LONG ISLAND BASIN

BLIND BROOK COUNTRY CLUB DAM
WESTCHESTER COUNTY, NEW YORK
INVENTORY NO. N.Y. 123

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT CORPS OF ENGINEERS
JULY 1981
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NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1981
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 the visual inspection of Blind Brook Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigations and remedial actions.
Using the Corps of Engineers Screening Criteria for the initial review of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 17 percent of the Probable Maximum Flood (PMF). The spillway is therefore adjudged 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 for loss of life downstream from the dam.

The structural stability analysis based on available information, assumed strength parameters and visual inspection indicates that the stability against sliding and overturning of the spillway section of the dam is inadequate for normal loading cases and marginal during floods greater than 25 percent of the PMF.
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 investigations, 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.
# PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
BLIND BROOK DAM  
I.D. NO. N.Y. 123  
N.Y. D.E.C. NO. 232C-2747  
BLIND BROOK BASIN  
WESTCHESTER COUNTY, N.Y.

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NAME OF DAM: Blind Brook (N.Y. 123)
STATE LOCATED: New York
COUNTY LOCATED: Westchester
STREAM: Blind Brook
BASIN: Long Island Basin
DATE OF INSPECTION: 02 April 1981

ASSESSMENT

The examination of documents and the visual inspection of Blind Brook Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigations and remedial actions.

Using the Corps of Engineers Screening Criteria for the initial review of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 17 percent of the Probable Maximum Flood (PMF). The spillway is therefore adjudged 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 for loss of life downstream from the dam.

The structural stability analysis based on available information, assumed strength parameters and visual inspection indicates that the stability against sliding and overturning of the spillway section of the dam is inadequate for normal loading cases and marginal during floods greater than 25 percent of the PMF.

It is therefore recommended that within 3 months of notification to the owner, a detailed hydrological and hydraulic investigation be undertaken to more accurately determine the site specific characteristics of the watershed and their affect upon the overtopping potential of the dam. At the same time,
a structural stability study of the spillway section should be performed. Within eighteen (18) months of the date of notification to the owner, any modification to the structure deemed necessary as a result of investigations, to achieve a spillway capacity adequate to discharge the outflow from at least one-half (½) PMF, should have been completed. In the interim, a detailed emergency action plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

In addition, the dam has a number of problem areas which, if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within twelve (12) months.

The following recommended measures should be initiated immediately:

1. Monitor at biweekly intervals with the aid of weirs or other measuring devices the seepage which is occurring at each of the abutment contacts. Document this information for future reference.

2. Monitor by visual inspection the leakage through the structural cracks and vertical and horizontal lift lines along the downstream face. At the time when the reservoir is emptied, inspect the upstream surfaces to determine if the cracks are continuous through the dam. Document this information for future reference.

3. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain and its control facilities. Document this information for future reference. The aforementioned emergency action plan should be maintained and updated periodically during the life of the structure.

Eugene O'Brien, P.E.
New York No. 29823

Approved by:

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

Date:
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 Contract No. DACW 51-81-C-0008 in a letter dated 14 December 1980 in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367 dated 8 August 1972.

b. Purpose of Inspection

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

1.2 DESCRIPTION OF THE PROJECT

a. Description of the Dam and Appurtenant Structures

Blind Brook Dam is a concrete gravity structure consisting of a center spillway section flanked on each side by a non-overflow section. The dam is approximately 130 feet long, 32 feet high and has a maximum base width of 20 feet. The crest of the dam is 4.5 feet wide.

The spillway is an ogee-type structure consisting of 9 foot long by 3 foot wide overflow sections separated by vertical concrete piers which support a concrete walkway approximately 2 feet above the crest. The crest level of the two middle sections (El 229.5) is approximately 6 inches below the crest level of the adjacent four sections (El 230). A concrete apron is located at the base of the spillway structure and extends 6 feet downstream of the dam.

A concrete pumping platform is located at the top of the dam directly above the two center overflow sections. The platform is cantilevered upstream from the dam crest and supports pumping machinery and control facilities for the reservoir drain.
The reservoir drain for the project consists of a 36-inch diameter steel pipe located at the base of the dam. A center rising screw-type valve is operated from the pumping platform and regulates discharge through the pipe.

The spillway discharges into a rock channel which runs perpendicular to the axis of the dam.

b. Location
Blind Brook Dam is located in the town of Purchase, Westchester County, New York. The dam is located off Anderson Hill Road, approximately 0.5 miles east of the Connecticut-New York State boundary.

c. Size Classification
The dam is 32 feet high and the reservoir has a storage capacity of 26 acre-feet. The dam is classified as "small" in size (26 to 40 feet).

d. Hazard Classification
The dam is classified as high hazard due to the large number of homes located 1000 feet downstream from the dam.

e. Ownership
The dam is owned and operated by the Blind Brook Country Club, P.O. Box 229, Purchase, N.Y., 10577, Tel. (914) 939-1566. The person to contact is Mr. Sabato Antorino, Superindentent of Maintenance.

f. Purpose of Dam
Blind Brook Dam creates a pool for irrigation of the Blind Brook Golf Course.

g. Design and Construction History
The dam was designed by Moran, Proctor, Mueser and Rutledge, Consulting Engineers (presently known as Mueser, Rutledge, Johnston & DeSimone), 415 Madison Avenue, New York, New York. The constructor of the dam is unknown. According to available documents, the dam was completed in 1959.

h. Normal Operating Procedures
According to Mr. Sabato Antorino, the reservoir is drained each fall to allow for storage of spring runoff. It was also reported that the reservoir is lowered prior to periods of high precipitation.

1.3 PERTINENT DATA

a. Drainage Area, Square Miles 1.79
b. **Discharge at Damsite, cfs**  
   Maximum Known Flood at Damsite: Unknown  
   Spillway (Maximum Pool: Top of Dam): 670 cfs  
   Reservoir Drain (Maximum Pool): Unknown  

c. **Elevation, USGS Datum, MSL**  
   Top of Spillway:  
   - Middle Two Sections: 229.5 feet  
   - Adjacent Four Sections: 230 feet  
   - Top of Non-Overflow Section: 232.8 feet  

d. **Reservoir**  
   Length of Maximum Pool: 350 feet  
   Length of Normal Pool (El 107.5): 350 feet  

e. **Storage**  
   Maximum Pool: 50 acre-feet  
   Normal Pool: 26 acre-feet  

f. **Reservoir Surface**  
   Maximum Pool: Unknown  
   Normal Pool: Unknown  

g. **Overflow Section**  
   Type: Ogee-type  
   Width: 3 feet  
   Length: 54 feet  
   Height: 32 feet  
   Slope:  
   - Upstream (H:V): 1:24  
   - Downstream (H:V): 7:12  
   Apron: Concrete  

h. **Non-Overflow Section**  
   Length:  
   - Left Section: 32 feet  
   - Right Section: 32 feet  
   Crest Width: 4.5 feet  
   Platform Width: 7.0 feet  

i. **Low Level Outlet**  
   Type: Steel  
   Diameter: 36-inch  
   Closure: Gate Valve  
   Reservoir Drain: Unknown
SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

Blind Brook Dam is located in the New England Upland Section of the New England Maritime Physiographic Province. The bedrock in this Section consists of metamorphic, igneous and sedimentary rocks which have undergone a complex sequence of deposition, folding, faulting and erosion. The rock at the damsite is sound, hard, massive gneiss of Precambrian Age. This rock is exposed at the abutments as well as upstream and downstream of the dam.

2.2 SUBSURFACE INVESTIGATIONS

A subsurface exploration program was performed during initial design of the dam. The borehole data which were obtained are shown on the boring logs presented in Appendix A.

2.3 DESIGN RECORDS

The construction drawings which exist for the project are presented in Appendix A.

2.4 CONSTRUCTION RECORDS

Construction records are not available for the project.

2.5 OPERATION RECORDS

No operation records exist for the project.

2.6 EVALUATION OF DATA

The information obtained from the available documents and a visual inspection is considered adequate for a Phase I inspection and evaluation.

There are two inconsistencies in the available drawings: (1) Plate 3 indicates four overflow sections, whereas six sections were observed during the visual inspection, and (2) the elevations shown on the drawings are different from those shown on the USGS Glenville Quadrangle Map, and is probably due to different datums. (For the purpose of this report, USGS datum is used except where noted.)
SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General
A visual inspection of Blind Brook Dam was made on 2 April 1981. The weather was sunny and clear and the temperature was 65°F. At the time of this inspection, the reservoir level was approximately one inch above the crests of the two center spillway sections.

b. Dam
The structural condition of the visible portions of the spillway is considered to be good (See PHOTOGRAPHS 1 and 2). Surficial deterioration of concrete at vertical and horizontal joints exists on the downstream face, but is not considered to be serious (See PHOTOGRAPHS 3 and 4).

The general condition of the non-overflow section is also good. Some structural cracking does exist along the downstream face of the right section. Leakage has occurred through these features as evidenced by the staining and efflorescence which exist along these cracks (See PHOTOGRAPHS 3 and 5).

The vertical and horizontal alignment of the crest is good. The concrete along the dam crest and along the surfaces of the cantilevered platform is also good (See PHOTOGRAPH 6).

No emergency action plan exists for the project.

c. Appurtenant Structures
The gate valve for the reservoir drain was operated during the inspection. The lifting of the gate and discharge through the drain appeared normal. The crank wheel used to operate the valve is located at the Blind Brook Country Club Maintenance Shed. The pumping machinery and its supports appear to be in good condition (See PHOTOGRAPH 6).

d. Downstream Channel
The downstream channel of the spillway is Blind Brook. The channel contains natural boulders and fallen trees, and for the most part, is clear of debris (See PHOTOGRAPH 7).

e. Reservoir Area
The reservoir area consists of flat to gently rolling terrain. Immediately upstream and downstream of the dam are outcrops of bedrock. The slopes in the reservoir area appear stable, with no signs of past movements. There appears to be no sedimentation problems in the reservoir area.
f. Abutments

Seepage was observed occurring at both the right and left abutment contacts about one or two feet below the top of the dam (See PHOTOGRAPHS 8 and 9). The quantity of flow at each location could not be measured, but is estimated to be less than 1 gpm. The seepage appears to be occurring through the discontinuities in the rock at the abutment contacts. Since the abutments are hard rock, little to no erosion is occurring at these locations.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of this inspection did not reveal serious problems which would adversely affect the adequacy of the dam and its appurtenant facilities. The following summarizes the encountered problem areas, in order of importance, with the recommended remedial action:

1. The seepage which is occurring at each of the abutment contacts should be monitored periodically with the aid of weirs or other measuring devices. Document this information for future reference.

2. Monitor by visual inspection the leakage through the structural cracks and vertical and horizontal lift lines along the downstream face. At the time when the reservoir is emptied, inspect the upstream surfaces to determine if the cracks are continuous through the dam.

3. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain and its control facilities. Document this information for future reference. Develop an emergency action plan and periodically update during the life of the structure.
SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

No written operation and maintenance procedures exist for the project. The normal operation of the project consists of allowing water to flow over the spillway. According to Mr. Antorino, the reservoir drain is used to lower the reservoir in anticipation of major storms and also each November to drain the reservoir.

4.2 MAINTENANCE OF DAM

It is reported that maintenance of the dam is performed when the need arises. Although there is no formal procedure for maintaining the dam, the maintenance is considered to be adequate.

4.3 WARNING SYSTEM IN EFFECT

No warning system is in effect or in preparation.

4.4 EVALUATION

The overall condition of the dam and appurtenant structures appears to be good. Recommendations in connection with regular maintenance are discussed in Section 7.
5.1 DRAINAGE AREA CHARACTERISTICS

The Blind Brook Dam is located on the Blind Brook just south of Anderson Hill Road and about 0.75 miles north of the Hutchinson River Parkway and the town of Rye in Westchester County, New York (Hydrologic Unit Code No. 02030102). The rectangular shaped basin extends north about 3-1/4 miles into Fairfield County, Connecticut. Maximum basin width is about 0.75 miles, and the area is 1.79 square miles. The average slope of the brook is about 0.012 ft/ft, rising from a normal pool elevation of 230 feet (MSL) to over 460 feet at the northern end of the drainage area.

The basin, as outlined on the USGS Glenville Quadrangle Map, is mostly undeveloped except for the Westchester County Airport.

5.2 ANALYSIS CRITERIA

The analysis of the adequacy of the spillway was performed by developing a design flood, using the unit hydrograph method and the Maximum Probable Precipitation (PMP). The all season, 200 square mile 24 hour PMP for Westchester County of 22 inches was obtained from Weather Bureau sources. Snyder's unit hydrograph coefficient, developed for the Blind Brook Basin in a previous study of 1.47 and 0.68 for CT and Cp, respectively, were used for this analysis. Loss parameters of 2.0 inches and 0.17 inch/hour for the initial and constant losses were also adopted.

In accordance with the Recommended Guidelines for Safety Inspection of Dams, the adequacy of the spillway was analyzed using the Probable Maximum Flood (PMF). A multi-plan analysis was performed for the 0.25, 0.50, 0.75 and 1.00 PMF.

5.3 SPILLWAY CAPACITY

The ungated concrete spillway, with a crest elevation estimated to be 230 feet (MSL) is centrally located on the dam. The effective width of the spillway is 45.0 feet, with a 10 inch (0.83) thick walkway 2.0 feet above the crest. The computed maximum spillway discharge with the pond elevation at 232.83 feet (top of dam) is 670 cfs, or 16 percent of the PMF before the dam is overtopped.

5.4 RESERVOIR CAPACITY

The normal reservoir capacity is listed as 26 acre-feet at spillway crest elevation (230.0+) and 50 acre-feet at the top
of the dam (EL 232.83). The surcharge storage between spillway crest and top of dam of 24 acre-feet is equivalent to about 0.25 feet of runoff over the entire drainage basin.

5.5 FLOODS OF RECORD

There are no records of floods or maximum reservoir elevations at the dam, however, at the Blind Brook gage at Rye (D/A 9.20 miles) approximately two miles downstream of the dam, the maximum recorded flood was 2,320 (about 40-50 percent PMF) on June 19, 1972.

5.6 OVERTOPPING POTENTIAL

The potential of the dam being overtopped was investigated on the basis of the spillway capacity and the available surcharge storage to meet the selected design flood inflows.

The analysis was performed assuming that (i) the water surface in the reservoir was at spillway crest elevation (230.0 feet) at the start of the flood event, and (ii) that the low level outlet was closed.

The PMF routed through the reservoir resulted in the dam being overtopped as follows:

<table>
<thead>
<tr>
<th>Ratio of PMF</th>
<th>Peak Inflow</th>
<th>Peak Outflow</th>
<th>Overtopping</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>3901 cfs</td>
<td>3873 cfs</td>
<td>2.96 ft.</td>
</tr>
<tr>
<td>0.75</td>
<td>2926 cfs</td>
<td>3021 cfs</td>
<td>2.39 ft.</td>
</tr>
<tr>
<td>0.50</td>
<td>1959 cfs</td>
<td>1982 cfs</td>
<td>1.59 ft.</td>
</tr>
<tr>
<td>0.25</td>
<td>975 cfs</td>
<td>977 cfs</td>
<td>0.57 ft.</td>
</tr>
</tbody>
</table>

The spillway is capable of passing only 17.3 percent of the PMF before the dam is overtopped.

5.7 EVALUATION

The principal spillway of the Blind Brook Country Club Dam has insufficient capacity to pass either the PMF or one-half (1/2) PMF without overtopping the dam. The overtopping of the dam could cause the failure of the dam, thus significantly increasing the hazard for the loss of life downstream. The spillway is therefore assessed as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.
SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation
Visual observation did not indicate conditions which would affect the structural stability of the dam. The observed seepage at the left and right abutment contacts and the structural cracking along the downstream face of the right non-overflow section are not detrimental to the stability or safety of the dam at the present time.

b. Design and Construction Data
The original design computations regarding the structural stability of the dam are not available.

c. Operating Records
There are no operation records available. No major operation problems which would affect the stability of the dam were reported.

d. Post-Construction Changes
There are no recorded post-construction changes. However, the available drawings presented in Appendix A show that only four (4) spillway sections, rather than six (6) which were observed, were designed.

e. Seismic Stability
According to the recommended Corps guidelines, the dam is located in Seismic Zone No. 1; therefore, no seismic stability analysis for this dam was performed.

6.2 STRUCTURAL STABILITY ANALYSIS

A structural stability analysis on what was determined from the drawings to be the maximum typical section was performed. In addition the analysis was performed inaccordance with recommended guidelines (Ref. 3). The following tables list each of the cases analyzed and the results of the analysis.

<table>
<thead>
<tr>
<th>Case</th>
<th>Description of Loading Conditions</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>Normal Loading, Lake Level at El 108.0, No Tailwater, Full Uplift</td>
</tr>
<tr>
<td>II</td>
<td>Same as Case I, with 5 K/LF, Ice Load</td>
</tr>
<tr>
<td>III</td>
<td>Unusual Loading, 1/2 PMF, Lake Level at El 112.42, Tailwater 6.6 Feet</td>
</tr>
<tr>
<td>IV</td>
<td>Extreme Loading, Full PMF, Lake Level at El 113.79, Tailwater 7.5 Feet</td>
</tr>
</tbody>
</table>

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### SUMMARY OF RESULTS

<table>
<thead>
<tr>
<th>Case</th>
<th>Location of Resultant</th>
<th>Sliding Factor of Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>2.27 feet Outside Middle Third</td>
<td>1.66</td>
</tr>
<tr>
<td>II</td>
<td>6.36 feet Outside Middle Third</td>
<td>1.44</td>
</tr>
<tr>
<td>III</td>
<td>7.97 feet Outside Middle Third</td>
<td>1.15</td>
</tr>
<tr>
<td>IV</td>
<td>10.33 feet Outside Middle Third</td>
<td>1.03</td>
</tr>
</tbody>
</table>

The results of the analyses indicate that the stability of the dam is inadequate in overturning and sliding for all loading conditions considered. The analysis, however, may not indicate the actual material properties of the foundation nor the actual loading conditions. Therefore, it is recommended that an in-depth engineering stability analyses of the structure be performed.
SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety
Phase I investigation of Blind Brook Dam did not indicate conditions which constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the dam, the project appears to be in fair condition. The project, however, does have inadequacies and deficiencies which, if not remedied, have the potential for developing into hazardous conditions.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 17 percent of the Probable Maximum Flood (PMF). The overtopping of the dam could result in a failure of the dam thus increasing the hazard to loss of life downstream. The spillway is, therefore, adjudged 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 for loss of life downstream from the dam.

Structural stability analyses based on available information and the visual inspection indicate that the stability of the spillway section against overturning and sliding is inadequate for all loading conditions.

b. Adequacy of Information
The information and data available were adequate for the performance of this investigation.

c. Need for Additional Investigations
A detailed hydrological/hydraulic investigation of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed. In addition it has been found on the basis of screening analyses of stability, that the overflow section of the dam does not meet current criteria under flooding conditions equal to half \((1/2)\) PMF and PMF. Further analysis of the structural stability of the spillway should be performed at the same time.
d. **Urgency**

The additional hydrologic/hydraulic investigations and the structural stability investigations which are required must be initiated within 3 months from the date of notification. Within 18 months of notification, remedial measures as a result of these investigations must be initiated, with completion of these measures during the following year. In the interim, develop an emergency action plan for the notification of downstream residents and proper government authorities in the event of overtopping and provide around-the-clock surveillance of the dam during periods of extreme runoff. The other problem areas listed below must be corrected within one year from notification.

7.2 **RECOMMENDED MEASURES**

1. The results of the aforementioned remedial measures will determine the appropriate remedial measures required.

2. Monitor periodically with the aid of weirs or other measuring devices the seepage which is occurring at each of the abutment contacts. Document this information for future reference.

3. Monitor by visual inspection the leakage through the structural cracks and vertical and horizontal lift lines along the downstream face. At the time when the reservoir is emptied, inspect the upstream surfaces to determine if the cracks are continuous through the dam. Document this information for future reference.

4. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain and its control facilities. Document this information for future reference. The aforementioned emergency action plan should be maintained and updated periodically during the life of the structure.
**Foundation Testing and Soil Sampling Record**

**Line:** Turner Construction Co.  
**Location:** Harrison, New York

**Hole No.:** 1  
**Elevation:** 81.20  
**Date:** 10-10

**Boring Log**

<table>
<thead>
<tr>
<th>Depth From-To</th>
<th>Description of Material</th>
<th>Number of Spoon Samples</th>
<th>Depth of Spoon Samples</th>
<th>Core Samples</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0' to 3'12&quot;</td>
<td>Soft Debris, Rock</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3'12&quot; to 19'16&quot;</td>
<td>Bed, to Hard Rock</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**2nd Run:**
- Run 3'12" to 8'2" Rec. 32" Pcs. 13 & Frags.

**3rd Run:**
- Run 8'12" to 13'2" Rec. 18" Inc. 7 & Frags.
- Run 13'2" to 19'16" Rec. 18" Inc. 6 & Frags.

**Ground Water:**

<table>
<thead>
<tr>
<th>Depth From-To</th>
<th>Description of Water</th>
<th>Amount</th>
</tr>
</thead>
</table>

**Notes:**
- Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.
- Under pressure, written kind of soil, loss of sample, loss of drilling water, soft spots, or broken rocks, having, cahiers, unusual ground water conditions, etc., at depth encountered.

**Driller:** Wilfred Dixon  
**Helper:** Gilbert Miller

**PLATE 3**
**SPRAGUE & HENWOOD, Inc.**
**SCRANTON, PA.**

**FOUNDATION TESTING and SOIL SAMPLING RECORD**

**NAME:** Turner Construction Co.  
**LOCATION:** Harrison, New York

**HOLE NO. 2**  
**SURFACE ELEVATION:** 22.25

**DATE:** From 10-14 to 10-16. No. 53

**BORING LOG**  
**DESCRIPTION**  
**FROM-TO DEPTH**

<table>
<thead>
<tr>
<th>Depth</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>4 1/2</td>
<td>-</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPOON SAMPLE AND CORE DATA**  
**CORE LOG**

<table>
<thead>
<tr>
<th>Core</th>
<th>Length</th>
<th>Core</th>
<th>Length</th>
<th>Core</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS**

- Run 4 1/2" to 9 1/2" Rec. 36" Fos. 13 & Frags.
- Run 9 1/2" to 14 1/2" Rec. 6" Fos. 3 & Frags.
- Run 4 1/2" to 19 1/2" Rec. 26" Fos. 13 & Frags.

**GROUND WATER**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Hour</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EQUIPMENT**

- Drill: Gilfred Silva
- Reamer: Gilbert Miller

**NOTE:** Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

- Under remarks, mention kind of soil, loss of sample, loss of drilling water, softness of broken rock, drilling facilities, unusual ground water conditions, etc., as deemed important.

**PLATE 4**
SPRAGUE & HENWOOD, inc.
SCRANTON, PA.

FOUNDATION TESTING - SOIL TESTING RECORD

<table>
<thead>
<tr>
<th>NAME</th>
<th>Turner Construction Company</th>
<th>LOCATION</th>
<th>Harrison, New York</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOE</td>
<td>3</td>
<td>DATE</td>
<td>10-25</td>
</tr>
<tr>
<td>DATE</td>
<td>1-11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>DESCRIPTION</th>
<th>SPOOR SAMPLE AND CORE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM FT. OF WATER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Fill</td>
<td></td>
</tr>
<tr>
<td>4'</td>
<td>Rock</td>
<td></td>
</tr>
<tr>
<td>14'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1st Run 4' to 9' Rec. 9' Pcd. 10
2nd Run 9' to 24' Rec. 60' Pcd. 24

GROUND WATER

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>HOE</th>
<th>DATE</th>
<th>WIDE</th>
<th>DISTANCE HAMMER DROP</th>
<th>DRIVE HAMMER</th>
<th>SPEW HAMMER</th>
<th>Core Size</th>
<th>Size of Core Bit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24-32 inch</td>
<td>32-72 inch</td>
<td>32-72 inch</td>
<td>2 inch</td>
<td>B inch</td>
</tr>
</tbody>
</table>

NOTE: Classification of soil has been made by the grader and taken from U.S. Soil Survey Engineers. Classification of rock has been made by the grader and has not been checked by an engineer.

Grader:  
Superintendent:  
Manager:  
Assistant Manager:

PLATE 5
SPRAGUE & HENWOOD, Inc.
SCRANTON, PA.

FOUNDATION TESTING & SOIL SAMPLING RECORD

NAME: Turner Construction Co.
LOCATION: Harrison, New York
BORE NO.: 4
ELEVATION: 88.1
DATE: FROM 10-15 TO 10-15 1958

BORING LOG

DEEP DESCRIPTION OF SOIL         SAMPLE  SPAN    TO     FROM    BETWEEN

0 to 6' Fill
6' Rock
16'

1st Min 6' to 12' Rec. 17' Fas. 16
2nd Fill 12' to 16' Rec. 45' Fas. 24

GROUND WATER

GEOX 2

NOTE: Classification of soil is based on the information given by the Driller and not on observations made by the investigator. It has not been corrected by a chart or graph. Classification of rock is based on information given by Driller and not on chart or graph.

Driller: Wilfred Biren
Helper: Gilbert Miller

PLATE 6
PHOTOGRAPH 1. CONDITION OF VISIBLE CONCRETE AT DOWNSTREAM FACE OF DAM

PHOTOGRAPH 2. CONDITION OF CONCRETE AT UPSTREAM FACE OF DAM
PHOTOGRAPH 3. STRUCTURAL CRACKING ALONG DOWNSTREAM FACE OF NONOVERFLOW SECTION

PHOTOGRAPH 4. DETERIORATION OF CONCRETE ALONG HORIZONTAL CONSTRUCTION JOINTS
PHOTOGRAPH 5. SEEPAKE THROUGH STRUCTURAL CRACKS IN RIGHT NONOVERFLOW SECTION

PHOTOGRAPH 6. CONDITION OF CONCRETE AT CREST (OBSERVE GOOD CONDITION OF MACHINERY)
PHOTOGRAPH 7. CONDITION OF DOWNSTREAM SPILLWAY CHANNEL

PHOTOGRAPH 8. SEEPAGE AT LEFT ABUTMENT CONTACT
PHOTOGRAPH 9. SEEPAGE AT RIGHT ABUTMENT CONTACT
VISUAL INSPECTION CHECKLIST

APPENDIX C
**Basic Data**

**a. General**

- **Name of Dam**: Blind Brook Dam
- **Fed. I.D. #**: NY/23
- **DEC Dam No.**: 252C-2747
- **River Basin**: Blind Brook Basin
- **Location**: Town Purchase, County Westchester
- **Stream Name**: Blind Brook
- **Tributary of**: Unknown
- **Latitude (N)**: 42°-02.1'
- **Longitude (W)**: 078°-41.4'
- **Type of Dam**: Concrete Gravity Structure with center agge-type spillways each 9' x 3' wide separated by thin vertical concrete walls approx. 2' high
- **Hazard Category**: High
- **Date(s) of Inspection**: 02 April 81
- **Weather Conditions**: Sunny, 65°F
- **Reservoir Level at Time of Inspection**: Couple of inches above spillway crest

**b. Inspection Personnel**

- Mr. Anthony Delavuccolo and Mr. Al DiBernardo

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

- Mr. Sabato Antorino - Superintendent (914) 939-1546
- c/o Blind Brook Country Club
- P.O. Box 229
- Purchase, N.Y. 10577

**d. History:**

- **Date Constructed**: 1958/59
- **Date(s) Reconstructed**: Not Applicable
- **Formerly**:
  - Designer: Moran, Proctor, Mueser & Rutledge
  - Constructed By: Unknown
- **Presently**:
  - Owner: Blind Brook Country Club

Sheet 1
## Embankment

### a. Characteristics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Embankment Material</td>
<td><strong>Not Applicable</strong></td>
</tr>
<tr>
<td>(2) Cutoff Type</td>
<td><strong>Not Applicable</strong></td>
</tr>
<tr>
<td>(3) Impervious Core</td>
<td><strong>Not Applicable</strong></td>
</tr>
<tr>
<td>(4) Internal Drainage System</td>
<td><strong>Not Applicable</strong></td>
</tr>
<tr>
<td>(5) Miscellaneous</td>
<td><strong>Not Applicable</strong></td>
</tr>
</tbody>
</table>

### b. Crest

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Vertical Alignment</td>
<td><strong>Not Applicable</strong></td>
</tr>
<tr>
<td>(2) Horizontal Alignment</td>
<td><strong>Not Applicable</strong></td>
</tr>
<tr>
<td>(3) Surface Cracks</td>
<td><strong>Not Applicable</strong></td>
</tr>
<tr>
<td>(4) Miscellaneous</td>
<td><strong>Not Applicable</strong></td>
</tr>
</tbody>
</table>

### c. Upstream Slope

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Slope (Estimate) (V:II)</td>
<td><strong>Not Applicable</strong></td>
</tr>
<tr>
<td>(2) Undesirable Growth or Debris, Animal Burrows</td>
<td><strong>Not Applicable</strong></td>
</tr>
<tr>
<td>(3) Sloughing, Subsidence or Depressions</td>
<td><strong>Not Applicable</strong></td>
</tr>
</tbody>
</table>
(4) Slope Protection  Not Applicable

(5) Surface Cracks or Movement at Toe  Not Applicable

d. Downstream Slope

(1) Slope (Estimate - V:H)  Not Applicable

(2) Undesirable Growth or Debris, Animal Burrows  Not Applicable

(3) Sloughing, Subsidence or Depressions  Not Applicable

(4) Surface Cracks or Movement at Toe  Not Applicable

(5) Seepage  Not Applicable

(6) External Drainage System (Ditches, Trenches; Blanket)  Not Applicable

(7) Condition Around Outlet Structure  Not Applicable

(8) Seepage Beyond Toe  Not Applicable

e. Abutments - Embankment Contact

Not Applicable

Sheet 3
<table>
<thead>
<tr>
<th></th>
<th>(1) Erosion at Contact</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(2) Seepage Along Contact</td>
<td>Not Applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Drainage System</strong></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Description of System</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Condition of System</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Discharge from Drainage System</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Instrumentation</strong></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>(Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)</td>
<td>None</td>
</tr>
</tbody>
</table>
Reservoir

a. Slopes The reservoir slopes are relatively flat. The right slope (looking w/s) is part of the Blind Brook Golf Course. The left slope is wooded and flat to gently rolling.
b. Sedimentation There were no visible signs of sedimentation. The reservoir is drained each November, thereby virtually eliminating sedimentation during the winter months.
c. Unusual Conditions Which Affect Dam None

6. Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) There are a large number of homes downstream of the dam, which are visible from the damsite.
b. Seepage, Unusual Growth The downstream area is wooded with many large trees. No seepage was observed through the rock outcropping or overlying soils.
c. Evidence of Movement Beyond Toe of Dam None observed

d. Condition of Downstream Channel The downstream channel consists of small to large boulders. There is minimal debris which should not restrict flow in the channel. The channel width is medium-wide.

Spillway(s) (Including Discharge Conveyance Channel)

Each of the five overflow sections is approximately 9 feet in width. The two middle sections are slightly lower in elevation than the adjacent sections. Each section is uncontrolled. The sections are separated by vertical walls.
a. General concrete walls. The walls support the walkway at the top of the dam. Upstream of the 2 center spillway sections is a cantilevered concrete platform which supports pumping machinery and the reservoir drain control facilities.
b. Condition of Service Spillway The service spillway appears to be in good condition. There is little deterioration and erosion along the walls. Since the reservoir is drained each winter season, little to no freeze-thaw action, and subsequent deterioration occurs. Although the upstream surfaces were unprepared, for the above reasons they are believed to be in good condition. (See Sheet 7 for additional comments concerning structural cracks, etc.)
c. Condition of Auxiliary Spillway  
Not Applicable

---

d. Condition of Discharge Conveyance Channel  
See Sheet (5), topic (6) - "Area Downstream of Dam"

---

3) Reservoir Drain/Outlet

Type: Pipe  
Conduit  
Other

Material: Concrete  
Metal  
Other

Size: 24"  
Length 25± feet

Invert Elevations: Entrance Unknown  
Exit Unknown

Physical Condition (Describe): 
Unobservable  

Material: Unobserved

Joints: Unobserved  
Alignment Unknown

Structural Integrity: Appears to be in good condition. Mr Antorico operated the drain, flow appeared to be normal.

Hydraulic Capability: See Structural Integrity

Means of Control: Gate  
Valve  
Uncontrolled

Operation: Operable  
Inoperable  
Other

Present Condition (Describe): The valve is operational. The center rising screw (visible portions) appear to be well maintained.
9) Structural
   a. Concrete Surfaces  The concrete surfaces are in good condition. There is little deterioration, spalling, or erosion of these surfaces, except at construction lift lines.

   b. Structural Cracking  Some structural cracking exists at the right nonoverflow section of the dam (Three major cracks were observed)

   c. Movement - Horizontal & Vertical Alignment (Settlement)  The vertical and horizontal alignments are good. It is uncertain as to whether the aforementioned cracks are due to settlement.

   d. Junctions with Abutments or Embankments  The dam appears to be tied in well with the rock abutments. There is a seepage condition at each abutment, however, as described below.

   e. Drains - Foundation, Joint, Face  None were observed nor shown on the drawings

   f. Water Passages, Conduits, Sluices  None

   g. Seepage or Leakage  Some seepage occurred at each of the abutment contacts. The seepage was estimated at less than 1 gpm. It appears that at both abutments, the seepage is occurring in the discontinuities in the rock
h. Joints - Construction, etc. There appears to be some spalling/deterioration of construction along vertical and horizontal lift lines. However, this does not apply to be a serious problem.

i. Foundation The foundation of the dam is rock. It appears to be hard and resistant to erosion.

j. Abutments See (g)

k. Control Gates None

l. Approach & Outlet Channels None

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

n. Intake Structures None

o. Stability The dam appears to be stable under the observed conditions

p. Miscellaneous None
10) **Appurtenant Structures (Powerhouse, Lock, Gatehouse, Other)**

a. **Description and Condition**

   Machinery and piping equipment for irrigation of the golf course are located at the east of the Clubhouse. This equipment is in excellent condition and is regularly maintained by Country Club personnel.
### AREA-CAPACITY DATA:

<table>
<thead>
<tr>
<th></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</td>
<td>230.8</td>
<td>Unknown</td>
<td>50</td>
</tr>
<tr>
<td>2) Design High Water (Max. Design Pool)</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>3) Auxiliary Spillway Crest</td>
<td>Not Applicable (NA)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>4) Pool Level with Flashboards</td>
<td>Not Applicable (NA)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>5) Service Spillway Crest</td>
<td>230.0</td>
<td>Unknown</td>
<td>26</td>
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</table>

### DISCHARGES

<table>
<thead>
<tr>
<th></th>
<th>Volume (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Average Daily</td>
<td>Unknown</td>
</tr>
<tr>
<td>2) Spillway @ Maximum High Water (top of dam)</td>
<td>670</td>
</tr>
<tr>
<td>3) Spillway @ Design High Water</td>
<td>Unknown</td>
</tr>
<tr>
<td>4) Spillway @ Auxiliary Spillway Crest Elevation</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>5) Low Level Outlet</td>
<td>Unknown</td>
</tr>
<tr>
<td>6) Total (of all facilities) @ Maximum High Water</td>
<td>170+</td>
</tr>
<tr>
<td>7) Maximum Known Flood at USGS gage 04/18/72</td>
<td>2320</td>
</tr>
<tr>
<td>8) At Time of Inspection</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
CREST:       ELEVATION: 108 ft

Type: Ogee-type (six sections)

Width: about 2 feet each  Length: 9 feet each

Spillover: Uncontrolled

Location: Center of dam

---

<table>
<thead>
<tr>
<th>SPILLWAY:</th>
<th>SERVICE</th>
<th>AUXILIARY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>108 ft</td>
<td>Elevation</td>
</tr>
<tr>
<td></td>
<td>Ogee-type</td>
<td>Type</td>
</tr>
<tr>
<td></td>
<td>9' x 6 sections = 54'</td>
<td>Width</td>
</tr>
</tbody>
</table>

Type of Control

Uncontrolled

Controlled:

Type

(Flashboards; gate)

Number

Size/Length

Invert Material

Anticipated Length of operating service

Chute Length

Height Between Spillway Crest & Approach Channel Invert (Weir Flow)
HYDROMETEOROLOGICAL GAGES:

Type: None Used
Location: N.A.
Records:
  Date - N.A.
  Max. Reading - N.A.

FLOOD WATER CONTROL SYSTEM:

Warning System: None

Method of Controlled Releases (mechanisms):
  36" metal pipe at base of dam and control facility at top of dam (center-rising screw-type valve)
DRAINAGE AREA: 1.79 square miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Mostly undeveloped woodland and meadow with County Airport in NW corner
Terrain - Relief: Rolling with gentle to moderate slopes
Surface - Soil: Glacial Till

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

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

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: Unknown

Reservoir:
Length & Maximum Pool: Unknown (Miles)
Length of Shoreline (at Spillway Crest): Unknown (Miles)
**TAMS**

**Job No.** 1579-11  
**Project** Blind Brook Dam Inspection  
**Subject** Hydrologic/Hydraulic Computations

**Date** April 081  
**By** DLC  
Chk. by __________

<table>
<thead>
<tr>
<th>Lake Elevation</th>
<th>230</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter</td>
<td>1000' ~ 0.19 mi</td>
</tr>
<tr>
<td>Fetch</td>
<td>350' ~ 0.07 mi</td>
</tr>
<tr>
<td>Area</td>
<td>0.5 acre</td>
</tr>
</tbody>
</table>

**Drainage Area**  
1.79 Sq mi

L = 3.8 mi  
L_a = 1.98 mi

$C_T = 1.47$

$T_P = 1.47 \times (3.8) \times (1.98)^{0.3} = 2.69$

$T_a = \frac{2.69}{5.5} = 0.489 \text{ hours}$  
$T_R = 0.5$

$t_{PR} = t_P + 0.25(t_P - t_a) = 2.69 + 0.25(0.489) = 2.80275 \text{ hr}$  
$T_{PR} = 2.69 \text{ hr}$  
$t_R = 0.5 \text{ hr}$

(Values calculated from U.S. Army Corps of Engineers' report, adjusted for local conditions)

From Hydrometeorological Report 433

**Zone 1: All season 200 sq mi, 24 hr PMP = 22"**

**Duration (hr):** 6, 12, 24, 48

<p>| % PMP | 111 | 123 | 133 | 142 |</p>
<table>
<thead>
<tr>
<th>Rainfall Losses (from Ref 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Loss - 2.0&quot;</td>
</tr>
<tr>
<td>Constant Loss - 0.17 in/hour</td>
</tr>
<tr>
<td>5% impervious drainage area estimated to be 25% (~30 cm)</td>
</tr>
<tr>
<td>Normal storage listed as 50 acre ft</td>
</tr>
<tr>
<td>and max storage as 54 acre ft</td>
</tr>
</tbody>
</table>

**Channel Section D/S by Resurrection Couvent**

<table>
<thead>
<tr>
<th>El.</th>
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<td>165</td>
</tr>
<tr>
<td>105</td>
</tr>
<tr>
<td>min.</td>
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| slope ~ 60' in 3500 or 0.017 |

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<td>50</td>
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<td>6.6 feet</td>
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**X Vol. Resources Data For, New York, NY, 79-1**
**TAMS**

**Job No.**

**Project**

**Country Club Dam**

**Subject**

**Hydrologic / Hydraulic Computations**

**Date**

**Apr 14, 81**

**By**

**D.L.C.**

**Chk. by**

---

**Effective Crest Length** 54.0'

**Crest EL** 230 MSL

Flow over spillway with 2.0' head.

\[ Q = 3.09 \times 3.6 \times 2^{1/2} = 3.15 \] for 4 openings.

\[ Q = 3.09 \times 1.8 \times 2^{2/3} = 6.20 \] for 2 openings.

Area below walkway:

\[ (18 \times 2.5) + (3.4 \times 2) \]

\[ = 45 + 72 = 117 \text{ ft}^2 \]

**Pressure flow below walkway**

\[ \frac{Q}{C} = 0.53, \quad Q = CA \sqrt{\frac{2gH}{}} \]

\[ Q = (0.53)(117) \frac{1}{4} = 673.18 \]

H measured from top of dam walkway (EL 232.83) to center of opening (EL 231.00)

**Spillway Rating Table**

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</table>

(at El 242, \( H = 242 - 231 = 11.0' \))

Flow over dam includes flow over walkway: \( L = 130 + 54 = 184' \)
**FLOOD HYDROGRAPH PACKAGE (HEC-1)**

**DAM SAFETY VERSION:** JULY 1979

**LAST MODIFICATION:** 01_APP.CO

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BLIND BROOK DAM PHASE I INSPECTION

HEC-10P: PWF ANALYSIS

APRIL 1971 TAPS 1970-71

sheet 4 of 19
<table>
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<th>Date/Time</th>
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**HYDROGRAPH AT STA 1 FOR PLAN 1, RT10 1**

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**HYDROGRAPH AT STA 1 FOR PLAN 1, RT10 2**

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**HYDROGRAPH AT STA 1 FOR PLAN 1, RT10 3**

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### End-of-Period Hydrograph Ordinates

#### Station 2 Plan 1: Ratio 2

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#### Peak Outflow is 15.00 at time 47.52 Hours

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### End-of-Period Hydrograph Ordinates

#### Station 2 Plan 1: Ratio 3

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### Sheet 11-219
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**Hydrograph Routing**

3 CHANNEL ROUTING DFS OF DAM AT SIN 35°00'

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GROSS GROSS AVG STPRT IPRT IFS SSTORE ISTDATE

0.0 0.100 0.0 (1) 1 0 0 0

**Sheet 13 of 19**
### PEAK FLOW AND STORACE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

FEET IN CUBIC FEET PER SECOND (CUMIC FEET PER SECOND)

AREA IN SQUARE MILES (SQUARE MILES)

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<td>(55.23)</td>
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<td>ROUTED TO</td>
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<td>(4.64)</td>
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### SUMMARY OF DAM SAFETY ANALYSIS

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TAMS

Job No. 1579-11  Project Blind Brook Country Club - Phase I Inspection  Sheet 1 of 11
Subject Stability Analysis  Date April 24, 1961

Loading Conditions

Case  Description
I  Normal Loading - Lake level at Outflow Section
   Cross Elevation (EL.108).*
II  Normal Loading as in Case I with an additional
    Extra Loading of 5 Kips/ft. at 0.5' below Cnt.
III Unusual Loading - Lake level at 1/2 PMF (EL.112.72)*
IV  Extreme Loading - Lake level at Full PMF (EL.118.79)*

* Elevations are as shown on drawings i.e. EL 108 = 230 (MSL)

Stability and overturning criteria (Recommended guidelines Eq. 3.1)

Case Location of Resultant Factor of Safety
I  middle third  > 3.0
II  middle third  > 3.0
III middle third  > 3.0
IV  middle third  > 3.0

Assumptions
1. The configuration of the Spillway Section is as shown on Plate 2
2. The dam is assumed to be founded on rock. The shear resistance
   between the rock and spillway concrete base is a c=11
   and \( \phi = 45^\circ \).
Computation of Center of Gravity (See Figure 1)

A. Dead Load

\[ FV (kip) \]
\[ W_1 = 0.150 \times 3 \times 32 = 14.4 \times 20.50 = 295.2 \]
\[ W_2 = 0.150 \times 32 \times 1.8 = 43.2 \times 13 = 561.6 \]
\[ W_3 = 0.150 \times (1 + 0.5) \times 5 = 2.8 \times 13.50 = 1.4 \]

\[ \Sigma Fy = 14.4 + 43.2 + 2.8 = 60.4 \text{ kips} \]
\[ \Sigma M_x = 295.2 + 561.6 + 1.4 = 858.2 \]

\[ x = \frac{\Sigma M_x}{\Sigma Fy} = \frac{858.2}{60.4} = 14.2' \]

\[ y = \frac{14.4 \times \frac{30}{2} + 43.2 \times \frac{(62 - 1)}{3} + 2.8 \times 3.13}{W_1 + W_2 + W_3} = \frac{685.6}{14.4 + 43.2 + 2.8} = 11.35' \]
Completion of Center of Gravity

\[ \frac{F}{2}(6.75 \times 5 \times 5.5 + 5 \times 1 \times 2.5) \times 15 \]

\[ W_3 = 3.13 \]

\[ \times 0.5' \text{ from Fig. A} \]

Scale \( \frac{1}{8''} = 1' \)

Figure 1
Case I: Normal Loading Condition (Lake level @ Spillway Crest)

Scale: 1/8" = 1 ft.

\[ P_w = \frac{1}{2} \times 30 \times 328w = 5128w \]
\[ U = \frac{1}{2} \times 328w \times 328w = 352 \gamma_w \uparrow \]
\[ W_t = 60.4K \times \frac{1}{6}w = 968\gamma_w \uparrow \]

\[ P_{wa} = 5128w \times 12.67 = 54163w \]
\[ U_a = 352 \gamma_w \times 14.67 = 5163w \]

\[ W_{ta} = 968 \gamma_w \times 14.2 = 13746 \gamma_w \]

Figure 2
CASE 1  Normal Loading Condition (Lake Level & Spillway Crest) 

- SEE Figure 2.

\[ 2F_h = 510 \text{ y} \rightarrow (k/ft) \]
\[ 2F_v = W_t - U = 168 \text{ y} - 352 \text{ y} = 616 \text{ y} \rightarrow (k/ft) \]
\[ 2M_{resisting} = W_h^2 = 13746 \text{ y}^3 \rightarrow (k \cdot ft/le) \]
\[ 2M_{friction} = P_{va} + U = 5463 \text{ y} + 5163 \text{ y} = 10626 \text{ y}^3 \rightarrow (k \cdot ft/le) \]

**Location of Resultant @ Base**

\[ x_{result} = \frac{2(M_v - M_d)}{2F_v} = \frac{13746 \text{ y}^3 - 10626 \text{ y}^3}{616 \text{ y}} = 5.06 \text{ ft} \]

From Pt. A.

\[ \frac{x_{result}}{3} \text{ should fall between } 2.33 \text{ ft and } 2.68 \text{ ft} = 2.5 \text{ ft} \]

\[ x_{result} \text{ at } 2.5 \text{ ft, outside middle third} \]

**Shear Friction Factor of Safety**

\[ S.F.F.S. = \frac{2F_v \tan \phi}{S_h} = \frac{616 \text{ y} + (940^3 + 21 \text{ y})}{510 \text{ y}} \]

\[ S.F.F.S. = 1.64 < 3.0 \]
Case II: Normal Loading with Ice Load

Ice Thickness: 1 ft
Ice Pressure = 5000 lb/ft² = 80.6 kPa

From Table 2, Eq. 3

\[ P_{wa} = 5465 \text{ kN}, \quad P_w = 5465 \text{ kN}, \quad d_z = 5746 \text{ kN} \]

\[ 2F_1 = 5120 \text{ kN} \left( g_x - g_y \right) + P_x = 5120 \text{ kN} + 200 \text{ kN} = 5320 \text{ kN} \rightarrow (1, \infty) \]

\[ 2F_2 = 6160 \text{ kN} \left( K_1 L_1 F_1 \right) \xi = \xi \]

\[ L_2 = 80.18 \text{ kN} \times 1.5 = 120 \text{ kN} \]

\[ F_{1w} = 5120 \text{ kN} \xi = 5746 \text{ kN} \left( K = 5.7/1.4 \right) \text{ Eq. } 4 \]

\[ F' = 5120 \text{ kN} \xi = 1666.6 \text{ kN} = 1666.6 \text{ kN} + 9523 \text{ kN} = 13140 \text{ kN} / (K=7/1.4) \]

Scale 1" = 1 ft.
CASE II: Normal Loading with Ice Load

\[
\Delta x_{res} = \frac{\Delta (Mr - Ma)}{2Fv} = \frac{616 \times 6}{616 \times 6} = 0.97 \text{ from P.A.}
\]

7.33' - 0.97 = 6.36 ft Outside Middle Third of:

\[
\text{Shear Friction Factor of Safety}
\]

\[
S.F.F.S. = \frac{\Sigma F \tan \phi + \Sigma A}{\Sigma F_n} = \frac{616 \times \tan 40^\circ + 21(1)}{5921 \times 6}
\]

S.F.F.S. = 1.44 < 2.0
Case III: Unusual Loading (1/2 PMF) \[ \frac{1}{2} \text{Uplift} = \frac{112\text{A}2}{3} \]

El. 112.42 \[ \frac{4.42}{1} \]

El. 108

P_a = \frac{4.42 + 3.64}{2} \times 32 = \frac{7.06}{2} \times 32 = 114.08 \text{kF}

Location of \( P_a = \frac{1}{P_a} \)

\[ P_a = 11.4' \]

\[ P_n = \frac{653 \times 11.4 \times 7705 \times Y_n}{(k-F/\text{LF})} \]

Uplift Force: \[ \frac{36.42 + 3.66 \times Y_n \times 22}{2} = 473 \times Y_n - U \]

Location of Uplift Force: Distance from Pt. A

\[ Y_n = \frac{8.6 \times Y_n - 22 + \frac{1}{3} (36.42 \times 6.6 \times 22 \times 2)}{2} \]

\[ = \frac{6.6 \times 22 \times Y_n + (36.42 \times 6.6) \times 22 \times 2}{2} \]

\[ = 13.5 \text{Ft. from Pt. A} \]

\[ U = U \times 13.5 = 473 \times Y_n \times 13.5 = 6386 \times Y_n \]
Case III: Unusual Loading ($\frac{1}{2} PMF$).

\[ \Sigma F_h = P_w + T_w = 653 \, \text{lb} + 13.0 \, \text{lb} = 639.9 \, \text{lb} \]
\[ \Sigma F_v = W_{T1} + q = 9.66 \, \text{lb} - 473.8 \, \text{lb} = 495.7 \, \text{lb} \]  
(See Fig. 2 Pg. 4 for $W_{T1}$ and $W_{A2}$)

\[ \Sigma M_T = W_{T1} + P'_{WA} = 13746 \, \text{lb} + 382.5 \, \text{lb} = 13784 \, \text{lb} \]  
($k = 1$ LF)

\[ \Sigma M_T = P_{W2} + U'_{A} = 770.5 \, \text{lb} + 658.0 \, \text{lb} = 1408.5 \, \text{lb} \]  
($k = 1$ LF)

\[
\bar{x}_{res} = \frac{\Sigma (F_v - M_o)}{\Sigma F_v} = \frac{13774.8 \, \text{lb} - 1409.5 \, \text{lb}}{495.7 \, \text{lb}} = -0.69
\]

\[
\frac{b}{3} - \bar{x}_{res} = 7.33 + 0.69 = 7.97 \text{ ft outside middle third}
\]

Shear Friction Factor of $\text{Sin}^{-1}\theta$

Shear F. F. S = \[ \frac{\Sigma F \tan \phi + CA}{\Sigma F_h} \]
\[
= \frac{495.7 \, \text{lb} \tan 40^\circ + 1 (21)}{654.98 \, \text{lb}}
\]

S. F. F. S = 1.15 < 3.0
Case III: Extreme (full PPI):

\[ \text{Upstream} = 115.79', \quad 7.9' \text{ down} \]

\[ e_1 = 76.79' - 83.4' \]

\[ P_w = \frac{5.79 + 37.79 \times 32}{2} = 69.73 \]

\[ \text{Location of } P_w \text{ from } A = \frac{3.2 \times (5.79 + \frac{1}{2} (32) - (37.79 - 5.79))}{32 \times (7.9 + \frac{1}{2} (37.79 - 5.79))} = 12.1' \]

\[ U_{1} = (37.79 - 5.79) \times \frac{1}{2} = 503 \times \frac{w}{1} \]

\[ \text{Location of } U_1 \text{ from } A = \frac{7.9 \times 22.8w + (37.79 - 5.79) \times \frac{1}{2} \times 22.8w}{7.9 \times 22.8w + (37.79 - 5.79) \times \frac{1}{2} \times 22.8w} \text{ Scale } \frac{w}{1} = 13.4 \text{ ft. from } A. \]

\[ M_{A} = U_{1} \times 13.4 = 503 \times 13.4 \times \frac{w}{1} = 6740.2 \times \frac{w}{1} \]
CASE III: Extreme Load (F.M.P.M.F.)

\[ P_{WA} = 697.3 \times 12.1 = 8432.3 \text{ k-Ft/LF} \]

\[ P_{W} = \frac{1}{2} 7.9^2 \gamma_w = 31.2 \gamma_w \text{ k-Ft/LF} \]

\[ P_{W} = 31.2 \gamma_w \times 0.6 = 18.7 \gamma_w \]

\[ \Sigma F_H = P_{W} + P_{W'} = 697.3 \gamma_w + 18.7 \gamma_w = 678.6 \gamma_w \rightarrow \text{K/Ft/LF} \]

\[ \Sigma F_V = W_{FH} + U = 767 \gamma_w - 30 \gamma_w = 465 \gamma_w \text{ (For } W' \text{ and )} \]

\[ \Sigma M_{1} = W_{TA}^2 + P_{WA}^2 = 15746 \gamma_w^2 - 488 \gamma_w \]

\[ \Sigma M_{2} = P_{WA}^2 + U_{A}^2 = 8437.3 \gamma_w^2 + 6740.2 \gamma_w^2 = 15177.5 \gamma_w^2 \]

\[ \chi_{int.} = \frac{\Sigma M_{2} - \Sigma M_{1}}{\Sigma F} = \frac{15177.5 \gamma_w - 13746 \gamma_w}{456.8 \gamma_w} \]

\[ \frac{b}{3} - \chi_{int.} = 7.33 \text{ ft} \quad \text{for middle third} \]

Shear Friction Factor of Sand:

\[ S.F.F.S. = \frac{\Sigma F_{tan} - cA}{\Sigma F_{H}} = \frac{465 \gamma_w \tan \phi (\gamma_w)}{706.1 \gamma_w} \]

\[ S.F.F.S. = 1.58 < 3.3 \text{, No Good} \]
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4. "New England Upland Section", Internal Report, Civil Engineering Department, Purdue University, West Lafayette, Indiana, August 1977.

OTHER DATA

APPENDIX G
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