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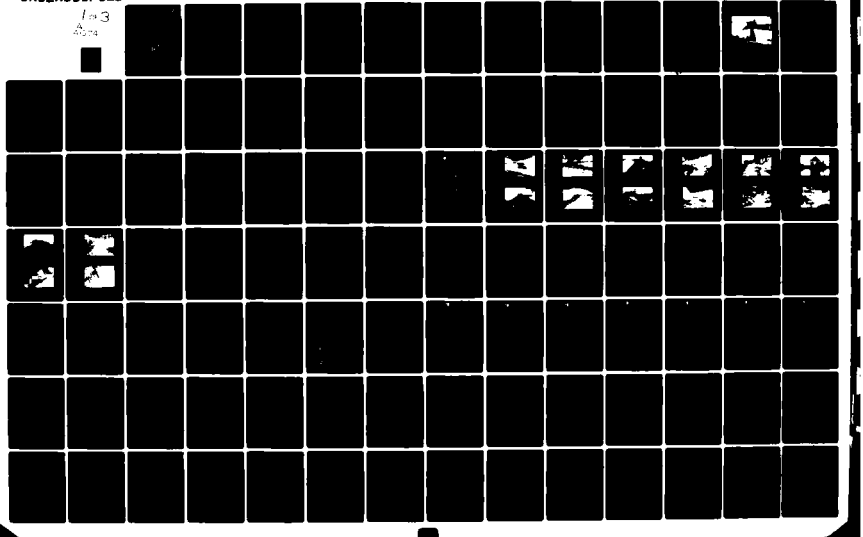

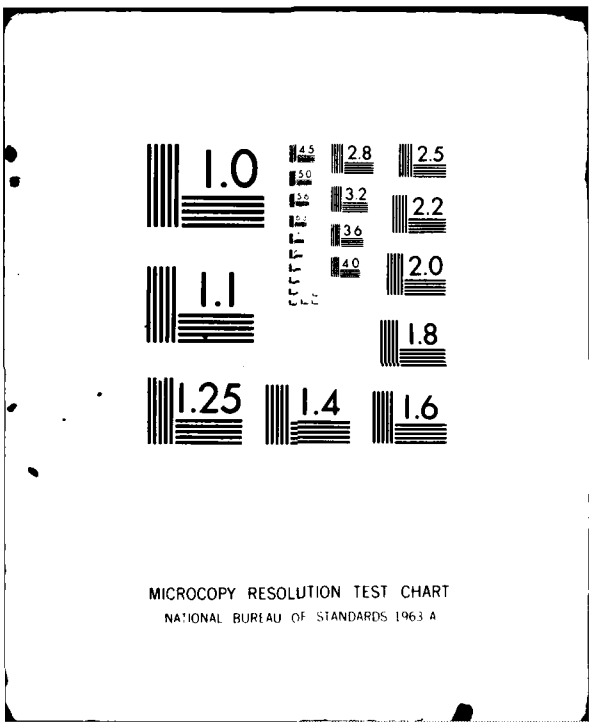
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SUSQUEHANNA RIVER BASIN

LEVEL II

NORWICH WATER WORKS DAM NO. 1

CHENANGO COUNTY, NEW YORK
INVENTORY No. NY 347

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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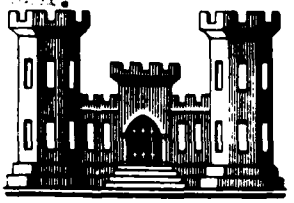

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National Dam Safety Program. Norwich Water Works Dam Number 1 (Inventory Number NY 347), Susquehanna River Basin, Chenango County, New York. Phase I Inspection Report,

19. KEY WORDS (Continue on reverse)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability

Norwich Water Works Dam #1
Chenango County
Susquehanna River Basin

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

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

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

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped by the outflow resulting from all storms exceeding 17 percent of the Probable Maximum Flood (PMF) when the flashboards are in place and the overtopping discharge from the embankment portion of Norwich Reservoir No. 2 Dam (NY 349) is included as an inflow hydrograph. Dam overtopping, the resulting erosion of the embankment and hence, dam breaching would cause water surface levels downstream to reach depths which would pose significant danger to residents. Therefore, the spillway is adjudged to be seriously inadequate and the dam is assessed as unsafe, nonemergency.

The classification "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 life downstream from the dam.

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PREFACE

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

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

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

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

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NORWICH WATER WORKS DAM NO. 1
INVENTORY NO. NY 347
SUSQUEHANNA RIVER BASIN
CHENANGO COUNTY, NEW YORK

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Norwich Water Works Dam No. 1

State Located: New York

County: Chenango

Watershed: Susquehanna River Basin

Stream: Ransford Creek

Date of Inspection: March 13, 1981

ASSESSMENT

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

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped by the outflow resulting from all storms exceeding 17 percent of the Probable Maximum Flood (PMF) when the flashboards are in place and the overtopping discharge from the embankment portion of Norwich Reservoir No. 2 Dam (NY 349) is included as an inflow hydrograph. Dam overtopping, the resulting erosion of the embankment and hence, dam breaching would cause water surface levels downstream to reach depths which would pose significant danger to residents. Therefore, the spillway is adjudged to be seriously inadequate and the dam is assessed as unsafe, nonemergency.

The classification "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 life downstream from the dam.

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

1. Conduct a detailed hydrologic and hydraulic analysis to determine the need for and methods of increasing the discharge ca-

pacity of the dam. This would include investigating the adequacy of the spillway and discharge channel.

2. Monitor the seepage and wet areas of the downstream slope and the toe of slope near the right abutment to determine if the observed seepage is seasonal or continuous, and/or if the rate is increasing. If found to be continuous or increasing, investigate to determine the source of the seepage (i.e. through the foundation or embankment or between the embankment and abutment) and recommend corrective measures.

It is recommended that within 3 months of the final approval date of this report, the hydrologic investigation of the structure should be undertaken and within 6 months, the remaining investigation should commence. Appropriate remedial measures for both additional investigations should be completed within 18 months of the final approval.

The following remedial measures should be completed within 12 months to correct existing deficiencies:

1. If seepage continues at the right downstream toe of slope, provide a means for collecting and draining water from this wet area to avoid erosion into the slope. It may be required to place a stone drainage layer with an adequate filter zone to prevent migration of fines from the slope, as well as a perforated pipe to collect the seepage and discharge it into the stilling basin.

2. Reconstruct the deteriorated portion of the concrete cap of the spillway weir and repair the damaged channel support base of the footbridge.

3. Regrade the dam crest to fill in the low spot near the right one-third point and to remove ruts and pockets. Reseed and mulch the crest to establish an erosion resistant cover. Keep future traffic off the crest.

4. Clear all fallen logs, debris and other obstructions from the spillway discharge channel and apron.

5. Cut any brush or trees on the embankment slopes and in the spillway discharge channel bottom at intervals of two to three years to prevent their being overgrown. All tree stumps on the embankment slopes should be removed and backfilled. Equipment and procedures for this maintenance should be such as to avoid damage to existing grass and weed cover on the slopes. Any slopes that become further scarred by runoff or traffic should be reseeded and mulched.

6. Fill in the woodchuck burrows and any other animal burrows noted in the embankment.

7. At least twice a year (in the early spring during periods of heavy flow in the channel and in late fall) inspect the right upstream reservoir slope for seepage, especially in the vicinity of the bypass canal dikes. Document locations and quantities of observed seepage. If progressively increasing seepage is observed, the source of the seepage should be investigated by a registered professional engineer and remedial measures implemented, if found to be necessary.

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

Submitted by: FLAHERTY GIAVARA ASSOCIATES, P.C.

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

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

Date: 3 Aug 81

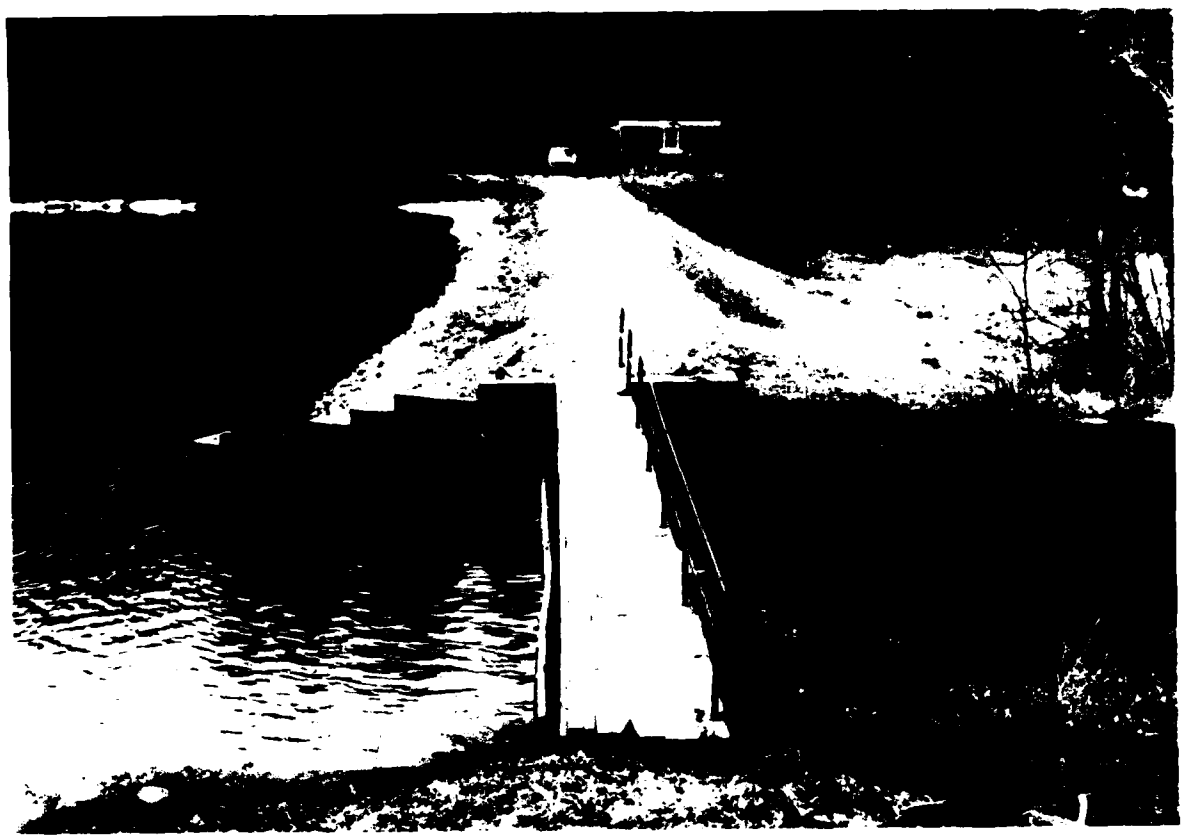
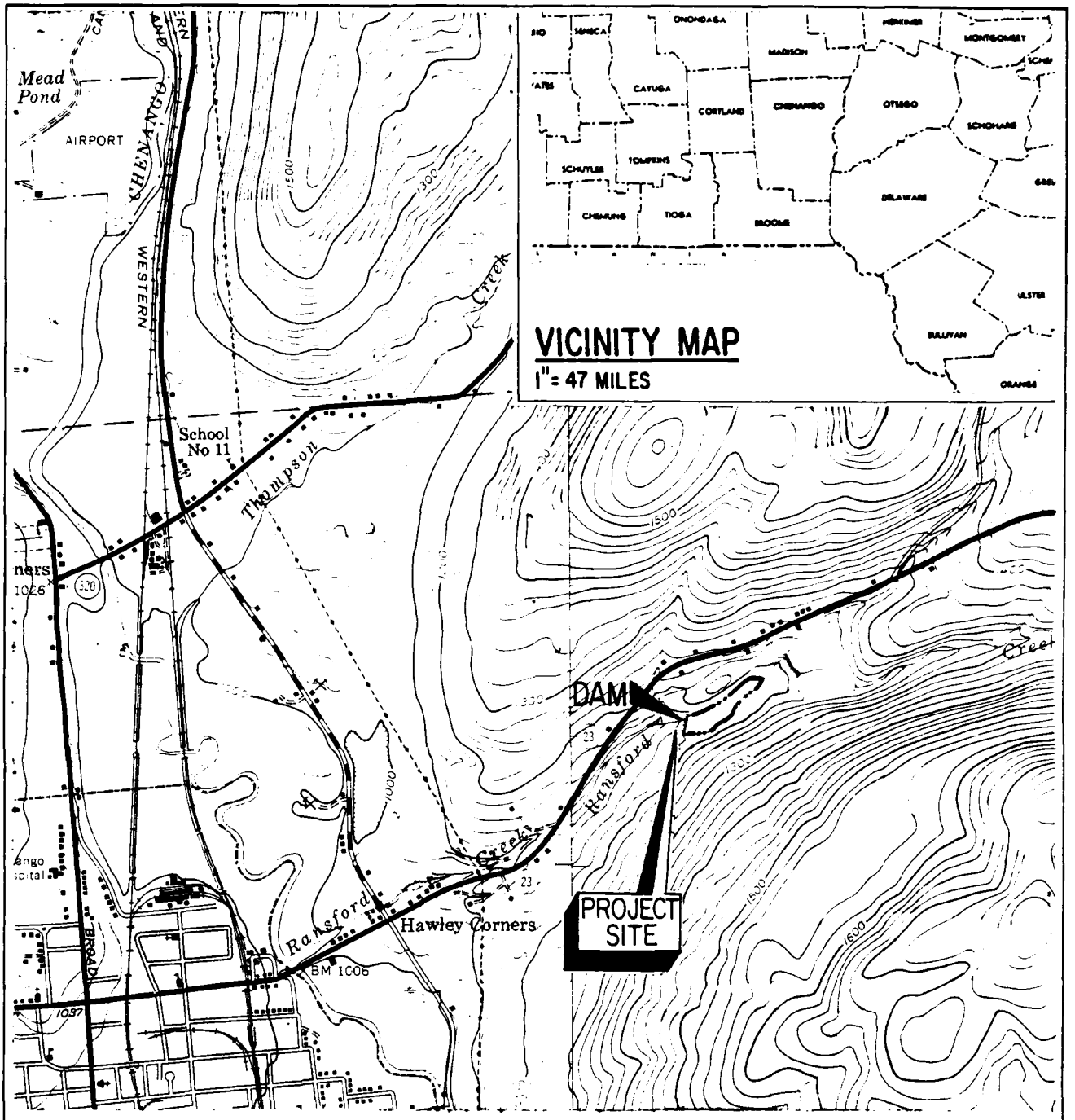


PHOTO #1: Overview of
Norwich Water Works Dam No. 1
Inventory No. NY 347



LOCATION MAP

NORWICH WATER WORKS DAM NO.1
INVENTORY No. NY 347

SUSQUEHANNA RIVER BASIN
CHENANGO COUNTY
NORWICH, NEW YORK

FLAHERTY · GIAVARA ASSOCIATES, P.C.

NATIONAL DAM SAFETY PROGRAM
PHASE I INSPECTION REPORT
NORWICH WATER WORKS DAM NO. 1
INVENTORY NO. NY 347
D.E.C. NO. 117C-620
SUSQUEHANNA RIVER BASIN
CHENANGO COUNTY, NEW YORK

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

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

b. Purpose

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

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

Norwich Water Works Dam No. 1 consists of an earthen embankment with a 16 inch diameter cast iron water supply pipe under the central portion of the embankment and a cut stone masonry spillway with flashboards at the right end of the embankment. Plans, profiles, and sections prepared for the project by the Norwich Water Works are included on drawings in Appendix F.

The dam embankment is approximately 270 feet long and 47 feet high and has an upstream slope of 2.5 horizontal to 1 vertical and a downstream slope of 2 to 1. The crest of the dam is 10 feet in width and its elevation is 1194.5 (NGVD). The embankment cross section consists primarily of compacted earth material with a compacted

clay and gravel (puddled) core. The core is 5 feet wide near the top of the embankment and widens to about 10 feet at the original ground surface. The core extends 7 to 14 feet below ground surface to form a cutoff. The width of the bottom of the cutoff is approximately 3 to 4 feet.

The upstream slope has a minimum layer of 12 inches of broken stone (riprap) for slope protection, while the downstream slope has a "soil dressing" and grass.

A 16 inch diameter cast iron water supply pipe runs beneath the center of the embankment from an intake structure in the reservoir, and constitutes part of the water supply system for the City of Norwich.

The spillway is 45 feet wide and 250 feet long consisting of a cut stone masonry weir with wooden flashboards and cut stone masonry abutments and wingwalls. The discharge channel downstream of the spillway is excavated into earth and rock. Approximately 60 feet downstream of the spillway, the discharge channel curves to the left and experiences about a 15± foot nearly vertical drop over rock outcrop into the original streambed that was dammed up by the embankment. The upper portions of the left side of the discharge channel may have been created by an earthen spur dike placed downstream and perpendicular to the right end of the embankment. The side slopes of the discharge channel are tree covered and have variable slopes, but are generally flatter than 1.5 to 2 horizontal to 1 vertical.

The "bypass canal" from the upper reservoir (Norwich Reservoir No. 2 Dam - NY 349) joins the stream about 250 feet downstream from the spillway discharge channel outlet.

b. Location

The Norwich Water Works Dam No. 1 is located off New York Route 23 approximately 1.2 miles northeast of the City of Norwich in the Town of Norwich, New York. The dam is located at latitude north 42°-32.8' and longitude west 75°-29.7' on the U.S. Geological Survey 7.5 minute series topographic map "Holmesville, New York". The Location Map on page i indicates where the dam is situated.

c. Size Classification

The maximum height of the dam is 47 feet and the maximum storage capacity is 136 acre-feet. Therefore, Norwich Water Works Dam No. 1 is classified as an "Intermediate" dam as defined by the Recommended Guidelines for Safety

Inspection of Dams.

d. Hazard Classification

There are approximately 2 dwellings, a large trailer park (30 to 40 trailers), 4 commercial buildings, two major roads (including New York Route 23) and high voltage transmission lines within the dam failure flood hazard area. Therefore, the dam is in the "High" hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the City of Norwich. The address and telephone number of the owner is as follows:

Owner

Contact: Mr. Nicholas W. Andrews, Superintendent
Norwich Water Department
City of Norwich
31 East Main Street
Norwich, New York 13815

Telephone: (607) 334-6618

f. Purpose

The primary purpose of this dam is water supply for the City of Norwich.

g. Design and Construction History

The dam was designed in 1881 by the Norwich Water Works, P.H. Baermann, Chief Engineer and John Mitchell, President. It was also constructed in 1881 by George L. Tubbs and Company of Rochester, New York. No major post construction modifications have been made to the dam; however, an additional 12 inch cast iron water supply pipe was installed in 1904.

h. Normal Operating Procedure

The flashboards are semi-permanent; therefore, the water level is maintained at the elevation of the top of the flashboards for normal flows. There are no regular operating procedures.

1.3 PERTINENT DATA

a. Drainage Area (Square Miles)	0.38
b. Discharge at Dam Site (CFS)	
- Top of Dam	
without flashboards	1861
with flashboards	1193
- Top of Flashboards	
without flashboards	213
with flashboards	-
- Crest of Spillway	-
c. Elevations (NGVD)	
- Top of Dam	1194.5
- Top of Flashboards	1190.4
- Crest of Spillway	1189.0
- Reservoir Drain Inlet	1159.3
d. Reservoir Surface Area (Acres)	
- Top of Dam	9.3
- Top of Flashboards	7.2
- Crest of Spillway	6.5
e. Storage (Acre-Feet)	
- Top of Dam	136
- Top of Flashboards	101
- Crest of Spillway	98
f. Dam	
- Type: Compacted earth with a compacted clay and gravel (puddled) core and cutoff	
- Length (Feet)	270
- Upstream Slope (H:V)	2.5:1
- Downstream Slope (H:V)	2:1
- Crest Width (Feet)	10
g. Spillway	
- Type: Cut stone masonry weir with a concrete crest and wooden flashboards and an excavated earthen channel with a spur dike forming the left bank	
- Length (Feet)	250

- Bottom Width (Feet) 45
- Side Slopes (H:V) 1.5-2.0:1
- Channel Bottom Slopes (Feet/Foot)
  upstream -
  downstream 0.031

- Control: Flashboards

h. Reservoir Drain

- Type: 16 inch diameter cast iron water supply pipe (200 feet long) having a 24 inch by 16 inch reducer at its inlet

- Control: 16 inch diameter slide gate located at the inlet to the stand pipe.

SECTION 2 - ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Norwich Water Works Dam No. 1 is located on Ransford Creek, a southwesterly flowing tributary to the Chenango River, about 1.2 miles northeast of the City of Norwich in the Appalachian (Allegheny) Plateau physiographic province of New York State.

The topography in the area ranges from elevation 1160 at the streambed downstream of the dam to about elevation 1590 to 1780 at the summits of hills surrounding the dam and reservoir area.

The underlying bedrock at the site consists of the Unadilla Formation belonging to the Upper Devonian Genesee group. This formation consists of coarse silty shales and siltstones that were deposited in a shallow water, near-shore setting of the Catskill Delta that propagated across the state from east to west. The bedding of these deposits is quite even and laminated, splitting readily into thin sheets upon exposure.

Above the bedrock, the valley bottom and side slopes are mantled by a heterogeneous mixture of clay, silt, sand and rock fragments known as glacial till (or hardpan).

b. Subsurface Investigations

No known subsurface explorations were made at the site. Based on reports made in the mid 1920's, the subsurface conditions at the site consist of relatively impermeable glacial till (hardpan) or shale bedrock.

2.2 DESIGN RECORDS

The dam was designed by the Norwich Water Works in 1881. No design data was obtained for this dam.

2.3 CONSTRUCTION RECORDS

This dam was constructed in 1881 by George L. Tubbs and Company of Rochester, New York. The contract drawings which were prepared by the Norwich Water Works are included in Appendix F. In addition, excerpts from the technical specifications can be found in Appendix D.

2.4 OPERATION RECORDS

There were no operation records available for this dam.

2.5 EVALUATION OF DATA

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

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Norwich Water Works Dam No. 1 was conducted on March 13, 1981. The weather was overcast and the temperature was 50±°F. At the time of the inspection, there were small patches of snow on the ground and no water was flowing over the weir in the spillway (See Photo No. 8).

b. Dam

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

The following specific items were noted:

1. An area of active seepage about 4 to 6 feet wide and wet ground were noted at the toe of the downstream slope near the right abutment (See Photos No. 16 and 17). Seepage was estimated to be 1 to 2 gallons per minute (GPM). It was not possible to determine if the water was carrying soil particles due to the soft muddy conditions of the ground from which seepage was emanating.

2. Several soft wet areas were evident on the flat area downstream of the toe near the left abutment. These areas may have been due to frost melt or ponded surface runoff.

3. The crest was observed to be 0.3 to 0.5 feet low at the right one-third point. Also, footpaths with minor rutting were noted on the grass covered crest (See Photo No. 3).

4. A very slight bulging of the downstream slope was noted at the left abutment. There was no evidence that this bulge was recent or was undergoing active movement. It did not appear to pose a potential threat to the safety of the dam.

5. Several minor mouse or mole burrows were observed throughout the downstream embankment slope and on the upper 1 to 2 feet of the upstream slope. Two woodchuck burrows were noted, one near the downstream toe of slope at the left abutment and the other on the spur dike between the right abutment and spillway

channel.

6. Scattered minor areas of brush and small trees were noted near the crest of the upstream slope and on the downstream slope (See Photos No. 3, 4, 5, 6, and 7). In addition, a strip of grass 1± foot wide is growing through the riprap on the upstream slope about 3.5 to 4 feet below the crest (See Photo No. 6).

c. Spillway

1. Spillway Weir

This broad-crested weir is constructed of mortar and cut stone, has a 6 inch concrete cap and is generally in fair condition. The approach to the weir is in good condition and is free from debris (See Photo No. 8). A 47 foot long by 3.5 foot wide footbridge spans the spillway weir (See Photos No. 8 and 9). It has two spans constructed of steel channels and angles with wood planking.

The following observations were made:

a) Minor seepage and soft areas were noted at the toe of the embankment slope at the downstream end of the left abutment wall.

b) Minor to moderate seepage was observed under the flashboards and between the masonry blocks below the flashboards.

c) The downstream portions of the left and right abutment walls of the weir were vine and moss-covered. Minor seepage was noted through the masonry joints at the mid-height of the right wall.

d) The base of one channel support of the footbridge is severely deteriorated with almost total section loss of the channel web (See sketches on pages B-10 and B-11 of Appendix B).

e) Large areas of erosion and deterioration were observed on the concrete cap (See Photo No. 8 and sketches on pages B-10 and B-11 of Appendix B).

2. Spillway Discharge Channel

The discharge channel has a typical width of 45 feet, a length of approximately 250 feet and is in fair condition. The side slopes of the channel vary, but are generally flatter than 1.5 to 1. The left side slope is formed by an earthen spur dike (See Photo

No. 14). Portions of the spillway discharge channel bottom are ledge (See Photo No. 10) as is the end of the channel which drops 15± feet nearly vertically into the stilling basin (See Photo No. 11).

The following items were noted along the discharge channel:

a) The discharge channel side slopes were covered with a moderate growth of trees and brush. The slopes appeared to be relatively stable (See Photo No. 10).

b) Several fallen trees and other debris were observed in the discharge channel and on the spillway apron (See Photo No. 9). Several trees were noted growing in the channel (See Photo No. 10).

d. Water Distribution System Appurtenances

1. Intake Structure

A stone masonry intake structure is located approximately 100 feet from the dam crest within the reservoir (See Photo No. 12). There was no access walkway; therefore, the intake structure was not inspected.

2. Outlet Works

The primary outlet works is a 16 inch diameter cast iron water supply pipe located between the intake structure and the stilling basin. Connected to this pipe are two 12 inch diameter cast iron pipes which supply water to the distribution system. A 12 inch diameter pipe provides a blowoff for one of these water supply pipes and discharges into the stilling basin (See Photo No. 13). The pipe networks for Reservoir No. 1 and Reservoir No. 2 are shown on a "Sketch Map" on page D-16 in Appendix D.

3. Aerating Jets

Aerating jets located 200± feet from the dam crest at the edge of the reservoir are supplied by a 12 inch diameter water supply pipe from Reservoir No. 2 (See Photo No. 15).

e. Downstream Channel

The natural channel downstream of the stilling basin has a width of 10 to 15 feet and almost immediately is joined by the bypass canal from Norwich Reservoir No. 2.

f. Reservoir - Storage Pool Area

The reservoir area is bordered by moderately to steeply sloping wooded land on the right side and flat to moderately sloping wooded land adjacent to a gravel road on the left side (See Photo No. 2). At the upstream end of the reservoir is Norwich Reservoir No. 2 Dam (NY 349). There is no significant probability of landslides into the storage pool affecting the safety of the dam.

The "bypass canal" for Reservoir No. 2 runs along the top of the slope above the right side of Reservoir No. 1. An earth dike was built along portions of the bypass canal on the side adjacent to Reservoir No. 1, but well back from the top of slope. An area of seepage was noted near the top of the right reservoir slope, near the upstream end of the reservoir. The seepage was 50 to 100 feet from the dike of the bypass canal, and may be due to seepage from the channel. This seepage does not appear to constitute a major concern relative to undermining the bypass channel dike or to the integrity of the upstream slopes of Reservoir No. 1.

3.2 EVALUATION OF OBSERVATIONS

The visual inspection revealed several deficiencies. The following observations were made:

a. An area of active seepage and wet ground were observed at the toe of the downstream slope near the right abutment.

b. Several soft wet areas were noted near the left abutment.

c. The dam crest was approximately 6 inches low at the right one-third point.

d. A very slight bulging of the downstream slope was evident at the left abutment.

e. Several small animal burrows were noted on the embankment slopes.

f. Scattered minor areas of brush and small trees were observed on the embankment slopes.

g. Minor seepage and soft areas were evident at the downstream end of the left abutment wall.

h. Minor to moderate seepage was noted beneath the flashboards and between the masonry blocks below the flashboards.

i. The downstream portions of both abutment walls of the spillway weir were vine and moss-covered with some minor seepage through the masonry joints.

j. The base of one channel support of the footbridge has a severely deteriorated web.

k. Large areas of erosion and deterioration were observed on the concrete spillway cap.

l. The spillway discharge channel side slopes are covered with a moderate growth of trees and brush.

m. Several trees have fallen into the spillway discharge channel and some are growing in it.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

The normal water surface level is maintained by the crest of the spillway weir at elevation 1189.0 (NGVD). However, with the flashboards in place, the normal water surface level is increased to 1190.4 (NGVD). The following operational procedures are in effect at this time:

a. The reservoir water level is checked visually twice daily, seven days a week.

b. The reservoir level is adjusted using water from the upper reservoir (Norwich Reservoir No. 2) through the aerating jets to maintain a water surface at or near the spillway crest elevation (the base of the flashboards).

4.2 MAINTENANCE OF DAM

Maintenance operations at the Norwich Water Works Dam No. 1 include:

a. The dam crest and embankments are mowed manually once every year.

b. Deciduous trees are cut back annually to prevent them from growing too close to the reservoir.

c. Repairs to masonry are performed as required.

d. Metalwork and wooden structures are painted as necessary.

4.3 WARNING SYSTEM

No warning system is presently in effect.

4.4 EVALUATION

Presently, the operation and maintenance procedures in effect for this dam and its appurtenances are satisfactory. However, increased maintenance efforts are required to correct the deficiencies which now exist.

and the peak outflow was determined to be 7605 CFS with the flashboards and 7606 CFS without them.

5.3 SPILLWAY CAPACITY

The total outlet capacity is the discharge from the spillway weir. There were 1.4 feet high by 43.3 feet long semi-permanent flashboards in place at the time of the inspection. The length of the overflow section of the weir is 46.1 feet.

The stage discharge data for the spillway weir with the flashboards in place was calculated for the stages tabulated below:

Stage (Feet)	Discharge Capacity (CFS)	Element of Structure
1190.4	0	Top of Flashboards
1190.7	21	--
1190.9	46	--
1191.9	247	--
1192.9	535	--
1194.0	927	Bottom of Footbridge
1194.5	1193	Top of Dam

The total spillway capacity at the top of dam is 1193 CFS.

The stage discharge data for the spillway weir without the flashboards in place is as follows:

Stage (Feet)	Discharge Capacity (CFS)	Element of Structure
1189.0	0	Spillway Weir
1190.4	213	--
1190.7	285	--
1190.9	337	--
1191.9	645	--
1192.9	1016	--
1194.0	1486	Bottom of Footbridge
1194.5	1861	Top of Dam

The total spillway capacity at the top of dam is 1861 CFS.

5.4 RESERVOIR CAPACITY

The storage capacity of the reservoir was obtained from the Norwich Water Department as indicated on the following page:

Stage (Feet)	Storage (Acre-Feet)	Storage (Inches of Runoff)
1189.0	98	4.87
1190.4	101	5.01
1194.5	136	6.74

5.5 FLOODS OF RECORD

No data regarding floods of record was obtained for this dam.

5.6 OVERTOPPING POTENTIAL

The results of the HEC-1 DB computer analyses indicate that when the overtopping discharge from the embankment portion of Norwich Reservoir No. 2 Dam is included as inflow, the crest of the dam is overtopped by the PMF event both with and without the flashboards in place. The PMF discharge rate of 7605 cubic feet per second (CFS) with the flashboards in place would occur at a peak flood stage of 1198.7 feet, which is 4.2 feet above the crest of the dam. Without the flashboards in place, the PMF discharge rate of 7606 CFS peaks at elevation 1198.2, which is 3.7 feet above the crest of the dam.

The results of the analyses are tabulated below:

- With the flashboards in place:

Flood Condition	Peak Inflow (CFS)	Peak Outflow (CFS)	Maximum Stage Elevation (NGVD)
0.5 PMF	3812	3800	1194.7
1.0 PMF	7625	7605	1198.7

- Without the flashboards in place:

Flood Condition	Peak Inflow (CFS)	Peak Outflow (CFS)	Maximum Stage Elevation (NGVD)
0.5 PMF	3812	3800	1196.2
1.0 PMF	7625	7606	1198.2

5.7 EVALUATION

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that when the overtopping discharge from the embankment portion of Norwich Reservoir No. 2 Dam is included as inflow, the capacity of the spillway is not adequate to pass either the full

PMF or one half the PMF, with or without the flashboards in place.

The extent of overtopping is summarized in the table below:

Flashboards	Ratio Of PMF Passed Safely (Percent)	Maximum Depth Over Dam (Feet)	Duration Over Top Of Dam (Hours)
With	17	4.2	9.5
Without	25	3.7	7.5

It is estimated that as a result of overtopping, breaching of the dam would cause water surface levels downstream to reach depths which would pose significant danger to residents. Therefore, the spillway is adjudged to be seriously inadequate and the dam is assessed as unsafe, nonemergency.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

There was no visible evidence of major settlement, lateral movement or other signs of overall structural instability of the dam during the site examination. Based on the conditions that were observed, there is no reason to question the static structural stability of the dam.

b. Design and Construction Data

The drawings entitled "Norwich Water Works RESERVOIR" for the Norwich Water Works Dam No. 1, (See Appendix F) show a configuration for the embankment and spillway that generally corresponds to the conditions observed on March 13, 1981, with the exception that the discharge channel downstream from the weir above the natural streambed is not shown on the original 1881 drawings; however, it does appear on subsequent sketches.

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

c. Seismic Stability

The Norwich Water Works Dam No. 1 is located in Seismic Zone 1, and in accordance with recommended Phase I guidelines does not require seismic analysis.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Condition

On the basis of the visual examination, the embankment of Norwich Water Works Dam No. 1 is considered to be generally in good condition. There were no signs of impending structural failure or other conditions which would warrant urgent remedial action; however, a number of deficiencies were noted.

b. Adequacy of Information

The evaluation of the embankment portions of this dam is based primarily on visual examination, reference to available plans, approximate hydraulic and hydrologic computations, and application of engineering judgement. The available information that was obtained is adequate for the purposes of a Phase I assessment.

c. Need for Additional Investigations

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

1. Conduct a detailed hydrologic and hydraulic analysis to determine the need for and methods of increasing the discharge capacity of the dam. This would include investigating the adequacy of the spillway and discharge channel.

2. Monitor the seepage and wet areas of the downstream slope and the toe of slope near the right abutment to determine if the observed seepage is seasonal or continuous, and/or if the rate is increasing. If found to be continuous or increasing, investigate to determine the source of the seepage (i.e. through the foundation or embankment or between the embankment and abutment) and recommend corrective measures.

d. Urgency

It is recommended that within 3 months of the final approval date of this report, the necessary hydrologic investigation should be undertaken and within 6 months, the remaining investigation should commence. Appropriate remedial measures for both of the additional investigations described in Section 7.1c should be completed within 18 months of the final approval of the report. Corrective measures listed in Section 7.2 should be accomplished

within 12 months of final approval.

7.2 RECOMMENDED MEASURES

It is considered important that the following items be accomplished in addition to any items required as a result of the additional investigations recommended in Section 7.1c:

a. If seepage continues at the right downstream toe of slope, provide a means for collecting and draining water from this wet area to avoid erosion into the slope. It may be required to place a stone drainage layer with an adequate filter zone to prevent migration of fines from the slope, as well as a perforated pipe to collect the seepage and discharge it into the stilling basin.

b. Reconstruct the deteriorated portion of the concrete cap of the spillway weir and repair the damaged channel support base of the footbridge.

c. Regrade the dam crest to fill in the low spot near the right one-third point and to remove ruts and pockets. Reseed and mulch the crest to establish an erosion resistant cover. Keep future traffic off the crest.

d. Clear all fallen logs, debris and other obstructions from the spillway discharge channel and apron.

e. Cut any brush or trees on the embankment slopes and spillway discharge channel bottom, at intervals of two to three years to prevent their being overgrown. All tree stumps on the embankment slopes should be removed and backfilled. Equipment and procedures for this maintenance should be such as to avoid damage to existing grass and weed cover on the slopes. Any slopes that become further scarred by runoff or traffic should be reseeded and mulched.

f. Fill in the woodchuck burrows and any other animal burrows noted in the embankment.

g. At least twice a year (in the early spring during periods of heavy flow in the channel and in the late fall) inspect the right upstream reservoir slope for seepage, especially in the vicinity of the bypass canal dikes. Document locations and quantities of observed seepage. If progressively increasing seepage is observed, the source of the seepage should be investigated by a registered professional engineer and remedial measures implemented, if found to be necessary.

h. Develop a flood warning and emergency evacuation plan which would be implemented to alert the downstream resi-

dents in the event conditions occur which could result in the failure of the dam.

APPENDIX A

PHOTOGRAPHS

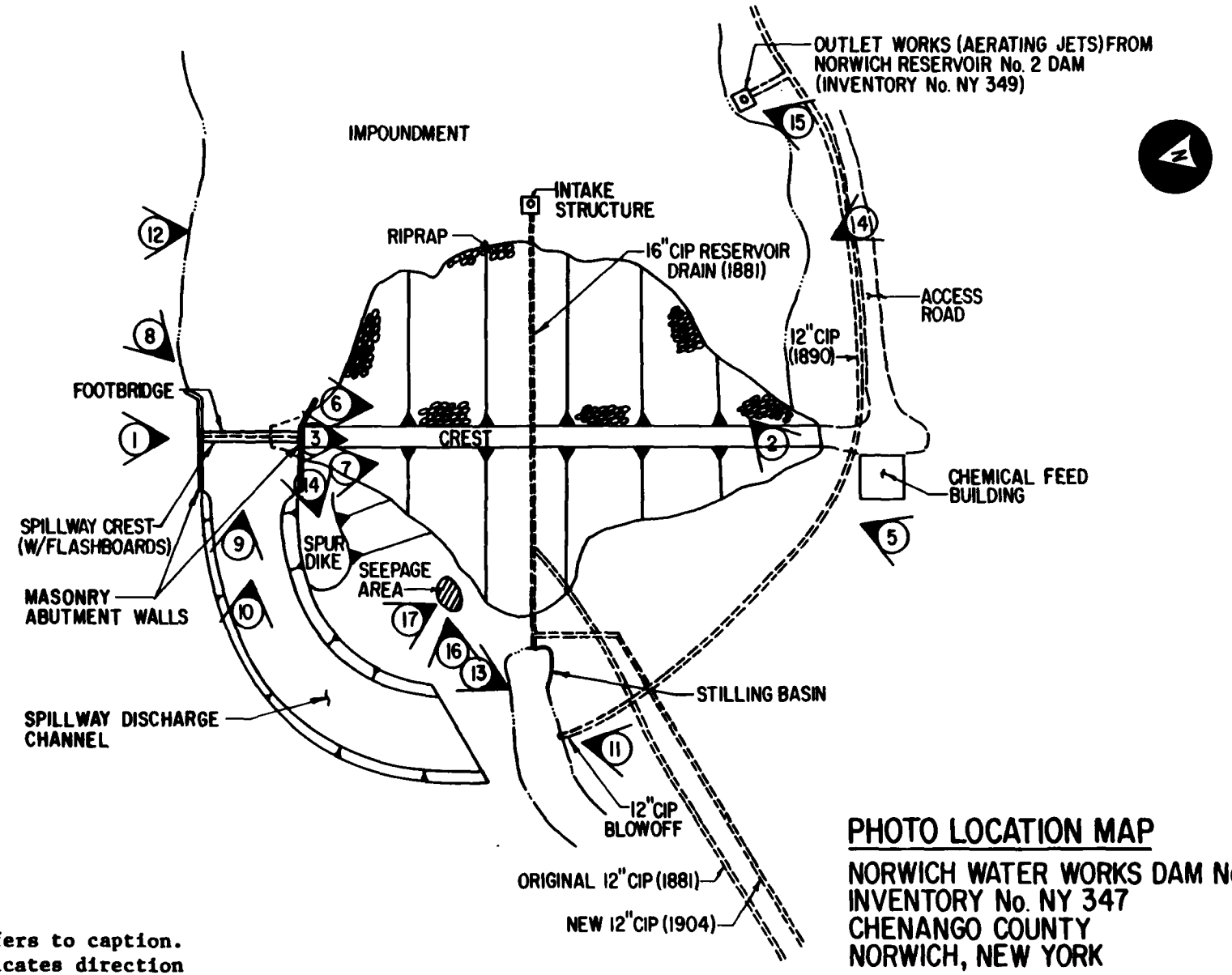


PHOTO LOCATION MAP

NORWICH WATER WORKS DAM No.1
INVENTORY No. NY 347
CHENANGO COUNTY
NORWICH, NEW YORK

LEGEND

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

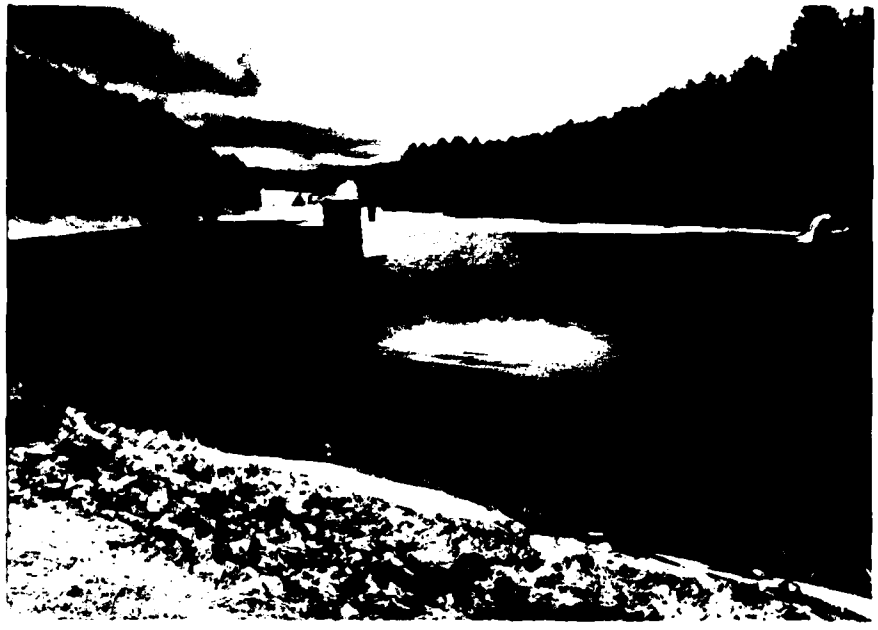


PHOTO #2: Overview of impoundment and appurtenances

PHOTO #3: Crest of dam looking toward left abutment

PHOTO #4: Overview of upstream face of dam

PHOTO #5: Overview of downstream face of dam

PHOTO #6: Upstream face of dam

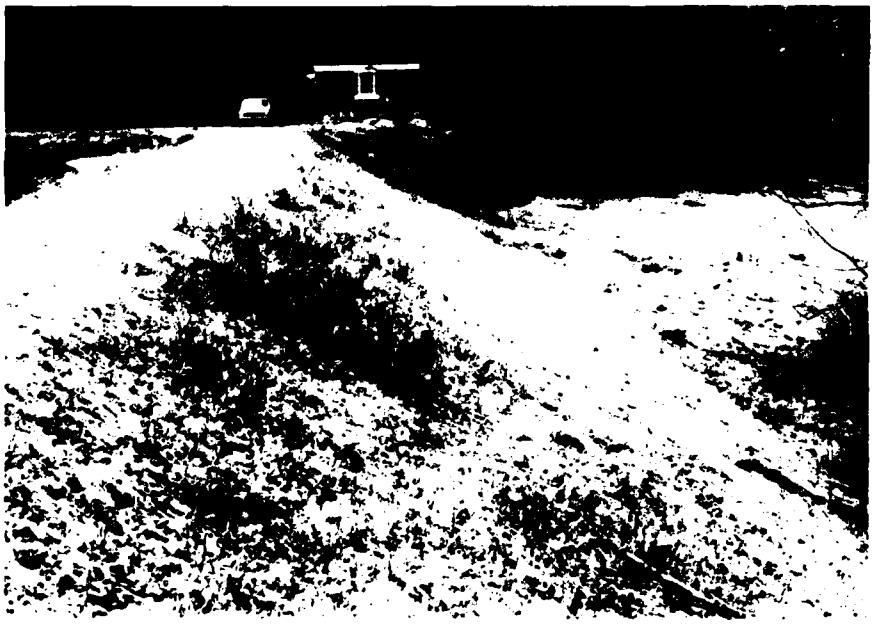


PHOTO #7: Downstream face of dam

PHOTO #8: View of spillway from upstream

PHOTO #9: View of spillway from downstream

PHOTO #10: Spillway channel looking upstream

PHOTO #11: Outlet of spillway channel

PHOTO #12: Intake structure

PHOTO #13: Outlet works

PHOTO #14: Crest of spur dike

PHOTO #15: Outlet works from Norwich Reservoir No. 2 Dam (Inventory No. NY 349)

PHOTO #16: Seepage at downstream toe of slope

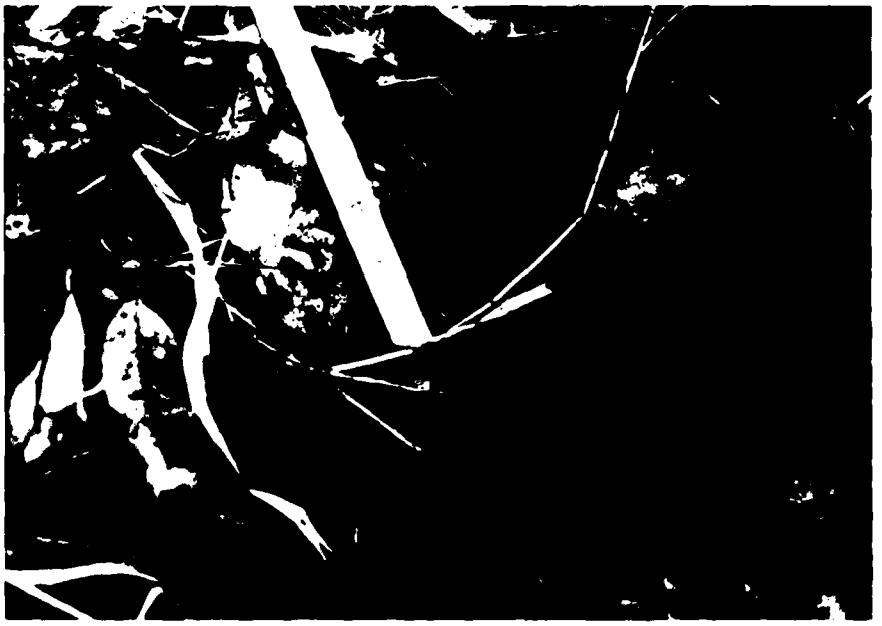


PHOTO #17: Closeup of seepage

APPENDIX B

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Norwich Water Works Dam No. 1

Fed. I.D. # NY 347 **DEC Dam No.** 117C-620

River Basin Susquehanna

Location: Town Norwich **County** Chenango

Stream Name Ransford Creek

Tributary of Chenango River

Latitude (N) 42°-32.8' **Longitude (W)** 75°-29.7'

Type of Dam Earthen embankment

Hazard Category High

Date(s) of Inspection March 13, 1981

Weather Conditions Overcast, 50°± F.

Reservoir Level at Time of Inspection Elevation 1189.4 (NGVD)

b. Inspection Personnel R.C. Smith, T.L. Ward & R.A. Criscuolo of Flaherty Giavara Associates, P.C.; J.J. Rixner & C.W. Eller of Haley & Aldrich, Inc.; E. Thomas of Salmon Associates.

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

Nicholas W. Andrews, Superintendent	Thomas J. Natoli, City Engineer
Norwich Water Department City of Norwich	City of Norwich P.O. Box 430
31 East Main Street Norwich, New York 13815	31 East Main Street Norwich, New York 13815
(607) 334-6618	(607) 334-4427

d. History:

Date Constructed 1881 **Date(s) Reconstructed** Never

Designer Norwich Water Works; P.H. Baermann, Chief Engineer

Constructed By George L. Tubbs and Company

Owner City of Norwich

2) **Embankment**

a. **Characteristics**

(1) **Embankment Material** Compacted earth material

(2) **Cutoff Type** Compacted clay and gravel (puddled)

(3) **Impervious Core** Compacted clay and gravel (puddled)

(4) **Internal Drainage System** None observed

(5) **Miscellaneous** No comments

b. **Crest**

(1) **Vertical Alignment** Fair; 0.3 to 0.5 feet low at the right one-third point

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

(3) **Surface Cracks** None observed

(4) **Miscellaneous** Mowed grass cover; minor rutting in gravel footpath

c. **Upstream Slope**

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

(2) **Undesirable Growth or Debris, Animal Burrows** Several mouse/mole burrows near the crest

(3) **Sloughing, Subsidence or Depressions** Minor erosion near crest and in grass strip

(4) **Slope Protection** Some grass and weeds near crest; layer of riprap extending almost to the crest except for one foot wide grass strip three feet below the crest.

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

d. **Downstream Slope**

(1) **Slope (Estimate - V:H)** 1:2

(2) **Undesirable Growth or Debris, Animal Burrows** Several mouse/mole burrows; woodchuck burrows at toe of slope near left abutment and in sloped area between right abutment and spillway

(3) **Sloughing, Subsidence or Depressions** Minor surface sloughing in area between right abutment and spillway; surface erosion with several 6± inch deep channels noted in level area below left abutment

(4) **Surface Cracks or Movement at Toe** Very slight bulging of left side of the downstream slope

(5) **Seepage** Seepage noted at the right abutment toe of slope; soft wet area in level section below left abutment

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

(7) **Condition Around Outlet Structure** Blowoff outlet into stilling basin from intake structure was unobservable

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

e. **Abutments - Embankment Contact**

Right: good condition

Left: good conditon

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

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

3) **Drainage System**

a. **Description of System** Masonry intake structure feeds water into the distribution system through a 12 inch cast iron pipe (CIP) from which a blowoff discharges into a stilling basin.

b. **Condition of System** Fair; some valves have not been opened or closed in years and are probably inoperable

c. **Discharge from Drainage System** Stilling basin

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

None observed

5) **Reservoir**

a. **Slopes** Moderately to steeply sloping woodlands

b. **Sedimentation** No apparent problems

c. **Unusual Conditions Which Affect Dam** None apparent

6) **Area Downstream of Dam**

a. **Downstream Hazard (No. of Homes, Highways, etc.)** Approximately 2 dwellings, a large trailer park (30 to 40 trailers), 4 commercial buildings, two major roads (including New York Route 23) and high voltage transmission lines are located within the dam failure flood hazard area

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

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

d. **Condition of Downstream Channel** Good; no aggradation or degradation due to steep slopes and the streambed in ledge

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

Principal spillway and discharge conveyance channel

a. **General** Principal spillway and discharge conveyance channel handle normal flows

b. **Condition of Principal Spillway** Fair; reinforced concrete is eroded and deteriorated; downstream portion of the left and right abutment walls are vine and moss covered; minor to moderate seepage was observed between the masonry blocks below the flashboards of the spillway weir; minor seepage and softspots were noted at the toe of the embankment slope at the downstream end of the left weir abutment wall.

c. **Condition of Emergency Spillway** Not applicable

d. **Condition of Discharge Conveyance Channel** Fair; side slopes have a moderate growth of trees and brush and appear stable; several trees are growing in the channel and others have fallen into it.

8) **Reservoir Drain/Outlet**

Type: Pipe X Conduit _____ Other _____

Material: Concrete _____ Metal X Other _____

Size: 16 inch cast iron pipe (CIP) **Length** 200 feet

Invert Elevations: **Entrance** 1159.3 (NGVD) **Exit** 1153.3 (NGVD)

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

Material: Unobservable

Joints: Unobservable **Alignment** Unobservable

Structural Integrity: Unknown

Hydraulic Capability: Good; pipe is used for water supply for the City of Norwich

Means of Control: **Gate** _____ **Valve** X **Uncontrolled** _____

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

Present Condition (Describe): Unknown; the valve was not operated during the inspection

9) **Structural**

a. **Concrete Surfaces** Concrete surfaces of the principal spillway weir have large areas of deterioration and erosion.

b. **Structural Cracking** Structural cracks along the spillway and adjacent to the masonry

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

d. **Junctions with Abutments or Embankments** No apparent problems

e. **Drains - Foundation, Joint, Face** None evident

f. **Water Passages, Conduits, Sluices** 16 inch cast iron water supply pipe from the intake structure having two 12 inch cast iron pipes branching off to the distribution system

g. **Seepage or Leakage** Minor seepage was noted through the masonry joints at the midheight of the right abutment wall; minor to moderate seepage was observed between the masonry blocks below the flashboards of the spillway weir.

h. **Joints - Construction, etc.** Some open joints in stone masonry

i. **Foundation** Inaccessible

j. **Abutments** Abutment walls are vine and moss covered; minor openings in masonry joints

k. **Control Gates** Valves control the flow of water to the distribution system

l. **Approach & Outlet Channels** Concrete surface is eroded on the approach to the weir

m. **Energy Dissipators (Plunge Pool, etc.)** Stilling basin at the outlet of the principal spillway discharge channel

n. **Intake Structures** Inaccessible

o. **Stability** Appears to be stable

p. **Miscellaneous** No comments

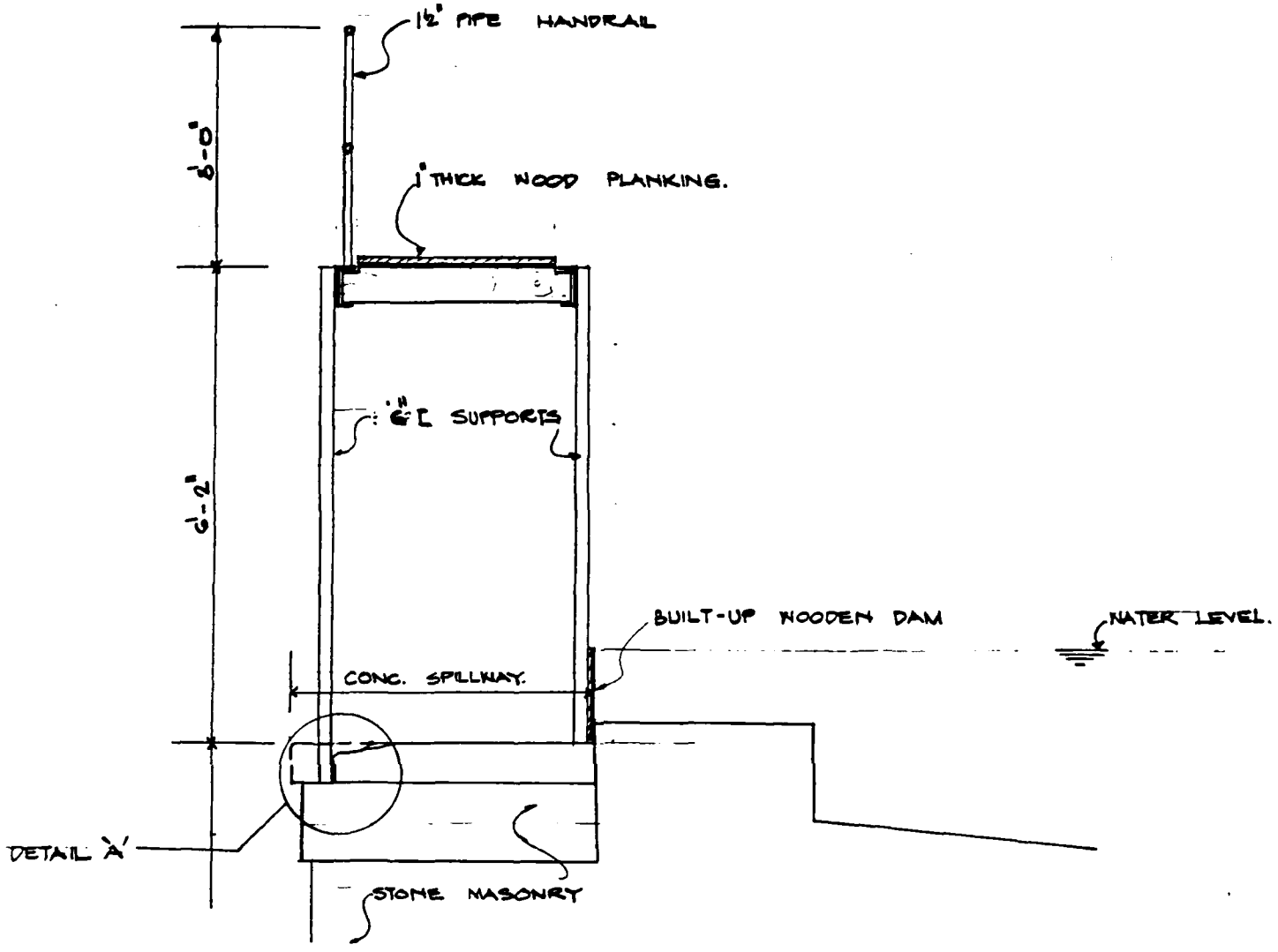
10) **Appurtenant Structures** (Power House, Lock, Gatehouse, Other)

a. **Description and Condition**

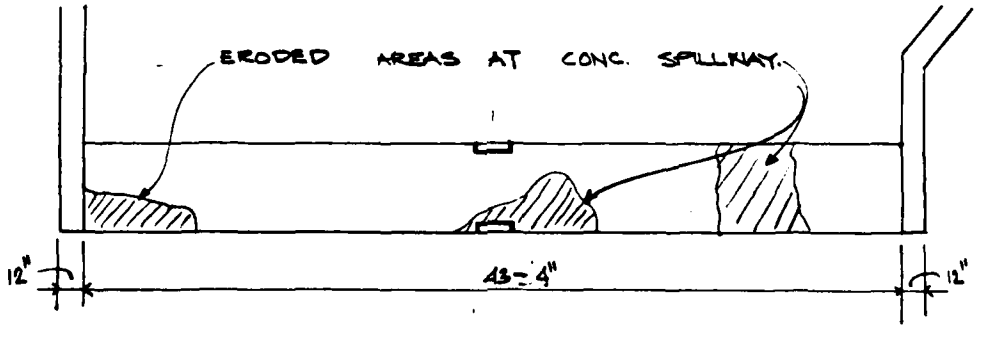
1. Intake structure: Inaccessible; however, it appears to be in good conditon

2. Chemical feed building: Inaccessible; however, it appears to be in good condition and is presently in use

3. Footbridge over spillway weir: Severe deterioration of one channel support causing almost total section loss of the channel web



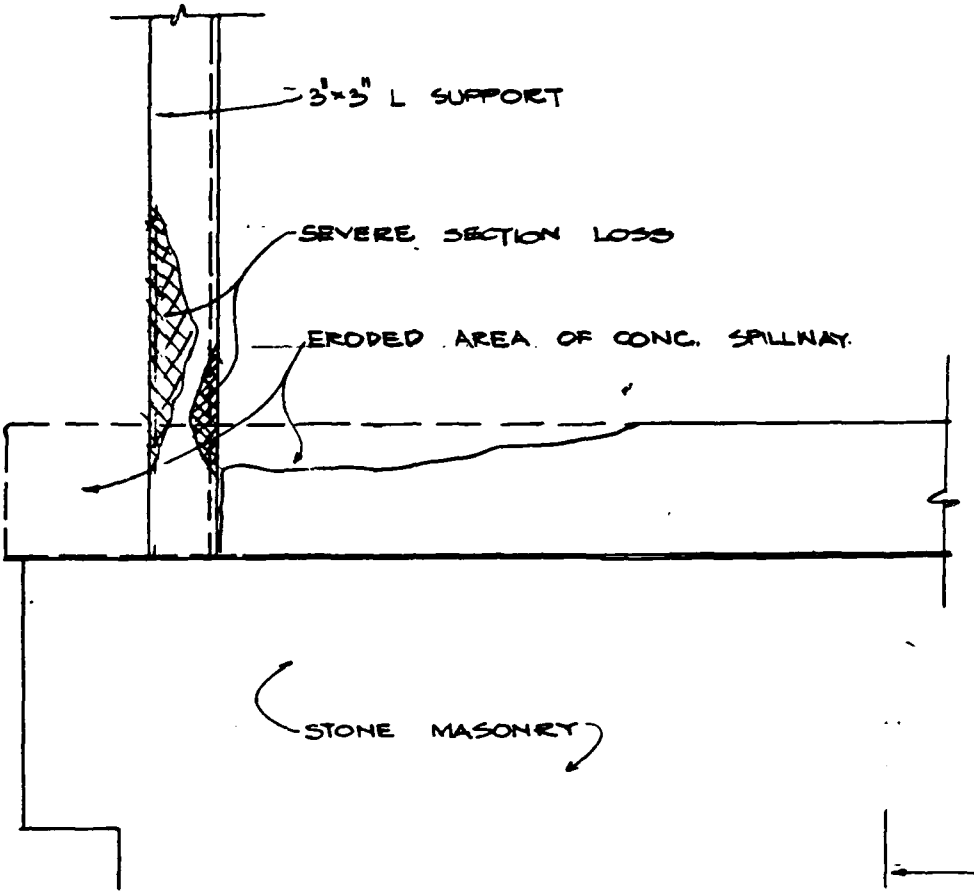
SECTION THRU FOOT BRIDGE & SPILLWAY.



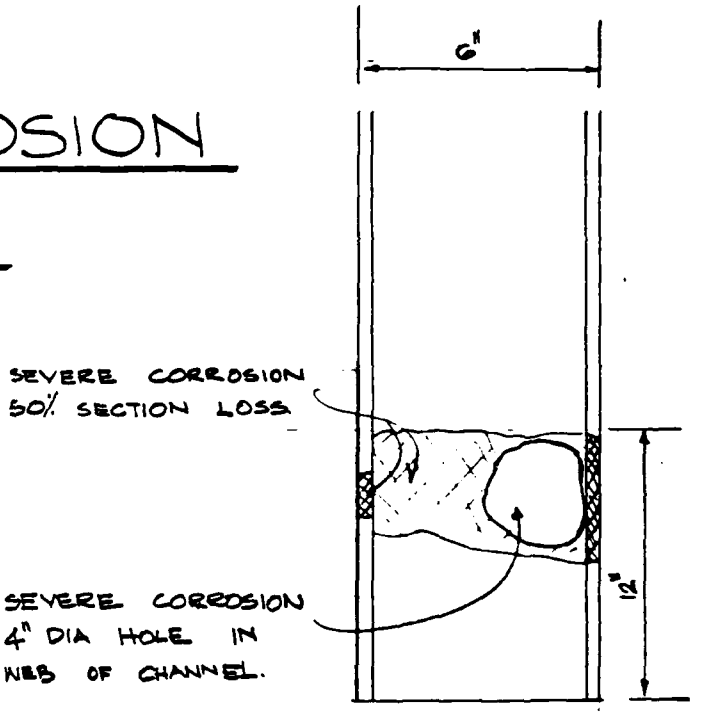
PLAN OF SPILLWAY.

NAME OF DAM : NORWICH RESERVOIR N-1

I.D. I.D NO. : 547



DETAIL OF EROSION AT SPILLWAY.



DETAIL 'A'

APPENDIX C

HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	1194.5	9.3	136
2) Design High Water (Max. Design Pool)	--	--	--
3) Emergency Spillway Crest	--	--	--
4) Pool Level with Flashboards	1190.4	7.2	101
5) Principal Spillway Crest	1189.0	6.5	98

DISCHARGES: (without flashboards in place)

	Volume (cfs)
1) Average Daily	Unknown
2) Principal Spillway @ Maximum High Water (Top of Dam)	1861
3) Emergency Spillway @ Design High Water	--
4) Principal Spillway @ Top of Flashboards	213
5) Low Level Outlet @ Principal Spillway Crest	--
6) Total (of all facilities) @ Maximum High Water	1861
7) Maximum Known Flood	Unknown
8) At Time of Inspection	0

CREST: **ELEVATION:** 1194.5

Type Vegetated earthen embankment

Width 10 feet **Length** 215 feet

Spillover Cut stone masonry and mortar spillway with a reinforced concrete cap

Location Right abutment

SPILLWAY:

PRINCIPAL		EMERGENCY
1189.0 (NGVD)	Elevation	
Broad-crested weir	Type	
43.3 feet and 46.1 feet	Width	
	Type of Control	
Weir	Uncontrolled	
--	Controlled	
Flashboards	Type: (Flashboards; gate)	
One	Number	
1.4 feet/43.3 feet	Size/Length	
Reinforced concrete	Invert Material	
Continuously	Anticipated Length of Operating Service	
Not applicable	Chute Length	
1± foot	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	

Type:

Location:

Records:

Date Unknown

Max. Reading Unknown

FLOOD WATER CONTROL SYSTEM:

Warning System None in effect

Method of Controlled Releases (mechanisms) Valves used to control flow to the water distribution system

DRAINAGE AREA: 242 acres = 0.38 square miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Rural, agriculture

Terrain - Relief: Moderate slopes

Surface - Soil: Glacial till

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

Primarily wooded with scattered open fields; glacial till soils; average watershed slope is 10± percent.

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

None

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

None

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

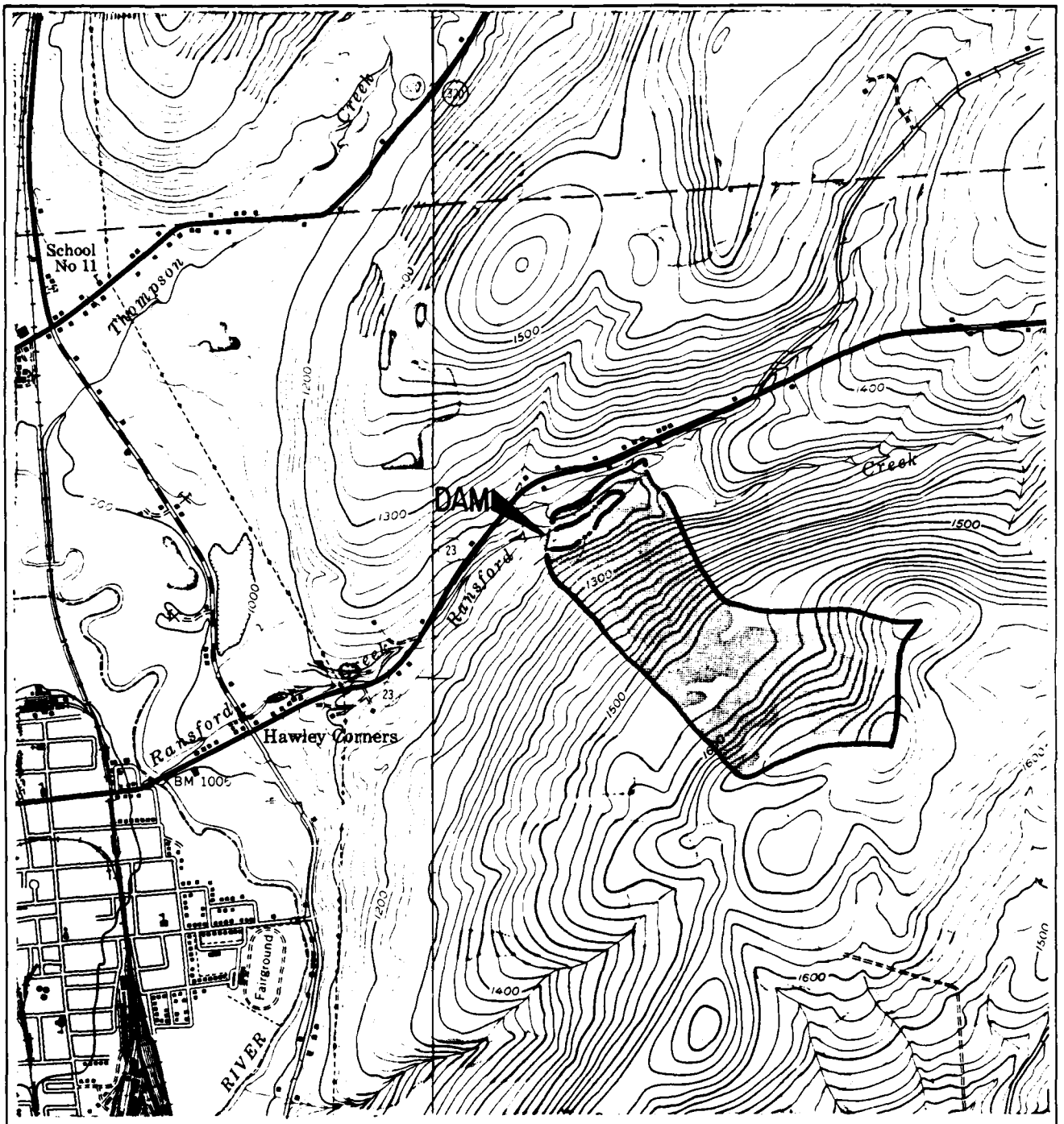
Location: Spur dike at the right end of the dam embankment adjacent to left side slope of the principal spillway discharge channel

Elevation: Unknown

Reservoir:

Length @ Maximum Pool: 1000± feet = 0.2 miles (Miles)

Length of Shoreline (@ Spillway Crest): 3000± feet = 0.6 miles (Miles)



WATERSHED MAP

NORWICH WATER WORKS DAM NO. 1
INVENTORY No. NY 347

SUSQUEHANNA RIVER BASIN
CHENANGO COUNTY
NORWICH, NEW YORK

N

0 2000 4000

SCALE IN FEET

FLAHERTY · GIAVARA ASSOCIATES, P.C.

CALCULATIONS

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

WATERSHED DATA FOR HEC 1 SNYDER HYDROGRAPH

1) TIME TO PEAK

$L = 6000 \text{ ft} = 1.14 \text{ mi}$

$L_c = 2500 \text{ ft} = 0.47 \text{ mi}$

$C_t = 2.0$ for average slopes

$$T_p = C_t (L \times L_c)^{0.3}$$

$$T_p = 2.0 (1.14 \times 0.47)^{0.3}$$

$$= 1.66 \text{ HOURS}$$

$$t_r = \frac{t_p}{5.5} = \frac{1.66}{5.5} = 0.30 \quad \text{USE } t_R = 0.5$$

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

$$= 1.66 + 0.25 (0.5 - 0.30)$$

$$= 1.71 \text{ HOURS}$$

2) SET $C_p = 0.63$ FOR HIGHLAND AREA

3) RAINFALL DATA (FROM HYDROMETEOROLOGICAL REPORT NO. 33).

24 HOUR DURATION PMP = 20.2 inches for 200 square miles

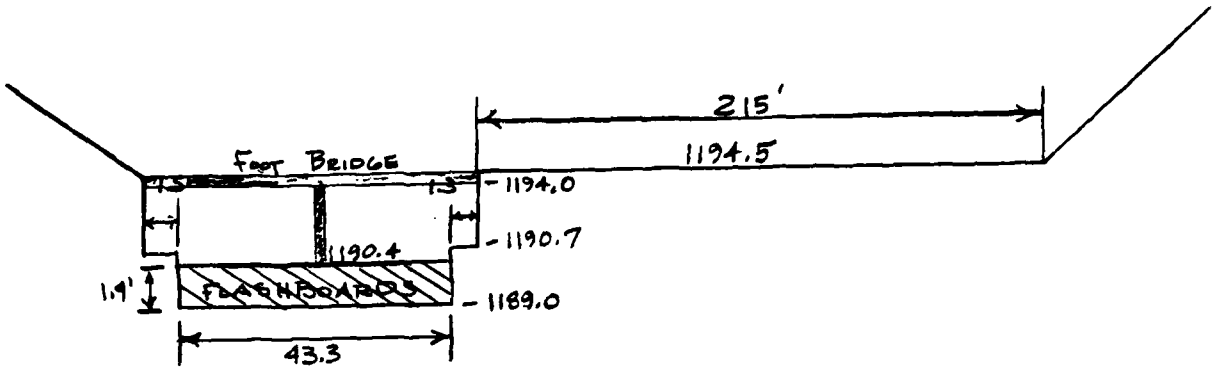
DURATION (HRS)	Adj FACTOR %
6	111
12	122
24	133
48	143

PROJECT Corps Dams
NY 347

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

SHEET NO. 2 OF 7
BY RAC DATE 3-26-81
CHK'D. BY TLW DATE 5-6-81

Stage Discharge Data
(w/Flashboards)

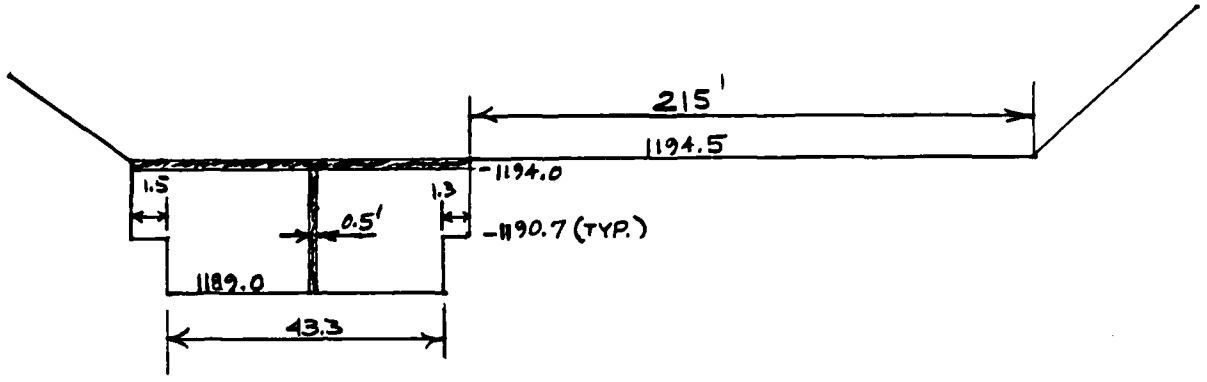


Stage	$Q = 3.0 L H^{1.5}$	$Q = 2.5 L H^{1.5}$	*1 $Q = CA\sqrt{2gh}$	Discharge
1190.4	0	—	—	0
1190.7	21.1	—	—	21.1
1190.9	46.1	—	—	46.1
1191.9	246.9	—	—	246.9
1192.9	535.0	—	—	535.0
1194.0	927.4	—	—	927.4
1194.5	—	—	1192.6	1192.6
1195.4 *2	128.1	458.9	*2 1406.6	1993.5 (1534.6)
1196.4	392.8	1407.7	1611.4	3411.9 (2004.3)

*1 It is assumed that the foot bridge doesn't get washed out if the dam is overtopped. Orifice flow conditions was assumed to exist for stages equal to or above the footbridge.

*2 Orifice and Weir flow conditions was assumed to exist for stages greater than the footbridge elev.

STAGE Discharge Data
(W/OUT Flashboards)



STAGE	$Q=3.0LH^{1.5}$	$Q=25LH^{1.5}$	*1 $Q=CA\sqrt{2g}$	Discharge	
1189.0	0			0	
1190.4	212.7	-	—	212.7	
1190.7	284.6	—	—	284.6	
1190.9	337.0	-	—	337.0	
1191.9	645.1	-	—	645.1	
1192.9	1016.3	-	—	1016.3	
1194.0	1485.9	-	—	1485.9	
1194.5	—		1861.4	1861.4	
1195.4	*2 128.1	458.9	*2 2122.4	2709.4	(2250.4
1196.4	392.8	1407.7	2379.0	4179.5	(2771.8)

*1 It is assumed that the footbridge doesn't get washed out if the dam is overtopped. ORIFICE flow conditions were assumed to exist for stages equal to or above the footbridge.

*2 ORIFICE and WEIR flow conditions was assumed to exist for stages greater than the footbridge elev.

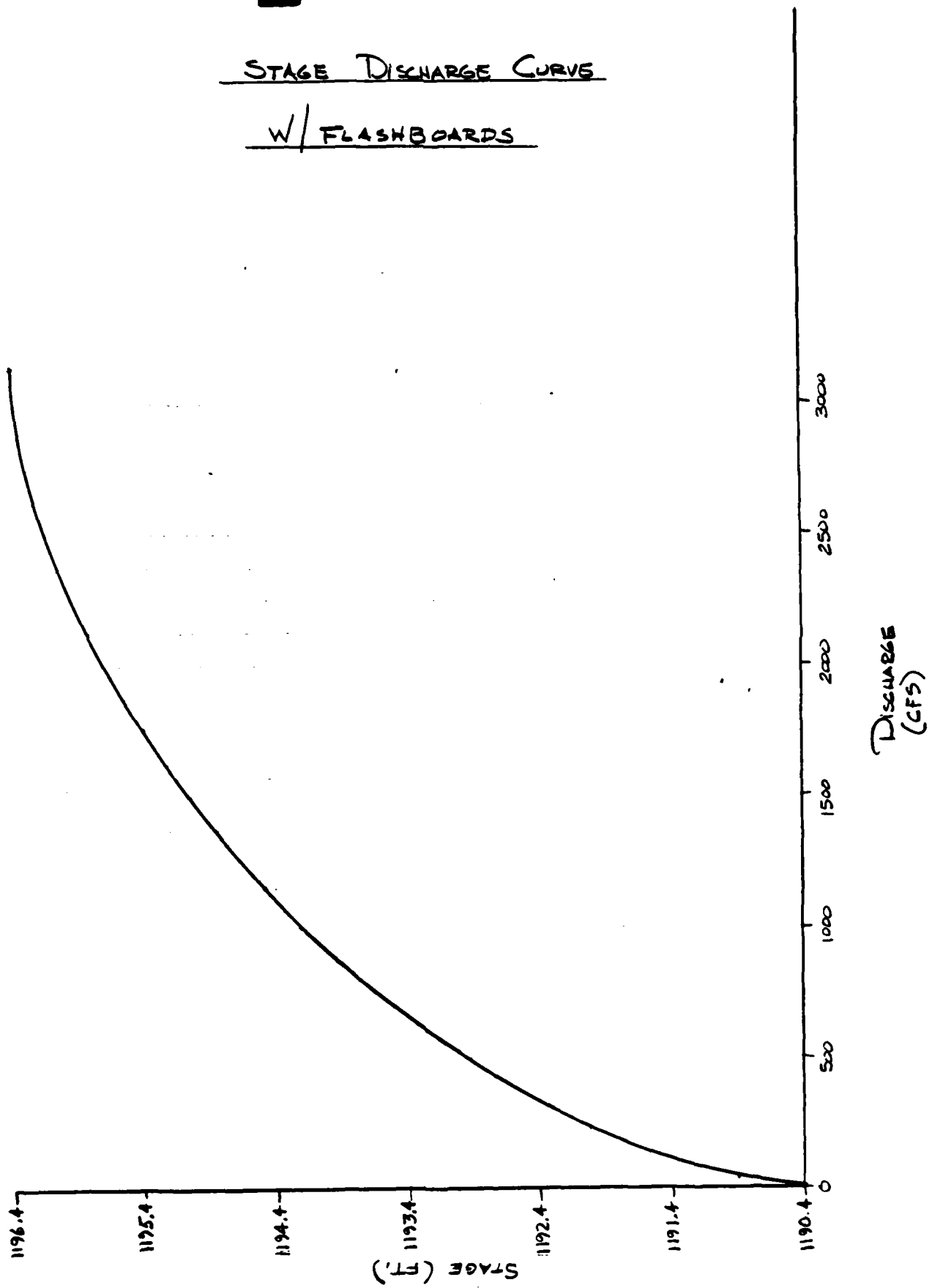
PROJECT Corps Dams
N4 347

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

SHEET NO. 4 OF 7
BY RAC DATE 3-31-81
CHK'D. BY TLW DATE 5-6-81

STAGE DISCHARGE CURVE

W/ FLASHBOARDS



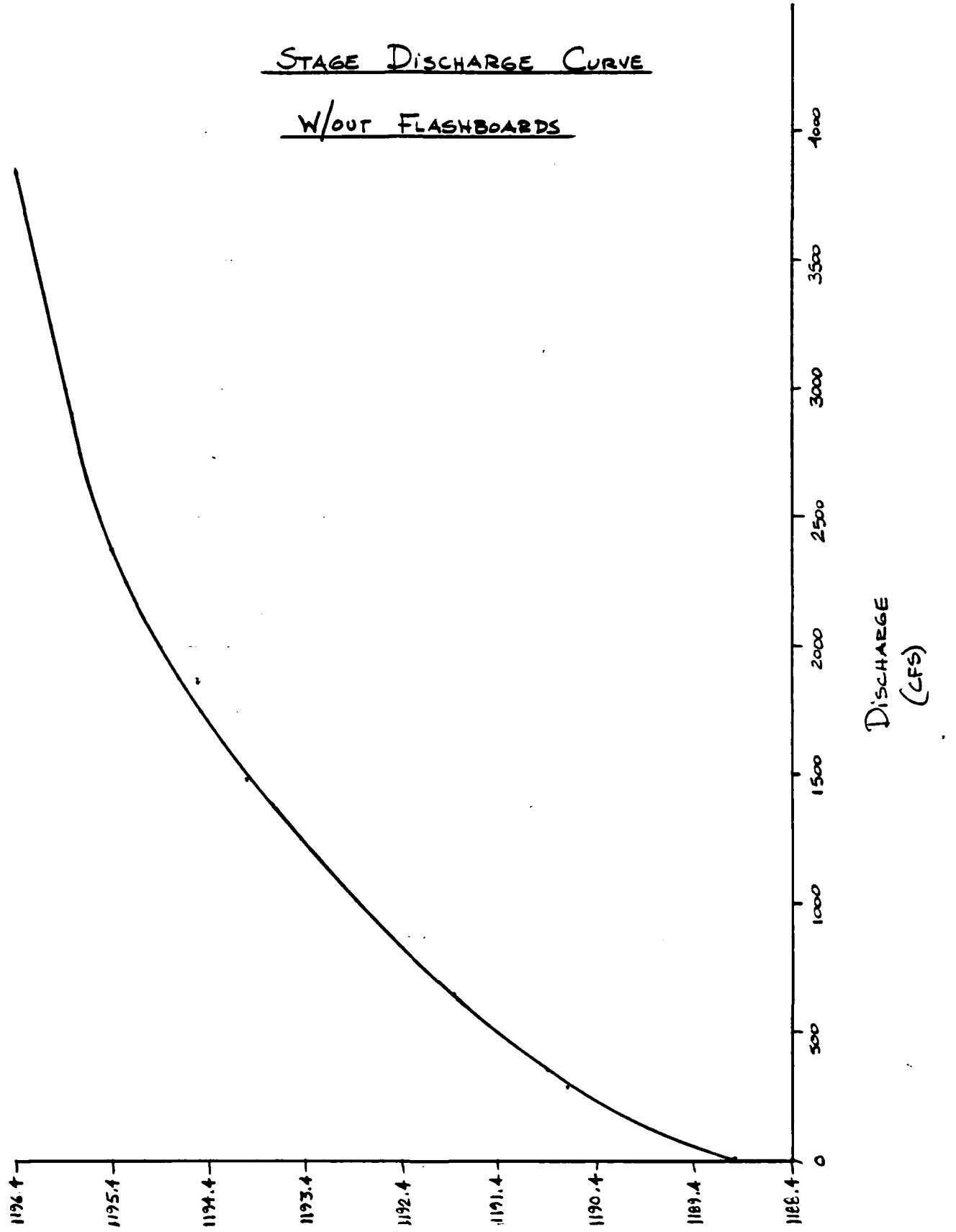
PROJECT Corps Dams
- N4347
-

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

SHEET NO. 5 OF 7
BY RAC DATE 3-31-81
CHK'D. BY TLW DATE 5-6-81

STAGE DISCHARGE CURVE

W/OUT FLASHBOARDS



INFLOW HYDROGRAPH TO NORWICH NO. 1 RESERVOIR, FROM DAM OVERTOPPING OF NO. 2

STAGE(S)	OUTFLOW HYDROGRAPH NORWICH NO. 2 RESERVOIR	(-) DISCHARGE* SPILLWAYS	FLOW INTO NORWICH NO. 1 DAM
1244.1 → 1248.8	(DISCHARGE through spillways & around No. 1 dam for these stages)		0
1249.4	1302	993	309
1249.8	1831	1052	779
1250.1	2406	1214	1192
1250.5	3085	1454	1631
1250.9	3888	1535	2353
1251.3	4943	1616	3327
1251.8	6086	1713	4373
1252.2	7188	1790	5398
1252.5	8081	1859	6222
1252.7	8596	1919	6677
1252.7	8637	1919	6718
1252.6	8190	1889	6301
1252.3	7420	1810	5610
1252.0	6555	1752	4803
1251.6	5671	1675	3996
1251.3	4831	1616	3215
1250.9	4090	1535	2555
1250.6	3470	1474	1996
1250.4	2954	1434	1520
1250.2	2518	1287	1231
1250.0	2167	1140	1027
1249.8	1867	1052	815
1249.6	1615	1022	593

STAGES	OUTFLOW HYDROGRAPH NORWICH NO. 2 RESERVOIR	* (-) DISCHARGE SPILLWAYS	FLOW INTO NORWICH NO. 1 DAM
1249.5	1394	1008	386
1249.3	1200	978	222
1249.1	1029	949	80
1248.9 → 1247.2	(Discharge through spillways & around No. 1 dam for these stages)		0

* THE principal and emergency spillways from Norwich No. 2 dam discharge into a channel that diverts the flows around Norwich No. 1 dam. Outflows from both dams converge several hundred feet downstream of the Norwich No. 1 dam.

HEC-1 FLOOD HYDROGRAPH COMPUTATIONS

(WITH FLASHBOARDS IN PLACE)

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FLAHERTY GIAVARA ASSOCIATES, P.C.
*********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
*********************************
                A1   NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT
                A2   DAM INVENTORY NO. NY 347, NORWICH WATER WORKS DAM NO. 1 (WITH FLASHBOARDS), CHENANGO COUNTY, JULY 14, 1981
                A3   PREPARED BY FLAHERTY GIAVARA ASSOCIATES, P.C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT
                B    120       0      30       0       0       0       0       2       0       0
                B1     5
                J      1       9       1
                J1   0.1     0.2     0.3     0.4     0.5     0.6     0.7     0.8     1.0
                K      0       1                       0       0       1       0
                K1   INFLOW HYDROGRAPH,  SNYDER METHOD
                M      1       1    0.38               0       1                       1
                P      0    20.2     111     122     133     143
                T                                                       1     0.1               0
                W   1.71    0.63
                X   -2.0   -0.10     1.5
                K      0       1                       0       0       1       0
                K1   OUTFLOW FROM THE OVERTOPPING OF NORWICH RESERVOIR NO. 2 DAM (INVENTORY NO. NY 349)
                M     -1
                N      0       0       0       0       0       0       0       0       0       0
                N      0       0       0       0       0       0       0       0       0       0
                N      0       0       0       0       0       0       0       0       0       0
                N      0       0       0       0       0       0       0       0       0       0
                N      0       0       0       0       0       0       0       0       0       0
                N      0       0       0       0       0       0       0       0       0       0
                N      0       0       0       0       0       0       0       0       0       0
                N      0       0       0       0       0     309     779    1192    1631    2353
                N   3327    4373    5398    6222    6677    6718    6301    5610    4803    3996
                N   3215    2555    1996    1520    1231    1027     815     593     386     227
                N     80       0       0       0       0       0       0       0       0       0
                N      0       0       0       0       0       0       0       0       0       0
                K      2       1                       0       0       1       0
                K1   OUTFLOW FROM NORWICH RESERVOIR NO. 2 DAM COMBINED WITH INFLOW FROM NORWICH WATER WORKS DAM NO. 1
                K      1       1                       0       0       1       0
                K1   RESERVOIR ROUTING   MODIFIED PULS METHOD
                Y                                   1       1
                Y1     3                                                   0      -1
                Y41190.4  1190.7  1190.9  1191.9  1192.9  1194.0  1194.5  1195.4  1196.4
                Y5     0    21.1    46.1   246.9   535.0   927.4  1192.6  1519.1  1986.4
                $A   6.5    12.3    17.4
                $E1190.4  1200.6  1210.6
                $$1190.4
                $D1194.5     2.5     1.5     215
                K     99
1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
                                   RUNOFF HYDROGRAPH AT          1
                                   RUNOFF HYDROGRAPH AT          1
                                   COMBINE  2 HYDROGRAPHS AT     1
                                   ROUTE HYDROGRAPH TO           1
                                   END OF NETWORK

*********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
```

LAST MODIFICATION 26 FEB 79
****

RUN DATE: 7/14/
TIME: 6:10 AM

NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT
DAM INVENTORY NO. NY 347, NORWICH WATER WORKS DAM NO. 1 (WITH FLASHBOARDS), CHENANGO COUNTY, JULY 14, 1981
PREPARED BY FLAHERTY GIAVARA ASSOCIATES, P.C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
120	0	30	0	0	0	0	2	0	0
			JOPER	NWT	LROPT	TRACE			
			3	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1
RTIOS= 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 1.00

****

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH, SNYDER METHOD ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDQ	IUHQ	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.38	0.00	0.38	1.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	20.20	111.00	122.00	133.00	143.00	0.00	0.00

LOSS DATA

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

UNIT HYDROGRAPH DATA
TP= 1.71 CP=0.63 NTA= 0

RECESSION DATA
STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.50

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 4.00 AND R= 3.10 INTERVALS

UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG= 1.72 HOURS, CP= 0.63 VOL= 1.00

12.	43.	79.	88.	76.	59.	39.	28.	21.	15.
11.	8.	6.	4.	3.	2.	2.	1.	1.	

END-OF-PERIOD FLOW

0												
MO. DA	HR. MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO. DA	HR. MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	0.30	1	0.01	0.00	0.01	1.	1.02	6.30	61	0.19	0.14	0.05	13.

1.01	1.00	2	0.01	0.00	0.01	1.	1.02	7.00	62	0.19	0.14	0.05	18.
1.01	1.30	3	0.01	0.00	0.01	1.	1.02	7.30	63	0.19	0.14	0.05	26.
1.01	2.00	4	0.01	0.00	0.01	1.	1.02	8.00	64	0.19	0.14	0.05	36.
1.01	2.30	5	0.01	0.00	0.01	1.	1.02	8.30	65	0.19	0.14	0.05	44.
1.01	3.00	6	0.01	0.00	0.01	1.	1.02	9.00	66	0.19	0.14	0.05	50.
1.01	3.30	7	0.01	0.00	0.01	1.	1.02	9.30	67	0.19	0.14	0.05	55.
1.01	4.00	8	0.01	0.00	0.01	1.	1.02	10.00	68	0.19	0.14	0.05	58.
1.01	4.30	9	0.01	0.00	0.01	1.	1.02	10.30	69	0.19	0.14	0.05	60.
1.01	5.00	10	0.01	0.00	0.01	1.	1.02	11.00	70	0.19	0.14	0.05	62.
1.01	5.30	11	0.01	0.00	0.01	0.	1.02	11.30	71	0.19	0.14	0.05	63.
1.01	6.00	12	0.01	0.00	0.01	0.	1.02	12.00	72	0.19	0.14	0.05	64.
1.01	6.30	13	0.01	0.00	0.01	0.	1.02	12.30	73	1.12	1.07	0.05	76.
1.01	7.00	14	0.01	0.00	0.01	0.	1.02	13.00	74	1.12	1.07	0.05	116.
1.01	7.30	15	0.01	0.00	0.01	0.	1.02	13.30	75	1.35	1.30	0.05	190.
1.01	8.00	16	0.01	0.00	0.01	0.	1.02	14.00	76	1.35	1.30	0.05	282.
1.01	8.30	17	0.01	0.00	0.01	0.	1.02	14.30	77	1.68	1.63	0.05	374.
1.01	9.00	18	0.01	0.00	0.01	0.	1.02	15.00	78	1.68	1.63	0.05	459.
1.01	9.30	19	0.01	0.00	0.01	0.	1.02	15.30	79	2.04	1.99	0.05	543.
1.01	10.00	20	0.01	0.00	0.01	0.	1.02	16.00	80	6.48	6.43	0.05	680.
1.01	10.30	21	0.01	0.00	0.01	0.	1.02	16.30	81	1.57	1.52	0.05	891.
1.01	11.00	22	0.01	0.00	0.01	0.	1.02	17.00	82	1.57	1.52	0.05	1084.
1.01	11.30	23	0.01	0.00	0.01	0.	1.02	17.30	83	1.23	1.18	0.05	1158.
1.01	12.00	24	0.01	0.00	0.01	0.	1.02	18.00	84	1.23	1.18	0.05	1087.
1.01	12.30	25	0.08	0.00	0.08	0.	1.02	18.30	85	0.11	0.06	0.05	948.
1.01	13.00	26	0.08	0.00	0.08	0.	1.02	19.00	86	0.11	0.06	0.05	798.
1.01	13.30	27	0.10	0.00	0.10	0.	1.02	19.30	87	0.11	0.06	0.05	636.
1.01	14.00	28	0.10	0.00	0.10	0.	1.02	20.00	88	0.11	0.06	0.05	481.
1.01	14.30	29	0.13	0.00	0.13	0.	1.02	20.30	89	0.11	0.06	0.05	356.
1.01	15.00	30	0.13	0.00	0.13	0.	1.02	21.00	90	0.11	0.06	0.05	269.
1.01	15.30	31	0.15	0.01	0.15	0.	1.02	21.30	91	0.11	0.06	0.05	200.
1.01	16.00	32	0.49	0.44	0.05	6.	1.02	22.00	92	0.11	0.06	0.05	152.
1.01	16.30	33	0.12	0.07	0.05	20.	1.02	22.30	93	0.11	0.06	0.05	117.
1.01	17.00	34	0.12	0.07	0.05	37.	1.02	23.00	94	0.11	0.06	0.05	112.
1.01	17.30	35	0.09	0.04	0.05	48.	1.02	23.30	95	0.11	0.06	0.05	107.
1.01	18.00	36	0.09	0.04	0.05	47.	1.03	0.00	96	0.11	0.06	0.05	103.
1.01	18.30	37	0.01	0.00	0.01	40.	1.03	0.30	97	0.00	0.00	0.00	99.
1.01	19.00	38	0.01	0.00	0.01	33.	1.03	1.00	98	0.00	0.00	0.00	95.
1.01	19.30	39	0.01	0.00	0.01	26.	1.03	1.30	99	0.00	0.00	0.00	91.
1.01	20.00	40	0.01	0.00	0.01	19.	1.03	2.00	100	0.00	0.00	0.00	87.
1.01	20.30	41	0.01	0.00	0.01	14.	1.03	2.30	101	0.00	0.00	0.00	84.
1.01	21.00	42	0.01	0.00	0.01	10.	1.03	3.00	102	0.00	0.00	0.00	81.
1.01	21.30	43	0.01	0.00	0.01	7.	1.03	3.30	103	0.00	0.00	0.00	77.
1.01	22.00	44	0.01	0.00	0.01	5.	1.03	4.00	104	0.00	0.00	0.00	74.
1.01	22.30	45	0.01	0.00	0.01	5.	1.03	4.30	105	0.00	0.00	0.00	71.
1.01	23.00	46	0.01	0.00	0.01	4.	1.03	5.00	106	0.00	0.00	0.00	69.
1.01	23.30	47	0.01	0.00	0.01	4.	1.03	5.30	107	0.00	0.00	0.00	66.
1.02	0.00	48	0.01	0.00	0.01	4.	1.03	6.00	108	0.00	0.00	0.00	63.
1.02	0.30	49	0.07	0.02	0.05	4.	1.03	6.30	109	0.00	0.00	0.00	61.
1.02	1.00	50	0.07	0.02	0.05	4.	1.03	7.00	110	0.00	0.00	0.00	58.
1.02	1.30	51	0.07	0.02	0.05	4.	1.03	7.30	111	0.00	0.00	0.00	56.
1.02	2.00	52	0.07	0.02	0.05	6.	1.03	8.00	112	0.00	0.00	0.00	54.
1.02	2.30	53	0.07	0.02	0.05	7.	1.03	8.30	113	0.00	0.00	0.00	52.
1.02	3.00	54	0.07	0.02	0.05	8.	1.03	9.00	114	0.00	0.00	0.00	50.
1.02	3.30	55	0.07	0.02	0.05	9.	1.03	9.30	115	0.00	0.00	0.00	48.
1.02	4.00	56	0.07	0.02	0.05	10.	1.03	10.00	116	0.00	0.00	0.00	46.
1.02	4.30	57	0.07	0.02	0.05	11.	1.03	10.30	117	0.00	0.00	0.00	44.
1.02	5.00	58	0.07	0.02	0.05	11.	1.03	11.00	118	0.00	0.00	0.00	42.
1.02	5.30	59	0.07	0.02	0.05	11.	1.03	11.30	119	0.00	0.00	0.00	40.

1.02 6.00 60 0.07 0.02 0.05 II. 1.03 12.00 120 0.00 0.00 0.00 39.

SUM 28.89 25.13 3.75 13746.
(734.)(638.)(95.)(389.24)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1198.	761.	268.	114.	13732.
CMS	33.	22.	8.	3.	389.
INCHES		18.62	26.24	28.01	28.01
MM		473.05	666.56	711.53	711.53
AC-FT		377.	532.	567.	567.
THOUS CU M		465.	656.	700.	700.

1*OVF*

STATION 1

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

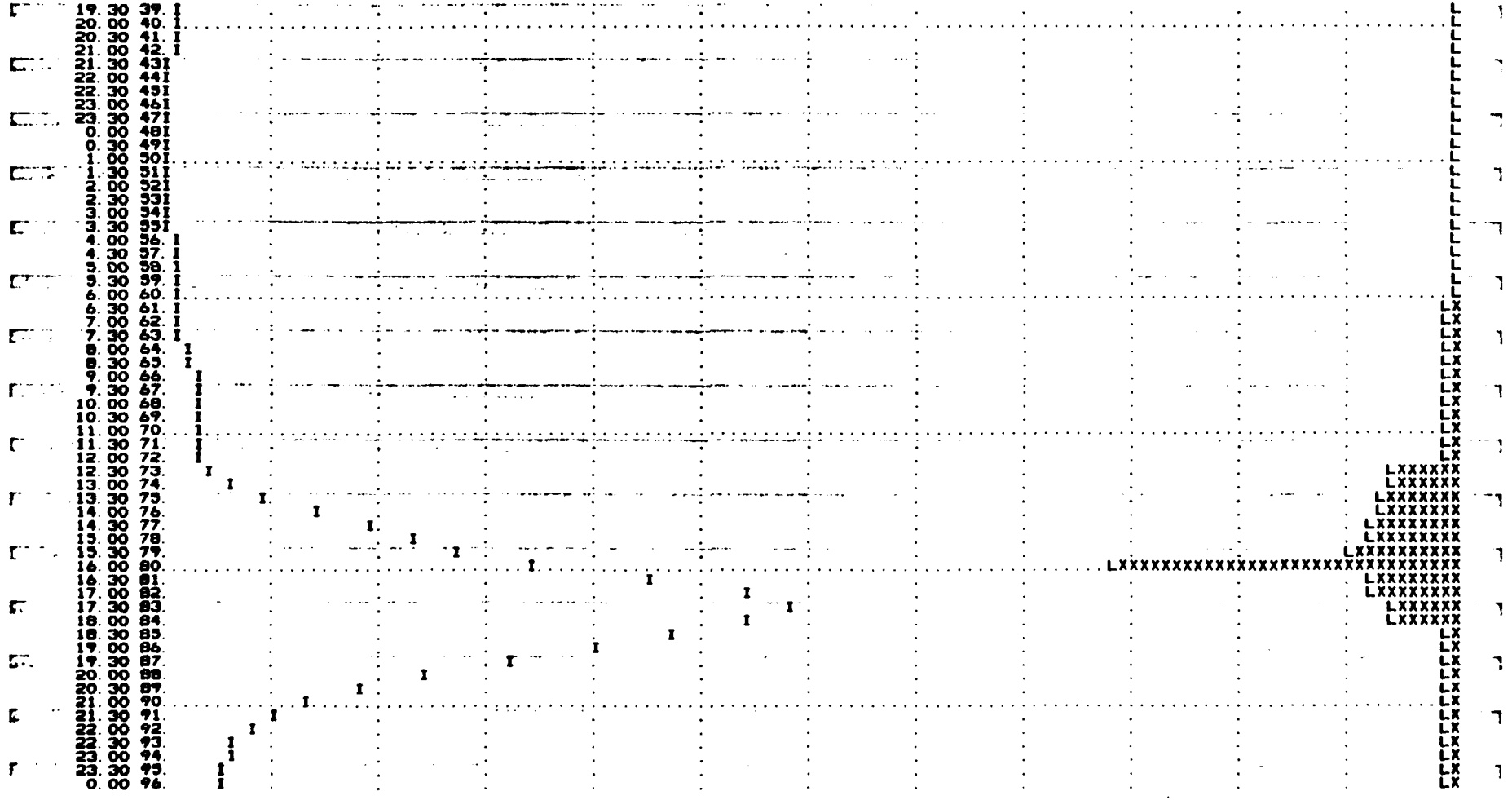
0. 200. 400. 600. 800. 1000. 1200. 0. 0. 0. 0. 0. 0.

PRECIP(L) AND EXCESS(X)

0. 0. 0. 0. 0. 0. 0. 0. 0. 8. 6. 4. 2. 0.

0.30	11	
1.00	21	
1.30	31	
2.00	41	
2.30	51	
3.00	61	
3.30	71	
4.00	81	
4.30	91	
5.00	101	
5.30	111	
6.00	121	
6.30	131	
7.00	141	
7.30	151	
8.00	161	
8.30	171	
9.00	181	
9.30	191	
10.00	201	
10.30	211	
11.00	221	
11.30	231	
12.00	241	
12.30	251	
13.00	261	
13.30	271	
14.00	281	
14.30	291	
15.00	301	
15.30	311	
16.00	321	
16.30	33. I	
17.00	34. I	
17.30	35. I	
18.00	36. I	
18.30	37. I	
19.00	38. I	

C-16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0.30 49
1.00 50
1.30 51
2.00 52
2.30 53
3.00 54
3.30 55
4.00 56.
4.30 57.
5.00 58.
5.30 59.
6.00 60.
6.30 61.
7.00 62.
7.30 63.
8.00 64.
8.30 65.
9.00 66.
9.30 67.
10.00 68.
10.30 69.
11.00 70.
11.30 71.
12.00 72.
12.30 73.
13.00 74.
13.30 75.
14.00 76.
14.30 77.
15.00 78.
15.30 79.
16.00 80.
16.30 81.
17.00 82.
17.30 83.
18.00 84.
18.30 85.
19.00 86.
19.30 87.
20.00 88.
20.30 89.
21.00 90.
21.30 91.
22.00 92.
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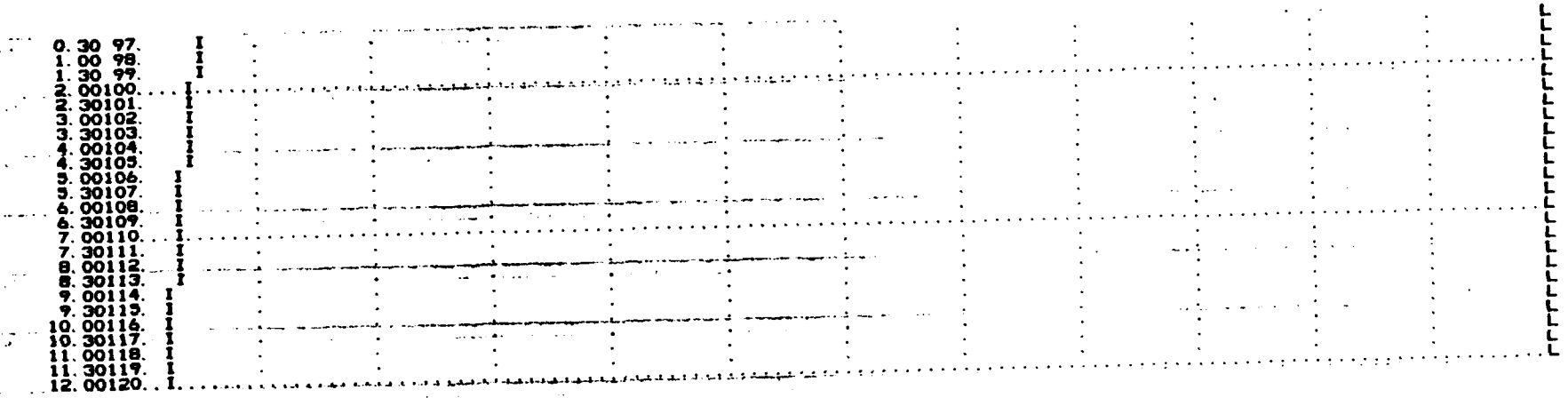
23.30 95.
0.00 96.



1*DVN*

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	2.	4.	5.	5.	4.	3.	2.
0.	1.	1.	1.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	2.	3.	4.	4.	5.	6.	6.	6.
6.	6.	8.	12.	19.	28.	37.	46.	68.
89.	108.	116.	109.	99.	80.	64.	54.	27.
20.	15.	12.	11.	11.	10.	10.	9.	9.
8.	8.	8.	7.	7.	7.	7.	6.	6.
6.	5.	5.	5.	5.	5.	4.	4.	4.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	116.	76.	27.	11.	1373.
CMS	3.	2.	1.	0.	39.
INCHES		1.86	2.62	2.80	2.80
MM		47.31	66.66	71.15	71.15
AC-FT		38.	53.	57.	57.
THOUS CU M		47.	66.	70.	70.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	2.	4.	5.	5.	4.	3.	2.
0.	1.	1.	1.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	2.	3.	4.	4.	5.	6.	6.	6.
6.	6.	8.	12.	19.	28.	37.	46.	68.
89.	108.	116.	109.	99.	80.	64.	54.	27.
20.	15.	12.	11.	11.	10.	10.	9.	9.
8.	8.	8.	7.	7.	7.	7.	6.	6.
6.	5.	5.	5.	5.	5.	4.	4.	4.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	116.	76.	27.	11.	1373.
CMS	3.	2.	1.	0.	39.
INCHES		1.86	2.62	2.80	2.80
MM		47.31	66.66	71.15	71.15
AC-FT		38.	53.	57.	57.
THOUS CU M		47.	66.	70.	70.

1.	1.	1.	2.	2.	2.	2.	2.	2.	2.
3.	4.	5.	7.	9.	10.	11.	12.	12.	12.
13.	13.	15.	23.	38.	56.	75.	92.	109.	136.
178.	217.	232.	217.	190.	160.	127.	96.	71.	53.
40.	30.	23.	22.	21.	21.	20.	19.	18.	17.
17.	16.	15.	15.	14.	14.	13.	13.	12.	12.
11.	11.	10.	10.	10.	9.	9.	8.	8.	8.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	232.	152.	54.	23.	2746.
CMS	7.	4.	2.	1.	78.
INCHES		3.72	5.25	5.60	5.60
MM		94.61	133.31	142.31	142.31
AC-FT		75.	106.	113.	113.
THOUS CU M		93.	131.	140.	140.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	2.	6.	11.	14.	14.	12.	10.	8.	6.
4.	3.	2.	2.	1.	1.	1.	1.	1.	1.
1.	2.	2.	3.	3.	3.	3.	3.	3.	3.
4.	5.	8.	11.	13.	15.	16.	17.	18.	19.
19.	19.	23.	35.	57.	85.	112.	138.	163.	204.
267.	329.	347.	326.	284.	239.	191.	144.	107.	80.
60.	46.	35.	33.	32.	31.	30.	28.	27.	26.
25.	24.	23.	22.	21.	21.	20.	19.	18.	17.
17.	16.	15.	15.	14.	14.	13.	13.	12.	12.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	347.	228.	80.	34.	4120.
CMS	10.	6.	2.	1.	117.
INCHES		5.59	7.87	8.40	8.40
MM		141.92	199.97	213.46	213.46
AC-FT		113.	159.	170.	170.
THOUS CU M		140.	197.	210.	210.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	2.	8.	15.	19.	19.	16.	13.	10.	8.
6.	4.	3.	2.	2.	2.	2.	2.	2.	2.
1.	2.	3.	3.	4.	4.	4.	4.	4.	5.
5.	7.	10.	14.	18.	20.	22.	23.	24.	25.
25.	26.	30.	47.	76.	113.	149.	184.	217.	272.
357.	434.	463.	435.	379.	319.	254.	192.	142.	106.
80.	61.	47.	45.	43.	41.	40.	38.	36.	35.
34.	32.	31.	30.	29.	27.	26.	25.	24.	23.
22.	22.	21.	20.	19.	18.	18.	17.	16.	16.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	463.	304.	107.	46.	5493.
CMS	13.	9.	3.	1.	156.
INCHES		7.45	10.50	11.21	11.21

MM	189.22	266.62	284.61		284.61
AC-FT	151.	213.	227.		227.
THOUS CU M	186.	262.	280.		280.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 5

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	3.	10.	19.	24.	24.	20.	17.	13.	10.
7.	5.	4.	3.	2.	2.	2.	2.	2.	2.
2.	3.	4.	4.	5.	5.	5.	6.	6.	6.
6.	9.	13.	18.	22.	25.	27.	29.	30.	31.
32.	32.	38.	58.	95.	141.	187.	230.	271.	340.
446.	542.	579.	543.	474.	399.	318.	241.	178.	133.
100.	76.	59.	56.	54.	51.	49.	47.	46.	44.
42.	40.	39.	37.	36.	34.	33.	32.	30.	29.
28.	27.	26.	25.	24.	23.	22.	21.	20.	19.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	579.	380.	134.	57.	6866.
CMS	16.	11.	4.	2.	194.
INCHES		9.31	13.12	14.01	14.01
MM		236.53	333.28	355.76	355.76
AC-FT		189.	266.	284.	284.
THOUS CU M		233.	328.	350.	350.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 6

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	3.	12.	22.	29.	28.	24.	20.	16.	12.
8.	6.	4.	3.	3.	3.	3.	2.	2.	2.
2.	3.	4.	5.	6.	6.	6.	7.	7.	7.
8.	11.	16.	22.	27.	30.	33.	35.	36.	37.
38.	38.	46.	70.	114.	169.	224.	275.	326.	408.
539.	651.	695.	692.	569.	479.	382.	289.	213.	159.
120.	91.	70.	67.	64.	62.	59.	57.	55.	52.
50.	48.	46.	45.	43.	41.	40.	38.	36.	35.
34.	32.	31.	30.	29.	27.	26.	25.	24.	23.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	695.	456.	161.	69.	8239.
CMS	20.	13.	5.	2.	233.
INCHES		11.17	15.75	16.81	16.81
MM		283.83	399.94	426.92	426.92
AC-FT		226.	319.	340.	340.
THOUS CU M		279.	393.	420.	420.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 7

1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	4.	14.	26.	33.	33.	28.	23.	18.	14.
10.	7.	5.	4.	3.	3.	3.	3.	3.	3.
3.	4.	5.	6.	7.	7.	7.	8.	8.	8.

9.	12.	18.	25.	31.	35.	38.	41.	42.	43.
44.	45.	53.	81.	133.	197.	262.	321.	380.	476.
624.	739.	811.	761.	663.	558.	445.	337.	249.	186.
140.	106.	82.	78.	75.	72.	69.	66.	64.	61.
99.	96.	94.	92.	90.	48.	46.	44.	42.	41.
39.	38.	36.	35.	33.	32.	31.	30.	28.	27.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	811.	533.	188.	80.	9612.
CMS	23.	15.	5.	2.	272.
INCHES		13.04	18.37	19.61	19.61
MM		331.14	466.59	498.07	498.07
AC-FT		264.	372.	397.	397.
THOUS CU M		326.	459.	490.	490.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 8

1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	9.	15.	30.	38.	38.	32.	27.	21.	16.
11.	8.	6.	4.	4.	4.	3.	3.	3.	3.
3.	4.	6.	7.	8.	8.	8.	9.	9.	9.
10.	14.	21.	29.	35.	40.	44.	46.	48.	50.
51.	51.	61.	73.	152.	226.	299.	367.	434.	544.
713.	867.	927.	869.	758.	638.	509.	389.	285.	212.
160.	122.	94.	89.	86.	82.	79.	76.	73.	70.
67.	65.	62.	59.	57.	55.	53.	51.	49.	47.
45.	43.	41.	40.	38.	37.	35.	34.	32.	31.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	927.	609.	214.	92.	10986.
CMS	26.	17.	6.	3.	311.
INCHES		14.90	20.99	22.41	22.41
MM		378.44	533.29	569.22	569.22
AC-FT		302.	425.	454.	454.
THOUS CU M		372.	525.	560.	560.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 9

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	6.	20.	37.	48.	47.	40.	33.	26.	19.
14.	10.	7.	5.	5.	4.	4.	4.	4.	4.
4.	6.	7.	8.	9.	10.	11.	11.	11.	11.
13.	18.	26.	36.	44.	50.	55.	58.	60.	62.
63.	64.	76.	116.	190.	282.	374.	459.	543.	680.
891.	1084.	1158	1087.	948.	798.	636.	481.	356.	269.
200.	152.	117.	112.	107.	103.	99.	95.	91.	87.
84.	81.	77.	74.	71.	69.	66.	63.	61.	58.
56.	54.	52.	50.	48.	46.	44.	42.	40.	39.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1158.	761.	268.	114.	13732.
CMS	33.	22.	8.	3.	389.
INCHES		18.62	26.24	28.01	28.01
MM		473.05	666.96	711.53	711.53

AC-FT	377.	532.	567.		567.
THOUS CU M	469.	656.	700.		700.

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

SUB-AREA RUNOFF COMPUTATION

OUTFLOW FROM THE OVERTOPING OF NORWICH NO. 2 DAM

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	0.00	0.00	0.00	0.00	0.000	0	0	0

INPUT HYDROGRAPH

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3327.	4373.	5398.	6222.	6677.	6718.	6301.	1192.	1631.	2353.
3215.	2555.	1996.	1520.	1231.	1027.	815.	593.	386.	227.
80.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6718.	4925.	1328.	611.	73334.
CMS	190.	139.	43.	17.	2077.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		2442.	3030.	3030.	3030.
THOUS CU M		3012.	3738.	3738.	3738.

1*OVF*

STATION 1

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

	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	0.	0.	0.	0.	0.
0.30	11												
1.00	21												
1.30	31												
2.00	41												
2.30	51												
3.00	61												
3.30	71												
4.00	81												
4.30	91												
5.00	101												
5.30	111												
6.00	121												
6.30	131												

7.00 141
7.30 151
8.00 161
8.30 171
9.00 181
9.30 191
10.00 201
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
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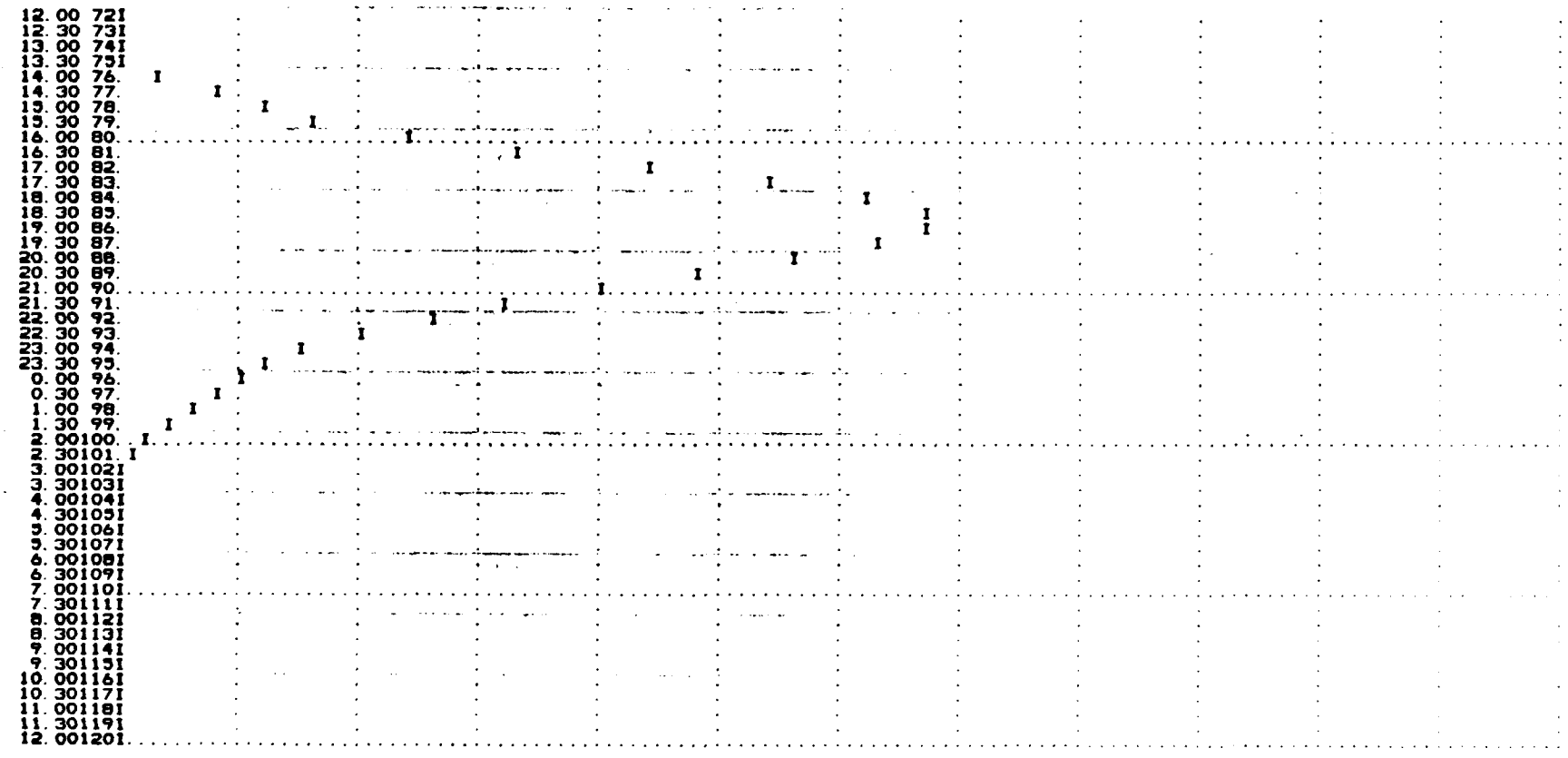
10.30 691
11.00 701
11.30 711



1*OVN*

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

0. 0. 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 0. 0. 0. 0. 0. 0.

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	31.	78.	119.	163.	239.
333.	437.	540.	622.	668.	672.	630.	561.	480.	400.
321.	259.	200.	152.	123.	103.	81.	59.	39.	23.
8.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	672.	492.	153.	61.	7333.
CMS	19.	14.	4.	2.	208.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		244.	303.	303.	303.
THOUS CU M		301.	374.	374.	374.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	62.	156.	238.	326.	471.
665.	879.	1080.	1244.	1335.	1344.	1260.	1122.	961.	799.
643.	511.	399.	304.	246.	205.	163.	119.	77.	45.
16.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1344.	985.	306.	122.	14667.
CMS	38.	28.	9.	3.	415.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		488.	606.	606.	606.
THOUS CU M		602.	748.	748.	748.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	93.	234.	358.	489.	706.
998.	1312.	1619.	1867.	2003.	2015.	1890.	1683.	1441.	1199.
964.	766.	599.	456.	369.	308.	244.	178.	116.	68.
24.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2015.	1477.	458.	183.	22000.

CMS	57.	42.	13.	5.	623.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		733.	909.	909.	909.
THOUS CU M		904.	1121.	1121.	1121.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	124.	312.	477.	632.	941.
1331.	1749.	2159.	2489.	2671.	2687.	2520.	2244.	1921.	1598.
1286.	1022.	798.	608.	492.	411.	326.	237.	154.	91.
32.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2687.	1970.	611.	244.	29334.
CMS	76.	56.	17.	7.	831.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		977.	1212.	1212.	1212.
THOUS CU M		1205.	1495.	1495.	1495.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 5

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	154.	389.	596.	813.	1176.
1663.	2186.	2699.	3111.	3338.	3359.	3150.	2805.	2401.	1998.
1607.	1277.	998.	760.	615.	513.	407.	296.	193.	113.
40.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3359.	2462.	764.	306.	36667.
CMS	95.	70.	22.	9.	1038.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		1221.	1515.	1515.	1515.
THOUS CU M		1506.	1869.	1869.	1869.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 6

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1996.	2624.	3239.	3733.	4006.	185.	467.	715.	979.	1412.
1929.	1533.	1198.	912.	739.	4031.	3781.	3366.	2882.	2398.
48.	0.	0.	0.	0.	616.	489.	356.	232.	136.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4031.	2955.	917.	367.	44000.
CMS	114.	84.	26.	10.	1246.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		1465.	1818.	1818.	1818.
THOUS CU M		1807.	2243.	2243.	2243.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 7

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2329.	3061.	3779.	4355.	4674.	216.	545.	834.	1142.	1647.
2250.	1788.	1397.	1064.	862.	4703.	4411.	3927.	3362.	2797.
56.	0.	0.	0.	0.	719.	570.	415.	270.	159.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4703.	3447.	1069.	428.	51334.
CMS	133.	98.	30.	12.	1454.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		1709.	2121.	2121.	2121.
THOUS CU M		2108.	2616.	2616.	2616.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 8

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2662.	3498.	4318.	4978.	5342.	247.	623.	954.	1305.	1882.
2572.	2044.	1597.	1216.	985.	5374.	5041.	4488.	3842.	3197.
64.	0.	0.	0.	0.	822.	652.	474.	309.	182.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5374.	3940.	1222.	489.	58667.
CMS	152.	112.	35.	14.	1661.

INCHES	0.00	0.00	0.00	0.00	
MM	0.00	0.00	0.00	0.00	
AC-FT	1954.	2424.	2424.	2424.	
THOUS CU M	2410.	2990.	2990.	2990.	

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 9

0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	309.	779.	1192.	1631.	2353.
3327.	4373.	3398.	6222.	6677.	6718.	6301.	5610.	4803.	3996.
3219.	2559.	1996.	1520.	1231.	1027.	815.	593.	386.	227.
80.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6718.	4924.	1528.	611.	73334.
CMS	190.	139.	43.	17.	2077.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		2442.	3030.	3030.	3030.
THOUS CU M		3012.	3738.	3738.	3738.

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

COMBINE HYDROGRAPHS

OUTFLOW FROM NORWICH NO. 2 COMBINED WITH NORWICH NO. 1 INFLOW

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

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	2.	4.	5.	5.	4.	3.	2.
1.	1.	1.	1.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	1.	1.
1.	2.	3.	4.	4.	5.	5.	6.	6.
6.	6.	8.	12.	19.	39.	115.	165.	217.	303.
422.	346.	656.	731.	762.	752.	694.	609.	516.	426.
341.	271.	211.	163.	134.	113.	91.	69.	48.	31.
16.	8.	8.	7.	7.	7.	7.	6.	6.	6.
6.	5.	5.	5.	5.	5.	4.	4.	4.	4.

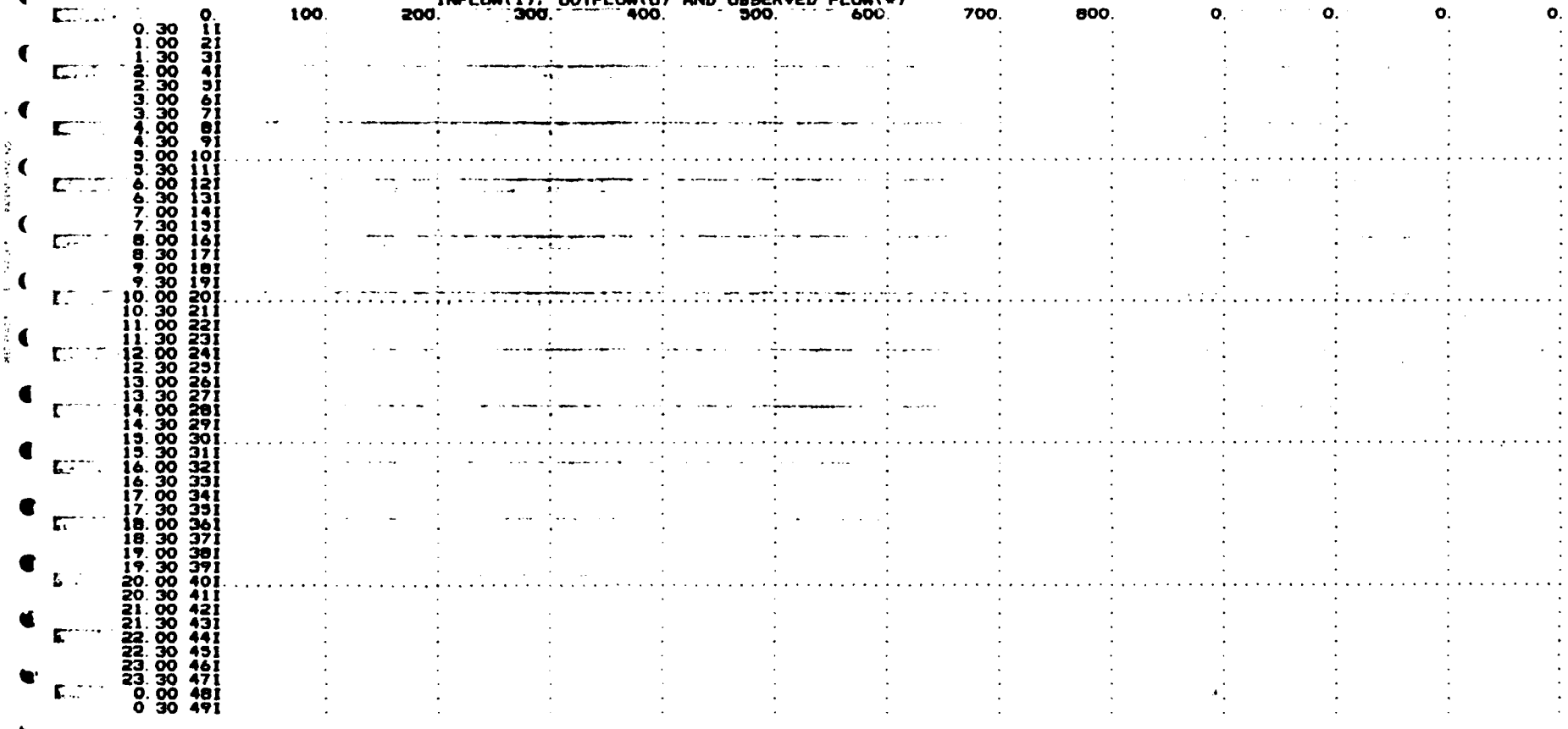
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	762.	562.	180.	73.	8707.
CMS	22.	16.	5.	2.	247.
INCHES		13.75	17.58	17.76	17.76

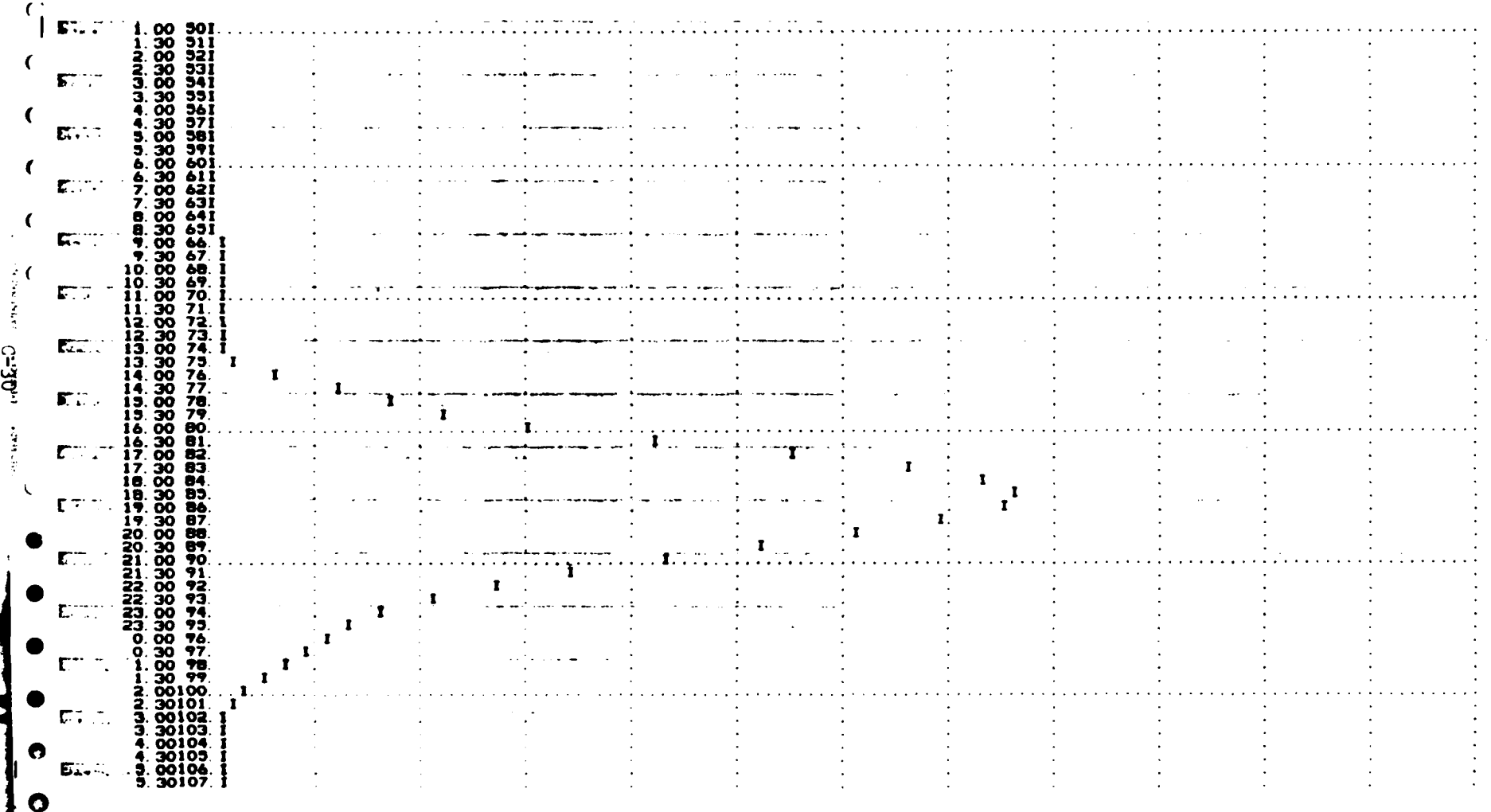
MM	349.31	446.64	451.14	451.14
AC-FT	279.	356.	360.	360.
THOUS CU M	344.	439.	444.	444.

1*OVF*

STATION 1

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

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1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
9.00 66
9.30 67
10.00 68
10.30 69
11.00 70
11.30 71
12.00 72
12.30 73
13.00 74
13.30 75
14.00 76
14.30 77
15.00 78
15.30 79
16.00 80
16.30 81
17.00 82
17.30 83
18.00 84
18.30 85
19.00 86
19.30 87
20.00 88
20.30 89
21.00 90
21.30 91
22.00 92
22.30 93
23.00 94
23.30 95
0.00 96
0.30 97
1.00 98
1.30 99
2.00100
2.30101
3.00102
3.30103
4.00104
4.30105
5.00106
5.30107

6.00108. I
6.30109. I
7.00110. I
7.30111. I
8.00112. I
8.30113. I
9.001141
9.301151
10.001161
10.301171
11.001181
11.301191
12.001201

1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	4.	7.	10.	9.	8.	7.	5.	4.
3.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	2.	2.	2.	2.	2.	2.
3.	4.	5.	7.	9.	10.	11.	12.	12.	12.
13.	13.	15.	23.	38.	118.	231.	330.	435.	607.
844.	1091.	1311.	1462.	1529.	1503.	1387.	1218.	1032.	892.
683.	541.	423.	326.	268.	226.	183.	138.	95.	63.
33.	16.	15.	15.	14.	14.	13.	13.	12.	12.
11.	11.	10.	10.	10.	9.	9.	8.	8.	8.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1929.	1124.	399.	149.	17413.
CMS	43.	32.	10.	4.	493.
INCHES		27.30	35.17	35.32	35.32
MM		698.61	893.28	902.27	902.27
AC-FT		337.	712.	720.	720.
THOUS CU M		687.	879.	888.	888.

1*OVF*

STATION 1

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

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

0.30 11
1.00 21
1.30 31
2.00 41
2.30 51
3.00 61
3.30 71
4.00 81
4.30 91
5.00 101
5.30 111
6.00 121

6.30	131
7.00	141
7.30	151
8.00	161
8.30	171
9.00	181
9.30	191
10.00	201
10.30	211
11.00	221
11.30	231
12.00	241
12.30	251
13.00	261
13.30	271
14.00	281
14.30	291
15.00	301
15.30	311
16.00	321
16.30	331
17.00	341
17.30	351
18.00	361
18.30	371
19.00	381
19.30	391
20.00	401
20.30	411
21.00	421
21.30	431
22.00	441
22.30	451
23.00	461
23.30	471
0.00	481
0.30	491
1.00	501
1.30	511
2.00	521
2.30	531
3.00	541
3.30	551
4.00	561
4.30	571
5.00	581
5.30	591
6.00	601
6.30	611
7.00	621
7.30	631
8.00	641
8.30	651
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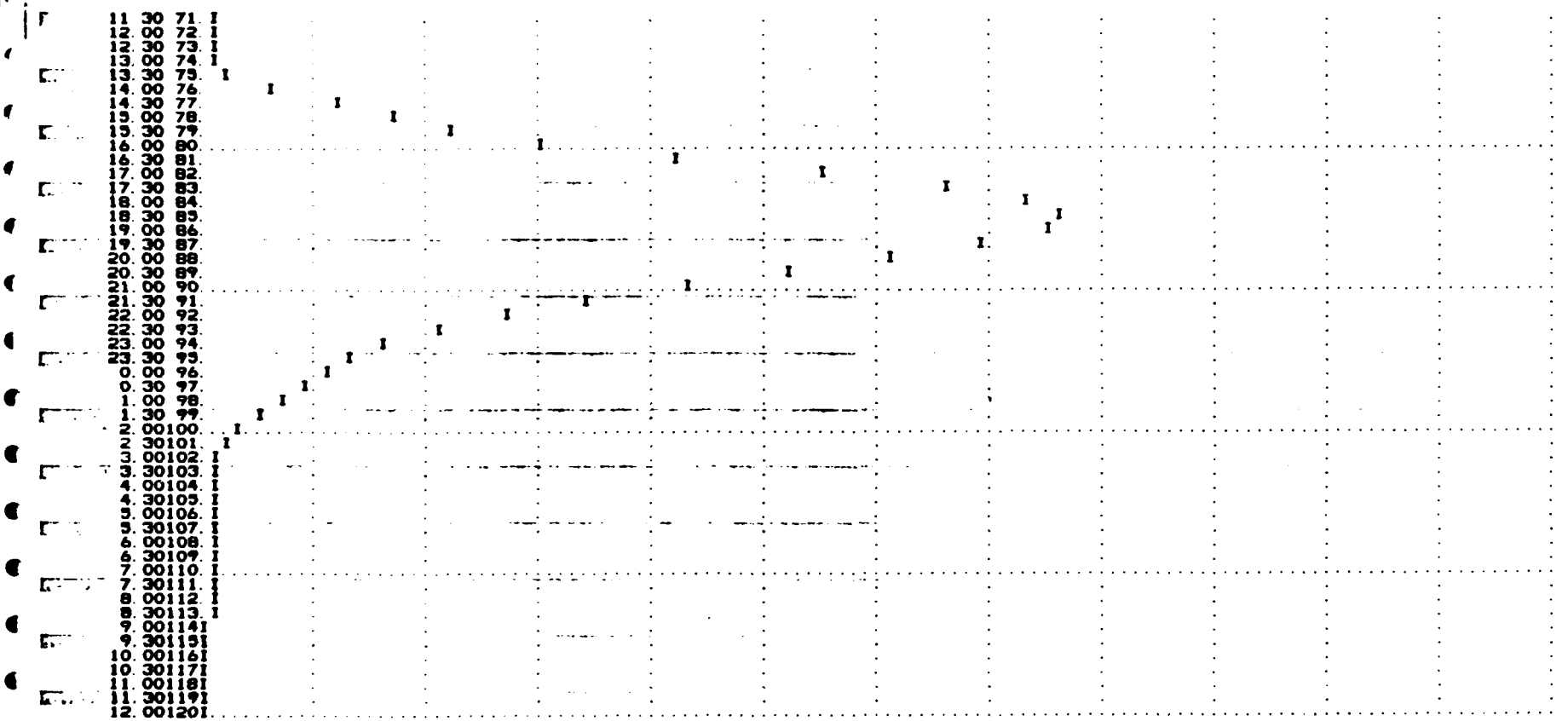


1=OVN=

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 3

0. 0. 0. 0. 0. 0. 0. 0. 0. 0.

	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	2.	4.	11.	14.	14.	12.	10.	8.	6.
	4.	3.	2.	2.	1.	1.	1.	1.	1.	1.
	1.	2.	2.	3.	3.	3.	3.	3.	3.	3.
	4.	5.	8.	11.	13.	15.	16.	17.	18.	19.
	19.	19.	23.	35.	97.	177.	346.	495.	652.	910.
	1266.	1637.	1967.	2193.	2287.	2255.	2081.	1827.	1548.	1278.
	1024.	812.	634.	489.	401.	339.	274.	206.	143.	94.
	49.	24.	23.	22.	21.	21.	20.	19.	18.	17.
	17.	16.	15.	15.	14.	14.	13.	13.	12.	12.

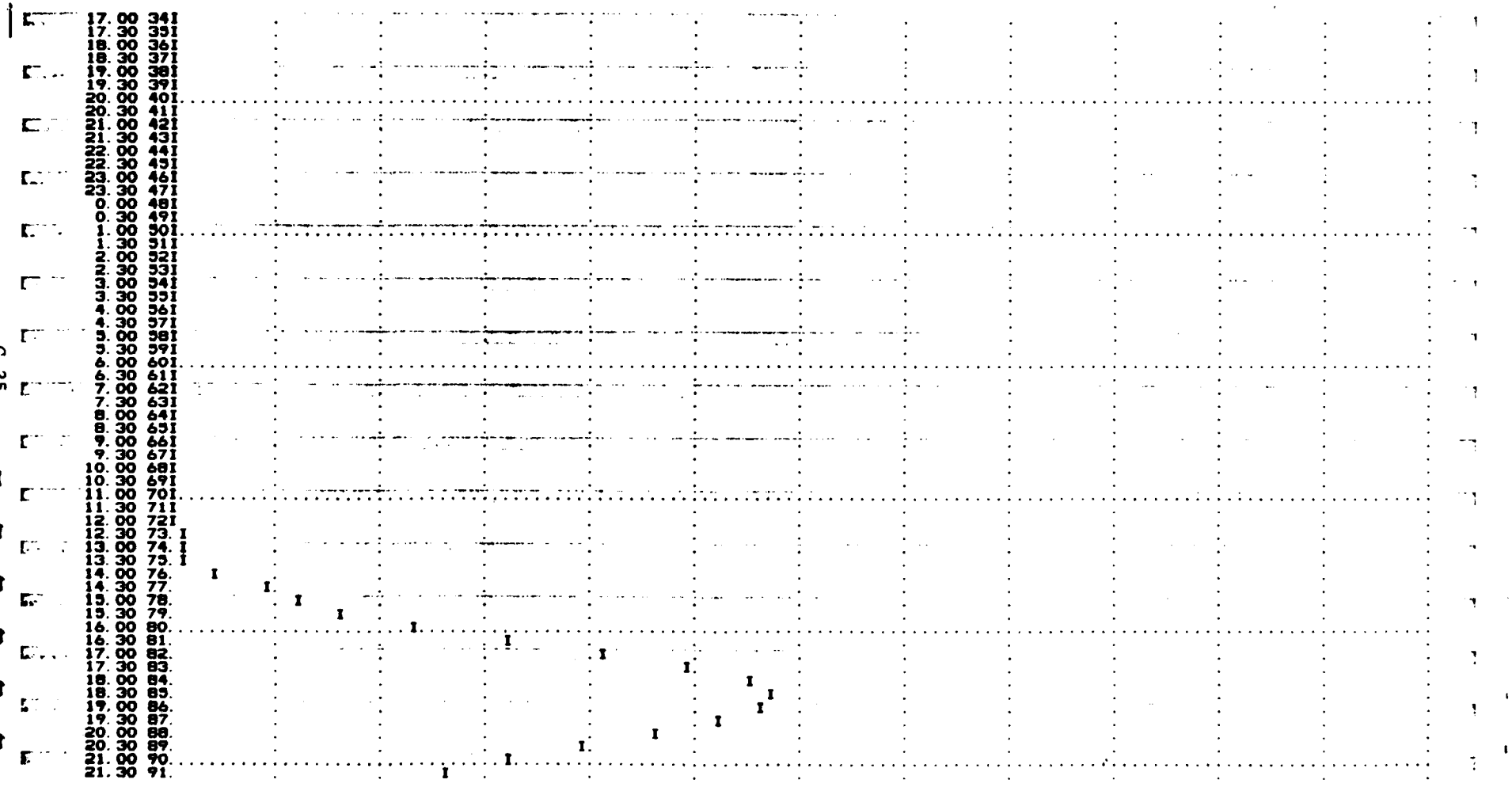
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2287.	1685.	539.	218.	26120.
CMS	65.	48.	15.	6.	740.
INCHES		41.26	52.79	53.28	53.28
MM		1047.92	1339.92	1353.41	1353.41
AC-FT		836.	1069.	1079.	1079.
THOUS CU M		1031.	1318.	1331.	1331.

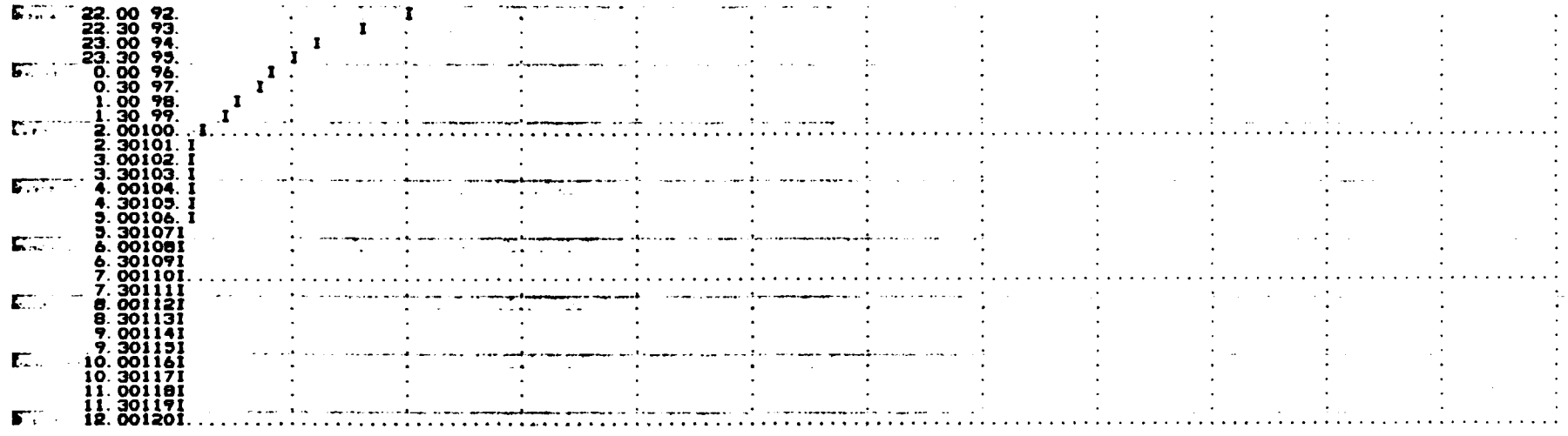
1*OVF*

STATION 1

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

	0.	400.	800.	1200.	1600.	2000.	2400.	0.	0.	0.	0.	0.	0.
0.30	11												
1.00	21												
1.30	31												
2.00	41												
2.30	51												
3.00	61												
3.30	71												
4.00	81												
4.30	91												
5.00	101												
5.30	111												
6.00	121												
6.30	131												
7.00	141												
7.30	151												
8.00	161												
8.30	171												
9.00	181												
9.30	191												
10.00	201												
10.30	211												
11.00	221												
11.30	231												
12.00	241												
12.30	251												
13.00	261												
13.30	271												
14.00	281												
14.30	291												
15.00	301												
15.30	311												
16.00	321												
16.30	331												


17.00 34I
17.30 35I
18.00 36I
18.30 37I
19.00 38I
19.30 39I
20.00 40I
20.30 41I
21.00 42I
21.30 43I
22.00 44I
22.30 45I
23.00 46I
23.30 47I
0.00 48I
0.30 49I
1.00 50I
1.30 51I
2.00 52I
2.30 53I
3.00 54I
3.30 55I
4.00 56I
4.30 57I
5.00 58I
5.30 59I
6.00 60I
6.30 61I
7.00 62I
7.30 63I
8.00 64I
8.30 65I
9.00 66I
9.30 67I
10.00 68I
10.30 69I
11.00 70I
11.30 71I
12.00 72I
12.30 73. I
13.00 74. I
13.30 75. I
14.00 76. I
14.30 77. I
15.00 78. I
15.30 79. I
16.00 80. I
16.30 81. I
17.00 82. I
17.30 83. I
18.00 84. I
18.30 85. I
19.00 86. I
19.30 87. I
20.00 88. I
20.30 89. I
21.00 90. I
21.30 91. I



1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	2.	8.	15.	19.	19.	16.	13.	10.	8.
6.	4.	3.	2.	2.	2.	2.	2.	2.	2.
1.	2.	3.	3.	4.	4.	4.	4.	4.	5.
5.	7.	10.	14.	18.	20.	22.	23.	24.	25.
25.	26.	30.	47.	76.	236.	461.	660.	869.	1213.
1687.	2183.	2622.	2923.	3050.	3006.	2779.	2436.	2063.	1704.
1366.	1083.	845.	653.	535.	452.	366.	275.	191.	126.
66.	32.	31.	30.	29.	27.	26.	25.	24.	23.
22.	22.	21.	20.	19.	18.	18.	17.	16.	16.

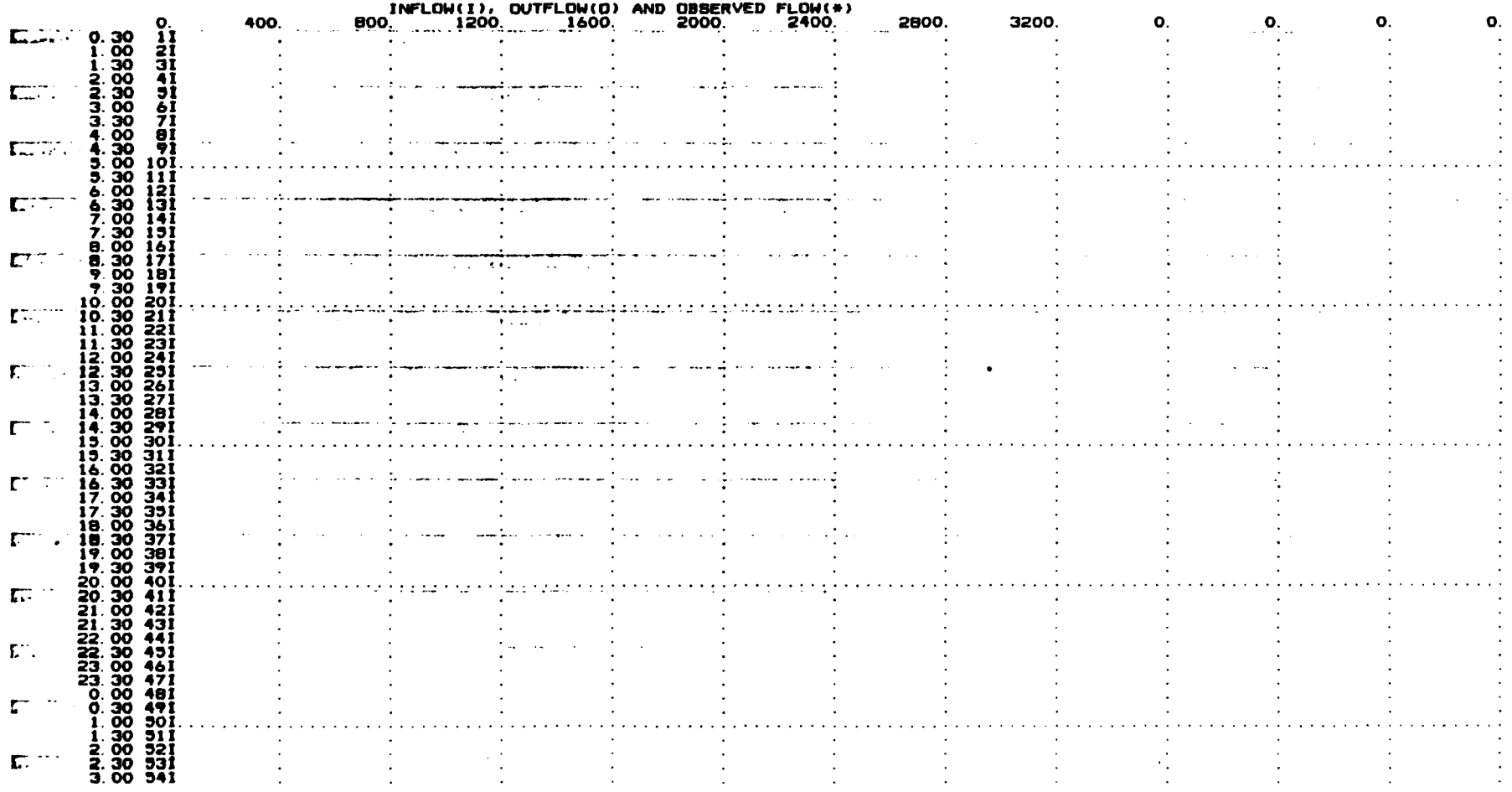
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3050.	2247.	718.	290.	34826.
CMS	86.	64.	20.	8.	986.
INCHES		55.01	70.34	71.04	71.04
MM		1397.23	1786.55	1804.54	1804.54
AC-FT		1114.	1425.	1439.	1439.
THOUS CU M		1374.	1757.	1775.	1775.

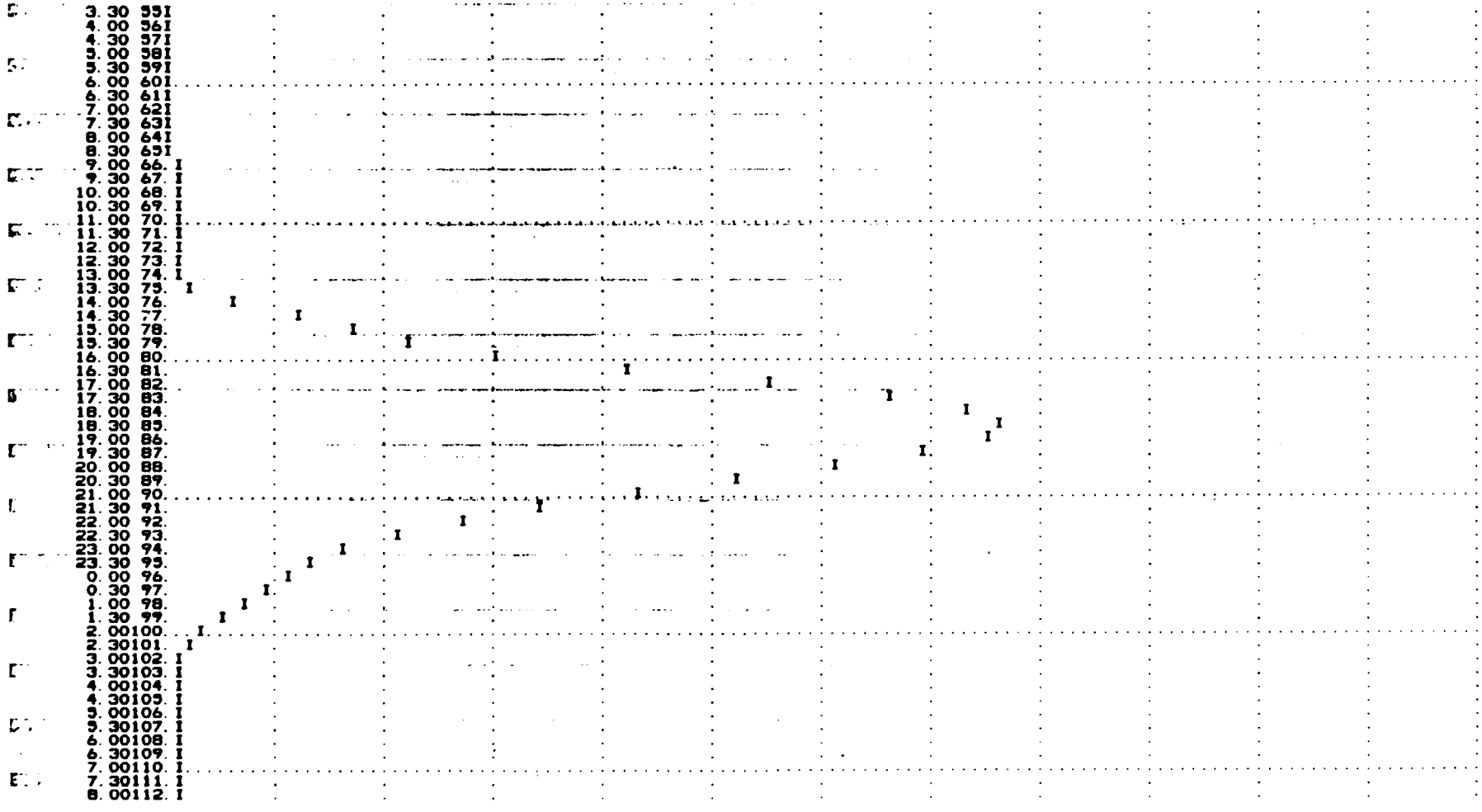
1*OVF*

C-38

STATION 1

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

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8.00 64I
8.30 65I
9.00 66. I
9.30 67. I
10.00 68. I
10.30 69. I
11.00 70. I
11.30 71. I
12.00 72. I
12.30 73. I
13.00 74. I
13.30 75. I
14.00 76. I
14.30 77. I
15.00 78. I
15.30 79. I
16.00 80. I
16.30 81. I
17.00 82. I
17.30 83. I
18.00 84. I
18.30 85. I
19.00 86. I
19.30 87. I
20.00 88. I
20.30 89. I
21.00 90. I
21.30 91. I
22.00 92. I
22.30 93. I
23.00 94. I
23.30 95. I
0.00 96. I
0.30 97. I
1.00 98. I
1.30 99. I
2.00100. I
2.30101. I
3.00102. I
3.30103. I
4.00104. I
4.30105. I
5.00106. I
5.30107. I
6.00108. I
6.30109. I
7.00110. I
7.30111. I
8.00112. I

```
 8.30113.I
 9.00114I
 9.30115I
10.00116I
10.30117I
11.00118I
11.30119I
12.00120I
```

1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 5

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	3.	10.	19.	24.	24.	20.	17.	13.	10.
7.	5.	4.	3.	2.	2.	2.	2.	2.	2.
2.	3.	4.	4.	5.	5.	5.	5.	6.	6.
6.	9.	13.	18.	22.	25.	27.	29.	30.	31.
32.	32.	38.	58.	95.	295.	576.	826.	1087.	1517.
2109.	2729.	3278.	3654.	3812.	3758.	3468.	3046.	2579.	2131.
1707.	1353.	1057.	816.	669.	565.	457.	344.	239.	157.
82.	40.	39.	37.	36.	34.	33.	32.	30.	29.
28.	27.	26.	25.	24.	23.	22.	21.	20.	19.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3812.	2809.	898.	363.	43533.
CMS	108.	80.	25.	10.	1233.
INCHES		68.76	87.92	88.81	88.81
MM		1746.53	2233.19	2255.68	2255.68
AC-FT		1393.	1781.	1799.	1799.
THOUS CU M		1718.	2197.	2219.	2219.

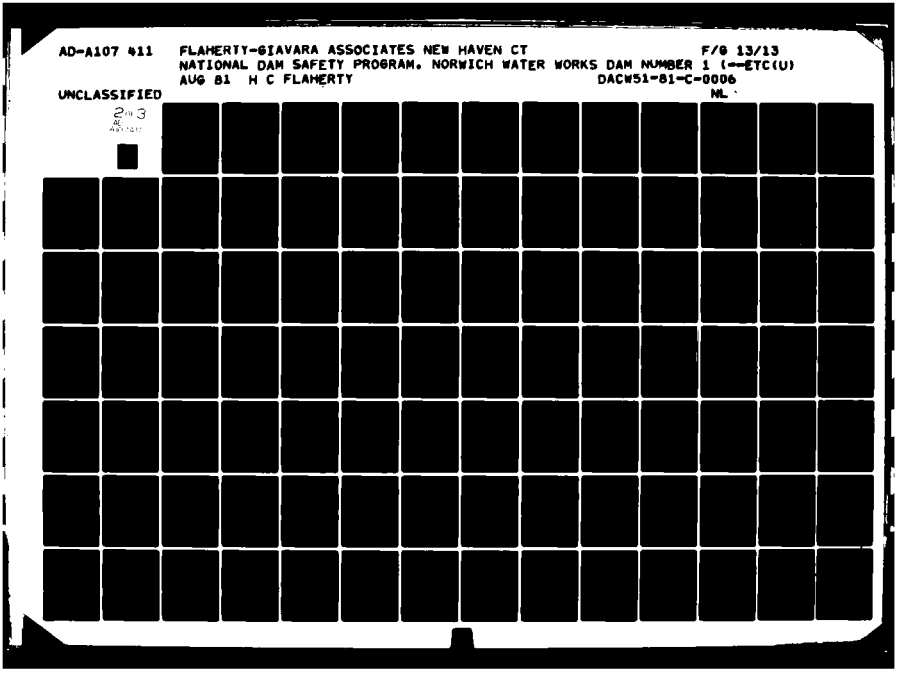
1*OVF*

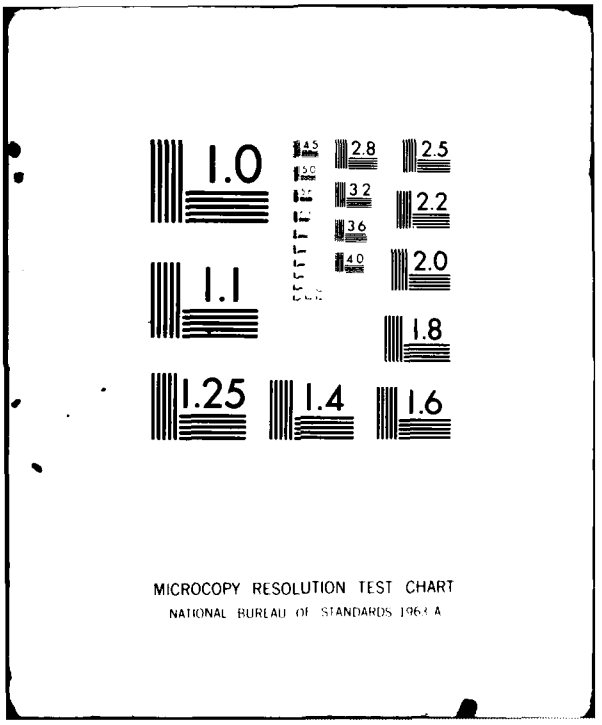
STATION 1

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

	0.	400.	800.	1200.	1600.	2000.	2400.	2800.	3200.	3600.	4000.	0.	0.
0 30	1I												
1 00	2I												
1 30	3I												
2 00	4I												
2 30	5I												
3 00	6I												
3 30	7I												
4 00	8I												
4 30	9I												
5 00	10I												
5 30	11I												
6 00	12I												
6 30	13I												
7 00	14I												
7 30	15I												
8 00	16I												
8 30	17I												

AD-A107 411 FLAHERTY-GIAVARA ASSOCIATES NEW HAVEN CT F/G 13/13
NATIONAL DAM SAFETY PROGRAM. NORWICH WATER WORKS DAM NUMBER 1 (--ETC(U)
AUG 81 H C FLAHERTY DACW51-81-C-0006
UNCLASSIFIED NL

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

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 9.00 18I
 9.30 19I
10.00 20I
10.30 21I
11.00 22I
11.30 23I
12.00 24I
12.30 25I
13.00 26I
13.30 27I
14.00 28I
14.30 29I
15.00 30I
15.30 31I
16.00 32I
16.30 33I
17.00 34I
17.30 35. I
18.00 36. I
18.30 37. I
19.00 38I
19.30 39I
20.00 40I
20.30 41I
21.00 42I
21.30 43I
22.00 44I
22.30 45I
23.00 46I
23.30 47I
 0.00 48I
 0.30 49I
 1.00 50I
 1.30 51I
 2.00 52I
 2.30 53I
 3.00 54I
 3.30 55I
 4.00 56I
 4.30 57I
 5.00 58I
 5.30 59I
 6.00 60I
 6.30 61I
 7.00 62I
 7.30 63I
 8.00 64I
 8.30 65. I
 9.00 66. I
 9.30 67. I
10.00 68. I
10.30 69. I
11.00 70. I
11.30 71. I
12.00 72. I
12.30 73. I
13.00 74. I
13.30 75.  I
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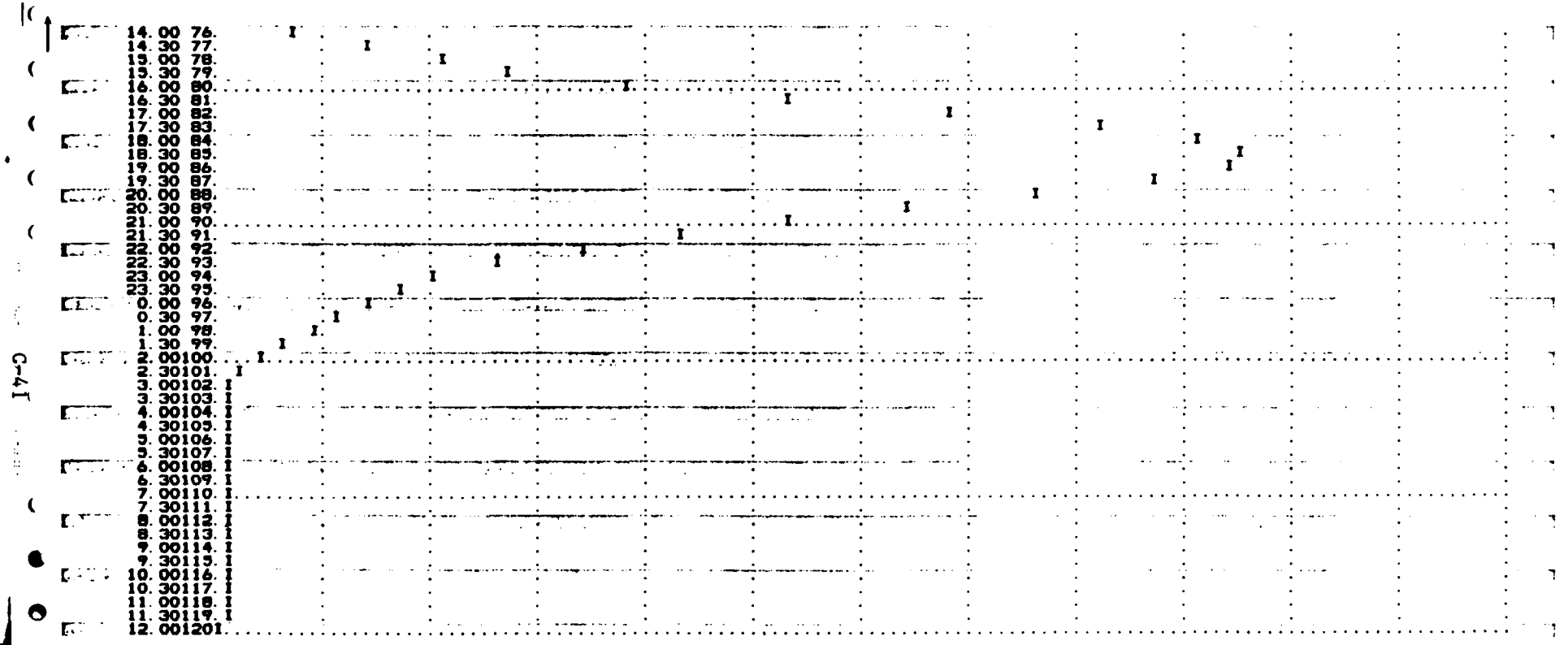


C-41

1*DVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 6

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	3.	12.	22.	29.	28.	24.	20.	16.	12.
8.	6.	4.	3.	3.	3.	3.	2.	2.	2.
2.	3.	4.	5.	6.	6.	6.	7.	7.	7.

8.	11.	16.	22.	27.	30.	33.	35.	36.	37.
38.	38.	46.	70.	114.	355.	692.	991.	1304.	1820.
2531.	3274.	3934.	4385.	4575.	4509.	4162.	3655.	3099.	2557.
2049.	1624.	1268.	979.	803.	678.	548.	413.	286.	189.
98.	48.	46.	45.	43.	41.	40.	38.	36.	35.
34.	32.	31.	30.	29.	27.	26.	25.	24.	23.

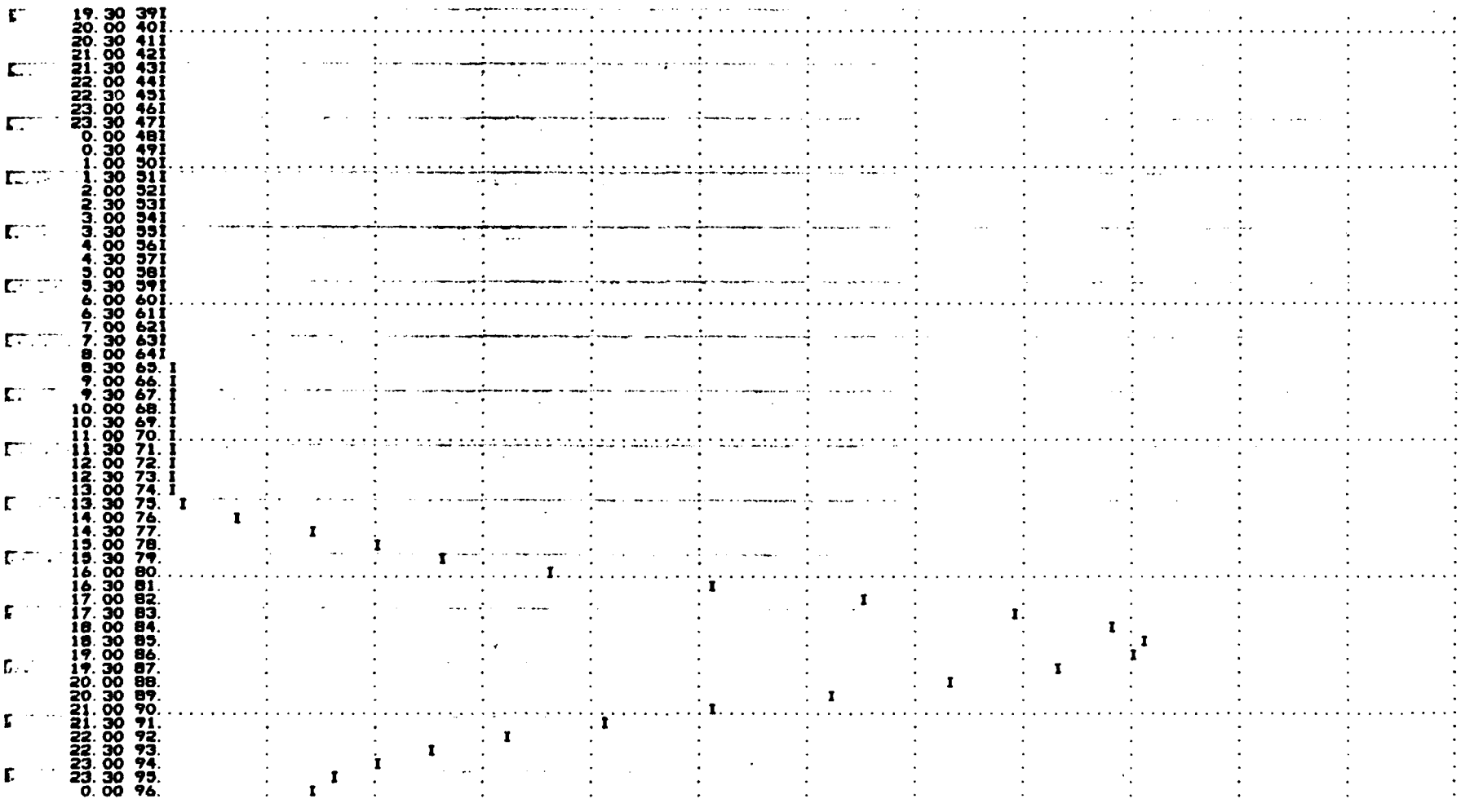
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4575.	3371.	1077.	435.	52239.
CMS	130.	95.	31.	12.	1479.
INCHES		82.51	105.51	106.57	106.57
MM		2095.84	2679.83	2706.81	2706.81
AC-FT		1671.	2137.	2159.	2159.
THOUS CU M		2062.	2636.	2663.	2663.

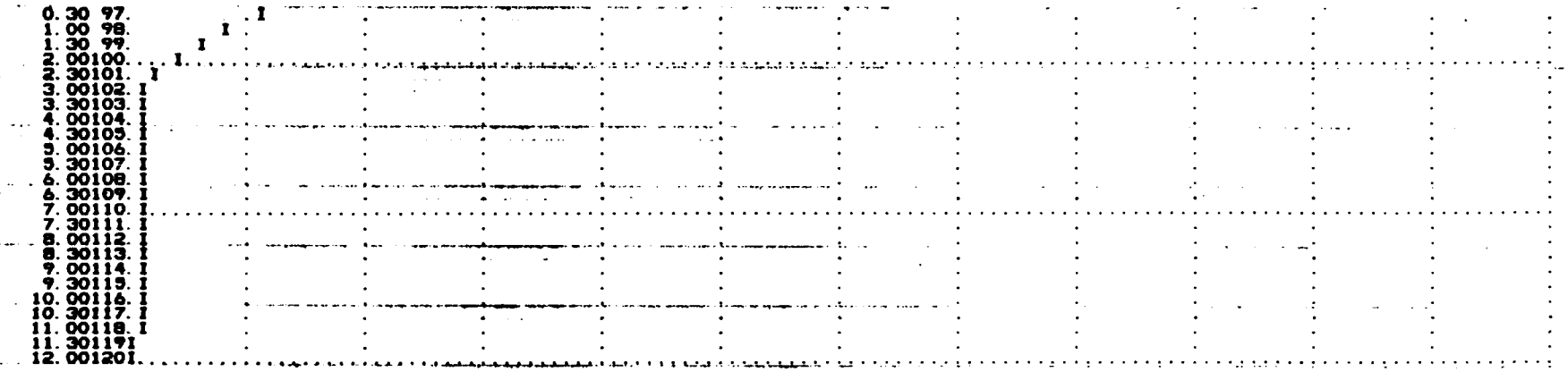
1*OVF*

STATION 1

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

	0.	500.	1000.	1500.	2000.	2500.	3000.	3500.	4000.	4500.	5000.	0.	0.
0.30	11												
1.00	21												
1.30	31												
2.00	41												
2.30	51												
3.00	61												
3.30	71												
4.00	81												
4.30	91												
5.00	101												
5.30	111												
6.00	121												
6.30	131												
7.00	141												
7.30	151												
8.00	161												
8.30	171												
9.00	181												
9.30	191												
10.00	201												
10.30	211												
11.00	221												
11.30	231												
12.00	241												
12.30	251												
13.00	261												
13.30	271												
14.00	281												
14.30	291												
15.00	301												
15.30	311												
16.00	321												
16.30	331												
17.00	341												
17.30	35. I												
18.00	36. I												
18.30	371												
19.00	381												


19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 65.
9.00 66.
9.30 67.
10.00 68.
10.30 69.
11.00 70.
11.30 71.
12.00 72.
12.30 73.
13.00 74.
13.30 75.
14.00 76.
14.30 77.
15.00 78.
15.30 79.
16.00 80.
16.30 81.
17.00 82.
17.30 83.
18.00 84.
18.30 85.
19.00 86.
19.30 87.
20.00 88.
20.30 89.
21.00 90.
21.30 91.
22.00 92.
22.30 93.
23.00 94.
23.30 95.
0.00 96.



1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 7

1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	4.	14.	26.	33.	33.	28.	23.	18.	14.	
10.	7.	5.	4.	3.	3.	3.	3.	3.	3.	
3.	4.	5.	6.	7.	7.	7.	8.	8.	8.	
9.	12.	18.	25.	31.	35.	38.	41.	42.	43.	
44.	65.	93.	81.	133.	414.	807.	1156.	1522.	2123.	
2953.	3820.	4589.	5116.	5337.	5261.	4856.	4264.	3611.	2983.	
2390.	1895.	1479.	1142.	937.	791.	640.	481.	334.	220.	
115.	56.	54.	52.	50.	48.	46.	44.	42.	41.	
39.	38.	36.	35.	33.	32.	31.	30.	28.	27.	

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5337.	3932.	1257.	508.	60946.
CMS	151.	111.	36.	14.	1726.
INCHES		76.27	123.09	124.33	124.33
MM		2445.19	3126.47	3157.95	3157.95
AC-FT		1930.	2493.	2518.	2518.
THOUS CU M		2409.	3075.	3106.	3106.

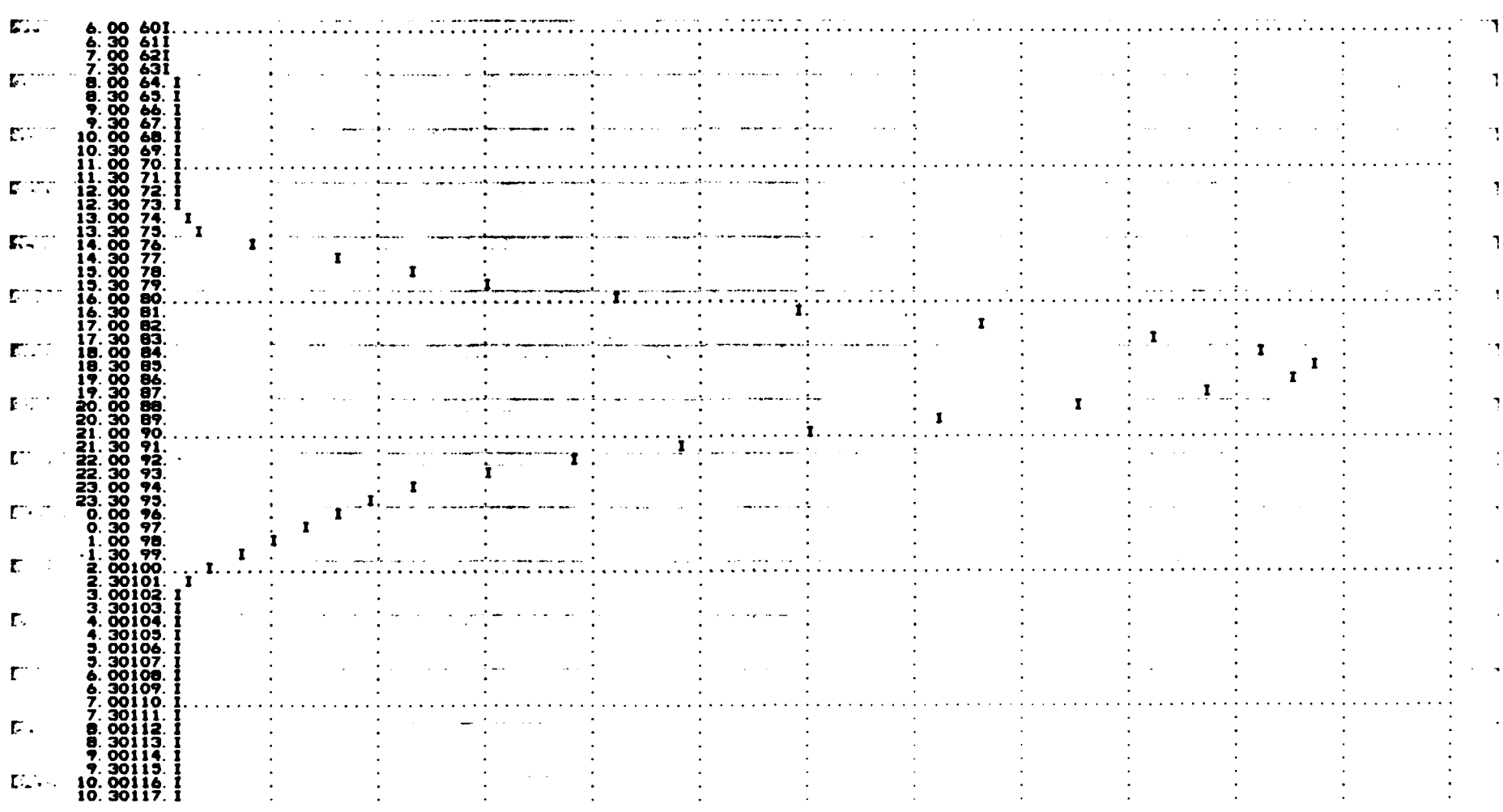
1*OVF*

STATION 1

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

0.	500.	1000.	1500.	2000.	2500.	3000.	3500.	4000.	4500.	5000.	5500.	0.
0.30 11											

1.00 21I
1.30 31I
2.00 41I
2.30 51I
3.00 61I
3.30 71I
4.00 81I
4.30 91I
5.00 101I
5.30 111I
6.00 121I
6.30 131I
7.00 141I
7.30 151I
8.00 161I
8.30 171I
9.00 181I
9.30 191I
10.00 201I
10.30 211I
11.00 221I
11.30 231I
12.00 241I
12.30 251I
13.00 261I
13.30 271I
14.00 281I
14.30 291I
15.00 301I
15.30 311I
16.00 321I
16.30 331I
17.00 34. I
17.30 35. I
18.00 36. I
18.30 37. I
19.00 381I
19.30 391I
20.00 401I
20.30 411I
21.00 421I
21.30 431I
22.00 441I
22.30 451I
23.00 461I
23.30 471I
0.00 481I
0.30 491I
1.00 501I
1.30 511I
2.00 521I
2.30 531I
3.00 541I
3.30 551I
4.00 561I
4.30 571I
5.00 581I
5.30 591I


6.00 601
6.30 611
7.00 621
7.30 631
8.00 64.
8.30 65.
9.00 66.
9.30 67.
10.00 68.
10.30 69.
11.00 70.
11.30 71.
12.00 72.
12.30 73.
13.00 74.
13.30 75.
14.00 76.
14.30 77.
15.00 78.
15.30 79.
16.00 80.
16.30 81.
17.00 82.
17.30 83.
18.00 84.
18.30 85.
19.00 86.
19.30 87.
20.00 88.
20.30 89.
21.00 90.
21.30 91.
22.00 92.
22.30 93.
23.00 94.
23.30 95.
0.00 96.
0.30 97.
1.00 98.
1.30 99.
2.00100.
2.30101.
3.00102.
3.30103.
4.00104.
4.30105.
5.00106.
5.30107.
6.00108.
6.30109.
7.00110.
7.30111.
8.00112.
8.30113.
9.00114.
9.30115.
10.00116.
10.30117.

```
11.00118.I
11.30119.I
12.00120.I
```

1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 8

1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	3.	16.	30.	38.	38.	32.	27.	21.	16.
11.	8.	6.	4.	4.	4.	3.	3.	3.	3.
3.	4.	6.	7.	8.	8.	8.	9.	9.	9.
10.	14.	21.	29.	35.	40.	44.	46.	48.	50.
51.	51.	61.	93.	152.	473.	922.	1321.	1739.	2427.
3379.	4366.	5249.	5847.	6100.	6013.	5550.	4873.	4127.	3409.
2732.	2166.	1691.	1305.	1070.	904.	731.	550.	382.	252.
131.	69.	62.	59.	57.	55.	53.	51.	49.	47.
45.	43.	41.	40.	38.	37.	35.	34.	32.	31.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6100.	4494.	1437.	580.	69692.
CMS	173.	127.	41.	16.	1972.
INCHES		110.02	140.67	142.09	142.09
MM		2794.45	3573.10	3609.08	3609.08
AC-FT		2229.	2850.	2878.	2878.
THOUS CU M		2749.	3515.	3550.	3550.

1*OVF*

STATION 1

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

	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	0.	0.	0.	0.	0.
0.30	1I												
1.00	2I												
1.30	3I												
2.00	4I												
2.30	5I												
3.00	6I												
3.30	7I												
4.00	8I												
4.30	9I												
5.00	10I												
5.30	11I												
6.00	12I												
6.30	13I												
7.00	14I												
7.30	15I												
8.00	16I												
8.30	17I												
9.00	18I												
9.30	19I												
10.00	20I												
10.30	21I												
11.00	22I												

```
11.30 231I
12.00 241I
12.30 251I
13.00 261I
13.30 271I
14.00 281I
14.30 291I
15.00 301I
15.30 311I
16.00 321I
16.30 331I
17.00 341I
17.30 351I
18.00 361I
18.30 371I
19.00 381I
19.30 391I
20.00 401I
20.30 411I
21.00 421I
21.30 431I
22.00 441I
22.30 451I
23.00 461I
23.30 471I
0.00 481I
0.30 491I
1.00 501I
1.30 511I
2.00 521I
2.30 531I
3.00 541I
3.30 551I
4.00 561I
4.30 571I
5.00 581I
5.30 591I
6.00 601I
6.30 611I
7.00 621I
7.30 631I
8.00 641I
8.30 651I
9.00 661I
9.30 671I
10.00 681I
10.30 691I
11.00 701I
11.30 71. I
12.00 72. I
12.30 73. I
13.00 74. I
13.30 75. I
14.00 76.  I
14.30 77.   I
15.00 78.    I
15.30 79.     I
16.00 80.      I
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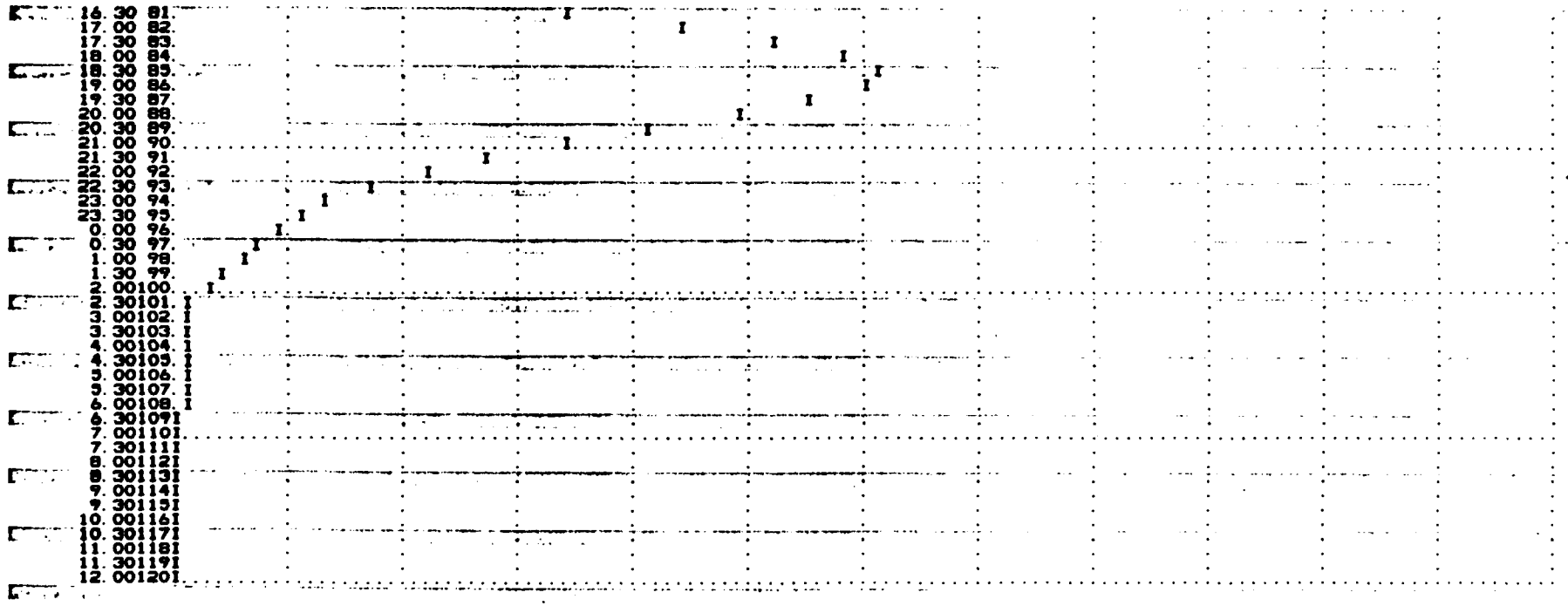

1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 9

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	6.	20.	37.	48.	47.	40.	33.	26.	19.
14.	10.	7.	5.	5.	4.	4.	4.	4.	4.
4.	6.	7.	8.	9.	10.	11.	11.	11.	11.
13.	18.	26.	36.	44.	50.	55.	58.	60.	62.
63.	64.	76.	116.	190.	391.	1153.	1651.	2174.	3033.
4218.	5457.	6556.	7309.	7625.	7516.	6937.	6091.	5159.	4261.
3419.	2707.	2113.	1632.	1338.	1130.	914.	688.	477.	314.
164.	81.	77.	74.	71.	69.	66.	63.	61.	58.

56. 54. 52. 50. 48. 46. 44. 42. 40. 39.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7625.	5618.	1796.	726.	87066.
CMS	216.	159.	51.	21.	2465.
INCHES		137.52	175.84	177.61	177.61
MM		3493.06	4466.38	4511.39	4511.39
AC-FT		2786.	3562.	3598.	3598.
THOUS CU M		3436.	4394.	4438.	4438.

1=OVF*

STATION 1

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

0. 1000. 2000. 3000. 4000. 5000. 6000. 7000. 8000. 0. 0. 0. 0.

0.30	11I
1.00	21I
1.30	31I
2.00	41I
2.30	51I
3.00	61I
3.30	71I
4.00	81I
4.30	91I
5.00	101I
5.30	111I
6.00	121I
6.30	131I
7.00	141I
7.30	151I
8.00	161I
8.30	171I
9.00	181I
9.30	191I
10.00	201I
10.30	211I
11.00	221I
11.30	231I
12.00	241I
12.30	251I
13.00	261I
13.30	271I
14.00	281I
14.30	291I
15.00	301I
15.30	311I
16.00	321I
16.30	331I
17.00	341I
17.30	351I
18.00	361I
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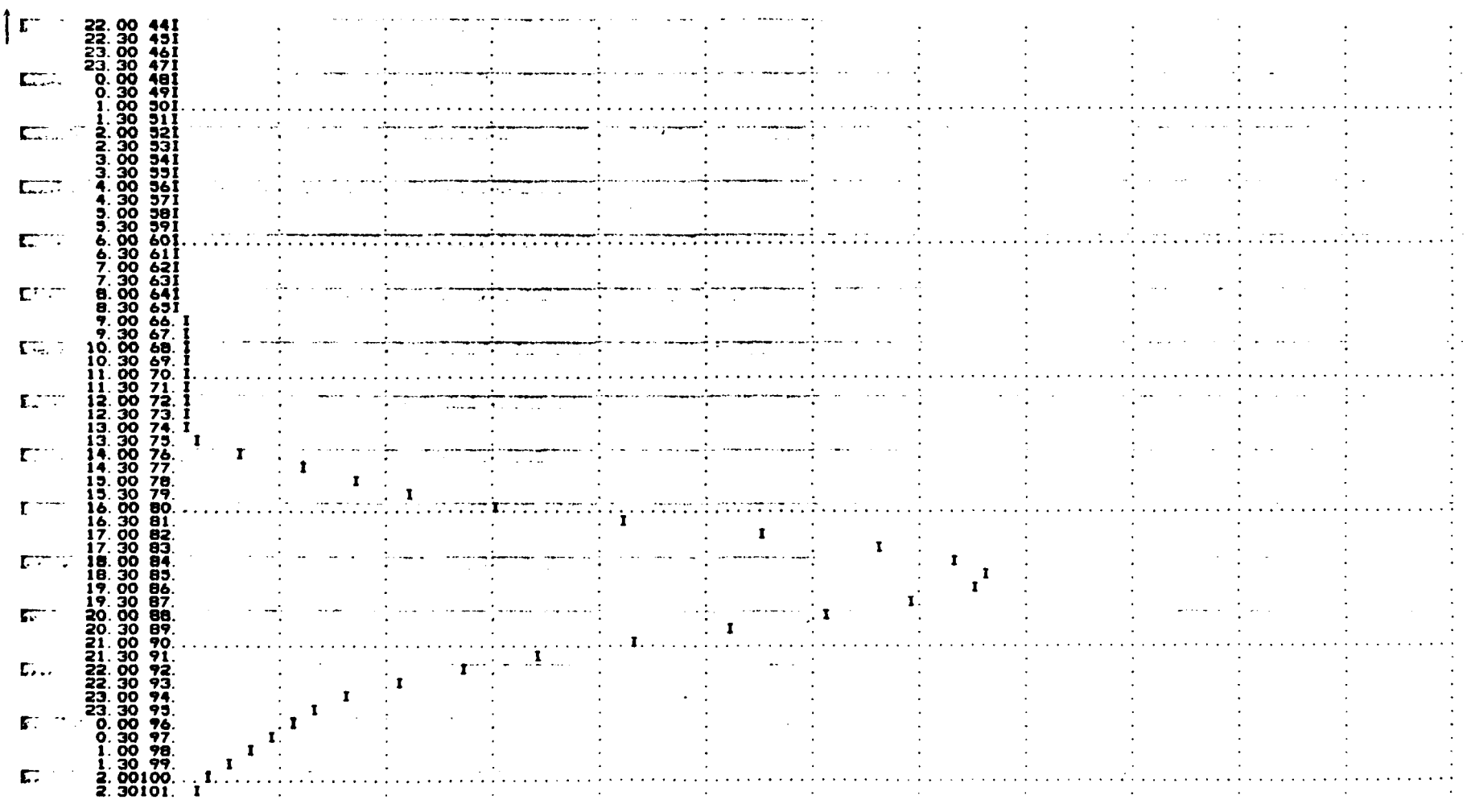
C-50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8.00 64
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19.30 87
20.00 88
20.30 89
21.00 90
21.30 91
22.00 92
22.30 93
23.00 94
23.30 95
0.00 96
0.30 97
1.00 98
1.30 99
2.00100
2.30101

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     8.30113.I
     9.00114I
     9.30115I
    10.00116I
    10.30117I
    11.00118I
    11.30119I
    12.00120I
```

1*DVN*

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

HYDROGRAPH ROUTING

RESERVOIR ROUTING MODIFIED PULS METHOD

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

ROUTING DATA

GLOSS	CLOSS	AVQ	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
3	0	0	0.000	0.000	0.000	0.	-1

STAGE	1190.40	1190.70	1190.90	1191.90	1192.90	1194.00	1194.50	1195.40	1196.40
FLOW	0.00	21.10	46.10	246.90	535.00	927.40	1192.60	1519.10	1986.40
SURFACE AREA=	7.	12.	17.						
CAPACITY=	0.	94.	242.						
ELEVATION=	1190.	1201.	1211.						

CREL	SPWID	COGW	EXPW	ELEVL	COGL	CAREA	EXPL
1190.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COGD	EXPD	DAMWID
1194.5	2.5	1.5	215.

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	1.	1.	2.	3.	4.	4.	3.	3.
3.	2.	2.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	1.	2.	2.	3.	3.	4.	5.	5.	5.
6.	6.	6.	7.	10.	21.	62.	121.	173.	237.
347.	468.	589.	690.	744.	756.	724.	654.	565.	480.
393.	316.	249.	203.	163.	133.	110.	87.	65.	46.
34.	22.	17.	13.	11.	10.	9.	8.	7.	7.
6.	6.	6.	6.	5.	5.	5.	5.	4.	4.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	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.	2.	4.	6.	8.	10.
13.	16.	19.	21.	22.	23.	22.	20.	18.	16.
14.	12.	10.	9.	7.	6.	5.	5.	4.	3.
3.	2.	2.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.

STAGE

1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.5	1190.5	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.5	1190.5	1190.5	1190.5
1190.5	1190.5	1190.5	1190.5	1190.5	1190.7	1191.0	1191.3	1191.5	1191.9
1192.2	1192.7	1193.1	1193.3	1193.3	1193.3	1193.4	1193.2	1193.0	1192.7
1192.4	1192.1	1191.9	1191.7	1191.5	1191.3	1191.2	1191.1	1191.0	1190.9
1190.8	1190.7	1190.6	1190.6	1190.6	1190.5	1190.5	1190.5	1190.5	1190.5
1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5

PEAK OUTFLOW IS 756. AT TIME 43.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	756.	557.	180.	72.	8693.
CMS	21.	16.	5.	2.	246.
INCHES		13.65	17.58	17.73	17.73
MM		346.64	446.45	450.45	450.45
AC-FT		276.	356.	359.	359.
THOUS CU M		341.	439.	443.	443.

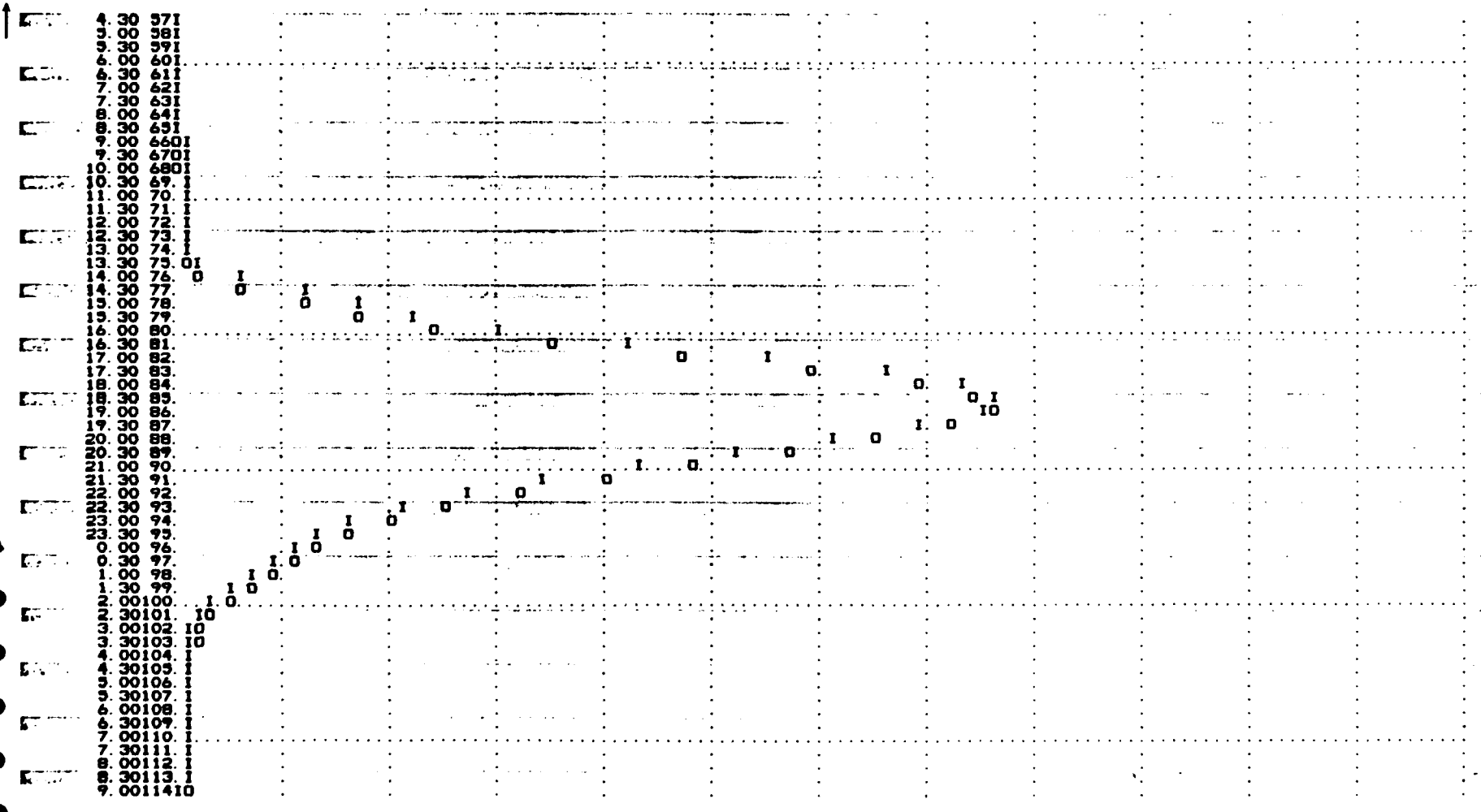
1*OVF*

STATION 1

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

0. 100. 200. 300. 400. 500. 600. 700. 800. 0. 0. 0. 0.

0.30 11
1.00 21
1.30 31
2.00 41
2.30 51
3.00 61
3.30 71
4.00 81
4.30 91
5.00 101
5.30 111
6.00 121
6.30 131
7.00 141
7.30 151
8.00 161
8.30 171
9.00 181
9.30 191
10.00 201
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561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9.00 66OI
9.30 67OI
10.00 68OI
10.30 69. I
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11.30 71. I
12.00 72. I
12.30 73. I
13.00 74. I
13.30 75. OI
14.00 76. O I
14.30 77. O I
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15.30 79. O I
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16.30 81. O I
17.00 82. O I
17.30 83. O I
18.00 84. O I
18.30 85. O I
19.00 86. I O
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20.00 88. I O
20.30 89. I O
21.00 90. I O
21.30 91. I O
22.00 92. I O
22.30 93. I O
23.00 94. I O
23.30 95. I O
0.00 96. I O
0.30 97. I O
1.00 98. I O
1.30 99. I O
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3.00102. IO
3.30103. IO
4.00104. I
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6.00108. I
6.30109. I
7.00110. I
7.30111. I
8.00112. I
8.30113. I
9.0011410

9. 3011510
10. 0011610
10. 301171
11. 001181
11. 301191
12. 001201

1*DVN*

STATION 1, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	1.	3.	5.	6.	7.	7.	7.	6.
5.	4.	3.	3.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	2.	2.	2.	2.	2.
2.	2.	3.	4.	6.	7.	8.	9.	10.	11.
11.	12.	13.	15.	21.	55.	145.	245.	368.	502.
714.	960.	1231.	1427.	1516.	1513.	1422.	1269.	1106.	922.
776.	619.	491.	388.	307.	253.	216.	175.	131.	92.
59.	36.	29.	20.	18.	17.	16.	13.	14.	13.
13.	12.	11.	11.	11.	10.	10.	9.	9.	9.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	4.	7.	10.	13.	17.
22.	27.	32.	34.	35.	35.	34.	32.	29.	27.
23.	20.	17.	14.	12.	10.	9.	8.	6.	5.
4.	3.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

STAGE

1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5
1190.5	1190.5	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.6
1190.6	1190.6	1190.6	1190.6	1190.7	1190.9	1191.4	1191.9	1192.3	1192.8
1193.4	1194.1	1194.6	1194.8	1194.9	1194.9	1194.8	1194.6	1194.3	1194.0
1193.6	1193.1	1192.7	1192.4	1192.1	1191.9	1191.7	1191.5	1191.3	1191.1
1191.0	1190.8	1190.7	1190.7	1190.7	1190.6	1190.6	1190.6	1190.6	1190.6
1190.6	1190.6	1190.6	1190.6	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5

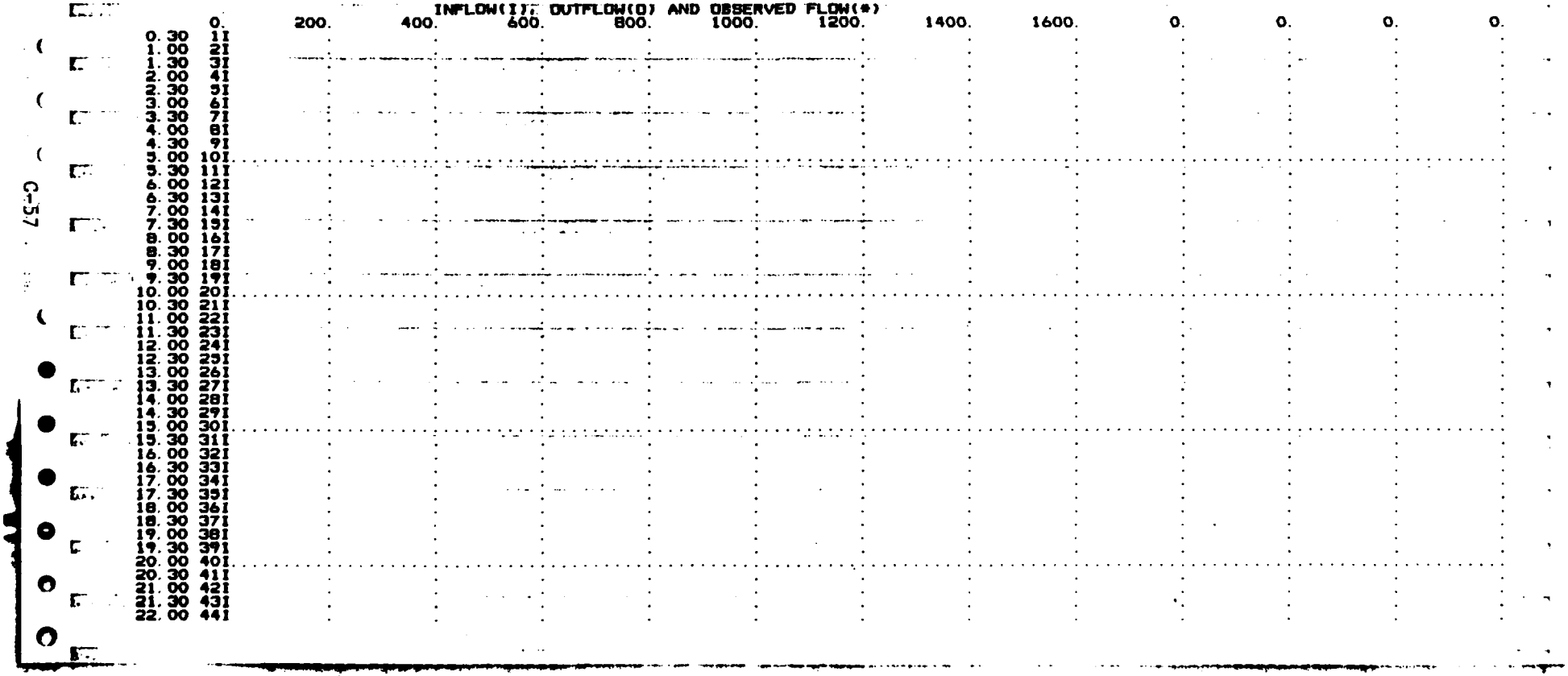
PEAK OUTFLOW IS 1516. AT TIME 42.50 HOURS

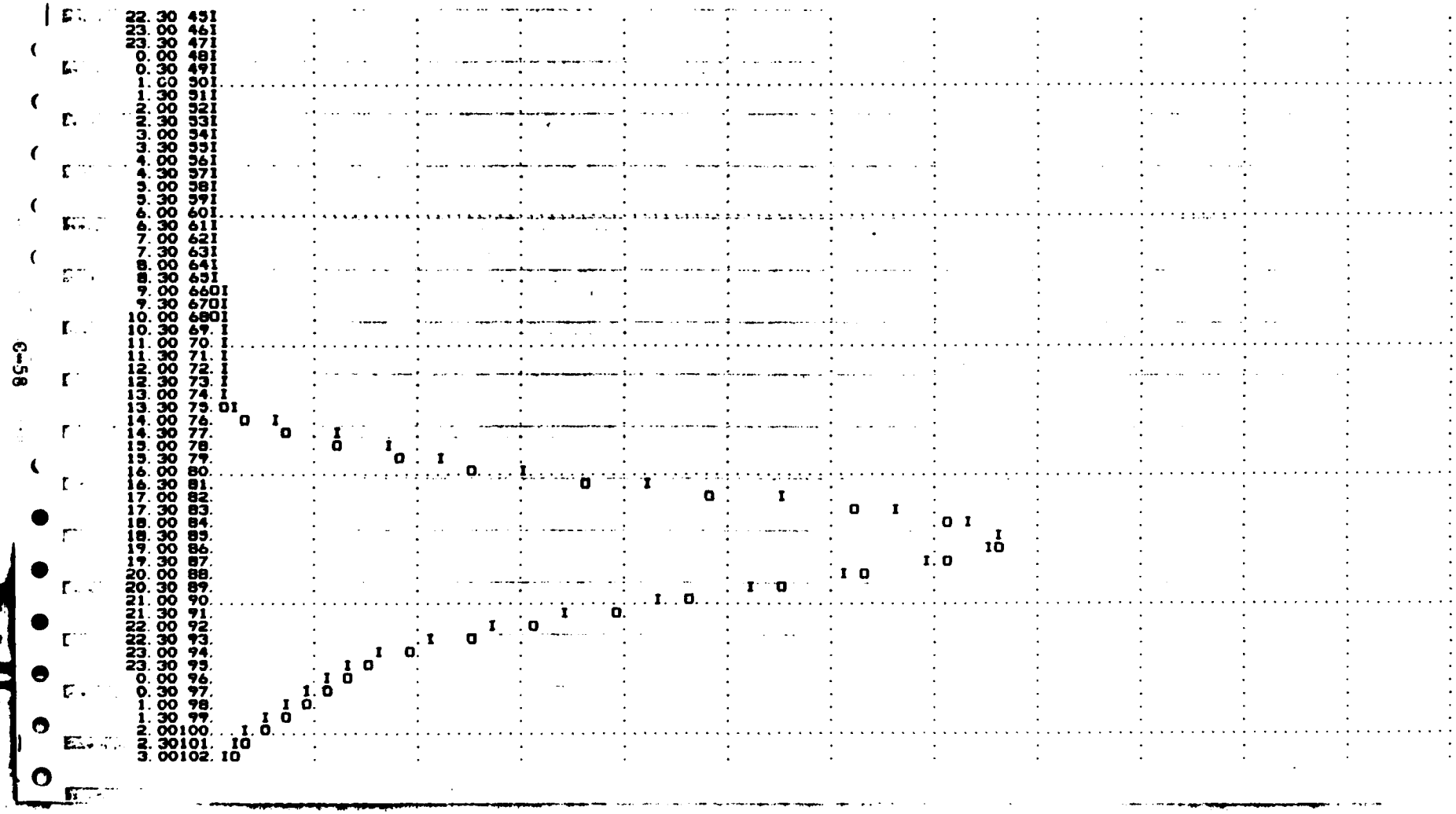
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1516.	1118.	359.	145.	17390.
CMS	43.	32.	10.	4.	492.
INCHES		27.37	35.16	35.48	35.48
MM		695.18	892.99	901.09	901.09
AC-FT		554.	712.	719.	719.
THOUS CU M		684.	878.	886.	886.

1*OVF*

STATION 1

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

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0.30 491
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1.30 511
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2.30 531
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3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
9.00 6601
9.30 6701
10.00 6801
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22.00 92.
22.30 93.
23.00 94.
23.30 95.
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0.30 97.
1.00 98.
1.30 99.
2.00100.
2.30101.
3.00102.

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   4.30105.I
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  10.0011610
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  11.301191
  12.001201
```

1*OVN*

STATION 1, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	2.	4.	7.	10.	11.	11.	10.	9.
8.	6.	5.	4.	3.	2.	2.	2.	2.	1.
1.	1.	2.	2.	2.	2.	3.	3.	3.	3.
3.	4.	5.	6.	8.	10.	12.	14.	15.	16.
17.	18.	19.	23.	36.	94.	218.	393.	553.	772.
1098.	1533.	1909.	2159.	2280.	2267.	2119.	1878.	1610.	1346.
1118.	898.	732.	568.	458.	380.	315.	248.	194.	138.
88.	49.	34.	28.	25.	23.	21.	21.	20.	19.
18.	18.	17.	16.	16.	15.	15.	14.	13.	13.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
1.	1.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	2.
2.	2.	2.	2.	3.	5.	9.	14.	18.	23.
29.	35.	38.	40.	41.	41.	40.	38.	36.	33.
30.	26.	22.	19.	16.	14.	12.	10.	8.	6.
5.	3.	3.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	1.	1.	1.	1.	1.	1.

STAGE

1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4

1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.5	1190.5	1190.5	1190.6	1190.6	1190.5	1190.5
1190.5	1190.5	1190.5	1190.5	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.5	1190.5	1190.5	1190.5	1190.5	1190.6	1190.6	1190.6	1190.6
1190.6	1190.7	1190.7	1190.7	1190.8	1191.1	1191.8	1192.4	1193.0	1193.6
1194.3	1195.0	1195.3	1195.5	1195.6	1195.6	1195.5	1195.3	1195.0	1194.7
1194.4	1193.9	1193.5	1193.0	1192.6	1192.4	1192.1	1191.9	1191.6	1191.4
1191.1	1190.9	1190.8	1190.8	1190.7	1190.7	1190.7	1190.7	1190.7	1190.7
1190.7	1190.7	1190.6	1190.6	1190.6	1190.6	1190.6	1190.6	1190.6	1190.6

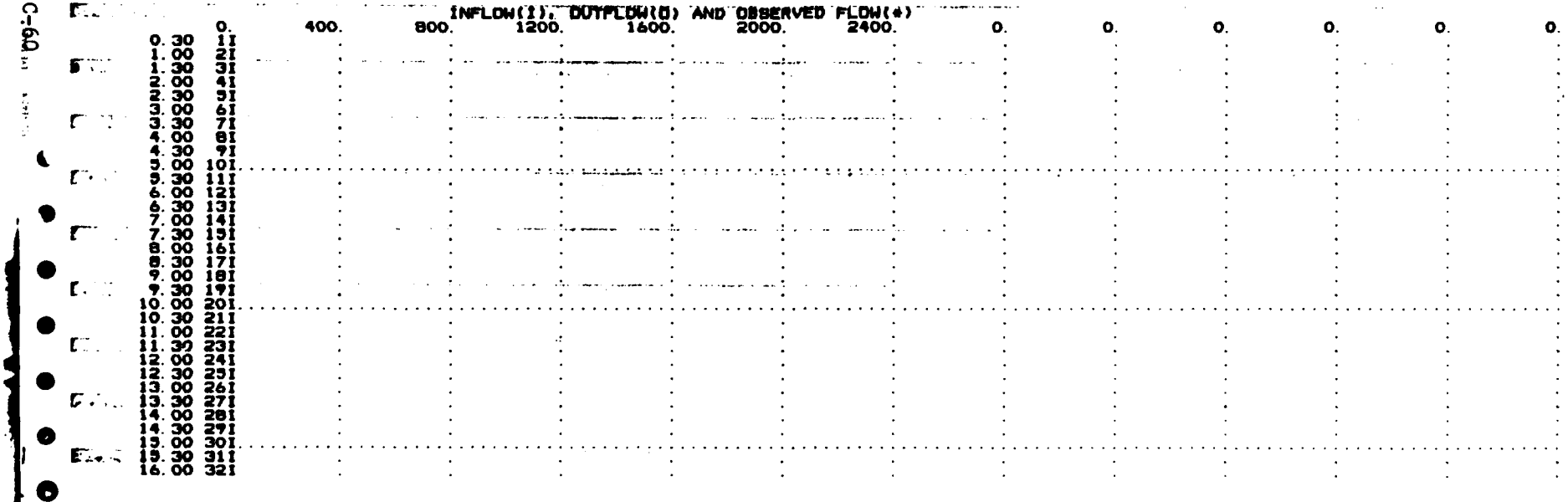
PEAK OUTFLOW IS 2280. AT TIME 42.50 HOURS

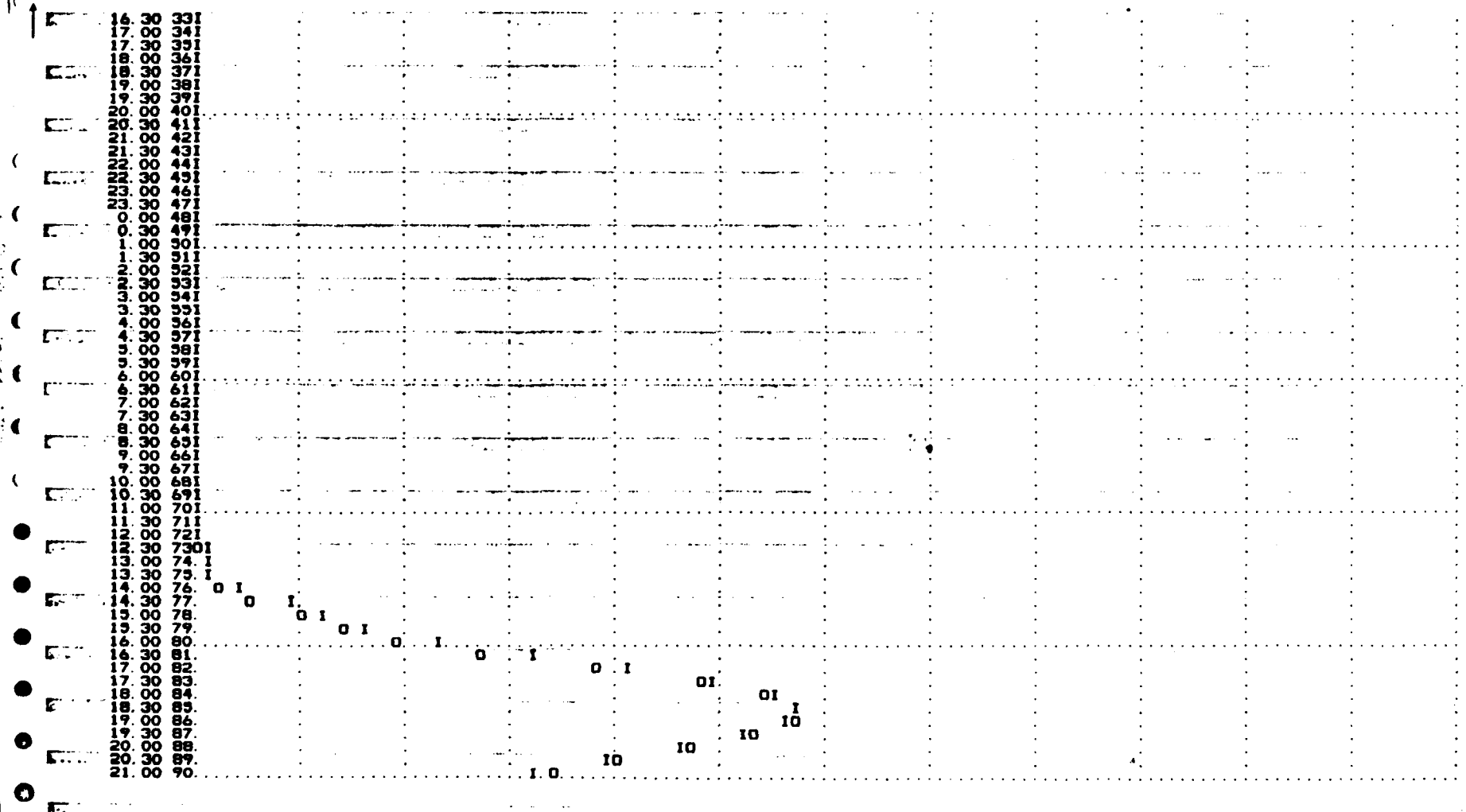
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2280.	1679.	539.	217.	26087.
CMS	65.	48.	15.	6.	739.
INCHES		41.11	52.73	53.22	53.22
MM		1044.24	1339.46	1351.71	1351.71
AC-FT		833.	1068.	1078.	1078.
THOUS CU M		1027.	1318.	1330.	1330.

1*OVF*

STATION 1

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

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17.30 35I
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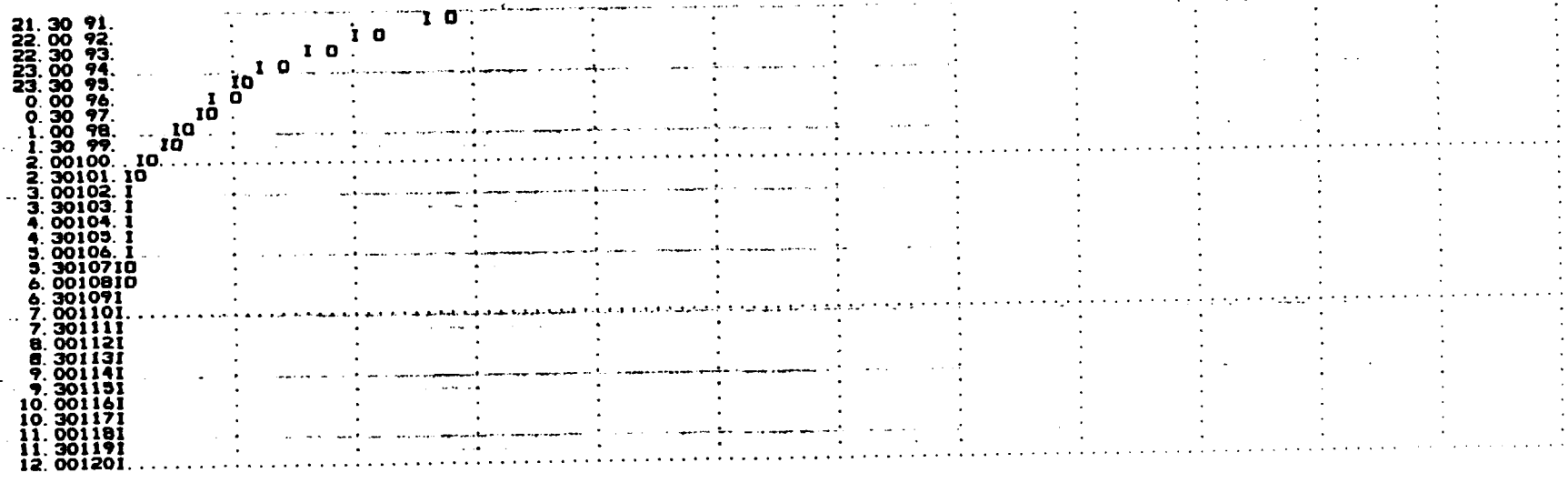
19.00 38I
19.30 39I
20.00 40I
20.30 41I
21.00 42I
21.30 43I
22.00 44I
22.30 45I
23.00 46I
23.30 47I
0.00 48I
0.30 49I
1.00 50I
1.30 51I
2.00 52I
2.30 53I
3.00 54I
3.30 55I
4.00 56I
4.30 57I
5.00 58I
5.30 59I
6.00 60I
6.30 61I
7.00 62I
7.30 63I
8.00 64I
8.30 65I
9.00 66I
9.30 67I
10.00 68I
10.30 69I
11.00 70I
11.30 71I
12.00 72I
12.30 73OI
13.00 74. I
13.30 75. I
14.00 76. O I
14.30 77. O I
15.00 78. O I
15.30 79. O I
16.00 80. O I
16.30 81. O I
17.00 82. O I
17.30 83. OI
18.00 84. OI
18.30 85. I
19.00 86. IO
19.30 87. IO
20.00 88. IO
20.30 89. IO
21.00 90. I O

C-61



1*OVN*

STATION 1, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	2.	6.	10.	13.	15.	15.	14.	12.
10.	8.	7.	5.	4.	3.	3.	2.	2.	2.
2.	2.	2.	2.	3.	3.	4.	4.	4.	4.
4.	5.	6.	8.	11.	14.	17.	19.	20.	22.
24.	25.	26.	33.	50.	130.	301.	530.	756.	1045.
1540.	2101.	2552.	2887.	3039.	3022.	2821.	2494.	2128.	1775.
1445.	1173.	937.	757.	600.	501.	420.	332.	244.	181.
117.	66.	41.	35.	32.	30.	28.	27.	26.	25.
24.	23.	22.	21.	20.	20.	19.	18.	18.	17.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
0.	0.	0.	1.	1.	1.	1.			

1.	1.	1.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	1.	1.	1.	1.	2.	2.	2.	2.
2.	2.	2.	3.	3.	6.	12.	18.	23.	29.
35.	40.	43.	45.	46.	46.	45.	42.	40.	37.
34.	31.	27.	23.	19.	17.	15.	12.	10.	8.
6.	4.	3.	3.	3.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.

STAGE

1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.5	1190.5	1190.6	1190.6	1190.6	1190.6	1190.6
1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.5	1190.5	1190.5
1190.5	1190.5	1190.5	1190.5	1190.6	1190.6	1190.6	1190.7	1190.7	1190.7
1190.7	1190.7	1190.7	1190.8	1190.9	1191.3	1192.1	1192.9	1193.5	1194.2
1195.0	1195.5	1195.8	1196.1	1196.2	1196.2	1196.0	1195.8	1195.5	1195.2
1194.9	1194.5	1194.0	1193.5	1193.1	1192.8	1192.5	1192.2	1191.9	1191.6
1191.3	1191.0	1190.9	1190.8	1190.8	1190.8	1190.8	1190.7	1190.7	1190.7
1190.7	1190.7	1190.7	1190.7	1190.7	1190.7	1190.7	1190.7	1190.7	1190.6

PEAK OUTFLOW IS 3039. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3039.	2243.	718.	290.	34785.
CMS	86.	64.	20.	8.	985.
INCHES		54.91	70.32	70.96	70.96
MM		1394.59	1786.02	1802.40	1802.40
AC-FT		1112.	1424.	1437.	1437.
THOUS CU M		1372.	1757.	1773.	1773.

1*OVF*

STATION 1

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

	0.	400.	800.	1200.	1600.	2000.	2400.	2800.	3200.	0.	0.	0.	0.
0.30	11												
1.00	21												
1.30	31												
2.00	41												
2.30	51												
3.00	61												
3.30	71												
4.00	81												
4.30	91												
5.00	101												
5.30	111												
6.00	121												
6.30	131												
7.00	141												
7.30	151												
8.00	161												
8.30	171												
9.00	181												
9.30	191												
10.00	201												

```
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
 0.00 481
 0.30 491
 1.00 501
 1.30 511
 2.00 521
 2.30 531
 3.00 541
 3.30 551
 4.00 561
 4.30 571
 5.00 581
 5.30 591
 6.00 601
 6.30 611
 7.00 621
 7.30 631
 8.00 641
 8.30 651
 9.00 6601
 9.30 6701
10.00 6801
10.30 69. I
11.00 70. I
11.30 71. I
12.00 72. I
12.30 73. I
13.00 74. I
13.30 75. OI
14.00 76.  O  I
14.30 77.     O  I
15.00 78.        O  I
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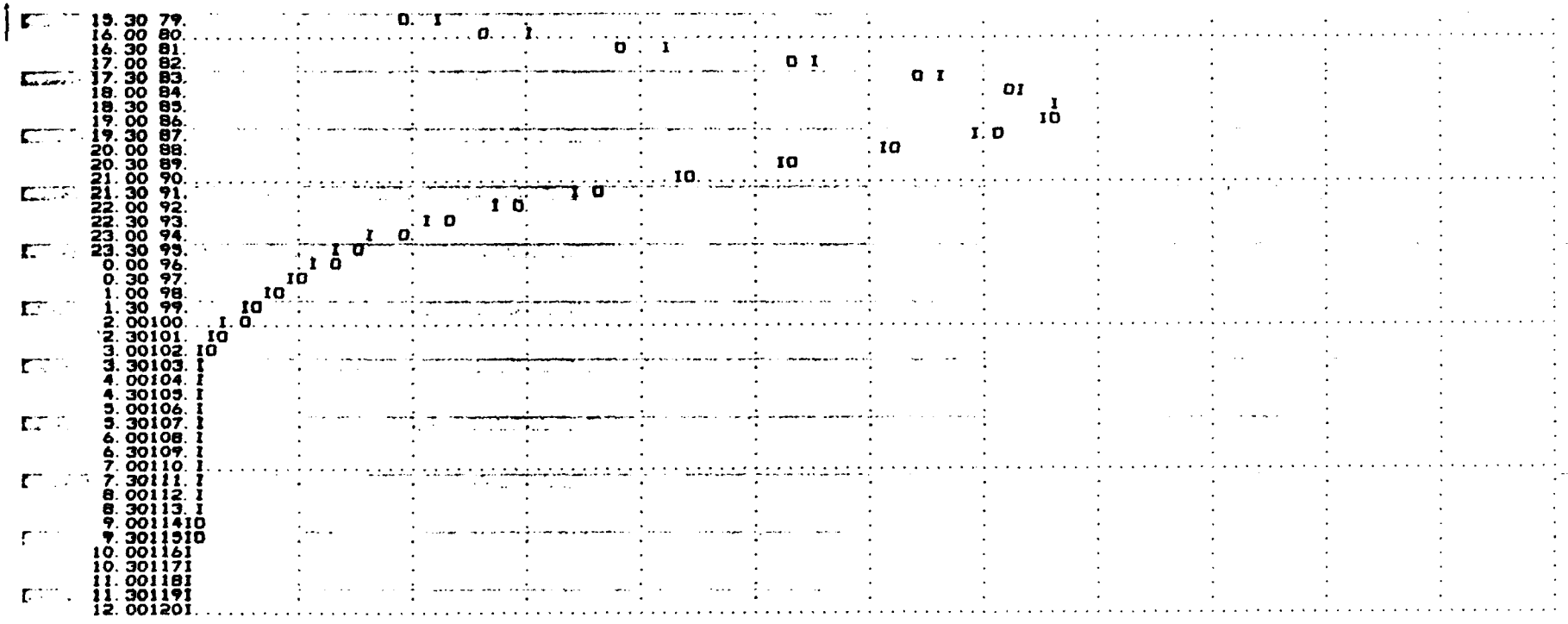


1*DVN*

STATION 1, PLAN 1, RATIO 5

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	3.	7.	12.	16.	18.	18.	17.	15.
13.	10.	8.	6.	5.	4.	3.	3.	2.	
2.	2.	3.	3.	4.	4.	4.	5.	5.	5.

5.	6.	8.	11.	14.	18.	21.	25.	27.	29.
30.	31.	33.	41.	66.	163.	389.	676.	945.	1358.
1988.	2633.	3198.	3611.	3800.	3777.	3523.	3113.	2654.	2204.
1789.	1433.	1155.	911.	751.	622.	516.	415.	305.	216.
145.	82.	50.	42.	39.	37.	35.	34.	32.	31.
30.	28.	27.	26.	25.	24.	23.	22.	21.	21.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	2.	2.	2.	2.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	2.	2.	2.	2.	2.
2.	3.	3.	3.	4.	7.	14.	21.	27.	33.
39.	43.	47.	50.	51.	51.	49.	47.	44.	40.
37.	34.	30.	26.	23.	20.	17.	15.	12.	9.
7.	5.	3.	3.	3.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.

STAGE

1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.5	1190.6	1190.6	1190.7	1190.7	1190.6	1190.6
1190.6	1190.5	1190.5	1190.5	1190.5	1190.5	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.5	1190.5	1190.5	1190.5	1190.5
1190.5	1190.5	1190.5	1190.6	1190.6	1190.6	1190.7	1190.7	1190.7	1190.8
1190.8	1190.8	1190.8	1190.9	1191.0	1191.5	1192.4	1193.3	1194.0	1194.8
1195.4	1195.9	1196.3	1196.5	1196.7	1196.6	1196.5	1196.2	1195.9	1195.6
1195.2	1194.9	1194.4	1194.0	1193.5	1193.1	1192.8	1192.5	1192.1	1191.7
1191.4	1191.1	1190.9	1190.9	1190.8	1190.8	1190.8	1190.8	1190.8	1190.8
1190.8	1190.8	1190.7	1190.7	1190.7	1190.7	1190.7	1190.7	1190.7	1190.7

PEAK OUTFLOW IS 3800. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3800.	2807.	898.	362.	43482.
CMS	108.	79.	25.	10.	1231.
INCHES		68.72	87.90	88.70	88.70
MM		1745.45	2232.77	2253.05	2253.05
AC-FT		1392.	1781.	1797.	1797.
THOUS CU M		1717.	2196.	2216.	2216

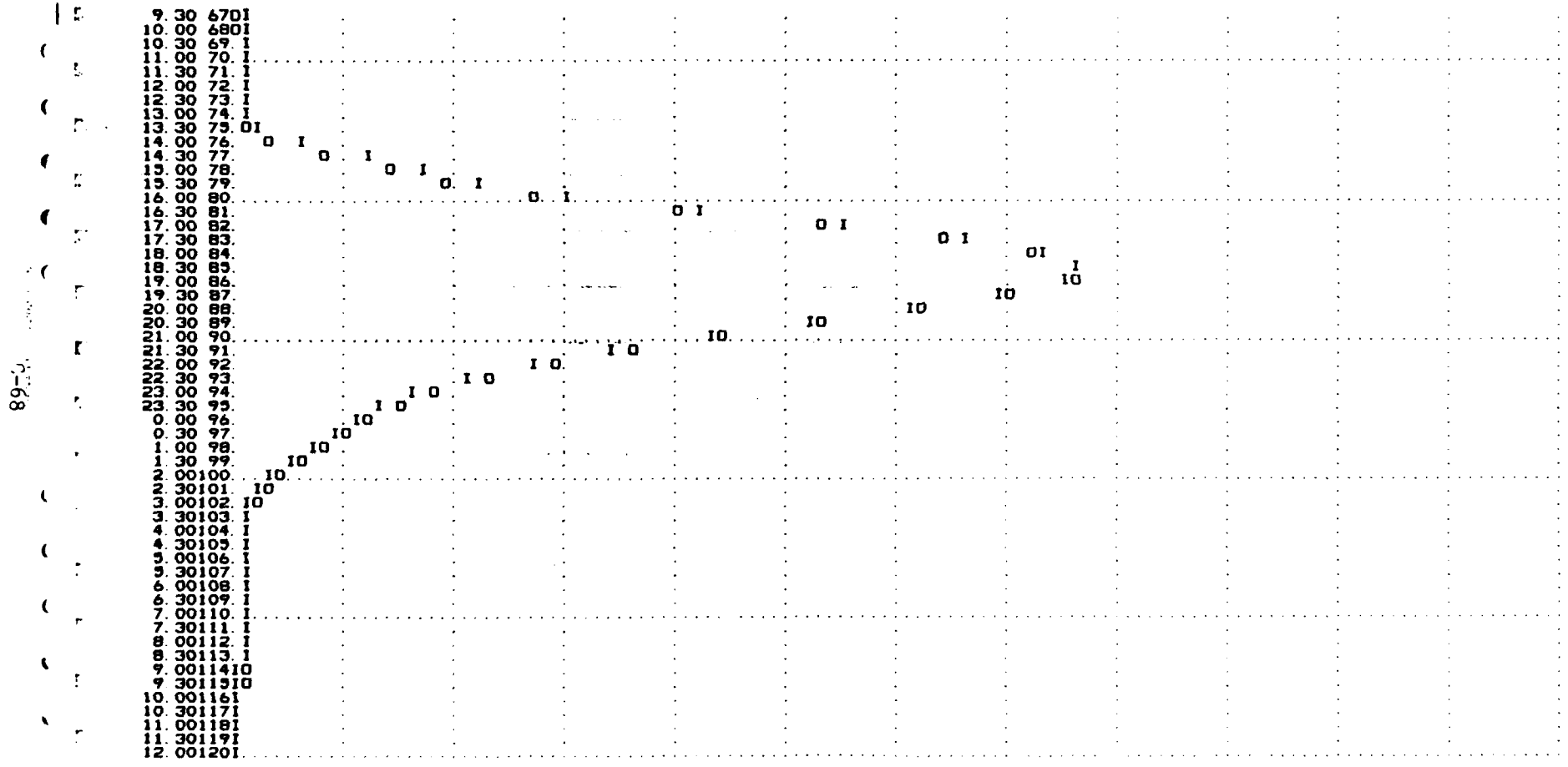
1*OVF*

STATION 1

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

		0.	500.	1000.	1500.	2000.	2500.	3000.	3500.	4000	0.	0.	0	0
0.30	11													
1.00	21													
1.30	31													
2.00	41													
2.30	51													
3.00	61													
3.30	71													
4.00	81													

4.30 9I
5.00 10I
5.30 11I
6.00 12I
6.30 13I
7.00 14I
7.30 15I
8.00 16I
8.30 17I
9.00 18I
9.30 19I
10.00 20I
10.30 21I
11.00 22I
11.30 23I
12.00 24I
12.30 25I
13.00 26I
13.30 27I
14.00 28I
14.30 29I
15.00 30I
15.30 31I
16.00 32I
16.30 33I
17.00 34I
17.30 35I
18.00 36I
18.30 37I
19.00 38I
19.30 39I
20.00 40I
20.30 41I
21.00 42I
21.30 43I
22.00 44I
22.30 45I
23.00 46I
23.30 47I
0.00 48I
0.30 49I
1.00 50I
1.30 51I
2.00 52I
2.30 53I
3.00 54I
3.30 55I
4.00 56I
4.30 57I
5.00 58I
5.30 59I
6.00 60I
6.30 61I
7.00 62I
7.30 63I
8.00 64I
8.30 65I
9.00 660I


9.30 67DI
10.00 68DI
10.30 69. I
11.00 70. I
11.30 71. I
12.00 72. I
12.30 73. I
13.00 74. I
13.30 75. DI
14.00 76. D I
14.30 77. D I
15.00 78. D I
15.30 79. D I
16.00 80. D I
16.30 81. D I
17.00 82. D I
17.30 83. D I
18.00 84. DI
18.30 85. I
19.00 86. ID
19.30 87. ID
20.00 88. ID
20.30 89. ID
21.00 90. ID
21.30 91. I D
22.00 92. I D
22.30 93. I D
23.00 94. I D
23.30 95. I D
0.00 96. ID
0.30 97. ID
1.00 98. ID
1.30 99. ID
2.00100. ID
2.30101. ID
3.00102. ID
3.30103. I
4.00104. I
4.30105. I
5.00106. I
5.30107. I
6.00108. I
6.30109. I
7.00110. I
7.30111. I
8.00112. I
8.30113. I
9.0011410
9.3011510
10.001161
10.301171
11.001181
11.301191
12.001201

1*OVN*

STATION 1, PLAN 1, RATIO 6

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	3.	8.	15.	20.	22.	22.	20.	18.
15.	12.	10.	8.	6.	5.	4.	4.	3.	3.
3.	3.	3.	4.	4.	5.	5.	6.	6.	6.
7.	7.	9.	13.	17.	21.	27.	31.	33.	35.
36.	37.	40.	51.	82.	196.	476.	821.	1168.	1675.
2405.	3162.	3845.	4335.	4562.	4531.	4215.	3732.	3181.	2639.
2134.	1705.	1354.	1084.	876.	747.	615.	490.	366.	251.
171.	98.	60.	49.	45.	43.	42.	40.	38.	37.
36.	34.	33.	31.	30.	29.	28.	27.	26.	25.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	3.	3.
3.	3.	3.	3.	5.	8.	16.	24.	30.	36.
42.	47.	51.	54.	55.	55.	53.	50.	47.	43.
40.	37.	33.	29.	25.	22.	20.	17.	13.	10.
8.	5.	4.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	2.	2.	2.	2.	2.	2.

STAGE

1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.5	1190.6	1190.7	1190.7	1190.7	1190.7	1190.7
1190.6	1190.6	1190.5	1190.5	1190.5	1190.5	1190.5	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5
1190.5	1190.5	1190.5	1190.6	1190.6	1190.7	1190.7	1190.8	1190.8	1190.8
1190.8	1190.8	1190.8	1190.9	1191.1	1191.6	1192.7	1193.7	1194.5	1195.1
1195.7	1196.3	1196.7	1197.0	1197.1	1197.1	1196.9	1196.6	1196.3	1195.9
1195.5	1195.1	1194.8	1194.3	1193.9	1193.5	1193.1	1192.7	1192.3	1191.9
1191.5	1191.2	1191.0	1190.9	1190.9	1190.9	1190.9	1190.9	1190.8	1190.8
1190.8	1190.8	1190.8	1190.8	1190.8	1190.8	1190.8	1190.7	1190.7	1190.7

PEAK OUTFLOW IS 4562. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4562.	3370.	1077.	435.	32183.
CMS	129.	95.	31.	12.	1478.
INCHES		82.50	105.49	106.45	106.45
MM		2095.44	2679.40	2703.91	2703.91
AC-FT		1671.	2137.	2156	2156
THOUS CU M		2061.	2636.	2660.	2660.

1*OVF*

STATION 1

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

	0.	1000.	2000.	3000.	4000.	5000.	0.	0.	0.	0.	0.	0.	0.
0.30	11												
1.00	21												
1.30	31												
2.00	41												
2.30	51												
3.00	61												
3.30	71												
4.00	81												
4.30	91												
5.00	101												
5.30	111												
6.00	121												
6.30	131												
7.00	141												
7.30	151												
8.00	161												
8.30	171												
9.00	181												
9.30	191												
10.00	201												
10.30	211												
11.00	221												
11.30	231												
12.00	241												
12.30	251												
13.00	261												
13.30	271												
14.00	281												
14.30	291												
15.00	301												
15.30	311												
16.00	321												
16.30	331												
17.00	341												
17.30	351												
18.00	361												
18.30	371												
19.00	381												
19.30	391												
20.00	401												
20.30	411												
21.00	421												
21.30	431												
22.00	441												
22.30	451												
23.00	461												
23.30	471												
0.00	481												
0.30	491												
1.00	501												
1.30	511												
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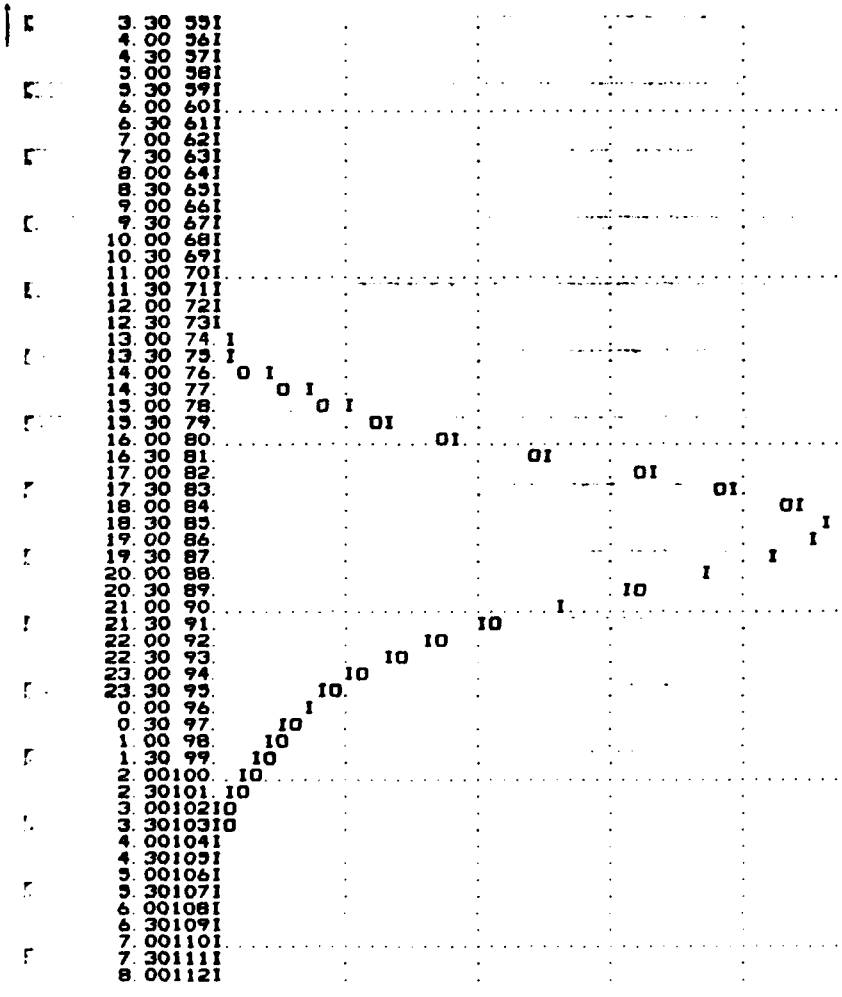
3.00	541												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17.00 82 OI
17.30 83 OI
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20.30 89 IO
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22.00 92 IO
22.30 93 IO
23.00 94 IO
23.30 95 IO
0.00 96 I
0.30 97 IO
1.00 98 IO
1.30 99 IO
2.00100 IO
2.30101 IO
3.0010210
3.3010310
4.001041
4.301051
5.001061
5.301071
6.001081
6.301091
7.001101
7.301111
8.001121

8. 301131
9. 001141
9. 301151
10. 001161
10. 301171
11. 001181
11. 301191
12. 001201

1*DVN*

STATION 1, PLAN 1, RATIO 7

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	4.	10.	17.	24.	28.	27.	23.	20.
17.	14.	11.	9.	7.	6.	5.	4.	4.	3.
3.	3.	4.	4.	5.	6.	6.	7.	7.	7.
8.	9.	11.	15.	20.	26.	32.	36.	39.	41.
42.	44.	47.	62.	96.	228.	565.	969.	1402.	1986.
2814.	3693.	4490.	5059.	5323.	5286.	4928.	4351.	3707.	3075.
2484.	1975.	1570.	1233.	1016.	858.	722.	566.	424.	293.
192.	113.	69.	57.	52.	50.	48.	46.	45.	43.
41.	40.	38.	37.	35.	34.	32.	31.	30.	29.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	2.	2.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	3.	3.	3.	3.
3.	3.	3.	4.	5.	10.	18.	27	34	39
45.	50.	55.	58.	59.	59.	57.	54.	50.	46.
42.	39.	35.	32.	28.	25.	22	18	15	11.
8.	6.	4.	4.	4.	3.	3.	3	3.	3.
3.	3.	3.	3.	3.	3.	3.	3	2.	2.

STAGE

1190. 4	1190. 4	1190. 4	1190. 4	1190. 4	1190. 4	1190 4	1190 4	1190 4	1190 4
1190. 4	1190. 4	1190. 4	1190. 4	1190. 4	1190. 4	1190 4	1190 4	1190 4	1190 4
1190. 4	1190. 4	1190. 4	1190. 4	1190. 4	1190. 4	1190 4	1190 4	1190 4	1190 4
1190. 4	1190. 4	1190. 5	1190. 5	1190. 6	1190. 7	1190 8	1190 7	1190 7	1190 7
1190. 6	1190. 6	1190. 6	1190. 5	1190. 5	1190. 5	1190 5	1190 5	1190 5	1190 4
1190. 4	1190. 4	1190. 5	1190. 5	1190. 5	1190. 5	1190 5	1190 5	1190 5	1190 5
1190. 3	1190. 3	1190. 6	1190. 6	1190. 7	1190. 7	1190 8	1190 8	1190 8	1190 9
1190. 9	1190. 9	1190. 9	1191. 0	1191. 1	1191. 8	1193 0	1194 1	1194 8	1195 4
1196. 0	1196. 6	1197. 1	1197. 4	1197. 5	1197. 5	1197 3	1197 0	1196 6	1196 2
1195. 8	1195. 4	1195. 0	1194. 6	1194. 2	1193. 8	1193 4	1193 0	1192 5	1192 1
1191. 6	1191. 2	1191. 0	1191. 0	1190. 9	1190. 9	1190 9	1190 9	1190 9	1190 9
1190. 9	1190. 8	1190. 8	1190. 8	1190. 8	1190. 8	1190 8	1190 8	1190 8	1190 8

PEAK OUTFLOW IS 5323. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5323.	3932.	1257.	507.	60884.
CMS	151.	111.	36.	14.	1724.
INCHES		96.27	123.07	124.20	124.20
MM		2445.15	3125.95	3154.72	3154.72
AC-FT		1950.	2493.	2516.	2516.
THOUS CU M		2405.	3075.	3103.	3103.

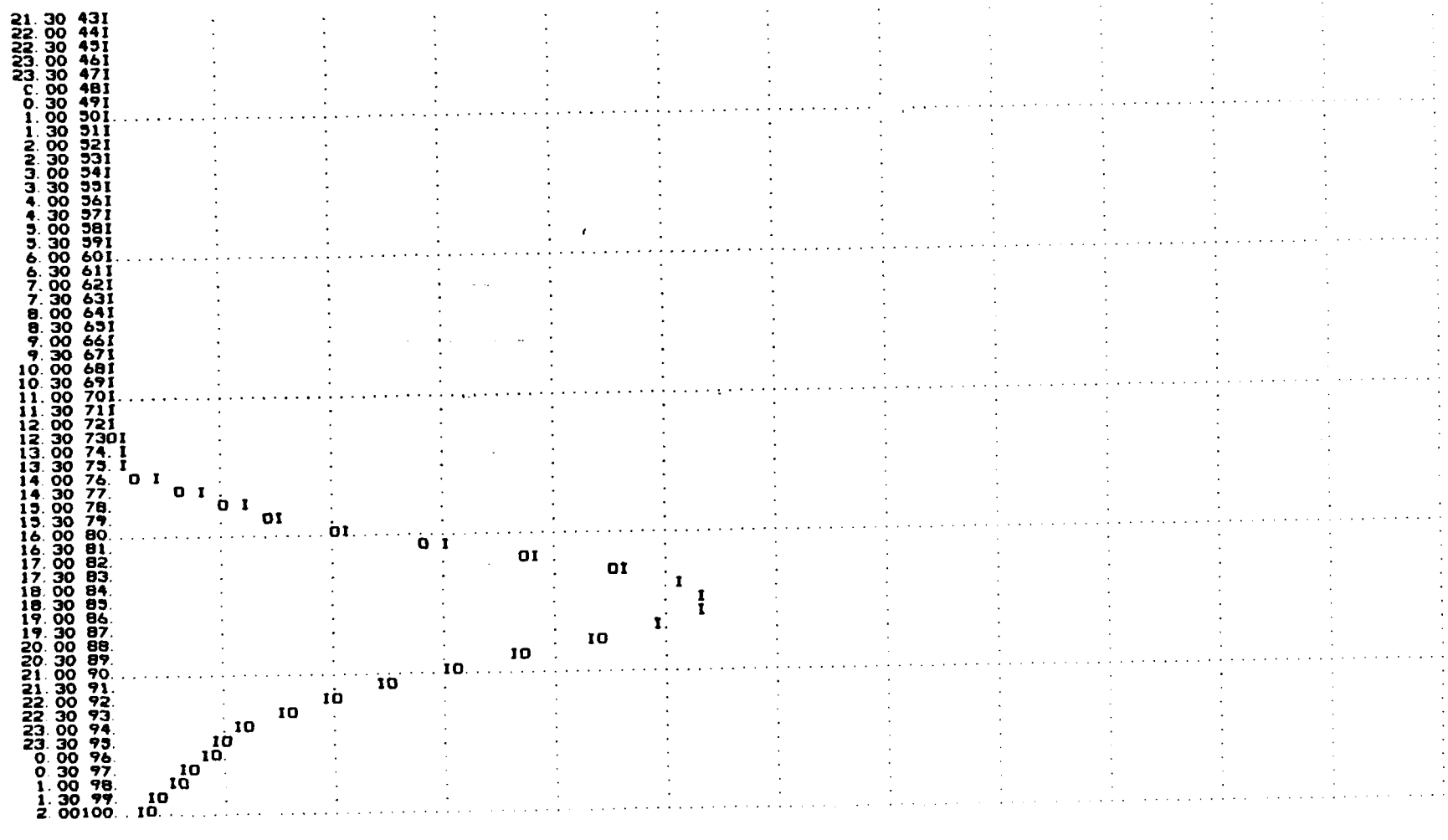
1*OVF*

STATION 1

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

0. 1000. 2000. 3000. 4000. 5000. 6000. 0. 0. 0. 0. 0. 0.

0.30	11
1.00	21
1.30	31
2.00	41
2.30	51
3.00	61
3.30	71
4.00	81
4.30	91
5.00	101
5.30	111
6.00	121
6.30	131
7.00	141
7.30	151
8.00	161
8.30	171
9.00	181
9.30	191
10.00	201
10.30	211
11.00	221
11.30	231
12.00	241
12.30	251
13.00	261
13.30	271
14.00	281
14.30	291
15.00	301
15.30	311
16.00	321
16.30	331
17.00	341
17.30	351
18.00	361
18.30	371
19.00	381
19.30	391
20.00	401
20.30	411
21.00	421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22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
9.00 661
9.30 671
10.00 681
10.30 691
11.00 701
11.30 711
12.00 721
12.30 7301
13.00 74. I
13.30 75. I
14.00 76. O I
14.30 77. O I
15.00 78. O I
15.30 79. OI
16.00 80. OI
16.30 81. O I
17.00 82. OI
17.30 83. OI
18.00 84. I
18.30 85. I
19.00 86. I
19.30 87. IO
20.00 88. IO
20.30 89. IO
21.00 90. IO
21.30 91. IO
22.00 92. IO
22.30 93. IO
23.00 94. IO
23.30 95. IO
0.00 96. IO
0.30 97. IO
1.00 98. IO
1.30 99. IO
2.00100. IO

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   2.30101.10
   3.00102.I
   3.30103.I
   4.00104.I
   4.3010510
   5.001061
   5.301071
   6.001081
   6.301091
   7.001101
   7.301111
   8.001121
   8.301131
   9.001141
   9.301151
  10.001161
  10.301171
  11.001181
  11.301191
  12.001201
```

1*OVN*

STATION 1, PLAN 1, RATIO 8

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.	4.	11.	19.	29.	32.	31.	27.	22.
19.	15.	12.	10.	8.	6.	5.	5.	4.	4.
3.	4.	4.	5.	6.	6.	7.	8.	8.	8.
9.	10.	13.	17.	23.	31.	37.	42.	45.	47.
49.	50.	55.	72.	110.	262.	658.	1131.	1636.	2282.
3221.	4227.	5134.	5784.	6084.	6040.	5630.	4969.	4233.	3510.
2835.	2251.	1780.	1394.	1146.	967.	819.	648.	478.	335.
214.	128.	79.	65.	60.	57.	54.	52.	50.	48.
46.	45.	43.	42.	40.	39.	37.	36.	34.	33.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	2.	2.	3.	2.	2.	2.
2.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	2.	3.	3.	3.	3.	3.
3.	3.	4.	4.	5.	11.	20.	30.	36.	41.
47.	53.	58.	62.	64.	63.	61.	57.	53.	49.
45.	41.	37.	34.	30.	27.	24.	20.	16.	13.
9.	6.	4.	4.	4.	4.	4.	4.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.

STAGE

1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.5	1190.6	1190.7	1190.8	1190.8	1190.8	1190.7	1190.7
1190.7	1190.6	1190.6	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5
1190.4	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5
1190.5	1190.5	1190.6	1190.6	1190.7	1190.8	1190.8	1190.9	1190.9	1190.9
1190.9	1190.9	1190.9	1191.0	1191.2	1192.0	1193.2	1194.4	1195.1	1195.6
1196.3	1196.9	1197.4	1197.8	1197.9	1197.9	1197.7	1197.3	1196.9	1196.5
1196.0	1195.6	1195.2	1194.8	1194.4	1194.1	1193.7	1193.2	1192.7	1192.2
1191.7	1191.3	1191.1	1191.0	1191.0	1191.0	1190.9	1190.9	1190.9	1190.9
1190.9	1190.9	1190.9	1190.9	1190.9	1190.8	1190.8	1190.8	1190.3	1190.8

PEAK OUTFLOW IS 6084. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6084.	4494.	1436.	580.	69585.
CMS	172.	127.	41.	16.	1970.
INCHES		110.02	140.65	141.95	141.95
MM		2794.61	3572.55	3605.56	3605.56
AC-FT		2229.	2849.	2875.	2875.
THOUS CU M		2749.	3514.	3547.	3547.

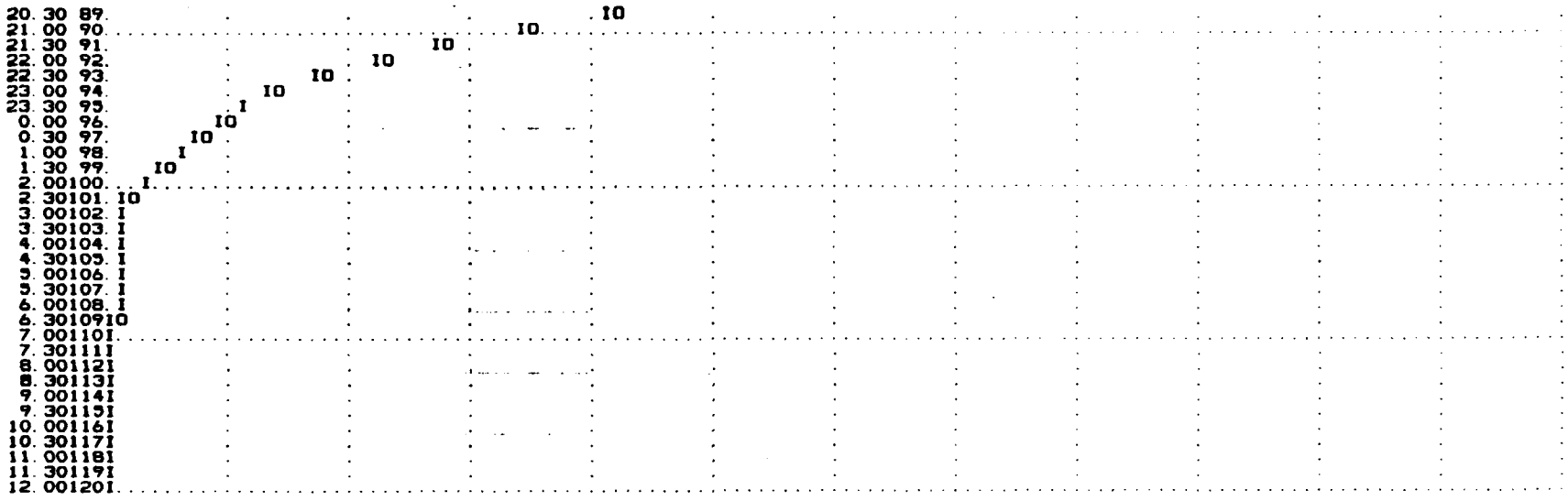
1*OVF*

STATION 1

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

		0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	0.	0.	0.	0	0.
0.30	1I													
1.00	2I													
1.30	3I													
2.00	4I													
2.30	5I													
3.00	6I													
3.30	7I													
4.00	8I													
4.30	9I													
5.00	10I													
5.30	11I													
6.00	12I													
6.30	13I													
7.00	14I													
7.30	15I													
8.00	16I													
8.30	17I													
9.00	18I													
9.30	19I													
10.00	20I													
10.30	21I													
11.00	22I													
11.30	23I													
12.00	24I													
12.30	25I													
13.00	26I													
13.30	27I													
14.00	28I													
14.30	29I													
15.00	30I													

C-76



1*OVN*

STATION 1, PLAN 1, RATIO 9

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	6.	14.	26.	38.	41.	39.	34.	28.
22.	18.	15.	12.	9.	8.	6.	6.	5.	5.
4.	4.	5.	6.	7.	8.	9.	9.	10.	10.
11.	12.	16.	21.	32.	41.	48.	54.	58.	60.
62.	63.	68.	89.	137.	340.	833.	1485.	2089.	2863.
4039.	5291.	6423.	7233.	7605.	7549.	7034.	6207.	5286.	4381.
3536.	2807.	2209.	1721.	1399.	1196.	1000.	800.	591.	414.
258.	156.	98.	81.	75.	71.	68.	65.	63.	60.
58.	56.	53.	51.	49.	47.	46.	44.	43.	41.

STORAGE

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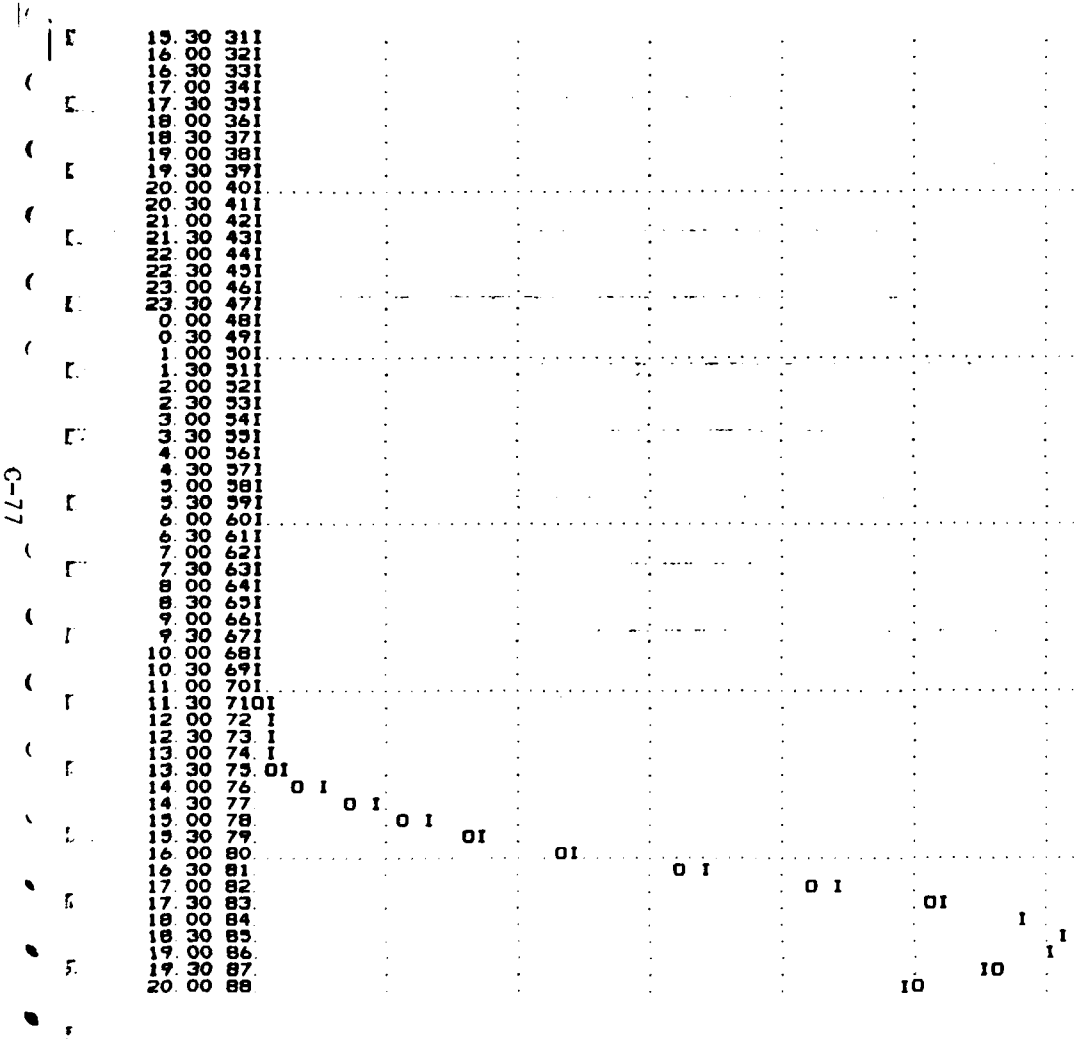
0.	0.	0.	0.	0.	0.	0	0	0.	0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16.30 331
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17.30 351
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18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
9.00 661
9.30 671
10.00 681
10.30 691
11.00 701
11.30 7101
12.00 72 I
12.30 73 I
13.00 74 I
13.30 75 OI
14.00 76 O I
14.30 77 O I
15.00 78 O I
15.30 79 OI
16.00 80 OI
16.30 81 O I
17.00 82 O I
17.30 83 OI
18.00 84 I
18.30 85 I
19.00 86 I
19.30 87 IO
20.00 88 IO

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	1.	1.	2.	3.	3.	3.	3.	2.
2	2.	1.	1.	1.	1.	1	1	0.	0.
0.	0.	0.	1.	1.	1.	1.	1	1.	1
1.	1.	1.	2.	3.	3.	3.	4.	4.	4.
4.	4.	4.	5.	6.	13.	24.	34	40	45.
52.	59.	65.	70.	72.	71.	69.	64	59	54.
49.	45.	41.	37.	34.	31.	28.	24	19	15.
11.	7.	5.	5.	4.	4.	4.	4	4.	4.
4.	4.	4.	3.	3.	3	3.	3.	3.	3.

STAGE

1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190 4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4	1190.4
1190.4	1190.4	1190.5	1190.6	1190.7	1190.8	1190.9	1190.8	1190.8	1190.8
1190.7	1190.7	1190.6	1190.6	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5
1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5	1190.5
1190.6	1190.6	1190.6	1190.7	1190.8	1190.9	1190.9	1190.9	1191.0	1191.0
1191.0	1191.0	1191.0	1191.1	1191.4	1192.2	1193.7	1194.9	1195.5	1196.1
1196.8	1197.5	1198.1	1198.5	1198.7	1198.6	1198.4	1198.0	1197.5	1197.0
1196.5	1196.0	1195.6	1195.2	1194.8	1194.5	1194.1	1193.6	1193.1	1192.5
1191.9	1191.4	1191.2	1191.1	1191.0	1191.0	1191.0	1191.0	1191.0	1191.0
1191.0	1190.9	1190.9	1190.9	1190.9	1190.9	1190.9	1190.9	1190.9	1190.9

PEAK OUTFLOW IS 7605 AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7605.	5618.	1796.	725.	86987.
CMS	215.	159.	51.	21.	2463.
INCHES		137.54	175.82	177.45	177.45
MM		3493.44	4465.93	4507.29	4507.29
AC-FT		2786.	3562.	3595.	3595.
THOUS CU M		3436.	4393.	4434.	4434

1*OVF*

STATION 1

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

	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	0.	0.	0.	0
0.30	1I												
1.00	2I												
1.30	3I												
2.00	4I												
2.30	5I												
3.00	6I												
3.30	7I												
4.00	8I												
4.30	9I												
5.00	10I												
5.30	11I												
6.00	12I												
6.30	13I												
7.00	14I												
7.30	15I												
8.00	16I												
8.30	17I												
9.00	18I												

```
 9.30 191
10.00 201
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
 0.00 481
 0.30 491
 1.00 501
 1.30 511
 2.00 521
 2.30 531
 3.00 541
 3.30 551
 4.00 561
 4.30 571
 5.00 581
 5.30 591
 6.00 601
 6.30 611
 7.00 621
 7.30 631
 8.00 641
 8.30 651
 9.00 6601
 9.30 6701
10.00 68. 1
10.30 69. 1
11.00 70. 1
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12.00 72. 1
12.30 73. 1
13.00 74. 1
13.30 75. 01
14.00 76.   0  1
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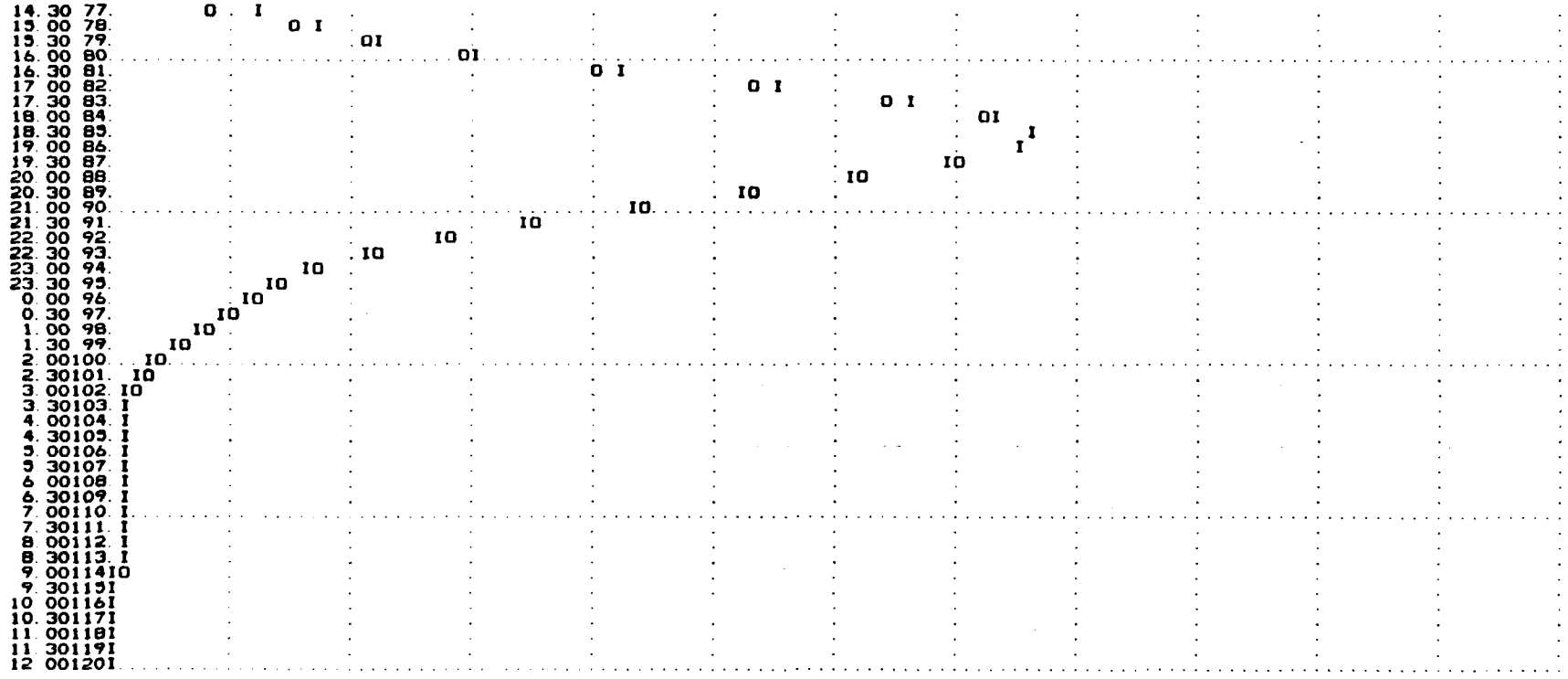

1*OVN*

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1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 0.10	RATIO 2 0.20	RATIO 3 0.30	RATIO 4 0.40	RATIO 5 0.50	RATIO 6 0.60	RATIO 7 0.70	RATIO 8 0.80	RATIO 9 1.00
HYDROGRAPH AT	1	0.38	1	116.	232.	347.	463.	579.	695.	811.	927.	1158.
	(	0.98)	(	3.28)(	6.56)(	9.84)(	13.12)(	16.40)(	19.68)(	22.96)(	26.24)(	32.80)
HYDROGRAPH AT	1	0.00	1	672.	1344.	2015.	2687.	3359.	4031.	4703.	5374.	6718.
	(	0.00)	(	19.02)(	38.05)(	57.07)(	76.09)(	95.12)(	114.14)(	133.16)(	152.19)(	190.23)
2 COMBINED	1	0.38	1	762.	1525.	2287.	3050.	3812.	4575.	5337.	6100.	7625.
	(	0.98)	(	21.59)(	43.18)(	64.77)(	86.36)(	107.95)(	129.54)(	151.14)(	172.73)(	215.91)
ROUTED TO	1	0.38	1	756.	1516.	2280.	3039.	3800.	4562.	5323.	6084.	7605.
	(	0.98)	(	21.41)(	42.92)(	64.55)(	86.05)(	107.60)(	129.18)(	150.72)(	172.27)(	215.36)

1

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1190.40	1190.40	1194.50
STORAGE	0.	0.	31.
OUTFLOW	0.	0.	1193.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.10	1193.52	0.00	23.	756.	0.00	43.00	0.00
0.20	1194.95	0.45	35.	1516.	3.00	42.50	0.00
0.30	1195.64	1.14	41.	2280.	4.50	42.50	0.00
0.40	1196.17	1.67	46.	3039.	5.50	42.50	0.00
0.50	1196.65	2.15	51.	3800.	6.50	42.50	0.00
0.60	1197.10	2.60	55.	4562.	7.00	42.50	0.00
0.70	1197.52	3.02	59.	5323.	8.00	42.50	0.00
0.80	1197.91	3.41	64.	6084.	8.00	42.50	0.00
1.00	1198.66	4.16	72.	7605.	9.50	42.50	0.00

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

HEC-1 FLOOD HYDROGRAPH COMPUTATIONS

(WITHOUT FLASHBOARDS IN PLACE)

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FLAHERTY GIAVARA ASSOCIATES, P.C.
 **********
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION     JULY 1978
   LAST MODIFICATION  26 FEB 79
 **********
      1                A1   NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT
      2                A2   DAM INVENTORY NO. NY 347, NORWICH WATER WORKS DAM NO. 1(W-OUT FLASHBOARDS), CHENANGO COUNTY, JULY 13, 198
      3                A3   PREPARED BY FLAHERTY GIAVARA ASSOCIATES, P.C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT
      4                B    120         0        30         0         0         0         0         2         0         0
      5                B1     5
      6                J      1         9         1
      7                J1   0.1       0.2       0.3       0.4       0.5       0.6       0.7       0.8       1.0
      8                K      0         1                             0         0         1         0
      9                K1   INFLOW HYDROGRAPH,  SNYDER METHOD
     10                M      1         1      0.38                   0         1                             1
     11                P      0      20.2       111       122       133       143
     12                T                                                                  1       0.1                   0
     13                W   1.71      0.63
     14                X   -2.0     -0.10       1.5
     15                K      0         1                             0         0         1         0
     16                K1   OUTFLOW FROM THE OVERTOPPING OF NORWICH RESERVOIR NO. 2 DAM (INVENTORY NO. NY 349)
     17                M     -1
     18                N      0         0         0         0         0         0         0         0         0         0
     19                N      0         0         0         0         0         0         0         0         0         0
     20                N      0         0         0         0         0         0         0         0         0         0
     21                N      0         0         0         0         0         0         0         0         0         0
     22                N      0         0         0         0         0         0         0         0         0         0
     23                N      0         0         0         0         0         0         0         0         0         0
     24                N      0         0         0         0         0         0         0         0         0         0
     25                N      0         0         0         0         0       309       779      1192      1631      2353
     26                N   3327      4373      5398      6222      6677      6718      6301      5610      4803      3996
     27                N   3215      2555      1996      1520      1231      1027       815       593       386       227
     28                N     80         0         0         0         0         0         0         0         0         0
     29                N      0         0         0         0         0         0         0         0         0         0
     30                K      2         1                             0         0         1         0
     31                K1   OUTFLOW FROM NORWICH RESERVOIR NO. 2 DAM COMBINED WITH INFLOW FROM NORWICH WATER WORKS DAM NO  1
     32                K      1         1                             0         0         1         0
     33                K1   RESERVOIR ROUTING   MODIFIED PULS METHOD
     34                Y                                 1         1
     35                Y1     3                                                            0        -1
     36                Y41189.0  1190.4    1190.7    1190.9    1191.9    1192.9    1194.0    1194.5    1195.4    1196.4
     37                Y5     0   212.7     284.6     337.0     645.1    1016.3    1485.9    1861.4    2237.1    2779.2
     38                $A   6.5    12.3      17.4
     39                $E1189.0  1200.6    1210.6
     40                $$1189.0
     41                $D1194.5     2.5       1.5       215
     42                K     99
1                                PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
                                       RUNOFF HYDROGRAPH AT              1
                                       RUNOFF HYDROGRAPH AT              1
                                       COMBINE  2 HYDROGRAPHS AT         1
                                       ROUTE HYDROGRAPH TO               1
                                       END OF NETWORK

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

RUN DATE: 7/13/
TIME: 9:07 PM

NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT
DAM INVENTORY NO. NY 347, NORWICH WATER WORKS DAM NO. 1 (W-OUT FLASHBOARDS), CHENANGO COUNTY, JULY 13, 19E
PREPARED BY FLAHERTY GIAVARA ASSOCIATES, P.C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
120	0	30	0	0	0	0	2	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 1.00

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

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH, SNYDER METHOD

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.38	0.00	0.38	1.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	20.20	111.00	122.00	133.00	143.00	0.00	0.00

LOSS DATA

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

UNIT HYDROGRAPH DATA
TP= 1.71 CP=0.63 NTA= 0

RECESSION DATA
STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.90

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 4.00 AND R= 3.10 INTERVALS

UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG= 1.72 HOURS, CP= 0.63 VOL= 1.00

12.	43.	75.	88.	76.	55.	39.	28.	21.	15.
11.	8.	6.	4.	3.	2.	2.	1.	1.	

END-OF-PERIOD FLOW

MO. DA	HR. MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO. DA	HR. MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	0.30	1	0.01	0.00	0.01	1.	1.02	6.30	61	0.19	0.14	0.05	13.

1.01	1.00	2	0.01	0.00	0.01	1.	1.02	7.00	62	0.19	0.14	0.05	18.
1.01	1.30	3	0.01	0.00	0.01	1.	1.02	7.30	63	0.19	0.14	0.05	26.
1.01	2.00	4	0.01	0.00	0.01	1.	1.02	8.00	64	0.19	0.14	0.05	36.
1.01	2.30	5	0.01	0.00	0.01	1.	1.02	8.30	65	0.19	0.14	0.05	44.
1.01	3.00	6	0.01	0.00	0.01	1.	1.02	9.00	66	0.19	0.14	0.05	50.
1.01	3.30	7	0.01	0.00	0.01	1.	1.02	9.30	67	0.19	0.14	0.05	55.
1.01	4.00	8	0.01	0.00	0.01	1.	1.02	10.00	68	0.19	0.14	0.05	58.
1.01	4.30	9	0.01	0.00	0.01	1.	1.02	10.30	69	0.19	0.14	0.05	60.
1.01	5.00	10	0.01	0.00	0.01	1.	1.02	11.00	70	0.19	0.14	0.05	62.
1.01	5.30	11	0.01	0.00	0.01	0.	1.02	11.30	71	0.19	0.14	0.05	63.
1.01	6.00	12	0.01	0.00	0.01	0.	1.02	12.00	72	0.19	0.14	0.05	64.
1.01	6.30	13	0.01	0.00	0.01	0.	1.02	12.30	73	1.12	1.07	0.05	76.
1.01	7.00	14	0.01	0.00	0.01	0.	1.02	13.00	74	1.12	1.07	0.05	116.
1.01	7.30	15	0.01	0.00	0.01	0.	1.02	13.30	75	1.35	1.30	0.05	190.
1.01	8.00	16	0.01	0.00	0.01	0.	1.02	14.00	76	1.35	1.30	0.05	282.
1.01	8.30	17	0.01	0.00	0.01	0.	1.02	14.30	77	1.68	1.63	0.05	374.
1.01	9.00	18	0.01	0.00	0.01	0.	1.02	15.00	78	1.68	1.63	0.05	459.
1.01	9.30	19	0.01	0.00	0.01	0.	1.02	15.30	79	2.04	1.99	0.05	543.
1.01	10.00	20	0.01	0.00	0.01	0.	1.02	16.00	80	6.48	6.43	0.05	680.
1.01	10.30	21	0.01	0.00	0.01	0.	1.02	16.30	81	1.57	1.52	0.05	891.
1.01	11.00	22	0.01	0.00	0.01	0.	1.02	17.00	82	1.57	1.52	0.05	1084.
1.01	11.30	23	0.01	0.00	0.01	0.	1.02	17.30	83	1.23	1.18	0.05	1158.
1.01	12.00	24	0.01	0.00	0.01	0.	1.02	18.00	84	1.23	1.18	0.05	1087.
1.01	12.30	25	0.08	0.00	0.08	0.	1.02	18.30	85	0.11	0.06	0.05	948.
1.01	13.00	26	0.08	0.00	0.08	0.	1.02	19.00	86	0.11	0.06	0.05	798.
1.01	13.30	27	0.10	0.00	0.10	0.	1.02	19.30	87	0.11	0.06	0.05	636.
1.01	14.00	28	0.10	0.00	0.10	0.	1.02	20.00	88	0.11	0.06	0.05	481.
1.01	14.30	29	0.13	0.00	0.13	0.	1.02	20.30	89	0.11	0.06	0.05	356.
1.01	15.00	30	0.13	0.00	0.13	0.	1.02	21.00	90	0.11	0.06	0.05	265.
1.01	15.30	31	0.	0.01	0.15	0.	1.02	21.30	91	0.11	0.06	0.05	200.
1.01	16.00	32	0.4	0.44	0.05	6.	1.02	22.00	92	0.11	0.06	0.05	152.
1.01	16.30	33	0.12	0.07	0.05	20.	1.02	22.30	93	0.11	0.06	0.05	117.
1.01	17.00	34	0.12	0.07	0.05	37.	1.02	23.00	94	0.11	0.06	0.05	112.
1.01	17.30	35	0.09	0.04	0.05	48.	1.02	23.30	95	0.11	0.06	0.05	107.
1.01	18.00	36	0.09	0.04	0.05	47.	1.03	0.00	96	0.11	0.06	0.05	103.
1.01	18.30	37	0.01	0.00	0.01	40.	1.03	0.30	97	0.00	0.00	0.00	99.
1.01	19.00	38	0.01	0.00	0.01	33.	1.03	1.00	98	0.00	0.00	0.00	95.
1.01	19.30	39	0.01	0.00	0.01	26.	1.03	1.30	99	0.00	0.00	0.00	91.
1.01	20.00	40	0.01	0.00	0.01	19.	1.03	2.00	100	0.00	0.00	0.00	87.
1.01	20.30	41	0.01	0.00	0.01	14.	1.03	2.30	101	0.00	0.00	0.00	84.
1.01	21.00	42	0.01	0.00	0.01	10.	1.03	3.00	102	0.00	0.00	0.00	81.
1.01	21.30	43	0.01	0.00	0.01	7.	1.03	3.3	103	0.00	0.00	0.00	77.
1.01	22.00	44	0.01	0.00	0.01	5.	1.03	4	104	0.00	0.00	0.00	74.
1.01	22.30	45	0.01	0.00	0.01	5.	1.03	4	105	0.00	0.00	0.00	71.
1.01	23.00	46	0.01	0.00	0.01	4.	1.03	5	106	0.00	0.00	0.00	69.
1.01	23.30	47	0.01	0.00	0.01	4.	1.03	5.3	107	0.00	0.00	0.00	66.
1.02	0.00	48	0.01	0.00	0.01	4.	1.03	6.00	108	0.00	0.00	0.00	63.
1.02	0.30	49	0.07	0.02	0.05	4.	1.03	6.30	109	0.00	0.00	0.00	61.
1.02	1.00	50	0.07	0.02	0.05	4.	1.03	7.00	110	0.00	0.00	0.00	58.
1.02	1.30	51	0.07	0.02	0.05	4.	1.03	7.30	111	0.00	0.00	0.00	56.
1.02	2.00	52	0.07	0.02	0.05	6.	1.03	8.00	112	0.00	0.00	0.00	54.
1.02	2.30	53	0.07	0.02	0.05	7.	1.03	8.30	113	0.00	0.00	0.00	52.
1.02	3.00	54	0.07	0.02	0.05	8.	1.03	9.00	114	0.00	0.00	0.00	50.
1.02	3.30	55	0.07	0.02	0.05	9.	1.03	9.30	115	0.00	0.00	0.00	48.
1.02	4.00	56	0.07	0.02	0.05	10.	1.03	10.00	116	0.00	0.00	0.00	46.
1.02	4.30	57	0.07	0.02	0.05	11.	1.03	10.30	117	0.00	0.00	0.00	44.
1.02	5.00	58	0.07	0.02	0.05	11.	1.03	11.00	118	0.00	0.00	0.00	42.
1.02	5.30	59	0.07	0.02	0.05	11.	1.03	11.30	119	0.00	0.00	0.00	40.

1.02 6.00 60 0.07 0.02 0.05 11. 1.03 12.00 120 0.00 0.00 0.00 39.

SUM 28.89 25.13 3.75 13746.
(734.)(638.)(95.)(389.24)

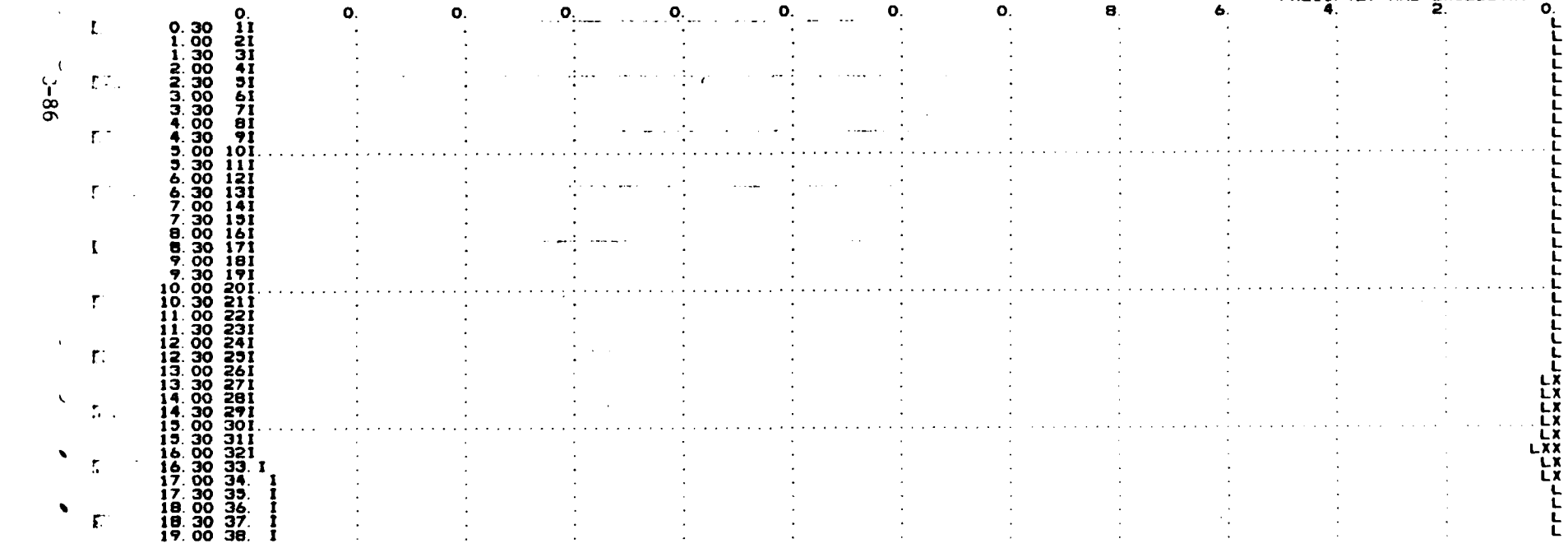
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1158.	761.	268.	114.	13732.
CMS	33.	22.	8.	3.	389.
INCHES		18.62	26.24	28.01	28.01
MM		473.05	666.56	711.53	711.53
AC-FT		377.	532.	567.	567.
THOUS CU M		465.	656.	700.	700.

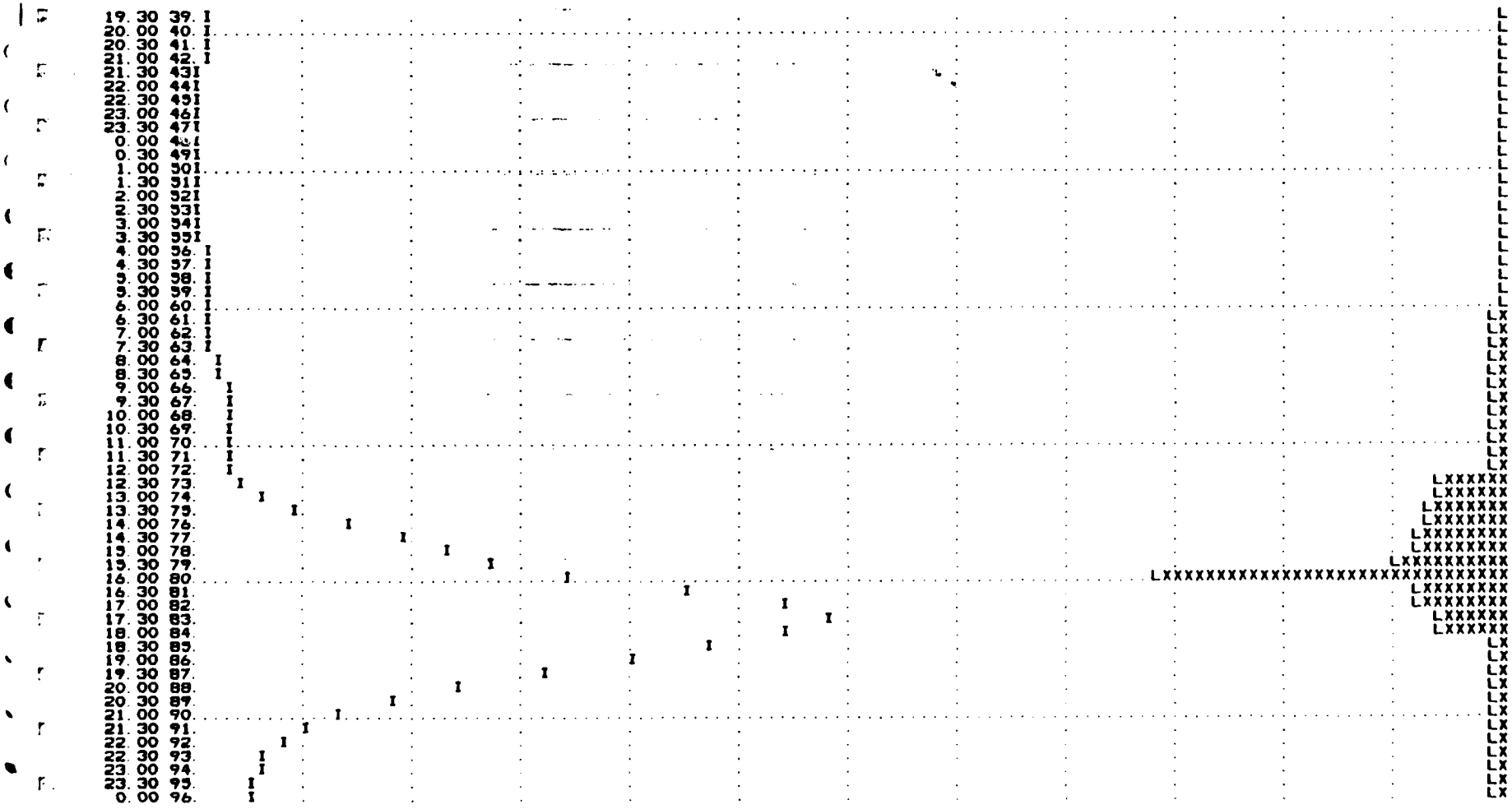
1*OVF*

STATION 1

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

0. 200. 400. 600. 800. 1000. 1200. 0. 0. 0. 0. 0. 0.
PRECIP(L) AND EXCESS(X)
0. 0. 0. 0. 0. 0. 0. 0. 8. 6. 4. 2. 0.

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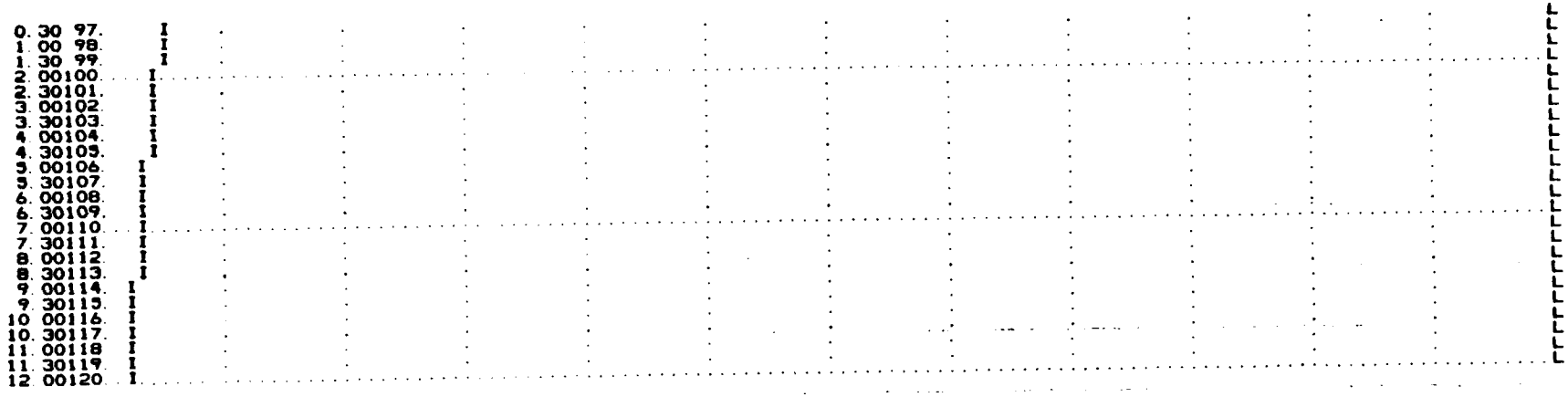

1*OVN*

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	2.
0.	1.	2.	4.	5.	5.	4.	3.	0.
1.	1.	1.	1.	0.	0.	0.	1.	1.
0.	1.	1.	1.	1.	1.	1.	1.	6.
1.	2.	3.	4.	4.	5.	5.	6.	6.
6.	6.	8.	12.	19.	28.	37.	46.	54.
89.	108.	116.	109.	95.	80.	64.	48.	36.
20.	15.	12.	11.	11.	10.	10.	9.	9.
8.	8.	8.	7.	7.	7.	7.	6.	6.
6.	5.	5.	5.	5.	5.	4.	4.	4.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	116.	76.	27.	11.	1373.
CMS	3.	2.	1.	0.	39.
INCHES		1.86	2.62	2.80	2.80
MM		47.31	66.66	71.15	71.15
AC-FT		38.	53.	57.	57.
THOUS CU M		47.	66.	70.	70.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	4.
0.	1.	4.	7.	10.	9.	8.	7.	5.
3.	2.	1.	1.	1.	1.	1.	1.	1.

1.	1.	1.	2.	2.	2.	2.	2	2.	2.
3.	4.	5.	7.	9.	10.	11.	12.	12.	12.
13.	13.	15.	23.	38.	56.	75.	92.	109.	136.
178.	217.	232.	217.	190.	160.	127.	96.	71.	53.
40.	30.	23.	22.	21.	21.	20.	19.	18.	17.
17.	16.	15.	15.	14.	14.	13.	13.	12.	12.
11.	11.	10.	10.	10.	9.	9.	8.	8.	8.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	232.	152.	54.	23.	2746.
CMS	7.	4.	2.	1.	78.
INCHES		3.72	5.25	5.60	5.60
MM		94.61	133.31	142.31	142.31
AC-FT		75.	106.	113.	113.
THOUS CU M		93.	131.	140.	140.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	2.	6.	11.	14.	14.	12.	10.	8.	6.
4.	3.	2.	2.	1.	1.	1.	1.	1.	1.
1.	2.	2.	3.	3.	3.	3.	3	3.	3.
4.	5.	8.	11.	13.	15.	16.	17.	18.	19.
19.	19.	23.	35.	57.	85.	112.	138.	163.	204.
267.	325.	347.	326.	284.	239.	191.	144.	107.	80.
60.	46.	35.	33.	32.	31.	30.	28.	27.	26.
25.	24.	23.	22.	21.	21.	20.	19.	18.	17.
17.	16.	15.	15.	14.	14.	13.	13.	12.	12.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	347.	228.	80.	34.	4120.
CMS	10.	6.	2.	1.	117.
INCHES		5.59	7.87	8.40	8.40
MM		141.92	199.97	213.46	213.46
AC-FT		113.	159.	170.	170.
THOUS CU M		140.	197.	210.	210

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

0.	0.	0.	0.	0.	0.	0.	0	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	2.	8.	15.	19.	19.	16.	13	10.	8.
6.	4.	3.	2.	2.	2.	2.	2.	2.	2.
1.	2.	3.	3.	4.	4.	4.	4.	4.	3.
5.	7.	10.	14.	18.	20.	22.	23	24	25.
25.	26.	30.	47.	76.	113.	149.	184	217.	272.
357.	434.	463.	435.	379.	319.	254.	192	142.	106.
80.	61.	47.	45.	43.	41	40.	38.	36.	35.
34.	32.	31.	30.	29.	27.	26.	25.	24.	23.
22.	22.	21.	20.	19.	18.	18.	17	16.	16.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	463.	304.	107.	46.	5493.
CMS	13.	9.	3.	1.	156.
INCHES		7.45	10.50	11.21	11.21

MM		189.22	266.62	284.61		284.61
AC-FT		151.	213.	227.		227.
THOUS CU M		186.	262.	280.		280.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 5

0.	0.	0.	0.	0.	0.	0	0	0	0
0.	0.	0.	0.	0.	0.	0	0	0	0
0.	0.	0.	0.	0.	0.	0	0	0	0
0.	3.	10.	19.	24.	24.	20	17	13	10
7.	5.	4.	3.	2.	2.	2	2	2	2
2.	3.	4.	4.	5.	5.	5	5	6	6
6.	9.	13.	18.	22.	25.	27	29	30	31.
32.	32.	38.	58.	95.	141	187	230	271	340
446.	542.	579.	543.	474.	399.	318.	241	178	133.
100.	76.	59.	56.	54.	51.	49.	47	46	44.
42.	40.	39.	37.	36.	34.	33.	32	30	29.
28.	27.	26.	25.	24.	23.	22.	21	20	19.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	579.	380.	134.	57.	6866.
CMS	16.	11.	4.	2.	194.
INCHES		9.31	13.12	14.01	14.01
MM		236.53	333.28	355.76	355.76
AC-FT		189.	266.	284.	284.
THOUS CU M		233.	328.	350.	350.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 6

0.	0.	0.	0.	0.	0.	0	0	0	0.
0.	0.	0.	0.	0.	0.	0	0	0	0.
0.	0.	0.	0.	0.	0.	0	0	0	0.
0.	3.	12.	22.	29.	28.	24.	20	16.	12.
8.	6.	4.	3.	3.	3.	3.	2	2	2.
2.	3.	4.	5.	6.	6.	6.	7	7.	7.
8.	11.	16.	22.	27.	30.	33.	35	36.	37.
38.	38.	46.	70.	114.	169.	224.	279	326.	408.
535.	651.	695.	652.	569.	479.	382.	289	213.	159.
120.	91.	70.	67.	64.	62.	59.	57	55.	52.
50.	48.	46.	45.	43.	41.	40.	38	36.	35.
34.	32.	31.	30.	29.	27.	26.	25	24.	23.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	695.	456.	161.	69.	8239.
CMS	20.	13.	5.	2.	233.
INCHES		11.17	15.75	16.81	16.81
MM		283.83	399.94	426.92	426.92
AC-FT		226.	319.	340.	340.
THOUS CU M		279.	393.	420.	420.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 7

1.	0.	0.	0.	0.	0.	0	0	0.	0.
0.	0.	0.	0.	0.	0.	0	0	0	0
0.	0.	0.	0.	0.	0.	0	0	0	0
0.	4.	14.	26.	33.	33.	28	23	18	14
10.	7.	5.	4.	3.	3.	3	3	3	3
3.	4.	5.	6.	7.	7	7	8	8.	8.

9.	12.	18.	25.	31.	35.	38.	41.	42.	43.
44.	45.	53.	81.	133.	197.	262.	321.	380.	476.
624.	759.	811.	761.	663.	558.	445.	337.	249.	186.
140.	106.	82.	78.	75.	72.	69.	66.	64.	61.
59.	56.	54.	52.	50.	48.	46.	44.	42.	41.
39.	38.	36.	35.	33.	32.	31.	30.	28.	27.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	811.	533.	188.	80.	9612.
CMS	23.	15.	5.	2.	272.
INCHES		13.04	18.37	19.61	19.61
MM		331.14	466.59	498.07	498.07
AC-FT		264.	372.	397.	397.
THOUS CU M		326.	459.	490.	490.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 8

1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	5.	16.	30.	38.	38.	32.	27.	21.	16.
11.	8.	6.	4.	4.	4.	3.	3.	3.	3.
3.	4.	6.	7.	8.	8.	8.	9.	9.	9.
10.	14.	21.	29.	35.	40.	44.	46.	48.	50.
51.	51.	61.	93.	152.	226.	299.	367.	434.	544.
713.	867.	927.	869.	758.	638.	509.	385.	283.	212.
160.	122.	94.	89.	86.	82.	79.	76.	73.	70.
67.	65.	62.	59.	57.	55.	53.	51.	49.	47.
45.	43.	41.	40.	38.	37.	35.	34.	32.	31.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	927.	609.	214.	92.	10986.
CMS	26.	17.	6.	3.	311.
INCHES		14.90	20.99	22.41	22.41
MM		378.44	533.25	569.22	569.22
AC-FT		302.	425.	454.	454.
THOUS CU M		372.	525.	560.	560.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 9

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	6.	20.	37.	48.	47.	40.	33.	26.	19.
14.	10.	7.	5.	5.	4.	4.	4.	4.	4.
4.	6.	7.	8.	9.	10.	11.	11.	11.	11.
13.	18.	26.	36.	44.	50.	55.	58.	60	62.
63.	84.	76.	116.	190.	282.	374.	459.	543.	680
891.	1084.	1158.	1087.	948.	798.	636.	481.	356.	265
200.	152.	117.	112.	107.	103.	99.	95	91	87
84.	81.	77.	74.	71.	69.	66.	63.	61	58
56.	54.	52.	50.	48.	46.	44.	42.	40	39

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1158.	761.	268.	114.	13732.
CMS	33.	22.	8.	3.	389
INCHES		18.62	26.24	28.01	28.01
MM		473.05	666.56	711.53	711.53

AC-FT	377.	532.	567.		567.
THOUS CU M	465.	656.	700.		700.

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SUB-AREA RUNOFF COMPUTATION

OUTFLOW FROM THE OVERTOPING OF NORWICH NO. 2 DAM

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	0.00	0.00	0.00	0.00	0.000	0	0	0

INPUT HYDROGRAPH

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	309.	779.	1192.	1631.	2353.
3327.	4373.	5398.	6222.	6677.	6718.	6301.	5610.	4803.	3996.
3215.	2559.	1996.	1520.	1231.	1027.	815.	593.	386.	227.
80.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6718.	4925.	1528.	611.	73334.
CMS	190.	139.	43.	17.	2077.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		2442.	3030.	3030.	3030.
THOUS CU M		3012.	3738.	3738.	3738.

1*OVF*

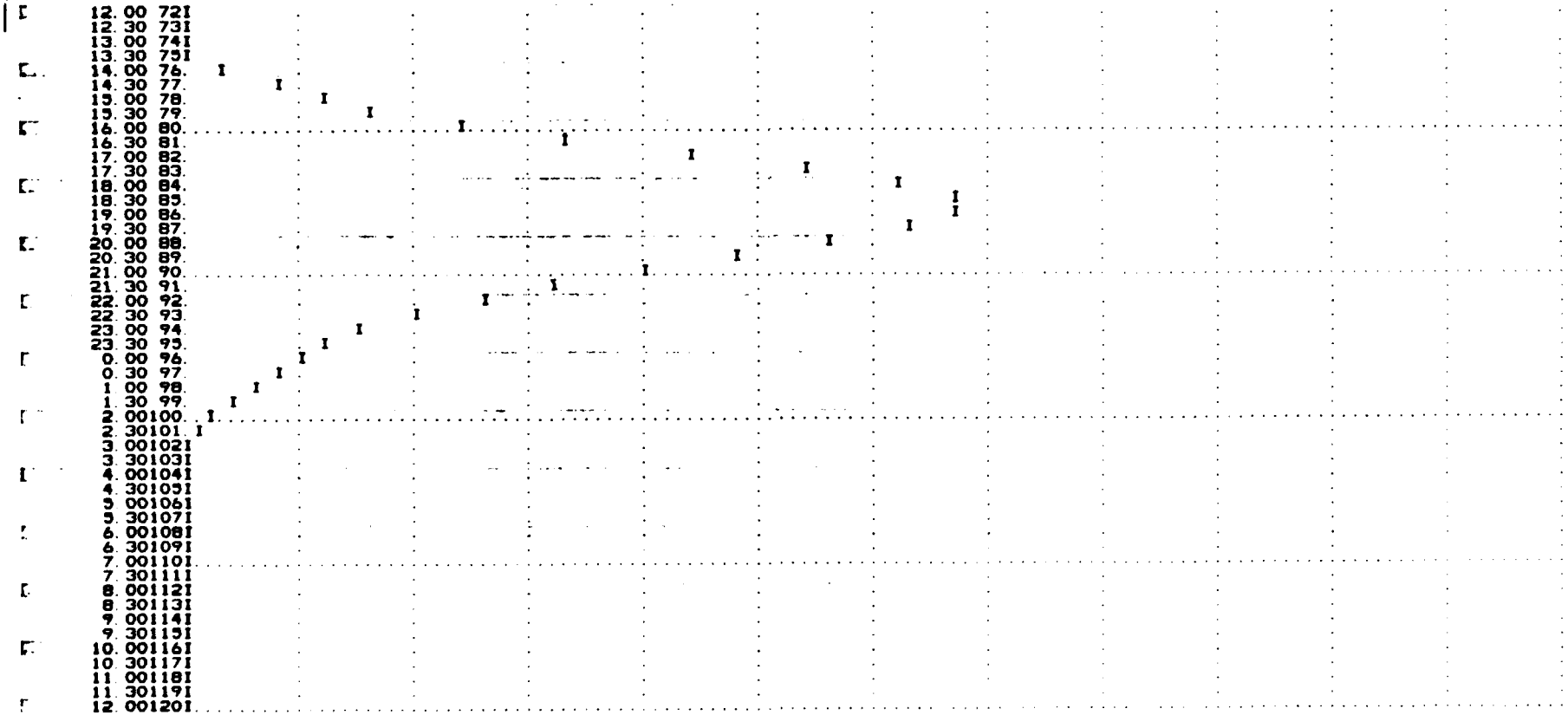
STATION 1

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

0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	0.	0.	0.	0.

0.30 1I
1.00 2I
1.30 3I
2.00 4I
2.30 5I
3.00 6I
3.30 7I
4.00 8I
4.30 9I
5.00 10I
5.30 11I
6.00 12I
6.30 13I

7.00 141
7.30 151
8.00 161
8.30 171
9.00 181
9.30 191
10.00 201
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
9.00 661
9.30 671
10.00 681
10.30 691
11.00 701
11.30 711



1*OVN*

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	0	0.	0.	0.	0	0	0	0	0

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0	0.	0.
0.	0.	0.	0.	0.	31.	78.	119.	163.	239.
333.	437.	540.	622.	668.	672.	630.	561.	480.	400.
321.	255.	200.	152.	123.	103.	81.	59.	39.	23.
8.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	672.	492.	153.	61.	7333.
CMS	19.	14.	4.	2.	208.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		244.	303.	303.	303.
THOUS CU M		301.	374.	374.	374.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	62.	156.	238.	326.	471.
665.	875.	1080.	1244.	1335.	1344.	1260.	1122.	961.	799.
643.	511.	399.	304.	246.	205.	163.	119.	77.	45.
16.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1344.	985.	306.	122.	14667.
CMS	38	28.	9.	3.	415.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		488.	606.	606.	606.
THOUS CU M		602.	748.	748.	748.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

0	0	0	0	0.	0.	0.	0	0.	0
0.	0.	0	0.	0.	0.	0.	0.	0.	0.
0.	0.	0	0.	0.	0.	0	0.	0.	0.
0.	0.	0	0.	0.	0.	0.	0.	0.	0.
0.	0.	0	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0	0.	0.	0.	0.	0.	0.	0.
0.	0.	0	0.	0.	93.	234.	358.	489.	706.
998.	1312.	1619.	1867.	2003.	2015.	1890.	1683.	1441.	1199.
964.	766.	599.	456.	369.	308.	244.	178.	116.	68.
24.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2015	1477.	458.	183.	22000.

CMS	57.	42.	13.	5.	623.				
INCHES		0.00	0.00	0.00	0.00				
MM		0.00	0.00	0.00	0.00				
AC-FT		733.	909.	909.	909.				
THOUS CU M		904.	1121.	1121.	1121.				

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	124.	312.	477.	652.	941.
1331.	1749.	2139.	2489.	2671.	2687.	2320.	2244.	1921.	1398.
1286.	1022.	798.	608.	492.	411.	326.	237.	154.	91.
32.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2687.	1970.	611.	244.	29334.
CMS	76.	56.	17.	7.	831.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		977.	1212.	1212.	1212.
THOUS CU M		1205.	1495.	1495.	1495.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 5

0.	0.	0.	0.	0.	0.	0.	0	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0	0.	0.
0.	0.	0.	0.	0.	154.	389.	596.	815.	1176.
1663.	2186.	2699.	3111.	3338.	3359.	3150.	2805.	2401.	1998.
1607.	1277.	998.	760.	615.	513.	407.	296.	193.	113.
40.	0.	0.	0.	0.	0.	0	0	0.	0.
0.	0.	0.	0.	0.	0.	0.	0	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3359.	2462.	764.	306.	36667.
CMS	95.	70.	22.	9.	1038.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		1221.	1515.	1515.	1515.
THOUS CU M		1506.	1869.	1869.	1869.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 6

0	0.	0.	0.	0.	0.	0.	0	0.	0
0.	0.	0.	0.	0.	0.	0.	0	0.	0.
0.	0.	0.	0.	0.	0.	0.	0	0.	0.
0.	0.	0.	0.	0.	0.	0.	0	0.	0

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	185.	467.	715.	979.	1412.
1996.	2624.	3239.	3733.	4006.	4031.	3781.	3366.	2882.	2398.
1929	1533.	1198.	912.	739.	616.	489.	356.	232.	136.
48.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4031.	2955.	917.	367.	44000.
CMS	114.	84.	26.	10.	1246.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		1465.	1818.	1818.	1818.
THOUS CU M		1807.	2243.	2243.	2243.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 7

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	216.	545.	834.	1142.	1647.
2329.	3061.	3779.	4355.	4674.	4703.	4411.	3927.	3362.	2797.
2250.	1788.	1397.	1064.	862.	719.	570.	415.	270.	159.
56.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4703.	3447.	1069.	428.	51334.
CMS	133.	98.	30.	12.	1454.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		1709.	2121.	2121.	2121.
THOUS CU M		2108.	2616.	2616.	2616.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 8

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	247.	623.	954.	1305.	1882.
2662.	3498.	4318.	4978.	5342.	5374.	5041.	4488.	3842.	3197.
2572	2044.	1597.	1216.	985.	822.	652.	474.	309.	182.
64.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5374.	3940.	1222.	489.	58667.
CMS	152	112.	35.	14.	1661.

C-97

INCHES	0.00	0.00	0.00		0.00
MM	0.00	0.00	0.00		0.00
AC-FT	1954.	2424.	2424.		2424.
THOUS CU M	2410.	2990.	2990.		2990.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 9

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3327.	4373.	5398.	6222.	667.	309.	779.	1192.	1631.	2353.
3215.	2559.	1996.	1520.	1231.	6718.	6301.	5610.	4803.	3996.
80.	0.	0.	0.	0.	1027.	815.	593.	386.	227.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6718.	4924.	1528.	611.	73334.
CMS	190.	139.	43.	17.	2077.
INCHES		0.00	0.00	0.00	0.00
MM		0.00	0.00	0.00	0.00
AC-FT		2442.	3030.	3030.	3030.
THOUS CU M		3012.	3738.	3738.	3738.

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

COMBINE HYDROGRAPHS

OUTFLOW FROM NORWICH NO. 2 COMBINED WITH NORWICH NO. 1 INFLOW

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

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	2.	4.	5.	5.	4.	3.	2.
1	1	1	1	0	0	0	0	0
1	1	1	1	1	1	1	1	1
1	2	3	4	5	5	6	6	6
6.	6.	8.	12.	19.	39.	115.	165.	217.
422.	546.	656.	731.	762.	752.	694.	609.	516.
341.	271.	211.	163.	134.	113.	91.	69.	48.
16.	8.	8	7	7.	7.	7.	6.	6.
6.	5.	5.	5.	5.	5.	4.	4.	4.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	762	562.	180.	73.	8707.
CMS	22.	16.	5.	2.	247.
INCHES		13.75	17.58	17.76	17.76

MM	349.31	446.64	451.14	451.14
AC-FT	279.	356.	360.	360.
THOUS CU M	344.	439.	444.	444.

1*OVF*

STATION 1

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

0. 100. 200. 300. 400. 500. 600. 700. 800. 0. 0. 0. 0.

0.30 11
1.00 21
1.30 31
2.00 41
2.30 51
3.00 61
3.30 71
4.00 81
4.30 91
5.00 101
5.30 111
6.00 121
6.30 131
7.00 141
7.30 151
8.00 161
8.30 171
9.00 181
9.30 191
10.00 201
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
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21.00 421
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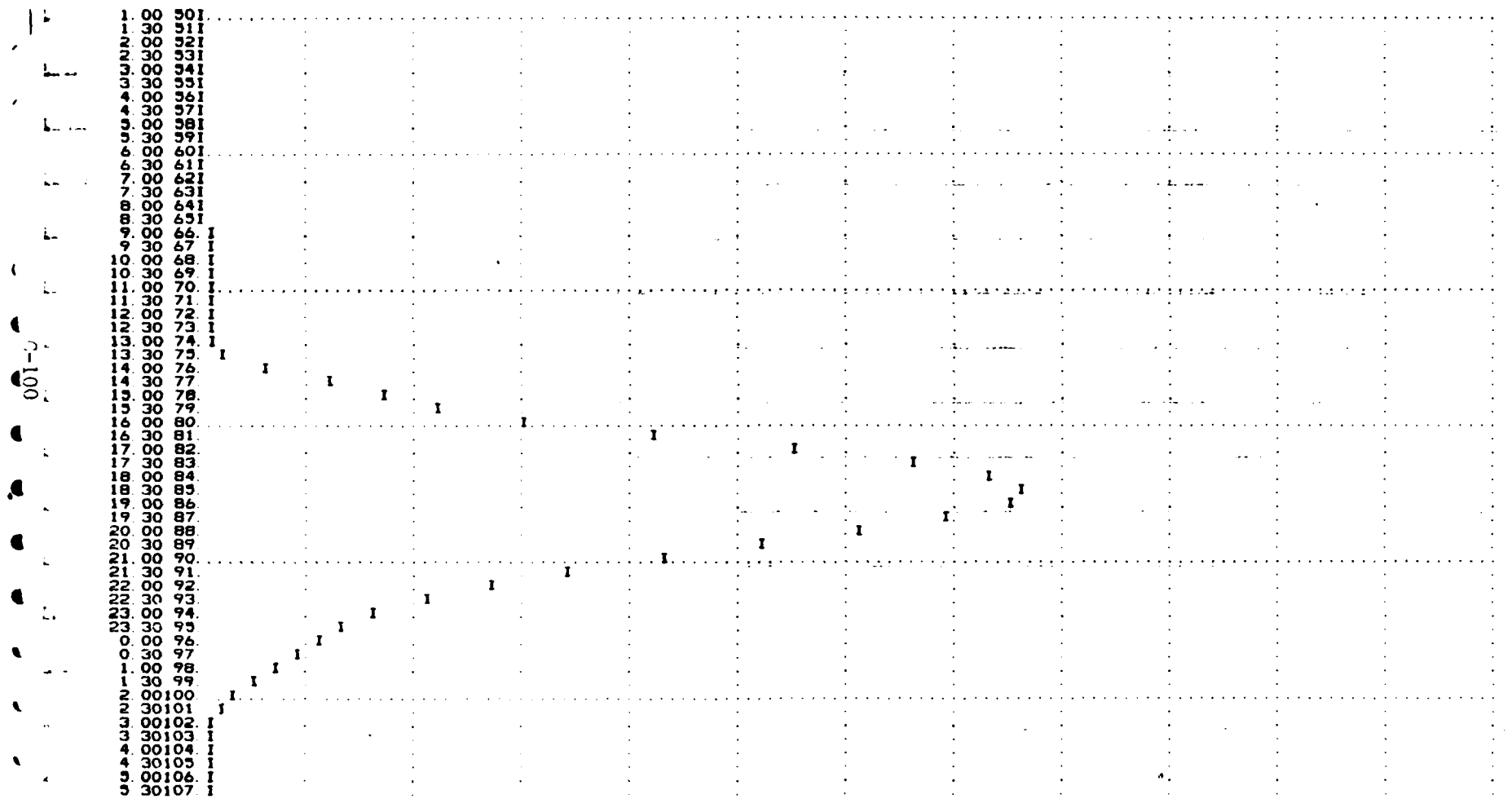
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491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22.30 93
23.00 94
23.30 95
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0.30 97
1.00 98
1 30 99
2.00100
2 30101
3.00102
3 30103
4.00104
4 30105
5.00106
5 30107

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8.00112.I
8.30113.I
9.001141
9.301151
10.001161
10.301171
11.001181
11.301191
12.001201

1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	1	4.	7.	10.	9.	8.	7.	5.	4.
3.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1	1.	1.	2.	2.	2.	2.	2.	2.	2.
3.	4.	5.	7.	9.	10.	11.	12.	12.	12.
13.	13.	15.	23.	38.	118.	231.	330.	435.	607.
844.	1091.	1311.	1462.	1525.	1503.	1387.	1218.	1032.	852.
683.	541.	423.	326.	268.	226.	183.	138.	95.	63.
33.	16.	15.	15.	14.	14.	13.	13.	12.	12.
11.	11.	10.	10.	10.	9.	9.	8.	8.	8.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1525.	1124.	359.	145.	17413.
CMS	43	32	10.	4.	493.
INCHES		27.30	35.17	35.52	35.52
MM		698.61	893.28	902.27	902.27
AC-FT		557.	712.	720.	720.
THOUS CU M		687.	879.	888.	888.

1*OVF*

STATION 1

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

	0	200	400	600	800	1000.	1200.	1400.	1600.	0.	0.	0.	0.
0	30	11											
1	00	21											
1	30	31											
2	00	41											
2	30	51											
3	00	61											
3	30	71											
4	00	81											
4	30	91											
5	00	101											
5	30	111											
6	00	121											

6.30 131
7.00 141
7.30 151
8.00 161
8.30 171
9.00 181
9.30 191
10.00 201
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
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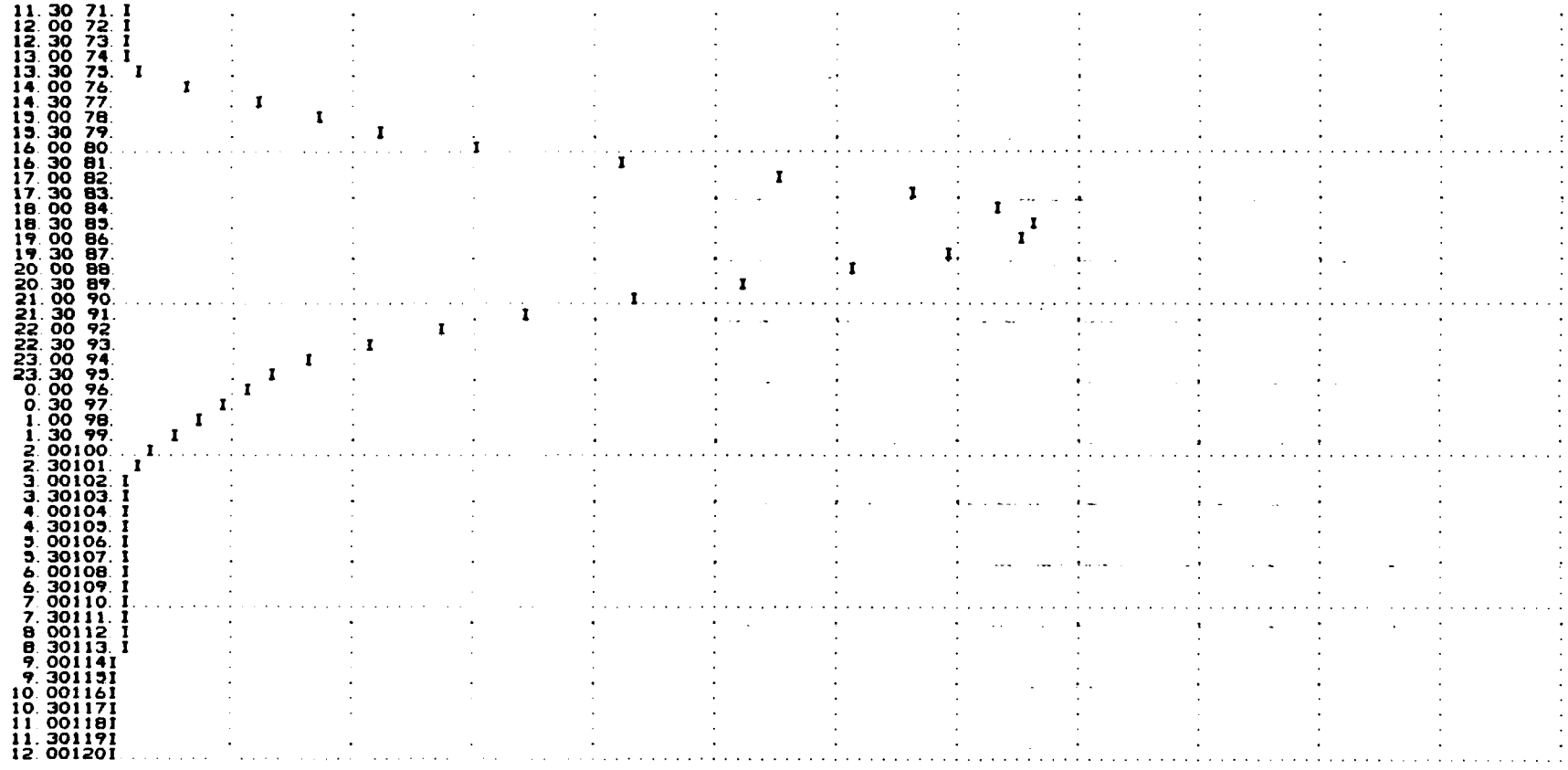
9.00 66 I
9.30 67 I
10.00 68 I
10.30 69. I
11.00 70 I



1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 3

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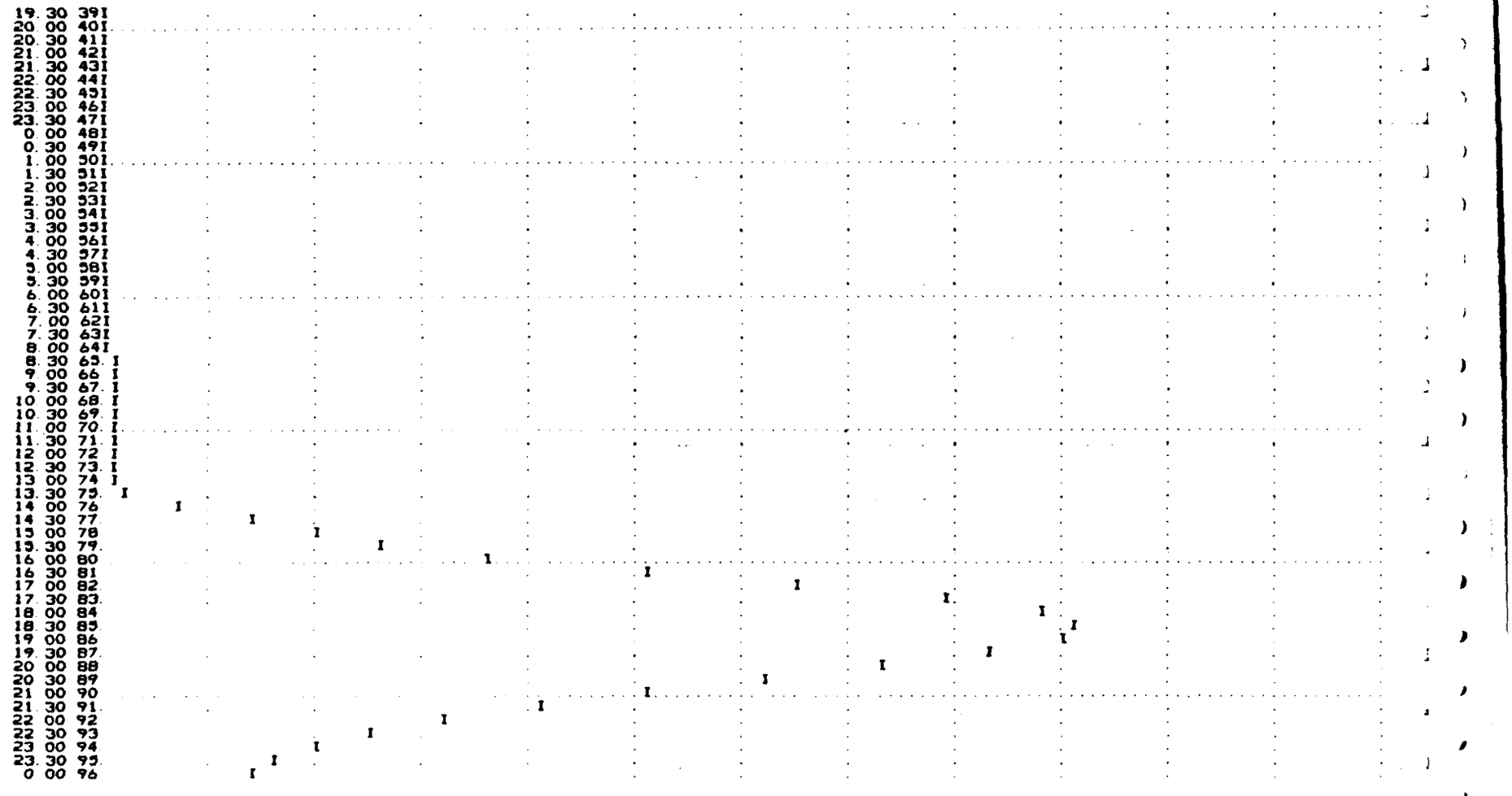
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0.30 49
1.00 50
1.30 51
2.00 52
2.30 53
3.00 54
3.30 55
4.00 56
4.30 57
5.00 58
5.30 59
6.00 60
6.30 61
7.00 62
7.30 63
8.00 64
8.30 65
9.00 66
9.30 67
10.00 68
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13.00 74
13.30 75
14.00 76
14.30 77
15.00 78
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16.30 81
17.00 82
17.30 83
18.00 84
18.30 85
19.00 86
19.30 87
20.00 88
20.30 89
21.00 90
21.30 91
22.00 92
22.30 93
23.00 94
23.30 95
0.00 96

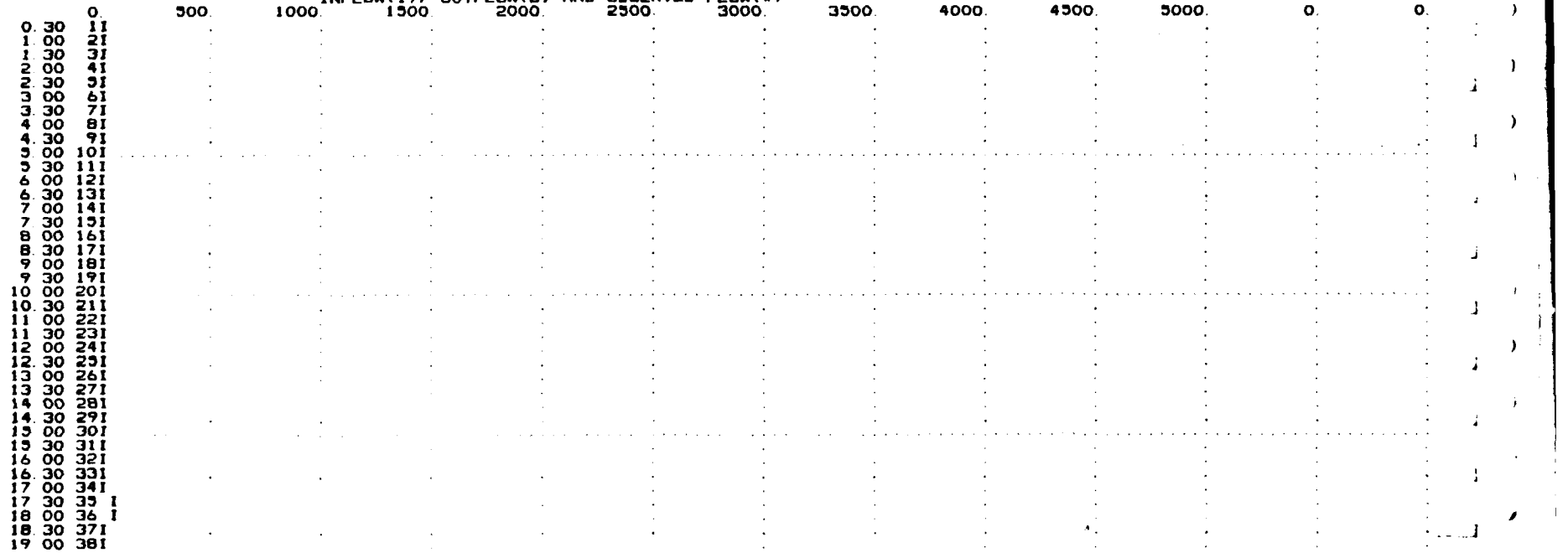
8.	11.	16.	22.	27.	30.	33.	35.	36.	37.
38.	38	46.	70.	114.	355.	692.	991.	1304.	1820.
2531.	3274.	3934.	4385.	4575.	4509.	4162.	3655.	3095.	2557.
2049.	1624.	1268.	979.	803.	678.	548.	413.	286.	189.
98.	48.	46.	45.	43.	41.	40.	38.	36.	35.
34.	32.	31	30.	29.	27.	26.	25.	24.	23.

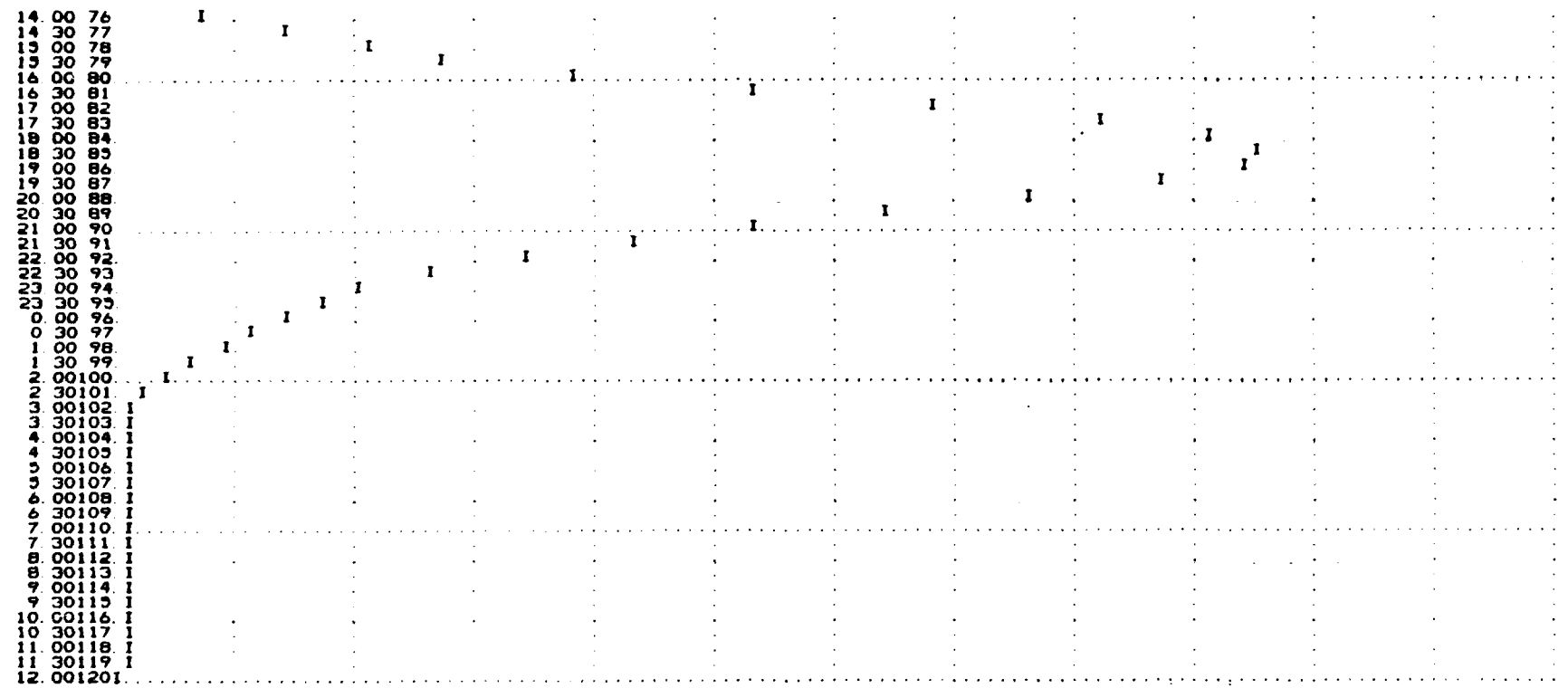
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4575.	3371.	1077.	439.	52239.
CMS	130	95.	31.	12.	1479.
INCHES		82.51	105.51	106.57	106.57
MM		2095.84	2679.83	2706.81	2706.81
AC-FT		1671.	2137.	2159.	2159.
THOUS CU M		2062.	2636.	2663.	2663.

1*OVF*

STATION 1

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





1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTID 6

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	3	12	22	29	28	24	20	16	12
8.	6.	4.	3.	3.	3.	3.	2.	2.	2.
2	3	4	5	6	6	6	7	7	7

9.00 18I
9.30 19I
10.00 20I
10.30 21I
11.00 22I
11.30 23I
12.00 24I
12.30 25I
13.00 26I
13.30 27I
14.00 28I
14.30 29I
15.00 30I
15.30 31I
16.00 32I
16.30 33I
17.00 34I
17.30 35.I
18.00 36.I
18.30 37.I
19.00 38I
19.30 39I
20.00 40I
20.30 41I
21.00 42I
21.30 43I
22.00 44I
22.30 45I
23.00 46I
23.30 47I
0.00 48I
0.30 49I
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1.30 51I
2.00 52I
2.30 53I
3.00 54I
3.30 55I
4.00 56I
4.30 57I
5.00 58I
5.30 59I
6.00 60I
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7.00 62I
7.30 63I
8.00 64I
8.30 65.I
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10.00 68.I
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12.00 72.I
12.30 73.I
13.00 74.I
13.30 75.I

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 8.30113.I
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 9.30115I
10.00116I
10.30117I
11 00118I
11 30119I
12 00120I.
```

1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 5

0	0	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	3.	10.	19.	24.	24.	20.	17.	13.	10.
7	5	4	3.	2.	2.	2.	2.	2.	2.
2.	3.	4.	4.	5.	5.	5.	5.	6.	6.
6.	9	13.	18.	22.	25.	27.	29.	30.	31.
32.	32.	38.	58.	95.	295.	576.	826.	1087.	1517.
2109	2729	3278.	3654.	3812.	3758.	3468.	3046.	2579.	2131.
1707.	1353.	1057.	816.	669.	565.	457.	344.	239.	157.
82	40.	39.	37.	36.	34.	33.	32.	30.	29.
28.	27.	26.	25.	24.	23.	22.	21.	20.	19.

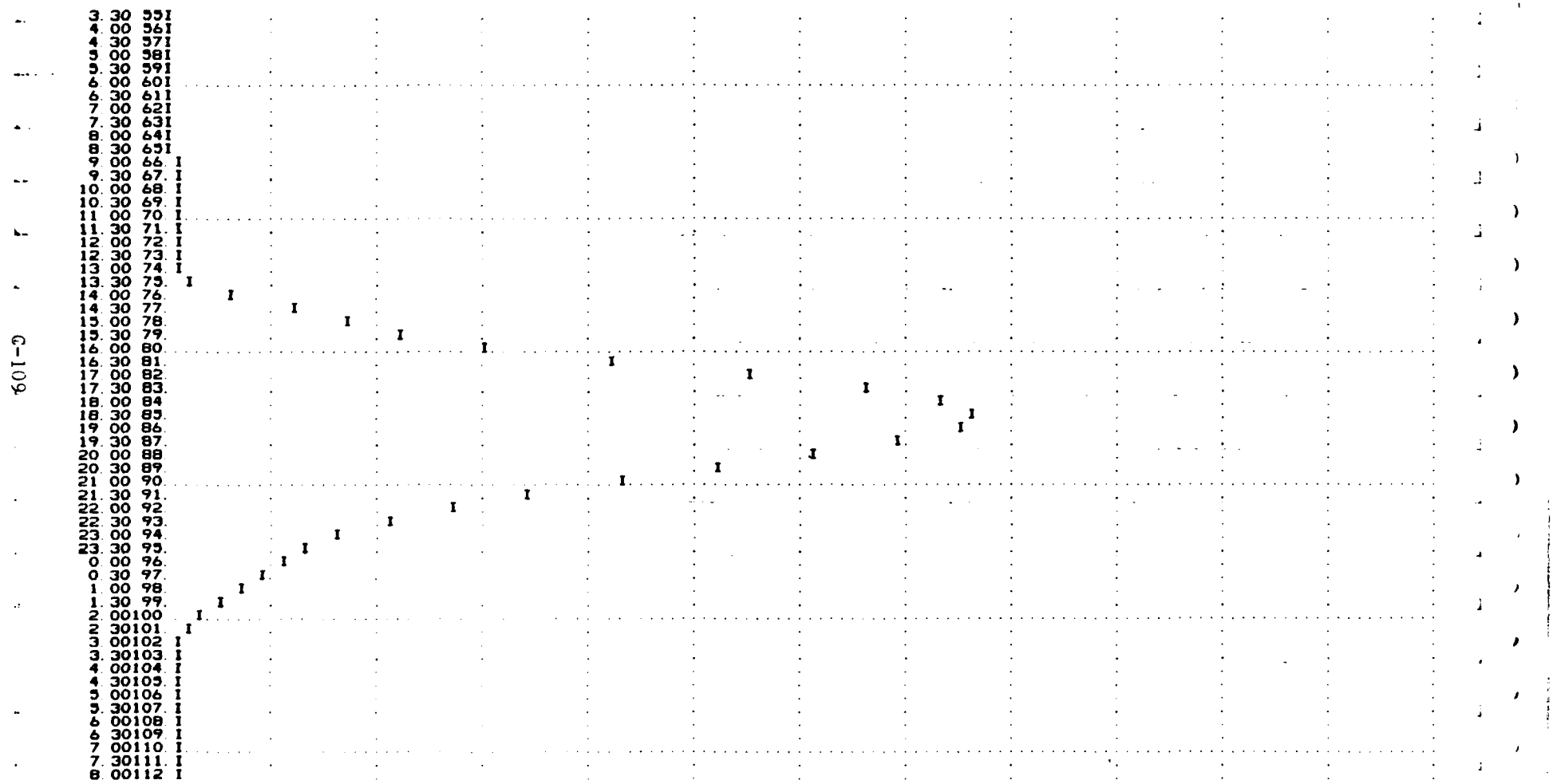
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3812.	2809.	898.	363.	43533.
CMS	108.	80.	25.	10.	1233.
INCHES		68.76	87.92	88.81	88.81
MM		1746.53	2233.19	2255.68	2255.68
AC-FT		1393.	1781.	1799.	1799.
THOUS CU M		1718.	2197.	2219.	2219.

1*OVF*

STATION 1

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

	0.	400.	800.	1200.	1600.	2000.	2400.	2800.	3200.	3600.	4000.	0.	0.
0.30	1I												
1.00	2I												
1 30	3I												
2.00	4I												
2 30	5I												
3.00	6I												
3 30	7I												
4.00	8I												
4 30	9I												
5.00	10I												
5 30	11I												
6.00	12I												
6 30	13I												
7.00	14I												
7 30	15I												
8.00	16I												
8.30	17I												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19.30 87
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20.30 89
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21.30 91
22.00 92
22.30 93
23.00 94
23.30 95
0.00 96
0.30 97
1.00 98
1.30 99
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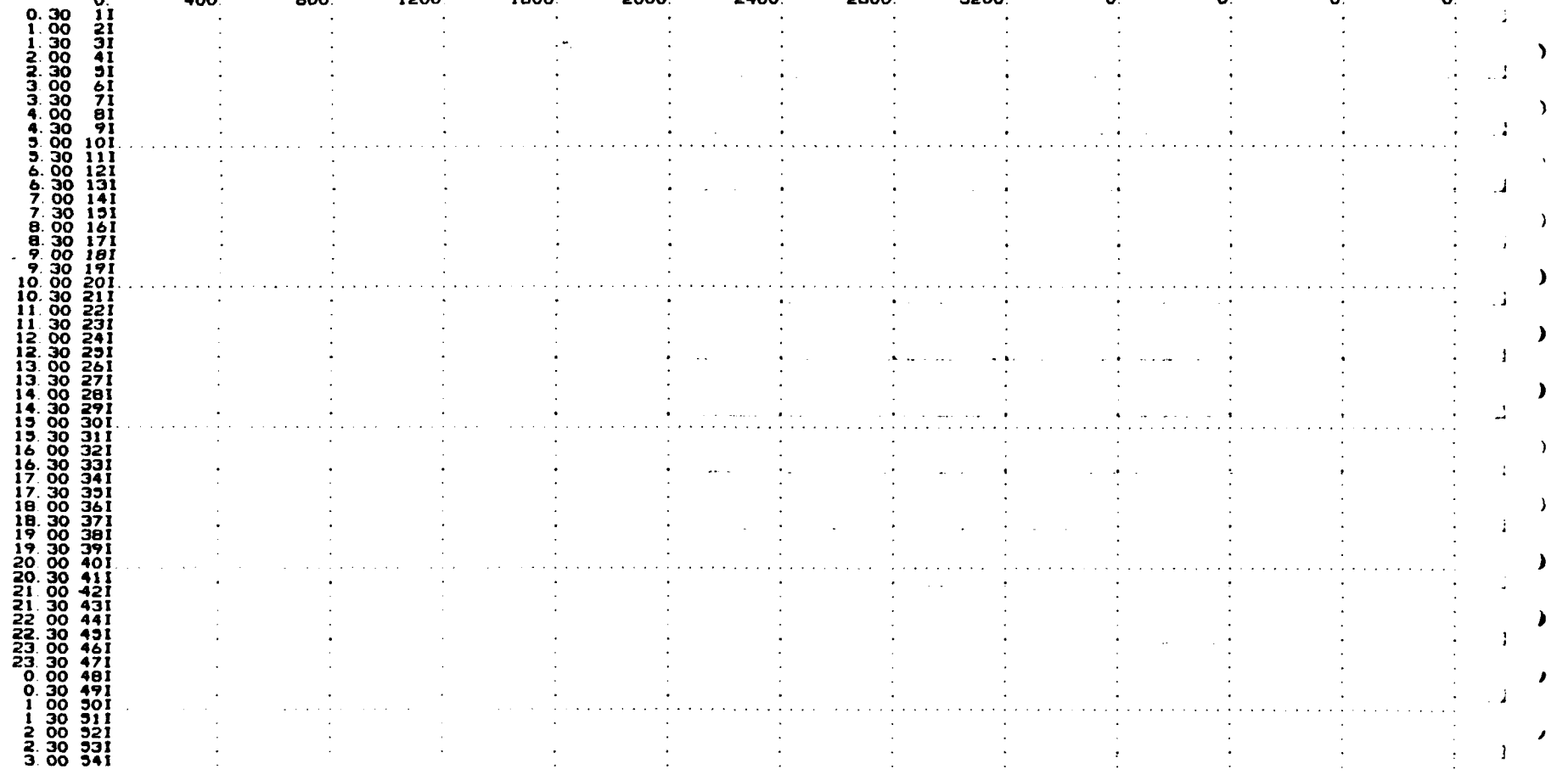
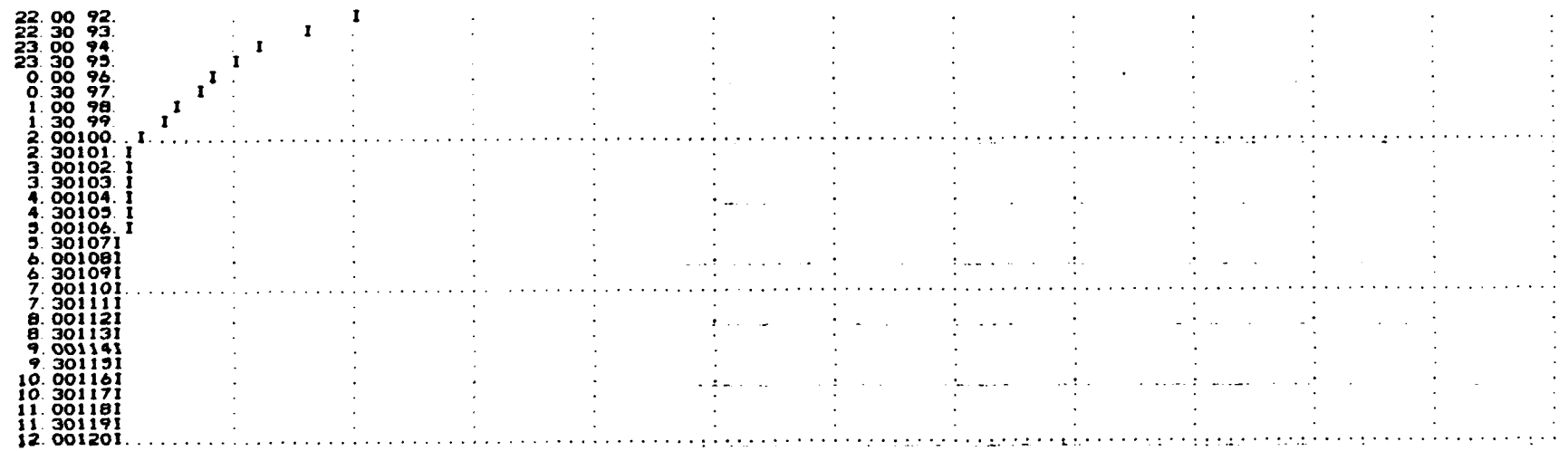
2.30101
3.00102
3.30103
4.00104
4.30105
5.00106
5.30107
6.00108
6.30109
7.00110
7.30111
8.00112

STATION 1

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





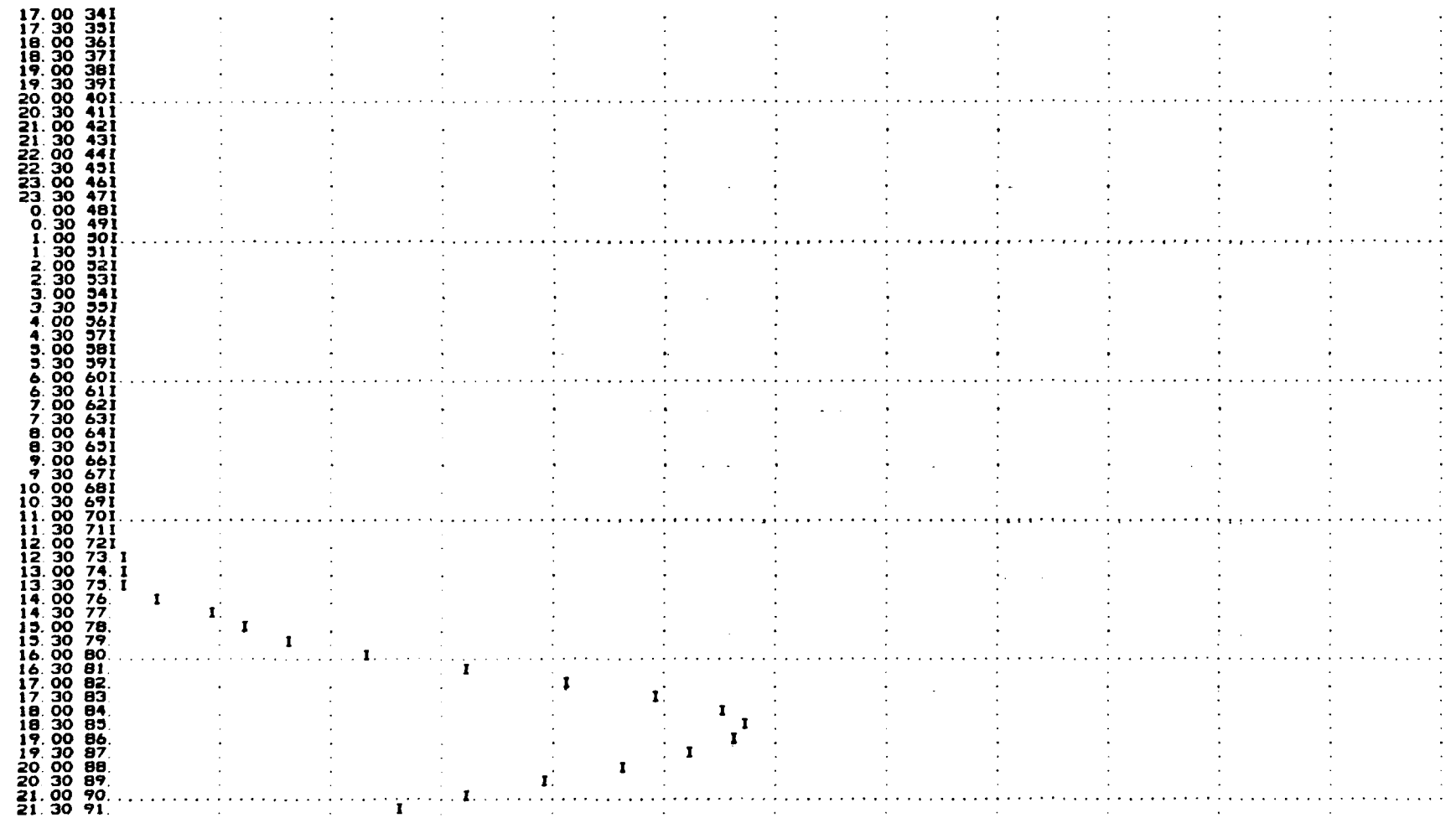
1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	2.	8.	15.	19.	19.	16.	13.	10.	8.
6.	4.	3.	2.	2.	2.	2.	2.	2.	2.
1.	2.	3.	3.	4.	4.	4.	4.	4.	5.
5.	7.	10.	14.	18.	20.	22.	23.	24.	25.
25.	26.	30.	47.	76.	236.	461.	660.	869.	1213.
1687.	2183.	2622.	2923.	3090.	3006.	2775.	2436.	2063.	1704.
1366.	1083.	845.	653.	535.	452.	366.	275.	191.	126.
66.	32.	31.	30.	29.	27.	26.	25.	24.	23.
22.	22.	21.	20.	19.	18.	18.	17.	16.	16.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3050.	2247.	718.	290.	34826.
CMS	86.	64.	20.	8.	986.
INCHES		55.01	70.34	71.04	71.04
MM		1397.23	1786.55	1804.54	1804.54
AC-FT		1114.	1425.	1439.	1439.
THOUS CU M		1374.	1757.	1775.	1775.

1*OVF*


17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
9.00 661
9.30 671
10.00 681
10.30 691
11.00 701
11.30 711
12.00 721
12.30 73.
13.00 74.
13.30 75.
14.00 76.
14.30 77.
15.00 78.
15.30 79.
16.00 80.
16.30 81.
17.00 82.
17.30 83.
18.00 84.
18.30 85.
19.00 86.
19.30 87.
20.00 88.
20.30 89.
21.00 90.
21.30 91.

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	0.	0	0.	0.	0.	0.	0.	0.	0.
0.	2.	6.	11.	14.	14.	12.	10.	8.	6.
4.	3.	2.	2.	1.	1.	1.	1.	1.	1.
1.	2.	2.	3.	3.	3.	3.	3.	3.	3.
4	9.	8	11.	13.	15.	16.	17.	18.	19.
19.	19.	23.	35.	57.	177.	346.	495.	652.	910.
1266.	1637.	1967.	2193.	2287.	2255.	2081.	1827	1548.	1278.
1024.	812.	634.	489.	401.	339.	274.	206.	143.	94.
49.	24.	23.	22.	21.	21.	20.	19.	18.	17.
17.	16.	15.	15.	14.	14.	13.	13.	12.	12.

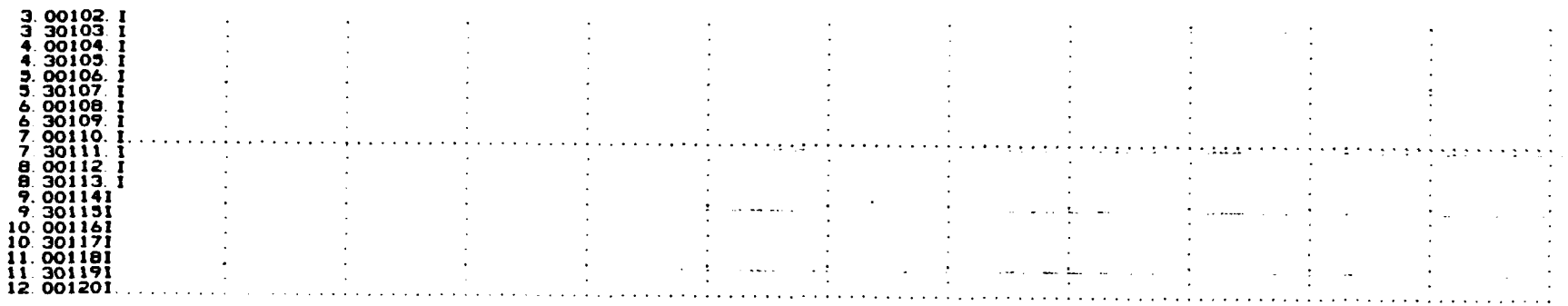
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2287.	1685.	539.	218.	26120.
CMS	65.	48.	15.	6.	740.
INCHES		41.26	52.75	53.28	53.28
MM		1047.92	1339.92	1353.41	1353.41
AC-FT		836.	1069.	1079.	1079.
THOUS CU M		1031.	1318.	1331.	1331.

1*OVF*

STATION 1

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

	0.	400.	800.	1200.	1600.	2000.	2400.	0.	0.	0.	0.	0.	0.
0 30	11												
1 00	21												
1 30	31												
2 00	41												
2 30	51												
3 00	61												
3 30	71												
4 00	81												
4 30	91												
5 00	101												
5 30	111												
6 00	121												
6 30	131												
7 00	141												
7 30	151												
8 00	161												
8 30	171												
9 00	181												
9 30	191												
10 00	201												
10 30	211												
11 00	221												
11 30	231												
12 00	241												
12 30	251												
13 00	261												
13 30	271												
14 00	281												
14 30	291												
15 00	301												
15 30	311												
16 00	321												
16 30	331												



1*DVN*

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

HYDROGRAPH ROUTING

RESERVOIR ROUTING MODIFIED PULS METHOD

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

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
3	0	0	0.000	0.000	0.000	0.	-1

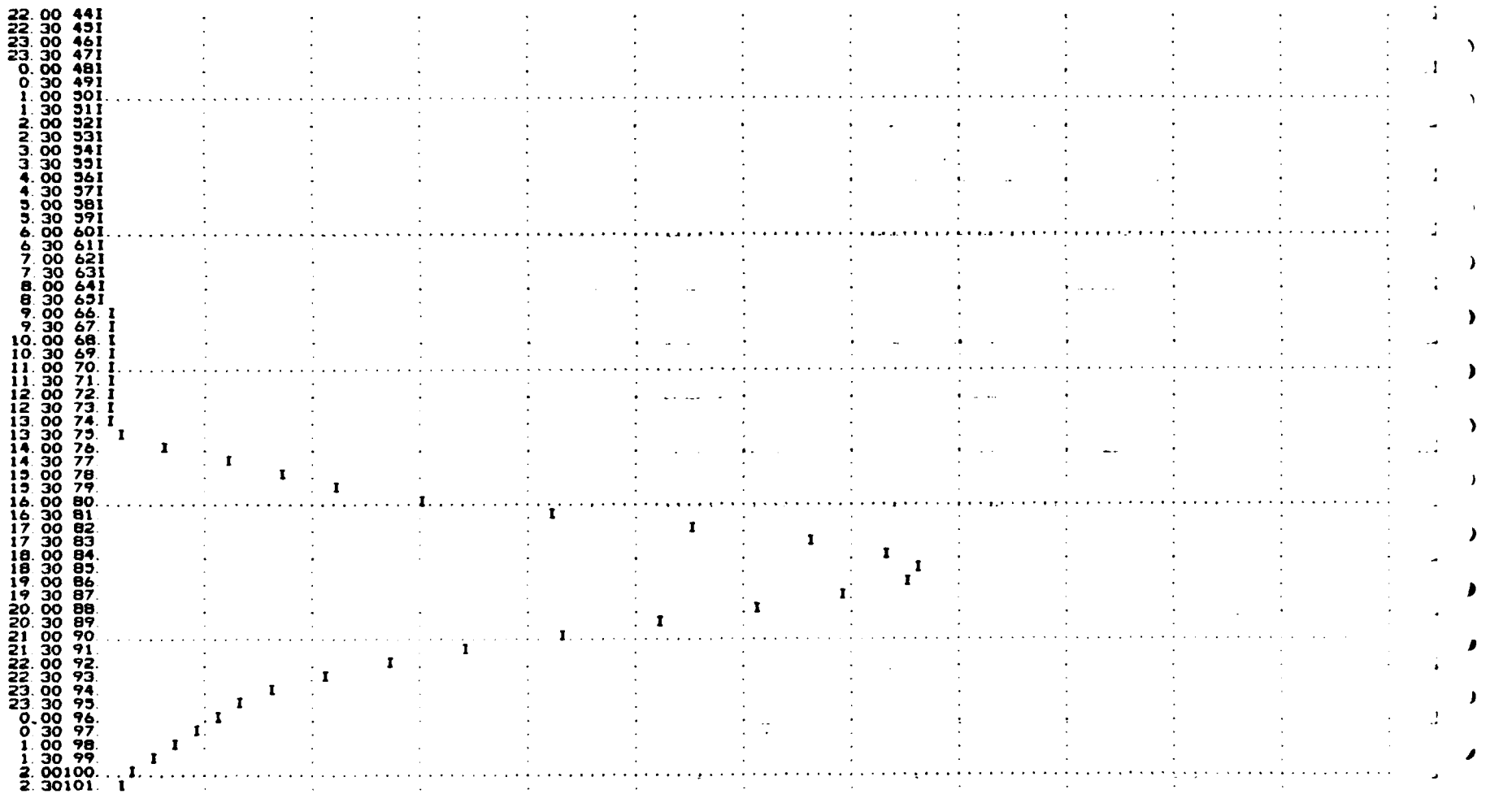
STAGE	1189.00	1190.40	1190.70	1190.90	1191.90	1192.90	1194.00	1194.50	1195.40	1196.40
FLOW	0.00	212.70	284.60	337.00	645.10	1016.30	1485.90	1861.40	2297.10	2779.20
SURFACE AREA=	7.	12.	17.							
CAPACITY=	0.	107.	255.							
ELEVATION=	1189.	1201.	1211.							

CREL	SPWID	COGW	EXPW	ELEVL	COGL	CAREA	EXPL
1189.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COGD	EXPD	DAMWID
1194.5	2.5	1.5	215.

STATION 1, PLAN 1, RATIO 1

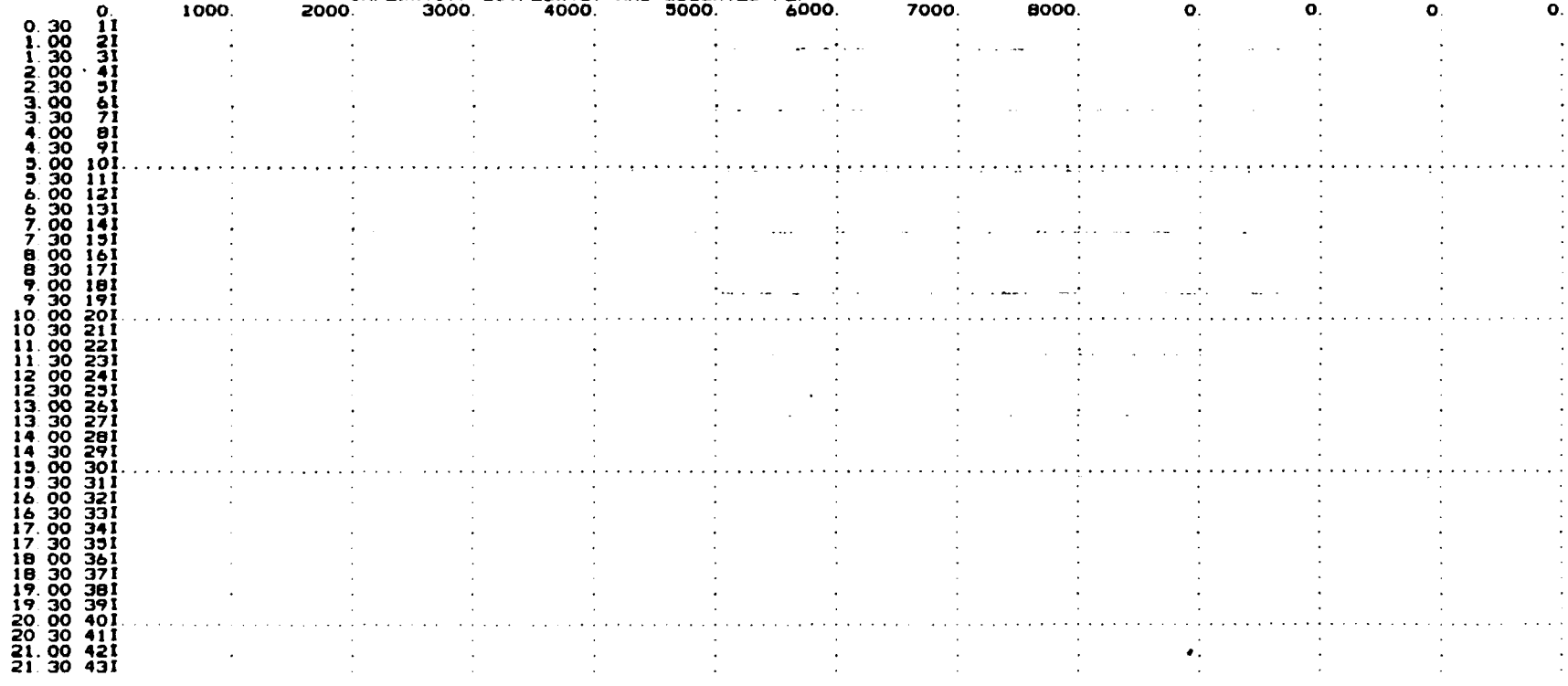

22.00 44
22.30 45
23.00 46
23.30 47
0.00 48
0.30 49
1.00 50
1.30 51
2.00 52
2.30 53
3.00 54
3.30 55
4.00 56
4.30 57
5.00 58
5.30 59
6.00 60
6.30 61
7.00 62
7.30 63
8.00 64
8.30 65
9.00 66
9.30 67
10.00 68
10.30 69
11.00 70
11.30 71
12.00 72
12.30 73
13.00 74
13.30 75
14.00 76
14.30 77
15.00 78
15.30 79
16.00 80
16.30 81
17.00 82
17.30 83
18.00 84
18.30 85
19.00 86
19.30 87
20.00 88
20.30 89
21.00 90
21.30 91
22.00 92
22.30 93
23.00 94
23.30 95
0.00 96
0.30 97
1.00 98
1.30 99
2.00100
2.30101

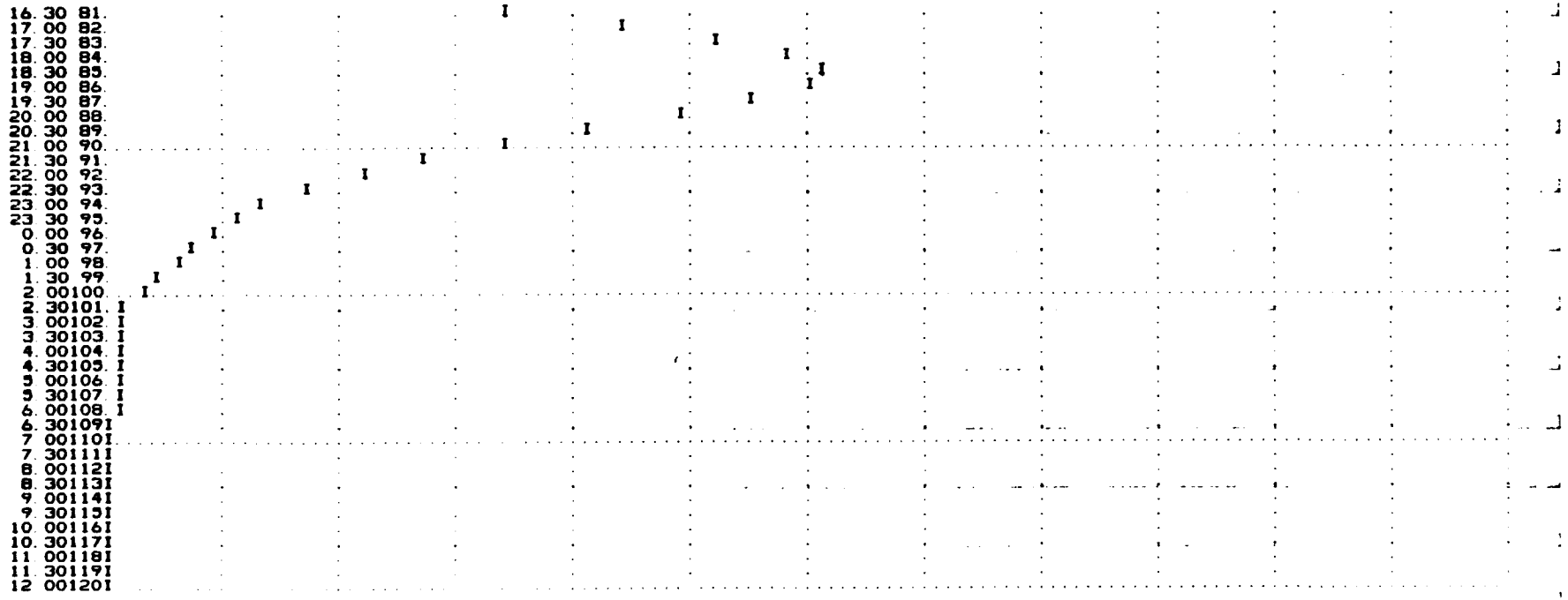
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7625.	5618.	1796.	726.	87066.
CMS	216.	159.	51.	21.	2465.
INCHES		137.52	175.84	177.61	177.61
MM		3493.06	4466.38	4511.35	4511.35
AC-FT		2786.	3562.	3598.	3598.
THOUS CU M		3436.	4394.	4438.	4438.

1*OVF*

STATION 1

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

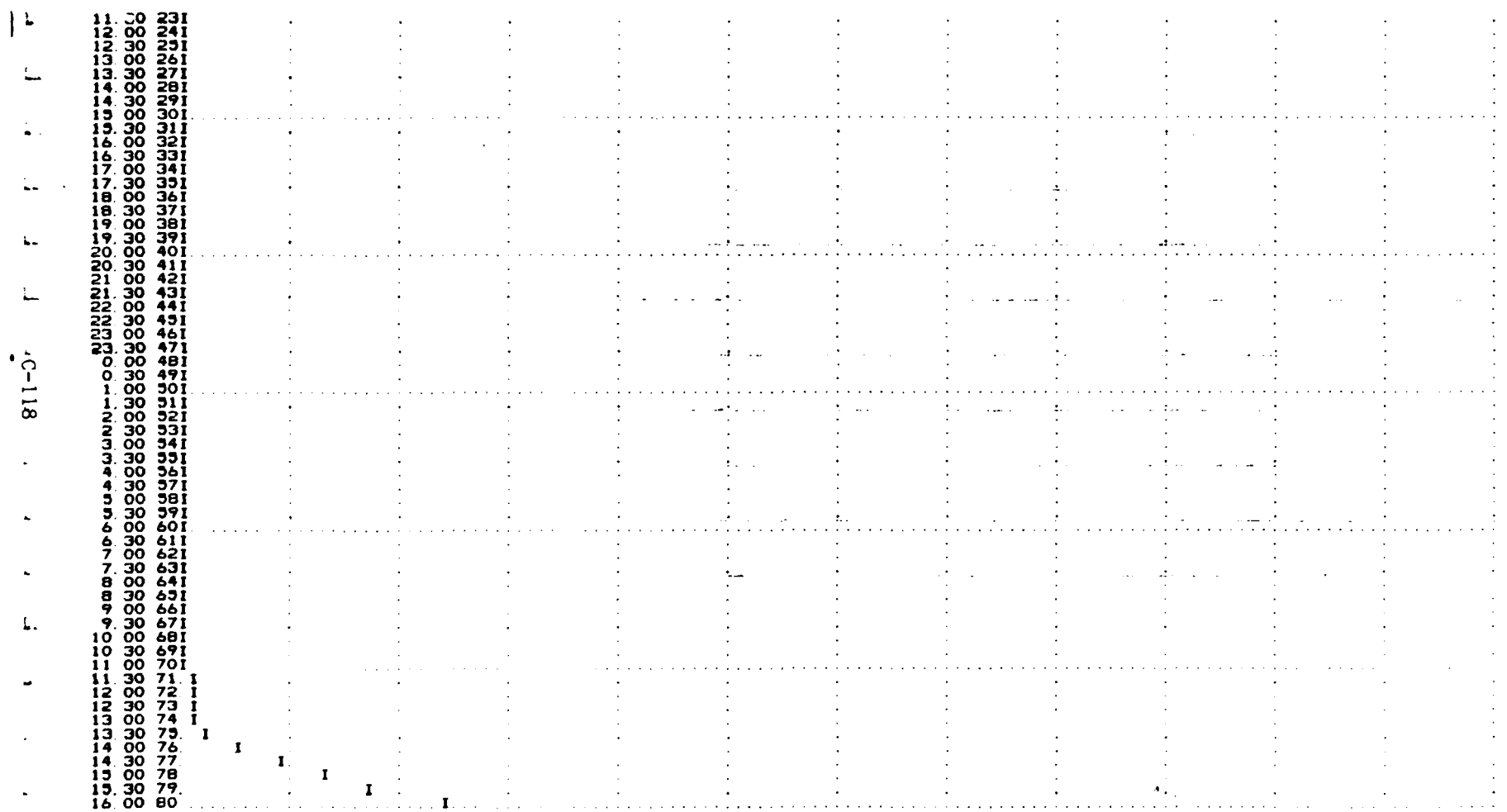




1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 9

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	6.	20.	37.	48.	47.	40.	33.	26.	19.
14.	10.	7.	5.	5.	4.	4.	4.	4.	4.
4.	6.	7.	8.	9.	10.	11.	11.	11.	11.
13.	18.	26.	36.	44.	50.	55.	58.	60.	62.
63.	64.	76.	116.	190.	391.	1153.	1691.	2174.	3033.
4218.	3457.	6556.	7309.	7625.	7516.	6937.	6091.	5139.	4261.
3415.	2707.	2113.	1632.	1338.	1130.	914.	688.	477.	314.
164.	81.	77.	74.	71.	69.	66.	63.	61.	58.


11.00 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
9.00 661
9.30 671
10.00 681
10.30 691
11.00 701
11.30 71
12.00 72
12.30 73
13.00 74
13.30 75
14.00 76
14.30 77
15.00 78
15.30 79
16.00 80

```
11.00118. I
11 30119 I
12 00:20 I
```

1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 8

1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0	0	0	0	0	0	0	0	0	0
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	5	16.	30.	38.	38.	32.	27.	21.	16.
11	8.	6	4.	4.	4.	3.	3.	3.	3.
3	4	6	7.	8.	8.	8.	9.	9.	9.
10.	14.	21.	29.	35.	40.	44.	46.	48.	50.
51	51	61	93.	152.	473.	922.	1321.	1739.	2427.
3379	4366.	5245.	5847.	6100.	6013.	5550.	4873.	4127.	3409.
2732	2166	1691	1305.	1070.	904.	731.	550.	382.	252.
131.	65.	62.	59.	57.	55.	53.	51.	49.	47.
45	43	41	40.	38.	37.	35.	34.	32.	31.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6100.	4494.	1437.	580.	69652.
CMS	173.	127.	41.	16.	1972.
INCHES		110.02	140.67	142.09	142.09
MM		2794.45	3573.10	3609.08	3609.08
AC-FT		2229.	2850.	2878.	2878.
THOUS CU M		2749.	3515.	3550.	3550.

1*OVF*

STATION 1

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

```
      0        1000      2000      3000      4000      5000      6000      7000.       0.        0         0.        0         0.
 0.30  11
 1.00  21
 1.30  31
 2.00  41
 2.30  51
 3.00  61
 3.30  71
 4.00  81
 4.30  91
 5.00 101
 5.30 111
 6.00 121
 6.30 131
 7.00 141
 7.30 151
 8.00 161
 8.30 171
 9.00 181
 9.30 191
10.00 201
10.30 211
11.00 221
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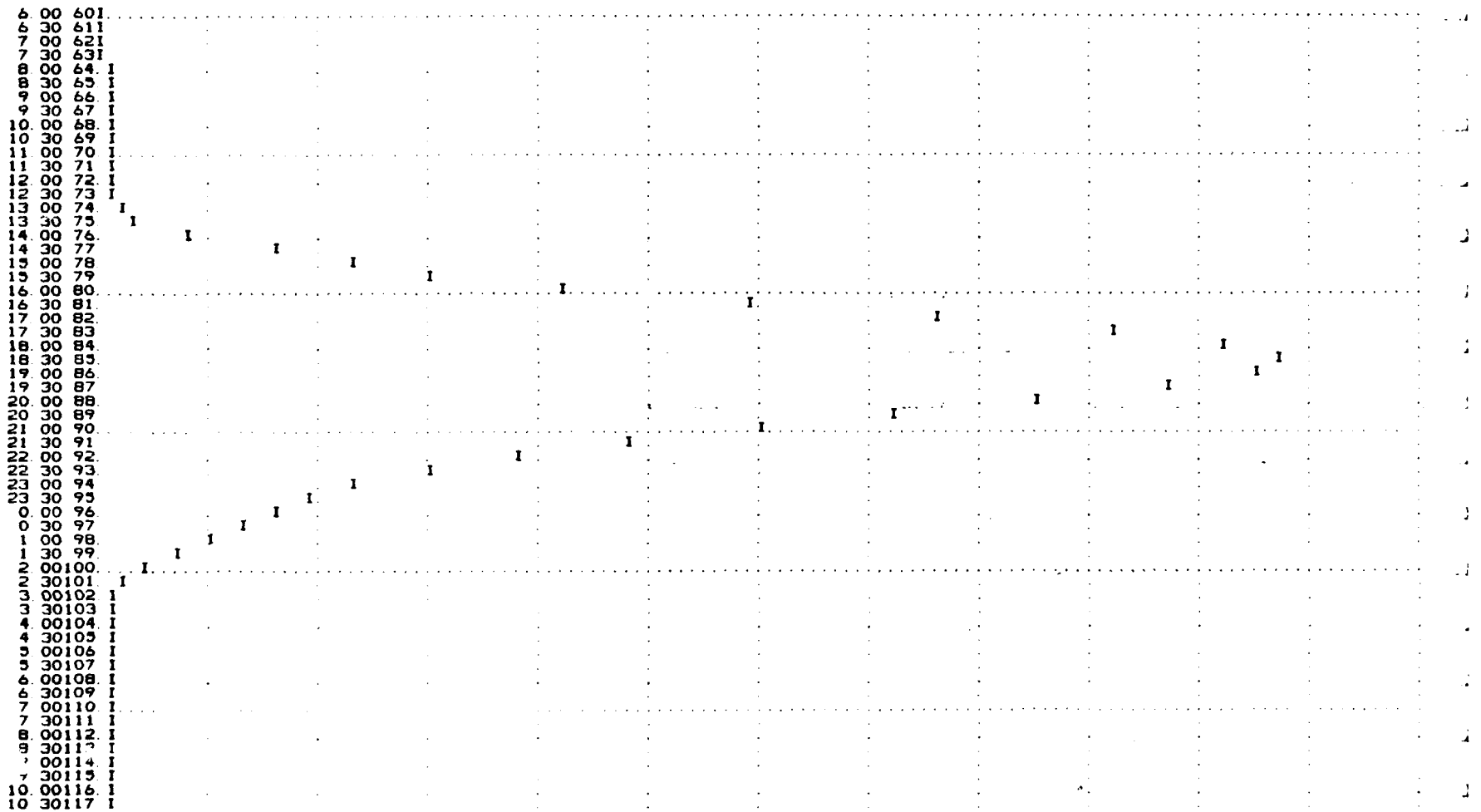
6 00 601
6 30 611
7 00 621
7 30 631
8 00 64
8 30 65
9 00 66
9 30 67
10 00 68
10 30 69
11 00 70
11 30 71
12 00 72
12 30 73
13 00 74
13 30 75
14 00 76
14 30 77
15 00 78
15 30 79
16 00 80
16 30 81
17 00 82
17 30 83
18 00 84
18 30 85
19 00 86
19 30 87
20 00 88
20 30 89
21 00 90
21 30 91
22 00 92
22 30 93
23 00 94
23 30 95
0 00 96
0 30 97
1 00 98
1 30 99
2 00100
2 30101
3 00102
3 30103
4 00104
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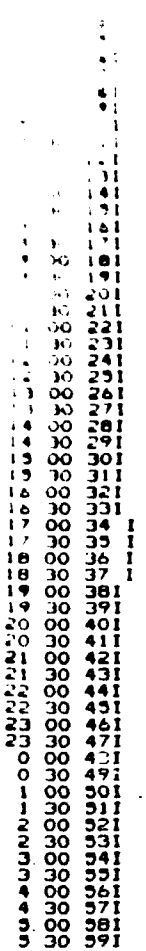
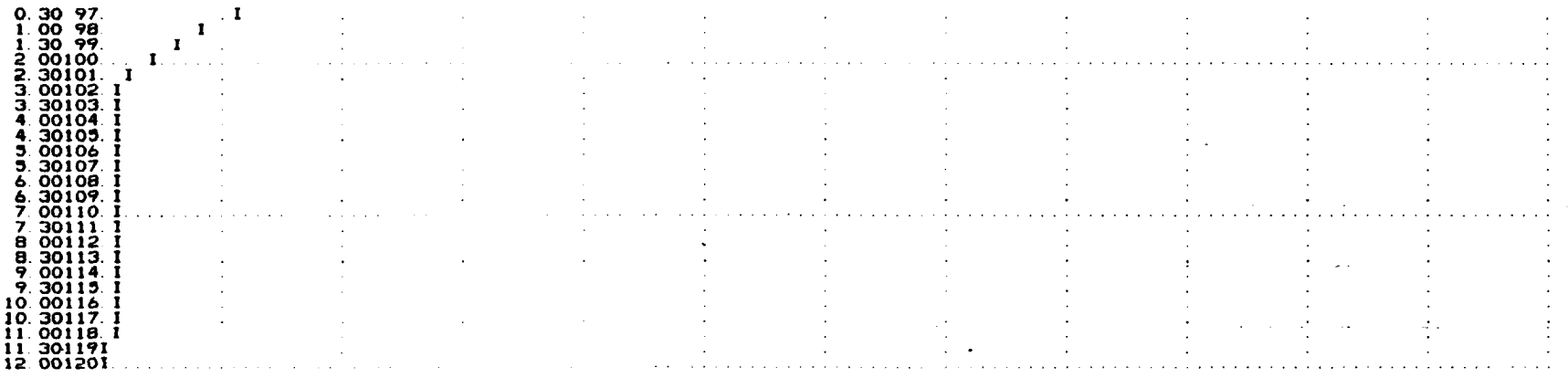
00114
7 30115
10 00116
10 30117





1*OVN*

SUM OF 2 HYDROGRAPHS AT 1 PLAN 1 RTIO 7

1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	4.	14.	26.	33.	33.	28.	23.	18.	14.
10.	7.	5.	4.	3.	3.	3.	3.	3.	3.
3.	4.	5.	6.	7.	7.	7.	8.	8.	8.
9.	12.	18.	25.	31.	35.	38.	41.	42.	43.
44.	45.	53.	81.	133.	414.	807.	1156.	1522.	2123.
2953.	3820.	4589.	5116.	5337.	5261.	4856.	4264.	3611.	2983.
2390.	1895.	1479.	1142.	937.	791.	640.	481.	334.	220.
115.	56.	54.	52.	50.	48.	46.	44.	42.	41.
39.	38.	36.	35.	33.	32.	31.	30.	28.	27.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5337.	3932.	1257.	508.	60946.
CMS	151.	111.	36.	14.	1726.
INCHES		96.27	123.09	124.33	124.33
MM		2445.15	3126.47	3157.95	3157.95
AC-FT		1950.	2493.	2518.	2518.
THOUS CU M		2405.	3075.	3106.	3106.

1*OVF*

STATION 1

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

	0.	500.	1000.	1500	2000.	2500.	3000.	3500.	4000.	4500.	5000.	5500.	0.
0 30	11												

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	1.	2.	3.	4.	4.	4.	3.	3.
2.	1.	1.	1.	1.	0.	0.	0.	0.	0.
0.	0.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	2.	3.	4.	4.	5.	5.	6.	6.
6.	6.	7.	9.	13.	30.	67.	113.	162.	226.
340.	473.	389.	687.	746.	757.	723.	652.	570.	480.
391.	314.	253.	203.	169.	141.	116.	93.	71.	51.
34.	20.	12.	9.	8.	7.	7.	7.	6.	6.
6.	6.	5.	5.	5.	5.	5.	4.	4.	4.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	1.	3.	5.	7.	10.
13.	16.	19.	22.	23.	23.	22.	21.	19.	17.
14.	12.	11.	9.	7.	6.	5.	4.	3.	2.
1.	1.	1.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.1	1189.1	1189.2	1189.4	1189.7	1190.1	1190.5
1190.9	1191.3	1191.7	1192.0	1192.2	1192.2	1192.1	1191.9	1191.7	1191.4
1191.1	1190.8	1190.6	1190.3	1190.1	1189.9	1189.8	1189.6	1189.5	1189.3
1189.2	1189.1	1189.1	1189.1	1189.1	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0

PEAK OUTFLOW IS 757 AT TIME 43.00 HOURS

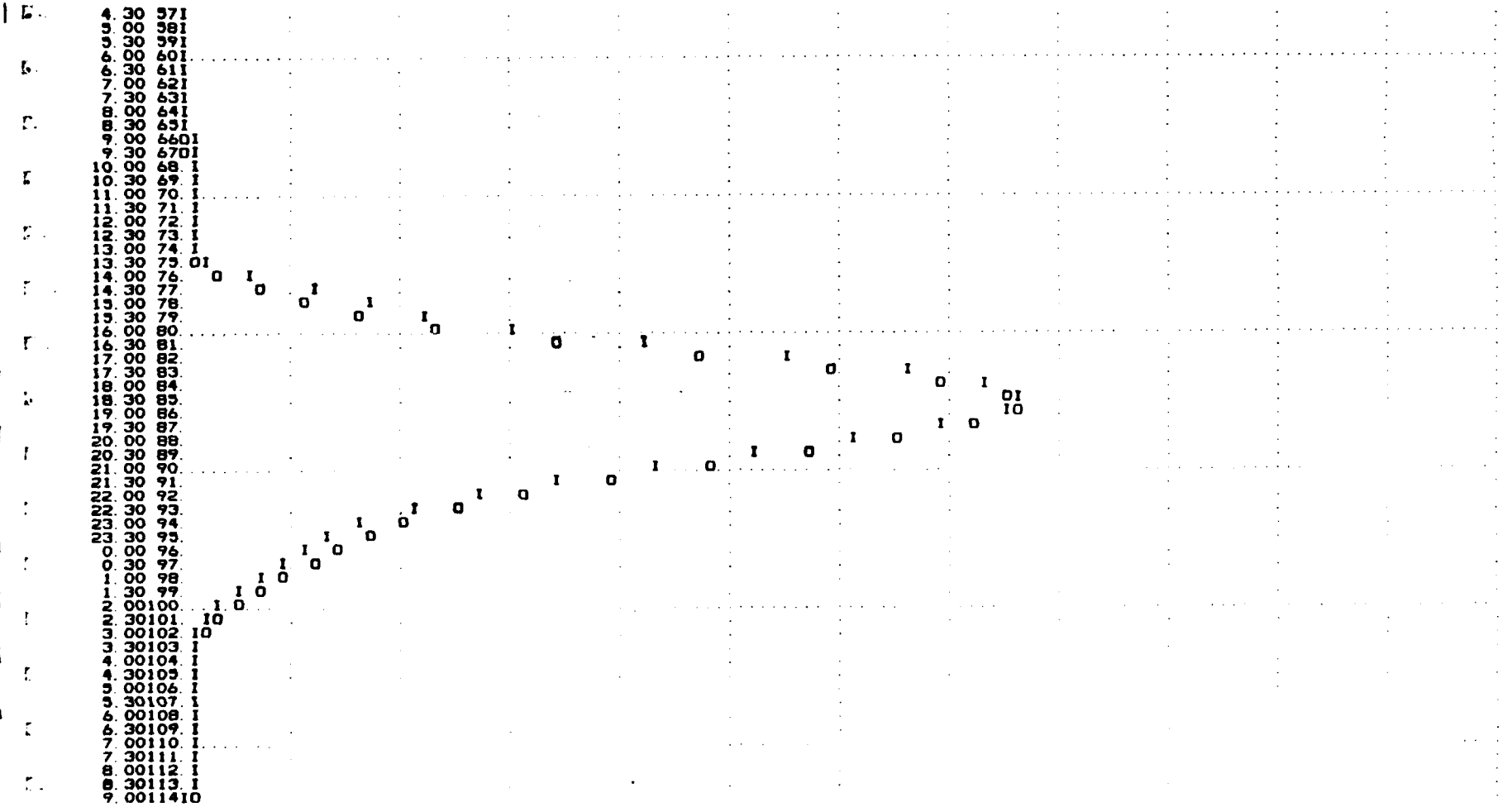
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	757	397.	180.	72.	8699.
CMS	21	16	5.	2.	246.
INCHES		13.63	17.58	17.75	17.75
MM		346.08	446.53	450.74	450.74
AC-FT		276.	356.	359.	359.
THOUS CU M		340	439.	443	443.

1*OVF*

STATION 1

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

	0	100	200	300	400	500	600	700	800	0.	0.	0.	0.
0.30	11												
1.00	21												
1.30	31												
2.00	41												
2.30	51												
3.00	61												
3.30	71												
4.00	81												
4.30	91												
5.00	101												
5.30	111												
6.00	121												
6.30	131												
7.00	141												
7.30	151												
8.00	161												
8.30	171												
9.00	181												
9.30	191												
10.00	201												
10.30	211												
11.00	221												
11.30	231												
12.00	241												
12.30	251												
13.00	261												
13.30	271												
14.00	281												
14.30	291												
15.00	301												
15.30	311												
16.00	321												
16.30	331												
17.00	341												
17.30	351												
18.00	361												
18.30	371												
19.00	381												
19.30	391												
20.00	401												
20.30	411												
21.00	421												
21.30	431												
22.00	441												
22.30	451												
23.00	461												
23.30	471												
0.00	481												
0.30	491												
1.00	501												
1.30	511												
2.00	521												
2.30	531												
3.00	541												
3.30	551												
4.00	561												


4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
9.00 6601
9.30 6701
10.00 68.1
10.30 69.1
11.00 70.1
11.30 71.1
12.00 72.1
12.30 73.1
13.00 74.1
13.30 75.01
14.00 76.
14.30 77.
15.00 78.
15.30 79.
16.00 80.
16.30 81.
17.00 82.
17.30 83.
18.00 84.
18.30 85.
19.00 86.
19.30 87.
20.00 88.
20.30 89.
21.00 90.
21.30 91.
22.00 92.
22.30 93.
23.00 94.
23.30 95.
0.00 96.
0.30 97.
1.00 98.
1.30 99.
2.00100.
2.30101.
3.00102.
3.30103.
4.00104.
4.30105.
5.00106.
5.30107.
6.00108.
6.30109.
7.00110.
7.30111.
8.00112.
8.30113.
9.0011410

9.301151
10.001161
10.301171
11.001181
11.301191
12.001201

1*OVN*

STATION 1, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	2	4	7	9	9	8	7	5
4	3	2	2	1	1	1	1	1	1
1	1	1	1	2	2	2	2	2	2
2	3	4	9	7	9	10	11	11	12
12	13	13	17	26	39	132	228	359	508
710	962	1204	1389	1496	1519	1438	1301	1121	941
772	617	494	384	306	257	214	180	141	102
68	40	24	18	16	15	14	13	13	12
12	11	11	10	10	9	9	9	8	8

STORAGE

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	3	6	10	14	17
22	27	32	36	38	38	37	34	31	27
23	20	17	14	12	11	10	8	6	4
3	2	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0

STAGE

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.1	1189.1	1189.1	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.1	1189.1	1189.1	1189.1	1189.1
1189.1	1189.1	1189.1	1189.1	1189.2	1189.4	1189.9	1190.5	1191.0	1191.5
1192.1	1192.8	1193.3	1193.8	1194.0	1194.0	1193.9	1193.6	1193.1	1192.7
1192.2	1191.8	1191.4	1191.1	1190.8	1190.6	1190.4	1190.2	1189.9	1189.7
1189.4	1189.3	1189.2	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1
1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1

PEAK OUTFLOW IS 1519 AT TIME 43.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1519	1118.	359.	145.	17401.
CMS	43.	32.	10.	4.	493.
INCHES		27.37	35.16	35.50	35.50
MM		695.18	893.13	901.65	901.65
AC-FT		554.	712.	719.	719.
THOUS CU M		684.	879.	887.	887.

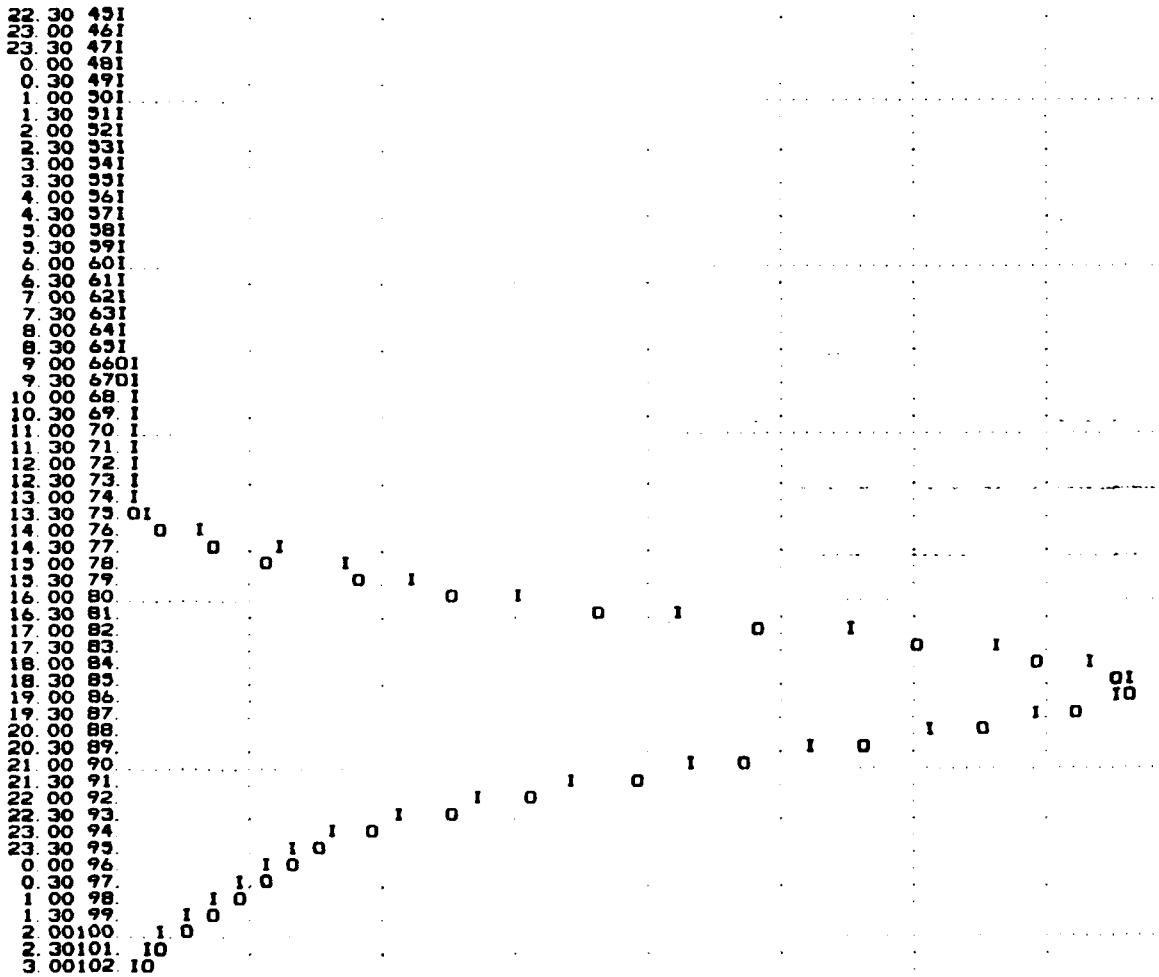
1*OVF*

STATION 1

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

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

0.30 11
1.00 21I
1.30 31I
2.00 41I
2.30 51I
3.00 61I
3.30 71I
4.00 81I
4.30 91I
5.00 101I
5.30 111I
6.00 121I
6.30 131I
7.00 141I
7.30 151I
8.00 161I
8.30 171I
9.00 181I
9.30 191I
10.00 201I
10.30 211I
11.00 221I
11.30 231I
12.00 241I
12.30 251I
13.00 261I
13.30 271I
14.00 281I
14.30 291I
15.00 301I
15.30 311I
16.00 321I
16.30 331I
17.00 341I
17.30 351I
18.00 361I
18.30 371I
19.00 381I
19.30 391I
20.00 401I
20.30 411I
21.00 421I
21.30 431I
22.00 441I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23.00 46I
23.30 47I
0.00 48I
0.30 49I
1.00 50I
1.30 51I
2.00 52I
2.30 53I
3.00 54I
3.30 55I
4.00 56I
4.30 57I
5.00 58I
5.30 59I
6.00 60I
6.30 61I
7.00 62I
7.30 63I
8.00 64I
8.30 65I
9.00 660I
9.30 670I
10.00 68.I
10.30 69.I
11.00 70.I
11.30 71.I
12.00 72.I
12.30 73.I
13.00 74.I
13.30 75.OI
14.00 76.O I
14.30 77.O I
15.00 78.O I
15.30 79.O I
16.00 80.O I
16.30 81.O I
17.00 82.O I
17.30 83.O I
18.00 84.O I
18.30 85.OI
19.00 86.IO
19.30 87.I O
20.00 88.I O
20.30 89.I O
21.00 90.I O
21.30 91.I O
22.00 92.I O
22.30 93.I O
23.00 94.I O
23.30 95.I O
0.00 96.I O
0.30 97.I O
1.00 98.I O
1.30 99.I O
2.00100.I O
2.30101.IO
3.00102.IO

```
  3.30103.I
  4.00104.I
  4.30105.I
  5.00106.I
  5.30107.I
  6.00108.I
  6.30109.I
  7.00110.I
  7.30111.I
  8.00112.I
  8.30113.I
  9.0011410
  9.301151
 10.001161
 10.301171
 11.001181
 11.301191
 12.001201
```

1*OVN*

STATION 1, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	3.	7.	11.	13.	13.	12.	10.	8.
6.	4.	3.	2.	2.	1.	1.	1.	1.	1.
1.	1.	2.	2.	2.	3.	3.	3.	3.	3.
3.	4.	6.	8.	11.	13.	15.	16.	17.	18.
18.	19.	20.	26.	39.	89.	197.	382.	558.	770.
1083.	1457.	1884.	2139.	2279.	2268.	2131.	1903.	1634.	1380.
1147.	918.	727.	570.	456.	377.	314.	252.	195.	148.
100.	60.	37.	28.	24.	22.	21.	20	19.	18.
18.	17.	16.	16.	15.	14.	14.	13.	13.	12.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0	0.	0.	0.
0.	0.	0.	0.	0.	0.	0	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1	0.	0.
0.	0	0.	0.	0.	0.	0	0	0.	0.
0.	0	0.	0.	0.	0.	0	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1	1	1	1.	2.	4.	9	14	18	23.
30.	37.	43.	46.	47.	47.	46.	43	40.	36.
31.	27.	22.	19.	16.	14.	12.	11	9.	7.
4.	3.	2.	1.	1.	1.	1	1	1.	1.
1.	1.	1.	1.	1.	1.	1	1	1.	1.

STAGE

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1
1189.1	1189.1	1189.1	1189.2	1189.3	1189.6	1190.3	1191.0	1191.6	1192.2
1193.1	1193.9	1194.5	1194.9	1195.0	1195.0	1194.9	1194.6	1194.2	1193.8
1193.2	1192.6	1192.1	1191.7	1191.3	1191.0	1190.8	1190.6	1190.3	1190.0
1189.7	1189.4	1189.2	1189.2	1189.2	1189.1	1189.1	1189.1	1189.1	1189.1
1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1

PEAK OUTFLOW IS 2279. AT TIME 42.50 HOURS

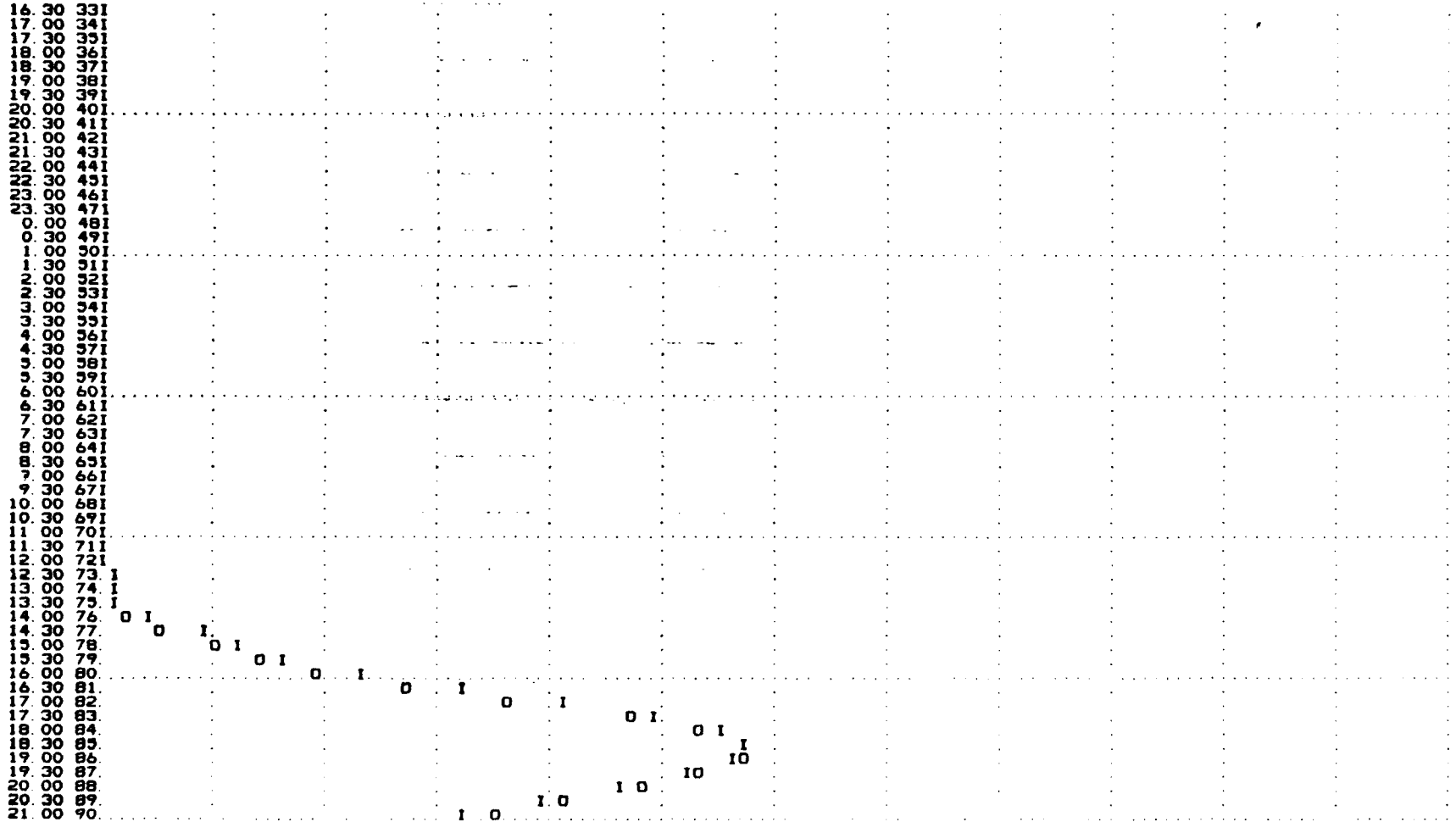
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2279.	1679.	539.	218.	26103.
CMS	65.	48.	15.	6.	739.
INCHES		41.10	52.75	53.25	53.25
MM		1043.88	1339.75	1352.56	1352.56
AC-FT		832.	1068.	1079.	1079.
THOUS CU M		1027.	1318.	1330.	1330.

1*OVF*

STATION 1

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

	0.	400.	800.	1200.	1600.	2000.	2400.	0.	0.	0.	0.	0.	0.
0.30	11												
1.00	21												
1.30	31												
2.00	41												
2.30	51												
3.00	61												
3.30	71												
4.00	81												
4.30	91												
5.00	101												
5.30	111												
6.00	121												
6.30	131												
7.00	141												
7.30	151												
8.00	161												
8.30	171												
9.00	181												
9.30	191												
10.00	201												
10.30	211												
11.00	221												
11.30	231												
12.00	241												
12.30	251												
13.00	261												
13.30	271												
14.00	281												
14.30	291												
15.00	301												
15.30	311												
16.00	321												


16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
7.00 661
9.30 671
10.00 681
10.30 691
11.00 701
11.30 711
12.00 721
12.30 73
13.00 74
13.30 75
14.00 76
14.30 77
15.00 78
15.30 79
16.00 80
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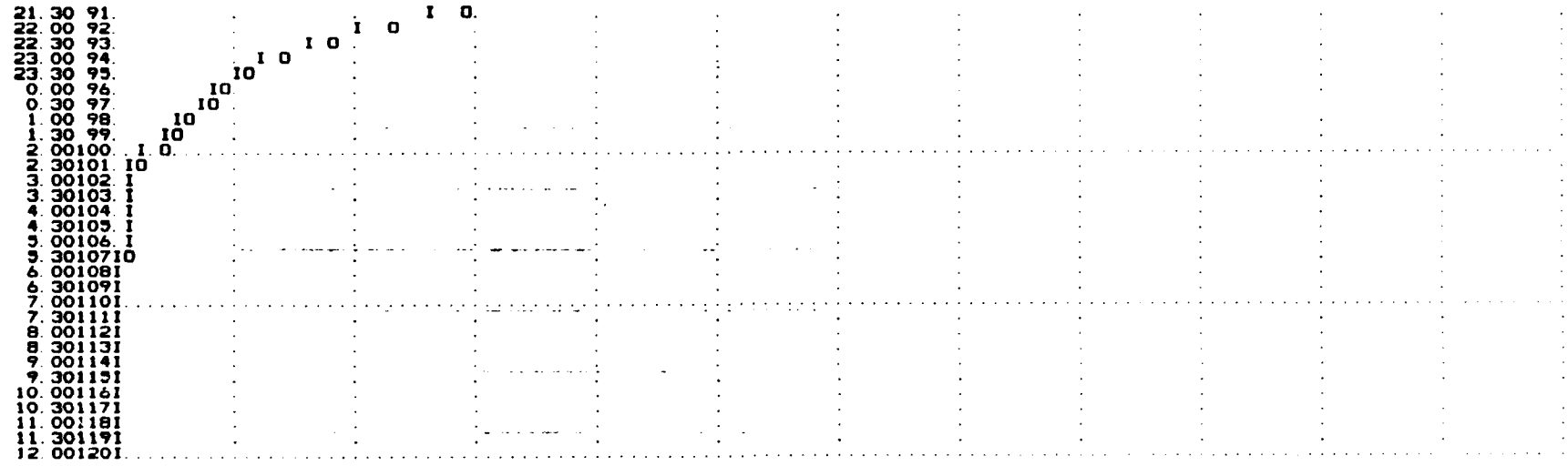
20.00 88
20.30 89
21.00 90



1*OVN*

STATION 1, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	1	4	9	14	17	17	16	13	11
8	6	4	3	2	2	2	2	2	2
1	2	2	3	3	4	4	4	4	4
5	6	8	11	14	17	20	22	23	24
25	25	27	34	52	118	277	533	752	1035
1458	2032	2537	2881	3039	3023	2826	2506	2149	1812
1465	1221	961	754	600	503	416	328	249	184
129	78	48	37	32	29	28	26	23	24
23	22	22	21	20	19	18	18	17	16

STORAGE

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	1	1	1	1	0

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	5.	11.	18.	23.	29.
37.	45.	49.	52.	53.	53.	52.	49.	46.	42.
38.	33.	27.	23.	20.	17.	15.	13.	11.	8.
6.	3.	2.	2.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

STAGE

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1
1189.1	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.2	1189.2
1189.2	1189.2	1189.2	1189.2	1189.3	1189.8	1190.7	1191.5	1192.2	1192.9
1193.9	1194.8	1195.2	1195.5	1195.6	1195.6	1195.5	1195.2	1194.9	1194.4
1194.0	1193.4	1192.8	1192.2	1191.8	1191.4	1191.2	1190.9	1190.5	1190.2
1189.8	1189.5	1189.3	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2
1189.2	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1

PEAK OUTFLOW IS 3039. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3039.	2240.	718.	290.	34806
CMS	86.	63.	20.	8.	986.
INCHES		54.83	70.33	71.00	71.00
MM		1392.59	1786.36	1803.48	1803.48
AC-FT		1111.	1425.	1438.	1438.
THOUS CU M		1370.	1757.	1774.	1774.

1*OVF*

STATION 1

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

	0.	400.	800.	1200.	1600.	2000.	2400.	2800	3200	0	0.	0.	0
0 30	11												
1.00	21												
1.30	31												
2.00	41												
2.30	51												
3.00	61												
3.30	71												
4.00	81												
4.30	91												
5.00	101												
5.30	111												
6.00	121												
6.30	131												
7.00	141												
7.30	151												
8.00	161												
8.30	171												
9.00	181												
9.30	191												
10.00	201												

```
10.30 21I
11 00 22I
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20.00 40I
20.30 41I
21.00 42I
21.30 43I
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22.30 45I
23 00 46I
23.30 47I
 0 00 48I
 0.30 49I
 1 00 50I
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 2 00 52I
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 4 00 56I
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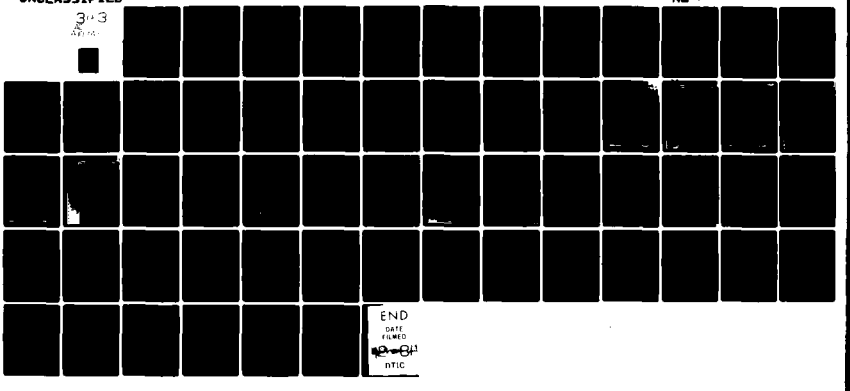
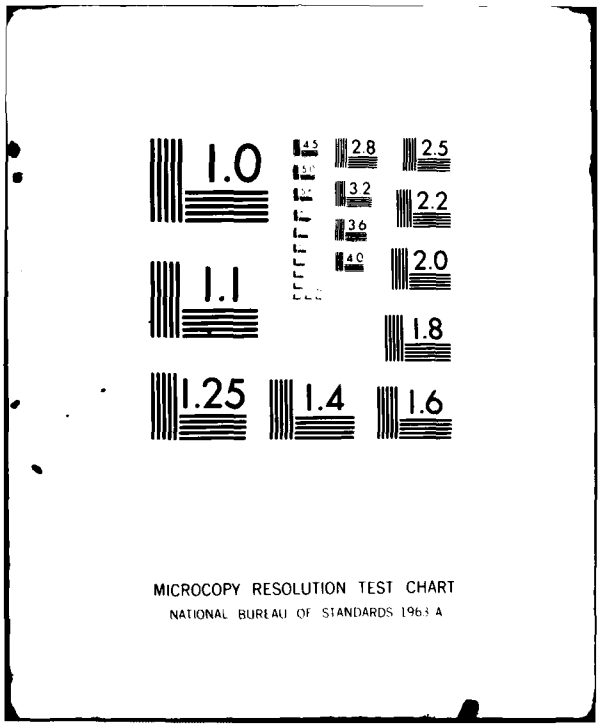
 6 00 60I
 6 30 61I
 7 00 62I
 7 30 63I
 8 00 64I
 8 30 65I
 9 00 660I
 9 30 670I
10 00 68 I
10 30 69 I
11 00 70 I
11 30 71 I
12 00 72 I
12 30 73 I
13 00 74 I
13 30 75 OI
14 00 76   O  I
14 30 77       O    I
15 00 78            O   I
```

AD-A107 411 FLAHERTY-GIAVARA ASSOCIATES NEW HAVEN CT F/G 13/13
NATIONAL DAM SAFETY PROGRAM. NORWICH WATER WORKS DAM NUMBER 1 (--ETC(U)
AUG 81 H C FLAHERTY DACW51-81-C-0006
UNCLASSIFIED NL

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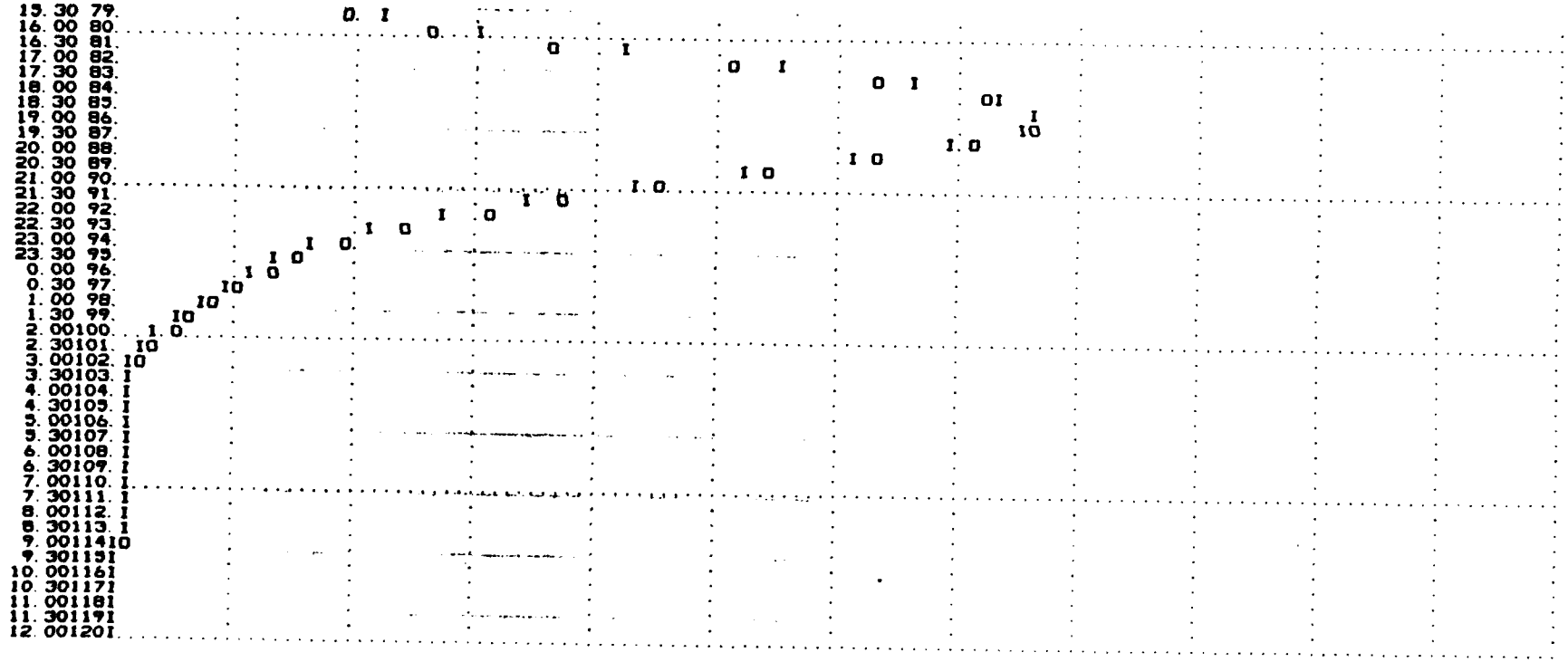
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A



1*OVN*

STATION 1, PLAN 1, RATIO 5

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	5.	11.	18.	22.	22.	20.	17.	13.
10.	7.	5.	4.	3.	3.	2.	2.	2.	2.
2.	2.	3.	4.	4.	5.	5.	5.	5.	6.

6.	7.	10.	13.	18.	22.	25.	27.	29.	30.
31.	31.	34.	43.	64.	147.	368.	674.	950.	1306.
1899.	2607.	3195.	3606.	3800.	3777.	3527.	3119.	2664.	2227.
1830.	1457.	1202.	934.	747.	621.	521.	410.	303.	216.
156.	96.	60.	46.	40.	37.	35.	33.	32.	30.
29.	28.	27.	26.	25.	24.	23.	22.	21.	20.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	3.	6.	14.	21.	27.	34.
43.	50.	54.	97.	98.	98.	56.	54.	50.	47.
42.	37.	32.	27.	23.	20.	18.	15.	12.	10.
7.	4.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

STAGE

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1
1189.1	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.1	1189.1	1189.1	1189.1	1189.2	1189.2	1189.2	1189.2
1189.2	1189.2	1189.2	1189.3	1189.4	1190.0	1191.0	1192.0	1192.7	1193.6
1194.6	1195.3	1195.8	1196.0	1196.2	1196.1	1196.0	1195.7	1195.4	1195.0
1194.5	1193.9	1193.3	1192.7	1192.2	1191.8	1191.5	1191.1	1190.8	1190.4
1190.0	1189.6	1189.4	1189.3	1189.3	1189.2	1189.2	1189.2	1189.2	1189.2
1189.2	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2	1189.1	1189.1	1189.1

PEAK OUTFLOW IS 3800. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3800.	2803.	878.	363.	43308.
CMS	108.	79.	25.	10.	1232.
INCHES		68.61	87.91	88.76	88.76
MM		1742.66	2232.96	2254.39	2254.39
AC-FT		1390.	1781.	1798.	1798.
THOUS CU M		1714.	2197.	2218.	2218.

1*DVF*

STATION 1

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

		0.	500.	1000.	1500.	2000.	2500.	3000.	3500.	4000.	0.	0.	0.	0.
0.30	1I													
1.00	2I													
1.30	3I													
2.00	4I													
2.30	5I													
3.00	6I													
3.30	7I													
4.00	8I													

4.30 91
5.00 101
5.30 111
6.00 121
6.30 131
7.00 141
7.30 151
8.00 161
8.30 171
9.00 181
9.30 191
10.00 201
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
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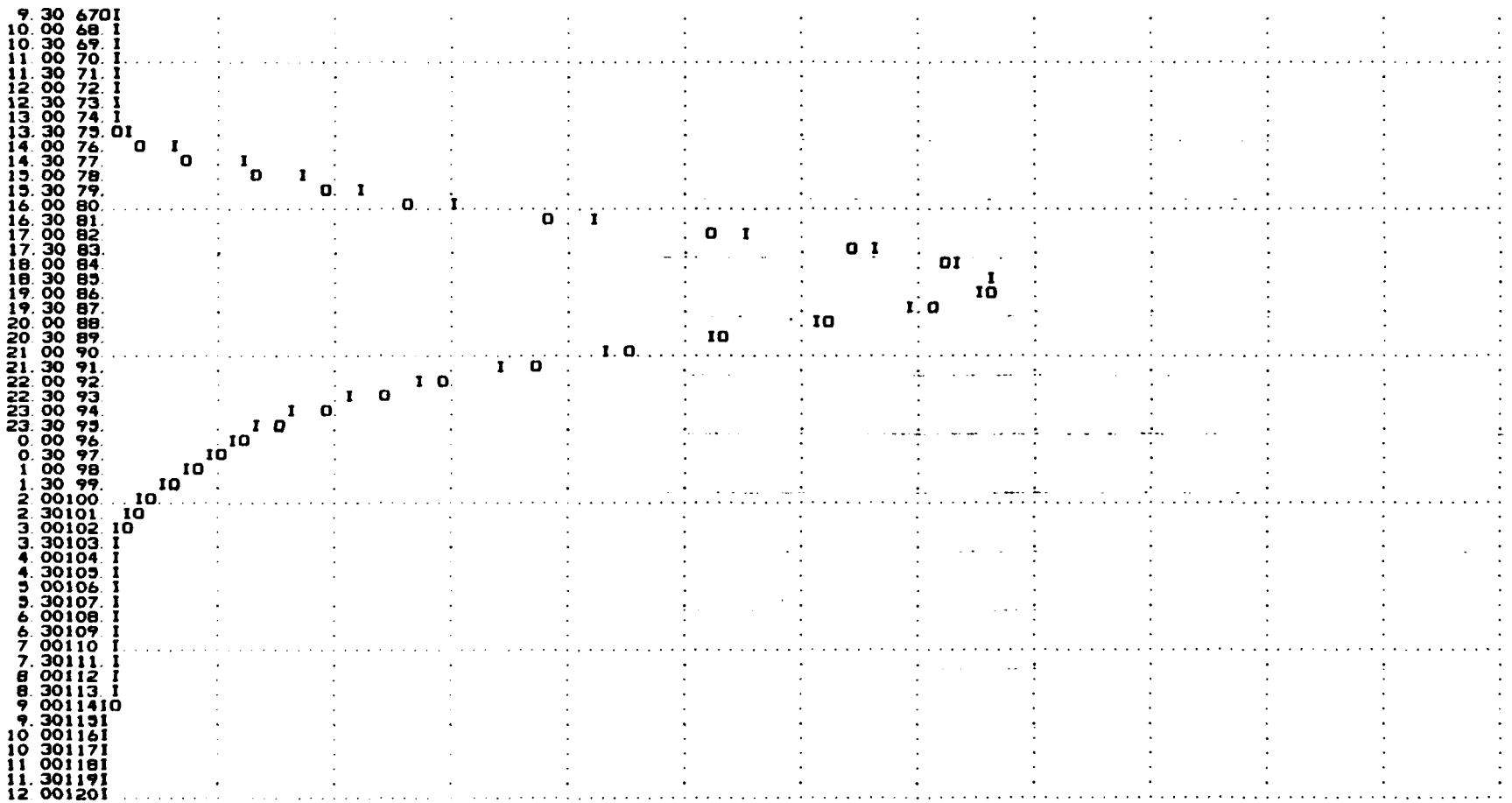
7.30 631
8.00 641
8.30 651
9.00 6601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15.00 78. O I
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16.00 80. O I
16.30 81. O I
17.00 82. O I
17.30 83. O I
18.00 84. OI
18.30 85. I
19.00 86. IO
19.30 87. I O
20.00 88. IO
20.30 89. IO
21.00 90. I O
21.30 91. I O
22.00 92. I O
22.30 93. I O
23.00 94. I O
23.30 95. I O
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0.30 97. IO
1.00 98. IO
1.30 99. IO
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3.00102. IO
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5.00106. I
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9.0011410
9.3011510
10.0011610
10.3011710
11.0011810
11.3011910
12.0012010

1=OVN=

C-138

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.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	5.	13.	21.	26.	26.	24.	20.	16.
12.	9.	7.	5.	4.	3.	3.	2.	2.	2.
2.	3.	3.	4.	5.	6.	6.	6.	6.	7.
7.	8.	11.	16.	21.	26.	30.	32.	34.	36.
37.	38.	40.	52.	77.	176.	464.	820.	1145.	1589.
2350.	3157.	3836.	4334.	4560.	4532.	4228.	3737.	3187.	2650.
2161.	1748.	1389.	1119.	892.	743.	617.	493.	361.	255.
176.	112.	71.	55.	48.	44.	42.	40.	38.	37.
35.	34.	32.	31.	30.	29.	27.	26.	25.	24.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	2.
2.	2.	2.	2.	3.	8.	16.	24.	31.	39.
48.	54.	58.	61.	63.	63.	61.	58.	54.	50.
46.	41.	36.	31.	26.	23.	20.	17.	14.	11.
8.	5.	3.	2.	2.	2.	2.	2.	2.	2.
2.	1.	1	1.	1.	1.	1.	1.	1.	1.

STAGE

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.1	1189.1	1189.2	1189.2	1189.2	1189.1	1189.1
1189.1	1189.1	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.1	1189.1	1189.1	1189.1	1189.2	1189.2	1189.2	1189.2	1189.2
1189.2	1189.2	1189.3	1189.3	1189.5	1190.2	1191.3	1192.4	1193.2	1194.1
1195.	1195.7	1196.2	1196.5	1196.6	1196.6	1196.4	1196.1	1195.7	1195.3
1194.9	1194.3	1193.8	1193.1	1192.6	1192.2	1191.8	1191.4	1191.0	1190.6
1190.2	1189.7	1189.5	1189.4	1189.3	1189.3	1189.3	1189.3	1189.3	1189.2
1189.2	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2

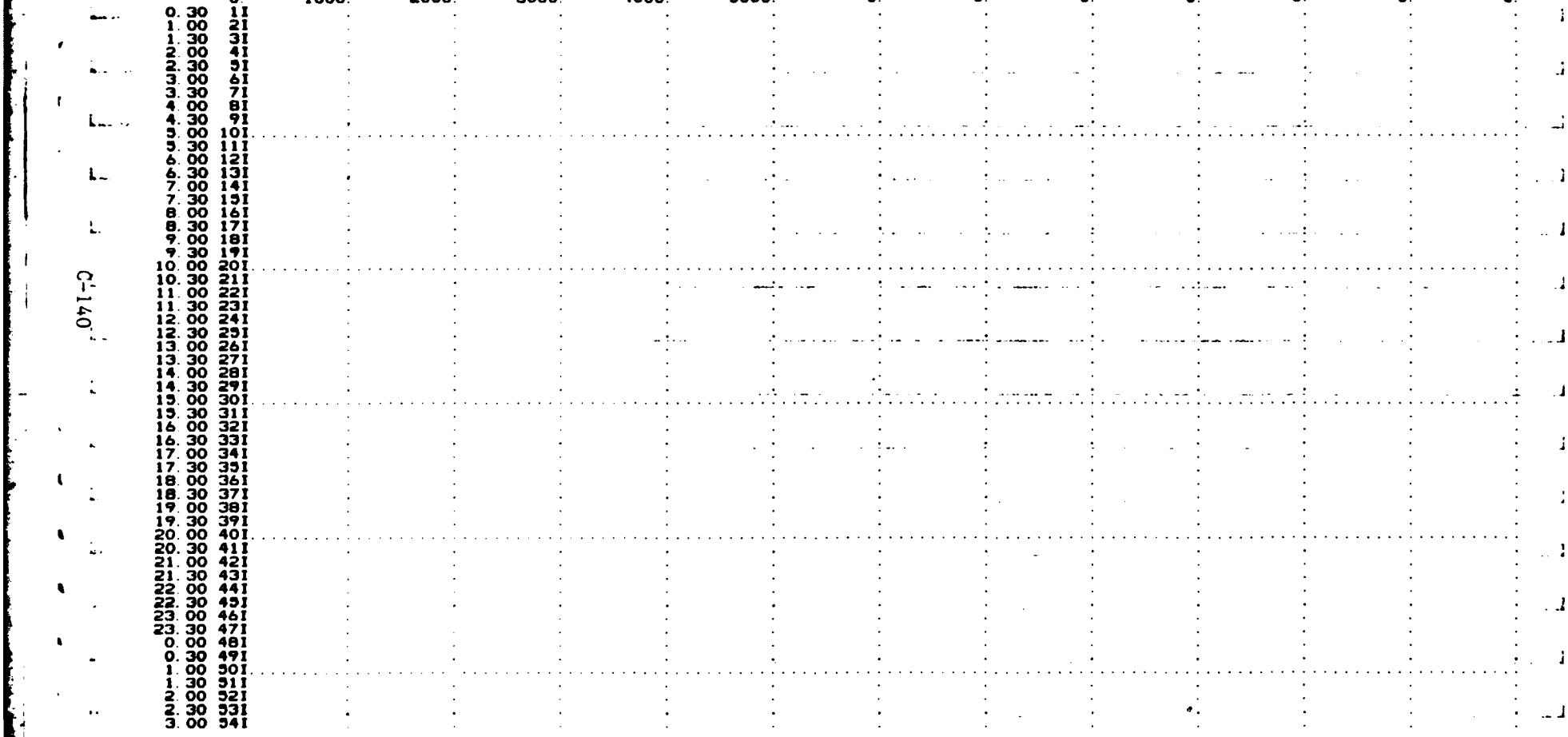
PEAK OUTFLOW IS 4560. AT TIME 42.50 HOURS

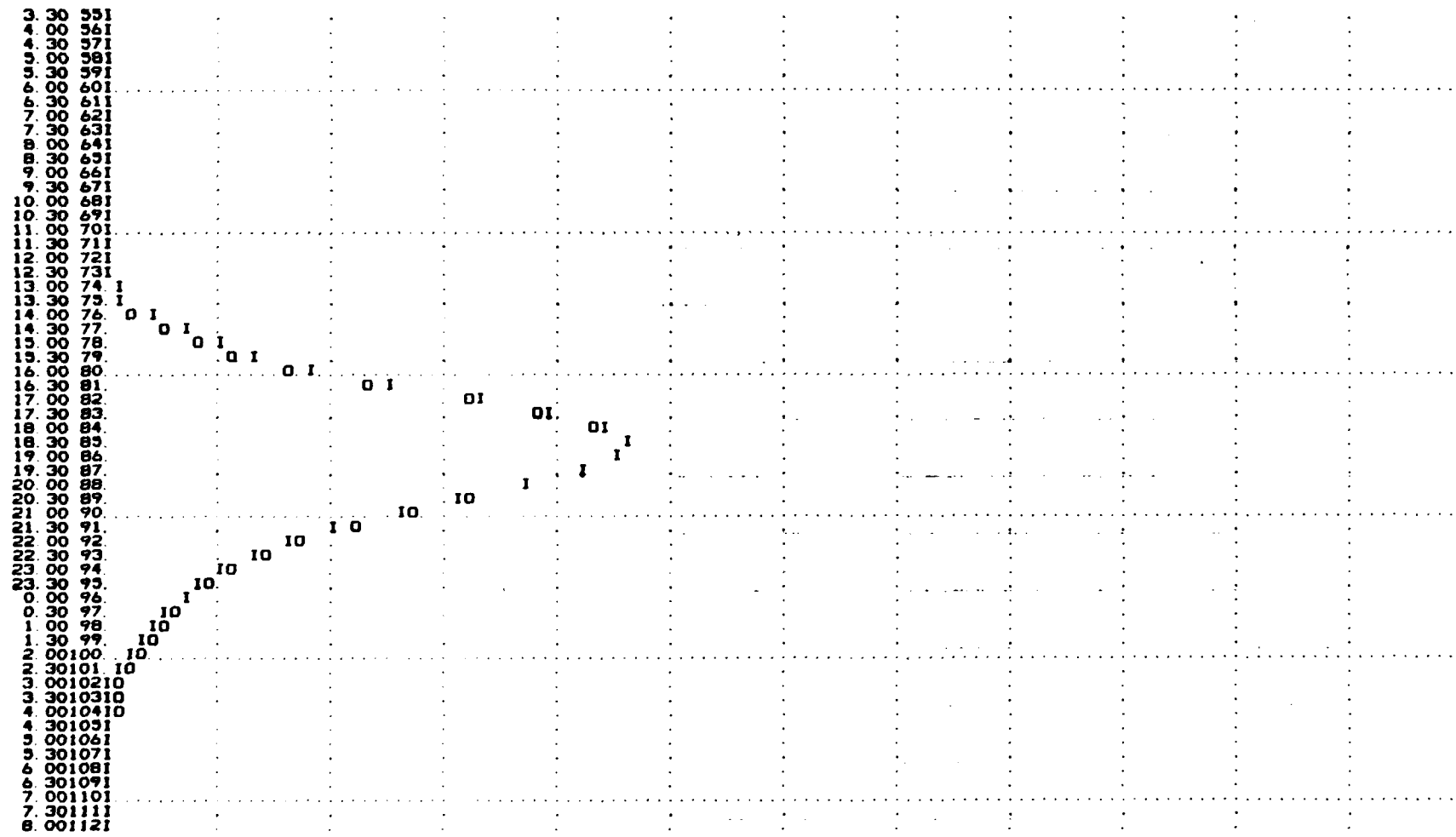
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4560.	3367.	1077.	439.	52210.
CMS	129.	95.	31.	12.	1478.
INCHES		82.42	105.49	106.51	106.51
MM		2093.39	2679.54	2705.27	2705.27
AC-FT		1669.	2137.	2157.	2157.
THOUS CU M		2059.	2636.	2661.	2661.

1*OVF*

STATION 1

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

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9.00 661
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10.00 681
10.30 691
11.00 701
11.30 711
12.00 721
12.30 731
13.00 74 I
13.30 75 I
14.00 76 O I
14.30 77 O I
15.00 78 O I
15.30 79 O I
16.00 80 O I
16.30 81 O I
17.00 82 OI
17.30 83 OI
18.00 84 OI
18.30 85 I
19.00 86 I
19.30 87 I
20.00 88 I
20.30 89 IO
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22.00 92 IO
22.30 93 IO
23.00 94 IO
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0.30 97 IO
1.00 98 IO
1.30 99 IO
2.00100 IO
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8.0011210

8. 301131
9. 001141
9. 301151
10. 001161
10. 301171
11. 001181
11. 301191
12. 001201

1*OVN*

STATION 1, PLAN 1, RATIO 7

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.	6.	15.	25.	30.	30.	27.	23.	18.
14.	10.	8.	6.	4.	4.	3.	3.	3.	3.
3.	3.	4.	5.	6.	6.	7.	7.	8.	8.
8.	10.	13.	19.	25.	30.	34.	38.	40.	42.
43.	44.	47.	60.	90.	204.	560.	966.	1344.	1910.
2777.	3695.	4480.	5060.	5320.	5287.	4929.	4355.	3712.	3083.
2501.	2009.	1606.	1283.	1033.	868.	718.	569.	421.	292.
195.	127.	82.	63.	55.	51.	49.	46.	44.	43.
41.	39.	38.	36.	35.	33.	32.	31.	30.	28.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	1.	1.	1.	1.	1.	2.	2.	2.
2.	2.	2.	3.	4.	9.	19.	28.	35.	43.
51.	57.	62.	66.	67.	67.	65.	62.	58.	53.
49.	44.	39.	34.	29.	25.	22.	19.	15.	12.
9.	6.	4.	3.	2.	2.	2.	2.	2.	2.
2.	2.	2	2.	1.	1.	1.	1.	1.	1.

STAGE

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.1	1189.2	1189.2	1189.2	1189.2	1189.2	1189.1
1189.1	1189.1	1189.1	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.1
1189.1	1189.1	1189.1	1189.1	1189.2	1189.2	1189.2	1189.2	1189.3	1189.3
1189.3	1189.3	1189.3	1189.4	1189.6	1190.3	1191.6	1192.8	1193.7	1194.6
1195.4	1196.1	1196.6	1196.9	1197.1	1197.0	1196.8	1196.5	1196.1	1195.7
1195.2	1194.7	1194.2	1193.5	1192.9	1192.5	1192.1	1191.7	1191.2	1190.7
1190.3	1189.8	1189.5	1189.4	1189.4	1189.3	1189.3	1189.3	1189.3	1189.3
1189.3	1189.3	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2	1189.2

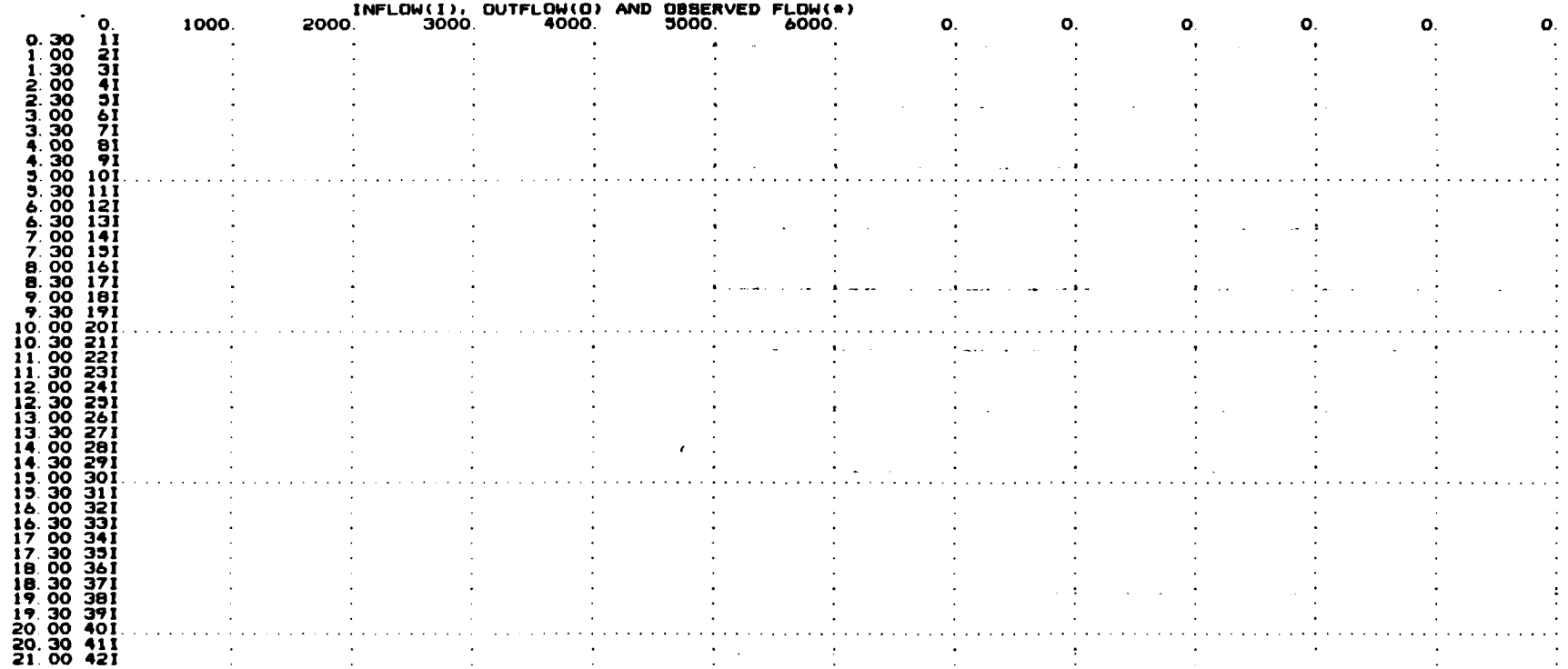
PEAK OUTFLOW IS 5320. AT TIME 42.50 HOURS

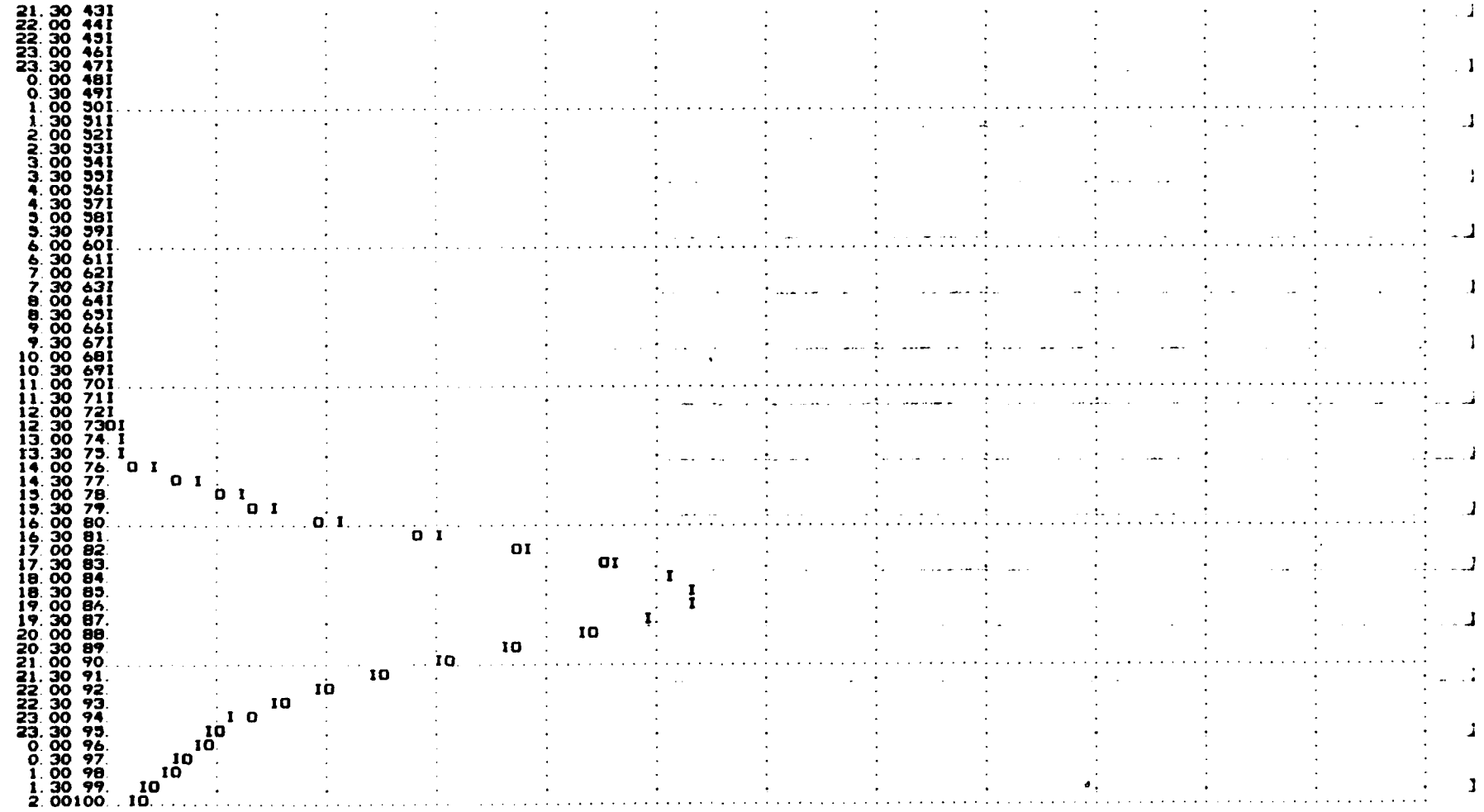
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5320.	3930.	1257.	508.	60912.
CMS	151.	111.	36.	14.	1725.
INCHES		96.20	123.08	124.26	124.26
MM		2443.98	3126.17	3156.20	3156.20
AC-FT		1949.	2493.	2517.	2517.
THOUS CU M		2404.	3075.	3109.	3109.

1*OVF*

STATION 1

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

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20.30 89
21.00 90
21.30 91
22.00 92
22.30 93
23.00 94
23.30 95
0.00 96
0.30 97
1.00 98
1.30 99
2.00100

2. 30101. IO
3. 00102. I
3. 30103. I
4. 00104. I
4. 3010510
5. 0010610
5. 301071
6. 001081
6. 301091
7. 001101
7. 301111
8. 001121
8. 301131
9. 001141
9. 301151
10. 001161
10. 301171
11. 001181
11. 301191
12. 001201

1*DVN*

STATION 1, PLAN 1, RATIO 8

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	2	7	18	28.	34.	35.	31.	27	21.
16.	12.	9	6.	5.	4.	4.	3	3	3.
3	3.	4	6	7.	7.	8	8	9	9.
9.	11.	15.	21.	28.	34.	39.	43.	46.	48.
49.	50.	54	69	103.	240.	650.	1116.	1549.	2233.
3204.	4222.	5129.	5783.	6082.	6041.	5632.	4973.	4238.	3517.
2845	2277.	1825	1425.	1184.	984.	822	643.	482	330.
215.	142.	92.	72.	63.	59.	55.	53.	51.	49.
47	45.	43.	41.	40.	38.	37.	35.	34.	32.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	0.	0	1	1.	1.	1	1	1	1.
1.	1.	0.	0.	0.	0.	0.	0	0.	0.
0	0	0	0.	0.	0.	0	0.	0.	0.
0	0.	1	1.	1.	1.	2.	2	2.	2.
2	2	2	3	4.	10.	21	31.	39.	47.
54.	61.	66.	70.	71.	71.	69.	65.	61.	56.
52	47	42.	37	32.	28.	24.	21.	17.	13.
10.	6.	4.	3.	3.	3.	2.	2.	2.	2.
2	2	2	2	2.	2.	2	2.	1.	1.

STAGE

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.1	1189.2	1189.2	1189.2	1189.2	1189.2	1189.1
1189.1	1189.1	1189.1	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.1	1189.1	1189.1	1189.1
1189.1	1189.1	1189.1	1189.1	1189.2	1189.2	1189.3	1189.3	1189.3	1189.3
1189.3	1189.3	1189.4	1189.5	1189.7	1190.5	1191.9	1193.1	1194.1	1195.0
1195.8	1196.4	1197.0	1197.3	1197.5	1197.4	1197.2	1196.9	1196.4	1196.0
1195.5	1195.0	1194.5	1193.9	1193.3	1192.8	1192.4	1191.9	1191.4	1190.9
1190.4	1189.9	1189.6	1189.5	1189.4	1189.4	1189.4	1189.3	1189.3	1189.3
1189.3	1189.3	1189.3	1189.3	1189.3	1189.3	1189.2	1189.2	1189.2	1189.2

PEAK OUTFLOW IS 6082. AT TIME 42.50 HOURS

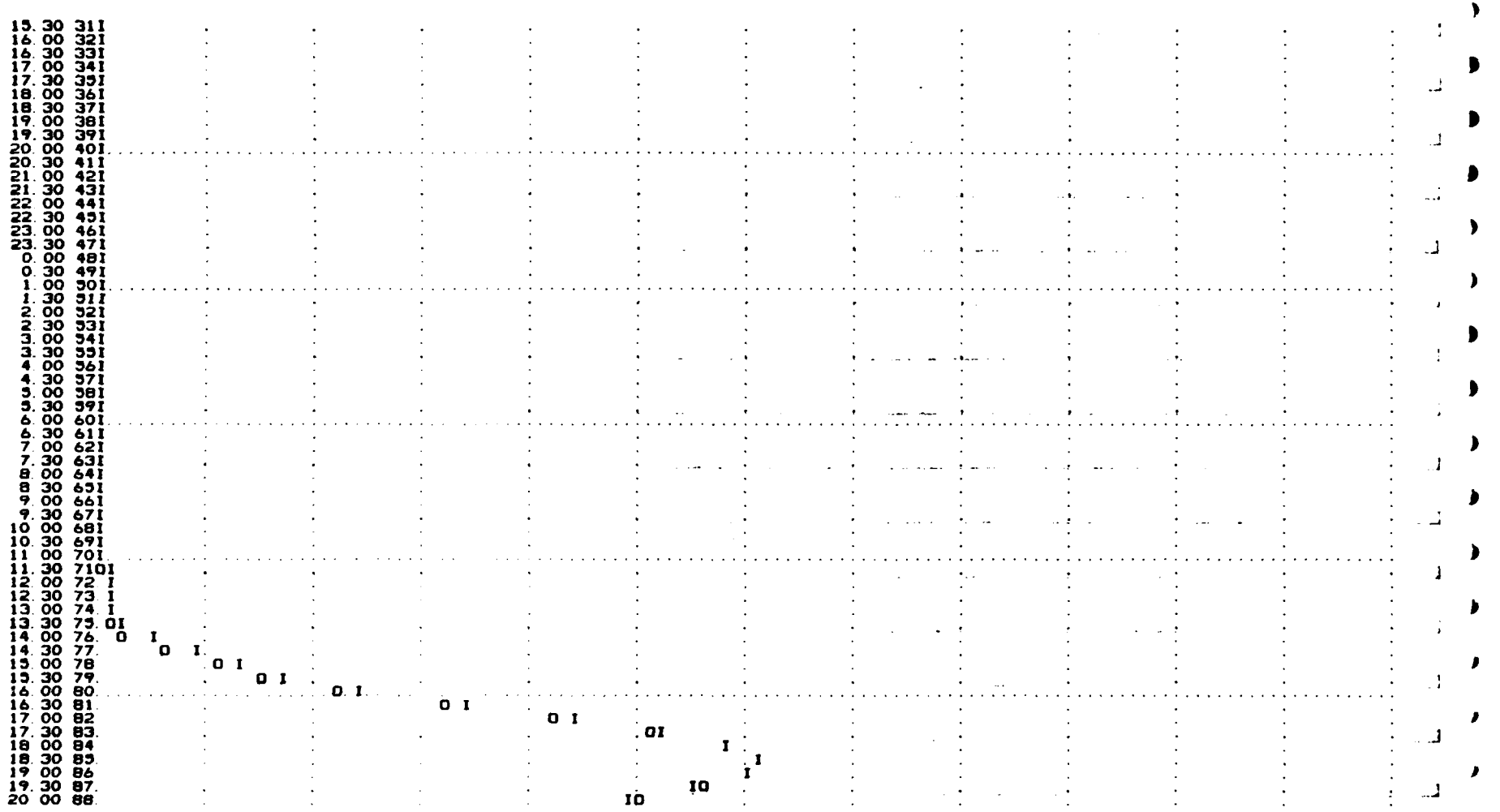
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6082.	4493.	1436.	580.	69614.
CMS	172.	127.	41.	16.	1971.
INCHES		109.99	140.66	142.01	142.01
MM		2793.87	3572.78	3607.11	3607.11
AC-FT		2228.	2849.	2877.	2877.
THOUS CU M		2748.	3514.	3548	3548.

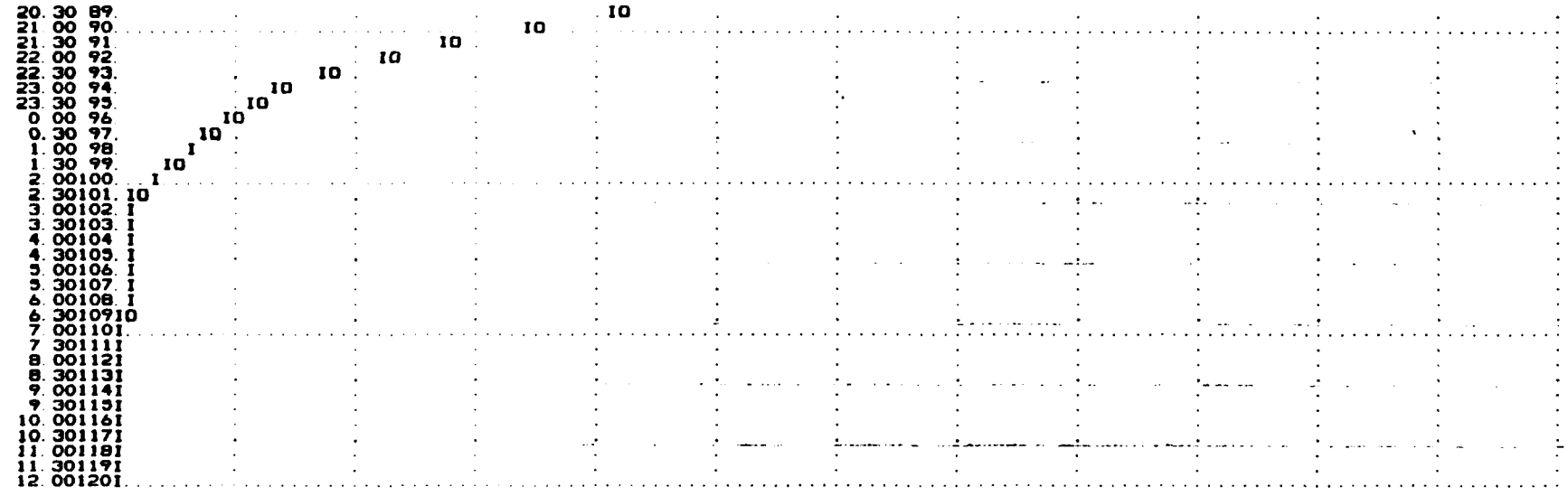
1*OVF*

STATION 1

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

	0	1000.	2000.	3000.	4000.	5000.	6000.	7000.	0.	0.	0.	0	0
0.30	1I												
1.00	2I												
1.30	3I												
2.00	4I												
2.30	5I												
3.00	6I												
3.30	7I												
4.00	8I												
4.30	9I												
5.00	10I												
5.30	11I												
6.00	12I												
6.30	13I												
7.00	14I												
7.30	15I												
8.00	16I												
8.30	17I												
9.00	18I												
9.30	19I												
10.00	20I												
10.30	21I												
11.00	22I												
11.30	23I												
12.00	24I												
12.30	25I												
13.00	26I												
13.30	27I												
14.00	28I												
14.30	29I												
15.00	30I												


15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
0.00 481
0.30 491
1.00 501
1.30 511
2.00 521
2.30 531
3.00 541
3.30 551
4.00 561
4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 651
9.00 661
9.30 671
10.00 681
10.30 691
11.00 701
11.30 7101
12.00 72 I
12.30 73 I
13.00 74 I
13.30 75 OI
14.00 76 O I
14.30 77 O I
15.00 78 O I
15.30 79 O I
16.00 80 O I
16.30 81 O I
17.00 82 O I
17.30 83 OI
18.00 84 I
18.30 85 I
19.00 86 I
19.30 87 IO
20.00 88 IO



1*OVN*

STATION 1, PLAN 1, RATIO 9

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	1.	1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	2.	9.	22.	35.	43.	44.	39.	33.	26.
20.	15.	11.	8.	6.	5.	5.	4.	4.	4.
4.	4.	6.	7.	8.	9.	10.	10.	11.	11.
12.	14.	19.	27.	39.	43.	49.	54.	57.	60.
62.	63.	67.	86.	128.	317.	837.	1404.	2023.	2839.
4031.	3284.	6422.	7232.	7606.	7349.	7036.	6209.	5290.	4386.
3544.	2817.	2236.	1768.	1424.	1232.	1016.	807.	590.	412.
260.	163.	111.	89.	79.	73.	69.	66.	64.	61.
58.	56.	54.	52.	50.	48.	46.	44.	42.	41.

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	2.	2.	2.	2.	1.	1.
1.	1.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	2.	2.	2.	2.	2.	3.
3.	3.	3.	4.	6.	13.	25.	36.	45.	92.
60.	67.	73.	78.	80.	79.	77.	72.	67.	62.
57.	52.	47.	41.	37.	33.	29.	24.	19.	15.
11.	7.	5.	4.	3.	3.	3.	3.	3.	3.
3.	2.	2.	2.	2.	2.	2.	2.	2.	2.

STAGE

1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0	1189.3	1189.2	1189.2
1189.0	1189.0	1189.1	1189.1	1189.2	1189.3	1189.3	1189.3	1189.2	1189.2
1189.1	1189.1	1189.1	1189.1	1189.0	1189.0	1189.0	1189.0	1189.0	1189.0
1189.0	1189.0	1189.0	1189.0	1189.1	1189.1	1189.1	1189.1	1189.1	1189.1
1189.1	1189.1	1189.1	1189.2	1189.2	1189.3	1189.3	1189.4	1189.4	1189.4
1189.4	1189.4	1189.4	1189.6	1189.8	1190.8	1192.4	1193.8	1194.7	1195.3
1196.3	1197.0	1197.6	1198.0	1198.2	1198.2	1198.0	1197.5	1197.0	1196.5
1196.0	1195.5	1195.0	1194.4	1193.9	1193.4	1192.9	1192.3	1191.7	1191.1
1190.6	1190.1	1189.7	1189.6	1189.5	1189.5	1189.5	1189.4	1189.4	1189.4
1189.4	1189.4	1189.4	1189.3	1189.3	1189.3	1189.3	1189.3	1189.3	1189.3

PEAK OUTFLOW IS 7606. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7606.	5618.	1796.	725.	87019.
CMS	215.	159.	51.	21.	2464.
INCHES		137.53	175.83	177.52	177.52
MM		3493.19	4465.99	4508.92	4508.92
AC-FT		2786.	3562.	3596.	3596.
THOUS CU M		3436.	4393.	4435.	4435.

1*OVF*

STATION 1

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

	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	0.	0.	0.	0.
0.30	11												
1 00	21												
1.30	31												
2 00	41												
2.30	51												
3 00	61												
3.30	71												
4 00	81												
4.30	91												
5 00	101												
5 30	111												
6 00	121												
6.30	131												
7 00	141												
7 30	151												
8 00	161												
8.30	171												
9 00	181												

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 9.30 191
10.00 201
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301
15.30 311
16.00 321
16.30 331
17.00 341
17.30 351
18.00 361
18.30 371
19.00 381
19.30 391
20.00 401
20.30 411
21.00 421
21.30 431
22.00 441
22.30 451
23.00 461
23.30 471
 0.00 481
 0.30 491
 1.00 501
 1.30 511
 2.00 521
 2.30 531
 3.00 541
 3.30 551
 4.00 561
 4.30 571
 5.00 581
 5.30 591
 6.00 601
 6.30 611
 7.00 621
 7.30 631
 8.00 641
 8.30 651
 9.00 6601
 9.30 6701
10.00 68. I
10.30 69. I
11.00 70. I
11.30 71. I
12.00 72. I
12.30 73. I
13.00 74. I
13.30 75. 01
14.00 76.   0  I
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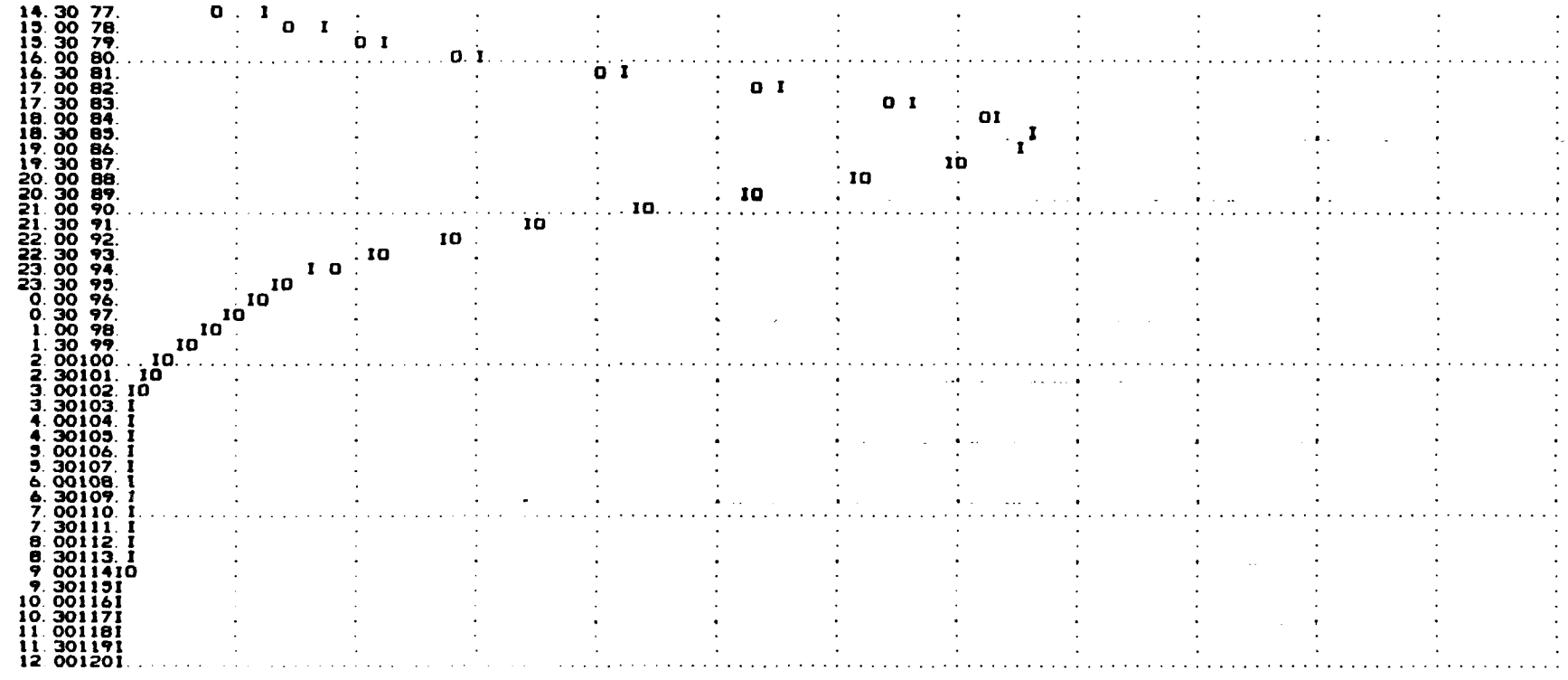

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1 ********** ********** ********** ********** **********

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 0.10	RATIO 2 0.20	RATIO 3 0.30	RATIO 4 0.40	RATIO 5 0.50	RATIO 6 0.60	RATIO 7 0.70	RATIO 8 0.80	RATIO 9 1.00
HYDROGRAPH AT	1	0.38	1	116.	232.	347.	463.	579.	695.	811.	927.	1158.
	(	0.98)	(	3.28)(	6.56)(	9.84)(	13.12)(	16.40)(	19.68)(	22.96)(	26.24)(	32.80)
HYDROGRAPH AT	1	0.00	1	672.	1344.	2015.	2687.	3359.	4031.	4703.	5374.	6718.
	(	0.00)	(	19.02)(	38.05)(	57.07)(	76.09)(	95.12)(	114.14)(	133.16)(	152.19)(	190.23)
2 COMBINED	1	0.38	1	762.	1525.	2287.	3050.	3812.	4575.	5337.	6100.	7625.
	(	0.98)	(	21.59)(	43.18)(	64.77)(	86.36)(	107.95)(	129.54)(	151.14)(	172.73)(	215.91)
ROUTED TO	1	0.38	1	757.	1519.	2279.	3039.	3800.	4560.	5320.	6082.	7606.
	(	0.98)	(	21.43)(	43.01)(	64.53)(	86.04)(	107.61)(	129.13)(	150.65)(	172.24)(	215.37)

1

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1189.00	1189.00	1194.50
STORAGE	0.	0.	42.
OUTFLOW	0.	0.	1861.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.10	1192.20	0.00	23.	757.	0.00	43.00	0.00
0.20	1194.04	0.00	38.	1519.	0.00	43.00	0.00
0.30	1195.01	0.51	47.	2279.	3.00	42.50	0.00
0.40	1195.64	1.14	53.	3039.	4.00	42.50	0.00
0.50	1196.16	1.66	58.	3800.	5.00	42.50	0.00
0.60	1196.62	2.12	63.	4560.	5.50	42.50	0.00
0.70	1197.06	2.56	67.	5320.	6.50	42.50	0.00
0.80	1197.47	2.97	71.	6082.	6.50	42.50	0.00
1.00	1198.23	3.73	80.	7606.	7.50	42.50	0.00

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

APPENDIX D

PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS

EXCERPTS FROM TECHNICAL SPECIFICATIONS

The Warwick Water Works

Contract and Specifications

1891.

SPECIAL NOTICE

To Contractors Proposing to Bid.

Contractors are requested to observe, that the specifications and conditions of contract are intended to ensure the performance of the work, in a straight-forward and workmanlike manner, and to prevent all claims, designated as extras, from arising.

There will be no opportunity whatever afforded for making up profits by extras, and contractors must look entirely to the contract for their remuneration. The contract price given in the proposal, should be sufficient to cover every item of labor and material, and all possible contingencies connected with the works, as well as a reasonable profit.

It is believed that this method of letting work will commend itself to all fair Contractors. It amounts in substance to making the final estimate in advance of the construction, and affords the Contractor, as well as the Corporation, the knowledge (very nearly) of the character and amount of the work.

For the amount of work and material represented as above stated, and performed in the manner defined in the specifications, which requirements will be enforced, a bid is invited.

Contractors must not be guided by any information furnished by any employe or agent of The Norwich Water Works, respecting nature of material, the location of stone, clay or any other thing, so as to make the Corporation liable. They must, in every instance, judge for themselves, from actual inspection or otherwise, and run all risk.

Engineer's Office, Norwich, April 20, 1881

P. H. BAERMANN,
Chief Engineer.

THE NORWICH WATER WORKS.

CONTRACT.

Articles of Agreement, *made and concluded this* 2nd *day of* [illegible] *, in the year one thousand eight hundred and eighty-one, by and between the Norwich Water Works, by their President, of the first part, and* [illegible] *of the second part, Contractors* ,

Witnesseth, *That the said parties of the second part have agreed, and by these presents do agree to and with the said parties of the first part, for the consideration hereinafter mentioned and expressed, to furnish at their own proper cost and expense, all the necessary labor and materials of whatever kind, and to prepare for and execute, in the most workmanlike manner, all the work called for in the following Specifications, which are a portion of this contract:*

SPECIFICATIONS.

1. These specifications refer generally to all work of construction, the furnishing of all material not specially mentioned as furnished by The Norwich Water Works, and the guarantee of the said work and material for six months from the date of its acceptance, as hereinafter provided.

The work comprises grubbing and clearing, the removal of all vegetable matter, where called for, within the reservoir site, the construction of earth and stone dams, the trenching and laying of all pipe and specials of various diameters, the setting of gates, hydrants, air valves, and every item of labor or material necessary to the establishment of works for the introduction of pure and wholesome water.

GRUBBING AND CLEARING.

Space defined on drawings

Brush, etc., burned up or removed.

2. From the space included within the reservoir site defined upon Reservoir drawing No. 1 by a —— x —— x —— at the base of all embankments, under the foundation of all structures, and along the pipe line, trees, saplings brush, roots and vegetable matter shall be cut and grubbed up, and together with logs, brush and refuse of every description, including old fences, shall be burned up and destroyed, or removed from the ground in such manner and to such location as the Engineer may direct.

MUCKING.

Where located.

3. Between the —— o —— o —— line shown upon Reservoir drawing No. 1, which line is two (2) feet vertically above the flow line, all vegetable or other objectionable matter shall be removed. Such portions as are considered suitable by the Engineer shall be deposited in spoil banks until the embankment is completed, and then used to dress the rear slope. That portion not suitable for this purpose, or any surplus of suitable material, shall be deposited in such spoil banks with dressed slopes, as may be directed; but such spoil banks shall be so located that its drainage cannot flow into the reservoir.

Placed in spoil banks.

Peat or muck wholly removed.

Should a deposit of peat or muck be discovered within the line —— o —— o ——, it shall be wholly removed and deposited in the manner above provided.

RESERVOIR.

Grubbing and clearing.

4. The removal of all wash material indicated on the Reservoir drawing No. —— is already provided for under the head of grubbing and clearing and mucking in *Specifications* 2 *and* 3.

Old Mill refuse removed.

The Norwich Water Works will remove or cause to be removed the Mill now standing at the upper end of the reservoir, but the Contractor will be required to so thoroughly clean up the site that it shall conform to the other portions of the reservoir as regards grubbing and clearing and mucking. Said material shall be removed in the manner and to the positions required by the Engineer.

Manner of preparing foundation for the embankment.

Clearing the bed of the stream.

5. Under the base of the embankment the soil shall be thoroughly removed to such depth and deposited in such positions as the Engineer may direct. The bed of the stream shall be cleaned down to rock bottom, and every precaution taken to give the embankment a solid foundation.

Excavation for puddle.

6. Upon the centre line of the dam the puddle trench shall be excavated to the dimensions shown in Reservoir drawing No. 3 to an average depth of not exceeding 6 feet as it ascends the hills, and stepped off in the manner indicated; through the bottom or low ground the average depth will not exceed 7 feet, without additional compensation, but should the Engineer deem it necessary the excavation of the trench may exceed 7 feet at any point or points without extra claim, provided the sum of the depths taken every 5 feet for this length shall not average more than 7 feet as above. A change of position but not of quantity shall not constitute any claim for extra compensation.

Excavation how deposited.

Dressing rear slopes.

Surplus.

7. All the material excavated, from the puddle trench, the foundation pits, and from the waste pipe trench, when considered suitable by the Engineer, shall be placed in the embankment, and all muck or decayed vegetable matter shall be deposited in spoil banks until the embankment is formed, and then used to dress the rear slopes, provided such dressing shall not exceed one foot in thickness. Should there be a surplus of muck or other vegetable matter, it shall be deposited in such place, manner and quantities, as already provided for in Specification 3.

EMBANKMENTS.

Embankments.

Slopes.

Material to be deposited on side of puddle wall.

Selected material.

Ramming.

8. The embankment will consist of the material excavated in the foundation pits, trenches, and from that portion of the interior of the reservoir indicated by the Engineer. It will be 10 feet wide on the top, 5 feet above the water line, with an inside slope of $2\frac{1}{2}$ to 1, and an outside slope of 2 to 1. The material will be deposited upon both sides of a puddle wall, which will form the centre of the embankment. In carrying up the embankment, selected earth, subject to the Engineer's approval, shall be placed next to the puddle, so as to afford it a uniform support and thoroughly rammed for three feet on each side of the puddle, to the satisfaction of the Engineer.

Slopes of hills stepped.

9. The slopes of the hills shall be stepped off in the manner indicated on Reservoir drawing No. 3, where directed, and the connection of the bank with the hills shall be made by loosing the material of the sides and then rolling it in with the bank.

Slopes full.

10. In constructing the embankments, the slopes shall be at least 6 inches full; they shall be dressed back to a line if directed, in front of, leaving them true and smooth; the front to receive the broken stone, the rear the soil dressing, both being in addition to the specified dimensions.

Measurement of puddle trench.

11. In calculating the depth of the puddle trench the measurements are taken after the soil is removed, such excavation being in addition to that called for under the base of the embankment.

Bank made in courses.

Roller.

12. The material shall be laid on in even and regular courses of not more than eight inches in thickness, the outer edges being carried higher than the centre, as indicated approximately on Reservoir drawing No. 3, section 4 x 40, and the surface kept free from ridges and hollows. The bank shall be thoroughly rolled to the satisfaction of the Engineer, with a grooved iron roller of not less than 600 pounds per foot, and not less than 5 feet in length. When necessary the bank shall be sprinkled.

Coarse material.

13. No stones, vegetable, or coarse material of any kind, shall be deposited in the embankment in front of the puddle, but when allowed by the Engineer may, with the exception of vegetable matter, be used in the rear slope.

Puddle wall slope of.

14. The puddle wall will be 5 feet wide at 2 feet above the water line, and descend with a batter, or in steppes, as may be directed, of 1 inch to the foot on each side; its dimensions are shown on the sections on Reservoir drawing No. 3.

Composition of puddle.

The puddle wall will be composed of clay and gravel, in courses of 6 inches in thickness, and cross-cut or puddled with spades; the cuts extending across the wall at intervals of not more than 3 inches, and into the layer below at least 3 inches; and the material of the puddle wall must be thoroughly incorporated with that of the

puddle, but when allowed by the Engineer may, with the exception of vegetable matter, be used in the rear slope.

Puddle wall size of.

14. The puddle wall will be 5 feet wide at 2 feet above the water line, and descend with a batter, or in steppes, as may be directed, of 1 inch to the foot on each side; its dimensions are shown on the sections on Reservoir drawing No. 3.

Composition of puddle.

The puddle wall will be composed of clay and gravel, in courses of 6 inches in thickness, and cross-cut or puddled with spades; the cuts extending across the wall at intervals of not more than 3 inches, and into the layer below at least 3 inches; and the material of the puddle wall must be thoroughly incorporated with that of the natural banks, on both sides, by cutting into the same.

Puddle wall covered.

When a course of puddle is not carried forward before the preceding course has set, the work shall be thoroughly wetted and covered to prevent injury by cracking.

Puddle carried up with bank.

15. The puddle wall shall be carried up in connection with the embankment; the difference in height shall not exceed at any time more than two courses of embankment. Suitable clay for this work must be furnished by the contractor from outside the reservoir site, if not found suitable in quality and quantity therein.

Clay furnished by Contractor.

The puddle wall shall extend from end to end of dam, and from the bottom of the puddle trench to a plane 2 feet above the water line, as indicated on Reservoir drawing No. 3. It shall be constructed in such workmanlike manner as above provided, and in conformity to the directions of the Engineer, so as to form a perfect stop-wall to whatever water might reach the center of the embankment.

Additional puddle

16. Should the construction develop the necessity of additional puddle beyond that called for by the plans, it shall be furnished, when directed by the Engineer, at the price per cubic yard named in the proposal hereunto annexed, and which is a part of this agreement.

How determined

The quantity of such additional puddle, if required, shall be determined by the Engineer, and shall be the difference in amount between the plans exhibited, and forming a part of this contract, and the actual construction. A change of form or position of puddle, or any other material, when the quantity remains the same, shall not

Location may be changed

constitute a claim for additional compensation, the contract price being for this *amount* of work located approximately as on the plans.

EXCAVATION.

Excavation shown by — — —

17. Upon Reservoir drawings No 4, the—— . —— . —— lines represent surface of construction, and the depths thereon indicated are without regard to the amount of material removed under the head of mucking, as defined in Specification 3. The lines only represent the actual bottom when all vegetable matter has been removed before reaching that depth. Should solid rock be found before reaching these depths the Engineer will decrease the depth at such points, and an equivalent quantity shall be taken from earth excavation from such places as may be directed.

Excavation to grade

18. The excavation, when finished, shall be left smooth, free from hollows and to such grade as will drain the entire bottom to the mud pipe situated at the lowest point in the pond. The surface of the ground, where

Surface rolled

disturbed, shall be rolled where directed by the Engineer. The sides of the excavation shall conform to the slopes

Slopes.

given by the Engineer's stakes, and when directed shall be dressed to a line.

Trenches set.

19. The excavation for the trenches, inlet, waste weir, etc., shall be performed in the manner and the material removed to such place as may be directed.

Waste material

20. The waste or surplus material shall be deposited along the exterior of the embankments, or other positions not exceeding a haul of 500 feet, with a graded slope, in such manner and amount as may be directed, and upon

Cleaning up

completion of the work the whole site must be left clean, the refuse of construction destroyed or removed from the grounds.

Waste pipe trench.

21. The Contractor will be required to excavate a trench for the waste pipe, extending from the present mill dam along the south side of the reservoir, as indicated on Reservoir drawing No. 1, by a —— —— —— —— line; the approximate profile of said line is shown on Reservoir drawing No. 1. The dimensions of the trench will give an average area of fifty-four square feet. The material excavated from this trench, except when otherwise

Surfaced.

directed by the Engineer, shall be used in forming the embankment. The trench shall conform in grade and direction to the Engineer's stakes, and before the pipe is laid shall be surfaced to exact elevation. In this Contract the

Waste pipe trench 2 yards per foot.

waste pipe trench shall have an average section of 54 square feet by a length of 1500 feet; of the material removed, such portions as are not necessary for covering the pipe as hereinafter provided, shall be used, when suitable, in the embankment. Should the above section or length be increased, all surplus material over and above that requisite to cover the pipe as above provided, shall, if suitable, be used in the construction of the embankment. All material from this trench, of the given or increased section which shall be used to form the embankment, shall be measured in the embankment, and the amount thereof shall be deducted from the total material removed from said trench. When the ground is such that the pipe is exposed above the natural surface, it shall be covered, to the satisfaction of the Engineer, without extra charge, provided, however, the quantity requisite shall not exceed the average section above given. In case more material is required, it will be paid for at the price of "Excavation wasted," as given in the Proposal.

Head wall and appurtenant.

22. At the upper end of the reservoir such suitable headwall or inlet chamber, together with the necessary embankment, puddling, rip-rap, etc., as the Engineer may hereafter determine necessary, shall be constructed in the same manner and of the same materials as is herein specified for each particular class of work there required.

Price for this work, this given in the proposal.

The price for such additional work shall be that named in the Proposal, and no claim shall be made for extra compensation, above the price stated in the Proposal, on account of the quantity or form not being herein stated.

Engineer's instructions to be closely followed.

23. Each and every direction of the Engineer is to be strictly followed, and any defective workmanship shall be immediately made good upon notice so to do.

FACING OF EMBANKMENTS.

Broken stone 18 inches in thickness

Gravel.

Soil dressing.

24. There shall be a layer of clean broken stone, not exceeding 6 inches in greatest measurement, of not less than 12 inches in thickness, extending from the foot of the slope to the top of the embankment, as shown on Reservoir drawing No. 3. The top of the embankment shall be covered with 10 inches of clean gravel, and the rear slope dressed with the vegetable matter as already provided, to a depth of not over 12 inches; both these dimensions being in addition to the given top width of 10 feet.

TRENCHES.

Waste weir

25. The waste weir trench shall be of the form and size shown on Reservoir drawing No. 7, excavated to grade; in those portions indicated upon the drawing, and where considered necessary, it shall be stepped and the steppes protected by rip-rap. The puddle trench and supply pipe trench, both passing under the embankment, shall be excavated to form shown upon the drawings, and the material, when suitable, deposited in the embankment.

Temporary trenches

26. Should it be considered necessary by the Engineer, during the progress of the work, the Contractor shall cut such temporary trenches at proper elevation in the natural soil, for discharging the storm water, as are directed. In refilling the above, special care must be used to break up the line of trench, and incorporate the embankment with the natural soil.

STRUCTURES.

IRON

Supply

16 inch pipe

Blow off.

16 to 24 reducer.

Ground removed to solid rock.

27. The supply from the reservoir will be controlled and operated by valves arranged in the manner indicated upon Reservoir drawing No. 6. The 16 inch pipe passing under the embankment will be laid in the trench excavated for that purpose, and shown on Reservoir drawing No. 6; the lower end will terminate in a 16x12 three way, the 16 inch way being closed with a gate, which will allow of its being used as a blow off; the 12 inch way will connect with the 12 inch main leading to the village. The upper end will terminate in a 16x24 three way, as shown, the 16 inch end having a 16 to 24 reducer extending into the lowest portion of the reservoir. The ground around this reducer for a distance of 25 feet in all directions, except towards the bank, shall be wholly removed to solid rock, and if necessary the rock graded to the pipe, so that all the water may be drawn from the reservoir.

Stand pipe.

12 inch gates

The 24 inch way will be vertical, and will form the base of the 24 inch stand pipe. The stand pipe will be formed of the three 24x12 inch three ways and sections of 24 inch pipe, thoroughly leaded together in the very best manner. The 12 inch way of the specials shall be horizontal, and each will be fitted with a 12 inch gate for closing the outlet. Should the Engineer deem it necessary, he may require the Contractor to drill into the solid rock not more than four holes, two inches in diameter and eighteen inches deep, to anchor the stand pipe to.

Screens

The Contractor will be required to furnish two screens with rods, etc., of the form shown on Reservoir drawing No. 6, made of copper wire secured to a copper frame, the upper one-half and the lower one-quarter inch mesh.

Base.

The special forming the base of the stand pipe shall be thoroughly built in with masonry of the most durable kind, in the manner hereinafter provided, and to the dimensions shown upon the drawings.

Material furnished by The Norwich Water Works

28. The Norwich Water Works will furnish on the cars, or delivered in good order along the line of the N. Y. & O. W. or D. L. & W. R. R's., in the village of Norwich, N. Y., the plain pipe, specials and valves required for this work. The Contractor will be required to furnish the remainder of the material, and perform all work necessary in its erection.

MASONRY

29. The masonry necessary for the construction of these works and called for by the plans and specifications shall be composed of good, sound quarry stone, laid in cement mortar. The foundation for all structures shall be composed of concrete or beton, made in strict conformity to the directions of the Engineer, in the proportions hereinafter named, and worked in the manner required. The sizes shall conform to the dimensions or scale, and when figured the figures shall govern. Upon this foundation the stone masonry shall be started and carried up in conformity with the shape and dimensions given on the various drawings.

Stone.

Courses.

Stretchers.

Headers.

Rock face.

Joint.

solid work.

The stone used shall be laid in courses, upon their natural or quarry beds, in the most workmanlike manner. In the arrangement of courses the large stone shall be placed at the bottom, diminishing in size upwards; the stone to break joints at least 3 inches. One-fourth of the stone to be laid as headers, and all stretchers to have a height of not more than the bed, and a length of 2.5 times the height; the headers must alternate on each side of the wall; and when the masonry is not over 2.5 in width, must extend entirely through the wall. The stone shall be left "rock faced," provided there be no projection of over 2 inches; the joints must be worked to a line, and must not exceed one quarter inch. All intersections of plans shall have a chisel draft of 1 inch. The stone must be laid solid upon the beds in a full joint of mortar, and no chips will be allowed, unless they shall be bedded in the cement before the stone is placed in position. The whole work must be absolutely solid, and no grouting will be allowed. All masonry must be constructed in such a manner as to render it water tight, and any failure in this regard shall be remedied by the Contractor, at such time and in such manner as the Engineer shall direct.

Pointing.

The inside and outside faces of the masonry shall be thoroughly pointed as follows: The joints shall be cleaned out before the cement has hardened, and well wetted, and the pointing mortar well worked into the joint and cut off

Rock face. Joint. Solid work.

"rock faced, provided there be no projection of over 2 inches; the joints must be worked to a line, and must not exceed one quarter inch. All intersections of plans shall have a chisel draft of 1 inch. The stone must be laid solid upon the beds in a full joint of mortar, and no chips will be allowed, unless they shall be bedded in the cement before the stone is placed in position. The whole work must be absolutely solid, and no grouting will be allowed. All masonry must be constructed in such a manner as to render it water tight, and any failure in this regard shall be remedied by the Contractor, at such time and in such manner as the Engineer shall direct.

Pointing.

The inside and outside faces of the masonry shall be thoroughly pointed as follows: The joints shall be cleaned out before the cement has hardened, and well wetted, and the pointing mortar well worked into the joint and cut off straight.

The coping of the waste weir of the reservoir, shall be made of good solid stone, of the dimensions given in the drawings, chipped off to a line on front and rear faces.

Waste weir. Puddle.

30. The waste weir shall be constructed of the form and dimensions shown on Reservoir drawing No. 5, of the material and in the manner provided. When figured the figures shall govern, and where figures are wanting the dimensions shall be supplied by the Engineer. Such puddle as may be required around the waste weir and other masonry structures shall be furnished by the Contractor.

Cement.

31. Hydraulic cement shall be of some well and favorably known brand, approved by the Engineer, freshly burned and ground to such fineness that not less than 80 per cent. will pass through a sieve having fifty meshes to the inch. It shall be delivered in tight paper lined barrels, and shall at all times be protected from the weather.

Rejected materials.

After delivery, samples may be taken from any or all of the barrels and subjected to such tests as the Engineer may require, and any lot failing the tests shall be marked "rejected," and shall immediately be removed from the site of the works. Should any of the "rejected" material be found to have been used on the works, all work constructed with said material shall be taken down and reconstructed with Specification material, without extra charge.

Sand.

32. The sand shall be clean, sharp, and free from loam or refuse; it shall be screened, and washed if required.

Cement mortar, proportions.

33. The cement mortar for the stone work will be composed of two (2) parts sand and one (1) part cement, mixed thoroughly, dry, and then tempered to the requisite consistency. It shall be used as soon as made, and any mortar which has taken a "set" shall be wasted.

Concrete.

34. Concrete shall consist of clean stone which will pass through a two-inch ring in any direction, and of hydraulic cement, lime and sand, in the following proportions:

Proportions.

1 barrel cement,
½ " lime powder,
3 " damp loose sand.
6 " broken stone.

Lime slacking.

The lime for this work shall be prepared by spreading in uniform layers, not exceeding 8 inches in depth, in a water-tight wooden box of suitable size, having a tight cover. The whole quantity of water required to bring the lime to a fine powder (previously ascertained approximately by trial) shall then be added, the cover placed upon the box tight, and left undisturbed for twenty-four hours.

Mixing.

These materials shall be intimately incorporated on the mixing board, and, after proper tempering, shall be deposited carefully in place and thoroughly rammed with an iron-shod rammer, until the surface is floated, and then left undisturbed for twenty-four hours.

SUPPLY MAIN.

Trenches opened according to Engineer's instructions.

35. The trenching for the supply pipe to the village, as well as for the System of Distribution hereinafter mentioned, shall be opened in accordance with lines and grades given for the work, and as far in advance of the pipe laying as may be required by the Engineer, but no further.

12 inch pipe.

36. The supply main from the reservoir to the village will consist of 12 inch iron pipe, described hereafter, as A, B, C, and D, pipe, and will be laid upon the inclination, and to the depth required, and approximately as located on Pipe line drawings, 1, 2, 3, &c.

Crossings.

All crossings of roads, streams and highways, will conform to the details as hereinafter given, and no portion of the pipe line, whether in excavation or embankment, shall have less than a 4½ feet covering over the pipe, measured from the top of the pipe, except at such points as may be permitted, and only then when specially protected from frost.

Protection from frost.

Change of line.

37. The Engineer may, should he deem it expedient, change the direction or cuttings on the pipe line, provided however, that such change shall not cause the average cuttings of the whole line to exceed 6½ feet, and in case of increased or diminished length, such increase or diminution shall be allowed either party, according to the scale given in the schedule, which forms a portion of this Contract.

MAINS.

Mains.

38. The mains in the System of Distribution will be laid in accordance with Map of Mains, and exhibited at the letting, and in conformity with the directions which may be given from time to time by the Engineer. No such directions however, shall increase the quantity of work, unless said alteration shall have been ordered by the Norwich Water Works, before the work has commenced, and the price established in an agreement signed by both parties to this Contract.

Increased quantity of work, how effected.

Depth of cuttings.

39. The pipes as shown shall be laid to a depth of not less than 5 feet, measured from the grade of the street to the top of the pipe; the alignment shall *conform* to the stakes given from time to time, by the Engineer, and the localities of gates, valves, hydrants, fountain, specials, etc., shall unless otherwise directed by the Engineer, be at the points and distances indicated upon detailed drawings furnished during the progress of the work. All pipe lengths will be measured horizontally, and will include all specials. All specials are in addition to the lengths given.

Location of gates, hydrants, etc.

PIPES AND SPECIAL CASTINGS.

Material furnished by Corporation.

40. The following quantities of plain pipe and special castings will be furnished sound and in good order along the lines of the N. Y. O. & W., and D. L. & W. Railroads, in the village of Norwich, N. Y., by The Norwich Water Works, and the Contractor will be required at his own expense and risk to deliver said quantities of material along the various streets of the village, the pipe line to the reservoir, and such other places as may be directed, perform all labor of trenching and back filling as hereinafter provided, furnish all lead, packing, and every item of material not included in the above.

PIPE.

Quantities of pipe.

41. The plain pipe and special castings will comprise the following classes and quantities:

Classes.

Class A—Under a head of 50 feet or less.

Class B—Under a head of from 50 to 100 feet.

Class C—Under a head of from 100 to 150 feet.

Class D—Under a head of from 150 to 200 feet.

PLAIN PIPE.

Class A.

CLASS A.

Nominal diameter in inches.	Total lineal feet.	Thickness of shell.	Depth of hub	Weight of 12 foot pipe
16	200	.56	3⅜	1,152
12	1,500	.49	3⅛	768
24	24	.68	4½	2,120

Class B.

CLASS B.

Nominal diameter in inches.	Total lineal feet.	Thickness of shell.	Depth of hub	Weight of 12 foot pipe
12	2,400	.53	3⅛	826

Class C.

CLASS C.

Nominal diameter in inches.	Total lineal feet	Thickness of shell	Depth of hub	Weight of 12 foot pipe.
12	1,000	.56	3⅛	885

Class D.

CLASS D.

Nominal diameter in inches.	Total lineal feet.	Thickness of shell.	Depth of hub	Weight of 12 foot pipe.
12	3,100	.59	3⅛	925
10	5,355	.53	3⅛	700
8	5,909	.48	3⅛	510
6	11,349	.43	3⅛	355
4	6,983	.39	3⅛	215

SPECIAL CASTINGS.

Specials.

42. The Norwich Water Works will furnish, in the manner above provided, the various special castings required for this work. They will consist of all the branches, bends, reducers, sleeves, caps, etc., of diameters from 24 to 4 inch, and will amount to about 200 in number, the exact number and size being shown at the letting, on Map of Mains.

Total lengths.

43. The total length of plain pipe as above is 37,820 feet, which, together with the length of the specials, shall constitute the total amount to be laid for the given gross sum. Any departure from these lengths shall be allowed either party, according to the prices named in the Proposal.

It must be clearly understood that the specials are not included in the above 37,820 feet, but are in addition thereto; and in the final measurement, unless the quantities are modified, any increased length of pipe actually laid due to length of specials shall not constitute a claim for extra compensation.

Pipe other than cast iron.

Waste pipe.

Trench refilled.

44. The Norwich Water Works reserves the right to furnish and cause to be laid by other parties than the party to this Contract, any such amount of pipe other than cast iron, as is indicated on the Reservoir drawings by the line — — — — — —. The excavation of said pipe trench is already provided for in Specification 21. Should such pipe be used the Contractor will be required to refill the trench from the material excavated, in the manner and to the amount required by the Engineer.

PIPE LAYING.

PREVIOUS REPORTS

RECEIVED

Form IWH 6-13 12 2000 (15 13288)

MAY 3 1914

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

DIVISION INLAND WATERS

Chief Engineer

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

RECEIVED

MAY 8 1914

DIVISION INLAND WATERS

J. D. M.

DAM REPORT

No. 1.

April 9, 1914
(Date)

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the The Norwich Water Works Dam. No. 1

This dam is situated upon the Ransford Brook (Give name of stream) in the Town of Norwich, Chenango County, about 6500 feet (State distance) from the Village or City of Norwich. The distance down (Up or down) stream from the dam, to the Chenango River (Give name of nearest important stream or of a bridge), is about 6500 feet (State distance).

The dam is now owned by The Norwich Water Works (Give name in full) and was built in or about the year 1881, and has been continuously maintained ~~was extensively repaired or reconstructed during the year~~ and is in good order.

As it now stands, the spillway portion of this dam is built of masonry (State whether of masonry, concrete or timber) and the other portions are built of earth with clay core (State whether of masonry, concrete, earth or timber with or without rock fill).

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is rock and under the remaining portions such foundation bed is rock & earth

The total length of this dam is 260 feet. The spillway or waste-weir portion, is about 45 feet long, and the crest of the spillway is about 5 feet below the top of the dam.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: mud pipe 16 inches, service pipe 12 inches

State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks which you may have observed.)

This dam is in good condition. No leaks or cracks whatever can been observed. It impounds water received from an upper reservoir, as to which a record report is made; and all surplus water is carried entirely around the reservoir No. 1, in a by-pass canal about 2000 feet long and 45 feet in width, so that the dam gets none of the effect of high water.

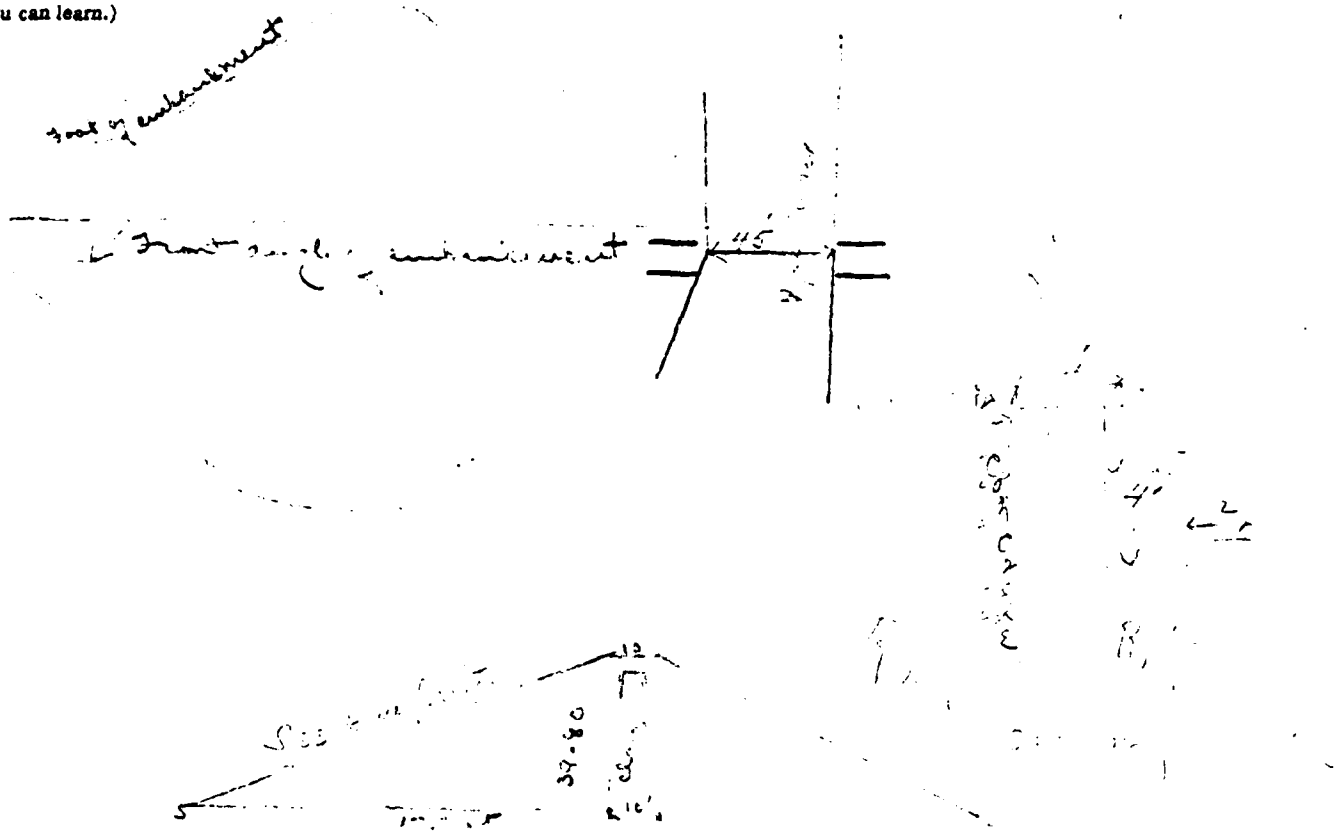
Reported by [signature]
(Signature)

173 [illegible]
(Address—Street and number, P. O. Box or R. F. D. route)

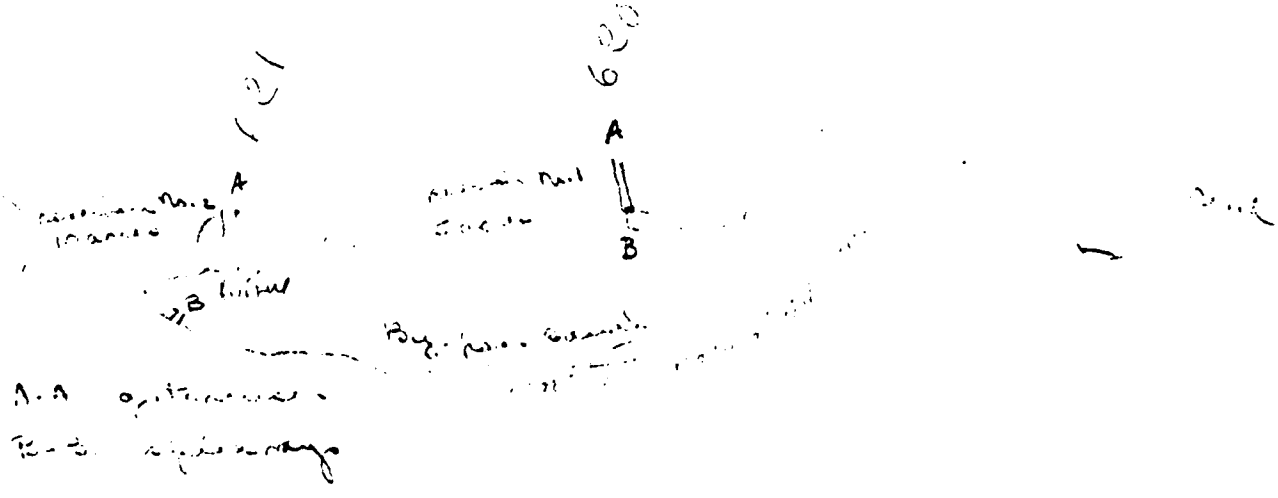
[illegible]
(Name of place)

(SEE OTHER SIDE)

(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)



(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.



8-23-24-3000 (6-1206)

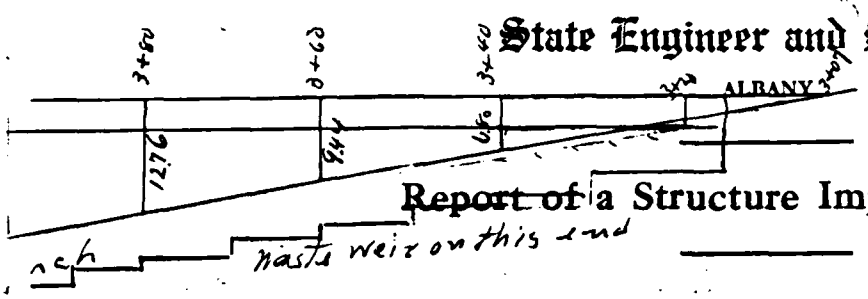
STATE OF NEW YORK

DEPARTMENT OF

State Engineer and Surveyor

Reservoir No. 1
Norwich Water Works

ncl



Report of a Structure Impounding Water

To assist in carrying out the provisions of Section 22 of the Conservation Law, being Chapter LXV of the Consolidated Laws of New York State, relating to safeguarding life and property and the erection, reconstruction, or maintenance of structures for impounding water, owners of such structures are requested to fill out as completely as possible this report form for each such dam or reservoir owned within the State of New York for which no plans or reports relative thereto are on file in this Department, and to return this report form, together with prints or photographs explanatory thereof to this department.

1. The structure is on Raisford Creek flowing into Chenango River in the Town of Norwich County of Chenango and about 6000 feet from the mouth of the stream on the City line
(Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

2. Is any part of the structure built upon or does its pond flood any State lands? no

3. The name and address of the owner is The Norwich Water Works
Norwich N.Y.

4. The structure is used for impounding water supply for use of the city of Norwich Now as also a distributing reservoir

5. The material of the right bank, in the direction with the current, is Rock with earth above; at the spillway crest elevation this material has a top slope of about 12 inches vertical to a foot horizontal on the center line of the structure, a vertical thickness at this elevation of about 10 feet, and the top surface extends for a vertical height of about 15 feet above the spillway crest.

6. The material of the left bank is hard pan; has a top slope of about 6 inches to a foot horizontal, a thickness of feet and a height of 400 + 500 feet.

7. The natural material of the bed on which the structure rests is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) ~~Limestone~~ Shale rock and hard pan

8. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. The rock and hard pan are impervious to water. There is some very slight leakage about the rock at the waste weir, but no increase for 30 or 35 years. There is some disintegration of rock on exposure to air

9. If the bed is in layers, are the layers horizontal or inclined? horizontal If inclined what is the direction of the horizontal outcropping relative to the axis of the main structure and the inclination and direction of the layers in a plane perpendicular to the horizontal outcropping?

10. What is the thickness of the layers? Variable

11. Are there any porous seams or fissures? No except as noted on page 1

12. The watershed at the above structure and draining into the pond formed thereby is about ½ square miles. in addition to about 5 square miles cut off by reservoir No 2

13. The pond area at the spillway crest elevation is 6.5 acres and the pond impounds about 4 mil. cubic feet of water.

14. The maximum known flow of the stream at the structure was cubic feet per second on (Date) See data on report of Reservoir No 2 Norwich Waterworks

15. Has the spillway capacity ever been exceeded by a high flow? No. Maximum on spillway about 36"

Can any possible flood flow from the pond otherwise than through the wastes noted under 17 and 18 of this report? No If so, give the location, the length and the elevation relative to the spillway crest and the character and slopes of the ground of such possible wastes

16. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the above structure. Describe the location, the character and the use of buildings below the structure which might be damaged by any failure of the structure; of roads adjacent to or crossing the stream below the structure, giving the lowest elevation of the roadway above the stream bed and giving the shape, the height and the width of stream openings; and of any embankments or steep slopes that any flood could pass over. Also indicate the character and use made of the ground below the structure. There are the same conditions as in the report of Reservoir No 2 in report of the same accompanying this report

17. WASTES. The spillway of the above structure is 45 feet long in the clear; the waters are held at the right end by a Masonry wall the top of which is 5 feet above the spillway crest, and has a top width of 2.5 feet; and at the left end by the same, the top of which is 5 feet above the spillway crest, and has a top width of 2.5 feet.

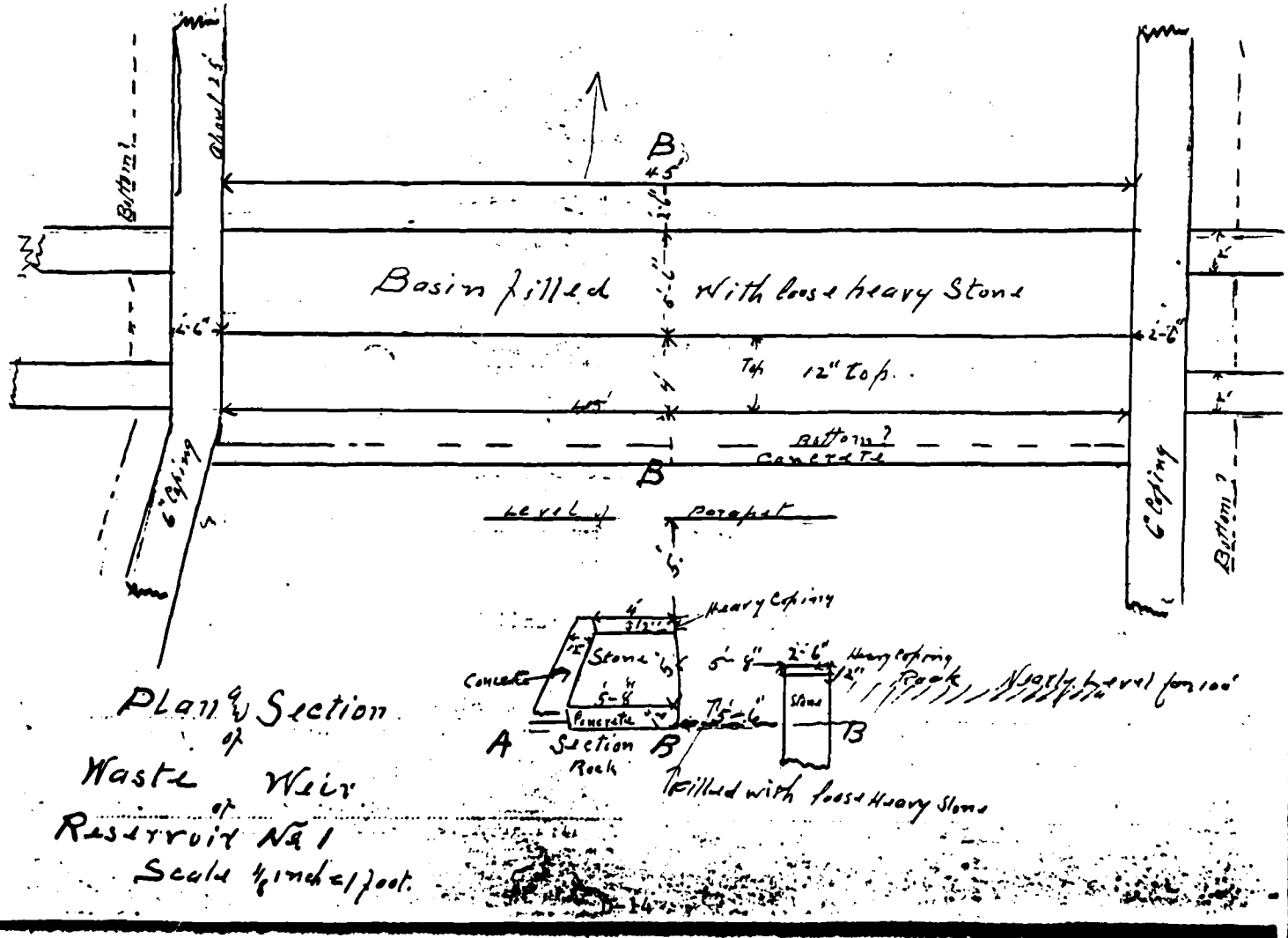
18. There is also for flood discharge a pipe 16 inches inside diameter and the bottom is about 35 feet below the spillway crest; and a (sluice, gate outlet) 16" diameter ~~feet wide~~ in the clear ~~by~~ ~~feet high~~, and the bottom is about 35 feet below the spillway crest.

19. APRON. Below the spillway there is an apron built of See sketch of Spillway (Material)
feet wide and ..... feet thick. The downstream side of the apron has a thickness of ..... feet
for a width of ..... feet.

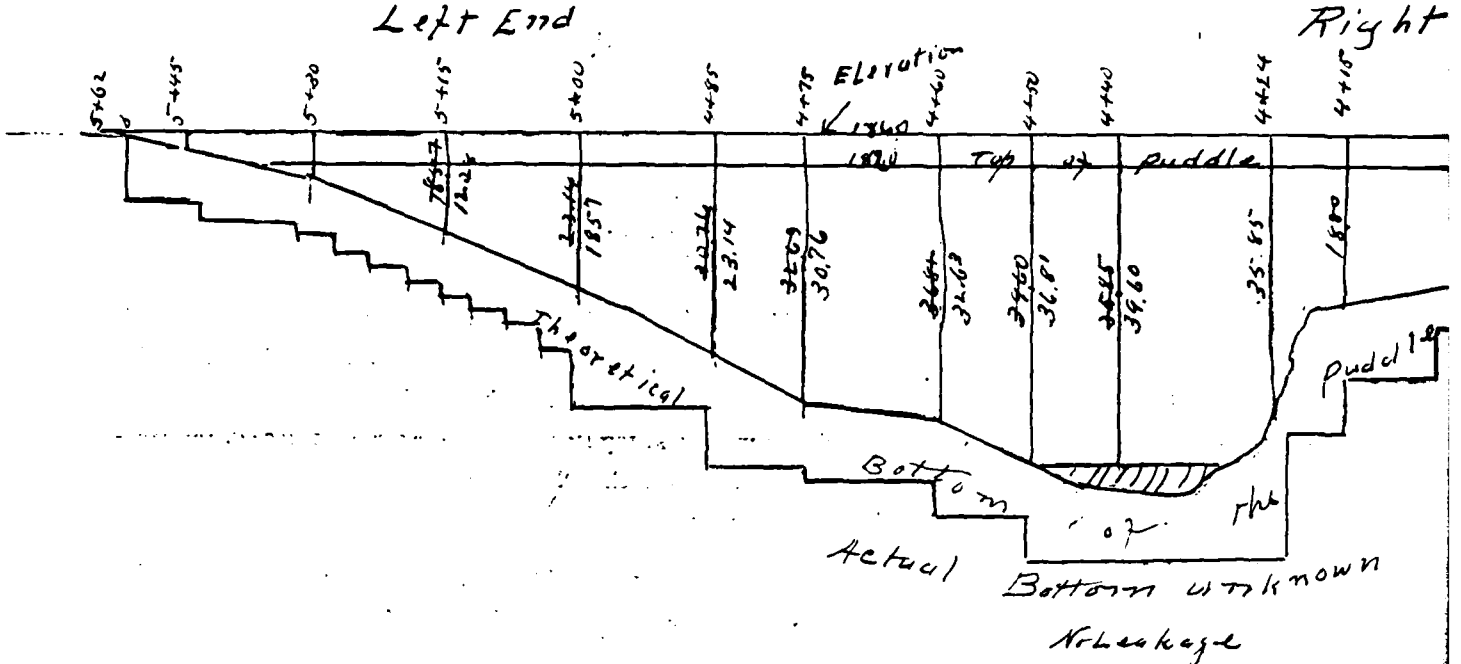
20. Has the structure any weaknesses which are liable to cause its failure in high flows? No

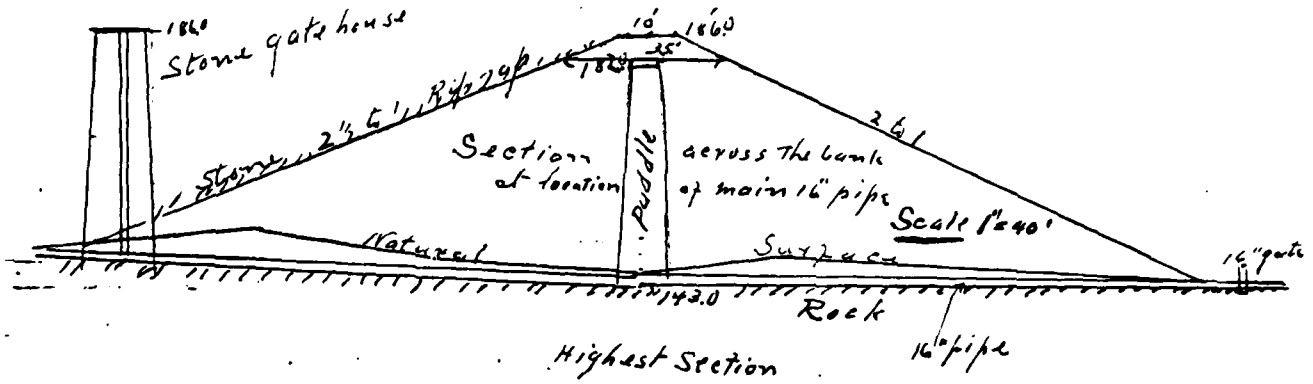
21. SKETCHES. On the back of this report make a sketch to scale for each different cross-section of the above structure at the greatest depth; giving the height and the depth from the surface of the foundation, the bottom width, the top width (for a concrete or masonry spillway at two feet below the crest), the elevation of the top in reference to the spillway crest, the length of the section, and the material of which the section is constructed; on the spillway section show a cross section of the apron, giving its width, thickness and material, and show the abutment or wash wall at the end of the spillway, giving its heights and thickness. Mark each section with a capital letter. Also sketch a plan; show the above sections by their top lines, giving the mark and the length of each; the openings by their horizontal dimensions; the abutments by their top width and top lengths from the upstream face of the spillway section; and outline the apron. Also sketch an elevation of each end of the structure with a cross section of the banks, giving the depth and width excavated into the banks.

22. WATER SUPPLY. The waters impounded by the above structure have (~~not~~) been used for a public water supply since 1881 by The City (formerly Village) of Norwich



Profile of Dam of Reservoir No 1
Scale 1 inch = 20 feet





The information in this report has been obtained from preliminary plans and observation and some measurements

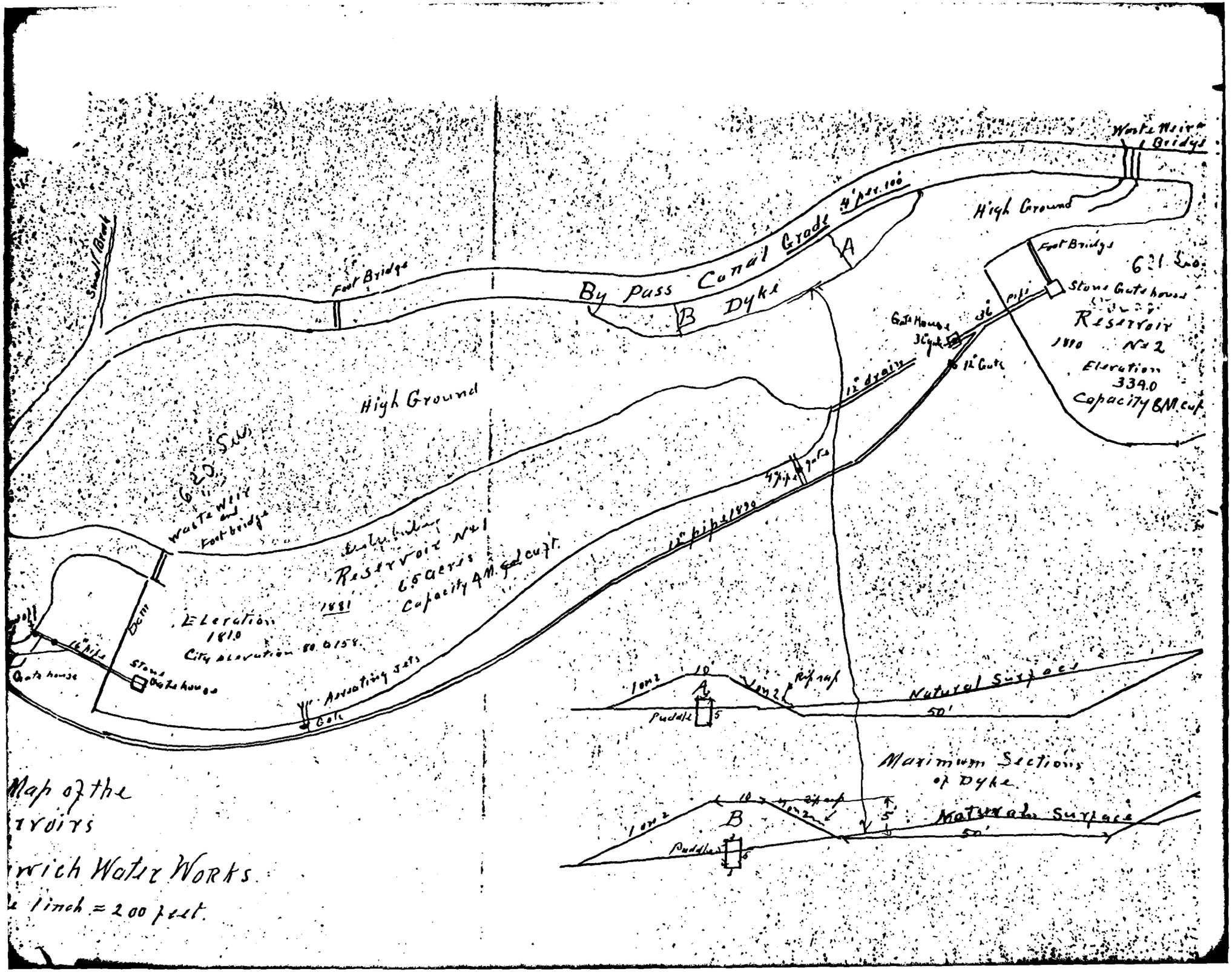
The above information is correct to the best of my knowledge and belief.

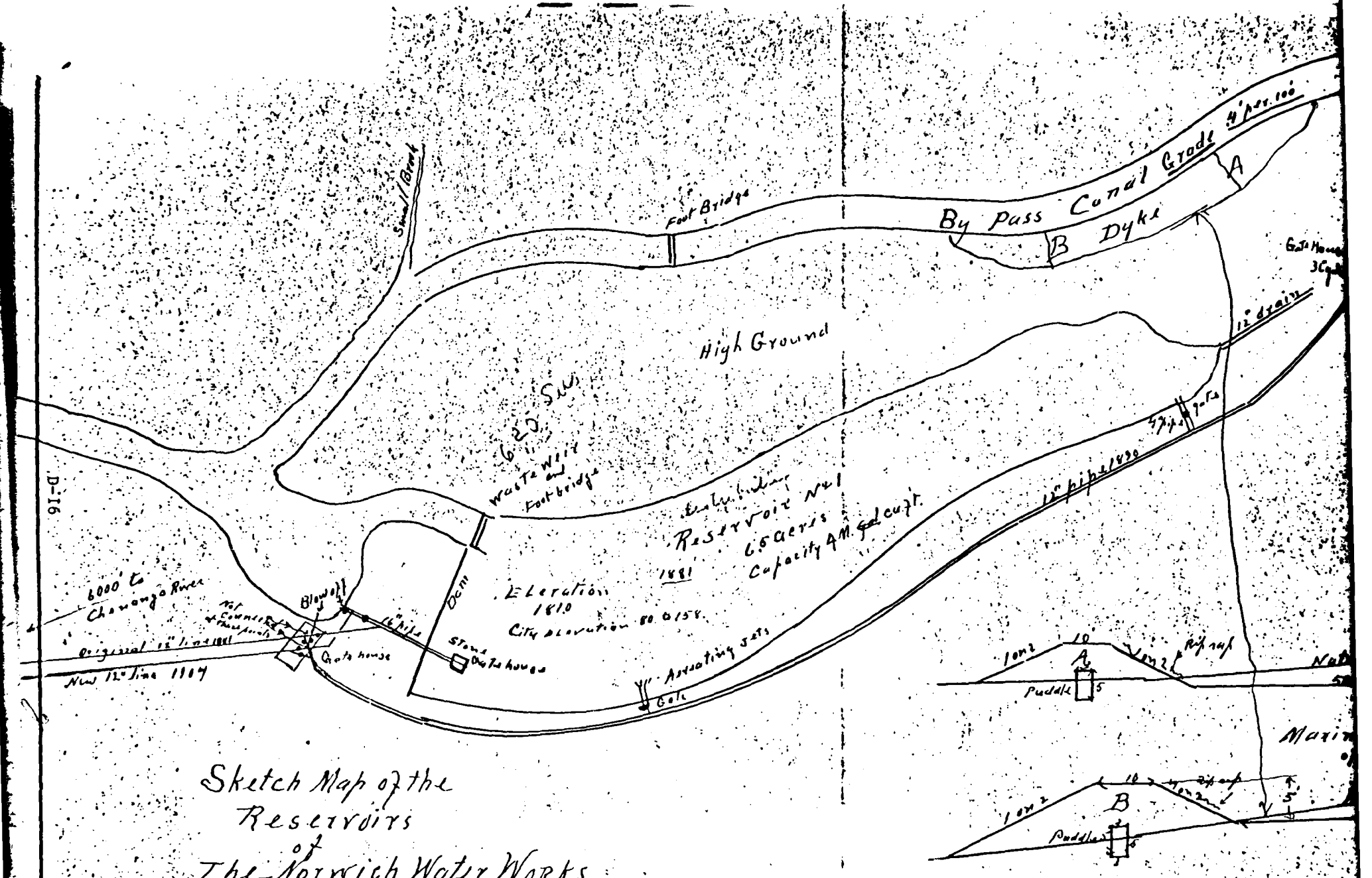
10 Sheldon
(Address of signer)

E. T. Musson
(Signature)

(Date)

Engineer of The Warwick Water works
(If person signing for owner should indicate his title or authority)


Waste Weir and Bridge
High Ground
Foot Bridge
Stone Gatehouse
Reservoir
1890 No 2
Elevation
339.0
Capacity 8M. cu ft
By Pass Canal Grade 4' per 100'
A
B
Dyke
Foot Bridge
Small Brook
High Ground
Waste Weir and Foot bridge
Reservoir No 1
6.5 acres
Capacity 4M. gal cu ft.
1881
Elevation
181.0
City elevation 80.0158.
Gate house
Stone Gatehouse
Aerating jets
Gate
12" pipe 1890
12" drain
Gate House
12" Gate
Natural Surface
50'
Maximum Sections of Dyke
Natural Surface
50'
Puddle
Puddle
Map of the
rvoirs
wich Water Works
1 inch = 200 feet.



Sketch Map of the Reservoirs of The Norwich Water Works

Scale 1 inch = 200 feet.

M. AM. SOC. C. E.
(RESIGNED)
E. F. Musson
Civil Engineer
OFFICE AND RESIDENCE 10 SHELDON ST.

OFFICE STATE ENG.
APR 20 1925
REF'D TO
ANS'D

NORWICH, N. Y., April 16, 1925.

Department of State Engineer and Surveyor,
Albany, N.Y.
Gentlemen;-

As requested by your department, I enclose herewith reports concerning the two earth dams and appurtenances owned by The Norwich Water Works of this City.

That designated as Reservoir No. 1, was constructed in the year 1881. The informationin regard to that has been mainly obtained from preliminary plans prepared before the construction, together with some measurements of parts that are now accesable and readily measured.

Since the construction of Reservoir No. 2, it has been in use as a distributing reservoir, the overflow from reservoir No. 2 passing in a by-pass canal.

The supply from reservoir is discharged into reservoir No. 1through aereating jets., In times of heavy rains when the water in No.w is roilythis is shut off till the water is in good condition for use.

The elevations used in the construction of both reservoirs are derived from an arbitrary bench mark near the center of the City, the elevation of which is assumed as 100.814. and is located on the top of the water table at the North East corner of the Congregational Church.

Reservoir No2 was constructed in the year 1890. The Hon Richard W. Sherman was engaged with Mr. McDonough in the Troy Public Works Co. as contractors. Mr W.S. Franklin was Engineer in charge, with the writer as assistant. The information contain-in the report concerning this reservoiris from the original construction notesand drawings used in the computations for the fin al estimate.

During the construction of this work there were two very unusual storms, as noted on the report. These figures were obtained as noted from the Weather Bureau at Tthaca, N&Y&

Owing to the very heavy rainfall that occured in May it was decided to install a waste pipe 36 inches in diameterin place of one of 20 inches. This was cast iron, asphalt coated and very carefully laid both as to line and grade. It was laid on a masonry wall with several cut off stops extending on each side and over the pipe, extra precaution being taken where the pipe crosses the puddle trench, the masonry extending down several feet to the rock as excavated in the trench.

At the timeof the heavy rainfall that occuredfrom Sept 9 to 13, the top of the dam was at about elevation 315. The 36 inc pipe was 192 feet in lengh, the elevation at the lower endwas 290.34 and at the upper end 296. The water rose above the dam

M. AM. SOC. C. E.
(RESIGNED)
E. F. Musson
Civil Engineer
OFFICE AND RESIDENCE 10 SHELDON ST.
NORWICH, N. Y.,

to the top thereof and I think overflowed a very little where a slight trench had been dug where less damage would doubtless resulted thanwould likely been done otherwise. Of course there was quite a large quantity of water impounded above the dam which would materially reduce the rate of discharge over the waste weir at reservoir No. 1. I am not at all satisfied with such computations as I have made from the lower weir and of the 36 inch pipe,but the facts are as stated and I leave any further computations for you to take up if you so desire.As stated in the report,at the time of the latter storm the water in the reservoir No. 1was 3 feet above the top of the weir at a point 50 or more feet Back from the weir.

Mr. Sherman agrees with me as to the conditions at the dam at the time,except that he thinks the dam was about 30 feet above the pipe at the time,but as I have the original notes of construction at hand which show the elevation Sept. 1st as at 313 and Oct. 1st as 320,it would appear that 315 was about right.

Precipitation records have been kept by the writer for the past 16 years.Only twice during those years has there been a precipitation of over 3 inches in 24 hours,and in each case there has not been a discharge of 3 feet over the waste weir of res. No. 2, I should have stated that the water shed between the two reservoirs is probably less than 1/2 mile.

Trusting the information I have been able to furnish will meet your requirements,I remain

very truly yours E. F. Musson

Engineer for The Norwich
Water Works

P.S.

We have a tracing of the entire area ocupied by both reservoirs and adjacent teritory as shown on the little map enclose This is drawn to a scale of 1 inch = 40 feet and if you desire w ill send you a blue print.(we have no facilities for cloth prints)

ENGINEERS' REPORT
TO THE
NEW YORK WATER POWER AND CONTROL COMMISSION
ON THE
NEW YORK WATER SERVICE CORPORATION
FOR THE
CITY OF NORWICH, NEW YORK

GENERAL AND HISTORICAL NOTES

The following description of the water supply system for the City of Norwich, New York has been compiled from information made available by the Company and the State Public Service Commission together with the results of various inspections in recent months by Baker & Wheeler. The data are mostly as at the date of July 1, 1946 and closely show the property as of the present date since only minor work has been done since June, 1946.

The Norwich Water Works, so-called, was incorporated January 26, 1881. Plant construction was started early in 1881 and the first water service was given in January 1882. On November 16, 1926, the New York Water Service Corporation acquired the old company and changed the name to Norwich Water Service Corporation. On May 7, 1929 the system was merged into the New York Water Service Corporation, and it is now commonly known as the Norwich Plant of that Corporation.

The Corporation furnishes water to domestic, commercial and industrial customers and gives fire protection by water service, in the City of Norwich and in parts of the Towns of Norwich, immediately adjacent to the easterly and westerly corporate limits of the City.

SOURCES OF SUPPLY

There are two sources of water. The first is about four square miles of drainage area along Ransford Creek in the Towns of Norwich, North Norwich and New Berlin, beginning about 1.5 miles northeast of the City of Norwich as will be seen from the accompanying U. S. Geological Survey topographic maps. In this drainage area are the two reservoirs first built, known as the "Upper" and "Lower". The Lower Reservoir has a surface area of about 6.5 acres, a maximum depth of about 30 ft. and a storage capacity of 32 million gallons, for 15 feet draw-down. Spillway elevation is 1108 feet above sea-level compared with about 1015 ft. for the center of the City. The Upper Reservoir is immediately upstream and has a surface area of about 9.1 acres, a maximum depth of 40 ft. and a storage capacity of 56.5 million gallons for a draw-down of 30 ft. The spillway here has an elevation of 1242 ft. or 54 ft. above the Lower Reservoir.

The second source of supply is Chenango Lake, in the Town of New Berlin about 3.5 miles northeast of the Lower Reservoir already mentioned.

The drainage area of Chenango Lake is contiguous to that of Ransford Creek and is about 0.8 square mile in extent. The lake surface is about 150 acres, and the normal elevation is 1750 ft. The drainage area has been developed to be contributory to the first area described, but it originally was part of the drainage area of Great Brook and the Unadilla River. Surplus waters not used for Norwich water supply still flow out to Great Brook. The Company, by purchasing the lands and water-rights of Chenango Lake and releasing upland cottage rights, has retained a strip of lake shore mostly 16.5 ft. wide. This strip is continuous around the lake except for a few interruptions totaling about 1900 ft. of shore, as shown on an appended map. The Corporation obtained the right to raise the water level to a given height two feet above the prior normal level and to draw it down five feet below prior level. This gives a potential storage of 540,000,000 gallons when it can be utilized. The normal realized storage is from 200 to 250 million gallons. The old natural outlet at the south end of the lake was plugged, and an artificial spillway channel opened up at the north-east end into a different branch of Great Brook. To divert the lake water into Ransford Creek, a tunnel 761 ft. long was driven through the ridge separating the two basins and a pipe line of 14, 16 and 18 inch cast iron pipe was run another 9587 ft. to connect the Lake and Creek with the tunnel. Water from the Lake runs 8,000 ft. in open brook channel to the Upper Reservoir already described.

OTHER LANDS

The Company owns about 270 acres of land around the reservoirs and Ransford Creek as shown in the accompanying maps. This has been replanted with about 177,000 evergreen trees. To improve the appearance around the two reservoirs, about 3100 shrubs have been planted.

There is a tract of about 7 acres on the south side of the New Berlin Highway in the Town of Norwich just east of the Chenango River and the City of Norwich. Here is located the filtration plant. On the opposite bank of the river, in the City of Norwich, is a corresponding tract of about 10 acres held undeveloped.

The Chenango Lake Tunnel and the approach pipe lines are under a strip of land 50 ft. wide owned in fee. The balance of the lake to creek line is on easements. The Company owns easements to extend the lake delivery line through to the Upper Reservoir and has rights to the waters of Ransford Creek.

There is a private right of way about 4700 ft. long for two 12-inch cast-iron transmission mains leading down from the Lower Reservoir. This parallels the New Berlin highway. The two mains continue under the high-way for another 1200 ft. to the filtration plant just outside the City as already noted. From the filtration plant, one 12-inch cast-iron main runs mostly under public ways into the Town and City of Norwich to River and Rexford Streets where it becomes a part of the distribution grid. A 10-inch cast-iron delivery line also runs on Company lands about 1200 ft. from the filtration plant to River and Gold Streets where it joins the distribution system. All river crossings are on private lands.

The distribution system is laid almost entirely under public streets. There is a length of about 350 ft. on a private easement near Broad and American Streets. South of the D.L. & W. R.R. at Front and Thompson Streets is a 600 ft. stretch. Near Elm and Beebee Streets are two lengths aggregating about 500 ft. From the end of East Main Street is a stretch on private right of way to River Road across the Chenango River.

STORAGE FACILITIES

Lower Reservoir. The dam at the Lower Reservoir was built in 1881. It is an earth embankment with puddled core. The maximum height is 39.8 ft. and the length is 240 ft. The top width is 12 ft. The upstream slope is 2.5 to 1 with a broken stone paving; and the downstream slope is 2 to 1 with a seeded soil top. The spillway is formed by a concrete and masonry weir, or overflow section, 40 ft. long between two wing walls of stone and concrete masonry 3.0 ft wide, 2.8 ft. high and 45 ft. long. The spillway delivery is into the old creek channel. The spillway approach and apron are paved with heavy stone. The intake at this reservoir is a 24-inch cast-iron standpipe with three 12-inch intake gates at different levels, all enclosed in a masonry tower. A "mud pipe," or drain, of 16-inch cast-iron pipe, 230 ft. long extends through the bottom of the dam and terminates in a dry masonry head-wall at the outlet end.

Upper Reservoir. The dam at the Upper Reservoir was built in 1891; it is an earth embankment with puddled core, 612 ft. long with a maximum height of 50.5 ft. and a top width of 15.5 ft. The upstream slope is 2.5 to 1 with 18 inches thickness of stone rip-rap. The downstream slope is 2 to 1 with seeded soil top. The spillway is a masonry weir, or overflow section, 45 ft. long, between wing walls, 2.5 ft. wide, 2.5 ft. high and 48 ft. long. The spillway has a cut-off wall extending 7 to 12 ft. below the flow line. The side walls extend 2.5 to 7.5 ft. below the flow line. The spillway approach channel and downstream apron are paved with heavy stone. This spillway discharges into a by-pass channel which has been dug past both reservoirs and empties into the old creek bed.

In 1914, counterweighted flasboards were installed on the spillway of the Upper Reservoir dam so as to raise the water level 2.5 ft. These boards are of 2" by 8" plank built in two sections. They are lifted by four hand wheels working through racks and pinions from a bridge above the spillway. This bridge is formed by two 8" I-beams with a 4" yellow-pine floor.

The upper intake is a 14-inch cast-iron pipe with a copper basket screen, protected by a masonry chamber which is topped with a frame structure and connected to the dam by a 65 ft. steel bridge with wood floor. A 20 to 36-inch cast-iron "mud pipe," or drain, 220 ft. long, runs under the bottom of the dam from a influent chamber (timber crib 7 x 7 x 4 ft. with a top grill of 3/4 inch iron bars). The outlet end is protected by a 2 x 4 ft. masonry wall.

A 12-inch cast-iron by-pass line about 2,000 ft. long extends from the 36-inch outlet pipe of the Upper Reservoir below the dam, along the south side of the Lower Reservoir and connects into the two 12-inch transmission lines leading to the City. At a point about 150 ft. upstream from the lower dam is a 12-inch cast-iron pipe lateral leading to 15 jet aerator nozzle. Normally water from the Upper Reservoir is discharged through this jet into the lower Reservoir.

A caretaker's two story frame house on rubble stone foundations is located opposite the Upper Reservoir. Adjacent to it is a one-story frame barn and a one-story garage.

Chenango Lake. The outlet dam at Chenango Lake is a block of concrete and masonry across an open cut previously made to supply a mill. Through the block is a 24-inch sleeve with sluice-gate and floor stand. Over this is a timber cover and around it is a steel-wire mesh fence, 7 ft. high. The Chenango Lake outlet consists of a 10 ft. riser of 14-inch cast-iron pipe, topped with a copper basket screen, 6 ft. high. The outflow is controlled on the shore by a 14-inch gate valve in box.

ADEQUACY OF SUPPLY

The Company records show conclusively that over periods of time aggregating several years, the described sources (exclusive of the use of Chenango River water which was used for a short time as an emergency supply) have supplied an average of 2 million gallons per day or more. (In the earlier days the consuption was excessive due to general lack of customers' meters and to the use of inadequately regulated sewer flush tanks.) The supply of 2 million gallons per day or more was maintained in spite of the fact that storage on Ransford Creek amounts to only about 90 million gallons, or 23 million per square mile of drainage area, which is rather low.

However, we have investigated a dam and reservoir site on the south branch of Ransford Creek above the Upper Reservoir. The drainage area is approximately 2 sq. mile, and there appear to be many swamps in the area. At a point about 1400 ft. above the present Upper Dam a dam can be constructed to impound 150 to 200 million gallons of water. With this development, it is estimated that the present sources of supply, as enumerated, will be able to supply an increased consumption at least as great as can be foreseen for a long time in the future.

PURIFICATION WORKS

Filtration Plant. From 1882 to 1905 the supply of water was delivered to customers without purification or treatment. In the latter year, the Company installed four horizontal-tank rapid-sand pressure filters, at the site which has been described as south of New Berlin highway adjacent to the Chenango River and the City. Two additional horizontal-tank rapid-sand pressure filters were added in 1907. The pressure tanks are 8' in diameter by 20' long. The units were made by the New York Continental Jewell Filtration Company and each contains 8 cu. yds. of gravel with 16 cu. yds. of filter sand. The

The secondary buildings at the filtration plant site include the following: (1) Storage barn; 1 story frame structure with ridge roof and gable ends, clap board sides, ruberoid roofing on 1" sheeting. One barn section is 30 by 24 ft. and 20 ft. high to roof peak; a second section is 30 by 18.2 ft. and 17.5 ft. high; a third section is 16 by 16.2 ft. and 14.5 ft. high. (2) Sand Storage Bin; a Ship-lap bin 9 by 20 ft. by 6.3 ft. with ruberoid roof, painted outside. (3) Hydrant & Hose House; 1 story frame structure 6 by 3 by 6.3 ft. and 9 ft. high to roof peak. Has concrete foundation, ruberoid roof and batten door; contains a 6" hydrant with 2 hose nozzles and steamer connections, and 350 ft. of 2-1/2" fire hose and nozzle. (4) There is a gravel drive, 12 ft. wide into the grounds and around the rear. There is 1300 ft. of 3-strand wire fencing on wood posts.

Chemical House at Lower Reservoir. On the south side of the Lower Reservoir near the dam is a chemical feed house. This is a hollow tile building, 16.3 by 24.3 ft. and 14 ft. high to roof peak. The foundation is of concrete and the building has a basement. The roof is of wood frame with asphalt shingles. The house is heated by a cast-iron boiler and 7 wall type radiators. There are 6 electric outlets. There is located here a Wallace & Tiernan automatic chlorinator, Type MAS", with 1" copper delivery piping to the main outlet, and a 500 lb. platform scale. There is also a Wallace & Tiernan dry-feed alum machine driven by a 16-inch water wheel. A chemical feed line of 4-inch cast-iron pipe leads to the outlet below the lower dam.

Farm Drainage Purification. To meet the requirements of the State Department of Health and to prevent farm sewage on the Ransford Creek drainage area from getting into the collected waters, the Company has built and maintains on the Follett, Bixby, Hudson, Skinner, Cooley and Anderson farms, steel septic tanks 38 by 48-ins. each with asphalt cover and an average of 75 ft. of 4-in. tile drain.

MAINS, SERVICES, METERS, HYDRANTS

Transmission Mains. The transmission mains, as so classified by the Company, are shown in the following list, at July 1, 1946.

18"	Pit-Cast Iron Pipe	784	L. Ft.
16"	" " " "	1734	"
14"	" " " "	7002	"
12"	Wrought Iron tar coated	137	"
12"	Pit-Cast Iron Pipe	13106	"
10"	Bell & Socket Cast Iron Pipe	480	"
10"	Pit-Cast Iron Pipe	433	"
8"	Centrifugal Cast Iron Pipe	14	"
6"	Pit-Cast Iron Pipe	15	"
6"	Centrifugal Cast Iron Pipe	50	"
	Total length	23755	"

The following are facts drawn up by Clarence [illegible] to the properties owned by the City of Norwich Water [illegible]

- - - - - -

1881 - Norwich Water Works incorporated January 21, 188[illegible] Board of Trustees of the Village of Norwich granted Franchise to lay and construct necessary pipes in and along village streets.

Water Company purchased lands along Ransford Creek to build and impound waters of this creek, and contract let for building Reservoir No. 1 (Lower) holding about 30,000,000 gallons, and for laying 12" transmission main to Rexford and Silver Streets. The original contract and the Franchise are on file in the Water Office. The record shows that approximately 3,800 feet of this 1881 line were laid in the highway (State Route 23). All riparian rights in the waters of Ransford Creek from the reservoir location to the Chenango River and necessary rights of way for the 12" line were also purchased. A record of these purchases and the deeds are also on file in the Water Office.

1890
1891 Additional lands east of Reservoir No. 1 purchased and Reservoir No. 2 (Upper) constructed to hold approximately 60,000,000 gallons. Original contract on file in the Water Office. Both dams have puddled cores (clay) and working drawings of both are on file in the Water Office. A 12" line is laid from the 36" waste line of the Upper Reservoir, around the south side of the Lower Reservoir from which 1 4" and 3 3" inlets can be used to feed into the Lower Reservoir together with 16 [illegible]

1904 - A second 12" transmission main was constructed to the Village, and this line is interconnected with the first 12" (1881) line so that the city supply can be delivered from either reservoir or both. This new line was reduced to 10" west of the Filter Plant and was laid under the river (as was the 1881 line) and up Gold Street to Silver.

1900 - The Norwich Water Works paid Colonel Edwin Loomis the sum of $15,000.00 to raise the level of Chenango Lake and draw down the waters thereof a maximum of 7'. Contract let to lay intake pipe and outlet line (including 750' of 4' rockcut tunnel) in Towns of New Berlin and North Norwich to the headwaters of Ransford Creek. Rights were also purchased from other lake front owners to raise lake level and rights of way to lay outlet line.

1919 - Sale (on mortgage foreclosure) by National Bank & Trust Co. of Norwich to the Norwich Water Works of all the lands in Town of New Berlin owned by late Colonel Loomis including approximately 111 acres of the 135 acres total surface of Chenango Lake.

The standing timber on the Loomis Lands sold to Sol Cornelius. Cottage lots surveyed and mapped on east, south and west sides of lake.

1905
1906 Filter Plant land purchased in 1904 and Filter Plant built with four units installed in 1905 and two in 1906 - each with a filtering capacity of 500,000 gallons per day. Chemical treatment begun using solution of alumina sulphate for clarifying and hypochlorite of lime solution for purification with laboratory control under the direction of

PREVIOUS INSPECTION REPORTS

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

Norwich Res #1

Dam Number	River Basin	Town	County	Hazard Class*	Date & Inspector
620	Susq.	Norwich	Chenango	BT	4/16/75 KDH GUE

Type of Construction

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

Use

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

Estimated Impoundment Size

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

Estimated Height of Dam above Streambed

- [ ] Under 10 feet
- [ ] 10-25 feet
- [x] Over 25 feet

Condition of Spillway

- [x] Service satisfactory
- [ ] In need of repair or maintenance
- [x] Auxiliary satisfactory
- [ ] In need of repair or maintenance

Explain: _____

Condition of Non-Overflow Section

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

Condition of Mechanical Equipment

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

Evaluation (From Visual Inspection)

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

*Explain Hazard Class, if Necessary _____

APPENDIX E

REFERENCES

REFERENCES

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

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

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

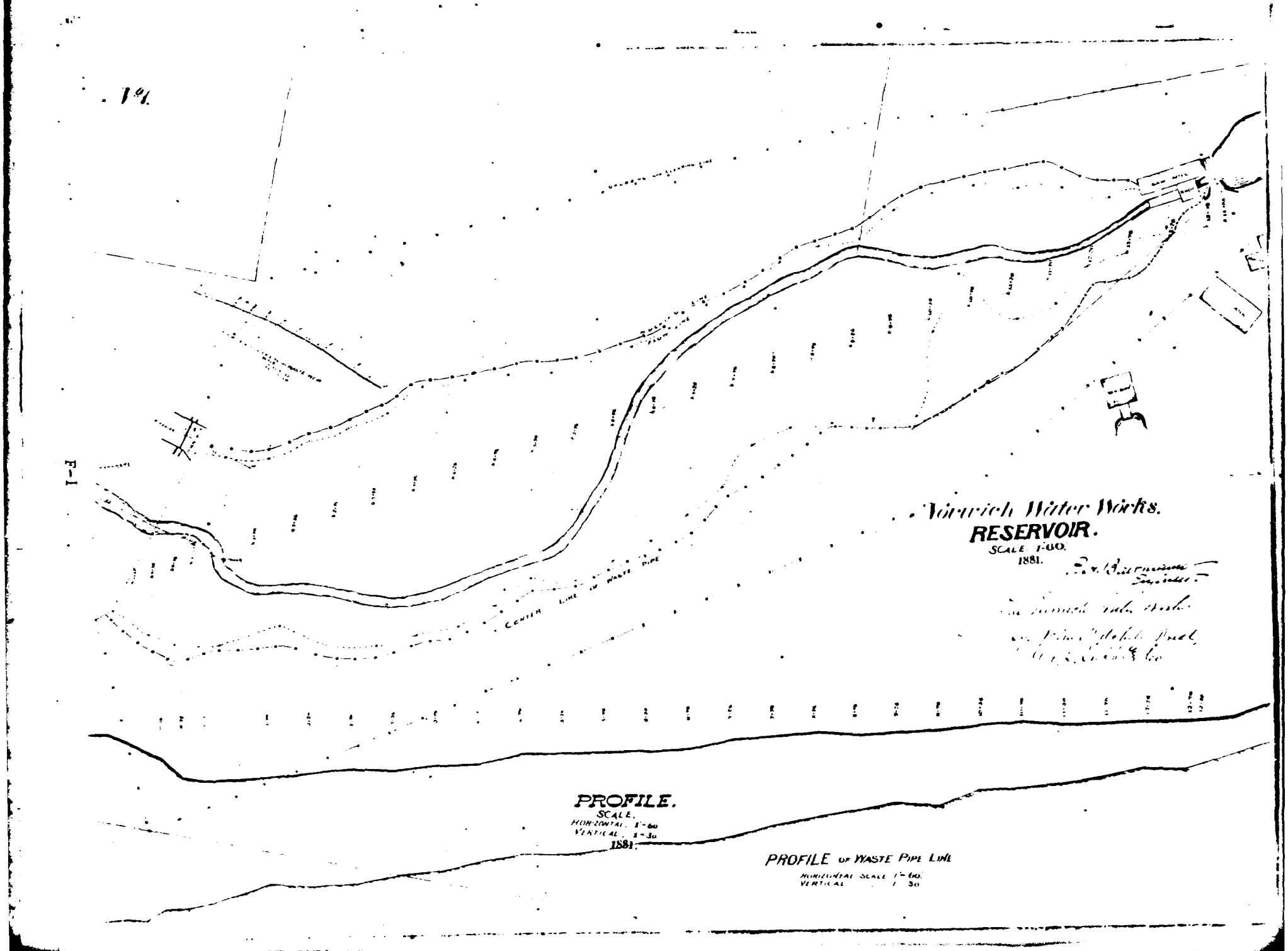
4. King, Horace and Brater, Ernest. Handbook of Hydraulics, 5th Edition. McGraw-Hill Book Company, New York, New York, 1963.

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

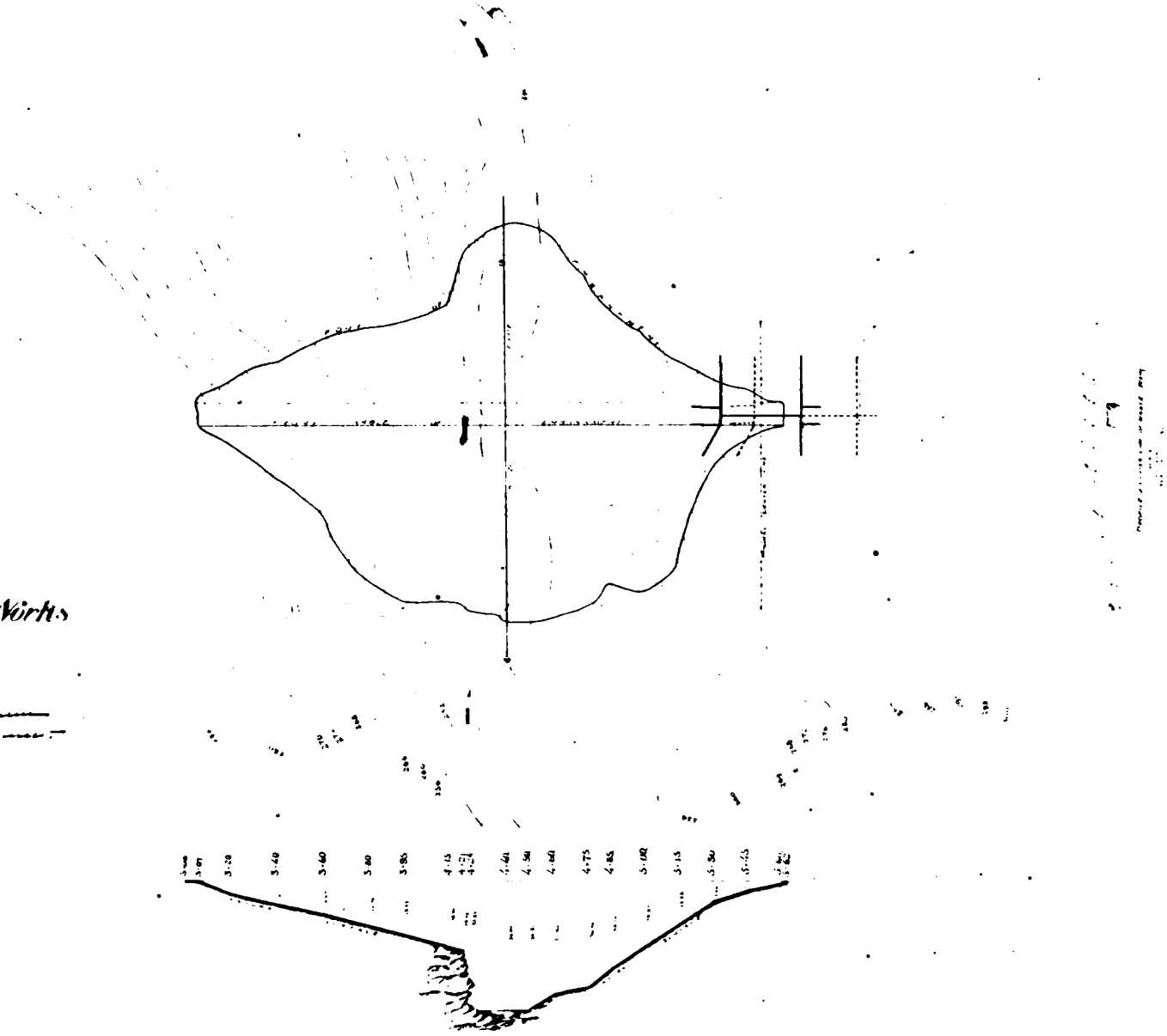
6. U.S. Department of the Interior, Bureau of Reclamation, Design of Small Dams, Second Edition, Washington, D.C., 1973.

APPENDIX F

DRAWINGS


Yonkers Water Works.
RESERVOIR.
SCALE 1-60.
1881.
PROFILE.
SCALE.
HORIZONTAL 1-60
VERTICAL 1-30
1881.
PROFILE OF WASTE PIPE LINE
HORIZONTAL SCALE 1-60.
VERTICAL 1-30
CENTER LINE OF WASTE PIPE
F-1

No. 2.



Norwich Water Works
RESERVOIR.
SCALE:-1-30.
1881.

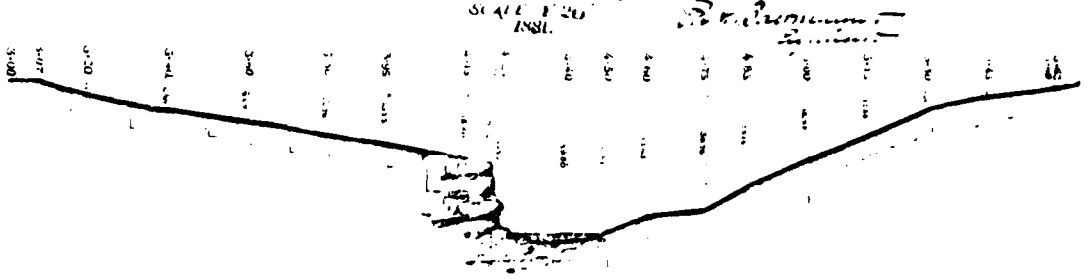
The Norwich Water Works
By [illegible]

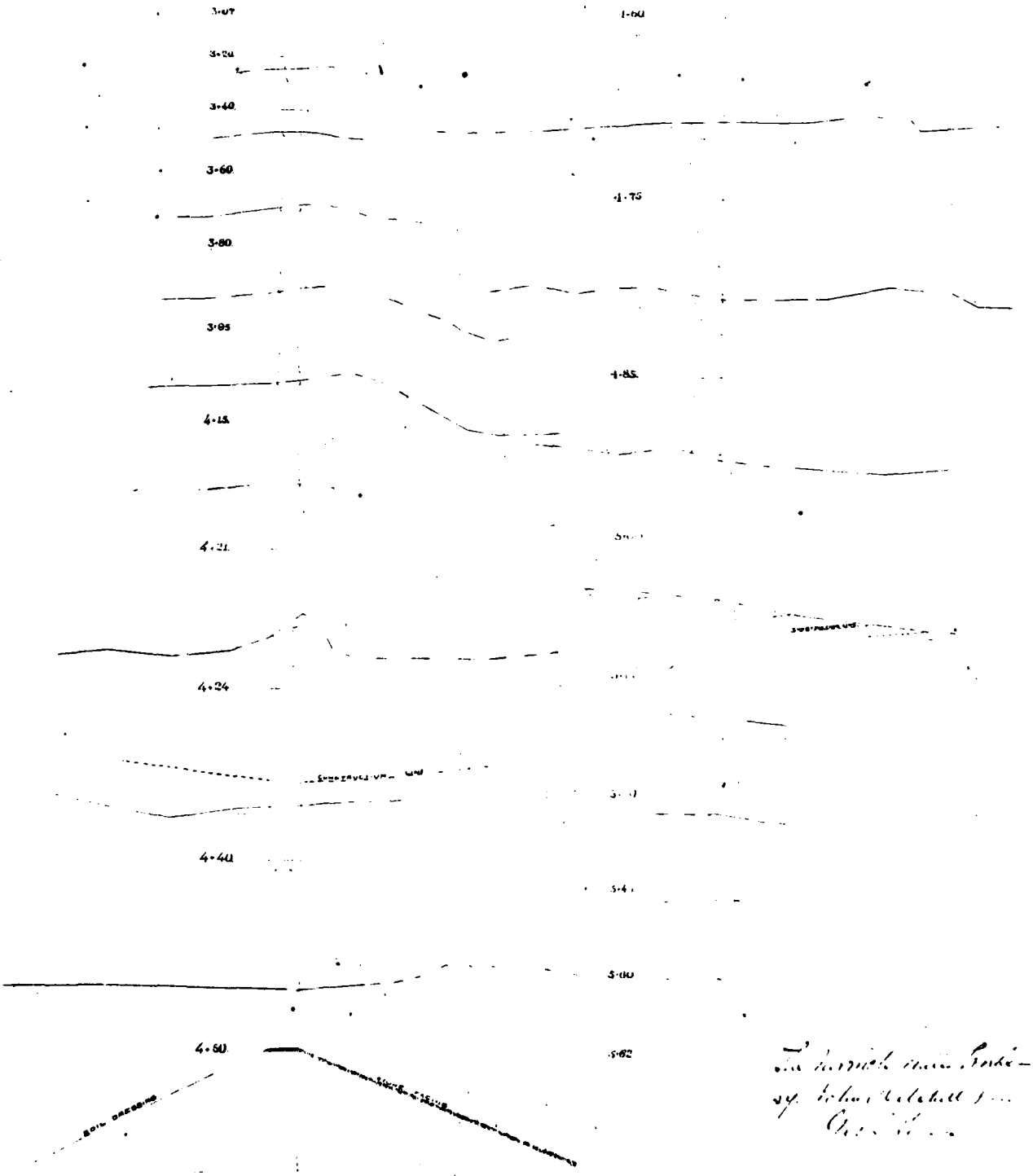
Profile of Front Angle of Bank.

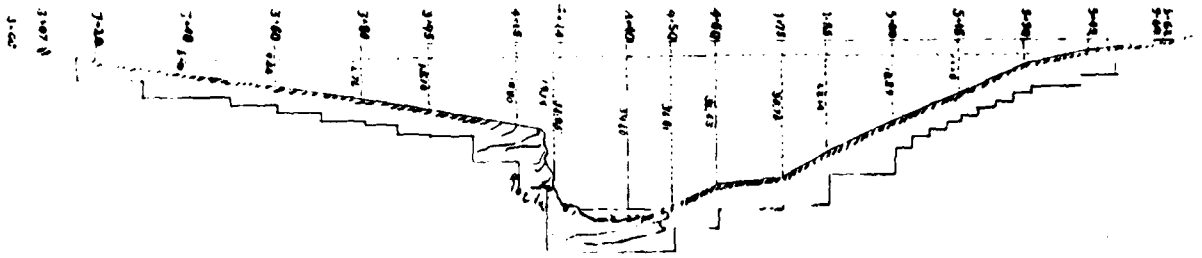
No 5.

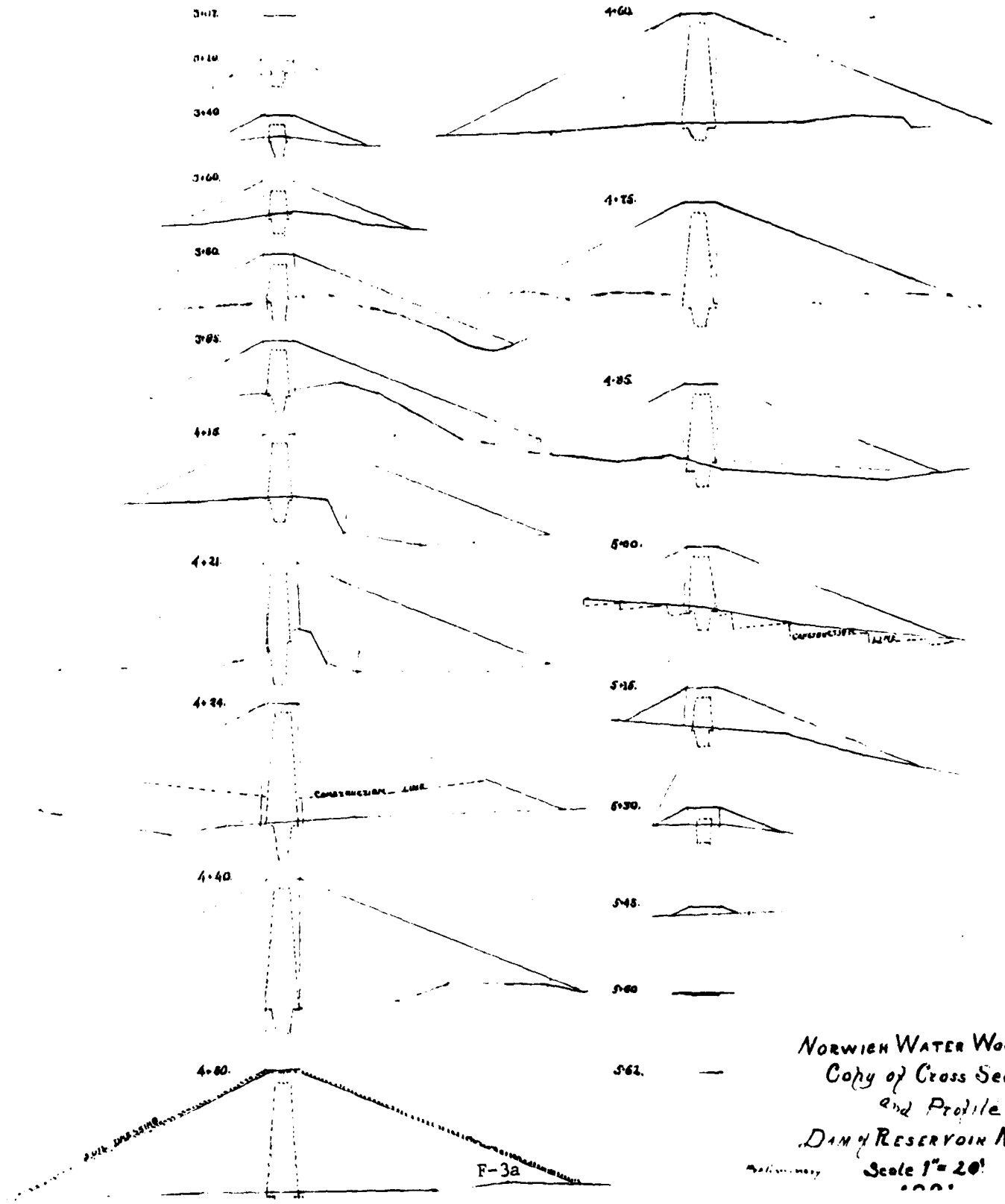
Berwick Water Works.

RESERVOIR.





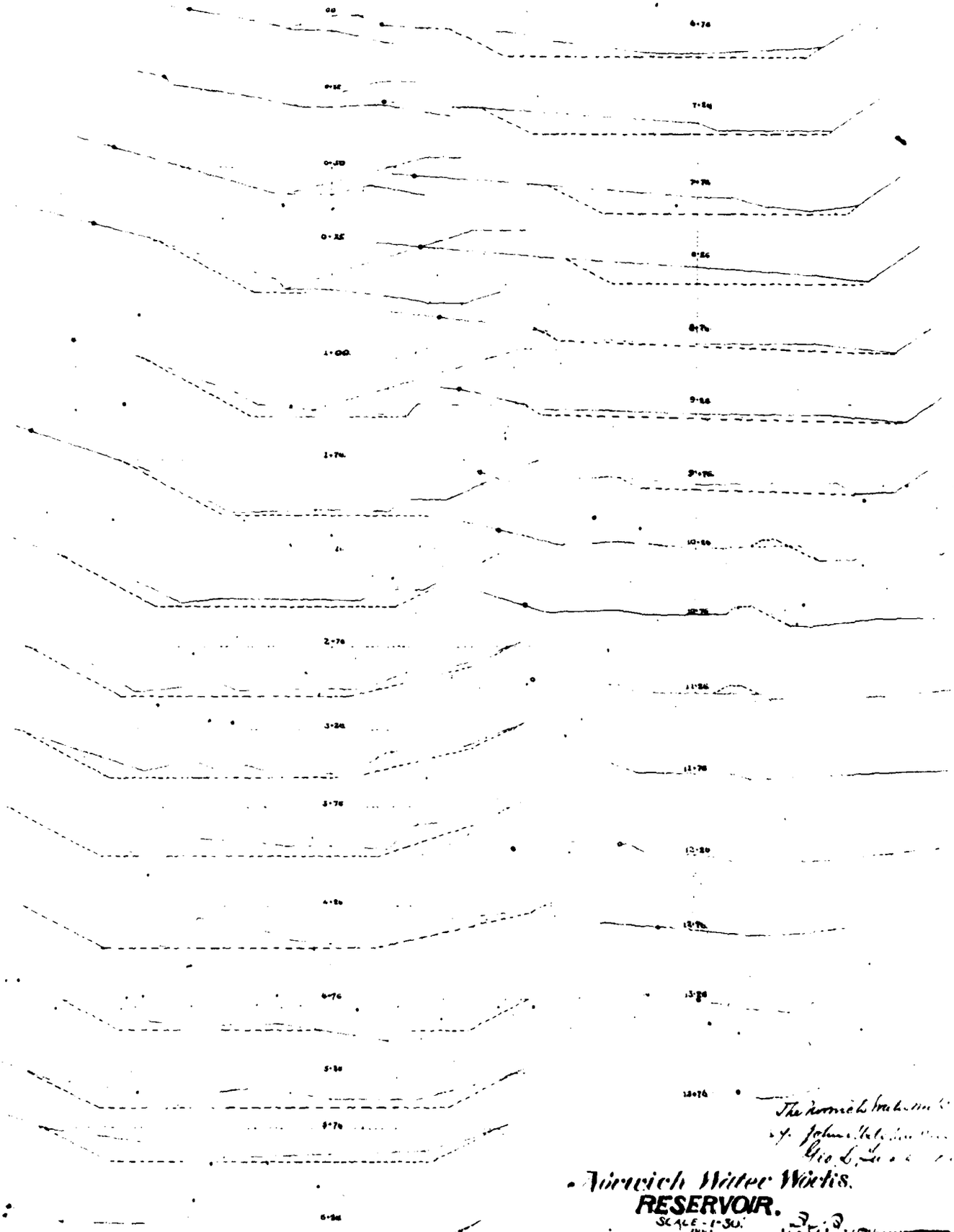




NORWICH WATER WORKS.
Copy of Cross Section
and Profile of
DAM & RESERVOIR No. 1
Scale 1" = 20'

F-3a

No 4.

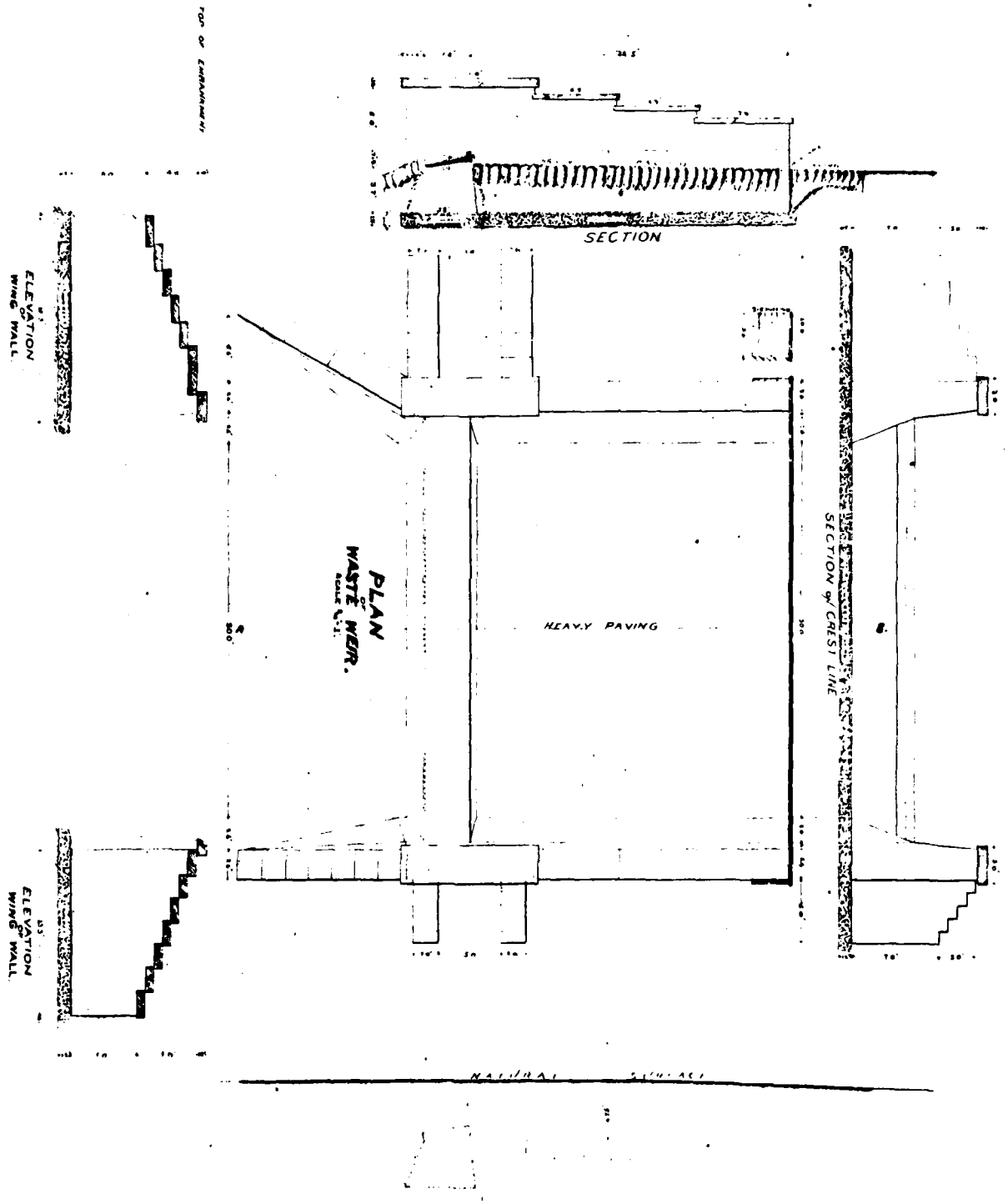


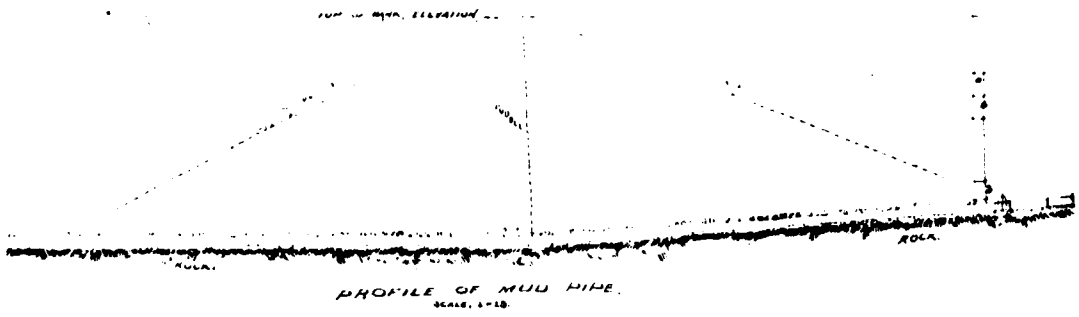
Norwich Water Works.
RESERVOIR.
SCALE - 1-30.
1881.

F-4

No. 5.

Norwich Water Works.
RESERVOIR
1881.

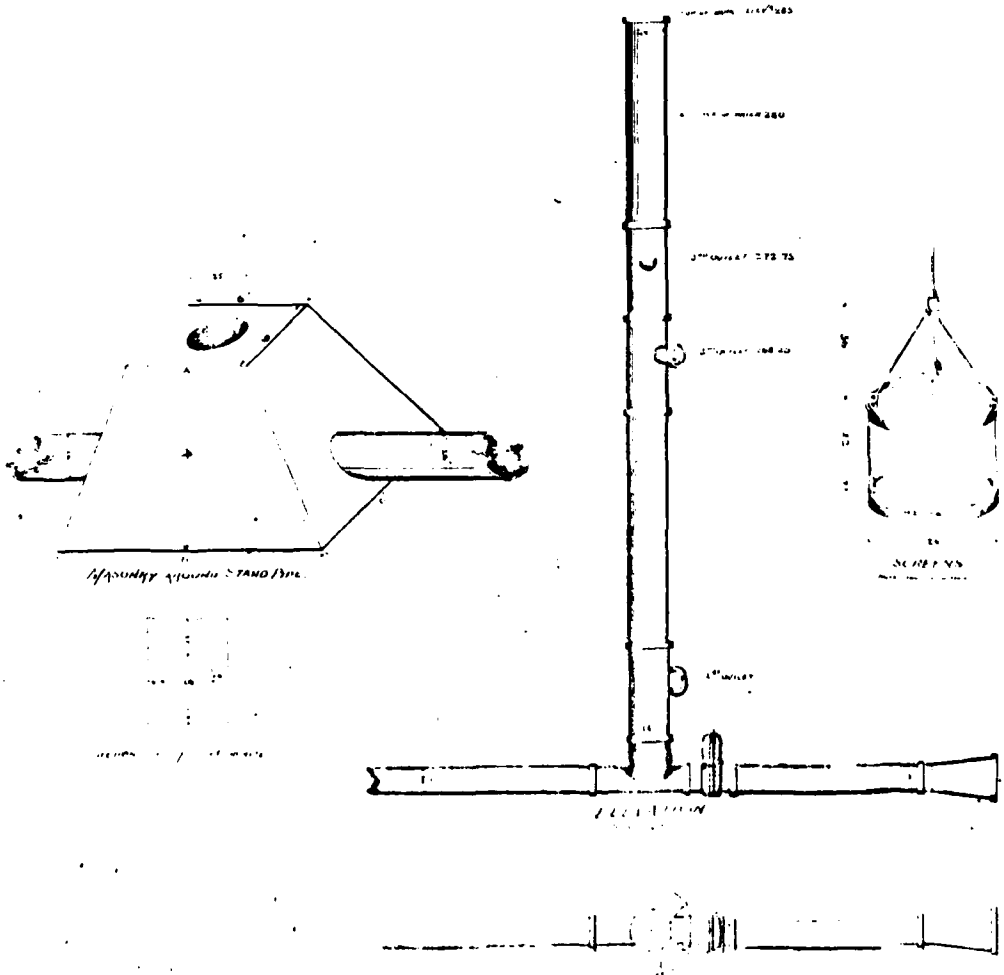


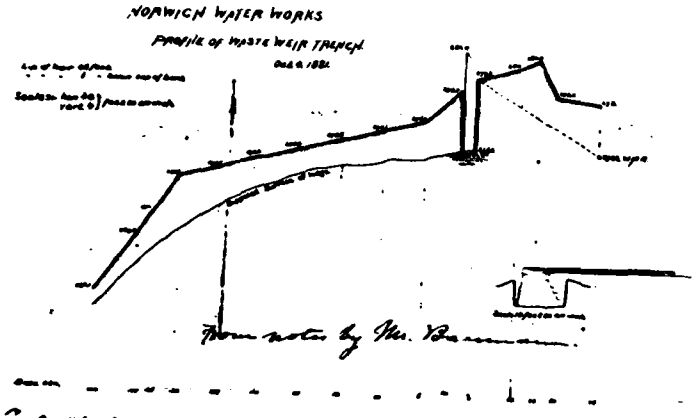


PROFILE OF MUD PIPE.

Berwick Water Works.

RESERVOIR.





The modification herein contemplated are adopted by the Norwich Water Works and the Chief Engr. is directed to have the work constructed in accordance therewith.

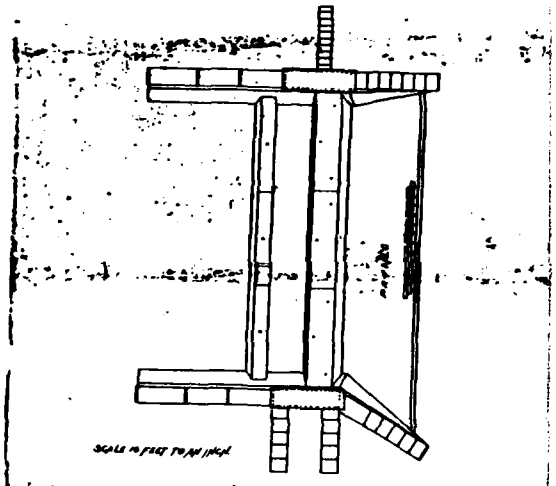
John Mitchell Pres't N.W.W.

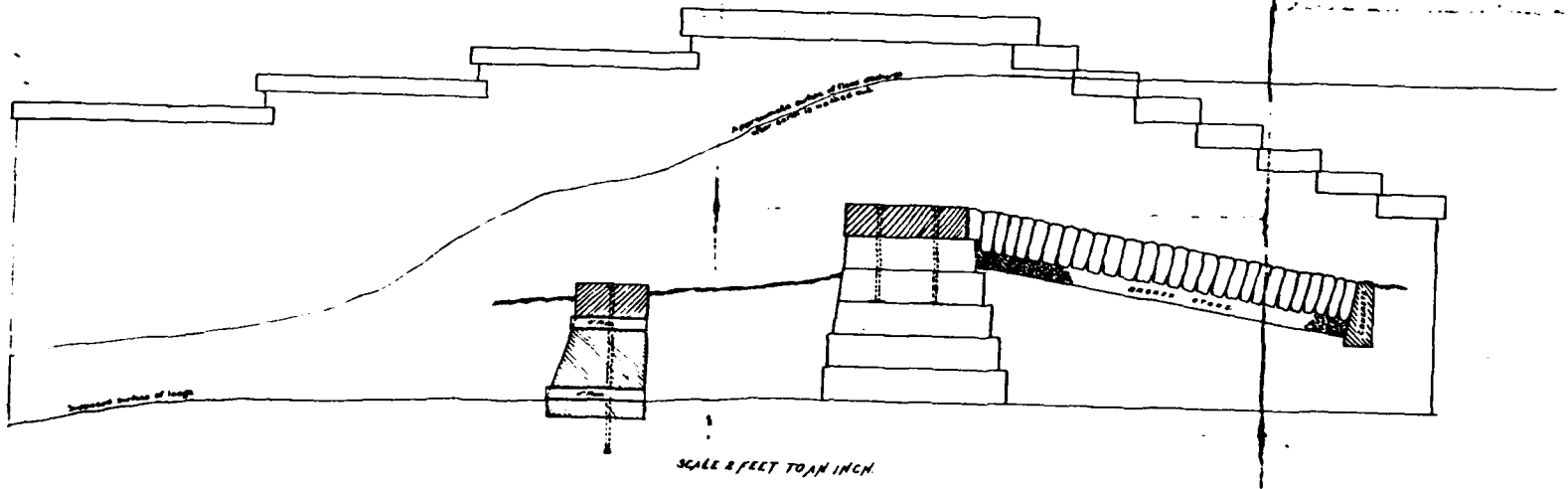
NORWICH WATER WORKS.

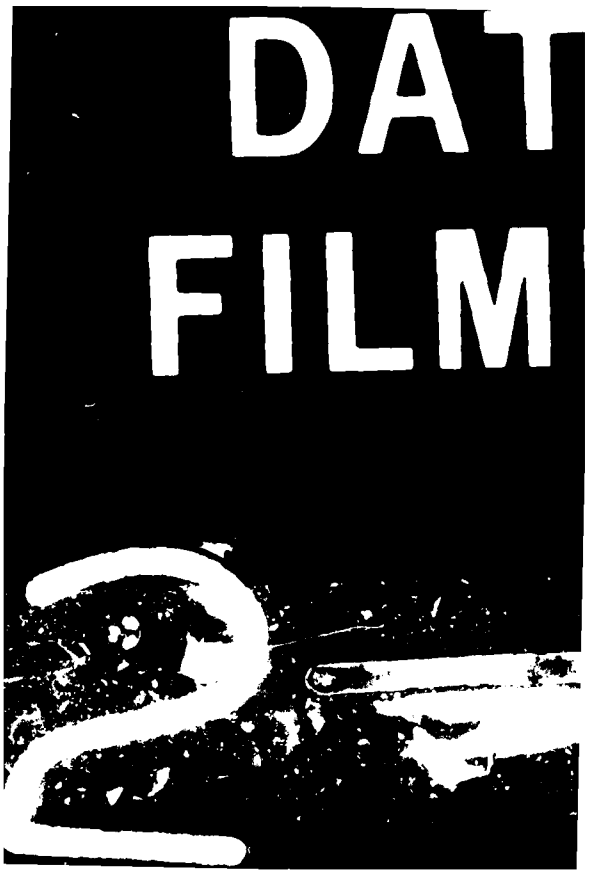
PLAN OF WASTE WEIR.

OCT. 1881

A rubble, faced, wall should be laid on the south side of the waste trench from the end of the wing wall to the side of the creek. It should be 3½ feet wide at the bottom, 2½ feet wide at the top, founded on the ledge and rise three feet above the graded bottom of the trench as represented on profile herewith.






DAT
FILM