AD-A063 993 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/2
NATIONAL DAM SAFETY PROGRAM. LARCHMONT WATER COMPANY DAM NUMBER--ETC(U)
JUL 78 J B STETSON DACW51-78-C-0035

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1 OF 1
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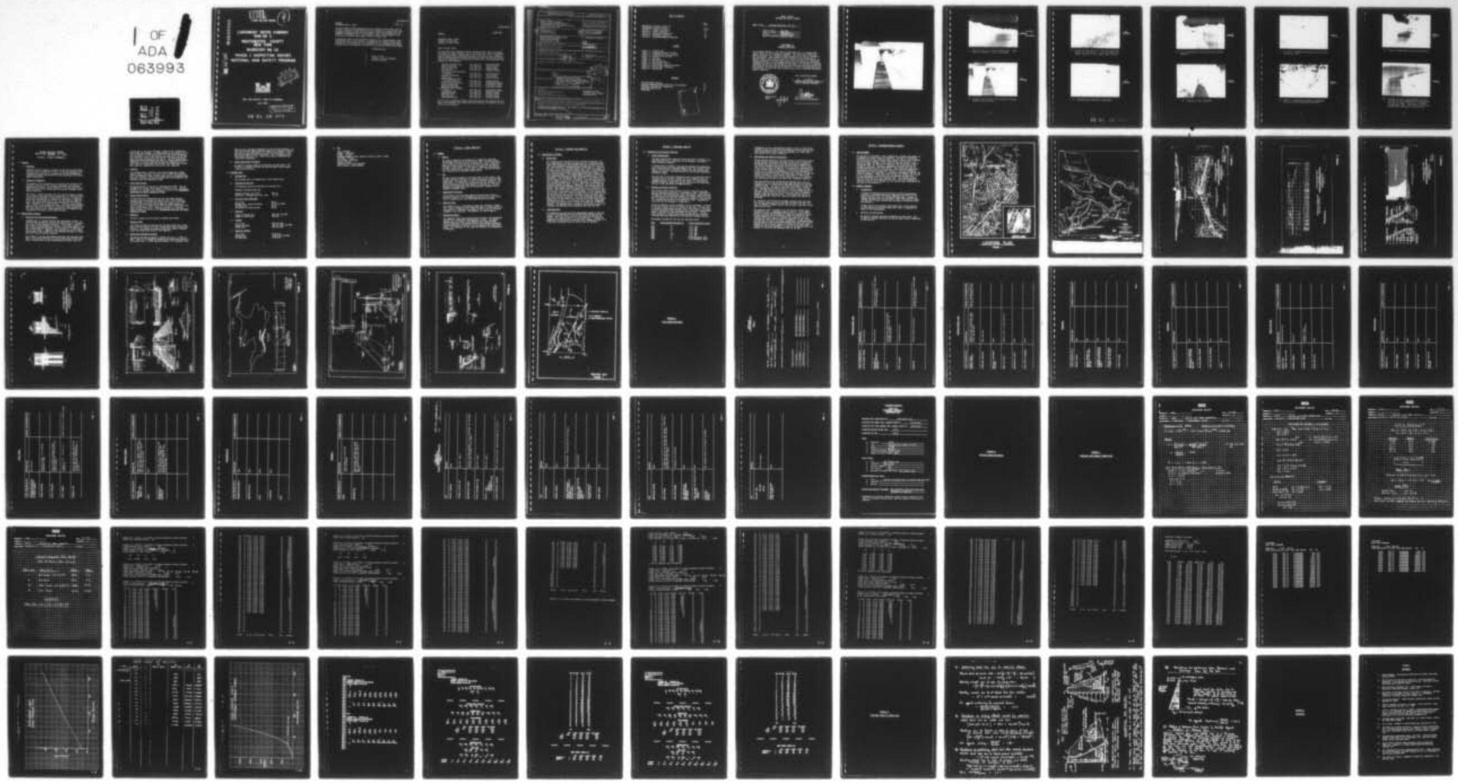

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LONG ISLAND BASIN

LARCHMONT WATER COMPANY DAM No 2

WESTCHESTER COUNTY NEW YORK

INVENTORY No 112

PHASE I INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1978

CASPE/dms/9111

NANEN-F
Honorable Hugh L. Carey

2 OCT 1978

It was arranged to have distribution of the reports to the owners made by NYS DEC. One copy of each report has been furnished Mr. George Koch, your designated contact at DEC for this purpose. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, after 31 August 1978.

An important facet of the Dam Safety Program is the implementation of recommendations made in the reports. We appreciate the efforts of the State in providing the impetus for the fulfillment of the recommendations and of keeping the New York District informed of the proposed actions to be taken.

Sincerely yours,

CLARK H. BENN
Colonel, Corps of Engineers
District Engineer

CASPE/dms/9111

NANEN-F

8 OCT 1978

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

Dear Governor Carey:

In accordance with President Carter's directive under Public Law 92-367 (National Dam Safety Program), the New York District, Corps of Engineers, has initiated Phase I inspections of dams in New York State. Approved final inspection reports of the following dams have been sent to the New York State Department of Environmental Conservation, the designated State contact for this program:

Woodland Reservoir Dam	I.D. 412 N.Y.	Onondaga County
Seneca Falls Dam	I.D. 708 N.Y.	Seneca County
Colliersville Dam	I.D. 685 N.Y.	Otsego County
Caneadea Dam	I.D. 464 N.Y.	Allegany County
New Central Park Receiving Reservoir	I.D. 183 N.Y.	New York County
Ridgewood Reservoir	I.D. 160 N.Y.	Kings County
Attica Dam	I.D. 445 N.Y.	Wyoming County
Newtown-Hoffman Creek Watershed Site 3A	I.D. 617 N.Y.	Chemung County
Grassy Sprain Reservoir	I.D. 188 N.Y.	Westchester County
Hillview Reservoir	I.D. 187 N.Y.	Westchester County
Brookside Reservoir	I.D. 168 N.Y.	Montgomery County
Larchmont Water Company Dam No. 2	I.D. 112 N.Y.	Westchester County
Cannonsville Dam	I.D. 542 N.Y.	Delaware County
Downsville Dam	I.D. 342 N.Y.	Delaware County
Cuba Lake Dam	I.D. 455 N.Y.	Allegany County
Conklingville Dam	I.D. 146 N.Y.	Saratoga County

Of the above transmitted reports, Cuba Lake Dam has been assessed as "unsafe, non-emergency" and as such you were notified by telegram on 20 July 1978 of this condition.

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle)
Phase I Inspection Report
Larchmont Water Company Dam No. 2
Long Island Basin, Westchester Co. N.Y.
Inventory No. N.Y. 112

5. TYPE OF REPORT & PERIOD COVERED
Phase I Inspection Report
National Dam Safety Program

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)
(10) John B. Stetson

8. CONTRACT OR GRANT NUMBER(s)
(15) DACW51-78-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
(11) 28 July 1978

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New York, New York 10007

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15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)
Approved for public release; Distribution unlimited.

DDC
JAN 31 1979
C

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

(6) National Dam Safety Program.
Larchmont Water Company Dam Number 2,
Long Island Basin, Westchester County,
New York, Inventory Number 112.
Phase I Inspection 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
Westchester County
Larchmont Water Company
Sheldrake River

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.

Larchmont Water Company Dam No. 2 was judged to be unsafe-non-emergency due to a seriously inadequate spillway.

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FIGURES

APPENDIX

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Larchmont Reservoir - NY 112

State Located New York
County Located Westchester
Stream Sheldrake River
Date of Inspection June 23, 1978

ASSESSMENT OF GENERAL CONDITIONS

The Larchmont Dam No. 2, also known as Sheldrake Lake, is a backup water supply source for the Village of Larchmont. The stone faced rubble and masonry structure is in excellent condition and the facility is reasonably well maintained. Some evidence of minor vandalism has occurred and is apparent where a small area of stone fill placed in back of the masonry dam should be replaced. The rock ogee spillway has been found to be seriously inadequate to pass the 1/2 Probable Maximum Flood. The Village of Larchmont indicated that prior to the dam being overtopped flows would be diverted into Pine Brook at the north end of the reservoir. Further investigations should be performed to refine the flood routing analysis and to consider alternative remedial measures.

Dale Engineering Company

John B. Stetson, President

Approved By:
Date: 28 July 78

Col. Clark H. Benn
New York District Engineer

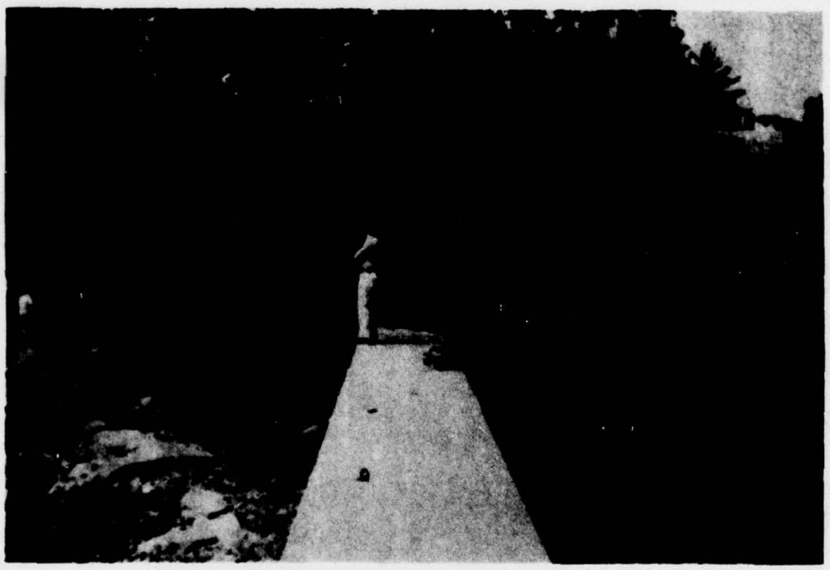
1. View across top of dam looking east. Gate house at opposite side of spillway.

2. Closeup of spillway with concrete cap and masonry ogee section.

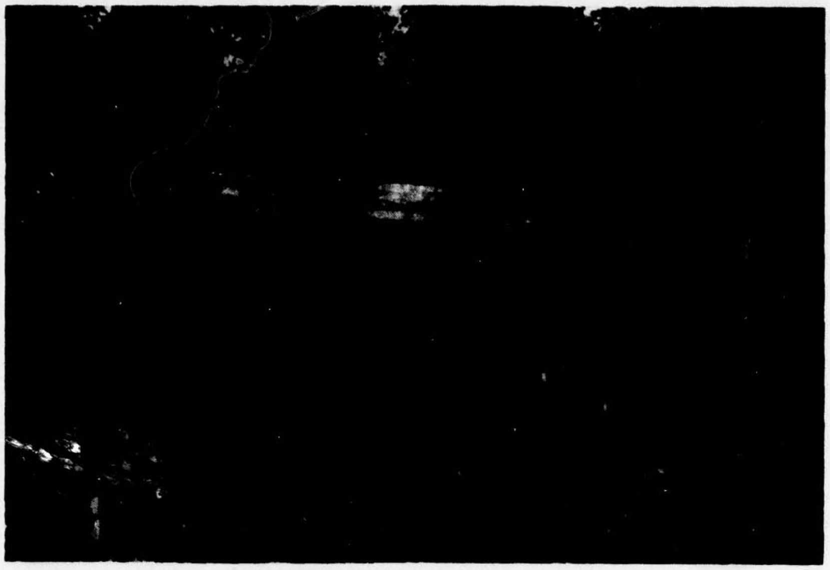
3. Detail of ogee section. Notice excellent condition of masonry. Stilling basin area below founded in rock shows some erosion.

4. View Back across spillway, looking west.

5. View looking west from location near east abutment.

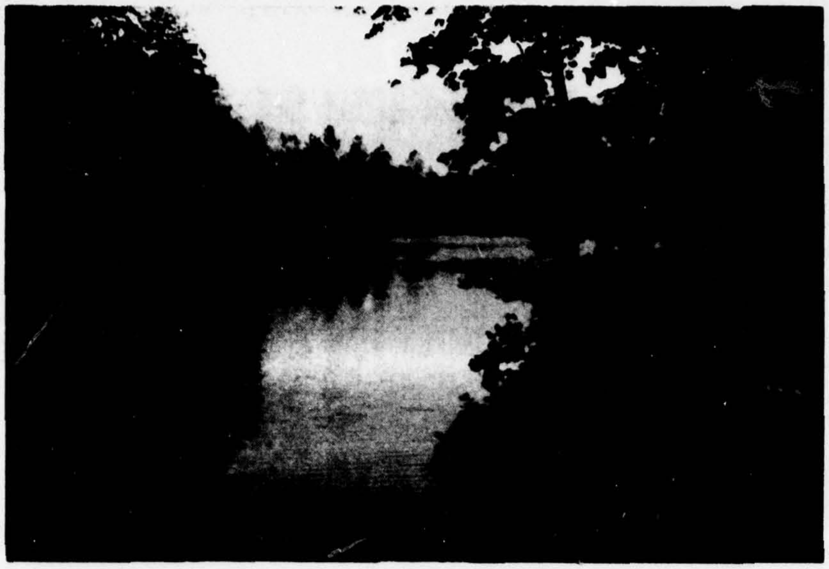


6. Closeup of east abutment.



7. Closeup of landmark indicating site of conservation area.

8. Detail of downstream masonry embankment. Typical of all-over good condition.



9. View of downstream area below spillway.

10. Closeup of top of dam showing concrete section on left modification and masonry section on right. Section in between filled with rock. This section has been vandalized, leaving a 2.0-foot hole.

NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - LARCHMONT ID# - NY112

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 Larchmont (Sheldrake Lake) Dam and appurtenant structures, 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

Larchmont Dam is a masonry dam that was constructed in 1924. In 1934 and 1935 the dam was raised by the construction of a concrete cap on the existing masonry structure. At this time, a rockfill was placed on the downstream of the dam. The present length of the dam is approximatley 1,000 feet. The top width is 10 feet wide; 6 feet of this width is composed of the reinforcing rock fill while the upstream 4 feet is made up of the concrete cap which is placed above the original masonry structure.

The spillway is located approximately 650 feet from the south abutment. The spillway consists of a broad crested weir 50 feet wide which discharges down an ogee shaped masonry spillway into a receiving pool at the toe of the dam. Slopes in the spillway endwalls allow the placement of flashboards which are capable of raising the elevation of the outlet weir 1-1/2 feet above the masonry weir elevation. Drain lines from the dam consists of two 20 inch cast iron pipe controlled by gate valves. The receiving channel downstream from the emergency spillway is a masonry channel approximately 80 to 100 feet long which discharges immediately into a small pond just downstream from the dam. This small pond is presently used as a conservation area by the local community.

b. Location

The Larchmont Dam is located in the Town of Mamaroneck in Westchester County, New York. The dam is built across the Sheldrake River and impounds a body of water known locally as Sheldrake Lake. The dam is situated 2.75 miles upstream from the confluence of the Sheldrake River with Mamaroneck Creek.

c. Size Classification

The maximum height of the dam is approximately 30 feet. The impoundment has a normal pool capacity of 424 acre feet. Therefore, the dam is in the small size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

The Sheldrake River downstream from the impoundment meanders through a heavily developed residential area. Flood discharges from Sheldrake Lake could cause substantial damage in this area. The small lake area below the dam does not appear adequate by visual inspection to absorb the 1/2 PMF dam break flood wave in the event the dam should fail. 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 Village of Larchmont Water Works.

f. Purpose of Dam

The original purpose for the dam was for water supply use. Presently, the dam provides off line, standby public water supply capabilities. Its present use appears to be mainly that of a recreational and conservation area for the community.

g. Design and Construction History

The dam was designed by George B. Burbank and Louis L. Tribus in 1897. There is no information regarding the construction period of the original dam. In 1924, Hazen and Wipple, Civil Engineers from

New York City, designed flashboards for the existing structure. In 1934, the original masonry dam was capped with a concrete structure and rockfill was placed behind the existing stone masonry. This work was designed by Fuller and Everett, Civil Engineers, 22 East 40th Street, New York City. There are no details regarding the construction procedures.

h. Normal Operational Procedures

No specific relevant operating information has been given. The Village of Larchmont maintains the dam and makes routine inspections of the facility.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of Larchmont dam is 2.66 square miles.

b. Discharge at Dam Site

No discharge records are available for the dam site.

Computed discharge capacities:

Ungated spillway, top of dam	987 cfs
Gated 24 in. drawdown pipe, max. flow	56 cfs

c. Elevation (feet above MSL)

Top of Dam	136.35
Maximum pool - design discharge	137.50 (1/2 PMF)
Spillway Crest	133.35
Stream bed at centerline dam	105.00

d. Reservoir

Length of maximum pool	600 feet (1/2 PMF)
Length of normal pool	600 feet

e. Storage

Top of dam	500 acre feet
Design surcharge	550 acre feet (1/2 PMF)
Normal pool	424 acre feet

f. Reservoir Surface

Top of dam	25.00 acre
Maximum pool	29.00 acre (1/2 PMF)
Spillway pool	29.00 acre

g. **Dam**

Type - Masonry.
Length - 1000 feet.
Height - 30 feet.
Freeboard between normal reservoir and top of dam - 3 feet.
Top width - 10 feet.
Side Slopes - See plans.
Zoning - Masonry.
Impervious core - None reported.
Grout curtain - None reported.

SECTION 2 - VISUAL INSPECTION

2.1 SUMMARY

a. General

The visual inspection of Larchmont No. 2 Reservoir also known as Sheldrake Lake took place on June 23, 1978. The dam was modified in 1936 to raise the crest an additional 5 feet. Portions of both the original plans and plans for the raising of the dam are included in this report. At the time of inspection, the resevoir was not in operation as a water supply source. The dam and reservoir functions as an emergency supply source.

b. Dam

The dam visually conforms to the plans shown in this report. The original portion of the dam is a masonry structure of cut and hand layed stone. The stone work is still in excellent condition. The raised portion of the dam was constructed over the original structure on the upstream face and contains a concrete cap. The toe abutments and downstream slope of the dam were inspected with no seepage or movement noted.

c. Appurtenant Structures

The spillway is an ogee stone masonry structure and is also in excellent condition. The drawdown pipe was partially open at the time of inspection and was discharging below the spillway.

d. Reservoir Area

The reservoir area is surrounded by woods and residential properties. Rock outcropping exists along the edge of a large portion of the reservoir. There was no evidence of rock slides or siltation problems in the reservoir. The reservoir is free of debris.

e. Downstream Channel

The immediate downstream discharge flows through a rock conveyance section into a large pond (approximately 5 acres). No channel obstructions were noted in the immediate area below the dam. Further downstream, the Sheldrake River flows through residential areas and through an industrial area discharging into Long Island Sound. The structures in this area are reported to be susceptable to flooding.

SECTION 3 - HYDROLOGY AND HYDRAULICS

3.1 EVALUATION OF FEATURES

a. Design Data

No information was obtained relevant to design of the dam. For this investigation, the dam was evaluated for a Probable Maximum Flood (PMF) hydrograph using Probable Maximum Precipitation rainfall data obtained in Hydrometeorlogical Report No. 51. Both the PMF and 1/2 PMF were evaluated whereas 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 Center's Computer Program UHCOMP. The program UHCOMP was used to develop a unit hydrograph computed by Snyder Method parameters and a flood hydrograph. These parameters were developed in a previous investigation done for the Corps of Engineers. The high resulting runoff is probably accurate due to the high degree of urbanization of the upstream drainage area. The U.S. Army Corps of Engineers Hydrologic Engineering Center's Program HEC-1 was used to route the flood through the dam emergency spillway using the Modified Puls Method. The drawdown pipe was assumed not to be in operation during the flood crest since it requires manual operation and is capable of only a negligible amount of discharge. It was assumed that the spillway crest was on the threshold of spilling at the start of the flood routing and there was no flood storage available below the top of spillway elevation. Peak flow discharges were approximately 6325 cfs and 3450 cfs for the PMF and 1/2 PMF events routed through the spillway. The relatively small reservoir impoundment area above the dam face had no effect on the PMF and 1/2 PMF discharges. The computed stage - discharge relationship on page C-19 indicates the dam would be overtopped by more than one foot.

b. Experience Data

No information was obtained from knowledgeable people at the site relevant to performance of the spillway during extreme rainfall events - only that in the spring of each year the spillway discharges, but routinely that it is not significant. It should be noted that the dam cannot be observed from a roadway and that it is relatively inaccessible and not visible from off property.

SECTION 4 - STRUCTURAL STABILITY

4.1 Evaluation of Structural Stability

a. Visual Observations

The dam's masonry wall reservoir facing and rockfill backing is in good condition with no indication of misalignment, settlement or other structural movement.

A limited depth of rubble in the dam core between the upstream masonry facing and rock faced downstream slope in the vicinity adjacent to the spillway's southerly headwall has been removed, presumably by vandals. The condition has not yet had any significant structural effect.

The rock face of the dam's downstream slope is covered with low foliage for much of the dam's length, but no evidence of rock displacement because of the condition was noted. No indication of seepage through or beneath the dam was observed on the downstream face or in the area below the downstream toe.

b. Geology and Seismic Stability

The original report concerning the reservoir indicates this dam rests on granite and the area is surrounded by rock. According to the New York State Geologic Map (1971) the eastern, lower reservoir is underlain by Harrison Gneiss whereas the higher reservoir to the west is underlain by rocks of the Hartland Formation. The Hartland is a fine-grained schist with an amphibolite unit. Serpentinite intrusions are not uncommon in these units.

Foliation generally strikes northwest and dips northwest. As noted on the map, several faults are present in the area. A linear feature may be located along the west side of the reservoir, according to the Preliminary Brittle Structures Map of New York, Lower Hudson sheet of the New York State Geological Survey (1977). If this linear feature is a shear zone, extensive weathering is possible. The above mentioned serpentinite also weathers extremely rapidly.

Earthquakes recorded for the area are tabulated below:

Date	Intensity-Modified Mercalli	Location Relative to Dam
1872	IV	3 mi. SSW
1874	V	3 mi. SSW
1916	IV	4 mi. NNW
1926	V	7 mi. SW
1933	III	4 mi. NNW
1938	III	5 mi. NE
1947	V	10 NE Greenwich, Conn.
1950	IV	10 NE Greenwich, Conn.

Although this area is designated as being in Zone 1 of the Seismic Probability Map, the New York State Geological Survey believes this area of Westchester County should be upgraded to at least Zone 2 with possibility of Zone 3 potential.

c. <u>Data Review and Stability Evaluation</u>

Design drawings relating to the construction of the original masonry dam provide limited data pertinent to the as-built structure. Design drawings applicable to the dam modification undertaken in the 1930's (increasing the height and installing a rockfill backing) provide limited information on the structure's foundation and do not include stability analysis. A stability analysis performed as part of this study (see Appendix D), utilizing, simplifying, conservative assumptions when information was lacking, indicate the present structure is stable against the effects of static overturning and sliding forces for the conditions of a full reservoir, flow overtopping the dam by one foot, and a drawndown reservoir.

Only one section of the raised dam was analyzed due to lack of information on the drawings which were made available to the dam inspection team. It could not be determined whether this was the critical section. The section was taken from Figure 7, Section C-C. The downstream elevation shown in Figure 3 generally indicates that the location of Section C-C is in the higher section of the dam. Further work on the structure could seek to determine whether higher dam sections exist. In the event they can be located and measured, additional stability computations should be performed.

Mr. Crawley of the Village of Larchmont indicated that the reservoir was not drawn down during the 1936 raising of the dam. He said in 1949-50 a drought occurred and the water level was 14 feet below the spillway.

The reservoir site is located in an area having a Seismic Zone 1 designation (with a suggested change to Zone 2). This seismic zoning is conventionally assumed to present no earthquake hazard. The dam structure has performed well under the effects of past loading conditions, and it is expected that stability will be retained for future loadings that are comparable to past effects providing the structure is properly maintained. Maintenance should include repair of the limited deteriorated/vandalized core section adjacent to the spillway, removal of foliage on the dam's downstream rock face, and placement of riprap on the exposed shore area adjacent to the north end (abutment area) of the dam.

SECTION 5 - ASSESSMENT/REMEDIAL MEASURES

5.1 DAM ASSESSMENT

On the basis of the Phase I visual examination, Larchmont Dam appears to be adequate for normal reservoir operation. The dam is in excellent condition and the area around the dam is heavily used by local residents for recreational purposes. Minor vandalism has occurred and is evidenced by removal of some of the stone fill that was placed in back of the masonry dam. The facility is reasonably well maintained by the Village of Larchmont. Hydrology computations indicate that the 1/2 Probable Maximum Flood will top the dam. These hydrology computations were based on relatively high runoff factors in the unit hydrograph parameters which were developed in a previous investigation done for the Corps of Engineers. These high runoff factors are probably accurate due to the high degree of urbanization of the upstream drainage area. It has been determined that the discharges from a 1/2 Probable Maximum Flood will top the dam by more than one foot. Stability computations show the structure to be adequate (at one location where information was available on the drawings.).

5.2 REMEDIAL MEASURES

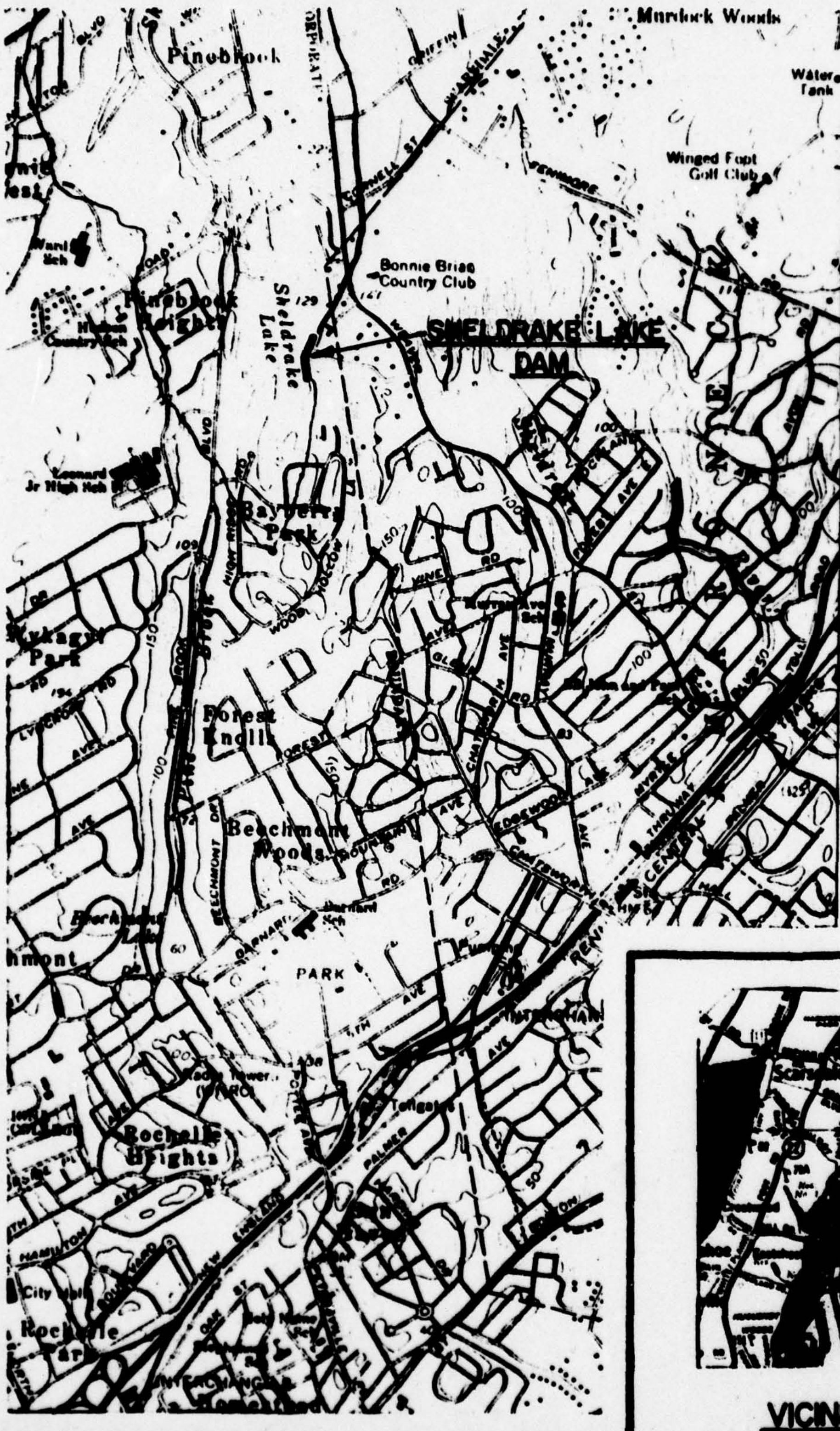
a. Alternatives

A further investigation should be done to refine the hydrologic computation performed herein and to determine the effect of topping of the dam by the 1/2 Probable Maximum Flood. A number of remedial measures could be considered - among them would be lowering down the spillway, widening the spillway, or diversion around the reservoir.

Further work on the structure could locate the critical sections for dam stability and perform additional stability computations based on field measurements.

b. Operation and Maintenance

No specific relevant operating information has been given. The Village of Larchmont maintains the dam and makes routine inspections of the facility.



VICINITY MAP

LOCATION PLAN

FIGURE 1

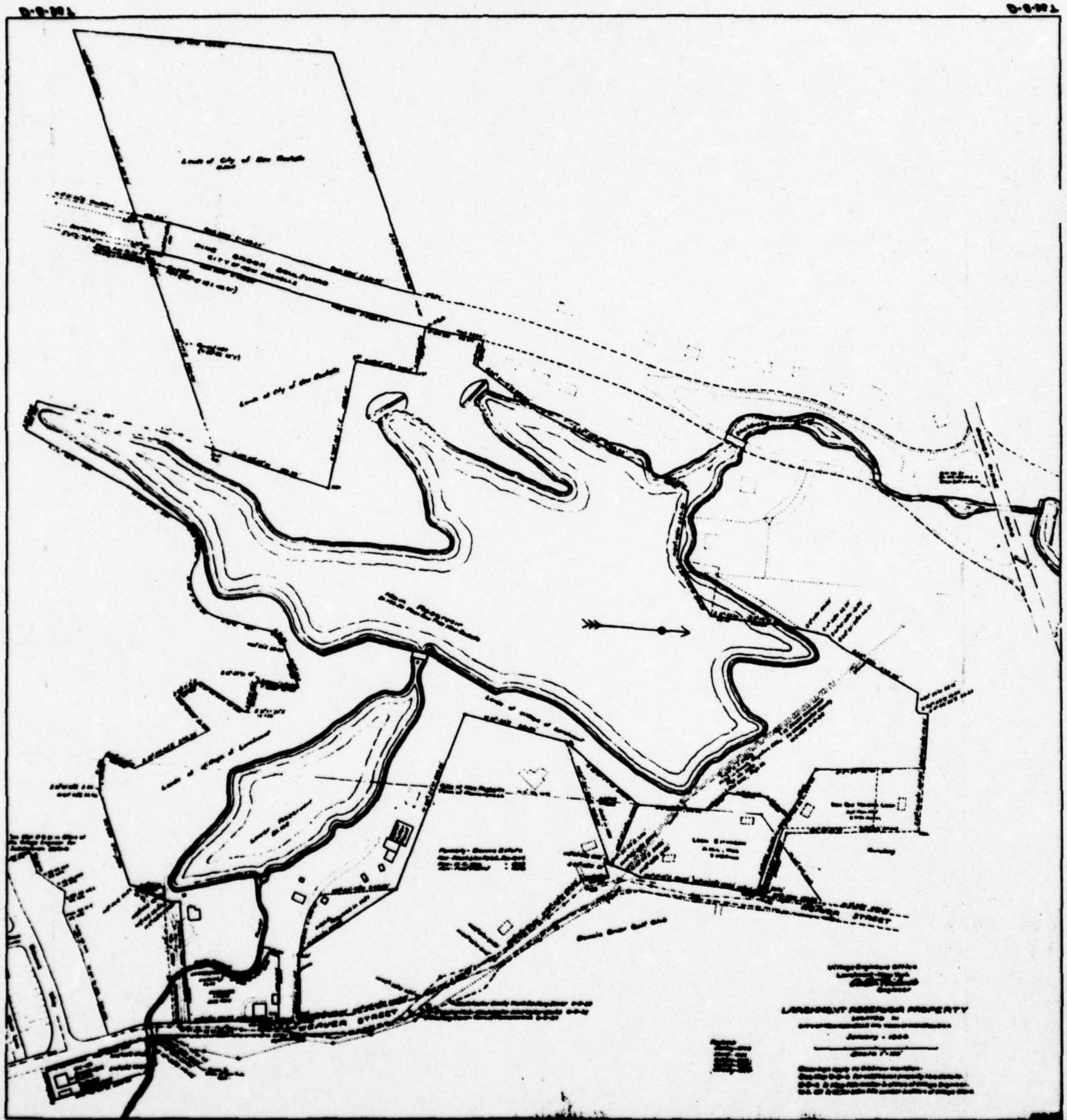


FIGURE 2

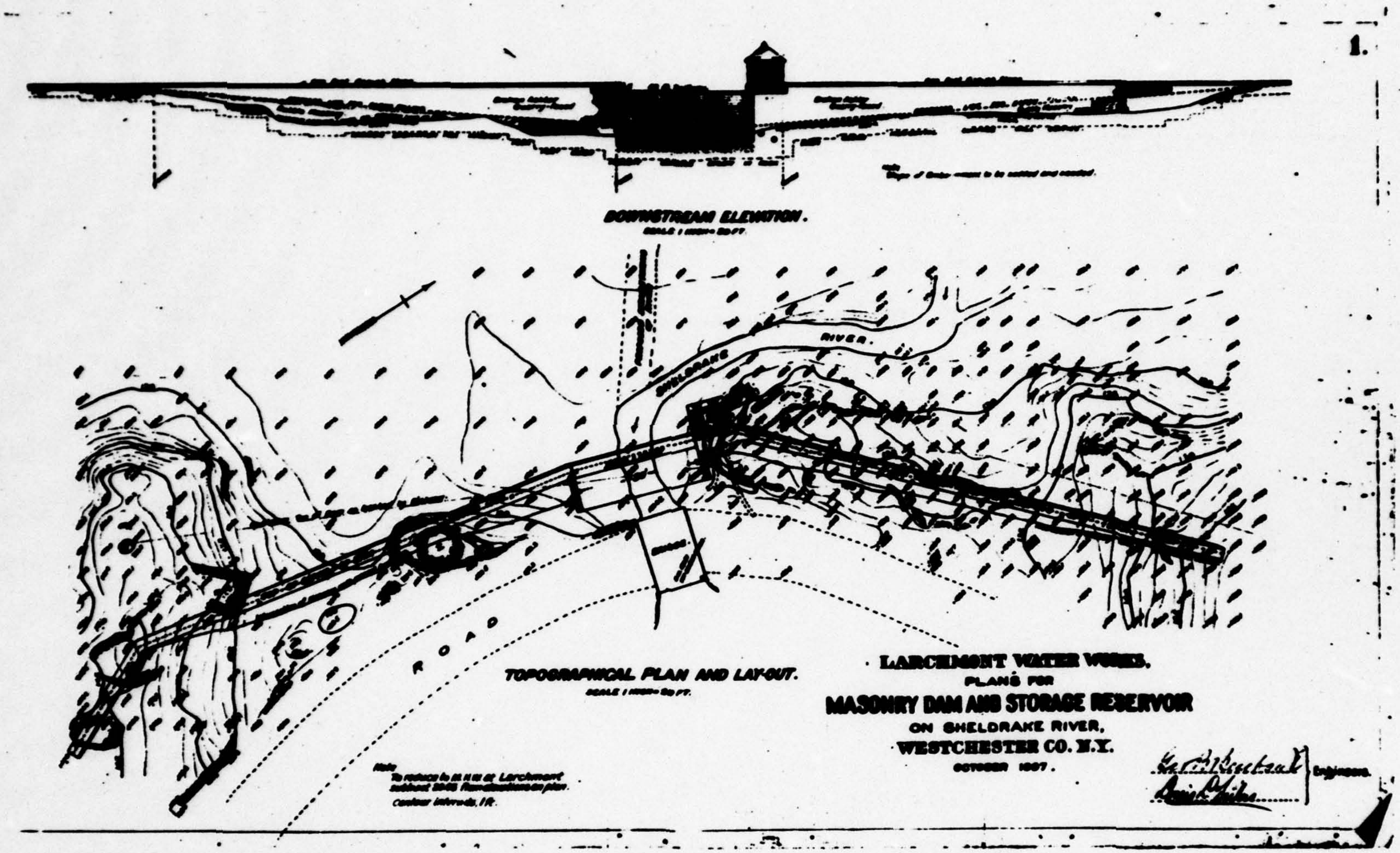
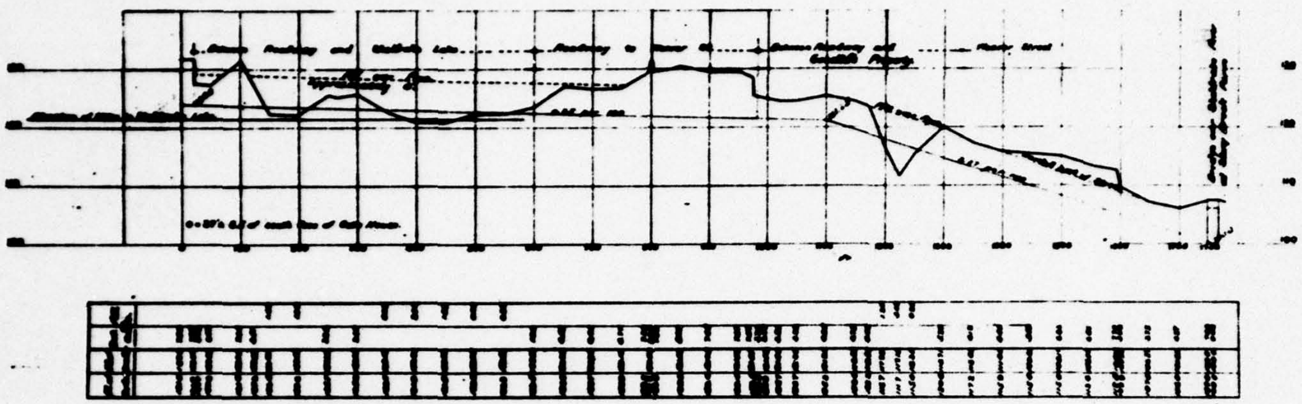

1.
DOWNSTREAM ELEVATION.
SHELDRAKE
RIVER.
ROAD
TOPOGRAPHICAL PLAN AND LAY-OUT.
LARCHMONT WATER WORKS.
PLANS FOR
MASONRY DAM AND STORAGE RESERVOIR
ON SHELDRAKE RIVER,
WESTCHESTER CO. N.Y.
OCTOBER 1907.
Engineers.

FIGURE 3



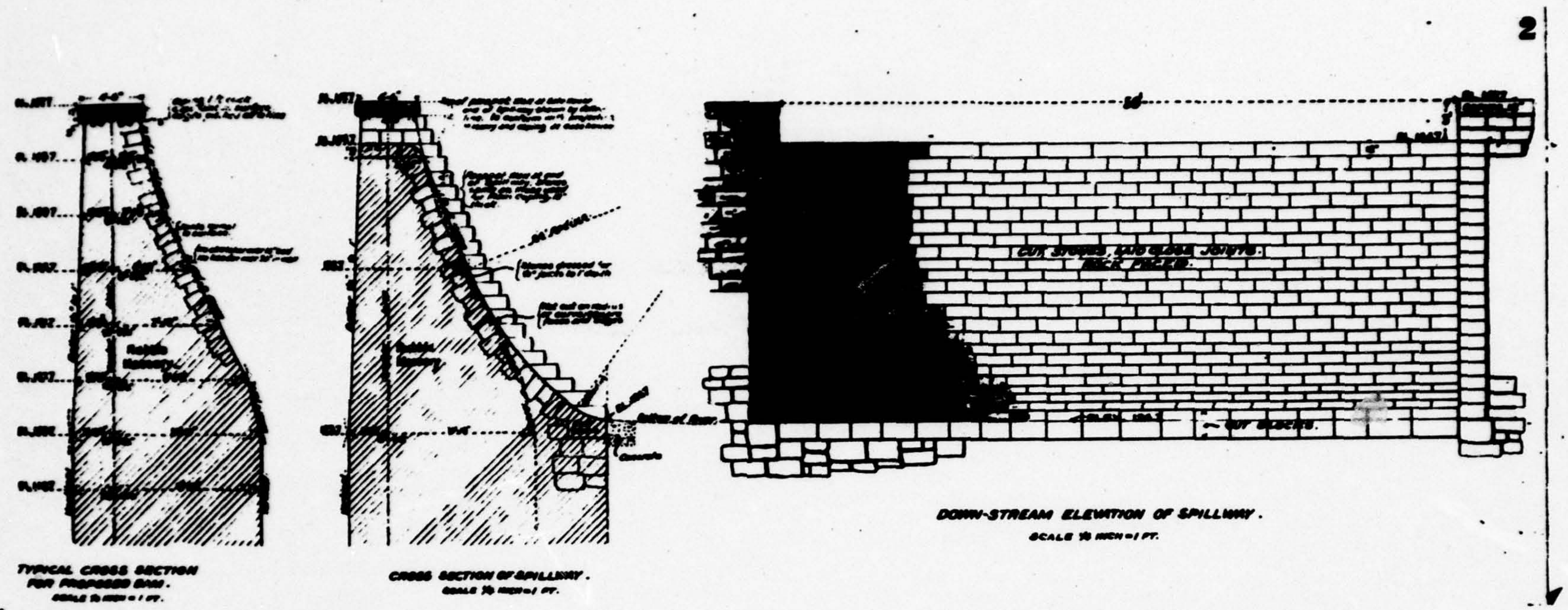
PROFILE OF 20 INCH MAIN.
FROM SKETCH BY W.M. DISBROW, C.E.
SCALE VERT. 1"=10', HOR. 1"=100'.

Note:
To reduce to H.W.M. at Larchmont subtract 100 from elevations on profile.

LARCHMONT WATER WORKS.
PLANS FOR
MASONRY DAM AND STORAGE RESERVOIR
ON SHELDRAKE RIVER.
WESTCHESTER CO., N.Y.
OCTOBER 1897.

.... Engineers

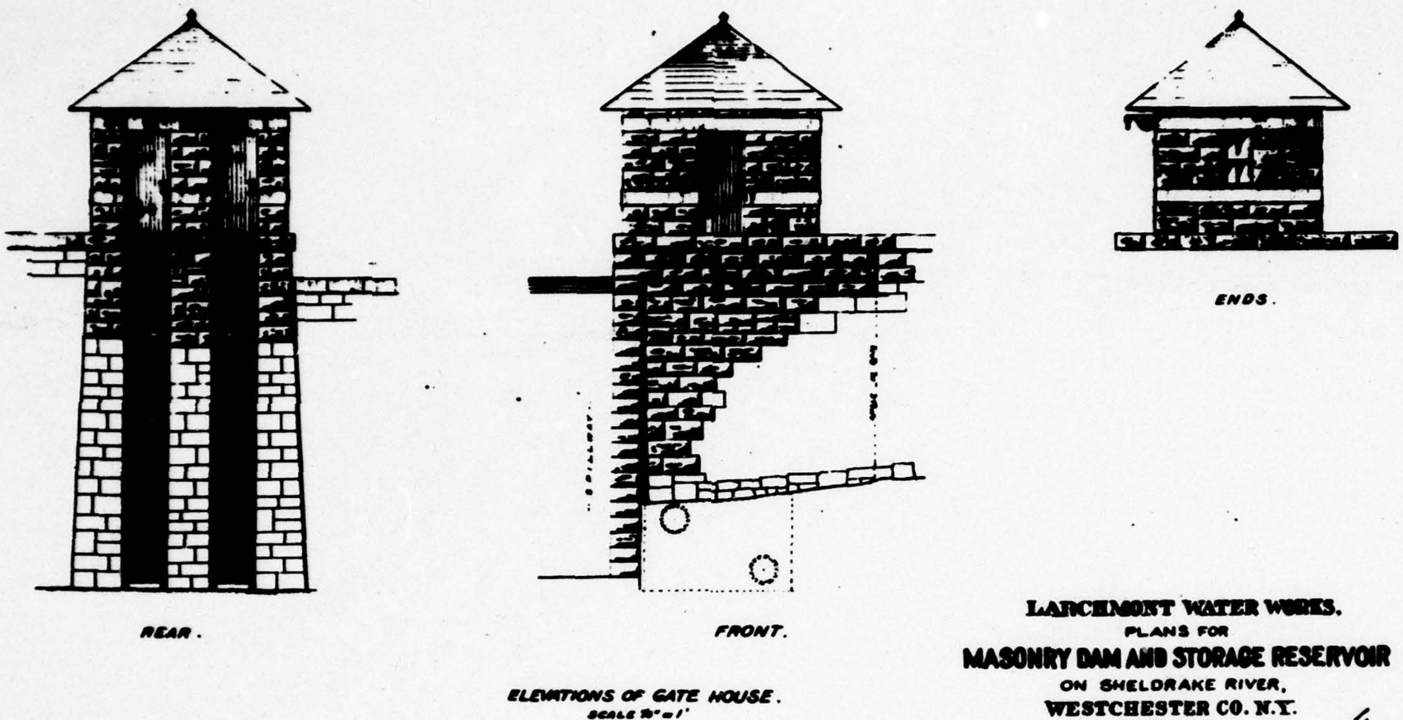
FIGURE 4



LARCHMONT WATER WORKS.
PLANS FOR
MASONRY DAM AND STORAGE RESERVOIR
ON SHELDRAKE RIVER,
WESTCHESTER CO. N.Y.
OCTOBER 1887.

FIGURE 5

4.



LARCHMONT WATER WORKS.

PLANS FOR

MASONRY DAM AND STORAGE RESERVOIR

ON SHELDRAKE RIVER,

WESTCHESTER CO. N.Y.

OCTOBER 1897.

Engineers.

FIGURE 6

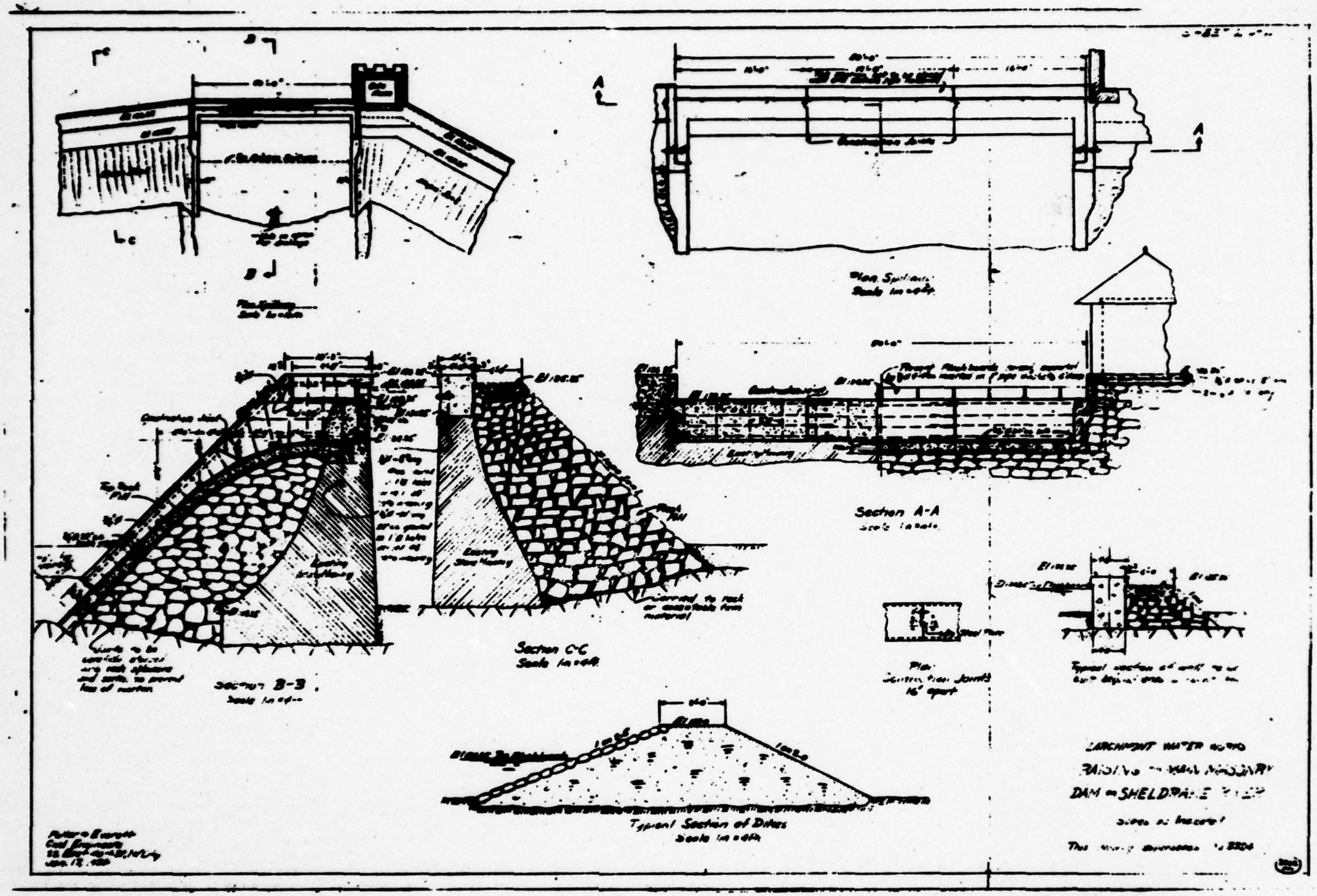

Plan Spillway
Section A-A
Section C-C
Scale 1 in = 4 ft.
Section B-B
Plan
Construction Joints
16' apart
Typical Section of Dikes
Scale 1 in = 4 ft.
Potter & Everett
Civil Engineers
DAM on SHELDRAKE RIVER

FIGURE 7

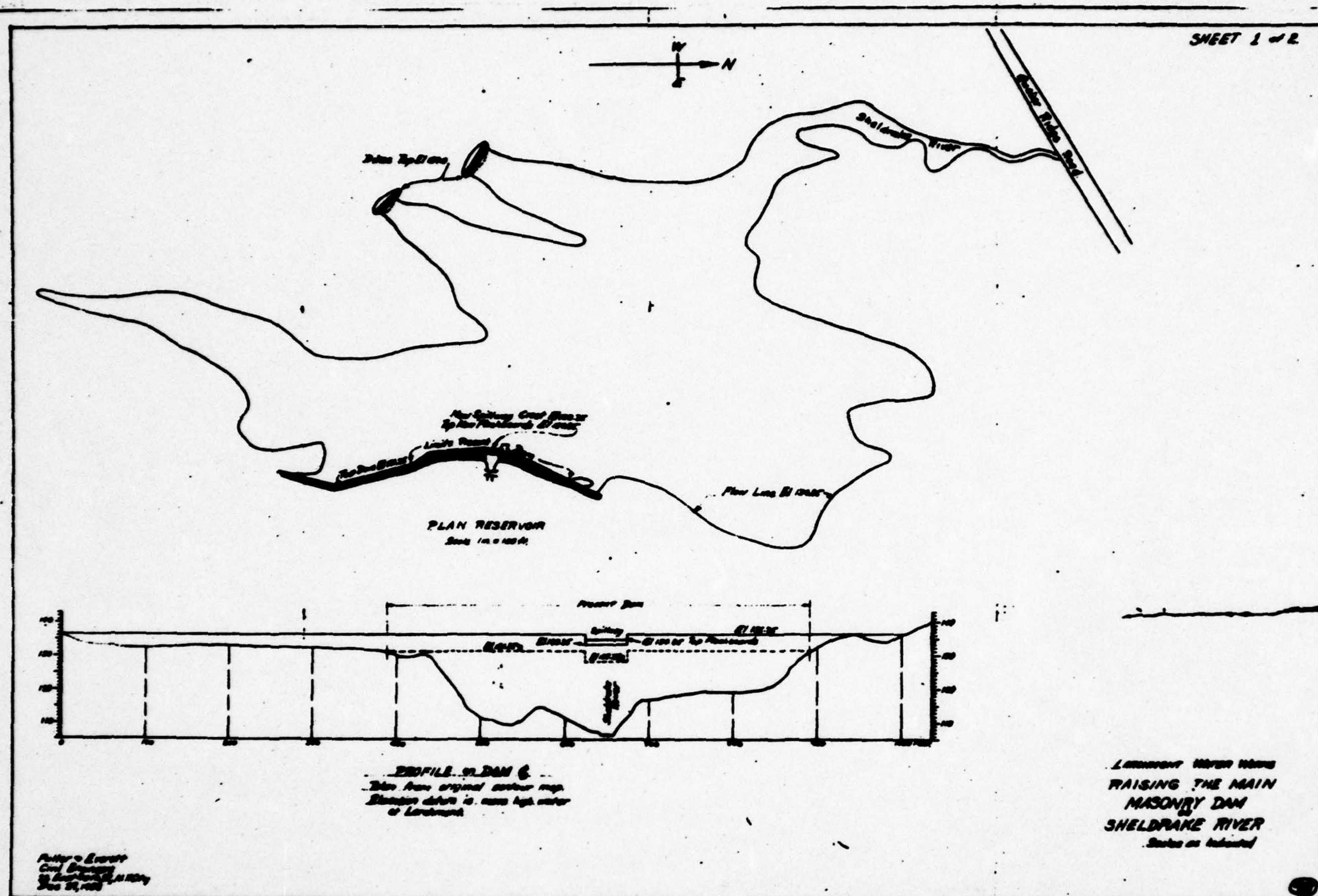

SHEET 1 of 2
W
N
E
Sheldrake River
PLAN RESERVOIR
PROFILE on DAM
Present Dam
Spillway
LARCHMONT WATER WORKS
RAISING THE MAIN
MASONRY DAM
SHELDRAKE RIVER

FIGURE 8

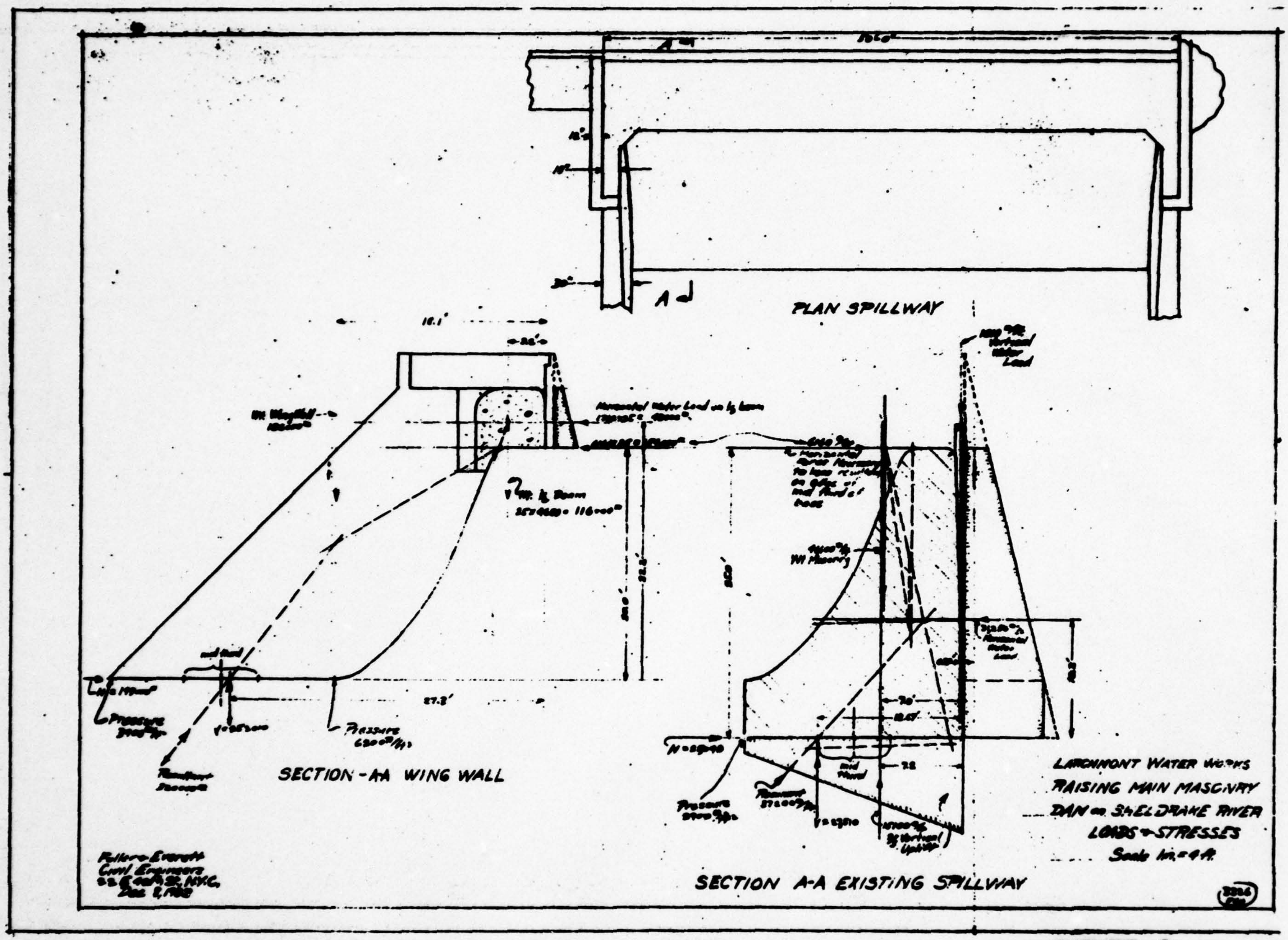

PLAN SPILLWAY
A
10.1'
27.3'
SECTION-AA WING WALL
SECTION A-A EXISTING SPILLWAY
LARCHMONT WATER WORKS
RAISING MAIN MASONRY
DAM on SHELDRAKE RIVER
LOADS & STRESSES
Scale 1in.=4ft.

FIGURE 9

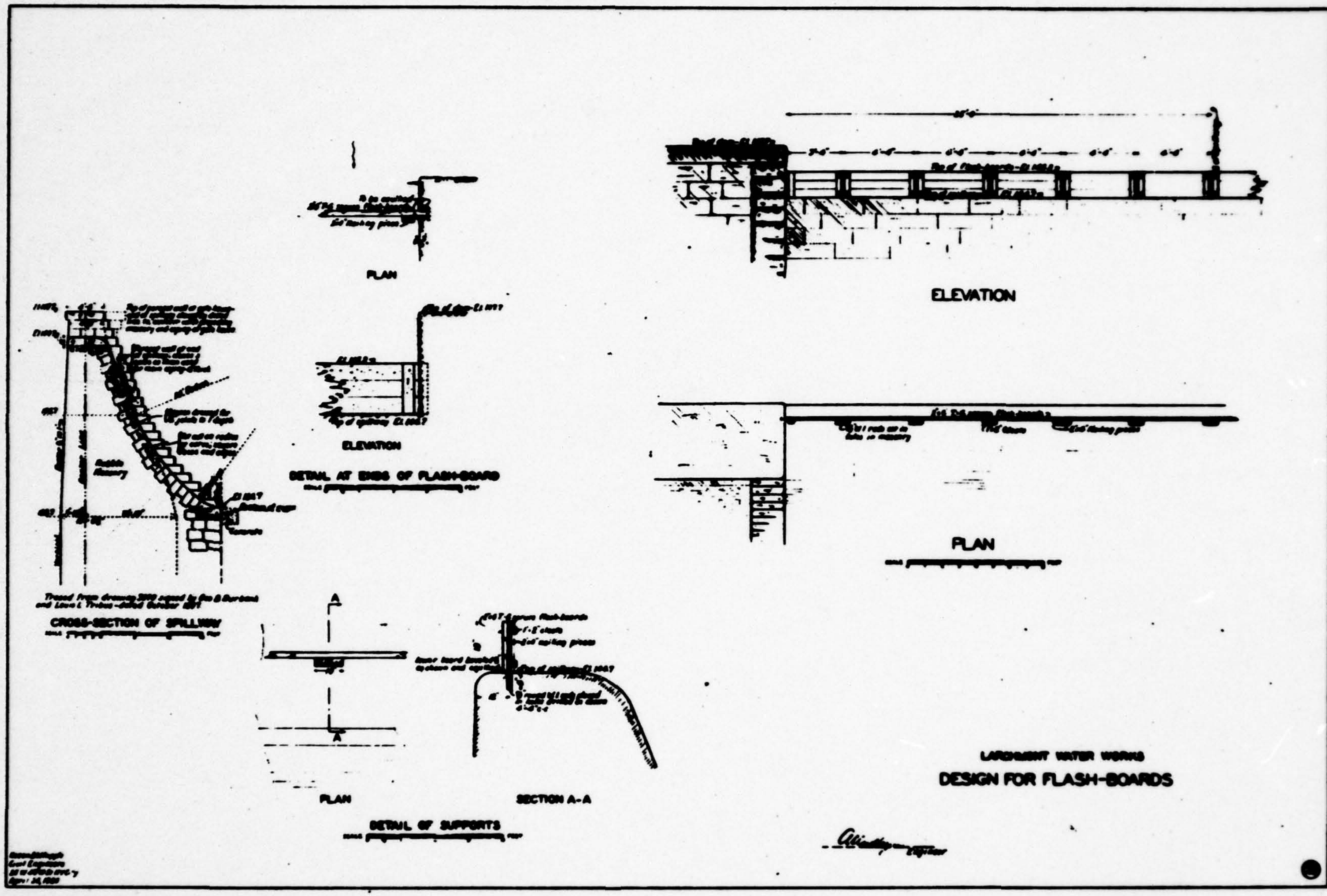
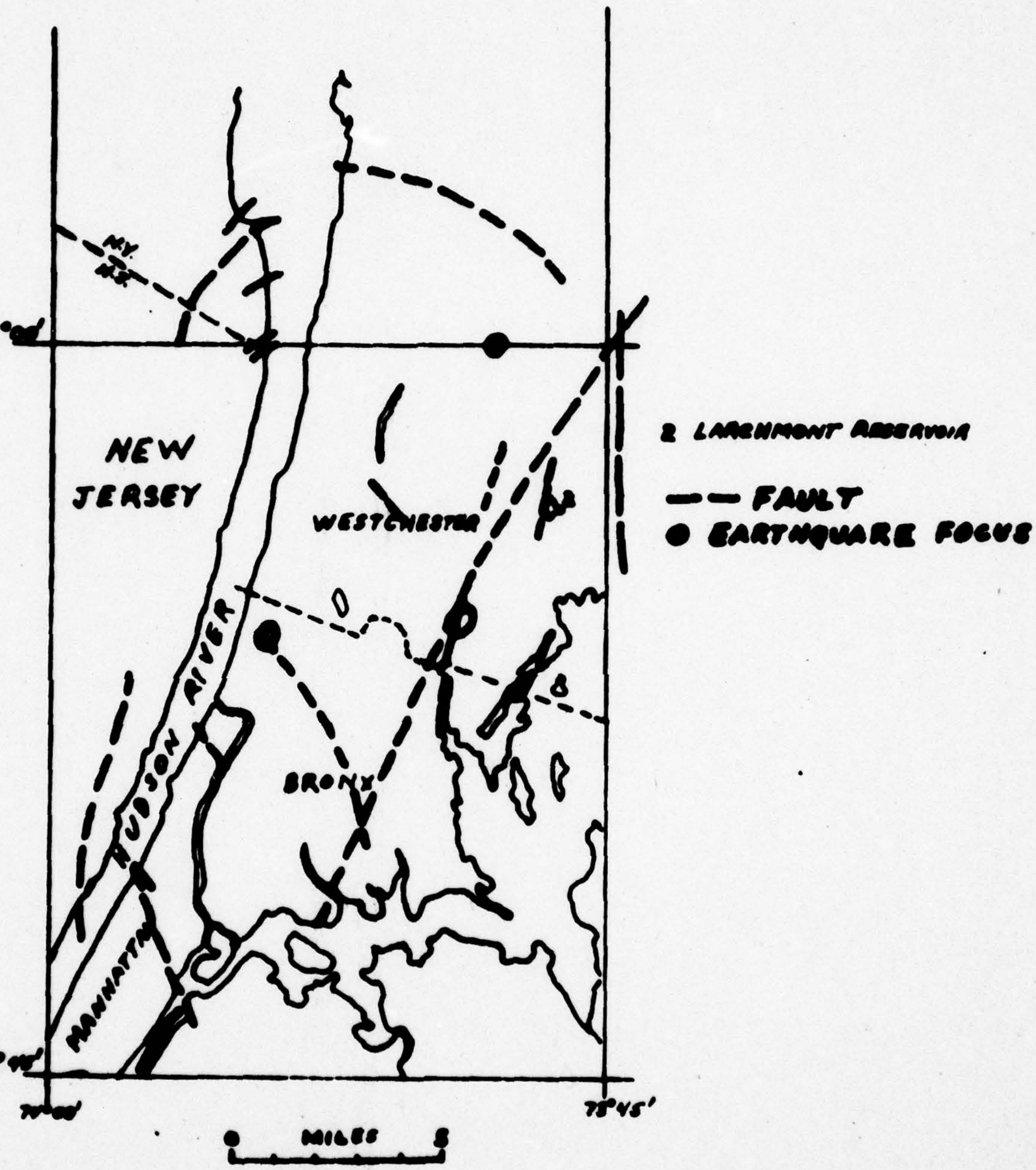

ELEVATION
PLAN
PLAN
ELEVATION
DETAIL AT ENDS OF FLASH-BOARD
CROSS-SECTION OF SPILLWAY
PLAN
SECTION A-A
DETAIL OF SUPPORTS
LARCHMONT WATER WORKS
DESIGN FOR FLASH-BOARDS

FIGURE 10



GEOLOGIC MAP
FIGURE 11

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam Larchmont Dam #2 County Westchester State New York ID # 112

Type of Dam Masonry Hazard Category 1

Date(s) Inspection June 23, 1978 Weather Clear Temperature 75-80°

Pool Elevation at Time of Inspection 147 ± 1.0 M.S.L. Tailwater at Time of Inspection below outlet pipe

Inspection Personnel:

N. F. Dunlevy	Dale Engineering Company	
F. W. Byszewski	Dale Engineering Company	
David McCarthy	Dale Engineering Company	

Neal F. Dunlevy Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	None observed.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Good condition.	Substantial portion of dam founded on rock outcropping.
DRAINS	12-inch drain spilling from below spillway in center of dam. No blockage observed.	
WATER PASSAGES	No apparent erosion.	
FOUNDATION	Surface condition excellent.	Substantial portion of dam founded on rock outcropping.

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Generally, dam in excellent shape. Surface cracks noted in one location. Not serious.	Dam is inspected weekly by Village of Larchmont staff.
STRUCTURAL CRACKING	None observed.	
VERTICAL & HORIZONTAL ALIGNMENT	Good.	
MONOLITH JOINTS	Masonry joints in good condition.	
CONSTRUCTION JOINTS	None.	
STAFF GAGE OF RECORDER	None.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	N/A	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	N/A	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	N/A	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	N/A	
RIPRAP FAILURES	N/A	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	N/A	
ANY NOTICEABLE SEEPAGE	N/A	
STAFF GAGE AND RECORDER	N/A	
DRAINS	N/A	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR MASONRY OGEE SPILLWAY	Excellent condition.	
APPROACH CHANNEL	Reservoir.	
DISCHARGE CHANNEL	Founded in rock. Little or no erosion.	
BRIDGE AND PIERS	None.	

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

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	No concrete.	
INTAKE STRUCTURE	Building locked; not inspected. Submerged intake.	
OUTLET STRUCTURE	Pipe protruded through spillway channel below ogee. Good condition. Water flowing.	
OUTLET CHANNEL	Founded in rock. Little or no weathering.	Below reservoir is a 25-acre pond.
EMERGENCY GATE	Outlet works described here consist of blow-down or drawing pipe. Village Engineer indicated gate is operable.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Good condition. Channel immediately below spillway founded in rock, opens into large pond (25 acres) approx. 150' below ogee spillway.	
SLOPES	None.	
APPROXIMATE NO. OF HOMES AND POPULATION	Below dam, Town of Mamaroneck industrial section and village. Some existing flooding problems on Brookside Drive. USACF did study 2 to 3 years ago.	

INSTRUMENTATION

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

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Treed slopes with significant rock outcropping.	
SEDIMENTATION	None observed. Drainage area above dam is residential with gutter and open channel collection into reservoir.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM: Larchmont Dam #2
ID #: 112

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	See this report.
CONSTRUCTION HISTORY	Little or no data available. To our knowledge, all available data has been included in this report.
TYPICAL SECTIONS OF DAM	See this report.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See this report.
RAINFALL/RESERVOIR RECORDS	Not collected at dam. Records available for vicinity.

ITEM	REMARKS
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None supplied. See work done for this report.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available.
POST-CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	None.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	In 1936 dam raised 5' to increase pool volume. Effectively, original dam was used as core wall for new dam. See plans in this report.
HIGH POOL RECORDS	Information not obtained.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None.
MAINTENANCE OPERATION: RECORDS	Dam inspected weekly by Village of Larchmont.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	See this report.
OPERATING EQUIPMENT PLANS & DETAILS	None.

LARCHMONT RESERVOIR

CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 9.90 square miles

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 133.35 feet*

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 133.35 feet*

ELEVATION MAXIMUM DESIGN POOL: 136.35

ELEVATION TOP DAM: 136.35

CREST:

a. Elevation 133.35
b. Type Concrete cap or masonry spillway
c. Width 4 feet
d. Length 50 feet
e. Location Spillover Center of dam
f. Number and Type of Gates None

OUTLET WORKS:

a. Type 36" diameter pipe
b. Location Base of dam
c. Entrance Inverts 127
d. Exit Inverts 125
e. Emergency Draindown Facilities 36" diameter pipe

HYDROMETEOROLOGICAL GATES:

a. Type Facility not operational; no rainfall data available.
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE: Not determined. Downstream flood areas affected by tributaries.

*Flashboards at elevation 134.85 feet shown on plans contained in this report on raising of the main dam. Were not found on site during inspection.

APPENDIX B

PREVIOUS INSPECTION REPORTS

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

DALE

DESIGN BRIEF

DESIGNED BY JPG DATE 7-7-78

CHECKED BY PAGE C-1 OF

PROJECT NO. 2210 SHORT TITLE NY DAM INSPECTION

DESIGN SUBJECT LARCHMONT (SHELDRAKE LAKE) REF. DWGS.

ESTIMATOR OF Tc (BPR)

ESTIMATE OF CLARK'S PARAMETERS

$Tc = (11.9\ L^3/H)^{.385} = (11.9\ (4.227)^3/106)^{.385} = 2.277$ HR

SCS

$L = \dfrac{\ell^{.8}(S+1)^{.7}}{1900\ Y^{.5}} = \dfrac{(22320)^{.8}\ (2.5+1)^{.7}}{1900\ (6.0)^{.5}}$

$S = \dfrac{1000}{CN} - 10 = 2.5$

$= \dfrac{7241.07}{4654.03} = 1.556$

$Tc = L/.6 = 1.556/.6 = 2.593$

North Atlantic Division Water Resources Study February 1972

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

$Tc + R = 10\ (1.82)\ (2.660/25.0)^{.25}$

$Tc + R = 10.40$

$R/(Tc+R) = 0.4$

$R = 4.16$

$Tc = 6.24$

$a = 1.82$

$R/(Tc+R) = 0.40$

DALE

DESIGN BRIEF

DESIGNED BY N.D. DATE 7-8-78

CHECKED BY PAGE C-2 OF

PROJECT NO. 2210 SHORT TITLE N.Y. DAM INSPECTION

DESIGN SUBJECT LARCHMONT (SHELDRAKE LAKE REF. DWGS.

ESTIMATE OF SNYDER'S PARAMETERS

640 Cp = 512 *from Lower Hudson Study by N.Y. Dist.

Cp = 0.8*

CT = 1.95 *

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

L length of drainage in miles

Lca length to center of drainage area in miles.

$t_p = 1.95 (4.23 \times 1.73)^{0.3}$

$t_p = 3.54$

$t_r = t_p / 5.5 = 0.64$

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

$T_{pr} = 3.54 + 0.25 (1 - 0.64)$

$T_{pr} = 3.54 + 0.09$

$T_{pr} = 3.63$

Summary of Parameters

Clark's

BPR $T_c = 2.28$ hours

SCS (CN Method) $T_c = 2.59$

North Atlantic Div. $T_c = 6.24$

use 2.59 hours

estimate R

$R / (T_c + R) = 0.4$

$R / (2.6 + R) = 0.4$

$R = 1.73$

Snyder's

$T_{pr} = 3.63$

$C_p = 0.80$

DALE

DESIGN BRIEF

DESIGNED BY N.D. DATE 7-8-78

CHECKED BY PAGE C-3 OF

PROJECT NO. 2210 SHORT TITLE N.Y. Dam Inspection

DESIGN SUBJECT Larchmont (Sheldrake Lake) REF. DWGS.

D-A-D Relationships *

Drainage Area less than 10 sq. miles
use values for 10 sq. miles

Duration	Depth	% of Index
6 HR	26.0	106
12 HR	30.0	122
24 HR	33.5	137
48 HR	37.0	151
72 HR	38.0	155

PMP Index Rainfall**
24.5

Base Flow

Estimate 2 cubic feet per second per square mile

Base flow = 2 × 2.7 = 5.4 say 5 cfs

Loss Rates

Initial Loss 1.0 in
Constant Loss 0.1 in/hr.

* From Hydrometeorological Report No. 51
** Index rainfall - estimate for 24 hour duration for area of 200 sq. mi.

DALE

DESIGN BRIEF

DESIGNED BY ND

DATE 7-12-78

CHECKED BY

PAGE C-4 OF

PROJECT NO. 2210

SHORT TITLE NY Dam Inspection

DESIGN SUBJECT Larchmont (Sheldrake Lake)

REF. DWGS.

HEC1 COMP Computer Runs Results

(Prior To Routing Thru Spillway)

Run No	Description	Peak	Pages
1	PMF, Clark Tc=2.6, R=1.73	6400	5-6
2	SPF, Clark	3400	7-9
3	PMF, Snyder CP=.8, TP=3.63	5700	10-11
4	SPF, Snyder	3000	12-14

SYNOPSIS

Values from runs 1 & 2 will be used

```
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) =        2.70
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) =          2.60        1.73

       TP       CP       TC        R

    2.10   0.580     2.60     1.73

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) = 24.50
ENTER R6,R12,R24,R48,R72,R96 =     106.00  122.00  137.00  151.00  155.00
ENTER TRSPC AND TRSDA (SQMI) =              0.00          2.70
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 -   LARCHMONT 2 PMF
ENTER STRTQ,QRCSN,AND RTIOR =           5.00     5.00 -389.00
```

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.02	0.02	0.00	132.	5.	5.
2	0	0.02	0.02	0.00	402.	5.	5.
3	0	0.02	0.02	0.00	481.	5.	5.
4	0	0.02	0.02	0.00	327.	5.	5.
5	0	0.02	0.02	0.00	180.	5.	5.
6	0	0.02	0.02	0.00	100.	5.	5.
7	0	0.05	0.05	0.00	55.	5.	5.
8	0	0.05	0.05	0.00	31.	5.	5.
9	0	0.05	0.05	0.00	17.	5.	5.
10	0	0.05	0.05	0.00	10.	5.	5.
11	0	0.05	0.05	0.00	6.	5.	5.
12	0	0.05	0.05	0.00	3.	5.	5.
13	0	0.20	0.20	0.00		5.	5.
14	0	0.24	0.24	0.00		5.	5.
15	0	0.30	0.19	0.11		5.	19.
16	0	0.75	0.10	0.65		5.	135.
17	0	0.28	0.10	0.18		5.	343.
18	0	0.22	0.10	0.12		5.	442.
19	0	0.03	0.03	0.00		5.	372.
20	0	0.03	0.03	0.00		5.	250.
21	0	0.03	0.03	0.00		5.	148.
22	0	0.03	0.03	0.00		5.	84.
23	0	0.03	0.03	0.00		5.	49.
24	0	0.03	0.03	0.00		5.	29.
25	0	0.18	0.10	0.08		5.	29.
26	0	0.18	0.10	0.08		5.	56.
27	0	0.18	0.10	0.08		5.	91.
28	0	0.18	0.10	0.08		5.	114.

29	0	0.18	0.10	0.08		5.	127.
30	0	0.18	0.10	0.08		5.	135.
31	0	0.49	0.10	0.39		5.	180.
32	0	0.49	0.10	0.39		5.	307.
33	0	0.49	0.10	0.39		5.	458.
34	0	0.49	0.10	0.39		5.	560.
35	0	0.49	0.10	0.39		5.	616.
36	0	0.49	0.10	0.39		5.	647.
37	0	1.94	0.10	1.84		5.	855.
38	0	2.33	0.10	2.23		5.	1500.
39	0	2.91	0.10	2.81		5.	2436.
40	0	7.38	0.10	7.28		5.	3922.
41	0	2.72	0.10	2.62		5.	5777.
42	0	2.14	0.10	2.04		5.	6381.
43	0	0.27	0.10	0.17		5.	5344.
44	0	0.27	0.10	0.17		5.	3720.
45	0	0.27	0.10	0.17		5.	2305.
46	0	0.27	0.10	0.17		5.	1410.
47	0	0.27	0.10	0.17		5.	917.
48	0	0.27	0.10	0.17		5.	644.
49	0	0.01	0.01	0.00		5.	469.
50	0	0.01	0.01	0.00		5.	315.
51	0	0.01	0.01	0.00		5.	184.
52	0	0.01	0.01	0.00		5.	92.
53	0	0.01	0.01	0.00		5.	49.
54	0	0.01	0.01	0.00		5.	26.
55	0	0.01	0.01	0.00		5.	16.
56	0	0.01	0.01	0.00		5.	11.
57	0	0.01	0.01	0.00		5.	8.
58	0	0.01	0.01	0.00		5.	7.
59	0	0.01	0.01	0.00		5.	6.
60	0	0.01	0.01	0.00		5.	5.
61	0	0.06	0.06	0.00		5.	5.
62	0	0.07	0.07	0.00		5.	5.
63	0	0.09	0.09	0.00		5.	5.
64	0	0.22	0.10	0.12		5.	21.
65	0	0.08	0.08	0.00		5.	53.
66	0	0.06	0.06	0.00		5.	63.
67	0	0.01	0.01	0.00		5.	44.
68	0	0.01	0.01	0.00		5.	27.
69	0	0.01	0.01	0.00		5.	17.
70	0	0.01	0.01	0.00		5.	12.
71	0	0.01	0.01	0.00		5.	9.
72	0	0.01	0.01	0.00		5.	7.
73	0					5.	6.
74	0					5.	6.
75	0					5.	5.
76	0					5.	5.
77	0					5.	5.
78	0					5.	5.
79	0					5.	5.
80	0					5.	5.
81	0					5.	5.
82	0					5.	5.
83	0					5.	5.
TOTAL		28.41	4.57	23.64	1744.	415.	41981.

```
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) =        2.70
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) =         2.60       1.73

      TP       CP       TC       R

    2.10   0.580    2.60     1.73


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) = 12.25
ENTER TRSPC AND TRSDA (SQMI) =           1.00       2.70
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 -   LARCHMONT 2 SPF
ENTER STRTQ,QRCSN,AND RTIOR =         5.00     5.00     1.00

 HR MIN   RAIN   LOSS EXCESS   UNIT HG    RECSN     FLOW
  1   0   0.00   0.00   0.00     132.        5.        5.
  2   0   0.00   0.00   0.00     402.        5.        5.
  3   0   0.00   0.00   0.00     481.        5.        5.
  4   0   0.00   0.00   0.00     327.        5.        5.
  5   0   0.00   0.00   0.00     180.        5.        5.
  6   0   0.00   0.00   0.00     100.        5.        5.
  7   0   0.01   0.01   0.00      55.        5.        5.
  8   0   0.01   0.01   0.00      31.        5.        5.
  9   0   0.01   0.01   0.00      17.        5.        5.
 10   0   0.01   0.01   0.00      10.        5.        5.
 11   0   0.01   0.01   0.00       6.        5.        5.
 12   0   0.01   0.01   0.00       3.        5.        5.
 13   0   0.03   0.03   0.00                 5.        5.
 14   0   0.04   0.04   0.00                 5.        5.
 15   0   0.05   0.05   0.00                 5.        5.
 16   0   0.12   0.12   0.00                 5.        5.
 17   0   0.04   0.04   0.00                 5.        5.
 18   0   0.03   0.03   0.00                 5.        5.
 19   0   0.01   0.01   0.00                 5.        5.
 20   0   0.01   0.01   0.00                 5.        5.
 21   0   0.01   0.01   0.00                 5.        5.
 22   0   0.01   0.01   0.00                 5.        5.
 23   0   0.01   0.01   0.00                 5.        5.
 24   0   0.01   0.01   0.00                 5.        5.
 25   0   0.02   0.02   0.00                 5.        5.
 26   0   0.02   0.02   0.00                 5.        5.
 27   0   0.02   0.02   0.00                 5.        5.
 28   0   0.02   0.02   0.00                 5.        5
```

29	0	0.02	0.02	0.00	5.	5.
30	0	0.02	0.02	0.00	5.	5.
31	0	0.04	0.04	0.00	5.	5.
32	0	0.04	0.04	0.00	5.	5.
33	0	0.04	0.04	0.00	5.	5.
34	0	0.04	0.04	0.00	5.	5.
35	0	0.04	0.04	0.00	5.	5.
36	0	0.04	0.04	0.00	5.	5.
37	0	0.14	0.14	0.00	5.	5.
38	0	0.16	0.13	0.03	5.	9.
39	0	0.20	0.10	0.10	5.	30.
40	0	0.52	0.10	0.42	5.	115.
41	0	0.19	0.10	0.09	5.	244.
42	0	0.15	0.10	0.05	5.	288.
43	0	0.03	0.03	0.00	5.	227.
44	0	0.03	0.03	0.00	5.	146.
45	0	0.03	0.03	0.00	5.	86.
46	0	0.03	0.03	0.00	5.	50.
47	0	0.03	0.03	0.00	5.	30.
48	0	0.03	0.03	0.00	5.	19.
49	0	0.13	0.10	0.03	5.	17.
50	0	0.13	0.10	0.03	5.	25.
51	0	0.13	0.10	0.03	5.	38.
52	0	0.13	0.10	0.03	5.	46.
53	0	0.13	0.10	0.03	5.	51.
54	0	0.13	0.10	0.03	5.	54.
55	0	0.34	0.10	0.24	5.	83.
56	0	0.34	0.10	0.24	5.	168.
57	0	0.34	0.10	0.24	5.	270.
58	0	0.34	0.10	0.24	5.	339.
59	0	0.34	0.10	0.24	5.	377.
60	0	0.34	0.10	0.24	5.	398.
61	0	1.05	0.10	0.95	5.	503.
62	0	1.26	0.10	1.16	5.	823.
63	0	1.57	0.10	1.47	5.	1293.
64	0	3.98	0.10	3.88	5.	2070.
65	0	1.47	0.10	1.37	5.	3057.
66	0	1.15	0.10	1.05	5.	3374.
67	0	0.21	0.10	0.11	5.	2818.
68	0	0.21	0.10	0.11	5.	1965.
69	0	0.21	0.10	0.11	5.	1231.
70	0	0.21	0.10	0.11	5.	769.
71	0	0.21	0.10	0.11	5.	514.
72	0	0.21	0.10	0.11	5.	374.
73	0	0.01	0.01	0.00	5.	280.
74	0	0.01	0.01	0.00	5.	192.
75	0	0.01	0.01	0.00	5.	114.
76	0	0.01	0.01	0.00	5.	59.
77	0	0.01	0.01	0.00	5.	32.
78	0	0.01	0.01	0.00	5.	18.
79	0	0.02	0.02	0.00	5.	12.
80	0	0.02	0.02	0.00	5.	9.
81	0	0.02	0.02	0.00	5.	7.

82	0	0.02	0.02	0.00		5.	6.
83	0	0.02	0.02	0.00		5.	5.
84	0	0.02	0.02	0.00		5.	5.
85	0	0.05	0.05	0.00		5.	5.
86	0	0.06	0.06	0.00		5.	5.
87	0	0.08	0.08	0.00		5.	5.
88	0	0.20	0.10	0.10		5.	18.
89	0	0.07	0.07	0.00		5.	45.
90	0	0.06	0.06	0.00		5.	53.
91	0	0.01	0.01	0.00		5.	38.
92	0	0.01	0.01	0.00		5.	23.
93	0	0.01	0.01	0.00		5.	15.
94	0	0.01	0.01	0.00		5.	11.
95	0	0.01	0.01	0.00		5.	8.
96	0	0.01	0.01	0.00		5.	7.
97	0					5.	6.
98	0					5.	6.
99	0					5.	5.
100	0					5.	5.
101	0					5.	5.
102	0					5.	5.
103	0					5.	5.
104	0					5.	5.
105	0					5.	5.
106	0					5.	5.
107	0					5.	5.
TOTAL		17.65	4.70	12.95	1744.	535.	23114.

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

```
ENTER DRAINAGE AREA (SQMI) =        2.70
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )        3
ENTER SNYDERS CP AND TP (HRS) =              0.80      3.63
ENTER INITIAL EST. CLARKS TC & R (HRS) (0=DEFAULT)=  0.00       0.00

        TP        CP        TC        R

      3.02     0.566     4.36     2.06
      3.37     0.718     4.70     1.84
      3.56     0.763     4.77     1.76
      3.59     0.773     4.82     1.70
      3.60     0.780     4.82     1.66
      3.58     0.782     4.89     1.62
      3.62     0.789     4.89     1.59
      3.61     0.790     4.89     1.57
      3.59     0.791     4.89     1.56
      3.58     0.792     4.95     1.54
CP OR TP POSSIBLY NOT SATISFIED


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) = 24.50
ENTER R6,R12,R24,R48,R72,R96 =     106.00  122.00   137.00   151.00   155.00
ENTER TRSPC AND TRSDA (SQMI) =              0.00       2.70
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 -   LARCHMONT 2 PMF
ENTER STRTQ,QRCSN,AND RTIOR =          5.00     5.00     1.00
```

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.02	0.02	0.00	55.	5.	5.
2	0	0.02	0.02	0.00	186.	5.	5.
3	0	0.02	0.02	0.00	320.	5.	5.
4	0	0.02	0.02	0.00	385.	5.	5.
5	0	0.02	0.02	0.00	342.	5.	5.
6	0	0.02	0.02	0.00	222.	5.	5.
7	0	0.05	0.05	0.00	114.	5.	5.
8	0	0.05	0.05	0.00	59.	5.	5.
9	0	0.05	0.05	0.00	31.	5.	5.
10	0	0.05	0.05	0.00	16.	5.	5.
11	0	0.05	0.05	0.00	8.	5.	5.
12	0	0.05	0.05	0.00	5.	5.	5.
13	0	0.20	0.20	0.00	3.	5.	5.
14	0	0.24	0.24	0.00		5.	5.
15	0	0.30	0.19	0.11		5.	11.
16	0	0.75	0.10	0.65		5.	61.
17	0	0.28	0.10	0.18		5.	171.
18	0	0.22	0.10	0.12		5.	295.
19	0	0.03	0.03	0.00		5.	373.
20	0	0.03	0.03	0.00		5.	359.
21	0	0.03	0.03	0.00		5.	270.
22	0	0.03	0.03	0.00		5.	167.
23	0	0.03	0.03	0.00		5.	94.
24	0	0.03	0.03	0.00		5.	51.
25	0	0.18	0.10	0.08		5.	33.
26	0	0.18	0.10	0.08		5.	37.
27	0	0.18	0.10	0.08		5.	57.
28	0	0.18	0.10	0.08		5.	84.

29	0	0.18	0.10	0.08		5.	109.
30	0	0.18	0.10	0.08		5.	126.
31	0	0.49	0.10	0.39		5.	152.
32	0	0.49	0.10	0.39		5.	214.
33	0	0.49	0.10	0.39		5.	316.
34	0	0.49	0.10	0.39		5.	436.
35	0	0.49	0.10	0.39		5.	543.
36	0	0.49	0.10	0.39		5.	612.
37	0	1.94	0.10	1.84		5.	728.
38	0	2.33	0.10	2.23		5.	1037.
39	0	2.91	0.10	2.81		5.	1615.
40	0	7.38	0.10	7.28		5.	2657.
41	0	2.72	0.10	2.62		5.	4063.
42	0	2.14	0.10	2.04		5.	5275.
43	0	0.27	0.10	0.17		5.	5746.
44	0	0.27	0.10	0.17		5.	5207.
45	0	0.27	0.10	0.17		5.	3921.
46	0	0.27	0.10	0.17		5.	2549.
47	0	0.27	0.10	0.17		5.	1547.
48	0	0.27	0.10	0.17		5.	946.
49	0	0.01	0.01	0.00		5.	627.
50	0	0.01	0.01	0.00		5.	435.
51	0	0.01	0.01	0.00		5.	296.
52	0	0.01	0.01	0.00		5.	187.
53	0	0.01	0.01	0.00		5.	98.
54	0	0.01	0.01	0.00		5.	50.
55	0	0.01	0.01	0.00		5.	26.
56	0	0.01	0.01	0.00		5.	16.
57	0	0.01	0.01	0.00		5.	10.
58	0	0.01	0.01	0.00		5.	8.
59	0	0.01	0.01	0.00		5.	6.
60	0	0.01	0.01	0.00		5.	5.
61	0	0.06	0.06	0.00		5.	5.
62	0	0.07	0.07	0.00		5.	5.
63	0	0.09	0.09	0.00		5.	5.
64	0	0.22	0.10	0.12		5.	12.
65	0	0.08	0.08	0.00		5.	27.
66	0	0.06	0.06	0.00		5.	43.
67	0	0.01	0.01	0.00		5.	51.
68	0	0.01	0.01	0.00		5.	46.
69	0	0.01	0.01	0.00		5.	32.
70	0	0.01	0.01	0.00		5.	19.
71	0	0.01	0.01	0.00		5.	12.
72	0	0.01	0.01	0.00		5.	9.
73	0					5.	7.
74	0					5.	6.
75	0					5.	6.
76	0					5.	5.
77	0					5.	5.
78	0					5.	5.
79	0					5.	5.
80	0					5.	5.
81	0					5.	5.
82	0					5.	5.
83	0					5.	5.
84	0					5.	5.
TOTAL		28.41	4.57	23.84	1745.	420.	42027.

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) = 2.70
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER) 3
ENTER SNYDERS CP AND TP (HRS) = 0.80 3.63
ENTER INITIAL EST. CLARKS TO & (HRS) (0=DEFAULT)= 0.00 0.00

TP	CP	TC	R
3.02	0.566	4.36	2.06
3.37	0.718	4.70	1.84
3.58	0.763	4.77	1.76
3.59	0.773	4.82	1.70
3.60	0.780	4.82	1.66
3.58	0.782	4.69	1.62
3.62	0.789	4.69	1.59
3.61	0.790	4.89	1.57
3.59	0.791	4.89	1.56
3.56	0.792	4.95	1.54

CP OR TP POSSIBLY NOT SATISFIED

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) = 12.25
ENTER TRSPC AND TRSDA (SQMI) = 1.00 2.70
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 - LARCHMONT 2 SPF
ENTER STRTQ,QRCSN,AND RTIOR = 5.00 5.00 1.00

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.00	0.00	0.00	55.	5.	5.
2	0	0.00	0.00	0.00	186.	5.	5.
3	0	0.00	0.00	0.00	320.	5.	5.
4	0	0.00	0.00	0.00	385.	5.	5.
5	0	0.00	0.00	0.00	342.	5.	5.
6	0	0.00	0.00	0.00	222.	5.	5.
7	0	0.01	0.01	0.00	114.	5.	5.
8	0	0.01	0.01	0.00	59.	5.	5.
9	0	0.01	0.01	0.00	31.	5.	5.
10	0	0.01	0.01	0.00	16.	5.	5.
11	0	0.01	0.01	0.00	8.	5.	5.
12	0	0.01	0.01	0.00	5.	5.	5.
13	0	0.03	0.03	0.00	3.	5.	5.
14	0	0.04	0.04	0.00		5.	5.
15	0	0.05	0.05	0.00		5.	5.
16	0	0.12	0.12	0.00		5.	5.
17	0	0.04	0.04	0.00		5.	5.
18	0	0.03	0.03	0.00		5.	5.
19	0	0.01	0.01	0.00		5.	5.
20	0	0.01	0.01	0.00		5.	5.
21	0	0.01	0.01	0.00		5.	5.
22	0	0.01	0.01	0.00		5.	5.

23	0	0.01	0.01	0.00	5.	5.
24	0	0.01	0.01	0.00	5.	5.
25	0	0.02	0.02	0.00	5.	5.
26	0	0.02	0.02	0.00	5.	5.
27	0	0.02	0.02	0.00	5.	5.
28	0	0.02	0.02	0.00	5.	5.
29	0	0.02	0.02	0.00	5.	5.
30	0	0.02	0.02	0.00	5.	5.
31	0	0.04	0.04	0.00	5.	5.
32	0	0.04	0.04	0.00	5.	5.
33	0	0.04	0.04	0.00	5.	5.
34	0	0.04	0.04	0.00	5.	5.
35	0	0.04	0.04	0.00	5.	5.
36	0	0.04	0.04	0.00	5.	5.
37	0	0.14	0.14	0.00	5.	5.
38	0	0.16	0.13	0.03	5.	7.
39	0	0.20	0.10	0.10	5.	16.
40	0	0.52	0.10	0.42	5.	56.
41	0	0.19	0.10	0.09	5.	131.
42	0	0.15	0.10	0.05	5.	207.
43	0	0.03	0.03	0.00	5.	246.
44	0	0.03	0.03	0.00	5.	225.
45	0	0.03	0.03	0.00	5.	162.
46	0	0.03	0.03	0.00	5.	97.
47	0	0.03	0.03	0.00	5.	55.
48	0	0.03	0.03	0.00	5.	31.
49	0	0.13	0.10	0.03	5.	20.
50	0	0.13	0.10	0.03	5.	19.
51	0	0.13	0.10	0.03	5.	26.
52	0	0.13	0.10	0.03	5.	35.
53	0	0.13	0.10	0.03	5.	44.
54	0	0.13	0.10	0.03	5.	50.
55	0	0.34	0.10	0.24	5.	65.
56	0	0.34	0.10	0.24	5.	106.
57	0	0.34	0.10	0.24	5.	174.
58	0	0.34	0.10	0.24	5.	255.
59	0	0.34	0.10	0.24	5.	327.
60	0	0.34	0.10	0.24	5.	374.
61	0	1.05	0.10	0.95	5.	438.
62	0	1.26	0.10	1.16	5.	593.
63	0	1.57	0.10	1.47	5.	883.
64	0	3.98	0.10	3.88	5.	1418.
65	0	1.47	0.10	1.37	5.	2150.
66	0	1.15	0.10	1.05	5.	2787.
67	0	0.21	0.10	0.11	5.	3035.
68	0	0.21	0.10	0.11	5.	2751.
69	0	0.21	0.10	0.11	5.	2075.
70	0	0.21	0.10	0.11	5.	1358.

71	0	0.21	0.10	0.11		5.	839.
72	0	0.21	0.10	0.11		5.	529.
73	0	0.01	0.01	0.00		5.	364.
74	0	0.01	0.01	0.00		5.	260.
75	0	0.01	0.01	0.00		5.	182.
76	0	0.01	0.01	0.00		5.	117.
77	0	0.01	0.01	0.00		5.	63.
78	0	0.01	0.01	0.00		5.	33.
79	0	0.02	0.02	0.00		5.	18.
80	0	0.02	0.02	0.00		5.	12.
81	0	0.02	0.02	0.00		5.	8.
82	0	0.02	0.02	0.00		5.	7.
83	0	0.02	0.02	0.00		5.	6.
84	0	0.02	0.02	0.00		5.	5.
85	0	0.05	0.05	0.00		5.	5.
86	0	0.06	0.06	0.00		5.	5.
87	0	0.08	0.08	0.00		5.	5.
88	0	0.20	0.10	0.10		5.	11.
89	0	0.07	0.07	0.00		5.	24.
90	0	0.06	0.06	0.00		5.	37.
91	0	0.01	0.01	0.00		5.	43.
92	0	0.01	0.01	0.00		5.	39.
93	0	0.01	0.01	0.00		5.	27.
94	0	0.01	0.01	0.00		5.	16.
95	0	0.01	0.01	0.00		5.	11.
96	0	0.01	0.01	0.00		5.	8.
97	0					5.	7.
98	0					5.	6.
99	0					5.	5.
100	0					5.	5.
101	0					5.	5.
102	0					5.	5.
103	0					5.	5.
104	0					5.	5.
105	0					5.	5.
106	0					5.	5.
107	0					5.	5.
108	0					5.	5.
TOTAL		17.65	4.70	12.95	1745.	540.	23141.

LARCHMONT (PRINC SPILLWAY)

DIAMETER OF PIPE (FT) 2.00
START ELEV OF PIPE (FT) 127.00
ROUGH COEFFICIENT 0.0140
HEIGHT-HEAD (FT) 35.00
PIPE LENGTH (FT) 50.00

KT,KG,KENT,KEXT 1.81 0.71 0.10 1.00

C 0.742

ELEV	HEIGHT	G2gH	(2gH)**1/2	Q/C	Q
128	1.00	64.40	8.02	25.21	18.72
129	2.00	128.80	11.35	35.65	26.47
130	3.00	193.20	13.90	43.67	32.42
131	4.00	257.60	16.05	50.42	37.44
132	5.00	322.00	17.94	56.37	41.86
133	6.00	386.40	19.66	61.75	45.85
134	7.00	450.80	21.23	66.70	49.52
135	8.00	515.20	22.70	71.31	52.94
136	9.00	579.60	24.07	75.63	56.15
137	10.00	644.00	25.38	79.72	59.19
138	11.00	708.40	26.62	83.62	62.08
139	12.00	772.80	27.80	87.33	64.84
140	13.00	837.20	28.93	90.90	67.49
141	14.00	901.60	30.03	94.33	70.04
142	15.00	966.00	31.08	97.64	72.50
143	16.00	1030.40	32.10	100.84	74.87
144	17.00	1094.80	33.09	103.95	77.18
145	18.00	1159.20	34.05	106.96	79.41
146	19.00	1223.60	34.98	109.89	81.59
147	20.00	1288.00	35.89	112.75	83.71
148	21.00	1352.40	36.77	115.53	85.78
149	22.00	1416.80	37.64	118.25	87.80
150	23.00	1481.20	38.49	120.91	89.77
151	24.00	1545.60	39.31	123.51	91.70
152	25.00	1610.00	40.12	126.06	93.59
153	26.00	1674.40	40.92	128.55	95.44
154	27.00	1738.80	41.70	131.00	97.26
155	28.00	1803.20	42.46	133.40	99.05
156	29.00	1867.60	43.22	135.77	100.80
157	30.00	1932.00	43.95	138.09	102.52
158	31.00	1996.40	44.68	140.37	104.22
159	32.00	2060.80	45.40	142.62	105.89
160	33.00	2125.20	46.10	144.83	107.53
161	34.00	2189.60	46.79	147.00	109.15
162	35.00	2254.00	47.48	149.15	110.74

LARCHMONT
WEIR FLOW PROGRAM

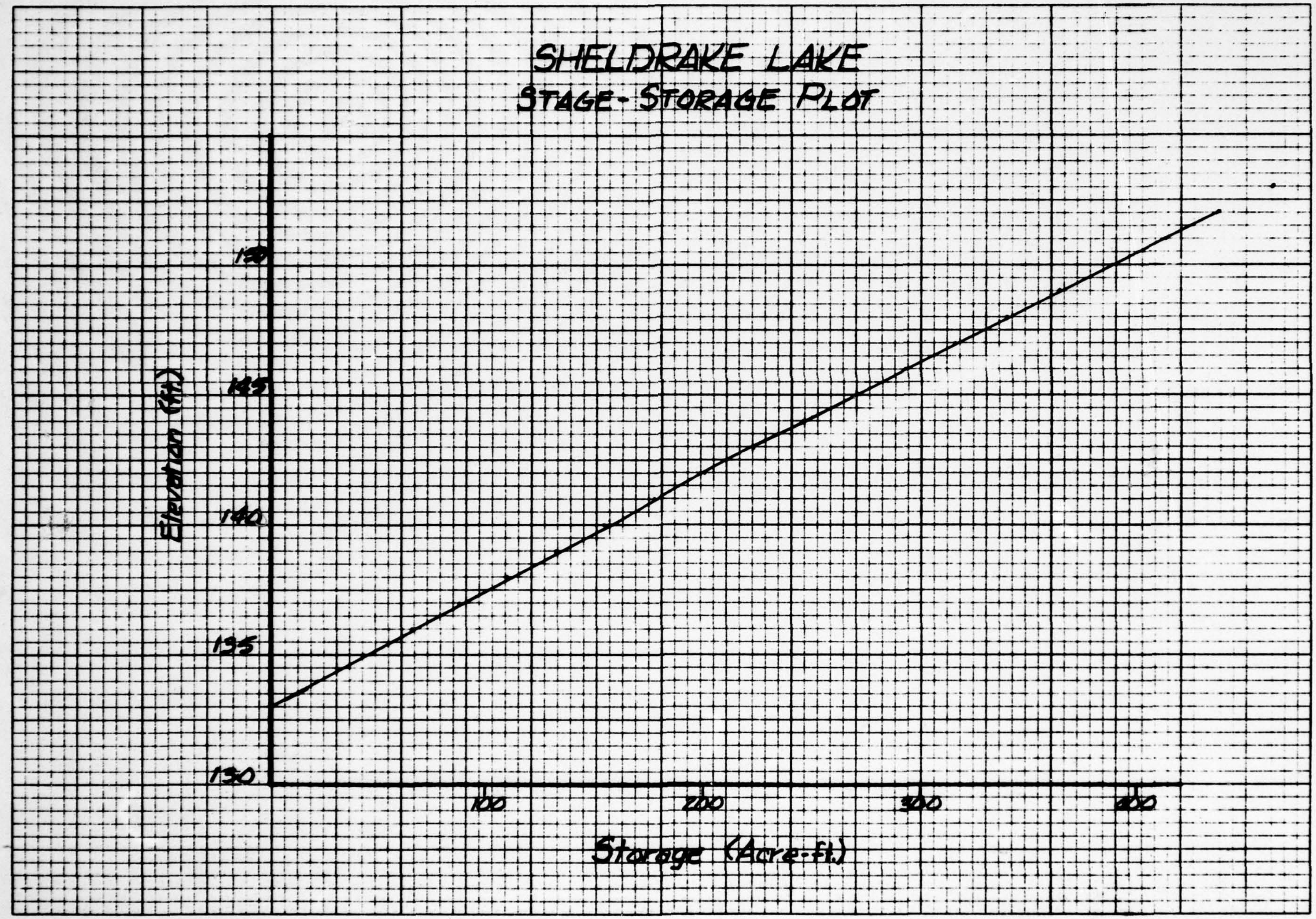
GIVE C,L 3.80 50.00
GIVE ELEVATION TO START FLOW AND HEIGHT 133 20

ELEV	134	FT	DISCHARGE	190.	CFS
ELEV	135	FT	DISCHARGE	537.	CFS
ELEV	136	FT	DISCHARGE	987.	CFS
ELEV	137	FT	DISCHARGE	1520.	CFS
ELEV	138	FT	DISCHARGE	2124.	CFS
ELEV	139	FT	DISCHARGE	2792.	CFS
ELEV	140	FT	DISCHARGE	3519.	CFS
ELEV	141	FT	DISCHARGE	4299.	CFS
ELEV	142	FT	DISCHARGE	5130.	CFS
ELEV	143	FT	DISCHARGE	6008.	CFS
ELEV	144	FT	DISCHARGE	6932.	CFS
ELEV	145	FT	DISCHARGE	7898.	CFS
ELEV	146	FT	DISCHARGE	8906.	CFS
ELEV	147	FT	DISCHARGE	9953.	CFS
ELEV	148	FT	DISCHARGE	11038.	CFS
ELEV	149	FT	DISCHARGE	12160.	CFS
ELEV	150	FT	DISCHARGE	13318.	CFS
ELEV	151	FT	DISCHARGE	14510.	CFS
ELEV	152	FT	DISCHARGE	15736.	CFS
ELEV	153	FT	DISCHARGE	16994.	CFS

LARCHMONT
WEIR FLOW PROGRAM

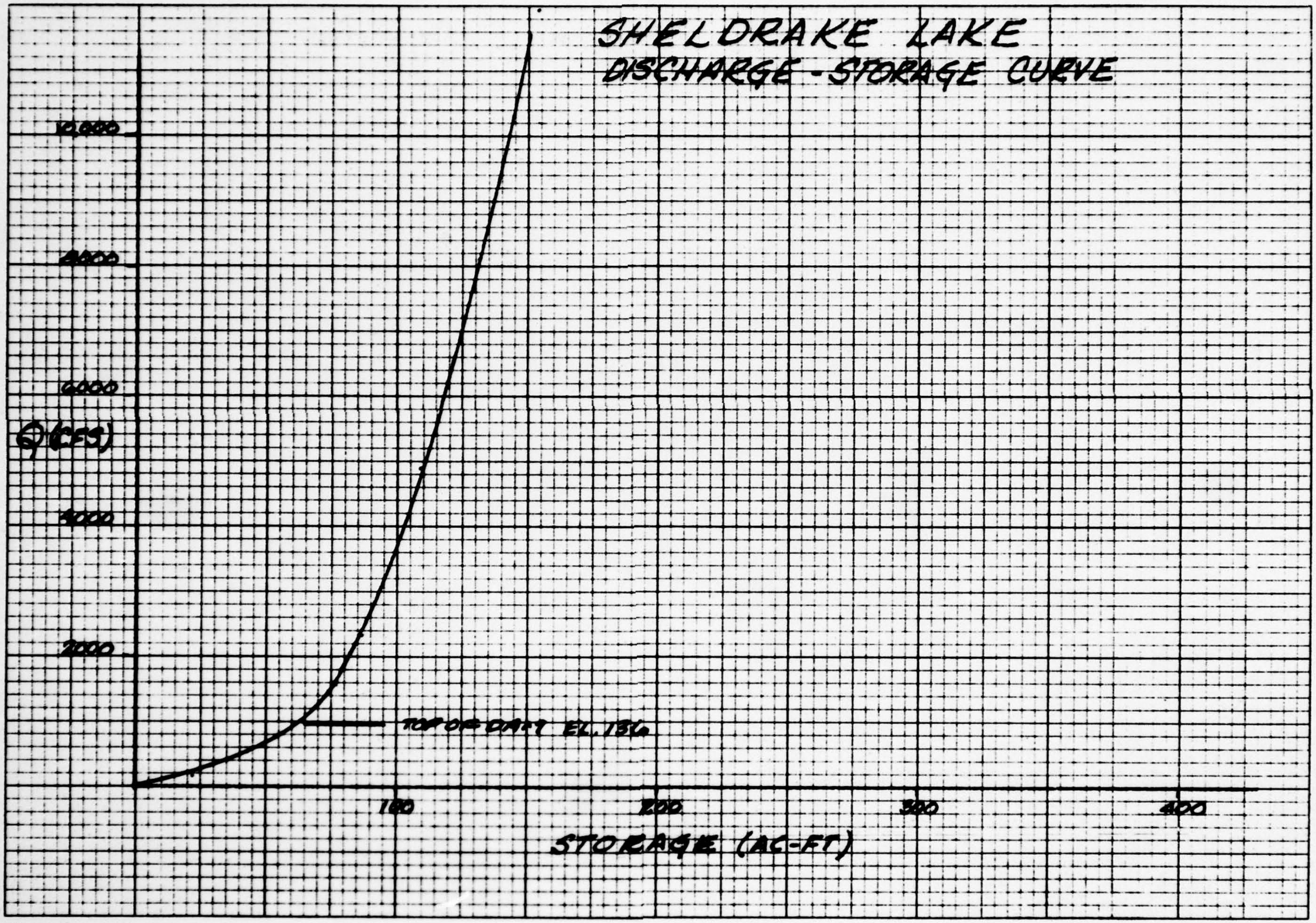
GIVE C,L 2.64 950.00
GIVE ELEVATION TO START FLOW AND HEIGHT 136 12

ELEV	137	FT	DISCHARGE	2508.	CFS
ELEV	138	FT	DISCHARGE	7094.	CFS
ELEV	139	FT	DISCHARGE	13032.	CFS
ELEV	140	FT	DISCHARGE	20064.	CFS
ELEV	141	FT	DISCHARGE	28040.	CFS
ELEV	142	FT	DISCHARGE	36860.	CFS
ELEV	143	FT	DISCHARGE	46449.	CFS
ELEV	144	FT	DISCHARGE	56749.	CFS
ELEV	145	FT	DISCHARGE	67716.	CFS
ELEV	146	FT	DISCHARGE	79310.	CFS
ELEV	147	FT	DISCHARGE	91499.	CFS
ELEV	148	FT	DISCHARGE	104255.	CFS


SHELDRAKE LAKE
STAGE-STORAGE PLOT
Elevation (ft.)
145
140
135
130
100
200
300
Storage (Acre-ft.)

STAGE DISCHARGE TABULATION
FROM CREST OF SPILLWAY

NAME	ELEV.	H	Q PRINC SPWY	Q EMERG SPWY	Q DAM	Q TOT
LARCHMONT	133	—		—	—	—
	134	1		190		190
	135	2		537		537
TOP OF DAM	136	3		987		987
	137	4		1520	2508	4028
	138	5		2124	7094	9218
	139	6		2792	13032	15824
	140	7		3519	20064	23583
	141	8		4299	28040	32339
	142	9		5130	36860	41990
	143	10		6008	46449	52457
	144	11		6932	56749	63681
	145	12		7898	67716	75614
	146	13		8906	79310	88216
	147	14		9953	91499	101452
	148	15		11038	104255	115293


SHELDRAKE LAKE
DISCHARGE - STORAGE CURVE
10,000
8000
6000
Q (CFS)
4000
2000
TOP OF DAM EL. 136
100
200
300
400
STORAGE (AC-FT)

HEC-1 INPUT

```
0OLD NY112PM
0LNNFF
00100 A LARCHMONT  SHELDRAKE LAKE
0110 A RESERVOIR  ROUTING OOF PMF OVER STRUCTURE
0120 A INCLUDES EMERGENCY SPILLWAY ONLY
0130 B      30       1
0140 1       3
0150 K
0160 M      -1             2.67
0170 M      29      56      91     114     127     135     180     307     450     560
0180 M     616     647     855    1500    2436    3922    5777    6301    5344    3720
0190 M    2305    1410     917     644     469     315     184      92      49      26
0200 K       1
0210 Y                               1
0220 1       1                                                 -1
0230 2          22.     43.     65.     88.    109.    132.    154.    177.    200.
0240 3         190.    537.    907.   4028.   9218.  15824.  23503.  32339.  41990.
0250 K      99
0260 A
0270 A
0280 A
0OLD NY112SP
0LNNFF
00100 A LARCHMONT DAM     SHELDRAKE LAKE
0110 A RESERVOIR  ROUTING OF SPF OVER STRUCTURE
0120 A INCLUDES EMERGENCY D SPILLWAY ONLY
0130 B      26       1
0140 1       3
0150 K
0160 M      -1             2.67
0180 M      51      54      83     160     270     339     377     398     503     823
0190 M    1293    2070    3057    3374    2818    1965    1231     769     514     374
0200 M     200     192     114      59      32      18
0210 K       1
0220 Y                               1
0230 1       1                                                 -1
0240 2          21.     43.     65.     87.    109.    132.    154.    177.    200.
0250 3         190.0   537.0   907.0  4028.   9218.0 15824.0 23503.0 32339.0 41990.0
0260 K      99
0270 A
0280 A
0290 A
```

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

LARCHMONT SHELDRAKE LAKE
RESERVOIR ROUTING OF PMF OVER STRUCTURE
INCLUDES EMERGENCY 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	2.67	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

29.	56.	91.	114.	127.	135.	180.	307.	458.	560.
616.	647.	855.	1500.	2436.	3922.	5777.	6301.	5344.	3728.
2305.	1410.	917.	644.	469.	315.	184.	92.	49.	26.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6301.	4997.	1638.	1322.	39666.
INCHES		16.01	22.83	23.03	23.03
AC-FT		2281.	3252.	3280.	3280.

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

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.	22.	43.	65.	88.	109.	132.	154.	177.	200.
OUTFLOW=	0.	190.	537.	987.	4028.	9218.	15024.	23583.	32339.	41990.

TIME	EOP STOR	AVG IN	EOP OUT
1	3.	29.	29.
2	4.	43.	36.
3	6.	74.	56.
4	9.	103.	80.
5	12.	121.	101.
6	14.	131.	117.
7	16.	158.	138.
8	22.	244.	196.
9	32.	383.	347.
10	39.	509.	479.
11	45.	588.	571.
12	47.	632.	626.
13	53.	751.	741.
14	67.	1178.	1271.
15	76.	1968.	2449.
16	85.	3179.	3683.
17	95.	4858.	5781.
18	97.	6079.	6324.
19	94.	5863.	5404.
20	86.	4532.	3778.
21	76.	3013.	2409.
22	68.	1858.	1421.
23	65.	1164.	906.
24	56.	781.	798.
25	45.	557.	577.
26	36.	392.	422.
27	28.	258.	282.
28	20.	138.	174.
29	14.	71.	128.
30	9.	38.	76.
SUM			39625.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6324.	4588.	1635.	1321.	39625.
INCHES		15.99	22.79	23.01	23.01
AC-FT		2276.	3245.	3276.	3276.

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

RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	6301.	4597.	1638.	1322.	2.67
ROUTED TO	0	6324.	4588.	1635.	1321.	2.67

```
******************************
EC-1 VERSION DATED JAN 1973
PDATED AUG 74
HANGE NO. 01
******************************
                      LARCHMONT DAM      SHELDRAKE LAKE
                     RESERVOIR  ROUTING OF SPF OVER STRUCTURE
                     INCLUDES EMERGENCY D SPILLWAY ONLY

                                         JOB SPECIFICATION
                           NQ   NHR  NMIN  IDAY   IHR  IMIN METRC  IPLT  IPRT NSTAN
                           24     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    2.47     0.0     0.0     0.0     0.0       0       0       0

                                           INPUT HYDROGRAPH
          51.       54.       83.      160.      270.      339.      377.      398.      503.      823.
        1293.     2070.     3057.     3374.     2018.     1965.     1231.      769.      514.      374.
         200.      192.      114.       59.       32.       18.

                                  PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                          CFS    3374.     2430.      882.      816.         21226.
                       INCHES               8.46     12.30     12.33          12.33
                        AC-FT              1205.     1751.     1755.          1755.


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

                                          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.       21.       43.       65.       87.      109.      132.      154.      177.      200.
      OUTFLOW=       0.      190.      537.      907.     4020.     9210.    15024.    23503.    32339.    41990.
```

TIME	EOP STOR	AVG IN	EOP OUT
1	6.	51.	51.
2	6.	53.	52.
3	7.	69.	61.
4	11.	126.	96.
5	18.	219.	163.
6	26.	305.	262.
7	30.	358.	338.
8	33.	388.	377.
9	37.	451.	435.
10	47.	663.	627.
11	65.	1058.	1052.
12	73.	1682.	2124.
13	79.	2564.	2872.
14	83.	3216.	3456.
15	78.	3096.	2843.
16	73.	2392.	2075.
17	67.	1598.	1263.
18	60.	1008.	894.
19	49.	642.	663.
20	39.	444.	473.
21	32.	327.	358.
22	26.	236.	262.
23	20.	153.	180.
24	14.	87.	129.
25	9.	46.	84.
26	6.	25.	52.
SUM			21242.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3456.	2439.	881.	817.	21242.
INCHES		8.50	12.27	12.33	12.33
AC-FT		1210.	1748.	1756.	1756.

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

RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	3374.	2438.	882.	816.	2.67
ROUTED TO	0	3456.	2439.	881.	817.	2.67

APPENDIX D

STRUCTURAL STABILITY COMPUTATIONS

I. Overturning about toe due to water/ice effects.

Moment about toe due to water = $1620^{\#}/ft^2 \times \frac{26'}{2} \times \frac{26'}{3}$ = 183,000 ft.-lb ↻

due to ice = $5000^{\#}/ft \times 25'$ = 125,000 ↻

Resisting moment due to mass of masonry dam =

$= \left[10' \times \frac{28'}{2} \times (\frac{2}{3} \times 10') \times 140^{\#}/ft^3\right] + \left[28' \times 4' \times 12' \times 140^{\#}/ft^3\right] = 322{,}000$ ft-lb ↺

Resisting moment due to 10^k lateral force from rockfill =

= $10^k \times 10$ ft moment arm (scaled) = 100,000 ft-lb ↺

FS against overturning for assumed forces =

$$= \frac{322{,}000 + 100{,}000}{183{,}000 + 125{,}000} = 1.4 \pm$$

II. Resistance to sliding effects caused by water/ice.

Lateral force due to water and ice =

$(1620 \text{ psf} \times 26 \times \frac{1}{2}) + 5000 = 26{,}000^{\#}$/linear ft.

Resistance due to friction on plane of sliding at base of masonry dam and rockfill (assuming $\mu = 0.6$) =

$\left[28' \times (\frac{4' + 14'}{2}) \times 140 \text{ pcf} + 46{,}000^{\#}\right](0.6) = 48{,}600^{\#} +$

$$\text{FS against sliding} = \frac{48{,}600^{\#}}{26{,}000} = 1.8 +$$

III. Resistance to overturning about heel after reservoir drawdown

Moment about heel due to lateral pressure of rockfill =

= $10^k \times 6'$ moment arm (scaled) = 60,000 ft-lb ↻

Resisting moment due to mass of masonry and rockfill friction on backface of dam =

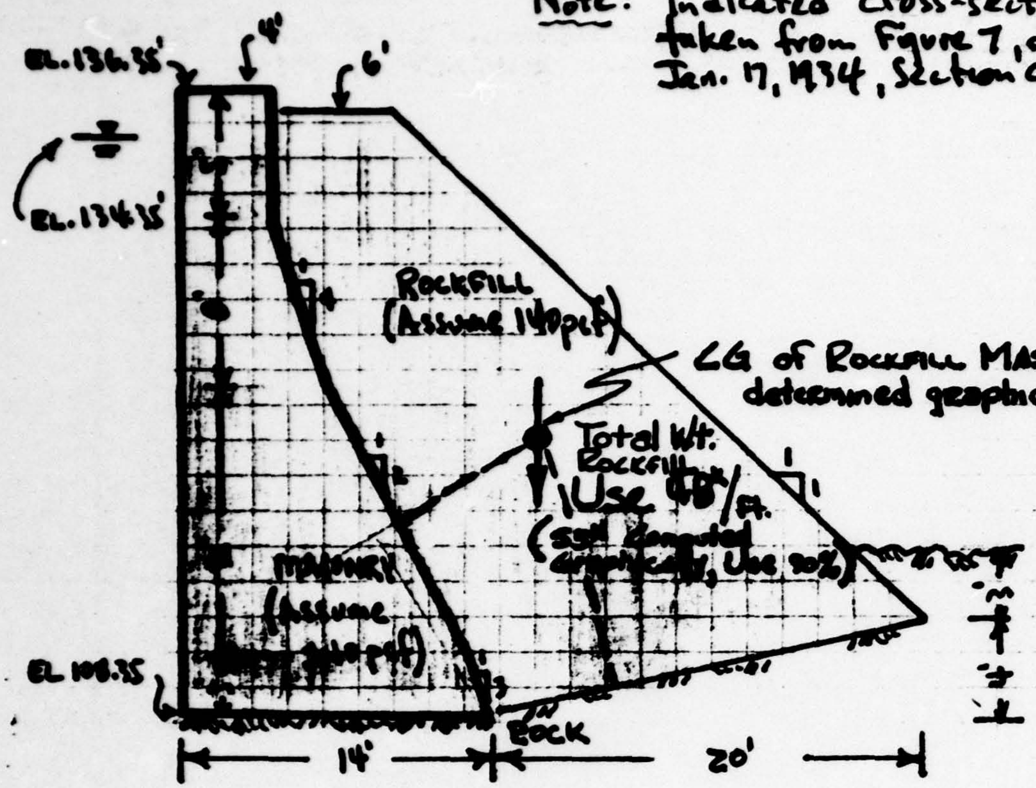
$= (10' \times 28' \times \frac{1}{2} \times 7' \times 140 \text{ pcf}) + (28' \times 4' \times 2' \times 140 \text{ pcf}) + 10^k \times \mu \times 12'$

$= 14{,}000$ ft-lb $+ 31{,}000$ ft-lb $+ 60{,}000$ ft-lb (for $\mu = 0.5$) $= 104{,}000$ ft-lb ↺

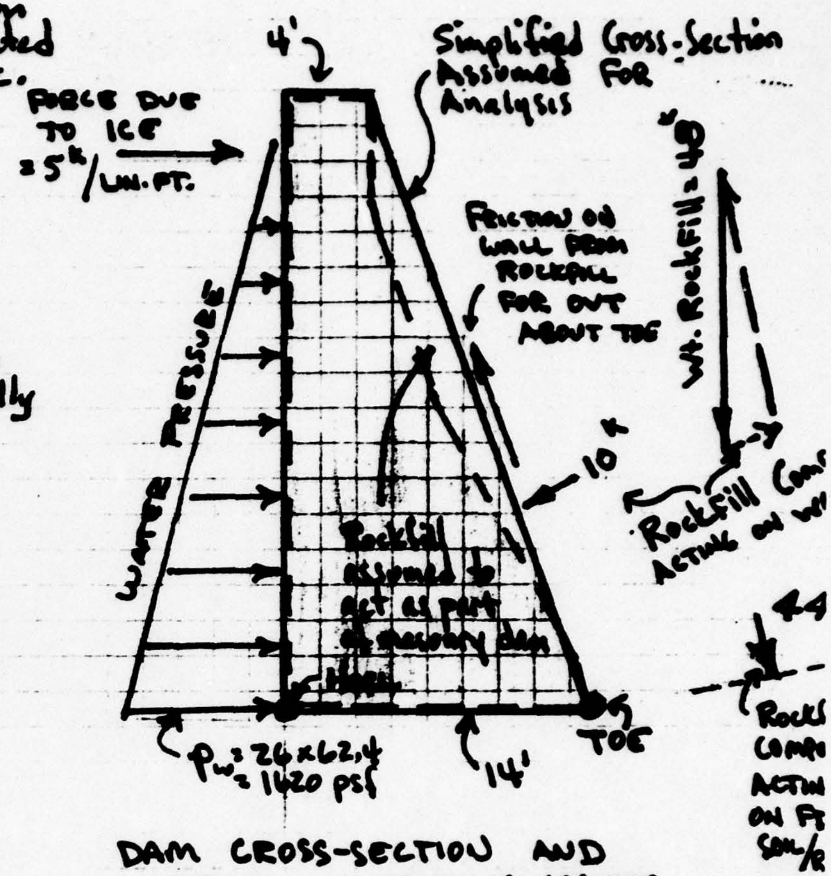
$$FS = 104{,}000 / 60{,}000 = 1.7 +$$

SCALE 1-8

Note: Indicated cross-section taken from Figure 7, dated Jan. 17, 1934, Section C-C.



DAM CROSS-SECTION INDICATED FROM COMPOSITE DESIGN DRAWINGS (ORIGINAL DESIGN AND SUBSEQUENT ENLARGEMENT)



DAM CROSS-SECTION AND LOADING CONDTIONS ASSUMED FOR ANAYSIS TO EVALUATE OVERTURNING ABOUT TOE

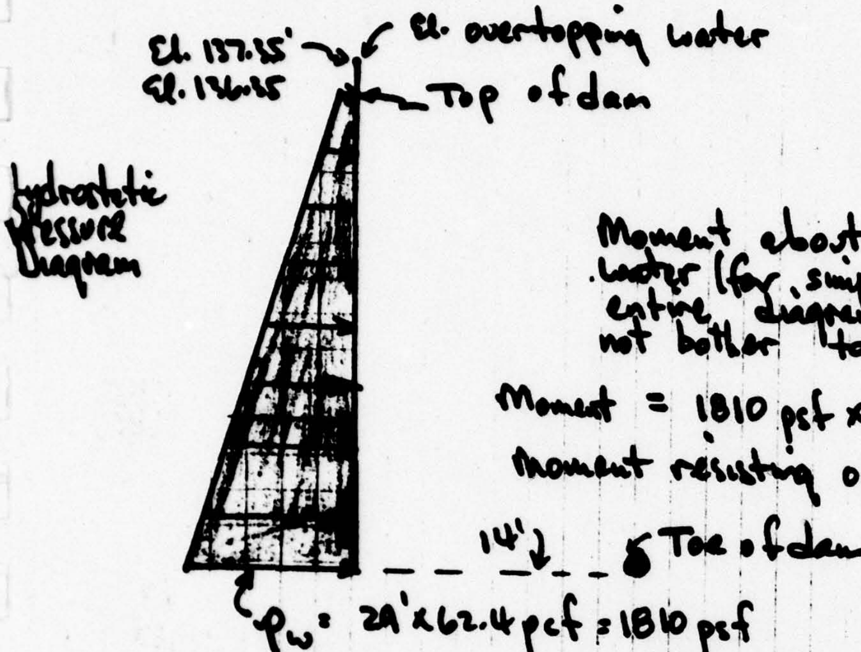
ASSUMPTIONS FOR ANALYSIS

(1) Dam masonry and rockfill have a unit weight of 140 pcf.

(2) Rockfill behind original masonry dam does not act as an integral part of the dam structure to resist overturning (conservative assumption) but does exert lateral force and friction on the back face of the masonry dam.

(3) Ice force near reservoir surface is due to ice one-ft. thick subject to temp change of 10°F

IV. Resistance to Overturning When Reservoir Level Overtops Dam By One Foot



Moment about toe of dam due to water (for simplicity of calculation, use entire diagram up to Elev. 137.35', do not bother to subtract topmost one foot)

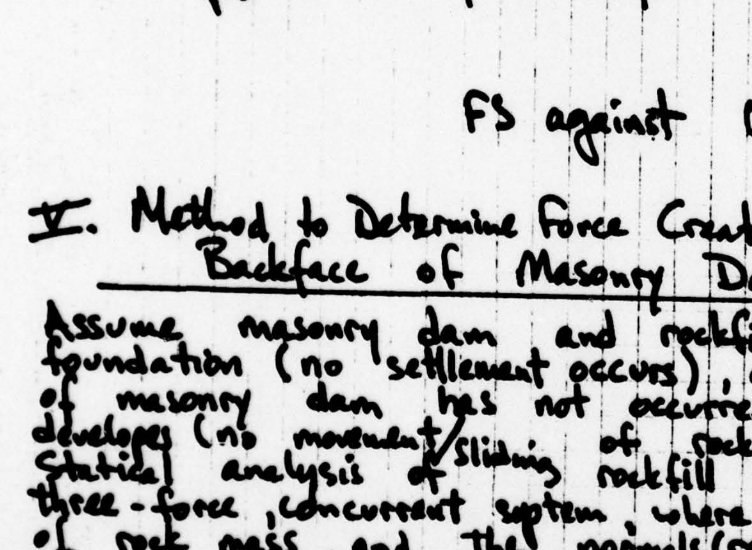
Moment = 1810 psf × $\frac{29'}{2}$ × $\frac{29'}{3}$ = 252,000 ft-lb/lin. ft.

Moment resisting overturning = 422,000 #/ft.

FS against Overturning = $\frac{422,000}{252,000}$ = 1.7 ±

V. Method to Determine Force Created by Rockfill Against Backface of Masonry Dam

Assume masonry dam and rockfill bear on a firm/rock foundation (no settlement occurs), and movement or deflection of masonry dam has not occurred; therefore, no friction develops (no movement/sliding of rockfill) relative to back of dam. Statical analysis of rockfill mass then resolves to be a three-force, concurrent system, where the three forces are weight of rock mass, and the normals (reactions) on the back face of the dam and on the baseline of the rockfill. The normal against the backface of the dam is used in evaluating the stability of the dam.



APPENDIX E

REFERENCES

APPENDIX

REFERENCES

1. Edward Wegmann: The Design and Construction of Dams, John Wiley and Sons (1918)

2. The University of the State of New York - The State Education Department - State Museum and Science Service - Geological Survey: Geological Map of New York (1961)

3. Water Resources Engineers, Inc., Lower Hudson River Basin, Hydrologic Flood Routing Model, January 1977

4. Department of the Army, Office of the Chief of Engineers. National Program of Investigation of Dams; Appendix D: Recommended Guidelines for Safety Inspection of Dams, 1976

5. Linsley and Franzini: Water Resources Engineering, Second Edition, McGraw-Hill (1972)

6. Sherard, Woodward, Gizienski, Clevenger: Earth and Earth - Rock Dams, John Wiley and Sons, Inc., 1963

7. Louis C. Schreiner and John T. Riedel: Hydrometeorological Report No. 51, U.S. Department of Commerce, National Oceanic and Atmospheric Administration National Weather Service, Office of Hydrology; Silver Springs, Maryland, September 1976

8. Delaware Water Supply News, 1942-1953, N.Y. State Library, Library No. S628-1097471 qD349

9. Ven Te Chow: Handbook of Applied Hydrology, McGraw-Hill, 1964

10. The Hydrologic Engineering Center: Computer Program 723-X6-L2010, HEC-1 Flood Hydrograph Package, User's Manual, Corps of Engineers, U.S. Army, 609 Second Street, Davis, California 95616, January 1973

11. The Hydrologic Engineering Center, Art Pabst: Computer Program UHCOMP, Unpublished, Corps of Engineers, U.S. Army, 609 Second Street, Davis, California 95616

12. North Atlantic Regional Water Resources Study Coordinating Committee: Appendix C, Climate, Meteorology and Hydrology, February 1972

13. Soil Conservation Service (Engineering Division): Urban Hydrology for Small Watersheds, Technical Release No. 55, U.S. Department of Agriculture, January 1975

14. H.W. King, E.F. Brater: Handbook of Hydraulics, McGraw-Hill, 5th Edition, 1963