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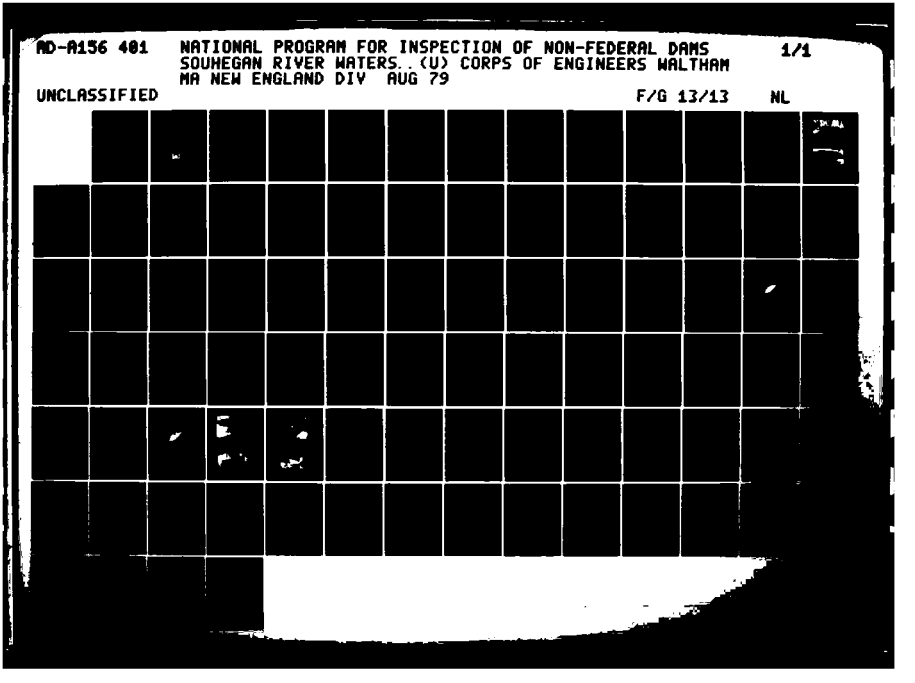
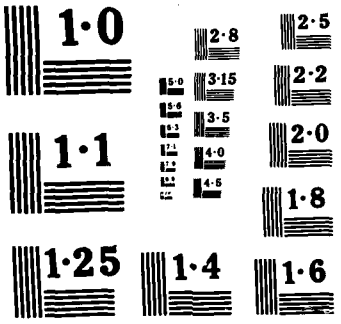




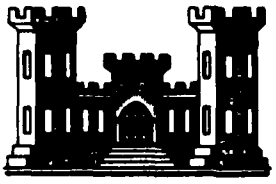
MERRIMACK RIVER BASIN
WILTON, NEW HAMPSHIRE

SOUHEGAN RIVER WATERSHED
DAM NO. 15

NH 00263

NHWRB 254.30

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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

AUGUST 1979

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

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

DAMS, INSPECTION, DAM SAFETY,
Merrimack River Basin
Wilton, New Hampshire
King Brook a tributary of the Souhegan River

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

The dam is an earth embankment 260 ft. long and 13 ft. high. The dam is small in size with a significant hazard potential. The test flood for the dam is the 100-year flood. The dam is in good condition. There are remedial measures to be undertaken by the owner. The program of annual technical inspections should be continued. No conditions were observed which require further investigaiton.

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REPLY TO
ATTENTION OF:
NEDED

DEC 21 1978

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

Dear Governor Gallen:

Inclosed is a copy of the Souhegan River Watershed Dam No. 15 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 and the owner.

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

SOUHEGAN RIVER WATERSHED DAM NO. 15
NH 00263

MERRIMACK RIVER BASIN
HILLSBOROUGH COUNTY, NEW HAMPSHIRE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

PHASE I REPORT

Identification No.:	NH 00263
NHWRB No.:	254.30
Name of Dam:	SOUHEGAN RIVER WATERSHED DAM NO. 15
Town:	Wilton
County and State:	Hillsborough County, New Hampshire
Stream:	King Brook, a tributary of the Souhegan River
Date of Inspection:	April 30, 1979

BRIEF ASSESSMENT

The Souhegan River Watershed Dam No. 15 is located on King Brook, approximately 1 mile upstream of its confluence with the Souhegan River. The dam is an earth embankment 260 feet long and 13 feet high with a drop inlet service spillway structure and a 30 inch outlet conduit. An emergency spillway 45 feet wide is cut into the right abutment.

The dam is owned by the New Hampshire Water Resources Board. It was designed by the Soil Conservation Service for the purpose of flood protection in the Souhegan River Watershed.

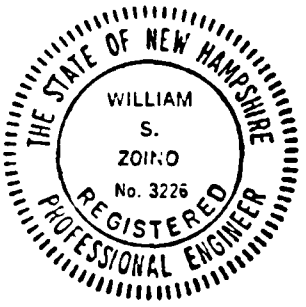
The drainage area of the dam covers 1.1 square miles primarily of mountainous woodland. The dam impounds only 74 acre-feet at low stage but has a maximum impoundment of 708 acre-feet. The dam is SMALL in size and its hazard classification is SIGNIFICANT since appreciable property damage could result in the event of a dam failure.

The test flood for this dam is the 100-year flood. The runoff volume from this storm is 3.5 inches and the resulting peak test flood outflow would be 24 cfs compared to a spillway capacity of 1040 cfs. The water surface would be at elevation 832.6 feet (MSL) or 4.4 feet below the top of the dam for this flood.

The dam is in GOOD condition at the present time. Remedial measures to be undertaken by the owner include: mowing of embankment slopes; clearing debris from the spillway inlet; operating the pond drain gate as part of the annual inspection procedures; and developing a formal written emergency warning system for the dam. The program of annual technical inspections should be continued.

No conditions were observed which require further investigation.

The remedial measures outlined above should be implemented within two years of receipt of this report by the owner.



William S. Zoino
N.H. Registration No. 3226

Nicholas A. Campagna, Jr.
California Registration 21006

This Phase I Inspection Report on **Souhegan River Watershed Dam No. 15** has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Joseph A. McElroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Joseph W. Finegan, Jr.

JOSEPH W. FINEGAN, JR., CHAIRMAN
Chief, Reservoir Control Center
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

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 unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the 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 aid 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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Overview from right abutment

Overview from left abutment

PHASE I INSPECTION REPORT

SOUHEGAN RIVER WATERSHED DAM NO. 15

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. Goldberg, Zoino, Dunnicliff & Associates, Inc. (GZD) 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 GZD under a letter of March 30, 1979 from Colonel John P. Chandler, Corps of Engineers. Contract No. DACW 33-79-C-0058 has been assigned by the Corps of Engineers for this work.

(b) Purpose

1) 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) Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.

3) Update, verify, and complete the National Inventory of Dams.

(c) Scope

The program provides for the inspection of non-federal dams in the high hazard potential category based upon location of the dams, and those dams in the significant hazard potential category believed to represent an immediate danger based on condition of the dams.

1.2 Description of Project

(a) Location

The Souhegan River Watershed Dam No. 15 is located on King Brook approximately one mile upstream of the Souhegan River in Wilton, New Hampshire. It can be reached from an access road off a town road which intersects State Route 31 in Wilton, New Hampshire. The dam is shown on USGS Peterborough, N.H. quadrangle, with coordinates approximately at N 42° 47.8', W 71° 48.3' (see location map on page v). Page B-2 of Appendix B is a site plan for this dam.

(b) Description of Dam and Appurtenances

The dam consists of an earth embankment 270 feet long, a principal spillway with a reinforced concrete riser and outlet pipe, and an earth emergency spillway located at the right abutment. The total length of the dam is approximately 315 feet, of which 45 feet is the emergency spillway.

1) Embankment (See pgs. B-3, B-4, B-5, and B-6)

The embankment was constructed primarily of silty sand (Designation SM using the Unified Soil Classification System). It is 260 feet long and is a maximum of 13 feet high. The upstream slope is 3 horizontal to 1 vertical; the downstream slope is 3 horizontal to 1 vertical; and the width of the crest is 12 feet.

Beneath the embankment is an earthfill cutoff trench which is 12 feet wide at the bottom. According to available plans, it is constructed of the same silty sand material as the embankment.

There is a berm approximately 10 feet wide on the upstream slope at approximately normal pool elevation (830.0 ft.). The purpose of this berm is wave erosion protection. The berm was constructed of the same silty sand material as the embankment.

2) Principal Spillway (See pg. B-5)

The principal spillway consists of a reinforced concrete drop inlet structure with a sluice gate controlled inlet pipe, an uncontrolled orifice inlet, and an outlet pipe supported on a concrete cradle.

The riser structure is 6.0 feet high and 7.0 feet wide normal to the axis of the dam. It is 4.5 feet long parallel to the embankment. The walls of the structure are 12 inches thick and the top slab is 8 inches thick.

At the base of the structure is an 8 inch diameter, vertical lift, sluice gate inlet which is controlled by a wheel operated bench stand with a rising stem. An 8 inch diameter, asphalt coated, corrugated metal pipe extends 12 feet upstream from the lift gate into the impoundment pool. Plans indicate the upstream end of this pipe is protected by a trash rack of 1/2 inch diameter bolts placed horizontally across the opening.

The "principal spillway inlet" is an uncontrolled opening approximately 1.75 feet above the sluice gate invert. It is 2 feet 8 inches wide and 12 inches high and is located in the right face of the riser structure. The water flows over this orifice and drops into the riser structure. It is protected by a trash rack assembly approximately 2 feet high and 4 feet wide. This assembly is fabricated from painted steel angle sections.

A secondary trash rack has been constructed around the drop inlet structure. This is made of 6 inch square steel wire mesh and was added to prevent beaver activity in front of the principal spillway orifice.

A 30 inch diameter manhole permits access into the riser structure.

There is a 4 inch diameter galvanized iron vent pipe which penetrates the top of the riser to a height of 3.3 feet where it terminates with a 180 degree "U" bend.

The riser structure is drained by a 30 inch diameter reinforced concrete pressure pipe. It is approximately 80 feet long and drops approximately one foot over that length. The pipe penetrates the downstream side of the riser structure and is supported by an 8 inch thick concrete cradle within the embankment. Plans indicate 2 concrete anti-seep collars cast around the pipe within the embankment.

The cradle and pipe extend approximately 12 feet downstream of the embankment. Plans indicate a reinforced concrete "tee" bent supporting the end of the pipe cradle. The outlet conduit discharges into a plunge pool.

3) Emergency Spillway (See pg. B-3 and B-7)

The grass covered emergency spillway was excavated in earth within the right abutment. It curves to the left around the embankment and is 45 feet wide at the control section. It is approximately 300 feet long and lies approximately 4 feet below the top of the embankment. The side slopes are 4 horizontal to 1 vertical toward the embankment and 2 horizontal to 1 vertical in the abutment.

4) Foundation and Embankment Drainage (See pg. B-4)

Toe drains extend from 30 feet to the left of the outlet to 174 feet to the right of the outlet.

The drains consist of a 4 foot wide, clean sand and gravel trench drain with a 6 inch perforated metal pipe. Two outlet pipes of 6 inch non-perforated metal pipe discharge on either side of the principal spillway outlet conduit.

(c) Size Classification

The dam's maximum impoundment of 708 acre feet and height of 13 feet place it in the SMALL size category according to the Corps of Engineers' Recommended Guidelines.

(d) Hazard Potential Classification

The hazard potential classification for this dam is SIGNIFICANT because of the appreciable economic losses which may occur in the event of dam failure. Section 5 of this report presents a more detailed discussion of the hazard potential.

(e) Ownership

The dam is owned by the New Hampshire Water Resources Board, 37 Pleasant Street, Concord, New Hampshire 03301. They can be reached by telephone at area code 603-271-3406.

(f) Operator

The operation of the dam is controlled by the New Hampshire Water Resources Board. Key officials are as follows:

George McGee, Chairman
Vernon Knowlton, Chief Engineer
Donald Rapoza, Assistant Chief Engineer

The Board's telephone number is 603-271-3406. Alternatively, the Board can be reached through the state capital at 603-271-1110.

(g) Purpose of the Dam

The purpose of the dam is to reduce downstream flooding by providing temporary storage for the runoff from 672 acres of watershed. This temporary storage is released through the inlet of the principal spillway.

(h) Design and Construction History

The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service in conjunction with the New Hampshire Water Resources Board. It was completed in 1964.

(i) Normal Operating Procedure

The dam is normally self regulating. The pond drain gate is operated only as part of infrequent maintenance checks.

1.3 Pertinent Data

(a) Drainage Area

The drainage area for this dam covers 1.1 square miles and is made up primarily of mountainous woodland with some pasture and minor development.

(b) Discharge at Damsite

1) Outlet Works

Normal discharge at the site is through the 30 inch diameter outlet pipe. In the event of severe flooding water would flow over the emergency spillway at elevation 833.0 feet (MSL). The invert of the principal orifice is at elevation 830.0 feet (MSL).

2) Maximum Known Flood

There is no data available for the maximum known flood at this damsite.

3) Ungated Spillway Capacity At Top Of Dam

The capacity of the principal spillway with the reservoir at top of dam elevation (837.0 feet MSL) is 39 cfs. The capacity of the emergency spillway is 1000 cfs at this level.

4) Ungated Spillway Capacity At Test Flood

The capacity of the principal spillway with the reservoir at test flood elevation (832.6 feet MSL) is 24 cfs. No water flows over the emergency spillway at this level.

5) Gated Spillway Capacity At Normal Pool

There are no gated spillways. The gated pond drain inlet is normally closed.

6) Gated Spillway Capacity At Test Flood

As previously stated, there are no gated spillways.

7) Total Spillway Capacity At Test Flood

The total spillway capacity at test flood elevation (832.6 feet MSL) is 24 cfs.

8) Project Discharge At Test Flood Elevation

The total project discharge at test flood elevation (832.6 feet MSL) is 24 cfs.

(c) Elevation (feet above MSL)

1) Streambed at centerline of dam: 824.0

2) Maximum tailwater: Unknown

3) Upstream portal invert diversion tunnel: Not applicable

4) Normal pool: 830.0

5) Full flood control pool: 833.0

6) Spillway crest:

a) Pond drain inlet: 828.25

b) Principal inlet: 830.0

c) Emergency spillway: 833.0

7) Design surcharge: 835.35

8) Top dam: 837.0

9) Test flood design surcharge: 832.6

(d) Reservoir

1) Length of maximum pool: 5200 ± ft.

2) Length of normal pool: 4000 ± ft.

3) Length of flood control pool: 5100 ± ft.

(e) Storage (acre-feet)

1) Normal pool: 74

2) Flood control pool: 315

3) Spillway crest pool:

a) Principal inlet: 74

b) Emergency spillway: 315

4) Top of dam: 708

5) Test flood pool: 279

(f) Reservoir Surface (acres)

1) Normal pool: 69

2) Flood control pool: 89

3) Spillway crest pool:

a) Principal inlet: 69

b) Emergency spillway: 89

4) Test flood: 86

5) Top of dam: 109

(g) Dam

1) Type: Earth embankment

2) Length: 260 ft.

3) Height: 13 ft.

4) Top width: 12 ft.

5) Side slopes: Upstream: 3 to 1
Downstream: 3 to 1

6) Zoning: Homogeneous, semi-pervious silty sand (SM)

7) Impervious core: None

8) Cutoff: 12 feet wide earthfill

9) Grout curtain: None

(h) Diversion and Regulating Tunnel

Not applicable

(i) Spillways

1) Type:

a) Principal spillway: Reinforced concrete drop inlet

b) Emergency spillway: Grass covered channel cut in earth within right abutment

2) Length of Weir:

a) Pond drain inlet: 8 inch diameter pipe

b) Principal inlet: 2.67 ft.

c) Emergency spillway: 45 ft.

3) Crest elevation (ft. above MSL)

a) Pond drain inlet: 828.25

b) Principal inlet: 830.0

c) Emergency spillway: 833.0

4) Gates: 8 inch vertical lift sluice gate on pond drain inlet

5) Upstream channel: Reservoir

6) Downstream channel: Manmade channel 340 ft. long to natural streambed

(j) Regulating Outlet

The only regulating outlet is an 8 inch diameter pipe controlled by a wheel operated sluice gate. The pipe invert is at elevation 828.25 feet (MSL). The purpose of this outlet is pond drainage, and it is normally closed.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

Among other design data available from the Soil Conservation Service are hydrologic and hydraulic computations, structural computations, a geological report and soil laboratory test results. This information was used extensively in computations presented in Section 5 and Appendix D of this report.

2.2 Construction Data

"As built" plans are available for this dam and show good agreement with the design plans and the visual inspection.

2.3 Operational Data

No operational data is available as the dam is self-regulating.

2.4 Evaluation of Data

(a) Availability

Sufficient data is available to permit an evaluation of the dam when combined with findings of the visual inspection.

(b) Adequacy

There is sufficient design and construction data to permit an assessment of dam safety when combined with the visual inspection, past performance, and sound engineering judgment.

(c) Validity

Since the observations of the inspection team generally confirm the available data, a satisfactory evaluation for validity is indicated.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

(a) General

The Souhegan River Watershed Dam No. 15 is in GOOD condition at the present time.

(b) Dam

1) Earth Embankment (See overview photos and photo #3)

The embankment is in good condition with no evidence of sloughing, erosion, or settlement. The toe drains were functioning with the left toe drain discharging approximately 2 gallons per minute and the right toe drain discharging approximately 4 gallons per minute. The discharge is clear.

2) Emergency Spillway (See overview photos)

The emergency spillway is in good condition. There is some minor seepage from the cut slope into the reservoir caused by natural groundwater but this seepage was predicted in the geological report and is not deemed excessive. The flow is clear.

(c) Appurtenant Structure

1) Drop Inlet Service Spillway Structure (See photos 1 and 2)

The structure is in good condition with no evidence of spalling, cracking, or efflorescence. The sluice gate bench stand is in good condition. The hand wheel has been removed from the site to prevent unauthorized use.

The secondary trash rack of wire mesh is severely clogged with debris. (See photo # 2).

2) Pond Drain Inlet Pipe

At the time of inspection the 8 inch pond drain inlet pipe was completely submerged and could not be observed.

3) Outlet Conduit (See photo 3 & 4)

The downstream end of this conduit is in good condition with no evidence of settlement, spalls, cracks, or efflorescence. The supporting cradle is in good condition. There is no evidence of settlement or displacement of the conduit. The tee bent is completely below ground.

(d) Reservoir Area

The shore of the reservoir is generally shallow sloping woodland. It appears stable and in good condition.

(e) Downstream channel

The downstream channel is a narrow channel passing over relatively flat flood plain. The channel appears stable and in good condition. Rip rap protection of the plunge pool is in good condition.

3.2 Evaluation

The dam and its appurtenances are generally in good condition. The only potential problem observed during the visual inspection is clogging of the track racks with floating debris.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

No written operational procedures were disclosed. The dam is normally self regulating.

4.2 Maintenance of Dam

An annual inspection is made jointly by the New Hampshire Water Resources Board and the Soil Conservation Service. Recommendations resulting from this inspection are implemented by the NHWRB.

4.3 Maintenance of Operating Facilities

Operation of the sluice gate for the pond drain inlet is checked approximately once every four or five years by NHWRB.

4.4 Description of Warning System in Effect

There is no warning system in effect.

4.5 Evaluation

The established operational procedures for this dam are generally satisfactory. Additional emphasis on routine maintenance will assist the owners in assuring the long-term safety of the dam. A formal, written, downstream emergency warning system should be developed for this dam.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features

(a) General

Souhegan River Watershed Dam No. 15 is a Soil Conservation Service (SCS) flood control dam on King Brook in Wilton, New Hampshire. The dam is about 340 feet upstream of Heald Road, and about one mile upstream of the confluence of King Brook and the Souhegan River. The upstream drainage area is about 1.05 square miles with mountainous topography. The reservoir's normal pool covers 69 acres, about 10 percent of the drainage area.

The dam is a 260 feet long earthen embankment with a grass-lined earth emergency spillway 45 feet wide. The principal spillway consists of an orifice located on a concrete riser in the reservoir. Flow from the orifice proceeds under the dam through a reinforced concrete pipe.

(b) Design Data

The data sources available for Souhegan River Watershed Dam No. 15 include the Soil Conservation Service's (SCS) "Hydrology and Hydraulics" Design Calculations. These calculations include Storage-Elevation and Stage-Discharge curves for the dam, and the routing of storms of various magnitudes through the reservoir. These calculations are dated 1963.

The SCS established the elevation of the principal spillway outlet (830.0 feet MSL) at the top of the 50-year sediment pool. The emergency spillway crest (833.0 feet MSL) is slightly above the 100-year flood stage, and the dam crest (837.0 feet MSL) is slightly above the Probable Maximum Flood (PMF) stage.

Also available for this dam are SCS "Maintenance Checklist" reports on dam inspections dated May 19, 1977 and June 15, 1978.

The Soil Conservation Service Design plans, dated 1963, are also available for this dam.

(c) Experience Data

No records of flow or stage are known to be available for Souhegan River Watershed Dam No. 15.

(d) Visual Observations

Souhegan River Watershed Dam No. 15 is a flood control structure on King Brook, a tributary of the Souhegan River. The dam is about one mile upstream of the mouth of King Brook. The dam consists of a 260 feet long earthen embankment with a crest elevation of 837.0 feet MSL.

The emergency spillway is a 45 feet wide grass-lined earth channel, with its crest at 833.0 feet MSL. The principal spillway consists of a concrete riser structure in the reservoir with a 1.0 foot by 2.7 feet orifice with its invert at 830.0 feet MSL. Discharge from the orifice flows under the dam to King Brook through a 30-inch reinforced concrete pipe 80.3 feet long.

The only controlled outlet is an 8-inch corrugated metal pipe with its invert at 828.25 feet MSL which also feeds into the riser and the 30-inch reinforced concrete pipe under the dam. This outlet is a pond drain and is usually closed. It is operated by a valve on the top of the riser structure.

Downstream of the dam, outflow enters a man-made channel which extends for 340 feet until King Brook passes under Heald Road. Heald Road is a secondary dirt road which crosses King Brook on a 10.5 feet high earth embankment with a 30-inch reinforced concrete pipe culvert passing underneath. The top of Heald Road is at 833.0 feet MSL, 4 feet below the top of the dam.

About 100 feet downstream of Heald Road, King Brook enters Batchelder Pond, which has a surface area of 7 acres and a spillway, 30 feet long, with 2.5 feet of freeboard.

Five hundred feet downstream of Batchelder Pond Dam, King Brook passes under another secondary road through a 36-inch reinforced concrete pipe. Just downstream of this road there is a house about 10 feet above the streambed.

After passing under the road, King Brook becomes quite steep, with steep banks and a narrow channel. This channel runs 4500 feet to New Hampshire Highway 31. The brook is paralleled by a third secondary road, which crosses King Brook on an 8 feet high embankment with two 48-inch reinforced concrete pipe culverts.

Immediately after passing under Highway 31, King Brook enters the Souhegan River.

(e) Test Flood Analysis

The hydrologic conditions of interest in this Phase I investigation are those required to assess the dam's overtopping potential and its ability to safely allow an appropriately large flood to pass. This requires using the discharge and storage characteristics of the structure to evaluate the impact of an appropriately sized Test Flood. The original hydraulic and hydrologic design calculations of the SCS are available for this dam.

Guidelines for establishing a recommended Test Flood based on the size and hazard classification of a dam are specified in the "Recommended Guidelines" of the Corps of Engineers. The impoundment of less than 1000 acre feet and the height of less than 40 feet classify this dam as a SMALL structure.

The appropriate hazard classification for this dam is SIGNIFICANT because of the potential for damage to New Hampshire Highway 31 in the event of dam failure. Other possible effects of dam failure include damage to three secondary roads and to Batchelder Pond Dam (see Dam Failure Analysis section). The possible damage to Highway 31 is the most important impact of failure, and the COE "Recommended Guidelines" cites potential damage to secondary highways as requiring a SIGNIFICANT hazard potential.

As shown in Table 3 of the Corps of Engineers' "Recommended Guidelines," the appropriate Test Flood for a dam classified as SMALL in size with a SIGNIFICANT hazard potential would be between the 100-year flood and one-half of the Probable Maximum Flood (PMF). If a range of possible test flood inflows is indicated, the "Recommended Guidelines" suggest using the inflow most closely related to the hazard classification. Since Souhegan River Watershed Dam No. 15 is on the low side of SIGNIFICANT, the 100-year flood will be used.

As part of their Hydrology and Hydraulics calculations for the dam, the SCS determined that the 100-year stage in the reservoir is controlled by the 100-year storm runoff volume of 3.5 inches. This runoff volume requires a peak water surface elevation of 832.6 feet MSL, 4.4 feet below the dam crest and 2.6 feet above normal pool. This yields a peak test flood outflow of 24 cfs.

(f) Dam Failure Analysis

The peak outflow that would result from the failure of Souhegan River Watershed Dam No. 15 is estimated using the procedure suggested in the Corps of Engineers New England Division's April 1978 "Rule of Thumb Guidelines for Estimating Downstream Dam Failure Hydrographs," as clarified in a December 7, 1978 meeting at the Corps' Waltham office. Normally this procedure is carried out with the dam failure assumed to occur when the water surface reaches the top of the dam. In this case, however, the outflow of 1040 cfs with the water surface at the top of the dam (837 feet MSL) is greater than the Probable Maximum Flood (PMF) routed outflow at the dam. Also, this outflow would create serious flooding downstream prior to dam failure. As a result, a dam failure would cause only a small incremental increase to flood damage in this situation. Failure is therefore assumed to occur with the water surface at the SCS Design High Water of 835.35 feet MSL, 1.65 feet below the top of the dam.

The discharge to King Brook just prior to failure at the elevation is given by the Stage-Discharge curve developed in Appendix D as 420 cfs. The tailwater elevation prior to failure at this discharge is estimated to be 829 feet MSL.

For an assumed breach width equal to 40 percent of the dam width at the half-height, the gap in the embankment due to failure would be 64 feet. The resulting increase in flow would be 1600 cfs or a total flow of about 2020 cfs.

This peak failure outflow would overtop and probably damage the Heald Road embankment (which might already be damaged or washed out by the pre-failure outflow). It would increase the stage in Batchelder Pond from less than one foot over the dam crest to 2 feet over the dam crest. Batchelder Pond would attenuate the peak dam failure outflow slightly to 1960 cfs.

This flow would severely overtop and probably damage the secondary road 500 feet downstream of Batchelder Pond Dam. It would not affect the house just downstream of this road. (The peak stage of 7 feet is approximately 3 feet below the house).

The stage in the 4500 foot reach from this road would increase from 2 feet to 6 feet. The only damage in this reach would be to the secondary road which parallels King Brook and crosses it four times. The embankments at these crossings would be severely overtopped.

At the downstream end of this reach, the New Hampshire Highway 31 crosses King Brook on an eight-foot embankment with two 48-inch reinforced concrete pipe culverts. The pre-failure outflow of 420 cfs would overtop the roadway by about 1/2 foot. The attenuated peak dam failure outflow of 1925 cfs would increase overtopping to 2 feet. This depth of flow, coupled with the high velocity of dam failure flows, would probable damage Highway 31 at this crossing.

Immediately after crossing under Highway 31, King Brook enters the Souhegan River, where dam failure flows would be rapidly attenuated in the larger river channel.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

(a) Visual Observations

There has been no significant displacement or distress which would warrant the preparation of structural stability calculations.

(b) Design and Construction Data

1) Embankment

No records of a stability assessment are available for this dam.

2) Principal Spillway Structures

A review of structural calculations for the design of the drop inlet service spillway structure and the outlet conduit (principal spillway) revealed that these structures have been designed on the basis of sound engineering practice.

(c) Operating Records

There are no known operating records for this dam.

(d) Post Construction Changes

There have been no known construction changes since the dam was completed in 1964.

(e) Seismic Stability

The dam is located in seismic zone No. 2 and, in accordance with the recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

(a) Condition

The dam and its appurtenances are generally in good condition at the present time.

(b) Adequacy of Information

There is sufficient design and construction data to permit an assessment of dam safety when combined with the visual inspection, past performance, and sound engineering judgment.

(c) Urgency

The remedial measures described herein should be implemented by the owner within two years of receipt of this phase I Inspection Report.

(d) Need for Additional Investigations

None

7.2 Recommendations

No conditions were observed which warrant further investigation.

7.3 Remedial Measures

It is recommended that the owner institute the following remedial measures:

1) Check the operability of the pond drain inlet gate as part of the annual inspection procedure.

2) Develop a downstream emergency warning system.

3) Maintain the program of annual technical inspections.

4) Implement and intensify a program of diligent and periodic maintenance including but not limited to:

a) Mowing of embankment slopes.

b) Clearing debris from the trash racks of the drop inlet structure and from the slopes of the embankment.

c) Backfilling any animal burrows, tire ruts or erosion gullies which may be found.

7.4 Alternatives

There are no meaningful alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

INSPECTION TEAM ORGANIZATION

Date: April 30, 1979

Project: NH 00263
SOUHEGAN RIVER WATERSHED DAM NO. 15
Wilton, New Hampshire
NHWRB 254.30

Weather: Sunny, warm

INSPECTION TEAM

Nicholas A. Campagna	Goldberg, Zoino, Dunnicliff & Associates, Inc. (GZD)	Team Captain
William S. Zoino	GZD	Soils
M. Daniel Gordon	GZD	Soils
Jeffrey Hardin	GZD	Soils
Paul Razgha	Andrew Christo Engineers (ACE)	Structural
Carl Razgha	ACE	Structural
Thomas Gooch	Resource Ananlysis, Inc. (RAI)	Hydrology
Richard Laramie	RAI	Hydrology

Owner's Representative Present

Gary Kerr, New Hampshire Water Resources Board

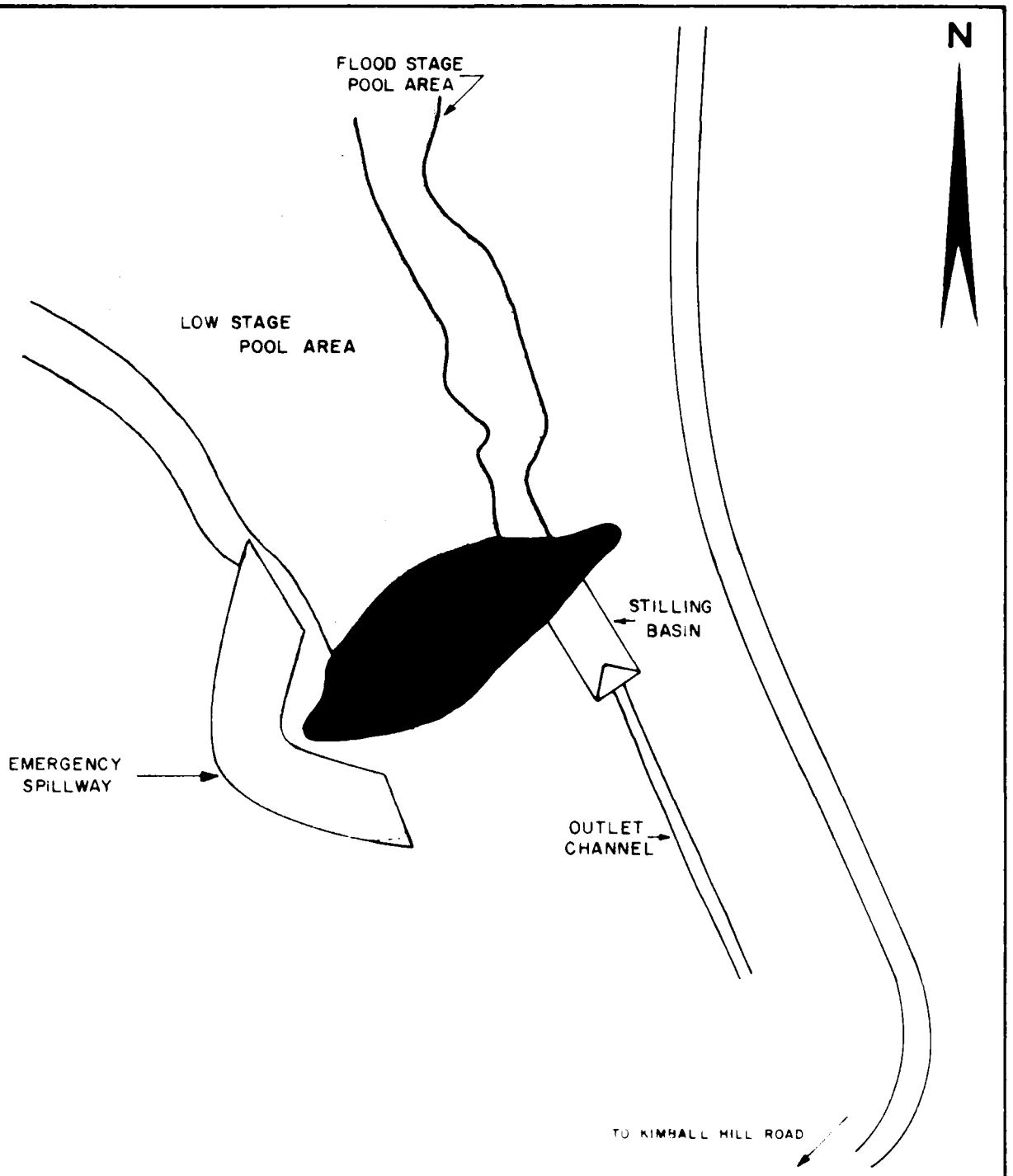
CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
DAM EMBANKMENT		
Crest Elevation	JMH	837.0 ft. (MSL)
Current Pool Elevation		831.6 ft. (MSL)
Maximum Impoundment to Date		No data
Surface Cracks		None
Pavement Condition		Not applicable
Movement or Settlement of Crest		None
Lateral Movement		None
Vertical Alignment		Good
Horizontal Alignment		Good
Condition at Abutment and at Concrete Structures		Good
Indications of Movement of Structural Items on Slopes		None
Trespassing on Slopes		None
Sloughing or Erosion of Slopes of Abutments		None-some natural groundwater seepage in cut slope on right abutment
Rock Slope Protection - Rip rap Failures		No rip rap - upstream slope in good condition
Unusual Movement or Cracking at or Near Toes	JMH	None

CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
Unusual Embankment or Downstream Seepage	JMH	None
Piping or Boils		None
Foundation Drainage Features		Functioning as below
Toe Drains		Right Toe drain - 4 gpm Left toe drain - 2 gpm
Instrumentation System	JMH	None
APPURTENANT STRUCTURES		
A. Drop Inlet Service Spillway Structure		
Condition of concrete		Good
Spalling		None noted
Erosion		None noted
Cracking		None noted
Rusting or staining of concrete		None noted
Visible reinforcing		None noted
Efflorescence		None noted
Trash Rack		
Upper stage trash rack		Surface rusting over 50% of surface area
Bench stand		No deficiencies noted
B. Reservoir Discharge Conduit		Submerged, could not be observed
C. Outlet conduit (primary spillway)		No deficiencies noted

APPENDIX B



GOLDBERG, ZOINO, DUNNICLIFF & ASSOC., INC GEOTECHNICAL CONSULTANTS NEWTON UPPER FALLS, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

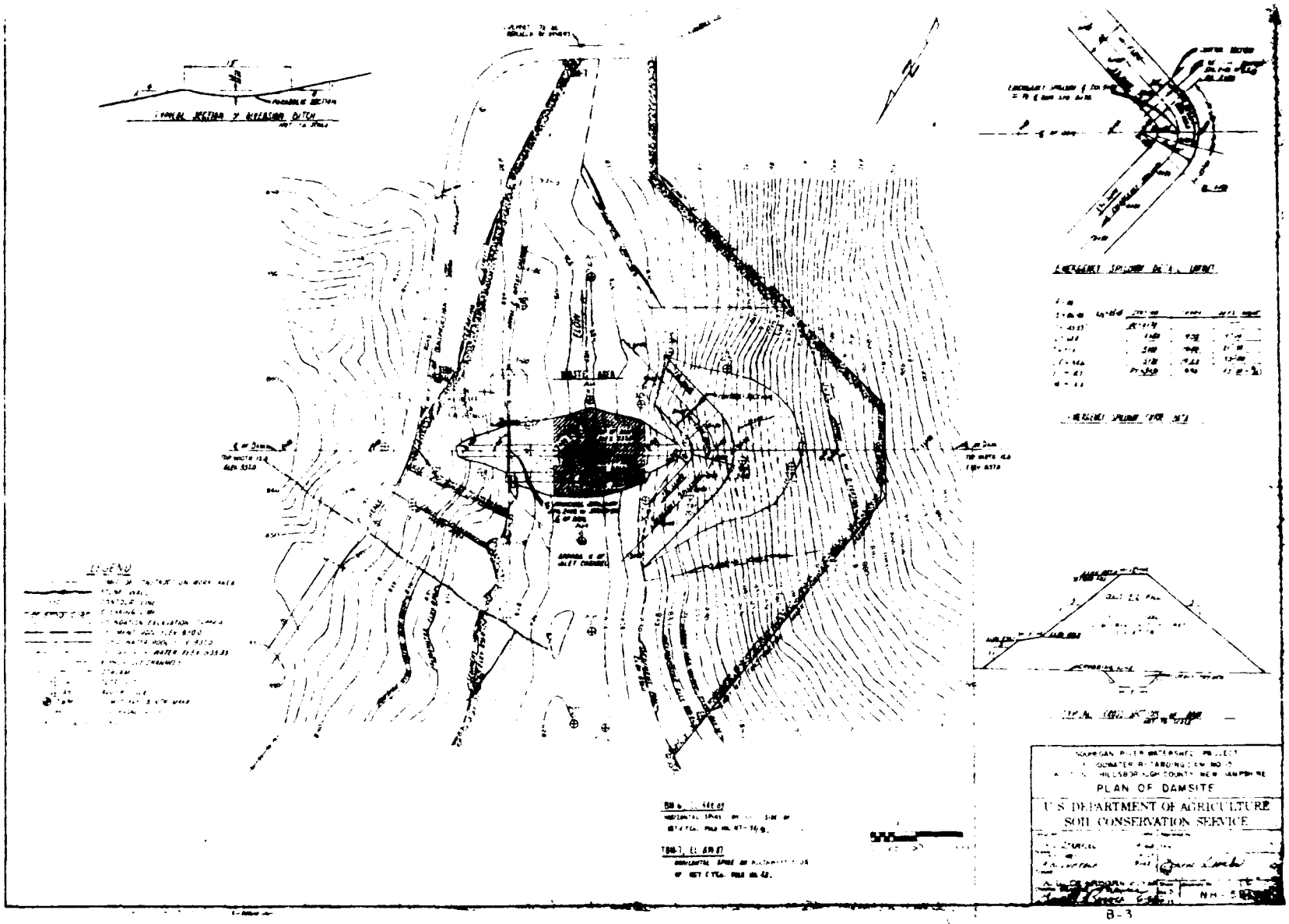
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

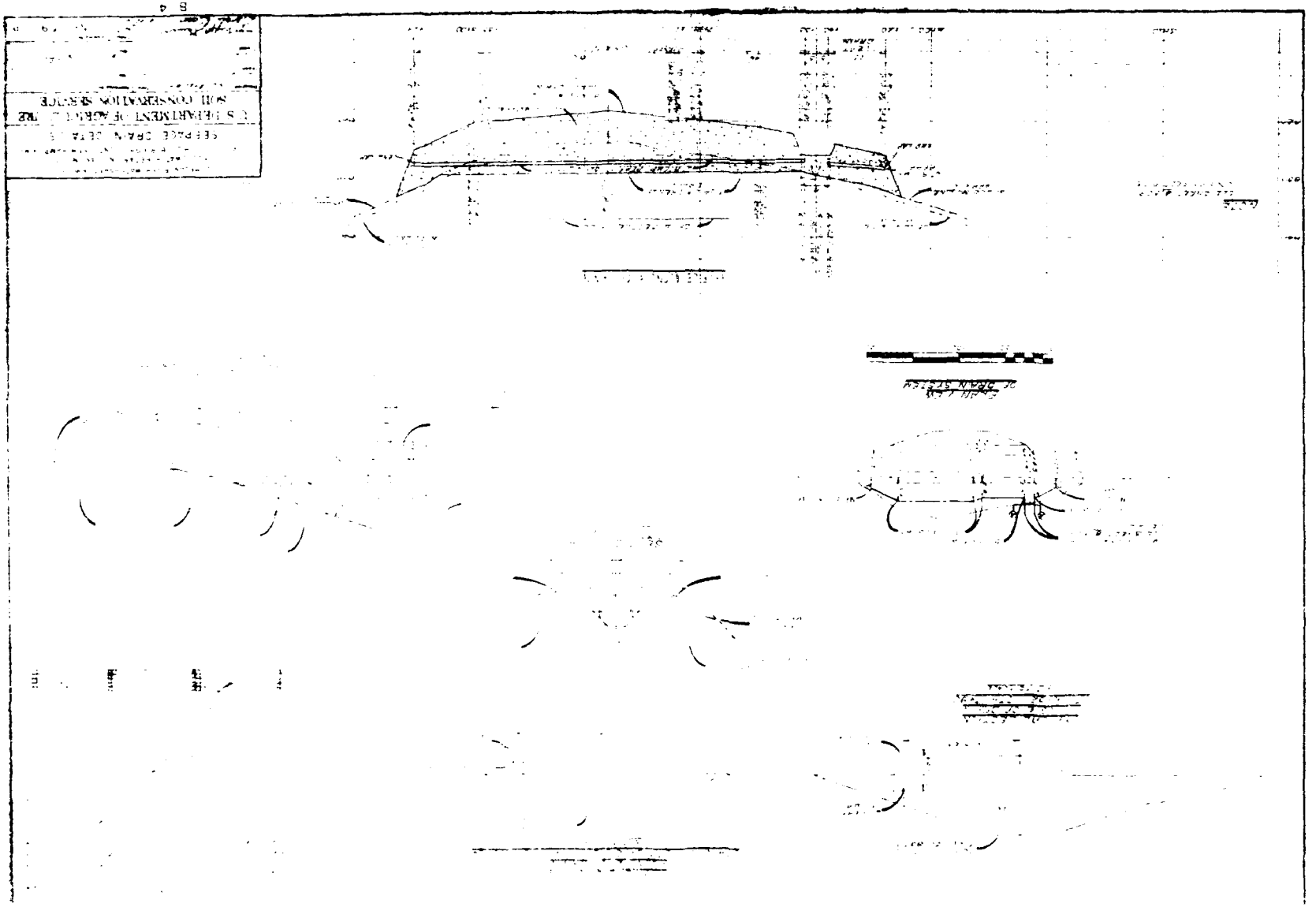
SITE PLAN

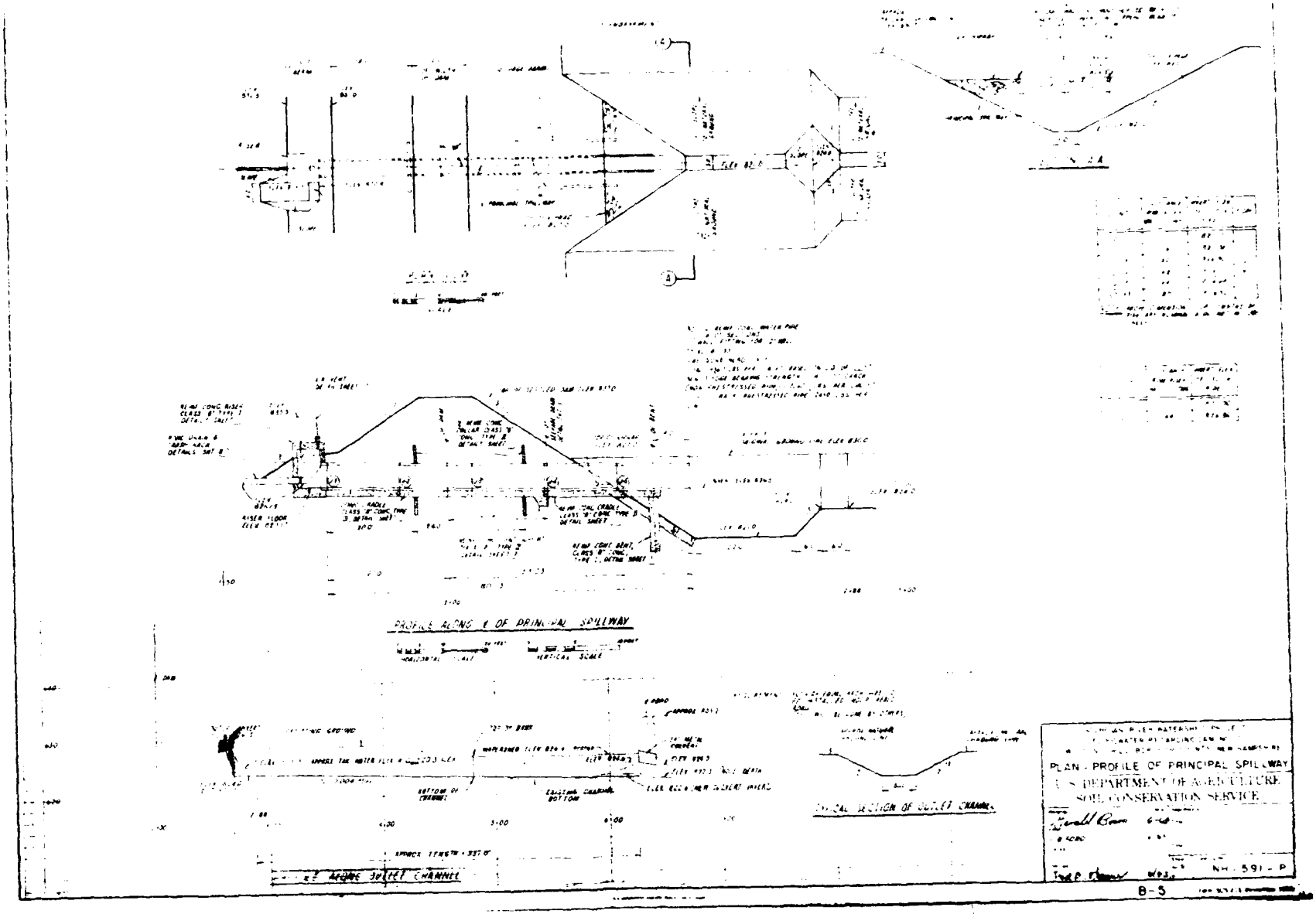
FILE No. 2327

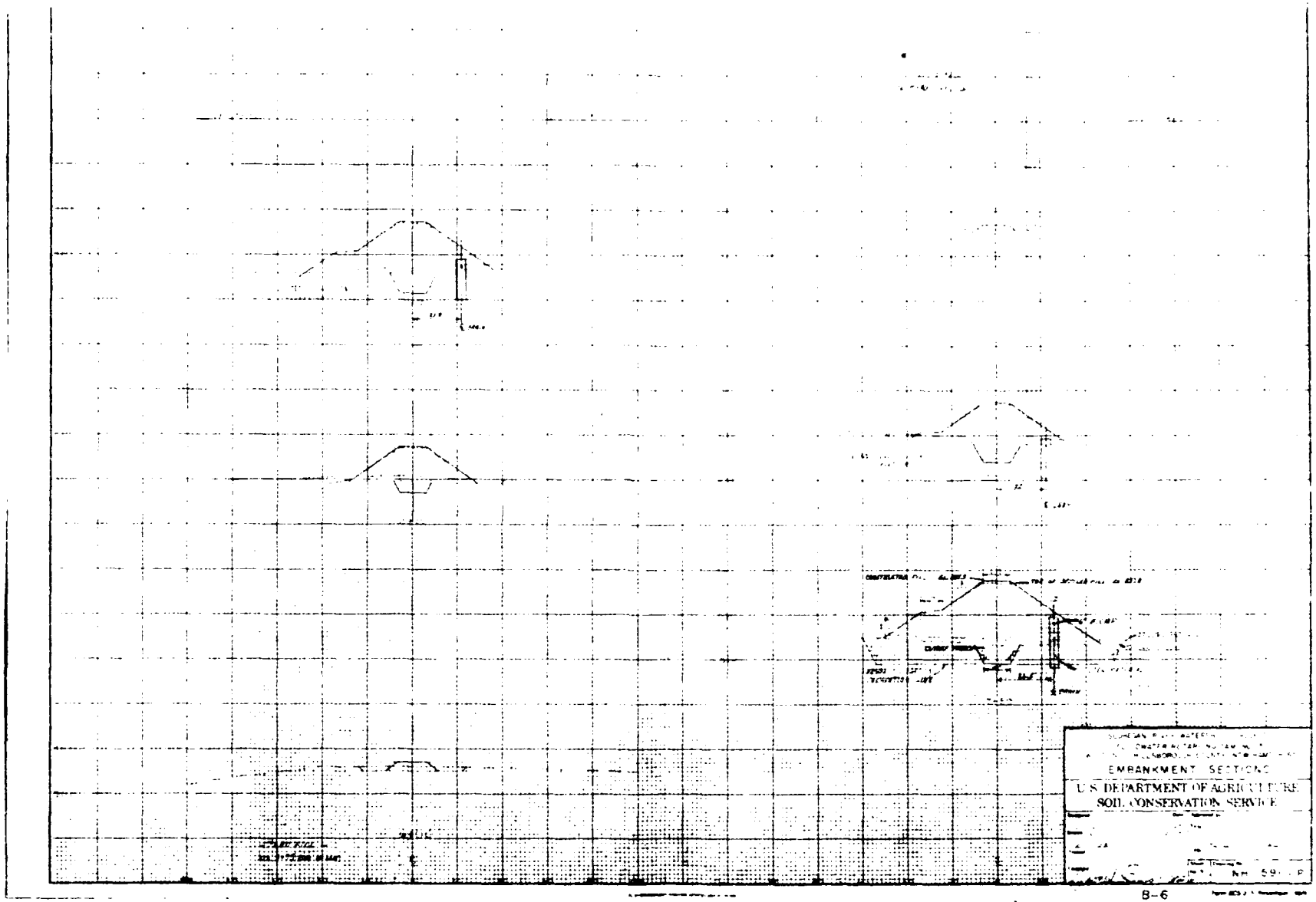
SOUHEGAN RIVER WATERSHED
DAM No. 15

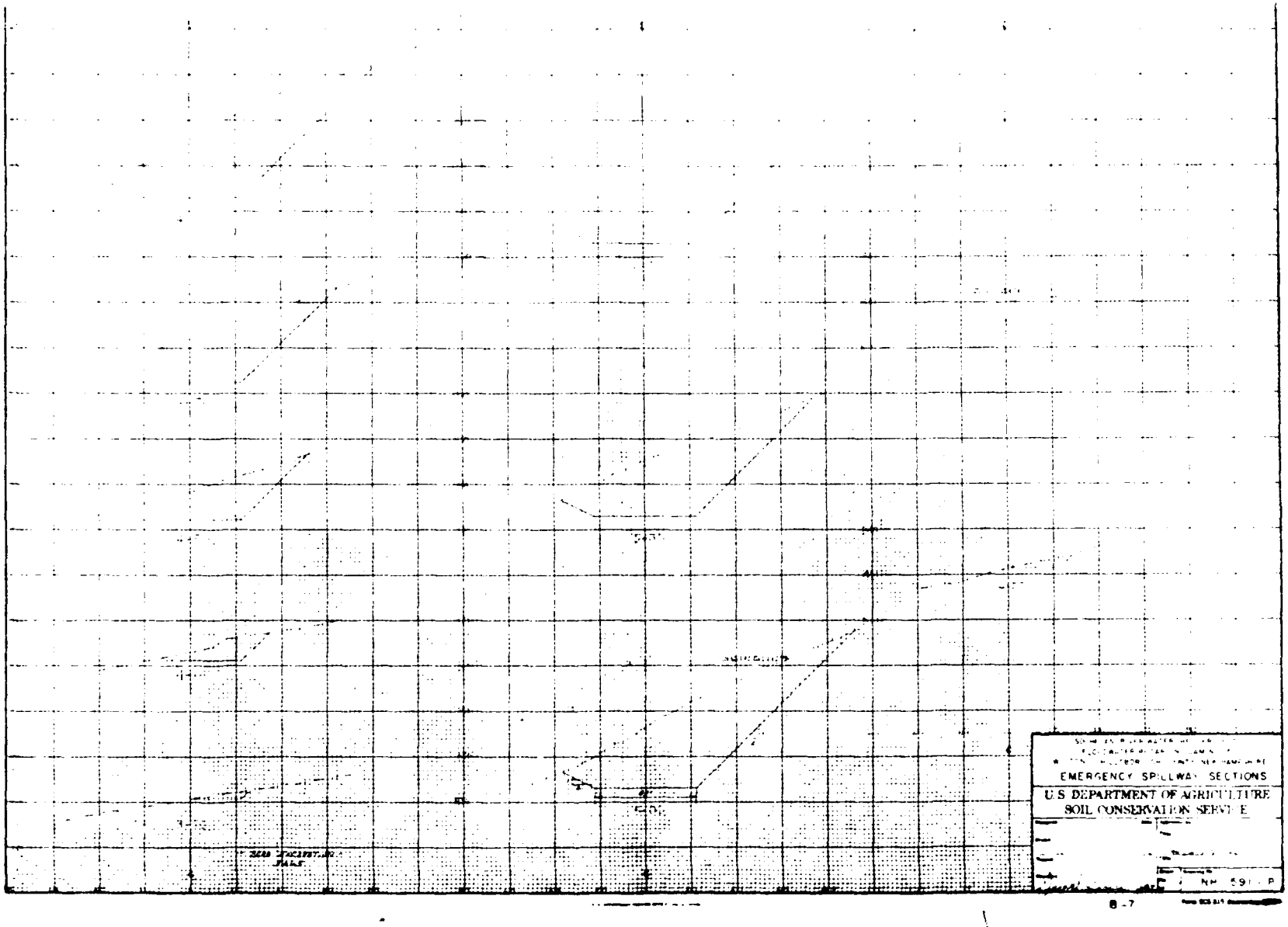
			SCALE 1" = 100'
			DATE MAY 1979






PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY
TYPICAL SECTION OF OUTLET CHANNEL
PLAN - PROFILE OF PRINCIPAL SPILLWAY
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NH - 591 - P
B-5


EMBANKMENT SECTIONS
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE


EMERGENCY SPILLWAY SECTIONS
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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.

WATERSHED SOUHEGAN RIVER SITE 15 DATE 5-19-77
INSPECTED BY KERR HUTCHINSON MACPHERSON MILLIGAN KELSEY

1. GENERAL ITEMS

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

COMMENTS TRASH ON DAM SHOULD BE REMOVED

2. RESERVOIR

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

COMMENTS

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	/	—	—	—	—	—
Holes (rodent and other) (check especially at embankments)	/	—	—	—	—	—
Excessive settlement (embankments)	/	—	—	—	—	—
Cracks						
Traverse	/	—	—	—	—	—
Longitudinal	/	—	—	—	—	—
Seepage 2/	/	—	—	—	—	—
Piping 2/	/	—	—	—	—	—

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	/	—	—	—	—
Embankment Gutters					
left	-	—	—	—	—
right	-	—	—	—	—
Emergency Spillway					
location _____	-	—	—	—	—
location _____	-	—	—	—	—
Waterways					
location _____	-	—	—	—	—
location _____	-	—	—	—	—
Outlet Channel	/	—	—	—	—
Other _____	-	—	—	—	—

COMMENTS _____

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)	1	—	1	—	1	—	—
Undesirable vegetation	1	—	2	—	2	—	—
Drainage (surface)	NA	—	1	—	1	—	—
Erosion 2/	1	—	1	—	1	—	—
Sedimentation	1	—	1	—	1	—	—
Condition of planting	NA	—	NA	—	NA	—	—
Pest control	—	—	—	—	—	—	—
Fire control	—	—	—	—	—	—	—

COMMENTS NONE

6. EMBANKMENT, STRUCTURAL, & OTHER DRAINS

		Dam left	Dam right 1/	Other (_____)	Other (_____)
Depth of Flow (in inches above invert)	With any obstruction	1/4	TR	—	—
	Without any obstruction	1/4	TR	—	—
Turbidity of Discharge (yes, no)	With any obstruction	NO	NO	—	—
	Without any obstruction	NO	NO	—	—
Condition of Protective Coating	Outside	2	2	—	—
	Inside	2	2	—	—
Obstruction in Flow (yes, no)		YES	YES	—	—
Animal Guard Condition		—	—	—	—
Outlet Condition		—	—	—	—

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

Other_____

COMMENTS IRON ALGAE IN RT DRAIN. GREEN ALGAE IN LEFT DRAIN. ASPHALT COATING GONE BUT NO RUST SHOWING. APPARENTLY GALVANIZED COATING INTACT.

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___; Other deterioration ___; Excessive movement (check joint at riser and conduit)___; Other___.
Trashracks: low and high stage	Condition of protective coatings 3 ; Corrosion 2 ; Damaged parts___; Condition of fastenings ___; Need of gratings due to beaver ½ ; 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 WRB PERSONNEL WILL CHECK RISER AND APPURTENANCES AT LATER DATE WHEN WATER RECEDES. TRASH RACK NEEDS PAINTING. W.R.B. HAS INSTALLED WIRE MESH AROUND R. SIDE OF RISER WITH LONG WOOD CONDUIT EXTENDING OUT INTO POOL TO SERVE AS A BEAVER FRUSTRATOR.

IMPACT BASIN, SAF, BOX INLET, & MISCELLANEOUS CONCRETE S[illegible]

(specify)_____ _____

Concrete: inside and out	Cracking___; Spalling___; 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_____

_____

_____

_____

_____

_____

9. CHANNEL

Stream obstructions. 2
Debris in stream. 2
Sediment bars controlled. 2
Plunge pool stability. 1
Fish habitat appurtenances . . . . . ___
Riprap -- Report under "Riprap" (item 4)

COMMENTS_____

_____

_____

_____

_____

_____

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.

WATERSHED Souhegan River SITE 15 25? 30 DATE 6-15-78

INSPECTED BY Porter, Hutchinson, MacPherson, Kerr, Fife

1. GENERAL ITEMS

Access Road.	1
Site Fencing.	1
Traffic Conditions.	1
Vandalism Control.	1
Trash Control.	4

COMMENTS Some trash caught in wire mesh outside of trash rack.

2. RESERVOIR

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

COMMENTS

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	1	—	—	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 _____

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	—	—	—	—	—
Other _____	—	—	—	—	—

COMMENTS _____

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)	1	—	1	—	—	—	—
Undesirable vegetation	1	—	3	—	—	—	—
Drainage (surface)	1	—	1	—	—	—	—
Erosion 2/	1	—	1	—	—	—	—
Sedimentation	1	—	1	—	—	—	—
Condition of planting	1	—	1	—	—	—	—
Pest control	1	—	1	—	—	—	—
Fire control	1	—	1	—	—	—	—

COMMENTS Spray or remove bushes up to height of berm.

6. EMBANKMENT; STRUCTURAL, & OTHER DRAINS

		Dam left	Dam right 1/	Other (_____)	Other (_____)
Depth of Flow (in inches above invert)	With any obstruction	¼	2¼	—	—
	Without any obstruction	¼	¼	—	—
Turbidity of Discharge (yes, no)	With any obstruction	No	No	—	—
	Without any obstruction	No	No	—	—
Condition of Protective Coating	Outside*	2	2	—	—
	Inside	2	2	—	—
Obstruction in Flow (yes, no)		No	Yes	—	—
Animal Guard Condition		2	2**	—	—
Outlet Condition		1	1	—	—

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

Other_____

COMMENTS * Asphalt coating gone. ** 2 inches of algae in rt. drain (green in color). Bolt in trash rack corroded.

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	N.A.	Condition of protective coating___; Corrosion___; Damaged parts___; Loose___; Other___.
Concrete: inside and out		Cracking 1; Spalling 1; Other deterioration 1; Excessive movement (check joint at riser and conduit)___; Other___.
Trashracks: low and high stage		Condition of protective coatings 2; Corrosion 2; Damaged parts 2; Condition of fastenings 2; Need of gratings due to beaver 1; Safety condition (protruding fastenings, sharp edges, etc.) 1; Other –.
Manhole:		Condition of protective coatings 2; Corrosion 2; Damage 2; 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 W.R.B. will check operation of M.H. cover lock and condition of gate.

(specify)_____ _____

Concrete: inside and out	Cracking___; Spalling___; 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 Not applicable.

9. CHANNEL

Stream obstructions.	2
Debris in stream.	1
Sediment bars controlled.	2
Plunge pool stability.	2
Fish habitat appurtenances	-
Riprap -- Report under "Riprap" (item 4)	

COMMENTS_____

The U.S.D.A. Soil Conservation Service (SCS) located in Durham, New Hampshire, maintains a file for this dam. Included in this file are:

1) SCS "Design Report" dated June 1963.

2) SCS "Hydrology and Hydraulics" design calculations dated 1963.

3) SCS structural design calculations dated 1963.

4) SCS "Detailed Geological Investigation of Dam Sites" dated 1962.

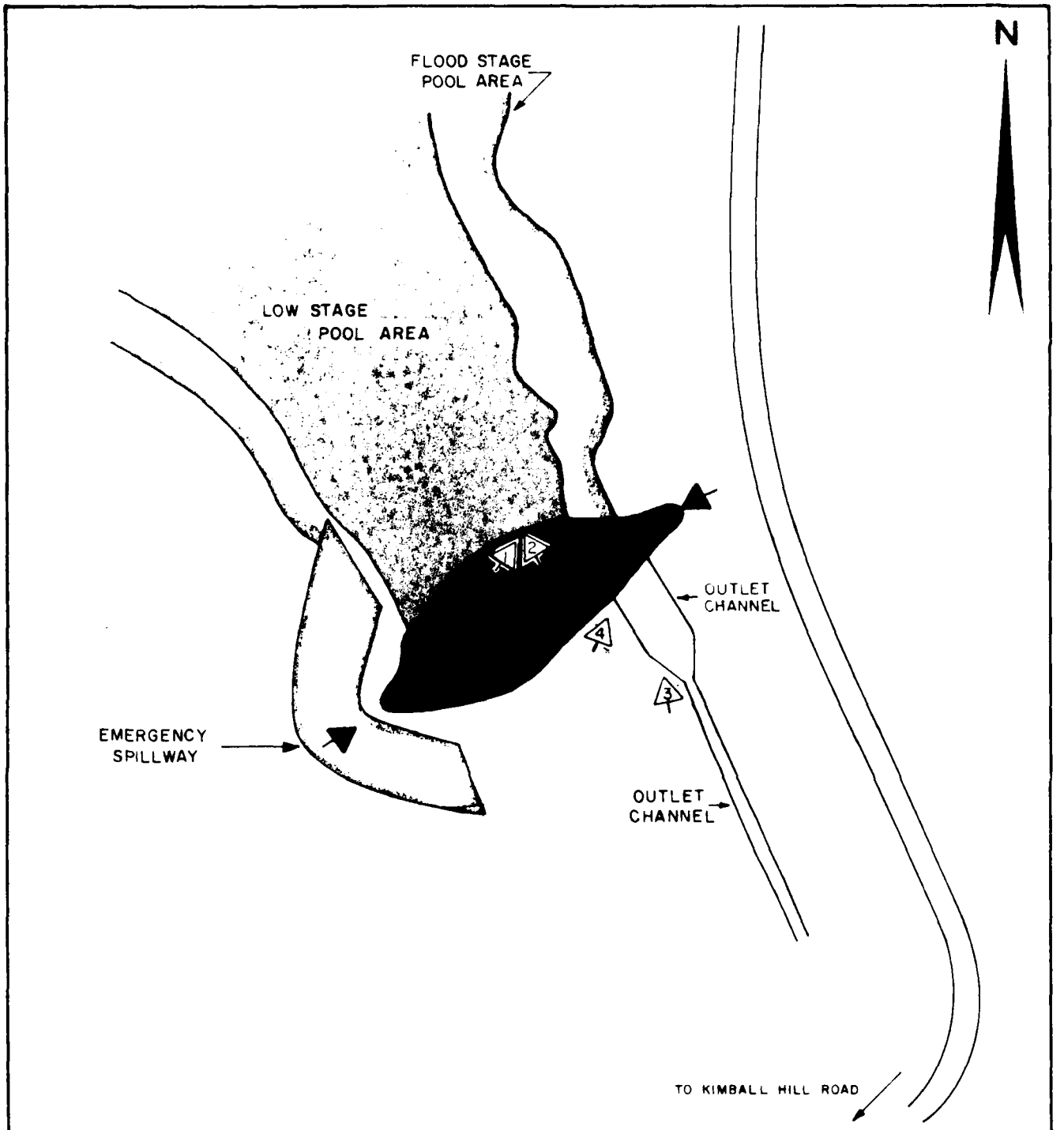
5) SCS "As Built" drawings dated 1964.

The New Hampshire Water Resources Board (NHWRB) maintains a correspondence file on this dam. Included in this file are:

1) Maintenance inspection checklists dated May 19, 1977 and June 15, 1978.

APPENDIX C

PHOTOGRAPHS



OVERVIEW PHOTO

APPENDIX C

GOLDBERG, ZOINO, DUNNICLIFF & ASSOC., INC.
GEOTECHNICAL CONSULTANTS
NEWTON UPPER FALLS, MASS.

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION AND ORIENTATION OF PHOTOS

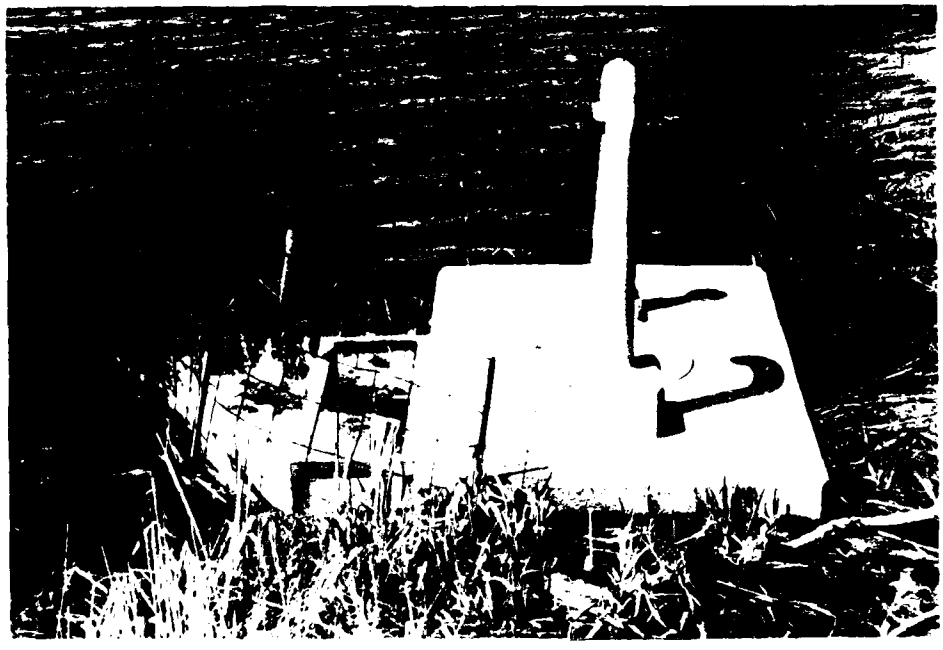
SOUHEGAN RIVER WATERSHED
DAM No. 15

FILE No. 2327

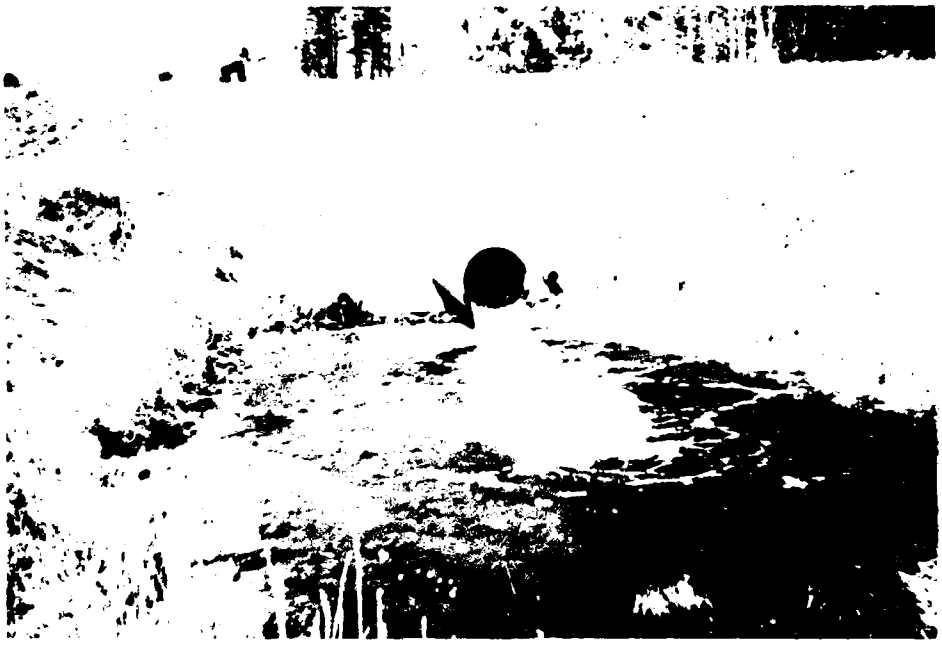
SCALE 1" = 100'

DATE MAY 1979

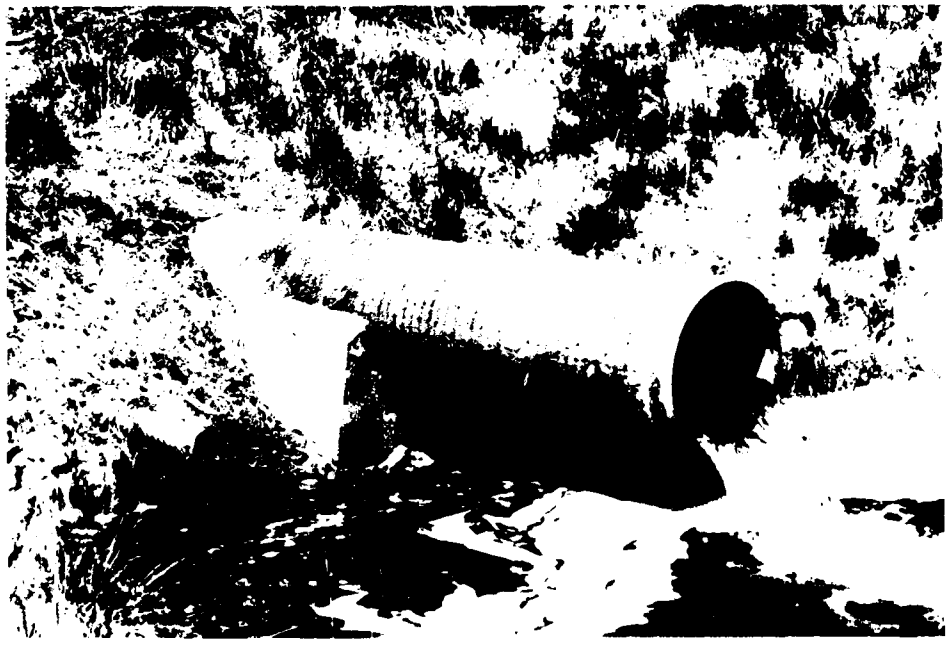
1. View of drop inlet structure from right downstream side



2. View of drop inlet structure showing debris clogging the trash racks



3. View of outlet conduit and plunge pool from downstream side

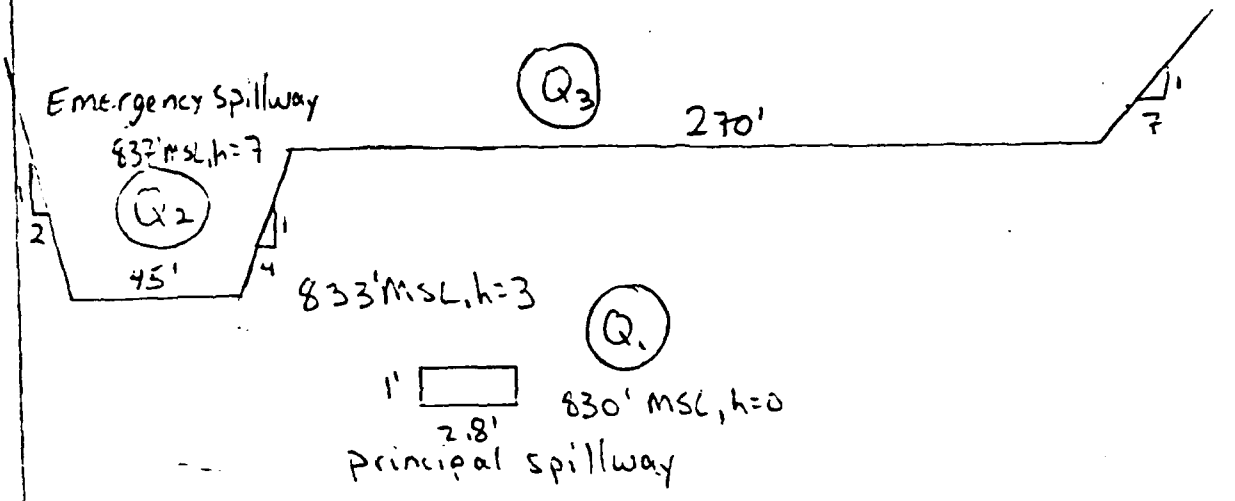


4. View of outlet pipe and right toe drain outlet

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The information used to establish this elevation of Southegan River Watershed Dam # 15 was determined from field notes and SCS design drawings:



The 1'x2.8' orifice is on a riser structure in the reservoir. Its flow goes under the dam through an 80.3' long 30" reinforced concrete pipe (u/s invert at 827.17' MSL; d/s at 826.5' MSL).

There is a second source of inflow to the riser- a "pond drain inlet" which is about 125' of 8" corrugated metal pipe with its invert at 828.25' MSL. This inlet is controlled by a sluice gate operated from the top of the riser, and is generally closed. Flow from the pond drain inlet also goes under the dam through the 30" r.c.p. For the purposes of these calculations, this gate will be assumed to be closed.

Flows:

(Q1) Principal spillway outflow is controlled by the 1'X2.8' orifice:

$0 < h < 1$, $Q_1 = (3.0)2.67\ h^{3/2}$ Broad crested weir.

$h > 1$

(Q1) $= .69\ (2.67\sqrt{2g}\sqrt{h} = CA\sqrt{2gh}$

C = .69 from p 27 of S.C.S. calculations

$= 14.78\sqrt{h}$

(Q2) Emergency Spillway

h (ft. above low flow outlet)	h_p (ft. above spillway crest)	h_{ec}* (head in spillway)	Q** (cfs)
3	0	0	0
3.5	.5	—	—
4	1	.665	77
4.5	1.5	1.10	167
5	2	1.54	287
5.5	2.5	1.99	425
6	3	2.44	585
6.5	3.5	2.91	780
7	4	3.40	1005
7.5	4.5	3.88	1250
8	5	4.37	1520

* S.C.S. T.R. #39, figure ES-171 sheet 4, h_{ec} vs. h_p for b=100 ft, 2:1 side slopes, Case 4 spillway. h_{ec} vs. h_p relationship is nearly independent of b, side slopes

** S.C.S T.R. #39, ES-175, sheets 2/9, 5/9, Q vs. h_{ec} for b=45', 3:1 side slopes.

(Q3) over top of dam ($h > 7$)

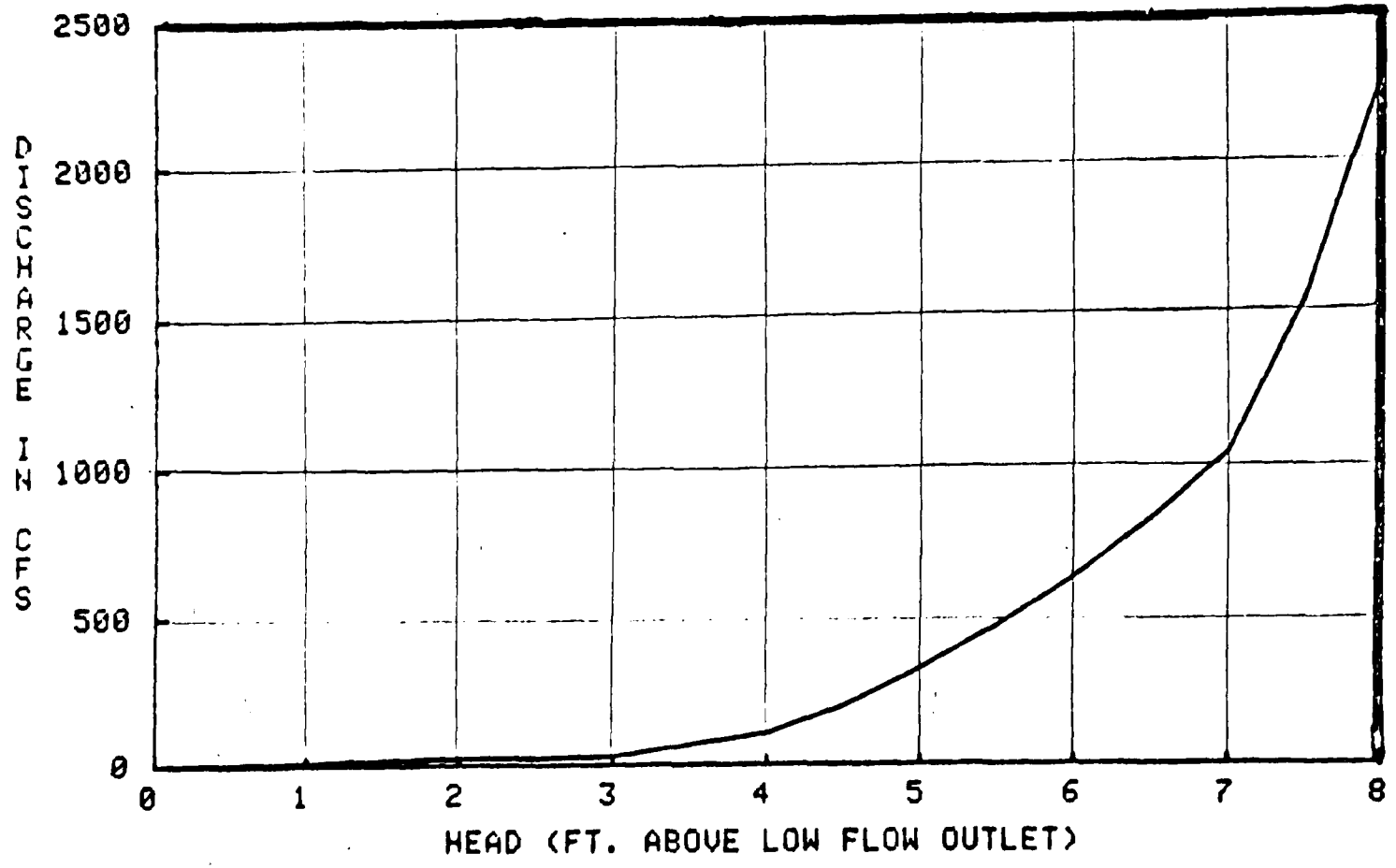
$$= 2.6\,(270)\,(h-7)^{3/2} + 2.6(7)(h-7)\,(.5(h-7))^{3/2}$$

C = 2.6 for broad-crested weir w/ gross

Stage vs. Discharge:

Elevation (Ft. msl)	h (Ft. above low flow outlet)	principal Spillway Discharge (cfs)	Emergency Spillway Discharge (cfs)	Top of Dam (cfs)	Total Discharge (cfs)
830	0	0	0	0	0
830.5	.5	2.8	0	0	2.8
831	1	8.0	0	0	8.0
831.5	1.5	18.1	0	0	18.1
832	2	20.9	0	0	20.9
832.5	2.5	23.4	0	0	23.4
833	3	25.6	0	0	25.6
834	4	29.6	77	0	107
834.5	4.5	31.4	167	0	198
835	5	33.0	287	0	320
835.5	5.5	34.7	425	0	460
836	6	36.2	585	0	621
836.5	6.5	37.7	780	0	818
837	7	39.1	1005	0	1040
837.5	7.5	40.5	1250	249	1540

STAGE-DISCHARGE CURVE FOR SOUHEGAN R. W. DAM # 15



Storage Elevation Curve

Storage-elevation data is given on pp. 12-14 of the SCS "Hydrology and Hydraulics" calculations

elevation (Ft. msl)	h (Ft above low flow Outlet)	Current Storage (Ac-Ft)	Available Storage (50 yr S) (Ac-Ft.)	Current Surface Area (Acres)
824	-6	0	0	.018
826	-4	.6	0	.57
828	-2	3	0	1.84
830	0	74	0	69.2
832	2	226	150	82.8
834	4	403	326	94.6
836	6	603	526	105.1
838	8	822	745	114.0
840	10	1058	981	122.2
842	12	1310	1233	129.8

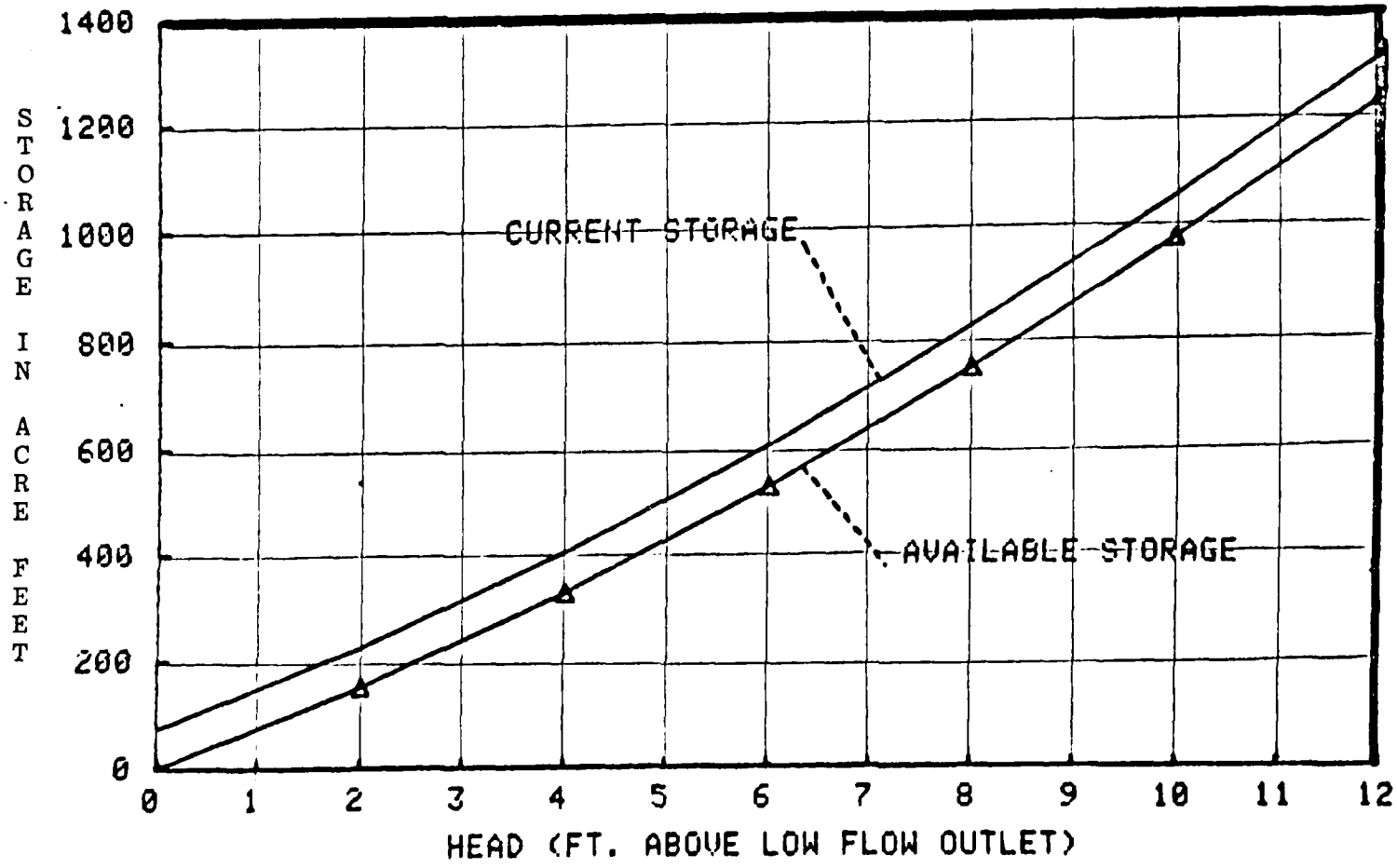
This curve is plotted on p. 6.

For the drainage area of 672 acres, 1 inch of runoff = 1/12(672) = 56 Ac-Ft

Available storage to emergency spillway crest = 1/56 (238) = 4.25" of runoff.

Available storage to dam crest = 1/56 (635.5) = 11.35" of runoff.

ELEVATION-STORAGE CURVE FOR SOUHEGAN R. W. DAM # 15



Dam Failure Analysis

Pg. D-24 is a location and downstream hazard map for SRW Dam #15.

The first question to be addressed in the Dam failure analysis is the assumed water surface elevation at dam failure. The normal assumption is that failure occurs with the water surface at the top of the dam. This would yield a pre-failure outflow of 1040 cfs, which is greater than the routed PMF outflow at the dam, and would cause most of the damage which might occur downstream before dam failure. Therefore, for this analysis failure is assumed to occur with the water surface at the SCS design high water of 835.35 ft MSL, h = 5.35 ft, 1.65 ft. below the dam crest. This represents 2.35 ft of flow in the emergency spillway, and a pre-failure outflow of 420 cfs. Available storage at this elevation is 461 ac-ft.

Peak failure outflow = normal outflow + Breach outflow

Normal outflow = 420 cfs

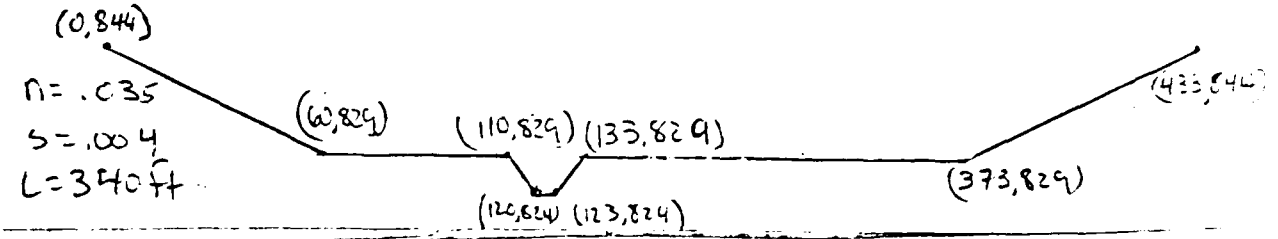
Breach outflow: $Q_p = 8/27 \sqrt{g}\, W_b\, y_o^{3/2}$

where: W_b = breach width = 40% of width of dam at half height

= .4(160) = 64 ft. (width from sheet 4 of SCS plans)

y_o = height above tailwater at time of failure.

The tailwater elevation at this dam is tricky to figure. The channel downstream of the dam for about 340 ft. is described by this cross-section, based on field notes, USGS topo information, & the SCS plans for SRWD #15



A stage-normal flow relationship for this reach is given on p. 10. 340' downstream of the dam, King Brook (the stream the dam is on) passes under Heald Road, a dirt road on an earth embankment, through a 30" rcp. The top of the road is at 833' MSL, 4 ft below the top of SRW Dam #15. At high flows this embankment would create a very high tailwater at the dam if it held. However, there are two reasons that backwater effects from Heald Road should be ignored:

① The road could easily be rebuilt in the future to cross King Brook in some other way (ie., bridge).

② The current embankment would probably wash out at high flows

Since the back water from this road would make y_o (and therefore dam failure outflow) very small, it is more conservative to assume that Heald Rd. embankment is not in place

DEPTH	ELEV	APER	WPER	HYD-R	AR2/3	Q
0.00	824.0	0.0	0.0	0.0	0.0	0.0
0.50	824.5	2.5	5.2	0.4	1.1	2.8
1.00	825.0	5.0	7.5	0.7	3.8	10.3
1.50	825.5	9.0	9.7	0.9	8.6	23.0
2.00	826.0	14.0	11.9	1.2	15.6	41.9
2.50	826.5	20.0	14.2	1.4	25.2	67.7
3.00	827.0	27.0	16.4	1.6	37.6	101.3
3.50	827.5	35.0	18.7	1.9	53.3	143.4
4.00	828.0	44.0	20.9	2.1	72.3	194.7
4.50	828.5	54.0	23.1	2.3	95.1	256.0
5.00	829.0	65.0	25.4	2.6	121.8	327.9
5.50	829.5	202.5	219.5	0.9	174.8	470.6
6.00	830.0	382.0	223.6	1.2	426.7	1148.9
6.50	830.5	543.5	227.7	1.7	761.6	2050.6
7.00	831.0	701.0	231.9	2.1	1170.9	3152.5
7.50	831.5	872.5	236.0	2.6	1649.0	4439.7
8.00	832.0	1040.0	240.1	3.1	2191.9	5901.5
8.50	832.5	1209.5	244.2	3.5	2796.6	7529.7
9.00	833.0	1381.0	248.3	4.0	3460.8	9318.2
9.50	833.5	1554.5	252.5	4.4	4182.7	11261.6
10.00	834.0	1730.0	256.6	4.9	4960.5	13355.9
10.50	834.5	1907.5	260.7	5.3	5793.0	15597.5
11.00	835.0	2087.0	264.8	5.7	6679.2	17983.4
11.50	835.5	2268.5	269.0	6.1	7618.0	20511.1
12.00	836.0	2452.0	273.1	6.6	8608.7	23178.4
12.50	836.5	2637.5	277.2	7.0	9650.5	25983.5
13.00	837.0	2825.0	281.3	7.4	10742.9	28924.6
13.50	837.5	3014.5	285.5	7.8	11885.3	32000.5
14.00	838.0	3206.0	289.6	8.2	13077.2	35209.8
14.50	838.5	3399.5	293.7	8.6	14318.4	38551.6
15.00	839.0	3595.0	297.8	9.0	15608.4	42024.8
15.50	839.5	3792.5	401.9	9.4	16946.9	45628.6
16.00	840.0	3992.0	406.1	9.8	18333.6	49362.5
16.50	840.5	4193.5	410.2	10.2	19768.5	53225.6

340' reach just downstream of dam.

as it may not be in the future.

Therefore, we will use the normal flow depth in the channel just downstream of the dam to establish the tailwater elevation.

At 420 cfs pre-failure flow, tailwater elevation = 829.3 ft. MSL.

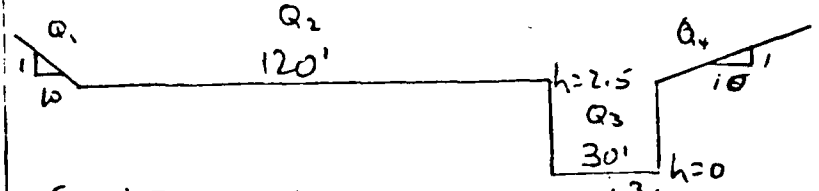
$y_0 = 835.35 - 829.3 = 6.05$ ft.

$Q_{P_1} = 8/27 \sqrt{g} (64) (6.05)^{3/2} = 1600$ cfs

Peak failure outflow = 1600 + 420 = 2020 cfs

This would increase the tailwater elevation by 1.2 ft to 830.5 ft. MSL.

The peak failure outflow might wash out the Heald Rd. embankment, if that had not already been done by the pre-failure outflow. About 100 ft. downstream of Heald Rd., the brook enters Batchelder pond, which has a surface area of about 7 acres. The following cross-section of Batchelder Pond Dam is based on field notes.



for $h \geq 0$, $Q_3 = 30 (2.6) h^{3/2}$, $Q_1 = Q_2 = Q_4 = 0$

for $h \geq 2.5$, $Q_1 = 2.8 (10)(h-2.5) (.5(h-2.5))^{3/2} = Q_4$

$Q_2 = 2.8 (120) (h-2.5)^{3/2}$

C = 2.6 for overgrown broad-crested weir = 2.8 for broad-crested weir

Pp. 12-13 gives a BASIC program to calculate the Stage-Discharge relation

```
LIST
100 REM - STAGE/DISCHARGE RELATIONSHIP FOR BATCHELDER POND DAM
110 PAGE
120 PRINT "STAGE-DISCHARGE RELATIONSHIP FOR BATCHELDER POND DAM"
121 PRINT "JJ"
130 PRINT " STAGE                DISCHARGE"
140 PRINT " (FT.)                  (CFS)   "
150 PRINT "                TOTAL      TOP OF DAM      SPILLWAY"
160 FOR H=1 TO 10 STEP 0.5
170 Q1=0
180 Q2=0
190 Q4=0
200 Q3=30*2.6*H↑1.5
210 IF H<2.5 THEN 250
220 Q1=2.8*10*(H-2.5)*(0.5*(H-2.5))↑1.5
230 Q4=Q1
240 Q2=2.8*120*(H-2.5)↑1.5
250 T2=Q1+Q2+Q4
260 T1=T2+Q3
270 PRINT USING 280:H,T1,T2,Q3
280 IMAGE 3D.2D,11D,14D,14D
290 NEXT H
300 END
```

STAGE-DISCHARGE RELATIONSHIP FOR BATCHELDER POND DAM

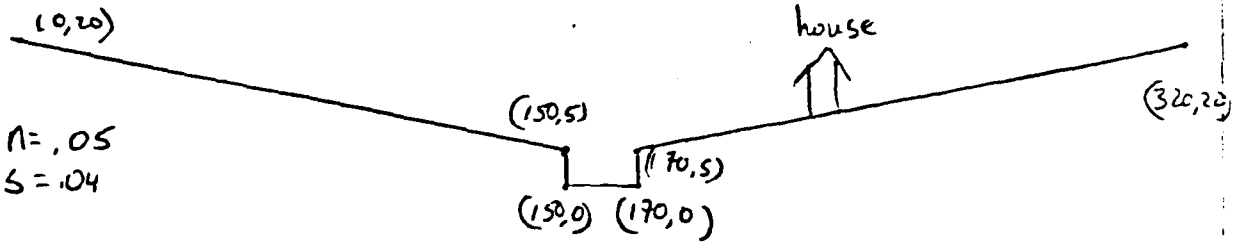
STAGE (FT.)	DISCHARGE (CFS) TOTAL	TOP OF DAM	SPILLWAY
1.00	78	0	78
1.50	143	0	143
2.00	221	0	221
2.50	308	0	308
3.00	528	122	405
3.50	867	356	511
4.00	1296	672	624
4.50	1807	1062	745
5.00	2396	1524	872
5.50	3061	2055	1006
6.00	3800	2654	1146
6.50	4614	3322	1293
7.00	5503	4058	1445
7.50	6465	4863	1602
8.00	7503	5739	1765
8.50	8617	6684	1933
9.00	9807	7701	2106
9.50	11073	8790	2284
10.00	12418	9951	2467

The attenuation due to storage in Batchelder pond is calculated on p. 15. Storage (in acre-feet) is assumed = 7(h). The pre-failure outflow of 420 cfs yields a stage of 2.75 ft, .25 ft. over the dam crest.

The attenuated peak dam failure outflow of 1960 cfs would increase the stage at Batchelder Pond Dam by 1.9 ft to 4.65 ft, which is 2.15 ft over the dam crest. That stage would possibly cause failure of the earth dam.

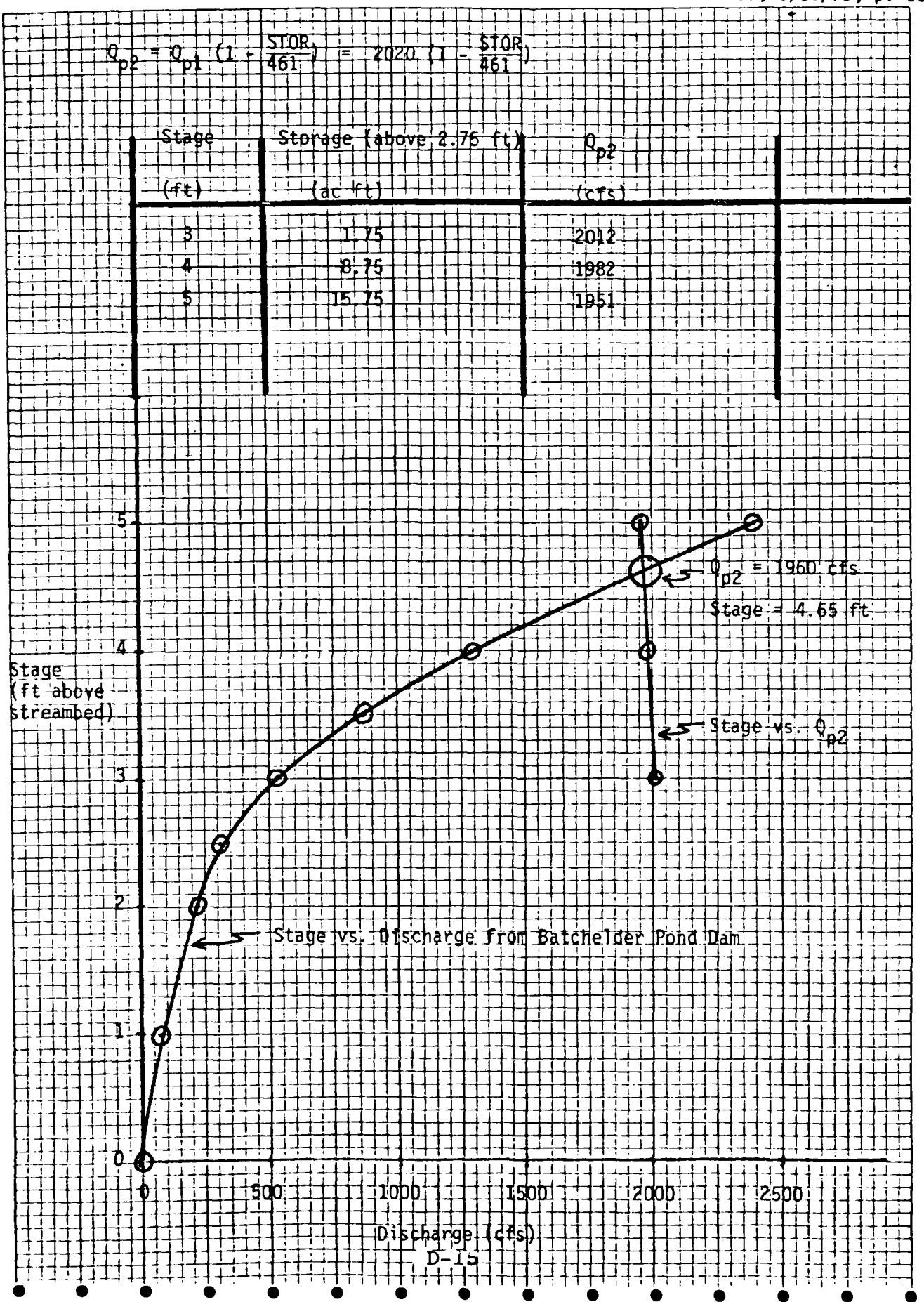
About 500 ft. downstream of Batchelder Pond Dam, King Brook is crossed by a secondary road. The brook goes under the road through a 36" reinforced concrete pipe. This road would be overtopped by the pre-failure flow of 420 cfs, and badly overtopped and possibly washed out by the failure flow of 1960 cfs (assuming negligible attenuation between Batchelder Pond Dam and the road).

Just downstream of this road there is a house about 10 ft. above the streambed. The following approximate cross-section of King Brook at this point is based on field notes.



$$Q_{p2} = Q_{p1}\left(1 - \frac{STOR}{461}\right) = 2020\left(1 - \frac{STOR}{461}\right)$$

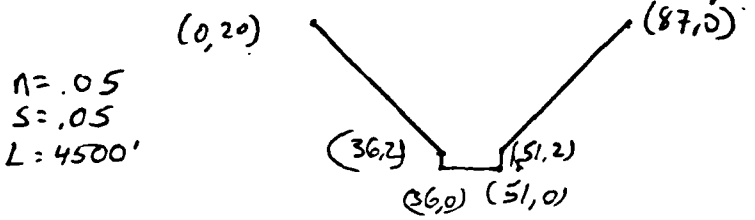
Stage (ft)	Storage (above 2.75 ft) (ac ft)	Q_{p2} (cfs)
3	1.75	2012
4	8.75	1982
5	15.75	1951



The Stage-Normal Flow curve for this cross-section is given on p.17. At the pre-failure flow of 420 cfs, the stage would be 2.3 ft. 1960 cfs would create a stage of 6.9 ft, which would not cause flooding at the house.

Downstream of this house King Brook runs about 4500' to New Hampshire Highway 31. After running under N.H. 31, King Brook enters the Souhegan River. The stream in this reach is narrow and very steep, with high, steep banks. The brook is paralleled by a secondary road, which crosses the brook four times in this reach. The road crossings would not significantly attenuate peak dam failure outflows and would possibly be washed out by the flow.

The following typical cross-section for this reach is based on field notes and U.S.G.S. topo information.



The Stage-Normal Flow relationship for this reach is given on p.18. The pre-failure flow of 420 cfs would yield a stage of 2.45 ft

The attenuated peak dam failure outflow at Highway 31 is given on p.19 as 1925 cfs. The following cross-section at Highway 31 is based on field notes:

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	0.0	0.0	0.0	0.0	0.0	0.0
1.00	1.0	20.0	22.0	0.9	18.8	111.9
2.00	2.0	40.0	24.0	1.7	56.2	335.2
3.00	3.0	60.0	26.0	2.3	104.8	624.7
4.00	4.0	80.0	28.0	2.9	161.1	960.4
5.00	5.0	100.0	30.0	3.3	223.2	1330.5
6.00	6.0	130.0	50.1	2.6	245.6	1463.5
7.00	7.0	180.0	70.2	2.6	337.3	2010.4
8.00	8.0	250.0	90.3	2.8	493.1	2938.8
9.00	9.0	340.0	110.4	3.1	720.0	4291.1
10.00	10.0	450.0	130.5	3.4	1027.5	6124.1
11.00	11.0	590.0	150.6	3.9	1425.7	8497.2
12.00	12.0	730.0	170.7	4.3	1924.3	11468.6
13.00	13.0	900.0	190.8	4.7	2532.7	15094.7
14.00	14.0	1090.0	210.9	5.2	3260.1	19430.3
15.00	15.0	1300.0	231.0	5.6	4115.5	24528.1
16.00	16.0	1530.0	251.1	6.1	5107.2	30439.1
17.00	17.0	1780.0	271.2	6.6	6243.8	37213.1
18.00	18.0	2050.0	291.3	7.0	7533.2	44898.1
19.00	19.0	2340.0	311.4	7.5	8983.4	53541.3
20.00	20.0	2650.0	331.5	8.0	10602.1	63188.5

KING BROOK AT HOUSE DOWNSTREAM OF BATCHELDER POND

P.17

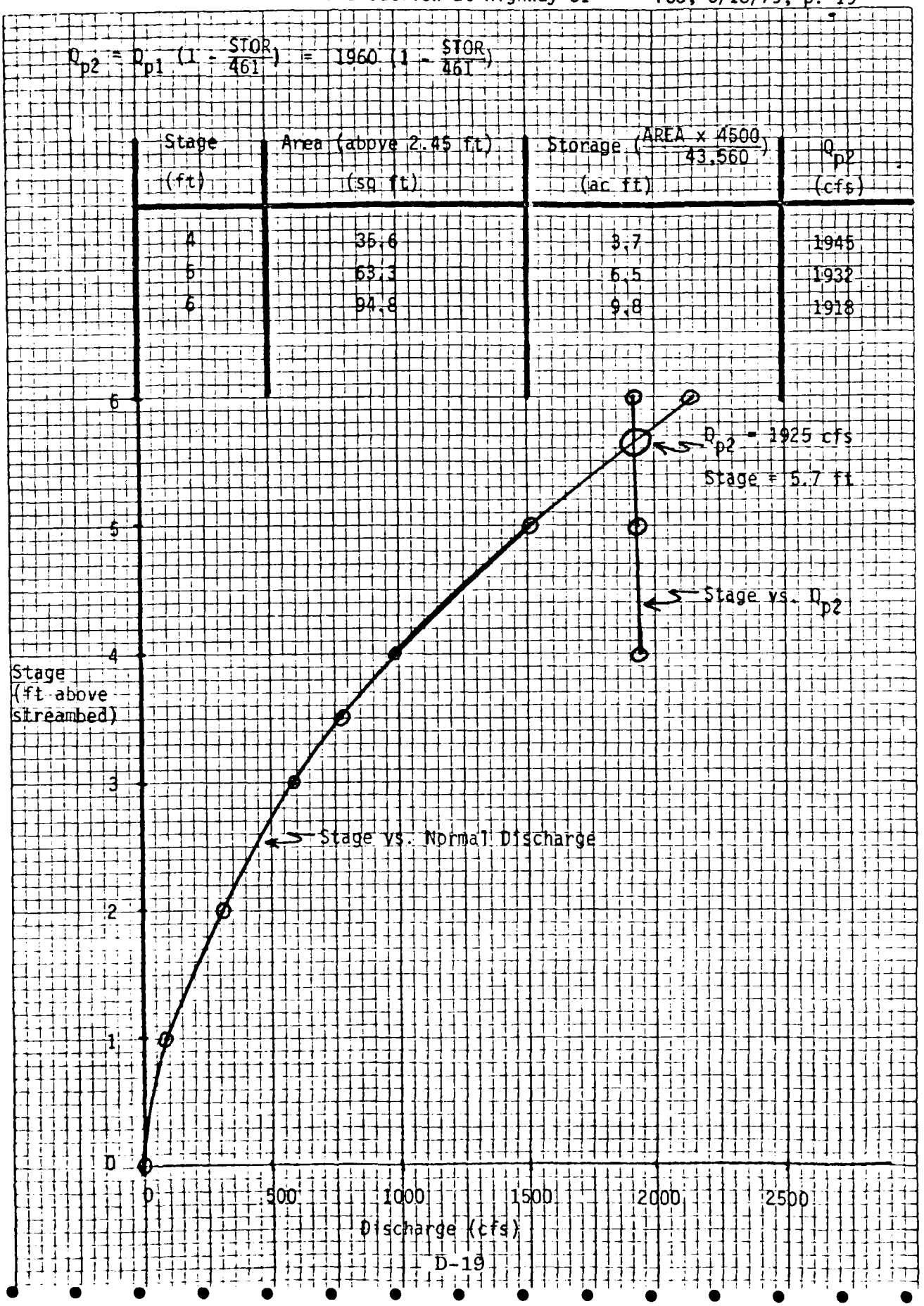
DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	0.0	0.0	0.0	0.0	0.0	0.0
0.50	0.5	7.7	16.5	0.5	4.6	31.0
1.00	1.0	15.9	18.0	0.9	14.6	97.2
1.50	1.5	24.4	19.5	1.3	28.4	189.3
2.00	2.0	33.4	21.0	1.6	45.6	304.0
2.50	2.5	43.1	23.1	1.9	65.4	435.7
3.00	3.0	53.7	25.2	2.1	89.0	593.1
3.50	3.5	65.3	27.3	2.4	116.7	777.5
4.00	4.0	77.7	29.4	2.6	148.6	990.1
4.50	4.5	91.1	31.5	2.9	184.9	1232.3
5.00	5.0	105.4	33.6	3.1	225.9	1505.3
5.50	5.5	120.7	35.7	3.4	271.7	1810.6
6.00	6.0	136.9	37.9	3.6	322.5	2149.2
6.50	6.5	154.0	40.0	3.9	378.6	2522.5
7.00	7.0	172.0	42.1	4.1	440.0	2931.7
7.50	7.5	191.0	44.2	4.3	506.9	3378.0
8.00	8.0	210.9	46.3	4.6	579.7	3862.7
8.50	8.5	231.7	48.4	4.8	658.3	4386.8
9.00	9.0	253.4	50.5	5.0	743.1	4951.7
9.50	9.5	276.1	52.6	5.2	834.1	5558.3
10.00	10.0	299.7	54.7	5.5	931.6	6208.0
10.50	10.5	324.3	56.8	5.7	1035.8	6901.7
11.00	11.0	349.7	59.0	5.9	1146.6	7640.7
11.50	11.5	376.1	61.1	6.2	1264.5	8425.9
12.00	12.0	403.4	63.2	6.4	1389.5	9258.6
12.50	12.5	431.7	65.3	6.6	1521.7	10139.7
13.00	13.0	460.9	67.4	6.8	1661.4	11070.4
13.50	13.5	491.0	69.5	7.1	1808.6	12051.7
14.00	14.0	522.0	71.6	7.3	1963.6	13084.6

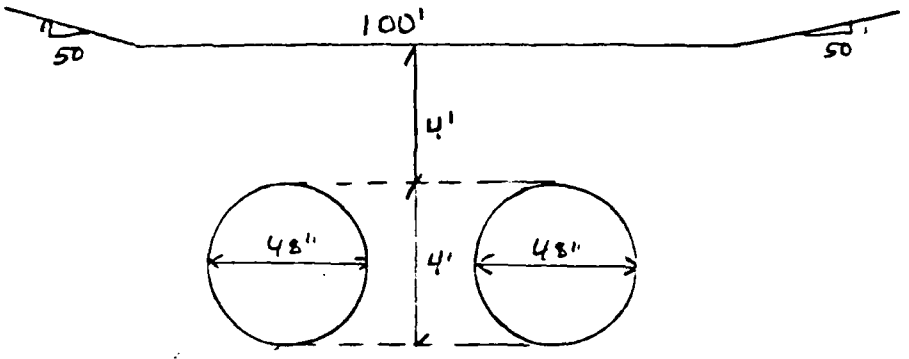
12.18

REACH FROM HOUSE D/S OF BATCHELDER POND TO HIGHWAY 31

$$Q_{p2} = Q_{p1}\left(1 - \frac{STOR}{461}\right) = 1960\left(1 - \frac{STOR}{461}\right)$$

Stage (ft)	Area (above 2.45 ft) (sq ft)	Storage $\left(\frac{AREA \times 4500}{43,560}\right)$ (ac ft)	Q_{p2} (cfs)
4	35.6	3.7	1945
5	63.3	6.5	1932
6	94.8	9.8	1918





From F.H.W.A. Hydraulic Engineering Circular #5, "Hydraulic charts for the selection of Highway Culverts", It is estimated that with the water surface at the top of the road, the culverts will handle 290 cfs. In the range of stage we are considering, this value could be taken as constant.

Flow over Road:

$$Q = 3.0\,(100)(h)^{3/2} + 2\left[3.0\,(50(4h))(.5(h))^{3/2}\right]$$

Stage (ft. above Road)	Q (cfs)
0	0
.5	115
1	406
1.5	843
2	1449
2.5	2234

Thus, the pre-failure flow of 420 cfs would have 420-290 = 130 cfs flowing over the road, yielding about 6" of flow. After failure, the flow over the road would be = 1960-290 = 1670 cfs

which would result in about 2.15 ft of flow over the road, an increase of 1.6 ft. It seems likely that this depth of flow, considering the high velocities to be expected, would severely damage or destroy the Highway 31 embankment at this point. It is probable that there would be interruption in the use of Highway 31 following dam failure.

Immediately after passing under Highway 31, King Brook flows into the Souhegan River. The attenuated peak dam failure outflow of 1925 cfs would have little impact in the Souhegan, and would be quickly attenuated in the larger river channel.

Test Flood Analysis

Size Classification: SMALL
Hazard Classification: SIGNIFICANT

The hazard classification is SIGNIFICANT due to the potential for serious damage to Highway 31 in the event of dam failure. Potential for damage to secondary highways is given as a reason for SIGNIFICANT classification in the COE "Recommended Guidelines."

Test Flood = 100 yr. to ½ PMF.

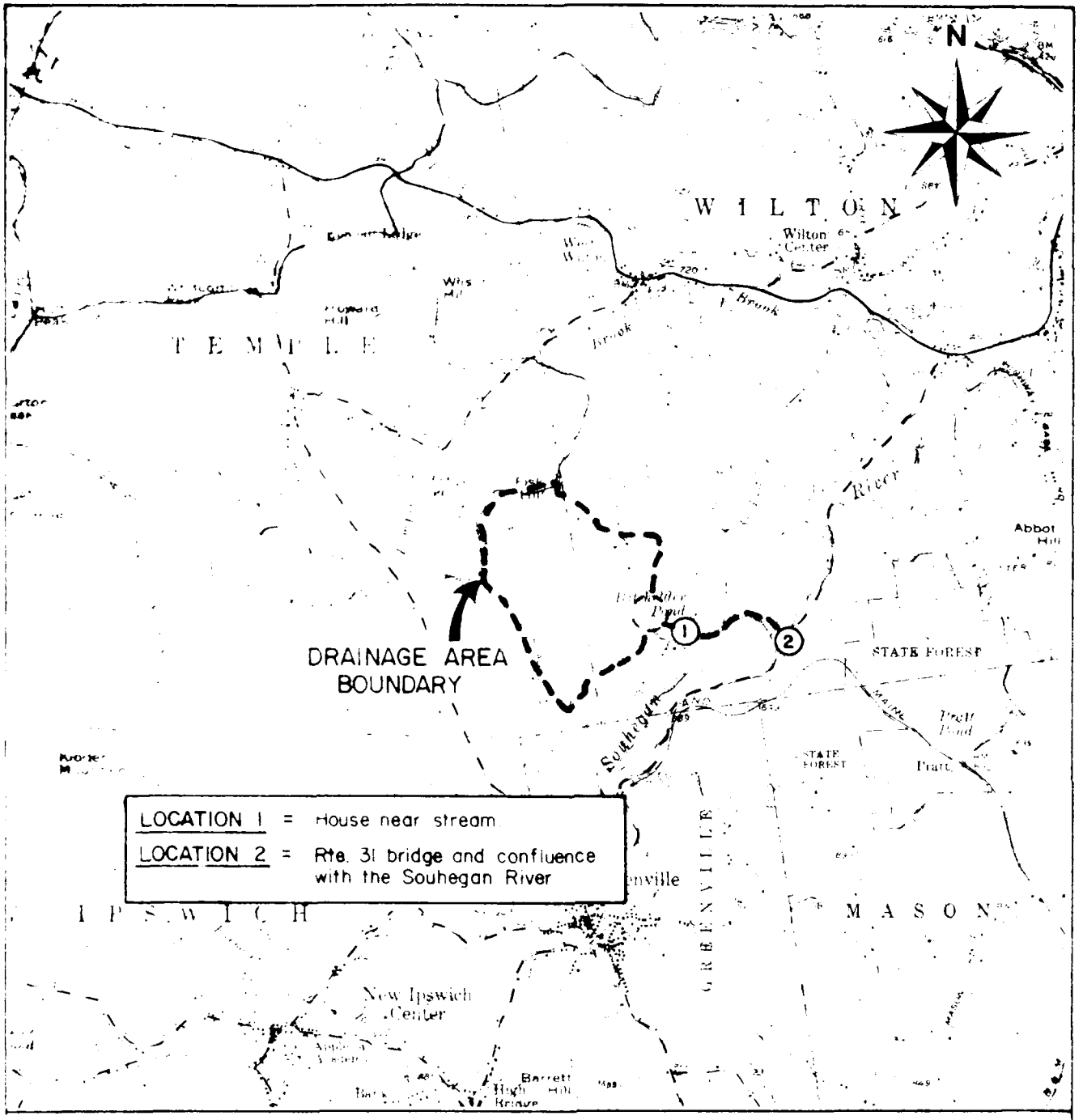
When there is a range of suggested Test Flood inflows at a site, the COE "Recommended Guidelines" suggest using the value most closely relating to the hazard potential. Since this dam is on the low side of SIGNIFICANT, we will use the 100 yr. flood as the test flood inflow.

P. 19 of the SCS calculations gives a 100 yr. inflow of 574 cfs. However, the SCS calculations show that this inflow, which they calculate to yield a stage of 832.1 ft MSL and a peak outflow of 20 cfs, does not yield the 100 year peak stage at the reservoir. P18 of the SCS calculations shows that to store the 100 yr. peak long-duration storm volum

of 3.5" requires a stage of 832.6 ft MSL, an outflow of 24 cfs. This elevation is 2.6 ft above normal pool, and 4.4 ft. below the dam crest.

Drawdown Time

According to p. 32 of the SCS calculations, the drawdown time from the emergency spillway crest (833 ft MSL) to 830.9 ft MSL is 6 days.



– SCALE –

2 0 2 Miles

FROM U.S.G.S. PETERBOROUGH – N.H. AND MASS. E MAPS

GOLDBERG, ZOINO, DUNNICLIFF & ASSOC., INC
GEOTECHNICAL CONSULTANTS
NEWTON UPPER FALLS, MASS

U.S. ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION AND DOWNSTREAM HAZARD MAP

SOUHEGAN RIVER
WATERSHED DAM No. 15 NEW HAMPSHIRE

FILE No. 22101

			SCALE AS NOTED
			DATE APRIL 1979

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) STATE	(2) IDENTITY NUMBER	(3) DIVISION	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST.	(10) NAME	(14) LATITUDE (NORTH)	(15) LONGITUDE (WEST)	(16) REPORT DATE DAY | MO | YR
NH	263	NED	NH	011	02				SOUHEGAN RIVER WATERSHED DAM NO 15	4247.8	7148.3	30JUL79

(17) POPULAR NAME	(18) NAME OF IMPOUNDMENT

(13) REGION	(14) BASIN	(17) RIVER OR STREAM	(18) NEAREST DOWNSTREAM CITY – TOWN – VILLAGE	(19) DIST FROM DAM (MI.)	(20) POPULATION
01	05	KING BROOK	WILTON	4	2276

(21) TYPE OF DAM	(22) YEAR COMPLETED	(23) PURPOSES	(24) STRUCTURAL HEIGHT (FT.)	(25) HYDRAULIC HEIGHT (FT.)	(26) IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	(27) NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
PGRE	1964	C	13	13	708	74	NED	N	N	N	B	

(28) REMARKS

(29) O/S HAS	(30) SPILLWAY CREST LENGTH	(31) SPILLWAY TYPE	(32) SPILLWAY WIDTH (FT.)	(33) MAXIMUM DISCHARGE (FT.)	(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.)
2	260	U	45	1040												

(46) OWNER	(47) ENGINEERING BY	(48) CONSTRUCTION BY
NH WATER RESOURCES BOARD	USDA SCS	

(49) REGULATORY AGENCY DESIGN	(50) CONSTRUCTION	(51) OPERATION	(52) MAINTENANCE
NONE	NONE	NONE	NONE

(53) INSPECTION BY	(54) INSPECTION DATE DAY | MO | YR	(55) AUTHORITY FOR INSPECTION
GOLDBERG ZOINO DUNNICLIFF + ASSOC	30APR79	PUBLIC LAW 92-367

(56) REMARKS

END

FILMED

8-85

DTIC