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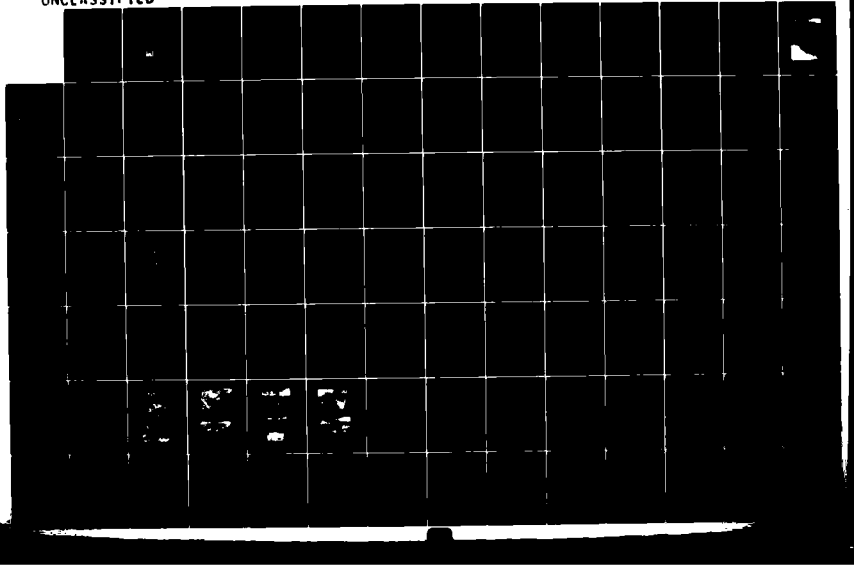

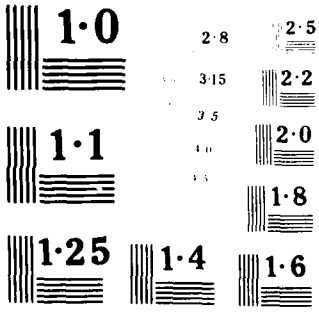
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MERRIMACK RIVER BASIN

NEW IPSWICH, NEW HAMPSHIRE

SOUHEGAN RIVER WATERSHED
DAM NO. 13

NH 00432 & 00481

NHWRB 175.20

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

DECEMBER 1979

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM MASSACHUSETTS 02154

NEDED

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. 13 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.

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

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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18 SUPPLEMENTARY NOTES

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
New Ipswich, New Hampshire
unnamed tributaries of the Souhegan River

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

The dam is about 500 ft. long and 15.5 ft. high. An earth emergency spillway 112 ft. wide is cut into the right abutment. It is small in size with a significant hazard potential. The dam is in good condition at the present time. No conditions were observed which require further investigation. There are various remedial measures which must be implemented by the owner.

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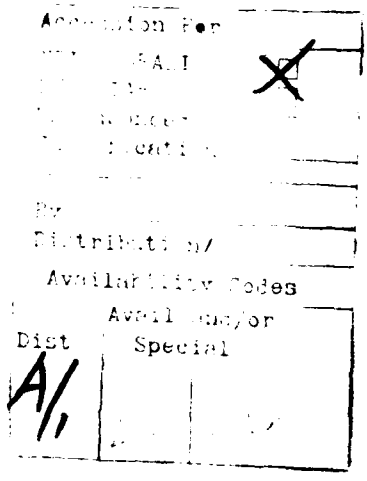
SOUHEGAN RIVER WATERSHED DAM NO. 13
NH 00432 and NH 00481



MERRIMACK RIVER BASIN
HILLSBOROUGH COUNTY, NEW HAMPSHIRE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

PHASE I REPORT

Idenfification No.:	Dam NH 00432; Dike NH 00481
NHWRB No.:	175.20
Name of Dam:	SOUHEGAN RIVER WATERSHED DAM NO. 13
Town:	New Ipswich
County and State:	Hillsborough County, New Hampshire
Stream:	Unnamed Tributary of the Souhegan River
Date of Inspection:	August 30, 1979

BRIEF ASSESSMENT

The Souhegan River Watershed Dam No. 13 is located on an unnamed tributary of the Souhegan River, approximately 2 miles upstream of the Town of Greenville, New Hampshire. The dam is located in the township of New Ipswich, New Hampshire. It consists of two earth embankment sections known as the main dam and the east dike. The main dam is 500 feet long and 13.5 feet high with a dro inlet service spillway structure and a 30 inch outlet conduit. The east dike is 620 feet long and 9.5 feet high with no outlet facilities. An earth emergency spillway 112 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 0.8 square miles and is made up primarily of rolling woodland. The dam impounds 13.6 acre-feet at low stage and has a maximum impoundment of 278 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 one half of the Probable Maximum Flood. The peak inflow for this flood is 1020 cfs. Because of storage, the resulting discharge is 165 cfs compared to a spillway capacity of 1052 cfs. The water surface would be at elevation 974.9 feet (MSL) or 1.6 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: Removing shrubs or saplings and filling the holes left by their roots, filling in animal burrows, mowing slopes, operating the pond drain gate as part of the annual inspection, and developing a formal written emergency warning system for the dam. No conditions were observed which require further investigation.

The remedial measures outlined above should be implemented within one year of receipt of this report by the owner and the program of annual technical inspections should be continued.

William S. Zoino
N.H. Registration 3226

Nicholas A. Campagna, Jr.
California Registration 21006

This Phase I Inspection Report on Souhegan River Watershed Dam No. 13 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 judgement and practice, and is hereby submitted for approval.

Joseph W. Finegan

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Joseph A. McElroy

JOSEPH A. MCELROY, CHAIRMAN
Chief, NED Materials Testing Lab.
Foundations & Materials 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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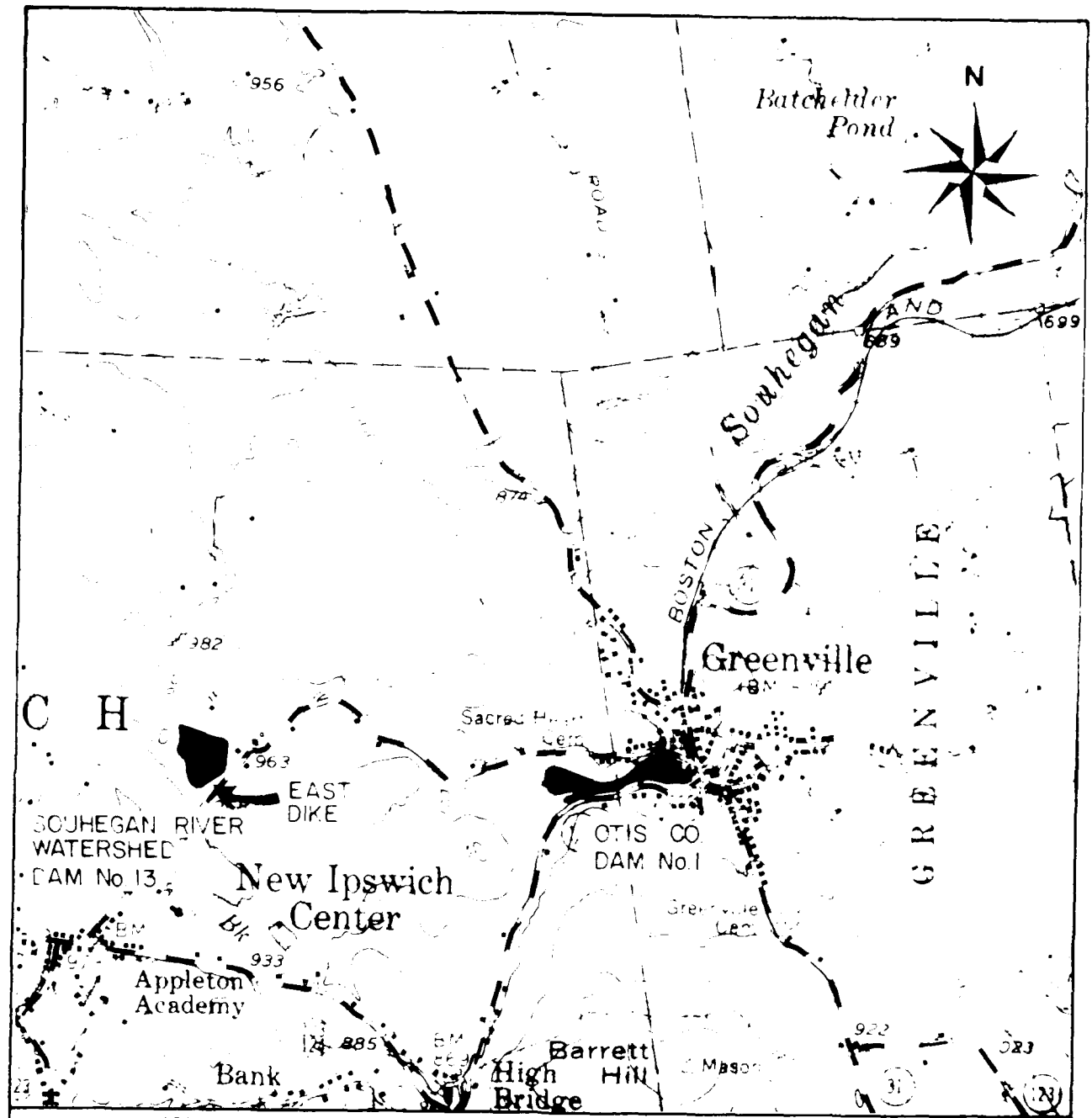
Overview from right abutment

Overview from left abutment



– SCALE –

FROM USGS PETERBOROUGH N H & WILTON E MAP

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

LOCUS PLAN

SOUHEGAN RIVER
WATERSHED DAM No 13

NEW IPSWICH, NEW HAMPSHIRE

FILE No 23.

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PHASE I INSPECTION REPORT

SOUHEGAN RIVER WATERSHED DAM NO. 13

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 August 28, 1979 from Colonel William E. Hodgson, Jr., 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. 13 is located on an unnamed brook approximately 2 miles upstream of Greenville, New Hampshire via the Souhegan River. The dam lies in the township of New Ipswich, New Hampshire and can be reached from Greenville Road which intersects State Route 124 in New Ipswich. The dam is shown on USGS Peterborough, N.H. quadrangle with coordinates approximately at N 42° 45.9', W 71° 50.7' (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 two earth embankment sections with an earthfill cutoff trench below each embankment, a principal spillway with a reinforced concrete riser and outlet pipe, and 112 feet wide emergency spillway located at the right abutment

(1) Embankment (See pages B-2, B-3, B-4, B-5, and B-9)

The two embankment sections are separated by approximately 200 feet of natural ground and bedrock outcrop. The two sections are oriented at an angle of approximately 142° 30' to each other.

The east dike is approximately 620 feet long and a maximum of 9.5 feet high. It is constructed primarily of Silty Sand. (Designation SM using the Unified Soil Classification System). There is a central core of silt (ML) extending the full height of the embankment. This core is 12 feet thick measured horizontally. Beneath the embankment is an earthfill cutoff trench which is 12 feet wide at the bottom. This cutoff trench lies just downstream of the central core and is made up of Silty Sand (SM). (See page B-7 for cross section).

The main dam embankment , which contains the principal spillway, is 500 feet long and a maximum of 135 feet high. It is constructed of silty sand with a silt core and silty sand cutoff trench in the same manner as the east dike. There is a blanket drain beneath the downstream slope of this section. It is of variable thickness and extends from the cutoff trench to the downstream toe of the embankment. It is made up of sand designated SM-SP.

The natural ground between the two embankment sections consists primarily of shallow bedrock and glacial till.

(2) Principal Spillway (See pages B-7 and B-8)

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 inside dimensions of the riser structure are 5.0 feet high, 3.0 feet wide, and 5.0 feet long perpendicular to the axis of the dam. The walls of the structure are 10 inches thick and the top slab is 8 inches thick. The structure is founded on bedrock.

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 3 feet above the sluice gate invert. It is 20 inches wide and 8 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 trash rack assembly approximately 2 feet, 9 inches high and 2 feet, 6 inches wide. This assembly is fabricated from painted steel angle sections.

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 96 feet long and drops approximately one-half 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 antiseep collars cast around the pipe within the embankment.

The downstream end of the pipe and cradle extend approximately 16 feet downstream of the embankment. The cradle is supported by a reinforced concrete tee bent on a 3 foot square, spread footing. The top flange of this bent is 12 inches thick, 24 inches deep and 4.5 feet wide. The discharge conduit outlets into a stone revetted plunge pool.

(3) Emergency Spillway (See pages B-2, B-3, and B-4)

The grass covered emergency spillway was excavated in earth within the right abutment. It curves to the left around the embankment and is 112 feet wide at the control section. It is approximately 500 feet long and lies approximately 2.6 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 page B-6)

Toe drains extend from 30 feet to the left of the outlet and 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 278 acre feet and height of 14 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 and possible loss of a few lives 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, Concord, New Hampshire 03301. They can be reached by telephone at (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 numbe 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 0.8 square mile 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 1963.

(i) Normal Operating Procedure

The dam is normally self regulating. The pond drain gate is operated on a once in 4 to 5 year basis.

1.3 Pertinent Data

(a) Drainage Area

The drainage area for this dam covers 0.8 square mile 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 973.9 feet (MSL). The invert of the principal orifice is at elevation 966.5 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 (976.5 feet MSL) is 20 cfs. The capacity of the emergency spillway is 1,032 cfs at this level.

4) Ungated Spillway Capacity At Test Flood

The capacity of the principal spillway with the reservoir at test flood elevation (974.9 feet MSL) is 18 cfs. The flow over the emergency spillway is 147 cfs 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 (974.9 feet MSL) is 165 cfs.

8) Project Discharge At Test Flood Elevation

The total project discharge at test flood elevation (974.9 feet MSL) is 165 cfs.

(c) Elevation (feet above MSL)

1) Streambed at centerline of dam: 963.0

2) Maximum tailwater: Unknown

3) Upstream portal invert diversion tunnel: Not applicable

4) Normal pool: 966.5

5) Full flood control pool: 973.9

6) Spillway crest:

a) Pond drain inlet: 963.0

b) Principal spillway inlet: 966.5

c) Emergency spillway: 973.9

7) Design surcharge: 974.9

8) Top dam: 976.5

9) Test flood design surcharge: 974.9

(d) Reservoir

1) Length of maximum pool: 3,000 feet

2) Length of normal pool: 1,200 feet

3) Length of flood control pool: 2,800 feet

(e) Storage (acre-feet)

1) Normal pool: 13.6

2) Flood control pool: 175

3) Spillway crest pool:

a) Principal inlet: 13.6

b) Emergency spillway: 175

4) Top of dam: 278

5) Test flood pool: 210

(f) Reservoir Surface (acres)

1) Normal pool: 10

2) Flood control pool: 35

3) Spillway crest pool:

a) Principal inlet: 10

b) Emergency spillway: 35

4) Test flood: 40

5) Top of dam: 44

(g) Dam

1) Type: Earth embankment

2) Length: Main Dam: 500 feet
East Dike: 620 feet

3) Height: Main Dam: 13.5 feet
East Dike: 9.5 feet

4) Top width: 12 feet

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

6) Zoning: Homogeneous Silty Sand (SM) with central core of Silt (ML). Main dam has blanket of sand (SM-SP) under the downstream toe and a 4 foot wide toe drain of sand and gravel with an 8 inch diameter perforated pipe.

7) Impervious core: 12 feet wide, silt (ML)

8) Cutoff: 12 feet wide, earth fill, silty sand

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: 1.67 ft.

c) Emergency spillway: 112 ft.

3) Crest elevation (ft. above MSL)

a) Pond drain inlet: 963.6

b) Principal inlet: 966.5

c) Emergency spillway: 973.9

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

5) Upstream channel: Reservoir

6) Downstream channel: Excavated channel leading 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 963.6 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, 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 judgement.

(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. 13 is in GOOD condition at the present time.

(b) Dam

1) Embankment (Photos No. 2,3,4,5, and 6)

The embankment slopes are covered with dense growth of grass, brush, and saplings. Three small animal burrows were noted at the downstream toe of the east dike.

2) Emergency Spillway (Photo No. 7)

The earth emergency spillway is in good condition. There are wet spots in the channel but these are caused by natural groundwater or ponded runoff.

(c) Appurtenant Structure

1) Drop Inlet Service Spillway Structure (Photo No.8)

This structure is in GOOD condition, at the present time, with no evidence of cracking or efflorescence. Localized spalling has occurred on the right side of the structure (see Photo 8) covering approximately 4 square inches. This spalling is approximately 1.5 inches deep. The face of the vent pipe pedestal shows localized spalling 1 inch deep over an area 7 inches long by 3.5 inches high. This spalling is attributed to excessive vibration of the concrete during placement. Portions of the trash rack assembly shows signs of severe corrosion (see Photo 8).

The bench stand operator is in good condition. The hand wheel has been removed from the site to prevent unauthorized use.

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 (Photo No. 9)

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.

(d) Reservoir Area (Photo No. 1)

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

(e) Downstream Channel (Photo No. 10)

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

3.2 Evaluation

The dam and its appurtenant structures are generally in good condition. The potential problems noted during the visual inspection are listed as follows:

a) Heavy brush growth on embankment slopes.

b) Three animal burrows in east dike embankment slopes.

c) Severe corrosion of trash rack assembly on drop inlet structure.

These indicate the need for improved routine maintenance.

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 4 or 5 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. Emphasis on routine maintenance will assist the owners in assuring the long-term performance of the dam. A formal, written downstream emergency warning system should be developed for this dam.

SECTION 5 - HYDRAULICS/HYDROLOGY

5.1 Evaluation of Features

(a) General

Souhegan River Watershed Dam No. 13 one of a series of floodwater retarding projects constructed by the Soil Conservation Service (SCS) on tributaries to the Souhegan River. This dam, completed in 1964, is located on a tributary to the Souhegan River approximately 2 miles upstream of Greenville, New Hampshire. It is an earthfill structure with an orifice controlled principal and a grass-lined emergency spillway channel. In addition, an earthfill dike has been constructed across a swale to the east of the main dam.

The watershed is rolling and almost completely forested. The drainage area at the dam is 518 acres or 0.81 square miles.

After a flood, a drawdown time of 7.9 days would bring the pool level down from the emergency spillway crest to normal level at the principal spillway crest. This is based on SCS design calculations .

(b) Design Data

The data sources available for Souhegan Watershed Dam No. 13 include the original Soil Conservation Service (SCS) "Hydrology and Hydraulics" design calculations. These calculations, dated 1962, establish storage-elevation and stage-discharge functions for the dam and develop flood hydrographs.

The SCS design drawings of the dam and spillway structures along with related outlet and drainage facilities are also available. These are dated 1962. As-Built modifications are indicated on one set of these drawings.

Some of the design criteria used were as follows. The elevation of the principal spillway outlet was set slightly above the level of the projected 50-year sediment acculmulation (966.5 MSL). The emergency spillway crest was set at the 100-year flood stage (973.9 MSL), and the dam crest (976.5 MSL) was set just above the maximum stage of the routed Freeboard Hydrograph which is equivalent to the PMF.

Additionally, there are SCS "Maintenance Checklist" reports of inspections of this dam dated May 10, 1977 and June 16, 1978.

(c) Experience Data

No records of flow or stage are known to be available for Souhegan Watershed Dam No. 13

(d) Visual Observations

Details of the embankment and spillway structures are presented in Sections 1.2 and 1.3.

The structure nearest the outlet channel downstream of the dam is a dwelling some 250 feet to the left which is elevated approximately 12 feet above the stream bed level. The man-made outlet channel ends at Greenville Road. This country road crosses the stream on a 7 foot embankment with two 24 inch concrete pipe culverts.

Further downstream, for the next 0.8 mile, the stream passes through a low, flat predominantly wooded area which offers a very extensive floodplain - 1,000 to 1,500 feet wide. There are no structures nearby.

The stream banks become more confined for the next half mile. The stream crosses Greenville Road two more times then, at the end of this reach, briefly takes on a very steep gradient. It then passes through a broad low lying field for a quarter mile before entering the Otis Co. Dam Reservoir in Greenville, where it joins with the Souhegan River. Except for the country road, there are no structures subject to flood damage near these last portions of the stream.

Below the dike to the east of the main dam, there are two homes which might be affected by the failure of the dike. The first, only 100 feet downstream of the the dike, is 200 feet to the left of, and 5 to 6 feet above, the deepest portion of the swale. The other is near the center of the swale about 350 feet downstream of the dike with a first floor elevation only 1 to 2 feet above the channel bottom.

Any dam break discharges which pass through this swale will cross Greenville Road about 400 feet downstream of the east dike and rejoin the main stream channel shortly thereafter.

(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 provided by the SCS were utilized in this analysis.

Guidelines for establishing a recommended Test Flood based on the size and hazard classifications of a dam are specified in the "Recommended Guidelines" of the Corps of Engineers. The impoundment of less than 1,000 acre feet and height of less than 40 feet classify this dam as a SMALL structure.

The hazard potential for the Souhegan Watershed Dam No. 13 is considered to fall within the SIGNIFICANT category. This is based mainly on the threat to the lives of the occupants of the dwelling which lies shortly downstream of the east dike, should the dike fail. The dwelling itself could be severely damaged if not destroyed. (Refer to Section 5.2, Dam Failure Analysis).

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 times the Probable Maximum Flood (PMF). As the hazard is on the high side of SIGNIFICANT because lives are jeopardized, one-half times the PMF is selected.

The Emergency Spillway Hydrograph developed by the SCS as part of the design calculations is of the order of magnitude of one-half the PMF. The peak value of this inflow hydrograph, 1,020 cfs, will be adopted as the Test Flood. In comparision, the Corps of Engineers New England Division's chart for "Maximum Probable Flood Peak Flow Rates" indicates that one-half the PMF for this dam from its 0.81 square mile watershed is approximately 810 cfs.

After accounting for the effect of storage in the flood control reservoir, the peak outflow through the spillway for this Test Flood was calculated by the SCE to be 165 cfs.

The SCS developed a stage-discharge curve for this dam defining discharge as the sum of flow through the principal spillway/outlet structure, and flow over the emergency spillway. Because this curve is based on a different emergency spillway configuration from that actually constructed, a slightly modified stage - discharge curve was developed as part of this investigation. The calculations determining this curve are outlined in Appendix D.

Using this stage-discharge curve, the peak discharge of 165 cfs would result in a maximum stage of approximately 974.9 feet MSL, 1.6 feet below the crest of the dam.

(f) Dam Failure Analysis

Main Dam

The peak outflow resulting from dam failure at the main dam of Souhegan Watershed Site No. 13 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". Failure is assumed to occur as soon as the dam crest is overtopped, at elevation 976.5 MSL. This is 13.5 feet above the natural streambed level. Just prior to failure, the normal outflow through the principal and emergency spillways would be 1,050 cfs, with a tailwater level estimated to be 11.0 feet below the dam crest. Assuming a 152 foot gap is opened in the dam, the peak failure outflow through this gap would be 10,370 cfs.

This outflow would result in an estimated flood depth downstream of the dam of 8 to 9 feet, a 4 to 5 foot increase over the assumed prefailure flow conditions. Dwelling near the dam would not be threatened.

Rapid attenuation of the dam failure flood wave would take place downstream, because the temporary storage capacity in the floodplain areas adjoining the stream and in the Otis Company Dam pond is siginficant in relation to the volume stored behind the dam. Failure of SWD 13 is not considered a threat to the Otis Company Dam #1, or to homes and businesses in Greenville.

East Dike

The peak outflow that would result from failure of the east dike has been estimated using the same procedure as for the main dam. Failure is assumed to occur as soon as the dam crest is overtopped, at elevation 976.5 MSL. As there is no outlet there would be no outflow below the east dike prior to failure. Assuming a 168 foot gap is opened in the dike, the peak failure outflow through this gap would be 8,270 cfs.

Downstream of the east dike, this outflow would result in an estimated flood depth of 7 feet. One home would incur 1 to 2 of flooding under these conditions, but, being far removed from the main flow path, velocities would not be great. Another home near the center of the swale would be subject to flooding 5 to 6 feet deep with very high velocities and a rapid rate of rise, seriously threatening the lives of the occupants.

Further downstream, the dam failure flood wave will join the main stream channel and attenuate as described previously for failure of the main dam.

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 an embankment slope stability assessment are available for this dam.

2) Principal Spillway Structures

A review of the 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 1963.

(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, but require more intensive routine maintenance.

(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 judgement.

(c) Urgency

The remedial measures described herein should be implemented by the owner within one year 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) Implement and intensify a program of diligent and periodic maintenance including, but not limited to:

   (a) Removing shrubs or saplings, including the roots, from slopes. Backfilling the resulting voids with suitable compacted material.

   (b) Mowing brush on slopes.

(c) Clearing accumulated debris from embankment slopes and trash racks.

(d) Backfilling tire ruts, erosion holes and animal burrows with suitable well tamped soil.

2) Remove, repair, galvanize, and reset the trash rack assembly.

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

4) Maintain the program of annual technical inspections.

5) Develop a formal written downstream emergency warning system.

6) Repair all spalled and cracked concrete.

7.4 Alternatives

There are no meaningful alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

INSPECTION TEAM ORGANIZATION

Date: August 30, 1979

Project: NH 00432
SOUHEGAN RIVER WATERSHED DAM No. 13
New Ipswich, New Hampshire
NHWRB 175.20

Weather: Sunny, 80°

INSPECTION TEAM

Nicholas A. Campagna	Goldberg, Zoino, Dunnicliff & Associates, Inc. (GZD)	Team Captain
M. Daniel Gordon	GZD	Soils
Jeffrey M. Hardin	GZD	Soils
Andrew Christo	Andrew Christo Engineers (ACE)	Structures
Paul Razgha	ACE	Structures
Carl Razgha	ACE	Structures
Dick Laramie	Resource Analysis, Inc. (RAI)	Hydrology
Tom Gooch	RAI	Hydrology

Owner's Representative Present

Garry Kerr - New Hampshire Water Resources Board

CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
MAIN DAM EMBANKMENT		
Crest Elevation	JMH	976.5 feet
Current Pool Elevation		966.8 feet
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	JMH	Good
Condition at Abutment and at Concrete Structures	MAC	Good
Indications of Movement of Structural Items on Slopes		None
Trespassing on Slopes		Much brush and saplings
Sloughing or Erosion of Slopes or Abutments		None
Rock Slope Protection - Rip Rap Failures		None
Unusual Movement or Cracking at or near Toes		None
Unusual Embankment or Downstream Seepage		None
Piping or Boils	MAC	None

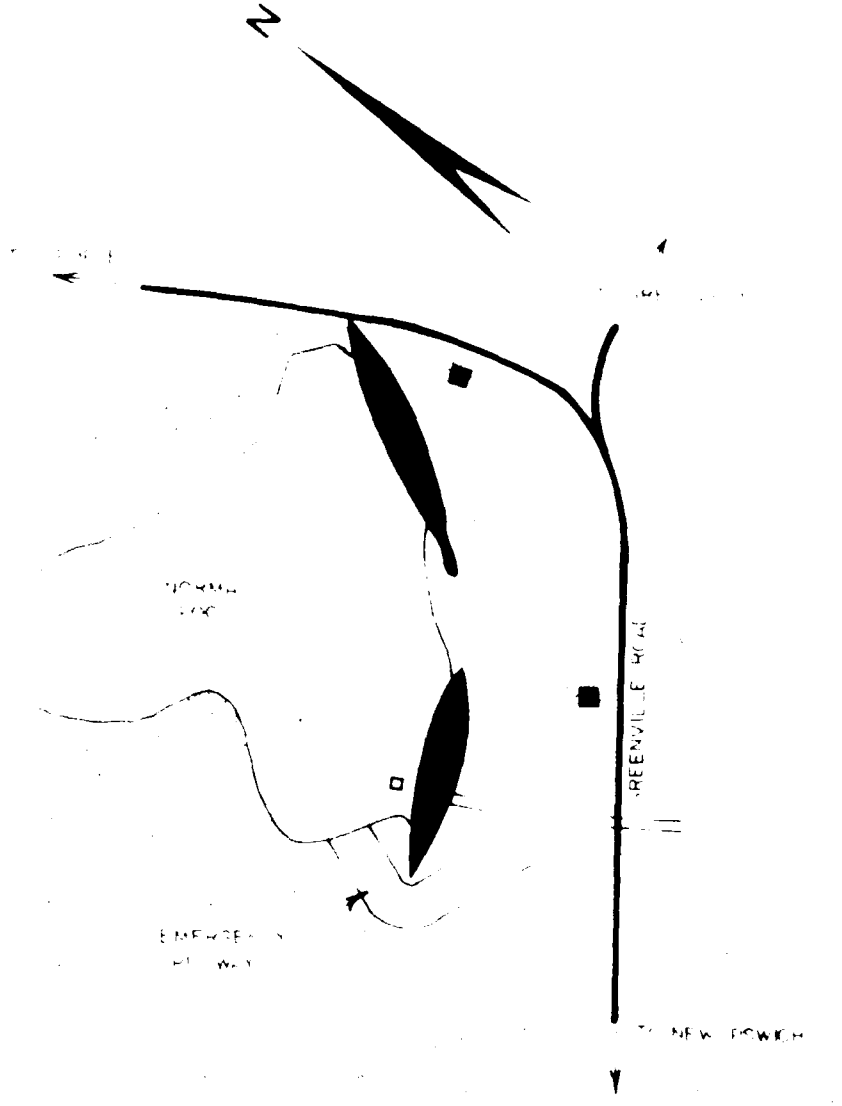
CHECK LISTS FOR VISUAL INSPECTION		
AREA EVALUATED	BY	CONDITION & REMARKS
Foundation Drainage Features	mDG	Toe Drains Functioning as below
Toe Drains		Left Toe Drain: 1-3 GPM Right Toe Drain: 1-3 GPM
Instrumentation Systems	mDG	None
EAST DIKE EMBANKMENT		
Crest Elevation	JMH	976.5 feet
Current Pool Elevation		966.8 feet
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	JMH	Good
Condition at Abutment and at Concrete Structures	mac	Good
Indications of Movement of Structural Items on Slopes		None
Trespassing on Slopes		3 small animal burrows in downstream left slope, much brush and saplings
Sloughing or Erosion of Slopes or Abutments		None
Rock Slope Protection - Riprap Failures	mac	None

CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
Unusual Movement or Cracking at or near Toes	NAC	None
Unusual Embankment or Downstream Seepage		None
Piping or Boils		None
Foundation Drainage Features		None
Toe Drains		None
Instrumentation System	NAC	None
APPURTENANT STRUCTURES		
Drop Inlet Service Spillway Structure		
Condition of Concrete	AC	Good
Spalling		Minor [illegible] surface [illegible] pedestal
Erosion		None noted
Cracking		None noted
Rusting or Staining of Concrete		None noted
Visible Reinforcing		None noted
Efflorescence		None noted
Trash Rack		Horizontal rods at normal water level and below badly rusted. Vertical rods [illegible] at water line.
Gate Bench Stand		No deficiencies noted
Reservoir Discharge Conduit	AC	Submerged, could not be observed

CHECK LISTS FOR VISUAL INSPECTION		
AREA EVALUATED	BY	CONDITION & REMARKS
Outlet Conduit (Principal Spillway		
Condition of Pipe	AC	No deficiencies noted
Condition of Cradle	AC	No deficiencies noted

APPENDIX B



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

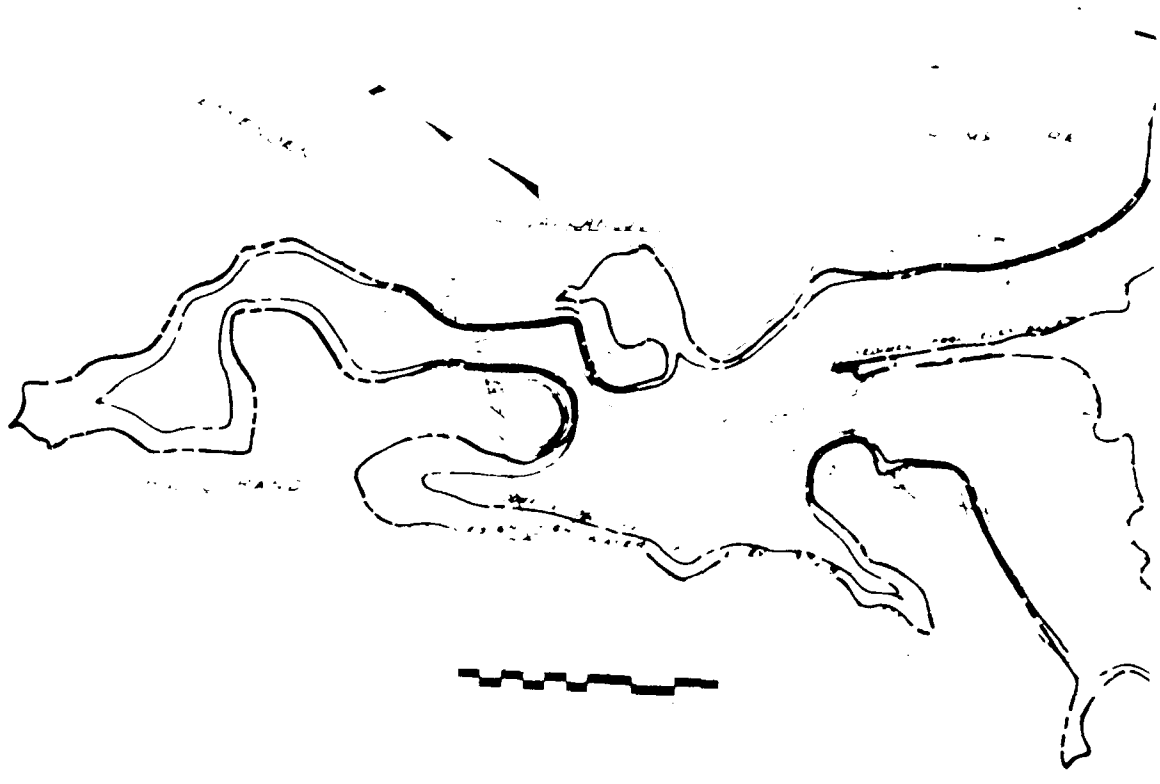
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

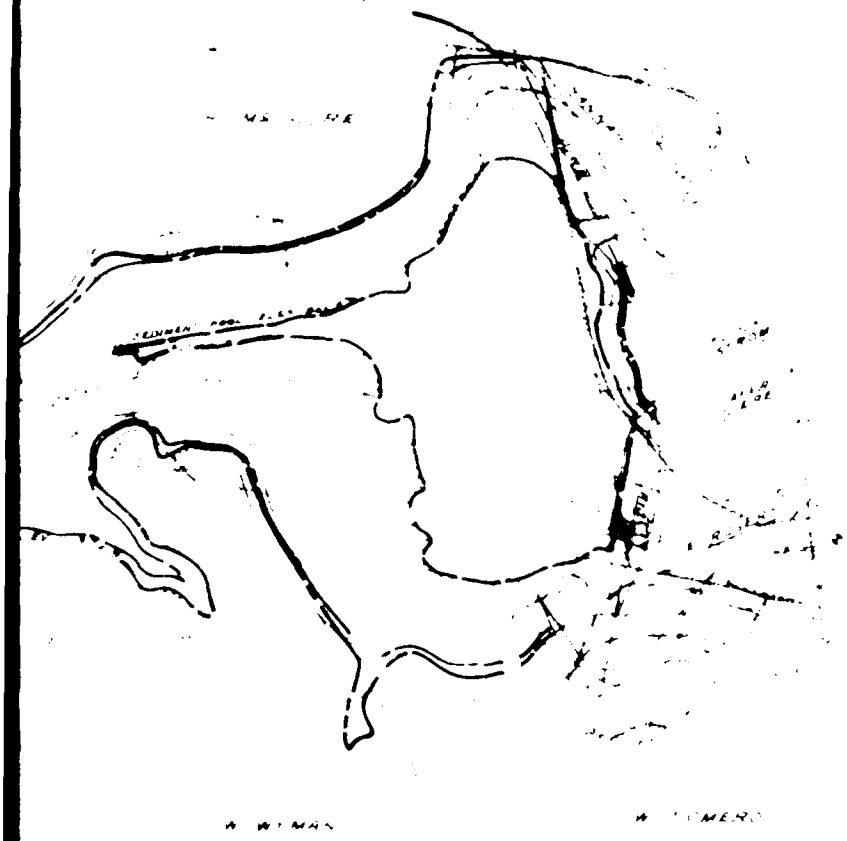
SITE PLAN

SOUHEGAN RIVER
WATERSHED DAM No 13 NEW HAMPSHIRE

FILE NO. [illegible]

SCALE 1" = 400'
DATE SEPT 1979

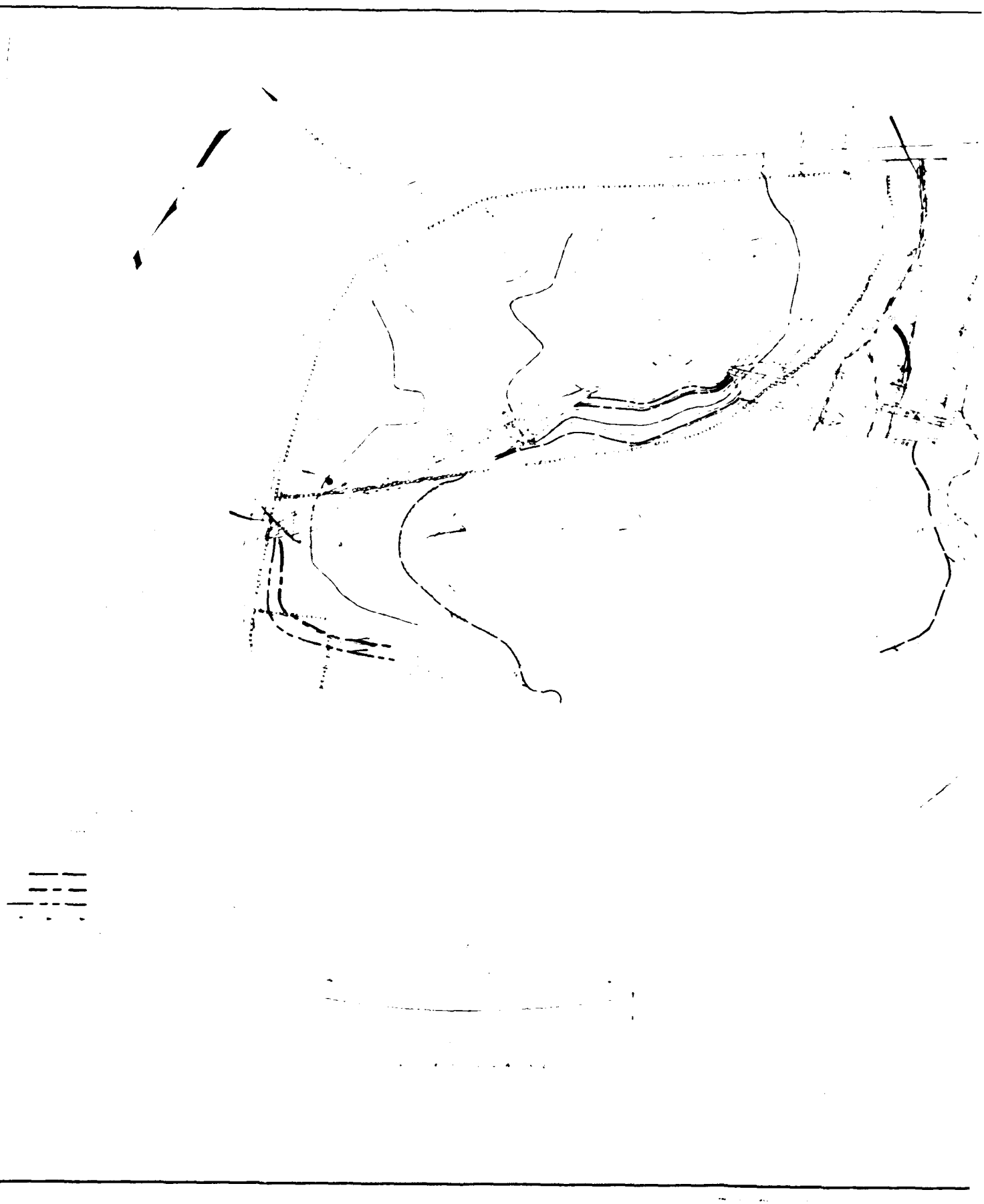




PLAN OF STORAGE AREAS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

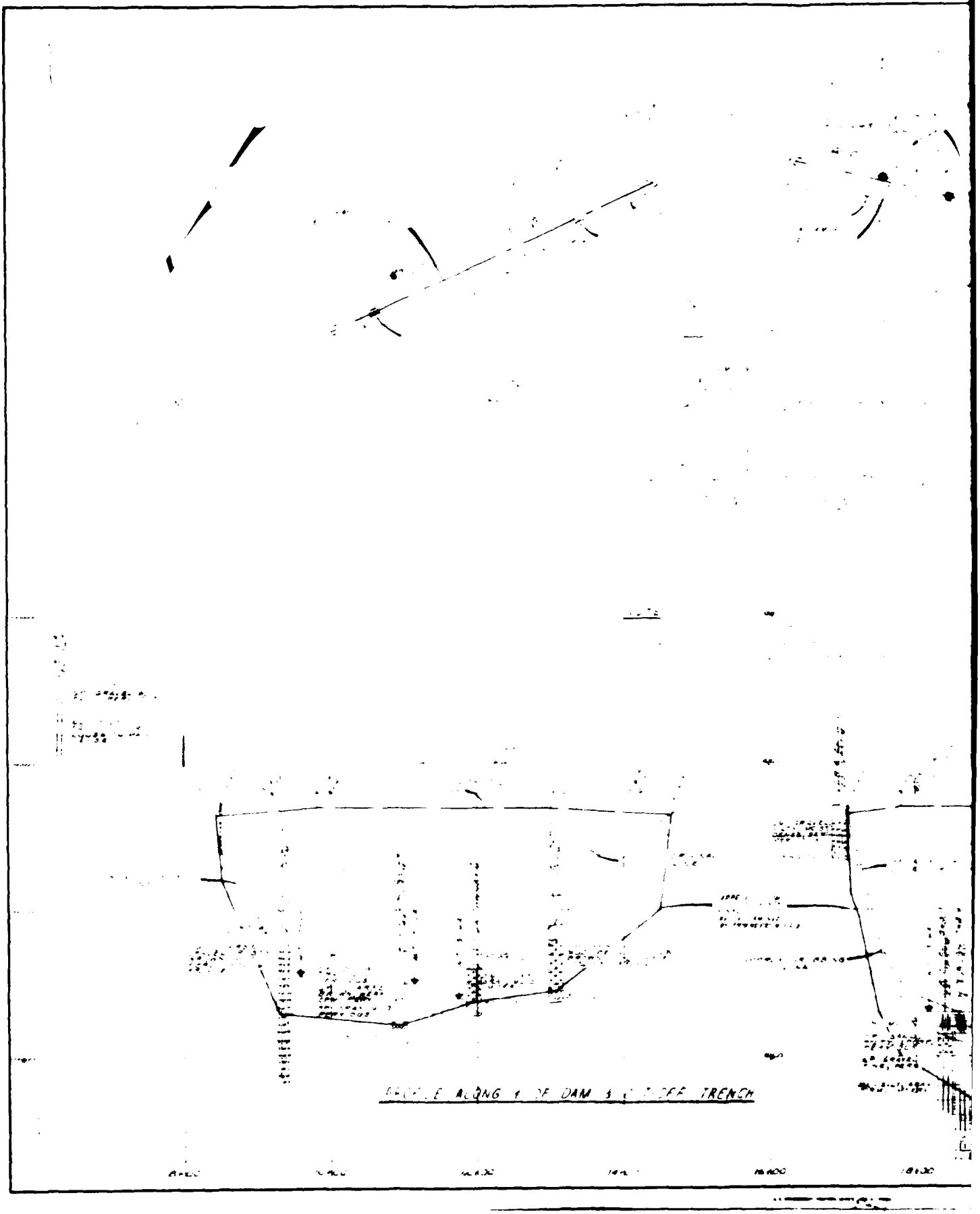
NH-589-P

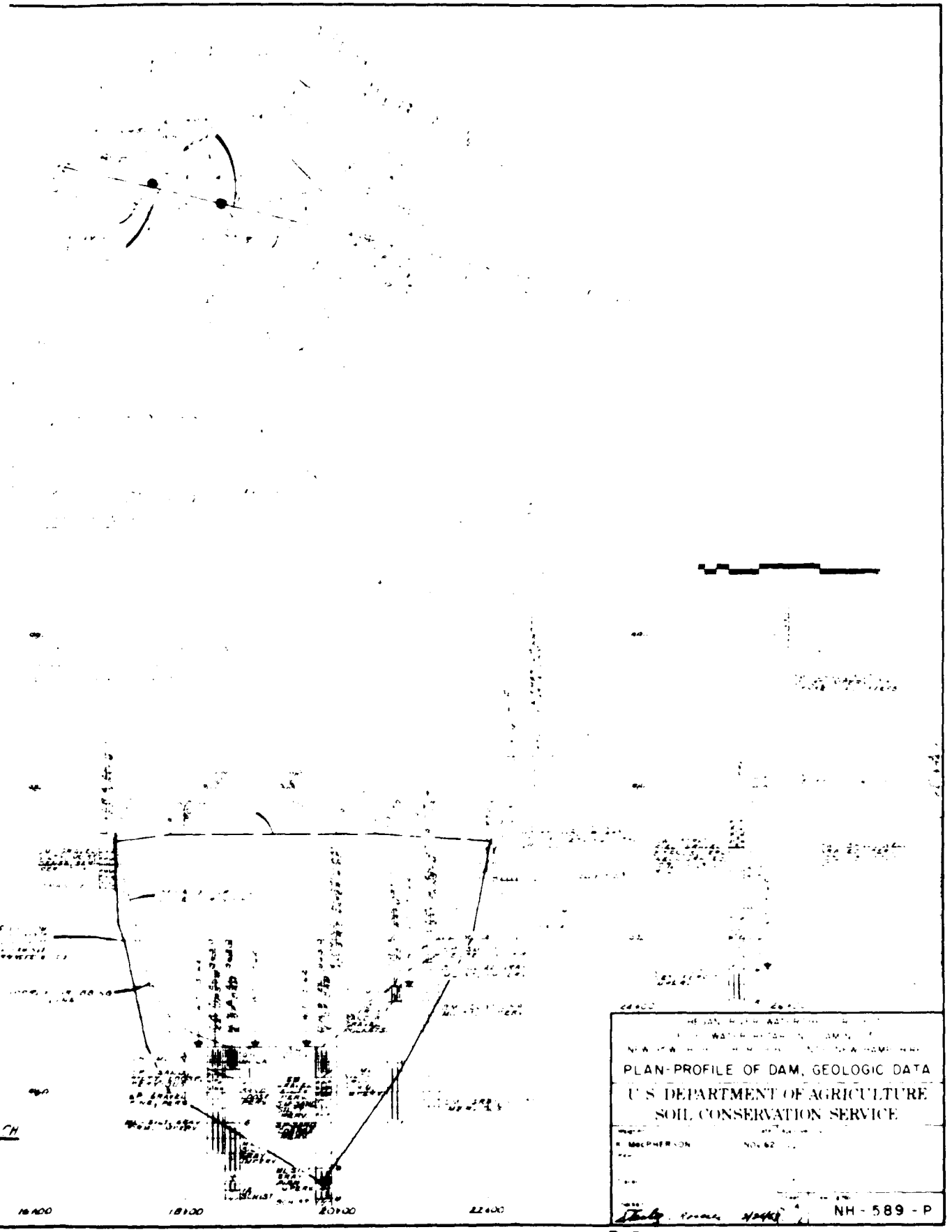


PLAN OF DAMSITE

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NH - 589 - P

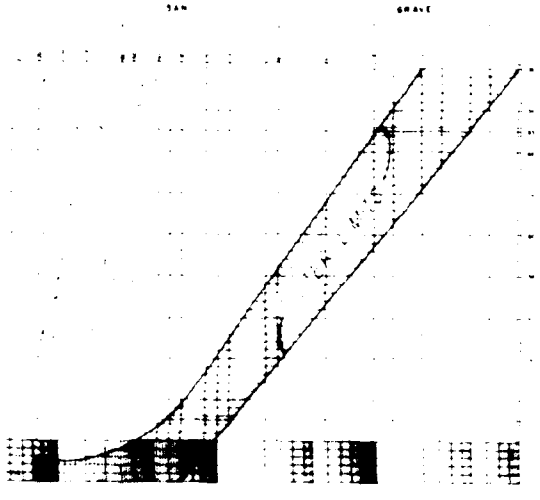


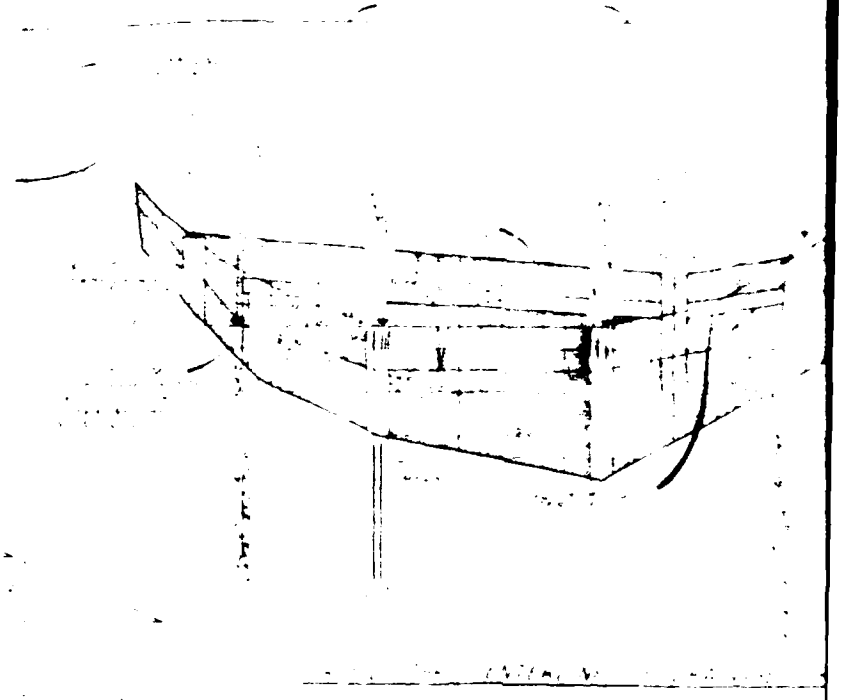


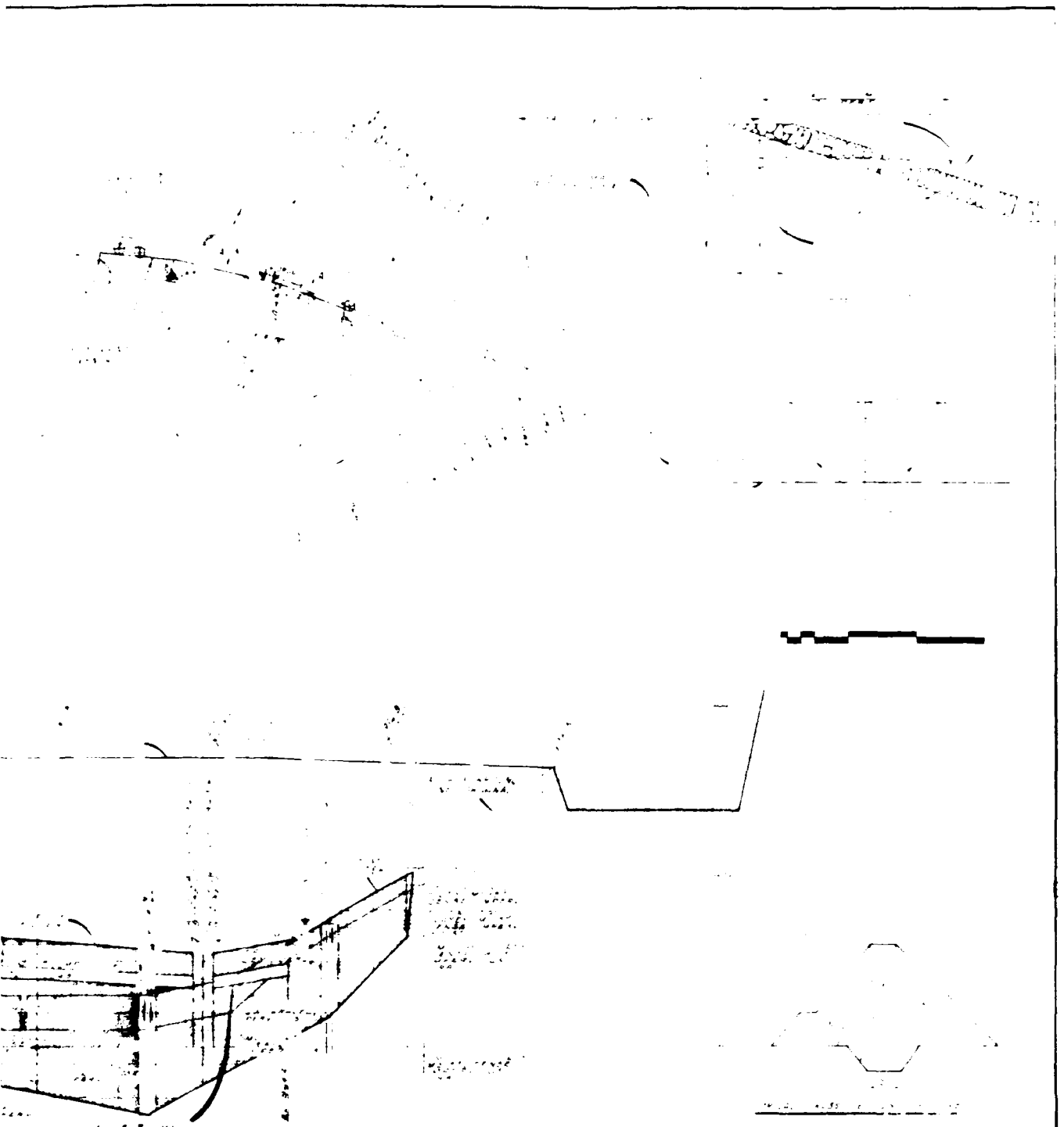
PLAN-PROFILE OF DAM, GEOLOGIC DATA

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NH - 589 - P



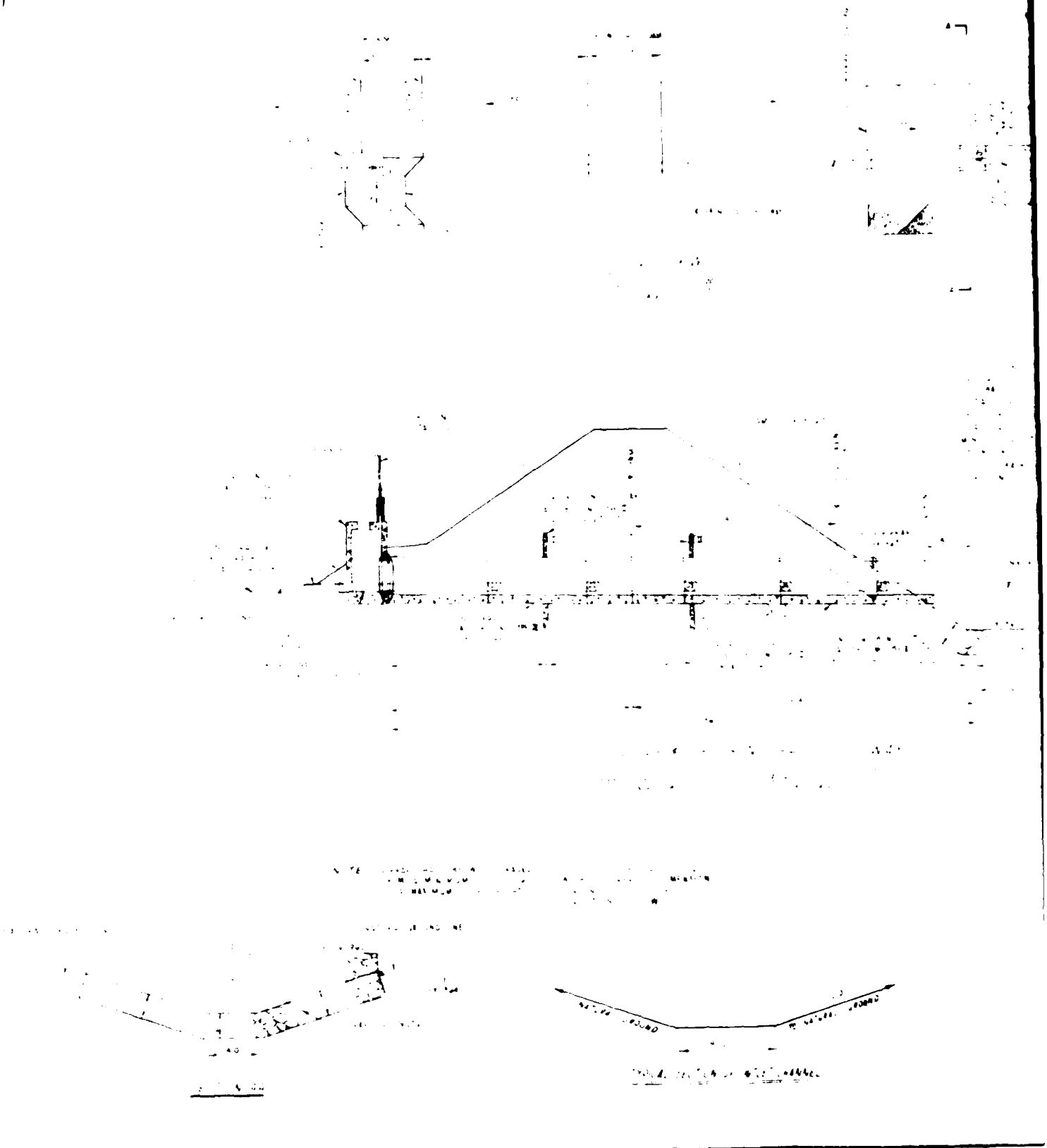


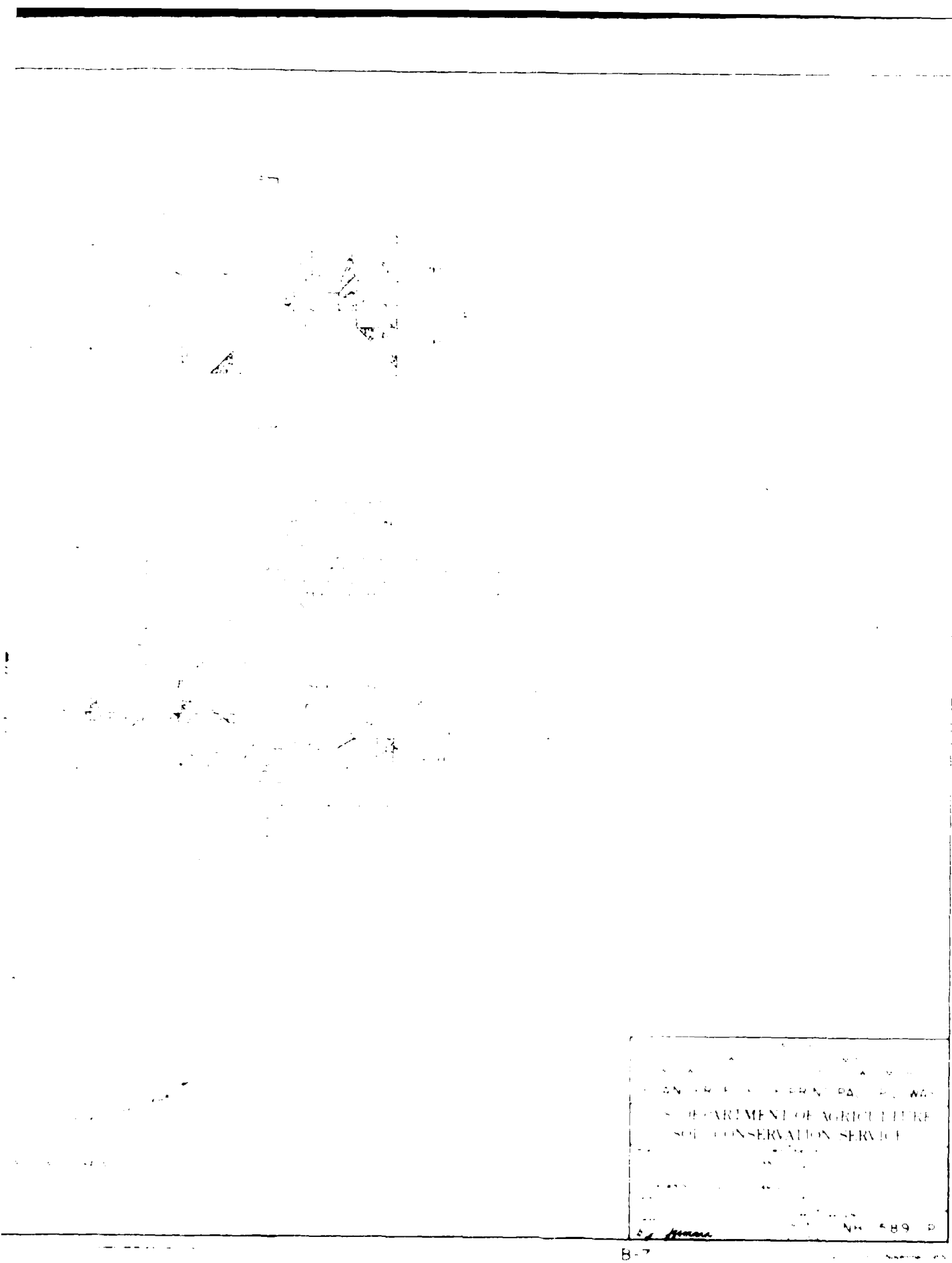


SEEPAGE DRAIN DETAILS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

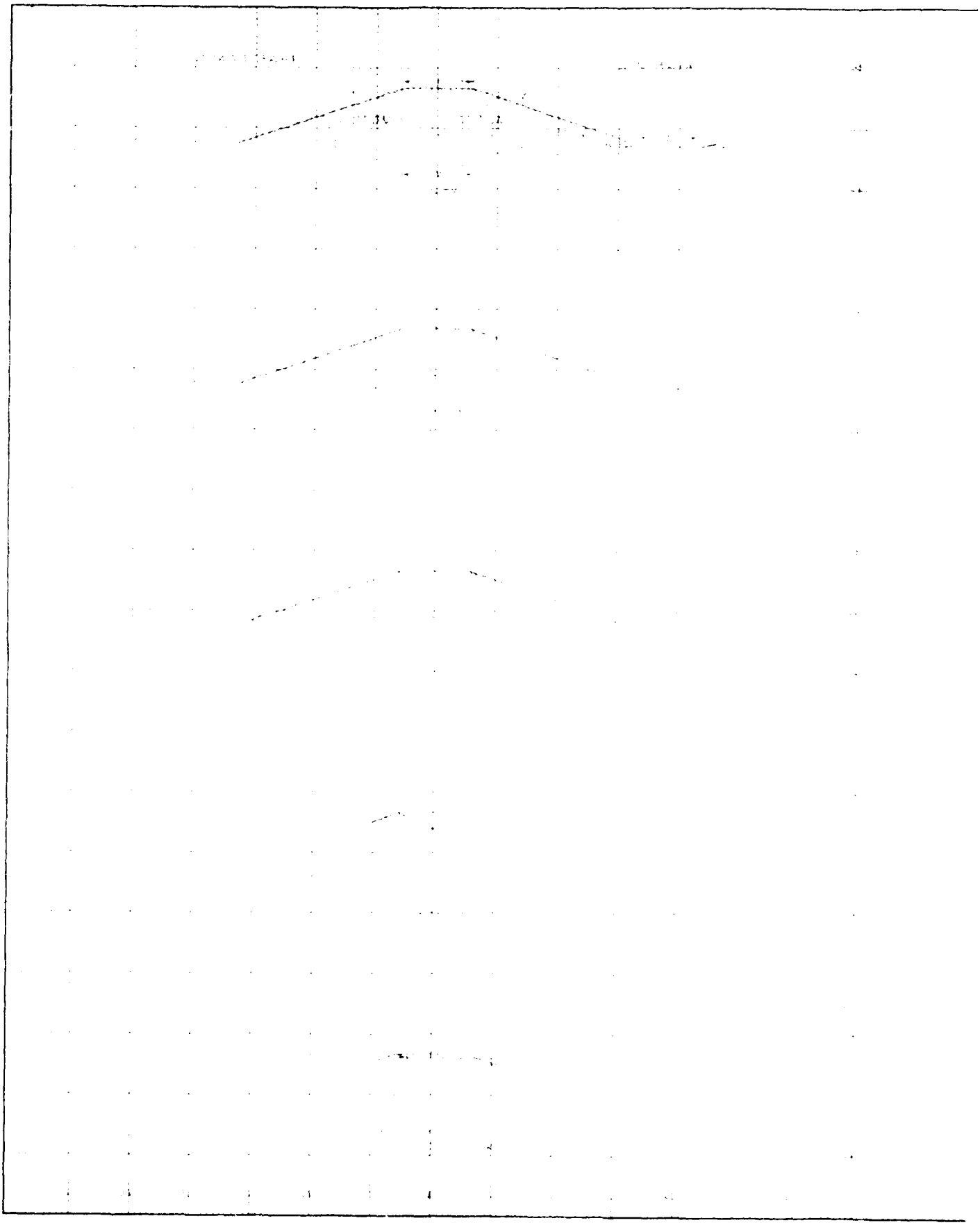
NH-589-P

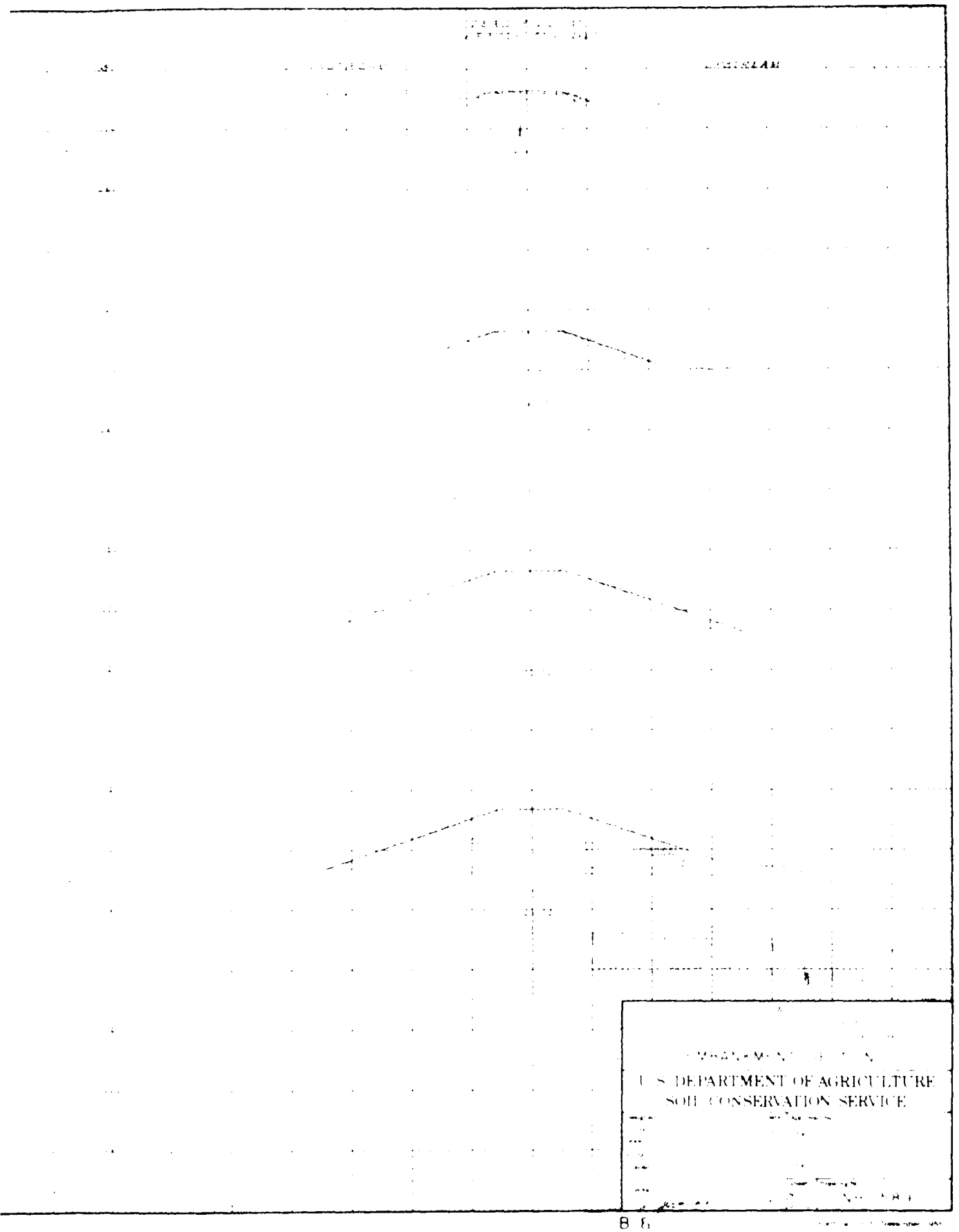




DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NH 589 P




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 SITE 13 DATE 5-19-77
INSPECTED BY LEAR, HUTCHINSON, MACPHERSON
MORRISSEY, KENSER

1. GENERAL ITEMS

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

COMMENTS SOME GRASS & ONE PIECE OF WOOD CAUGHT IN TRASH RACK

2. RESERVOIR

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

COMMENTS

SOIL CONSERVATION SERVICE
U.S. 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	2	—	1	—	—
Holes (rodent and other) (check especially at embankments)	1	3	—	1	—	—
Excessive settlement (embankments)	1	1	—	1	—	—
Cracks						
Traverse	1	1	—	1	—	—
Longitudinal	1	1	—	1	—	—
Seepage 2/	—	—	—	—	—	—
Piping 2/	—	—	—	—	—	—

COMMENTS ERODED AREAS ON UPSTM FACE OF DAM & DIKE. RODENT HOLES ON UPSTM FACE OF DIKE

4. RIPRAP

	Displ. of Rock	Loss of Spalls	Loss of Bedding	Erosion of Found.	Breakdown of R
Dam					
Upstream berm	1	1	—	—	—
Principal Spillway Outlet	1	1	—	—	—
Embankment Gutters					
left	—	—	—	—	—
right	—	—	—	—	—
Emergency Spillway					
location_____	—	—	—	—	—
location_____	—	—	—	—	—
Waterways					
location_____	—	—	—	—	—
location_____	—	—	—	—	—
Outlet Channel	2	2	—	—	—
Other_____	—	—	—	—	—

COMMENTS SOME MOVEMENT OF RIPRAP HAS TAKEN PLACE.

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

COMMENTS WEAK STAND OF GRASS/WEED ON DOWNSTREAM FACE OF DAM & RT. AB. DIKE. LIME WITH 2 T/AC. FERTILIZE W/400 LBS OF 0-10-10 PER ACRE. BRUSH CONTROL NEEDED IN EMER. SPILLWAYS. BRUSH CONTROL ON AREA BETWEEN DAM & DIKE. LET WHITE PINE GROW. VEGETATION IN OUTLET CHANNEL

6. EMBANKMENT, STRUCTURAL, & OTHER DRAINS

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

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

Other_____

COMMENTS VEGETATION IN OUTLET CHANNEL

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 2; Excessive movement (check joint at riser and conduit)___; Other___.
Trashracks: low and high stage	Condition of protective coatings___; Corrosion___; Damaged parts___; Condition of fastening___; 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 WRB PERSONNEL WILL CHECK RISER & APPURTENANCES WHEN WATER RECEDES. CONCRETE ON LEFT TOP SIDE OF RISER & ON BASE SUPPORT FOR BREATHER PIPE IS BADLY CHIPPED. REPAIRS SHOULD BE MADE TO PREVENT FURTHER DAMAGE BY FREEZING & THAWING.

...NTACT BASIN, SAF, BOX INLET, & MISCELLANEOUS CONCRETE STRUCTURE

(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.	3
Debris in stream.	2
Sediment bars controlled.	1
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.

,75.20

WATERSHED Soucook River SITE 13 DATE 6-15-78

INSPECTED BY Kerr, Fife, Hutchinson, Wenninger

1. GENERAL ITEMS

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

COMMENTS

2. RESERVOIR

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

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.	Breakdown 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	—	—	—	—	—
Other _____	—	—	—	—	—

COMMENTS

1/Looking downstream.
2/Chael especially at downstream face of [illegible]

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

COMMENTS White pine is emergency spillway. Gray birch in outlet channel.

6. EMBANKMENT, STRUCTURAL, & OTHER DRAINS

		Dam left	Dam right 1/	Other (____)	Other (____)
Depth of Flow (in inches above invert)	With any obstruction	1/8"	1/8"	—	—
	Without any obstruction			—	—
Turbidity of Discharge (yes, no)	With any obstruction	—	—	—	—
	Without any obstruction	No	No	—	—
Condition of Protective Coating	Outside	1	1	—	—
	Inside	1	1	—	—
Obstruction in Flow (yes, no)		No	No	—	—
Animal Guard Condition		1	1	—	—
Outlet Condition		1	1	—	—

Retarding Pool Elevation (ft. msl)_____ or ≈ / (ft.) above below L.S.

Other_____

COMMENTS

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 1; Spalling 1; Other deterioration 1; 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 1; Corrosion 1; Damage 1; 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 Orifice mostly plugged. (Kerr said they took care of it.) Should check gate operation and inside of riser as it was not done during this inspection.

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

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

COMMENTS_____

_____

_____

_____

_____

List of Pertinent Data Not Included

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 February 20, 1963

(2) SCS "Hydrology and Hydraulics" design calculations dated

(3) SCS structural design calculation dated 1963

(4) SCS "Geology Report" undated

(5) SCS "As-Built" drawings dated 1963

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 16, 1978.

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

(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_____

_____

_____

_____

_____

_____

6 CHANNEL

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

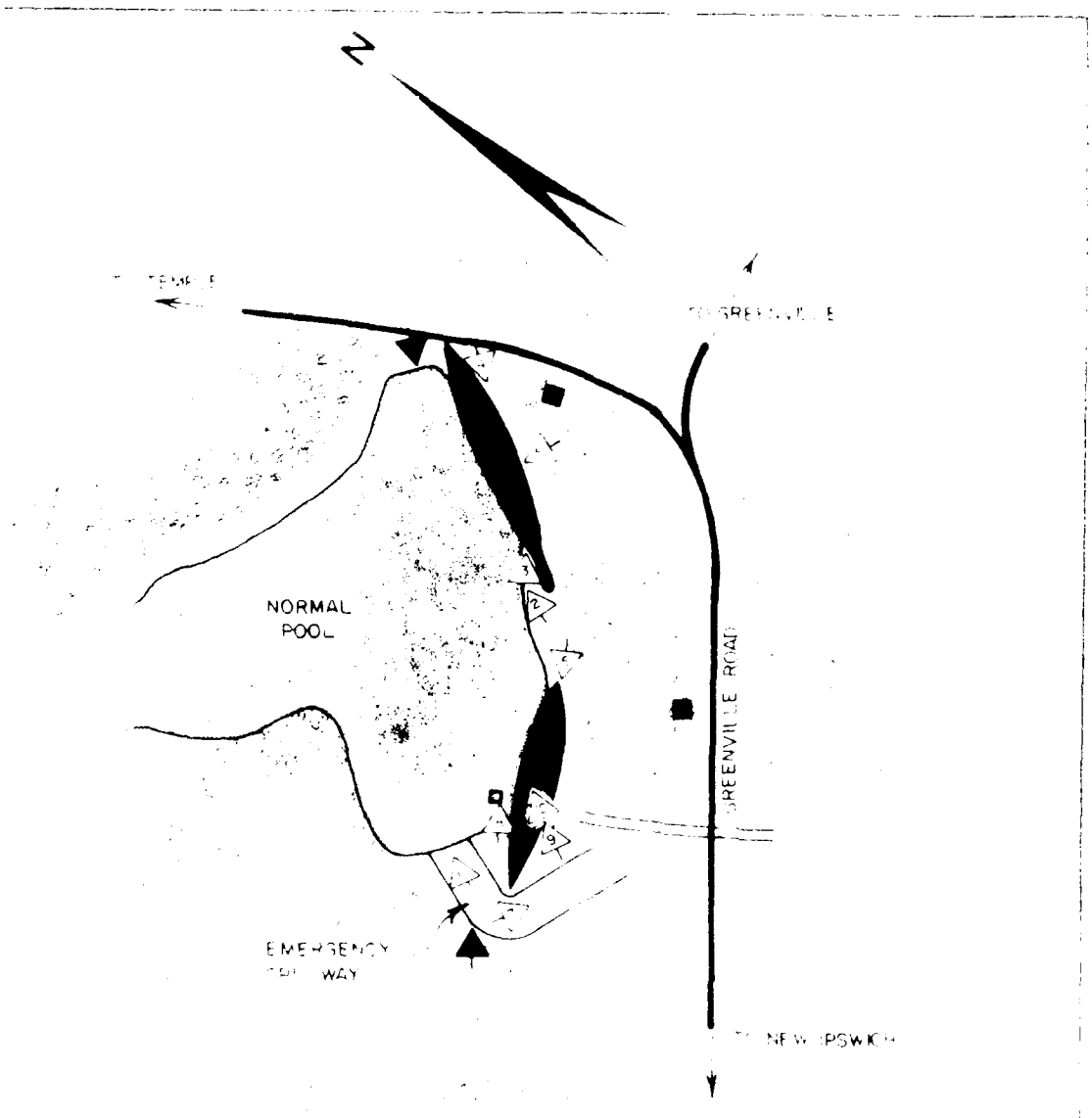
COMMENTS_____

_____

_____

_____

_____



WEIDLINGER ASSOCIATES, CONSULTING ENGINEERS 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. 13	NEW HAMPSHIRE	SCALE 400' DATE SEPT. 1979

1. Reservoir area from emergency spillway

2. Upstream slope of east dike

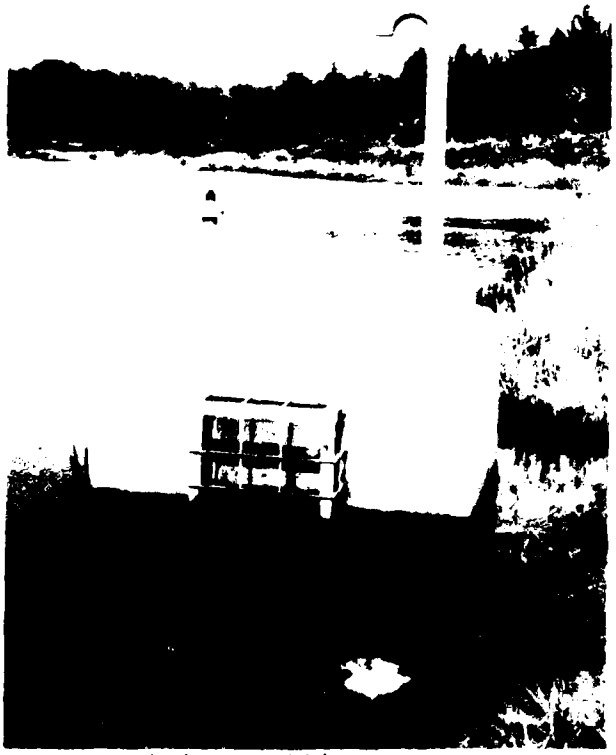
3. Brush and sapling growth on east dike

4. Crest and downstream slope of east dike showing heavy brush growth

5. Animal burrows at downstream toe of east dike

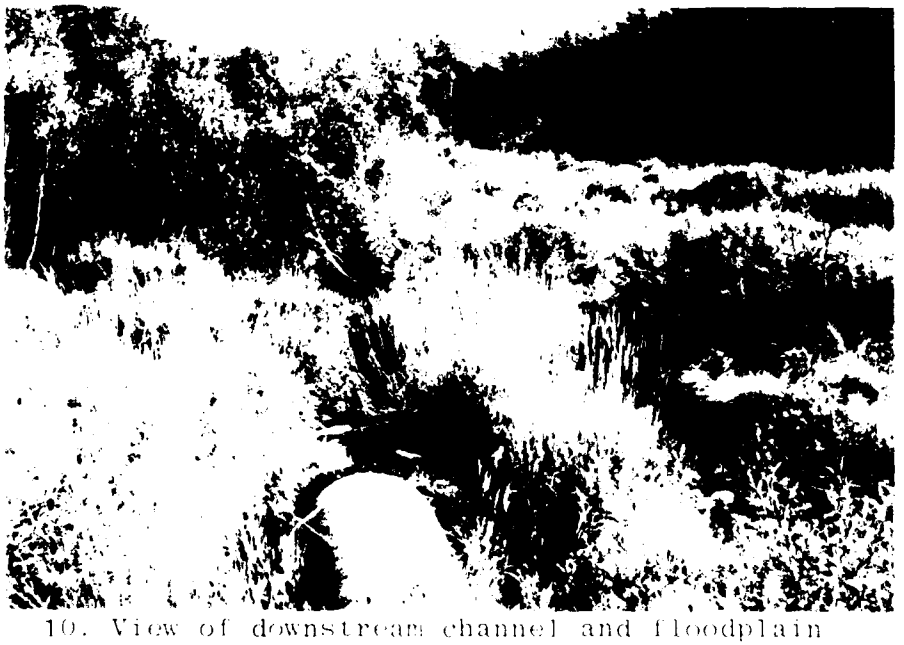
6. Crest of main dam

7. Emergency spillway channel looking downstream



8. Drop inlet spillway structure showing spalling of concrete and rusting of trash rack

9. Outlet conduit and right toe drain



10. View of downstream channel and floodplain

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Dam Rating Curve

Outlets from this dam include a principal spillway, an emergency spillway, and a pond drain.

The principal spillway consists of a riser which reservoir discharges enter through an orifice and which is drained by a 96' long 30" ϕ RC pipe. It is designed such that the flow rate is controlled by the orifice except at very high stages.

The emergency spillway is a level grass-lined channel at the end of which is a critical flow control section.

The pond drain is normally closed and will not be considered.

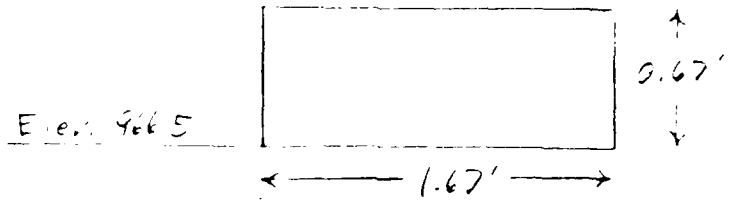
A schematic section of the dam and spillways is shown on the next page.

SCHEMATIC SECTION
of DAM

No Scale

Principal Spillway Orifice

A rating function for this outlet has been computed by the SCS as part of the design calculations. The calculations are summarized below.



$H = 0$ to $H = 0.7'$ (datum -- elev. 966.5)

$Q = CLH^{3/2}$ (weir flow)

$C = 3.$

$L = 1.67'$

$Q = 5.2\,H^{3/2}$

$H > 0.7'$

$Q = CA\sqrt{2g \times H_{orifice}}$ (orifice flow)

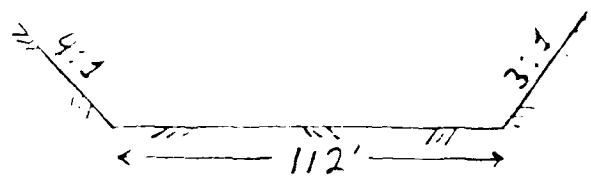
$C = 0.7$

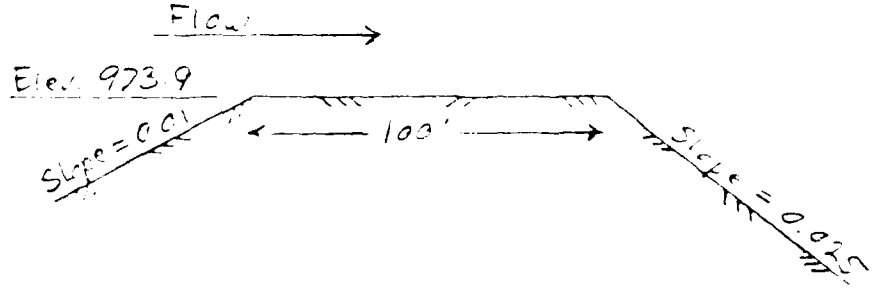
$A = 1.67 \times 0.67 = 1.12'^2$

$H_{orifice} = H - 0.34'$

$Q = 6.46(H - 0.34)^{1/2}$

Emergency Spillway





The SCS design calculations are based on a different emergency spillway configuration from that actually constructed. A rating function for the as-built case is calculated below.

Weir flow is assumed at the critical section. For a given discharge, the H at the control section must be adjusted by a backwater computation to determine the water surface elev. at the reservoir 100' upstream. This adjustment will be made using SCS, T.R. 39, assuming Manning's n = 0.04.

$H \leq 7.4'$ (Datum – elev. 966.5)

$Q_{EM} = 0$

$H = 7.4'$ to $H = 10.0'$

$$Q_{EM} = C L h_{cs}^{3/2} + C(3 \times h_{cs})(.5 h_{cs})^{3/2} + C(4 \times h_{cs})(.5 h_{cs})^{3/2}$$

$C = 3.1$

$L = 112'$

h_{cs} = Head at control section

$$Q_{EM} = 3.1 \cdot 112 h_{cs}^{3/2} + 3.1(4 h_{cs})(.5 h_{cs})^{3/2} + 3.1(4 \cdot h_{cs})(.5 h_{cs})^{3/2}$$

h_{cs}*	Q_{EM}	h_p**	H = h_p*** + 7.4
0	0	0	7.4
0.5	124	0.9	8.3
1.0	352	1.5	8.9
1.5	642	2.0	9.4
2.0	1032	2.6	10.0
~~2.5~~	~~1420~~	~~3.1~~	

* Head on Em Sp Crest at Critical Section (e.e. 973.0)

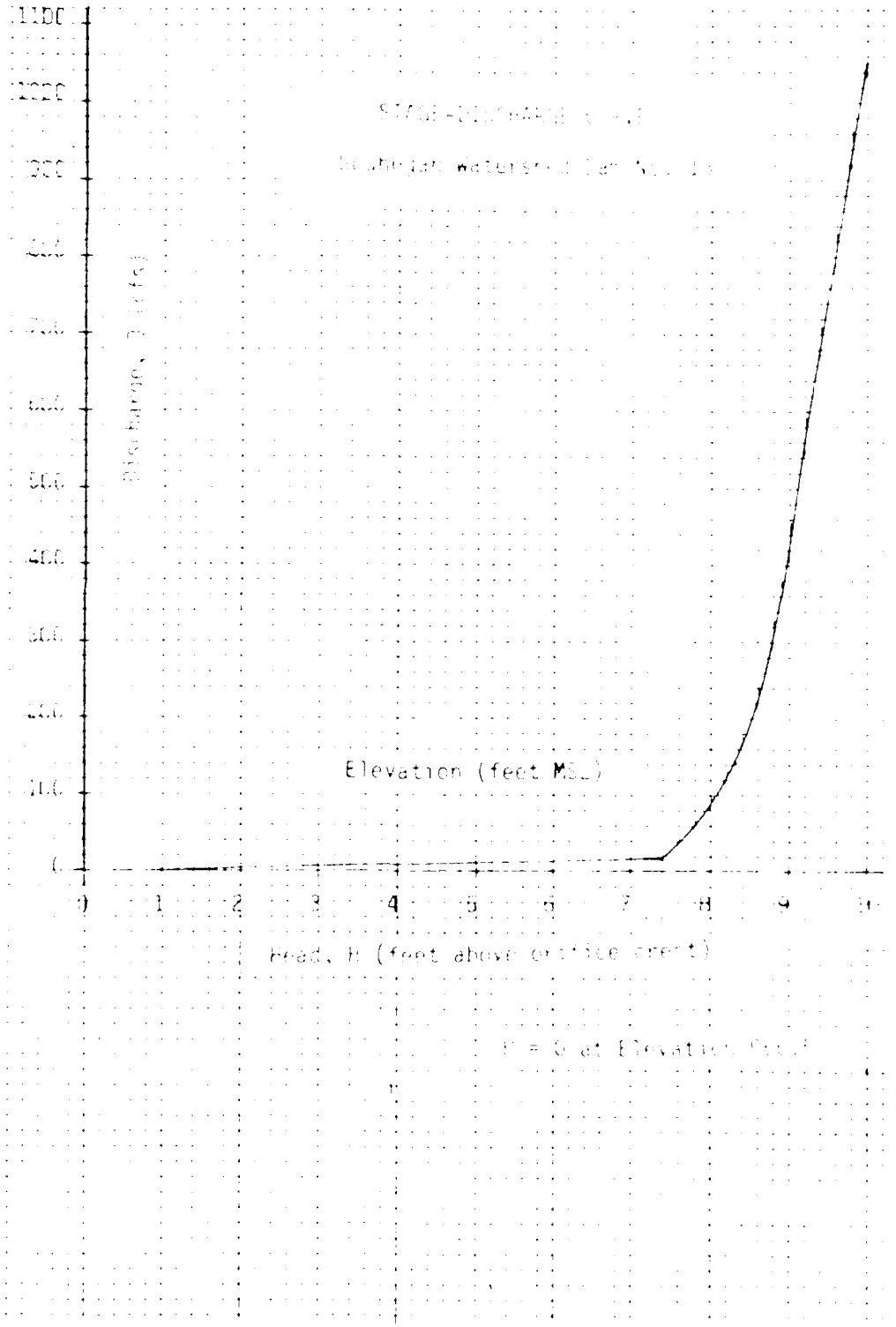
** " " " " " " Reservoir (see SMD, crest EL SCS, TR-39)

*** Head of Reservoir above orifice crest (e.e. 973.5)

RATING TABLE

Pool Elev	H	Discharge		
		Principal Spillway	Emerg Spillway	Total
965.5	0	0		0 cfs
967.0	1.5	2.7		2.7
967.5	2.0	5.7		5.7
968.0	2.5	7.0		7.0
968.5	3.0	8.6		8.6
969.0	3.5	9.5		9.5
969.5	4.0	10		10
970.0	4.5	12		12
970.5	5.0	13		13
971.0	5.5	13		13
971.5	6.0	14		14
972.0	6.5	15		15
972.5	7.0	15		15
973.0	7.5	16		16
973.5	8.0	17		17
973.9	8.4	17	0	17
974.5	9.0	18	124	142
975.0	9.5	19	356	375
975.5	10.0	19	662	681
976.5	11.0	20	1032	1052

Principal spillway discharges taken from sheet 4-4 of SCS design calculations

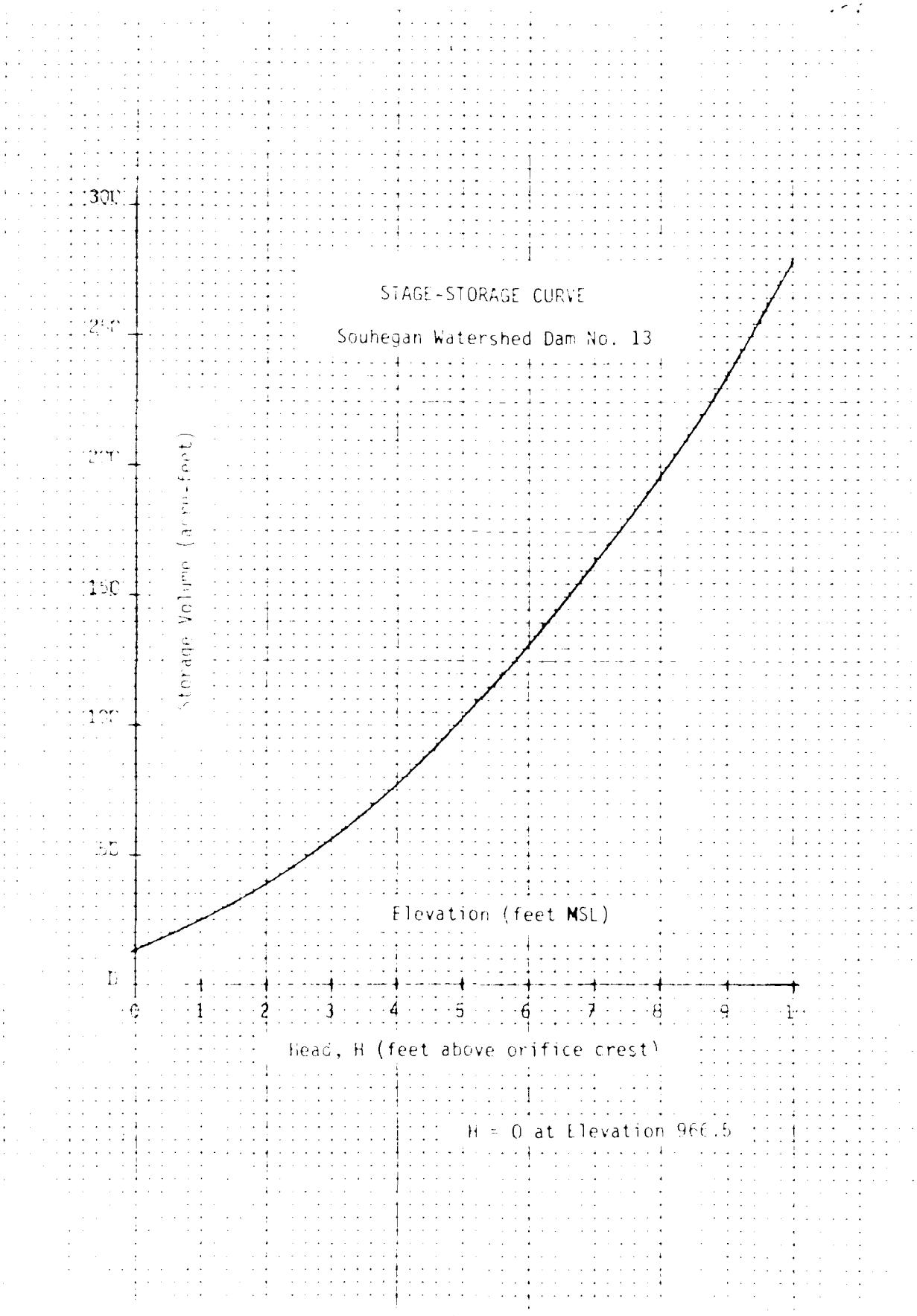

Elevation (feet MSL)
0
1
2
3
4
5
6
7
8
9
10

Stage - Storage Function

Stage - storage and stage - surface area functions as computed in the SCS routing calculations (sheet 3-1) are shown below.

Pool Elev.	H	Area (acres)	Storage* (acre-ft.)
93	-	0	0
95	-	3.5	3.6
96.5	0	9.7	13.6
98	1.5	13.4	31.1
99	3.5	21.8	66.5
100	5.5	29.3	117.4
101.5	8.0	36.9	194.0
102	9.5	43.6	250.4
Extrapolate			
103.5	10.0	43.6	292.2

* Total design storage upstream of proposed sediment retention


STAGE-STORAGE CURVE
Souhegan Watershed Dam No. 13
Storage Volume (acre-foot)
Elevation (feet MSL)
0
1
2
3
4
5
6
7
8
9
Head, H (feet above orifice crest)
H = 0 at Elevation 966.5

Flood storage to emergency spillway level

Vol. = 161 acre-ft (available storage after sedimentation)

Drainage Area = 518 acres

Storage = $\frac{161}{518} \times 12 = 3.7$" runoff

Flood storage to top of dam

Vol. = 278 acre-ft

Storage = $\frac{278}{518} \times 12 = 6.4$" runoff

Dam Failure Analysis - Main Dam

Outflow at failure = Outflow through breach
+ Normal outflow at failure elev. of pool

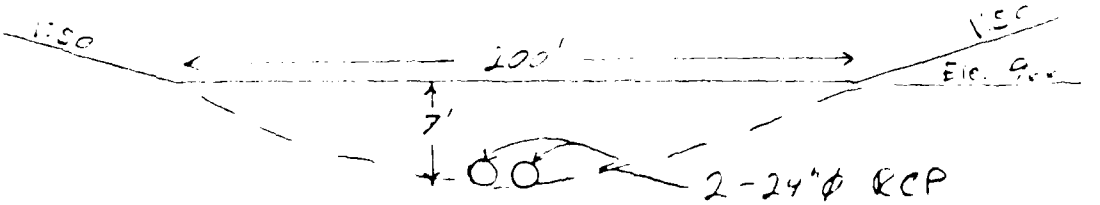
Assume that the dam fails when it is overtopped with the pool at the level of the dam crest — elev. 976.5

Normal Outflow

$Q = 1052$ cfs (dam rating w/ $H = 10.5'$)

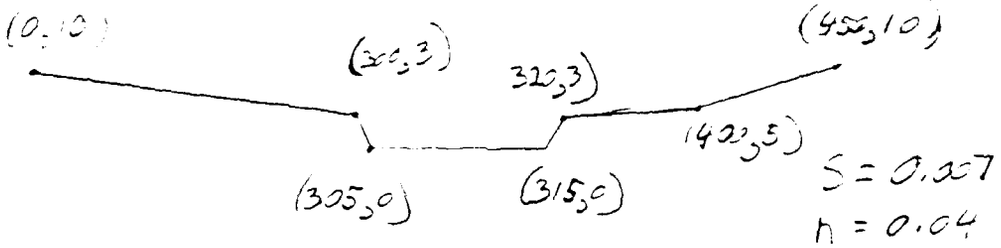
Tailwater Level at Failure

At this outflow, the tailwater level would be controlled by the road crossing 350' d/s of the dam.



Granville S.D. Crossing

However, the capacity of the culverts with a head of 7' is only 75 cfs. (Chart 2 in FHWA, Hydraulic Charts for the Selection of Highway Culverts). It will be more conservative to assume that the road is washed out prior to dam failure, and that the tailwater is controlled by the channel d/s of the dam.



Channel d/s of main dam

A rating table based on the approximate typical section sketched above is shown on the next page.

$Q = 1000$ cfs $\Rightarrow$ tailwater depth $\cong 4.2'$

@ toe of dam

channel bottom excavated to elev. 961.3

tailwater elev. = $961.3 + 4.2 = 965.5$

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5	0.5	7.3	19.5	0.4	3.8	11.9
1.0	1.0	19.3	29.0	0.7	14.8	46.0
1.5	1.5	36.0	38.5	0.9	34.4	107.4
2.0	2.0	57.3	47.9	1.2	64.6	201.3
2.5	2.5	83.3	57.4	1.5	106.8	332.9
3.0	3.0	114.0	66.9	1.7	162.5	506.9
3.5	3.5	154.5	96.3	1.6	210.9	657.3
4.0	4.0	203.9	126.8	1.7	293.9	915.7
4.5	4.5	280.3	156.8	1.9	413.1	1287.5
5.0	5.0	365.7	186.7	2.0	572.6	1784.7
5.5	5.5	465.2	213.2	2.2	792.8	2439.7
6.0	6.0	577.9	239.6	2.4	1039.4	3239.4
6.5	6.5	703.8	266.1	2.6	1346.3	4195.9
7.0	7.0	842.9	292.6	2.9	1707.2	5320.5
7.5	7.5	995.2	319.0	3.1	2125.5	6624.3
8.0	8.0	1160.7	345.5	3.4	2604.8	8113.0
8.5	8.5	1339.5	371.9	3.6	3148.4	9912.3
9.0	9.0	1531.4	398.4	3.8	3759.7	11717.2
9.5	9.5	1736.6	424.8	4.1	4441.7	13842.9
10.0	10.0	1955.0	451.3	4.3	5197.7	16198.9

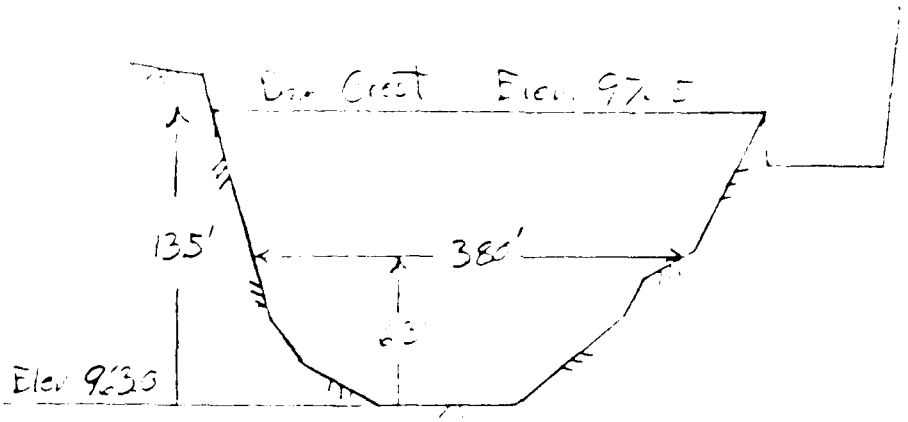
CHANNEL RATING DOWNSTREAM OF MAIN DAM

Breach Outflow

$$Q_{p1} = 8/27 \times L_b \times \sqrt{g} \times Y_o^{3/2}$$

L_b = width of breach

$\leq 0.4 \times$ (width of dam at ½ height)



use $L_b = 0.4 \times 380 = 152'$

Y_o = pool elev. − tailwater elev.

$= 974.5 - 965.5 = 11.0'$

$$Q_{p1} = 8/27 \cdot 152 \cdot \sqrt{g} \times 11^{3/2} = 9320 \text{ cfs}$$

Total Outflow

$$Q_{tot} = 9320 + 1050 = \underline{10,370 \text{ cfs}}$$

Downstream Flooding from Main Dam Failure

The stream section sketched on p. 12 is representative of the first 350' reach d/s of the dam. The rating table on p. 13 indicates that with a flow rate

$$Q = 10,370 \text{ cfs}$$

the depth of flow would be

$$D = 8' \text{ to } 9'$$

A home ~ 200' d/s of the dam is about 12' above the stream-bed and so should not be affected by the flood wave.

Further downstream, for about the next 0.9 mile, the stream passes through a long flat predominantly wooded area which offers a very extensive floodplain — 1000' to 1500' wide. The dam failure flood wave should be significantly attenuated along this reach.

Except for a country road, there are no structures to be affected by

153	Dam Study	SWD 13	9/2/75

the dam failure until the Otis Co. Dam in Greenville, 2 miles d/s of SWD 13. Before reaching this dam, the flood wave would be further attenuated by temporary storage in the broad low-lying fields just upstream of the Otis Co. Dam reservoir and in the reservoir itself, and thus is not considered a threat to the dam or to homes and businesses in Greenville

Dam Failure Analysis - East Dike

Outflow at Failure = Outflow through breach
+ Normal outflow at failure elev. of pool

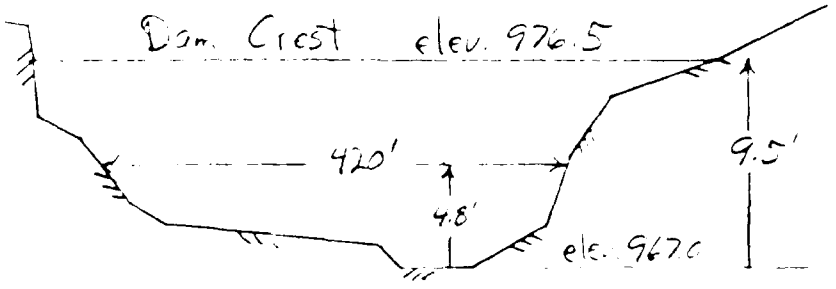
Assume that the dam fails when it is overtopped with the pool at the level of the dam crest — elev. 976.5

Normal Outflow

$Q = 0$ (no outlet at East Dike)

Breach Outflow

$Q_p = 3.27 \times W_b \times \sqrt{g} \times Y_o^{3/2}$



use $W_b = 0.4 \times 420 = 168'$

$Y_o = 9.5'$

EE Dam Safety	SWD B	EMT 9/12/79	18-E

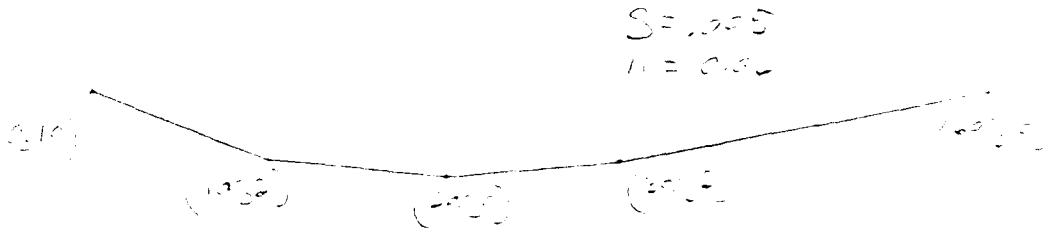
$$Q = 8/27 \times 165 \times \sqrt{9} \times 9.5^{3/2} = 8270 \text{ cfs}$$

Total Outflow

$$Q_{tot} = \underline{8270 \text{ cfs}}$$

Downstream Flooding from East Dike Failure

The section sketched below is representative of the valley (or canal) starting downstream of the East Dike



A normal flow rating table, shown on the next page, was calculated for the above section to estimate depth of flooding due to the dam break.

$Q = 8270$ cfs $\Rightarrow$

Flow Depth $\cong 7'$

Two homes downstream of the East Dike would be affected by the dam failure. The 5'4" above the channel bottom would experience some flooding. However, it is far removed from the main flow path so that velocities would not be great. The other is near the deepest part of the canal about 25

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5	0.5	12.5	50.0	0.2	5.0	8.7
1.0	1.0	50.0	100.0	0.5	31.5	55.3
1.5	1.5	112.5	150.0	0.7	92.8	163.0
2.0	2.0	200.0	200.0	1.0	200.0	351.1
2.5	2.5	306.3	225.1	1.4	376.1	660.4
3.0	3.0	425.0	250.1	1.7	605.3	1062.9
3.5	3.5	556.3	275.1	2.0	889.6	1562.2
4.0	4.0	700.0	300.1	2.3	1231.4	2162.3
4.5	4.5	856.3	325.2	2.6	1633.3	2868.0
5.0	5.0	1025.0	350.2	2.9	2099.1	3684.2
5.5	5.5	1206.3	375.2	3.2	2629.5	4615.5
6.0	6.0	1400.0	400.3	3.5	3227.3	5667.1
6.5	6.5	1606.3	425.3	3.8	3897.3	6843.6
7.0	7.0	1825.0	450.3	4.1	4641.3	8150.0
7.5	7.5	2056.3	475.3	4.3	5461.9	9590.9
8.0	8.0	2300.0	500.4	4.6	6361.8	11171.2
8.5	8.5	2556.3	525.4	4.9	7343.7	12895.4
9.0	9.0	2825.0	550.4	5.1	8410.2	14768.2
9.5	9.5	3106.3	575.4	5.4	9564.0	16794.2
10.0	10.0	3400.0	600.5	5.7	10807.5	18977.7

STREAM RATING 350 FEET D/S OF EAST DIKE

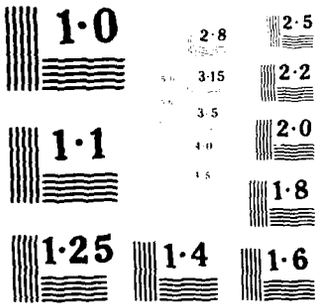
downstream of the East Site. The [illegible] floor level is 1' - 2' above the channel bottom.

The [illegible] failure flood [illegible] pass this levee with 3' - 5' depths of flowing, very high velocities, [illegible] rate of rise, [illegible] the occupants.

Further downstream, [illegible] join the main stream [illegible] attended as discussed under Evacuation Routes and Warning Time.

AD-A158 555 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS SOUHEGAN RIVER WATERS..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV DEC 79 2/2

UNCLASSIFIED F/G 13/13 NL


1·0
2·8
2·5
3·15
2·2
3·5
2·0
1·1
4·0
4·5
1·8
1·25
1·4
1·6

Test Flood Analysis

Size Classification — SMALL

Storage < 1000 acre-ft.

Height < 40'

Hazard Classification - SIGNIFICANT

Failure of the East Dike would seriously damage or destroy the dwelling which lies in the main flow path 350' downstream, and threaten the lives of the occupants.

Test Flood Selection

Per COE guidelines, a SMALL dam with SIGNIFICANT hazard potential should use a 100 year to ½ PMF Test Flood. As the hazard is on the high side of significant because lives are jeopardized the ½ PMF is selected. A complete inflow hydrograph of this order of magnitude has been developed for this dam by the SCS. The peak value of this hydrograph will be selected as the Test Flood inflow.

Emergency Spillway Hydrograph

This was developed by the SCS as part of the design calculations using the SCS unit hydrograph

Peak Outflow

$Q = \underline{1020}$ cfs (Adopt as Test Flood)

Check using COE NED "Maximum Probable Flood Peak Flow Rates"

Watershed - rolling

Drainage Area - 518 acres = 0.81 sq. miles

use PMF = 2000 :SM

$= 2000 \times 0.81 = 1620$ cfs

½ PMF = 810 cfs (Test Flood value more conservative)

Routed Peak Outflow (Based on SCS hydrology design calculations)

After storage routing through the reservoir the peak outflow was calculated by the SCS to be $\underline{165}$ cfs

Storage routing was started at the level of the principal spillway orifice invert, elev. 946.5.

From the dam rating curve, the peak outflow of 165 cfs will occur with a pool elevation of approximately 974.9, 1.6 feet below the crest of the dam.

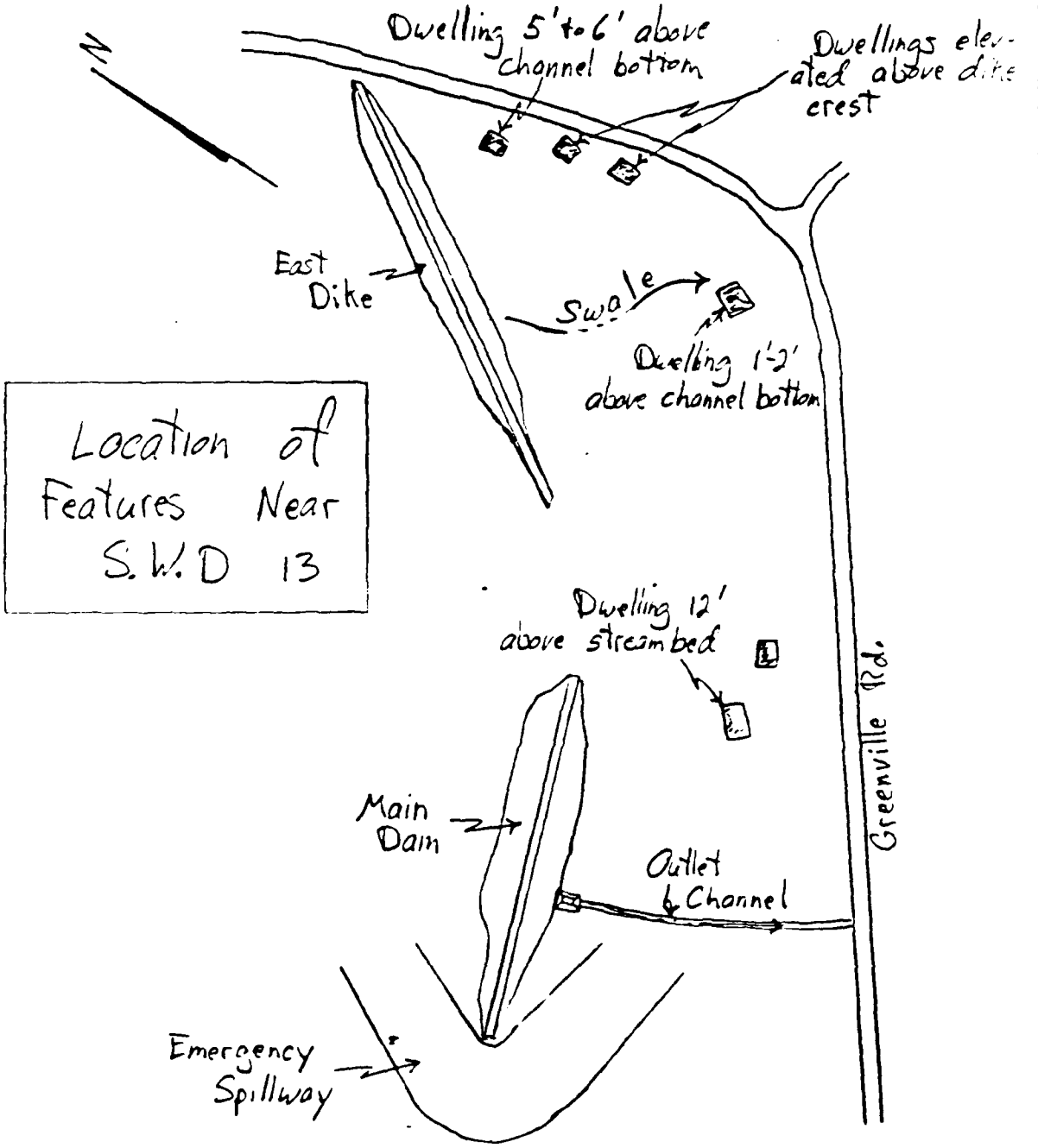
Because the SCS routing calculations assume a narrower emergency spillway than was actually built, the peak outflow and peak pool level resulting from the Test Flood would be slightly less than the values calculated

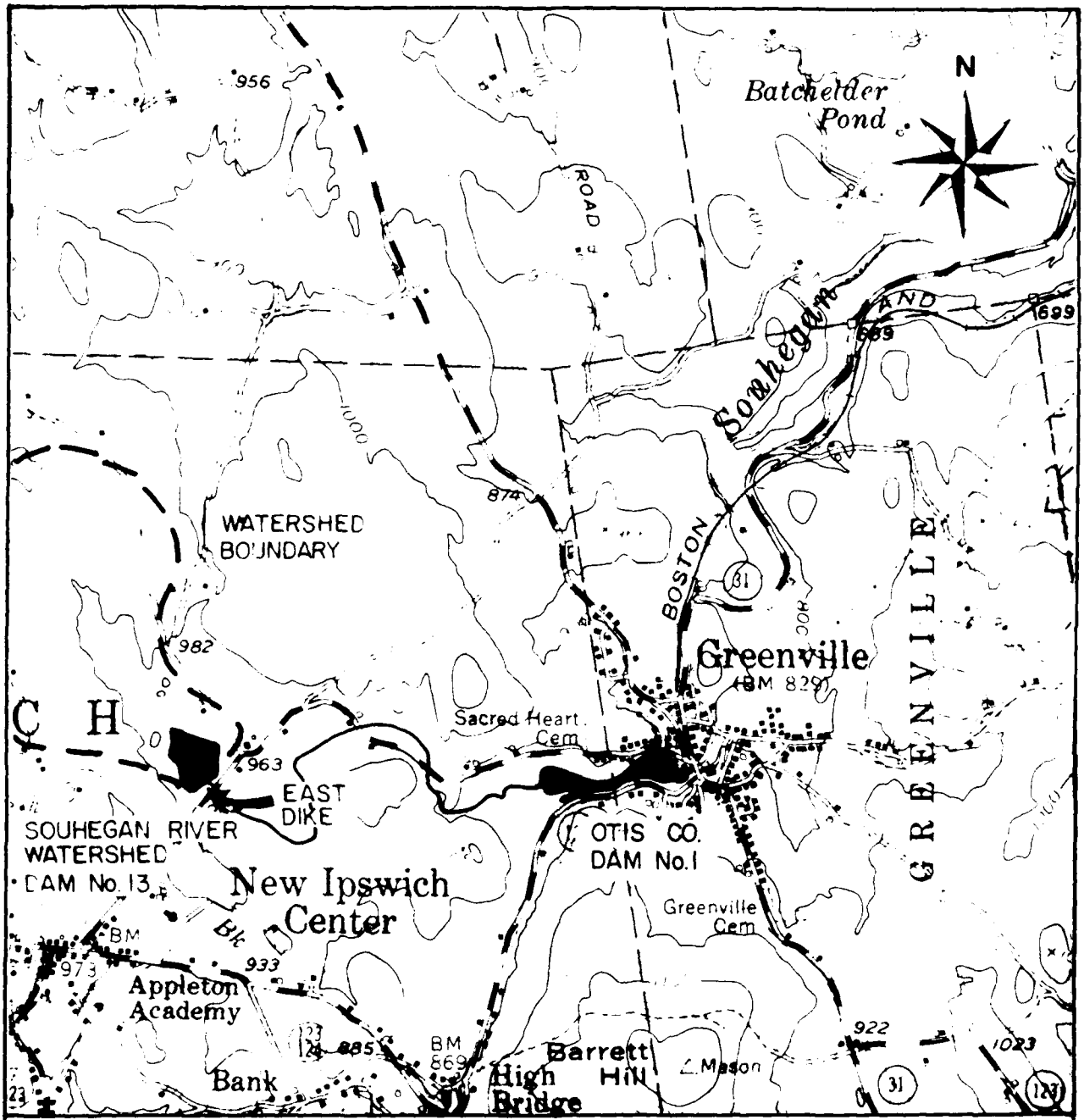
Drawdown Time

Sheet 5-3 of the SCS design calculations presents a drawdown time check

Beginning at the level of the emergency spillway crest, elev. 973.9, and assuming no inflow, the drawdown time to the orifice invert would be 7.9 days.

99% drawdown takes 5.8 days.


Dwelling 5' to 6' above channel bottom
Dwellings elevated above dike crest
East Dike
Swale
Dwelling 1'-2' above channel bottom
Location of Features Near S.W.D 13
Dwelling 12' above streambed
Greenville Rd.
Main Dam
Outlet Channel
Emergency Spillway



FROM: USGS PETERBOROUGH - N H QUADRANGLE MAP

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

FILE No. 2327

SOUHEGAN RIVER
WATERSHED DAM No. 13

NEW IPSWICH, NEW HAMPSHIRE

SCALE	AS NOTED
DATE	JAN 1980

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST	STATE	COUNTY	CONGR DIST	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
NH	[illegible]		NH	011	02				SOUHEGAN RIVER WATERSHED DIKE NO 13	4245.9	7150.6	09OCT79

POPULAR NAME	NAME OF IMPOUNDMENT
	SOUHEGAN RIVER WATERSHED RES NO 13

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI)	POPULATION
01	6	UN-TRIB SOUHEGAN RIVER	GREENVILLE	2	1587

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT)	HYDRAULIC HEIGHT (FT)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
[illegible]	1964	C	10	10	679	14	NED	N	N	N	8	

REMARKS

U/S HAS	SPILLWAY LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH	MAXIMUM DISCHARGE (FT)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)
2	650															

OWNER	ENGINEERING BY	CONSTRUCTION BY
NH WATER RES	SCS	

REGULATORY AGENCY

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
SCHOENBERG ZOINO DUNNICLIFF	30AUG79	PL92-367

REMARKS

51-SPILLWAY AT DAM NH00452

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST	STATE	COUNTY	CONGR DIST	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
NH	[illegible]	[illegible]	NH	11	02				SUNCOOK RIVER WATERSHED DAM NO 13	4245.9	7150.7	09	OCT	79

POPULAR NAME	NAME OF IMPOUNDMENT
	SUNCOOK RIVER RESERVOIR NO 13

REGION/BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST FROM DAM (MI)	POPULATION
1 S	SOUTH SUNCOOK RIVER	GREENVILLE	2	1587

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUC HEIGHT (FT)	HYDRAU HEIGHT (FT)	IMPOUNDING CAPACITIES MAXIMUM (ACRE FT)	NORMAL (ACRE FT)	DIST	DWN	FED H	PRV/FED	SCS A	VEH/DATE
[illegible]	1964	C	14	14	276	14	NED	N	N	N	B	

REMARKS

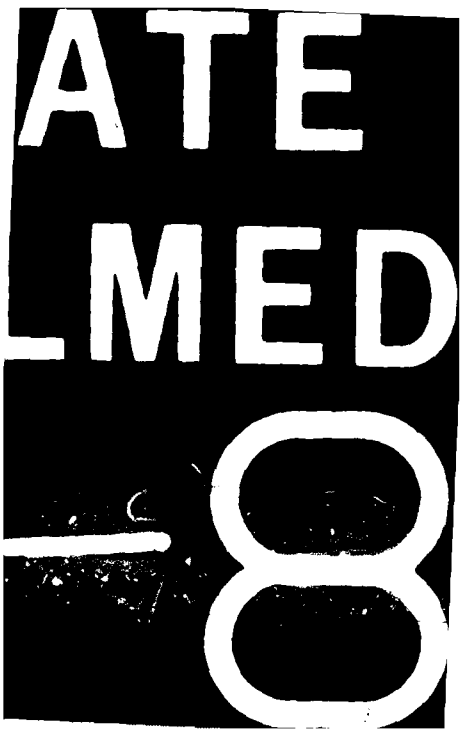
U.S. HAS	SPILLWAY LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT)	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)
2	500	U	112	1052												

OWNER	ENGINEERING BY	CONSTRUCTION BY
NH WATER RESOURCES DAM	SCS	

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
GOLDBERG ZOINO DUNNICLIFF + ASSOC	[illegible]		79	PL92-367

REMARKS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