

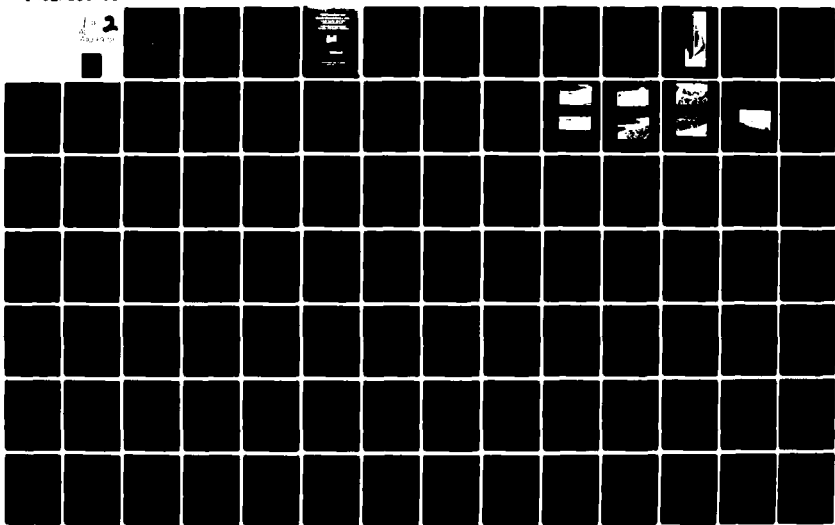
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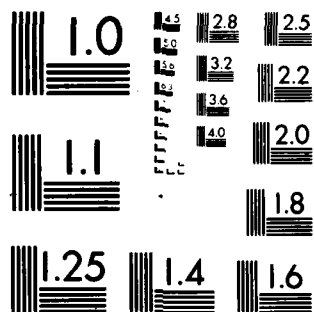
NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. DELMAR RESERVOIR NUMBER 1 DAM (INV--ETC(U)
SEP 81 G KOCH

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REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG
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7. AUTHOR(s) GEORGE KOCH		6. PERFORMING ORG. REPORT NUMBER DACW51-79-C-0001
9. PERFORMING ORGANIZATION NAME AND ADDRESS New York State Department of Environmental Conservation 50 Wolf Road Albany, New York 12233		10. PROGRAM ELEMENT, PROJECT, AREA & WORK UNIT NUMBER
11. CONTROLLING OFFICE NAME AND ADDRESS Department of the Army 26 Federal Plaza New York District, CofE New York, New York 10287		12. REPORT DATE 14 September 1979
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dam Safety National Dam Safety Program Visual Inspection Hydrology, Structural Stability Delmar Reservoir Dam No. 1 Albany County, NY Lower Hudson River Basin		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization. The examination of documents and visual inspection of the Delmar No. 1 Dam did not reveal conditions which constitute a hazard to human property. → next page		

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Since this is a storage reservoir with an embankment entirely surrounding the pond area, the hydraulic/hydrologic analysis was not performed in the usual manner of modeling a watershed area. The drainage area for this structure was limited to the reservoir itself. From normal water surface elevation to the top of the dam, the Probable Maximum Flood can safely be stored and discharged through the overflow pipe. Therefore, the spillway is therefore assessed as adequate.

PREFACE

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

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

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

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

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
DELMAR RESERVOIR NO. 1 DAM
I.D. NO. N.Y. 1401
LOWER HUDSON RIVER BASIN
ALBANY COUNTY, N.Y.

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Phase I Inspection Report
National Dam Safety Program

Name of Dam: Delmar Reservoir No.1
I.D. No. NY -1401

State Located: New York

County Located: Albany

Watershed: Lower Hudson

Date of Inspection: May 8, 1981

ASSESSMENT:

The examination of documents and visual inspection of the Delmar Reservoir No. 1 Dam did not reveal conditions which constitute a hazard to human life or property.

Since this is a storage reservoir with an embankment entirely surrounding the pond area, the hydraulic/hydrologic analysis was not performed in the usual manner of modeling a watershed area. The drainage area for this structure was limited to the reservoir itself. From normal water surface elevation to the top of the dam, the Probable Maximum Flood can safely be stored and discharged through the overflow pipe. Therefore, the spillway is therefore assessed as adequate.

Three deficiencies were noted which should be corrected within 6 months of the date of notification to the owner. These are:

- a. Remedial measures to eliminate sloughing of the western portions of the embankment.
- b. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the drain system. Document this information for future reference.
- c. An emergency action plan for the notification of nearby residents should be developed and updated periodically during the life of the structure.

George Koch
G. Koch

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

Approved by:

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

Date:

14 Sept 81



OVERVIEW - DELMAR RESERVOIR
(from Southwest Corner)

Phase I Inspection Report
National Dam Safety Program
Delmar Reservoir No. 1 I.D. No. NY 1401
DEC No. 208-861 Lower Hudson River Basin
Albany County, NY

SECTION 1. PROJECT INFORMATION

1.1 GENERAL

a. Authority

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

b. Purpose of Inspection

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

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Delmar Reservoir No. 1 is a water supply storage and distribution reservoir for the Town of Bethlehem, New York. The impoundment is created by an embankment with a steel sheet pile core wall. The interior slope is protected with placed rip rap while the crest and exterior slope are vegetated. Height of embankment varies from 20' to 2'. Both interior and exterior slopes are 2.5 horizontal to 1.0 vertical. There are actually two ponds split by an embankment in which a 10" uncontrolled pipe connects the two. There is another 10" cast iron pipe from the northerly pond through the embankment which does not show on the plans. This pipe acts as a spillway. There is a 12" clean out pipeline located along the intake line in each pond.

b. Location

The reservoir is located about 2.5 miles west of Slingerlands, N.Y. just north of Rte 85. It is in the Vloman Creek watershed which is in the Lower Hudson Basin.

c. Size

The dam is 20 feet high and impounds 163 acre-feet normally. The dam is classified as "small" in size.

d. Hazard Classification

The dam is classified as high hazard due to its location relative to several homes just east of the embankment along Rte 85.

e. Ownership

The dam is owned and maintained by the Town of Bethlehem, New York. Mr. Paul Andress Jr., Chief Operator, Water District No. 1, Box 383, R.D. Delmar, NY 12054 (518) 765-4433 was the person contacted for the inspection.

f. Purpose of the Dam

The dam is used for storage and distribution in the Town of Bethlehem's water supply system.

g. Design and Construction History

The present structure was built in 1930 according to Permit Applications in the N.Y.S. Department of Environmental Conservation files. There was an existing structure of unknown age creating a small pond at the site when the reconstruction permit was issued. It was believed to be a part of the water supply system, also. The reconstruction was designed and built under the supervision of Solomon and Keis, Consulting Engineers, Troy, New York.

h. Normal Operating Procedures

Normal inflow enters the reservoirs through an 8 inch pipeline from the Vly Creek Reservoir/Treatment plant. Outflow from the reservoirs is transmitted to the water supply system by 10 inch lines. Water levels in the reservoirs are monitored by a telemeter back to the Vly Creek Treatment Plant.

1.3 PERTINENT DATA

<u>a. Drainage Area (acres.)</u>	8.07
<u>b. Elevations (ft., USGS Datum)</u>	
Top of Dam	457.0
Outlet Pipe Invert (Normal water surface)	455.1
<u>c. Reservoir</u>	
Surface Area @ Normal Pool Elevation (acres)	
Storage @ Top of Dam (acre-feet)	178.0
Storage @ Normal Pool Elevation (acre-feet)	163.0
<u>d. Dam</u>	
Type: Homogeneous earth embankment with steel sheet pile core wall.	
Length (ft.)	
Upstream Slope:	2.5:1
Downstream Slope:	2.5:1
Crest Width (ft.)	20
<u>e. Spillway</u>	
Type: 10 inch cast iron pipe.	
Capacity (cfs)	3.0

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

The Delmar Reservoir No.1 Dam is located in the glaciated portion of the Appalachian Uplands (northern extreme of the Appalachian Plateau) physiographic province of New York State. These uplands were formed by the dissection of the uplifted but flat lying sandstones, limestones, and shales of the Ordovician Period (435 to 500 million years ago). The plateau surface is represented by flat-topped divides with drainage generally north eastward.

Glacial cover is generally thin, the deposits of which have resulted from glaciation during the Wisconsin glaciation, approximately 11,000 years ago.

The "Preliminary Brittle Structures Map of New York" developed by Ynguar W. Isachsen and William G. McKendree (1977) does not indicate the presence of any faulting or other brittle deformations within the vicinity of the dam.

2.2 SUBSURFACE INVESTIGATIONS

No subsurface investigation could be located for the dam. The "General Soil Map of New York State" prepared by Cornell University Agriculture Experiment Station indicates that the surficial soils are the Burdett and Darien series of glacial till origin. These soils are formed on glacial till from shale and limestone, and are composed of stony silt, some clay and a trace of sand. The permeability is low and runoff is generally moderate.

2.3 DAM AND APPURTENANT STRUCTURES

The present structure was built in 1930 at the site of an existing dam which was believed to be part of the water supply system also. The reconstruction was designed and built under the supervision of Solomon and Keis, Consulting Engineers, Troy, New York.

The design of the structure includes a steel sheet piling through the embankment which surrounds the entire embankment. The only spillway capacity is through a 10 inch pipe through the embankment on the north end of the reservoir, with an invert elevation 1.9 feet below crest elevation.

2.4 CONSTRUCTION RECORDS

No construction records are available for the construction or reconstruction of the Delmar Reservoir No. 1 Dam.

2.5 OPERATION RECORDS

The operation records available are kept at the Water Treatment Plant at Vly Creek Reservoir.

2.6 EVALUATION

The data presented in this report has been compiled from information obtained from Mr. Paul Andress, Jr., Town of Bethlehem and the New York State Department of Environmental Conservation files. This information appears adequate and reliable for Phase I Inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Delmar Reservoir No. 1 and the surrounding area was conducted on May 8, 1981. The weather was clear and the temperature ranged in the sixties. The reservoir level was low at the time and the storage was not in use due to water quality problems.

b. Embankment

The only sign of instability along the embankment is on the west side where some of the slope is in cut section. The western portion of the embankment is cut into a natural hillside, groundwater is emanating on the pond side of the slope and causing sloughing and movement of the rip rap protection. (Photos # 4 & 5) This seepage is causing water quality problems as well as structural instability of the slope. The rest of the embankment creating the perimeter of the pond appeared to be in very good condition. All slopes are vegetated and well maintained. The clay blanket which could be observed due to the low water level appeared to be well placed and intact.

c. Seepage

The only seepage apparent was that previously mentioned into the pond, causing instability to the cut slope. No signs of seepage were evident at the toe of the embankment on the fill sections around the rest of the pond.

d. Spillway

The only spillway out of ponds is a 10 inch, uncontrolled, pipe through the north embankment. Its invert is located 1.9 feet below the crest of the embankment.

e. Reservoir Drain

There is a 12 inch clean out line and a 10 inch water supply line from each pond. All lines are reportedly operational.

f. Downstream Channel

There is no confined downstream channel.

g. Reservoir

The reservoir was low at the time of inspection. There was no problems with sedimentation, however, groundwater infiltration was causing quality problems. The slope instability on the west cut section was the only problem found concerning the embankment.

3.2 EVALUATION OF OBSERVATION

Visual inspection of the Delmar Reservoir No. 1 Dam revealed the following deficiency:

- a. Sloughing at several points into the reservoir of the slope on the western side of the reservoir. This subsidence is caused by seepage from the hillside above the embankment.

SECTION 4: OPERATION AND MAINTENANCE

4.1 PROCEDURES

Being a water supply distribution reservoir, the water surface elevation is constantly maintained by the piping system from the treatment plant and to the distribution system in the town. There is a telemeter level gauge on the pond continually recording at the Vly Creek treatment plant.

4.2 MAINTENANCE OF THE DAM

The dam is maintained by the owners, the Town of Bethlehem.

4.3 WARNING SYSTEM

There is no warning system in effect or in preparation.

4.4 EVALUATION

The dam has been well maintained, however, the single problem of seepage from the west slope must be resolved.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

This structure is a series of two storage reservoirs for water supply 20 feet apart and connected by a 10 inch diameter pipe. Each of the two reservoirs is completely surrounded by embankment. The structure's drainage area, therefore, is limited to the surface area of the two reservoirs. The total drainage area for this dam is 8.07 acres.

5.2 ANALYSIS CRITERIA

Since the two reservoirs are connected by a 10 inch diameter pipe, they were treated as a single drainage area for analysis purposes. The inflow to and outflow from the reservoirs for the water supply portion of the flow was not analysed since that can be controlled by operation of valves. Only the runoff resulting from rain falling directly on the reservoirs was considered. The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers HEC-1 computer program. The floods selected for analysis were the PMF and $\frac{1}{2}$ PMF in accordance with the recommended guidelines of the Corps of Engineers.

5.3 SPILLWAY CAPACITY

The spillway is a 10 inch diameter pipe through the embankment with its invert elevation at 455.1. Its capacity at the reservoir water surface elevation of 456.2 which would result from a storm equal to one half the PMF, is 2 cfs. This capacity will increase to 3 cfs at the reservoir water surface elevation of 456.9 caused by a storm equal to the PMF.

5.4 RESERVOIR CAPACITY

The normal storage capacity of this reservoir is about 163 acre-feet. Approximately 15 acre-feet of additional storage capacity is available between the normal pool and the top of the dam, creating a total storage of 178 acre-feet. The surcharge storage between the spillway and the dam crest is equivalent to 22.3 inches of runoff.

5.5 FLOODS OF RECORD

No record of past floods is available since this is a storage reservoir completely surrounded by embankment and the only contributing drainage area is the surface area of the reservoir itself.

5.6 OVERTOPPING POTENTIAL

The PMF analysis indicates that, barring any wave action, the embankment will be high enough to contain a storm equal in magnitude to the PMF without any overtopping since the maximum reservoir water surface elevation is expected to reach 456.86 compared to the dam crest elevation of 457.0.

5.7 EVALUATION

The spillway capacity combined with the surcharge storage will retain and safely discharge the PMF. The spillway is, therefore, assessed as adequate according to the Corps of Engineer's screening criteria.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation

Signs of distress were found in connection with the western slope in the cut section. Seepage was noted emanating from the slope at several points through the rip rap causing sloughing of the slope. (Photos #4, 5, & 6)

b. Design and Construction Data

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

c. Operating Records

No operating problems were reported which would affect the stability of the dam.

d. Post Construction Changes

The embankment was built on the site of a smaller water supply and distribution pond. Since the reconstruction, an open ditch along the western portion of embankment has been dug to intercept surface runoff and groundwater seeping through the embankment into the pond.

SECTION 7: ASSESSMENT/RECOMMENDATION

7.1 ASSESSMENT

a. Safety

The Phase I Inspection of the Delmar Reservoir No. 1 revealed that the spillway capacity combined with the surcharge storage allows the structure to impound and safely discharge the PMF. Therefore, the spillway is "adequate" based upon the Corps of Engineers' screening criteria.

b. Adequacy of Information

The plans acquired from the Town of Bethlehem and N.Y.S.D.E.C. appeared to be accurate and relatively complete. Other information was gathered from visual inspection and water department personnel.

c. Need for Additional Investigations

No additional investigations are required at this time.

d. Urgency

All recommended measures described below should be completed with six months from the date of notification of the owner.

7.2 RECOMMENDED MEASURES

The following actions should be taken within 6 months from the date of notification of the owner:

- a. Remedial measures to eliminate sloughing of western portions of embankment.
- b. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system. Document this information for future reference.
- c. An emergency action plan for the notification of nearby residents should be developed and updated periodically during the life of the structure.

APPENDIX A

PHOTOGRAPHS



Photo #1 OVERVIEW
From Northeast Corner



Photo #2 Embankment Separating
the two ponds. (from west side)



Photo #3 Drainage Ditch
along west slope



Photo #4 Slope failures caused
by seepage (western slope, looking south)



Photo #5 Seepage points on
western slope



Photo #6 Seepage points on
western slope

Photo #7 Overflow pipe,
located through Northern embankment



APPENDIX B

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST1) Basic Data

a. General

Name of Dam DELMAR RESERVOIR No 1
Fed. I.D. # NY 1401 DEC Dam No. 208-861 L.H.
River Basin LOWER HUDSON
Location: Town New Scotland County ALBANY
Stream Name NOT ON A WATER COURSE
Tributary of VIOMAN CREEK
Latitude (N) 42° 37.7' Longitude (W) 73° 55.7'
Type of Dam EARTH FILL WITH SHEET PILE CUTOFF
Hazard Category HIGH - 'C'
Date(s) of Inspection MAY 8, 1981
Weather Conditions CLEAR, 60's°
Reservoir Level at Time of Inspection 6 FEET BELOW NORMAL

b. Inspection Personnel KEN. HARMER, SYED HUSAIN, JAMIE VEITCH

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

MR. PAUL ANDRESS, JR.
CHIEF OPERATOR, WATER DISTRICT No. 1
Box 383 R.D. DELMAR NY 12054
(518) 765-4433

d. History:

Date Constructed 1930 Date(s) ReconstructedDesigner Solomon & Keis, TROY, NYConstructed By UNKNOWNOwner TOWN OF BETHLEHEM

2) Embankment

a. Characteristics

- (1) Embankment Material EARTH
- (2) Cutoff Type STEEL SHEET PILE
- (3) Impervious Core "
- (4) Internal Drainage System UNKNOWN
- (5) Miscellaneous _____

b. Crest

- (1) Vertical Alignment good
- (2) Horizontal Alignment good
- (3) Surface Cracks NONE
- (4) Miscellaneous _____

c. Upstream Slope

- (1) Slope (Estimate) (V:H) 1:2.5
- (2) Undesirable Growth or Debris, Animal Burrows NONE
- (3) Sloughing, Subsidence or Depressions WESTERN portion
sloughing due to seepage into reservoir
from hillside above reservoir

- (4) Slope Protection rip rap well placed, good condition
except for a portion where the sloughing
undermined rip-rap.
- (5) Surface Cracks or Movement at Toe No

d. Downstream Slope

- (1) Slope (Estimate - V:H) 1:2.5
- (2) Undesirable Growth or Debris, Animal Burrows No
- (3) Sloughing, Subsidence or Depressions No
- (4) Surface Cracks or Movement at Toe No
- (5) Seepage No
- (6) External Drainage System (Ditches, Trenches; Blanket) drainage ditch between hillside and western
embankment partially clogged w/ vegetation.
- (7) Condition Around Outlet Structure good
- (8) Seepage Beyond Toe NONE FOUND

e. Abutments - Embankment Contact

good.

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(1) Erosion at Contact NONE

(2) Seepage Along Contact NONE

3) Drainage System

a. Description of System UNKNOWN

b. Condition of System

c. Discharge from Drainage System

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

reservoir level gauge telemetered to treatment plant

5) Reservoir

- a. Slopes completely embankment - western portion
sloughing
- b. Sedimentation NONE
- c. Unusual Conditions Which Affect Dam WATER SUPPLY, EMBANKMENT
completely encloses RESERVOIR

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) several
homes IN VICINITY OF EMBANKMENT
- b. Seepage, Unusual Growth NONE
- c. Evidence of Movement Beyond Toe of Dam NONE
- d. Condition of Downstream Channel N/A

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

- 10" dia. pipe 1.9' below dam crest elevation.
- a. General very unusual to have flow in spillway
pipe as level is maintained by the water
system
- b. Condition of Service Spillway good

c. Condition of Auxiliary Spillway Noned. Condition of Discharge Conveyance Channel N/A8) Reservoir Drain/OutletType: Pipe 2 (from both reservoirs) conduit _____ Other _____Material: Concrete _____ Metal ☒ Other _____Size: 12" Length _____

Invert Elevations: Entrance _____ Exit _____

Physical Condition (Describe): reportedly operating Unobservable ☒Material: castJoints: ? Alignment ?Structural Integrity: Apparently goodHydraulic Capability: ?Means of Control: Gate _____ Valve ☒ Uncontrolled _____Operation: Operable ☒ Inoperable _____ Other _____

Present Condition (Describe): _____

9) Structural

a. Concrete Surfaces

good

b. Structural Cracking

None

c. Movement - Horizontal & Vertical Alignment (Settlement)

None

d. Junctions with Abutments or Embankments

good

e. Drains - Foundation, Joint, Face

NONE FOUND

f. Water Passages, Conduits, Sluices

—

g. Seepage or Leakage

seepage from hillside creating
sloughing of embankment into reservoir

h. Joints - Construction, etc. good

i. Foundation APPARENTLY good

j. Abutments good

k. Control Gates —

l. Approach & Outlet Channels N/A

m. Energy Dissipators (Plunge Pool, etc.) N/A

n. Intake Structures good

o. Stability good (except for western portion)

p. Miscellaneous —

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

- a. Description and Condition ALL APPURTENANCES IN
GOOD OPERATING CONDITION

11) Operation Procedures (Lake Level Regulation):

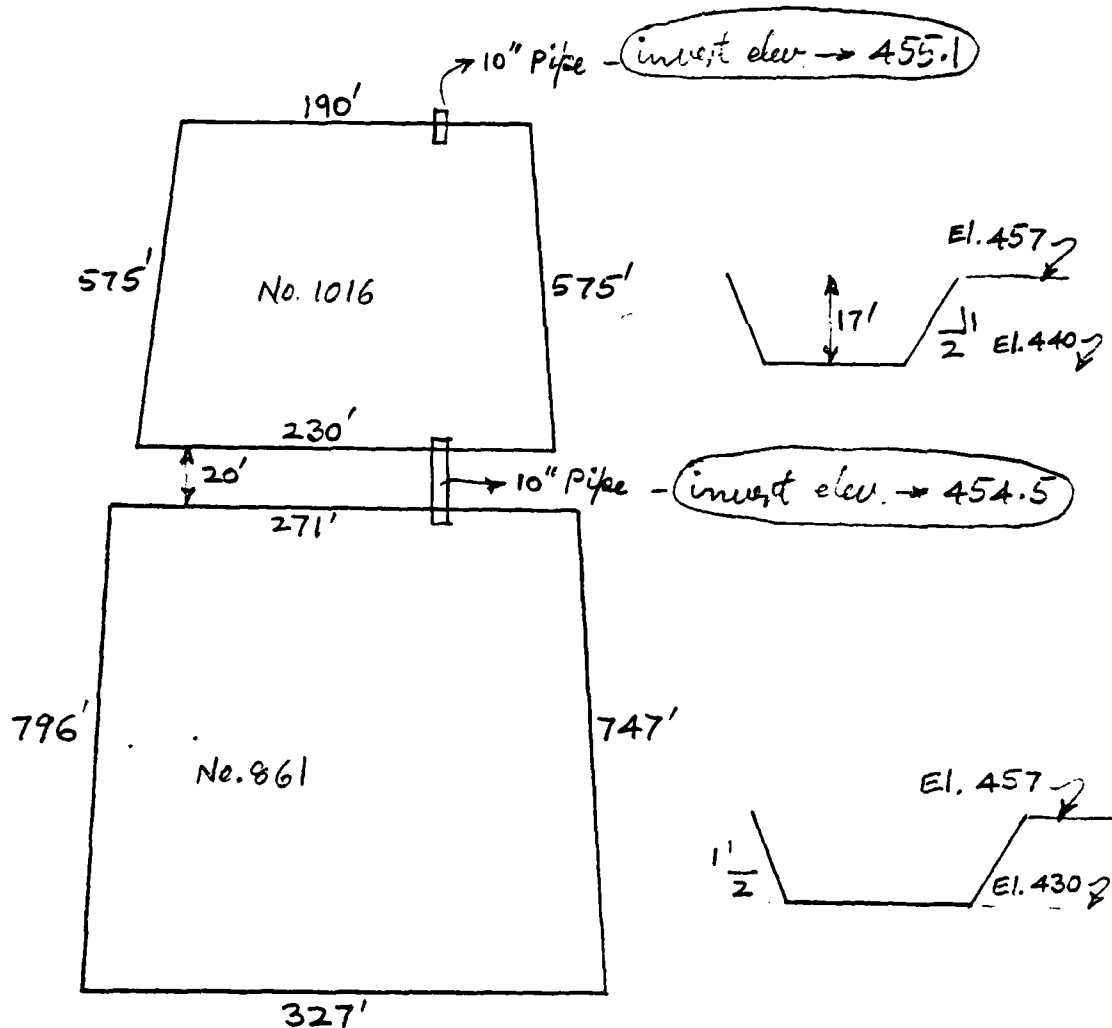
Closely regulated, as it is a water
supply, distribution reservoir.

APPENDIX C

HYDROLOGIC / HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS

Delmar Reservoir (No. 861 + 1016)



Assume reservoir dimensions (as shown above) are at the top of the reservoir levees @ Elev. 457.0.

Surface area of the two reservoirs

$$\begin{aligned}
 &= \frac{230+190}{2} \times 575 + \frac{747+796}{2} \times \frac{271+327}{2} \\
 &= 120750 + 230679 = 351,429 \text{ ft.}^2 \\
 &= 0.013 \text{ mi.}^2 = 8.07 \text{ acres}
 \end{aligned}$$

Snyder Unit Hydrograph

$$DA = 0.013 \text{ mi.}^2$$

$$L = 1390 \text{ ft.} = 0.26 \text{ mi.}$$

$$Lca = 750 \text{ ft.} = 0.14 \text{ "}$$

Assume $C_t = 4.0$ (for a pond or reservoir)

$$\begin{aligned} t_p &= C_t (L \times Lca)^{0.3} \\ &= 4 (0.26^{0.4} \times 0.14)^{0.3} \\ &= 3.04 \text{ hours} \end{aligned}$$

$$t_r = \frac{t_p}{5.5} = \frac{3.04}{5.5} = 0.55 \text{ hr}$$

$$t_R = 0.5 \text{ hr}$$

$$\begin{aligned} T_p &= t_p + 0.25(t_R - t_r) \\ &= 3.04 + 0.25(0.5 - 0.55) \\ &= 3.04 - 0.25 \times 0.05 \\ &= 3.04 - 0.01 \\ &= 3.03 \text{ hrs.} \end{aligned}$$

Transposition Factor

$$\begin{aligned} TF &= 1 - \frac{0.3008}{(DA)^{0.17718}} = 1 - \frac{0.3008}{(0.013)^{0.17718}} = 1 - \frac{0.3008}{0.46326} \\ &= 1 - 0.6493 = 0.351 \rightarrow [\text{Too low - Let TRSPC} \\ &\quad \text{default to 1.0}] \end{aligned}$$

ANALYZE FOR POND AREA

Direct input - no infiltration loss

$$t_R = 0.5 \text{ hr.} \quad \text{D.A.} = 8.07 \text{ acres.}$$

$$\text{Input U.H.} = \frac{8.07 \times 43560 \times 1/12}{0.5 \times 3600}$$

$$= 16.3 \text{ cfs.}$$

RUNOFF FROM HILLSIDE AREA TOWARDS
POND WILL BE HANDLED BY DRAINAGE
DITCH.

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

1

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam	<u>457.0</u>	<u>8.07</u>	<u>178</u>
2) Design High Water (Max. Design Pool)	<u>-</u>	<u>-</u>	<u>-</u>
3) Auxiliary Spillway Crest	<u>-</u>	<u>-</u>	<u>-</u>
4) Pool Level with Flashboards	<u>-</u>	<u>-</u>	<u>-</u>
5) Service Spillway Crest	<u>455.1</u>	<u>7.91</u>	<u>163</u>

DISCHARGES

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

CREST:

ELEVATION: 457.0Type: Compacted earth

Width: _____

Length: 3711'

Spillover _____

Location _____

SPILLWAY:

SERVICE

AUXILIARY

455.1

Elevation

NoneCircular Pipe

Type

10" dia.

Width

Type of Control✓ Uncontrolled

Controlled:

Type

(Flashboards; gate)

Number

Size/Length

Invert Material

Anticipated Length
of operating service

Chute Length

Height Between Spillway Crest
& Approach Channel Invert
(Weir Flow)

HYDROMETEROLOGICAL GAGES:

Type : None

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: None

Method of Controlled Releases (mechanisms):

None for precipitation runoff

DRAINAGE AREA: 0.013 sq. miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Reservoir Surface area

Terrain - Relief: Flat slope

Surface - Soil: Water Surface only

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

No alterations planned or anticipated

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

None evident

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

Several homes nearby, east of embankment
along Rte 85.

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

Location: None

Elevation: _____

Reservoir:

Length @ Maximum Pool _____ (Miles)

Length of Shoreline (@ Spillway Crest) 0.703 (Miles)

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

 NEW YORK STATE
 DEPT OF ENVIRONMENTAL CONSERVATION
 FLOOD PROTECTION BUREAU

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

RUN DATE 08/12/81

CELNAR RESERVOIR
 PHASE 1
 PMF

JOB SPECIFICATION
 NO 200
 NHR 0
 NMIN 30
 IDAY 0
 JOPER 5
 IHR 0
 NMT 0
 IMIN 0
 LROPT 0
 PETRC 0
 TRACE 0
 IPLY 0
 IPRT 0
 INSTAN 0

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

SUB-AREA RUNOFF COMPUTATION

INFLOW FROM RESERVOIR
 ISTAG 1
 ICOMP 0
 IFCON 0
 ITAPE 0
 JPLT 2
 JPRT 2
 INAME 1
 ISTAGE 0
 IAUTO 0

HYDROGRAPH DATA
 IHYDG 1
 IUNG -1
 TAREA 0.01
 SNAP 0.01
 TRSDA 0.01
 TRSPC 0.01
 RATIO 0.01
 ISNOJ 0
 ISAME 0
 LCCAL 0

PRECIP DATA
 SPFE 0.1950
 PHS 111.00
 R6 123.00
 R12 133.00
 R24 142.00
 R48 0.00
 R72 0.00
 R96 0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT 0
 STRKR 0
 DLTKR 0
 RTIOL 1.00
 ERAIV 0.00
 STIRKS 0.00
 RTIOK 1.00
 STRTL 0.00
 CNSTL 0.00
 ALSMX 0.00
 RTIMP 0.00

GIVEN UNIT GRAPH, NUHGC= 1

UNIT GRAPH TOTALS 15. CFS OR 0.97 INCHES OVER THE AREA

RECESSION DATA

STRIC= -2.00 ORCSN= -0.05 RTIOR= 1.00

END-OF-PERIOD FLOW

MC-DA	HR-MM	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO-DA	HR-MM	PERIOD	RAIN	EXCS	LOSS	COMP Q
0	1.01	0.30	1	0.00	0.03	0.00	1.03	2.30	101	0.00	0.00	0.00	0.00
1	1.01	1.00	2	0.00	0.00	0.00	1.03	3.00	102	0.00	0.00	0.00	0.00
2	1.01	1.30	3	0.00	0.00	0.00	1.03	3.30	103	0.00	0.00	0.00	0.00
3	1.01	2.00	4	0.00	0.00	0.00	1.03	4.00	104	0.00	0.00	0.00	0.00
4	1.01	2.30	5	0.00	0.00	0.00	1.03	4.30	105	0.00	0.00	0.00	0.00
5	1.01	3.00	6	0.00	0.00	0.00	1.03	5.00	106	0.00	0.00	0.00	0.00

[illegible]

1.02	10.00	68	0.16	0.16	0.0	3.	1.04	12.00	168	0.	0.	0.	4.
1.02	10.30	69	0.16	0.16	0.	3.	1.04	12.30	169	0.	0.	0.	4.
1.02	11.00	70	0.16	0.16	0.	3.	1.04	13.00	170	0.	0.	0.	4.
1.02	11.30	71	0.16	0.15	0.	3.	1.04	13.30	171	0.	0.	0.	4.
1.02	12.00	72	0.16	0.15	0.	3.	1.04	14.00	172	0.	0.	0.	4.
1.02	12.30	73	0.87	0.87	0.	14.	1.04	14.30	173	0.	0.	0.	4.
1.02	13.00	74	0.87	0.87	0.	14.	1.04	15.00	174	0.	0.	0.	4.
1.02	13.30	75	1.04	1.04	0.	17.	1.04	15.30	175	0.	0.	0.	4.
1.02	14.00	76	1.04	1.04	0.	17.	1.04	16.00	176	0.	0.	0.	4.
1.02	14.30	77	1.30	1.30	0.	21.	1.04	16.30	177	0.	0.	0.	4.
1.02	15.00	78	1.30	1.30	0.	21.	1.04	17.00	178	0.	0.	0.	4.
1.02	15.30	79	1.58	1.58	0.	26.	1.04	17.30	179	0.	0.	0.	4.
1.02	16.00	80	5.00	5.00	0.	82.	1.04	18.00	180	0.	0.	0.	4.
1.02	16.30	81	1.21	1.21	0.	20.	1.04	18.30	181	0.	0.	0.	4.
1.02	17.00	82	1.21	1.21	0.	20.	1.04	19.00	182	0.	0.	0.	4.
1.02	17.30	83	0.95	0.95	0.	16.	1.04	19.30	183	0.	0.	0.	4.
1.02	18.00	84	0.95	0.95	0.	16.	1.04	20.00	184	0.	0.	0.	4.
1.02	18.30	85	0.08	0.04	0.	4.	1.04	20.30	185	0.	0.	0.	4.
1.02	19.00	86	0.08	0.08	0.	4.	1.04	21.00	186	0.	0.	0.	4.
1.02	19.30	87	0.08	0.08	0.	4.	1.04	21.30	187	0.	0.	0.	4.
1.02	20.00	88	0.08	0.03	0.	4.	1.04	22.00	188	0.	0.	0.	4.
1.02	20.30	89	0.08	0.08	0.	4.	1.04	22.30	189	0.	0.	0.	4.
1.02	21.00	90	0.08	0.03	0.	4.	1.04	23.00	190	0.	0.	0.	4.
1.02	21.30	91	0.08	0.08	0.	4.	1.04	23.30	191	0.	0.	0.	4.
1.02	22.00	92	0.08	0.03	0.	4.	1.05	0.	192	0.	0.	0.	4.
1.02	22.30	93	0.08	0.03	0.	4.	1.05	0.30	193	0.	0.	0.	4.
1.02	23.00	94	0.08	0.08	0.	4.	1.05	1.00	194	0.	0.	0.	4.
1.02	23.30	95	0.08	0.08	0.	4.	1.05	1.30	195	0.	0.	0.	4.
1.03	0.	96	0.08	0.03	0.	4.	1.05	2.00	196	0.	0.	0.	4.
1.03	0.30	97	0.	0.	0.	4.	1.05	2.30	197	0.	0.	0.	4.
1.03	1.00	98	0.	0.	0.	4.	1.05	3.00	198	0.	0.	0.	4.
1.03	1.30	99	0.	0.	0.	4.	1.05	3.30	199	0.	0.	0.	4.
1.03	2.00	100	0.	0.	0.	4.	1.05	4.00	200	0.	0.	0.	4.

SUM 22.15 22.15 0. 814.
(563.)(563.)(0.)(23.05)

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
82.	23.	9.	5.	821.
2.	1.	0.	0.	23.
	16.35	25.56	47.00	48.95
	420.35	649.13	1193.94	1243.25
	11.	18.	33.	34.
	14.	22.	40.	42.

CFS
CMS
INCHES
MM
AC-FT
THOUS CL M

3JVF.

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(O)										PRECIP(L) AND EXCESS(X)	
0.	10.	20.	30.	40.	50.	60.	70.	80.	90.	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. 481	.	.	.	.	.	.	.	.	.	.	.
0.30 491	.	.	.	.	.	.	.	.	.	.	.
1.00 501	.	.	.	.	.	.	.	.	.	.	.
1.30 511	.	.	.	.	.	.	.	.	.	.	.
2.00 521	.	.	.	.	.	.	.	.	.	.	.
2.30 531	.	.	.	.	.	.	.	.	.	.	.
3.00 541	.	.	.	.	.	.	.	.	.	.	.

LX

10.00116. 1
10.30117. 1
11.00118. 1
11.30119. 1
12.00120. 1
12.30121. 1
13.00122. 1
13.30123. 1
14.00124. 1
14.30125. 1
15.00126. 1
15.30127. 1
16.00128. 1
16.30129. 1
17.00130. 1
17.30131. 1
18.00132. 1
18.30133. 1
19.00134. 1
19.30135. 1
20.00136. 1
20.30137. 1
21.00138. 1
21.30139. 1
22.00140. 1
22.30141. 1
23.00142. 1
23.30143. 1
0. 144. 1
0.30145. 1
1.00146. 1
1.30147. 1
2.00148. 1
2.30149. 1
3.00150. 1
3.30151. 1
4.00152. 1
4.30153. 1
5.00154. 1
5.30155. 1
6.00156. 1
6.30157. 1
7.00158. 1
7.30159. 1
8.00160. 1
8.30161. 1
9.00162. 1
9.30163. 1
10.00164. 1
10.30165. 1
11.00166. 1
11.30167. 1
12.00168. 1
12.30169. 1
13.00170. 1
13.30171. 1
14.00172. 1
14.30173. 1
15.00174. 1
15.30175. 1
16.00176. 1

16.30177. 1
17.30178. 1
17.30179. 1
18.00180....1
18.30181. 1
19.00182. 1
19.30183. 1
20.00184. 1
20.30185. 1
21.00186. 1
21.30187. 1
22.00188. 1
22.30189. 1
23.00190....1
23.30191. 1
0. 192. 1
0.30193. 1
1.00194. 1
4.30195. 1
2.00196. 1
2.30197. 1
3.00198. 1
3.30199. 1
4.00200....1

[illegible][illegible]

420.35	649.13	1192.84	1243.25
11.	18.	33.	34.
14.	22.	40.	42.

HYDROGRAPH ROUTING

INAME	ISTAGE	IAUTO
1	0	0

GLOSS	CLOSS	AV3	IRES	ISAME
0.	0.	0.	1	1

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.	0.	0.	-455.	-1

STAGE	455.10	455.90	456.40	457.00	458.10	460.00	465.00
-------	--------	--------	--------	--------	--------	--------	--------

FLOW	.0	1.00	2.90	3.30	4.40	6.00	9.00
------	----	------	------	------	------	------	------

SURFACE AREA=

CAPACITY=	0.	53.	124.	153.	178.	203.	245.
-----------	----	-----	------	------	------	------	------

ELEVATION= 430. 440. 450. 455. 457. 460. 465.

DATA DATA

TOPEL	COOD	EXPC	DAMWIO
457.0	3.0	1.5	1340.

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

[illegible]

STATION 1 1

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

[illegible]

4.30 5701
5.00 5801
5.30 5901
6.00 6001
6.30 610 1
7.00 620 1
7.30 630 1
8.00 640 1
8.30 650 1
9.00 660 1
9.30 670 1
10.00 680 1
10.30 690 1
11.00 700 1
11.30 710 1
12.00 720 1
12.30 730
13.00 74.0
13.30 75.0
14.00 76.0
14.30 77.0
15.00 78.0
15.30 79.0
16.00 80.0
16.30 81.0
17.00 82.0
17.30 83.0
18.00 84.0
18.30 85.0
19.00 86.0
19.30 87.0
20.00 88.0
20.30 89.0
21.00 90.0
21.30 91.0
22.00 92.0
23.00 93.0
23.30 94.0
23.30 95.0
0. 96.0
0.30 97.0
1.06 98.0
1.30 99.0
2.00100.0
2.30101.0
3.00102.0
3.30103.0
4.00104.0
4.30105.0
5.00106.0
5.30107.0
6.00108.0
6.30109.0
7.00110.0
7.30111.0
8.00112.0
8.30113.0
9.00114.0
9.30115.0
10.00116.0
10.00117.0

11-00118. 01
11-30119. 01
12-00120. 01
12-30121. 01
13-00122. 01
13-30123. 01
14-00124. 01
14-30125. 01
15-00126. 01
15-30127. 01
16-00128. 01
16-30129. 01
17-00130. 01
17-30131. 01
18-00132. 01
18-30133. 01
19-00134. 01
19-30135. 01
20-00136. 01
20-30137. 01
21-00138. 01
21-30139. 01
22-00140. 01
23-00141. 01
23-00142. 01
23-30143. 01
0. 144. 01
6-30145. 01
1-00146. 01
1-30147. 01
2-00148. 01
2-30149. 01
3-00150. 01
3-30151. 01
4-00152. 01
4-30153. 01
5-00154. 01
5-30155. 01
6-00156. 01
6-30157. 01
7-00158. 01
7-30159. 01
8-00160. 01
8-30161. 01
9-00162. 01
9-30163. 01
10-00164. 01
10-30165. 01
11-00166. 01
11-30167. 01
12-00168. 01
12-30169. 01
13-00170. 01
13-30171. 01
14-00172. 01
14-30173. 01
15-00174. 01
15-30175. 01
16-00176. 01
16-30177. 01
17-00178. 01

17.30179.	01
18.00180..01.	01.
18.30181.	01
19.00182.	01
19.30183.	01
20.00184.	01
20.30185.	01
21.00186.	01
21.30187.	01
22.00188.	01
22.30189.	01
23.00190..01.	01.
23.30191.	01
0.192.	01
0.30193.	01
1.00194.	01
1.30195.	01
2.00196.	01
2.30197.	01
3.00198.	01
3.30199.	01
4.00200..01.	01.

[illegible]

STATION 1, PLAN 1, RATIO 2
END-OF-PERIOD HYDROGRAPH ORIGINATES[illegible][illegible]

455.8	455.8	455.5	453.9	455.9	455.9	455.9	455.9	455.9	455.9
455.9	455.9	455.5	453.9	455.9	455.9	455.9	455.9	455.9	455.9
455.9	455.9	455.5	453.9	455.9	455.9	455.9	455.9	455.9	455.9
455.9	455.9	455.5	453.9	455.9	455.9	455.9	455.9	455.9	455.9
456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0
456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0
456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0
456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0
456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0
456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0	456.0

PEAK OUTFLOW IS 2. AT TIME 100.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2.	1.	1.	1.	149.
CHS	0.	0.	0.	0.	4.
INCHES		1.07	4.08	8.77	8.87
MM		27.10	103.59	222.85	225.38
AC-FT		1.	3.	6.	6.
THOUS CL M.		1.	3.	7.	8.

4.30 5701
5.00 5801
5.30 5901
6.00 6001
6.30 610 1
7.00 620 1
7.30 630 1
8.00 640 1
8.30 650 1
9.00 660 1
9.30 670 1
10.00 680 1
10.30 690 1
11.00 700 1
11.30 710 1
12.00 720 1
12.30 730
13.00 74.0
13.30 75.0
14.00 76.0
14.30 77.0
15.00 78.0
15.30 79.0
16.00 80.0
16.30 81.0
17.00 82.0
17.30 83.0
18.00 84.0
18.30 85.0
19.00 86.0
19.30 87.0
20.00 88.0
20.30 89.0
21.00 90.0
21.30 91.0
22.00 92.0
22.30 93.0
23.00 94.0
23.30 95.0
0. 96.0
0.30 97.0
1.00 98.0
1.30 99.0
2.00 100.0
2.30 101.0
3.00 102.0
3.30 103.0
4.00 104.0
4.30 105.0
5.00 106.0
5.30 107.0
6.00 108.0
6.30 109.0
7.00 110.0
7.30 111.0
8.00 112.0
8.30 113.0
9.00 114.0
9.30 115.0
10.00 116.0
10.30 117.0

11.00118. 01
11.30119. 01
12.00120. 01
12.30121. 01
13.00122. 01
13.30123. 01
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14.30125. 01
15.00126. 01
15.30127. 01
16.00128. 01
16.30129. 01
17.00130. 01
17.30131. 01
18.00132. 01
18.30133. 01
19.00134. 01
19.30135. 01
20.00136. 01
20.30137. 01
21.00138. 01
21.30139. 01
22.00140. 01
22.30141. 01
23.00142. 01
23.30143. 01
0. 144. 01
0.30145. 01
1.00146. 01
1.30147. 01
2.00148. 01
2.30149. 01
3.00150. 01
3.30151. 01
4.00152. 01
4.30153. 01
5.00154. 01
5.30155. 01
6.00156. 01
6.30157. 01
7.00158. 01
7.30159. 01
8.00160. 01
8.30161. 01
9.00162. 01
9.30163. 01
10.00164. 01
10.30165. 01
11.00166. 01
11.30167. 01
12.00168. 01
12.30169. 01
13.00170. 01
13.30171. 01
14.00172. 01
14.30173. 01
15.00174. 01
15.30175. 01
16.00176. 01
16.30177. 01
17.00178. 01

17.30179. 1
18.00180. 1
18.30181. 1
19.00182. 1
19.30183. 1
20.00184. 1
20.30185. 1
21.00186. 1
21.30187. 1
22.00188. 1
22.30189. 1
23.00190. 1
23.30191. 1
0. 192. 1
0.30193. 1
1.00194. 1
1.30195. 1
2.00196. 1
2.30197. 1
3.00198. 1
3.30199. 1
4.00200. 1

STATION 1, PLAN 1, RAYIO 3
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible][illegible][illegible]

PEAK OUTFLOW IS 2. AT TIME 100.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFS	2.	2.	2.	1.	238.	
CMS	0.	0.	0.	0.	6.	
INCHES		1.38	5.39	12.26	12.38	
MM		35.02	136.80	311.34	314.50	
AC-FT		1.	4.	8.	9.	
THOUS CU M		1.	5.	10.	11.	

STATION 1

INFLOW(I), OJFLOW(O) AND OBSERVED FLOW(O)

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4.36 5701
5.00 5801
5.30 5901
6.00 6001
6.30 6101
7.00 6201
7.30 6301
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9.00 6601
9.30 6701
10.00 6801
10.30 6901
11.00 7001
11.30 7101
12.00 7201
12.30 7301
13.00 7401
13.30 7501
14.00 7601
14.30 7701
15.00 7801
15.30 7901
16.00 8001
16.30 8101
17.00 8201
17.30 8301
18.00 8401
18.30 8501
19.00 8601
19.30 8701
20.00 8801
20.30 8901
21.00 9001
21.30 9101
22.00 9201
22.30 9301
23.00 9401
23.30 9501
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0.30 9701
1.00 9801
1.30 9901
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2.30 10101
3.00 10201
3.30 10301
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4.30 10501
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17.00130. 01
17.30131. 01
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19.00134. 01
19.30135. 01
20.00136. 01
20.30137. 01
21.00138. 01
21.30139. 01
22.00140. 01
22.30141. 01
23.00142. 01
23.30143. 01
0. 144. 01
0.30145. 01
1.00146. 01
1.30147. 01
2.00148. 01
2.30149. 01
3.00150. 01
3.30151. 01
4.00152. 01
4.30153. 01
5.00154. 01
5.30155. 01
6.00156. 01
6.30157. 01
7.00158. 01
7.30159. 01
8.00160. 01
8.30161. 01
9.00162. 01
9.30163. 01
10.00164. 01
10.30165. 01
11.00166. 01
11.30167. 01
12.00168. 01
12.30169. 01
13.00170. 01
13.30171. 01
14.00172. 01
14.30173. 01
15.00174. 01
15.30175. 01
16.00176. 01
16.30177. 01
17.00178. 01

17.30175. 1
18.00180. 1
18.30181. 1
19.00182. 1
19.30183. 1
20.00184. 1
20.30185. 1
21.00186. 1
21.30187. 1
22.00188. 1
22.30189. 1
23.00190. 1
23.30191. 1
0. 192. 1
0.30193. 1
1.00194. 1
1.30195. 1
2.00196. 1
2.30197. 1
3.00198. 1
3.30199. 1
4.00200. 1

END-OF-PERIOD HYDROGRAPH ORDINATES

NOTES

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STORAGE

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STAGE

[illegible]

STATION 1

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

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4.30 5701
5.00 5801
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4-00200. I

END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

STORAGE

[illegible]

STAGE

[illegible]

[illegible]

4.30 5701
5.00 5801
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17.30 13101
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21.30 13901
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22.30 14101
23.00 14201
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12.30 16901
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13.30 17101
14.00 17201
14.30 17301
15.00 17401
15.30 17501
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3.00 58201
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7.00 59001
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18.30 61301
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22.00 62001
22.30 62101
23.00 62201
23.30 62301
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3.00 63001
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STAGE			
455.1	455.1	455.1	455.1
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455.2	455.2	455.2	455.2
455.2	455.2	455.2	455.2
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455.2	455.2	455.2	455.2
455.3	455.3	455.3	455.3
455.4	455.4	455.4	455.4
455.6	455.7	455.7	455.7
455.7	455.7	455.7	455.7
455.8	455.8	455.8	455.8
455.8	455.8	455.8	455.8

PEAK OUTFLOW IS 3. AT TIME 100.00 HOURS

	PEAK	6-MIN	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3.	3.	3.	3.	395.
CMS	0.	0.	0.	0.	11.
INCHES		2.29	9.14	23.28	23.53
MM		58.23	232.08	591.39	591.71
AC-FT		2.	6.	16.	16.
THOUS CL M.		2.	8.	20.	20.

STATION 1 1

INFLOW(I), OJT=LOW(O) AND OBSERVED FLOW(O) .

0.	10.	20.	30.	40.	50.	60.	70.	80.	90.	0.	10.	20.	30.	40.	50.	60.	70.	80.	90.	0.
0.30	11	.	.	.	.	.	.	.	.	.	0.30	11	.	.	.	.	.	.	.	.
1.00	21	.	.	.	.	.	.	.	.	.	1.00	21	.	.	.	.	.	.	.	.
1.30	31	.	.	.	.	.	.	.	.	.	1.30	31	.	.	.	.	.	.	.	.
2.00	41	.	.	.	.	.	.	.	.	.	2.00	41	.	.	.	.	.	.	.	.
2.30	51	.	.	.	.	.	.	.	.	.	2.30	51	.	.	.	.	.	.	.	.
3.00	61	.	.	.	.	.	.	.	.	.	3.00	61	.	.	.	.	.	.	.	.
3.30	71	.	.	.	.	.	.	.	.	.	3.30	71	.	.	.	.	.	.	.	.
4.00	81	.	.	.	.	.	.	.	.	.	4.00	81	.	.	.	.	.	.	.	.
4.30	91	.	.	.	.	.	.	.	.	.	4.30	91	.	.	.	.	.	.	.	.
5.00	101	.	.	.	.	.	.	.	.	.	5.00	101	.	.	.	.	.	.	.	.
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0.30	211	.	.	.	.	.	.	.	.	.	0.30	211	.	.	.	.	.	.	.	.
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23.30191. 01
0. 192. 01
0.30193. 01
1.00194. 01
1.30195. 01
2.00196. 01
2.30197. 01
3.00198. 01
3.30199. 01
4.00200. 01

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FORMULATED 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	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
HYDROGRAPH AT	1	0.01	1	0.20	0.40	0.50	0.60	0.80	1.00
	(8.31)		(0.46)	33.	41.	49.	55.	82.	
ROUTED TO	1	0.01	1	1.	2.	2.	2.	3.	3.
	(6.31)		(0.02)	0.04	0.05	0.07	0.08	0.09	

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

RATIO OF PMF	ELEVATION STORAGE OUTFLOW	INITIAL VALUE 455.10 163. 0.	SPILLWAY CREST 455.10 163. 0.	TOP OF DAM 457.00 178. 2.	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TCP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20					455.61	167.	1.	0.	100.00	0.
0.40					456.03	170.	2.	0.	100.00	0.
0.50					456.15	171.	2.	0.	100.00	0.
0.60					456.25	172.	2.	0.	100.00	0.
0.80					456.50	174.	3.	0.	100.00	0.
1.00					456.86	177.	3.	0.	100.00	0.

[illegible]

```

-- 3 0 --      DATE 08-12-81      TIME 10.627      ID = AJ      NYS06S

```

APPENDIX D

REFERENCES

APPENDIX D

REFERENCES

- 1) U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, May 1961.
- 2) U.S. Department of Commerce, Hydrometeorological Report No. 33, Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24, and 48 Hours; April 1956.
- 3) Soil Conservation Service, National Engineering Handbook, Section 4, Hydrology, August 1972 (U.S. Department of Agriculture).
- 4) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw-Hill, 1963.
- 5) T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley and Sons, 1965.
- 6) W.D. Thornbury, Principles of Geomorphology, John Wiley and Sons, 1969.
- 7) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.
- 8) Cornell University Agriculture Experiment Station (compiled by M.G. Cline and R.L. Marshall), General Soil Map of New York State and Soils of New York Landscapes, Information Bulletin 119, 1977.

AD-A109 972

NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALRANY F/6 13/13
NATIONAL DAM SAFETY PROGRAM, DELMAR RESERVOIR NUMBER 1 DAM (INV--ETC(U)
SEP 81 G KOCH

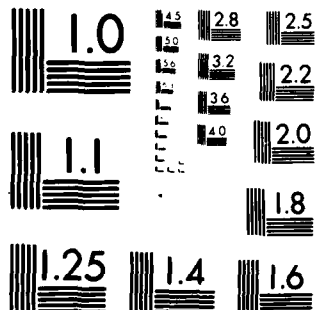
UNCLASSIFIED

NL

2 1
10 10/10/81

END
DATE
FILMED
3-82
DTIC

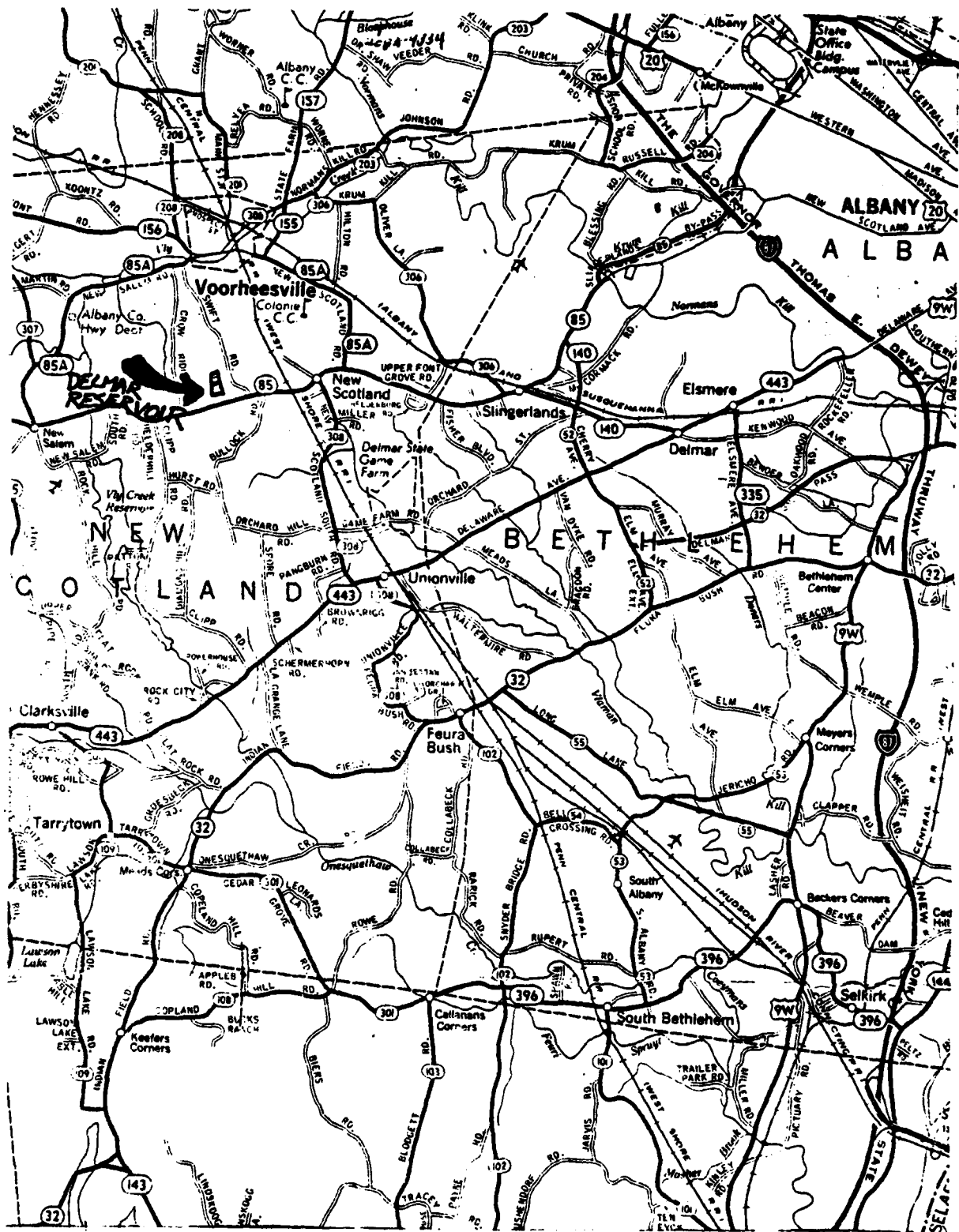
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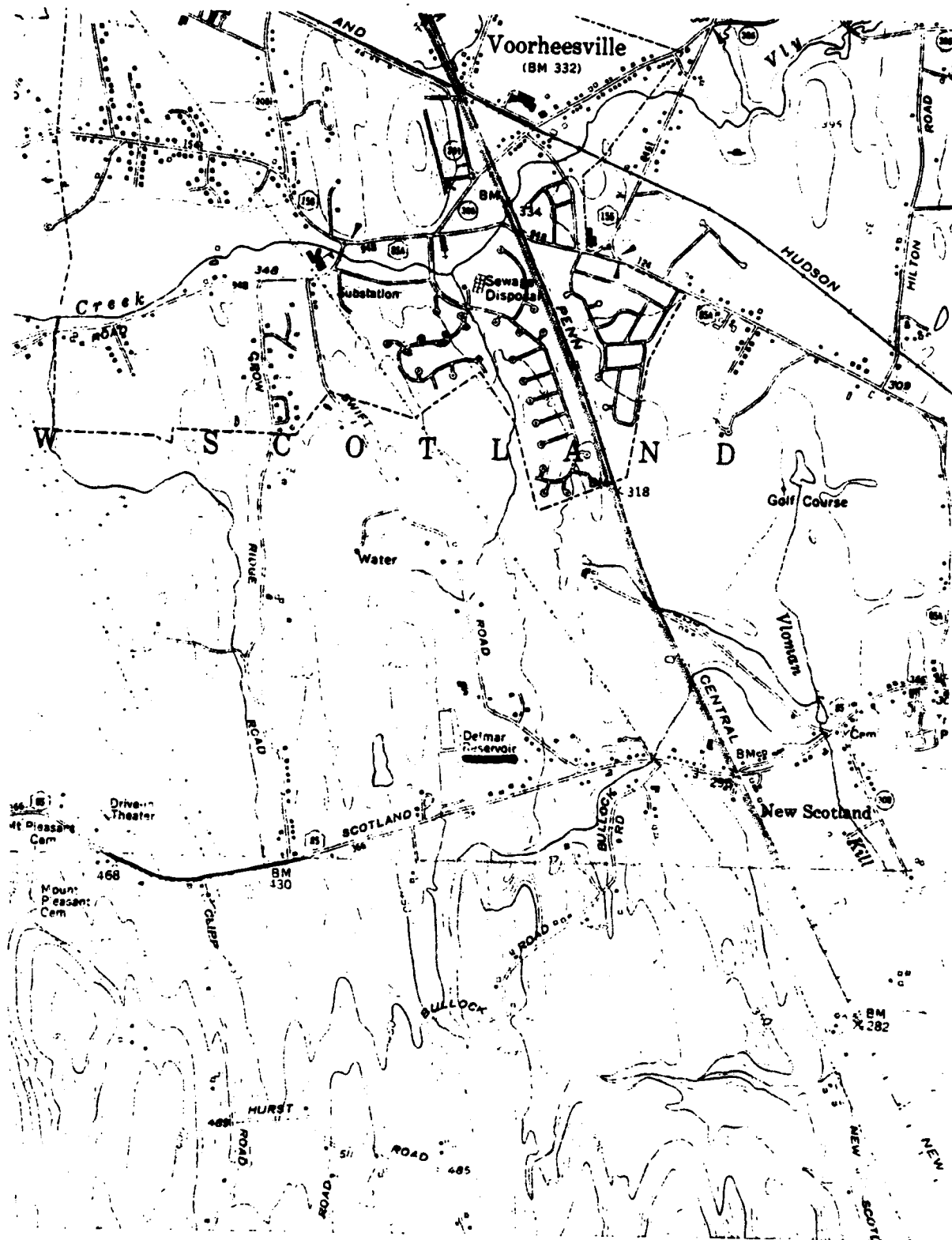
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

APPENDIX E

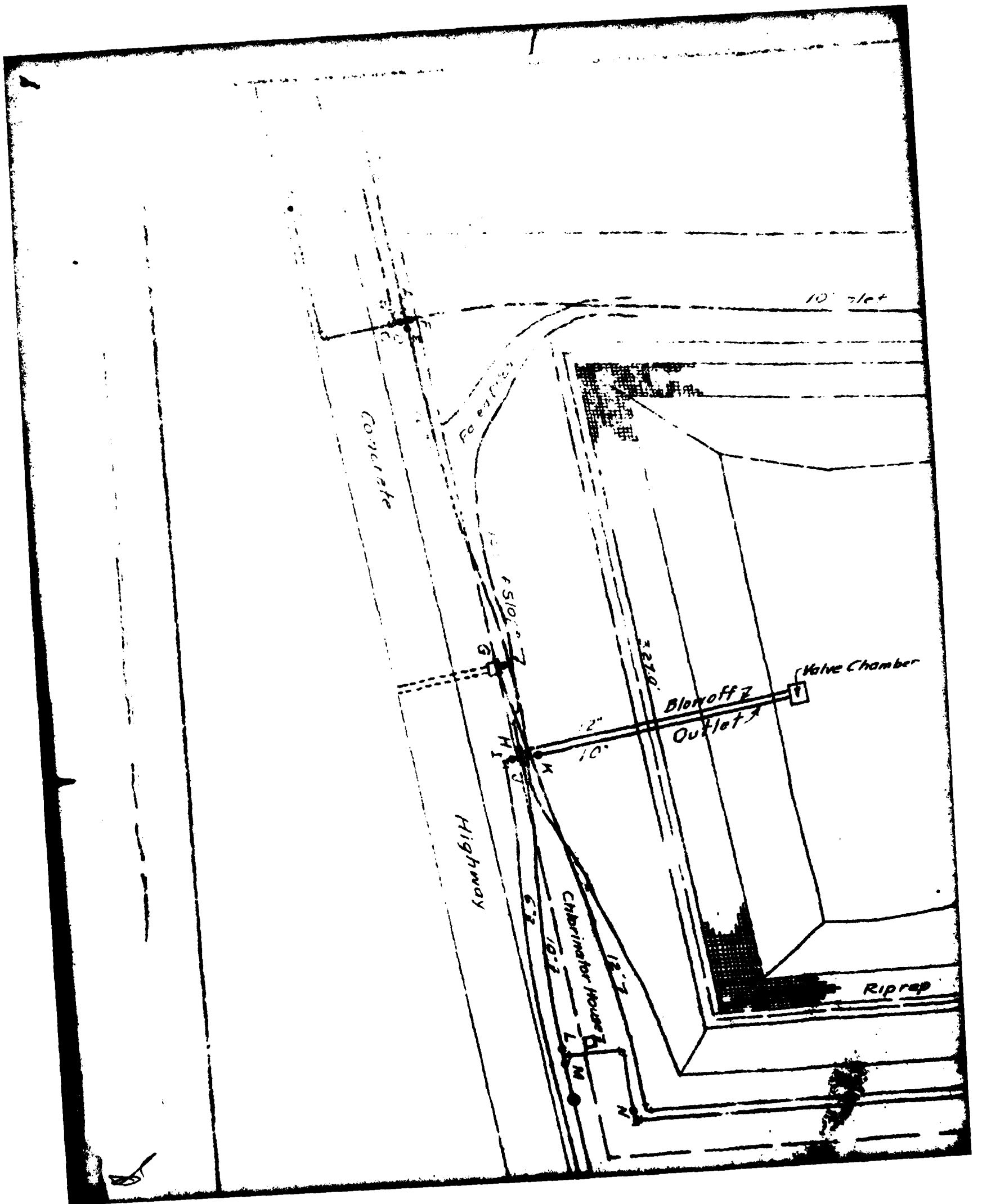
DRAWINGS



VICINITY MAP



TOPOGRAPHIC MAP



Property Line 2

Outlet to Both Reservoirs

796.3'

Chamber

SOUTH RESERVOIR

CAPACITY 28,500,000 GALLONS

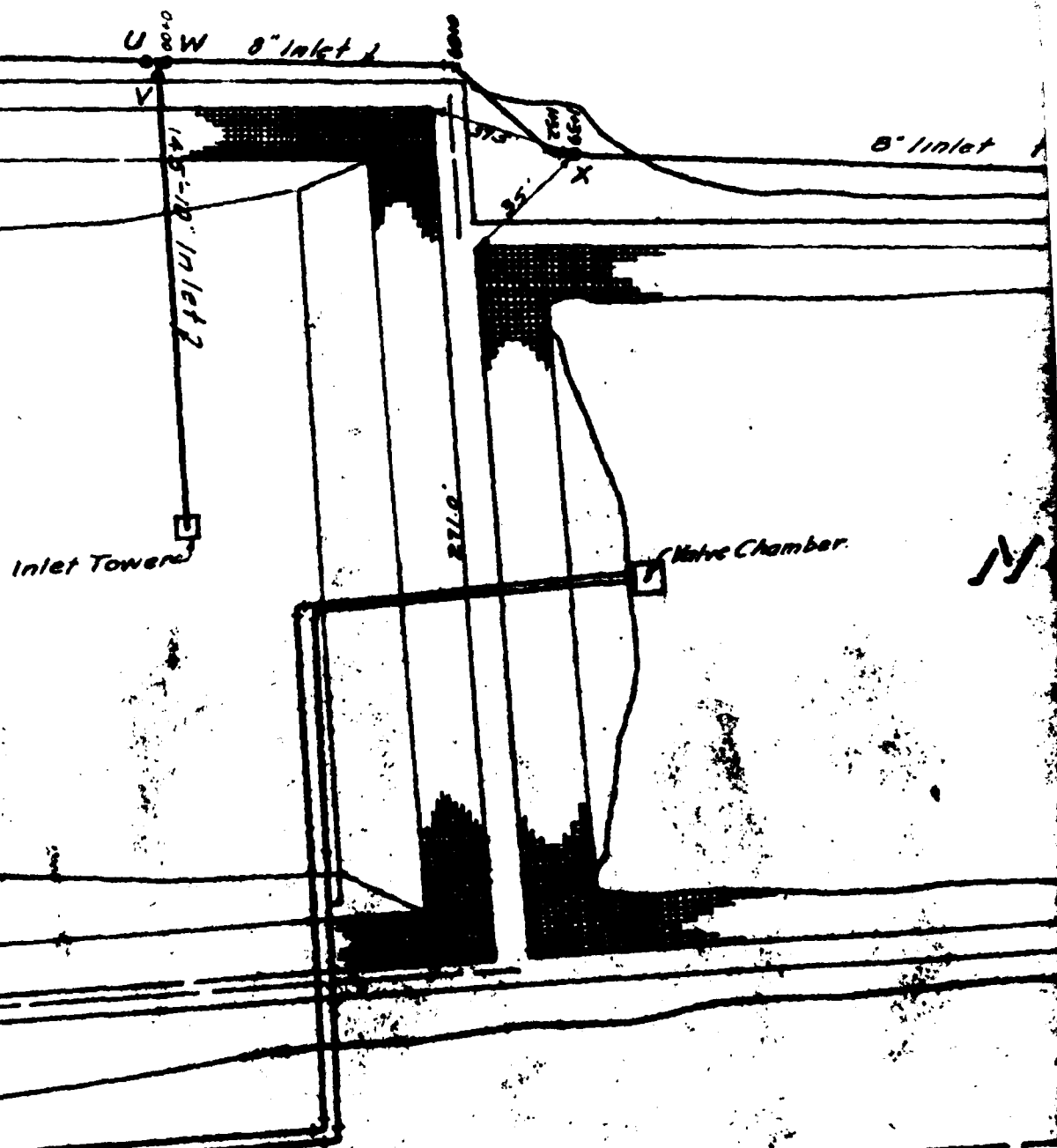
Riprap

747.0'

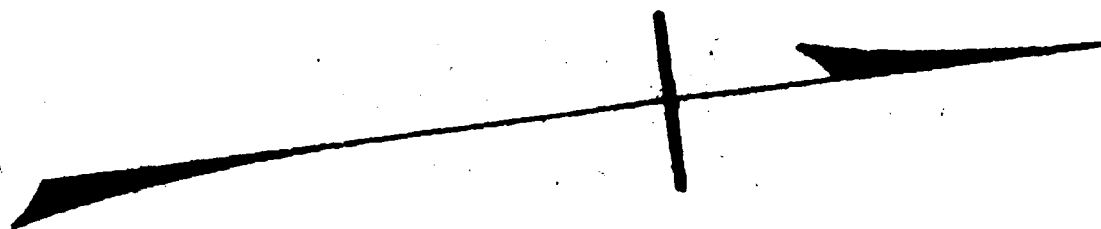
12" Blowoff from North Reservoir 2

10" Outlet from North Reservoir
Property Line 2

GENERAL PL



4



8" inlet to North Reservoir

NORTH RESERVOIR
CAPACITY 8,200,000 GALLONS

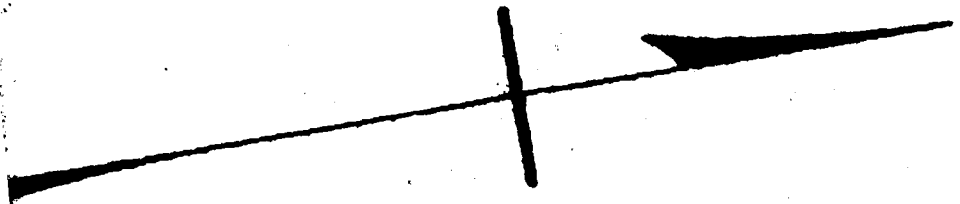
Inlet Tower



4

1

6

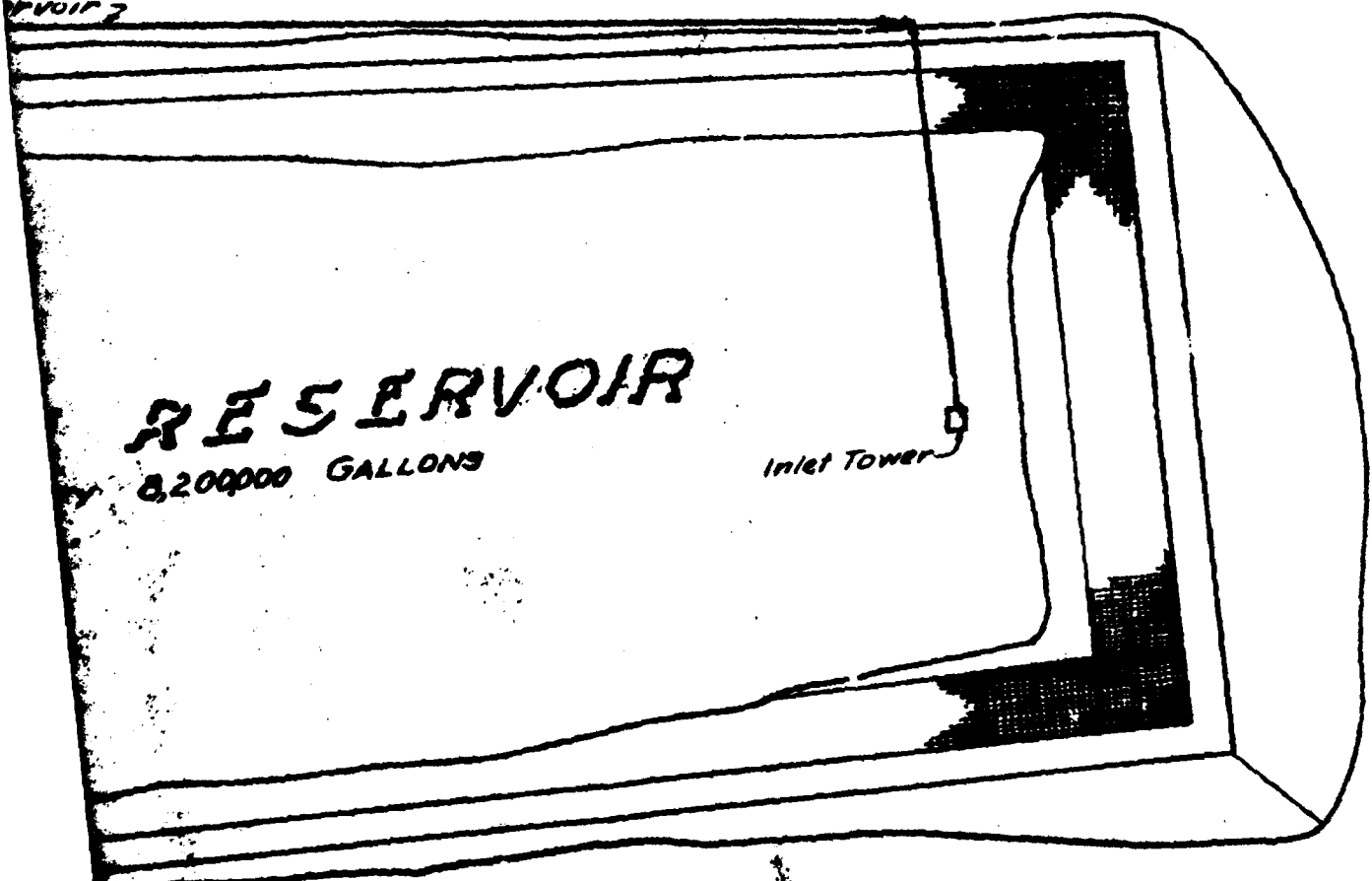


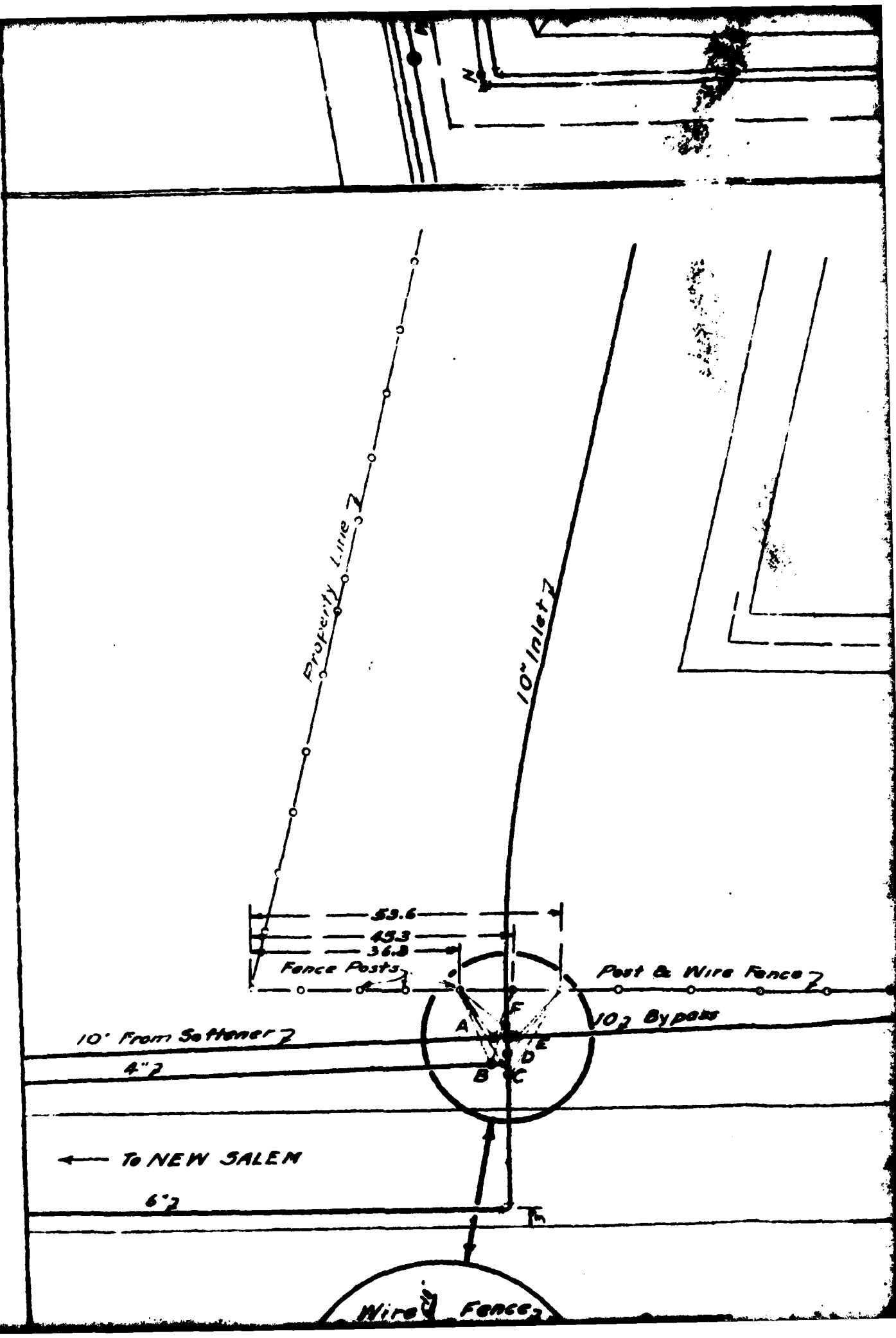
RESERVOIR 2

RESERVOIR

8,200,000 GALLONS

Inlet Tower





12" Blowoff from North Reservoir

10" Outlet from North Reservoir
Property Line

GENERAL PLAN

RESERVOIR

Steel Sheet Piling Core Wall

12" Blowoff

10" Outlet

10" x 6" Blowoff Tee

G

6" Valve on Blowoff

PLAN Scale 1"=50'

VOIR



Valve Chamber

Berm

12" Blowoff
10" Outlet

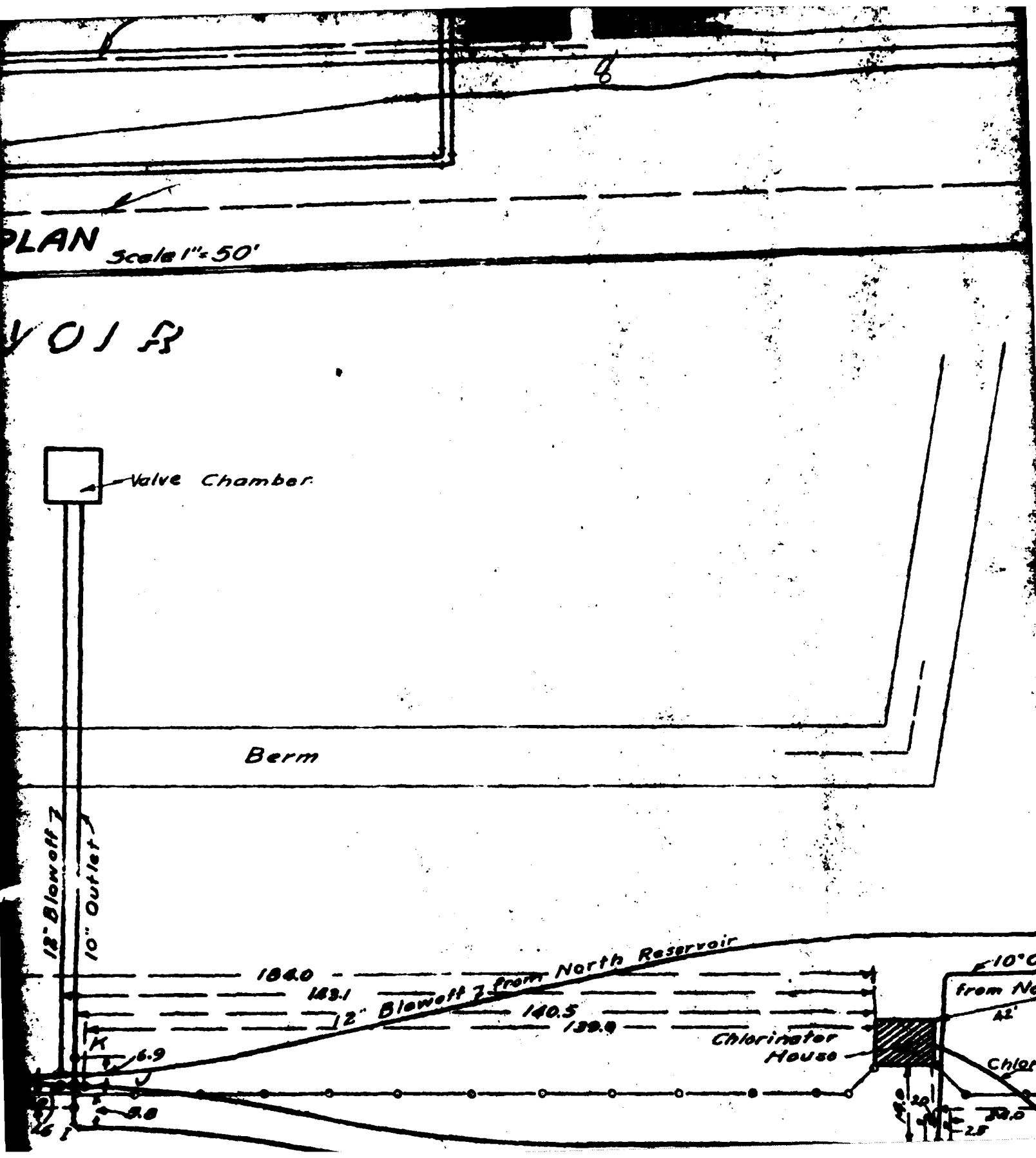
184.0
183.1
12" Blowoff from North Reservoir
140.5
139.9

Chlorinator House

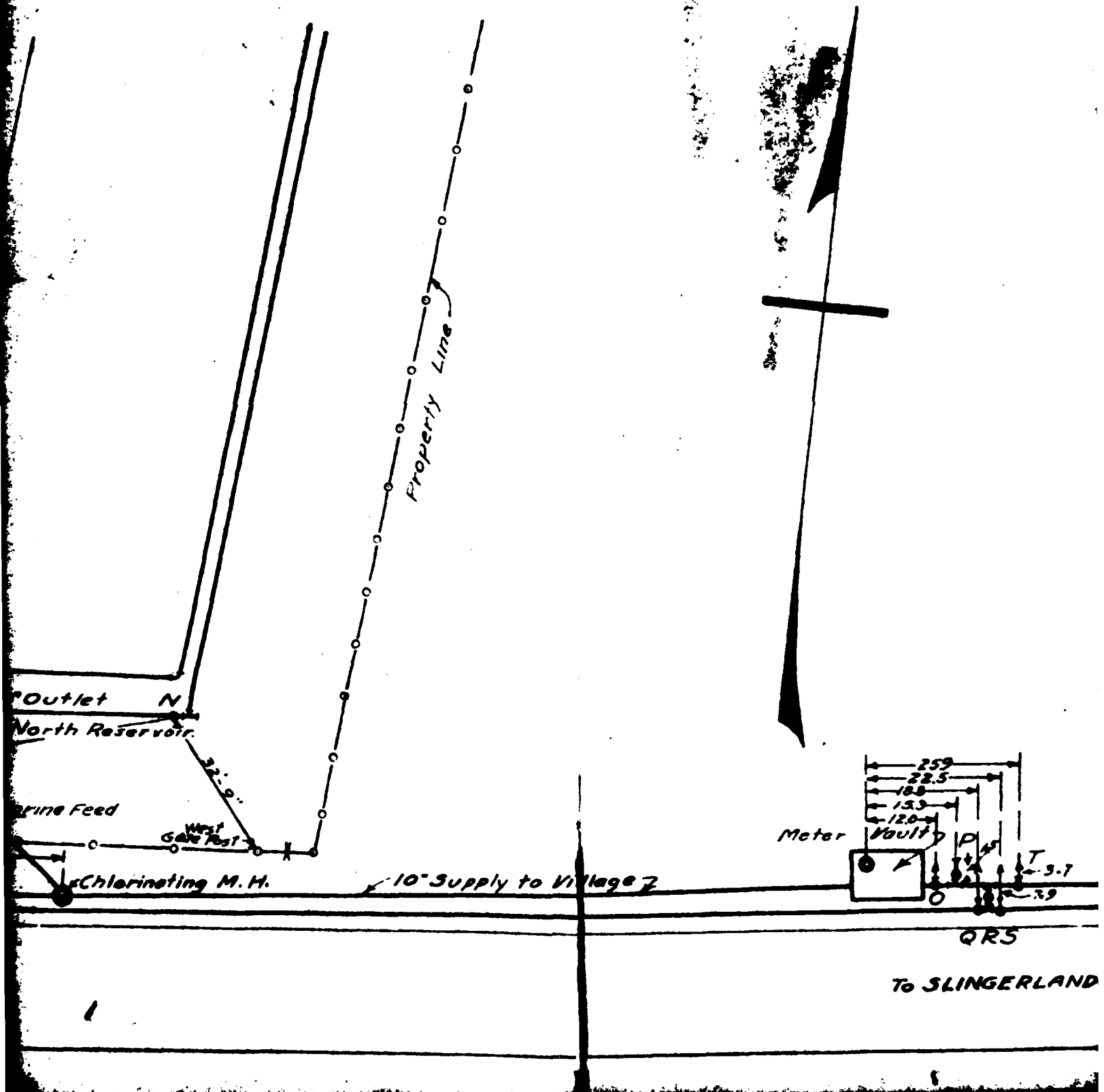
E 10' 0"
from No
A2

Chlor

30.0
2.5



9

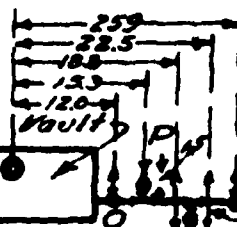


9

10

Property Line

Meter



ing M. H.

10" Supply to Village 2

QRS

TO SLINGERLANDS →

Steel Sheet Piling Core Wall

12" Blowoff 7

10"x6" Blowoff Tee

G

6" Valve on Blowoff

H

16 1

Concrete

Culvert 7

NOTE

ATTACHED SHEETS EXPLAINS
OPERATING FUNCTIONS OF
LETTERED VALVES.

PLAN
SHOWING
PIPING & VAL
ALONG HIGH

Scale 1" = 10'

12

Wave Chamber

Berm

12" Blowoff 7

10" Outlet 7

184.0

143.1

12" Blowoff 7 from North Reservoir

140.5

139.9

Chlorinator House

6.9

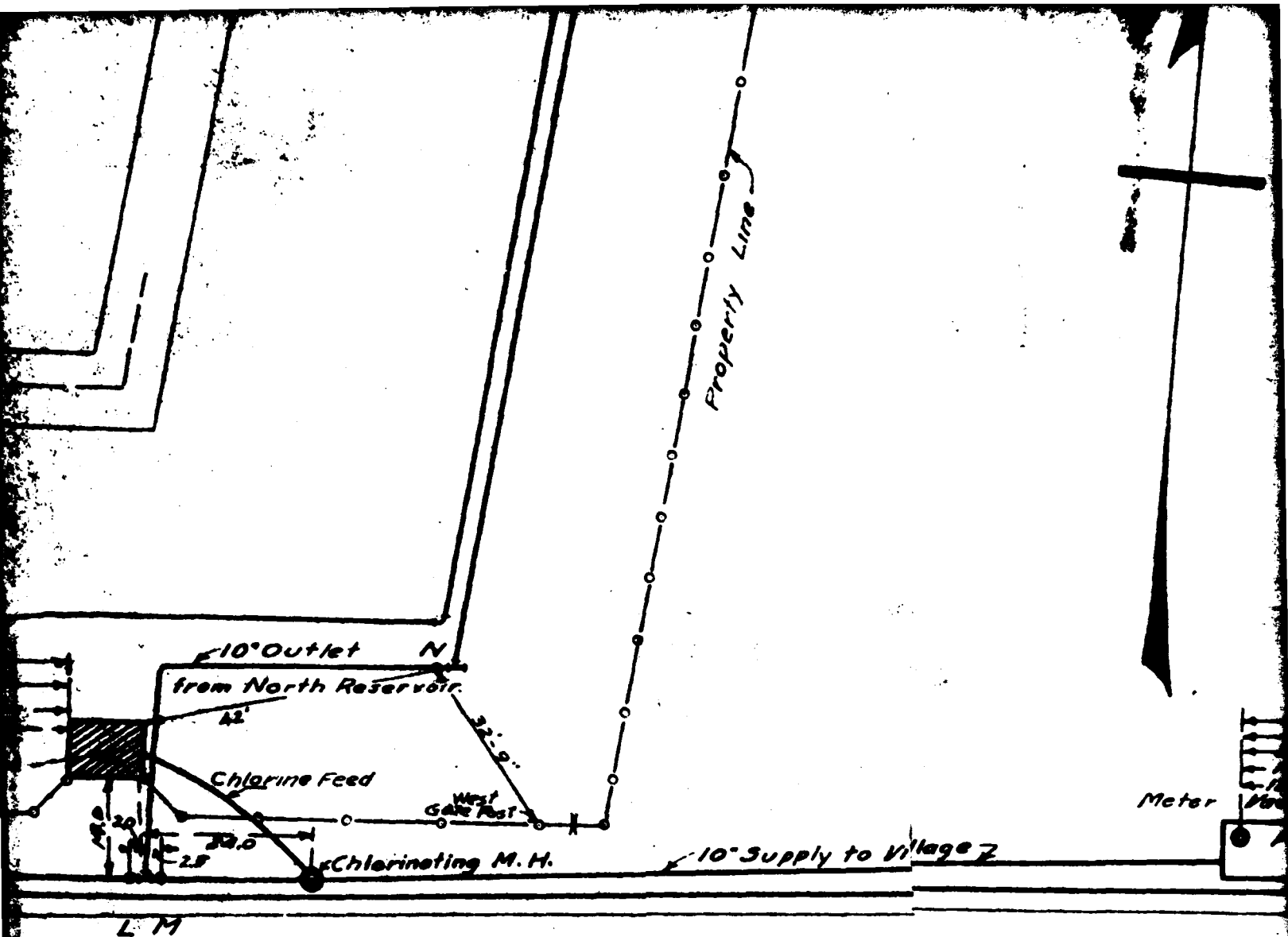
9.8

6" Supply to Village

L M

Highway

AN
NING
VALVES
HIGHWAY
1" 20'

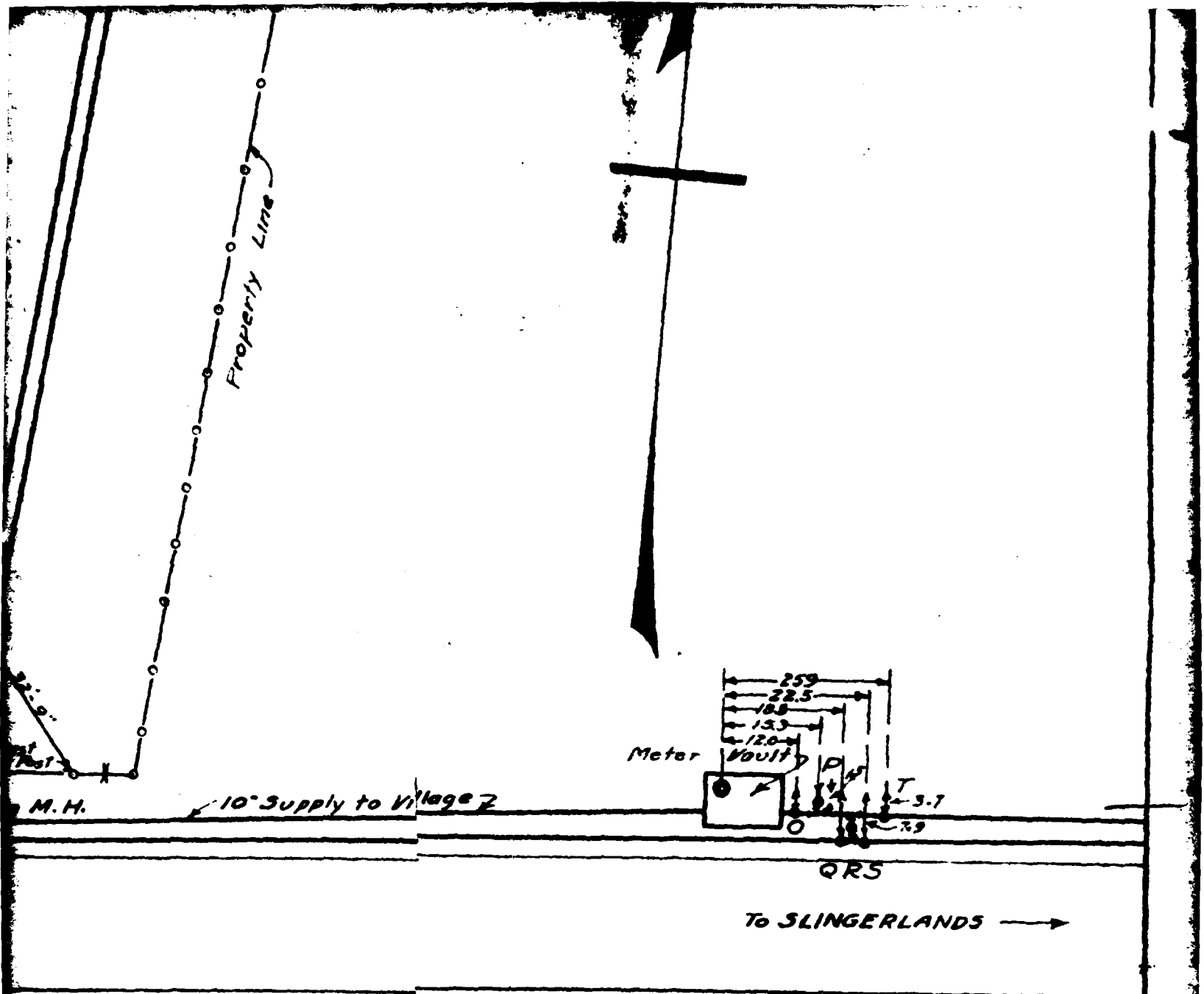


BETHLEHEM
TOWN OF

RESE
PIPING

M. SOLOMON

VS. IL T



**BETHLEHEM WATER DISTRICT
TOWN OF BETHLEHEM, N.Y.**

**RESERVOIR
PIPING & VALVES**

M.D.

SOLOMON & KEIS
CONSULTING ENGINEERS
TOWNSHIP, N.Y.

SHEET
OF

14

15

