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 South Pond 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 3.0 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 and visual inspection indicates that the stability against sliding and overturning of the spillway section of the dam is inadequate for all cases except Normal Loading without Ice Load.

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 as detailed in Section 6.1c. Within twelve (12) months of the date of notification to the owner, any modifications 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 (1/2) 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.
LONG ISLAND BASIN

SOUTH POND DAM

NASSAU COUNTY, NEW YORK
INVENTORY NO. N.Y. 109

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT CORPS OF ENGINEERS
JULY 1981

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SOUTH POND DAM

NASSAU COUNTY, NEW YORK
INVENTORY NO. N.Y. 109

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1981
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
SOUTH POND DAM
I.D. NO. N.Y. 109
D.E.C. NO. 192
LONG ISLAND BASIN
NASSAU COUNTY, N.Y.

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NAME OF DAM  South Pond Dam, NY 109
STATE LOCATED  New York
COUNTY LOCATED  Nassau
STREAM  Mill River
BASIN  Long Island
DATE OF INSPECTION  March 13, 1981

ASSESSMENT

The examination of documents and the visual inspection of South Pond 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 3.0 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 and visual inspection indicates that the stability against sliding and overturning of the spillway section of the dam is inadequate for all cases except Normal Loading without Ice Load.
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 as detailed in Section 6.1c. Within twelve (12) 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 (1/2) 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 are the recommended measures which must be corrected:

1. The seepage near the toe of the dam about 50 feet left of the spillway should be investigated to determine the source and cause. The appropriate methods of correction should be identified and carried out.

2. The continued erosion of the upstream face and crest of the dam should be prevented by re-establishing the original crest width and upstream slope and protecting them by riprap.

3. The seepage through the masonry joints in the spillway should be controlled and monitored at biweekly intervals with the aid of collectors and/or weirs. The source of the seepage should be investigated and if warranted corrected.

4. Clean all brush, saplings and debris from the upstream and downstream slopes. All coniferous trees should be removed while larger hardwood trees should not be removed but should be inventoried and their condition monitored. If a tree dies, the area around the tree should then be monitored for possible seepage. A program of periodic cutting and mowing should be provided.
5. The upstream and downstream low level inlets and outlets at the spillway should be cleaned out and made operable.

6. The approach and tailrace channels of the spillway should be cleared of debris.

7. The capacity and arrangement of the outlet works and auxiliary spillway located near the right abutment should be confirmed.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the repaired gates. Document this information for future reference. The emergency action plan described in Section 7.1d should be maintained and updated periodically during the life of the structure.

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

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

Date: 05 AUG 1981
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 by Contract No. DACW 51-81-C-0008 dated 14 December 1980 in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367, 8 August 1972.

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

1.2 DESCRIPTION OF THE PROJECT

a. Description of Dam and Appurtenant Structures
The South Pond Dam is composed of an approximately 800 foot long earth embankment. The crest of the dam is 10 feet wide and its maximum height above the river is 13 feet. The upstream face of the dam appears to have been paved with stone and the upper part of the upstream face has a slope of 1V:3H, while the lower has a slope of 1V:4H. The downstream face of the dam has a slope of 1V:3H on the upper part and 1V:2H on the lower sections.

An intake tower is located near the right abutment. The size of the inlets and/or outlets, if any, could not be ascertained.

A stone masonry uncontrolled overflow weir service spillway is located about 250 feet from the left abutment. The crest of the spillway is 3.5 feet below the top of the dam and has an opening 25 feet wide. The spillway has sloping training walls 21 feet long which form an upstream approach channel. These walls are equipped with stoplog slots to allow closure of the spillway opening. Also included in these walls near the base are two controlled low level bypass conduits (approxi-
An auxiliary spillway which exits about 150 feet downstream in a stepped channel appears to be part of the outlet works located near the right abutment. The intake arrangement was not visible.

b. Location
South Pond Dam is located on the Mill River in Hempstead Lake State Park near the Village of Rockville Centre, New York. Lake View Avenue near its intersection with Peninsula Boulevard, passes just downstream of the dam.

c. Size Classification
The dam is 13 feet high and has a reservoir with a maximum storage capacity of 187 acre-feet and therefore is classified as a small dam.

d. Hazard Classification
The dam is in the "high" hazard potential category because of its location within a developed suburban area, and the close downstream proximity of major highways and residences.

e. Ownership
South Pond Dam is owned by the New York City Bureau of Water Supply. The person to contact is Mr. Edward Conway, Acting Borough Engineer, Queens at 119-45 Union Turnpike, Forest Hills, New York, 11375, Telephone Number (212) 520-3467.

f. Purpose of Dam
The dam impounds water as part of the New York City Water Supply. The water has not been used for this purpose, however, in several years.

g. Design and Construction History
The dam was designed and constructed in 1903 for the Brooklyn Water Company. The designer and constructors are not known.

h. Normal Operating Procedures
There is no normal operating procedure nor records of past operating procedures.

### 1.3 PERTINENT DATA

| a. Drainage Area, Square Miles | 16.0 |
| b. Discharge at Damsite, cfs   |       |
| Ungated Overflow Spillway      | 600   |
| Auxiliary Spillway             | Unknown |
| Maximum Capacity 5 x 6 Aqueduct | Unknown |
| Total Discharge Maximum Pool   | Unknown |
c. Elevation, Feet Above MSL, USGS Datum
   Top of Dam 15.75
   Maximum Pool 15.75
   Spillway Crest 12.0
   Spillway Low Level Outlets 4.0

d. Reservoir
   Length of Normal Pool (Feet) 1500
   Surface Area of Maximum Pool (acres) 23.5
   Surface Area of Normal Pool (acres) 21

e. Storage, Acre-Feet
   Reservoir at Spillway Crest (El. 12.0) 83
   Reservoir at Maximum Pool 187

f. Dam
   Type
      Earth Embankment
   Length (Feet) 800
   Upstream Slope
      Stone Paved
      Upper 1V:3H
      Lower 1V:4H
   Downstream Slope
      Upper 1V:2H
      Lower 1V:2H
   Crest Elevation (MSL) 15.75
   Crest Width (Feet) 10
   Grout Curtain
      Unknown
   Cutoff
      Unknown

g. Spillway
   Type
      Uncontrolled Stone Masonry, Broad-Crested Weir
   Size
      25 feet wide, 3.5 feet below crest elevation
   Crest Elevation (MSL) 12.0
   Upstream Channel
      21 feet long x 25 feet wide formed by sloping training walls
   Downstream Channel
      Open channel with downstream sloping training walls
   Auxiliary Spillway
      Unknown

h. Reservoir Drain and Pipelines
   Unknown
SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

The records of the owner contain no data on site geology. However, there is data available in the literature on the general geology of the area. The South Pond Dam is located in the northeast portion of the Atlantic Coastal Plain Physiographic Province. This province is characterized by sediments which lack a definite coherence. The area around South Pond Dam is characteristic of the south shore of Long Island exhibiting topography of very low relief consisting of glacial outwash plain sediments of clayey sand, sand and gravel deposits. These Quaternary deposits overlie the Magothy Formation of the Upper Cretaceous. These are also primarily clayey sand, sand and gravel.

2.2 SUBSURFACE INVESTIGATIONS

There are no records of subsurface investigations carried out at the site. It is known that the surficial soils in the vicinity of South Pond Dam are glacial outwash plain clayey sands, sands and gravels. There are also some recent fine-grained alluvial sediments present just south of the dam.

2.3 DAM AND APPUR TENANT STRUCTURES

There are no records or drawings available with regard to the original construction of the dam in 1901. There are however drawings available in the records of the owner relating to the water supply system.

2.4 CONSTRUCTION RECORDS

No information has been located in relation to the construction of the project. The name(s) of the contractor(s) is (are) unknown.

2.5 OPERATION RECORDS

In recent years there has been no regular operation of the dam and no records are kept of reservoir operation. The dam is reportedly monitored and routine surrounding park maintenance is carried out by the NYSDEC, LISPC. No systematic monitoring of the performance of the dam is in effect.

2.6 EVALUATION OF DATA

There is sufficient data available to support a Phase I evaluation of the dam.
SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General
The visual inspection of the South Pond Dam was made on 13 March 1981. The weather was clear and the temperature was in the low fifties. At the time of the inspection, the lake level was just below the spillway crest of about El 11.5 MSL.

b. Dam
Both the upstream and downstream slopes of the earth embankment are heavily overgrown with trees and shrubs. The upstream slope of the dam was once covered by stone paving which has broken away, resulting in the exposure and subsequent erosion of the underlying granular material. The erosion has led to local sloughing and subsidence along the upstream face which is continuing. The horizontal and vertical alignment of the crest appears to be good with the exception of a slightly irregular upstream edge resulting from local sloughing and erosion.

The downstream slope of the dam is somewhat irregular due to the close proximity of the adjacent Lakeview Avenue road embankment. A wet area is located at a low point near the downstream toe about 50 feet to the left of the spillway. It was not possible to determine whether the wet area is caused by seepage or surface runoff which appears to collect at this point from various directions. The flow rate (about 5 gpm) and the clarity of the flow indicates however that it might be seepage flow (see PHOTOGRAPH 9).

There is no emergency action plan for the project.

c. Spillway
The spillway which is located about 250 feet from the left abutment suffers from a lack of maintenance. There is seepage through the masonry at various places in the downstream face and near the base of the downstream training walls. The upstream and downstream channel are clogged with debris. Two small low level gated outlets are inoperative and their intakes clogged by debris.

An auxiliary spillway appears to be included as part of the reservoir outlet system. A stepped spillway outlet channel is located south of Lakeview Avenue near the right abutment of the dam. This appears to be connected to the outlet works on the upstream face of the dam. The relationship of the intake to the outlet could not be ascertained and the owner has no record of this outlet.
d. Outlets and Pipelines
The intake for the outlet which feeds the New York City Aqueduct is located near the right abutment. The intake system and aqueduct has not been used for many years and is inoperable and full of debris.

e. Abutments
The abutment/dam contacts and abutments are in good condition. There does not appear to be any portion of the abutment lower than the crest of the dam.

f. Reservoir Area
The reservoir is located within the park closely surrounded by residential areas and highways. The surrounding topography is relatively flat. There are neither slides, rockfalls or sloughing around the reservoir. There were no sedimentation problems visible.

3.2 EVALUATION OF OBSERVATIONS

Although deficiencies were observed, there is no indication that the dam is in imminent danger. A number of the deficiencies observed in the previous paragraphs are minor and can be corrected by increased maintenance. Other conditions described above, however, represent conditions which may have potential for further deterioration and for this reason these conditions need to be further investigated or corrected.

Significant conditions were observed which require immediate investigation to determine the extent of corrective action necessary to insure the stability of the dam and appurtenances. The following is a summary of the problem areas encountered, with the appropriate recommended action:

1. There appears to be seepage near the toe of the dam about 50 feet left of the spillway requiring investigation. The source of this seepage should be identified and appropriate corrections determined and carried out.

2. The continued erosion of the upstream face, if not corrected, could lead to an unsafe, unstable condition. The upstream slope therefore should be re-established to its original condition and protected by riprap to prevent further erosion.

3. The seepage through the masonry joints in the spillway should be controlled and monitored at biweekly intervals with the aid of collectors and/or weirs. The source of the seepage should be investigated and if warranted corrected.

4. Clean all brush, saplings and debris from the upstream and downstream slopes. All coniferous trees should be
removed while larger hardwood trees should not be removed, but should be inventoried and their condition monitored. If a tree dies, the area around the tree should then be monitored for possible seepage. A program of periodic cutting and mowing should be provided.

5. The upstream and downstream low level inlets and outlets at the spillway should be cleaned out and made operable.

6. The approach and tailrace channels of the spillway should be cleared of debris.

7. The capacity and arrangement of the outlet works and auxiliary spillway located near the right abutment should be investigated and confirmed.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the repaired gates. Document this information for future reference. The emergency action plan described in Section 7.1d should be maintained and updated periodically 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. There is no normal operation of the project.

4.2 MAINTENANCE OF THE DAM

There is no regular maintenance schedule for the dam. The responsibility for day-to-day maintenance of the dam reportedly belongs to the Park Staff. Maintenance is not considered adequate as evidenced by the erosion of the upstream face of the dam, condition of the spillway and extensive tree and brush growth on the upstream and downstream faces.

4.3 WARNING SYSTEM IN EFFECT

No warning system is in effect or in preparation.

4.4 EVALUATION

The overall maintenance of the South Pond Dam is considered inadequate in the following areas:

1. Stone paving, once present on the upstream face, has broken away along most of the dam resulting in erosion of the underlying material. This erosion is continuing and ultimately results in local subsidence and sloughing.

2. The spillway exhibits extensive seepage through the downstream face and training walls.

3. Control of trees and vegetation on the upstream face, the crest and the downstream face is completely absent.

4. No formal operation and maintenance manual exists for the project.
SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

South Pond Dam is located on the Schodack Brook, north of Rockville Centre in Nassau County, Long Island, New York (Hydrologic Unit Code No. 02030202). The dam and pond is in Hempstead Lake State Park and is immediately downstream of Hempstead Lake. Flow from Hempstead Lake discharges into South Pond. The drainage area contributing directly to South Pond is 1.06 square miles and is almost entirely urbanized. It is estimated that 32 percent of the drainage area is covered by impervious materials (roads, houses, parking lots, etc.). The basin is relatively flat with a length to width ratio of approximately 6 to 1, with a highly permeable surficial sandy soil. The influence of storm-sewers in the basin is unknown but has been assumed to drain into the stream channel.

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 Probable Maximum Precipitation (PMP). The all season, 200 square mile 24 hours, PMP for the Hempstead area (Zone 6) taken from Weather Bureau sources, was 23 inches. The drainage basin was divided into two sub-areas for this analysis. Run-off from the Hempstead Lake sub-area was computed using the unit hydrograph developed for the adjacent 10 square mile East Meadow Brook basin. This unit graph, transposed to the smaller South Pond sub-area, produced coefficients of $2.05 = C_T$ and $450 = C_P$ for the Snyder unit hydrograph. Loss rates of 2.2 inches initial and 0.24 inches/hour were estimated in accordance with U.S.G.S. Professional Paper 627-F (Ref. -1) to reflect the high infiltration capacity of the pervious soils found in the Hempstead area. The inflow hydrograph was developed by the U.S. Army Corps of Engineers HEC-1DB computer program and the inflow from the South Pond drainage area was combined with outflow from Hempstead Lake and resulted in a peak PMF inflow of 16,700 cfs. A multi-plan analysis was performed to test the spillway under the full, 0.75, 0.50 and 0.25 PMF.

5.3 SPILLWAY CAPACITY

The ungated concrete spillway, with a crest elevation of 12.0 feet (MSL), is 24.75 feet in length, with vertical wingwalls 3.75 feet in height. The computed maximum spillway discharge, with the pond level at EL 15.75 feet (top of dam elevation), is 600 cfs. The additional capacity, if any of the auxiliary spillway is not known.
5.4 **RESERVOIR CAPACITY**

The normal capacity of the South Pond Reservoir is listed as 82.6 acre-feet (26.9 million gallons). Surcharge storage between spillway crest elevation (12.0 feet) and top of dam (El. 15.75 feet) is computed to be 104 acre-feet.

5.5 **FLOODS OF RECORD**

There are no records available of floods or maximum lake elevations.

5.6 **OVERTOPPING POTENTIAL**

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

The analysis was performed assuming that the water surface in the reservoir was at spillway crest elevation at the start of the flood event. The computed PMF peak outflow was 16,900 cfs. The routing of the inflow hydrographs 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>16,670 cfs</td>
<td>16,900 cfs</td>
<td>3.37 ft.</td>
</tr>
<tr>
<td>0.75</td>
<td>12,490 cfs</td>
<td>12,260 cfs</td>
<td>2.68 ft.</td>
</tr>
<tr>
<td>0.50</td>
<td>8,260 cfs</td>
<td>8,520 cfs</td>
<td>2.06 ft.</td>
</tr>
<tr>
<td>0.25</td>
<td>3,900 cfs</td>
<td>3,890 cfs</td>
<td>1.13 ft.</td>
</tr>
</tbody>
</table>

The spillway is capable of passing only 3.6 percent of the PMF without the dam being overtopped.

5.7 **EVALUATION**

The principal spillway of the South Pond 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.
6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate any structural problems with the embankment or appurtenant structures with the reservoir at its present level. There are no adverse conditions observable which would affect the stability of the dam at the present time.

b. Design and Construction Data

There are no design calculations or construction data available.

On the basis of performance, visual inspection, as well as engineering judgment, the embankment and appurtenant structures appear to be adequate with the reservoir at its present level.

c. Stability Analysis

As there were no drawings available, the structural stability of the masonry spillway section was analyzed based on an assumed typical section and field measurements. Stability analysis, for the spillway section was done in accordance with the Corps of Engineers Recommended Guidelines. (Reference 3) The following table shows the loading cases considered and the results of the analysis.

<table>
<thead>
<tr>
<th>Loading Case</th>
<th>Overturning (See Appendix E)</th>
<th>Sliding Factor of Safety (See Appendix E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Normal Loading condition with reservoir level at Spillway Crest, No Ice Load</td>
<td>Inside Middle 1/3</td>
<td>4.3</td>
</tr>
<tr>
<td>II) Normal Loading condition with reservoir at Spillway Crest, with Ice Load</td>
<td>3.93 ft. Outside Middle 1/3</td>
<td>1.47</td>
</tr>
<tr>
<td>III) Unusual Loading: One-half (1/2) PMF, water overtopping the dam by 2.18 feet</td>
<td>1.63 ft. Outside Middle 1/3</td>
<td>2.61</td>
</tr>
<tr>
<td>IV) Extreme Loading: PMF - water overtopping the dam by 3.34 feet</td>
<td>2.93 ft. Outside Middle 1/3</td>
<td>2.12</td>
</tr>
</tbody>
</table>

On the basis of the structural stability analysis performed during the investigation, the stability of the spillway against overturning and sliding was determined to be inadequate for Case II, Normal Loading with Ice Load, Case III,
Unusual Loading; One-half (1/2) PMF and Case IV, Extreme Loading: PMF.

Since exact geometry, foundation conditions, upstream backfill characteristics and extent, as well as the extent and magnitude of the uplift pressure are unknown, it is recommended that a more detailed structural stability study be performed. The study should include field investigations to obtain more information regarding the extend and characteristics of the backfill and foundation materials, as well as the quality and condition of the observable masonry of the structure. Based on the results of the analysis, modifications to the spillway should be recommended as required.

d. Operating Records
There are no operating records kept or available. There are no records or reports or any operation problems which would effect the stability of the dam.

e. Post-Construction Changes
It is reported that the dam was constructed in 1901. There are no reported post-construction changes.

f. Seismic Stability
The dam is located in Seismic Risk Zone 1 and in accordance with recommended Phase I guidelines, does not warrant seismic analyses.
SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety
Examination of the available documents and visual inspections of the South Pond Dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

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 3.0 percent of the PMF. The overtopping of the dam could cause the erosion of both abutments and the downstream face of the dam, particularly in the vicinity of the spillway-embankment contact resulting in dam failure, thus significantly increasing the hazard for 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 to loss of life downstream from the dam.

The results of the stability analysis indicates that the stability of the spillway against overturning and sliding are inadequate for all loading cases except Case I - Normal Loading without Ice Load.

b. Adequacy of Information
The information and data available were adequate for performance of a Phase I inspection, except as noted in Section 6.1c and 6.1d.

c. Need for Additional Investigations
Since the spillway is considered to be "seriously inadequate", additional hydrologic/hydraulic investigations are required to more accurately determine the site specific characteristics of the watershed. After the in-depth hydrologic/hydraulic investigations have been completed, remedial measures must be initiated to provide spillway capacity sufficient to discharge the outflow from the one-half (1/2) PMF event. In
addition, an investigation of the structural stability of the spillway portion of the dam is required.

d. Urgency

The additional hydrologic/hydraulic investigations and the stability investigation which are required must be initiated within 3 months from the date of notification. Within 12 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 governmental 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

Recommended measures are as follows:

1. The seepage near the toe of the dam about 50 feet left of the spillway should be investigated to determine the source and cause. The appropriate methods of correction should be identified and carried out.

2. The continued erosion of the upstream face and crest should be prevented by re-establishing the original crest width and upstream slope and protecting them by riprap.

3. The seepage through the masonry joints in the spillway should be controlled and monitored at biweekly intervals with the aid of collectors and weirs. The source of the seepage should be investigated and if warranted corrected.

4. Clean all brush, saplings and debris from the upstream and downstream slopes. All coniferous trees should be removed while larger hardwood trees should not be removed, but should be inventoried and their condition monitored. If a tree dies, the area around the tree should then be monitored for possible seepage. A program of periodic cutting and mowing should be provided.

5. The upstream and downstream low level inlets and outlets at the spillway should be cleaned out and made operable.

6. The approach and tailrace channels of the spillway should be cleared of debris.

7. The capacity and arrangement of the outlet works and auxiliary spillway located near the right abutment should be confirmed.
8. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the repaired gates. Document this information for future reference. The emergency action plan described in Section 7.1d should be maintained and updated periodically during the life of the structure.
APPENDIX A
Scale 1" = 1.3 miles

SOUTH POND DAM
VICINITY MAP
2. VIEW OF CREST TOWARDS LEFT ABUTMENT FROM GATEHOUSE

3. VIEW OF CREST TOWARDS SPILLWAY FROM LEFT ABUTMENT (NOTE: EROSION AND CONDITION OF TRAINING WALL)
4. VIEW OF UPSTREAM FACE NEAR RIGHT ABUTMENT
   (NOTE: EROSION OF FACE AND CREST)

5. VIEW OF UPSTREAM FACE NEAR SPILLWAY
   (NOTE: STONE PAVING)
6. VIEW OF SPILLWAY FROM DOWNSTREAM SIDE

7. VIEW OF APPROACH CHANNEL AND SPILLWAY TRAINING WALL
8. VIEW OF AUXILIARY SPILLWAY STRUCTURE

9. SEEPAGE PONDING NEAR TOE OF DAM LEFT OF SPILLWAY
VISUAL INSPECTION CHECKLIST

Basic Data

a. General

Name of Dam: South Pond Dam

Fed. I.D. #: NY 109

DEC Dam No.: 234-192

River Basin: Long Island

Location: Town Rockville Centre County Nassau

Stream Name: Mill River

Tributary of: 

Latitude (N): 40-40.1

Longitude (W): 73-39.2

Type of Dam: Earth with Rockfill

Hazard Category: 1

Date(s) of Inspection: March 13, 1981

Weather Conditions: 

Reservoir Level at Time of Inspection: 

b. Inspection Personnel

Harvey Feldman, Joe Fiten, Jr. 

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

Art Larson,
NYC Bureau of Water Supply, 119-45 Union Tpke,
Forest Hills, N.Y. 11375 (212) 520-3467. Also Mr. Edward Conway at same address.

d. History:

Date Constructed: 1901

Date(s) Reconstructed:

Designer: Not Known

Constructed By: Not Known

Owner: New York City Water Supply
Embankment

a. Characteristics
(1) Embankment Material: **Sand**

(2) Cutoff Type: **Not known**

(3) Impervious Core: **Sandy Clay**

(4) Internal Drainage System: **Not Known**

(5) Miscellaneous: **Upstream face was originally stone-paved; some areas of paving remain.**

b. Crest
(1) Vertical Alignment: **Irregular. Erosion by surface runoff and footpaths.**

(2) Horizontal Alignment: **OK where visible, but also somewhat irregular due to erosion.**

(3) Surface Cracks: **None visible.**

(4) Miscellaneous: **Local sloughing of upper and downstream faces results in irregularities to crest.**

c. Upstream Slope
(1) Slope (Estimate) (V:H): **Upper 1V:3H, Lower 1V:4H**

(2) Undesirable Growth or Debris, Animal Burrows: **Upstream slope has line of trees just below crest, also shrub growth.**

(3) Sloughing, Subsidence or Depressions: **Where surface paving has broken away, large amount of local sloughing and erosion of the sandy embankment material.**

Sheet 2
(4) Slope Protection  For the most broken away above
and just below the waterline resulting
erosion of underlying granular materials

(5) Surface Cracks or Movement at Toe  Local sloughing at
waterline, Toe not visible

d. Downstream Slope

(1) Slope (Estimate - V:II)  Upper 1V:3H, lower 1V:2H

(2) Undesirable Growth or Debris, Animal Burrows  Entire lower
slope covered by trees -(8" madclown) and brush growth

(3) Sloughing, Subsidence or Depressions  No subsidence, depressions
and local sloughing however exist due to footpads and
surface drainage

(4) Surface Cracks or Movement at Toe  None visible

(5) Seepage  Possible seepage just left of going
near toe of dam. Not clear if seepage or surface
runoff, but quantity (5gpm) and clarity indicate seepage

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

(7) Condition Around Outlet Structure  OK

(8) Seepage Beyond Toe  None obvious except as above.

e. Abutments - Embankment Contact

OK where visible

Sheet 3
(1) Erosion at Contact: None evident

(2) Seepage Along Contact: None evident

3) Drainage System
   a. Description of System: Horseshoe shaped brick Aqueduct, to N.Y.C. water supply.
   b. Condition of System: Inoperable
   c. Discharge from Drainage System: None possible

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.): None present
Reservoir

a. Slopes  Very minor relief in reservoir area  No large slopes present, no problems on small slopes

b. Sedimentation  Some fine sandy sedimentation in upstream area of dam

c. Unusual Conditions Which Affect Dam  Reservoir is directly downstream about 1/4 mile from much larger reservoir which if breached or emptied would discharge totally or partially into South Pond

Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.)  Very High Hazard

b. Seepage, Unusual Growth  Area directly downstream

c. Evidence of Movement Beyond Toe of Dam  None

d. Condition of Downstream Channel  Overgrown and full of debris

Spillway(s) (Including Discharge Conveyance Channel)

Two - Auxiliary as part of discharge system - Service - Uncontrolled overflow weir section (masonry)

a. General  Whether the Service or Auxiliary Spillways have been maintained resulting in conditions of disrepair

b. Condition of Service Spillway  Spillway in generally poor condition, upstream & downstream channels clogged by debris. Seepage through downstream face near caprock of weir and various places on face. Seepage also near toe of downstream right training wall. Two small holes that would allow water to pass around the lower end of the spillway are inoperable

Sheet 5.
c. Condition of Auxiliary Spillway: Spillway itself is okay except for some undermining at end of step structure. Unable to ascertain intake structure condition and conduit under road, as they are part of Aqueduct system.

d. Condition of Discharge Conveyance Channel: Full of debris, natural and otherwise.

Reservoir Drain/Outlet

Type: Pipe Conduit Other: Horseshoe Aqueduct

Material: Concrete Metal Other: Brick

Size: base 6', height 4½', Length: Not Known

Invert Elevations: Entrance N/A Exit N/A

Physical Condition (Describe): Unobservable

Material:

Joints:

Alignment:

Structural Integrity:

Hydraulic Capability:

Means of Control: Gate ✔ Valve Uncontrolled

Operation: Operable Inoperable Other

Present Condition (Describe): Poor.
2) Structural

a. Concrete Surfaces  
   See Item #7

b. Structural Cracking  
   See Item #7

c. Movement - Horizontal & Vertical Alignment (Settlement)  
   See Item #7

d. Junctions with Abutments or Embankments  
   See Item #7

e. Drains - Foundation, Joint, Face  
   None observed

f. Water Passages, Conduits, Sluices  
   See Items 7 & 8

g. Seepage or Leakage  
   See Items 7 and 8
h. Joints - Construction, etc.  See Item 7 and 8

i. Foundation  of Dam and Spillway is Glacial Till.

j. Abutments  N/A

k. Control Gates  See Item 7

l. Approach & Outlet Channels  See Items 7 and 8

m. Energy Dissipators (Plunge Pool, etc.)  N/A

n. Intake Structures  See Item 8

o. Stability  See Items 7 and 8

p. Miscellaneous  

Sheet 8
10) **Appurtenant Structures** (Powerhouse, Lock, Gatehouse, Other)

   a. Description and Condition  

      *No Appurtenant Structures present*
### 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>15.75</td>
<td>23.5</td>
<td>187</td>
</tr>
<tr>
<td>2) Design High Water</td>
<td>Not Known</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Max. Design Pool)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Auxiliary Spillway</td>
<td>Not Known</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Pool Level with</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flashboards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Service Spillway</td>
<td>12</td>
<td>21</td>
<td>83</td>
</tr>
<tr>
<td>Crest</td>
<td></td>
<td></td>
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</tbody>
</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</td>
<td>6000 cfs</td>
</tr>
<tr>
<td>3) Spillway @ Design High Water</td>
<td>Unknown</td>
</tr>
<tr>
<td>4) Spillway @ Auxiliary Spillway Crest Elevation</td>
<td></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>6000 cfs</td>
</tr>
<tr>
<td>7) Maximum Known Flood</td>
<td>None</td>
</tr>
<tr>
<td>8) At Time of Inspection</td>
<td></td>
</tr>
<tr>
<td>CREST: DAM</td>
<td>ELEVATION: 15.75</td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Type: EARTH</td>
<td>Width: 10 FT Length: 800 FEET</td>
</tr>
<tr>
<td>Spillover: Broad Crested Uncontrolled Masonry Structure</td>
<td>Location: 5'/5' from left abutment</td>
</tr>
</tbody>
</table>

**SPILLWAY:**

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>AUXILIARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Not Known</td>
</tr>
<tr>
<td>Broad Crested Weir</td>
<td>overflow of outlet works</td>
</tr>
<tr>
<td>Type: Uncontrolled</td>
<td>Width: 6' x 2' rectangle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Control</th>
<th>Not Known</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncontrolled</td>
<td>Controlled</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number</th>
<th>Size/Length</th>
<th>Invert Material</th>
<th>Anticipated Length of operating service</th>
</tr>
</thead>
</table>

| Type | (Flashboards; gate) | No.
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated Length of operating service</th>
<th>10 FT SLOPED TRAINING WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chute Length</td>
<td>44 FEET</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Height Between Spillway Crest &amp; Approach Channel Invert (Weir Flow)</th>
<th>Nat Known</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 FT</td>
<td></td>
</tr>
</tbody>
</table>
HYDROMETEOROLOGICAL GAGES:

Type: None Used in Analysis
Location: ____________________________
Records: None Available

Date - ________________________________________
Max. Reading - ________________________________________

FLOOD WATER CONTROL SYSTEM: None

Warning System: ____________________________

Method of Controlled Releases (mechanisms): UNKNOWN
DRAINAGE AREA: 16.0 Sq Miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

<table>
<thead>
<tr>
<th>Land Use - Type:</th>
<th>URBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrain - Relief:</td>
<td>Flat</td>
</tr>
<tr>
<td>Surface - Soil:</td>
<td>Sandy - Highly Permeable</td>
</tr>
</tbody>
</table>

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

Urban development is estimated to cover 32% of basin (roads, parking lots, etc). Natural runoff affected by Storm Sewers and detention basins

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:

With large discharges, Backwater will probably occur due to Flow over Lakeview Ave

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter: None Observed

<table>
<thead>
<tr>
<th>Location:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation:</td>
<td></td>
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</tbody>
</table>

Reservoir:

<table>
<thead>
<tr>
<th>Length @ Maximum Pool:</th>
<th>0.29 (Miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Shoreline (@ Spillway Crest)</td>
<td>0.76 (Miles)</td>
</tr>
</tbody>
</table>
### DRAINAGE AREA

- 746 in² ~ 1.06 sq mi

### LAKE AREA

- 0.23 in² ~ 21 acres

### LAKE PERIMETER

- 20' Contour: 0.375 in² ~ 34.4 acres
- 25' Contour: 0.735 in² ~ 67.5 acres

**Snyder Coefficients adopted from adjacent basin.**

- $C_L = 2.05$
- $C_p = 0.7$
- $t_p = 2.9$ hrs
- $Q_p = 164.5$ cfs
- $L = 2.84$ mi
- $L_c = 1.1$ mile
TAMS

Job No.  
Project  SOUTH POND DAM INVESTIGATION  
Subject  HYDROLOGIC/HYDRAULIC COMPUTATIONS

<table>
<thead>
<tr>
<th>EL</th>
<th>A</th>
<th>AREA</th>
<th>Mean Area</th>
<th>Δ Vol.</th>
<th>SURCHARGE</th>
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<tbody>
<tr>
<td>12</td>
<td>8</td>
<td>21</td>
<td>27.7</td>
<td>222</td>
<td>0</td>
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<tr>
<td>20</td>
<td>5</td>
<td>34.4</td>
<td>50.95</td>
<td>255</td>
<td>222</td>
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<tr>
<td>2.5</td>
<td>5</td>
<td>67.5</td>
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<td>447</td>
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</tbody>
</table>

Normal Storage listed as 26.9 million gals. (1066.7 = 3.268 x 10^6 gals) leave 82.6 acre feet.

<table>
<thead>
<tr>
<th>EL</th>
<th>Capacity</th>
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<tr>
<td>12</td>
<td>82.6</td>
</tr>
<tr>
<td>60</td>
<td>305</td>
</tr>
<tr>
<td>25</td>
<td>530</td>
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Spillway Rating

Crest EL. 12.0  Length 24.75 Top of Dam EL. 15.75

<table>
<thead>
<tr>
<th>EL</th>
<th>h</th>
<th>C</th>
<th>Q</th>
<th>Dam dimensions</th>
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<tbody>
<tr>
<td>12</td>
<td>0</td>
<td></td>
<td></td>
<td>L = 800'</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>2.98</td>
<td>74</td>
<td>Q at EL. 20 = 21,720 cfs</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>3.30</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>15.75</td>
<td>3.75</td>
<td>3.32</td>
<td>680</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>8</td>
<td>3.32</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>13</td>
<td>3.32</td>
<td>385.0</td>
<td></td>
</tr>
</tbody>
</table>

(Crest EL. taken from drawing.)
Downstream water surface elevation
Assume average elevation of Peninsula Blvd = 15.0' MSL
Also assume effective length of road overtopped = 1500'
Flow through 4' x 11.25' culvert will not exceed 500 cfs
PMF = 16840+ depth over food = 3.4'
1/2 PMF = 8580' CHZ = 2.1'

Resulting D/S Elevations
PMF = 17.3'
1/2 PMF = 16.5'

Elevation of dam = 15.75'
## Hydrograph Routing

### 3 Reservoir Routing Hempstead Lake

<table>
<thead>
<tr>
<th>STAGE</th>
<th>ICUMP</th>
<th>IECPN</th>
<th>ITACP</th>
<th>JPRT</th>
<th>INAME</th>
<th>ISTAGE</th>
<th>IAUTO</th>
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<tbody>
<tr>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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### Routing Data

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<th>NSTD</th>
<th>LAG</th>
<th>APSKX</th>
<th>X</th>
<th>TSK</th>
<th>STOR</th>
<th>ISPRT</th>
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<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0.000</td>
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<table>
<thead>
<tr>
<th>STAGE</th>
<th>FLOW</th>
<th>CAPACITY</th>
<th>ELEVATION</th>
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<tr>
<td>29.00</td>
<td>30.00</td>
<td>650.00</td>
<td>22.00</td>
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<td>31.00</td>
<td>28.00</td>
<td>600.00</td>
<td>29.00</td>
</tr>
<tr>
<td>32.00</td>
<td>27.00</td>
<td>550.00</td>
<td>36.00</td>
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</tbody>
</table>

### Elevation

- CRIP...SPAP...CQG...EXPW...ELEV...COOL...AREA...EXPL
- TOP...COOD...EXPD...BANDWID
- STATION 3. PLAN 1. RATIO 1

### End-Of-Field Hydrograph Ordinates

- Outflow
- Storage

### Peak Outflow

- 15374.4 at Time 45.00 Hours
<table>
<thead>
<tr>
<th></th>
<th>PEAK</th>
<th>6-HOUR</th>
<th>24-HOUR</th>
<th>72-HOUR</th>
<th>TOTAL VOLUME</th>
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<tr>
<td></td>
<td>CFS</td>
<td></td>
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<tr>
<td></td>
<td>15374</td>
<td>12477.</td>
<td>5021.</td>
<td>2444.</td>
<td>122627.</td>
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<tr>
<td></td>
<td>CMS</td>
<td>433.</td>
<td>142.</td>
<td>58.</td>
<td>3672.</td>
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<tr>
<td></td>
<td>MM</td>
<td>11.44</td>
<td>19.44</td>
<td>19.44</td>
<td>39.32</td>
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<tr>
<td></td>
<td>THOUS</td>
<td>305.87</td>
<td>464.22</td>
<td>492.76</td>
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<td>955.</td>
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<td>1294.</td>
<td>12901.</td>
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**STATION** 3, PLAN 1, RATIO 2

**END-OF-PERIOD HYDROGRAPH ORDINATES**

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<tr>
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<th>OUTFLOW</th>
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<td>0.</td>
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<td></td>
<td></td>
<td>(435.13)</td>
<td>374.71</td>
<td>214.76</td>
<td>104.28</td>
<td></td>
</tr>
<tr>
<td>HYDROGRAPH AT</td>
<td>1</td>
<td>1.10</td>
<td>1</td>
<td>2470.0</td>
<td>1852.0</td>
<td>1235.0</td>
<td>617.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(49.93)</td>
<td>37.45</td>
<td>24.97</td>
<td>17.44</td>
<td></td>
</tr>
<tr>
<td>2 COMBINED</td>
<td>3</td>
<td>10.20</td>
<td>1</td>
<td>16645.0</td>
<td>1248.0</td>
<td>8260.0</td>
<td>3896.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(282.89)</td>
<td>222.63</td>
<td>142.88</td>
<td>100.32</td>
<td></td>
</tr>
<tr>
<td>ROUTED TO</td>
<td>6</td>
<td>10.40</td>
<td>1</td>
<td>16109.0</td>
<td>12761.0</td>
<td>8515.0</td>
<td>4792.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(281.23)</td>
<td>225.50</td>
<td>147.19</td>
<td>110.20</td>
<td></td>
</tr>
</tbody>
</table>

---

**Summary of Dam Safety Analysis**

<table>
<thead>
<tr>
<th>Plan</th>
<th>Elev.</th>
<th>Initial Val.</th>
<th>Spillway Ch.</th>
<th>Top of Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29.00</td>
<td>14.00</td>
<td>14.00</td>
<td>34.00</td>
</tr>
</tbody>
</table>

Sheet 210F23
Assumptions

1) The unit weights used are as follows:
   Masonry  165 lbs/ft³
   Concrete  150 lbs/ft³

2) Ice load of 5 kips/ft² acting about 1 ft.
   from the top of the spillway section

3) Angle of Internal Resistance of granular soil
   foundation 30° and c = 500 psf based on engineering
   judgement and observations

4) Dam site is in Seismic Zone 1

5) Stability Analysis in accordance with Recommended guide
   lines (Ref. 10)

Loading Conditions

Case I - Normal Load; Lake at Spillway Crest
   ELEV 12.0. No Ice Load

Case II - Normal Load; Lake at Spillway Crest
   ELEV 12.0. With Ice Load

Case III - Unusual loading; Lake level at 1/2 PMF
   ELEV 17.8

Case IV - Extreme Loading; Lake level at PMF ELEV 18

Stability Criteria:

a) Overturning: Cases I thru IV; Resultant in middle 1/3 of
   base.

b) Sliding: Case I thru IV - Shear friction
   factor of safety > 3

IV - No analysis required
   according to guidelines
Stability of Spillway

Dead Load

Entire Spillway Assumed to be Masonry

\[ E.M \text{ about } IOE = F(\text{kips}) \times MA(\text{ft}) = M_0 \ (\text{ft}-\text{kips}) \]

\[ w_1 = \frac{9 \times 1}{2} \times 0.165 = 0.74 \times 0.5 = 0.37 \]
\[ w_2 = \frac{2 \times 9 \times 0.165}{2} = 2.97 \times 2.0 = 5.94 \]
\[ w_3 = \frac{9 + 8 \times (5) \times 0.165}{2} = 7.01 \times 5.5 = 38.57 \]
\[ w_4 = \frac{8 \times 2 \times 0.165}{2} = 1.32 \times 6.66 = 11.43 \]
\[ w_5 = \frac{(5 \times 1) \times 0.0624}{2} = 0.156 \times 6.34 = 0.99 \]
\[ w_6 = \frac{1}{2}(9 \times 1) \times (2) \times 0.0624 = \frac{0.624 \times 9.3}{28} \approx \frac{5.82}{12.8} \approx \frac{M_E}{62.7} \]
\[ M_E = 62.7 \]
\[ \bar{F} = \frac{62.7}{12.8} = 4.9 \ \text{ft} \]

**** LOAD ****

\[ F(\text{kips}) \times MA(\text{ft}) = M_0 \]
\[ 5.0 \times 8.5 = 42.5 \ \text{ft}-\text{kips} \]
Hydrostatic Forces - Normal Cases

\[ P = \frac{1}{2} (0.562) (9) \]
\[ U = \frac{1}{2} (0.562) (10) \]

EM about Toe

\[ F_H (kips) E_U (kips) x M_A (ft) = \frac{M_0 (ft-kips)} {3.0} \]

\[ \frac{2.53 \times 2.81 \times 6.67}{2.53} = \frac{7.59}{18.74} = 20.33 \]

\[ \uparrow F_V = 2.81 \text{ kips} \]
\[ \downarrow F_H = 2.53 \text{ kips} \]
\[ \circ M_0 = 20.33 \text{ ft-kips} \]
Hydrostatic Forces - 1/2 PIF

EL 16.5

\[ 4.5 \times 0.0624 = 0.28 \]

EL 12.0

\[ 5.9 \times 0.0624 = 0.368 \]

EL 17.9

\[ 14.9 \times 0.0624 = 0.930 \]

\[
\begin{align*}
PH &= \frac{0.930 \times 0.368}{2} \\
F_r &= \frac{0.842 + 0.28}{2} \\
\sum F_H &= 2.8 - 2.8 \\
\sum F_V &= 8.8 \uparrow \\
\sum M_o &= 62.1 \ \text{Ft-kips} \\
\sum M_L &= 11.3 \ \text{Ft-kips}
\end{align*}
\]
Hydrostatic Forces - PMF

\[ PH = \frac{[1.005 + 0.443]}{2} (9.0) = \frac{6.52}{2} \times 3.92 = 26.6 \text{ kips} \]

\[ PT = \frac{[0.892 + 0.331]}{2} (9.0)(0.6) = 3.30 \times 3.81 = 12.62 \text{ kips} \]

\[ U = \frac{[1.005 + 0.892]}{2} (10.0) = 9.485 \times 5.10 = 48.49 \text{ kips} \]

\( \leq F_H \leq 3.2 \text{ kips} \)

\( \leq F_T \uparrow 9.5 \text{ kips} \)

\( \leq M_{z} \uparrow 74.0 \text{ ft-kips} \)

\( \leq M_{e} \uparrow 12.6 \text{ ft-kips} \)
Case I - Normal Load - Without Ice

<table>
<thead>
<tr>
<th>Load Type</th>
<th>( F_v ) (kips)</th>
<th>( F_h ) (kips)</th>
<th>( M_e ) (ft-kips)</th>
<th>( M_r ) (ft-kips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead Load</td>
<td>12.8</td>
<td>10.0</td>
<td>62.72</td>
<td>26.36</td>
</tr>
<tr>
<td>Hydrostatic</td>
<td>2.8</td>
<td>2.5</td>
<td>62.72</td>
<td>26.36</td>
</tr>
</tbody>
</table>

OVERTURNING

\[ \leq m = 62.7 - 26.3 = 36.4 \text{ ft-kips} \]

\[ \bar{F} = \frac{36.4}{10.0} = 3.6 \text{ ft} \]

Resultant location = \( 3.6 - \frac{10}{3} = 0.33 \text{ ft} \) inward middle third (of)
Case II - Normal Load - With Ice

<table>
<thead>
<tr>
<th></th>
<th>( \frac{F_d}{F_u} ) (kips)</th>
<th>( \frac{F_u}{F_{tu}} ) (kips)</th>
<th>( \frac{M}{F_{tu}} ) (kips)</th>
<th>( \frac{M_0}{(f+1)F_{tu}} ) (kips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead Load</td>
<td>12.8 ( \uparrow )</td>
<td>2.8 ( \downarrow )</td>
<td>62.7 ( \uparrow )</td>
<td>26.3 ( \uparrow )</td>
</tr>
<tr>
<td>Hydrostatic Ice</td>
<td>10.0 ( \downarrow )</td>
<td>5.0 ( \downarrow )</td>
<td>62.7 ( \uparrow )</td>
<td>42.5 ( \uparrow )</td>
</tr>
</tbody>
</table>

\[ \text{Overturning} \]
\[ \pm M = 62.7 - 68.8 \]
\[ \pm M = -6.1 \]

\[ \bar{X} = \frac{-6.1}{10.0} = -0.6 \text{ ft} \]

Resultant location: \( -0.6 \cdot \frac{10}{3} = -3.93 \text{ ft} \) outside middle third (ft)

Sliding:
Shear Friction Factor of Safety:

\[ FF_S = \frac{10.0 \cdot \tan \, 30^\circ + (10.0)(0.5)}{7.5} = 1.47 \lesssim 3 \]

NG.
**Case III - Unusual Loading - 1/2 PMF**

<table>
<thead>
<tr>
<th>Dead Load</th>
<th>Fr (kips/ft)</th>
<th>Fr (kips/ft)</th>
<th>M (kips-ft)</th>
<th>M (kips-ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrostatic</td>
<td>12.8</td>
<td>8.8</td>
<td>2.8</td>
<td>67.1</td>
</tr>
<tr>
<td></td>
<td>8.8</td>
<td>4.0</td>
<td>2.8</td>
<td>67.1</td>
</tr>
</tbody>
</table>

**OVERTURNING**

\[ EM = 73.8 - 67.1 = 6.7 \text{ ft-kip} \]

\[ \bar{H} = \frac{6.7}{4.0} = 1.7 \text{ ft} \]

Resultant location: \[ 1.7 - \frac{10}{3} = -1.63 \text{ ft out side middle third} \]

**Sliding**

Shear Friction Factor of Safety:

\[ SSF = \frac{4.0 \tan 30^\circ + 10(0.5)}{2.8} = \frac{2.8}{2.8} = 2.61 < 3 \]

NG
Case IV - Extreme Loading PMF

Dead Load

\[
\begin{array}{ccc}
\text{Hydrostatic} & Fv (\text{kips}) & Fh (\text{kips}) \\
12.8 & 9.5 & 3.3 \\
9.5 & 3.3 & 3.3 \\
3.3 & 3.3 & 3.3 \\
\end{array}
\]

OVERTURNING

\[
\bar{h} = \frac{1.3}{3.3} = 0.4 \text{ Ft}.
\]

Resultant location \( \bar{y} \) = \( 0.4 - \frac{10}{3} \) = 2.93 ft outside middle third (A13)

SLIDING

Shear Friction Factor of Safety:

\[
SSF = \frac{3.3 \tan 30^\circ + 10(0.5)}{3.3} = 2.12 < 3
\]

NG
References


2. "Seasonal Variation of the Probably Maximum Precipitation, East of the 105th Meridian for Areas from 10 to 1,000 Square Miles, and Durations of 6, 12, 24, and 48 Hours", Hydrometeorological Report No. 33. Weather Bureau, U. S. Department of Commerce, April 1956.


<table>
<thead>
<tr>
<th>Location of Sp'way and outlet</th>
<th>Elevations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Sp'way and Outlet</td>
<td>Geometry of Non-overflow section</td>
</tr>
</tbody>
</table>

### General Condition of Non-overflow Section

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Joints</th>
<th>Undermining</th>
<th>Settlement of Embankment</th>
<th>Crest of Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deflections</td>
<td>Cracks</td>
<td>Leakage</td>
<td>Upstream Slope</td>
<td>Toe of Slope</td>
</tr>
</tbody>
</table>

### General Cond. of Sp'way and Outlet Notes

<table>
<thead>
<tr>
<th>Auxiliary Spillway</th>
<th>Service or Concrete Sp'way</th>
<th>Stilling Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joints</td>
<td>Surface of Concrete</td>
<td>Spillway Toe</td>
</tr>
<tr>
<td>Mechanical Equipment</td>
<td>Plunge Pool</td>
<td>Drain</td>
</tr>
</tbody>
</table>

### Maintenance

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Hazard Class</th>
<th>Inspector</th>
</tr>
</thead>
</table>

---

**Inspector:**

Trees & Brush Growing on Embank.
CONSERVATION COMMISSION,  
DIVISION OF INLAND WATERS.

GENTLEMEN:

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

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

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

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

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is [character], and under the remaining portions such foundation bed is [character].
(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.)

Hemstead Reservoir Dyke + Filtration Beds

Lake View Ave
40 Nashville Cente
The total length of this dam is 250 feet. The spillway or waste-weir portion is about 25 feet long, and the crest of the spillway is about $34\frac{1}{2}$ 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:

- 1 x 2" iron pipe running under one end of spillway.

At the time of this inspection the water level above the dam was $2\frac{1}{2}$ in. below 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 which you may have observed.)

This dam is in good condition. No leaks were apparent.

Reported by: [Signature]

[Address: Street and number, P. O. Box or R. F. D. route]

Post Office, N.Y. (Name of place)