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NATIONAL DAM SAFETY PROGRAM. OTISCO LAKE DAM (INVENTORY NUMBER --ETC(U)
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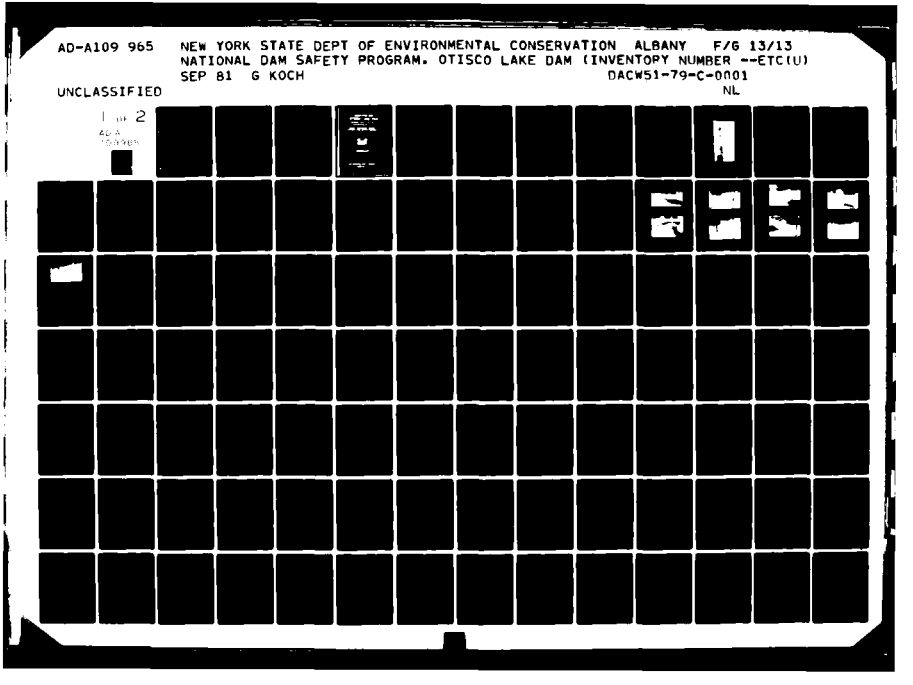

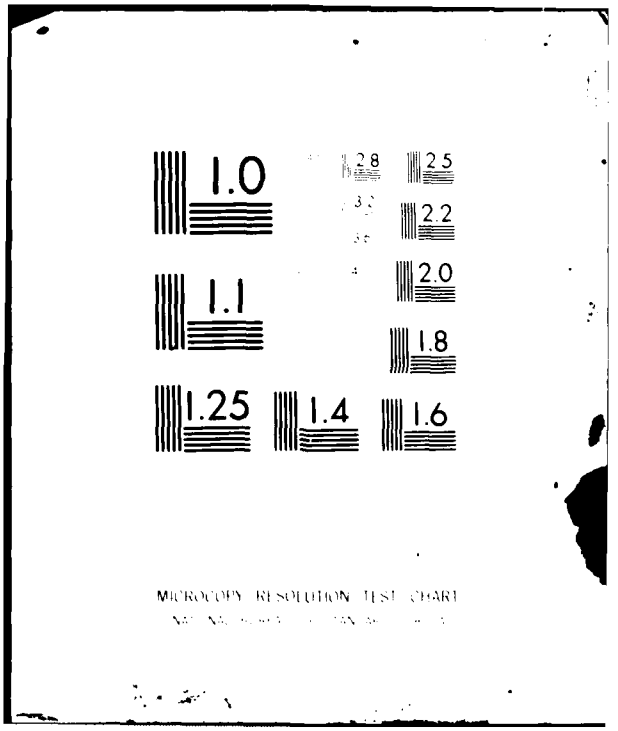
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Otisco Lake Dam
Onondaga County, NY
Oswego River Basin

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.

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

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Further investigations are required to assess the stability of the spillway section. Analysis performed indicated that the structure is only marginally stable under normal loading conditions and is unstable when subjected to severe loading conditions (such as flood flows or ice loading).

The spillway has sufficient capacity to discharge the Probable Maximum Flood (PMF) therefore, it has been assessed as "Adequate" according to the Corps of Engineers screening criteria.

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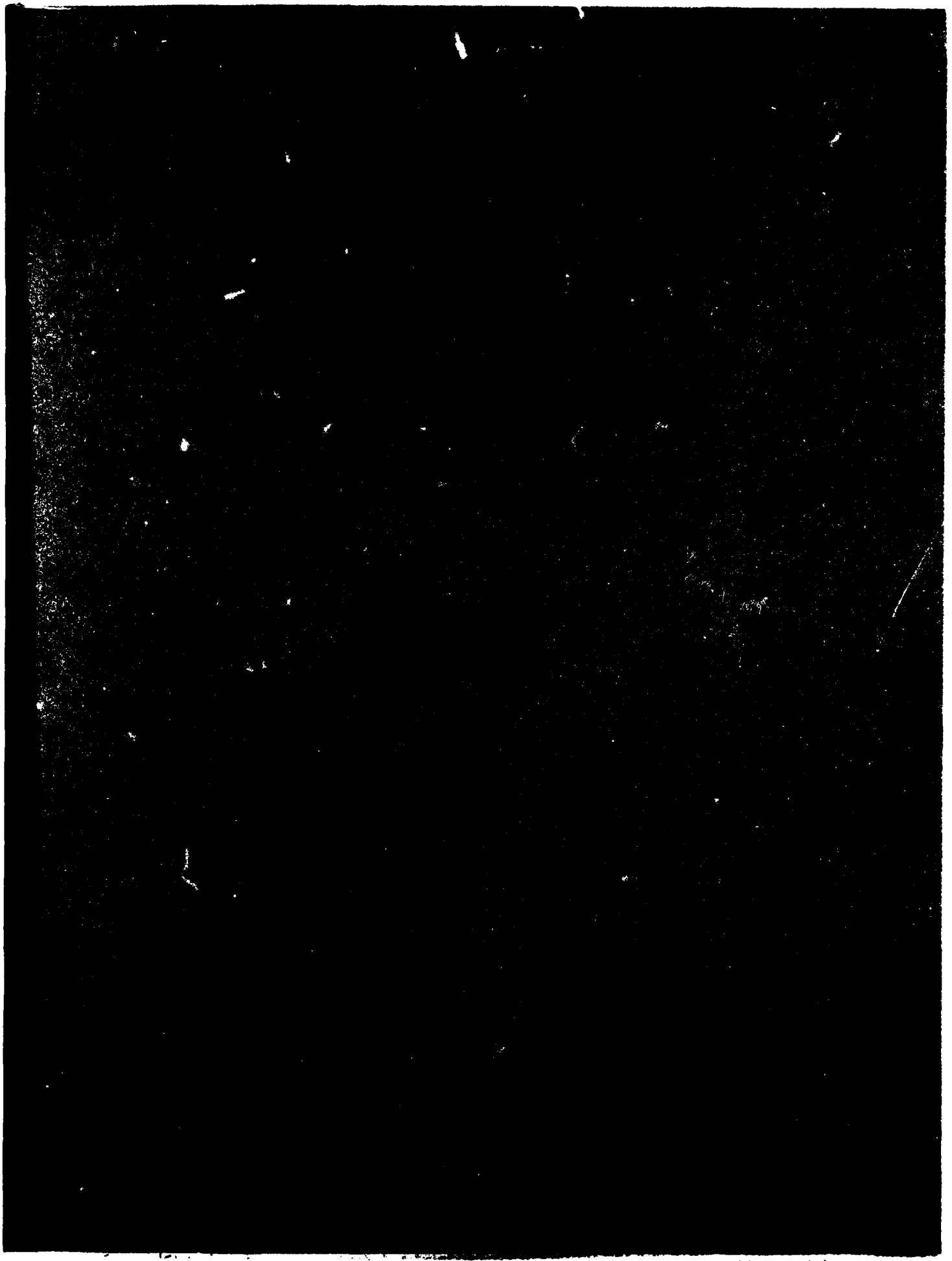


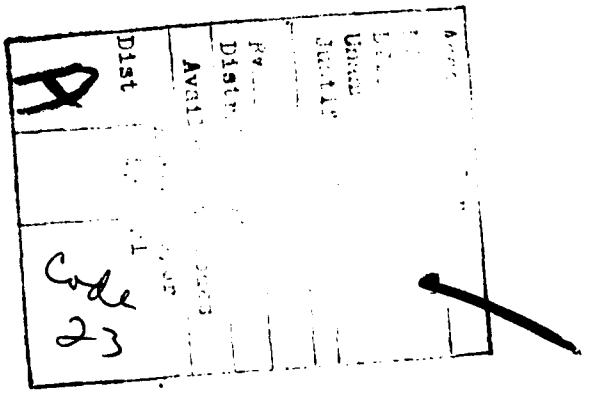
PREFACE

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

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

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

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



PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
OTISCO LAKE DAM
I.D. NO. NY-753
DEC #73B-2751A
OSWEGO RIVER BASIN
ONONDAGA COUNTY

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Otisco Lake Dam I.D. No. NY 753
State Located:	New York
County:	Onandaga
Watershed:	Oswego River Basin
Stream:	Ninemile Creek; tributary to Onandaga Lake
Date of Inspection:	June 12, 1981

ASSESSMENT:

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

Further investigations are required to assess the stability of the spillway section. Analysis performed indicated that the structure is only marginally stable under normal loading conditions and is unstable when subjected to severe loading conditions (such as flood flows or ice loading).

The spillway has sufficient capacity to discharge the Probable Maximum Flood (PMF) therefore, it has been assessed as "Adequate" according to the Corps of Engineers screening criteria.

In addition, the dam has several problem areas which if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within 1 year. These areas are:

1. Repair the deteriorated portions of the concrete on the downstream edges of the concrete paving.
2. Repair the undermining of the concrete paving.
3. Provide a program of periodic inspection and maintenance of the dam and appurtenances, Document this information for future reference.
4. An emergency action plan must be developed and maintained during the life of the structure.

...D. George Koch

George Koch
Chief, Dam Safety Section
New York State Department
of Environmental Conservation
NY License No. 45937

...ceived by:

Richard E. Mayo, EC, USE
Col. W. M. Smith, Jr.
New York District Engineer

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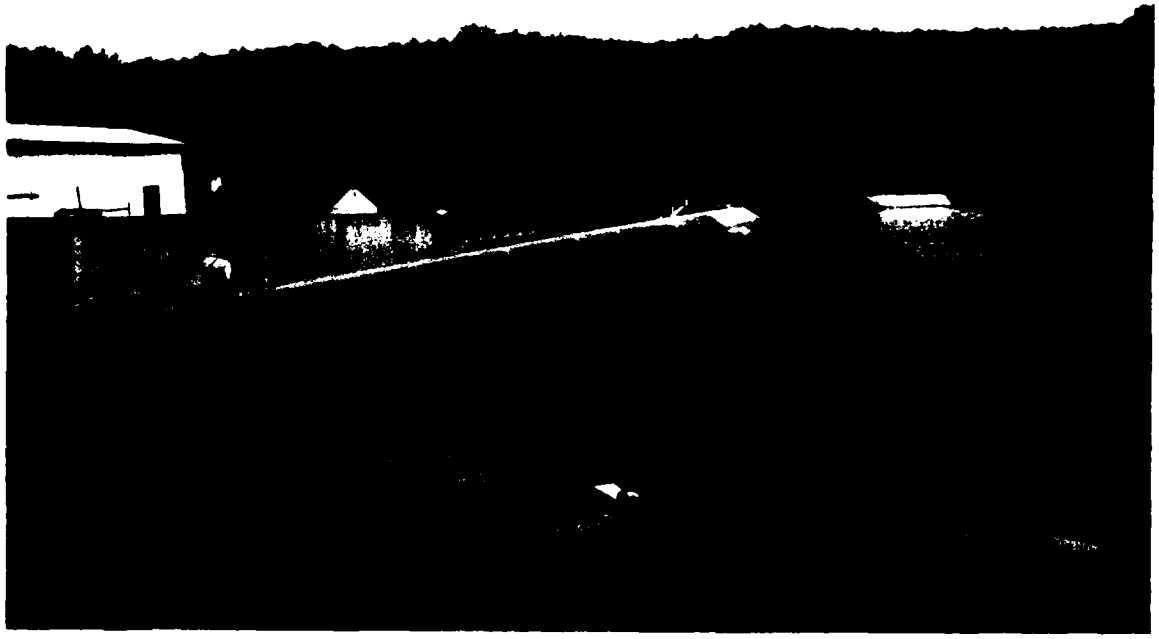


OTISCO LAKE DAM OVERVIEW

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
OTISCO LAKE DAM I.D. NO. NY753
DEC # 73B-2751A OSWEGO RIVER BASIN
ONONDAGA COUNTY

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority
The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

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

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances
The Otisco Lake Dam is a 300 feet long earth dam which has an ogee masonry/concrete primary spillway and a concrete paved secondary spillway abutted by reinforced concrete training walls. The masonry/concrete spillway is 18 feet high and has 55 feet of ogee weir length. The secondary spillway has a total length of 336 feet of uncontrolled overflow section. The secondary spillway channel within the training walls is directed into the natural channel by the training walls. There is a concrete core wall located under the overflow section and around the abutment walls. There are three 4' x 4' low level outlets located adjacent to the primary spillway section.

b. Location
The dam is located on Ninemile Creek, which is tributary to Onondaga Lake, Seneca River and finally the Oswego River. The village of Marietta, New York is downstream of the dam,within one mile.

c. Size
The dam is 18 feet high and impounds 26,000 acre feet at normal pool elevation. The dam is classified as "intermediate" in size.

d. Hazard Classification
The dam is classified as high hazard due to its location, above several low lying homes in the area between the dam and the village of Marietta, New York.

e. Ownership
The dam is owned by Onondaga County Water Authority, P.O. Box 9, Northern

Concourse, Syracuse, New York 13211. The person responsible for operation and maintenance, who was contacted to make the inspection of the dam was Mr. Joseph DeVoldre, (315) 455-7061.

f. Purpose of Dam

The dam was built to increase storage for water supply.

g. Design and Construction History

In 1857, a feeder dam for the Erie Canal was constructed at the site of the present dam. By 1872 the dam had been raised another ten feet for more storage for canal use. In 1907, a new dam of masonry construction (which now makes up the lower portion of the primary spillway) was completed adding another four feet of storage and providing a domestic water source. The dam as it now exists was completed in 1962.

h. Normal Operating Conditions

All flows in excess of the Onondaga County Water Authority requirements are passed over the uncontrolled spillway. The three low level outlets are operable and in good working condition.

1.3 PERTINENT DATA

a. Drainage Area (sq.mi.) 39.15

b. Elevations (ft., USGS datum)

Top of Dam	798.1
Secondary Spillway	790.1
Primary Spillway	786.6
Low Level Outlets	768.6
Original Stream Channel	768. ±

c. Reservoir

Surface Area @ spillway crest (acres)	2291.
Storage @ Top of dam (acre-feet)	47,890.
Storage @ Spillway Crest (acre-feet)	26,067.

d. Dam

Type: Earth fill with reinforced concrete paving on the downstream slope and concrete core wall, an earth embankment makes up the right portion of the dam.

Length (ft)	
Concrete paved overflow section	336.
Earth embankment	300.
Height (ft)	
Upstream Slope, Earth embankment	3H:1V
Downstream Slope, Earth Embankment	3H:1V
Crest Width, Earth Embankment	10.

e. Spillway

Type: Masonry/concrete ogee section

Weir length (ft)	55.
Spillway Capacity (cfs)	
@ Secondary Spillway Crest	1,369.
@ Top of Dam	31,345.

f. Reservoir Drain

Type: Three - 4' x 4' sluiceways with manually controlled gate.

Capacity @ Normal Pool Elevation (cfs)	750.

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Otisco Lake Dam is located in the "Alleghany Plateau" physiographic province of New York State. The hills are smoothly sloping and generally well drained. The deep soils of the area are of the Honeoye-Lima Association.

b. Subsurface Investigation

No information about foundation conditions or borings could be found other than some description from the 1958 Dam Reconstruction Application. This stated the character of the stream bed and banks as "silty sand with traces of gravel, compact sand and gravel, and silty clay in various parts".

c. Design Records

There are no design records for the original dam constructed at the site. The only records available on the most recent reconstruction are plans which are included in App.F. Drawings or can be obtained from O'Brien and Gere, Engineers at 1304 Buckley Road, Syracuse, N.Y. (315) 451-4700.

2.2 CONSTRUCTION RECORDS

There are no construction records available for the original construction or reconstruction of Otisco Lake Dam.

2.3 OPERATION RECORDS

Operating records are available at the water station located adjacent to the dam. Any other data available regarding water levels, usage, or quality can be obtained from Mr. Joseph DeVoldre, Water Plant Manager, (315) 455-7061.

2.4 EVALUATION OF DATA

The data presented in this report is compiled from information contained in the files of Department of Environmental Conservation, drawings from O'Brien and Gere, Engineers, and data gained from the visual inspection. This information appears to be adequate and reliable for Phase I Inspection purposes.

SECTION 3: VISUAL INSPECTION

3:1 FINDINGS

a. General

Visual inspection of the Otisco Lake Dam and surrounding watershed was conducted on June 12, 1981. The weather was cloudy and the temperature ranged in the seventies. The reservoir water surface was at the primary spillway crest.

b. Dam

Both the earth embankments and the concrete paved section of the embankment appear to be in very good condition and well maintained. The vertical and horizontal alignments of the embankments are good. Some minor deterioration of concrete and minor undermining were found at the downstream edge of the secondary spillway (Photos 6 & 7). There is a roadway that passes between the spillway training wall and the right earth embankment. (See Photo #5). The road elevation is approximately 2.5 feet above the secondary spillway crest, therefore, under extreme flooding conditions, it would be possible for flow to pass over the dam on the roadway before overtopping occurs. There are stop logs available at the dam to block off the road, preventing erosion and hazard due to extreme floods. However, there is no emergency action plan detailing how or when to implement a plan.

c. Seepage

There was no seepage or sloughing found at the toe or any of the slopes.

d. Spillway

The overflow spillway is in good condition. Both the masonry and concrete are well maintained. The secondary spillway concrete paving is also in good condition.

e. Reservoir Drain

There are three 4'x 4' sluiceways located adjacent to the primary spillway. The manually operated valves are in good working condition, located at the secondary spillway elevation. A 36 inch and 24 inch pipe are also available to draw off water into the supply system.

f. Reservoir

Originally a naturally occurring lake, the area around it appears very stable. Sedimentation is not a problem with the dam at present.

3.2 EVALUATION OF OBSERVATIONS

The only deficiencies that could be found with the visual inspection was the small amount of concrete deterioration and slight undermining of the concrete paving on the left side of the spillway channel.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

The normal water surface is approximated by the uncontrolled overflow primary spillway. The other draw from the reservoir is through a 36 inch or 24 inch pipeline to the Onondaga County Water Authority distribution system.

4.2 MAINTENANCE OF THE DAM

The dam is maintained by the Onondaga County Water Authority. Maintenance is considered satisfactory. All valves and gates are operated and lubricated annually.

4.3 WARNING SYSTEM

There is no warning system in effect.

4.4 EVALUATION

The dam and appurtenances have been maintained in a satisfactory condition, except for the minor maintenance noted in this report.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

Otisco Lake Dam is located about 3/4 mile southeast of the Village of Marietta. The lake is fed at its upper end by Spafford Creek,while downstream of the dam, the excess flow is discharged into Ninemile Creek. The total drainage area of the basin is 39.15 square miles and the surface area of the lake at normal pool is 3.71 square miles. The basin drains generally in a northerly direction. Its slope ranges from moderate to steep and, except for some marshy areas south of the lake, is fairly well drained. It was analysed as a single basin.

5.2 ANALYSIS CRITERIA

The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers HEC-1 computer program incorporating the "Snyder Synthetic Unit Hydrograph" method and the "Modified Puls" flood routing procedure. The floods selected for analysis were the PMF and 1/2 the PMF in accordance with the recommended guidelines of the Corps of Engineers.

5.3 SPILLWAY CAPACITY

The spillway has a capacity of 31,345 cfs at the top of the dam. An inflow of 17,706 cfs generated by a storm equal to 1/2 the PMF will produce a maximum outflow of 8901 cfs. An inflow of 35,412 cfs resulting from the PMF will produce a maximum outflow of 22,719 cfs which is well below the spillway capacity of 31,345 cfs at top of dam.

5.4 RESERVOIR CAPACITY

The reservoir capacity to normal pool elevation is 26,067 acre-feet. Surcharge storage to top of dam is an additional 21,823 acre-feet, creating a total storage of 47,890 acre-feet. The surcharge storage between spillway and dam crests is equivalent to 10.5 inches of runoff.

5.5 FLOODS OF RECORD

The maximum known flood of record in Ninemile Creek occurred on June 23, 1972 at a point 1.8 miles downstream from Otisco Lake Dam. Ratioed by drainage area the estimated inflow at Otisco Lake Dam was 913 cfs. The resulting depth of flow over the spillway crest would be about 2.2 feet.

5.6 OVERTOPPING POTENTIAL

The PMF analysis indicates that the dam will not be overtopped by a storm equal to 1/2 the PMF nor by the PMF.

5.7 EVALUATION

The spillway is adequate to pass the flows produced by 1/2 the PMF as well as the PMF without overtopping of the dam. The structure is, therefore, assessed as "Adequate".

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation

Both the earth embankment and the masonry/concrete spillway section appeared stable. No sloughing or subsidence was found on the dam.

b. Design and Construction Data

No information regarding structural stability of the dam or spillway section was located.

c. Operating Records

Any data or information on operations of the Otisco Lake dam can be found at the pumping station located at the dam.

d. Post Construction Changes

The dam as it exists is a reconstruction of a masonry dam that was built in 1907. The overflow spillway was raised and the embankments were paved with concrete.

6.2 STRUCTURAL STABILITY ANALYSIS

A structural stability analysis was conducted for the masonry/concrete gravity spillway portion of the dam. The results of the analysis are as follows:

Case	Overturning Safety Factor	Resultant in Middle Third	Sliding Safety Factor
a. Normal conditions; water surface at spillway crest	1.73	Yes	1.03
b. Case a. plus ice load of 5,000 lb/ft	1.30	No	0.76
c. 1/2 PMF flows; water surface 6.4 ft above spillway crest	1.33	No	0.64
d. PMF flows; water surface 9.6 feet above spillway crest	1.19	No	0.54
e. Seismic loading; water surface at spillway crest	1.66	Yes	0.73

The analysis indicates that this portion of the dam is marginally stable under normal loading conditions and would be unstable under severe loading conditions (ice loading, flood flows). The analysis was based on available information and was done in accordance with Corps of Engineers "Recommended Guidelines", assuming full uplift pressure under the upstream toe decreasing to tailwater pressure under the downstream toe.

Further investigations are required to better assess the stability of the spillway section. Subsurface explorations and concrete cores are required to obtain information about the uplift forces acting on the dam. An accurate cross section of the spillway should be developed for the analysis. A revised stability analysis should then be performed using this data. Based on the results of these analyses, the need for modifications to the structure should be determined.

This structure is located in Seismic Zone 2. A seismic stability analysis was performed assuming a seismic coefficient of 0.1. The results of this analysis (shown on page 8) indicate that the safety factor against sliding fall below 1.0 when seismic considerations are included.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I Inspection of Otisco Lake Dam revealed that the spillway is adequate to pass the Probable Maximum Flood according to the Corps of Engineers screening criteria.

The inspection also revealed that the stability of this structure is questionable. Analysis performed indicated that the structure is only marginally stable under normal loading conditions and is unstable when subjected to severe loading conditions (such as flood flows or ice loading).

b. Adequacy of Information

The information which was available for the preparation of this report presented a fairly complete history of the structure. Final plans of the most recent modification did not reveal the actual configuration of the foundation of the spillway. Therefore, some assumptions had to be made on the section of the spillway. Overall, the information is considered adequate for Phase I Inspection purposes.

c. Need for Additional Investigations

Further investigations are required to assess the stability of the spillway section. Subsurface explorations and concrete cores are required to obtain information about the uplift forces acting on the dam. An accurate cross section of the spillway should be developed for the analysis. A revised stability analysis should then be performed using this data. Based on the results of these analyses, the need for modifications to the structure should be determined.

d. Urgency

The additional stability investigation must be initiated within 6 months from the date of notification. Within 1 year of notification, remedial measures as a result of these investigations must be initiated, with completion of the measures during the following year. In the interim, develop an emergency action plan for the notification of downstream residents and proper governmental authorities in the event of overtopping and provide round-the-clock surveillance of the dam during periods of extreme run-off.

7.2 RECOMMENDED MEASURES

1. The results of the stability investigation will determine the appropriate remedial actions for the spillway section.

2. Repair the deterioration of the concrete on the downstream edges of the concrete pavement.

3. Repair the undermining of the concrete paving.

4. Provide a program of periodic inspection and maintenance of the dam and appurtenances. Document this information for future reference.

5. An emergency action plan must be developed and maintained during the life of the structure.

APPENDIX A

PHOTOGRAPHS

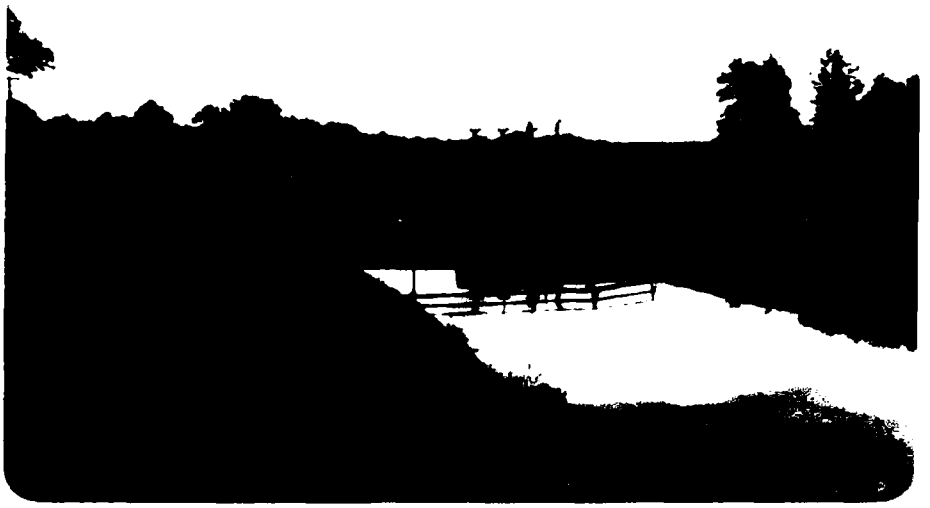


PHOTO #2 DOWNSTREAM VIEW OF DAM

PHOTO # 3 SPILLWAY CREST

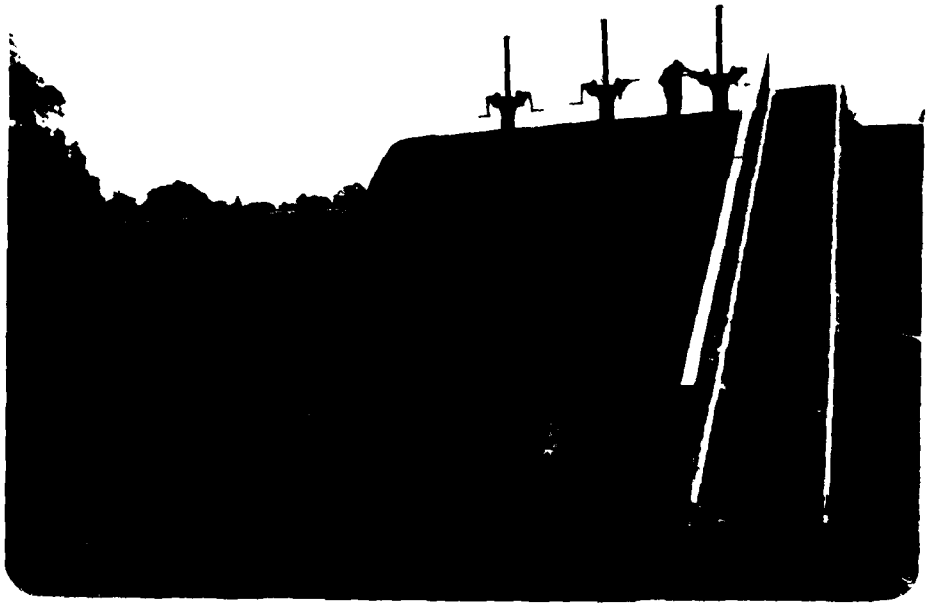


PHOTO # 4 RESERVOIR DRAINS, VALVE CONTROLS

PHOTO # 5. ROADWAY LOCATED BETWEEN SPILLWAY ABUTMENT AND LEFT EARTH EMBANKMENT

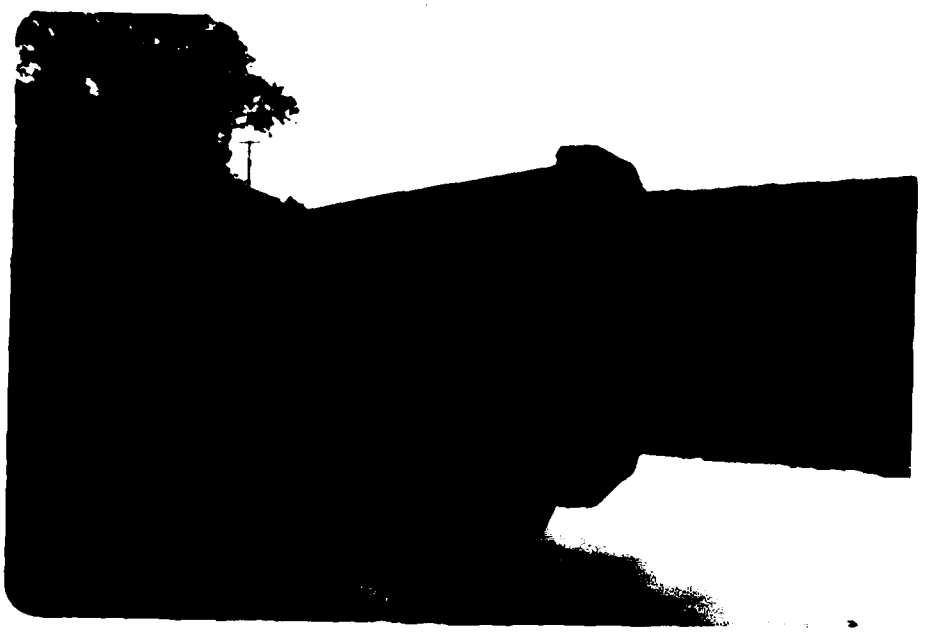


PHOTO # 6 MINOR DETERIORATION OF CONCRETE

PHOTO # 7 MINOR UNDERMINING OF CONCRETE PAVEMENT

PHOTO # 8 DOWNSTREAM VIEW OF SPILLWAY
AND NORMAL TAILWATER

PHOTO # 9 CONCRETE PAVING ON LEFT EMBANKMENT

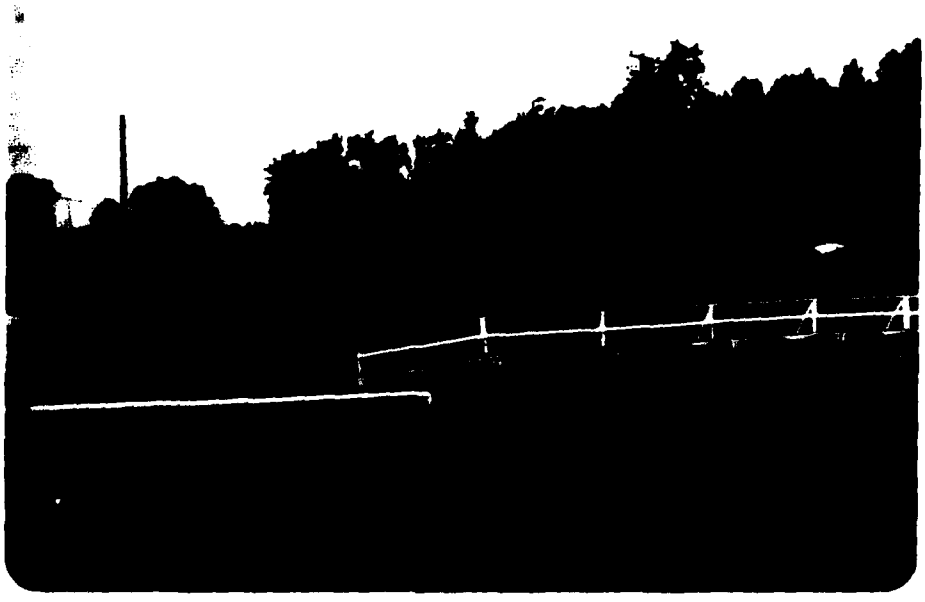


PHOTO # 10 DOWNSTREAM CHANNEL

APPENDIX B

VISUAL INSPECTION CHECKLIST

93-15-3(9/80)

VISUAL INSPECTION CHECKLIST

1) **Basic Data**

a. General

Name of Dam Otisco Lake Dam

Fed. I.D. # 753 DEC Dam No. 733-2751

River Basin Oswego River Basin

Location: Town Marcellus County Onondaga

Stream Name Nine Mile Creek

Tributary of Onondaga

Latitude (N) 42° 54.3' Longitude (W) 76° 18.8'

Type of Dam Earth w/ concrete paving

Hazard Category high

Date(s) of Inspection June 12, 1981

Weather Conditions cloudy, 70's

Reservoir Level at Time of Inspection At primary spillway crest

b. Inspection Personnel Ken Harmer, Jamie Veitch

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

Mr. Joseph J. DeVoldre
Water Plant Manager, Onondaga Cty. Water Authority
P.O. Box 9, Northern Concourse, Syracuse NY 13211
(315) 455-7061

d. History:

Date Constructed 1857 Date(s) Reconstructed 1872, 1907

Designer (1962) O'Brien & Gere Engrs. Syracuse NY 1962

Constructed By ~ UNKNOWN ~

Owner Onondaga County Water Authority

93-15-3(9/80)

2) Embankment

a. Characteristics

(1) Embankment Material EARTH EMBANKMENTS, CONCRETE PAVED EARTH ABUTMENTS FORMING AUX. SPILLWAY

(2) Cutoff Type CONCRETE

(3) Impervious Core —

(4) Internal Drainage System PIPED TO OUTLET CHANNEL - NO FLOW @ TIME OF INSPECTION

(5) Miscellaneous —

b. Crest

(1) Vertical Alignment GOOD

(2) Horizontal Alignment GOOD

(3) Surface Cracks NONE

(4) Miscellaneous —

c. Upstream Slope

(1) Slope (Estimate) (V:H) 1:3 EARTH PORTION

(2) Undesirable Growth or Debris, Animal Burrows NONE

(3) Sloughing, Subsidence or Depressions NONE

(4) Slope Protection Vegetation

(5) Surface Cracks or Movement at Toe None

d. Downstream Slope

(1) Slope (Estimate - V:H) 1:3

(2) Undesirable Growth or Debris, Animal Burrows None

(3) Sloughing, Subsidence or Depressions None

(4) Surface Cracks or Movement at Toe None

(5) Seepage None

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

(7) Condition Around Outlet Structure excellent

(8) Seepage Beyond Toe None

e. Abutments - Embankment Contact

good no signs of erosion, seepage

93-15-3(9/80)

(1) Erosion at Contact NONE

(2) Seepage Along Contact NONE

3) Drainage System

a. Description of System

b. Condition of System good

c. Discharge from Drainage System NONE

4) Instrumentation (Momumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)

NONE

93-15-3(9/80)

5) Reservoir

a. Slopes STABLE

b. Sedimentation NOT A PROBLEM AROUND DAM

c. Unusual Conditions Which Affect Dam NONE

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) Highway runs between embankment and abutment

b. Seepage, Unusual Growth NONE

c. Evidence of Movement Beyond Toe of Dam NONE

d. Condition of Downstream Channel good

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

a. General masonry/concrete ogee section

b. Condition of Service Spillway good condition

c. Condition of Auxiliary Spillway concrete pavement - very good condition

d. Condition of Discharge Conveyance Channel good

8) Reservoir Drain/Outlet

Type: Pipe _____ Conduit _____ Other spillway

Material: Concrete ✓ Metal _____ Other _____

Size: 4' x 4' Length 17'

Invert Elevations: Entrance _____ Exit _____

Physical Condition (Describe): good Unobservable _____

Material: concrete

Joints: could not see Alignment _____

Structural Integrity: apparently sound

Hydraulic Capability: total 750 cfs at normal pool

Means of Control: Gate ✓ Valve _____ Uncontrolled _____

Operation: Operable ✓ Inoperable _____ Other _____

Present Condition (Describe): good

9) Structural

a. Concrete Surfaces good

b. Structural Cracking None

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

d. Junctions with Abutments or Embankments good

e. Drains - Foundation, Joint, Face Not Flowing

f. Water Passages, Conduits, Sluices good condition

g. Seepage or Leakage None FOUND.

h. Joints - Construction, etc. good

i. Foundation APPARENTLY GOOD - NO SIGNS SETTLEMENT OR MOVEMENT

j. Abutments GOOD

k. Control Gates OPERABLE

l. Approach & Outlet Channels GOOD

m. Energy Dissipators (Plunge Pool, etc.) GOOD CONDITION

n. Intake Structures good

o. Stability good

p. Miscellaneous WELL MAINTAINED STRUCTURE

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

a. Description and Condition PUMP STATION LOCATED IMMEDIATELY DOWNSTREAM WELL MAINTAINED.

11) Operation Procedures (Lake Level Regulation):

No SET PROCEDURES, EXCEPT TO DRAW WATER SUPPLY AND KEEP LAKE LEVEL AT CREST.

APPENDIX C

HYDROLOGIC/HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS

Otisco Lake

Drainage area = 39.15 mi^2
(Planimetred from Quad) = 25,056 acres

Lake Area (@ El. 788) = 3.71 mi^2
(Planimetred from Quad) = 2374 acres

Shoreline = 13.4 mi (Gazetteer)
Max. length of Lake = 5.75 "
Max. width " = 0.75 "
Max. depth " = 70 feet
Normal pool elev. = 786.6 " (From Plans as received 1-5-81)

(Feasibility Report for Oswego River Watershed, May 1978)

Stage - Capacity (From Fig. A-30, Feasibility Report May 1978)

Elev.	Vol. (Acre-feet)
722	0
780	13,600
785	23,000
788	28,750
790	32,500
795	42,000

Otisco Lake

Precipitation: ≤ PMP = 21.0" (H.M. No. 33)

DUR.	6	12	24	48
%	94	108	118	126

Drainage area = 39.15 mi^2

$$L = 12.5 \times \frac{62,500}{12 \times 5280} = 12.33 \text{ mi.}$$

$$L_{ca} = 4.8 \times \frac{62,500}{12 \times 5280} = 4.73 \text{ mi.}$$

Assume $C_t = 2.2$ $C_p = 0.625$

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

$$= 2.2(12.33 \times 4.73)^{0.3} = 7.45 \text{ hr.}$$

$$t_r = \frac{t_p}{5.5} = \frac{7.45}{5.5} = 1.35 \text{ hr.}$$

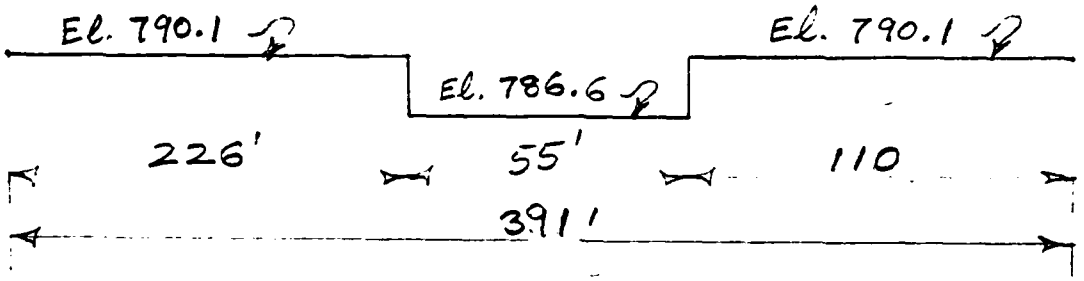
= 1 hr 21 min. Use <u>1 hr 30 min.</u>

$$T_p = t_p + 0.25(t_R - t_r)$$

$$= 7.45 + 0.25(1.50 - 1.35)$$

$$= 7.45 + 0.04 = 7.49 \text{ hr.}$$

Tisco Lake



Total spillway Length = 391'
Spillway crest elev. = 786.6 (From Plans as revised 1-5-81)
Assume C = 3.8 (Ogee Section)
C = 3.4 (Dam)

EL	L_1	C_1	H_1	L_2	C_2	H_2	Q_1	Q_2	Q
786.6	55	3.8	0	-	-	-	0	-	0
788	55	3.8	1.4	-	-	-	347	-	347
789	55	3.8	2.4	-	-	-	777	-	777
790.1	55	3.8	3.5	-	-	-	1369	-	1369
791	55	3.8	4.4	336	3.4	0.9	1929	975	2904
792	55	3.8	5.4	336	3.4	1.9	2623	2992	5615
793	55	3.8	6.4	336	3.4	2.9	3384	5642	9026
794	55	3.8	7.4	336	3.4	3.9	4207	8799	13006
795	55	3.8	8.4	336	3.4	4.9	5088	12391	17479

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	798.1	2973	47890
2) Design High Water (Max. Design Pool)	–	–	–
3) Auxiliary Spillway Crest	790.1	–	–
4) Pool Level with Flashboards	–	–	–
5) Service Spillway Crest	786.6	2291	26067

DISCHARGES

	Volume (cfs)
1) Average Daily	–
2) Spillway @ Maximum High Water	31345
3) Spillway @ Design High Water	–
4) Spillway @ Auxiliary Spillway Crest Elevation	–
5) Low Level Outlet	750
6) Total (of all facilities) @ Maximum High Water	32096
7) Maximum Known Flood	913
8) At Time of Inspection	0

CREST: ELEVATION: 798.1

Type: Masonry, broad crested

Width: Length: 336

Spillover —

Location —

SPILLWAY:

SERVICE		AUXILIARY
786.6	Elevation	None
Ogee	Type	—
—	Width	—
	Type of Control	
✓	Uncontrolled	—
	Controlled:	
—	Type (Flashboards; gate)	—
—	Number	—
—	Size/Length	—
	Invert Material	—
	Anticipated Length of operating service	—
—	Chute Length	—
	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	—

HYDROMETEROLOGICAL GAGES:

Type : Water-Stage recorder # 04240180

Location: Ninemile Creek, 1.8 mi downstream from Otisco Lake Dam.

Records:

Date - June 23, 1972

Max. Reading - 1030 cfs (gage height - 8.65 ft.)

FLOOD WATER CONTROL SYSTEM:

Warning System: _____

_____

Method of Controlled Releases (mechanisms):

_____

_____

DRAINAGE AREA: 39.15 Sq. mi

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Woods, open fields, substantial residential devel.

Terrain - Relief: Moderate to steep slopes, generally well drained.

Surface - Soil: High to medium-fine, moderately well drained soils of glacial till origin.

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

No alterations planned or anticipated

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

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

Significant number of homes and cottages along and/or near the lake shore.

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

Location: _____

Elevation: _____

Reservoir:

Length @ Maximum Pool 5.75 (Miles)

Length of Shoreline (@ Spillway Crest) 13.4 (Miles)

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MODIFIED FOR HONEYWELL APR 79
**********
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**********
NEW YORK STATE
DEPT OF ENVIRONMENTAL CONSERVATION
FLOOD PROTECTION BUREAU
**********
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```
    1                A1   OTISCO LAKE
    2                A2   PHASE 1
    3                A3   PMF
    4                B    200       1       30        0        0        0        0        0        0        0
    5                B1     5
    6                J      1       6        1
    7                J1    .2      .4       .5       .6       .8        1
    8                K              1                          2        2        1
    9                K1   INFLOW FROM BASIN
   10                M      1       1   39.15
   11                P              21       94     .108      118      126
   12                T                                                       1       .1
   13                W   7.49    .625
   14                X     -2      -.1      2.5
   15                K      1       1                          2        2        1
   16                K1   ROUTE THROJGH RESERVOIR
   17                Y                                  1        1
   18                Y1     1                                                -788      -1
   19                Y4  786.6     788      789    790.1      791      792      793      794      795
   20                Y5             347      777     1369     2904     5615     9026    13006    17479
   21                SS     0   13600    23000    28750    32500    42000
   22                SE   722     780      785      788      790      795
   23                S3  786.6
   24                SD  798.1     3.8      1.5       50
   25                K     99
   26                A
   27                A
   28                A
   29                A
   30                A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
RUNOFF HYDROGRAPH AT 1
ROUTE HYDROGRAPH TO 1
END OF NETWORK

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**********                                                    **********
FLOOD HYDROGRAPH PACKAGE (HEC-1)                              NEW YORK STATE
DAM SAFETY VERSION     JULY 1978                              DEPT OF ENVIRONMENTAL CONSERVATION
  LAST MODIFICATION  26 FEB 79                                FLOOD PROTECTION BUREAU
  MODIFIED FOR HONEYWELL APR 79                             **********
**********

RUN  DATE 07/21/81
                        OTISCO LAKE
                        PHASE 1
                        PMF

                                    JOB SPECIFICATION
          NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
         200        1       30        0        0        0        0        0        0        0
                                   JOPER      NWT   LROPT    TRACE
                                       5        0        0        0

                              MULTI-PLAN ANALYSES TO BE PERFORMED
                                   NPLAN= 1 NRTIO= 6 LRTIO= 1
                        RTIOS=   0.20   0.40   0.50   0.60   0.80   1.00

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

                                  SUB-AREA RUNOFF COMPUTATION

                        INFLOW FROM BASIN
                                  ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                                      1       0       0       0       2       2       1       0       0

                                    HYDROGRAPH DATA
                   IHYDG     IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO   ISNOW   ISAME   LOCAL
                       1        1    39.15       0.    39.15       0.       0.       0       0       0

                                      PRECIP DATA
                                SPFE      PMS       R6      R12      R24      R48      R72      R96
                                  0.    21.00    94.00   108.00   118.00   126.00       0.       0.
TRSPC COMPUTED BY THE PROGRAM IS 0.843

                                      LOSS DATA
                  LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                      0      0.      0.    1.00      0.      0.    1.00    1.00    0.10      0.      0.

                                  UNIT HYDROGRAPH DATA
                                TP=  7.49    CP=0.63    NTA=  0

                                  RECESSION DATA
                                STRTQ=   -2.00    QRCSN=   -0.10    RTIOR= 2.50
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 5.79 AND R= 4.47 INTERVALS
     EXP UNDERFLO  AT LOCATION     230246
     EXP UNDERFLO  AT LOCATION     230246

               UNIT HYDROGRAPH 27 END-OF-PERIOD ORDINATES, LAG=  7.45 HOURS, CP= 0.62  VOL= 1.00
            172.     623.    1218.    1769.    2094.    2085.    1786.    1427.    1140.     910.
            727.     581.     464.     370.     296.     236.     189.     151.     120.      96.
             77.      61.      49.      39.      31.      25.      20.

      0                                 END-OF-PERIOD FLOW
    MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q       MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q
```

1.01	1.30	1	0.01	0.	0.01	71.	1.07	7.30	101	0.	0.	0.	16.
1.01	3.00	2	0.01	0.	0.01	65.	1.07	9.00	102	0.	0.	0.	14.
1.01	4.30	3	0.01	0.	0.01	59.	1.07	10.30	103	0.	0.	0.	13.
1.01	6.00	4	0.01	0.	0.01	54.	1.07	12.00	104	0.	0.	0.	12.
1.01	7.30	5	0.04	0.	0.04	50.	1.07	13.30	105	0.	0.	0.	11.
1.01	9.00	6	0.04	0.	0.04	45.	1.07	15.00	106	0.	0.	0.	10.
1.01	10.30	7	0.04	0.	0.04	41.	1.07	16.30	107	0.	0.	0.	9.
1.01	12.00	8	0.04	0.	0.04	38.	1.07	18.00	108	0.	0.	0.	8.
1.01	13.30	9	0.29	0.	0.29	34.	1.07	19.30	109	0.	0.	0.	8.
1.01	15.00	10	0.60	0.08	0.52	45.	1.07	21.00	110	0.	0.	0.	7.
1.01	16.30	11	0.24	0.09	0.15	94.	1.07	22.30	111	0.	0.	0.	6.
1.01	18.00	12	0.00	0.00	0.	178.	1.08	0.	112	0.	0.	0.	6.
1.01	19.30	13	0.02	0.	0.02	272.	1.08	1.30	113	0.	0.	0.	5.
1.01	21.00	14	0.02	0.	0.02	344.	1.08	3.00	114	0.	0.	0.	5.
1.01	22.30	15	0.02	0.	0.02	369.	1.08	4.30	115	0.	0.	0.	4.
1.02	0.	16	0.02	0.	0.02	343.	1.08	6.00	116	0.	0.	0.	4.
1.02	1.30	17	0.18	0.03	0.15	291.	1.08	7.30	117	0.	0.	0.	4.
1.02	3.00	18	0.18	0.03	0.15	252.	1.08	9.00	118	0.	0.	0.	3.
1.02	4.30	19	0.18	0.03	0.15	240.	1.08	10.30	119	0.	0.	0.	3.
1.02	6.00	20	0.18	0.03	0.15	252.	1.08	12.00	120	0.	0.	0.	3.
1.02	7.30	21	0.62	0.47	0.15	356.	1.08	13.30	121	0.	0.	0.	3.
1.02	9.00	22	0.62	0.47	0.15	665.	1.08	15.00	122	0.	0.	0.	2.
1.02	10.30	23	0.62	0.47	0.15	1234.	1.08	16.30	123	0.	0.	0.	2.
1.02	12.00	24	0.62	0.47	0.15	2040.	1.08	18.00	124	0.	0.	0.	2.
1.02	13.30	25	4.33	4.18	0.15	3623.	1.08	19.30	125	0.	0.	0.	2.
1.02	15.00	26	8.82	8.67	0.15	7643.	1.08	21.00	126	0.	0.	0.	2.
1.02	16.30	27	3.49	3.34	0.15	14847.	1.08	22.30	127	0.	0.	0.	1.
1.02	18.00	28	0.00	0.00	0.	23624.	1.09	0.	128	0.	0.	0.	1.
1.02	19.30	29	0.27	0.12	0.15	31290.	1.09	1.30	129	0.	0.	0.	1.
1.02	21.00	30	0.27	0.12	0.15	35412.	1.09	3.00	130	0.	0.	0.	1.
1.02	22.30	31	0.27	0.12	0.15	34804.	1.09	4.30	131	0.	0.	0.	1.
1.03	0.	32	0.27	0.12	0.15	30482.	1.09	6.00	132	0.	0.	0.	1.
1.03	1.30	33	0.	0.	0.	25062.	1.09	7.30	133	0.	0.	0.	1.
1.03	3.00	34	0.	0.	0.	20318.	1.09	9.00	134	0.	0.	0.	1.
1.03	4.30	35	0.	0.	0.	16460.	1.09	10.30	135	0.	0.	0.	1.
1.03	6.00	36	0.	0.	0.	13287.	1.09	12.00	136	0.	0.	0.	1.
1.03	7.30	37	0.	0.	0.	10673.	1.09	13.30	137	0.	0.	0.	1.
1.03	9.00	38	0.	0.	0.	8537.	1.09	15.00	138	0.	0.	0.	1.
1.03	10.30	39	0.	0.	0.	6819.	1.09	16.30	139	0.	0.	0.	0.
1.03	12.00	40	0.	0.	0.	5446.	1.09	18.00	140	0.	0.	0.	0.
1.03	13.30	41	0.	0.	0.	4350.	1.09	19.30	141	0.	0.	0.	0.
1.03	15.00	42	0.	0.	0.	3518.	1.09	21.00	142	0.	0.	0.	0.
1.03	16.30	43	0.	0.	0.	3210.	1.09	22.30	143	0.	0.	0.	0.
1.03	18.00	44	0.	0.	0.	2929.	1.10	0.	144	0.	0.	0.	0.
1.03	19.30	45	0.	0.	0.	2672.	1.10	1.30	145	0.	0.	0.	0.
1.03	21.00	46	0.	0.	0.	2438.	1.10	3.00	146	0.	0.	0.	0.
1.03	22.30	47	0.	0.	0.	2225.	1.10	4.30	147	0.	0.	0.	0.
1.04	0.	48	0.	0.	0.	2030.	1.10	6.00	148	0.	0.	0.	0.
1.04	1.30	49	0.	0.	0.	1852.	1.10	7.30	149	0.	0.	0.	0.
1.04	3.00	50	0.	0.	0.	1690.	1.10	9.00	150	0.	0.	0.	0.
1.04	4.30	51	0.	0.	0.	1542.	1.10	10.30	151	0.	0.	0.	0.
1.04	6.00	52	0.	0.	0.	1407.	1.10	12.00	152	0.	0.	0.	0.
1.04	7.30	53	0.	0.	0.	1284.	1.10	13.30	153	0.	0.	0.	0.
1.04	9.00	54	0.	0.	0.	1171.	1.10	15.00	154	0.	0.	0.	0.
1.04	10.30	55	0.	0.	0.	1069.	1.10	16.30	155	0.	0.	0.	0.
1.04	12.00	56	0.	0.	0.	975.	1.10	18.00	156	0.	0.	0.	0.
1.04	13.30	57	0.	0.	0.	890.	1.10	19.30	157	0.	0.	0.	0.
1.04	15.00	58	0.	0.	0.	812.	1.10	21.00	158	0.	0.	0.	0.
1.04	16.30	59	0.	0.	0.	741.	1.10	22.30	159	0.	0.	0.	0.
1.04	18.00	60	0.	0.	0.	676.	1.11	0.	160	0.	0.	0.	0.
1.04	19.30	61	0.	0.	0.	617.	1.11	1.30	161	0.	0.	0.	0.
1.04	21.00	62	0.	0.	0.	563.	1.11	3.00	162	0.	0.	0.	0.

1.04	22.30	63	0.	0.	0.	514.	1.11	4.30	163	0.	0.	0.	0.
1.05	0.	64	0.	0.	0.	469.	1.11	6.00	164	0.	0.	0.	0.
1.05	1.30	65	0.	0.	0.	423.	1.11	7.30	165	0.	0.	0.	0.
1.05	3.00	66	0.	0.	0.	390.	1.11	9.00	166	0.	0.	0.	0.
1.05	4.30	67	0.	0.	0.	356.	1.11	10.30	167	0.	0.	0.	0.
1.05	6.00	68	0.	0.	0.	325.	1.11	12.00	168	0.	0.	0.	0.
1.05	7.30	69	0.	0.	0.	296.	1.11	13.30	169	0.	0.	0.	0.
1.05	9.00	70	0.	0.	0.	270.	1.11	15.00	170	0.	0.	0.	0.
1.05	10.30	71	0.	0.	0.	247.	1.11	16.30	171	0.	0.	0.	0.
1.05	12.00	72	0.	0.	0.	225.	1.11	18.00	172	0.	0.	0.	0.
1.05	13.30	73	0.	0.	0.	205.	1.11	19.30	173	0.	0.	0.	0.
1.05	15.00	74	0.	0.	0.	187.	1.11	21.00	174	0.	0.	0.	0.
1.05	16.30	75	0.	0.	0.	171.	1.11	22.30	175	0.	0.	0.	0.
1.05	18.00	76	0.	0.	0.	156.	1.12	0.	176	0.	0.	0.	0.
1.05	19.30	77	0.	0.	0.	142.	1.12	1.30	177	0.	0.	0.	0.
1.05	21.00	78	0.	0.	0.	130.	1.12	3.00	178	0.	0.	0.	0.
1.05	22.30	79	0.	0.	0.	119.	1.12	4.30	179	0.	0.	0.	0.
1.06	0.	80	0.	0.	0.	108.	1.12	6.00	180	0.	0.	0.	0.
1.06	1.30	81	0.	0.	0.	99.	1.12	7.30	181	0.	0.	0.	0.
1.06	3.00	82	0.	0.	0.	90.	1.12	9.00	182	0.	0.	0.	0.
1.06	4.30	83	0.	0.	0.	82.	1.12	10.30	183	0.	0.	0.	0.
1.06	6.00	84	0.	0.	0.	75.	1.12	12.00	184	0.	0.	0.	0.
1.06	7.30	85	0.	0.	0.	68.	1.12	13.30	185	0.	0.	0.	0.
1.06	9.00	86	0.	0.	0.	62.	1.12	15.00	186	0.	0.	0.	0.
1.06	10.30	87	0.	0.	0.	57.	1.12	16.30	187	0.	0.	0.	0.
1.06	12.00	88	0.	0.	0.	52.	1.12	18.00	188	0.	0.	0.	0.
1.06	13.30	89	0.	0.	0.	47.	1.12	19.30	189	0.	0.	0.	0.
1.06	15.00	90	0.	0.	0.	43.	1.12	21.00	190	0.	0.	0.	0.
1.06	16.30	91	0.	0.	0.	39.	1.12	22.30	191	0.	0.	0.	0.
1.06	18.00	92	0.	0.	0.	36.	1.13	0.	192	0.	0.	0.	0.
1.06	19.30	93	0.	0.	0.	33.	1.13	1.30	193	0.	0.	0.	0.
1.06	21.00	94	0.	0.	0.	30.	1.13	3.00	194	0.	0.	0.	0.
1.06	22.30	95	0.	0.	0.	27.	1.13	4.30	195	0.	0.	0.	0.
1.07	0.	96	0.	0.	0.	25.	1.13	6.00	196	0.	0.	0.	0.
1.07	1.30	97	0.	0.	0.	23.	1.13	7.30	197	0.	0.	0.	0.
1.07	3.00	98	0.	0.	0.	21.	1.13	9.00	198	0.	0.	0.	0.
1.07	4.30	99	0.	0.	0.	19.	1.13	10.30	199	0.	0.	0.	0.
1.07	6.00	100	0.	0.	0.	17.	1.13	12.00	200	0.	0.	0.	0.
									SUM	22.30	18.81	3.50	340279.
										(567.)	(478.)	(89.)	(9635.63)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	35412.	32219.	18043.	6953.	340249.
CMS	1003.	912.	511.	197.	9635.
INCHES		7.66	17.15	19.82	20.21
MM		194.45	435.58	503.54	513.37
AC-FT		15976.	35788.	41372.	42180.
THOUS CU M		19706.	44144.	51031.	52028.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	4000.	8000.	12000.	16000.	20000.	24000.	28000.	32000.	36000.	0.	0.	0.
											PRECIP(L) AND EXCESS(X)		
	0.	0.	0.	0.	0.	0.	0.	0.	0.	12.	8.	4.	0.
1.30	1I												L
3.00	2I												L
4.30	3I												L
6.00	4I												L
7.30	5I												L
9.00	6I												L
10.30	7I												L
12.00	8I												L
13.30	9I												L
15.00	10I												LX
16.30	11I												LX
18.00	12I												LX
19.30	13.I												L
21.00	14.I												L
22.30	15.I												L
0.	16.I												L
1.30	17.I												L
3.00	18.I												L
4.30	19.I												L
6.00	20.I												L
7.30	21.I												L
9.00	22. I												LXX
10.30	23. I												LXX
12.00	24. I												LXX
13.30	25. I												LXX
15.00	26. I											LXXXXXXXXXXX	
16.30	27. I										LXXXXXXXXXXXXXXXXXXXX		
18.00	28. I											LXXXXXXXXX	
19.30	29. I												L
21.00	30. I												LX
22.30	31. I												LX
0.	32. I												LX
1.30	33. I												L
3.00	34. I												L
4.30	35. I												L
6.00	36. I												L
7.30	37. I												L
9.00	38. I												L
10.30	39. I												L
12.00	40. I												L
13.30	41. I												L
15.00	42. I												L
16.30	43. I												L
18.00	44. I												L
19.30	45. I												L
21.00	46. I												L
22.30	47. I												L
0.	48. I												L
1.30	49. I												L
3.00	50. I												L
4.30	51. I												L
6.00	52. I												L
7.30	53. I												L
9.00	54. I												L
10.30	55. I												L

```
12.00 56. I                                                                  L
13.30 57. I                                                                  L
15.00 58. I                                                                  L
16.30 59. I                                                                  L
18.00 60..I..................................................................L
19.30 61. I                                                                  L
21.00 62.I                                                                   L
22.30 63.I                                                                   L
 0.   64.I                                                                   L
 1.30 65.I                                                                   L
 3.00 66.I                                                                   L
 4.30 67.I                                                                   L
 6.00 68.I                                                                   L
 7.30 69.I                                                                   L
 9.00 70.I...................................................................L
10.30 71.I                                                                   L
12.00 72.I                                                                   L
13.30 73.I                                                                   L
15.00 74I                                                                    L
16.30 75I                                                                    L
18.00 76I                                                                    L
19.30 77I                                                                    L
21.00 78I                                                                    L
22.30 79I                                                                    L
 0.   80I...................................................................L
 1.30 81I                                                                    L
 3.00 82I                                                                    L
 4.30 83I                                                                    L
 6.00 84I                                                                    L
 7.30 85I                                                                    L
 9.00 86I                                                                    L
10.30 87I                                                                    L
12.00 88I                                                                    L
13.30 89I                                                                    L
15.00 90I...................................................................L
16.30 91I                                                                    L
18.00 92I                                                                    L
19.30 93I                                                                    L
21.00 94I                                                                    L
22.30 95I                                                                    L
 0.   96I                                                                    L
 1.30 97I                                                                    L
 3.00 98I                                                                    L
 4.30 99I                                                                    L
 6.00100I...................................................................L
 7.30101I                                                                    L
 9.00102I                                                                    L
10.30103I                                                                    L
12.30104I                                                                    L
13.30105I                                                                    L
15.00106I                                                                    L
16.30107I                                                                    L
18.00108I                                                                    L
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21.00110I...................................................................L
22.30111I                                                                    L
 0.  112I                                                                    L
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 6.00116I                                                                    L
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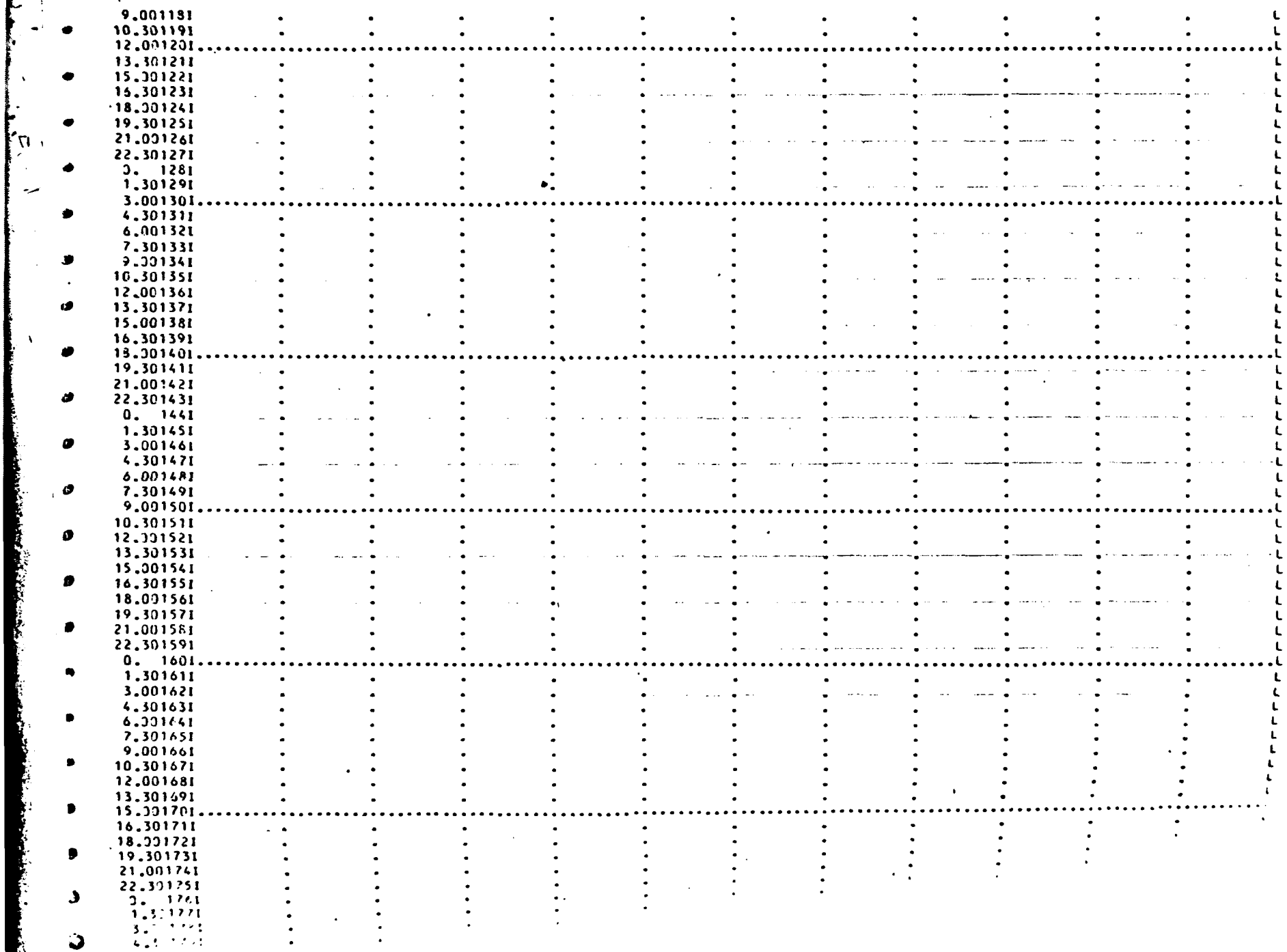
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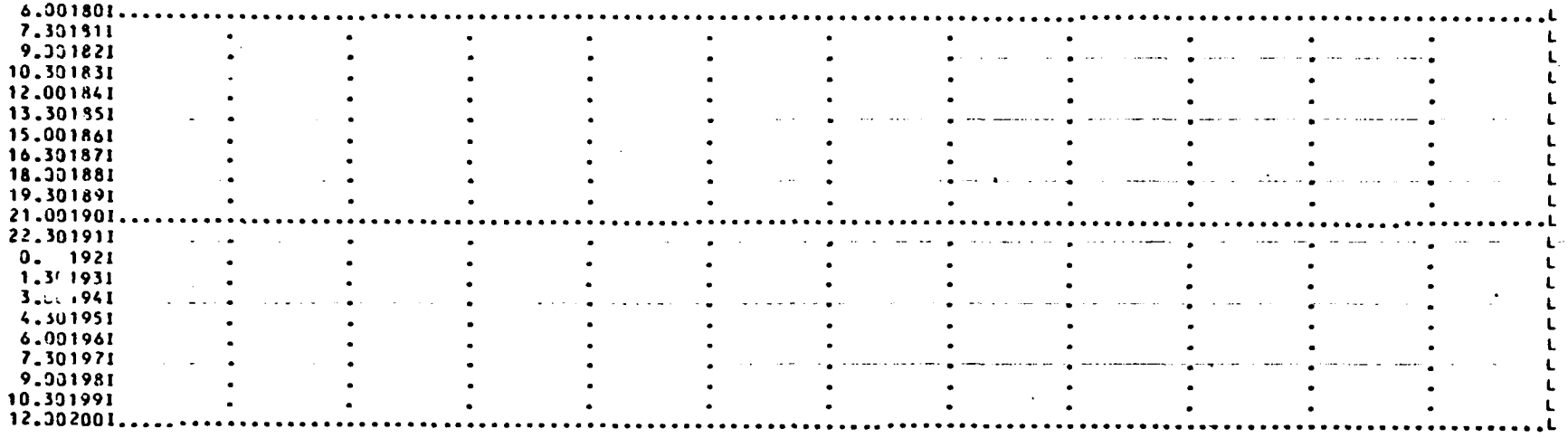
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3.((1941
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12.002001

DVM

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

14.	13.	12.	11.	10.	9.	8.	8.	7.	9.
19.	36.	54.	69.	74.	69.	58.	50.	48.	50.
71.	133.	247.	408.	725.	1529.	2969.	4725.	6258.	7082.
6961.	6096.	5012.	4064.	3292.	2657.	2135.	1707.	1364.	1089.
870.	704.	642.	586.	534.	488.	445.	406.	370.	338.
308.	281.	257.	234.	214.	195.	178.	162.	148.	135.
123.	113.	103.	94.	86.	78.	71.	65.	59.	54.
49.	45.	41.	37.	34.	31.	28.	26.	24.	22.
20.	18.	16.	15.	14.	12.	11.	10.	9.	9.
8.	7.	7.	6.	5.	5.	5.	4.	4.	3.
3.	3.	3.	2.	2.	2.	2.	2.	2.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7082.	6444.	3609.	1391.	68050.
CMS	201.	182.	102.	39.	1927.
INCHES		1.53	3.43	3.96	4.04
MM		38.89	87.12	100.71	102.67
AC-FT		3195.	7158.	8274.	8436.
THOUS CU M		3941.	8829.	10206.	10406.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

29.	26.	24.	22.	20.	18.	16.	15.	14.	18.
37.	71.	109.	137.	148.	137.	116.	101.	96.	101.
142.	266.	494.	816.	1449.	3057.	5939.	9449.	12516.	14165.
13922.	12193.	10025.	8127.	6584.	5315.	4269.	3415.	2727.	2178.
1740.	1407.	1294.	1171.	1069.	975.	890.	812.	741.	676.
617.	563.	514.	469.	428.	390.	356.	325.	296.	270.
247.	225.	205.	187.	171.	156.	142.	130.	119.	108.
99.	90.	82.	75.	68.	62.	57.	52.	47.	43.
39.	36.	33.	30.	27.	25.	23.	21.	19.	17.
16.	14.	13.	12.	11.	10.	9.	8.	8.	7.
6.	6.	5.	5.	4.	4.	4.	3.	3.	3.
3.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	14165.	12887.	7217.	2781.	136100.
CMS	401.	365.	204.	79.	3854.
INCHES		3.06	6.86	7.93	8.08
MM		77.78	174.23	201.41	205.35
AC-FT		6390.	14315.	16549.	16872.
THOUS CU M		7885.	17664.	20411.	20811.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

36.	33.	30.	27.	25.	23.	21.	19.	17.	23.
47.	89.	136.	172.	185.	171.	145.	126.	120.	126.
178.	333.	617.	1020.	1811.	3822.	7424.	11812.	15645.	17706.
17402.	15241.	12531.	10159.	8230.	6644.	5336.	4269.	3409.	2723.
2175.	1759.	1505.	1464.	1336.	1219.	1112.	1015.	926.	845.
771.	704.	642.	586.	534.	488.	445.	406.	370.	338.
308.	281.	257.	234.	214.	195.	178.	162.	148.	135.
123.	113.	103.	94.	86.	78.	71.	65.	59.	54.
49.	45.	41.	37.	34.	31.	28.	26.	24.	22.
20.	18.	16.	15.	14.	12.	11.	10.	9.	9.
8.	7.	7.	6.	5.	5.	5.	4.	4.	3.
3.	3.	3.	2.	2.	2.	2.	2.	2.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	17706.	16109.	9022.	3476.	170124.
CMS	501.	456.	255.	98.	4817.
INCHES		3.83	8.57	9.91	10.11
MM		97.22	217.79	251.77	256.68
AC-FT		7988.	17894.	20686.	21090.
THOUS CU M		9853.	22072.	25516.	26014.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

43.	39.	36.	33.	30.	27.	25.	23.	21.	27.
56.	107.	163.	206.	222.	206.	175.	151.	144.	151.
214.	399.	740.	1224.	2174.	4586.	8908.	14174.	18774.	21247.
20883.	18289.	15037.	12191.	9876.	7972.	6404.	5122.	4091.	3268.
2610.	2111.	1926.	1757.	1603.	1463.	1335.	1218.	1111.	1014.
925.	844.	770.	703.	641.	585.	534.	487.	445.	406.
370.	338.	308.	281.	257.	234.	214.	195.	178.	162.
148.	135.	123.	112.	103.	94.	85.	78.	71.	65.
59.	54.	49.	45.	41.	37.	34.	31.	28.	26.
24.	22.	20.	18.	16.	15.	14.	12.	11.	10.
9.	9.	8.	7.	7.	6.	5.	5.	5.	4.
4.	3.	3.	3.	3.	2.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	21247.	19331.	10826.	4172.	204149.
CMS	602.	547.	307.	118.	5781.
INCHES		4.59	10.29	11.89	12.13
MM		116.67	261.35	302.12	308.02
AC-FT		9586.	21473.	24823.	25308.
THOUS CU M		11824.	26486.	30619.	31217.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 5

57.	52.	48.	43.	40.	36.	33.	30.	27.	36.
75.	142.	217.	275.	295.	274.	233.	202.	192.	202.
285.	532.	987.	1632.	2898.	6115.	11878.	18899.	25032.	28330.
27844.	24385.	20049.	16254.	13168.	10630.	8538.	6830.	5455.	4357.
3480.	2814.	2568.	2343.	2138.	1951.	1780.	1624.	1482.	1352.
1234.	1126.	1027.	937.	855.	780.	712.	650.	593.	541.
493.	450.	411.	375.	342.	312.	285.	260.	237.	216.
197.	180.	164.	150.	137.	125.	114.	104.	95.	87.
79.	72.	66.	60.	55.	50.	46.	42.	38.	35.
32.	29.	26.	24.	22.	20.	18.	17.	15.	14.
13.	12.	11.	10.	9.	8.	7.	7.	6.	6.
5.	5.	4.	4.	4.	3.	3.	3.	2.	2.
2.	2.	2.	2.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	28330.	25775.	14435.	5562.	272199.
CMS	802.	730.	409.	158.	7708.
INCHES		6.12	13.72	15.86	16.17
MM		155.56	348.46	402.83	410.70
AC-FT		12781.	28630.	33097.	33744.
THOUS CU M		15765.	35315.	40825.	41622.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 6

71.	65.	59.	54.	50.	45.	41.	38.	34.	45.
94.	178.	272.	344.	369.	343.	291.	252.	240.	252.
356.	665.	1234.	2040.	3623.	7643.	14847.	23624.	31290.	35412.
34804.	30482.	25062.	20318.	16460.	13287.	10673.	8537.	6819.	5446.
4350.	3518.	3210.	2929.	2672.	2438.	2225.	2030.	1852.	1690.
1542.	1407.	1284.	1171.	1069.	975.	890.	812.	741.	676.
617.	563.	514.	469.	428.	390.	356.	325.	296.	270.
247.	225.	205.	187.	171.	156.	142.	130.	119.	108.
99.	90.	82.	75.	68.	62.	57.	52.	47.	43.
39.	36.	33.	30.	27.	25.	23.	21.	19.	17.
16.	14.	13.	12.	11.	10.	9.	8.	8.	7.
6.	6.	5.	5.	4.	4.	4.	3.	3.	3.
3.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	35412.	32219.	18043.	6953.	340249.
CMS	1003.	912.	511.	197.	9635.
INCHES		7.66	17.15	19.82	20.21
MM		194.45	435.58	503.54	513.37
AC-FT		15976.	35788.	41372.	42180.
THOUS CU M		19707.	44144.	51031.	52028.

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

HYDROGRAPH ROUTING

ROUTE THROUGH RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	2	2	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.	0.	0.	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.	0.	0.	-788.	-1

STAGE	786.60	788.00	789.00	790.10	791.00	792.00	793.00	794.00	795.00
FLOW	0.	347.00	777.00	1369.00	2904.00	5615.00	9026.00	13006.00	17479.00
CAPACITY=	0.	13600.	23000.	28750.	32500.	42000.			
ELEVATION=	722.	780.	785.	788.	790.	795.			

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
786.6	0.	0.	0.	0.	0.	0.	0.

DAM DATA

TOPEL	COQD	EXPD	DAMWID
798.1	3.8	1.5	50.

WARNING *** TOP OF DAM, BOTTOM OF BREACH, OR LOW-LEVEL OUTLET IS NOT WITHIN RANGE OF GIVEN ELEVATIONS IN STORAGE-ELEVATION DATA
BOTTOM OF RESERVOIR ASSUMED TO BE AT 722.00
STORAGE-ELEVATION DATA WILL BE EXTRAPOLATED ABOVE ELEVATION 795.00

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

342.	336.	331.	326.	321.	316.	311.	307.	302.	297.
293.	288.	285.	281.	278.	274.	271.	268.	264.	261.
258.	255.	254.	255.	260.	274.	305.	373.	516.	689.
888.	1086.	1242.	1356.	1575.	1723.	1794.	1807.	1779.	1720.
1642.	1552.	1459.	1370.	1342.	1313.	1283.	1253.	1223.	1193.
1162.	1132.	1102.	1072.	1042.	1013.	984.	956.	928.	900.
873.	847.	821.	796.	772.	753.	734.	715.	697.	679.
661.	644.	627.	611.	595.	579.	564.	549.	534.	520.
506.	492.	479.	466.	453.	441.	429.	417.	406.	394.
384.	373.	363.	353.	345.	339.	334.	329.	324.	319.
314.	309.	304.	299.	294.	290.	285.	281.	276.	272.
267.	263.	259.	255.	251.	247.	243.	239.	235.	232.
228.	224.	221.	217.	214.	210.	207.	204.	201.	197.
194.	191.	188.	185.	182.	179.	176.	174.	171.	168.
165.	163.	160.	158.	155.	153.	150.	148.	146.	143.
141.	139.	137.	134.	132.	130.	128.	126.	124.	122.
120.	118.	116.	114.	113.	111.	109.	107.	106.	104.
102.	101.	99.	97.	96.	94.	93.	91.	90.	89.
87.	86.	84.	83.	82.	80.	79.	78.	77.	75.
74.	73.	72.	71.	70.	69.	67.	66.	65.	64.

STORAGE

28709.	28669.	28629.	28590.	28551.	28512.	28475.	28437.	28400.	28364.
28330.	28297.	28267.	28240.	28214.	28188.	28162.	28136.	28109.	28083.
28058.	28039.	28031.	28040.	28078.	28185.	28428.	28862.	29488.	30240.
31013.	31700.	32244.	32646.	32920.	33084.	33163.	33178.	33146.	33081.
32994.	32894.	32791.	32691.	32593.	32492.	32389.	32285.	32179.	32074.
31968.	31862.	31757.	31653.	31550.	31448.	31347.	31248.	31151.	31055.
30961.	30869.	30779.	30691.	30605.	30520.	30437.	30356.	30276.	30198.
30121.	30046.	29973.	29901.	29830.	29762.	29695.	29629.	29565.	29503.
29442.	29382.	29324.	29267.	29212.	29159.	29106.	29055.	29005.	28957.
28910.	28864.	28819.	28775.	28733.	28691.	28650.	28609.	28569.	28530.
28491.	28453.	28416.	28379.	28342.	28306.	28271.	28236.	28202.	28168.
28135.	28102.	28070.	28033.	28007.	27976.	27946.	27916.	27886.	27858.
27829.	27801.	27774.	27747.	27720.	27694.	27668.	27642.	27617.	27593.
27569.	27545.	27521.	27498.	27475.	27453.	27431.	27409.	27388.	27367.
27346.	27326.	27306.	27286.	27267.	27248.	27229.	27210.	27192.	27174.
27157.	27139.	27122.	27106.	27089.	27073.	27057.	27041.	27026.	27010.
26995.	26980.	26966.	26952.	26938.	26924.	26910.	26897.	26884.	26871.
26858.	26845.	26833.	26821.	26809.	26797.	26785.	26774.	26763.	26751.
26741.	26730.	26719.	26709.	26699.	26689.	26679.	26669.	26659.	26650.
26641.	26632.	26623.	26614.	26605.	26597.	26588.	26580.	26572.	26564.

STAGE

788.0	788.0	787.9	787.9	787.9	787.9	787.9	787.8	787.8	787.8
787.8	787.8	787.7	787.7	787.7	787.7	787.7	787.7	787.7	787.7
787.6	787.6	787.6	787.6	787.6	787.7	787.8	788.1	788.4	788.8
789.2	789.6	789.9	790.1	790.2	790.3	790.3	790.4	790.3	790.3
790.3	790.2	790.2	790.1	790.0	790.0	789.9	789.9	789.8	789.8
789.7	789.7	789.6	789.5	789.5	789.4	789.4	789.3	789.3	789.2
789.2	789.1	789.1	789.0	789.0	788.9	788.9	788.9	788.8	788.8
788.7	788.7	788.7	788.6	788.6	788.5	788.5	788.5	788.4	788.4
788.4	788.3	788.3	788.3	788.2	788.2	788.2	788.2	788.1	788.1
788.1	788.1	788.0	788.0	788.0	788.0	787.9	787.9	787.9	787.9
787.9	787.8	787.8	787.8	787.8	787.8	787.7	787.7	787.7	787.7
787.7	787.7	787.6	787.6	787.6	787.6	787.6	787.6	787.5	787.5
787.5	787.5	787.5	787.5	787.5	787.4	787.4	787.4	787.4	787.4
787.4	787.4	787.4	787.3	787.3	787.3	787.3	787.3	787.3	787.3
787.3	787.3	787.2	787.2	787.2	787.2	787.2	787.2	787.2	787.2
787.2	787.2	787.2	787.1	787.1	787.1	787.1	787.1	787.1	787.1
787.1	787.1	787.1	787.1	787.1	787.0	787.0	787.0	787.0	787.0
787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0
787.0	786.9	786.9	786.9	786.9	786.9	786.9	786.9	786.9	786.9
786.9	786.9	786.9	786.9	786.9	786.9	786.9	786.9	786.9	786.9

PEAK OUTFLOW IS 1807. AT TIME 57.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1807.	1775.	1513.	1074.	85371.
CMS	51.	50.	43.	30.	2417.
INCHES		0.42	1.44	3.06	5.07
MM		10.71	36.52	77.75	128.81
AC-FT		880.	3000.	6388.	10583.
THOUS CU M		1086.	3701.	7879.	13054.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	0.	0.	0.	0.
1.30	11	O											
3.00	21	O											
4.30	31	O											
6.00	41	O											
7.30	51	O											
9.00	61	O											
10.30	71	O											
12.00	81	O											
13.30	91	O											
15.00	101	O											
16.30	111	O											
18.00	121	O											
19.30	13.1	O											
21.00	14.1	O											
22.30	15.1	O											
0.	16.1	O											
1.30	17.1	O											
3.00	18.1	O											
4.30	191	O											
6.00	20.1	O											
7.30	21.1	O											
9.00	22.1	O											
10.30	23.	IO											
12.00	24.	OI											
13.30	25.	O I											
15.00	26.	O I											
16.30	27.	O		I									
18.00	28.	O				I							
19.30	29.	O					I						
21.00	30.	O						I					
22.30	31.	O						I					
0.	32.	O					I						
1.30	33.	O				I							
3.00	34.	O			I								
4.30	35.	O		I									
6.00	36.	O	I										
7.30	37.	O I											
9.00	38.	IO											
10.30	39.	I O											
12.00	40.	I O											
13.30	41.	I O											
15.00	42.	I O											
16.30	43.	I O											
18.00	44.	I O											
19.30	45.	I O											
21.00	46.	I O											
22.30	47.	I O											
0.	48.	I O											
1.30	49.	I O											
3.00	50.	I O											
4.30	51.	I O											
6.00	52.	I O											
7.30	53.	I O											
9.00	54.	I O											
10.30	55.	I O											
12.00	56.	I O											
13.30	57.	I O											

```
15.00 58. I        0
16.30 59.I        0.
18.00 60.I.......0.....................................................
19.30 61.I        0.
21.00 62.I       0 .
22.30 63.I       0 .
 0.   64.I       0 .
 1.30 65.I       0 .
 3.00 66.I       0 .
 4.30 67.I      0  .
 6.00 68.I      0  .
 7.30 69.I      0  .
 9.00 70.I.....0.....................................................
10.30 71I       0  .
12.00 72I      0   .
13.30 73I      0   .
15.00 74I      0   .
16.30 75I      0   .
18.00 76I      0   .
19.30 77I      0   .
21.00 78I     0    .
22.30 79I     0    .
 0.   80I....0.....................................................
 1.30 81I     0    .
 3.00 82I     0    .
 4.30 83I     0    .
 6.00 84I     0    .
 7.30 85I     0    .
 9.00 86I    0     .
10.30 87I    0     .
12.00 88I    0     .
13.30 89I    0     .
15.00 90I...0.....................................................
16.30 91I    0     .
18.00 92I    0     .
19.30 93I    0     .
21.00 94I    0     .
22.30 95I   0      .
 0.   96I   0      .
 1.30 97I   0      .
 3.00 98I   0      .
 4.30 99I  .0      .
 6.001001..0.....................................................
 7.301011  0      .
 9.001021  0      .
10.301031  0      .
12.001041  0      .
13.301051  0      .
15.001061  0      .
16.301071  0      .
18.001081  0      .
19.301091  0      .
21.001101..0.....................................................
22.301111  0      .
 0.  1121  0      .
 1.301131  0      .
 3.001141  0      .
 4.301151  0      .
 6.001161 0       .
 7.301171 0       .
 9.001181 0       .
    .....1 0      .
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12.001201.0
13.301211 0
15.301221 0
16.301231 0
18.001241 0
19.301251 0
21.001261 0
22.301271 0
 0.  1281 0
 1.301291 0
 3.001301.0
 4.301311 0
 6.001321 0
 7.301331 0
 9.301341 0
10.301351 0
12.001361 0
13.301371 0
15.001381 0
16.301391 0
18.001401.0
19.301411 0
21.001421 0
22.301431 0
 0.  1441 0
 1.301451 0
 3.001461 0
 4.301471 0
 6.0014810
 7.3014910
 9.0015010...
10.3015110
12.0015210
13.3015310
15.3015410
16.3015510
18.0015610
19.3015710
21.0015810
22.3015910
 0.  16010
 1.3016110
 3.0016210
 4.3016310
 6.0016410
 7.3016510
 9.0016610
10.3016710
12.0016810
13.3016910
15.0017010
16.3017110
18.0017210
19.3017310
21.0017410
22.3017510
 0.  17610
 1.3017710
 3.0017810
 4.3017910
 6.0018010
 7.3018110
```

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 9.0018210
10.3018310
12.0018410
13.3018510
15.0018610
16.3018710
18.0018810
19.3018910
21.0019010
22.3019110
 0.  19210
 1.3019310
 3.0019410
 4.3019510
 6.0019610
 7.3019710
 9.0019810
10.3019910
12.0020010
```

OVN

WARNING *** TOP OF DAM, BOTTOM OF BREACH, OR LOW-LEVEL OUTLET IS NOT WITHIN RANGE OF GIVEN ELEVATIONS IN STORAGE-ELEVATION DATA
BOTTOM OF RESERVOIR ASSUMED TO BE AT 722.00
STORAGE-ELEVATION DATA WILL BE EXTRAPOLATED ABOVE ELEVATION 795.00

STATION 1, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

342.	337.	332.	327.	322.	317.	313.	308.	303.	299.
294.	291.	287.	285.	282.	280.	278.	275.	272.	270.
267.	264.	268.	274.	288.	319.	415.	619.	942.	1387.
2721.	4301.	5408.	6094.	6347.	6267.	5972.	5558.	5154.	4715.
4268.	3830.	3426.	3069.	2806.	2618.	2440.	2273.	2115.	1967.
1828.	1697.	1575.	1461.	1364.	1331.	1298.	1265.	1231.	1198.
1165.	1133.	1101.	1069.	1038.	1008.	978.	948.	919.	891.
864.	837.	810.	785.	763.	744.	725.	706.	687.	669.
652.	635.	618.	601.	585.	570.	554.	539.	525.	511.
497.	483.	470.	457.	445.	433.	421.	409.	398.	387.
376.	366.	356.	346.	341.	336.	330.	325.	320.	315.
310.	305.	300.	296.	291.	286.	282.	277.	273.	269.
264.	260.	256.	252.	248.	244.	240.	236.	233.	229.
225.	222.	218.	215.	211.	208.	205.	201.	198.	195.
192.	189.	186.	183.	180.	177.	174.	172.	169.	166.
164.	161.	158.	156.	153.	151.	149.	146.	144.	142.
139.	137.	135.	133.	131.	129.	127.	125.	123.	121.
119.	117.	115.	113.	111.	110.	108.	106.	104.	103.
101.	100.	98.	96.	95.	93.	92.	90.	89.	88.
86.	85.	83.	82.	81.	80.	78.	77.	76.	75.

STORAGE

28711.	28672.	28634.	28596.	28558.	28521.	28484.	28447.	28411.	28376.
28343.	28313.	28289.	28268.	28251.	28234.	28215.	28194.	28172.	28151.
28133.	28125.	28139.	28187.	28292.	28534.	29046.	29936.	31200.	32710.
34196.	35379.	36155.	36567.	36708.	36663.	36499.	36260.	35977.	35670.
35356.	35049.	34766.	34516.	34290.	34081.	33883.	33697.	33521.	33356.
33201.	33056.	32919.	32792.	32673.	32556.	32440.	32324.	32208.	32092.
31978.	31865.	31753.	31643.	31535.	31428.	31324.	31221.	31121.	31023.
30927.	30833.	30742.	30653.	30565.	30480.	30397.	30315.	30234.	30156.
30079.	30004.	29931.	29859.	29789.	29721.	29654.	29589.	29525.	29464.
29403.	29344.	29287.	29231.	29176.	29123.	29072.	29021.	28972.	28924.
28878.	28833.	28789.	28746.	28704.	28662.	28622.	28581.	28542.	28503.
28464.	28426.	28389.	28353.	28316.	28281.	28246.	28211.	28177.	28144.
28111.	28079.	28047.	28015.	27985.	27954.	27924.	27895.	27866.	27837.
27809.	27781.	27754.	27727.	27701.	27675.	27649.	27624.	27600.	27575.
27551.	27528.	27504.	27482.	27459.	27437.	27415.	27394.	27373.	27352.
27331.	27311.	27292.	27272.	27253.	27234.	27215.	27197.	27179.	27162.
27144.	27127.	27110.	27094.	27077.	27061.	27045.	27030.	27014.	26999.
26985.	26970.	26956.	26941.	26926.	26914.	26900.	26887.	26874.	26861.
26849.	26836.	26824.	26812.	26800.	26788.	26777.	26766.	26755.	26744.
26733.	26722.	26712.	26702.	26691.	26682.	26672.	26662.	26653.	26643.

STAGE

788.0	788.0	787.9	787.9	787.9	787.9	787.9	787.8	787.8	787.8
787.8	787.8	787.8	787.7	787.7	787.7	787.7	787.7	787.7	787.7
787.7	787.7	787.7	787.7	787.8	787.9	788.2	788.6	789.3	790.1
790.9	791.5	791.9	792.1	792.2	792.2	792.1	792.0	791.8	791.7
791.5	791.3	791.2	791.1	790.9	790.8	790.7	790.6	790.5	790.5
790.4	790.3	790.2	790.2	790.1	790.0	790.0	789.9	789.8	789.8
790.2	790.2	790.1	789.5	789.5	789.4	789.4	789.3	789.3	789.2

789.2	789.1	789.1	789.0	789.0	788.9	788.9	788.8	788.8	788.7
788.7	788.7	788.6	788.6	788.6	788.5	788.5	788.4	788.4	788.4
788.3	788.3	788.3	788.3	788.2	788.2	788.2	788.1	788.1	788.1
788.1	788.0	788.0	788.0	788.0	788.0	787.9	787.9	787.9	787.9
787.9	787.8	787.8	787.8	787.8	787.8	787.7	787.7	787.7	787.7
787.7	787.6	787.6	787.6	787.6	787.6	787.6	787.6	787.5	787.5
787.5	787.5	787.5	787.5	787.5	787.4	787.4	787.4	787.4	787.4
787.4	787.4	787.4	787.3	787.3	787.3	787.3	787.3	787.3	787.3
787.3	787.2	787.2	787.2	787.2	787.2	787.2	787.2	787.2	787.2
787.2	787.2	787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.1
787.1	787.1	787.1	787.1	787.0	787.0	787.0	787.0	787.0	787.0
787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0
786.9	786.9	786.9	786.9	786.9	786.9	786.9	786.9	786.9	786.9

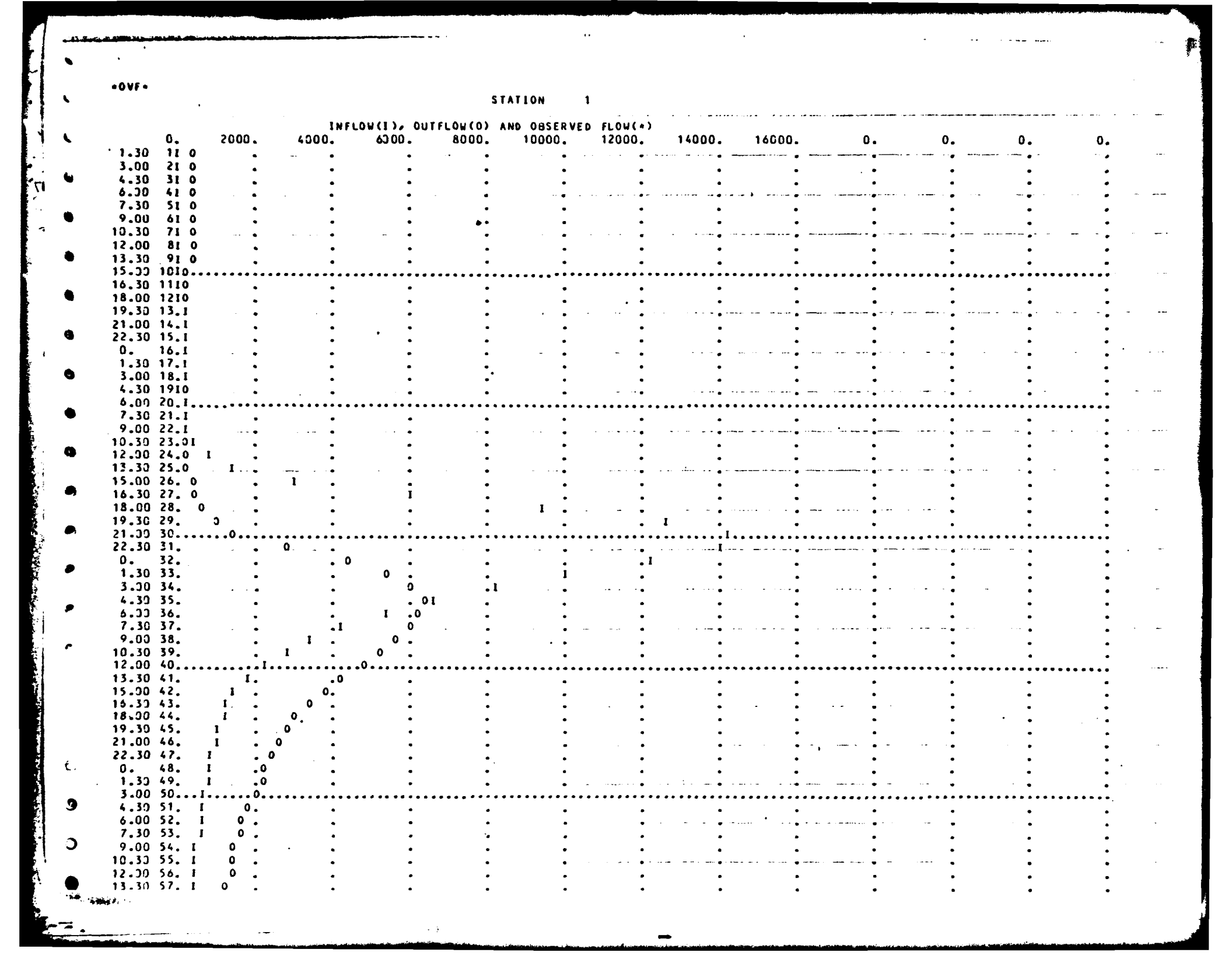
PEAK OUTFLOW IS 6347. AT TIME 52.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6347.	6103.	4527.	2352.	152798.
CMS	180.	173.	128.	67.	4327.
INCHES		1.45	4.30	6.71	9.08
MM		36.83	109.26	170.37	230.54
AC-FT		3026.	8977.	13998.	18942.
THOUS CU M		3733.	11073.	17266.	23364.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)



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21.00 78I    0
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 3.00 82I  0
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 9.00 86I  0
10.30 87I  0
12.00 88I  0
13.30 89I  0
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 7.3011710
 9.0011810
10.3011910
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13.3013710
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19.3014110
21.0014210
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 9.0015010
10.3015110
12.0015210
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18.0015610
19.3015710
21.0015810
22.3015910
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 3.0016210
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12.0016810
13.3016910
15.0017010
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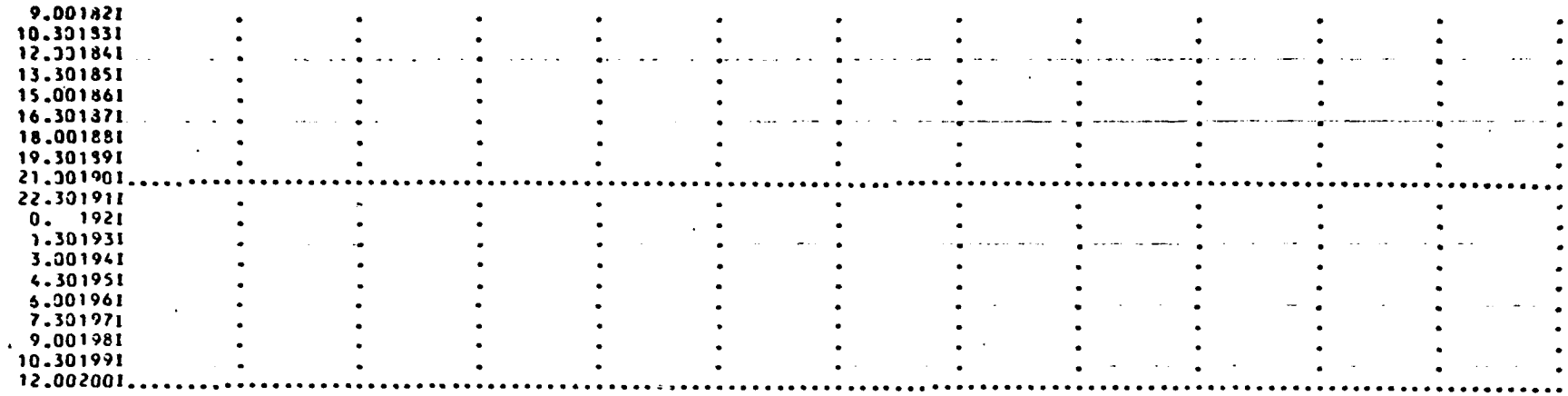
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0. 1921
1.301931
3.001941
4.301951
6.001961
7.301971
9.001981
10.301991
12.002001

OVN

WARNING *** TOP OF DAM, BOTTOM OF BREACH, OR LOW-LEVEL OUTLET IS NOT WITHIN RANGE OF GIVEN ELEVATIONS IN STORAGE-ELEVATION DATA
BOTTOM OF RESERVOIR ASSUMED TO BE AT 722.00
STORAGE-ELEVATION DATA WILL BE EXTRAPOLATED ABOVE ELEVATION 795.00

STATION 1, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

342.	337.	332.	327.	323.	318.	313.	309.	304.	299.
295.	292.	289.	287.	285.	283.	281.	279.	276.	274.
272.	272.	275.	284.	302.	342.	486.	742.	1187.	2450.
4659.	6772.	8197.	8827.	8901.	8608.	8084.	7426.	6708.	5979.
5337.	4739.	4284.	3837.	3441.	3090.	2822.	2637.	2461.	2295.
2138.	1991.	1852.	1721.	1599.	1484.	1377.	1339.	1306.	1273.
1240.	1207.	1174.	1141.	1109.	1078.	1047.	1016.	986.	956.
928.	899.	872.	845.	818.	792.	769.	750.	730.	711.
693.	675.	657.	640.	623.	606.	590.	574.	559.	544.
529.	515.	501.	487.	474.	461.	449.	436.	424.	413.
401.	390.	380.	369.	359.	349.	343.	337.	332.	327.
322.	317.	312.	307.	302.	297.	292.	288.	283.	279.
274.	270.	266.	261.	257.	253.	249.	245.	241.	238.
234.	230.	226.	223.	219.	216.	212.	209.	206.	202.
199.	196.	193.	190.	187.	184.	181.	178.	175.	172.
170.	167.	164.	162.	159.	157.	154.	152.	149.	147.
145.	142.	140.	138.	136.	133.	131.	129.	127.	125.
123.	121.	119.	117.	116.	114.	112.	110.	108.	107.
105.	103.	102.	100.	98.	97.	95.	94.	92.	91.
89.	88.	87.	85.	84.	83.	81.	80.	79.	77.

STORAGE

28712.	28674.	28636.	28599.	28562.	28525.	28489.	28453.	28417.	28382.
28349.	28321.	28299.	28283.	28269.	28256.	28241.	28223.	28204.	28185.
28170.	28168.	28193.	28260.	28399.	28708.	29354.	30470.	32053.	33894.
35630.	36945.	37738.	38089.	38130.	37967.	37675.	37309.	36909.	36503.
36105.	35721.	35367.	35054.	34777.	34530.	34308.	34102.	33907.	33722.
33547.	33383.	33228.	33082.	32946.	32818.	32699.	32583.	32468.	32352.
32237.	32122.	32008.	31895.	31783.	31673.	31564.	31458.	31353.	31250.
31149.	31051.	30954.	30860.	30768.	30679.	30591.	30505.	30421.	30339.
30258.	30179.	30102.	30027.	29953.	29881.	29810.	29741.	29674.	29609.
29545.	29482.	29422.	29362.	29304.	29248.	29193.	29140.	29088.	29037.
28987.	28939.	28892.	28847.	28802.	28759.	28717.	28675.	28634.	28594.
28554.	28515.	28476.	28439.	28401.	28364.	28328.	28292.	28257.	28222.
28188.	28154.	28121.	28089.	28057.	28025.	27994.	27964.	27933.	27904.
27875.	27846.	27818.	27790.	27763.	27736.	27709.	27683.	27657.	27632.
27607.	27583.	27559.	27535.	27512.	27489.	27466.	27444.	27422.	27400.
27379.	27358.	27338.	27318.	27298.	27278.	27259.	27240.	27221.	27203.
27185.	27167.	27150.	27132.	27115.	27099.	27082.	27066.	27050.	27035.
27019.	27004.	26989.	26975.	26960.	26946.	26932.	26918.	26905.	26891.
26878.	26865.	26853.	26840.	26828.	26816.	26804.	26792.	26780.	26769.
26758.	26747.	26736.	26726.	26715.	26705.	26695.	26685.	26675.	26665.

STAGE

788.0	788.0	787.9	787.9	787.9	787.9	787.9	787.8	787.8	787.8
787.8	787.8	787.8	787.8	787.7	787.7	787.7	787.7	787.7	787.7
787.7	787.7	787.7	787.7	787.8	788.0	788.3	788.9	789.8	790.7
791.6	792.3	792.8	792.9	793.0	792.9	792.7	792.5	792.3	792.1
791.9	791.7	791.5	791.3	791.2	791.1	791.0	790.8	790.7	790.6
790.6	790.5	790.4	790.3	790.2	790.2	790.1	790.0	790.0	789.9
789.9	789.8	789.7	789.7	789.6	789.6	789.5	789.4	789.4	789.3

789.3	789.2	789.2	789.1	789.1	789.0	789.0	788.9	788.9	788.8
788.8	788.8	788.7	788.7	788.6	788.6	788.6	788.5	788.5	788.5
788.4	788.4	788.4	788.3	788.3	788.3	788.2	788.2	788.2	788.2
788.1	788.1	788.1	788.1	788.0	788.0	788.0	788.0	787.9	787.9
787.9	787.9	787.9	787.8	787.8	787.8	787.8	787.8	787.7	787.7
787.7	787.7	787.7	787.7	787.6	787.6	787.6	787.6	787.6	787.6
787.5	787.5	787.5	787.5	787.5	787.5	787.5	787.4	787.4	787.4
787.4	787.4	787.4	787.4	787.4	787.3	787.3	787.3	787.3	787.3
787.3	787.3	787.3	787.3	787.2	787.2	787.2	787.2	787.2	787.2
787.2	787.2	787.2	787.2	787.1	787.1	787.1	787.1	787.1	787.1
787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.0	787.0	787.0
787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0
787.0	787.0	786.9	786.9	786.9	786.9	786.9	786.9	786.9	786.9

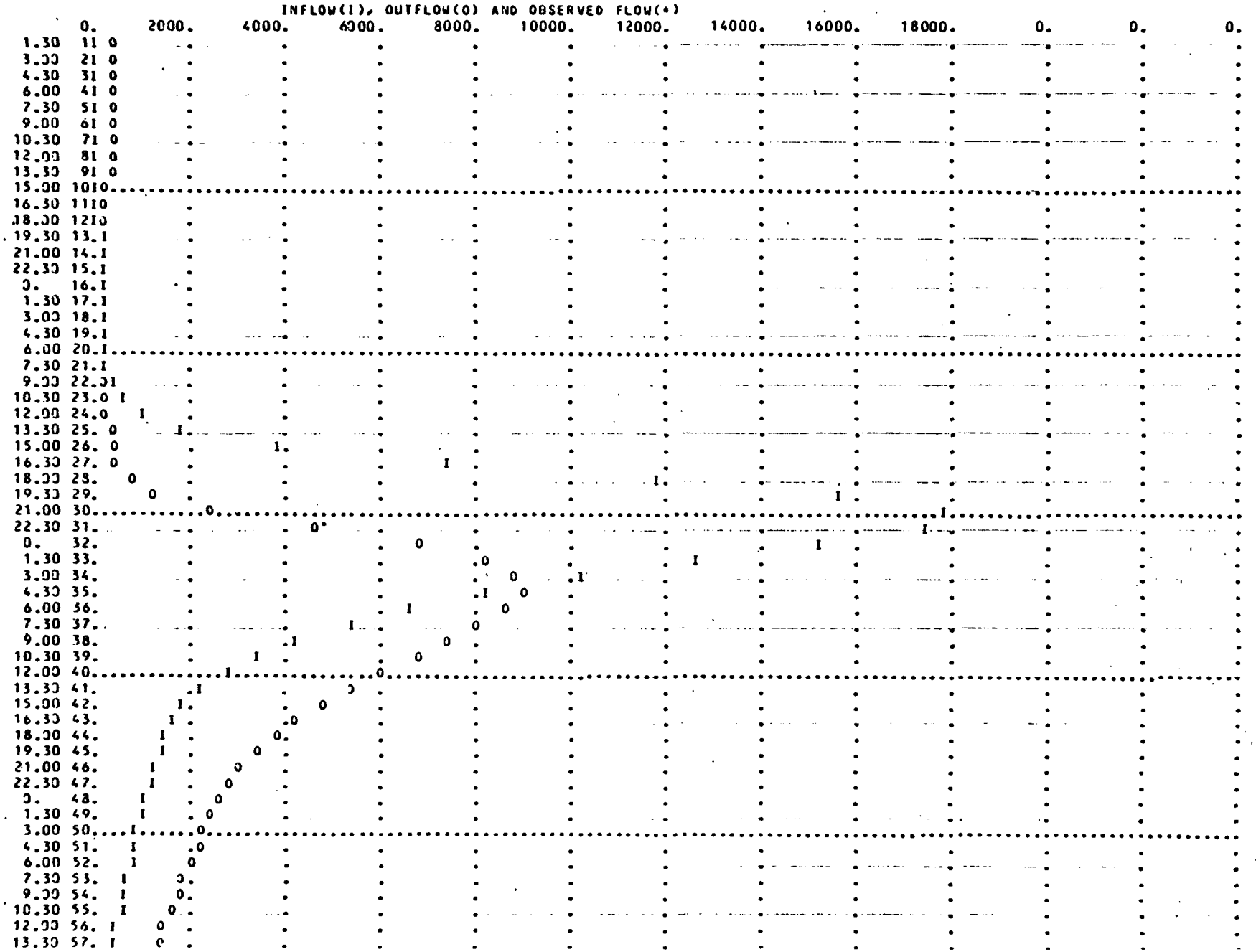
PEAK OUTFLOW IS 8901. AT TIME 52.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8901.	8619.	6164.	3020.	186657.
CMS	252.	244.	175.	86.	5286.
INCHES		2.05	5.86	8.61	11.09
MM		52.02	148.80	218.70	281.63
AC-FT		4274.	12226.	17969.	23139.
THOUS CU M		5272.	15080.	22165.	28542.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)



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 3.00 66.I    0
 4.30 67.I    0
 6.00 68.I    0
 7.30 69.I    0
 9.00 70.I...0.....
10.30 71.I    0
12.00 72.I  0
13.30 73.I  0
15.00 74I   0
16.30 75I   0
18.00 76I   0
19.30 77I   0
21.00 78I   0
22.30 79I   0
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18.00 92I   0
19.30 93I   0
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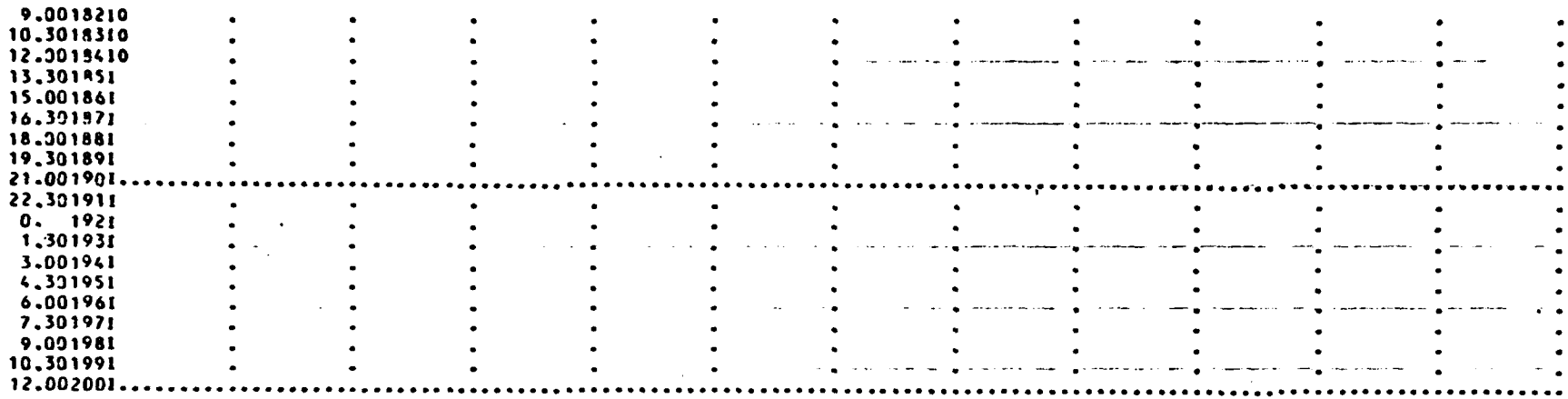
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4.301951
6.001961
7.301971
9.001981
10.301991
12.002001

OVN

WARNING *** TOP OF DAM, BOTTOM OF BREACH, OR LOW-LEVEL OUTLET IS NOT WITHIN RANGE OF GIVEN ELEVATIONS IN STORAGE-ELEVATION DATA
BOTTOM OF RESERVOIR ASSUMED TO BE AT 722.00
STORAGE-ELEVATION DATA WILL BE EXTRAPOLATED ABOVE ELEVATION 795.00

STATION 1, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

342.	337.	333.	328.	323.	318.	314.	309.	305.	300.
296.	293.	290.	288.	287.	286.	285.	283.	280.	278.
277.	277.	282.	293.	315.	377.	556.	885.	1552.	3819.
6855.	9461.	11116.	11690.	11539.	10938.	10076.	9085.	8181.	7279.
6410.	5602.	5020.	4503.	4045.	3637.	3273.	2948.	2745.	2568.
2399.	2240.	2089.	1946.	1812.	1686.	1567.	1456.	1363.	1331.
1298.	1265.	1232.	1200.	1167.	1135.	1103.	1072.	1041.	1010.
980.	951.	922.	894.	867.	840.	814.	788.	766.	746.
727.	708.	690.	672.	654.	637.	620.	604.	588.	572.
557.	542.	527.	513.	499.	485.	472.	459.	447.	435.
423.	411.	400.	389.	378.	368.	357.	348.	342.	337.
331.	326.	321.	316.	311.	306.	301.	296.	292.	287.
283.	278.	274.	269.	265.	261.	257.	253.	249.	245.
241.	237.	233.	230.	226.	222.	219.	215.	212.	209.
205.	202.	199.	196.	192.	189.	186.	183.	181.	178.
175.	172.	169.	167.	164.	161.	159.	156.	154.	151.
149.	147.	144.	142.	140.	137.	135.	133.	131.	129.
127.	125.	123.	121.	119.	117.	115.	113.	112.	110.
108.	106.	105.	103.	101.	100.	98.	97.	95.	94.
92.	91.	89.	88.	86.	85.	84.	82.	81.	80.

STORAGE

28713.	28676.	28639.	28602.	28566.	28529.	28493.	28458.	28422.	28388.
28356.	28330.	28310.	28297.	28288.	28279.	28267.	28252.	28236.	28219.
28208.	28211.	28247.	28333.	28506.	28882.	29661.	31002.	32893.	35041.
36991.	38408.	39198.	39472.	39400.	39113.	38701.	38228.	37729.	37227.
36743.	36291.	35883.	35521.	35199.	34913.	34659.	34431.	34223.	34025.
33838.	33660.	33492.	33333.	33183.	33043.	32911.	32786.	32670.	32555.
32441.	32326.	32211.	32097.	31984.	31872.	31761.	31652.	31544.	31438.
31334.	31232.	31131.	31033.	30938.	30844.	30753.	30663.	30576.	30491.
30407.	30326.	30245.	30167.	30090.	30015.	29941.	29869.	29799.	29731.
29664.	29599.	29535.	29473.	29412.	29353.	29296.	29240.	29185.	29132.
29080.	29029.	28980.	28932.	28885.	28840.	28796.	28753.	28710.	28669.
28629.	28588.	28548.	28509.	28470.	28433.	28395.	28358.	28322.	28287.
28252.	28217.	28183.	28149.	28116.	28084.	28052.	28021.	27990.	27959.
27929.	27899.	27870.	27842.	27814.	27786.	27759.	27732.	27705.	27679.
27654.	27628.	27604.	27579.	27555.	27532.	27508.	27485.	27463.	27441.
27419.	27397.	27376.	27355.	27335.	27315.	27295.	27275.	27256.	27237.
27219.	27200.	27182.	27164.	27147.	27130.	27113.	27096.	27080.	27064.
27048.	27032.	27017.	27002.	26987.	26972.	26958.	26944.	26930.	26916.
26903.	26889.	26876.	26863.	26851.	26838.	26826.	26814.	26802.	26790.
26779.	26767.	26756.	26745.	26735.	26724.	26713.	26703.	26693.	26683.

STAGE

788.0	788.0	787.9	787.9	787.9	787.9	787.9	787.8	787.8	787.8
787.8	787.8	787.8	787.8	787.8	787.8	787.7	787.7	787.7	787.7
787.7	787.7	787.7	787.8	787.9	788.1	788.5	789.2	790.2	791.3
792.4	793.1	793.5	793.7	793.6	793.5	793.3	793.0	792.8	792.5
792.2	792.0	791.8	791.6	791.4	791.3	791.1	791.0	790.9	790.8
790.7	790.6	790.5	790.4	790.4	790.3	790.2	790.2	790.1	790.0
790.0	789.9	789.8	789.8	789.7	789.7	789.6	789.5	789.5	789.4

789.4	789.3	789.3	789.2	789.2	789.1	789.1	789.0	789.0	788.9
788.9	788.8	788.8	788.8	788.7	788.7	788.6	788.6	788.6	788.5
788.5	788.5	788.4	788.4	788.4	788.3	788.3	788.3	788.2	788.2
788.2	788.1	788.1	788.1	788.1	788.0	788.0	788.0	788.0	788.0
787.9	787.9	787.9	787.9	787.9	787.8	787.8	787.8	787.8	787.8
787.7	787.7	787.7	787.7	787.7	787.7	787.6	787.6	787.6	787.6
787.6	787.6	787.5	787.5	787.5	787.5	787.5	787.5	787.5	787.4
787.4	787.4	787.4	787.4	787.4	787.4	787.4	787.3	787.3	787.3
787.3	787.3	787.3	787.3	787.3	787.3	787.2	787.2	787.2	787.2
787.2	787.2	787.2	787.2	787.2	787.2	787.1	787.1	787.1	787.1
787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.0
787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0
787.0	787.0	787.0	787.0	786.9	786.9	786.9	786.9	786.9	786.9

PEAK OUTFLOW IS 11690. AT TIME 51.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	11690.	11191.	7846.	3692.	220545.
CMS	331.	317.	222.	105.	6245.
INCHES		2.66	7.46	10.53	13.10
MM		67.54	189.40	267.41	332.76
AC-FT		5549.	15561.	21971.	27340.
THOUS CU M		6845.	19195.	27101.	33724.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

```
        0.      4000.     8000.     12000.    16000.    20000.    24000.    0.    0.    0.    0.    0.    0.
 1.30  110
 3.00  210
 4.30  310
 6.00  410
 7.30  510
 9.00  610
10.30  710
12.00  810
13.30  910
15.00 1010.....................................................................................
16.30 1110
18.00 1210
19.30 1310
21.00 14.I
22.30 15.I
 0.    16.I
 1.30 1710
 3.00 1810
 4.30 1910
 6.00 2010.....................................................................................
 7.30 21.I
 9.00 22.I
10.30 23.0I
12.00 24.0 I
13.30 25.0   I
15.00 26.0  .I
16.30 27.0     .I
18.00 28. 0       .I
19.30 29.   0       .I
21.00 30.....0.....................................I.....................................
22.30 31.       .  0                              I
 0.    32.       .   0                        I
 1.30 33.       .     0.        I
 3.00 34.       .      0I
 4.30 35.       .    I  0.
 6.00 36.       .   I    0
 7.30 37.       .     I  .  0
 9.00 38.       .  I     .0
10.30 39.       .  I     0
12.00 40.....I..........0.....................................................................
13.30 41.      I  .     0
15.00 42.    I    .   0
16.30 43.    I    .  0
18.00 44.   I     .0
19.30 45.   I    0
21.00 46.   I   0.
22.30 47.  I    0 .
 0.    48.  I   0 .
 1.30 49.  I   0  .
 3.00 50...I..0.....................................................................................
 4.30 51. I   0  .
 6.00 52. I   0  .
 7.30 53. I  0   .
 9.00 54. I  0   .
10.30 55. I  0   .
12.00 56.I   0  .
13.30 57.I   0  .
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15.30 58.1  0
16.30 59.1 0
18.00 60.1.0
19.30 61.1 0
21.00 62.1 0
22.30 63.1 0
 0.   64.1 0
 1.30 65.1 0
 3.00 66.1 0
 4.30 67.1 0
 6.00 68I  0
 7.30 69I  0
 9.00 70I..0
10.30 71I 0
12.00 72I 0
13.30 73I 0
15.00 74I 0
16.30 75I 0
18.00 76I 0
19.30 77I 0
21.00 78I 0
22.30 79I 0
 0.   80I.0
 1.30 81I 0
 3.00 82I 0
 4.30 83I 0
 6.00 84I 0
 7.30 85I 0
 9.00 86I 0
10.30 87I 0
12.00 88I 0
13.30 8910
15.30 9010
16.30 9110
18.00 9210
19.30 9310
21.00 9410
22.30 9510
 0.   9610
 1.30 9710
 3.00 9810
 4.30 9910
 6.0010010
 7.3010110
 9.3010210
10.3010310
12.0010410
13.3010510
15.0010610
16.3010710
18.0010810
19.3010910
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16.3012310
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 1.3012910
 3.0013010
 4.3013110
 6.0013210
 7.3013310
 9.0013410
10.3013510
12.0013610
13.3013710
15.0013810
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 3.001461
 4.301471
 6.001481
 7.301491
 9.001501
10.301511
12.001521
13.301531
15.301541
16.301551
18.001561
19.301571
21.001581
22.301591
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 1.301611
 3.001621
 4.301631
 6.001641
 7.301651
 9.001661
10.301671
12.001681
13.301691
15.001701
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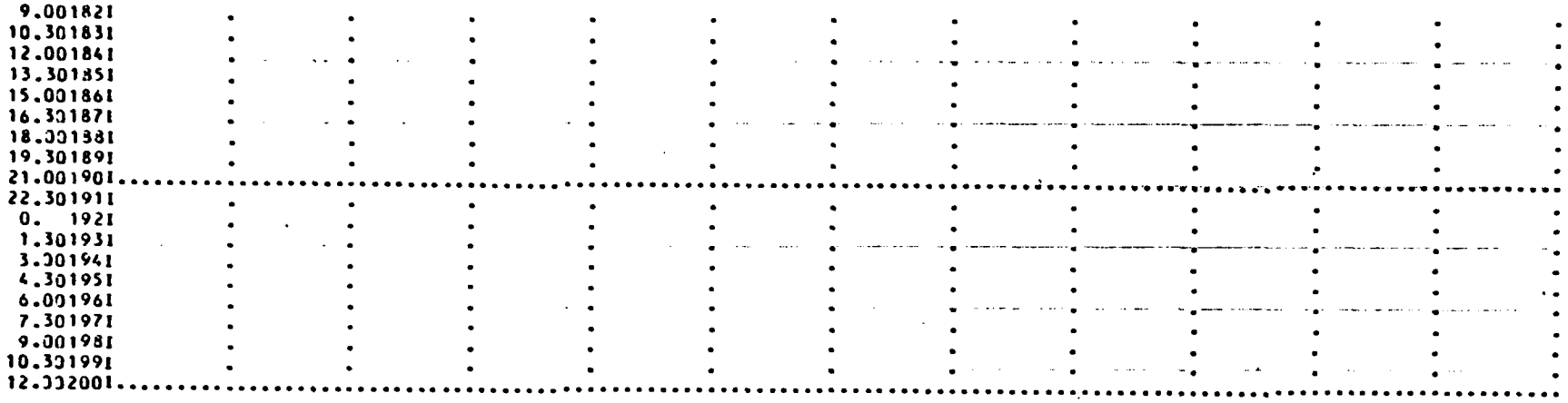
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0. 1921
1.301931
3.301941
4.301951
6.001961
7.301971
9.001981
10.301991
12.302001

OVN

WARNING *** TOP OF DAM, BOTTOM OF BREACH, OR LOW-LEVEL OUTLET IS NOT WITHIN RANGE OF GIVEN ELEVATIONS IN STORAGE-ELEVATION DATA
BOTTOM OF RESERVOIR ASSUMED TO BE AT 722.00
STORAGE-ELEVATION DATA WILL BE EXTRAPOLATED ABOVE ELEVATION 795.00

STATION 1, PLAN 1, RATIO 5

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

342.	338.	333.	329.	324.	320.	315.	311.	306.	302.
298.	295.	293.	292.	292.	292.	291.	290.	289.	287.
287.	288.	296.	312.	343.	457.	696.	1190.	3078.	7216.
11745.	15269.	17038.	17322.	16657.	15445.	13952.	12420.	10977.	9582.
8376.	7329.	6400.	5611.	5064.	4573.	4133.	3738.	3383.	3063.
2821.	2648.	2482.	2324.	2174.	2031.	1895.	1767.	1647.	1533.
1426.	1355.	1323.	1290.	1258.	1225.	1193.	1161.	1129.	1098.
1066.	1036.	1006.	976.	947.	918.	890.	863.	836.	810.
785.	763.	744.	725.	706.	688.	670.	652.	635.	618.
602.	586.	570.	555.	540.	526.	511.	497.	484.	471.
458.	446.	433.	421.	410.	399.	388.	377.	367.	357.
347.	341.	336.	331.	326.	320.	315.	310.	306.	301.
296.	291.	287.	282.	278.	273.	269.	265.	260.	256.
252.	249.	244.	240.	237.	233.	229.	226.	222.	218.
215.	212.	208.	205.	202.	198.	195.	192.	189.	186.
183.	180.	177.	175.	172.	169.	166.	164.	161.	159.
156.	154.	151.	149.	146.	144.	142.	140.	137.	135.
133.	131.	129.	127.	125.	123.	121.	119.	117.	115.
113.	111.	110.	108.	106.	105.	103.	101.	100.	98.
96.	95.	93.	92.	90.	89.	88.	86.	85.	84.

STORAGE

28714.	28679.	28644.	28608.	28573.	28538.	28503.	28468.	28433.	28399.
28369.	28346.	28332.	28326.	28325.	28324.	28320.	28310.	28299.	28288.
28282.	28297.	28355.	28480.	28720.	29229.	30273.	32064.	34522.	37192.
39498.	41061.	41813.	41933.	41651.	41136.	40502.	39820.	39131.	38465.
37838.	37255.	36737.	36297.	35914.	35570.	35261.	34984.	34736.	34512.
34307.	34115.	33930.	33754.	33587.	33427.	33276.	33134.	32999.	32872.
32753.	32639.	32527.	32414.	32301.	32187.	32075.	31963.	31852.	31742.
31633.	31526.	31421.	31318.	31217.	31117.	31020.	30925.	30832.	30741.
30652.	30566.	30481.	30398.	30316.	30236.	30158.	30081.	30006.	29933.
29862.	29792.	29724.	29657.	29592.	29528.	29467.	29406.	29347.	29290.
29234.	29180.	29126.	29075.	29024.	28975.	28927.	28881.	28836.	28791.
28749.	28706.	28665.	28624.	28584.	28544.	28505.	28467.	28429.	28392.
28355.	28319.	28283.	28248.	28214.	28180.	28146.	28113.	28081.	28049.
28018.	27987.	27956.	27926.	27897.	27868.	27839.	27811.	27783.	27756.
27729.	27703.	27677.	27651.	27626.	27601.	27577.	27553.	27529.	27506.
27483.	27461.	27439.	27417.	27395.	27374.	27353.	27333.	27313.	27293.
27274.	27254.	27235.	27217.	27199.	27181.	27163.	27145.	27128.	27111.
27095.	27078.	27062.	27047.	27031.	27016.	27001.	26986.	26971.	26957.
26943.	26929.	26915.	26901.	26888.	26875.	26862.	26850.	26837.	26825.
26813.	26801.	26789.	26778.	26766.	26755.	26744.	26734.	26723.	26713.

STAGE

788.0	788.0	787.9	787.9	787.9	787.9	787.9	787.9	787.8	787.8
787.8	787.8	787.8	787.8	787.8	787.8	787.8	787.8	787.8	787.8
787.8	787.8	787.8	787.9	788.0	788.3	788.8	789.8	791.1	792.5
793.7	794.5	794.9	795.0	794.8	794.5	794.2	793.9	793.5	793.1
792.8	792.5	792.2	792.0	791.8	791.6	791.5	791.3	791.2	791.1
791.0	790.8	790.8	790.7	790.6	790.5	790.4	790.3	790.3	790.2
790.1	790.1	790.0	790.0	789.9	789.8	789.8	789.7	789.7	789.6

789.5	789.5	789.4	789.4	789.3	789.3	789.2	789.2	789.1	789.1
789.0	789.0	788.9	788.9	788.8	788.8	788.8	788.7	788.7	788.6
788.6	788.6	788.5	788.5	788.4	788.4	788.4	788.3	788.3	788.3
788.3	788.2	788.2	788.2	788.1	788.1	788.1	788.1	788.0	788.0
788.0	788.0	788.0	787.9	787.9	787.9	787.9	787.9	787.8	787.8
787.8	787.8	787.8	787.7	787.7	787.7	787.7	787.7	787.7	787.6
787.6	787.6	787.6	787.6	787.6	787.5	787.5	787.5	787.5	787.5
787.5	787.5	787.4	787.4	787.4	787.4	787.4	787.4	787.4	787.4
787.3	787.3	787.3	787.3	787.3	787.3	787.3	787.3	787.3	787.2
787.2	787.2	787.2	787.2	787.2	787.2	787.2	787.2	787.2	787.1
787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.1
787.1	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0
787.0	787.0	787.0	787.0	787.0	787.0	787.0	786.9	786.9	786.9

PEAK OUTFLOW IS 17322. AT TIME 51.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	17322.	16594.	11213.	5047.	288373.
CMS	491.	470.	318.	143.	8166.
INCHES		3.94	10.66	14.39	17.13
MM		100.15	270.69	365.50	435.10
AC-FT		8228.	22241.	30031.	35749.
THOUS CU M		10149.	27434.	37042.	44095.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	4000.	8000.	12000.	16000.	20000.	24000.	28000.	32000.	0.	0.	0.	0.
1.30	110												
3.00	210												
4.30	310												
6.00	410												
7.30	510												
9.00	610												
10.30	710												
12.00	810												
13.30	910												
15.00	1010												
16.30	1110												
18.00	1210												
19.30	13.I												
21.00	14.I												
22.30	15.I												
0.	16.I												
1.30	17.I												
3.00	18.I												
4.30	1910												
6.00	20.I												
7.30	21.I												
9.00	22.I												
10.30	23.0I												
12.00	24.0 I												
13.30	25.0 I												
15.00	26.0 I												
16.30	27. 0 I												
18.00	28. 0 I												
19.30	29. 0 I												
21.00	30. 0 I												
22.30	31. I			0.					I				
0.	32. I			I	0		I						
1.30	33. I				I	0							
3.00	34. I					I	0						
4.30	35. I				I		0						
6.00	36. I			I		0.							
7.30	37. I		I		0								
9.00	38. I		I	0									
10.30	39. I		I	0									
12.00	40. I		I	0									
13.30	41. I		I	.0									
15.00	42. I		I	0									
16.30	43. I		I	0									
18.00	44. I		I	0									
19.30	45. I		I	0									
21.00	46. I		I	.0									
22.30	47. I		I	0									
0.	48. I		I	0.									
1.30	49. I		I	0									
3.00	50. I		I	0									
4.30	51. I		I	0									
6.00	52. I		I	0									
7.30	53. I		I	0									
9.00	54. I		I	0									
10.30	55. I		I	0									
12.00	56. I		I	0									

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18.00 60.1..0
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22.30 63.1 0
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 1.30 65.1 0
 3.00 66.1 0
 4.30 67.1 0
 6.00 68.1 0
 7.30 69.1 0
 9.00 70.1.0
10.30 711  0
12.00 721  0
13.30 731  0
15.00 741 0
16.30 751 0
18.00 761 0
19.30 771 0
21.00 781 0
22.30 791 0
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 1.30 811 0
 3.00 821 0
 4.30 831 0
 6.00 841 0
 7.30 851 0
 9.00 861 0
10.30 871 0
12.00 881 0
13.30 891 0
15.00 901.0
16.30 911 0
18.00 9210
19.30 9310
21.00 9410
22.30 9510
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 1.30 9710
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22.301591
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 3.301621
 4.301631
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10.301671
12.301681
13.301691
15.301701
16.301711
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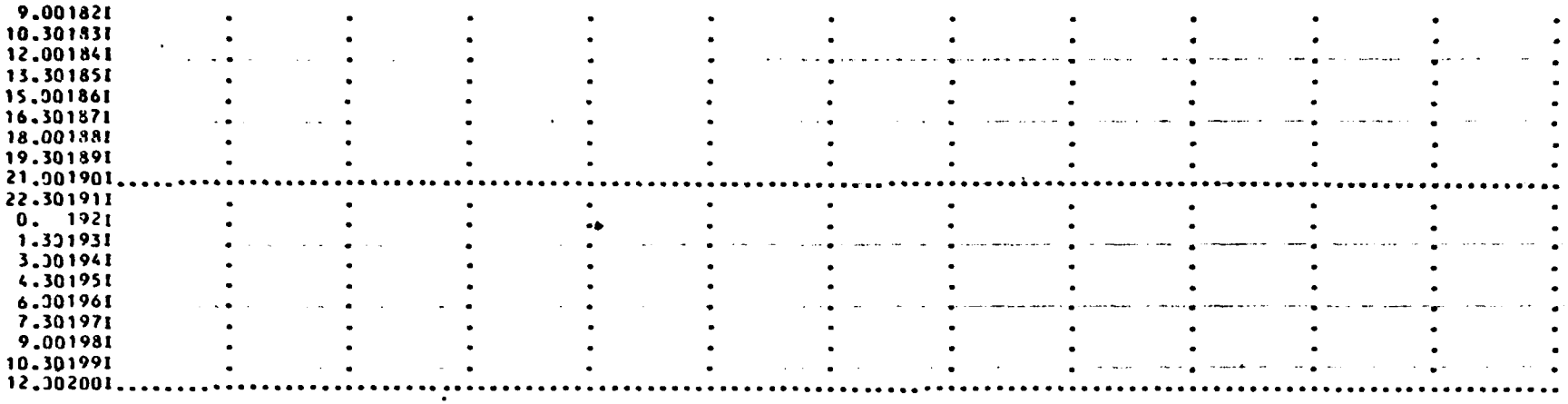
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0. 1921
1.301931
3.001941
4.301951
6.001961
7.301971
9.001981
10.301991
12.302001

OVN

WARNING *** TOP OF DAM, BOTTOM OF BREACH, OR LOW-LEVEL OUTLET IS NOT WITHIN RANGE OF GIVEN ELEVATIONS IN STORAGE-ELEVATION DATA
BOTTOM OF RESERVOIR ASSUMED TO BE AT 722.00
STORAGE-ELEVATION DATA WILL BE EXTRAPOLATED ABOVE ELEVATION 795.00

STATION 1, PLAN 1, RATIO 6

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

343.	338.	334.	329.	325.	321.	316.	312.	307.	303.
299.	297.	296.	296.	297.	298.	298.	298.	297.	296.
296.	300.	310.	331.	389.	536.	851.	1742.	5292.	11104.
17011.	20993.	22719.	22712.	21611.	19895.	17879.	15772.	13710.	11900.
10291.	8855.	7756.	6817.	6013.	5376.	4881.	4434.	4029.	3662.
3329.	3028.	2807.	2641.	2481.	2327.	2180.	2040.	1907.	1780.
1661.	1548.	1442.	1360.	1329.	1297.	1264.	1232.	1200.	1168.
1136.	1105.	1074.	1043.	1013.	983.	954.	925.	897.	870.
843.	817.	791.	769.	749.	730.	711.	693.	675.	657.
640.	623.	606.	590.	575.	559.	544.	530.	515.	501.
438.	474.	462.	449.	437.	425.	413.	402.	391.	380.
370.	359.	349.	343.	338.	332.	327.	322.	317.	312.
307.	302.	297.	293.	288.	283.	279.	275.	270.	266.
262.	258.	253.	249.	245.	242.	238.	234.	230.	227.
223.	219.	216.	213.	209.	206.	203.	199.	196.	193.
190.	187.	184.	181.	178.	175.	173.	170.	167.	165.
162.	159.	157.	154.	152.	149.	147.	145.	142.	140.
138.	136.	134.	131.	129.	127.	125.	123.	121.	119.
117.	116.	114.	112.	110.	108.	107.	105.	103.	102.
100.	99.	97.	95.	94.	92.	91.	89.	88.	87.

STORAGE

28716.	28682.	28648.	28614.	28580.	28546.	28512.	28478.	28444.	28411.
28382.	28362.	28353.	28355.	28362.	28370.	28372.	28369.	28362.	28356.
28357.	28383.	28463.	28627.	28933.	29574.	30982.	33106.	36074.	39192.
41801.	43492.	44226.	44223.	43755.	43026.	42170.	41275.	40399.	39572.
38804.	38105.	37492.	36970.	36522.	36132.	35786.	35472.	35188.	34931.
34698.	34487.	34292.	34107.	33928.	33757.	33593.	33437.	33289.	33148.
33015.	32889.	32771.	32658.	32547.	32435.	32323.	32211.	32099.	31987.
31876.	31767.	31659.	31552.	31447.	31343.	31242.	31142.	31044.	30949.
30856.	30764.	30675.	30588.	30503.	30420.	30338.	30258.	30179.	30102.
30027.	29953.	29881.	29811.	29742.	29675.	29610.	29546.	29484.	29423.
29364.	29306.	29250.	29195.	29141.	29089.	29038.	28989.	28941.	28894.
28848.	28804.	28761.	28718.	28677.	28636.	28595.	28556.	28516.	28478.
28440.	28402.	28365.	28329.	28293.	28258.	28224.	28189.	28156.	28123.
28090.	28058.	28027.	27996.	27965.	27935.	27905.	27876.	27847.	27819.
27791.	27764.	27737.	27710.	27684.	27659.	27633.	27608.	27584.	27560.
27536.	27513.	27490.	27467.	27445.	27423.	27401.	27380.	27359.	27339.
27319.	27299.	27279.	27260.	27241.	27222.	27204.	27186.	27168.	27150.
27133.	27116.	27100.	27083.	27067.	27051.	27035.	27020.	27005.	26990.
26975.	26961.	26947.	26933.	26919.	26905.	26892.	26879.	26866.	26853.
26841.	26828.	26816.	26804.	26793.	26781.	26770.	26759.	26748.	26737.

STAGE

788.0	788.0	787.9	787.9	787.9	787.9	787.9	787.9	787.8	787.8
787.8	787.8	787.8	787.8	787.8	787.8	787.8	787.8	787.8	787.8
787.8	787.8	787.9	787.9	788.1	788.4	789.1	790.3	791.9	793.5
794.9	795.8	796.2	796.2	795.9	795.5	795.1	794.6	794.2	793.7
793.3	792.9	792.6	792.4	792.1	791.9	791.7	791.6	791.4	791.3
791.2	791.0	790.9	790.8	790.8	790.7	790.6	790.5	790.4	790.3
790.3	790.2	790.1	790.1	790.0	790.0	789.9	789.8	789.8	789.7

789.7	789.6	789.6	789.5	789.4	789.4	789.3	789.3	789.2	789.2
789.1	789.1	789.0	789.0	788.9	788.9	788.8	788.8	788.8	788.7
788.7	788.6	788.6	788.6	788.5	788.5	788.5	788.4	788.4	788.4
788.3	788.3	788.3	788.2	788.2	788.2	788.2	788.1	788.1	788.1
788.1	788.0	788.0	788.0	788.0	787.9	787.9	787.9	787.9	787.9
787.8	787.8	787.8	787.8	787.8	787.7	787.7	787.7	787.7	787.7
787.7	787.6	787.6	787.6	787.6	787.6	787.6	787.5	787.5	787.5
787.5	787.5	787.5	787.5	787.4	787.4	787.4	787.4	787.4	787.4
787.4	787.4	787.3	787.3	787.3	787.3	787.3	787.3	787.3	787.3
787.3	787.2	787.2	787.2	787.2	787.2	787.2	787.2	787.2	787.2
787.2	787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.1	787.1
787.1	787.1	787.1	787.1	787.0	787.0	787.0	787.0	787.0	787.0
787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	787.0	786.9

PEAK OUTFLOW IS 22719. AT TIME 49.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	22719.	21871.	14667.	6412.	356242.
CMS	643.	619.	415.	182.	10088.
INCHES		5.20	13.94	18.28	21.16
MM		132.00	354.08	464.35	537.50
AC-FT		10845.	29092.	38152.	44162.
THOUS CU M		13377.	35885.	47060.	54473.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	4000.	8000.	12000.	16000.	20000.	24000.	28000.	32000.	36000.	0.	0.	0.
1.30	110												
3.00	210												
4.30	310												
6.00	410												
7.30	510												
9.00	610												
10.30	710												
12.00	810												
13.30	910												
15.00	1010												
16.30	1110												
18.00	1210												
19.30	13.1												
21.00	14.1												
22.30	15.1												
0.	16.1												
1.30	17.1												
3.00	18.1												
4.30	19.1												
6.00	20.1												
7.30	21.1												
9.00	22.01												
10.30	23.0 I												
12.00	24.0 I												
13.30	25.0 I												
15.00	26.0 I												
16.30	27. 0 I												
18.00	28. 0 I												
19.30	29. 0 I												
21.00	30. 0 I												
22.30	31. 0 I												
0.	32. 0 I												
1.30	33. 0 I												
3.00	34. 0 I												
4.30	35. 0 I												
6.00	36. 0 I												
7.30	37. 0 I												
9.00	38. 0 I												
10.30	39. 0 I												
12.00	40. 0 I												
13.30	41. 0 I												
15.00	42. 0 I												
16.30	43. 0 I												
18.00	44. 0 I												
19.30	45. 0 I												
21.00	46. 0 I												
22.30	47. 0 I												
0.	48. 0 I												
1.30	49. 0 I												
3.00	50. 0 I												
4.30	51. 0 I												
6.00	52. 0 I												
7.30	53. 0 I												
9.00	54. 0 I												
10.30	55. 0 I												
12.00	56. 0 I												
13.30	57. 0 I												

```
15.00 58. I  0
16.30 59. I  0
18.00 60..I.0.....
19.30 61. I 0
21.00 62.I  0
22.30 63.I  0
 0.   64.I 0
 1.30 65.I 0
 3.00 66.I 0
 4.30 67.I 0
 6.00 68.I 0
 7.30 69.I 0
 9.00 70.I.0.....
10.30 71.I 0
12.00 72.I 0
13.30 73.I 0
15.00 74I  0
16.30 75I  0
18.00 76I 0
19.30 77I 0
21.00 78I 0
22.30 79I 0
 0.   80I.0.....
 1.30 81I 0
 3.00 82I 0
 4.30 83I 0
 6.00 84I 0
 7.30 85I 0
 9.00 96I 0
10.30 87I 0
12.00 98I 0
13.30 89I 0
15.00 90I.0.....
16.30 91I 0
18.00 92I 0
19.30 93I 0
21.00 9410
22.30 9510
 0.   9610
 1.30 9710
 3.00 9810
 4.30 9910
 6.0010010.....
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12.3010410
13.3010510
15.0010610
16.3010710
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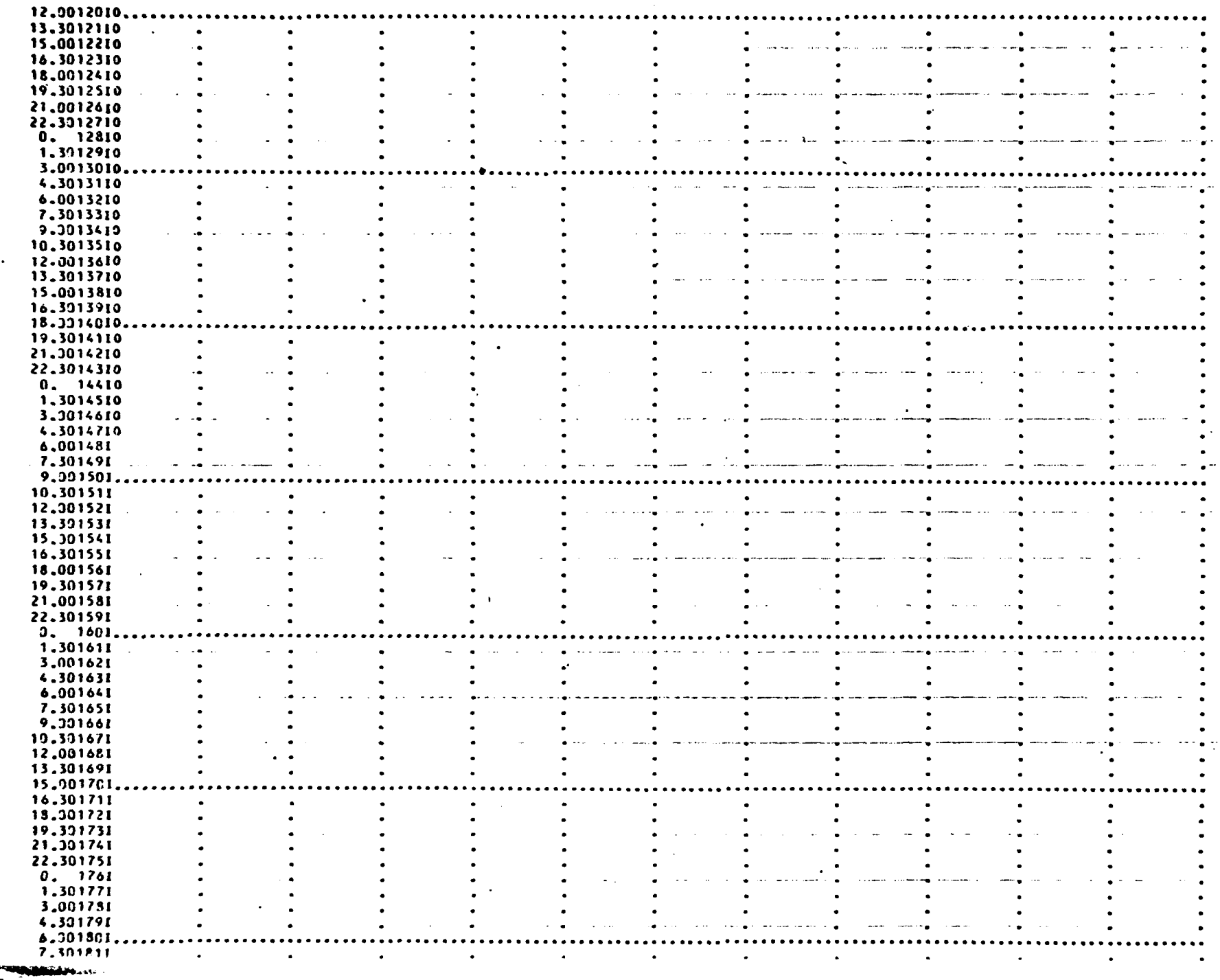
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0. 1601
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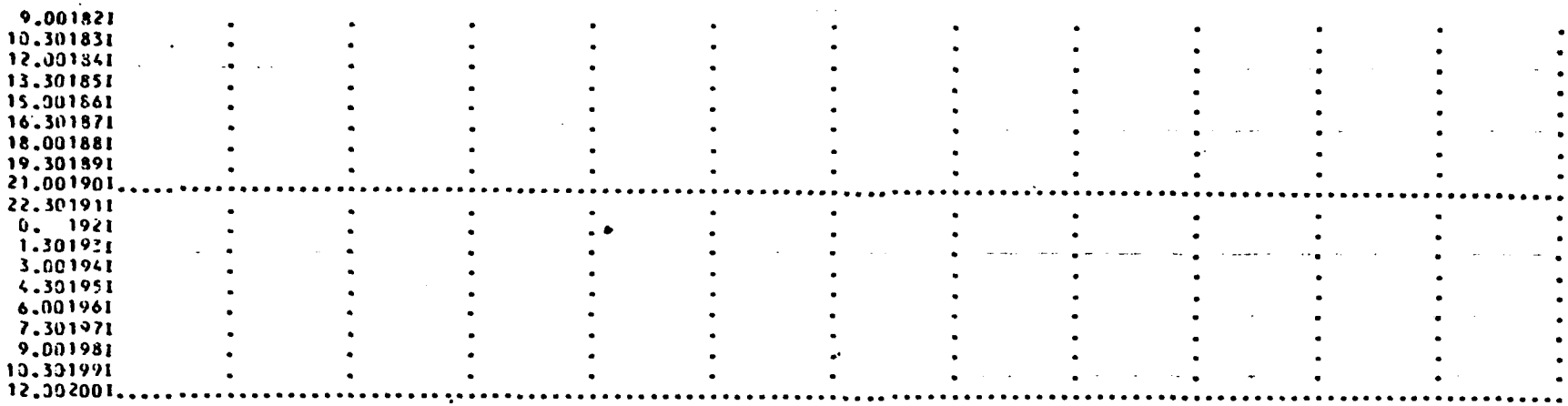
7.301811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0. 1921
1.301931
3.001941
4.301951
6.001961
7.301971
9.001981
10.301991
12.302001

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FORMULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS					
				RATIO 1 0.20	RATIO 2 0.40	RATIO 3 0.50	RATIO 4 0.60	RATIO 5 0.80	RATIO 6 1.00
HYDROGRAPH AT	1	39.15	1	7082.	14165.	17706.	21247.	28330.	35412.
		(58842.09)		(200.55)(	401.10)(	501.38)(	601.66)(	802.21)(	1002.76)(
ROUTED TO	1	39.15	1	1807.	6347.	8901.	11690.	17322.	22719.
		(58842.09)		(51.17)(	179.72)(	252.04)(	331.03)(	490.50)(	643.33)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	788.00	786.60	798.10
STORAGE	28750.	26067.	47890.
OUTFLOW	347.	0.	31345.

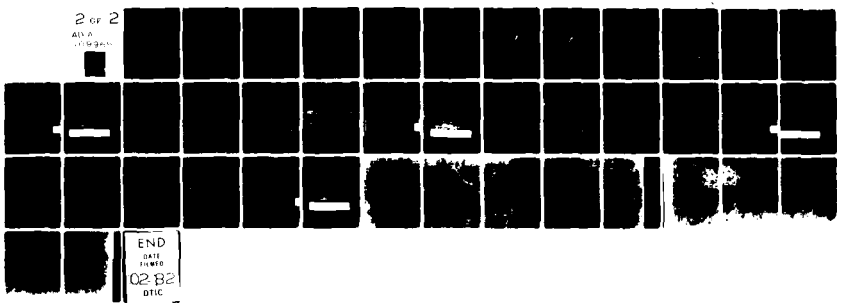
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	790.36	0.	33178.	1807.	0.	57.00	0.
0.40	792.21	0.	36708.	6347.	0.	52.50	0.
0.50	792.96	0.	38130.	8901.	0.	52.50	0.
0.60	793.67	0.	39472.	11690.	0.	51.00	0.
0.80	794.96	0.	41933.	17322.	0.	51.00	0.
1.00	796.17	0.	44226.	22719.	0.	49.50	0.

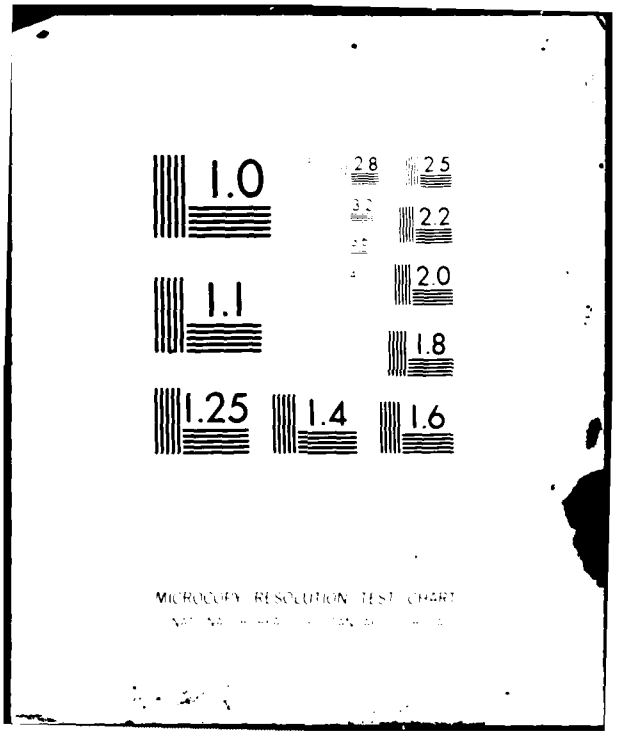
APPENDIX D

STABILITY ANALYSIS

AD-A109 965 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. OTISCO LAKE DAM (INVENTORY NUMBER --ETC(U)
SEP 81 G KOCH DACW51-79-C-0001

UNCLASSIFIED NL

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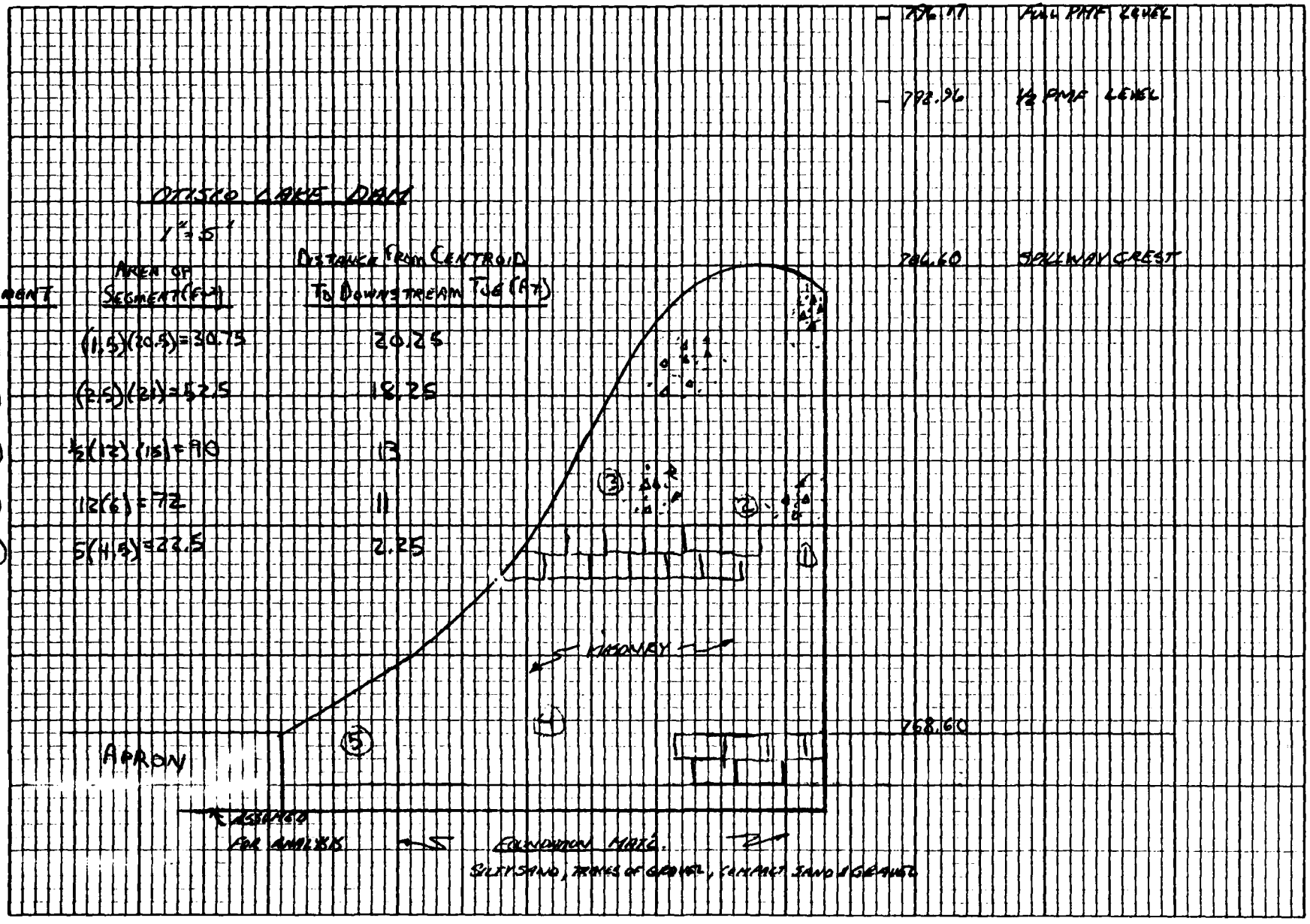
1.4
1.6
1.8
2.0
2.2
2.5
MICROCOPY RESOLUTION TEST CHART

STRUCTURAL STABILITY ANALYSIS

The analysis of the spillway section was based on information shown on the plans and on measurements made at the time of the inspection. A normal analysis was performed including both overturning and sliding analyses. Due to unknown foundation conditions, full uplift was assumed at the upstream toe, decreasing to the tailwater pressure at the downstream toe. It was assumed that the base of the dam is at the same level as the bottom of the spillway apron (which is 3 feet thick).

ANALYSIS CONDITIONS

1. Normal conditions; water surface at spillway crest
2. Same as #1 plus ice load of 5,000 pounds per linear foot
3. 1/2 PMF flow; water surface 6.4 feet above the spillway crest
4. PMF flow; water surface 9.6 feet above spillway crest
5. Seismic Conditions - Water at Spillway Crest with seismic coefficient of 0.1.



STABILITY ANALYSIS PROGRAM - WORK SHEET

INPUT ENTRY		ANALYSIS CONDITION 1	2	3	4	5
Unit Weight of Dam (K/ft^3)	0	0.15	0.15	0.15	0.15	0.15
Area of Segment No. 1 (ft^2)	1	30.75	30.75	30.75	30.75	30.75
Distance from Center of Gravity of Segment No. 1 to Downstream Toe (ft)	2	20.25	20.25	20.25	20.25	20.25
Area of Segment No. 2 (ft^2)	3	52.5	52.5	52.5	52.5	52.5
Distance from Center of Gravity of Segment No. 2 to Downstream Toe (ft)	4	18.25	18.25	18.25	18.25	18.25
Area of Segment No. 3 (ft^2)	5	90	90	90	90	90
Distance from Center of Gravity of Segment No. 3 to Downstream Toe (ft)	6	13	13	13	13	13
Base Width of Dam (Total) (ft)	7	21	21	21	21	21
Height of Dam (ft)	8	21	21	21	21	21
Ice Loading (K/ft.)	9	—	5.0	—	—	—
Coefficient of Sliding	10	0.55	0.55	0.55	0.55	0.55
Unit Weight of Soil (K/ft^3) (default 18)	11	0.055	0.055	0.055	0.055	0.055
Active Soil Coefficient - Ka	12	0.33	0.33	0.33	0.33	0.33
Passive Soil Coefficient - Kp	13	3.00	3.0	3.0	3.0	3.0
Height of Water over Top of Dam or Spillway (ft)	14	—	—	6.36	9.57	—
Height of Soil for Active Pressure (ft)	15	3.0	3.0	3.0	3.0	3.0
Height of Soil for Passive Pressure (ft)	16	3.0	3.0	3.0	3.0	3.0
Height of Water in Tailrace Channel (ft)	17	5.0	5.0	7.0	7.0	5.0
Weight of Water (K/ft^3)	18	.0624	.0624	.0624	.0624	.0624
Area of Segment No. 4 (ft^2)	19	72	72	72	72	72
Distance from Center of Gravity of Segment No. 4 to Downstream Toe (ft)	20	11	11	11	11	11
Height of Ice Load or Active Water (ft) (does not include 14)	46	21	21	21	21	21
Seismic Coefficient (g)	50	—	—	—	—	0.1
AREA OF SEG. 5 →	21	22.5	22.5	22.5	22.5	22.5
RESULTS OF ANALYSIS DIST. TO CENTROID TO D.S. TOE SEG. 5 →	22	2.25	2.25	2.25	2.25	2.25
Factor of Safety vs. Overturning		1.73	1.30	1.33	1.19	1.66
Distance From Toe to Resultant		9.91	5.37	6.12	4.15	9.33
Factor of Safety vs. Sliding		1.03	0.76	0.64	0.54	0.73

APPENDIX E

REFERENCES

APPENDIX E

REFERENCES

1) U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, May 1961.

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

3) Soil Conservation Service, National Engineering Handbook, Section 4, Hydrology, August 1972 (U.S. Department of Agriculture).

4) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw-Hill, 1963.

5) T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley and Sons, 1965.

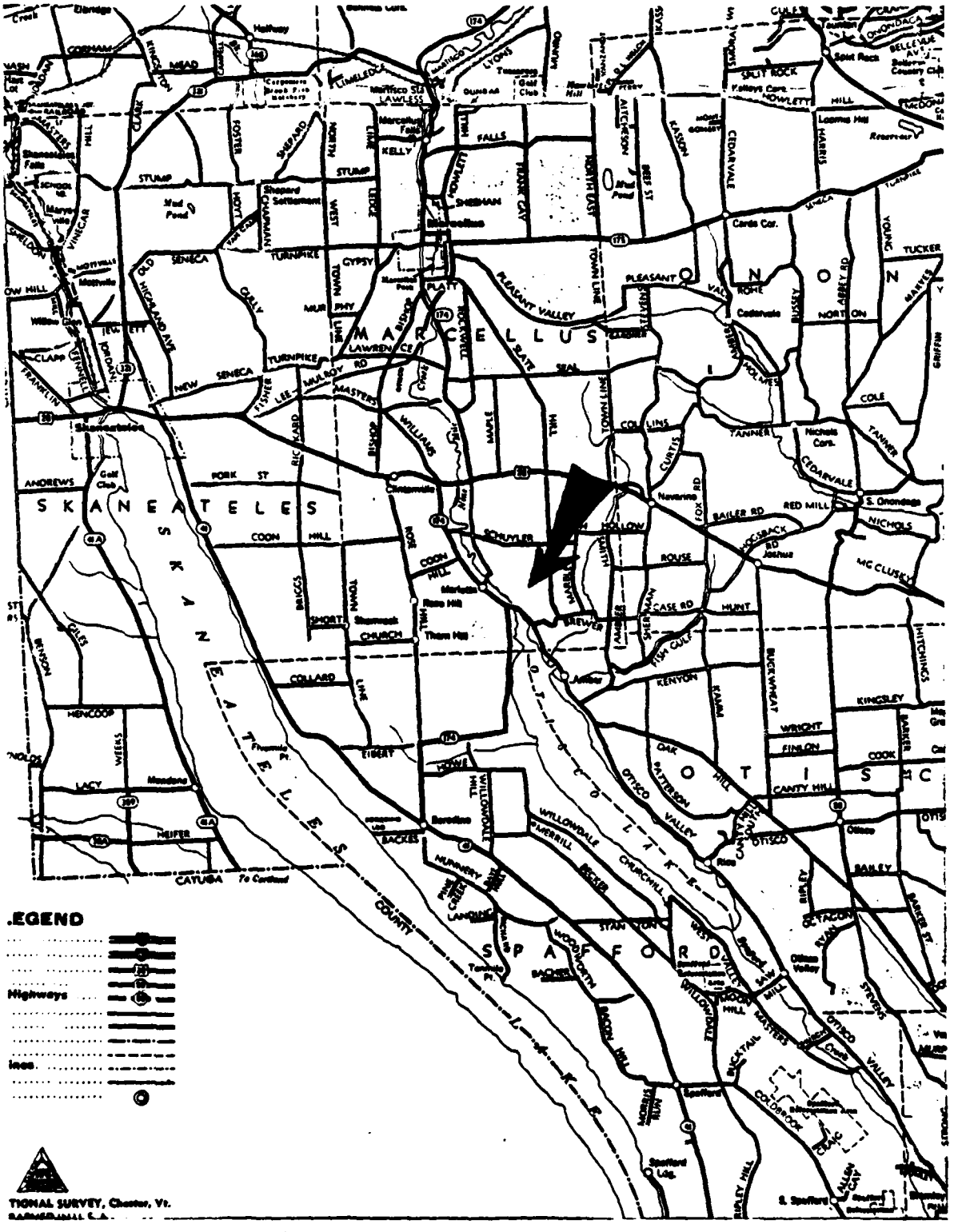
6) W.D. Thornbury, Principles of Geomorphology, John Wiley and Sons, 1969.

7) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.

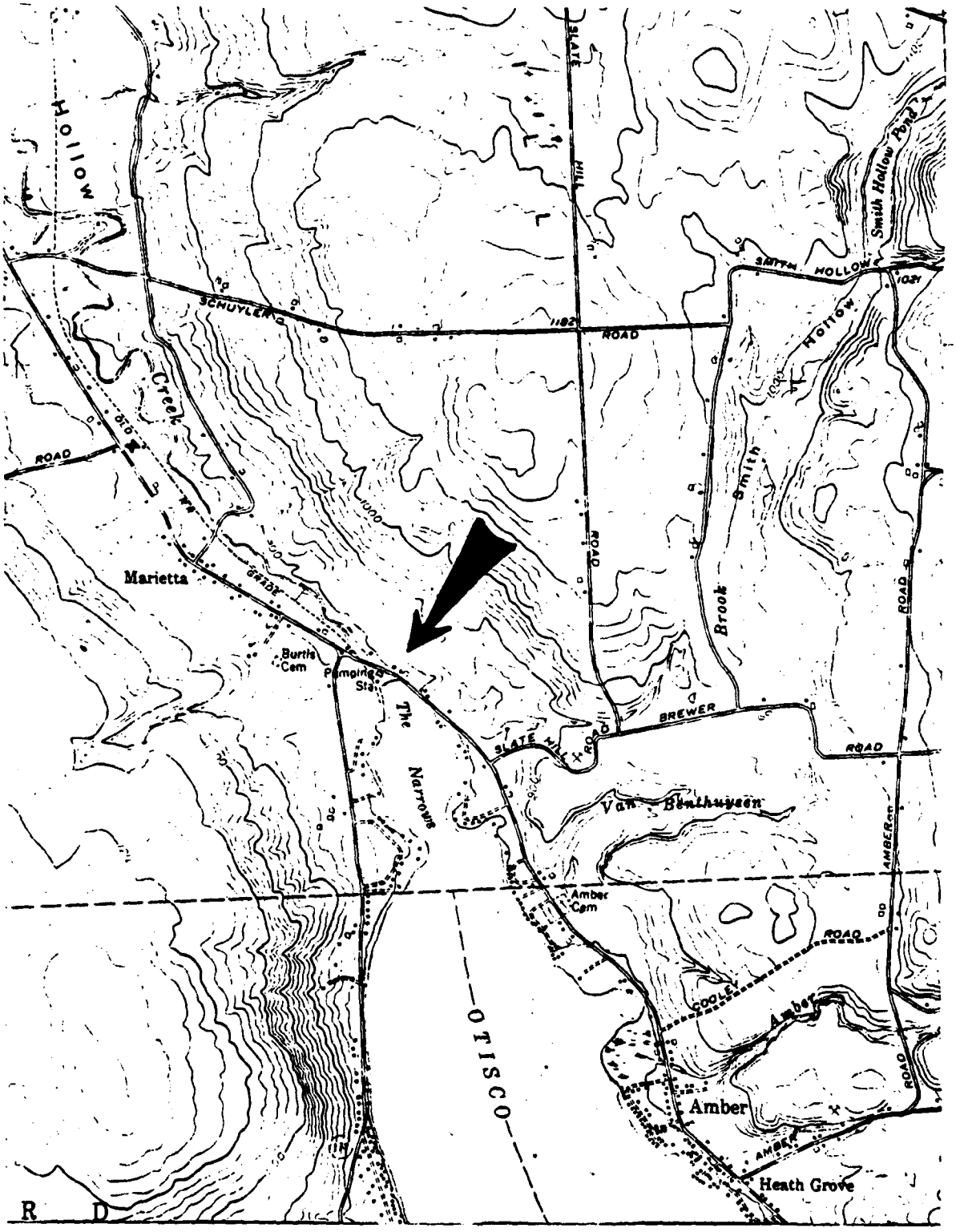
8) Cornell University Agriculture Experiment Station (compiled by M.G. Cline and R.L. Marshall), General Soil Map of New York State and Soils of New York Landscapes, Information Bulletin 119, 1977.

APPENDIX F

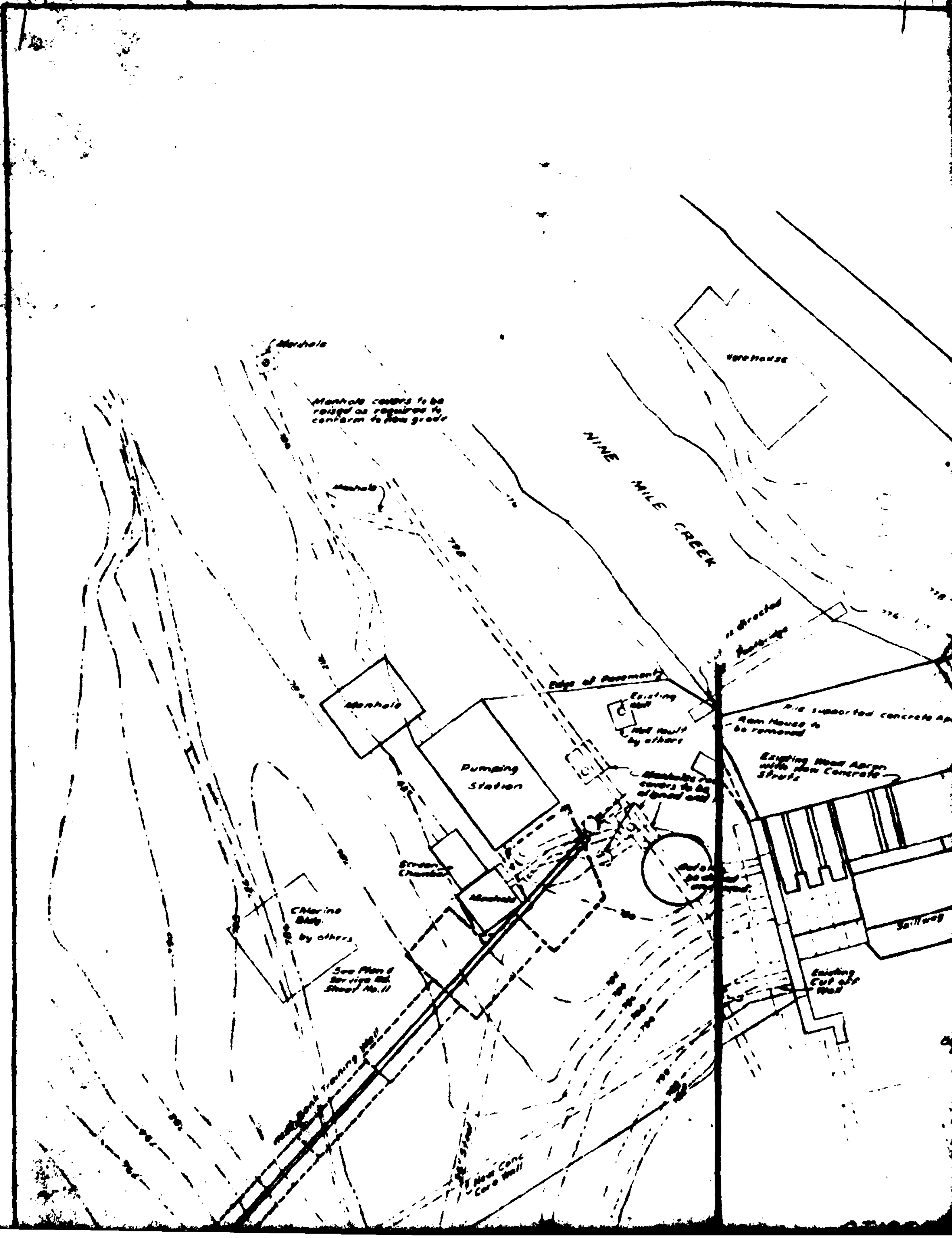
DRAWINGS

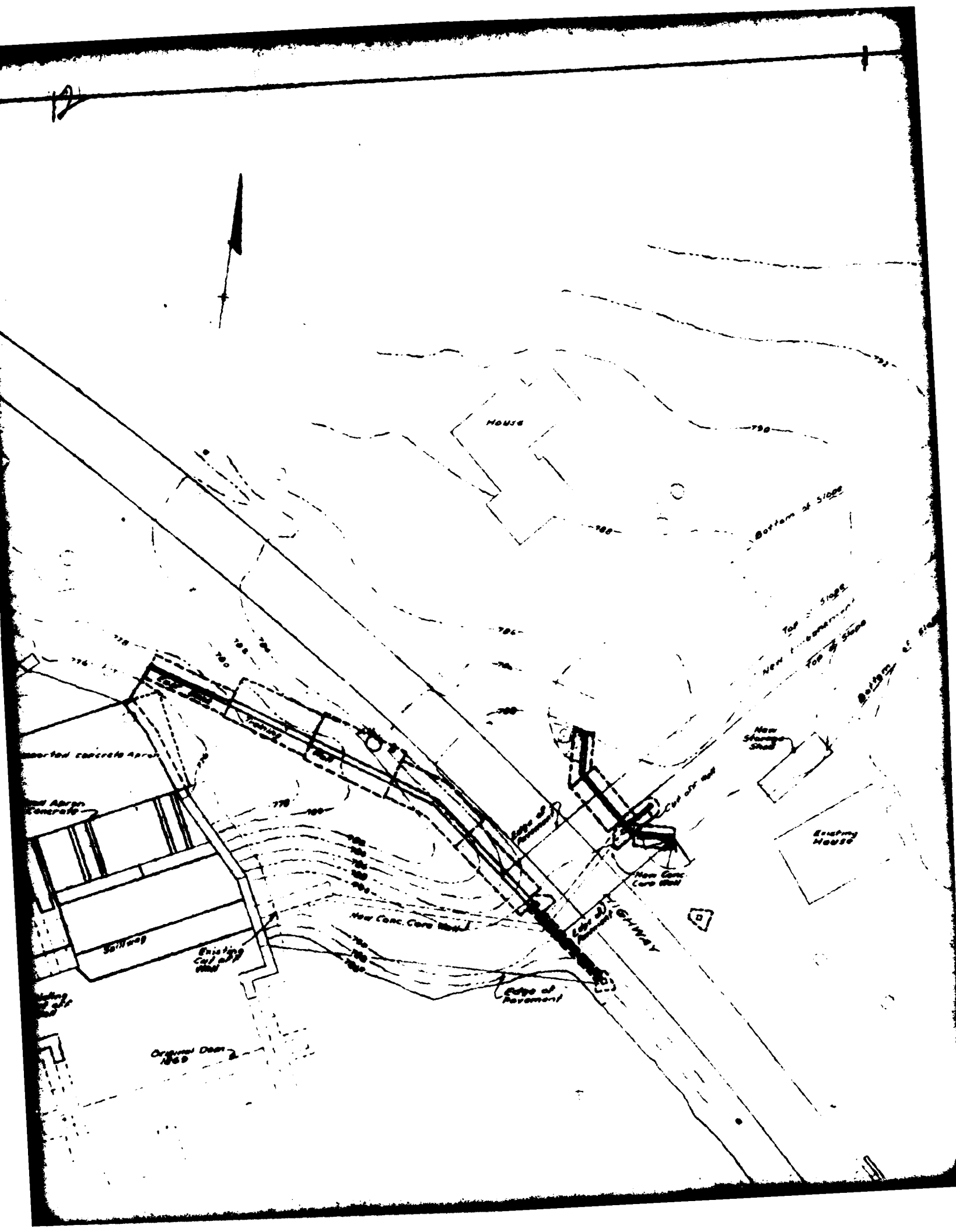


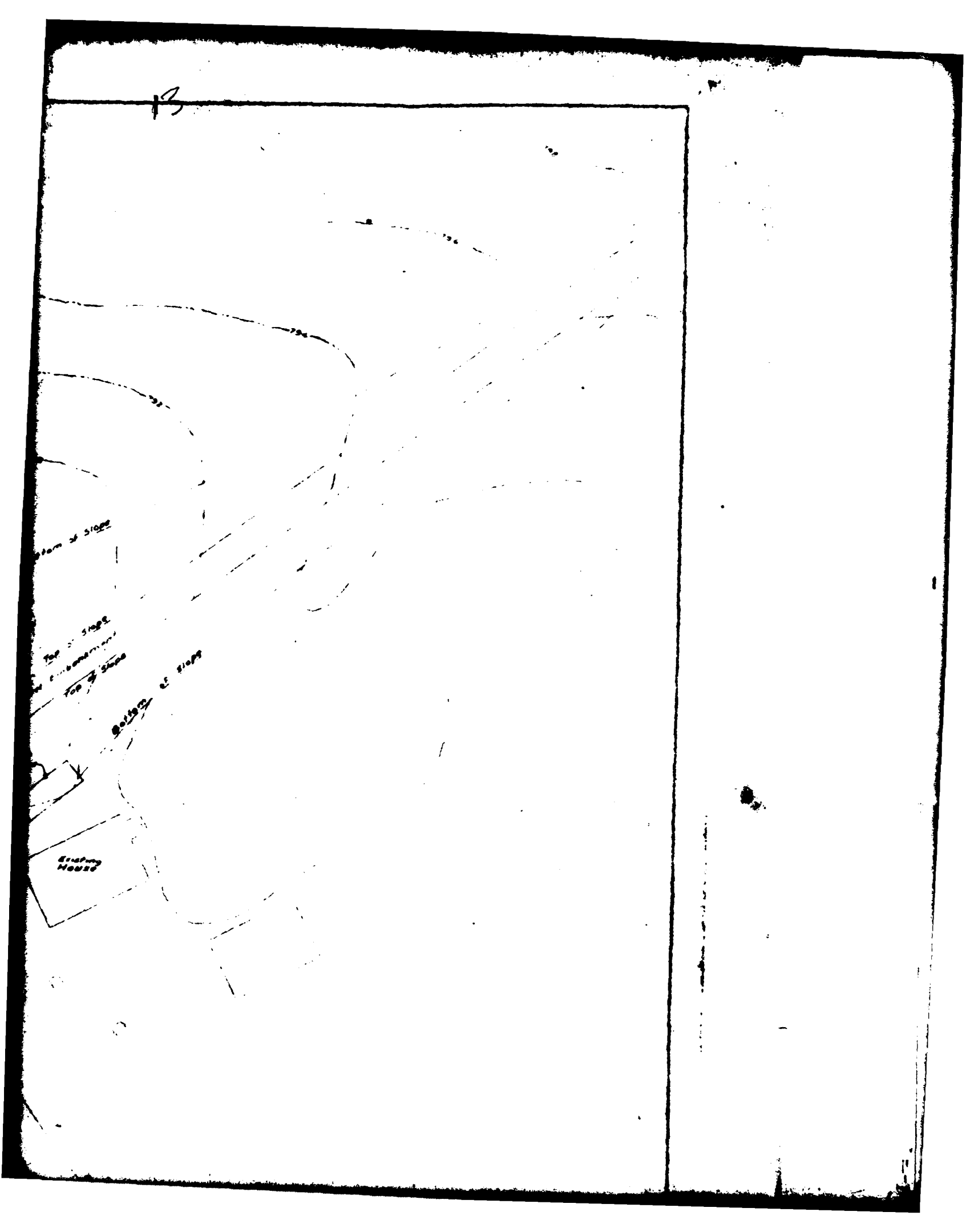
VICINITY MAP

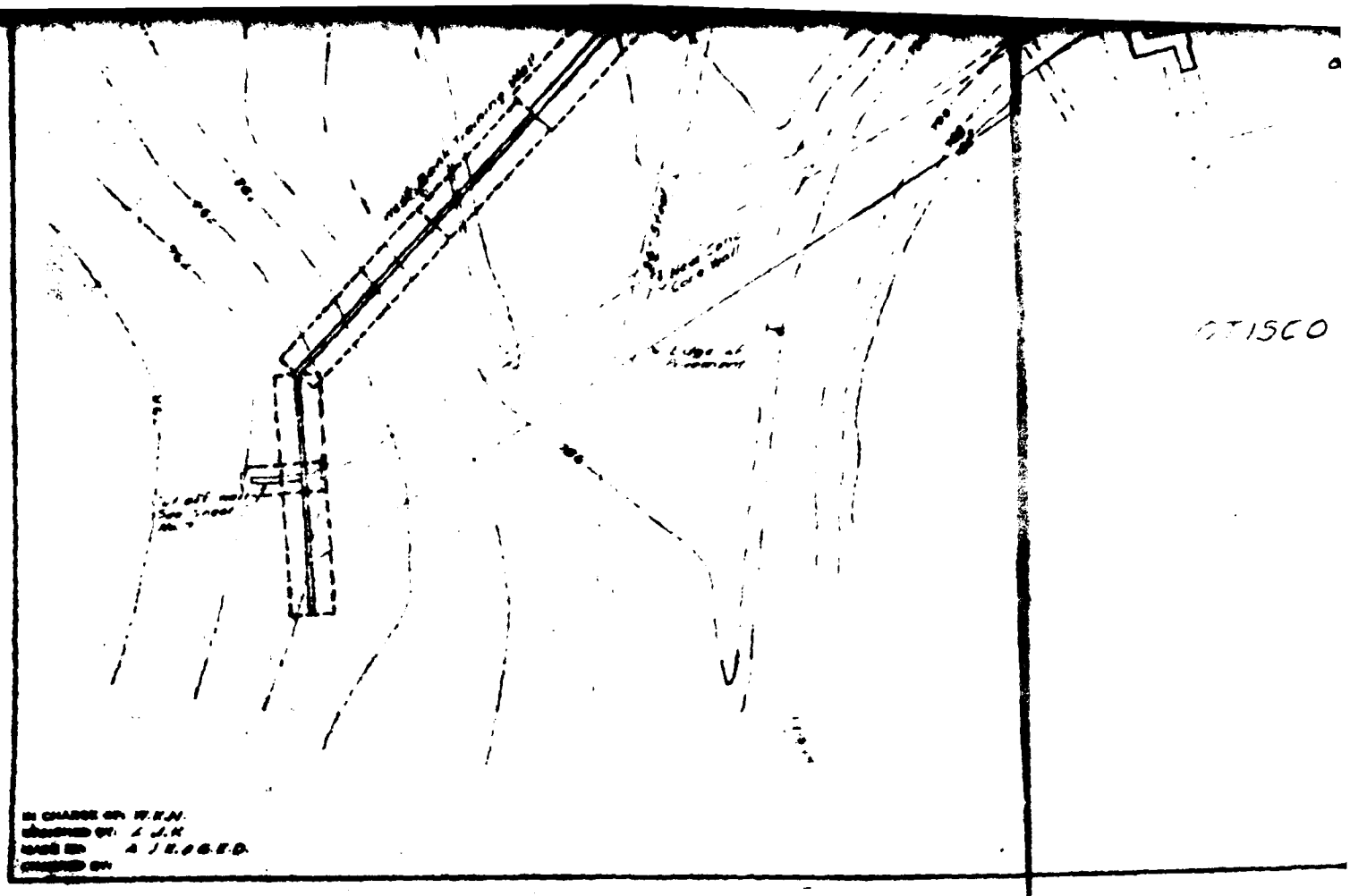


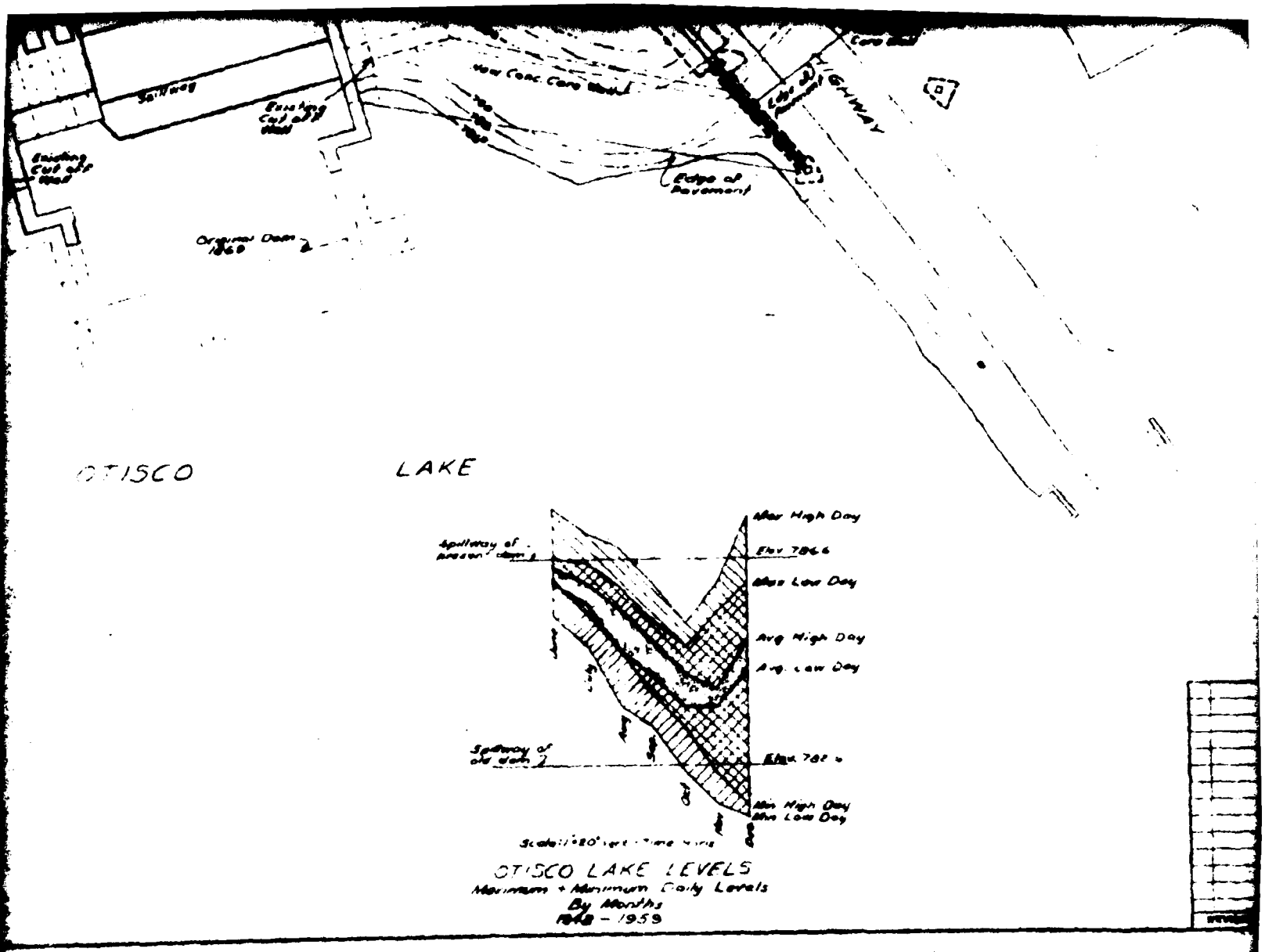
TOPOGRAPHIC MAP


Manhole
Manhole covers to be raised as required to conform to new grade
Warehouse
NINE MILE CREEK
Manhole
Edge of Pavement
Existing Wall
Ram House to be removed
Existing Wood Apron with New Concrete Struts
Manhole
Pumping Station
Manhole
Chlorine Bldg. by others
See Plan & Service Rd. Sheet No. 11
Spillway
Existing Cut off Wall
New Conc Core Wall


HOUSE
Bottom of Slope
Top of Slope
New Storage Shed
Existing House
Edge of Pavement
GUIDEWAY
Original Door Sill


Existing House


OTISCO



OTISCO LAKE LEVELS
Maximum + Minimum Daily Levels
By Months
1948 - 1959

15

Existing House

ONONDAGA COUNTY WATER AUTHORITY

OTISCO LAKE DAM MODIFICATIONS

GENERAL PLAN

O'BRIEN & GERE
CONSULTING ENGINEERS & LAND SURVEYORS
SYRACUSE, NEW YORK

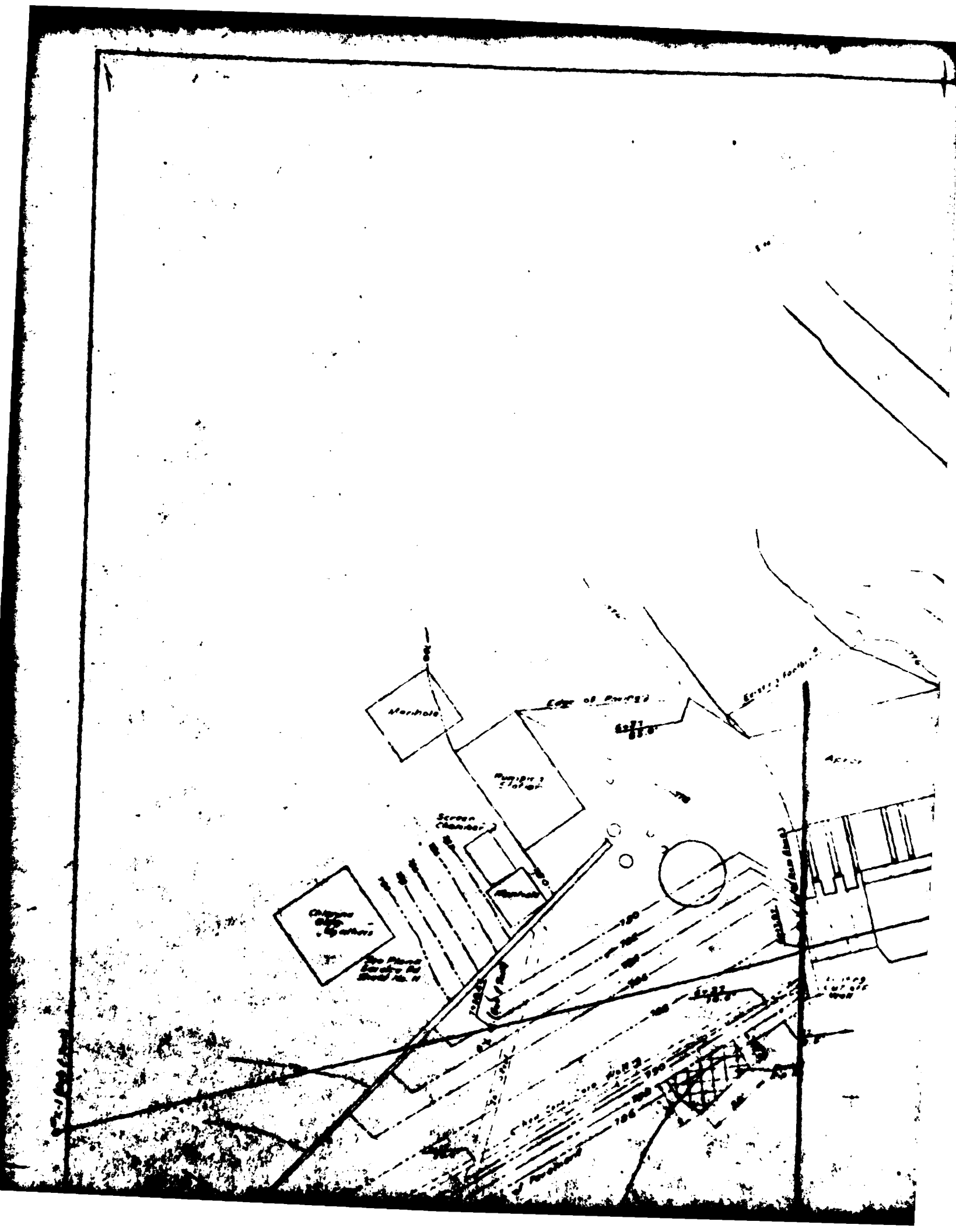
DATE: MAY 15, 1981
SCALE: 1" = 20'
FILE NO: 209 5 16-081

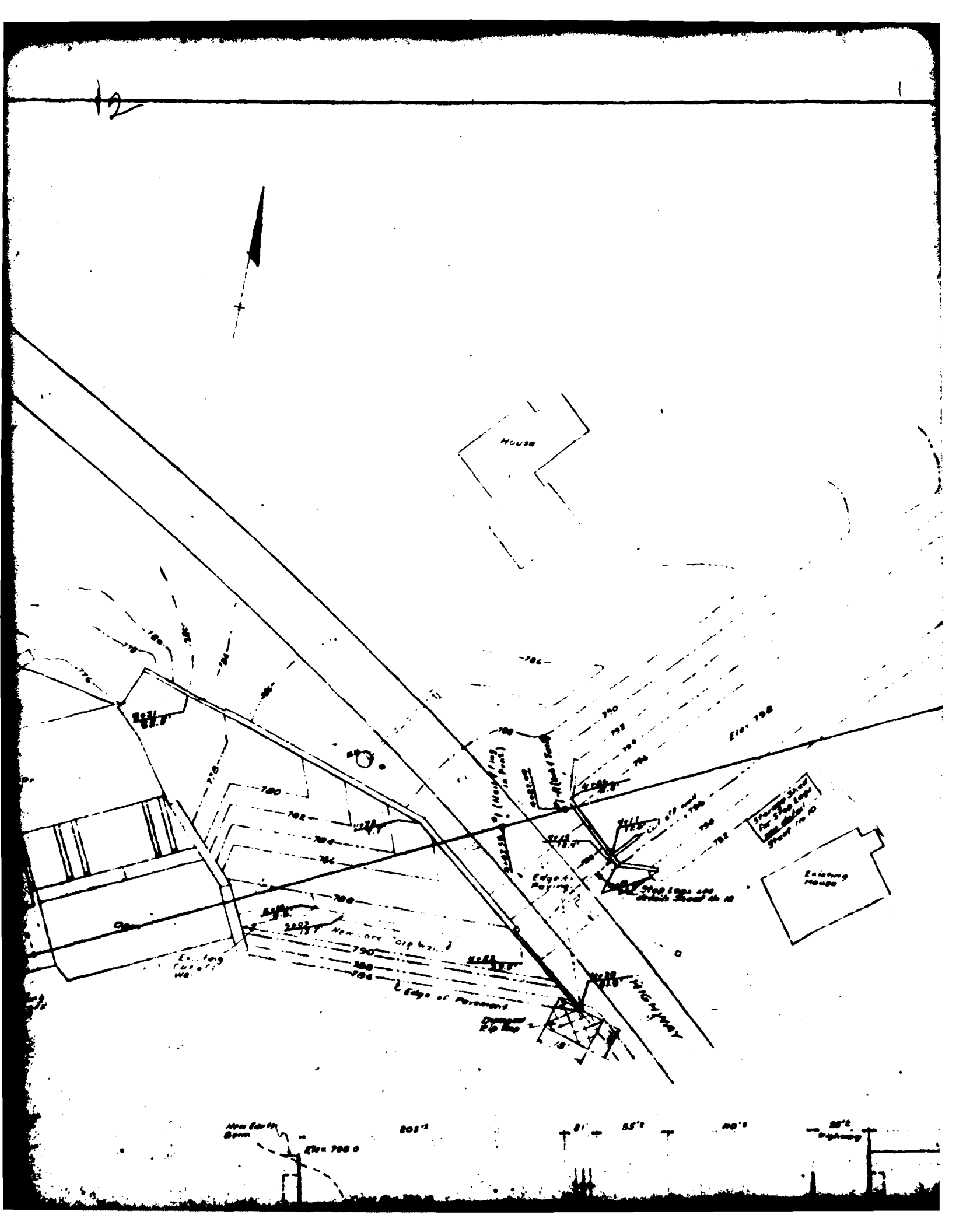
REVISIONS

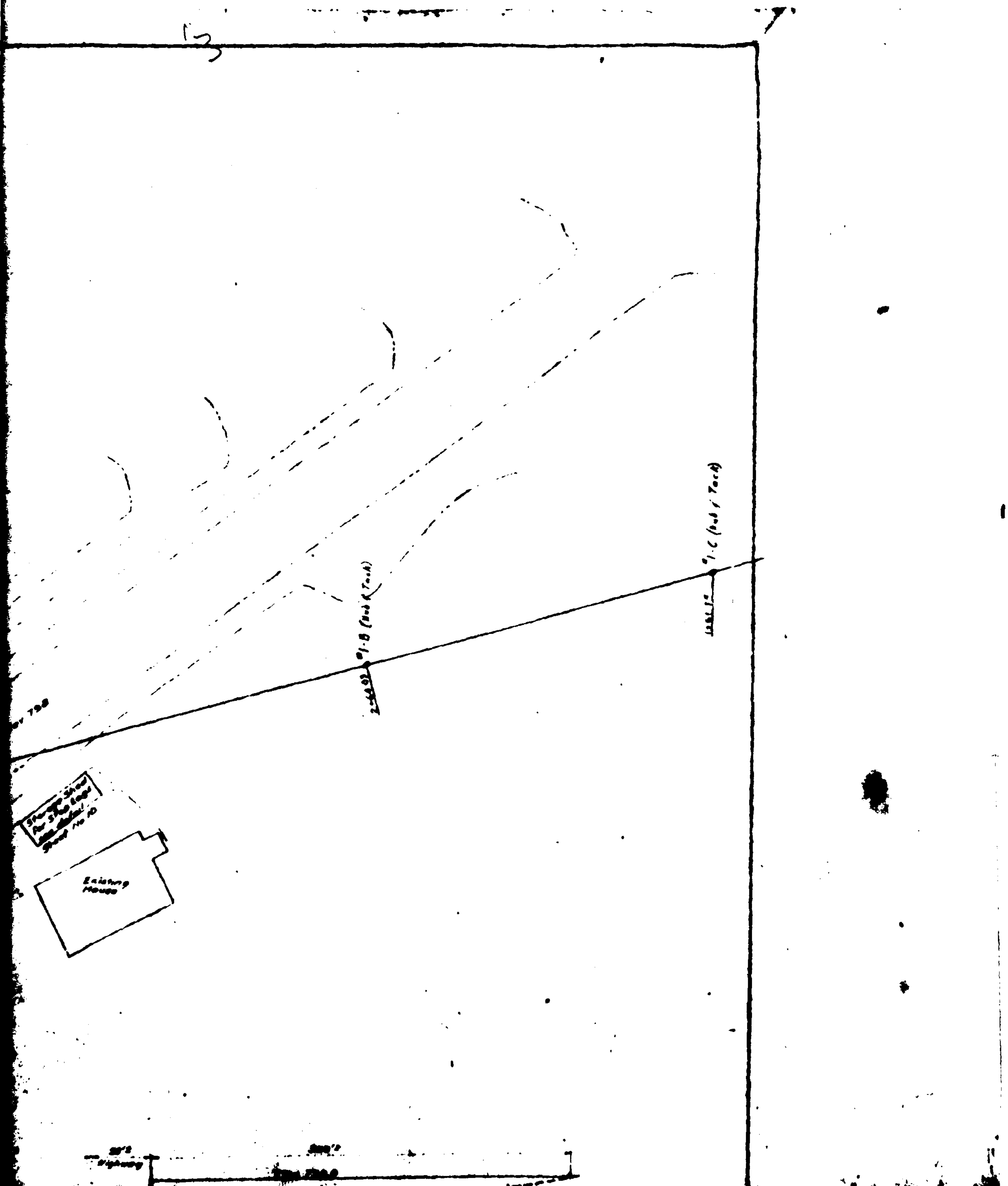
1

B 1

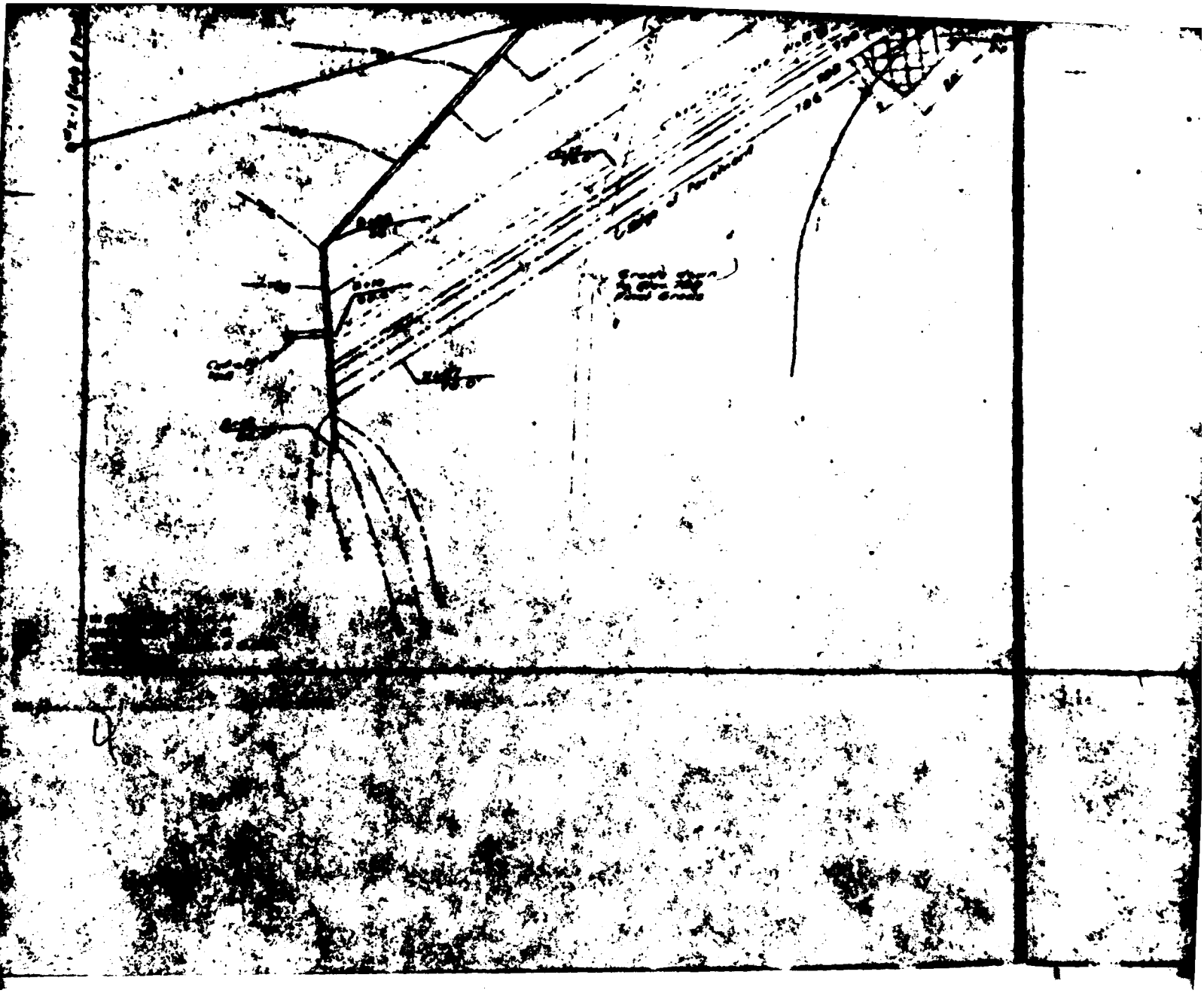
16

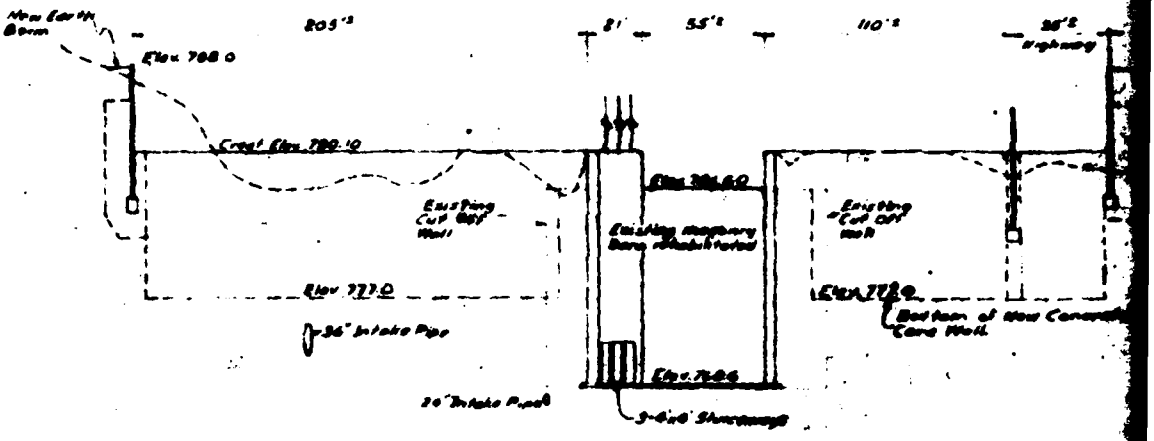



12
HOUSE
Elev 798
Existing House
HIGHWAY
Edge of Pavement
New Earth Berm
Elev. 798.0



Existing
House
#1.B (Nail & Tack)
#1.C (Nail & Tack)
Highway

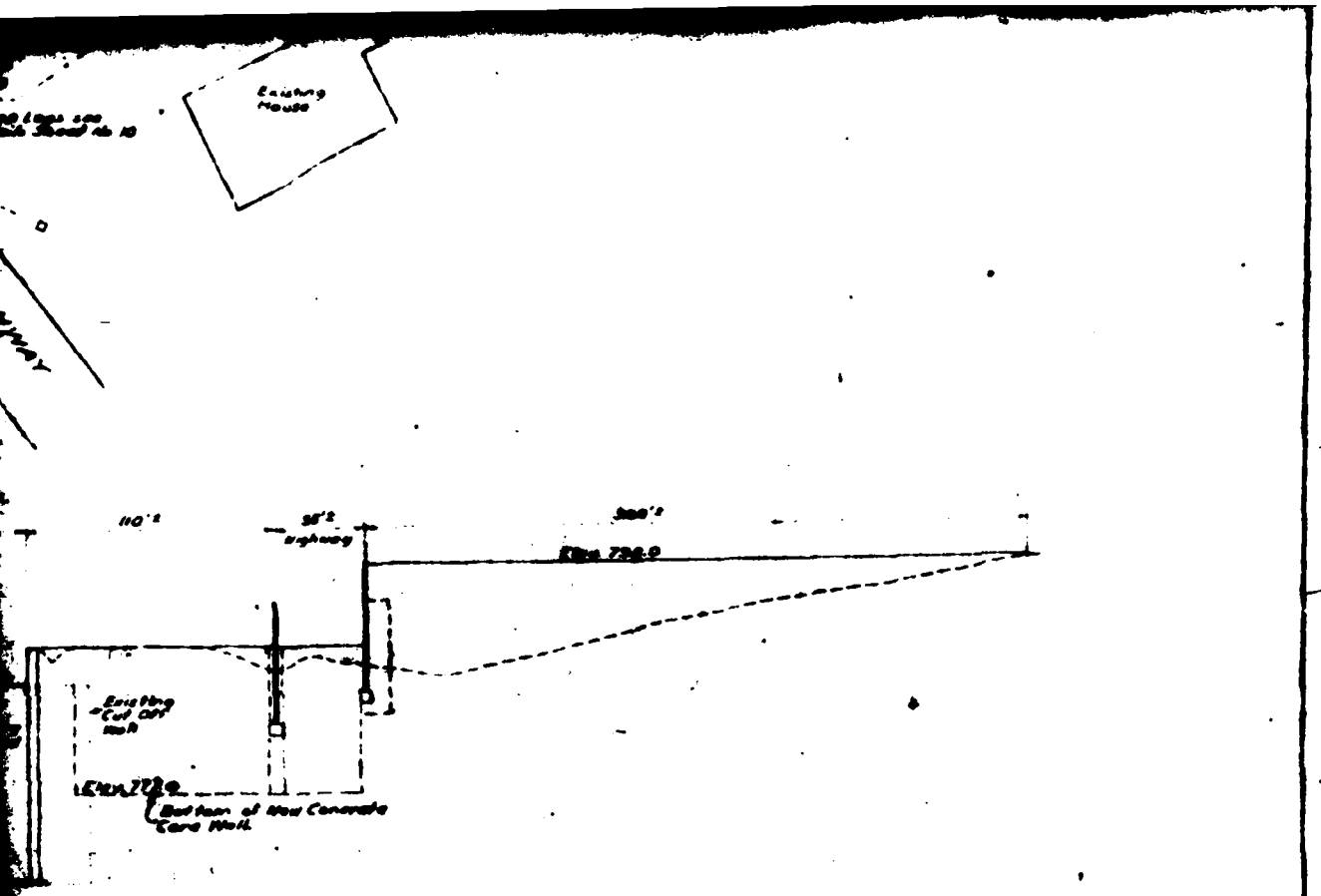




ELEVATION OF DAM & EMBANKMENTS ALONG CREST

(All sections viewed from upstream)

Scale: Horiz. 1" = 50'
Vert. 1" = 10'



EMBANKMENTS
SYS

ONONDAGA COUNTY WATER AUTHORITY

STEELCO LAKE DAM MODIFICATIONS

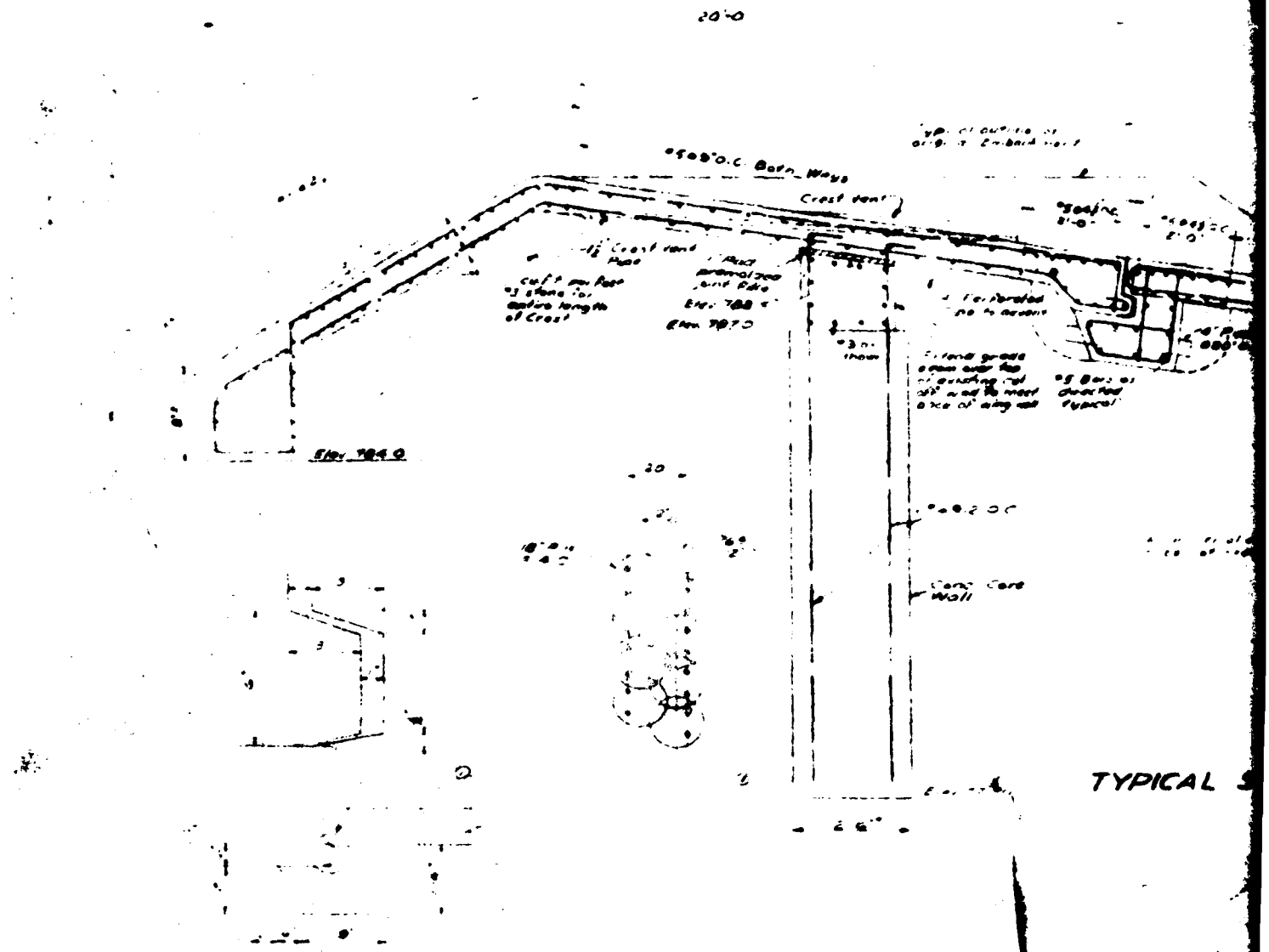
FINAL CONTOUR PLAN

MAY 15, 19[illegible]

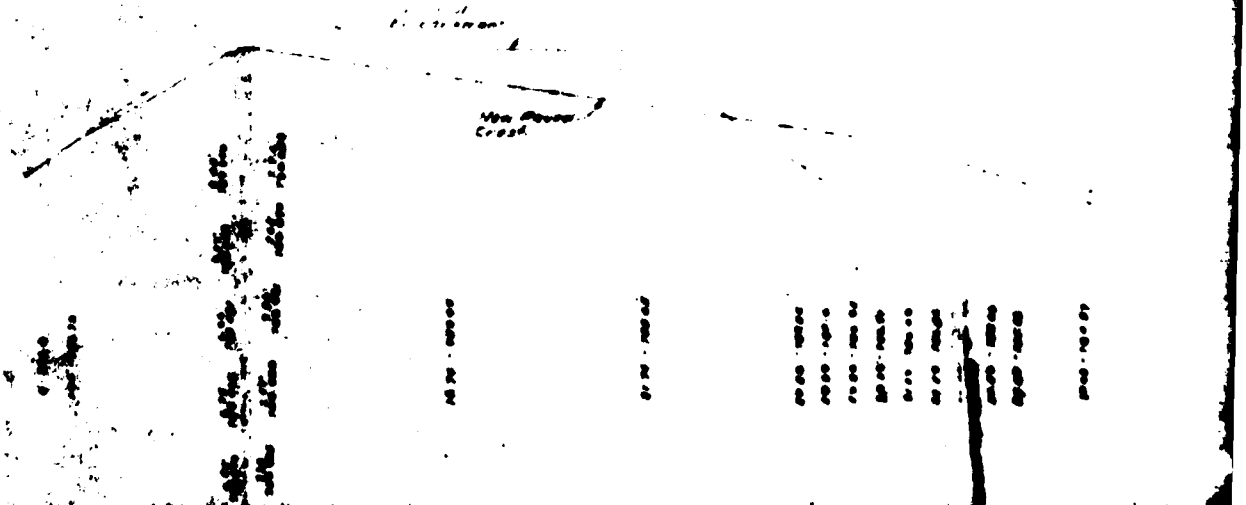
2

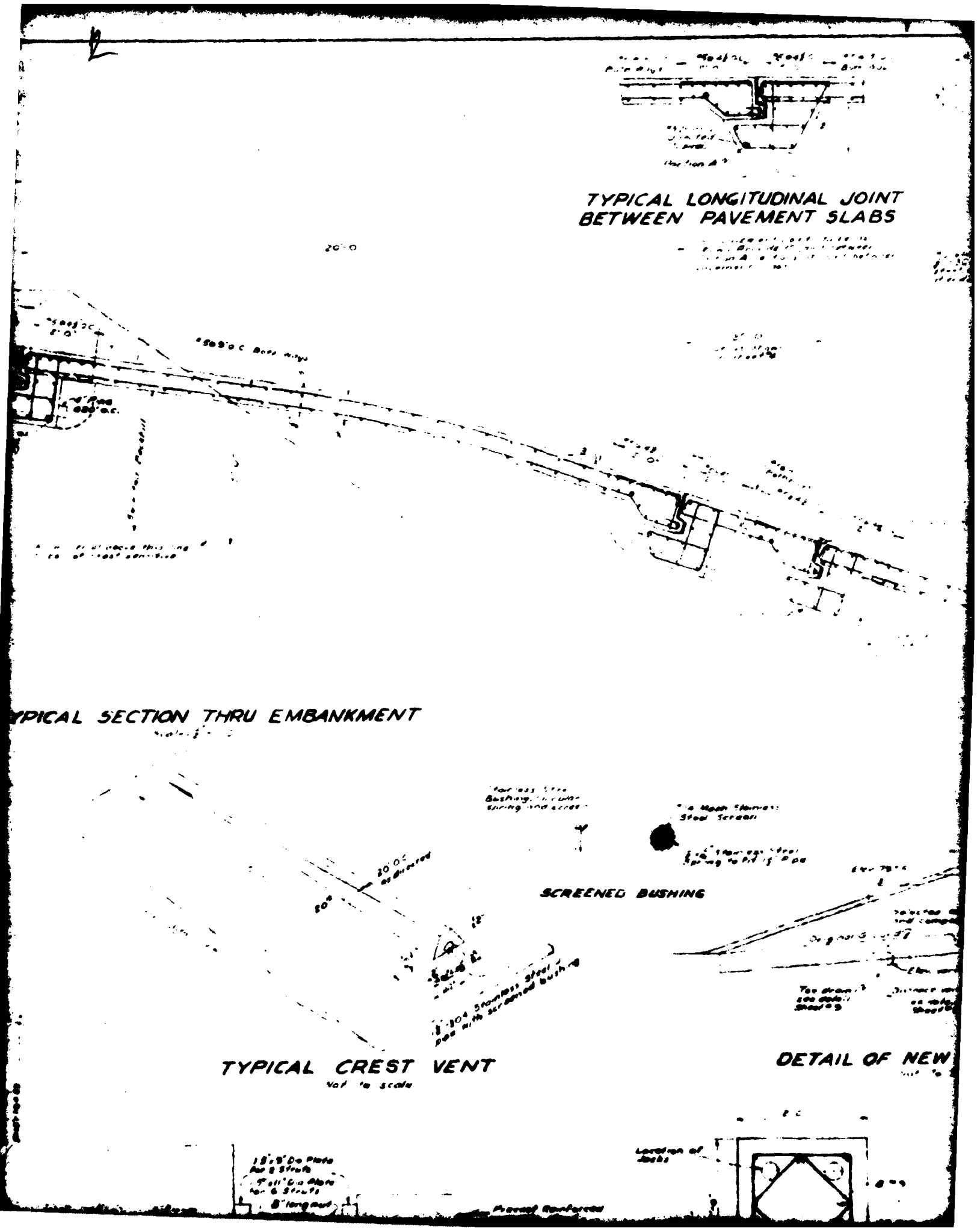
B 11

6

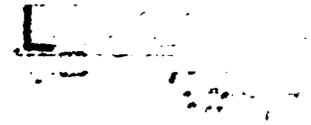


TYPICAL TRANSVERSE JOINT BETWEEN PAVEMENT SLABS

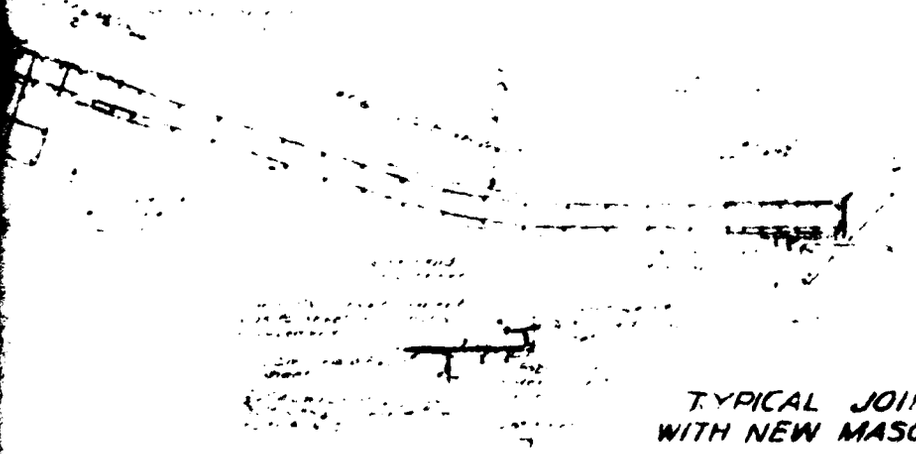



TYPICAL LONGITUDINAL JOINT
BETWEEN PAVEMENT SLABS
YPICAL SECTION THRU EMBANKMENT
SCREENED BUSHING
TYPICAL CREST VENT
DETAIL OF NEW

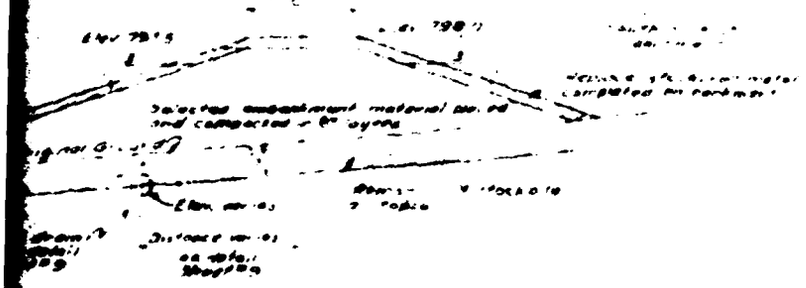
JOINT
SLABS



AIR VENT DETAIL

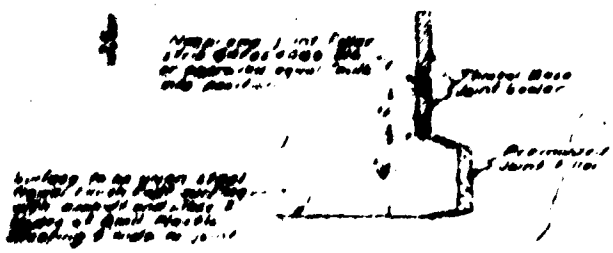


TYPICAL JOINT
WITH NEW MASONRY



AIL OF NEW EMBANKMENT

CREST ELEVATIONS



TYPICAL JOINT SEAL FOR PAVEMENT SLAB

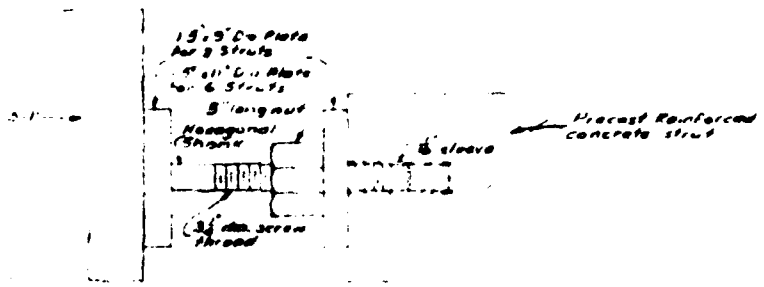
TYPIC JOINT SEA
WA I WALLS

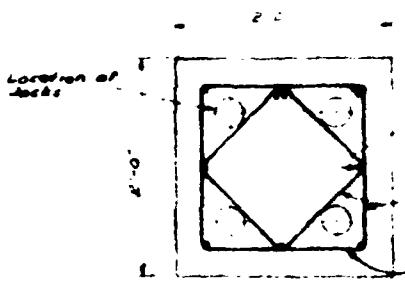
SCREENED BUSHING

TYPICAL CREST VENT

not to scale

DETAIL OF NE

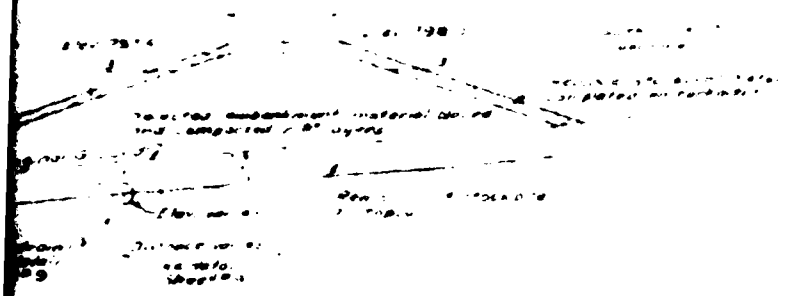




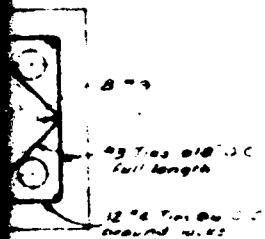
TYPICAL DETAIL OF REINFORCED STRUTS

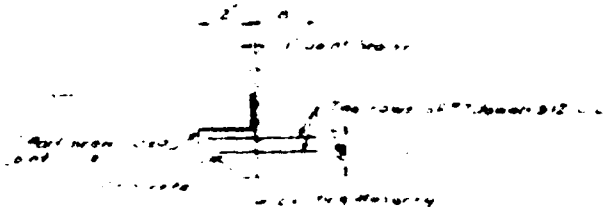
TYPICAL STRUT & JACK SCREW

JOINT SEAL
WALLS
to Scale



AIL OF NEW EMBANKMENT





TYPICAL JOINT WITH EXIST. MASONRY

ETAIL OF STRUTS

ONONDAGA COUNTY WATER AUTHORITY

OTISCO LAKE DAM MODIFICATIONS

TYPICAL EMBANKMENT & PAVING DETAILS

O'BRIEN & GERE
CONSULTING ENGINEERS & LAND SURVEYORS
SYRACUSE, NEW YORK

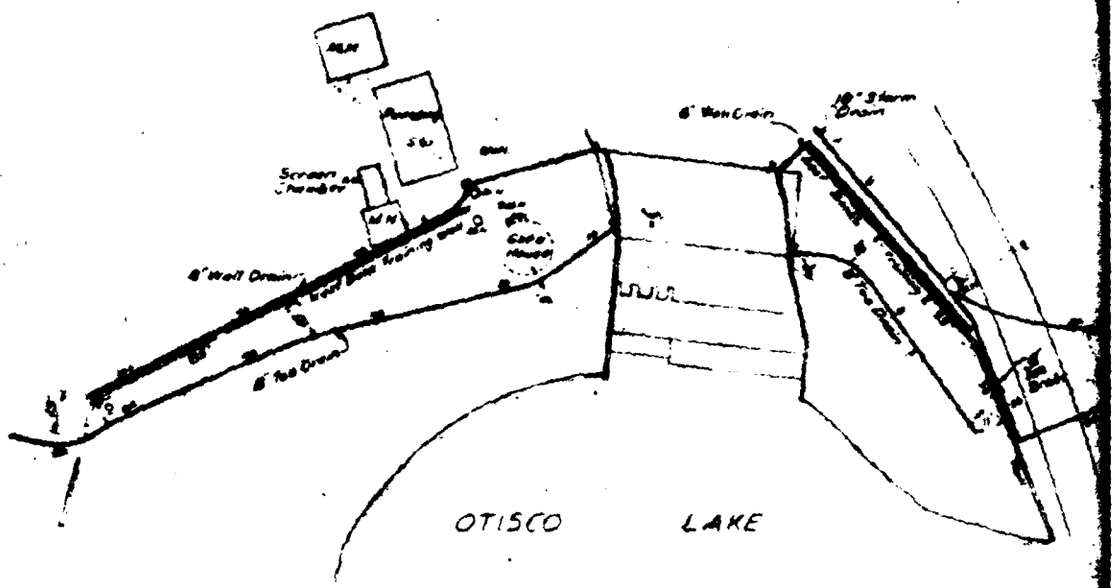
DATE MAY 15, 1961
SCALE AS SHOWN
FILE 209 5-15-18F

3

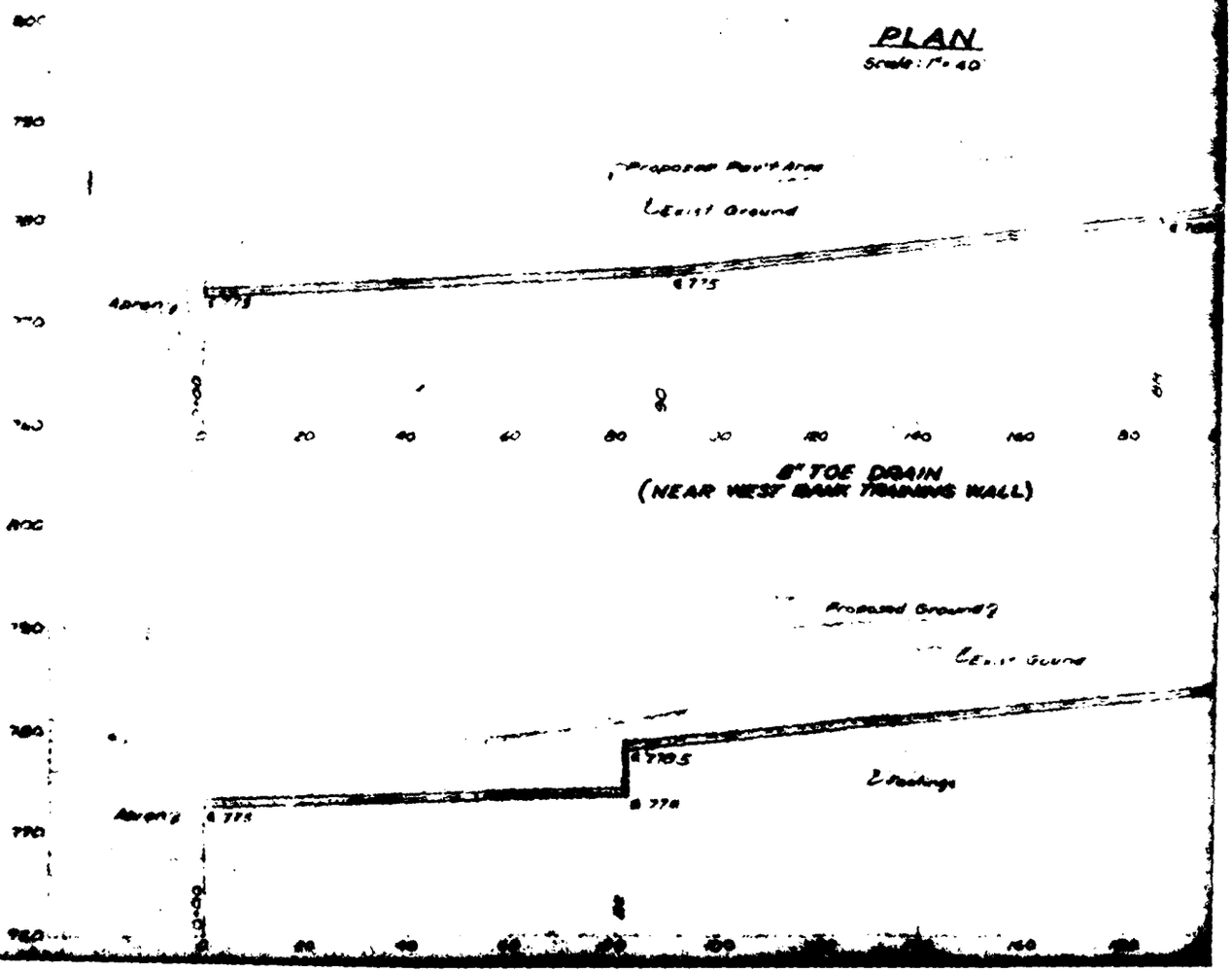
REVISIONS

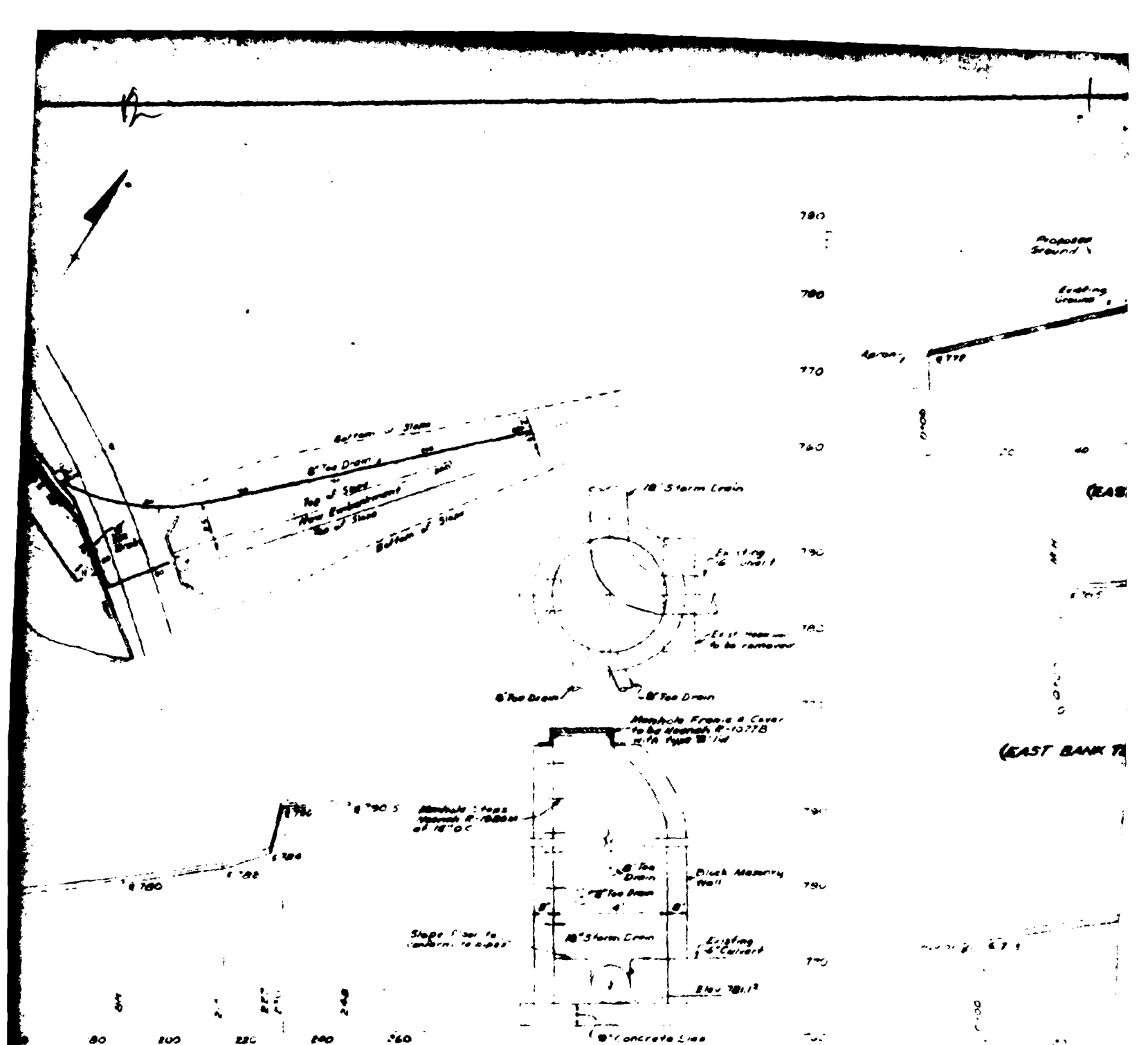
16

A



PLAN
Scale: 1" = 40'



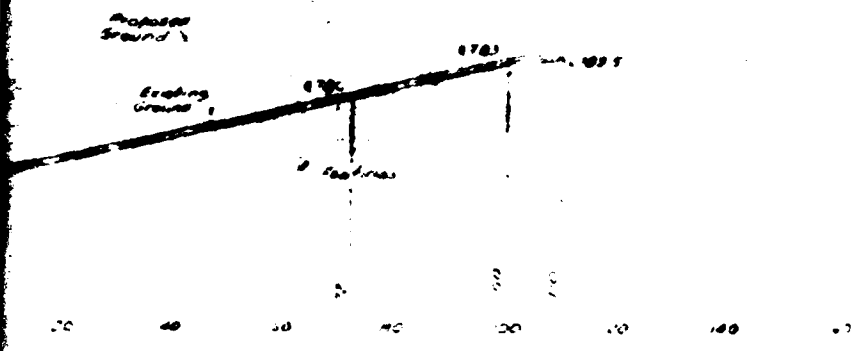


TYPICAL SECTION THRU MANHOLE

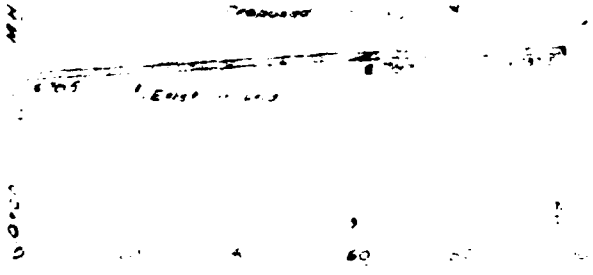
Not to Scale

TYPICAL SECTION OF TOE DRAIN

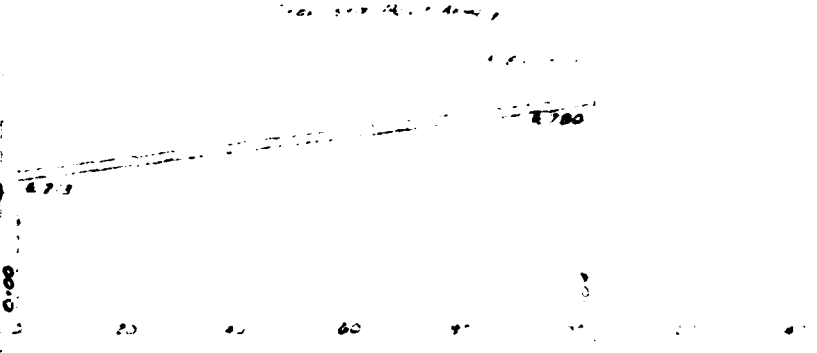
Not to Scale



8" WALL DRAIN
(EAST BANK TRAINING WALL)

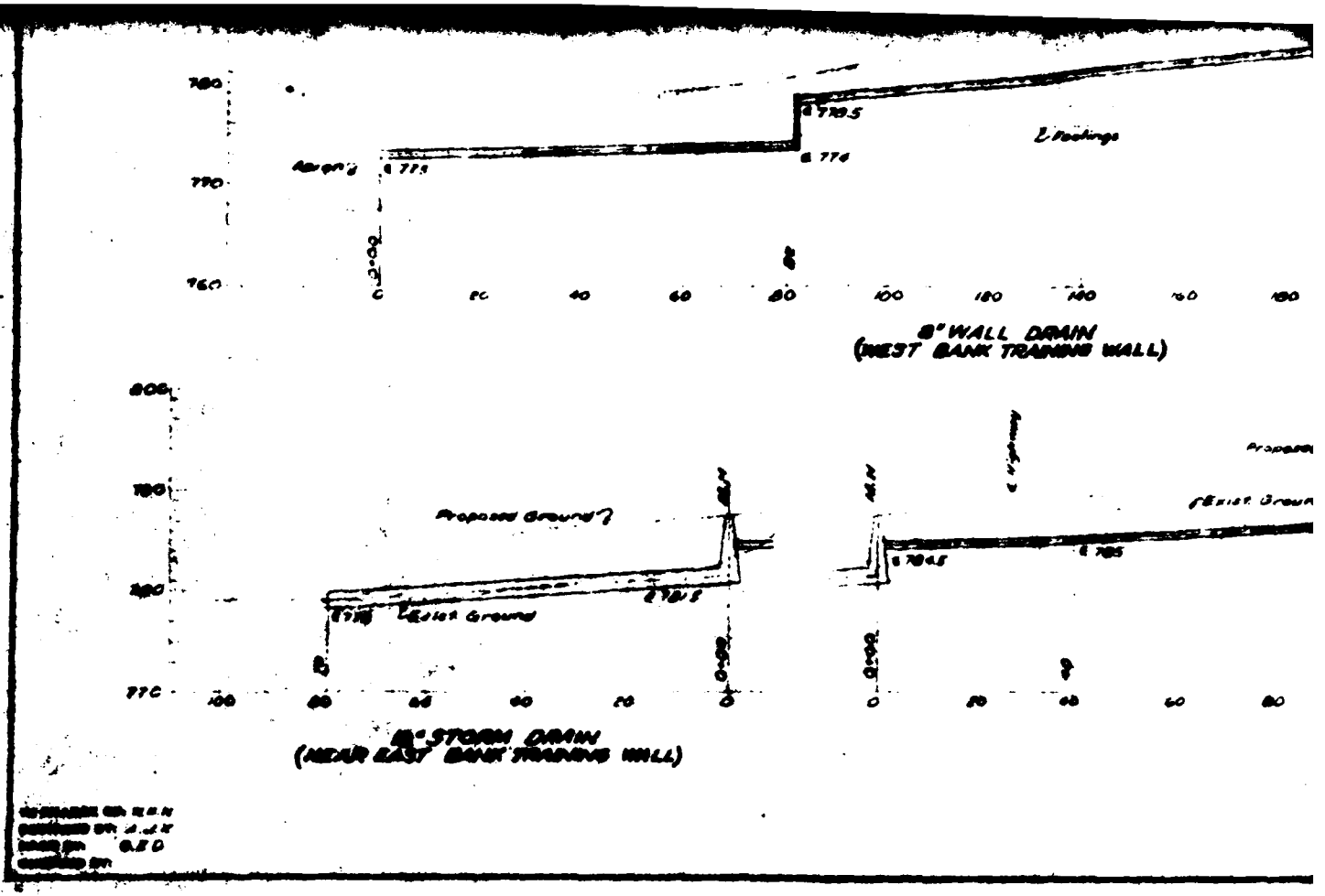


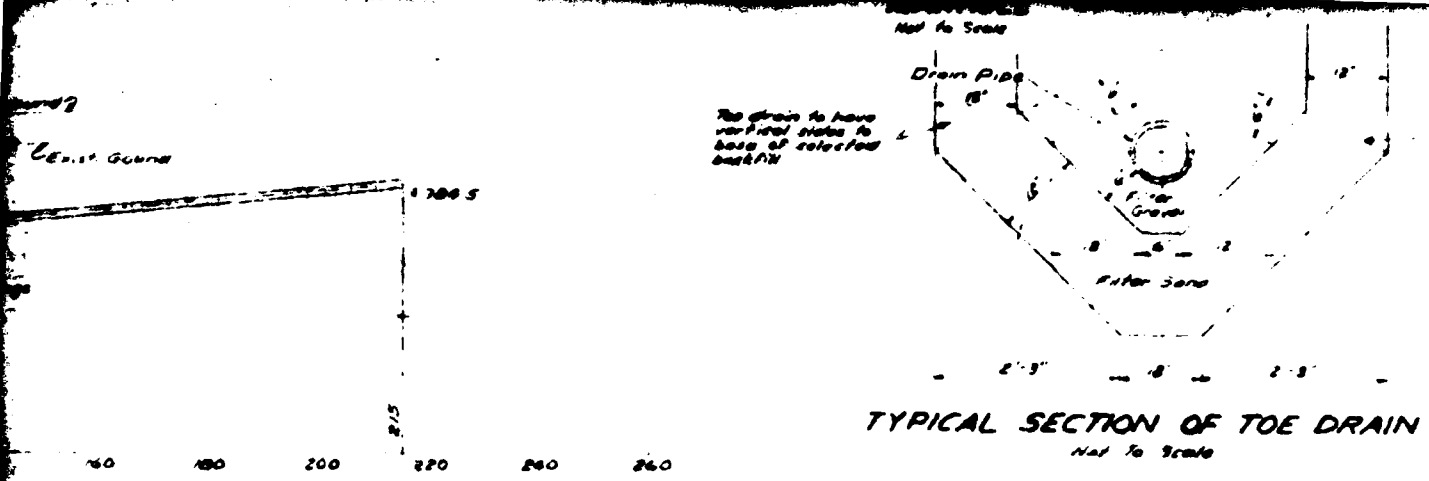
8" TOE DRAIN
(EAST BANK TRAINING WALL & UNDER HIGHWAY)



8" TOE DRAIN
(BETWEEN DAM & EAST BANK TRAINING WALL)

Toe of toe drain for embankment east of highway


8" WALL DRAIN
(WEST BANK TRAINING WALL)
Proposed Ground
Existing Ground
Existing Ground
Proposed Ground
8" STORM DRAIN
(NEAR EAST BANK TRAINING WALL)

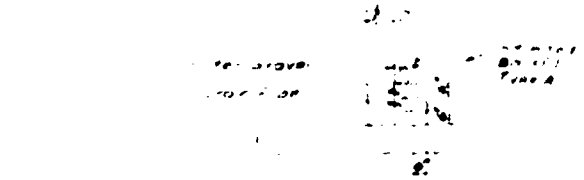


TYPICAL SECTION OF TOE DRAIN
Not to Scale

8"TOE DRAIN
(ALONG NEW EMBANKMENT)

8" TOE DRAIN
(BETWEEN DAM & EAST BANK TRAINING WALL)

DRAIN



TYPICAL SECTION OF WALL DRAIN

ONONDAGA COUNTY WATER AUTHORITY

OTISCO LAKE DAM MODIFICATIONS

DRAINS

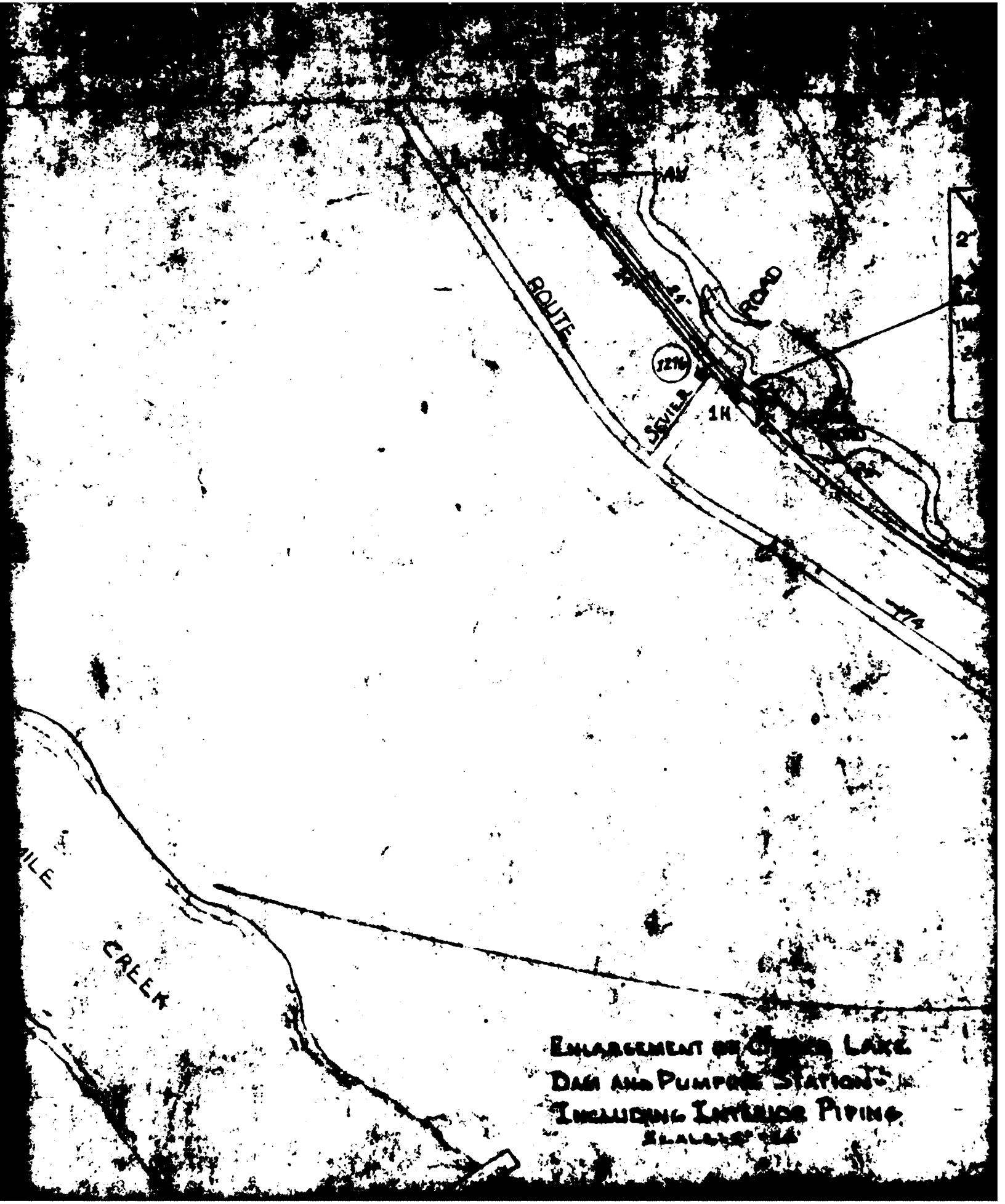
O'BRIEN & GERE
CONSULTING ENGINEERS & LAND SURVEYORS

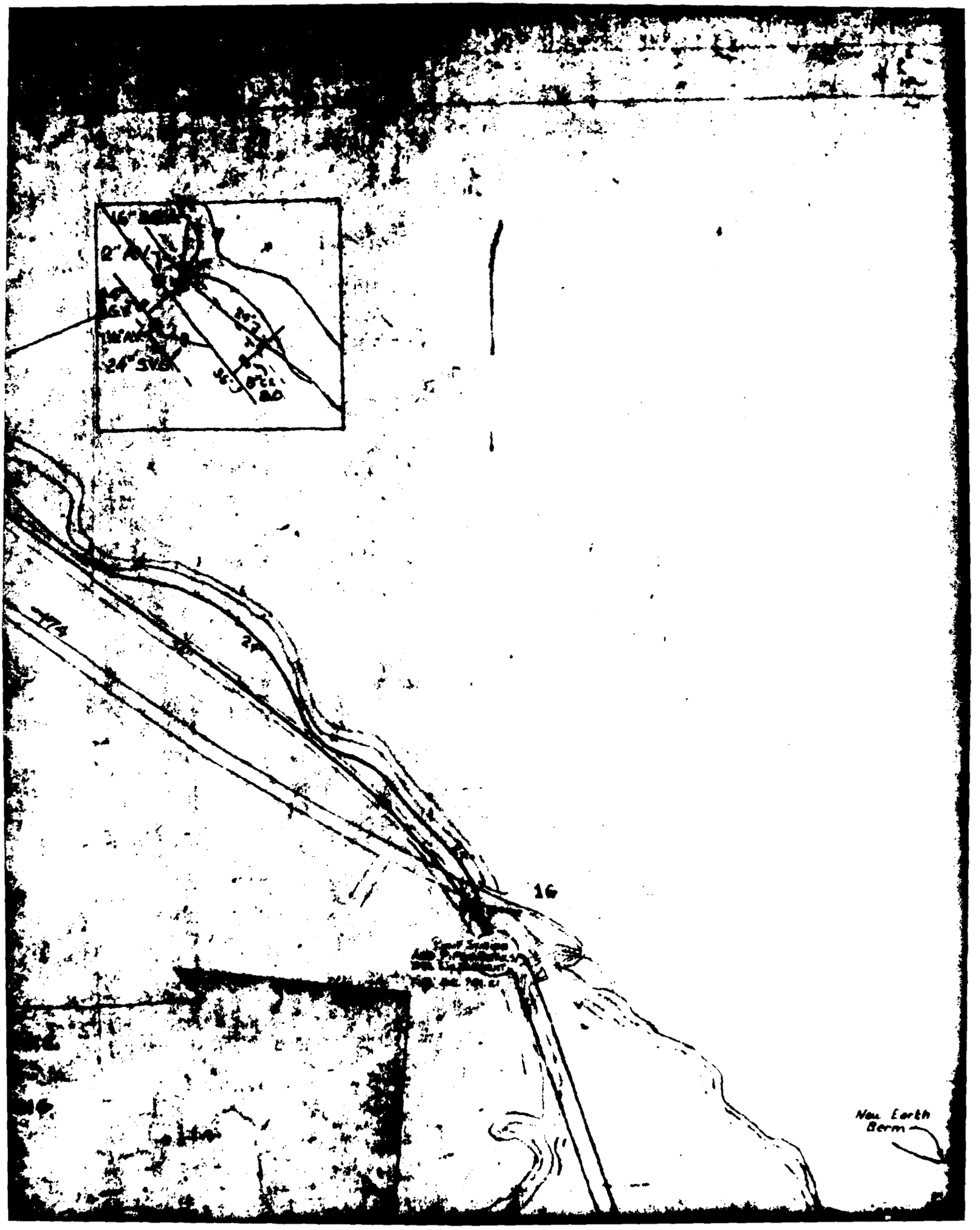
DATE: MAY 15, 1961
SCALE: AS SHOWN
FILE NO. 208.0-15-SOF

5

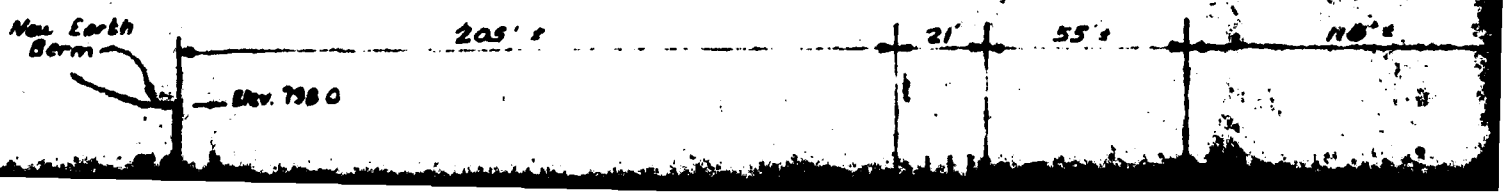
A 2

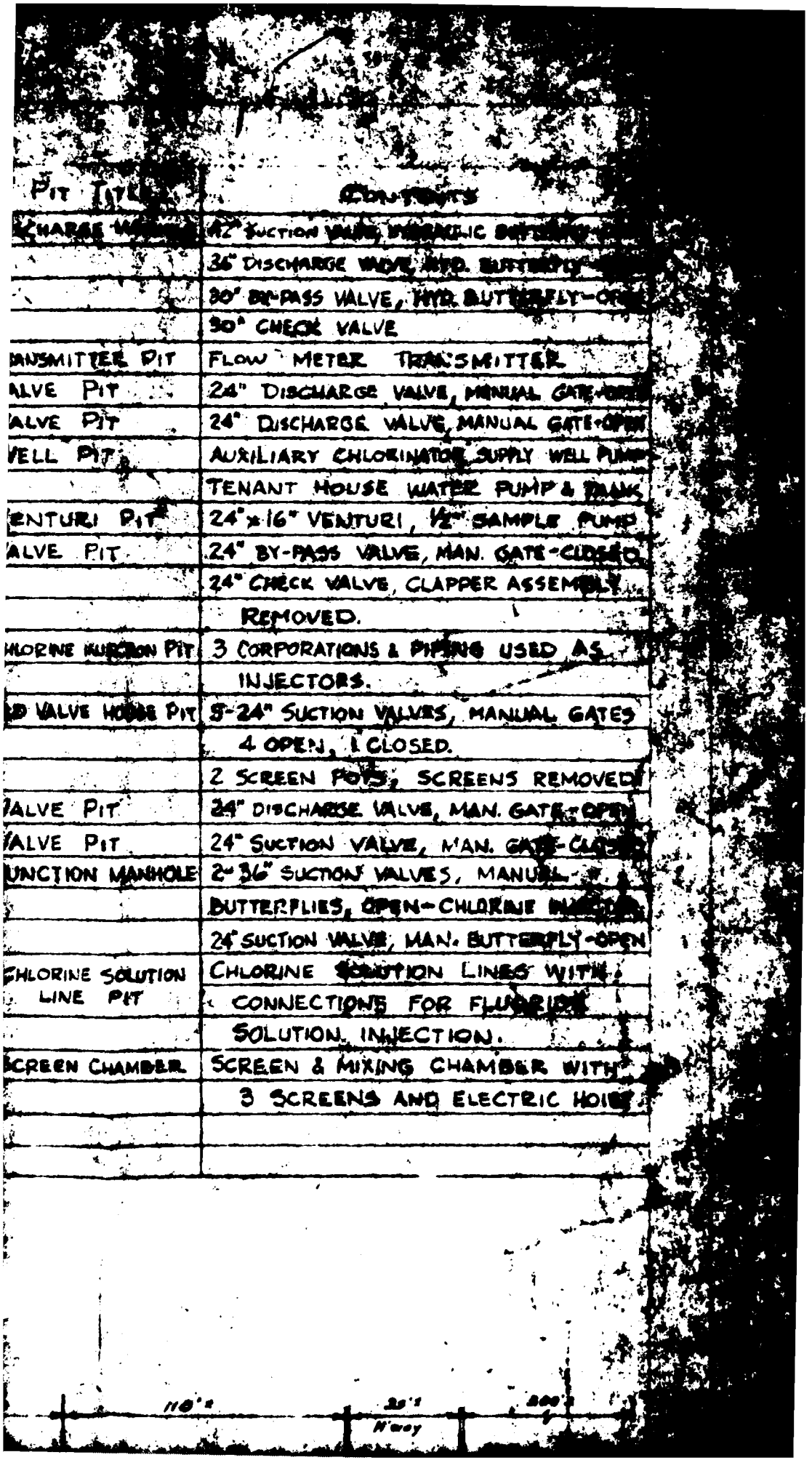
PARKING AREA
36"
24"
A'NE
MILE
CREEK
PIT #3
PIT #4
PIT #2
24"


ROUTE
SEWER
1H
CREEK

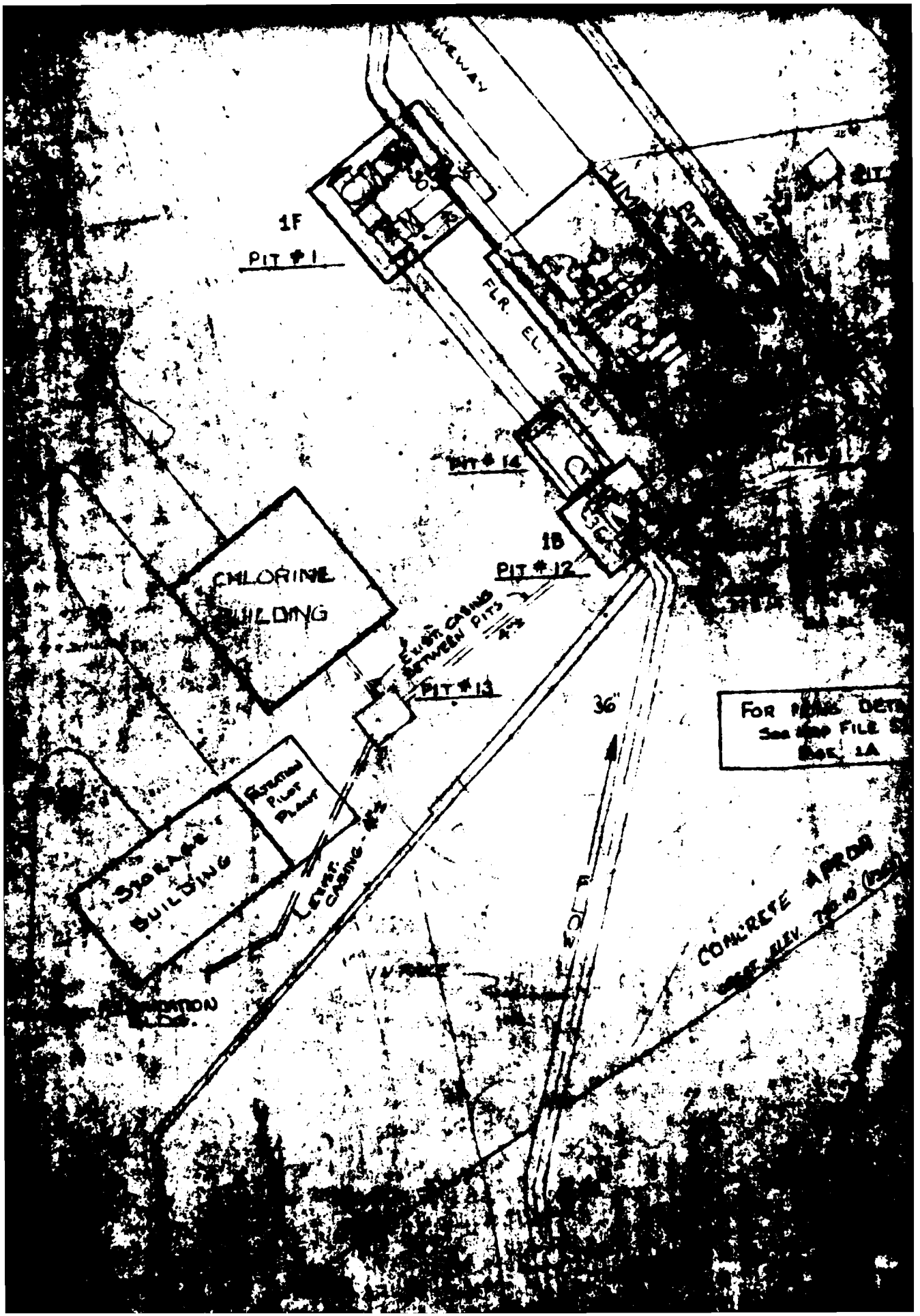

24" SVR
16
New Earth Berm

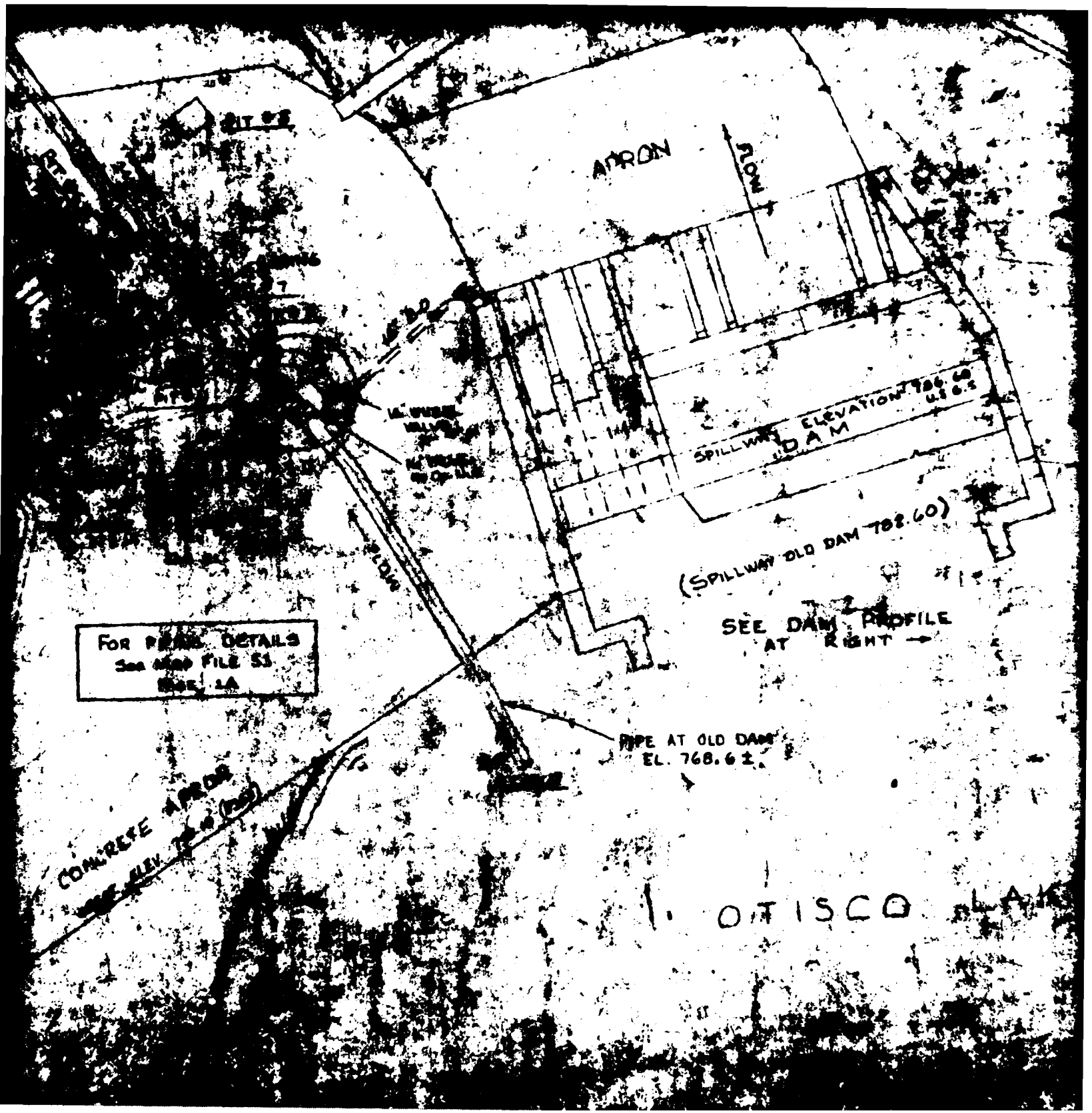
Pit No.	Sump [illegible]	Pit [illegible]	
1	YES	[illegible]	[illegible]
			36" Disc
			36" [illegible]
			36" C[illegible]
2	YES	TRANSMITTER PIT	FLOW [illegible]
3	NO	VALVE PIT	24" D[illegible]
4	NO	VALVE PIT	24" D[illegible]
5	YES	WELL PIT	AUXILI[illegible]
			TENAN[illegible]
6	NO	VENTURI PIT	24" [illegible]
7	NO	VALVE PIT	24" BY[illegible]
			24" CH[illegible]
			RE[illegible]
8	NO	CHLORINE INJECTION PIT	3 CORP[illegible]
			INJ[illegible]
9	NO	OLD VALVE HOUSE PIT	3-24" [illegible]
			4 G[illegible]
			2 SCR[illegible]
10	NO	VALVE PIT	36" DI[illegible]
11	NO	VALVE PIT	24" SU[illegible]
12	YES	JUNCTION MANHOLE	2-36" [illegible]
			BUTTE[illegible]
			24" SUC[illegible]
13	NO	CHLORINE SOLUTION LINE PIT	CHLOR[illegible]
			CON[illegible]
			SOL[illegible]
14	ABOVE GROUND	SCREEN CHAMBER	SCRE[illegible]
			3 [illegible]

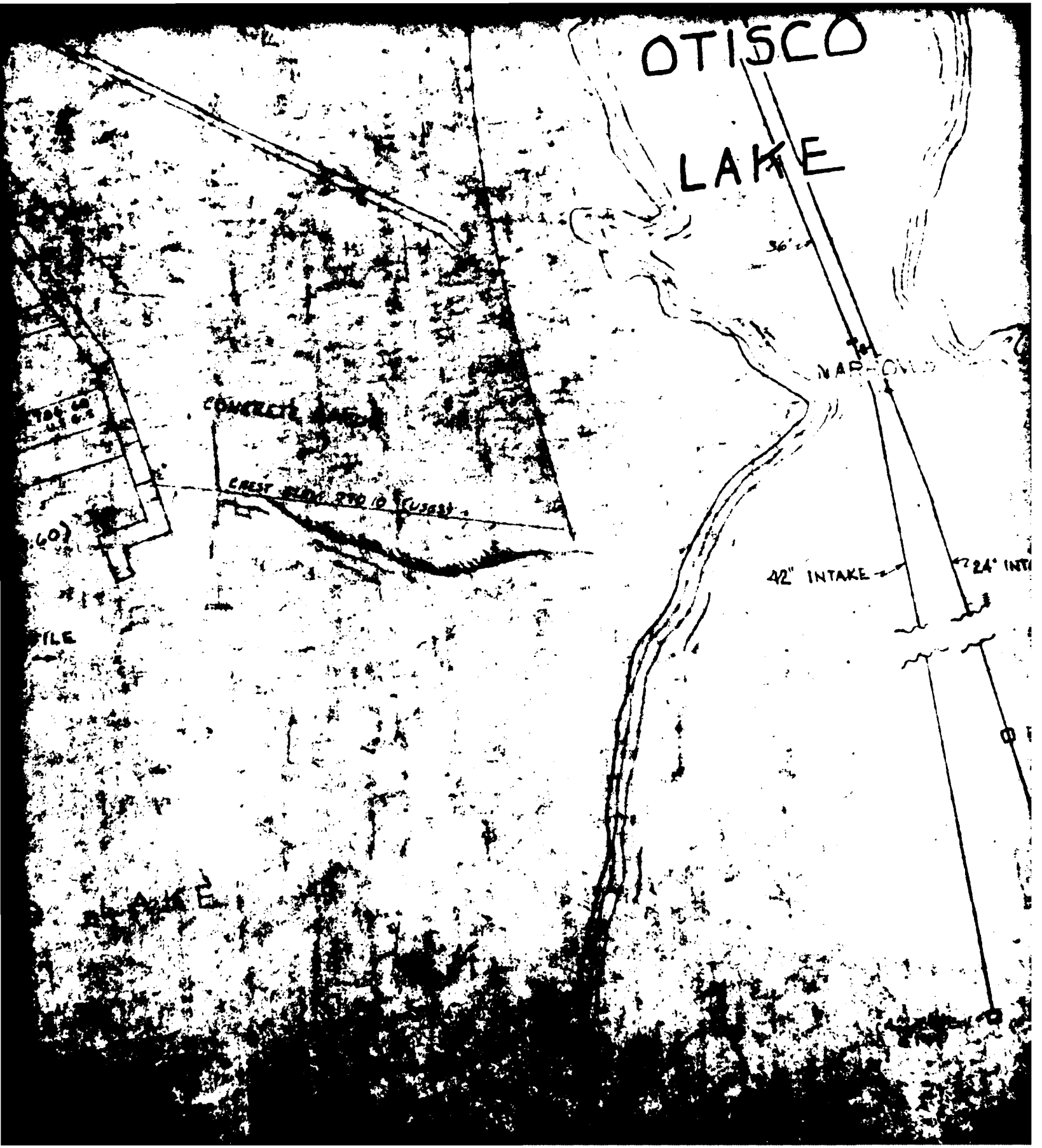


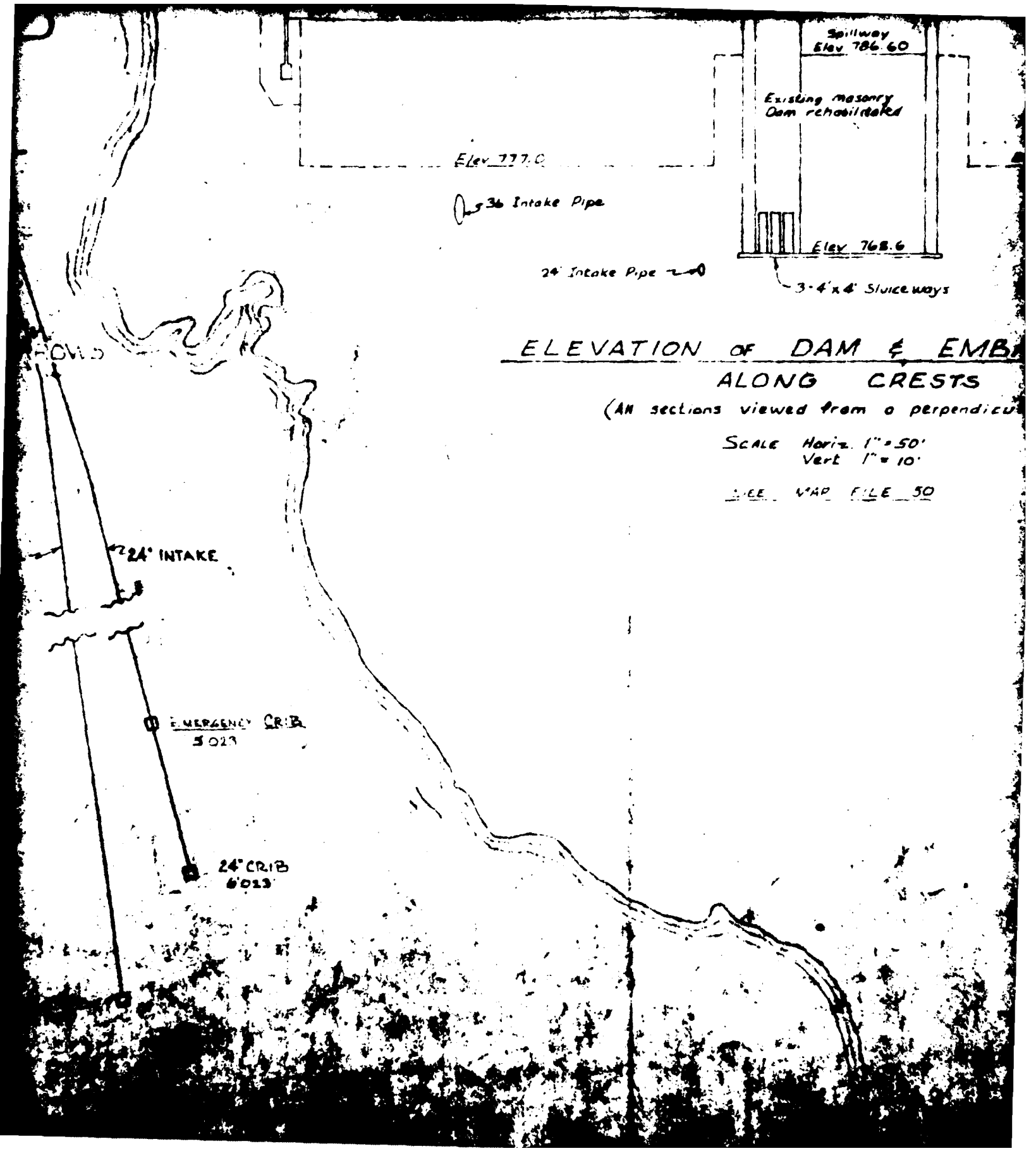


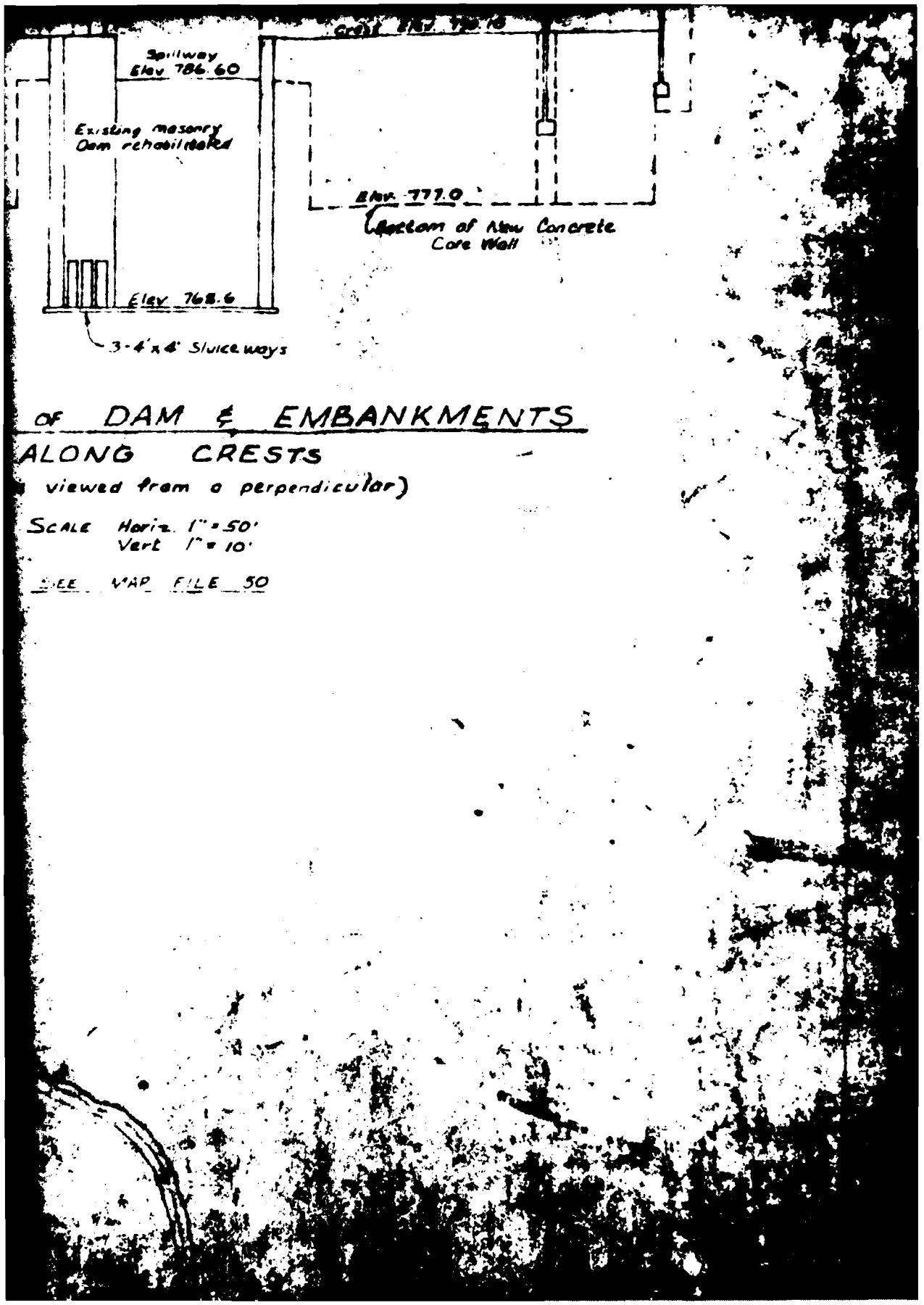
PIT TITLE	CONTENTS
CHARGE [illegible]	42" SUCTION VALVE, HYDRAULIC BUTTERFLY-
	36" DISCHARGE VALVE, HYD. BUTTERFLY-
	30" BY-PASS VALVE, HYD. BUTTERFLY-OPEN
	30" CHECK VALVE
[illegible]NSMITTER PIT	FLOW METER TRANSMITTER
[illegible]ALVE PIT	24" DISCHARGE VALVE, MANUAL GATE-OPEN
[illegible]ALVE PIT	24" DISCHARGE VALVE, MANUAL GATE-OPEN
[illegible]ELL PIT	AUXILIARY CHLORINATOR SUPPLY WELL PUMP
	TENANT HOUSE WATER PUMP & TANK
[illegible]ENTURI PIT	24"x16" VENTURI, ½" SAMPLE PUMP
[illegible]ALVE PIT	24" BY-PASS VALVE, MAN. GATE-CLOSED
	24" CHECK VALVE, CLAPPER ASSEMBLY
	REMOVED.
[illegible]HLORINE INJECTION PIT	3 CORPORATIONS & PIPING USED AS
	INJECTORS.
[illegible]D VALVE HOUSE PIT	5-24" SUCTION VALVES, MANUAL GATES
	4 OPEN, 1 CLOSED.
	2 SCREEN POTS, SCREENS REMOVED
[illegible]ALVE PIT	24" DISCHARGE VALVE, MAN. GATE-OPEN
[illegible]ALVE PIT	24" SUCTION VALVE, MAN. GATE-CLOSED
[illegible]UNCTION MANHOLE	2-36" SUCTION VALVES, MANUAL-
	BUTTERFLIES, OPEN-CHLORINE INJECTOR
	24" SUCTION VALVE, MAN. BUTTERFLY-OPEN
[illegible]HLORINE SOLUTION LINE PIT	CHLORINE SOLUTION LINES WITH
	CONNECTIONS FOR FLUORIDE
	SOLUTION INJECTION.
[illegible]CREEN CHAMBER	SCREEN & MIXING CHAMBER WITH
	3 SCREENS AND ELECTRIC HOIST.


1F
PIT #1
FLR. EL.
PIT #14
1B
PIT #12
CHLORINE BUILDING
EXIST. CABLE BETWEEN PITS
PIT #13
36"
STORAGE BUILDING
CONCRETE APRON


APRON
FLOW
SPILLWAY
DAM
ELEVATION 706.60
U.S.G.S.
(SPILLWAY OLD DAM 708.60)
SEE DAM PROFILE
AT RIGHT →
FOR PENN. DETAILS
SEE MAP FILE S3
SHT. 1A
PIPE AT OLD DAM
EL. 768.6 ±
CONCRETE APRON
OTISCO LAKE


OTISCO
LAKE
42" INTAKE


Spillway
Elev 786.60
Existing masonry
Dam rehabilitated
Elev 777.0
36 Intake Pipe
24" Intake Pipe
Elev 768.6
3-4'x4' Sluiceways
ELEVATION OF DAM & EMB
ALONG CRESTS
(All sections viewed from a perpendicu
SCALE Horiz. 1" = 50'
Vert 1" = 10'
SEE MAP FILE 50
24" INTAKE
EMERGENCY CRIB
5023
24" CRIB
6023



OF DAM & EMBANKMENTS

ALONG CRESTS

(viewed from a perpendicular)

SCALE Horiz. 1" = 50'
Vert 1" = 10'

SEE MAP FILE 50


02