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NATIONAL DAM SAFETY PROGRAM. LAKE SEBAGO DAM (INVENTORY NO. 772--ETC(U)
SEP 78 J B STETSON DACW51-78-C-0035

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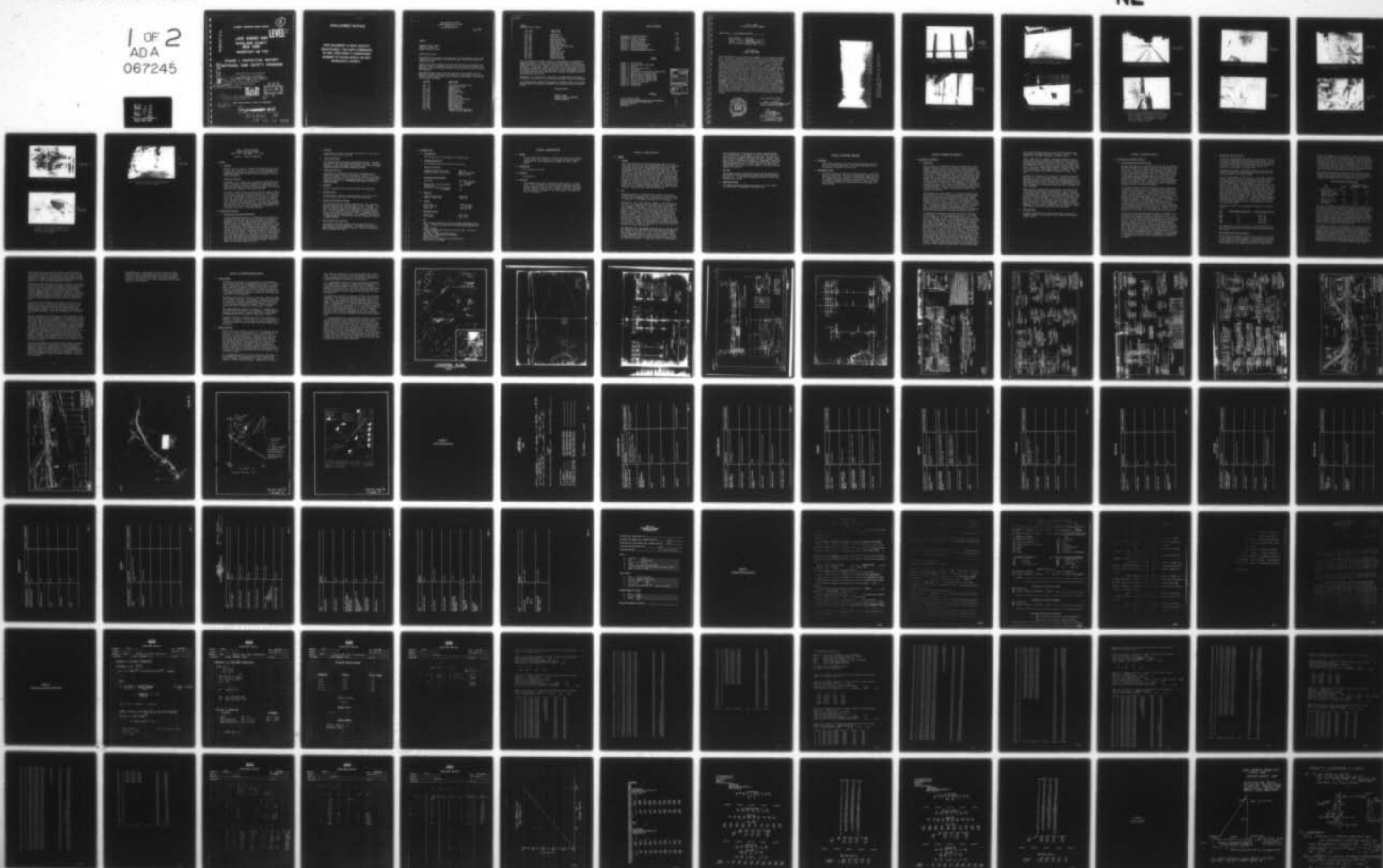

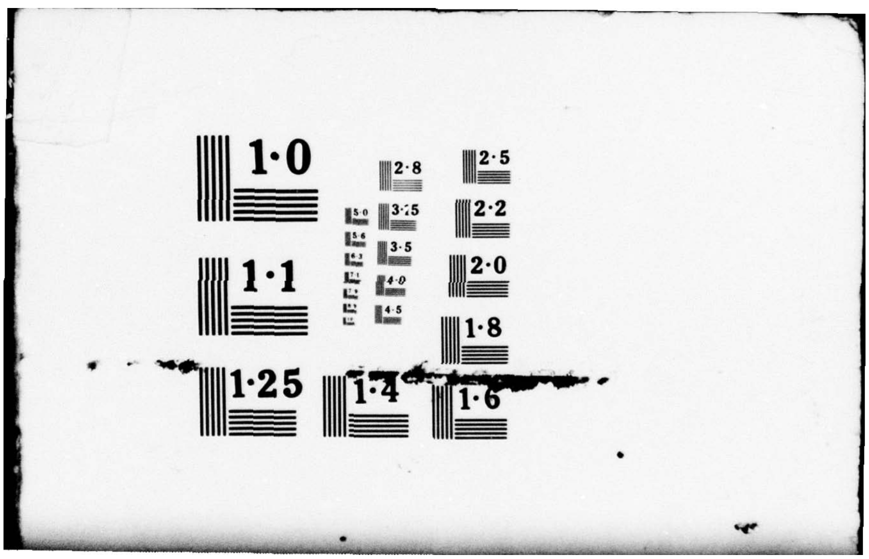
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LEVEL II

LOWER HUDSON RIVER BASIN

LAKE SEBAGO DAM
ROCKLAND COUNTY
NEW YORK

INVENTORY No. 772

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

APPROVED FOR PUBLIC RELEASE;
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(6) (15) ~~CONTRACT NO.~~ DACW 51-78-C-0035

National Dam Safety Program. Lake Sebago Dam (772), Lower Hudson River Basin, Rockland County, New York. Phase I Inspection Report.

Inventory no.

(10) John B. Stetson

NEW YORK DISTRICT CORPS OF ENGINEERS

(12) 42p.

(11) 19 SEP[redacted] 1978

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DISCLAIMER NOTICE

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, NEW YORK
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

2 OCT 1978

NANEN-F

Honorable Hugh L. Carey
Governor of New York
Albany, New York 12224

Dear Governor Carey:

The purpose of this letter is to inform you of a clarification of the guidelines used by this office in assessing dams under the National Program of Inspection of Dams.

Office of the Chief of Engineers has recently provided a clarification that dams with seriously inadequate spillways are to be assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The following dams in your state have previously been assessed as having seriously inadequate spillways, with capability to pass safely only the percentage of the probable maximum flood as noted in each report. They are now to be assessed as unsafe:

I.D. NO.	NAME OF DAM
N.Y. 59	Lower Warwick Reservoir Dam
N.Y. 4	Salisbury Mills Dam
N.Y. 45	Amawalk Dam
N.Y. 418	Jamesville Dam
N.Y. 685	Colliersville Dam
N.Y. 6	Delta Dam
N.Y. 421	Oneida City Dam
N.Y. 39	Croton Falls Dam
N.Y. 509	Chadwick Dam (Plattenkill)
N.Y. 66	Boyds Corner Dam
N.Y. 397	Cranberry Lake Dam
N.Y. 708	Seneca Falls Dam
N.Y. 332	Lake Sebago Dam
N.Y. 338	Indian Brook Dam
N.Y. 33	Lower(S) Wiccopee Dam (Lower Hudson W.S. for Peekskill)

NANEN-F
Honorable Hugh L. Carey

I.D. NO.	NAME OF DAM
N.Y. 49	Pocantico Dam
N.Y. 445	Attica Dam
N.Y. 658	Cork Center Dam
N.Y. 153	Jackson Creek Dam
N.Y. 172	Lake Algonquin Dam
N.Y. 318	Sixth Lake Dam
N.Y. 13	Butlet Storage Dam
N.Y. 90	Putnam Lake (Bog Brook Dam)
N.Y. 166	Pecks Lake Dam
N.Y. 674	Bradford Dam
N.Y. 75	Sturgeon Pool Dam
N.Y. 414	Skaneateles Dam
N.Y. 155	Indian Lake Dam
N.Y. 472	Newton Falls Dam
N.Y. 362	Buckhorn Lake Dam

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.

Consequently, it is advisable to implement the recommendations previously furnished in the reports for the above-mentioned dams as soon as practicable.

It is requested that owners of these dams be furnished a copy of this letter and that copies be permanently appended to all reports previously furnished to you.

Sincerely yours,

CLARK H. BENN
Colonel, Corps of Engineers
District Engineer

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FIGURES

See page D-2

APPENDIX

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Lake Sebago Dam NY772

State Located	New York
County Located	Rockland
Stream	Stony Brook Creek
Date of Inspection	July 28, 1978

ASSESSMENT OF GENERAL CONDITIONS

The Lake Sebago Dam is a recreational impoundment in the Palisades Interstate Park. The dam is a combination concrete gravity and earth embankment structure. Seven Lakes Parkway Bridge runs over the gravity portion of the dam. The dam is continually maintained by the Park Commission. This Phase I investigation has determined that the dam is in need of future investigative work and subsequent modifications and repair work. A number of areas of concern were noted during the visual inspection relating to seepage problems with significant seepage flow observed along the earthen embankment section. This has apparently been going on for some time with some effort by the commission to eliminate the seepage. Limited flow with minor piping (or iron oxide deposition) was noted coming from a drainpipe in the eastern bridge headwall at the gravity dam section. These two cases where seepage has been noted should be investigated further and the seepage should be corrected. The seepage problem is compounded by the fact that the spillway is seriously inadequate to pass the 1/2 Probable Maximum Flood (SPF) without overtopping the dam. Since the spillway has been found to be seriously inadequate, it is recommended that immediately, during periods of unusually high runoff, the owner should provide round-the-clock surveillance and have a contingency plan in the event of overtopping. The spillway is currently only capable of passing 22 percent of the PMF. Additional investigations should be taken immediately to evaluate alternative measures to deal with the problem of dam overtopping.

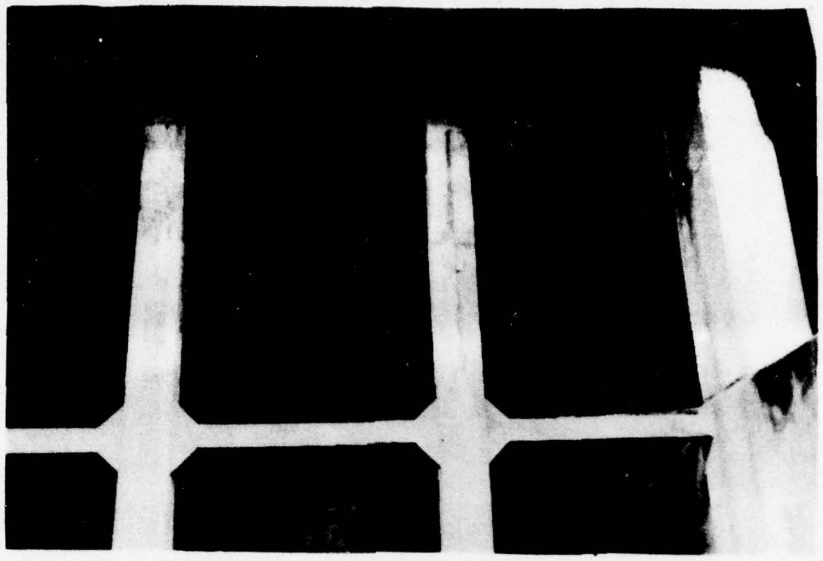
Dale Engineering Company

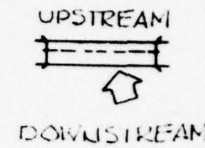
John B. Stetson, President

Approved By:
Date:

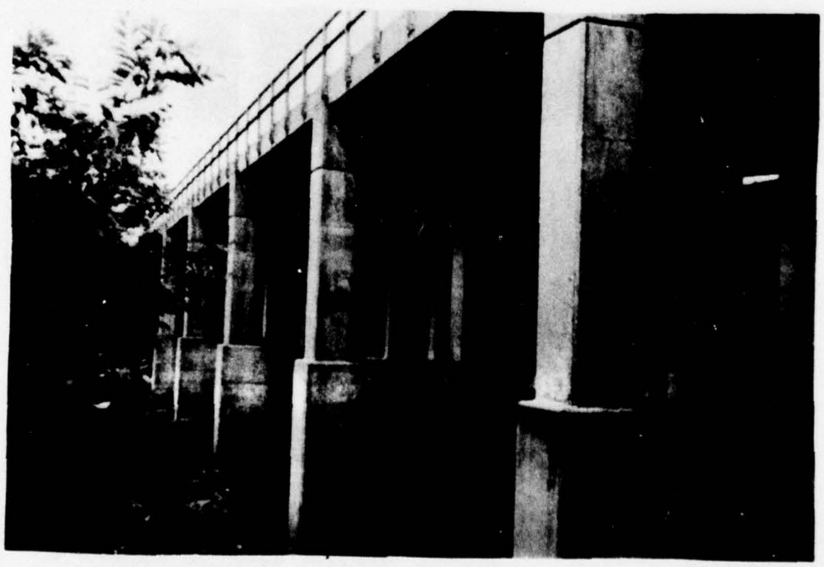
Col. Clark H. Benn
New York District Engineer
19 September 1978

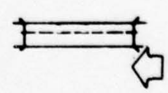
Overview of upstream face of concrete gravity dam and bridge. Dam also has 1500 feet of earthen embankment.



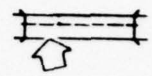


1. View of dam and bridge piers from below dam.

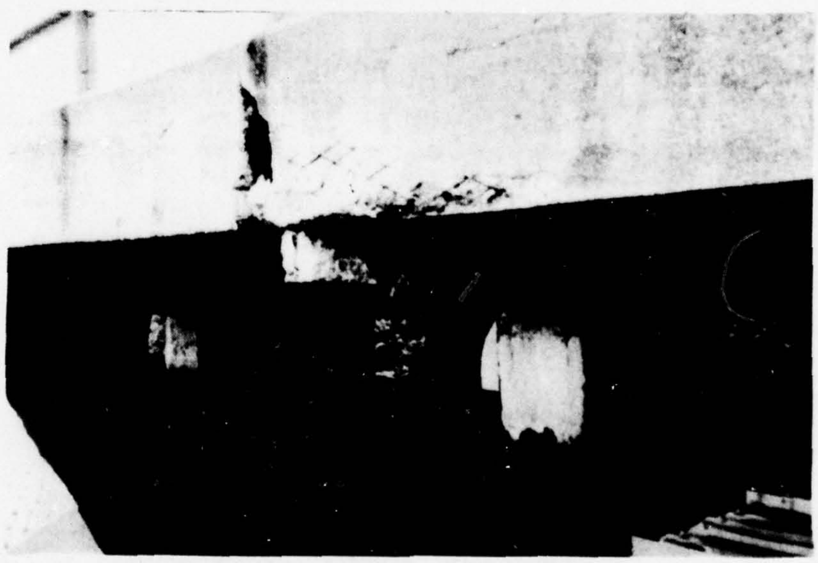


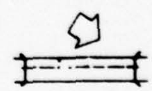


2. View across back of dam.

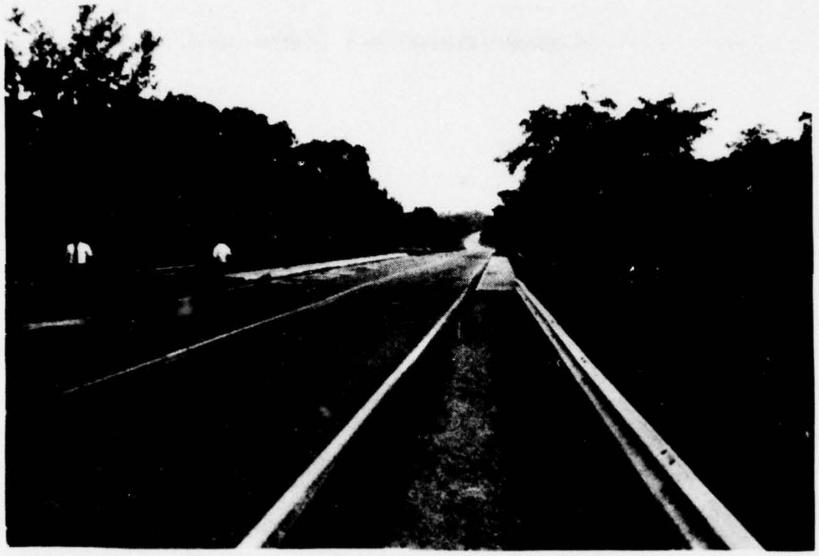


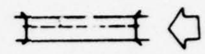
3. Closeup of concrete dam. Notice what appears to be cold poured joints.



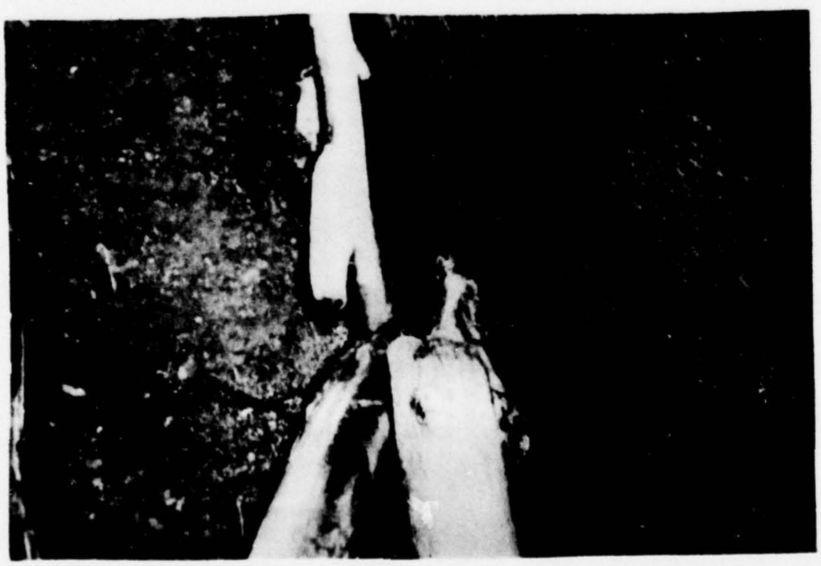


4. Closeup of spalled bridge area upstream of dam.

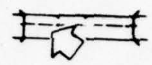




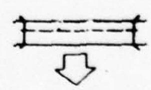
5. Seven Lakes Parkway road across dam.



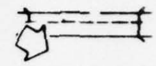
6. Drain in east abutment of bridge at joint with dam has significant discharge and is piping clay material as evident with residue. Discharge was clear at time of inspection; however, channel has become discolored.



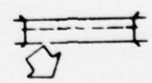
7. Closeup of construction joint.



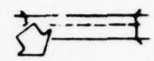
8. View of downstream channel.



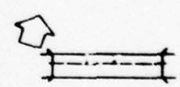
9. Earthen embankment location with large amount of seepage.



10. Marsh area below seepage.



11. Detail of wetness area above marsh.



12. Closeup of upstream embankment above seepage. Notice some of the clay material being deposited into reservoir to stop seepage.

13. Treed area along top of embankment near location of seepage.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - LAKE SEBAGO ID# - NY772

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and The New York State Department of Environmental Conservation.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of the Lake Sebago Dam and appurtenant structures, owned by the Palisades Interstate Park Commission, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the State of New York.

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

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Lake Sebago Dam consists of a concrete gravity structure approximately 200 feet long (serving as the dam's spillway and the foundation for the Seven Lakes Parkway Bridge) and an earthen embankment section with a concrete core wall approximately 1500 feet in length. The embankment section also formerly carried the Seven Lakes Parkway. This highway has been recently relocated so that the earthen dam section now has been abandoned for highway purposes. The spillway has an effective length of 162 feet due to the fact that the length is interrupted by numerous piers along the top of the gravity section. Flow from the lake is controlled by two sluice gates located near the center of the dam. The sluice gates are 3 feet square and are operated by hand wheels located just below the bridge deck which traverses the dam. These sluice gates are a low level outlet and control discharges into Stony Brook, the receiving stream of the lake.

b. Location

Lake Sebago is located in Palisades Intestate Park in the Town of Ramapo, Rockland County, New York.

c. Size Classification

The maximum height of the dam is approximatley 30 feet. The storage volume of the dam is approximatley 4,280 acre feet. Therefore, the dam is in the intermediate size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

Stony Brook, the receiving stream from the impoundment flows through a developed section of the Hamlet of Sleater Hill. The Seven Lakes Parkway, a heavily traveled Park Road also passes over the gravity dam section. Therefore, the dam is in the high hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the Palisades Interstate Park Commission.

f. Purpose of Dam

The dam presently impounds a reservoir which is used for recreational purposes as part of the Palisades Interstate Park.

G. Design and Construction History

The Lake Sebago Dam was reputedly constructed in 1925. Park records indicate that repair was undertaken in 1935. Although, no information regarding the nature of these repairs is available. In 1961, plans were prepared for the relocation of Seven Lakes Parkway. At that time, modifications were made to the superstructure on the concrete gravity section of the dam to accommodate the realignment of the Seven Lakes Parkway. This relocation also resulted in the abandonment of the earth fill section of the dam for use as a highway road bed.

h. Normal Operational Procedures

The Palisades Interstate Parkway staff provides operation and maintenance of the Lake Sebago Dam. A caretaker at the dam site makes continuous surveillance of the dam. The dam is located on a heavily traveled park road.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of Lake Sebago is 9.9 square miles.

b. Discharge at Dam Site

No discharge records are available at this site.

Computed Discharges:

Ungated spillway, top of dam	4700 cfs
Ungated spillway, design flood	9600 cfs (1/2 PMF)
	20975 cfs (PMF)

c. Elevation (feet above MSL)

Top of dam	780 (Top of bridge and road)
Maximum pool - design discharge	781 (1/2 PMF)
Spillway crest	774
Stream bed at centerline of dam (estimated)	743

d. Reservoir

Length of maximum pool	10200 feet
Length of normal pool	10000 feet

e. Storage

Top of dam	4280 acre feet
Design surcharge	0 acre feet
Normal pool	3100 acre feet

f. Reservoir Surface

Top of dam	332.4 acre
Spillway pool	295.7 acre

g. Dam

Type - Concrete gravity section and an earthen embankment section.
Length - 195 feet of gravity section and 1500 feet enbankment section.
Height - 25 feet.
Freeboard between normal reservoir and top of dam - 0.0 feet at gravity section.
Top width - 24 feet at earthen section.
Side slopes - 6 horizontal to 12 vertical.
Zoning - Not known.
Impervious core - Concrete along earthen section.
Grout curtain - Not known.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

All the information available to evaluate this dam has been included in this report. This information is largely contained in Figures 1 through 14. The Park Commission has reviewed its files on this matter.

2.2 CONSTRUCTION

No information available.

2.3 OPERATION

See Section 4.

2.4 EVALUATION

The engineering data cannot readily be assessed, since it is incomplete. Little information is available on the embankment materials and the locations of the core wall. However, sufficient information has been gathered through the field inspection efforts to supplement this data, making it adequate for the investigators to perform this Phase I investigation.

SECTION 3 - VISUAL INSPECTION

3.1 SUMMARY

a. General

The visual inspection of Lake Sebago Dam took place on July 28, 1978. The concrete gravity and earth embankment dam is structurally integrated into the Seven Lakes Parkway road section and bridge. The spillway ogee crest is located below the bridge deck. Flow discharges over the spillway along the total length of the gravity dam section. Lake-side bridge piers are integrated into the concrete structure and restrict flow over the dam at locations. The piers are 18 inches wide and 10 feet on center. The earth embankment section consists of the old parkway known as Johnstown Road. The road is currently used as a service road. The new Seven Lakes Parkway was constructed in 1965 and involved reconstruction of the bridge. At the time of inspection, the Palisades Interstate Park Commission was reviewing engineering proposals for inspection and repair work of the bridge. Structural members are steel encased in concrete. They exhibit some cracking and spalling.

b. Dam

The gravity portion of the dam visually conforms to the plans. Limited information was available in the plans on the location of the 1500 feet of embankment with concrete core wall which is shown in Figure No. 12. The depth of the core wall is not known.

Photographs 1 and 2 show structural elements of the bridge across the dam. The bridge cross beams are seated onto the dam ogee section as shown in Photograph 3. Cold pour joints can be seen in this photograph. The upstream face of the dam is shown in Photograph 4. This reservoir side of the dam was inspected by boat. A number of spalled areas in the bridge superstructure were noted. Redish clay material was found to be discharging from a drain on the east abutment. The red color of the water discharging from this drain also suggests iron oxide from the material behind the abutment precipitating as pressure is relieved. However, the precipitate has a slippery feel that suggests a clay material carried by the seepage. Further investigations should be made to determine the source of this material. No seepage or unusual conditions were located in the area below the dam.

The embankment area, approximately 100 yards east of the dam at the old parkway area has considerable seepage midway down the embankment (Figure 12, Station PT 19 + 02). Large trees were growing on the upstream, downstream and on top of the dam. Seepage occurs along an embankment length a distance of over 100 feet. The flow is almost uniform across this area with considerable sheet flow at the downstream extremity. A large marsh exists in the depressed terrain between the old and new road. Cattails and high grasses are located adjacent to the marsh at elevations higher than the water surface of the marsh between the two roads. The elevation of the water surface suggests additional locations of seepage. Seepage is shown in Photographs 9 through 11. Photograph 12 shows clay material lying on the top of the embankment where trucks have been dumping some material into the lake in the last few years on the upstream face in an effort to retard seepage. This action does not appear to be effective.

c. Spillway

The spillway consists of the entire top part of the gravity dam at the location of the bridge which has been previously described in Section 3.1.c. At the time of inspection, there was a very slight discharge over the dam.

d. Downstream Channel

The immediate downstream channel was found to be clear of debris and wide enough to accommodate considerable flow.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

During normal conditions, the water surface elevations of the reservoir is at the spillway crest. The sluice gates generally are not adjusted to regulate flow variation.

4.2 MAINTENANCE OF DAM

The dam is maintained by the Park Commission which has a full-time staff in the park area. The staff is experienced in operations and maintenance activities. Generally, the Commission engages services of a consulting engineer to perform larger projects. At the time of inspection, proposals were being reviewed to inspect and prepare plans and specifications for repair work on the bridge which traverses the dam.

SECTION 5 - HYDROLOGY AND HYDRAULICS

5.1 EVALUATION OF FEATURES

a. Design Data

For this report, no information relevant to the hydrologic and/or hydraulic design for the dam was available. Analysis provided in Appendix C was performed utilizing information obtained from construction documents and other general sources of information listed in the reference section of this report. Lake Sebago Dam is a combination of an earthen embankment type structure and concrete gravity structure. The concrete gravity section traverses Seven Lakes Parkway with the dam section constructed in combinations with the bridge. The spillway of the dam flows along the entire length of the gravity section between the bridge abutments. The drainage area contributing to the reservoir is approximately 10 square miles including 1/2 square mile of reservoir water surface. The volume of the impoundment is purely a function of natural watershed in the Palisades Park area. A number of small ponds and lakes lie upstream of the reservoir.

The purpose of this investigation is to analyze the dam and spillway with respect to their flood control potential and/or adequacy. This potential was assessed in the development of the Probable Maximum Flood (PMF) for the watershed and a subsequent routing through the reservoir system. The PMF is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration loss and concentration runoff of a specific location, that is considered reasonably possible for a particular drainage area. The hydrologic analysis was performed using the unit hydrograph method to develop the flood hydrograph. No information was available on historical flood events at the dams location.

In preparing the hydrograph, both Clark and Snyder coefficients were estimated. For the Clark Method values of Tc = 5.70 and R = 1.61 were computed. For the Snyder Method, values of Tpr = 4.45 and CP = 0.625 were computed. Two unit hydrographs were developed from these parameters and two sets of hydrographs were computed for the purposes of comparison. The more severe discharge was then used as the flood hydrograph in the spillway analysis. The Probable Maximum Flood (PMF) hydrograph was determined using Probable Maximum Precipitation rainfall data obtained in Hydrometeorological Report No. 51. An index rainfall of 24 inches for 200 square miles for a period of 24 hours was used in the analysis. Both the PMF and 1/2 PMF were evaluated. The 1/2 PMF was assumed to be approximately the Standard Project Flood (SPF) in utilizing the U.S. Army Corps of Engineers, Hydrologic Engineering Centers, Computer Program (UHCOMP). The peak discharge for the Clark Method were 10,100 cfs for the SPF and 21,162 cfs for tha PMF. The peak discharges for the Snyder Method were 7,816 cfs for the SPF and 15,952 cfs for the PMF. Hydraulic studies were performed at the spillway gravity structure. These computations assume weir flow below the bridge deck, orifice flow was assumed in control along the bridge face, while above the bridge deck the weir flow was in control. These computations are shown in Appendix C on Sheets 16-18.

The U.S. Army Corps of Engineers, Hydrologic Engineering Centers, Program HEC-1 using the Modified Puls Method for flood routing was used to evaluate the structure and the reservoirs. The peak flow discharges were reduced to 20,975 cfs for the PMF and 9,586 cfs for the 1/2 PMF (SPF). These figures represent relatively small reductions in the flood discharges when reservoir storage has been taken into consideration. The spillway capacity is 4,700 cfs. The spillway is currently only capable of passing 22 percent of the PMF.

Information is lacking on the elevations of the earthen embankment which was part of old Seven Lakes Parkway. Assuming the top of embankment elevation is the same as the bridge deck, elevation 780, then the hydrologic analysis indicates that the embankment would be overtopped by a foot for the 1/2 PMF (SPF) and and two feet for the PMF. Overtopping is also predicted with the results obtained using Snyder parameters.

Figures 10 and 11 show plans for the new Seven Lakes Parkway (old Seven Lakes Parkway noted as Johnstown Road). The profile shows the depressed terrain between the old and new roadway. Currently, a large swamp exists is the area partly from runoff and partly from seepage of the dams embankment. Overtopping of the dam would flood this area. A drain pipe (36" R.C.C.P.) at Station 154 + 00 could drain this area, but its suspected it may not be able to sustain the 18 feet of head it would receive and could blowout causing a breech or failure in the road embankment. The adequacy of the road embankment is also unknown. Stations below 154 + 00 have a higher grade indicating that the road would not be overtopped.

b. Experience Data

The owners representative at the site was unable to provide information relevant to performance of the spillway during extreme rainfall events.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations And Data Review

The lake dam consists of a concrete gravity structure approximately 200 feet long (which also serves as the dams spillway and the foundation for a Seven Lakes Parkway bridge) and earth embankment sections (with a concrete core wall) some 1,500 feet in length to the gravity structures north easterly side and an undetermined length on the gravity sections westerly side. It is understood that most of this north easterly embankment section served as the original location (now abandoned) for the Seven Lakes Parkway extending through this area of the park. This section of core-walled embankment is not continuous; part of the section of the now-abandoned Parkway route carries across a peninsula of original ground which has been utilized as an impounding segment.

The downstream area of the concrete gravity section is accessible, to about the foundation level. As observed from the downstream side, this gravity section shows no indication of significant settlement or lateral movement. A number of horizontal construction joints along the height of the dam are highly visible and limited leakage is occurring through these joints. Limited leakage is also occurring at locations where members for the overlying parkway bridge frame connect to the dams downstream face. A limited amount of water is flowing in the narrow Stony Brook serving as the spillway channel immediately downstream of the gravity section. Limited seepage was also noted to be occurring through a weep hole in the easterly head wall for the gravity dam. Some piping of clay material (possibly backfill for the headwall) is noted. It is not expected to be iron oxide, but this source remains a possibility.

The core wall earth embankment sections show no misalignment or indications of significant settlement, sloughing, or erosion. Part of the core wall embankment serves as the foundation for an existing section of the Seven Lakes Parkway Road and part (northeasterly part) is along the location of the now-abandoned section of the old parkway. Grasses, trees and shrubs of various height generally cover the exposed side slopes. Seepage is occurring through the embankment/impounding section of the abandoned segment of the road, into a basin area existing between the old and new parkway embankments. Generally, it appears that this seepage is near to the location where the impounding land area and northeasterly most section of core-walled embankment meet. Although the on-going seepage is significant, this area of reservoir embankment was not observed to be experiencing distress such as piping erosion, sloughing, or settlement.

b. Geology and Seismic Stability

The New York State Geologic Map (1970) indicates the dam is sited in an area of amphibolite and hornblende granite gneiss. The 1924 State Report concerned with the dam siting indicates that the bed of the dam and the right and left bank were to be in contact with the bedrock. That report also states that there were "no crevices....porous seams or fissures seen".

Although granite gneiss is generally considered to be relatively impervious, amphibolite and hornblende may upon weathering yield rotted zones which could permit seepage.

The area is designated as being in Zone 1 of the Seismic Probability Map. Because the area is located within the Ramapo Fault System, the New York State Geological Survey believes this region should be upgraded to a Zone 3 designation. As shown on the Geologic Structure Maps, numerous faults are known to exist in the vicinity of the reservoir. Several significantly large faults are known to exist outside the boundaries of the map shown in this report. Numerous additional lineaments, not shown on the map in this report but shown on the Preliminary Brittle Structures Map of New York of the New York State Geological Survey (1977), may indicate additional fault zones present in this area. Aggarwal and Sykes (1978) believe that the Ramapo Fault is capable of generating an earthquake of a least intensity VII. Their map has been reproduced here as Geologic Structures Map 2. The dam location is in the vicinity of their number 23, close to the Ramapo Fault and northeast of the Map Center.

Information on some of the earthquakes for the area is tabulated below:

Date	Intensity-Modified Mercalli	Location Relative to Dam
1783	VI	23 mi. SW
1878	V	22 mi. NE
1947	III	15 mi. SW
1951	V	7 mi. NW
1953	IV	15 mi. SE
1965	IV	19 mi. NW

Many earthquakes of lesser intensity are known to have occurred in this region, according to the records of the New York State Geological Survey.

c. Data Review and Stability Evaluation

Design drawings applicable to stability evaluations made available for this study are limited to typical cross sections for the gravity dam and the core wall embankment. On the drawings, many cross-section dimensions are provided but some dimensioning and elevations necessary to fully ascertain the size of all parts of the gravity and embankment structures are not shown. Soils and rock properties assumed for the original design of the gravity section are not known. As part of the present study, stability evaluations have been performed for the gravity section. Actual rock and soil properties, and depths to rock and groundwater, have not been determined; where data was lacking, assumptions felt to be realistic but conservative have been applied. The condition for a reservoir at the spillway elevation (with ice) and with the downstream water level at the base of the foundation has been studied.

The analysis performed (See Appendix D) indicate unsatisfactory stability against overturning and sliding for the forces assumed (wherever the computed factors of safety under certain conditions approach unity; below unity is considered to be unstable).

Results of Stability Computations

Case		Uplift	Factors of Safety	
			Overturning	Sliding
I.	Water level at top of dam, dam and footing integral unit, downstream water level at base of footing.	YES	1.01	0.82
		NO	1.70	1.31
II.	Same as I but for dam section at top of footing.	YES	1.01	--
		NO	1.50	1.03

Critical to the analysis and resulting indication of stability are the items of uplift water pressures acting on the foundation of the dam and the permeability of the sites foundation rock. The analysis uplift force was based on full headwater hydrostatic pressure acting on the dam's foundation upstream corner; tailwater hydrostatic pressure acting at the dams downstream corner was assumed to be zero pounds per square foot. The uplift pressures were assumed to vary linearly between upstream and downstream corners of the dam base, and were applied over 100 percent of the section. The resulting uplift is significant in arriving at the condition of low factors of safety against overturning/sliding.

The assigned uplift force is possible but also could be too great. The prediction of uplift acting on the base of a gravity dam supported on rock, without having information on the permeability/seepage properties of the foundation rock stratum, represents an analysis area of great uncertainty. If the rock is very sound and impermeable, seepage would be very low and uplift pressures of significance would require a long period of time to develop. Similarly, within the masonry itself (say near the base of the dam) hydrostatic pressures from permeating headwater potentially causing the same effect as uplift at the base of the dam could require a considerable period of time before reaching a significant magnitude. A conclusion drawn from these latter conditions is that the computed uplift may not exist at present and only develop at some future time. Without a condition with high uplift forces acting, the factor of safety for stability against overturning and sliding would be at a level considered acceptable for design.

The geology review provided for this study, (Section 4.1 (b) above) indicates that this site should be rated as a Seismic Probability Zone 3 on the basis of current data (reservoir site presently is assigned a Zone 1 designation on the Seismic Probability Map). A seismic stability analysis utilizing equivalent static coefficients recommended by the U. S. Army Corp of Engineers criteria has not been completed; additional horizontal and uplift loading based on the seismic coefficients would lower further the already low factors of safety computed for conventional static loading conditions.

Loading conditions as assumed in this reports analysis most probably have existed, with the possible exception of uplift. The stability experienced may be because the computed uplift water pressure has not existed and/or, the additional weight of the bridge-roadway (unknown in this reports analysis) imposed onto the dam foundation has made a significant contribution to its stability.

The past performance not withstanding, the future stability of the concrete gravity section is as suspected. In consideration of the high seismic hazard presently attached to the area and the existing uncertainty about the dams ability to resist static forces and dynamic forces that would result from earthquake, it would be prudent to perform a field investigation and engineering study as necessary to properly determine the condition and effect of underdam seepage, and more fully ascertain the seismicity of the reservoir area. The necessary engineering geology field explorations could include a geophysical investigation of the general area and subsurface exploration methods, such as borings, to obtain undisturbed rock samples to determine the engineering/geologic character and properties of the reservoirs foundation rock, and the installation of instruments for determining seepage pressures and gradients in the vicinity of the dam.

The core wall embankment sections and related impounding segments, appear generally to be in good condition with no indication of structural instability or deterioration, although considerable seepage is occurring through in one area. It is recommended that, at the time studies for the gravity dam are undertaken, field explorations and engineering studies also be performed to ascertain the area of embankment seepage and develop a method for correction of the condition.

The embankment has a large number of trees growing on it which should be removed. Seepage may be related to tree growth where seepage paths may have developed along root systems. If this is the case, it may be necessary to make a relatively comprehensive evaluation of alternatives to eliminate the seepage and improve the condition of the embankment.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

On the basis of the Phase I visual examination, the combination concrete gravity and earthen embankment dam structure is in need of future investigative work and subsequent modifications and repair work. Operation, maintenance and repair of the dam is under the authority of The Palisades Interstate Park Commission with offices located at Bear Mountian, New York. At this time, the Commission is reviewing engineering proposals for studies for maintenance and repair work for the bridge only.

The gravity dam section's stability is inadequate, especially when uplift forces are included in the analysis. Some minor repair work on the bridge is required. The downstream area immediately below the bridge does not show significant problem areas. At the location of the east bridge abutment headwall, limited seepage was noted coming from a drainpipe with some evidence of piping.

The earthen embankment section of the dam is in a wooded setting with substantial tree growth on the embankment. A large amount of seepage is present which is feeding a marsh-pond located between the embankment and the new section of Seven Lakes Parkway.

Hydrologic evaluations performed indicate that the dam would be topped by 1 foot with a 1/2 PMF (SPF) event. The spillway capacity is seriously inadequate. The spillway is capable of passing 22 percent of the PMF. A major park road, Seven Lakes Parkway , would be flooded.

7.2 REMEDIAL MEASURES

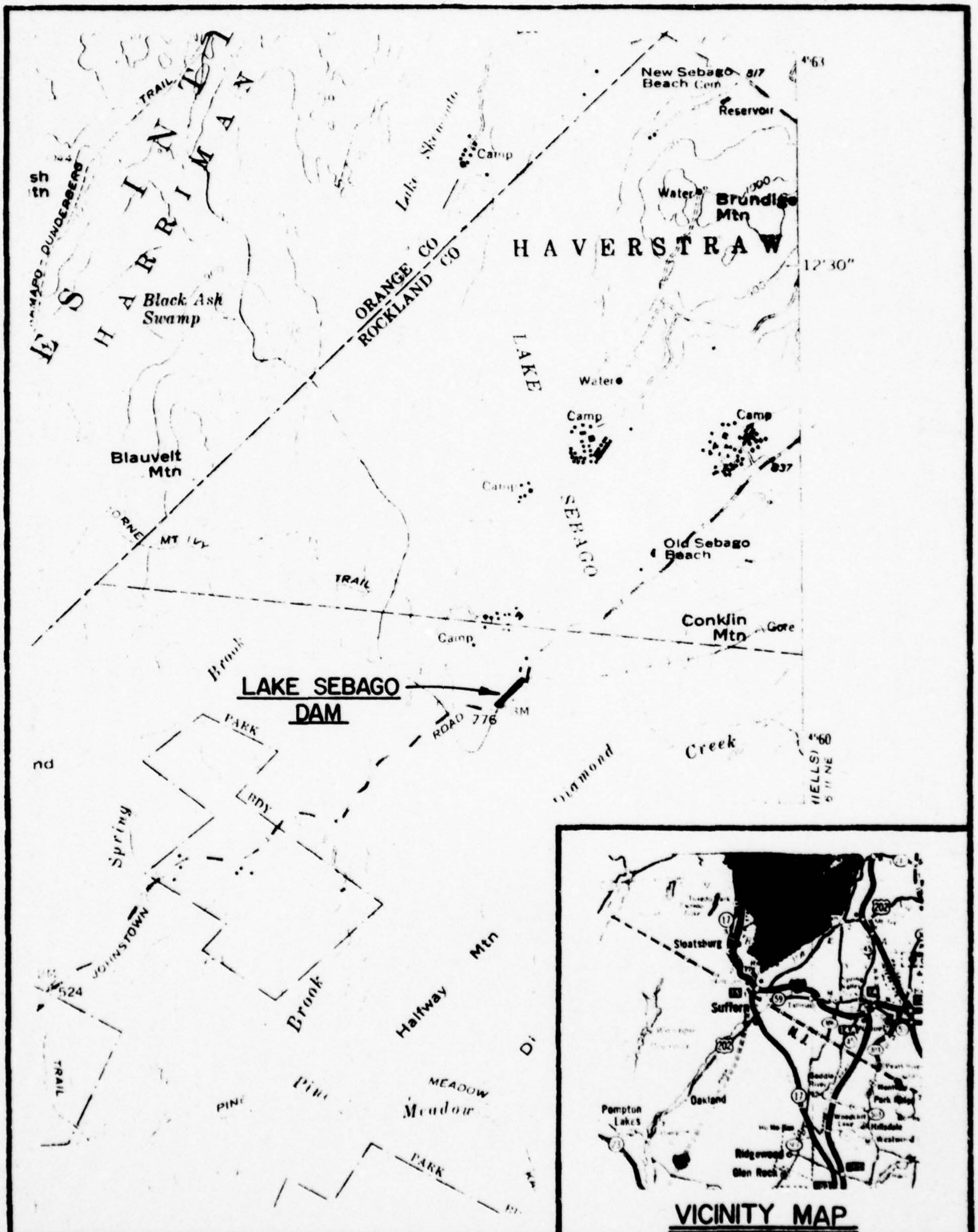
Based on available information, stability of the concrete gravity sections of the dam is unsatisfactory. It is recommended that the owner have a licensed professional engineer perform a field investigation and engineering study, as necessary, to properly determine the conditions and effect of underdam seepage and more fully ascertain the seismicity of the reservoir area. The necessary engineering geology field explorations will include a geophysical investigation of the general area and subsurface exploration methods, such as borings, to obtain undisturbed rock samples to determine the engineering/geologic character and properties of the reservoir's foundation rock, and the installation of instruments for determining seepage pressures and gradients in the vicinity of the dam.

It is recommended the owner of the dam investigate the seepage in the embankment section to determine the extent of seepage and source of seepage. The embankment has a large number of trees growing on it which should be removed. Seepage may be related to tree growth where seepage paths may have developed along root systems. If this is the case, it may be necessary to make a relatively comprehensive evaluation of alternatives to eliminate the seepage and improve the condition of the embankment.

It is recommended the owner of the dam investigate the seepage in the concrete gravity dam section coming from the drainpipe in the east bridge abutment headwall and perform tests to determine whether piping is occurring. If piping is occurring, steps should be taken to correct the situation. The source of the leak will need to be determined before a method can be developed to correct the condition.

The hydrologic evaluation has found the spillway to be seriously inadequate. The dam would be overtopped by 1 foot from a 1/2 PMF (SPF) event. Since seepage through the embankment section is already in evidence, overtopping and additional head could cause a breech in the embankment. The immediate downstream hazard in the marsh area between the roads cannot be easily assessed. Since the park is a highly used recreational area, it cannot be assumed that the park space would be unoccupied. It is safe to assume there would be a hazard related to occupancy of this area. Further breeching of the lower road embankment would lead to additional hazards to life and property downstream of the dam along Johnstown Road.

It is recommended that an in depth hydrologic analysis be performed to refine the flood discharge computations, the lake's stage-storage relationship, and to collect and utilize additional topographic information to determine the location and extent of overtopping from the 1/2 PMF (SPF) condition. This information could then be used as the basis for investigating alternative measures. Some of the areas which could be evaluated are: the possibility of breeching or failure of the embankment, depth of flow on Seven Lakes Parkway, increasing of spillway capacity, lowering the water surface elevation, lowering the spillway elevation, the feasibility of providing a high stage diversion around the dam and under the roadway using culverts, and/or the feasibility of closing the road and park area during a severe flood event.



LOCATION PLAN

FIGURE 1

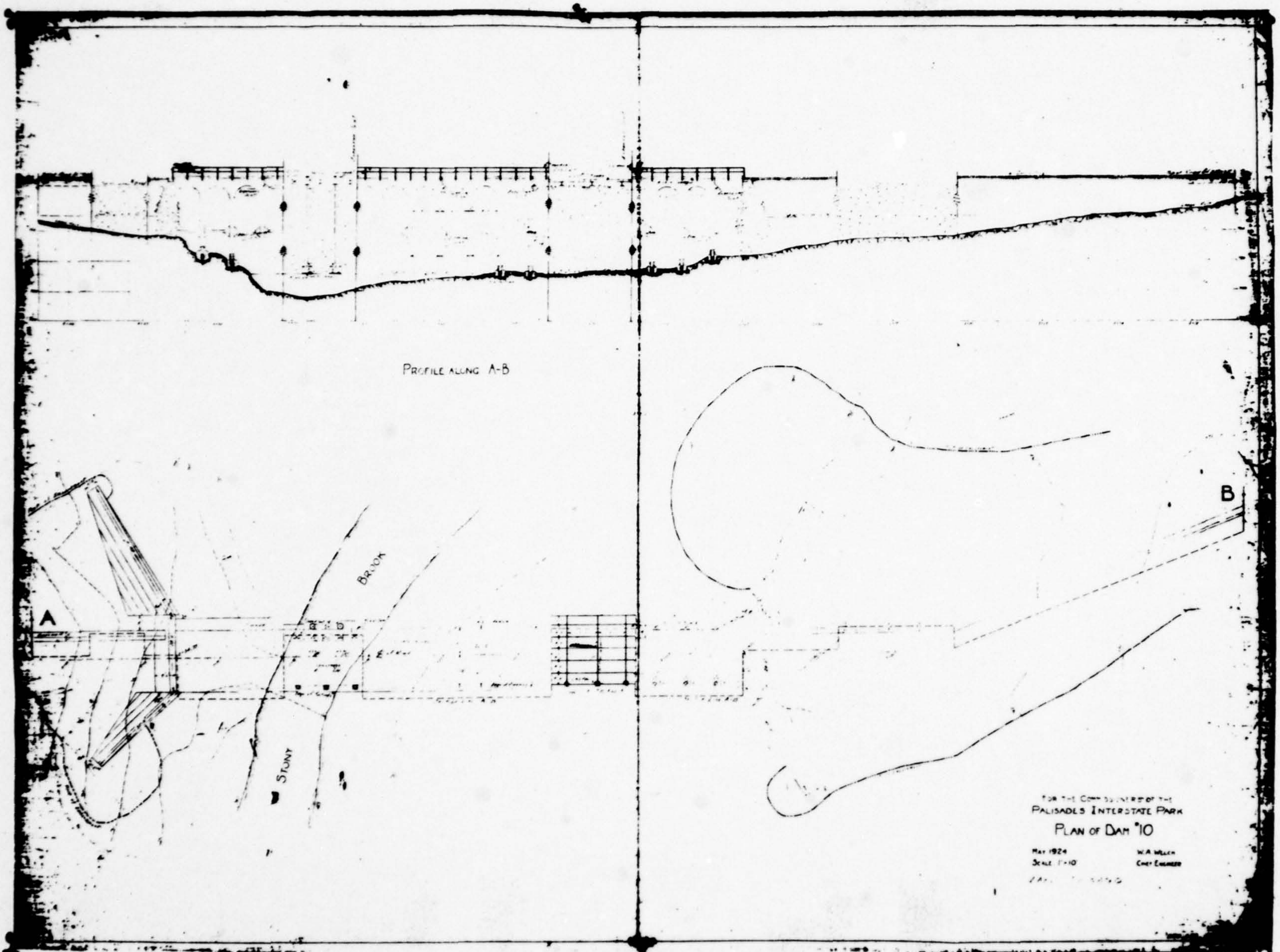
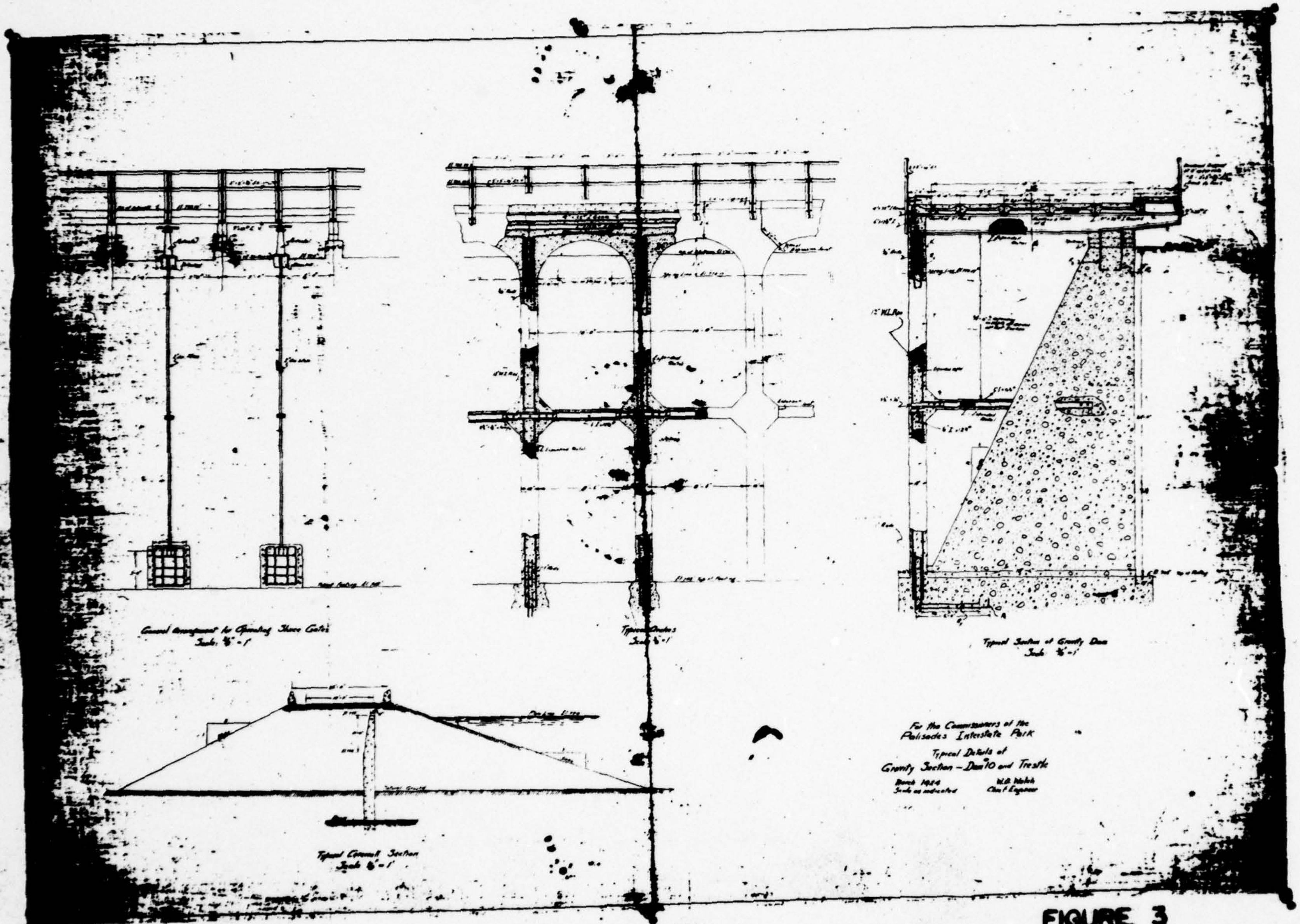
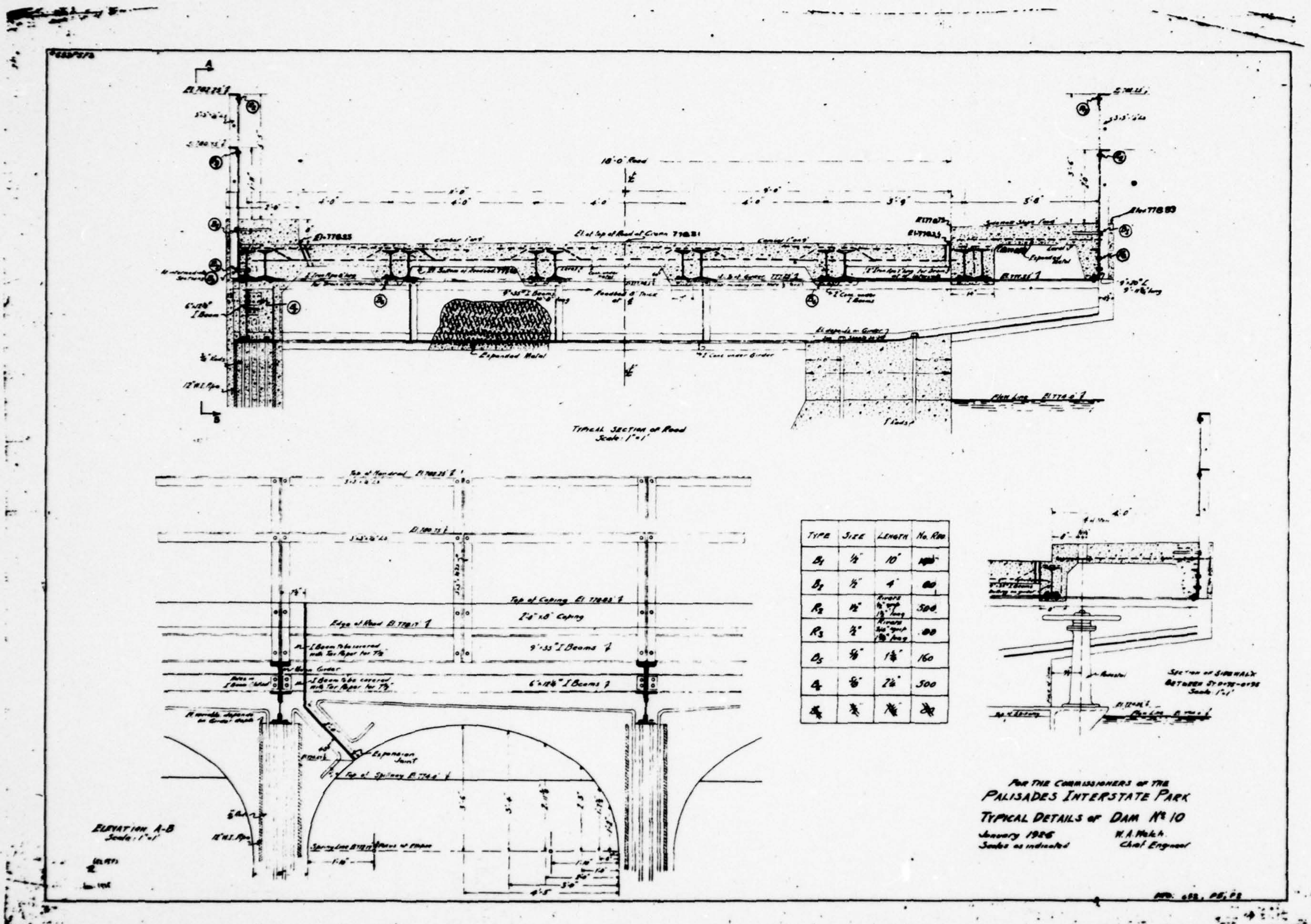

Profile along A-B
A
B
Stony
Brook
For the Commissioners of the
Palisades Interstate Park
Plan of Dam #10
May 1924
Scale 1"=10'
W.A. Welch
Chief Engineer

FIGURE 2



Typical Section of Gravity Dam
For the Commissioners of the
Palisades Interstate Park
Typical Details of
Gravity Section – Dam 10 and Trestle
March 1924
Scale as indicated
W.A. Welch
Chief Engineer

FIGURE 3



Typical Section of Road
Scale: 1" = 1'
Elevation A-B
Scale: 1" = 1'
Section of Sidewalk
For the Commissioners of the
Palisades Interstate Park
Typical Details of Dam No. 10
January 1926
Scales as indicated
W. A. Welch
Chief Engineer

FIGURE 4

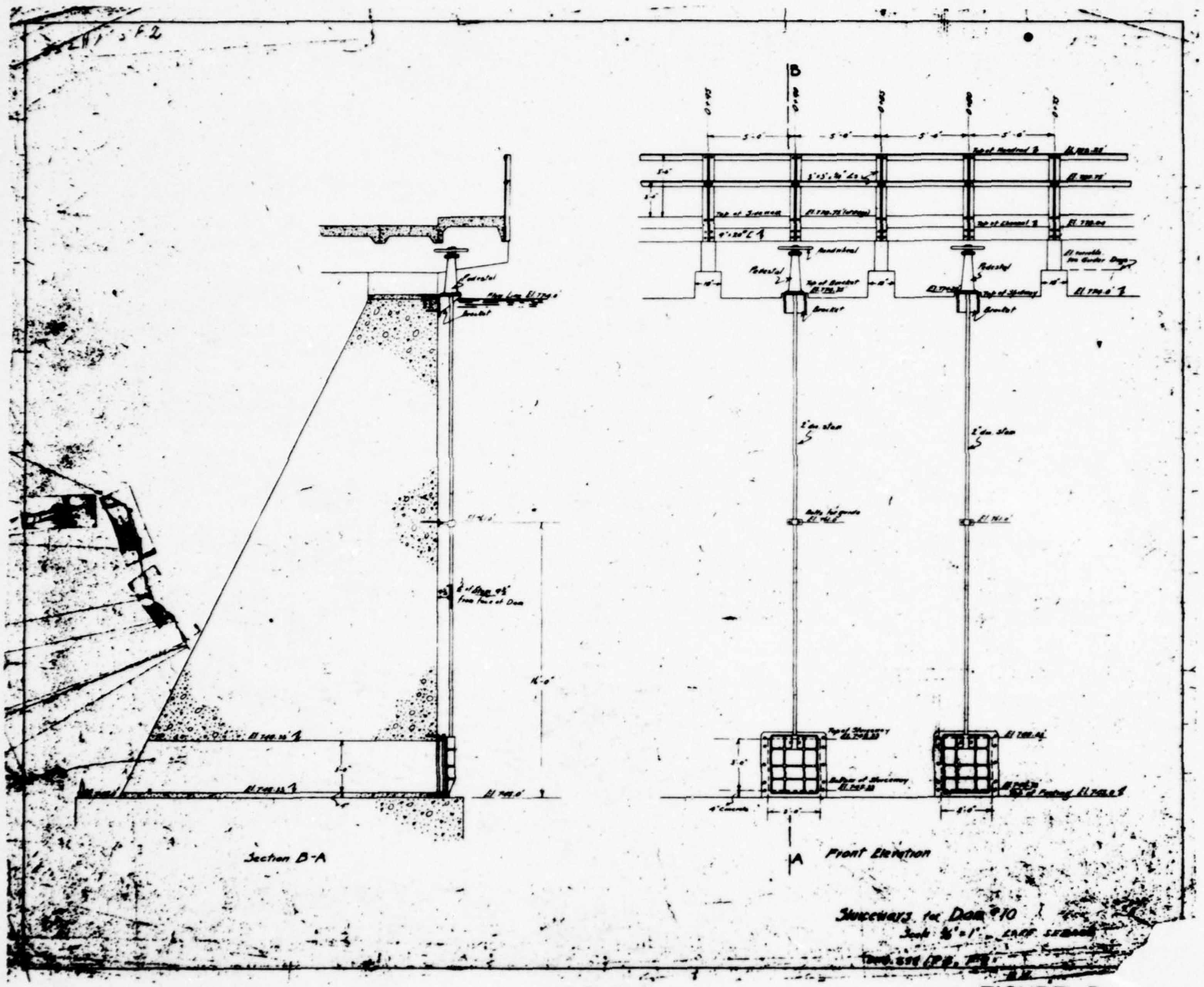
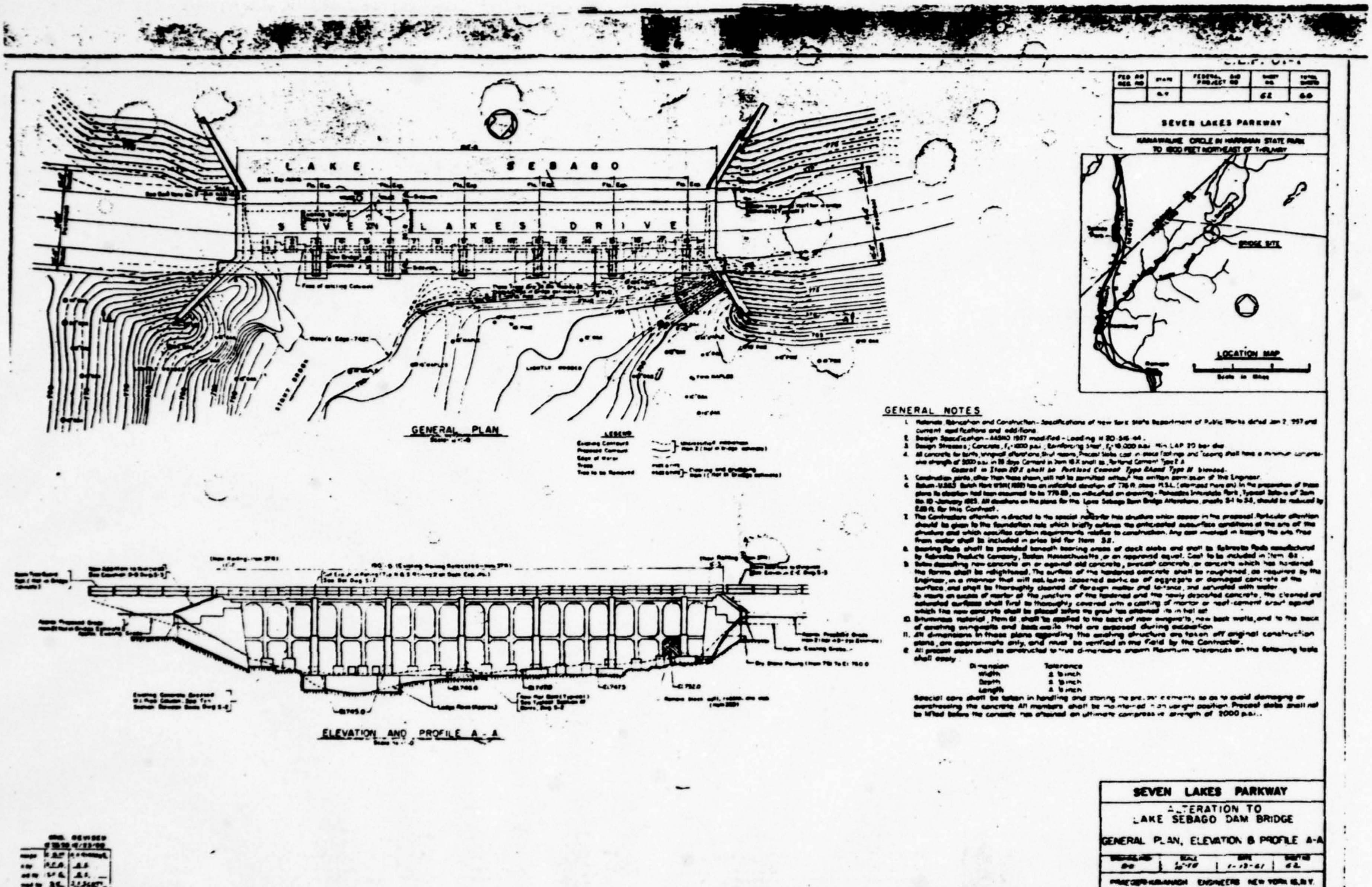


FIGURE 5



SLP 61-1

FIGURE 6

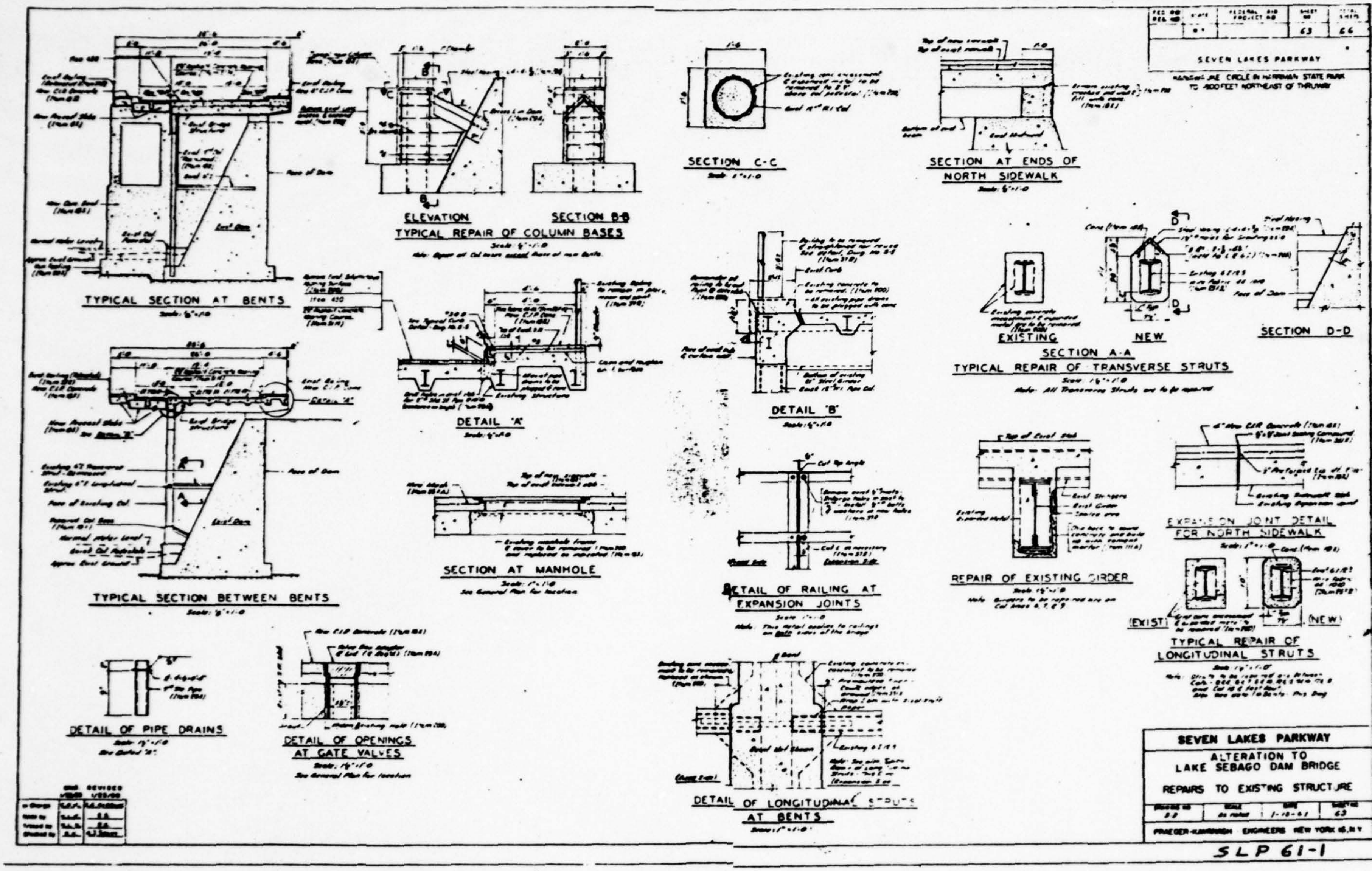
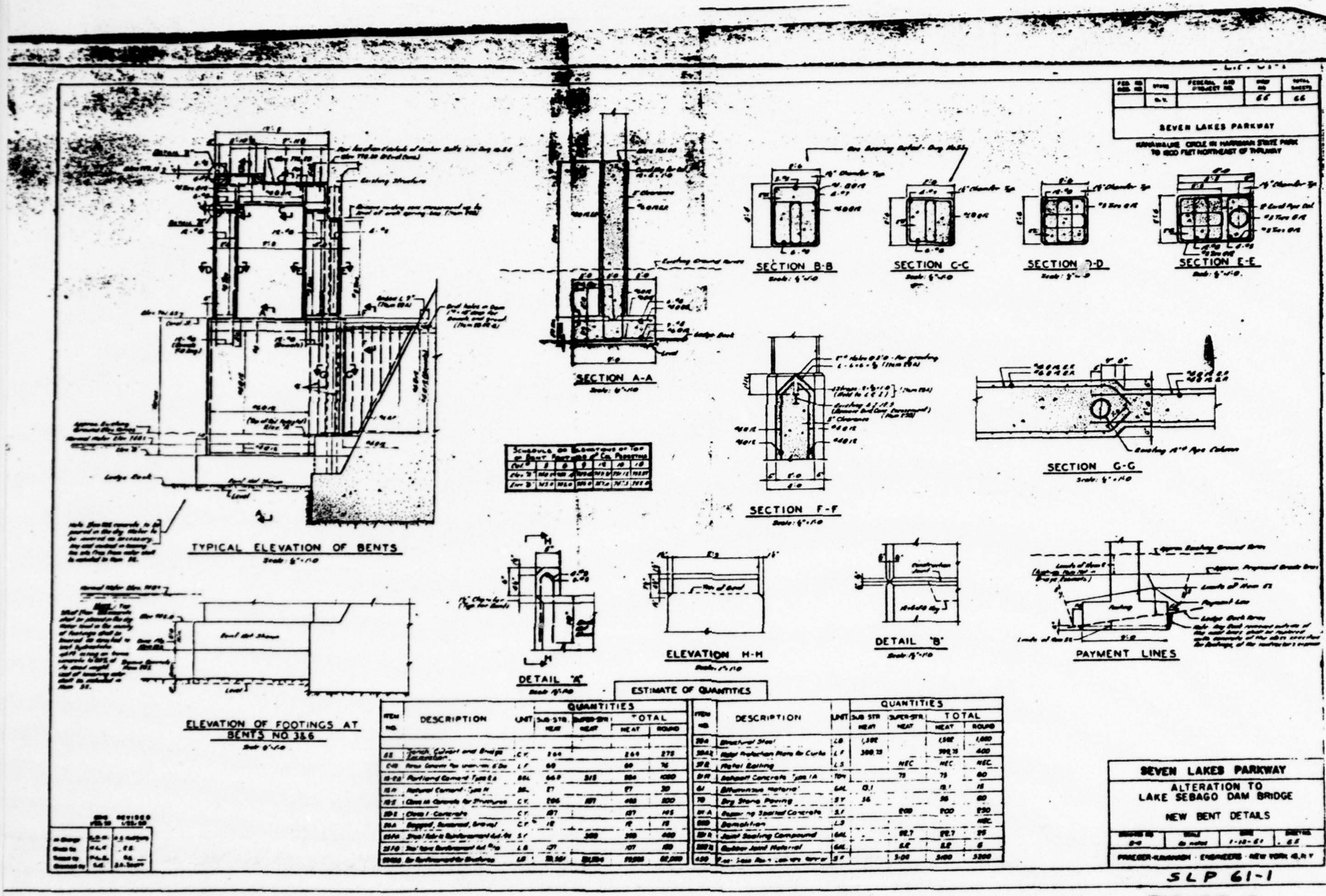

TYPICAL SECTION AT BENTS
ELEVATION
SECTION B-B
TYPICAL REPAIR OF COLUMN BASES
SECTION C-C
SECTION AT ENDS OF NORTH SIDEWALK
SEVEN LAKES PARKWAY
HANDCHANGE CIRCLE IN HARRIMAN STATE PARK TO 1800 FEET NORTHEAST OF THRUWAY
DETAIL 'A'
DETAIL 'B'
EXISTING
NEW
SECTION A-A
TYPICAL REPAIR OF TRANSVERSE STRUTS
Note: All Transverse Struts are to be repaired
SECTION D-D
TYPICAL SECTION BETWEEN BENTS
SECTION AT MANHOLE
DETAIL OF RAILING AT EXPANSION JOINTS
REPAIR OF EXISTING GIRDER
EXPANSION JOINT DETAIL FOR NORTH SIDEWALK
EXIST
NEW
TYPICAL REPAIR OF LONGITUDINAL STRUTS
DETAIL OF PIPE DRAINS
DETAIL OF OPENINGS AT GATE VALVES
DETAIL OF LONGITUDINAL STRUTS AT BENTS
SEVEN LAKES PARKWAY
ALTERATION TO LAKE SEBAGO DAM BRIDGE
REPAIRS TO EXISTING STRUCTURE
PRAEGER-KAVANAGH ENGINEERS NEW YORK 16, N.Y.
SLP 61-1

FIGURE 7



SEVEN LAKES PARKWAY
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
SECTION E-E
SECTION F-F
SECTION G-G
TYPICAL ELEVATION OF BENTS
ELEVATION OF FOOTINGS AT BENTS NO. 3&6
DETAIL "A"
ELEVATION H-H
DETAIL "B"
PAYMENT LINES
ESTIMATE OF QUANTITIES
SEVEN LAKES PARKWAY
ALTERATION TO
LAKE SEBAGO DAM BRIDGE
NEW BENT DETAILS
SLP 61-1

FIGURE 8

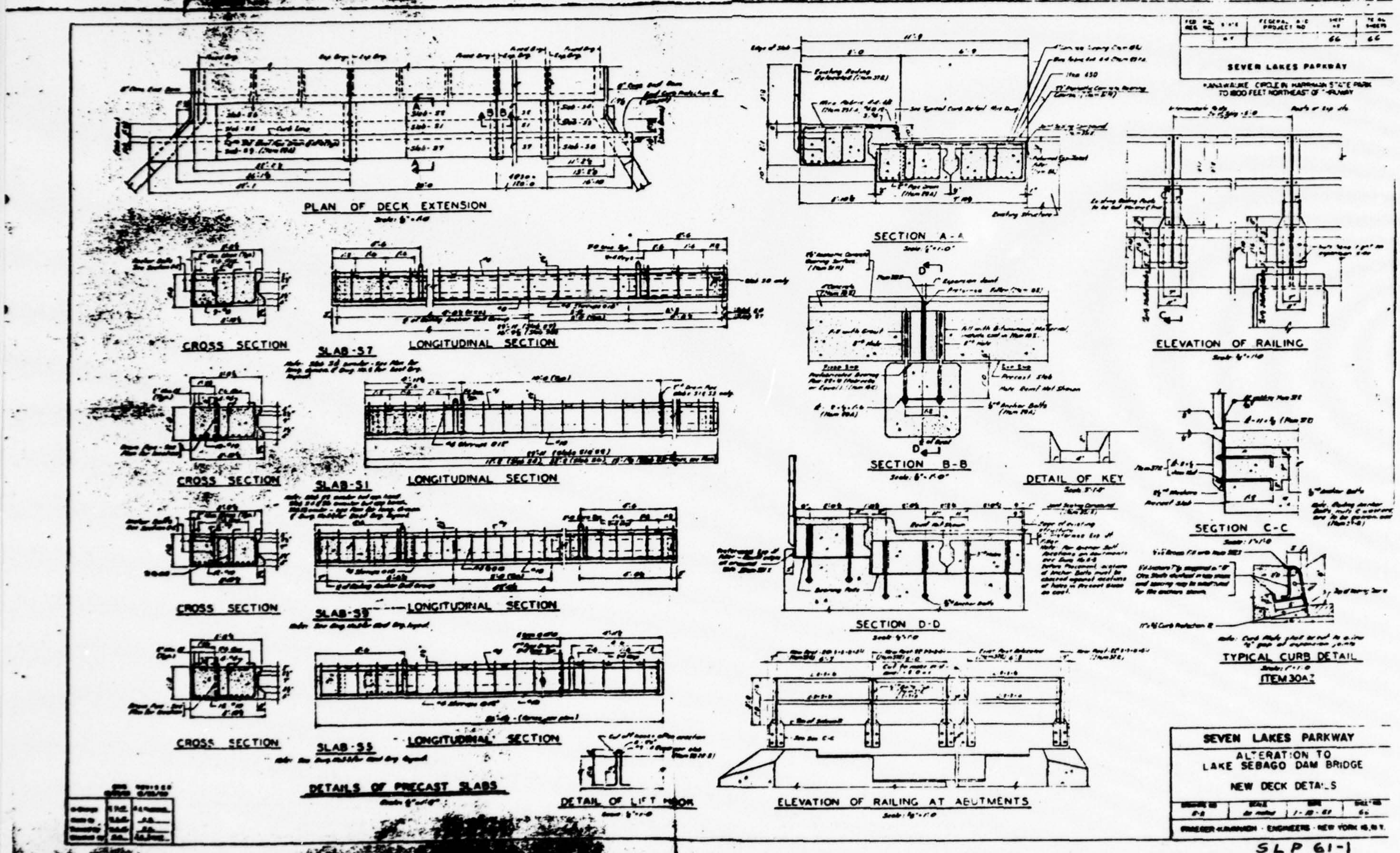
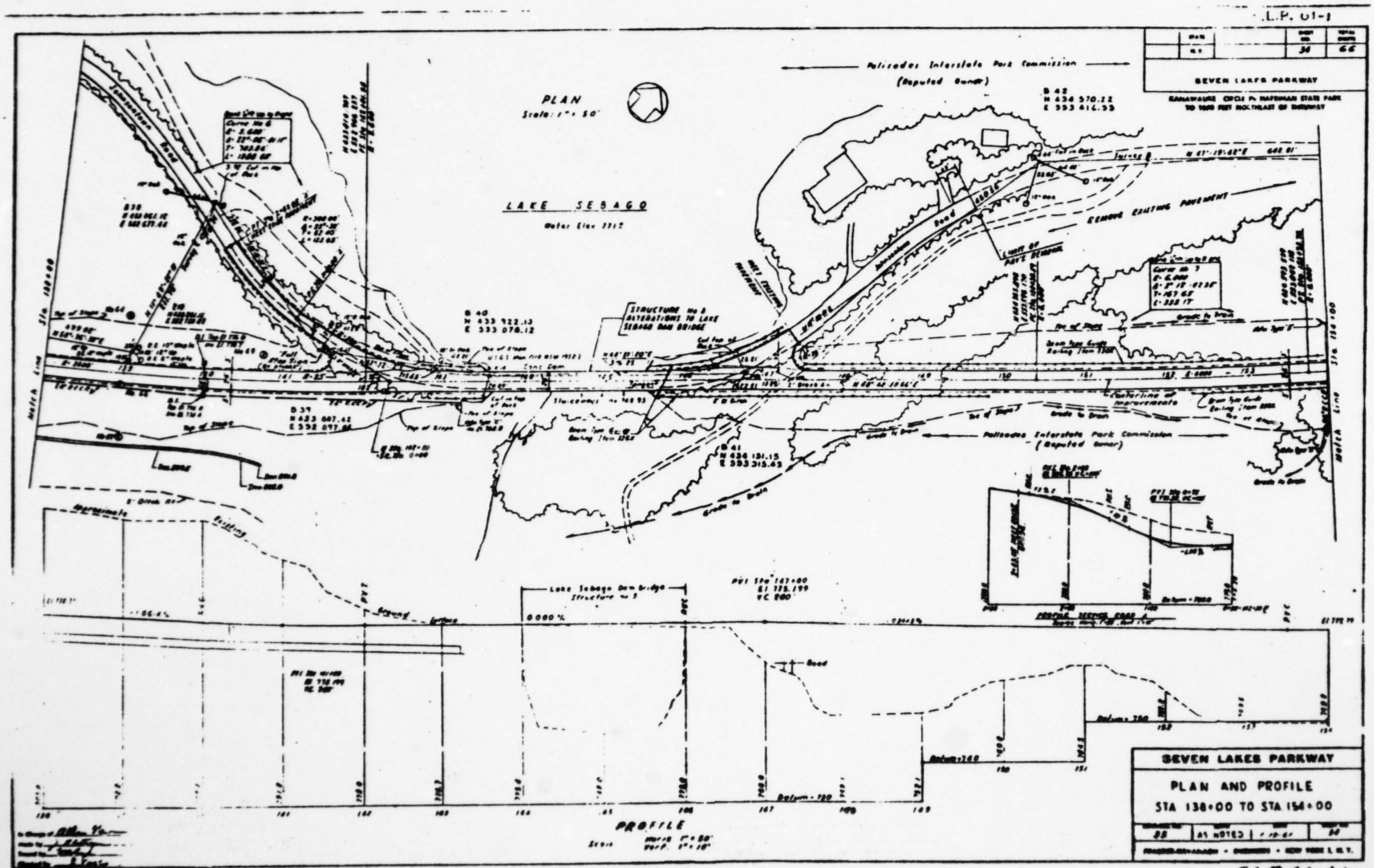
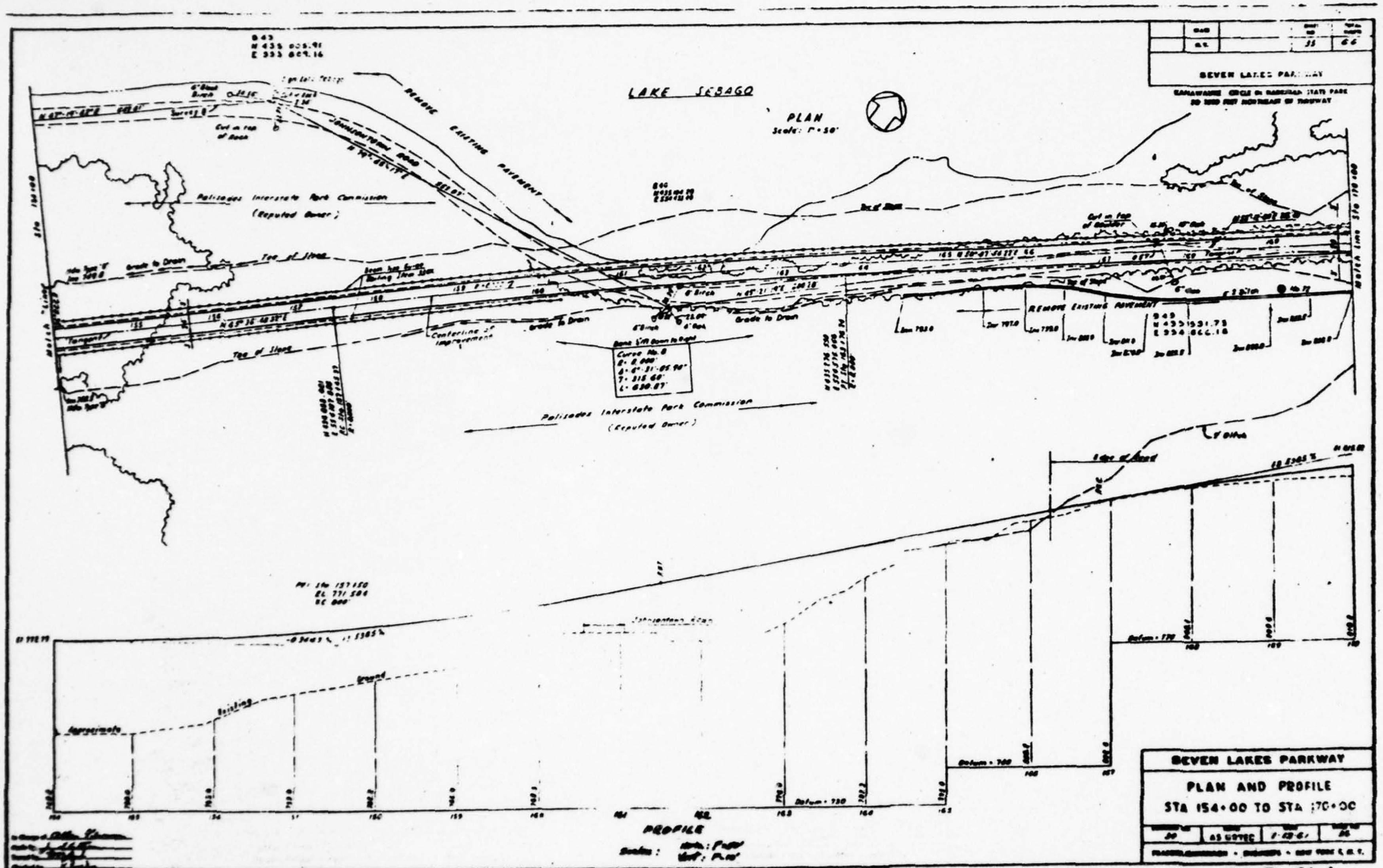

SEVEN LAKES PARKWAY
PLAN OF DECK EXTENSION
SECTION A-A
ELEVATION OF RAILING
CROSS SECTION
SLAB-57
LONGITUDINAL SECTION
SECTION B-B
DETAIL OF KEY
CROSS SECTION
SLAB-51
LONGITUDINAL SECTION
SECTION C-C
CROSS SECTION
SLAB-53
LONGITUDINAL SECTION
SECTION D-D
TYPICAL CURB DETAIL
ITEM 30A?
CROSS SECTION
SLAB-55
LONGITUDINAL SECTION
DETAILS OF PRECAST SLABS
DETAIL OF LIFT HOOK
ELEVATION OF RAILING AT ABUTMENTS
SEVEN LAKES PARKWAY
ALTERATION TO
LAKE SEBAGO DAM BRIDGE
NEW DECK DETAILS
SLP 61-1

FIGURE 9



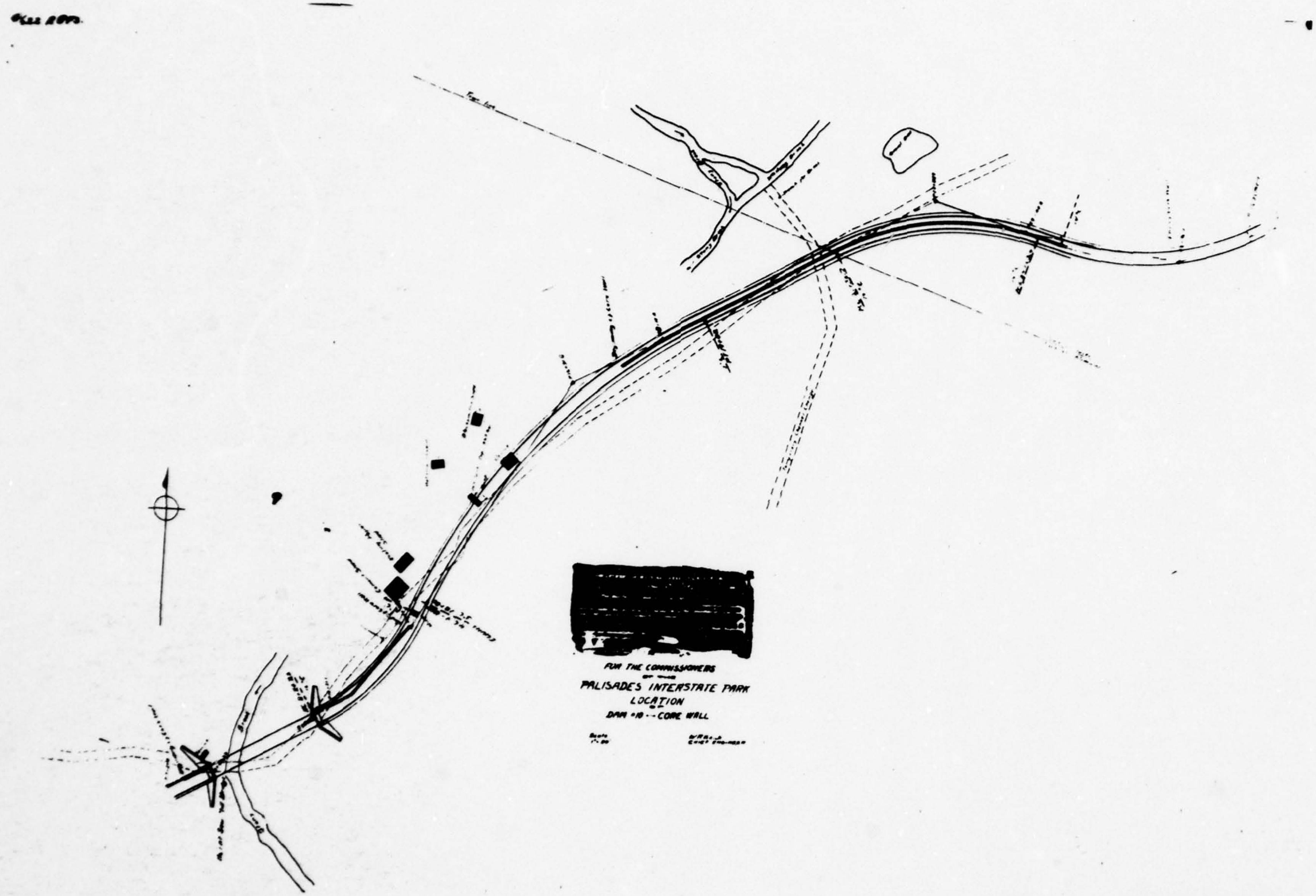
SLP 61-1

FIGURE 10



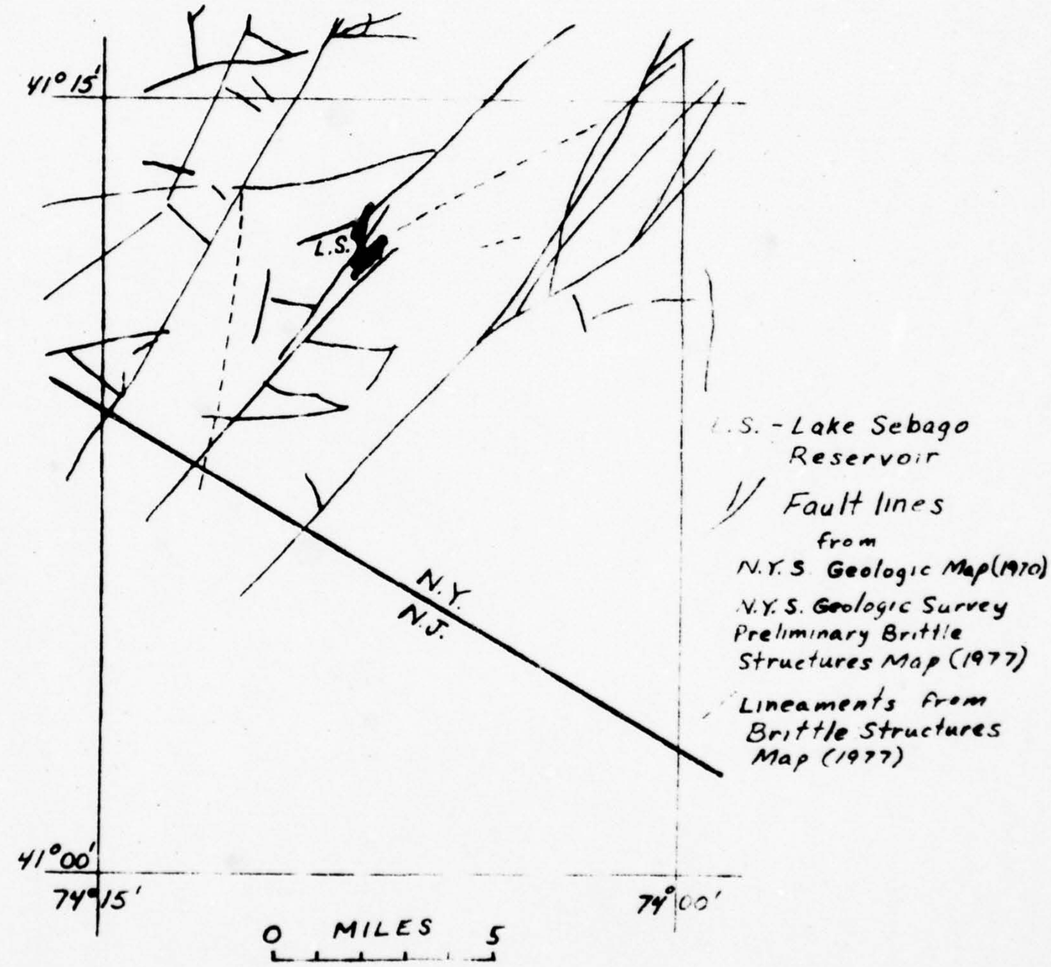
SLP 61-1

FIGURE 11



FOR THE COMMISSIONERS
PALISADES INTERSTATE PARK
LOCATION
DAM #10 -- CORE WALL

FIGURE 12



Geologic Structures Map 1

GEOLOGIC MAP # 1

FIGURE 13

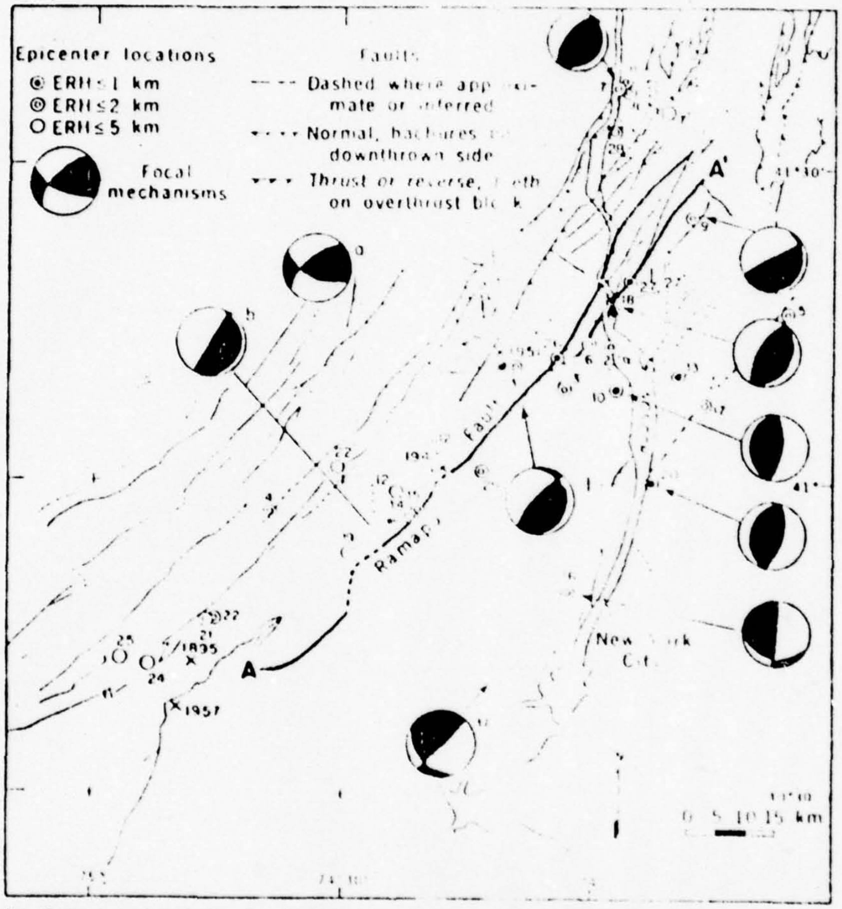


Fig. 2. Fault map (4, 5, 29) of southeastern New York and northern New Jersey showing epicenters (circles) of instrumentally located earthquakes from 1962 through 1977.

Lake Sebago (•) located in the vicinity of number 23. From Aggarwal and Sykes (1977).

Geologic Structures Map 2.

GEOLOGIC MAP #2

FIGURE 14

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam LAKE SEBAGO County ROCKLAND State NEW YORK ID # NY 332

Type of Dam CONCRETE GRAVITY Hazard Category HIGH

Date(s) Inspection JULY 28, 1978 Weather CLOUDY Temperature 70°

Pool Elevation at Time of Inspection 1" BELOW CREST M.S.L. Tailwater at Time of Inspection ______

Inspection Personnel:

N. F. DUNLEVY	DALE ENGINEERING COMPANY	
F. W. BYSZEWSKI	DALE ENGINEERING COMPANY	
D. F. MCCARTHY	DALE ENGINEERING COMPANY	
R. SANTORO, SR. PARK ENGR.,	PALISADES PARK COMMISSION	

N. F. DUNLEVY Recorder

CONCRETE/MASONRY DAMS

DAM HAS CONCRETE SECTION AND EARTH EMBANKMENT SECTION.

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	None through dam wall or floor. However, concrete abutment (north side) drain has piping as evidence with clay residue.	Abutment drain piping needs to be investigated.
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	See above.	
DRAINS	See above.	
WATER PASSAGES	Clear.	
FOUNDATION	No evidence of problems.	See section on embankment.

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Along cold joint so horizontal cracks in evidence.	
STRUCTURAL CRACKING	On bridge associated with dam.	
VERTICAL & HORIZONTAL ALIGNMENT	Good.	
MONOLITH JOINTS	Cold pour joints have some cracks.	
CONSTRUCTION JOINTS	No problems observed.	
STAFF GAGE OF RECORDER	None.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Toe area is marsh.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Embankment either sloughed or used as path.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Good but has a lot of tree growth.	
RIPRAP FAILURES	Riprap not in good condition.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATIVE GROWTH OF EMBANKMENT	Mature trees are growing on the embankment.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Core wall of original dam embankment and roadway ties into bridge at location of new road.	Needs to be investigated.
ANY NOTICEABLE SEEPAGE	Seepage at abutment noted above is a problem. Seepage along 100-foot embankment discharges up to 1/2 cfs.	
STAFF GAGE AND RECORDER	None.	
DRAINS	None noted.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Dam acts as ogee crest spillway between bridge piers. Good condition; clear.	
APPROACH CHANNEL	Reservoir impoundment.	
DISCHARGE CHANNEL	Clear.	
BRIDGE AND PIERS	Needs work. Spalling and cracking of members.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	None.	
APPROACH CHANNEL	None.	
DISCHARGE CHANNEL	None.	
BRIDGE AND PIERS	None.	
GATES AND OPERATION EQUIPMENT	None.	

OUTLET WORKS

(IN BASE OF CONCRETE DAM)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None.	
INTAKE STRUCTURE	Sluice gate in base of dam.	
OUTLET STRUCTURE	Same.	
OUTLET CHANNEL	Clear.	
EMERGENCY GATE	None. Just gates which operate at bridge through access opening.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Clear.	
SLOPES	Flat.	
APPROXIMATE NO. OF HOMES AND POPULATION	Homes along Johnsontown Road (approximately 12 homes).	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Treed slopes above reservoir. Stable.	
SEDIMENTATION	None observed.	

NAME OF DAM Lake Sebago

ID # NY 332

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	See this report.
CONSTRUCTION HISTORY	No data.
TYPICAL SECTIONS OF DAM	See this report.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See this report.
RAINFALL/RESERVOIR RECORDS	No data.

ITEM	REMARKS
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None.
POST-CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	No data.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	See this report.
HIGH POOL RECORDS	No data.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	No data.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None.
MAINTENANCE OPERATION RECORDS	No data.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	See this report.
OPERATING EQUIPMENT PLANS & DETAILS	See this report.

CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: ______

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 774.0

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 774.0

ELEVATION MAXIMUM DESIGN POOL: 774.0

ELEVATION TOP DAM: 774.0 concrete section

CREST:

a. Elevation 774.0
b. Type Concrete Weir
c. Width 4'-0"
d. Length 170 feet less piers
e. Location Spillover Entire length of concrete section.
f. Number and Type of Gates ______

OUTLET WORKS:

a. Type Two sluice gates.
b. Location Center of dam at base
c. Entrance Inverts 745
d. Exit Inverts 745
e. Emergency Draindown Facilities Just sluice gates.

HYDROMETEOROLOGICAL GATES:

a. Type None
b. Location None
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: ---

APPENDIX B

PREVIOUS INSPECTION REPORTS

STATE OF NEW YORK
DEPARTMENT OF
State Engineer and Surveyor
ALBANY

Received .... Dam No. .... Hudson Watershed

Disposition .... Serial No. ....

Foundation inspected ....

Structure inspected ....

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the State Engineer, Albany, N. Y., in compliance with the provisions of Chapter LXV of the Consolidated Laws and Chapter 647, Laws of 1911, Section 22 as amended, for the approval of specifications and detailed drawings, marked Dam #10, and core wall, #622, #623, #624.

herewith submitted for the {construction / ~~reconstruction~~} of a dam located as stated below. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about .... (Date)

1. The dam will be on Stony Brook flowing into Ramapo River in the town of Haverstraw & Ramapo, County of Rockland and 3-1/2 miles northeast from Sloatsburg. (Give exact distance and direction from a well-know bridge, dam, village main cross-roads or mouth of a stream)

2. The name and address of the owner is Palisades Interstate Park Commission.

3. The dam will be used for lake for recreational uses and landscape effect.

4. Will any part of the dam be built upon or its pond flood any State lands? All Park property.

5. The watershed at the proposed dam draining into the pond to be formed thereby is 11 square miles.

6. The proposed dam will have a pond area at the spillcrest elevation of 313.6 acres and will impound 135,100,000 cubic feet of water.

7. The lowest part of the natural shore of the pond is 4 feet vertically above the spillcrest, and everywhere else the shore will be at least 15 feet above the spillcrest.

8. The maximum known flow of the stream at the dam site was .... cubic feet per second on .... (Date)

9. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam. Might cause considerable damage in the Ramapo Valley.

10. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) [illegible]neiss ledge.

B-1

[illegible] ... is [illegible] ...; at the spillcrest elevation [illegible] ... inches vertical to a foot horizontal on the center line of the dam, a [illegible] elevation is 55 feet, and the [illegible] extends for a vertical height of 4 [illegible]

[illegible] is [illegible]; has a top slope of 2 inches to a foot horizontal, a [illegible] feet, and a height of 4 feet.

13. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. gneiss ledge, no crevices, impervious to water

14. If the [illegible] is in layers, are the layers horizontal or inclined? .... If inclined what is the direction of the horizontal outcropping relative to the axis of the main dam and the inclination and direction of the layers in a plane perpendicular to the horizontal outcropping ....

15. What is the thickness of the layers? ....

16. Are there any porous seams or fissures? no.

17. WASTES. The spillway of the above proposed dam will be 150 feet long in the clear; the waters will be held at the right end by a concrete abutment the top of which will be 4 feet above the spillcrest, and have a top width of 2-1/2 feet: and at the left end by a concrete abutment the top of which will be 4 feet above the spillcrest, and have a top width of 2-1/2 feet.

18. There will be also for flood discharge a pipe .... inches inside diameter and the bottom will be .... below the spillcrest, a sluice of 2 gates 3 feet wide in the clear by 3 feet high, and the bottom will be 22-2/3 feet below the spillcrest.

19. APRON. Below the proposed dam there will be an apron built of .... long across the stream, ... feet wide and .... feet thick. The downstream side of the apron will have a thickness of .... feet for a width of .... feet.

20. PLANS. Each application for a permit of a dam over 12 feet in height must be accompanied by a location map and complete working drawings in triplicate of the proposed structure, one set of which will be returned if they are approved. Each drawing should have a title giving the parts shown, the name of the town and county in which the structure is located, and the name of the owner and of the engineer.

The location map (U. S. Geological Quadrangle or other map) should show the exact location of the proposed [illegible] buildings below the dam which might be damaged by any failure of the dam; of roads adjacent to or crossing [illegible] below the dam, giving the lowest elevation of the roadway above the stream bed and giving the slopes,

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DAM INSPECTION REPORT
(By Visual Inspection)

Lake Sebago
Palisades Park Comm

Dam Number	River Basin	Town	County	Hazard Class*	Date & Inspector
332	L. Hudson	Ramapo	Rockland	B-(C)	1/9/75 KH

Type of Construction

- [x] Earth w/concrete spillway
- [ ] Earth w/drop inlet pipe
- [ ] Earth w/stone or riprap spillway
- [ ] Concrete
- [ ] Stone
- [ ] Timber

Use

- [ ] Water Supply
- [ ] Power
- [x] Recreation
- [x] Fish and Wildlife
- [ ] Farm Pond
- [ ] No Apparent Use-Abandoned

Estimated Impoundment Size

- [ ] 1-5 acres
- [ ] 5-10 acres
- [x] Over 10 acres 310

Estimated Height of Dam above Streambed

- [ ] Under 10 feet
- [ ] ~~10-25 feet~~ 30'
- [x] Over 25 feet

D.A. = 5825

Condition of Spillway

- [x] Service satisfactory
- [ ] In need of repair or maintenance
- [ ] Auxiliary satisfactory (none)
- [ ] In need of repair or maintenance

Explain: ______

Condition of Non-Overflow Section

- [x] Satisfactory
- [ ] In need of repair or maintenance Explain: ______

Condition of Mechanical Equipment

- [x] Satisfactory
- [ ] In need of repair or maintenance Explain: ______

Evaluation (From Visual Inspection)

- [x] No defects observed beyond normal maintenance
- [ ] Repairs required beyond normal maintenance

*Explain Hazard Class, if Necessary: [illegible] large lake

(10/75)

[illegible]

[illegible]: [illegible], as [illegible].

Concrete: [illegible].

[illegible]: All [illegible] to be [illegible].

[illegible]: All [illegible] to be [illegible] to carry on 5/8" [illegible] and pass 2" [illegible]; about [illegible] plums to be placed one foot or more from face of structure and [illegible] each other.

Aggregate: All aggregate shall be measured in boxes at mixer and mixed at least [illegible] minutes.

Cement: All cement to be tested upon arrival of cars and checked against manufacturer's test reports.

Excavation: All earth, loose rock, seamy or scaly rock shall be removed from within the lines of the dam, portions of solid rock shall be blasted where necessary to give a solid footing for the dam.

Forms: Forms to consist of good square 1" boards, securely nailed to 2" x 4" studs placed 15" center to center and securely wired in place by 4 strands of #[illegible] galvanized wire (every five feet, vertically and horizontally); expansion or construction joints to be placed every [illegible] feet.

Concrete: Concrete to be placed with bottom dump cars and moveable spouts, and worked by men in boots, face of forms to be spaded.

Expansion Joints: After concrete has been placed in alternate [illegible] foot sections, [illegible] to be removed from the ends of said sections [illegible] the [illegible] feet, the expand [illegible] of hot tar and covered with

held in position against the

r is in place this shall be painted

placing concrete, great care shall

opposite joint.

joint vertical V shaped keys with

feet center to center. After each day's

keys with 8" sides to be placed as well as

be half burried in the concrete. The previous

d, broomed and covered with neat grouts before

-----ooOoo-----

STATE OF NEW YORK
DEPARTMENT OF STATE ENGINEER
EASTERN DIVISION
ALBANY

[illegible]
STATE ENGINEER
ARNOLD G. CHAPMAN
DEPUTY

[illegible]

[illegible] Co[illegible]ion

August 15, 192[illegible]

[illegible] Dwight [illegible],
[illegible],
[illegible]

Dear Sir:-

In reply to your letter of July 31st with reference to the inspection of a dam being built under the supervision of the Palisades Interstate Park Commission at Burnt Saw Mill Bridge on Stony Brook, I would report as follows:

Major W. A. Welch, Chief Engineer and General Manager called on Mr. Anderberg of this department with reference to the above dam on August 5th. At the same time Deputy State Engineer Chapman was present. Major Welch was advised by Mr. Chapman of the necessity for furnishing plans and having same approved for all dams built under the supervision of this commission. The Major agreed to furnish such plans for all dams built and to be built.

On August 11th Mr. Anderberg inspected Dam No. 10 at Stony Brook, Dam No. 7 at Kanawake built in 1917, Stahahe Dam built in 1918, Lower Cohasset Dam built in 1919, Upper Cohasset Dam and Queensborough Dam built in 1916.

In connection with the inspection of Dam No. 10 at Stony Brook it was found to have a concrete spillway section and an earth section with concrete core wall. The concrete section is partially completed but the forms have not been removed. The excavation for the concrete core wall in the earth section has been mostly completed but no concrete has been placed in the core wall. The design of the concrete dam is not over generous in width at the base and should be built of high grade concrete with the best of workmanship to have a suitable factor of safety. You will note that at Elevation 745 the width is 1[illegible] feet 6 inches. Below that elevation is a footing [illegible] feet [illegible] inches wide. According to the rock profile this footing [illegible] down to Elevation 738 at Station 0+30. [illegible] excellent [illegible] of [illegible] or gneiss rock. [illegible] the excavation is extended to [illegible] fractured rock [illegible]. Mr. Anderberg [illegible] placed except at [illegible] day's run. [illegible]

B-6

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

DALE

DESIGN BRIEF

DESIGNED BY JPG DATE 8-7-78

CHECKED BY PAGE C-1 OF

PROJECT NO. 2210 SHORT TITLE NY DAM INSPECTION

DESIGN SUBJECT LAKE SEBAGO DAM REF. DWGS.

ESTIMATE OF CLARK'S PARAMETERS

ESTIMATE OF TC (BPR)

$$T_C = (11.9\ L^3/H)^{.385} = (11.9\ (5.275)^3/5.32)^{.385} = 1.53\ HR$$

SCS

$$L = \frac{l^{.8}\ (S+1)^{.7}}{1900\ Y^{.5}} = \frac{(27850)^{.8}\ (3.89+1)^{.7}}{1900(2.1)^{.5}}$$

$$S = \frac{1000}{CN} - 10 = 3.89$$

$$= \frac{10923.82}{2753.36} = 3.967$$

$$T_C = L/.6 = 3.967/.6 = 6.612\ HR$$

NORTH ATLANTIC DIV WATER RESOURCES STUDY (FEB 72)

$$(T_C + R) = 10\ (a)\ (DA/S)^{.25}$$

$$= 10\ (.94)\ (7.900/27)^{.25} = 7.31$$

$R/(T_C+R) = .22$

$R/7.31 = 0.22$

$R = 1.61$

$T_C = 7.31 - 1.61 = 5.70$

DALE

DESIGN BRIEF

DESIGNED BY NFD — DATE 8.7.78
CHECKED BY — PAGE C-2 OF
PROJECT NO. 2210 — SHORT TITLE NY DAM INSPECTIONS
DESIGN SUBJECT LAKE SEBAGO DAM — REF. DWGS.

ESTIMATE OF SNYDER'S PARAMETERS

$640\ C_P =$

$C_P = 0.625$

$C_T = 2.000$

$t_p = C_t (L \times L_{ca})^{0.3}$

$t_p = 2.0 (5.3 \times 2.6)^{0.3}$

$t_p = 4.4$

$t_r = t_p / 5.5 = 0.8$

$t_{pr} = t_p + 0.25 (t_R - t_r)$

$t_{pr} = 4.4 + 0.25 (0.2) = 4.45$

SUMMARY OF PARAMETERS

CLARK'S		SNYDER'S
BPR	$T_c = 1.53$	$t_{pr} = 4.45$
SCS (CN METHOD)	$T_c = 6.62$ R=1.46	$C_p = 0.625$
NORTH ATLANTIC DIV	$T_c = 5.70$ R=1.61	

$R/(T_c + R) = 0.22$

DALE

DESIGN BRIEF

DESIGNED BY NFD — DATE 8-7-78

CHECKED BY — PAGE C-3 OF

PROJECT NO. 2210 — SHORT TITLE NY DAM INSPECTIONS

DESIGN SUBJECT LAKE SEBAGO DAM — REF. DWGS.

D-A-D RELATIONSHIPS

DURATION	DEPTH	% OF INDEX
6 HR	25.8	107
12 HR	29.5	122
24 HR	32.9	137
48 HR	36.5	151
72 HR	38.3	159

INDEX RAINFALL

24.0 in

BASE FLOW

2 cfs/sq. mi = 22 cfs

LOSS RATES

INITIAL LOSS = 1.0
CONSTANT LOSS = 0.1

DALE

DESIGN BRIEF

DESIGNED BY NFD DATE 8-7-78

CHECKED BY ______ PAGE C-4 OF ______

PROJECT NO. ______ SHORT TITLE ______

DESIGN SUBJECT ______ REF. DWGS. ______

Summary [illegible]

				Peak Discharge
SP	Clark's	Parameters	0 .70 R 1.60	10100
	[illegible]	Parameters	Z .23 R [illegible]	7816
[illegible]	Clark's	Parameters		21162
	[illegible]	Parameters		15952

```
SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      1
ENTER TIME INTERVAL(MIN)=    60.


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      2
ENTER DRAINAGE AREA (SQMI) =       9.90
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )        2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE)=     0
ENTER CLARKS TC AND R (HRS) =          5.70       1.60

        TP        CP        TC        R

    3.99    0.779     5.70     1.60


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      3
ENTER RATIO  IMPERVIOUS =         0.00
SELECT 1-3 ( 1=RAIN, 2=SPS, 3=PMS )       2
ENTER SPS INDEX RAINFALL (IN) = 12.00
ENTER TRSPC AND TRSDA (SQMI) =           1.00       9.90
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)       1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =      1.00       0.10


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      4
ENTER A TITLE PLEASE -  LAKE SEBAGO SPF
ENTER STRTQ,QRCSN,AND RTIOR =       20.00   20.00     1.00
```

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.00	0.00	0.00	158.	20.	20.
2	0	0.00	0.00	0.00	530.	20.	20.
3	0	0.00	0.00	0.00	939.	20.	20.
4	0	0.00	0.00	0.00	1216.	20.	20.
5	0	0.00	0.00	0.00	1245.	20.	20.
6	0	0.00	0.00	0.00	1003.	20.	20.
7	0	0.01	0.01	0.00	618.	20.	20.
8	0	0.01	0.01	0.00	324.	20.	20.
9	0	0.01	0.01	0.00	170.	20.	20.
10	0	0.01	0.01	0.00	89.	20.	20.
11	0	0.01	0.01	0.00	47.	20.	20.
12	0	0.01	0.01	0.00	25.	20.	20.
13	0	0.03	0.03	0.00	13.	20.	20.
14	0	0.04	0.04	0.00	7.	20.	20.
15	0	0.05	0.05	0.00		20.	20.
16	0	0.12	0.12	0.00		20.	20.
17	0	0.04	0.04	0.00		20.	20.
18	0	0.03	0.03	0.00		20.	20.
19	0	0.01	0.01	0.00		20.	20.
20	0	0.01	0.01	0.00		20.	20.
21	0	0.01	0.01	0.00		20.	20.
22	0	0.01	0.01	0.00		20.	20.
23	0	0.01	0.01	0.00		20.	20.
24	0	0.01	0.01	0.00		20.	20.

25	0	0.02	0.02	0.00	20.	20.
26	0	0.02	0.02	0.00	20.	20.
27	0	0.02	0.02	0.00	20.	20.
28	0	0.02	0.02	0.00	20.	20.
29	0	0.02	0.02	0.00	20.	20.
30	0	0.02	0.02	0.00	20.	20.
31	0	0.04	0.04	0.00	20.	20.
32	0	0.04	0.04	0.00	20.	20.
33	0	0.04	0.04	0.00	20.	20.
34	0	0.04	0.04	0.00	20.	20.
35	0	0.04	0.04	0.00	20.	20.
36	0	0.04	0.04	0.00	20.	20.
37	0	0.14	0.14	0.00	20.	20.
38	0	0.16	0.13	0.03	20.	25.
39	0	0.20	0.10	0.10	20.	52.
40	0	0.51	0.10	0.41	20.	166.
41	0	0.19	0.10	0.09	20.	382.
42	0	0.15	0.10	0.05	20.	620.
43	0	0.03	0.03	0.00	20.	784.
44	0	0.03	0.03	0.00	20.	806.
45	0	0.03	0.03	0.00	20.	676.
46	0	0.03	0.03	0.00	20.	463.
47	0	0.03	0.03	0.00	20.	278.
48	0	0.03	0.03	0.00	20.	160.
49	0	0.12	0.10	0.02	20.	97.
50	0	0.12	0.10	0.02	20.	72.
51	0	0.12	0.10	0.02	20.	73.
52	0	0.12	0.10	0.02	20.	88.
53	0	0.12	0.10	0.02	20.	107.
54	0	0.12	0.10	0.02	20.	123.
55	0	0.32	0.10	0.22	20.	166.
56	0	0.32	0.10	0.22	20.	278.
57	0	0.32	0.10	0.22	20.	470.
58	0	0.32	0.10	0.22	20.	714.
59	0	0.32	0.10	0.22	20.	964.
60	0	0.32	0.10	0.22	20.	1166.
61	0	1.03	0.10	0.93	20.	1402.
62	0	1.23	0.10	1.13	20.	1875.
63	0	1.54	0.10	1.44	20.	2730.
64	0	3.90	0.10	3.80	20.	4336.
65	0	1.44	0.10	1.34	20.	6627.
66	0	1.13	0.10	1.03	20.	8833.
67	0	0.20	0.10	0.10	20.	10108.
68	0	0.20	0.10	0.10	20.	9939.
69	0	0.20	0.10	0.10	20.	8368.
70	0	0.20	0.10	0.10	20.	6041.
71	0	0.20	0.10	0.10	20.	3920.
72	0	0.20	0.10	0.10	20.	2455.
73	0	0.01	0.01	0.00	20.	1585.
74	0	0.01	0.01	0.00	20.	1085.
75	0	0.01	0.01	0.00	20.	754.

76	0	0.01	0.01	0.00		20.	507.
77	0	0.01	0.01	0.00		20.	316.
78	0	0.01	0.01	0.00		20.	171.
79	0	0.02	0.02	0.00		20.	94.
80	0	0.02	0.02	0.00		20.	55.
81	0	0.02	0.02	0.00		20.	38.
82	0	0.02	0.02	0.00		20.	29.
83	0	0.02	0.02	0.00		20.	25.
84	0	0.02	0.02	0.00		20.	22.
85	0	0.05	0.05	0.00		20.	21.
86	0	0.06	0.06	0.00		20.	20.
87	0	0.06	0.06	0.00		20.	20.
88	0	0.20	0.10	0.10		20.	36.
89	0	0.07	0.07	0.00		20.	73.
90	0	0.06	0.06	0.00		20.	114.
91	0	0.01	0.01	0.00		20.	142.
92	0	0.01	0.01	0.00		20.	145.
93	0	0.01	0.01	0.00		20.	120.
94	0	0.01	0.01	0.00		20.	82.
95	0	0.01	0.01	0.00		20.	52.
96	0	0.01	0.01	0.00		20.	37.
97	0					20.	29.
98	0					20.	25.
99	0					20.	22.
100	0					20.	21.
101	0					20.	21.
102	0					20.	20.
103	0					20.	20.
104	0					20.	20.
105	0					20.	20.
106	0					20.	20.
107	0					20.	20.
108	0					20.	20.
109	0					20.	20.
TOTAL		17.19	4.70	12.49	6385.	2180.	81924.

```
--- OPERATIONS AVAILABLE ---

TIME INT  = SET TIME INTERVAL OF ALL COMPUTATIONS
UNIT H    = COMPUTE UH BY INPUT, CLARK, OR SNYDER
RAIN      = INPUT RAIN AND LOSS RATE DATA
RUNOFF    = INPUT BASEFLOW, COMPUTE & PRINT HYDROGRAPH
PNT       = PRINT UNIT HYDROGRAPH ONLY
STOP      = STOP EXECUTION OF PROGRAM

USER MUST SELECT OPERATION DESIRED
MAY RETURN TO ANY OPERATION


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      1
ENTER TIME INTERVAL(MIN)=   60.


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      2
ENTER DRAINAGE AREA (SQMI) =       9.90
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )        3
ENTER SNYDERS CP AND TP (HRS) =           0.62        4.45
ENTER INITIAL EST. CLARKS TC & (HRS) (0=DEFAULT)=  0.00        0.00

      TP       CP       TC       R

     3.83    0.603    5.16    3.44
     4.24    0.651    5.42    3.58
     4.55    0.671    5.30    3.84
     4.51    0.647    5.23    3.98
     4.47    0.633    5.23    4.03
     4.49    0.631    5.23    4.03


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      3
ENTER RATIO  IMPERVIOUS =        0.00
SELECT 1-3 ( 1=RAIN, 2=SPS, 3=PMS )        2
ENTER SPS INDEX RAINFALL (IN) = 12.00
ENTER TRSPC AND TRSDA (SQMI) =           1.00        9.90
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)        1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =       1.00        0.10


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      4
ENTER A TITLE PLEASE -   LAKE SEBAGO SPF
ENTER STRTQ,QRCSN,AND RTIOR =       20.00     20.00      1.00

 HR MIN   RAIN   LOSS  EXCESS   UNIT HG    RECSN     FLOW
  1   0   0.00   0.00   0.00       83.      20.       20.
  2   0   0.00   0.00   0.00      301.      20.       20.
  3   0   0.00   0.00   0.00      579.      20.       20.
  4   0   0.00   0.00   0.00      807.      20.       20.
  5   0   0.00   0.00   0.00      897.      20.       20.
  6   0   0.00   0.00   0.00      813.      20.       20.
  7   0   0.01   0.01   0.00      643.      20.       20.
  8   0   0.01   0.01   0.00      501.      20.       20.
```

9	0	0.01	0.01	0.00	390.	20.	20.
10	0	0.01	0.01	0.00	304.	20.	20.
11	0	0.01	0.01	0.00	237.	20.	20.
12	0	0.01	0.01	0.00	185.	20.	20.
13	0	0.03	0.03	0.00	144.	20.	20.
14	0	0.04	0.04	0.00	112.	20.	20.
15	0	0.05	0.05	0.00	88.	20.	20.
16	0	0.12	0.12	0.00	68.	20.	20.
17	0	0.04	0.04	0.00	53.	20.	20.
18	0	0.03	0.03	0.00	42.	20.	20.
19	0	0.01	0.01	0.00	33.	20.	20.
20	0	0.01	0.01	0.00	26.	20.	20.
21	0	0.01	0.01	0.00	20.	20.	20.
22	0	0.01	0.01	0.00	16.	20.	20.
23	0	0.01	0.01	0.00	12.	20.	20.
24	0	0.01	0.01	0.00	10.	20.	20.
25	0	0.02	0.02	0.00	8.	20.	20.
26	0	0.02	0.02	0.00		20.	20.
27	0	0.02	0.02	0.00		20.	20.
28	0	0.02	0.02	0.00		20.	20.
29	0	0.02	0.02	0.00		20.	20.
30	0	0.02	0.02	0.00		20.	20.
31	0	0.04	0.04	0.00		20.	20.
32	0	0.04	0.04	0.00		20.	20.
33	0	0.04	0.04	0.00		20.	20.
34	0	0.04	0.04	0.00		20.	20.
35	0	0.04	0.04	0.00		20.	20.
36	0	0.04	0.04	0.00		20.	20.
37	0	0.14	0.14	0.00		20.	20.
38	0	0.16	0.13	0.03		20.	23.
39	0	0.20	0.10	0.10		20.	37.
40	0	0.51	0.10	0.41		20.	102.
41	0	0.19	0.10	0.09		20.	233.
42	0	0.15	0.10	0.05		20.	396.
43	0	0.03	0.03	0.00		20.	532.
44	0	0.03	0.03	0.00		20.	590.
45	0	0.03	0.03	0.00		20.	554.
46	0	0.03	0.03	0.00		20.	463.
47	0	0.03	0.03	0.00		20.	372.
48	0	0.03	0.03	0.00		20.	295.
49	0	0.12	0.10	0.02		20.	236.
50	0	0.12	0.10	0.02		20.	195.
51	0	0.12	0.10	0.02		20.	169.
52	0	0.12	0.10	0.02		20.	157.
53	0	0.12	0.10	0.02		20.	152.
54	0	0.12	0.10	0.02		20.	151.
55	0	0.32	0.10	0.22		20.	167.
56	0	0.32	0.10	0.22		20.	227.
57	0	0.32	0.10	0.22		20.	342.
58	0	0.32	0.10	0.22		20.	503.
59	0	0.32	0.10	0.22		20.	683.
60	0	0.32	0.10	0.22		20.	845.
61	0	1.03	0.10	0.93		20.	1033.
62	0	1.23	0.10	1.13		20.	1363.
63	0	1.54	0.10	1.44		20.	1938.
64	0	3.90	0.10	3.80		20.	2977.
65	0	1.44	0.10	1.34		20.	4505.

66	0	1.13	0.10	1.03		20.	6148.
67	0	0.20	0.10	0.10		20.	7384.
68	0	0.20	0.10	0.10		20.	7816.
69	0	0.20	0.10	0.10		20.	7334.
70	0	0.20	0.10	0.10		20.	6286.
71	0	0.20	0.10	0.10		20.	5162.
72	0	0.20	0.10	0.10		20.	4177.
73	0	0.01	0.01	0.00		20.	3393.
74	0	0.01	0.01	0.00		20.	2758.
75	0	0.01	0.01	0.00		20.	2229.
76	0	0.01	0.01	0.00		20.	1781.
77	0	0.01	0.01	0.00		20.	1406.
78	0	0.01	0.01	0.00		20.	1102.
79	0	0.02	0.02	0.00		20.	864.
80	0	0.02	0.02	0.00		20.	678.
81	0	0.02	0.02	0.00		20.	532.
82	0	0.02	0.02	0.00		20.	419.
83	0	0.02	0.02	0.00		20.	331.
84	0	0.02	0.02	0.00		20.	262.
85	0	0.05	0.05	0.00		20.	208.
86	0	0.06	0.06	0.00		20.	162.
87	0	0.08	0.08	0.00		20.	125.
88	0	0.20	0.10	0.10		20.	102.
89	0	0.07	0.07	0.00		20.	85.
90	0	0.06	0.06	0.00		20.	97.
91	0	0.01	0.01	0.00		20.	110.
92	0	0.01	0.01	0.00		20.	116.
93	0	0.01	0.01	0.00		20.	106.
94	0	0.01	0.01	0.00		20.	87.
95	0	0.01	0.01	0.00		20.	72.
96	0	0.01	0.01	0.00		20.	60.
97	0					20.	50.
98	0					20.	44.
99	0					20.	38.
100	0					20.	34.
101	0					20.	31.
102	0					20.	29.
103	0					20.	27.
104	0					20.	25.
105	0					20.	24.
106	0					20.	23.
107	0					20.	23.
108	0					20.	22.
109	0					20.	22.
110	0					20.	21.
111	0					20.	21.
112	0					20.	21.
113	0					20.	20.
114	0					20.	20.
115	0					20.	20.
116	0					20.	20.
117	0					20.	20.
118	0					20.	20.
119	0					20.	20.
120	0					20.	20.
TOTAL		17.19	4.70	12.49	6372.	2400.	81987.

```
SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      1
ENTER TIME INTERVAL(MIN)=    60.

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      2
ENTER DRAINAGE AREA (SQMI) =       9.90
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )        2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE)=     0
ENTER CLARKS TC AND R (HRS) =         5.70       1.46

       TP        CP        TC        R

    3.95    0.784     5.70     1.46

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      3
ENTER RATIO  IMPERVIOUS =          0.00
SELECT 1-3 ( 1=RAIN, 2=SPS, 3=PMS )        3
ENTER PMS INDEX RAINFALL (IN) = 24.00
ENTER R6,R12,R24,R48,R72,R96 =     107.00  122.00  137.00  151.00  159.00
ENTER TRSPC AND TRSDA (SQMI) =            0.00        9.90
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)        1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =       1.00        0.10

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      4
ENTER A TITLE PLEASE -   LAKE SEBAGO PMF
ENTER STRTQ,QRCSN,AND RTIOR =         20.00    20.00     1.00
```

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.02	0.02	0.00	169.	20.	20.
2	0	0.02	0.02	0.00	562.	20.	20.
3	0	0.02	0.02	0.00	984.	20.	20.
4	0	0.02	0.02	0.00	1257.	20.	20.
5	0	0.02	0.02	0.00	1268.	20.	20.
6	0	0.02	0.02	0.00	997.	20.	20.
7	0	0.05	0.05	0.00	587.	20.	20.
8	0	0.05	0.05	0.00	288.	20.	20.
9	0	0.05	0.05	0.00	141.	20.	20.
10	0	0.05	0.05	0.00	69.	20.	20.
11	0	0.05	0.05	0.00	34.	20.	20.
12	0	0.05	0.05	0.00	17.	20.	20.
13	0	0.21	0.21	0.00	9.	20.	20.
14	0	0.25	0.25	0.00		20.	20.
15	0	0.31	0.18	0.13		20.	42.
16	0	0.80	0.10	0.70		20.	212.
17	0	0.29	0.10	0.19		20.	574.
18	0	0.23	0.10	0.13		20.	1001.
19	0	0.03	0.03	0.00		20.	1325.
20	0	0.03	0.03	0.00		20.	1404.
21	0	0.03	0.03	0.00		20.	1198.
22	0	0.03	0.03	0.00		20.	823.
23	0	0.03	0.03	0.00		20.	481.
24	0	0.03	0.03	0.00		20.	259.
25	0	0.19	0.10	0.09		20.	153.
26	0	0.19	0.10	0.09		20.	144.
27	0	0.19	0.10	0.09		20.	203.
28	0	0.19	0.10	0.09		20.	301.
29	0	0.19	0.10	0.09		20.	406.
30	0	0.19	0.10	0.09		20.	492.

31	0	0.48	0.10	0.38		20.	593.
32	0	0.48	0.10	0.38		20.	782.
33	0	0.48	0.10	0.38		20.	1080.
34	0	0.48	0.10	0.38		20.	1451.
35	0	0.48	0.10	0.38		20.	1822.
36	0	0.48	0.10	0.38		20.	2113.
37	0	2.05	0.10	1.95		20.	2550.
38	0	2.46	0.10	2.36		20.	3585.
39	0	3.08	0.10	2.98		20.	5507.
40	0	7.80	0.10	7.70		20.	9052.
41	0	2.87	0.10	2.77		20.	13998.
42	0	2.26	0.10	2.16		20.	18637.
43	0	0.29	0.10	0.19		20.	21162.
44	0	0.29	0.10	0.19		20.	20551.
45	0	0.29	0.10	0.19		20.	17002.
46	0	0.29	0.10	0.19		20.	11958.
47	0	0.29	0.10	0.19		20.	7485.
48	0	0.29	0.10	0.19		20.	4494.
49	0	0.01	0.01	0.00		20.	2802.
50	0	0.01	0.01	0.00		20.	1875.
51	0	0.01	0.01	0.00		20.	1284.
52	0	0.01	0.01	0.00		20.	844.
53	0	0.01	0.01	0.00		20.	483.
54	0	0.01	0.01	0.00		20.	255.
55	0	0.03	0.03	0.00		20.	126.
56	0	0.03	0.03	0.00		20.	71.
57	0	0.03	0.03	0.00		20.	45.
58	0	0.03	0.03	0.00		20.	31.
59	0	0.03	0.03	0.00		20.	25.
60	0	0.03	0.03	0.00		20.	22.
61	0	0.12	0.10	0.02		20.	23.
62	0	0.14	0.10	0.04		20.	38.
63	0	0.18	0.10	0.08		20.	76.
64	0	0.46	0.10	0.36		20.	190.
65	0	0.17	0.10	0.07		20.	389.
66	0	0.13	0.10	0.03		20.	590.
67	0	0.02	0.02	0.00		20.	711.
68	0	0.02	0.02	0.00		20.	703.
69	0	0.02	0.02	0.00		20.	567.
70	0	0.02	0.02	0.00		20.	369.
71	0	0.02	0.02	0.00		20.	209.
72	0	0.02	0.02	0.00		20.	116.
73	0					20.	67.
74	0					20.	43.
75	0					20.	31.
76	0					20.	25.
77	0					20.	21.
78	0					20.	20.
79	0					20.	20.
80	0					20.	20.
81	0					20.	20.
82	0					20.	20.
83	0					20.	20.
84	0					20.	20.
TOTAL		30.53	4.90	25.63	63[illegible]4.	1680.	165293.

```
SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)        1
ENTER TIME INTERVAL(MIN)=    60.

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)        2
ENTER DRAINAGE AREA (SQMI) =        9.90
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )        3
ENTER SNYDERS CP AND TP (HRS) =              0.62        4.45
ENTER INITIAL EST. CLARKS TC & (HRS) (0=DEFAULT)=  0.00        0.00
```

TP	CP	TC	R
3.83	0.603	5.16	3.44
4.24	0.651	5.42	3.58
4.55	0.671	5.30	3.84
4.51	0.647	5.23	3.98
4.47	0.633	5.23	4.03
4.49	0.631	5.23	4.03

```
SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)        3
ENTER RATIO  IMPERVIOUS =          0.00
SELECT 1-3 ( 1=RAIN, 2=SPS, 3=PMS )        3
ENTER PMS INDEX RAINFALL (IN) = 24.00
ENTER R6,R12,R24,R48,R72,R96 =      107.00  122.00  137.00  151.00  159.00
ENTER TRSPC AND TRSDA (SQMI) =             0.00        9.90
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)        1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =       1.00        0.10

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)        4
ENTER A TITLE PLEASE -   LAKE SABAGO PMF
ENTER STRTQ,QRCSN,AND RTIOR =           20.00   20.00     1.00
```

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.02	0.02	0.00	83.	20.	20.
2	0	0.02	0.02	0.00	301.	20.	20.
3	0	0.02	0.02	0.00	579.	20.	20.
4	0	0.02	0.02	0.00	807.	20.	20.
5	0	0.02	0.02	0.00	897.	20.	20.
6	0	0.02	0.02	0.00	813.	20.	20.
7	0	0.05	0.05	0.00	643.	20.	20.
8	0	0.05	0.05	0.00	501.	20.	20.
9	0	0.05	0.05	0.00	390.	20.	20.
10	0	0.05	0.05	0.00	304.	20.	20.
11	0	0.05	0.05	0.00	237.	20.	20.
12	0	0.05	0.05	0.00	185.	20.	20.
13	0	0.21	0.21	0.00	144.	20.	20.
14	0	0.25	0.25	0.00	112.	20.	20.
15	0	0.31	0.18	0.13	88.	20.	31.

16	0	0.80	0.10	0.70	68.	20.	118.
17	0	0.29	0.10	0.19	53.	20.	322.
18	0	0.23	0.10	0.13	42.	20.	598.
19	0	0.03	0.03	0.00	33.	20.	850.
20	0	0.03	0.03	0.00	26.	20.	982.
21	0	0.03	0.03	0.00	20.	20.	948.
22	0	0.03	0.03	0.00	16.	20.	806.
23	0	0.03	0.03	0.00	12.	20.	649.
24	0	0.03	0.03	0.00	10.	20.	512.
25	0	0.19	0.10	0.09	8.	20.	411.
26	0	0.19	0.10	0.09		20.	353.
27	0	0.19	0.10	0.09		20.	339.
28	0	0.19	0.10	0.09		20.	361.
29	0	0.19	0.10	0.09		20.	402.
30	0	0.19	0.10	0.09		20.	444.
31	0	0.48	0.10	0.38		20.	501.
32	0	0.48	0.10	0.38		20.	615.
33	0	0.48	0.10	0.38		20.	803.
34	0	0.48	0.10	0.38		20.	1053.
35	0	0.48	0.10	0.38		20.	1326.
36	0	0.48	0.10	0.38		20.	1571.
37	0	2.05	0.10	1.95		20.	1896.
38	0	2.46	0.10	2.36		20.	2554.
39	0	3.08	0.10	2.98		20.	3756.
40	0	7.80	0.10	7.70		20.	5931.
41	0	2.87	0.10	2.77		20.	9107.
42	0	2.26	0.10	2.16		20.	12504.
43	0	0.29	0.10	0.19		20.	15052.
44	0	0.29	0.10	0.19		20.	15952.
45	0	0.29	0.10	0.19		20.	14978.
46	0	0.29	0.10	0.19		20.	12837.
47	0	0.29	0.10	0.19		20.	10525.
48	0	0.29	0.10	0.19		20.	8494.
49	0	0.01	0.01	0.00		20.	6877.
50	0	0.01	0.01	0.00		20.	5572.
51	0	0.01	0.01	0.00		20.	4489.
52	0	0.01	0.01	0.00		20.	3579.
53	0	0.01	0.01	0.00		20.	2818.
54	0	0.01	0.01	0.00		20.	2204.
55	0	0.03	0.03	0.00		20.	1723.
56	0	0.03	0.03	0.00		20.	1347.
57	0	0.03	0.03	0.00		20.	1054.
58	0	0.03	0.03	0.00		20.	826.
59	0	0.03	0.03	0.00		20.	648.
60	0	0.03	0.03	0.00		20.	509.
61	0	0.12	0.10	0.02		20.	403.
62	0	0.14	0.10	0.04		20.	317.
63	0	0.18	0.10	0.08		20.	262.
64	0	0.46	0.10	0.36		20.	262.
65	0	0.17	0.10	0.07		20.	301.

66	0	0.13	0.10	0.03		20.	407.
67	0	0.02	0.02	0.00		20.	494.
68	0	0.02	0.02	0.00		20.	530.
69	0	0.02	0.02	0.00		20.	488.
70	0	0.02	0.02	0.00		20.	403.
71	0	0.02	0.02	0.00		20.	321.
72	0	0.02	0.02	0.00		20.	254.
73	0					20.	201.
74	0					20.	161.
75	0					20.	130.
76	0					20.	106.
77	0					20.	87.
78	0					20.	72.
79	0					20.	61.
80	0					20.	52.
81	0					20.	45.
82	0					20.	39.
83	0					20.	35.
84	0					20.	32.
85	0					20.	29.
86	0					20.	27.
87	0					20.	25.
88	0					20.	24.
89	0					20.	21.
90	0					20.	20.
91	0					20.	20.
92	0					20.	20.
93	0					20.	20.
94	0					20.	20.
95	0					20.	20.
96	0					20.	20.
TOTAL		30.53	4.90	25.63	6372.	1920.	165236.

DALE

DESIGN BIEF

DESIGNED BY: NFD

CHECKED BY:

PROJECT NO.:

SHORT TITLE:

DESIGN SUBJECT: [illegible]

DATE: 8.8.78

PAGE: C-16 OF

REF. DWGS.:

[illegible] DISCHARGE C[illegible]

[illegible] [illegible] [illegible] 192[illegible]

20 [illegible] 10 [illegible] to.c.

[illegible] [illegible] ft.

net [illegible] 1[illegible] - [illegible] feet

a. [illegible]

H	[illegible]	C	L	$H^{3/2}$	Q
[illegible]	774		162		
[illegible]	77[illegible]	[illegible]	|	1	[illegible]18
[illegible]	[illegible]76	[illegible]		2.8	1497
[illegible]	77	[illegible]	↓	5.2	2864

b. [illegible]

H	[illegible]	C	[illegible] C	L	$H_2^{3/2}$	([illegible] - H_2)	Q
4	[illegible]	0.64	557	8	1	7	3897
5	[illegible]	0.65	[illegible]	11.1	2.83	8.3	4698
6	[illegible]	0.66	[illegible]	[illegible]	5.2	9.5	5453
7	.4	.67	[illegible]	[illegible]	8.0	[illegible]	6121
8	[illegible]	.6[illegible]	[illegible]	[illegible]	11.1	[illegible]	6803
9	[illegible]	.6[illegible]	60[illegible]	[illegible]	14.7	12[illegible]	7380
10	[illegible]	.6[illegible]	60[illegible]	[illegible]	18.5	[illegible]	7920

DALE

DESIGN BRIEF

DESIGNED BY: HFD | DATE: 8·8·78
CHECKED BY: | PAGE: C-17 OF
PROJECT NO.: | SHORT TITLE:
DESIGN SUBJECT: La[illegible] S[illegible] | REF. DWGS.:

c. Discharge over bridge

H	Elev	C	L	$H^{3/2}$	Q
–	774	–	1800 ft	–	
–	775	–	↓	–	
–	776	–		–	
–	777	–		–	
	778	–		–	
0	779	–		–	
1	780	2.68		1	4,824
2	781	↓		2.9[illegible]	13,651
3	782			5.[illegible]	[illegible]5,095
4	783			8.[illegible]	[illegible]8,600
5	784				[illegible]3,934

DALE

DESIGN BRIEF

DESIGNED BY: NFD

CHECKED BY:

PROJECT NO.: SHORT TITLE:

DESIGN SUBJECT: [illegible]

DATE: 8·8·78

PAGE: C-18 OF

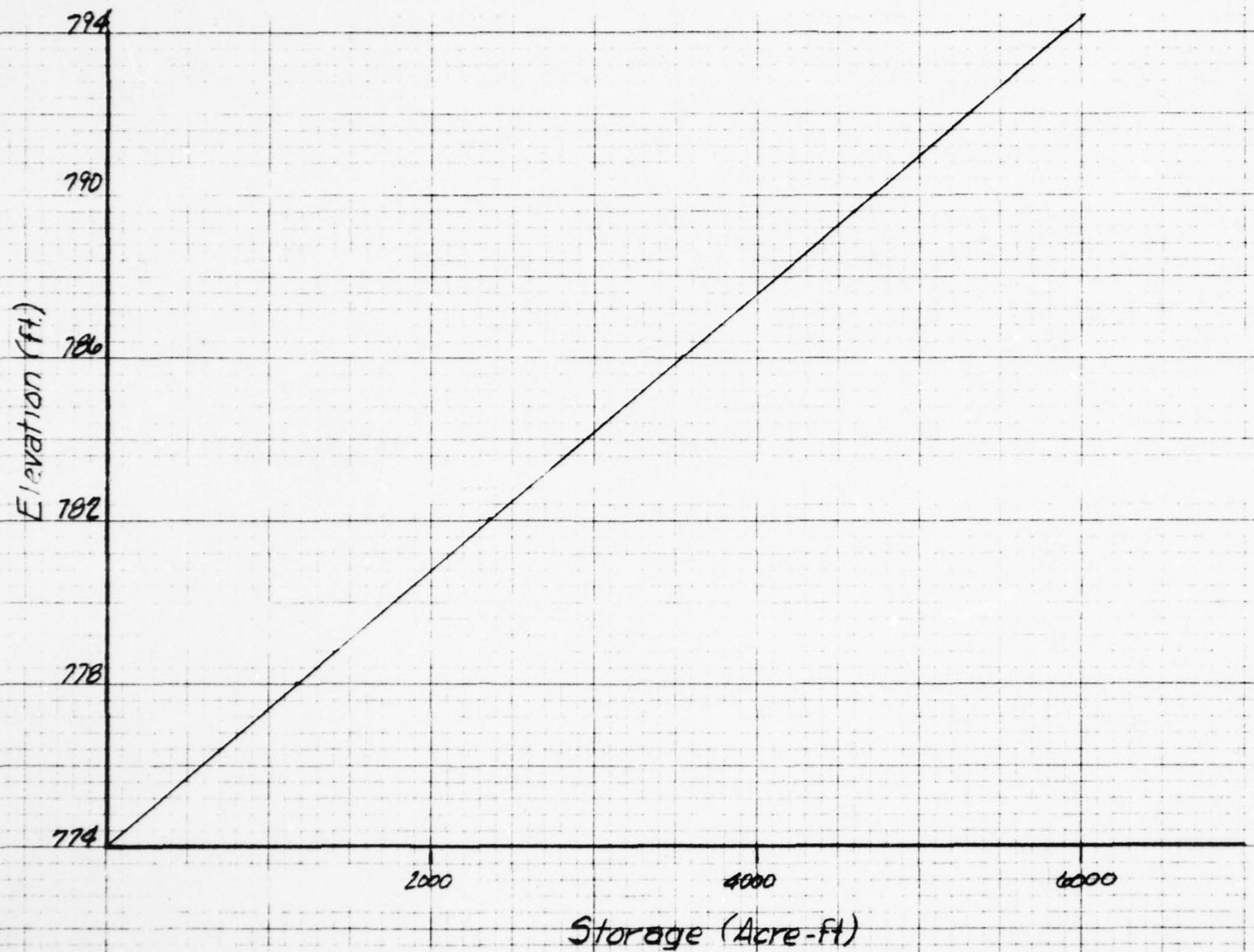
REF. DWGS.

[illegible] – DISCHARGE T[illegible]

DESC.	ELEV.	H	Q SPILLWAY	QDAM	QTOT
	774	—			
	775	1	[illegible]8	—	[illegible]13
	[illegible]76	2	1[illegible]77	—	14[illegible]7
	777	3	2[illegible]64	—	2864
BOT [illegible]	778	4	3[illegible]77	—	3899
	779	[illegible]	4[illegible]	—	4698
TOP [illegible]	780	[illegible]	[illegible]	4324	10277
	781	[illegible]	6[illegible]	13[illegible]51	[illegible]772
	[illegible]	[illegible]	[illegible]3	2[illegible]	[illegible]1893
	[illegible]	[illegible]	[illegible]0	35[illegible]00	[illegible]59[illegible]
	784	[illegible]	7[illegible]0	53[illegible]74	[illegible]1[illegible]

LAKE SEBAGO DAM

STAGE - STORAGE PLOT



```
#OLD NY332PM
#160M      -1              9.9
#SAVE
#LNHFF
00100 A LAKE SEBAGO DAM
0110 A RESERVOIR ROUTING OVER STRUCTURE OF PMF
0120 A SERVICE SPILLWAY ONLY
0130 B      30       1
0140 1       3
0150 K       0
0160 M      -1             9.9
0170 N     144     203     301     406     492     593     782    1080    1451    1822
0180 N    2113    2550    3585    5507    9052   13998   18637   21162   20551   17002
0190 N   11958    7485    4494    2802    1875    1284     844     483     255     126
0200 K       1
0210 Y                               1
0220 1       1                                              -1
0230 2       0     300     600     900    1200    1500    1800    2100    2400    2700
00240 3       0     518    1497    2864    3899    4698   10277   19772   31893   45980
0250 K      99
0260 A
0270 A
0280 A
#SAVE
#OLD NY332SP
#160M      -1              9.9
#SAVE
#LNHFF
00100 A LAKE SEBAGO DAM
0110 A RESERVOIR ROUTING OVER STRUCTURE OF SPF
0120 A SERVICE SPILLWAY ONLY
0130 B      30       1
0140 1       3
0150 K       0
0160 M      -1             9.9
0170 N      72      88     107     123     166     278     470     714     964    1166
0180 N    1402    1875    2730    4336    6627    8833   10108    9939    8368    6041
0190 N    3920    2455    1585    1085     754     507     316     171      94      55
0200 K       1
0210 Y                               1
0220 1       1                                              -1
0230 2       0     300     600     900    1200    1500    1800    2100    2400    2700
00240 3       0     518    1497    2864    3899    4698   10277   19772   31893   45980
0250 K      99
0260 A
0270 A
0280 A
#SAVE
#CAT
```

****
HEC-1 VERSION DATED JAN 1973
PDATED AUG 74
HANGE NO. 01
****

LAKE SEBAGO DAM
RESERVOIR ROUTING OVER STRUCTURE OF SPF
SERVICE SPILLWAY ONLY

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
30	1	0	0	0	0	0	0	0	0

JOPER	NWT
3	0

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

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	9.90	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

73.	88.	107.	123.	166.	278.	470.	714.	964.	1166.
1402.	1875.	2730.	4336.	6627.	8833.	10108.	9939.	8368.	6041.
3920.	2455.	1585.	1085.	754.	507.	316.	171.	94.	55.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10108.	8319.	3117.	2512.	75350.
INCHES		7.82	11.72	11.80	11.80
AC-FT		4127.	6186.	6230.	6230.

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

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE=	0.	300.	600.	900.	1200.	1500.	1800.	2100.	2400.	2700.
OUTFLOW=	0.	518.	1497.	2864.	3899.	4698.	10277.	19772.	31893.	45980.

TIME	EOP STOR	AVG IN	EOP OUT
1	42.	73.	73.
2	43.	81.	74.
3	45.	98.	77.
4	48.	115.	82.
5	52.	145.	90.
6	63.	222.	108.
7	83.	374.	143.
8	118.	592.	203.
9	167.	839.	288.
10	227.	1065.	391.
11	296.	1284.	510.
12	378.	1639.	772.
13	489.	2303.	1136.
14	661.	3533.	1775.
15	920.	5482.	2932.
16	1269.	7730.	4082.
17	1607.	9471.	6680.
18	1763.	10024.	9586.
19	1743.	9154.	9210.
20	1649.	7205.	7467.
21	1533.	4981.	5306.
22	1394.	3188.	4417.
23	1216.	2020.	3941.
24	1027.	1335.	3302.
25	856.	920.	2665.
26	715.	631.	2020.
27	603.	412.	1510.
28	511.	244.	1206.
29	433.	133.	951.
30	369.	75.	743.
SUM			71742.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9586.	7111.	2968.	2391.	71742.
INCHES		6.68	11.16	11.24	11.24
AC-FT		3528.	5890.	5932.	5932.

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

RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	10108.	8319.	3117.	2512.	9.90
ROUTED TO	0	9586.	7111.	2968.	2391.	9.90

****
HEC-1 VERSION DATED JAN 1973
PDATED AUG 74
HANGE NO. 01
****

LAKE SEBAGO DAM
RESERVOIR ROUTING OVER STRUCTURE OF PMF
SERVICE SPILLWAY ONLY

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
30	1	0	0	0	0	0	0	0	0

JOPER	NWT
3	0

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

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	9.90	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

144.	203.	301.	406.	492.	593.	782.	1080.	1451.	1822.
2113.	2550.	3585.	5507.	9052.	13998.	18637.	21162.	20551.	17002.
11958.	7485.	4494.	2802.	1875.	1284.	844.	483.	255.	126.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	21162.	17218.	6317.	5101.	153037.
INCHES		16.18	23.74	23.97	23.97
AC-FT		8542.	12[illegible]36.	12654.	12654.

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

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE=	0.	300.	600.	900.	1200.	1500.	1800.	2100.	2400.	2700.
OUTFLOW=	0.	518.	1497.	2864.	3879.	4698.	10277.	19772.	31893.	45980.

TIME	EOP STOR	AVG IN	EOP OUT
1	83.	144.	144.
2	86.	174.	148.
3	94.	252.	162.
4	108.	354.	187.
5	129.	449.	222.
6	153.	543.	265.
7	186.	688.	321.
8	233.	931.	402.
9	300.	1266.	517.
10	381.	1637.	783.
11	467.	1968.	1064.
12	560.	2332.	1365.
13	680.	3068.	1861.
14	867.	4546.	2712.
15	1196.	7280.	3884.
16	1666.	11525.	7785.
17	2003.	16318.	16698.
18	2115.	19900.	20384.
19	2130.	20857.	20975.
20	2056.	18777.	18370.
21	1916.	14480.	13961.
22	1754.	9722.	9417.
23	1594.	5990.	6438.
24	1441.	3648.	4542.
25	1277.	2339.	4105.
26	1092.	1580.	3528.
27	914.	1064.	2913.
28	757.	664.	2213.
29	629.	369.	1629.
30	526.	191.	1254.
SUM			148251.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	20975.	16634.	6130.	4942.	148251.
INCHES		15.63	23.04	23.22	23.22
AC-FT		8253.	12165.	12258.	12258.

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

RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	21162.	17218.	6317.	5101.	9.90
ROUTED TO	0	20975.	16634.	6130.	4942.	9.90

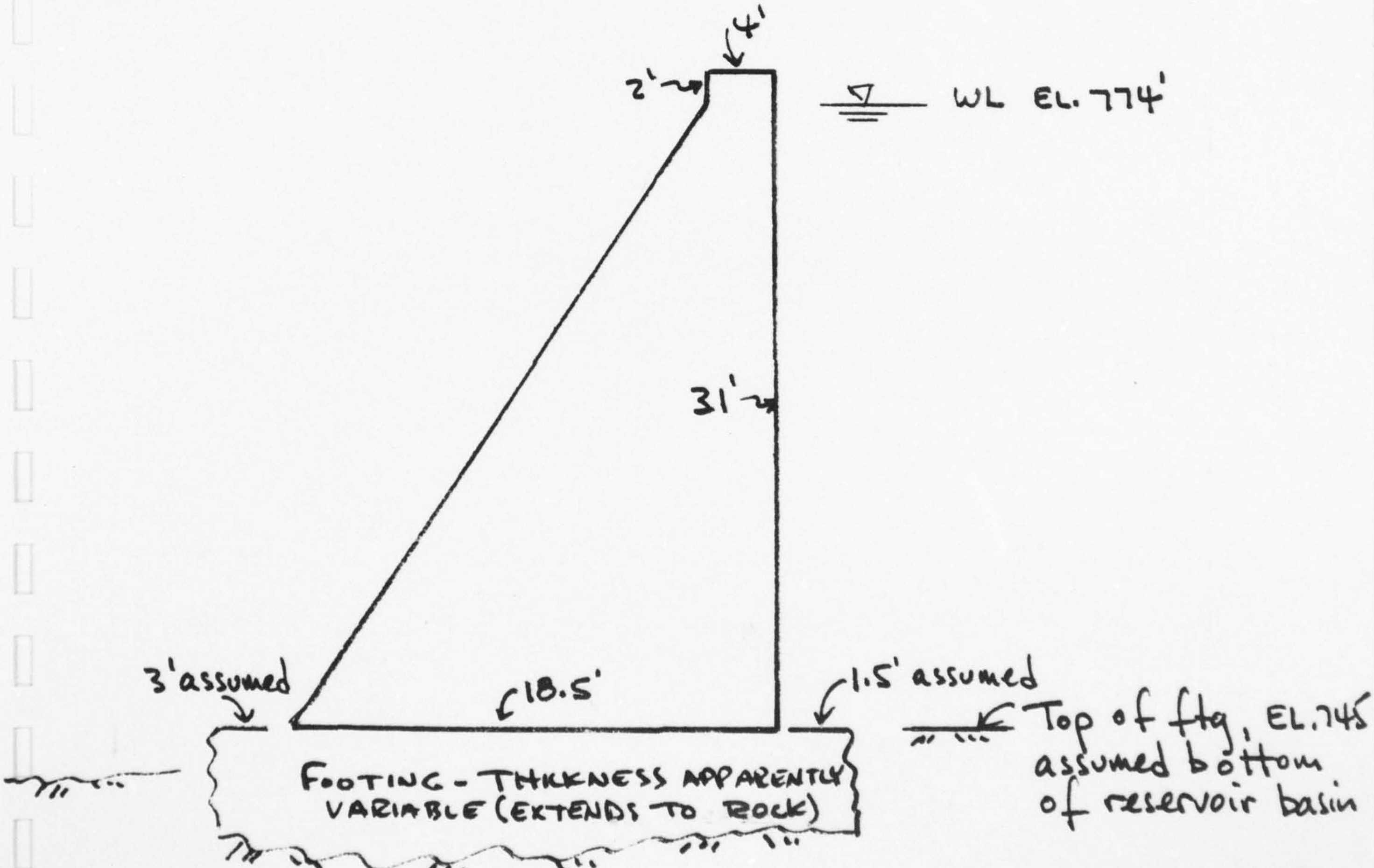
APPENDIX D

STABILITY ANALYSIS

LAKE SEBAGO – BEAR MTN STATE PARK

MASONRY/CONCRETE DAM

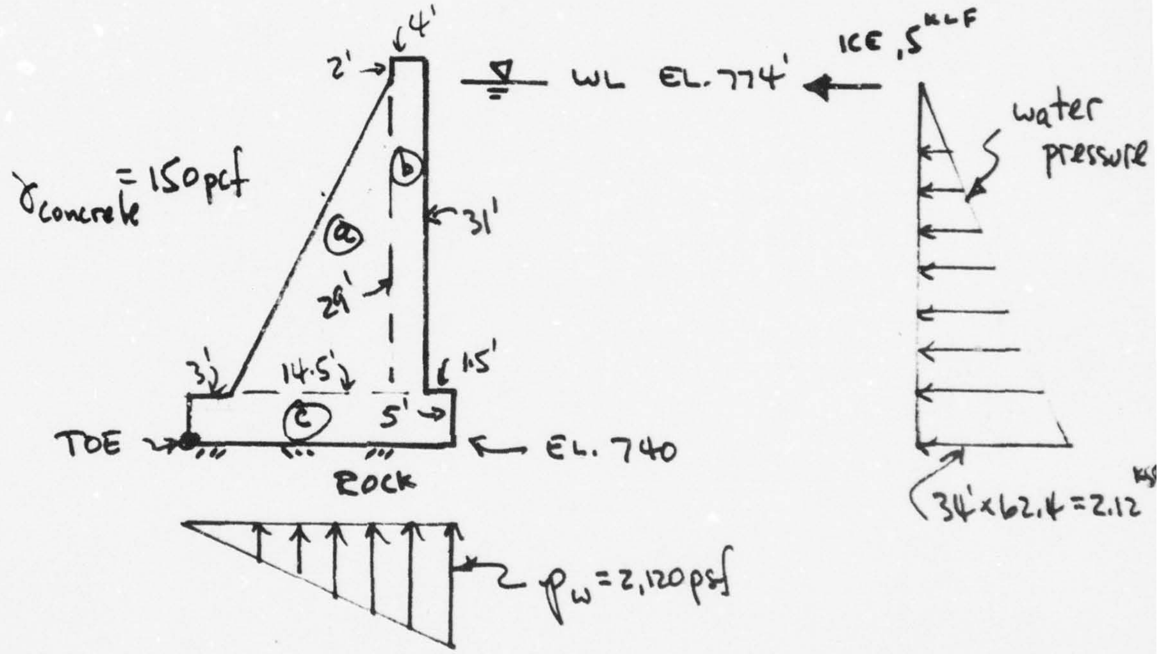
Section Taken From Drawings entitled "For the Commissioners of Palisades Interstate Park, Gravity Section – Dam #10 and Trestle, dated March 1924.



For Stability Evaluation, neglect attached road trestle structure, possible buttress effects, etc.

STABILITY – OVERTURNING & SLIDING

I. Assume following conditions
- WL at top of dam (plan elev. 774)
- dam and footing integral unit (use section shown previous page)
- downstream WL at base of footing



A. OVERTURNING

Forces contributing to overturning moment about toe = horiz. water pressure + uplift water pressure + ice

- horiz. water pressure $= \left(\frac{1}{2} \times 34 \times 62.4 \times 34 \times \frac{34}{3}\right) = 408.8^{1K}$
- uplift pressure $= \left(\frac{1}{2} \times 23 \times 2.12^{KLF} \times \frac{2}{3} \times 23'\right) = 373.8^{1K}$
- ice $= 5^{KLF} \times 34' = 170^{1K}$

Total = 952^{1K}

Forces contributing to overturning resistance = moment due to mass of dam

$= \Big[\left(\frac{1}{2} \times 29 \times 14.5 \times .150\right)\left(3' + \frac{2}{3} \times 14.5'\right) + \left(31 \times 4 \times .150 \times 19.5\right) + \ldots$ (a), (b)

$\ldots + \left(23 \times 5 \times \frac{23}{2} \times .150\right) \Big] = 960.6^{1K}$ (c)

FS against overturning $= \frac{960.6}{952} = 1.01 \pm$ (with uplift)

FS against overturning $= \frac{960.6}{\ldots} = 1.7 \pm$ (no uplift)

(contd)

AD-A067 245 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/2
NATIONAL DAM SAFETY PROGRAM. LAKE SEBAGO DAM (INVENTORY NO. 772--ETC(U)
SEP 78 J B STETSON DACW51-78-C-0035

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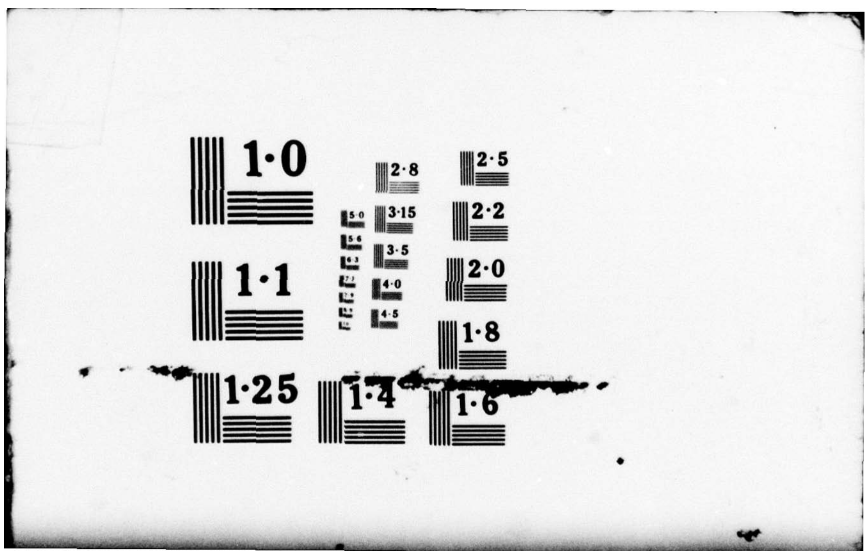
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5·0
3·15
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5·6
3·5
1·1
2·0
4·0
4·5
1·8
1·25
1·4
1·6

B. SLIDING

Forces causing sliding ~ water pressure behind dam

- water pressure = $(\frac{1}{2} \times 34' \times 62.4\,pcf \times 34') = 36.1^K$

- ICE pressure = 5^K

Forces resisting sliding ~ friction along base of dam footing + passive soil pressure behind footing

- friction along base of footing = f[wt. dam − uplift]

where wt. dam = $(\frac{1}{2} \times 29' \times 14.5' \times .150)$ (a) + $(4 \times 31 \times .150)$ (b) + ...
... + $(23 \times 5 \times .150)$ (c)] = 67.5^K

where uplift = $(\frac{1}{2} \times 2.12 \times 23) = 24.4$

where f = 0.8 between concrete and rock

∴ friction = $0.8[67.5 - 24.4] = 34.5^K$

FS against sliding = $\frac{34.5}{36.1}$ = 0.82 ± (with uplift)

FS against sliding = $\frac{54}{36.1}$ = 1.31 ± (no uplift)

II. Stability for dam section, along top of footing

A. OVERTURNING

Forces causing overturning moment about toe of dam (not ftg) ~ horiz. water pressure behind dam only (to EL. 745) + uplift water pressure + ice

- horiz. water press. $= \left(\frac{1}{2} \times 29 \times 62.4 \times 29 \times \frac{29}{3}\right) = 253.6^{k}$
- ice $= 5^{k} \times 29' = 145^{1k}$
- uplift pressures along joint at base of dam, top of ftg. $= (29 \times 62.4)(18.5 \times \frac{1}{2})(\frac{2}{3} \times 18.5) = 206.4^{1k}$

Forces contributing to overturning resistance ~ moment due to mass of dam about toe

$$= \left[\left(\frac{1}{2} \times 29 \times 14.5 \times .150 \times \frac{2}{3} \times 14.5\right)_{ⓐ} + \left(31 \times 4 \times .150 \times 16.5\right)_{ⓑ}\right] = 611.8^{1k}$$

FS against overturning $= \dfrac{611.8}{253.6 + 145 + 206.4} = 1.01 \pm$ (with uplift)

FS against overturning $= \dfrac{611.8}{253.6 + 145} = 1.5 \pm$ (no uplift)

B. SLIDING

Force causing sliding = water pressure + ice $= 62.4 \times 29 \times \frac{29}{2} = 26.2^{k}$
$+ 5^{k}$
$= 31.7^{k}$

Force resisting sliding = friction = $f \times$ wt. dam

$$= (.65)\left[\left(\frac{1}{2} \times 29 \times 14.5 \times .150\right)_{ⓐ} + \left(4 \times 31 \times .15\right)_{ⓑ}\right] = 32.6^{k}$$

or concrete shear along joint $= \left[.25^{ksi} \times 144 \frac{in^2}{ft^2} \times 18.5' \times 1'\right] = 666^{k}$

or bond between concrete at joint $= \left[.020^{ksi} \times 144 \times 18.5 \times 1\right] = 54^{k}$

use 32.6^{k}

FS against sliding $= \dfrac{32.6}{31.7} = 1.03 \pm$ (with no uplift considered)

APPENDIX E

REFERENCES

APPENDIX E

REFERENCES

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report Lake Sebago Dam Lower Hudson River Basin, Rockland County, N.Y. Inventory No. N.Y. 772		5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) John B. Stetson		8. CONTRACT OR GRANT NUMBER(s) DACW-51-78-C-0035
9. PERFORMING ORGANIZATION NAME AND ADDRESS Dale Engineering Company, Inc. Bankers Trust Building Utica, New York 13501		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS New York State Department of Environmental Conservation/ 50 Wolf Road Albany, New York 12233		12. REPORT DATE 19 September 1978 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Department of the Army 26 Federal Plaza/ New York District, CofE New York, New York 10007		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Rockland County
Stony Brook Creek
Lake Sebago Dam

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.

Lake Sebago Dam was judged to be unsafe non-emergency due to a seriously inadequate spillway.