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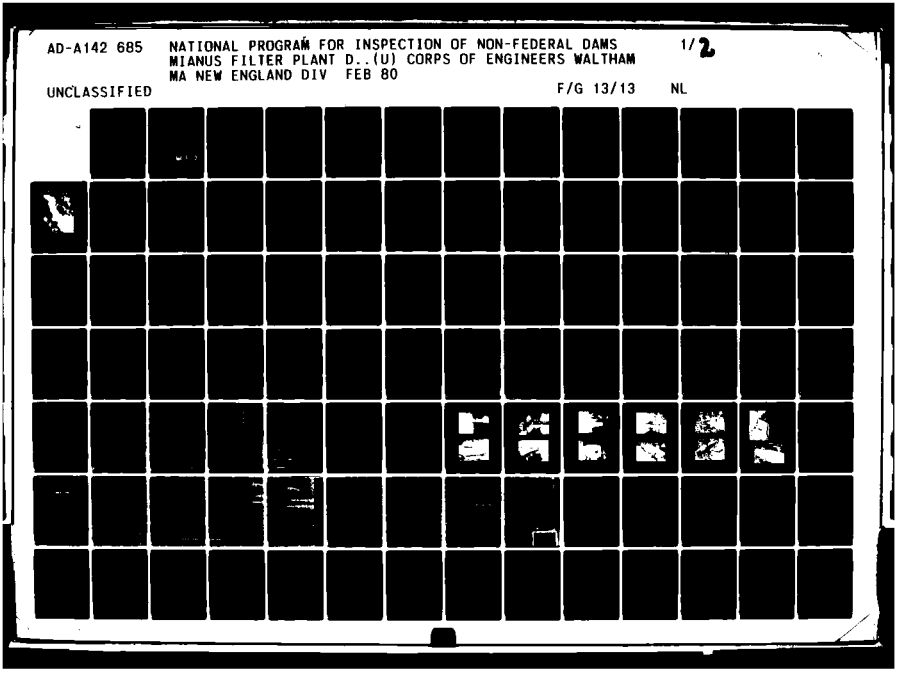

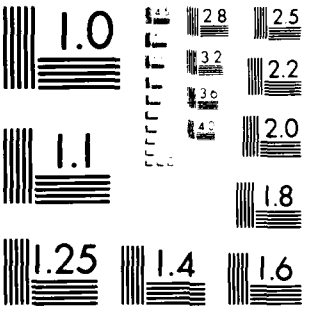

SOUTHWESTERN COASTAL BASIN
GREENWICH, CONNECTICUT

MIANUS FILTER PLANT DAM
CT 00040

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

FEBRUARY, 1980

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

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

DAMS, INSPECTION, DAM SAFETY,

Southwestern Coastal Basin,
Greenwich, Conn.
Mianus Filter Plant Dam

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

The dam at the Mianus Filter Plant is a stone masonry dam built in the 1870's and is a source of water supply for the surrounding area. The water treatment facility was renovated in 1954. The dam is approx. 130 ft. long, 31 ft. hgih and has a top width of 7 ft. The outlet works for the dam consist of a 65 ft. long spillway, a 30 inch supply main to the water treatment facility, a low level blowoff, and two 4 ft. wide by 5 ft. hgih flood control gates.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF
NEDED

MAR 21 1980

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

Inclosed is a copy of the Mianus Filter Plant Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Connecticut American Water Company, Greenwich, Connecticut.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

SOUTHWESTERN COASTAL BASIN

GREENWICH, CONNECTICUT

MIANUS FILTER PLANT DAM

CT 00040

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

Identification No.:	CT 00040
Name of Dam:	Mianus Filter Plant Dam
Town:	Greenwich, Connecticut
County and State:	Fairfield County, Connecticut
Stream:	Mianus River
Date of Inspection:	November 13, 1979

BRIEF ASSESSMENT

The dam at the Mianus Filter Plant is a stone masonry dam built in the 1870s and is a source of water supply for the surrounding area. The water treatment facility was renovated in 1954. The dam is approximately 130 feet long, 31 feet high and has a top width of 7 feet. The outlet works for the dam consist of a 65 foot long spillway, a 30 inch supply main to the water treatment facility, a low level blowoff, and two 4 foot wide by 5 foot high flood control gates.

Based on the visual inspection, the review of the 1954 renovation plans and past operational performance, the dam is judged to be in FAIR condition. However, there is a concern about the seepage zone at the downstream face of the dam, which requires further study.

The dam is classified as SMALL in size and a HIGH hazard potential structure in accordance with recommended guidelines established by the Corps of Engineers. The test flood for this dam is 1/2 the Probable Maximum Flood (PMF). The test flood has an outflow discharge equal to 14100 cfs and will overtop the dam in a stillwater condition. The maximum outflow capacity of the spillway under stillwater condition is 680 cfs which represents approximately 5 percent of the test flood.

It is recommended that the owner take the following actions: Monitor the seepage on the downstream face, remove the trees from the upstream channel bed and develop and implement a formal emergency warning system.

Recommendations and remedial measures that should be implemented by the Owner within one year period after receipt of this Phase I Inspection Report, are further described in Section 7.

JAMES P. PURCELL ASSOCIATES, INC.

Sudhir A. Shah

Sudhir A. Shah, P.E.
Vice-President
Connecticut P.E. No. 8012

This Phase I Inspection Report on Mianus Filter Plant Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. DiBuono

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, CHAIRMAN
Foundation & Materials Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

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 continued care and inspection can there by any chance that unsafe conditions be detected.

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

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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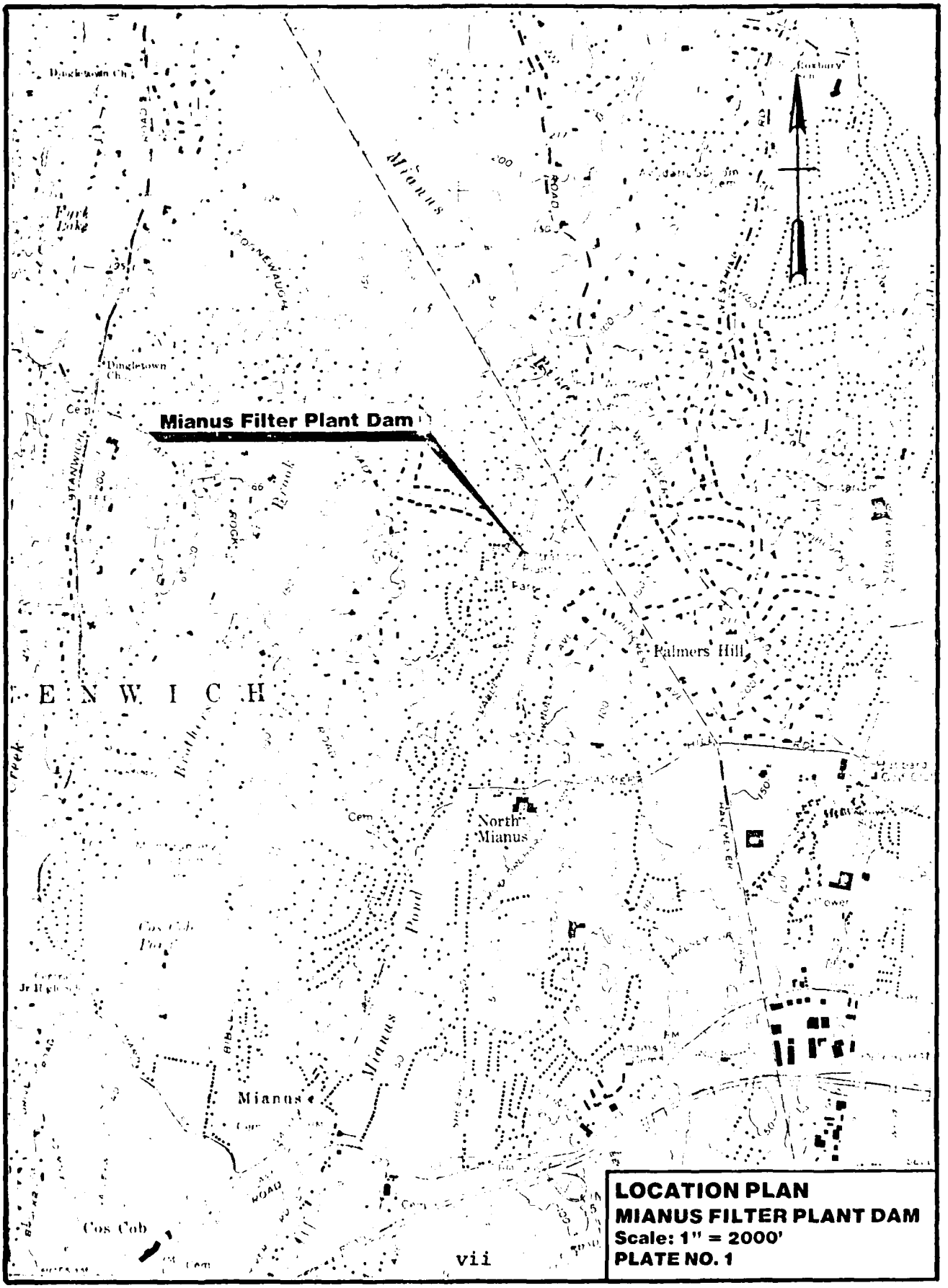


LOCATION PLAN
MIANUS FILTER PLANT DAM
Scale: 1" = 2000'
PLATE NO. 1

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

NAME OF DAM: MIANUS FILTER PLANT DAM

SECTION 1

PROJECT INFORMATION

1.1 General

a. **Authority:** Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. James P. Purcell Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to James P. Purcell Associates, Inc., under a letter from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0002 has been assigned by the Corps of Engineers for this work.

b. **Purpose of Inspection**

1. Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

2. Encourage and prepare the States to initiate quickly, effective dam safety programs for non-Federal dams.

3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. **Location:** Mianus Filter Plant Dam is located in Fairfield County, Connecticut, approximately 0.8 miles north of North Mianus, Connecticut. The dam impounds water from the Mianus River and is located approximately 4000 feet upstream of Mianus Pond and the Village of North Mianus.

The impoundment is situated in a north/south direction, with the dam located at the southern end. Latitude 41° -04'-06", longitude 73° -34'-42".

All elevations used in this report are based on the Greenwich Water Company Datum (GWCD) unless noted. The datum is 7.29 feet above the U. S. Coast and Geodetic Survey mean low water datum.

b. **Description of Dam and Appurtenances:** This dam impounds water from the Mianus River which is processed through the filtration plant and distributed to many customers in the surrounding area. The dam itself consists of stone masonry body and was believed to have been built approximately 100 years ago.

The outlet works for the dam consist of the following: A 30 inch pipe, controlled by a lift mechanism on the dam's west crest, for water supply to the filters; a low level blowoff controlled by a lift mechanism on the dam's west crest; two high level flood gates on the dam's east crest; and a 65 foot spillway.

The dam creates a narrow impoundment by flooding a portion of the natural valley of the Mianus River.

c. **Size Classification:** The size classification of this dam is SMALL as per the criteria set forth in Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers. The impoundment storage at the top of the dam is 118 ac-ft (with the range 50 to 1000 ac-ft), and the maximum height of the dam is 31 feet (within the range 25 to 40 feet). The size classification is based on both the height and storage criteria.

d. **Hazard Classification:** The hazard classification of this dam is HIGH as per the criteria set forth in Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers. Failure discharge can result in the loss of more than a few lives, and cause damage to residential structures along the downstream channel; and loss of the water supply would impose hardships on the service area. The estimated water depth due to a dam failure may range from 9.0 feet at the dam to 4.5 feet at Mianus Pond.

e. **Ownership:** This dam is owned and operated by the Connecticut American Water Company.

f. **Operator:** The person in charge of the day-to-day maintenance of the dam as well as the adjacent water treatment plant is:

Mr. William McCormick, Superintendent
Connecticut American Water Company
125 East Putnam Avenue
Greenwich, Connecticut 06830
Tel. (203) 869-5200
(203) 661-7200

g. **Purpose:** This dam impounds water from the Mianus River that is used to supply drinking water to approximately 13,000 customers in the surrounding area.

h. **Design and Construction History:** The original dam was built in the 1870s. However, there are no documents available to support either the design or construction. In the 1950s when the filter plant was renovated, modifications to the blowoff system and intake piping were made, and this involved some construction to the body of the dam. It is not clear just what work was done to the dam body to make these renovations. During this renovation period the retaining walls along the downstream channel were built to accommodate the new plant facility.

i. **Normal Operational Procedure:** The operating procedure for controlling the water level of the dam's pond is governed primarily by the water supply demands of the treatment plant. The emergency blowoff valves and flood gates are rarely used, because in the case of a storm emergency the gates would handle such a relatively small amount of the flow. An agreement with adjacent property owners requires a flow of one MGD to be discharged downstream and, therefore, a 4 inch gate valve at the flood gates is maintained in an open position.

1.3 Pertinent Data

a. **Drainage Area:** Mianus Filter Plant Dam is located in Fairfield County, Connecticut. The dam lies just north of North Mianus, approximately 0.8 miles. The basin is generally rectangular in shape with a length of 11.9 miles and an average width of 4 miles, resulting in a total drainage area of 29.9 square miles. (See Drainage Basin Map in Appendix D). The topography is generally rolling to moderate terrain, with elevations ranging from a high of 810 to 69.65 at the spillway crest. Stream and basin slopes are flat to moderate, having average grades of 0.5 percent to 2.0 percent, respectively. The normal water surface area is 7.2 acres which is approximately 0.04 percent of the watershed.

b. **Discharge at Dam Site:** Daily spillway discharge records are available from the Connecticut American Water Company. Listed below are calculated discharge values for the spillway and outlet works.

1. Outlet Works: A low level blowoff with an intake approximately at elevation 44.5 and a discharge capacity of 74 cfs at an elevation of 69.65, the spillway crest. Twin 4 foot wide by 5 foot high flood gates with an invert at elevation 65.15 and a discharge capacity of 206 cfs with water at the spillway crest level.

2. Maximum known flood at dam site: Recorded on June 19, 1972 to be in excess of 310 cfs (upper limit of flow recorder).

3. Spillway capacity at top of dam: 680 cfs at elevation 72.15 (east side).

4. Spillway capacity at test flood: 7650 cfs at elevation 82.2.

5. Gated outlet capacity at normal pool elevation: 74 cfs (blowoff) and 206 cfs (flood gates) at elevation 69.65.

6. Gated outlet capacity at test flood elevation: 92 cfs (blowoff) and 850 cfs (flood gates) at elevation 82.20.

7. Gated outlet capacity at top of dam elevation: 80 cfs (blowoff) and 410 (flood gates) at elevation 72.15.

8. Total project discharge at top of dam: 1,170 cfs at elevation 72.15 (east side).

9. Total project discharge at test flood elevation: 8590 cfs at elevation 82.20

c. **Elevation** (Feet above GWCD)

1.	Streambed at toe of dam	41.6
2.	Bottom of cutoff	Unknown
3.	Maximum tailwater	Unknown
4.	Recreation pool	N/A
5.	Full flood control pool	N/A
6.	Spillway crest	69.65
7.	Design surcharge (Original Design)	Unknown

8.	Top of dam	72.15 east, 74.70 west
9.	Test flood level	82.20

d. **Reservoir** (Length in feet)

1.	Normal pool	1000
2.	Flood control pool	N/A
3.	Spillway crest pool	1000
4.	Top of dam	1000
5.	Test flood pool	2500

e. **Storage** (acre-feet)

1.	Normal pool	101
2.	Flood control pool	N/A
3.	Spillway crest pool	101
4.	Top of dam	118
5.	Test flood pool	419

f. **Reservoir Surface** (acres)

1.	Normal pool	7.2
2.	Flood control pool	N/A
3.	Spillway crest	7.2
4.	Test flood pool	60+
5.	Top of dam	7.6

g. **Dam**

1.	Type	Stone masonry

2.	Length	130 feet
3.	Height	28 feet at spillway
4.	Top Width	7 feet
5.	Side Slopes	Upstream: 1H:10V Downstream: 1H:10V
6.	Zoning	Unknown
7.	Impervious Core	Unknown
8.	Cutoff	Unknown
9.	Grout curtain	Unknown
10.	Other	Concrete weir located downstream

h. ***Diversion and Regulating Tunnel*** N/A

i. **Spillway**

1.	Type	Overflow, broad crested, uncontrolled weir
2.	Length of weir	65 feet
3.	Crest elevation	69.65
4.	Gates	None
5.	U/S Channel	Natural Bed
6.	D/S Channel	Stone retaining wall on right side extending 500 ft. downstream of dam. Channel and left bank are natural.

j. **Regulating Outlets:** Refer to Paragraph 1.2b "Description of Dam and Appurtenances" for description of outlet works.

1. 30 inch cast iron supply main, intake at elevation 49.75, sluice gate controlled by lift mechanism on top of dam.

2. Low level blowoff, intake at elevation 44.5, 24 inch sluice gate controlled by lift mechanism on top of dam.

3. Two 4 foot wide by 5 foot high flood gates, intakes at elevation 65.15, controlled by lift mechanisms on top of dam.

SECTION 2

ENGINEERING DATA

2.1 Design

There is no formal design data available for the dam both in terms of stability analysis or spillway capacity. Available design data consists of plans of the 1954 renovations to the sluice gates and water treatment facilities.

2.2 Construction

The years of construction appear to have been in the 1870s, although the exact date is unknown. Review of the contract plans for the 1954 renovation showed that the modifications to the body of the dam appear to be limited to the supply pipes and flood gates. The retaining walls in the downstream channel were also repaired. However, no records or photographs were available of this work.

2.3 Operation

The operation of the dam is for the purpose of water supply, and, therefore, the water level for this dam is established on the basis of the water supply demand. However, there is no written procedure that has been established for this purpose.

2.4 Evaluation

a. **Availability:** The information concerning this dam was gathered only by field investigation and meetings with officials of the Connecticut American Water Company.

b. **Adequacy:** The lack of in depth engineering did not allow a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on the visual inspection, the dam's past performance, and sound engineering judgment.

c. **Validity:** The validity of the limited information available must be verified.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. **General:** The visual inspection was conducted on November 13, 1979 and a copy of the visual inspection check list is contained in Appendix A of this report. The following procedure was used:

1. Inspection of the upstream area of the river which was impounded by the dam.

2. Visual survey of the face of the dam and spillway for cracks, loose stones, etc.

3. Review of the condition of the top of the dam for cracking, spalling or loose stones.

4. Survey of the process used by the water treatment plant as well as emergency procedures that could be used.

5. Check of the downstream area for seepage, piping, boils, or other distressed areas.

6. Photographs of the general area of the dam and of specific items of note were taken during the inspection, and are contained in Appendix C of this report.

Before the inspection, the design and construction documents and aerial photographs were studied and reviewed.

b. **Dam**

1. Crest: The top of the dam is constructed of granite stone and shows no evidence of settlement or misalignment. Grass is growing from joints on the east side. A concrete capped stone block platform, just upstream of the dam's west crest supports the lift mechanisms for the supply main and the blowoff (Photo C-7).

2. Upstream Slope: The upstream slope is stone masonry with a nearly vertical face above the water level. The joints are in a deteriorated condition. The flood gates are on the upstream face on the east side of the dam (Photo C-5).

3. Downstream Slope: The downstream slope is also stone masonry with a nearly vertical face. There are numerous places where seepage is steady on the face of each abutment (Photos C-8, 9). The condition of the joints is quite poor (Photo C-9) and one joint on the west abutment has a void which measures 18 inches deep (Photo C-10). A few loose stones were noted on the east abutment and grass was growing from some of the joints. The fill on the downstream face of the west abutment seemed to be quite moist, indicating that seepage occurs below grade as well as above.

c. **Appurtenant Structures**

1. Spillway: The spillway for the dam is a 65 foot long stone capped weir with a free drop of approximately 28 feet to the tailwater (Photos C-2, 4). The water level on the day of inspection was 30 inches below the east top of the dam and water was flowing over the spillway. The spillway appears to be in generally good condition.

2. 30 Inch Supply Main: This pipe extends from a sluice gate inlet below the west top of the dam to the filters located downstream on the west bank. The lift mechanism, located on the dam's west crest is reportedly operable (Photo C-7). A 20 inch and a 6 inch blowoff to the river (Photo 12) is located off the 30 inch pipe in a covered valve chamber on the west bank downstream of the dam. The valves for the blowoffs are hydraulically controlled from inside the filter plant building but have not been operated for at least 6 years. Steady flow (5-10 GPM) from the ground to the floor of the valve chamber was noted. This reportedly has been constant since before the 1954 renovations.

3. Low Level Blowoff: The blowoff is controlled by a 24 inch sluice gate below the dam's west crest and is operated by a lift mechanism on the top of the dam (Photo C-7). The conduit extends through the base of the dam to a 4 foot square opening in the face of the dam at the tailwater level. It was last operated in the summer of 1979.

4. Twin Flood Gates: Two flood gates are located below the dam's east crest at a shallow level (Photos C-5, 6). They are controlled by lift mechanisms on the top of the dam and appear in good condition. A 4 inch gate valve at the base of the flood gates is maintained in an open condition as per an agreement with adjacent homeowners. A natural, rock discharge channel rejoins the Mianus River just downstream of the dam.

d. **Reservoir Area:** The dam creates an impoundment extending upstream in the natural riverbed. The upstream sides of the river seemed to be in a natural state

with no visible signs of erosion or sloughing. There were two trees in the riverbed that the maintenance personnel are trying to have removed, but some difficulty was noted (Photo C-1). Concern was expressed that during a heavy storm these trees could be a problem.

No geologic features were detected that could be expected to adversely affect the dam or appurtenant structures.

Trespassing on the dam is not permitted and the proximity of personnel in the adjacent filter plant building reduces the potential for trespassing.

e. **Downstream Channel:** The spillway and downstream channel retaining walls appear to be founded on bedrock and are generally in fair condition (Photo 11). Some trees overhang the west side of the channel and access to this side is difficult. There is a metering weir about 440 feet downstream of the spillway which appears to be in good condition. On the right side of the spillway channel just below the face of the dam there are some holes behind the retaining walls noted. The cause is unknown; however, it appeared to be related to erosion.

3.2 Evaluation

Based on the visual inspection, the Mianus Filter Plant Dam appears to be in fair condition and there are specific areas of concern that should be addressed:

The leakage on the downstream face and slope.

The missing mortar and holes on the faces of the dam.

The trees in the upstream channel bed.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. **General:** The responsibility for the operation and maintenance of this facility is with the Connecticut American Water Company. The maintenance staff is headquartered at the water treatment facility which is adjacent to the dam site. These staff personnel operate and maintain the valves and equipment for the water treatment facility. Operation of the valves is in general for the sole purpose of regulating the water supply to the plant. No written procedure is available for emergency operation of the blowoff system, but one is now being written. The last time the hydraulic 20 inch blowoff to the 30 inch supply main was opened was 6 to 10 years ago.

b. **Description of Any Warning System in Effect:** There is no warning system in effect.

4.2 Maintenance Procedures

a. **General:** The maintenance of the dam is centered around those valves and sluice gates that supply water to the filtration plant. The downstream face of the dam has recently been cleared of vegetation. The water has never been drawn down so that the upstream face of the spillway could be inspected or repaired.

b. **Operating Facilities:** The operation facilities consist of two flood gates on the left abutment, one low level blowoff, and one sluice gate which controls the raw water to the filtration plant.

4.3 Evaluation

The operation and maintenance of this dam could be oriented so that it more directly deals with the emergency procedure to be followed in case of a heavy storm.

SECTION 5

EVALUATION OF HYDRAULICS/HYDROLOGIC FEATURES

5.1 General

The Mianus Filter Plant Dam, built across the Mianus River, creates a narrow impoundment with a total storage capacity of 101 ac.-ft. at elevation 69.65, the spillway crest. Each foot of depth in the pond above the spillway crest can accommodate approximately 7.5 ac.-ft. The spillway is a 65 foot long by 7 foot wide broad crested weir. Stream and basin slopes are flat to moderate having average grades of 0.5 percent to 2.0 percent.

5.2 Design Data

a. No specific design data is available for this watershed or the structures of the Mianus Filter Plant Dam. In lieu of existing design information, U.S.G.S. Topographic Maps (Scale 1" = 2000') were utilized to develop hydrologic parameters such as drainage areas, reservoir surface areas, basin lengths, time of concentration and other runoff characteristics. Elevation - storage relationships for the reservoir were approximated. Surcharge storage was computed using the U.S.G.S. maps. Some of the pertinent hydraulic design data was obtained and/or confirmed by actual field measurements at the time of the visual field inspection.

b. Outflow values (routing procedures) and dam overtopping analysis were computed in accordance with the guidelines developed by the Corps of Engineers. Judgment was used in calculating final values outlined in this report, which are quite approximate and should not be considered a substitute for actual detailed analysis.

5.3 Experience Data

Historical Data for recorded discharges is limited and consists of records obtained since 1955 from a small measurement weir 440 feet downstream of the dam. The recent maximum discharge occurred on June 19, 1972 when the flow was in excess of 310 cfs (200 MGD), the upper range of the flow recorder.

5.4 Test Flood Analysis

Recommended guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for the selection of the "Test Flood". This dam is classified as

a HIGH hazard and SMALL size structure. Guidelines indicate that 1/2 to 1 times Probable Maximum Flood (PMF) be used as the test flood for these classifications. A test flood of 1/2 PMF was chosen because the dam's height and impoundment storage are on the low side of the small size category. The watershed has a total area of 29.9 square miles. Snyder's lag was calculated to be 7.55 hours and a Snyder peaking coefficient of 0.625 was used. The 200 square mile - 24 hour probable maximum precipitation (PMP) is 22 inches. The flood hydrograph package, HEC-1 computer program, developed by the Corps of Engineers, was utilized to develop the inflow hydrograph, route the flood through the reservoir, and for the dam overtopping analysis. A test flood inflow was calculated to be 14200 cfs. The spillway was assumed to be the only outlet operating at the time of the flood, with the initial water level at the spillway crest.

The spillway capacity is hydraulically inadequate to pass the test flood (1/2 PMF) and overtopping of the dam will occur. The maximum outflow capacity of the spillway without overtopping the dam is 680 cfs. This corresponds to 5 percent of the test flood and a storage above the spillway level of 17 ac.-ft. The maximum outflow discharge value for the test flood is 14100 cfs corresponding to a depth of flow over the top of the dam of 7.5 feet and a storage above the spillway level of 318 ac.-ft. A spillway rating curve, outlet works (low level blowoff and flood gates) rating curves, and a reservoir surface area-capacity curve are included in Appendix D of this report.

At the spillway crest elevation of 69.65, the capacity of the low level blowoff is 74 cfs, and the capacity of flood gates is 206 cfs. It will require approximately .4 hours to lower the water level the first foot assuming a water surface area of 7.2 acres and use of these outlet works to regulate the water level for expected inflows. Storage for impending flood conditions can be provided quickly by use of the outlet works if the pool level is high. Use of the flood gates will lower the water level to elevation 65.15.

5.5 Dam Failure Analysis

This dam is classified as a high hazard structure. Failure discharge can cause loss of life and damage due to high velocities, impact from debris and flooding to 3 to 5 residential homes. Also, loss of this dam would impose hardships on the local community because of the loss of water supply.

Calculated dam failure discharge is 8463 cfs at a pool level equal to the top of the dam. At this elevation, the flow in the downstream channel would be equal to the full spillway discharge of 680 cfs or a depth of flow of approximately 2 to 3 feet downstream. Failure will produce a water surface level approximately 9.0 feet immediately downstream from the dam. The failure discharge will affect downstream areas for a distance of 4000 feet from the dam. At this distance the water surface

level will be approximately 4.5 feet above normal observations. Beyond 4000 feet, the effects of the failure discharge will be reduced as it enters Mianus Pond. Water surface elevations due to the failure of the dam are listed in Appendix D. Probable consequences including the prime impact areas, are also listed in Appendix D.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observation

This inspection revealed no signs of major physical distress in the structure. However, leakage was noted on the downstream face and embankment.

6.2 Design and Construction Data

The only design or construction data available were the contract drawings from the 1954 renovation of the treatment plant. These drawings revealed that the only work done to the dam was the fixing of sluice gates to facilitate a smoother operation of the water treatment process. The absence of any stability computations makes the visual aspect of this report the primary basis for evaluation.

6.3 Post Construction Changes

The following changes to Mianus Filter Plant Dam facility have been noted since its construction in the 1870s.

a. Retaining wall replacement or repair of the downstream spillway channel.

b. Replacement of the sluice gates for the 30 inch diameter raw water supply pipe and the low level blowoff.

c. Replacement of the sluice gates and their operators for the flood control gates on the east abutment of the dam.

d. Construction of a metering weir approximately 440 feet downstream of the dam.

All of the above changes took place during the 1954 renovation project.

6.4 Seismic Stability

This dam is in Seismic Zone 1 and hence does not require evaluation for seismic stability according to the USCE Recommended Guidelines.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. **Condition:** After study of the contract plan for the 1954 renovation and the results of this inspection, the conclusion is that the general condition of the dam at the Mianus Filter Plant is FAIR. The stability of the original design was probably good based on the visual inspection and past performance. However, age and seepage have taken their toll and further study could reveal the need for specific design improvements.

b. **Adequacy of Information:** The information available is such that the assessment of the safety of the dam is based primarily on the visual inspection results and the past operational performance of the structure.

c. **Urgency:** It is considered that the recommendations suggested below be implemented by the owner within one year of receipt of this Phase I Inspection Report.

7.2 Recommendations

It is recommended that the owner engage a qualified registered engineer to carry out the following actions:

a. A detailed hydrologic-hydraulic investigation to determine the need and means of increasing the discharge capacity of the project.

b. The pond be lowered and the upstream face be visually inspected and the toe be checked for potential undermining.

7.3 Remedial Measures

a. **Operation and Maintenance Procedures:**

1. Trees from the floor of the upstream riverbed should be removed as soon as possible.

2. The seepage on the downstream face should be monitored to note any change from the existing conditions.

3. Repointing of the downstream face of the abutment and replacing of loose stones on the left abutment, with repointing and replacement wherever it is needed.

4. Develop a formal flood warning and surveillance plan, including round-the-clock monitoring during heavy precipitation.

5. Insure the operability of all gate valves and blowoffs.

6. Institute a program of annual periodic technical inspection with particular emphasis on the entire downstream face for signs of distress and leakage.

7.4 Alternatives

None.

APPENDIX A

INSPECTION CHECK LIST

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT MIANUS FILTER PLANT DAM DATE November 13, 1979

TIME 1:00 - 3:00 P.M.

WEATHER Overcast

W.S. ELEV. _____ U.S. _____ DN.S.

PARTY:

1. R. Johnston, JPPA
2. R. Lyon, JPPA
3. G. Salzman, CWDD
4. _____
5. _____
6. B. McCormick - Connecticut American Water Company
7. _____
8. _____
9. _____
10. _____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydraulics	R. Johnston	
2.	Structural	R. Lyon	
3.	Geotechnical	G. Salzman	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

INSPECTION CHECK LIST

PROJECT MIANUS FILTER PLANT DAM DATE November 13, 1979

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation 72.15 East 74.70 West	Good - Stone Crest
Current Pool Elevation 69.9+/-	Good - 3 inches above spillway
Maximum Impoundment to Date	
Surface Cracks	None observed.
Pavement Condition	N/A
Movement or Settlement of Crest	None observed.
Lateral Movement	None observed.
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Large spaces up to 18" deep between stones.
Indications of Movement of Structural Items on Slopes	None observed.
Trespassing on Slopes	Not permitted.
Vegetation on Slopes	Ground cover on right downstream face.
Sloughing or Erosion of Slopes or Abutments	None observed.
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or near Toes	None observed.
Unusual Embankment or Downstream Seepage	Slight on faces and from ground just below left face.
Piping or Boils	None observed.
Foundation Drainage Features	None observed.
Toe Drains	None observed.
Instrumentation System	Weir located 440 ft. downstream from dam.

INSPECTION CHECK LIST

PROJECT MIANUS FILTER PLANT DAM DATE November 13, 1979

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	Entire riverbed - underwater.
b. Intake Structures	
30 inch supply pipe	30 inch sluice gate with bar rack. Controlled by gear lift on top of dam and maintained in an open condition. Visible portion in good gondition and appears operable.
Low Level Blow Off	24 inch sluice gate controlled by gear lift on top of dam. Visible portion in good condition and appears operable.
Flood Gates	Twin 4 ft. wide by 5 ft. high slide gates controlled by gear lifts on top of dam. 4 inch gate valve at base between slide gates maintained in open condition. Visible portions in good condition and appear operable.

INSPECTION CHECK LIST

PROJECT MIANUS FILTER PLANT DAM DATE November 13, 1979

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
30 Inch Supply Pipe	30 inch pipe extends from the intake to a 24 inch tee (to blow offs) and a 24 inch valve. A 24 inch pipe then continues to filters.
Low Level Blow Off	Square 4 ft. by 4 ft. blow off extends from the intake through the dam to the downstream face.
Flood Gates	An arched opening 10 ft. wide by 5 ft. high (at crown) and 4 ft. high (at sides) extends from the intakes through dam to the downstream face.

INSPECTION CHECK LIST

PROJECT MIANUS FILTER PLANT DAM DATE November 13, 1979

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
30 Inch Supply	20 inch and 6 inch blow offs from the 24 inch tee discharge to the river. Hydraulically controlled valves are located in an underground concrete chamber, but are controlled from the plant building. Not operated for at least 6 years, but reportedly are operable. A steady flow (10 GPM±) was noted into chamber from the ground. A 24 inch line continues to the filters and then to distribution lines. Fire hydrants in service area could be opened to drain pond.
Low Level Blow Off	Discharges from the downstream face of dam to the river.
Flood Gates	Discharges from the downstream face of dam through a natural rock channel to the river.

INSPECTION CHECK LIST

PROJECT MIANUS FILTER PLANT DAM DATE November 13, 1979

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	Entire riverbed - underwater
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Granite Blocks	Good
Rust or Staining	N/A
Spalling	None observed.
Any Visible Reinforcing	None observed.
Any Seepage or Efflorescence	Spillway flowing - not visible.
Drain Holes	None observed.
c. Discharge Channel	Entire riverbed underwater.
General Condition	Good
Loose Rock Overhanging Channel	None observed.
Trees Overhanging Channel	Yes.
Floor of Channel	Underwater - apparently rock.
Other Obstructions	5.5 ft. high weir 440 ft. downstream from dam.

APPENDIX B

ENGINEERING DATA

APPENDIX B-1

DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS AND LOCATION

Mr. Victor J. Galgowski
Dam Safety Engineer
Water and Related Resources Unit
Department of Environmental Protection
State of Connecticut
State Office Building
Hartford, Connecticut 06115

Connecticut American Water Company
125 East Putnam Avenue
Greenwich, Connecticut 06830

APPENDIX B-2

COPIES OF PAST INSPECTION REPORTS

No. _____ WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

Inventoried By _____ Insp. 13-3-1-45

Date _____ Last 11-0-1-09

Name of Dam or Pond [illegible]

Code No. MI 3.8

Nearest Street Location Valley Rd

Town Greenwich

U.S.G.S. Quad. Stamford

Name of Stream Mianus River

Owner [illegible]

Address [illegible]

[illegible] 869-5200 OKT 3/78

Pond Used For [illegible]

Dimensions of Pond: Width 150' Length [illegible] Area [illegible]

Total Length of Dam 200'± Length of Spillway [illegible]

Location of Spillway [illegible]

Height of Pond Above Stream Bed [illegible]

Height of Embankment Above Spillway [illegible]

Type of Spillway Construction [illegible]

Type of Dike Construction [illegible]

Downstream Conditions [illegible]

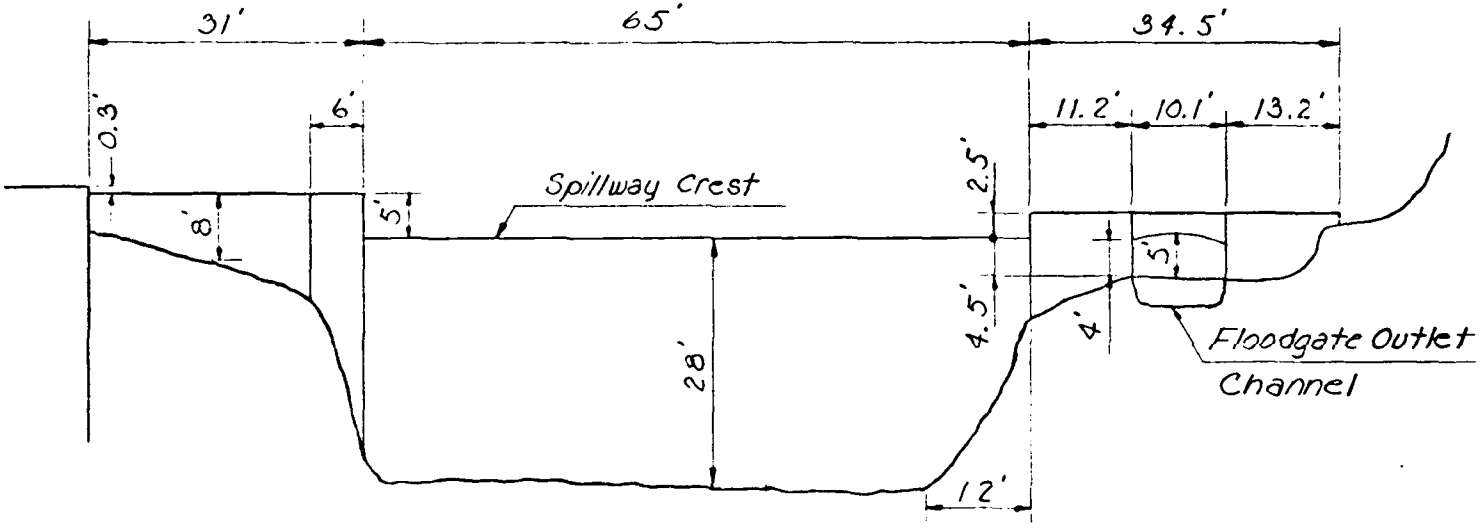
Summary of File Data _____

Remarks [illegible]

Would Failure Cause Damage? _____ Class [illegible]

APPENDIX B-3

RECORD DRAWINGS AND SKETCHES



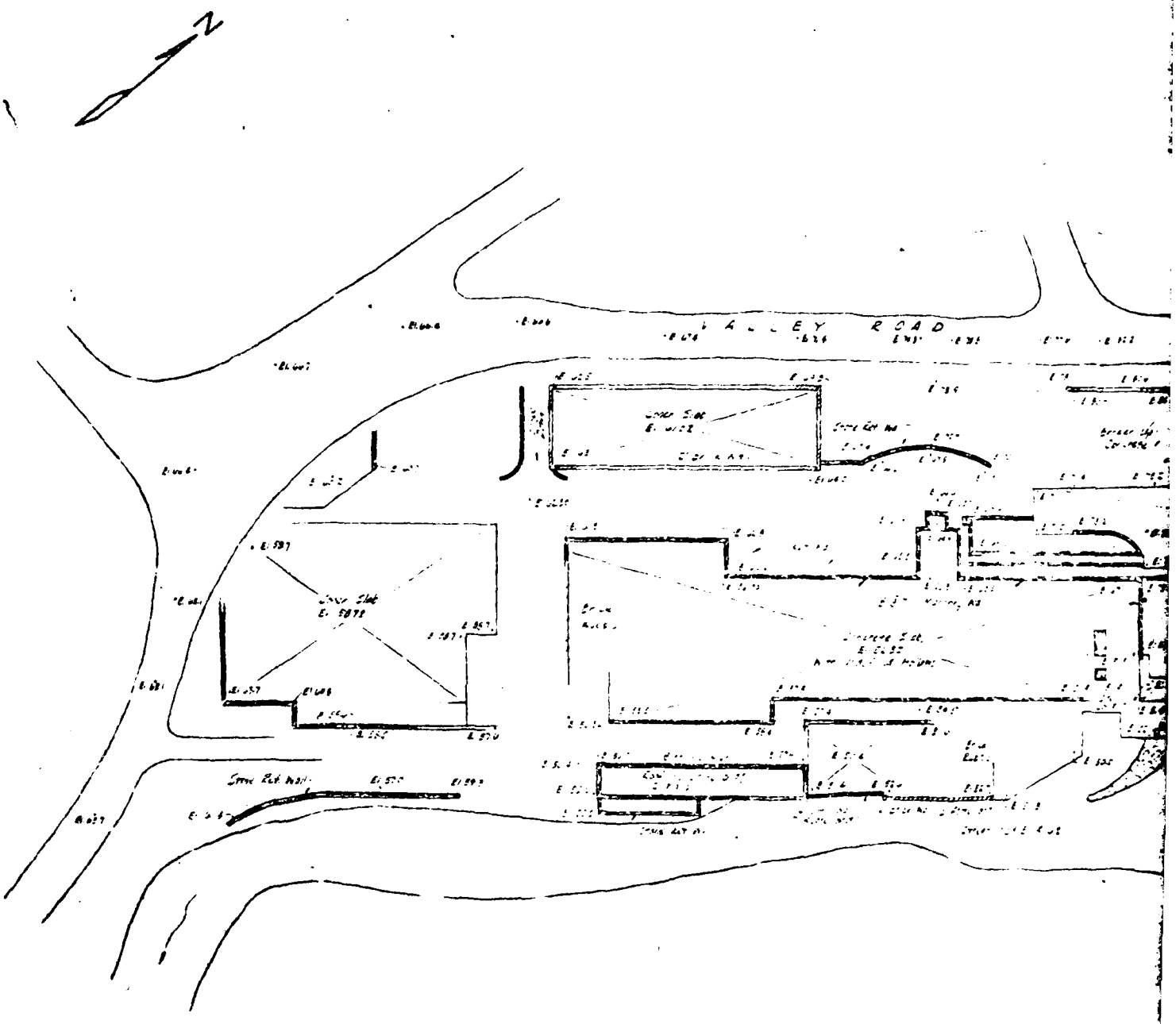
NOTE:
All Dimensions Shown
Are Plus Or Minus

SKETCH OF DAM LOOKING UPSTREAM

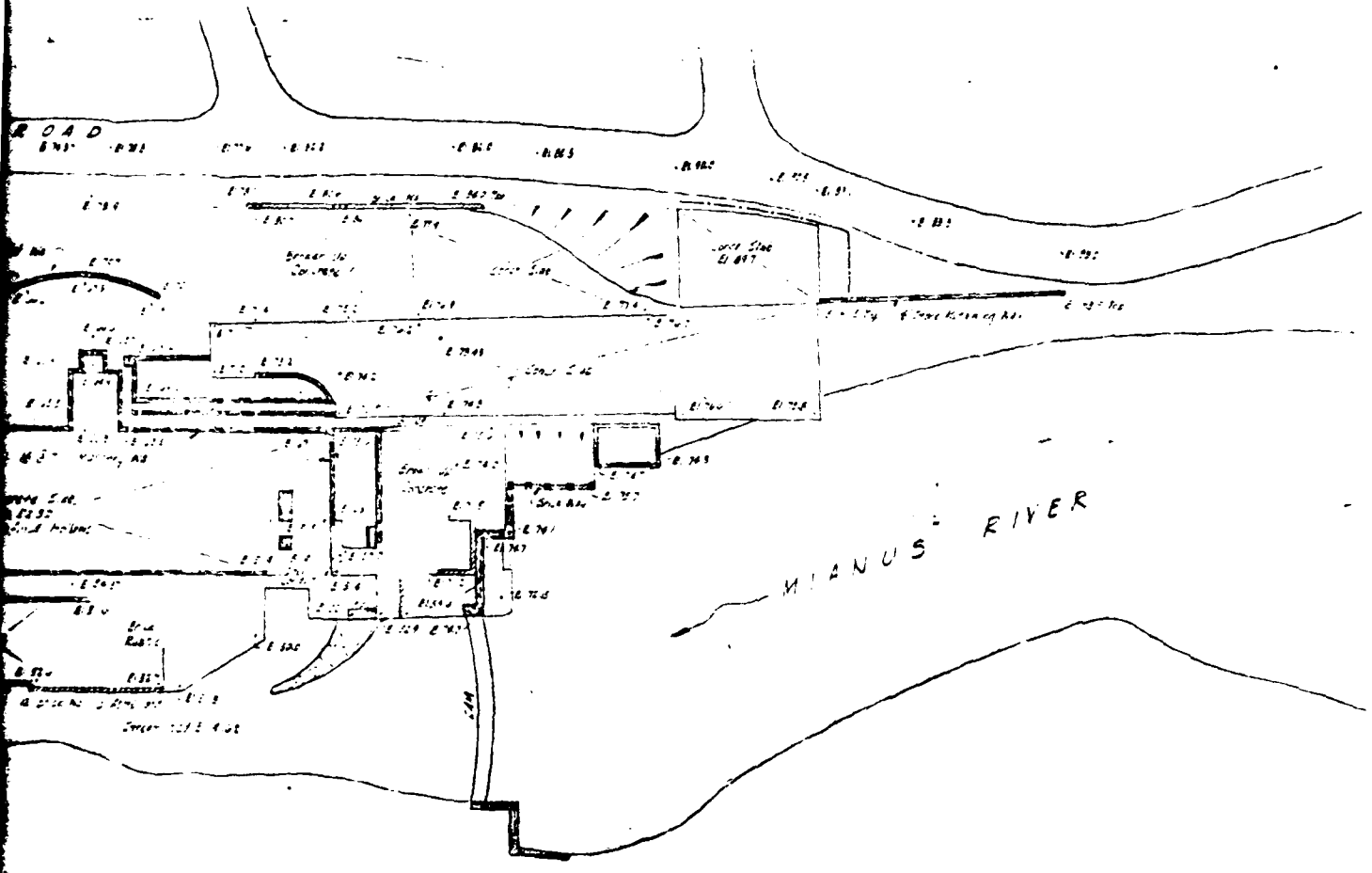
SCALE : 1" = 20'

MIANUS FILTER PLANT DAM

[illegible] P. [illegible] ASSOCIATES, INC.
ENGINEERS • ARCHITECTS • PLANNERS



SHEET
NOT TO



REVISIONS

MIANUS FILTER PLANT
EXISTING PLANT SITE PLAN

GREENWICH WATER COMPANY
GREENWICH, CONN.

AMERICAN WATER WORKS SERVICE COMPANY, INC.
121 SOUTH BROAD STREET PHILADELPHIA, PA.

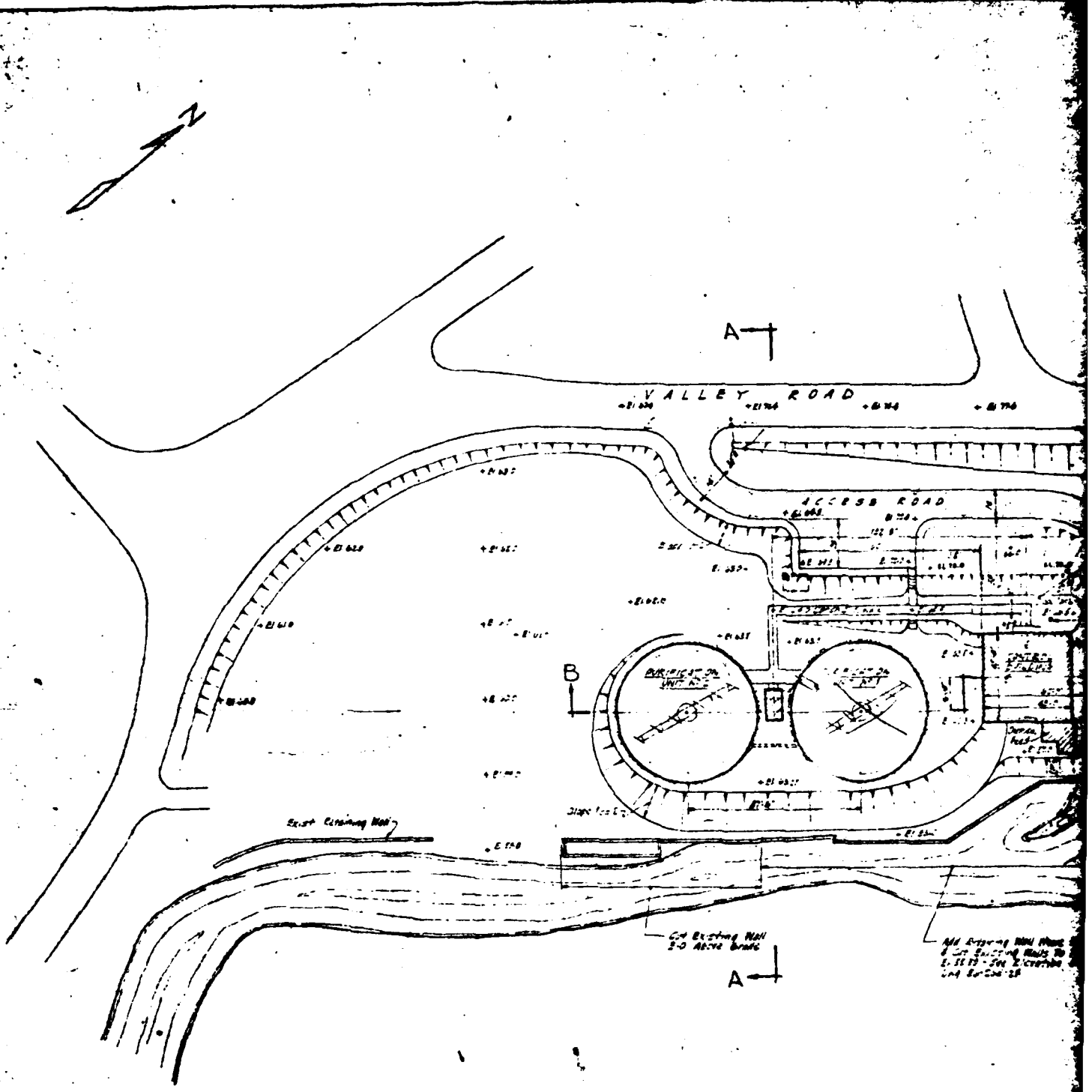
SCALE: 1"=30' USE DIMENSIONS ONLY
DRAWN BY GFB DATE: CHECKED BY
APPROVED WJC PROJECT MAP BY

USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES

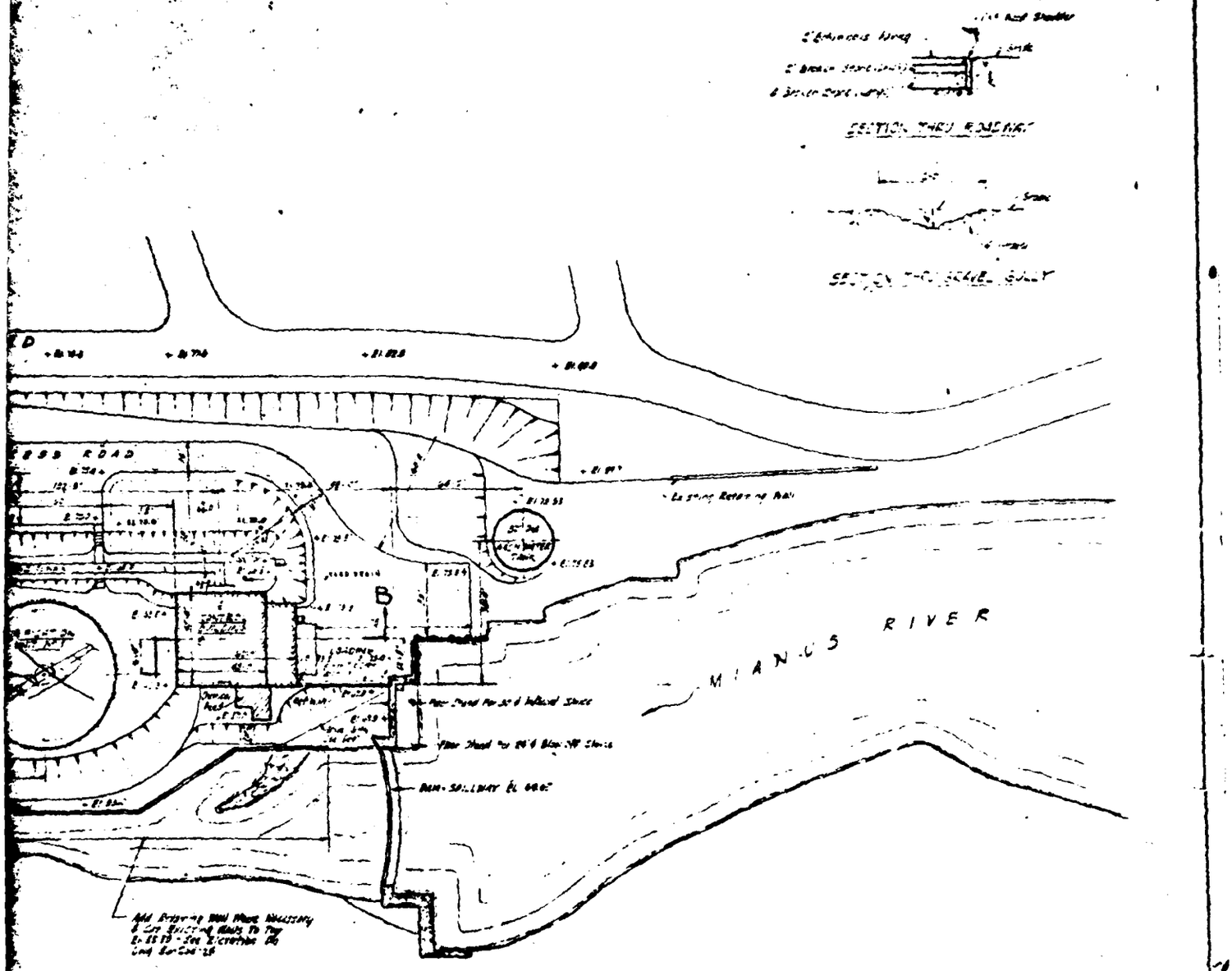
36-265-1A

SHEET REDUCED NOT TO SCALE

PLANS PREPARED BY HOWARD NEEDLES TAMMEN & BERGENDOFF CONSULTING ENGINEERS


N
A
VALLEY ROAD
ACCESS ROAD
B
Existing Wall
Cut Existing Wall
3:0 Above Grade
A

SHEET
NOT



MIANUS FILTER PLANT
LOCATION & GRADING PLAN

GREENWICH WATER CO.
GREENWICH CONN.

AMERICAN WATER WORKS SERVICE COMPANY, INC.

SCALE: 1"=50'
DRAWN BY: JTF
APPROVED: W.G.
DATE: 5-11-51
PROJECT: P-7

THIS APPROVED DRAWING ONLY FOR CONSTRUCTION PURPOSES

56-P65-1

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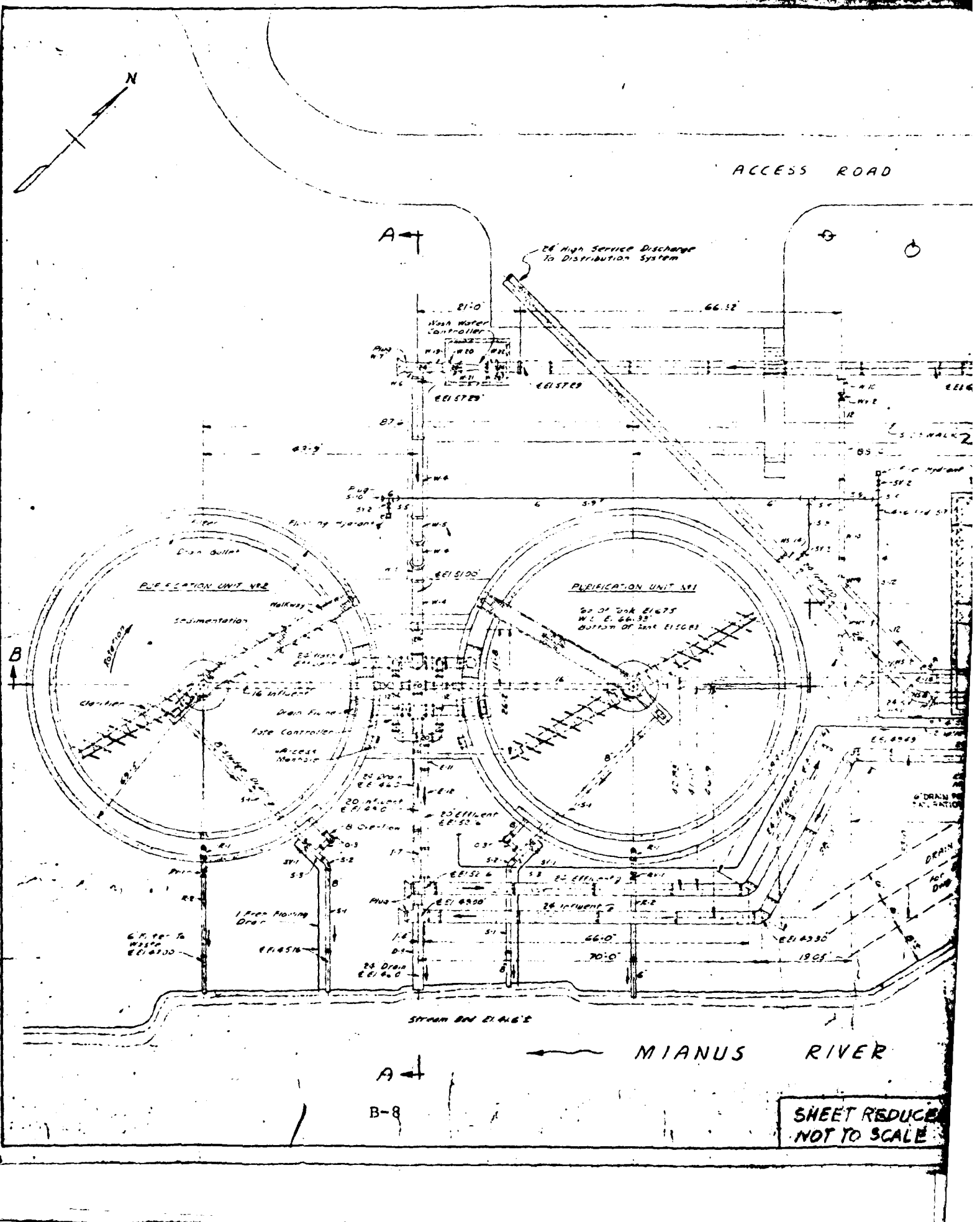
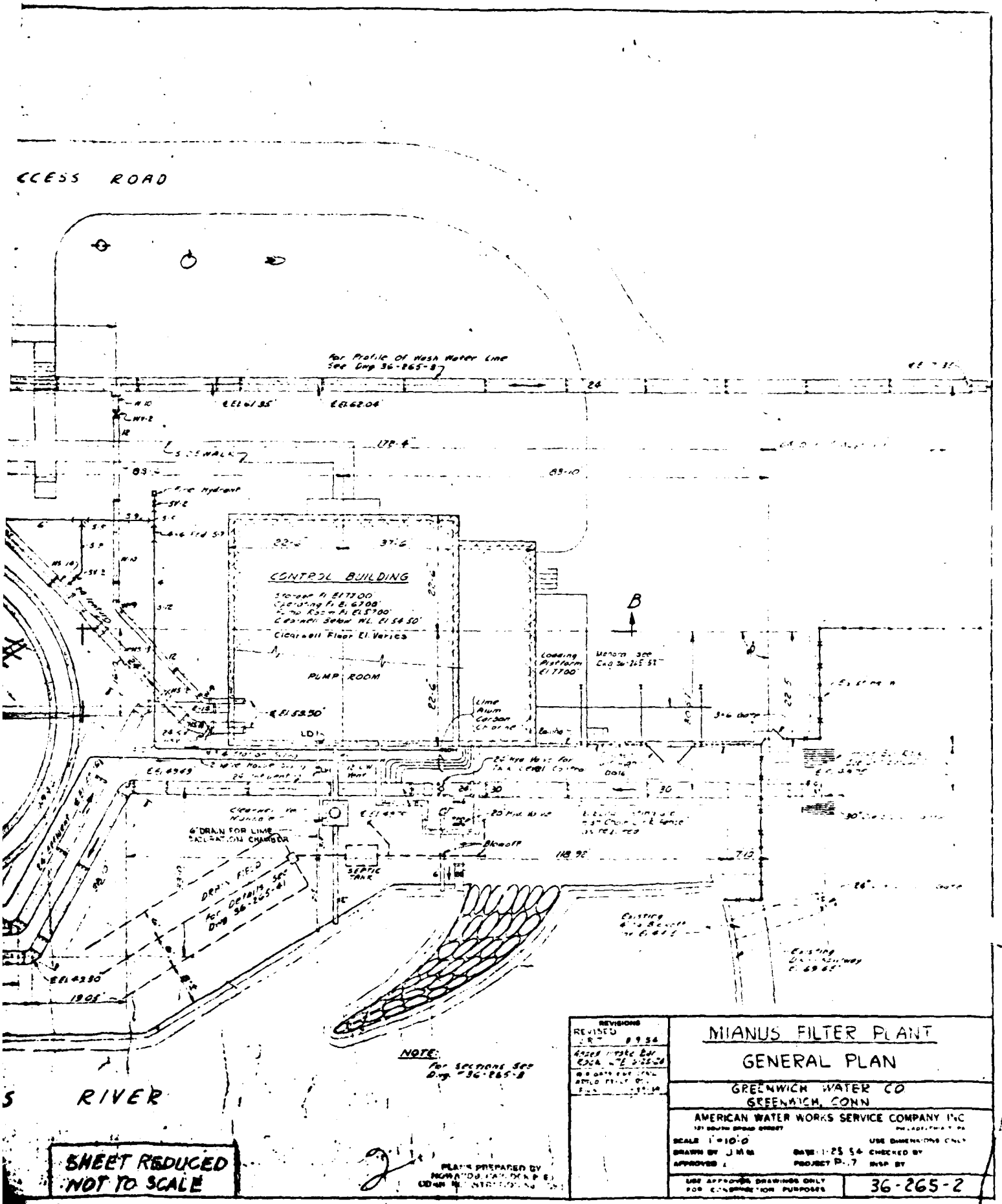
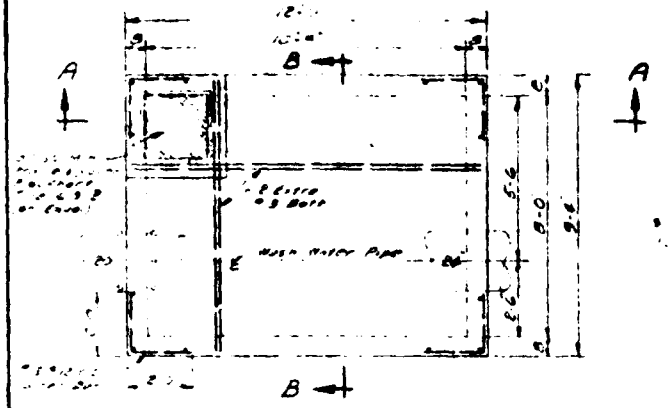
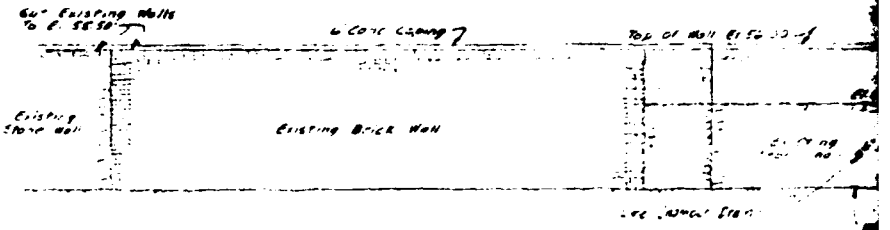
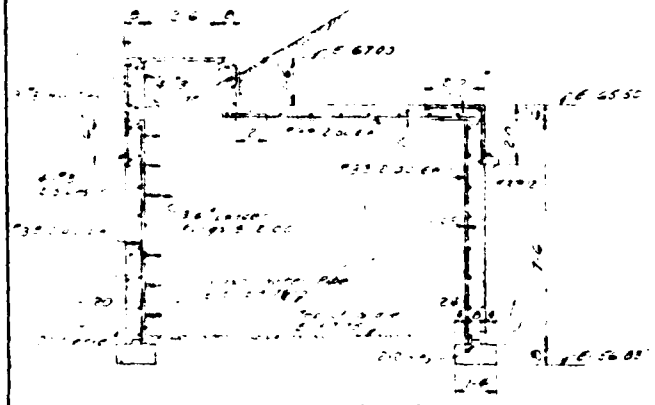
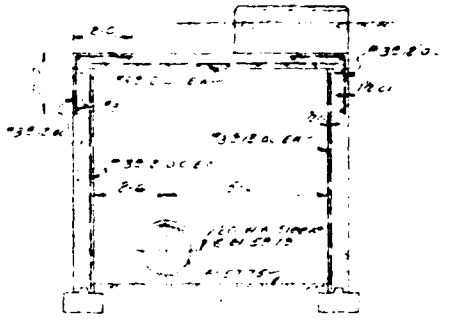

N
ACCESS ROAD
A
B
24" High Service Discharge To Distribution System
Wash Water Controller
PURIFICATION UNIT NO 2
PURIFICATION UNIT NO 1
Sedimentation
Walkway
Rotation
Drain Gallery
Clarifier
Flocculator
Access Manhole
Drain Pump
Free Flowing Drain
Stream Bed El 4.6'
MIANUS RIVER
B-8
SHEET REDUCED
NOT TO SCALE

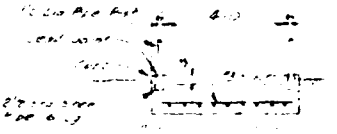

ACCESS ROAD
for Profile of Wash Water Line See Dwg 36-265-8
CONTROL BUILDING
PUMP ROOM
B
Loading Platform El 17.00
Manara 300 Cap 36-265 ST
6" DRAIN FOR LIME SATURATION CHAMBER
SEPTIC TANK
DRAIN FIELD
for details see Dwg 36-265-61
NOTE:
for SECTIONS See Dwg 36-265-8
RIVER
SHEET REDUCED NOT TO SCALE
PLANS PREPARED BY
REVISIONS
MIANUS FILTER PLANT
GENERAL PLAN
GREENWICH WATER CO
GREENWICH, CONN
AMERICAN WATER WORKS SERVICE COMPANY INC
SCALE 1"=10'-0
USE DIMENSIONS ONLY
DRAWN BY J.M.M.
DATE 1-25-54
CHECKED BY
APPROVED
PROJECT P-7
INSP BY
USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES
36-265-2



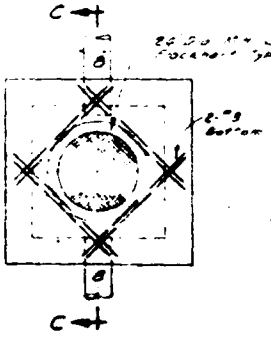


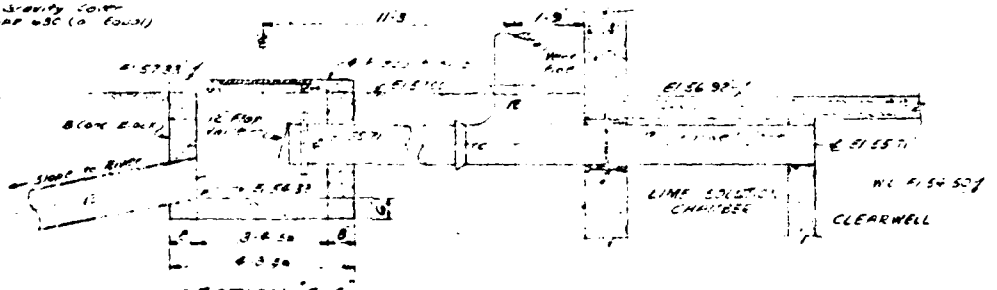






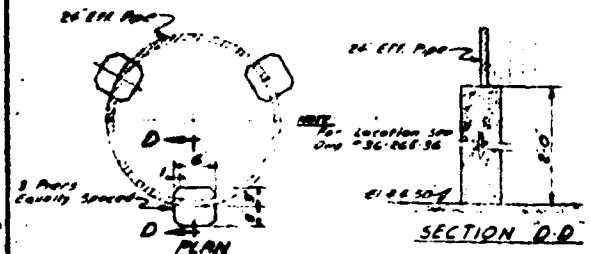
WASH WATER RATE CONTROLLER PIT DETAIL





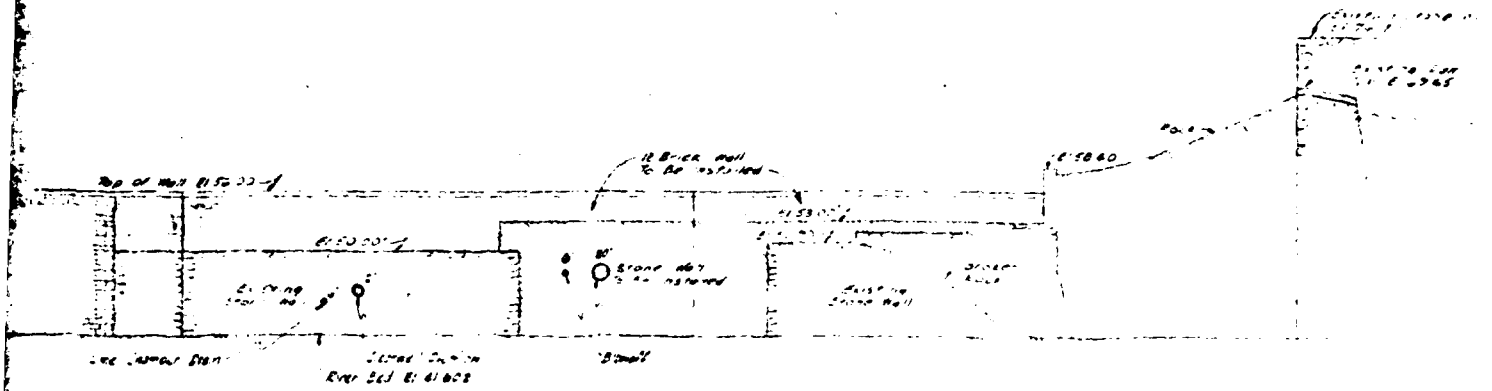
CLEARWELL VENT MANHOLE DETAILS

Scale 1/8"=1'-0"



Eff. PIPE SUPPORT DETAIL

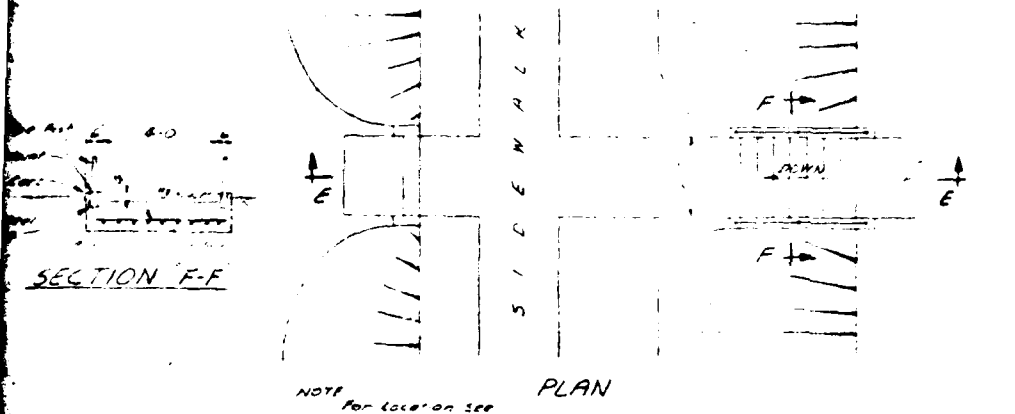
SHEET
NOT TO



ELEVATION

RIVER BANK RETAINING WALL

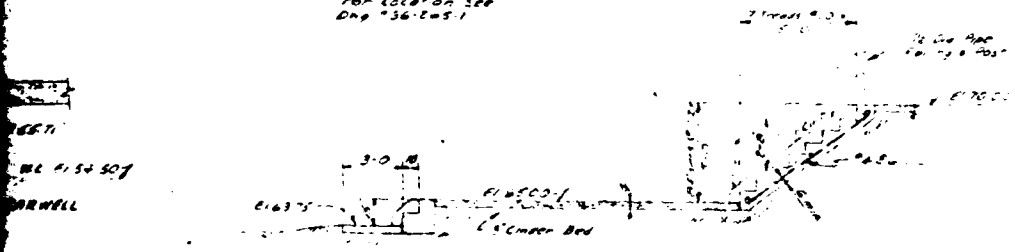
Scale 1/8"=1'-0"



SECTION F-F

NOTE For location see Dwg #36-265-1

PLAN



SECTION E-E

OUTSIDE STEP DETAILS

Scale 1/4"=1'-0"

SHEET REDUCED NOT TO SCALE

REVISIONS

MANUS FILTER PLANT

MISCELLANEOUS CONCRETE DETAILS

GREENWICH WATER CO

GREENWICH, CONN

AMERICAN WATER WORKS SERVICE COMPANY, INC

101 SOUTH BROAD STREET PHILADELPHIA 7, PA.

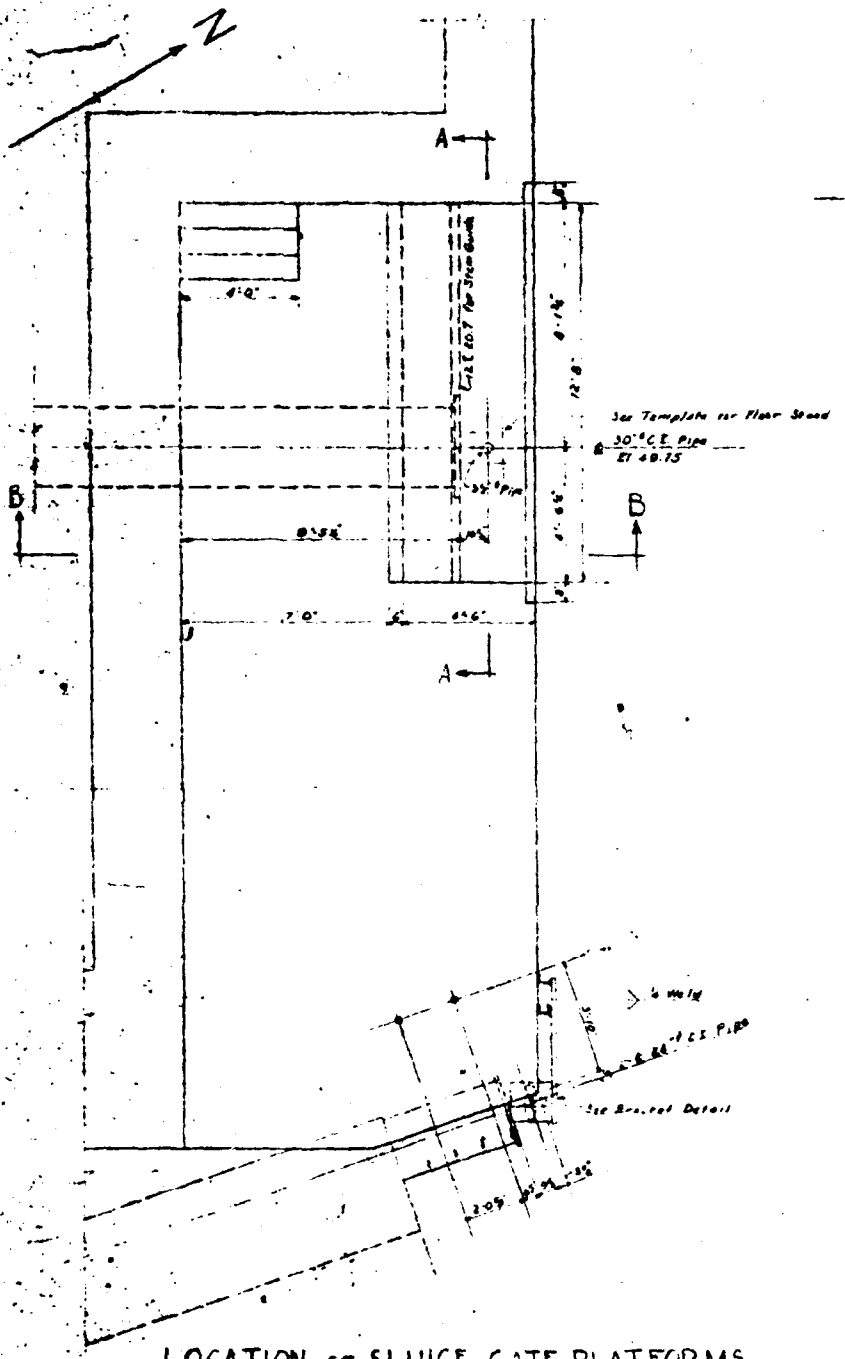
SCALE: AS NOTED — USE DIMENSIONS ONLY

DRAWN BY J.M.M. — DATE: 2-8-54 — CHECKED BY

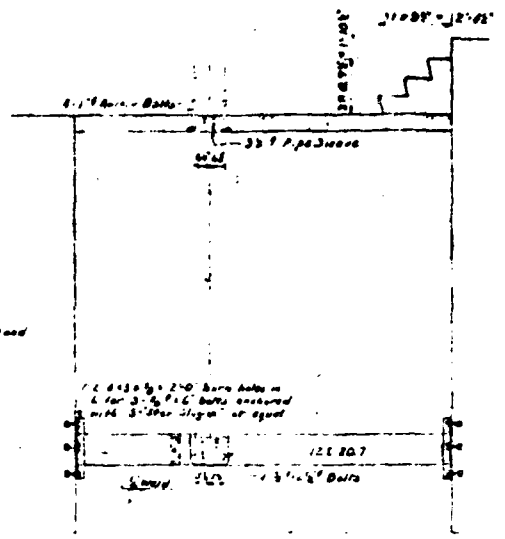
APPROVED A.J.C. — PROJECT P-17 — INSP. BY

USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES

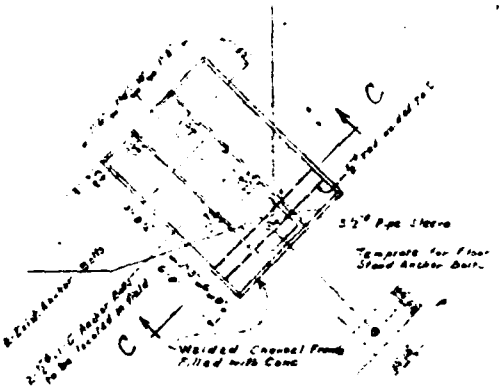
36-265-2E



LOCATION of SLUICE GATE PLATFORMS
Scale: 1/8"=1'-0"

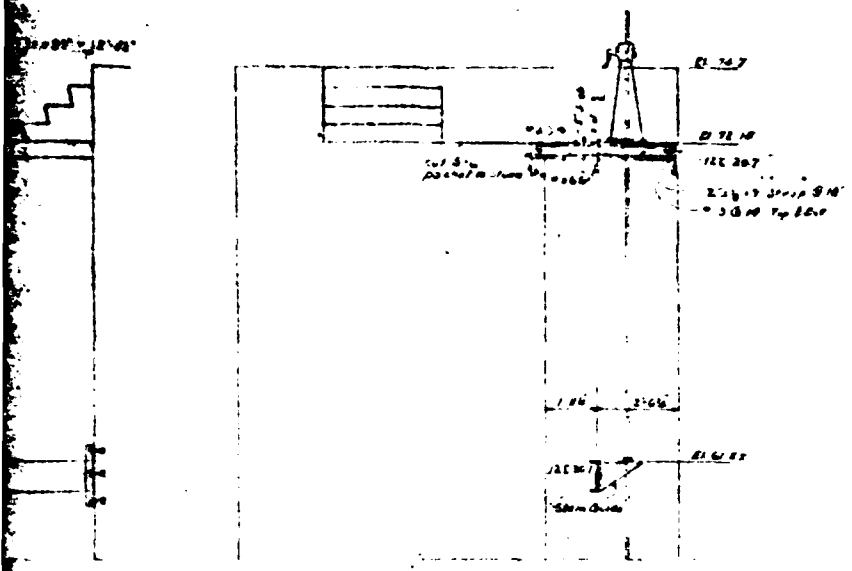


SEC. A A
Scale 1/2"=1'-0"

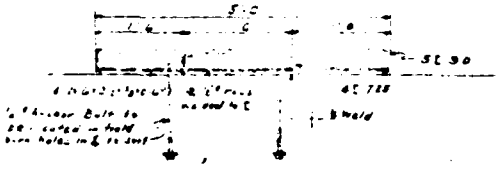


PLAN of 24"
SLUICE GATE PLATFORM
Scale 1/2"=1'-0"

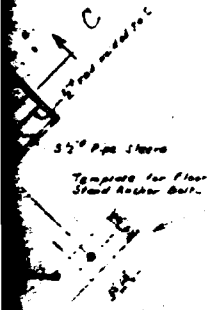
SHEET R
NOT TO



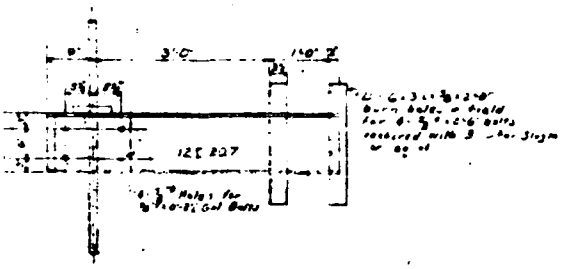
SEC B-B
Scale 3/8" = 1'-0"



SEC C-C
Scale 3/4" = 1'-0"



TFORM



BRACKET FOR STEM GUIDE
Scale 3/4" = 1'-0"

REVISIONS

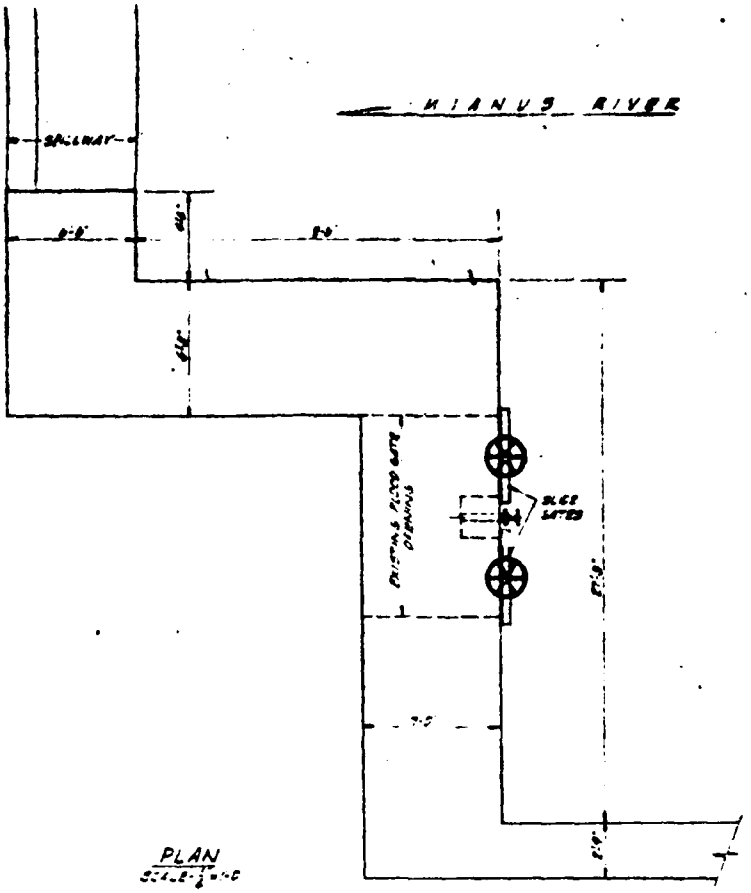
MIANUS FILTER PLANT
DAM SLUICE GATE SUPPORTS DETAILS
GREENWICH WATER COMPANY
GREENWICH, CONN.
AMERICAN WATER WORKS SERVICE COMPANY, INC.

SCALE: AS SHOWN — USE DIMENSIONS ONLY
DESIGN BY E.L.S. — DRAWN BY E.L.S. — CHECKED BY E.L.S.
APPROVED W.A.C. — PROJECT ENG. — DRWG. BY
USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES

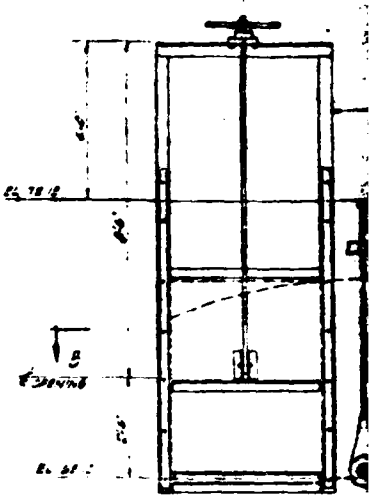
36-265-29

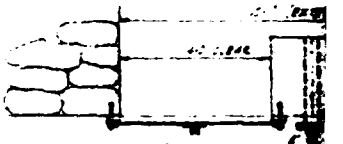
SHEET REDUCED NOT TO SCALE

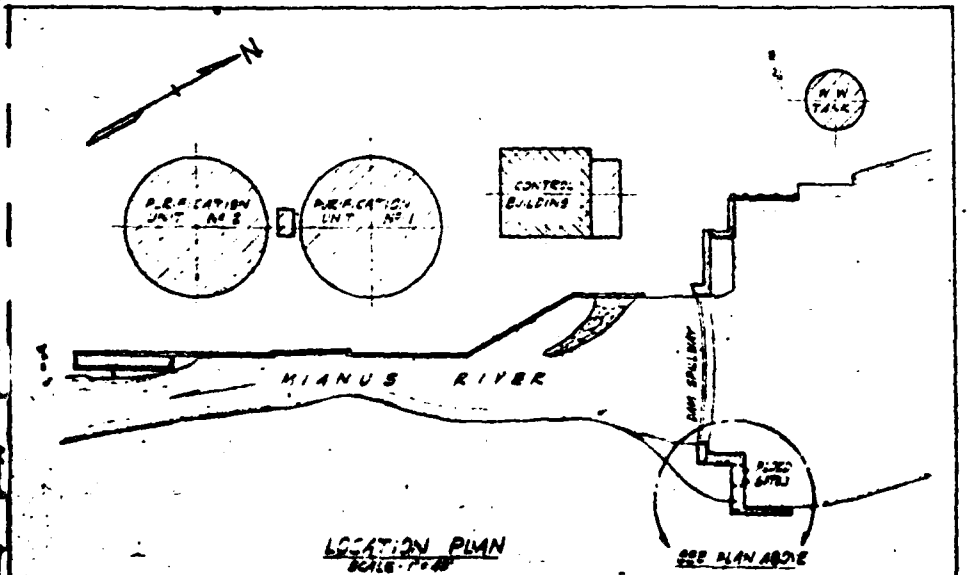
PLANS PREPARED BY HOWARD [illegible] E.E. CONN. REGISTRATION No. [illegible]



PLAN

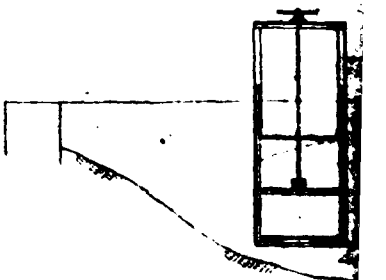


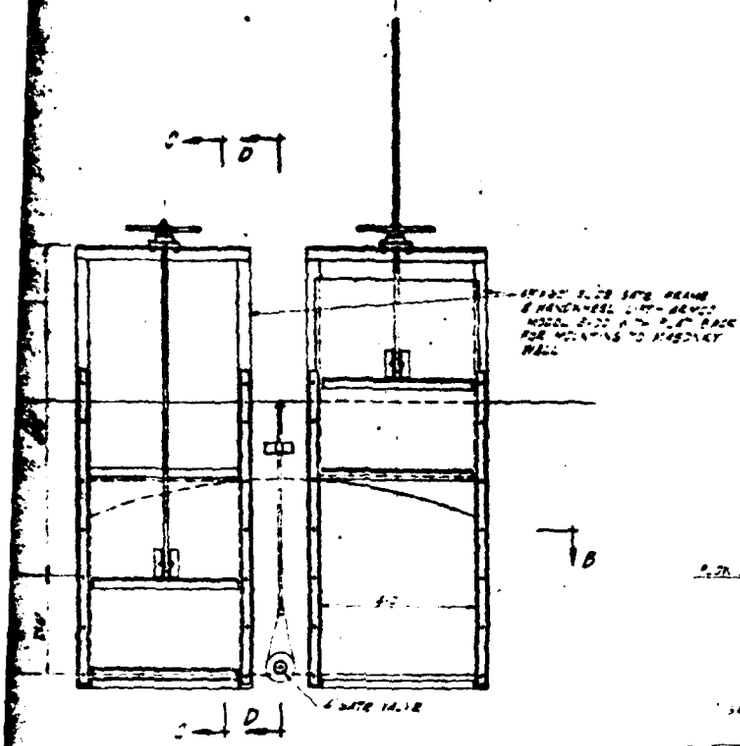




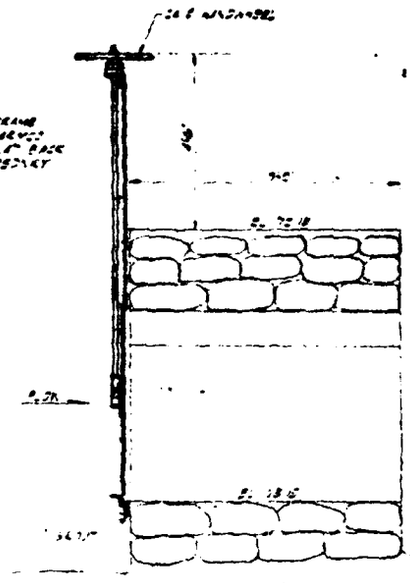
LOCATION PLAN

SEE PLAN ABOVE

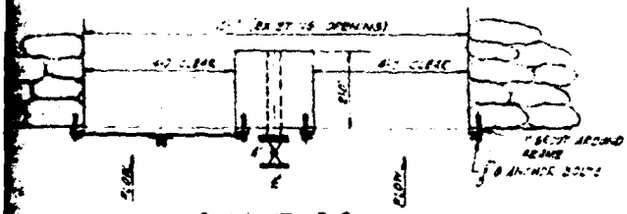




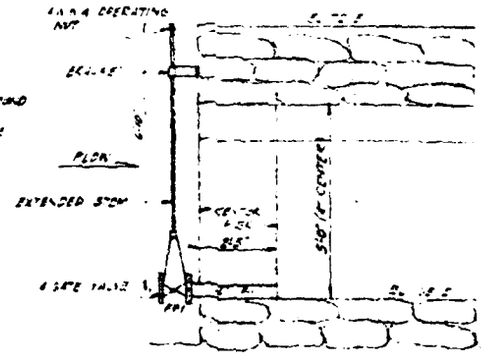
ELEVATION OF GATES



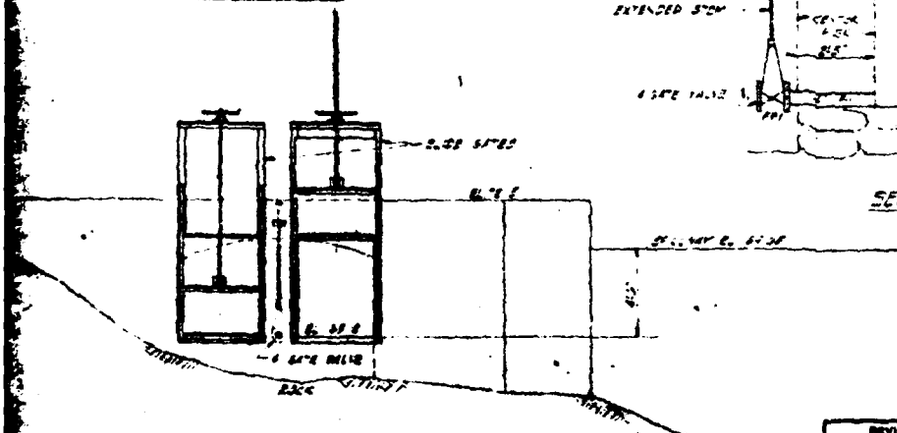
SECTION C-C



PLAN AT B-B



SECTION D-D



UPSTREAM ELEVATION OF FLOOD GATES

SHEET REDUCED
NOT TO SCALE

PLANS PREPARED BY
HOWARD J. CANNON P.E.
CIVIL ENGINEERING PO. 3456

REVISIONS

MANUS FILTER PLANT
FLOOD GATE DETAILS

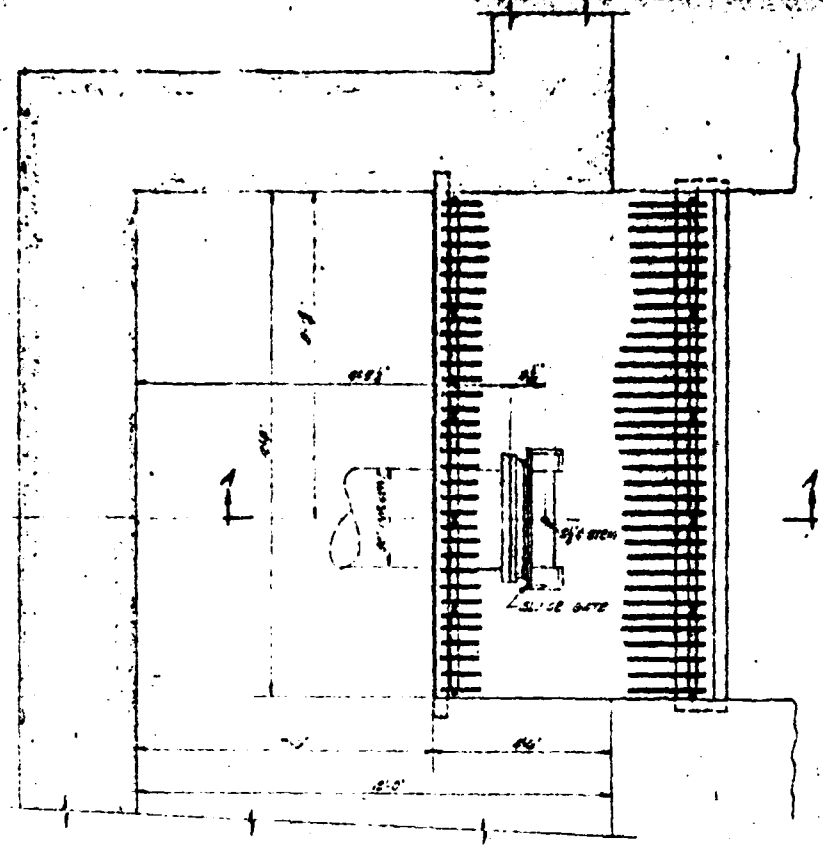
GREENWICH WATER COMPANY
GREENWICH, OHIO

AMERICAN WATER WORKS SERVICE COMPANY, INC.
127 SOUTH BROAD STREET
PHILADELPHIA 7, PA.

SCALE: AS NOTED — SEE DIMENSIONS ONLY
DRAWN BY — DATE — CHECKED BY
APPROVED — DATE — DES. BY

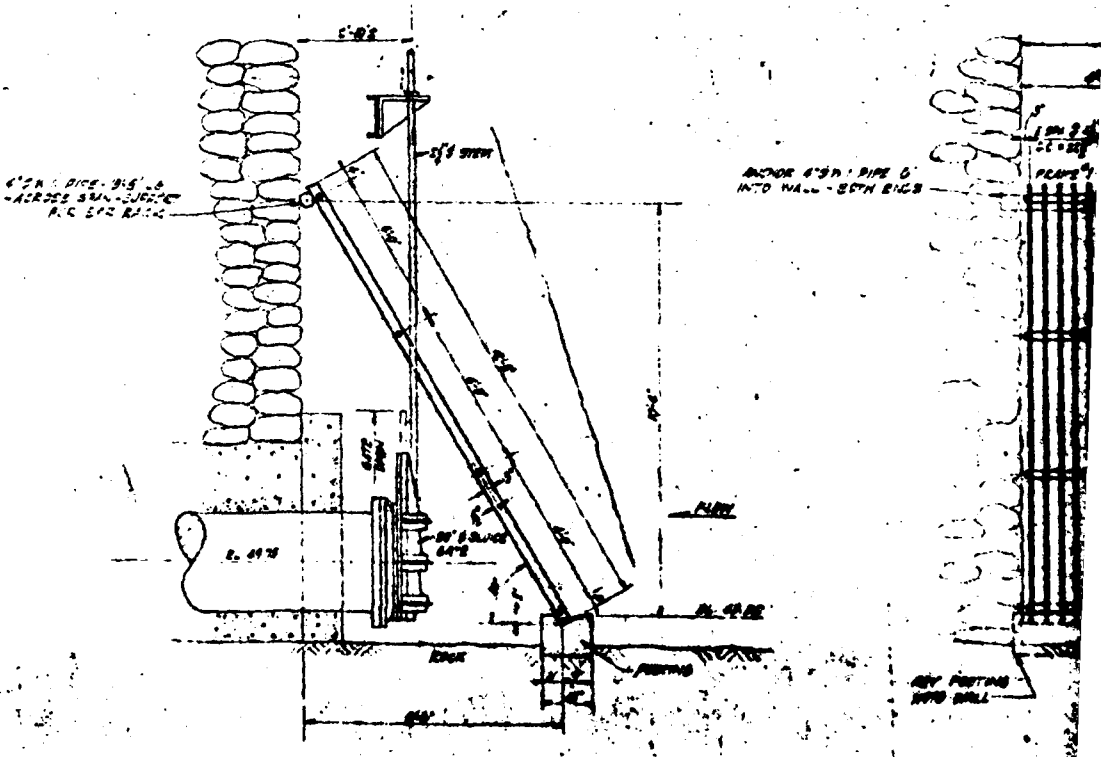
USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES

36-265-50

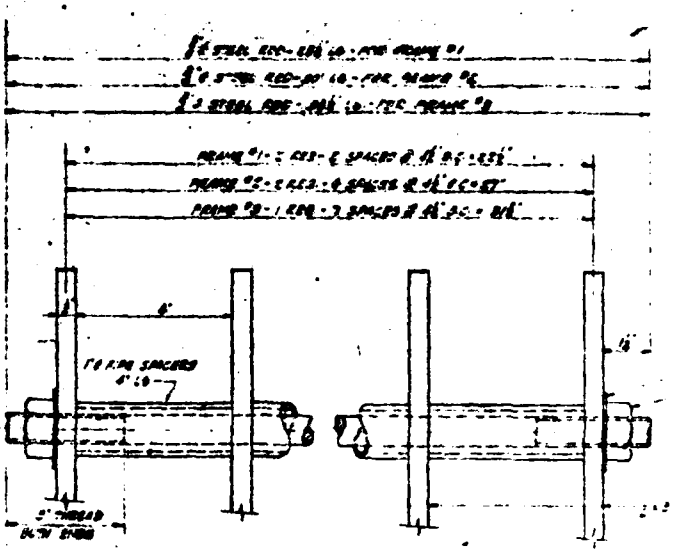


PLAN

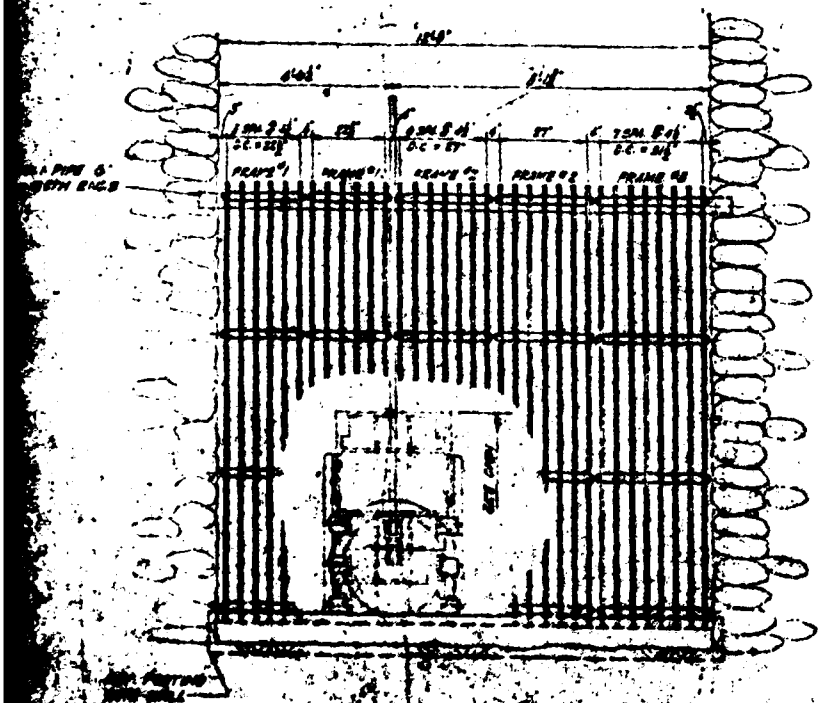
FOR LOCATION PLAN
SEE DNS 20-E08-2



SECTION A-A



BAR ASSY DETAIL
HALF SIZE



UPSTREAM ELEVATION

NOT TO SCALE

PLANS PREPARED BY
[illegible]

AMERICAN WATER WORKS SERVICE COMPANY, INC.

MAIN E. [illegible]
INTAKE BAR RACK
DETAILS

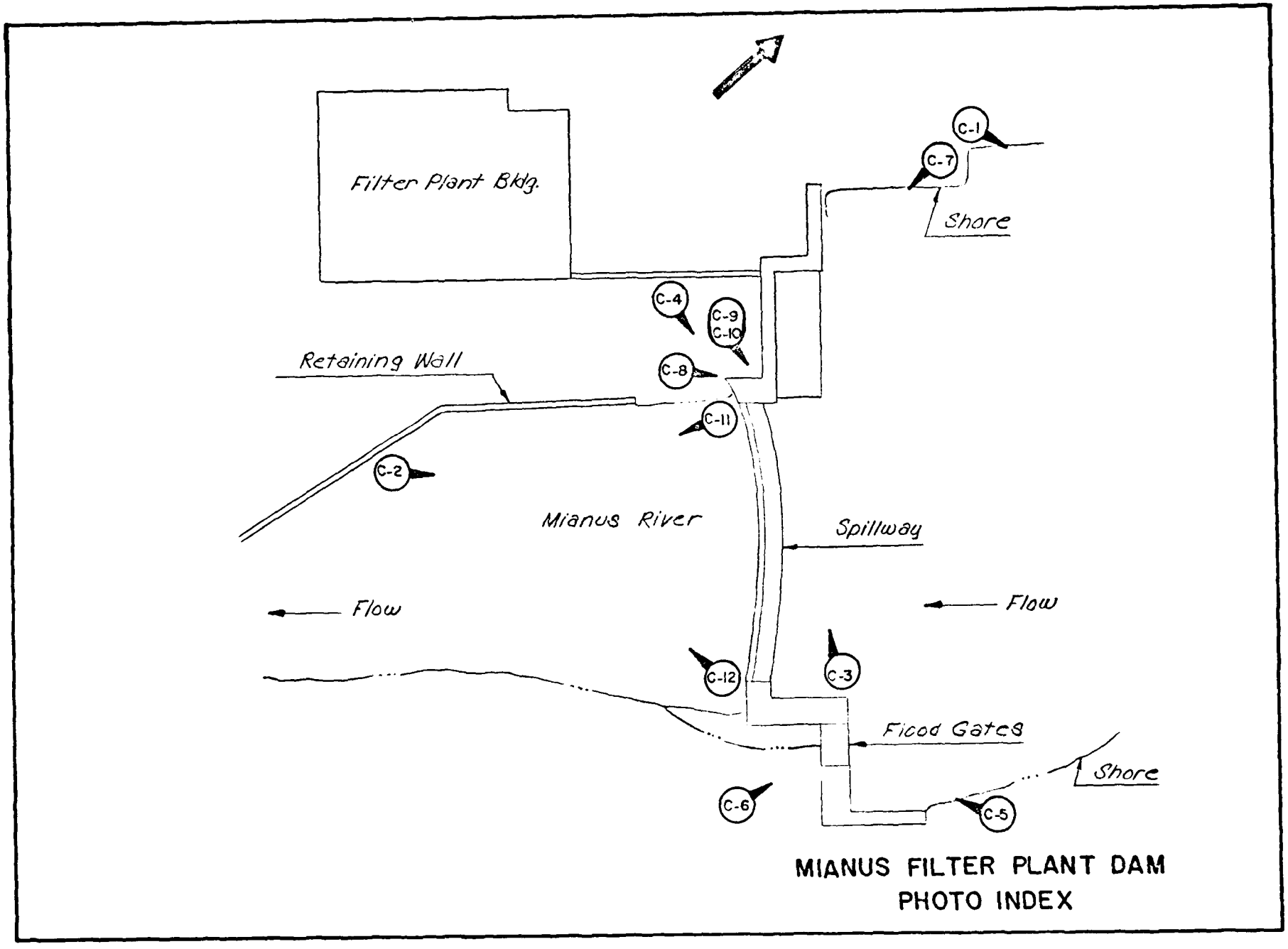
SCALE: 1" = 1'-0"
DRAWN BY: -TB
APPROVED: [illegible]

USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES

36-265-S1

APPENDIX C

PHOTOGRAPHS



MIANUS FILTER PLANT DAM
PHOTO INDEX

C-1 UPSTREAM IMPOUNDMENT - LOOKING FROM WEST BANK

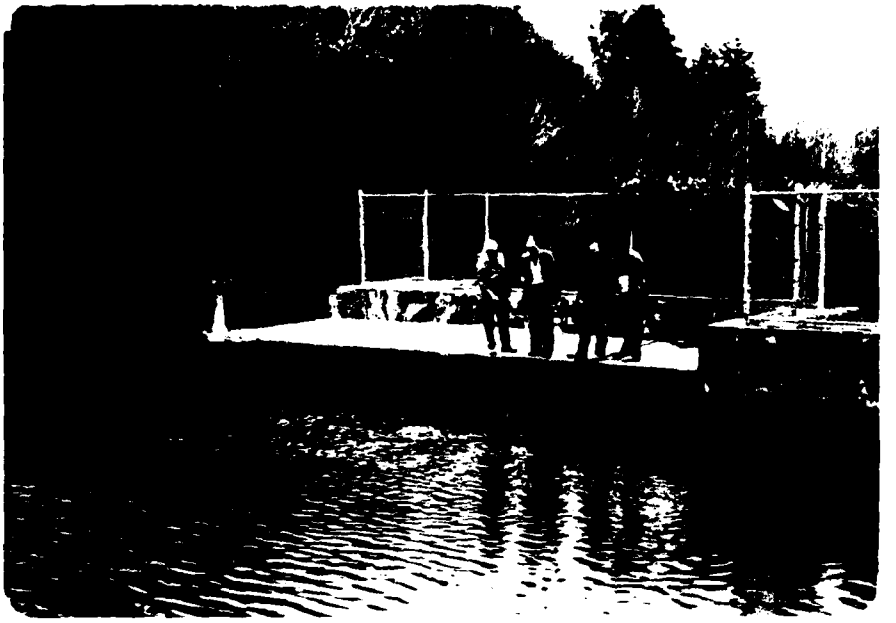
C-2 DOWNSTREAM FACE OF DAM AND SPILLWAY

C-3 WEST CREST OF DAM - LOOKING FROM EAST CREST

C-4 EAST CREST OF DAM - LOOKING FROM WEST ABUT-MENT

C-5 FLOODGATES ON EAST CREST

C-6 OPENING IN DOWNSTREAM FACE AT EAST CREST FOR FLOODGATES

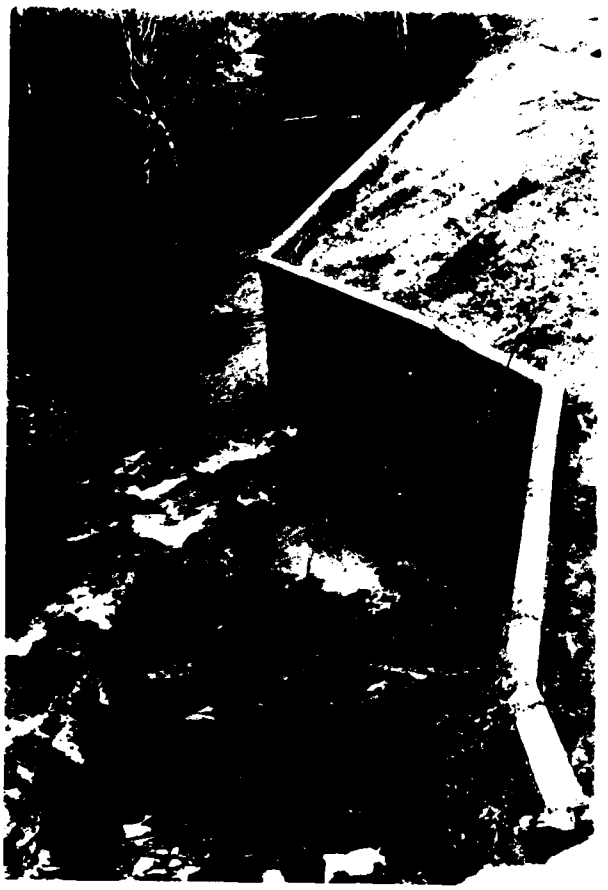


C-7 WEST CREST OF DAM - LOOKING FROM UPSTREAM BANK ON WEST

C-8 SEEPAGE POINT BELOW WEST CREST

C-9 SEEPAGE POINT BELOW WEST CREST

C-10 OPEN JOINT IN MASONRY ON DOWNSTREAM FACE BELOW WEST CREST

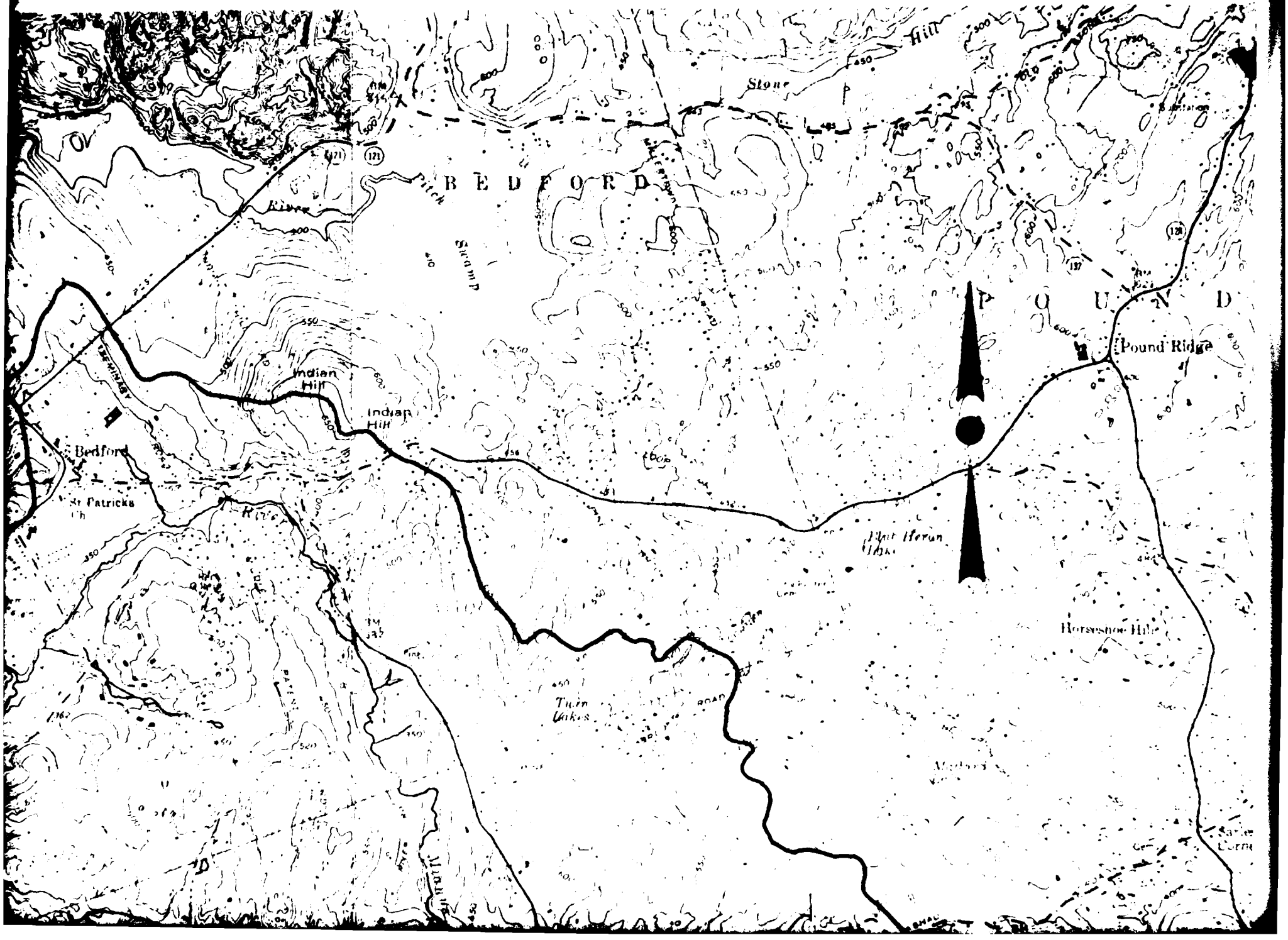


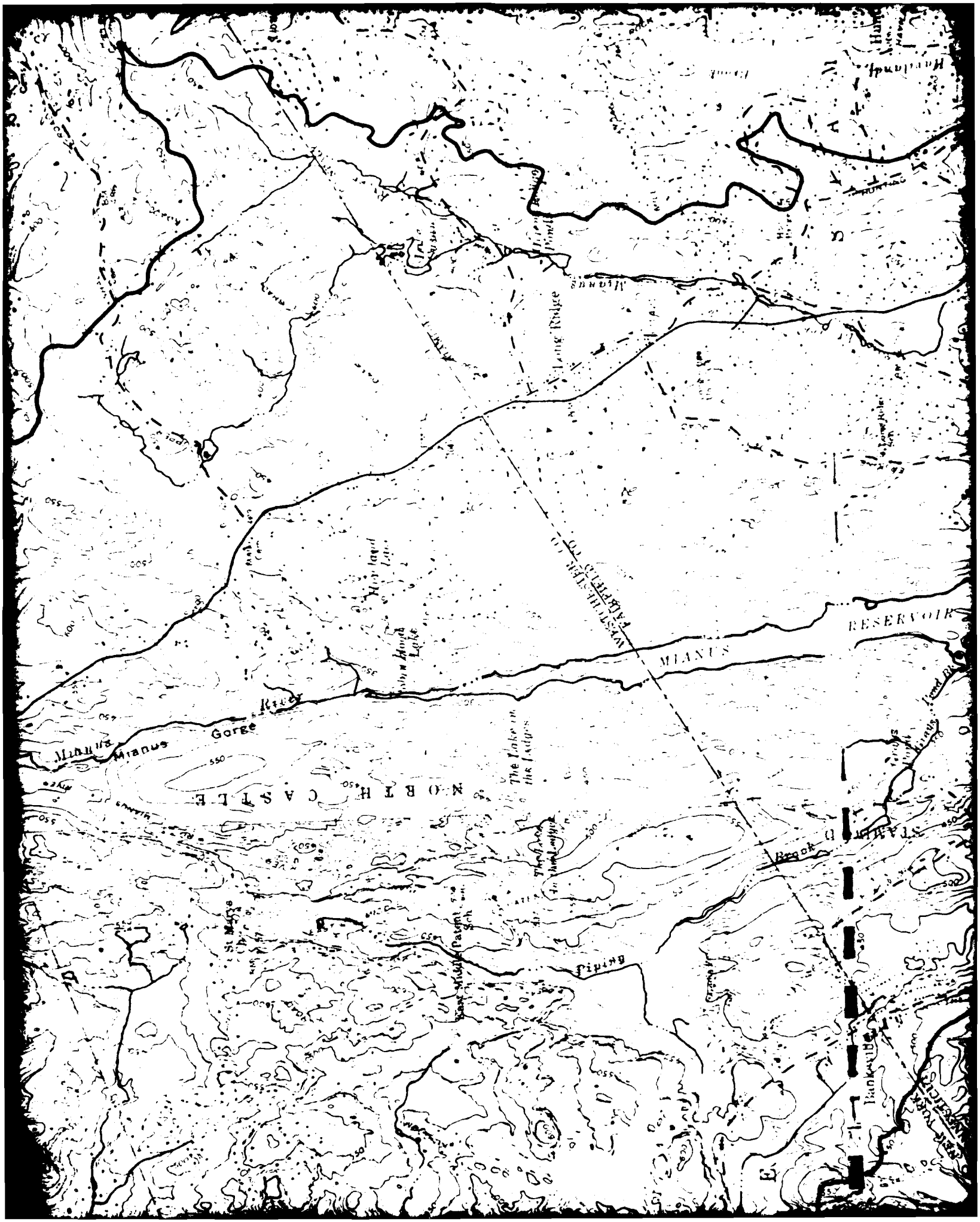
C-11 [illegible] -
LOOKING [illegible]

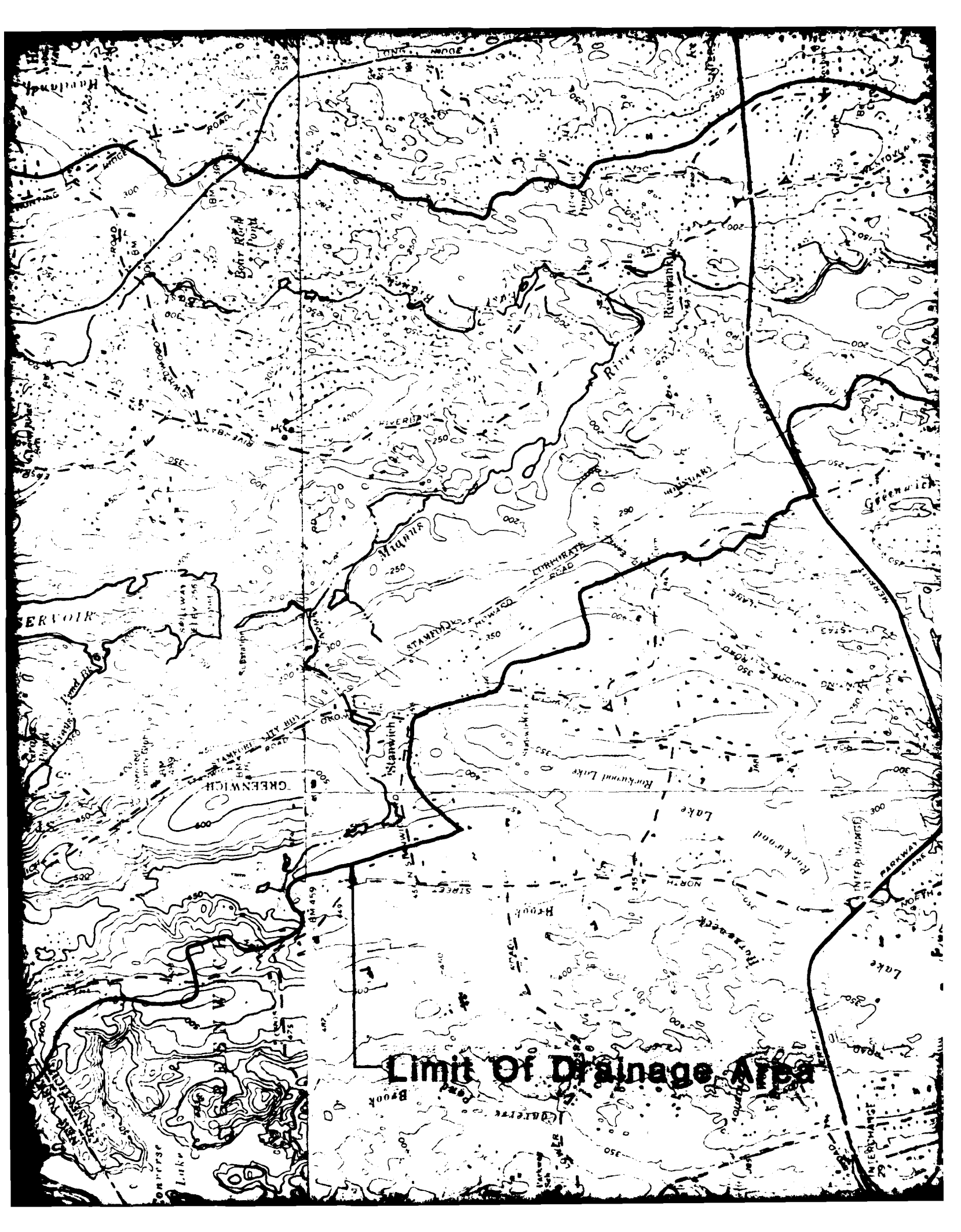
C-12 RETAINING WALL AND BLOWOFF OUTLETS ON [illegible]
BANK OF DOWNSTREAM CHANNEL - LOOKING [illegible]
CREST

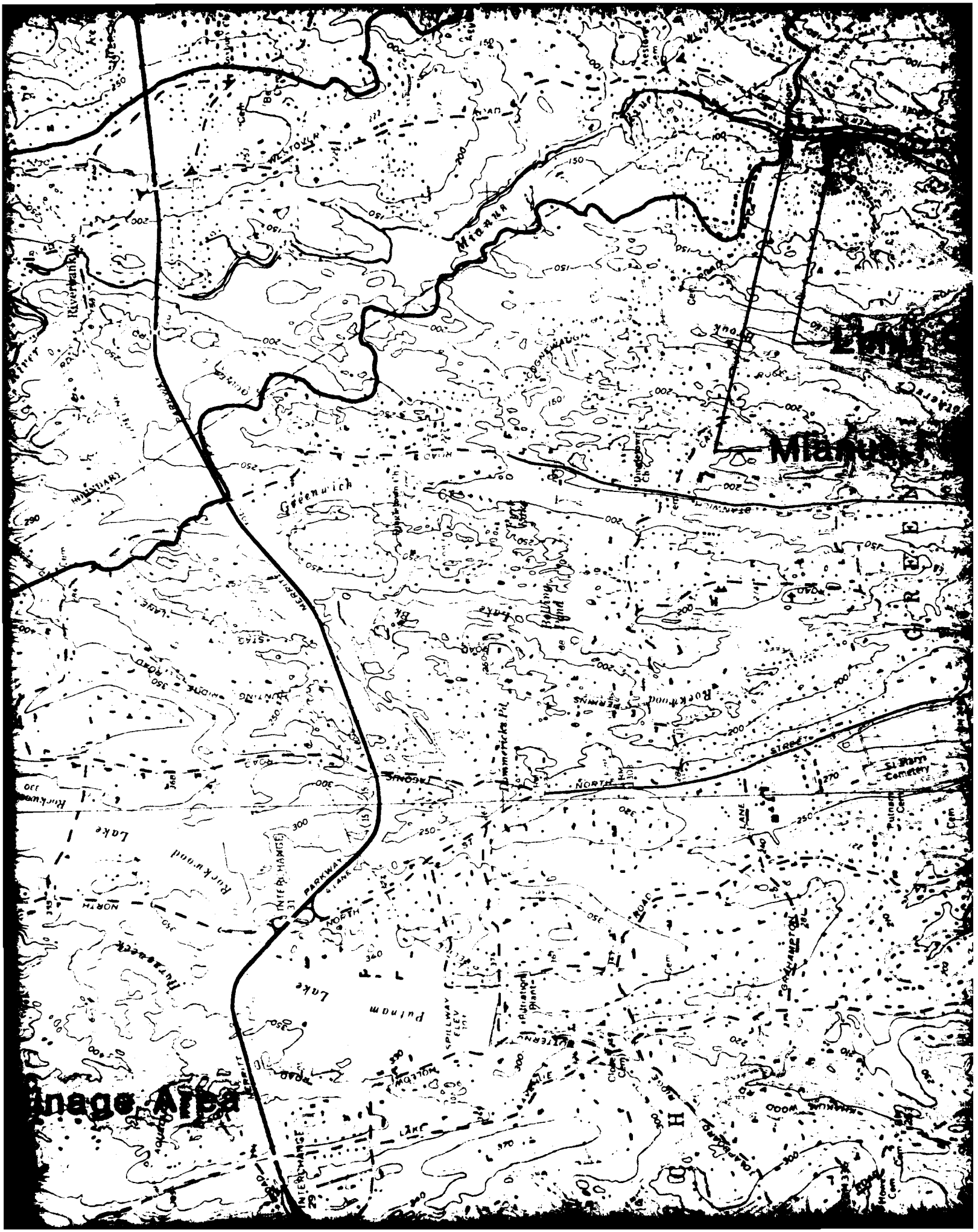
APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS


Stone
Hill
BEDFORD
Pitch
River
Swamp
Indian
Hill
Indian
Hill
Bedford
St Patricks
Ch
River
POUND
Pound Ridge
Mount Herun
Horseshoe Hill
Twin
Lakes
Saddle
Corner


RESERVOIR
MANUS
Gorge
NORTH CASTLE
Brook
Lane Ridge
Long Pond
Bankhead
Pipits
Manus

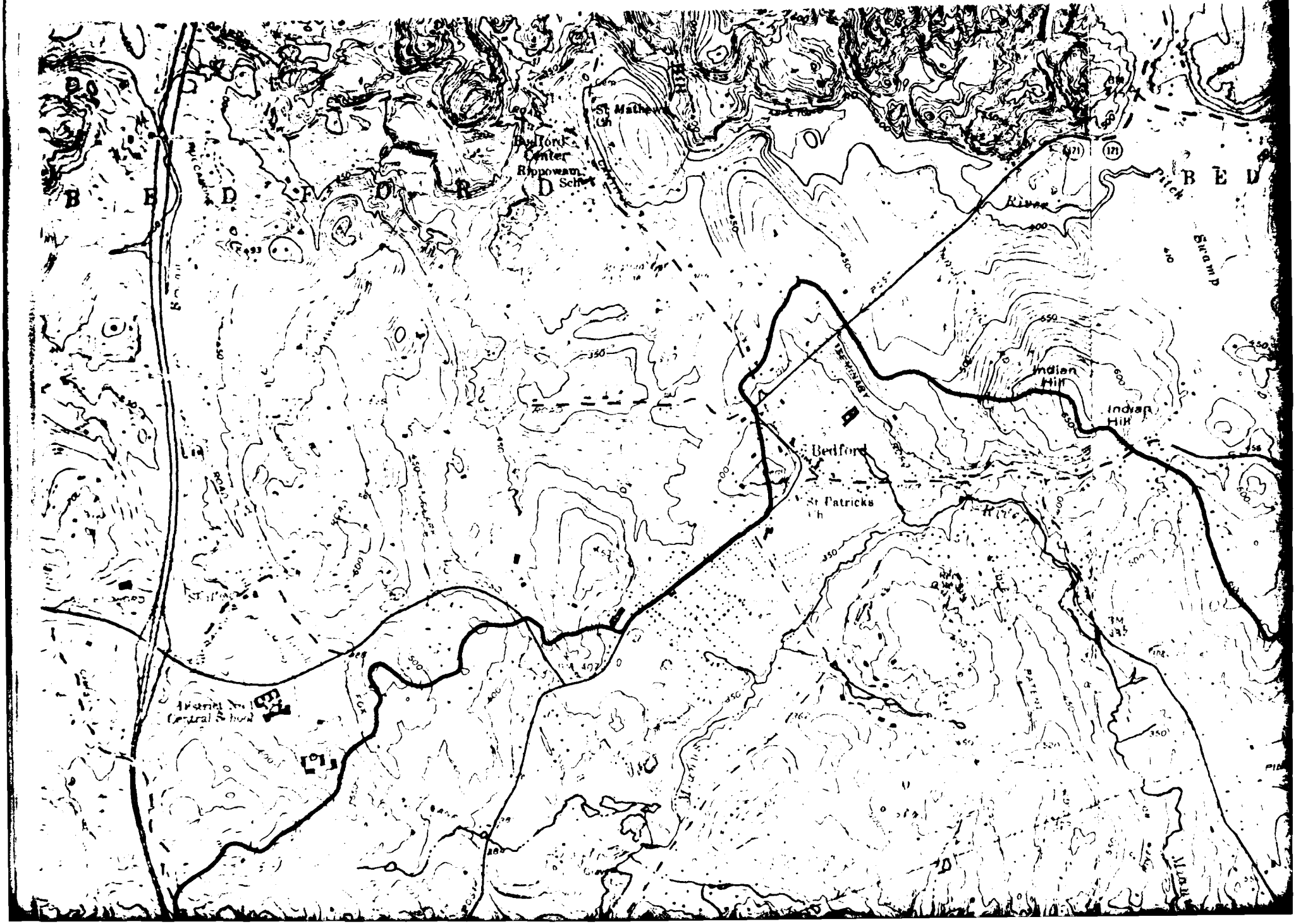

Limit Of Drainage Area



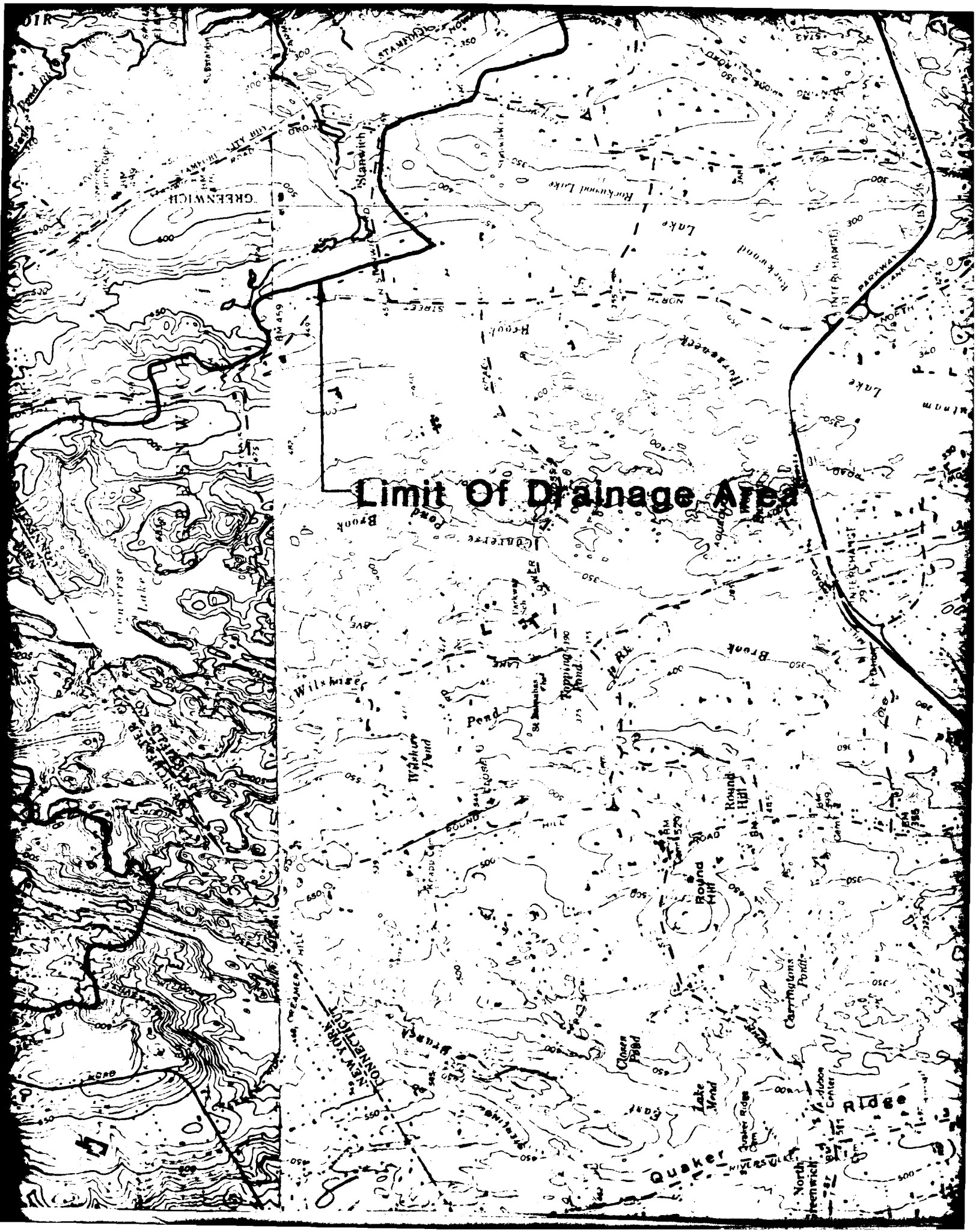
Riverbank
Mianus
Greenwich
MERRITT PARKWAY
COGNEWAUGH
STAG LANE
HUNTING RIDGE ROAD
Rockwood Lake
Rockwood
NORTH STREET
St Marys Cemetery
Cem
Putnam Lake
INTERCHANGE 31
SPILLWAY ELEV
Filtration Plant
INTERCHANGE
LAKE
Mianus
inage Area

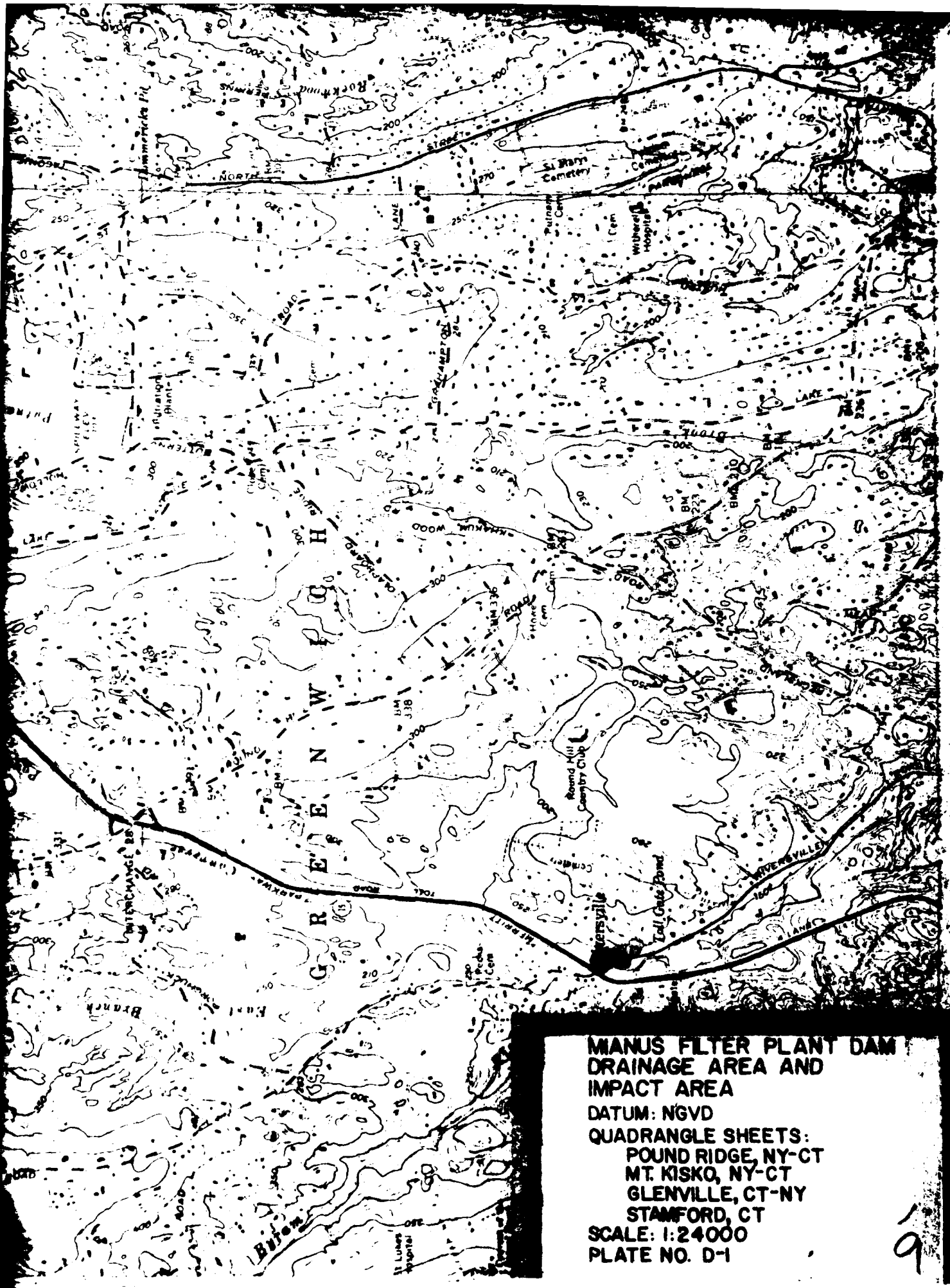
4


Limit Of Imp[illegible]
Mianus [illegible]
Mianus
Pond
Mianus
Brothers
Greenwich Country Club
Rockwood
NORTH STREET
St Marys Cemetery
Putnam Cem
Witherell Hospital
Creek
Brook
LAKE
ROAD
150
200
250
270


B E D F O R D
St Mathews
Bedford Center
Rippowam-Scho
Rivers
Swamp
Indian Hill
Indian Hill
Bedford
St Patricks
Central School


Byram Lake Reservoir
Cormon Hill Sch
Cabaret Pond
Middle Patent Ch
North Lake
Middle Patent Sch
Windmill Farm
Windmill Lake
Bank ville
NEW YORK
CONNECTICUT
St Marys Ch
East Middle Patent Sch
The Lake in the Ladies
Mianus Gorge
Mianus River
Byram River
Grand Street
Round Hill Road
Taconic State Parkway
Merritt Parkway
Westchester County Blvd
NORTH CASTLE
STAMFORD


Limit Of Drainage Area
Wilkinson Pond
Round Hill
Quaker Ridge
Lake Mead
Closes Pond
Carrington's Pond
Topping Pond
Brook
Lake
Pond
Ridge
Round Hill Road
Stanwich Road
Parkway
Interstate
North Street
Greenwich
New York
Connecticut



MANUS FILTER PLANT DAM
DRAINAGE AREA AND
IMPACT AREA

DATUM: NGVD

QUADRANGLE SHEETS:
- POUND RIDGE, NY-CT
- MT. KISKO, NY-CT
- GLENVILLE, CT-NY
- STAMFORD, CT

SCALE: 1:24000

PLATE NO. D-1

HYDROLOGIC AND HYDRAULIC ANALYSIS
SUMMARY SHEET

Dam Mianus Filter Plant Dam

Test Flood 1/2 PMF

INFLOW HYDROGRAPH DEVELOPMENT

Drainage Area 29.9 **sq. mi.**

Probable Maximum Precipation
24 hour - 200 square mile PMP 22 **inches**

Initial Railfall Loss 0 **Inch**
Uniform Railfall loss .1 **Inch**

Snyder's Lag 7.55 **hours**
Snyder's Peaking Coefficient .625

Test Flood Inflow 14200 **CFS**

PMF Inflow 28300 **CFS**

RESERVOIR ROUTING AND DAM OVERTOPPING

Test Flood Outflow 14100 **CFS**

Spillway Capacity at Top of Dam 680 **CFS**
5 **% of Test Flood**

Flow Over Spillway at Test Flood 7650 **CFS**

Spillway Crest Elevation	69.65	**Feet**
Top of Dam Elevation	72.15	**Feet** (east)
Test Flood Elevation	82.2	**Feet**

FINAL

```
                                                                                
 FLOOD HYDROGRAPH PACKAGE (HEC-1)                                               
 DAM SAFETY VERSION       JULY 1978                                             
  LAST MODIFICATION  26 FEB 79                                                  
                                                                                
    1                 A1       DAM SAFETY ANALYSIS-JOB NO. 79-905/01-EHJ
    2                 A2       MIANUS FILTER PLANT DAM-GREENWICH-CONN.
    3                 A3       12-05-79   1/2 PMF
    4                 K     75        1         0         0         0         0         0         2         0         0
    5                 K1       5
    6                 J        1         2         1
    7                 J1    .5         1.        0.        0.        0.        0.        0.        0.        0
    8                 K        0         1         0         0         0         0         1         0
    9                 K1       COMPUTATION OF PMF-DEVELOPMENT OF INFLOW HYDROGRAPH
   10                 M        1         1      29.9         0      29.9         0         0         0         1
   11                 P        0        22        99       112       122       129
   12                 T        0         8         0         0         0         0         0        .1
   13                 W     7.55      .625
   14                 Y     1.6       .05       2.0
   15                 K        1         1         0         0         0         0         1
   16                 K1       ROUTING INFLOW HYDROGRAPH THRU LAKE-OVERTOPPING ANALYSES
   17                 Y        0         0         0         1         1
   18                 Y1       1         0         0         0         0         0        -1         0
   19                 $A    7.2         8        17        50
   20                 $F   69.65        75        76        80
   21                 $S   69.65        65      2.65       1.5
   22                 $D    74.7      2.63       1.5       120
   23                 W        99
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

ROUTE HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	1
END OF NETWORK	

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

RUN DATE= 12/05/79.
TIME= 07.22.56.

DAM SAFETY ANALYSIS-JOB NO. 79-905/01-ERJ
MIAMIS FILTER PLANT DAM-GREENWICH-CONN.
12-05-79

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
75	1	0	0	0	0	0	2	0	0
			JOPER	NXT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 2 LRTIO= 1

RTIOS= .50 1.00

****

SUB-AREA RUNOFF COMPUTATION

COMPUTATION OF PMF-DEVELOPMENT OF INFLOW HYDROGRAPH

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

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	29.90	0.00	29.90	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.00	99.00	112.00	122.00	129.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .835

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	0.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 7.55 CP= .53 NTA= 0

RECESSION DATA
STRTQ= 1.60 QRCSN= .05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 8.64 AND R= 6.87 INTERVALS

UNIT HYDROGRAPH 42 END-OF-PERIOD ORDINATES. LAG= 7.54 HOURS, CP= .53 VOL= 1.00

73.	269.	534.	862.	1152.	1409.	1570.	1632.	1563.	1388.
1200.	1037.	877.	775.	670.	579.	501.	433.	374.	323.

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.01	0.00	.01	1.	1.02	14.00	38	2.18	2.08	.10	2991.
1.01	2.00	2	.01	0.00	.01	1.	1.02	15.00	39	2.73	2.63	.10	4327.
1.01	3.00	3	.01	0.00	.01	1.	1.02	16.00	40	6.91	6.81	.10	6557.
1.01	4.00	4	.01	0.00	.01	1.	1.02	17.00	41	2.55	2.45	.10	9934.
1.01	5.00	5	.01	0.00	.01	1.	1.02	18.00	42	2.00	1.90	.10	14140.
1.01	6.00	6	.01	0.00	.01	1.	1.02	19.00	43	.18	.08	.10	18656.
1.01	7.00	7	.02	0.00	.02	1.	1.02	20.00	44	.18	.08	.10	22889.
1.01	8.00	8	.02	0.00	.02	1.	1.02	21.00	45	.18	.08	.10	26173.
1.01	9.00	9	.02	0.00	.02	1.	1.02	22.00	46	.18	.08	.10	28027.
1.01	10.00	10	.02	0.00	.02	1.	1.02	23.00	47	.18	.08	.10	28341.
1.01	11.00	11	.02	0.00	.02	1.	1.03	0.00	48	.18	.08	.10	27127.
1.01	12.00	12	.02	0.00	.02	1.	1.03	1.00	49	0.00	0.00	0.00	24769.
1.01	13.00	13	.10	.00	.10	1.	1.03	2.00	50	0.00	0.00	0.00	21970.
1.01	14.00	14	.13	.03	.10	4.	1.03	3.00	51	0.00	0.00	0.00	19228.
1.01	15.00	15	.16	.06	.10	14.	1.03	4.00	52	0.00	0.00	0.00	16759.
1.01	16.00	16	.40	.30	.10	55.	1.03	5.00	53	0.00	0.00	0.00	14589.
1.01	17.00	17	.15	.05	.10	140.	1.03	6.00	54	0.00	0.00	0.00	12679.
1.01	18.00	18	.11	.01	.10	257.	1.03	7.00	55	0.00	0.00	0.00	10998.
1.01	19.00	19	.01	0.00	.01	387.	1.03	8.00	56	0.00	0.00	0.00	9523.
1.01	20.00	20	.01	0.00	.01	515.	1.03	9.00	57	0.00	0.00	0.00	8234.
1.01	21.00	21	.01	0.00	.01	621.	1.03	10.00	58	0.00	0.00	0.00	7114.
1.01	22.00	22	.01	0.00	.01	686.	1.03	11.00	59	0.00	0.00	0.00	6148.
1.01	23.00	23	.01	0.00	.01	707.	1.03	12.00	60	0.00	0.00	0.00	5315.
1.02	0.00	24	.01	0.00	.01	676.	1.03	13.00	61	0.00	0.00	0.00	4594.
1.02	1.00	25	.12	.02	.10	608.	1.03	14.00	62	0.00	0.00	0.00	3971.
1.02	2.00	26	.12	.02	.10	536.	1.03	15.00	63	0.00	0.00	0.00	3432.
1.02	3.00	27	.12	.02	.10	477.	1.03	16.00	64	0.00	0.00	0.00	2967.
1.02	4.00	28	.12	.02	.10	434.	1.03	17.00	65	0.00	0.00	0.00	2565.
1.02	5.00	29	.12	.02	.10	406.	1.03	18.00	66	0.00	0.00	0.00	2217.
1.02	6.00	30	.12	.02	.10	392.	1.03	19.00	67	0.00	0.00	0.00	1916.
1.02	7.00	31	.40	.30	.10	407.	1.03	20.00	68	0.00	0.00	0.00	1656.
1.02	8.00	32	.40	.30	.10	483.	1.03	21.00	69	0.00	0.00	0.00	1431.
1.02	9.00	33	.40	.30	.10	637.	1.03	22.00	70	0.00	0.00	0.00	1237.
1.02	10.00	34	.40	.30	.10	875.	1.03	23.00	71	0.00	0.00	0.00	1069.
1.02	11.00	35	.40	.30	.10	1197.	1.04	0.00	72	0.00	0.00	0.00	924.
1.02	12.00	36	.40	.30	.10	1589.	1.04	1.00	73	0.00	0.00	0.00	795.
1.02	13.00	37	1.82	1.72	.10	2129.	1.04	2.00	74	0.00	0.00	0.00	684.
							1.04	3.00	75	0.00	0.00	0.00	588.
									SUM	23.70	20.46	3.24	390779.
										(602.)	(520.)	(82.)	(11065.63)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	28341.	26144.	14651.	5423.	390478.
CMS	803.	740.	415.	154.	11057.
INCHES		8.13	18.23	20.25	20.25
MM		206.60	463.09	514.28	514.28
AC-FT		12964.	29059.	32271.	32271.
THOUS CU M		15991.	35844.	39806.	39806.

STATION 1

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

	0.	4000.	8000.	12000.	16000.	20000.	24000.	28000.	32000.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	8.	6.	PRECIP(L) AND EXCESS(X) 4.	2.	0.
1.00	1I												L
2.00	2I												L
3.00	3I												L
4.00	4I												L
5.00	5I												L
6.00	6I												L
7.00	7I												L
8.00	8I												L
9.00	9I												L
10.00	10I												L
11.00	11I												L
12.00	12I												L
13.00	13I												LX
14.00	14I												LX
15.00	15I												LX
16.00	16I												LXX
17.00	17I												LX
18.00	18.I												LX
19.00	19.I												L
20.00	20.I												L
21.00	21. I												L
22.00	22. I												L
23.00	23. I												L
0.00	24. I												L
1.00	25. I												LX
2.00	26.I												LX
3.00	27.I												LX
4.00	28.I												LX
5.00	29.I												LX
6.00	30.I												LX
7.00	31.I												LXX
8.00	32.I												LXX
9.00	33. I												LXX
10.00	34. I												LXX
11.00	35. I												LXX
12.00	36. I												LXX
13.00	37. I												LXXXXXXXXX
14.00	38. I												LXXXXXXXXXX
15.00	39. I												LXXXXXXXXXXX
16.00	40. I												LXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
17.00	41. I												LXXXXXXXXXXXX
18.00	42. I												LXXXXXXXXX
19.00	43. I												LX
20.00	44. I												LX
21.00	45. I												LX
22.00	46. I												LX
23.00	47. I												LX
0.00	48. I												LX
1.00	49. I												L
2.00	50. I												L
3.00	51. I												L
4.00	52. I												L

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

1.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	2.	7.	27.	70.	128.	193.	258.
310.	343.	353.	338.	304.	268.	238.	217.	203.	196.
214.	242.	314.	437.	598.	795.	1064.	1495.	2164.	3276.
4467.	7076.	9324.	11445.	13087.	14014.	14170.	13563.	12384.	10985.
9414.	8379.	7295.	6340.	5499.	4761.	4117.	3557.	3074.	2657.
2297.	1985.	1716.	1483.	1282.	1108.	958.	828.	716.	618.
534.	462.	397.	342.	294.					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	14170.	13076.	7325.	2712.	195239.
CMS	401.	370.	207.	77.	5529.
INCHES		4.07	9.12	10.12	10.12
MM		103.30	231.55	257.14	257.14
AC-FT		6482.	14529.	16135.	16135.
THOUS CU M		7996.	17922.	19903.	19903.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	4.	14.	55.	140.	257.	387.	515.
621.	686.	707.	676.	608.	536.	477.	434.	406.	392.
407.	483.	637.	875.	1197.	1589.	2129.	2991.	4327.	6557.
9934.	14140.	18656.	22889.	26173.	28027.	28341.	27127.	24769.	21970.
19229.	16759.	14589.	12679.	10998.	9523.	8234.	7114.	6148.	5315.
4594.	3971.	3432.	2967.	2565.	2217.	1916.	1656.	1431.	1237.
1069.	924.	795.	684.	588.					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	28341.	26144.	14651.	5423.	390478.
CMS	803.	740.	415.	154.	11057.
INCHES		8.13	18.23	20.25	20.25
MM		206.60	463.09	514.28	514.28
AC-FT		12964.	29059.	32271.	32271.
THOUS CU M		15991.	35844.	39805.	39806.

****

HYDROGRAPH ROUTING

ROUTING INFLOW HYDROGRAPH THRU LAKE-OVERTOPPING ANALYSES

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

ROUTING DATA

QLOSS	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
1	0	0	0.000	0.000	0.000	-1.	0

SURFACE AREA= 7. 11. 17. 50.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
69.7	85.0	2.7	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
74.7	2.6	1.5	120.

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.	1.	2.	12.	44.	102.	169.	237.
296.	335.	352.	344.	315.	278.	247.	223.	207.	198.
208.	228.	293.	402.	556.	749.	1004.	1404.	2041.	3110.
4584.	6562.	8684.	10765.	12511.	13677.	14134.	13840.	12874.	11510.
10071.	8748.	7586.	6573.	5687.	4913.	4238.	3655.	3153.	2715.
2338.	2026.	1764.	1520.	1319.	1140.	987.	854.	739.	639.
553.	479.	414.	356.	307.					

STORAGE

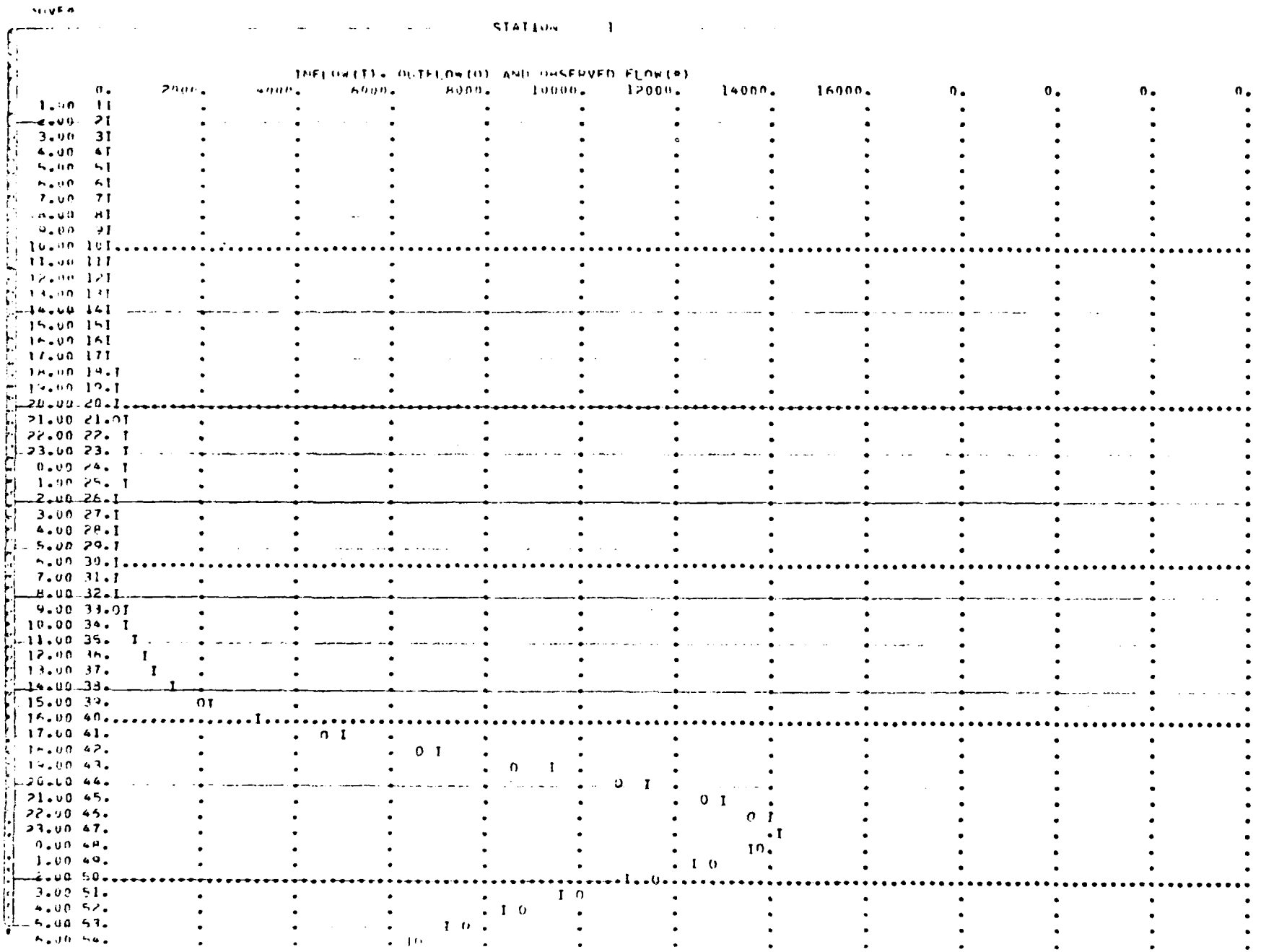
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	3.	5.	7.	9.
10.	11.	12.	12.	11.	10.	9.	9.	8.	8.
8.	9.	10.	14.	16.	20.	24.	30.	39.	51.
74.	111.	156.	213.	285.	303.	318.	308.	276.	234.
194.	160.	133.	111.	94.	80.	68.	59.	52.	46.
42.	39.	36.	32.	29.	26.	24.	22.	20.	18.
16.	15.	13.	12.	11.					

STAGE

69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7
69.7	69.7	69.7	69.7	69.7	69.8	70.1	70.4	70.6	70.9
71.1	71.2	71.3	71.2	71.1	71.0	70.9	70.8	70.8	70.7
70.8	70.9	71.1	71.4	71.8	72.3	72.9	73.7	74.8	75.9
77.0	78.3	79.5	80.6	81.4	82.0	82.2	82.1	81.6	81.0
80.3	79.6	78.9	78.3	77.8	77.3	76.8	76.3	75.9	75.5
75.2	74.8	74.4	73.9	73.5	73.2	72.9	72.6	72.3	72.0
71.8	71.6	71.4	71.3	71.1					

PEAK OUTFLOW IS 14134. AT TIME 47.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	14134.	13029.	7327.	2710.	195109.
CMS	400.	369.	207.	77.	5525.
INCHES		4.05	9.12	10.12	10.12
MM		102.96	231.69	256.97	256.97
AC-FT		6461.	14533.	16125.	16125.
THOUS CU M		7969.	17926.	19890.	19890.


STATION 1
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
0. 2000. 4000. 6000. 8000. 10000. 12000. 14000. 16000. 0. 0. 0. 0.

STATION 1. PLAN 1. RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	5.	28.	98.	215.	349.	483.
594.	674.	705.	686.	625.	553.	490.	444.	412.	395.
401.	454.	546.	818.	1128.	1515.	2031.	2871.	4037.	6008.
8922.	12627.	16705.	20733.	24225.	26727.	27954.	27770.	26226.	23718.
20840.	18063.	15601.	13457.	11615.	10008.	8611.	7409.	6379.	5496.
4738.	4086.	3525.	3041.	2617.	2256.	1952.	1703.	1467.	1272.
1099.	952.	821.	707.	609.					

STORAGE

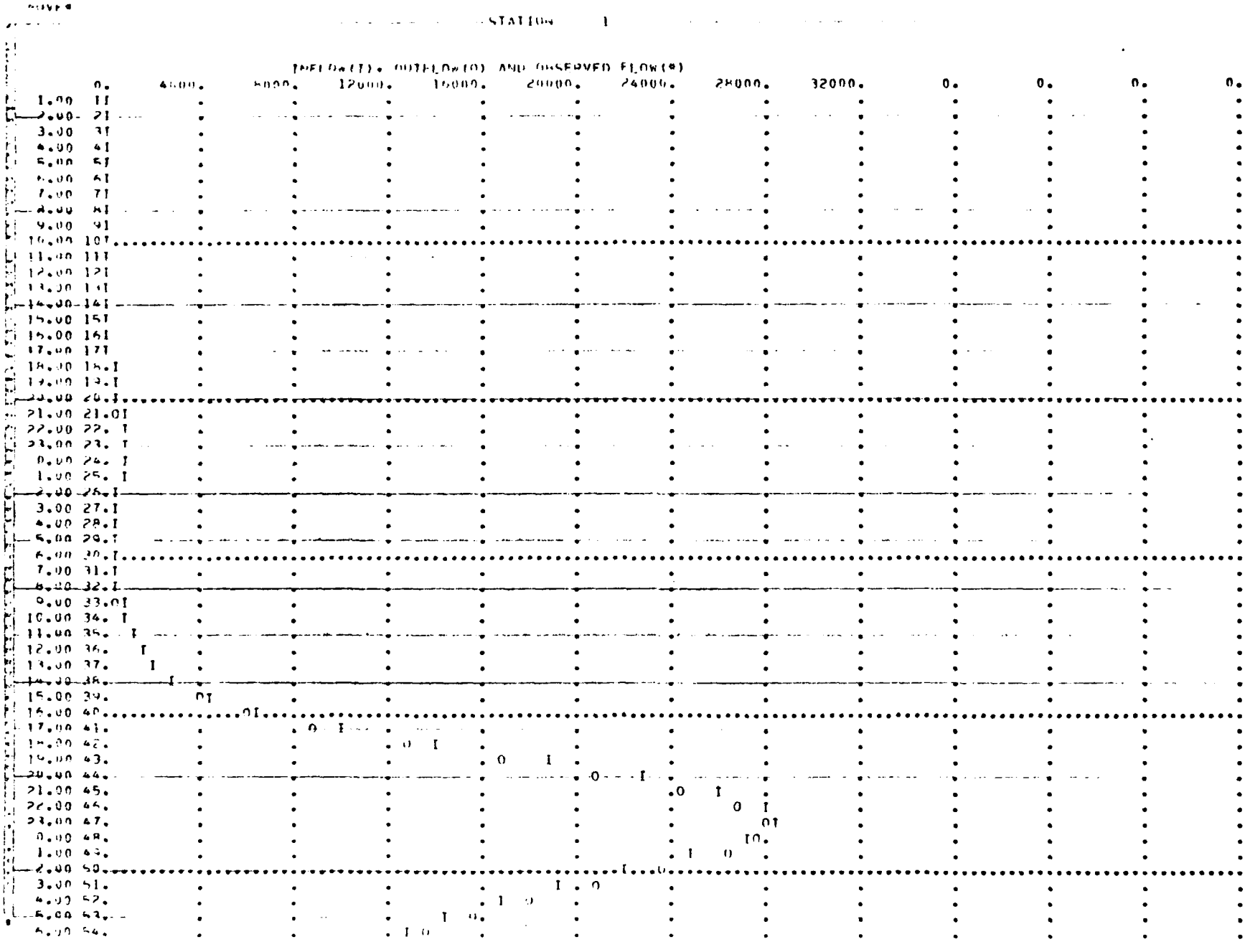
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	1.	2.	5.	8.	12.	15.
17.	18.	19.	19.	17.	16.	15.	14.	13.	13.
13.	14.	17.	21.	26.	32.	39.	48.	65.	100.
164.	269.	412.	581.	751.	885.	955.	944.	858.	725.
586.	466.	370.	296.	238.	192.	157.	129.	107.	90.
77.	66.	57.	50.	45.	41.	38.	35.	31.	28.
25.	23.	21.	19.	17.					

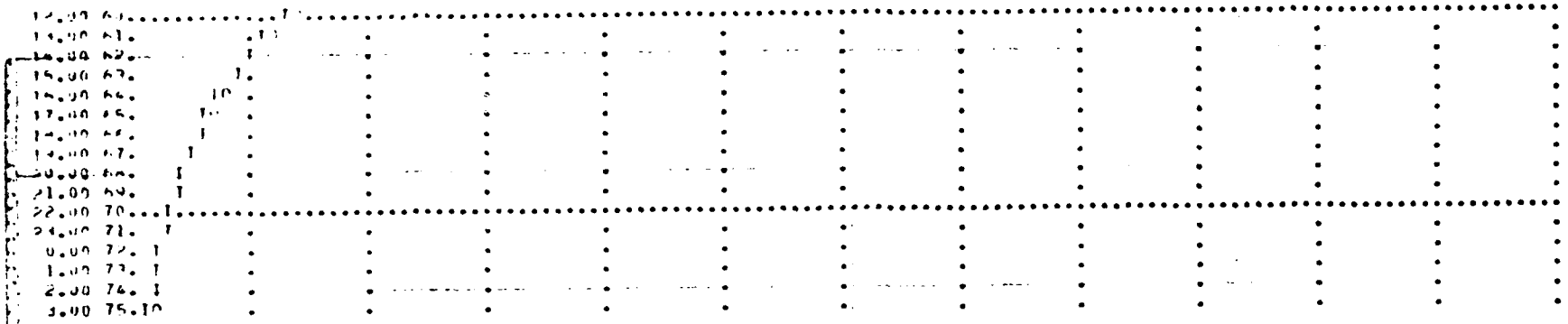
STAGE

69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7	69.7
69.7	69.7	69.7	69.7	69.8	69.9	70.3	70.8	71.3	71.6
71.9	72.1	72.2	72.2	72.0	71.8	71.7	71.5	71.4	71.4
71.4	71.5	71.9	72.5	73.2	73.9	74.8	75.7	76.6	78.0
79.6	81.5	83.3	85.0	86.3	87.2	87.7	87.6	87.1	86.1
85.0	83.9	82.8	81.9	81.0	80.2	79.5	78.8	78.2	77.6
77.1	76.7	76.2	75.8	75.5	75.1	74.7	74.3	73.8	73.4
73.1	72.8	72.6	72.2	72.0					

PEAK OUTFLOW IS 27954. AT TIME 47.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	27954.	25855.	14654.	5420.	390272.
CMS	792.	732.	415.	153.	11051.
INCHES		8.04	18.24	20.24	20.24
MM		204.31	463.22	514.01	514.01
AC-FT		12820.	29067.	32254.	32254.
THOUS CU M		15814.	35853.	39785.	39785.


STATION 1
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
0.
4000.
8000.
12000.
16000.
20000.
24000.
28000.
32000.
0.
0.
0.
0.



B-15

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 .50	RATIO 2 1.00
HYDROGRAPH AT	1	29.00	1	14170.	28341.
	(	77.44)	(	401.26)	(802.52) (
ROUTED TO	1	29.00	1	14134.	27954.
	(	77.44)	(	400.23)	(791.57) (

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	69.65	69.65	74.70
STORAGE	0.	0.	38.
OUTFLOW	0.	0.	1955.

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
.50	82.20	7.50	318.	14134.	24.00	47.00	0.00
1.00	87.68	12.98	955.	27934.	30.00	47.00	0.00

A. Size Classification

Height of dam = 31 ft.; hence Samll

Storage capacity at top of dam (elev. 72.15)= 118 AC-FT.; hence small

Adopted size classification small

B.i) Hazard Potential

This dam is located upstream of North Mianus, an urbanized area. The pond supplies water through a 24" pipe for this town.

ii) Impact of Failure of Dam at Maximum Pool (Top of Dam)

It is estimated from the rule of "thumb" failure hydrograph, that the following adverse impacts are a possibility by the failure of this dam.

a) Loss of homes Yes 3-5 ;
b) Loss of buildings Yes 3-5 ;
c) Loss of highways or roads No ;
d) Loss of bridges No ;

The failure profile can affect a distance of 4000 feet from the dam.

C. Hazard Potential Classifications

HAZARD	SIZE	TEST FLOOD RANGE
High	Small	1/2 PMF to PMF

Adopted Test Flood = 1/2 PMF = 490 CSM

= 14,200 CFS

D. Overtopping Potential

Drainage Area 19,164 Acres = 29.9 sq. miles

Spillway crest elevation = 69.65

Top of Dam Elevation = 72.15 (east)

Maximum spillway discharge

Capacity without overtopping of dam = 680 CFS
"test flood" inflow discharge = 14,200 CFS
"test flood" outflow discharge = 14,100 CFS

MIANUS FILTER PLANT DAM

Dam Failure Analysis

1. Failure discharge with pool at top of dam (elev. 72.15) = 8463 CFS
2. Depth of water in reservoir at time of failure = 28 ft.
3. Maximum depth of flow downstream of dam = @ Face 9.0 ft.
4. Water surface elevation just downstream) of dam at time of failure) = 50.5±

The failure discharge of 8463 CFS will enter and flow downstream 4000+ feet until the river enters Mianus Pond. Valley storage in this 4000 foot length of brook is substantial in reducing the discharge. Also due to roughness characteristics, obstructions and frictional losses, it is very likely that the unsteady dam failure flow will dissipate its wave and kinetic energy and thus convert to steady and uniform flow obeying Manning's formulae 4000 feet downstream. The failure profile will have the following hydraulic characteristics:

DISTANCE FROM THE DAM	WATER SURFACE ELEVATION	REMARKS
0	72.15	Upstream of dam
0	50.5	Downstream of dam
2000'	25.0	
4000'	19.5	

Beyond 4000 feet, and into Mianus Pond, the failure discharge will flow in the below given channel characteristics:

Q = 4582 CFS; S = .005

n = 0.05; b = 150; d = 4.5

Side slopes = 1V or 2H.

"Rule of Thumb Guidance for Estimating Downstream Dam Failure Analysis"

DATA

Name of Dam Mianus Filter Plant Dam

Location North of North Mianus

Drainage Area 29.9 sq. mi., Top of Dam 72.15 (east)

Spillway Type Broad Crested, Crest of Spillway 69.65

Surface Area @ Crest Elev. 7.6 Acres = 0.012 sq. mi.

Pool Bottom Near Dam = 41.5±

Assumed Side Slopes of Embankments = 2:1

Depth of Pool at Dam (Yo) = 28 Feet

Mid-Height Elev. 57.25

Length of Dam at Crest = 200 Feet

Length of Dam at Mid-Height = 171 Feet

20 % of Dam Length at Mid-Height = W_b = 34 Feet

Step 1

Storage (S) at time of failure 118 Ac-FT
(Equal to top of dam)

Step 2

Peak Failure Discharge
$Q_{pl} = 8/27\ W_b\ \sqrt{g}\ Yo^{3/2}$

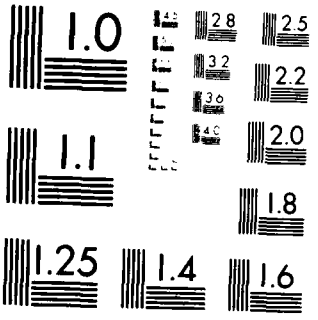
$= 1.68\ W_b\ Yo^{3/2}$ = 8463 cfs

Failure is assumed to coincide with pool elevation at top of dam.

AD-A142 685 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS MIANUS FILTER PLANT D..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV FEB 80 2/2

UNCLASSIFIED F/G 13/13 NL

END
DATE FILMED
8-84
DTIC



Mianus Pond is located 4000 feet downstream of Mianus Filter Plant dam. There is a 26.5 foot drop into Mianus pond which will cause the dissipation of wave and kinetic energy of the failure discharge. Approximately, the water surface elevations between the dam and Mianus pond will be as given on Dam Failure Analysis. The increase of depth in Mianus pond due to failure of Mianus Filter Plant dam is estimated to be 4.5 feet.

BY FLB DATE 1/22/79 SUBJECT DAM INSPECTION SHEET NO 1 OF 3
CHKD. BY ERJ DATE 1/25/79 STORAGE JOB NO 79-318

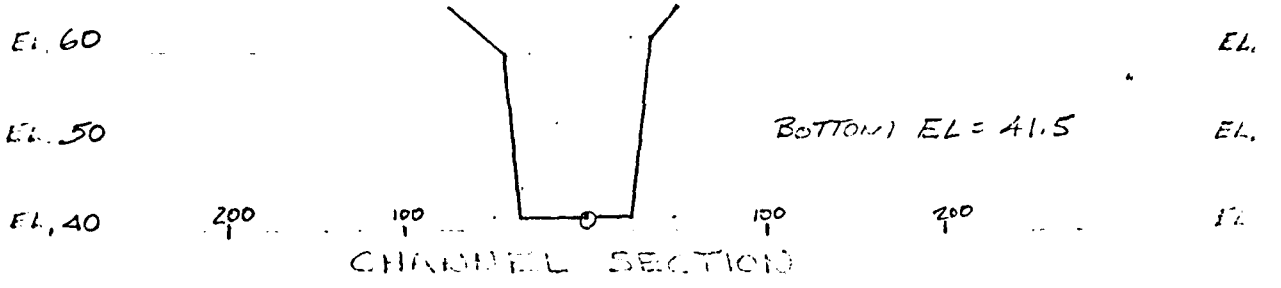
DOWNSTREAM W.S.EL. COMPUTATIONS

NAME OF DAM: MIANUS FILTER PLANT DAM

SECTION LOCATION: FACE DOWNSTREAM OF DAM

USING: $Q = 1.486/n\ A\ R^{2/3}\ S^{1/2}$

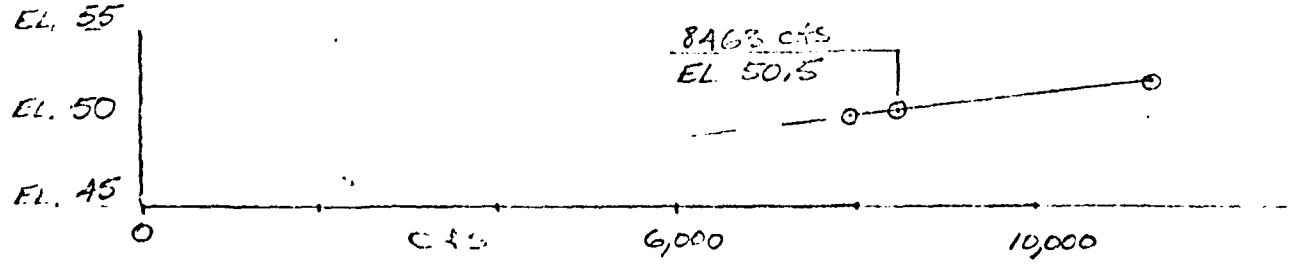
WHERE: n = 0.05 SLOPE = 0.017 ft/ft



CHANNEL SECTION

Q_{PF} = 8463 cfs STORAGE (S) 118 Ac-ft

ELEV	DEPTH	W.P.	R	$R^{2/3}$	S	$S^{1/2}$	Q	V
50	553	77	7.18	3.72	.13	29%	7952	8.5
55	916	87	10.52	4.80	.13	29%	16,996	13.5
52	696	81	8.59	4.20	.13	29%	11,282	



DEPTH @ DOWNSTREAM FACE OF DAM EQUAL TO 9.0 OR EL 50.5

STAGE DISCHARGE 8463 ELEV = 50.5 OR A D = 9.0

NEXT DOWNSTREAM SECTION 2000 FT.

PURCELL ASSOCIATES

BY FJC DATE 11/22/77 SUBJECT DAM INSPECTION SHEET NO 2 OF 3
CHKD. BY ERT DATE 11/23/77 STORAGE JOB NO 77-265

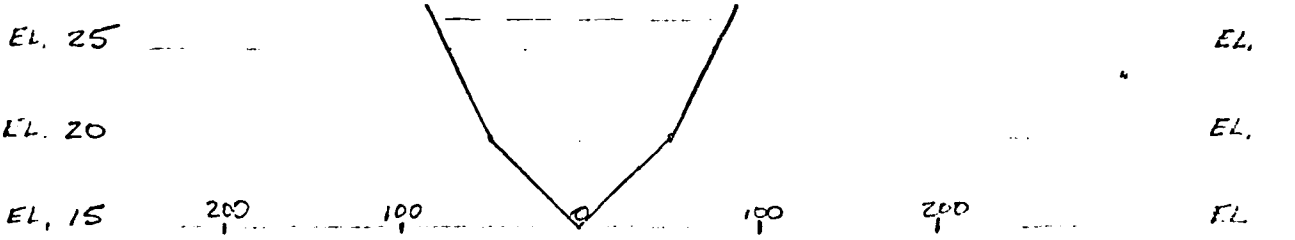
DOWNSTREAM W.S.EL. COMPUTATIONS

NAME OF DAM: MILANOS FILTER PLANT DAM

SECTION LOCATION: 2000' DOWNSTREAM OF DAM

USING: $Q = 1.486/n \, A R^{2/3} S^{1/2}$

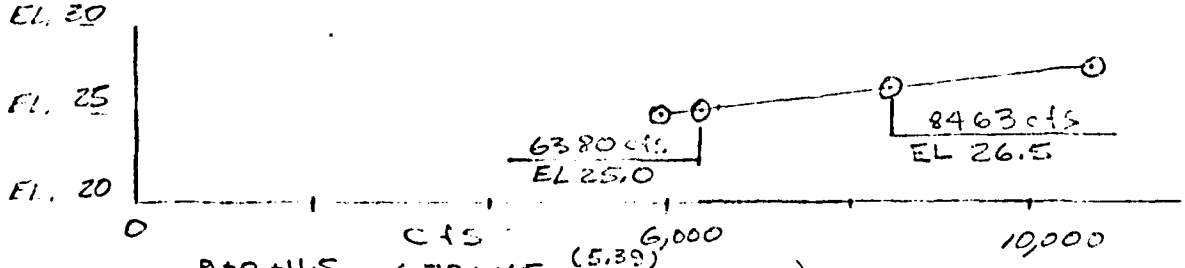
WHERE: n = 0.05 S = SLOPE = .005 1/1 (ASSUMED)



CHANNEL SECTION

Q_{P_1} = 8463 STORAGE (S) 118 Ac-ft

ELEV	AREA	WP	R	$A^{2/3}$	$S^{1/2}$	$1.486/n$	Q cfs	DIFF
20	250	100	2.5	1.84	.07	29.72	968	5
25	875	150	5.83	3.24	.07	29.72	5899	10
27.5	1281	170	7.54	3.84	.07	29.72	10,245	12.5



$V_1 = \frac{9+0+11.5}{2} \times \left(\frac{70+165}{2} \times 2000 - \frac{(5.39)}{43560} \right) 1/2 = 27.6$ Ac-ft

Q_{P_2} (TRIAL) $= Q_{P_1}(1 - V_1/S) = 6380$ cfs

$V_2 = \frac{9+0+10.0}{2} \times 5.39 \times 1/2 = 25.6$ Ac-ft VAVE = 26.6 Ac-ft

$Q_{P_2} = Q_{P_1}(1 - V_{AVE}/S) = 6626$ cfs

STAGE DISCHARGE = 6626 cfs ELEV = 25.0 OR A D = 10.0

NEXT DOWNSTREAM SECTION 2000' ft.

PURCELL ASSOCIATES

BY. FCR DATE 11/22/17 SUBJECT DAM INSPECTION SHEET NO. 3 OF 3
CHKD. BY. TRJ DATE 11/23/17 STORM III JOB NO. 77-005

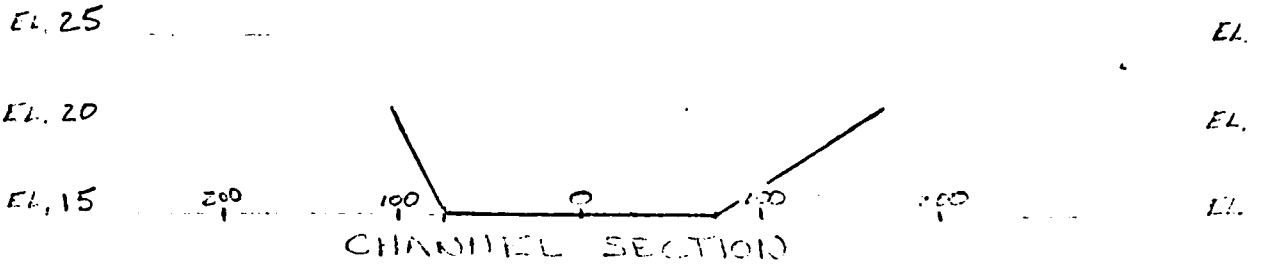
DOWNSTREAM W.S.EL. COMPUTATIONS

NAME OF DAM: _____

SECTION LOCATION: 4000' DOWNSTREAM OF DAM
JUST SOUTH OF PALMERS HILL RD

USING: $Q = 1.486/n \, A \, R^{2/3} \, S^{1/2}$

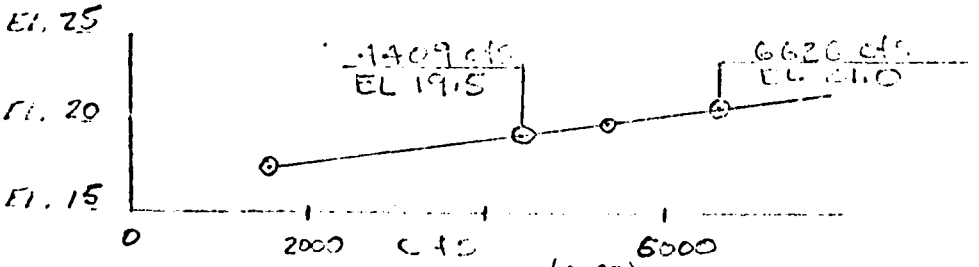
WHERE: n = 0.05 S = SLOPE = .005 ft/ft



CHANNEL SECTION

Q_{P_1} = 6626 cfs STORAGE (S) 118 Ac-ft

ELEV	AREA	WP	R	$A^{2/3}$	$S^{1/2}$	$1.486/n$	S	
17.5	444	205	2.16	1.67	.07	29.72	1546	2.5
20	1013	250	4.05	2.54	.07	29.72	5358	5.0
						29.72		



$V_1 = \frac{10.0+6.0}{2} \times \left(\frac{160+270}{2} \times 2000 \div 43,560\right) 1/2 = 39.5$ Ac-ft (9.87)

$Q_{P_2(TRIAL)} = Q_{P_1}(1 - V_1/S) = 4409$ cfs

$V_2 = \frac{10.0+4.5}{2} \times \left(\frac{150+240}{2} \times 200 \div 43,560\right) 1/2 = 33.3$ Ac-ft $V_{AVE} = 36.4$ Ac-ft

$Q_{P_2} = Q_{P_1}\left(1 - V_{AVE}/S\right) = 4582$ cfs

STAGE DISCHARGE = 4582 cfs ELEV = 19.5 OR A D = 1.5

NEXT DOWNSTREAM SECTION N/A ft.

RATING CURVE DEVELOPMENT

Mianus Filter Plant Dam

Spillway

$Q = C\ L\ H^{2/3}$

$C = 2.65$

$L = 65$ feet

24 Inch Blowoff

$Q = c\ a\ (2gh)^{1/2}$

$c = .6$

$a = 3.14$ square feet

Floodgates

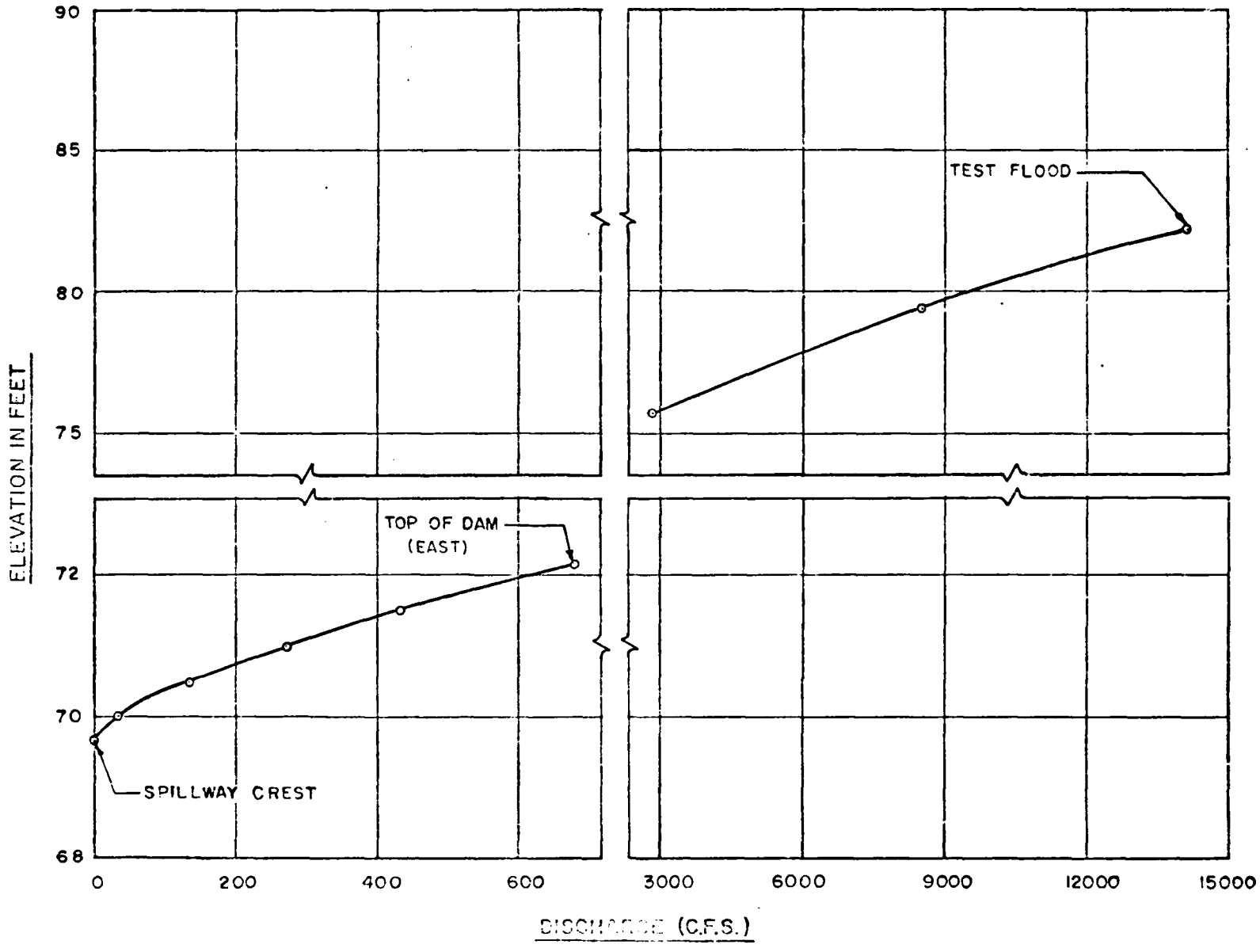
$Q = C\ L\ H^{2/3}$ (unsubmerged)

$C = 2.7$

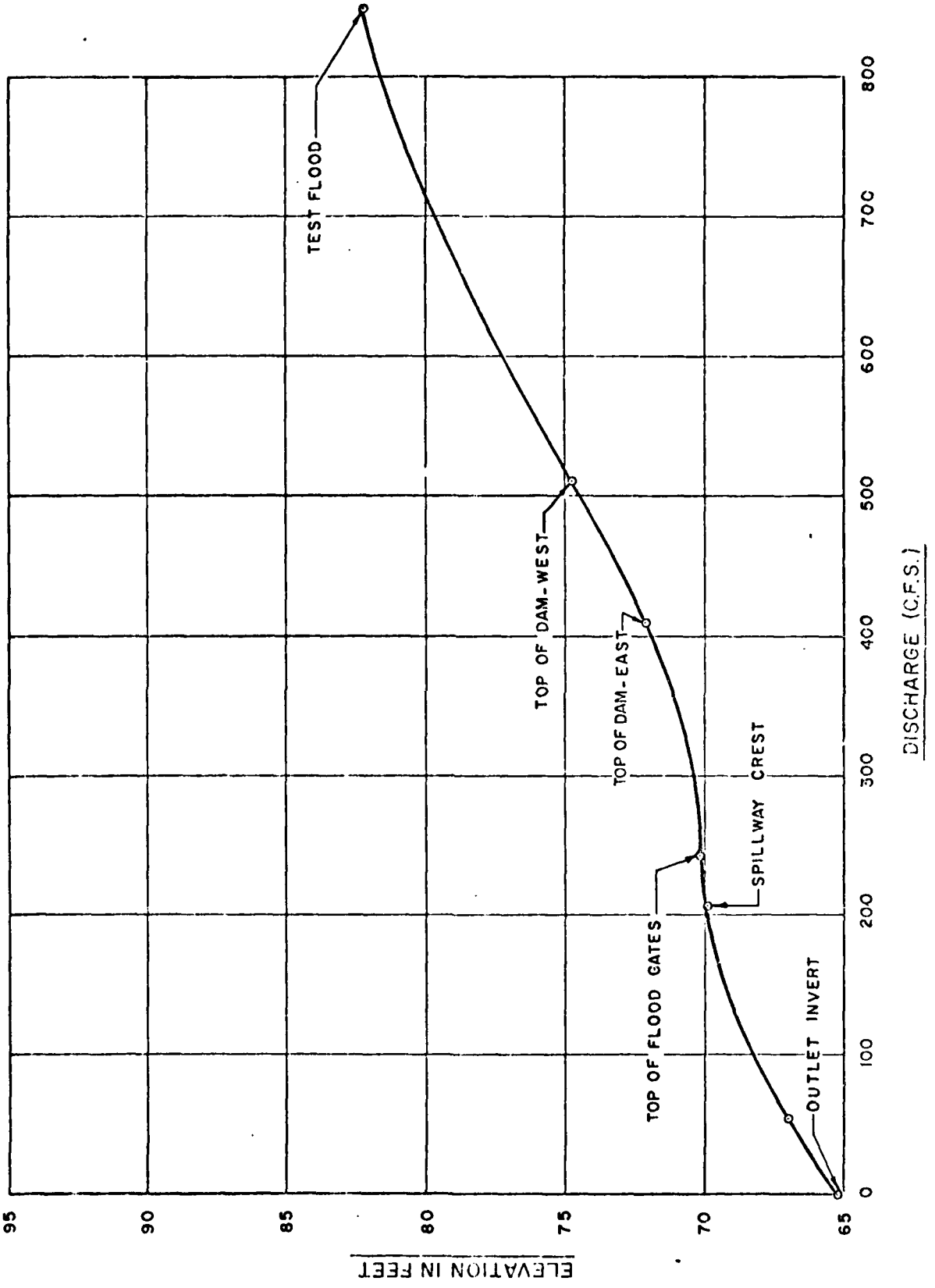
$L = 8$ feet

$Q = c\ a\ (2gh)^{1/2}$ (submerged)

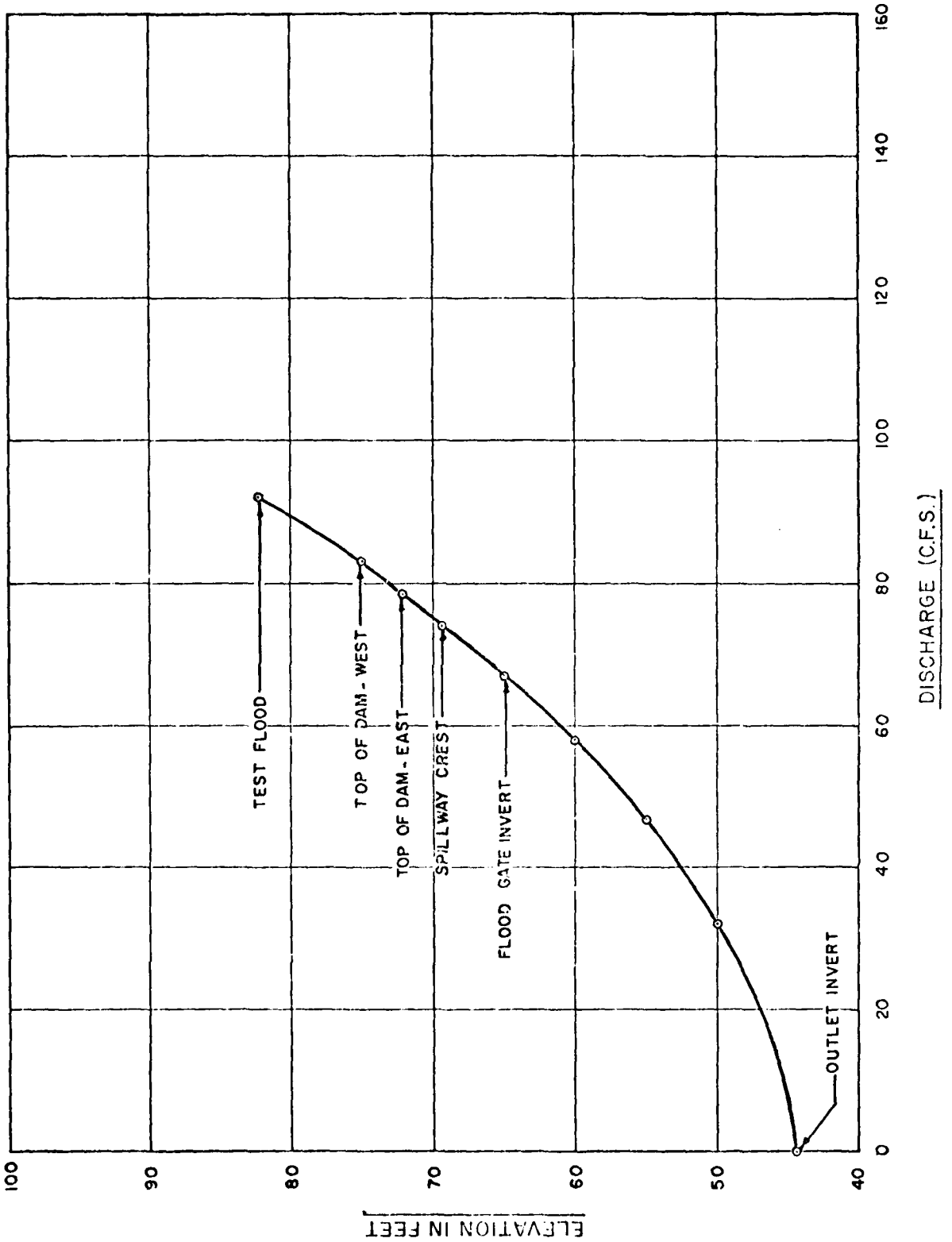
$c = 40$ square feet



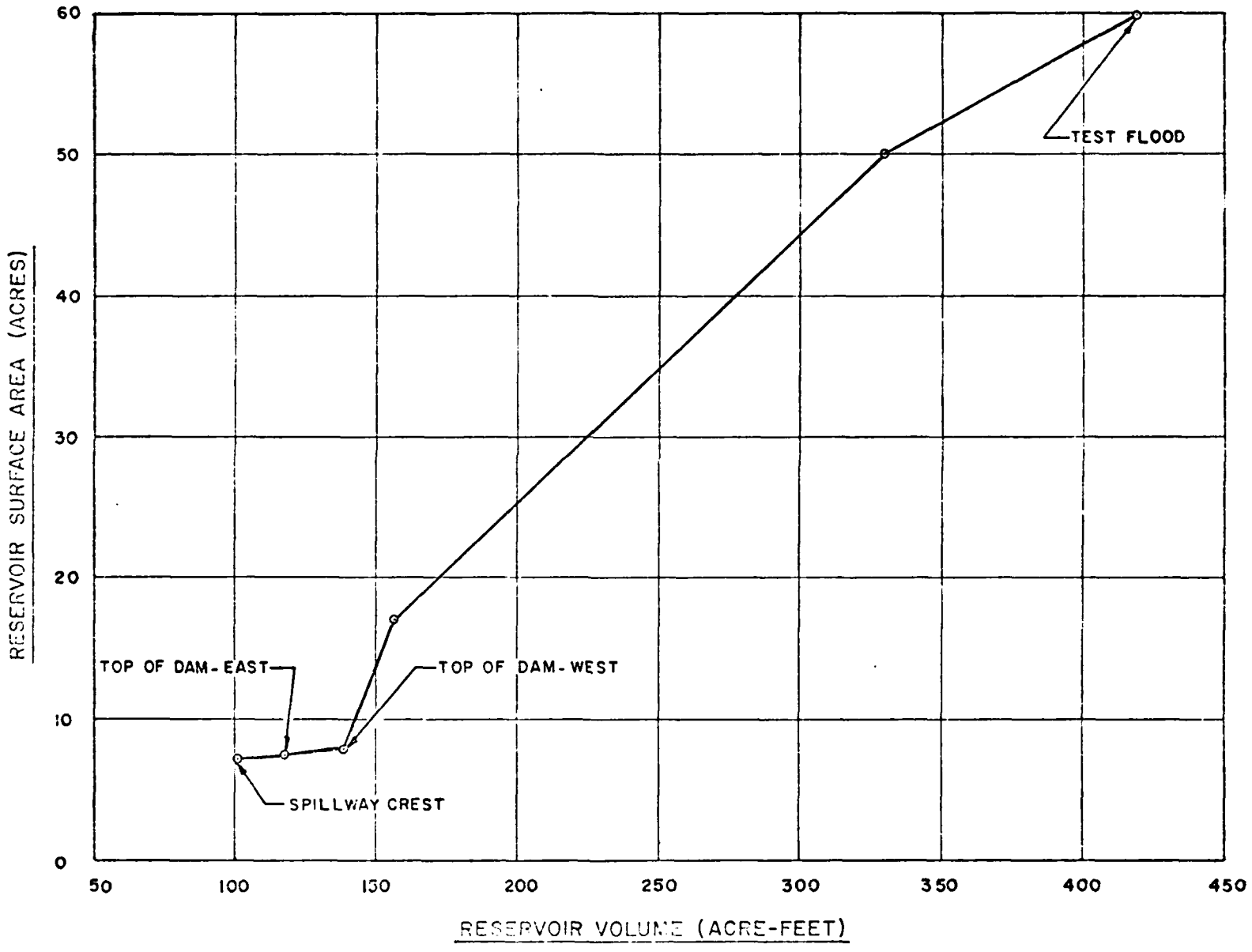
MIANUS FILTER PLANT DAM
SPILLWAY RATING CURVE



MIANUS FILTER PLANT DAM
FLOOD GATES RATING CURVE



MIANUS FILTER PLANT DAM
LOW LEVEL BLOWOFF
OUTLET WORKS RATING CURVE



MIANUS FILTER PLANT DAM
RESERVOIR AREA-CAPACITY CURVE

APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
CT	40	NED	CT	001	04				MIANUS FILTER PLANT DAM	4104.1	7334.7	19	DEC	79

POPULAR NAME	NAME OF IMPOUNDMENT
	MIANUS RIVER

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI)	POPULATION
01	07	MIANUS RIVER	NORTH MIANUS	1	2000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT)	HYDRAULIC HEIGHT (FT)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT)	DIST	U&N	FED R	PRV/FED	SCS A	VER/DATE
PGOT	1875	S	31	31	116	101	NED	N	N	N	N	

REMARKS
21=STONE MASONARY, 22=APPROXIMATE, MODIFIED IN 1955

DIS HAS	SPILLWAY LENGTH (FT)	SPILLWAY TYPE	SPILLWAY WIDTH (FT)	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)
1	130	U	65	680	2100											

OWNER	ENGINEERING BY	CONSTRUCTION BY
CT AMERICAN WATER CO	AM WATER WORKS SERV CO	

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
		CT DEPT ENVIR PROT	CT DEPT ENVIR PROT

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
JAMES P PURCELL ASSOCIATES INC	13	NOV	79	

REMARKS
47=1955 MODIFICATIONS ONLY


DATE
ILME