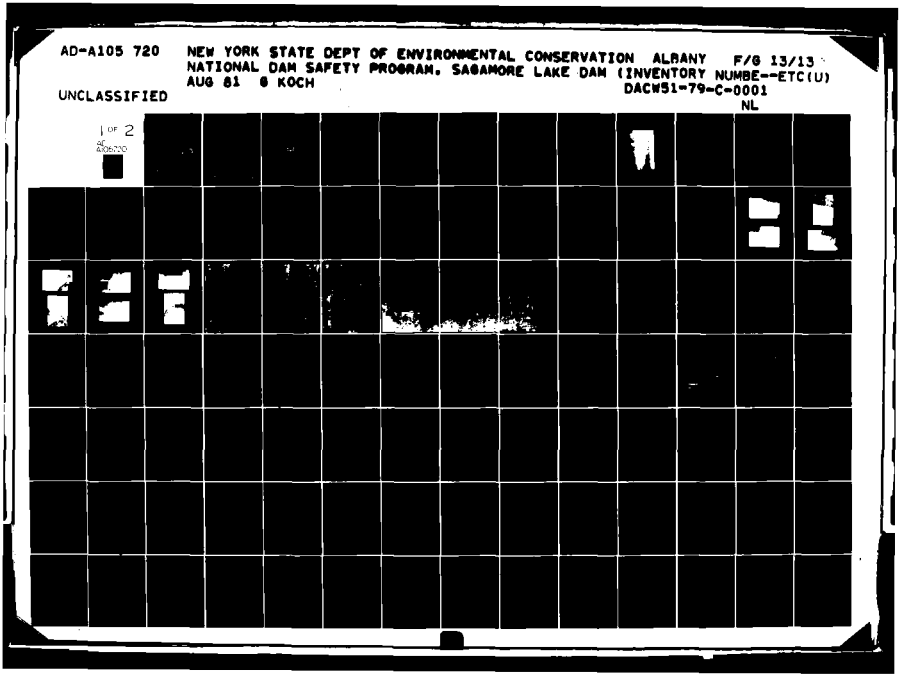
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18. SUPPLEMENTARY NOTES

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Sagamore Lake Dam
Putnam County
Lower Hudson River Basin

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

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

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to life or property. However, the dam has some deficiencies which need to be evaluated and remedied.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Using the Corps of Engineers' Screening Criteria for initial review of spillway adequacy, it has been determined that the dam would be overtopped by all storms exceeding 13% of the Probable Maximum Flood (PMF) inflows. Since failure of the dam would increase the hazard to downstream residents, the spillway capacity is adjudged as seriously inadequate and the dam is assessed as "unsafe; non-emergency".

The classification of "unsafe" means that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam. Due to the severity of the spillway adequacy, it is required that the stop logs on the spillway be removed to lower the reservoir level and to provide additional spillway capacity. The stop logs should not be replaced until appropriate mitigating measures have been taken.

In the interim, a system for providing around-the-clock surveillance of the dam during periods of unusually heavy precipitation should be developed and implemented. An emergency action plan for the notification and evacuation of downstream residents should be also developed.

Structural stability analyses performed for the spillway section of this dam indicate that the factors of safety are below recommended values for all conditions studied. Safety factors fall to critical levels when the dam is subjected to severe loading conditions, such as one-half of the PMF.

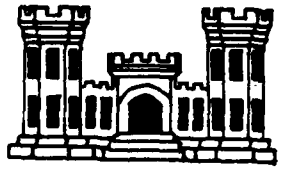
It is recommended that within 3 months of the date of notification of the owner, investigations into the deficiencies on this structure should be commenced. A detailed hydrologic/hydraulic investigation of the structure is required. In addition, further investigations to better assess the structural stability of the spillway section are needed. Mitigating measures deemed necessary as a result of these investigations should be completed within 18 months.

LOWER HUDSON RIVER BASIN

SAGAMORE LAKE DAM

PUTNAM COUNTY, NEW YORK
INVENTORY NO. N.Y. 313

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1981

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 frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

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

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
SAGAMORE LAKE DAM
I.D. N.Y.313
DEC NO. 213-1113-LH
PUTNAM COUNTY, N.Y.

TABLE OF CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Sagamore Lake Dam (I.D. NY 313)
State Located:	New York
County:	Putnam
Watershed:	Lower Hudson River Basin
Stream:	West Branch of Croton River
Date of Inspection:	May 27, 1981

ASSESSMENT

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to life or property. However, the dam has some deficiencies which need to be evaluated and remedied.

Using the Corps of Engineers' Screening Criteria for initial review of spillway adequacy, it has been determined that the dam would be overtopped by all storms exceeding 13% of the Probable Maximum Flood (PMF) inflows. Since failure of the dam would increase the hazard to downstream residents, the spillway capacity is adjudged as seriously inadequate and the dam is assessed as "unsafe; non-emergency".

The classification of "unsafe" means that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam. Due to the severity of the spillway adequacy, it is required that the stop logs on the spillway be removed to lower the reservoir level and to provide additional spillway capacity. The stop logs should not be replaced until appropriate mitigating measures have been taken.

In the interim, a system for providing around-the-clock surveillance of the dam during periods of unusually heavy precipitation should be developed and implemented. An emergency action plan for the notification and evacuation of downstream residents should be also developed.

Structural stability analyses performed for the spillway section of this dam indicate that the factors of safety are below recommended values for all conditions studied. Safety factors fall to critical levels when the dam is subjected to severe loading conditions, such as one half of the PMF.

It is recommended that within 3 months of the date of notification of the owner, investigations into the deficiencies on this structure should be commenced. A detailed hydrologic/hydraulic investigation of the structure is required. In addition, further investigations to better assess the structural stability of the spillway section are needed. Mitigating measures deemed necessary as a result of these investigations should be completed within 18 months.

Several other deficiencies were noted on this structure. These deficiencies should be corrected within 12 months of the date of notification of the owner. Among the required actions are the following:

1. Brush and trees growing on the embankment should be cut. A follow-up inspection of the dam should be conducted after the embankment has been cleared.

2. The oversteepened downstream slope at the right end of the dam should be flattened.

3. The seepage observed beyond the ends of the wingwalls at both ends of the spillway section should be kept under surveillance. If the rate of seepage increases, remedial actions should be taken.

4. The area behind the downstream end of the right wingwall should be regraded to fill the small scoured area which has developed.

5. The reservoir drain should be operated and if it is not operational, it should be repaired.

George Koch RW

George Koch
Chief, Dam Safety Section
New York State Department
of Environmental Conservation
NY License No 45937

Approved By:

Col. W. M. Smith, Jr.
New York District Engineer

Date: 26 Aug 81

OVERVIEW
SAGAMORE LAKE DAM
I.D. NO. NY-313

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
SAGAMORE LAKE DAM
I.D.NO. NY-313
#213-1113 LOWER HUDSON RIVER BASIN
PUTNAM COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2. DESCRIPTION OF PROJECT

a. Description of Dam

The Sagamore Lake Dam (formerly known as the Old Forge Dam) is an earth dam with a concrete corewall. A concrete gravity spillway section is located near the left end of the dam.

The dam is approximately 300 feet long and 20 feet high. The crest width is about 20 feet at the right end of the dam and somewhat less at the left end. A reinforced concrete core wall extends the length of the embankment. This corewall is 1.25 feet wide at the top and 3 feet wide at the base. The depth of embedment of the wall varied with the height of the wall. The plans indicate that the embankment slopes are 1 vertical on 2.5 horizontal on the upstream slope and 1 vertical on 2 horizontal on the downstream slope. The existing embankment slopes appear to be steeper than these values.

The spillway is a 48 foot long ungated concrete overflow section. The section has a rounded crest about 2 feet wide. There is a stoplog slot near the center of the spillway section. This slot is 8.8 feet long and 1.6 feet deep (below the spillway crest). Concrete wingwalls on either side of the spillway separate it from the embankment. A concrete apron extends about 25 feet beyond the downstream toe of the spillway section.

The structure reportedly has a 20 inch diameter steel drain through the base of the spillway section. The outlet from this pipe could not be located but there is a gate stem which rises several feet above the normal water level immediately upstream of the spillway.

b. Location

The Sagamore Lake Dam is located off of Sagamore Drive in the Town of Kent, Putnam County. It is about 0.5 miles south of New York State Route 301 and approximately 2.5 miles east of the Taconic State Parkway. Boyd Corners Reservoir Dam, another "high" hazard structure, is located one mile downstream of this dam.

c. Size Classification

This dam is 20 feet high and has a storage capacity of 1824 acre-feet. Therefore, the dam is in the intermediate size category as defined by the "Recommended Guidelines for Safety Inspection of Dams".

d. Hazard Classification

The dam is classified as "high" hazard due to the presence of several homes located near the stream channel between the dam and Boyd Corners Reservoir. One town road and State Route 301 would also be affected by a dam failure.

e. Ownership

The dam is owned by the Lake Sagamore Community Association. The president of the association is Mr. Ira Nathan. His address is RD2 Carmel, New York 10512. His phone number is (914) 225-4136.

f. Purpose of Dam

This dam is used to maintain the water level in the lake for recreational purposes.

g. Design and Construction History

This dam was originally constructed in 1940. R.J. Crane, Professional Engineer, designed the dam for Antoinette M. Ryder of Carmel, New York. The height of the dam was increased in 1946. These modifications to the structure, which included rebuilding the spillway section, were designed by M. Chazen, Professional Engineer.

h. Normal Operating Procedures

There are no regular operating procedures on this dam. Water flows over the ungated spillway.

1.3 PERTINENT DATA

a. Drainage Area (sq.miles)	5.91
b. Discharge at Dam	(cfs)
Spillway (Water @ Top-Dam; stoplogs in place)	983
Stoplogs Out (water @ spillway crest)	43
c. Elevation (USGS Datum)	
Top of Dam	659.45
Spillway Crest	656.
Stoplog Slot - Invert	654.4

d. Reservoir (Surface Area)		(acres)
Top of Dam		96+
Spillway Crest		96
e. Storage Capacity		(acre-feet)
Top of Dam		1824
Spillway Crest		1492

f. Dam

Type: Earth embankment with concrete corewall extending into the foundation

Embankment Length (ft)		250
Crest Width (ft)		Variable
Design Slopes (V:H)	Upstream	1 on 2.5
	Downstream	1 on 2

g. Spillway

Type: Ungated concrete overflow weir located near left end of dam; slot for stop logs in center of spillway

Length of Overflow Weir (ft)	47.9
Length of Stop Log Slot (ft)	8.8
Height of Stop Log (below spillway crest) (ft)	1.6

h. Reservoir Drain

Type: 20 inch diameter steel pipe through base of spillway section; Valve stem to control flow through pipe is immediately upstream of spillway.

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Sagamore Lake Dam is located in the Hudson Hills segment of the New England Uplands physiographic province of New York State. These hills, commonly known as the "Highlands of the Hudson", are composed of crystalline rocks similar to those in the Adirondacks. The highlands, which trend northeast-southwest, have been eroded to form very rugged terrain with summit levels reaching 1000 feet above sea level. Bedrock in the area consists of gneiss, quartzite, and marble from the Precambrian era (more than 570 million years ago). A review of the "Brittle Structures Map of New York" indicates that there is a fault trace which runs through the reservoir about 1500 feet to the northwest of the dam.

The surficial soils in this area are the results of glaciations during the Cenozoic Era, the last of which was the Wisconsin glaciation.

b. Subsurface Investigation

No records of any subsurface investigations performed for this structure could be located. Limited subsurface data was included on the application form for the original construction of the dam. This indicated that the foundation consisted of hard pan, clay and rocks.

2.2 DESIGN RECORDS

Limited design information was available for this structure. Applications for the construction in 1940 and the reconstruction in 1946 were available and have been included in Appendix F. Plans were available for both the construction and the reconstruction. The 1940 plans were prepared by R.J. Crane. The 1946 plans were prepared by M. Chazen.

2.3 CONSTRUCTION RECORDS

No construction records were available for this dam. It is believed that the dam was built predominantly according to plans. One discrepancy noted between the plans and the existing conditions was that only one stop log slot exists rather than the four indicated on the 1946 plans. The crest width of the embankment is wider and the slopes are steeper than the plans indicate as well. This appears to be due to fill placed on the embankment after the reconstruction.

2.4 OPERATION RECORDS

No operation records were available for this structure.

2.5 EVALUATION OF DATA

Information used for the preparation of this report was obtained from the Department of Environmental Conservation files. With the exception of the discrepancies noted above, the available information appeared to be reasonably accurate.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Sagamore Lake Dam was conducted on May 27, 1981. The weather was partly cloudy and the temperature was in the mid-sixties. The water level at the time of the inspection was slightly above the spillway crest.

b. Embankment

Inspection of the embankment was hampered by trees and brush growing on the downstream slope. There was also extensive brush cover on the crest and upstream slope at the left end of the dam. The remainder of the crest and upstream slope had only a minor amount of undesireable growth.

The crest of the dam was somewhat irregular. There was an area to the right of the spillway section where the crest elevation was about one foot higher than it was on the remainder of the dam. This section was about 90 feet long and had resulted from filling operations which had widened the crest and steepened the downstream slope.

The fill that had been used appeared to have been road sweepings, pieces of asphalt and broken concrete. The crest width of the embankment was variable due to this fill material. Several small erosion gullies in this material were observed on the downstream slope.

There was some seepage observed on both ends of the spillway section. At the right end of the spillway, a minor flow was appearing on the edge of the plunge pool, downstream of the concrete wingwall which separated the spillway section from the embankment. The volume of seepage on the left end was somewhat larger. This seepage was flowing under large rocks which had been dumped in this area. The exact cause of the seepage in either area was not readily apparent.

Some embankment material was missing from a small area at the downstream end of the right wingwall. This was probably the result of some minor scouring action from the plunge pool. The embankment behind the right wingwall was covered by the dumped rocks previously mentioned. The rock made it impossible to see the embankment in this area.

c. Spillway

The spillway was in satisfactory condition. Only minor spalling of the concrete was observed. Some efflorescence was noted along the construction joints on each of the wingwalls. Stop logs were in place at the time of inspection. This brought the crest of the stop log slot up to the same level as the remainder of the spillway.

d. Reservoir Drain

No inspection of the reservoir drain facilities was possible. The valve stem rose several feet above the water surface immediately upstream of the spillway section. The outlet to the drain was apparently submerged and could not be located at the time of the inspection.

e. Reservoir

There were no indications of soil instability on this structure.

f. Downstream Channel

The channel downstream of the dam was natural and rock filled. It passed beneath a small highway bridge several hundred feet downstream of the dam.

3.2 EVALUATION OF OBSERVATIONS

Visual observations revealed several deficiencies on this structure. The following items were noted:

1. Brush and trees growing on the downstream slope at the right end of the embankment and on the entire embankment at the left end.

2. An oversteepened downstream slope at the right end of the dam caused by dumping unsuitable material on the crest and slope.

3. Seepage observed beyond the wingwalls at both ends of the spillway section.

4. A small area which had been scoured behind the right wingwall at the downstream end.

5. Rock dumped behind the left wingwall hiding the embankment in this area.

6. It could not be determined whether the reservoir drain was operational.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no formal operating procedures for this dam. Stop logs can be removed or added in the stop log slot to vary the water level.

4.2 MAINTENANCE OF DAM

There is no established maintenance plan for this dam.

4.3 WARNING SYSTEM IN EFFECT

No apparent warning system for notification or evacuation of downstream residents is present.

4.4 EVALUATION

The operation procedures on this structure are satisfactory. Maintenance has been unsatisfactory as evidenced by the deficiencies noted in section 3.2.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The delineation of the contributing watershed to this dam is indicated on the map titled "Drainage Area Map - Sagamore Lake Dam" (Appendix C). The irregular but somewhat square, north-south oriented watershed of some 5.91 square miles (3783 acres) is comprised of relatively undeveloped lands , primarily forests and woodlands. No significant land development exists except for those seasonal residences surrounding Sagamore Lake itself. Numerous wetlands are interspersed throughout the watershed. Slopes along the primary drainage paths are moderate (3%-7%). However, the adjacent hillsides have steep slopes , with those hilltops forming the watershed divide ranging from 350 feet to 650 feet in elevations above the reservoir. There are no other sizeable bodies of water within the watershed nor are there any known flow diversions, either into or out of this basin. The outlet stream is known as the West Branch of the Croton River.

5.2 ANALYSIS CRITERIA

No hydrologic/hydraulic information was available regarding the original design for this dam. Therefore, the analysis of the floodwater retarding capability of the dam was performed using the Corps of Engineers HEC-1 computer program, Dam Safety version. The computer program develops an inflow hydrograph using the "Snyder Unit Hydrograph" method and then reservoir routs the hydrograph using the "Modified Puls" flood routing procedure. The spillway design flood selected for analysis was the Probable Maximum Flood (PMF), in accordance with the Recommended Guidelines of the U.S. Army Corps of Engineers. The PMF event is that hypothetical storm event resulting from the most critical combination of rainfall, minimum soil retention, and direct runoff to a specific site that is considered reasonably possible for a particular watershed. Precipitation values used in the analysis were obtained from the Weather Bureau publication HRR 33. Soil retention rates selected were an initial loss of 1.5 inches and a constant loss of 0.1 inches per hour.

5.3 SPILLWAY CAPACITY

The single, ungated concrete spillway was analyzed for weir flow using a discharge coefficient, C, of 3.25. Near the center of the spillway crest is a stoplog slot which can provide about 43 cfs additional flow capacity. Since the slot is not easily accessable from either spillway abutment wall during the occurrence of a large storm event, the analysis does not include the additional 43cfs.

The floodwater analysis performed for this dam indicates that the spillway does not have sufficient capacity for discharging one-half the PMF. For this storm event, the peak inflow is 5181 cfs and the peak outflow is 5019 cfs. The PMF peak inflow and peak outflow are 10363 cfs and 10143 cfs respectively. The computed spillway discharge capacity with the stop logs in place is 983 cfs.

5.4 RESERVOIR CAPACITY

The normal water surface is at or near the spillway crest (elevation 656 -USGS) The impounded capacity at this elevation is 1492 acre-feet. Surcharge storage capacity to the top-of-dam (elevation 659.45) adds 332 acre-feet which is equivalent to a direct run-off depth of 1.05 inches over the watershed. The total storage capacity is 2306 acre-feet.

5.5 FLOODS OF RECORD

No data was available regarding the occurrence of the maximum known flood at this dam site.

5.6 OVERTOPPING POTENTIAL

Analyses using the PMF and one-half the PMF storm events indicates that the spillway does not have sufficient discharge capacity. The computed depths of overtopping for these two events are 4.90 feet and 2.81 feet respectively. All storm events exceeding 13% of the PMF will result in the dam being overtopped.

5.7 EVALUATION

The spillway capacity is inadequate for the peak outflow from one-half the PMF. Overtopping of the earth embankment is likely to cause dam failure. Therefore, a dam-break analysis, assuming a breaching of the dam, was performed. The analysis indicates that water surface levels downstream of the dam could reach depths which would pose a significant danger to residents. That is, dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before an overtopping failure. Therefore the spillway is adjudged as "seriously inadequate" and the dam is assessed as "unsafe,non-emergency."

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual inspection of the embankment was hampered by trees and brush growing on the slopes. Minor seepage was noted beyond the wingwalls at both ends of the spillway section. The embankment had been modified by the addition of fill material. The crest had been raised by about one foot along a 90 foot long section. The fill has also widened the crest and caused the downstream slope to become oversteepened. There were several small erosion gullies in this material on the downstream slope.

b. Data Review and Stability Evaluation

No design information concerning the stability of either the earth embankment or concrete spillway section was available.

A stability analysis of the spillway section was performed for this report in accordance with the "Recommended Guidelines for the Safety Inspection of Dams." This analysis was based on a cross section shown on the 1946 plans prepared by M. Chazen. The results of the analysis are as follows:

Case	Overturning Safety Factor	Resultant in Middle Third	Sliding Safety Factor
a. Normal Conditions; water surface at spillway crest	1.84	Yes	1.36
b. Case a. plus an ice load of 5,000 lb/ft	1.35	No	1.07
c. Water Surface at Top of Dam; 3.5 feet over spillway crest	1.52	No	1.09
d. 1/2 PMF Water Surface 6.3 feet over spillway crest (2.8 feet over top of dam)	1.35	No	0.92
3. Normal conditions with seismic coefficient of 0.10	1.74	Yes	0.96

The analysis indicates that the spillway section is only marginally stable under most of the conditions analyzed. When subjected to severe loading conditions due to one half the PMF or worse, the section would be unstable.

Further investigations are required to better assess the stability of the spillway section. Subsurface explorations and concrete cores, to obtain information about the condition of the structure and uplift forces, are required. Stability analyses should then be performed using this data. Based on the results of these analyses, required modifications to the structure should be made.

c. Seismic Stability

This structure is located in Seismic Zone 1. However, since there was a fault trace in the vicinity of the dam, a seismic stability analysis was performed assuming a seismic coefficient of 0.1. The results of this analysis (shown on page 11) indicate that the safety factor against sliding fall below 1.0 when seismic considerations are included.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I inspection of the Sagamore Lake Dam revealed that the spillway is seriously inadequate and outflows from all storms exceeding 13% of the Probable Maximum Flood would overtop the dam. Since an overtopping induced failure would significantly increase the hazard to downstream residents, the dam has been assessed as unsafe; non emergency.

In addition, a stability analysis performed for the spillway section indicates that the factors of safety are below recommended values for all conditions analyzed. When the dam is subjected to severe loading conditions, such as one half of the PMF, the safety factors fall to critical levels.

Several other deficiencies were noted which affect the safety of this structure. Trees and brush growing on the embankment prevent a detailed inspection of the dam. Fill has been placed on the downstream slope at the right end of the dam resulting in an oversteepened slope. Minor seepage was noted emerging beyond the ends of the wingwalls at both ends of the spillway section.

b. Adequacy of Information

The information available for the preparation of this report was reasonably complete and accurate. There was very little information available about subsurface conditions in the vicinity of the dam.

c. Need for Additional Investigations

Since the spillway has been assessed as seriously inadequate, additional hydrologic/hydraulic investigations are required to more accurately determine the site specific characteristics of the watershed. Analysis will then be required to determine appropriate mitigating measures in response to the seriously inadequate spillway capacity.

Further investigations are required to better assess the stability of the spillway section. Subsurface explorations and concrete cores to obtain information about the condition of the structure and uplift forces are required. Based on the results of these analyses, required modifications to this portion of the structure should be made.

d. Urgency

The hydrologic/hydraulic investigations and structural stability studies which are required should be commenced within 3 months of the date of notification of the owner. Remedial measures deemed necessary based on the results of the investigations should be completed within 18 months. All other deficiencies noted should be corrected within 12 months of the date of notification.

7.2 RECOMMENDED MEASURES

a. Due to the seriously inadequate spillway capacity, remove the stop logs on the spillway section pending the results of the detailed hydrologic/hydraulic analysis.

b. After the hydrologic/hydraulic investigation has been completed, mitigating measures dealing with the seriously inadequate spillway capacity should be taken.

c. Based on the results of the stability analysis, make the necessary modifications to the spillway section.

d. Cut brush and trees growing on the embankment to permit a more detailed inspection of the dam.

e. Flatten the oversteepened slope at the right end of the dam.

f. The seepage beyond the ends of the wingwalls should be kept under surveillance and remedial actions taken if the conditions worsen.

g. The small scoured area behind the downstream end of the right wingwall should be filled.

h. Test the reservoir drain to assure that it is operational and if not it should be repaired.

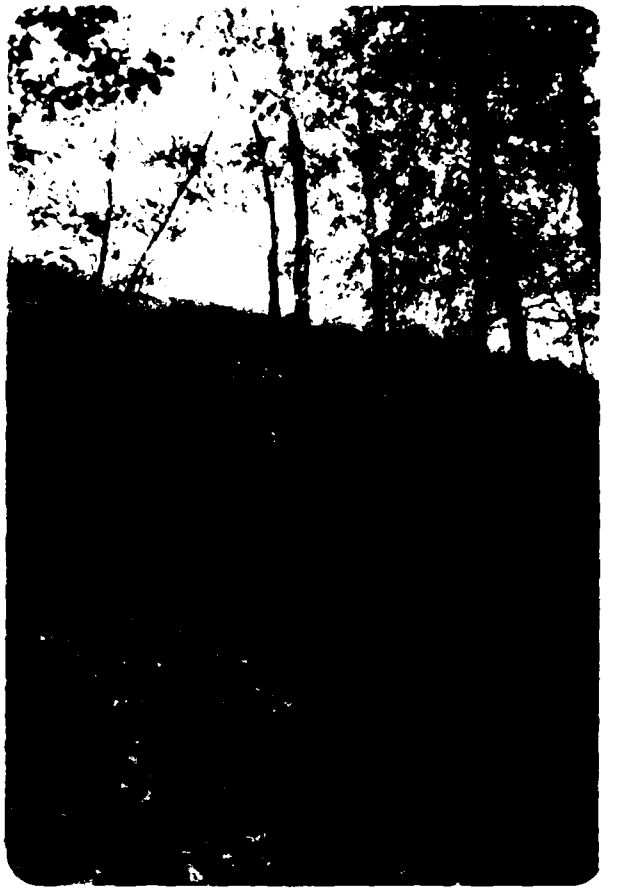
i. An emergency action plan for the notification and evacuation of downstream residents should be developed.

APPENDIX A

PHOTOGRAPHS

EMBANKMENT CREST AT RIGHT END OF DAM

EMBANKMENT CREST AT RIGHT END OF DAM;
AREA WHERE CREST IS HIGHER AND WIDER



DOWNSTREAM SLOPE AT RIGHT END OF DAM
IN AREA OF DUMPED FILL

MINOR SCOUR BEHIND WINGWALL AT RIGHT END OF SPILLWAY

RIGHT END OF SPILLWAY: AREA OF MINOR SEEPAGE
AT END OF WINGWALL

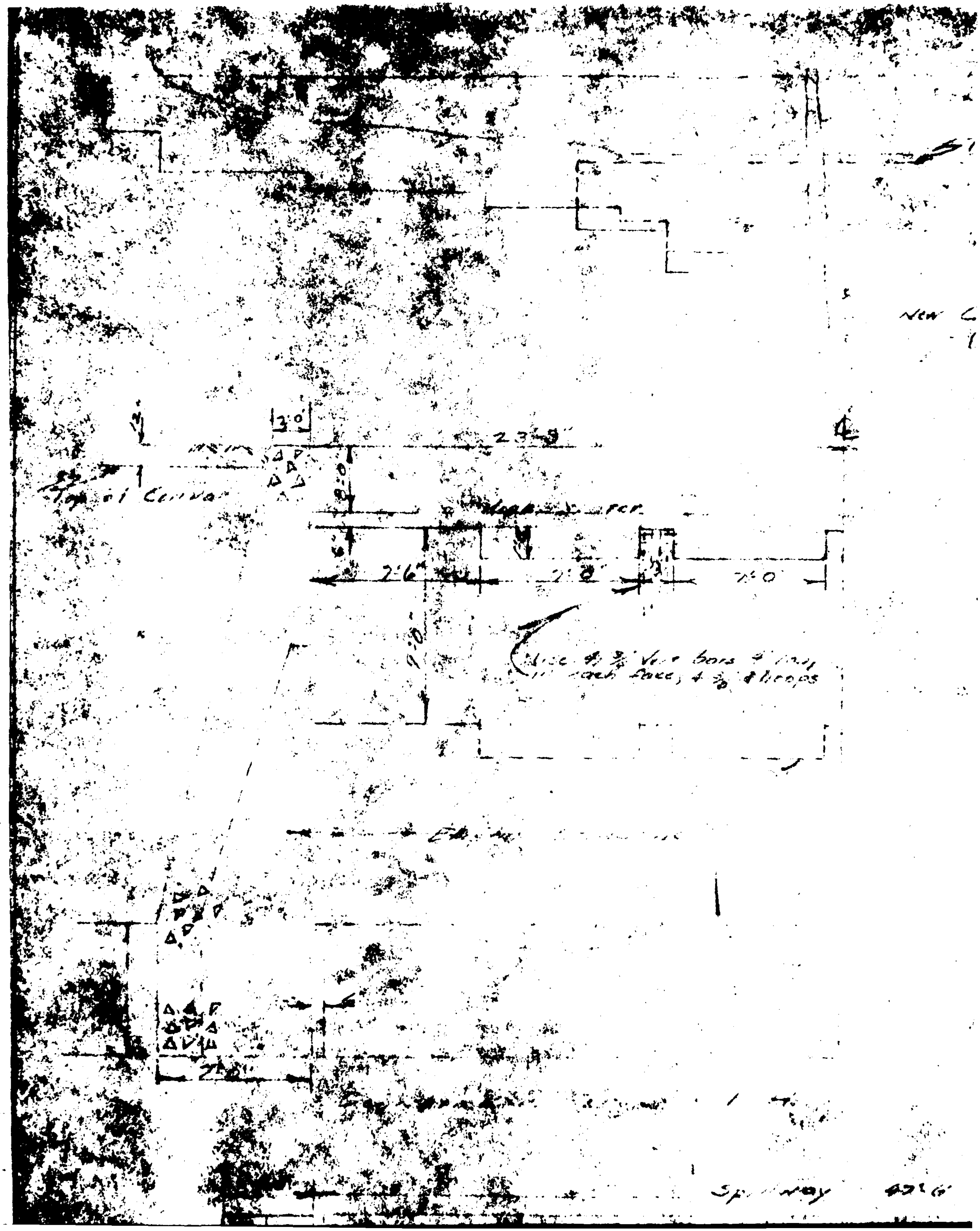
CLOSE UP OF SEEPAGE AREA SHOWN ABOVE

EMBANKMENT CREST AT LEFT END OF DAM
NOTE TREES AND BRUSH GROWING ON EMBANKMENT

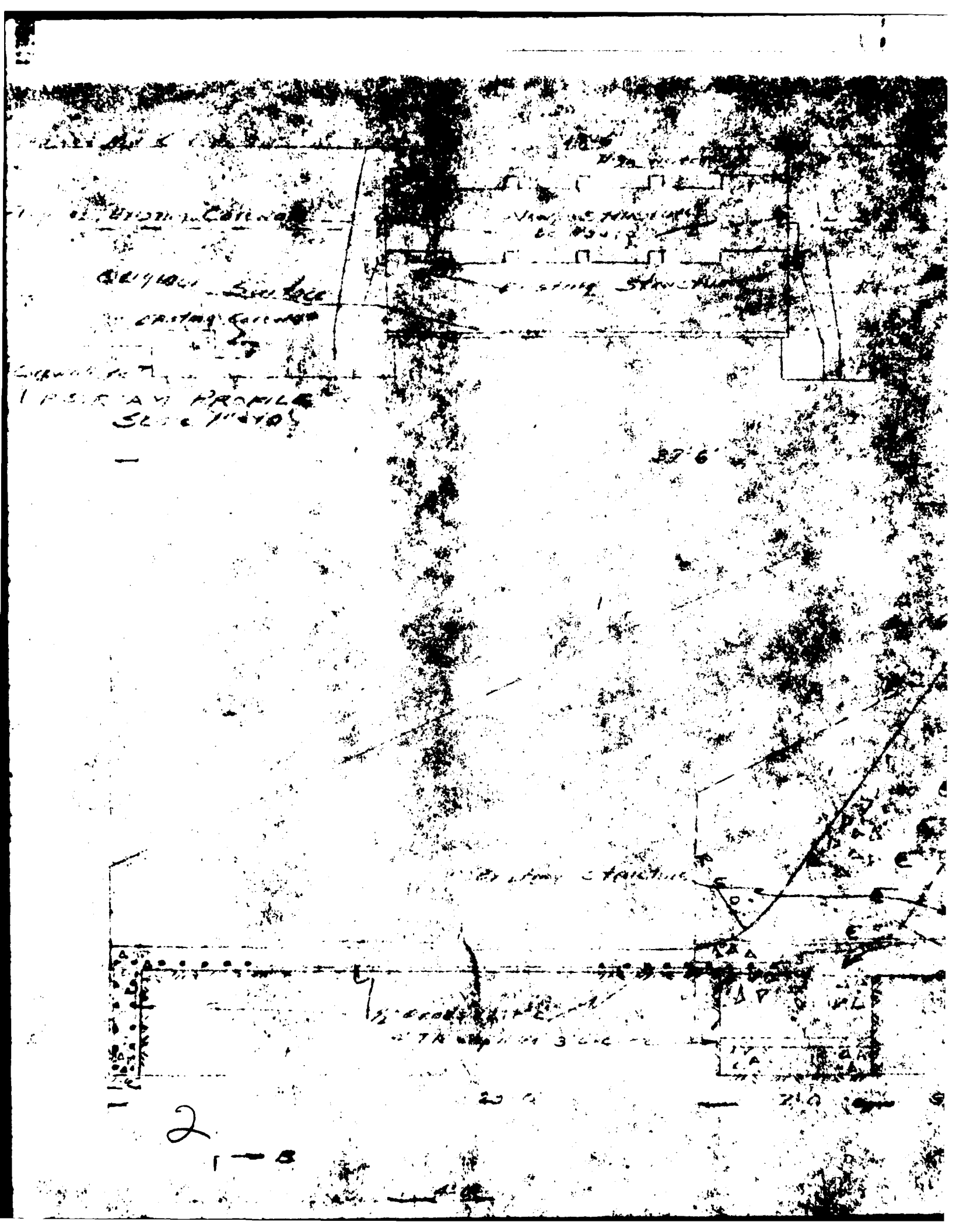
AREA OF DUMPED STONE AT LEFT END OF SPILLWAY
SEEPAGE EMERGING FROM BENEATH STONE

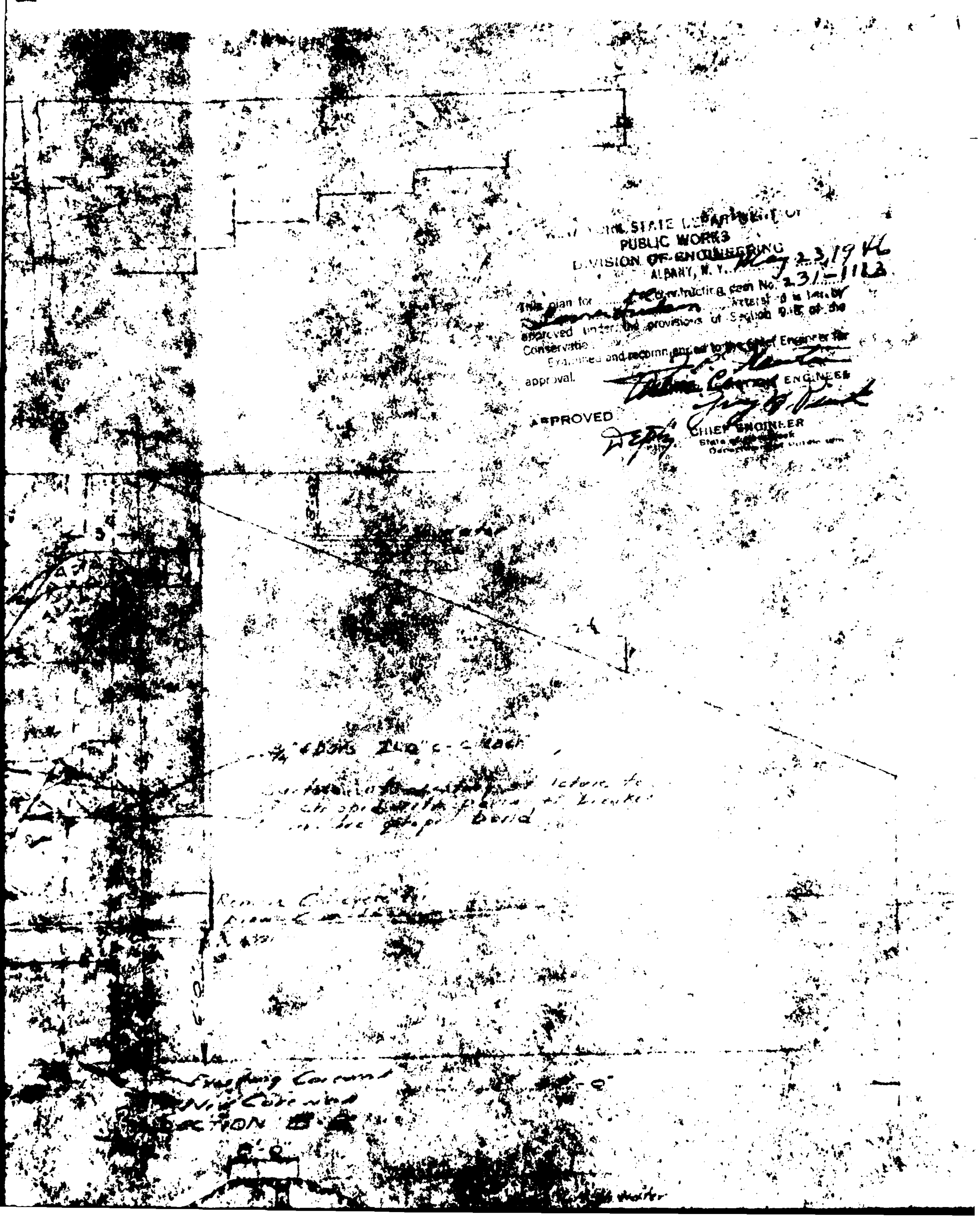
SPILLWAY SECTION; NOTE RESERVOIR DRAIN CONTROL STEM
AT LEFT SIDE OF PICTURE

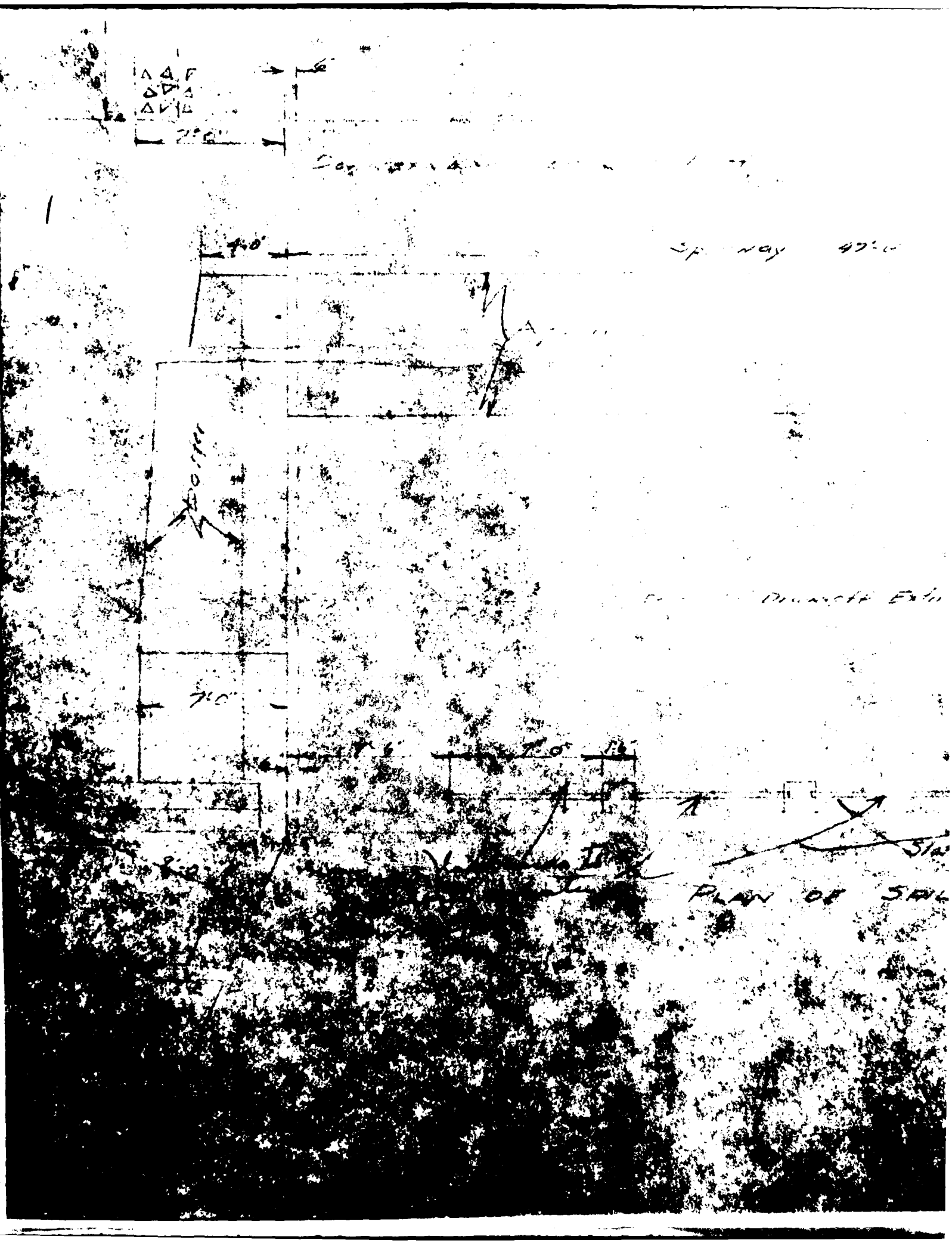
VIEW LOOKING ACROSS SPILLWAY CREST

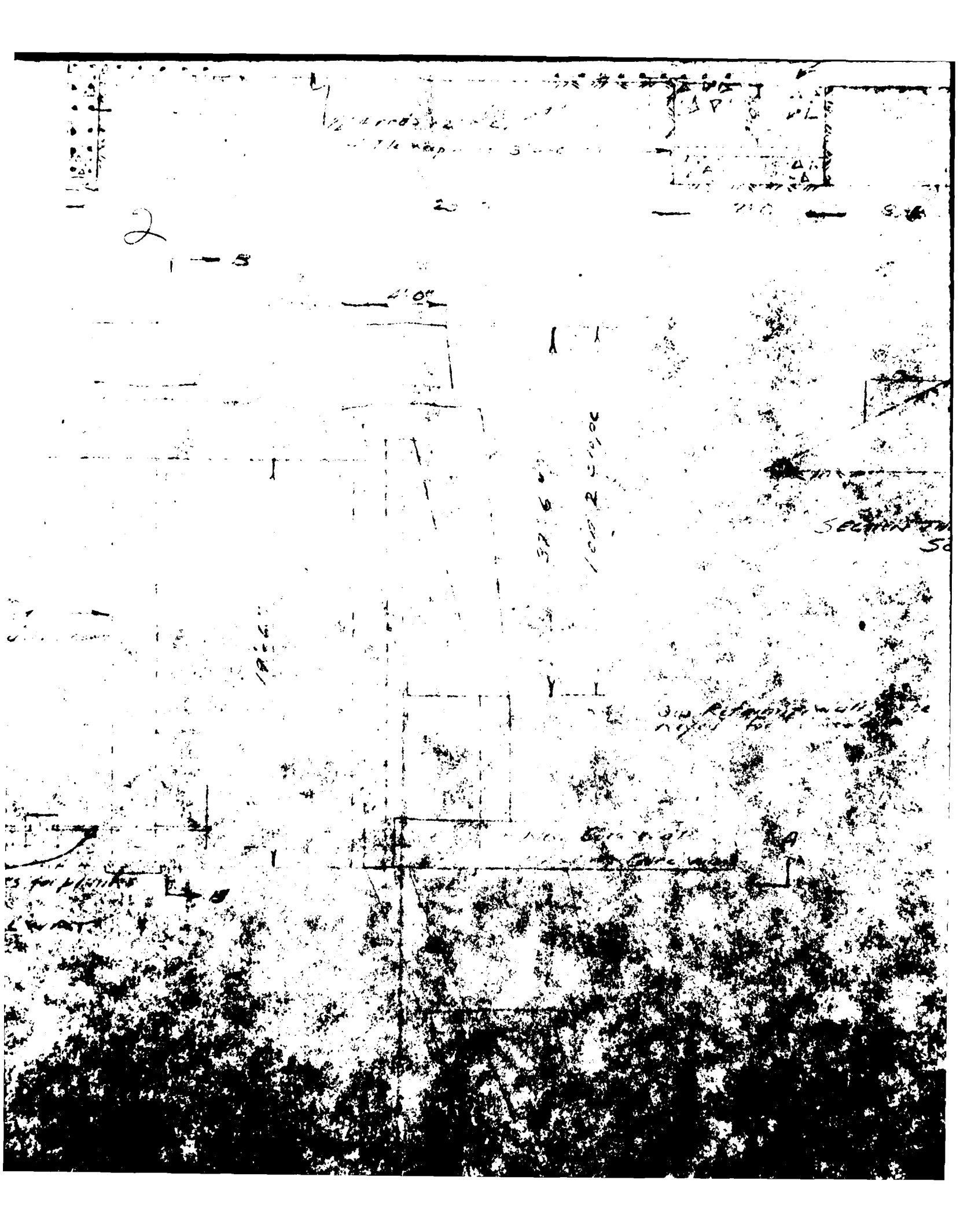


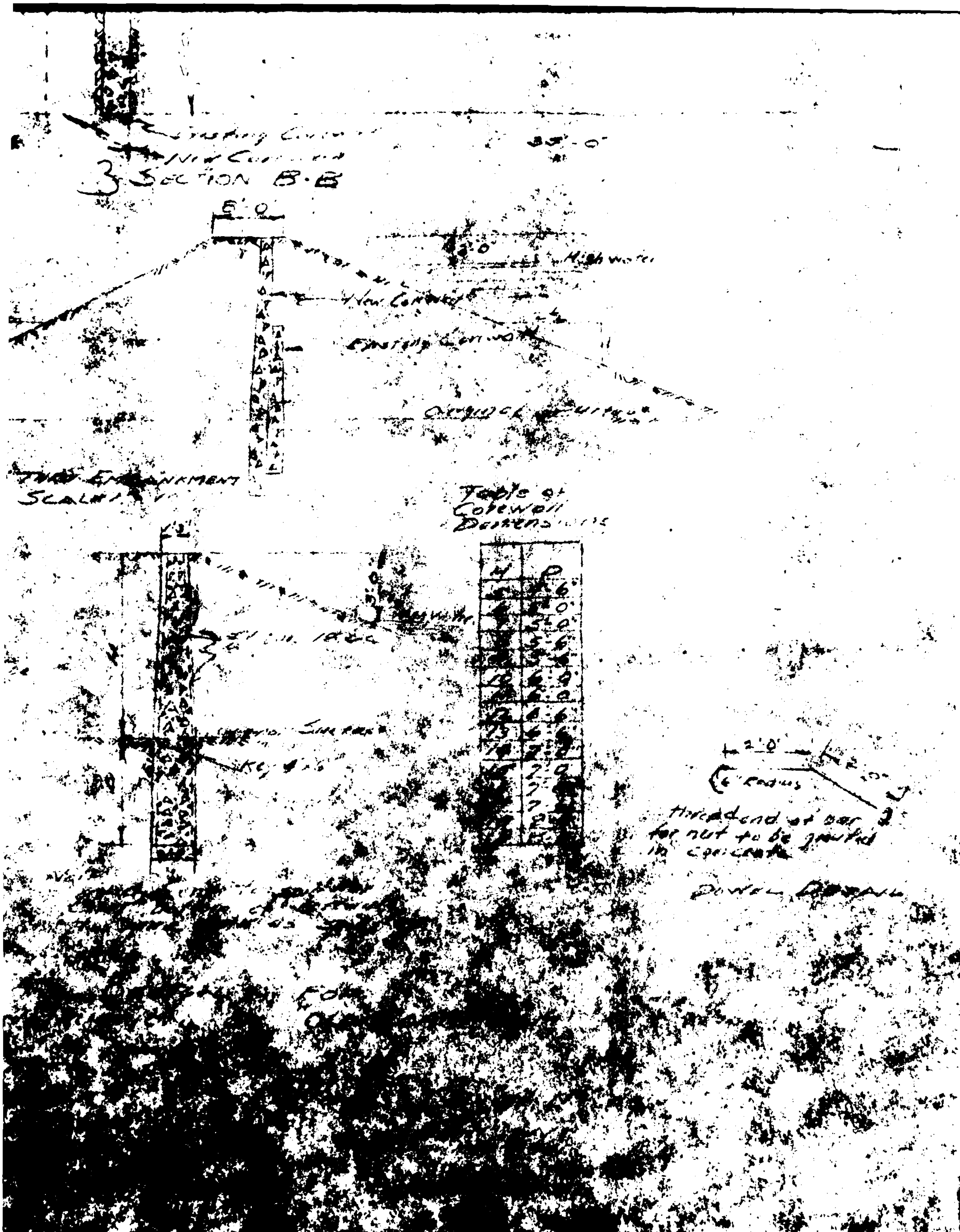
3'0"
23'9"
Top of Conver
2'6"
2'0"
7'0"
7'0"
New C
2'0"
Spillway



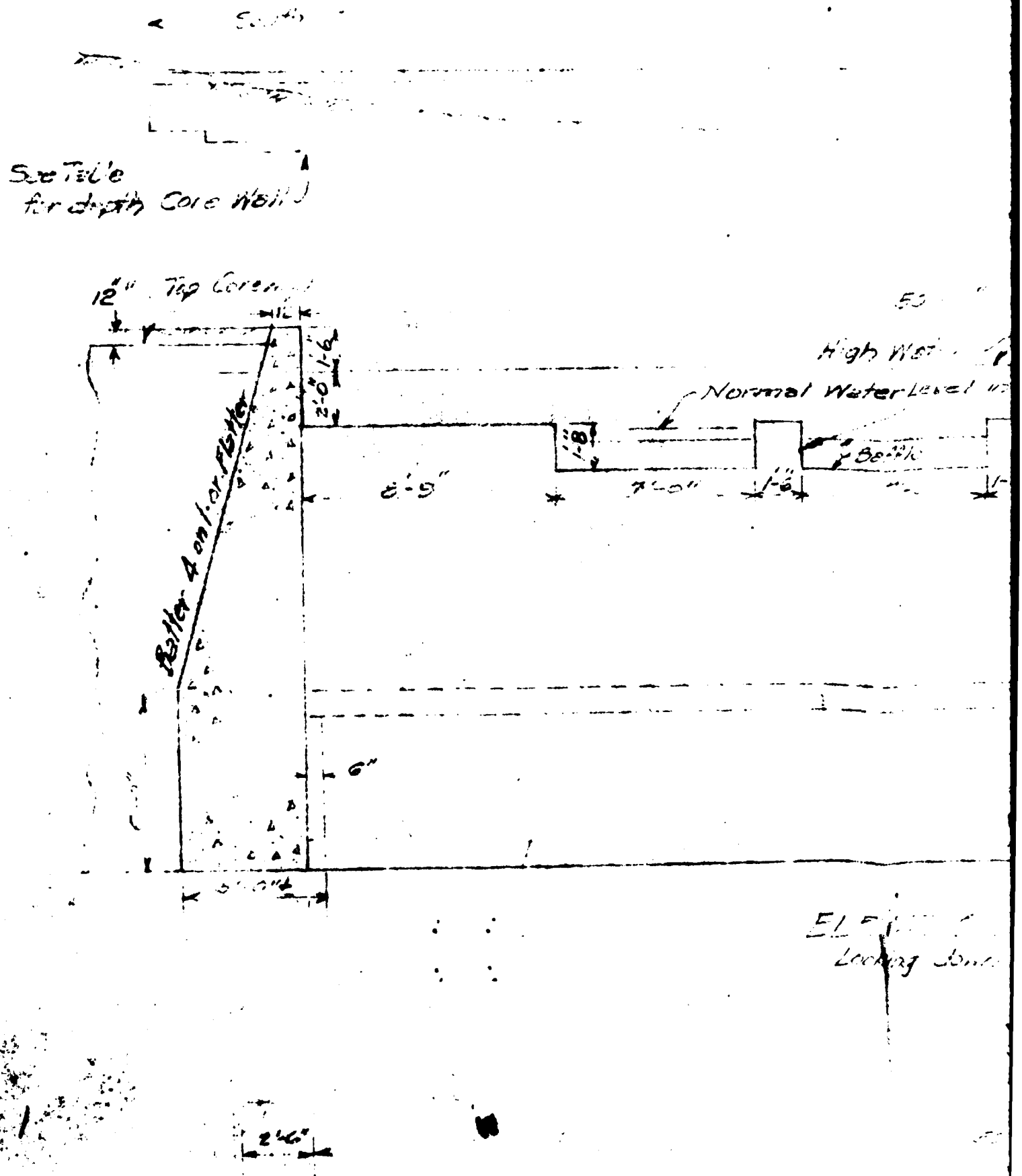

STATE DEPARTMENT OF
PUBLIC WORKS
DIVISION OF ENGINEERING
ALBANY, N. Y.
This plan for
approved under the provisions of Section
Conservation
Examined and recommended to the Chief Engineer for
approval.
ENGINEER
APPROVED
CHIEF ENGINEER
SECTION B-B

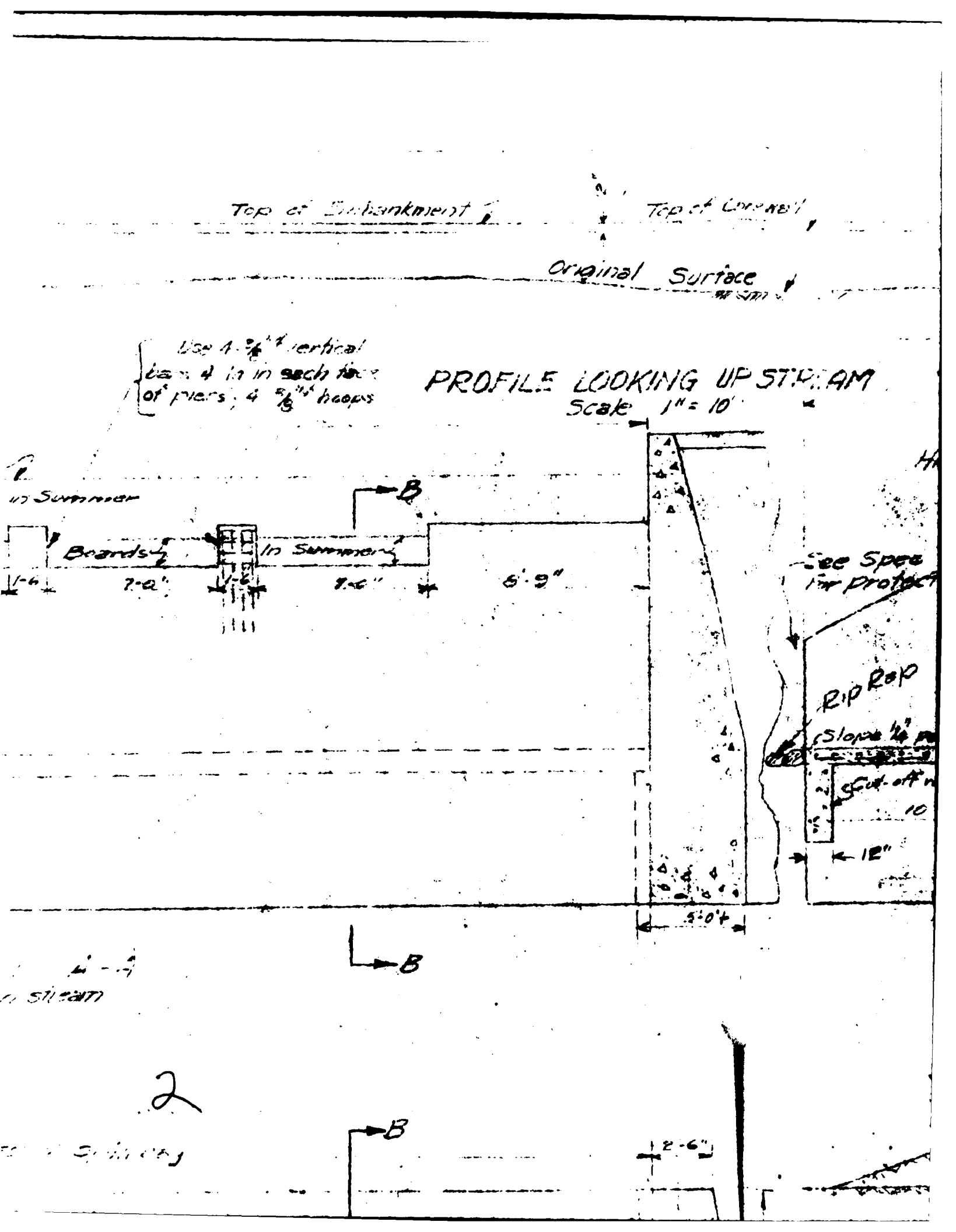


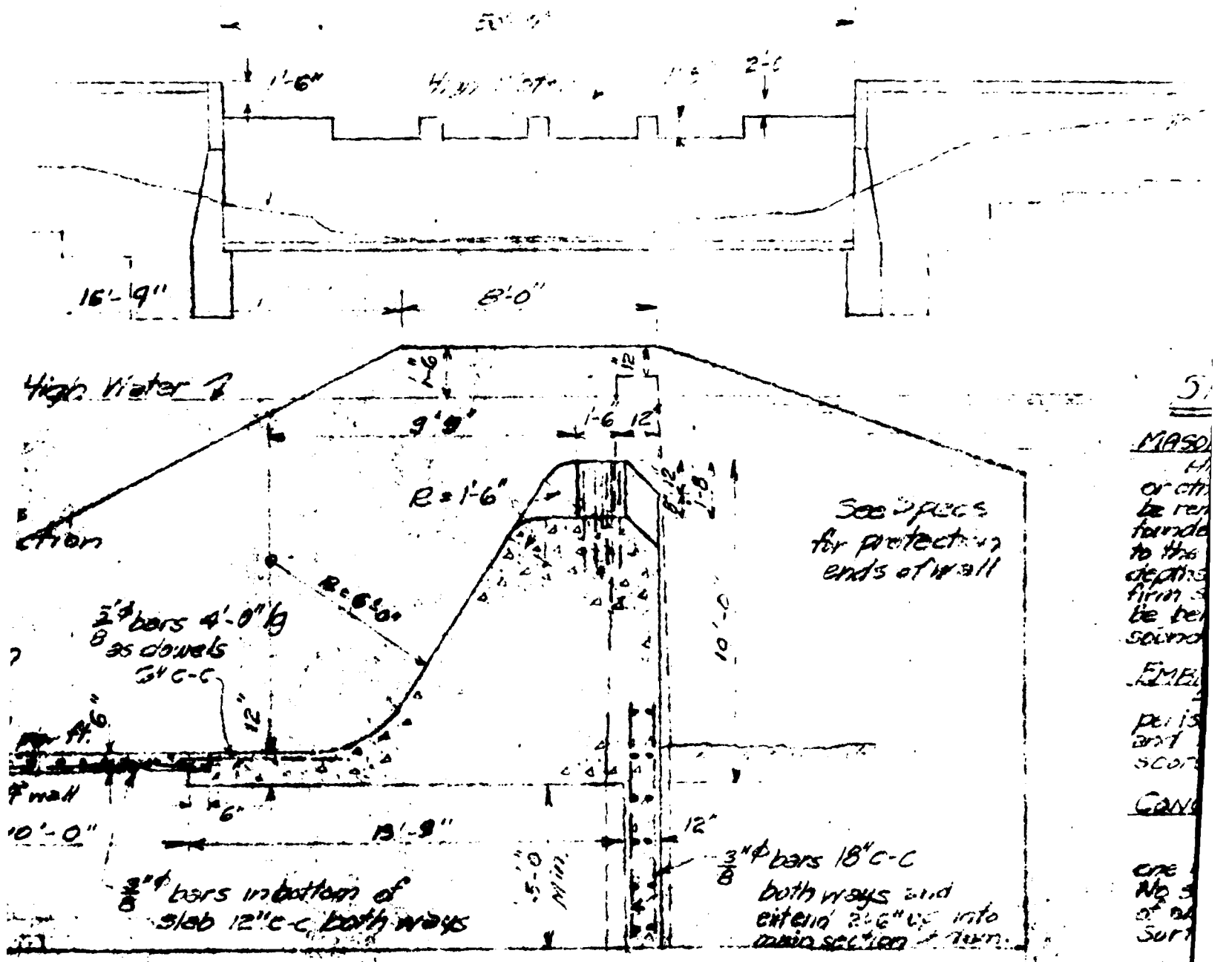




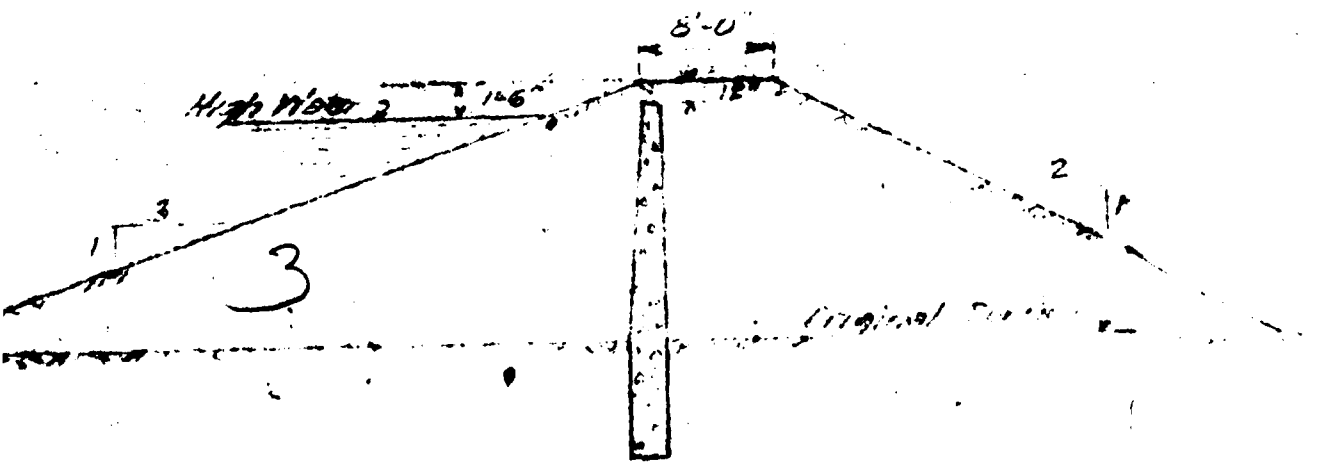
Existing Contour
New Contour
3 Section B-B
5'0"
2'0"
High water
New Contour
Existing Contour
Original Surface
Thru Embankment
Table of Corewall Dimensions
H
Key
6" Radius
2'0"
2'0"
Threaded end of bar for nut to be grouted in concrete
Dowel Detail

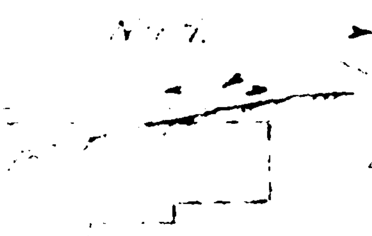

See Table
for depth Core Wall
12" Top Coping
2'-0"
1'-6"
Batter 4 on 1 or flatter
6"
High Water
Normal Water Level
1'-8"
6'-9"
7'-0"
1'-6"
Looking down


Top of Embankment
Top of Concrete
Original Surface
Use 4-⅞" vertical bars 4 in in each face of piers; 4 ⅝" hoops
PROFILE LOOKING UPSTREAM
Scale 1" = 10'
in Summer
Boards
In Summer
7-0"
1'-6"
8'-6"
5'-9"
B
See Spec for Protect
Rip Rap
Slope ¼"
Cut-off
10
12"
5'-0"
B
2
B
2'-6"


1'-6"
2'-0"
16'-9"
8'-0"
High Water
9"
12"
3'-9"
1'-6"
12"
R = 1'-6"
See specs for protection ends of wall
R = 6'-0"
3/8" ϕ bars 4'-0" lg 36 dowels 3" c-c
12"
4'-6"
10'-0"
13'-9"
12"
3/8" ϕ bars 18" c-c both ways and extend 2'-6" into main section
3/8" ϕ bars in bottom of slab 12" c-c both ways
5'-0" min.
10'-0"

SECTION B-B


8'-0"
High Water
1'-6"
3
1
3
2



SPECIFICATION.

MASONRY FOUNDATIONS
All soft spots, vegetable matter or other perishable material shall be removed from the site of the foundation & excavation carried down to the depths shown or to greater depths where required to obtain firm soil. Foundations on rock shall be benched or stepped on clean sound rock.

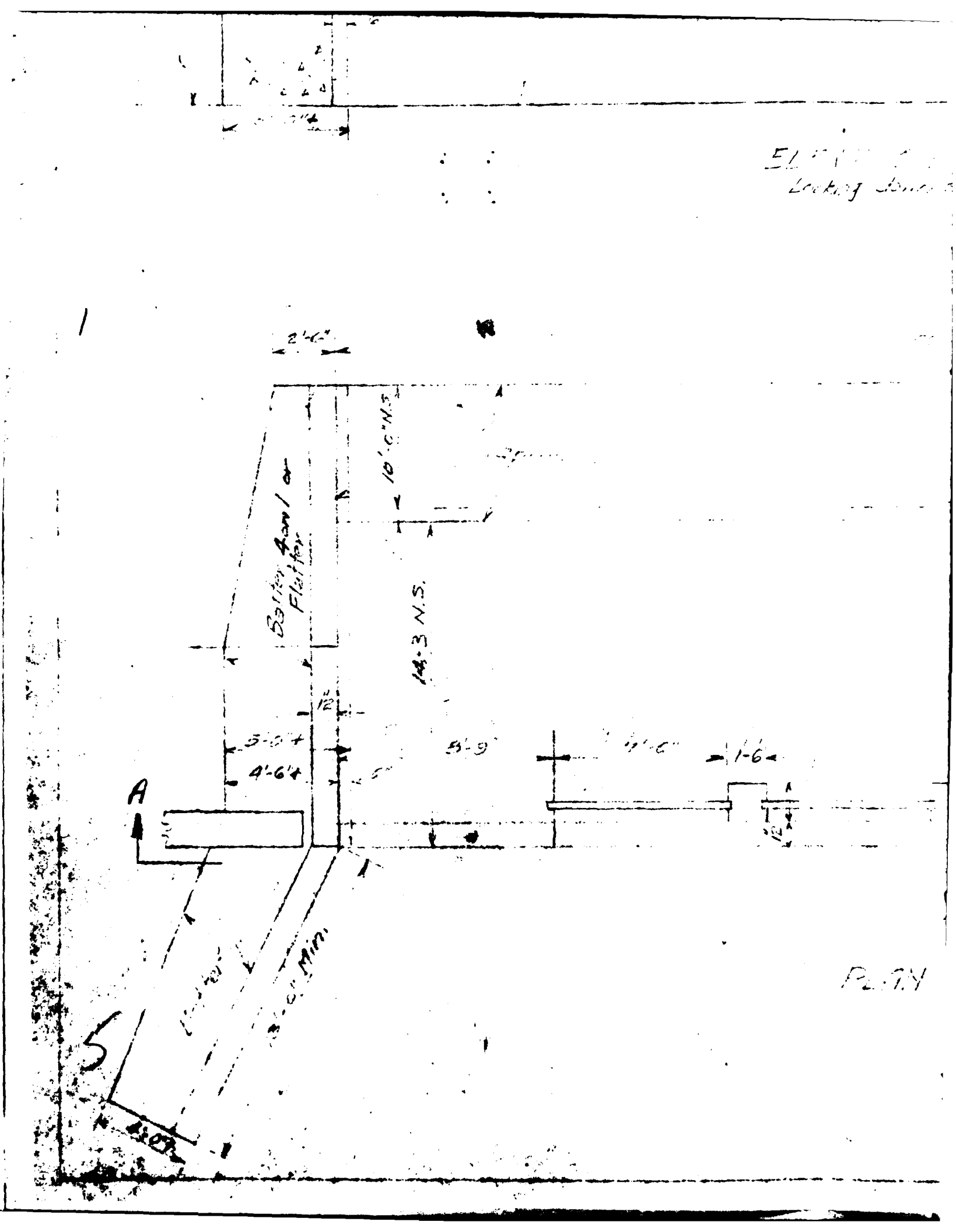
EMBANKMENT FOUNDATION.
All vegetable matter and other perishable material shall be removed and the area shall be ploughed or scored parallel to the core.

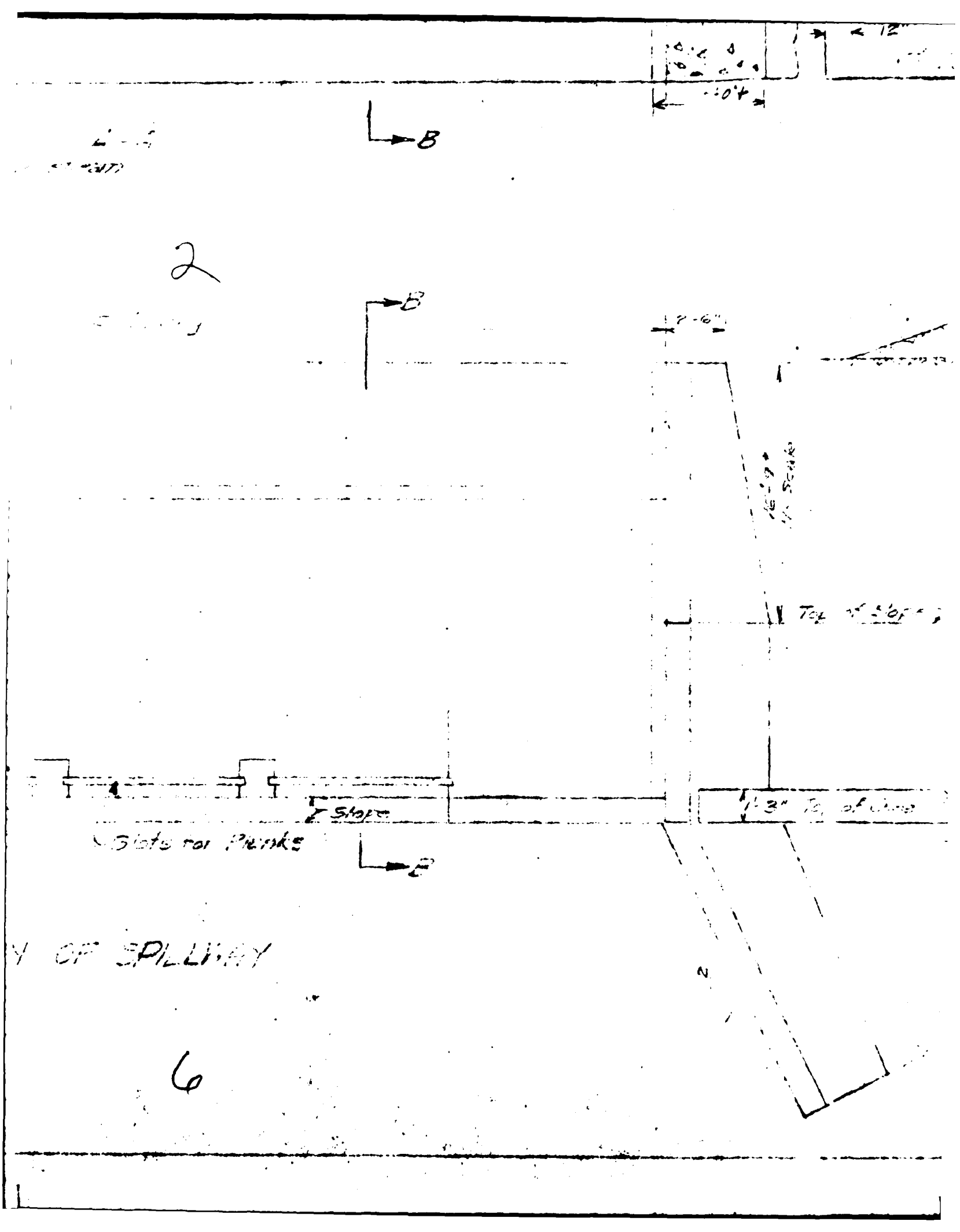
CONCRETE
Concrete shall be 1:2½:3 mix.
In the spillway sound clean one man stone may be embedded. No stone shall be placed within 6" of another stone or an outside surface.
All reinforcing bars ⅝"ϕ. Bars shall be placed 3" from the surface. All laps to be 18".

EMBANKMENT
Fill shall be deposited on both sides of the core wall at the same time and the embankments carried up by [illegible] the materials in 9" [illegible] the entire area. Layers to be sprinkled and compacted. The [illegible] impervious material shall [illegible] in the embankment upstream [illegible] the core. Backfill of trench [illegible] upstream side of corewall shall be packed impervious material.
Embankment shall be [illegible] [illegible] [illegible] [illegible] heights shown [illegible] [illegible].

PROTECTION OF [illegible] SLOPES
At the ends of spillway wing [illegible] at intake and outlet ends of [illegible] pipe [illegible] [illegible] [illegible]
[illegible]

4

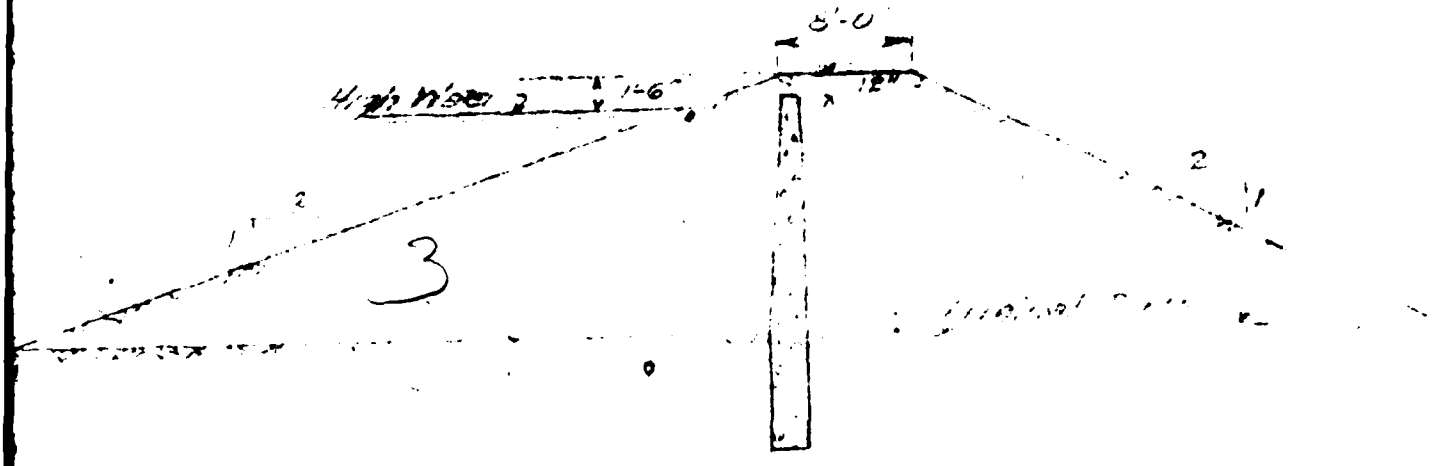

2'-6"
10'-0" N.S.
Bitten Asphalt on Flat Roof
14-3 N.S.
12"
5'-0"
4'-6"
5'-9"
1'-6"
A
12"
5
4'-0"


B
2
B
12"
Slope
Slope for Planks
Y OF SPILLWAY
6

3/8" bars in bottom of slab 12" c-c both ways

extend 2'-6" into main section

SECTION B-B



SECTION THRU END KEY
Scale 1" = 10'

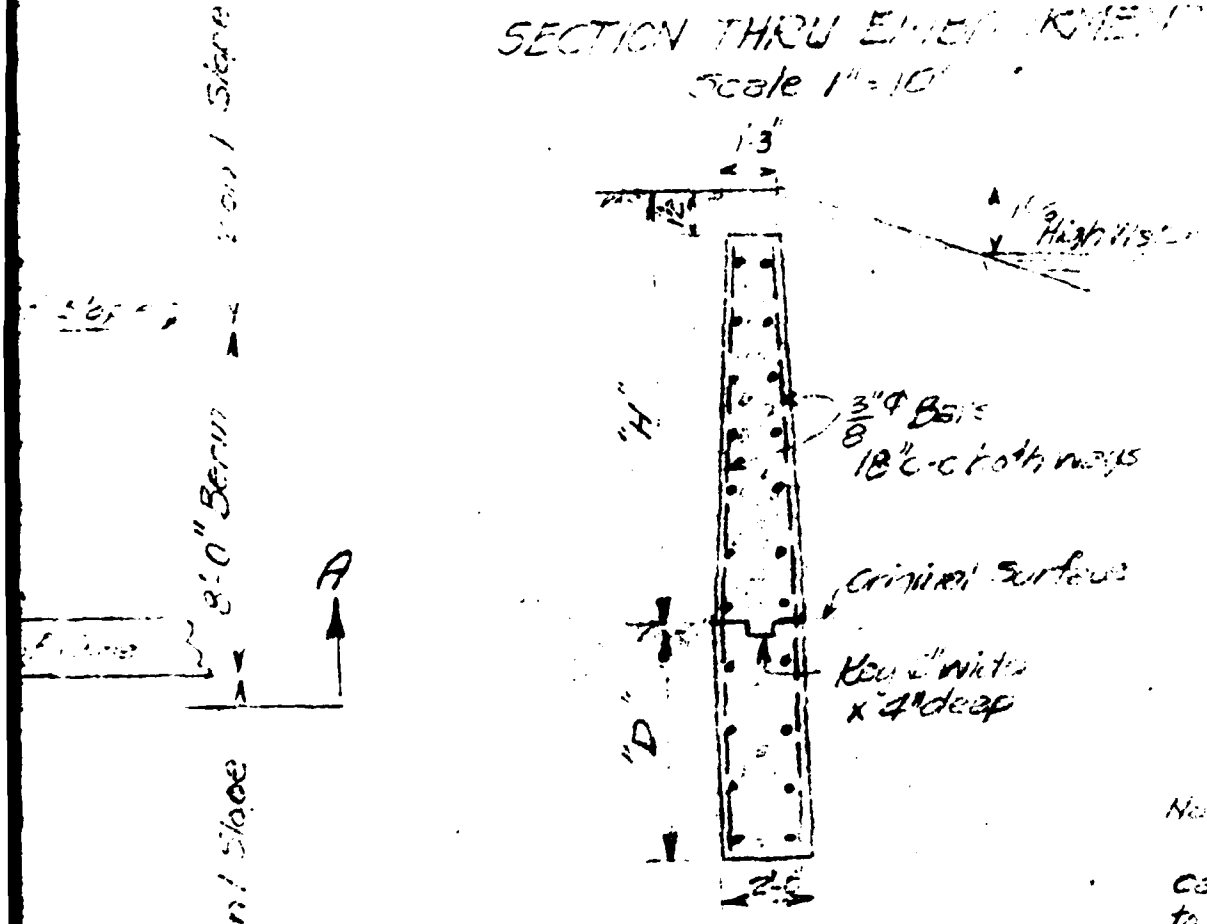


TABLE OF
DIMENSIONS

4'	4'
	4'
6'	5'-0
7'	5'-
8'	5'-6
9'	5'-6
10'	5'-6
11'	6'
12'	6'-
13'	6'
14'	7'-0
15'	7'-

Note
Adjacent [illegible]
carry berm & curb wall
to same on wings.

TYPICAL SECTION
SIDE WALL

7

of another stone or an outside surface.

All reinforcing bars ¾" Bars shall be placed 3" from the surface. All laps to be 18"

EMBANKMENT.

Fill shall be deposited on both sides of the core wall of the dam, ... embankments carried ... by depositing ... in 9" ... the entire ... shall ... upstream ... upstream ...

Embankment ... be ...

4

PROTECTION ... SLOPES

At the ends of ... wing ... the ... exits ... shall be ...

... digging ... deposits.

DATUM NOTE:

Construction to be carried ... so that "High Water" shown on plan is ... (0.326') below the ... datum plane used in ... survey.

DESIGN FOR

OLD FORGE DAM

on property of

A. M. RYDER

situated in the

TOWN OF KENT PUTNAM COUNTY

Scale ... = 1'-0"
E... as shown

Carmel N.Y.
June 26, 1940.
8 Revised July 15, 1940.
R. J. ...ene P.E. & L.S. No. 2365

APPENDIX B

VISUAL INSPECTION CHECKLIST

93-15-3(9/80)

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam LAKE SAGAMORE DAM (FORMERLY OLD FORGE DAM)

Fed. I.D. # NY 313 DEC Dam No. 213-1113

River Basin LOWER HUDSON

Location: Town KENT County PUTNAM

Stream Name WEST BRANCH OF CROTON RIVER

Tributary of

Latitude (N) 41° 28.3' Longitude (W) 73° 46.5'

Type of Dam EARTH EMBANKMENT W/CONCRETE COREWALL & CONCRETE SPILLWAY

Hazard Category C

Date(s) of Inspection 5/27/81

Weather Conditions PARTLY CLOUDY 60°F

Reservoir Level at Time of Inspection SPILLWAY CREST ±

b. Inspection Personnel R. WARRENDER W. LYNICK

c. Persons Contacted (Including Address & Phone No.)

d. History:

Date Constructed 1940 Date(s) Reconstructed 1946

Designer R. J. CRANE M. CHAZEN

Constructed By

Owner LAKE SAGAMORE COMMUNITY ASSOCIATION

93-15-3(9/80)

2) Embankment

a. Characteristics

(1) Embankment Material CLAY & GLACIAL TILL

(2) Cutoff Type UNKNOWN

(3) Impervious Core CONCRETE COREWALL

(4) Internal Drainage System NONE

(5) Miscellaneous

b. Crest

(1) Vertical Alignment IRREGULAR - 90' LONG SEGMENT TO RIGHT OF SPILLWAY IS ABOUT 1' HIGHER THAN REST OF CREST - DROPS BACK TO NORMAL

(2) Horizontal Alignment SATISFACTORY | ELEVATION 6' FROM RIGHT END OF SPILLWAY | LEFT SIDE OF SPILLWAY IS AT THE LOWER CREST LEVEL

(3) Surface Cracks NONE

(4) Miscellaneous WIDTH VARIES - WIDEST IN HIGHER (1') SECTION - EMBANKMENT IS WIDER DUE TO DUMPED FILL MATERIAL

c. Upstream Slope

(1) Slope (Estimate) (V:H) 1:2

(2) Undesirable Growth or Debris, Animal Burrows BRUSH & TREES MOSTLY ON LEFT END - ONLY ISOLATED INSTANCES ON THE RIGHT END

(3) Sloughing, Subsidence or Depressions FACE HAS SOME IRREGULARITIES BUT IS GENERALLY OKAY

(4) Slope Protection LARGE OVERSIZED ROCKS & BOULDERS

(5) Surface Cracks or Movement at Toe UNOBSERVABLE

d. Downstream Slope

(1) Slope (Estimate - V:H) 1:1 OR SLIGHTLY STEEPER

(2) Undesirable Growth or Debris, Animal Burrows SUBSTANTIAL GROWTH ON DOWNSTREAM SLOPE; OVERGROWN; A REAL JUNGLE

(3) Sloughing, Subsidence or Depressions NONE; THERE WERE SOME EROSION TYPE GULLIES IN THE AREA OF DUMPED FILL

(4) Surface Cracks or Movement at Toe NONE

(5) Seepage SLIGHT AMOUNT NOTED ON EITHER SIDE OF SPILLWAY FAIRLY MINOR ON RIGHT END AT DOWNSTREAM END OF PLUNGE POOL MORE SUBSTANTIAL ON LEFT END. FLOW UNDER DUMPED ROCKS & POSSIBLY COMING OUT OF HILLSIDE

(6) External Drainage System (Ditches, Trenches; Blanket) NONE

(7) Condition Around Outlet Structure SEEPAGE AS NOTED IN (5)

(8) Seepage Beyond Toe NONE

e. Abutments - Embankment Contact

THE SEEPAGE AT THE LEFT END OF THE SPILLWAY APPEARS TO BE RELATED TO THIS CONTACT

93-15-3(9/80)

(1) Erosion at Contact NONE

(2) Seepage Along Contact POSSIBLY ALONG CONTACT SEE PRIOR DISCUSSION

3) Drainage System

a. Description of System NONE

b. Condition of System

c. Discharge from Drainage System

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)

NONE

93-15-3(9/80)

5) Reservoir

a. Slopes OKAY

b. Sedimentation NO EVIDENT PROBLEMS

c. Unusual Conditions Which Affect Dam NONE

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) LOCAL ROAD BRIDGE ON SAGAMORE RD.; STATE RTE 301; SEVERAL HOMES SCATTERED ALONG CHANNEL

b. Seepage, Unusual Growth NONE

c. Evidence of Movement Beyond Toe of Dam NONE

d. Condition of Downstream Channel RELATIVELY NARROW - 15'-20' WIDE BOTTOM W/ STEEP SIDES; BRIDGE WATERWAY = 7.5'W x 10'H

7) Spillway(s) (Including Discharge Conveyance Channel)

CONCRETE GRAVITY OVERFLOW SECTION - FLASHBOARDS IN CENTER WINGWALLS ON EITHER SIDE

a. General CONCRETE ON OVERFLOW SECTION IN GOOD SHAPE - ONLY MINOR SPALLING OF SURFACE

SOME EFFLORESCENCE ALONG JOINTS ON WINGWALLS

b. Condition of Service Spillway STOPLOGS IN GOOD CONDITION

SOME MISSING MATERIAL BEHIND RIGHT WINGWALL AT THE BOTTOM - PROBABLY REMOVED BY SCOUR

c. Condition of Auxiliary Spillway N/A

d. Condition of Discharge Conveyance Channel SOME WHAT NARROW; GOES UNDER COUNTY ROAD BRIDGE

8) Reservoir Drain/Outlet

Type: Pipe ✓ Conduit _____ Other _____

Material: Concrete _____ Metal _____ Other _____

Size: _____ Length _____

Invert Elevations: Entrance _____ Exit _____

Physical Condition (Describe): Unobservable ✓

Material: _____

Joints: _____ Alignment _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate ✓ Valve _____ Uncontrolled _____

Operation: Operable _____ Inoperable _____ Other UNKNOWN

Present Condition (Describe): COULD NOT LOCATE THE OUTLET PIPE

9) STRUCTURAL - CONCRETE DESCRIBED UNDER SPILLWAY SECTION

10 & 11 - NOT APPLICABLE

APPENDIX C

HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS

SAGAMORE LAKE DAM
NY-313

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	(USGS) Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	659.45	96 +	1824
2) Design High Water (Max. Design Pool)	N/A		
3) Auxiliary Spillway Crest	N/A		
4) Pool Level with Flashboards	N/A		
5) Service Spillway Crest	656	96	1492
6) STOPLOG SLOT-INV.	654.4	—	—

DISCHARGES

	[redacted] (cfs)
1) Average Daily	N/A
2) Spillway @ Maximum High Water (STOPLOGS IN-PLACE)	983
3) Spillway @ Design High Water	N/A
4) STOPLOGS OUT; WATER @ [redacted] Spillway Crest Elevation	43
5) Low Level Outlet	N/A
6) MAX. [redacted] (of all facilities) @ Maximum High Water	1026
7) Maximum Known Flood	N/A
8) At Time of Inspection	±10

SAGAMORE LAKE DAM
NY-313

CREST: (USGS) ELEVATION: 659.45

Type: EARTH w/ VEGETATIVE COVER

Width: VARIABLE 20'-27' Length: ±250'

Spillover CONCRETE WEIR

Location NEAR LEFT END OF EMBANKMENT

SPILLWAY:

SERVICE	[redacted]
656	Elevation
SHARP-CRESTED WEIR w/ END CONTRACTIONS	Type NONE
±2'	Width
Type of Control	
✓	Uncontrolled
ALSO A STOPLOG SLOT BELOW SPILLWAY CREST	Controlled:
	Type (Flashboards; gate)
± 4 STOPLOGS	Number
1.6' DEEP x 8.8' WIDE	Size/Length
	Invert Material
	Anticipated Length of operating service
N/A	Chute Length
>10'	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)

HYDROMETEROLOGICAL GAGES:

Type : NONE

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

_____

Method of Controlled Releases (mechanisms):

20" ø DRAIN ; ELEV. UNKNOWN

_____

SAGAMORE LAKE DAM
NY-313 4

DRAINAGE AREA: 3783 ACRES 5.91 SQ. MILES

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: UNDEVELOPED w/ FORESTS, WOODLANDS, WETLANDS

Terrain - Relief: MODERATE TO STEEP; HILLTOPS @ 350'-650' ABOVE RESV.

Surface - Soil: GLACIAL DEPOSITS

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

NONE APPARENT

Potential Sedimentation problem areas (natural or man-made; present or future)

NO

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

NONE APPARENT

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: NO

Elevation:

Reservoir:

Length @ Maximum Pool ±4500' ±0.85 (Miles)

Length of Shoreline (@ Spillway Crest) ±2.80 (Miles)
±14800'

93-15-4(9/80)

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
SAGAMORE LAKE DAM NY-313	1/		
SUBJECT		**COMPUTED BY**	**DATE**
WATERSHED PARAMETERS		WCL	6/24/81

DRAINAGE AREA:

USGS 7.5 MIN QUAD = OSCAWANA LAKE

SCALE: 1" = 2000' 1 SQ. IN = 91.827 ACRES

PLANIMETERED AREAS:	BASIN	LAKE SURFACE
(SQ INS.)	22.82	1.05
	18.38	
	41.20	
(ACRES)	3783	96.4 @ ELEV. 656
(SQ MI)	5.91	

TOTAL: WETLANDS (MARSH)

243 ACRES = 2.65 SQ INS

% OF BASIN = 6.4

PRECIPITATION:

REF: HRR 33

INDEX RAINFALL = 21.2"
(ZONE 1)

ADJUSTMENT (AREA - DURATION)				
	6	12	24	48
% OF INDEX	111	123	132	142

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
SAGAMORE LAKE DAM	2/		
SUBJECT		COMPUTED BY	DATE
WATERSHED PARAMETERS		WCL	6/24/81

SNYDER UNIT HYDROGRAPH:

LAG TIME: $t_p = C_t (L \times L_{CA})^{0.3}$

$C_t = 2$

$L = 3.79$ $\quad L_{CA} = 5780' = 1.09$

$t_p = 2(3.79 \times 1.09)^{0.3}$

$t_p = 3.06$ HRS

UNIT RAIN DURATION: $t_r = \frac{t_p}{5.5}$

$t_r = 0.56$

USE $T_R = 0.5$ HRS ←

ADJUSTED LAG TIME: $TP = t_p + 0.25(T_R - t_r)$

$TP = 3.06 + 0.25(0.5 - 0.56)$

$TP = 3.05$ HRS ←

PEAKING COEFFICIENT: CP

REF: NY DISTRICT - CORPS ENGINEERS
LOWER HUDSON RIVER BASIN
HYDRO. ROUTING MODEL STUDY

ADJACENT WATERSHEDS:

	SUBBASIN #	640 CP		CP
PEEKSKILL HOLLOW CREEK	1	364	→	0.57
	2	384	→	0.60

USE CP = 0.57 ←

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
SAGAMORE LAKE DAM	3/		
SUBJECT		**COMPUTED BY**	**DATE**
		WCL	6/24/81

SOIL RETENTION + RAINFALL LOSS RATES:

* REF: LOWER HUDSON RIVER BASIN MODEL STUDY

(SAME) ADJACENT WATERSHEDS: INITIAL = 1.5 INS. ←
CONSTANT = 0.1 INS/HR ←

BASE FLOW:

* REF: —— SAME:

START Q = 1 cfs/SQ MI. → 6 cfs

QRCSN = 0.25

RTIQR = 3

RESERVOIR STORAGE VOLUME:

REF: 5/20/46 APPLICATION (RECONSTRUCTION)

@ ELEV 6656: VOL = 65 x 10^6 FT^3 → 1492 AC-FT CREST ←

@ ELEV 6638 HT ≈ 18' VOL = → —0 AC-FT

@ ELEV. 6659.45 TOP DAM ←

ΔVOL = (3.45)(96.4) = 332.6 AC-FT

VOL → 1824.6 AC-FT ←

PROJECTED VOL = 96.4 AC-FT/FT

@ 6664.45 H=5 ΔV = 482 → 2306.6 AC-FT

@ 6666 H=6.55 ΔV = 631.4 → 2456 AC-FT

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
SAGAMORE LAKE DAM	4/		
SUBJECT		**COMPUTED BY**	**DATE**
SPILLWAY - DISCHARGE CAPACITY		WCL	6/24/81

WEIR FLOW: $Q = CLH^{3/2}$ STOPLOGS IN-PLACE

w/ SIDE WALL CONTRACTION

$C = 3.25$

$L = L' - 2(NK_p + K_a)H$ $L' = 47.9'$

$= 47.9 - 0.2H$ $N = 0$

$K_a = 0.1$

	ELEV.	H	L	Q
	656	—	47.9	—
		0.5	47.8	54.9
		1	47.7	155
		1.5	47.6	284
		2	47.5	436
		2.5	47.4	609
		3	47.3	798
TOP DAM	659.45	3.45	47.21	983
	660	4	47.21	1227
PROJECTED	660.5	4.5		1464
	661	5		1715
	662	6		2255
	664	8		3471
	666	10	47.21	4852

ADDITIONAL CAPACITY W/ NO STOPLOGS IN-PLACE:

$Q = CLH^{3/2}$ $K_a = 0.2$

$C = 2.63$

$L = 8.8 - 0.4H$

$H = 1.6'$

$Q = 43.4$ cfs

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
SAGAMORE LAKE DAM	5/		
SUBJECT		**COMPUTED BY**	**DATE**
DISCHARGE		WCL	6/24/81

EMBANKMENT OVERTOPPING : UNEVEN EMB. CREST

WEIR FLOW $Q = CLH^{3/2}$ $C = 2.63$

	ELEV.	H	L	Q	H	L	Q	TOTAL Q
TOP DAM	659.45	—	160	—				
	660	0.55	160	171				171
	660.5	1.05	160	452	—	90	—	452
	661	1.55		812	0.50		83	895
	662	2.55		1713	1.5		434	2147
	664	4.55		4084	3.5		1550	5634
	666	6.55	160	7054	5.5	90	3053	10107

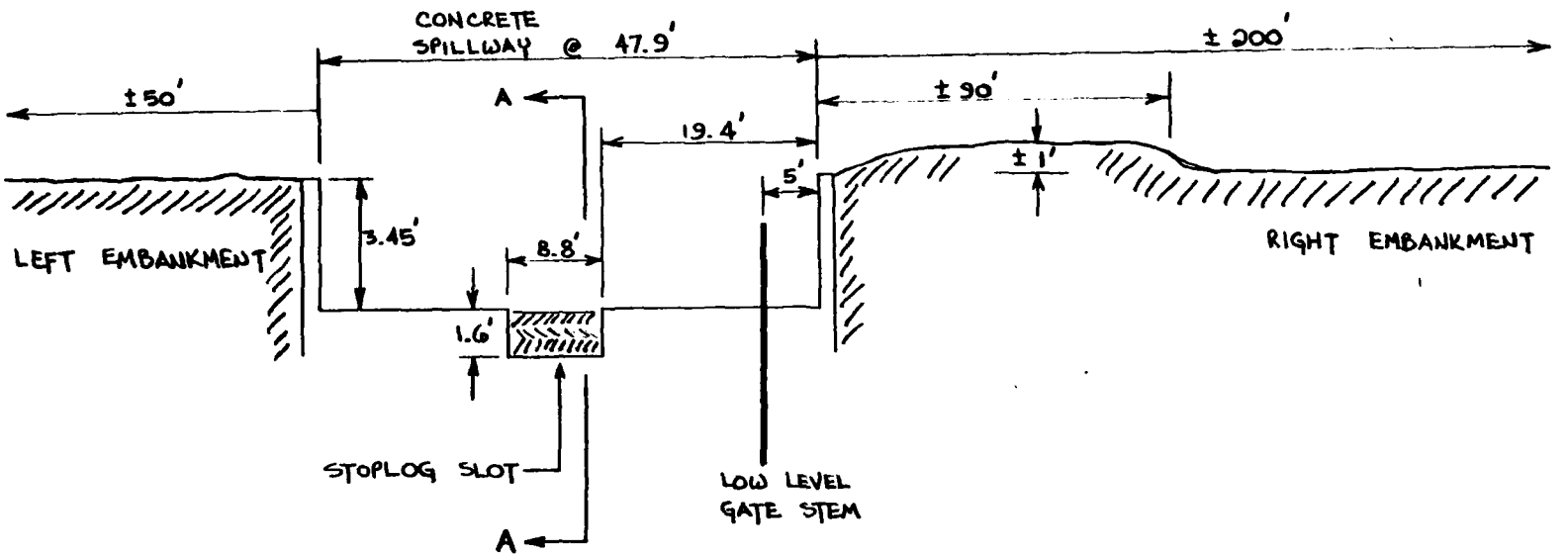
TOP OF DAM :

ELEV = 659.45

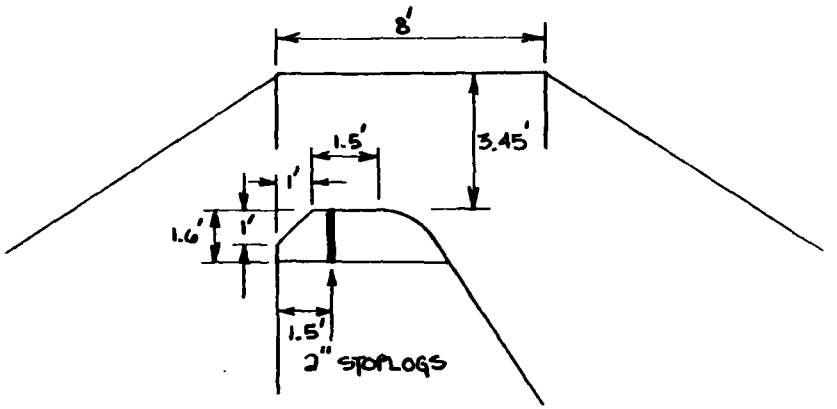
WEIR FLOW $Q = CLH^{3/2}$

$C = 2.63$

USE $L = 0$



ELEVATION



SECTION A-A
(THRU STOPLOG SLOT)

SAGAMORE LAKE DAM
NY - 313

[FIELD MEASUREMENTS - MAY 1981]

NY - 313
DAM: SAGAMORE LAKE DAM

SUMMARY OF FLOOD ANALYSIS

By: WCL Date: 7/1/81
Sht: 6/

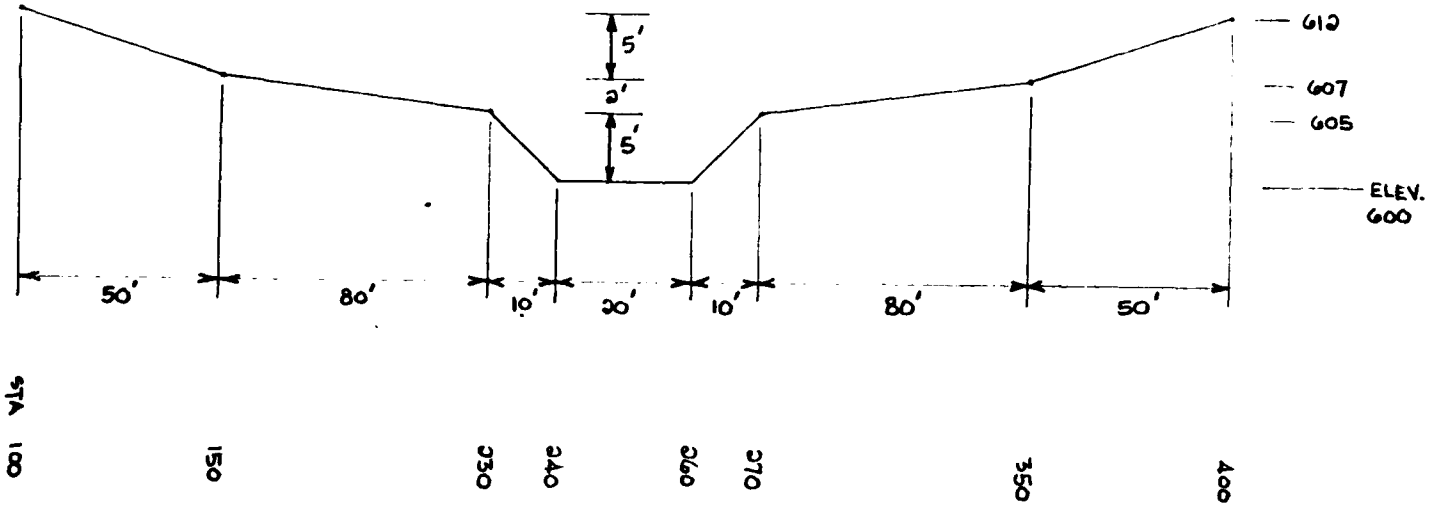
#	ANALYSIS CONDITIONS:		RATIO	PEAK INFLOW	PEAK OUTFLOW	Overtopping Depth @ Dam	STA: 4800 W.S.Elev.	DOWNSTREAM LOCATION Inv: 600.0 Flow Depth	STA: N/A W.S.Elev.	Inv: N/A Flow Depth	ΔH
	NO BREACH		0.13	1347	908	-0-	604.3	4.3			
			0.14	1451	993	0.01	604.5	4.5			
			0.15					± 5.0			0
			0.50	5181	5019	2.81	608.0	8.0			
			1	10363	10143	4.90	609.9	9.9			
	FAIL ELEV. = 659.6 :										
	BREACH :	DEPTH ± 10'	0.14	1451	993	0.01	604.5	4.5			
	BRWID =	15' BOT.									
	BOT. ELEV	= 649	0.15	1554	3256	0.16	607.0	7.0			2.0
	TFAIL =	0.5 HRS									
			0.50	5181	4996	1.15	608.0	8.0			
			1	10363	10164	3.28	609.9	9.9			
	BREACH :	DEPTH ± 19'	0.14	1451	993	0.01	604.5	4.5			
	BRWID =	15' BOT.									
	BOT. ELEV	= 640	0.15	1554	5588	0.16	608.1	8.1			3.1
	TFAIL =	2.0 HRS									
			0.50	5181	8527	1.10	609.2	9.2			
			1	10363	10020	1.11	609.8	9.8			

SAGAMORE LAKE DAM
NY-313

DOWNSTREAM CHANNEL SECTION

$\Delta H \approx 53'$
$L \approx 4800'$ % SLOPE = 1.10

$n \approx 0.045$



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**********                                                    **********
FLOOD HYDROGRAPH PACKAGE (HEC-1)                              NEW YORK STATE
DAM SAFETY VERSION      JULY 1978                             DEPT OF ENVIRONMENTAL CONSERVATION
  LAST MODIFICATION  26 FEB 79                                FLOOD PROTECTION BUREAU
  MODIFIED FOR HONEYWELL APR 79
**********                                                    **********
    1              A1  NY-313    SAGAMORE LAKE DAM                          LOWER HUDSON RIVER BASIN
    2              A2            DEC 213-1113 LH -- WEST BR CROTON RIVER    PUTNAM COUNTY
    3              A3            LAKE SAGAMORE ASSOC                        SNYDER UH
    4              B    150       0       30        0        0        0        0        0        0        0
    5              B1     5
    6              J      1       8        1
    7              J1  0.10    0.11     0.12     0.13     0.14     0.15     0.50        1
    8              K      0   BASIN                                            1
    9              K1             INFLOW HYDROGRAPH - DAM
   10              M      1       1     5.91                5.91                                  1
   11              P             21.2      111      123      132      142
   12              T                                                        1.5      0.1             0.064
   13              W   3.05     0.57
   14              X      6   -0.25        3
   15              K      1     DAM                                            1
   16              K1             ROUTED OUTFLOW - DAM - SPILLCREST ELEV 656-USGS -- STOPLOGS IN
   17              Y                                    1        1
   18              Y1     1                                                 -656       -1
   19              Y4   656     656.5      657    657.5      658    658.5      659   659.45      660    660.5
   20              Y4   661       662      664      666
   21              Y5     0      54.9      155      284      436      609      798      983     1398     1916
   22              Y5  2610      4402     9105    14959
   23              $S     0      1492     1824     2306     2456
   24              $E   638       656   659.45   664.45      666
   25              $$   656
   26              $D659.45      2.63      1.5        0
   27              K      1      4800                                            1
   28              K1             DAM TO SR-301
   29              Y                                    1        1
   30              Y1     1
```

```
31          Y6 0.045   0.045   0.045    600    612    4100  0.011
32          Y7  100    612     150     607    230     605   240   600   260   600
33          Y7  270    605     350     607    400     612
34          K    99
35          A
36          A
37          A
38          A
39          A
40          A
41          A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	BASIN
ROUTE HYDROGRAPH TO	DAM
ROUTE HYDROGRAPH TO	4800
END OF NETWORK	

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MODIFIED FOR HONEYWELL APR 79
**********
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**********
NEW YORK STATE
DEPT OF ENVIRONMENTAL CONSERVATION
FLOOD PROTECTION BUREAU
**********
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RUN DATE 06/26/81

NY-313 SAGAMORE LAKE DAM
DEC 213-1113 LH -- WEST BR CROTON RIVER
LAKE SAGAMORE ASSOC

LOWER HUDSON RIVER BASIN
PUTNAM COUNTY
SNYDER UH

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
150	0	30	0	0	0	0	0	0	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 8 LRTIO= 1
RTIOS= 0.10 0.11 0.12 0.13 0.14 0.15 0.50 1.00

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

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH - DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
BASIN	0	0	0	0	0		0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	5.91	0.	5.91	0.	0.	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.	21.20	111.00	123.00	132.00	142.00	0.	0.

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.	0.	1.00	0.	0.	1.00	1.50	0.10	0.	0.06

UNIT HYDROGRAPH DATA
TP= 3.05 CP=0.57 NTA= 0

RECESSION DATA
STRTQ= 6.00 QRCSN= -0.25 RTIOR= 3.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 6.91 AND R= 6.51 INTERVALS

UNIT HYDROGRAPH 39 END-OF-PERIOD ORDINATES, LAG= 3.06 HOURS, CP= 0.57 VOL= 1.00

42.	156.	311.	480.	624.	708.	719.	653.	560.	480.
412.	353.	303.	260.	223.	191.	164.	140.	120.	103.
88.	76.	65.	56.	48.	41.	35.	30.	26.	22.
19.	16.	14.	12.	10.	9.	8.	6.	6.	

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	0.30	1	0.00	0.00	0.00	5.	1.02	16.00	76	1.13	1.08	0.05	1400.

PERMISSIBLE LOSS COEFFICIENTS FROM SEVEN STORM EV AND IA ARE IA= 0.01 AND RT 0.51 INTERVALS

UNIT HYDROGRAPH 39 END-OF-PERIOD ORDINATES, LAG= 3.06 HOURS, CP= 0.57 VOL= 1.00

42.	156.	311.	480.	624.	708.	719.	653.	560.	480.
412.	353.	303.	260.	223.	191.	164.	140.	120.	103.
88.	76.	65.	56.	48.	41.	35.	30.	26.	22.
19.	16.	14.	12.	10.	9.	8.	6.	6.	

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	0.30	1	0.00	0.00	0.00	5.	1.02	14.00	76	1.13	1.08	0.05	1600.
1.01	1.00	2	0.00	0.00	0.00	5.	1.02	14.30	77	1.41	1.37	0.05	2172.
1.01	1.30	3	0.00	0.00	0.00	4.	1.02	15.00	78	1.41	1.37	0.05	2870.
1.01	2.00	4	0.00	0.00	0.00	4.	1.02	15.30	79	1.72	1.67	0.05	3657.
1.01	2.30	5	0.00	0.00	0.00	4.	1.02	16.00	80	5.44	5.39	0.05	4648.
1.01	3.00	6	0.00	0.00	0.00	4.	1.02	16.30	81	1.32	1.27	0.05	5903.
1.01	3.30	7	0.00	0.00	0.00	4.	1.02	17.00	82	1.32	1.27	0.05	7267.
1.01	4.00	8	0.00	0.00	0.00	3.	1.02	17.30	83	1.04	0.99	0.05	8585.
1.01	4.30	9	0.00	0.00	0.00	3.	1.02	18.00	84	1.04	0.99	0.05	9653.
1.01	5.00	10	0.00	0.00	0.00	3.	1.02	18.30	85	0.08	0.03	0.05	10284.
1.01	5.30	11	0.00	0.00	0.00	3.	1.02	19.00	86	0.08	0.03	0.05	10363.
1.01	6.00	12	0.00	0.00	0.00	3.	1.02	19.30	87	0.08	0.03	0.05	9877.
1.01	6.30	13	0.01	0.00	0.01	3.	1.02	20.00	88	0.08	0.03	0.05	9055.
1.01	7.00	14	0.01	0.00	0.01	3.	1.02	20.30	89	0.08	0.03	0.05	8115.
1.01	7.30	15	0.01	0.00	0.01	3.	1.02	21.00	90	0.08	0.03	0.05	7133.
1.01	8.00	16	0.01	0.00	0.01	3.	1.02	21.30	91	0.08	0.03	0.05	6183.
1.01	8.30	17	0.01	0.00	0.01	3.	1.02	22.00	92	0.08	0.03	0.05	5334.
1.01	9.00	18	0.01	0.00	0.01	4.	1.02	22.30	93	0.08	0.03	0.05	4605.
1.01	9.30	19	0.01	0.00	0.01	4.	1.02	23.00	94	0.08	0.03	0.05	3981.
1.01	10.00	20	0.01	0.00	0.01	5.	1.02	23.30	95	0.08	0.03	0.05	3445.
1.01	10.30	21	0.01	0.00	0.01	5.	1.03	0.	96	0.08	0.03	0.05	2986.
1.01	11.00	22	0.01	0.00	0.01	5.	1.03	0.30	97	0.	0.	0.	2591.
1.01	11.30	23	0.01	0.00	0.01	5.	1.03	1.00	98	0.	0.	0.	2322.
1.01	12.00	24	0.01	0.00	0.01	5.	1.03	1.30	99	0.	0.	0.	2080.
1.01	12.30	25	0.07	0.00	0.07	6.	1.03	2.00	100	0.	0.	0.	1864.
1.01	13.00	26	0.07	0.00	0.07	6.	1.03	2.30	101	0.	0.	0.	1670.
1.01	13.30	27	0.09	0.01	0.08	8.	1.03	3.00	102	0.	0.	0.	1496.
1.01	14.00	28	0.09	0.01	0.08	10.	1.03	3.30	103	0.	0.	0.	1340.
1.01	14.30	29	0.11	0.01	0.10	12.	1.03	4.00	104	0.	0.	0.	1201.
1.01	15.00	30	0.11	0.01	0.10	16.	1.03	4.30	105	0.	0.	0.	1076.
1.01	15.30	31	0.13	0.01	0.12	20.	1.03	5.00	106	0.	0.	0.	964.
1.01	16.00	32	0.41	0.03	0.39	24.	1.03	5.30	107	0.	0.	0.	864.
1.01	16.30	33	0.10	0.01	0.09	30.	1.03	6.00	108	0.	0.	0.	774.
1.01	17.00	34	0.10	0.01	0.09	37.	1.03	6.30	109	0.	0.	0.	693.
1.01	17.30	35	.08	0.02	0.06	44.	1.03	7.00	110	0.	0.	0.	621.
1.01	18.00	36	.08	0.03	0.05	52.	1.03	7.30	111	0.	0.	0.	557.
1.01	18.30	37	0.01	0.00	0.01	61.	1.03	8.00	112	0.	0.	0.	499.
1.01	19.00	38	0.01	0.00	0.01	68.	1.03	8.30	113	0.	0.	0.	447.
1.01	19.30	39	0.01	0.00	0.01	73.	1.03	9.00	114	0.	0.	0.	400.
1.01	20.00	40	0.01	0.00	0.01	74.	1.03	9.30	115	0.	0.	0.	359.
1.01	20.30	41	0.01	0.00	0.01	72.	1.03	10.00	116	0.	0.	0.	321.
1.01	21.00	42	0.01	0.00	0.01	66.	1.03	10.30	117	0.	0.	0.	288.
1.01	21.30	43	0.01	0.00	0.01	58.	1.03	11.00	118	0.	0.	0.	258.
1.01	22.00	44	0.01	0.00	0.01	50.	1.03	11.30	119	0.	0.	0.	231.
1.01	22.30	45	0.01	0.00	0.01	44.	1.03	12.00	120	0.	0.	0.	207.
1.01	23.00	46	0.01	0.00	0.01	38.	1.03	12.30	121	0.	0.	0.	186.
1.01	23.30	47	0.01	0.00	0.01	33.	1.03	13.00	122	0.	0.	0.	166.
1.02	0.	48	0.01	0.00	0.01	29.	1.03	13.30	123	0.	0.	0.	149.
1.02	0.30	49	0.05	0.00	0.05	25.	1.03	14.00	124	0.	0.	0.	133.
1.02	1.00	50	0.05	0.00	0.05	22.	1.03	14.30	125	0.	0.	0.	120.
1.02	1.30	51	0.05	0.00	0.05	21.	1.03	15.00	126	0.	0.	0.	107.
1.02	2.00	52	0.05	0.00	0.05	20.	1.03	15.30	127	0.	0.	0.	96.

1.02	1.00	50	0.05	0.00	0.05	22.	1.03	14.30	125	0.	0.	0.	120.
1.02	1.30	51	0.05	0.00	0.05	21.	1.03	15.00	126	0.	0.	0.	107.
1.02	2.00	52	0.05	0.00	0.05	20.	1.03	15.30	127	0.	0.	0.	96.
1.02	2.30	53	0.05	0.00	0.05	21.	1.03	16.00	128	0.	0.	0.	86.
1.02	3.00	54	0.05	0.00	0.05	22.	1.03	16.30	129	0.	0.	0.	77.
1.02	3.30	55	0.05	0.00	0.05	23.	1.03	17.00	130	0.	0.	0.	69.
1.02	4.00	56	0.05	0.00	0.05	24.	1.03	17.30	131	0.	0.	0.	62.
1.02	4.30	57	0.05	0.00	0.05	25.	1.03	18.00	132	0.	0.	0.	55.
1.02	5.00	58	0.05	0.00	0.05	26.	1.03	18.30	133	0.	0.	0.	50.
1.02	5.30	59	0.05	0.00	0.05	27.	1.03	19.00	134	0.	0.	0.	44.
1.02	6.00	60	0.05	0.00	0.05	27.	1.03	19.30	135	0.	0.	0.	40.
1.02	6.30	61	0.17	0.12	0.05	33.	1.03	20.00	136	0.	0.	0.	36.
1.02	7.00	62	0.17	0.12	0.05	52.	1.03	20.30	137	0.	0.	0.	32.
1.02	7.30	63	0.17	0.12	0.05	89.	1.03	21.00	138	0.	0.	0.	29.
1.02	8.00	64	0.17	0.12	0.05	147.	1.03	21.30	139	0.	0.	0.	26.
1.02	8.30	65	0.17	0.12	0.05	221.	1.03	22.00	140	0.	0.	0.	23.
1.02	9.00	66	0.17	0.12	0.05	305.	1.03	22.30	141	0.	0.	0.	21.
1.02	9.30	67	0.17	0.12	0.05	391.	1.03	23.00	142	0.	0.	0.	18.
1.02	10.00	68	0.17	0.12	0.05	468.	1.03	23.30	143	0.	0.	0.	17.
1.02	10.30	69	0.17	0.12	0.05	535.	1.04	0.	144	0.	0.	0.	15.
1.02	11.00	70	0.17	0.12	0.05	592.	1.04	0.30	145	0.	0.	0.	13.
1.02	11.30	71	0.17	0.12	0.05	641.	1.04	1.00	146	0.	0.	0.	12.
1.02	12.00	72	0.17	0.12	0.05	683.	1.04	1.30	147	0.	0.	0.	11.
1.02	12.30	73	0.94	0.89	0.05	752.	1.04	2.00	148	0.	0.	0.	10.
1.02	13.00	74	0.94	0.89	0.05	903.	1.04	2.30	149	0.	0.	0.	9.
1.02	13.30	75	1.13	1.08	0.05	1178.	1.04	3.00	150	0.	0.	0.	8.
									SUM	24.08	20.29	3.79	160856.
										(612.)	(515.)	(96.)	(4554.93)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10363.	8117.	3235.	1117.	160847.
CMS	293.	230.	92.	32.	4555.
INCHES		12.78	20.37	21.09	21.10
MM		324.52	517.41	535.81	535.88
AC-FT		4025.	6417.	6646.	6647.
THOUS CU M		4965.	7916.	8197.	8198.

HYDROGRAPH AT STA BASIN FOR P AN 1, RTIO 1

1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	1.	1.	2.
2.	2.	3.	4.	4.	5.	6.	7.	7.	7.
7.	7.	6.	5.	4.	4.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	3.	3.	3.	3.
3.	5.	9.	15.	22.	31.	39.	47.	54.	59.
64.	68.	75.	90.	118.	160.	217.	287.	366.	465.
590.	727.	859.	965.	1028.	1036.	988.	905.	812.	713.
618.	533.	461.	398.	345.	299.	259.	232.	208.	186.
167.	150.	134.	120.	108.	96.	86.	77.	69.	62.
56.	50.	45.	40.	36.	32.	29.	26.	23.	21.
19.	17.	15.	13.	12.	11.	10.	9.	8.	7.
6.	6.	5.	4.	4.	4.	3.	3.	3.	2.
2.	2.	2.	1.	1.	1.	1.	1.	1.	1.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1036.	812.	324.	112.	16085.
CMS	29.	23.	9.	3.	455.
INCHES		1.28	2.04	2.11	2.11
MM		32.45	51.74	53.58	53.59

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1244.	974.	388.	134.	19302.
CMS	35.	28.	11.	4.	547.
INCHES		1.53	2.44	2.53	2.53
MM		38.94	62.09	64.30	64.31
AC-FT		483.	770.	797.	798.
THOUS CU M		596.	950.	984.	984.

HYDROGRAPH AT STA BASIN FOR PLAN 1, RTIO 4

1.	1.	1.	1.	1.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	2.	2.
3.	3.	4.	5.	6.	7.	8.	9.	9.	10.
9.	9.	8.	7.	6.	5.	4.	4.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	4.
4.	7.	12.	19.	29.	40.	51.	61.	70.	77.
83.	89.	98.	117.	153.	208.	282.	373.	475.	604.
767.	945.	1116.	1255.	1337.	1347.	1284.	1177.	1055.	927.
804.	693.	599.	518.	448.	388.	337.	302.	270.	242.
217.	194.	174.	156.	140.	125.	112.	101.	90.	81.
72.	65.	58.	52.	47.	42.	37.	34.	30.	27.
24.	22.	19.	17.	16.	14.	12.	11.	10.	9.
8.	7.	6.	6.	5.	5.	4.	4.	3.	3.
3.	2.	2.	2.	2.	2.	1.	1.	1.	1.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1347.	1055.	421.	145.	20910.
CMS	38.	30.	12.	4.	592.
INCHES		1.66	2.65	2.74	2.74
MM		42.19	67.26	69.66	69.66
AC-FT		523.	834.	864.	864.
THOUS CU M		645.	1029.	1066.	1066.

HYDROGRAPH AT STA BASIN FOR PLAN 1, RTIO 5

1.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	2.	2.
3.	3.	4.	5.	6.	7.	9.	10.	10.	10.
10.	9.	8.	7.	6.	5.	5.	4.	4.	3.
3.	3.	3.	3.	3.	3.	4.	4.	4.	4.
5.	7.	12.	21.	31.	43.	55.	66.	75.	83.
90.	96.	105.	126.	165.	224.	304.	402.	512.	651.
826.	1017.	1202.	1351.	1440.	1451.	1383.	1268.	1136.	999.
866.	747.	645.	557.	482.	418.	363.	325.	291.	261.
234.	209.	188.	168.	151.	135.	121.	108.	97.	87.
78.	70.	63.	56.	50.	45.	40.	36.	32.	29.
26.	23.	21.	19.	17.	15.	13.	12.	11.	10.
9.	8.	7.	6.	6.	5.	4.	4.	4.	3.
3.	3.	2.	2.	2.	2.	1.	1.	1.	1.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1451.	1136.	453.	156.	22519.
CMS	41.	32.	13.	4.	638.
INCHES		1.79	2.85	2.95	2.95
MM		45.43	72.44	75.01	75.02
AC-FT		564.	898.	930.	931.
THOUS CU M		695.	1108.	1148.	1148.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CMS	41.	32.	13.	4.	638.
INCHES		1.79	2.85	2.95	2.95
MM		45.43	72.44	75.01	75.02
AC-FT		564.	898.	930.	931.
THOUS CU M		695.	1108.	1148.	1148.

HYDROGRAPH AT STA BASIN FOR PLAN 1, RTIO 6

1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	2.	2.
3.	4.	5.	6.	7.	8.	9.	10.	11.	11.
11.	10.	9.	8.	7.	6.	5.	4.	4.	3.
3.	3.	3.	3.	3.	4.	4.	4.	4.	4.
5.	8.	13.	22.	33.	46.	59.	70.	80.	89.
96.	102.	113.	135.	177.	240.	326.	430.	549.	697.
885.	1090.	1288.	1448.	1543.	1514.	1482.	1358.	1217.	1070.
927.	800.	691.	597.	517.	448.	389.	348.	312.	280.
250.	224.	201.	180.	161.	145.	130.	116.	104.	93.
83.	75.	67.	60.	54.	48.	43.	39.	35.	31.
28.	25.	22.	20.	18.	16.	14.	13.	12.	10.
9.	8.	7.	7.	6.	5.	5.	4.	4.	3.
3.	3.	2.	2.	2.	2.	2.	1.	1.	1.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1554.	1218.	485.	168.	24127.
CMS	44.	34.	14.	5.	683.
INCHES		1.92	3.06	3.16	3.16
MM		48.68	77.61	80.37	80.38
AC-FT		604.	963.	997.	997.
THOUS CU M		745.	1187.	1230.	1230.

HYDROGRAPH AT STA BASIN FOR PLAN 1, RTIO 7

3.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	1.	1.	1.	1.	2.	2.	2.	2.	2.
2.	3.	3.	3.	3.	3.	4.	5.	6.	8.
10.	12.	15.	19.	22.	26.	30.	34.	36.	37.
36.	33.	29.	25.	22.	19.	16.	14.	13.	11.
10.	10.	10.	11.	11.	12.	13.	13.	13.	14.
16.	26.	45.	73.	110.	153.	195.	234.	268.	296.
321.	342.	376.	452.	589.	800.	1086.	1435.	1829.	2324.
2951.	3634.	4293.	4826.	5142.	5181.	4938.	4527.	4058.	3566.
3092.	2667.	2303.	1990.	1723.	1493.	1296.	1161.	1040.	932.
835.	748.	670.	600.	538.	482.	432.	387.	347.	311.
278.	249.	223.	200.	179.	161.	144.	129.	116.	104.
93.	83.	74.	67.	60.	54.	48.	43.	39.	35.
31.	28.	25.	22.	20.	18.	16.	14.	13.	12.
10.	9.	8.	7.	7.	6.	5.	5.	4.	4.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5181.	4059.	1618.	558.	80423.
CMS	147.	115.	46.	16.	2277.
INCHES		6.39	10.19	10.55	10.55
MM		162.26	258.70	267.90	267.94
AC-FT		2013.	3209.	3323.	3323.
THOUS CU M		2482.	3958.	4099.	4099.

HYDROGRAPH AT STA BASIN FOR PLAN 1, RTIO 8

5.	5.	5.	5.	6.	6.	9.	10.	12.	16.
20.	24.	30.	37.	44.	52.	61.	68.	73.	74.
72.	66.	58.	50.	44.	38.	35.	29.	25.	22.
21.	20.	21.	22.	23.	24.	25.	26.	27.	27.
33.	52.	89.	147.	221.	305.	391.	468.	535.	592.
641.	683.	752.	903.	1178.	1600.	2172.	2870.	3657.	4648.
5903.	7267.	8585.	9653.	10284.	10363.	9877.	9055.	8115.	7133.
6183.	5334.	4605.	3981.	3445.	2986.	2591.	2322.	2080.	1864.
1670.	1496.	1340.	1201.	1076.	964.	864.	774.	693.	621.
557.	499.	447.	400.	359.	321.	288.	258.	231.	207.
186.	166.	149.	133.	120.	107.	96.	86.	77.	69.
62.	55.	50.	44.	40.	36.	32.	29.	26.	23.
21.	18.	17.	15.	13.	12.	11.	10.	9.	8.

RATIO 8

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10363.	8117.	3255.	1117.	160847.
CMS	293.	230.	92.	32.	4555.
INCHES		12.78	20.37	21.09	21.10
MM		324.52	517.41	535.81	535.88
AC-FT		4025.	6417.	6646.	6647.
THOUS CU M		4965.	7916.	8197.	8198.

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HYDROGRAPH ROUTING

ROUTED OUTFLOW - DAM - SPILLCREST ELEV 656-USGS -- STOPLOGS IN

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
DAM	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.	0.	0.	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.	0.	0.	-656.	-1

STAGE	656.00	656.50	657.00	657.50	658.00	658.50	659.00	659.45	660.00	660.50
	661.00	662.00	664.00	666.00						
FLOW	0.	54.90	155.00	284.00	436.00	609.00	798.00	983.00	1398.00	1916.00
	2610.00	4402.00	9105.00	14959.00						
CAPACITY=	0.	1492.	1824.	2306.	2456.					
ELEVATION=	638.	656.	659.	664.	666.					

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
656.0	0.	0.	0.	0.	0.	0.	0.

DAM DATA

TOPEL	COQD	EXPD	DAMWID
659.4	2.6	1.5	0.

STATION DAM, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

	[illegible]	[illegible]	[illegible]	[illegible]
INCHES	1.15	2.29	2.47	2.47
MM	29.15	58.05	62.67	62.67
AC-FT	361.	720.	777.	777.
THOUS CU M	446.	888.	959.	959.

STATION DAM, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	C.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	1.	1.	2.	2.	2.	3.
3.	3.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	5.	7.	8.	11.	13.	16.
19.	22.	25.	29.	34.	41.	50.	69.	98.	135.
187.	257.	348.	452.	569.	681.	777.	849.	892.	908.
901.	876.	839.	794.	747.	698.	647.	599.	556.	514.
475.	438.	407.	377.	349.	322.	297.	275.	257.	239.
222.	206.	190.	176.	163.	151.	142.	133.	125.	117.
110.	102.	96.	89.	83.	78.	72.	67.	63.	58.
54.	52.	50.	48.	46.	44.	42.	41.	39.	37.
36.	34.	33.	31.	30.	29.	27.	26.	25.	24.

STORAGE

1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1493.	1493.	1493.	1493.	1493.	1493.	1494.	1494.	1494.	1494.
1495.	1495.	1495.	1495.	1495.	1495.	1495.	1495.	1495.	1495.
1495.	1495.	1495.	1495.	1495.	1495.	1495.	1495.	1495.	1495.
1495.	1495.	1495.	1496.	1497.	1498.	1499.	1501.	1504.	1506.
1509.	1511.	1514.	1517.	1522.	1528.	1536.	1547.	1561.	1579.
1600.	1626.	1656.	1689.	1721.	1751.	1775.	1793.	1803.	1806.
1805.	1799.	1790.	1780.	1768.	1755.	1742.	1730.	1718.	1706.
1695.	1685.	1675.	1666.	1657.	1649.	1641.	1633.	1626.	1619.
1613.	1607.	1601.	1596.	1591.	1587.	1582.	1578.	1574.	1570.
1566.	1563.	1560.	1557.	1554.	1551.	1548.	1546.	1544.	1542.
1540.	1538.	1536.	1534.	1533.	1531.	1529.	1528.	1526.	1525.
1523.	1522.	1521.	1519.	1518.	1517.	1516.	1515.	1514.	1513.

STAGE

656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.1	656.1	656.1	656.1	656.1
656.2	656.2	656.2	656.3	656.3	656.4	656.5	656.6	656.7	656.9
657.1	657.4	657.7	658.0	658.4	658.7	658.9	659.1	659.2	659.3
659.3	659.2	659.1	659.0	658.9	658.7	658.6	658.5	658.3	658.2
658.1	658.0	657.9	657.8	657.7	657.6	657.5	657.5	657.4	657.3
657.3	657.2	657.1	657.1	657.0	657.0	656.9	656.9	656.9	656.8
656.8	656.7	656.7	656.7	656.6	656.6	656.6	656.6	656.5	656.5
656.5	656.5	656.5	656.4	656.4	656.4	656.4	656.4	656.4	656.3
656.3	656.3	656.3	656.3	656.3	656.3	656.2	656.2	656.2	656.2

1695.	1685.	1675.	1666.	1657.	1649.	1641.	1633.	1626.	1619.
1613.	1607.	1601.	1596.	1591.	1537.	1532.	1578.	1574.	1570.
1566.	1563.	1560.	1557.	1554.	1551.	1548.	1546.	1544.	1542.
1540.	1538.	1536.	1534.	1533.	1531.	1529.	1528.	1526.	1525.
1523.	1522.	1521.	1519.	1518.	1517.	1516.	1515.	1514.	1513.

STAGE

656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.1	656.1	656.1	656.1	656.1
656.2	656.2	656.2	656.3	656.3	656.4	656.5	656.6	656.7	656.9
657.1	657.4	657.7	658.0	658.4	658.7	658.9	659.1	659.2	659.3
659.3	659.2	659.1	659.0	658.9	658.7	658.6	658.5	658.3	658.2
658.1	658.0	657.9	657.8	657.7	657.6	657.5	657.5	657.4	657.3
657.3	657.2	657.1	657.1	657.0	657.0	656.9	656.9	656.9	656.8
656.8	656.7	656.7	656.7	656.6	656.6	656.6	656.6	656.5	656.5
656.5	656.5	656.5	656.4	656.4	656.4	656.4	656.4	656.4	656.3
656.3	656.3	656.3	656.3	656.3	656.3	656.2	656.2	656.2	656.2

PEAK OUTFLOW IS 908. AT TIME 45.00 HOURS

RATIO 4

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	908.	798.	395.	142.	20404.
CMS	26.	23.	11.	4.	578.
INCHES		1.26	2.48	2.68	2.68
MM		31.88	63.10	67.98	67.98
AC-FT		395.	783.	843.	843.
THOUS CU M		488.	965.	1040.	1040.

STATION DAM, PLAN 1, RATIO 5

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	1.	2.	2.	2.	3.	3.
3.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	5.	6.	7.	9.	11.	14.	17.
20.	24.	27.	31.	37.	44.	54.	78.	109.	148.
208.	283.	384.	501.	626.	749.	853.	930.	974.	993.
979.	951.	910.	860.	805.	751.	697.	644.	595.	551.
509.	469.	432.	401.	371.	343.	317.	292.	271.	252.
234.	218.	202.	187.	173.	160.	149.	140.	131.	123.
115.	108.	101.	94.	88.	82.	76.	71.	66.	61.
57.	54.	52.	50.	48.	46.	44.	42.	40.	39.
37.	35.	34.	32.	31.	30.	28.	27.	26.	25.

STORAGE

1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1493.
1493.	1493.	1493.	1493.	1493.	1493.	1494.	1494.	1494.	1495.
1495.	1495.	1495.	1495.	1496.	1496.	1496.	1496.	1496.	1496.
1494.	1494.	1495.	1495.	1495.	1495.	1495.	1495.	1495.	1495.

1495.	1495.	1496.	1496.	1497.	1498.	1500.	1502.	1504.	1507.
1510.	1513.	1516.	1519.	1524.	1530.	1539.	1551.	1566.	1585.
1608.	1636.	1668.	1703.	1737.	1768.	1774.	1812.	1822.	1825.
1823.	1817.	1807.	1795.	1782.	1769.	1755.	1741.	1729.	1716.
1705.	1694.	1683.	1673.	1664.	1655.	1647.	1639.	1632.	1625.
1618.	1612.	1606.	1600.	1595.	1590.	1585.	1581.	1577.	1573.
1569.	1565.	1562.	1559.	1556.	1553.	1550.	1548.	1545.	1543.
1541.	1539.	1537.	1536.	1534.	1532.	1530.	1529.	1527.	1526.
1524.	1523.	1522.	1520.	1519.	1518.	1517.	1516.	1515.	1514.

STAGE

656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.1	656.1	656.1	656.1	656.1	656.2
656.2	656.2	656.2	656.3	656.3	656.4	656.5	656.6	656.8	657.0
657.2	657.5	657.8	658.2	658.5	658.9	659.1	659.3	659.4	659.5
659.4	659.4	659.3	659.1	659.0	658.9	658.7	658.6	658.5	658.3
658.2	658.1	658.0	657.9	657.8	657.7	657.6	657.5	657.5	657.4
657.3	657.2	657.2	657.1	657.1	657.0	657.0	656.9	656.9	656.8
656.8	656.8	656.7	656.7	656.7	656.6	656.6	656.6	656.6	656.5
656.5	656.5	656.5	656.5	656.4	656.4	656.4	656.4	656.4	656.4
656.3	656.3	656.3	656.3	656.3	656.3	656.3	656.2	656.2	656.2

PEAK OUTFLOW IS 993. AT TIME 45.00 HOURS

RATIO 5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	993.	868.	425.	153.	21995.
CMS	28.	25.	12.	4.	623.
INCHES		1.37	2.58	2.88	2.89
MM		34.70	68.16	73.28	73.28
AC-FT		430.	845.	909.	909.
THOUS CU M		531.	1043.	1121.	1121.

STATION DAM, PLAN 1, RATIO 6

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
1.	1.	1.	1.	1.	2.	2.	2.	3.	3.
3.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	5.	5.	6.	8.	10.	12.	15.	18.
22.	25.	29.	33.	39.	47.	60.	86.	120.	163.
229.	312.	420.	549.	686.	817.	930.	1029.	1101.	1113.
1081.	1021.	960.	909.	852.	792.	736.	681.	628.	581.
537.	496.	457.	422.	391.	362.	334.	308.	284.	265.
246.	229.	212.	196.	182.	168.	155.	146.	137.	128.
120.	112.	105.	98.	92.	85.	80.	74.	69.	64.
60.	56.	53.	51.	49.	47.	45.	43.	41.	40.
38.	36.	35.	33.	32.	30.	29.	28.	27.	25.

STORAGE

1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.

			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1101.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	736.	681.	628.	581.
537.	496.	457.	422.	391.	362.	334.	308.	284.	265.
246.	229.	212.	196.	182.	168.	155.	146.	137.	128.
120.	112.	105.	98.	92.	85.	80.	74.	69.	64.
60.	56.	53.	51.	49.	47.	45.	43.	41.	40.
38.	36.	35.	33.	32.	30.	29.	28.	27.	25.

STORAGE

1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1493.
1493.	1493.	1493.	1493.	1493.	1493.	1494.	1494.	1494.	1495.
1495.	1495.	1496.	1496.	1496.	1496.	1496.	1496.	1496.	1496.
1496.	1496.	1496.	1496.	1496.	1496.	1496.	1496.	1496.	1496.
1496.	1496.	1496.	1496.	1497.	1499.	1501.	1503.	1505.	1508.
1511.	1514.	1513.	1521.	1526.	1533.	1543.	1555.	1571.	1591.
1616.	1645.	1679.	1716.	1752.	1785.	1812.	1830.	1839.	1841.
1837.	1829.	1819.	1807.	1793.	1779.	1765.	1751.	1738.	1725.
1713.	1701.	1690.	1680.	1670.	1661.	1652.	1644.	1636.	1629.
1622.	1616.	1609.	1604.	1598.	1593.	1598.	1584.	1579.	1575.
1571.	1568.	1564.	1561.	1558.	1555.	1552.	1549.	1547.	1545.
1542.	1540.	1539.	1537.	1535.	1533.	1531.	1530.	1528.	1527.
1525.	1524.	1522.	1521.	1520.	1519.	1518.	1516.	1515.	1514.

STAGE

656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.1	656.1	656.1	656.1	656.1	656.2
656.2	656.2	656.3	656.3	656.4	656.4	656.5	656.7	656.8	657.0
657.3	657.6	657.9	658.3	658.7	659.0	659.3	659.5	659.6	659.6
659.6	659.5	659.4	659.3	659.1	659.0	658.8	658.7	658.6	658.4
658.3	658.2	658.1	658.0	657.9	657.8	657.7	657.6	657.5	657.4
657.4	657.3	657.2	657.2	657.1	657.1	657.0	657.0	656.9	656.9
656.8	656.8	656.8	656.7	656.7	656.7	656.6	656.6	656.6	656.5
656.5	656.5	656.5	656.5	656.4	655.4	656.4	656.4	656.4	656.4
656.3	656.3	656.3	656.3	656.3	655.3	656.3	656.3	656.2	656.2

PEAK OUTFLOW IS 1113. AT TIME 45.00 HOURS

RATIO 6

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1113.	943.	458.	164.	23588.
CMS	32.	27.	13.	5.	668.
INCHES		1.48	2.88	3.09	3.09
MM		37.70	73.22	78.59	78.59
AC-FT		468.	908.	975.	975.
THOUS CU M		577.	1120.	1202.	1202.

STATION DAM, PLAN 1, RATIO 7

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	2.	2.	2.	2.
2.	3.	3.	4.	5.	6.	7.	[illegible]	[illegible]	[illegible]

THOUS CU M	577.	1120.	1202.		1202.

STATION DAM, PLAN 1, RATIO 7

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	2.	2.	2.	2.
2.	3.	3.	4.	5.	6.	7.	8.	9.	10.
12.	13.	13.	14.	15.	15.	15.	15.	15.	15.
15.	14.	14.	14.	14.	14.	14.	14.	14.	14.
14.	14.	15.	17.	20.	26.	32.	41.	51.	66.
86.	106.	127.	151.	188.	241.	320.	435.	601.	824.
1214.	1913.	2904.	3823.	4481.	4937.	5019.	4827.	4469.	4093.
3669.	3231.	2817.	2473.	2191.	1923.	1730.	1547.	1388.	1276.
1167.	1062.	972.	917.	861.	804.	751.	700.	650.	602.
560.	519.	480.	443.	411.	381.	353.	327.	302.	279.
260.	242.	225.	209.	193.	179.	166.	153.	144.	135.
127.	119.	111.	104.	97.	91.	85.	79.	73.	68.
64.	59.	55.	53.	51.	49.	47.	45.	43.	41.

STORAGE

1492.	1492.	1492.	1492.	1492.	1492.	1493.	1493.	1493.	1493.
1493.	1493.	1493.	1493.	1493.	1493.	1493.	1493.	1493.	1493.
1493.	1493.	1493.	1493.	1493.	1493.	1493.	1493.	1494.	1494.
1494.	1494.	1495.	1495.	1496.	1497.	1498.	1499.	1500.	1501.
1502.	1503.	1504.	1504.	1505.	1505.	1505.	1505.	1505.	1505.
1505.	1505.	1504.	1504.	1504.	1504.	1504.	1504.	1504.	1504.
1504.	1504.	1505.	1507.	1510.	1514.	1520.	1528.	1536.	1545.
1555.	1565.	1575.	1586.	1601.	1620.	1648.	1684.	1730.	1787.
1854.	1925.	1989.	2039.	2073.	2092.	2095.	2087.	2073.	2053.
2030.	2007.	1985.	1964.	1944.	1926.	1908.	1891.	1876.	1861.
1847.	1834.	1821.	1809.	1795.	1782.	1769.	1756.	1743.	1731.
1719.	1708.	1697.	1686.	1677.	1667.	1658.	1650.	1642.	1634.
1627.	1621.	1614.	1608.	1603.	1597.	1592.	1587.	1583.	1579.
1575.	1571.	1567.	1564.	1560.	1557.	1554.	1552.	1549.	1547.
1544.	1542.	1540.	1538.	1536.	1535.	1533.	1531.	1530.	1528.

STAGE

656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.1	656.1	656.1	656.1	656.1
656.1	656.1	656.1	656.1	656.1	656.1	656.1	656.1	656.1	656.1
656.1	656.1	656.1	656.1	656.1	656.1	656.1	656.1	656.1	656.1
656.1	656.1	656.1	656.2	656.2	656.2	656.3	656.4	656.5	656.6
656.7	656.8	656.9	657.0	657.1	657.3	657.6	658.0	658.5	659.1
659.8	660.5	661.2	661.7	662.0	662.2	662.3	662.2	662.0	661.8
661.6	661.3	661.1	660.9	660.7	660.5	660.3	660.1	660.0	659.8
659.7	659.6	659.4	659.3	659.2	659.0	658.9	658.7	658.6	658.5
658.4	658.2	658.1	658.0	657.9	657.8	657.7	657.6	657.6	657.5
657.4	657.3	657.3	657.2	657.1	657.1	657.0	657.0	656.9	656.9
656.9	656.8	656.8	656.7	656.7	656.7	656.6	656.6	656.6	656.6
656.5	656.5	656.5	656.5	656.5	656.4	656.4	656.4	656.4	656.4

PEAK OUTFLOW IS 5019. AT TIME 43.50 HOURS

PEAK OUTFLOW IS 5019. AT TIME 43.50 HOURS

RATIO 7

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5019.	3872.	1575.	552.	79554.
CMS	142.	110.	45.	16.	2253.
INCHES		6.09	9.92	10.43	10.43
MM		154.80	251.87	265.04	265.05
AC-FT		1920.	3124.	3287.	3287.
THOUS CU M		2368.	3853.	4055.	4055.

STATION DAM, PLAN 1, RATIO 8

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	1.	1.	1.	1.	1.	1.	1.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	3.	3.	3.	3.	3.	3.	4.	4.
5.	6.	7.	8.	9.	11.	13.	16.	18.	21.
23.	25.	27.	28.	29.	30.	30.	30.	30.	29.
29.	29.	28.	28.	28.	28.	27.	27.	27.	27.
27.	28.	30.	34.	41.	51.	73.	102.	135.	175.
221.	267.	320.	382.	466.	594.	786.	1127.	1820.	2918.
4226.	5771.	7215.	8491.	9538.	10143.	10125.	9617.	8858.	8031.
7111.	6205.	5377.	4651.	4088.	3604.	3152.	2766.	2480.	2247.
2027.	1842.	1688.	1537.	1393.	1289.	1185.	1083.	986.	931.
876.	819.	766.	714.	664.	616.	572.	531.	491.	453.
420.	390.	362.	335.	309.	285.	266.	247.	230.	213.
198.	183.	170.	157.	147.	138.	129.	121.	113.	106.
99.	93.	86.	81.	75.	70.	65.	61.	56.	53.

STORAGE

1492.	1492.	1493.	1493.	1493.	1493.	1493.	1493.	1493.	1493.
1493.	1493.	1493.	1494.	1494.	1494.	1494.	1494.	1494.	1494.
1494.	1494.	1494.	1494.	1494.	1495.	1495.	1495.	1495.	1496.
1496.	1497.	1498.	1499.	1500.	1502.	1504.	1506.	1508.	1510.
1512.	1514.	1516.	1517.	1517.	1518.	1518.	1518.	1518.	1518.
1519.	1517.	1517.	1517.	1516.	1516.	1516.	1516.	1516.	1516.
1516.	1517.	1518.	1522.	1528.	1537.	1549.	1563.	1579.	1596.
1613.	1630.	1648.	1667.	1693.	1728.	1778.	1842.	1916.	1990.
2060.	2126.	2185.	2237.	2277.	2297.	2296.	2279.	2253.	2219.
2181.	2144.	2110.	2080.	2053.	2027.	2003.	1982.	1964.	1948.
1933.	1918.	1904.	1890.	1876.	1863.	1850.	1837.	1824.	1812.
1799.	1786.	1772.	1759.	1747.	1734.	1722.	1711.	1700.	1689.
1679.	1670.	1661.	1652.	1644.	1637.	1630.	1623.	1616.	1610.
1604.	1599.	1594.	1589.	1584.	1580.	1576.	1572.	1568.	1565.
1561.	1558.	1555.	1552.	1550.	1547.	1545.	1543.	1541.	1539.

STAGE

656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.1	656.1	656.1	656.1	656.1	656.1	656.1	656.2	656.2
656.2	656.2	656.2	656.3	656.3	656.3	656.3	656.3	656.3	656.3
656.3	656.3	656.3	656.3	656.3	656.3	656.2	656.2	656.2	656.2
656.2	656.3	656.3	656.3	656.4	656.5	656.6	656.7	656.9	657.1
657.3	657.4	657.6	657.8	658.1	658.5	659.0	659.6	660.4	661.2
661.9	662.6	663.2	663.7	664.1	664.4	664.3	664.2	663.9	663.5
663.2	662.8	662.4	662.1	661.8	661.6	661.3	661.1	660.9	660.7

PEAK OUTFLOW IS 10143. AT TIME 43.00 HOURS

RATIO 8

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10143.	7993.	3181.	1109.	159719.
CMS	287.	226.	90.	31.	4523.
INCHES		12.58	20.03	20.95	20.95
MM		319.57	508.66	532.11	532.12
AC-FT		3964.	6309.	6600.	6600.
THOUS CU M		4889.	7782.	8141.	8141.

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

HYDROGRAPH ROUTING

DAM TO SR-301

ISTAQ	ICOMP	IECON	ITAPE	JLT	JPRT	INAME	ISTAGE	IAUTO
4800	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.	0.	0.	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.	0.	0.	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0450	0.0450	0.0450	600.0	612.0	4800.	0.01100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 612.00 150.00 607.00 230.00 605.00 240.00 600.00 260.00 600.00
270.00 605.00 350.00 607.00 400.00 612.00

STORAGE	0.	1.48	3.14	4.97	6.97	9.16	11.52	14.05	16.77	21.61
	29.96	41.83	56.10	71.27	87.31	104.23	122.04	140.72	160.28	180.71
OUTFLOW	0.	32.75	105.89	212.62	351.47	522.39	725.90	962.81	1238.64	1631.92
	2179.60	2947.23	4055.35	5421.46	7029.83	8877.87	10965.96	13296.23	15871.91	18696.92
STAGE	600.00	600.63	601.26	601.89	602.53	603.16	603.79	604.42	605.05	605.68
	606.32	606.95	607.58	608.21	608.84	609.47	610.11	610.74	611.37	612.00
FLOW	0.	32.75	105.89	212.62	351.47	522.39	725.90	962.81	1238.64	1631.92
	2179.60	2947.23	4055.35	5421.46	7029.83	8877.87	10965.96	13296.23	15871.91	18696.92

STATION 4800, PLAN 1, RTIO 1

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	1.	1.	1.	1.	1.	1.	2.	2.
2.	2.	2.	3	3	4	4	5	5	5

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FORMULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS							
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8
				0.10	0.11	0.12	0.13	0.14	0.15	0.50	1.00
HYDROGRAPH AT	BASIN	5.91	1	1036.	1140.	1244.	1347.	1451.	1554.	5181.	10363.
		(8237.39)	(	29.34)(	32.28)(	35.21)(	38.15)(	41.08)(	44.02)(	146.72)(	293.44)(
ROUTED TO	DAM	5.91	1	666.	745.	826.	908.	993.	1113.	5019.	10143.
		(8237.39)	(	18.85)(	21.11)(	23.38)(	25.71)(	28.13)(	31.51)(	142.13)(	287.23)(
ROUTED TO	4800	5.91	1	667.	745.	824.	906.	990.	1114.	5023.	10168.
		(8237.39)	(	18.88)(	21.10)(	23.33)(	25.64)(	28.05)(	31.55)(	142.24)(	287.93)(

SAGAMORE LAKE DAM
NY-313

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	656.00	656.00	659.45
STORAGE	1492.	1492.	1824.
OUTFLOW	0.	0.	983.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.10	658.65	0.	1747.	666.	0.	45.50	0.
0.11	658.86	0.	1767.	745.	0.	45.00	0.
0.12	659.07	0.	1787.	826.	0.	45.00	0.
0.13	659.27	0.	1806.	908.	0.	45.00	0.
0.14	659.46	0.01	1825.	993.	0.50	45.00	0.
0.15	659.62	0.17	1841.	1113.	2.50	45.00	0.
0.50	662.26	2.81	2095.	5019.	11.00	43.50	0.
1.00	664.35	4.90	2297.	10143.	16.00	43.00	0.

PLAN 1 STATION 4800

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.10	667.	603.6	45.50
0.11	745.	603.8	45.50
0.12	824.	604.1	45.50
0.13	906.	604.3	45.00
0.14	990.	604.5	45.00
0.15	1114.	604.8	45.00
0.50	5023.	608.0	43.50
1.00	10168.	609.9	43.50

SAGAMORE LAKE DAM
NY-313

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MODIFIED FOR HONEYWELL APR 79
**********
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**********
NEW YORK STATE
DEPT OF ENVIRONMENTAL CONSERVATION
FLOOD PROTECTION BUREAU
**********
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     1              A1  NY-313     SAGAMORE LAKE DAM                                                    LOWER HUDSON RIVER BASIN
     2              A2             DEC 213-1113 LH -- WEST BR CROTON RIVER                              PUTNAM COUNTY
     3              A3             LAKE SAGAMORE ASSOC                                                  SNYDER-UH
     4              B    150       3       30        0         0         0         0         0         0         0
     5              B1     5
     6              J      2       4       1
     7              J1  0.14     0.15    0.50        1
     8              K      0   BASIN                                                          1
     9              K1             INFLOW HYDROGRAPH - DAM
    10              M      1       1     5.91                  5.91                                      1
    11              P              21.2    111       123       132       142
    12              T                                                                1.5       0.1               0.064
    13              W   3.05     0.57
    14              X      6    -0.25       3
    15              K      1   DAM                                                            1
    16              K1             ROUTED OUTFLOW - DAM - SPILLCREST ELEV 656-USGS -- STOPLOGS IN                    w/ BREACH
    17              Y                                        1         1
    18              Y1     1                                                                -656        -1
    19              Y4   656     656.5     657     657.5     658     658.5     659    659.45     660     660.5
    20              Y4   661       662     664       666
    21              YS     0      54.9     155       284       436       609       798       983      1398      1916
    22              YS  2610      4402    9105     14959
    23              $S     0      1492    1824      2306      2456
    24              $E   638       655  659.45    664.45       666
    25              $$   656
    26              $D659.45      2.63     1.5         0
    27              $B    15         1     649       0.5       656     659.6
    28              $B    15         1     640         2       656     659.6
    29              K      1      4800                                                     1
    30              K1             DAM TO SR-301
```

```
      SB652.45    2.63     1.5       0
      SR    15       1     649     0.5     656   659.6
      SB    15       1     640       2     656   659.6
      K      1    4800                                  1
      K1                DAM TO SR-301

Y                                      1       1
Y1       1
Y6  0.045   0.045   0.045     600     612    4800   0.011
Y7     100     612     150     607     230     605     240     600     260     600
Y7     270     605     350     607     400     612
K       99
A
A
A
A
A
A
A
```

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**********                                        **********
FLOOD HYDROGRAPH PACKAGE (HEC-1)                  NEW YORK STATE
DAM SAFETY VERSION      JULY 1978                 DEPT OF ENVIRONMENTAL CONSERVATION
  LAST MODIFICATION  26 FEB 79                    FLOOD PROTECTION BUREAU
  MODIFIED FOR HONEYWELL APR 79
**********                                        **********

RUN  DATE 07/01/81
                    NY-313    SAGAMORE LAKE DAM                          LOWER HUDSON RIVER BASIN
                              DEC 213-1113 LH -- WEST BR CROTON RIVER    PUTNAM COUNTY
                              LAKE SAGAMORE ASSOC                        SNYDER UH

                                        JOB SPECIFICATION
                    NO      NHR     NMIN     IDAY     IHR     IMIN    METRC     IPLT     IPRT    NSTAN
                   150       0       30        0       0        0        0        0        0        0
                                    JOPER      NWT    LROPT    TRACE
                                       5        0        0        0

                                  MULTI-PLAN ANALYSES TO BE PERFORMED
                                      NPLAN= 2 NRTIO= 4 LRTIO= 1
                          RTIOS=   0.14   0.15   0.50   1.00

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

                                  SUB-AREA RUNOFF COMPUTATION

                                  INFLOW HYDROGRAPH - DAM
                                    ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                                    BASIN       0       0       0       0       0       1       0       0

                                        HYDROGRAPH DATA
                              IHYDG     IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO    ISNOW    ISAME    LOCAL
                                  1        1     5.91       0.     5.91       0.       0.        0        1        0

                                        PRECIP DATA
                                 SPFE      PMS       R6      R12      R24      R48      R72      R96
                                   0.    21.20   111.00   123.00   132.00   142.00     0.       0.
TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                        LOSS DATA
                              LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                                  0      0.      0.    1.00      0.      0.    1.00    1.50    0.10      0.    0.06

                                    UNIT HYDROGRAPH DATA
                                    TP=  3.05    CP=0.57    NTA=  0

                                    RECESSION DATA
                                STRTQ=    6.00    QRCSN=   -0.25    RTIOR= 3.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 6.91 AND R= 6.51 INTERVALS

                    UNIT HYDROGRAPH 39 END-OF-PERIOD ORDINATES, LAG=   3.06 HOURS, CP= 0.57  VOL= 1.00
                      42.     156.     311.     480.     624.     708.     719.     653.     560.     480.
                     412.     353.     303.     260.     223.     191.     164.     140.     120.     103.
                      88.      76.      65.      56.      48.      41.      35.      30.      26.      22.
                      19.      16.      14.      12.      10.       9.       8.       6.       6.

0                                       END-OF-PERIOD FLOW
     MO.DA  HR.MN  PERIOD    RAIN    EXCS    LOSS      COMP Q      MO.DA  HR.MN  PERIOD    RAIN    EXCS    LOSS     COMP Q
     1.01   0.30       1    0.20    0.00    0.00           5      1.02   14.00      74    1.13    1.08    0.05       1600
```

MM	324.52	517.41	535.81	535.88
AC-FT	4025.	6417.	6646.	6647.
THOUS CU M	4965.	7916.	8197.	8198.

PLAN 2 SAME AS PLAN 1

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

HYDROGRAPH ROUTING

ROUTED OUTFLOW - DAM - SPILLCREST ELEV 655-USGS -- STOPLOGS IN

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
DAM	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IJPT	IPMP	LSTR
0.	0.	0.	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.	0.	0.	-656.	-1

STAGE	656.00	656.50	657.00	657.50	658.00	658.50	659.00	659.45	660.00	660.50
	661.00	662.00	664.00	666.00						
FLOW	0.	54.90	155.00	284.00	435.00	609.00	798.00	983.00	1398.00	1916.00
	2610.00	4402.00	9105.00	14959.00						
CAPACITY=	0.	1492.	1824.	2306.	2456.					
ELEVATION=	638.	656.	659.	664.	666.					

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
656.0	0.	0.	0.	0.	0.	0.	0.

DAM DATA

TOPEL	COQD	EXPD	DAMWID
659.4	2.6	1.5	0.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
15.	1.00	649.00	0.50	656.00	659.60

PLAN 1

STATION DAM, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	1.	2.	2.	2.	3.	3.
3.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	5.	6.	7.	9.	11.	14.	17.
20.	24.	27.	31.	37.	44.	54.	78.	109.	148.
208.	283.	384.	501.	626.	749.	853.	930.	974.	993.
979.	951.	910.	860.	805.	751.	697.	644.	595.	551.
509.	469.	432.	401.	371.	343.	317.	292.	271.	252.
236.	218.	202.	187.	173.	160.	149.	140.	131.	123.

39.50 51.

OVN

PLAN 2

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
15.	1.00	640.00	2.00	656.00	659.60

STATION DAM, PLAN 2, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	1.	2.	2.	2.	3.	3.
3.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	5.	6.	7.	9.	11.	14.	17.
20.	24.	27.	31.	37.	44.	54.	78.	109.	148.
209.	283.	384.	501.	626.	749.	853.	930.	974.	993.
979.	951.	910.	860.	805.	751.	697.	644.	595.	551.
509.	469.	432.	401.	371.	343.	317.	292.	271.	252.
234.	218.	202.	187.	173.	160.	149.	140.	131.	123.
115.	108.	101.	94.	88.	82.	76.	71.	66.	61.
57.	54.	52.	50.	48.	46.	44.	42.	40.	39.
37.	35.	34.	32.	31.	30.	28.	27.	26.	25.

STORAGE

1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.
1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1492.	1493.
1493.	1493.	1493.	1493.	1493.	1493.	1494.	1494.	1494.	1495.
1495.	1495.	1495.	1495.	1496.	1496.	1496.	1496.	1496.	1496.
1496.	1496.	1495.	1495.	1495.	1495.	1495.	1495.	1495.	1495.
1495.	1495.	1496.	1496.	1497.	1498.	1500.	1502.	1504.	1507.
1510.	1513.	1516.	1519.	1524.	1530.	1539.	1551.	1566.	1585.
1609.	1636.	1668.	1703.	1737.	1768.	1794.	1812.	1822.	1825.
1823.	1817.	1807.	1795.	1782.	1769.	1755.	1741.	1729.	1716.
1705.	1694.	1683.	1673.	1664.	1555.	1647.	1639.	1632.	1625.
1618.	1612.	1606.	1600.	1595.	1590.	1585.	1581.	1577.	1573.
1567.	1565.	1562.	1559.	1556.	1553.	1550.	1548.	1545.	1543.
1541.	1539.	1537.	1536.	1534.	1532.	1530.	1529.	1527.	1526.
1524.	1523.	1522.	1520.	1519.	1518.	1517.	1516.	1515.	1514.

STAGE

656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	556.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	556.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
656.0	656.0	656.0	656.0	656.1	656.1	656.1	656.1	656.1	656.2
656.2	656.2	656.2	656.3	656.3	656.4	656.5	656.6	656.8	657.0
657.2	657.5	657.8	658.2	658.5	658.9	659.1	659.3	659.4	659.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

OVN

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

HYDROGRAPH ROUTING

DAM TO SR-3C1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4800	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.	0.	0.	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.	0.	0.	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0450	0.0450	0.0450	600.0	612.0	4800.	0.01100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 612.00 150.00 607.00 230.00 605.00 240.00 600.00 260.00 600.00
270.00 605.00 350.00 607.00 400.00 612.00

STORAGE	0.	1.48	3.14	4.97	6.97	9.16	11.52	14.05	16.77	21.61
	29.96	41.83	56.10	71.27	87.31	104.23	122.04	140.72	160.28	180.71
OUTFLOW	0.	32.75	105.89	212.62	351.47	522.39	725.90	962.81	1238.64	1631.92
	2179.60	2947.23	4055.35	5421.46	7029.83	8877.87	10965.96	13296.23	15871.91	18696.92
STAGE	600.00	600.63	601.26	601.89	602.53	603.16	603.79	604.42	605.05	605.68
	606.32	606.95	607.58	608.21	608.84	609.47	610.11	610.74	611.37	612.00
FLOW	0.	32.75	105.89	212.62	351.47	522.39	725.90	962.81	1238.64	1631.92
	2179.60	2947.23	4055.35	5421.46	7029.83	8877.87	10965.96	13296.23	15871.91	18696.92

STATION 4800, PLAN 1, RTIO 1

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	1.	1.	2.	2.	2.	3.
3.	3.	3.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	5.	6.	7.	9.	11.	14.	
17.	20.	23.	27.	31.	39.	48.	65.	92.	130.
182.	254.	348.	465.	589.	715.	828.	912.	965.	990.
985.	958.	922.	873.	819.	765.	711.	659.	608.	563.
520.	491.	463.	410.	380.	352.	326.	301.	278.	259.
241.	223.	208.	193.	179.	165.	153.	144.	135.	126.
118.	111.	104.	97.	91.	85.	79.	74.	69.	64.
59.	56.	53.	51.	49.	47.	45.	43.	41.	39.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FORMULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

w/ BREACH

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 0.14	RATIO 2 0.15	RATIO 3 0.50	RATIO 4 1.00
HYDROGRAPH AT	BASIN	5.91	1	1451.	1554.	5181.	10363.
		(-0.00)		(41.08)(	44.02)(	146.72)(	293.44)(
			2	1451.	1554.	5181.	10363.
				(41.08)(	44.02)(	146.72)(	293.44)(
ROUTED TO	DAM	5.91	1	993.	3256.	4996.	10164.
		(9743.88)		(28.13)(	92.21)(	141.48)(	287.81)(
			2	993.	5588.	8527.	10020.
				(28.13)(	158.24)(	241.45)(	283.74)(
ROUTED TO	4800	5.91	1	990.	3009.	4990.	10166.
		(9743.88)		(28.05)(	85.20)(	141.29)(	287.88)(
			2	990.	5183.	8056.	10025.
				(28.05)(	146.75)(	228.13)(	283.89)(

SAGAMORE LAKE DAM
NY-313

SC

SUMMARY OF DAM SAFETY ANALYSIS

w/ BREACH

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	656.00	656.00	659.45
STORAGE	1492.	1492.	1824.
OUTFLOW	0.	0.	983.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.14	659.46	0.01	1825.	993.	0.50	45.00	0.
0.15	659.61	0.16	1839.	3256.	1.38	45.00	44.50
0.50	660.60	1.15	1935.	4996.	6.00	43.50	40.50
1.00	662.73	3.28	2140.	0164.	9.50	43.00	39.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	656.00	656.00	659.45
STORAGE	1492.	1492.	1824.
OUTFLOW	0.	0.	983.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.14	659.45	0.01	1825.	993.	0.50	45.00	0.
0.15	659.61	0.16	1840.	5588.	1.62	46.50	44.50
0.50	660.55	1.10	1930.	8527.	2.35	42.50	40.50
1.00	660.56	1.11	1931.	10020.	5.15	43.50	39.00

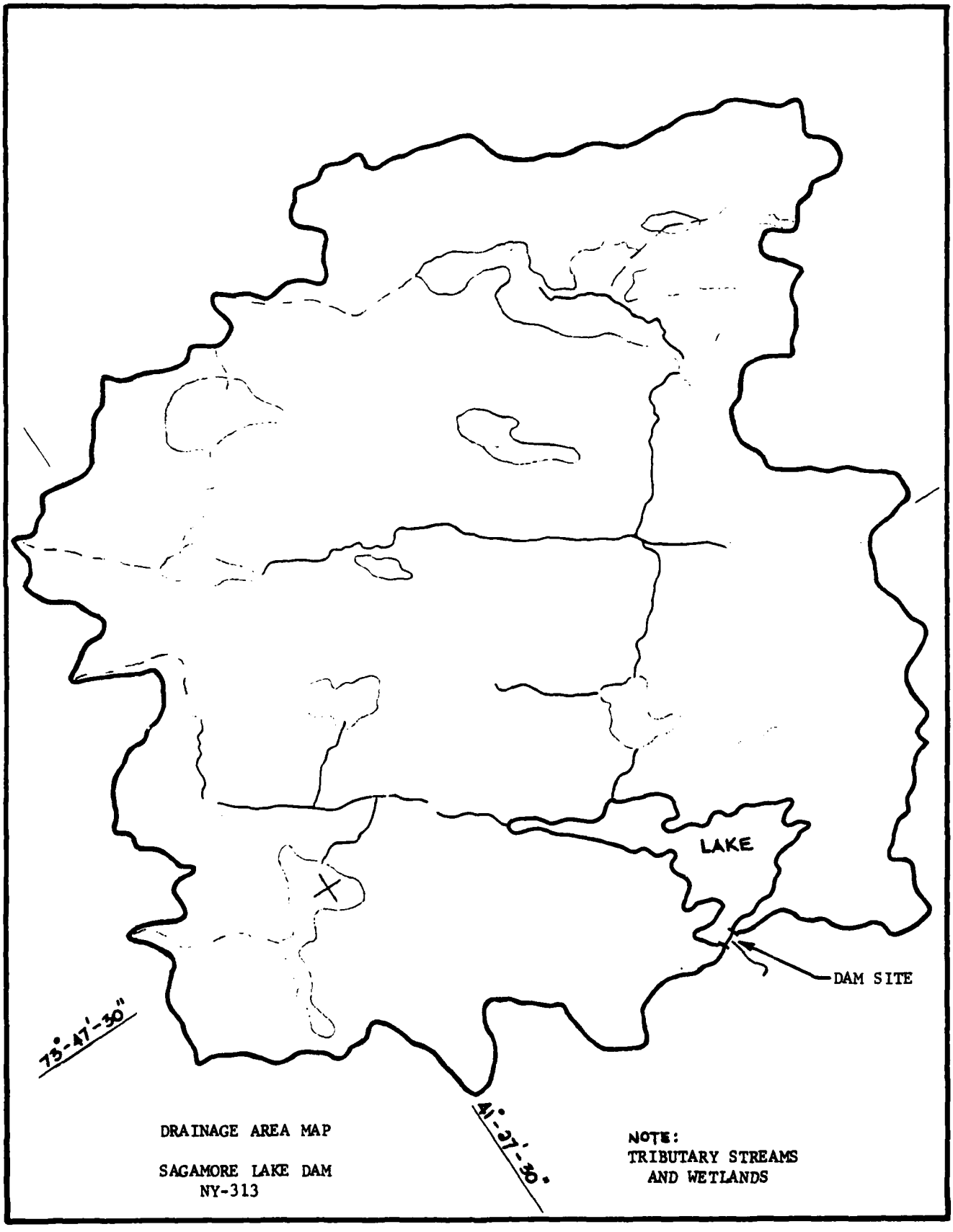
PLAN 1 STATION 4800

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.14	990.	604.5	45.00
0.15	3009.	607.0	45.50
0.50	4990.	608.0	43.50
1.00	10166.	609.9	43.50

PLAN 2 STATION 4800

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.14	990.	604.5	45.00
0.15	5183.	608.1	46.50
0.50	8056.	609.2	42.50
1.00	10025.	609.8	43.50

SAGAMORE LAKE DAM
NY-313



DRAINAGE AREA MAP

SAGAMORE LAKE DAM
NY-313

NOTE:
TRIBUTARY STREAMS
AND WETLANDS

APPENDIX D

STABILITY COMPUTATIONS

STRUCTURAL STABILITY ANALYSIS

The analysis was based on a cross section shown on plans. A normal analysis was performed including both overturning and sliding analysis. Due to unknown foundation conditions, full uplift was assumed at the upstream toe, decreasing to the tailwater pressure at the downstream toe.

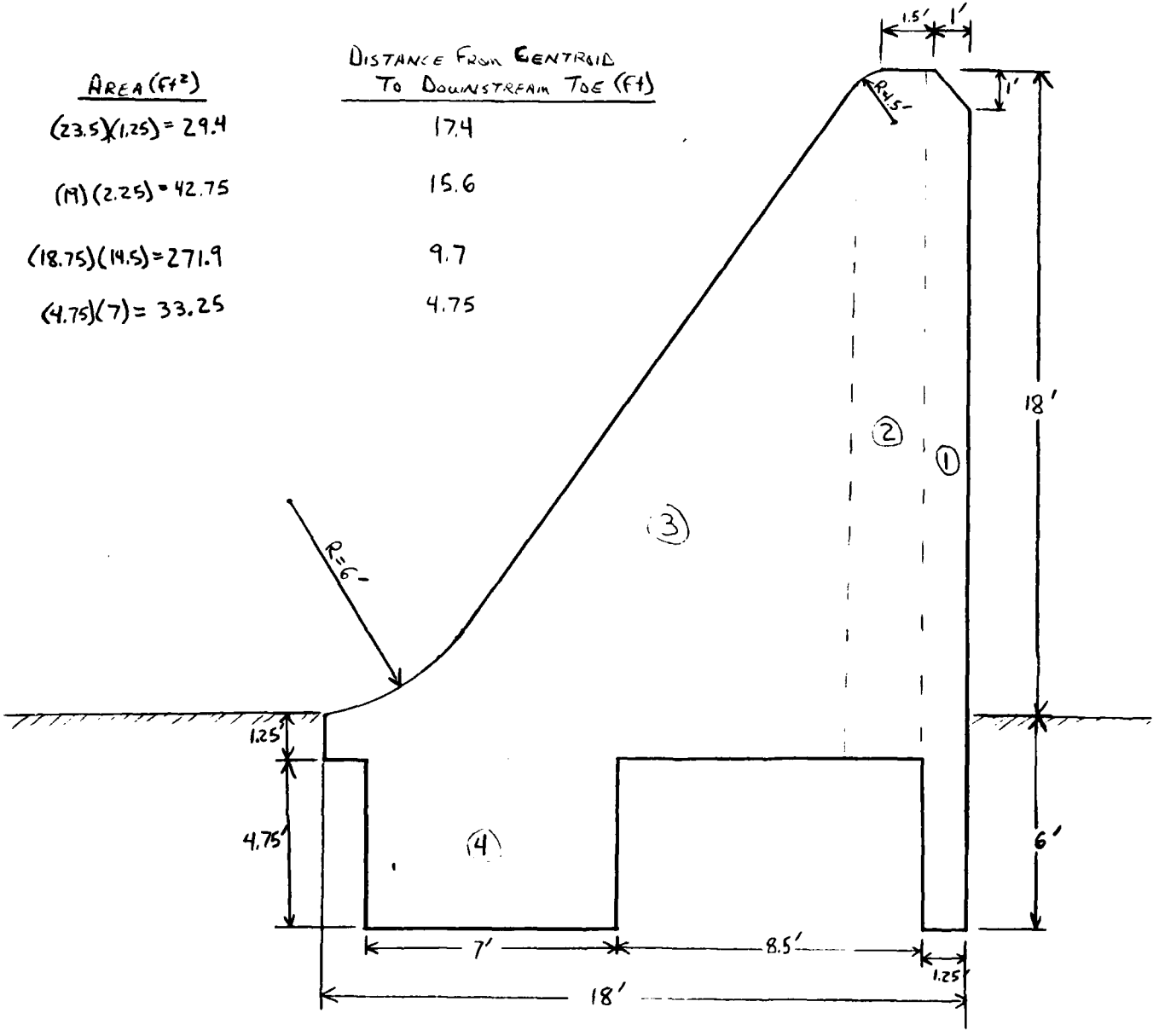
ANALYSIS CONDITIONS

1. Normal conditions; water surface at spillway crest
2. Same as #1 plus ice load of 5,000 pounds per linear foot
3. Flood Flows water surface at top of dam (3.5 feet above spillway crest).
4. One-half PMF flow-water surface 6.3 feet above spillway crest (2.8 feet above top of dam).
5. Seismic Conditions - Water at Spill Crest with seismic coefficient of 0.1

SAGAMORE LAKE DAM - NY 313

SCALE 1" = 5'

SEGMENT NO.	AREA (FT^2)	DISTANCE FROM CENTROID TO DOWNSTREAM TOE (FT)
①	(23.5)(1.25) = 29.4	17.4
②	(19)(2.25) = 42.75	15.6
③	(18.75)(14.5) = 271.9	9.7
④	(4.75)(7) = 33.25	4.75



STABILITY ANALYSIS PROGRAM - WORK SHEET

INPUT ENTRY		ANALYSIS CONDITION 1	2	3	4	5
Unit Weight of Dam (K/ft^3)	0	0.15	0.15	0.15	0.15	0.15
Area of Segment No. 1 (ft^2)	1	29.4	29.4	29.4	29.4	29.4
Distance from Center of Gravity of Segment No. 1 to Downstream Toe (ft)	2	17.4	17.4	17.4	17.4	17.4
Area of Segment No. 2 (ft^2)	3	42.75	42.75	42.75	42.75	42.75
Distance from Center of Gravity of Segment No. 2 to Downstream Toe (ft)	4	15.6	15.6	15.6	15.6	15.6
Area of Segment No. 3 (ft^2)	5	271.9	271.9	271.9	271.9	271.9
Distance from Center of Gravity of Segment No. 3 to Downstream Toe (ft)	6	9.7	9.7	9.7	9.7	9.7
Base Width of Dam (Total) (ft)	7	18	18	18	18	18
Height of Dam (ft)	8	24	24	24	24	24
Ice Loading (K/L ft.)	9	—	5.0	—	—	—
Coefficient of Sliding	10	0.5	0.5	0.5	0.5	0.5
Unit Weight of Soil (K/ft^3) (deduct 13)	11	0.055	0.055	0.055	0.055	0.055
Active Soil Coefficient - Ka	12	0.27	0.27	0.27	0.27	0.27
Passive Soil Coefficient - Kp	13	3.69	3.69	3.69	3.69	3.69
Height of Water over Top of Dam or Spillway (ft)	14	—	—	3.5	6.31	—
Height of Soil for Active Pressure (ft)	15	6	6	6	6	6
Height of Soil for Passive Pressure (ft)	16	6	6	6	6	6
Height of Water in Tailrace Channel (ft)	17	7	7	10	10	7
Weight of Water (K/ft^3)	18	0.0624	.0624	.0624	.0624	.0624
Area of Segment No. 4 (ft^2)	19	33.25	33.25	33.25	33.25	33.25
Distance from Center of Gravity of Segment No. 4 to Downstream Toe (ft)	20	4.75	4.75	4.75	4.75	4.75
Height of Ice Load or Active Water (ft) (does not include 14)	46	24	24	24	24	24
Seismic Coefficient (g)	50	—	—	—	—	0.1
RESULTS OF ANALYSIS						
Factor of Safety vs. Overturning		1.84	1.35	1.52	1.35	1.74
Distance From Toe to Resultant		7.07	4.01	5.63	4.28	6.57
Factor of Safety vs. Sliding		1.36	1.07	1.09	0.92	0.96

APPENDIX E

REFERENCES

APPENDIX E

REFERENCES

1) T. S. George and R.S. Taylor: Lower Hudson River Basin, Hydrologic Flood Routing Model, for the Department of the Army, New York District, Corps of Engineers, Water Resources Engineers Inc. January 1977.

2) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw Hill, 1963.

3) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.

U.S. Army Corp of Engineers:

4) HEC-1 Flood Hydrograph Package - Dam Safety Version, September 1978.

5) Engineering Manual 1110-2-1405; Flood-Hydrograph Analyses and Computations, August 1959.

6) U.S. Department of Agriculture, Soil Conservation Service; National Engineering Handbook; Section 4 - Hydrology, August 1972.

7) U.S. Department of Commerce; Weather Bureau;

Hydrometeorological Report No. 33:
Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24 and 48 Hours, April 1956.

8) U.S. Department of Interior, BUREC; Design of Small Dams, 2nd edition (rev. reprint), 1977.

AD-A105 720 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. SAGAMORE LAKE DAM (INVENTORY NUMBE--ETC(U)
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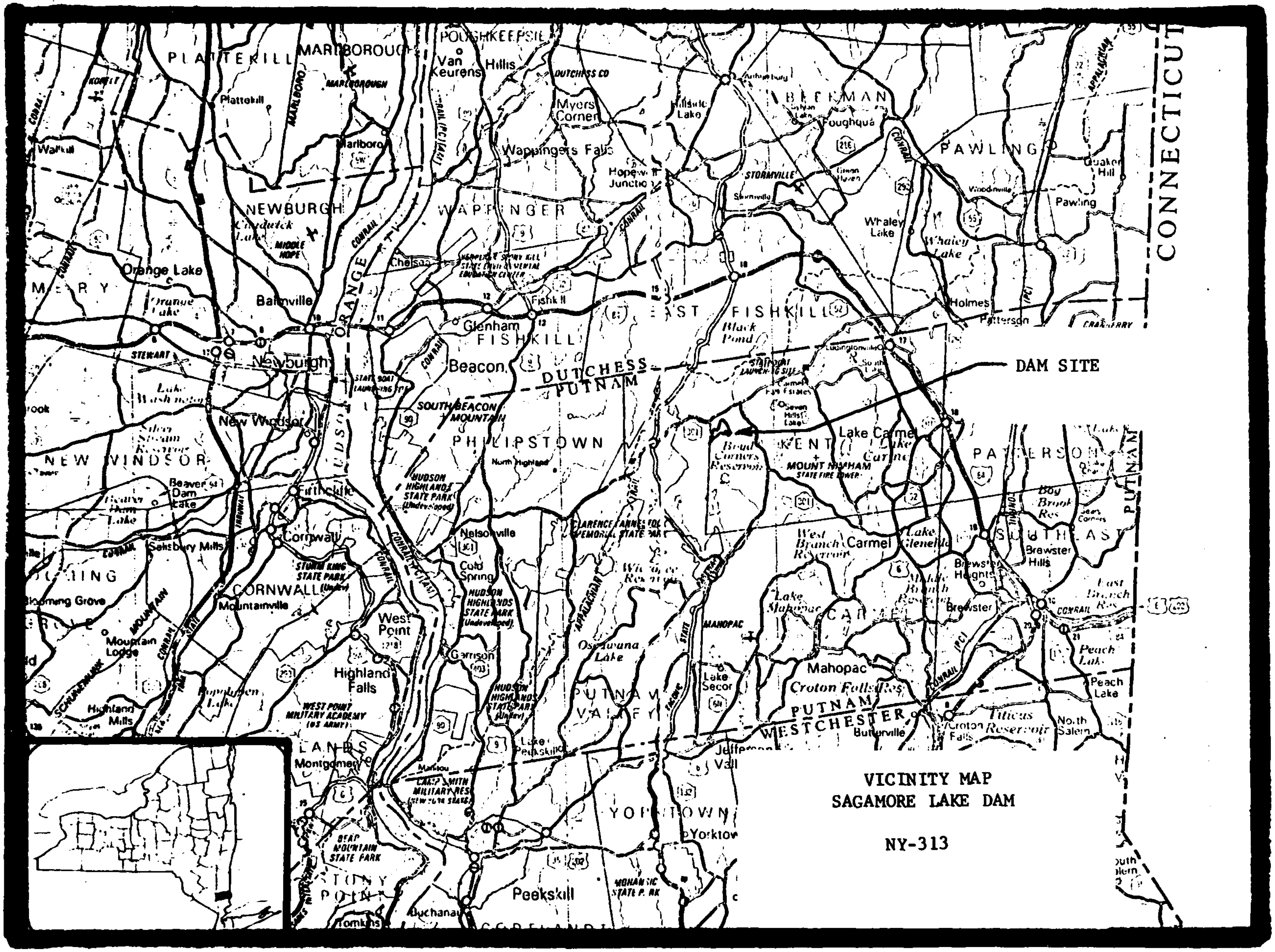
UNCLASSIFIED NL

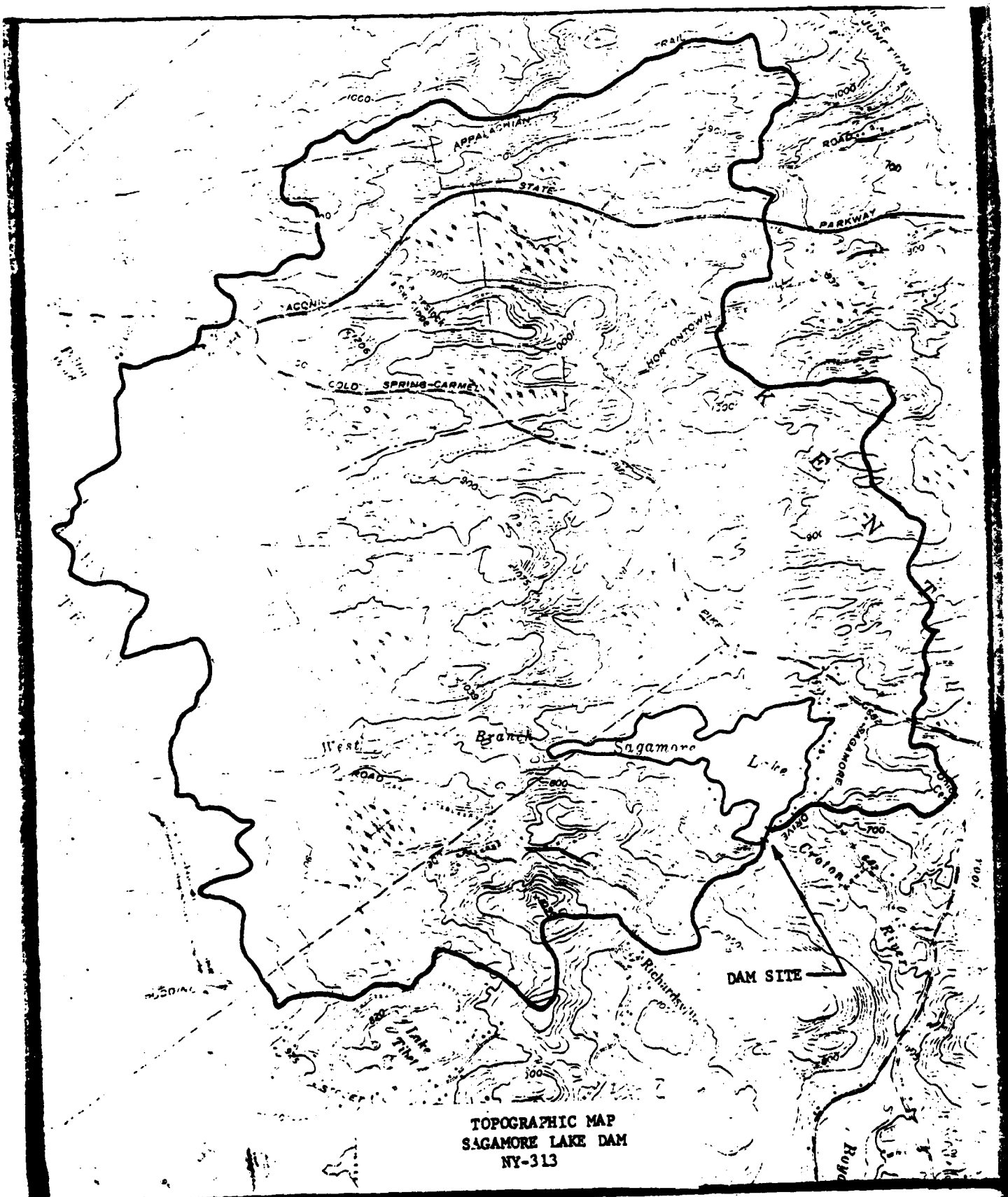
2 OF 2

APPENDIX F

DRAWINGS AND

RELATED DOCUMENTS


VICINITY MAP
SAGAMORE LAKE DAM
NY-313
DAM SITE
CONNECTICUT
DUTCHESS
PUTNAM
WESTCHESTER
ORANGE
PLATTEKILL
MARLBOROUGH
POUGHKEEPSIE
NEWBURGH
WAPPINGER
BEEKMAN
PAWLING
EAST FISHKILL
FISHKILL
PHILIPSTOWN
KENT
PATTERSON
SOUTHEAST
CARMEL
PUTNAM VALLEY
YORKTOWN
NEW WINDSOR
CORNWALL
Newburgh
Beacon
Lake Carmel
Carmel
Brewster
Mahopac
Peekskill
West Point
Highland Falls
Cold Spring
Garrison
Nelsonville
Pawling
Holmes
Patterson
Wappingers Falls
Hopewell Junction
Myers Corner
Fishkill
Glenham
Balmville
Orange Lake
New Windsor
Cornwall
Mountainville
Fort Montgomery
Buchanan
Croton Falls
North Salem
Peach Lake
Whaley Lake
Stormville
Poughquag
Beaver Dam Lake
Salisbury Mills
Blooming Grove
Mountain Lodge
Highland Mills
Stony Point
Tomkins Cove
Butlerville
Lake Secor
Oscawana Lake
Lake Peekskill
Jefferson Valley
Yorktown
Brewster Hills
Brewster Heights
Lake Gleneida
West Branch Reservoir
Boyd Corners Reservoir
Bog Brook Res.
East Branch Res.
Croton Falls Res.
Titicus Reservoir
MOUNT NIMHAM STATE FIRE TOWER
HUDSON HIGHLANDS STATE PARK
STORM KING STATE PARK
BEAR MOUNTAIN STATE PARK
WEST POINT MILITARY ACADEMY (US ARMY)
CAMP SMITH MILITARY RES (NEW YORK STATE)
MOHANSIC STATE P. RK
CLARENCE FAHNESTOCK MEMORIAL STATE PARK
SOUTH BEACON MOUNTAIN



TOPOGRAPHIC MAP
SAGAMORE LAKE DAM
NY-313

Form E-61
9-11-34-500 (11E-1836)

STATE OF NEW YORK

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENGINEERING

ALBANY

Received July 6, 1940 Dam No.

Disposition Watershed

Foundation inspected

Structure inspected

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see last page of this application) for the approval of specifications and detailed drawings, marked

herewith submitted for the { construction / ~~reconstruction~~ } of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about August 30th.
(Date)

1. The dam will be on West Branch, Croton flowing into Wright, in the town of Kent, County of Putnam and 1,000 ft West of old Forge Dam
(give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

2. Location of dam is shown on the West Point quadrangle of the United States Geological Survey.

3. The name of the owner is Town of the Highlands

4. The address of the owner is Carmel, N.Y.

5. The dam will be used for Power

6. Will any part of the dam be built upon or its pond flood any State lands? No

7. The watershed above the proposed dam is 6 square miles.

8. The proposed dam will create a pond area at the spillcrest elevation of 50. acres and will impound cubic feet of water.

9. The maximum height of the proposed dam above the bed of the stream is 9 feet ____ inches.

10. The lowest part of the natural shore of the pond is ____ feet vertically above the spillcrest, and everywhere else the shore will be at least ____ feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam None

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) Clay + Pebbles,

13. Facing down stream, what is the nature of material composing the right bank? Hard Pan Clay & Rocks

14. Facing down stream, what is the nature of the material composing the left bank? Hard Pan, Clay & Rocks

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Hard Pan Clay & Rocks

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? No

17. WASTES. The spillway of the above proposed dam will be 50 feet long in the clear; the waters will be held at the right end by a Retaining wall the top of which will be 3 feet above the spillcrest, and have a top width of 1 feet; and at the left end by a Retaining wall the top of which will be 3 feet above the spillcrest, and have a top width of 1 feet.

18. The spillway is designed to safely discharge ____ cubic feet per second.

19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows: 20" gate in pipe from water side

20. What is the maximum height of flash boards which will be used on this dam? 1' 6"

21. APRON. Below the proposed dam there will be an apron built of Concrete. feet long across the stream, 50 feet wide and 1 feet thick.

22. Does this dam constitute any part of a public water supply? No.

Form R-61. 7-12-40-500 (11E-93) 515-1)
(RID-12-5-4

STATE OF NEW YORK

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENGINEERING

ALBANY

Received Nov 20, 1942 Dam No. 213-1113

Disposition Dec 23 Watershed

Foundation inspected

Structure inspected

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see third page of this application) for the approval of specifications and detailed drawings, marked Reconstruction of Boyd Corner Dam

herewith submitted for the { construction / reconstruction } of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about

(Date)

1. The dam will be on West Branch Inc. flowing into Boyd's Corner Reservoir in the town of Kent County of Putnam and Swamp of Boyd's Corner Reservoir
(Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)
2. Location of dam is shown on the West Point quadrangle of the United States Geological Survey.
3. The name of the owner is F. M. Ryder
4. The address of the owner is Carmel N.Y.
5. The dam will be used for Ice Impoundment Purposes
6. Will any part of the dam be built upon or its pond flood any State lands? No
7. The watershed above the proposed dam is - square miles.
8. The proposed dam will create a pond area at the spillcrest elevation of 12.0 acres and will impound [illegible] cubic feet of water.

9. The maximum height of the proposed dam above the bed of the stream is 21 feet 6 inches.

10. The lowest part of the natural shore of the pond is 4 feet vertically above the spillcrest, and everywhere else the shore will be at least 4 feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam Yes wash out Town Road. No buildings effected

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) clay

13. Facing downstream, what is the nature of material composing the right bank? hardpan

14. Facing downstream, what is the nature of the material composing the left bank? hardpan

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing effect of exposure to air and to water, uniformity, etc. Fairly uniform & impervious

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? No

17. Wastes. The spillway of the above proposed dam will be 47.5' feet long in the clear; the waters will be held at the right end by a Conc Retaining Wall the top of which will be 3.5' feet above the spillcrest, and have a top width of 1 feet; and at the left end by a Conc Retaining Wall the top of which will be 3.5 feet above the spillcrest, and have a top width of 1 feet.

18. The spillway is designed to safely discharge 1000 cubic feet per second.

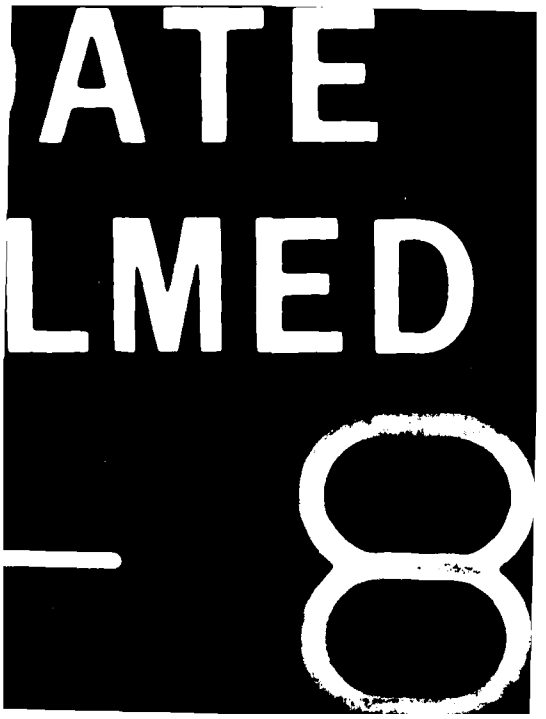
19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows:

20" dia steel pipe

20. What is the maximum height of flash boards which will be used on this dam? 20"

21. Apron. Below the proposed dam there will be an apron built of Conc 47.5' feet long across the stream, 29 feet wide and 1 feet thick.

22. Does this dam constitute any part of a public water supply? Yes, in NYC watershed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