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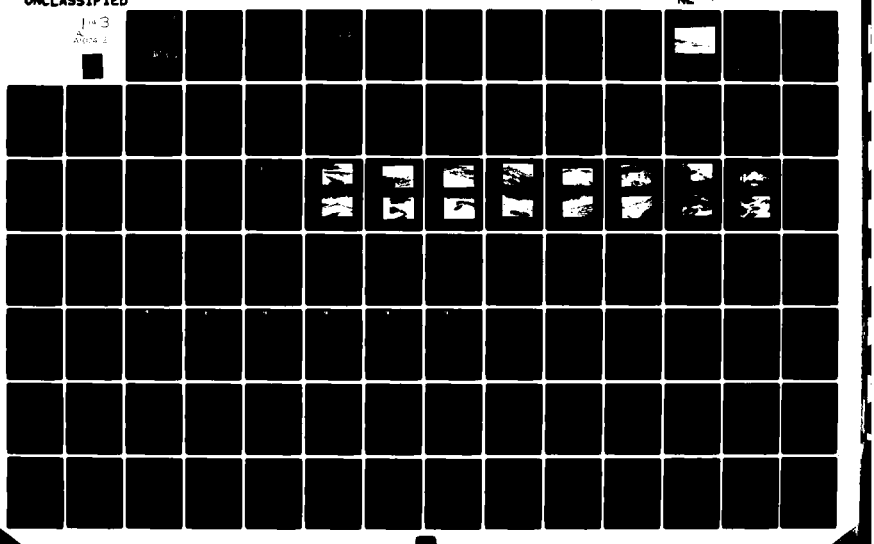

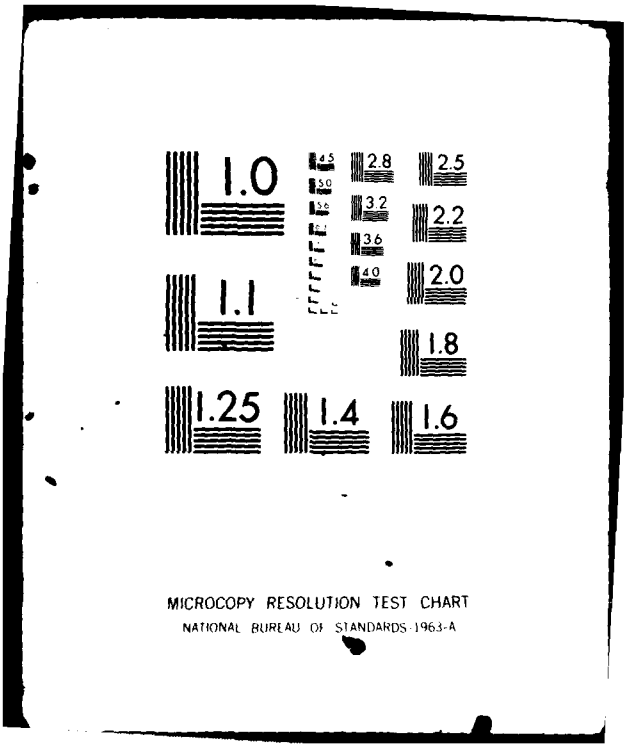
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SUSQUEHANNA RIVER BASIN

LEVEL II

LARCHWOOD LAKE DAM

OTSEGO COUNTY, NEW YORK
INVENTORY No. NY 727

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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NEW YORK DISTRICT, CORPS OF ENGINEERS
MAY 1981

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National Dam Safety Program. Larchwood Lake Dam (Inventory Number NY 727), Susquehanna River Basin, Otsego County, New York. Phase I Inspection Report.

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

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Larchwood Lake Dam
Otsego County
Susquehanna 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.

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies that need to be evaluated and remedied.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Hydrologic/hydraulic analyses performed in accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams indicate that the principal spillway and the emergency spillway would pass 100 percent of the outflow from the Probable Maximum Flood (PMF) without overtopping the dam. Therefore, the combined spillway capacity is adjudged to be adequate.

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 aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LARCHWOOD LAKE DAM
INVENTORY NO. NY 727
SUSQUEHANNA RIVER BASIN
OTSEGO COUNTY, NEW YORK

TABLE OF CONTENTS

APPENDICES

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Larchwood Lake Dam
State Located:	New York
County:	Otsego
Watershed:	Susquehanna River Basin
Stream:	Butts Corners Creek
Dates of Inspection:	March 12 and 14, 1981

ASSESSMENT

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies that need to be evaluated and remedied.

Hydrologic/hydraulic analyses performed in accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams indicate that the principal spillway and the emergency spillway would pass 100 percent of the outflow from the Probable Maximum Flood (PMF) without overtopping the dam. Therefore, the combined spillway capacity is adjudged to be adequate.

It is recommended that the following additional investigation be performed by a registered professional engineer engaged by the owner:

1. Determine to what extent the erosion due to high velocities in the emergency spillway will affect the stability of the channel bottom and left side slope as well as the dam embankment.

This investigation should be initiated within 6 months and completed within 18 months of the final approval date of this report.

In addition to any items required as a result of the additional investigation recommended above, the following remedial measures should be implemented within 12 months from the final approval date of this report:

1. Remove the slumped material from the bottom of the emergency spillway channel and restore the channel cross section and slope protection. There is potential for further slumping unless the cause is identified and the restoration includes provisions for slope drainage or other corrective measures.

2. Regrade the dam crest to remove the ruts and pockets and permit surface runoff without promoting concentrated flow. A gravel surface layer would improve trafficability and minimize rutting.

3. Cut the brush on the dam and the emergency spillway slopes and channel bottom every year to prevent their becoming overgrown. Equipment and procedures for this cutting should be such as to avoid damage to existing grass and weed cover on the slopes. Any slopes that become further scarred by runoff or traffic should be reseeded and mulched.

4. Repair the broken toe drain pipe and cut both pipes shorter to reduce the unsupported length and minimize the potential for additional damage.

5. Remove the tree stumps from the vicinity of the drop inlet structure.

6. Ensure the reservoir drain is operational.

7. Develop and implement a flood warning and emergency evacuation plan to alert the public in the event conditions occur which could result in failure of the dam.

Submitted by: FLAHERTY GIAVARA ASSOCIATES, P.C.

Hugh C. Flaherty, P.E. & L.S.
Chairman of the Board
New York License No. 58508

Approved by: Col. W. M. Smith, Jr.
New York District Engineer

Date: 3 Aug 81

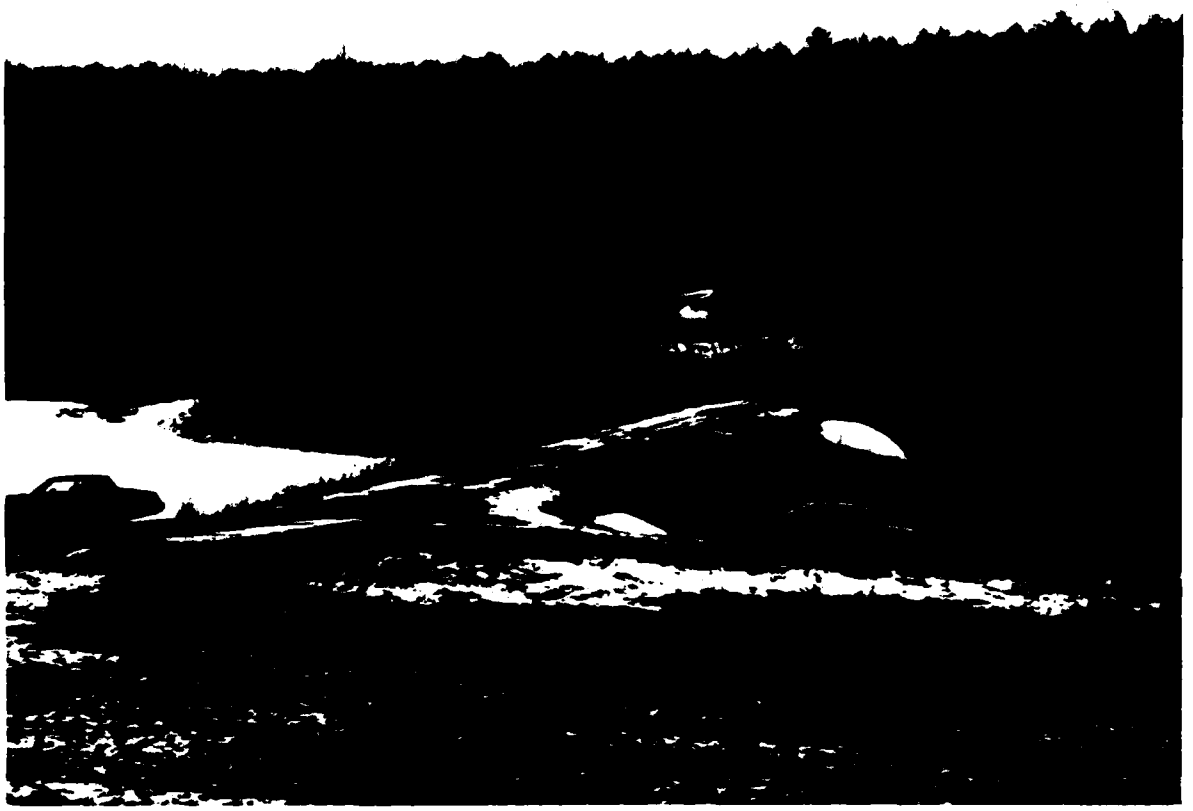
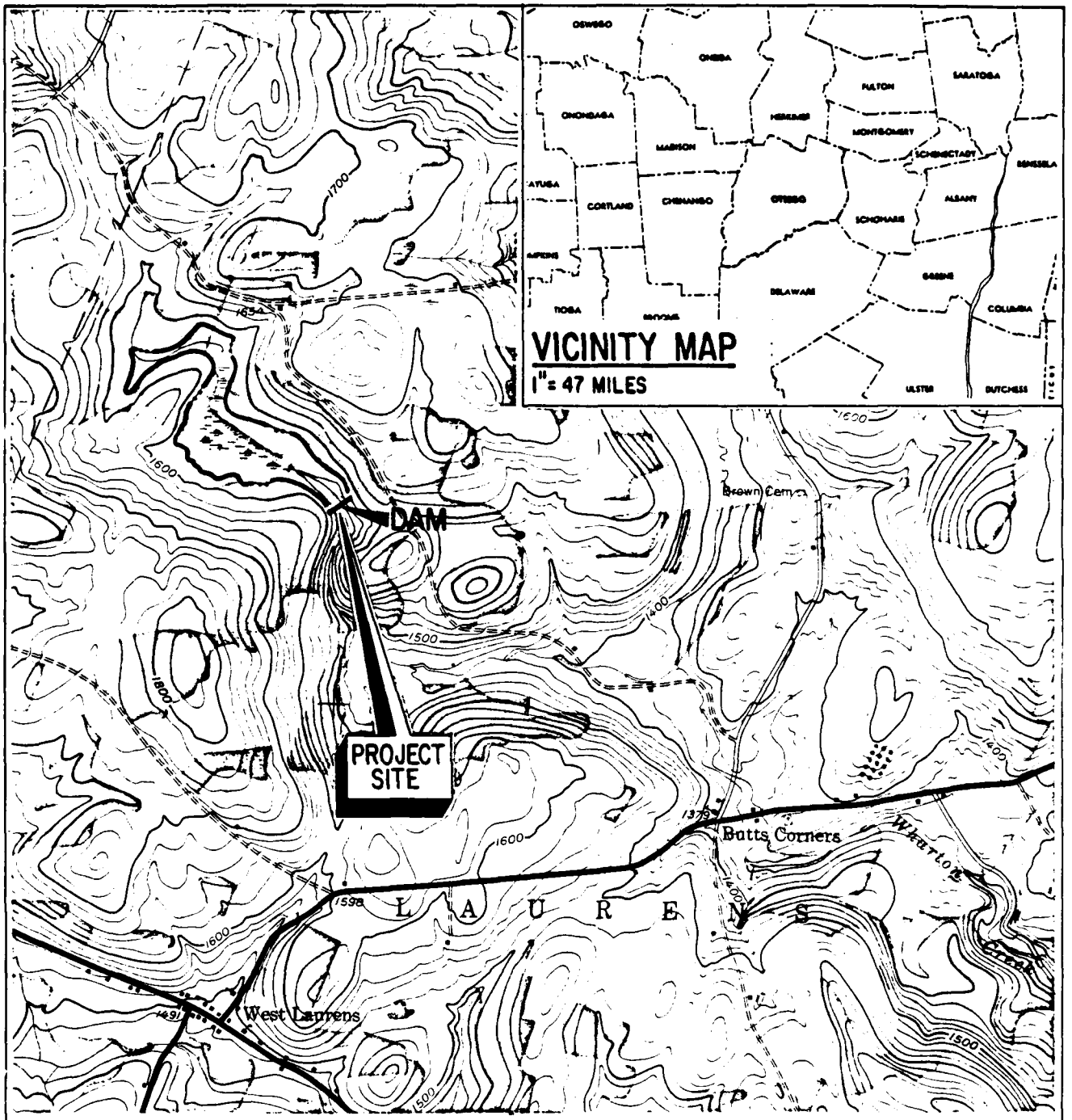


PHOTO #1: Overview of
Larchwood Lake Dam
Inventory No. NY 727



LOCATION MAP

LARCHWOOD LAKE DAM

INVENTORY No. NY 727

SUSQUEHANNA RIVER BASIN
OTSEGO COUNTY
LAURENS, NEW YORK

FLAHERTY · GIAVARA ASSOCIATES, P.C.

NATIONAL DAM SAFETY PROGRAM
PHASE I INSPECTION REPORT
LARCHWOOD LAKE DAM
INVENTORY NO. NY 727
D.E.C. NO. 130C-3588
SUSQUEHANNA RIVER BASIN
OTSEGO COUNTY, NEW YORK

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I Inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367. Flaherty Giavara Associates, P.C. has been retained by the New York District to inspect and report on selected dams in the State of New York. Authorization and notice to proceed was issued to Flaherty Giavara Associates, P.C. under a letter of December 24, 1980 from W.M. Smith, Jr., Colonel, Corps of Engineers. Contract No. DACW 51-81-C-0006 has been assigned by the Corps of Engineers for this work.

b. Purpose

Evaluation of the existing conditions of the subject dam to identify deficiencies and hazardous conditions, determine if they constitute hazards to life and property and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

Larchwood Lake Dam consists of an earthen embankment with a concrete pipe principal spillway under the left central portion of the embankment and a sparsely vegetated emergency spillway channel cut into the right abutment. Plans, profiles and sections prepared for the project by the U.S. Department of Agriculture, Soil Conservation Service (SCS), are included on drawings in Appendix F.

The dam embankment is approximately 260 feet long and 36 feet high and has an upstream slope of 3 horizontal to 1 vertical and a downstream slope of 2.5 to 1. The crest of the dam is 14 feet in width and its elevation varies from 114.1 to 115.4 (Assumed Datum). There is a 10 foot wide berm at the toe of the upstream slope just below

normal pond level. The embankment has a cross section primarily of compacted glacial till and a 12 foot wide cutoff of the same material extending 4 to 5 feet below the original ground surface. Sparse grass cover provides erosion protection for the upstream slope. Riprap is provided around the principal spillway outlet.

The embankment has an internal drain constructed in pervious fill located near the downstream toe of slope. Two 8 inch diameter perforated bituminous-coated corrugated metal pipes (BCCMP) are embedded in the pervious fill to drain the embankment and they discharge into the stilling basin at both sides of the principal spillway outlet.

The principal spillway is a drop inlet structure consisting of a single stage reinforced concrete riser, a 30 inch diameter prestressed concrete cylinder pipe (PCCP) and a stilling basin at the outlet of the conduit.

The emergency spillway is a curved 85 foot wide, trapezoidal-shaped channel with 3 to 1 side slopes cut into earth at the right abutment. It is about 420 feet long, extending below the dam in a cut section. Both channel side slopes have a cover of broken shaley rock in random sizes ranging up to about 6 inches. The emergency spillway channel bottom slopes gently downward both upstream and downstream from a 50 foot wide level section (the spillway crest) that is in the vicinity of the right side of the dam crest. Approximately 150 feet of the left channel slope is formed by a spur dike which has a 12 foot crest that varies in elevation from approximately 110.4 to 114.1 (Assumed Datum). The discharge channel drops off steeply into the natural streambed at the downstream end. The channel bottom and side slopes of the emergency spillway and the slopes and crest of the spur dike are sparsely vegetated.

b. Location

The Larchwood Lake Dam is located off an unimproved road approximately 1.3 miles northwest of Butts Corners in the Town of Laurens, New York. The dam is located at latitude north 42°-33.0' and longitude west 75°-10.0' on the U.S. Geological Survey 7.5 minute series topographic map "Morris, New York". The Location Map on page i indicates where the dam is situated.

c. Size Classification

The maximum height of the dam is 36 feet and the maximum storage capacity at the top of dam is 1100 acre-feet. Therefore, Larchwood Lake Dam is classified as an "Intermediate" dam as defined by the Recommended Guidelines for

Safety Inspection of Dams.

d. Hazard Classification

There are approximately 4 dwellings and three roads within the dam failure flood hazard area. Therefore, the dam is in the "High" hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by Larchwood Lake, Inc. The address and telephone number of the owner is as follows:

Owner

Contact: Larchwood Lake, Inc.
c/o Frank Getman
P.O. Box 613
Oneonta, New York 13820

Telephone: (607) 432-3530

f. Purpose

The primary purpose of this dam is to maintain the water level of the lake for recreational use.

g. Design and Construction History

The dam was designed by the Soil Conservation Service (SCS), of the U.S. Department of Agriculture (USDA) in 1966 and 1969. It was constructed in 1969 by Everett Van De Bogart of Oneonta, New York. No major post construction modifications have been made to the dam.

h. Normal Operating Procedure

The riser structure is always open; therefore, the water level is maintained at the elevation of the crest of the intake weir for normal flows. There are no regular operating procedures.

1.3 PERTINENT DATA

a. Drainage Area (Square Miles) 1.15

b. Discharge at Dam Site (CFS)

- Top of Dam	3071
- Crest of Emergency Spillway	108
- Crest of Principal Spillway	8
- Reservoir Drain Inlet	-

c. Elevations (Assumed Datum)

- Top of Dam	114.1
- Design High Water Level	111.2
- Crest of Emergency Spillway	108.6
- Crest of Principal Spillway	102.0
- Reservoir Drain Inlet	87.8

d. Reservoir Surface Area (Acres)

- Top of Dam	82.9
- Design High Water Level	74.6
- Crest of Emergency Spillway	66.9
- Crest of Principal Spillway	47.2

e. Storage (Acre-Feet)

- Top of Dam	1100
- Design High Water Level	861
- Crest of Emergency Spillway	675
- Crest of Principal Spillway	298

f. Dam

- Type: Homogeneous compacted glacial till with a glacial till cutoff	
- Crest Length (Feet)	260
- Upstream Slope (H:V)	3:1
- Downstream Slope (H:V)	2.5:1
- Crest Width (Feet)	14

g. Emergency Spillway

- Type: Excavated earthen channel; left bank is part of spur dike	
- Length (Feet)	420
- Bottom Width (Feet)	85
- Side Slopes (H:V)	3:1
- Channel Bottom Slopes (Feet/Foot)	
upstream	0.0200
downstream	0.0285

- Control: None

h. Principal Spillway

- Type: Drop inlet structure consisting of a single stage reinforced concrete riser, a 30 inch diameter prestressed concrete cylinder pipe (120 feet long) and a stilling basin at

the outlet end of the conduit

- Control: None

i. Reservoir Drain

- Type: 12 inch diameter asbestos cement pipe (39 feet long) having a trash rack and a reinforced concrete pond drain inlet and draining into the reinforced concrete riser

- Control: 12 inch flat frame slide gate located at the inlet to the reinforced concrete riser

j. Toe Drain

- Type: Two 8 inch diameter perforated bituminous-coated corrugated metal pipes in pervious fill

- Control: None

SECTION 2 - ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Larchwood Lake Dam is located in the Allegheny Plateau physiographic province of New York State.

The topography in the area ranges from an elevation of 1100 feet at the Susquehanna River to about 1800 feet on the summits of the hills. Glacial action has rounded the tops of the summits in the Allegheny Plateau and has deeply scoured the north-south valleys, such as the valley of Butternut Creek, west of the site. The lesser valley in which the dam is located was only moderately scoured by glacial erosion.

The underlying bedrock is of the Unadilla Formation and is Upper Devonian in age. It is a shallow water deposit made up of coarse silty shales and finely laminated siltstones deposited in the Catskill Delta as a consequence of mountain building that occurred to the east and southeast.

Above the bedrock the valley bottom and slopes are mantled by a heterogeneous mixture of clay, silt, sand and rock fragments. This soil is known as glacial till, and was deposited as the glacial ice melted back past the site.

b. Subsurface Investigations

Sixteen test pits were excavated for the project, with most or all being in the area of the dam and the emergency spillway. All of the pits apparently encountered low permeability glacial till at a relatively shallow depth, and terminated in dense glacial till at depths of 5 to 12 feet without reaching bedrock. Several test pits in the lower part of the valley revealed moderately permeable alluvium or colluvium above the glacial till at shallow depths ranging up to 4 feet. Logs of test holes are included on sheet 14 of the drawings in Appendix F.

2.2 DESIGN RECORDS

This dam was designed by the SCS in 1966 and 1969. As part of the design process, design calculations, a preliminary geologic investigation and soils testing were completed for the site. This data is included in Appendix D.

2.3 CONSTRUCTION RECORDS

This dam was constructed in 1969 by Everett Van De Bogart of Oneonta, New York. The contract drawings which were prepared by the SCS are included in Appendix F. No other construction records were available.

2.4 OPERATION RECORDS

There were no operation records available for this dam.

2.5 EVALUATION OF DATA

The data presented herein was obtained primarily from the SCS office located in Syracuse, New York and also from the files of the New York State Department of Environmental Conservation (DEC). This information appears to be reliable and adequate for the purposes of a Phase I Inspection Report.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspections of the Larchwood Lake Dam were conducted on March 12 and 14, 1981. The weather was overcast and the temperature was 35± °F. At the time of these inspections, there were patches of snow on the ground and water was flowing in the principal spillway outlet pipe (See Photo No. 16).

b. Dam

The earthfill embankment of the dam is generally in satisfactory condition. There was no visible evidence of lateral movement, significant seepage, major settlement or erosion, or other serious defects.

The following specific items were noted:

1. The crest of the dam embankment is rutted and somewhat irregular with ponded water (and ice) at several locations. The depressions are about 6 inches below the general level of the crest (See Photo No. 3).

2. The dam embankment slopes have a sparse cover of grass, weeds and occasional brush. Numerous fragments of shale were exposed on the upstream slope and may have been intended as a protective cover. Bare patches of soil are evident on the upper part of the downstream slope, but there has not been significant erosion (See Photos No. 4, 5, 6, 7, and 8).

3. There is wet ground and slight seepage at the intersection of the upstream slope with the left abutment. The source of the seepage appears to be ponded surface runoff at the end of the crest.

4. The discharge pipe of the left toe drain is broken off at the surface of the riprap. Neither drain was flowing (See Photo No. 15).

c. Principal Spillway

1. Riser Structure

The reinforced concrete riser structure with a drop inlet is in good condition. The inlet weir has a trash rack attached to it and is largely free from debris. However, four or five tree stumps remain from the construction of the dam and should be re-

moved. The gate stem for the reservoir drain was very rusty and was not operated during the inspection (See Photo No. 12). The riprap in place at the toe of the upstream embankment adjacent to the riser structure is in good condition with no bare spots observed (See Photo No. 13).

2. Principal Spillway Conduit

The 30 inch diameter prestressed concrete cylinder pipe (PCCP) is in excellent condition where visible (See Photo No. 16).

3. Principal Spillway Outlet

The 30 inch diameter conduit has a projecting end and discharges into a riprap stilling basin with a 6 foot drop. The cast-in-place concrete cradle supporting the cantilevered outlet pipe is in good condition. The riprap which surrounds the discharge pipe, its cradle and the toe drains appeared to be stable (See Photo No. 16). The stilling basin is in good condition having no major deterioration of the riprap lining (See Photo No. 14).

4. Principal Spillway Discharge Channel

The gravel-lined channel has an average width of 6 feet, a flow depth of 8 inches and narrows slightly in the downstream direction as it flows through a wooded area (See Photo No. 17).

d. Emergency Spillway

The dam has an 85 foot wide, trapezoidal-shaped, earthen spillway excavated into the right abutment. The approach channel, level crest, and discharge channel all have a thin, sparse grass cover and are in fair condition (See Photo No. 9).

The discharge channel is separated from the dam embankment by an earthen spur dike which is in good condition (See Photo No. 10).

The following specific items were noted:

1. Portions of the right cut slope downstream from the spillway crest, have sloughed about 15 feet out onto the channel bottom (See Photo No. 11).

2. There are scattered minor growths of brush and weeds among the rocks on the emergency spillway channel side slopes.

3. The bottom of the emergency spillway channel is locally irregular, and also has a sparse growth of grass, weeds, and low brush (See Photo No. 9).

e. Downstream Channel

The natural channel downstream of the dam site has a width of 10 to 15 feet. The streambed material consists of sand and fine to coarse gravel.

f. Reservoir - Storage Pool Area

The floodwater storage area is bordered by moderately sloping woodlands. There is no significant probability of landslides into the storage pool affecting the safety of the dam (See Photo No. 2). Sedimentation is not presently a safety factor because of the low normal pool level.

3.2 EVALUATION OF OBSERVATIONS

The visual inspections revealed some deficiencies. The following obsevations were made:

a. Portions of the right side slope of the emergency spillway downstream from the crest have sloughed about 15 feet out onto the channel bottom.

b. The crest of the dam embankment was rutted and somewhat irregular.

c. The dam embankment slopes and emergency spillway channel bottom and side slopes have a sparse cover of grass, weeds and occasional brush.

d. The outlet to the left toe drain of the embankment has broken off at its emergence from the slope.

e. There are four or five tree stumps around the drop inlet structure.

f. The gate stem used to operate the reservoir drain was very rusty.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

The normal water surface level is maintained by the crest of the intake weir in the riser structure at elevation 102.0 (Assumed Datum). No operational procedures are in effect at this time.

4.2 MAINTENANCE OF DAM

There was no evidence of any mowing, reservoir drain operation, or any other maintenance operations at the Larchwood Lake Dam.

4.3 WARNING SYSTEM

No warning system is presently in effect.

4.4 EVALUATION

Presently, there are none in effect; therefore, the operation and maintenance procedures for this dam are inadequate. Consequently, regular operation and maintenance procedures should be implemented.

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The dam is located in Laurens on Butts Corners Creek, 9500± feet upstream of Wharton Creek. Butts Corners Creek joins Wharton Creek near Butts Corners, approximately five miles upstream of Otego Creek at West Oneonta, New York.

The watershed (shown on the Watershed Map on Page C-5 in Appendix C) consists of 735 acres (1.15 square miles) of rolling to hilly uplands with typical slopes of 5 to 10 percent. Land within the watershed is largely undeveloped with extensive open fields and woodlands. There are no significant waterbodies or wetlands located upstream of the dam.

The watercourse upon which the dam is located is a small perennial stream with a typical flow width of 10 feet and a typical flow depth of 8 inches.

5.2 ANALYSIS CRITERIA

The purpose of the hydrologic/hydraulic analysis is to evaluate the spillway capacity and the potential for overtopping. The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers' HEC-1 Computer Model - Dam Safety Version. The procedure included determining the Probable Maximum Flood (PMF) runoff from the watershed and routing the inflow hydrograph through the impoundment to determine the outflow hydrograph. The unit hydrograph was defined by the Snyder Synthetic Unit Hydrograph method, and the Modified Puls routing procedure was incorporated.

The initial rainfall loss was assumed to be 1.0 inches, and the uniform rainfall loss was assumed to be 0.1 inches per hour. In accordance with recommended guidelines of the Corps of Engineers, the Probable Maximum Precipitation (PMP) was 19.7 inches (24 hour duration, 200 square mile area).

The analysis was conducted for both the full PMF and for several fractional PMF conditions. The PMF inflow of 2970 CFS was routed through the reservoir and the peak outflow was determined to be 2173 CFS.

5.3 SPILLWAY CAPACITY

The total outlet capacity is the sum of discharges from the principal spillway and the emergency spillway.

The principal spillway consists of a riser structure with a drop inlet, a conduit and a stilling basin. The crest elevation of the drop inlet is 102.0 feet (from SCS design data)

at the normal pool elevation and the invert elevation of the principal spillway conduit (30" PCCP) is 86.75 at its inlet and 85.75 at its outlet into the stilling basin. A reservoir drain (12 inch diameter asbestos cement pipe) is located at the upstream toe of slope at an elevation of 87.75. Flow is conveyed through the 12 inch reservoir drain to the riser structure and then through the 30 inch conduit into the stilling basin. Flow through the reservoir drain is controlled at the riser structure by a 12 inch diameter flat frame slide gate. The flow capacity was evaluated by assuming that its capacity was controlled by the inlet, which acts as an orifice during periods of high flow.

The emergency spillway is an 85 foot wide trapezoidal-shaped, sparsely vegetated channel. The SCS design information indicates the emergency spillway was designed to be used only by a flood event with an average return frequency of more than 100 years.

The stage discharge curve for the combined principal and emergency spillways was obtained from the Soil Conservation Service for the stages tabulated below:

Stage (Feet)	Discharge Capacity (CFS)	Element of Structure
102.0	0	Normal Water Level
103.0	40	--
104.0	96	--
105.0	99	--
106.0	102	--
107.0	104	--
108.0	107	--
108.6	108	Emergency Spillway Crest
109.0	149	--
110.1	416	--
111.1	814	--
111.2	869	Design High Water Level
112.1	1397	--
113.1	2179	--
114.1	3071	Top of Dam

The total spillway capacity at the top of dam is 3071 CFS.

The principal spillway can pass the peak outflow from a flood equal to approximately 34 percent of the PMF before use of the emergency spillway would be required.

The energy grade line of the PMF discharge would be 4.4 feet above the crest of the emergency spillway. The average flow velocity in the emergency spillway discharge channel would be

10.5 feet per second (FPS), which may cause erosion of the sparsely vegetated channel.

5.4 RESERVOIR CAPACITY

The storage capacity of the reservoir was obtained from the Soil Conservation Service, as indicated below:

Stage (Feet)	Storage (Acre-Feet)	Storage (Inches of Runoff)
88.0	0.2	0.00
90.0	4	0.07
92.0	18	0.29
94.0	42	0.69
96.0	82	1.34
98.0	139	2.27
100.0	211	3.44
102.0	298	4.86
104.0	399	6.51
106.0	512	8.36
108.0	636	10.38
110.0	772	12.60
112.0	920	15.02
114.0	1080	17.63

5.5 FLOODS OF RECORD

No records of floods were available for this dam.

5.6 OVERTOPPING POTENTIAL

The results of the HEC-1 DB computer analysis indicate that the crest of the dam is not overtopped by the PMF event. The PMF discharge rate of 2173 cubic feet per second (CFS) would occur at a peak flood stage of 113.0 feet, which is 1.1 feet below the crest of the dam.

The results of the analysis are tabulated below:

Flood Condition	Peak Inflow (CFS)	Peak Outflow (CFS)	Maximum Stage Elevation (Assumed Datum)
0.5 PMF	1485	517	110.4
1.0 PMF	2970	2173	113.0

5.7 EVALUATION

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the dam would not be overtopped by either the full Probable

Maximum Flood (PMF) or one half the PMF. Approximately 1.1 feet of freeboard would exist between the PMF maximum water level and the crest of the dam. Therefore, the spillway is adjudged to be adequate.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

There was no visible evidence of major settlement, lateral movement or other signs of overall structural instability of the dam during the site examinations. However, the pool level was approximately 12 feet below the top of the dam at the time, with the result that the forces tending to cause instability were much lower than design levels. Based on the conditions that were observed, there is no reason to question the static structural stability of the dam.

b. Design and Construction Data

Although they are not labelled "As-Built", the Soil Conservation Service record drawings for the Larchwood Lake Dam (see Appendix F) show a configuration for the dam embankment and emergency spillway that generally corresponds to the conditions observed during the visual examinations on March 12 and 14, 1981. It is noted that the "Riser Revisions" on Sheet 8A, dated September 1969, have been incorporated in the construction of the dam.

There is no construction data to confirm the actual physical properties and configuration of the earthfill in the embankments. However, the dam proportions are considered to be reasonable for the soils that were available at the site and the dam would be expected to have adequate safety margins with respect to stability under static loading conditions.

c. Seismic Stability

The Larchwood Lake Dam is located in Seismic Zone 1, and in accordance with recommended Phase I guidelines does not require seismic analysis.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Condition

On the basis of the visual examinations, the Larchwood Lake Dam is considered to be in fair condition. There were no signs of impending structural failure or other conditions which would warrant urgent remedial action; however, a number of deficiencies were noted.

b. Adequacy of Information

The evaluation of this dam is based primarily on visual examinations, reference to available SCS plans, approximate hydraulic and hydrologic computations, and application of engineering judgement. The visual examination was somewhat hampered by low pool level and weather conditions; however, the available information that was obtained is adequate for the purposes of a Phase I assessment.

c. Need for Additional Investigations

It is recommended that the following additional investigation be performed by a registered professional engineer engaged by the owner:

1. Determine to what extent the erosion due to high velocities in the emergency spillway will affect the stability of the channel bottom and the left side slope well as the dam embankment.

d. Urgency

The additional investigation recommended in Section 7.1c should be initiated within 6 months and appropriate remedial measures completed within 18 months of the final approval date of this report. The recommended measures presented in Section 7.2 should be completed within 12 months of the final approval.

7.2 RECOMMENDED MEASURES

Due to the fact the dam is generally in fair condition, it is considered important that the following items be accomplished in addition to any items required as a result of the additional investigation recommended in Section 7.1c:

a. Remove the slumped material from the bottom of the emergency spillway channel and restore the channel cross section and slope protection. There is potential for fur-

ther slumping unless the cause is identified and the restoration includes provisions for slope drainage or other corrective measures.

b. Regrade the dam crest to remove the ruts and pockets and permit surface runoff without promoting concentrated flow. A gravel surface layer would improve trafficability and minimize rutting.

c. Cut the brush on the dam and emergency spillway slopes and channel bottom every year to prevent their becoming overgrown. Equipment and procedures for this cutting should be such as to avoid damage to existing grass and weed cover on the slopes. Any slopes that become further scarred by runoff or traffic should be reseeded and mulched.

d. Repair the broken toe drain pipe and cut both pipes shorter to reduce the unsupported length and minimize the potential for additional damage.

e. Remove the tree stumps from the vicinity of the riser structure.

f. Ensure the reservoir drain is operational.

g. Develop and implement a flood warning and emergency evacuation plan which would be implemented to alert the public in the event conditions occur which could result in the failure of the dam.

APPENDIX A

PHOTOGRAPHS

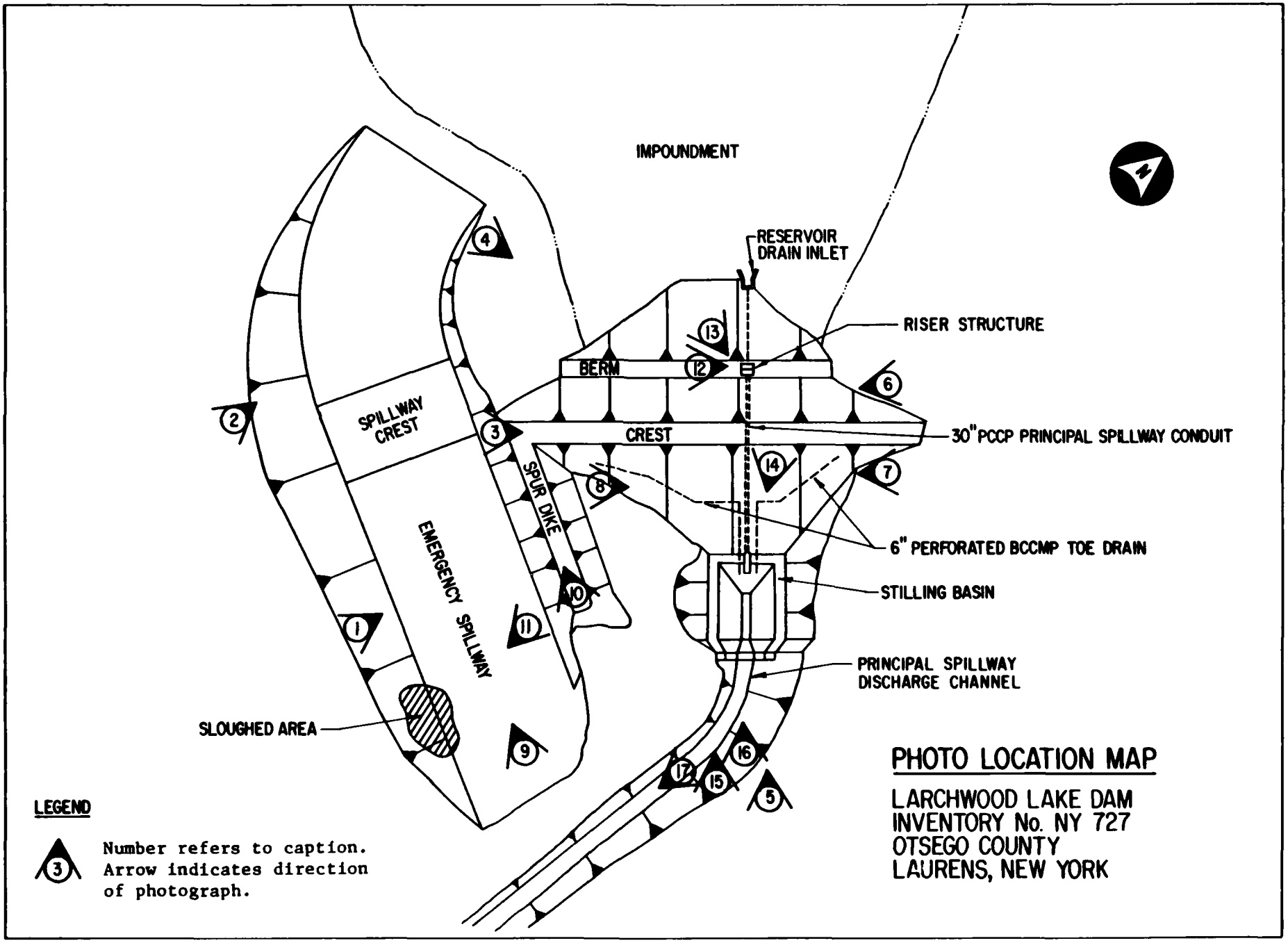


PHOTO LOCATION MAP

LARCHWOOD LAKE DAM
INVENTORY No. NY 727
OTSEGO COUNTY
LAURENS, NEW YORK

LEGEND

(3) Number refers to caption. Arrow indicates direction of photograph.

PHOTO #2: Overview of impoundment

PHOTO #3: Crest of dam looking toward left abutment

PHOTO #4: Overview of upstream face of dam

PHOTO #5: Overview of downstream face of dam

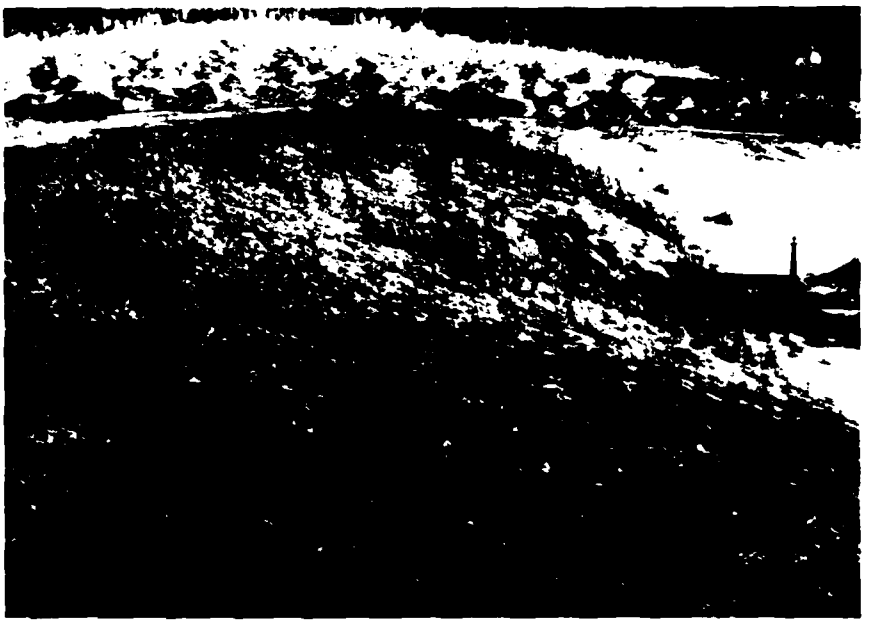


PHOTO #6: Upstream face of dam

PHOTO #7: Downstream face of dam looking toward right abutment

PHOTO #8: Downstream face of dam looking toward left abutment

PHOTO #9: Emergency spillway looking upstream

PHOTO #10: Crest of spur dike

PHOTO #11: Sloughing of right side slope of emergency spillway

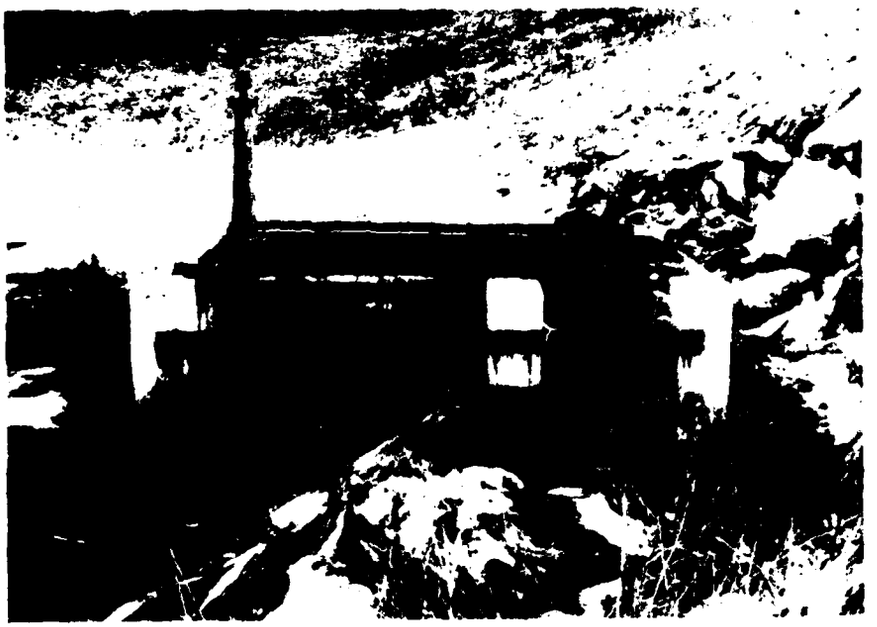


PHOTO #12: Principal spillway drop inlet structure

PHOTO #13: Riprap slope protection near drop inlet structure

PHOTO #14: Riprap-lined stilling basin

PHOTO #15: Principal spillway outlet works; 30" prestressed concrete cylinder pipe (PCCP) and toe drains (one broken)

PHOTO #16: Closeup of outlet works (toe drain not flowing)

PHOTO #17: Downstream channel conditions

APPENDIX B

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Larchwood Lake Dam

Fed. I.D. # NY 727 **DEC Dam No.** 130C-3588

River Basin Susquehanna

Location: Town Laurens **County** Otsego

Stream Name Butts Corners Creek

Tributary of Wharton Creek

Latitude (N) 42°-33.0' **Longitude (W)** 75°-10.0'

Type of Dam Earthen embankment

Hazard Category High

Date(s) of Inspection March 12 and 14, 1981

Weather Conditions Overcast, 35± F.

Reservoir Level at Time of Inspection Elevation 102.1 (Assumed Datum)

b. Inspection Personnel

R.C. Smith, T.L. Ward and R.A. Criscuolo of Flaherty Giavara Associates, P.C.; P.L. LeCount and J.J.Rixner of Haley & Aldrich, Inc.; E. Thomas of Salmon Associates; G.L. Page of the Soil Conservation Service (USDA)

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

Gary L. Page	Donald W. Lake Jr.
Binghamton Watershed Office Soil Conservation Service	Soil Conservation Service 771 Federal Building
P.O. Box 1255 Broome County Airport	100 South Clinton Street Syracuse, New York 13260
Binghamton, New York 13902 (607) 773-2751	(315) 423-5505

d. History:

Date Constructed 1969 **Date(s) Reconstructed** Never

Designer Soil Conservation Service

Constructed By Everett Van De Bogart

Owner Larchwood Lake, Inc.

2) **Embankment**

a. **Characteristics**

(1) **Embankment Material** Very firm fragipan and till; silty gravel

(2) **Cutoff Type** Compacted glacial till

(3) **Impervious Core** None

(4) **Internal Drainage System** Two 8 inch perforated BCCMP toe drains on either side of the principal spillway outlet; no flow in either drain

(5) **Miscellaneous** No comments

b. **Crest**

(1) **Vertical Alignment** Excellent; slightly crowned at the center of the dam

(2) **Horizontal Alignment** Excellent; substantially straight

(3) **Surface Cracks** None evident

(4) **Miscellaneous** Wheel rutting and low spots

c. **Upstream Slope**

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

(2) **Undesirable Growth or Debris, Animal Burrows** None observed

(3) **Sloughing, Subsidence or Depressions** None apparent

(4) **Slope Protection** Sparse grass and weeds; occasional brush; numerous pieces of shale exposed; riprap around concrete riser appears satisfactory

(5) **Surface Cracks or Movement at Toe** None evident

d. **Downstream Slope**

(1) **Slope (Estimate - V:H)** 1:2.5

(2) **Undesirable Growth or Debris, Animal Burrows** None observed

(3) **Sloughing, Subsidence or Depressions** None evident; however, bare soil exposed in patches on upper portion

(4) **Surface Cracks or Movement at Toe** None evident

(5) **Seepage** None observed

(6) **External Drainage System (Ditches, Trenches, Blanket)** None observed

(7) **Condition Around Outlet Structure** Riprap surrounds the outlets of the principal spillway and the toe drains but has fallen away from the toe drains causing the left one to break off at the slope

(8) **Seepage Beyond Toe** None observed

e. **Abutments - Embankment Contact**

Good condition

(1) **Erosion at Contact** None evident

(2) **Seepage Along Contact** None observed

3) **Drainage System**

a. **Description of System** Drop inlet structure consisting of a reinforced concrete riser, a 30 inch diameter conduit and a stilling basin

b. **Condition of System** Excellent

c. **Discharge from Drainage System** Riprap-lined stilling basin

4) **Instrumentation** (Monumentation/Surveys, Observation Wells, Weirs, Peizometers, Etc.)

None observed

5) **Reservoir**

a. **Slopes** Moderately sloping woodlands

b. **Sedimentation** No apparent problems

c. **Unusual Conditions Which Affect Dam** Low normal pool level

6) **Area Downstream of Dam**

a. **Downstream Hazard (No. of Homes, Highways, etc.)** Approximately 4 dwellings and 3 roads are within the dam failure flood hazard area

b. **Seepage, Unusual Growth** None observed

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

d. **Condition of Downstream Channel** Good; no aggradation or degradation

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

Principal spillway, emergency spillway and discharge conveyance channel

a. **General** Principal spillway and discharge conveyance channel handle normal flows, while the emergency spillway conveys flood events with average return frequencies greater than 100 years

b. **Condition of Principal Spillway** Good; however, debris has collected around old stumps in front of the trash rack and could hinder flow over the weir

c. **Condition of Emergency Spillway** Fair; a section of the right side slope has sloughed out about 15 feet onto the channel bottom

d. **Condition of Discharge Conveyance Channel** Good; the bed is gravel-lined and the banks appear stable

8) **Reservoir Drain/Outlet**

Type: **Pipe** Two **Conduit** _____ **Other** _____

Material: **Concrete** X **Metal** _____ **Other** Asbestos cement

Size: Conc: 30 in., Asbestos cement: 12 in. **Length** 120 feet and 39 feet

Invert Elevations: **Entrance** 87.75 **Exit** 85.75

Physical Condition (Describe): **Unobservable** X

Material: Prestressed concrete cylinder and asbestos cement

Joints: Rubber/Steel and Rubber **Alignment** Straight

Structural Integrity: Excellent

Hydraulic Capability: Good

Means of Control: **Gate** Flat Frame Slide Gate **Valve** _____ **Uncontrolled** _____

Operation: **Operable** _____ **Inoperable** X **Uncontrolled** _____

Present Condition (Describe): Each pipe is in excellent condition; however, the slide gate appears to be rusted shut in the closed position

9) **Structural**

a. **Concrete Surfaces** Good condition

b. **Structural Cracking** None observed

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

d. **Junctions with Abutments or Embankments** Not applicable

e. **Drains - Foundation, Joint, Face** Not applicable

f. **Water Passages, Conduits, Sluices** Not applicable

g. **Seepage or Leakage** None observed

h. **Joints - Construction, etc.** Not applicable

i. **Foundation** Not applicable

j. **Abutments** Not applicable

k. **Control Gates** 12 inch flat frame slide gate on the reservoir drain at its inlet to the reinforced concrete riser

l. **Approach & Outlet Channels** Not applicable

m. **Energy Dissipators (Plunge Pool, etc.)** Riprap-lined stilling basin at the principal spillway outlet

n. **Intake Structures** Reinforced concrete riser with overflow weir in good condition

o. **Stability** No evidence of structural instability

p. **Miscellaneous** No comments

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

a. Description and Condition None

APPENDIX C

HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS

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	114.1	82.9	1090
2) Design High Water (Max. Design Pool)	111.2	74.6	861
3) Emergency Spillway Crest	108.6	66.9	675
4) Pool Level with Flashboards	---	---	---
5) Principal Spillway Crest	102.0	47.2	298

DISCHARGES:

	Volume (cfs)
1) Average Daily	Unknown
2) Emergency Spillway @ Maximum High Water (Top of Dam)	2950
3) Emergency Spillway @ Design High Water	754
4) Principal Spillway @ Emergency Spillway Crest	108
5) Low Level Outlet @ Principal Spillway Crest	8
6) Total (of all facilities) @ Maximum High Water	3071
7) Maximum Known Flood	Unknown
8) At Time of Inspection	1+

CREST: **ELEVATION:** 114.1

Type Vegetated earthen embankment

Width 14 feet **Length** 260 feet

Spillover Sparsely vegetated emergency spillway

Location Right abutment

SPILLWAY:

PRINCIPAL		EMERGENCY
102.0	**Elevation**	108.6
Drop inlet structure	**Type**	Earth excavated
13 feet, 4 inches	**Width**	85 feet
	Type of Control	
Weir	**Uncontrolled**	Weir
--	**Controlled**	--
--	**Type:** (Flashboards; gate)	--
One	**Number**	One
30 inch/120 feet	**Size/Length**	85 feet/420 feet
Concrete	**Invert Material**	Sparsely vegetated cover on earth
Continuously	**Anticipated Length of Operating Service**	11.84 hours
Not applicable	**Chute Length**	220 feet
1.0 feet	**Height Between Spillway Crest & Approach Channel Invert (Weir Flow)**	Slope = 0.0200 on the approach channel

Type:

Location:

Records:

Date Unknown

Max. Reading Unknown

FLOOD WATER CONTROL SYSTEM:

Warning System None in effect

Method of Controlled Releases (mechanisms) Manually controlled slide gate to drain the impoundment

DRAINAGE AREA: 735 acres = 1.15 square miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type Rural, agriculture

Terrain - Relief Moderate slopes

Surface - Soil Glacial till

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

Moderate due to rolling uplands

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

None

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

None

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

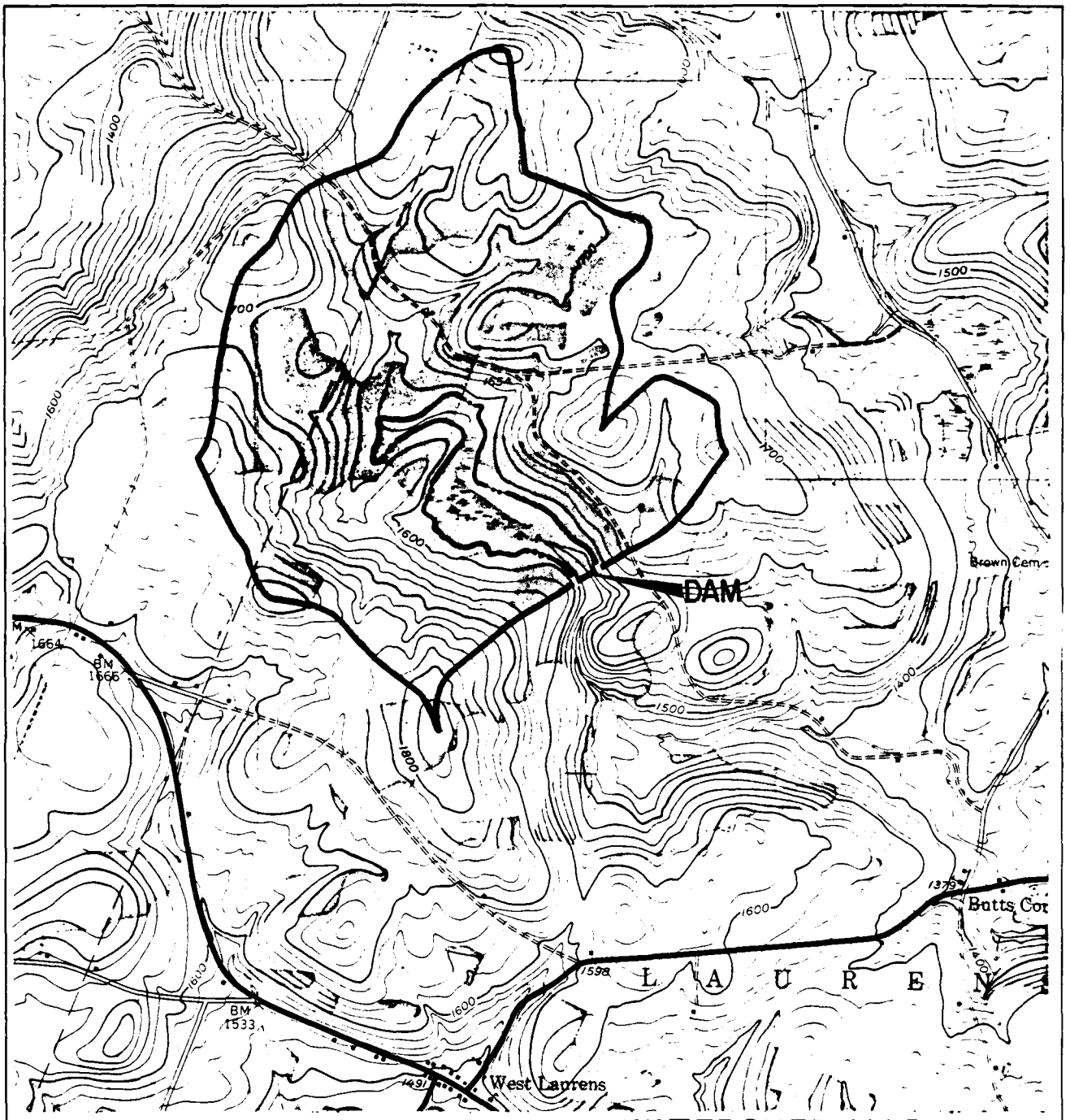
Location: Spur dike at the right end of the dam embankment

Elevation: Approximately 110.4 to 114.1 (Assumed Datum)

Reservoir:

Length @ Maximum Pool 4600± feet = 0.9 miles **(Miles)**

Length of Shoreline (@ Spillway Crest) 10,600± feet = 2.0 miles **(Miles)**



WATERSHED MAP

LARCHWOOD LAKE DAM

INVENTORY No. NY 727

SUSQUEHANNA RIVER BASIN
OTSEGO COUNTY
LAURENS, NEW YORK

N

0 2000 4000

SCALE IN FEET

FLAHERTY · GIAVARA ASSOCIATES, P.C.

CALCULATIONS

NY727
LACKWOOD LAKE DAM

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

SHEET NO. ____ OF ____
BY RAC DATE 3-17-9
CHK'D. BY TLW DATE 4-20-9

WATERSHED DATA FOR HEC I SNYDER HYDROGRAPH

1) TIME TO PEAK

L = 19,000 FT = 1.89 miles
Lc = 4,000 FT = 0.76 miles
Ct = 2.0 for average slope

$$T_p = C_t (L \times L_c)^{0.3}$$
$$= 2.0 (1.89 \times 0.76)^{0.3}$$
$$= 2.23$$

$$t_r = \frac{t_p}{5.5} = \frac{2.23}{5.5} = 0.41 \qquad \text{USE } t_R = 0.5$$

$$t_{pR} = t_p + 0.25(t_R - t_r)$$
$$= 2.23 + 0.25(0.5 - 0.41)$$
$$= 2.25 \text{ HOURS}$$

2) SNYDER'S Peaking coefficient (CP) = 0.63 for Highlands

3) % IMPERVIOUS

ROADS 7000' x 25' = 175,000 ft²
HOUSES 2 x 1000' = 2000 ft²
177,000 ft²

177,000 ft² = 4 acres

$$\frac{4 \text{ acres}}{735 \text{ acres}} = 0.5\% \text{ of watershed}$$

4) WATERSHED AREA

735 acres / 640 = 1.15 square miles

5) Rainfall Data (From Hydrometeorological Report No. 33)

-4 Hour Duration PMP = 19.7 inches
For 200 square Miles

Duration HRS	Adj Factor %
6	111
12	122
24	133
48	143

PROJECT [illegible]

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

SHEET NO. 5 OF 6
BY [illegible] DATE [illegible]
CHK'D. BY TLW DATE 4-28-81

PRINCIPAL & EMERGENCY [illegible]

STAGE DISCHARGE DATA (FROM [illegible])

STAGE FT	PRINICIPAL HEAD (FT)	EMERGENCY HEAD (FT)	DISCHARGE (CFS)
102.0	0	-	0
102.5	0.5	-	14.3
103.0	1.0	-	40.3
103.5	1.5	-	74.2
103.8	1.8	-	97.5
103.9	[illegible]	-	105.6
104.0	2.0	-	106.8
104.3	2.3	-	107.7
108.6	6.6	0	[illegible]
109.0	7.0	0.4	149.3
[illegible]	7.6	1.0	[illegible]
110.1	8.1	1.5	416.1
110.6	[illegible]	2.0	593.3
[illegible]	[illegible]	2.5	814.2
[illegible]	[illegible]	2.6	[illegible]
[illegible]	[illegible]	3.0	[illegible]
[illegible]	10.1	3.5	[illegible]
113.1	[illegible]	4.5	[illegible]
[illegible]	12.1	5.5	30[illegible]

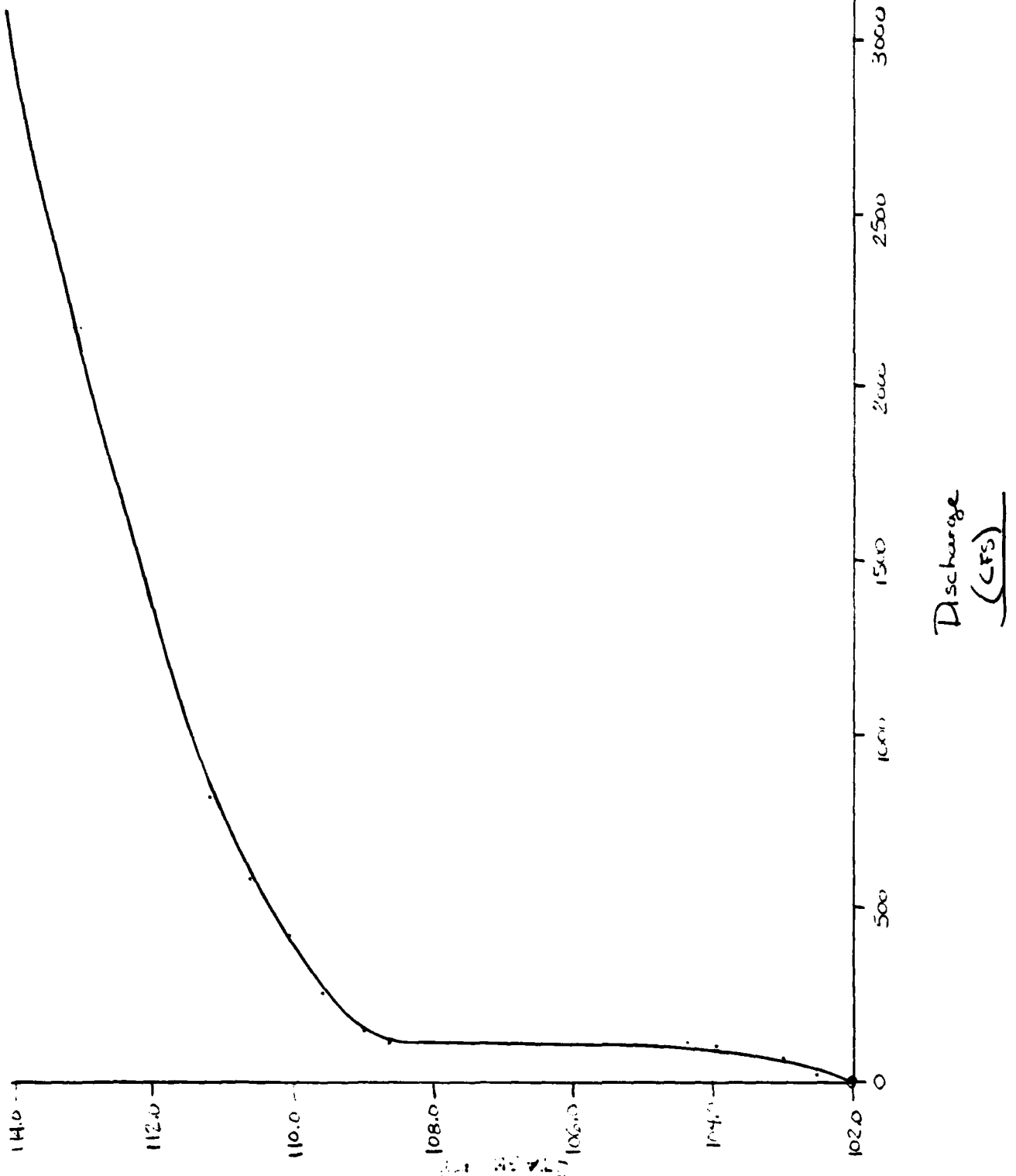
PROJECT Lore Dams
N4727

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

SHEET NO. 9 OF 6
BY RAC DATE 3-[illegible]
CHK'D. BY TLW DATE 4-20-81

STAGE - DISCHARGE CURVE

PRINCIPAL & EMERGENCY SPILLWAYS



FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

EMERGENCY SPILLWAY DISCHARGE CHANNEL

$b = 85$ ft
$Z = 3:1$
$S = 2.85\%$
$n = 0.04$
$Q = 2211$ cfs (PMF - PRINCIPAL SPILLWAY + EMERGENCY SPILLWAY)

FIND D, A, V

$Q = \frac{K'}{n} b^{8/3} s^{1/2}$ (KING'S HANDBOOK TABLE 7-)

$K' = \frac{2n}{b^{8/3} s^{1/2}} = \frac{(2211)(0.04)}{(85)^{2.67}(0.0285)^{1/2}} = 0.00315$

INTERPOLATE

$\frac{.03 - .02}{.00443 - .00223} = \frac{x}{.00575 - .00223}$

$\frac{D}{b} = 0.0069 + 0.02 = 0.0269$

$D = 0.0269 (85) = 2.29'$

$A = (85 \times 2.29) + (6.5 \times 2.29) = 210.4$ ft²

$V = \frac{Q}{A} = \frac{2211}{210.4} = 10.5$ ft/sec

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

Check for Critical Depth

$K_c' = \frac{Q}{b^{5/2}}$ (KINGS HANDBOOK TABLE 3-5)

$= \frac{2211}{85^{5/2}} = 0.0332$

$\frac{0.04 - 0.03}{0.0483 - 0.0332} = \frac{x}{0.0332 - 0.0319}$ $x = 0.0013$

$\frac{D_c}{b} = 0.0013 + 0.03 = 0.0313$

$D_c = 0.0313 (85') = 2.66'$

$D_c = 2.66' > D_n = 2.29'$ ∴ supercritical flow exists @ the end of the emergency spillway

Velocity @ spillway crest (@ Dam section)

$\frac{V^2}{2g} = \frac{D}{2}$ (Assume)

$V = \sqrt{DG}$

$= \sqrt{2.29 \times 32.2}$ = [illegible]

HEC-1 FLOOD HYDROGRAPH COMPUTATIONS

```
FLAHERTY GIAVARA ASSOCIATES, P C.
 ********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION     JULY 1978
   LAST MODIFICATION  26 FEB 79
 ********************************
     1                A1 NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT
     2                A2 DAM INVENTORY NO. NY 727, LARCHWOOD LAKE DAM, OTSEGO COUNTY, NEW YORK, JUNE 26, 1981
     3                A3 PREPARED BY FLAHERTY GIAVARA ASSOCIATES, P.C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT
     4                B    120       0      30       0       0       0       0       2       0       0
     5                B1     5
     6                J      1       9       1
     7                J1   0.1     0.2     0.3     0.4     0.5     0.6     0.7     0.8     1.0
     8                K      0       1                       0       0       1       0
     9                K1   INFLOW HYDROGRAPH,  SNYDER METHOD
    10                M      1       1    1.15               0     1.0                       1
    11                P      0    19.7     111     122     133     143
    12                T                                                       1     0.1             0.005
    13                W   2.25    0.63
    14                X   -2.0   -0.10     1.5
    15                K      1       1                       0       1       1       0
    16                K1   RESERVOIR ROUTING  MODIFIED PULS METHOD
    17                Y                                   1       1
    18                Y1     3                                                0      -1
    19                Y4 102.0   103.5   104.0   108.6   110.1   111.2   112.1   114.1
    20                Y5     0    74.2   106.8   108.4   416.1   814.5  1396.8  3071.4
    21                $A 47.22   65.09   66.90   71.12   74.65   77.00   82.65   82.93
    22                $E 102.0   108.0   108.6   110.0   111.2   112.2   114.0   114.1
    23                $$108.60
    24                $D114.10     2.5     1.5     263
    25                K     99
1                                PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
                                        RUNOFF HYDROGRAPH AT          1
                                        ROUTE HYDROGRAPH TO           1
                                        END OF NETWORK

 ********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION     JULY 1978
   LAST MODIFICATION  26 FEB 79
 ********************************

 RUN   DATE  6/26/
       TIME  11.03 AM
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NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT
DAM INVENTORY NO. NY 727, LARCHWOOD LAKE DAM, OTSEGO COUNTY, NEW YORK, JUNE 26, 1981
PREPARED BY FLAHERTY GIAVARA ASSOCIATES, P.C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
120	0	30	0	0	0	0	2	0	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED

NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 1.00

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

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH, SNYDER METHOD

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	CAL
1	1	1.15	0.00	1.15	1.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	19.70	111.00	122.00	133.00	143.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 2.25 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.50

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 5.21 AND R= 4.14 INTERVALS

UNIT HYDROGRAPH 25 END-OF-PERIOD ORDINATES, LAG= 2.25 HOURS, CP= 0.63 VOL= 1.00

19.	69.	132.	185.	205.	187.	148.	116.	91.	71.
56	44	34.	27.	21.	17.	13.	10.	8.	6.
5.	4.	3.	2.	2.					

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	0.30	1	0.01	0.00	0.01	2.	1.02	6.30	61	0.18	0.13	0.05	33
1.01	1.00	2	0.01	0.00	0.01	2.	1.02	7.00	62	0.18	0.13	0.05	41.
1.01	1.30	3	0.01	0.00	0.01	2.	1.02	7.30	63	0.18	0.13	0.05	56
1.01	2.00	4	0.01	0.00	0.01	2.	1.02	8.00	64	0.18	0.13	0.05	76
1.01	2.30	5	0.01	0.00	0.01	2.	1.02	8.30	65	0.18	0.13	0.05	99
1.01	3.00	6	0.01	0.00	0.01	2.	1.02	9.00	66	0.18	0.13	0.05	119
1.01	3.30	7	0.01	0.00	0.01	2.	1.02	9.30	67	0.18	0.13	0.05	135
1.01	4.00	8	0.01	0.00	0.01	2.	1.02	10.00	68	0.18	0.13	0.05	148
1.01	4.30	9	0.01	0.00	0.01	2.	1.02	10.30	69	0.18	0.13	0.05	158
1.01	5.00	10	0.01	0.00	0.01	2	1.02	11.00	70	0.18	0.13	0.05	166
1.01	5.30	11	0.01	0.00	0.01	2.	1.02	11.30	71	0.18	0.13	0.05	172
1.01	6.00	12	0.01	0.00	0.01	1.	1.02	12.00	72	0.18	0.13	0.05	177
1.01	6.30	13	0.01	0.00	0.01	1.	1.02	12.30	73	1.09	1.04	0.05	198
1.01	7.00	14	0.01	0.00	0.01	1.	1.02	13.00	74	1.09	1.04	0.05	263
1.01	7.30	15	0.01	0.00	0.01	1.	1.02	13.30	75	1.31	1.26	0.05	391
1.01	8.00	16	0.01	0.00	0.01	1.	1.02	14.00	76	1.31	1.26	0.05	576
1.01	8.30	17	0.01	0.00	0.01	1.	1.02	14.30	77	1.64	1.59	0.05	800
1.01	9.00	18	0.01	0.00	0.01	1.	1.02	15.00	78	1.64	1.59	0.05	1034
1.01	9.30	19	0.01	0.00	0.01	1.	1.02	15.30	79	1.99	1.94	0.05	1266

1	01	10 00	20	0 01	0 00	0 01	1.	1	02	16 00	80	6 32	6 27	0 05	1580.
1	01	10 30	21	0 01	0 00	0 01	1.	1	02	16 30	81	1 53	1 48	0 05	2016.
1	01	11 00	22	0 01	0 00	0 01	1.	1	02	17 00	82	1 53	1 48	0 05	2477.
1	01	11 30	23	0 01	0 00	0 01	1.	1	02	17 30	83	1 20	1 15	0 05	2828.
1	01	12 00	24	0 01	0 00	0 01	1.	1	02	18 00	84	1 20	1 15	0 05	2970.
1	01	12 30	25	0 08	0 00	0 08	1.	1	02	18 30	85	0 11	0 06	0 05	2855.
1	01	13 00	26	0 08	0 00	0 08	1.	1	02	19 00	86	0 11	0 06	0 05	2566.
1	01	13 30	27	0 10	0 00	0 10	1.	1	02	19 30	87	0 11	0 06	0 05	2225.
1	01	14 00	28	0 10	0 00	0 10	1.	1	02	20 00	88	0 11	0 06	0 05	1860.
1	01	14 30	29	0 12	0 00	0 12	1.	1	02	20 30	89	0 11	0 06	0 05	1507.
1	01	15 00	30	0 12	0 00	0 12	1.	1	02	21 00	90	0 11	0 06	0 05	1203.
1	01	15 30	31	0 15	0 00	0 15	1.	1	02	21 30	91	0 11	0 06	0 05	962.
1	01	16 00	32	0 47	0 41	0 06	9.	1	02	22 00	92	0 11	0 06	0 05	773.
1	01	16 30	33	0 12	0 07	0 05	31.	1	02	22 30	93	0 11	0 06	0 05	625.
1	01	17 00	34	0 12	0 07	0 05	62.	1	02	23 00	94	0 11	0 06	0 05	509.
1	01	17 30	35	0 09	0 04	0 05	91.	1	02	23 30	95	0 11	0 06	0 05	418.
1	01	18 00	36	0 09	0 04	0 05	110.	1	03	0 00	96	0 11	0 06	0 05	346.
1	01	18 30	37	0 01	0 00	0 01	112.	1	03	0 30	97	0 00	0 00	0 00	295.
1	01	19 00	38	0 01	0 00	0 01	100.	1	03	1 00	98	0 00	0 00	0 00	284
1	01	19 30	39	0 01	0 00	0 01	86.	1	03	1 30	99	0 00	0 00	0 00	272.
1	01	20 00	40	0 01	0 00	0 01	71.	1	03	2 00	100	0 00	0 00	0 00	262.
1	01	20 30	41	0 01	0 00	0 01	57.	1	03	2 30	101	0 00	0 00	0 00	251.
1	01	21 00	42	0 01	0 00	0 01	45.	1	03	3 00	102	0 00	0 00	0 00	241.
1	01	21 30	43	0 01	0 00	0 01	35.	1	03	3 30	103	0 00	0 00	0 00	232.
1	01	22 00	44	0 01	0 00	0 01	28.	1	03	4 00	104	0 00	0 00	0 00	222.
1	01	22 30	45	0 01	0 00	0 01	22.	1	03	4 30	105	0 00	0 00	0 00	214
1	01	23 00	46	0 01	0 00	0 01	17.	1	03	5 00	106	0 00	0 00	0 00	205.
1	01	23 30	47	0 01	0 00	0 01	14.	1	03	5 30	107	0 00	0 00	0 00	197.
1	02	0 00	48	0 01	0 00	0 01	11.	1	03	6 00	108	0 00	0 00	0 00	189.
1	02	0 30	49	0 07	0 02	0 05	11.	1	03	6 30	109	0 00	0 00	0 00	182.
1	02	1 00	50	0 07	0 02	0 05	10.	1	03	7 00	110	0 00	0 00	0 00	174.
1	02	1 30	51	0 07	0 02	0 05	10.	1	03	7 30	111	0 00	0 00	0 00	167.
1	02	2 00	52	0 07	0 02	0 05	13.	1	03	8 00	112	0 00	0 00	0 00	161.
1	02	2 30	53	0 07	0 02	0 05	17.	1	03	8 30	113	0 00	0 00	0 00	154.
1	02	3 00	54	0 07	0 02	0 05	21.	1	03	9 00	114	0 00	0 00	0 00	148.
1	02	3 30	55	0 07	0 02	0 05	23.	1	03	9 30	115	0 00	0 00	0 00	142.
1	02	4 00	56	0 07	0 02	0 05	26.	1	03	10 00	116	0 00	0 00	0 00	137.
1	02	4 30	57	0 07	0 02	0 05	27.	1	03	10 30	117	0 00	0 00	0 00	131.
1	02	5 00	58	0 07	0 02	0 05	28.	1	03	11 00	118	0 00	0 00	0 00	126.
1	02	5 30	59	0 07	0 02	0 05	29.	1	03	11 30	119	0 00	0 00	0 00	121
1	02	6 00	60	0 07	0 02	0 05	30.	1	03	12 00	120	0 00	0 00	0 00	116.
											SUM	28 17	24 44	3 73	39439.
												(716)	(621)	(95)	(1116 79)

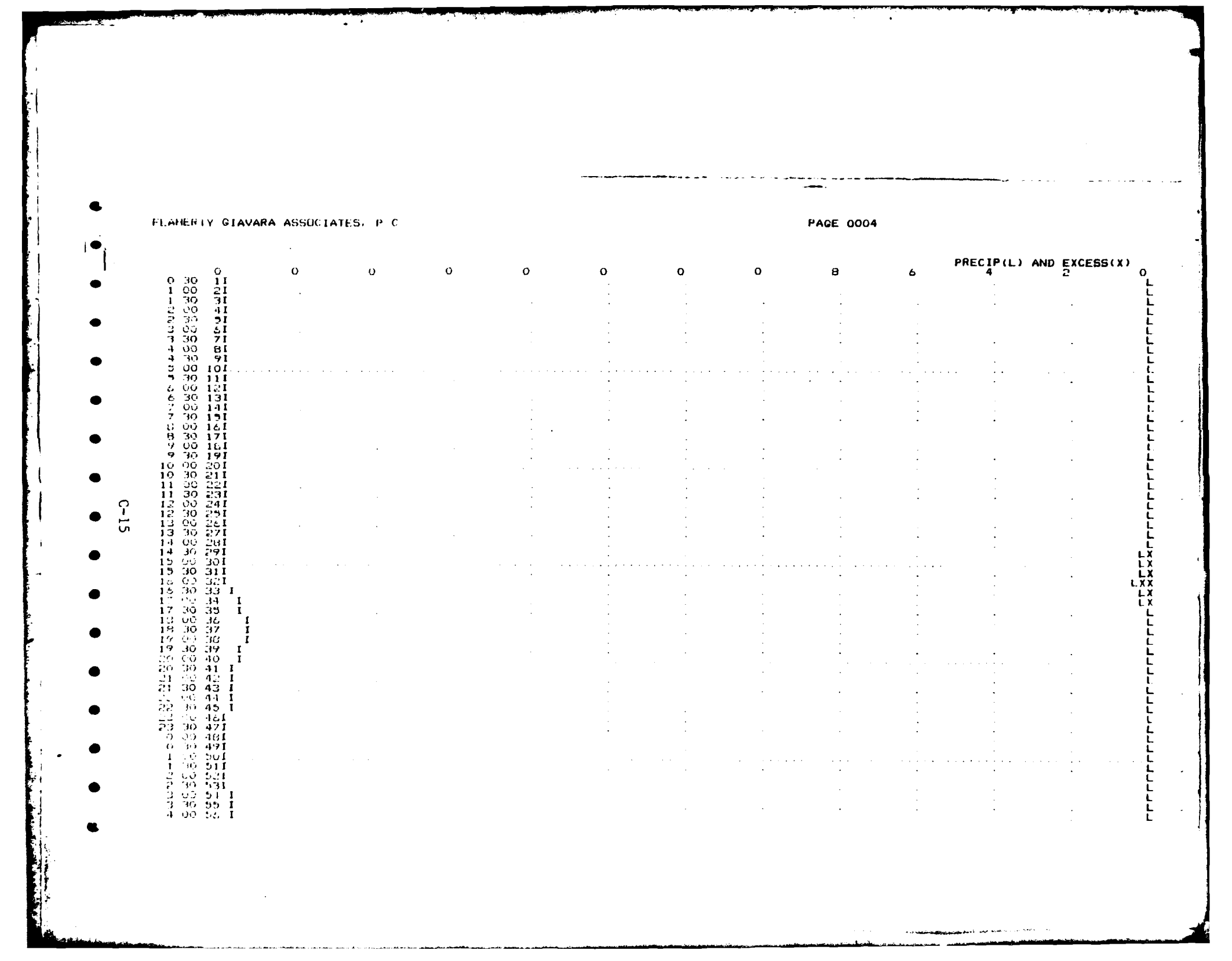
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2970	2106.	772.	328	39383
CMS	84	60	22	9	1115
INCHES		17 03	24 98	26 55	26 55
MM		432 67	634 52	674 31	674 31
AC-FT		1044	1531.	1627.	1627
THOUS CU M		1288	1889.	2007	2007

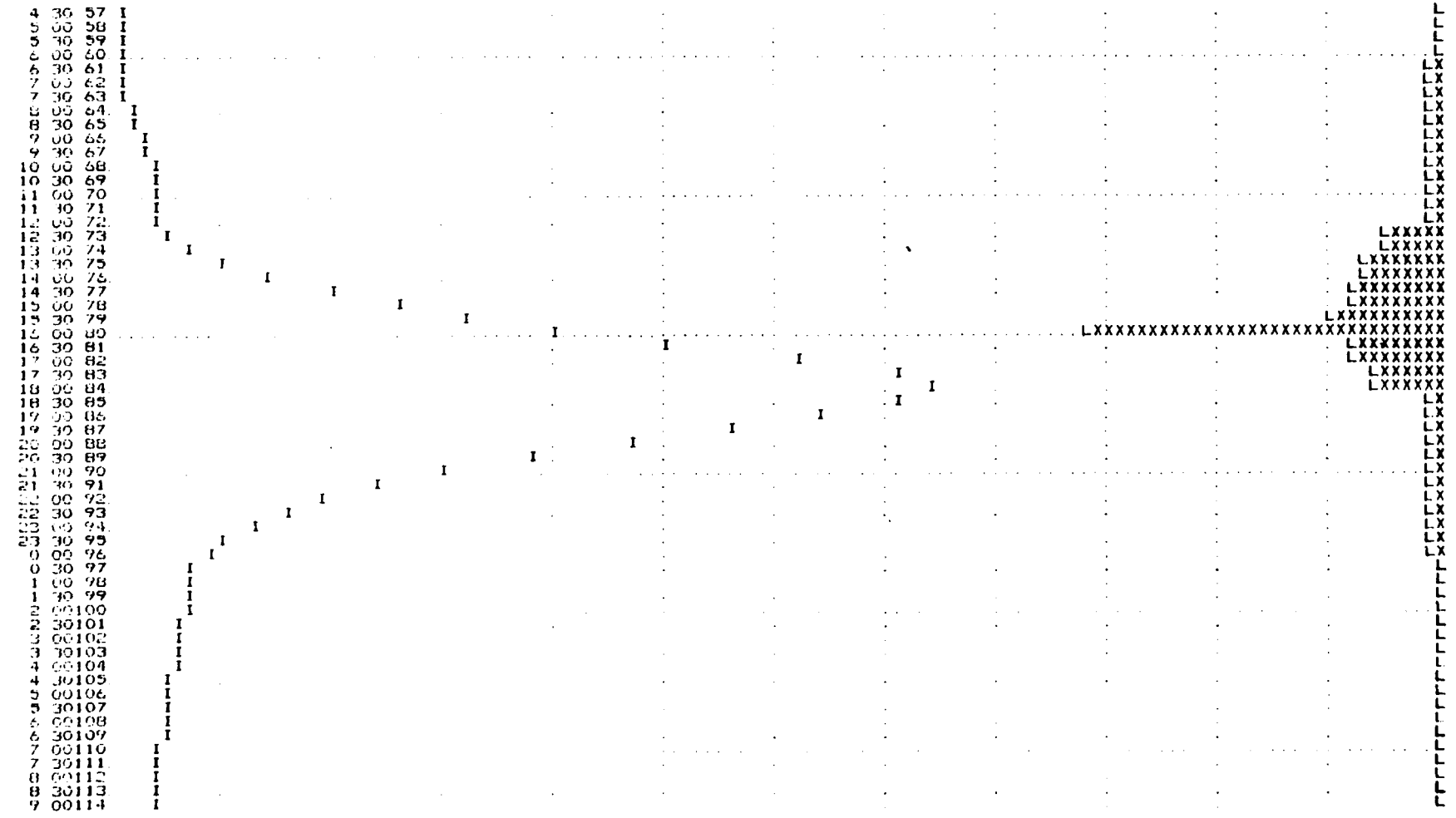
140M >

STATION 1

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

0 400 800 1200 1600 2000 2400 2800. 3200 0 0. 0 0


PRECIP(L) AND EXCESS(X)
0 0 0 0 0 0 0 0 8 6 4 2 0



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 9 00115    I
10 00116    I
10 00117    I
11 00118    I
11 00119    I
12 00120    I
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ROUTE*
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HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 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	1	3	6	9.	11.	11.	10	9	7
6	5	4	3	2.	2.	1.	1.	1.	1.
1	1	2	2	2	3.	3.	3	3	3
3	4	6	8.	10.	12.	14.	15	16.	17.
17	18	20	26	39.	58	80.	103.	127	158
202	248	283	297.	286.	257.	222.	186.	151.	120.
96	77	63	51	42.	35	30.	28.	27	26
25	24	23	22.	21.	21.	20.	19.	18.	17.
17	16	15	15.	14.	14.	13.	13	12	12

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	297.	211.	77.	33.	3938.
CMS	8	6.	2.	1.	112.
INCHES		1.70	2.50	2.65	2.65
MM		43.27	63.45	67.43	67.43
AC-FT		104.	153	163.	163.
THOUS CU M		129.	189	201	201

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

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	2	6	12.	18.	22.	22.	20	17.	14.
11	9	7	6	4.	3.	3.	2	2	2
2	3	3	4.	5.	5.	5.	6.	6.	6.
7	8	11	15	20.	24	27.	30	32	33
34	35	40	53	78.	115.	160.	207	253.	316.
403	495	566	594	571.	513	445.	372	301	241
192	155	125	102.	84.	69.	59.	57.	54.	52.
50	48	46	44	43.	41	39	38.	36	35.
33	32	31	30.	28.	27.	26.	25.	24	23.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	594	421	154.	66.	7877
CMS	17	12	4	2.	223
INCHES		3.41	5.00	5.31	5.31
MM		86.53	126.90	134.86	134.86
AC-FT		209	306.	325.	325.
THOUS CU M		258	378.	401.	401

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

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	3	9	18	27	33	33	30	26	21
17	14	11	8	7	5	4	3	3	3
3	4	5	6	7	8	8	8	9	9
10	12	17	23	30	36	41	44	47	50
52	53	59	79	117	173	240	310	380	474
605	743	848	891	857	770	667	558	452	361
289	232	188	153	125	104	89	85	82	78
73	72	69	67	64	62	59	57	54	52
50	48	46	44	43	41	39	38	36	35

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	891	632	232	98	11815
CMS	25	18	7	3	335
INCHES		5.11	7.49	7.96	7.96
MM		129.80	190.36	202.29	202.29
AC-FT		313	459	488	488
THOUS CU M		386	567	602	602

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

1	1	1	1	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	4	12	25	36	44	45	40	35	29
23	18	14	11	9	7	5	4	4	4
4	5	7	8	9	10	11	11	12	12
13	16	22	30	39	48	54	59	63	66
69	71	79	105	156	230	320	414	506	632
807	991	1131	1188	1142	1026	890	744	603	481
385	309	250	204	167	138	118	113	109	105
100	96	93	89	85	82	79	76	73	70
67	64	62	59	57	55	53	50	48	46

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1188	842	309	131	15753
CMS	34	24	9	4	446
INCHES		6.81	9.99	10.62	10.62
MM		173.07	253.81	269.72	269.72
AC-FT		418	613	651	651
THOUS CU M		515	756	803	803

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 5

1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	0	0	0	0	0	0	1	1
1	5	15	31	46	55	56	50	43	36
29	23	18	14	11	9	7	6	5	5
5	7	9	10	12	13	13	14	15	15
16	20	28	38	49	59	68	74	79	83
86	88	99	132	195	288	400	517	633	790
1008	1238	1414	1485	1428	1283	1112	930	754	601
481	387	313	254	209	173	148	142	136	131
126	121	116	111	107	103	98	95	91	87
84	80	77	74	71	68	66	63	61	58

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1485	1053.	386.	164.	19692.
CMS	42	30	11.	5.	558.
INCHES		8.52	12.49	13.27	13.27
MM		216.33	317.26	337.15	337.15
AC-FT		522.	766.	814.	814.
THOUS CU M		644.	944.	1004.	1004.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 6

1	1.	1	1.	1.	1.	1.	1.	1.	1.
1.	1	1	1.	1.	1.	1.	1.	1.	1.
1	1	1	1.	1.	1.	1.	1	1.	1
1	5	18	37.	55.	66.	67.	60.	52.	43.
34.	27	21	17.	13.	10.	8.	7.	6.	6.
6	8	10	12.	14.	15.	16.	17.	17.	18.
20	25	33	46	59.	71.	81	89	95	99
103	106	119	158	234.	346.	480.	621.	759.	948.
1210.	1486	1697	1782.	1713.	1540.	1335.	1116.	904.	722
577	464	375	305.	251.	208.	177.	170.	163.	157.
151	145	139	133	128.	123	118.	113.	109.	105.
100	96	93	89.	85.	82	79.	76.	73.	70.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1782.	1264	463.	197.	23630.
CMS	50.	36.	13.	6.	669.
INCHES		10.22	14.99	15.93	15.93
MM		259.60	380.71	404.59	404.59
AC-FT		627.	919.	976.	976.
THOUS CU M		773.	1133.	1204.	1204.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 7

2	1	1	1	1.	1.	1.	1.	1.	1.
1	1	1	1.	1.	1.	1.	1.	1.	1
1	1	1	1.	1.	1.	1.	1.	1.	1.
1	6	22	43.	64.	77	78.	70	60.	50.
40	32	25	20	15.	12.	10.	8.	7.	7.
7	9	12	14.	16.	18.	19.	20.	20	21.
23	29	39.	53	69.	83.	95.	104.	111.	116.
120	124	138	184	273.	403.	560	724	886.	1106.
1411	1734	1980	2079.	1999.	1796.	1557.	1302.	1055.	842.
673	541	438	356.	292.	242.	207.	199.	191.	183.
176	169	162	156.	149.	144.	138.	132.	127.	122.
117	113	108	104.	100.	96.	92.	88.	85	81.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2079	1474.	540.	230.	27568.
CMS	59	42	15	7	781
INCHES		11.92	17.49	18.58	18.58
MM		302.87	444.16	472.02	472.02
AC-FT		731.	1072.	1139.	1139.
THOUS CU M		902	1322.	1405	1405

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 8

2	2	2	2	2	1	1	1.	1	1

1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	7	25	49	73	88	89	80	69	57
46	36	28	22	18	14	11	9	9	8
8	11	14	16	19	20	21	22	23	24
26	33	45	61	79	95	108	118	126	133
138	141	158	211	313	461	640	828	1012	1264
1613	1982	2263	2376	2284	2053	1780	1488	1206	962
770	619	500	407	334	277	236	227	218	209
201	193	185	178	171	164	158	151	145	139
134	129	124	119	114	109	105	101	97	93

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2376	1685	618	263	31507
CMS	67	48	17	7	892
INCHES		13.63	19.98	21.24	21.24
MM		346.13	507.61	539.45	539.45
AC-FT		835	1225	1302	1302
THOUS CU M		1030	1511	1606	1606

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 9

2	2	2	2	2	2	2	2	2	2
2	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	9	31	62	91	110	112	100	86	71
57	45	35	28	22	17	14	11	11	10
10	13	17	21	23	26	27	28	29	30
33	41	56	76	99	119	135	148	158	166
172	177	198	263	391	576	800	1034	1266	1380
2016	2477	2828	2970	2855	2566	2225	1860	1527	1203
962	773	625	509	418	346	295	284	272	262
251	241	232	222	214	205	197	189	182	174
167	161	154	148	142	137	131	126	121	116

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2970	2106	772	328	39383
CMS	84	60	22	9	1115
INCHES		17.03	24.98	26.55	26.55
MM		432.67	634.52	674.31	674.31
AC-FT		1044	1531	1627	1627
THOUS CU M		1288	1889	2007	2007

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HYDROGRAPH ROUTING

RESERVOIR ROUTING MODIFIED PULS METHOD

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	1	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0 0	0 000	0 00	1	1	0	0		0
	NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT

3 0 0 0.000 0.000 0.000 0. -1

STAGE	102.00	103.50	104.00	108.60	110.10	111.20	112.10	114.10
FLOW	0.00	74.20	106.80	108.40	416.10	814.50	1396.80	3071.40
SURFACE AREA=	47.	65.	67.	71.	75.	77.	83.	83.
CAPACITY=	0	335	375	472.	559.	635.	779.	787.
ELEVATION=	102.	108.	109.	110.	111.	112.	114.	114.

CREL	SPWID	COGW	EXPW	ELEVL	COGL	CARBA	EXPL
108.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COGD	EXPD	DAMWID
114.1	2.5	1.5	263.

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

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.	1.	1.	1.	2.	2.	2.
3.	3.	3.	3.	3.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	3.	3.	3.	3.	4.	4.	5.	5.
6.	6.	7.	7.	8.	10.	13.	16.	20.	23.
31.	39.	48.	58.	67.	75.	84.	90.	94.	96.
97.	96.	95.	93.	90.	88.	85.	82.	79.	77.
74.	72.	70.	68.	67.	65.	63.	61.	60.	58.
56.	55.	53.	52.	50.	49.	47.	46.	45.	43.

STORAGE

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.	1.	1.	1.	2.	2.	2.
2.	3.	3.	3.	3.	3.	3.	3.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	3.	3.	3.	4.	4.	4.	5.
5.	6.	6.	7.	8.	10.	12.	15.	19.	24.
30.	38.	47.	57.	67.	75.	82.	86.	90.	91.
92.	91.	90.	89.	87.	85.	83.	80.	78.	76.
74.	72.	70.	68.	66.	64.	62.	61.	59.	57.
56.	54.	52.	51.	49.	48.	46.	45.	44.	42.

STAGE

102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0

102.0	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1
102.1	102.1	102.1	102.1	102.2	102.2	102.3	102.3	102.4	102.5
102.6	102.8	103.0	103.2	103.4	103.5	103.6	103.7	103.8	103.8
103.8	103.8	103.8	103.8	103.7	103.7	103.7	103.6	103.6	103.5
103.5	103.5	103.4	103.4	103.3	103.3	103.3	103.2	103.2	103.2
103.1	103.1	103.1	103.0	103.0	103.0	103.0	102.9	102.9	102.9

PEAK OUTFLOW IS 97 AT TIME 45.50 HOURS

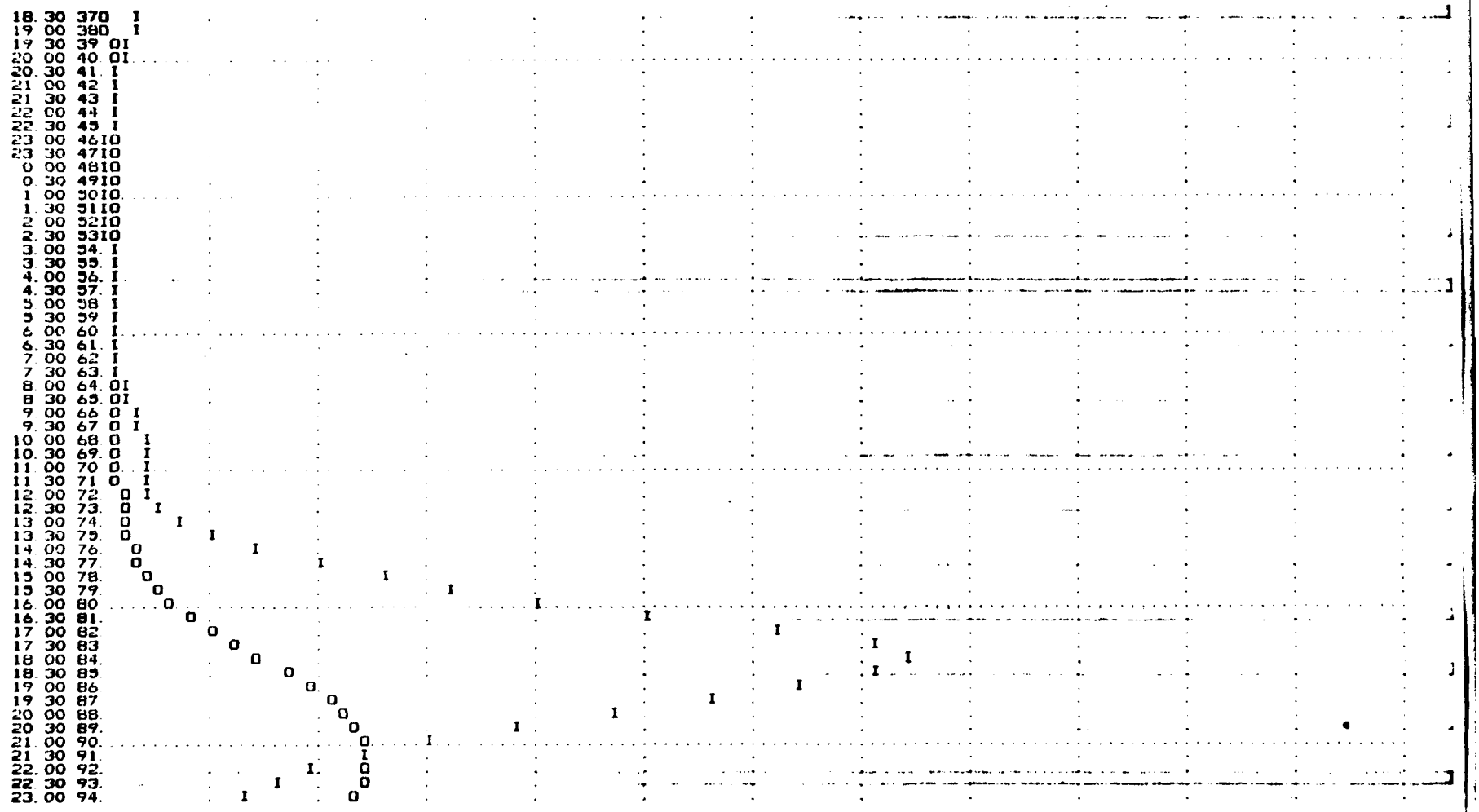
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	97.	91.	58.	24.	2912.
CMS	3.	3.	2.	1.	82.
INCHES		0.73	1.89	1.96	1.96
MM		18.60	48.04	49.85	49.85
AC-FT		45.	116.	120.	120.
THOUS CU M		55.	143.	148.	148.

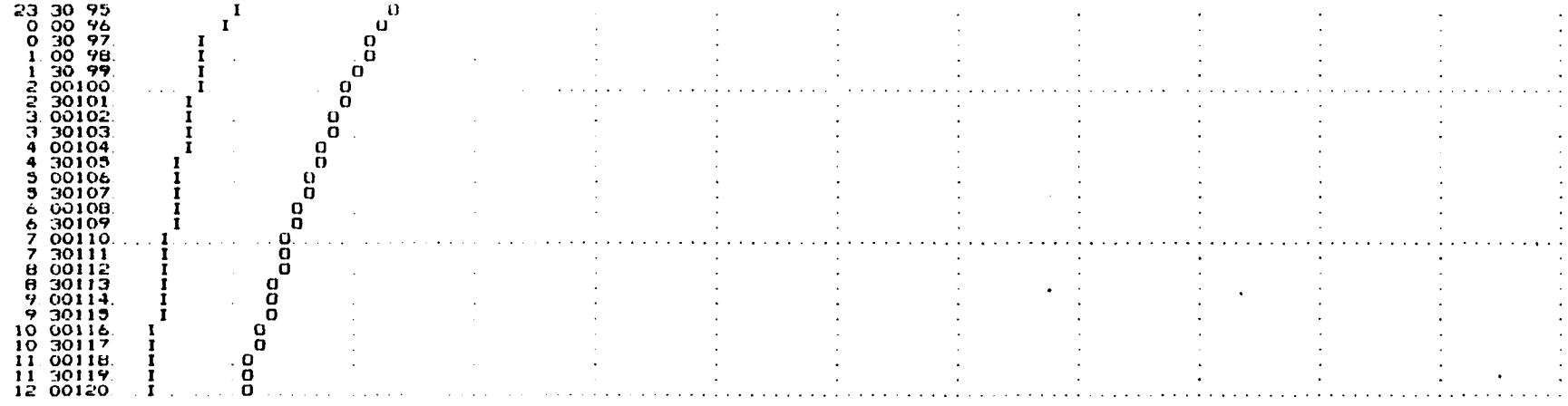
1*OVF*

STATION 1

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

	0	40.	80.	120	160	200.	240.	280.	320.	0.	0.	0.	0.
0 30	1I												
1 00	2I												
1 30	3I												
2 00	4I												
2 30	5I												
3 00	6I												
3 30	7I												
4 00	8I												
4 30	9I												
5 00	10I												
5 30	11I												
6 00	12I												
6 30	13I												
7 00	14I												
7 30	15I												
8 00	16I												
8 30	17I												
9 00	18I												
9 30	19I												
10 00	20I												
10 30	21I												
11 00	22I												
11 30	23I												
12 00	24I												
12 30	25I												
13 00	26I												
13 30	27I												
14 00	28I												
14 30	29I												
15 00	30I												
15 30	31I												
16 00	32I												
16 30	330I												
17 00	340 I												
17 30	350 I												
18 00	360 I												


18 30 370 I
19 00 380 I
19 30 39 OI
20 00 40 OI
20 30 41 I
21 00 42 I
21 30 43 I
22 00 44 I
22 30 45 I
23 00 4610
23 30 4710
0 00 4810
0 30 4910
1 00 5010
1 30 5110
2 00 5210
2 30 5310
3 00 54 I
3 30 55 I
4 00 56 I
4 30 57 I
5 00 58 I
5 30 59 I
6 00 60 I
6 30 61 I
7 00 62 I
7 30 63 I
8 00 64 OI
8 30 65 OI
9 00 66 O I
9 30 67 O I
10 00 68 O I
10 30 69 O I
11 00 70 O I
11 30 71 O I
12 00 72 O I
12 30 73 O I
13 00 74 O I
13 30 75 O I
14 00 76 O I
14 30 77 O I
15 00 78 O I
15 30 79 O I
16 00 80 O I
16 30 81 O I
17 00 82 O I
17 30 83 O I
18 00 84 O I
18 30 85 O I
19 00 86 O I
19 30 87 O I
20 00 88 O I
20 30 89 O I
21 00 90 O I
21 30 91 I
22 00 92 I O
22 30 93 I O
23 00 94 I O



1*DVN*

STATION 1, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

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.	1.	1.	2.	3.	4.	4.	5.
5.	5.	6.	6.	6.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	6.	7.	7.	8.	9.	10.
11.	12.	13.	15.	17.	20.	25.	31.	39.	49.
62.	78.	101.	107.	107.	107.	107.	107.	107.	107.
107.	107.	107.	107.	107.	107.	107.	107.	107.	107.
107.	107.	107.	107.	107.	107.	107.	107.	107.	107.
107.	107.	107.	107.	107.	107.	107.	107.	107.	107

STORAGE

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.	1.	1.	2.	3.	4.	4.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	4.	4.	4.	4.	4.	5.	5.	5.
5.	5.	5.	5.	6.	6.	7.	8.	9.	10.
11.	12.	13.	14.	16.	19.	24.	31.	39.	48.

61	77.	95.	115.	134.	152.	168.	180.	190.	196.
201	204	205	205.	205.	203.	201.	199.	197.	195.
193	190	188	185	183.	180.	177.	174.	171.	168.
165	162.	159	156.	153.	150.	146.	143.	140	136.

STAGE

102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.1	102.1	102.1	102.1
102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1
102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1
102.1	102.1	102.1	102.1	102.1	102.1	102.2	102.2	102.2	102.2
102.2	102.2	102.3	102.3	102.3	102.4	102.5	102.6	102.8	103.0
103.2	103.6	103.9	104.3	104.6	105.0	105.2	105.5	105.6	105.7
105.8	105.9	105.9	105.9	105.9	105.9	105.8	105.8	105.8	105.7
105.7	105.6	105.6	105.5	105.5	105.5	105.4	105.4	105.3	105.3
105.2	105.1	105.1	105.0	105.0	104.9	104.9	104.8	104.7	104.7

PEAK OUTFLOW IS 107. AT TIME 47.00 HOURS

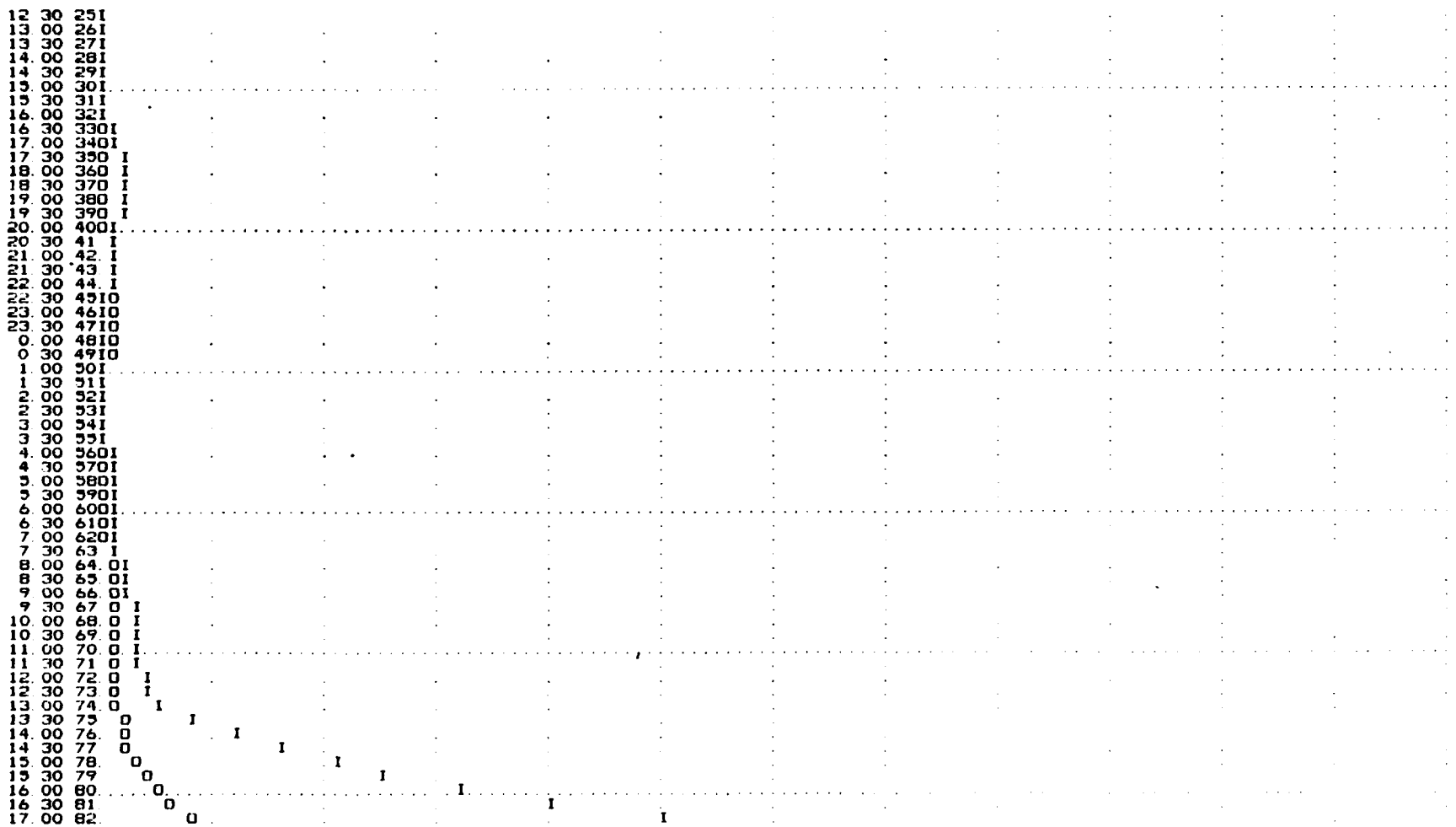
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	107.	107.	91.	38.	4583.
CMS	3	3.	3.	1	130.
INCHES		0.87	2.95	3.09	3.09
MM		22.07	74.85	78.47	78.47
AC-FT		53.	181.	189.	189.
THOUS CU M		66.	223.	234.	234.

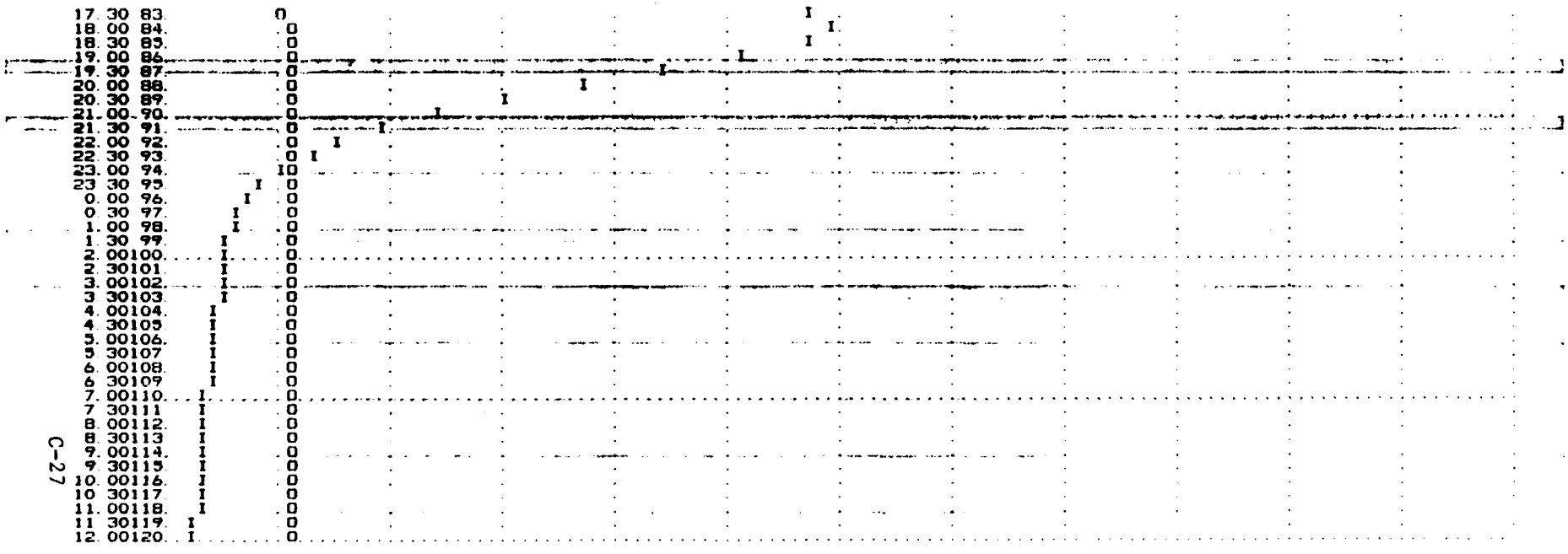
1*OVF*

STATION 1

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

	0	100.	200.	300	400.	500.	600.	0.	0.	0.	0.	0.	0
0 30	1I												
1 00	2I												
1 30	3I												
2 00	4I												
2 30	5I												
3 00	6I												
3 30	7I												
4 00	8I												
4 30	9I												
5 00	10I												
5 30	11I												
6 00	12I												
6 30	13I												
7 00	14I												
7 30	15I												
8 00	16I												
8 30	17I												
9 00	18I												
9 30	19I												
10 00	20I												
10 30	21I												
11 00	22I												
11 30	23I												
12 00	24I												


12 30 25I
13 00 26I
13 30 27I
14 00 28I
14 30 29I
15 00 30I
15 30 31I
16 00 32I
16 30 330I
17 00 340I
17 30 350 I
18 00 360 I
18 30 370 I
19 00 380 I
19 30 390 I
20 00 400I
20 30 41 I
21 00 42 I
21 30 43 I
22 00 44 I
22 30 4510
23 00 4610
23 30 4710
0 00 4810
0 30 4910
1 00 50I
1 30 51I
2 00 52I
2 30 53I
3 00 54I
3 30 55I
4 00 560I
4 30 570I
5 00 580I
5 30 590I
6 00 600I
6 30 610I
7 00 620I
7 30 63 I
8 00 64 0I
8 30 65 0I
9 00 66 0I
9 30 67 0 I
10 00 68 0 I
10 30 69 0 I
11 00 70 0 I
11 30 71 0 I
12 00 72 0 I
12 30 73 0 I
13 00 74 0 I
13 30 75 0 I
14 00 76 0 I
14 30 77 0 I
15 00 78 0 I
15 30 79 0 I
16 00 80 0 I
16 30 81 0 I
17 00 82 0 I



1*OVN*

STATION 1, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

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	1	1	2	3	4	6	7	7
8	8	8	8	8	8	8	8	8	7
7	7	7	7	7	7	7	7	7	7
7	7	8	8	9	10	11	12	14	15
17	18	20	22	25	30	37	47	59	73
96	107	107	107	107	108	108	108	108	108
108	108	108	108	108	108	108	108	108	108

108	108	108	108	108	108	108	108	108	108
108	108	108	108	108	108	108	108	108	108

STORAGE

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	1	1	2	3	4	5	6	7
7	8	8	8	8	8	8	8	7	7
7	7	7	7	7	7	7	7	7	7
7	7	7	8	9	10	11	12	13	15
16	18	19	21	24	29	36	46	58	73
92	115	144	175	207	236	261	282	299	311
320	326	330	333	334	334	334	333	332	331
330	328	327	325	323	321	319	317	315	313
311	308	306	303	300	298	295	292	289	286

STAGE

102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.1	102.1	102.1	102.1	102.1
102.2	102.2	102.2	102.2	102.2	102.2	102.2	102.2	102.2	102.2
102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1
102.1	102.2	102.2	102.2	102.2	102.2	102.2	102.3	102.3	102.3
102.3	102.4	102.4	102.4	102.5	102.6	102.8	102.9	103.2	103.5
103.8	104.3	104.8	105.4	105.9	106.4	106.8	107.2	107.4	107.6
107.8	107.9	107.9	108.0	108.0	108.0	108.0	108.0	107.9	107.9
107.9	107.9	107.9	107.8	107.8	107.8	107.8	107.7	107.7	107.6
107.6	107.6	107.5	107.5	107.5	107.4	107.4	107.3	107.3	107.2

PEAK OUTFLOW IS 108. AT TIME 48.00 HOURS

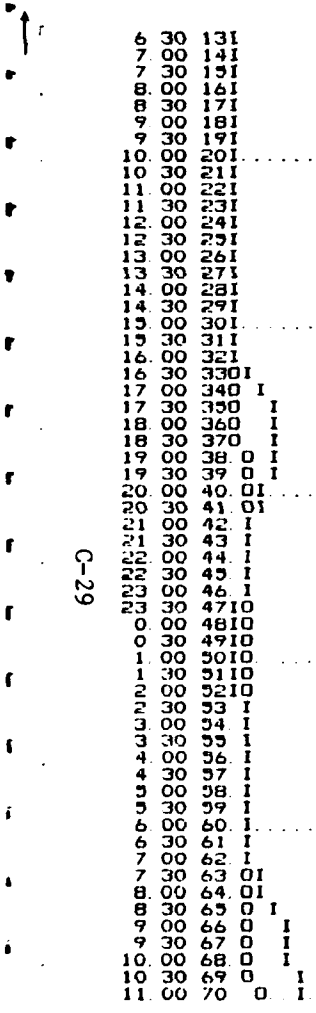
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	108	108	95.	41.	4892.
CMS	3	3.	3.	1.	139.
INCHES		0.87	3.08	3.30	3.30
MM		22.22	78.33	83.76	83.76
AC-FT		54	189.	202	202
THOUS CU M		66.	233.	249.	249.

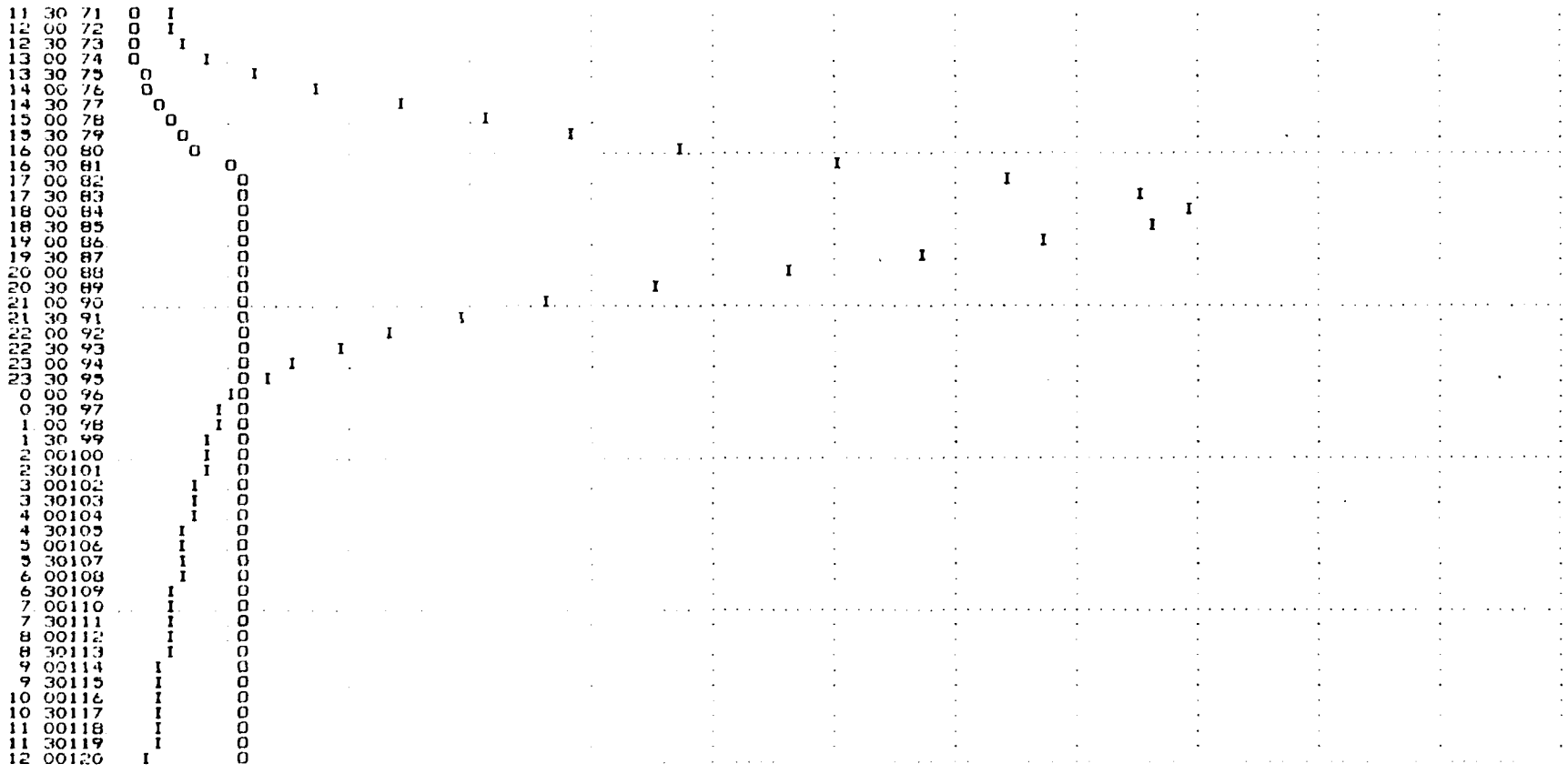
1*OVF*

STATION 1

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

	0	100	200	300	400	500	600	700	800	900	0	0	0
0 30	1I												
1 00	2I												
1 30	3I												
2 00	4I												
2 30	5I												
3 00	6I												
3 30	7I												
4 00	8I												
4 30	9I												
5 00	10I												
5 30	11I												
6 00	12I												


6 30 13I
7 00 14I
7 30 15I
8 00 16I
8 30 17I
9 00 18I
9 30 19I
10 00 20I
10 30 21I
11 00 22I
11 30 23I
12 00 24I
12 30 25I
13 00 26I
13 30 27I
14 00 28I
14 30 29I
15 00 30I
15 30 31I
16 00 32I
16 30 33OI
17 00 340 I
17 30 350 I
18 00 360 I
18 30 370 I
19 00 38 0 I
19 30 39 0 I
20 00 40 0I
20 30 41 0I
21 00 42 I
21 30 43 I
22 00 44 I
22 30 45 I
23 00 46 I
23 30 47IO
0 00 48IO
0 30 49IO
1 00 50IO
1 30 51IO
2 00 52IO
2 30 53 I
3 00 54 I
3 30 55 I
4 00 56 I
4 30 57 I
5 00 58 I
5 30 59 I
6 00 60 I
6 30 61 I
7 00 62 I
7 30 63 0I
8 00 64 0I
8 30 65 0 I
9 00 66 0 I
9 30 67 0 I
10 00 68 0 I
10 30 69 0 I
11 00 70 0 I



11	30	71	0
12	00	72	0
12	30	73	0
13	00	74	0
13	30	75	0
14	00	76	0
14	30	77	0
15	00	78	0
15	30	79	0
16	00	80	0
16	30	81	0
17	00	82	0
17	30	83	0
18	00	84	0
18	30	85	0
19	00	86	0
19	30	87	0
20	00	88	0
20	30	89	0
21	00	90	0
21	30	91	0
22	00	92	0
22	30	93	0
23	00	94	0
23	30	95	0
0	00	96	0
0	30	97	0
1	00	98	0
1	30	99	0
2	00	100	0
2	30	101	0
3	00	102	0
3	30	103	0
4	00	104	0
4	30	105	0
5	00	106	0
5	30	107	0
6	00	108	0
6	30	109	0
7	00	110	0
7	30	111	0
8	00	112	0
8	30	113	0
9	00	114	0
9	30	115	0
10	00	116	0
10	30	117	0
11	00	118	0
11	30	119	0
12	00	120	0

1*OVN*

STATION 1, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

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	1	2	3.	4	6	8	9	10.
10	11	11	11	11.	11.	11.	10.	10.	10.
10	10	9	9.	9.	9	9.	9.	9.	10.
10	10	10.	11.	12.	13.	15.	17.	18.	20.
22	24	26	29	33.	40	49.	62	78	103.
107	107	107	108	108.	108.	108.	141.	204.	243
265	275	275	270.	260.	247	234.	220.	207	196.
185	175.	165	156.	148.	141.	133.	127.	121.	115.
109	108	108	108	108.	108	108.	108	108	108

STORAGE

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.	1	1.	3.	4.	6.	7	8.	9
10.	10.	11.	11.	11.	10.	10.	10.	10.	10.
9	9	9	9	9.	9	9.	9	9.	9
9	10	10	11.	12.	13.	14.	16.	18.	20.
22	24.	26	28.	32.	39.	48.	61.	77.	97
122.	155.	195.	238.	282.	322.	357.	386.	407.	420.
427	430	430	429	425.	421.	416.	412	408.	404
400.	397	394.	391.	388.	386.	383.	381.	379.	377.
375	374.	372	370.	368.	366.	363.	361.	358.	356.

STAGE

102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 1	102 1	102 1	102 2	102 2	102 2
102 2	102 2	102 2	102 2	102 2	102 2	102 2	102 2	102 2	102 2
102 2	102 2	102 2	102 2	102 2	102 2	102 2	102 2	102 2	102 2
102 2	102 2	102 2	102 2	102 2	102 3	102 3	102 3	102 4	102 4
102 5	102 5	102 5	102 6	102 7	102 8	103 0	103 3	103 6	103 9
104 4	105 0	105 7	106 4	107 2	107 8	108 3	108 8	109 1	109 3
109 4	109 4	109 4	109 4	109 3	109 3	109 2	109 1	109 1	109 0
109 0	108 9	108 9	108 8	108 8	108 8	108 7	108 7	108 7	108 6
108 6	108 6	108 5	108 5	108 5	108 5	108 4	108 4	108 4	108 3

PEAK OUTFLOW IS 275. AT TIME 46.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	275.	240.	140.	60.	7140.
CMS	8.	7.	4.	2.	202.
INCHES		1.94	4.53	4.81	4.81
MM		49.40	115.01	122.25	122.25
AC-FT		119.	278.	295.	295.
THOUS CU M		147.	342.	364.	364.

1*OVF*

STATION 1

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

0. 200. 400. 600. 800. 1000. 1200. 0. 0. 0. 0. 0. 0.

```
 0 30  1I
 1 00  2I
 1 30  3I
 2 00  4I
 2 30  5I
 3 00  6I
 3 30  7I
 4 00  8I
 4 30  9I
 5 00 10I
 5 30 11I
 6 00 12I
 6 30 13I
 7 00 14I
 7 30 15I
 8 00 16I
 8 30 17I
 9 00 18I
 9 30 19I
10 00 20I
10 30 21I
11 00 22I
11 30 23I
12 00 24I
12 30 25I
13 00 26I
13 30 27I
14 00 28I
14 30 29I
15 00 30I
15 30 31I
16 00 32I
16 30 3301
17 00 3401
17 30 350 I
18 00 360 I
18 30 370 I
19 00 380 I
19 30 390 I
20 00 4001
20 30 41 I
21 00 42 I
21 30 43 I
22 00 44 I
22 30 4510
23 00 4610
23 30 4710
 0 00 4810
 0 30 4910
 1 00 501
 1 30 511
 2 00 521
 2 30 531
 3 00 541
 3 30 551
 4 00 5601
 4 30 9701
 5 00 5801
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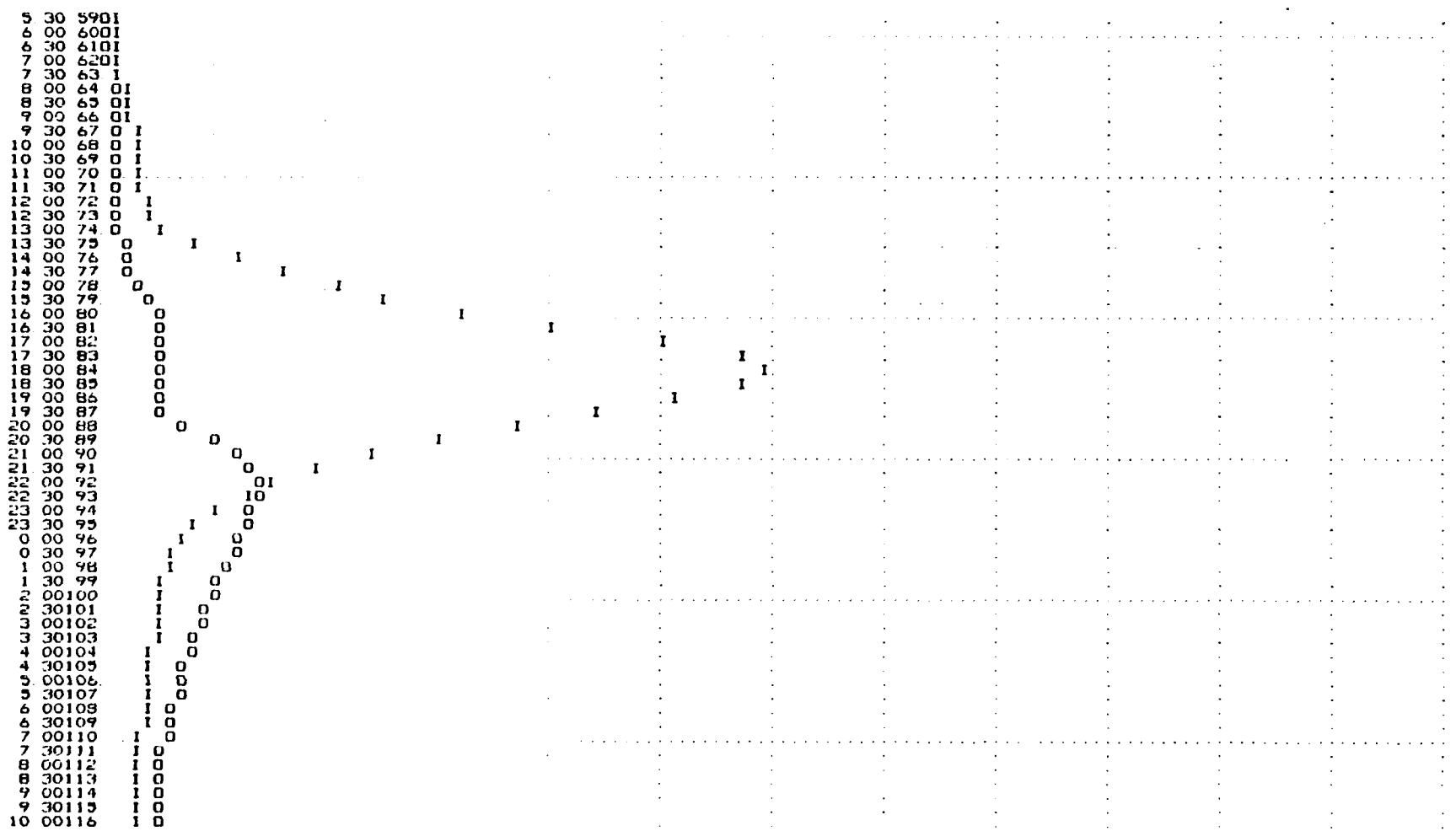
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6 30 610I
7 00 620I
7 30 63 I
8 00 64 OI
8 30 65 OI
9 00 66 OI
9 30 67 O I
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10 30 69 O I
11 00 70 O I
11 30 71 O I
12 00 72 O I
12 30 73 O I
13 00 74 O I
13 30 75 O I
14 00 76 O I
14 30 77 O I
15 00 78 O I
15 30 79 O I
16 00 80 O I
16 30 81 O I
17 00 82 O I
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18 30 85 O I
19 00 86 O I
19 30 87 O I
20 00 88 O I
20 30 89 O I
21 00 90 O I
21 30 91 O I
22 00 92 OI
22 30 93 IO
23 00 94 I O
23 30 95 I O
0 00 96 I O
0 30 97 I O
1 00 98 I O
1 30 99 I O
2 00100 I O
2 30101 I O
3 00102 I O
3 30103 I O
4 00104 I O
4 30105 I O
5 00106 I O
5 30107 I O
6 00108 I O
6 30109 I O
7 00110 I O
7 30111 I O
8 00112 I O
8 30113 I O
9 00114 I O
9 30115 I O
10 00116 I O

10.30117 I O
11.00118 I O
11.30119 I O
12.00120 I O

1*OVN*

STATION 1, PLAN 1, RATIO 5

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

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	1	1	2	3	5	7	9	11	12
13	14	14	14	14	14	13	13	13	12
12	12	12	12	12	12	12	12	12	12
12	12	13	14	15	17	19	21	23	25
28	30	33	36	41	49	61	78	103	107
107	107	108	108	108	206	321	400	473	511
517	501	473	437	406	381	356	332	310	290
271	254	239	224	211	198	187	176	166	157
149	141	134	127	120	114	109	108	108	108

STORAGE

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	1	1	2	3	5	7	9	11	12
12	13	13	13	13	13	13	13	12	12
12	11	11	11	11	11	11	11	11	12
12	12	12	13	14	16	18	20	22	25
27	29	32	35	40	49	60	77	97	122
154	196	247	302	358	407	446	473	490	498
499	496	490	483	475	467	458	450	442	436
429	423	418	413	409	405	401	397	394	391
388	386	383	381	379	377	375	373	371	369

STAGE

102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 1	102 1	102 2	102 2	102 2	102 2
102 3	102 3	102 3	102 3	102 3	102 3	102 3	102 3	102 3	102 3
102 2	102 2	102 2	102 2	102 2	102 2	102 2	102 2	102 2	102 2
102 2	102 3	102 3	102 3	102 3	102 3	102 4	102 4	102 5	102 5
102 6	102 6	102 7	102 7	102 8	103 0	103 2	103 6	103 9	104 4
105 0	105 7	106 6	107 5	108 3	109 1	109 6	110 0	110 3	110 4
110 4	110 3	110 3	110 2	110 0	109 9	109 8	109 7	109 6	109 5
109 4	109 3	109 2	109 2	109 1	109 0	109 0	108 9	108 9	108 8
108 8	108 8	108 7	108 7	108 7	108 6	108 6	108 6	108 5	108 5

PEAK OUTFLOW IS 517 AT TIME 45 50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME

CFS	517	425	213.	90.	10754.
CMS	15	12	6	3	305.
INCHES		3 44	6 89	7 25	7 25
MM		87 39	175.09	184 13	184 13
AC-FT		211	423.	444.	444.
THOUS CU M		260	521.	548.	548.

1*DVF*

STATION 1

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

0 200 400 600 800 1000 1200 1400. 1600. 0. 0. 0. 0.

0 30 1I
1 00 2I
1 30 3I
2 00 4I
2 30 5I
3 00 6I
3 30 7I
4 00 8I
4 30 9I
5 00 10I
5 30 11I
6 00 12I
6 30 13I
7 00 14I
7 30 15I
8 00 16I
8 30 17I
9 00 18I
9 30 19I
10 00 20I
10 30 21I
11 00 22I
11 30 23I
12 00 24I
12 30 25I
13 00 26I
13 30 27I
14 00 28I
14 30 29I
15 00 30I
15 30 31I
16 00 32I
16 30 33OI
17 00 34O I
17 30 35O I
18 00 36O I
18 30 37O I
19 00 38O I
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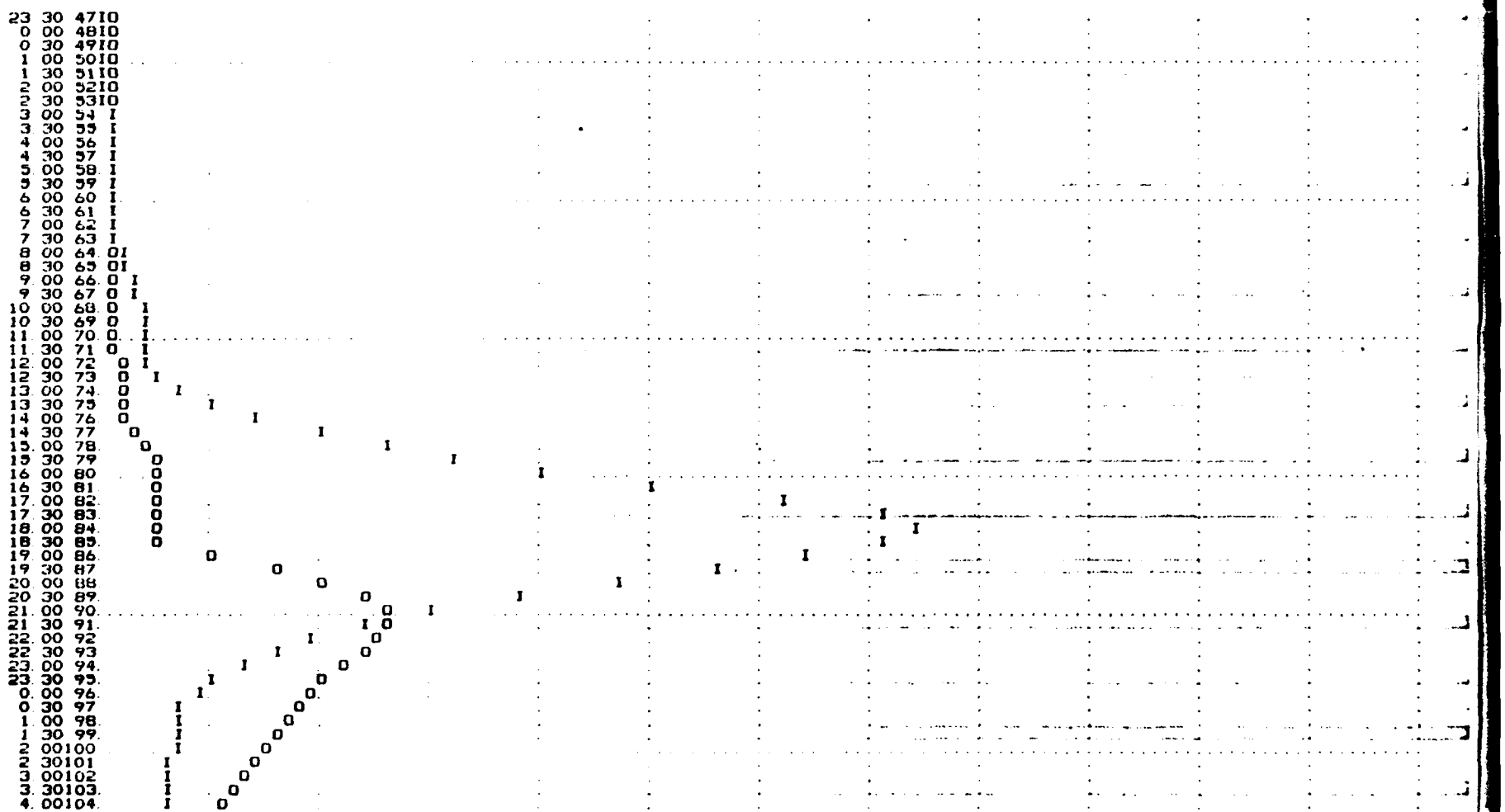
20 00 40 OI
20 30 41 I
21 00 42 I
21 30 43 I
22 00 44 I
22 30 45 I
23 00 46OI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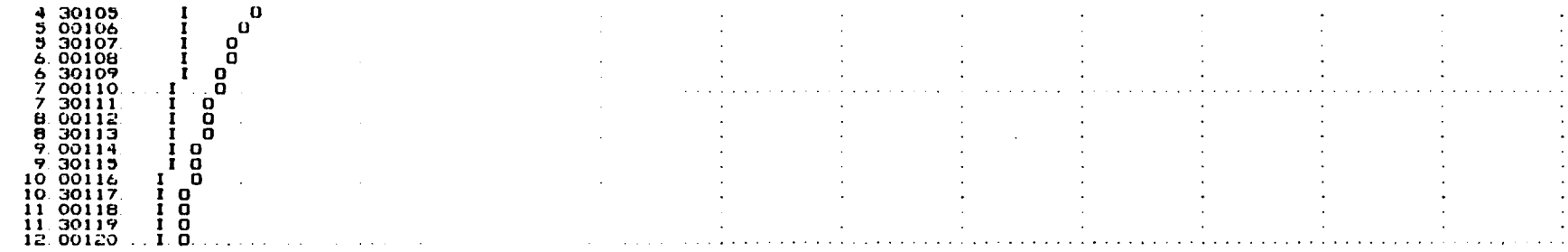
0 30 49I0
1 00 50I0
1 30 51I0
2 00 52I0
2 30 53I0
3 00 54 I
3 30 55 I
4 00 56 I
4 30 57 I
5 00 58 I
5 30 59 I
6 00 60 I
6 30 61 I
7 00 62 I
7 30 63 I
8 00 64 OI
8 30 65 OI
9 00 66 O I
9 30 67 O I
10 00 68 O I
10 30 69 O I
11 00 70 O. I
11 30 71 O I
12 00 72 O I
12 30 73 O I
13 00 74 O I
13 30 75 O I
14 00 76 O I
14 30 77 O I
15 00 78 O I
15 30 79 O I
16 00 80 O I
16 30 81 O I
17 00 82 O I
17 30 83 O I
18 00 84 O I
18 30 85 O I
19 00 86 O I
19 30 87 O I
20 00 88 O I
20 30 89 O I
21 00 90 O I
21 30 91 I O
22 00 92 I O
22 30 93 I O
23 00 94 I O
23 30 95 I O
0 00 96 I O
0 30 97 I O
1 00 98 I O
1 30 99 I O
2 00100 I O
2 30101 I O
3 00102 I O
3 30103 I O
4 00104 I O



1*OVN*

STATION 1, PLAN 1, RATIO 6

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0	0	0	0	0.	0.	0.	0.	0.	0.
0.	0	0	0	0.	0.	1.	1.	1.	1.
1.	1	1	1	1.	1.	1.	1.	1.	1.
1	1	1	2	4.	6.	9.	11.	13.	15.
16	16	17	17	17.	16.	16.	16.	15.	15.
15	14	14	14	14.	14.	14.	14.	14.	14.
15.	15	15.	16.	18.	20.	22.	25.	28.	30.
33	36	39	43	49.	59.	73.	97.	107.	107.
107	108	108	108.	278.	441.	628.	738.	788.	793.
766	721	666	605.	544.	485.	430.	395.	370.	346.
324	304	285	268.	252.	238.	224.	211.	200.	189.
179	169	160	152.	145.	137.	131.	124.	118.	113.

STORAGE

0	0	0	0.	0.	0.	0.	0.	0.	0.
0	0	0	0	0.	0.	0.	0	0	1.
1	1	1	1.	1.	1.	1.	1.	1.	1.
1	1	1	2.	4.	6	9	11.	13.	14.
15	16	16	16.	16.	16.	15.	15.	15.	14.
14	14	14	13	13.	13	13	14	14	14.
14	14	15	16	17.	19.	22.	24.	27.	30.
32	35	38	42.	49.	58	73	92.	116	147.
187	238	300	367.	431.	484.	521.	543.	554.	555.
549	540	529	517.	504.	492	482.	472.	463	455.
447	440	434	428.	423.	418.	413.	409.	405.	402.
398	395	392	389.	387	385.	382.	380.	378.	377.

STAGE

102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 1	102 1	102 2	102 2	102 3	102 3

102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3
102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3
102.3	102.3	102.3	102.3	102.4	102.4	102.4	102.5	102.6	102.6
102.7	102.7	102.8	102.9	103.0	103.2	103.5	103.8	104.3	104.9
105.6	106.5	107.4	108.5	109.4	110.2	110.7	111.0	111.1	111.1
111.1	110.9	110.8	110.6	110.5	110.3	110.1	110.0	109.9	109.8
109.7	109.6	109.5	109.4	109.3	109.2	109.2	109.1	109.0	109.0
108.9	108.9	108.9	108.8	108.8	108.7	108.7	108.7	108.6	108.6

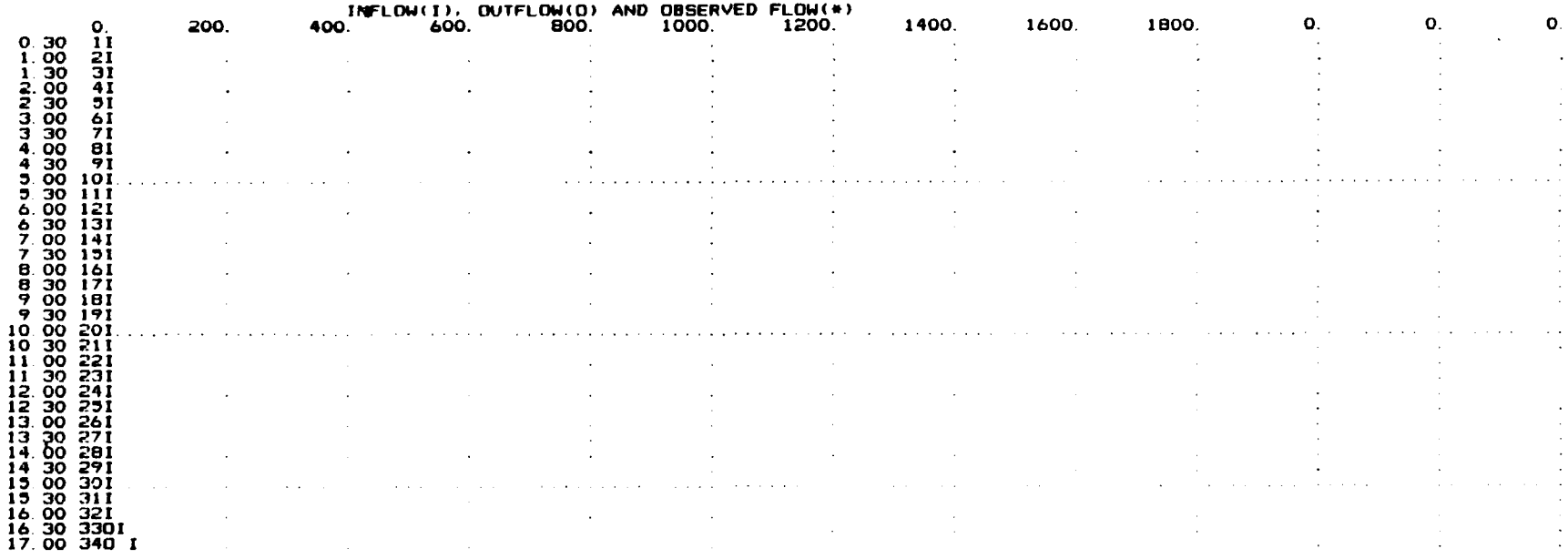
PEAK OUTFLOW IS 793. AT TIME 45.00 HOURS

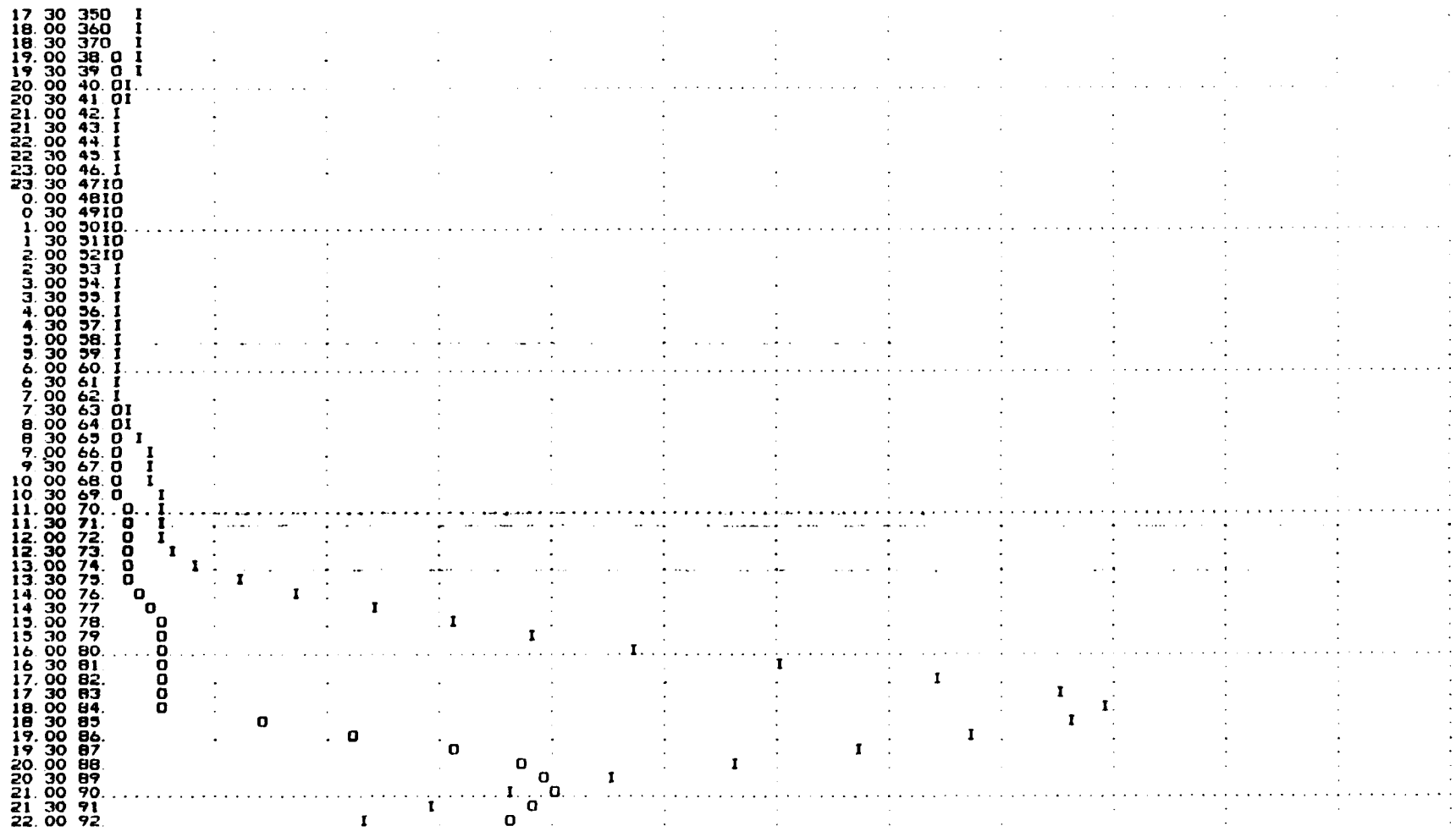
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	793	632	289.	121.	14520.
CMS	22.	18.	8.	3.	411.
INCHES		5.11	9.36	9.79	9.79
MM		129.83	237.76	248.60	248.60
AC-FT		313.	574.	600.	600
THOUS CU M		386.	708.	740.	740

1*OVF*

STATION 1

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

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18 00 360 I
18 30 370 I
19 00 38 0 I
19 30 39 0 I
20 00 40 0I
20 30 41 0I
21 00 42 I
21 30 43 I
22 00 44 I
22 30 45 I
23 00 46 I
23 30 47 I0
0 00 48 I0
0 30 49 I0
1 00 50 I0
1 30 51 I0
2 00 52 I0
2 30 53 I
3 00 54 I
3 30 55 I
4 00 56 I
4 30 57 I
5 00 58 I
5 30 59 I
6 00 60 I
6 30 61 I
7 00 62 I
7 30 63 0I
8 00 64 0I
8 30 65 0 I
9 00 66 0 I
9 30 67 0 I
10 00 68 0 I
10 30 69 0 I
11 00 70 0 I
11 30 71 0 I
12 00 72 0 I
12 30 73 0 I
13 00 74 0 I
13 30 75 0 I
14 00 76 0 I
14 30 77 0 I
15 00 78 0 I
15 30 79 0 I
16 00 80 0 I
16 30 81 0 I
17 00 82 0 I
17 30 83 0 I
18 00 84 0 I
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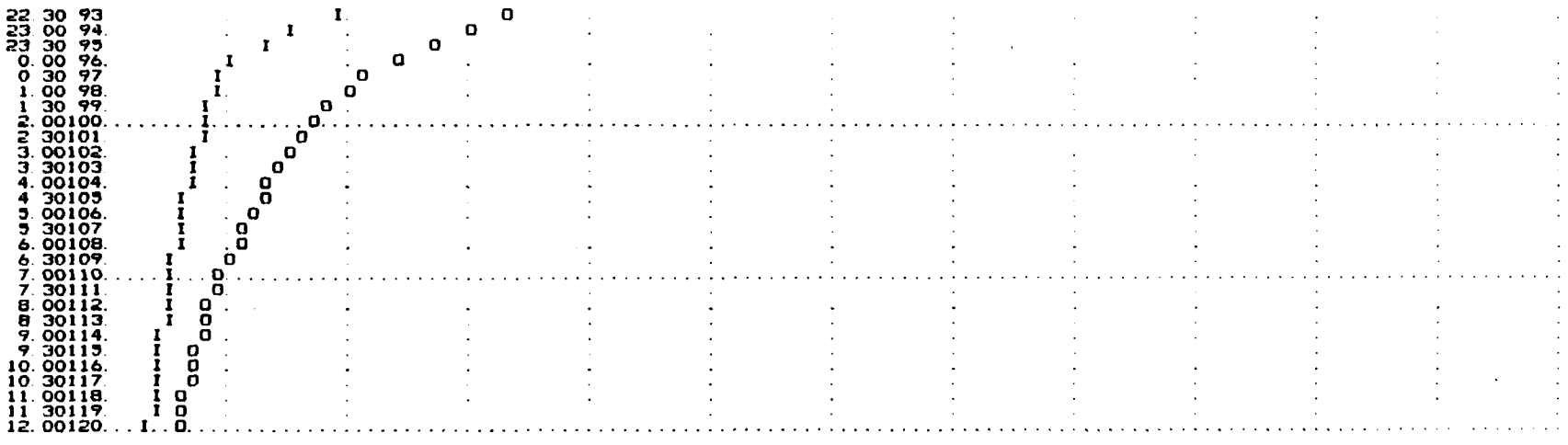
19 30 87 0 I
20 00 88 0 I
20 30 89 0 I
21 00 90 0 I
21 30 91 0 I
22 00 92 0 I



1*DVN*

STATION 1, PLAN 1, RATIO 7

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0	0	0	0	0	0	0	0	0	0
0	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	3	5	8	10	13	15	17
18	19	19	19	19	19	19	18	18	17
17	17	16	16	16	16	16	16	17	17
17	17	18	19	21	23	26	29	32	35
39	42	46	50	57	69	88	107	107	107
108	108	108	272	510	767	1011	1137	1149	1089
990	874	780	710	639	569	505	448	407	382
359	338	318	300	283	267	253	239	226	215
203	193	183	174	166	158	150	143	136	130

STORAGE

0	0	0	0	0	0	0	0	0	0
0	0	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	3	5	7	10	13	15	16
18	18	19	19	19	18	18	18	17	17
16	16	16	16	16	16	16	16	16	16

16.	17.	17.	19.	20.	22.	25.	28.	31.	35.
38.	41.	45.	50.	57.	68.	85.	107.	136.	173.
220.	281.	353.	429.	497.	549.	582.	597.	598.	591.
579.	566.	552.	538.	523.	509.	496.	485.	476.	467.
459.	452.	445.	439.	433.	428.	423.	418.	414.	410.
406.	403.	400	397.	394.	391.	389.	386.	384	382.

STAGE

102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.1	102.1	102.2	102.2	102.3	102.3	102.3
102.4	102.4	102.4	102.4	102.4	102.4	102.4	102.4	102.4	102.4
102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3
102.3	102.4	102.4	102.4	102.4	102.5	102.5	102.6	102.6	102.7
102.8	102.9	102.9	103.0	103.2	103.4	103.7	104.1	104.7	105.3
106.1	107.1	108.3	109.4	110.4	111.1	111.5	111.7	111.7	111.6
111.5	111.3	111.1	110.9	110.7	110.5	110.3	110.2	110.1	109.9
109.8	109.7	109.6	109.5	109.5	109.4	109.3	109.2	109.2	109.1
109.1	109.0	109.0	108.9	108.9	108.8	108.8	108.8	108.7	108.7

PEAK OUTFLOW IS 1149. AT TIME 44.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1149.	852.	366.	193.	18322.
CMS	33.	24.	10.	4.	519.
INCHES		6.89	11.85	12.35	12.35
MM		175.02	301.07	313.70	313.70
AC-FT		422.	727.	757.	757.
THOUS CU M		521.	896.	934.	934.

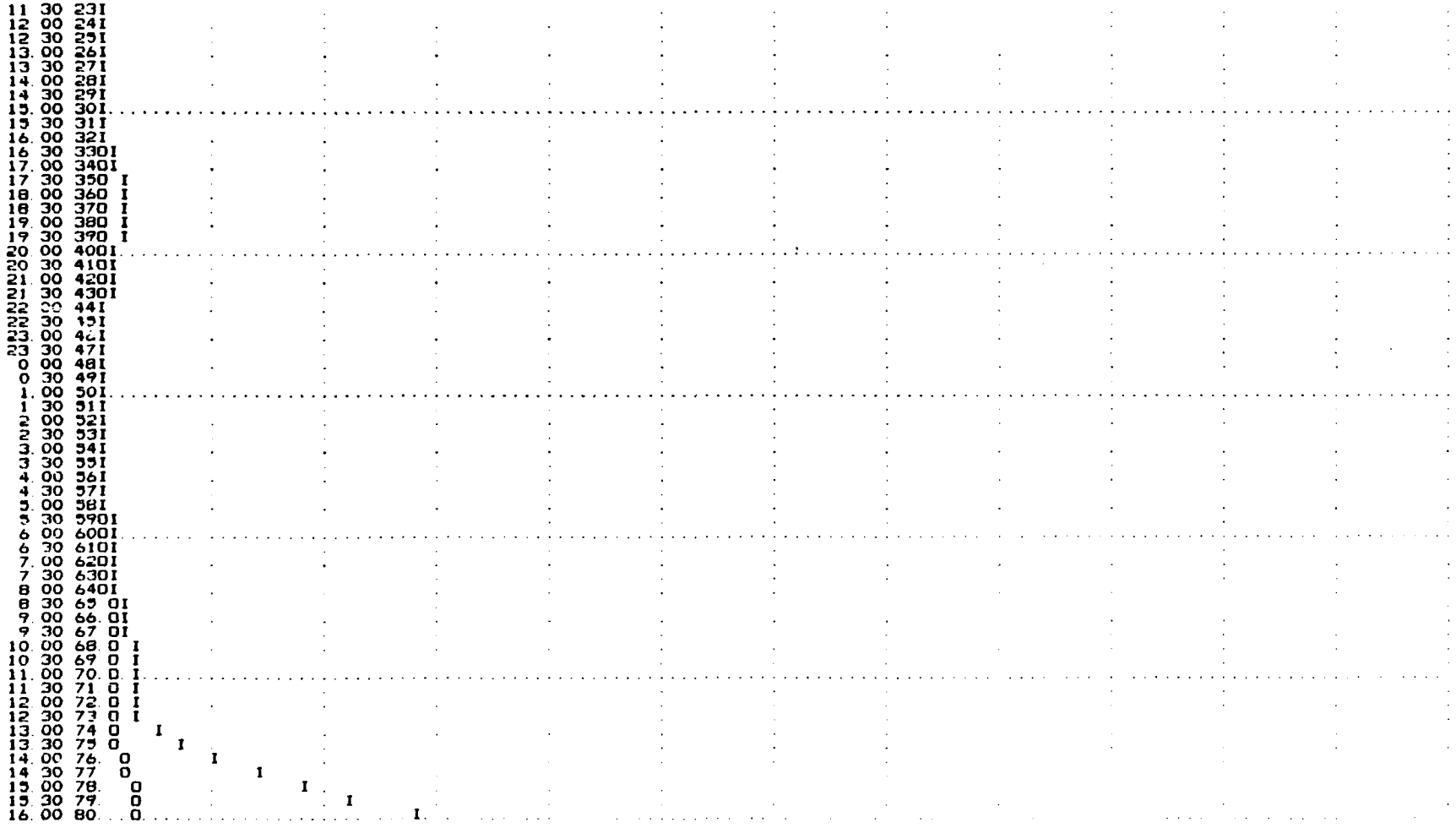
1*OVF*

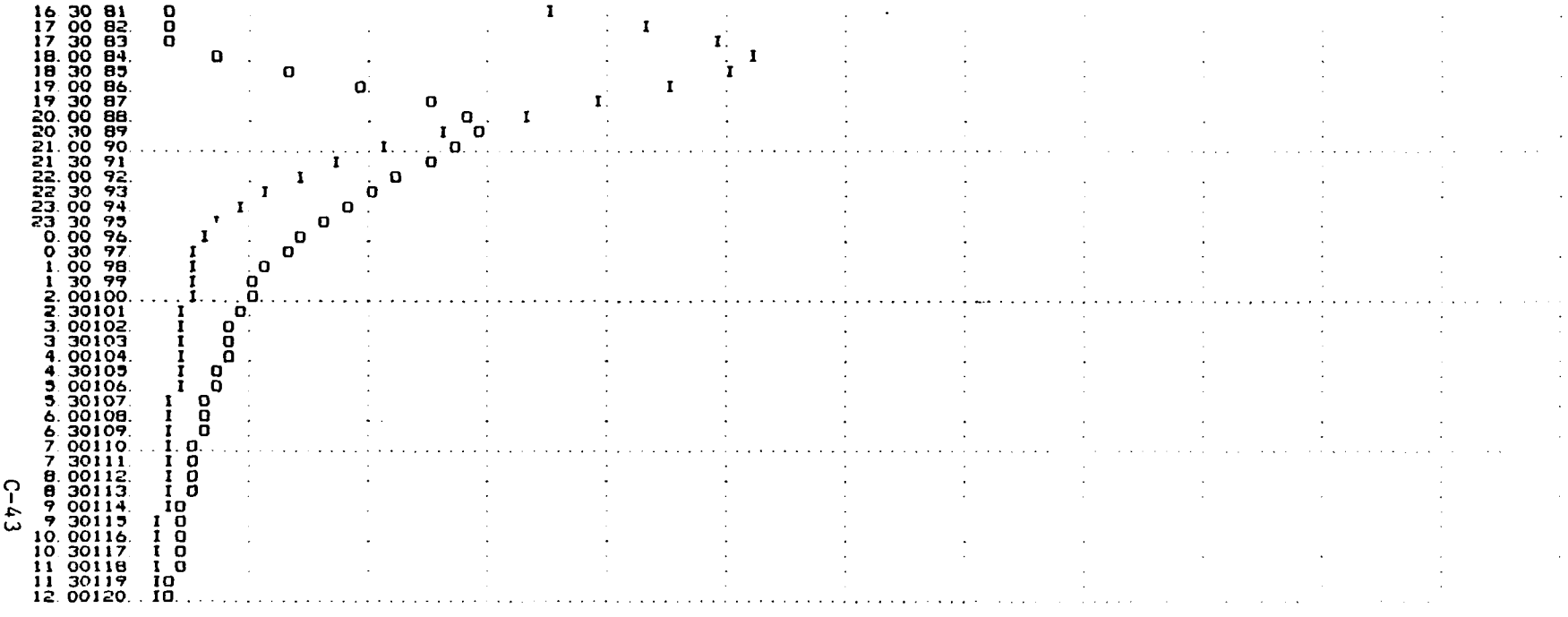
STATION 1

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

0. 400. 800. 1200. 1600. 2000. 2400. 0. 0. 0. 0. 0. 0

0.30 1I
1.00 2I
1.30 3I
2.00 4I
2.30 5I
3.00 6I
3.30 7I
4.00 8I
4.30 9I
5.00 10I
5.30 11I
6.00 12I
6.30 13I
7.00 14I
7.30 15I
8.00 16I
8.30 17I
9.00 18I
9.30 19I
10.00 20I
10.30 21I
11.00 22I


11 30 23I
12 00 24I
12 30 25I
13 00 26I
13 30 27I
14 00 28I
14 30 29I
15 00 30I
15 30 31I
16 00 32I
16 30 33OI
17 00 34OI
17 30 35O I
18 00 36O I
18 30 37O I
19 00 38O I
19 30 39O I
20 00 40OI
20 30 41OI
21 00 42OI
21 30 43OI
22 00 44I
22 30 45I
23 00 46I
23 30 47I
0 00 48I
0 30 49I
1 00 50I
1 30 51I
2 00 52I
2 30 53I
3 00 54I
3 30 55I
4 00 56I
4 30 57I
5 00 58I
5 30 59OI
6 00 60OI
6 30 61OI
7 00 62OI
7 30 63OI
8 00 64OI
8 30 65 OI
9 00 66 OI
9 30 67 OI
10 00 68 O I
10 30 69 O I
11 00 70 O I
11 30 71 O I
12 00 72 O I
12 30 73 O I
13 00 74 O I
13 30 75 O I
14 00 76 O I
14 30 77 O I
15 00 78 O I
15 30 79 O I
16 00 80 O I



1*OVN*

STATION 1, PLAN 1, RATIO 8

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0	0	0	0	0	0	0	0	0	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	2	3	5	9	12	15	17	19
21	22	22	22	22	22	21	21	20	20
19	19	19	19	19	19	19	19	19	19
19	20	21	22	24	27	30	33	37	40
44	48	52	57	65	79	103	107	107	107

108	108	200	460	807	1212	1427	1503	1446	1329
1191	1042	896	783	707	633	563	501	448	409
386	365	345	326	309	293	278	263	250	238
226	215	205	195	186	177	169	161	154	147

STORAGE

0	0	0	0	0	0	0	0	0	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	3	5	8	12	14	17	19
20	21	21	21	21	21	21	20	20	19
19	18	18	18	18	18	18	18	18	19
19	19	20	21	23	26	29	32	36	39
43	47	51	57	65	78	97	123	156	199
254	324	405	487	558	605	630	637	632	619
603	586	569	553	537	522	508	496	485	476
468	461	454	448	442	436	431	426	422	418
414	410	407	404	400	398	395	392	390	388

STAGE

102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0	102 0
102 0	102 0	102 0	102 1	102 1	102 2	102 2	102 3	102 4	102 4
102 4	102 4	102 4	102 4	102 4	102 4	102 4	102 4	102 4	102 4
102 4	102 4	102 4	102 4	102 4	102 4	102 4	102 4	102 4	102 4
102 4	102 4	102 4	102 4	102 5	102 5	102 6	102 7	102 7	102 8
102 9	103 0	103 1	103 2	103 3	103 6	103 9	104 4	105 0	105 8
106 7	107 8	109 0	110 2	111 2	111 8	112 1	112 2	112 2	112 0
111 8	111 6	111 3	111 1	110 9	110 7	110 5	110 3	110 2	110 1
110 0	109 8	109 8	109 7	109 6	109 5	109 4	109 4	109 3	109 2
109 2	109 1	109 1	109 0	109 0	108 9	108 9	108 9	108 8	108 8

PEAK OUTFLOW IS 1503. AT TIME 44.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1503	1074	443	184	22128
CMS	43	30	13	5	627
INCHES		8 69	14 35	14 92	14 92
MM		220 70	364 45	378 87	378 87
AC-FT		533	880	914	914
THOUS CU M		657	1085	1128	1128

1*0\/F*

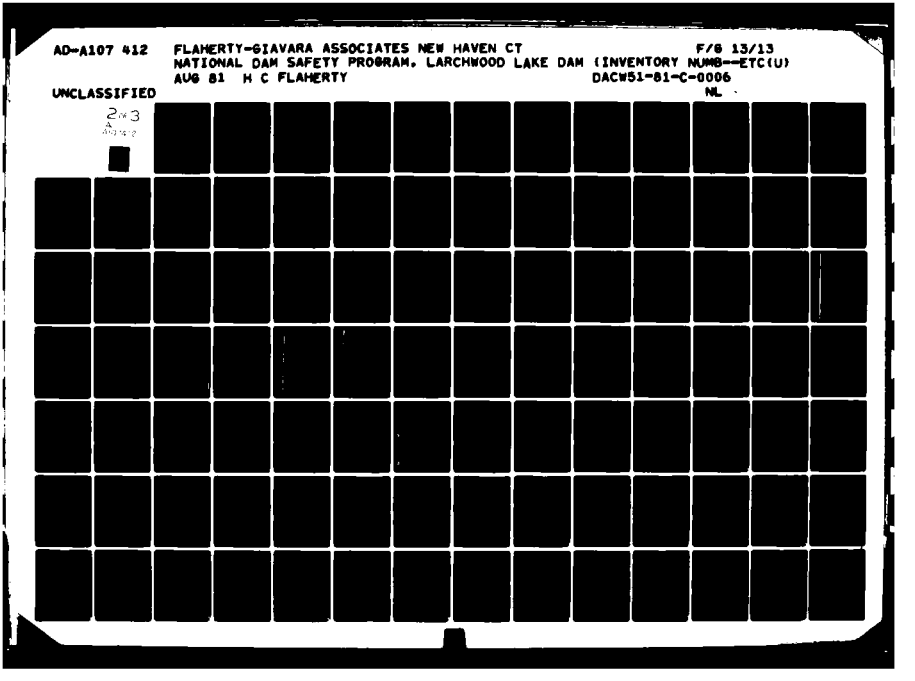
STATION 1

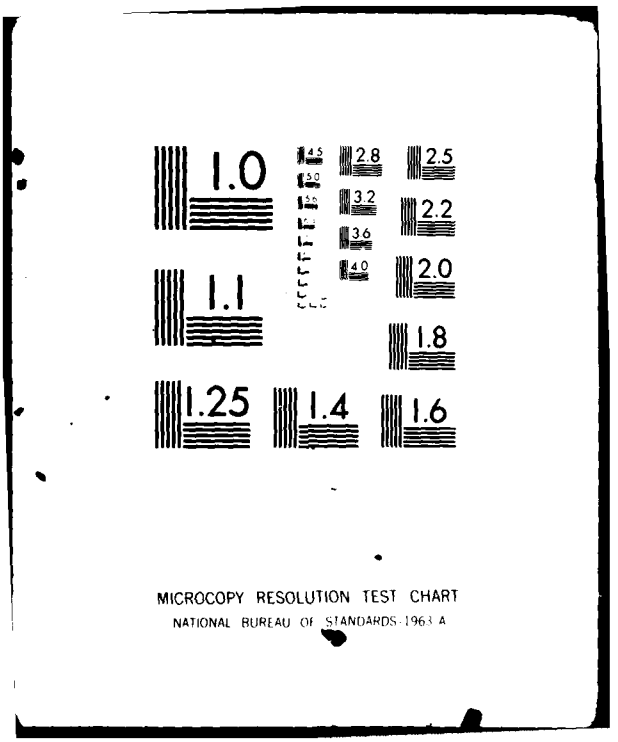
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

0	400	800	1200	1500	2000	2400	0	0	0	0	0	0

0 30 1I
1 00 2I
1 30 3I
2 00 4I
2 30 5I
3 00 6I
3 30 7I
4 00 8I
4 30 9I
5 00 10I

AD-A107 412 FLAHERTY-GIAVARA ASSOCIATES NEW HAVEN CT F/G 13/13
NATIONAL DAM SAFETY PROGRAM. LARCHWOOD LAKE DAM (INVENTORY NUMB--ETC(U)
AUG 81 H C FLAHERTY DACW51-81-C-0006
UNCLASSIFIED NL

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1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
 5 30 111
 6.00 121
 6.30 131
 7.00 141
 7.30 151
 8.00 161
 8.30 171
 9.00 181
 9.30 191
10.00 201
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 3301
17.00 3401
17.30 350 I
18.00 360 I
18.30 370 I
19.00 380 I
19.30 390 I
20.00 4001
20.30 41. I
21.00 42. I
21.30 43. I
22.00 44. I
22.30 4910
23.00 4610
23 30 4710
 0.00 4810
 0 30 4910
 1.00 501
 1 30 511
 2.00 521
 2 30 531
 3.00 541
 3 30 551
 4.00 5601
 4 30 5701
 5.00 5801
 5 30 5901
 6.00 6001
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 7.00 6201
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 8.00 64. 01
 8 30 65. 01
 9.00 66. 01
 9 30 67. 0 I
10.00 68. 0 I
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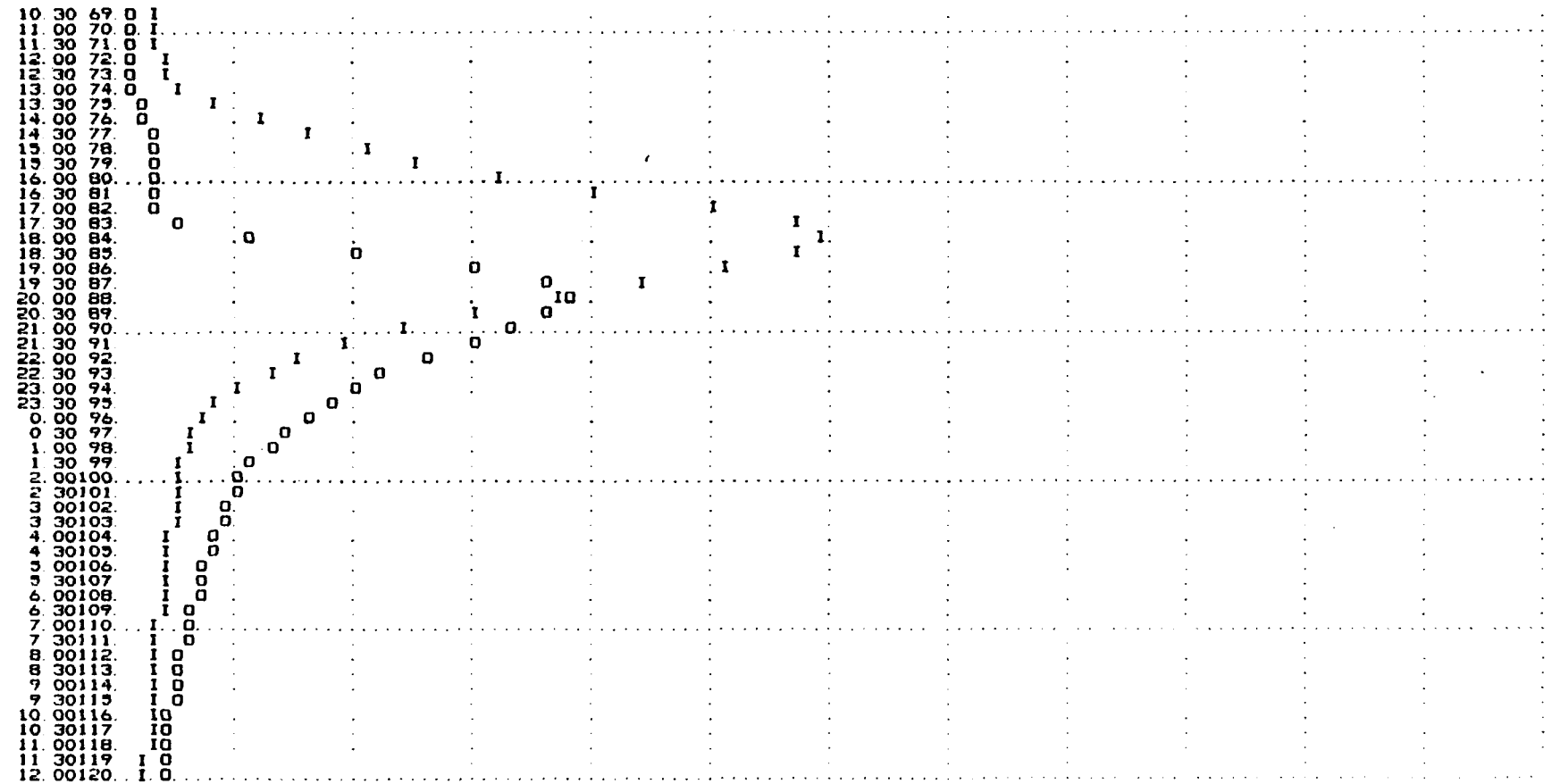


1*OVN*

STATION 1, PLAN 1, RATIO 9

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1	1.	1.
1.	1.	2.	4.	7.	11.	15.	19.	22.	24.
26.	27.	27.	28.	27.	27.	27.	26.	25.	25.
24.	24.	23.	23.	23.	23.	23.	23.	24.	24.
24.	25.	26.	27.	30.	33.	37.	41.	46.	50.
55.	60.	65.	71.	83.	104.	107.	107.	107.	108.
108.	210.	536.	1073.	1674.	2049.	2173.	2126.	1968.	1746.
1504.	1294.	1116.	951.	808.	730.	654.	587.	529.	480.
438.	407.	388.	370.	353.	337.	321.	307.	293.	279.
267.	255.	244.	233.	223.	213.	204.	195.	187.	179.

STORAGE

0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	2.	4.	7.	10.	14.	18.	21.	23.
25.	26.	27.	27.	27.	26.	26.	25.	25.	24.
23.	23.	23.	22.	22.	22.	23.	23.	23.	23.
23.	24.	25.	27.	29.	32.	36.	40.	45.	49.
54.	59.	64.	71.	81.	97.	121.	155.	198.	252.
322.	408.	503.	589.	653.	688.	700.	695.	680.	660.
637.	615.	594.	575.	558.	542.	526.	513.	501.	491.
483.	476.	469.	463.	457.	451.	446.	441.	436.	432.
428.	424.	420.	416.	413.	410.	407.	404.	401.	398.

STAGE

102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0
102.0	102.0	102.0	102.1	102.1	102.2	102.3	102.4	102.4	102.5
102.5	102.5	102.6	102.6	102.6	102.5	102.5	102.5	102.5	102.5
102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
102.5	102.5	102.5	102.6	102.6	102.7	102.7	102.8	102.9	103.0
103.1	103.2	103.3	103.4	103.6	103.9	104.4	105.0	105.8	106.7
107.8	109.1	110.4	111.6	112.4	112.9	113.0	113.0	112.8	112.5
112.2	111.9	111.7	111.4	111.2	111.0	110.8	110.6	110.4	110.3
110.2	110.1	110.0	109.9	109.8	109.7	109.6	109.6	109.5	109.4
109.4	109.3	109.3	109.2	109.2	109.1	109.1	109.0	109.0	108.9

PEAK OUTFLOW IS 2173. AT TIME 43.50 HOURS

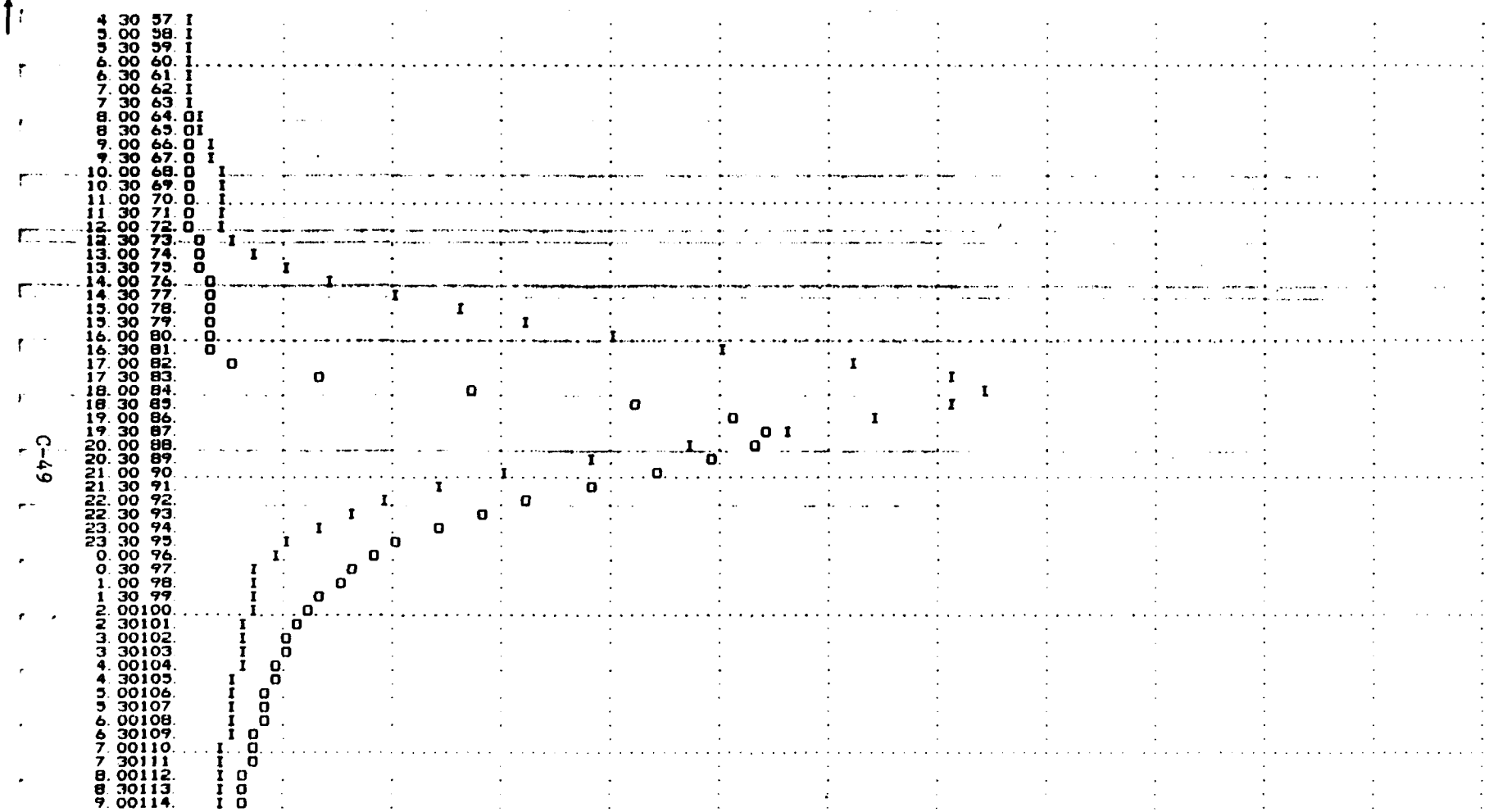
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2173.	1529.	598.	248.	29750.
CMS	62.	43.	17.	7.	842.
INCHES		12.37	19.35	20.05	20.05
MM		314.12	491.38	509.37	509.37
AC-FT		758.	1186.	1229.	1229.
THOUS CU M		935.	1463.	1516.	1516.

1*OVF*

STATION 1

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

	0.	400.	800.	1200.	1600.	2000.	2400.	2800.	3200.	0.	0.	0.	0.
0 30	11												
1.00	21												
1 30	31												
2.00	41												
2 30	51												
3.00	61												
3 30	71												
4.00	81												
4 30	91												
5.00	101												
5 30	111												
6.00	121												
6 30	131												
7.00	141												
7 30	151												
8.00	161												
8 30	171												
9.00	181												
9 30	191												
10.00	201												
10 30	211												
11.00	221												
11 30	231												
12.00	241												
12 30	251												
13.00	261												
13 30	271												
14 00	281												
14 30	291												
15.00	301												
15 30	311												
16.00	321												
16 30	3301												
17.00	340 I												
17 30	350 I												
18.00	360 I												
18 30	370 I												
19.00	380 I												
19 30	39. OI												
20.00	40. OI												
20 30	41. I												
21.00	42. I												
21 30	43. I												
22.00	44. I												
22 30	45. I												
23.00	4610												
23 30	4710												
0.00	4810												
0 30	4910												
1.00	5010												
1 30	5110												
2.00	5210												
2 30	5310												
3.00	54. I												
3 30	55. I												
4.00	56. I												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10 00 68 O I
10 30 69 O I
11 00 70 O I
11 30 71 O I
12 00 72 O I
12 30 73 O I
13 00 74 O I
13 30 75 O I
14 00 76 O I
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18 30 85 O I
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21 30 91 O I
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22 30 93 O I
23 00 94 O I
23 30 95 O I
0 00 96 O I
0 30 97 O I
1 00 98 O I
1 30 99 O I
2 00100 O I
2 30101 O I
3 00102 O I
3 30103 O I
4 00104 O I
4 30105 O I
5 00106 O I
5 30107 O I
6 00108 O I
6 30109 O I
7 00110 O I
7 30111 O I
8 00112 O I
8 30113 O I
9 00114 O I

```
 9 30115    I  O
10.00116.   I  O
10 30117.   I  O
11.00118.   I  O
11 30119.   I  O
12.00120...IO.....
```

1*OVN*

1 ********** ********** ********** ********** **********

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE 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 0.10	RATIO 2 0.20	RATIO 3 0.30	RATIO 4 0.40	RATIO 5 0.50	RATIO 6 0.60	RATIO 7 0.70	RATIO 8 0.80	RATIO 9 1.00
HYDROGRAPH AT	1	1.15	1	297.	594.	891.	1188.	1485.	1782.	2079.	2376.	2970.
	(	2.98)	(	8.41)(	16.82)(	25.23)(	33.64)(	42.06)(	50.47)(	58.88)(	67.29)(	84.11)
ROUTED TO	1	1.15	1	97.	107.	108.	275.	517.	793.	1149.	1503.	2173.
	(	2.98)	(	2.73)(	3.04)(	3.06)(	7.79)(	14.64)(	22.44)(	32.55)(	42.57)(	61.53)

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	102.00	108.60	114.10
STORAGE	0.	375.	787.
OUTFLOW	0.	108.	3071.

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
0.10	103.84	0.00	92.	97.	0.00	45.50	0.00
0.20	105.89	0.00	205.	107.	0.00	47.00	0.00
0.30	107.98	0.00	334.	108.	0.00	48.00	0.00
0.40	109.41	0.00	430.	275.	0.00	46.50	0.00
0.50	110.38	0.00	499.	517.	0.00	45.50	0.00
0.60	111.14	0.00	555.	793.	0.00	45.00	0.00
0.70	111.72	0.00	598.	1149.	0.00	44.50	0.00
0.80	112.23	0.00	637.	1503.	0.00	44.00	0.00
1.00	113.03	0.00	700.	2173.	0.00	43.50	0.00

APPENDIX D

PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS

DESIGN DATA SUMMARY

DF-3

U.S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

DESIGN REPORT SUMMARY

I.	Watershed Data		
	A. Structure Class	"C"	
	B. Drainage Area	735	Ac.
	C. Time of Concentration - T_c	0.54	Hrs.
	D. Hydrologic Curve Number - C_n		
	1. Moisture Condition II	73	
II.	Principal Spillway		
	A. Conduit		
	1. Inside Dia. R/Concrete Prestressed	30"	In.
	2. Length	121	Ft.
	B. Riser		
	1. Inside Dimensions	2.5 X 7.5	Ft.
	2. Height (Floor to Crest)	19.0	Ft.
	C. Weir Length	13.0	Ft.
	D. Orifice Dimensions	N/A	In.
	E. Reservoir Drain Size	12"	In.
	F. Type of Energy Dissipater	Plunge Pool	
III.	Emergency Spillway		
	A. Width	85	Ft.
	B. Side Slopes	3:1	
	C. Length of Level Section	50	Ft.
	D. Exit Slope	0.028	Ft/Ft.
	E. Max. Velocity in Exit Section @ D. H. W.	6.6	Ft/Sec.
	F. Duration of Flow thru Emer. Spillway @ D. H. W.	11.8	Hrs.
	G. Frequency of Use	100 yr	
IV.	Earth Fill		
	A. Height	27	Ft.
	B. Volume	11,412	C. Y.
	C. Compaction	Class A 95%	

FILL PLACEMENT

STATE NEW YORK PROJECT LARCHWOOD LAKE

OTSEGO CO.

USDA SCS HYATTSVILLE MD 1976

HYDROLOGIC AND HYDRAULIC DESIGN CALCULATIONS

LARCHWOOD LAKE

OTSEGO CO. S&WCD

NY-936-D

HYDROLOGY AND HYDRAULICS

TABLE OF CONTENTS

LARCHWOOD LAKE

OTSEGO CO. S&WCD

NY-936-D

DESIGN CRITERIA

1. Structure Classification: Class "C".

2. Purpose; Single purpose flood retarding structure.

3. Riser:

   Single stage with the riser crest set at normal water line by landowner.

4. Principal Spillway: Use 30" RCP

5. Crest of Emergency Spillway: The minimum crest elevation of the emergency spillway is set by routing through the principal spillway the PSH and PSMC developed by Chapter 21, Section 4, Hydrology, Part I. Use 100 year frequency rainfall.

6. Emergency spillway and freeboard hydrographs: Use minimum rainfall values from ES-1020 for Class "C" structures.

7. Emergency spillway:

   a. Length of level section = 50.0 ft.

   b. Inlet channel: S = 0.020

8. Earth Fill:

   a. Top Width: Determine by $W = \frac{H+35}{5}$

   b. Side Slopes: Upstream 3:1; Downstream $2\frac{1}{2}$:1

   c. Berm (upstream): 10' width set approx. 0.5' below crest of riser

9. Dike (along the emergency spillway):

   a. Top Width - 12.0'

   b. Side Slopes - 3:1

STATE NEW YORK		PROJECT LARCHWOOD LAKE - OTSEGO S. & W.C.D.			
BY J. R. M.	DATE 5/66	CHECKED BY RKC JJH	DATE 5/66 7/66	JOB NO.	
SUBJECT STRUCTURE CLASSIFICATION				SHEET ____ OF 1-2	

1. $\frac{\text{Height} \times \text{Storage}}{1000} = \frac{26 \times 920.34}{1000} = 24.0$ ~~920.34~~ ~~24.0~~

$\therefore K_s = 13.8$ ~~12.5~~

2. Damage to Restaurant
1.25 mi. below structure and 2 houses
on County Road 1.75 mi below structure 20 People $\therefore K_p = 2.5$ ✓

3 Flood Plain Width - 350-400' $\therefore K_w = 4.5$ ✓

4 Distance to Damage Center
1) 1.25 mi
2) 1.75 mi
$\therefore K_d = 0.7$ ✓

5 $\frac{K_s + K_p + K_w}{K_d} = \frac{13.8 + 2.5 + 4.5}{0.7} = \frac{20.8}{0.7} = 29.7$ ~~12.5~~ ~~19.5~~ ~~27.8~~

This Structure Classification has been determined to be a Class "C" ✓

USDA, SCS, Syracuse, NY

PRESENT LAND USE
present or future

SHT. 2-1

Watershed OTEGO Site LARCHWOOD LAKE W.A. 735 Acres

Computed by JRM Date 5/66 Checked by RKC Date 5/66
JFH 7/66

Cover	Practice	Condition or Rota.	Acres Per Practice	Curve Numbers Moisture Cond. II B Soils	C Soils	D Soils		Product
Fallow	Straight Row	--		86	91	94		
Row Crops	Straight Row	Poor		81	88	91		
	Straight Row	Good		78	85	89		
	**Contoured	Poor		79	84	88		
	**Contoured	Good		75	82	86		
	*C and T	Poor		74	80	82		
	*C and T	Good		71	78	81		
Small Grain	Straight Row	Poor		76	84	88		
	Straight Row	Good		75	83	87		
	**Contoured	Poor		74	82	85		
	**Contoured	Good		73	81	84		
	*C and T	Poor		72	79	82		
	*C and T	Good		70	78	81		
Legumes or Rotation Meadow	Straight Row	Poor		77	85	89		
	Straight Row	Good		72	81	85		
	**Contoured	Poor		75	83	85		
	**Contoured	Good		69	78	83		
	*C and T	Poor		73	80	83		
	*C and T	Good		67	76	80		
Pasture		Poor		79	86	89		
		Fair		69	79	84		
		Good	142 C 69 D	61	(74)	(80)		16028 ✓
Meadow (Permanent)		Good	49	58	(71)	78		3479 ✓
Woods (Farm)		Poor	11	66	(77)	83		847 ✓
		Fair		60	73	79		
		Good	42 D 422 C	55	(70)	(77)		32774 ✓
Farmsteads		--		74	82	86		
Roads (Inc. R.O.W)	Dirt	--		82	87	89		
	Hard Surface	--		84	90	92		
Impervious Surfaces		--		100	100	100		
Water Surfaces (lakes, ponds)		--		100	100	100		

Total Acres 735 Product Total = 53128 ✓

Weighted Runoff Curve No. $\frac{\text{Product Total}}{\text{Total Acres}} = \frac{53128}{735} = 72.3$ ✓

use RCN 73

* Contoured and graded terraces
** Includes level terraced areas (runoff corrected by volume).

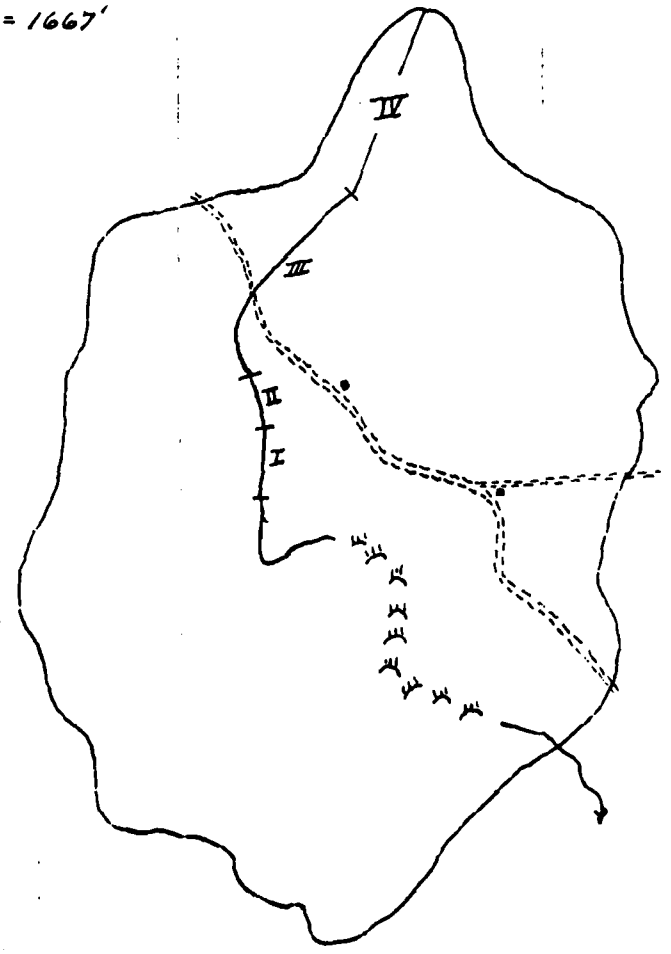
NY-155
(8-12-64)

GPO 1958 O—470667

STATE NEW YORK		PROJECT Larchwood Lake - Otsego S. & W. C. D.		
BY F. F. alds	DATE 4/66	CHECKED BY JRM & H	DATE 5/66 7/66	JOB NO.
SUBJECT Estimate of "n" Value For Inlet Channel				SHEET ___ OF 2-2

①	Channel in Earth	Basic "n"	=	0.020
②	Surface Irregularity	(Moderate) Modifying Value	=	0.010
③	Variations In Shape	(Lg - small All Gradual) Modifying Value	=	0.005
④	Obstructions	Minor Modifying Value	=	0.010
⑤	Vegetation	Low		0.005
			n_s =	0.050
⑥	P_m/P_s	Minor		0.000
			n =	0.05

FROM Aerial Photo No. EHH-4AA-78
Scale 1" = 1667'



STATE NEW YORK		PROJECT LARCHWOOD LAKE - OTSEGO S.&W.C.D.		
BY F. Fields	DATE 4/66	CHECKED BY JRM	DATE 5/66	JOB NO.
SUBJECT TIME OF CONCENTRATION COMPS.		Mathematics ✓		SHEET ___ OF 2-3

Reach *I 650 L.F. Defined Channel

$$V = \frac{1.486\, r^{2/3}\, S^{1/2}}{n} = \frac{1.486\,(1.0)^{2/3}\,(.03)^{1/2}}{0.05} = 5.15 \text{ F/S} \quad \frac{650}{5.15} = 126 \text{ SEC.}$$

Reach *II 500 L.F. Defined Channel

$$V = \frac{1.486\, r^{2/3}\, S^{1/2}}{n} = \frac{1.486\,(1.15)^{2/3}\,(.034)^{1/2}}{0.05} = 6.00 \text{ F/S} \quad \frac{500}{6.00} = 83 \text{ SEC}$$

Reach *III 2100 L.F. Channel & Draw

$$V = \frac{1.486\, r^{2/3}\, S^{1/2}}{n} = \frac{1.486\,(.62)^{2/3}\,(.035)^{1/2}}{0.05} = 4.04 \text{ F/S} \quad \frac{2100}{4.04} = 520 \text{ SEC.}$$

Reach *IV 1835 L.F. Overland Flow

Pasture 4-7 % Slope = 1.5 F/S ✓ $\quad \frac{1835}{1.5} = 1223$ SEC.

Total 1952 Sec

$$T.C. = \frac{1952 \text{ SEC}}{3600 \text{ SEC/HR}} = 0.54 \text{ HRS.}$$

STATE NEW YORK		PROJECT LARCHWOOD LAKE - OTSEGO S. & W.C.D.		
BY RKC	DATE 5/66	CHECKED BY JRM	DATE 5/66 7/66	JOB NO.
SUBJECT PRINCIPLE SPILLWAY				SHEET ___ OF 2-4

100-YEAR FREQUENCY

1 DAY RAINFALL				10 DAY RAINFALL			Q_1/Q_{10}	T.C. (Hrs)	D.A. (sq mi.)	SERIAL NO
SITE	RCN AMC II	RAINFALL (IN.)	RUNOFF Q.	R.C.N. AMC II	RAINFALL (IN)	RUNOFF Q_{10}				
1	73	5.70	2.84	56	10.00	4.36	0.651	0.54	1.15	6

SNOW MELT OR BASE FLOW

USE VALUE FROM N.Y. STATE MAP - MINIMUN RUNOFF (INCHES/DAY) FOR DEVELOPING THE PSH & PSMC 2/66

USE 0.6"/DAY

GPO : 1958 O—470667

STATE	PROJECT			
NEW YORK	LARCHWOOD LAKE - OTSEGO S.&W.C.D.			
BY RKC	DATE 5/66	CHECKED BY JRM	DATE 5/66	JOB NO.
SUBJECT P.S.H. & P.S.M.C.				SHEET ___ OF 2-5

Q_{10} = 4.36 ✓ A = 1.15 Sq Mi. ✓ AQ_{10} = 5.01 ✓ Mi^2-Inches

TIME	Preliminary P.S.H	Snow MELT	P.S.H.	Preliminary P.S.M.C.	Acc. Snow MELT	P.S.M.C.	
DAYS	C.F.S.	C.F.S.	C.F.S.	Inches	Inches	Inches	Ac. Ft. 1/
0.0	0	19 ✓	19	0.000	0.00	0.00	0
0.1	2 ✓		21	0.003	0.06	0.06	4 ✓
0.5	2		21	0.030	0.30	0.33	20 ✓
1.0	3 ✓		22	0.072	0.60	0.67	41 ✓
2.0	3 ✓		22	0.163 ✓	1.20	1.36	83 ✓
3.0	4 ✓		23	0.285 ✓	1.80	2.09	128 ✓
3.5	6 ✓		25	0.368 ✓	2.10	2.47	151 ✓
4.0	7 ✓		26	0.477	2.40	2.88	176 ✓
4.2	10 ✓		29	0.533	2.52	3.05	187 ✓
4.4	14 ✓		33	0.610	2.64	3.25	199 ✓
4.6	17 ✓		36	0.707	2.76	3.47	213 ✓
4.7	21 ✓		40	0.766	2.82	3.59	220 ✓
4.8	28 ✓		47	0.842 ✓	2.88	3.72	228 ✓
4.9	45 ✓		64	0.957 ✓	2.94	3.90	239 ✓
5.0	550 ✓		569	1.885 ✓	3.00	4.89	300 ✓
5.1	184 ✓		203	3.028	3.06	6.09	373 ✓
5.2	65 ✓		84	3.416	3.12	6.54	401 ✓
5.3	32 ✓		51	3.568	3.18	6.75	413 ✓
5.4	21 ✓		40	3.650	3.24	6.89	422 ✓
5.5	17 ✓		36	3.709	3.30	7.01	429 ✓
5.6	13 ✓		32	3.756	3.36	7.12	436 ✓
5.8	10 ✓		29	3.824	3.48	7.30	447 ✓
6.0	8 ✓		27	3.879	3.60	7.48	458 ✓
6.5	7 ✓		26	3.990	3.90	7.89	483 ✓
7.0	5 ✓		24	4.074	4.20	8.27	507 ✓
8.0	4 ✓		23	4.197	4.80	9.00	551 ✓
9.0	3 ✓		22	4.290	5.40	9.69	594 ✓
10.0	2 ✓		21	4.355 ✓	6.00	10.36	635 ✓
10.1	0 ✓		19	4.360 ✓	6.06	10.42	638 ✓
10.3	0		19	4.360 ✓	6.18	10.54	646

1/ $\frac{735 \text{ ACRES}}{12 \text{ IN/FT}}$ = 61.25 ✓ $\frac{\text{AC. FT.}}{\text{IN}}$

HYDROGRAPH COMPUTATION SHT. 2-6

WATERSHED OR PROJECT LARCHWOOD LAKE STATE NEW YORK

STRUCTURE SITE OR SUBAREA OTSEGO CO.

DR. AREA .115 SQ. MI. T_c .54 HR. RUNOFF CONDITION NO. II

RUNOFF CURVE NO. 73 . STORM DISTRIB. CURVE B . HYDROGRAPH FAMILY NO. 2

STORM DURATION 6 HR. RAINFALL: 9.1 X 1.33 POINT 12.1 IN. AREAL 12.1 IN.

Q 8.57 IN. COMPUTED T_p .54(.7) HR. 0.38 T_c 5.18 HR.

$(T_c \div T_p)$: $\frac{5.18}{0.38}$ COMPUTED 13.63, USED 16 . REVISED T_p 0.324

$q_p = \frac{484\ A}{REV.\ T_p}$ = 1718 CFS. Qq_p = 14,723 CFS.

t(COLUMN) = (t/T_p) REV. T_p. q(COLUMN) = (q_a/q_p) Qq_p.

LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS
1	0	0	21	5.83	88	41		
2	0.29	29	22	~~6.12~~ 6.80	44	42		
3	0.58	103	23	6.42	15	43		
4	0.87	294	24	6.71	0	44		
5	1.17	545	25			45		
6	1.46	2179	26			46		
7	1.75	4078	27			47		
8	2.04	3151	28			48		
9	2.33	2194	29			49		
10	2.62	1649	30			50		
11	2.92	1296	31			51		
12	3.21	1075	32			52		
13	3.50	928	33			53		
14	3.79	824	34			54		
15	4.08	766	35			55		
16	4.37	707	36			56		
17	4.67	663	37			57		
18	4.96	648	38			58		
19	5.25	618	39			59		
20	5.54	339	40			60		

55 61

HYDROGRAPH COMPUTATION

SHT. 2-7

FREEBOARD

CK JRM 5/66

CK'D H 7/

WATERSHED OR PROJECT LARCHWOOD LAKE STATE NEW YORK

STRUCTURE SITE OR SUBAREA OTSEGO Co.

DR. AREA 1.15 SQ. MI. T_c 0.54 HR. RUNOFF CONDITION NO. II

RUNOFF CURVE NO. 73 . STORM DISTRIB. CURVE B . HYDROGRAPH FAMILY NO. 1

STORM DURATION 6 HR. RAINFALL: 22.6 x 1.0 POINT 22.6 IN. AREAL 22.6 IN.

Q 18.70 IN. COMPUTED T_p 0.54 x 0.7 HR. 0.38 T_e 5.51 HR..

$(T_e \div T_p)$: COMPUTED 14.5 : USED 16 . REVISED T_p 0.344 .

$q_p = \frac{484\ A}{REV, T_p}$ = 1618 CFS. Qq_p = 30,257 CFS.

t(COLUMN) = (t/T_p) REV. T_p. q(COLUMN) = (q_c/q_p) Qq_p.

LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS
1	0	0	21	4.54	1422	41		
2	0.23	30	22	4.77	1362	42		
3	0.45	182	23	4.99	1331	43		
4	0.68	454	24	5.22	1301	44		
5	0.91	817	25	5.45	1210	45		
6	1.14	1120	26	5.68	1029	46		
7	1.36	1422	27	5.90	605	47		
8	1.59	1876	28	6.13	242	48		
9	1.82	2784	29	6.36	121	49		
10	2.04	6744 6747	30	6.58	61	50		
11	2.27	9349	31	6.81	30	51		
12	2.50	7352	32	7.04	0	52		
13	2.72	5174	33			53		
14	2.95	3752	34			54		
15	3.18	2935	35			55		
16	3.41	2451	36			56		
17	3.63	2118	37			57		
18	3.86	1846	38			58		
19	4.09	1668 4	39			59		
20	4.31	1513	40			60		

~~Jacobson Lake~~ – LARCHWOOD LAKE

NY – SHT. 3-1

Stage Storage Computations

Map Scale – 1"=100' Planimeter Set At 440.00

1/ Acres = Planimeter Reading x 0.230 x 0.003851 = Planimeter Reading x 0.00088

Elev. (ft)	Planimeter Reading	1/ Acres	Σ Acres	Ave Acres	Diff in Elev (ft)	Storage Area (ac. ft.)	Accum Total (ac. ft.)	
86.0	0	0.00					0	
			0.24	–	2	0.24		
88.0	276	0.24					0.24	
			4.42	–	2	4.42		
90.0	4750	4.18					4.66	
			13.65	–	2	13.65		
92.0	10763	9.47					18.31	
			24.01	–	2	24.01		
94.0	16520	14.54					42.32	
			39.47	–	2	39.47		
96.0	28331	24.93					81.79	
			57.00	–	2	57.00		
98.0	36438	32.07					138.79	
			72.14	–	2	72.14		
100.0	45535	40.07					210.93	
			87.29	–	2	87.29		
102.0	53655	47.22					298.22	
			100.70	–	2	100.70		
104.0	60768	53.48					398.92	
			112.74	–	2	112.74		
106.0	67340	59.26					511.66	0
			124.35	–	2	124.35		
108.0	73962	65.09					636.01	124.35

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SOIL CONSERVATION SERVICE

~~Jacobson Lake~~ LARCHWOOD LAKE

NY -

SHT. 3-2

Stage Storage Computations

Map Scale - 1" = 100' Planimeter Set At 440.00

1/ Acres = Planimeter Reading x 0.230 x 0.003851 = Planimeter Reading x 0.00088

Elev (ft)	Planimeter Reading SPW CK RKC	1/ Acres	Σ Acres	Ave Acres	Diff IN Elev (ft)	Storage Area (ac.ft.)	Accum. Total (ac.ft.)	
108.0	73962	65.09					636.01	124.35
			136.21	-	2	136.21		
110.0	80822	71.12					772.22	260.56
			148.12	-	2	148.12		
112.0	87502	77.00					920.34	408.68
			159.65	-	2	159.65		
114.0	93922	82.65					1079.99	568.33

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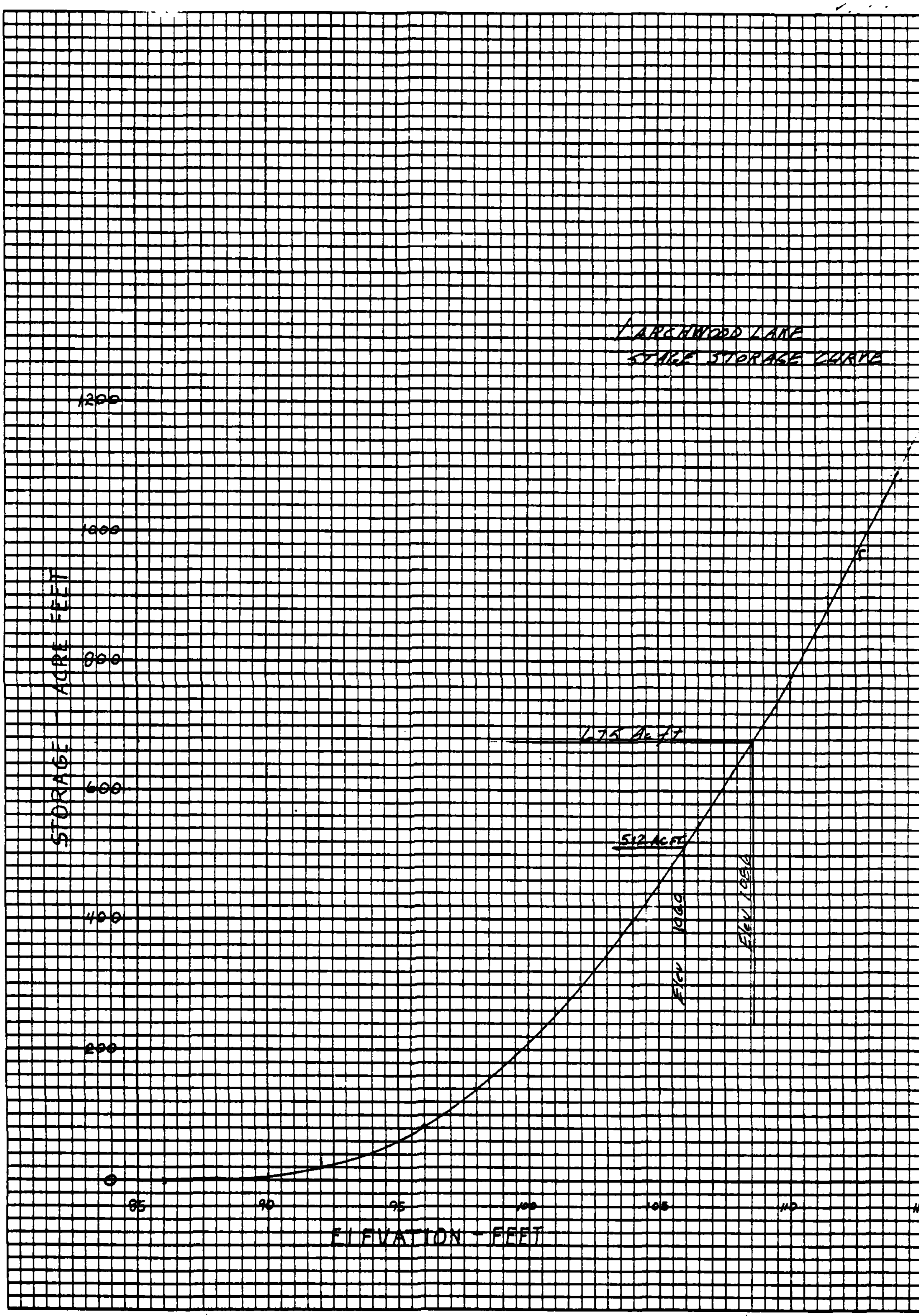
LARCHWOOD LAKE
STAGE STORAGE CURVE
STORAGE - ACRE FEET
1200
1000
800
675 Ac Ft
600
512 Ac Ft
400
200
0
Elev 106.0
Elev 108.6
85
90
95
100
105
110
115
ELEVATION - FEET

STATE NEW YORK		PROJECT LARCHWOOD LAKE		OTSEGO S.&W.C.D.
BY RKC	DATE 7/66	CHECKED BY	DATE	JOB NO. NY-936-P
SUBJECT DETERMINATION OF EMERGENCY SPILLWAY ELEVATION				SHEET ___ OF 3-5

NORMAL WATER LINE SET AT ELEVATION ~~1000~~ 102.0 BY REQUEST OF OWNER

CREST OF EMERGENCY SPILLWAY

REQUIRED STORAGE = 162 AC.FT (SEE PSMC ROUTING)

FROM STAGE STORAGE CURVE SET CREST AT ELEV. 108.56

LARCHWOOD LAKE SHT. 4-1

DISCHARGE CONSTANTS

30" ID R/C PIPE
2.5' X 7.5' CONCRETE RISER
ANTI-VORTEX WALLS AS
SHOWN ON ES-151 W/CENTERWALL
$L = 2(3D-1) = 2(7.5-1) = 13.0'$

NOTE: SPLITTER WALL WAS
USED ∴ 13.0' IS CORRECT

WEIR FLOW

$Q = CLH^{3/2}$

$Q = 3.1(13.0)H^{3/2}$

$Q = 40.3\ H^{3/2}$

PIPE FLOW

$Q = CA\sqrt{2gh}$

$C = \frac{1}{\sqrt{1 + K_e + K_p L_p}}$

$= \frac{1}{\sqrt{1 + 1.0 + .00786(110)}}$

$= \frac{1}{\sqrt{2.865}} = \frac{1}{1.69}$

$= .592$

30" I.D. R/C PIPE
$A = 4.91$ sq ft
$L_p = 110$ ft
$n = .012$
$K_p = .00786$ (ES-42 NEH-5)
$K_e = 1.0$

$Q = .592(4.91)(8.02)h^{1/2}$

$= 23.31\ h^{1/2}$

U. S. GOVERNMENT PRINTING OFFICE: 1999 O - 467091

SOIL CONSERVATION SERVICE

SHT. 4-2

Larchwood Lake

Emergency Spillway Discharge Computations

n = .040 S_e = 0.020' L_e = 200' Control Sect - 50'

Crest Elev 108.6 b = 85'

Reference ES-124 Sheet 28 of 32
ES 139 Sheet 1 of 1

Q	b feet	Q/b	d x	$V^2/2g$ +	$S_e(L_s-L_e)$ (.02)(150)	Hp	Elev	
170	85'	2	4.09	0.00	3.00	1.09	109.7	
340		4	4.60	.01		1.61	110.2	
510		6	5.02	.02		2.04	110.6	
850		10	5.73	.04		2.77	111.4	
1275		15	6.40	.07		3.47	112.1	
2125		25	7.42	.13		4.55	113.2	
3400		40	8.84	0.23		6.07	114.7	

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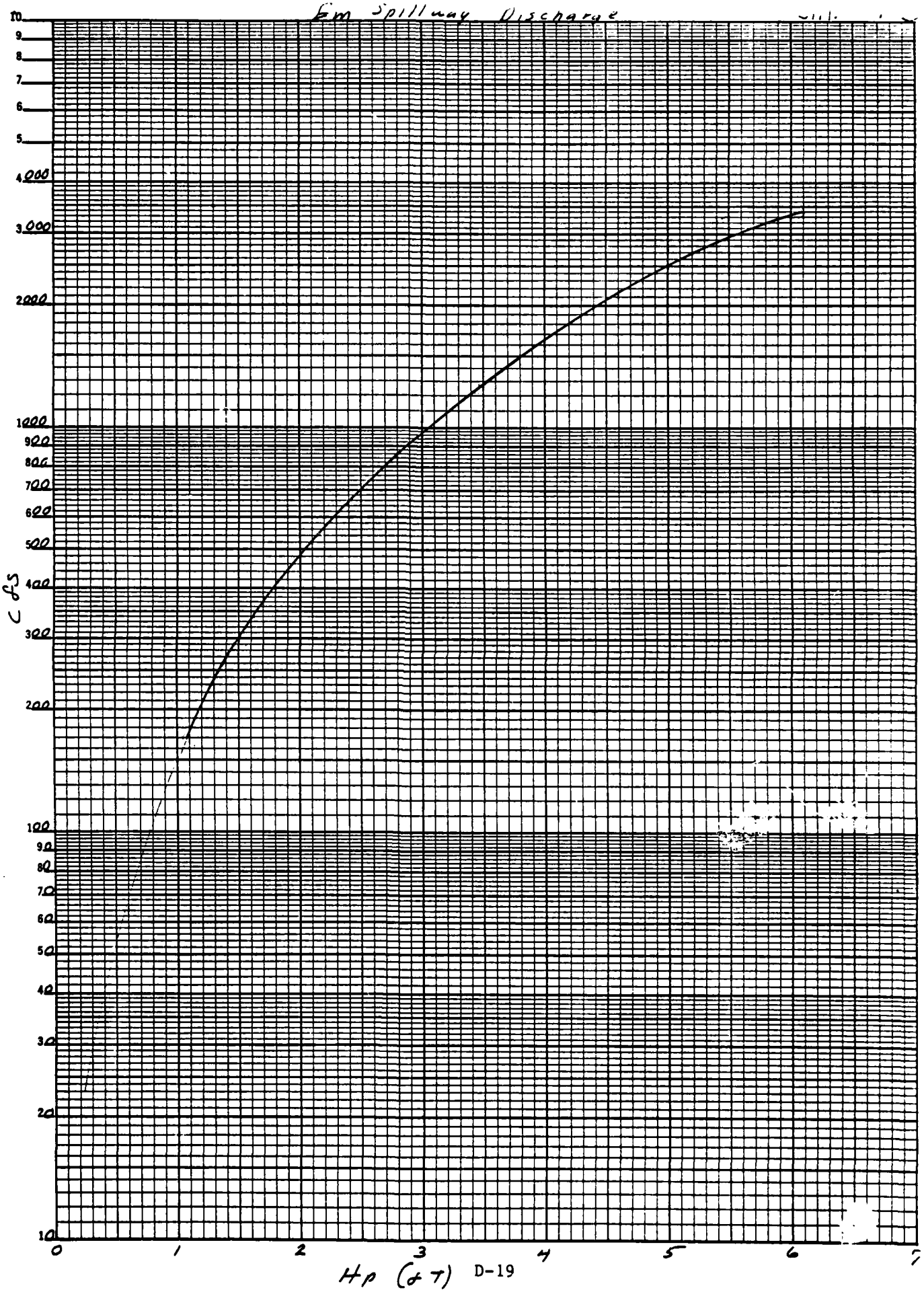
Em Spillway Discharge



LARCHWOOD LAKE SHT. 4-4

Stage Discharge Computations

Assume 2 Pipe
@ Outlet Elev - 87.0

STAGE	ELEV. ft	WEIR H ft	WEIR $H^{3/2}$	WEIR FLOW $40.3 H^{3/2}$ cfs	PIPE h ft	PIPE $h^{1/2}$	PIPE FLOW $23.31 h^{1/2}$ cfs	EMERGENCY SPILLWAY H_p ft	EMERGENCY SPILLWAY Q/b	EMERGENCY SPILLWAY Q_{em} cfs	Q_{TOTAL} cfs
	106.0	0	0	0.0	19.0	4.36	101.6				0.0
	106.5	0.5	.354	14.3	19.5	4.42	103.0				14.3
	107.0	1.0	1.000	40.3	20.0	4.47	104.2				40.3
	107.5	1.5	1.84	74.2	20.5	4.53	105.6				74.2
	107.8	1.8	2.42	97.5	20.8	4.56	106.3				97.5
	107.9	1.9	2.62	~~105.5~~ 105.6	20.9	4.57	106.5				~~105.5~~ 105.6
	108.0	2.0	2.83	114.0	21.0	4.58	106.8				106.8
	108.3	2.3	3.49		21.3	4.62	107.7				107.7
	108.5				21.5	4.64	108.2				108.2
	108.6				21.6	4.65	~~108.5~~ 108.4	0	0	0	~~108.5~~ 108.4
	109.0				22.0	4.69	109.3	0.4	.275	~~83.4~~ 40.0	~~132.7~~ 149.3
	109.6				22.5	4.75	110.7	1.0	1.50	~~138.7~~ 150	~~239.4~~ 260.7
	110.1				23.1	4.81	112.1	1.5	3.19	~~275.4~~ 304	~~387.5~~ 416.1
	110.6				23.6	4.86	113.3	2.0	5.40	469.5 480	~~582.8~~ 593.3
	111.1				24.1	4.91	114.5	2.5	8.30	~~726.9~~ 700	~~841.4~~ 814.5
	111.6				24.6	4.96	115.6	~~3.5~~ 3.0	11.7	~~1031.9~~ 970	~~1147.5~~ 1085.6
	112.1				25.1	5.01	116.8	~~3.5~~ 3.3	15.5	~~1378.0~~ 1280	~~1494.8~~ 1396.8
	113.1				26.1	5.11	119.1	4.5	25.0	~~3260.0~~ 2060	~~3379.1~~ 2179.1
	114.1				27.1	5.21	121.9	5.5	36.0	~~3308.4~~ 2950	~~3429.8~~ 3071.4

U. S. GOVERNMENT PRINTING OFFICE: 1959 O - 507093

SCS-344 5-57
Tabular Computations

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

[illegible]

[illegible]

Stage	Elev (ft)	Weir H	$H^{3/2}$	Flow Q cfs	Pipe H	$H^{1/2}$	Flow Q cfs	E.S. H	$H^{3/2}$	E.S. Flow Q cfs	Total Q cfs
Low	102	0	0	0.0	15	3.87	90.[illegible]	–	–	–	0.0
	102.5	.5	.354	14.2	15.5	3.94	91.77	–	–	–	14.2
	103	1.0	1.000	40.3	16	4.00	93.24	–	–	–	40.3
	103.5	1.5	1.837	74.0	16.5	4.06	94.69	–	–	–	74.0
	104	2.0	2.828	113.99	17	4.12	96.11	–	–	–	96.11
	104.5	2.5	3.953	159.3	17.5	4.18	97.51	–	–	–	97.51
	105	3.0	5.196	209.4	18	4.24	98.90	–	–	–	98.90
	105.5	3.5			18.5	4.30	100.26	–	–	–	100.26
	106	4.0	[illegible]		19	4.36	[illegible]	–	–	–	[illegible]
	106.5	4.5		[illegible]	19.5	4.42	102.93	–	–	–	102.93
	107	5.0			20	4.47	104.25	–	–	–	104.25
	107.5	5.5			20.5	4.53	105.54	–	–	–	105.5[illegible]
	108	6.0			21	4.58	106.82	–	–	–	106.82
	108.3				21.3	4.62	107.58	–	–	–	107.58
Emer. Spillway Crest	108.6				21.6	4.65	108.34	0	0	0.0	108.34
	109.0				22	4.69	109.3	.4	.253	40.0	149.3
	109.6				22.6	4.75	110.7	1.0	150	150	260.7
	110.1				23.1	4.81	112.1	1.5	3.19	304	416.1
	110.6				23.6	4.86	113.3	2.0	5.4	480	593.3
	111.1				24.1	4.91	114.5	2.5	8.3	700	[illegible]
	111.6				24.6	4.96	115.6	3.0	11.7	970	1085.6
	112.1				25.1	5.01	116.8	3.5	15.5	1240	1356.8
	113.1				26.1	5.11	119.1	4.5	[illegible]	[illegible]	2179.1
Top Dam	114.1				27.1	5.21	121.4	5.5	[illegible]	[illegible]	3071.4

SCS-344 5-57
Tabular Computations

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Emer. Spillway Crest								
	113.							

STATE		PROJECT		
New York		Larch Wood Lake		
BY	DATE	CHECKED BY	DATE	JOB NO. SHT. 4-5
SUBJECT Em. Spillway Exit Slope & Velocity				SHEET OF

Exit Slope

Q Total = 856 cfs
Q pipe = 115 cfs

$Q_{sm} = Q_{Total} - Q_{pipe}$ $856 - 115 = 741$ cfs

$25\% \frac{Q}{b} = .25 \left(\frac{741}{85}\right) = 2.18$ cfs

Exit Slope = 0.029

Exit Channel Velocity

$Q_{sm} = 741$ cfs

$Q/b = \frac{741}{85} = 8.72$

$V_c = 6.6$ fps

STATE NEW YORK		PROJECT Larchwood Lake		
BY JH	DATE 7/66	CHECKED BY	DATE	JOB NO NY-

SUBJECT DURATION OF FLOW THROUGH EMERGENCY SPILLWAY ____ OF 5-1

Q = Runoff = 8.57 inches
A = Drainage Area = 735 acres
Qp = Pipe Flow at D.H.W. = 115 cfs.
Qem = Emergency Spillway Flow at D.H.W = Qtotal − Qp = 856 − 115 = 741 cf

To = 1.83 hrs. (Time at which emergency spillway begins to flow)

T1 = 3.65 hrs. (Time at which emergency spillway flow is maximum)

So = 138 ac.ft. (Storage at time To)

S_{max} = 312 ac. ft. (Storage at time T1)

Q_{max} = 856 cfs. (Maximum outflow rate which occurs at time T1)

$$I_{max} = \frac{QA}{12} = \frac{8.57 \times 735}{12} = 524.9 \text{ ac.ft. (Total inflow volume)}$$

$$I_1 = 25.82 \text{ sq.in} \times \frac{\text{cfs/in of ordinate} \times \text{sec./in of abscissa}}{43{,}560} =$$

$$25.82 \times \frac{400 \times 1800}{43{,}560} = 419.8 \text{ ac. ft.}$$

$t_1 = T_1 - T_o$ = 3.65 hrs. − 1.83 hrs. = 1.82 hrs.

$$t_2 = \frac{(I_{max} + S_{max}) - (I_1 + S_o)}{Q_p + 0.3\,Q_{em}} \times 12.1 = \frac{(524.9 \text{ ac.ft.} + 312.0 \text{ ac.ft}) - (419.8 \text{ ac.ft} + 138 \text{ ac.ft})}{115 \text{ cfs} + 0.3 \times 741 \text{ cfs}} \times 1$$

= 10.02 hrs.

Duration of Flow = $t_1 + t_2$ = 1.82 hrs + 10.02 hrs = **11.84 hrs.**

STATE NEW YORK | PROJECT LARCHWOOD LAKE

BY JLH | DATE 6/66 | CHECKED BY RKC | DATE 6/66 | JOB NO. NY-936-P

SUBJECT DRAWDOWN TIME COMPUTATIONS- | SHEET ___ OF 5-2

Elevation (ft.)	Storage (total) (ac. ft.) 1/	Storage (between elev's) (ac. ft.)	Out flow (total) (cfs)	Out flow (average) (cfs)	Time (between elev's) (days) 2/	Time (accum.) (days)
108.6	163.0		108.5			0
		37.0		107.7	1.47	
108.0	126.0		106.8			1.47
		32.0		90.5	1.43	
107.5	94.0		74.2			2.90
		34.0		57.3	0.85	
107.0	60.0		40.3			3.75
		25.0		29.7	0.60	
106.6	35		19.0			4.35

1/ Storage above crest of RISER 106.0

2/ $\frac{\text{ac. ft.}}{\text{avg. outflow}}$ x 0.504 = Time (in days)

PRELIMINARY GEOLOGIC INVESTIGATION

CHECK LIST

TO DETERMINE THE ADEQUACY OF DAMSITE INVESTIGATIONS

Name GLAIR JACOBSEN SCS-WCD OTSEGO

Site location 2 MI. N. OF WEST LAURENS Quadrangle MORRIS 7½'

Exploration 1/17/66 Personnel MULCAHEY, FIELD TRIP

DATA

Are adequate quantities available? YES

Station	U.S.C.S.	C.Y. Available
EAST.	CH-CL	6000 YDS +
U.S. BORROW	CH-CL	

Is other material available at or near the site? PROBABLY NOT

Material Sample Quantity available

Has each filter embankment material at the site been sampled for complete laboratory tests? YES (Soil Correlation Table)

Are water tables located? INDICATED IN LOGS & IN NARRATIVE W/ RESPECT TO DEWATERING CUTOFF TRENCH

Consolidation and shear strength

Can in-place bearing strength be determined? FOUNDATION IS A DENSE

Are water levels and pervious zones shown in logs and on profiles? PARTLY

Has each distinct foundation material been sampled for sieve and/or mechanical (hydrometer) analysis? No. If not, does report contain correlation evidence to other samples? YES (Soil Correlation Table) (PARTIALLY)

Have samples for filter design been obtained from the foundation drain location or correlated to other samples taken from the site? No

Flood plain? Abutments? Embankments?

Bedrock characteristics (if applicable) N.A.

- Weathered (soft)?
- Firm (hard)?
- Bedding thickness?
- Strike and dip?
- Fractures and/or cavity locations and descriptions?
- Water or permeability tests or remarks?
- Confirmation of bedrock or boulders?

Did borings extend to sufficient depth to establish stable and impermeable materials? YES Is proof by test data or samples recorded? BOTH

Are water or permeability tests available or sufficient remarks to determine values by Bur. of Rec. methods, E-18 or E-19, Earth Manual? Or can it be estimated by D_{10} and dry density (Slichter).

MIN % OF FINES = 32%. PERM. NOT A FACTOR IN EMB. OR FOUND.

SUSPECT ENTIRE FLOODPLAIN (VERY NARROW SHOULD BE SCALPED

5. Have zones or areas of critical foundation materials been delineated on the plans? ✓ Profiles? _____

6. Proposed Spillway

a. Is the foundation location adequate? YES Yielding? No Non-yielding? ESSEUTIALLY Is the proof available in test data? LOGS Samples? _____

b. Are alternate locations more favorable? _____ Why? _____
MAYBE COULD STAND TO SWING A LITTLE MORE TOWARD THE STREAM ON LOWER END?

c. Have test data or samples been obtained to be used to determine loading and elongation? LOGS & REPORT

d. Foundation of riser sample or test data? SEE NOTE ON PLAN Part founded on condition sample or test data sufficient? OK

e. Have water tables or conditions been located? PARTLY
VIEW. HOW ABOUT EXCAVATION OF THIS MATL

7. Emergency Spillway

a. Do test holes extend to or below proposed spillway grades or elevation? ?

b. Are there sufficient holes to compute quantities of rock elevations? _____

c. Are rock descriptions or correlations adequate to determine rippability or ease of removal? _____

d. Are seepage zones or water levels described and located? NONE INDICAT Is need for drains? _____

e. Are soils described or sampled to determine erodibility? SAMPLED Possible use in embankments? YES

f. If conditions, as outlined by this report, indicate the need for a further, more detailed investigation and in-place testing.

g. No further investigation is needed.

Reviewed by _____
State Conservation Engineer

B.S. Ellis
Geologist

Preliminary Geologic Investigation

GENERAL

Date of Exploration: 1/17/66
Personnel: J.R. Mulvaney, F. Fields, L. Kick
Site Name: Clair Jacobsen Pond
SWCD: Otsego
Geographic Location: 2 mi. N. of West Laurens
Quadrangle: Morris 7½ minute
Equipment: Backhoe
Site Data: Drainage Area: 600 Ac.
Max. Pool Depth: 17 feet
Max. Height of Dam: 24 feet
Length of dam: 400 feet
Volume of fill: 6000 cu. yd.(estimate)

EMBANKMENT FOUNDATION

Five test pits were dug along the C/L of the dam. Pit 1 was dug near the upper end of the east abutment, and was sampled at a depth of 7 to 8 feet(Sample 1.1). Pit 4 was dug near the upper end of the west abutment. Both pits were well into dense glacial till. Pits 2 and 5 were a few feet above the stream and showed colluvial material in the upper part, but both were dug well into the same dense glacial till as sampled in pit 1. Pit 3, located in the bottom of the draw, also showed the same dense till below 2 feet depth.

PRINCIPAL SPILLWAY

Pit 301 was dug at the lower end of the principal spillway, and was sampled at the 6 to 7 foot depth(Sample 301.1). Pit 302 was dug at the upper end. Both pits showed good material for footings for the outlet structure in the bottom of the pits.

EMERGENCY SPILLWAY AND BORROW

All or most of the fill will come from excavating the emergency spillway. Pits 201, 202, 203, and 204 were dug in the spillway area, and pit 201 was sampled at the 10 to 12 foot depth. Sample 201.1). In the event additional borrow is needed, pit 101 was dug and sampled at the 4 to 6 depth. All pits showed a quite uniform, dense, deep till throughout the area, which is usable with a minimum of waste. Clearing is needed.

RECOMMENDATIONS

1. Cutoff trench

A cutoff trench of a minimum 4 feet depth is sufficient for both abutments. Trench will have a 12 foot width with 1:1 side slopes.

2. Principal Spillway
Spillway pipe camber should be considered in design.

3. Drainage
Installation of foundation drainsis recommended to insure downstream slope stability.

4. Embankment Design:
The dense glacial till found in the emergency spillway excavation and borrow area is suitable homogeneous embankment material. I recommend that this material be used for backfill of cut off trench and embankment construction with controlled compaction. Sides slope upstream should be 3:1 and downstream $2\frac{1}{2}$:1 with a 8' berm upstream at normal water level.

5. Miscellaneous
Seepage during cutoff trench excavation will be a problem and dewatering will be required. Close attention should be given to sorting out the plus 6 course fragments from the fill material. This appears to be no problem with respect to emergency spillway excavation or the use of this material in the embankment.

Location _____ County _____ State _____

Watershed _____ Sub-watershed _____ Site No. _____

Logged by _____ Date _____ 19 ___ Project: WP1 ____ WP2 ____ FP ____ Pub 46 ____

Drilling Equipment _____ Location of Holes _____

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec.† %
3024	98.3	0	1	DISTURBED TOP							
		1	5	GRAVEL - SILTY - QUITE HIGH IN % SILT W/	GM						
	37' RT			PERHAPS 1½ TO ½" GRAVEL & 10% SUBROUNDED							
	STA 2+14			COBBLES AND SOME BOULDERS > 4" - GRAY -							
	& DAM			MOIST - SLOWLY PERMEABLE - DEVONIAN AGE -			3C2A-1				
				GLACIAL TILL - DENSE							
		5	7	SILTY - SAND - GRAVEL - HIGH IN % SILT AND	SM						
				VERY FINE SAND - W/5% PEBBLES < ½" and							
				W/5% SUB-ROUNDED STONES > 4" - GRAY -							
				MOIST - SLOWLY PERMEABLE - DEVONIAN AGE -			3024-2				
				GLACIAL TILL - DENSE.							

Sheet ___ of ___ Sheets

* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Watershed ______ Sub-watershed ______ Site No. ______

Logged by CLARENCE E FURBUSH Date JUNE 29 1966 Project: WP1 ___ WP2 ___ FP ___ Pub. 46 ___

Drilling Equipment BACKHOE Location of Holes ______

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type	Samples From Ft.	Samples To Ft.	Rec. %
501	90.4	0	3	COLLUVIUM - GRAVEL - SILTY QUITE HIGH IN % SILTS	GM						
	42' LT			W/15-20% SUB ANGULAR COBBLES & SMALL BOULDERS							
	STA 2+50			BROWN - MOIST - MODERATE PERMEABILITY - DEVONIAN							
	℄ DAM			AGE - GLACIAL TILL MEDIUM.							
		3	7	SILTY - GRAVEL - W/20-25% SUBROUNDED COBBLES	GM						
				AND BOULDERS > 4" and 5% SUB-ROUNDED PEBBLES							
				1/4 to 1/2" - gray - MOIST - DEVONIAN AGE - GLACIAL							
				TILL - VERY DENSE.							
				(6-7' SAMPLE 501.1)							

— Disturbed-undisturbed-rock core. ‡ Percent sample recovery.

1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.

Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Location [illegible] Owner Mrs. JACOBSEN State NEW YORK

Watershed [illegible] Sub-watershed [illegible] Site No. 501

Logged by CLARENCE E. FERGUSON Date JUNE 29 1966 Project: WP1 ___ WP2 ___ FP ___ Pub. 46 ___

Drilling Equipment RACKMOF Location of Holes [illegible]

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type	Samples From Ft.	Samples To Ft.	Samples Rec. %
2-A	951.0	0	2	TOPSOIL							
	15 LT	2	4	SILTY-GRAVEL-quite high % silts - w/5% sub-	GM						
	STA 1+40			ANGULAR STONES (≥4" and w/5% (≤4" - BROWN-							
	& DAM			MOIST - SLOWLY PERMEABLE - DEVONIAN AGE - DENSE - GLACIAL TILL							
		4	6	SILTY-GRAVEL - quite high % silts & very fine sands	GM						
				w/10% sub-rounded stone (≥4" - gray - MOIST -							
				SLOWLY PERMEABLE - DEVONIAN AGE - GLACIAL TILL - DENSE							
		6	9	GRAVEL - SILTY - w/20% sub-angular stone (≥4"	GM-SM						
				& 5% (≤4" - gray - WET to MOIST - SLOWLY							
				PERMEABLE - DEVONIAN AGE - GLACIAL TILL - DENSE*							
				* SLOW SEEPAGE AT 7 FEET IN A GRAVEL							
				POCKET OF MODERATE PERMEABILITY - THIS							
				SEEPAGE APPEARS TO BE AT SOME LEVEL							
				ABOVE THE STREAMBED.							

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* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist.

Sheet 1 of 1 Sheets

Location _____ Owner _____ State _____

Watershed _____ Sub-watershed _____ Site No. _____

Logged by CLARENCE E. FERGUSON Date JULY 29 19 66 Project: WP1 ___ WP2 ___ FP ___ Pub. 46 ___

Drilling Equipment BACKHOE Location of Holes _____

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. % †
301A	86.7	0	1	RECENT ALLUVIUM [illegible]							
	70' LT	1	4	SILT-GRAVEL - HIGH IN SILT AND VERY FINE	SM or ML						
	2+13			SAND - W/5% PEBBLES < 1/2" and W/10% 2-4"							
	CLAIM			SUB-ROUNDED COBBLES - GRAY - MOIST - SLOWLY							
				PERMEABLE - DEVONIAN AGE - GLACIAL TILL - DENSE							
		4	5	GRAVEL-SILT - QUITE HIGH IN % SILT - W/15-	GM						
				20% > 4" SUBROUNDED COBBLES - gray - MOIST							
				SLOWLY PERMEABLE - DEVONIAN AGE - GLACIAL TILL -							
				DENSE with [illegible] sand. 20% [illegible]							
				[illegible] cobbles and small boulders. Mapped as [illegible]							
				[illegible] of siltone and sandstone. Parent rock zone							
				[illegible] than in hole #1. Gray color. Massive, very							
				[illegible] numerous, very thin. Slight seepage at							
				[illegible] inclusions.							
3				[illegible] and debris.							
				[illegible] + 1', otherwise same as 1-71 in hole #2							
				Telephone location.							

* D = Disturbed-undisturbed-rock core. † Percent sample recovery.

1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.

Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

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Location 2 Mi. N. of Laurens, Otsego County Owner Clair Jacobsen State New York

Watershed Susquehanna Sub-watershed Tributary of Otego Creek Site No.

Logged by L. Kick Date Jan. 17 19 66 Project: WP1 ___ WP2 ___ FP ___ Pub. 46 X

Drilling Equipment Backhoe Location of Holes

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
1		0	2	Topsoil; silt w/15% + 4" as channers & flags.	ML						
		2	8	Gravel, silty; 5% + 4" as channers & flags. Wisconsin							
				till from Devonian siltstone and fine textured sandstone.							
			8	Brown color. Massive, slowly permeable, very firm							
				fragipan and till. No seepage. Mardin.	GM		1.1		7	8	
2		0	1	Topsoil							
				Gravel, silty; 15% + 4". Brown color.							
		1	4	Gravel, silty; colluvium from material as in Hole #1.	GM						
		4	7	Gravel, silty, with some fine sand. 20% + 4" as sub-							
				rounded cobbles and small boulders. Wisconsin till from							
				Devonian siltstone and sandstone. Parent rock more							
201		0	1	massive than in Hole #1. Gray color. Massive, very							
		1	2	slowly permeable, very firm. Slight seepage at 4".							
				Mardin inclusion.	GM						
		2	2'	Gravel, silty; 20% + 4". No seepage. Same as 2-8' in							
3		0	2	Alluvium and debris.	GM		201		2	10	
		2	8	25-30% + 4". Otherwise same as 4-7' in Hole #2.	GM						
				Chippewa inclusion.							

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* Disturbed-undisturbed-rock core. † Percent sample recovery.

1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.

Other copies as directed by State Conservationist.

Sheet ___ of ___ Sheets

Location: 2 mi. N. of W. Laurens, Otsego Co. Owner: Clair Jacobson State: New York

Watershed: Susquehanna Sub-watershed: Tributary to Otsego Creek Site No.:

Logged by: L. Kick Date: Jan. 17 1966 Project: WP1 ___ WP2 ___ FP ___ Pub. 46 ___

Drilling Equipment: Backhoe Location of Holes:

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. % †
4		0	1	Topsoil							
		1	3	Gravel, silty, 5% + 4". Subsoil Gravel silty; 5% +4" Moderate permeability, friable.	GM						
		3	8	Gravel, silty; 15% + 4". Same as 2'-8' in Hole #1.							
				Pocket of GW at 7', surrounded by the till. Mardin.	GM						
5		0	3	Colluvium. Gravel, silty; 15% + 4". Brown color. Moderately permeable	GM						
		3	9	Gravel, silty; Same as 4-7' in Hole #2. No seepage,							
				and hole dug to 4' below stream level. Mardin inclusion.	GM						
201		0	1	Topsoil							
		1	2	Gravel, silty; 10% + 4". Moderately permeable and							
				friable. Brown color.	GM						
301		2	12	Gravel, silty; 20% + 4". No seepage. Same as 2-8' in							
				Hole #1. Mardin.	GM		201	1	8	10	
				[illegible] cobbles & small boulders (Same as 7' in Hole							
				#) Chippewa							

* D-Disturbed-undisturbed-rock core. † Percent sample recovery.

I - 1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.

O: Other cases as directed by State Conservationist.

Sheet ___ of ___ Sheets

Sheet ___ of ___ Sheets

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Location 2 mi. N. of W. Laurens, Otsego Co. Owner Clair Jacobsen State New York

Watershed Susquehanna Sub-watershed Tributary to Otego Creek Site No.

Logged by L. Kick Date Jan. 17 19 66 Project: WP1 ___ WP2 ___ FP ___ Pub. 46 ___

Drilling Equipment Backhoe Location of Holes

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. % †
202		0	2	Topsoil							
		2	8	Same as 2-8' in Hole #1 Mardin.	GM						
				Lacustrine material. Slowly permeable and firm. Not							
203		0	11	Same as Hole #201 all the way. Small isolated pocket of							
		6	8	GM at 9-10'. Mardin. as 1-7' in Hole #202 Mardin Silt.	GM						
204		0	5	Same as Hole #201 all the way. Mardin.	GM						
101		0	1	Topsoil							
		1	6	Gravel, silty; 20% + 4" as 3" thick flags. Massive,							
				very firm, very slowly permeable fragipan in Wisconsin							
				till. Gray color.							
				Volusia.	GM		101.1		4	6	
301		0	1	Topsoil, gray color.							
		1	7	Gravel, silty, with some fine sand. 25% + 4" as sub-							
				rounded cobbles & small boulders. (Same as 4-7' in Hole							
				#2) Chippewa	GM		301.1		6	7	

* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit. 1 copy Soil Mechanics Laboratory with samples.
Other as directed by State Conservationist.

Sheet ___ of ___ Sheets

D-35

Location 2 mi. N. of W. Laurens, Otsego Co. Owner Clair Jacobsen State New York

Watershed Susquehanna Sub-watershed Tributary to Otsego Creek Site No.

Logged by L. Kick Date Jan. 17 19 66 Project: WP1 ___ WP2 ___ FP ___ Pub. 46 ___

Drilling Equipment Backhoe Location of Holes

Hole No.	Station and Surface Elev.	Hole Depth From Ft.	Hole Depth To Ft.	Description of Materials	Unif. Soil Class. Symb.	Type Bit Used	Samples No.	Samples Type*	Samples From Ft.	Samples To Ft.	Samples Rec. † %
302		0	1	Topsoil							
		1	6	Clay, silty. Firm and slowly permeable. Remnant of							
				lacustrine material. Slowly permeable and firm. Not							
				needed in constructions.	CL						
		6	8	Gravel, silty. Same as 1'7' in Hole #301 Hudson over till.	GM						

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* Disturbed-undisturbed-rock core. † Percent sample recovery.
1 copy to E and WP Unit, 1 copy Soil Mechanics Laboratory with samples.
Other copies as directed by State Conservationist. 23 5

Sheet ___ of ___ Sheets

REMARKS: CURVE ADJUSTED TO REFLECT 4.5 % + 3" MATERIAL

COMPUTATION SHEET
SCS-823 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE	PROJECT			
New York	Larch wood Lake			
BY	DATE	CHECKED BY	DATE	JOB NO.
TCI	8/66			NY-936-D
SUBJECT				SHEET ___ OF ___
Placement of Fill Material				

Homogeneous Fill

Earth Fill shall be from material in the emergency spillway and supplemental borrow area represented by TP 101 from 1'-6", TP201 1'-12", and TP 202 from 2'-8".

The coarsest material shall be placed in the outer most portion of the dam as directed by the engineer.

Max. rock size = 6"
Max. lift = 9"
Req'd water content = 2 per centage points less to 2 per centage points greater than optimum.
Class A Compaction
95% max. density by ASTM D 698, Method A

SOILS ANALYSES

Form SCS 353a
9-64

LABORATORY NO 101.1

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	SOIL CLASSIFICATION

PROJECT and STATE: JACOBSEN POND, OTSEGO CO., N.Y.

SAMPLE LOCATION: BORROW

FIELD SAMPLE NO	DEPTH	GEOLOGIC ORIGIN
101.1	4'-6'	.

TYPE OF SAMPLE	TESTED AT	APPROVED BY	DATE
DIST. 35 LB.	SCS LAB-SYR., N.Y.		5-19-66

SYMBOL GM-GC | DESCRIPTION

GRAIN SIZE DISTRIBUTION

C_c .06 | C_u 1600 | D_{MAX} 4" | D_{30} 30. | D_{10} 2.4 | D_{60} .4 | D_{30} .015 | D_{10} .0025 | D_{60} .0015

UNDISTURBED CONDITION

MOISTURE % | DRY UNIT WEIGHT g/cc pcf

SOLUBLE SALTS % | SHRINKAGE LIMIT %

AFTER REMOVING 3" MATERIAL

23 5

REMARKS: CURVE ADJUSTED TO REFLECT 4.5 % + 3" MATERIAL

Form SCS 352a
Rev. 5-65

LABORATORY NO 101.1

MATERIALS TESTING REPORT	U.S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	COMPACTION AND PENETRATION RESISTANCE

PROJECT OR LOCATION: JACOBSEN POND, OTSEGO CO., N.Y.

FIELD SAMPLE NO	SOURCE	DEPTH
101.1	BORROW	4'-6'

DESCRIPTION	TESTED AT	APPROVED BY	DATE
	SCS LAB-SYR, NY		5-66

CLASSIFICATION GM-GC LL 23 PI 5 CURVE NO 1 OF 2

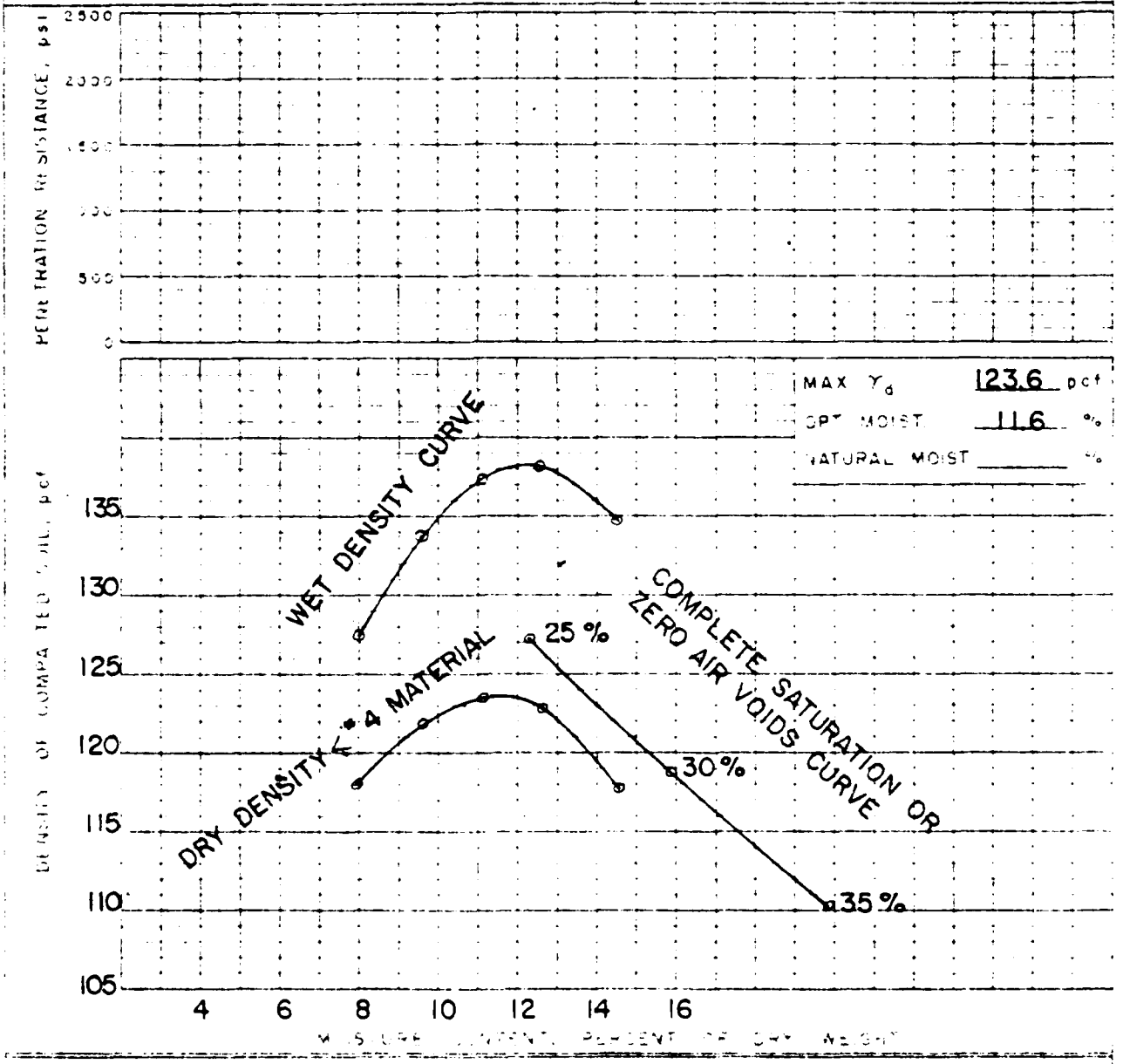
MAX. PARTICLE SIZE INCLUDED IN TEST #4

SPECIFIC GRAVITY (G_s) { MINUS NO 4 ____ PLUS NO 4 ____

STD (ASTM D-698) [X]; METHOD A

MOD (ASTM D-557) [ ]; METHOD ____

OTHER TEST [ ] (SEE REMARKS)



REMARKS

Form SCS 353a
9-64

LABORATORY NO 301.1

MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	SOIL CLASSIFICATION

PROJECT and STATE: JACOBSEN POND, OTSEGO CO., N.Y.

SAMPLE LOCATION: PR. SPLWY

FIELD SAMPLE NO	DEPTH	GEOLOGIC ORIGIN
301.1	6'-7'	

TYPE OF SAMPLE	TESTED AT	APPROVED BY	DATE
DIST. 35 LB.	SCS LAB-SYR., N.Y.		5-19-66

SYMBOL GM

DESCRIPTION

GRAIN SIZE DISTRIBUTION

C_c .15 | C_u 667. | D_{MAX} 2" | D_{60} 30. | C_{sc} 4.0 | C_{uc} 1.8 | D_{30} .06 | D_{10} .012 | D_{90} .006

COBBLES | GRAVELS | SAND | FINES

SIEVE OPENING (mm) | U.S. STANDARD SIEVE SIZE

GRAIN SIZE IN MILLIMETERS

PERCENT FINER BY DRY WEIGHT

UNDISTURBED CONDITION: MOISTURE % | DRY UNIT WEIGHT g/cc pcf

SOLUBLE SALTS %

SHRINKAGE LIMIT %

ATTERBERG LIMITS: NATURAL MOISTURE | AIR DRY | LL NP | PL NP | PI NP

SPECIFIC GRAVITY (G_s)

REMARKS

Form SCS 353a
9-64

LABORATORY NO 201.1

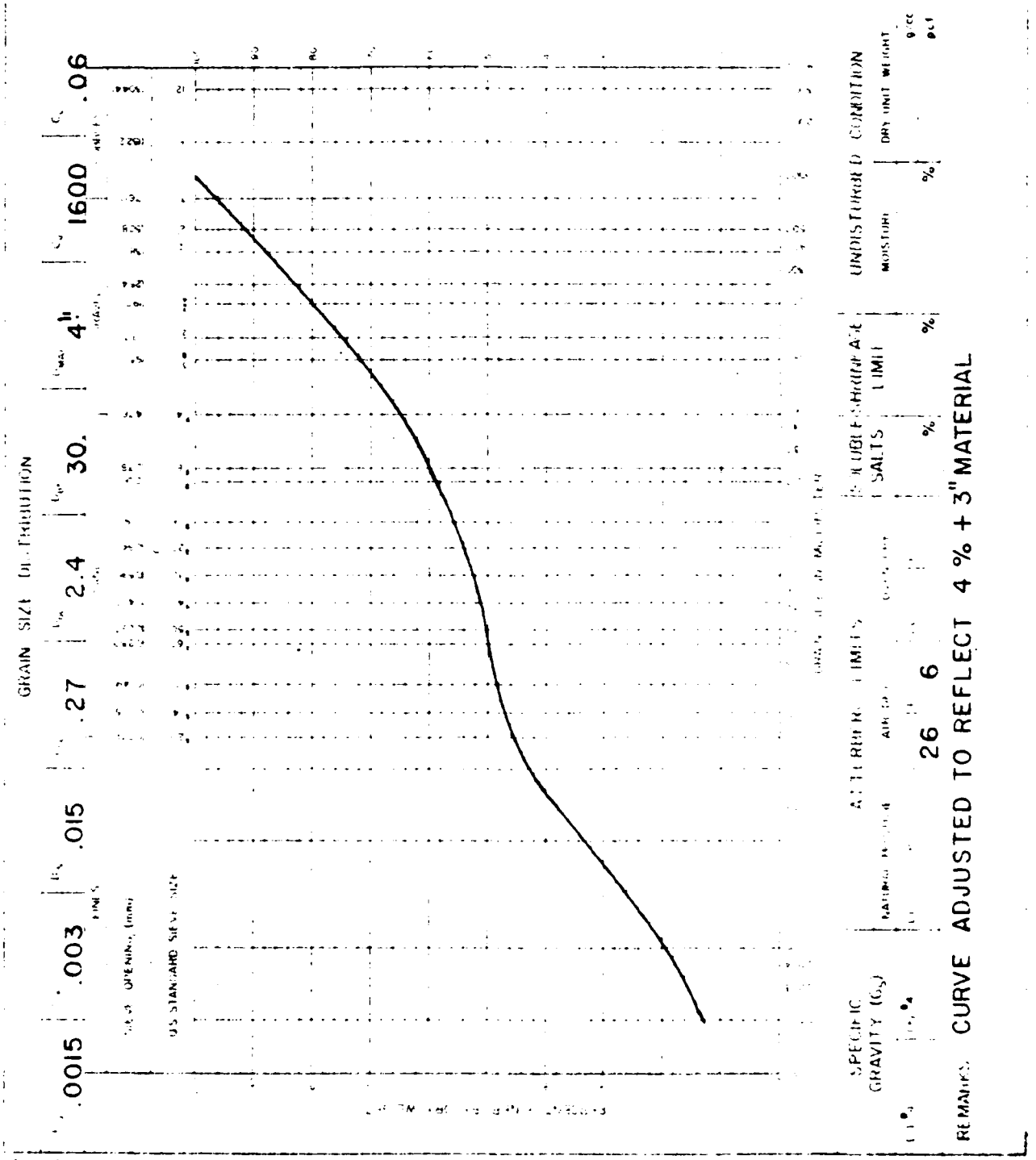
MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	SOIL CLASSIFICATION

PROJECT and STATE: JACOBSEN POND, OTSEGO CO., N.Y.
SAMPLE LOCATION: EM. SPLWY

FIELD SAMPLE NO	DEPTH	GEOLOGIC ORIGIN
201.1	8'-10'	

TYPE OF SAMPLE	TESTED AT	APPROVED BY	DATE
DIST. 35 LB.	SCS LAB-SYR., N.Y.		5-19-66

SYMBOL GM - GC
DESCRIPTION



MATERIALS TESTING REPORT | U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE | COMPACTION AND PENETRATION RESISTANCE

JACOBSEN POND, OTSEGO CO., N.Y.

201.1 EM. SPLWY 8'-10'

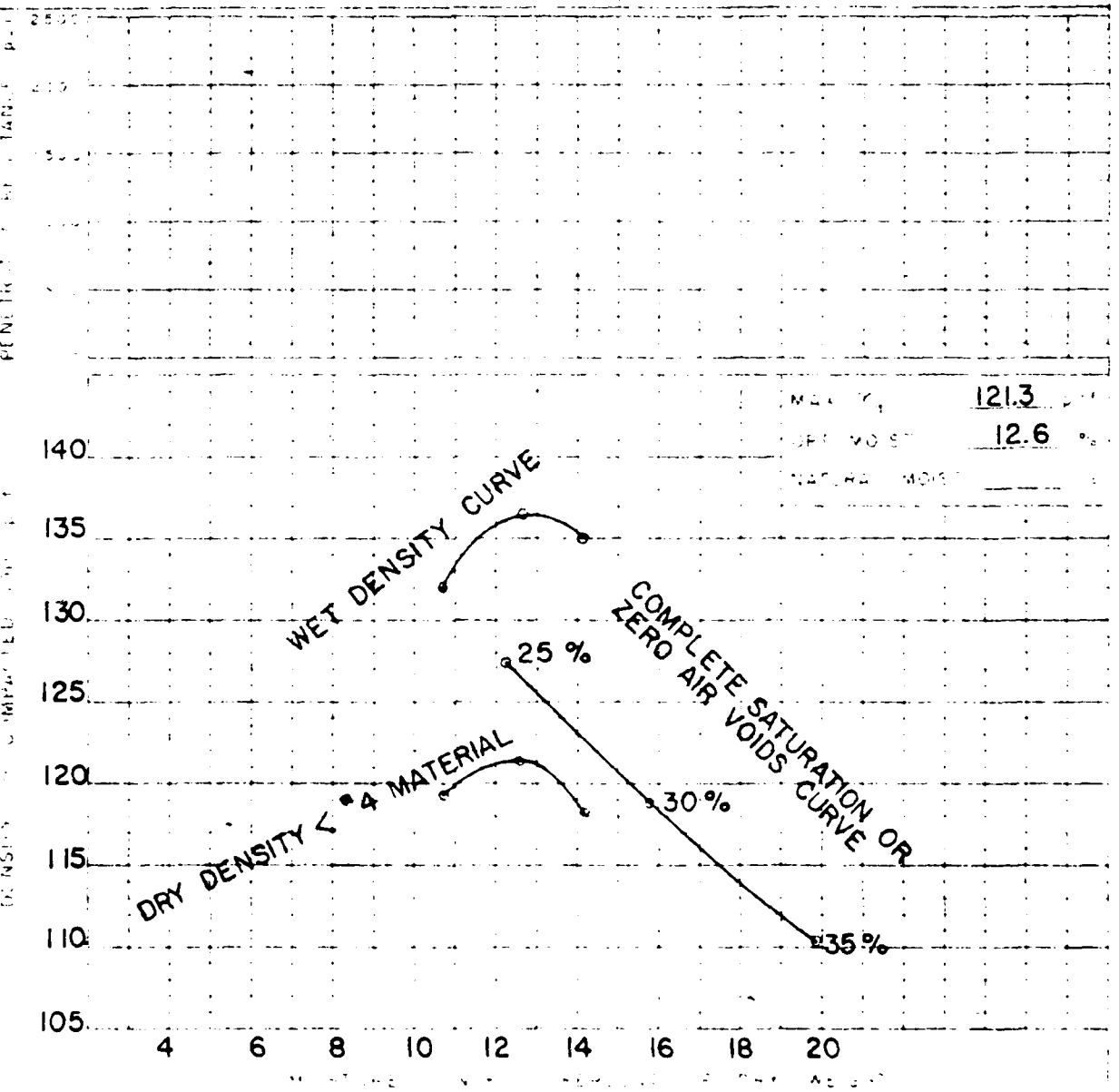
SCS LAB-SYR.N.Y. 5-66

CLASSIFICATION GM-GC 26 6 CURVE NO. 2 OF 2

MAX. PARTICLE SIZE INCLUDED IN TEST #4 STD. ASTM D-698, X METHOD A

SPECIFIC GRAVITY (G_s) MINUS NO. 4 MOD. ASTM D-[illegible] METHOD

PLUS NO. 4 OTHER TESTS SEE REMARKS



MAX. γ_d 121.3 pcf

OPT. MOIST 12.6 %

NATURAL MOIST. [illegible] %

REMARKS

LABORATORY NO. 302-A1

MATERIALS TESTING REPORT — U.S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE

SOIL CLASSIFICATION

PROJECT OR STATE: JACOBSEN POND OTSEGO CO., N.Y

SAMPLE LOCATION: Q PR. SPLWY

SAMPLE NO.: 302-A1

SUBMITTED BY: DIST

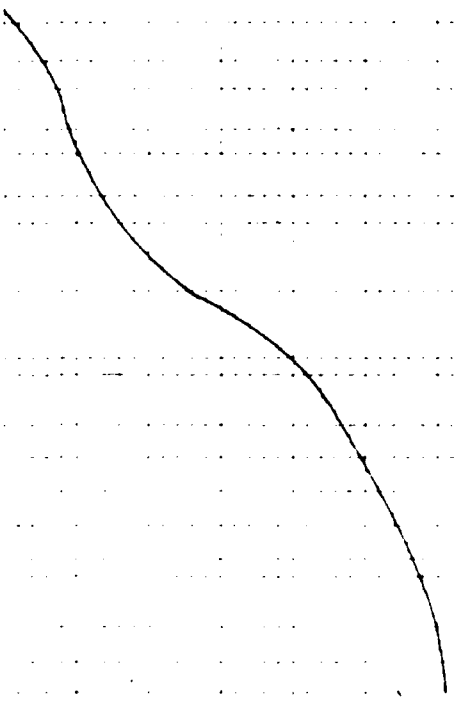
SPECIFICATION: SCS LAB-SYR., N.Y.

APPROVED BY:

DATE: 7-16-66

SYMBOL

DESCRIPTION



Form SCS 353a
9-64

LABORATORY NO 302-A2

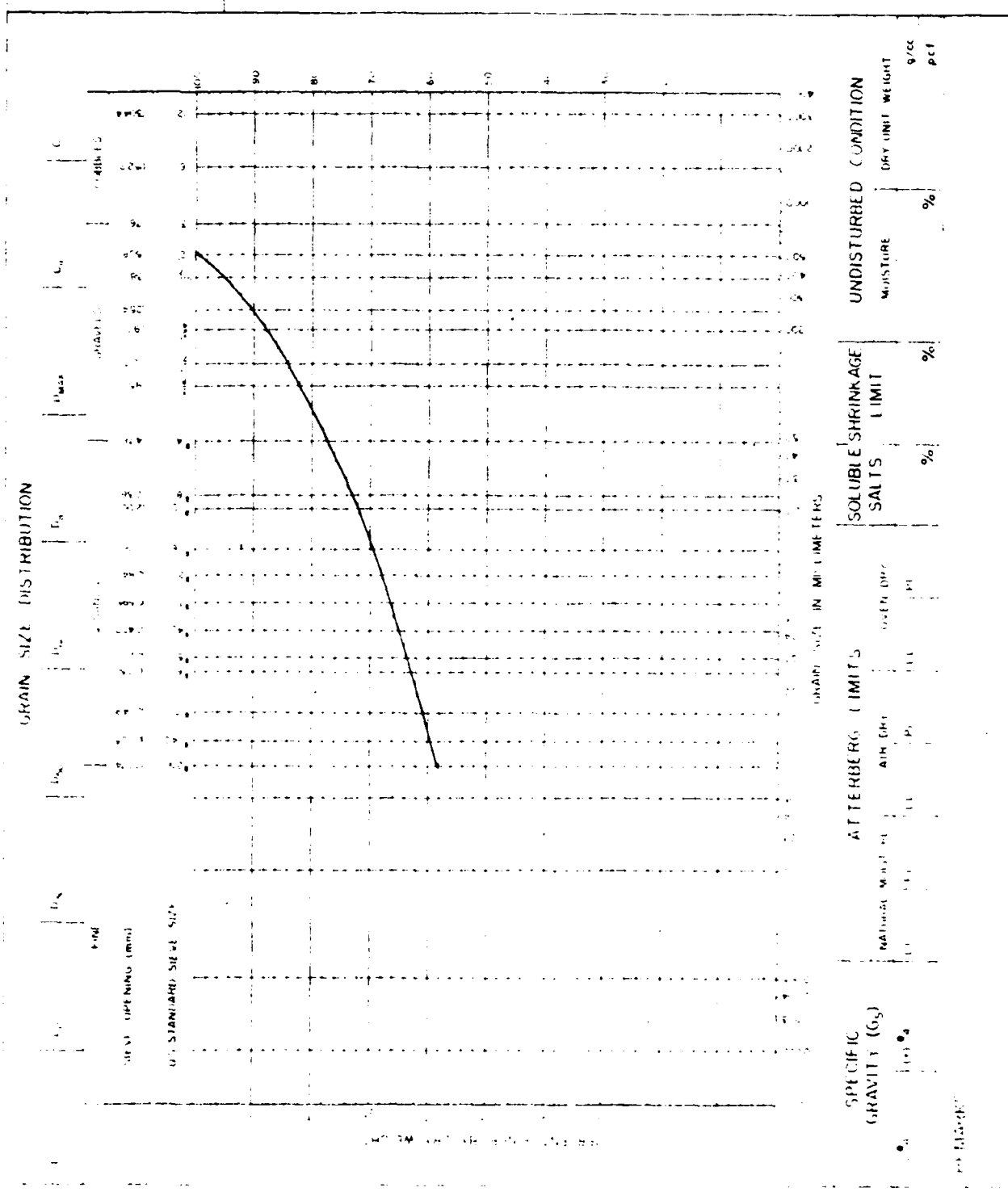
MATERIALS TESTING REPORT	U. S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE	SOIL CLASSIFICATION

PROJECT and STATE: JACOBSEN POND, OTSEGO CO., N.Y.
SAMPLE LOCATION: ℄ PR. SPLWY

FIELD SAMPLE NO	DEPTH	GEOLOGIC ORIGIN
302-A2		

TYPE OF SAMPLE	TESTED AT	APPROVED BY	DATE
DIST.	SCS LAB - SYR., N.Y.		7-16-66

SYMBOL	DESCRIPTION



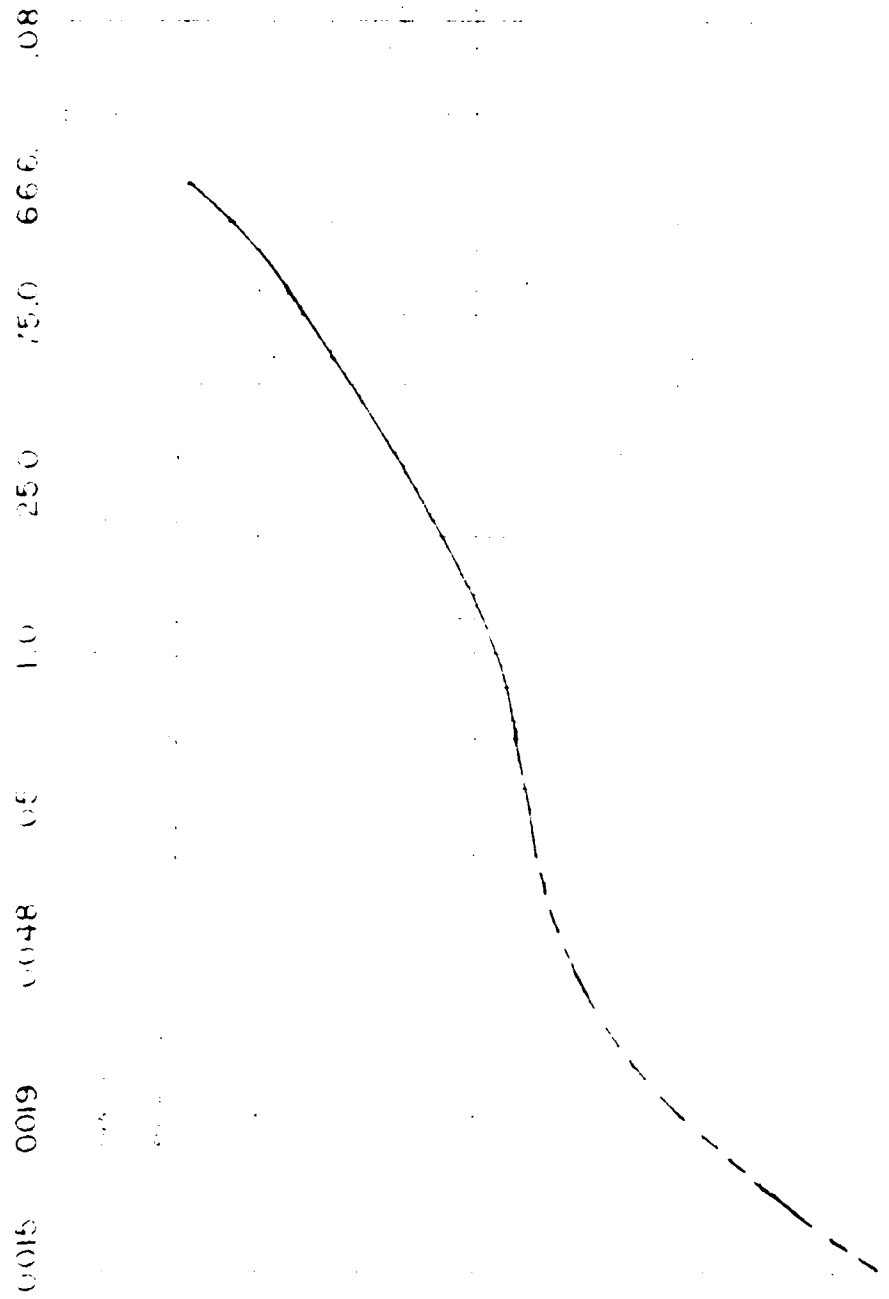
MATERIALS TESTING REPORT: SOIL CONSERVATION SERVICE

SOIL CLASSIFICATION

JACOBSEN POND OTSEGO CO., N.Y.

501.1

DIST. SCS LAB-SYR., N.Y. 7-16-66



STRUCTURAL CALCULATIONS

STATE NEW YORK		PROJECT LARCHWOOD LAKE		
BY DCZ	DATE 7/66	CHECKED BY	DATE	JOB NO. NY-936P
SUBJECT RISER LOAD COMPUTATION				SHEET 1 OF 1-1

γ_s = 140 p.c.f. (this value is considered conservative)

γ_b = 140 − 62.4 = 77.6 p.c.f.

Assume $K = 0.55$

$\therefore \gamma = 0.55(77.6) = 42.7$

$\gamma_{effective}$ = 42.7 + 62.4 = 105.1 p.c.f.

T.R.30 Pg. 1-2 K_{WB} = 45 pcf $\therefore \gamma$ = 45 + 62.4 = 107.4 p.c.f.

$\therefore$ Design Loading is adequate.

STATE NEW YORK		PROJECT LARCHWOOD LAKE		
BY D.C.Z	DATE 7/66	CHECKED BY LCI	DATE 8/2/66	JOB NO. NY-936P
SUBJECT Conduit Loading Calculations				SHEET 1 OF 2 2-1

EARTH FILL :

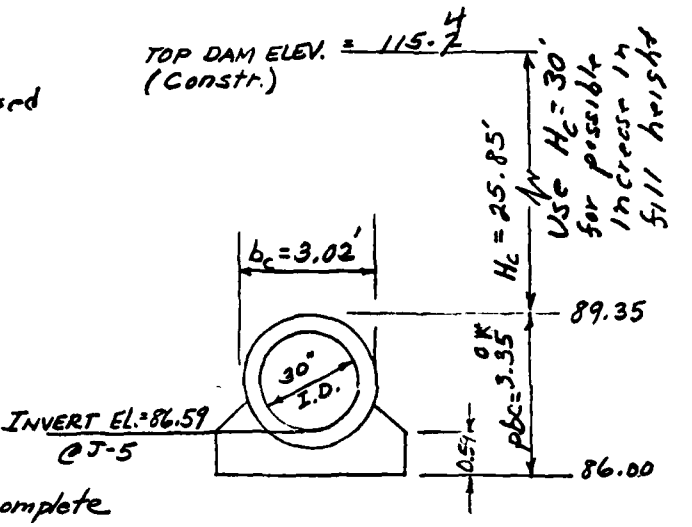
Embankment material is a dense glacial till & homogeneous.

γ = 140 #/cu. FT. (ASSUMED)

ϕ = ~~25°~~ 32° assumed based on GM-GC

Wall Thickness = 3.12"

Type B-1 Concrete Bedding



Classify as a positive projecting (Refer to SCS-~~42~~ 27 Rev) Conduit

1- Sub-classify as complete or incomplete

$$p = \frac{p b_c}{b_c} = \frac{3.35}{3.02} = 1.11$$

S = 1.0 (ES-115 sheet 2 of 4 - Assume Case a)

δp = 1.0 × 1.11 = 1.11

$K\mu$ = 0.19 (ES-114 sheet 3 of 3)

$\frac{He}{b_c}$ = 2.10 (ES-117 sheet 1 of 2)

$$\frac{Hc}{b_c} = \frac{30.0}{3.02} = \frac{9.93}{\sout{8.60}}$$

$\frac{Hc}{b_c} > \frac{He}{b_c}$ ∴ INCOMPLETE Condition Exists

2- Obtain Cp (ES-118 sheet 2 of 3)

$2K\mu \frac{Hc}{b_c}$ = 2 × 0.19 × ~~8.60~~ 9.93 = 3.77

$2K\mu\,\delta p$ = 2 × 0.19 × 1.11 = 0.422

$2K\mu Cp$ = ~~6.7~~ 7.85 (ES-118 2 of 3)

$$Cp = \frac{7.85}{2K\mu} = \frac{7.85}{2 \times 0.19} = \frac{20.53}{\sout{17.63}}$$

STATE NEW YORK		PROJECT LARCHWOOD LAKE		
BY DCZ	DATE 7/66	CHECKED BY JCI	DATE 8/9/66	JOB NO. NY-936 P
SUBJECT Conduit Loading Calculations				SHEET 2 OF 2 27

3 - Solve for W_c

$$W_c = C_p \gamma b_c^2 = \cancel{19.632}\ 20.53 \times 140 \times (3.02)^2 = \cancel{23,544}\ 26,214\ \#/\text{L.F. of conduit}$$

4 - Solve for K_t

$K = \cancel{0.27}\ 0.31$ (ES-114 Sheet 3 of 3)

$$K_t = \frac{\rho K}{C_p}\left(\frac{H_c}{b_c} + \frac{\rho}{2}\right) = \frac{1.0 \times 0.\cancel{27}\ 31}{\cancel{17.63}\ 20.63}\left(\frac{9.93}{\cancel{8.60}} + \frac{1.0}{2}\right) = 0.\cancel{184}\ 164$$

5 - Obtain X_p (ES-120 sheet 3 of 5 for type B-1 Concrete Bedding)

$X_p = 0.650$

6 - Obtain X_a (ES-120 sheet 5 of 5)

Use $\rho = 1.0$

$X_a = 0.638$

7 - Solve for L_f

$$L_f = \frac{1.431}{X_p - K_t \cdot X_a} = \frac{1.431}{0.650 - (\cancel{0.184}\ 0.164)(0.638)} = \cancel{2.55}\ 2.60$$

8 - Solve for Reb

$$\text{Reb (Prestressed - 0.001" crack)} = \frac{W_c}{L_f} = \frac{\cancel{23,544}\ 26,214}{\cancel{2.55}\ 2.60} = \cancel{9,229}\ 10,044\ \#/\text{L.F.}$$

— Pressure Head = 25 FT.

— Load (W_c) = $\cancel{23,544}\ 26,214$ #/LN.FT. based on O.D. of 3.02' (Reference - Lock Joint SP-12 PIPE)

— Min. 3 edge bearing for 0.001" crack

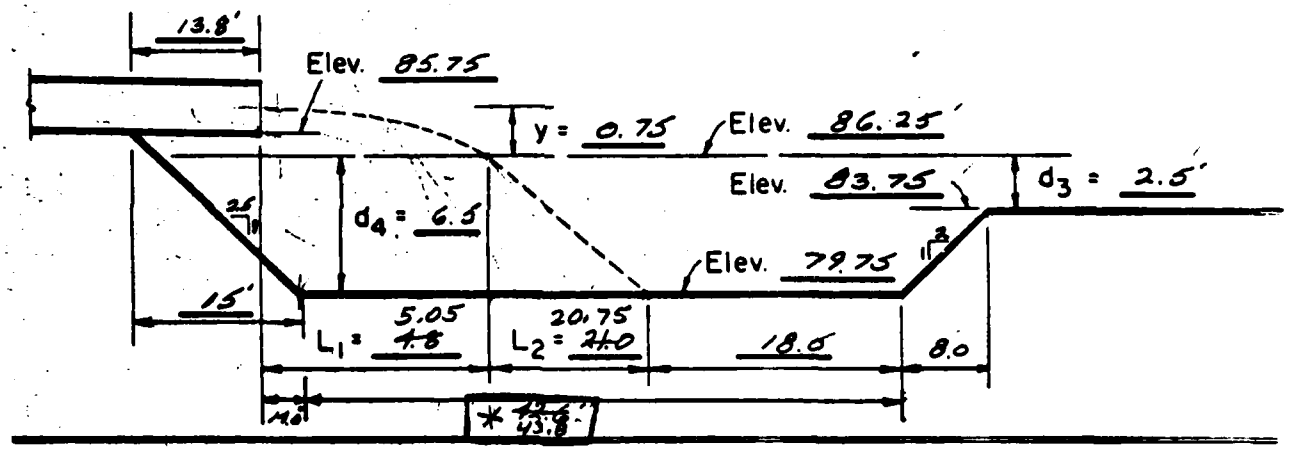
Reb (Prestressed Pipe) = $\cancel{9,229}\ 10,044$ #/LN.FT. (AWWA C-301)

~~MAX~~ MAX strength for SP-12 = 10,000 #/L.F.

By I.A.P.	Date 3/12/66	Checked By D.S.Z.	Date 7/6	Job No NY-936-D
Subject STILLING BASIN COMPUTATION				Sheet of 3

GIVEN:

- Q_p = 115 C.F.S. (At Design High Water)
- D_p = 30 IN. (Dia. of Pipe)
- A_p = 1.909 SQ. FT. (Area of Pipe)
- b_1 = 5.0 FT. (Bottom Width of Basin)
- S.S. = 2:1 (Side Slope of Basin)
- b_2 = 10.0 FT. (Bottom Width of Outlet Channel)
- S.S. = 2:1 (Side Slope of Outlet Channel)
- S = 0.0025 FT./FT. (Slope of Outlet Channel)
- n = 0.035



TAILWATER: ~~(d_3)~~

$$X = \sqrt{\frac{2V_0^2 y}{9}}$$

$$x = \sqrt{\frac{2(23.42)^2}{32.2}} \times \sqrt{y=0.75}$$

$Q = AV$

$V = \frac{Q}{A} = \frac{115}{4.909} = 23.42$ fps.

$X_1 = 5.837 \times .865 = 5.05 = L_1$

From Curve $L_1 + L_2 = 25.8$

$L_2 = 26.8 - 5.05 = 20.75$

* - ACTUAL LENGTH OF 30' USED - AS RECOMMENDED BY DESIGN ENGR.

LARCHWOOD LAKE STILLING BASIN CUR.

ADD VALUES OF y =

$y_1 = 0.1$, $x_1 = 23.5(0.1)^{1.7} = 1.9$

$y_2 = 0.5$, $x_2 = " (0.5)^{1.7} = 4.1$

$y_3 = 1.9$, $x_3 = " (1.9)^{1.7} = 8.04$

$y = \frac{q}{2} \frac{x^2}{v_1^2} \quad \frac{q^2}{2} \frac{x^2}{23.5^2}$

$y = 0.03 x^2$

USE DEV. V

D-50

GPO 1956 O—470867

STATE NEW YORK		PROJECT LARCHWOOD LAKE		
BY J.F.P.	DATE 7/12/66	CHECKED BY D.C.Z	DATE 7/66	JOB NO. N.Y.- 936- D
SUBJECT OUTLET CHANNEL VELOCITY - PRINCIPAL SPILLWAY				SHEET ____ OF ____ 4-1

$Q = 115$ cfs

$n = 0.035$

$b = 10.0$ ft

$S = 0.0025$ ft/ft

S.S. = 2:1

$$Q = \frac{K'}{n} b^{8/3} S^{1/2}$$

$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{115 \times 0.035}{(10)^{8/3} \times (0.0025)^{1/2}} = \frac{115 \times 0.035}{464 \times 0.05} = \frac{4.025}{23.2}$$

$K' = 0.173$

From TABLE 7-11, PAGE 7-38 OF KING'S HANDBOOK OF HYDRAULICS

$\frac{D}{b} = 0.25$

$D = 0.25 \times 10.0 = 2.50$ FT.

$D = 2.5$

$r = 1.77$

$V = 1.78$ F.P.S. $\quad V = 3.01$ f.p.s

DAM CONSTRUCTION PERMIT APPLICATION

STATE OF NEW YORK
WATER RESOURCES COMMISSION
CONSERVATION DEPARTMENT
ALBANY, N.Y. 12226

WRC FORM #2 1/66

Do Not Write in This Box

Appl. No. 7-0-66-66 Dam No. 130C-3588
Permit No. _____ Watershed Susquehanna River

Application for a Permit for the Construction, Reconstruction or Repair of a Dam or Other Impoundment Structure under Conservation Law, Section 429(c).

INSTRUCTIONS

1. Type or print ink.
2. All papers must be filed in quadruplicate.
3. The completed application relating to construction, reconstruction or repair of a dam must include the following information:

   (a) A topographical plan (with contours) of the impounded area drawn to a suitable scale.

   (b) A profile and transverse section of the impounded area showing the proposed excavation, the normal water and possible high water elevations. A 1'-0" minimum of freeboard is to be provided between the top of the dam and the possible high water.

   (c) A longitudinal elevation and transverse section of the dam with all the necessary details of the related appurtenances, spillways, drains, etc.

   (d) A log of the soil information. Samples of the materials to be used in the dam and of the material upon which the dam is to be founded may be asked for, but need not be furnished unless requested.
4. No work of construction, reconstruction or repairs of the structure or structures shall be started until a permit therefor has been issued by the New York State Water Resources Commission.
5. The design, preparation of plans, estimates and specifications and the supervision of the erection, reconstruction and repair of all the structures herein applied for shall be done by a licensed professional engineer, or in the case of farm ponds by an engineer or conservationist employed by a governmental agency cooperating with a soil conservation district, or by an engineer employed by the Conservation Department.
6. A "Notice of Application" must be published by the applicant. The form of notice and instructions for publication will be furnished to the applicant by the Local Permit Agent to whom the application is delivered.

APPLICATION

Application is hereby made by (Clair Jackson) Larchwood Lake to the Conservation Department acting on behalf of the Water Resources Commission, pursuant to the provisions of Conservation Law, Section 429(c) for a permit to (construct) ~~(reconstruct)~~ ~~(repair)~~ a dam or impoundment structure substantially as shown on plans and specifications marked N.Y. 936-P herewith submitted and described.

It is intended to commence the work covered by the application about Aug 1966 (Date) and complete it about Nov. 1967 (Date).

1. The dam will be on Butts Corner Creek flowing into Wharton Creek in the town of Laurens County of Otsego and 1.3 Mi N.W. of Butts Corner
(Give exact distance and direction from a well-known bridge, dam, village, main cross-roads or mouth of a stream)
2. Location of dam is shown on the attached map or overlay of the Morris N.Y. quadrangle of the United States Geological Survey at latitude 42° 33' 00" longitude 75° 16' 02".
3. The impounded water will be used for Recreation
4. Will any part of the dam be built upon or its pond flood any State lands? no
5. The area draining into the proposed pond or lake is 735 acres; 1.15 square miles.
6. The computed 6 hr. duration storm 57 year peak rate of runoff used in the design is 4078 cu. ft. per sec. State criterion or method used in determining the peak rate of runoff U.S.D.A. Soil Cons. Serv. Engineers Hdbk #4 - Soil Conser Complet
7. The maximum height of the proposed dam above the bed of the stream will be 27 feet — inches.
8. The designed maximum high water elevation above the spillcrest is computed to be 2.6 feet — inches; the designed freeboard as measured from the maximum high water elevation to the top of the proposed dam will be 2.9 feet — inches. (One foot minimum)
9. The open spillway of the proposed dam that will control the designed flood flow will be of Vegtated Earth Spillway
(State type, such as: vegetated earth, concrete, masonry, timber, rock filled crib, etc.)

The width of the control section of the spillway, measured normal to the flow of water at the crest, will be 85 feet — inches in the clear; facing down stream, the waters will be held at the right end by a Natural Bank the top of which will be — feet — inches above the spillcrest, and have a top width of — feet — inches; and at the left end by Natural Bank + Dike the top of which will be 5.5 feet — inches above the spillcrest and have a top width of 14 feet — inches. The slope of the sides of the spillway will be 3 on 1 (left) 3 on 1 (right)

or Other Impoundment Structure under Conservation Law, Section 429(c).

INSTRUCTIONS

1. Type or print in ink.
2. All papers must be filed in quadruplicate.
3. The completed application relating to construction, reconstruction or repair of a dam must include the following information:

   (a) A topographical plan (with contours) of the impounded area drawn to a suitable scale.

   (b) A profile and transverse section of the impounded area showing the proposed excavation, the normal water and possible high water elevations. A 1'-0" minimum of freeboard is to be provided between the top of the dam and the possible high water.

   (c) A longitudinal elevation and transverse section of the dam with all the necessary details of the related appurtenances, spillways, drains, etc.

   (d) A log of the soil information. Samples of the materials to be used in the dam and of the material upon which the dam is to be founded may be asked for, but need not be furnished unless requested.
4. No work of construction, reconstruction or repairs of the structure or structures shall be started until a permit therefor has been issued by the New York State Water Resources Commission.
5. The design, preparation of plans, estimates and specifications and the supervision of the erection, reconstruction and repair of all the structures herein applied for shall be done by a licensed professional engineer, or in the case of farm ponds by an engineer or conservationist employed by a governmental agency cooperating with a soil conservation district, or by an engineer employed by the Conservation Department.
6. A "Notice of Application" must be published by the applicant. The form of notice and instructions for publication will be furnished to the applicant by the Local Permit Agent to whom the application is delivered.

APPLICATION

Application is hereby made by (Clair Jacobson) Larchwood Lake tc the Conservation Department acting on behalf of the Water Resources Commission, pursuant to the provisions of Conservation Law, Section 429(c) for a permit to (construct) ~~(reconstruct)~~ ~~(repair)~~ a dam or impoundment structure substantially as shown on plans and specifications marked N.Y. 936-P herewith submitted and described.

It is intended to commence the work covered by the application about Aug 1966 (Date) and complete it about Nov. 1967 (Date).

1. The dam will be on Butts Corner Creek flowing into Wharton Creek in the town of Laurens County of Otsego and 1.3 Mi N.W. of Butts Corners (Give exact distance and direction from a well-known bridge, dam, village, main cross-roads or mouth of a stream)
2. Location of dam is shown on the attached map or overlay of the Morris, N.Y. quadrangle of the United States Geological Survey at latitude 42° 33' 00" longitude 75° 16' 02".
3. The impounded water will be used for Recreation
4. Will any part of the dam be built upon or its pond flood any State lands? No.
5. The area draining into the proposed pond or lake is 735 acres; 1.15 square miles.
6. The computed 6 hr. duration Storm 50 year peak rate of runoff used in the design is 4078 cu. ft. per sec. State criterion or method used in determining the peak rate of runoff U.S.D.A. Soil Cons. Serv. Engineers Hdbk #4 - Soil Conser Complet
7. The maximum height of the proposed dam above the bed of the stream will be 27 feet — inches.
8. The designed maximum high water elevation above the spillcrest is computed to be 2.6 feet — inches; the designed freeboard as measured from the maximum high water elevation to the top of the proposed dam will be 2.9 feet — inches. (One foot minimum)
9. The open spillway of the proposed dam that will control the designed flood flow will be of Vegtated Earth Spillway (State type, such as: vegetated earth, concrete, masonry, timber, rock filled crib, etc.)

The width of the control section of the spillway, measured normal to the flow of water at the crest, will be 85 feet — inches in the clear; facing down stream, the waters will be held at the right end by a Natural Bank the top of which will be — feet — inches above the spillcrest, and have a top width of — feet — inches; and at the left end by a Natural Bank + Dike the top of which will be 5.5 feet — inches above the spillcrest and have a top width of 14 feet — inches. The slope of the sides of the spillway will be 3 on 1 (left) 3 on 1 (right).

10. The spillway is designed to safely discharge 875 cu. ft. per sec.
11. The surface area of the proposed pond or lake will be 59 acres at the normal water elevation and 74 acres at the spillcrest elevation; the volume of the water impounded in the pond or lake will be 19,223,911 gallons at the normal water elevation and 24,111,346 gallons at the spillcrest elevation.
12. The normal water elevation of the proposed pond or lake will be 2.6 feet — inches below the spillway crest, and will be maintained by means of a Reinforced Concrete Drop outlet; the pond or lake will be drained by means of a 12" diam C.I.P.; provision will be made for supplying water to riparian owners downstream, during dry seasons, by means of 12" sluice gate.
13. The maximum discharge through the spillway that controls the normal water elevation will be 114 cu. ft. per sec. during maximum high water.

N.A. 14. If flashboards are to be used to control flood flow they must be of the automatic or self-tilting type, designed to fail or otherwise permit full discharge through the spillway when the flood waters reach a height of _____ feet _____ inches above the spillcrest.

N.A. 15. If an overfall structure is used as a spillway, it shall be provided with an apron constructed of _____; the thickness of the _____ will be _____ feet _____ inches, the width _____ feet _____ inches across the stream and the length _____ feet _____ inches parallel to the stream.

16. Facing downstream, what is the nature of material composing the right bank? gravel, silty moderately permeable - Glacial till

17. Facing downstream, what is the nature of the material composing the left bank? Gravel, silty with sand, massive, slowly permeable, glacial till

18. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) gravel, silty, slowly permeable, glacial till

19. Are there any porous seams or fissures beneath the foundation of the proposed dam? no.

20. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Material is slow to moderately permeable, firm in place, uniformly dense, Glacial till.

21. Was the above soil information obtained from soil borings? -; test pits? _____

22. State the height above the spillcrest elevation of the lowest part of the immediate upstream adjoining property or properties, - feet - inches. Flooding rights obtained by owner

23. Does this proposed pond or lake constitute any part of a public water supply? no If not, where is the nearest downstream public water supply intake located? unknown

24. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam possible damage to life, buildings & County road 1½ to 1¾ mi from site to

25. The design, plans and specifications have been prepared under the supervision of near Butts Corners
U.S.D.A Soil Conserv. Ser. or P.E. License No. _____
(Authorized Agency)
Address 700 E. Water St. Syracuse N.Y. Title State Conservation Engineer

26. The Erection will be under the supervision of
(State which: Erection, Reconstruction or Repairs)
U.S.D.A Soil Conserv. Serv. or P.E. License No. _____
(Authorized Agency)
Address 139 Main St. Cooperstown, N.Y. Title Work Unit Conservationist

27. Name and address of official newspaper of the town or city in which the proposed works are to be located,
Ononta Star, Oneonta, N.Y.

All provisions of law will be complied with in the erection and maintenance of the proposed dam or impoundment structure. The construction will be carried out substantially in accordance with the approved plans and specifications.

If the applicant is other than the owner, the applicant certifies that he has been duly authorized by the owner to make the application and to carry out the project described herein.

The applicant certifies the truth of the above statements and agrees that the issuance of the permit is based on the accuracy thereof. As a condition to the issuance of a permit, the applicant accepts full legal responsibility for all damage, direct or indirect, of whatever nature, and by whomever suffered, arising out of the project described herein and agrees to indemnify and save harmless the State from suits, actions, damages and costs of every name and description resulting from the said project.

Clair Jacobsen, Owner

By _____, authorized agent of owner.

Address of owner New Berlin, N.Y.

Address of signer _____ Date Aug 15, 1966
(If other than owner)

NOTE: Acceptance of a permit subjects permittee to restrictions, regulations or obligations stated in application and permit.

DAM CONSTRUCTION PERMIT

WRC FORM #3 1/66

PERMIT NO. 7-66-66
DAM NO. 130C-3588
Susquehanna River

STATE OF NEW YORK
WATER RESOURCES COMMISSION
CONSERVATION DEPARTMENT

CLAIR JACOBSEN residing at
New Berlin, New York
is hereby permitted to: (construct) (reconstruct) (repair) (alter the bed or banks of) (dredge) (place fill in) A Pond
Located in County Otsego Town Laurens by
carrying out the following works: Construct an earth fill dam with vegetated spillway according to Soil Conservation Service plans # NY 936-P and specifications attached thereto

Section of stream to which this permit applies Butts Corner's Creek, tributary of Wharton Creek, 1.3 miles northwest of Butts Corners

Note: (a) This permit does not relieve the permittee of responsibility for damages to riparian owners or others.

(b) If the structure or work herein authorized is not completed on or before 31st day of December, 1967, this permit, if not specifically extended, shall cease and be null and void.

CONDITIONS

1 The permitted work shall be subject to inspection by an authorized representative of the Water Resources Commission who may order the work suspended if the public interest so requires.

2. The permittee shall file in the office of the Local Permit Agent a notice of intention to commence work at least 48 hours in advance of the time of commencement and shall also notify him promptly in writing of the completion of the work.

3. As a condition of the issuance of this permit, the applicant has accepted expressly, by the execution of the application, the full legal responsibility for all damages, direct or indirect, of whatever nature, and by whomever suffered, arising out of the project described herein and has agreed to indemnify and save harmless the State from suits, actions, damages and costs of every name and description resulting from the said project.

4. Any material dredged in the prosecution of the work herein permitted shall be removed evenly, without leaving large refuse piles, ridges across the bed of the waterway, or deep holes that may have a tendency to cause injury to navigable channels or to the banks of the waterway.

5. Any material to be deposited or dumped under this permit, either in the waterway or on shore above high-water mark, shall be deposited or dumped at the locality shown on the drawing hereto attached, and, if so prescribed thereon, within or behind a good and substantial bulkhead or bulkheads, such as will prevent escape of the material into the waterway.

6. There shall be no unreasonable interference with navigation by the work herein authorized.

7. That if future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Water Resources Commission it shall cause unreasonable obstruction to the free navigation of said waters or endanger the health, safety or welfare of the people of the State, or loss or destruction of the natural resources of the State, the owner may be ordered by the Commission to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the State, and to such extent and in such time and manner as the Water Resources Commission may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

8. That the State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

9. That if the display of lights and signals on any work hereby authorized is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the owner.

10. All work carried out under this permit shall be performed in accordance with established engineering practice and in a workmanlike manner.

11. This permit shall not be construed as conveying to the applicant any right to trespass upon the lands of others to perform the permitted work or as authorizing the impairment of any right, title or interest in real or personal propery held or vested in a person not a party to the permit.

12. Nothing in this permit shall be deemed to affect the responsibility of the permittee to comply with any applicable Rules and Regulations of the U.S. Army Corps of Engineers or any other governmental agency having jurisdiction.

Other Conditions:

13. Make provision for riparian flow to assure downstream owners and water users of an adequate water supply.

The issuance of this permit certifies that it is not contrary to the public interest that the proposed works be done.

The applicant in accepting this permit signifies his agreement to abide by the conditions set forth above.

Application Date August 15, 1966 Expiration Date December 31, 1967

Permit Issued October 3, 1966

By s/ R. A. COOK (Permit Agent) State Campus Site, Albany, New York 12226 (Name and Address)

Central

cc: J. Could, Regional Supervisor
A. Dickinson, Dept. of Public Works
Soil Conservation Service, Cooperstown

APPENDIX E

REFERENCES

REFERENCES

1. Chow, Ven Te, Editor - Handbook of Applied Hydrology. McGraw-Hill Book Company, New York, New York, 1964.

2. Hydrologic Engineering Center, U.S. Army Corps of Engineers, HEC-1 Flood Hydrograph Package, Users Manual. Davis, California, January 1973.

3. Hydrologic Engineering Center, U.S. Army Corps of Engineers, Flood Hydrograph Package (HEC-1), Users Manual for Dam Safety Investigations, Davis, California, September 1978.

4. King, Horace and Brater, Ernest. Handbook of Hydraulics, 5th Edition. McGraw-Hill Book Company, New York, New York, 1963.

5. Riedel, J.T., Appleby, J.F. and Schloemer, R.W. Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1000 Square Miles and Durations of 6, 12, 24, and 48 Hours (Hydrometeorological Report No. 33) U.S. Department of Commerce - Weather Bureau and U.S. Department of the Army - Corps of Engineers, Washington, D.C., April 1956

6. U.S. Department of the Interior, Bureau of Reclamation, Design of Small Dams, Second Edition, Washington, D.C., 1973.

APPENDIX F

DRAWINGS

LARCHWOOD LAKE

OTSEGO S.&W.C.D.

DRAINAGE AREA
NORMAL POND AREA
POND STORAGE
HEIGHT OF DAM

DESIGNED BY THE

U. S. DEPARTMENT OF AGRICULT
SOIL CONSERVATION SERVI

CHWOOD LAKE

SEGO S.& W.C.D.

735 ACRES
59 ACRES
512 AC. FT.
27 FEET

DESIGNED BY THE

TMENT OF AGRICULTURE
CONSERVATION SERVICE

SHEET
AREA
AREA
E
ES
GE SYSTEM DETAILS
E OF PRINCIPAL SPILLWAY
STRUCTURAL DETAILS
RACK, & SMALL ANIMAL GUARD
, CRADLE, BEDDING, BENT, & MISC. DETAILS
RAIN INLET DETAILS
TEST HOLES
EVISIONS

JUNE 1967	SHEETS 7 & 8	
DATE	ITEM	APP'D

REVISIONS

COVER SHEET

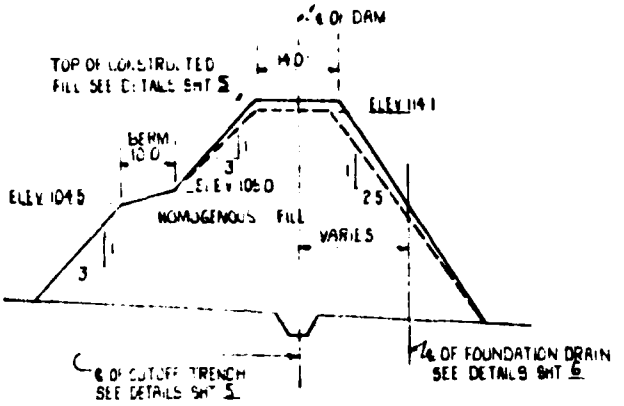
LARCHWOOD LAKE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

L. C. IBBITSON		
T.R. MULVANEY	3/66	
SHERRILL	7/66	
B.	8/66	1 of 14 — NY-930-P

1

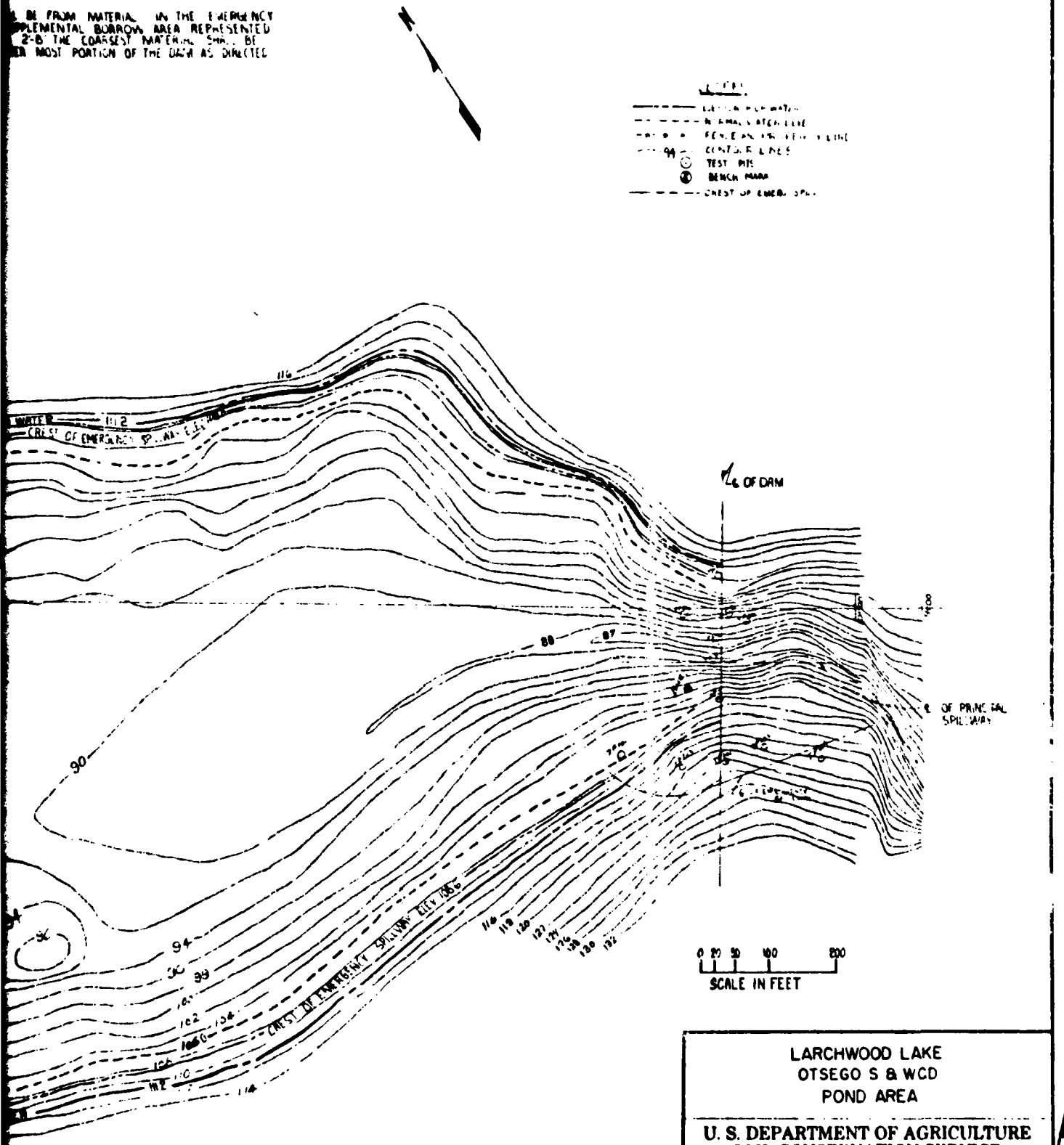
2



EARTH FILL SHALL BE FROM MATERIAL IN
SPILLWAY AND SUPPLEMENTAL BORROW ARE
BY TP 202 FROM 2-8' THE COARSEST MATE
PLACED IN THE OUTER MOST PORTION OF THE
BY THE ENGINEER

TYPICAL SECTION OF DAM AND FILL PLACEMENT
NOT TO SCALE

BE FROM MATERIAL IN THE EMERGENCY
SUPPLEMENTAL BORROW AREA REPRESENTED
2-B. THE COARSEST MATERIAL SHALL BE
ER MOST PORTION OF THE DAM AS DIRECTED



LARCHWOOD LAKE
OTSEGO S & WCD
POND AREA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

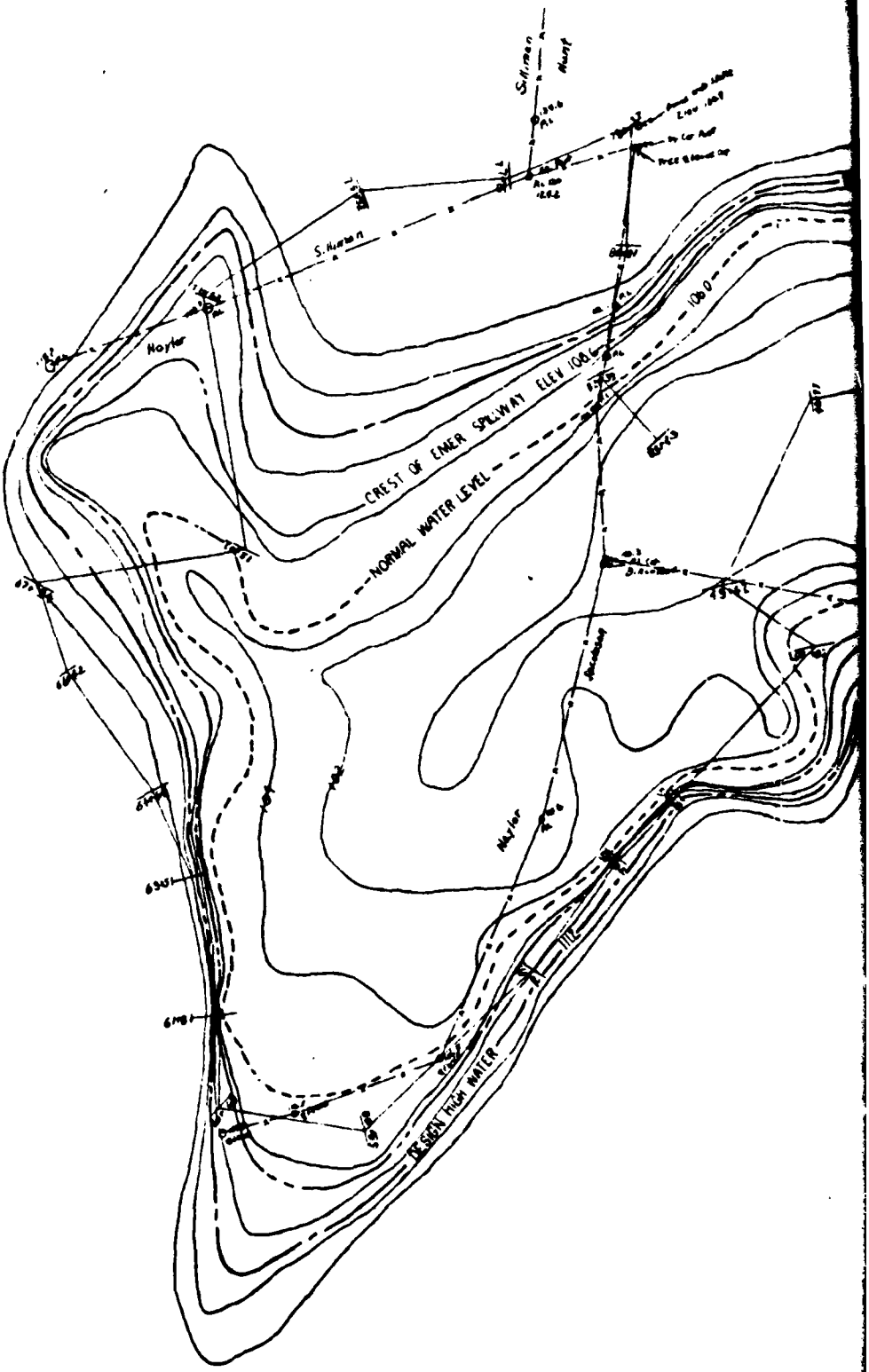
	Date	
		Approved By
	5/80	
	5/80	
	5/80	

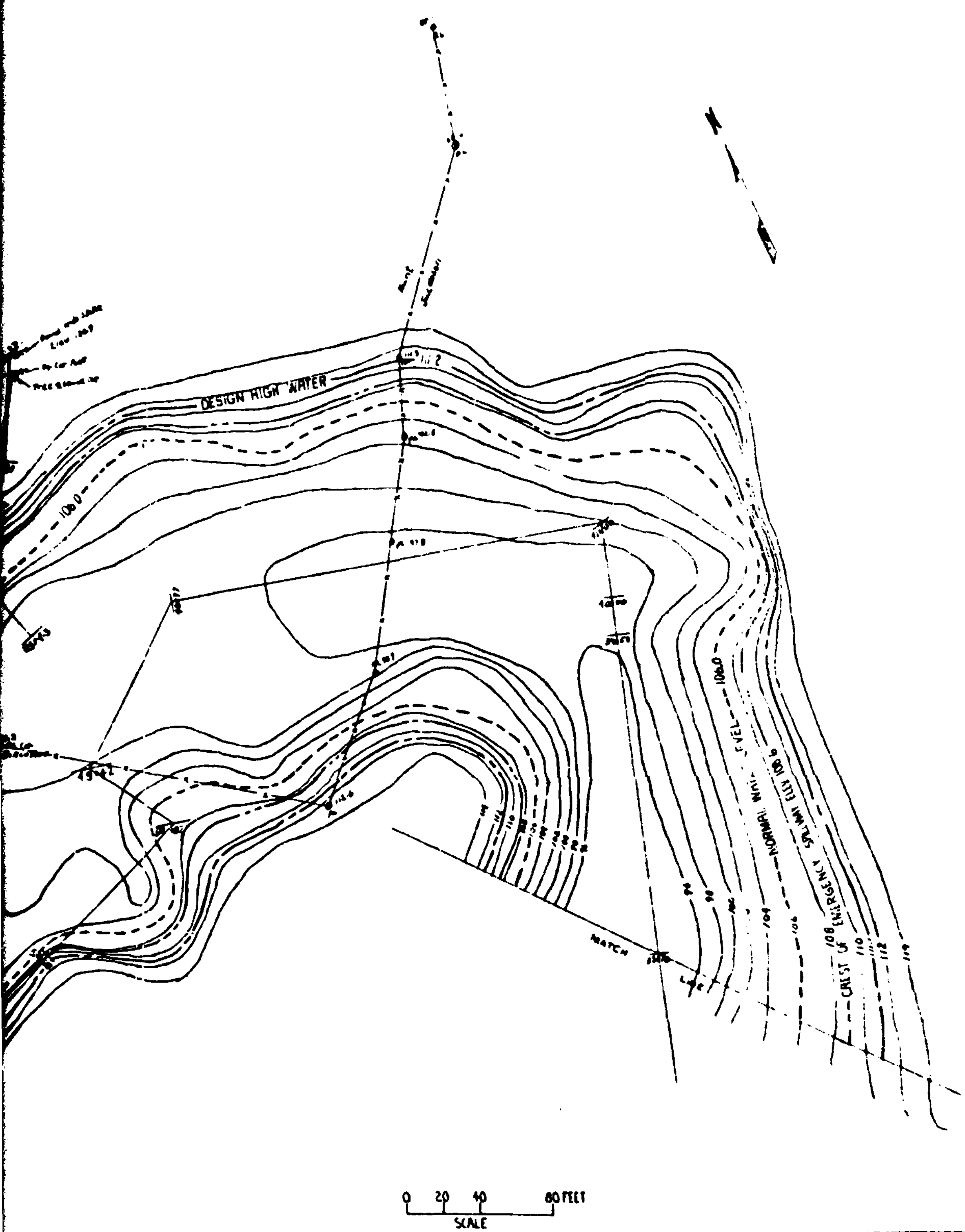
NY- 936 -P

2' CONTOUR INTERVAL

GENERAL NOTES

1. AREAS UNDER DAM, DIKE, EMERGENCY SPILLWAY, OUTLET CHANNEL AND SUPPLEMENTAL BORROW AREA TO BE CLEARED AND GRUBBED. LIMITS TO BE CLEARED AND GRUBBED SHALL BE AS STAKED IN THE FIELD BY THE ENGINEER (SPEC 2A)
2. ALL CLEARING AND FENCE REMOVAL UPSTREAM FROM DAM WILL BE DONE BY OTHERS
3. BOTTOM SECTION OF EMERGENCY SPILLWAY TO BE COVERED WITH 6" OF TOPSOIL. ALL ADDITIONAL TOPSOIL THAT IS SUITABLE FOR USE WILL BE INCORPORATED WITHIN THE SLOPES OF THE EARTH FILL AS DIRECTED BY THE ENGINEER





FOR LEGEND SEE SHEET 2

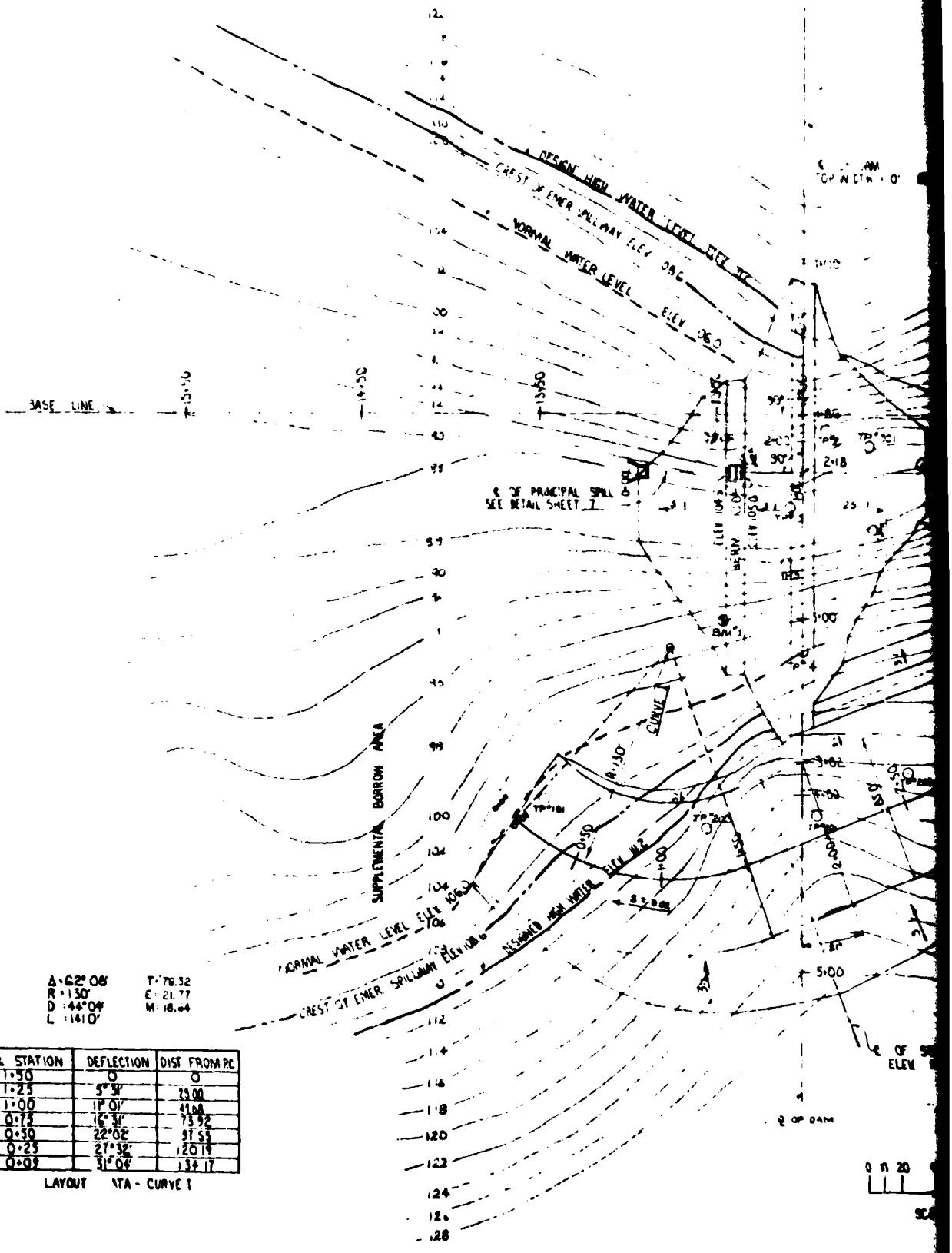
2' CONTOUR INTERVAL

LARCHWOOD LAKE
OTSEGO S&WCD
POND AREA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by
Drawn		
Traced		
Checked	Sheet 3 of 14	Drawing No. NY-930-P

2

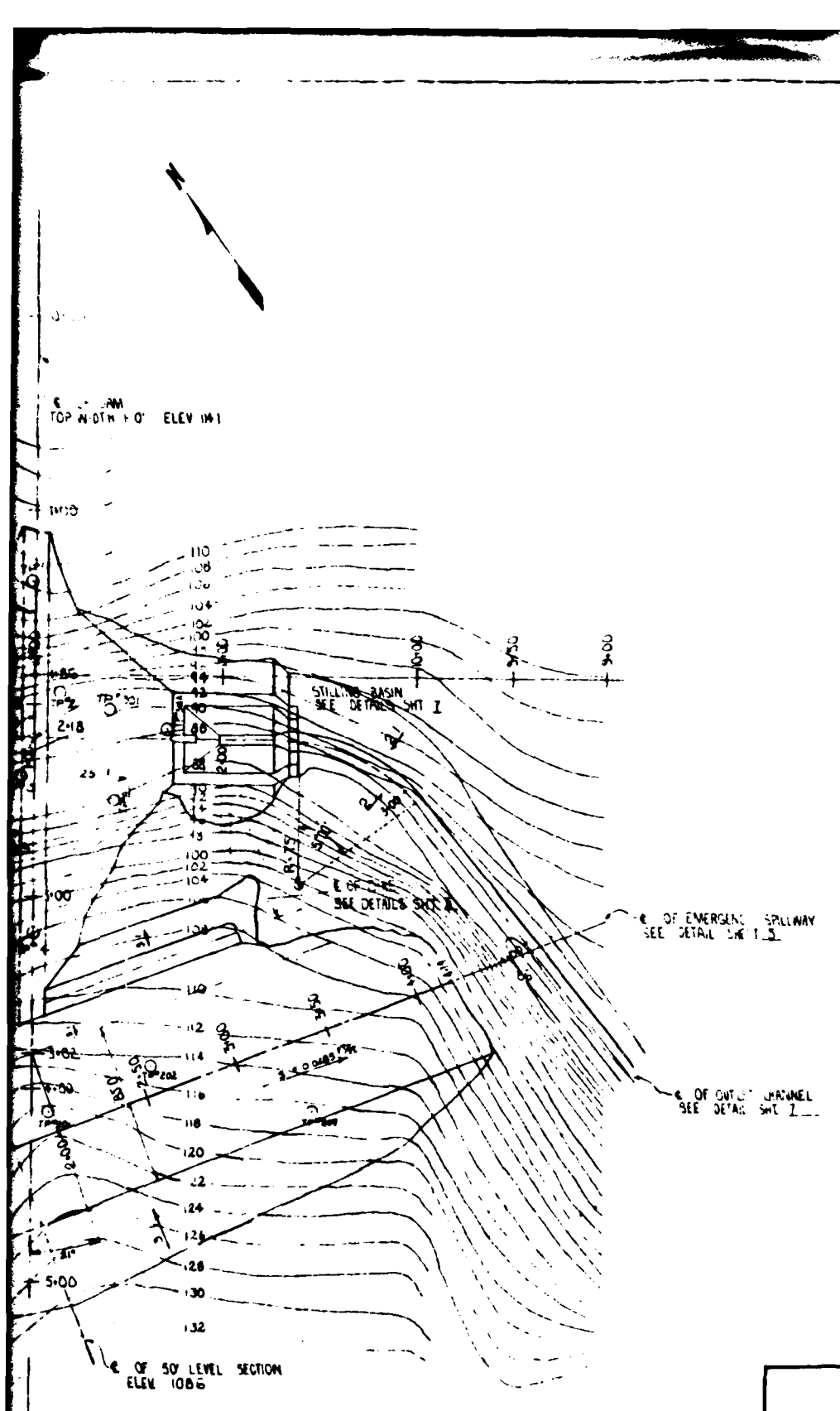


Δ = 62° 08'
R = 150'
D = 44° 04'
L = 161.0'

T = 76.32
E = 21.77
M = 18.44

℄ STATION	DEFLECTION	DIST FROM PC
1+50	0	0
1+25	5° 31'	25.00
1+00	11° 01'	49.88
0+75	16° 31'	73.92
0+50	22° 02'	97.55
0+25	27° 32'	120.19
0+09	31° 04'	134.17

LAYOUT NTA - CURVE 1



FOR LEGEND SEE SHEET 2

2' CONTOUR INTERVAL

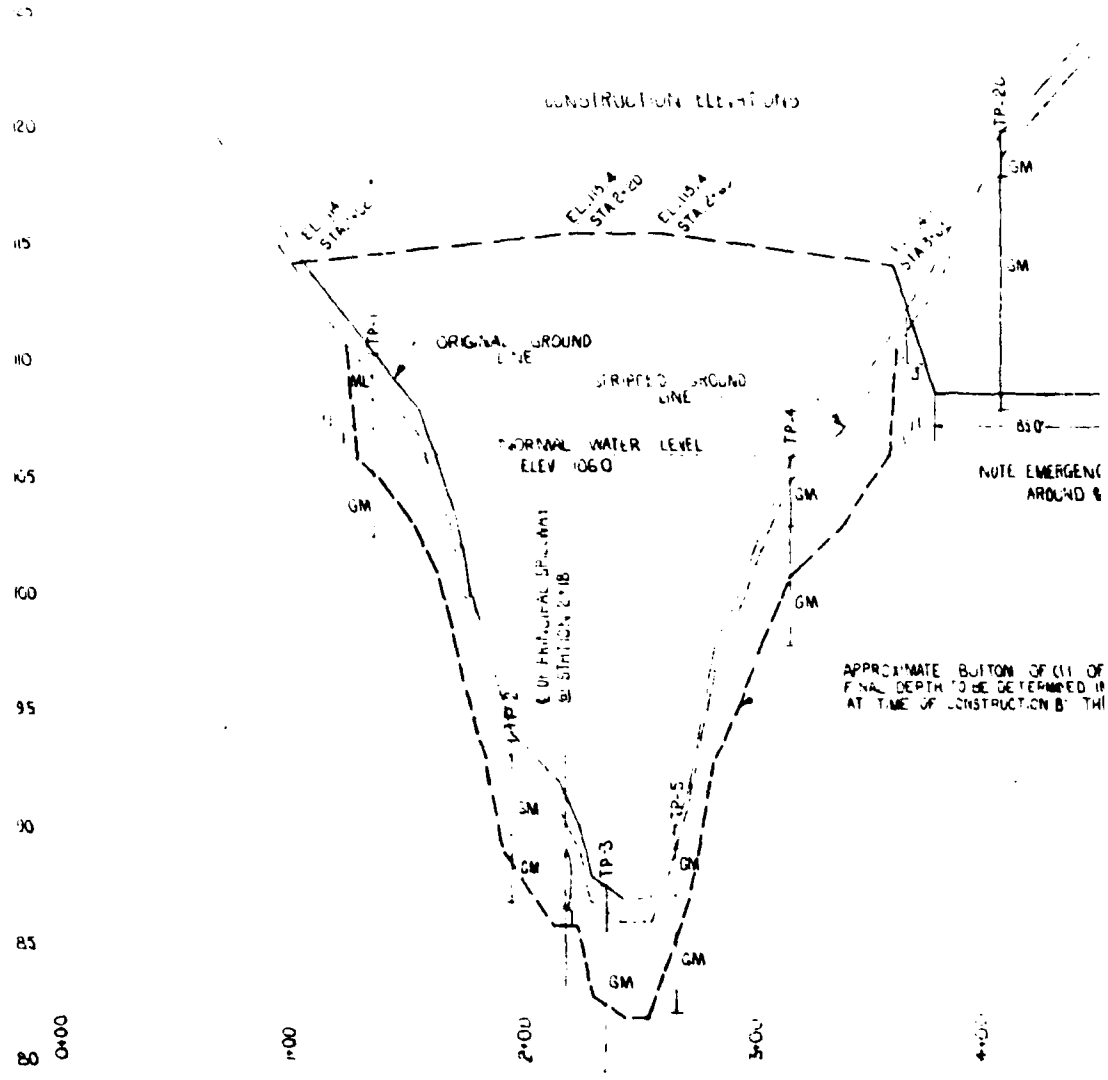
LARCHWOOD LAKE
OTSEGO S & WCD
DAMSITE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

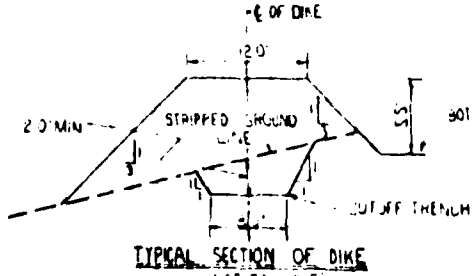
J.R. MULVANEY			
R.K. CROWL			
J. WILLIAMS			
LB	8/80	4/14	NY-936-P

1

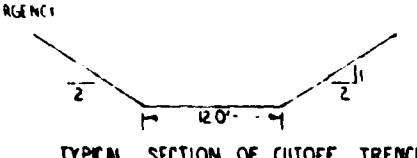
2



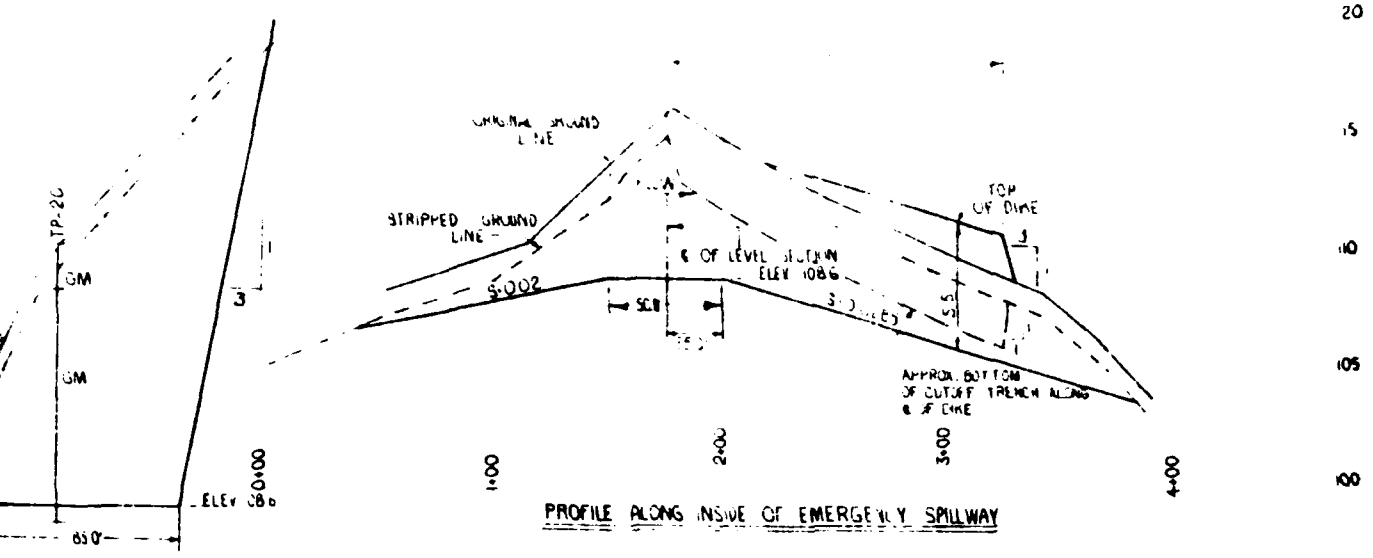
PROFILE ALONG ℄ OF DAM (LOOKING DOWNSTREAM)



TYPICAL SECTION OF DIKE
(NOT TO SCALE)



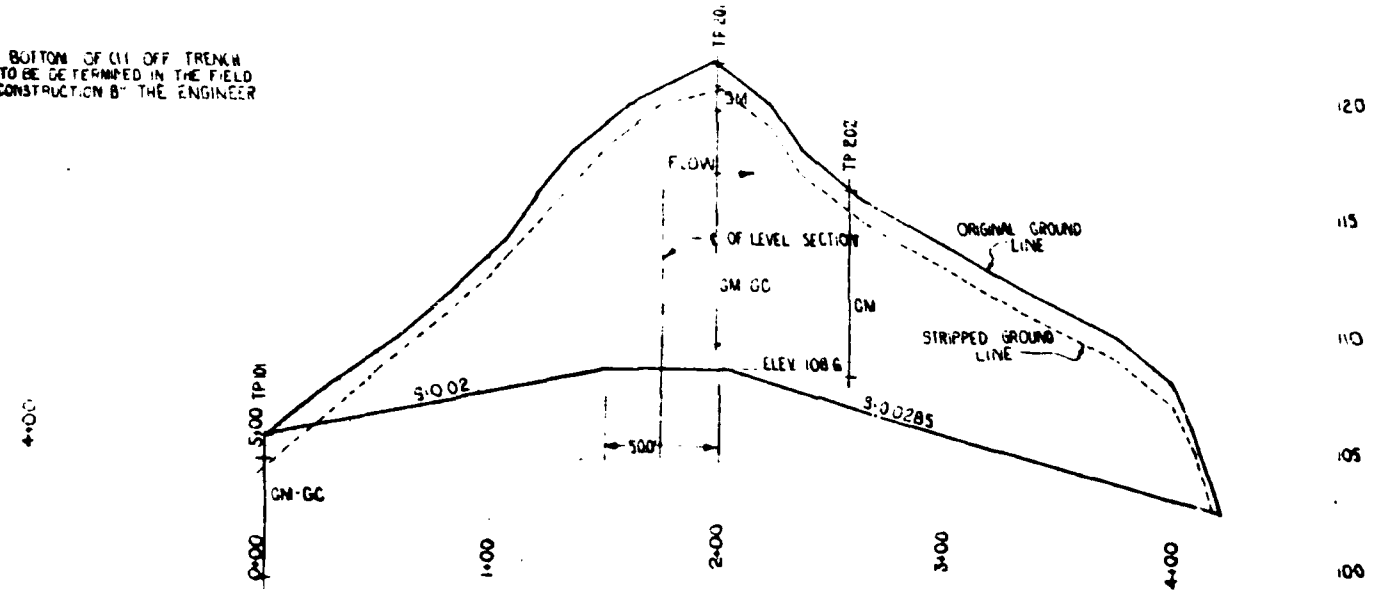
TYPICAL SECTION OF CUTOFF TRENCH
(NOT TO SCALE)



PROFILE ALONG INSIDE OF EMERGENCY SPILLWAY

NOTE EMERGENCY SPILLWAY REVOLVED AROUND ℄ OF DAM AT STA 3+82

BOTTOM OF CUT OFF TRENCH TO BE DETERMINED IN THE FIELD CONSTRUCTION BY THE ENGINEER



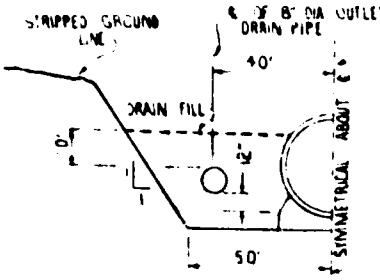
PROFILE ALONG ℄ OF EMERGENCY SPILLWAY

0 40 80 160 FEET

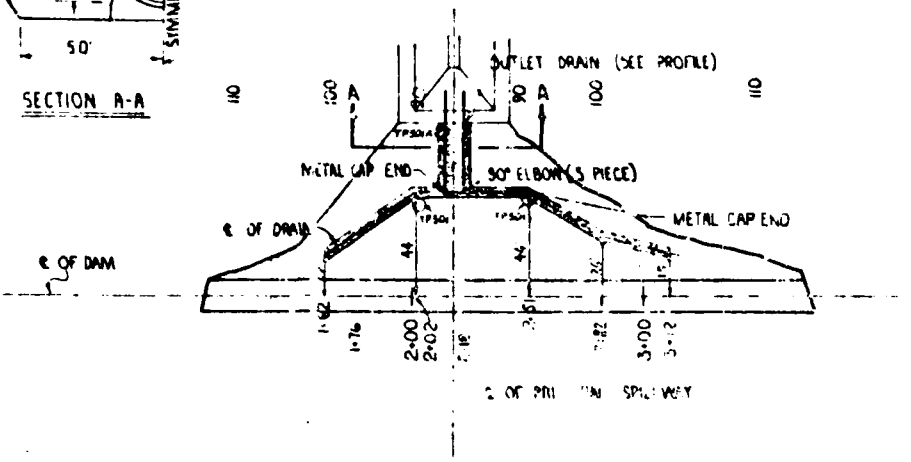
LARCHWOOD LAKE
OTSEGO S & WCD
PROFILES

U DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NY-936-P



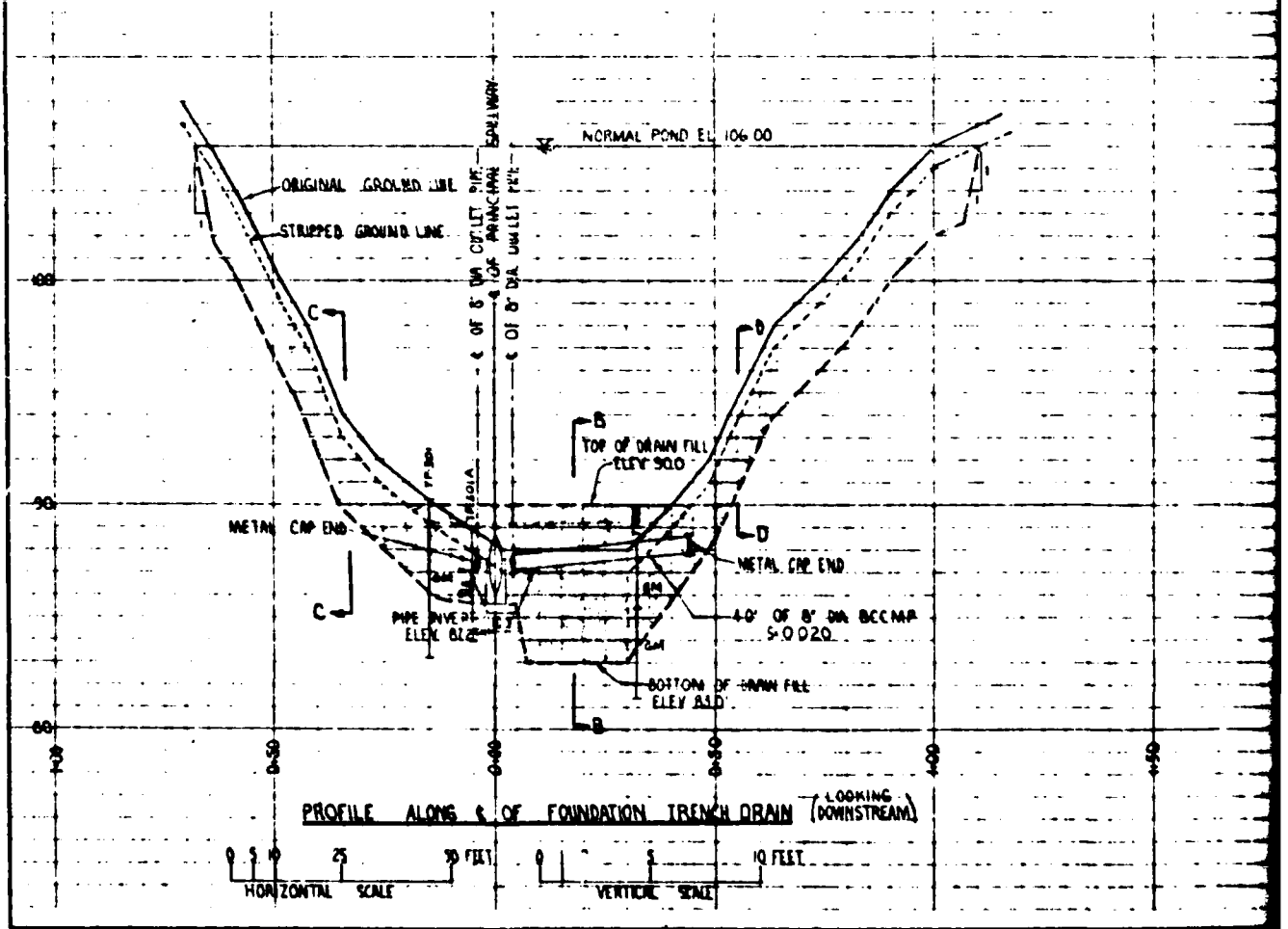
SECTION A-A



PLAN VIEW

SECTION C-C, D-D

0 10 20 40 60 FEET
SCALE



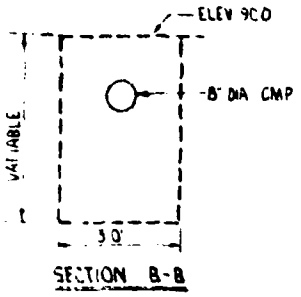
PROFILE ALONG ℄ OF FOUNDATION TRENCH DRAIN (LOOKING DOWNSTREAM)

0 5 10 25 30 FEET
HORIZONTAL SCALE

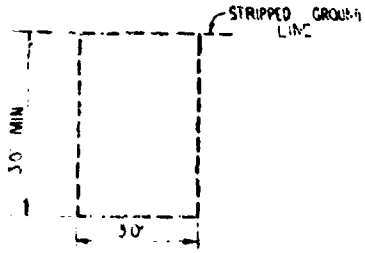
0 5 10 FEET
VERTICAL SCALE

DRAINAGE SYSTEM NOTES

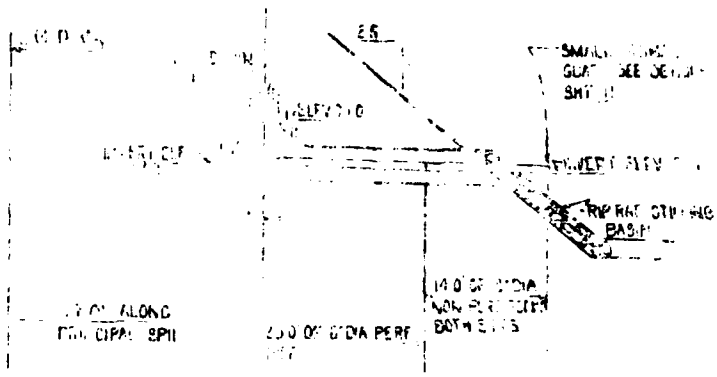
ALL DRAIN PIPE SHALL CONFORM TO SPECIFICATION 110 AND SHALL BE 8" DIA. 16 GAUGE, CLASS II HELICAL CORRUGATION SHAPE 1, TYPE A, FULLY BITUMINOUS COATED [illegible] MINIMUM 6" GRAVEL AROUND PIPES. THE PROFILES OF THE BOTTOM OF ALL EXCAVATIONS AS SHOWN ARE ONLY APPROXIMATE THE REQUIRED FINISHED GRADES WILL BE ESTABLISHED AT TIME OF CONSTRUCTION BY THE ENGINEER



SECTION B-B

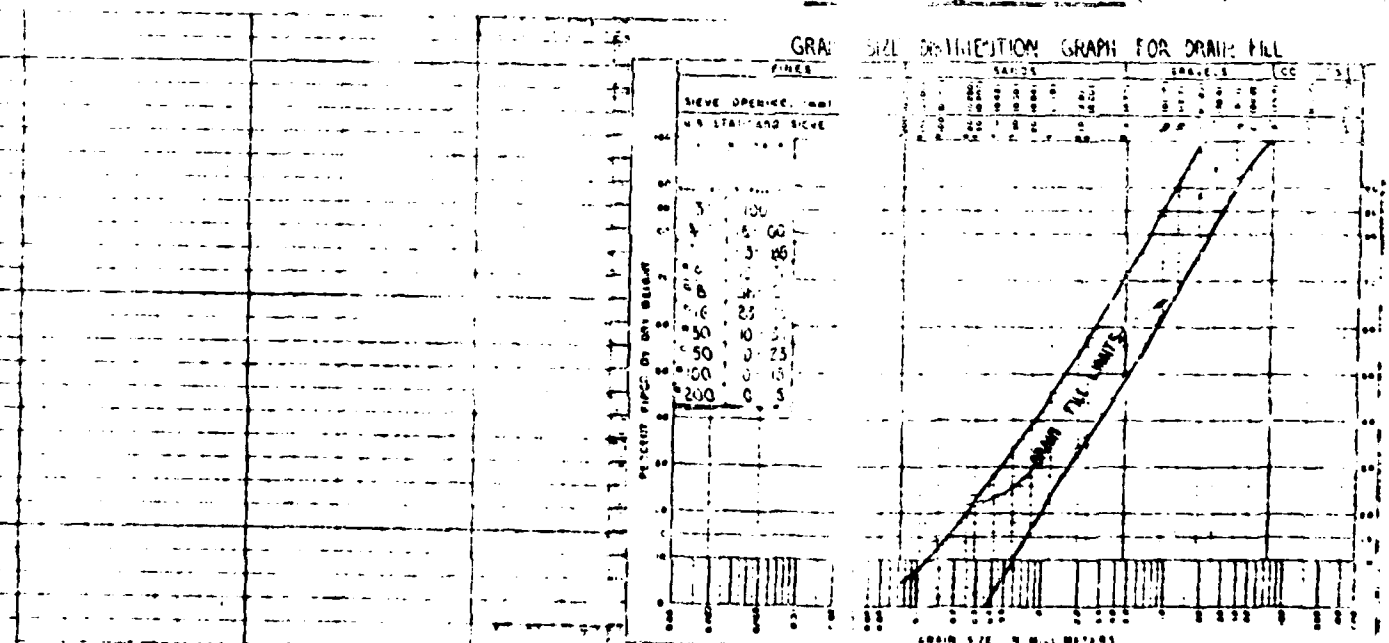


SECTION C-C, D-D

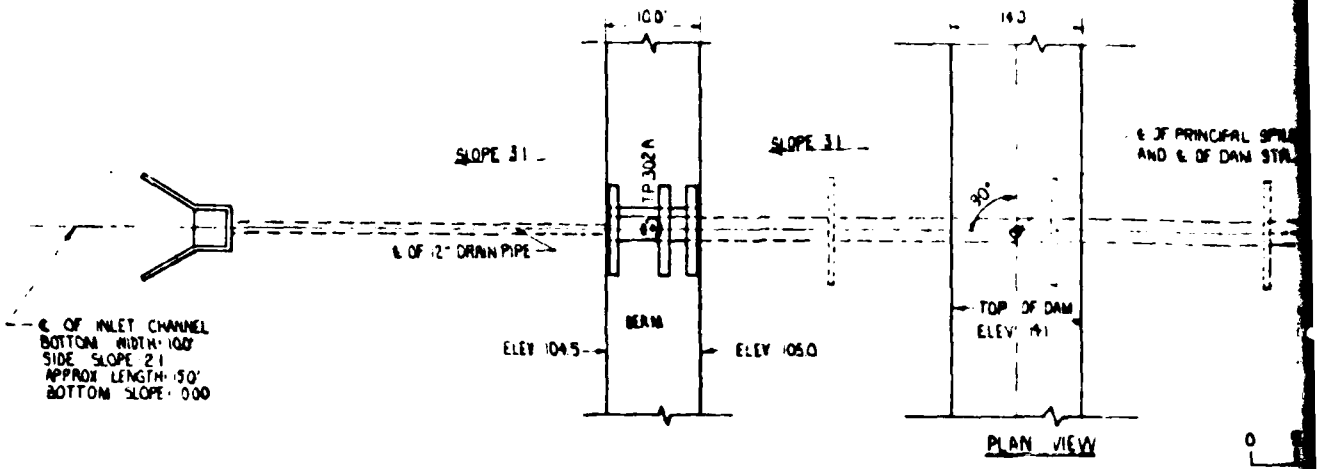


PROFILE OF OUTLET DRAIN (EACH END)

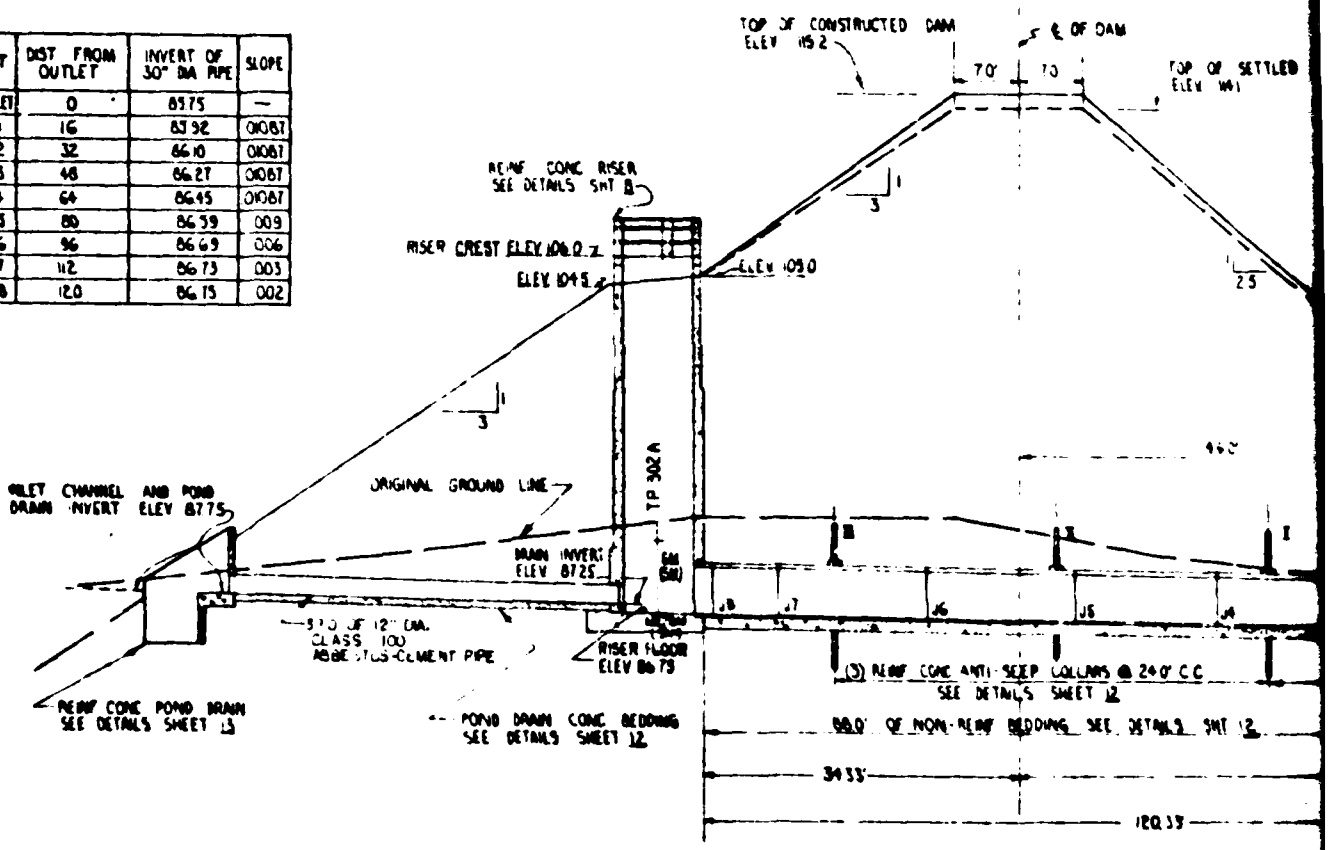
GRADATION GRAPH FOR DRAIN FILL



LARCHWOOD LAKE	
OTSEGO S&WCD	
DRAINAGE SYSTEM DETAILS	
U.S. DEPARTMENT OF AGRICULTURE	
SOIL CONSERVATION SERVICE	
L.C. UBITSON 7/66	
W. GRAJKO 7/66	
L. BECK 8/66	NY-936-P



JOINT	DIST FROM OUTLET	INVERT OF 30" DIA PIPE	SLOPE
OUTLET	0	8875	—
J-1	16	8792	01087
J-2	32	8610	01087
J-3	48	8627	01087
J-4	64	8645	01087
J-5	80	8659	009
J-6	96	8669	006
J-7	112	8673	003
J-8	120	8675	002



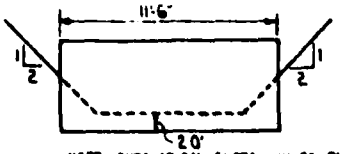
PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY

0 5 10 20 FEET — HORIZONTAL SCALE

0 2.5 5 10 FEET — VERTICAL SCALE

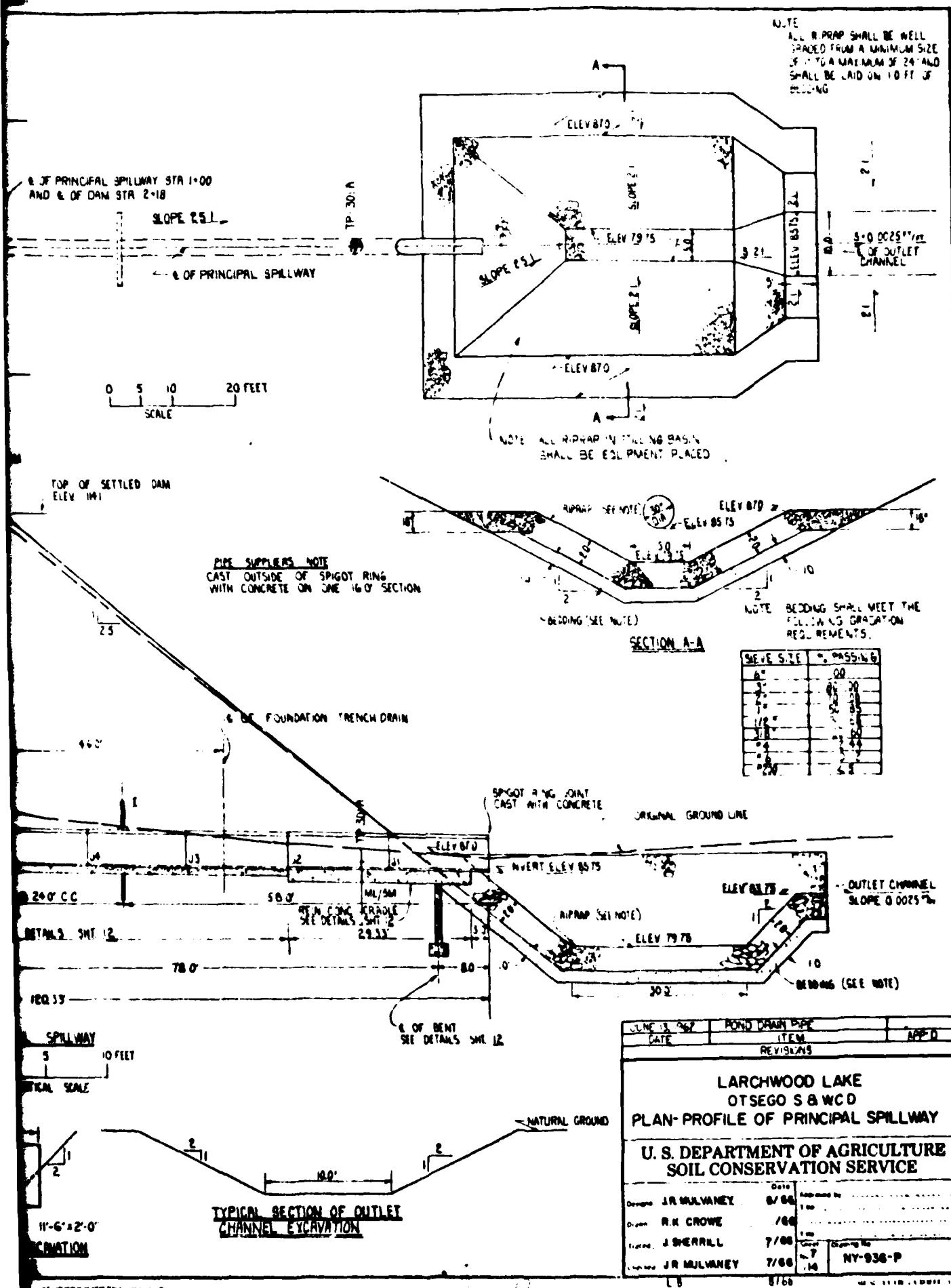
COLLAR	DIST FROM OUTLET	INVERT OF 30" DIA PIPE
III	106'	8672
II	82	8660
I	58	8638

30" I.D. REINF WATER PIPE
(7) 16'-0" SECTIONS
(1) 8'-0" SECTION
(1) SPIGOT RING WALL FITTING FOR 12" WALL
TOTAL LENGTH = 121.33'
PRESSURE HEAD 25.0'
LOAD = 26 219 LBS PER LIN FT BASED ON O.D. OF 3.02" MIN 3 EDGE BEARING STRENGTH FOR 0.001 CRACK 10.049 LBS PER LIN FT FOR PRESTRESSED PIPE (AWWA C-301)



NOTE EXCAVATION SLOTS 11'-6" x 2'-0"

PRINCIPAL SPILLWAY EXCAVATION AT ANTI-SEEP COLLARS



DATE	ITEM	APP'D
JUNE 3, '68	POND DRAIN PIPE	
	REVISIONS	

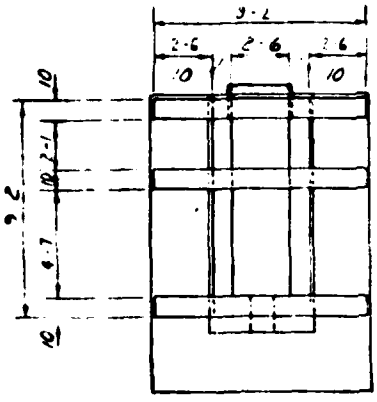
LARCHWOOD LAKE
OTSEGO S & W C D
PLAN-PROFILE OF PRINCIPAL SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

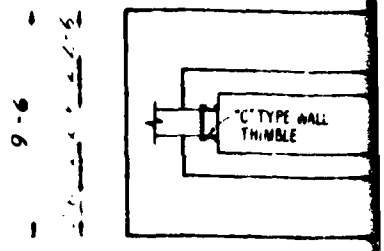
		Date
Designed	J.R. MULVANEY	6/68
Drawn	R.H. CROWE	/68
Traced	J. SHERRILL	7/68
Checked	J.R. MULVANEY	7/68

Approved by .....
Title .....
Date .....
Sheet No. 7 of 14
Drawing No. NY-936-P

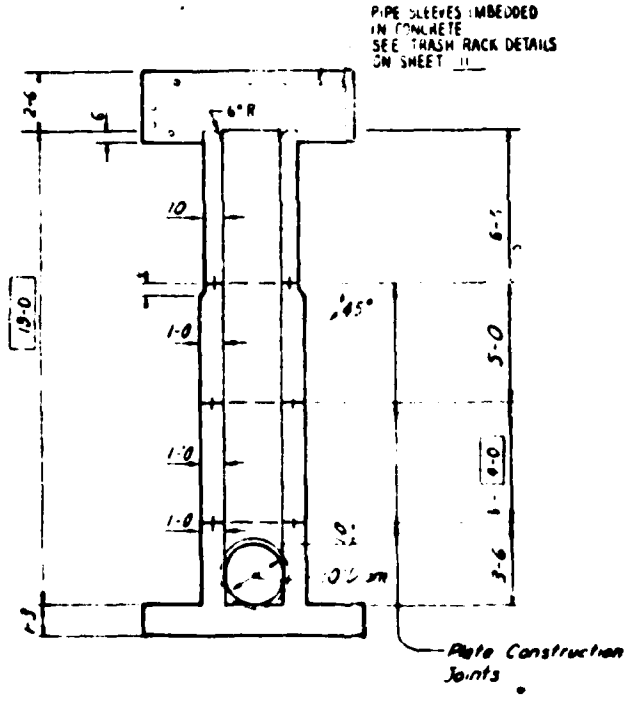
L B 8/68



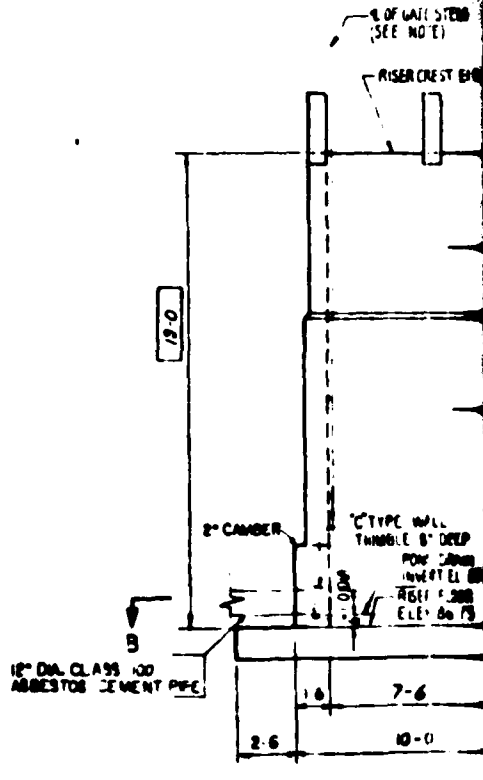
PLAN - TOP



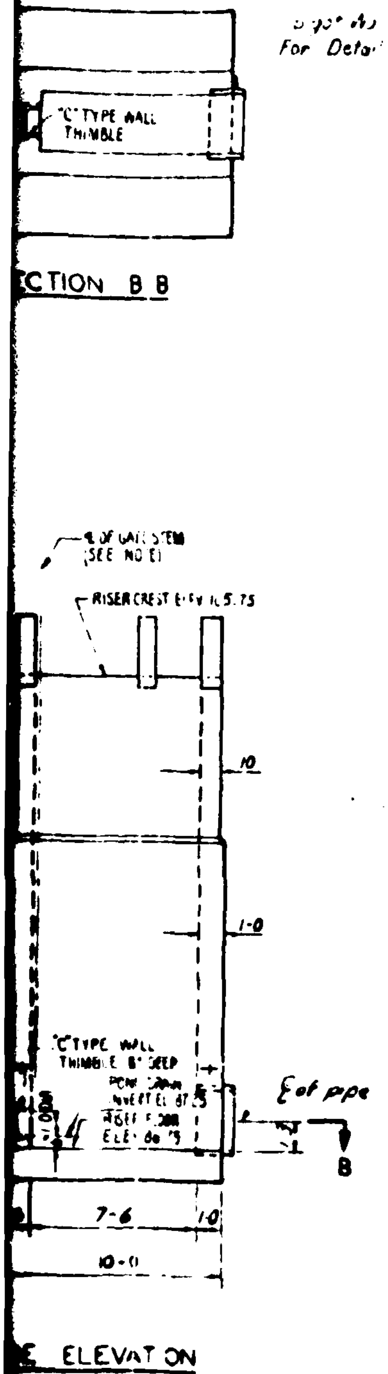
SECTION B-B



SECTION A-A



SIDE ELEVATION



BAR TYPES

Mark	Size	Quantity	Length	Type	B	C	Total Length
[illegible]	#6	13	[illegible]	1	—	—	[illegible]
[illegible]	#6	10	[illegible]	1			[illegible]
[illegible]	#4	4	[illegible]	1			[illegible]
[illegible]	[illegible]	34	[illegible]	21	3-3	6-0	[illegible]
[illegible]	#6	10	12-0	[illegible]			[illegible]
56	#6	13	7-0	1			[illegible]
57	[illegible]	[illegible]	[illegible]	1			7-[illegible]
58	#5	[illegible]	[illegible]	21	1-0	6-0	42-[illegible]
59	#6	3	7-0	21	1-0	[illegible]	[illegible]
[illegible]	[illegible]	6	7-0	21	[illegible]	[illegible]	[illegible]
[illegible]	#6	[illegible]	8-[illegible]	1			[illegible]
[illegible]	#5	[illegible]	[illegible]	1			[illegible]
[illegible]	#6	[illegible]	[illegible]	1			[illegible]
514	#5	2	2-3	1			[illegible]
515	#6	10	6-3	21	[illegible]	5-8	[illegible]
516	#6	18	8-9	21	3-1	5-8	157-6
41	#5	[illegible]	10-7	1			222-0
42	[illegible]	12	[illegible]	1			[illegible]2-0
43	[illegible]	8	[illegible]	[illegible]			28-0
44	#5	[illegible]	8-6				221-0
45	#5	32	[illegible]	21	2-[illegible]	5-[illegible]	264-0
46	#5	4	[illegible]	1			[illegible]
47	#5	6	[illegible]	1			[illegible]
48	#5	[illegible]	[illegible]	1			6[illegible]
49	#4	36	[illegible]	21	[illegible]	[illegible]	[illegible]
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[illegible]	#5	[illegible]	6-3	1			2[illegible]
[illegible]	[illegible]	36	6-[illegible]	21	2-7	5-3	[illegible]88-[illegible]
T1	#5	28	4-4	1			[illegible]-4
T2	#4	12	3-9	21	2-6	1-3	45-0
T3	#4	36	2-7	1			93-0
T4	#4	4	2-[illegible]	1			[illegible]-4
T5	#4	18	8-9	1			[illegible]

SLIDE GATE NOTES

1. 12" DIA SLIDE GATE (SELF CONTAINED TYPE)
2. FLAT FRAME
3. "C" TYPE WALL THIMBLE 8" DEEP
4. SEATING HEAD 0'
5. UNSEATING HEAD 50'
6. OPERATING HEAD 25'
7. NON-RISING STEM-THREADED PORTION BRONZE
8. BRONZE LIFT NUTS AND SEAT FACINGS
9. STEM & STEM GUIDES SIZED AND SPACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS

CONSTRUCTION DETAILS

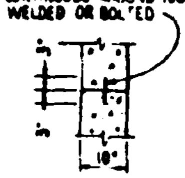
1. BAR DIMENSIONS ARE OUT TO OUT OF BAR
2. RADIUS OF BENDS EQUALS 3 BAR DIAMETERS FOR SIZES EQUAL TO OR LESS THAN #7
3. THE 2" & 3" DISTANCES FROM SPECIFIED CONCRETE SURFACES ARE CLEAR DISTANCES WHERE [illegible] SPECIFIED. ALL REINFORCING STEEL PLACED [illegible] CONCRETE POURED AGAINST THE GROUND SHALL HAVE [illegible] MUM OF 3" COVER. ALL REINFORCING STEEL [illegible] IN CONCRETE POURED IN FORMS SHALL HAVE A MINIMUM OF 2" CLEAR COVER
4. ALL EXPOSED EDGES OF CONCRETE TO HAVE A 3/4" CHAMFER UNLESS OTHERWISE NOTED

0 2 4 6 8

SCALE IN FEET

NOTE: BLOCKED IN DIMENSIONS NOT TO SCALE

1/4" x 6" STRUCTURAL CARBON STEEL PLATE GRADE "C" STEEL PLATE IN WALLS TO BE CONTINUOUS AROUND RISER JOINT TO BE WELDED OR BOLTED



RISER CONSTRUCTION JOINT DETAIL

RISER QUANTITIES

STEEL:

#4 BARS	658.83 LIN FT	440 LBS
#5 BARS	1951.16 LIN FT	2035 LBS
#6 BARS	916.25 LIN FT	1376 LBS
#7 BARS	314.60 LIN FT	643 LBS
	TOTAL	4494 LBS

CONCRETE: (REINFORCED) — 24 CU YDS

105.75
86.75
19.0

DATE	ITEM	APP'D
JUNE 13 1967	POND DRAIN PIPE	[illegible]

REVISIONS

LARCHWOOD LAKE

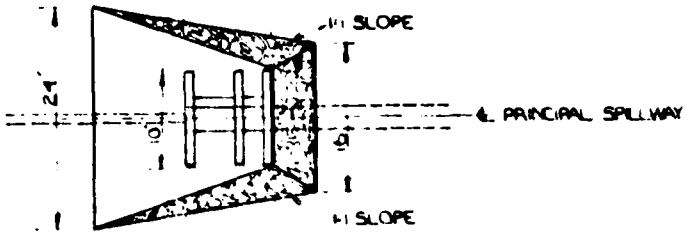
OTSEGO S & W C D

RISER STRUCTURAL DETAILS

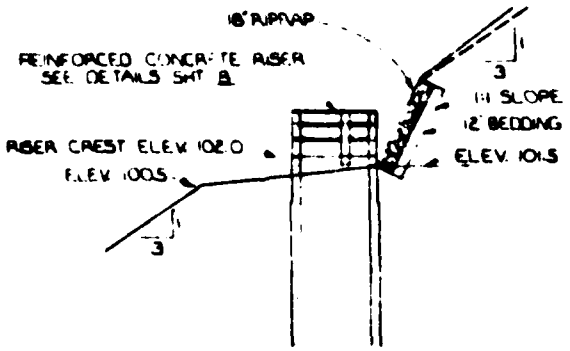
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date	Approved By
Adapted	D. ZOGRAFO	5/66	
Drawn	M. VOLTON	6/66	
Checked	LS	6/66	

Sheet 8 of 14 — Drawing No. NY-938-P



PLAN VIEW OF RISER AT BERM

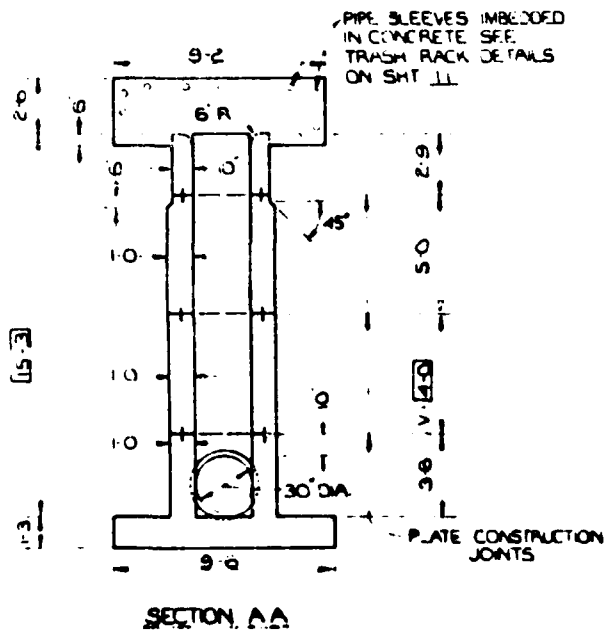


DETAIL OF RISER AT BERM

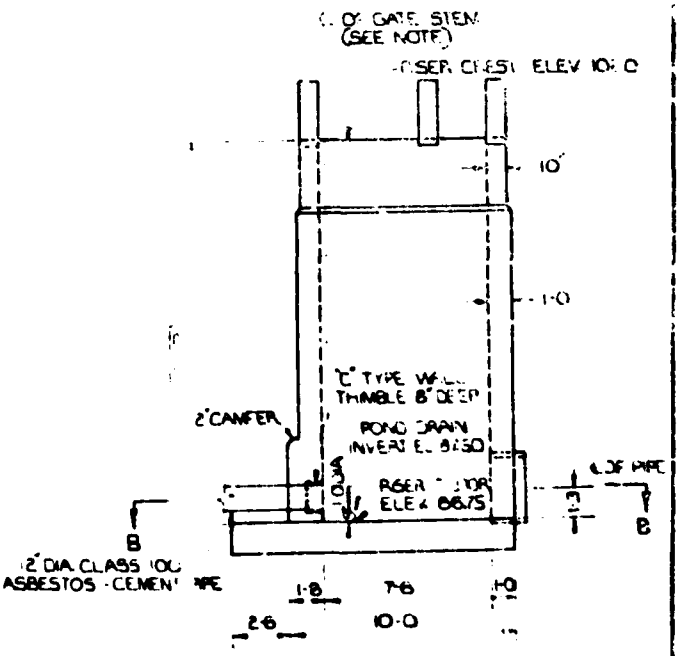
STEEL SCHEDULE

MARK	SIZE	QUANTITY	LENGTH	TYPE	B	C	TOTAL LENGTH
R1	#5	20	2-6	1			50-0
R2	#5	6	8-3	1			49-6
R3	#5	6	3-3	1			19-6
R4	#5	20	2-6	1			50-0
R5	#5	12	8-0	21	2-9	5-3	96-0

NOTE - REFER TO SHEET 10 FOR LOCATION OF REVISED BARS



SECTION A-A



SIDE ELEVATION

LARCHWOOD LAKE

OTSEGO S & WCD

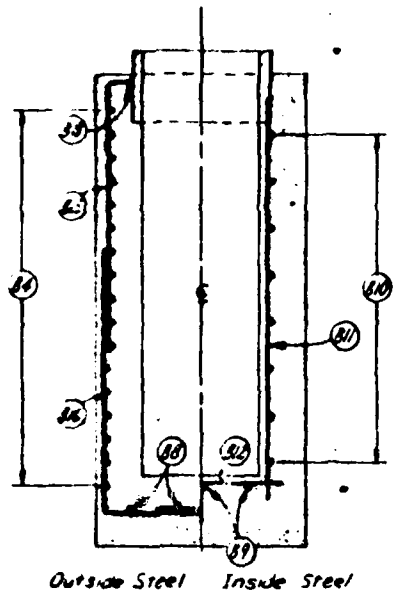
RISER REVISIONS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

J. DE VITA III 9-80

1

2

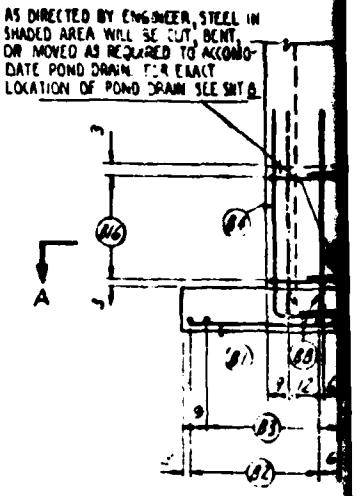


Outside Steel Inside Steel

SECTION A-A

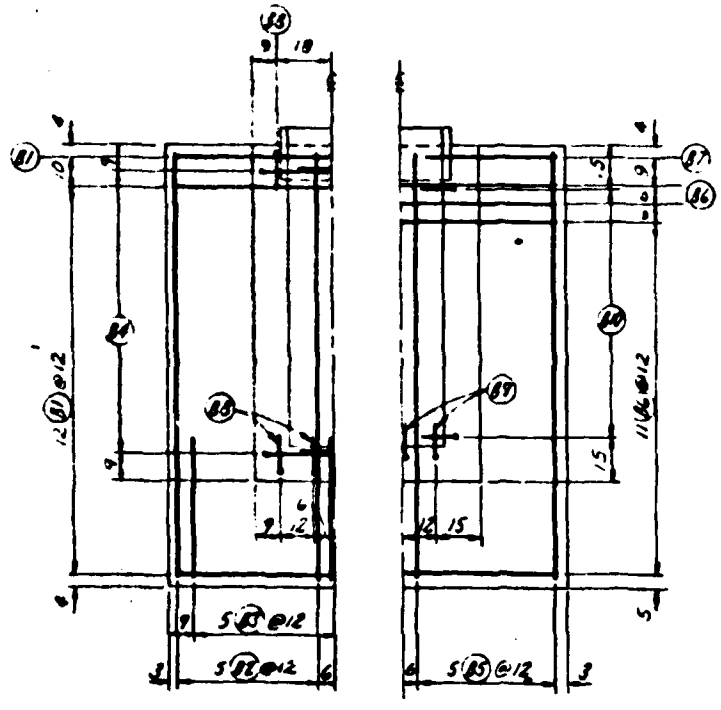
0 1 2 3

Scale in Feet



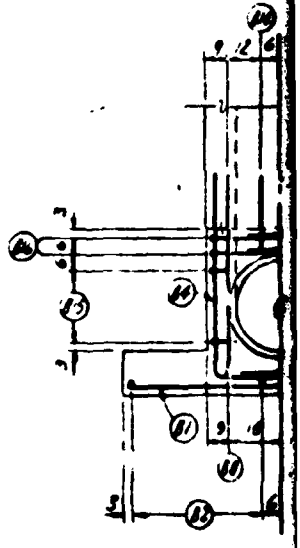
Steel 2" From Outside face

UPSTREA



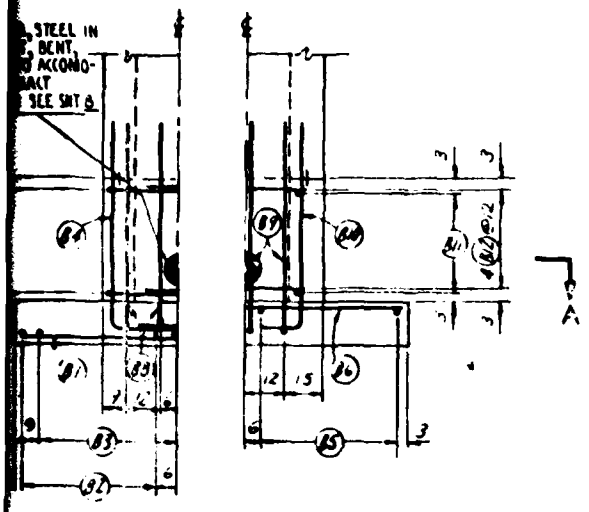
Steel 3" From Bottom of Footing Steel 2" From Top of Footing

PLAN-FOOTING



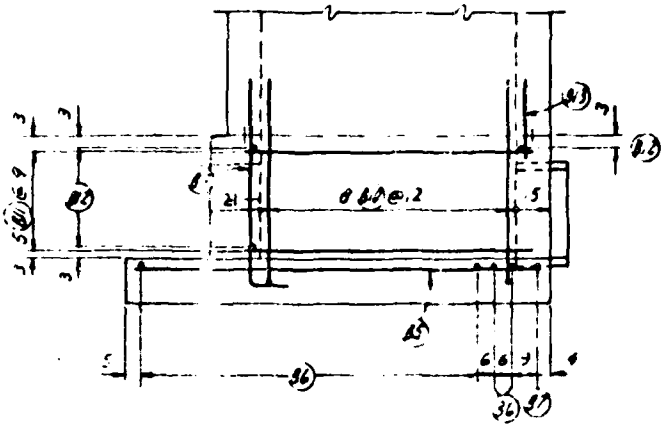
Steel 2" From Outside face

DOWNSTR



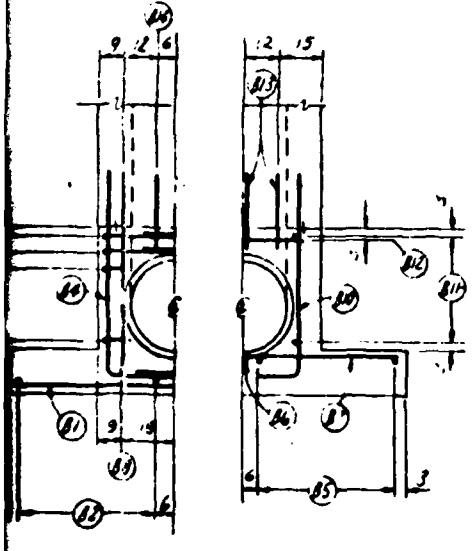
Outside Face Steel 2 From Inside Face

UPSTREAM ELEVATION



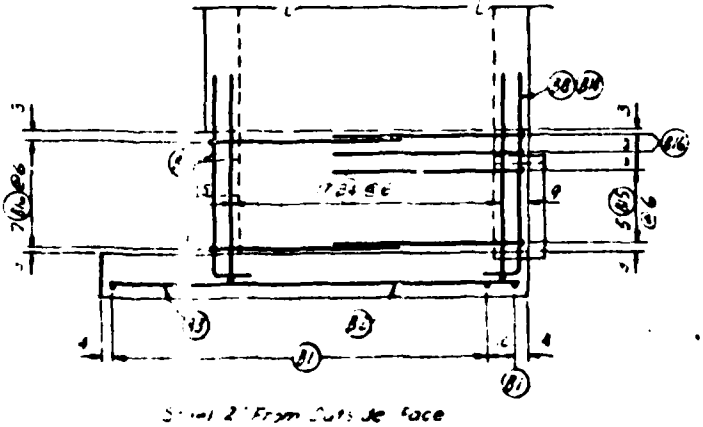
Steel 2" From Inside Face
and 2 From Top of Footing

SIDEWALL ELEVATION



Outside Face Steel 2 From Inside Face

DOWNSTREAM ELEVATION



Steel 2" From Outside Face
and 4" From Bottom of Footing

SIDEWALL ELEVATION

2 0 2 4

Scale in Feet
Unless Otherwise Shown

LARCHWOOD LAKE

OTSEGO S & WCD

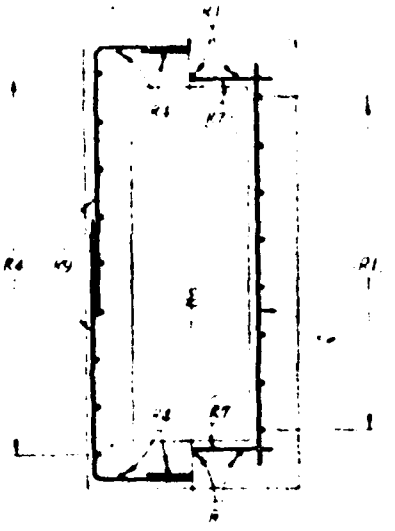
RISER STRUCTURAL DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

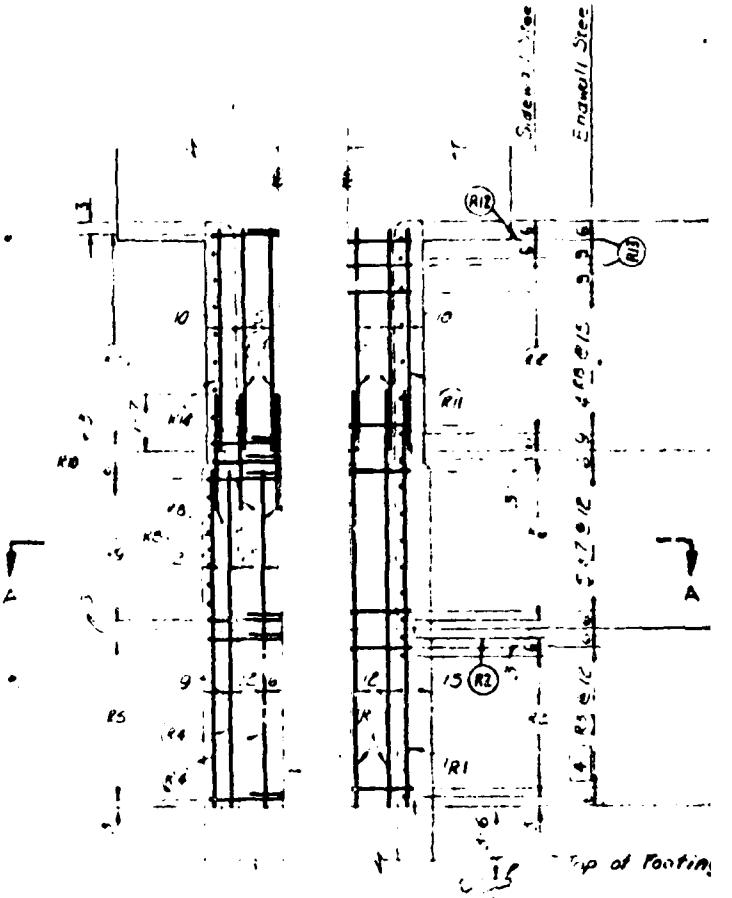
Designed B. ZOGRAFOS 5/66

NY-916-P

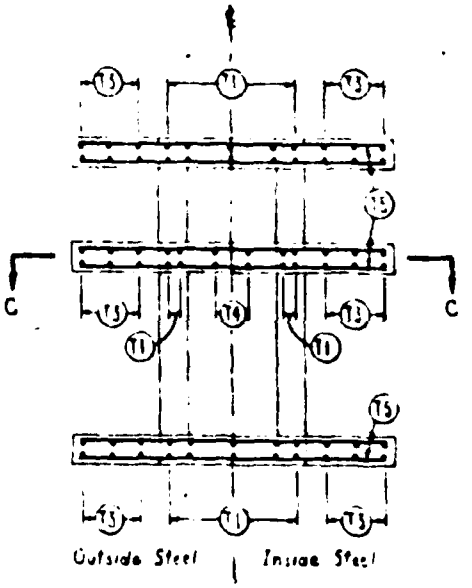
12



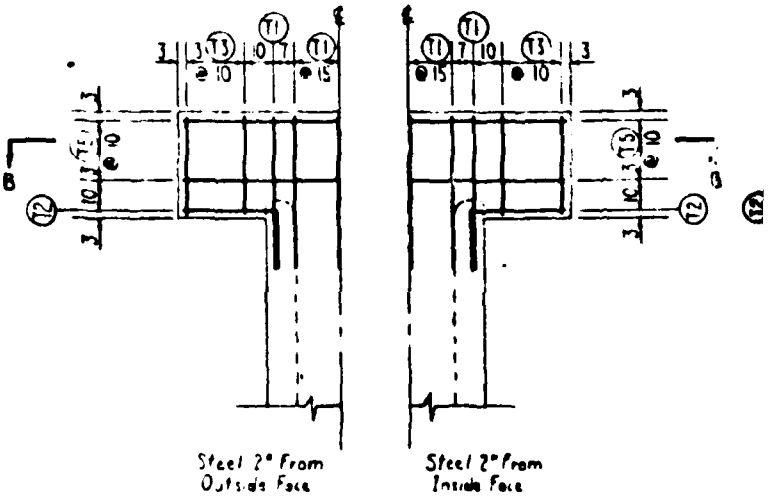
SECTION A-A



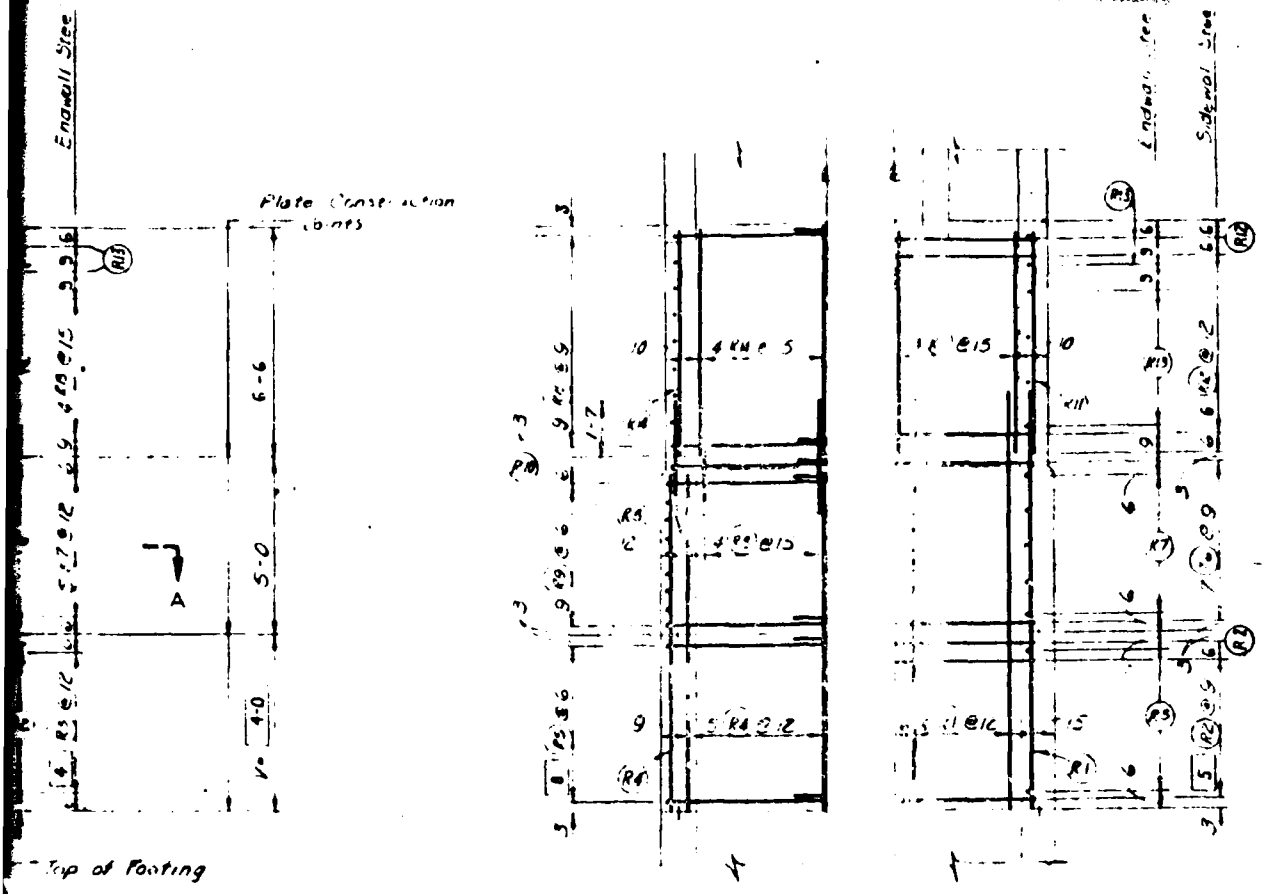
ENDWALL ELEVATION



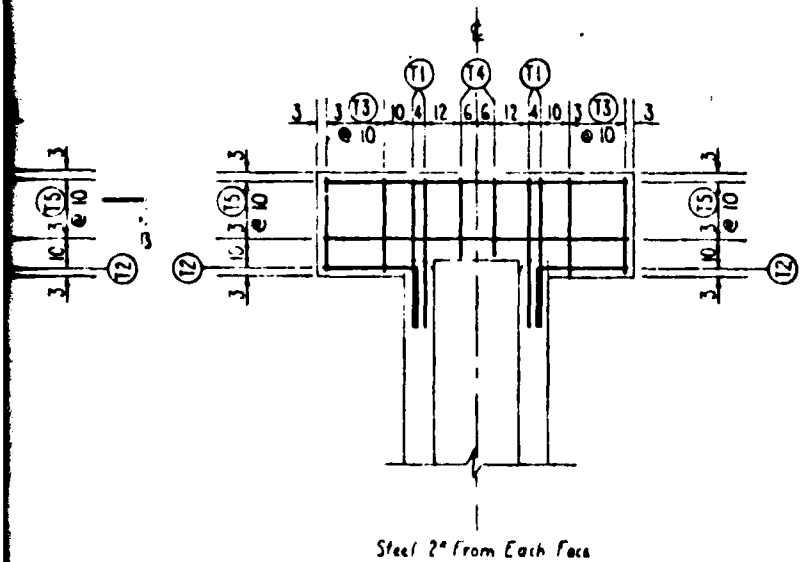
SECTION B-B



UPSTREAM & DOWNSTREAM ANTI-VORTEX BAFFLE



SIDEWALL ELEVATION



CENTER ANTI-VORTEX BAFFLE
SECTION C-C

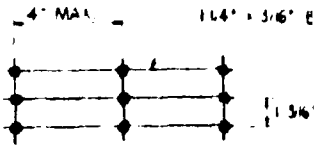
0 2 4
Scale in Feet
Unless Otherwise Shown

LARCHWOOD LAKE
OTSEGO S & WC D
RISER STRUCTURAL DETAILS

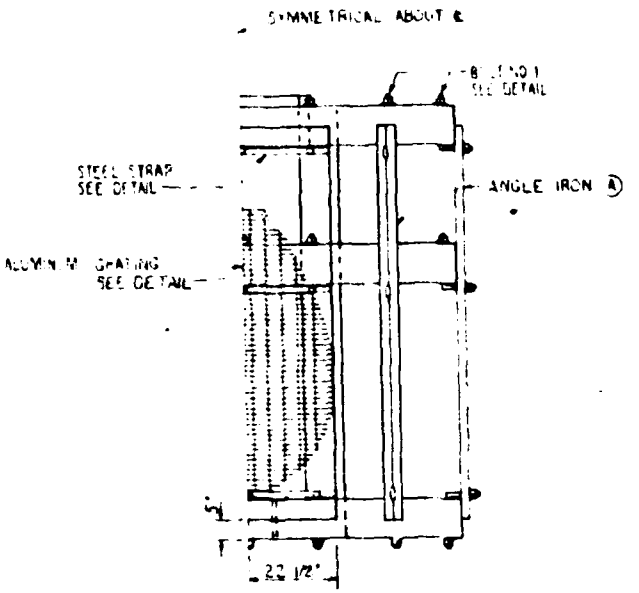
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed D. ZOGRAFOS 5/66
Drawn W. YOLTON 5/66
Traced
Checked L.B. 5/66
Approved by
Title
Date
Sheet No. 10 of 14
NY-936-P

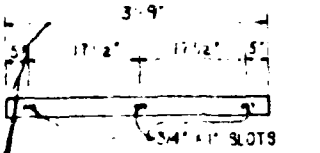
2



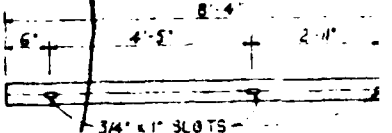
ALUMINUM GRATING DETAIL



PLAN



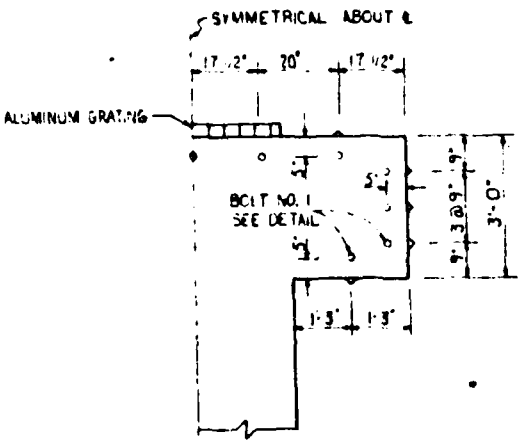
STEEL STRAP DETAIL



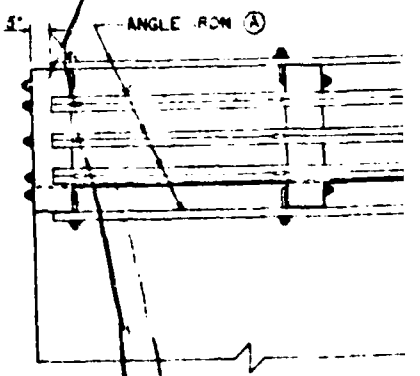
ANGLE IRON Ⓐ

NOTE

ENTIRE TRASH RACK EXCEPT ALUMINUM GRATING TO BE PAINTED



UPSTREAM ELEVATION



SIDE ELEVATION

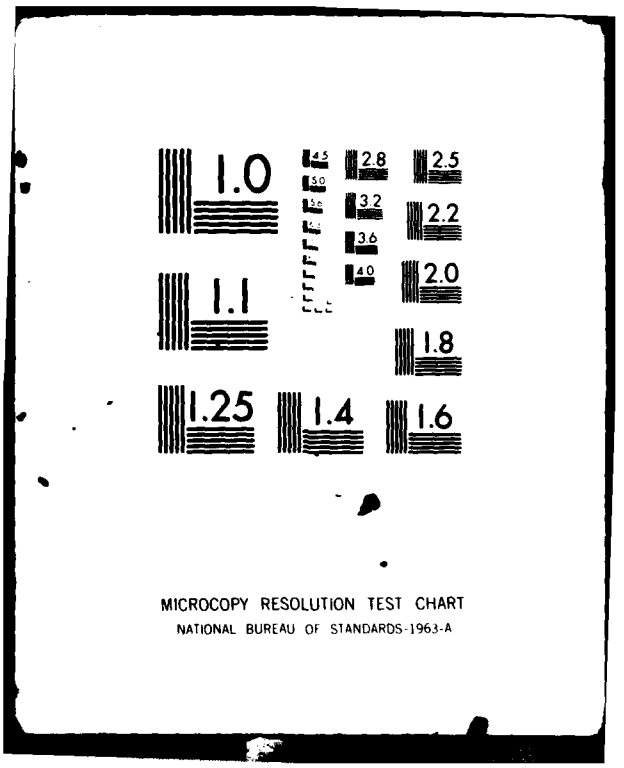
RISER TRASH RACK DETAILS

SCALE: 1/4" = 1'-0"

AD-A107 412 FLAHERTY-GIAVARA ASSOCIATES NEW HAVEN CT F/G 13/13
NATIONAL DAM SAFETY PROGRAM. LARCHWOOD LAKE DAM (INVENTORY NUMB--ETC(U)
AUG 81 H C FLAHERTY DACW51-81-C-0006
UNCLASSIFIED NL

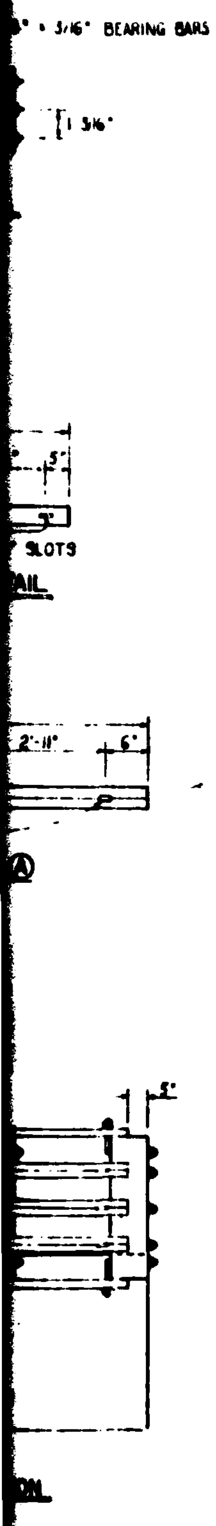
3+3
A
AD-A107

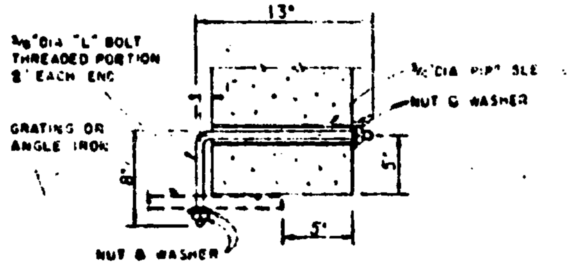
END
DATE FILMED
12-81
DTIC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

BILL OF MATERIALS

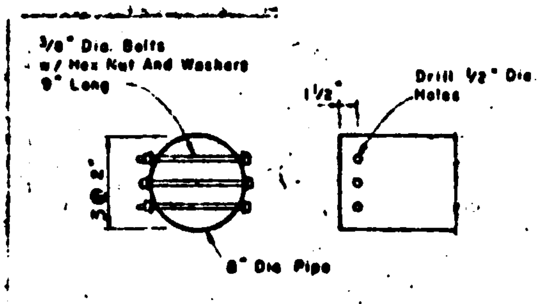
LOCATION	ITEM	SIZE	LENGTH	QUAN.
TRASH RACK	[illegible]	3"x3"x3/8"	8'-4"	10
	[illegible]	5/8" DIA	8"x13"	39
	[illegible]	3/4" DIA	10"	39
	[illegible]	-	8'-4"x3'-9"	1
	[illegible]	1/4"x2"	3'-9"	3





BOLT DETAIL No. 1

GALV. IRON, SUPPLY W/ NUTS & WASHERS



SMALL ANIMAL GUARD DETAILS

LARCHWOOD LAKE

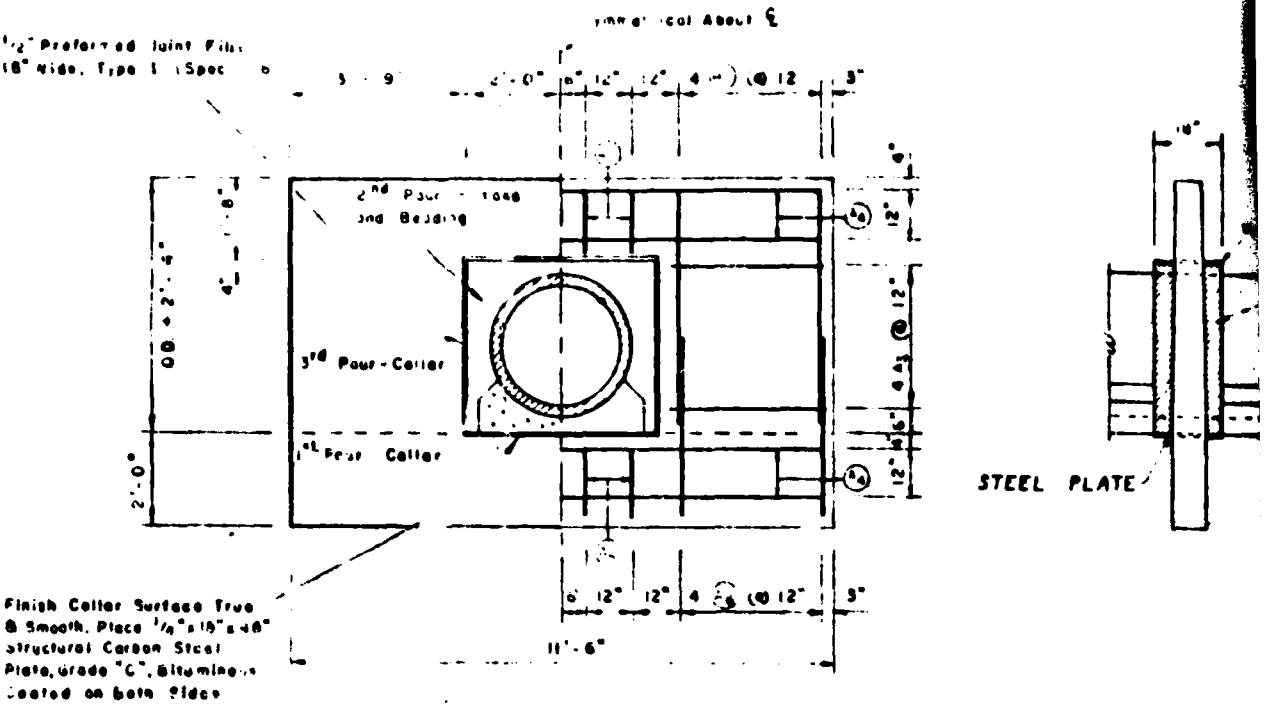
OTSEGO S & W C D

TRASH RACK & SMALL ANIMAL GUARD DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed L. IBBITSON	5/66	Approved by
Drawn B. ANGELO	5/66	
Traced		
Checked L.I.	5/66	Sheet 11 of 14 — Drawing No. NY-936-P

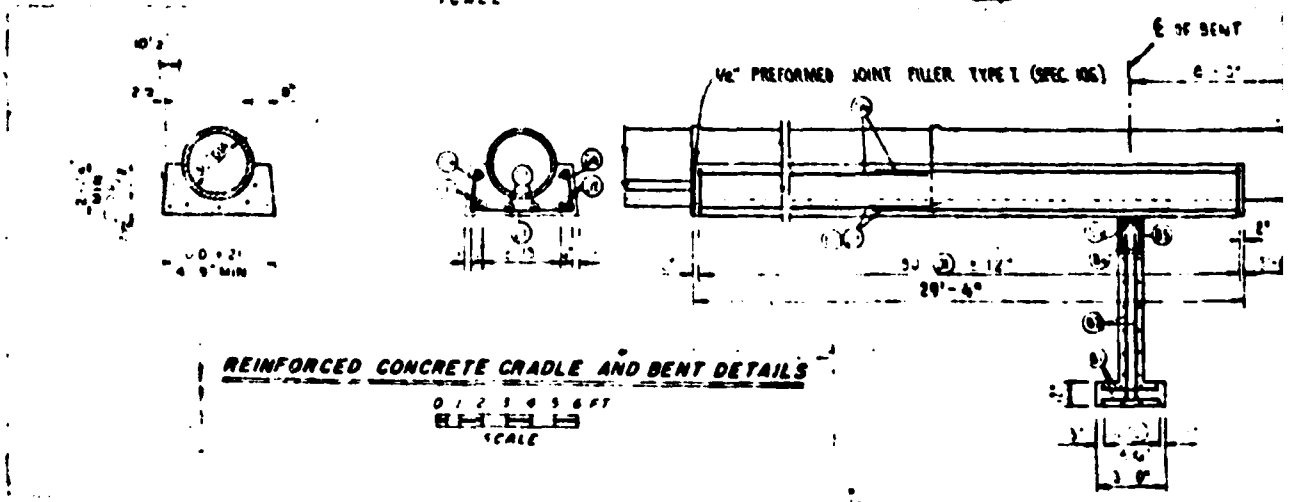
2



REINFORCED CONCRETE ANTI-SEEP COLLAR

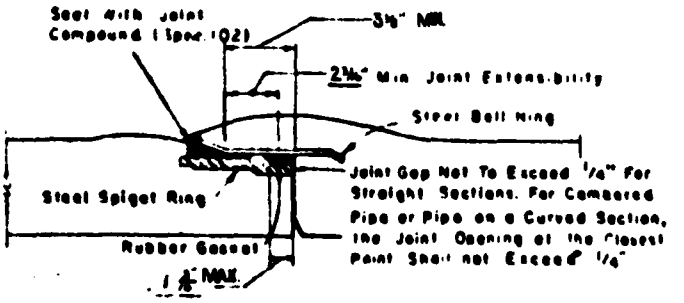
SCALE

3 - Req'd.

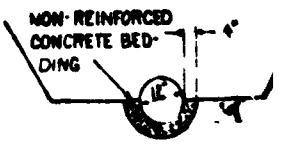


REINFORCED CONCRETE CRADLE AND BENT DETAILS

0 1 2 3 4 5 6 FT
SCALE

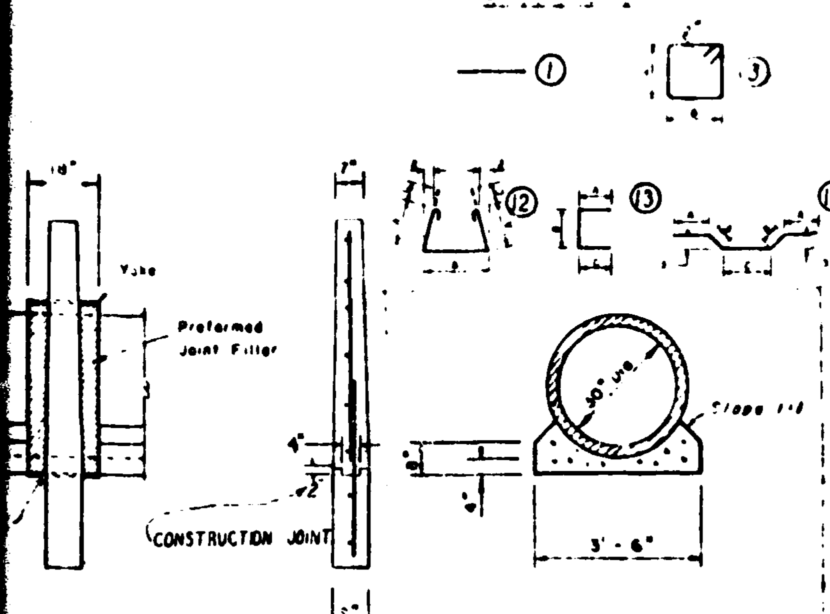


REINFORCED CONCRETE WATER PIPE JOINT



POND DRAIN CONCRETE

BAR TYPES



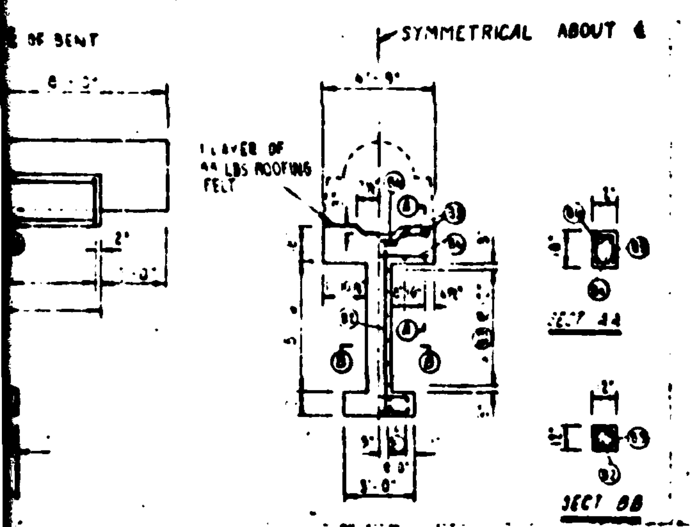
CONCRETE BEDDING

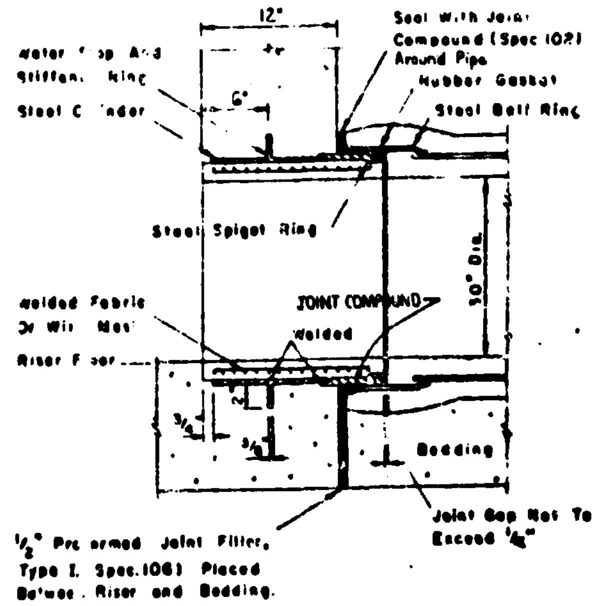
ANTI-SEEP COLLAR STEEL SCHEDULE

Mark	Size	Length	Type	Quan / Collar	Total Quan	Total Length
-1	4	1 - 2	1	4	12	15' - 0"
-2	4	4 - 9	1	8	24	114' 0"
3	4	3 - 3	1	8	24	78' 0"
-4	4	11 - 0	1	4	12	132' 0"
-5	4	1 - 6	1	4	12	18' 0"
-6	4	3 - 2	1	8	24	76' 0"

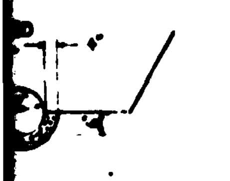
Mark	Location	Quan	Size	Length	Type	A	B	C	Total Length
-1	BENT	16	4	2 - 6	1				40' 0"
-2		4	6	8 - 3	13	0 - 6	7 - 3	0 - 6	33' 0"
-3		6	2	3 - 2	3	0 - 8	0 - 8	0 - 3	19' 0"
-4		2	4	4 - 3	1				8' 6"
-5		4	2	4 - 2	2	1 - 2	0 - 8	0 - 3	16' - 8"
-6		2	7	5 - 2	14	1 - 6	0 - 4	1 - 6	10' - 4"
-1	CRADLE	30	4	8 - 7	12	1 - 8	4 - 5	0 - 5	257' - 6"
-2		8	9	16 - 0	1				128' - 0"
-3		4	4	15 - 1	1				60' - 4"
-4		4	7	15 - 6	1				62' - 0"

CONSTRUCTION NOTES SEE SHEET 8.





SPIGOT RING WALL FITTING



CONCRETE BEDDING

TOTAL QUANTITIES
COLLARS, CRADLE, BEDDING & BENT

STEEL

#2 BARS 35.67 LIN FT 5.96 LBS.
#4 BARS 799.33 LIN FT 534.0 LBS
#6 BARS 33.00 LIN FT 49.6 LBS
#7 BARS 72.33 LIN FT 147.8 LBS.
#9 BARS 128.00 LIN FT 435.2 LBS.

CONCRETE

REINFORCED 13.92 CU. YDS.
NON-REINFORCED 8.4 CU. YDS.

LARCHWOOD LAKE
OTSEGO S. & W.C.D.
COLLAR, CRADLE, BEDDING, BENT & MISC. DETAIL
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed D. ZOGRAFOS	Date 5/66	Approved by
Drawn W.T. Browning, Jr.	May 6?	
Traced		
Checked L. B.	8/66	Sheet 12 of 14 · Drawing No. NY-936-P

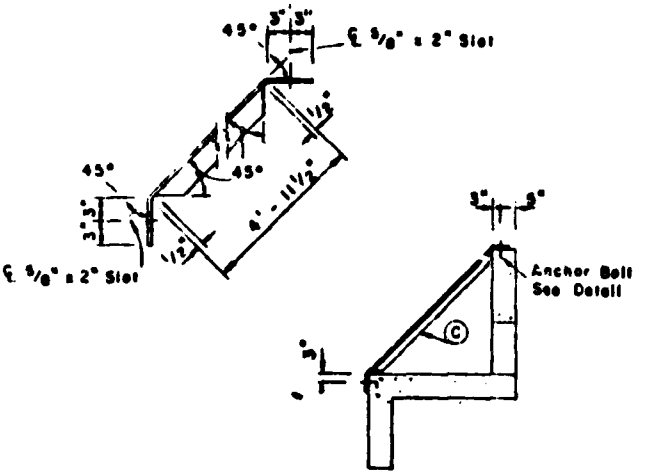
2

POND DRAIN TRASH RACK BILL OF MATERIAL

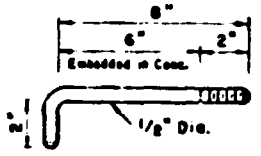
Item	Size	Length	Quan
Angle (A)	1½" x 1½" x ¼"	6' - 11½"	2
Anchor Bolt	½" Dia.	2" x 8"	4

CONSTRUCTION DETAILS

1. Material in Pond Drain Trash Rack shall conform to Spec 117 for Structural Carbon Steel Plates, Shapes and Bars, Grade C



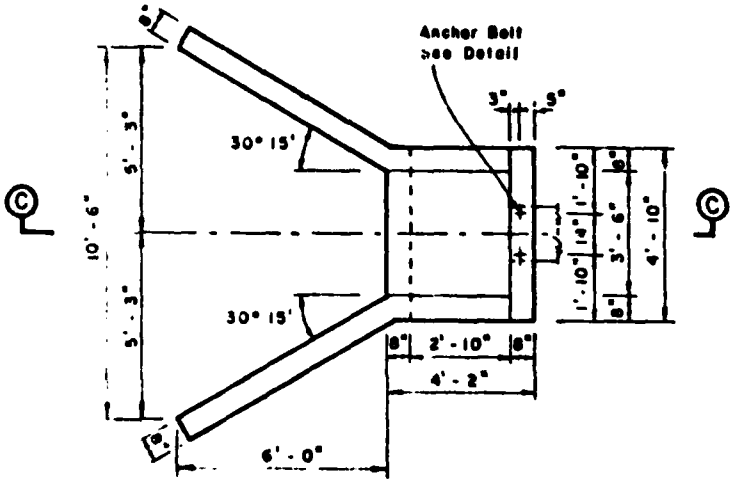
TRASH RACK



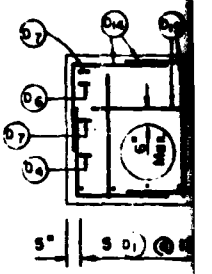
ANCHOR BOLT

Stainless Steel (Class 303, 303 Se or 416, Condition A)

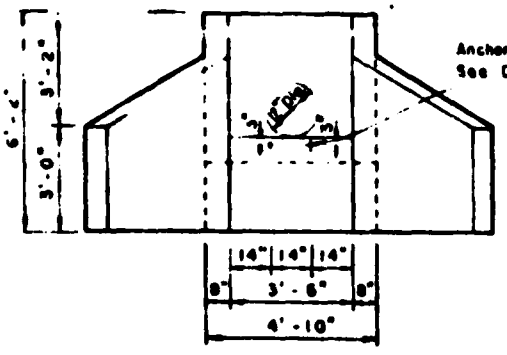
Supply with Hex Nut and Washer



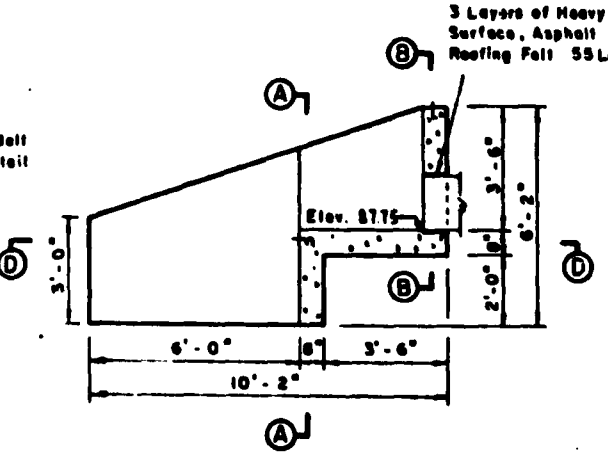
PLAN



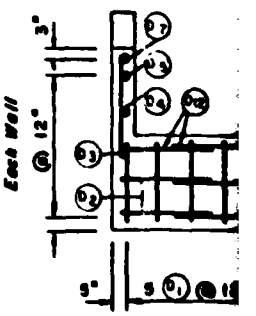
SECTION



UPSTREAM ELEVATION

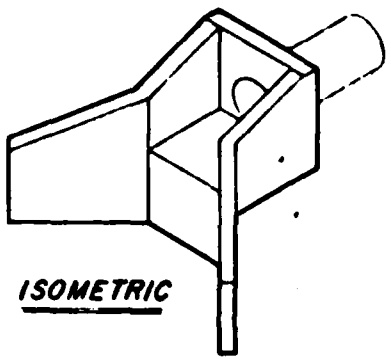


SECTION ALONG CENTERLINE



SECTION

BAR TYPES



ISOMETRIC

POND DRAIN STEEL SCHEDULE

Mark	Quan	Size	Length	Type	B	C	D	Total Length
D-1	5	4	5-9	21	2-2	3-0		28.75
D-2	4	4	9-5	19	6-8	2-9	2-4	37.67
D-3	2	4	8-0	19	6-8	1-4	1-5	16.00
D-4	2	4	8-4	22	3-9	3-10	1-11	16.67
D-5	2	4	5-10	22	1-0	3-10	0-6	11.67
D-6	2	4	2-11	21	2-2	0-9		5 83
D-7	2	4	11-11	22	7-2	4-0	3-7	23 83
D-8	4	4	2-9	1				9.50
D-9	4	4	3-3	1				13.00
D-10	4	4	4-0	1				16.00
D-11	2	4	4-9	1				9.50
D-12	4	4	5-6	21	2-9	2-9		22.00
D-13	4	4	6-2	21	2-9	3-5		24.67
D-14	4	4	5-0	21	2-9	2-3		20.00
D-15	3	4	3-6	1				10.50

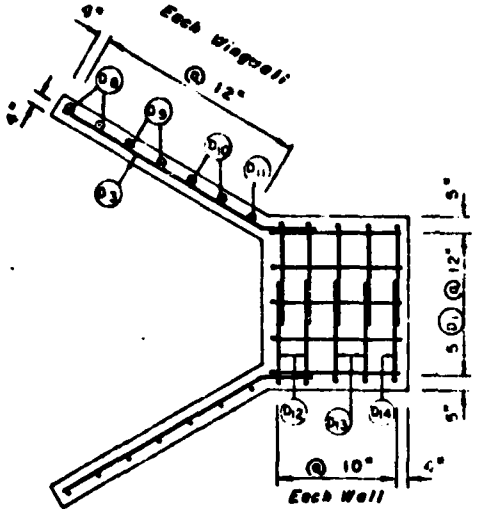
QUANTITIES (This Sheet Only)

STEEL

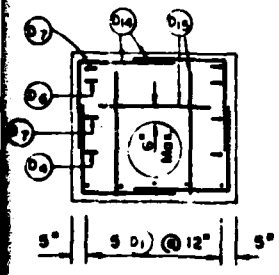
No. 4 Bar 269.1 @ 177.1 Lbs.

CONCRETE

Class 4000 3.0 Cu. Yds.

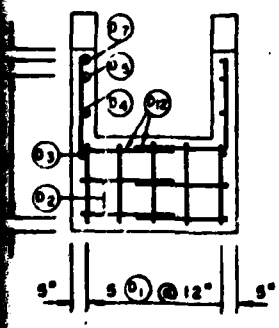


SECTION DD

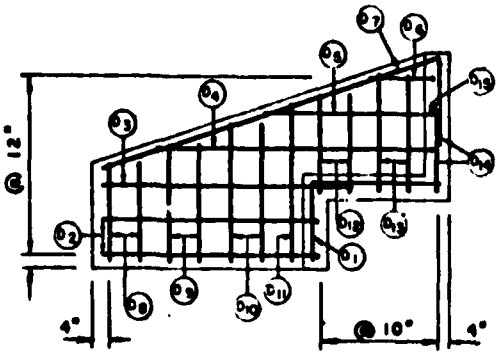


SECTION BB

SEE SHEET 8 FOR CONSTRUCTION DETAILS



SECTION A A



SECTION C C

LARCHWOOD LAKE
OTSEGO S & W C D
POND DRAIN INLET DETAILS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed L. B.	Approved by
Drawn	Date
Traced	Date
Checked L. B. 9/66	Drawing No. NY-936-P

TP 1

Topsoil, silt [illegible] as [illegible] flags. — ML

[illegible] from Devonian siltstone [illegible] Massive, [illegible] permeable, very firm [illegible] No seepage. Marsin. — GM

TP 2

0 1 Topsoil.

1 4 Gravel, silty; [illegible] from material as [illegible] Hole # 1. — GM

4 7 Gravel, silty, with some fine sand. [illegible] # 4" as sub-rounded [illegible] and small boulders. [illegible] till from Devonian siltstone and [illegible] Parent rock more massive than in Hole # 1. Grey color. Massive, very slowly permeable, very firm. Slight seepage at 4'. Marsin inclusion. — GM

TP 2 A

0 2 Topsoil.

2 4 Silty gravel-quite high [illegible] silt [illegible] angular stones [illegible] and [illegible] brown-moist-slowly permeable-devonian age-glacial till-dense. — GM

4 6 Silty gravel-quite high [illegible] silt & very fine sands & [illegible] stones > [illegible] grey-moist-slowly permeable-devonian age-glacial till-dense. — GM

6 9 Gravel-silty [illegible] grey [illegible] moist-slowly permeable-devonian age-glacial till-dense. — GM-SW

** Slow seepage at 7 feet in a gravel pocket or [illegible] permeability [illegible] seepage appears to be at same level as the stream [illegible]

TP 3

0 2 Alluvium and [illegible]

2 [illegible] [illegible] # 4". Otherwise same as [illegible] in Hole # [illegible] Chippewa inclusion. — GM

TP 4 (?)

0 1 Topsoil.

1 5 Gravel, silty, [illegible] # 4". Subsoil Gravel, silty; [illegible] # 4". Moderate permeability, friable. — GM

5 [illegible] Gravel, silty; [illegible] # [illegible] Same as [illegible] in Hole # 1. Pocket of GM at 7', surrounded by the till. Marsin. — GM

TP 5

0 3 Colluvium. Gravel, silty; 15% # 4". Brown color. Moderately permeable. — GM

3 [illegible] Gravel, silty. Same as [illegible]-7' in Hole # 2. No seepage, and hole dug to 4' below stream level. Marsin inclusion. — GM

TP 101

0 1 Topsoil.

1 6 Gravel, silty; 20% # 4" as 5" thick flags. Massive, very firm, very slowly permeable fragipan in Wisconsin till. Grey color. Volusia. — GM (GM-GC) 4'-6' DEPTH

TP 201

0 1 Topsoil.

1 2 Gravel, silty; 10% # 4". Moderately permeable and friable. Brown color. — GM

2 12 Gravel, silty; 20% # 4". No seepage. Same as [illegible] in Hole # 1. Marsin. — GM (GM-GC) 8'-10' DEPTH

TP 202 (?)

0 2 Topsoil.

2 8 Same as [illegible] in Hole # 1. Marsin. — GM

TP 203 (?)

0 11 Same as Hole # 201. Small isolated pocket of GM at 9-10'. Marsin. — GM

TP 204 (?)

0 5 Same as Hole # 204. Marsin. — GM

TP 301 (?)

0 1 Topsoil, gray color.

1 7 Gravel, silty, with some fine sand, [illegible] # 4" as sub-rounded cobbles & small boulders. (Same as [illegible] in Hole # 2). Chippewa. — GM (GM) 6'-7' [illegible]

TP 301 A

0 1 Recent Alluvium.

1 4 Silty gravel-high in silt and very fine sand-w/5% pebbles < [illegible]" and w/1-5% [illegible] sub-rounded cobbles-grey-moist-slowly permeable-devonian age-glacial till-dense. — GM or GM

4 5 Gravel-silt-quite high in % silt-w/15-20% > 4" sub-rounded cobbles-grey-moist-slowly permeable-devonian age-glacial till-dense. — GM

TP 402 (?)

0 1 Topsoil.

1 6 Clay, silty, firm and slowly permeable. Remnant of lacustrine material. Slowly permeable and firm. — CL

6 [illegible] Gravel, silty. Same as 1-7' in Hole # 401. Hudson over till. — GM

TP 402 A (?)

0 1 Disturbed soil.

1 5 Gravel-silty-quite high in % silt-w/5% pebbles [illegible] to [illegible] and 10% sub-rounded cobbles and small boulders > 4"-gray-moist-slowly permeable-devonian age-glacial till-dense. — GM (ML)

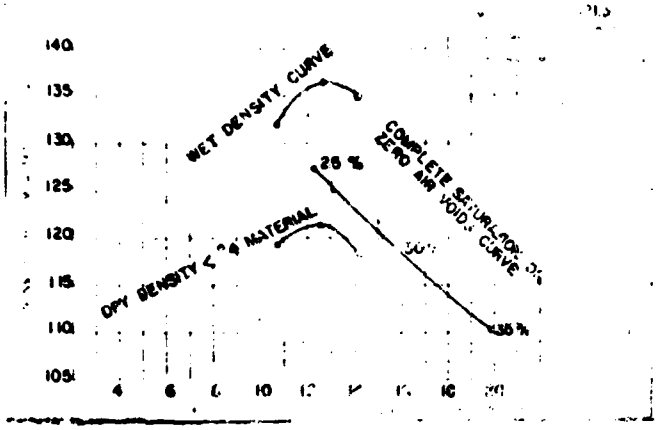
5 7 Silty-sand-gravel-high in % silt and very fine sand-w/[illegible] pebbles < [illegible]" and w/5% sub-rounded stones 4"-gray-moist-slowly permeable-devonian age-glacial till-dense. — GM or GM (ML)

TP 501 (?)

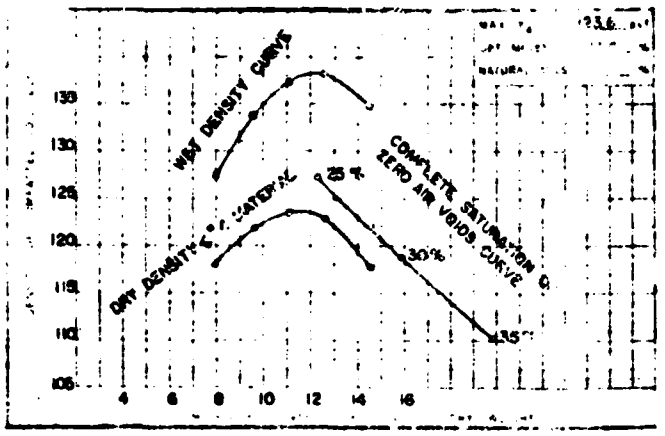
0 3 Colluvium-Gravel-silty-Quite high in % silts w/[illegible]0% sub-angular cobbles & small boulders, brown-moist-moderate permeability-devonian age-glacial till-medium. — GM

3 7 Silty-Gravel-w/20-25% sub-rounded cobbles and boulders > 4" and 5% sub-rounded pebbles [illegible] to [illegible]" gray-moist-devonian age-glacial till very dense. — GM (ML)

TYPICAL COMPACTION CURVES



COMPACTION CURVE FOR MATERIAL FROM TP 2011, 8'-10' DEEP



COMPACTION CURVE FOR MATERIAL FROM TP 1011, 4'-6' DEEP

UNIFIED SOIL CLASSIFICATION SYMBOLS

GM Silty gravels; gravel-sand-silt mixtures

ML Silts, silty, v. fine sands; sandy or clayey silts

CL Inorganic clays of low to medium plasticity

(A) - UNIFIED CLASSIFICATION MADE BY VISUAL INSPECTION IN THE FIELD.

(L) - UNIFIED CLASSIFICATION BY THE LABORATORY.

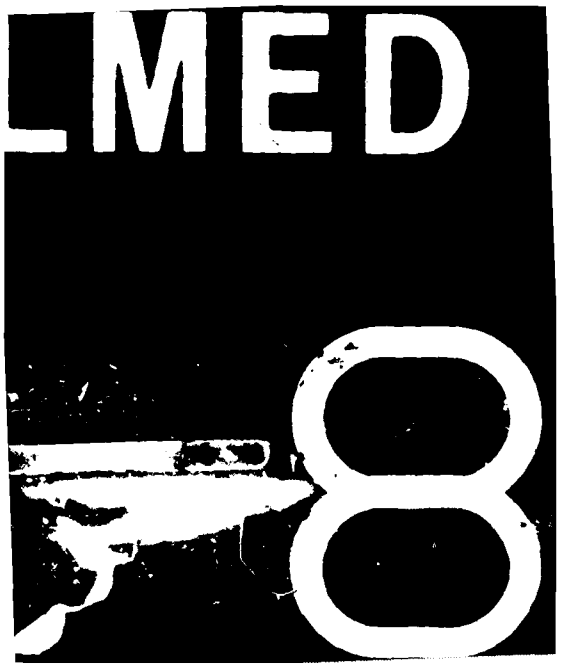
LARCHWOOD LAKE
OTSEGO S & W.C.D.
LOGS OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

L KICK Date
Soil Investigations J R MULVANEY

L B 8/66

NY-936-P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