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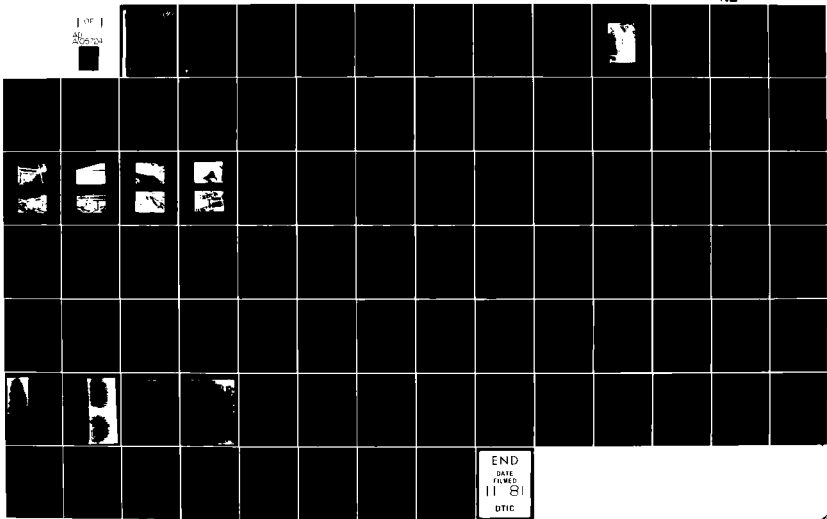
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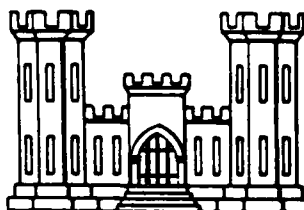
LAKE PEEKSKILL DAM

PUTNAM COUNTY, NEW YORK
INVENTORY NO. N.Y. 87

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



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NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST 1981

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization. Examination of available documents and a visual inspection of the dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property.		

Using the Corps of Engineers' screening criteria, it has been determined that the dam would be overtopped for all storms exceeding approximately 77 percent of the Probable Maximum Flood (PMF). Therefore, the spillway is adjudged "inadequate."

Structural stability analyses based on available information, indicate that the factors of safety against overturning are generally low, and the locations of the resultants fall outside the middle 1/3 (except for analyses of the normal pool loading conditions). When the dam is subjected to severe loading conditions such as an ice load or a PMF event, the factors of safety fall to critical levels. Therefore, it is recommended that further analyses of the structural stability be performed within three months of later notification. These analyses will determine the appropriate remedial measures required.

Formal inspection and maintenance procedures should be developed with records maintained for future reference.

A formal warning system and emergency action plan should be developed and put into operation as soon as possible.

The seeps should be monitored at regular intervals for quantity and increase in flow.

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

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

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LAKE PEEKSKILL DAM
I.D. No. NY 87
DEC DAM No. 213C-814 LOWER HUDSON RIVER BASIN
PUTNAM COUNTY, NEW YORK

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Lake Peekskill Dam (I.D. No. NY 87)
State: New York
County: Putnam
Stream: Unnamed Tributary of Peekskill Hollow Brook
Date of Inspection: 6 March 1981

ASSESSMENT

Examination of available documents and a visual inspection of the dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property.

Using the Corps of Engineers' screening criteria, it has been determined that the dam would be overtopped for all storms exceeding approximately 77 percent of the Probable Maximum Flood (PMF). Therefore, the spillway is adjudged "inadequate."

Structural stability analyses based on available information, indicate that the factors of safety against overturning are generally low, and the locations of the resultants fall outside the middle 1/3 (except for analyses of the normal pool loading conditions). When the dam is subjected to severe loading conditions such as an ice load or a PMF event, the factors of safety fall to critical levels. Therefore, it is recommended that further analyses of the structural stability be performed within three months of owner notification. These analyses will determine the appropriate remedial measures required.

Formal inspection and maintenance procedures should be developed with records maintained for future reference.


A formal warning system and emergency action plan should be developed and put into operation as soon as possible.

The seeps should be monitored at regular intervals for turbidity and increase in flow.

The following remedial measures must be completed within one year:

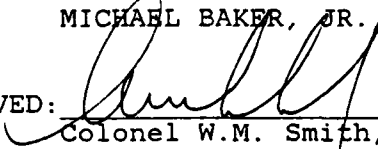
1. The far left bridge support should be underpinned and protected from future erosion.
2. The debris should be cleaned from the upstream side and bottom discharge area of the spillway.
3. The trees in the spillway discharge channel should be cut off at ground level.
4. Repair the spalled concrete on the spillway and dam.
5. Install a staff gage to monitor reservoir levels.

SUBMITTED:


Granville Kester, Jr., P.E.
Vice President

MICHAEL BAKER, JR. of New York, INC.

APPROVED:


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

DATE:

14 Aug 81



Overall View of Dam
Lake Peekskill Dam
I.D. No. NY 87
6 March 1981

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LAKE PEEKSKILL DAM
I.D. No. NY 87
DEC DAM No. 213C-814
LOWER HUDSON RIVER BASIN
PUTNAM COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

- a. Authority - The Phase I Inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.
- b. Purpose of Inspection - This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam - Lake Peekskill Dam is a concrete gravity dam 15.6 feet high measured from the crest to the toe of the dam. The dam is 120 feet long with a vertical upstream face and sloped downstream face (sloping 2V:1H). The crest of the dam is an abandoned highway bridge deck 16 feet wide with a new highway bridge built approximately 1.2 feet above the abandoned bridge deck. The spillway consists of two 3-foot high by 6-foot wide (perpendicular to flow) openings. The spillway crest has a breadth of 4 feet (parallel to flow).

The discharge channel is steep and contains rock outcrops. A small breached dam is located approximately 500 feet downstream.

- b. Location - Lake Peekskill Dam is located on an unnamed tributary of Peekskill Hollow Brook and is 2-1/2 miles northeast of Peekskill, New York. The reservoir and dam are located in Putnam County, New York. The coordinates of the dam are N 41° 20.2' and W 73° 52.8'. The dam can be found on the

Peekskill, New York, USGS 7.5 minute topographic quadrangle. A Location Map is shown in Appendix E.

- c. Size Classification - Lake Peekskill Dam is 15.6 feet high, and the reservoir storage capacity at the minimum top of the dam (Elevation 295.6 feet M.S.L.) is 1357 acre-feet. Therefore, the dam is in the "intermediate" size category as defined by the Recommended Guidelines for Safety Inspection of Dams (Reference 14, Appendix D).
- d. Hazard Classification - Two houses are located 1600 feet downstream from the dam. Loss of life in the homes is likely if the dam were to fail. Lake Peekskill Dam is therefore considered in the "high" hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.
- e. Ownership - The dam and reservoir are owned and operated by Lake Peekskill Improvement District, Box 317, Lake Peekskill, New York. The contact person is Mr. A. Purdy (telephone 914-528-9745).
- f. Purpose of the Dam - Lake Peekskill is used for recreational purposes.
- g. Design and Construction - Allan Smith, Professional Engineer, Cold Spring, N.Y., designed the dam in 1928. No date or contractor for construction is known.
- h. Normal Operating Procedure - The reservoir level is typically maintained at the spillway crest. The owner's representative reported that the dam is checked four or five times a year for leaks and debris, and the reservoir is lowered in the fall to clean around the shorelines.

1.3 PERTINENT DATA

- a. Drainage Area (Acres) - 386.0
- b. Discharge at Dam (c.f.s.)

Spillway Capacity (at Minimum Top of
Dam Elev. 295.6 ft. M.S.L.) 589.0
- c. Elevation (Feet Above M.S.L.)¹ -

Minimum Top of Dam 295.6
Normal Pool (Spillway Crest) 291.0
Streambed at Toe of Dam 280.0

d. Reservoir Surface (Acres) -

Top of Dam (Elev. 295.6 ft. M.S.L.)	67.0
Spillway Crest (Elev. 291.0 ft. M.S.L.)	52.0

e. Reservoir Storage Capacity (Acre-Feet) -

Top of Dam (Elev. 295.6 ft. M.S.L.)	1357.0
Spillway Crest (Elev. 291.0 ft. M.S.L.)	1074.0

f. Dam -

Type: Concrete gravity	
Length (Feet)	120.0
Height (Feet)	15.6
Top Width (Feet)	16.0
Side Slopes - Upstream	Vertical
Downstream	2V:1H

g. Spillway -

Type: Two 3-ft. x 6-ft. openings.	
Crest Length Perpendicular to Flow (Feet)	12.0
Crest Width Parallel to Flow (Feet)	4.0
Crest Elevation (Feet M.S.L.)	291.0

h. Reservoir Drain -

The original 24-inch outlet pipe was plugged with concrete in 1948. Therefore, the outlet pipe is not operable.

¹All elevations are referenced to the spillway crest, Elev. 291.0 ft. M.S.L., estimated from the USGS 7.5 minute topographic quadrangle, Peekskill, NY.

SECTION 2: ENGINEERING DATA

2.1 GEOLOGY

The Lake Peekskill Dam is located in the southern end of the "New England Uplands" physiographic province of New York State. This province is geologically complex and characteristically composed of a diverse group of igneous and metamorphic rocks which have been tectonically disturbed by a number of normal and thrust faults.

Bedrock in the immediate vicinity of the dam is represented by Ordovician and Precambrian rocks. The Ordovician rocks are composed of a hornblende diorite and the Manhattan Formation, a sillimanite, garnet, muscovite, biotite, plagioclase, and quartz gneiss. The Precambrian rocks consist of an amphibolite and a biotite granitic gneiss. The contact between the Ordovician diorite and the Precambrian amphibolite is located just east of Lake Peekskill. Two major fault systems are present within approximately 2 miles of either side of the lake. The first and most extensive faulting runs northeast-southwest and is located north of the lake. The second set of faults are located southeast of the lake and trend northwest to southeast. In both cases, these faults are probably best classified as high angle reverse faults.

2.2 SUBSURFACE INVESTIGATION

Original subsurface information was not available for reference as a part of this investigation. Four borings were performed in 1968 in conjunction with the design of the new bridge structure. The location of these four borings is shown on Plate 2 (Appendix E) of this report. The boring logs are presented in Appendix F, Background Documents. Borings on the right abutment (S-1 and S-2) indicate approximately 4 feet of soil overlying greenish gray gneiss. The soil was logged as "brown coarse-fine sand with little-to-some silt and a trace of med.-fine gravel." The left abutment borings (S-3 and S-4) indicate 3.0 feet and 6.5 feet, respectively, of soil overlying greenish gray gneiss. Boring S-3 was logged as "brown coarse-fine sand, little silt, trace coarse-fine gravel." Boring S-4 was logged as "brown coarse-fine sand, little coarse-fine gravel, little silt."

According to the available soils report (interim) for Putnam County prepared by the Putnam County Soil and Water Conservation District, the soils in the vicinity

of the dam are of the Hollis-Charlton Association. These soils are described as "shallow, excessively-to-well drained, sandy loam soils and deep, well-drained stony, sandy loam soils that have a permeable subsoil and substratum."

2.3 DAM AND APPURTENANT STRUCTURES

Plans for the dam and original bridge prepared by Allan Smith, P.E., Cold Spring, New York, circa 1928, were obtained from Mr. Ron Kobbe, Putnam County Highway Department, 351 Fair Street, Carmel, New York 10512. Design drawings for the new bridge, circa 1969, were also obtained from Mr. Kobbe.

The dam is a concrete semi-gravity dam with a vertical upstream face, crest width of 16 feet and a sloped downstream face (sloping 2V:1H). The spillway consists of two 3-foot high by 6-foot wide openings. A highway bridge has been built above the dam.

2.4 CONSTRUCTION RECORDS

No construction records were available for this investigation.

2.5 OPERATION RECORDS

Formal operation records are not maintained by the owner. The dam is checked four or five times annually for leaks and debris, and the reservoir is lowered in the fall to clean around the shorelines.

2.6 EVALUATION OF DATA

The background information collected during this investigation was obtained primarily from the New York State Department of Environmental Conservation files. Supplementary information was acquired through conversations with Mr. A. Purdy, representing the Lake Peekskill Improvement District. Design drawings were obtained through Mr. Kobbe of the Putnam County Highway Department. The available data are considered adequate and reliable for Phase I Inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

- a. General - The inspection was performed on 6 March 1981. The weather was sunny with a temperature of 30°F. One to two inches of snow had fallen two days previously, but the dam and structures were not covered during the inspection. The water surface was 0.5 feet above the crest. Deficiencies found during the inspection will require remedial treatment. A Field Sketch of conditions found during the inspection is included in Appendix E. The complete Visual Inspection Checklist is presented as Appendix B.
- b. Spillway - The spillway consists of two 3-foot x 6-foot openings and is located 25 feet from the left abutment. The two openings were 4 feet wide.

Debris was located on the upstream side of the spillway and where the spillway junctions with the discharge channel.

- c. Dam - The dam is a concrete structure 120 feet long with a height of 15.6 feet. An abandoned bridge deck is the top of the dam, and a new bridge is located 1.2 feet above this structure. Seepage was observed exiting from the right downstream buttress near the spillway. This concrete buttress is also spalled and partially deteriorated. Seepage was also observed 2 feet from the left bridge column of the abandoned bridge. The owner's representative reported seeing seepage exiting from the right toe of the dam near the spillway. The inspection team was unable to locate this seepage because of the debris present at this location. The abandoned bridge deck is spalled. The far left downstream (abandoned) bridge support has been undermined. No major cracking of the dam was observed.
- d. Outlet Works - The outlet works for the dam are no longer operable, as they are filled with concrete. The only means of lowering the reservoir level is by two 6-inch PVC pipes (used as siphons) placed over the spillway crest.
- e. Downstream Channel - The downstream channel is steep and contains rock outcrops. Trees are located in the channel.

A small breached dam structure is located approximately 500 feet downstream. This dam is currently non-impounding but would impound water if excessively heavy flows in the creek were greater than the capacity of the breached portion. This structure is of masonry construction and is in need of repair.

Two houses and a road are located 1600 feet downstream from the dam. The stream flows through a 48-inch diameter culvert under the road.

- f. Reservoir - The slopes of the reservoir are moderate and covered by homes and vegetation. There were no signs of instability, and sedimentation was not reported to be a problem.

3.2 EVALUATION

→ The visual inspection revealed several deficiencies in this structure. The following items were noted:

1. Seepage was observed exiting the right downstream buttress near the spillway;
2. Seepage was observed exiting near the downstream left bridge column of the abandoned bridge.
3. Seepage was observed at the right toe of the dam.
4. The far left bridge support has been undermined.
5. Debris was located on the upstream side of the spillway;
6. Debris was located at toe of the spillway discharge area;
7. The outlet works have been sealed and are no longer operable;
8. Trees are located in the discharge channel;
9. The spillway and dam have minor spalling on its concrete surfaces,

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no formal written instructions for operating the reservoir. The normal water surface elevation is at the spillway crest, but because of recent precipitation, the water surface was 0.5 feet above the crest at the time of the inspection. The reservoir is used for recreation. Two 6-inch PVC pipes (used as siphons) were on the spillway crest.

4.2 MAINTENANCE OF THE DAM

Maintenance of the dam is the responsibility of the Lake Peekskill Improvement District. The maintenance foreman checks the dam four or five times a year. He visually inspects it for cracks and seepage. Maintenance is performed when funds are available.

4.3 WARNING SYSTEM

At the time of the inspection, there was no warning system or emergency action plan in operation.

4.4 EVALUATION

Past maintenance of the dam and operating facilities appears to have been adequate, but the past activities have gone undocumented. A checklist should be compiled by the owner's representative to document the findings made during the periodic inspections and the maintenance items completed. A warning system and emergency action plan should be developed and put into operation.

SECTION 5: HYDRAULIC/HYDROLOGY

5.1 DRAINAGE AREA CHARACTERISTICS

Delineation of the watershed of Lake Peekskill Dam was made using the USGS quadrangle for Peekskill, New York. The drainage basin has steep slopes near the reservoir with extensive lakeside development in the 386-acre drainage area. No storage exists upstream of the reservoir.

5.2 ANALYSIS CRITERIA

A hydrologic analysis of the watershed and hydraulic analysis of the dam was conducted using the U.S. Army Corps of Engineers' Flood Hydrograph Package HEC-1 DB computer program (Reference 12, Appendix D). The unit hydrograph was defined using the Snyder's Unit Hydrograph Method. Estimates of Snyder's hydrograph coefficients were developed from average coefficients from the Hydrologic Flood Routing Model for Lower Hudson River Basin (Reference 16, Appendix E). Precipitation data was taken from Hydrometeorological Report No. 33 (Reference 8, Appendix D). Rainfall losses were estimated at an initial loss of 1.0 inch and a constant loss rate of 0.1 inch per hour thereafter. The hydraulic capacity of the dam, reservoir and spillway was determined by incorporating the Modified Puls Routing Method. All flood routings were begun with the reservoir at normal pool level. Outlet discharge capacity was computed by hand. The Probable Maximum Flood (PMF) and 1/2 Probable Maximum Flood (1/2 PMF) were developed and routed through the reservoir.

5.3 SPILLWAY CAPACITY

The spillway consists of two 3-foot by 6-foot openings near the center of the dam. The spillway has a capacity of 589 cubic feet per second (c.f.s.) at the top of the dam. There is no auxiliary or emergency spillway at Lake Peekskill Dam.

5.4 RESERVOIR CAPACITY

The storage capacity of Lake Peekskill Dam at normal pool is 1074 acre-feet. The storage capacity of the reservoir at the minimum top of dam is 1357 acre-feet. Therefore, flood control storage of the reservoir between the spillway crest and top of dam is 283 acre-feet. This volume represents a total of 8.80 inches of runoff from the watershed.

5.5 FLOODS OF RECORD

No information concerning the effects of significant floods on the dam is available.

5.6 OVERTOPPING POTENTIAL

The maximum capacity of the spillway is 589 c.f.s. before overtopping would occur. The peak outflows of the PMF and 1/2 PMF are 693 c.f.s. and 316 c.f.s., respectively. Therefore, the spillways are capable of passing 77 percent of the PMF before overtopping would occur.

5.7 RESERVOIR EMPTYING POTENTIAL

The reservoir can be drawn down by two 6-inch P.V.C. siphon pipes. The maintenance foreman stated that it takes one month to lower the reservoir 4 to 5 feet.

5.8 EVALUATION

Lake Peekskill Dam is an "intermediate" size - "high" hazard dam requiring the spillway to pass the PMF. The PMF and 1/2 PMF were routed through the watershed and dam. It was determined that the spillway is capable of passing 77 percent of the PMF before overtopping the dam. Therefore, the spillway is judged "inadequate."

Conclusions pertain to present conditions and the effect of future development on the hydrology has not been considered.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observations - No signs of instability were observed during the field inspection. Minor problems observed which may affect the stability of the structure include:
 1. Clear seepage was observed exiting the right downstream buttress near the spillway.
 2. Clear seepage was observed exiting near the left downstream bridge column of the abandoned bridge.
 3. The spillway and dam have minor spalling, especially at the point of seepage exiting on the right downstream buttress, on its concrete surfaces. No major cracks were observed.
 4. The owner's representative reported seepage exiting at the right toe of the spillway. However, this seepage was not observed due to the amount of debris present at this location.
 5. The left downstream abandoned bridge column footing is partially undermined.
- b. Design and Construction Data - Design information regarding the stability of the structure is unavailable.
- c. Operating Records - Operating records are unavailable. The reservoir is typically at the same elevation as the spillway crest, except during the 1 October to 31 December period when the reservoir is drawn down 4 to 5 feet to facilitate shoreline and dock maintenance.
- d. Post Construction Changes - The structure was built circa 1928. The outlet drain pipe was plugged with concrete in 1948. Around 1970, a new bridge was installed spanning over the dam to replace the existing bridge deck founded on the crest of the dam. The previous bridge deck was then left in place and abandoned.

6.2 STABILITY ANALYSIS

The results of any previous stability analyses were unavailable for reference during this evaluation. A structural stability analysis was conducted at the spillway location which coincides with the maximum section of the dam. The cases analyzed and respective results are as follows:

<u>Case</u>	<u>Description of Loading Conditions</u>
1	Normal operating conditions with the reservoir at the spillway crest (Elev. 291 ft. M.S.L.), full uplift, and with a tailwater of 1.0 foot.
2	Same as Case 1 with additional ice loading of 5000 pounds per lineal foot at normal pool level.
3	Reservoir level during the 1/2 PMF (Elev. 294.4 ft. M.S.L.), full uplift, with a tailwater of 1.5 feet.
4	Reservoir level during the PMF (Elev. 296.5 ft. M.S.L.), full uplift, with a tailwater of 2.0 feet.

<u>Case</u>	<u>Factor of Safety</u>		<u>Location of Resultant from Toe (ft.)</u>
	<u>Overturning</u>	<u>Sliding</u>	
1	1.89	6.15	4.51
2	0.83	2.90	-1.98
3	1.26	3.81	2.26
4	1.04	3.06	0.46

Notes: Location of middle 1/3 is 7.0 to 3.5 feet from the downstream toe.

A negative (-) above indicates that the location of the resultant is downstream from the toe.

A value of 2 ksf was used as a conservative approximation of the shear strength of weathered rock.

In all cases analyzed, the factors of safety against sliding are near or exceed a recommended value of three. The factors of safety against overturning are low, and the locations of the resultants (except Case 1) fall outside of the middle 1/3. Therefore, the dam is considered unsafe against overturning. However, the structure has withstood normal loading conditions in the past without apparent damage, and the analyses may not indicate the true field conditions or proper loading conditions. Because overturning during the SDF would result in a probable loss of life downstream of the dam, a detailed stability analysis of the dam should be performed by a qualified engineering firm within three months of owner notification.

6.3 SEISMIC STABILITY

Lake Peekskill Dam is located in Seismic Zone 1 which presents no hazard from earthquakes according to the Recommended Guidelines for Safety Inspection of Dams by the Department of the Army, Office of the Chief of Engineers. This determination is contingent on the requirements that static stability conditions are satisfactory, and conventional safety margins exist. As presented in Paragraph 6.2, conventional safety margins against overturning were not indicated by the analyses. If the detailed stability analysis indicates conventional safety margins, then there should be no hazard due to potential earthquakes. However, if the detailed stability analysis indicates low factors of safety against overturning, then a seismic stability evaluation should be performed as a part of the detailed stability analysis.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

- a. Safety - Examination of available documents and visual inspections of Lake Peekskill Dam did not reveal any conditions which are considered to be hazardous.

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 77 percent of the PMF. The overtopping of the dam could result in dam failure, increasing the hazard to loss of life downstream. Therefore, the spillway is adjudged "inadequate."

The stability analyses of the dam performed for this investigation indicate that the factors of safety against overturning may be inadequate.

- b. Adequacy of Information - The information available and the observations and measurements made during the visual inspection are considered sufficient for this Phase I Inspection Report.
- c. Need for Additional Investigation - A detailed stability analysis of the dam is considered necessary to determine actual stability conditions.
- d. Urgency - The stability analyses must be initiated within three months of notification to the owner. Within one year, remedial measures resulting from these investigations must be initiated, with completion of these measures during the following year. In the interim, a detailed emergency action plan must be developed and implemented during periods of unusually heavy precipitation. Around-the-clock surveillance must also be provided during these periods. The problem areas listed below must be corrected within one year of notification.

7.2 RECOMMENDED MEASURES

The regular inspections and maintenance procedures presently conducted by the owner's representative appear to be adequate, although some form of documentation is needed. A thorough checklist should be compiled by the owner's representative and completed during each

inspection. Maintenance items should be completed annually. Monitoring of the reservoir level should be expanded to include reservoir levels above normal pool.

A formal warning system and emergency action plan should be developed and put into operation as soon as possible. Monitor the seeps at regular intervals for turbidity and increase in flow. If increased flow from the seep area or turbidity is noted, a qualified geotechnical engineering firm should be retained to recommend remedial measures.

The following remedial measures must be completed within one year:

1. The far left bridge support must be underpinned and protected from future erosion.
2. The debris must be cleaned from the upstream side of the spillway.
3. The trees in the spillway discharge channel must be cut off at ground level.
4. Repair the spalled concrete on the spillway and dam.
5. Install a staff gage to monitor reservoir levels.

APPENDIX A
PHOTOGRAPHS

CONTENTS

- Photo 1: View of Left Downstream Half and Abutment of Dam
- Photo 2: View of Right Downstream Half and Abutment of Dam
- Photo 3: View of Upstream Face of Dam and Spillway Entrance
- Photo 4: View of Downstream Face of Dam and Spillway
- Photo 5: View of Upstream Side of Bridge
- Photo 6: View of Downstream Side of Bridge
- Photo 7: View of Right Downstream Buttress
- Photo 8: View of Small Masonry Dam Downstream

Note: Photographs were taken on 6 March 1981

LAKE PEEKSKILL DAM



Photo 1. View of Left Downstream Half and Abutment of Dam
6 March 1981



Photo 2. View of Right Downstream Half and Abutment of Dam
6 March 1981

LAKE PEEKSKILL DAM



Photo 3. View of Upstream Face of Dam and Spillway Entrance
6 March 1981



Photo 4. View of Downstream Face of Dam and Spillway
6 March 1981

LAKE PEEKSKILL DAM



Photo 5. View of Upstream Side of Bridge
6 March 1981



Photo 6. View of Downstream Side of Bridge
6 March 1981

LAKE PEEKSKILL DAM



Photo 7. View of Right Downstream Buttress
6 March 1981



Photo 8. View of Small Masonry Dam Downstream
6 March 1981

APPENDIX B
VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Lake Peekskill Dam

Fed. I.D. # NY 87 DEC Dam No. 213C-814

River Basin Lower Hudson

Location: Town Lake Peekskill County Putnam

Stream Name Unnamed

Tributary of Peekskill Hollow Brook

Latitude (N) 41° 20.2' Longitude (W) 73° 52.8'

Type of Dam Concrete

Hazard Category High

Date(s) of Inspection 6 March 1981

Weather Conditions Cold, clear and 30° F.

Reservoir Level at Time of Inspection 291.5

b. Inspection Personnel James Ulinski, Anthony Klimek and Steve Lockington

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

Mr. A. Purdy

Lake Peekskill Improvement District

Box 317

Lake Peekskill, NY

d. History:

Date Constructed about 1928 Date(s) Reconstructed _____

Designer Allan Smith, P.E., Cold Spring, NY

Constructed By Unknown

Owner Village of Lake Peekskill, New York

2) Embankment - Not Applicable

a. Characteristics

- (1) Embankment Material _____

- (2) Cutoff Type _____

- (3) Impervious Core _____

- (4) Internal Drainage System _____

- (5) Miscellaneous _____

b. Crest

- (1) Vertical Alignment _____

- (2) Horizontal Alignment _____

- (3) Surface Cracks _____

- (4) Miscellaneous _____

c. Upstream Slope

- (1) Slope (Estimate) (V:H) _____

- (2) Undesirable Growth or Debris, Animal Burrows _____

(3) Sloughing, Subsidence, or Depressions _____

(4) Slope Protection _____

(5) Surface Cracks or Movement at Toe _____

d. Downstream Slope

(1) Slope (Estimate - V:H) _____

(2) Undesirable Growth or Debris, Animal Burrows _____

(3) Sloughing, Subsidence or Depressions _____

(4) Surface Cracks or Movement at Toe _____

(5) Seepage _____

(6) External Drainage System (Ditches, Trenches, Blanket) _____

(7) Condition Around Outlet Structure _____

(8) Seepage Beyond Toe _____

e. Abutments - Embankment Contact _____

(1) Erosion at Contact _____

(2) Seepage Along Contact _____

3) Drainage System

a. Description of System None

b. Condition of System Not applicable

c. Discharge from Drainage System Not applicable

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

5) Reservoir

a. Slopes Slopes at reservoir are moderate and developed.

b. Sedimentation Sedimentation is not reported to be a problem.

c. Unusual Conditions Which Affect Dam None observed.

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) Two homes and a road are located 1600 ft. downstream. Loss of life in homes is likely if the dam were to fail.

b. Seepage, Unusual Growth No unusual growth was observed. Seepage near right downstream buttress near spillway (0.5 gpm, estimated), seep (0.5 gpm) 2 ft. from far left bridge column support, small seeps on right side bottom. Erosion from storm sewer downstream of right abutment.

c. Evidence of Movement Beyond Toe of Dam None observed.

d. Condition of Downstream Channel The channel is narrow and steep with rock outcrops. Structure (8 ft. high and 51 ft. long) is 50 ft. downstream and is currently breached (non-impounding).

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

a. General The spillway consists of two 3 ft. high x 6 ft. wide (perpendicular to flow) openings which are 4 ft. wide (parallel to flow).

b. Condition of Service Spillway Spillway is in fair condition. Debris found at the spillway entrance and spillway bottom. Two 6 in. PVC pipes over spillway are used to siphon water from the lake. Spillway has minor spalling, 1/2-way up face.

c. Condition of Auxiliary Spillway None

d. Condition of Discharge Conveyance Channel Rock outcrops extend the length of the discharge channel. Debris and trees are located in the discharge channel.

8) Reservoir Drain/Outlet

Type: Pipe 2 Conduit _____ Other _____

Material: Concrete _____ Metal _____ Other PVC

Size: 6 inches Length _____

Invert Elevations: Entrance Unknown

Exit Unknown

Physical Condition (Describe): Unobservable

Material: PVC

Joints: _____ Alignment _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate _____ Valve _____ Uncontrolled _____

Operation: Operable X Inoperable _____ Other _____

Present Condition (Describe): Used to syphon water from the
reservoir in fall. Takes one month to lower the reservoir 5 ft.

Broken in places. A 24 in. outlet pipe was plugged with concrete in
1948.

9) Structural

a. Concrete Surfaces Abandoned bridge deck (top of dam) is spalled. Right
downstream buttress is seeping through deteriorated concrete. Far
left downstream bridge (abandoned) support is undermined.

b. Structural Cracking No major cracking.

c. Movement - Horizontal & Vertical Alignment (Settlement) None observed.

d. Junctions with Abutments or Embankments No problems observed.

e. Drains - Foundation, Joint, Face None observed.

f. Water Passages, Conduits, Sluices None observed.

g. Seepage or Leakage Seepage exists near right downstream buttress near spillway and 2 ft. from far left bridge column. The seepage is estimated at 0.5 gpm. The owner's representative reported seeing seepage exiting the right toe area near the spillway. The inspection team did not observe this seepage because of the amount of debris at this location.

h. Joints - Construction, etc. No problems observed.

i. Foundation The dam is estimated to be founded on tight, high RQD gneissic rock.

j. Abutments No problems observed.

k. Control Gates None

1. Approach & Outlet Channels Good Condition

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

n. Intake Structures None

o. Stability No signs of instability were noted during the visual inspection.

p. Miscellaneous

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

a. Description and Condition None

APPENDIX C
HYDROLOGIC/HYDRAULIC DATA AND COMPUTATIONS

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject LAKE PEELSKILL DAM

S.O. No. _____

APPENDIX C

Sheet No. _____ of _____

Drawing No. _____

Computed by _____

Checked by _____

Date _____

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DRAINAGE AREA MAP	5
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UPSTREAM PROFILE	11
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SPILLWAY CAPACITY ANALYSIS	13
HEC-1 ANALYSIS	14

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	<u>Elevation (ft.)</u>	<u>Surface Area (acres)</u>	<u>Storage Capacity (acre-ft.)</u>
1) Top of Dam	<u>295.6</u>	<u>67</u>	<u>1,357</u>
2) Design High Water (Max. Design Pool)	<u>Unknown</u>	<u>--</u>	<u>--</u>
3) Auxiliary Spillway Crest	<u>None</u>	<u>--</u>	<u>--</u>
4) Pool Level with Flashboards	<u>N/A</u>	<u>--</u>	<u>--</u>
5) Service Spillway Crest	<u>N/A</u>	<u>--</u>	<u>1,074</u>

DISCHARGES

	<u>Volume (cfs)</u>
1) Average Daily	<u>Unknown</u>
2) Spillway @ Maximum High Water - Top of Dam -	<u>589</u>
3) Spillway @ Design High Water	<u>Unknown</u>
4) Spillway @ Auxiliary Spillway Crest Elevation	<u>N/A</u>
5) Low Level Outlet	<u>N/A</u>
6) Total (of all facilities) @ Maximum High Water	<u>589</u>
7) Maximum Known Flood	<u>Unknown</u>
8) At Time of Inspection	<u>15</u>

CREST:

ELEVATION: 295.6 ft.

Type: Concrete (two 3' X 6' openings)

Width: 16 ft. (abandoned bridge deck) Length: 120 ft.

Spillover Broad-crested weir

Location Spillway is located 25 ft. from left abutment

SPILLWAY:

SERVICE		AUXILIARY
291.0	Elevation	None
Two broad-crested weirs	Type	--
4 ft. ea.	Width	--
<u>Type of Control</u>		
Uncontrolled	Uncontrolled	--
Controlled:		
--	Type	--
(Flashboards; gate)		
--	Number	--
--	Size/Length	--
Invert Material		
Anticipated Length		
of Operating Service		
Approximately 12 ft.	Chute Length	--
11 ft.	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	--

HYDROMETEROLOGICAL GAGES:

Type: None

Location: _____

Records:

Date: _____

Max. Reading: _____

FLOOD WATER CONTROL SYSTEM:

Warning System: None

Method of Controlled Releases (mechanisms):

None

DRAINAGE AREA: 0.60 sq. mi. (386 acres)

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Forests and lake development

Terrain - Relief: Moderate slopes

Surface - Soil: Well-drained

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

No known plans to change runoff patterns at time of inspection.

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

No problem areas observed. Slopes were developed or well vegetated.

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

Flooding of homes on the lake shoreline could occur.

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

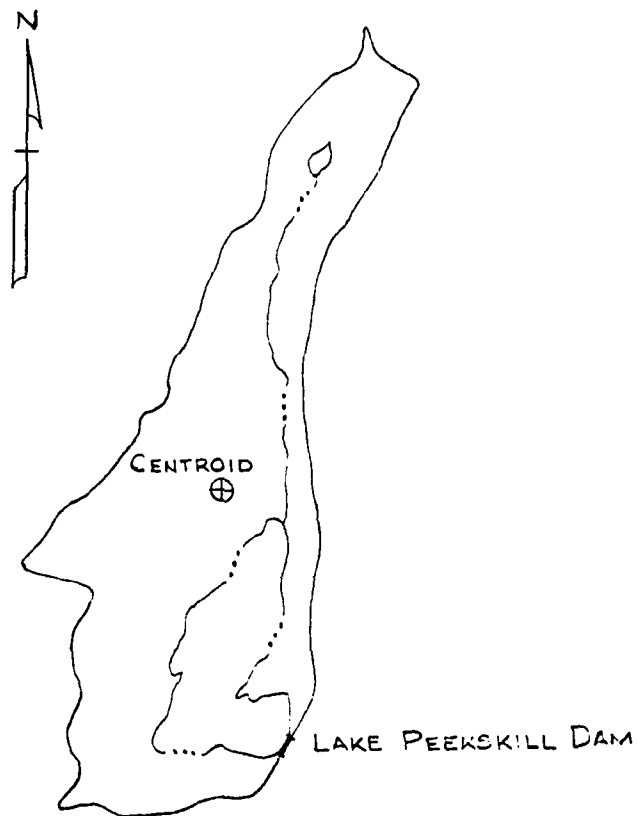
Location: None

Elevation: _____

Reservoir:

Length @ Maximum Pool 3,400 ft.

Length of Shoreline (@ Spillway Crest) 8,800 ft. (1.67 mi.)



QUAD : PEEKSKILL, N.Y.
DRAINAGE AREA = 0.60 SQ. MI.

DRAINAGE AREA ABOVE
LAKE PEEKSKILL DAM

SCALE : 1 IN. = 2000 FT.

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THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject NEW YORK DAMS

LAKE PEEKSKILL DAM

S.O. No. _____

Sheet No. 6 of 18

Drawing No. _____

Computed by WLS

Checked by JE

Date 1/12/31

HYDROLOGIC AND HYDRAULIC DATA

DRAINAGE AREA ABOVE DAM = 4.21 SQ. MI. (MEASURED ON
PEEKSKILL, N.Y. QUAD) = 0.604 SQ. MI. ✓

$L_{CA} = 3700 \text{ FT} = 0.70 \text{ MI.}$ ✓

$L = 9300 \text{ FT} = 1.76 \text{ MI.}$ ✓

STORAGE COMPUTATIONS

SURFACE AREA VS. ELEVATION MEASUREMENTS (TAKEN FROM QUAD)

ELEVATION (FT)	AREA (ACRES)
291	58.16 ✓
300	72.24 ✓
320	88.77 ✓
340	112.64 ✓

NOTE: NORMAL POOL ASSUMED TO BE
ELEV. 291 (LISTED ON QUAD)

$$C_p = 0.63 \quad C_T = 2.0$$

$$T_p = C_T (L \times L_{CA})^{.3}$$
$$= 2.0 (1.76 \times 0.70)^{.3}$$
$$T_p = 2.13$$

ADJUSTMENT FOR DURATION

$$T_R = T_p / 5.5 = 2.13 / 5.5 = 0.39 \text{ HR} \quad \text{USED } 0.33 \text{ HR. INTERVAL.}$$

$$T_R = T_p + \frac{T_R - T_p}{4}$$
$$= 2.13 + \frac{.39 - .33}{4}$$

$$T_R = 2.14 \text{ HR}$$

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S.O. No. _____

Sheet No. 7 of 18

Drawing No. _____

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Checked by GWT

Date 3/12/81

SURFACE AREA RESERVOIR BOTTOM

SURFACE AREA EL. 291 58.16 ACRES

EQUIVALENT CIRCLE RADIUS $r = 898.01$ FT ✓

AVERAGE SIDE SLOPE $S = 5.39$ H:V

AVERAGE RESERVOIR DEPTH $D = 21$ FT (FROM MAINTENANCE FORMAN)

RADIUS BOTTOM OF RESERVOIR

$$898.01 - 21(5.39) = 784.82 \text{ FT } \checkmark$$

SURFACE AREA BOTTOM 44.42 ACRES ✓

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Subject NEW YORK DAMS S.O. No. _____
LAKE PEEKSKILL DAM Sheet No. 5 of 18
RAINFALL DATA Drawing No. _____
Computed by WLS Checked by JE Date 1/12/84

RAINFALL DATA (FROM VPIR-33)

DAM AND DRAINAGE AREA ARE IN ZONE 1

$$PMP (24 HR)_{200 mi^2} = 21.3 \text{ in.}$$

$$DRAINAGE AREA = 0.604 \text{ SQ. MI.}$$

$$PMP (6-HR) = 111\% PMP (24-HR)_{200 mi^2}$$

$$" (12 HR) = 123\% " " "$$

$$" (24 HR) = 133\% " " "$$

$$" (48 HR) = 142\% " " "$$

$$100\text{-YEAR, 24 HR RAINFALL (FROM TP-10)} = 7.8 \text{ in.}$$

$$" " 12 HR " " = 6.5 \text{ in.}$$

$$" " 6 HR " " = 5.3 \text{ in.}$$

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Subject LAKE PEEKSKILL DAM

S.O. No. _____

PROFILE TOP OF DAM

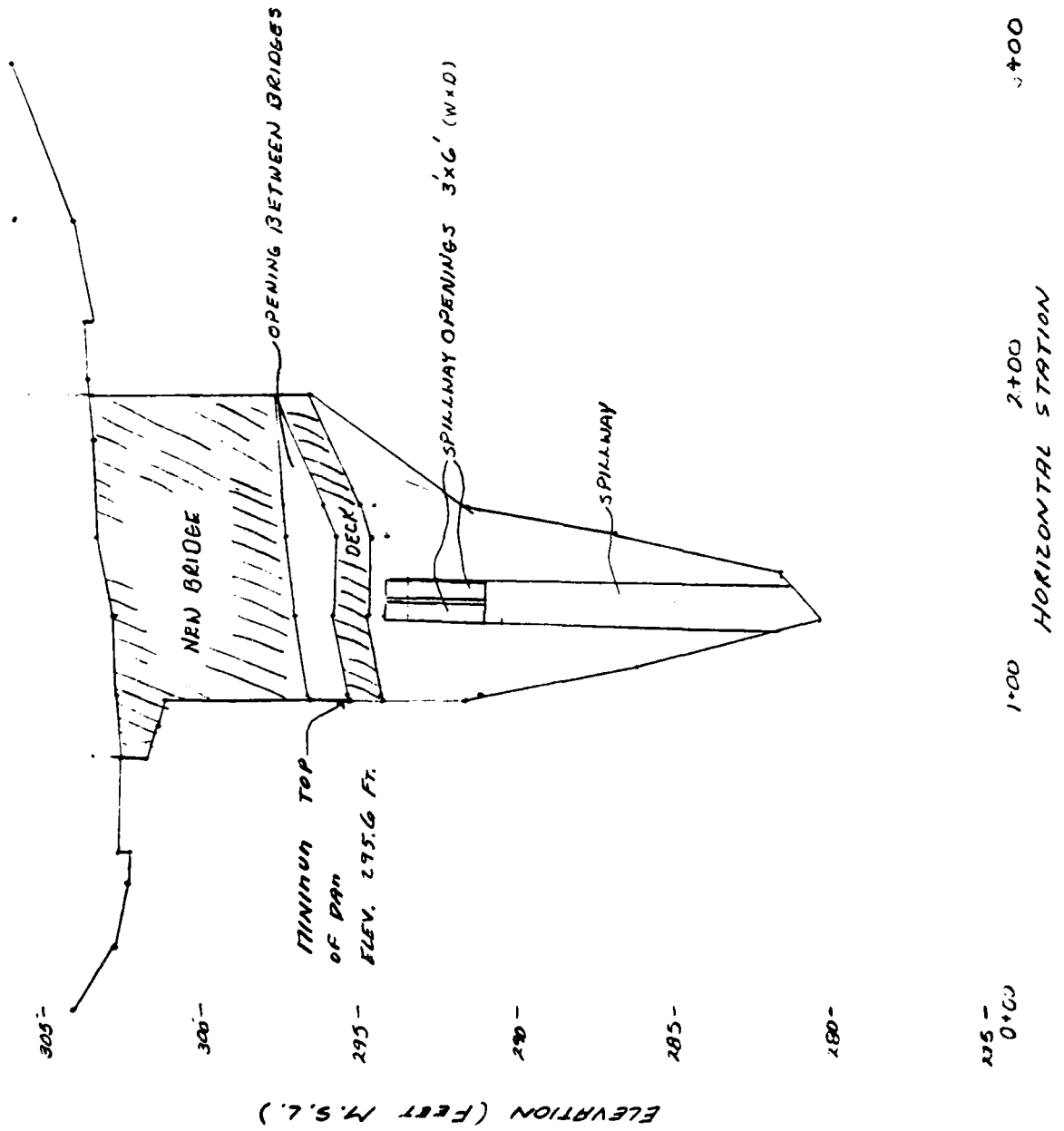
Sheet No. 9 of 13

Drawing No. _____

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S.O. No. _____

CROSS SECTION AT STA. 1+2.5

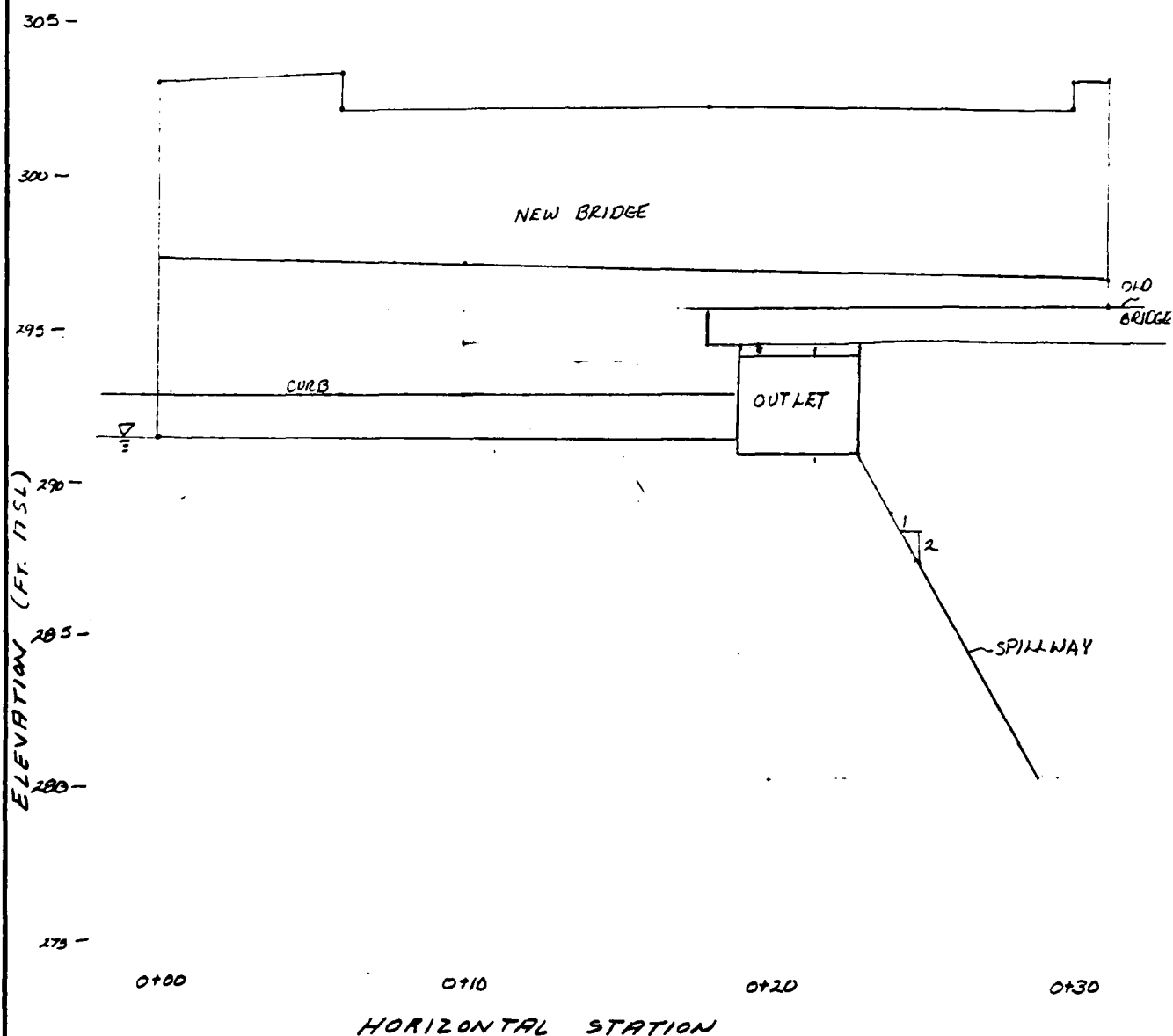
Sheet No. 10 of 15

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Computed by SMH

Checked by GWT

Date 3/8/81



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Subject LAKE PECKSKILL DAM

UPSTREAM PROFILE

S.O. No. _____

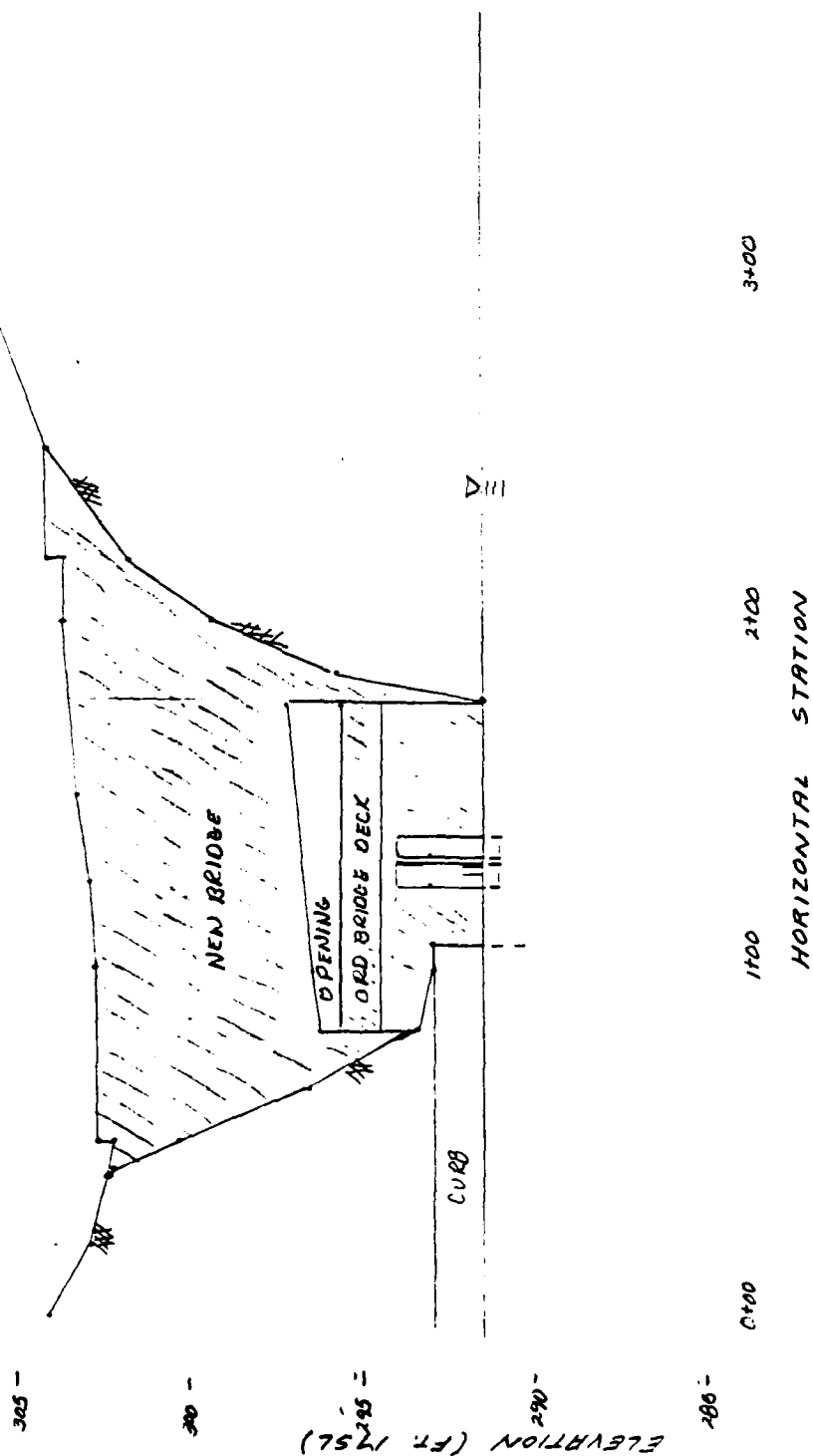
Sheet No. 11 of 13

Drawing No. _____

Computed by SHL

Checked by GWJ

Date 3/11/21



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Box 280
Beaver, Pa. 15009Subject LAKE PEERSKILL DAM

S.O. No. _____

SPILLWAY AND COMBINED RATING CURVES Sheet No. 12 of 12

Drawing No. _____

Computed by SHL Checked by SWT Date 5/20/81

THE TWO 3 FT x 6 FT OUTLETS WERE ASSUMED TO BE EROD CRESED WEIRS AS LONG AS THE TOP OF DAM. FOR WEIR FLOW THE EQUATION IS

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

WHEN THE LAKE SURFACE SEALS THE TOP OF THE CULVERT THEN THE FLOW BECOMES ORIFICE FLOW. THE EQUATION BECOMES

$$Q = CA\sqrt{2gH}$$

BETWEEN THE OLD DAM AND THE NEW BRIDGE AN AVERAGE WIDTH OF 1.2 FT AND AN AVERAGE LENGTH OF 72' WAS USED.

ELEV.	2 - 3' x 6' OUTLETS				TOP OF OLD DAM				COMBINED FLOW (CFS)
	TYPE OF FLOW	C	H (FT)	Q (CFS)	TYPE OF FLOW	C	H (FT)	Q (CFS)	
291	NONE	NA	NA	0	NONE	NA	NA	NA	0
291.6	WEIR	2.69	0.6	15	"	"	"	"	15
292	"	2.67	1.0	32	"	"	"	"	32
293	"	2.68	2.0	91	"	"	"	"	91
293.5	"	2.72	2.5	129	"	"	"	"	129
293.9	WEIR	2.73	2.9	162	"	"	"	"	162
295.0	ORIFICE	0.61	2.5	279	WEIR	2.65	1.0	244	523
296.80	"	"	4.10	357	ORIFICE	0.61	0.40	342	699
297.5	"	"	5.0	394	"	"	1.3	616	1010
298.5	"	"	6.0	432	"	"	2.3	820	1252
300.5	"	"	8.0	498	"	"	4.3	1121	1619
302.5	ORIFICE	0.61	10	557	ORIFICE	0.61	6.3	1356	1913

WEIR COEFFICIENTS KING + BRATER P 5-40 TABLE 5-3

ORIFICE COEFFICIENTS KING + BRATER P 4-31 TABLE 4-5

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Subject LAKE PEEKSKILL DAM

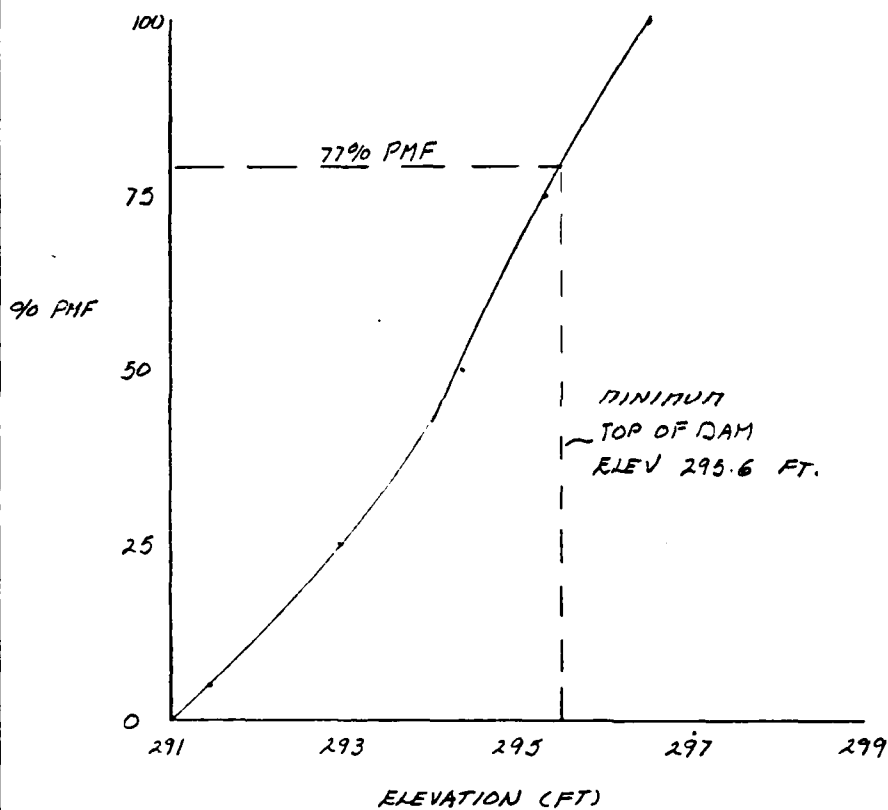
S.O. No. _____

SPILLWAY CAPACITY ANALYSIS

Sheet No. 13 of 13

Drawing No. _____

Computed by SML Checked by GUT Date 2/16/91



[illegible]

PEAK FLOW AND STORAGE (LNO OF PERIOD) SUMMARY FOR SURFACE PERMEABILITY CORRELATION COMPUTATIONS
 FLOW IN CUBIC FEET PER SECOND (CFS) ALONG PER PERIOD
 AREA IN SQUARE FEET (SQ. FT.)

OPERATION	STATION	AREA	PLAN	RATIO	1	RATIO	2	RATIO	3	RATIO	4	RATIO	5	RATIO	6	RATIO	7	RATIO	8	RATIO	9	RATIO	10	RATIO	11	RATIO	12	RATIO	13	RATIO	14	RATIO	15	RATIO	16	RATIO	17	RATIO	18	RATIO	19	RATIO	20	RATIO	21	RATIO	22	RATIO	23	RATIO	24	RATIO	25	RATIO	26	RATIO	27	RATIO	28	RATIO	29	RATIO	30	RATIO	31	RATIO	32	RATIO	33	RATIO	34	RATIO	35	RATIO	36	RATIO	37	RATIO	38	RATIO	39	RATIO	40	RATIO	41	RATIO	42	RATIO	43	RATIO	44	RATIO	45	RATIO	46	RATIO	47	RATIO	48	RATIO	49	RATIO	50	RATIO	51	RATIO	52	RATIO	53	RATIO	54	RATIO	55	RATIO	56	RATIO	57	RATIO	58	RATIO	59	RATIO	60	RATIO	61	RATIO	62	RATIO	63	RATIO	64	RATIO	65	RATIO	66	RATIO	67	RATIO	68	RATIO	69	RATIO	70	RATIO	71	RATIO	72	RATIO	73	RATIO	74	RATIO	75	RATIO	76	RATIO	77	RATIO	78	RATIO	79	RATIO	80	RATIO	81	RATIO	82	RATIO	83	RATIO	84	RATIO	85	RATIO	86	RATIO	87	RATIO	88	RATIO	89	RATIO	90	RATIO	91	RATIO	92	RATIO	93	RATIO	94	RATIO	95	RATIO	96	RATIO	97	RATIO	98	RATIO	99	RATIO	100	RATIO	101	RATIO	102	RATIO	103	RATIO	104	RATIO	105	RATIO	106	RATIO	107	RATIO	108	RATIO	109	RATIO	110	RATIO	111	RATIO	112	RATIO	113	RATIO	114	RATIO	115	RATIO	116	RATIO	117	RATIO	118	RATIO	119	RATIO	120	RATIO	121	RATIO	122	RATIO	123	RATIO	124	RATIO	125	RATIO	126	RATIO	127	RATIO	128	RATIO	129	RATIO	130	RATIO	131	RATIO	132	RATIO	133	RATIO	134	RATIO	135	RATIO	136	RATIO	137	RATIO	138	RATIO	139	RATIO	140	RATIO	141	RATIO	142	RATIO	143	RATIO	144	RATIO	145	RATIO	146	RATIO	147	RATIO	148	RATIO	149	RATIO	150	RATIO	151	RATIO	152	RATIO	153	RATIO	154	RATIO	155	RATIO	156	RATIO	157	RATIO	158	RATIO	159	RATIO	160	RATIO	161	RATIO	162	RATIO	163	RATIO	164	RATIO	165	RATIO	166	RATIO	167	RATIO	168	RATIO	169	RATIO	170	RATIO	171	RATIO	172	RATIO	173	RATIO	174	RATIO	175	RATIO	176	RATIO	177	RATIO	178	RATIO	179	RATIO	180	RATIO	181	RATIO	182	RATIO	183	RATIO	184	RATIO	185	RATIO	186	RATIO	187	RATIO	188	RATIO	189	RATIO	190	RATIO	191	RATIO	192	RATIO	193	RATIO	194	RATIO	195	RATIO	196	RATIO	197	RATIO	198	RATIO	199	RATIO	200	RATIO	201	RATIO	202	RATIO	203	RATIO	204	RATIO	205	RATIO	206	RATIO	207	RATIO	208	RATIO	209	RATIO	210	RATIO	211	RATIO	212	RATIO	213	RATIO	214	RATIO	215	RATIO	216	RATIO	217	RATIO	218	RATIO	219	RATIO	220	RATIO	221	RATIO	222	RATIO	223	RATIO	224	RATIO	225	RATIO	226	RATIO	227	RATIO	228	RATIO	229	RATIO	230	RATIO	231	RATIO	232	RATIO	233	RATIO	234	RATIO	235	RATIO	236	RATIO	237	RATIO	238	RATIO	239	RATIO	240	RATIO	241	RATIO	242	RATIO	243	RATIO	244	RATIO	245	RATIO	246	RATIO	247	RATIO	248	RATIO	249	RATIO	250	RATIO	251	RATIO	252	RATIO	253	RATIO	254	RATIO	255	RATIO	256	RATIO	257	RATIO	258	RATIO	259	RATIO	260	RATIO	261	RATIO	262	RATIO	263	RATIO	264	RATIO	265	RATIO	266	RATIO	267	RATIO	268	RATIO	269	RATIO	270	RATIO	271	RATIO	272	RATIO	273	RATIO	274	RATIO	275	RATIO	276	RATIO	277	RATIO	278	RATIO	279	RATIO	280	RATIO	281	RATIO	282	RATIO	283	RATIO	284	RATIO	285	RATIO	286	RATIO	287	RATIO	288	RATIO	289	RATIO	290	RATIO	291	RATIO	292	RATIO	293	RATIO	294	RATIO	295	RATIO	296	RATIO	297	RATIO	298	RATIO	299	RATIO	300	RATIO	301	RATIO	302	RATIO	303	RATIO	304	RATIO	305	RATIO	306	RATIO	307	RATIO	308	RATIO	309	RATIO	310	RATIO	311	RATIO	312	RATIO	313	RATIO	314	RATIO	315	RATIO	316	RATIO	317	RATIO	318	RATIO	319	RATIO	320	RATIO	321	RATIO	322	RATIO	323	RATIO	324	RATIO	325	RATIO	326	RATIO	327	RATIO	328	RATIO	329	RATIO	330	RATIO	331	RATIO	332	RATIO	333	RATIO	334	RATIO	335	RATIO	336	RATIO	337	RATIO	338	RATIO	339	RATIO	340	RATIO	341	RATIO	342	RATIO	343	RATIO	344	RATIO	345	RATIO	346	RATIO	347	RATIO	348	RATIO	349	RATIO	350	RATIO	351	RATIO	352	RATIO	353	RATIO	354	RATIO	355	RATIO	356	RATIO	357	RATIO	358	RATIO	359	RATIO	360	RATIO	361	RATIO	362	RATIO	363	RATIO	364	RATIO	365	RATIO	366	RATIO	367	RATIO	368	RATIO	369	RATIO	370	RATIO	371	RATIO	372	RATIO	373	RATIO	374	RATIO	375	RATIO	376	RATIO	377	RATIO	378	RATIO	379	RATIO	380	RATIO	381	RATIO	382	RATIO	383	RATIO	384	RATIO	385	RATIO	386	RATIO	387	RATIO	388	RATIO	389	RATIO	390	RATIO	391	RATIO	392	RATIO	393	RATIO	394	RATIO	395	RATIO	396	RATIO	397	RATIO	398	RATIO	399	RATIO	400	RATIO	401	RATIO	402	RATIO	403	RATIO	404	RATIO	405	RATIO	406	RATIO	407	RATIO	408	RATIO	409	RATIO	410	RATIO	411	RATIO	412	RATIO	413	RATIO	414	RATIO	415	RATIO	416	RATIO	417	RATIO	418	RATIO	419	RATIO	420	RATIO	421	RATIO	422	RATIO	423	RATIO	424	RATIO	425	RATIO	426	RATIO	427	RATIO	428	RATIO	429	RATIO	430	RATIO	431	RATIO	432	RATIO	433	RATIO	434	RATIO	435	RATIO	436	RATIO	437	RATIO	438	RATIO	439	RATIO	440	RATIO	441	RATIO	442	RATIO	443	RATIO	444	RATIO	445	RATIO	446	RATIO	447	RATIO	448	RATIO	449	RATIO	450	RATIO	451	RATIO	452	RATIO	453	RATIO	454	RATIO	455	RATIO	456	RATIO	457	RATIO	458	RATIO	459	RATIO	460	RATIO	461	RATIO	462	RATIO	463	RATIO	464	RATIO	465	RATIO	466	RATIO	467	RATIO	468	RATIO	469	RATIO	470	RATIO	471	RATIO	472	RATIO	473	RATIO	474	RATIO	475	RATIO	476	RATIO	477	RATIO	478	RATIO	479	RATIO	480	RATIO	481	RATIO	482	RATIO	483	RATIO	484	RATIO	485	RATIO	486	RATIO	487	RATIO	488	RATIO	489	RATIO	490	RATIO	491	RATIO	492	RATIO	493	RATIO	494	RATIO	495	RATIO	496	RATIO	497	RATIO	498	RATIO	499	RATIO	500	RATIO	501	RATIO	502	RATIO	503	RATIO	504	RATIO	505	RATIO	506	RATIO	507	RATIO	508	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CONTINUED FROM PREVIOUS PAGE

PLAN 1

ELEVATION
STAKE
CUTTER

INITIAL VALUE
298.00
10.0

APPROXIMATE
10.0

TOP OF ROAD
222.00
10.0

RATIO OR P/R	MAXIMUM ACCELERATION	MAXIMUM DEPTH OVER DAT	MAXIMUM STRESS AC-T	MAXIMUM STRESS AC-T	CORRECTION WHEN TOP IS	TIME OF MAX. COLLISION HOURS	TIME OF FAILURE HOURS
1.00	298.00	0.00	10.00	10.00	0.00	11.00	0.00
0.75	298.00	0.00	10.00	10.00	0.00	11.00	0.00
0.50	298.00	0.00	10.00	10.00	0.00	11.00	0.00
0.25	298.00	0.00	10.00	10.00	0.00	11.00	0.00
0.00	298.00	0.00	10.00	10.00	0.00	11.00	0.00

SHEET 18 OF 18

APPENDIX D

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APPENDIX E
DRAWINGS

CONTENTS

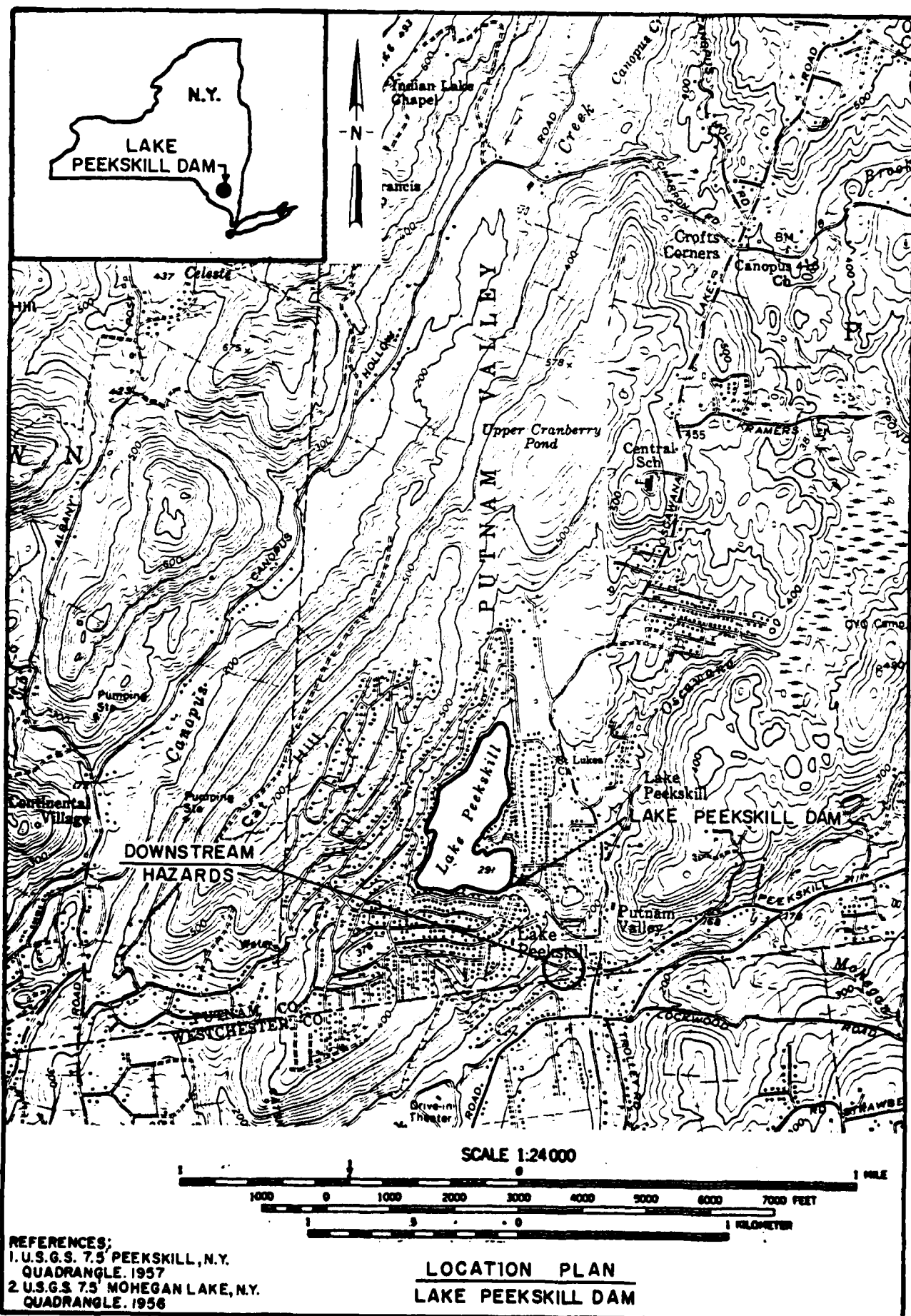
Location Plan

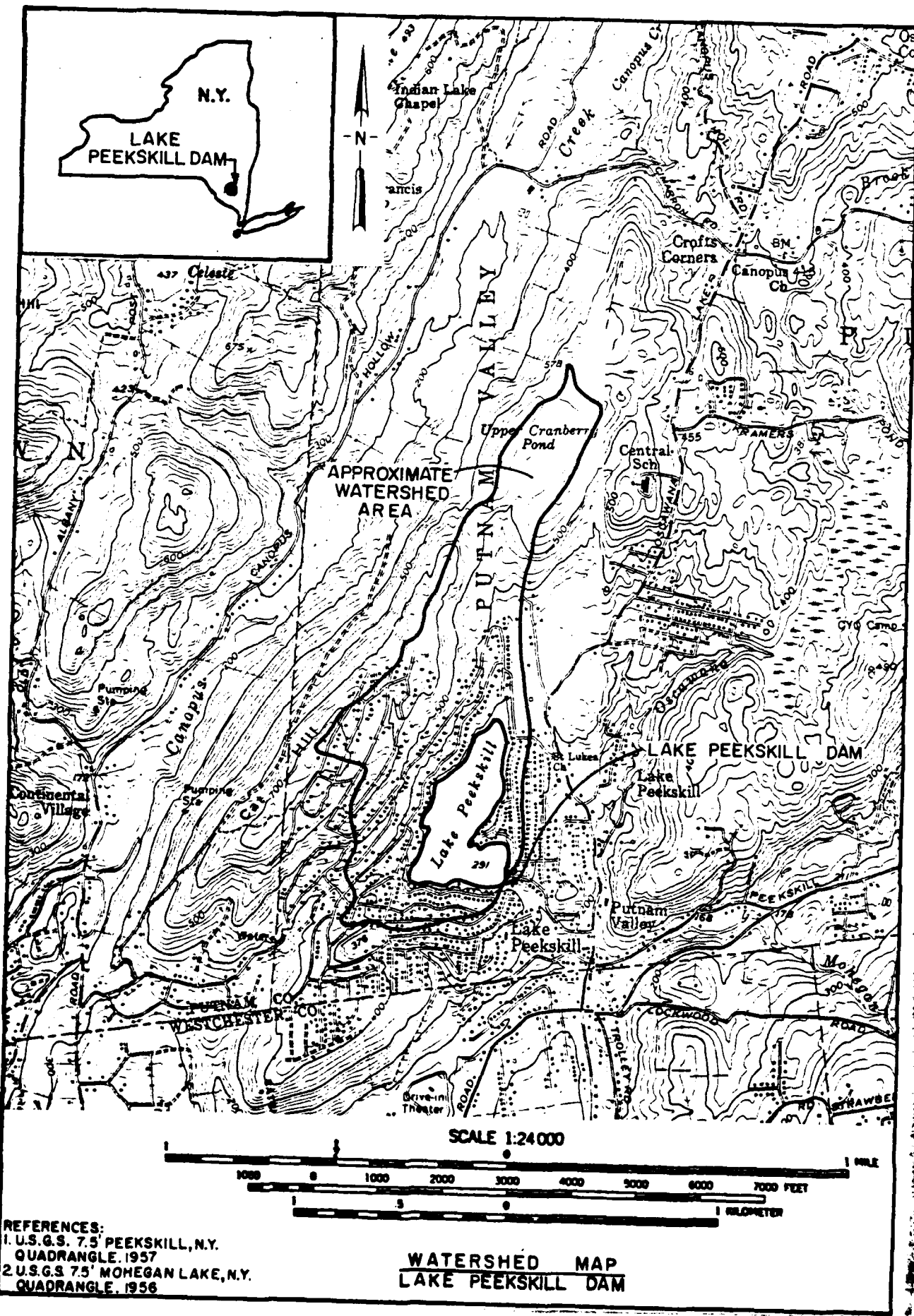
Watershed Map

Plate 1: Field Sketch

Plate 2: General Plan from Replacement Bridge Design Drawings

Plate 3: Original Dam Design Profile and Section





RESERVOIR

A A

NEW BRIDGE DECK
(PLAN VIEW)

NEW BRIDGE

TOP OF DAM - OLD BRIDGE DECK

OPENING BETWEEN
OLD AND NEW BRIDGE

OLD
BRIDGE
PIERS

EROSION

MASONRY
WALL

UNDERMINING

OLD BRIDGE
PIERS

SPALLING

SEEPAGE
PIERS
Q ≈ 0.5 g.p.m.

DEBRIS
JUNK

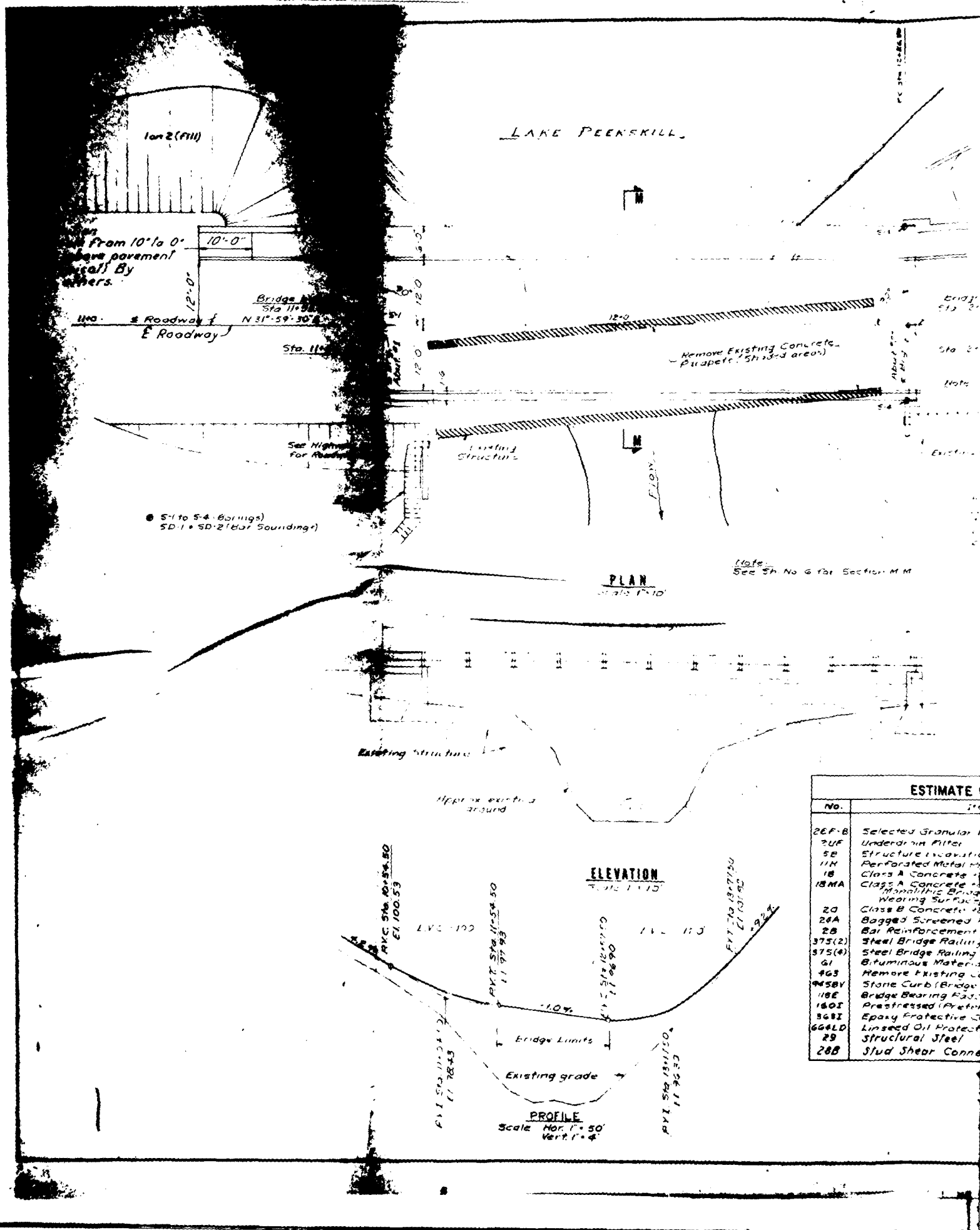
SPALLED AND
DETERIORATED
CONCRETE
(IN BATTRESS)

SEEPAGE
Q ≈ 0.5 g.p.m.

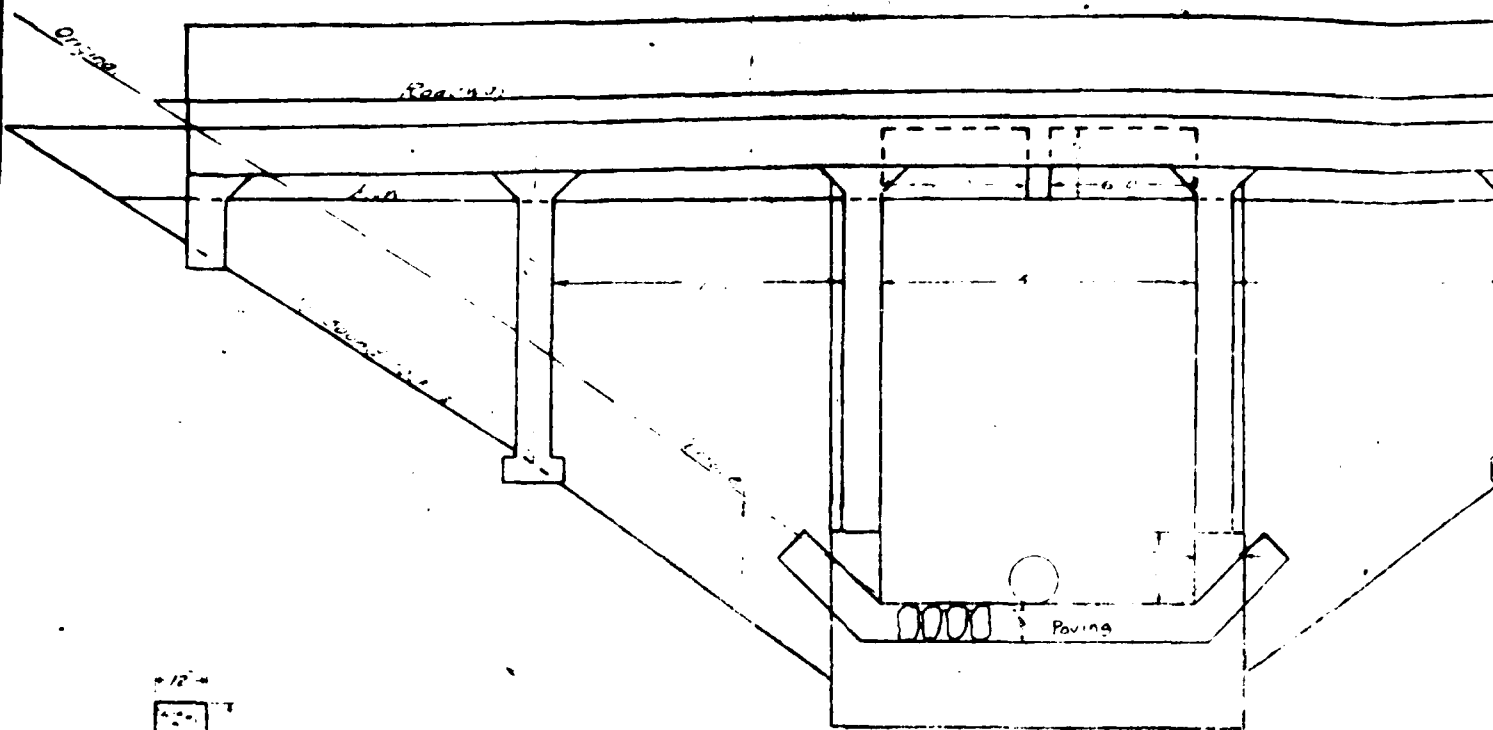
LAKE PEESKILL DAM
FIELD SKETCH

PLATE 1

FRONT VIEW
(A A')

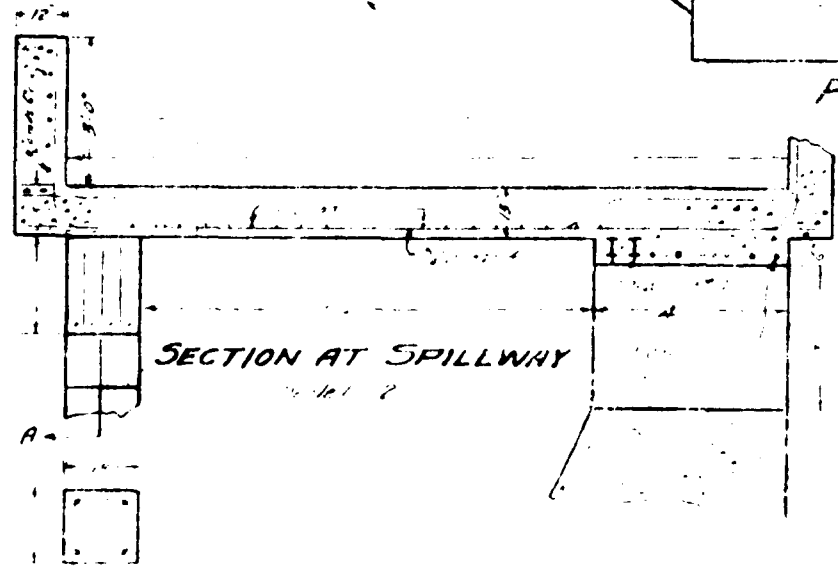


1/2" = 1'-0"

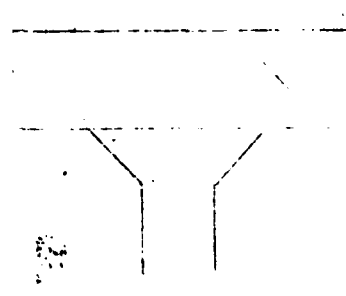


PROFILE

SE



SECTION AT SPILLWAY

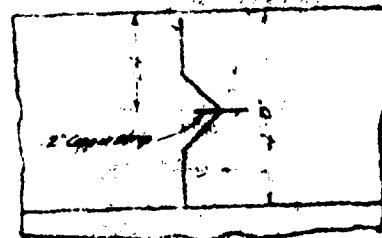


Revised Nov 1954
E. J. S. S.

1. Height of spillway added
2. Second water level added
3. 24' high and 12' wide
4. Paving at spillway added
5. Larger slope added to right
6. New channel bottom at spillway

SECTION AT VALVE HOUSE

SECTION AT SPILLWAY



EXPANSION JOINT IN DAM

2

FRUFGOTT LUM.
LAKE PEEKSKILL
PUTNAM VALLEY PUTNAM CO, N.Y.
LONG BEACH GARDENS INC.
SCAFFOLD - AS SHOWN NOV. 5, 1928.

PLATE 3

APPENDIX F
BACKGROUND DOCUMENTS

GENERAL BORING'S, INC.

STRAITSVILLE RD., PROSPECT, CONN.

SOILS CLASSIFICATION SYSTEM

DESCRIPTION	FROM	TO
BOULDERS	8"	+
COBBLES	2-1/2	8"
COARSE GRAVEL	1"	2-1/2
MEDIUM GRAVEL	3/8"	1"
FINE GRAVEL	2mm	3/8"
COARSE SAND	0.5mm	2mm
MEDIUM SAND	0.25mm	0.5mm
FINE SAND	.125	0.25mm
VERY FINE SAND	0.62	.125
SILT & CLAY	Less than 0.62mm	

Proportions Used -

Trace 0 to 10% Little 10 to 20% Some 20 to 35% and 35 to 50%

EXAMPLES -

"Brown fine sand Medium gravel") Equal amounts of sand) and gravel)
"Brown medium to fine sand and gravel) Sample predominantly sand) with 35 to 50% gravel)
Some silt) 20 to 35% silt)
Boulders") Various percentages -

GENERAL BORING'S, INC.

STRAITSVILLE RD., PROSPECT, CONN.

CORRELATION CHART

PENETRATION RESISTANCE & SOIL PROPERTIES

Predominant sand and gravel		Predominant silt and clay		
COHESIONLESS	SOILS	COHESIVE	SOILS	COMPRESSIVE
Blows per foot	Relative Density	Blows per foot	Consistency	Strength (qu*)
0 to 4	very loose	0 to 2	very soft	below .25
4 to 10	loose	2 to 4	soft	.25 to .50
10 to 30	medium	4 to 8	medium	.50 to 1.0
30 to 50	dense	8 to 15	stiff	1 to 2
over 50	very dense	15 to 30	very stiff	2 to 4
		over 30	hard	over 4

NOTES:

Above based on 2" O. D. sampler x 1-3/8" i.d. 140# Wt. x 30" Fall (qu*) =
Tons per Square Foot

STATE OF CONNECTICUT BASIC BUILDING CODE

TABLE 15. PRESUMPTIVE SURFACE BEARING VALUES OF FOUNDATION MATERIALS

CLASS OF MATERIAL		Tons per Square Foot
1	Massive crystalline bed rock including granite, diorite, gneiss, trap rock hard limestone and dolomite.	100
2	Foliated rock including bedded limestone, schist and slate in sound condition.	40
3	Sedimentary rock including hardshales, sandstones, and thoroughly cemented conglomerates.	25
4	Soft or broken bed rock (excluding shale) and soft limestone.	10
5	Compacted, partially cemented gravels, sand and hardpan overlying rock.	10
6	Gravel and sand-gravel mixtures.	6
7	Loose gravel, hard dry clay, compact coarse sand, and soft shales.	4
8	Loose, coarse sand and sand-gravel mixtures and compact fine sand (confined).	3
9	Loose medium sand (confined), stiff clay.	2
10	Soft broken shale, soft clay.	1.5

Sheet of

REPORT OF AUGER BORINGS AND PIPE AND BAR PROBINGS

LINE Station 11+56

PROJECT NO. 275

DATE WORK DONE _____

FOR Goodkind & C'Dea

CONTRACTING ENGINEER

[illegible]

[illegible]

CLIENT: <u>Goodkind & C'Dee</u>		General Borings, Inc. STRAITSVILLE RD. PROSPECT, CONN.		SHEET <u>1</u> OF <u>1</u> HOLE NO. <u>S-2</u>									
CONTRACTOR <u>EMAN - DRILLER</u>		PROJECT NAME <u>Lake Peekskill, Bridge</u>		LINE <u>2</u>									
INSPECTOR <u>W. Cereska</u>		LOCATION <u>Putnam County</u>		STATION <u>11+56</u>									
GROUND WATER OBSERVATIONS AT <u>13.5</u> FT AFTER <u>0</u> HOURS AT _____ FT AFTER _____ HOURS		New York		OFFSET <u>18' D</u>									
		CASINO <u>HA</u>		SAMPLER <u>SS</u>									
		CORE BAR <u>AX</u>		Date Start <u>10/30/68</u> Date Fin. _____									
		TYPE SIZE I.D. _____ HAMMER WT _____ HAMMER FALL _____		SURFACE ELEV. <u>92.4</u> & GROUND WATER ELEV. _____									
		<u>1 3/8</u> <u>140</u> <u>30"</u>		<u>1 3/8</u> <u>Diamond</u> <u>Carbide</u>									
DEPTH	CASING BLOWS PER FOOT	SAMPLE					BLOWS PER 6" ON SAMPLER (FORCE ON TUBE)			CORING TIME PER FT (MIN.)	DENSITY OR CONSIST	STRATA CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		NO.	TYPE	PEN	REC	DEPTH @ BOT	0-6	6-12	12-18				
		1	ss	1'6"	1'2"	1'6"	9	12	15				
													1) Brown coarse-fine sand, little silt, trace med-fine gravel.
													3'7"
5													Run#1 Drilled 3'7"-5'7" Recovered 0.7' greenish gray rock(fractured).
													5'7"
													Run#2 Drilled 5'7"-10'1". Recovered 1'0" greenish gray soft rock.
10													10'1"
													Run#3 Drilled 10'1"-13'7". Lost water at 7'6". Seam 8'11"-9'6".
													13'7"
													Run#4 Drilled 10'1"-13'7". Recovered 2'4" greenish gray gneiss.
													14'7"
													Run#5 Drilled 14'7"-18'7". Water returned at 10'7".
20													18'7"
													Run#4 Drilled 13'7"-14'7". Recovered 0'-5" sandy fractured greenish gray gneiss.
													Run#5 Drilled 14'7"-18'7". Recovered 2.0' greenish gray gneiss.
													END OF BORING 18'7"
													3'7" Soil
													15'0" Rock
35													

TYPE OF SAMPLES

D: DRY W: WASHED C: CORED A: AUGER UP: UNDISTURBED PISTON

UB: UNDISTURBED BALL CHECK V: VANE TEST

PROPORTIONS USED TRACE: 0-10%, LITTLE: 10-20%, SOME: 20-35%, AND: 35-50%

TOTAL FOOTAGE

EARTH BORING _____ FT.

ROCK CORING _____ FT.

[illegible]

CLIENT: <u>Goodkind & O'Dea</u>			General Borings, Inc. STRAITSVILLE RD. PROSPECT, CONN.			SHEET <u>1</u> OF <u>1</u> HOLE NO. <u>S-4</u>							
CONTRACTOR EMAN - DRILLER <u>R. TUCCILLO</u>			PROJECT NAME <u>Lake Peekskill, Bridge</u>			LINE <u>4 12+56</u>							
INSPECTOR <u>W. Cereska</u>			LOCATION <u>Putnam County</u>			STATION							
GROUND WATER OBSERVATIONS AT <u>2.6'</u> FT. AFTER <u>0</u> HOURS AT _____ FT. AFTER _____ HOURS			TYPE <u>HA</u> SIZE I.D. _____ HAMMER WT. _____ HAMMER FALL _____			SAMPLER <u>SS</u> <u>1 3/8</u> <u>140</u> <u>30"</u>							
			CORE BAR <u>AX</u> <u>Diamond</u>			Date Start <u>10/31/66</u> Date Fin. <u>10/31</u> SURFACE ELEV. <u>92.2</u> GROUND WATER ELEV. _____							
DEPTH	CASING BLOWS PER FOOT	SAMPLE					BLOWS PER 6" ON SAMPLER (FORCE ON TUBE)			CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST	STRAT. CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		NO.	TYPE	PEN	REC	DEPTH @ BOT	0-6	6-12	12-18				
5		1	ss	18"	8"	1'6"	2	6	12		Ref.		1) Brown coarse-fine sand, little coarse-fine gravel, little silt. 0'0"-1'6".
		2	"	12"	4"	6'0"	13	38	60/3"			2) Gray-brown coarse-fine sand and silt, trace med-fine gravel. 5'0"-6'0"	
		2A	"	3"	3"	6'3"						Run#1 2A) Greenish gray soft decomposed rock. 6'0"-6'3"	
												Run#1 Drilled 6'6"-8'6". Recovered 0'-4" greenish gray rock fragments.	
10												Run#2 10'6"	Run#2 8'6"-10'6" (drilled). Recovered 0'-5" greenish gray rock fragments.
20												Run#3 13'6"	Run#3 Drilled 10'6"-13'6" Recovered 1'6" greenish gray rock.
25													
30													
35													

TYPE OF SAMPLES

D. DRY W. WASHED C. CORED A. AUGER UP. UNDISTURBED PISTON

UB. UNDISTURBED BALL CHECK VT. VANE TEST

PROPORTIONS USED TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

TOTAL FOOTAGE

EARTH BORING _____ FT.

ROCK CORING _____ FT.

APPENDIX G
STABILITY COMPUTATIONS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject Lake Fork - R. Dam
Stability Analysis

Computed by JMK

Checked by JGU

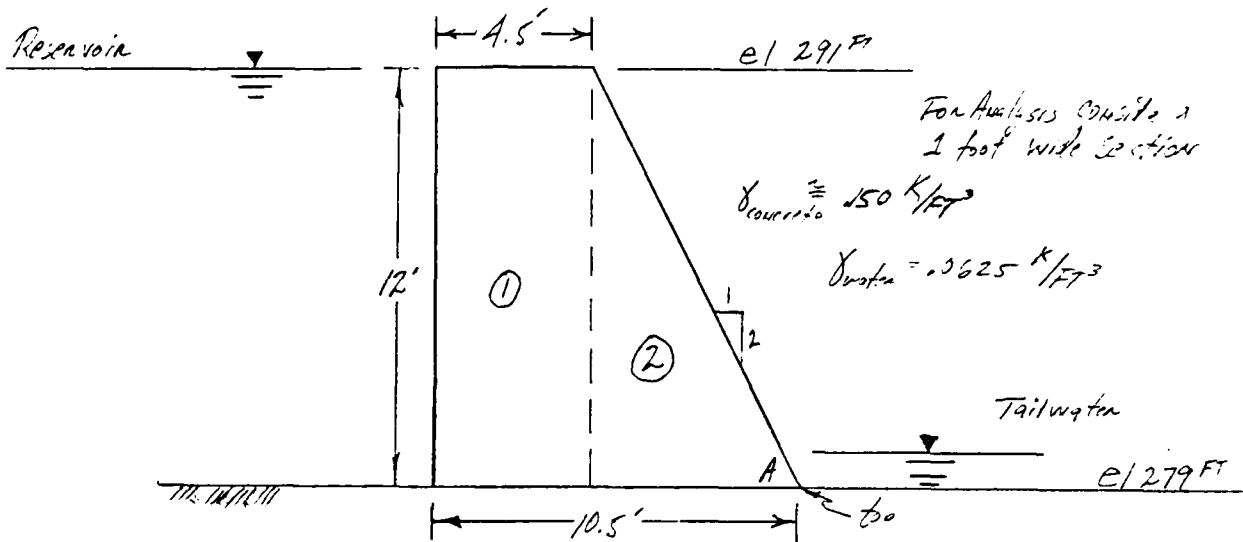
S.O. No. 13984-01-AKA

Sheet No. 1 of 9

Drawing No. _____

Date Mar 11, 1991

(Overflow Section)



Section	Volume (FT ³)	γ	W	Distance from toe	M (K-FT)
①	4.5 (12)(1)	150 K/FT ³	8.1 kips	3.25 FT	66.825
②	1/2 (6)(12)(1)	150	5.4 kips	4.0 FT	21.6
			<u>13.5 K</u>		<u>88.425</u>

Resultant = 13.5 K

Location = $\frac{88.425}{13.5} = 6.55$ FT from toe

Cases to be considered

- I Normal Pool level, Full Uplift
- II Same as I plus Ice loading
- III 1/2 PMF (variations) Full Uplift
- IV Full PMF, Full Uplift

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject LAW. 800 45411" LAW

Spillway Analysis

S.O. No. 13320-00-ARA

Sheet No. 2 of 9

Drawing No. _____

Computed by ELM Checked by JGU

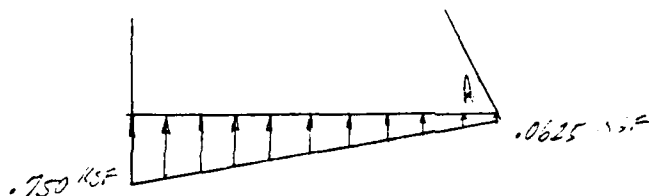
Date 11/11/1971

3.0 I

Reservoir level 291 Ft $H_w = 12 \text{ Ft}$
Tailwater level 280 Ft $H_w = 1 \text{ Ft}$

Up lift

$$\begin{aligned}\text{Reservoir} &= 12 (.0625) = .750 \text{ KSF} \\ \text{Tailwater} &= 1 (.0625) = .0625 \text{ KSF}\end{aligned}$$



$$\text{Resultant} = \left(\frac{.750 + .0625}{2} \right) (10.5)(1) = 4.266 \text{ Kips}$$

$$\begin{aligned}\text{Location} &= \frac{[.0625(10.5)] \frac{10.5}{2} + [.750 - .0625, \frac{1}{2}(10.5)] \frac{2}{3}(10.5)}{4.266} \\ &= 6.731 \text{ Ft from toe}\end{aligned}$$

Hydrostatic Pressure

$$\text{Reservoir Resultant} = \frac{1}{2} (12)^2 (.0625) = 4.5 \text{ K}$$

$$\text{Location} = \frac{2}{3} = 4 \text{ Ft from base level (el 279)}$$

$$\text{Tailwater Resultant} = \frac{1}{2} (1)^2 (.0625) = .031 \text{ K}$$

$$\text{Location} = \frac{1}{3} = .333 \text{ Ft from base level}$$

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject LEAD FOR 15' T

Stitch Analysis

Computed by JWH

Checked by JGU

S.O. No. 13239-2-AHA

Sheet No. 3 of 9

Drawing No. _____

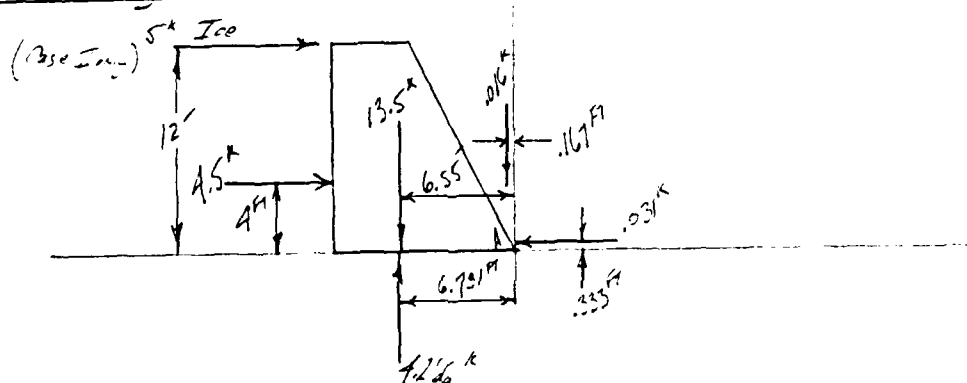
Date May 11, 1981

Light front Hatch bottom 500 is 200000

$$Res Head = (1)(1/2)(1/2)(.0625) = .016 \text{ KIPS}$$

$$Location = (1/2)(1/2) = .167 \text{ FT from top}$$

Case I + II Loadings



Case I

$F.S. =$
overturning

$$\frac{13.5(6.55) + .016(11.67) + .031(13.33)}{4.5(4) + 4.266(6.731)}$$

$F.S. = 1.313$
overturning

Sliding

$$R = \Sigma V (\tan \phi + C)$$

$$= (13.5 + .016 - 4.266) \cdot 7 + 10.5(2)$$

$$= 27.475$$

$$H = 4.5 - .031 = 4.469$$

$$F.S. = \frac{R}{H} = \frac{27.475}{4.469}$$

$$C = 2 \text{ KSF}$$

$$A = 10.5 \text{ ft}^2$$

$$\tan \phi = .7 \quad \phi = 35^\circ$$

$F.S. = 6.148$
Sliding

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject LEAD Pool Clinic Dam
Stability Analysis

S.O. No. 15893-20-400

Sheet No. 4 of 9

Drawing No. _____

Computed by DWH Checked by JGU

Date Mar 11, 1991

Case II

Overturning

$$F.S. = \frac{13.5(6.55) + .016(1.67) + .031(1.333)}{4.5(4) + 4.266(6.731) + 5(12)}$$

$F.S. = 0.821$
Overturning

Sliding

$R = 27.475$

$H = 4.469 + 5 = 9.469$

$F.S. = \frac{27.475}{9.469}$
Sliding

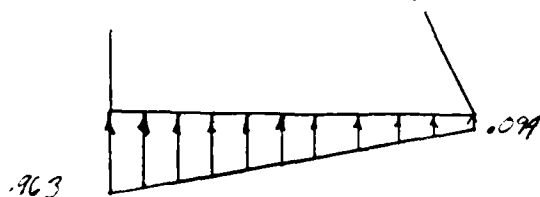
$F.S. = 2.902$
Sliding

Case III

Roseville Pond level = 294.4 FT $H_w = 15.4$ FT
Tailwater Pond = 280.5 FT $H_w = 1.5$ FT

Uplift

Roseville Side = $15.4(.0625) = 0.963$ KSF
Tailwater Side = $1.5(.0625) = .094$ KSF



Resultant = $\left(\frac{.963 + .094}{2} \right) 10.5 = 5.549$ Kips

Location = $\frac{\left[(.094) 10.5 \right] \frac{10.5}{2} + \left[(.963 - .094) \left(\frac{1}{2} \right) 10.5 \right]^{2/3} (10.5)}{5.549} = 6.637$ FT

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject Lake Lock, SPM S.O. No. R5993-22-AKP
Stability Analysis Sheet No. 5 of 9
Drawing No. _____
Computed by DJM Checked by JGU Date Mar. 11, 1991

Hydrostatic Pressure

Reservoir Bottom $L_{2.4} = 15.4(.0625) = 0.963 \text{ KSF}$

Top $L_{9.4} = 3.4(.0625) = .213 \text{ KSF}$

Resultant = $\left(\frac{.963 + .213}{2} \right) 12 = 7.056 \text{ Kips}$

location = $\frac{[(.213)(12.0)] \frac{12.0}{2} + [(.963 - .213) \frac{1}{2}(12.0)] \frac{12.0}{3}}{7.056}$
 $= 4.724 \text{ Ft above base level}$

Tailwater

Resultant = $\frac{1}{2}(1.5)^2(.0625) = .070 \text{ Kips}$

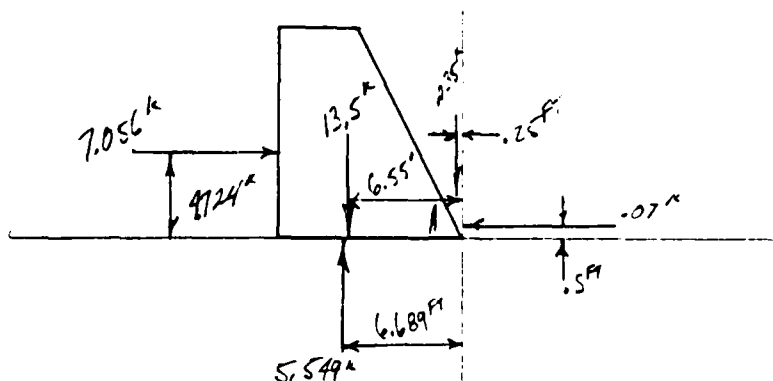
location = $\frac{1.5}{3} = .5 \text{ Ft above base level}$

Additional Vehicle Loading Due to Tailwater

Resultant = $\frac{1}{2}(1.5) \left(\frac{1.5}{2} \right) (.0625) = .035 \text{ K}$

location = $\left(\frac{1.5}{2} \right) \frac{1}{3} = .25 \text{ Ft from toe of Dam}$

Case III Loadings



MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject Lake Douglas Dam S.O. No. 1338-25-ARA
Stability Analysis Sheet No. 6 of 9
Drawing No. _____
Computed by VJM Checked by JGU Date May 11, 1931

Overturning

$$F.S. = \frac{13.5(6.55) + 0.35(25) + 0.07(5)}{7.056(4.724) + 5.549(6.639)}$$

$F.S. = 1.256$
OVERTURNING

Sliding

$$R = (13.5 + 0.35 - 5.549) \cdot 7 + 2(10.5)$$

$$= 26.59 \text{ k}$$

$$H = (7.056 - 0.07) = 6.986 \text{ k}$$

$$F.S. = \frac{R}{H} = \frac{26.59}{6.986}$$

$F.S. = 3.806$
Sliding

Case IV

Reservoir Pool level = 296.5

$H_w = 17.5 \text{ Ft}$

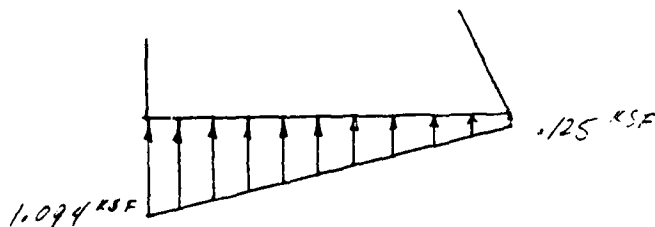
Tailwater level = 291.0

$H_w = 2.0 \text{ Ft}$

Uplift

Reservoir Side = $17.5(0.0625) = 1.094 \text{ ksf}$

Tailwater Side = $2.0(0.0625) = .125 \text{ ksf}$



$$\text{Resultant} = \left[\frac{(1.094 + .125)}{2} \right] 10.5 = 6.4 \text{ kips}$$

$$\text{location} = \frac{[(.125)(10.5)] \frac{10.5}{2} + (1.094 - .125) \left(\frac{1}{2} \right) (10.5) \left[\frac{10.5(2)}{3} \right]}{6.4}$$

$$= 6.64 \text{ ft from toe}$$

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject Lake Park Skid LFR S.O. No. KB992-23-AAA
Stability Analysis Sheet No. 7 of 9
Drawing No. _____
Computed by DUM Checked by JGU Date Mar. 11, 1991

Hydrostatic Pressure

Pressure Top Dam = $(17.5 - 12)(.0625) = .344 \text{ KSF}$

Bottom Dam = $17.5(.0625) = 1.094 \text{ KSF}$

Resultant = $\left(\frac{1.094 + .344}{2} \right) (12) = 8.628 \text{ Kips}$

Location = $\frac{[.344(12)]^{1/2} + [(1.094 - .344) \frac{1}{2}(12)]^{1/2}}{8.628}$
= 4.957 FT above base level

Tailwater =

Resultant = $\frac{1}{2}(2)(.0625) = .125 \text{ Kips}$

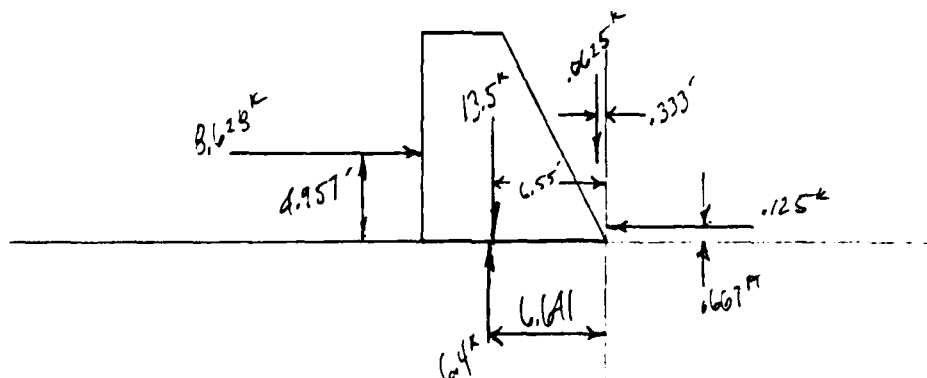
Location = $\frac{2}{3} = .667 \text{ FT above base level}$

Additional Vorticle Loading Due to Tailwater

Resultant = $2\left(\frac{2}{3}\right) \frac{1}{2} (.0625) = .0625 \text{ K}$

Location = $\left(\frac{2}{3}\right) \frac{1}{3} = .333 \text{ FT from toe}$

Case IV Loadings



MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject Lake Fort Hill L.P. S.O. No. 13388-22-ALP
Stability Analysis Sheet No. 8 of 9
Drawing No. _____
Computed by DWH Checked by JGU Date Apr. 11, 1931

Overturning

$$F.S. = \frac{13.5(6.55) + (.0625)(.233) + .125(.667)}{8.628(4.957) + 6.4(6.541)}$$

$F.S. = 1.038$
Overturning

Sliding

$$R = (13.5 + .0625 - 6.4) \cdot 7 + 2(10.5) \\ = 26.014$$

$$H = (8.628 - .125) = 8.503$$

$$F.S. = R/H = \frac{26.014}{8.503}$$

$F.S. = 3.059$
Sliding

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject Lake Peckskill Dam S.O. No. 13883-00-AAA-07-0
Stability Analysis Sheet No. 9 of 9
Drawing No. _____
Computed by DWM. Checked by JGU Date May 29, 1931

Resultant Location $\Rightarrow \frac{\Sigma M}{\Sigma V}$

Case I

$$\text{Resultant Location} = \frac{13.5(6.55) + 0.016(.167) + 0.031(-.333) - 4.5(4) - 4.266(6.731)}{13.5 + 0.016 - 4.266}$$

$$= \underline{4.511 \text{ FT from DE}}$$

Case II

$$\text{Location} = \frac{13.5(6.55) + 0.016(.167) + 0.031(.333) - 4.5(4) - 4.266(6.731) - 5(12)}{13.5 + 0.016 - 4.266}$$

$$= \underline{-1.976 \text{ FT}}$$

Case III

$$\text{Location} = \frac{13.5(6.55) + 0.035(.25) + 0.07(.5) - 7.056(4.724) - 5.549(6.684)}{13.5 + 0.035 - 5.549}$$

$$= \underline{2.256 \text{ FT}}$$

Case IV

$$\text{Location} = \frac{13.5(6.55) + 0.0625(.333) + 0.125(.667) - 8.628(4.957) - 6.4(6.641)}{13.5 + 0.0625 - 6.4}$$

$$= \underline{0.455 \text{ FT.}}$$

END

DATE
FILMED

11-81

DTIC