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NATIONAL DAM SAFETY PROGRAM. GLENMERE LAKE DAM, (INVENTORY NUMB--ETC(U)
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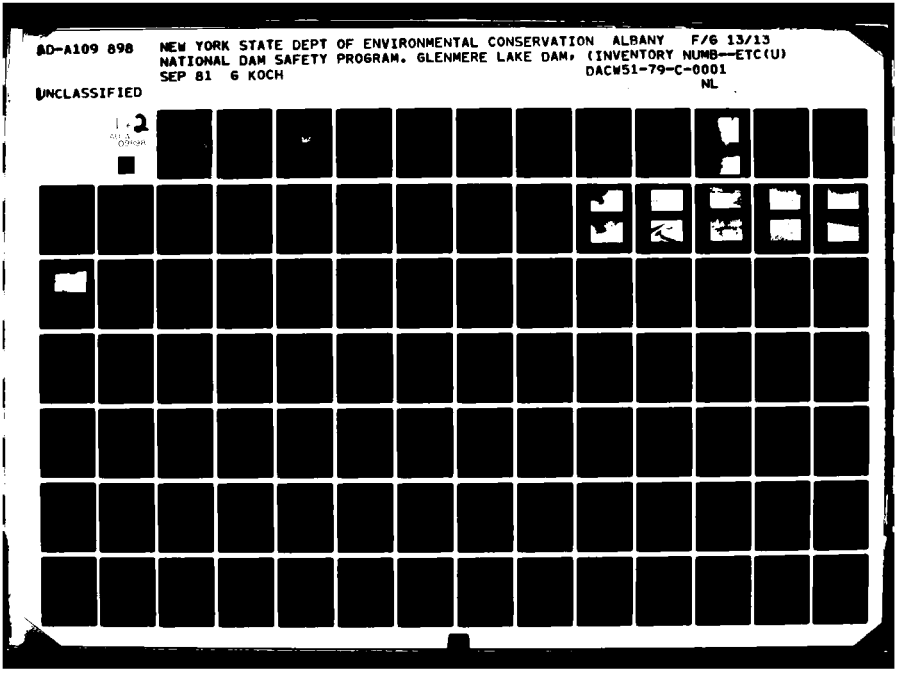

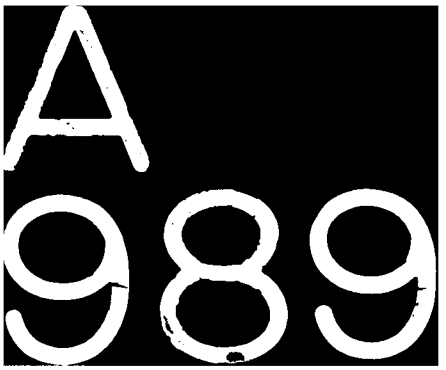
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National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Glenmere Lake Dam
Orange County
Lower Hudson River Basin

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

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

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Cont

Using the Corps of Engineers' "screening criteria" for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped for all storms in excess of 17% of the Probable Maximum Flood (PMF).. The spillway is, therefore, adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity; and if a severe storm were to occur, overtopping and failure of the dam could take place significantly increasing the hazard to loss of life downstream of the dam.

It is, therefore, recommended that within 6 months of notification to the owner, detailed hydrological/hydraulic investigation of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed. The results of this investigation will determine the appropriate remedial measures which will be required to achieve a spillway capacity adequate to discharge the outflow from at least the 1/2 PMF event. In the interim, a detailed emergency action plan must be developed and implemented during unusually heavy precipitation. Around-the-clock surveillance of the structure must be provided during these periods, also remove the stoplog.

Seepage and collapsing of the downstream retaining wall warrant further investigation of the embankment. This investigation will determine the type and extent of remedial measures required.

LOWER HUDSON RIVER BASIN

GLENMERE LAKE DAM

ORANGE COUNTY, NEW YORK
INVENTORY NO. N.Y. 224

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST, 1981

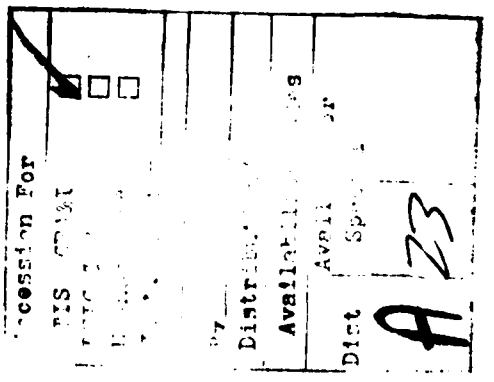
PREFACE

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

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

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

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



PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
GLENMERE LAKE DAM
I.D. NO. NY 224
DEC NO. 179D-460
LOWER HUDSON RIVER BASIN
ORANGE COUNTY, N.Y.

TABLE OF CONTENTS

Phase I Inspection Report
National Dam Safety Program

Name of Dam:	Glenmere Lake Dam I.D. No. NY - 224
State Located:	New York
County Located:	Orange
Watershed:	Lower Hudson River Basin
Stream:	Browns Creek
Date of Inspection:	March 31, 1981

ASSESSMENT:

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

Using the Corps of Engineers' "screening criteria" for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped for all storms in excess of 17% of the Probable Maximum Flood (PMF). The spillway is, therefore, adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity; and if a severe storm were to occur, overtopping and failure of the dam could take place significantly increasing the hazard to loss of life downstream of the dam.

It is, therefore, recommended that within 6 months of notification to the owner, detailed hydrological/hydraulic investigation of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed. The results of this investigation will determine the appropriate remedial measures which will be required to achieve a spillway capacity adequate to discharge the outflow from at least the 1/2 PMF event. In the interim, a detailed emergency action plan must be developed and implemented during unusually heavy precipitation. Around-the-clock surveillance of the structure must be provided during these periods, also remove the stoplog.

Seepage and collapsing of the downstream retaining wall warrant further investigation of the embankment. This investigation will determine the type and extent of remedial measures required.

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

1. Collapsing portions of the retaining wall on the downstream slope of the embankment.

2. Seepage at several points on the downstream toe of the embankment.

3. Deteriorated concrete elements and joints of the spillway structure, wingwalls should be repaired and backfilled.

4. Heavy vegetation and debris in and around the spillway channel.

5. Remove the stoplog in the spillway to reduce normal pool elevation. Rip rap the upstream slope.

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

7. Develop the above-mentioned emergency action plan.

Recommended by:

G. Koch

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

Approved by:

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

Date: 14 Sep 81

Overview - Glenmere Lake Dam

Phase I Inspection Report
National Dam Safety Program
Glenmere Lake Dam I.D. No. NY 224
DEC #179D-460 Lower Hudson River Basin
Orange County

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

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

b. Purpose of Inspection

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

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Glenmere Lake Dam is a 600 feet long earth embankment with a concrete drop inlet type spillway located at the right end of the embankment. It is 24 feet high at its maximum height. The upstream slope of the embankment is rip rapped below the present water surface at a 1½ horizontal to 1 vertical. The nearly vertical downstream slope is a 5 feet thick dry stone wall. This stone wall has been replaced in one 63 feet section by a concrete wall where it had previously collapsed. The embankment also serves a town road, maintained by the Town of Chester. The spillway has a weir length of 12.4 feet by which flow passes over and into a 6.5 by 6.0 feet rectangular culvert through the embankment. There is no operational reservoir drain. The downstream channel consists of an open section of channel leading to a horseshoe culvert under another downstream embankment believed to be associated with the previous mill operation.

b. Location

The dam is located on Browns Creek, a tributary of the Wallkill River and Hudson River, approximately one mile east of the Village of Florida, New York.

c. Size

The dam is 24 feet high and impounds 2830. acre feet at normal pool elevation with flashboards. The dam is classified as "intermediate" in size.

d. Hazard Classification

The dam is classified as high hazard due to its location above several low lying homes in the area between the dam and the Village of Florida, New York. The Village of Florida is within one mile of the Glenmere Lake Dam.

e. Ownership

The dam is owned by Florida Water Works Company, which is owned and operated by Mr. Raymond Green, Florida, New York (914)651-4164.

f. Purpose of Dam

Originally the dam was built to power a mill, however, since 1892 the storage provided has been used for water supply.

g. Design and Construction History

There is no information available with regard to design or construction. From information located in the NYSDEC files, it can be ascertained that the dam is about 100 years old.

h. Normal Operating Conditions

All flows in excess of the Florida Water Works requirements are passed over the uncontrolled spillway. A reservoir drain could not be located.

1.3 PERTINENT DATA

a. Drainage Area (sq. mi.)	2.40
b. Elevations (ft. USGS Datum)	
Top of Dam	534.0
Top of Stop Logs	532.55
Spillway Crest	532.0
Original Stream Channel	510.0±
c. Reservoir	
Surface Area @ Spillway Crest (acres)	328.0
Storage @ Top of Dam (acre feet)	3327.0
Storage @ Spillway Crest (acre feet)	2832.0
d. Dam	
Type: Earth fill with rip rapped upstream slope and stone retaining wall downstream slope.	
Length (ft.)	600.0
Height (max.; ft.)	24.0
Upstream Slope	1½H:1V
Downstream Slope	about 1H:5V
Crest Width (ft.)	23.0±
e. Spillway	
Type: Drop inlet to 6.5 X 6.0 rectangular culvert through embankment.	
Weir Length (ft.)	12.4
Spillway Capacity @ Top of Dam (cfs)	78.0
Reservoir Drain	None

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Glenmere Lake Dam is located in the "Hudson Valley Lowlands" physiographic province of New York State. These lowland areas have gentle relief and are underlain by Ordovician shales that have been exposed by the erosion of overlying Silurian and Devonian limestones. Drainage is generally northeast towards the Hudson River.

b. Subsurface Investigation

The Troy-Cossayuna is the dominant association of the glacial till of the Hudson Valley (Ref. 8). No information could be found concerning site conditions during construction.

2.2 DESIGN RECORDS

The dam was constructed around one hundred years ago and consisted of an earth embankment protected with stone. The dam was originally used for power and intakes existed to the left of the present spillway. These intakes were blocked off at some time before 1926 when the Florida Water Works gained water rights to the lake. There are no plans or construction data available.

2.3 CONSTRUCTION RECORDS

There are no construction records available for Glenmere Lake Dam.

2.4 OPERATION RECORD

There are no operating records available.

2.5 EVALUATION OF DATA

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

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Glenmere Lake Dam and surrounding watershed was conducted on March 31, 1981. The weather was partially cloudy and the temperature ranged in the fifties. The reservoir water surface was at the top of the stoplogs. There was a higher draw of water than normal due to the emergency diversion of water to the Village of Goshen (Photo #2).

b. Dam

The earth embankment shows signs of distress which require further investigation to determine the severity of the problem areas. The upstream slope was found to be very irregular with some areas of movement as evidenced by the guard rails and shoreline (Photo #1). The dam has a town road running along its crest, and the shoulders of the road are showing signs of erosion and general wear from vehicular traffic (Photo #2). From the left abutment (Photo #7), there is local drainage running along the toe of the embankment; the pipeline to Goshen is leaking at the chlorination house. The downstream slope is caving in almost the entire length of the dam (Photos #9, 10, and 11). Seepage is eminating at several points along the downstream slope creating the sloughing and movement of the wall (Photo #8).

c. Seepage

Seepage was observed eminating from several points. The two major point seepages are located approximately 150 feet from the chlorination house and adjacent to the concrete retaining wall. The seepage totalled about 5 gallons per minute. This combined with the pipeline leakage to form the flow along the toe of the embankment. The flow did not appear to be carrying fines; however, the failure of the stone retaining walls warrants investigation into the seepage.

d. Spillway

The concrete drop inlet spillway is in fair condition. The concrete box culvert is in need of repair, joints should be cleaned and recaulked, cracks patched, and wingwalls repaired and back-filled.(Photos #4 and 5). The downstream channel is full of debris, which could block the horseshoe culvert diverting flow along the toe of the embankment (Photo #6).

e. Reservoir Drain

Besides the water supply draw off the only visible drain was an 8 inch pipe through the spillway wall, however, no control could be located.

f. Downstream Channel

The downstream channel is confined to a horseshoe culvert just downstream of the culvert through the embankment (Photo #6). There is heavy vegetation and debris in and around the channel. Upon exiting the horseshoe culvert, the channel takes a natural course which is well defined with steep side slopes.

g. Reservoir

There are no visible signs of instability around the reservoir. The lake formed by the dam is rather shallow as are the banks surrounding it.

3.2 EVALUATION

Significant conditions were observed which require investigation to determine what remedial action is required to insure the stability of the dam and appurtenances. The following is a summary of the problem areas encountered with appropriate recommended action:

1. The movement of guard rails and collapsing of portions of the wall indicate that movement of both upstream and downstream slopes has occurred. These areas should be monitored at bi-weekly intervals to ascertain if any ongoing movement is occurring. These areas must be repaired or replaced.

2. Seepage which was observed at several points along the toe of the embankment should be monitored at bi-weekly intervals with the aid of weirs. If the flow rate increases significantly or the migration of fines occurs, immediate remedial measures will be required to control this seepage.

3. The concrete elements of the spillway are cracked, and the joints are deteriorated. Repair all deteriorated areas during low flow periods and recaulk joints. The wingwalls should be repaired and backfilled.

4. Considerable vegetation was observed growing on the downstream slope around the spillway channel which is filled with vegetation and debris. Both vegetation and debris should be removed.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURE

4.1 PROCEDURES

The normal water surface elevation is approximated by the top of the slopes on the uncontrolled overflow spillway. The only other draw off from the reservoir is to the Florida Water Works Company.

4.2 MAINTENANCE OF THE DAM

The dam is maintained by the Florida Water Works Company; the roadway is maintained by the Town of Chester. Maintenance of the dam is not considered satisfactory as evidenced by the erosion of the upstream slope and crest, collapse of much of the retaining wall and overall deterioration of the spillway structures.

4.3 WARNING SYSTEM

There is no warning system in effect or in preparation.

4.4 EVALUATION

The dam and appurtenances have not been maintained in satisfactory condition as noted in "Section 3: Visual Inspection."

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

Glenmere Lake Dam is located on Browns Creek, about one mile east of the Village of Florida, Orange County, New York. The total drainage area is 2.40 square miles. The basin was broken into two sub-basins; one is 0.51 square miles, which is the surface area of the lake itself, and the other is 1.89 square miles which has rather mild slopes interspersed by scattered ponds.

5.2 ANALYSIS CRITERIA

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

5.3 SPILLWAY CAPACITY

The spillway has a capacity of 78 cfs. For 1/2 the PMF, the peak inflow will be 2406 cfs and the peak outflow will be 1182 cfs. During this event, the dam will be overtopped by 0.65 foot of water. For the PMF, the peak inflow will be 4812 cfs and the peak outflow will be 3029 cfs. During this event, the dam will be overtopped by 1.29 feet of water.

5.4 RESERVOIR CAPACITY

Capacity to normal water elevation is 2830 acre feet. Surcharge storage to top of dam is an additional 542 acre feet creating a total storage of 3372 acre feet. The surcharge storage between spillway and dam crests is equivalent to 4.23 inches of runoff.

5.5 FLOODS OF RECORD

No records of past floods for Browns Creek are available.

5.6 OVERTOPPING POTENTIAL

The analysis indicates the embankment will be overtopped during all storms in excess of 17% of the PMF. A storm equal to 1/2 the PMF will cause overtopping of the embankment by about 0.65 foot of water, whereas, the PMF is expected to cause overtopping by 1.29 feet.

5.7 EVALUATION

The spillway is inadequate to pass the floods exceeding 17% of the PMF. The spillway, therefore, is adjudged as "seriously inadequate", and the dam is assessed as unsafe, non-emergency.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation

Signs of distress, significant enough to warrant further investigation, were found along the retaining wall, downstream slope of the embankment. Collapsing of the stone wall, movement of the guard rails, and seepage eminating from several points along the toe warrant this investigation.

b. Design and Construction Data

No information could be located regarding the structural stability of the structure.

c. Operation Records

No operating problems which would affect the stability of the dam were found. However, removal of the 0.55 foot stoplog would reduce the possibility of overtopping by wave run up somewhat.

d. Post Construction Changes

Since the original construction, which was for power to an adjacent mill, some changes have occurred. Information taken from the NYS Department of Environmental Conservation files shows that these changes were the present spillway and the blocking off of intakes to the mill.

e. Seismic Stability

Glenmere Lake Dam is located in Seismic Zone 1, therefore, no seismic analysis was performed.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I Inspection of Glenmere Lake Dam revealed that the spillway is "seriously inadequate," based upon the Corps of Engineers screening criteria; the outflows from any storm in excess of 17% of the PMF will overtop the dam. This overtopping could cause breaching of the dam, and the resulting flood wave would significantly increase the hazard to downstream residents. For these reasons, the dam has been assessed as unsafe, non-emergency.

In addition, the dam has a number of problem areas which if left uncorrected, have the potential for the development of hazardous conditions. These areas are:

1. Collapsing portions of the retaining wall on the downstream slope of the embankment.

2. Seepage at several points on the downstream toe of the embankment.

3. Deteriorated concrete elements and joints of the spillway structure. Wingwalls should be repaired and backfilled.

4. Vegetation and debris in and around the spillway channel.

b. Adequacy of Information

The information reviewed is considered adequate for Phase I Inspection purposes.

c. Need for Additional Investigations

Since the spillway is considered to be "seriously inadequate," additional hydrologic/hydraulic investigation is required to more accurately determine the site specific characteristics of the watershed. After the in-depth hydrologic/hydraulic investigation has been completed, remedial measures must be initiated to provide spillway capacity sufficient to discharge the outflow from the 1/2 PMF event. In addition, the seepage and deterioration of the embankment require further investigation of the embankment. This investigation will determine the type and extent of remedial measures required.

d. Urgency

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

7.2 RECOMMENDED MEASURES

1. The results of the hydrologic/hydraulic investigation will determine the appropriate remedial actions for the spillway.

2. The results of the embankment investigation will determine the appropriate remedial work.

3. Monitor the downstream retaining wall at bi-weekly intervals to ascertain if a significant movement is occurring.

4. Monitor the seepage at the toe of the downstream slope at bi-weekly intervals with the aid of weirs. If flow rates increase significantly or migration of fines occurs, immediate remedial measures will be required to control this seepage.

5. Remove the stoplog in the spillway to reduce effect of wave action on the upstream slope. Rip rap the upstream slope for protection.

6. Repair all deteriorated concrete surfaces and clean and recaulk joints in spillway structure. Repair wingwalls and backfill.

7. Remove heavy vegetation and debris from downstream slope and spillway channel.

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

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

APPENDIX A

PHOTOGRAPHS

Photo #1 Upstream slope - Note irregularity and guard rail movement.

Photo #2 Crest of embankment. Pipeline to Goshen on right.

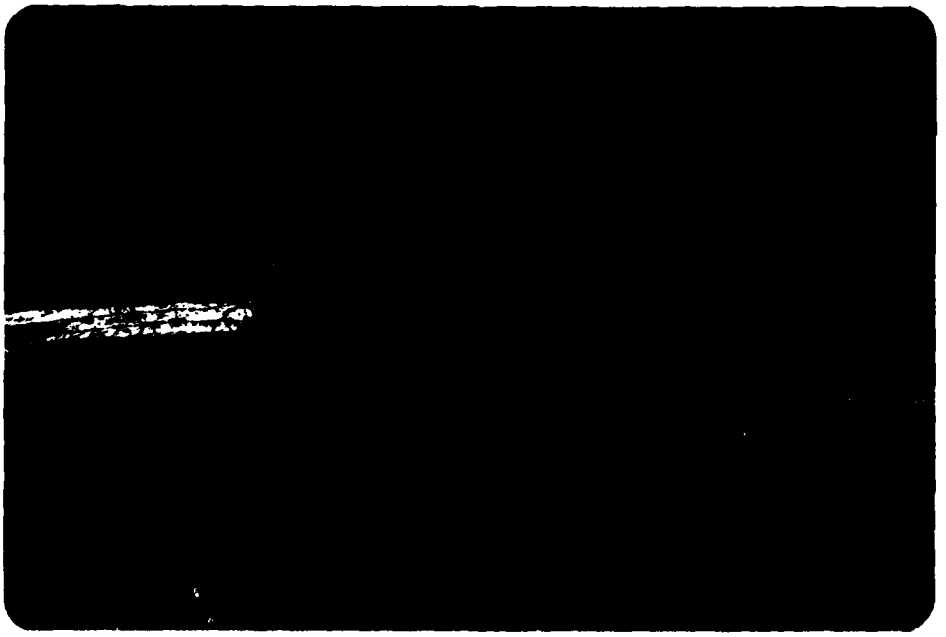


Photo #3 Deterioration of crest, right of spillway

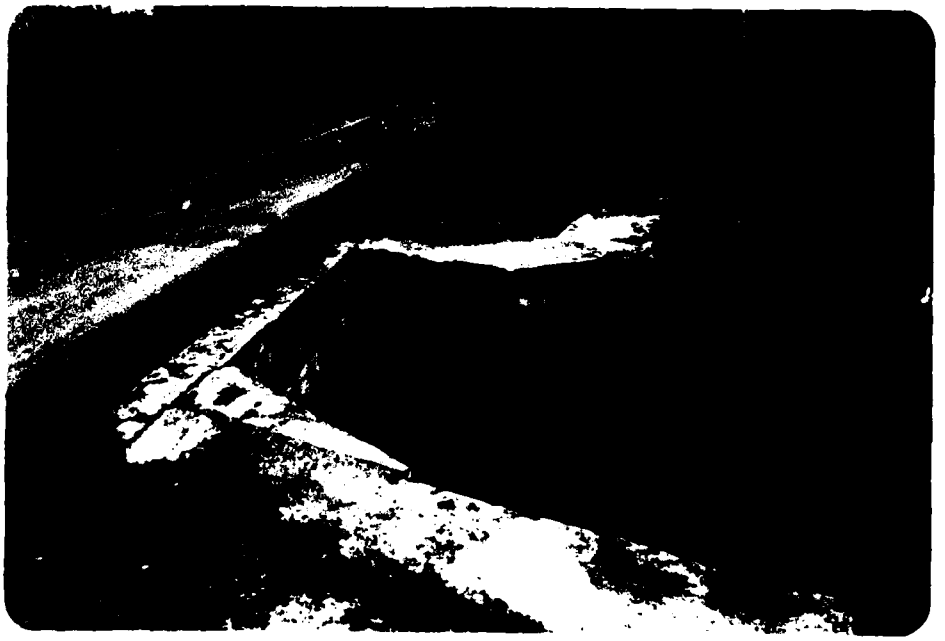


Photo #4 Spillway crest. Note deterioration of concrete and construction joints.

Photo #5 Spillway culvert. Note deterioration of wingwalls and concrete.

Photo #6 Spillway channel. Note debris.

Photo #7 Embankment from left abutment

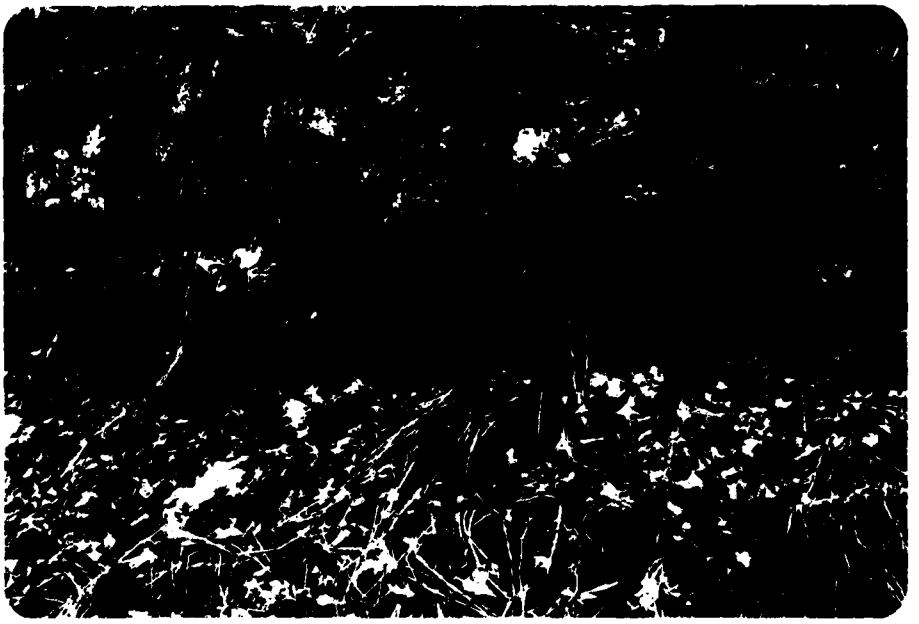


Photo #8 Seepage at toe of retaining wall.

Photo #9 Downstream slope. Note movement of guard rails and wal .

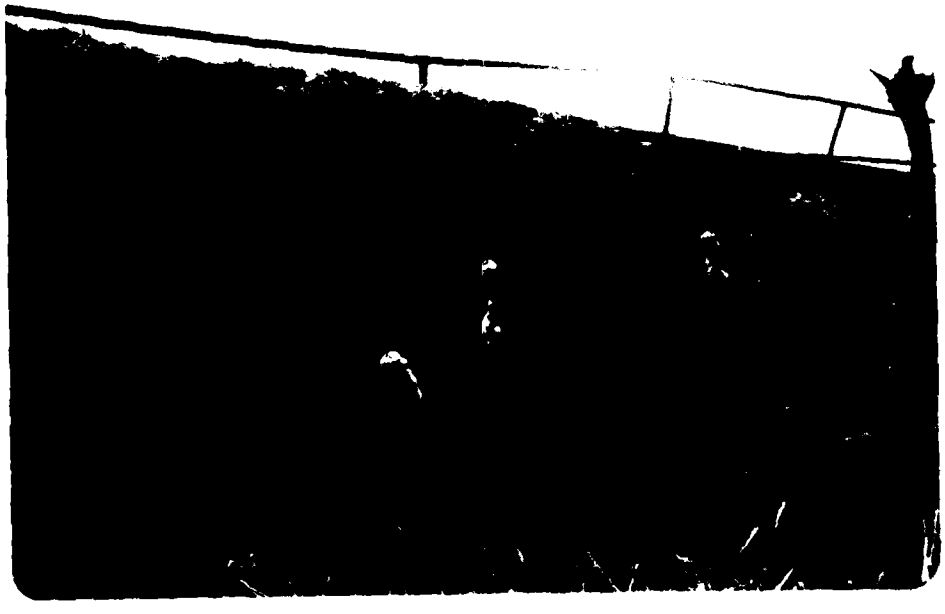


Photo #10. Collapse of retaining wall.

Photo #11. Collapse of wall and embankment.

APPENDIX B

VISUAL INSPECTION CHECKLIST

93-15-3(9/80)

VISUAL INSPECTION CHECKLIST

1) **Basic Data**

a. General

Name of Dam GLENMERE LAKE DAM

Fed. I.D. # NY 224 DEC Dam No. 179D-460

River Basin LOWER HUDSON

Location: Town CHESTER County ORANGE

Stream Name BROWN'S CREEK

Tributary of WALLKILL RIVER

Latitude (N) 41°20.4' Longitude (W) 74°21.9'

Type of Dam earth embankment / masonry downstrm slope

Hazard Category high - "C"

Date(s) of Inspection MARCH 31, 1981

Weather Conditions cloudy - 50's.°

Reservoir Level at Time of Inspection top of stop log

b. Inspection Personnel Robert Durrin, Jamie Veitch

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

John C. Harter, Mayor & Dan Kimiecik, Trustee
Village of Florida, Inc.
Florida NY
(914) 651-7815

d. History:

Date Constructed ≈ 1880 Date(s) Reconstructed 1926

Designer UNKnown

Constructed By UNKnown

Owner FLORIDA WATER WORKS; Mr. Ray Green

2) Embankment

a. Characteristics

(1) Embankment Material earth, Stone wall (downstream slope)

(2) Cutoff Type Unknown

(3) Impervious Core Unknown

(4) Internal Drainage System only in concrete section or Retaining wall

(5) Miscellaneous

b. Crest

(1) Vertical Alignment FAIR

(2) Horizontal Alignment Good

(3) Surface Cracks None

(4) Miscellaneous Crest Rounded, wave erosion on upstream slope, runoff, vehicular wear eroding downstream edge of crest.

c. Upstream Slope

(1) Slope (Estimate) (V:H) 1:1½

(2) Undesirable Growth or Debris, Animal Burrows None

(3) Sloughing, Subsidence or Depressions Erosion caused by wave action

(4) Slope Protection riprap & some concrete - broken up

(5) Surface Cracks or Movement at Toe —

d. Downstream Slope

(1) Slope (Estimate - V:H) nearly vertical

(2) Undesirable Growth or Debris, Animal Burrows heavy brush and tree

(3) Sloughing, Subsidence or Depressions wall collapsing in several spots along dam

(4) Surface Cracks or Movement at Toe sloughing & collapsing along d/s toe

(5) Seepage several points of seepage

(6) External Drainage System (Ditches, Trenches; Blanket) trench along toe for local drainage - blocked w/ leaves, silt, debris

(7) Condition Around Outlet Structure filled with debris

(8) Seepage Beyond Toe NO

e. Abutments - Embankment Contact

seepage, debris, sloughing

93-15-3(9/80)

(1) Erosion at Contact No

(2) Seepage Along Contact yes

3) Drainage System

a. Description of System only from concrete portion of retaining wall

b. Condition of System —

c. Discharge from Drainage System dripping

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

None

93-15-3(9/80)

5) Reservoir

a. Slopes shallow

b. Sedimentation No apparent problem

c. Unusual Conditions Which Affect Dam None

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) roadway across crest of DAM, several home d/s at another rd. crossin

b. Seepage, Unusual Growth —

c. Evidence of Movement Beyond Toe of Dam —

d. Condition of Downstream Channel heavily treed, debris.

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

a. General drop inlet, 1-6" stoplog

b. Condition of Service Spillway concrete joints deteriorated, spalling

c. Condition of Auxiliary Spillway —

d. Condition of Discharge Conveyance Channel filled with debris — channel walls collapsing, downstream wingwalls deteriorated, erosion along wingwalls

8) Reservoir Drain/Outlet N/A

Type: Pipe _____ Conduit _____ Other _____

Material: Concrete _____ Metal _____ Other _____

Size: _____ Length _____

Invert Elevations: Entrance _____ Exit _____

Physical Condition (Describe): Unobservable _____

Material: _____

Joints: _____ Alignment _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate _____ Valve _____ Uncontrolled _____

Operation: Operable _____ Inoperable _____ Other _____

Present Condition (Describe): _____

9) Structural

a. Concrete Surfaces —

b. Structural Cracking —

c. Movement - Horizontal & Vertical Alignment (Settlement) d/s retaining wall collapsing entire length

d. Junctions with Abutments or Embankments fair

e. Drains - Foundation, Joint, Face —

f. Water Passages, Conduits, Sluices —

g. Seepage or Leakage seepage at several points at d/s toe from retaining wall (causing sloughing)

h. Joints - Construction, etc. Joints in drop inlet and tunnel deteriorated

i. Foundation APPARENTLY O.K.

j. Abutments GOOD

k. Control Gates NONE

l. Approach & Outlet Channels APPROACH OKAY - OUTLET FULL OF DEBRIS

m. Energy Dissipators (Plunge Pool, etc.)

n. Intake Structures NONE

o. Stability APPARENTLY GOOD, EXCEPT FOR RETAINING WALL WHICH

p. Miscellaneous

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

a. Description and Condition SMALL PUMP HOUSE AND CHLORINATION BUILDING FAIR CONDITION — AT TIME OF INSPECTION THERE WAS A DIVERSION PIPELINE TO THE VILLAGE OF GOSHEN

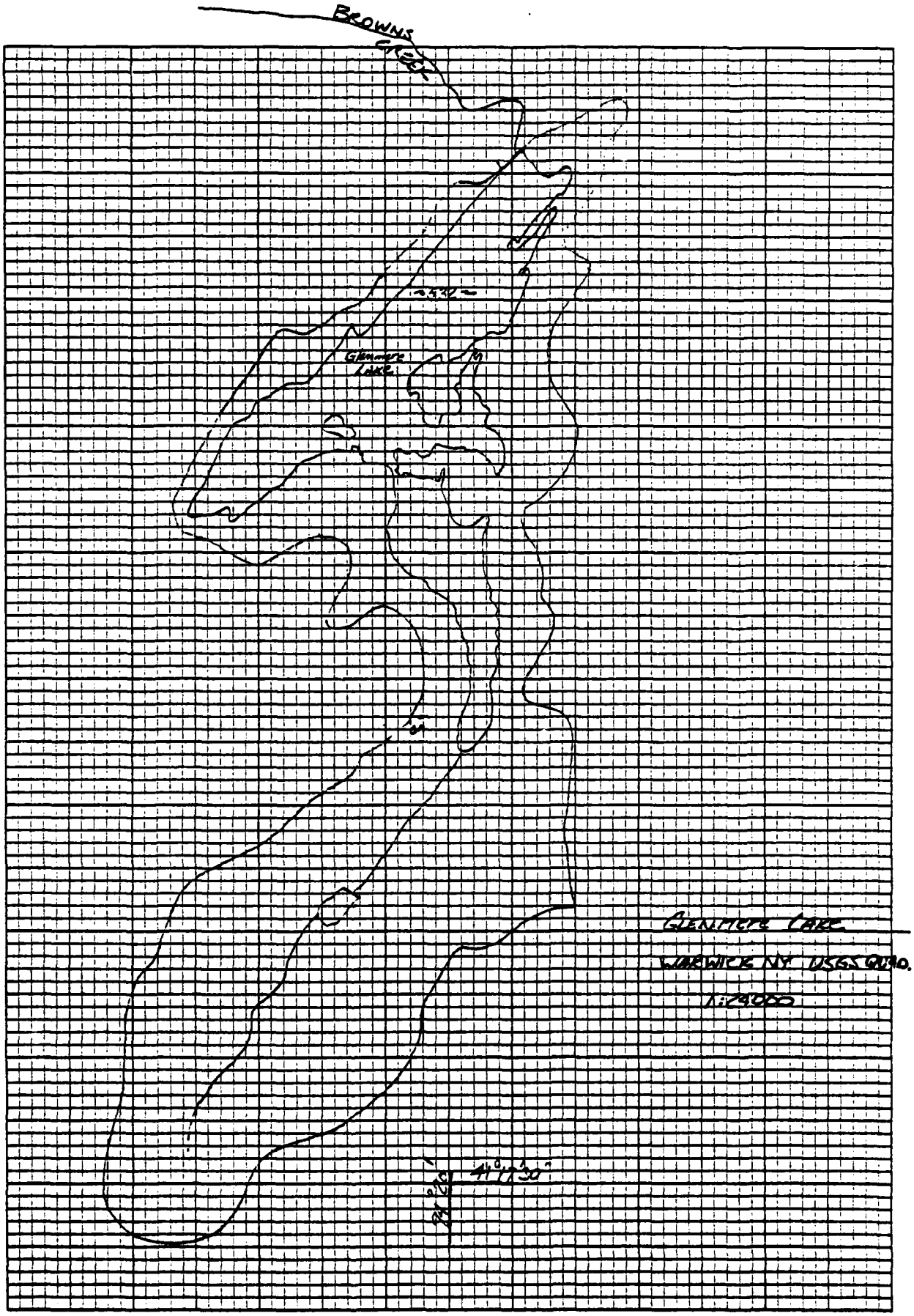
11) Operation Procedures (Lake Level Regulation):

ONE STOPLOG IN PLACE @ TIME OF INSPECTION — POSSIBLE TO ADD MORE.

APPENDIX C

HYDROLOGIC / HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS



GLENMERE LAKE
WARWICK NY USGS QUAD.
1:24000

46 0782

GLENMERE LAKE

DRAINAGE AREA : $16.76 \frac{(24000)^2}{144(43560)}$ = 1539.0 ACRES
from USGS quad.

= 2.40 mi.^{2}

POND AREA: 3.57 (") = 327.8 ACRES @ 532

= 0.51 mi.^{2}

4.56 (") = 418.7 ACRES @ 540

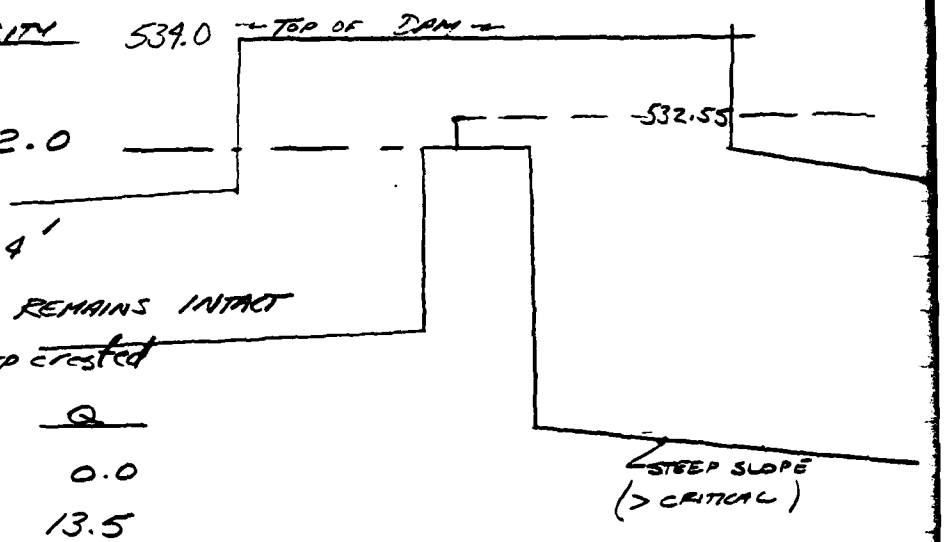
5.96 (") = 547.2 ACRES @ 560

EL.	AREA	AREA	Vol.	Σ Vol
508	0	0	0	0
		1/3Ah = Vol		
532	328			2624
540	419	379	2992	5616
560	547	483	9660	15276

Height approximately 24 feet high at its highest fill location.

Glenmere Lake

Spillway Capacity



WEIR LENGTH = 12.4'

ASSUME FLASHBOARDS REMAINS INTACT

ASSUME C = 3.6 ~~sharp crested~~

EL	H	C	Q
532.55	0	3.6	0.0
533.0	0.45	3.6	13.5
533.55	1.0	3.6	44.6
534.0	1.45	3.6	77.9
534.55	2.0	3.6	126.3
535.0	2.45	3.6	171.2

Precipitation

Σ PMP = 21.5"

Dur.	6	12	24	48
%	111	123	133	142

Drainage Area = 2.40 $Mi.^2$

$L = 9.9'' \left(\frac{24000}{12(5280)}\right) = 3.75$ mi $\quad C_t = 2.0$

$L_{ca} = 5.9(\ \times\ ) = 2.05$ mi. $\quad C_p = .625$

$t_p = C_t (L \times L_{ca})^{0.3} = 2.\left(3.75 \times 2.05\right)^{0.3} = 3.69$ hr.

$t_r = t_p / 5.5 = .67$ hr $= 40$ min. USE 30 min.

$T_p = t_p + 0.25(t_R - t_r) = 3.69 + .25(.9 - .67) = 3.65$ HR.

Glenmere Lake

TRANSPOSITION FACTOR

$$TF = 1 - \frac{0.3008}{(DA)^{0.17718}} = 1 - \frac{0.3008}{(2.4)^{.17718}} = 0.742$$

ANALYZE FOR TWO BASINS

POND AREA - DIRECT INPUT NO LOSS

UPPER AREA - LAGGED W/ LOSS of 1" INITAL
0.1"/hr

UPPER AREA

t_r = 30 MIN.

SNYDER U.H. T_p = 3.65

C_p = 0.625

D.A. = 1.89 $mi.^2$

POND AREA

t_r = 30 MIN.

INPUT U.H. = $\frac{A(1")}{30 MIN.} = \frac{(51)640(43560)(1")\frac{1A}{12}}{(30 MIN.)60\frac{S}{M.}}$
= 658, cfs

D.A. = 0.51 $mi.^2$

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	534.0	351	3372
2) Design High Water (Max. Design Pool)	—	—	—
3) Auxiliary Spillway Crest	—	—	—
4) Pool Level with Flashboards	532.55	334	2830
5) Service Spillway Crest	532.55	334	2830

DISCHARGES

	Volume (cfs)
1) Average Daily	
2) Spillway @ Maximum High Water	78
3) Spillway @ Design High Water	NA
4) Spillway @ Auxiliary Spillway Crest Elevation	—
5) Low Level Outlet	—
6) Total (of all facilities) @ Maximum High Water	78
7) Maximum Known Flood	NA
8) At Time of Inspection	None

CREST: ELEVATION: _____

Type: Compacted earth. upstream face of dry stone wall

Width: 5' Length: 600'

Spillover _____

Location _____

SPILLWAY:

SERVICE		AUXILIARY
532.55'	Elevation	
Drop Inlet	Type	
12.4'	Width	
	Type of Control	
✓	Uncontrolled	
	Controlled:	
Flashboards	Type (Flashboards; gate)	
	Number	
0.55' high	Size/Length	
	Invert Material	
	Anticipated Length of operating service	
	Chute Length	
	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	

HYDROMETEROLOGICAL GAGES:

Type : None

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: None

_____

Method of Controlled Releases (mechanisms):

None

_____

DRAINAGE AREA: 2.40 mi.^{2}

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Woods, open field, some residential development.

Terrain - Relief: Upper area - mild slope. Lower area - Pond

Surface - Soil: Silurian and Devonian limestones

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

No alterations planned or anticipated

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

None evident

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

Several low lying homes downstream of the dam

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

Location: None

Elevation: _____

Reservoir:

Length @ Maximum Pool _____ (Miles)

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

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

   1          A1   GLENMERE LAKE DAM
   2          A2   PHASE I INSPECTION
   3          A3   MAY 1981
   4          H      200       0      30       0       0       0       0       0       0       0
   5          B1       5

   6          J        1       6       1

   7          J1      .2      .4      .5      .6      .3      1.

   8          K                1                       2       2       1

   9          K1   INFLOW FROM UPPER BASIN AREA

  10          M        1       1    1.89            2.43   0.742

  11          P             21.5     111     123     133     142

  12          T                                                     1.0     0.1

  13          W     3.65   0.625

  14          X       -2     -.1       1

  15          K                1                       1       2       1

  16          K1   DIRECT INFLOW TO RESERVOIR FROM RAINFALL

  17          M        1      -1    0.51

  18          P             21.5     111     123     133     142

  19          T

  20          U        1

  21          U1     658

  22          X       -2     -.1       1

  23          K        2                               1       2       1

  24          K1   COMBINE INFLOWS

  25          K        1       1                       2       2       1

  26          K1   ROUTE THROUGH RESERVOIR

  27          Y                                1       1

  28          Y1       1                                         -532.55      -1

  29          Y4532.55       533  533.55     534  534.55     535

  30          Y5              14      45      78     126     171
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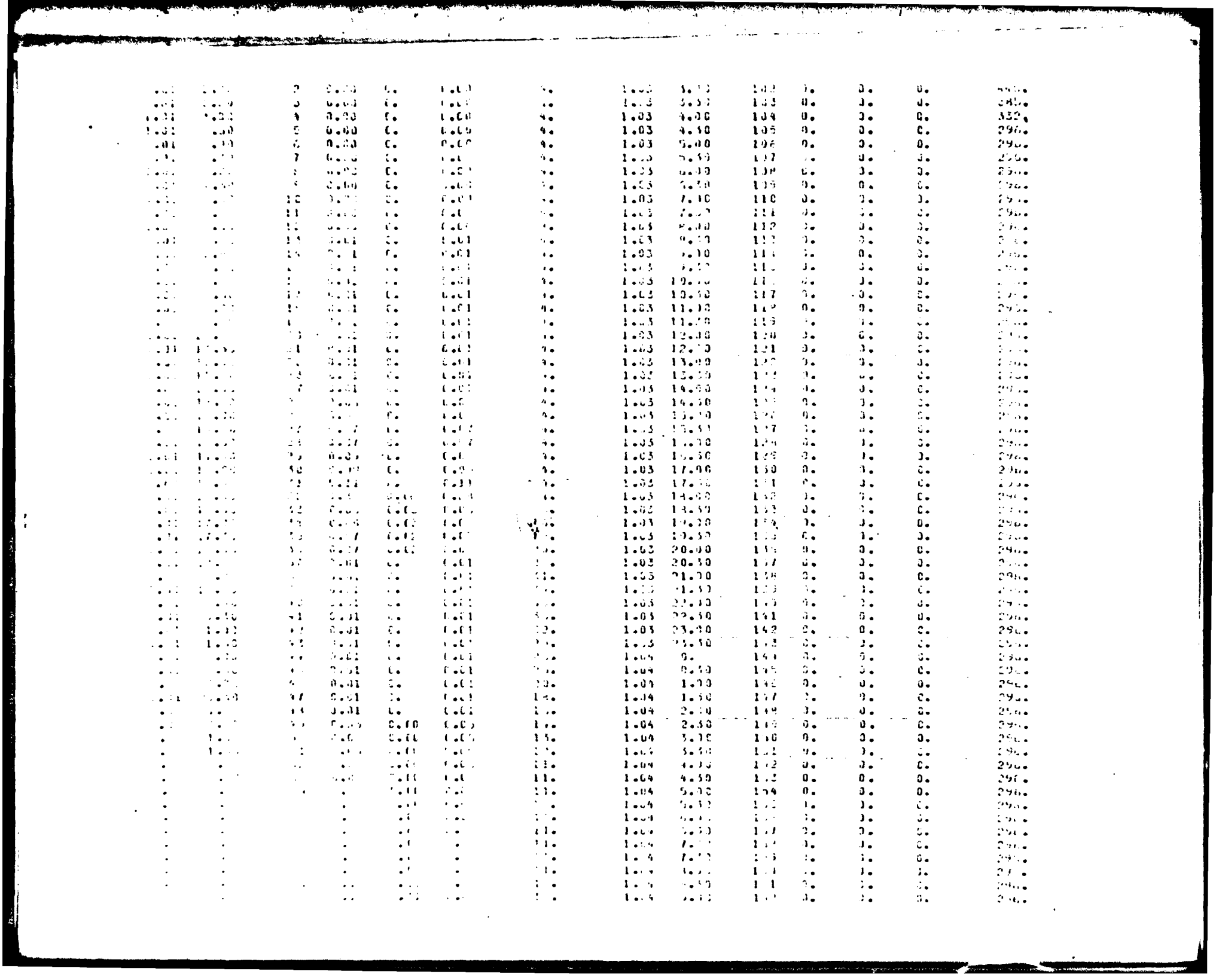

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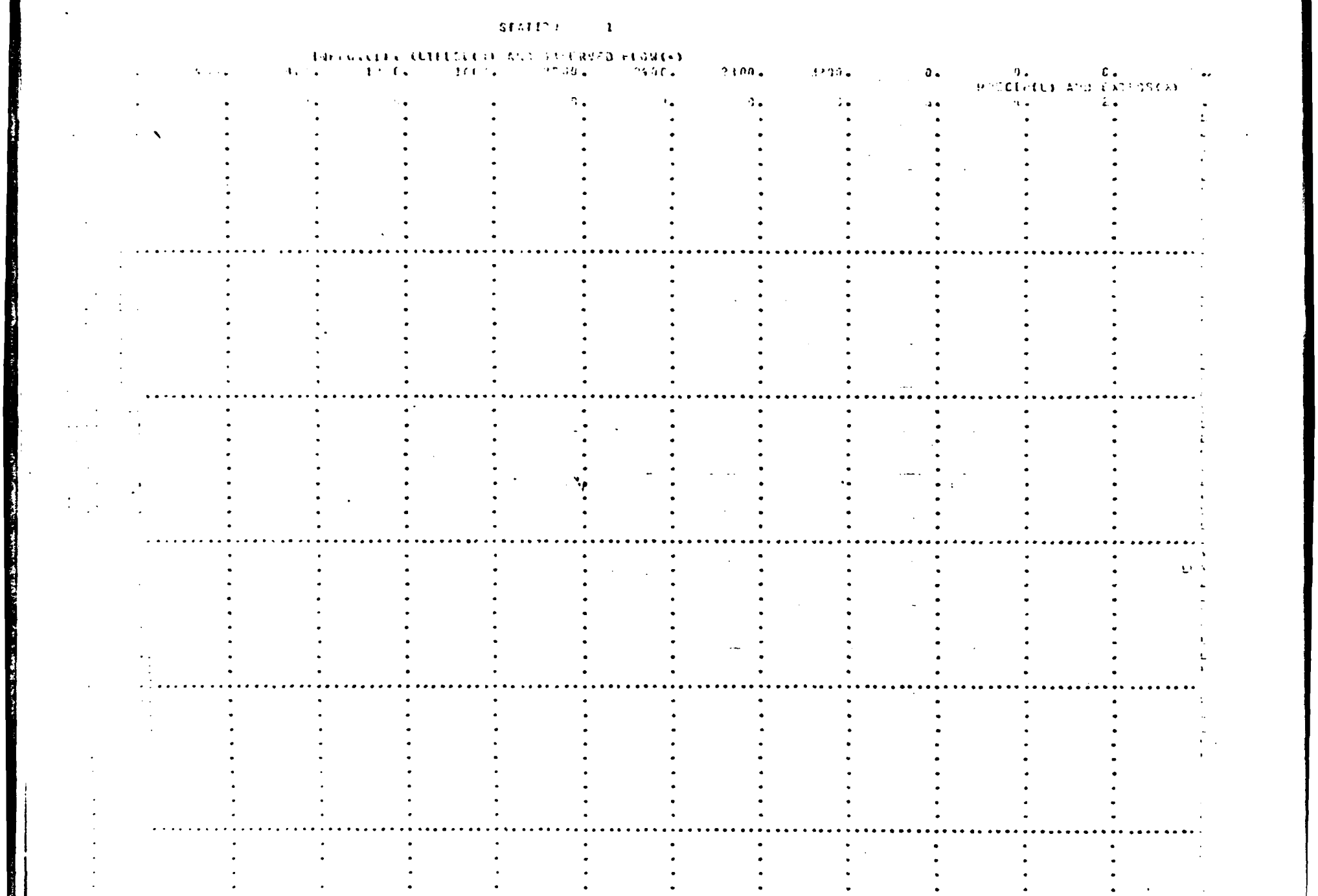

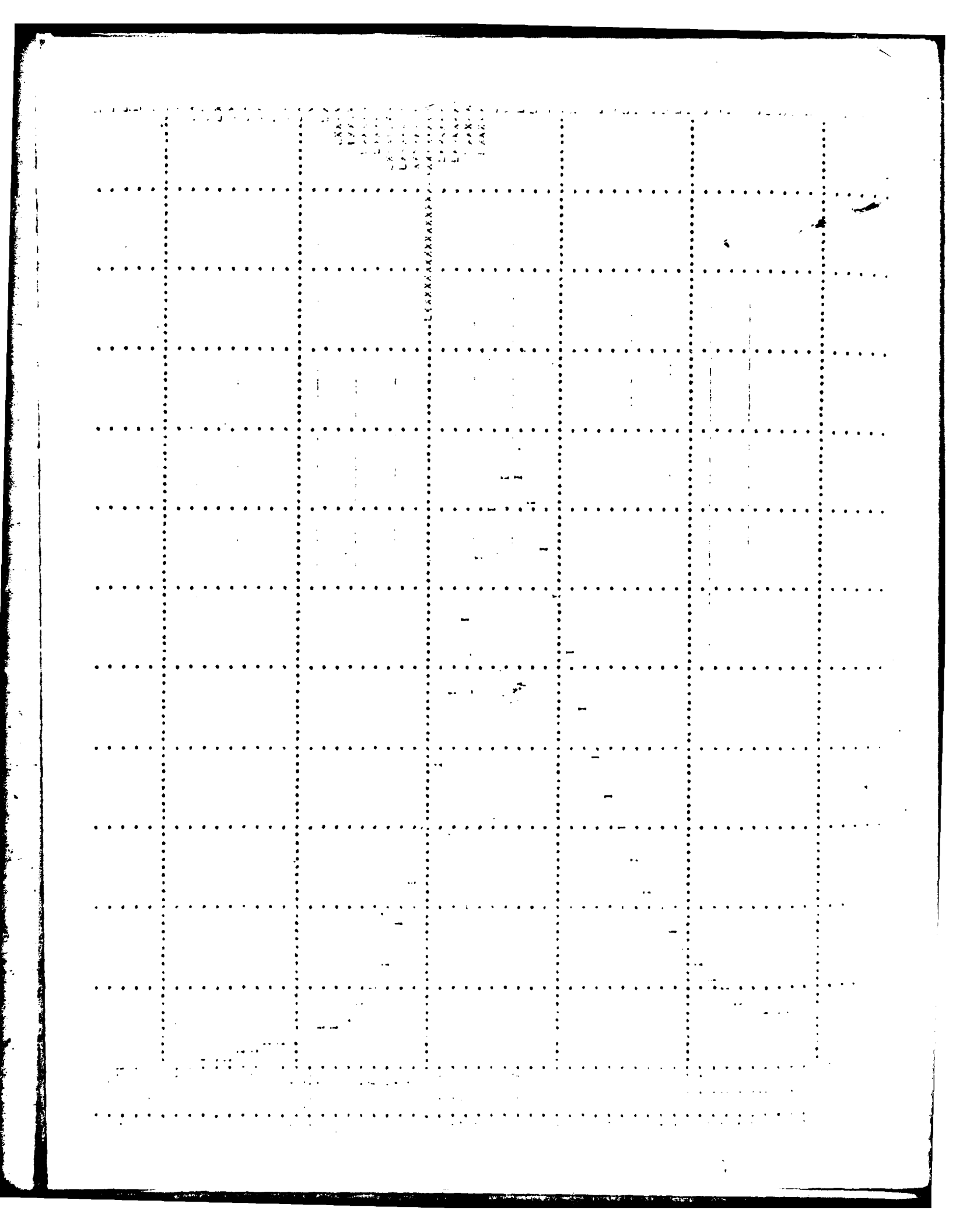

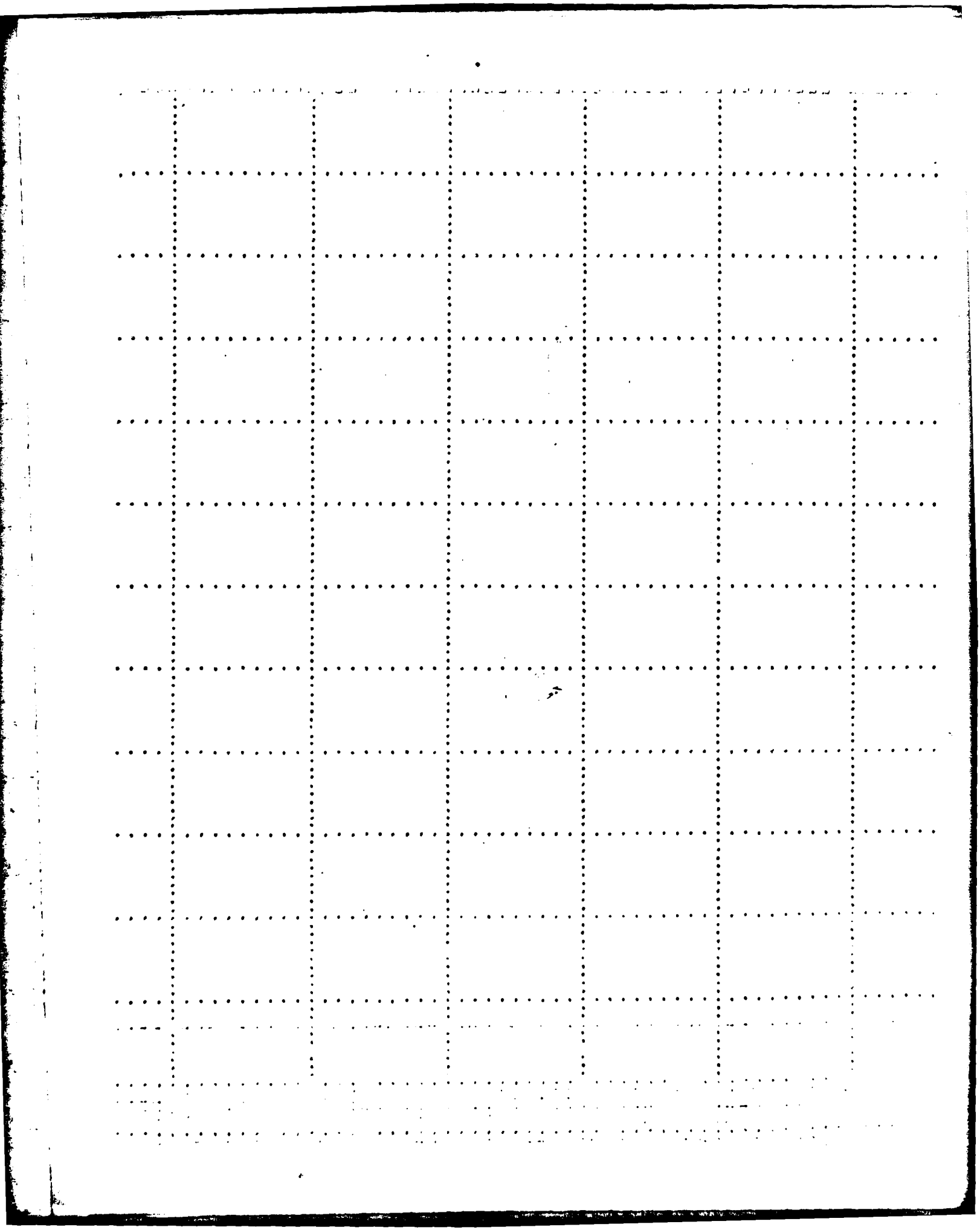

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 [illegible] [illegible] [illegible] [illegible]   59.        59.       59.   [illegible]   59.   [illegible]
 [illegible] [illegible] [illegible] [illegible] [illegible]  59.       59.   [illegible]   59.   [illegible]

                    PEAK     6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
          CFS  [illegible] [illegible] [illegible]  101.     [illegible]
          CMS        17.  [illegible] [illegible] [illegible] [illegible]
       INCHES             [illegible] [illegible] [illegible] [illegible]
           MM             [illegible] [illegible]   150.74   [illegible]
        AC-FT             [illegible]    395.    [illegible]  [illegible]
  THOUS CU M              [illegible]    487.    [illegible]  [illegible]

                         HYDROGRAPH AT STA     1 FOR PLAN 1, RTIO 2
 [illegible] [illegible] 2. [illegible]  2.        2.        2.        2.        2.   [illegible]
 [illegible] [illegible] [illegible] 2.  2.        2.        2.   [illegible]    2.   [illegible]
 [illegible] [illegible] [illegible] [illegible] 2. [illegible] 2. [illegible] [illegible] [illegible]
 [illegible] [illegible] [illegible] [illegible] [illegible] 8.  10.       12.       14.   [illegible]
 [illegible] [illegible] [illegible] [illegible] [illegible] 6.   7.   [illegible]    5.   [illegible]
 [illegible] [illegible]  4.        4.        4.        4.        4.        4.        4.   [illegible]
 [illegible] [illegible]  10.  [illegible] [illegible]  23.       38.       47.       55.       63.
 [illegible] [illegible] [illegible] [illegible] [illegible] 161. 219. [illegible] [illegible] 473.
 [illegible] [illegible] [illegible] [illegible] [illegible] 1182. 1185. [illegible] 1095.   940.
 [illegible] [illegible] [illegible] [illegible] 474.    412.     358.   [illegible]  272.   [illegible]
 [illegible] [illegible] [illegible] [illegible]  119.     119.     119.   [illegible] [illegible] [illegible]
 [illegible] [illegible]  119.  [illegible]  119.      119.      119.   [illegible]  119.   [illegible]
 [illegible] [illegible]  119.  [illegible]  119.      119.      119.   [illegible]  119.   [illegible]
 [illegible] [illegible]  119.  [illegible] [illegible] 119.    119.   [illegible]  119.   [illegible]
 [illegible] [illegible]  119.  [illegible] [illegible] 119.    119.   [illegible]  119.   [illegible]
 [illegible] [illegible] [illegible] [illegible] [illegible] 119. [illegible] [illegible] 119. [illegible]
 [illegible] [illegible]  119.  [illegible] [illegible]  119.     119.   [illegible]  119.   [illegible]
 [illegible] [illegible]  119.  [illegible]  119.      119.      119.   [illegible]  119.   [illegible]
 [illegible] [illegible]  119.  [illegible]  119.   [illegible]  119.   [illegible]  119.   [illegible]
 [illegible] [illegible]  119.  [illegible]  119.      119.      119.      119.      119.   [illegible]

                    PEAK     6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
          CFS  [illegible] [illegible]   394.      201.     [illegible]
          CMS        34.  [illegible]     11.   [illegible]  [illegible]
       INCHES                  4.70       7.84      11.27    [illegible]
           MM             [illegible] [illegible] 301.55     303.18
        AC-FT             [illegible]    792.      1135.    [illegible]
```
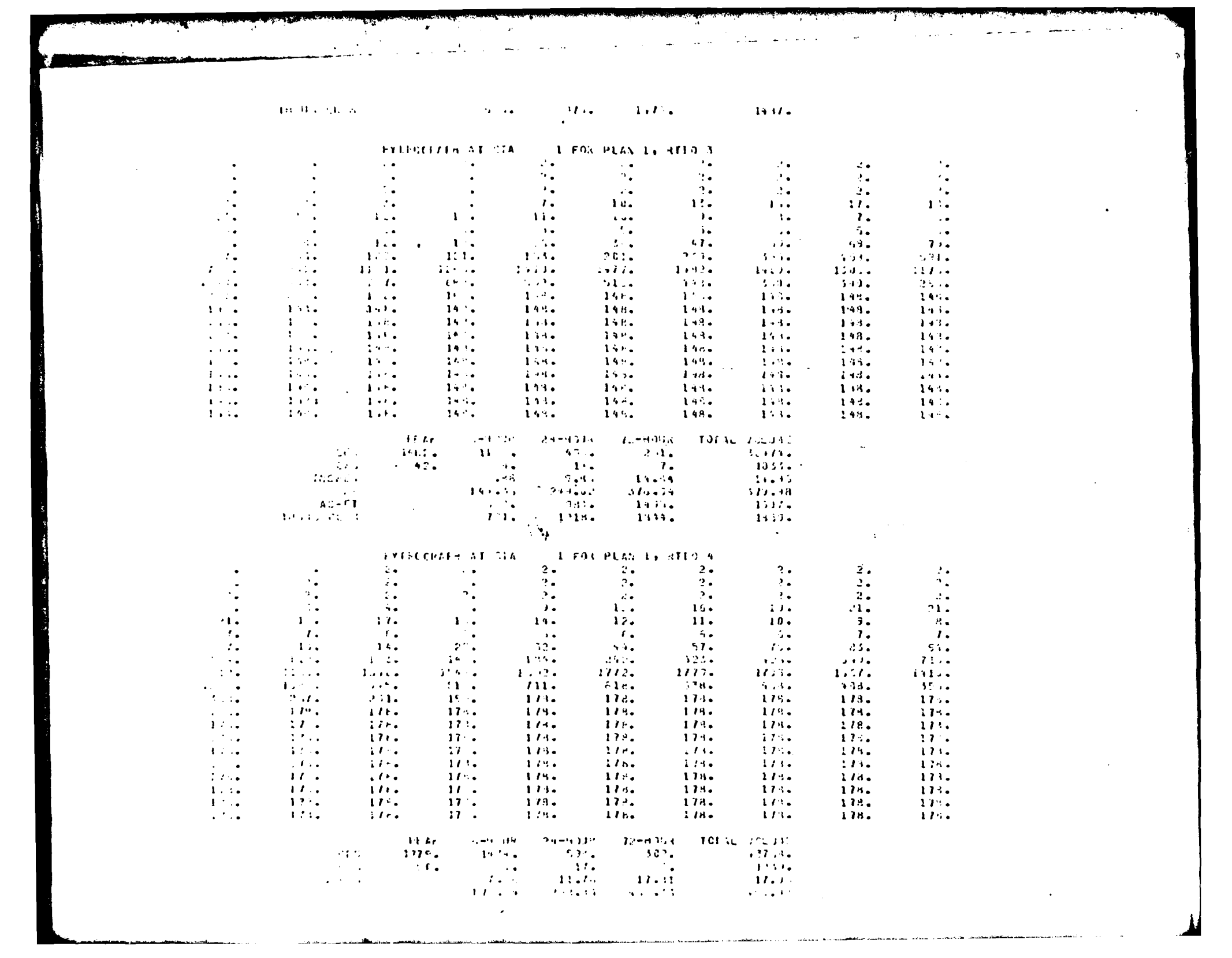

EXPECTATION AT CIA FOR PLAN 1, RATIO 3

EXPECTATION AT CIA FOR PLAN 1, RATIO 4



```
             AC-FT               711.     1184.     1795.          1809.
        THOUS CU M               877.     1462.     2213.          2231.


                           HYDROGRAPH AT STA      1 FOR PLAN 1, RTIO 5
     3.        3.        3.        3.        3.        3.        3.        3.        3.        3.
     3.        3.        3.        3.        3.        3.        3.        3.        3.        3.
     3.        3.        3.        3.        3.        3.        3.        3.        3.        3.
     3.        4.        5.        8.       12.       16.       21.       25.       28.       27.
    28.       25.       23.       21.       18.       16.       14.       13.       11.       10.
     9.        9.        9.        9.        8.        8.        9.        9.        9.        9.
    10.       11.       15.       29.       42.       56.       74.       94.      111.      124.
   135.      139.      164.      194.      243.      322.      430.      554.      732.      947.
  1715.     1503.     1734.     2056.     2245.     2352.     2371.     2373.     2392.     1892.
  1443.     1435.     1270.     1092.      748.      824.      717.      524.      344.      475.
   411.      355.      308.      255.      237.      237.      237.      237.      237.      237.
   237.      237.      237.      237.      237.      237.      237.      237.      237.      237.
   237.      237.      237.      237.      237.      237.      237.      237.      237.      237.
   237.      237.      237.      237.      237.      237.      237.      237.      237.      237.
   237.      237.      237.      237.      237.      237.      237.      237.      237.      237.
   237.      237.      237.      237.      237.      237.      237.      237.      237.      237.
   237.      237.      237.      237.      237.      237.      237.      237.      237.      237.
   237.      237.      237.      237.      237.      237.      237.      237.      237.      237.
   237.      237.      237.      237.      237.      237.      237.      237.      237.      237.
   237.      237.      237.      237.      237.      237.      237.      237.      237.      237.

                            PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
               CFS         2271.     1913.       797.       402.        34358.
               CMS           67.       54.        23.        11.         1663.
            INCHES                    9.41      15.69      23.74         23.99
                MM                  238.98     398.44     603.10        607.77
             AC-FT                    948.      1580.      2397.         2411.
        THOUS CU M                   1169.      1949.      2951.         2975.


                           HYDROGRAPH AT STA      1 FOR PLAN 2, RTIO 6
     4.        4.        4.        4.        4.        4.        4.        4.        4.        4.
     4.        4.        4.        4.        4.        4.        4.        4.        4.        4.
     4.        4.        4.        4.        4.        4.        4.        4.        4.        4.
     4.        4.        6.       10.       15.       20.       26.       31.       34.       35.
    35.       32.       29.       27.       23.       20.       18.       16.       14.       13.
    12.       11.       11.       11.       10.       11.       11.       11.       11.       11.
    12.       16.       24.       35.       53.       73.       95.      117.      133.      152.
   173.      197.      206.      242.      305.      403.      538.      713.      915.     1180.
  2519.     1843.     2243.     2571.     2419.     2934.     2764.     2838.     2511.     2333.
  2074.     1816.     1575.     1255.     1165.     1030.      855.      735.      673.      591.
   515.      445.      385.      332.      296.      296.      296.      296.      296.      295.
   296.      296.      296.      296.      296.      296.      296.      296.      296.      296.
   296.      296.      296.      296.      296.      296.      296.      296.      296.      296.
   296.      296.      296.      296.      296.      296.      296.      296.      296.      296.
   296.      296.      296.      296.      296.      296.      296.      296.      296.      296.
   296.      296.      296.      296.      296.      296.      296.      296.      296.      296.
   296.      296.      296.      296.      296.      296.      296.      296.      296.      296.
   296.      295.      296.      296.      296.      296.      296.      296.      295.      296.
   296.      296.      296.      296.      296.      296.      296.      296.      296.      296.
   296.      296.      296.      296.      296.      296.      296.      296.      296.      296.

                            PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
               CFS         2964.     2390.       995.       503.        72547.
               CMS           84.       68.        28.        14.         2056.
            INCHES                   11.76      19.61      29.58         29.72
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MM	258.75	498.00	755.48	759.25
AC-FT	1165.	1975.	2993.	3014.
THOUS CU M	1462.	2437.	3688.	3719.

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

SUB-AREA RUNOFF COMPUTATION

DIRECT INFLOW TO RESERVOIR FROM RAINFALL

ISTAO	ICOMP	ICON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	1	2	1	0	0

HYDROGRAPH DATA

IHYDG	ILHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	-1	0.51	0.	0.51	0.	0.	0	0	0

PRECIP DATA

SPFE	PRS	P6	P12	P24	P48	P72	P96
0.	21.50	111.00	123.00	133.00	142.00	0.	0.

TRSPC COMPUTED BY THE PROGRAM IS 0.480

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
0	0.	0.	1.00	0.	0.	1.00	0.	0.	0.	0.

GIVEN UNIT GRAPH, NUHGC= 1

658.

UNIT GRAPH TOTALS 658. CFS OR 1.00 INCHES OVER THE AREA

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.00

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	0.00	0.00	0.	9.	1.03	2.30	101	0.	0.	0.	363.
1.01	1.00	2	0.00	0.00	0.	9.	1.03	3.00	102	0.	0.	0.	363.
1.01	1.30	3	0.00	0.00	0.	9.	1.03	3.30	103	0.	0.	0.	363.
1.01	2.00	4	0.00	0.00	0.	9.	1.03	4.00	104	0.	0.	0.	363.
1.01	2.30	5	0.00	0.00	0.	9.	1.03	4.30	105	0.	0.	0.	363.
1.01	3.00	6	0.00	0.00	0.	9.	1.03	5.00	106	0.	0.	0.	363.
1.01	3.30	7	0.00	0.00	0.	9.	1.03	5.30	107	0.	0.	0.	363.
1.01	4.00	8	0.00	0.00	0.	9.	1.03	6.00	108	0.	0.	0.	363.
1.01	4.30	9	0.00	0.00	0.	9.	1.03	6.30	109	0.	0.	0.	363.
1.01	5.00	10	0.00	0.00	0.	9.	1.03	7.00	110	0.	0.	0.	363.
1.01	5.30	11	0.00	0.00	0.	9.	1.03	7.30	111	0.	0.	0.	363.
1.01	6.00	12	0.00	0.00	0.	9.	1.03	8.00	112	0.	0.	0.	363.
1.01	6.30	13	0.01	0.01	0.	9.	1.03	8.30	113	0.	0.	0.	363.
1.01	7.00	14	0.01	0.01	0.	9.	1.03	9.00	114	0.	0.	0.	363.
1.01	7.30	15	0.01	0.01	0.	9.	1.03	9.30	115	0.	0.	0.	363.
1.01	8.00	16	0.01	0.01	0.	9.	1.03	10.00	116	0.	0.	0.	363.
1.01	8.30	17	0.01	0.01	0.	9.	1.03	10.30	117	0.	0.	0.	363.
1.01	9.00	18	0.01	0.01	0.	9.	1.03	11.00	118	0.	0.	0.	363.
1.01	9.30	19	0.01	0.01	0.	9.	1.03	11.30	119	0.	0.	0.	363.
1.01	10.00	20	0.01	0.01	0.	9.	1.03	12.00	120	0.	0.	0.	363.
1.01	10.30	21	0.01	0.01	0.	9.	1.03	12.30	121	0.	0.	0.	363.
1.01	11.00	22	0.01	0.01	0.	9.	1.03	13.00	122	0.	0.	0.	363.
1.01	11.30	23	0.01	0.01	0.	9.	1.03	13.30	123	0.	0.	0.	363.
1.01	12.00	24	0.01	0.01	0.	9.	1.03	14.00	124	0.	0.	0.	363.

1.01	17.50	25	0.04	0.04	0.	44.	1.03	14.40	125	0.	0.	0.	363.
1.01	18.00	26	0.04	0.04	0.	44.	1.03	15.00	126	0.	0.	0.	363.
1.01	18.30	27	0.04	0.04	0.	52.	1.03	15.30	127	0.	0.	0.	363.
1.01	19.00	28	0.04	0.04	0.	52.	1.03	16.00	128	0.	0.	0.	363.
1.01	19.30	29	0.10	0.10	0.	97.	1.03	16.30	129	0.	0.	0.	363.
1.01	20.00	30	0.10	0.10	0.	97.	1.03	17.00	130	0.	0.	0.	363.
1.01	20.30	31	0.12	0.12	0.	77.	1.03	17.30	131	0.	0.	0.	363.
1.01	21.00	32	0.07	0.07	0.	247.	1.03	18.00	132	0.	0.	0.	363.
1.01	21.30	33	0.07	0.07	0.	247.	1.03	18.30	133	0.	0.	0.	363.
1.01	22.00	34	0.09	0.09	0.	61.	1.03	19.00	134	0.	0.	0.	363.
1.01	22.30	35	0.07	0.07	0.	46.	1.03	19.30	135	0.	0.	0.	363.
1.01	23.00	36	0.07	0.07	0.	46.	1.03	20.00	136	0.	0.	0.	363.
1.01	23.30	37	0.01	0.01	0.	2.	1.03	20.30	137	0.	0.	0.	363.
1.01	24.00	38	0.01	0.01	0.	2.	1.03	21.00	138	0.	0.	0.	363.
1.01	24.30	39	0.01	0.01	0.	2.	1.03	21.30	139	0.	0.	0.	363.
1.01	25.00	40	0.01	0.01	0.	2.	1.03	22.00	140	0.	0.	0.	363.
1.01	25.30	41	0.01	0.01	0.	2.	1.03	22.30	141	0.	0.	0.	363.
1.01	26.00	42	0.01	0.01	0.	2.	1.03	23.00	142	0.	0.	0.	363.
1.01	26.30	43	0.01	0.01	0.	2.	1.03	23.30	143	0.	0.	0.	363.
1.01	27.00	44	0.01	0.01	0.	2.	1.04	0.	144	0.	0.	0.	363.
1.01	27.30	45	0.01	0.01	0.	2.	1.04	0.30	145	0.	0.	0.	363.
1.01	28.00	46	0.01	0.01	0.	2.	1.04	1.00	146	0.	0.	0.	363.
1.01	28.30	47	0.01	0.01	0.	2.	1.04	1.30	147	0.	0.	0.	363.
1.01	29.00	48	0.01	0.01	0.	2.	1.04	2.00	148	0.	0.	0.	363.
1.01	29.30	49	0.01	0.01	0.	2.	1.04	2.30	149	0.	0.	0.	363.
1.01	30.00	50	0.01	0.01	0.	2.	1.04	3.00	150	0.	0.	0.	363.
1.01	30.30	51	0.01	0.01	0.	2.	1.04	3.30	151	0.	0.	0.	363.
1.02	31.00	52	0.04	0.04	0.	97.	1.04	4.00	152	0.	0.	0.	363.
1.02	31.30	53	0.04	0.04	0.	97.	1.04	4.30	153	0.	0.	0.	363.
1.02	32.00	54	0.04	0.04	0.	97.	1.04	5.00	154	0.	0.	0.	363.
1.02	32.30	55	0.04	0.04	0.	97.	1.04	5.30	155	0.	0.	0.	363.
1.02	33.00	56	0.04	0.04	0.	97.	1.04	6.00	156	0.	0.	0.	363.
1.02	33.30	57	0.04	0.04	0.	97.	1.04	6.30	157	0.	0.	0.	363.
1.02	34.00	58	0.04	0.04	0.	97.	1.04	7.00	158	0.	0.	0.	363.
1.02	34.30	59	0.04	0.04	0.	97.	1.04	7.30	159	0.	0.	0.	363.
1.02	35.00	60	0.04	0.04	0.	97.	1.04	8.00	160	0.	0.	0.	363.
1.02	35.30	61	0.17	0.17	0.	111.	1.04	8.30	161	0.	0.	0.	363.
1.02	36.00	62	0.17	0.17	0.	111.	1.04	9.00	162	0.	0.	0.	363.
1.02	36.30	63	0.17	0.17	0.	111.	1.04	9.30	163	0.	0.	0.	363.
1.02	37.00	64	0.17	0.17	0.	111.	1.04	10.00	164	0.	0.	0.	363.
1.02	37.30	65	0.17	0.17	0.	111.	1.04	10.30	165	0.	0.	0.	363.
1.02	38.00	66	0.17	0.17	0.	111.	1.04	11.00	166	0.	0.	0.	363.
1.02	38.30	67	0.17	0.17	0.	111.	1.04	11.30	167	0.	0.	0.	363.
1.02	39.00	68	0.17	0.17	0.	111.	1.04	12.00	168	0.	0.	0.	363.
1.02	39.30	69	0.17	0.17	0.	111.	1.04	12.30	169	0.	0.	0.	363.
1.02	40.00	70	0.17	0.17	0.	111.	1.04	13.00	170	0.	0.	0.	363.
1.02	40.30	71	0.17	0.17	0.	111.	1.04	13.30	171	0.	0.	0.	363.
1.02	41.00	72	0.17	0.17	0.	111.	1.04	14.00	172	0.	0.	0.	363.
1.02	41.30	73	0.55	0.55	0.	439.	1.04	14.30	173	0.	0.	0.	363.
1.02	42.00	74	0.55	0.55	0.	439.	1.04	15.00	174	0.	0.	0.	363.
1.02	42.30	75	1.15	1.15	0.	795.	1.04	15.30	175	0.	0.	0.	363.
1.02	43.00	76	1.15	1.15	0.	795.	1.04	16.00	176	0.	0.	0.	363.
1.02	43.30	77	1.43	1.43	0.	965.	1.04	16.30	177	0.	0.	0.	363.
1.02	44.00	78	1.43	1.43	0.	965.	1.04	17.00	178	0.	0.	0.	363.
1.02	44.30	79	1.74	1.74	0.	1147.	1.04	17.30	179	0.	0.	0.	363.
1.02	45.00	80	1.81	1.81	0.	1197.	1.04	18.00	180	0.	0.	0.	363.
1.02	45.30	81	1.24	1.24	0.	838.	1.04	18.30	181	0.	0.	0.	363.
1.02	46.00	82	1.24	1.24	0.	838.	1.04	19.00	182	0.	0.	0.	363.
1.02	46.30	83	1.05	1.05	0.	678.	1.04	19.30	183	0.	0.	0.	363.
1.02	47.00	84	1.05	1.05	0.	678.	1.04	20.00	184	0.	0.	0.	363.
1.02	47.30	85	0.89	0.89	0.	580.	1.04	20.30	185	0.	0.	0.	363.

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1.02  19.00    86   0.09   0.09   0.         363.      1.04  21.00   186   0.     0.     0.          363.
1.02  19.30    87   0.09   0.09   0.         363.      1.04  21.30   187   0.     0.     0.          363.
1.02  20.00    88   0.09   0.09   0.         363.      1.04  22.00   188   0.     0.     0.          363.
1.02  20.30    89   0.09   0.09   0.         363.      1.04  22.30   189   0.     0.     0.          363.
1.02  21.00    90   0.09   0.09   0.         363.      1.04  23.00   190   0.     0.     0.          363.
1.02  21.30    91   0.09   0.09   0.         363.      1.04  23.30   191   0.     0.     0.          363.
1.02  22.00    92   0.09   0.09   0.         363.      1.05   0.     192   0.     0.     0.          363.
1.02  22.30    93   0.09   0.09   0.         363.      1.05   0.30   193   0.     0.     0.          363.
1.02  23.00    94   0.09   0.09   0.         363.      1.05   1.00   194   0.     0.     0.          363.
1.02  23.30    95   0.09   0.09   0.         363.      1.05   1.30   195   0.     0.     0.          363.
1.03   0.      96   0.09   0.09   0.         363.      1.05   2.00   196   0.     0.     0.          363.
1.03   0.30    97   0.     0.     0.         363.      1.05   2.30   197   0.     0.     0.          363.
1.03   1.00    98   0.     0.     0.         363.      1.05   3.00   198   0.     0.     0.          363.
1.03   1.30    99   0.     0.     0.         363.      1.05   3.30   199   0.     0.     0.          363.
1.03   2.00   100   0.     0.     0.         363.      1.05   4.00   200   0.     0.     0.          363.

                                                                    SUM  24.42  24.42   0.       57840.
                                                                       ( 620.)( 620.)(   0.)( 1637.85)

                        PEAK    6-HOUR    24-HOUR    72-HOUR    TOTAL VOLUME
              CFS      3629.     1037.      532.       388.        57629.
              CMS       103.       29.       15.        11.         1632.
           INCHES                 18.91     38.79      85.17         87.50
               MM                480.34    985.27    2163.30       2222.50
            AC-FT                  514.     1055.      2314.         2381.
      THOUS CU M                  634.     1301.      2854.         2937.

                    HYDROGRAPH AT STA     1 FOR PLAN 1, RTIO 1
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        2.        2.        2.        2.        2.        2.        2.        2.
        2.        2.        2.        2.        9.        9.       10.       10.       13.       13.
       16.       41.       12.       12.       10.       10.        5.        5.        5.        8.
        5.        5.        5.        5.        5.        5.        5.        5.        8.        8.
        8.        8.        8.        8.        8.        8.        8.        8.        8.        8.
       23.       23.       22.       23.       23.       23.       23.       23.       23.       23.
       25.       25.      126.      126.      151.      151.      189.      149.      229.      729.
      173.      173.      138.      133.       73.       73.       73.       73.       73.       72.
       73.       73.       72.       73.       73.       73.       73.       73.       73.       73.
       73.       73.       72.       73.       73.       73.       73.       73.       73.       73.
       73.       73.       72.       73.       73.       73.       73.       73.       73.       73.
       73.       73.       73.       73.       73.       73.       73.       73.       73.       73.
       73.       73.       73.       73.       73.       73.       73.       73.       73.       73.
       73.       73.       72.       73.       73.       73.       73.       73.       73.       73.
       73.       73.       73.       73.       73.       73.       73.       73.       73.       73.
       73.       73.       72.       73.       73.       73.       73.       73.       73.       73.
       73.       73.       73.       73.       73.       73.       73.       73.       73.       73.
       73.       73.       72.       73.       73.       73.       73.       73.       73.       73.

                        PEAK    6-HOUR    24-HOUR    72-HOUR    TOTAL VOLUME
              CFS       720.      207.      105.        78.        11525.
              CMS        21.        6.        3.         2.          326.
           INCHES                  3.78      7.73      17.33         17.33
               MM                 96.07    197.32     439.44        440.17
            AC-FT                  103.      211.       463.          476.
      THOUS CU M                  127.      259.       571.          587.

                    HYDROGRAPH AT STA     1 FOR PLAN 1, RTIO 2
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
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       1.       1.       3.       3.       3.       3.       3.       3.       3.       3.
       3.       3.       3.       3.      17.      17.      21.      21.      25.      25.
      31.      94.      24.      24.      19.      19.      10.      10.      10.      10.
      10.      19.      10.      10.      10.      10.      10.      10.      15.      15.
      15.      15.      15.      15.      15.      15.      15.      15.      15.      15.
      46.      46.      46.      46.      46.      46.      45.      45.      46.      46.
      45.      45.     252.     252.     302.     302.     377.     377.     459.    1452.
     312.     352.     277.     277.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.
     145.     145.     145.     145.     145.     145.     145.     145.     145.     145.

                         PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
               CFS      2452.      415.       213.       155.         23032.
               CMS        41.       12.         6.         4.           653.
            INCHES                 7.56      15.51      34.07          35.04
                MM               192.14     394.03     865.36         889.97
             AC-FT                 206.       422.       925.           953.
        THOUS CU M                 254.       520.      1142.          1175.

                    HYDROGRAPH AT STA      1 FOR PLAN 1, RTIO 3
       2.       2.       2.       2.       2.       2.       2.       2.       2.       2.
       2.       2.       4.       4.       4.       4.       4.       4.       4.       4.
       4.       4.       4.       4.      22.      22.      26.      26.      32.      32.
      33.     123.      30.      30.      24.      24.      12.      12.      12.      12.
      17.      12.      12.      12.      12.      12.      12.      12.      19.      19.
      19.      19.      13.      19.      19.      19.      19.      19.      19.      19.
      57.      57.      57.      57.      57.      57.      57.      57.      57.      57.
      57.      57.     315.     315.     377.     377.     472.     472.     573.    1815.
     453.     446.     246.     246.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.
     181.     181.     181.     181.     181.     181.     181.     181.     181.     181.

                         PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
               CFS      1815.      518.       265.       195.         28815.
               CMS        51.       15.         8.         6.           816.
            INCHES                 9.46      19.39      42.59          43.80
                MM               240.17     492.54    1081.78        1112.47
             AC-FT                 257.       527.      1158.          1191.
        THOUS CU M                 317.       650.      1428.          1469.

                    HYDROGRAPH AT STA      1 FOR PLAN 1, RTIO 4
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```
      2.        2.        2.        2.        2.        2.        2.        2.        2.        2.
      2.        2.        5.        5.        5.        5.        5.        5.        5.        5.
      5.        5.        5.        5.       26.       26.       31.       31.       39.       39.
     47.      141.       34.       34.       29.       29.       17.       17.       15.       15.
     15.       15.       15.       15.       15.       15.       15.       15.       23.       23.
     23.       23.       22.       22.       23.       23.       25.       25.       23.       23.
     57.       57.       59.       62.       65.       65.       63.       64.       63.       63.
     64.       64.      377.      377.      433.      433.      560.      560.      644.     2177.
    528.      523.      415.      415.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.
    218.      218.      218.      218.      218.      218.      218.      218.      218.      218.

                          PEAK    6-HOUR    24-HOUR   72-HOUR   TOTAL VOLUME
                  CFS    2177.      522.       310.      233.          34574.
                  CMS      62.       15.         9.        7.            979.
               INCHES              11.35      23.27     51.10           52.75
                   MM             288.21     591.05   1298.04         1339.96
                AC-FT               304.       633.     1392.           1427.
           THOUS CU M               390.       780.     1717.           1762.

                        HYDROGRAPH AT STA      1 FOR PLAN 1, RTIO 5
      3.        3.        3.        3.        3.        3.        3.        3.        3.        3.
      3.        3.        7.        7.        7.        7.        7.        7.        7.        7.
      7.        7.        7.        7.       35.       35.       42.       42.       52.       52.
     43.      132.       43.       43.       38.       38.       20.       20.       20.       20.
     20.       20.       20.       20.       20.       20.       20.       20.       31.       31.
     31.       31.       31.       31.       31.       31.       31.       31.       31.       31.
     91.       91.       91.       91.       91.       91.       91.       91.       91.       91.
     91.       91.      602.      604.      604.      604.      755.      755.      917.     2903.
    704.      704.      554.      554.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.
    290.      290.      290.      290.      290.      290.      290.      290.      290.      290.

                          PEAK    6-HOUR    24-HOUR   72-HOUR   TOTAL VOLUME
                  CFS    2903.      829.       425.      311.          40103.
                  CMS      82.       23.        12.        9.           1136.
               INCHES              15.13      31.03     68.14           73.34
                   MM             384.27     788.36   1730.72         1777.19
                AC-FT               411.       843.     1852.           1903.
           THOUS CU M               507.      1040.     2285.           2349.
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                           HYDROGRAPH AT STA      1 FOR PLAN 1, RTIO 1
     4.        4.        4.        4.        4.        4.        4.        4.        4.        4.
     4.        9.        5.        9.        9.        9.        9.        9.        9.        9.
     9.        9.        9.        9.       44.       44.       52.       52.       65.       65.
    79.      247.       61.       61.       48.       48.       25.       25.       25.       25.
    25.       25.       25.       25.       25.       25.       25.       25.       39.       39.
    39.       39.       39.       39.       39.       39.       39.       39.       39.       39.
   114.      114.      114.      114.      114.      114.      114.      114.      114.      114.
   114.      114.      629.      629.      755.      755.      865.      945.     1147.     3629.
   480.      480.      692.      692.      363.      363.      363.      363.      363.      363.
   363.      363.      362.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      363.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      362.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      362.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      362.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      362.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      362.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      362.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      362.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      363.      363.      363.      363.      363.      363.      363.      363.
   363.      363.      362.      363.      363.      363.      363.      363.      363.      363.

                      PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
            CFS      3629.     1037.      532.       591.        37529.
            CMS       103.       29.       15.        11.         1062.
         INCHES                18.41     38.73      85.17        87.50
             MM               480.34    985.36    2163.40      2224.04
          AC-FT                 514.     1354.      2315.         2381.
    THOUS CU M                  634.     1301.      2855.         2937.


 ...........       ...........       ...........       ...........       ...........

                             COMBINE HYDROGRAPHS

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

                     SUM OF 2 HYDROGRAPHS AT              PLAN 1  RTIO 1
     1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
     1.        1.        2.        2.        2.        2.        2.        2.        2.        2.
     2.        9.        5.        2.        9.        9.       11.       11.       14.       14.
    15.       50.       13.       14.       12.       14.       10.       11.       12.       12.
    12.       13.       11.       10.        9.        9.        9.        9.       11.       12.
    10.       14.       10.       10.       10.       10.       10.       10.       10.       10.
    25.       24.       26.       30.       33.       37.       42.       47.       51.       54.
    97.       80.      167.      174.      212.      232.      236.      331.      412.      962.
   480.      555.      557.      652.      656.      663.      665.      644.      595.      542.
   434.      132.      367.      345.      310.      279.      252.      224.      204.      191.
   175.      166.      145.      132.      132.      132.      132.      132.      132.      132.
   132.      132.      132.      132.      132.      132.      132.      132.      132.      132.
   132.      132.      132.      132.      132.      132.      132.      132.      132.      132.
   132.      132.      132.      132.      132.      132.      132.      132.      132.      132.
   132.      132.      132.      132.      132.      132.      132.      132.      132.      132.
   132.      132.      132.      132.      132.      132.      132.      132.      132.      132.
   132.      132.      132.      132.      132.      132.      132.      132.      132.      132.
```

132.	132.	132.	132.	132.	132.	132.	132.	132.	132.
132.	132.	132.	132.	132.	132.	132.	132.	132.	132.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	562.	618.	305.	173.	26115.
CMS	27.	18.	9.	5.	740.
INCHES		2.49	4.73	6.29	6.66
MM		63.24	120.14	212.68	169.22
AC-FT		369.	584.	1061.	1079.
THOUS CU M		379.	746.	1309.	1331.

SUM OF 2 HYDROGRAPHS AT PLAN 1 RTIO 2

1.	1.	2.	3.	3.	3.	3.	3.	3.	3.
3.	3.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	19.	19.	22.	22.	27.	27.
35.	109.	27.	28.	25.	27.	20.	22.	24.	24.
24.	21.	22.	20.	19.	18.	17.	19.	21.	21.
20.	21.	20.	20.	20.	20.	20.	20.	20.	20.
21.	21.	21.	76.	87.	75.	85.	93.	101.	109.
115.	120.	334.	360.	429.	463.	592.	661.	825.	1024.
1023.	1139.	1174.	1365.	1274.	1327.	1331.	1240.	1193.	1095.
777.	721.	775.	691.	619.	557.	504.	457.	417.	389.
371.	331.	299.	279.	274.	269.	269.	266.	266.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1525.	1753.	910.	527.	52731.
CMS	54.	50.	17.	11.	1479.
INCHES		4.80	9.46	13.33	13.37
MM		121.97	240.24	421.56	423.51
AC-FT		714.	1210.	2120.	2158.
THOUS CU M		761.	1493.	2618.	2662.

SUM OF 2 HYDROGRAPHS AT PLAN 1 RTIO 3

4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	6.	6.	6.	6.	6.	6.	6.	6.
6.	6.	6.	6.	24.	24.	28.	28.	34.	34.
41.	127.	33.	35.	31.	34.	25.	28.	30.	30.
30.	26.	27.	25.	24.	22.	21.	23.	25.	27.
27.	27.	25.	25.	25.	25.	25.	25.	25.	25.
25.	25.	25.	77.	83.	93.	105.	116.	126.	136.
144.	153.	417.	436.	530.	577.	749.	827.	1031.	1266.
1257.	1394.	1447.	1031.	1341.	1656.	1594.	1413.	1287.	1152.
1023.	1137.	1030.	895.	771.	696.	629.	572.	521.	477.
437.	403.	374.	347.	330.	320.	330.	333.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.

330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.
330.	330.	330.	330.	330.	330.	330.	330.	330.	330.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2406.	1547.	765.	494.	66284.
CMS	68.	44.	22.	14.	1877.
INCHES		6.10	11.82	20.74	21.07
MM		154.94	300.30	526.70	535.33
AC-FT		7.7.	1511.	2931.	2624.
THOUS CU M		946.	1864.	3272.	3328.

SUM OF 2 HYDROGRAPHS AT PLAN 1 RTIO 4

4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	7.	7.	7.	7.	7.	7.	7.	7.
7.	7.	7.	7.	14.	29.	55.	55.	91.	91.
91.	181.	40.	40.	57.	91.	59.	55.	35.	34.
31.	34.	32.	33.	28.	27.	26.	24.	32.	31.
30.	33.	30.	33.	53.	50.	50.	50.	50.	39.
75.	71.	95.	90.	133.	112.	125.	137.	152.	135.
177.	261.	381.	527.	655.	695.	889.	942.	1237.	2857.
1843.	1603.	1761.	1927.	1789.	1930.	1966.	1337.	1795.	1627.
1960.	1337.	1142.	1027.	929.	835.	795.	635.	635.	573.
526.	495.	498.	417.	396.	396.	396.	395.	396.	395.
396.	395.	396.	396.	396.	396.	396.	395.	396.	395.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2867.	1827.	915.	535.	79343.
CMS	81.	52.	26.	15.	2247.
INCHES		7.20	14.19	24.88	25.21
MM		182.81	360.41	632.04	642.70
AC-FT		901.	1815.	3183.	3237.
THOUS CU M		1110.	2239.	3927.	3993.

SUM OF 2 HYDROGRAPHS AT PLAN 1 RTIO 5

6.	6.	6.	6.	6.	6.	6.	6.	6.	6.
6.	6.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	10.	38.	38.	45.	45.	55.	55.
46.	201.	54.	56.	50.	55.	41.	45.	47.	46.
47.	46.	45.	46.	38.	34.	34.	32.	42.	41.
40.	40.	40.	39.	39.	39.	40.	40.	40.	40.
101.	101.	111.	128.	134.	130.	137.	136.	202.	217.
260.	241.	638.	697.	449.	926.	1185.	1332.	1549.	2841.
1793.	2211.	2368.	2618.	2546.	2603.	2662.	2130.	2379.	2178.
1934.	1745.	1550.	1382.	1234.	1114.	1007.	915.	834.	765.
731.	694.	668.	655.	627.	627.	627.	627.	627.	627.
627.	627.	627.	627.	627.	627.	627.	627.	627.	627.

```
     527.      527.      527.      527.      527.      527.      527.      527.      527.      527.
     527.      527.      527.      527.      527.      527.      527.      527.      527.      527.
     527.      527.      527.      527.      527.      527.      527.      527.      527.      527.
     527.      527.      527.      527.      527.      527.      527.      527.      527.      527.
     527.      527.      527.      527.      527.      527.      527.      527.      527.      527.
     527.      527.      527.      527.      527.      527.      527.      527.      527.      527.
     527.      527.      527.      527.      527.      527.      527.      527.      527.      527.
     527.      527.      527.      527.      527.      527.      527.      527.      527.      527.

                          PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
                 CFS      3849.    2476.     1229.       713.       134951.
                 CMS       109.      70.       35.        20.         2058.
              INCHES                9.60     18.92      33.18         33.74
                  MM              243.74    480.55     842.72        857.01
               AC-FT               1227.     2421.      4245.         4317.
          THOUS CU M               1514.     2986.      5236.         5324.


                    SUM OF 2 HYDROGRAPHS AT           PLAN 1  RTIO 5
       7.        7.        7.        7.        7.        7.        7.        7.        7.        7.
       7.        7.       12.       12.       12.       12.       12.       12.       12.       12.
      12.       12.       12.       12.       47.       47.       56.       56.       69.       63.
      40.       20.       67.       70.       62.       68.       51.       55.       59.       61.
      59.       57.       54.       51.       47.       45.       43.       41.       53.       52.
      51.       50.       45.       42.       49.       49.       47.       50.       50.       51.
     130.      135.      138.      150.      157.      187.      201.      232.      253.      271.
     267.      301.      535.      871.     1041.     1158.     1481.     1555.     2062.     4812.
    2400.     2765.     2935.     3262.     3182.     3317.     3327.     3281.     2974.     2712.
    2442.     2174.     1937.     1728.     1548.     1395.     1259.     1143.     1042.      954.
     876.      803.      717.      659.      659.      659.      659.      659.      659.      659.
     659.      659.      659.      659.      659.      659.      659.      659.      659.      659.
     659.      659.      659.      659.      659.      659.      659.      659.      659.      659.
     659.      659.      659.      659.      659.      659.      659.      659.      659.      659.
     659.      659.      659.      659.      659.      659.      659.      659.      659.      659.
     659.      659.      659.      659.      659.      659.      659.      659.      659.      659.
     659.      659.      659.      659.      659.      659.      659.      659.      659.      659.
     659.      659.      659.      659.      659.      659.      659.      659.      659.      659.
     659.      659.      659.      659.      659.      659.      659.      659.      659.      659.
     659.      659.      659.      659.      659.      659.      659.      659.      659.      659.

                          PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
                 CFS      4812.    3309.     1525.       893.       130176.
                 CMS       136.      94.       43.        25.         3686.
              INCHES               12.00     23.65      41.47         42.18
                  MM              304.58    600.65    1053.40       1071.27
               AC-FT               1537.     3025.      5306.         5395.
          THOUS CU M               1893.     3732.      6545.         6656.



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

                                    HYDROGRAPH ROUTING

             ROUTE THROUGH RESERVOIR
                          ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                              1       1       0       0       2       2       1       0       0
                                              ROUTING DATA
                  QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
```

```
                  0.    0.     0.      1      1      0      0          0

                      NSTPS  NSTDL    LAG  AMSKK      X    TSK   STORA  ISPRAT
                          1      0      0     0.     0.     0.   -533.      -1

 STAGE    532.50    533.00    533.55    534.10    534.55    535.03

 FLOW         0.     14.00     45.00     78.00    126.00    171.00

 CAPACITY=        0.     2829.     5610.    15276.

 ELEVATION=     500.      532.      540.      550.

                    CREL   SPWID   COQW   EXPW   ELEVL   COOL   CAREA   EXPL
                   532.6      0.     0.     0.      0.     0.      0.     0.

                                        DAM DATA
                               TOPEL    COQD   EXPD  DAMWID
                               534.0     3.2    1.5    500.

                               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.      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.      2.
           2.      2.      2.      2.      2.      2.      2.      2.      2.      3.
           3.      3.      3.      4.      5.      5.      6.      7.      9.     11.
          13.     16.     19.     23.     27.     31.     35.     39.     42.     45.
          49.     53.     56.     58.     60.     62.     64.     65.     66.     67.
          68.     69.     70.     70.     71.     71.     72.     72.     73.     73.
          74.     74.     75.     75.     76.     76.     77.     77.     77.     78.
          79.     81.     83.     86.     88.     91.     94.     96.     99.    101.
         103.    106.    108.    110.    112.    113.    115.    116.    118.    119.
         120.    121.    122.    123.    124.    125.    125.    126.    126.    127.
         127.    128.    128.    129.    129.    129.    129.    130.    130.    130.
         130.    130.    131.    131.    131.    131.    131.    131.    131.    131.
         131.    131.    131.    131.    131.    132.    132.    132.    132.    132.
         132.    132.    132.    132.    132.    132.    132.    132.    132.    132.
         132.    132.    132.    132.    132.    132.    132.    132.    132.    132.

                                         STORAGE
        2830.   2830.   2830.   2830.   2830.   2830.   2830.   2830.   2830.   2830.
        2830.   2830.   2830.   2831.   2831.   2831.   2831.   2831.   2831.   2831.
        2831.   2831.   2831.   2832.   2832.   2832.   2833.   2833.   2834.   2834.
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  [illegible] [illegible] 2842.   2842.   2843.   2843.   2843.   2844.   2844.   2844.
  [illegible] [illegible] [illegible] [illegible] [illegible] 2847. 2847. 2847. 2848. [illegible]
  [illegible] [illegible] 2851.   2852.   2853.   2854. [illegible] [illegible] [illegible] [illegible]
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  [illegible] [illegible] [illegible] [illegible] 3582. [illegible] [illegible] [illegible] [illegible] [illegible]
  [illegible] [illegible] [illegible] [illegible] 3594. [illegible] [illegible] [illegible] [illegible] [illegible]
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      3398.     3399.     3399.     3400.     3401.     3402.     3401.     3401.     3401.     3401.
      3401.     3402.     3402.     3402.     3402.     3402.     3402.     3402.     3403.     3403.
      3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.
      3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.
      3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.
      3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.     3403.

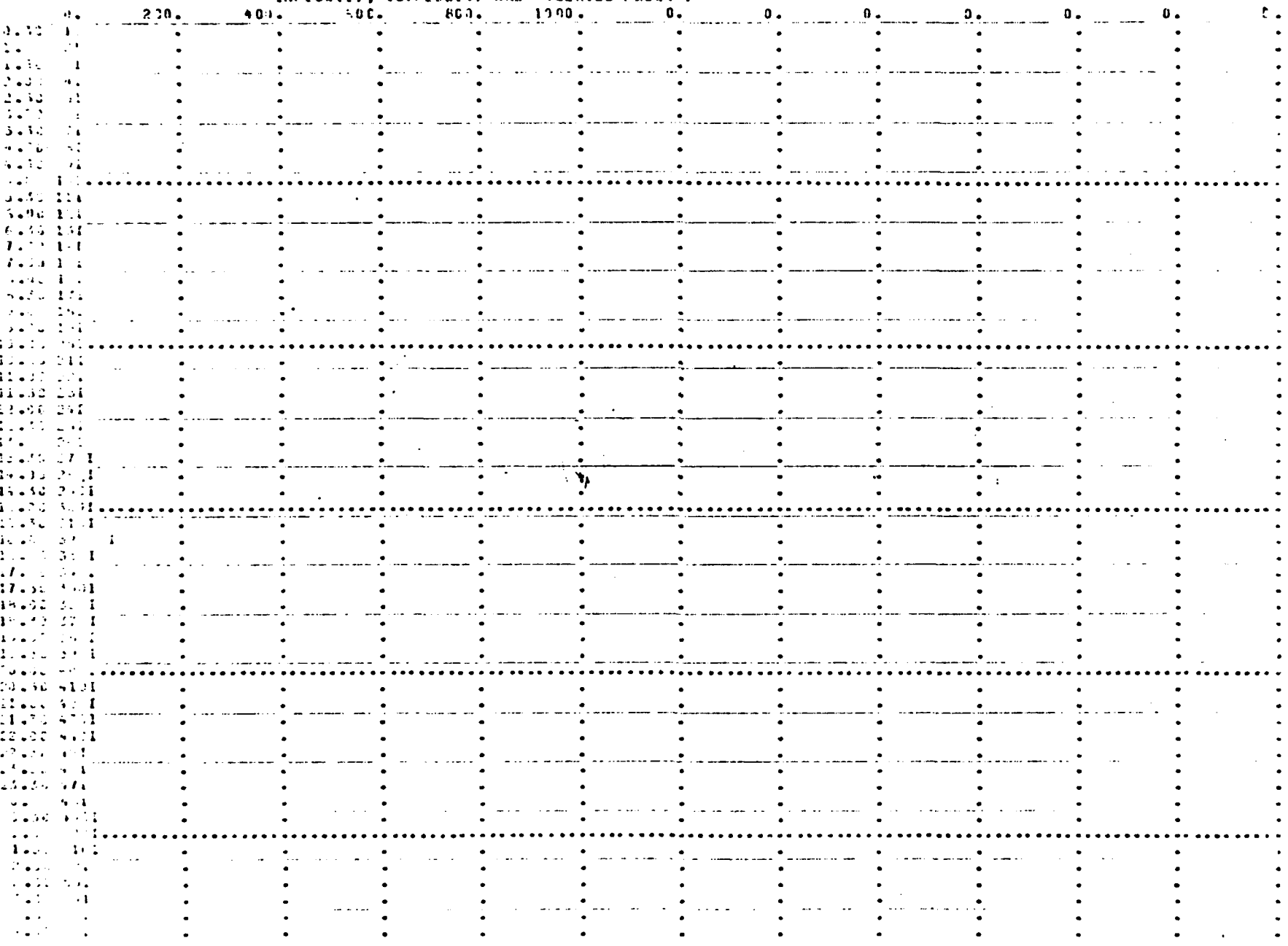
                                                     STAGE
      532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.5
      532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6
      532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6
      532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6
      532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6
      532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6
      532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6     532.6
      532.6     532.6     532.7     532.7     532.7     532.7     532.8     532.8     532.8     532.5
      533.0     533.0     533.1     533.2     533.2     533.3     533.4     533.4     533.5     533.6
      533.6     533.7     533.7     533.7     533.8     533.8     533.9     533.8     533.8     533.8
      533.9     533.9     533.9     533.9     533.9     533.9     533.9     533.9     533.9     533.9
      533.9     534.0     534.0     534.0     534.0     534.0     534.0     534.0     534.0     534.0
      534.0     534.0     534.0     534.0     534.0     534.0     534.0     534.0     534.0     534.0
      534.0     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1
      534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1
      534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.2     534.2
      534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1
      534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1
      534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1
      534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1     534.1

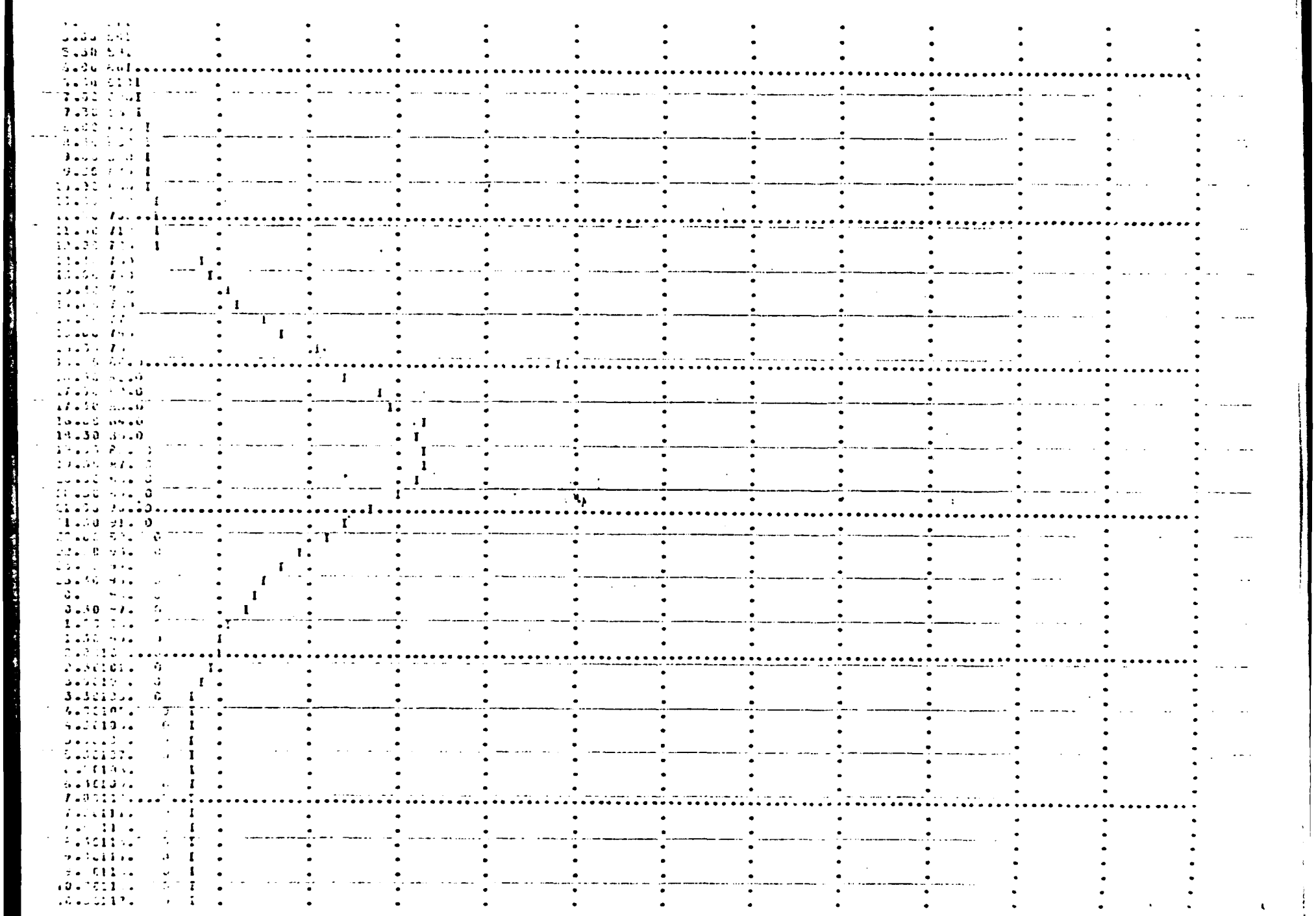
PEAK OUTFLOW IS      132. AT TIME  97.56 HOURS

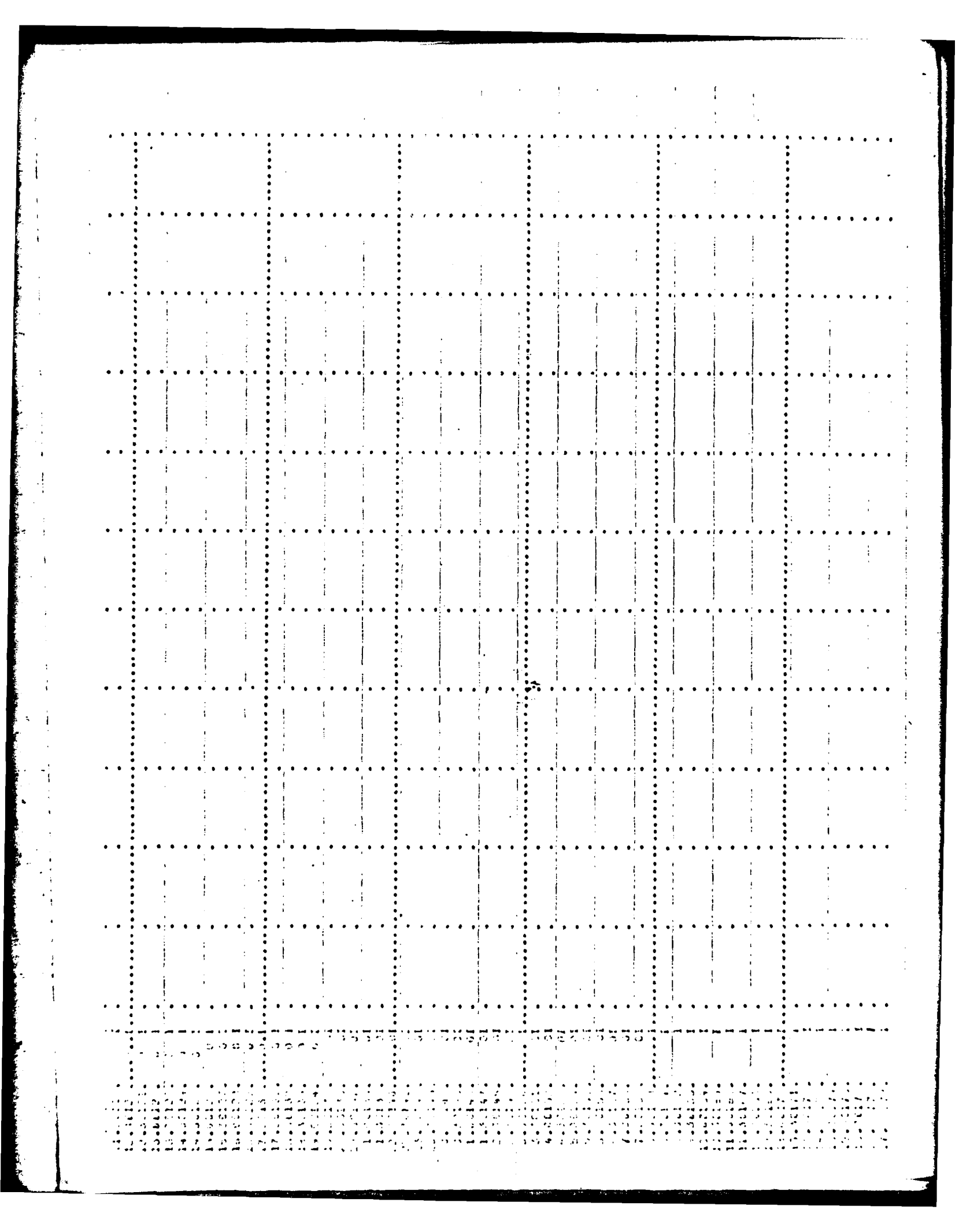
                            PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
                   CFS      132.      132.       131.        85.        12210.
                   CMS        4.        4.         4.         2.          346.
                INCHES                0.51       2.03       3.93          3.94
                    MM               12.98      51.56      99.93        100.17
                 AC-FT                 65.       260.       503.          505.
             THOUS CU M                81.       321.       621.          622.
```

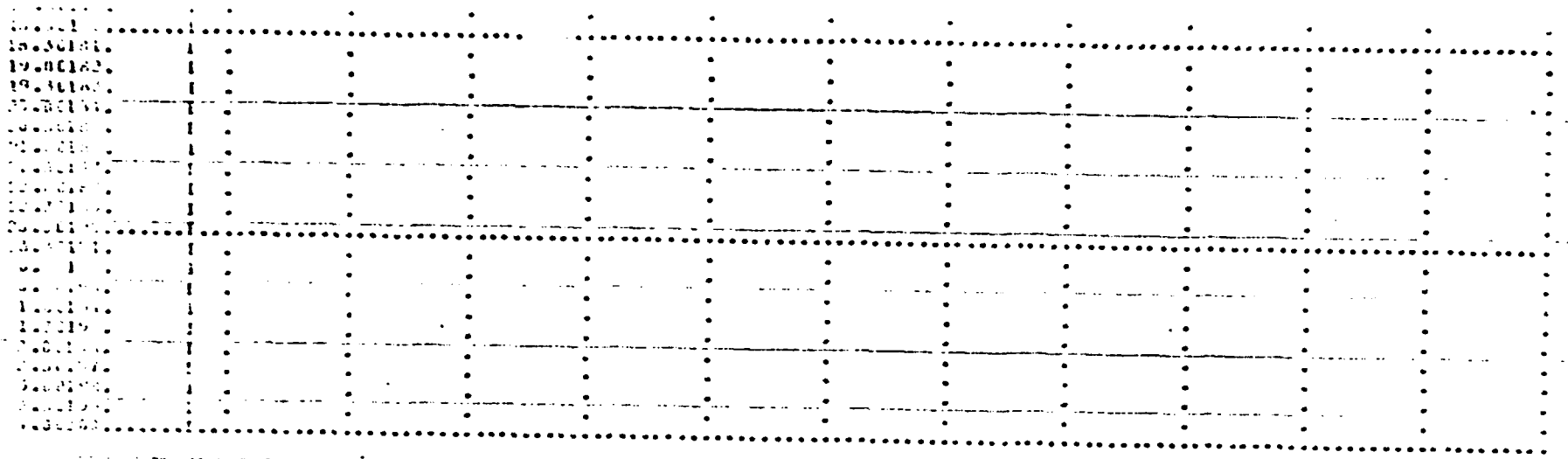
STATION 1

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









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.	1.	1.	1.
1.	1.	1.	1.	1.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	[illegible]	3.	4.	4.	4.	4.	[illegible]	3.	[illegible]
[illegible]	[illegible]	7.	[illegible]	9.	11.	12.	13.	23.	24.
37.	43.	51.	61.	71.	94.	122.	391.	526.	542.
[illegible]	[illegible]	775.	[illegible]	743.	712.	675.	557.	593.	551.
[illegible]	441.	436.	439.	433.	391.	362.	[illegible]	334.	325.
324.	[illegible]	300.	[illegible]	290.	286.	285.	280.	275.	[illegible]
274.	273.	271.	270.	269.	269.	268.	267.	267.	[illegible]
[illegible]	[illegible]	265.	[illegible]	[illegible]	265.	[illegible]	[illegible]	[illegible]	[illegible]
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.
[illegible]	[illegible]	264.	264.	264.	264.	264.	264.	264.	264.
264.	264.	264.	264.	264.	264.	264.	264.	264.	264.

STORAGE

[illegible]	[illegible]	2830.	2830.	2830.	2830.	2831.	2831.	2831.	2831.
[illegible]	2831.	2831.	2831.	2832.	2832.	2832.	2832.	2832.	2833.
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[illegible]	[illegible]	2845.	[illegible]	[illegible]	2846.	2849.	[illegible]	2851.	[illegible]
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[illegible]	[illegible]	2872.	2874.	[illegible]	2875.	2882.	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	3446.	[illegible]	[illegible]	3446.	[illegible]	[illegible]	[illegible]	[illegible]
3446.	3446.	3446.	[illegible]	3446.	3446.	3445.	[illegible]	3446.	3446.
3446.	3446.	3446.	3446.	3446.	3446.	3446.	[illegible]	3446.	3446.
[illegible]	[illegible]	[illegible]	3446.	3446.	3446.	3446.	[illegible]	3446.	[illegible]
[illegible]	[illegible]	3446.	3446.	[illegible]	[illegible]	3446.	[illegible]	3446.	[illegible]

STAGE

532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7
532.7	532.7	532.8	532.8	532.8	532.9	533.0	533.0	533.1	533.2
533.6	533.5	533.6	533.3	533.3	533.0	533.2	533.3	533.4	533.4
534.5	534.5	534.5	534.5	534.5	534.5	534.4	534.4	534.4	534.4

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     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2

PEAK OUTFLOW IS      775. AT TIME  46.50 HOURS

                        PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
             CFS        775.      677.       405.       259.         37731.
             CMS         22.       19.        11.         7.          1097.
          INCHES                  2.62       6.29      12.04          12.05
              MM                 66.62     159.71     305.71         306.18
           AC-FT                  336.       804.      1539.          1542.
     THOUS CU M                   414.       992.      1897.          1902.
```
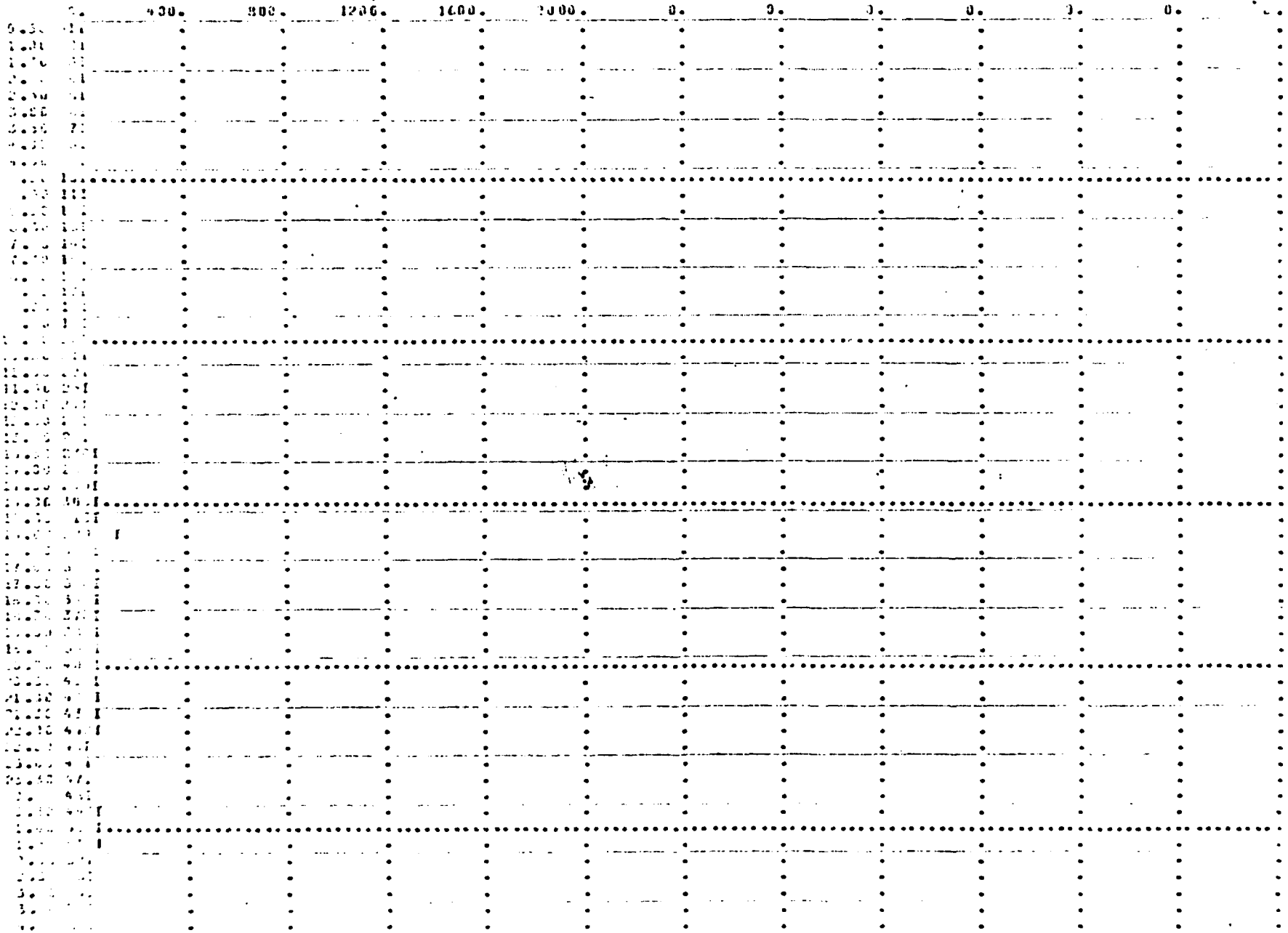
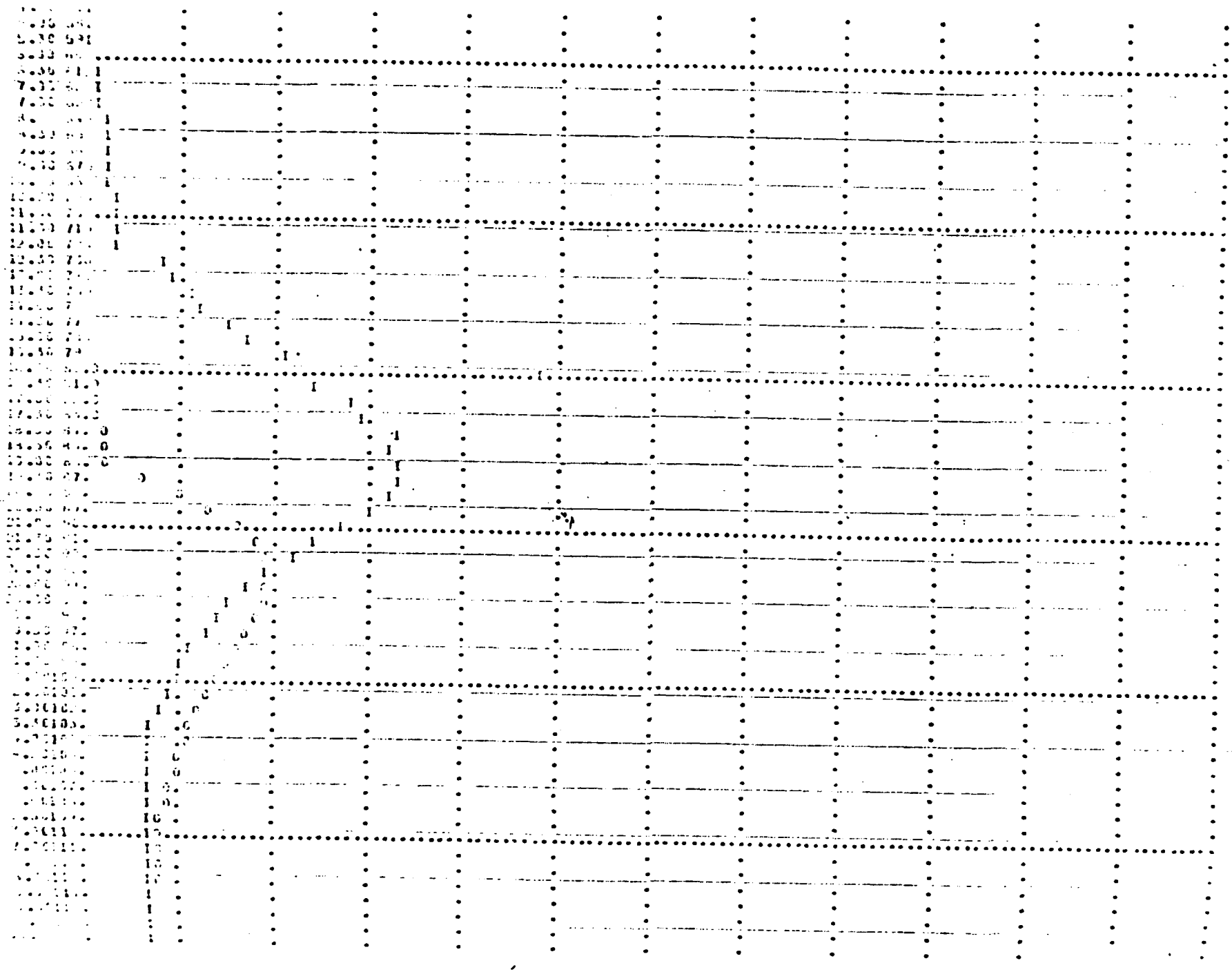
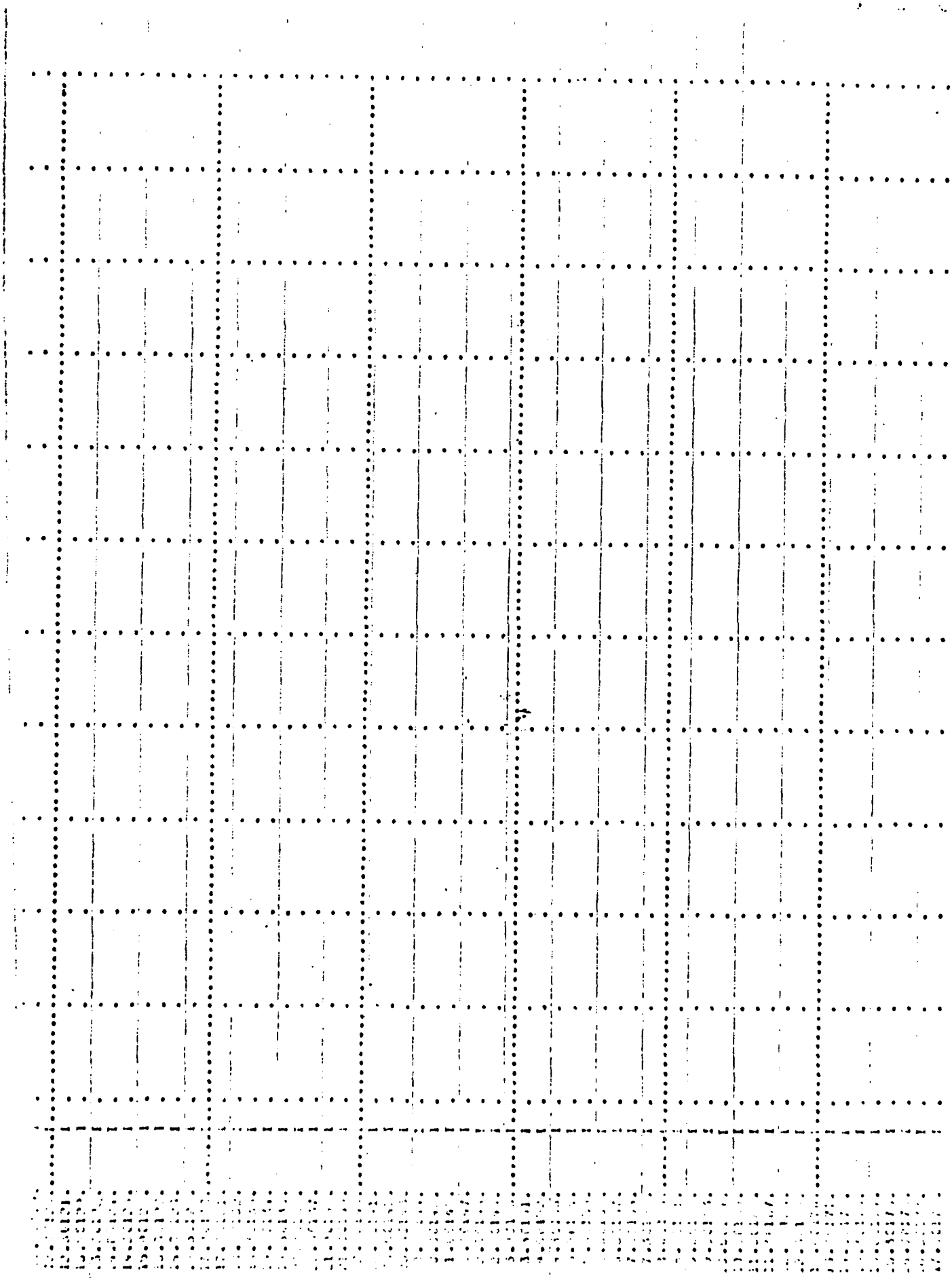

STATION 1

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





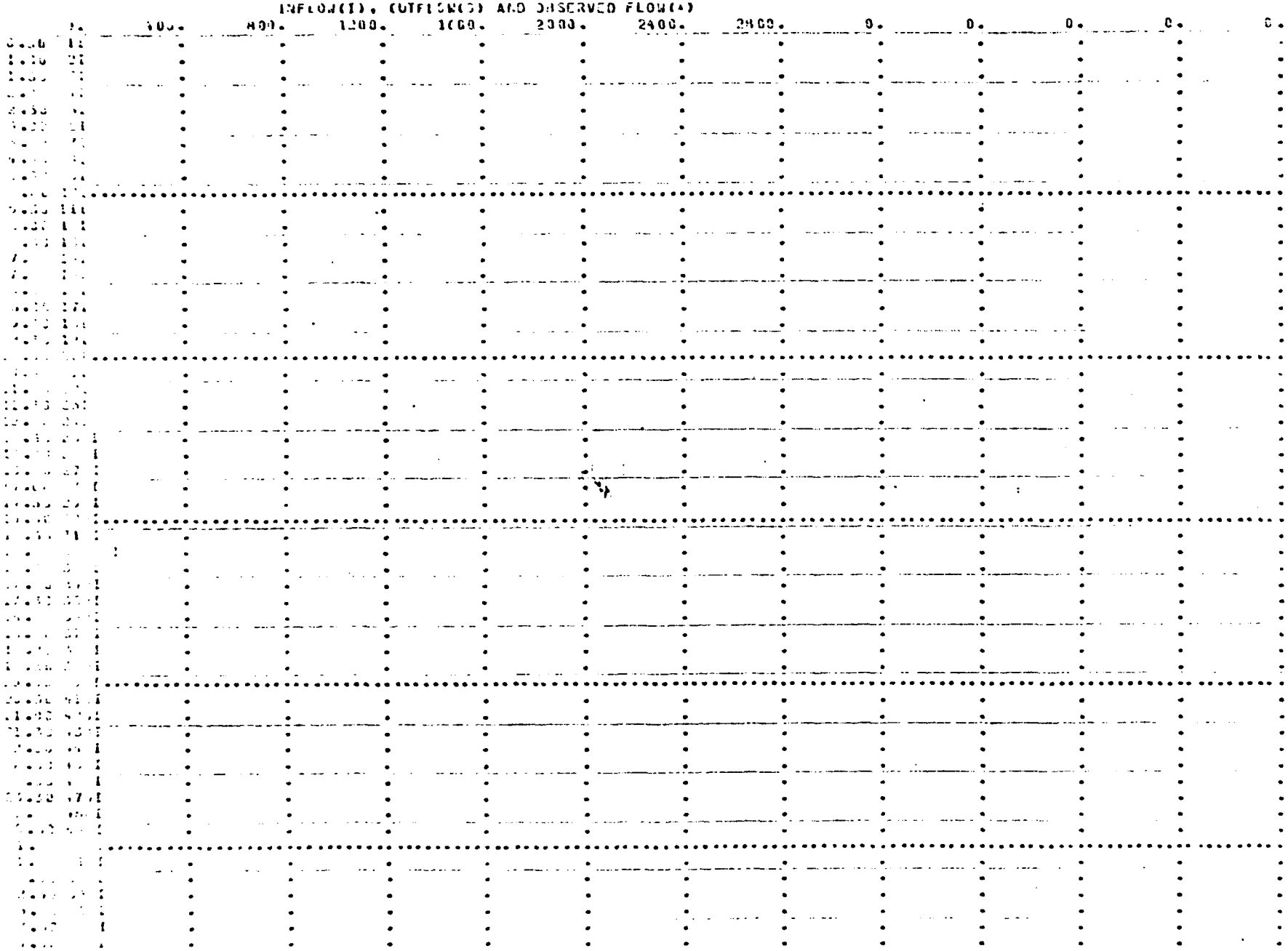


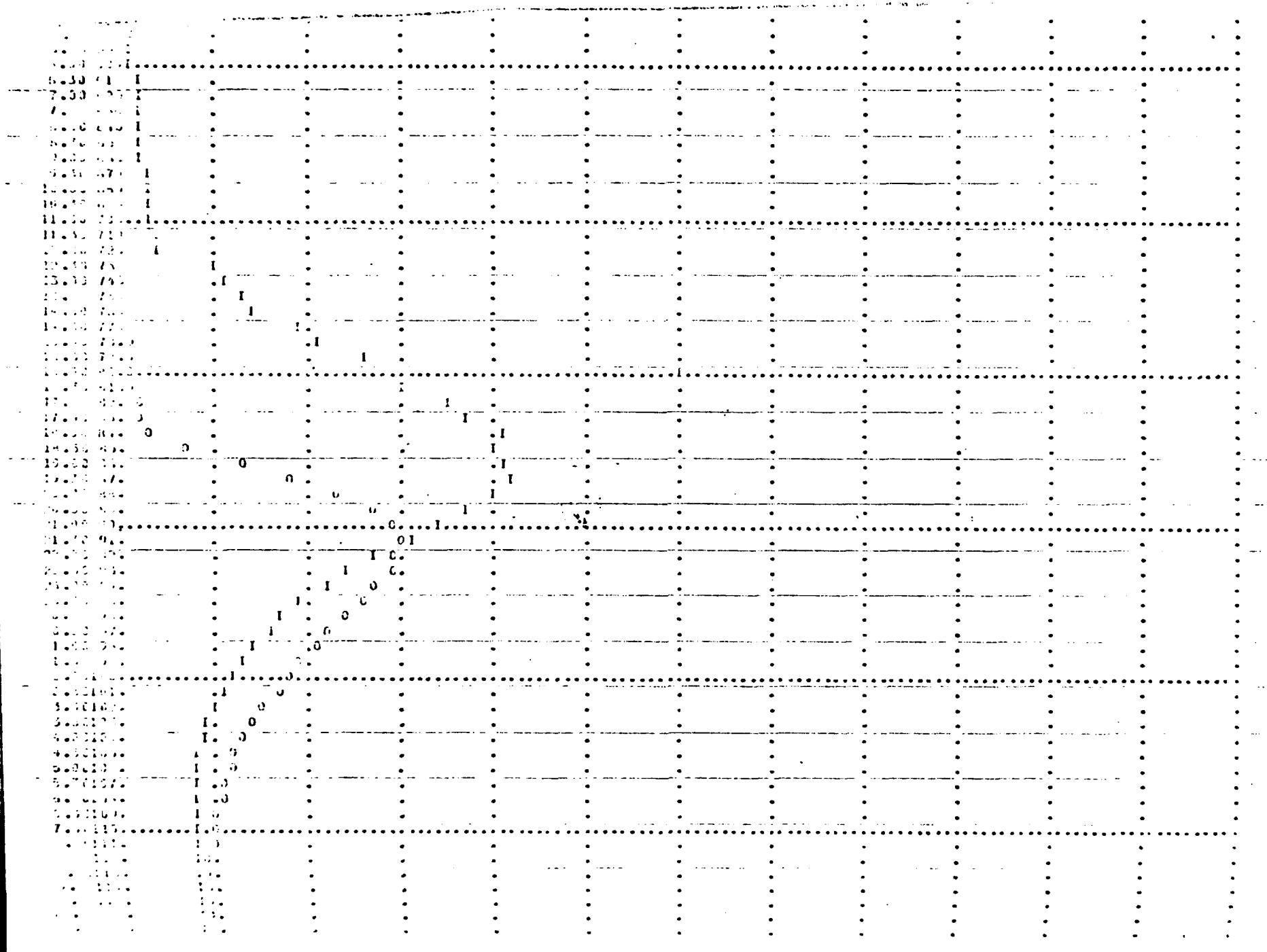
```
                              STATION      1, PLAN 1, RATIO 5

                             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.       1.       1.       1.       1.       1.
      1.       1.       2.       2.       2.       2.       2.       2.       2.       2.
      2.       2.       2.       2.       3.       3.       3.       3.       3.       3.
      3.       3.       3.       3.       3.       4.       4.       4.       4.       4.
      4.       4.       4.       4.       5.       5.       5.       6.       6.       7.
      7.       8.       9.      10.      12.      13.      17.      22.      27.      33.
     40.      50.      71.     116.     287.     516.     737.     927.    1055.    1140.
   1142.    1176.    1181.    1089.    1026.     961.     855.     832.     772.     715.
    681.     617.     574.     537.     474.     449.     445.     425.     403.     396.
    383.     370.     365.     357.     357.     351.     349.     345.     344.     341.
    342.     338.     337.     335.     335.     334.     333.     333.     332.     332.
    332.     331.     331.     331.     331.     330.     330.     330.     330.     330.
    330.     330.     330.     330.     330.     330.     330.     330.     330.     330.
    330.     330.     330.     330.     330.     330.     330.     330.     330.     330.
    330.     330.     330.     330.     330.     330.     330.     330.     330.     330.
    330.     330.     330.     330.     330.     330.     330.     330.     330.     330.
    330.     330.     330.     330.     330.     330.     330.     330.     330.     330.
    330.     330.     330.     330.     330.     330.     330.     330.     330.     330.

                                        STORAGE
   2830.    2830.    2830.    2830.    2830.    2831.    2831.    2831.    2831.    2831.
   2831.    2831.    2832.    2832.    2832.    2832.    2833.    2833.    2833.    2835.
   2834.    2835.    2836.    2834.    2835.    2836.    2837.    2838.    2839.    2841.
   2842.    2844.    2845.    2850.    2852.    2853.    2854.    2855.    2856.    2857.
   2858.    2859.    2860.    2851.    2862.    2863.    2864.    2865.    2866.    2867.
   2867.    2868.    2869.    2870.    2871.    2872.    2873.    2874.    2874.    2875.
   2877.    2883.    2882.    2885.    2888.    2891.    2895.    2900.    2906.    2913.
   2915.    2921.    2932.    2949.    2963.    2991.    3018.    3050.    3087.    3157.
   3224.    3263.    3331.    3397.    3455.    3505.    3544.    3581.    3603.    3613.
   3521.    3630.    3615.    3607.    3597.    3586.    3575.    3564.    3554.    3544.
   3534.    3527.    3517.    3509.    3501.    3495.    3490.    3485.    3482.    3479.
   3476.    3471.    3472.    3471.    3470.    3469.    3468.    3467.    3466.    3466.
   3465.    3465.    3465.    3464.    3464.    3464.    3464.    3464.    3464.    3464.
   3463.    3463.    3463.    3463.    3463.    3463.    3463.    3463.    3463.    3463.
   3463.    3463.    3462.    3463.    3463.    3463.    3463.    3463.    3463.    3463.
   3463.    3463.    3462.    3463.    3463.    3463.    3463.    3463.    3463.    3463.
   3463.    3463.    3462.    3463.    3463.    3463.    3463.    3463.    3463.    3463.
   3463.    3463.    3462.    3463.    3463.    3463.    3463.    3463.    3463.    3463.
   3463.    3463.    3462.    3463.    3463.    3463.    3463.    3463.    3463.    3463.
   3463.    3463.    3463.    3463.    3463.    3463.    3463.    3463.    3463.    3463.

                                         STAGE
  532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6
  532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6
  532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6
  532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6
  532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6    532.6
  532.7    532.7    532.7    532.7    532.7    532.7    532.7    532.7    532.7    532.7
  532.7    532.7    532.7    532.7    532.7    532.7    532.7    532.7    532.7    532.8
  532.8    532.8    532.8    532.9    532.9    533.0    533.1    533.1    533.2    532.9
  533.4    533.9    533.9    534.1    534.2    534.4    534.5    534.5    534.6    534.7
  534.7    534.7    534.6    534.6    534.6    534.6    534.5    534.5    534.5    534.5
```

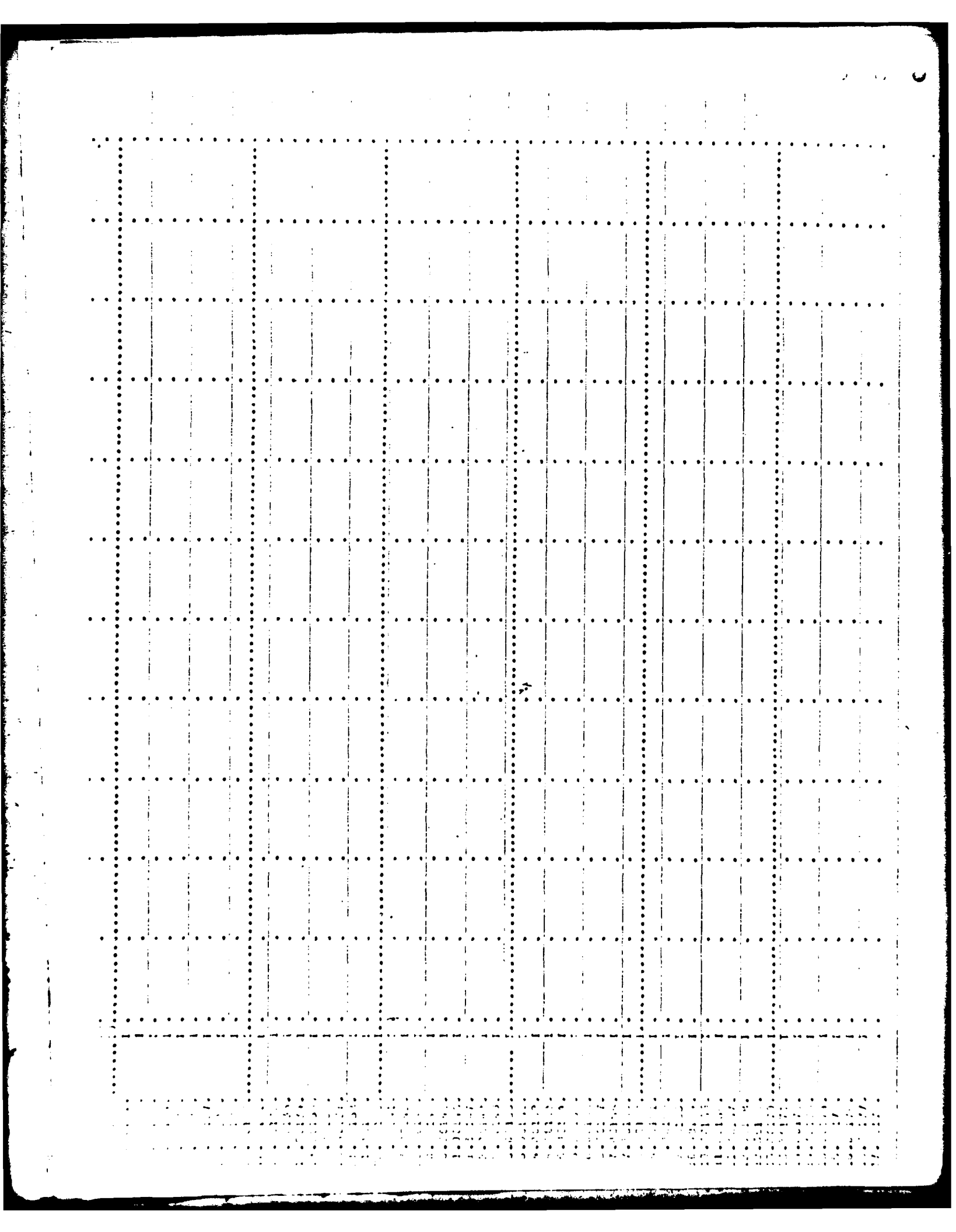
```
   534.4     534.4     534.4     534.4     534.3     534.3     534.3     534.4     534.3     534.3
   534.3     534.3     534.3     534.3     534.3     534.3     534.3     534.3     534.3     534.3
   534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
   534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
   534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
   534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
   534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
   534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
   534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2
   534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2     534.2

PEAK OUTFLOW IS      1182. AT TIME  45.50 HOURS

                               PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
                    CFS        1182.     1017.      565.       347.        49979.
                    CMS          33.       29.       16.        10.         1415.
                 INCHES                   3.94      8.76      16.12         16.14
                     MM                 100.08    222.55     409.37        409.96
                  AC-FT                   504.     1121.      2062.         2065.
              THOUS CU M                  622.     1383.      2543.         2547.
```

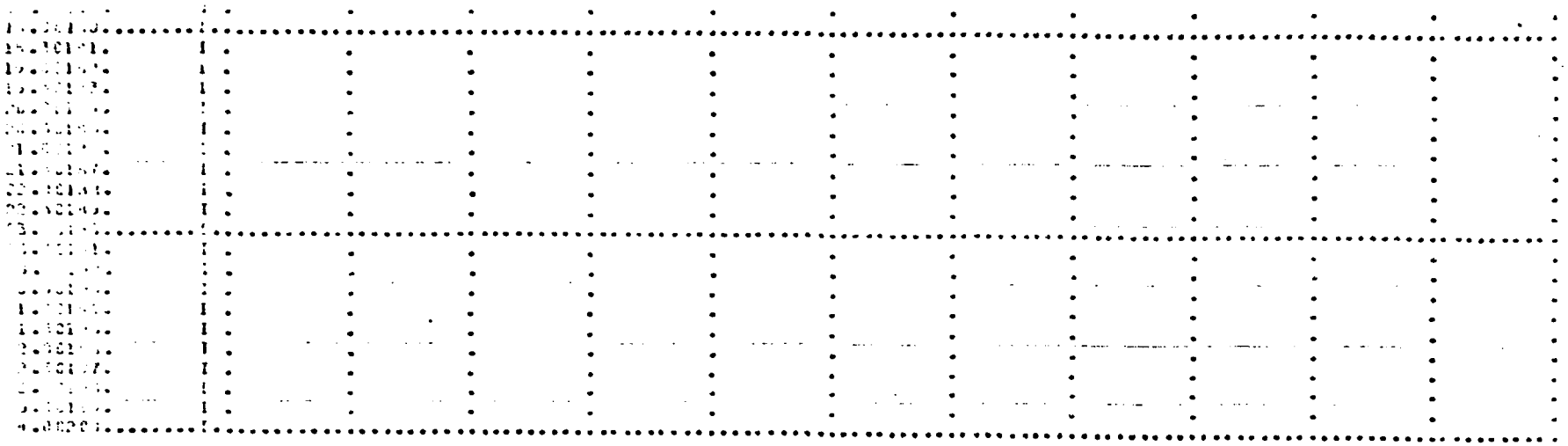
STATION 1

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









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.	1.	0.	0.	1.	1.	1.	1.	1.	1.
1.	2.	2.	2.	2.	2.	2.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	5.
[illegible]	[illegible]	5.	6.	6.	6.	7.	7.	7.	9.
[illegible]	[illegible]	10.	12.	14.	18.	23.	28.	35.	49.
[illegible]	71.	222.	476.	735.	1014.	1244.	1420.	1333.	1576.
1558.	1721.	1496.	1361.	1263.	1175.	1086.	1002.	925.	859.
731.	731.	678.	633.	587.	551.	523.	500.	481.	464.
454.	444.	435.	429.	423.	419.	415.	412.	409.	407.
405.	403.	402.	401.	400.	399.	399.	398.	398.	397.
397.	397.	397.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.
396.	396.	396.	396.	396.	396.	396.	396.	396.	396.

STORAGE

2830.	2831.	2830.	2830.	2831.	2831.	2831.	2831.	2831.	2831.
2832.	2832.	2832.	2832.	2833.	2833.	2833.	2834.	2834.	2834.
2835.	2835.	2835.	2835.	2836.	2837.	2838.	2840.	2841.	2843.
2844.	2849.	2852.	2854.	2856.	2857.	2859.	2861.	2861.	2863.
2859.	2865.	2867.	2868.	2869.	2870.	2871.	2872.	2873.	2875.
2875.	2876.	2877.	2878.	2879.	2880.	2881.	2882.	2883.	2885.
2888.	2889.	2893.	2895.	2901.	2904.	2908.	2914.	2919.	2926.
2932.	[illegible]	2952.	2973.	2997.	3024.	3056.	3093.	3133.	[illegible]
[illegible]	3573.	3434.	[illegible]	3351.	3395.	3431.	[illegible]	3672.	[illegible]
3577.	3571.	3566.	3543.	3534.	3523.	3505.	[illegible]	3580.	3568.
3557.	3547.	3537.	3524.	3519.	3512.	3506.	3502.	3498.	3494.
3492.	3490.	3488.	3485.	3485.	3484.	3483.	3482.	3482.	3481.
3481.	3480.	3480.	3480.	3480.	3480.	3479.	3479.	3479.	3479.
3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.
3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.
3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.
3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.
3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.
3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.
3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.	3479.

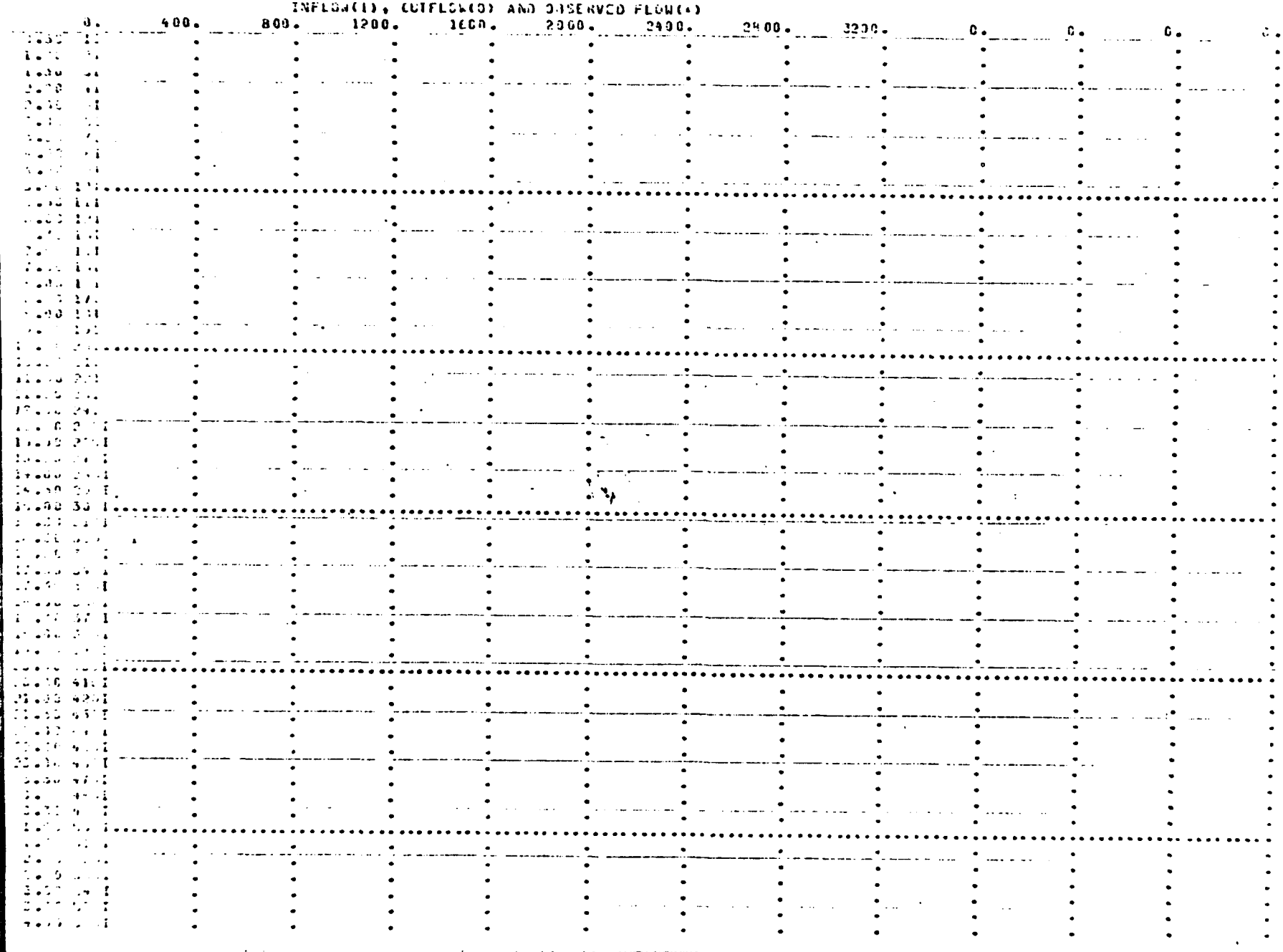
STAGE

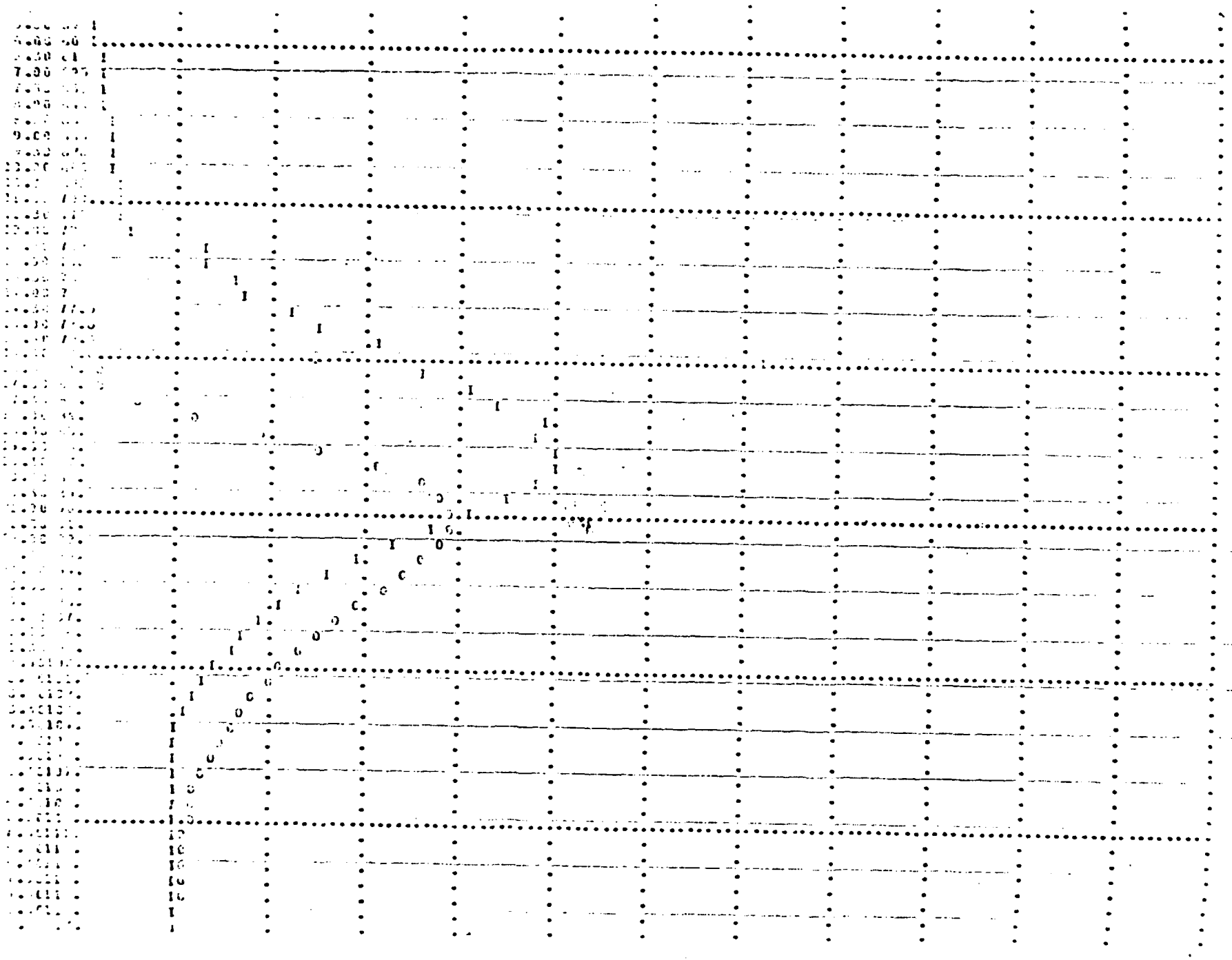
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.7	532.7	532.7	532.7	532.7	532.7	532.7
532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7
532.7	532.7	532.7	532.7	532.7	532.7	532.8	532.8	532.8	532.8
532.8	532.8	532.9	532.9	533.0	533.1	533.2	533.3	533.4	[illegible]
[illegible]	534.2	534.2	534.3	534.5	534.6	534.7	[illegible]	534.8	[illegible]
534.8	534.8	534.8	534.7	534.7	534.7	534.6	534.6	534.6	534.5

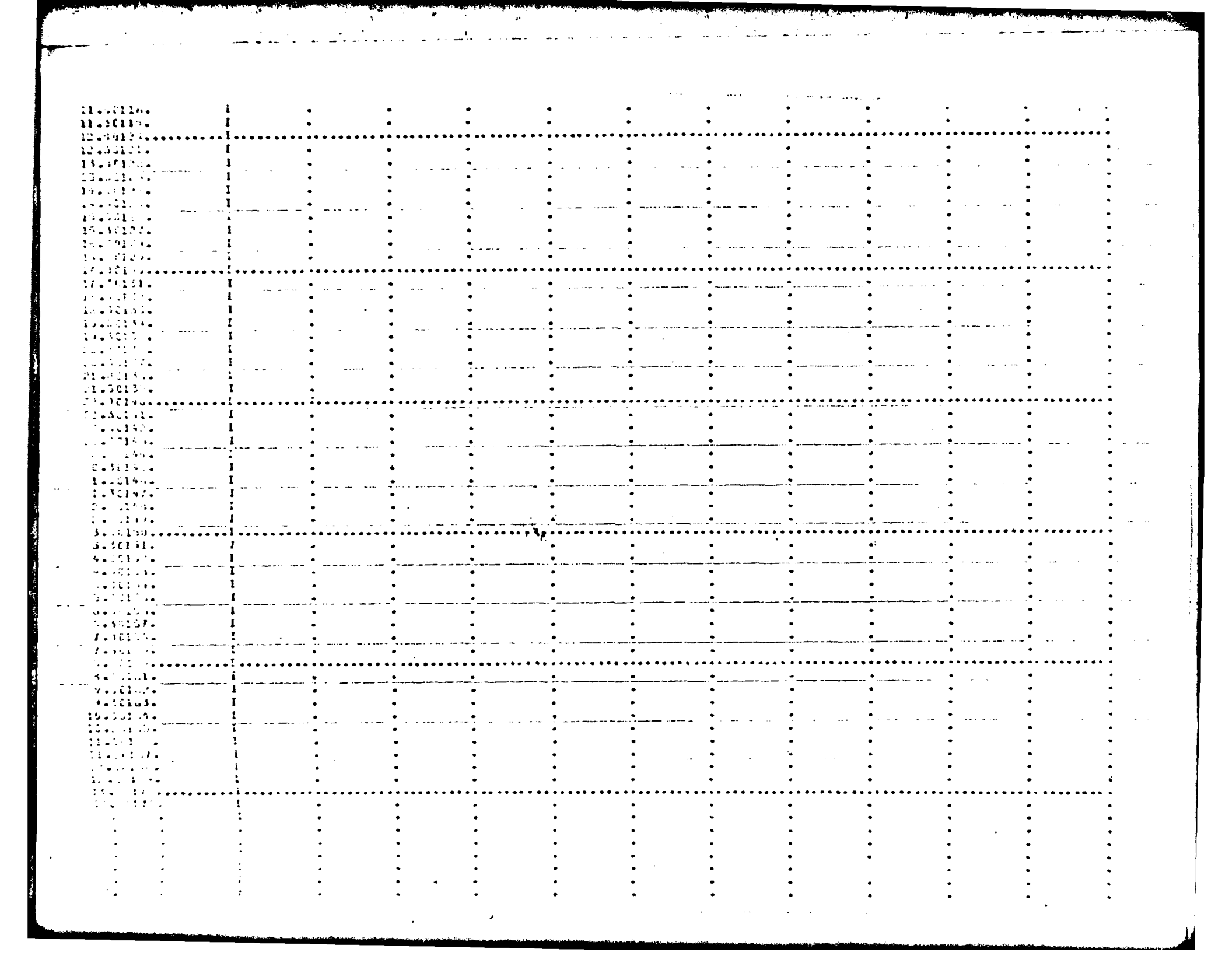
```
                                        534.3    534.3    534.3    534.3    534.3    534.3    534.3
    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3
    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3
    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3
    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3
    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3
    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3
    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3
    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3
    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3    534.3

PEAK OUTFLOW IS     1576. AT TIME  45.00 HOURS

                                PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                       CFS     1576.     1356.      721.      434.     [illegible]
                       CMS       45.       38.       21.       12.          1774.
                    INCHES                5.23     11.23     20.21          20.24
                        MM              132.95    285.20    513.29         513.99
                     AC-FT                670.     1437.     2585.          2599.
               THOUS CU M                 826.     1772.     3189.          3193.
```

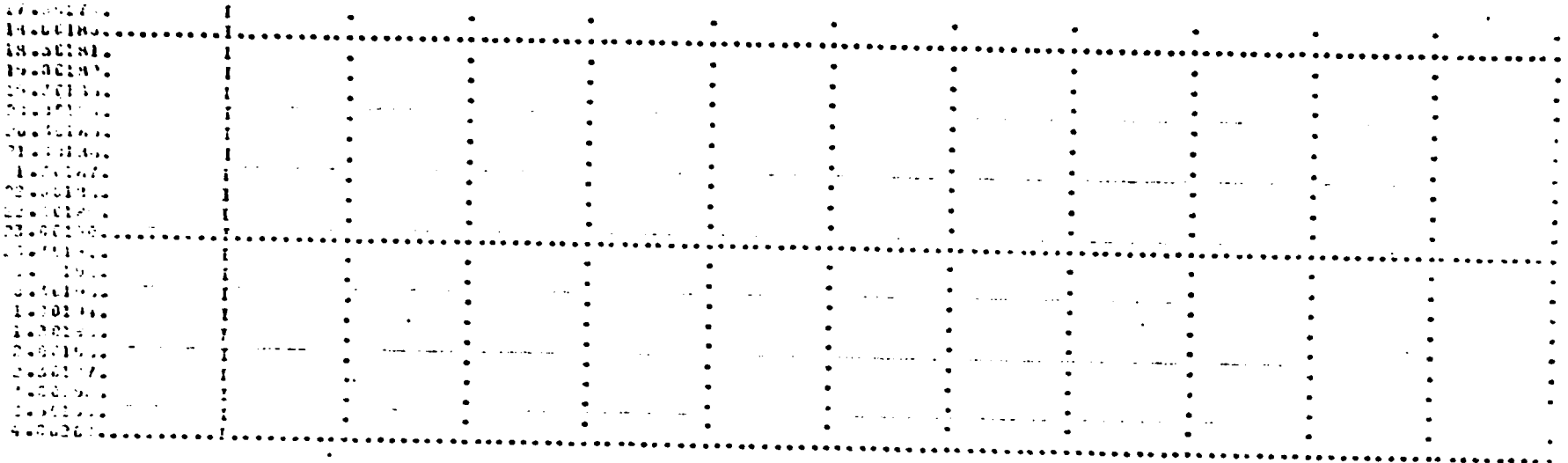
STATION 1

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









STATION 1, PLAN 1, RATIO 5

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
2.	2.	3.	3.	3.	3.	3.	3.	4.	4.
4.	[illegible]	4.	[illegible]	4.	4.	5.	5.	5.	5.
5.	5.	5.	[illegible]	5.	6.	6.	6.	[illegible]	[illegible]
[illegible]	7.	7.	7.	9.	8.	9.	9.	10.	11.
11.	[illegible]	14.	[illegible]	22.	26.	34.	[illegible]	52.	75.
[illegible]	523.	975.	1336.	[illegible]	1595.	2115.	[illegible]	2319.	2307.
2235.	2123.	1990.	1845.	1752.	1564.	1435.	1317.	1209.	[illegible]
1024.	[illegible]	875.	811.	755.	709.	672.	644.	621.	603.
589.	577.	568.	559.	554.	549.	545.	542.	545.	537.
[illegible]	534.	532.	530.	531.	530.	530.	[illegible]	529.	524.
[illegible]	[illegible]	528.	528.	528.	528.	528.	528.	528.	528.
528.	528.	528.	528.	528.	528.	528.	528.	528.	528.
528.	528.	528.	528.	528.	528.	528.	528.	528.	528.
528.	528.	528.	528.	528.	528.	528.	528.	528.	528.
528.	528.	528.	528.	528.	528.	528.	528.	528.	528.
528.	528.	528.	528.	528.	528.	528.	528.	528.	528.
528.	528.	528.	528.	528.	528.	528.	528.	528.	528.

STORAGE

2830.	2830.	2830.	2831.	2831.	2831.	2831.	2832.	2832.	2832.
2832.	2833.	2833.	2833.	2834.	2834.	2834.	2835.	2835.	[illegible]
[illegible]	[illegible]	2837.	2837.	2838.	2840.	2841.	2843.	2845.	2847.
[illegible]	[illegible]	2860.	2861.	2865.	2867.	2869.	2871.	2872.	2874.
2876.	2877.	2879.	2881.	2882.	2883.	2885.	2885.	2887.	2889.
2890.	2892.	2892.	2894.	2896.	2897.	2899.	2900.	2901.	2903.
[illegible]	[illegible]	2914.	2918.	2923.	2928.	2935.	2942.	2947.	2957.
[illegible]	[illegible]	2994.	3021.	3052.	3098.	3130.	3181.	3240.	3351.
[illegible]	[illegible]	3585.	3643.	[illegible]	3722.	3749.	3767.	3774.	3771.
3754.	3750.	3733.	3715.	3695.	3677.	3659.	3641.	3625.	3610.
3597.	3584.	3572.	3561.	3551.	3542.	3535.	3530.	3525.	3520.
3520.	3517.	3516.	3514.	3513.	3512.	3511.	3510.	3510.	3509.
3509.	[illegible]	3508.	3508.	3508.	3508.	3509.	3504.	3506.	3509.
3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.
3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.
3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.
3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.
3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.
3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.
3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.	3507.

STAGE

532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.7	532.7	532.7	532.7
532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7
532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7
532.8	532.8	532.8	532.8	532.8	532.8	532.8	532.8	532.9	532.9
532.9	[illegible]	533.0	533.1	533.1	533.2	533.4	533.5	533.6	533.9
534.2	[illegible]	534.6	534.7	534.8	534.9	535.0	535.1	535.1	535.1
535.0	[illegible]	535.0	[illegible]	534.9	534.3	534.8	534.7	534.7	[illegible]

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    534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
    534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
    534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
    534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
    534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
    534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
    534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
    534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
    534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4

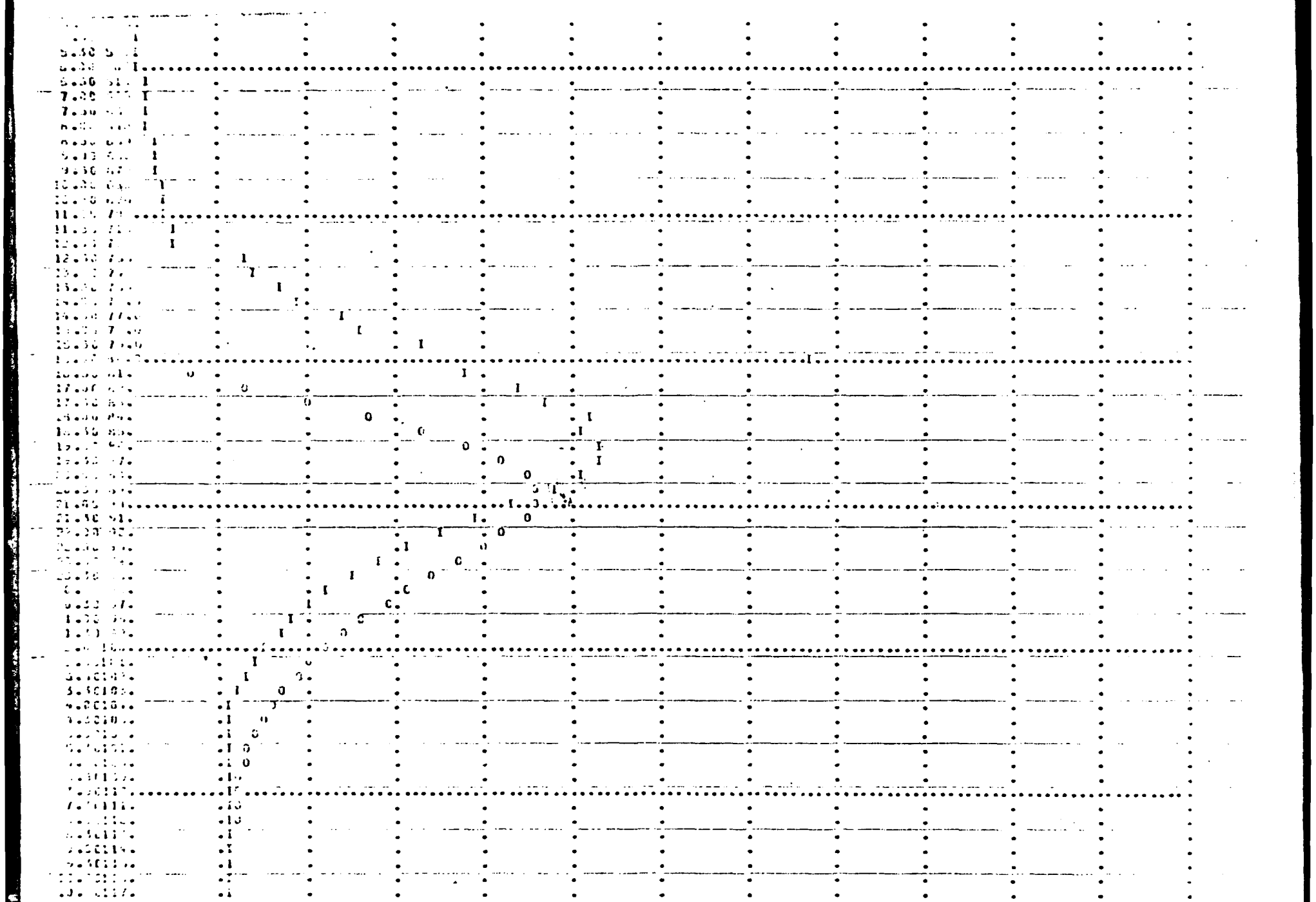
PEAK OUTFLOW IS      2319. AT TIME  44.50 HOURS

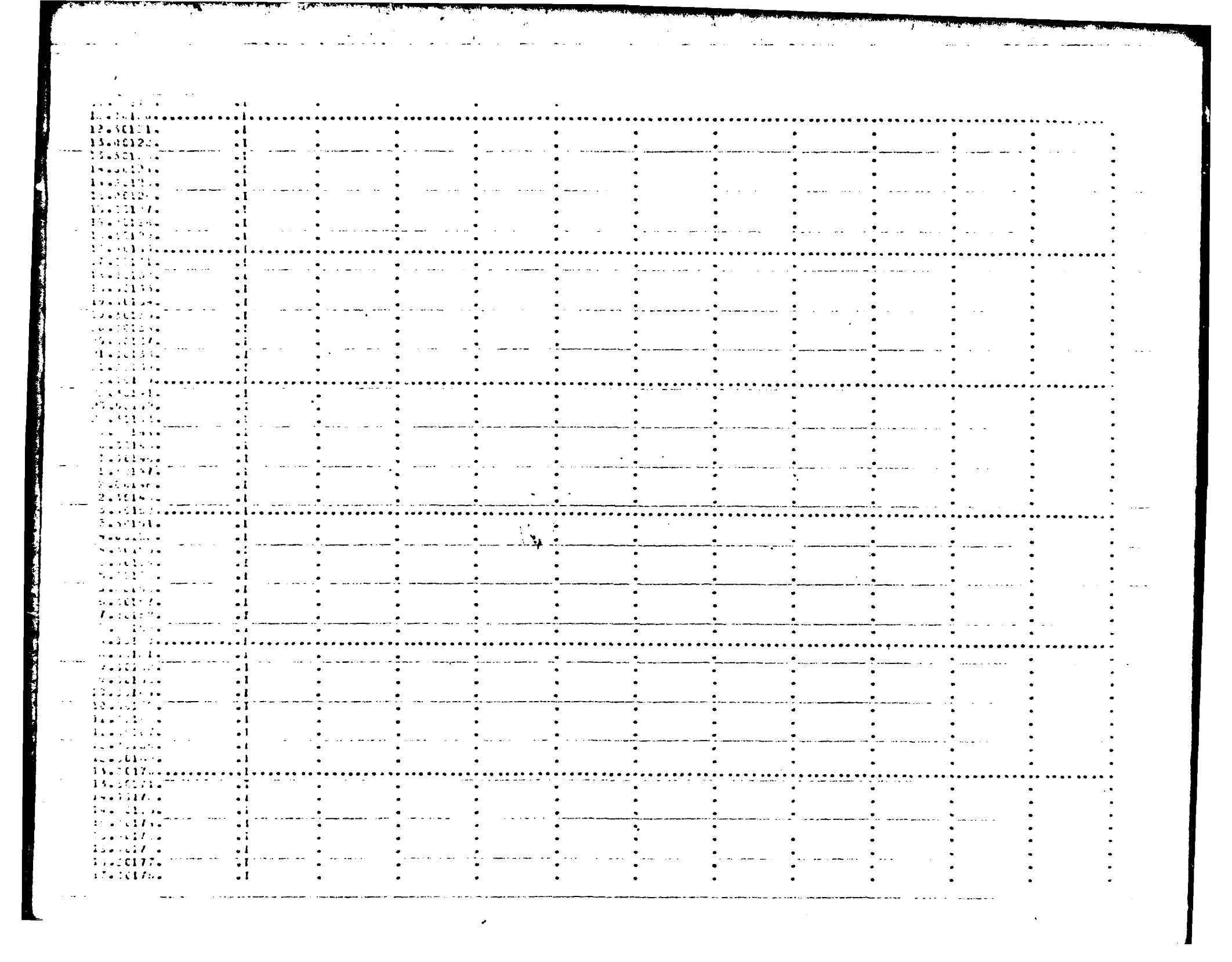
                              PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                     CFS     2319.     1992.     1041.      611.        88074.
                     CMS       66.       56.       29.       17.         2494.
                  INCHES                7.72     16.14     28.41         28.45
                      MM              196.12    409.95    721.43        722.57
                   AC-FT                988.     2065.     3635.         3639.
              THOUS CU M               1218.     2547.     4483.         4489.
```

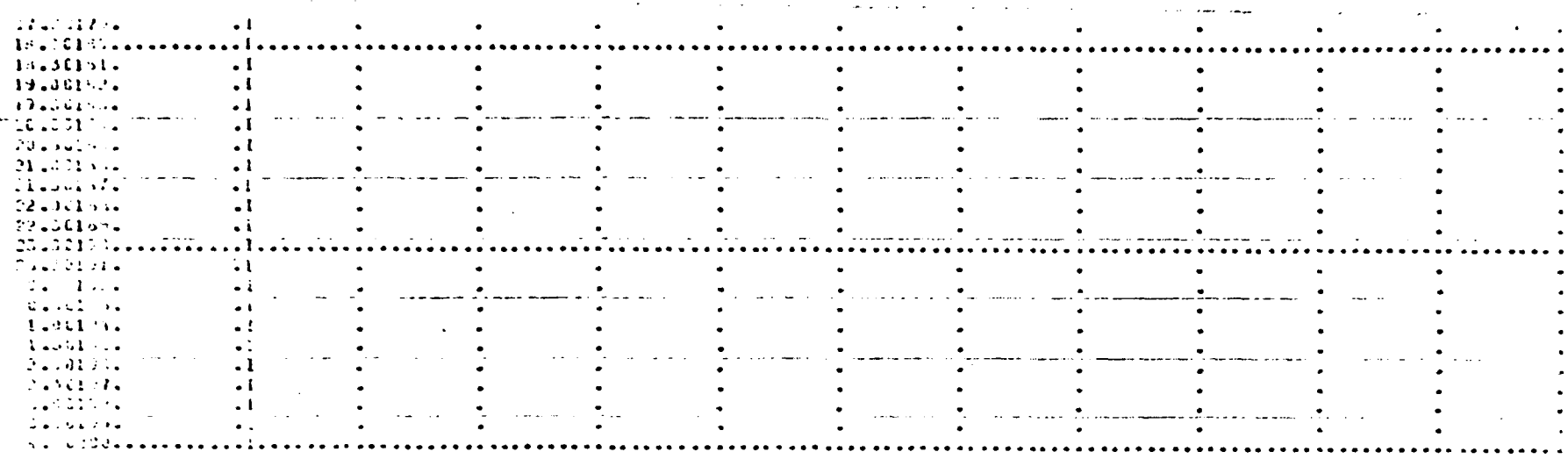
STATION 1

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

0. 500. 1000. 1500. 2000. 2500. 3000. 3500. 4000. 0. 0. 0. 1.







AD-A109 898 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. GLENMERE LAKE DAM, (INVENTORY NUMB--ETC(U)
SEP 81 G KOCH DACW51-79-C-0001

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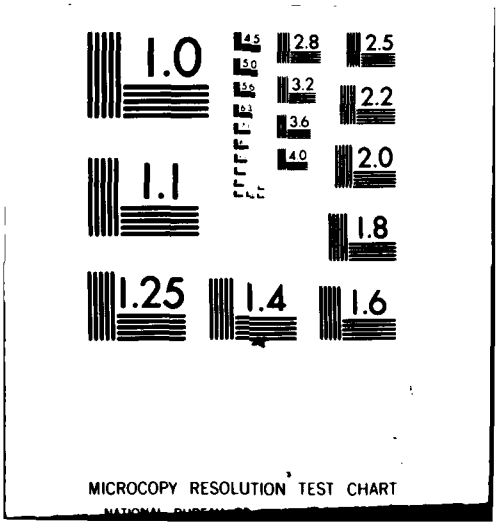
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1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
MICROCOPY RESOLUTION TEST CHART

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.	0.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	2.	2.
2.	3.	3.	3.	4.	4.	4.	4.	4.	5.
5.	5.	6.	6.	6.	6.	6.	6.	6.	6.
6.	6.	7.	7.	7.	7.	7.	7.	7.	8.
8.	8.	9.	9.	10.	10.	11.	11.	12.	13.
14.	16.	20.	27.	41.	57.	45.	58.	72.	577.
1313.	1597.	1767.	2135.	2491.	2690.	2484.	5335.	3829.	2971.
2493.	2044.	2498.	2201.	2111.	1932.	1767.	1617.	1481.	1360.
1255.	1155.	1065.	987.	919.	862.	819.	785.	759.	737.
720.	711.	706.	702.	699.	696.	693.	691.	690.	688.
686.	685.	684.	683.	682.	682.	681.	681.	681.	680.
680.	680.	680.	680.	680.	680.	680.	680.	679.	679.
679.	679.	679.	679.	679.	679.	679.	679.	679.	679.
679.	679.	679.	679.	679.	679.	679.	679.	679.	679.
679.	679.	679.	679.	679.	679.	679.	679.	679.	679.
679.	679.	679.	679.	679.	679.	679.	679.	679.	679.
679.	679.	679.	679.	679.	679.	679.	679.	679.	679.
679.	679.	679.	679.	679.	679.	679.	679.	679.	679.

STORAGE

2830.	2830.	2831.	2831.	2831.	2832.	2832.	2832.	2832.	2833.
2833.	2833.	2834.	2834.	2835.	2835.	2836.	2836.	2837.	2837.
2838.	2838.	2839.	2839.	2840.	2842.	2844.	2847.	2849.	2852.
2855.	2861.	2868.	2871.	2873.	2876.	2878.	2880.	2882.	2885.
2887.	2889.	2891.	2893.	2895.	2897.	2898.	2900.	2901.	2903.
2905.	2907.	2909.	2911.	2912.	2914.	2916.	2918.	2919.	2921.
2924.	2929.	2935.	2940.	2946.	2953.	2961.	2970.	2979.	2988.
3005.	3017.	3035.	3054.	3108.	3152.	3205.	3268.	3342.	3424.
3514.	3611.	3704.	3791.	3790.	3818.	3840.	3855.	3866.	3875.
3882.	3887.	3895.	3877.	3878.	3726.	3704.	3684.	3669.	3654.
3642.	3617.	3603.	3590.	3579.	3570.	3562.	3555.	3552.	3549.
3546.	3544.	3541.	3539.	3538.	3537.	3536.	3535.	3535.	3535.
3535.	3534.	3534.	3534.	3534.	3534.	3534.	3534.	3534.	3534.
3533.	3533.	3533.	3534.	3533.	3533.	3533.	3533.	3533.	3533.
3533.	3533.	3533.	3533.	3533.	3533.	3533.	3533.	3533.	3533.
3533.	3533.	3533.	3533.	3533.	3533.	3533.	3533.	3533.	3533.
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3533.	3533.	3533.	3533.	3533.	3533.	3533.	3533.	3533.	3533.

STAGE

532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6	532.6
532.6	532.6	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7
532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7	532.7
532.8	532.8	532.8	532.8	532.8	532.8	532.8	532.8	532.8	532.8
532.8	532.8	532.8	532.8	532.9	532.9	532.9	532.9	532.9	532.9
533.0	533.0	533.1	533.2	533.3	533.4	533.6	533.7	533.8	534.0
534.2	534.4	534.7	534.9	535.0	535.1	535.2	535.3	535.4	535.5
535.6	535.7	535.7	535.8	535.8	535.9	535.9	536.0	536.1	536.2

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 534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
 534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
 534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
 534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
 534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
 534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
 534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4
 534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4     534.4

PEAK OUTFLOW IS      3029. AT TIME  44.50 HOURS

                          PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
               CFS        3029.    2625.     1360.       783.        113532.
               CMS          86.      74.       39.        22.          3215.
            INCHES                 10.17     21.09      36.63         36.68
                MM                258.44    535.69     930.40        931.68
             AC-FT                 1302.     2694.      4687.          4595.
       THOUS CU M                  1606.     3328.      5781.          5738.
```
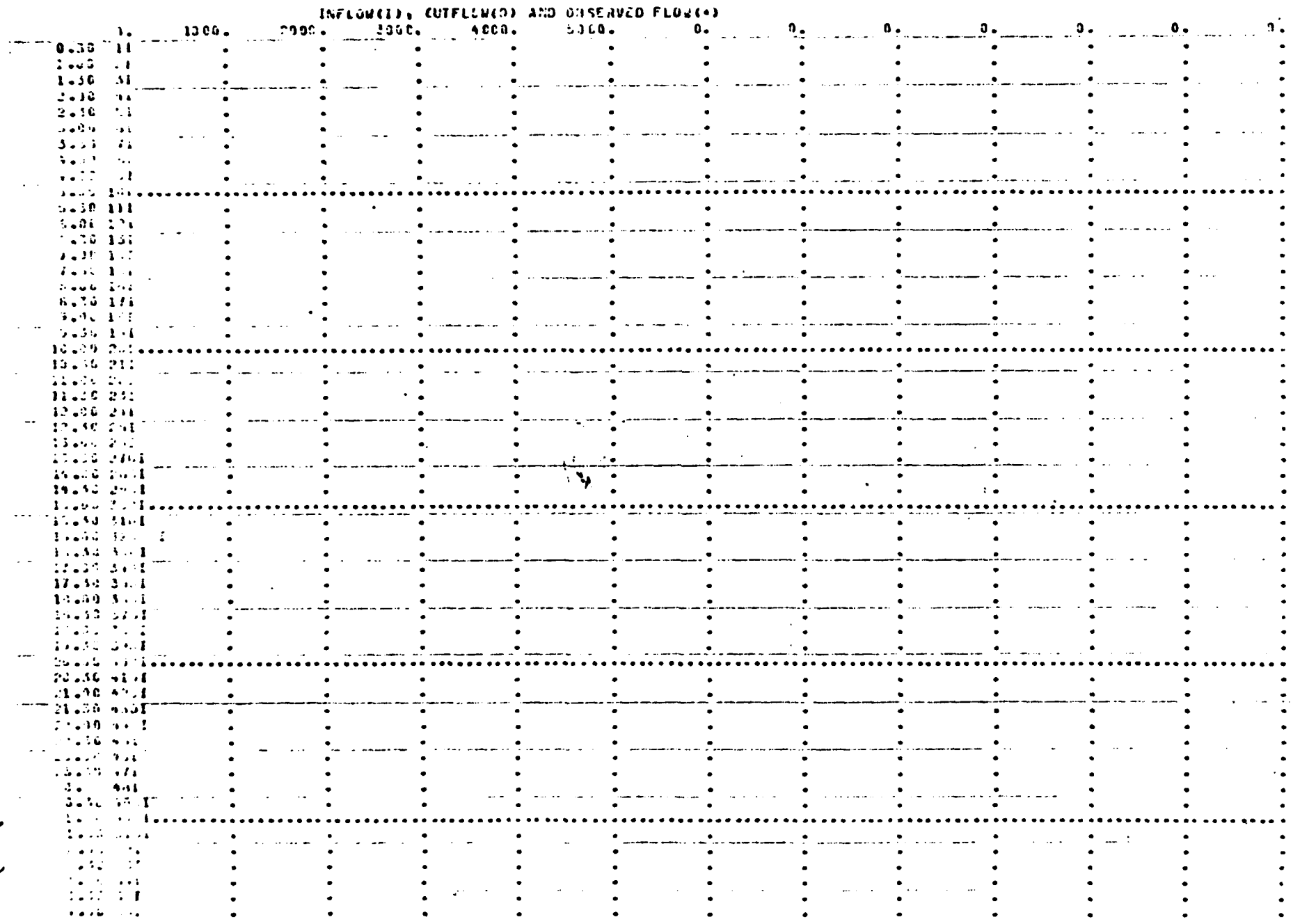
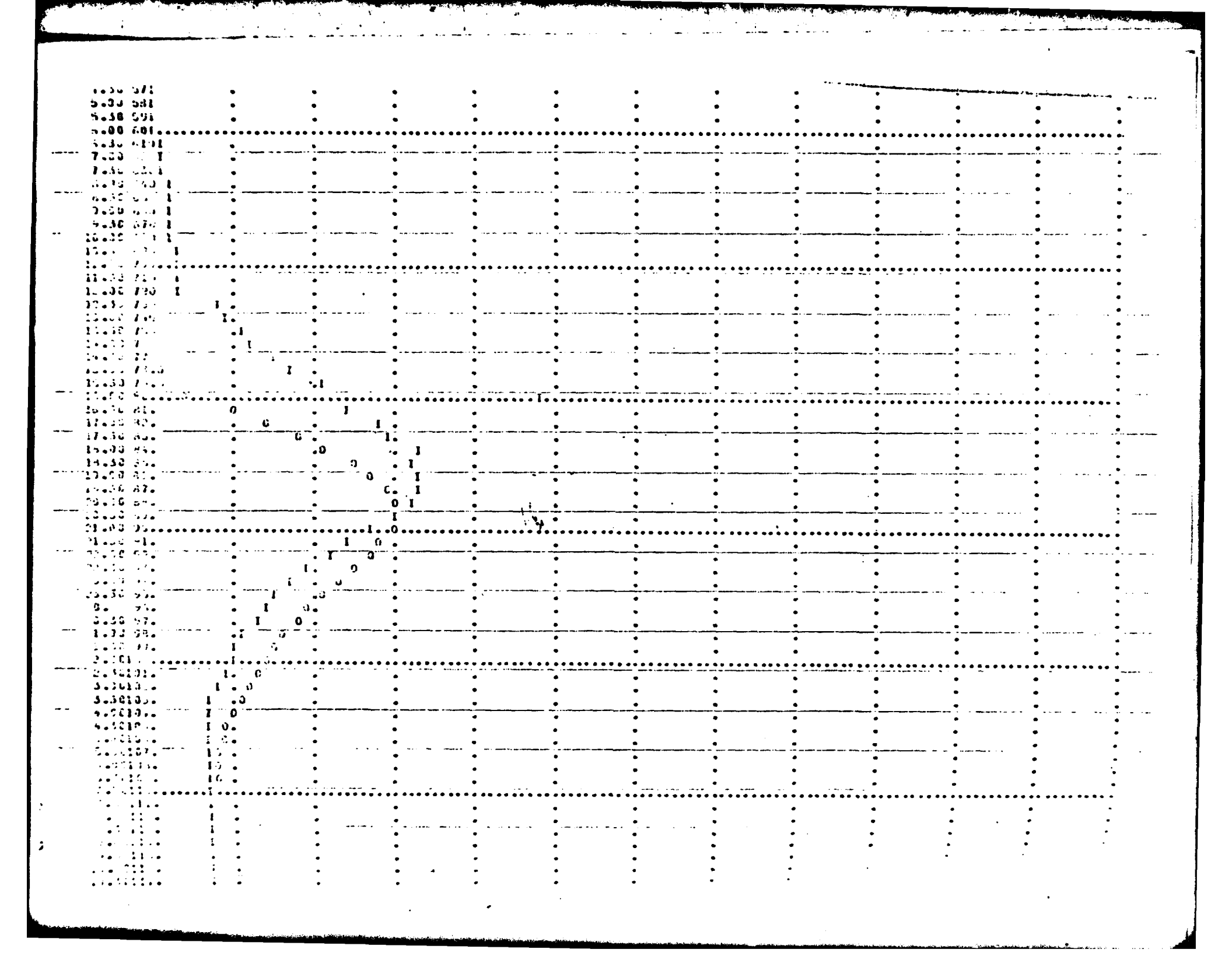
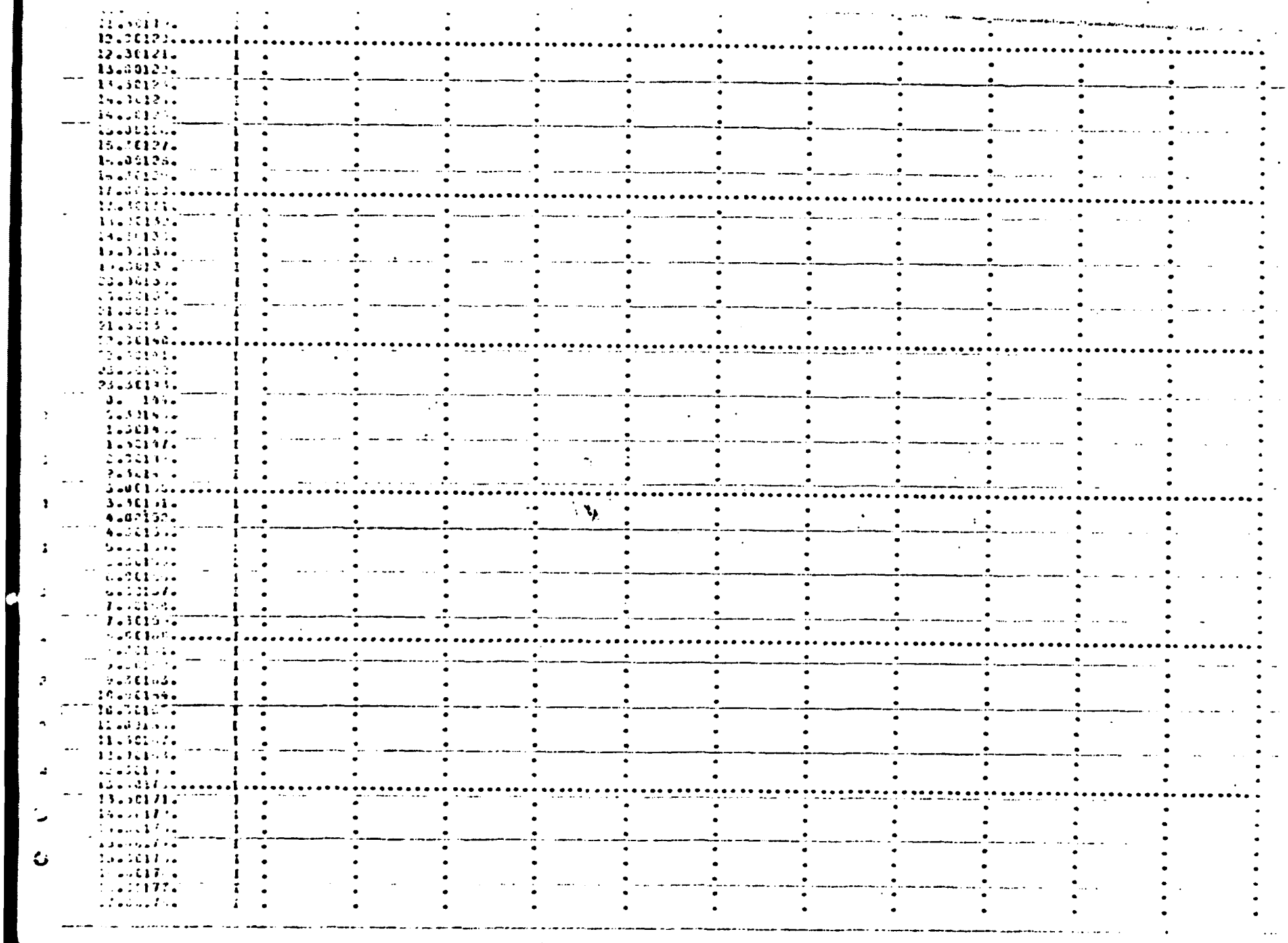

STATE)% 1

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







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	RATIO 1	RATIO 2	RATIOS APPLIED TO FLOWS RATIO 3	RATIO 4	RATIO 5	RATIO 6
				0.30	0.40	0.50	0.60	0.80	1.00
HYDROGRAPH AT	1	1.83	1	554.	1185.	1482.	1779.	2371.	2964.
		(7995.92)		(15.69)(	33.56)(	41.97)(	50.36)(	67.13)(	83.94)(
HYDROGRAPH AT	1	0.51	1	724.	1452.	1815.	2177.	2903.	3629.
		(7995.92)		(20.50)(	41.11)(	51.38)(	61.66)(	82.21)(	102.76)(
2 COMBINED		2.40	1	980.	1925.	2406.	2887.	3849.	4812.
		(7995.92)		(27.75)(	54.50)(	68.12)(	81.75)(	109.00)(	136.25)(
ROUTED TO	1	2.40	1	139.	775.	1182.	1576.	2319.	3029.
		(7995.92)		(3.93)(	21.94)(	33.49)(	44.62)(	65.68)(	85.78)(

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	532.55	532.55	534.00
STORAGE	2830.	2830.	3372.
OUTFLOW	0.	0.	78.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	534.08	0.08	3405.	852.	40.33	22.50	0.
0.40	534.49	0.49	3594.	779.	57.33	0.00	0.
0.60	534.67	0.67	3671.	1142.	58.50	45.50	0.
0.80	534.82	0.82	3679.	1576.	59.00	45.00	0.
0.90	535.08	1.08	3774.	2319.	60.00	44.50	0.
1.00	535.29	1.29	3866.	3039.	60.50	44.50	0.

APPENDIX D

REFERENCES

APPENDIX D

REFERENCES

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

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

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

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

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

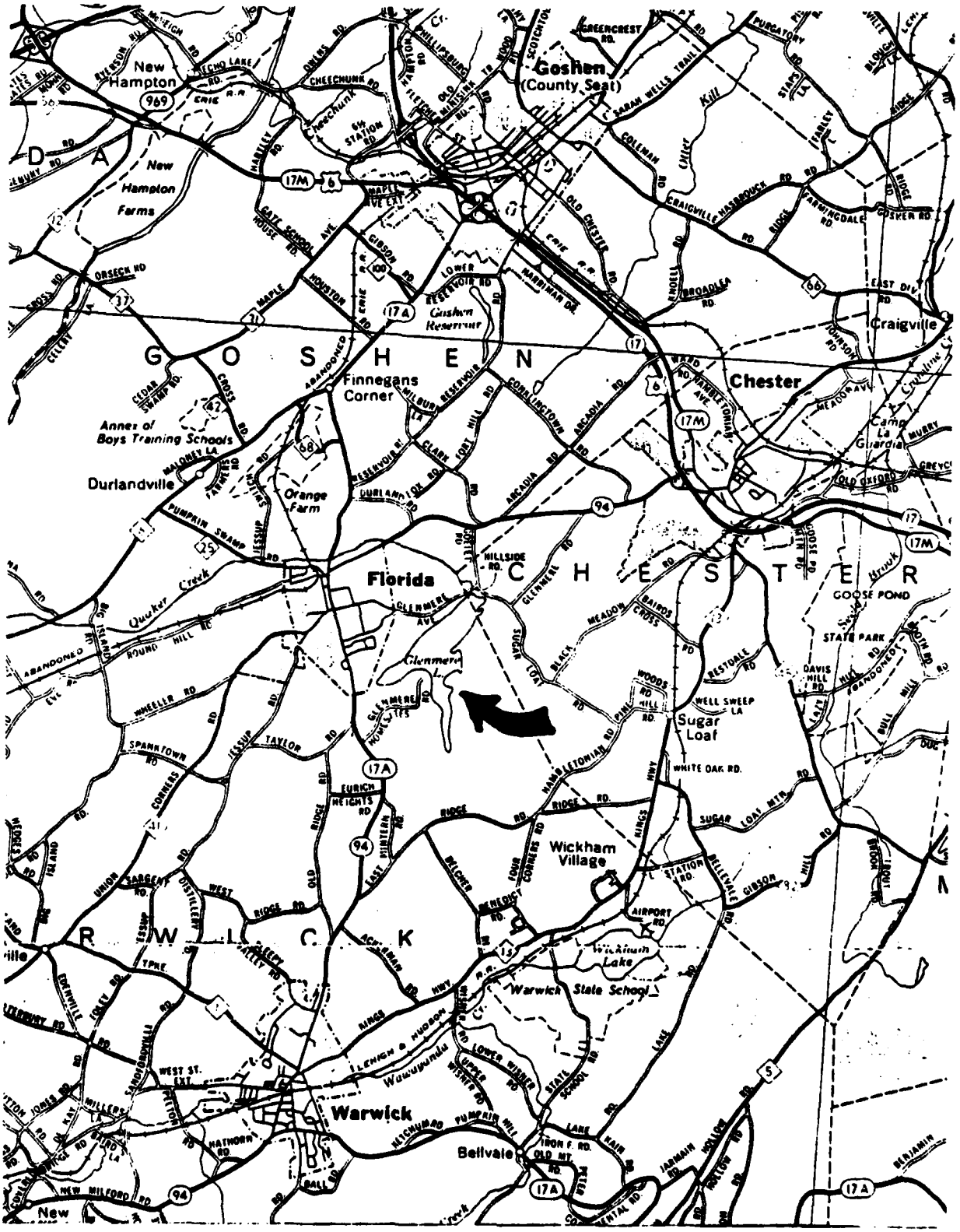
6) W.D. Thornbury, Principles of Geomorphology, John Wiley and Sons, 1969.

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

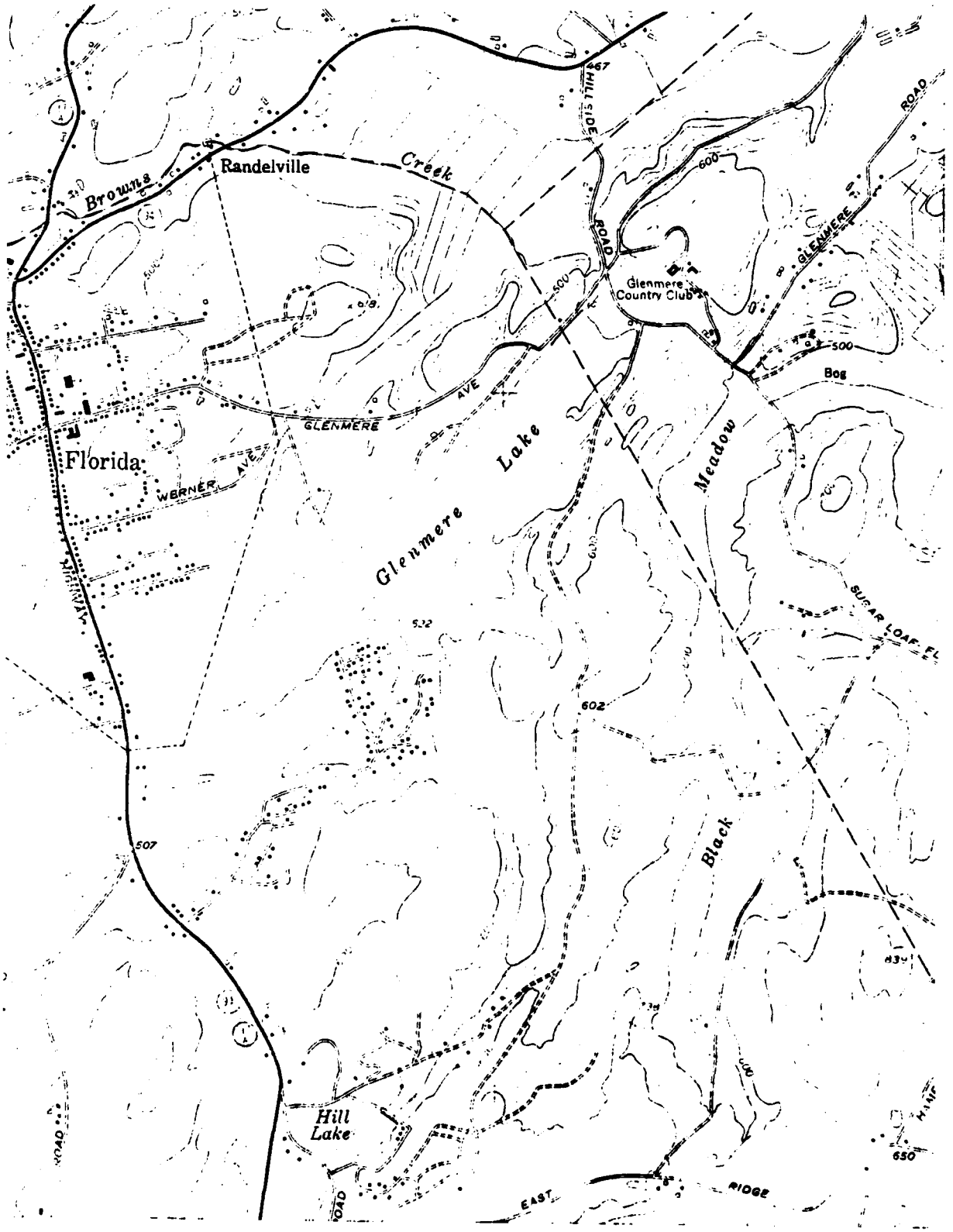
8) Cornell University Agriculture Experiment Station (compiled by M.G. Cline and R.L. Marshall), General Soil Map of New York State and Soils of New York Landscapes, Information Bulletin 119, 1977.

APPENDIX E

DRAWINGS



VICINITY MAP



TOPOGRAPHIC MAP