any evidence of stability problems. The riser structure generally appeared to be in good condition, except for surface deterioration in the form of staining, cracks and scaling, Photos No. 7, 8, 9 and 10. The spillway trash racks and service ladder are in good condition. No rust or peeling of the protective coating were noted.

The concrete riser structure (principal spillway) consists of three elements: An overflow control with a low stage inlet and a high stage crest, a vertical transition and a closed discharge conduit. The riser structure is placed in the embankment. Visual inspection revealed that the riser structure appeared to be in good condition, except for water staining, cracks and extensive surface scaling in the form of loss of surface mortar and in some locations loss of coarse aggregate particles.

The 30 inch diameter pond drain pipe, intake and gate could not be inspected as they were under water. The gate and control mechanism are housed in the concrete riser tower. The control mechanism appeared to be in good condition.

The trash racks at the low and high flow control stages consist of a standard shape angles and grating. Both trash rack assemblies are in good condition. No rust or peeling of the protective coating was noted. The low stage trash rack structure is filled with debris.

The emergency spillway is a grass covered excavation in the left abutment passing around the dam. The spillway is shown in Photos No. 18, 19 and 20.

The earth spillway is in good condition. The channel downstream of the emergency spillway is heavily wooded.

The outlet works structure at the toe of earth dam consists of 60 inch reinforced concrete pipe and Saint Anthony's Falls Type stilling basin structure with u-type training walls and wingwalls, see Photos No. 12 and 13.

Visual inspection of the outlet works structure reveals that the concrete surface is generally in good condition except for the wingwalls which have moved approximately 2.5 inches from the training walls. The movement is horizontal (sliding) as seen in Photos No. 14, 15, 16 and 17 causing a cutting of the plastic waterstops. There appears to be no rotational movement. The movement of the wingwalls does not pose a safety problem to the dam.

The discharge channel below the stilling basin extends for a distance of 350 feet downstream of the outlet works (Photo No. 12). The channel is lined with rock riprap and is in excellent condition.

d. Reservoir Area. The reservoir area is in mountainous terrain. The shoreline is clear of trees. There are no cottages, docks or recreational facilities on the reservoir. Debris was noted on the upstream face of the dam.

e. Downstream Channel. The stream regains the natural channel downstream of the riprap lined outlet channel. The natural channel is about 20 feet wide and both banks are lined with trees. Some debris was noted in the channel. The banks show some signs of erosion due to high flows.

3.2 Evaluation

Visual examination indicates generally the dam is in good condition. The inspection revealed the following:

(a) Some surface deterioration in the form of staining, cracking and scaling of the concrete on the riser portion of the principal spillway.

(b) Debris on the low stage trash rack.

(c) Separation of the wingwalls and training walls of the outlet works structure due to movement (sliding) of the wingwalls.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedure

Baker Dam Site 8 is used for floodwater control. Under normal operating procedures, the dam is left to function as designed. The normal pool level is maintained by the low stage orifice openings in the riser. Flood events of up to a 100 year frequency are retarded by the reservoir storage between the normal pool and the emergency spillway crest. The emergency spillway is utilized only with events greater than a 100 year frequency.

4.2 Maintenance of Dam

The dam is inspected on an annual basis by the New Hampshire Water Resources Board and the Soil Conservation Service. Maintenance is undertaken as a result of the inspection on an as needed basis. The dam is visited on a monthly basis by personnel of the Water Resources Board.

4.3 Maintenance of Operating Facilities

Maintenance of the outlet works is performed as in Section 4.2.

4.4 Description of Warning Systems

There are no warning systems in effect for this facility.

4.5 Evaluation

The current operation and maintenance procedures for this facility appear to be adequate to insure that any problems encountered can be remedied within a reasonable period of time. However, the owner should establish a downstream warning system to follow in the event of emergency conditions.

SECTION 5
HYDROLOGY AND HYDRAULIC ANALYSIS

5.1 Evaluation of Features

a. General. Baker Dam Site 8 is an earthen embankment dam 1,462 feet long with a hydraulic height of 62 feet. The dam is constructed with four fill zones and a earth fill core. Appurtenant works consist of two stage riser and 5.0 foot diameter concrete pipe which discharges to a Saint Anthony's Falls type stilling basin, an emergency spillway 400 feet wide and a 30 inch diameter gated pond drain.

The dam is used for floodwater control. The dam is classified as intermediate in size having a height of 62 feet and maximum storage of 4,784 acre-feet.

b. Design Data. According to the Soil Conservation Service design data, this dam is constructed to retard flood flows of up to a 100 year frequency storm without utilizing the emergency spillway. The design flood control elevation is 1,060.2 feet or 4.3 feet below the emergency spillway crest. Total runoff for this condition is 3.62 inches during a six hour Type IIB storm. The crest elevation of the dam was designed using a total watershed runoff of 10.10 inches. The structure is classified as having a "C" hazard which is defined as "dams located where failure may cause loss of life, serious damage to homes, industrial and commercial buildings, important public utilities, main highways or railroads.

c. Experience Data. There are no records available of maximum discharge at the dam site. However, during the inspection of the dam on May 17, 1979, it was noted that debris on the face of the dam reached to about elevation 1,040.4 which would correspond to a discharge of about 190 cfs.

d. Visual Observations. No evidence of damage to any portion of the project from overtopping was visible at the time of inspection.

e. Test Flood Analysis. Even though detailed design and operational data are available for this dam, a hydrologic evaluation was performed using a test flood equal to the Probable Maximum Flood (PMF) as determined from Guide Curves issued by the Corps of Engineers. Based on a drainage area of 16.04 square miles, it was estimated that the test flood inflow at Baker Dam Site 8 would be 29,000 cfs. Following the guidance for Estimating Effect of Surcharge Storage on Maximum Probable Discharge results in a routed test flood outflow discharge of 20,500 cfs. As the maximum capacity

of the spillways at the top of dam is 17,310 cfs (approximately 84 percent of the routed test flood outflow), the test flood will result in the dam being overtopped by approximately 0.4 feet. The test flood was routed with the water surface starting at the normal pool elevation.

As there is a high hazard to loss of life from large flows downstream of the dam (resulting from dam failure), and dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam, a review of the spillway capacity for its ability to pass ½ the PMF was made. This analysis indicates that the test flood inflow would be approximately 14,500 cfs. Following the guidance for Estimating Effect of Surcharge Storage on Maximum Probable Discharge results in a routed ½ PMF outflow of 7,000 cfs. As the total capacity of the spillways at the top of dam is 17,310 cfs, the spillway can safely pass the routed ½ PMF outflow with a free board of approximately 2.6 feet.

f. Dam Failure Analysis. The impact of failure of the dam at maximum pool (top of dam) was assessed using the "Rule of Thumb" Guidance for Estimating Downstream Hazard Hydrographs issued by the Corps of Engineers. The analysis covered the reach extending from the dam to a point 5.5 miles downstream at the intersection of Route 25 and 118 with the South Branch Baker River. The downstream channel stage, prior to breach of dam, with the spillway discharging at full capacity, will be 3 feet above the river bank or about 8 feet from the streambed. After breach, the total flood wave height of 25 feet at the dam will be reduced to about a 17 foot height by the end of the reach studied. About 8 dwellings along this reach will probably be inundated. Two major roads, Route 118, one mile downstream of the dam and Route 25, 5.5 miles downstream will be affected by the floodwave.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation. The visual inspection did not disclose any immediate stability problems. Although some movement of the wingwall on the outlet works was observed, it did not pose a problem to the safety of the dam.

b. Design and Construction Data

Design drawings and construction specifications exist and indicate the dam is a zoned embankment consisting of a wide upstream zone of silty sand, sand and a downstream zone of poorly-graded gravel. A cutoff trench extends below the central portion of the dam. The cutoff trench extends up both abutments, but its depth could not be determined from the available drawings.

A Drainage trench and blanket drain are located beneath the downstream zone of the embankment.

A grass-covered emergency spillway passes around the embankment on the left abutment.

Construction records indicate that the dam and appurtenant structures were built according to the plans and specifications.

A review of the design calculations and drawings was made in order to determine the cause of movement of the wingwalls at the outlet works. The movement is horizontal. There appears to be no rotational movement, probably because the end of wingwall is embedded in the riprap placed below the wall to shape the discharge channel.

The wingwalls were designed as cantilever walls, expansion joints with water-stop were placed between the training walls and cantilever wingwalls.

c. Operating Records. No operating records are available.

d. Post Construction Changes. The outlet pipes of the foundation drainage system originally passed immediately behind the outlet works training walls and exited through the wingwalls, as shown in Photo No. 13. In 1977, in order to provide better drainage around the SAF outlet, the location of the drain pipes was moved away from the outlet works and carried below the structrue to outlet into the discharge channel. The new drain pipe

outlets were below the water surface at the time of inspection. The work included plugging of the old drain pipes, placement of new drain fill material around the relocated drain pipe and placement of the ¼ inch thick plates behind each separation of the training wall and wingwall. All modifications were designed by the Soil Conservation Service.

Piezometers were installed behind each wingwall in 1973 as part of the investigation to remedy the wall movement. The study was conducted by professional engineers from the New Hampshire State SCS office in conjunction with professional engineers from the regional SCS office in Bromall, Pennsylvania. The above noted modifications are based on recommendations from this study. The report entitled "Report on Investigation of Structural Deficiency - Site 8, Baker River Watershed - Grafton County, New Hampshire," dated March 1976 is available on request from the SCS. The piezometer pipes may be seen in Photo No. 12.

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

SECTION 7
ASSESSMENT, RECOMMENDATION AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The visual inspection of Baker Floodwater Reservoir Site 8 indicates the dam is in good condition. The inspection revealed the following:

(1) Some surface deterioration in the form of staining, cracking and scaling of the concrete on the riser portion of the principal spillway.

(2) Debris in the low stage trash rack.

(3) Separation of the wingwalls and training walls of the outlet works structure due to movement (sliding of the wingwalls).

The hydraulic analysis reveals that the spillways cannot pass the routed test flood outflow without overtopping the dam.

b. Adequacy. A complete set of design and construction data did allow for a definitive review within the confines of this Phase I - Inspection Report. Therefore, the adequacy of this dam is based on the design and construction data reviewed, visual inspection, past performance history and sound engineering judgment.

c. Urgency. This dam is in generally good condition. The recommendations and remedial measures described in Sections 7.2 and 7.3 should be accomplished within 2 years of the receipt of this Phase I - Inspection Report by the owner.

d. Necessity for Additional Information. No additional investigation is needed to complete the Phase I inspection.

7.2 Recommendations

There are no recommendations resulting from the Phase Inspection.

7.3 Remedial Measures

(a) Clear the debris from the trash rack on the low stage inlet.

(b) Repair the deteriorating surface of the concrete on the riser structure.

(c) Develop a downstream warning system to follow in the event of emergency conditions.

(d) Continue to monitor water levels behind the outlet structure wingwalls and the rate (if any) of further separation.

(e) Continue the periodic inspections on a biennial basis.

(f) The installation of a more permanent type fencing around the outlet works should be considered.

7.4 Alternatives

There are no practical alternatives to the recommendations of Section 7.2 and 7.3.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

A-1

PROJECT Site 8, Baker Dam

DATE May 17, 1979

TIME 1:00 P.M.

WEATHER Fair

W.S. ELEV. 1023.4 U.S. _____ DN.S

PARTY:

1. G. Slaney - HNTB
2. S. Mazur - HNTB
3. D. LaGatta - GEI
4. C. Osgood - GEI
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam	D. LaGatta, C. Osgood	
2.	Spillway, Outlet Works	S. Mazur	
3.	and Downstream Channel	G. Slaney	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST

A-2

PROJECT Baker Site No. 8 Dam — DATE May 17, 1979

PROJECT FEATURE Earth Embankment — NAME D. P. LaGatta

DISCIPLINE Geotechnical Engineer — NAME C. E. Osgood

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	1070.5
Current Pool Elevation	1023.4
Maximum Impoundment to Date	1040.00 estimated from debris level.
Surface Cracks	None observed.
Pavement Condition	No pavement. Grass cover with wheel tracks.
Movement or Settlement of Crest	None observed.
Lateral Movement	None observed.
Vertical Alignment	No misalignment observed.
Horizontal Alignment	No misalignment observed.
Condition at Abutment and at Concrete Structures	Good except for joint separation of wing walls from training walls at principal spillway outlet.
Indications of Movement of Structural Items on Slopes	None.
Trespassing on Slopes	No damage due to trespassers.
Sloughing or Erosion of Slopes or Abutments	Minor surface erosion at a high water-line at an elevation about 15 ft. above the pool.
Rock Slope Protection - Riprap Failures	No riprap on slopes.
Unusual Movement or Cracking at or near Toes	None observed.
Unusual Embankment or Downstream Seepage	None observed.
Piping or Boils	None observed.
Foundation Drainage Features	12" foundation drain outlets are dry and clearn.
Toe Drains	None apparent
Instrumentation System	Measurement points at joints between wing wall and training wall. Piezometer tubes noted at 6 ft. from wingwalls.
Vegetation	Grass cover in good condition.

PERIODIC INSPECTION CHECK LIST

A-3

PROJECT Site 8, Baker Dam

DATE May 17, 1979

PROJECT FEATURE Intake Channel/Structure

NAME D. LaGatta, C. Osgood

DISCIPLINE Geotechnical/Structural Engineers

NAME S. Mazur

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	No intake channel.
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	None.
Debris	Low trash rack at riser structure is filled with debris.
Condition of Concrete Lining	
Drains or Weep Holes	-
b. Intake Structure	Galvanized trash rack and concrete surface of riser structure at both high and low stages of spillway are in good condition. Bottom water release structure (outlet works) was under water. Trash racks need cleaning.
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECK LIST

A-4

PROJECT Site 8, Backer Dam

DATE May 17, 1979

PROJECT FEATURE Control Tower

NAME G. Slaney

DISCIPLINE Structural/Hydraulic Engineers

NAME S. Mazur

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	Outlet works (bottom water release structure) consist of inlet structure and 30" ID reinforced concrete pipe extended to riser structure. Bottom, water release structure including mechanically operated gate were under water.
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	Mechanically operated gate and control mechanism are housed in concrete riser structure. Gate is operated from roof of riser structure. Gate and control mechanism appear to be in good operational condition.
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECK LIST

A-5

PROJECT Site 8, Baker Dam

DATE May 17, 1979

PROJECT FEATURE Spillway/Outlet Works Conduit

NAME G. Slaney

DISCIPLINE Structural/Hydraulic Engineers

NAME S. Mazur

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	At the time of inspection, outlet works conduits were under water. Outlet conduit, dam section, consists of 60" ID reinforced concrete pipe and is placed on concrete bedding. Outlet works, conduit appears to be in good condition.
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECK LIST

A-6

PROJECT Site 8, Baker Dam — DATE May 17, 1979

PROJECT FEATURE Outlet Structure/Channel — NAME D. LaGatta, C. Osgood

DISCIPLINE Structural/Hydraulic/Geotechnical — NAME S. Mazur, G. Slaney

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Concrete discharge pipe, stilling basin and training walls are generally in good condition, except that concrete wingwalls are completely separated from training walls at expansion joints (2½" or more).
General Condition of Concrete	
Rust or Staining	Water staining, training and wingwalls.
Spalling	
Erosion or Cavitation	None observed.
Visible Reinforcing	None.
Any Seepage or Efflorescence	None.
Condition at Joints	Expansion joints at wingwalls, 22" opening along training wall; plastic water stop is cut at center of joint, as can be seen in photos No 15 & 17
Drain Holes	
Channel	
Loose Rock or Trees Overhanging Channel	Riprap in good condition None
Condition of Discharge Channel	Good, channel clear.

PERIODIC INSPECTION CHECK LIST

PROJECT Site 8, Baker Dam — DATE May 17, 1979

PROJECT FEATURE Outlet Works - Spillway — NAME D. LaGatta, C. Osgood

DISCIPLINE Structural/Hydraulic/Geotechnical — NAME S. Mazur, G. Slaney

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good
Loose Rock Overhanding Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Grass cover. A few bushes should be mowed. Area damp at time of inspection at left of channel. Poses no threat to dam. This facility has two spillway structures; concrete riser or shaft spillway and auxiliary earth spillway located in left abutment. Both spillways are in good condition.
b. Weir and Training Walls	
General Condition of Concrete	Water staining, cracks and loss of motor in concrete surface. Photo No. 7
Rust or Staining	None
Spalling	None
Any Visible Reinforcing	None
Any Seepage or Efflorescence	None
Drain Holes	
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Channel	Grass covered
Other Obstructions	None

PERIODIC INSPECTION CHECK LIST

A-8

PROJECT Site 8, Baker Dam DATE May 17, 1979

PROJECT FEATURE Service Bridge NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	This facility has no service bridge.
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

ENGINEERING DATA

1. LIST OF DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS
2. PAST INSPECTION REPORTS
3. PLAN AND DETAILS

AVAILABLE ENGINEERING DATA

1. A set of drawings (36 sheets), dated October 1965, showing plans and details of the dam and appurtenant structures, and another set of drawings (5 sheets), dated April 1976, showing changes to the outlet works structure.

2. Design Data including layout, hydraulic design, geology and soils reports, structural design, quantities and specifications.

3. Construction Data: including as-built plans, job diaries, surveying records, test drilling logs, compaction test results, concrete tests and certificate of completion.

All of the above are on file with the U.S.D.A. Soil Conservation Service, Federal Building, Durham, New Hampshire 03824.

PAST INSPECTION REPORTS

MAINTENANCE CHECKLIST FOR PL 566 FLOOD CONTROL STRUCTURES

This maintenance checklist is a guide for determining the maintenance required for Public Law 566 flood control structures in New Hampshire. It doesn't take the place of experience and judgment and is not inclusive. Items of a difficult nature to check, such as principal spillway conduit condition, are not included. Intensive checks of these items are necessary at proper intervals. Review of As Built drawings, the design folder, structure history, and previous maintenance reports should be part of the inspection. Prompt maintenance is a vital part of safe and effective operation.

Except where otherwise indicated, completion of this form may be facilitated by ranking maintenance items on a 1 to 4 basis where

1 = satisfactory
2 = satisfactory, but check carefully at next inspection
3 = requires maintenance this season
4 = requires immediate attention.

6606

WATERSHED Baker SITE 8 DATE 6-13-78

INSPECTED BY Gary Kerr, Lyall Milligan (WRB); Mike Dannehy, Nick Luhtala, Ray Wenninger (~~SCS~~)

1. GENERAL ITEMS

Access Road.	N/A
Site Fencing.	(3)
Traffic Conditions.	1
Vandalism Control.	(3)
Trash Control.	1

COMMENTS Fence at dam continues to be vandalized. SAF should be fenced in for safety. Riser has holes in downstream end wall. Probably due to bullet impact.

2. RESERVOIR

Timber stand at reservoir.	1
Debris and slash.	3
Sediment level in relation to low stage inlet	1

COMMENTS A lot of debris at riser should be removed.

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

3. EMBANKMENT AND EXCAVATED SLOPES

(Report riprap and vegetation and erosion condition under Items 4 and 5.)

	Dam	Dike	Emergency Spillways left	Emergency Spillways right 1/	Other (____)	Other (____)
Sliding or sloughing	1	—	1	—	—	—
Holes (rodent and other) (check especially at embankments)	1	—	1	—	—	—
Excessive settlement (embankments)	1	—	—	—	—	—
Cracks						
Traverse	1	—	1	—	—	—
Longitudinal	1	—	1	—	—	—
Seepage 2/	1	—	1	—	—	—
Piping 2/	1	—	1	—	—	—

COMMENTS _____

4. RIPRAP

	Displ. of Rock	Loss of Spalls	Loss of Bedding	Erosion of Found.	Break-down of Rock
Dam					
Upstream berm	—	—	—	—	—
Principal Spillway Outlet	1	1	1	1	1
Embankment Gutters					
left	—	—	—	—	—
right	—	—	—	—	—
Emergency Spillway					
location_____	—	—	—	—	—
location_____	—	—	—	—	—
Waterways					
location_____	—	—	—	—	—
location_____	—	—	—	—	—
Outlet Channel	1	1	1	1	1
Other_____	—	—	—	—	—

COMMENTS _____

1/Looking downstream.
2/Check especially at downstream face of embankments.

5. VEGETATION

	Dam	Emergency Spillways left	Emergency Spillways right 1/	Dike	Outlet Channel	Water way	Other (_____)
Condition of stand (including need for lime and fertilizer)	—	—	—	—	—	—	—
Undesirable vegetation	—	4 ✓	4 ✓	—	—	—	—
Drainage (surface)	—	—	—	—	—	—	—
Erosion 2/	—	—	—	—	—	—	—
Sedimentation	—	—	—	—	—	—	—
Condition of planting	—	—	—	—	—	—	—
Pest control	—	—	—	—	—	—	—
Fire control	—	—	—	—	—	—	—

COMMENTS Brush coming in very heavy on emergency spillway and dam. Needs immediate attention. Rest of vegetation looks good.

6. EMBANKMENT, STRUCTURAL, & OTHER DRAINS

		Dam left	Dam right 1/	Other (_____)	Other (_____)
Depth of Flow (in inches above invert) Submerged	With any obstruction	—	—	—	—
	Without any obstruction	—	—	—	—
Turbidity of Discharge (yes, no)	With any obstruction	—	—	—	—
	Without any obstruction	—	—	—	—
Condition of Protective Coating	Outside	—	—	—	—
	Inside	—	—	—	—
Obstruction in Flow (yes, no)		—	—	—	—
Animal Guard Condition		—	—	—	—
Outlet Condition		—	—	—	—

Retarding Pool Elevation (ft. msl)_____ or_____(ft.) above / below _____

Other_____ 3 or 4 feet above L.S.

COMMENTS_____

1/Looking downstream.
2/Including wave, surface, stream, manmade, and livestock erosion.

7. RISER

Caution Be extremely careful when using ladders. Check condition before using. Ladders are sometimes broken, loose, corroded, and or slippery.
Use safety harness.

Ladders: inside and out
Condition of protective coating 1 ; Corrosion 1 ; Damaged parts ___; Loose ___; Other ___.

Concrete: inside and out
Cracking 1 ; Spalling 1 ; Other deterioration 3 ; Excessive movement (check joint at riser and conduit) ___; Other ___.

Trashracks: low and high stage
Condition of protective coatings 1 ; Corrosion 1 ; Damaged parts 1 ; Condition of fastenings ___; Need of gratings due to beaver ___; Safety condition (protruding fastenings, sharp edges, etc.) ___; Other ___.

Manhole:
Condition of protective coatings ___; Corrosion ___; Damage ___; Lock operable ___; Other ___.

Gate: including lifting device, stem; guides, disc
Condition of protective coating ___; Corrosion ___; Damaged parts ___; Condition of fastenings ___; Stem alignment ___; Lubrication ___; Operation ___; Other ___.

Safety Items:
Condition of warning signs ___; Condition of safety equipment ___; Other ___.

COMMENTS Outside downstream end of riser has surface holes (bullet maybe) Steel not exposed. Difficult to see L.S. trash rack well. Did not go down riser. Recommend checking riser interior, gate operation, and conduit at suitable intervals.

IMPACT BASIN, SAF, BOX INLET, & MISCELLANEOUS CONCRETE STRUCTURES

(specify) SAF

Concrete: inside and out	Cracking 3 ; Spalling 1 ; Other deterioration ___; Excessive movement (check joints)___; Waterstops___; Joint sealant___; Other___.
Trashracks: low and high stage	Condition of protective coatings___; Corrosion ___; Damaged parts___; Condition of fastenings___; Need of gratings due to beaver___; Safety condition (protruding fastenings, sharp edges, etc.)___; Other___.
Gates: including lifting device, stem, guides, disc, flap	Condition of protective coating___; Corrosion ___; Damaged parts___; Condition of fastenings___; Stem alignment___; Operation___; Lubrication___; Wood decay___; Other___.
Structure Drainage:	Report under "Embankment and Other Drains"
Structure, Railing, Grates, Barriers, etc.	Condition of protective coating___; Corrosion ___; Damaged parts___; Condition of Fastenings___; Wood decay___; Safety condition (protruding fastenings, sharp edges, etc.) ____; Other___.
Safety Items:	Condition of warning signs___; Condition of safety equipment___; Other___.

COMMENTS Top of SAF wall cracks should be sealed with flexible caulking or coating (not changed from before, however) to prevent further cracking by freezing.

CHANNEL

Stream obstructions.	1
Debris in stream.	1
Sediment bars controlled.	1
Plunge pool stability.	____
Fish habitat appurtenances	____

Riprap -- Report under "Riprap" (item 4)

COMMENTS

4 -

MAINTENANCE CHECKLIST FOR PL 566 FLOOD CONTROL STRUCTURES

This maintenance checklist is a guide for determining the maintenance required for Public Law 566 flood control structures in New Hampshire. It doesn't take the place of experience and judgment and is not inclusive. Items of a difficult nature to check, such as principal spillway conduit condition, are not included. Intensive checks of these items are necessary at proper intervals. Review of As Built drawings, the design folder, structure history, and previous maintenance reports should be part of the inspection. Prompt maintenance is a vital part of safe and effective operation.

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1 = satisfactory
2 = satisfactory, but check carefully at next inspection
3 = requires maintenance this season
4 = requires immediate attention.

WATERSHED BAKER RIVER SITE 4 DATE 5-20-77
INSPECTED BY KERR DANNIGHY LUNTALA MILLIGAN KELSEY MACPHERSON

1. GENERAL ITEMS

Access Road.	1
Site Fencing.	2
Traffic Conditions.	2
Vandalism Control.	2
Trash Control.	3

COMMENTS RENOVE TRASH FROM UPSTREAM FACE OF DAM & LOW STAGE TRASH RACKS. ROCK MARKS ON RISER PROBABLY FROM BULLETS.

2. RESERVOIR

Timber stand at reservoir.	1
Debris and slash.	2
Sediment level in relation to low stage inlet	

COMMENTS CONSIDERABLE AMOUNT OF DEBRIS CAUGHT IN WOODED AREA UPSTREAM RIGHT SIDE OF RISER

SOIL CONSERVATION SERVICE
US DEPARTMENT OF AGRICULTURE

EMBANKMENT AND EXCAVATED SLOPES

(Report riprap and vegetation and erosion condition under Items 4 and 5.)

	Dam	Dike	Emergency Spillways left	Emergency Spillways right 1/	Other (____)	Other (____)
Sliding or sloughing	2	—	1	—	—	—
Holes (rodent and other) (check especially at embankments)	1	—	1	—	—	—
Excessive settlement (embankments)	1	—	1	—	—	—
Cracks						
Traverse	1	—	1	—	—	—
Longitudinal	1	—	1	—	—	—
Seepage 2/	1	—	1	—	—	—
Piping 2/	1	—	1	—	—	—

COMMENTS SOME SLOUGHING BY ICE ON UPSTM SLOPE. ALSO SOME RILLING & EROSION. 2 SMALL AREAS OF SLOUGHING ON DOWNSTM FACE OF DAM. THESE AREAS ABOUT 150 FT FROM RT. END OF DAM.

4. RIPRAP

	Displ. of Rock	Loss of Spalls	Loss of Bedding	Erosion of Found.	Break-down of Rock
Dam					
Upstream berm	—	—	—	—	—
Principal Spillway Outlet	—	—	—	—	—
Embankment Gutters					
left	—	—	—	—	—
right	—	—	—	—	—
Emergency Spillway					
location_____	—	—	—	—	—
location_____	—	—	—	—	—
Waterways					
location_____	—	—	—	—	—
location_____	—	—	—	—	—
Outlet Channel	1	1	1	1	1
Other SAF OUTLET LT. SIDE	1	1	1	1	1

COMMENTS CONTRACTOR WORKING ON RT SIDE OF SAF OUTLET.

1/ Looking downstream.
2/ Check especially at downstream face of embankments.

VEGETATION

	Dam	Emergency Spillways left	Emergency Spillways right 1/	Dike	Outlet Channel	Water way	Other (_____)
Condition of stand (including need for lime and fertilizer)	3	2	—	—	NA	—	—
Undesirable vegetation	3	2	—	—	3	—	—
Drainage (surface)	NA	1	—	—	NA	—	—
Erosion 2/	3	1	—	—	1	—	—
Sedimentation	1	1	—	—	1	—	—
Condition of planting	NA	NA	—	—	NA	—	—
Pest control	—	—	—	—	—	—	—
Fire control	—	—	—	—	—	—	—

COMMENTS EAST OF DAM NEEDS VEGETATIVE ESTABLISHMENT BUSHES GROWING ON DAM FACES. POOR SOD IN EM. SPILLWAY RELATIVE TO OTHER SITES. TREFOIL ERODING, SMITH GRASS SPREADING ON EM. SPILLWAY. ERODED VETCH COMING IN ON DAM.

6. EMBANKMENT, STRUCTURAL, & OTHER DRAINS

		Dam left	Dam right 1/	Other (_____)	Other (_____)
Depth of Flow (in inches above invert)	With any obstruction	?	1/4	—	—
	Without any obstruction	—	—	—	—
Turbidity of Discharge (yes, no)	With any obstruction	NO	NO	—	—
	Without any obstruction	—	—	—	—
Condition of Protective Coating	Outside	1	1	—	—
	Inside	1	1	—	—
Obstruction in Flow (yes, no)		YES	YES	—	—
Animal Guard Condition		0	1	—	—
Outlet Condition		1	1	—	—

Retarding Pool Elevation (ft. msl)_____ or_____(ft.) above / below _____

Other_____

COMMENTS LEFT PIPE HALF SUBMERGED AT OUTLET IRON ALGAE IN OUTLET OF RT. PIPE

1/ Looking downstream.
2/ Including wave, surface, stream, manmade, and livestock erosion.

RISER

Caution Be extremely careful when using ladders. Check condition before using. Ladders are sometimes broken, loose, corroded, and or slippery.
Use safety harness.

Ladders: inside and out — Condition of protective coating___; Corrosion___; Damaged parts___; Loose___; Other___.

Concrete: inside and out — Cracking___; Spalling 2; Other deterioration 2; Excessive movement (check joint at riser and conduit)___; Other___.

Trashracks: low and high stage — Condition of protective coatings___; Corrosion ___; Damaged parts___; Condition of fastenings ___; Need of gratings due to beaver___; Safety condition (protruding fastenings, sharp edges, etc.)___; Other___.

Manhole: — Condition of protective coatings___; Corrosion ___; Damage___; Lock operable___; Other___.

Gate: including lifting device, stem, guides, disc — Condition of protective coating___; Corrosion ___; Damaged parts___; Condition of fastenings___; Stem alignment___; Lubrication___; Operation___; Other___.

Safety Items: — Condition of warning signs___; Condition of safety equipment___; Other___.

COMMENTS WAR PERSONNEL WILL CHECK RISER & PERFORMANCES AT LATER DATE. RISER PROTECTED WITH WHAT APPEARS TO BE BULLET HOLES. THE BLACK PUR COATING IS SPALLING.

IMPACT BASIN, SAF, BOX INLET, & MISCELLANEOUS CONCRETE STRUCTURES

(specify)_____ _____

Concrete: inside and out	Cracking 2; Spalling 1; Other deterioration ___; Excessive movement (check joints) 2; Waterstops 1; Joint sealant 1; Other___.
Trashracks: low and high stage	Condition of protective coatings___; Corrosion ___; Damaged parts___; Condition of fastenings___; Need of gratings due to beaver___; Safety condition (protruding fastenings, sharp edges, etc.)___; Other___.
Gates: including lifting device, stem, guides, disc, flap	Condition of protective coating___; Corrosion ___; Damaged parts___; Condition of fastenings___; Stem alignment___; Operation___; Lubrication___; Wood decay___; Other___.
Structure Drainage:	Report under "Embankment and Other Drains"
Structure, Railing, Grates, Barriers, etc.	Condition of protective coating___; Corrosion ___; Damaged parts___; Condition of Fastenings___; Wood decay___; Safety condition (protruding fastenings, sharp edges, etc.) ____; Other___.
Safety Items:	Condition of warning signs___; Condition of safety equipment___; Other___.

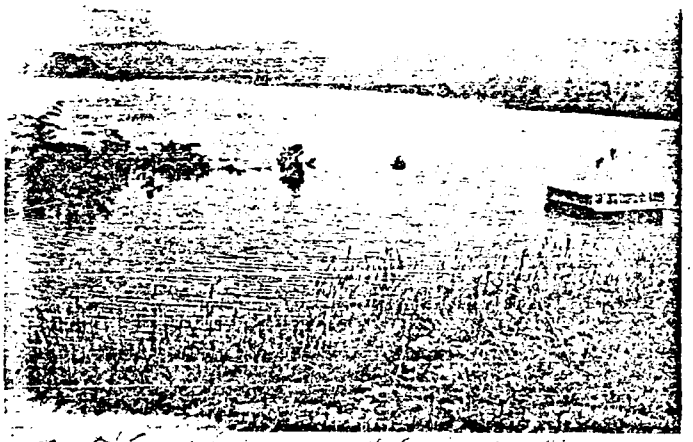
COMMENTS FINE CRACKS IN SAF WALLS. SAF WINGWALLS & SIDE WALLS BEING REPAIRED TO ELIMINATE ADVERSE EFFECTS OF WINGWALL MOVEMENT.

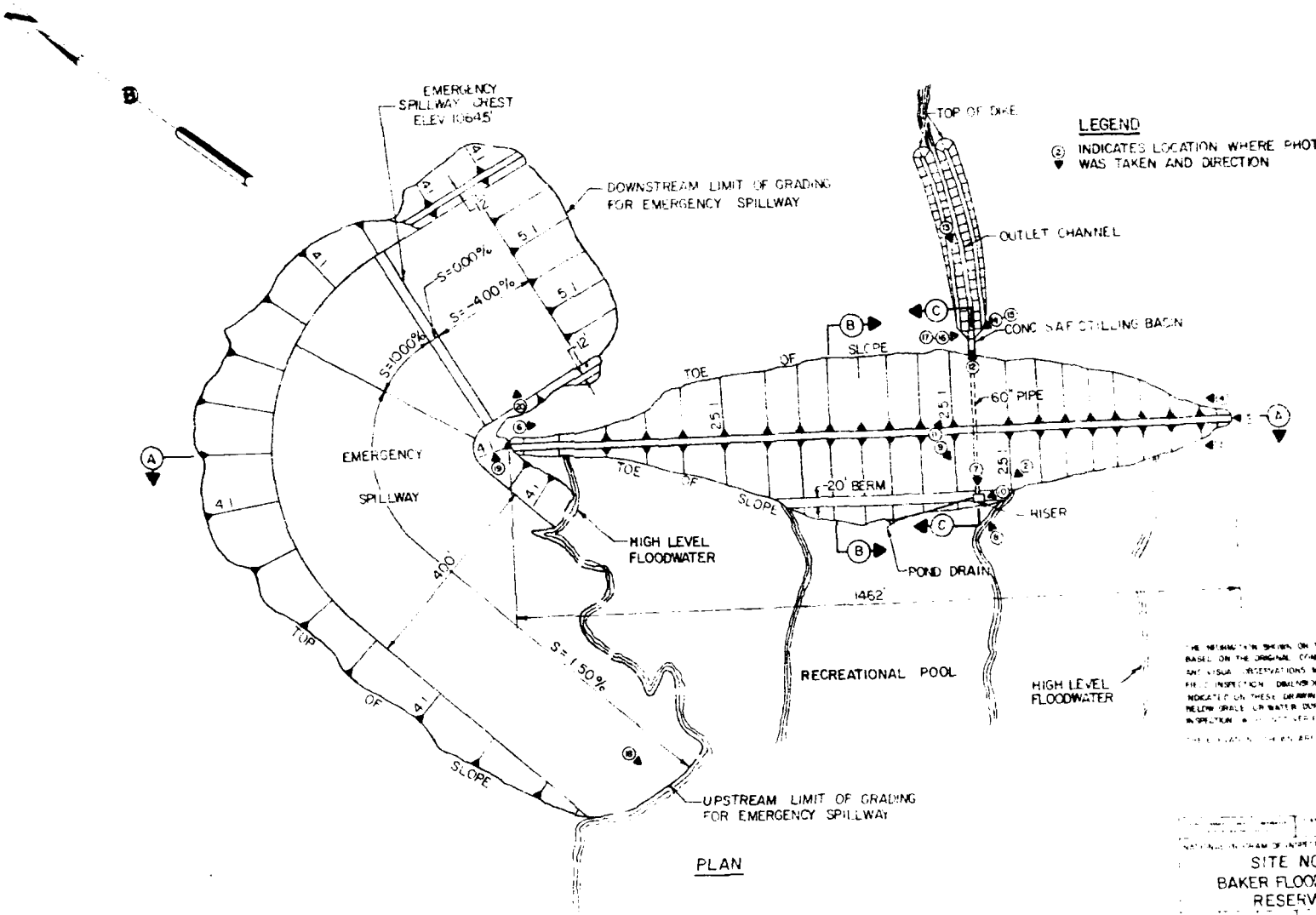
9 CHANNEL

Stream obstructions.	1
Debris in stream.	1
Sediment bars controlled.	1
Plunge pool stability.	1
Fish habitat appurtenances	___

Riprap -- Report under "Riprap" (item 4)

COMMENTS_____





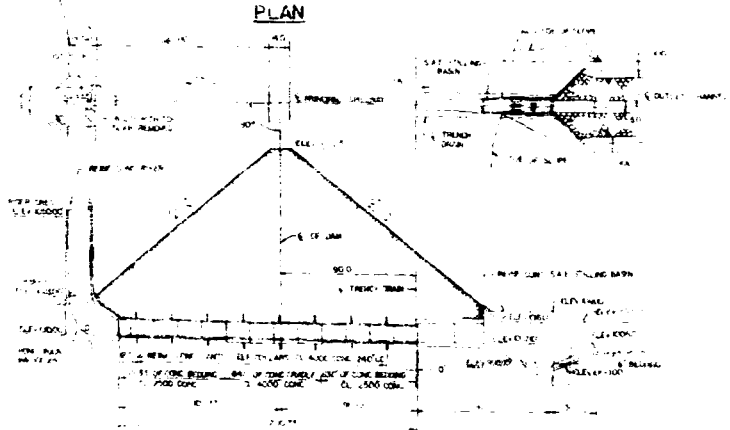
THE INFORMATION SHOWN ON THESE DRAWINGS IS BASED ON THE ORIGINAL CONSTRUCTION PLANS AND VISUAL OBSERVATIONS MADE DURING THE FIELD INSPECTION. DRAWINGS OR MATERIALS INDICATED ON THESE DRAWINGS WHICH WERE BELOW GRADE OR WATER DURING THE TIME OF INSPECTION [illegible]

SITE NO. 8
BAKER FLOODWATER RESERVOIR

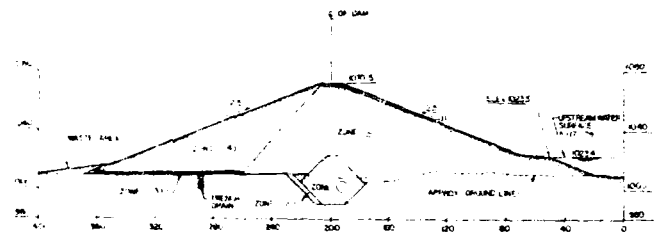
Figure 1 of 2

SECTION A-A

PLAN



SECTION C-C



SECTION B-B

EARTH FILL REQUIREMENTS

ZONE	MATERIAL	REQUIRED WATER CONTENT	COMPACTION SPECIFICATION
3	[illegible] SAND	[illegible] OPTIMUM	100% MAXIMUM DENSITY BY ASTM D1557 METHOD A
4	SAND AND SILTY SAND	[illegible] OPTIMUM	95% MAXIMUM DENSITY BY ASTM D1557 METHOD A
5	[illegible]	[illegible] FOR MATERIAL [illegible]	[illegible]
6	[illegible] ZONE 2 FILLED WITH MATERIAL [illegible]	[illegible] FOR MATERIAL [illegible]	[illegible]

1. THE INFORMATION SHOWN ON THESE DRAWINGS IS BASED ON THE ORIGINAL CONSTRUCTION PLANS AND VISUAL OBSERVATIONS MADE DURING THE FIELD INSPECTION. DIMENSIONS OR MATERIALS INDICATED ON THESE DRAWINGS WHICH WERE BELOW GRADE OR WATER DURING THE TIME OF INSPECTION WERE NOT VERIFIED.
2. THE ELEVATIONS SHOWN ARE USGS MSL DATUM.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

SITE NO 8
BAKER FLOODWATER
RESERVOIR

Figure 2 of 2

APPENDIX C

PHOTOGRAPHS

FOR LOCATION OF PHOTOS, SEE FIGURE 1
LOCATED IN APPENDIX B

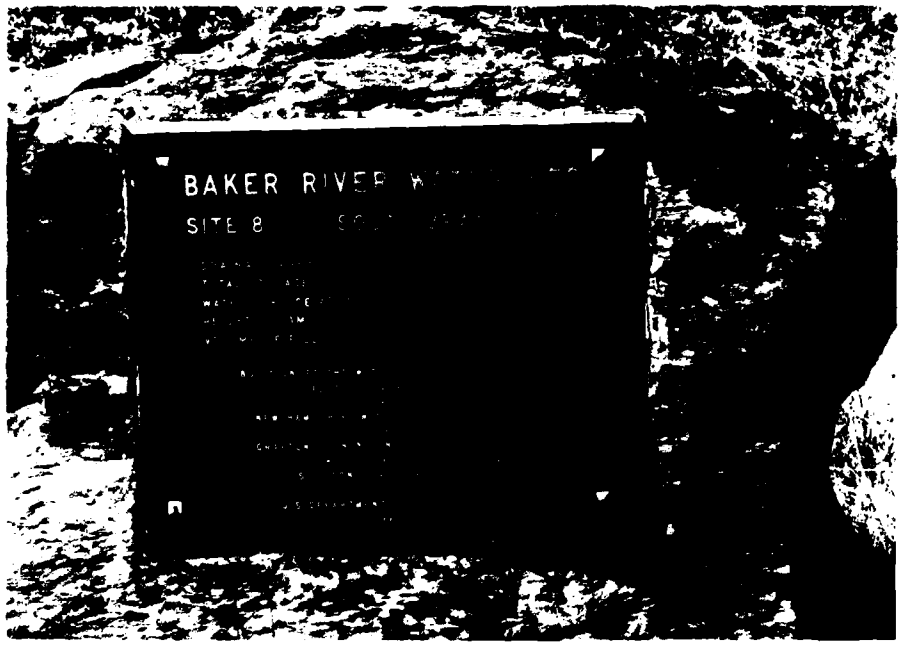


PHOTO NO. 1 - Information monument.

PHOTO NO. 2 - View of principal spillway, riser and portion of reservoir.

PHOTO NO. 3 - View of upstream face of dam from right abutment.

PHOTO NO. 4 - View of downstream slope from right abutment.

PHOTO NO. 5 - View of dam crest from right abutment.

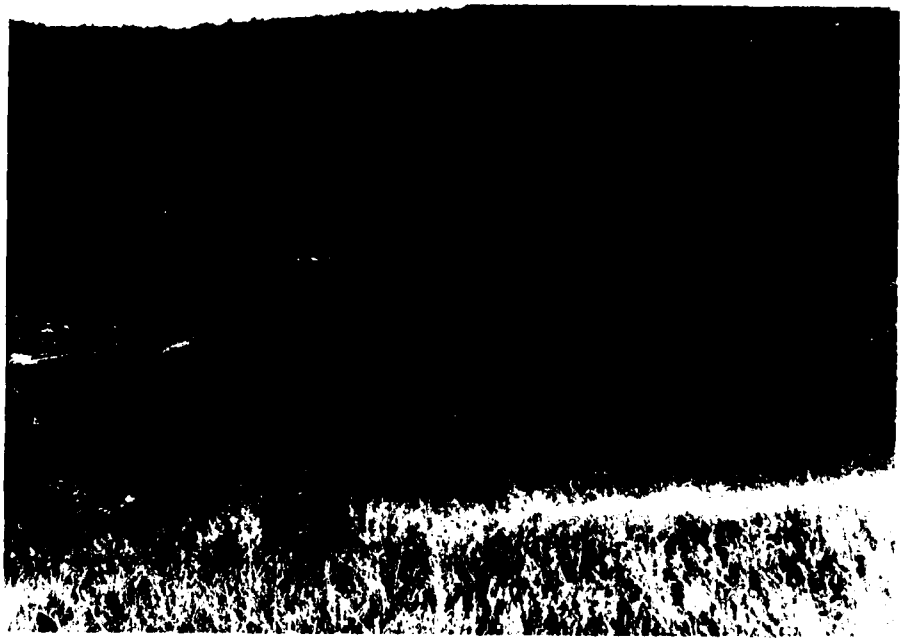


PHOTO NO. 6 - View of downstream slope of dam from left abutment.

PHOTO NO. 7 - View of riser and covered top high stage inlet from dam.

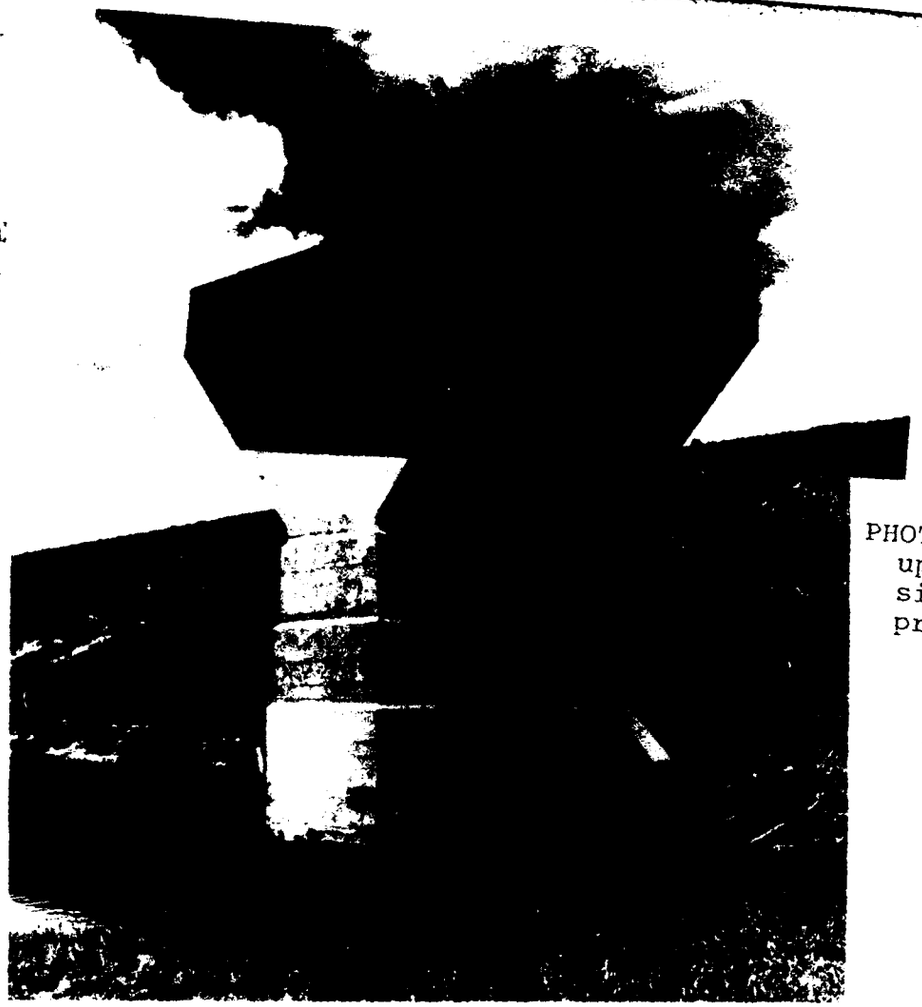


PHOTO NO. 8 - View of upstream and right side of riser, and principal spillway.

PHOTO NO. 9 - View of downstream and left side of principal spillway from crest of dam.

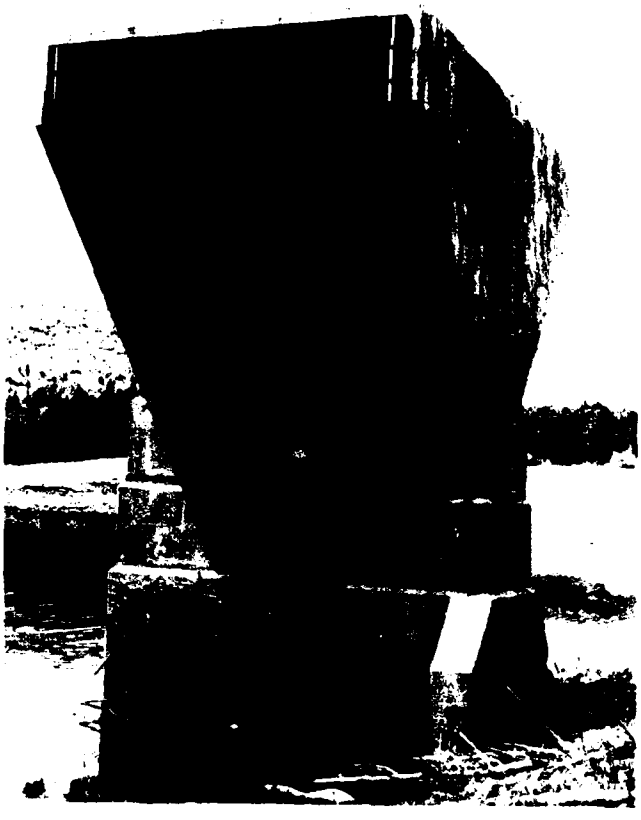


PHOTO NO. 10 - View of high stage and low stage trash racks on right side of principal spillway.

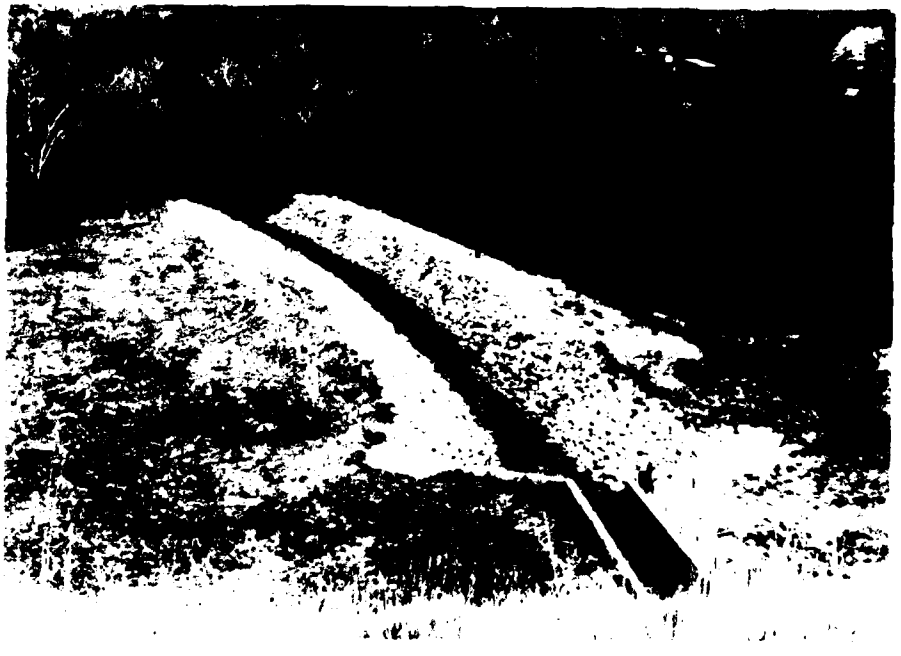


PHOTO NO. 11 - View of outlet works and downstream channel from dam.

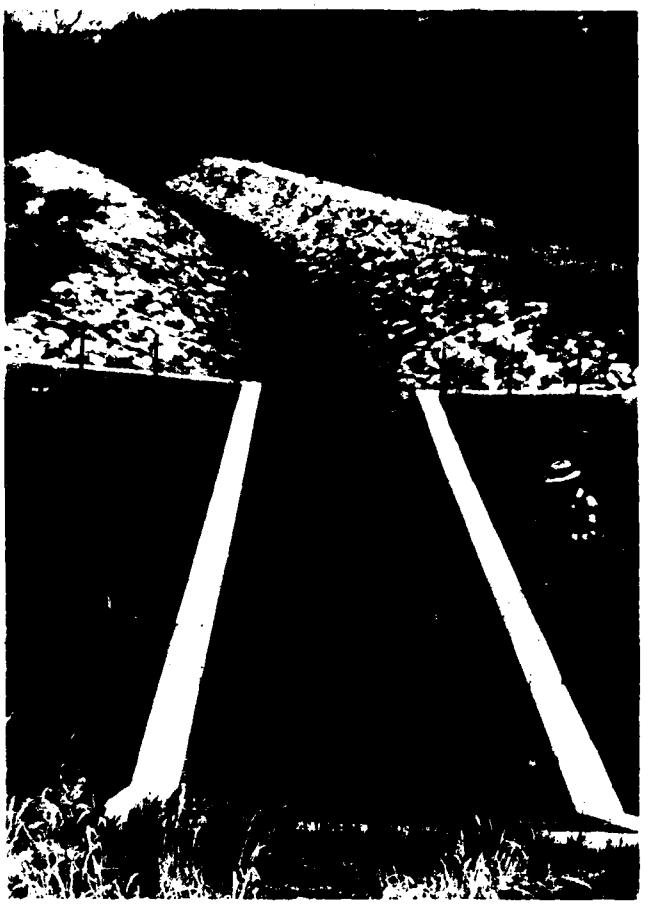


PHOTO NO. 12 - View of a portion of SAF stilling basin and outlet channel.

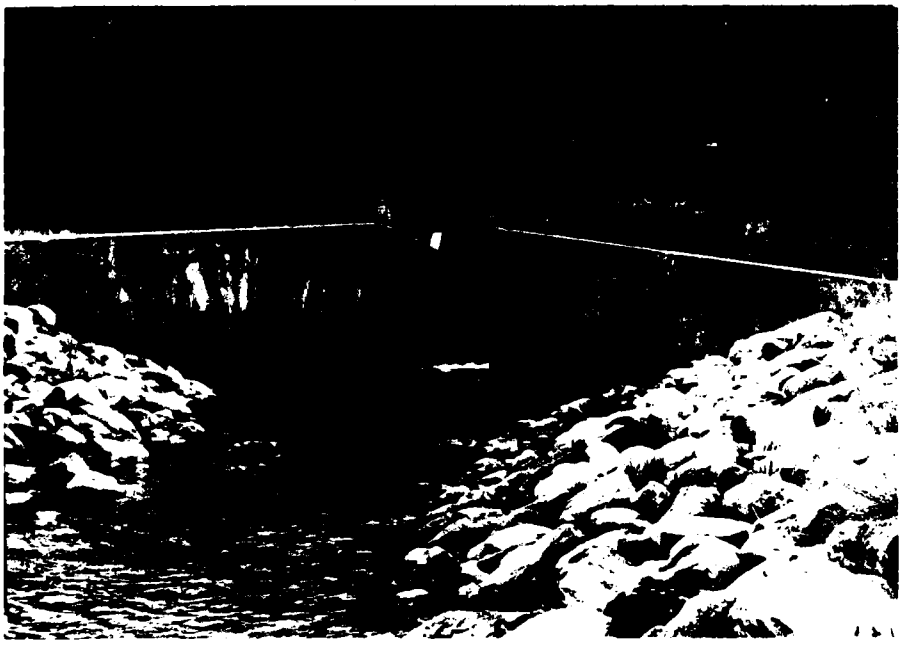


PHOTO NO. 13 - View of outlet works.

PHOTO NO. 14 - View of separation between right training wall and wingwall of outlet works.

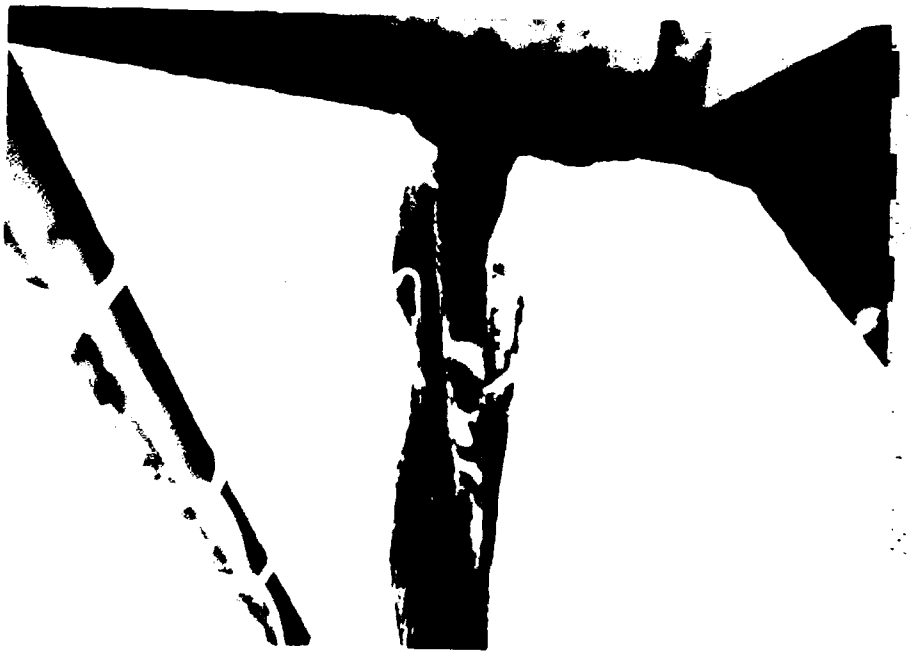


PHOTO NO. 15 - Close-up view of Photo No. 14.

PHOTO NO. 16 - View of separation between left training wall and wingwall of outlet works.

PHOTO NO. 17 - Close-up view of Photo No. 16.

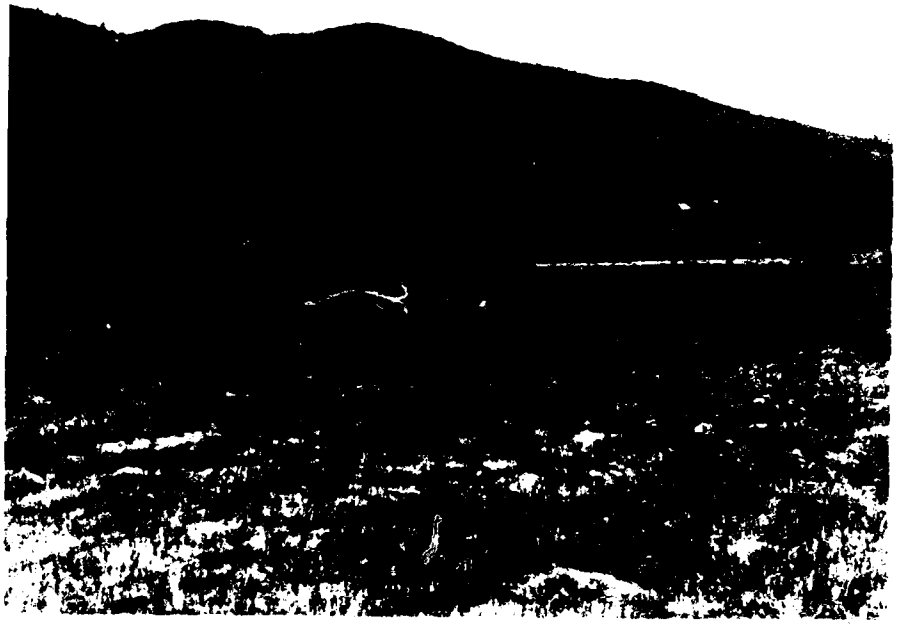


PHOTO NO. 18 - Entrance of emergency spillway from mid-channel of emergency spillway.

PHOTO NO. 19 - View of crest of emergency spillway from left abutment.

PHOTO NO. 20 - View of discharge area of emergency spillway from left downstream slope of dam.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 6/1/79	Job No 5965-11-21
	Checked by VHG	Date 6/4/79	Sheet No 1
For Baker Dam Site # 8			

HYDRAULICS & HYDROLOGY

Baker River Dam Site #8 Located on South Branch Baker River in the Town of Dorchester, N.H. in the Merrimack River Basin.

Classification: Size : intermediate
Hazard : High

Basic Data: D.A. 16.04 sq mi
upstream basin slope 220 ft/mi
Max elev - 2564 ft

Reservoir: Recreation Pool @ 1025 ft
Storage 145 acre-ft
Emergency Spillway @ 1064.5 ft
Storage 3760 acre ft
Top of Dam @ 1070.5 ft
Storage 4714 acre ft

Dam: Earth
Length 1462 ft.
Height 62 ft.

Spillway:
Rider: Crest 1050.0 ft
length & width : 30 ft
Emergency: crest 1064.5 ft
width 400 ft

See Appendix "B" for plan of dam

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by R.Y.	Date 6/1/79	Job No 5965-11-01
	Checked by L.D.	Date 6/14/79	Sheet No 2
For Baker-8			

Step 1 Calculation of Test Flood Inflow

Classification : Size · Intermediate
Hazard : High

Hydrologic Evaluation Guideline Recommends

PMF for Test Flood Inflow

Use Mountainous curve at average stream slope is 200 feet per mile.

Test Flood = 1810 csm × 16.04 sq mi = 29,000 cfs

at 19 inch runoff

Note: This is a flood control reservoir the portion of storage above the recreational pool can be used to store a portion of the PMF.

173 acre-ft at normal - recreation pool level
3760 acre-ft at crest of emergency spillway

3617 acre-ft available to store PMF

Volume of PMF = $\frac{19''}{12 \text{ in/ft}} \times 640 \frac{\text{acre}}{\text{mi}^2} \times 16.04 \text{ sq mi}$

= 16,254 acre-ft

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 6/1/79	Job No 5765-11-01
	Checked by [illegible]	Date 6/17	Sheet No 3
For Baker # 8			

Step 2 Calculation of Test Flood Surcharge

Stage - Discharge Curve

Elev.	Stage above Emer spillway	A. Riser Pipe Flow	B. Emergency Spillway	C. Crest of Dam	Total
1064.5	0 ft	628 cfs	0	—	628 cfs
1066.	1.5	637	1530 cfs	-	2167
1068	3.5	648	6700	-	7348
1070	5.5	659	14,400	-	15,059
1070.5	6.0	661	16,650	-	17,311
1071.5	7.0	666	21,000	4518 cfs	26,184

A. From Baker River #8 Design Book, SCS Durham, N.H.
See calcs. in appendix

B Same as A

C. Computed as flow over broadcrested weir

$Q = CLH^{3/2}$

$C = 3.09$

$L = 1462$

$Q = 4518\, H^{3/2}$

See figure 2 for Plot

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 6/1/79	Job No 5965-11-01
	Checked by [illegible]	Date 6/8/79	Sheet No 4
For Baker # 8			

Step 3 Estimate of Surcharge - Storage Effect

Q_{P_1} = 29,000 cfs Runoff = 19.0"

$$Q_{P_2} = Q_{P_1} \times \left(1 - \frac{Stor}{19}\right)$$

Stor in acre-ft used from figure 1 minus 143 acre ft

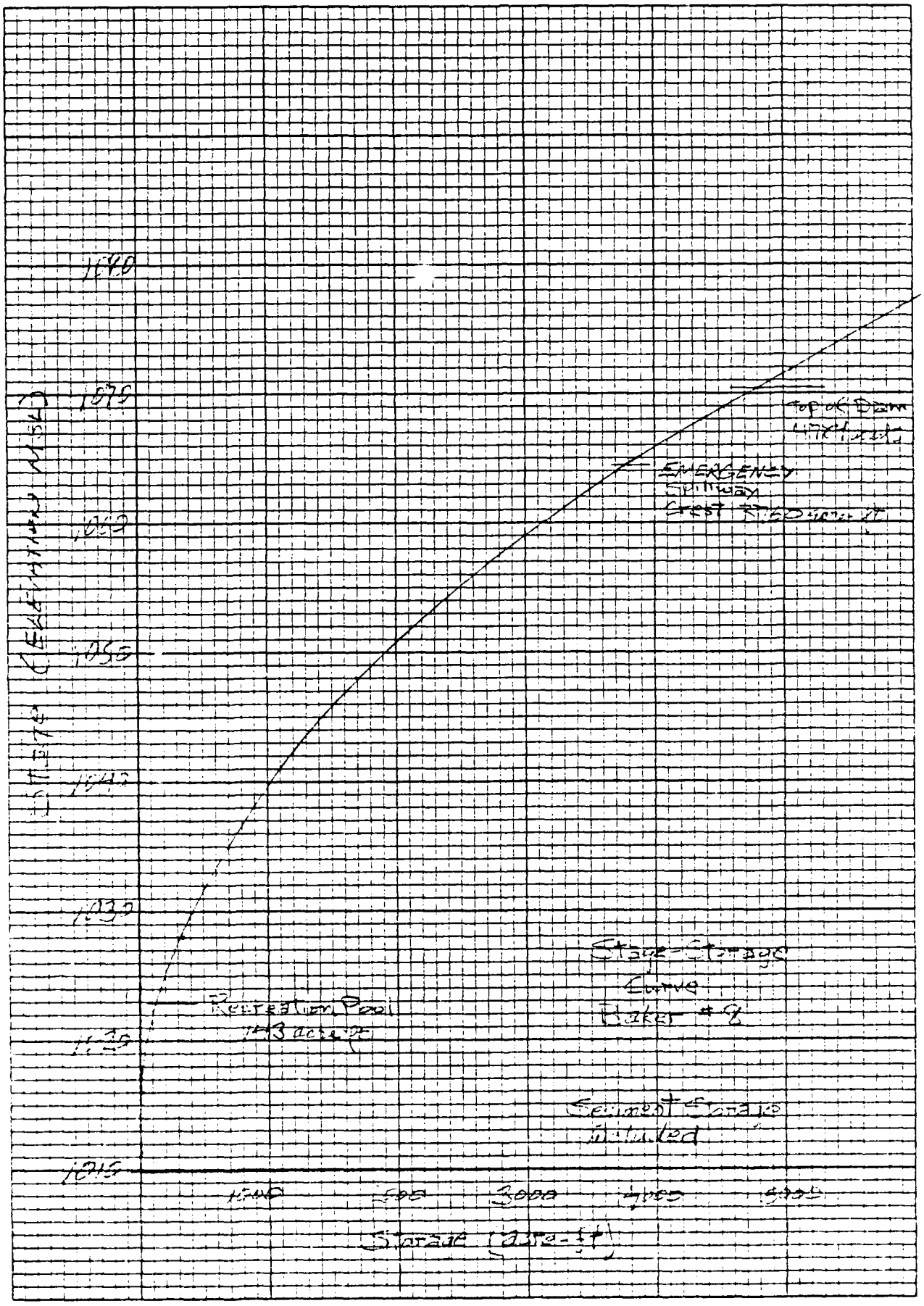
$$Stor(in) = \frac{Stor(acre\text{-}ft) \times 12\ in/ft}{16.04\ sq\ mi \times 640\ acre/mi^2} = Stor\,(1.17 \times 10^{-3})$$

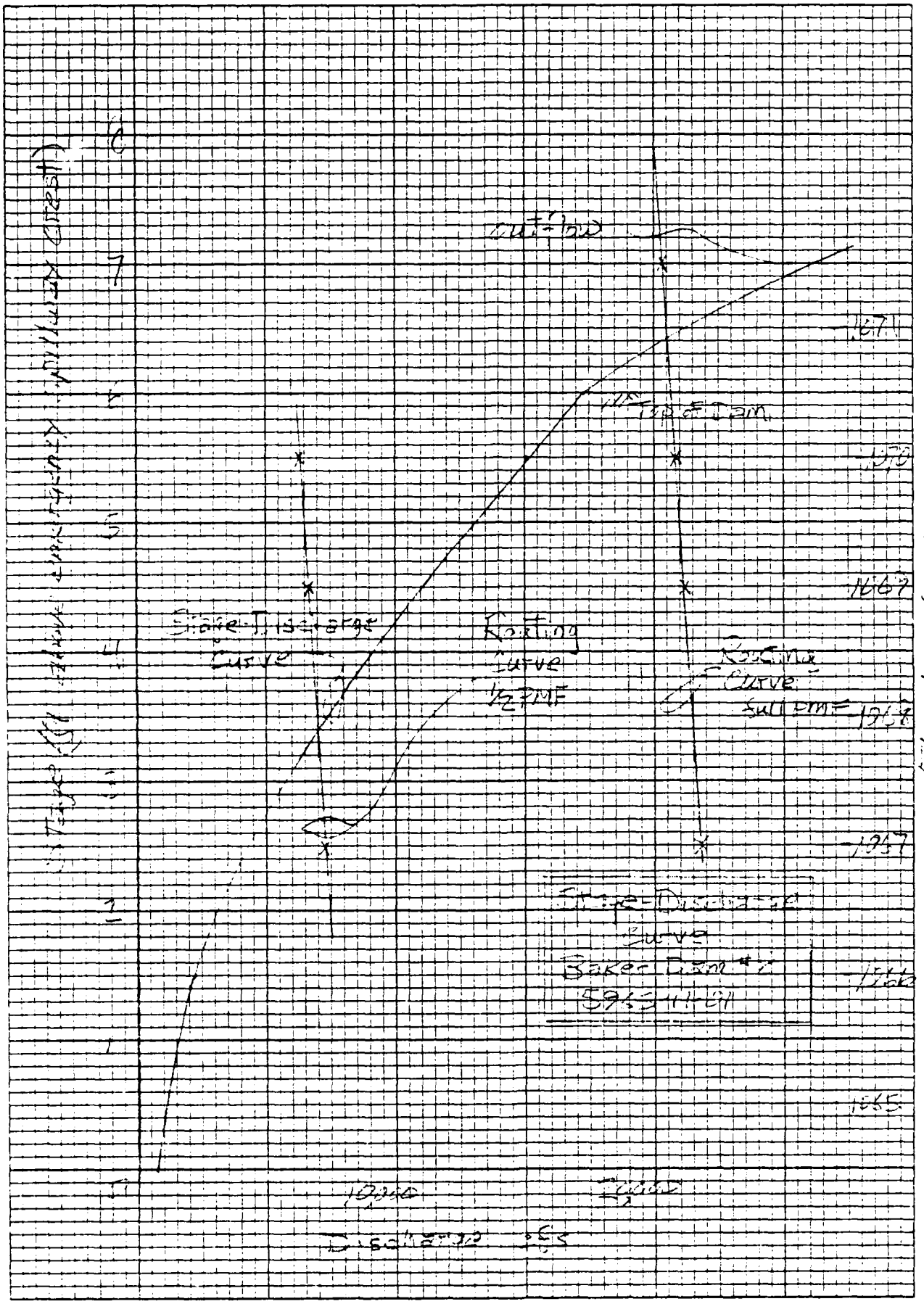
Elev	Stor (acre-ft)	Stor (in)	Q_{P_2}
1067	4057	4.75	21,750 cfs
1069	4397	5.14	21,150
1070	4577	5.36	20,830
1071.5	4857	5.68	20,330

See figure 2 for Plot and final outflow

From Figure 2 Outflow 20,500 cfs
Stage = 1070.9 ft
or 0.4 ft above
crest of dam

Test Flood - Spillway Capacity 19360 cfs
At top of dam 84% cap


1690
1670
1650
1630
1610
1590
ELEVATION (FEET)
Top of Dam
Emergency Spillway Crest
Retention Pool
Stage-Storage Curve
Baker # 6
Sediment Storage Included
3000
4000
5000
Storage (acre-ft)


Elevation ft. MSL
Figure 2

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 5/31/79	Job No 5965-11-01
	Checked by [illegible]	Date 6/4/79	Sheet No 5
For Baker #8			

Estimate of Downstream Damage

Step 1 Reservoir Storage

Top of Dam @ Elev. 1070.5
Storage 4784 acre-ft

Step 2 Breach Outflow

$Q_{Breach} = 8/27 \sqrt{g}\, Y_o^{3/2}\, W_o$

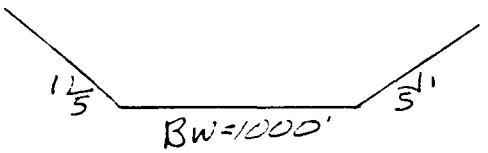
W_o = 40% of length of dam

Y_o = height - stream bed to max. pool elev. 59 ft

$Q_{Breach} = 8/27 \sqrt{g}\,(.40)(1462)(59)^{3/2} =$ 445,200 cfs
Spillway discharge 16,500
$Q_{P_1} =$ 461,800 cfs

Step 3 Stage - Discharge

Valley Section



Reach 1 = 850 cfs
$S_{channel}$ = .0070
n = .05

Stage - Discharge

10 ft	104,100 cfs
15	195,600 cfs
20	311,700
25	456,500

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 5/31/79	Job No 5955-11-01
	Checked by	Date 6/4/79	Sheet No 6
For Baker #8			

Step 4 Reach Outflow $S = 4784$ acre ft

$Q_{P_1} = 461{,}800$ cfs

Reach 1A 3550' of 9500 ft.

Stage 25.1 ft area = 28,250 ft²

$V_1 = \frac{3550' \times 28250}{43560} = 2302$ acre ft $< \frac{4784}{2}$

$Q_{P_{2T}} = 461{,}800\left(1 - \frac{2302}{4784}\right) = 239{,}600$ cfs

$Stage_2 = 17.1$ ft $\quad area_2 = 18{,}562$ ft²

$V_2 = \frac{3550 \times 18{,}562}{43560} = 1513$ acre ft

$V_{ave} = 1907$ acre ft

$Q_{P_2} = 461{,}800\left(1 - \frac{1907}{4784}\right) = 277{,}700$ cfs

Reach 1B from 4750' of 9500'

Stage = 18.7 ft $\quad area_2 = 20{,}448$ ft²

$V_2 = \frac{4950 \text{ ft} \times 20448}{43560} = 2323$ acre ft $< \frac{4784}{2}$

$Q_{P_2} = 277{,}700$ cfs $\left(1 - \frac{2323}{4784}\right) = 143{,}500$ cfs

$Stage_2 = 12.7$ ft $\quad area = 13506$ ft²

$V_2 = \frac{4950 \times 13506}{43560} = 1535$ acre ft

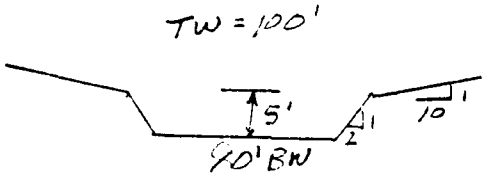
$V_{ave} = 1929$ acre ft

$Q_{P_2} = 277{,}700\left(1 - \frac{1929}{4784}\right) = 165{,}700$ cfs

Stage = 13.8 ft

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by	Date 5/31/79	Job No 5965-11-01
	Checked by	Date 6/4/79	Sheet No 1
For Reber # 8			

Step 3 Reach 2 Length 11,500 feet



$S_{channel} = 0.028\%$

$n_{ch} = .03$

$n_{OVB} = .08$

Stage - Discharge

10 ft	36,600 cfs
15	80,300
18	116,000
20	144,000
22	175,000

Step 4

$Q_{P_1} = 165,700$ cfs

$Stage_1 = 21.3$ ft $area_1 = 4740$ ft²

$V_1 = \frac{11,500 \times 4740}{43560} = 1251$ acre-ft $< \frac{47.4}{2}$

$Q_{P_{2T}} = 165,700 \text{ cfs} \left(1 - \frac{1251}{4744}\right) = 122,370$ cfs

$Stage_2 = 18.5$ ft $area_2 = 3620$ ft²

$V_2 = \frac{11,500 \times 3620}{43560} = 956$ acre-ft

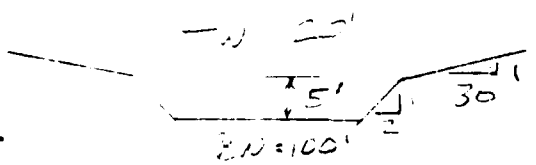
$V_{ave} = 1103$ acre-ft

$Q_{P_2} = 165,700 \text{ cfs} \left(1 - \frac{1103}{4744}\right) = 127,500$ cfs

Stage = 18.5 ft.

HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by RY	Date 5/31/79	Job No 5365-11-01
	Checked by [illegible]	Date 6/1/79	Sheet No 7

Reach 3 Length 9000 ft



$S_{channel} = .009$

$n_{ch} = .03$

$n_{OS} = .08$

Stage Discharge

10 ft	27,400 cfs
15	69,300
18	108,200
20	140,600

$Q_{P_1} = 127,500$ cfs

$Stage_1 = 19.2$ ft $area_1 = 8303$ ft²

$V_1 = \frac{9000 \times 8303}{43560} = 1715$ acre-ft $< \frac{4274}{2}$

$Q_{P_{2_T}} = 127500 \text{ cfs}\left(1 - \frac{1715}{4274}\right) = 51,300$ cfs

$Stage_2 = 16.1$ ft $area_2 = 5578$ ft²

$V_2 = \frac{9000 \times 5578}{43560} = 1152$ acre-ft

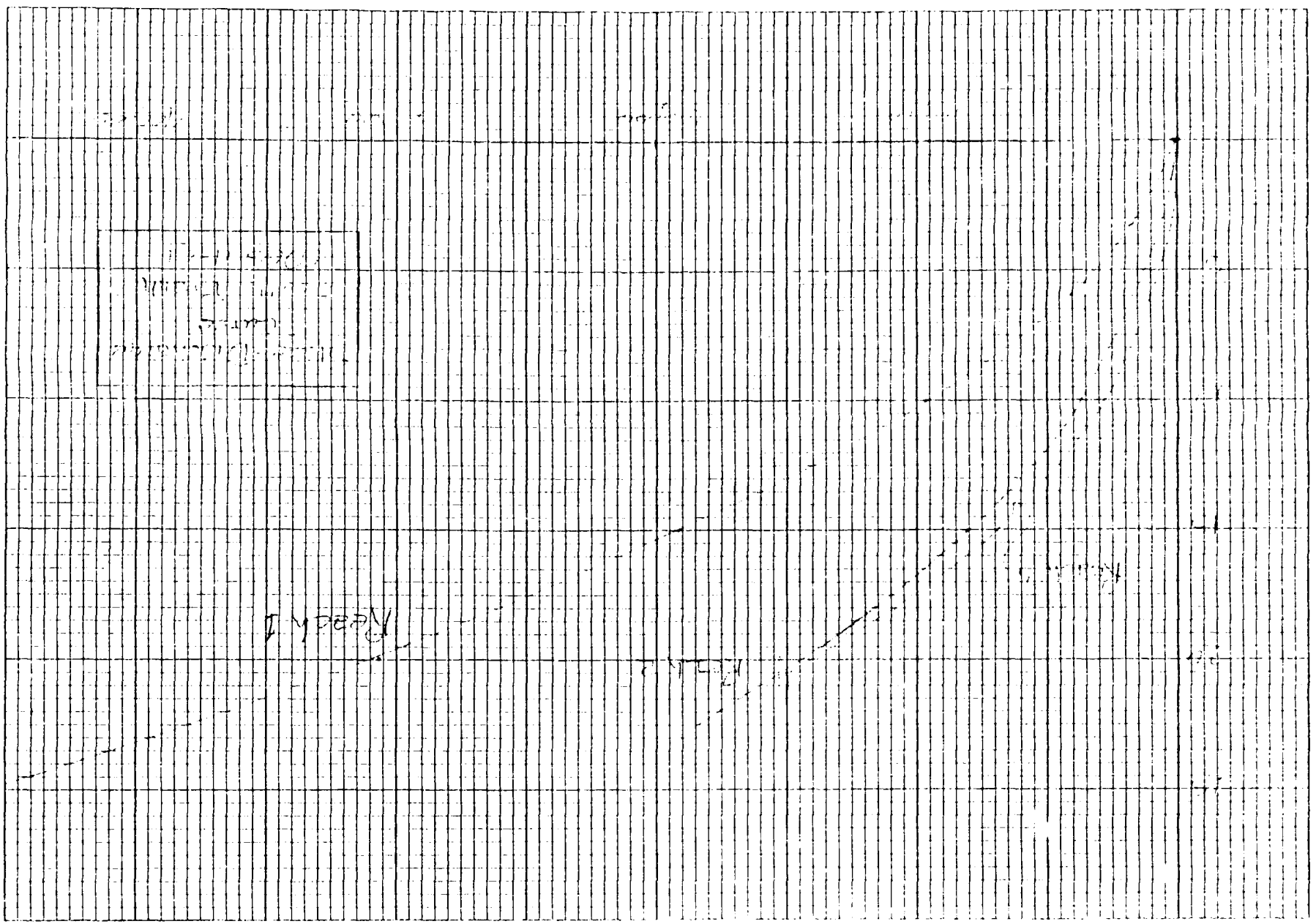
$V_{ave} = 1434$ acre-ft

$Q_{P_2} = 127,500\left(1 - \frac{1434}{4784}\right) = 89,300$ cfs

Stage 16.7 ft.

Summary

At dam	25.1 ft
1.5 mi d.s.	21.3 ft
3.7 mi d.s.	18.8 ft



HNTB HOWARD NEEDLES TAMMEN & BERGENDOFF	Made by	Date	Job No
	Checked by	Date	Sheet No 9
For Basin #1			

½ PMF Surcharge Storage Effect

PMF = 29000 cfs ½ PMF = 14,500 cfs

Volume of ½ PMF = 8127 acre-ft

Available Storage = Figure 2 - 143 acre-ft

See pg. 4 for calculation of Stor(in)

R.O. = 9.5 inches

$$Q_{P2} = Q_{P1} \times \left(1 - \frac{Stor}{9.5}\right)$$

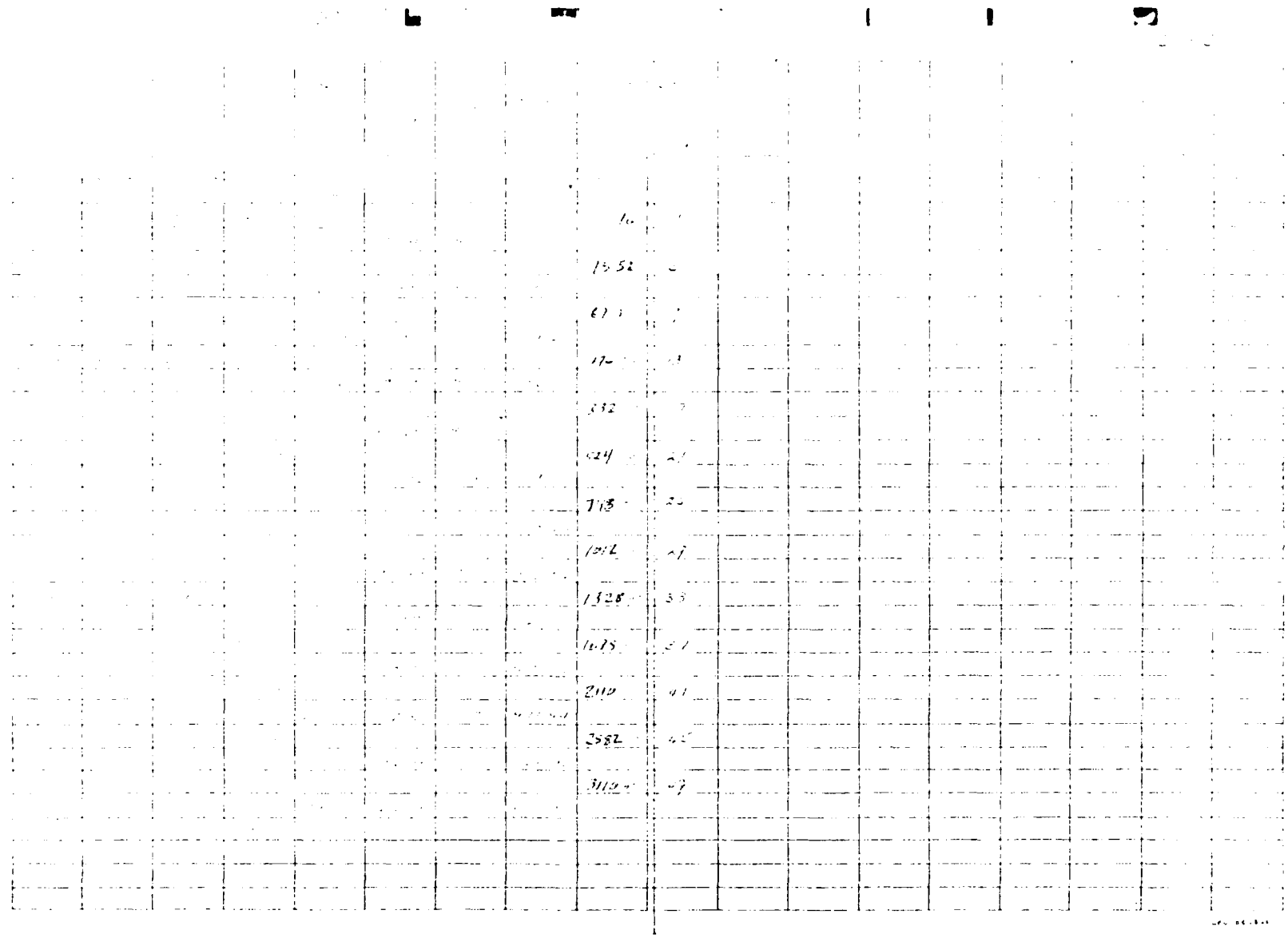
Elev	Stor(in)	Q_{P2}
1067	4.75	7250 cfs
1068	5.14	6650
1070	5.36	6320
1071.5	5.68	5830

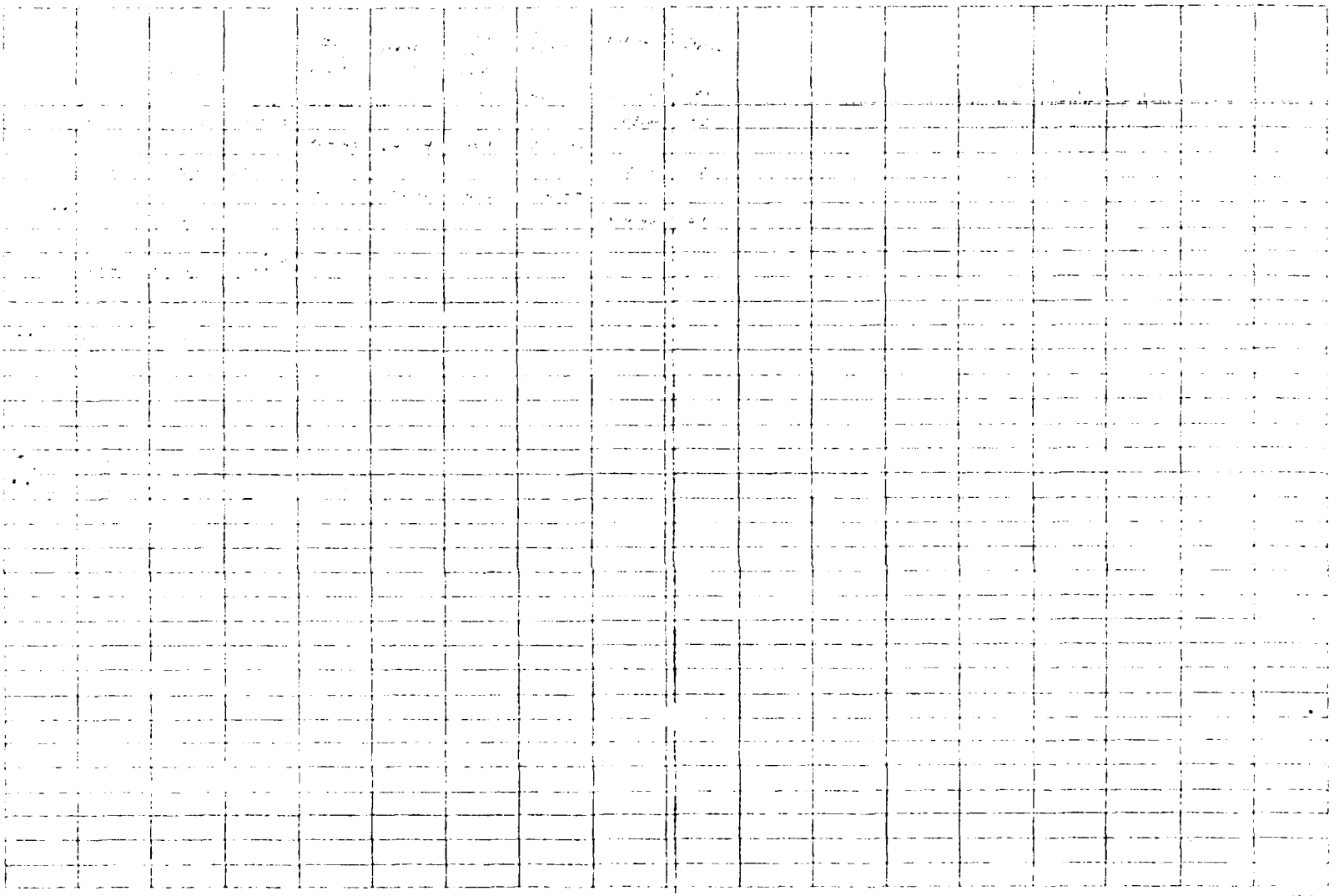
See figure 2 for Plot and final ½ PMF Outflow

From Figure 2 Outflow = 7,000 cfs

Stage = 1067.7 ft

2.6 ft below Top of Dam





COMPUTATION SHEET
SCS-522 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE _____ PROJECT _____

BY _____ DATE _____ CHECKED BY _____ DATE _____ JOB NO _____

SUBJECT _____ SHEET 9 OF _____

FLOW CONSTANT -

$Q = C I \sqrt{2g}\, H^{3/2}$

$H = \frac{Q}{C \sqrt{2g}}$

Q = 237 CFS
C = 0.67
H = 1650.0 - 1623.0 = 27.0 FT

ASSUME 26.3 FT TO ℄ OF CREST

$H = \frac{237}{0.67 \times 5.33 \times (26.3)^{3/2}} = \frac{237}{37.60} = 6.30$ FT

USE Z = 3.0 X H' OPTIMUM

H = 2 × 3.0 × H = 6.30 FT OK

FOR INTERMEDIATE POINTS

$Q = (0.67)(5.33)(3.0)(H)^{3/2}$

$Q = 10.70\, H^{3/2}$

ELEV	HEAD	$H^{3/2}$	Q
1623.0			
1623.7	0	0	0
1624.0	0.7	0.83	8.9
1625.0	1	1.00	10.7
1627.0	4	8.00	85.6
1629.0	6	14.70	157.3
1631.0	8	22.60	241.8
1633.0	10	31.60	338.1
1636.0	13	46.90	501.8	237

SCS-344 5-57
Tabular Computations

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SITE 6 — N.Y. 644

ROUTE 44/55 — SHEET 11

AVERAGE END STAGE RELEASE RATE

$\frac{1.0 - 1.71}{1.910}$ = 0.910 CC 01.3 % DRAWDOWN

(1) STAGE	(2) STORAGE AC-FT	(3) ΔS AC-FT	(4) ΔS (12.10 x (3)) CFS-HRS	(5) AVG C CFS	(6) TIME CFS-HRS / CFS
1050	1913				
		216	2661.6	233	11.16
1048	1697				
		567	7440.7	219	33.68
1044	1325				
		315	3611.5	118	10.22
1041	1013				
		265	3300.5	115	18.32
1036	748				
		304	3710.8	149	13.10
1032	444				
		131	2311.1	117	13.75
1028	313				
		141	1796.1	87	10.61
1024.4	172				
					126.56

(1.910 + 1.71) 12.10 = 1.81 (1.81) = 3.62 CFS-HRS

AVG C = 3.62 / 126.56 = 1.64 CFS

AVG C FOR = 1.64 / 1.81 CC = 0.70

ADJUSTED TO 2" RAINFALL

(1.81 x 2") / 1.71" = 2.11" RAINFALL

1.64 x 2.11 = 3.46 CFS

AVG. RELEASE RATE = 3.46 / 2.11 = 1.64 CFS

AVG. RELEASE = 3.46 CFS / 1.81 AC-FT = 1.91 CFS/AC-FT

COMPUTATION SHEET
SCS-522 REV 3-58

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE N.H. PROJECT [illegible] S. STRAFFORD COUNTY MUNICIPAL

BY [illegible] DATE 1-3-84 CHECKED BY TJD DATE 1/85 JOB NO V-H-654

SUBJECT SERVICE SPILLWAY ELEVATIONS SHEET 13 OF

LOW STAGE SERVICE

VOL OF SEDIMENT CLAY = 1.2 x AC-FT - FROM VA CURVE

VOL OF SUSPENDED SED. = 199 x 0.72 = 143.3 USE 143 AC-FT

VOL OF ANNUAL BASE FLOW = 199 x 0.28 = 55.7 USE 56 AC-FT

FROM STAGE STORAGE CURVE

143 AC-FT OF STORAGE AT ELEV 1022.0

HIGH STAGE SERVICE

EMERG. SPILLWAY ELEV FROM HYDRATION

VOL OF STORAGE USED

$\frac{\text{EMERG SPILLWAY ELEV} - \text{BOTTOM ELEV}}{\text{TOTAL DRAINAGE AREA}} \times \text{DRAINAGE AREA} = 1710.0$ AC-FT

USE 1701 AC-FT

TOTAL STORAGE USED TO HIGH STAGE

SUSPENDED SED.	143 AC-FT
DISSOLVED SED.	56 AC-FT
FLOOD STORAGE	1701 AC-FT
TOTAL	1900 AC-FT

HIGH STAGE STORAGE CURVE

THE ELEVATION OF 1900 AC-FT. ELEV 1032.0

USE HIGH STAGE SERVICE AT ELEV 1032.0

FLOOD STORAGE FROM ELEV 1022.0 TO 1032.0 AC-FT

COMPUTATION SHEET
SCS-522 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE N.H. PROJECT SITE D - STACK RIVER WATERSHED
BY [illegible] DATE 11-3-64 CHECKED BY TJH DATE 11-6-64 SOUND
SUBJECT LOW STAGE ORIFICE - SIZE SHEET 14 OF

TOTAL ECCLUSE RATE = 237 CFS — FROM HOLEFLAN

INVERT ELEV - HIGH STAGE = 1050.0
" " - LOW STAGE = 1023.0
DIFF. IN ELEV = 27.0 FT

FOR ORIFICE FLOW $Q = CA\sqrt{2gh}$
$Q = 237$ CFS
$C = 0.67$ CFS
$\sqrt{2g} = 8.02$
$h = 27.5 - 0.5$ (CENTER OF LOW STAGE ORIFICE)

TRY 2 - 3.02 x 1.42' OPENINGS

$A = 8.56$
$h = 27.00 - 0.71 = 26.29$

$Q = 0.67 \times 8.56 \times 8.02 \times (26.29^{1/2} + 0.13)$
$Q = 46.10\ (h^{1/2} + 0.13) = 236.89$

USE 2 - 3.02' x 1.42' } OPENINGS
3'-0 1/8" x 1'-5" }

OR

1 - 6.04' x 1.42' } OPENING
6'-0 1/2" x 1'-5" }

WEIR FLOW
$Q = CLh^{3/2}$ $C = 3.1$
$L = 2 \times 3.02 + 0.1 = 6.14'$

$Q = 19.2\ h^{3/2}$

COMPUTATION SHEET
SCS 522 REV 5-58

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ____ PROJECT ____
BY ____ DATE ____ CHECKED BY ____ DATE ____
SUBJECT ____

SHEET ____ OF ____

$Q = C_p H^{1/2}$

$C_p = \sqrt{\frac{\quad}{\quad}}$

$C_p = \sqrt{\frac{\quad}{\quad}}$

$C_p = \sqrt{\frac{\quad}{\quad}}$

$C_p = \sqrt{\frac{\quad}{0.406}}$

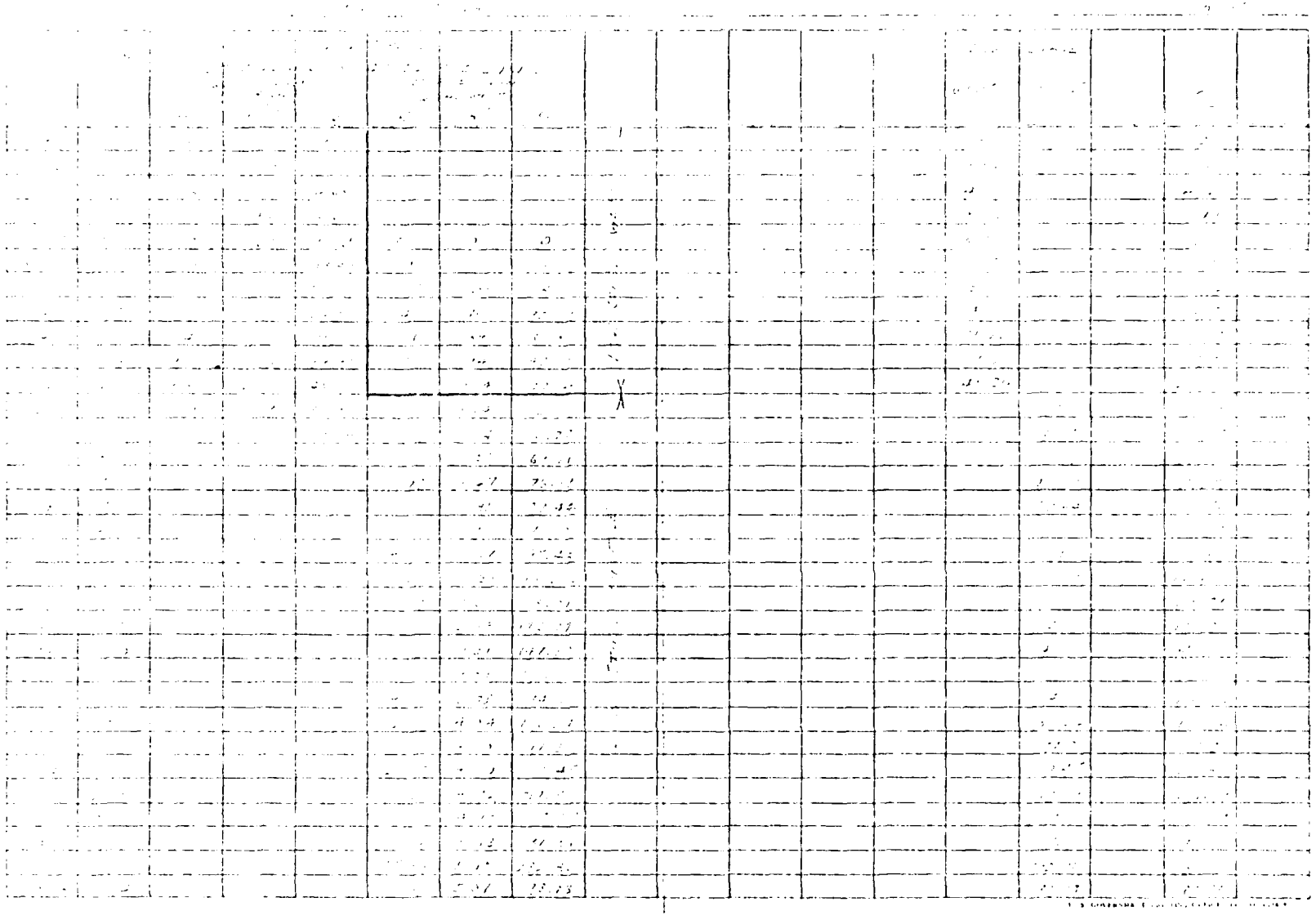
$C_p = \sqrt{7,167.05}$

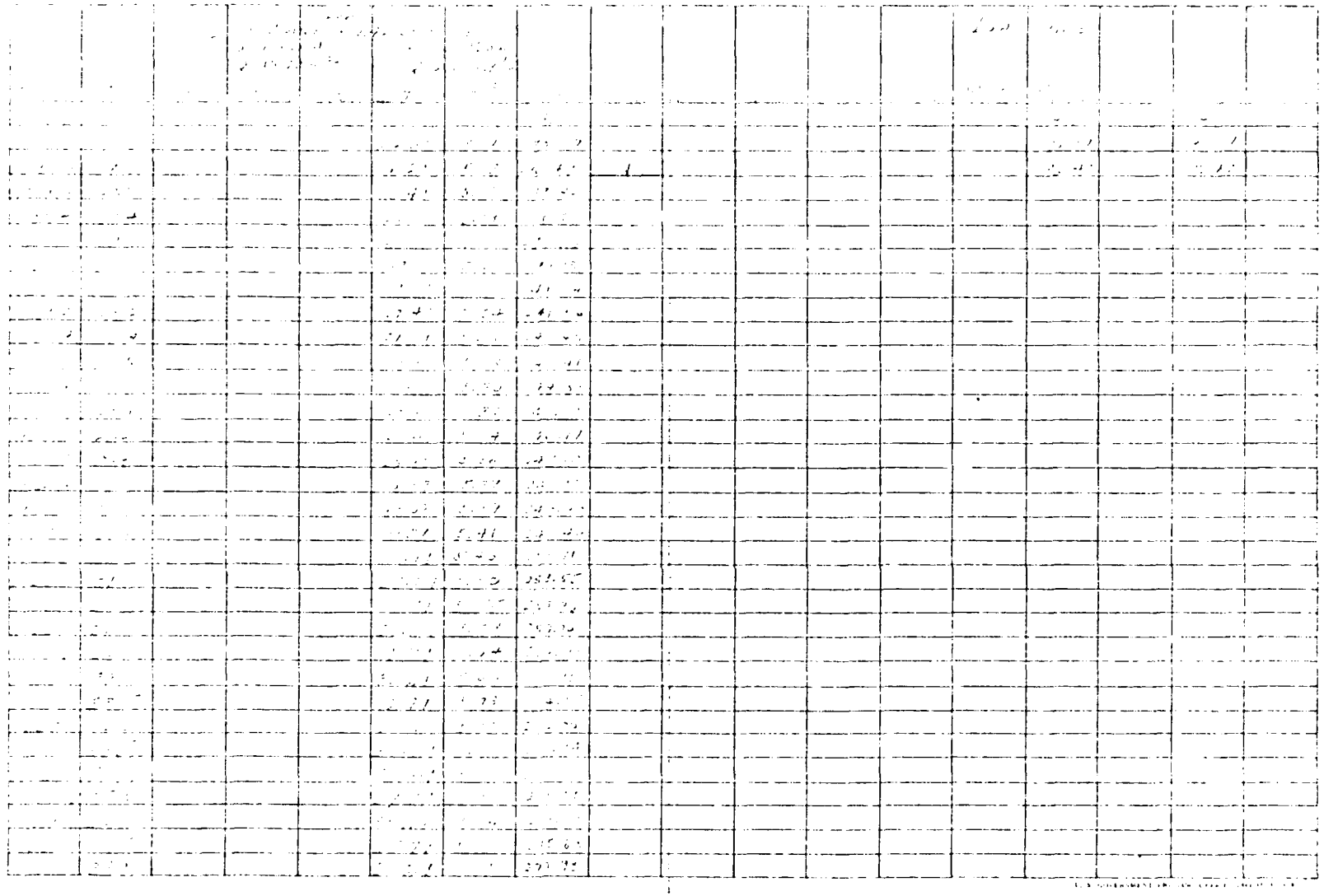
$C_p = 84.66$

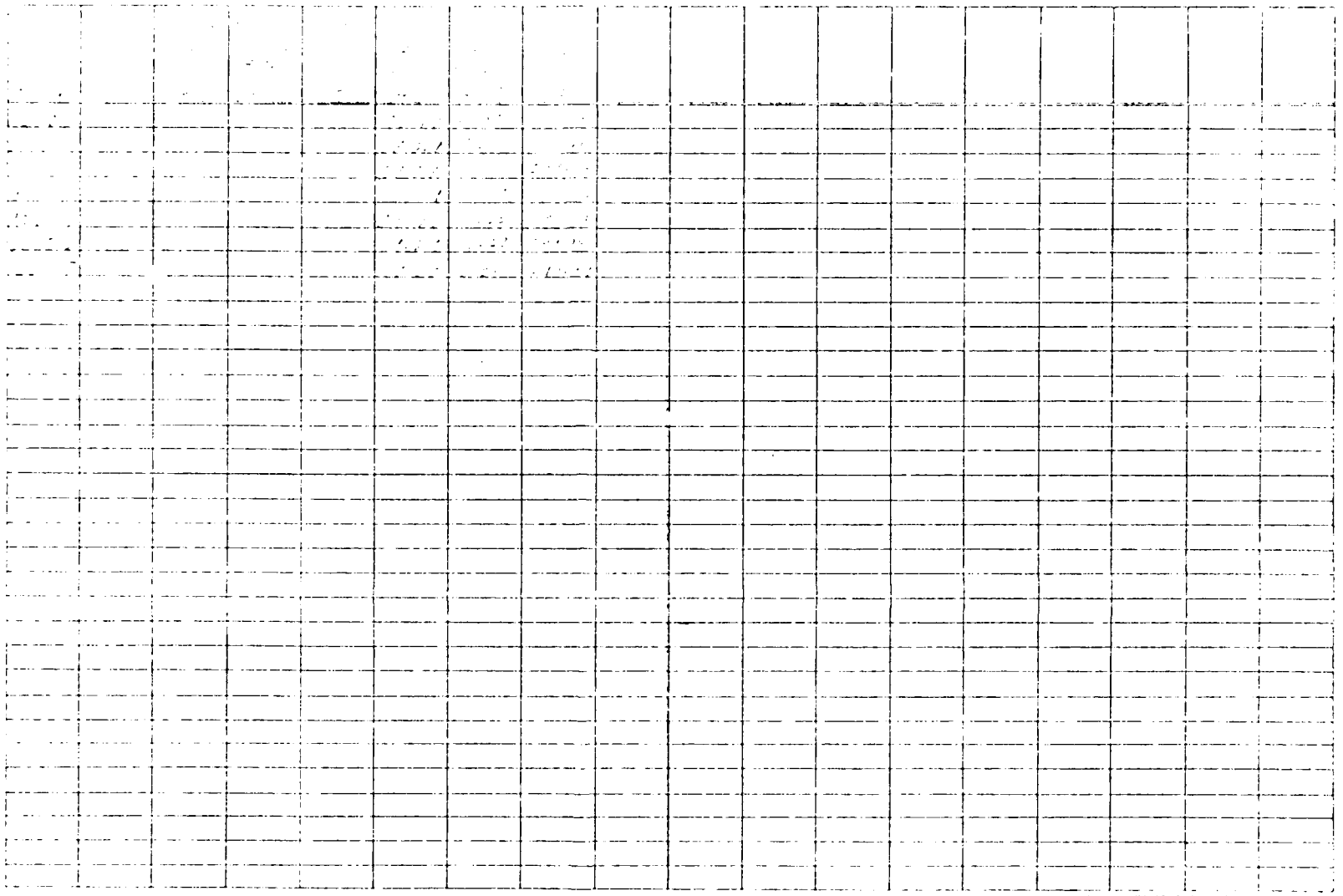
$Q = 84.66 [\quad]^{1/2} = 84.66 (\quad)^{1/2}$

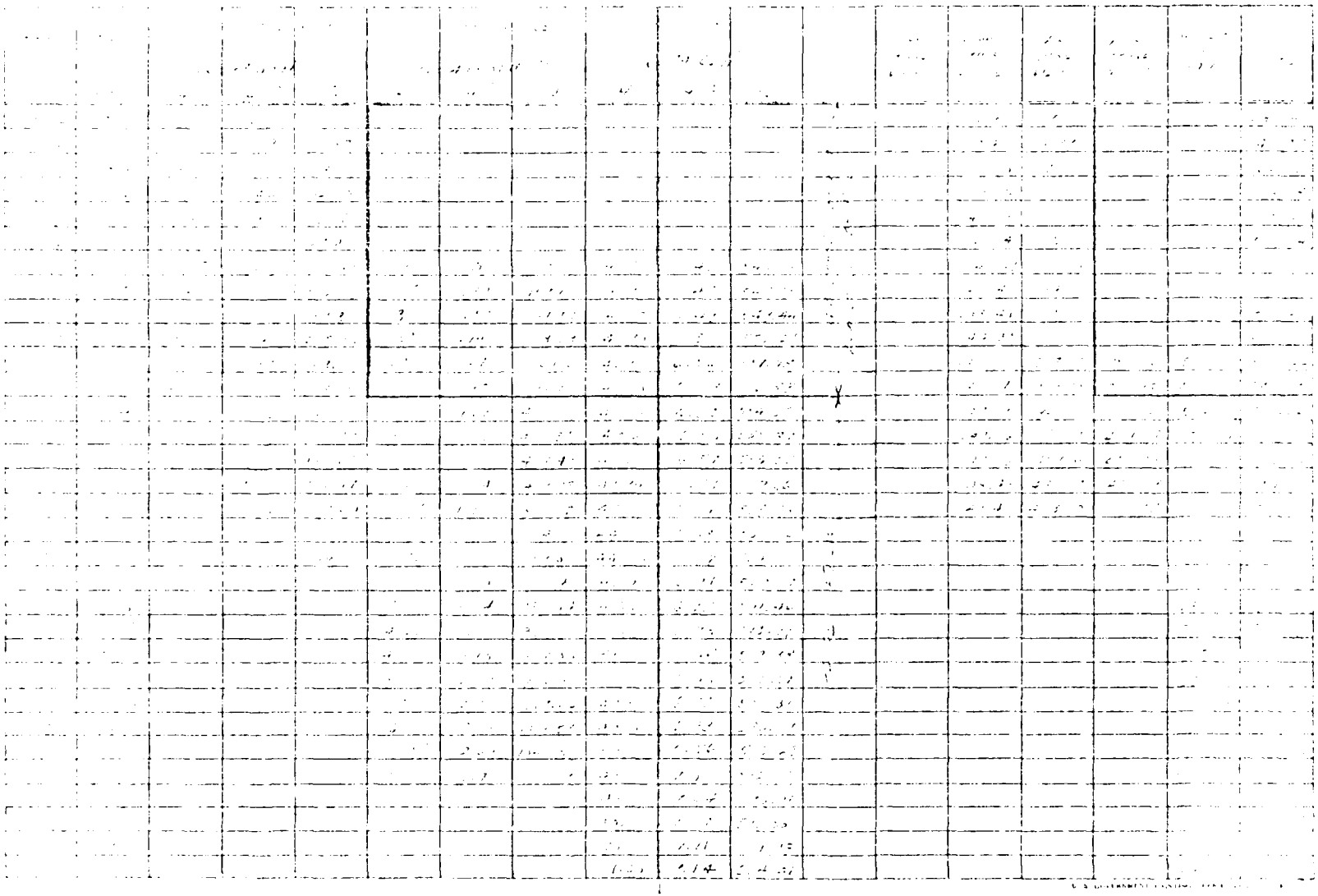
$Q = 84.66 \times 7.42 = 628.12$ CFS $\approx$ 715 CFS

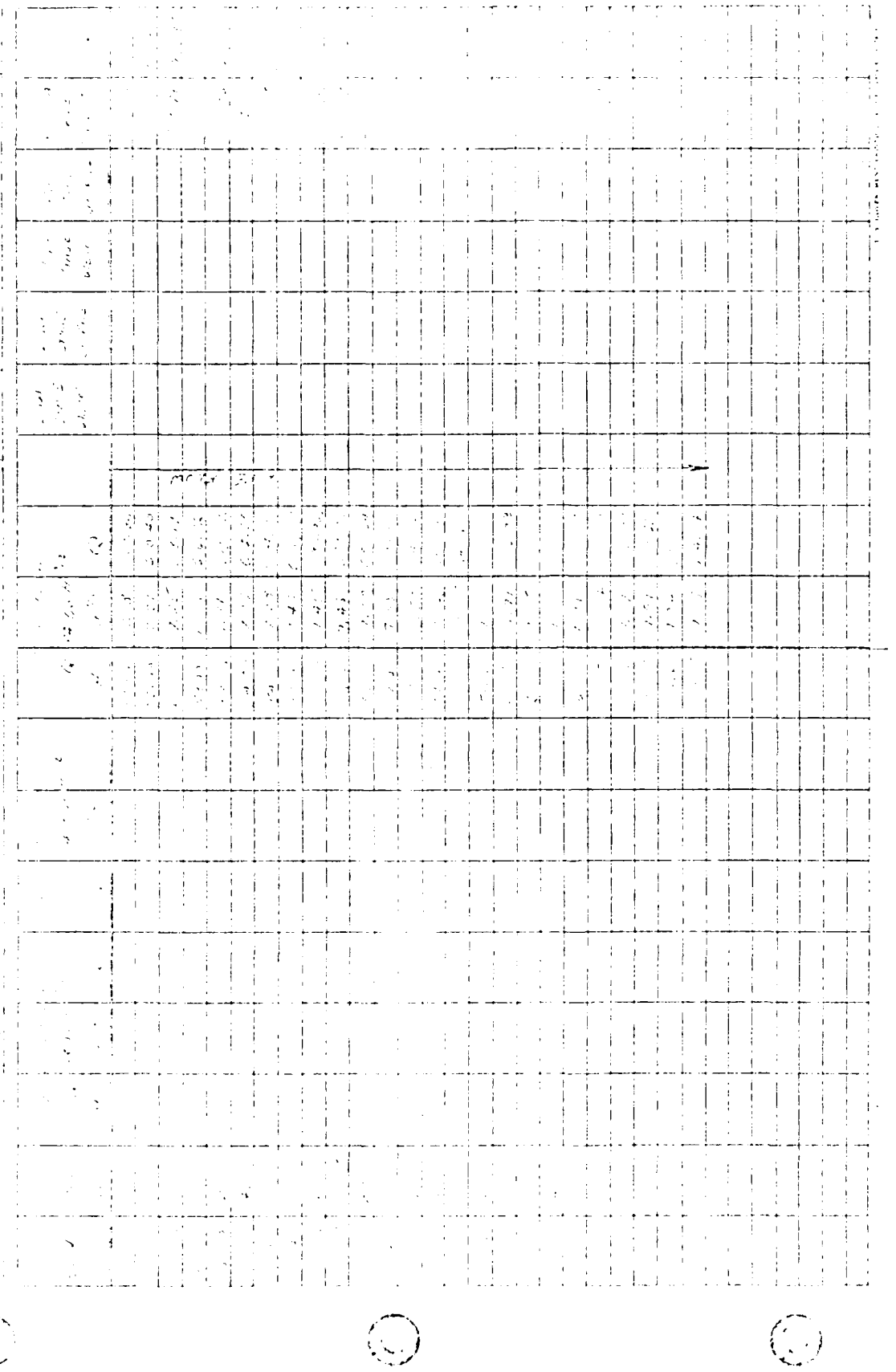
66" RCP PROVIDES 756.0 CFS WHICH IS > 715 CFS
SO USE 60" RCP WITH PLUNGE POOL AT OUTLET.
STORAGE TO BE CONSERVATIVE











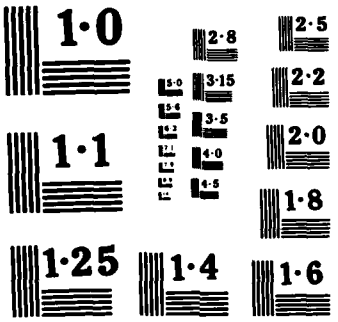
SCS 344 5-57
Tabular Computations

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET 30

AD-A156 414 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 2/2
BAKER FLOODWATER RESE..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV JUN 79

UNCLASSIFIED F/G 13/13 NL



SCS-344-A-57
Tabular Computations

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

N.H. 654
10-13-65
Lipay

TOTAL DISCHARGE

60" RCP & EMERGENCY SPILLWAY

SHEET 31

		Q CFS	Q CFS	Q CFS				
	55.0	0	605.16	605.16				
	55.5	60.0	630.72	690.72				
	56.0	130	632.2	762.2				
	56.5	200	634.40	834.40				
	57.0	270	636.8	906.8				
	57.5	340	639.32	979.32				
	58.0	410	641.11	1051.11				
	58.5	480	642.45	1122.45				
	59.0	550	643.14	1193.14				
	59.5	620	643.28	1263.28				
	60.0	690	643.1	1333.1				
	60.5	760	642.6	1402.6				
	61.0	830	641.9	1471.9				
	61.5	900	641.07	1541.07				
	62.0	970	640.21	1610.21				

SCS 344 5-57
Tabular Computations

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STAGE DISCHARGE [illegible]

[illegible] FLOOD ROUTING — SHEET 33

SITE B

[illegible] WATERSHED

	ELEV.	Q (CFS)	ELEV.	Q (CFS)	ELEV.	Q (CFS)	ELEV.	Q (CFS)
	1023.0	0	1048.0	227.27	1056.0	571.35	1070.0	15058.65
	1023.2	1.05	1049.0	231.58	1056.5	580.77	1070.5	17,221.19
	1023.4	4.65	1049.2	230.51	1057.0	553.31	1071.0	[illegible],413.73
	1023.6	5.61	1049.4	233.73	1057.5	556.62	1071.5	21,666.27
	1023.7	11.33	1049.6	234.65	1058.0	561.23		
	1023.5	13.45	1049.8	237.01	1058.5	572.12		
	1024.0	15.12	1050.0	236.49	1059.0	576.01		
	1024.2	24.02	1050.2	240.79	1059.5	595.25		
	1024.4	31.05	1050.4	244.25	1060.0	601.63		
	1024.6	31.51	1050.6	252.04	1060.5	614.67		
	1024.8	40.30	1050.8	257.14	1061.0	[illegible]		
	1025.0	52.55	1051.0	338.64	1061.5	[illegible]		
	1025.5	61.77	[illegible]	312.23	[illegible]	[illegible]		
	1026.0	69.11	[illegible]	371.57	1062.5	[illegible]		
	1026.5	72.22	[illegible]	421.27	1063.0	[illegible]		
	1027.0	83.44	[illegible]	[illegible]	[illegible]	[illegible]		
	1027.5	[illegible]	[illegible]	[illegible]	[illegible]	624.9		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	433.72		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	579.51		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7347.05		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8010.19		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10,102.13		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

SOIL CONSERVATION SERVICE

HYDROGRAPH COMPUTATION

EASTERLY SPILLWAY HYDROGRAPH

NH 684

WATERSHED OR PROJECT BAKER RIVER STATE N.H.

STRUCTURE SITE OR SUBAREA SITE B

DR. AREA 16.04 SQ. MI. T_c 3.92 HR. RUNOFF CONDITION NO: II

RUNOFF CURVE NO. 68 . STORM DISTRIB. CURVE B (7.0 hrs) . HYDROGRAPH FAMILY NO. 3

STORM DURATION 6 HR. RAINFALL: POINT 8.75 IN. AREAL 7.26 IN. (0.83 x 8.75)

Q 3.62 IN. COMPUTED T_p 2.74 HR. (Or 3.92) T_o 11.55 HR.

$(T_o \div T_p)$: COMPUTED 1.66 : USED 1.5 . REVISED T_p 3.03 .

$q_p = \frac{484\,A}{REV.\,T_p}$ = 2,562 CFS. QR_p = 9,274 CFS.

t(COLUMN) = (t/T_p) REV. T_p. q(COLUMN) = (q_c/q_p) Qa_p

LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q' CFS	LINE NO.	t HOURS	q CFS
1	0.00	0.00	21	17.57	18.55	41		
2	0.88	259.67	22	18.45	9.27	42		
3	1.76	1762.06	23	19.33	0.00	43		
4	2.64	4173.30	24			44		
5	3.5	6083.74	25		Σq = 43,559.98	45		
6	4.39	6807.12	26			46		
7	5.27	6352.69	27	$Q = \frac{\Delta\Sigma(39)}{645\,A}$		47		
8	6.15	5425.29	28			48		
9	7.03	4126.93	29	$Q = \frac{(0.88)(43,559.98)}{645\,(16.04)}$		49		
10	7.91	3245.90	30	$Q = \frac{38,332.782}{10,345.800.0}$		50		
11	8.79	1845.53	31			51		
12	9.67	1224.17	32	$Q = 3.705$		52		
13	10.54	825.39	33	$\%Er = \frac{3.705 - 3.62}{3.62}$		53		
14	11.42	528.62	34	$\%Er = 2.3\%$		54		
15	12.30	352.41	35			55		
16	13.18	231.85	36			56		
17	14.06	139.11	37			57		
18	14.94	74.19	38			58		
19	15.82	46.37	39			59		
20	16.70	27.82	40			60		

T.P 1/65

SHEET 33

SOIL CONSERVATION SERVICE

HYDROGRAPH COMPUTATION

Freedom, New Hampshire

NH 684

SHEET 39

WATERSHED OR PROJECT Kancamagus Highway STATE N.H.

STRUCTURE SITE OR SUBAREA Site 6

DR. AREA 16.04 SQ. MI. T_c 1.72 HR. RUNOFF CONDITION NO. II

RUNOFF CURVE NO. 66 . STORM DISTRIB. CURVE II . HYDROGRAPH FAMILY NO. 2

STORM DURATION 6 HR. RAINFALL: POINT 17.5 IN. AREAL 14.52 IN. 0.83 (17.5)

Q 10.10 IN. COMPUTED T_p 5.74 HR. T_o 5.15 HR.

$(T_o \div T_p)$: COMPUTED 1.88 : USED 2.0 . REVISED T_p 2.58 .

$q_p = \frac{484 A}{1.67 T_p}$ = 3009.05 CFS. Qq_p = 33,394.40 CFS.

t(COLUMN) = (t/T_p) REV. T_p. q(COLUMN) = (q/q_p) Qq_p

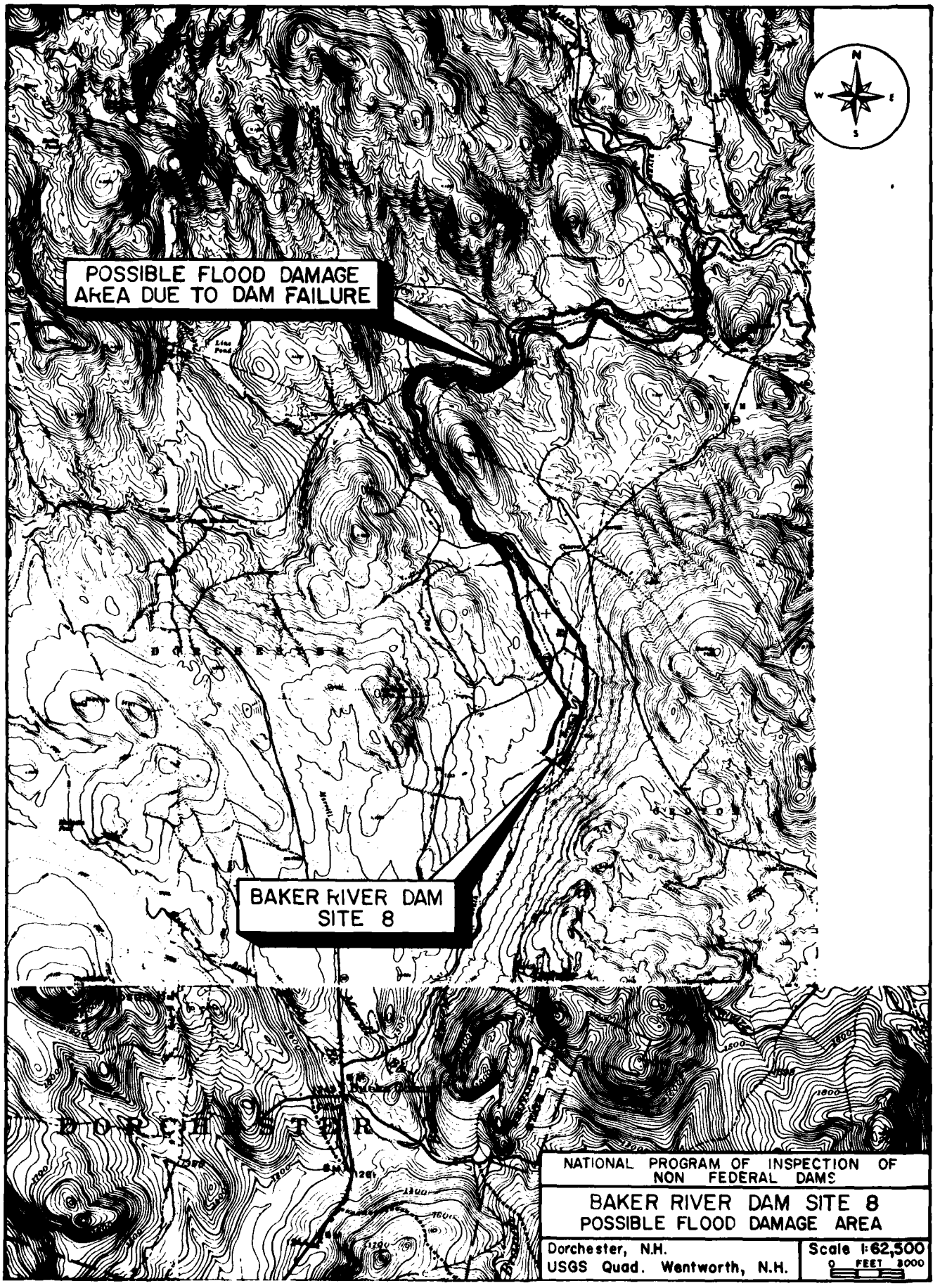
LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS
1	0	0.00	21	14.45	121.56	41		
2	10.72	121.57	22	15.17	91.17	42		
3	1.44	1215.66	23	15.89	60.78	43		
4	2.17	5161.54	24	16.62	30.39	44		
5	2.89	17,007.52	25	17.34	0.00	45		
6	3.61	19,607.46	26	Σq =	146,912.06	46		
7	4.33	21,727.55	27	Δt = 0.72		47		
8	5.06	23,574.98	28			48		
9	5.78	17,000.07	29	Q = (Δt)(Σq) / 645.71		49		
10	6.50	10,200.74	30			50		
11	7.22	4,243.43	31	Q = 1057.68 / 16,040.00		51		
12	7.95	1,000.68	32	Q = 10.2		52		
13	8.67	243.76	33			53		
14	9.39	60.93	34	%Error = (10.2 − 10.10) / 10.10		54		
15	10.11	15.23	35	%Error = 1.0%		55		
16	10.84	3.81	36			56		
17	11.56	0.95	37			57		
18	12.28	0.24	38			58		
19	13.00	0.06	39			59		
20	13.72	0.01	40			60		

NATIONAL PROGRAM OF INSPECTION OF NON FEDERAL DAMS

BAKER RIVER DAM SITE 8
DRAINAGE AREA

Dorchester, N.H.
USGS Quad, Wentworth N.H.

Scale 1:62,500
0 FEET 3000



NATIONAL PROGRAM OF INSPECTION OF NON FEDERAL DAMS

BAKER RIVER DAM SITE 8
POSSIBLE FLOOD DAMAGE AREA

Dorchester, N.H.
USGS Quad. Wentworth, N.H.

Scale 1:62,500
0 FEET 3000

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) STATE	(2) IDENTITY NUMBER	(3) INVSDN	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST.	(9) NAME	(10) LATITUDE (NORTH)	(11) LONGITUDE (WEST)	(12) REPORT DATE DAY	MO	YR
NH	178	NED	NH	009	02				BAKER FLOODWATER RESERVOIR SITE 8	4346.5	7154.9	18	JUN	79

(13) POPULAR NAME	(14) NAME OF IMPOUNDMENT
SOUTH BRANCH DAM	

(15) REGION	(16) BASIN	(17) RIVER OR STREAM	(18) NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	(19) DIST FROM DAM (MI.)	(20) POPULATION
01	05	SOUTH BRANCH BAKER RIVER	GROTON	0	120

(21) TYPE OF DAM	(22) YEAR COMPLETED	(23) PURPOSES	(24) STRUC HEIGHT (FT.)	(25) HYDRAU HEIGHT (FT.)	(26) IMPOUNDING CAPACITIES MAXIMUM (ACRE FT.)	NORMAL (ACRE FT.)	DIST	(27) OWN	(28) FED R	(29) PRV/FED	(30) SCS A	(31) VER/DATE
PGPK	1968	C	73	62	4794	145		N	N	N	B	18JUN79

(32) REMARKS

(33) U/S HAS	(34) SPILLWAY CREST LENGTH (FT.)	(35) TYPE	(36) WIDTH (FT.)	(37) MAXIMUM DISCHARGE (FT.)	(38) VOLUME OF DAM (CY)	(39) POWER CAPACITY INSTALLED (MW)	PROJECTED (MW)	(40) NO	NAVIGATION LOCKS (41) LENGTH (FT.)	(42) WIDTH (FT.)	(43) LENGTH (FT.)	(44) WIDTH (FT.)	(45) LENGTH (FT.)	(46) WIDTH (FT.)	(47) LENGTH (FT.)	(48) WIDTH (FT.)
1	1462	U	400	16560	314219											

(49) OWNER	(50) ENGINEERING BY	(51) CONSTRUCTION BY
N H WATER RESOURCES BD	SOIL CONSERVATION SER	LANDERS + GRIFFIN

(52) REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

(53) INSPECTION BY	(54) INSPECTION DATE DAY | MO | YR	(55) AUTHORITY FOR INSPECTION
HOWARD NEEDLES TAMMEN BERGENDOFF	17MAY79	PUBLIC LAW 92-367 8AUG1972

(56) REMARKS

END

FILMED

8-85

DTIC