Phase I Inspection Report
Brant Lake Upper Dam
Upper Hudson River Basin, Warren County, New York
Inventory No. N.Y. 158

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Approved for public release; Distribution unlimited.

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Brant Lake Upper Dam
Warren County
Schroon River

20. ABSTRACT
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.
Brant Lake Upper Dam was found to have no serious deficiencies which pose a threat to the structure. Further stability analyses were recommended. Additionally, the spillway is considered inadequate.
UPPER HUDSON RIVER BASIN

BRANT LAKE UPPER DAM
WARREN COUNTY, NEW YORK
INVENTORY No. NY 158

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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NEW YORK DISTRICT CORPS OF ENGINEERS
JANUARY 1979
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PHASE 1 REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Brant Lake Upper Dam
I.D. No. NY-158 (#652)

State Located: New York

County Located: Warren

Watershed: Upper Hudson River Basin

Stream: A tributary of the Schroon River

Date of Inspection: October 24, 1978

ASSESSMENT

The Brant Lake Upper Dam is the structure which maintains the level of Brant Lake for recreational purposes. A visual inspection did not reveal any deficiencies which pose a serious threat to the structure. Concrete surfaces on both the highway bridge which crosses the dam and the northeast wingwall are deteriorated and in need of repair. A small scour hole exists on the eastern end of the spillway under the bridge abutment. While these deficiencies do not appear to be serious, they are problems which should be addressed.

Stability analyses for this structure indicate that the factors of safety for all conditions analyzed are unsatisfactory. Further studies are required to better assess the structural integrity of the dam. An investigation of the concrete spillway section should be made to determine the exact limits and dimensions of the concrete and using this information, the structural stability should be reanalyzed. This study should be commenced within six months of the date of final approval of this report.

The spillway capacity is not sufficient to pass the Probable Maximum Flood (PMF). However, the spillway will pass the outflow from 1/2 PMF. Therefore, the spillway is considered to be inadequate. A program of periodic inspection and maintenance should also be established for the dam. In addition, a warning system should be developed and placed in readiness for future use.
George Koch
Chief, Dam Safety Section
New York State Department
of Environmental Conservation
NY License No. 45937

Approved By:

Col. Clark H. Benn
New York District Engineer

Date:

17 April 79
SECTION 1: PROJECT INFORMATION

1.1 GENERAL

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

b. Purpose of Inspection
To evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, determine if they constitute hazards to life and property, and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of the Dam and Appurtenant Structures
The Brant Lake Upper Dam consists of a spillway section in the center and wingwalls retaining fill and natural ground on either side. A town highway crosses the top of the dam on a bridge spanning the spillway. Based on available information, the dam is approximately 35 feet long.

The spillway section is about 15 feet long and is composed of a block of concrete 3.5 feet wide and 9 feet high. The vertical drop from the spillway crest to its base at the downstream channel is 7 feet.

Masonry wingwalls extend out from either end of the spillway. These masonry walls appear to have been a portion of the original dam. Only one of these walls is still exposed, the other having been covered by the east abutment of the bridge. The top of this exposed wall is about 2 feet above the spillway crest. This level was apparently the original top of the dam. Fill material placed as part of the dam ties into the natural ground surface at a point near the end of these walls.

The existing highway bridge was constructed on top of the dam. The bridge abutments rest on the ends of the spillway. Concrete wingwalls were built on each end of both abutments to permit raising the grade of the highway. This increased the effective height of the dam to 5.5 feet above the spillway crest.

b. Location
Brant Lake Upper Dam is located at the southern end of Brant Lake in the Town of Horicon. The lake outlets into a small pond formed by the Brant Lake Lower Dam. This in turn empties into a tributary of the Schroon River.
c. Size Classification
This dam is 11.5 feet high and the reservoir has a storage capacity of 37,075 acre feet. Therefore, the dam is in the "intermediate" size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification
The dam is classified as "high" hazard due to the presence of 10 to 15 houses, several stores, the town hall and a fire station downstream of the dam.

e. Ownership
The dam is owned by the Town of Horicon.

f. Purpose of Dam
The dam is now used exclusively to maintain the water level of Brant Lake. The lake is used primarily for recreational purposes.

g. Design and Construction History
Based on the records available, the dam was constructed in 1908. No construction plans were available for the structure so it was not possible to determine the exact date of construction or the name of the designer.

h. Normal Operation Procedures
Water flows over an ungated spillway.

1.3 PERTINENT DATA

a. Drainage Area (acres) 26100

b. Discharge at Dam (cfs)
   Total at Maximum High Water (Top of Bridge/Roadway) 940
   Spillway @ Top of Dam 436

c. Elevation
   Top of Bridge/Roadway 804.5
   Top of Dam 803.5
   Spillway Crest 799
   Lake Surface Elevation (1966 USGS 7.5' quad) 799

d. Reservoir (acres)
   Top of Bridge/Roadway 1761 (est.)
   Surface Area at Top of Dam 1711 (est.)
   Surface Area at Crest of Spillway 1490

e. Storage Capacity (acre-feet)
   Top of Bridge/Roadway 38815
   Top of Dam 37075
   Spillway Crest 29875

f. Dam
   Earth dam with a concrete drop spillway in the center
   Dam length (ft) 34(+)
   Vertical Downstream Face on Concrete Section
   Earth portions of dam retained by wingwalls
   Crest Elevation 803.5
   Crest Width (ft) 30 (+)
g. Spillway
Type: Uncontrolled rectangular concrete drop structure having a 3.5 foot wide broad crested weir.

| Length (ft) | Weir | 14.8 |
SECTION 2: ENGINEERING DATA

2.1 DESIGN

a. Geology
The Brant Lake Upper Dam is located in the "Adirondack Highlands" physiographic province of New York State. Bedrock in this area consists of metasedimentary gneisses, marbles and quartzites. The superficial soils are the result of glaciations during the Cenozoic Era.

b. Subsurface Investigations
We were unable to locate any record of subsurface investigations taken for this structure. The only information available is from inspection reports dated August 13, 1913 and July 16, 1920, both of which suggest that the foundation soil is predominantly gravel.

2.2 CONSTRUCTION RECORDS
No construction records were available for this structure.

2.3 OPERATION RECORDS
There were no operating or water level records available for this structure.

2.4 EVALUATION OF DATA
The only data available for this report was from the Department of Environmental Conservation files. New York State Conservation Commission inspection reports from 1913 and 1920 were the sole source of subsurface and structural information on this structure. While the information available concerning this dam was quite limited, it appears to be adequate and reliable for the purpose of the Phase I Inspection.
SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General
Visual inspection of Brant Lake Upper Dam was conducted on October 24, 1978. The weather was clear and the temperature was in the forties. Water was flowing approximately 1 inch deep over the spillway at the time of the inspection.

b. Dam
This dam is a small structure with a highway running across the top. The spillway is in the center of the structure. A highway bridge spans this spillway. The bridge abutments rest on either end of the spillway. Beyond the ends of the spillway the soil serves both as dam embankment and roadway subgrade and is retained by the abutments and wingwalls. The wingwalls extend up to about 5.5 feet above the spillway crest, to the level of the roadway surface. The dam embankment ties into the natural soil at some point near the end of the wingwalls. The section of natural soil becomes very wide beyond the end of the walls and so will not be considered as part of the dam.

c. Spillway
The spillway itself consists primarily of a mass of concrete between the abutments. The entire block forms a broad crested weir 14.8 feet long by 3.5 feet wide. The concrete which was visible on the spillway block itself, appeared to be in satisfactory condition.

d. Highway Bridge
The highway bridge which carries a town road over the dam (New York State Bridge No. 3305250) is in poor condition. Concrete on the bridge is seriously deteriorated, especially on the upstream fascia where the coarse aggregate is exposed over almost half of the fascia. In addition to this deterioration, there is a small area under the east abutment which has been scoured due to flow over the spillway. The area is several feet long but only a couple of inches deep. It is near the point where the east wingwall on the upstream face ties into the abutment.

The Town of Horicon is now investigating the possibility of reconstructing this bridge. If they are able to secure funding, they plan to rebuild the bridge within a year. Should this bridge collapse, it might damage the dam or it could block the spillway.

e. Wingwalls
There are concrete wingwalls on either side of both abutments. The wall on the east side of the upstream face (northeastern wall) is in poor condition. The flow of water has cut into the face of the wall and has undermined the toe slightly. This wall retains an area where the soil section is widest and so it is unlikely that failure of the wall would endanger the dam or allow the water to flow around the end of the structure.

The wall on the west side of the upstream face is in satisfactory condition. This wall is composed of a concrete section about 4 feet high founded on a masonry block base which is also about 4 feet.
Surface runoff from the road and possibly scour which occurred at times of high water had eroded some of the soil beyond the end of the wall. In an apparent attempt to stop this erosion, sand bags had been placed at the end of the wall beginning at the toe and continuing about half the way up the slope. This erosion problem does not appear to be serious.

Both retaining walls on the downstream side appear to be in satisfactory condition.

f. Downstream Channel
Flow over the spillway falls into a boulder filled stream bed. This channel is only about 25 feet long. It then empties into the backwater pond formed by the lower dam. This Lower Dam is about one half mile downstream of the Upper Dam.

There is one area near the Lower Dam which appears to be at a lower elevation than the dam crest. In the event of a failure of the Upper Dam, the floodwaters would probably flow through this area affecting the post office and several houses.

3.2 EVALUATION OF OBSERVATIONS
Visual observations did not reveal any serious problems which would affect the immediate safety of the dam. However, the following deficiencies were noted:

1. Deterioration of concrete on the northeast wingwall.
2. Void under the concrete at the junction of the northeast wingwall and the east abutment.
3. Minor concrete spalling in the zone of aeration of the flowing water on several of the remaining concrete faces.
4. Deterioration of the concrete and generally poor condition of the highway bridge on top of the dam.
SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURE
Normal water surface elevation is at the crest of the spillway. Downstream flows are uncontrolled over this spillway. The reservoir provides 7,200 acre-feet of storage between the crest of the spillway and the top of the dam.

4.2 MAINTENANCE OF DAM
From the information available to us, we would assume that no maintenance has been done on the dam for a number of years.

4.3 WARNING SYSTEM IN EFFECT
No apparent warning system is present.

4.4 EVALUATION
Some maintenance is required on the dam, mainly to repair the deteriorated concrete surfaces.
SECTION 5: HYDROLOGIC HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS
Delineation of the contributing watershed to Brent Lake was made using both USGS 7.5 and 15 minute quadrangle sheets. The 40.78 sq. mi. rectangular-shaped watershed consists of forested and wooded lands throughout. Relief is relatively steep; the areas South and East of Brent Lake have slopes in the range of 10 to 35% and the areas Northeast to West of the Lake have slopes in the range of 45 to 70%. Mountain peaks occur at elevations 600 to 1300 feet above normal lake level.

5.2 ANALYSIS CRITERIA
No hydrologic/hydraulic information was available regarding the original design for this dam. Therefore, the analysis of the spillway capacity of the dam was performed using the Corps of Engineers HEC-1 computer program, incorporating the "Snyder Synthetic Unit Hydrograph" method and the "Modified Puls" flood routing procedure. The spillway design flood selected for analysis was the PMF in accordance with recommended guidelines of the U.S. Army Corps of Engineers.

5.3 SPILLWAY CAPACITY
The single, concrete drop spillway located in the center of the dam is uncontrolled, with a sloping crest 3.5 feet wide and 14.8 feet long.

Hydraulically, the spillway was analyzed operating under weir flow and orifice flow conditions. Weir flow was evaluated from the spillway crest upward to the bottom-side of the bridge beams spanning the spillway. Acting as a broad-crested weir, a discharge coefficient varying with head was used in the analysis. Orifice flow under low head conditions was evaluated for water surface elevations above the bottom side of bridge beams elevation. If the water surface overtops the bridge and roadway, a combination of orifice flow through the drop spillway and weir flow over the bridge and roadway was analyzed.

The spillway capacity of 940 cfs is not sufficient for discharging the peak outflow from the PMF. However, the spillway does have sufficient capacity for discharging the peak outflow from 1/2 the PMF. For this storm, the peak inflow is 12,400 cfs and the peak outflow is 390 cfs. For the PMF, the peak inflow is 24,800 cfs and the peak outflow is 5,200 cfs.

5.4 RESERVOIR CAPACITY
Normal reservoir capacity when the water surface is at the spillway crest elevation is 29,875 acre-feet including approximately 20,100 acre-feet of dead storage. Surchage storage capacity to the top-of-dam elevation is an additional 7,200 acre-feet, which is equivalent to a runoff depth of 3.3 inches over the drainage area. Additional storage capacity to the top-of-bridge/roadway elevation is an additional 1,740 acre-feet or 0.8 inches of runoff depth.

5.5 FLOODS OF RECORD
No information was available regarding the occurrence of the maximum known flood.
5.6 OVERTOPPING POTENTIAL
Analysis using the PMF indicates the spillway does not have sufficient discharge capacity. For the peak outflow of 5,200 cfs, the discharge capacity is 940 cfs. Hence, overtopping of the dam and also the bridge/roadway to computed depths of 4.5 feet and 3.5 feet respectively would occur for this outflow.

5.7 EVALUATION
This dam does have sufficient capacity to satisfactorily discharge the peak outflow from 1/2 the PMF without overtopping. It does not have sufficient capacity to satisfactorily discharge the PMF peak outflow. Therefore, the dam is regarded as having inadequate spillway capacity.
6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations
Visual observation of the dam did not reveal any signs of major distress. The spillway section, the abutments, and the wingwalls all appeared to be relatively stable. The only problem noted was the undermining near the point where the east abutment joins the northeast wingwall. Further undermining in this area could result in a stability problem.

b. Design and Construction Data
No design computations or other data were available on the structural stability of the structure. We were not able to locate any construction records.

c. Data Review and Stability Evaluation
The only data available concerning this structure was from the Department of Environmental Conservation files. The 1913 and 1920 N.Y. State Conservation Commission inspection reports were the sole source of structural and subsurface information. Due to the limited data, certain assumptions concerning the dam and its foundation conditions had to be made.

The structural analysis was based on a cross section of the spillway section shown on the 1920 inspection report. While substantial modifications have been made on top of the dam (placing additional fill and constructing the highway bridge), we believe that the concrete spillway section has remained essentially unchanged. It is also our belief that the concrete section extends beyond the ends of the spillway into the highway embankment. However, since we were unable to document this opinion, the spillway section was analyzed as acting independent of the abutments.

Stability analyses were performed for the following three conditions:

a. normal conditions with reservoir at the spillway crest
b. 1/2 PMF, water flowing over the spillway 4.3 feet deep.
c. reservoir at spillway crest with ice load of 5000 lb/ft.

The analyses performed (see Appendix B) indicate unsatisfactory stability against overturning and sliding for the forces assumed.

<table>
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<tr>
<th>CASE</th>
<th>FACTORS OF SAFETY</th>
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<tbody>
<tr>
<td></td>
<td>OVERTURNING</td>
</tr>
<tr>
<td>I. Reservoir Level at Spillway Crest; No ice</td>
<td>1.41</td>
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<tr>
<td>II. 1/2 PMF; Water flowing over Spillway to Depth of 4.3 Ft.; No ice</td>
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<tr>
<td>III. Reservoir at Spillway Crest; Ice Load of 5,000 lb/ft.</td>
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</table>
These factors of safety indicate a critical deficiency in the stability of this structure. However, the dam has withstood the test of time (having been in existence since about 1908). As stated above, there were no signs of major distress observed during the visual inspection. Therefore, it appears that the concrete section is deriving some support from the area beyond the ends of the spillway. Further investigation will be required to confirm this opinion.

d. Seismic Stability
The dam is located in Seismic Zone No. 2. Since the seismic coefficient is relatively small, a seismic stability analysis is not warranted.
SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety
The Phase I inspection of Brant Lake Upper Dam did not reveal any conditions which constitute a hazard to human life or property. The dam and earth embankments appear to be stable. Concrete on the bridge which crosses the dam and the northeast wingwall are deteriorated but failure of either of these would probably not affect the integrity of the structure.

b. Adequacy of Information
The information available was extremely limited. No construction plans, subsurface information, or hydrologic data were available. Therefore, the observations made during the visual inspection of the structure were the primary source of information on this structure.

c. Urgency
The condition of the dam and dike is considered to be a non-emergency situation not requiring immediate action to protect the downstream development.

The stability analyses indicate that the safety factors for all conditions analyzed are unsatisfactory. Further investigation of the structural stability is needed. This study should be commenced within six months of the date of final approval of this report.

7.2 RECOMMENDED MEASURES

a. Investigate the concrete spillway section to determine the exact limits and dimensions of the concrete, and using this information reassess the stability of the dam.

b. Fill the void which exists at the eastern end of the spillway under the bridge abutment.

c. Repair the deteriorated concrete on the northeastern wingwall.

d. Repair or replace the highway bridge crossing the dam.

e. Establish a program of periodic inspections of the dam.

f. Maintain a record of maintenance of the dam.

g. Develop and place in readiness a warning system for possible future use during periods of unusually heavy precipitation.
APPENDIX A

PHOTOGRAPHS
Dam (Circa. 1920)

Spillway Looking Upstream
Scour Hole At East Abutment

Concrete Deterioration in Zone of Aeration
Top of Dam at West Abutment

Concrete Deterioration on Bridge Fascia
APPENDIX B

ENGINEERING DATA CHECKLIST
<table>
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<th>Item</th>
<th>Plans</th>
<th>Details</th>
<th>Typical Sections</th>
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<td>Seepage Studies</td>
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<td>DAM REPORT - APPLICATIONS</td>
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<td>Post-Construction Engineering</td>
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<td>Studies and Reports</td>
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<td>Accidents or Failure of Dam</td>
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<td>Operation and Maintenance Records</td>
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<td>Operation Manual</td>
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APPENDIX C

VISUAL INSPECTION CHECKLIST
VISUAL INSPECTION CHECKLIST

1) Basic Data
   a. General
   Name of Dam  BRAHIT LAKE UPPER DAM
   I.D. #  NY-158  (#1452 - UPPER HUDSON)
   Location: Town HORIZON  County (W)ARREN
   Stream Name  UNNAMED
   Tributary of  SCHROON RIVER
   Longitude (W), Latitude (N)  W 73° 44' 57"  N 43° 40' 39"
   Hazard Category  C
   Date(s) of Inspection  10/24/78
   Weather Conditions  CLEAR, SUNNY, 40°

   b. Inspection Personnel  R. WARBENDER  W. LYNICK

   c. Persons Contacted  E. BUMP (TOWN SUPERVISOR)  518-494-3647  TOWN HALL

   d. History:
      Date Constructed  1908
      Owner  TOWN OF HORIZON
      Designer  UNKNOWN
      Constructed by  UNKNOWN

2) Technical Data
   Type of Dam  STONE-BLOCK MASONRY AND CONCRETE
   Drainage Area  2000 ACRES
   Height  11.5'  Length  34' (+)
   Upstream Slope  N/A  Downstream Slope  N/A
      CONCRETE DROP STRUCTURE
2) **Technical Data (Cont'd.)**

External Drains: on Downstream Face **N/A** @ Downstream Toe **N/A**

**Internal Components:**

- Impervious Core: **NONE**
- Drains: **NONE**
- Cutoff Type: **NONE**
- Grout Curtain: **NONE**
3) **Embankment**

Earth backfill contained by bridge abutments and wingwalls; paved road forms the top of the backfill.

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<table>
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<tbody>
<tr>
<td>a. Crest</td>
<td></td>
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<tr>
<td>(1) Vertical Alignment</td>
<td><strong>Satisfactory</strong></td>
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<tr>
<td>(2) Horizontal Alignment</td>
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<td>(3) Surface Cracks</td>
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<td>(4) Miscellaneous</td>
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<td>b. Slopes</td>
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<tr>
<td>(1) Undesirable Growth or Debris, Animal Burrows</td>
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<td>(2) Sloughing, Subsidence or Depressions</td>
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<td>(3) Slope Protection</td>
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<td>(4) Surface Cracks or Movement at Toe</td>
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<td>(5) Seepage</td>
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<td>(6) Condition Around Outlet Structure</td>
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4) **Instrumentation**

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<td>3. Weirs</td>
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<td>4. Piezometers</td>
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5) **Reservoir**

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<tbody>
<tr>
<td>a. Slopes</td>
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<tr>
<td>b. Sedimentation</td>
<td><strong>NOT EVIDENT</strong></td>
</tr>
</tbody>
</table>
6) Spillway(s) (including tail race channel)

- 2 Bent Pipes (2 in. length) - Fencing the remains of former flashboard supports

a. General
   Foundation - Natural Channel, Boulders & Rock in Tailwater Area

b. Principle Spillway
   Concrete Drop Structure
   West Abutment:
   - Stone Backs - Satisfactory
   - Some Concrete Fascia Cracks
   - Some Concrete Spalling (2 3/4 in. deep) near drop
   East Abutment:
   - Northeast Wingwall @ Abutment - Hole / undermined @ water surface
   - Fascia Concrete - Spalled (2 1/2 - 3 ft)
   - Downstream of drop - Concrete has some surface spalling

- Concrete Spalling - occurs in or near zone of aeration of flowing water - on all surfaces

c. Emergency or Auxiliary Spillway
   N/A

d. Condition of downstream channel @ spillway:
   - Satisfactory
   - Boulders in streambed
   - Lower Dam Reservoir - backwater depth = 1.5'

e. Stability of Channel side/slopes
   N/A
7) Downstream Channel

Reservoir - Brant Lake Lower Dam

a. Condition (debris, etc.) None

b. Slopes Satisfactory

c. Approximate number of homes
   6 residences; elementary school; town hall; fire station; 3 gasoline stations; town library; 14 residences downstream of Brant Lake Lower Dam

8) Miscellaneous
9) Structural
   a. Concrete Surfaces
      SEE c.b - PRINCIPAL SPILLWAY

   b. Structural Cracking
      NONE APARENT

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

   d. Junctions with Abutments
      SATISFACTORY

   e. Drains - Foundation, Joint, Face
      N/A

   f. Water passages, conduits, sluices
      N/A

   g. Seepage or Leakage
      NONE
h. Joints - Construction, etc. 

__________________________________________________________

i. Foundation  Boulders & rock in streambed below drop 

__________________________________________________________

j. Abutments  EAST BRIDGE ABUTMENT - Hole & undermined @ water surface 
CONCRETE CRACKED; REPAIRS DUE IN 1979 

k. Control Gates  NONE 

__________________________________________________________

l. Approach & Outlet Channels  N/A 

__________________________________________________________

m. Energy Dissipators (plunge pool, etc.)  NONE 

__________________________________________________________

n. Intake Structures  N/A 

__________________________________________________________

o. Stability 

__________________________________________________________

p. Miscellaneous 

__________________________________________________________
APPENDIX D

HYDROLOGIC/HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS
<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>Item 2</td>
<td>Item 3</td>
<td>Item 4</td>
</tr>
<tr>
<td>Item 5</td>
<td>Item 6</td>
<td>Item 7</td>
<td>Item 8</td>
</tr>
<tr>
<td>Item 9</td>
<td>Item 10</td>
<td>Item 11</td>
<td>Item 12</td>
</tr>
<tr>
<td>Item 13</td>
<td>Item 14</td>
<td>Item 15</td>
<td>Item 16</td>
</tr>
<tr>
<td>Item 17</td>
<td>Item 18</td>
<td>Item 19</td>
<td>Item 20</td>
</tr>
</tbody>
</table>

- **Note:** The table is handwritten and contains multiple columns with entries spanning across them.
# Check List for Dams

## Hydrologic and Hydraulic Engineering Data

**Area-Capacity Data:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Elevation (ft.)</th>
<th>Surface Area (acres)</th>
<th>Storage Capacity (acre-ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Top of Dam (bottom of bridge girder)</td>
<td>803.5</td>
<td>1711 (est.)</td>
<td>37075 (est.)</td>
</tr>
<tr>
<td>2) Design High Water (Max. Design Pool)</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Auxiliary Spillway Crest</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Pool Level with Flashboards</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Service Spillway Crest</td>
<td>799</td>
<td>1490</td>
<td>29875 (est.)</td>
</tr>
</tbody>
</table>

**Discharges**

<table>
<thead>
<tr>
<th>Description</th>
<th>Volume (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Average Daily</td>
<td>NA</td>
</tr>
<tr>
<td>2) Spillway @ Maximum High Water (Top of Bridge Elev.)</td>
<td>940</td>
</tr>
<tr>
<td>3) Spillway @ Top of Dam Elev.</td>
<td>436</td>
</tr>
<tr>
<td>4) Spillway @ Auxiliary Spillway Crest Elevation</td>
<td>NA</td>
</tr>
<tr>
<td>5) Low Level Outlet</td>
<td>NA</td>
</tr>
<tr>
<td>6) Total (of all facilities) @ Maximum High Water</td>
<td>940</td>
</tr>
<tr>
<td>7) Maximum Known Flood</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
CREST:

Type: **STONE-BLOCK MASONRY AND CONCRETE; EARTH BACKFILL BEHIND BRIDGE ABUTMENTS**

Width: 30' **BRIDGE ABUTMENT**  Length: 34' **EAST ABUTMENT WALL**

Spillover **PRINCIPAL SPILLWAY**

Location **CENTER OF DAM: BETWEEN THE BRIDGE ABUTMENTS**

---

**SPILLWAY:**

<table>
<thead>
<tr>
<th><strong>PRINCIPAL</strong></th>
<th><strong>EMERGENCY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation: 803.5</td>
<td><strong>Elevation</strong></td>
</tr>
<tr>
<td><strong>CONCRETE VERTICAL DROP STRUCTURE</strong></td>
<td>Type: <strong>NONE</strong></td>
</tr>
<tr>
<td>Width: 3.5'</td>
<td><strong>Width</strong></td>
</tr>
<tr>
<td><strong>Type of Control</strong></td>
<td><strong>Controlled:</strong></td>
</tr>
<tr>
<td>Uncontrolled</td>
<td>Controlled:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>POSSIBLY USED AT ONE TIME</strong></td>
<td>Type</td>
</tr>
<tr>
<td>3 <strong>RENT STEEL HOSES IN CREST</strong> (Flashboards:  )</td>
<td><strong>Number</strong></td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td><strong>Invert Material</strong></td>
</tr>
<tr>
<td>14.8'</td>
<td></td>
</tr>
<tr>
<td>Anticipated Length of operating service</td>
<td></td>
</tr>
<tr>
<td><strong>N/A</strong></td>
<td>Chute Length</td>
</tr>
<tr>
<td><strong>0'</strong></td>
<td>Height Between Spillway Crest</td>
</tr>
<tr>
<td>&amp; Approach Channel Invert (Weir Flow)</td>
<td></td>
</tr>
</tbody>
</table>
OUTLET STRUCTURES/EMERGENCY DRAWDOWN FACILITIES:

<table>
<thead>
<tr>
<th>Type</th>
<th>Gate</th>
<th>Sluice</th>
<th>Conduit</th>
<th>Penstock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Elevations:
- Entrance Invert
- Exit Invert
- Tailrace Channel: Elevation

HYDROMETEROLOGICAL GAGES:

<table>
<thead>
<tr>
<th>Type</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location:</td>
<td></td>
</tr>
<tr>
<td>Records:</td>
<td></td>
</tr>
</tbody>
</table>
  - Date:      
  - Max. Reading: 

FLOOD WATER CONTROL SYSTEM:

- Warning System: NONE

Method of Controlled Releases (mechanisms):

- NONE

OTHER: 1) **BRANT LAKE (AS A WATER RESOURCE) IS CLASSIFIED “AA SPECIAL”**
DRAINAGE AREA: 26,100 ACRES 40.78 SQ MILES

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: HEAVILY WOODED & FORESTED
Terrain - Relief: RELATIVELY STEEP SLOPES; MOUNTAIN PEAKS @ ELEV. 1400 - 3100
Surface - Soil: ROCK & GRAVEL

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

N/A

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

N/A

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

NONE

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

Location:NONE

Elevation:

Reservoir:

Length @ Maximum Pool APPROXIMATELY 5 (Miles)

Length of Shoreline (@ Spillway Crest) APPROXIMATELY 1.2 (Miles)
<table>
<thead>
<tr>
<th>JOB</th>
<th>SHEET NO.</th>
<th>CHECKED BY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRANT LAKE H &amp; H - PHASE I RPT.</td>
<td>1/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DRAINAGE AREAS - SUMMARY</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>UPPER DAM</th>
<th>LOWER DAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRAINAGE AREA:</td>
<td>26100 ACRES</td>
<td>26240 ACRES</td>
</tr>
<tr>
<td>USGS QUAD:</td>
<td>40.7B SQ.M.</td>
<td>41.0 SQ.M.</td>
</tr>
<tr>
<td>SURFACE AREA:</td>
<td>1490 ACRES</td>
<td>5 ACRES</td>
</tr>
</tbody>
</table>
## NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

### PROJECT GRID

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>DRAINAGE AREAS - PLANIMETERED</th>
<th>COMPUTED BY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOB: BRANT LAKE - PHASE I RPT.</td>
<td></td>
<td>WCL</td>
<td>12/8/78</td>
</tr>
<tr>
<td>SHEET NO.</td>
<td>2/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHECKED BY</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### USGS QUAD:
- Entire Area

#### SCALE:
- 1:62500

#### UPPER DAM:
- **Height**: 41.91 ft
- **Dr. Area**: 260.99 acres
- **Volume**: 40.78 cfs

#### LOWER DAM:
- **Height**: 41.91 ft
- **Dr. Area**: 362.98 acres
- **Volume**: 41.09 cfs

#### SURFACE - LAKE:
- **Area**: 2.38 acres
- **Volume**: 78.58 cfs

#### SURFACE - POND:
- **Area**: 0.02 acres
- **Volume**: 0.97 cfs

#### AREA:
- **Total Area**: 4.59 acres
- **Total Volume**: 4.67 cfs

#### SCALE:
- 1:62500
- 1" = 520.83 ft

1 sq. in. = 0.0645 ft<sup>2</sup>

= 622.74 acres

= 0.973 sq. miles
## PROJECT GRID

<table>
<thead>
<tr>
<th>JOB</th>
<th>SUBJECT</th>
<th>SHEET NO.</th>
<th>CHECKED BY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brant Lake H &amp; H - Phase I Rpt.</td>
<td>DRAINAGE AREAS - PLANIMETERED</td>
<td>3/3</td>
<td>WCL</td>
<td>12/3/78</td>
</tr>
</tbody>
</table>

### USGS QUAD:
- AREA ≤ 360" 00" and 73" 35".
  - SCALE: 1:24,000

### Upper Dam Surface Area - Lake
- 11.15 in³
- \[ \frac{5.05}{16.20 \text{ in}^3} \] (14.90)
- 14.35 acres

### Lower Dam Surface - Pond
- 0.05 in³
- 0.6 acres

### Lower Dam Partial Drainage Area
- 1.50 in³
- (160)
- 138 acres

### Scale:
- 1" = 24,000
- 1" = 2000 ft
- 1 sq in = 4,000,000 sq ft
- 1 sq ft = 94.93 acres
- 1 sq mile = 0.143 sq miles
# Project Grid

**Job:** Brant Lake H-1 H - Phase I Rpt.  **Sheet No.:** 4  
**Subject:** Stage - Storage Data  
**Computed by:** UCL  **Date:** 12/8/78

**Ref:** NYS DEC Information Leaflet No. 56  
**Brant Lake Depth Contours:**

**Given:**  
- **Area:** 1357 Acres
- **Elev:** 301
- **Length:** 5 Miles

**Scale:** 1" = Approx. 0.5 Mile

**Use:** 1" = 2650'

## Planimetered Areas:

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Area (acres)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10.07</td>
<td>100</td>
</tr>
<tr>
<td>-10</td>
<td>4.73</td>
<td>47</td>
</tr>
<tr>
<td>-20</td>
<td>4.60</td>
<td>48</td>
</tr>
<tr>
<td>-30</td>
<td>2.27</td>
<td>22</td>
</tr>
<tr>
<td>-40</td>
<td>0.93</td>
<td>9</td>
</tr>
<tr>
<td>-50</td>
<td>0.45</td>
<td>4</td>
</tr>
<tr>
<td>-60</td>
<td>0.10</td>
<td>1</td>
</tr>
</tbody>
</table>

**Given Scale and Planimetered Areas Do Not Agree With the Given Area of the Lake (1450 Acres vs. 1357 Acres)**

**Therefore:** Apply the Above Percentages to the USGS Quad Surface Area of 1490 Acres (90% 1/5)

## Lake - Surface Areas:

<table>
<thead>
<tr>
<th>Elev</th>
<th>Area (Acres)</th>
<th>Elev</th>
<th>Area (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1490</td>
<td>-40</td>
<td>134</td>
</tr>
<tr>
<td>-10</td>
<td>998</td>
<td>-50</td>
<td>100</td>
</tr>
<tr>
<td>-20</td>
<td>715</td>
<td>-60</td>
<td>15</td>
</tr>
<tr>
<td>-30</td>
<td>328</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Brant Lake

General
Tourist accommodations available
Boats available

Location
Northern Warren County, five miles northeast of the Village of Chestertown

Physical Features
Area: 1,357 acres
Maximum depth: 60 feet
Elevation: 801 feet
Length: Approximately 5 miles
Maximum width: Approximately 1 mile

Chemical Characteristics
pH: Surface—alkaline
deeper waters—acid
Oxygen: Excellent, except for deepest waters

Fur Bearers in Vicinity
Beaver
Otter
Mink
Raccoon
Muskrat

Fish Present
Brown bullhead
Chain pickerel
Yellow perch
Pikeperch
Smallmouth bass
Largemouth bass
Yellowbelly sunfish
Pumpkinseed
Rock bass
Golden shiner
Bluntnose minnow
Banded killifish

Hunting in Vicinity
Deer
Grouse
Bear
Snowshoe Rabbit
Bobcat

—Robert G. Zellios
<table>
<thead>
<tr>
<th>JOB</th>
<th>BRANT LAKE H &amp; H - PHASE 1 RPT</th>
<th>SHEET NO.</th>
<th>CHECKED BY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJECT</td>
<td>STORAGE CAPACITY</td>
<td>SEE SHT</td>
<td>WCL</td>
<td>DATE</td>
</tr>
<tr>
<td></td>
<td>ELEV.</td>
<td>SURFACE AREA (ACRES)</td>
<td>STORAGE (AC-ET)</td>
<td>STORAGE (AC-ET)</td>
</tr>
<tr>
<td>739</td>
<td>0</td>
<td>1480</td>
<td>1243.0</td>
<td>29875</td>
</tr>
<tr>
<td>739</td>
<td>-10</td>
<td>995</td>
<td>8565</td>
<td>17435</td>
</tr>
<tr>
<td>739</td>
<td>-20</td>
<td>715</td>
<td>5215</td>
<td>6870</td>
</tr>
<tr>
<td>739</td>
<td>-30</td>
<td>328</td>
<td>2210</td>
<td>3655</td>
</tr>
<tr>
<td>739</td>
<td>-40</td>
<td>134</td>
<td>970</td>
<td>1345</td>
</tr>
<tr>
<td>739</td>
<td>-50</td>
<td>40</td>
<td>375</td>
<td>275</td>
</tr>
<tr>
<td>739</td>
<td>-60</td>
<td>15</td>
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</table>
**PROJECT GRID**

<table>
<thead>
<tr>
<th>JOB</th>
<th>BRANT LAKE H&amp;H - PHASE I RPT</th>
<th>SHEET NO.</th>
<th>CHECKED BY</th>
<th>DATE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>H&amp;H ANALYSIS USING HEC-1</th>
<th>COMPUTED BY</th>
<th>WCL</th>
<th>DATE</th>
</tr>
</thead>
</table>

**DAM HT:** 7' (CREST TO BASE)  
**STORAGE:** < 50,000 AC. FT.  
**HAZARD POTENTIAL:** HIGH  

- **H&H EVALUATION:**  
  - PMF STORM  
  - 1/2 PMF  

**[11.5'] TO BOTTOM OF BRIDGE STRINGER**  
**[12.5'] TO TOP PAVEMENT ON BRIDGE ROADWAY ACTING AS WEIR**
<table>
<thead>
<tr>
<th>JOB</th>
<th>SHEET NO.</th>
<th>CHECKED BY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brant Lake H4 H - Phase I RPT</td>
<td>7/1</td>
<td>WCL</td>
<td>12/11/78</td>
</tr>
<tr>
<td>SUBJECT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMP Rainfall - NWS HR #33</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LAT: N 43° 48' 45"  
LONG: W 73° 40'

ZONE 1: (ALL SEASON)

PMP = 17.5" (24 HR - 200 SQ MILE)

For Drainage Area = 40.78 sq mi.

<table>
<thead>
<tr>
<th>Mean Hr</th>
<th>Rainfall (in)</th>
<th>PMP (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>94</td>
<td>114.45</td>
</tr>
<tr>
<td>10</td>
<td>108</td>
<td>18.9</td>
</tr>
<tr>
<td>24</td>
<td>118</td>
<td>20.45</td>
</tr>
<tr>
<td>48</td>
<td>121</td>
<td>22.05</td>
</tr>
</tbody>
</table>

Transposition Factor:

\[ T.F. = \frac{1 - 0.3008}{(P.H.A.)^{0.1718}} \]

\[ T.F. = \frac{1 - 0.3008}{(40.78)^{0.1718}} = 1 - 0.154 \]

T.F. = 0.846
# Project Grid

### Job: Lake H - Phase I RPT

<table>
<thead>
<tr>
<th>Subject</th>
<th>Checks By</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snyder UH Computations - Input for HEC-1</td>
<td>WCL</td>
<td>12/11/78</td>
</tr>
</tbody>
</table>

### Computed Values:

- **L**:
  - Dam - 0
  - End Lake - 14.3"
  - (320') Pump Outlet - 18.1"
  - Branch - 19.5"
  - 45'45" - 22.4"  
    - 2000' - 44300'  
    - 3.48 MILES
  - 45'45" - 0
  - Pond Outlet - 3.1"
  - Edge Basin - 4.45"  
    - 5208' - 23175'  
    - 4.39 MILES

- \( L = 12.87 \text{ MILES} \)
- \( L_{oa} = 5.0" \)  
  - @ \( 1" = 5208' = 39105' \)
  - \( L_{oa} = 5.52 \text{ MILES} \)

### Lag Time:

- \( t_p = C_e \left( \frac{L_{oa}}{L} \right)^{0.5} \)
- \( \text{Ave } C_e = 2.0 \)
- \( \text{Use } C_e = 2.5 \)

- \( t_p = (2.5)(2.87\cdot5.52)^{0.5} \)
- \( t_p = 8.98 \text{ HRS} \)

### Unit Rainfall Duration:

- \( t_r = t_p \cdot \frac{5.5}{8.98} \cdot 1.63 \text{ HRS} \)
  - \( t_r = 2 \text{ HR HYDROGRAPH} \)

### Adjusted Lag Time:

- \( t_{pa} = t_p + 0.25(t_r - t_p) \)
- \( t_{pa} = 8.98 + 0.25(2 - 8.98) \)
- \( t_{pa} = 9.07 \text{ HRS} \)  
  - \( \text{Use } C_p = 0.625 \)
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB: BRANT LAKE H4H - PHASE I RP7

SHEET NO.: 9

CHECKED BY: WCL

DATE: 12/12/73

SUBJECT: STAGE - DISCHARGE DATA FOR SPILLWAY

75' BROAD-CRESTED WEIR

NORTH BRIDGE STRINGER

100' BROAD-CRESTED WEIR

ELEV. 793

USGS - 1966 QUAD

BOULDERS

3.5'

0.5'

793.5

790

790.05

1.5

798.5

TO BRANT LAKE LOWER DAM

BRIDGE ROADWAY

BOTTOM OF STRINGER

804.5

803.5

4.5'

4.95'

DAM
**PROJECT GRID**

<table>
<thead>
<tr>
<th>JOB</th>
<th>SHEET NO.</th>
<th>CHECKED BY</th>
<th>DATE</th>
<th>COMPUTED BY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRETT LAKE H 1/2 H - PHASE I RPT</td>
<td>10/1</td>
<td>-</td>
<td>-</td>
<td>WCL</td>
<td>12/12/73</td>
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**SUBJECT**

STAGE - DISCHARGE DATA FOR SPILLWAY

**NOTE**

"HANDBOOK OF HYDRAULICS" 5TH ED.

**FORMULA**

\[ Q = CLH^{3/2} \]

**EQUATION**

\[ L = 14.8' \]

**Table**

<table>
<thead>
<tr>
<th>H</th>
<th>C</th>
<th>( H^{3/2} )</th>
<th>( Q = CLH^{3/2} )</th>
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<tr>
<td>0.5</td>
<td>2.62</td>
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<td>1.837</td>
<td>72.3</td>
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<td>2.828</td>
<td>113</td>
</tr>
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<td>2.77</td>
<td>3.953</td>
<td>162</td>
</tr>
<tr>
<td>3.0</td>
<td>2.82</td>
<td>5.194</td>
<td>217</td>
</tr>
<tr>
<td>3.5</td>
<td>2.86</td>
<td>6.543</td>
<td>277</td>
</tr>
<tr>
<td>4.0</td>
<td>2.93</td>
<td>8.0</td>
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<td>3.087</td>
<td>9.546</td>
<td>436</td>
</tr>
<tr>
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<td>-</td>
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<tr>
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</table>

**Diagram**

- **ORIFICE FLOW**
- **WEIR FLOW**
- **BOTTOM OF STRINGER**

\( e = 25.107 \)

\( \text{AVE } C = 2.79 \)
## Project Grid

**Job:** Grant Lake H - Phase I Int  
**Subject:** Stage - Discharge Data for Spillway  
**Sheet No.:** 11  
**Checked By:**  
**Computed By:** WCW  
**Date:** 12/10/73

### Orifice Flow Under Low Head

**Elev.**: 303.5 - 304.5  
**Tailwater Elev. @**: 173.5

- **Q** = \( \frac{3}{2} L \sqrt{2g \left( h_1^{3/2} - h_2^{3/2} \right)} \)
- **L** = 14.8
- **g** = 32.2
- \( \sqrt{g} = 8.025 \)
- **h_1** = 4.5

<table>
<thead>
<tr>
<th>HDG @ ELEV</th>
<th>h_1</th>
<th>h_2</th>
<th>h_2^{3/2}</th>
<th>h_1^{3/2}</th>
<th>Q</th>
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<tr>
<td>304.0</td>
<td>0.5</td>
<td>5530</td>
<td>5.0</td>
<td>11.18</td>
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<td>2.828</td>
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### Weir Flow

**Q** = \( \frac{3}{2} L \sqrt{2g \left( h_2^{3/2} - h_1^{3/2} \right)} = Q = CA \sqrt{2g \left( h \right)} \)

- **CA** = \( C \left( L \times 4.5 \right) \)
- **L** = 14.8
- **g** = 45.0
- **A** = 38.12 ft²
<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>STAGE</th>
<th>DISCHARGE</th>
<th>DATA</th>
<th>@ DAM</th>
<th>OVER ROADWAY</th>
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<tr>
<td>ROAD - CRESTED WEIR ELEV. 104.5</td>
<td>0.5</td>
<td>.3536</td>
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<td>1.0</td>
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REF: KING & BRATER, "HANDBOOK OF HYDRAULICS" SPVL ED.

Q = C L H^{3/6}

C = 3.087 (MAX)

L = 190'

H H^20 Q
<table>
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<td>SUBJECT</td>
<td>STAGE - DISCHARGE DATA</td>
<td>SUMMARY</td>
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<td>ELEV</td>
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<td>ORIFICE</td>
<td>WEIR</td>
<td>TOTAL</td>
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<td></td>
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<tr>
<td>TOP OF DAM</td>
<td>803.5</td>
<td>436 (OR)</td>
<td>756</td>
<td>USE 436</td>
</tr>
<tr>
<td>804</td>
<td></td>
<td></td>
<td>957</td>
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# Project Grid

**Job:** Brant Lake H.H. - Phase 1 R/P

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<th>AREA</th>
<th>Δ STORAGE</th>
<th>Δ STORAGE (AC·FT)</th>
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<td>790</td>
<td>1146</td>
<td>3016</td>
<td>30450 (Base of Dam)</td>
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<tr>
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<td>1490</td>
<td>7202</td>
<td>29375</td>
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<td>803.5</td>
<td>1741</td>
<td>1736</td>
<td>37077 (37075)</td>
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<tr>
<td>804.5</td>
<td>1761</td>
<td>4556</td>
<td>33313</td>
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<tr>
<td>807</td>
<td>1884</td>
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Δ AREA/FT ELEV. = 49 AC/FT
BRANT LAKE UPPER DAM NY-158 UPPER HUUSON-652
PMF WITH RATIOS--ANALYSIS USING SNYDER METHOD

JOB SPECIFICATION

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<th>NMIN</th>
<th>IDAY</th>
<th>IHR</th>
<th>I1IN</th>
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<th>IPLT</th>
<th>IPRT</th>
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JOPER  NMT  5   0

MULTI-PLAN ANALYSES TO BE PERFORMED

NPLAN= 1 NRTQ= 2 LRTQ= 1

RTIQS= 0.50 1.00

*******

SUB-AREA RUNOFF COMPUTATION

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<tr>
<th>ISTAQ</th>
<th>ICOMP</th>
<th>IECON</th>
<th>ITAPE</th>
<th>JPLT</th>
<th>JPRT</th>
<th>INAME</th>
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HYDROGRAPH DATA

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<th>IUMG</th>
<th>TAREA</th>
<th>SNAP</th>
<th>TRSDA</th>
<th>TRSPC</th>
<th>RATIO</th>
<th>ISNOW</th>
<th>ISAME</th>
<th>LOCAL</th>
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PRECIP DATA

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TRSPC COMPUTED BY THE PROGRAM IS 0.844

LOSS DATA

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<th>ERAIN</th>
<th>STRKS</th>
<th>RTIDK</th>
<th>STRTL</th>
<th>CNSTL</th>
<th>ALSMX</th>
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UNIT HYDROGRAPH DATA

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APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE: TC= 5.19 AND R= 4.21 INTERVALS

UNIT HYDROGRAPH 26 END-OF-PERIOD ORDINATES. LAG= 9.00 HOURS, CP= 0.62 VOL= 1.00

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<th>1624</th>
<th>1808</th>
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END-OF-PERIOD FLOW

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<th>EXCS</th>
<th>COMP</th>
<th>Q</th>
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</tr>
<tr>
<td>STA</td>
<td>CFS</td>
<td>6-HOUR</td>
<td>24-HOUR</td>
<td>72-HOUR</td>
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**HYDROGRAPH AT STA**

**FOR PLAN 1, RTIO 1**

<table>
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<th>STA</th>
<th>CFS</th>
<th>6-HOUR</th>
<th>24-HOUR</th>
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<th>TOTAL VOLUME</th>
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**HYDROGRAPH AT STA**

**FOR PLAN 1, RTIO 2**

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<td>493</td>
<td>400</td>
<td>327</td>
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**SUM 18.64 15.06 205007.**
**HYDROGRAPH ROUTING**

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<th>AMSSK</th>
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**STORAGE**

```
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```

**OUTFLOW**

```
OUTFLOW= 0. 0. 436. 942. 3592. 0. 0. 0. 0. 0. 0. 0.
```

**STATION 1 PLAN 1 RTID 1**

```
STATION 1 PLAN 1 RTID 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.      41.     125.    190.    242.    281.    0.      0.      0.
332.    329.    326.    323.    320.    317.    315.    312.    309.    307.    306.    0.
304.    301.    299.    296.    294.    291.    289.    286.    284.    281.    280.    0.
279.    276.    274.    272.    269.    267.    265.    263.    260.    258.    256.    0.
256.    254.    252.    250.    248.    246.    243.    241.    239.    237.    235.    0.
```

**STOR**

```
STOR
20657. 20663. 20670. 20676. 20683. 20690. 20696. 20703. 20709. 20710. 20716. 0.
20723. 20729. 20736. 20743. 20749. 20759. 20785. 20846. 20984. 21310. 0.
22008. 23216. 24909. 26383. 28844. 30555. 31937. 33021. 33865. 34518. 0.
30018. 33998. 35685. 33998. 36052. 36161. 36233. 36278. 36301. 36307. 0.
36299. 36296. 36253. 36220. 36179. 36132. 36078. 36023. 35969. 35913. 0.
35061. 35808. 35755. 35704. 35652. 35601. 35551. 35501. 35451. 35402. 0.
35354. 35361. 35358. 35211. 35165. 35119. 35073. 35028. 34983. 34939. 0.
34895. 34852. 34809. 34766. 34724. 34682. 34641. 34600. 34560. 34520. 0.
34480. 34441. 34402. 34363. 34325. 34288. 34250. 34213. 34177. 34140. 0.
34104. 34069. 34034. 33999. 33964. 33930. 33863. 33830. 33780. 33797. 0.
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**PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME**

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<td>193.</td>
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<tr>
<td>389.</td>
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<td>763.</td>
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<td>23083.</td>
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**STATION 1 PLAN 1 RTID 2**

```
STATION 1 PLAN 1 RTID 2
0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.      0.      0.      0.      195.    430.    1759.   3147.   4091.   4692.   5034.   0.
5181.  5188.  5093.  4927.  4714.  4472.  4213.  3947.  3681.  3421.  0.
3170.  2930.  2702.  2488.  2283.  2092.  1910.  1742.  1590.  1452.  0.
1325.  1212.  1103.  1013.  935.   895.   856.   760.   620.   785.   752.   0.
720.   599.   661.   634.   608.   563.   559.   537.   515.   495.   475.   0.
```

**AC-FT**

```
AC-FT
```
**PEAK FLOW SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS**

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<td>0</td>
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<tr>
<td>ROUTED TO</td>
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<td>1</td>
<td>389</td>
<td>5188</td>
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<tr>
<td></td>
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APPENDIX E

STRUCTURAL STABILITY COMPUTATIONS
PROJECT GRID

STABILITY ANALYSIS

CASE 1 NORMAL CONDITIONS

DRIVING FORCES

\[ D_1 = \frac{1}{2} (55)(1.33)(9)^2 = 735 \]
\[ D_2 = \frac{1}{2} (62.9)(9)^2 = 2527 \]
\[ D_3 = \frac{1}{2} (62.9)(6) = 112.3 \]
\[ D_4 = \frac{1}{2} (62.9)(8.3) - (62.9)(3) = 112.3 \]

RESISTING FORCES

\[ R = (4.5)(9)(150) = 6075 \]
\[ R_1 = \frac{1}{3} (15)(9)(150) = 1012 \]
\[ R_2 = \frac{1}{3} (6.9)(3)(55) = 47.3 \]
\[ R_4 = \frac{1}{3} (55)(3)(3) = 742 \]
\[ R_5 = \frac{1}{3} (62.9)(3)^2 = 281 \]
PROJECT GRID

**SUBJECT**
Stability Analysis

**COMPUTED BY**
RLW

**DATE**
1/15/79

**CASE I (Cont.)**

**DRIVING MOMENTS**

\[4527(3) + 735(3) + (1123)(3) + (1123)(4) = 17647\]

**RESISTING MOMENTS**

\[6075(3.75) + 1012(1) + 742(1) + 281(1) + 41.3(1.17) = 24823\]

**F.S.**

\[\frac{24823}{17647} = 1.41\]

**SLIDING**

**DRIVING FORCES**

\[2527 + 735 = 3262\]

**RESISTING FORCES**

\[281 + 742 + 0.5[(6075 + 1012 + 41.3) - (582 + 735)] = 3462\]

**F.S.**

\[\frac{3462}{3262} = 1.06\]
**Project Grid**

**Case 2**

**Stability Analysis**

**Driving Forces**

\[ D_1 = (4.3)(62.4)(9) = 2415 \]
\[ D_2 = \frac{1}{2}(62.4)(9) = 255.3 \]
\[ D_3 = \frac{1}{3}(55)(1.3)(9) = 73.5 \]
\[ D_4 = (62.4)(3)(6) = 112.3 \]
\[ D_5 = \frac{1}{3}(6)(62.4)(13.3 - 3) = 1928 \]

**Resisting Forces**

\[ R_1 = \frac{1}{2}(1.5)(9)(150) = 6075 \]
\[ R_2 = \frac{1}{2}(1.5)(9)(150) = 412 \]
\[ R_3 = \frac{1}{3}(55)(3)(55) = 41.3 \]
\[ R_4 = (55)(3)(3) = 742 \]
\[ R_5 = \frac{1}{3}(62.4)(3) = 281 \]
<table>
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<th>DATE</th>
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<td>CASE 2 (CONT.)</td>
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<tr>
<td><strong>DRIVING MOMENTS</strong></td>
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<tr>
<td>(2415(4.5) + 2527(3) + 735(3) + 1123(3) + 1928(4) = 31735)</td>
<td></td>
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<td><strong>RESISTING MOMENTS</strong></td>
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<td></td>
</tr>
<tr>
<td>(6075(3.75) + 1012(1) + 742(1) + 281(1) + (1/13)(7) = 24823)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(F.S. = \frac{24823}{31735} = .78)</td>
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<tr>
<td><strong>SLIDING</strong></td>
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</tr>
<tr>
<td><strong>DRIVING FORCES</strong></td>
<td></td>
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</tr>
<tr>
<td>(2527 + 2415 + 735 = 5677)</td>
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<tr>
<td><strong>RESISTING FORCES</strong></td>
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<td></td>
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</tr>
<tr>
<td>(281 + 742 + 5\left[(6075 + 1012 + \frac{1}{13})\right] = 3059)</td>
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<tr>
<td>(F.S. = \frac{3059}{5677} = .53)</td>
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CASE 3  NORMAL WATER LEVEL WITH ICE LOAD

Driving Forces

\[ D_1 = \frac{1}{3}(55)(33)(9) = 735 \]
\[ D_2 = \frac{1}{2}(62.4)(15) = 252.7 \]
\[ D_3 = (624)(3)(6) = 12.3 \]
\[ D_4 = \frac{1}{2}(62.4)(9-3) = 12.3 \]
\[ D_5 = 5000 \]

Resisting Forces

\[ R_1 = 4.5(9)(150) = 6075 \]
\[ R_2 = \frac{1}{2}(15)(9)(150) = 1012 \]
\[ R_3 = \frac{1}{3}(55)(3)(55) = 41.3 \]
\[ R_4 = \frac{1}{2}(55)(3)(3) = 742 \]
\[ R_5 = \frac{1}{3}(62.4)(3) = 281 \]
### SUBJECT
**Stability Analysis**

### Case 3 (Cont.)

#### Driving Moments

\[ 2527(3) + 735(3) + 5000(4) + 1123(3) + 1123(4) = 6264 \]

#### Resisting Moments

\[ 6075(3.75) + 1012(1) + 792(1) + 281(1) + 41.3(1.1) = 24823 \]

F.S. = \[ \frac{24823}{6264} = 4.0 \]

### Sliding

#### Driving Forces

\[ 2527 + 735 + 5000 = 8262 \]

#### Resisting Forces

\[ 281 + 742 + 5\left(6075 + 1012 + 41.3\right) - \left(\frac{622 + 1981}{2}\right) = 3462 \]

F.S. = \[ \frac{3462}{8262} = 0.42 \]
APPENDIX F

REFERENCES


APPENDIX G

DRAWINGS
VICINITY MAP
BRANT LAKE UPPER DAM
TOPOGRAPHIC MAP
BRANT LAKE UPPER DAM
(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

DAM REPORT

CONSERVATION COMMISSION,
DIVISION OF INLAND WATERS.

GENTLEMEN:

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

This dam is situated upon the ____________________________ Stream (Give name of stream) in the Town of ____________________________ County, about ____________________________ from the Village or City of ____________________________ (State distance).

The distance ____________________________ stream from the dam, to the ____________________________ (Give name of nearest important stream or of a bridge).

is about ____________________________ (State distance).

The dam is now owned by ____________________________ (Give name in full) and was built in or about the year ____________________________, and was extensively repaired or reconstructed during the year ____________________________.

As it now stands, the spillway portion of this dam is built of ____________________________ (State whether of masonry, concrete or timber) and the other portions are built of ____________________________ (State whether of masonry, concrete, earth or timber with or without rock fill).

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is ____________________________ and under the remaining portions such foundation bed is ____________________________.
The total length of this dam is ___________ feet. The spillway or waste-weir portion, is about ___________ feet long, and the crest of the spillway is about ___________ 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: ____________________________

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.

Good condition

Reported by ____________________________ (Signature)

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

(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.)
STATE OF NEW YORK
CONSERVATION COMMISSION
ALBANY

DAM REPORT

S-222 - No 652 Upper Hudson 1920

CONSERVATION COMMISSION,
DIVISION OF WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Grant Lake Upper Dam.

This dam is situated upon the in the Town of County, about... from the Village or City of... The distance stream from the dam, to the... is about...

The dam is now owned by... and was built in or about the year..., and was extensively repaired or reconstructed during the year........

As it now stands, the spillway portion of this dam is built of... and the other portions are built of...

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is... and under the remaining portions such foundation bed is...
(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.)
(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 outline the abutment, 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.)
The total length of this dam is 32 feet. The spillway or waste-weir portion, is about 54 feet long, and the crest of the spillway is about 3 feet below the abutment.

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: 

At the time of this inspection the water level above the dam was 8 feet above the crest of the spillway.

(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 or erosions which you may have observed.)

Dam is in good condition; no leaks.

Reported by: Richard W. Brown

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

(Name of place)