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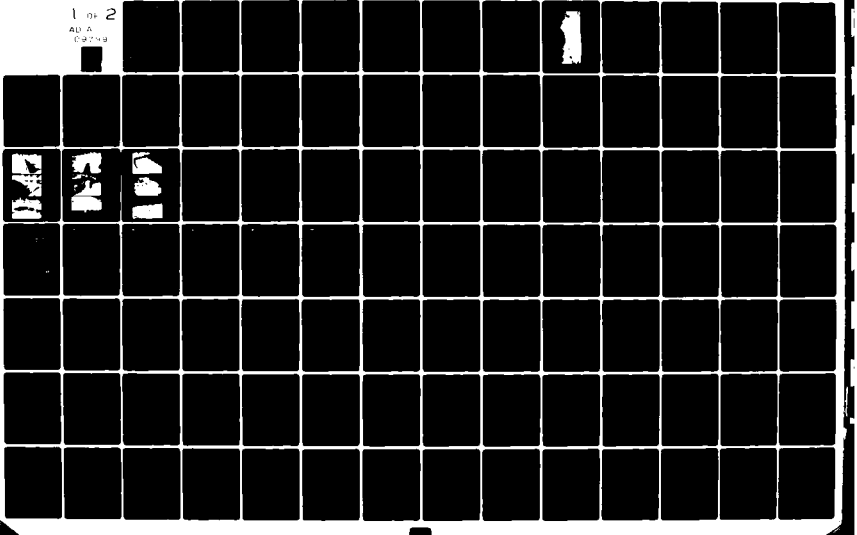

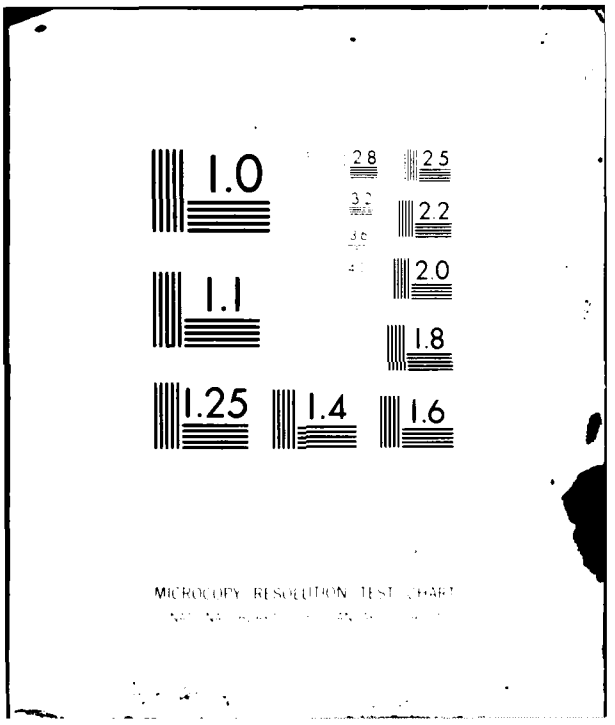
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LEVEL II

(2)

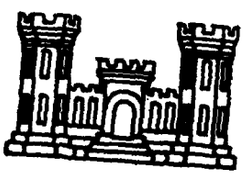
BLACK RIVER BASIN

HAWKINSVILLE DAM

NEW YORK

INVENTORY No. NY 895

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST 1981

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Hawksville Dam
Black River Basin
Oneida County

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

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

The examination of documents and visual inspection of the Hawkinsville Dam did not reveal conditions which constitute an immediate hazard to human life or property. The dam, however, has a number of problem areas which require further investigation and remedial work.

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The structural stability analysis indicates unsatisfactory stability would result from loadings which could occur under ice loading conditions and the Probable Maximum Flood (PMF) and 1/2 PMF events. A structural stability investigation should be commenced within 3 months to determine the characteristics of the uplift forces acting on the dam, the properties of the existing dam and foundation, and the effect of these conditions on the stability of the dam. Remedial work should be undertaken depending on the results of this investigation and completed within 18 months.

The hydrologic/hydraulic analysis indicates that the spillway will pass only 11% of the Probable Maximum Flood (PMF). The dam will be overtopped by 19 feet and 10 feet by the PMF and 1/2 PMF respectively. Failure of the dam during the 1/2 PMF event would significantly increase the downstream hazard from that which would exist just prior to failure of the dam. The spillway capacity, therefore, is assessed as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate spillway" is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream from the dam.

It is, therefore, recommended that within 3 months of notification to the Owner, a detailed hydrologic/hydraulic investigation of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed and their effect upon the overtopping potential of the dam. The results of these investigations will determine the appropriate remedial measures necessary to provide adequate spillway capacity. This remedial work should be completed within 18 months. In the interim, a detailed emergency action plan must be developed and implemented during periods of unusually heavy precipitation. Also, around-the-clock surveillance of the structure must be provided during these periods.

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 aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

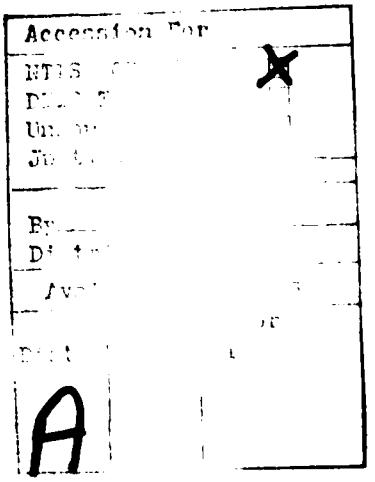

TABLE OF CONTENTS

APPENDIX

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Hawkinsville Dam I.D. No. NY 895
State Located:	New York
County:	Oneida
Watershed:	Black River Basin
Stream:	Black River
Date of Inspection:	May 22, 1981

ASSESSMENT OF GENERAL CONDITIONS

The examination of documents and visual inspection of the Hawkinsville Dam did not reveal conditions which constitute an immediate hazard to human life or property. The dam, however, has a number of problem areas which require further investigation and remedial work.

The structural stability analysis indicates unsatisfactory stability would result from loadings which could occur under ice loading conditions and the Probable Maximum Flood (PMF) and 1/2 PMF events. A structural stability investigation should be commenced within 3 months to determine the characteristics of the uplift forces acting on the dam, the properties of the existing dam and foundation, and the effect of these conditions on the stability of the dam. Remedial work should be undertaken depending on the results of this investigation and completed within 18 months.

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The following remedial work should be undertaken within one year:

1. Trees and brush should be removed from the earthfilled portion of the right abutment of the dam.

2. The crest elevation of the earthfilled portion should be raised to meet the elevation of the top of concrete at the right abutment of the spillway.

3. The area where seepage occurs near the center of the earthfilled portion should be cleared of brush and the surface graded so that observations can be made of the extent and quantity of the seepage which occurs.

4. The reservoir drain should be placed in operating condition by the installation of a sluice gate operator.

5. Repairs should be made to the concrete surfaces at the left abutment to prevent further deterioration.

6. A formalized inspection system should be initiated to develop data on the conditions and maintenance operations at the facility.

7. A flood warning and emergency evacuation system should be implemented to alert the public in the event conditions occur which could result in failure of the dam.

Dale Engineering Company

John B. Stetson, President

Approved By: for Col. W. M. Smith, Jr.
Date: New York District Engineer

10 SEP 1981

1. OVERVIEW OF HAWKINSVILLE DAM AS VIEWED FROM DOWNSTREAM BRIDGE.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
HAWKINSVILLE DAM I.D. NO. NY 895
BLACK RIVER BASIN
ONEIDA COUNTY, NY

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and the U.S. Army Corps of Engineers.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the existing condition of the Hawkinsville Dam and appurtenant structures owned by the Hudson River-Black River Regulating District, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the U.S. Army Corps of Engineers.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION

a. Description of Dam and Appurtenances

The Hawkinsville Dam is a run-of-river concrete gravity dam. The structure is approximately 300 feet long, with a maximum height of approximately 18 feet. A short embankment section is located at the right abutment of the dam. This embankment section is poorly defined and hardly discernible as a man-made embankment. An abandoned Excelsior manufacturing plant is situated downstream from the left abutment of the dam. A 5-1/2 foot diameter penstock was used to conduct flow from the impoundment to operate the machinery in the plant. Flow into the penstock is controlled by a sluice gate situated at the waterbox in the left abutment. A 4 foot high by 3 foot wide sluice gate serves as a reservoir drain and is situated in the left abutment of the dam.

b. Location

The reservoir is located in the hamlet of Hawkinsville, Town of Boonville, Oneida County, New York.

c. Size Classification

The maximum height of the dam is approximately 18 feet. The volume of the impoundment is approximately 1230 acre feet to the top of dam. Therefore, the dam is in the intermediate size classification as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

A residential property is located along the bank of the Black River just downstream from the dam. Several summer homes are located on the banks of the river further downstream. Therefore, the dam is in the high hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the Hudson River-Black River Regulating District.

Contact: Hudson River-Black River Regulating District
491 Eastern Boulevard
Watertown, NY 13601

Attention: Kenneth H. Mayhew

Telephone: (315) 788-5440

f. Purpose of the Dam

The dam was originally constructed to provide power for an Excelsior manufacturing plant located just below the left abutment of the dam. This use has been abandoned for several years and the facility now serves only to provide a recreational pool on the Black River.

g. Design and Construction History

The Hawkinsville Dam was constructed in 1915. There are no plans available for this structure. No information is available regarding the design or construction history of the facility.

h. Normal Operational Procedures

The sluice gate to the penstock which serves the abandoned Excelsior plant is operated annually. Representatives of the Hudson River-Black River Regulating District also provide surveillance of the facility. During normal operations, the water level in the impoundment fluctuates with run-off conditions and provides a recreational pool in the Black River. This pool is approximately 1.2 miles long with numerous summer cottages developed along its banks.

1.3 PERTINENT DATA

a. Drainage area

The drainage area of the Hawkinsville Dam is 270 square miles.

b. Discharge at Dam Site

The maximum recorded discharge at USGS gage number 04252500 was 12,400 cfs on March 28, 1913. This gage is 3-3/4 miles downstream of the dam.

Computed discharges:

Ungated spillway, top of dam	14,990 cfs
Gated drawdown *	195 cfs

c. Elevation (feet above MSL)

Top of dam	1,056
Spillway crest	1,050
Stream bed at centerline of dam	1,038 ±

d. Reservoir

Length of normal pool	6,340 ft.

e. Storage

Top of dam	1,230 acre ft.
Normal pool	130 acre ft.

f. Reservoir Area

Top of dam	270 acres
Spillway pool	40 acres

g. Dam

Type - concrete gravity
Length of abutments - 60 ft.
Height - 18 ft.
Freeboard between normal reservoir and top of dam - 6 ft.
Side slopes - N/A
Zoning - none
Impervious core - concrete
Grout Curtain - None

* Flow through 3 foot x 4 foot gated outlet, with reservoir at top of dam elevation.

h. Spillway

Type - Uncontrolled, inclined crest with rounded downstream corner and inclined downstream face.
Length - 300 ft.
Crest elevation - 1050
Gates - None
U/S Channel - Reservoir
D/S Channel - Natural

i. Reservoir Drain

5-1/2 ft. diameter, sluice gated penstock.
3 ft. wide x 4 ft. high, gated.

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Hawkinsville Dam is located on the southwest margin of the Adirondack Province which is a part of the Appalachian Highlands, the major physiographic division. The area had been subjected to glacial activity, scouring and deposition.

Bedrock, in the immediate vicinity of the dam, is of Precambrian rock, mainly granitic and syenitic gneisses. Layers of amphibolite are present in places. The gneisses have considerable strength and bearing capacity and is generally considered to be relatively impervious. Amphibolite, on the other hand, is readily susceptible to weathering and may yield rotted zones which could permit seepage. Such weathered zones are present and visible near the right bank of the channel downstream of the dam.

Outcroppings of bedrock are present, immediately below the dam, in the downstream channel from approximately the middle of the dam to the right bank. No outcrops were observed from the center of the dam to the left bank. Further downstream, and upstream of the bridge, outcrops are present bank to bank.

b. Subsurface Investigations

The 1915 report indicates that both the spillway and the dam foundation were to be set on rock. There is no indication as to whether the rock was to be treated or if the foundation was to be keyed.

2.2 DESIGN RECORDS

No records were available from the original design of the dam.

2.3 CONSTRUCTION RECORDS

No information was available concerning the original construction.

2.4 OPERATIONAL RECORDS

There are no operational records available for this dam.

2.5 EVALUATION OF DATA

The data presented in this report was obtained from the New York State Department of Conservation, Dam Safety Section. The information available appears to be reliable and adequate for a Phase I inspection report.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The Hawkinsville Dam was inspected on May 22, 1981. The Dale Engineering Company inspection team was accompanied on the inspection by Kenneth H. Mayhew of the Hudson River-Black River Regulating District. The water level in the impoundment was approximately 1050.3 feet. Water was cresting the spillway to the depth of approximately 4 inches. The weather during the inspection was fair.

b. Dam

The concrete gravity section of the dam was found to be generally in good condition. The section maintains alignment with no evidence detected of structural instability or displacement of the concrete section. Some surface deterioration of the concrete on the face of the spillway was evident as viewed through the cascading water. However, this deterioration was not observed to be of a severe extent. The left abutment of the spillway section suffers from some degree of concrete deterioration, however, the deterioration does not presently affect the structural integrity of the facility.

c. Abutments

The right abutment of the dam consists of an earthfill section which is heavily overgrown with trees and brush. This earthfill portion of the facility is irregular with respect to its section and the elevation of the crest. These irregularities make it hardly discernible as a man-made portion of the facility. Seepage is occuring at the toe of this embankment near the center of the earthfill portion. This area was repaired in 1973. At that time, seepage was repaired by the excavation of a cut-off trench parallel to the dike at the point of seepage near the middle of the dike. After excavation, clay was compacted in layers in the excavation from a depth well below the leak to a point well above. It is evident that this repair has not been completely successful.

d. Appurtenant Structures

The gate controlling the reservoir drain and the gate controlling flow into the penstock are completely submerged and the operating mechanism has been removed. Manipulation of the gates can only be performed through the use of portable hoisting equipment. The penstock appears to be in satisfactory structural condition when viewed from the outside. No access to the interior of the penstock is provided.

3.2 EVALUATION

The visual inspection revealed several deficiencies on this structure. No evidence of misalignment or settlement were detected in the field. The following specific items were noted:

1. The earthfilled portion of the dam at the right abutment is heavily overgrown with trees and brush.

2. The crest elevation of the earthfilled portion of the dam is depressed below the elevation of the top of the concrete at the right abutment of the spillway.

3. Minor seepage occurs near the center of the earthfilled portion at the right abutment.

4. The concrete surfaces at the left abutment of the spillway section are deteriorated.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

Since its abandonment as a source of power for the Excelsior plant, this facility has served only to maintain a recreational pool in the Black River. Periodic visits are made to the facility to check on the conditions at the site. The gates serving the penstock are opened annually.

4.2 MAINTENANCE OF THE DAM

Maintenance and operation of the dam is controlled by the Hudson River-Black River Regulating District. The concrete portions of the facility have not deteriorated due to lack of maintenance. The earth embankment at the right abutment suffers from lack of maintenance. No formalized inspection system is in effect at the facility.

4.3 MAINTENANCE OF OPERATING FACILITIES

The gates serving the penstock are exercised annually. The sluice gate operating mechanism has been removed to avoid vandalism.

4.4 DESCRIPTION OF WARNING SYSTEM

No warning system is in effect at present.

4.5 EVALUATION

1. A flood warning and emergency evacuation system should be implemented to warn the public should conditions occur which could result in failure of the dam.

2. A formal inspection procedure should be implemented and records maintained so that changing conditions can be readily identified.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The Hawkinsville Dam is located in the northeast portion of Oneida County on the Black River in Hawkinsville, New York. Upstream of the dam site, the Black River has a drainage area of approximately 270 square miles which is characterized by mostly wooded areas. The surface area at the spillway elevation is approximately 39 acres.

5.2 ANALYSIS CRITERIA

The purpose of this investigation is to evaluate the dam and spillway with respect to their flood control potential and adequacy. This has been assessed through the evaluation of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the flood through the reservoir and the dam's spillway system. The PMF event is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration loss and concentration of run-off of a specific location that is considered reasonably possible for a particular drainage area.

The hydrologic analysis was performed using the unit hydrograph method to develop the flood hydrograph. Due to the limited scope of this Phase I investigation, certain assumptions based on experience and existing data, were used in this analysis and in the determination of the dam's spillway capacity to pass the PMF. In the event that the dam could not pass 1/2 the Probable Maximum Flood without overtopping, additional analyses are to be performed on potential dam failures if the dam is designated as a High Hazard Classification. This process was done with the concept that if the dam was unable to satisfy this criteria, further refined hydrologic investigations would be required.

The U.S. Army Corps of Engineers' Hydrologic Engineering Center's Computer Program HEC-1 DB using the Modified Puls Method of flood routing was used to evaluate the dam, spillway capacity and downstream hazard.

Unit hydrographs were defined by Snyder coefficients, C_t and C_p. Snyder's C_t was estimated to be 2.0 for the drainage area and C_p was estimated to be 0.625. The drainage area was divided into sub-areas to model the variability in hydrologic characteristics within the drainage basin. Run-off, routing and flood hydrograph combining was then performed to obtain the flow into the reservoir. In this analysis, the reservoir pool was assumed to be at the spillway crest elevation at the start of the storm and outflow through the low level outlet was assumed to be zero.

The Probable Maximum Precipitation (PMP) was 18.7 inches according to Hydrometeorological Report (HMR #33) for a 24-hour duration storm, 200 square mile basin, while loss rates were set at 1.0 inches initial abstraction and 0.1 inches/hour continuous loss rate. The loss rate function yielded 79 percent run-off from the PMF. The peak for the PMF inflow hydrograph was 141,429 cfs and the 1/2 PMF inflow peak was 70,484 cfs. The storage capacity of the reservoir reduced these peak flows to 137,430 cfs for the PMF and 69,174 cfs for the 1/2 PMF.

5.3 SPILLWAY CAPACITY

The spillway is an uncontrolled weir with an inclined crest and rounded downstream corner. The discharge capacity of the spillway at the top of dam elevation is 14,990 cfs.

SPILLWAY CAPACITY

FLOOD	PEAK DISCHARGE	CAPACITY AS % OF FLOOD DISCHARGE
PMF	137,430 cfs	11%
1/2 PMF	69,174 cfs	22%

5.4 RESERVOIR CAPACITY

The reservoir storage capacity was estimated from USGS mapping and available riverbed information at Hawkinsville Dam. The resulting estimates of the reservoir storage capacity are shown below:

Top of Dam	1,230 acre feet
Spillway Crest	130 acre feet

5.5 FLOODS OF RECORD

The nearest USGS gaging station (number 04252500) is located approximately 3-3/4 miles downstream of the dam. It is located on the Black River near Boonville, New York, and has a drainage area of 295 square miles as compared to the 270 square mile drainage area at the dam. The maximum discharge for this gage was 12,400 on March 28, 1913. The period of record is from 1911 through present.

5.6 OVERTOPPING POTENTIAL

The HEC-1 DB analysis indicates that the dam will be overtopped as follows:

FLOOD	MAXIMUM DEPTH OVER DAM
PMF	18.6 feet
1/2 PMF	9.8 feet

A dam break analysis was performed to determine the significance of various dam failures on the downstream hazard. This analysis was performed with the 1/2 PMF assuming the dam to fail at the maximum elevation resulting from the 1/2 PMF. The flood elevations, due to various dam failures and the flood elevations that would exist just before the corresponding dam break induced flood wave are shown on the following page. These flood elevations are compared approximately 1100 feet downstream of the dam, which is one of the downstream hazard areas.

	Flood Elevations 1100 Feet Downstream of Dam	
	Just Prior to Dam Break	Due to Dam Break
Failure Time = 0.1 hrs.	1130.3	1136.5
Failure Time = 0.3 hrs.	1130.3	1136.0
Failure Time = 0.5 hrs.	1130.3	1135.4

The above elevations were estimated from USGS quad sheets. These elevations are not exact and their significance is in the difference between the elevations for the flood levels with and without the dam failure. The worst of these three cases indicates that the flood depth would increase from 10 feet to 16.5 feet due to a dam failure. The structures in this area are located about 10 to 15 feet above the stream level. Therefore, this flood depth increase of 6.5 feet indicates that the downstream hazard would be significantly increased by a dam failure under this condition.

5.7 EVALUATION

The hydrologic/hydraulic analysis establishes the spillway capacity as 11% of the Probable Maximum Flood (PMF) and 22% of the 1/2 PMF. The dam will be overtopped by 19 feet by the PMF and 10 feet under the 1/2 PMF. The stability analysis indicates unsatisfactory stability for the dam under the 1/2 PMF loading condition and the dam break analysis indicates that failure of the dam under the 1/2 PMF will increase the downstream flood levels on the order of 6.5 feet. Therefore, the spillway is assessed as seriously inadequate according to the Corps of Engineers' screening criteria.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

This concrete dam functions as a spillway for virtually its entire length across the Black River. A penstock controlling intake to a steel pipe flume is incorporated into the left (west) abutment structure. The flume passes into a not-in-service mill/manufacturing building situated on the west shore of the river, a short distance downstream from the dam.

The dam appears to be founded on rock as evidenced by the rock outcroppings that rise to above the river level in various areas immediately downstream of the toe. Topographically, in the vicinity of the dam, the land surface comprising the westerly shore area rises steeply, while, in contrast, the land surface adjacent to the easterly river bank is flat with some areas slightly below the river surface. A county bridge is located a few hundred feet downstream of the dam.

The spillway was cresting at the time of the inspection. This spillway, as viewed from the abutments, appears to be in relatively good condition with no indication of structural movement or other distress evident. The exposed concrete surface appears to be in relatively good condition.

Various areas of the concrete surface zones in the left abutment-intake structure suffer from spalling and surface deterioration. Noticeable erosion of concrete has occurred at about the waterline.

Visually, the right abutment is in good structural condition with the concrete surface experiencing little deterioration.

Some areas of the land surface adjacent to the east river bank, slightly upstream from the dam, are below the level of the river and the constructed dike/bank which establishes the river boundary. The surface across parts of the low areas is damp and spongy, with isolated locations of ponded water. Slight flow was noted, indicating the probability that the noted surface water is seepage from the river.

b. Design and Construction Data

No design or "as-built" drawings relating to the construction of the dam have been found. Information about the dam cross section and the river bed foundation apparently are not on record. Dimensions used to develop a cross section necessary for the stability analysis which is part of the present study were compiled from field measurements obtained during the inspection visit, and from discussions and correspondence with Kenneth Mayhew, Chief Engineer, Board of Hudson River-Black River Regulating District (see Appendix F). This latter source could obtain only information to indicate that the dam is 300 feet long and 12 feet high.

c. Operating Records

No operating records are available.

d. Post Construction Changes

The correspondence included in Appendix F indicates that the original dam at this site was constructed in 1824, and rebuilt in 1915, but no records of these construction endeavors have been made available. Mr. Mayhew indicates that some reconstruction of the earthen embankment adjacent to the east abutment was undertaken in 1973 to help correct a seepage condition.

e. Seismic Stability

Rock foliation appears to generally trend N60°E and dip about 50°SE. Joint trends and their spacing are as follows:

Strike	Dip	Spacing
N45E	about 90°	2 feet
N40W	80°SW	6-8 inches

A branching fracture system, with a spacing of about 1-3 feet, has a general trend of about N65°W. One of two widened joint or foliation plane openings, about 6 inches, follows a less resistant amphibolite layer.

No known faults exist in the immediate vicinity of the dam. Several small lineaments, which may represent faults, are indicated on the Brittle Structures Map. These are located about one mile to the northeast of the dam and trend northeastward.

The area is located within Zone 2 of the Seismic Probability Map. Earthquakes recorded in the area are tabulated below:

Date	Intensity Modified Mercalli	Location Relative to Dam
1853	VI	18 miles NW
1963	V	1 mile E
1979	IV-V	8 miles WSW
1980	VI	4 miles ENE
1980	IV-V	12 miles NE
1980	V-VI	6 miles NE

6.2 STRUCTURAL STABILITY ANALYSIS

No reports or plans have been made available to provide information on the dam design, alignment, and cross section. As part of this study, stability evaluations have been performed for the dam's spillway section. The structural cross section utilized in the analysis has been developed from field measurements obtained by the inspection team (see Appendix G). Actual properties of the dam's construction materials and river bed foundation were not determined as part of this study; where information on properties were necessary for computations but lacking, assumptions felt to be practical were made.

The studied loading conditions for the stability analysis include: a normal summer pool elevation at the spillway, the 1/2 PMF, and the PMF level, the normal spillway pool with an ice loading, and a normal spillway pool with seismic effects.

The analysis indicates adequate stability for the normal summer operations condition and normal pool with seismic effects. Calculations indicate unsatisfactory stability against overturning for the dam when subjected to forces possible during normal winter operations which include ice loading, and for the 1/2 PMF and the PMF conditions, according to criteria established by the U.S. Army Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams (i.e., unsatisfactory stability is indicated where the resultant of forces acting on the dam is located outside the middle third of the dam base; tensile stresses would develop in the dam section, a condition which is structurally undesirable because of the low tensile strength of concrete). A summary of the stability analysis is presented in the table following this page. The stability computations are included in Appendix E.

Critical to the analysis and resulting indication of stability are the items of uplift water pressure acting on the base of the dam and the relative permeability of the site's foundation rock. For the "normal summer operating conditions" case, the analysis uplift force was based on a full headwater hydrostatic pressure acting on the dam's upstream corner and a zero tailwater hydrostatic pressure acting on the dam's downstream corner. Uplift pressures were assumed to vary linearly between the dam's upstream and downstream corners, and to act upon 100 percent of the dam base. Uplift as computed for the normal operating condition was also assigned to the flood conditions studied, assuming that uplift pressures would not increase significantly over a relatively short flood stage time period because of an expected low foundation rock permeability.

Because of the indications of structural instability indicated by the evaluations performed for the present study, further investigation is recommended to ascertain the as-built properties of the dam and the foundation, including determination of underdam uplift pressures. Final stability studies can be conducted on the basis of conditions revealed. The need to develop methods for improving the stability of this dam should be anticipated.

Measures to repair the zones of deteriorated concrete noted in the left abutment-intake structure should also be planned.

The suspected seepage condition existing over the land surface adjacent to the right abutment/east bank of the river does not appear to be having a significant effect on the dam structure. Planned periodic inspections of the general area should be undertaken, however, with observations documented to detect a worsening condition or other occurrence requiring corrective measures.

RESULTS OF STABILITY COMPUTATIONS

	Loading Condition	Factor of Safety* Overturning	Factor of Safety* Sliding**	Location of Resultant Passing through Base***
(1)	Water level at spillway elevation, uplift on base (no ice)	2.0	21.4	0.54b
(2)	Water level at spillway elevation, uplift on base plus 5 kips per lineal foot ice load	1.03	10.1	0.03b
(3)	Water levels against upstream face and downstream face based on 1/2 PMF elevations, uplift same as Case 1	0.99	5.8	Outside Base F.S. < 1.0
(4)	Water level against upstream face and downstream face based on PMF elevations, uplift same as Case 1	0.91	4.3	Outside Base F.S. < 1.0
(5)	Water level at spillway elevation, uplift on base, seismic effects applicable to Zone 2	1.79	17.5	0.49b

* These factors of safety indicate the ratio of moments resisting overturning to those moments causing overturning, and the ratio of forces resisting sliding to those causing sliding. Upstream and downstream water levels were obtained from hydrologic/hydraulic analysis.

** As determined applying the shear-friction method.

*** Indicated in terms of dam's base dimension, b, measured from the toe of the dam.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

The Phase I inspection of the Hawkinsville Dam did not indicate conditions which would constitute an immediate hazard to human life or property.

The stability analysis indicates unsatisfactory stability during loadings which would occur under ice loading conditions and during the Probable Maximum Flood (PMF) and 1/2 PMF events.

The hydrologic/hydraulic analysis indicates that the spillway will pass only 11% of the PMF and 22% of the 1/2 PMF. The dam will be overtopped by 19 feet and 10 feet by the PMF and 1/2 PMF, respectively. Failure of the dam under the 1/2 PMF will increase the downstream hazard from that which would exist just prior to failure of the dam. The spillway capacity, therefore, is assessed as seriously inadequate.

The following specific safety assessment is based on the Phase I visual examination, analysis of hydrology/hydraulics and structural stability analysis.

1. The earthfilled portion of the dam at the right abutment is heavily overgrown with trees and brush.

2. The crest elevation of the earthfilled portion of the dam is depressed below the elevation of the top of concrete at the right abutment of the spillway.

3. Minor seepage occurs near the center of the earthfilled portion at the right abutment.

4. The concrete surfaces at the left abutment of the spillway section are deteriorated.

5. No formal inspection procedure is now in effect at the structure.

6. No warning system is presently in effect to alert the public should conditions occur which could result in failure of the dam.

b. Adequacy of Information

The information available is adequate for this Phase I investigation.

c. Urgency

The Owner should immediately implement a program of surveillance during heavy run-off conditions. Within three months, a flood warning and emergency evacuation plan should be implemented.

The recommended investigations should begin within 3 months. The remaining items set forth in the safety assessement should be addressed by the Owner within one year. Appropriate repairs as determined by the investigations should be performed within 18 months of notification.

d. Need for Additional Investigations

Further investigations relative to the stability of the structure should be performed to determine appropriate measures necessary to provide stability under all conditions. A detailed hydrologic/hydraulic analysis to more accurately determine the site specific characteristics of the watershed should be undertaken to determine the necessary measures to provide adequate spillway capacity. The remedial work necessary to provide this capacity should be undertaken depending on the results of this investigation.

7.2 RECOMMENDED MEASURES

The following is a list of recommended measures to be undertaken to insure safety of the facility.

1. Trees and brush should be removed from the earthfilled portion of the right abutment of the dam.

2. The crest elevation of the earthfilled portion should be raised to meet the elevation of the top of the concrete at the right abutment of the spillway.

3. The area where seepage occurs near the center of the earthfilled portion should be cleared of brush and the surface graded so that observations can be made of the extent and quantity of the seepage which occurs.

4. The reservoir drain should be placed in an operating condition by the installation of a sluice gate operator.

5. Repairs should be made to the concrete surfaces at the left abutment to prevent further deterioration.

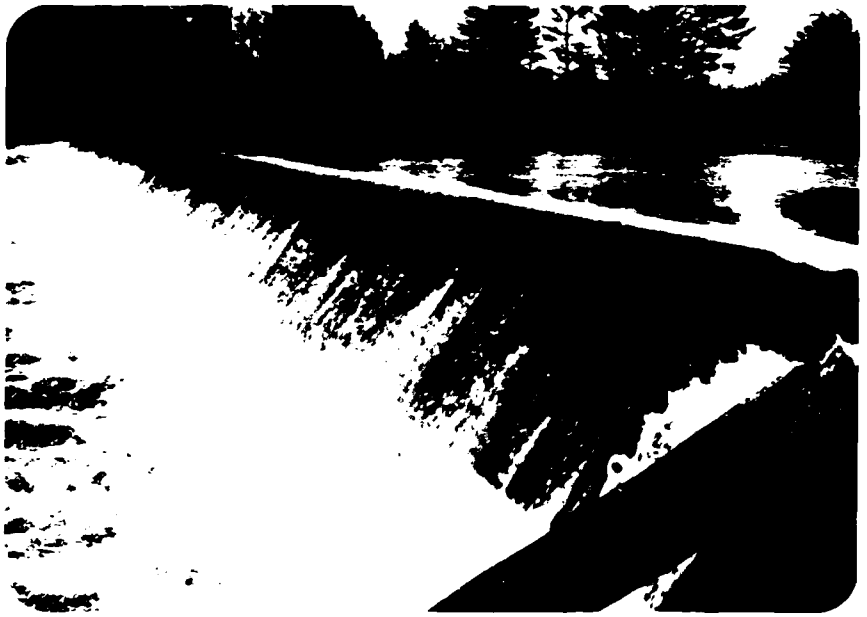
6. A formalized inspection system should be initiated to develop data on the conditions and maintenance operations at the facility.

7. A flood warning and emergency evacuation system should be implemented to aiert the public in the event conditions occur which could result in failure of the dam.

APPENDIX A

PHOTOGRAPHS

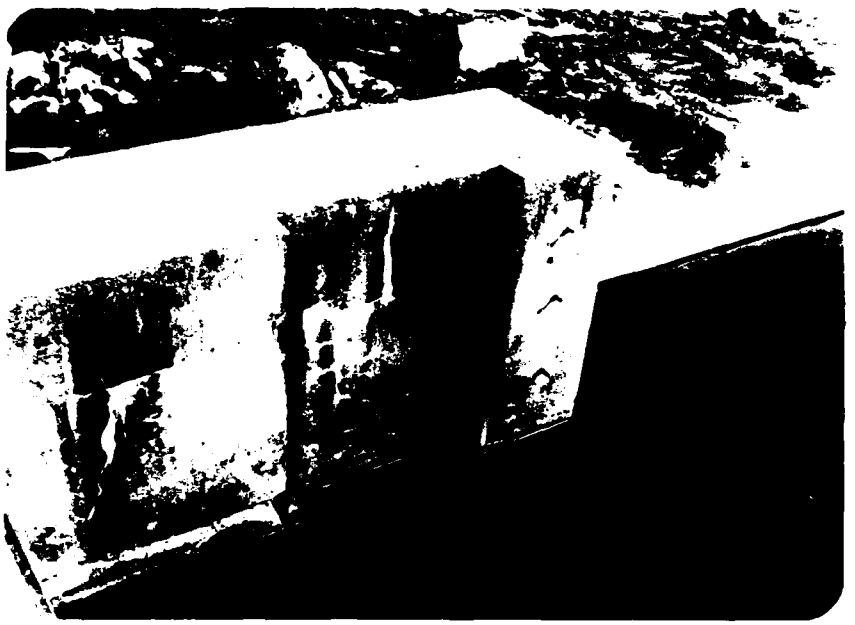
2. VIEW ALONG CREST OF DAM FROM RIGHT ABUTMENT.
NOTE: PENSTOCK IN BACKGROUND EXTENDS FROM THE DAM TO OLD MILL DOWNSTREAM.



3. DOWNSTREAM FACE OF DAM AS VIEWED FROM LEFT ABUTMENT.

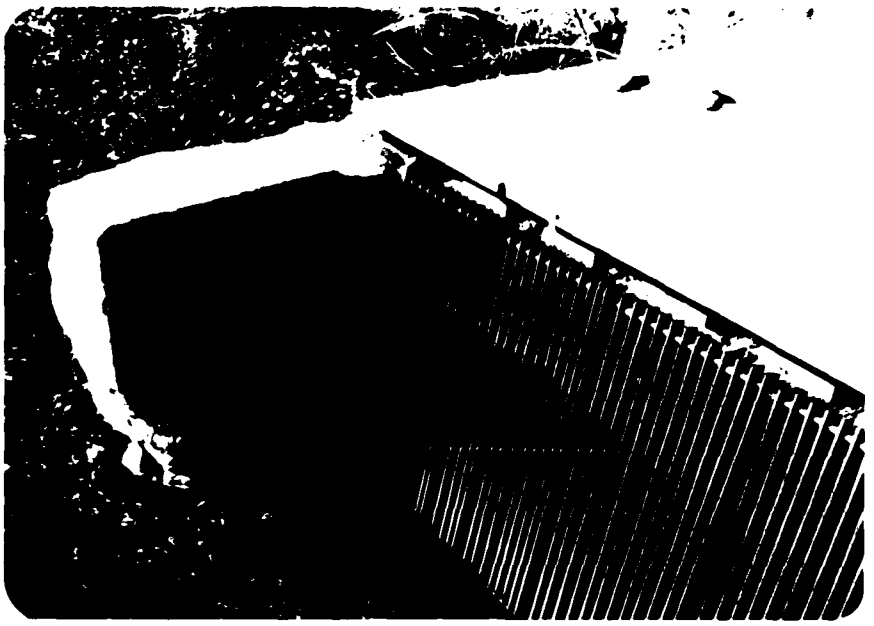
4. RIGHT ABUTMENT AS VIEWED FROM DOWNSTREAM
NOTE: EMBANKMENT ADJACENT TO ABUTMENT IS LOWER ELEVATION THAN ABUTMENT. DRAINAGE COURSE IN FOREGROUND DRAINS SEEPAGE AREA SHOWN IN PHOTO #9.

5. LEFT ABUTMENT AS VIEWED FROM DOWNSTREAM. LOW LEVEL OUTLET IN LOWER LEFT OF PHOTO.
NOTE: CONCRETE DETERIORATION OF ABUTMENT AT DOWNSTREAM WATER LEVEL AND AT CREST ELEVATION



6. GUIDE RAILS FOR LOW LEVEL OUTLET GATE.

7. DOWNSTREAM VIEW FROM LEFT ABUTMENT SHOWING PENSTOCK AND OLD MILL IN BACKGROUND AND STUB OF PENSTOCK GATE STEM IN FOREGROUND.



8. TRASHRACK AT INTAKE WATERBOX FOR PEN AT LEFT ABUTMENT.

9. AREA OF SEEPAGE IN EMBANKMENT EXTENDING FROM RIGHT ABUTMENT.

10. DOWNSTREAM HAZARD ON RIGHT BANK OF RIVER.

APPENDIX B

VISUAL INSPECTION CHECKLIST

93-15-3(9/80)

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam HAWKINSVILLE DAM

Fed. I.D. # N.Y. 895 DEC Dam No. _____

River Basin BLACK RIVER

Location: Town BOONVILLE County ONEIDA

Stream Name BLACK RIVER

Tributary of LAKE ONTARIO

Latitude (N) 43-29.6 Longitude (W) 75-16.5

Type of Dam GRAVITY

Hazard Category HIGH

Date(s) of Inspection MAY 27, 1981

Weather Conditions FAIR 60

Reservoir Level at Time of Inspection 1050.3±

b. Inspection Personnel F.W. BUSZEWSKI, J.A. GOMEZ, D.F. McCARTHY
H. MUSKATT - DALE ENGINEERING COMPANY K. MAYHEW H.B.R.C.

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

HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
471 EASTERN BLVD.
WATERTOWN N.Y. 13601 TELEPHONE 315-788-5540
ATTN: KENNETH H MAYHEW

d. History:

Date Constructed 1915 Date(s) Reconstructed —

Designer WG STONE & SON - UTICA N.Y.

Constructed By L.C. CLEVELAND - WATERTOWN N.Y.

Owner BRANT EXCELSIOR COMPANY.

2) Embankment

a. Characteristics

(1) Embankment Material EARTH FILL (NO SOIL CHARACTERISTICS RECORDED)

(2) Cutoff Type NONE

(3) Impervious Core UNKNOWN

(4) Internal Drainage System NONE

(5) Miscellaneous —

b. Crest

(1) Vertical Alignment POOR, LOCAL SUBSIDENCE/EROSION AT CREST ALONG RIGHT EMBANKMENT

(2) Horizontal Alignment POORLY DEFINED OVERGROWN W/ TREES & BRUSH.

(3) Surface Cracks NONE OBSERVED.

(4) Miscellaneous

c. Upstream Slope

(1) Slope (Estimate) (V:H) VARIES — IRREGULAR

(2) Undesirable Growth or Debris, Animal Burrows OVER GROWTH

(3) Sloughing, Subsidence or Depressions NO DEFINED SLOPE, LOCALIZED IRREGULARITIES. PREVAIL.

(4) Slope Protection NONE

(5) Surface Cracks or Movement at Toe NOT OBSERVED DUE TO WATER LEVEL IN IMPOUNDMENT.

d. Downstream Slope

(1) Slope (Estimate - V:H) POORLY DEFINED VARIES.

(2) Undesirable Growth or Debris, Animal Burrows NO BURROWS HEAVILY OVERGROWN.

(3) Sloughing, Subsidence or Depressions NO WELL DEFINED SLOPE TO USE AS A STANDARD.

(4) Surface Cracks or Movement at Toe NONE OBSERVED

(5) Seepage YES. NEAR CENTER OF EIGHT EMBANKEMENT. REPAIRS ATTEMPTED 1973

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

(7) Condition Around Outlet Structure N/A

(8) Seepage Beyond Toe SEE (5) above

e. Abutments - Embankment Contact

OK ALTHOUGH POORLY DEFINED

(1) Erosion at Contact NONE OBSERVED

(2) Seepage Along Contact NONE OBSERVED.

3) Drainage System

a. Description of System NONE

b. Condition of System ~

c. Discharge from Drainage System ~

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

NONE

5) Reservoir

a. Slopes MODERATE SLOPE - RIVER BANK

b. Sedimentation SUBSTANTIAL SEDIMENTATION AT UPSTREAM FACE OF STRUCTURE.

c. Unusual Conditions Which Affect Dam

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) RESIDENCES 5-6000 ft Downstream.

b. Seepage, Unusual Growth NONE OBSERVED - FLOW CREATING DAM.

c. Evidence of Movement Beyond Toe of Dam NONE OBSERVED

d. Condition of Downstream Channel NO RECENT EROSION.

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

OGEE SHAPED

a. General GOOD ALIGNMENT NO SERIOUS DETERIORATION AS VIEWED THROUGH FLOW CRESTING SPILLWAY

b. Condition of Service Spillway SOME DETERIORATED CONCRETE ON ABUTMENT WALLS

c. Condition of Auxiliary Spillway NO AUX SPILLWAY

d. Condition of Discharge Conveyance Channel N/A.

8) Reservoir Drain/Outlet

Type: Pipe ✓ Conduit _____ Other _____

Material: Concrete _____ Metal ✓ Other _____

Size: 5½ FT DIA Length 120± FT.

Invert Elevations: Entrance 1043I Exit UNKNOWN

Physical Condition (Describe): 4' high x 3' wide SLUICE 1041I Unobservable ✓

Material: STEEL

Joints: NO FLOW THROUGH PENSTOCK AT TIME OF INSPECTION Alignment GOOD

Structural Integrity: NO APPARENT STRUCTURAL PROBLEMS.

Hydraulic Capability: COMPUTED

Means of Control: Gate ✓ Valve _____ Uncontrolled _____

Operation: Operable ✓ Inoperable _____ Other _____

Present Condition (Describe): EXERCIZED ANNUALLY

9) Structural

a. Concrete Surfaces MINOR EROSION OF CONCRETE OBSERVED THROUGH FLOWING WATER

b. Structural Cracking NONE OBSERVED

c. Movement - Horizontal & Vertical Alignment (Settlement) NONE OBSERVED

d. Junctions with Abutments or Embankments Oh

e. Drains - Foundation, Joint, Face NONE

f. Water Passages, Conduits, Sluices NONE

g. Seepage or Leakage NONE OBSERVED.

55-19-5(9/80)

h. Joints - Construction, etc. NONE OBSERVED THROUGH FLOWING WATER.

i. Foundation NO PROBLEMS OBSERVED

j. Abutments SURFACE SPALLING OF CONCRETE.

k. Control Gates SEE 8

l. Approach & Outlet Channels RUN OF RIVER

m. Energy Dissipators (Plunge Pool, etc.) NONE

n. Intake Structures SEE 8

o. Stability NO SIGNS OF INSTABILITY OBSERVED.

p. Miscellaneous NONE

93-15-3(9/80)

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

a. Description and Condition

NONE.

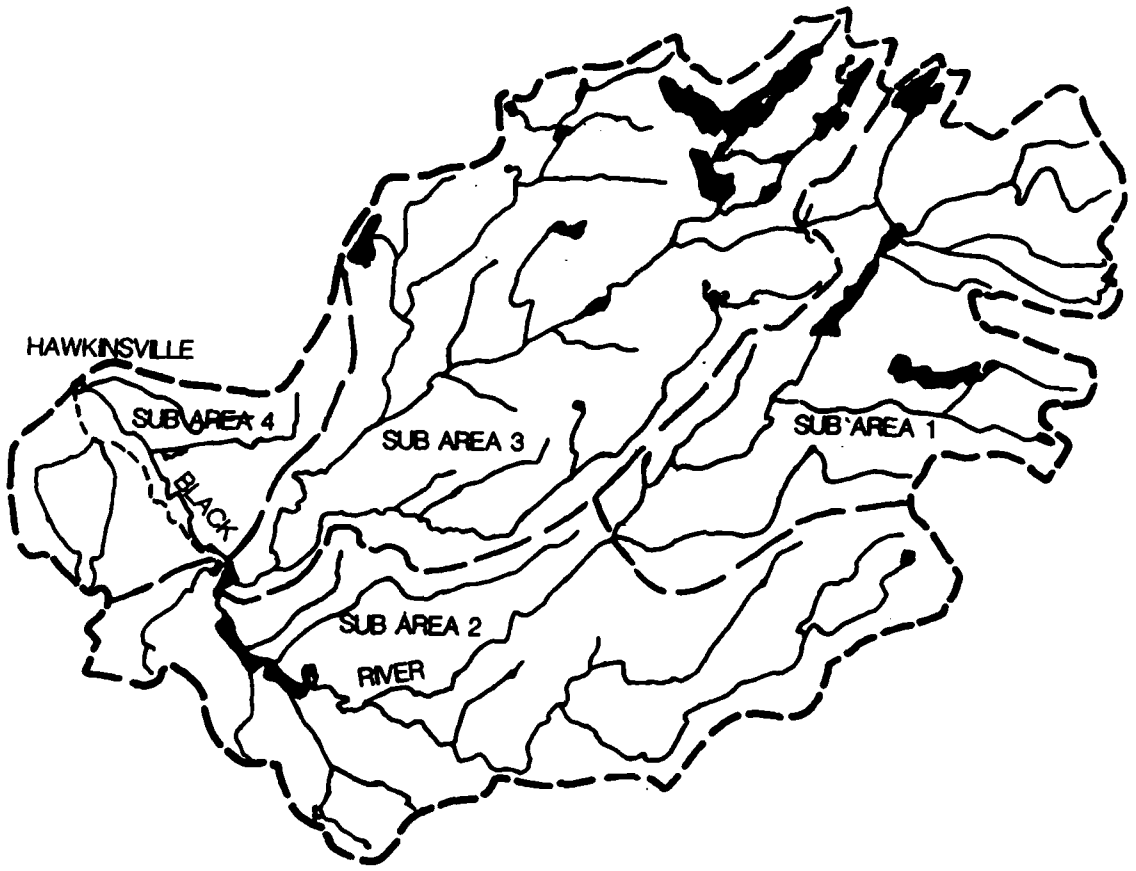
ABANDONED EXCELSIOR PLANT DOWNSTREAM AT

11) Operation Procedures (Lake Level Regulation):

GATE TO PENSTOCK OPERATED ANNUALLY

APPENDIX C

HYDROLOGIC/HYDRAULIC, ENGINEERING DATA AND COMPUTATIONS



SCALE 1 : 250,000

LEGEND

WATERSHED AREA

SUB AREA

DRAINAGE BASIN

STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501
TEL 315-797-5800

DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Hawkinsville Dam ID # 895 PROJECT NO. 2530

Subarea Hydrologic Parameters DRAWN BY FDM

Subarea	Area	C_T	L	LCA	$t_1 = C_T (L \times L_{CA})^{0.3}$
1	67.9 mi²	2.0	14.2 mi.	7.5 mi	8.11 + 0.31* = 8.33 HR
2	80.8	2.0	18.9	9.1	9.37 + 0.27* = 9.64
3	96.6	2.0	17.8	13.2	10.05 + 0.03* = 10.08
4	27.4	2.0	9.9	2.6	5.29

* Adjustment for travel time through reservoir.

$$t = \frac{\text{travel distance}}{V_w}$$

$V_w = \sqrt{g D_m}$

$g = 32.2$ FT/SEC²

D_m = avg. depth of reservoir

Subarea	D_m	distance	V_w	t
1	15 FT	16,667 FT	22.0	0.21 HR
2	20	35,000	25.4	0.37
3	20	2600	25.4	0.03

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DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Hawkinsville Dam PROJECT NO 2 30

Depth - Area - Duration DRAWN BY F.J.A.

PMP From HMR # 33
for Lat. ~ 43° 30' Long. ~ 75° 16'
Index Rainfall = 18.7 in. for 200 mi², 24 hr.
Zone 1

Duration	% Index*	Depth
6 HRS	72	13.5 IN
12 HRS	86	16.1
24 HRS	97	18.1
48 HRS	107	20.0

* Adjusted for site area, Drainage Area = 270 mi²

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PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Hawkinsville Dam PROJECT NO. 3[illegible]C

Spillway Rating DRAWN BY TDM

Length 300 FT. Assume constant "C" of 3.40 - from King & Brater, "Handbook of Hydraulics" based on spillway geometry.

Elevation	H	Q (cfs)
1050	0	0
1051	1	1020
1053	2	2855
1054	3	5300
1055	4	8160
1055	5	11,405
1056	6	14,990
1058	8	23,080
1060	10	32,355
1062	12	42,400
1064	14	53,430
1066	16	65,280
1068	18	77,895
1070	20	91,230
1073	22	105,255
1074	24	119,935
1076	26	135,225
1078	28	151,125
1080	30	167,605
1083	32	184,640

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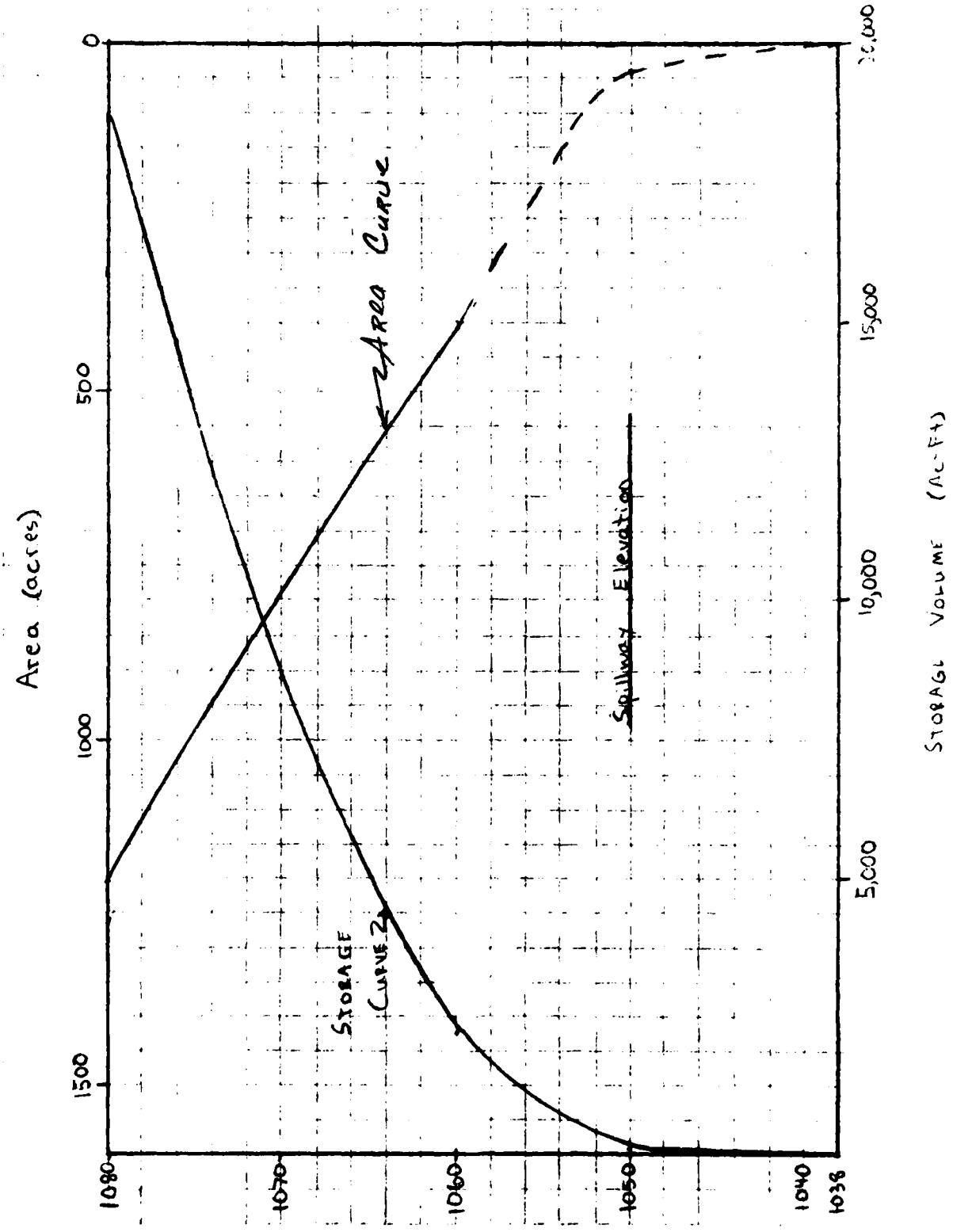
DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Hawkinsville Dam PROJECT NO. 3580

Area Capacity Curve DRAWN BY EDM



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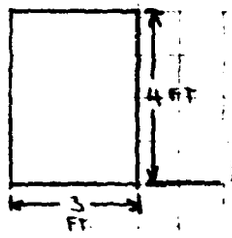
DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Holleyville Dam PROJECT NO. 2330

Reservoir Drain Discharge Rating DRAWN BY

Sluice gate entrance



Field measurements (approximate)

Elevation 1041

Flows from nomograph on p. 569 of "Design of Small Dams" by the U.S. Bureau of Reclamation. Scale 1

Spillway Elevation = 1050

Top of dam elevation = 1056

W = 3 FT D = 4 FT.

Elevation	H	H/D	Q/w	Q (cfs)
Spillway	7	1.75	42	126
Top of Dam	13	3.25	65	195

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	1056	270	1230
2) Design High Water (Max. Design Pool)	N/A	—	—
3) Auxiliary Spillway Crest	N/A	—	—
4) Pool Level with Flashboards			
5) Service Spillway Crest	1050	40	130

DISCHARGES

	Volume (cfs)
1) Average Daily	N/A
2) Spillway @ Maximum High Water (Top of Dam)	14,990
3) Spillway @ Design High Water	N/A
4) Spillway @ Auxiliary Spillway Crest Elevation	N/A
5) Low Level Outlet w/ water level at top of dam.	195
6) Total (of all facilities) @ Maximum High Water	15,185
7) Maximum Known Flood	unknown
8) At Time of Inspection	126 ±

CREST: ELEVATION: 1056

Type: concrete gravity

Width: _____ Length: 60 FT (abutments)

Spillover Uncontrolled weir

Location center of dam, comprises majority of dam length - spanning width of River

SPILLWAY:

PRINCIPAL		EMERGENCY
N/A	Elevation	1050
	Type	Inclined crest, rounded downstream corner,
	Width	300 FT.
	Type of Control	
	Uncontrolled	✓
	Controlled:	
	Type (Flashboards; gate)	
	Number	
	Size/Length	
	Invert Material	
	Anticipated Length of operating service	N/A
	Chute Length	N/A
	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	12'±

HYDROMETEROLOGICAL GAGES:

Type : None at present

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: None at present

_____

Method of Controlled Releases (mechanisms):

5½ FT. diameter, sluice-gated penstock. and
4'x3' gated low level outlet

DRAINAGE AREA: 270 sq. Mi.

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Predominantly forested

Terrain - Relief: Moderate to steeply sloped hills

Surface - Soil: Not known

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

No extensive alterations to drainage area known to be planned

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

Reservoir appears to be heavily silted on the upstream face of dam up to the crest.

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

None known

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

Location: Earthen embankment adjacent to Right abutment

Elevation: 1052 ±

Reservoir:

Length @ Maximum Pool (½ PMP) 5.7 ± (Miles)

Length of Shoreline (@ Spillway Crest) 2.42 ± (Miles)

```
(0001)  A1      HAWKINSVILLE DAM    FILE IS ACAN
(0002)  A2      HEC-1DB (SNYDER PARAMETERS)
(0003)  A3      PMF - DAM OVERTOPPING ANALYSIS
(0004)  B     90        1        0        0        0        0        0        0        4        0
(0005)  B1     5        0        0        0        0        0        0        0        0        0
(0006)  J      1        7        1        0        0        0        0        0        0        0
(0007)  J1   0.2      0.3      0.4      0.5      0.6      0.8      1.0        0        0        0
(0008)  K      0      100        0        0        0        0        1        0        0        0
(0009)  K1       RUNOFF SUBAREA 1
(0010)  M      1        1     67.9        0    272.7        0        0        0        1        0
(0011)  P      0     18.7       72       86       97      107        0        0        0        0
(0012)  T      0        0        0        0        0        0      1.0      0.1        0     0.02
(0013)  W   8.32    0.625        0        0        0        0        0        0        0        0
(0014)  X   -2.0    -0.10      1.6        0        0        0        0        0        0        0
(0015)  K      1      200        0        0        0        0        0        0        0        0
(0016)  K1       ROUTE TO SUBAREA 2
(0017)  Y      0        0        0        1        1        0        0        0        0        0
(0018)  Y1     1        0        0        0        0        0       -1        0        0        0
(0019)  Y6  0.07    0.035     0.07     1406     1440    47920    0.008        0        0        0
(0020)  Y7   100     1440      180     1420      280     1410      290     1406      320     1406
(0021)  Y7   330     1410      410     1420      470     1440        0        0        0        0
(0022)  K      0      200        0        0        0        0        1        0        0        0
(0023)  K1       RUNOFF SUBAREA 2
(0024)  M      1        1    80.08        0    272.7        0        0        0        1        0
(0025)  P      0     18.7       72       86       97      107        0        0        0        0
(0026)  T      0        0        0        0        0        0      1.0      0.1        0     0.01
(0027)  W   9.64    0.625        0        0        0        0        0        0        0        0
(0028)  X   -2.0    -0.10      1.6        0        0        0        0        0        0        0
(0029)  K      0      300        0        0        0        0        1        0        0        0
(0030)  K1       RUNOFF SUBAREA 3
(0031)  M      1        1     96.6        0    272.7        0        0        0        1        0
(0032)  P      0     18.7       72       86       97      107        0        0        0        0
(0033)  T      0        0        0        0        0        0      1.0      0.1        0     0.04
(0034)  W  10.08    0.625        0        0        0        0        0        0        0        0
(0035)  X   -2.0    -0.10      1.6        0        0        0        0        0        0        0
(0036)  K      3      300        0        0        0        0        1        0        0        0
(0037)  K1       COMBINE 3 HYDROGRAPHS 1+2+3=3
(0038)  K      1      302        0        0        0        0        1        0        0        0
```

```
(0039)  K1      ROUTE TO SUBAREA 4
(0040)  Y       0       0       0       1       1       0       0       0       0       0
(0041)  Y1      1       0       0       0       0       0      -1       0       0       0
(0042)  Y6    0.37   0.035    0.37     910     960   29170   0.002       0       0       0
(0043)  Y7     100     960     220     940     300     920   312.5     910   367.5     910
(0044)  Y7     380     920     500     940     640     960       0       0       0       0
(0045)  K        0     400       0       0       0       0       1       0       0       0
(0046)  K1      RUNOFF SUBAREA 4
(0047)  M        1       1    27.4       0   272.7       0       0       0       1       0
(0048)  P        0    16.7      72      86      97     107       0       0       0       0
(0049)  T        0       0       0       0       0       0     1.0     0.1       0       0
(0050)  W     5.29   0.625       0       0       0       0       0       0       0       0
(0051)  X     -2.0   -0.10     1.6       0       0       0       0       0       0       0
(0052)  K        2     400       0       0       0       0       1       0       0       0
(0053)  K1      COMBINE 2 HYDROGRAPHS 3+4=4  TOTAL INFLOW
(0054)  K        1     402       0       0       0       0       1       0       0       0
(0055)  K1      ROUTE OVER HAWKINSVILLE DAM
(0056)  Y        0       0       0       1       1       0       0       0       0       0
(0057)  Y1       1       0       0       0       0       0   -1050      -1       0       0
(0058)  Y4    1050    1051    1052    1053    1054    1055    1056    1058    1060    1062
(0059)  Y4    1064    1066    1068    1070    1072    1074    1076    1078    1080    1082
(0060)  Y5       0    1020    2890    5300    8160   11400   14990   23080   32260   42000
(0061)  Y5   53430   65280   77900   91230  105250  119930  135230  151130  167600  184640
(0062)  $S       0      65     130     430     830    1230    1730    2430    3280    4130
(0063)  $S    5430    6830    8230   10130   12130   14330   16380   18630
(0064)  $E    1038    1045    1050    1052    1054    1056    1058    1060    1062    1064
(0065)  $E    1066    1068    1070    1072    1074    1076    1078    1080
(0066)  $$    1050
(0067)  $D    1056    2.65     1.5      60       0       0       0       0       0       0
(0068)  K       99       0       0       0       0       0       0       0       0       0
(0069)  A
(0070)  A
(0071)  A
(0072)  A
(0073)  A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	100
ROUTE HYDROGRAPH TO	200
RUNOFF HYDROGRAPH AT	270
RUNOFF HYDROGRAPH AT	300
COMBINE 3 HYDROGRAPHS AT	300
ROUTE HYDROGRAPH TO	302
RUNOFF HYDROGRAPH AT	400
COMBINE 2 HYDROGRAPHS AT	400
ROUTE HYDROGRAPH TO	402
END OF NETWORK	

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************

RUN  DATE?NED, AUG 26 1981
     TIME?12:01:15

                         HAWKINSVILLE DAM    FILE IS ACAN
                         HEC-1DB (SNYDER PARAMETERS)
                         PMF - DAM OVERTOPPING ANALYSIS

                                    JOB SPECIFICATION
                  NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
                  90        1        0        0        0        0        0        0        4        0
                                    JOPER      NWT   LROPT   TRACE
                                        5        0        0        0

                                 MULTI-PLAN ANALYSES TO BE PERFORMED
                                      NPLAN= 1 NRTIO= 7 LRTIO= 1
                          RTIOS=   0.20    0.30    0.40    0.50    0.60    0.80    1.00


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

                                    SUB-AREA RUNOFF COMPUTATION

                      RUNOFF SUBAREA 1
                               ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                                 100       0       0       0       0       0       1       0       0

                                    HYDROGRAPH DATA
                        IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                            1       1   67.90    0.00  272.70    0.00   0.000       0       1       0

                                    PRECIP DATA
                               SPFE     PMS      R6     R12     R24     R48     R72     R96
                               0.00   18.70   72.00   86.00   97.00  107.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.869

                                    LOSS DATA
                     LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                               0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.02

                                    UNIT HYDROGRAPH DATA
                                TP=   1.42    CP=0.63    NTA=  7
```

RECESSION DATA
STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 45 END-OF-PERIOD ORDINATES, LAG= 8.25 HOURS, CP= 0.63 VOL= 1.00

133.	494.	993.	1560.	2160.	2708.	3108.	3338.	3387.	3189.
2827.	2475.	2167.	1898.	1662.	1455.	1274.	1116.	977.	855.
749.	656.	574.	503.	440.	385.	337.	295.	259.	227.
198.	174.	152.	133.	117.	102.	89.	78.	69.	60.
53.	46.	40.	35.	31.					

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	17.78	14.09	3.69	647087.
										(452.)	(358.)	(94.)	(18323.45)

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

HYDROGRAPH ROUTING

ROUTE TO SUBAREA 2

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
200	1	0	0	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0350	0.0700	1406.0	1440.0	47920.	0.00800

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1440.00 180.00 1420.00 260.00 1410.00 290.00 1406.00 320.00 1406.00
330.00 1410.00 410.00 1420.00 470.00 1440.00

STORAGE	0.00	67.86	153.32	269.78	448.37	690.35	995.73	1364.51	1796.09
	2759.53	3278.23	3821.58	4389.59	4982.26	5599.58	6241.55	6908.18	7599.46
OUTFLOW	0.0	315.42	1061.46	2371.05	4301.99	6917.26	10307.04	14559.75	19786.32
	33644.96	41935.66	51127.24	61225.27	72232.52	84158.08	97011.69	110804.33	125547.75

STAGE	1405.61	1407.79	1409.58	1411.37	1413.16	1414.95	1416.74	1418.53	1420.31
	1423.89	1425.68	1427.47	1429.26	1431.05	1432.84	1434.63	1436.42	1438.21
FLOW	0.00	315.42	1061.46	2371.05	4300.90	6917.26	10307.04	14550.75	19786.32
	33644.98	41935.66	51128.24	61225.27	72232.52	84158.08	97011.69	110804.33	125547.75

MAXIMUM STAGE IS 1415.4

MAXIMUM STAGE IS 1417.3

MAXIMUM STAGE IS 1416.9

MAXIMUM STAGE IS 1420.2

MAXIMUM STAGE IS 1421.4

MAXIMUM STAGE IS 1423.4

MAXIMUM STAGE IS 1425.2

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
200	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	80.08	0.00	272.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.70	72.00	86.00	97.00	107.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.889

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSPX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.01

UNIT HYDROGRAPH DATA

TP= 9.64 CP=0.63 NTA= 6

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 53 END-OF-PERIOD ORDINATES, LAG= 9.64 HOURS, CP= 0.63 VOL= 1.00

109.	406.	820.	1296.	1809.	2334.	2798.	3141.	3356.	3439.
3350.	3080.	2751.	2456.	2194.	1959.	1749.	1562.	1395.	1246.
1113.	994.	887.	792.	708.	632.	564.	504.	450.	402.
359.	321.	286.	256.	228.	204.	182.	163.	145.	130.
116.	103.	92.	82.	74.	66.	59.	52.	47.	42.
37.	33.	30.							

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
									SUM	17.78	14.05	3.73	745386.
										(452.)	(357.)	(95.)	(21106.96)

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
330	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	96.60	0.00	272.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.70	72.00	86.00	97.00	107.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.889

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.04

UNIT HYDROGRAPH DATA

TP= 10.08 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 56 END-OF-PERIOD ORDINATES, LAG= 10.10 HOURS, CP= 0.63 VOL= 1.00

120.	448.	908.	1438.	2012.	2606.	3147.	3560.	3836.	3970.
3939.	3687.	3319.	2981.	2678.	2406.	2161.	1941.	1744.	1567.
1407.	1264.	1136.	1020.	916.	823.	739.	664.	597.	536.
481.	433.	389.	349.	314.	282.	253.	227.	204.	183.
165.	148.	133.	119.	107.	96.	87.	78.	70.	63.
56.	51.	45.	41.	37.	33.				

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
									SUM	17.78	14.17	3.61	900633.
										(452.)	(360.)	(92.)	(25503.06)

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COMBINE HYDROGRAPHS

COMBINE 3 HYDROGRAPHS 1+2+3=3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
300	3	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
302	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0350	0.0700	910.0	960.0	29170.	0.00200

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

100.00 960.00 220.00 940.00 300.00 920.00 312.50 910.00 367.50 910.00
380.00 920.00 500.00 940.00 640.00 960.00

STORAGE	0.00	102.72	217.02	342.92	481.11	654.54	874.33	1140.50	1453.04
	2217.23	2668.68	3169.40	3729.09	4349.06	5329.31	5769.85	6570.66	7431.76
OUTFLOW	0.00	526.15	1684.41	3353.50	5570.30	8617.27	12347.90	16826.73	22118.20
	55538.89	43372.56	52302.77	62285.48	73472.95	85936.25	99737.34	114939.09	131602.97
STAGE	911.00	912.68	915.24	917.89	920.55	923.16	925.79	928.42	931.05

	936.31	936.95	941.58	944.21	946.84	949.47	952.10	956.73	957.37
FLOW	0.00	526.15	1684.41	3353.50	5570.30	8617.27	12347.90	16828.73	22118.20
	35336.89	43372.56	52302.77	62283.48	73472.95	85936.25	99737.34	114939.39	131602.97

MAXIMUM STAGE IS 932.5

MAXIMUM STAGE IS 937.3

MAXIMUM STAGE IS 941.3

MAXIMUM STAGE IS 944.6

MAXIMUM STAGE IS 947.6

MAXIMUM STAGE IS 952.6

MAXIMUM STAGE IS 956.9

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
400	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	27.40	0.00	272.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.70	72.00	86.00	97.00	107.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.889

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
2	0.00	0.00	1.00	0.00	0.00	1.00	1.20	0.10	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 5.29 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 29 END-OF-PERIOD ORDINATES, LAG= 5.32 HOURS, CP= 0.63 VOL= 1.00

150.	547.	1074.	1601.	1969.	2068.	1906.	1567.	1272.	1033.
839.	681.	553.	449.	365.	296.	241.	195	159.	129.

105.	85.	69.	56.	46.	37.	30.	24.	20.	

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	17.78	14.02	3.76	275463.
										(452.)	(356.)	(96.)	(7800.24)

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

COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 3+4=4 TOTAL INFLOW

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
400	2	0	0	0	0	1	0	0

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

HYDROGRAPH ROUTING

ROUTE OVER HAWKINSVILLE DAM

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
402	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	-0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1050.	-1

STAGE	1050.00	1051.00	1052.00	1053.00	1054.00	1055.00	1056.00	1058.00	1060.00
	1064.00	1066.00	1068.00	1070.00	1072.00	1074.00	1076.00	1078.00	1080.00
FLOW	0.00	1020.00	2890.00	5300.00	8160.00	11400.00	14990.00	23080.00	32260.00
	53430.00	65280.00	77900.00	91230.00	105250.00	119930.00	135230.00	151130.00	167600.00
CAPACITY=	0.	65.	130.	430.	830.	1230.	1730.	2430.	3280.	4130.
	5430.	6830.	8230.	10130.	12130.	14330.	16380.	18630.		
ELEVATION=	1038.	1045.	1050.	1052.	1054.	1056.	1058.	1060.	1062.	1064.
	1066.	1068.	1070.	1072.	1074.	1076.	1078.	1080.		

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1050.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID

1056.0 2.6 1.5 60.

PEAK OUTFLOW IS 27790. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 41657. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 55675. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 69174. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 83024. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 110266. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 137430. AT TIME 50.00 HOURS

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE 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 0.20	RATIO 2 0.30	RATIO 3 0.40	RATIO 4 0.50	RATIO 5 0.60	RATIO 6 0.80	RATIO 7 1.00
HYDROGRAPH AT	100	67.90	1	7996.	11993.	15991.	19989.	23987.	31982.	39978.
		(175.86)		(226.41)(	339.61)(	452.82)(	566.02)(	679.23)(	905.64)(	1132.04)(
ROUTED TO	200	67.90	1	7781.	11697.	15631.	19561.	23600.	31573.	39550.
		(175.86)		(220.35)(	331.23)(	442.63)(	553.91)(	668.26)(	894.85)(	1119.93)(
HYDROGRAPH AT	200	80.08	1	8303.	12454.	16605.	20756.	24908.	33210.	41513.
		(207.40)		(235.10)(	352.65)(	470.21)(	587.76)(	705.31)(	940.41)(	1175.51)(
HYDROGRAPH AT	300	96.60	1	9733.	14600.	19466.	24333.	29200.	38933.	48666.
		(250.19)		(275.61)(	413.42)(	551.23)(	689.03)(	826.84)(	1102.45)(	1378.06)(
3 COMBINED	300	244.56	1	25782.	38680.	51561.	64464.	77398.	103263.	129162.
		(633.45)		(730.05)(	1095.29)(	1460.62)(	1825.98)(	2191.67)(	2924.07)(	3657.45)(
ROUTED TO	302	244.58	1	25589.	38436.	51278.	64129.	77064.	102893.	128719.
		(633.45)		(724.61)(	1088.38)(	1452.03)(	1815.94)(	2182.22)(	2913.61)(	3644.91)(
HYDROGRAPH AT	400	27.40	1	4472.	6708.	8944.	11179.	13415.	17887.	22359.
		(70.97)		(126.63)(	189.94)(	253.25)(	316.57)(	379.88)(	506.50)(	633.13)(
2 COMBINED	400	271.98	1	28131.	42249.	56362.	70484.	84691.	113062.	141429.
		(704.42)		(796.59)(	1196.35)(	1596.00)(	1995.90)(	2398.17)(	3201.55)(	4004.82)(
ROUTED TO	402	271.98	1	27790.	41657.	55675.	69174.	83024.	110266.	137430.
		(704.42)		(786.91)(	1179.59)(	1576.53)(	1958.78)(	2350.98)(	3122.39)(	3891.58)(

PLAN 1 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	7781.	1415.4	48.00
0.30	11697.	1417.3	48.00
0.40	15631.	1418.9	48.00
0.50	19561.	1420.2	48.00
0.60	23600.	1421.4	48.00

0.80	31573.	1423.4	48.00
1.00	39550.	1425.2	48.00

PLAN 1 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	25589.	932.5	49.00
0.30	38436.	937.3	49.00
0.40	51278.	941.3	49.00
0.50	64129.	944.6	49.00
0.60	77064.	947.6	49.00
0.80	102893.	952.6	49.00
1.00	128719.	956.9	49.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1050.00	1050.00	1056.00
STORAGE	130.	130.	1230.
OUTFLOW	0.	0.	14990.

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
0.20	1058.86	2.86	2031.	27790.	14.00	50.00	0.00
0.30	1061.51	5.51	3071.	41657.	18.00	50.00	0.00
0.40	1063.79	7.79	4040.	55675.	22.00	50.00	0.00
0.50	1065.83	9.83	5320.	69174.	25.00	50.00	0.00
0.60	1067.79	11.79	6684.	83024.	26.00	50.00	0.00
0.80	1071.35	15.35	9514.	110266.	30.00	50.00	0.00
1.00	1074.62	18.62	12810.	137430.	34.00	50.00	0.00

```
(0001)  A1      HAWKINSVILLE DAM    FILE IS ACAN-1
(0002)  A2      HEC-1DB (SNYDER PARAMETERS)
(0003)  A3      1/2 PMF - DAM BREAK ANALYSIS
(0004)  B    300        0       12        0        0        0        0        4        0
(0005)  B1     5        0        0        0        0        0        0        0        0
(0006)  J      3        1        1        0        0        0        0        0        0
(0007)  J1   0.5
(0008)  K      0      100        0        0        0        0        1        0        0        0
(0009)  K1      RUNOFF SUBAREA 1
(0010)  M      1        1     67.9        0    272.7        0        0        0        1        0
(0011)  P      0     18.7       72       86       97      107        0        0        0        0
(0012)  T      0        0        0        0        0        0      1.0      0.1        0     0.02
(0013)  W   8.32    0.625        0        0        0        0        0        0        0        0
(0014)  X   -2.0    -0.10      1.6        0        0        0        0        0        0        0
(0015)  K      1      200        0        0        0        0        0        0        0        0
(0016)  K1      ROUTE TO SUBAREA 2
(0017)  Y      0        0        0        1        1        0        0        0        0        0
(0018)  Y1     1        0        0        0        0        0       -1        0        0        0
(0019)  Y6  0.07    0.035     0.07     1406     1440    47920    0.008        0        0        0
(0020)  Y7   100     1440      180     1420      280     1410      290     1406      320     1406
(0021)  Y7   330     1410      410     1420      470     1440        0        0        0        0
(0022)  K      0      200        0        0        0        0        1        0        0        0
(0023)  K1      RUNOFF SUBAREA 2
(0024)  M      1        1    80.08        0    272.7        0        0        0        1        0
(0025)  P      0     18.7       72       86       97      107        0        0        0        0
(0026)  T      0        0        0        0        0        0      1.0      0.1        0     0.01
(0027)  W   9.64    0.625        0        0        0        0        0        0        0        0
(0028)  X   -2.0    -0.10      1.6        0        0        0        0        0        0        0
(0029)  K      0      300        0        0        0        0        1        0        0        0
(0030)  K1      RUNOFF SUBAREA 3
(0031)  M      1        1     96.6        0    272.7        0        0        0        1        0
(0032)  P      0     18.7       72       86       97      107        0        0        0        0
(0033)  T      0        0        0        0        0        0      1.0      0.1        0     0.04
(0034)  W  10.08    0.625        0        0        0        0        0        0        0        0
(0035)  X   -2.0    -0.10      1.6        0        0        0        0        0        0        0
(0036)  K      3      300        0        0        0        0        1        0        0        0
(0037)  K1      COMBINE 3 HYDROGRAPHS 1+2+3=3
(0038)  K      1      302        0        0        0        0        1        0        0        0
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(0039)  K1      ROUTE TO SUBAREA 4
(0040)  Y       0       0       0       1       1       0       0       0       0       0
(0041)  Y1      1       0       0       0       0       0      -1       0       0       0
(0042)  Y6   0.07   0.035    0.07     910     960   29170   0.002       0       0       0
(0043)  Y7    180     960     220     940     300     920   312.5     910   367.5     910
(0044)  Y7    380     920     500     940     640     960       0       0       0       0
(0045)  K       0     400       0       0       0       0       1       0       0       0
(0046)  K1      RUNOFF SUBAREA 4
(0047)  M       1       1    27.4       0   272.7       0       0       0       1       0
(0048)  P       0    18.7      72      86      97     107       0       0       0       0
(0049)  T       0       0       0       0       0       0     1.0     0.1       0       0
(0050)  W    5.29   0.625       0       0       0       0       0       0       0       0
(0051)  X    -2.0   -0.10     1.6       0       0       0       0       0       0       0
(0052)  K       2     400       0       0       0       0       1       0       0       0
(0053)  K1      COMBINE 2 HYDROGRAPHS 3+4=4  TOTAL INFLOW
(0054)  K       1     402       0       0       0       0      -1       0       0       0
(0055)  K1      ROUTE OVER HAWKINSVILLE DAM
(0056)  Y       0       0       0       1       1       0       0       0       0       0
(0057)  Y1      1       0       0       0       0       0   -1050      -1       0       0
(0058)  Y4   1050    1051    1052    1053    1054    1055    1056    1058    1060    1062
(0059)  Y4   1064    1066    1068    1070    1072    1074    1076    1078    1080    1082
(0060)  Y5      0    1020    2890    5300    8160   11400   14990   23080   32260   42000
(0061)  Y5  53430   65280   77900   91230  105250  119930  135230  151130  167600  184640
(0062)  $S      0      65     130     430     830    1230    1730    2430    3280    4130
(0063)  $S   5430    6830    8230   10130   12130   14330   16380   18630
(0064)  $E   1038    1045    1050    1052    1054    1056    1058    1060    1062    1064
(0065)  $E   1066    1068    1070    1072    1074    1076    1078    1080
(0066)  $$   1050
(0067)  $D   1056    2.65     1.5      60       0       0       0       0       0       0
(0068)  $B    300       0    1038     0.1    1050 1065.82
(0069)  $B    300       0    1038     0.3    1050 1065.82
(0070)  $B    300       0    1038     0.5    1050 1065.82
(0071)  K       1    1500                       2       1
(0072)  K1      CHANNEL ROUTE TO FIRST DOWNSTREAM HAZARD
(0073)  Y                               1       1
(0074)  Y1      1                                      -1
(0075)  Y6   0.07   0.035    0.07    1120    1160    1100   0.015
(0076)  Y7    111     116     230    1140     360    1123     366    1120     614    1120
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(0077)  Y7   620    1123     820    1140    1020    1160
(0078)  K      1    5100
(0079)  K1       CHANNEL ROUTE TO SECOND DOWNSTREAM HAZARD
(0080)  Y                                1       1
(0081)  Y1     1                                        -1
(0082)  Y6  0.07   0.035    0.07    1012    1050    3600  0.0013
(0083)  Y7   100    1050     101    1030    1100    1015    1106    1012    1254    1012
(0084)  Y7  1260    1015    1300    1030    1340    1050
(0085)  K      1    9900                            0       1
(0086)  K1       CHANNEL ROUTE TO THIRD DOWNSTREAM HAZARD
(0087)  Y                                1       1
(0088)  Y1     1                                        -1
(0089)  Y6  0.07   0.035    0.07    1007    1050    8800  0.0013
(0090)  Y7   100    1050     660    1030    1500    1010    1506    1007    1654    1007
(0091)  Y7  1660    1010    1760    1030    1820    1050
(0092)  K      1   12500                            0       1
(0093)  K1       CHANNEL ROUTE TO FOURTH DOWNSTREAM HAZARD
(0094)  Y                                1       1
(0095)  Y1     1                                        -1
(0096)  Y6  0.07   0.035    0.07     992    1030    2600  0.005
(0097)  Y7   100    1030     160    1010     240     995     246     992     414     992
(0098)  Y7   420     995     570    1010     810    1030
(0099)  K     99       0       0       0       0       0       0       0       0       0
(0100)  A
(0101)  A
(0102)  A
(0103)  A
(0104)  A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	100
ROUTE HYDROGRAPH TO	200
RUNOFF HYDROGRAPH AT	200
RUNOFF HYDROGRAPH AT	300
COMBINE 3 HYDROGRAPHS AT	300
ROUTE HYDROGRAPH TO	302
RUNOFF HYDROGRAPH AT	400
COMBINE 2 HYDROGRAPHS AT	400
ROUTE HYDROGRAPH TO	402
ROUTE HYDROGRAPH TO	1500
ROUTE HYDROGRAPH TO	5100
ROUTE HYDROGRAPH TO	9900
ROUTE HYDROGRAPH TO	12500
END OF NETWORK	

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE?FRI, AUG 28 1981
     TIME?14:17:59

                    HAWKINSVILLE DAM     FILE IS ACAN-1
                    HEC-1DB (SNYDER PARAMETERS)
                    1/2 PMF - DAM BREAK ANALYSIS

                                JOB SPECIFICATION
          NW      NWR     NMIN     IDAY     IHR     IMIN    METRC     IPLT     IPRT    NSTAN
         300       0       12        0       0        0        0        3        4        0
                                   JOPER      NWT   LROPT   TRACE
                                       5        0       0       0

                            MULTI-PLAN ANALYSES TO BE PERFORMED
                                NPLAN= 3 NRTIO= 1 LRTIO= 1
               RTIOS=    0.50

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

                            SUB-AREA RUNOFF COMPUTATION

              RUNOFF SUBAREA 1
                       ISTAQ   ICOMP   IECON   ITAPE   JPLT    JPRT   INAME  ISTAGE  IAUTO
                         100       0       0       0      0       0       1       0      0

                                HYDROGRAPH DATA
          IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
              1       1   67.90    0.00  272.70    0.00   0.000       0       1       0

                                PRECIP DATA
                      SPFE     PMS      R6     R12     R24     R48     R72     R96
                      0.00   18.70   72.00   86.00   97.00  107.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 3.889

                                LOSS DATA
          LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
              0    0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.02

                                UNIT HYDROGRAPH DATA
```

TP= 8.32 CP=0.65 NTA= 0

RECESSION DATA
STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 8.31 HOURS, CP= 0.65 VOL= 0.86

13.	50.	105.	171.	246.	328.	417.	511.	611.	714.
822.	932.	1046.	1163.	1281.	1403.	1526.	1650.	1777.	1904.
2133.	2163.	2293.	2420.	2539.	2651.	2756.	2853.	2943.	3025.
3100.	3169.	3230.	3283.	3330.	3369.	3401.	3424.	3440.	3448.
3446.	3435.	3414.	3379.	3325.	3250.	3166.	3085.	3005.	2926.
2853.	2780.	2708.	2639.	2571.	2505.	2440.	2378.	2316.	2257.
2199.	2142.	2087.	2034.	1981.	1931.	1881.	1833.	1785.	1740.
1695.	1651.	1609.	1568.	1527.	1488.	1450.	1412.	1376.	1341.
1306.	1273.	1240.	1206.	1177.	1147.	1117.	1089.	1061.	1033.
1007.	981.	956.	931.	907.	884.	861.	839.	818.	797.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	17.88	14.19	3.69	2658278.
										(454.)	(360.)	(94.)	(75273.98)

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

HYDROGRAPH ROUTING

ROUTE TO SUBAREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
200	1	0	0	0	0	0	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

LN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.073)	0.035	0.070[illegible]	1406.)	1449.[illegible]	47920.	0.00801

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

	330.00 1413.00	410.00 1420.00	470.00 1440.00						
STORAGE	0.00	67.86	153.32	269.78	448.37	690.35	995.73	1364.51	1796.09
	2759.53	3278.23	3821.56	4389.59	4982.26	5599.56	6241.55	6908.18	7599.46
OUTFLOW	0.00	315.42	1061.46	2371.05	4300.90	6917.26	10307.04	14550.75	19786.32
	33644.98	41935.66	51128.24	61225.27	72232.52	84158.08	97011.69	110804.33	125547.75
STAGE	1406.00	1407.79	1409.58	1411.37	1413.16	1414.95	1416.74	1418.53	1420.31
	1423.89	1425.68	1427.47	1429.26	1431.05	1432.84	1434.63	1436.42	1438.21
FLOW	0.00	315.42	1061.46	2371.05	4300.90	6917.26	10307.04	14550.75	19786.32
	33644.98	41935.66	51128.24	61225.27	72232.52	84158.08	97011.69	110804.33	125547.75

MAXIMUM STAGE IS 1420.3

MAXIMUM STAGE IS 1420.3

MAXIMUM STAGE IS 1420.3

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

SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
200	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	80.00	0.00	272.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.70	72.00	86.00	97.00	107.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.889

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.01

UNIT HYDROGRAPH DATA

TP= 9.64 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.63

UNIT HYDROGRAPH END-OF-PERIOD ORDINATES, LAG= 9.64 HOURS, CP= 0.63 VOL= 1.00

11.	41.	88.	149.	226.	270.	344.	463.	263.	342.
662.	775.	870.	969.	1069.	1171.	1276.	1382.	1489.	1598.
1709.	1825.	1932.	2046.	2160.	2275.	2389.	2498.	2602.	2700.
2792.	2879.	2960.	3036.	3106.	3171.	3230.	3284.	3332.	3375.
3412.	3444.	3469.	3489.	3503.	3510.	3511.	3504.	3490.	3467.
3434.	3385.	3318.	3244.	3172.	3102.	3033.	2966.	2900.	2835.
2773.	2711.	2651.	2592.	2534.	2478.	2423.	2369.	2317.	2265.
2215.	2166.	2118.	2071.	2025.	1980.	1936.	1893.	1851.	1810.
1770.	1730.	1692.	1654.	1618.	1582.	1546.	1512.	1479.	1446.
1414.	1382.	1352.	1322.	1292.	1264.	1235.	1208.	1181.	1155.

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
		SUM	17.88	14.15	3.73	2904798.
			(454.)	(360.)	(95.)	(82254.64)

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
300	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	96.00	0.00	272.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.70	72.00	86.00	97.00	107.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.889

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.04

UNIT HYDROGRAPH DATA

TP= 10.08 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 136 END-OF-PERIOD ORDINATES, LAG= 10.03 HOURS, CP= 0.63 VOL= 0.78

12.	45.	93.	152.	219.	293.	373.	458.	548.	642.
739.	840.	945.	1052.	1161.	1273.	1387.	1502.	1620.	1739.
1860.	1981.	2105.	2229.	2354.	2480.	2607.	2733.	2855.	2971.
3081.	3185.	3283.	3375.	3462.	3542.	3617.	3686.	3749.	3806.

3838.	3784.	3943.	3977.	4003.	4020.	4041.	4049.	4030.	4044.
4030.	4106.	3972.	3923.	3854.	3773.	3693.	3615.	3538.	3463.
3389.	3317.	3247.	3178.	3111.	3045.	2980.	2917.	2855.	2794.
2735.	2677.	2620.	2565.	2510.	2457.	2405.	2354.	2304.	2255.
2207.	2160.	2114.	2069.	2026.	1983.	1940.	1899.	1859.	1820.
1781.	1743.	1706.	1670.	1635.	1600.	1566.	1533.	1500.	1468.

C MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	17.68	14.27	3.61	3438824.
										(454.)	(362.)	(92.)	(97376.56)

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COMBINE HYDROGRAPHS

COMBINE 3 HYDROGRAPHS 1+2+3=3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
300	3	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 4

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
302	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	C

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0350	0.0700	910.0	960.0	29170.	0.00200

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

	360.00	920.00	500.00	940.00	640.00	960.00			
STORAGE	0.00	102.72	217.02	342.92	481.11	654.56	874.33	1140.50	1453.04
	2217.23	2668.88	3169.40	3729.09	4349.06	5029.31	5769.85	6570.66	7431.76
OUTFLOW	0.00	526.15	1684.41	3353.50	5570.30	8617.27	12347.90	16828.73	22118.20
	35338.89	43372.56	52302.77	62283.48	73472.95	85936.25	99737.34	114939.09	131602.97
STAGE	910.00	912.63	915.26	917.89	920.53	923.16	925.79	928.42	931.05
	936.31	938.95	941.58	944.21	946.84	949.47	952.10	954.73	957.37
FLOW	0.00	526.15	1684.41	3353.50	5570.30	8617.27	12347.90	16828.73	22118.20
	35338.89	43372.56	52302.77	62283.48	73472.95	85936.25	99737.34	114939.09	131602.97

MAXIMUM STAGE IS 944.8

MAXIMUM STAGE IS 944.8

MAXIMUM STAGE IS 944.8

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 4

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
400	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	27.40	0.00	272.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.70	72.00	86.00	97.00	107.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.889

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
2	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 5.29 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 5.27 HOURS, CP= 0.62 VOL= 1.00

15.	81.	127.	208.	293.	392.	493.	604.	717.	835.
955.	1079.	1204.	1332.	1459.	1581.	1691.	1789.	1877.	1953.
2018.	2072.	2115.	2146.	2165.	2172.	2164.	2139.	2088.	2013.
1933.	1856.	1782.	1711.	1643.	1578.	1515.	1455.	1397.	1341.
1286.	1237.	1188.	1140.	1095.	1052.	1010.	970.	931.	894.
858.	824.	792.	760.	730.	701.	673.	646.	621.	596.
572.	549.	528.	507.	486.	467.	449.	431.	414.	397.
381.	366.	352.	338.	324.	311.	299.	287.	276.	265.
254.	244.	234.	225.	216.	207.	199.	191.	184.	176.
169.	163.	156.	150.	144.	138.	133.	128.	122.	118.

G — END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	17.88	14.12	3.76	1207460.
										(454.)	(359.)	(96.)	(34191.43)

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

COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 3+4=4 TOTAL INFLOW

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
400	2	0	0	0	0	1	0	0

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

HYDROGRAPH ROUTING

ROUTE OVER HAWKINSVILLE DAM

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
402	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1050.	-1

STAGE	1050.00	1051.00	1052.00	1053.00	1054.00	1055.00	1056.00	1058.00	1060.00
	1064.00	1066.00	1068.00	1070.00	1072.00	1074.00	1076.00	1078.00	1080.00
FLOW	0.00	1020.0	2890.00	5300.00	8160.00	11480.00	14990.00	23080.00	32260.00
	43450.0	65280.0	77900.00	91230.00	105250.00	119930.00	135230.00	151130.00	167600.00

CAPACITY=	0. 5430.	63. 6830.	130. 8230.	430. 10130.	630. 12130.	1630. 14330.	1730. 16380.	2430. 18630.	3280.	4130.
ELEVATION=	1038. 1066.	1045. 1068.	1050. 1070.	1052. 1072.	1054. 1074.	1056. 1076.	1058. 1078.	1060. 1080.	1062.	1064.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1053.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1056.0	2.6	1.5	60.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
300.	0.00	1038.00	0.10	1050.00	1065.82

BEGIN DAM FAILURE AT 48.8[illegible] HOURS

PEAK OUTFLOW IS 192508. AT TIME 48.90 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
300.	0.00	1038.00	0.30	1050.00	1065.82

BEGIN DAM FAILURE AT 48.8[illegible] HOURS

PEAK OUTFLOW IS 167783. AT TIME 49.10 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
300.	0.00	1038.00	0.50	1050.00	1065.82

BEGIN DAM FAILURE AT 48.8[illegible] HOURS

PEAK OUTFLOW IS 146754. AT TIME 49.30 HOURS

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HYDROGRAPH ROUTING

CHANNEL ROUTE TO FIRST DOWNSTREAM HAZARD

ISTAW	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1500	1	0	0	0	2	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
.0	0.[illegible]	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	[illegible]	0	[illegible]	[illegible]	[illegible]	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0350	0.0700	1120.0	1160.0	1100.	0.01500

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

100.00 1160.00 200.00 1140.00 360.00 1123.00 366.00 1120.00 614.00 1120.00
620.00 1123.00 820.00 1140.00 1020.00 1160.00

STORAGE	0.00	13.41	27.58	43.95	62.69	83.80	107.28	133.13	161.35
	224.82	259.45	295.77	333.77	373.44	414.80	457.83	502.54	548.93
OUTFLOW	0.00	4485.83	14453.67	29040.41	48007.84	71312.36	98972.77	131041.98	167593.13
	254870.53	306038.00	361823.31	422252.44	487360.50	557189.00	631784.75	711197.75	795481.88
STAGE	1120.00	1122.11	1124.21	1126.32	1128.42	1130.53	1132.63	1134.74	1136.84
	1141.05	1143.16	1145.26	1147.37	1149.47	1151.58	1153.68	1155.79	1157.89
FLOW	0.00	4485.83	14453.67	29040.41	48007.84	71312.36	98972.77	131041.98	167593.13
	254870.53	306038.00	361823.31	422252.44	487360.50	557189.00	631784.75	711197.75	795481.88

STATION 1500, PLAN 1, RTIO 1

OUTFLOW

27.	45.	71.	89.	107.	122.	135.	146.	156.	164.
171.	176.	181.	184.	187.	189.	190.	190.	190.	189.
188.	186.	184.	182.	179.	176.	173.	170.	167.	163.
160.	156.	152.	149.	145.	141.	137.	134.	130.	126.
122.	119.	115.	112.	109.	105.	102.	99.	96.	93.
90.	87.	85.	82.	80.	77.	75.	73.	71.	69.
67.	65.	63.	61.	60.	58.	57.	56.	55.	53.
52.	51.	50.	50.	49.	48.	48.	47.	47.	48.
49.	51.	54.	59.	65.	72.	81.	92.	105.	119.
136.	155.	176.	198.	223.	249.	277.	306.	337.	369.
402.	437.	471.	507.	545.	585.	629.	675.	722.	770.
816.	867.	916.	964.	1014.	1089.	1171.	1239.	1304.	1363.
1417.	1467.	1512.	1554.	1592.	1627.	1659.	1688.	1715.	1736.
1756.	1774.	1789.	1799.	1807.	1812.	1813.	1813.	1810.	1806.
1800.	1793.	1784.	1775.	1764.	1753.	1742.	1730.	1718.	1707.
1695.	1684.	1674.	1666.	1659.	1654.	1653.	1655.	1661.	1673.
1689.	1714.	1741.	1777.	1824.	1871.	1931.	2002.	2086.	2180.
2284.	2399.	2523.	2657.	2801.	2952.	3111.	3277.	3447.	3621.
3801.	3991.	4192.	4406.	4636.	4896.	5157.	5456.	5799.	6160.

6545.	6958.	7401.	7877.	8414.	9018.	9654.	10325.	11044.	11865.
12787.	13776.	14852.	15938.	17089.	18374.	19731.	21197.	22735.	24214.
25633.	27175.	28796.	30524.	32278.	34035.	35682.	37388.	39138.	40920.
42721.	44560.	46575.	48558.	50438.	52252.	53976.	55624.	57118.	58199.
59223.	60297.	61313.	62335.	63292.	64226.	65089.	65908.	66650.	67333.
67938.	68472.	68925.	69303.	160948.	141842.	99374.	94654.	72931.	77385.
67169.	71707.	65544.	68461.	64259.	65773.	62644.	63180.	60717.	60610.
58578.	58109.	56389.	55633.	54089.	53180.	51771.	50677.	49231.	48143.
46908.	45858.	44715.	43749.	42738.	41767.	40757.	39791.	38814.	36762.
35503.	34764.	33630.	32741.	31658.	30711.	29650.	28681.	27656.	26669.
25654.	24652.	23625.	22618.	21609.	20606.	19544.	18235.	16560.	14879.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	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.
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.	1.	1.
1.	1.	1.	2.	2.	2.	2.	2.	2.	2.
2.	3.	3.	3.	3.	3.	3.	4.	4.	4.
4.	4.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	6.	6.	6.	6.	7.
7.	7.	8.	8.	8.	9.	9.	10.	10.	11.
11.	12.	13.	13.	14.	14.	14.	15.	15.	16.
16.	17.	18.	18.	19.	20.	21.	22.	23.	24.
25.	27.	28.	29.	31.	32.	34.	35.	37.	39.
40.	42.	44.	45.	47.	49.	51.	52.	54.	56.
57.	59.	61.	63.	65.	67.	68.	70.	71.	72.
73.	74.	75.	76.	77.	77.	78.	79.	80.	80.
81.	81.	82.	82.	156.	141.	107.	104.	85.	89.
80.	84.	79.	81.	77.	79.	76.	76.	74.	74.
72.	72.	70.	70.	68.	67.	66.	65.	64.	63.
62.	61.	59.	58.	57.	57.	56.	55.	54.	52.
50.	50.	48.	48.	47.	46.	45.	44.	42.	41.
40.	39.	38.	37.	36.	34.	33.	32.	30.	28.

STAGE

1120.0	1120.0	1120.0	1120.0	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0

1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.2	1120.2
1120.2	1120.2	1120.2	1120.2	1120.3	1120.3	1120.3	1120.3	1120.3	1120.4
1120.4	1120.4	1120.4	1120.5	1120.5	1120.5	1120.5	1120.6	1120.6	1120.6
1120.7	1120.7	1120.7	1120.7	1120.7	1120.8	1120.8	1120.8	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.8	1120.9	1120.9	1120.9	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.9	1120.9	1120.9	1120.9	1121.0	1121.0
1121.1	1121.1	1121.2	1121.2	1121.3	1121.4	1121.5	1121.5	1121.6	1121.7
1121.8	1121.9	1122.0	1122.1	1122.1	1122.2	1122.2	1122.3	1122.4	1122.5
1122.5	1122.6	1122.7	1122.8	1122.9	1123.1	1123.2	1123.3	1123.5	1123.7
1123.9	1124.1	1124.3	1124.4	1124.6	1124.8	1125.0	1125.2	1125.4	1125.6
1125.8	1126.0	1126.3	1126.5	1126.7	1126.9	1127.1	1127.2	1127.4	1127.6
1127.8	1128.0	1128.3	1128.5	1128.6	1128.8	1129.0	1129.1	1129.2	1129.3
1129.4	1129.5	1129.6	1129.7	1129.8	1129.9	1130.0	1130.0	1130.1	1130.2
1130.2	1130.3	1130.3	1130.3	1136.5	1135.4	1132.6	1132.3	1130.6	1131.0
1130.2	1130.0	1130.0	1130.3	1129.9	1130.0	1129.7	1129.8	1129.6	1129.6
1129.4	1129.3	1129.2	1129.1	1129.0	1128.9	1128.8	1128.7	1128.5	1128.4
1128.3	1128.2	1128.1	1127.9	1127.8	1127.7	1127.6	1127.5	1127.4	1127.2
1127.0	1127.0	1126.8	1126.7	1126.6	1126.5	1126.4	1126.3	1126.1	1126.0
1125.8	1125.7	1125.5	1125.4	1125.2	1125.1	1124.9	1124.8	1124.5	1124.3

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	160948.	73562.	40323.	16606.	4981696.
CMS	4558.	2083.	1142.	470.	141066.
INCHES		2.52	5.52	5.68	5.68
MM		63.91	140.12	144.26	144.26
AC-FT		36477.	79979.	82342.	82342.
THOUS CU M		44994.	98652.	101567.	101567.

MAXIMUM STORAGE = 156.

MAXIMUM STAGE IS 1136.5

STATION 1500, PLAN 2, RTIO 1

OUTFLOW

27.	45.	71.	89.	107.	122.	135.	146.	156.	164.
171.	176.	181.	184.	187.	189.	190.	190.	190.	189.
185.	186.	184.	182.	179.	176.	173.	170.	167.	163.
160.	156.	152.	149.	145.	141.	137.	134.	130.	126.
122.	119.	115.	112.	109.	105.	102.	99.	96.	93.
90.	87.	85.	82.	80.	77.	75.	73.	71.	69.
67.	65.	63.	61.	60.	58.	57.	56.	55.	53.
52.	51.	50.	50.	49.	48.	48.	47.	47.	48.
49.	51.	54.	59.	65.	72.	81.	92.	105.	119.
136.	155.	176.	198.	223.	249.	277.	306.	337.	369.

402.	437.	471.	507.	543.	583.	629.	675.	722.	771.
818.	867.	916.	964.	1014.	1089.	1171.	1239.	1304.	1363.
1417.	1467.	1512.	1554.	1592.	1627.	1659.	1688.	1713.	1736.
1756.	1774.	1788.	1799.	1807.	1812.	1813.	1813.	1810.	1806.
1800.	1793.	1784.	1775.	1764.	1753.	1742.	1730.	1718.	1707.
1695.	1684.	1674.	1666.	1659.	1654.	1653.	1655.	1661.	1673.
1689.	1712.	1741.	1777.	1820.	1871.	1931.	2002.	2086.	2180.
2284.	2399.	2523.	2657.	2801.	2952.	3111.	3277.	3447.	3621.
3801.	3991.	4192.	4406.	4656.	4896.	5157.	5456.	5759.	6160.
6545.	6956.	7401.	7877.	8414.	9018.	9654.	10325.	11044.	11865.
12787.	13776.	14852.	15938.	17089.	18374.	19731.	21197.	22735.	24214.
25633.	27170.	28796.	30524.	32278.	34035.	35682.	37388.	39138.	40920.
42721.	44560.	46575.	48558.	50438.	52252.	53976.	55624.	57118.	58199.
59223.	60297.	61313.	62335.	63292.	64226.	65089.	65908.	66650.	67333.
67936.	68472.	68923.	69303.	139944.	152533.	114332.	98738.	80072.	76864.
69884.	70583.	66937.	67367.	65079.	65164.	63156.	62780.	61044.	60352.
58789.	57941.	56523.	55526.	54176.	53110.	51826.	50632.	49267.	48114.
46931.	45840.	44729.	43737.	42747.	41760.	40763.	39787.	38817.	36760.
35505.	34762.	33631.	32740.	31659.	30710.	29651.	28681.	27656.	26668.
25654.	24651.	23625.	22617.	21609.	20606.	19544.	18235.	16560.	14879.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	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.
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.
1.	1.	1.	2.	2.	2.	2.	2.	2.	2.
2.	3.	3.	3.	3.	3.	3.	4.	4.	4.
4.	4.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	6.	6.	6.	6.	7.
7.	7.	8.	8.	8.	9.	9.	10.	10.	11.
11.	12.	13.	13.	14.	14.	14.	15.	15.	16.
16.	17.	18.	18.	19.	20.	21.	22.	23.	24.
25.	27.	28.	29.	31.	32.	34.	35.	37.	39.
41.	42.	44.	45.	47.	49.	51.	52.	54.	56.
57.	59.	61.	63.	65.	67.	68.	70.	71.	72.
73.	74.	75.	76.	77.	77.	78.	79.	80.	80.
81.	81.	82.	82.	140.	150.	120.	107.	91.	89.
85.	83.	85.	80.	78.	78.	76.	76.	74.	74.
72.	72.	73.	70.	68.	67.	66.	65.	64.	63.
62.	61.	59.	58.	57.	57.	56.	55.	54.	52.
51.	50.	49.	48.	47.	46.	45.	44.	42.	41.

40.	39.	38.	37.	36.	34.	33.	32.	30.	28.
				STAGE					
1120.0	1120.0	1120.0	1120.0	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.2	1120.2
1120.2	1120.2	1120.2	1120.2	1120.3	1120.3	1120.3	1120.3	1120.3	1120.4
1120.4	1120.4	1120.4	1120.5	1120.5	1120.5	1120.5	1120.6	1120.6	1120.6
1120.7	1120.7	1120.7	1120.7	1120.7	1120.8	1120.8	1120.8	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.8	1120.9	1120.9	1120.9	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.9	1120.9	1120.9	1120.9	1121.0	1121.0
1121.1	1121.1	1121.2	1121.2	1121.3	1121.4	1121.5	1121.5	1121.6	1121.7
1121.8	1121.9	1122.0	1122.1	1122.1	1122.2	1122.2	1122.3	1122.4	1122.5
1122.5	1122.6	1122.7	1122.8	1122.9	1123.1	1123.2	1123.3	1123.5	1123.7
1123.9	1124.1	1124.3	1124.4	1124.6	1124.8	1125.0	1125.2	1125.4	1125.6
1125.8	1126.0	1126.3	1126.5	1126.7	1126.9	1127.1	1127.2	1127.4	1127.6
1127.8	1128.0	1128.3	1128.5	1128.6	1128.8	1129.0	1129.1	1129.2	1129.3
1129.4	1129.5	1129.6	1129.7	1129.8	1129.9	1130.0	1130.0	1130.1	1130.2
1130.2	1130.3	1130.3	1130.3	1135.2	1136.0	1133.6	1132.6	1131.2	1130.9
1130.4	1130.5	1130.1	1130.2	1130.0	1130.0	1129.8	1129.8	1129.6	1129.5
1129.4	1129.3	1129.2	1129.1	1129.0	1128.9	1128.8	1128.7	1128.5	1128.4
1128.3	1128.2	1128.1	1127.9	1127.8	1127.7	1127.6	1127.5	1127.4	1127.2
1127.0	1127.0	1126.8	1126.7	1126.6	1126.5	1126.4	1126.3	1126.1	1126.0
1125.8	1125.7	1125.5	1125.4	1125.2	1125.1	1124.9	1124.8	1124.5	1124.3

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	152533.	74170.	40475.	16666.	4999944.
CMS	4319.	2100.	1146.	472.	141583.
INCHES		2.54	5.54	5.70	5.70
MM		64.43	140.65	144.79	144.79
AC-FT		36779.	80280.	82644.	82644.
THOUS CU M		45366.	99024.	101939.	101939.

MAXIMUM STORAGE = 150.

MAXIMUM STAGE IS 1136.0

STATION 1500, PLAN 3, RTIO 1

				OUTFLOW					
67.	45.	71.	89.	107.	122.	135.	146.	156.	164.

171.	176.	181.	184.	187.	189.	190.	190.	190.	189.
188.	186.	184.	182.	179.	176.	173.	170.	167.	163.
160.	156.	152.	149.	145.	141.	137.	134.	130.	126.
122.	119.	115.	112.	109.	105.	102.	99.	96.	93.
90.	87.	85.	82.	80.	77.	75.	73.	71.	69.
67.	65.	63.	61.	60.	58.	57.	56.	55.	53.
52.	51.	50.	50.	49.	48.	48.	47.	47.	48.
49.	51.	54.	59.	65.	72.	81.	92.	105.	119.
136.	155.	176.	198.	223.	249.	277.	306.	337.	369.
402.	437.	471.	507.	545.	585.	629.	675.	722.	770.
818.	867.	916.	964.	1014.	1089.	1171.	1239.	1304.	1363.
1417.	1467.	1512.	1554.	1592.	1627.	1659.	1688.	1713.	1736.
1756.	1774.	1788.	1799.	1807.	1812.	1813.	1813.	1810.	1806.
1800.	1793.	1784.	1775.	1764.	1753.	1742.	1730.	1718.	1707.
1695.	1684.	1674.	1666.	1659.	1654.	1653.	1655.	1661.	1673.
1689.	1712.	1741.	1777.	1820.	1871.	1931.	2002.	2086.	2180.
2284.	2399.	2523.	2657.	2801.	2952.	3111.	3277.	3447.	3621.
3801.	3991.	4192.	4406.	4656.	4896.	5157.	5456.	5799.	6160.
6545.	6958.	7401.	7877.	8414.	9018.	9654.	10325.	11044.	11865.
12787.	13776.	14852.	15938.	17089.	18374.	19731.	21197.	22735.	24214.
25633.	27170.	28796.	30524.	32278.	34035.	35682.	37388.	39138.	40920.
42721.	44560.	46575.	48558.	50438.	52252.	53976.	55624.	57118.	58199.
59223.	60297.	61313.	62335.	63292.	64226.	65089.	65908.	66650.	67333.
67936.	68472.	68923.	69303.	117522.	143410.	129751.	106437.	86177.	78869.
71442.	70764.	67455.	67459.	65308.	65048.	63282.	62694.	61118.	60294.
58856.	57934.	56553.	55501.	54195.	53095.	51839.	50622.	49275.	48108.
46936.	45836.	44732.	43735.	42749.	41758.	40764.	39786.	38818.	36759.
35536.	34762.	33631.	32740.	31659.	30710.	29651.	28681.	27656.	26668.
25654.	24651.	23626.	22617.	21609.	20606.	19544.	18235.	16560.	14879.

STOR

1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	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.
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.	1.	1.
1.	1.	1.	2.	2.	2.	2.	2.	2.	2.
2.	3.	3.	3.	3.	3.	3.	4.	4.	4.
4.	4.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	6.	6.	6.	6.	7.
7.	7.	8.	8.	8.	9.	9.	10.	10.	11.
11.	12.	13.	15.	14.	14.	14.	15.	15.	16.
16.	17.	18.	18.	19.	21.	21.	22.	23.	24.

43.	41.	40.	39.	51.	50.	54.	53.	57.	59.
40.	42.	44.	45.	47.	49.	51.	52.	54.	56.
57.	59.	61.	63.	65.	67.	68.	70.	71.	72.
73.	74.	75.	76.	77.	77.	78.	79.	80.	80.
81.	81.	82.	82.	122.	143.	132.	115.	96.	90.
84.	83.	80.	80.	78.	78.	77.	76.	75.	74.
72.	72.	70.	69.	68.	67.	66.	65.	64.	63.
62.	61.	59.	58.	57.	57.	56.	55.	54.	52.
50.	50.	48.	48.	47.	46.	45.	44.	42.	41.
40.	39.	38.	37.	36.	34.	33.	32.	30.	28.

STAGE

1120.0	1120.0	1120.0	1120.0	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0
1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.0	1120.1
1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.1	1120.2	1120.2
1120.2	1120.2	1120.2	1120.2	1120.3	1120.3	1120.3	1120.3	1120.3	1120.4
1120.4	1120.4	1120.4	1120.5	1120.5	1120.5	1120.5	1120.6	1120.6	1120.6
1120.7	1120.7	1120.7	1120.7	1120.7	1120.8	1120.8	1120.8	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.8	1120.9	1120.9	1120.9	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8	1120.8
1120.8	1120.8	1120.8	1120.8	1120.9	1120.9	1120.9	1120.9	1121.0	1121.0
1121.1	1121.1	1121.2	1121.2	1121.3	1121.4	1121.5	1121.5	1121.6	1121.7
1121.8	1121.9	1122.0	1122.1	1122.1	1122.2	1122.2	1122.3	1122.4	1122.5
1122.5	1122.6	1122.7	1122.8	1122.9	1123.1	1123.2	1123.3	1123.5	1123.7
1123.9	1124.1	1124.3	1124.4	1124.6	1124.8	1125.0	1125.2	1125.4	1125.6
1125.8	1126.0	1126.3	1126.5	1126.7	1126.9	1127.1	1127.2	1127.4	1127.6
1127.8	1128.0	1128.3	1128.5	1128.6	1128.8	1129.0	1129.1	1129.2	1129.3
1129.4	1129.5	1129.6	1129.7	1129.8	1129.9	1130.0	1130.0	1130.1	1130.2
1130.2	1130.3	1130.3	1130.3	1133.8	1135.4	1134.7	1133.3	1131.7	1131.1
1130.5	1130.5	1130.2	1130.2	1130.0	1130.0	1129.8	1129.7	1129.6	1129.5
1129.4	1129.3	1129.2	1129.1	1129.0	1128.9	1128.8	1128.7	1128.5	1128.4
1128.3	1128.2	1128.1	1127.9	1127.8	1127.7	1127.6	1127.5	1127.4	1127.2
1127.0	1127.0	1126.8	1126.7	1126.6	1126.5	1126.4	1126.3	1126.1	1126.0
1125.8	1125.7	1125.5	1125.4	1125.2	1125.1	1124.9	1124.8	1124.5	1124.3

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	143410.	74304.	40548.	16680.	5003970.
CMS	4061.	2104.	1147.	472.	141697.
INCHES		2.54	5.54	5.70	5.70
MM		64.55	140.76	144.90	144.90
AC-FT		36845.	80347.	82711.	82711.
THOUS CU M		45448.	99107.	102021.	102021.

MAXIMUM STORAGE = 143.

MAXIMUM STAGE IS 1135.4

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HYDROGRAPH ROUTING

CHANNEL ROUTE TO	SECOND	DOWNSTREAM	HAZARD					
ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5100	1	0	0	0	0	0	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0350	0.0700	1012.0	1050.0	3600.	0.00130

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1053.00 131.00 1038.00 1100.00 1015.00 1156.00 1312.00 1254.00 1012.00
1269.00 1015.00 1300.00 1038.00 1340.00 1050.00

STORAGE	0.00	25.12	54.27	103.61	175.85	270.99	389.03	529.97	693.80
	1879.06	1278.26	1478.13	1678.69	1879.92	2081.83	2284.41	2487.68	2691.62
OUTFLOW	0.00	725.07	2363.33	4999.72	8852.46	14117.94	20975.52	29593.62	40132.41
	69459.53	88220.19	108912.27	131443.81	155738.63	181732.34	209369.06	238599.88	269381.38
STAGE	1012.00	1014.00	1016.00	1018.00	1020.00	1022.00	1024.00	1026.00	1028.00
	1032.00	1034.00	1036.00	1038.00	1040.00	1042.00	1044.00	1046.00	1048.00
FLOW	0.00	725.07	2363.33	4999.72	8852.46	14117.94	20975.52	29593.62	40132.41
	69459.53	88220.19	108912.27	131443.81	155738.63	181732.34	209369.06	238599.88	269381.38

MAXIMUM STAGE IS 1039.6

MAXIMUM STAGE IS 1039.1

MAXIMUM STAGE IS 1036.4

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HYDROGRAPH ROUTING

CHANNEL ROUTE TO THIRD DOWNSTREAM HAZARD

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
9900	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0350	0.0700	1007.0	1050.0	8800.	0.00130

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.30 1050.00 660.00 1030.00 1500.00 1010.00 1506.00 1007.00 1654.00 1007.00
1660.30 1010.00 1760.00 1030.00 1820.00 1050.00

STORAGE	0.00	69.75	153.72	283.98	462.86	690.37	966.51	1291.28	1664.67
	2557.35	3070.75	3616.49	4194.30	4804.19	5446.14	6120.16	6826.25	7564.42
OUTFLOW	0.00	891.59	2934.48	6175.84	10781.54	16913.56	24725.80	34365.85	45976.00
	75650.75	94645.09	116095.06	139905.38	166126.50	194812.16	226018.00	259800.81	296218.63
STAGE	1007.00	1009.26	1011.53	1013.79	1016.05	1018.32	1020.58	1022.84	1025.10
	1029.63	1031.89	1034.16	1036.42	1038.68	1040.95	1043.21	1045.47	1047.73
FLO-	0.00	891.59	2934.48	6175.84	10781.54	16913.56	24725.80	34365.85	45976.00
	75650.75	94645.09	116095.06	139905.38	166126.50	194812.16	226018.00	259800.81	296218.63

MAXIMUM STAGE IS 1034.4

MAXIMUM STAGE IS 1034.5

MAXIMUM STAGE IS 1034.4

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HYDROGRAPH ROUTING

CHANNEL ROUTE TO FOURTH DOWNSTREAM HAZARD

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
12500	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

EN(1)	EN(2)	EN(3)	ELNVT	ELMAX	RLNTH	SEL
0.070	0.0350	0.0700	992.0	1030.0	2600.	0.00500

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

100.00 1030.00 160.00 1010.00 240.00 995.00 246.00 992.00 414.00 992.00
420.00 995.00 570.00 1010.00 810.00 1030.00

STORAGE	0.00	20.53	42.36	67.51	96.32	128.79	164.92	204.71	248.16
	346.01	400.33	458.22	519.70	584.76	653.40	725.62	801.43	880.81
OUTFLOW	0.00	1613.03	5215.73	10519.11	17418.95	25898.96	35965.65	47637.97	60942.30
	92590.84	111007.50	131191.22	153175.91	176997.31	202692.00	230297.22	259850.81	291390.63
STAGE	992.00	994.00	996.00	998.00	1000.00	1002.00	1004.00	1006.00	1008.00
	1012.00	1014.00	1016.00	1018.00	1020.00	1022.00	1024.00	1026.00	1028.00
FLOW	0.00	1613.03	5215.73	10519.11	17418.95	25898.96	35965.65	47637.97	60942.30
	92590.84	111007.50	131191.22	153175.91	176997.31	202692.00	230297.22	259850.81	291390.63

MAXIMUM STAGE IS 1014.6

MAXIMUM STAGE IS 1014.9

MAXIMUM STAGE IS 1014.8

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE 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
				0.50
HYDROGRAPH AT	100	67.90	1	20281.
		(175.86)		(574.28)(
			2	20281.
				(574.28)(
			3	20281.
				(574.28)(
ROUTED TO	200	67.90	1	19827.
		(175.86)		(561.43)(
			2	19827.
				(561.43)(
			3	19827.
				(561.43)(
HYDROGRAPH AT	250	80.08	1	21170.
		(207.40)		(599.46)(
			2	21170.
				(599.46)(
			3	21170.
				(599.46)(
HYDROGRAPH AT	350	96.60	1	24667.
		(250.19)		(698.50)(
			2	24667.
				(698.50)(
			3	24667.
				(698.50)(
3 COMBINED	300	244.58	1	65586.
		(633.45)		(1857.19)(
			2	65586.
				(1857.19)(
			3	65586.
				(1857.19)(
ROUTED TO	302	244.58	1	65[illegible].
		(633.45)		(1[illegible])(

			2 65209. (1840.85)(3 65209. (1840.85)(
HYDROGRAPH AT	400	27.40 (70.97)	1 11513. (326.03)(2 11513. (326.03)(3 11513. (326.03)(
2 COMBINED	400	271.98 (704.42)	1 71399. (2021.79)(2 71399. (2021.79)(3 71399. (2021.79)(
ROUTED TO	402	271.98 (704.42)	1 169914. (4811.41)(2 146947. (4161.06)(3 141032. (3993.57)(
ROUTED TO	1500	271.98 (704.42)	1 160948. (4557.54)(2 152533. (4319.25)(3 143410. (4060.92)(
ROUTED TO	5100	271.98 (704.42)	1 150569. (4263.64)(2 144671. (4096.61)(3 136449. (3863.80)(
ROUTED TO	9900	271.98 (704.42)	1 119065. (3371.55)(2 119289. (3377.90)(3 119185. (3374.93)(
ROUTED TO	12500	271.98 (704.42)	1 117458. (3326.02)(2 120380. (3408.77)(

5 11E601.
(3360.12)(

PLAN 1 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	19827.	1420.3	48.00

PLAN 2 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	19827.	1420.3	48.00

PLAN 3 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	19827.	1420.3	48.00

PLAN 1 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	65009.	944.8	49.00

PLAN 2 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	65009.	944.8	49.00

PLAN 3 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	65009.	944.8	49.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1050.00	1050.00	1056.00
STORAGE	130.	130.	1230.
OUTFLOW	0.	0.	14990.

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
0.50	1065.65	9.85	5333.	192508.	9.00	48.90	48.80

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1050.00	1050.00	1056.00
STORAGE	130.	130.	1230.
OUTFLOW	0.	0.	14990.

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
0.50	1065.85	9.85	5333.	167783.	9.00	49.10	48.80

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1050.00	1050.00	1056.00
STORAGE	130.	130.	1230.
OUTFLOW	0.	0.	14990.

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
0.50	1065.85	9.85	5333.	146754.	9.20	49.30	48.80

PLAN 1 STATION 1500

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	160948.	1136.5	49.00

PLAN 2 STATION 1500

	MAXIMUM	MAXIMUM	TIME

RATIO	FLOW,CFS	STAGE,FT	HOURS
0.50	152533.	1136.0	49.20

PLAN 3 STATION 1500

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	143410.	1135.4	49.20

PLAN 1 STATION 5100

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	150569.	1039.6	49.20

PLAN 2 STATION 5100

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	144671.	1039.1	49.20

PLAN 3 STATION 5100

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	136449.	1038.4	49.40

PLAN 1 STATION 9900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	119065.	1034.4	49.40

PLAN 2 STATION 9900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	119289.	1034.5	49.60

PLAN 3 STATION 9900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	119185.	1034.4	49.60

PLAN 1 STATION 12500

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	117458.	1014.6	49.40

PLAN 2 STATION 12500

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	120380.	1014.9	49.60

PLAN 3 STATION 12500

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	118661.	1014.8	49.60

APPENDIX D

REFERENCES

APPENDIX D

REFERENCES

1. Department of the Army, Office of the Chief of Engineers. National Program of Investigation of Dams; Appendix D: Recommended Guidelines for Safety Inspection of Dams, 1976.

2. U.S. Nuclear Regulatory Commission: Design Basis Floods for Nuclear Power Plants, Regulating Guide 1.59, Revision 2, August 1977.

3. Linsley and Franzini: Water Resources Engineering, Second Edition, McGraw-Hill (1972).

4. W. Viessman, Jr., J. Knapp, G. Lewis, 1977, 2nd Edition, Introduction to Hydrology.

5. Ven Te Chow: Handbook of Applied Hydrology, McGraw-Hill, 1964.

6. The Hydrologic Engineering Center: Computer Program 723-X6-L2010, HEC-1 Flood Hydrograph Package, User's Manual, Corps of Engineers, U.S. Army, 609 Second Street, Davis, California 95616, January 1973.

7. The Hydrologic Engineering Center, Computer Program: Flood Hydrograph Package (HEC-1) Users Manual For Dam Safety.

8. Soil Conservation Service (Engineering Division): Urban Hydrology for Small Watersheds, Technical Release No. 55, U.S. Department of Agriculture, January 1975.

9. H.W. King, E.F. Brater: Handbook of Hydraulics, McGraw-Hill, 5th Edition, 1963.

10. Ven Te Chow: Open Channel Hydraulics, McGraw-Hill, 1959.

11. Bureau of Reclamation, United States Department of the Interior, Design of Small Dams: A Water Resources Technical Publication, Third Printing, 1965.

12. J.T. Riedel, J.F. Appleby and R.W. Schloemer: Hydrometeorological Report No. 33, U.S. Department of Commerce, U.S. Department of Army, Corps of Engineers, Washington, D.C., April 1956. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

13. North Atlantic Regional Water Resources Study Coordinating Committee: Appendix C, Climate, Meteorology and Hydrology, February 1972.

14. Sherard, Woodward, Gizienski, Clevenger: Earth and Earth-Rock Dams, John Wiley and Sons, Inc., 1963.

15. U.S. Soil Conservation Service, Stillwater Outdoor Hydraulic Laboratory: Handbook of Channel Design for Soil and Water Conservation, SCS-TP-61, March 1974; revised June 1954.

16. The University of the State of New York - The State Education Department, State Museum and Science Service, Geological Survey: Geologic Map of New York, 1970.

17. Y.W. Isachsen and W.G. McKendree, 1977, Preliminary Brittle Structures Map of New York, New York State Museum Map and Chart Series No. 31.

18. U.S. Geological Survey, Water Resources Division: U.S Geological Survey Water-Data Report NY-78-1, Water Year 1978, Vol. 1.

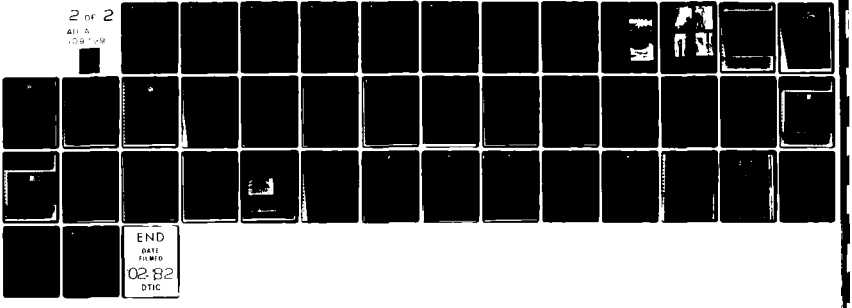
19. U.S. Department of the Interior, Geological Survey, Maximum Known Stages and Discharges of New York Streams Through 1973, by Irving R. Leonard and Bernard Dunn, 1976.

APPENDIX E

STABILITY ANALYSIS

AD-A109 799 STETSON-DALE UTICA NY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. HAWKINSVILLE DAM (INVENTORY NUMBER--ETC(U)
SEP 81 J B STETSON DACW51-81-C-0009
UNCLASSIFIED NL

2 OF 2
AD A
109 799



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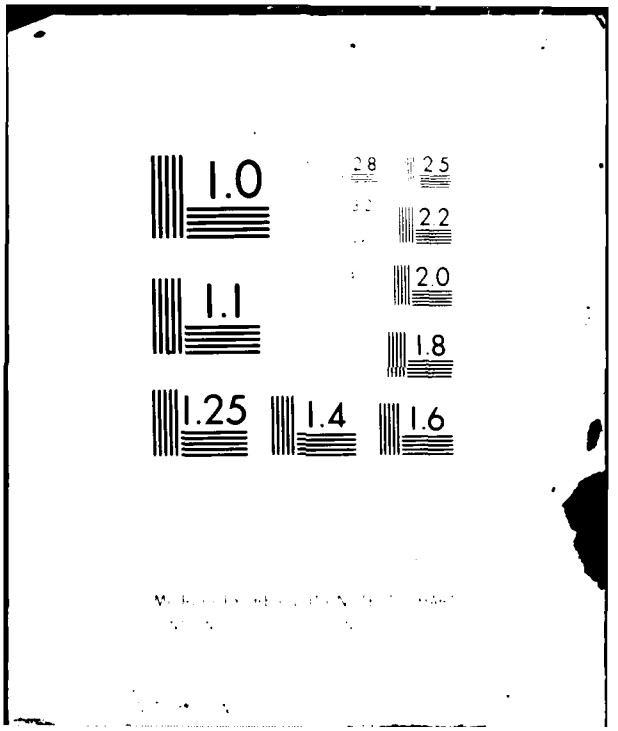
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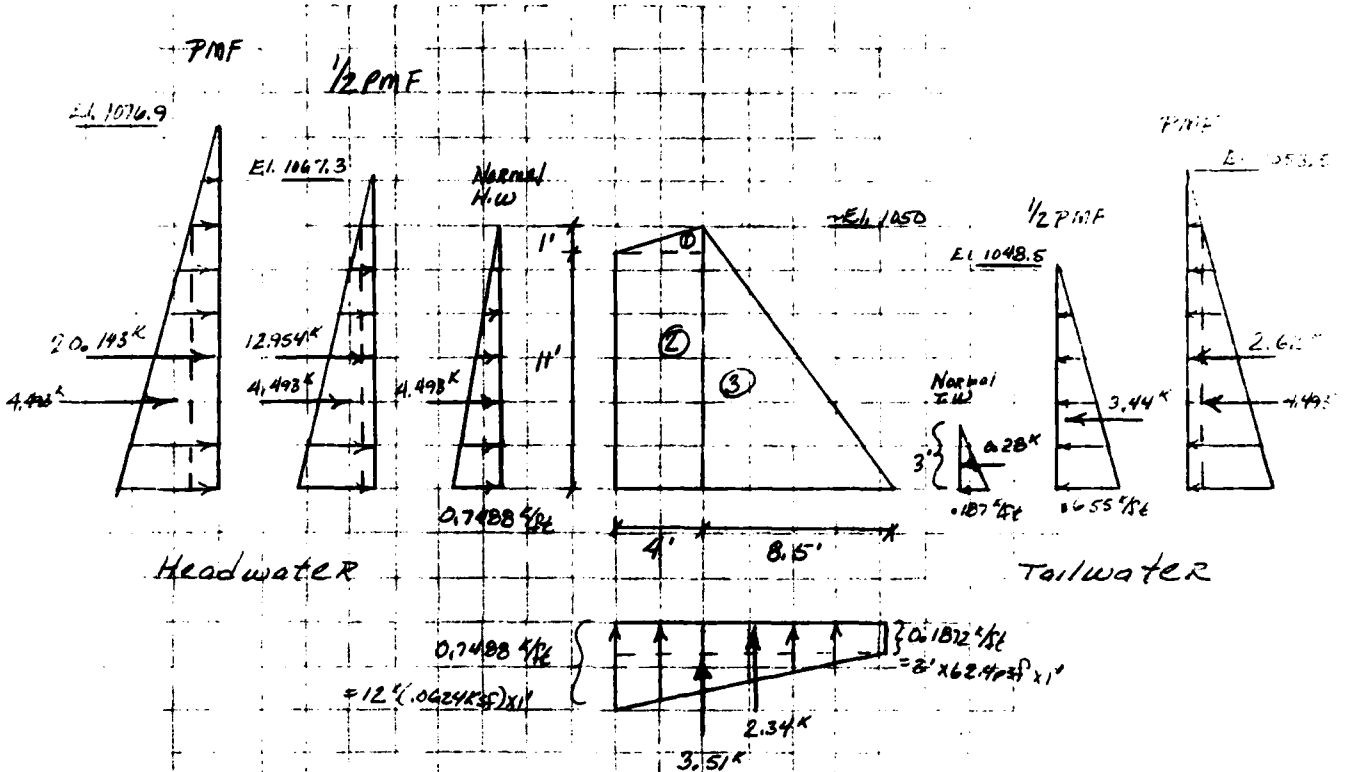
TEL 315-797-5800

DESIGN BRIEF

PROJECT NAME N.Y.S Dam Inspections 1981 DATE

JBJECT Hawkinsville Dam PROJECT NO.

Stability DRAWN BY JAS



Wt. of Dam

① 1' x 1' x 4' x ½ (0.15K/cf) = 0.3 K
② 1' x 11' x 4' (0.15K/cf) = 6.6 K
③ 1' x 12' x 8.5' x ½ (0.15K/cf) = 7.65 K

$\Sigma = 14.55$ K

Resisting Moment due to wt. of dam

$M_R = 0.3^K(8.5' + 4/3) + 6.6^K(8.5'+2') + 7.65^K(2/3 + 8.5'$
$2.95^{1-K} + 69.3^{1-K} + 43.35^{1-K}$
$M_R = 115.6^{1-K}$

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IBJECT Hawkinsville Dam PROJECT NO.

DRAWN BY JAS

Uplift Pressure

Uplift = 3.51^k + 2.34^k = 5.85^k

Overturning Moment = 2.34^k (12.5'/2) + 3.51^k (2/3 × 12.5')

= 14.6^{1-k} + 29.3^{1-k} = 43.88^{1-k}

Case I - Normal Pool (@ Spillway Crest)

1) Overturning

Overturning moment due to U/S water pressure

= 1.493^k (12'/3) = 13.48^{1-k}

Total Overturning moment = 43.88^{1-k} + 13.48^{1-k} = 57.36^{1-k}

Resisting moment due to Tailwater

0.28^k(1') = 0.28^{1-k} + wt. of water

1'x(0.0.24kcf) 3'(2.125)(2.125')/2 = 0.14^{1-k}

Total resistance due to TW = 0.42^{1-k}

Total resisting moment = 115.6+0.4 = 116^{1-k}

$$F.S. = \frac{M_R}{M_O} = \frac{116^{1-k}}{57.36^{1-k}} = 2.02$$

Position of Resultant

$$d = \frac{\Sigma M}{\Sigma V} = \frac{116^{1-k} - 57.4^{1-k}}{14.55^k - 5.85^k} = \frac{58.6^{1-k}}{8.7^k} = 6.74'$$

$$= \frac{6.74'}{12.5'} = 0.54b$$ from toe (Inside middle third, OK)

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Hawkinsville PROJECT NO.

DRAWN BY AS

ii) Sliding

$$F.S. = \frac{\mu N + CA + T.W.\ Force}{driving\ Force}$$

$N = \Sigma V = 8.7^K$

$$F.S. = \frac{0.65(8.7^K) + (0.05 Ksi)(144\ in^2/ft^2)(1')(12.5') + 0.28^K}{4.493^K} = \frac{95.94}{4.493}$$

$= 21.4$

Case II Normal Pool w/ Ice

Ice Force = 5 K/ft of dam @ elev. 1049

$M_{ice} = 5^K(11') = 55'^K$

i) Overturning

$$F.S. = \frac{116'^K}{57.36 + 55'^K} = \frac{116}{112.36} = 1.03$$

∴ Resultant Pos: $\frac{116 - 112.4}{8.7} = 0.4' = 0.036$

ii) Sliding

$$F.S. = \frac{95.94^K}{4.493^K + 5^K} = 10.1$$

Case III ½ PMF (Assuming Uplift same as Case II)

i) Overturning

Add'l. overturning moment due to H.W.

$12.954^K \left(\frac{72'}{2}\right) = 77.72^{ft\text{-}K}$

Total $M_o = 57.36^{ft\text{-}K} + 77.72^{ft\text{-}K} = 135.1^{ft\text{-}K}$

Resistance due to Tailwater

$3.44^K \left(\frac{10.5'}{3}\right) = 12.04^{ft\text{-}K}$

$+ \frac{\frac{1}{2}(10.5')(7.44')}{2}(.0624^{(cf)})\left(\frac{7.44'}{3}\right) = 6.04^{ft\text{-}K} = 3.44^K(2.48')$

T.W. Resisting Moment = $18.08^{ft\text{-}K}$

Total Resisting Moment = $115.6^{ft\text{-}K} + 18^{ft\text{-}K} = 134^{ft\text{-}K}$

$F.S. = \frac{134^{ft\text{-}K}}{135^{ft\text{-}K}} = 0.99 < 1.0$ ∴ Resultant out of base

ii) Sliding

$\Sigma V = 14.55^K + 2.44^K - 5.85^K = 11.14^K$

$\Sigma H_{driving} = 12.954^K + 4.493^K = 17.447$

$F.S. = \frac{0.65(11.14^K) + 90^K + 3.44^K}{17.447^K} = 5.8$

Case IV PMF (Assuming Uplift same as Case II)

i) Overturning

Add'l moment due to H.W.

$20.143^k(6') = 120.9^{1-k}$

Total Overturning moment = $120.9 + 57.4 = 178.2^{1-k}$

Resistance due to Tailwater

$= 13.48^{1-k} + 2.62^k(6') = 29.2^{1-k}$

$+ \underbrace{1'(3.5')(8.5')(0.0624^k/f^3)(8.5'/2)}_{1.856^{1-k}} + \underbrace{1/2(12')(8.5')(1')(0.0624^k/f^3)(8.5'/3)}_{3.182^{1-k}}$

$= 29.2^{1-k} + 16.9^{1-k} = 46.1^{1-k}$

Total $M_R = 46.1 + 115.6^{1-k} = 162^{1-k}$

$F.S. = \frac{162}{178} = 0.91 < 1.0$ ∴ Resultant outside Base

ii) Sliding

$\Sigma V = 14.55^k + 1.856^k + 3.182^k - 5.85^k = 13.7^k$

$\Sigma H_{driving} = 20.143^k + 4.493^k = 24.64^k$

$F.S. = \frac{0.65(13.7^k) + 90^k + 2.62^k + 4.493^k}{24.64^k} = 4.3$

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DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Hawkinsville PROJECT NO.

DRAWN BY JAT

Case V. Seismic Load

Zone 2 ; Horiz E.Q. coeff = 0.05, Vert. Coeff = 0.025

a) Add'l overturning moment due to seismic gravity loads

$0.05\{0.3^k(11'+1'/3)+6.6^k(11/2)+7.65^k(1/3*12')\} = 3.52^{ft\text{-}k}$

$0.025\{0.3^k(8.5'+1/3')+6.6^k(10.5')+7.65^k(2/3*8.5')\} = 2.9^{ft\text{-}k}$

Effective Vertical loads = $8.7^k - 0.025(14.55^k) = 8.34^k$

b) Add'l moment due to hydrodynamic effect of reservoir (Ref. "Design of Small Dams" Bureau of Reclamation)

$Pe = C\lambda w h = 0.73(0.05)(0.027^k/ft^3)(12') = 0.027^k/ft$

$Ve = 0.726\ Pe\ y = 0.726(0.027^k/ft)(12') = 0.24^k$

$Me = Ve\ \bar{y} = 0.24^k(0.4118*12') = 1.18^{ft\text{-}k}$

i.) Overturning

$F.S. = \frac{116^{ft\text{-}k}}{52.36+3.52+2.9+1.18} = \frac{116}{64.96} = 1.79$

Position of Resultant

$= \frac{\Sigma M}{\Sigma V} = \frac{116-64.96^{ft\text{-}k}}{8.34^k} = \frac{51^{ft\text{-}k}}{8.34^k} = 6.1' = 0.49\,D$

O.K.

ii.) Sliding

$F.S. = \frac{0.65(8.34^k)+90^k+0.28}{4.79^k+0.05(14.55^k)+0.24^k} = \frac{95.7}{5.46} = 17.5$

APPENDIX F

PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS

DEC DAM INSPECTION REPORT

RB	CTY	YR. AP.	DAM NO.	INS. DATE	USE	TYPE
16	33	15	00521	5273	6	4

AS BUILT INSPECTION

1 Location of Spillway and outlet	1 Elevations
1 Size of Spillway and outlet	1 Geometry of Non-overflow section

1 GENERAL CONDITION OF NON-OVERFLOW SECTION

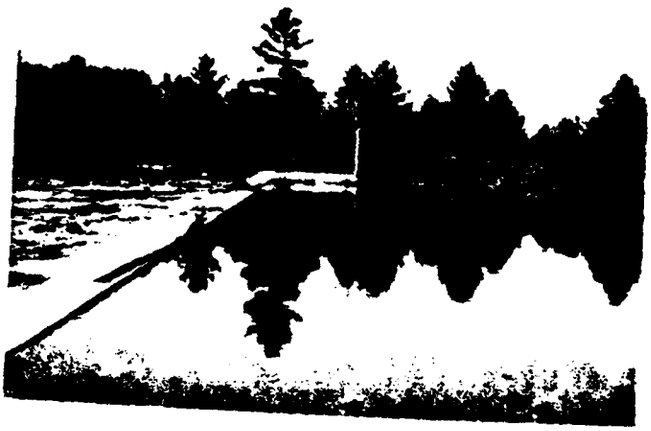
1 Settlement	2 Cracks	1 Deflections
2 Joints	2 Surface of Concrete	2 Leakage
1 Undermining	1 Settlement of Embankment	1 Crest of Dam
2 Downstream Slope	2 Upstream Slope	2 Toe of Slope Trees

1 GENERAL CONDITION OF SPILLWAY AND OUTLET WORKS

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

1 Maintenance	8 Hazard Class
3 Evaluation	5 Inspector

COMMENTS: Right Bank Look



"188 521 Blad(

BRANT EXCELSIOR COMPANY

MANUFACTURERS OF

HIGH-CLASS WOOD EXCELSIOR

HAWKINSVILLE, NEW YORK

Dam No. [illegible] Hook River Waterway.

Owner - Brass Engraving Works, [illegible], N. Y.

Plans on file in Map Filing Cabinet.

STATE OF NEW YORK

IN REPLYING PLEASE REFER TO FILE NUMBER

CONSERVATION COMMISSION

ALBANY

March 8, 1915.

Brant Excelsior Co.,

Hawkinsville, N. Y.

Gentlemen:-

Receipt is acknowledged of your letter of February 27, 1915, together with application and plans in duplicate for the proposed concrete dam on the Black River. This Commission will take action on this application in the near future.

No contracts should be let or construction started on this project until the formal approval thereof by this Commission has been received.

Very truly yours,

Conservation Commission,

By JDM

Commissioner.

McY/C.

March 9, 1915.

Mr. W. C. Brant,

Hawkinsville, N. Y.

Dear Sir:-

Under separate cover you will find blue print of plans and duplicate application for dam known in our records as Serial #188, Dam #321, Black River Watershed.

Upon the plan you will find a certificate signed by the Secretary to the Commission stating that by a duly adopted resolution your plans and specifications have been approved in accordance with the provisions of Section 22 of the Conservation Law.

You will also find enclosed copy of the resolution, which please read carefully and acknowledge receipt.

Yours truly,

CONSERVATION COMMISSION,

By

Secretary to Commission.

RWB/H.

ORIGINAL

Black

Form No. IW66 11-1-18-1000 (16-781)

Dam No. 521

STATE OF NEW YORK

CONSERVATION COMMISSION
ALBANY

Serial No. 188

Application filed March 5-15

Approved by Commission March 9-15

Material Tag No. 29

Foundations inspected

Final inspection

APPLICATION FOR CONSTRUCTION OR RECONSTRUCTION OF A DAM

Hankinsville. N.Y.
(Address of Applicant)

Application is hereby made to the Conservation Commission of the State of New York, in compliance with the provisions of Chap. LXV of the Consolidated Laws, the Conservation Law, for approval of the detailed specifications and plans, marked

Concrete Dam for Brant Excelsior Works. Hankinsville. N.Y. on Black River

herewith submitted, for the {construction / ~~reconstruction~~} of the dam herein described. All provisions of law will be complied with in the erection of the said dam, whether specified herein or not.

(Date)

{Signature of Applicant}

Mr McKim

March 16, 1915.

In re Dam #521 Black River
Watershed.

Brant Excelsior Co.,

Hawkinsville, N. Y.

Gentlemen:-

Please give us at least a week's notice of the time when the foundation bed for this dam will be ready for inspection, so that our Inspector, Mr. McKim, will be able to make arrangements to be there. At the same time give us the name and address of the contractors for the work.

Very truly yours,

Conservation Commission,

By

Commissioner.

FCK/C.
MB

OIC 9/9/15
D 824

WHEREAS, the Brant Excelsior Works of Hawkinsville, N. Y., did on the 5th day of March, 1915, submit plans and specifications for the construction of a dam on the Black River within the limits of the town of Boonville, Oneida County said dam being known in Conservation Commission records as Dam #521 Black River watershed; and did by Conservation Commission Serial #188 make application for the approval of said plans and specifications under the provisions of the Conservation Law, and

WHEREAS, said plans and specifications have been approved by the Chief Engineer and the Inspector of Docks and Dams, and said plans signed by them respectively, Now, Therefore, Be it

RESOLVED, that said plans and specifications be and hereby are approved, provided however that this resolution shall not be deemed to authorize any invasion of any property rights, public or private, by any person in carrying out the requirements of this resolution, nor to create any claim or demand against the State of New York.

188 Ot Conn Rivers
March 8-1915

adopted 6/12/1918

WHEREAS, the Brant Excelsior Works of Hawkinsville, N. Y., did on the 5th day of March, 1915, submit plans and specifications for the construction of a dam on the Black River within the limits of the town of Boonville, Oneida County, said dam being known in Conservation Commission records as Dam #521 Black River watershed; and did by Conservation Commission Serial #188 make application for the approval of said plans and specifications under the provisions of the Conservation Law, and

WHEREAS, said plans and specifications have been approved by the Chief Engineer and the Inspector of Docks and Dams, and said plans signed by them respectively, Now, Therefore, Be it

RESOLVED, that said plans and specifications be and hereby are approved, provided however that this resolution shall not be deemed to authorize any invasion of any property rights, public or private, by any person in carrying out the requirements of this resolution, nor to create any claim or demand against the State of New York.

LOCATION AND GENERAL DATA

Site of dam is on Black River.
(Name of stream)

a branch of ..... (Name of stream), within the limits of the town of Boonville, County of Oneida.

about 500 feet south of Bridge in village.
(Give approximate distance from well-known bridge, dam, village or mouth of stream, so that work can be located on map of state)

Purpose of dam Power

Reasons for making changes in existing structure Decay of old timber Dam

DATA AND DIMENSIONS

General:

Materials of which dam is to be constructed

Concrete proportioned 1:2:5. Will probably be constructed by owner

Area of watershed above dam not in excess of 400 square miles.

Area of water surface of pond at level of spillway crest not in excess of 40 acres.

Capacity of reservoir (at above level) not in excess of 8,000,000 cubic feet.

Length of spillway crest 300 feet.

Maximum depth of water on spillway crest at highest known flood — 4 feet.

Maximum discharging capacity of spillway ..... cubic feet per second.

Maximum discharging capacity of spillway per square mile of drainage area .....

..... cubic feet per second.

Masonry ~~or timber~~ portion:

Length on top.... about 357 ..... feet.

Length in stream bed.... about 300 ..... feet.

Maximum height above stream bed..... 12.02 ..... feet.

Maximum height above foundation bed 12.02 ..... feet.

Maximum width of base..... 12.76 ..... feet.

Maximum width of top..... 4.00 ..... feet.

Elevation of top above maximum water level in pond 2. ..... feet.

Elevation of top above spillway crest..... 6 ..... feet.

Nature of foundations ..... Solid Granite. .....

Earth portion:

Embankment:

Length on top ..... feet.

Length in stream bed..... feet.

Maximum height above stream bed..... feet.

Maximum width of base..... feet.

Maximum width of top..... feet.

Elevation of top above maximum water level in pond..... feet.

Elevation of top above spillway crest..... feet.

Slope, upstream face.....

Slope, downstream face.....

Core wall:

Material.....

Elevation of top above spillway crest..... feet.

Width of top..... feet.

Batter of faces.....

Maximum height above foundations ..... feet.

Maximum width of base..... feet.

Sheeting or other cut-off.....

Is fishway provided? No.

General description of regulating works, gate houses, outlet pipes, penstocks, forebays, canals, flashboards, gates, log chutes, etc.

See detail plans.

Names of owners of property which will be submerged by construction of dam, with approximate submerged area owned by each.

W.C. Brant— owner.

It is intended to complete work covered by this application by during 1915
(Date)

REPORT UPON APPLICATION

CONSERVATION COMMISSION — DIVISION OF INLAND WATERS

Albany March 5th-15th

I have carefully examined the plans of the above dam, and find that if the work is constructed in accordance with the plans, filed March 5th-15th with good workmanship and the specified materials that it will be safe.

Approved:

R W Sherman
Chief Engineer.

Alex Rae McLean
Inspector of Docks and Dams.

FORM IW-1 6-13-12 2000 10-1-15

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

114-T

521 Black

DAM REPORT

6/21/, 1915.
(Date)

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Hawkinsville Dam.

This dam will be situated upon the Black River (Give name of stream)

in the Town of Boonville, Oneida County,

~~about~~ in ~~from~~ the Village ~~of City~~ of Hawkinsville.

The distance down stream from the dam, to the highway bridge (Give name of highway bridge or railroad bridge)

will be about 300 ft.

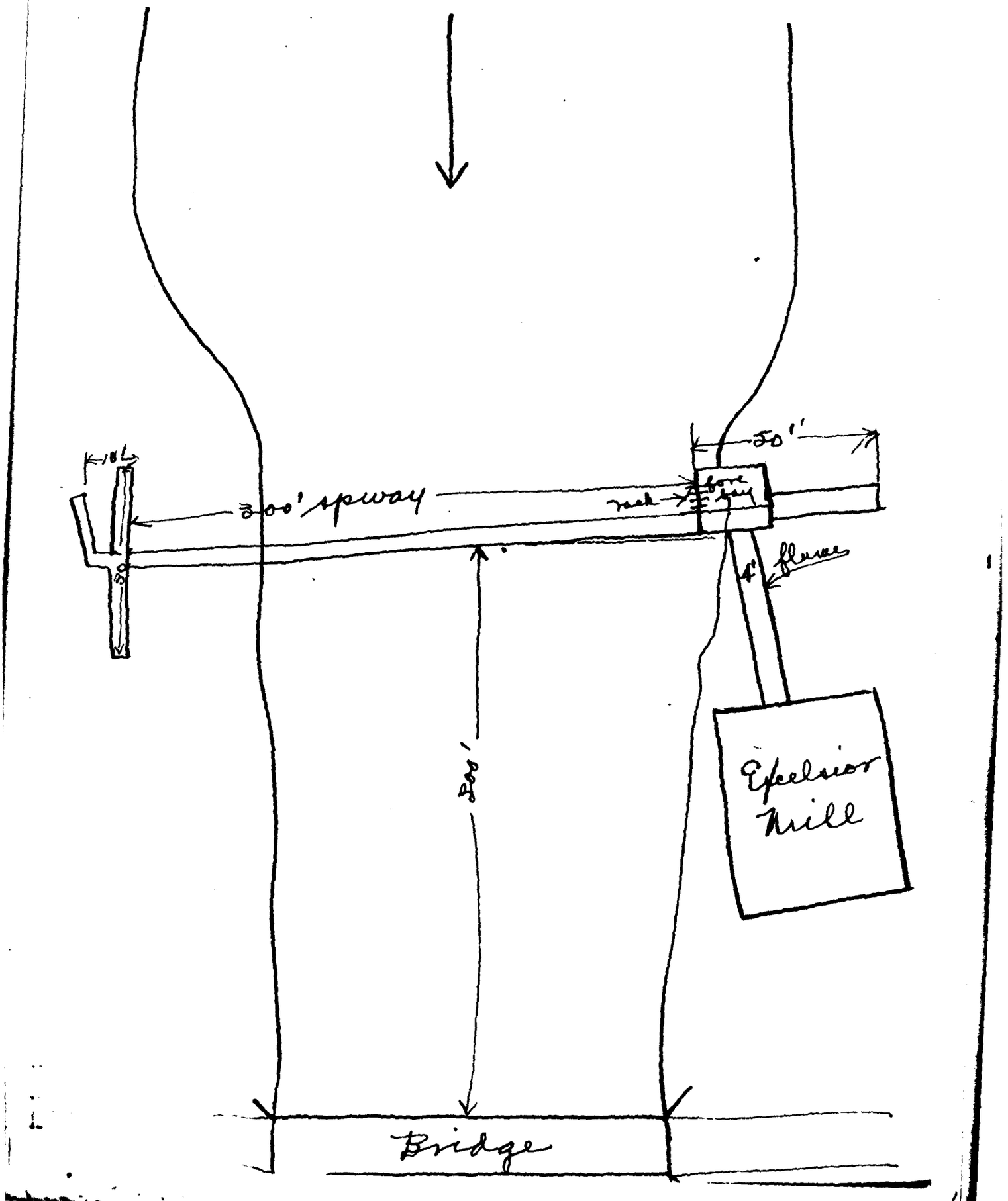
The dam is now owned by W.C. Brout, Hawkinsville, N.Y.

and ~~was~~ is to be built in ~~repaired~~ the year 1915. ~~and was extensively repaired or reconstructed during the year~~.

As it now stands, the spillway portion of this dam is to be built of concrete (Stone, concrete or timber)

and the other portions are to be built of concrete also. (Earth, stone, concrete or timber)

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is solid rock and under the remaining portions such foundation bed is solid rock.


50'
18'
300' spway
rock
bore hole
flume
4'
200'
Excelsior Mill
Bridge

The total length of this dam is 360 feet. The spillway or waste-weir portion, is about 300 feet long, and the crest of the spillway is about 6 feet below the top of the dam.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: One waste gate to be built — not incorporated in present plans.

State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks which you may have observed.)

This dam is just about to be started — plans have been approved by Conservation Commission.

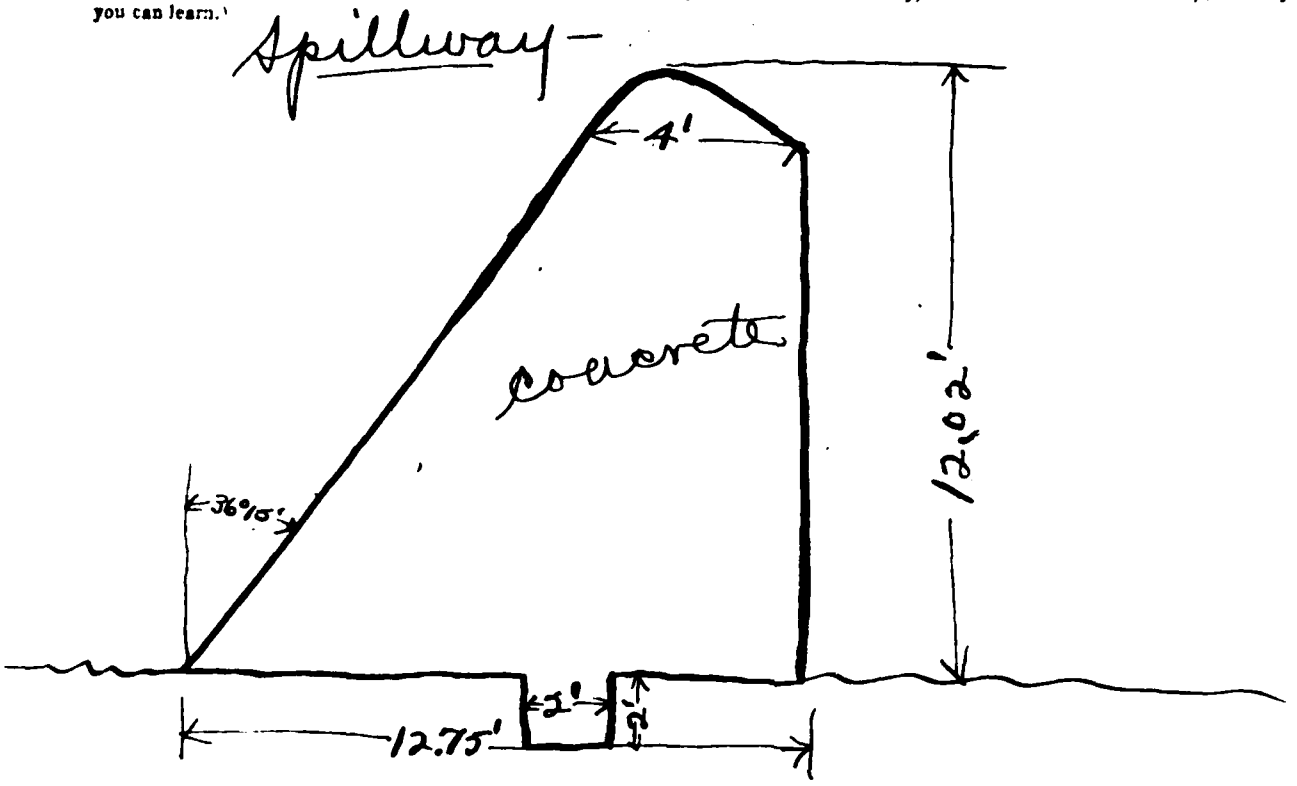
Reported by C. W. Douglass,
(Signature)

115 Standart St.,
(Address—Street and number, P. O. Box or R. F. D. route)

Syracuse, N.Y.
(Name of place)

(SEE OTHER SIDE)

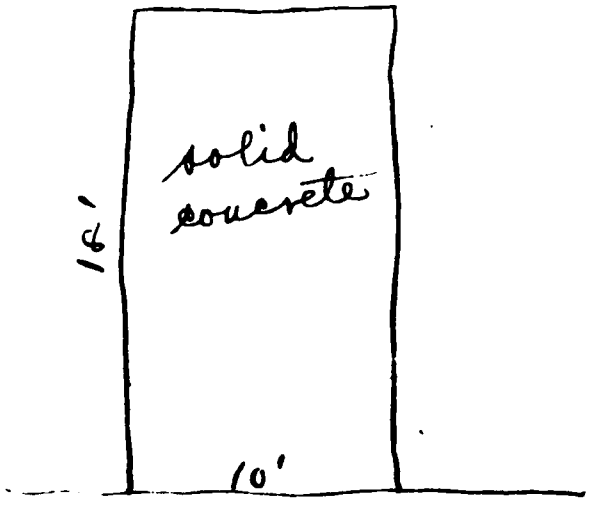
(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)

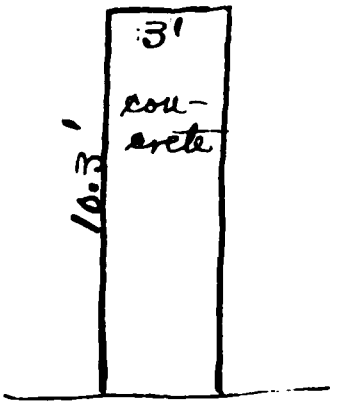


(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.

abutment wall at left bank

Wing wall at right bank





Form 1201

CLASS OF SERVICE	SYMBOL
Day Message	
Day Letter	Blue
Night Message	Nite
Night Letter	N L

If none of these three symbols appears after the check (number of words) this is a day message. Otherwise its character is indicated by the symbol appearing after the check.

WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT

GEORGE W. E. ATKINS, VICE-PRESIDENT BELVIDERE BROOKS, VICE-PRESIDENT

CLASS OF SERVICE	SYMBOL
Day Message	
Day Letter	Blue
Night Message	Nite
Night Letter	N L

If none of these three symbols appears after the check (number of words) this is a day message. Otherwise its character is indicated by the symbol appearing after the check.

RECEIVED AT 53 & 55 STATE ST., ALBANY, N. Y.

0765

B713NY EG 26NL

WATERTOWN NY JULY 7

A R MCKIM

CONSERVATION COMMISSION ALBANY NY

ON ACCT OF HIGH WATER IT HAS BEEN IMPOSSIBLE TO DRY OUT FOUNDATION FOR DAM AT HAWKINSVILLE CAN YOU POSTPONE YOUR TRIP UNTIL SATURDAY OR MONDAY

L B CLEVELAND

1255AM

WESTERN UNION TELEGRAM

Form 260

GEORGE W. E. ATKINS, VICE-PRESIDENT — NEWCOMB CARLTON, PRESIDENT — BELVIDERE BROOKS, VICE-PRESIDENT

RECEIVER'S No.	TIME FILED	CHECK

SEND the following Telegram, subject to the terms *on back hereof, which are hereby agreed to*

July 8, 1915.

Mr. A. P. McKim,
Conservation Commission,
Albany, N. Y.

On account of high water it has been impossible to dry out foundation for dam at Hawkinsville. Can you postpone your trip until Saturday or Monday.

Lou R. Cleveland.

LRC. (Confirmation)

APPROVAL BY COMMISSION

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

On March 9/15 the Conservation Commission, by resolution duly adopted, approved of the above application for the { construction / ~~reconstruction~~ } of dam 521 Black on Black River and hereby gives permission for the { construction / ~~reconstruction~~ } of said dam within 12 months from date in accordance with the specifications and plans, and subject before erection to the approval by the Inspector of the materials of construction and of the foundation bed when stripped and prepared, and subject to the inspection of the work during and after construction. This approval may be amended if deemed necessary to secure a safe structure.

(Seal)

John J. Farrell
Asst Secretary to Commission.

REPORT ON INSPECTION OF FOUNDATION

CONSERVATION COMMISSION — DIVISION OF INLAND WATERS

Albany.....

Work on the above dam was started....., contracts for the same having been awarded to.....

.....

On .....

.....

.....

.....

Approved:

.....
Inspector of Docks and Dams.

.....
Chief Engineer.

REPORT ON COMPLETION OF WORK

CONSERVATION COMMISSION — DIVISION OF INLAND WATERS

Albany Sept 28 - 15

On Sept 23 - 15 I inspected the above work and found that it had been completed in a satisfactory manner.

Approved:

Alex Rice McLean
Inspector of Docks and Dams.

Chief Engineer.

INSTRUCTIONS TO APPLICANTS

Requirements for Plans.—Before beginning the construction, reconstruction, alteration or extension of a structure for impounding water, the owner of the proposed structure shall submit, in duplicate, to the Conservation Commission complete drawings showing the location of the dam, the flow line of the impounded water, the boundary lines and the ownership of the property affected, the nature of the foundation bed, the character of the materials to be employed, the size and the location of the discharge and control gates, the general and special features of the dam, and such dimensions as are necessary for the calculation of the stresses and the erection of the structure.

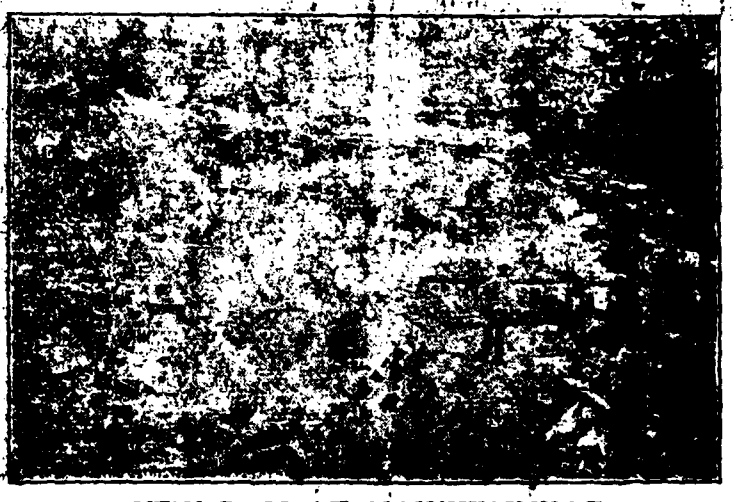
Drawings shall be on sheets of uniform size 24 inches wide by 36 inches long. Each sheet shall have a white space 2¾ inches high by 5¼ inches long below the title to receive the stamp of approval. On each sheet of every set of drawings there shall be clearly printed a conspicuous title in which shall appear the name of the county, the name of the city, village or town, and the name of the stream in which the dam is located, and the name of the owner thereof. The scale of the drawings shall be stated under the title. When the designs have been approved by the Commission, one set will be returned to the owner, with such approval endorsed thereon. Copies in duplicate of the specifications under which the dam is to be constructed shall accompany the plans.

Inspection.—The name of the inspector and a statement of his experience in such work must be sent to the Commission. There must also be sent a sample of at least one-half a cubic foot of sand and of cement, and twenty cubic inches of the stone for concrete or masonry to be used in the structure, and of the natural materials in the foundation bed. The foundation bed, after it has been cleared and prepared, must be inspected subject to approval by the Inspector of the Commission. The inspection of materials takes about ten days in the laboratory. On request tags will be sent for labeling the materials.

July 8.15. Excavation for Wall Wing began. Stones, boulders & clay & gravel. Rain and high water.
July 25-15. Same Conditions. No work done. A R McKim
Aug 5-15. Bed prepared for 40' at West end. Blue hard clay & boulders. Down 2 ft down & cut off 2 ft further.
Aug 27-15. Work about ended. 50 ft of wall finished. Concrete good. Forms for 700 ft at East about ready for concrete. Recommend cut-off for East abut. A R McKim
Sept 22-15. Work completed. Concrete good. A R McKim
Sept 8-17. Good condition A R McKim

Thursday, October 14, 1915.

NUMBER THIRTY-THREE



NEW DAM AT HAWKINSVILLE

Recently Completed for the Brant Excelsior Company

During the past months a new concrete dam has been constructed on Black River at Hawkinsville for W. F. Brant of the Brant Excelsior Company. A picture of the dam in process of building appears in this connection. The length of the dam is 359 feet, with a spillway 298½ feet long. The dam is four feet at the crest, the width at the base varying according to the height. It is 14½ feet high at the highest point and 4½ feet at the lowest. It contains nearly 1,000 cubic yards of concrete and 1,200 barrels of cement were used. This dam replaces the old log dam which [illegible]

The work was designed by the well known engineering firm of W. G. Stone & Son, Utica, the work of building being in the hands of L. C. Cleveland, contractor and engineer of Watertown.

The new dam will give Brant Excelsior Company much more water for manufacturing purposes than before and will insure steady power for the operation of this plant. Mr. Brant has made a success of the business which gives employment to quite a number of hands and is an industry which is of much benefit to Hawkinsville. It is hoped that [illegible]

Bureau of Water Regulation

May 11, 1973

Hudson - Black River Regulating District
90 State Street
Albany, New York 12210

Gentlemen:

Dam No. 521
Black River
Hawkinsville, Oneida County

In conformance with the Department's Dam Safety Program, an inspection was made of the above-referenced dam on May 2, 1973.

A review of our files reveals that this dam was constructed in 1915 and consists of a concrete structure approximately 360 feet long and up to 12 feet high, forming an impoundment of approximately 8 million cubic feet. The dam is located 300 feet upstream from the bridge on County Route 61 in Boonville at Hawkinsville.

Our findings reveal that water is going through the right bank approximately 80 feet upstream of the dam. This is creating a stream which is flowing around the right concrete abutment and enters the river a short distance downstream of the abutment.

We suggest that your office examine the situation and take remedial action. Maintenance at this time will prevent future problems.

Very truly yours,

Stanford Zeccolo
Senior Hydraulic Engineer

SZ:KH;ls

cc: Mr. Leigh Blake

STATE OF NEW YORK

BOARD OF HUDSON RIVER-BLACK RIVER REGULATING DISTRICT

90 STATE STREET, ALBANY, N. Y. 12207

Phone 465-3491

May 14, 1973

Mr. Stanford Zeccolo, Sr. Hydraulic Engineer
N. Y. S. Dept. of Environmental Conservation
Bureau of Water Regulation
Albany, N. Y. 12201

Re: Dam No. 521, Black River
Hawkinsville, Oneida Co.

Dear Mr. Zeccolo:

Receipt is acknowledged of your letter of May 11, 1973, in which you draw our attention to the leakage occurring through the right bank and around the right concrete abutment of the above mentioned dam.

I have already notified Assistant Chief Kenneth H. Mayhew of this situation as a result of your recent telephone notification. You may rest assured that whatever remedial work is necessary will be performed as soon as arrangements to do so have been made.

Thank you for your prompt action in this matter.

Very truly yours,

CHIEF ENGINEER

RF:sh

cc: Mr. Tabner
Mr. Mayhew

BOARD OF HUDSON RIVER-BLACK RIVER REGULATING DISTRICT

BLACK RIVER AREA OFFICE
491 EASTERN BOULEVARD
WATERTOWN, NEW YORK 13601
PHONE 788-8440 A. C. 315

May 17, 1973

Mr. Stanford Zeccolo, Sr. Hydraulic Engineer
N.Y.S. Department of Environmental Conservation
Bureau of Water Regulation
Albany, New York 12201

Dear Mr. Zeccolo:

Dam No. 521, Black River
Hawkinsville, Oneida County
Your Letter of May 11, 1973

Mr. Forrest, Chief Engineer, of our Albany office telephoned the writer relative to flow through the east bank of the Black River southerly and upstream of our dam at Hawkinsville, New York.

An examination of this break was made on May 14th by the writer with the determination that although this leak is not serious at the moment, it should be repaired as soon as possible.

Our difficulty is that this repair must be made on property with an absentee owner and considerable time has been spent trying to contact this party for permission.

You will be notified when repairs have been completed.

Very truly yours,

K. H. Mayhew

K. H. Mayhew
Assistant Chief Engineer

KHM:FG
Enc. Map 3M5-1

BOARD OF HUDSON RIVER-BLACK RIVER REGULATING DISTRICT

BLACK RIVER AREA OFFICE
401 EASTERN BOULEVARD
WATERTOWN, NEW YORK 13601
PHONE 788-8440 A. C. 315

September 13, 1973

Mr. Stanford Zeccolo, Sr. Hydraulic Engineer
NYS Department of Environmental Conservation
Bureau of Water Regulation
Albany, New York 12201

Dear Mr. Zeccolo:

Dam No. 521, Black River
Hawkinsville, Oneida County

This is notification that remedial action has been taken to arrest the infiltration of water through the east bank of the river above the dam, as reported in your letter of May 11, 1973.

As this repair work was on the property of an absentee owner, permission to accomplish this work, as well as funds for same, presented unusual problems.

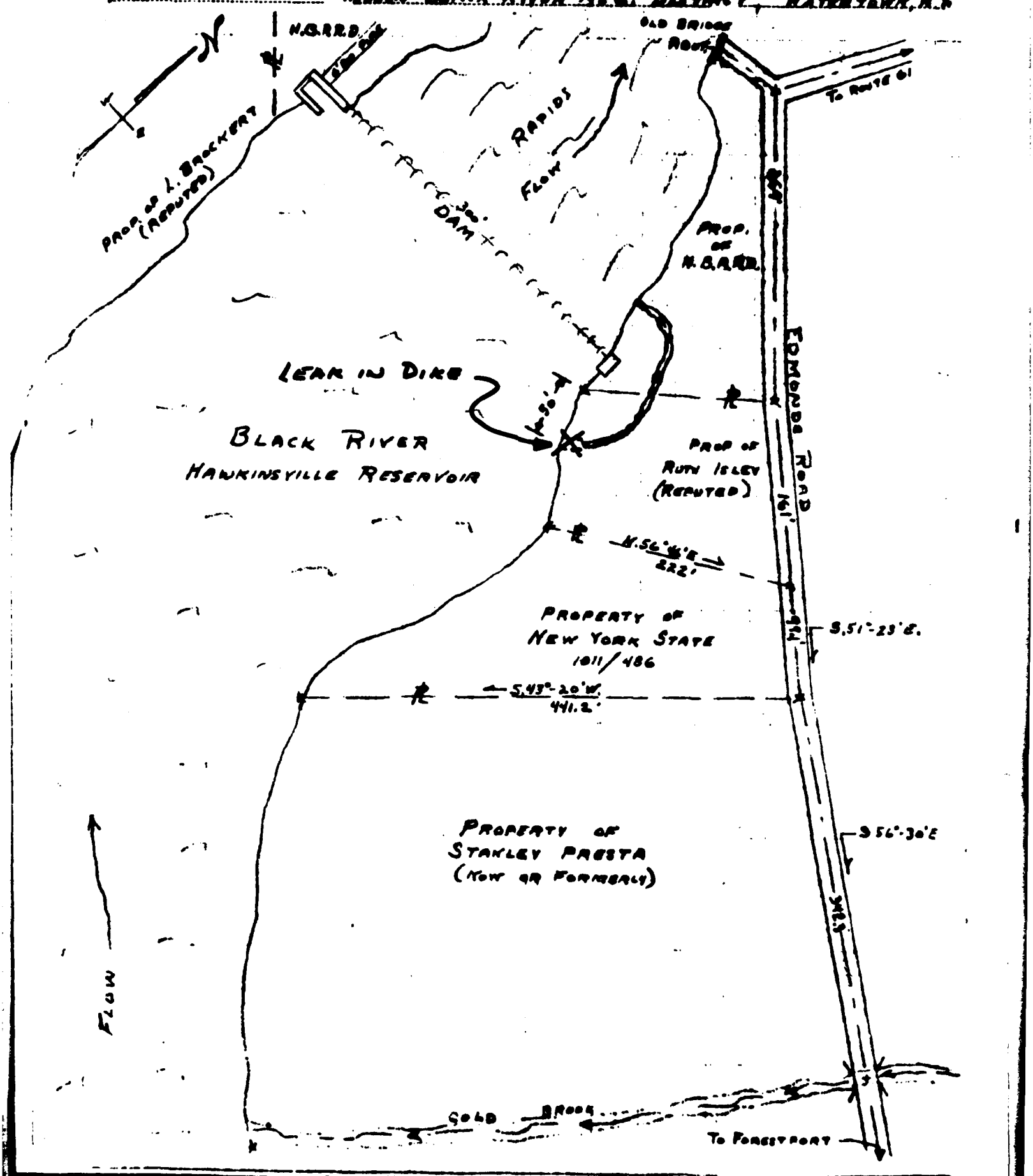
In mid August, a contractor completed the excavation of a cut-off trench parallel to and midway of the dike on this east bank at the point of water seepage. After excavation, heavy impervious clay was compacted in layers in this excavation from a depth well below the leak to well above. Topsoil was then placed to original dike level.

No shoreline alteration was affected other than brush cutting for machine clearance purposes. Excess spoil and brush was placed on the east side of the excavation resulting in no disturbance of the bed or shoreline of the river.

Very truly yours,

K. H. Mayhew
Assistant Chief Engineer

KHM:FG
cc: Mr. Forest
Mr. Blake


SCALE 1" = 100'
HUDSON - BLACK RIVER REG. DISTRICT, WATERTOWN, N.Y.
N
N.Y.C.R.R.
PROP. OF L. BROCKERT (REPUTED)
DAM
RAPIDS
FLOW
OLD BRIDGE ROAD
TO ROUTE 61
PROP. OF N.Y.C.R.R.
LEAK IN DIKE
BLACK RIVER
HAWKINSVILLE RESERVOIR
PROP OF RUTH ISLEY (REPUTED)
FOMONDA ROAD
161'
N. 56°-45'-E
222'
PROPERTY OF NEW YORK STATE
1011/486
S. 51°-23'-E.
S. 45°-20'-W.
441.2'
PROPERTY OF STANLEY PRESTA (NOW OR FORMERLY)
S. 56°-30'-E
FLOW
COLD BROOK
TO FORESTPORT

STATE OF NEW YORK

BOARD OF HUDSON RIVER-BLACK RIVER REGULATING DISTRICT

BLACK RIVER AREA OFFICE

491 Eastern Boulevard
Watertown, New York 13601
Phone (315) 788-5440

May 12, 1981

Stetson-Dale
185 Genesee Street
Utica, New York 13501

Att: Mr. Jerry A. Gomez, Civil Engineer

Dear Jerry:

Relative to our meeting at the Hawkinsville Dam last Thursday morning, May 7th, I have researched some of our records for information on this property and Dam.

My memory was incorrect on the size of the steel flume and the height of the Dam according to these enclosed notes. The flume is 6 ft. in diameter and the Dam is approximately 12 ft. high. We received no information on the physical dimensions of the Dam other than what are listed here.

If there are any further questions, call me at your convenience.

Sincerely,

K. H. Mayhew
Chief Engineer

KHM:FTM
Enc.

November 27, 1967

PRESENT DAM AND ADJACENT AREA AT HAWKINSVILLE

ONEIDA COUNTY, N. Y.

Owner: Stanley A. Presta,
formerly Brant Excelsior Co.

Location: 200' South or upstream from present Boonville-Woodgate Highway Bridge, County Route #61 crossing Black River at Hamlet of Hawkinsville
Lot No. 18 of Adgates Western Tract, Town of Boonville, County of Oneida, State of New York

Land Area: Approximately .5+ Acres each side of present dam:
West Bank - 100' x 300' - Mill property and dam works
Assessment '66 $5,000, '67 $4,000
East Bank - .5 Acres adjacent to dam abutment
Assessment $100
Also 3 Acres upstream from Dam (Trailer Area - Presta)
Assessment $450

Exceptions: N.Y.S.C.D. fishing rights, 30' each side and Right of Way from road to water

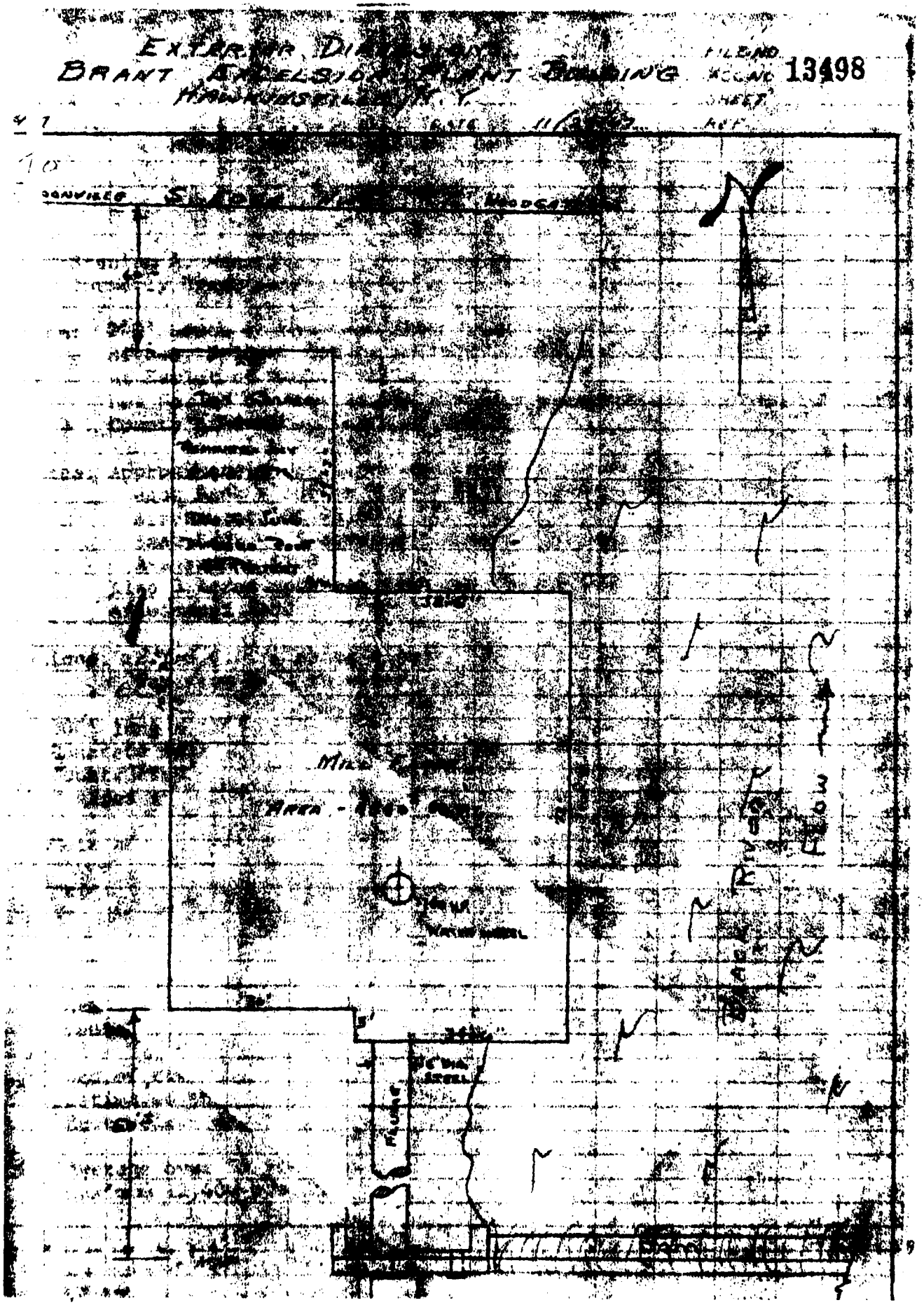
Dam: 300' long x 12' high
Concrete spillway, abutments and gate works
Constructed 1915, abutment repairs '45 - fair condition
2 gates in West abutment 1 - 3'x3' w/o guard racks
1 - flume gate w/8' wide guard racks
Gate adjustments by means of lever pry on spindle
Flume to mill - 6' diameter x 100' - good condition
Original dam constructed 1824, rebuilt 1915
No flash boards or pins

Mill: Wood frame construction 5400 sq. ft. with 100 HP water wheel. Good condition. No heat or machinery. Formerly used to make excelsior, 1900 to 1966. Ceased operations in 1966, mill rented for boat storage at present.

Pond: Bed of river only
Estimated volume at dam crest 8 m.c.f. or 2% size of Sixth Lake Reservoir. Approximately 50 camp sites, assessed $300 - $400 each.

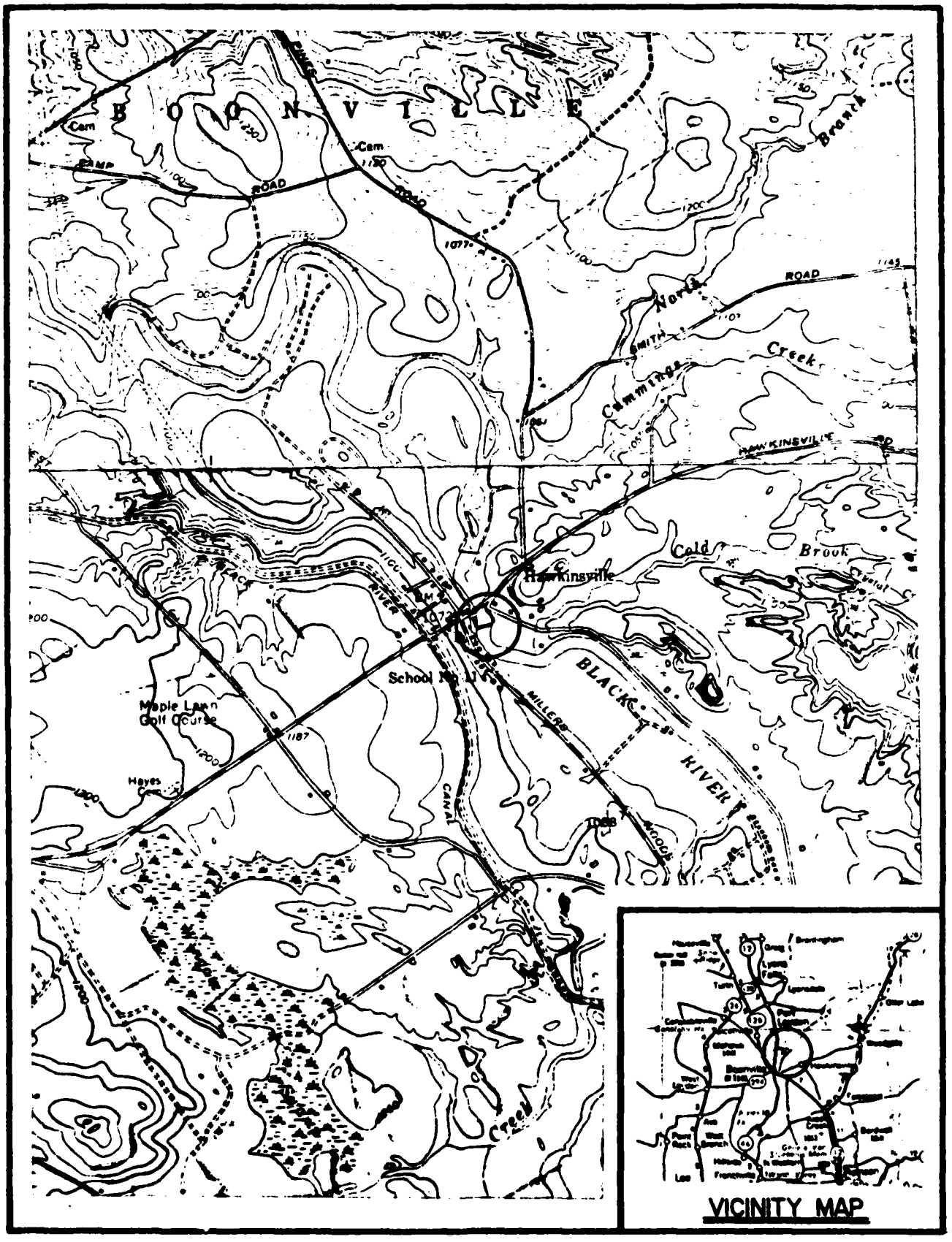
Flow: Average over 55 year period 670 cfs
Maximum 12,400 cfs, Minimum 5 cfs

Purchased 1911
Deed Recd Sept 3, 69
Check for 25,000 Presented to Mr. Presta on 9/3/69


EXTERIOR DIMENSIONS
BRANT & FELSIOR
HAWKINSVILLE, N.Y.
FILE NO. 13498
SHEET
AREA -

APPENDIX G

DRAWINGS



LOCATION PLAN

FIGURE 1

STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501
TEL 315-797-5800

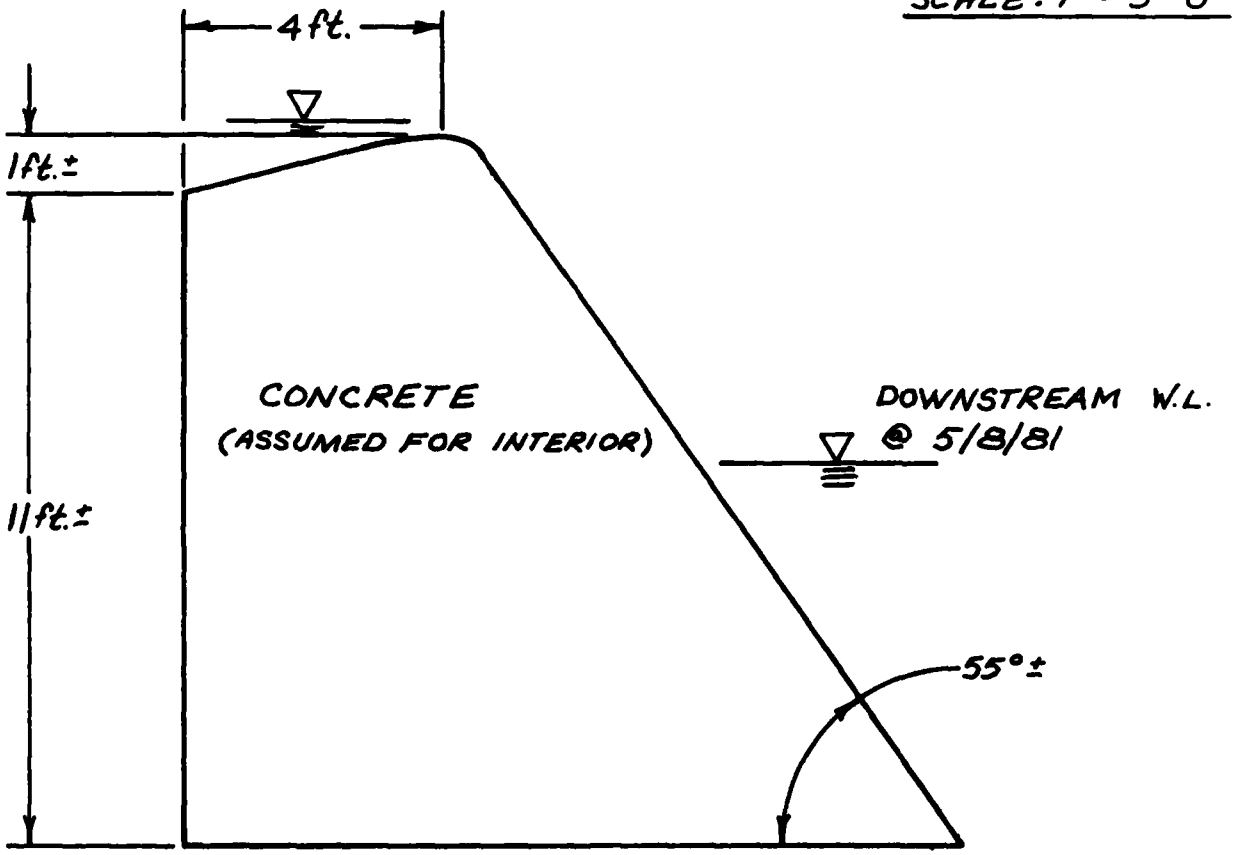
DESIGN BRIEF

PROJECT NAME HAWKINSVILLE DAM, TOWN OF BOONVILLE DATE 6/1/81

SUBJECT DAM SECTION - BASED ON FIELD MEASUREMENTS PROJECT NO

DRAWN BY D.F.M.

SCALE: 1" = 3'-0"



NOTE: DAM SECTION SHOWN IS BASED UPON FIELD MEASUREMENTS AT THE TIME OF A FIELD INSPECTION, 5/8/81. HEIGHT OF DAM APPEARS TO VARY, AS INFLUENCED BY ELEVATION OF FOUNDATION ROCK. SECTION SHOWN REPRESENTS MAXIMUM HEIGHT. ENTIRE DAM FUNCTIONS AS A SPILLWAY.

FIGURE 2