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NATIONAL DAM SAFETY PROGRAM. HOFFMAN CREEK DAM (NY 463). CHEMUN--ETC(U)
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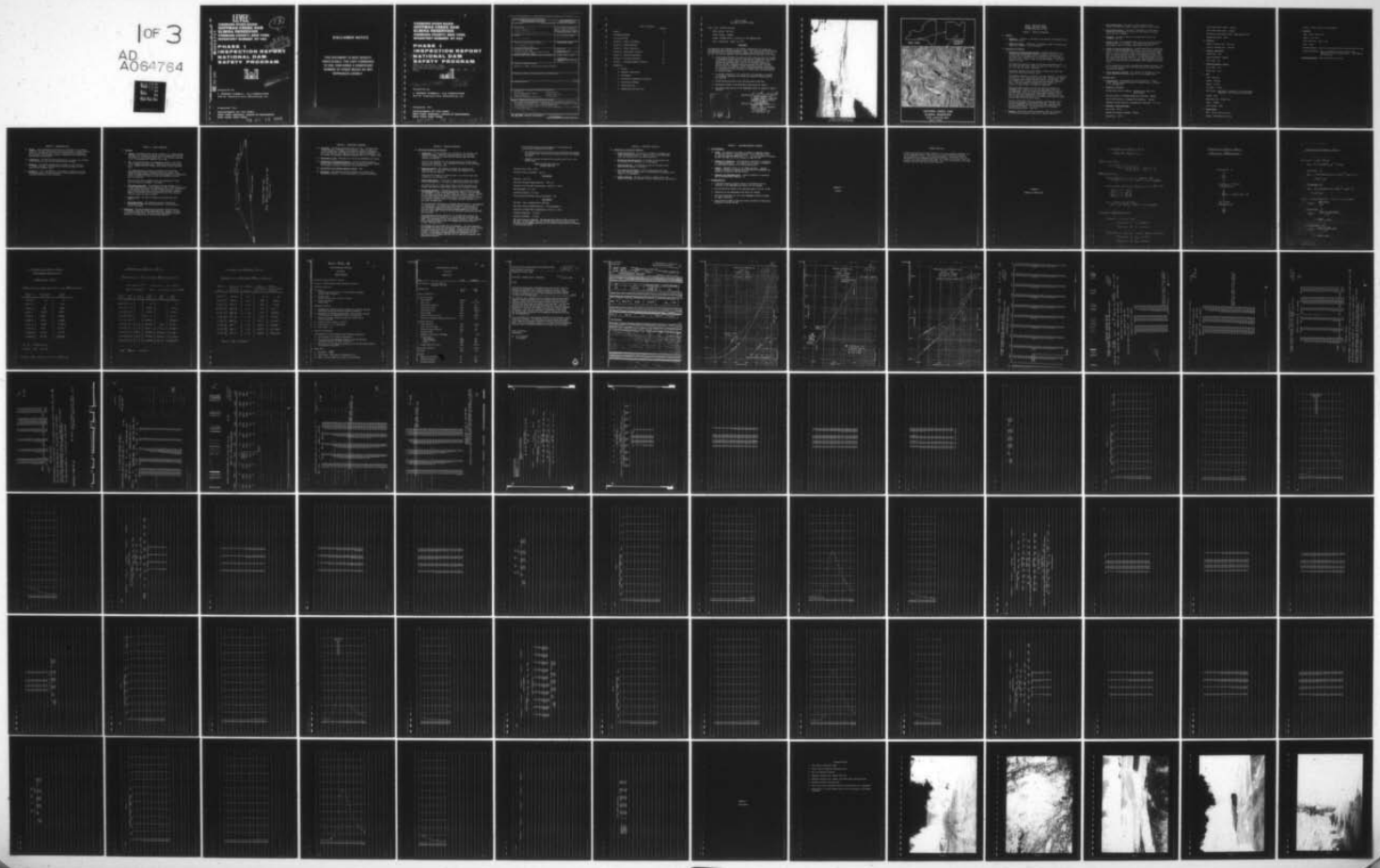

LEVEL II

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CHEMUNG RIVER BASIN
HOFFMAN CREEK DAM
ELMIRA RESERVOIR
CHEMUNG COUNTY, NEW YORK
INVENTORY NUMBER NY 463

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PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

Prepared by

L. ROBERT KIMBALL and ASSOCIATES
615 W. Highland Ave. Ebensburg, Pa.

Prepared For

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
NEW YORK, NEW YORK

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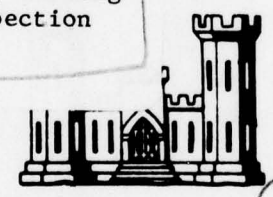
CHEMUNG RIVER BASIN
HOFFMAN CREEK DAM
ELMIRA RESERVOIR
CHEMUNG COUNTY, NEW YORK
INVENTORY NUMBER NY 463

PHASE 1
INSPECTION REPORT
NATIONAL DAM
SAFETY PROGRAM.

Hoffman Creek Dam (NY 463). Chemung River Basin, Elmira Reservoir, Chemung County, New York. Phase I Inspection Report.



(10) R. Jeffrey/Kimball

(11) 29 Sep 78

(15) DACW51-78-C-0025

(12) 264p.

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REPORT DOCUMENTATION PAGE

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Chemung County
Hoffman Creek Dam
Hoffman Brook

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.

Hoffman Creek Dam was judged to be unsafe-non emergency due to a seriously inadequate spillway.

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Table of Contents

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Hoffman Creek Dam

State Located: New York

County Located: Chemung

Stream: Hoffman Brook, a tributary to the Chemung River

Date of Inspection: August 30, 1978

ASSESSMENT

The inspection and evaluation of the Hoffman Creek Dam did not reveal any problems which would require emergency action. This does not mean that planning and implementation of followup analyses, design, and construction should be put off. As soon as practical, the following should be initiated by the owner:

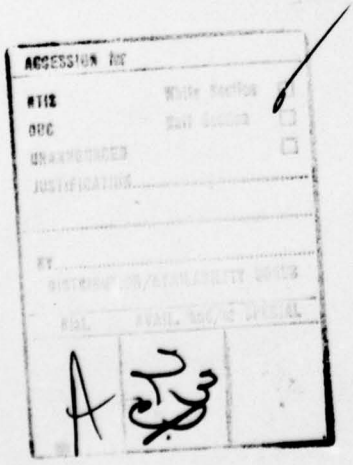
1. Flood Routing completed for this structure indicated that the spillway is inadequate to pass the PMF. This analysis assumed that the flood control dam currently under construction was operational. The spillway can currently pass 62 % of the discharge necessary to control the PMF. Existing facilities can pass the SPF (1/2 PMF) with 0.6 feet of freeboard. Either additional spillway facilities or lowering of the pool elevation to provide additional storm storage or a combination of the two should be studied and a plan implemented in the near future.

2. A thorough evaluation of the condition of the embankment including test borings, sampling, and testing and stability analyses should be conducted.

3. Riprap should be placed on the upstream slope of the dam.

4. Vegetation (trees) on the downstream slope should be removed.

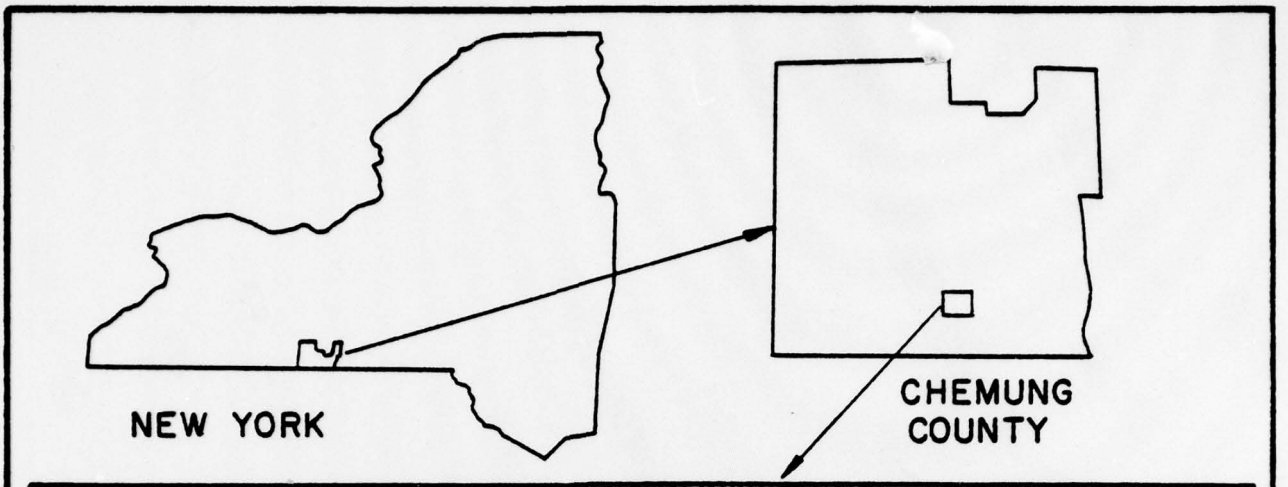
5. Fill placed near the toe of the embankment should be graded at regular interval.

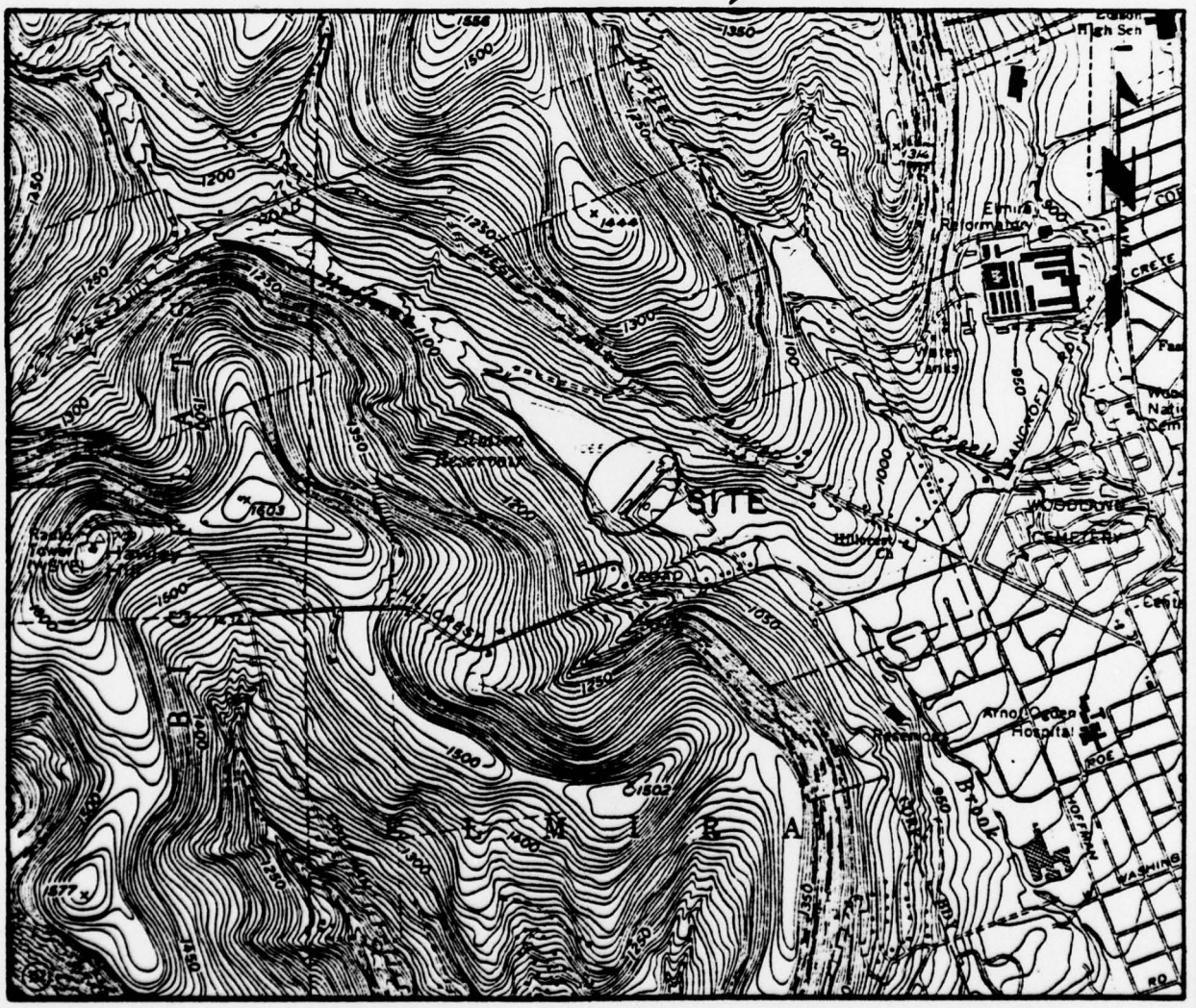


Approved by: R Jeffrey Kimball
R. Jeffrey Kimball, P.R.
L. ROBERT KIMBALL & ASSOCIATES
Registration No. PA 26275E

Approved by: Clark H. Benn
CLARK H. BENN
Colonel, Corps of Engineers
District Engineer
29 September 78

OVERVIEW OF UPSTREAM SLOPE
AND CREST FROM RIGHT ABUTMENT





HOFFMAN CREEK DAM
ELMIRA RESERVOIR
SITE LOCATION MAP
SCALE: 1" = 2000'

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
HOFFMAN CREEK DAM ID #463

SECTION I: PROJECT INFORMATION

1.1 General:

a. Authority: Authority is provided by the National Dam Inspection Act Public Law 92-367.

b. Purpose of Project: Evaluation of non-Federal dams to identify dams which are a threat to life and property.

1.2 Description of Project:

a. Description of Dam and Appurtenances: Hoffman Creek Dam is an earthfill dam approximately 36 feet high and 800 feet long. The upstream face is rip rapped below the emergency spillway level and no rip rap is present above the spillway level. The effective upstream slope is about 4:1 and 2:1 near the abutment. The crest width is 12 feet.

The downstream slope has a wide (40-70) bench approximately 3-6 feet below the dam crest. Below the bench the slope is about 1 1/2:1 to 2.75:1 and very heavily vegetated.

The dam and spillway have been modified at least five times (See Design and Construction History 1.2g).

The emergency spillway is located on the left abutment. The spillway consists of a 119.5' long sharp crested weir. The approach channel is a concrete paved channel 100 feet long and 100 feet wide. The exit channel has a concrete paved bottom and concrete retaining walls. The exit channel is stepped the entire length to a concrete stilling basin at the natural stream bed.

The outlet works consist of a 16" cast iron pipe through the embankment which branches into two sections beyond the toe of the embankment. Here, two valves are present which can regulate the flow toward the filter plant (water supply system) or to a blow off line that discharges to the stream. The area below the outlet works valves and the toe of the dam has been used as a dump for soil and rock by the Water Board.

The Soil Conservation Service is presently constructing a flood control dam upstream of the Hoffman Creek Dam. The dam is an earthfill embankment which will form an 11 acre lake and store 376 acre-feet of water. The dam is refered to as "Hoffman Creek Watershed Project - Site 18".

b. Location: The dam is located approximately 3000 feet northwest of the corporate boundary of the City of Elmira, New York.

c. Size Classification: The dam is a small structure with a height of 36 feet and a normal storage capacity of 460 acre-feet.

d. Hazard Classification: The dam is classified as a high hazard dam because in the event of failure all flow would be directed toward the City of Elmira.

e. Ownership: The dam is owned by the Elmira Water Board, City of Elmira, New York.

f. Purpose of Dam: The impounded waters are part of the water supply system for the City of Elmira. The Hoffman Creek Dam supplies approximately 15% of the annual water needs of the city.

g. Design and Construction History: Hoffman Creek Dam was constructed in 1871. Since the original construction the dam was raised several times. In 1930 the dam was raised several feet by placing dredged material from the reservoir on the top and downstream slope of the dam. In 1940 an addition was made to the emergency spillway and in 1948 the spillway was reconstructed. In 1956 an additional section was added to the spillway. The last major work performed on the dam was in 1972 when the spillway was repaired after damage during high flows.

Little information was found concerning the original structure. The only drawings located were of the 1948 spillway revisions designed by Barker and Wheeler.

h. Normal Operation Procedres: The reservior is operated as a water supply reservoir with water drawn off on an as-needed basis.

1.3 Pertinent Data:

a. Drainage Area: The drainage area above the dam is 4.3 square miles. The dam impounds the waters of Hoffman Brook, a tributary to the Chemumg River.

b. Discharge at Dam Site:

Maximum known flood at damsite: Believed to be June, 1972 - flood unknown

Spillway Capacity at Maximum Design Pool Elevation: Unknown

Outlet Works Capacity at Maximum Pool Elevation: Unknown

Emergency Spillway Capacity at Maximum Pool Elevation: 4,731 cfs

c. Elevation: (feet above MSL)

Top of Dam: 1072.3

Maximum Pool Design Surcharge: Unknown

Normal Pool: 1067.5

Outlet Works Inlet Invert: Unknown

Outlet Works Exit Invert: Unknown

Streambed at Centerline of Dam: Approximately 1036

Maximum Tailwaters: None

d. Reservoir:

Length of Normal Pool: 1800 feet

Length of Maximum Pool: 2700 feet

e. Storage: (acre-feet)

Normal Pool: 460

Design Surcharge: Unknown

Top of Dam: 570

f. Reservoir Surface: (acres)

Top of Dam: 27.2

Normal Pool: 22.6

g. Dam:

Type: Earthfill

Length: 800 feet

Height: 36 feet

Top Width: 12 feet

Side Slopes: Upstream 4:1 effective; 2:1 near abutments
Downstream 1 1/2:1 with 40-70' wide berm

Zoning: None

Impervious Core: Puddle Core

Cutoff: Unknown

Grout Curtain: None

h. Outlet Works:

Type: One 16" cast iron pipe

Length: Approximately 450 feet

Closure: Valves beyond toe of embankment

i. Spillway:

Type: Sharp crested weir

Length: 119.5 feet

Crest Elevation: 1067.5 feet

Gates: None

Upstream Channel: Open cut paved channel 100 feet long and 100 feet wide

Downstream Channel: Open cut stepped chute with concrete paved bottom and concrete retaining walls. Approximately 450 feet long.

j. Regulating Outlets: None other than outlet works

SECTION 2: ENGINEERING DATA

2.1 Design: Little information is available on the design of the Hoffman Creek Dam. No data is available on the original dam. A typical section drawn on a 1916 Dam Report by New York State Conservation Commission may represent original design concept. Drawings on the 1948 spillway modifications are available.

2.2 Construction: No detailed construction history or reports are available other than for the year in which modifications were made.

2.3 Operation: No detailed information is available on the operation of Hoffman Creek Dam. The Water Board records the amount of water drawn off the reservoir yearly.

2.4 Evaluation: Little information on the design or construction of the dam was available. The data available is not sufficient to perform a detailed evaluation of the structure.

SECTION 3: VISUAL INSPECTION

3.1 Findings:

a. General: The Hoffman Creek Dam was inspected by L. Robert Kimball and Associates personnel on August 30, 1978 accompanied by Mr. Ed Considine, Jr. of the Elmira Water Board. The structure appeared to be in reasonably good condition for its age.

b. Dam: The upstream slope of the embankment appears to be eroded at the emergency spillway level. There is no rip rap above this level. Large trees have recently been removed from the upstream face.

The downstream slope is steep and covered with considerable vegetative growth (grass, blackberry bushes and trees). This growth obscurred inspection for erosion and seepage on the downstream slope. In addition, large pine trees are growing on the berm near the dam crest.

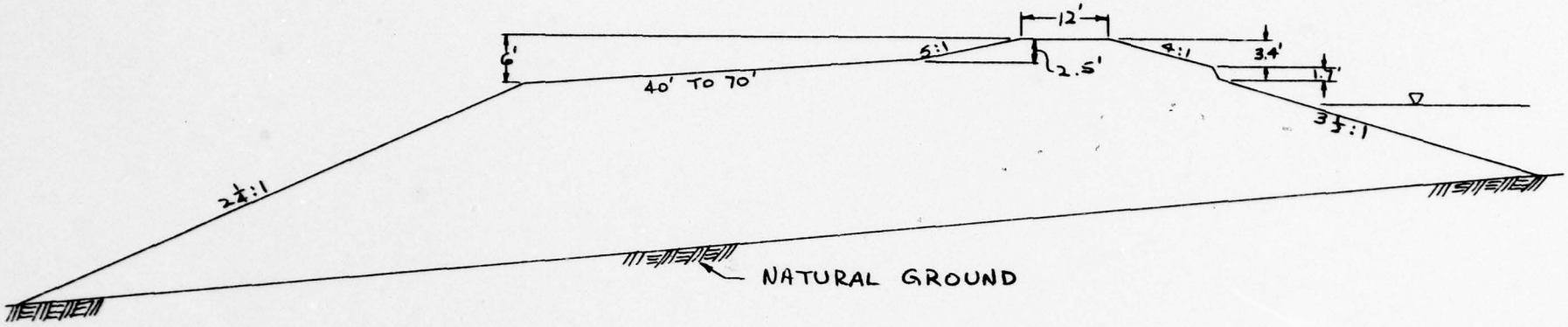
Waste soil and rock is dumped beyond the downstream toe which may also obscure any seepage , if present.

c. Appurtenant Structures: The emergency spillway appeared to be in good condition since it was repaired in 1972. Little deterioration of the concrete was noted. The exit channel narrows at one point and during high flows water may back up and eventually overflow. However, this overflow point is beyond the toe of the dam and would not create any major problems.

d. Reservoir Area: No signs of reservoir rim instability were noted:

e. Downstream Channel: The downstream channel is narrow for approximately 3,000 feet and then fans into a flood plain and the city of Elmira.

3.2 Evaluation: The visual inspection was partially limited because of the heavy vegetation on the downstream slope. However, no signs of instability were noted. The outlet works and emergency spillway appeared to be adequate and in good working condition.



HOFFMAN CREEK DAM

CROSS SECTION NEAR CENTER OF DAM

SCALE: 1" = 20'

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures: No defined operational plan is in use. The water level is kept as high as possible in the reservoir. Water is drawn off on an as-need basis. Hoffman Creek Reservoir supplies approximately 15% of the Elmira's water supply and thus is used only seasonally. On an average, the emergency spillway discharges water 2 to 3 times a year.

4.2 Maintenance of Dam: Maintenance of the dam and embankment are laking.

4.3 Maintenance of Operating Facilities: The outlet works valves and blowoff line are operated monthly during the spring and summer seasons. The emergency spillway is repaired on an as-needed basis.

4.4 Description of Any Warning System in Effect: None

4.5 Evaluation: The operating facilities appear to be operated and maintained frequently. Little maintenance of the dam is performed.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Hydrologic Evaluation of Features:

a. Design Data: Little information is available on the hydraulic and hydrologic design. Some very rough calculations are available, however, the spillway has been modified several times and their validity is uncertain.

Flood routing conducted for the SCS dam upstream of Hoffman Creek Reservoir was available. This information was used in the hydrologic evaluation of the subject dam.

b. Experience Record: The emergency spillway has controlled all flows to date. In 1972, the outlet channel was damaged during high flow and was repaired.

During the 1972 storm it is reported that 2 to 3 feet of water was flowing over the spillway weir.

c. Visual Observations: At the time of inspection no water was flowing over the spillway weir. No signs of major deterioration were noted.

The construction of a flood control dam by the SCS upstream of the Hoffman Creek Dam will significantly affect the hydrology (inflow).

d. Overtopping Analysis: Overtopping potential was investigated through the development of the probable maximum flood (PMF) for the watershed and subsequent routing of the PMF through the reservoir system. The PMF is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration losses, and concentration of run-off at a specific location, that is considered reasonable possible for a particular drainage area.

The drainage area contributing to Hoffman Creek Reservoir is approximately 4.3 square miles. To develop the basic hydrologic working tool, the unit hydrograph, Snyder Coefficients were used. After discussions with the Corps of Engineers personnel assumed parameters of Cp=0.60 and Ct=2.0 were used, a value of Tp was calculated considering watershed size and shape.

Using Hydrometeorological Report No. 33, the PMP index rainfall was determined to be 22.0 inches for a 24 hour duration, 200 square mile basin. The percentages of the index rainfall applied to other durations were interpolated from the plot of drainage area versus percent of 24 hour, 200 square mile.

The drainage area was divided into two subbasins. The first basin was the drainage area above the upstream dam. The floods were routed through the upstream dam considering the effects of flood retention in the structure. Elevation, storage, discharge information was provided by the SCS. The discharge was combined with the hydrograph for the lower basin above Hoffman Creek Dam and the composite hydrograph routed through the reservoir.

To allow inflow and outflow hydrographs to be developed and routed several assumptions were made.

1. The upstream flood control structure was operational and storage was allotted above the principal spillway and below the emergency spillways.

2. Elevation storage information was obtained from U.S.G.S. topographic maps.

SUMMARY OF HYDROLOGIC ANALYSIS
HOFFMAN CREEK DAM

Elevation Top of Dam: 1072.3'

Elevation Crest of Spillway: 1067.5'

PMF ROUTING

PMF Peak: 6,929 cfs

PMF After Routing through Reservoir: 6,893 cfs

Elevation of Routed PMF Corresponding to 6893 cfs: 1073.0

Dam Overtopped: 0.7 feet

Spillway Surcharge: 5.5 feet

Percent Required Spillway Capacity Available: 62%

SPF ROUTING

SPF Peak: 3,447 Assuming 50% of PMF Peak

SPF After Routing through Reservoir: 3,447 Approximate

Elevation of Routed SPF Corresponding to 3447 cfs: 1071.7

Freeboard Remaining: 0.6 feet

Spillway Surcharge: 4.2 feet

SPF routing was not conducted. The PMF peak was reduced by 50% to obtain the SPF peak. It was assumed that the peak SPF inflow was not reduced by the reservoir and the maximum elevation of the reservoir during the SPF corresponds to the SPF peak inflow.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability:

a. Visual Observations: No distress, settlement or movement were noted during the inspection. However, most of the downstream slope was obscured due to the heavy vegetation.

b. Design and Construction Data: No design or construction data is available on the stability of the embankment.

c. Operating Records: No operating records are available which would provide insight on stability.

d. Post Construction Changes: Several modifications were made after the original construction. No information is available on the changes to the embankment.

e. Seismic Stability: The dam is located in seismic zone 1 and should not present any problems if static conditions are satisfactory.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment:

a. Safety: The dam does not appear to present an immediate danger to life and property. Some maintenance of the embankment should be performed (See Recommendations 7.2). The dam is capable of passing the SPF (1/2 PMF) but is not adequate to pass the PMF.

b. Adequacy of Information: The information available is inadequate for complete analysis. The validity of the limited information is questionable because of the many modifications.

c. Urgency: Emergency action is not deemed necessary. However, follow up studies and remedial modifications are recommended and should be initiated in the near future.

d. Necessity for Additional Work: Follow up analysis is necessary and is outlined below (Section 7.2).

7.2 Recommendations:

1. A detailed stability analysis should be performed since the condition of the embankment and puddle core are unknown.

2. Rip rap should be placed on the upstream slope to the top of dam.

3. Vegetation on the downstream slope should be removed.

4. The fill placed near the toe of the embankment should be graded at regular intervals.

5. Steps should be taken in the near future to modify the dam and/or spillway to control the PMF.

APPENDIX A

GEOLOGY

HOFFMAN CREEK DAM

Hoffman Creek Dam and the Elmira Reservoir lie in the Alleghany highlands part of the Appalachian Uplift. The area was glaciated during the Pleistocene leaving deposits of clays, silts, sands and gravels. The bedrock under the dam consists of Upper Devonian aged shales of the West Falls Group. There are no major structural features in the area. The strata are relatively flat-lying although they have been uplifted and dissected.

APPENDIX B

HYDRAULIC COMPUTATIONS

HOFFMAN CREEK DR. A

ELMIRA RESERVOIR

DRAINAGE AREA

FROM U.S.G.S. QUADRANGLES

AREA = 3.59 SQ. MI. SUBAREA 1

0.53 SQ. MI. SUBAREA 2

PRECIPITATION

FROM HYDROMETEOROLOGICAL REPORT 33

PROBABLE MAXIMUM PRECIP. INDEX = 22.0"

DEPTH - AREA - DURATION RELATIONSHIP (ZONE 2)

6 HR. —— 117 %
12 HR —— 126 %
24 HR —— 141 %
48 HR —— 152 %

FROM EM1110-2-1411,

STANDARD PROJECT PRECIP. INDEX = 9.9"

SNYDER COEFFICIENTS

LENGTH OF CHANNEL:

SUBAREA 1 L = 3.22 MI.

SUBAREA 2 L = 0.70 MI.

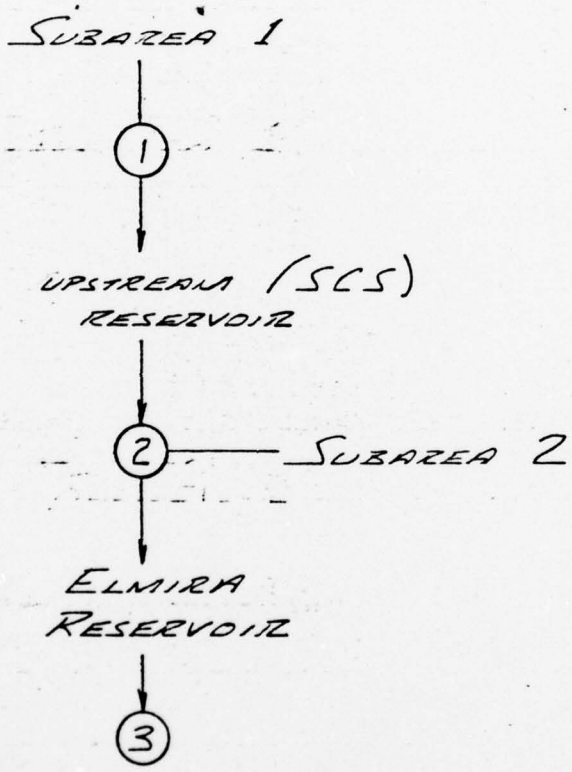
CENTROIDAL LENGTH ALONG MAIN CHANNEL:

SUBAREA 1 L_{ca} = 2.05 MI.

SUBAREA 2 L_{ca} = 0.43 MI.

HOFFMAN CREEK DAM

ELMIRA RESERVOIR



HOFFMAN CREEK DAM

SNYDER'S LAG TIME:

$$t_{pR} = C_t(.955)(LL_{ca})^{.3} + .25\,t_R$$

SUBAREA 1

$$t_{pR} = 2.0(.955)(3.22 \times 2.05)^{.3} + .25(.5)$$

$$= 3.51 \text{ HR.}$$

SUBAREA 2

$$t_{pR} = 2.0(.955)(0.70 \times 0.43)^{.3} + .25(.5)$$

$$= 1.5 \text{ HR.}$$

UNIT HYDROGRAPH PEAK DISCHARGE:

$$Q_{pR} = \frac{640\,C_p A}{t_{pR}}$$

SUBAREA 1

$$Q_{pR} = \frac{640(0.6)(3.59)}{3.5}$$

$$= 394 \text{ cfs}$$

SUBAREA 2

$$Q_{pR} = \frac{640(0.6)(0.53)}{1.5}$$

$$= 136 \text{ cfs.}$$

HOFFMAN CREEK DAM

ELMIRA RESERVOIR

UPSTREAM DAM

*ELEVATION - STORAGE - DISCHARGE RELATIONSHIP

ELEV. (FT)	STORAGE (AC-FT)	Q (CFS)
1130.9	0	0
1131.5	0	21
1136.0	43	124
1153.5	378	149
1154.0	391	284
1155.0	416	1058
1156.0	442	2365
1157.0	471	4167
1158.5	515	7674
1160.5	675	13646

D.A. = 3.59 SQ. MI.

T/DAM EL. 1161.6'

* FROM SOIL CONSERVATION SERVICE

HOFFMAN CREEK DAM

ELEVATION - DISCHARGE RELATIONSHIP

$Q_1 = 3.4 L_1 H_1^{3/2}$ SPILLWAY $L_1 = 119.5'$

$Q_2 = 2.63 L_2 H_2^{3/2}$ DAM OVERTOP $L_2 = 800'$

ELEV. (FT)	H_1 (FT)	H_2 (FT)	Q_1 (CFS)	Q_2 (CFS)	Q_T (CFS)
1067.5	0.0		0		0
1068.5	1.0		406		406
1069.5	2.0		1149		1149
1070.5	3.0		2111		2111
1071.5	4.0		3250		3250
1072.5	5.0	0.2	4543	188	4731
1073.5	6.0	1.2	5971	2766	8737
1074.5	7.0	2.2	7525	6866	14,391
1075.5	8.0	3.2	9194	12,044	21,238
1076.5	9.0	4.2	10,970	18,110	29,080

EL. T/DAM = 1072.3'

HOFFMAN CREEK DAM

ELEVATION - STORAGE RELATIONSHIP

ELEV. (FT.)	SURFACE AREA (ACRES)	Δ ELEV. (FT.)	TOTAL STORAGE (AC-FT)	TOTAL DISCHARGE (CFS)
1067.5	21.8	0.0	0	0
1068.5	23.0	1.0	22	406
1069.5	24.2	1.0	46	1149
1070.5	25.3	1.0	71	2111
1071.5	26.2	1.0	97	3250
1072.5	27.2	1.0	123	4731
1073.5	28.2	1.0	151	6737
1074.5	29.1	1.0	180	14,391
1075.5	30.1	1.0	209	21,238
1076.5	31.0	1.0	240	29,080

T/DAM = EL. 1072.3'

SCS - Site 18

X

NEWTOWN-HOFFMAN WATERSHED

NY-2289-D

DESIGN CRITERIA

1. Structure classification: class C

2. Purpose: Single purpose flood retarding structure

3. Principal spillway:

   a. Riser:
   Single stage with crest set at the 100-year submerged sediment pool elevation.

   b. Release rate:
   Maximum release rate = 150 cfs = 42 csm

   c. Energy dissipator:
   Impact basin

4. Emergency spillway:

   a. Minimum crest elevation set by routing the principal spillway hydrograph, using the 100-year frequency rainfall.

   b. Emergency and freeboard hydrographs: point rainfall derived from rainfall map (ES-1020) for class C structures.

   c. Maximum allowable velocity through exit section for a class C structure.

   d. Length of level section: 50 feet.

   e. Inlet channel: S = 0.020 ft/ft.

   f. Side slopes - 3:1

5. Top of dam elevation:

   Determined by the most severe of the following conditions:

   a. The passage of the freeboard hydrograph.

   b. The passage of the emergency spillway, plus the necessary freeboard required for frost conditions.

   c. The passage of the emergency spillway, plus the necessary freeboard required for wave action.

6. Earth fill:

   a. Top width: $w=\frac{H+35}{5}$

   b. Side slopes: Upstream 3:1; downstream 2.5:1

   c. Berm: 10 foot width set at riser crest elevation.

NEWTOWN-HOFFMAN WATERSHED

NY-2289-D

DESIGN DATA

ITEM	UNIT	QUANTITY
Site location: Latitude 42°06'51" Longitude 76°51'31"		
Drainage Area:	sq. mi.	3.59
	acres	2298
Class of Structure: C		
Principal Spillway:		
Pipe diameter	inches	30
Riser size	feet	2.5 x 7.5'
Pipe length (approx.)	feet	274
Riser crest elev.	feet	1130.9
Riser floor elev.	feet	1100.9
Riser height	feet	30
Pipe outlet invert elev.	feet	1092.0
Release at emergency spillway crest elev.	cfs	150
Emergency Spillway:		
Crest elevation	feet	1153.5
Level section length	feet	50
Entrance length (approx.)	feet	300
Entrance slope	%	2
Roughness coefficient (Manning)	- -	0.04
Bottom width:		
Left abutment	feet	180
Right abutment	feet	74
Total	feet	254
Design high water elev.	feet	1157.0
Top of dam elevation	feet	1161.6
Top width	feet	20
Storage:		
Riser crest elevation	AF	116
Retarding storage	AF	376
Spillway storage	AF	257

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Syracuse, New York 13210

2-1 X

WS-PL-566 - Hoffman Creek - Hydrology

DATE: May 22, 1975

Files

The basic hydrology data, developed in the late sixties, has been checked for conformance to present hydrologic criteria. Items checked included Tc's, CN's, channel capacities and flood routing. An error was found in the curve number computations which created a change in CN from 68 to 75. CN

The original flood routing had been completed using the old Wilson graphical method; therefore, this was redone using the TR-20 procedures. Using TR-20, we were able to analyze structural site alternatives plus several variations in release rate. In the final analysis, the TR-20 100-year peak discharge near the school was approximately 1,500 cfs as compared to 1,200 cfs which was computed originally. With site 18 in place, the discharge at the school is reduced to 234 cfs near the school and 540 cfs at the outlet. The corresponding discharges for the graphical method were 510 and 667 cfs respectively.

It is concluded that the hydrology provided for the original economic analysis is adequate. The hydrology for the structure site needs to be redone to investigate alternate structure sites and release rates. With the structure located at its original site or downstream from that site, the benefits claimed in the plan will be derived.

Ivan R. Wilkinson
Hydrologist

cc: D. D. Hackbart
G. P. Bowie

PUTATION SHEET
523 REV 5-58

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE NEW YORK | PROJECT NEWTOWN - SITE 18

WAR	DATE 8-28-75	CHECKED BY	DATE 9/23/75	JOB NO. NY-2289-D

SUBJECT HYDROGRAPH VALUES | SHEET ___ OF ___

GENERAL DATA

CN	Tc	DRAINAGE AREA	CLASS STRUCTURE
75	1.4 HRS.	3.59 MI^2 2298 AC	C

PRINCIPAL SPILLWAY

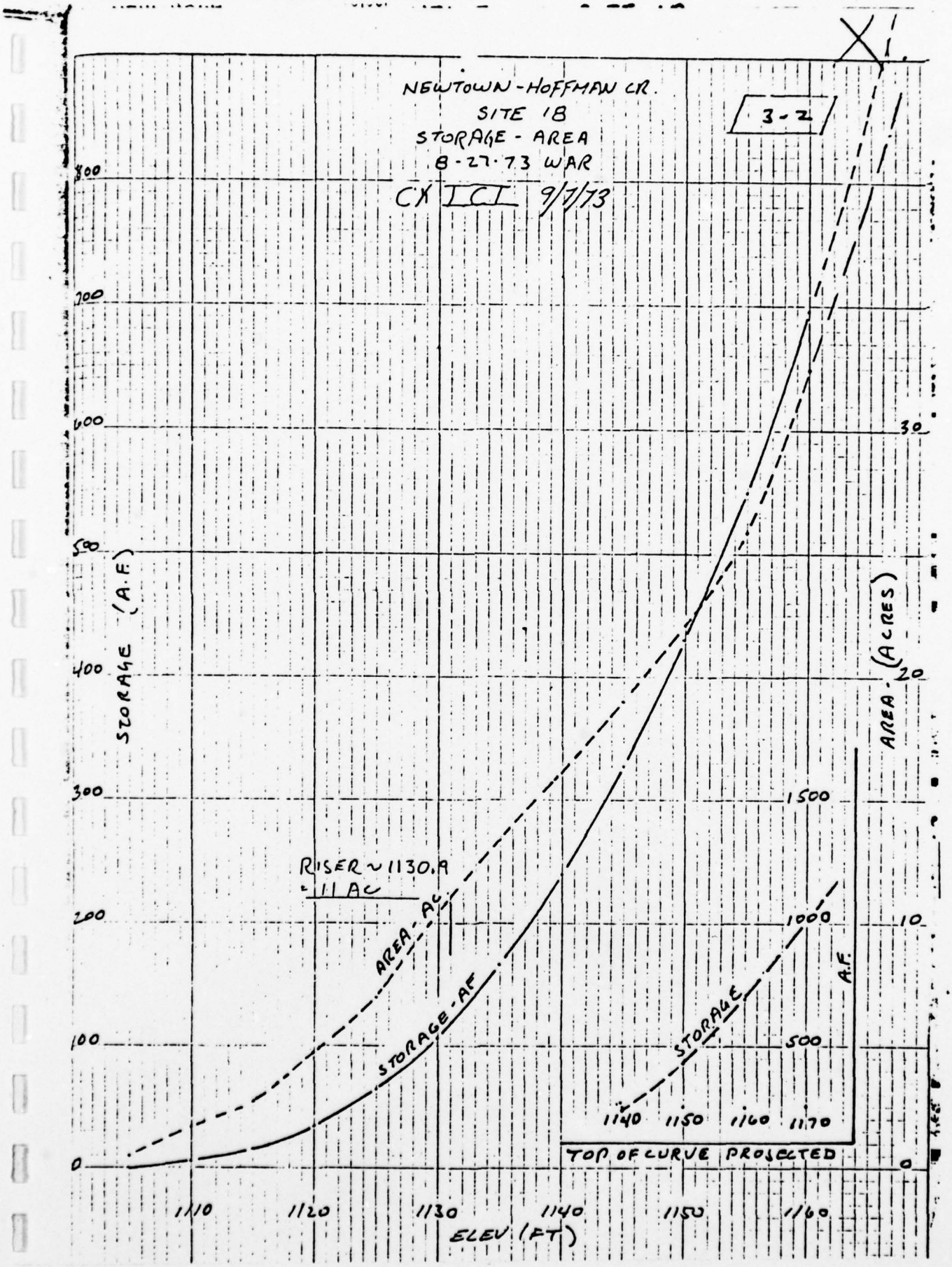
DESIGN STORM	Q10 RUNOFF	Q1/Q10 RATIO	Q1 RUNOFF	QUICK RETURN FLOW
100 YR.	8.0 IN.	0.4	3.2 IN.	6. C.S.M.

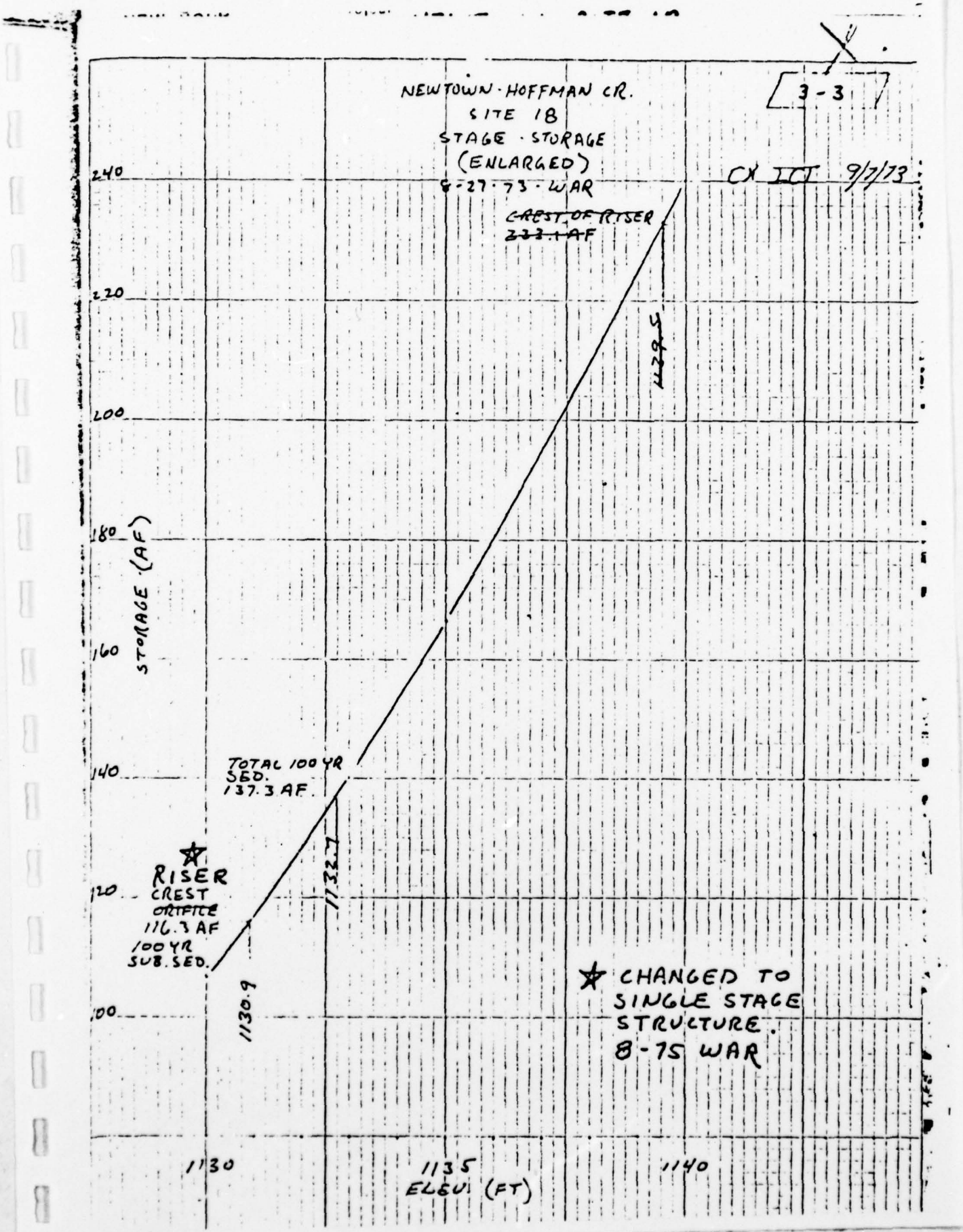
EMERGENCY SPILLWAY

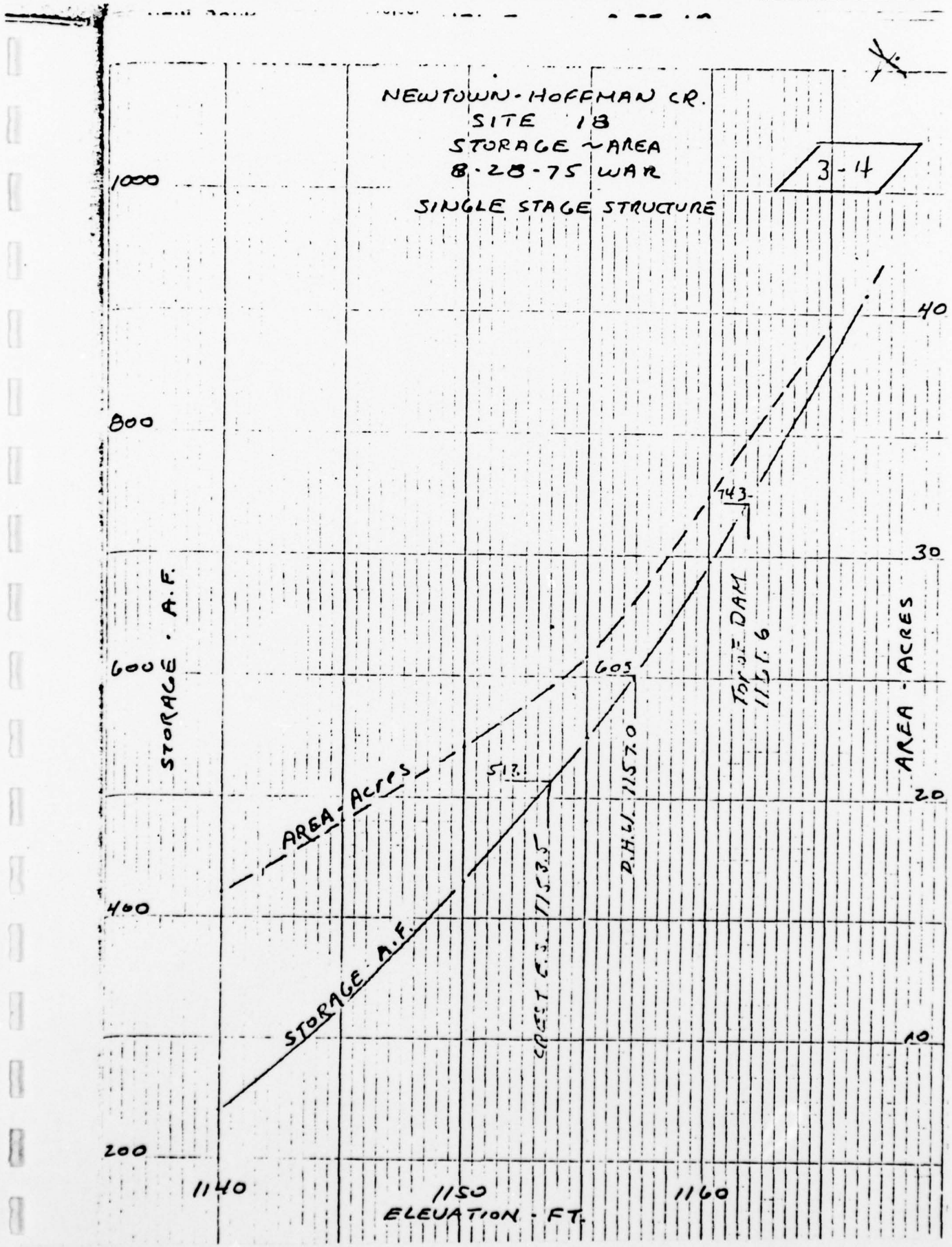
POINT RAINFALL	STORM DURATION	AREAL RAIN FACTOR	AREAL RAIN FALL	RUNOFF
9.2 IN.	6. HR.	1.	9.2 IN.	6.13 IN.

FREEBOARD

POINT RAINFALL	STORM DURATION	AREAL RAIN FACTOR	AREAL RAIN FALL	RUNOFF
24.2 IN	6 HR.	1	24.2 IN.	20.6 IN.


NEWTOWN - HOFFMAN CR.
SITE 18
STORAGE - AREA
8-27-73 WAR
CK ICI 9/7/73
3-2
STORAGE (A.F.)
AREA - (ACRES)
800
700
600
500
400
300
200
100
0
30
20
10
0
1500
1000
500
A.F.
STORAGE
RISER ~ 1130.9
= 11 AC
AREA - AC
STORAGE - AF
1140
1150
1160
1170
TOP OF CURVE PROJECTED
1110
1120
1130
1140
1150
1160
ELEV (FT)


NEWTOWN-HOFFMAN CR.
SITE 18
STAGE-STORAGE
(ENLARGED)
8-27-73-WAR
3-3
CK ICI 9/7/73
CREST OF RISER
233.1 AF
1129.5
240
220
200
180
160
140
120
100
STORAGE (AF)
TOTAL 100 YR
SED.
137.3 AF.
1133.7
RISER
CREST
ORIFICE
116.3 AF
100 YR
SUB. SED.
1130.9
★ CHANGED TO
SINGLE STAGE
STRUCTURE.
8-75 WAR
1130
1135
1140
ELEV. (FT)


NEWTOWN - HOFFMAN CR.
SITE 18
STORAGE ~ AREA
8-28-75 WAR
SINGLE STAGE STRUCTURE
3-14
1000
800
600
400
200
STORAGE - A.F.
AREA - ACRES
40
30
20
10
743
605
517
AREA - Acres
STORAGE A.F.
TOP OF DAM 1162.6
D.H.W. 1157.0
CREST C.S. 1153.5
1140
1150
1160
ELEVATION - FT.

PRINCIPAL SPILLWAY ROUTING ADP 3332 5-2-75

5-1

TERSHED NEWTOWN-HOFFMAN 05-02-75 BY GPB
W YORK CLASS-C DESIGN STORM 100 YR FREQ SINGLE STAGE

INTERVENING AREA HYDROGRAPH

ME	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
00	0.	14.	27.	30.	31.	31.	31.	31.	31.	32.
00	32.	32.	32.	32.	32.	33.	33.	33.	33.	33.
00	34.	34.	34.	34.	34.	35.	35.	35.	35.	36.
00	36.	36.	36.	37.	37.	37.	37.	38.	38.	38.
00	38.	39.	39.	39.	40.	40.	40.	41.	41.	41.
00	42.	42.	42.	43.	43.	44.	44.	44.	45.	45.
00	46.	46.	47.	47.	48.	48.	49.	49.	50.	50.
00	51.	52.	52.	53.	54.	54.	55.	56.	57.	57.
00	58.	59.	60.	61.	62.	63.	64.	65.	67.	68.
00	69.	70.	72.	74.	75.	77.	79.	81.	83.	85.
00	88.	90.	93.	96.	100.	103.	108.	112.	117.	123.
00	130.	138.	147.	158.	172.	189.	213.	245.	297.	399.
00	1240.	1231.	655.	402.	291.	239.	208.	186.	169.	156.
00	145.	136.	129.	122.	116.	111.	107.	103.	99.	96.
00	93.	90.	87.	85.	82.	80.	78.	77.	75.	73.
00	72.	70.	69.	68.	66.	65.	64.	63.	62.	61.
00	60.	59.	58.	57.	56.	56.	55.	54.	53.	53.
00	52.	52.	51.	50.	50.	49.	49.	48.	48.	47.
00	47.	46.	46.	45.	45.	44.	44.	44.	43.	43.
00	42.	42.	42.	41.	41.	41.	40.	40.	40.	39.
00	39.	39.	38.	38.	38.	38.	37.	37.	37.	37.
00	36.	36.	36.	36.	35.	35.	35.	35.	34.	34.
00	34.	34.	34.	33.	33.	33.	33.	33.	32.	32.
00	32.	32.	32.	32.	31.	31.	31.	31.	31.	31.
00	30.	15.	3.	0.	0.	0.	0.	0.	0.	0.
00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
00	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

PEAK

PRINCIPAL SPILLWAY ROUTING
TERSHED NEWTOWN-HOFFMAN 05-02-75 BY GPB
W YORK CLASS-C DESIGN STORM 100 YR FREQ SINGLE STAGE

5-2

CURVE NO. 100., 24 HOUR RAINFALL 3.20, Q 3.20 ** CURVE NO. 100., 10 DAY RAINFALL 8.00, Q 8.00

TC 1.40 LENGTH OF PIPE 283. MANNING'S 'N' VALUE 0.012 DRAINAGE AREA 3.59

BASE FLOW IS 6.00 CSM (21.54 CFS).

SINGLE STAGE WITH OPEN TOP.

HIGH STAGE CREST ELEV. 1130.90 WIDTH 15.00

CONDUIT SIZE IS 30. INCHES.

ELEVATION	STORAGE	CFS
1130.90	137.20	0.00
1131.10	137.21	4.15
1131.30	137.22	11.75
1131.50	137.23	21.60
1131.69	137.24	33.26
1131.90	137.25	46.50
1132.10	137.26	61.12
1132.30	137.27	77.01
1132.50	137.28	94.09
1132.69	137.29	112.27
1132.78	138.26	118.15
1136.00	180.00	123.55
1140.00	241.00	129.94
1144.00	310.00	136.04
1148.00	388.00	141.88
1152.00	478.30	147.48
1156.00	579.20	152.88
1160.00	696.00	158.10
1164.00	831.20	163.14

CREST E.S. ELEV 1153.5 = 150 CFS
DHW ELEV 1156.92 = 154.08 CFS

BASE FLOW IS 0.00 CSM (21.54 CFS).

S-2A

SINGLE STAGE WITH OPEN TOP.

HIGH STAGE CREST ELEV. 1130.90 WIDTH 15.00

CONDUIT SIZE IS 30. INCHES.

ELEVATION	STORAGE	CFS
1130.90	137.20	0.00
1131.10	137.21	4.15
1131.30	137.22	11.75
1131.50	137.23	21.60
1131.69	137.24	33.26
1131.90	137.25	46.50
1132.10	137.26	61.12
1132.30	137.27	77.01
1132.50	137.28	94.09
1132.69	137.29	112.27
1132.78	138.26	118.15
1136.00	180.00	123.55
1140.00	241.00	129.94
1144.00	310.00	136.04
1148.00	388.00	141.88
1152.00	478.30	147.48
1156.00	579.20	152.88
1160.00	696.00	158.10
1164.00	831.20	163.14
1168.00	966.40	168.04
1172.00	1101.60	172.80
1176.00	1236.80	177.43
1180.00	1372.00	181.94
1184.00	1507.19	186.35
1188.00	1642.40	190.65
1192.00	1777.60	194.85
1196.00	1912.80	198.97
1200.00	2048.00	203.01
1204.00	2183.20	206.96
1208.00	2318.40	210.84

CREST E.S. ELEV. 1153.5 = 150 CFS
DHW ELEV. 1156.92 = 154.08 CFS

PRINCIPAL SPILLWAY ROUTING

TERSHED NEWTOWN-HOFFMAN 05-02-75 BY GPB
W YORK CLASS-C DESIGN STORM 100 YR FREQ SINGLE STAGE

5-3

CONDUIT DIAMETER IS 30. INCHES.

	TIME	INFLOW	AVE IN	OUTFLOW	ELEV.	STORAGE
	6.00	31.	31.	31.	1131.66	137.2
	12.00	32.	32.	32.	1131.68	137.2
	18.00	33.	33.	33.	1131.70	137.2
	24.00	34.	34.	34.	1131.72	137.2
	30.00	36.	36.	36.	1131.74	137.2
	36.00	37.	37.	37.	1131.76	137.2
	42.00	39.	39.	39.	1131.79	137.2
	48.00	41.	41.	41.	1131.82	137.2
	54.00	43.	43.	43.	1131.85	137.2
	60.00	46.	46.	46.	1131.89	137.2
	66.00	49.	48.	48.	1131.93	137.2
	72.00	52.	52.	52.	1131.98	137.2
	78.00	57.	56.	56.	1132.03	137.2
	84.00	62.	62.	62.	1132.11	137.2
	90.00	69.	68.	68.	1132.19	137.2
	96.00	79.	78.	78.	1132.31	137.2
	102.00	93.	92.	92.	1132.47	137.2
	108.00	117.	115.	115.	1132.74	137.7
	114.00	172.	165.	120.	1133.90	152.8
	120.00	1240.	820.	131.	1141.17	261.2
	126.00	208.	224.	147.	1152.18	482.9
~~PEAK~~	130.00	145.	151.	148.	1152.50	491.0
	MAXIMUM STORAGE OBTAINED.			TEN DAY DRAWDOWN BEGINS.		
	1.00	21.	21.	131.	1140.84	255.6
Days →	1.62	21.	21.	21.	1131.49	137.2

OUTFLOW = INFLOW.

MAXIMUM STORAGE IS 491.0 ACRE FEET (2.564 INCHES) AT ELEV. 1152.50 (CREST, EMER. SPW.).

NET DETENTION STORAGE REQUIRED IS 353.8 ACRE FEET (1.848 INCHES).

GROSS STORAGE REMAINING AFTER 10 DAYS IS 137.2 ACRE FEET (0.716 INCHES)
AT ELEV. 1131.49 (START EMER. SPW. AND FREEBOARD ROUTINGS).

NET REMAINING STORAGE IS 0.0 ACRE FEET (0.000 INCHES).

	42.00	39.	39.	39.	[illegible]	137.2
	48.00	[illegible]	41.	41.	1131.92	137.2
	54.00	43.	43.	43.	1131.85	137.2
	60.00	46.	46.	46.	1131.89	137.2
	66.00	49.	48.	48.	1131.93	137.2
	72.00	52.	52.	52.	1131.98	137.2
	78.00	57.	56.	56.	1132.03	137.2
	84.00	62.	62.	62.	1132.11	137.2
	90.00	69.	68.	68.	1132.19	137.2
	96.00	79.	78.	78.	1132.31	137.2
	102.00	93.	92.	92.	1132.47	137.2
	108.00	117.	115.	115.	1132.74	137.7
	114.00	172.	165.	120.	1133.90	152.8
	120.00	1240.	820.	131.	1141.17	261.2
	126.00	208.	224.	147.	1152.18	482.9
~~PEAK~~	130.00	145.	151.	148.	1152.50	491.0
	MAXIMUM STORAGE OBTAINED.			TEN DAY DRAWDOWN BEGINS.		
	1.00	21.	21.	131.	1140.84	255.6
Days →	1.62	21.	21.	21.	1131.49	137.2

OUTFLOW = INFLOW.

MAXIMUM STORAGE IS 491.0 ACRE FEET (2.564 INCHES) AT ELEV. 1152.50 (CREST, EMER. SPW.). ☆

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GROSS STORAGE REMAINING AFTER 10 DAYS IS 137.2 ACRE FEET (0.716 INCHES)
AT ELEV. 1131.49 (START EMER. SPW. AND FREEBOARD ROUTINGS).

NET REMAINING STORAGE IS 0.0 ACRE FEET (0.000 INCHES).

CHECKED ~ WAR 8-75

☆ NOTE : CREST RAISED TO ELEV. 1153.5
TO DECREASE REQ'D SPILLWAY WIDTH.

5-3A

E. S. DESIGN AND FREEBOARD ROUTINGS.

5-4 X

NEWTOWN HOFFMAN CREEK SITE 18 NEW YORK 12 5 75 CK WUK

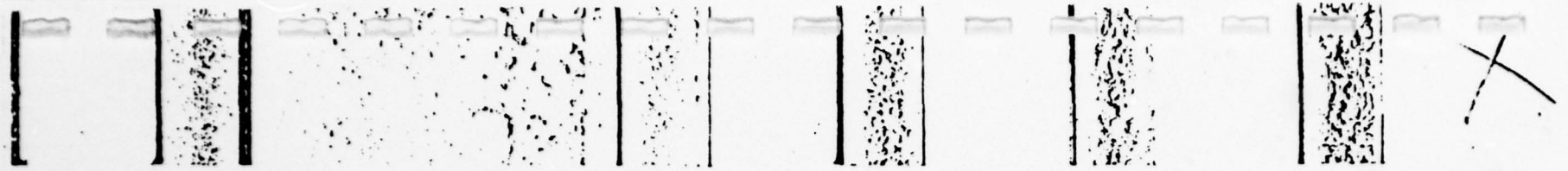
CURVE NO. 75. TC 1.40 STORM DURATION 6.00

EMER. SPW. RAINFALL 9.20 FREEBOARD RAINFALL 24.20

CASE NO. 2. DRAINAGE AREA 3.59 EMER. SPW. CREST 1153.5

B01 254. L1 1. B02 0. L2 0. B03 0. L3 0.

	ELEVATION	STORAGE	CFS	CFS	CFS
	1130.90	137.	0.	0.	0.
	1131.10	137.	4.	0.	0.
	1131.30	137.	11.	0.	0.
	1131.50	137.	21.	0.	0.
	1132.50	137.	94.	0.	0.
	1136.00	180.	124.	0.	0.
	1140.00	241.	130.	0.	0.
	1148.00	388.	142.	0.	0.
	1152.00	478.	147.	0.	0.
CREST E.S. →	1153.50	515.	149.	0.	0.
	1154.00	528.	284.	0.	0.
	1154.50	541.	605.	0.	0.
	1155.00	553.	1058.	0.	0.
	1155.50	566.	1638.	0.	0.
	1156.00	579.	2365.	0.	0.
	1156.50	593.	3232.	0.	0.
	1157.00	608.	4167.	0.	0.
	1157.50	622.	5234.	0.	0.
	1158.50	652.	7674.	0.	0.
	1160.00	696.	12153.	0.	0.
	1160.50	712.	13646.	0.	0.
	1164.00	831.	27417.	0.	0.
	1168.00	966.	47761.	0.	0.
	1170.99	1068.	66592.	0.	0.



NEWTOWN HOFFMAN CREEK SITE 18 NEW YORK 12 5 75 CK WUK

5-5

EMER. SPW. INTERVENING HYDROGRAPH.

0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25
0.	0.	0.	0.	0.	8.	42.	139.	370.	920.
1998.	3483.	4777.	5328.	5155.	4637.	4084.	3603.	3186.	2811.
2485.	2227.	2039.	1913.	1811.	1661.	1411.	1087.	775.	533.
362.	245.	165.	110.	73.	48.	31.	19.	11.	6.
2.	0.	0.	0.	0.	0.	0.	0.	0.	0.

PEAK

NEWTOWN HUFFMAN CREEK SITE 18 NEW YORK 12 5 75 CK HUK

BO = 254. L = 1. CREST = 1153.50

5-6

TIME	INFLOW	AVE IN	OUTFLOW	ELEV.	
0.25	0.	0.	0.	1130.90	
0.50	0.	0.	0.	1130.90	
0.75	0.	0.	0.	1130.90	
1.00	0.	0.	0.	1130.92	
1.25	8.	4.	7.	1131.18	
1.50	42.	25.	41.	1131.76	
1.75	139.	91.	94.	1132.53	
2.00	370.	255.	96.	1132.80	
2.25	920.	645.	104.	1133.72	
2.50	1998.	1459.	124.	1136.00	
2.75	3483.	2741.	129.	1139.54	
3.00	4777.	4130.	136.	1144.11	
3.25	5328.	5052.	143.	1149.34	
3.50	5155.	5242.	222.	1153.77	
3.75	4637.	4896.	3032.	1156.38	
4.00	4084.	4361.	4080.	1156.95	USC ELEV 1157.0
4.25	3603.	3843.	3892.	1156.85	PEAK OCCURS PREVIOUS LINE
4.50	3186.	3395.	3496.	1156.64	
4.75	2811.	2999.	3106.	1156.42	
5.00	2485.	2648.	2758.	1156.22	
5.25	2227.	2356.	2453.	1156.05	
5.50	2039.	2133.	2213.	1155.89	
5.75	1913.	1976.	2036.	1155.77	
6.00	1811.	1862.	1906.	1155.68	
6.25	1661.	1736.	1779.	1155.59	
6.50	1411.	1536.	1603.	1155.47	
6.75	1087.	1249.	1375.	1155.27	
7.00	775.	931.	1089.	1155.02	
7.25	533.	654.	849.	1154.76	
7.50	362.	447.	632.	1154.52	
7.75	245.	304.	489.	1154.31	
8.00	165.	205.	371.	1154.13	
8.25	110.	137.	279.	1153.98	
8.50	73.	91.	242.	1153.84	
8.75	48.	60.	205.	1153.70	
9.00	31.	39.	172.	1153.58	
9.25	19.	25.	149.	1153.47	
9.50	11.	15.	149.	1153.36	

2.50	[illegible]	[illegible]	[illegible]	[illegible]
2.75	[illegible]	[illegible]	[illegible]	[illegible]
3.00	4777.	4130.	[illegible]	1144.11
3.25	5328.	5052.	143.	1149.34
3.50	5155.	5242.	222.	1153.77
3.75	4637.	4896.	3032.	1156.38
4.00	4084.	4361.	4080.	1156.95 USC ELEV 1157.0
4.25	3603.	3843.	3892.	1156.85 PEAK OCCURS PREVIOUS LINE
4.50	3186.	3395.	3496.	1156.64
4.75	2811.	2999.	3106.	1156.42
5.00	2485.	2648.	2758.	1156.22
5.25	2227.	2356.	2453.	1156.05
5.50	2039.	2133.	2213.	1155.89
5.75	1913.	1976.	2036.	1155.77
6.00	1811.	1862.	1906.	1155.68
6.25	1661.	1736.	1779.	1155.59
6.50	1411.	1536.	1603.	1155.47
6.75	1087.	1249.	1375.	1155.27
7.00	775.	931.	1089.	1155.02
7.25	533.	654.	849.	1154.76
7.50	362.	447.	632.	1154.52
7.75	245.	304.	489.	1154.31
8.00	165.	205.	371.	1154.13
8.25	110.	137.	279.	1153.98
8.50	73.	91.	242.	1153.84
8.75	48.	60.	205.	1153.70
9.00	31.	39.	172.	1153.58
9.25	19.	25.	149.	1153.47
9.50	11.	15.	149.	1153.36
9.75	6.	9.	148.	1153.25
10.00	2.	4.	148.	1153.13
10.25	0.	1.	148.	1153.01
10.50	0.	0.	148.	1152.89
10.75	0.	0.	148.	1152.77

5-6A

VOLUME CHECK AT HP IS 0.00 PERCENT.
COMPUTED HP 3.45
DURATION OF FLOW THRU EMERGENCY SPILLWAY = 5.75 HRS
VOLUME OF OUTFLOW THRU THE EMERGENCY SPILLWAY PER FOOT OF BOTTOM WIDTH (0/

****
HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
****

HOFFMAN CREEK - ELMIRA RESERVOIR
RESERVOIR POOL AT SPILLWAY LEVEL
TEST PMP

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
125	0	30	0	0	0	0	2	0	0

JOPER	NWT
3	0

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

SUB-AREA RUNOFF COMPUTATION

HYDROGRAPH FOR SUBAREA 1

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	3.59	0.0	3.59	0.0	0.0	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.0	22.00	117.00	126.00	141.00	152.00	0.0	0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.760

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP

0.0 0.0 1.00 0.0 0.0 1.00 1.50 0.10 0.0 0.01

UNIT HYDROGRAPH DATA
TP 3.50 CP 0.60 NTA 0

RECESSION DATA
STRTQ 10.00 QRCSN -0.35 RTIOR 3.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC 7.86 AND R 6.87 INTERVALS

UNIT HYDROGRAPH 41 END-OF-PERIOD ORDINATES, LAG 3.51 HOURS, CP 0.60 VOL 1.00

20.	74.	149.	233.	313.	372.	403.	400.	362.	313.
270.	234.	202.	175.	151.	130.	113.	97.	84.	73.
63.	54.	47.	41.	35.	30.	26.	23.	20.	17.
15.	13.	11.	9.	8.	7.	6.	5.	5.	4.
3.									

END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP Q
1	0.01	0.00	9.
2	0.01	0.00	8.
3	0.01	0.00	7.
4	0.01	0.00	6.
5	0.01	0.00	6.
6	0.01	0.00	5.
7	0.01	0.00	5.
8	0.01	0.00	4.
9	0.01	0.00	4.
10	0.01	0.00	4.
11	0.01	0.00	3.
12	0.01	0.00	3.
13	0.01	0.00	3.
14	0.01	0.00	2.
15	0.01	0.00	2.
16	0.01	0.00	2.
17	0.01	0.00	2.
18	0.01	0.00	2.

19	0.01	0.00	2.
20	0.01	0.00	2.
21	0.01	0.00	1.
22	0.01	0.00	1.
23	0.01	0.00	1.
24	0.01	0.00	1.
25	0.08	0.00	1.
26	0.08	0.00	1.
27	0.09	0.00	1.
28	0.09	0.00	1.
29	0.11	0.00	2.
30	0.11	0.00	2.
31	0.29	0.00	3.
32	0.29	0.00	3.
33	0.11	0.00	4.
34	0.11	0.03	5.
35	0.08	0.03	8.
36	0.08	0.03	13.
37	0.01	0.00	21.
38	0.01	0.00	28.
39	0.01	0.00	35.
40	0.01	0.00	41.
41	0.01	0.00	43.
42	0.01	0.00	42.
43	0.01	0.00	39.
44	0.01	0.00	34.
45	0.01	0.00	30.
46	0.01	0.00	26.
47	0.01	0.00	22.
48	0.01	0.00	19.
49	0.08	0.03	18.
50	0.08	0.03	18.
51	0.08	0.03	21.
52	0.08	0.03	27.
53	0.08	0.03	37.
54	0.08	0.03	48.

55	0.08	0.03	61.
56	0.08	0.03	74.
57	0.08	0.03	85.
58	0.08	0.03	95.
59	0.08	0.03	104.
60	0.08	0.03	111.
61	0.13	0.08	118.
62	0.13	0.08	127.
63	0.13	0.08	138.
64	0.13	0.08	152.
65	0.13	0.08	169.
66	0.13	0.08	187.
67	0.13	0.08	207.
68	0.13	0.08	226.
69	0.13	0.08	243.
70	0.13	0.08	258.
71	0.13	0.08	271.
72	0.13	0.08	282.
73	0.98	0.93	309.
74	0.98	0.93	380.
75	1.17	1.12	518.
76	1.17	1.12	737.
77	1.47	1.42	1044.
78	1.47	1.42	1434.
79	3.72	3.67	1932.
80	3.72	3.67	2585.
81	1.37	1.32	3355.
82	1.37	1.32	4160.
83	1.08	1.03	4931.
84	1.08	1.03	5580.
85	0.13	0.08	6023.
86	0.13	0.08	6197.
87	0.13	0.08	6080.
88	0.13	0.08	5729.
89	0.13	0.08	5258.
90	0.13	0.08	4739.

91	0.13	0.08	4208.
92	0.13	0.08	3700.
93	0.13	0.08	3246.
94	0.13	0.08	2854.
95	0.13	0.08	2514.
96	0.13	0.08	2221.
97	0.0	0.0	1989.
98	0.0	0.0	1782.
99	0.0	0.0	1597.
100	0.0	0.0	1431.
101	0.0	0.0	1282.
102	0.0	0.0	1148.
103	0.0	0.0	1029.
104	0.0	0.0	922.
105	0.0	0.0	826.
106	0.0	0.0	740.
107	0.0	0.0	663.
108	0.0	0.0	594.
109	0.0	0.0	532.
110	0.0	0.0	477.
111	0.0	0.0	427.
112	0.0	0.0	383.
113	0.0	0.0	343.
114	0.0	0.0	307.
115	0.0	0.0	275.
116	0.0	0.0	247.
117	0.0	0.0	221.
118	0.0	0.0	198.
119	0.0	0.0	177.
120	0.0	0.0	159.
121	0.0	0.0	142.
122	0.0	0.0	128.
123	0.0	0.0	114.
124	0.0	0.0	102.
125	0.0	0.0	92.
SUM	25.54	21.35	101647.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6197.	4997.	2037.	813.	101651.
INCHES		12.95	21.11	21.95	21.95
AC-FT		2479.	4043.	4203.	4203.

OVF

STATION 1

INFLOW I , OUTFLOW O AND OBSERVED FLOW *

0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	0.	0.	0.	0.
										PRECIP L	AND EXC
0.	0.	0.	0.	0.	0.	0.	0.	4.	3.	2.	1.
1 I	.	.	.	.	.	.	.	.	.	.	.
2 I	.	.	.	.	.	.	.	.	.	.	.
3 I	.	.	.	.	.	.	.	.	.	.	.
4 I	.	.	.	.	.	.	.	.	.	.	.
5 I	.	.	.	.	.	.	.	.	.	.	.
6 I	.	.	.	.	.	.	.	.	.	.	.
7 I	.	.	.	.	.	.	.	.	.	.	.
8 I	.	.	.	.	.	.	.	.	.	.	.
9 I	.	.	.	.	.	.	.	.	.	.	.
10 I	.	.	.	.	.	.	.	.	.	.	.
11 I	.	.	.	.	.	.	.	.	.	.	.
12 I	.	.	.	.	.	.	.	.	.	.	.
13 I	.	.	.	.	.	.	.	.	.	.	.
14 I	.	.	.	.	.	.	.	.	.	.	.
15 I	.	.	.	.	.	.	.	.	.	.	.
16 I	.	.	.	.	.	.	.	.	.	.	.
17 I	.	.	.	.	.	.	.	.	.	.	.
18 I	.	.	.	.	.	.	.	.	.	.	.
19 I	.	.	.	.	.	.	.	.	.	.	.
20 I	.	.	.	.	.	.	.	.	.	.	.
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22 I	.	.	.	.	.	.	.	.	.	.	.
23 I	.	.	.	.	.	.	.	.	.	.	.
24 I	.	.	.	.	.	.	.	.	.	.	.
25 I	.	.	.	.	.	.	.	.	.	.	.
26 I	.	.	.	.	.	.	.	.	.	.	.
27 I	.	.	.	.	.	.	.	.	.	.	.
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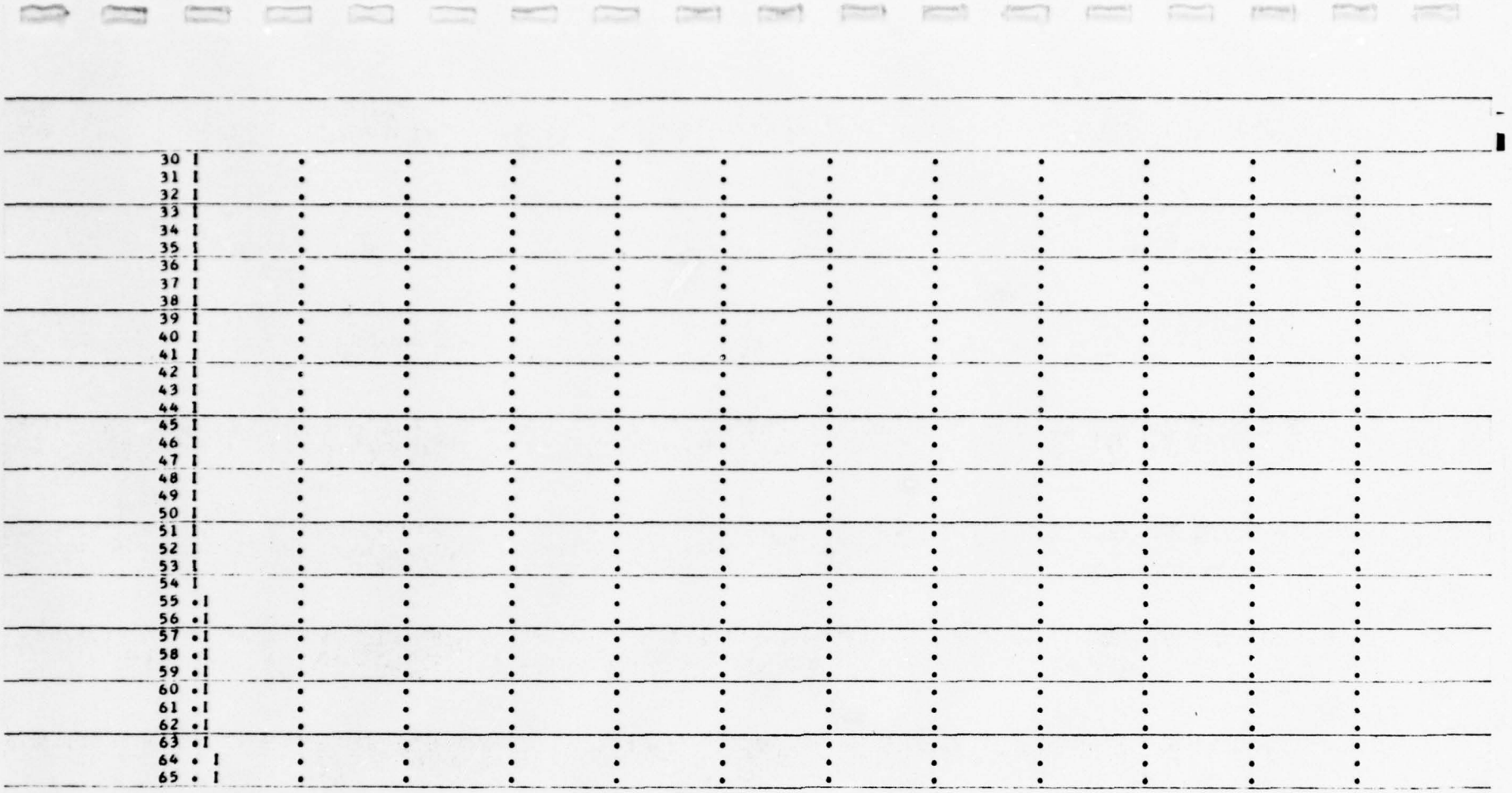

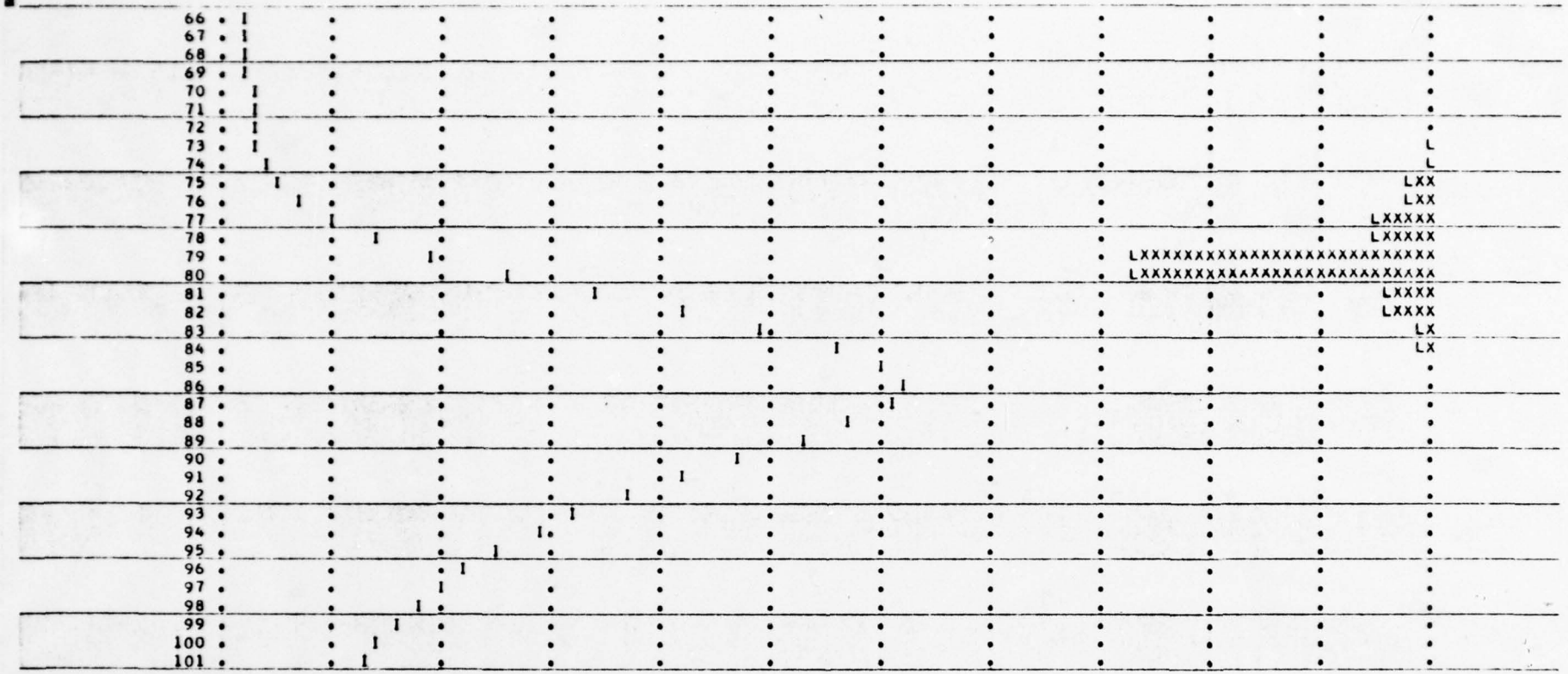

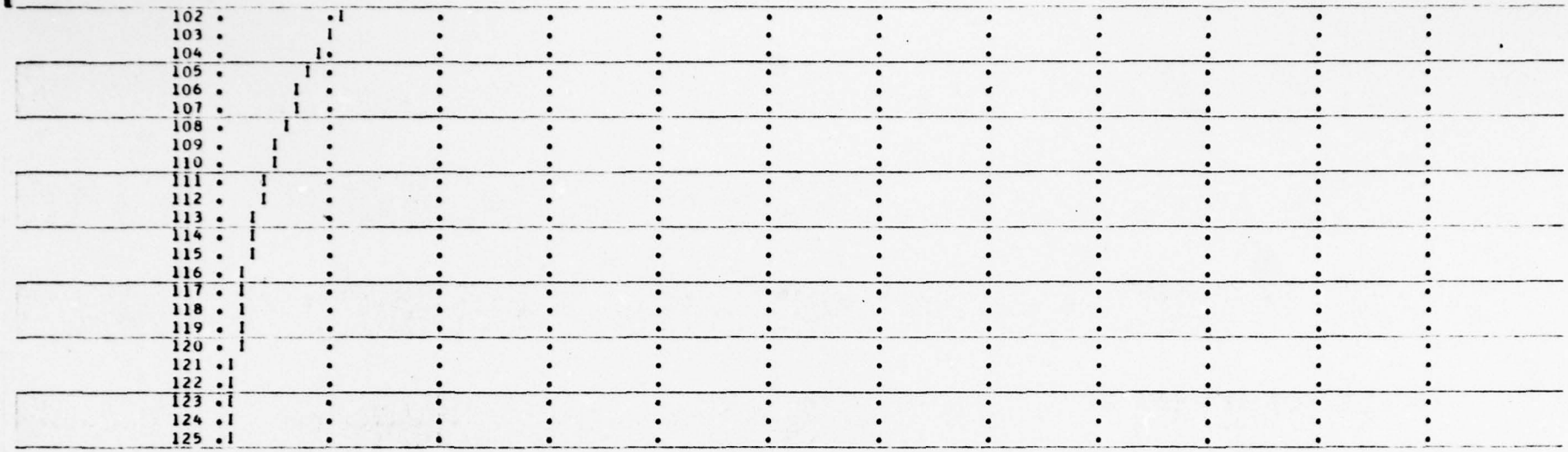
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HYDROGRAPH ROUTING

ROUTE THROUGH SCS RESERVOIR

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

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE	0.	0.	43.	378.	391.	416.	442.	471.	515.	675.
OUTFLOW	0.	21.	124.	149.	284.	1058.	2365.	4167.	7674.	13646.

TIME	EOP STOR	AVG IN	EOP OUT
1	0.	9.	9.
2	0.	8.	8.
3	0.	8.	7.
4	0.	7.	6.
5	0.	6.	6.
6	0.	6.	5.
7	0.	5.	5.
8	0.	5.	4.
9	0.	4.	4.
10	0.	4.	4.
11	0.	3.	3.
12	0.	3.	3.
13	0.	3.	3.
14	0.	3.	2.
15	0.	2.	2.

16	0.	2.	2.
17	0.	2.	2.
18	0.	2.	2.
19	0.	2.	2.
20	0.	2.	2.
21	0.	2.	1.
22	0.	1.	1.
23	0.	1.	1.
24	0.	1.	1.
25	0.	1.	1.
26	0.	1.	1.
27	0.	1.	1.
28	0.	1.	1.
29	0.	2.	2.
30	0.	2.	2.
31	0.	2.	3.
32	0.	3.	3.
33	0.	4.	4.
34	0.	5.	5.
35	0.	7.	8.
36	0.	11.	13.
37	0.	17.	21.
38	0.	24.	21.
39	1.	32.	22.
40	1.	38.	24.
41	2.	42.	26.
42	3.	43.	27.
43	3.	41.	28.
44	3.	37.	29.
45	4.	32.	29.
46	3.	28.	29.
47	3.	24.	29.
48	3.	21.	28.
49	3.	19.	27.
50	2.	18.	26.
51	2.	19.	26.

52	2.	24.	26.
53	2.	32.	26.
54	3.	42.	28.
55	4.	54.	30.
56	5.	67.	34.
57	7.	79.	38.
58	9.	90.	43.
59	11.	99.	48.
60	14.	107.	54.
61	16.	115.	60.
62	19.	123.	66.
63	21.	133.	72.
64	24.	145.	79.
65	27.	160.	86.
66	31.	178.	95.
67	35.	197.	105.
68	39.	216.	115.
69	44.	235.	124.
70	49.	251.	124.
71	55.	264.	125.
72	61.	276.	125.
73	68.	295.	126.
74	77.	344.	127.
75	91.	449.	128.
76	111.	628.	129.
77	143.	891.	131.
78	188.	1239.	135.
79	252.	1683.	140.
80	340.	2258.	146.
81	427.	2970.	1589.
82	467.	3757.	3947.
83	477.	4546.	4669.
84	486.	5256.	5399.
85	493.	5801.	5900.
86	496.	6110.	6161.
87	496.	6138.	6133.

88	492.	5905.	5849.
89	487.	5494.	5407.
90	480.	4998.	4899.
91	474.	4473.	4370.
92	466.	3954.	3883.
93	459.	3473.	3422.
94	452.	3050.	3004.
95	446.	2684.	2644.
96	441.	2368.	2336.
97	437.	2105.	2101.
98	432.	1886.	1882.
99	428.	1690.	1686.
100	425.	1514.	1510.
101	422.	1356.	1353.
102	419.	1215.	1213.
103	417.	1089.	1086.
104	414.	975.	993.
105	411.	874.	900.
106	408.	783.	809.
107	405.	702.	725.
108	403.	629.	650.
109	401.	563.	582.
110	399.	505.	522.
111	397.	452.	467.
112	395.	405.	419.
113	394.	363.	375.
114	393.	325.	336.
115	392.	291.	301.
116	390.	261.	278.
117	389.	234.	262.
118	387.	210.	244.
119	385.	188.	224.
120	383.	168.	204.
121	381.	151.	185.
122	380.	135.	168.
123	378.	121.	151.

124	376.	108.	149.	
125	374.	97.	149.	
SUM			92620.	

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6161.	5003.	1874.	741.	92620.
INCHES		12.96	19.42	20.00	20.00
AC-FT		2482.	3719.	3829.	3829.

QVF

STATION 2

INFLOW I , OUTFLOW O AND OBSERVED FLOW *

	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	0.	0.	0.	0.
1	I											
2	I											
3	I											
4	I											
5	I											
6	I											
7	I											
8	I											
9	I											
10	I											
11	I											
12	I											
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14	I											
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56 OI
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63 .I
64 .I
65 .OI
66 .OI
67 .OI
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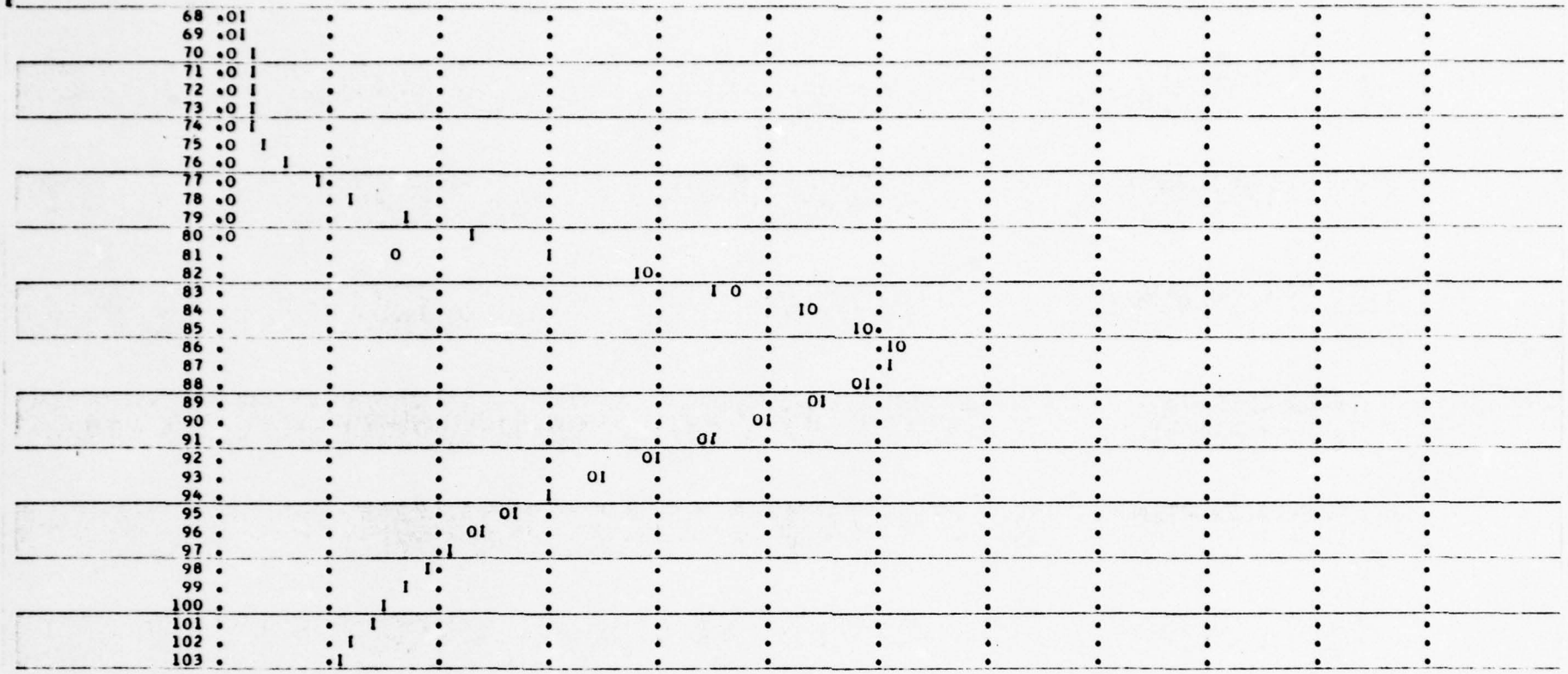
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82 . 10
83 . 1 0
84 . 10
85 . 10
86 . 10
87 . 1
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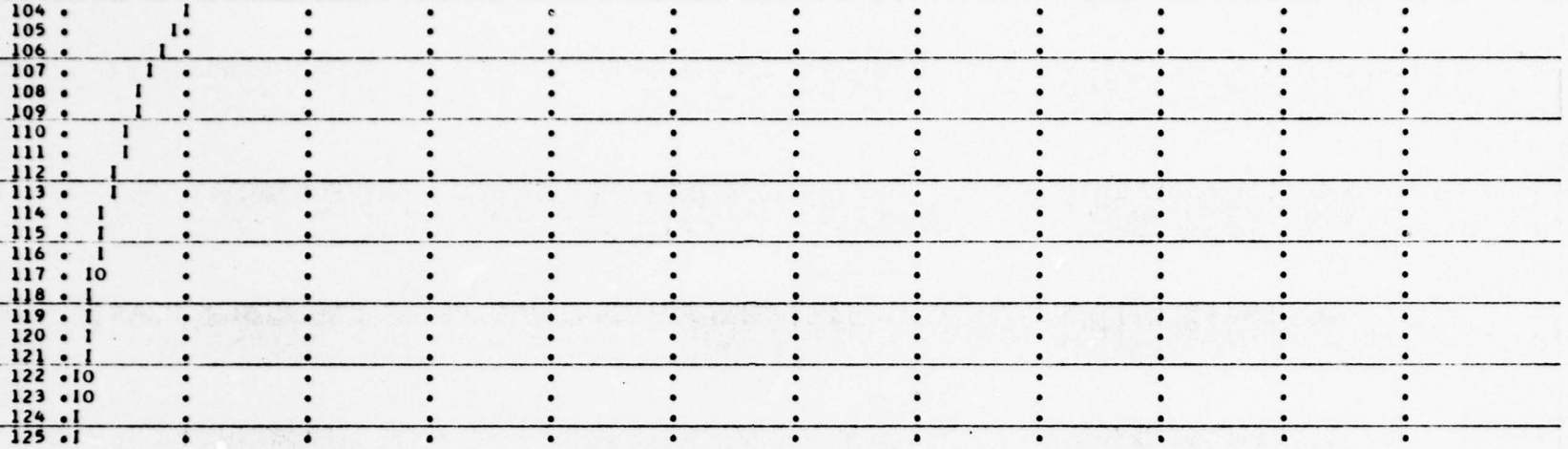
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SUB-AREA RUNOFF COMPUTATION

HYDROGRAPH FOR SUBAREA 2

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.53	0.0	0.53	0.0	0.0	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.0	22.00	117.00	126.00	141.00	152.00	0.0	0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.663

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.0	0.0	1.00	0.0	0.0	1.00	1.50	0.10	0.0	0.08

UNIT HYDROGRAPH DATA

TP 1.50 CP 0.60 NTA 0

RECESSION DATA

STRTQ 10.00 QRCSN -0.35 RTIOR 3.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC 3.66 AND R 2.67 INTERVALS

UNIT HYDROGRAPH 17 END-OF-PERIOD ORDINATES, LAG 1.50 HOURS, CP 0.61 VOL 1.00

22.	76.	127.	133.	103.	70.	48.	33.	23.	15.
11.	7.	5.	3.	2.	2.	1.			

END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP Q
1	0.01	0.00	9.
2	0.01	0.00	8.
3	0.01	0.00	7.
4	0.01	0.00	7.
5	0.01	0.00	6.
6	0.01	0.00	5.
7	0.01	0.00	5.
8	0.01	0.00	4.
9	0.01	0.00	4.
10	0.01	0.00	4.
11	0.01	0.00	3.
12	0.01	0.00	3.
13	0.01	0.00	3.
14	0.01	0.00	2.
15	0.01	0.00	2.
16	0.01	0.00	2.
17	0.01	0.00	2.
18	0.01	0.00	2.
19	0.01	0.00	2.
20	0.01	0.00	2.
21	0.01	0.00	1.
22	0.01	0.00	1.
23	0.01	0.00	1.
24	0.01	0.00	1.
25	0.07	0.01	1.
26	0.07	0.01	1.
27	0.08	0.01	2.
28	0.08	0.01	3.
29	0.10	0.01	3.
30	0.10	0.01	4.
31	0.25	0.02	5.
32	0.25	0.02	6.
33	0.09	0.01	8.
34	0.09	0.01	8.
35	0.07	0.01	8.

36	0.07	0.01	7.
37	0.01	0.00	6.
38	0.01	0.00	5.
39	0.01	0.00	4.
40	0.01	0.00	3.
41	0.01	0.00	3.
42	0.01	0.00	2.
43	0.01	0.00	2.
44	0.01	0.00	2.
45	0.01	0.00	2.
46	0.01	0.00	2.
47	0.01	0.00	1.
48	0.01	0.00	1.
49	0.07	0.03	1.
50	0.07	0.03	3.
51	0.07	0.03	6.
52	0.07	0.03	10.
53	0.07	0.03	13.
54	0.07	0.03	14.
55	0.07	0.03	16.
56	0.07	0.03	17.
57	0.07	0.03	17.
58	0.07	0.03	18.
59	0.07	0.03	18.
60	0.07	0.03	18.
61	0.11	0.06	19.
62	0.11	0.06	22.
63	0.11	0.06	27.
64	0.11	0.06	31.
65	0.11	0.06	35.
66	0.11	0.06	38.
67	0.11	0.06	40.
68	0.11	0.06	41.
69	0.11	0.06	42.
70	0.11	0.06	42.
71	0.11	0.06	42.

72	0.11	0.06	43.
73	0.85	0.81	59.
74	0.85	0.81	116.
75	1.02	0.98	214.
76	1.02	0.98	326.
77	1.28	1.23	430.
78	1.28	1.23	525.
79	3.24	3.20	653.
80	3.24	3.20	874.
81	1.20	1.15	1129.
82	1.20	1.15	1269.
83	0.94	0.89	1230.
84	0.94	0.89	1093.
85	0.11	0.06	937.
86	0.11	0.06	768.
87	0.11	0.06	588.
88	0.11	0.06	439.
89	0.11	0.06	393.
90	0.11	0.06	352.
91	0.11	0.06	316.
92	0.11	0.06	283.
93	0.11	0.06	253.
94	0.11	0.06	227.
95	0.11	0.06	203.
96	0.11	0.06	182.
97	0.0	0.0	163.
98	0.0	0.0	146.
99	0.0	0.0	131.
100	0.0	0.0	117.
101	0.0	0.0	105.
102	0.0	0.0	94.
103	0.0	0.0	84.
104	0.0	0.0	76.
105	0.0	0.0	68.
106	0.0	0.0	61.
107	0.0	0.0	54.

108	0.0	0.0	49.
109	0.0	0.0	44.
110	0.0	0.0	39.
111	0.0	0.0	35.
112	0.0	0.0	31.
113	0.0	0.0	28.
114	0.0	0.0	25.
115	0.0	0.0	23.
116	0.0	0.0	20.
117	0.0	0.0	18.
118	0.0	0.0	16.
119	0.0	0.0	15.
120	0.0	0.0	13.
121	0.0	0.0	12.
122	0.0	0.0	10.
123	0.0	0.0	9.
124	0.0	0.0	8.
125	0.0	0.0	8.
SUM	22.22	18.46	15109.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1269.	828.	302.	121.	15115.
INCHES		14.53	21.18	22.11	22.11
AC-FT		411.	599.	625.	625.

QVF

STATION 2

INFLOW I , OUTFLOW O AND OBSERVED FLOW *

0.	200.	400.	600.	800.	1000.	1200.	1400.	0.	0.	0. PRECIP L	0. AND EXC
0.	0.	0.	0.	0.	0.	0.	0.	4.	3.	2.	1.
1 I	.	.	.	.	.	.	.	.	.	.	.
2 I	.	.	.	.	.	.	.	.	.	.	.
3 I	.	.	.	.	.	.	.	.	.	.	.
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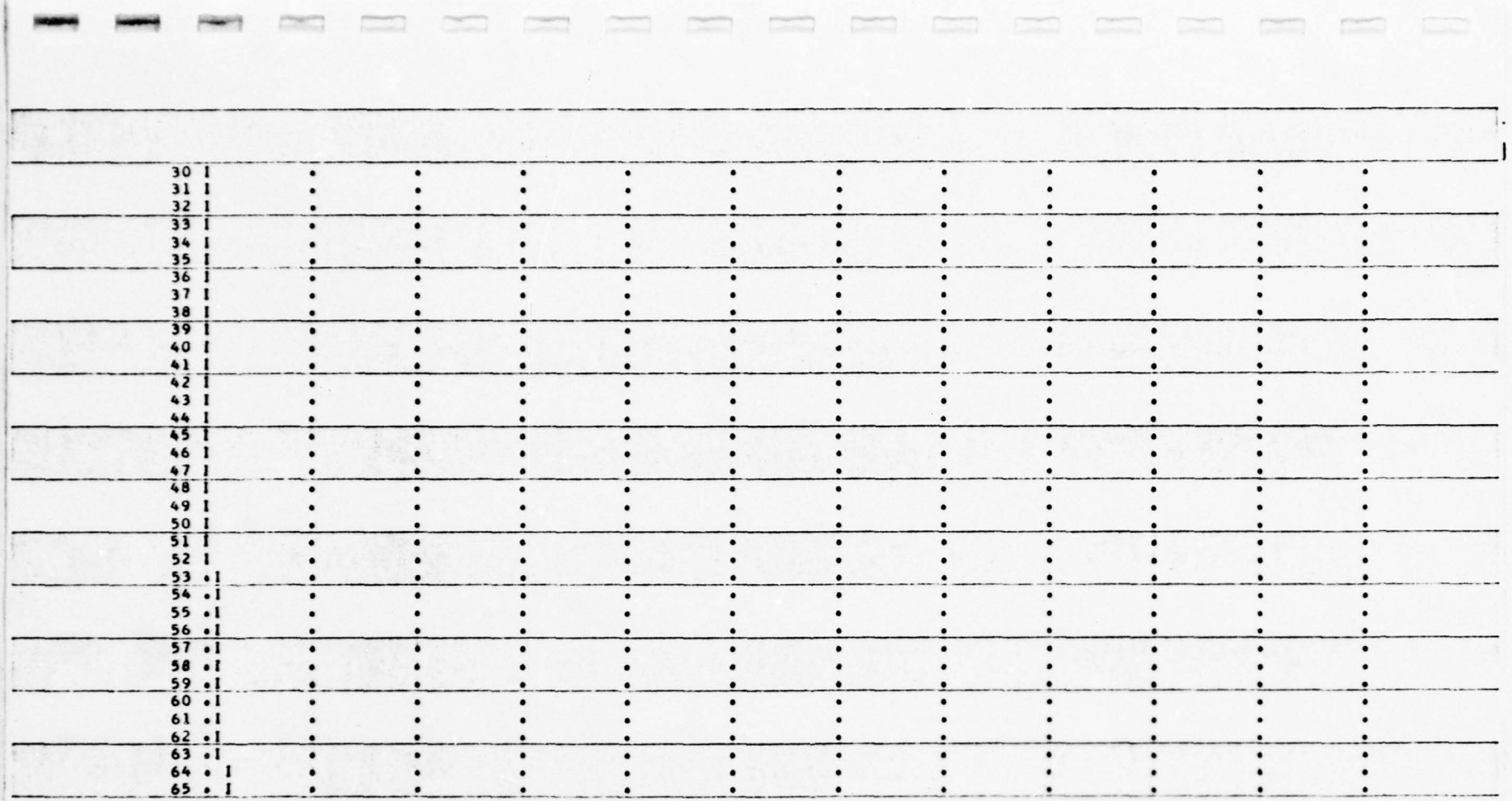

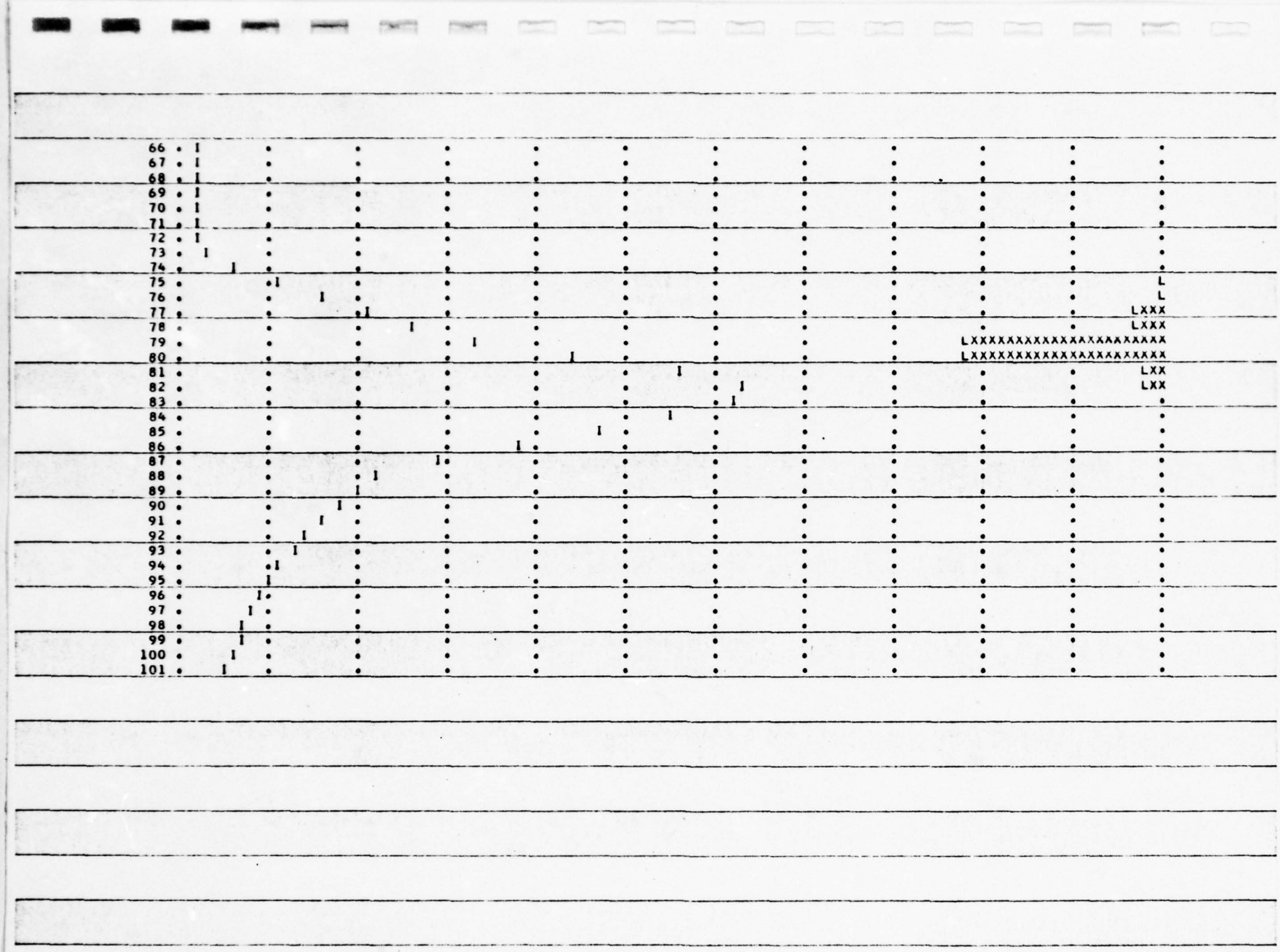

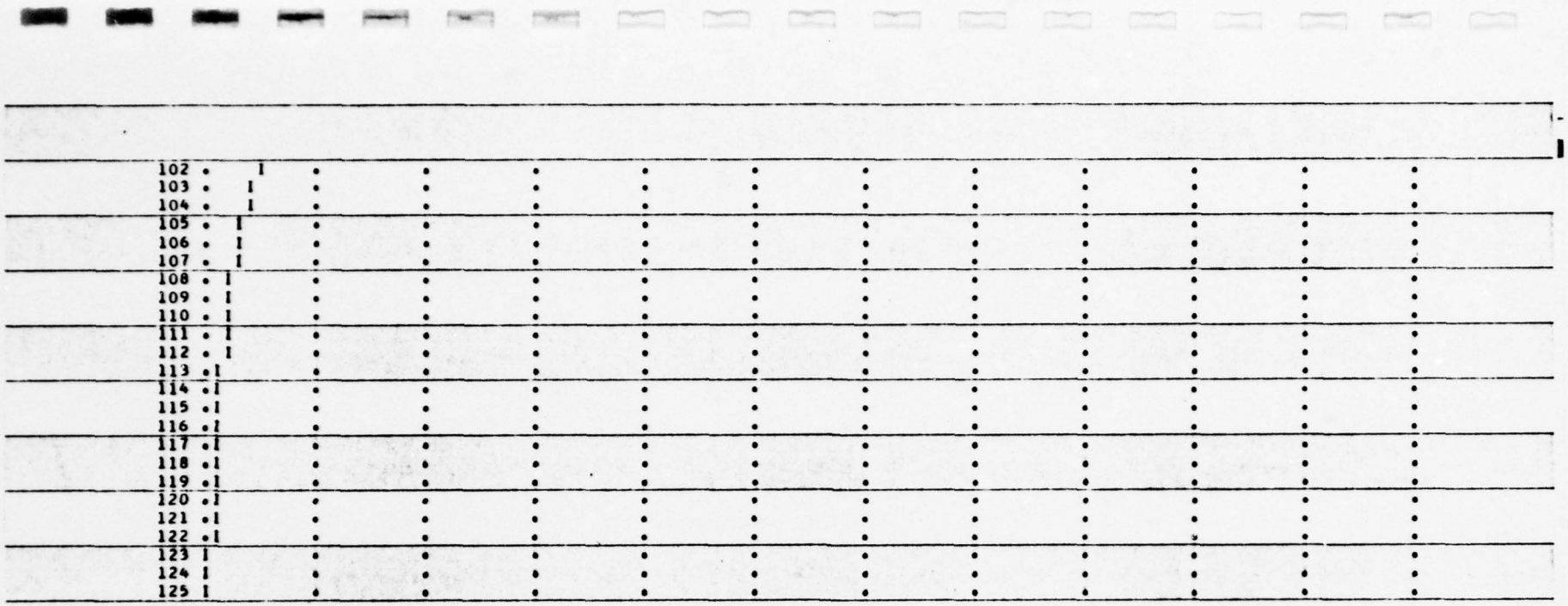
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COMBINE HYDROGRAPHS

COMBINE HYDROGRAPHS

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

SUM OF 2 HYDROGRAPHS AT 2

18.	16.	15.	13.	12.	11.	10.	9.	8.	7.
7.	6.	5.	5.	5.	4.	4.	4.	3.	3.
3.	3.	3.	2.	2.	3.	3.	4.	5.	6.
7.	9.	11.	14.	16.	21.	27.	27.	26.	27.
28.	30.	31.	31.	31.	31.	30.	29.	28.	29.
32.	35.	39.	42.	46.	50.	55.	60.	66.	72.
79.	87.	98.	110.	122.	133.	144.	156.	166.	167.
167.	168.	185.	243.	342.	455.	561.	659.	793.	1020.
2718.	5216.	5899.	6492.	6837.	6929.	6721.	6288.	5800.	5251.
4685.	4166.	3676.	3231.	2848.	2518.	2264.	2028.	1817.	1628.
1459.	1307.	1171.	1069.	968.	870.	780.	699.	626.	561.
502.	450.	403.	361.	324.	298.	280.	260.	238.	217.
197.	178.	160.	157.	156.					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6929.	5663.	2169.	862.	107735.
INCHES		12.79	19.59	20.27	20.27
AC-FT		2810.	4305.	4454.	4454.

#OVF#

STATION 2

INFLOW I , OUTFLOW O AND OBSERVED FLOW #

	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	0.	0.	0.	0.
1	I	.	.	.	.	.	.	.	.	.	.	.
2	I	.	.	.	.	.	.	.	.	.	.	.
3	I	.	.	.	.	.	.	.	.	.	.	.
4	I	.	.	.	.	.	.	.	.	.	.	.
5	I	.	.	.	.	.	.	.	.	.	.	.
6	I	.	.	.	.	.	.	.	.	.	.	.
7	I	.	.	.	.	.	.	.	.	.	.	.
8	I	.	.	.	.	.	.	.	.	.	.	.
9	I	.	.	.	.	.	.	.	.	.	.	.
10	I	.	.	.	.	.	.	.	.	.	.	.
11	I	.	.	.	.	.	.	.	.	.	.	.
12	I	.	.	.	.	.	.	.	.	.	.	.
13	I	.	.	.	.	.	.	.	.	.	.	.
14	I	.	.	.	.	.	.	.	.	.	.	.
15	I	.	.	.	.	.	.	.	.	.	.	.
16	I	.	.	.	.	.	.	.	.	.	.	.
17	I	.	.	.	.	.	.	.	.	.	.	.
18	I	.	.	.	.	.	.	.	.	.	.	.
19	I	.	.	.	.	.	.	.	.	.	.	.
20	I	.	.	.	.	.	.	.	.	.	.	.
21	I	.	.	.	.	.	.	.	.	.	.	.
22	I	.	.	.	.	.	.	.	.	.	.	.
23	I	.	.	.	.	.	.	.	.	.	.	.
24	I	.	.	.	.	.	.	.	.	.	.	.
25	I	.	.	.	.	.	.	.	.	.	.	.
26	I	.	.	.	.	.	.	.	.	.	.	.
27	I	.	.	.	.	.	.	.	.	.	.	.
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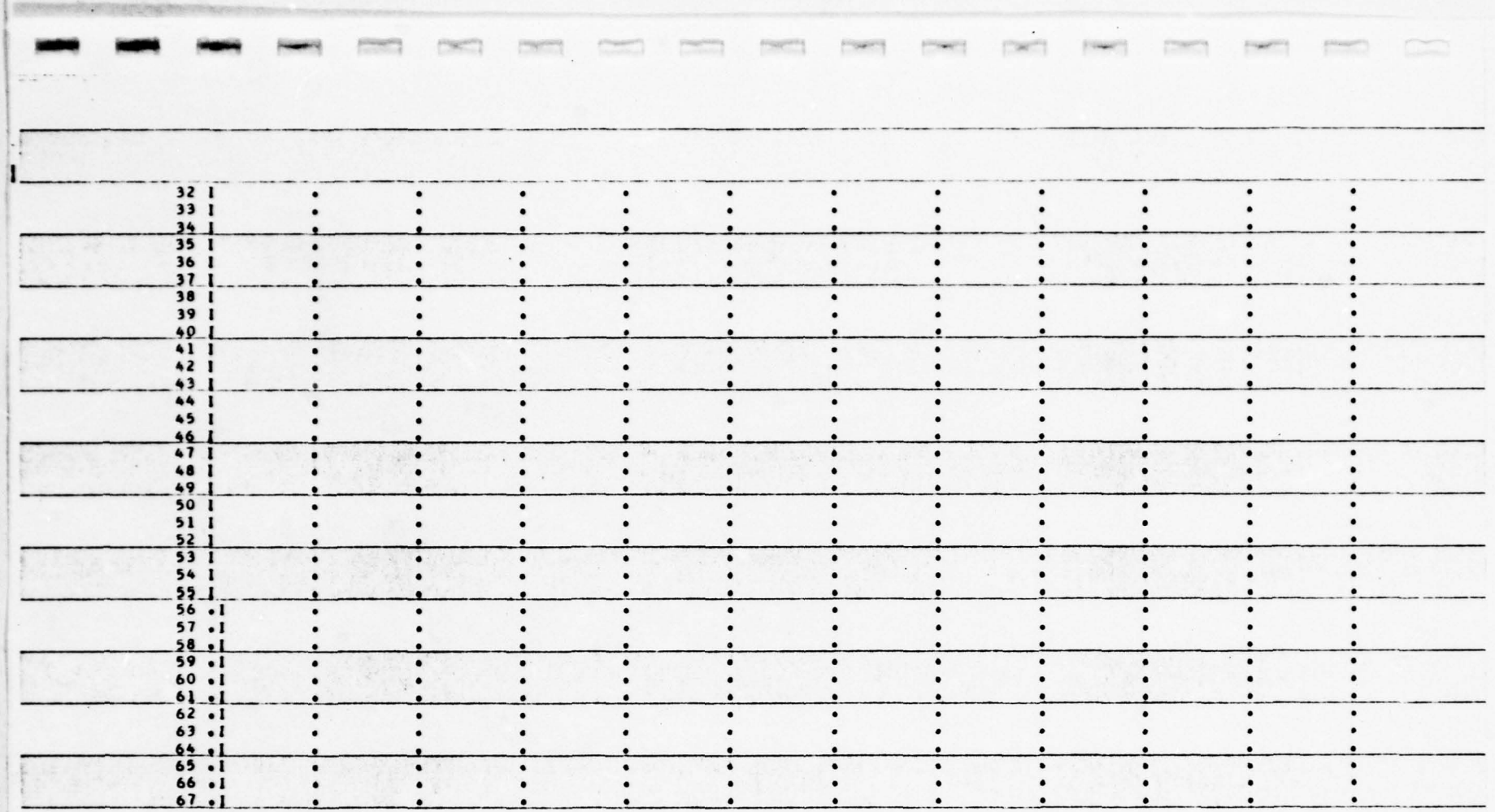

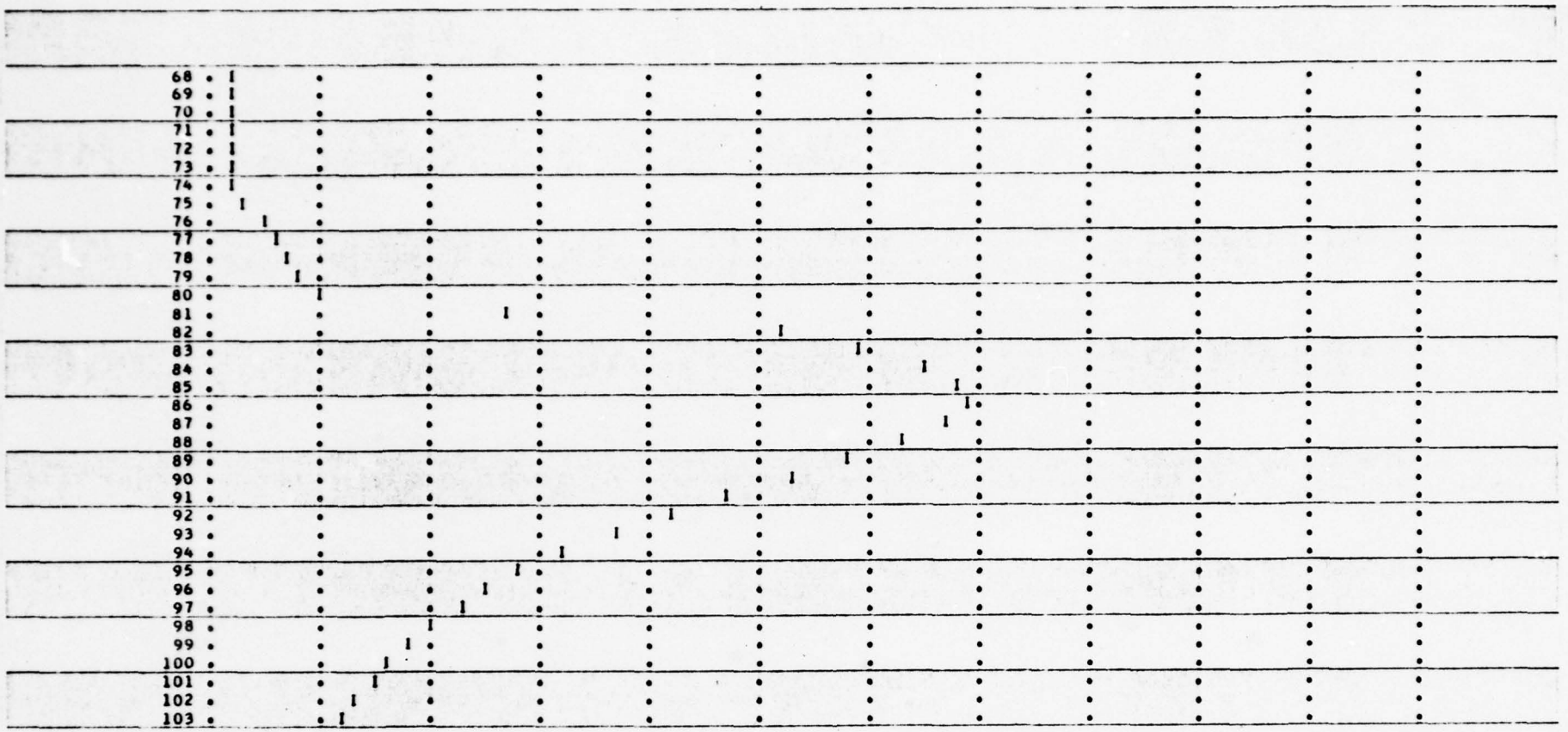
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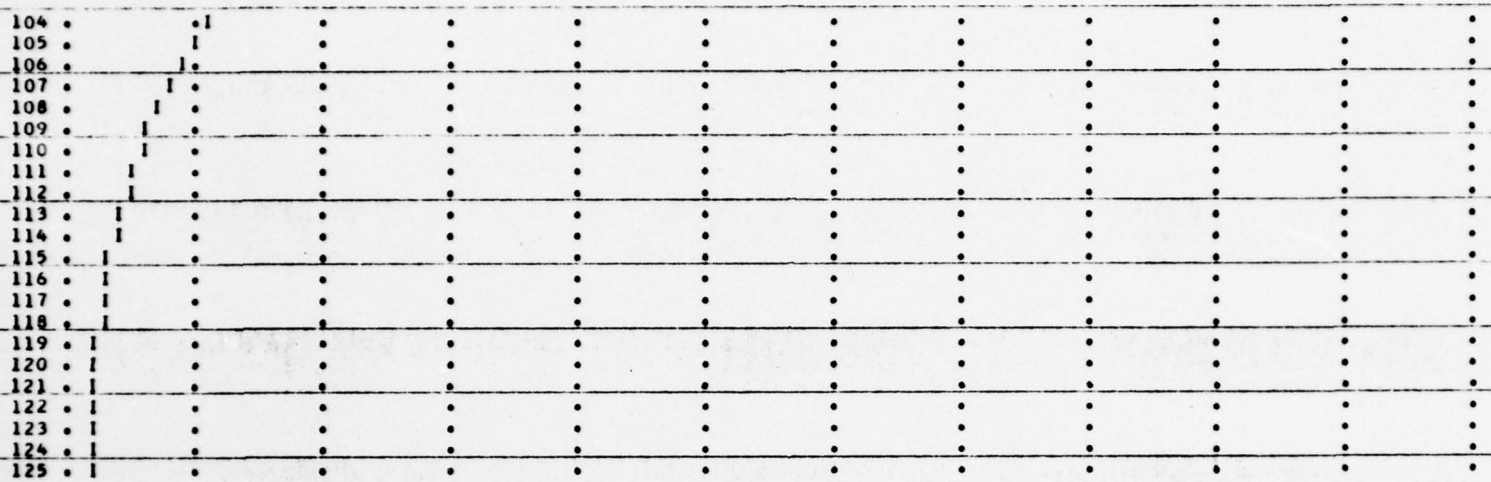
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HYDROGRAPH ROUTING

ROUTE THROUGH ELMIRA RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
3	1	0	0	0	0	1

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE	0.	22.	46.	71.	97.	123.	151.	180.	209.	240.
OUTFLOW	0.	406.	1149.	2111.	3250.	4731.	8737.	14391.	21238.	29080.

TIME	EOP STOR	AVG IN	EOP OUT
1	1.	18.	18.
2	1.	17.	17.
3	1.	15.	16.
4	1.	14.	15.
5	1.	12.	14.
6	1.	11.	12.
7	1.	10.	11.
8	1.	9.	10.
9	0.	8.	9.
10	0.	8.	8.
11	0.	7.	7.
12	0.	6.	7.
13	0.	6.	6.
14	0.	5.	6.
15	0.	5.	5.

16	0.	4.	5.
17	0.	4.	4.
18	0.	4.	4.
19	0.	3.	4.
20	0.	3.	3.
21	0.	3.	3.
22	0.	3.	3.
23	0.	3.	3.
24	0.	2.	3.
25	0.	2.	2.
26	0.	3.	3.
27	0.	3.	3.
28	0.	4.	3.
29	0.	5.	4.
30	0.	5.	5.
31	0.	7.	6.
32	0.	8.	7.
33	0.	10.	9.
34	1.	13.	11.
35	1.	15.	13.
36	1.	19.	16.
37	1.	24.	20.
38	1.	27.	24.
39	1.	27.	25.
40	1.	27.	26.
41	1.	28.	27.
42	2.	29.	28.
43	2.	30.	29.
44	2.	31.	30.
45	2.	31.	31.
46	2.	31.	31.
47	2.	31.	31.
48	2.	30.	30.
49	2.	29.	29.
50	2.	29.	29.
51	2.	31.	30.

52	2.	34.	32.
53	2.	37.	35.
54	2.	40.	38.
55	2.	44.	41.
56	2.	48.	45.
57	3.	53.	49.
58	3.	58.	54.
59	3.	63.	59.
60	3.	69.	65.
61	4.	75.	70.
62	4.	83.	77.
63	5.	93.	86.
64	5.	104.	96.
65	6.	116.	107.
66	6.	127.	118.
67	7.	139.	129.
68	8.	150.	141.
69	8.	161.	152.
70	9.	166.	160.
71	9.	167.	164.
72	9.	168.	166.
73	9.	177.	172.
74	11.	214.	195.
75	13.	292.	249.
76	18.	398.	331.
77	23.	508.	439.
78	27.	610.	573.
79	31.	726.	692.
80	37.	906.	859.
81	61.	1869.	1714.
82	109.	3967.	3906.
83	132.	5557.	6059.
84	134.	6195.	6263.
85	138.	6664.	6863.
86	138.	6883.	6893.
87	137.	6825.	6791.

88	134.	6504.	6362.
89	131.	6044.	5887.
90	127.	5526.	5347.
91	123.	4968.	4781.
92	117.	4426.	4383.
93	108.	3921.	3883.
94	100.	3453.	3418.
95	92.	3039.	3038.
96	84.	2683.	2701.
97	78.	2391.	2407.
98	72.	2146.	2159.
99	67.	1922.	1946.
100	62.	1722.	1748.
101	57.	1543.	1567.
102	53.	1383.	1404.
103	49.	1239.	1258.
104	46.	1120.	1137.
105	43.	1018.	1045.
106	39.	919.	946.
107	36.	825.	851.
108	34.	739.	764.
109	31.	662.	685.
110	29.	593.	613.
111	27.	532.	550.
112	25.	476.	492.
113	23.	427.	441.
114	22.	382.	398.
115	20.	343.	368.
116	18.	311.	336.
117	17.	289.	310.
118	16.	270.	288.
119	14.	249.	267.
120	13.	228.	245.
121	12.	207.	224.
122	11.	187.	204.
123	10.	169.	185.

124	9.	159.	170.	
125	9.	157.	163.	
SUM			107548.	

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6893.	5618.	2168.	860.	107548.
INCHES		12.68	19.58	20.24	20.24
AC-FT		2787.	4303.	4446.	4446.

OVF

STATION 3

INFLOW I , OUTFLOW O AND OBSERVED FLOW #

	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	0.	0.	0.	0.
1	I	.	.	.	.	.	.	.	.	.	.	.
2	I	.	.	.	.	.	.	.	.	.	.	.
3	I	.	.	.	.	.	.	.	.	.	.	.
4	I	.	.	.	.	.	.	.	.	.	.	.
5	I	.	.	.	.	.	.	.	.	.	.	.
6	I	.	.	.	.	.	.	.	.	.	.	.
7	I	.	.	.	.	.	.	.	.	.	.	.
8	I	.	.	.	.	.	.	.	.	.	.	.
9	I	.	.	.	.	.	.	.	.	.	.	.
10	I	.	.	.	.	.	.	.	.	.	.	.
11	I	.	.	.	.	.	.	.	.	.	.	.
12	I	.	.	.	.	.	.	.	.	.	.	.
13	I	.	.	.	.	.	.	.	.	.	.	.
14	I	.	.	.	.	.	.	.	.	.	.	.
15	I	.	.	.	.	.	.	.	.	.	.	.
16	I	.	.	.	.	.	.	.	.	.	.	.
17	I	.	.	.	.	.	.	.	.	.	.	.
18	I	.	.	.	.	.	.	.	.	.	.	.
19	I	.	.	.	.	.	.	.	.	.	.	.
20	I	.	.	.	.	.	.	.	.	.	.	.
21	I	.	.	.	.	.	.	.	.	.	.	.
22	I	.	.	.	.	.	.	.	.	.	.	.
23	I	.	.	.	.	.	.	.	.	.	.	.
24	I	.	.	.	.	.	.	.	.	.	.	.
25	I	.	.	.	.	.	.	.	.	.	.	.
26	I	.	.	.	.	.	.	.	.	.	.	.
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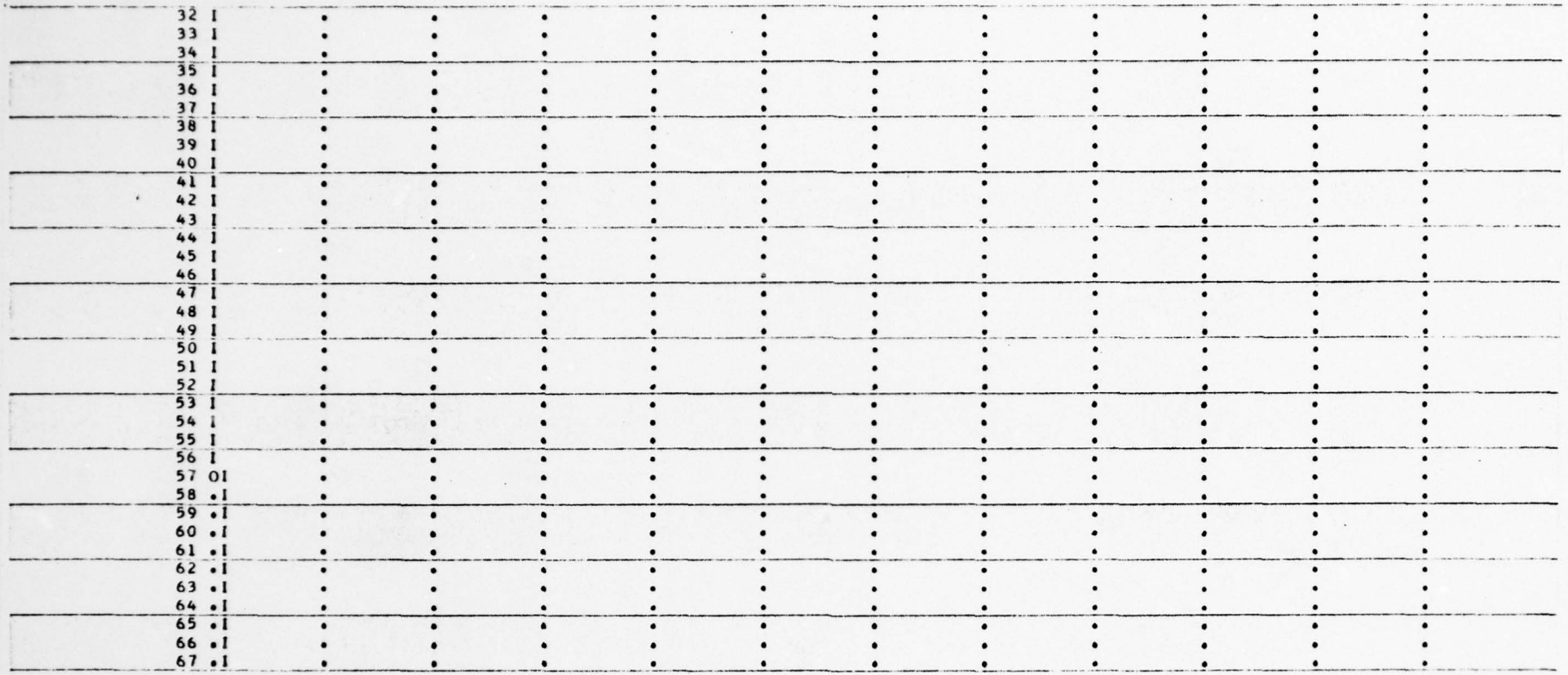
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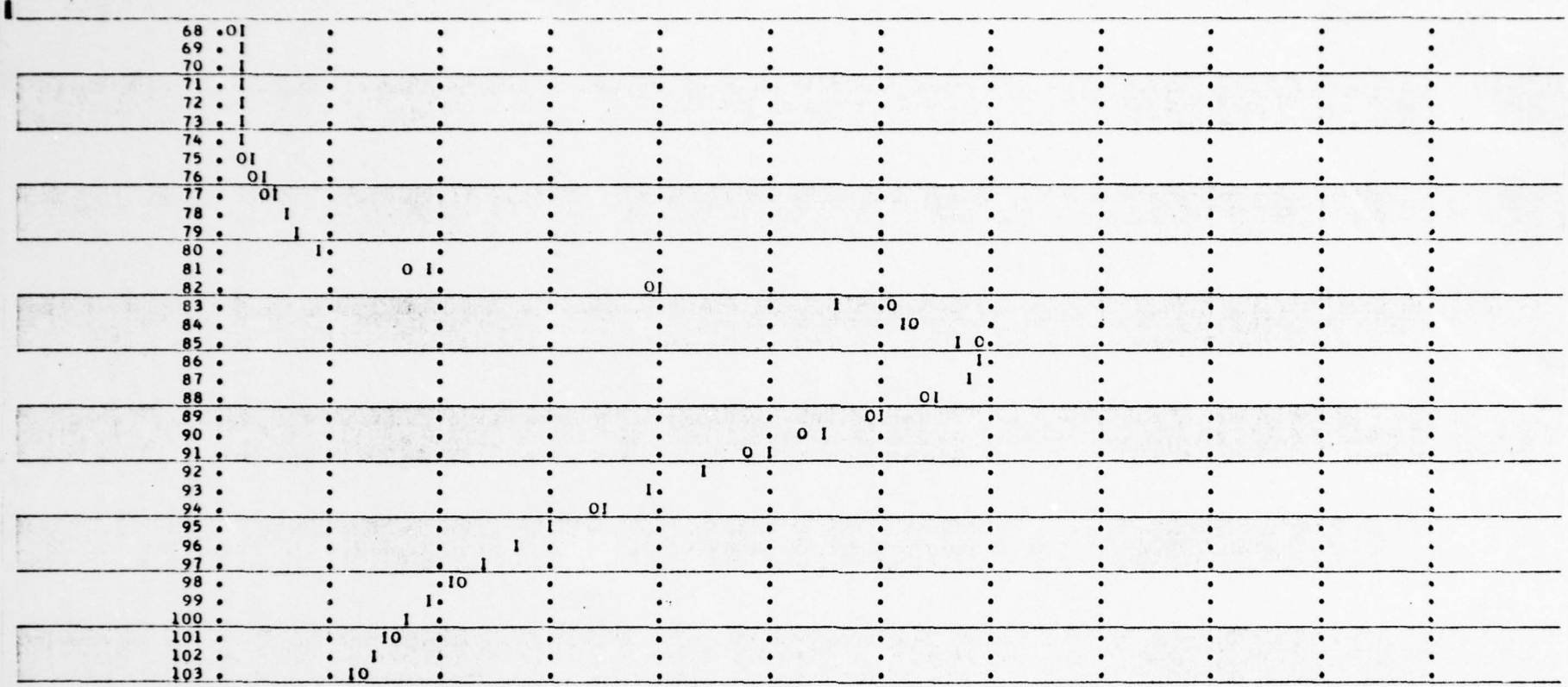
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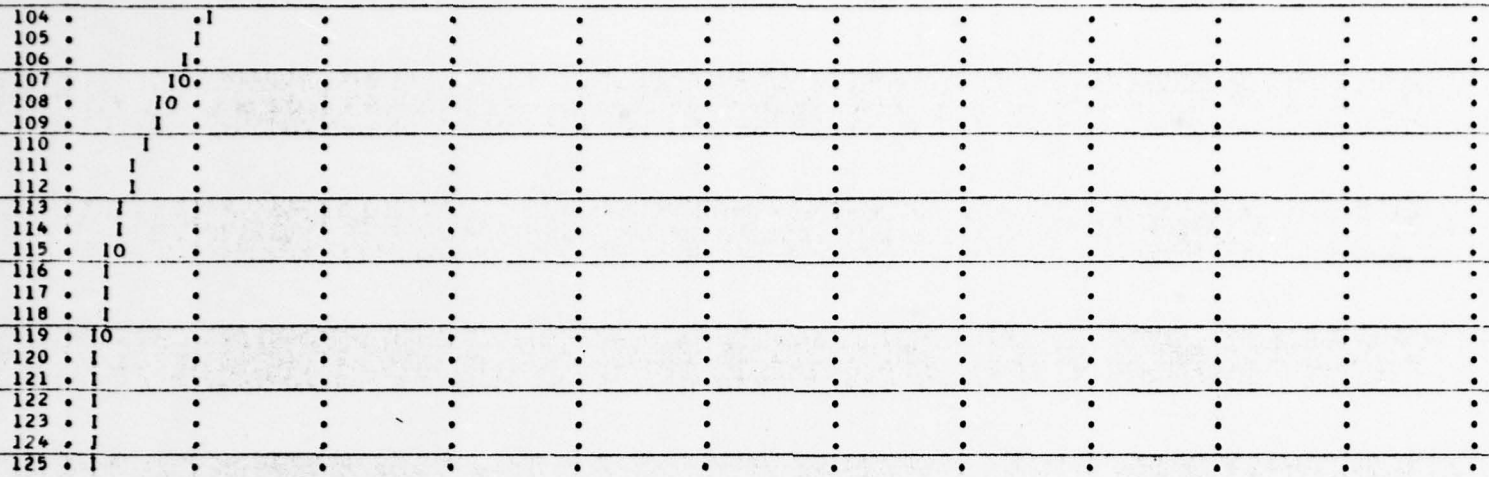
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RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	1	6197.	4997.	2037.	813.	3.59
ROUTED TO	2	6161.	5003.	1874.	741.	3.59
HYDROGRAPH AT	2	1269.	828.	302.	121.	0.53
2 COMBINED	2	6929.	5663.	2169.	862.	4.12
ROUTED TO	3	6893.	5618.	2168.	860.	4.12

APPENDIX C

PHOTOGRAPHS

Photograph Index

1. Wide berm on downstream slope.
2. Steep, heavily vegetated downstream slope.
3. Weir for emergency spillway.
4. Emergency spillway exit channel from weir.
5. Emergency spillway exit channel from downstream looking upstream.
6. Emergency spillway stilling basin.
7. Valve controls for principal spillway located beyond toe of embankment.
8. Construction of a flood control dam by the SCS upstream of the Hoffman Creek Dam.

Photo 1

Photo 2

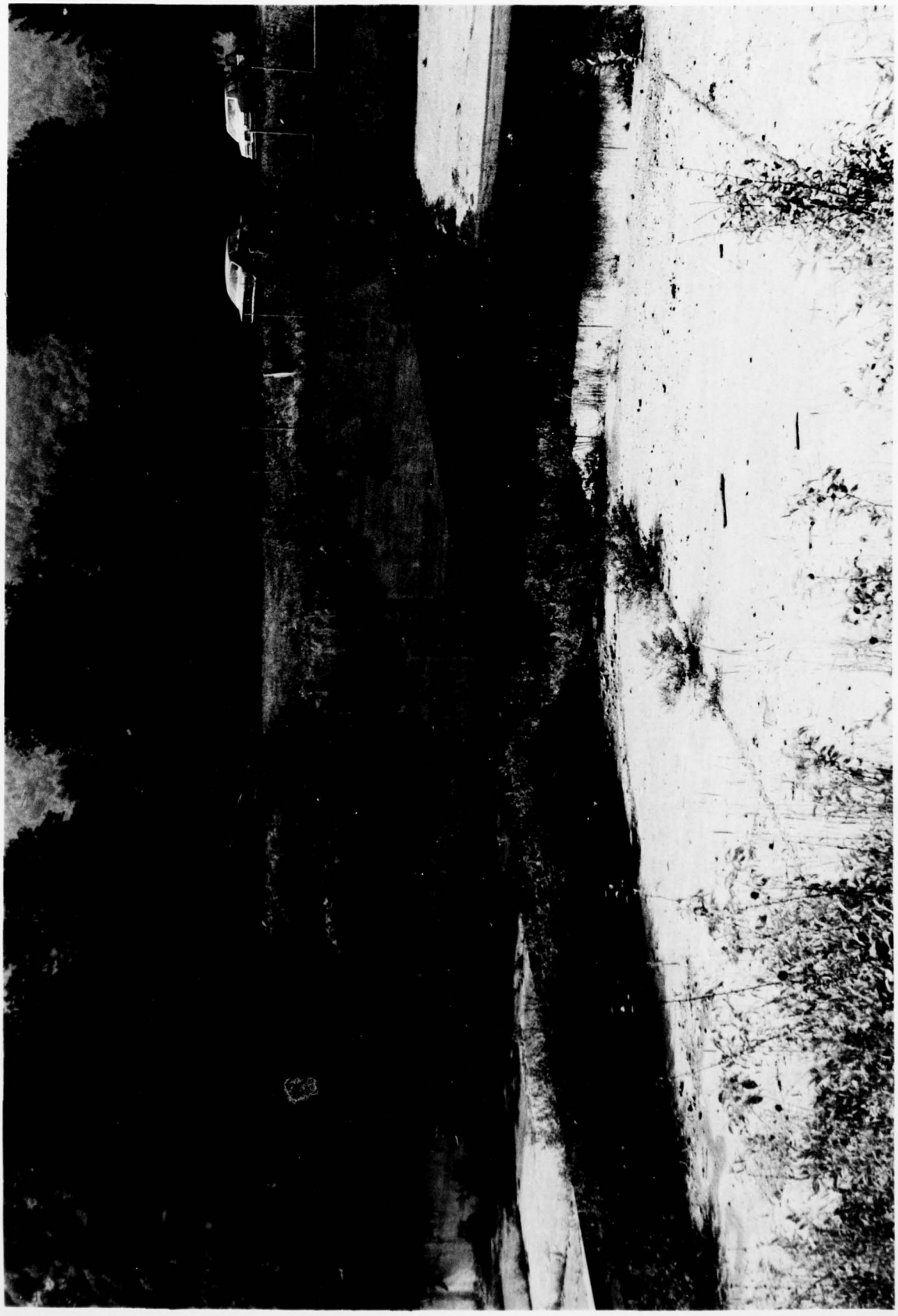

Photo 3

Photo 4

Photo 5

AD-A064 764 KIMBALL (L ROBERT) AND ASSOCIATES EBENSBURG PA F/G 13/2
NATIONAL DAM SAFETY PROGRAM. HOFFMAN CREEK DAM (NY 463). CHEMUN--ETC(U)
SEP 78 R J KIMBALL DACW51-78-C-0025
UNCLASSIFIED NL

2 OF 3
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A064764

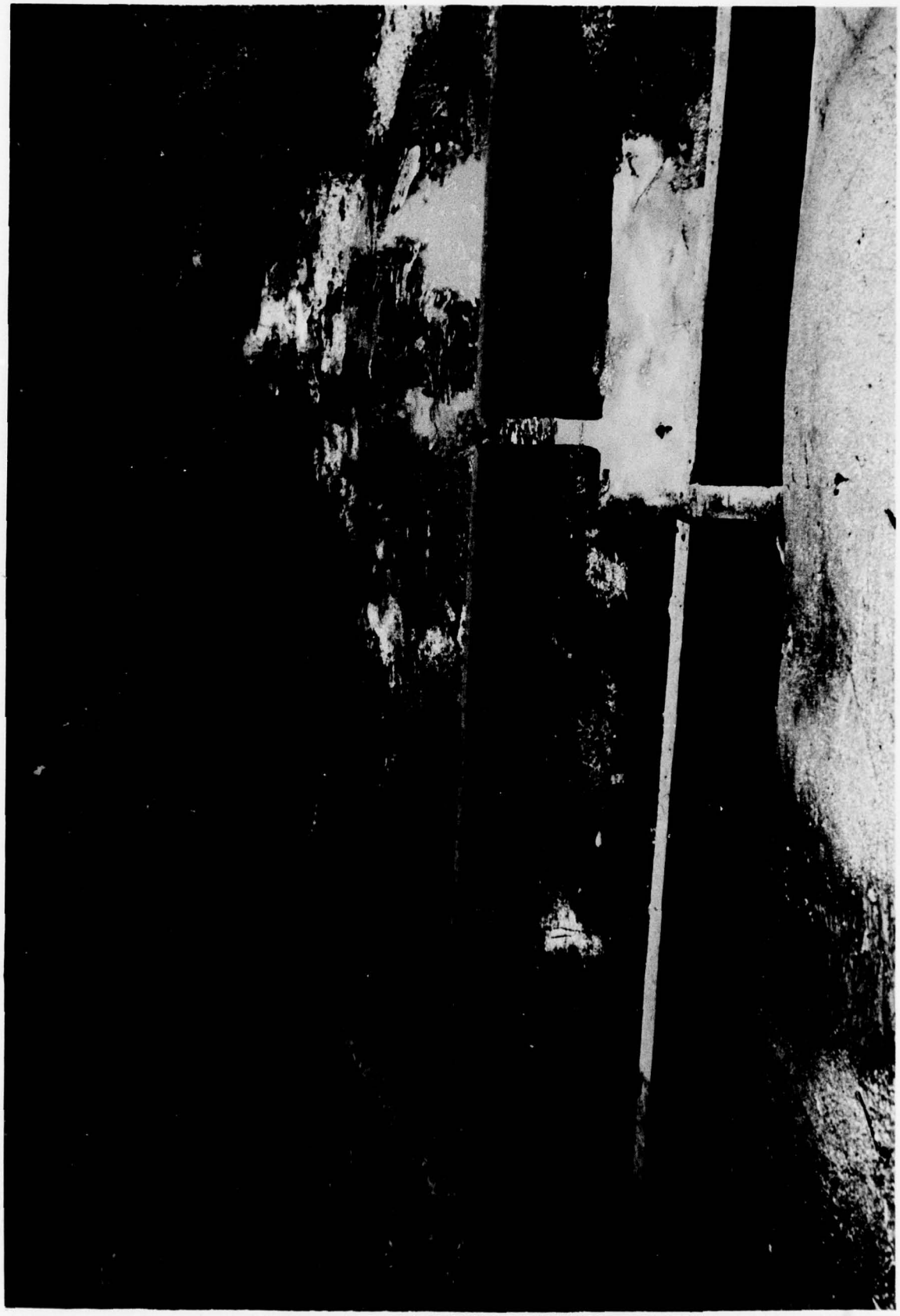


Photo 6

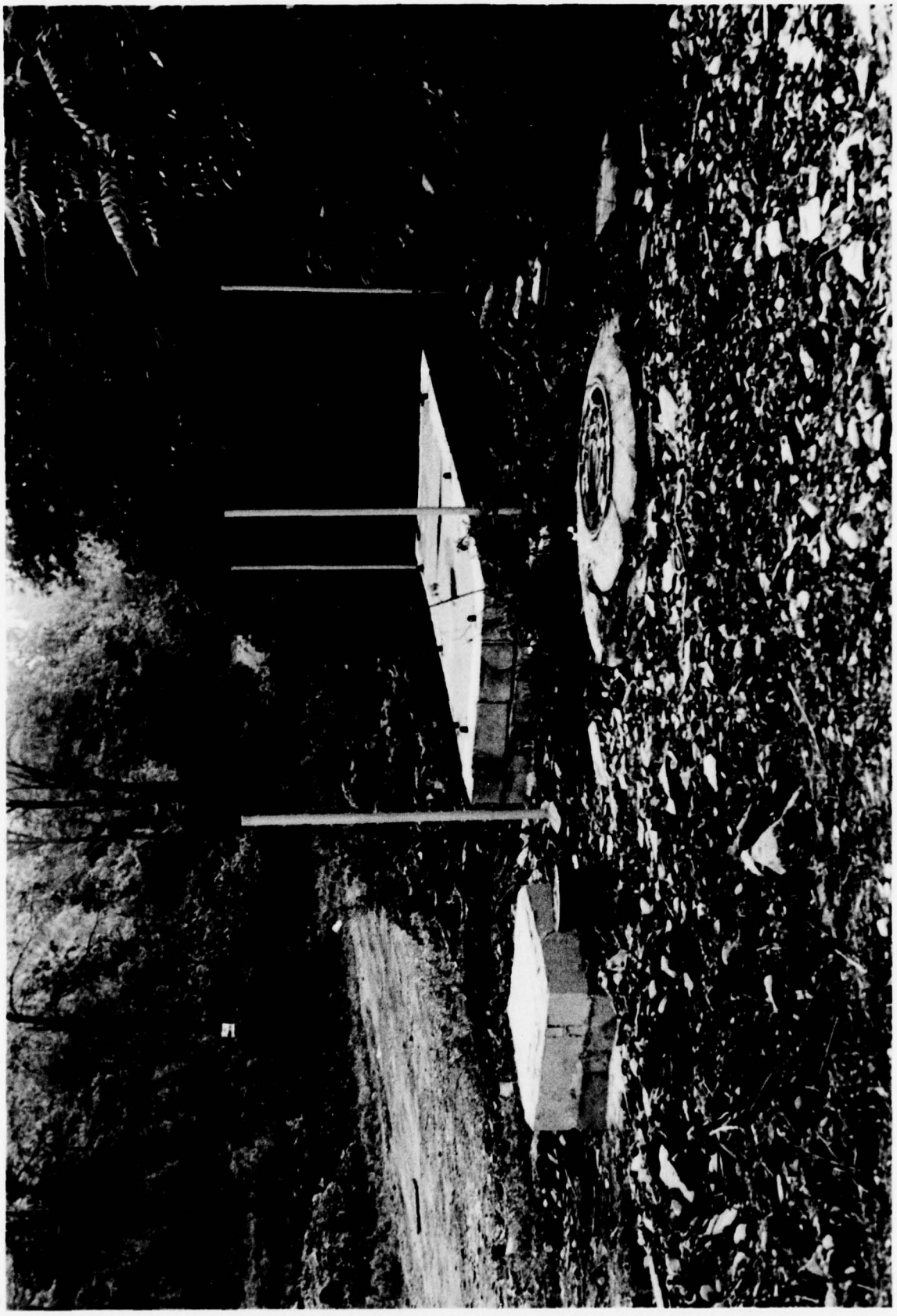


Photo 7

Photo 8

APPENDIX D

PERTINENT CORRESPONDENCE AND REPORTS

164 Chemung

Form 1031. 11-6-14-1000 (16-1035) Acc. 383

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

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

DAM REPORT

61-a

June 22, 1916
(Date)

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the City Reservoir Dam.

This dam is situated upon the Hoffman Brook (Give name of stream)

in the Town of Elmira, Chemung County,

about 2 1/2 Miles (State distance) from the Village or City of Elmira

The distance Down (Up or down) stream from the dam, to the first road bridge (Give name of nearest important stream or of a bridge), is about 3/4 (State distance)

The dam is now owned by City of Elmira, N.Y. (Give name and address in full)

and was built in or about the year 1877, and was extensively repaired or reconstructed during the year 1913.

As it now stands, the spillway portion of this dam is built of Concrete (State whether of masonry, concrete or timber)

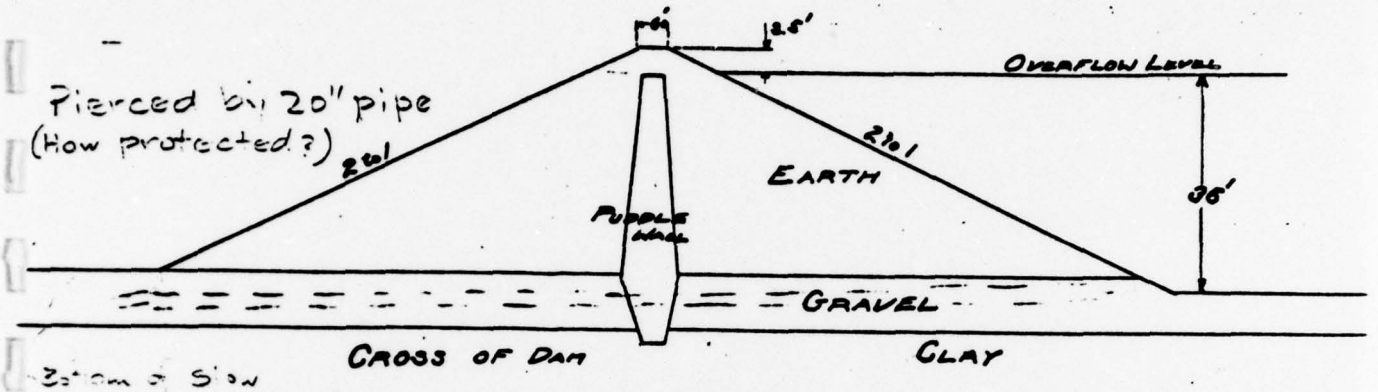
and the other portions are built of Earth and rock (State whether of masonry, concrete, earth or timber with or without rock fill)

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

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

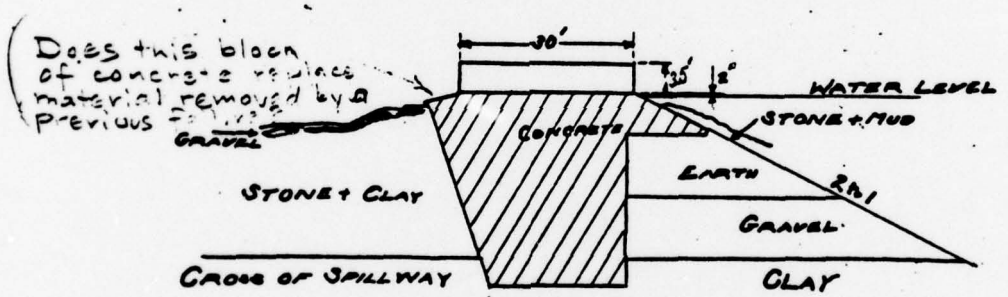
(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the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

20 foot puddle wall all around the dam.

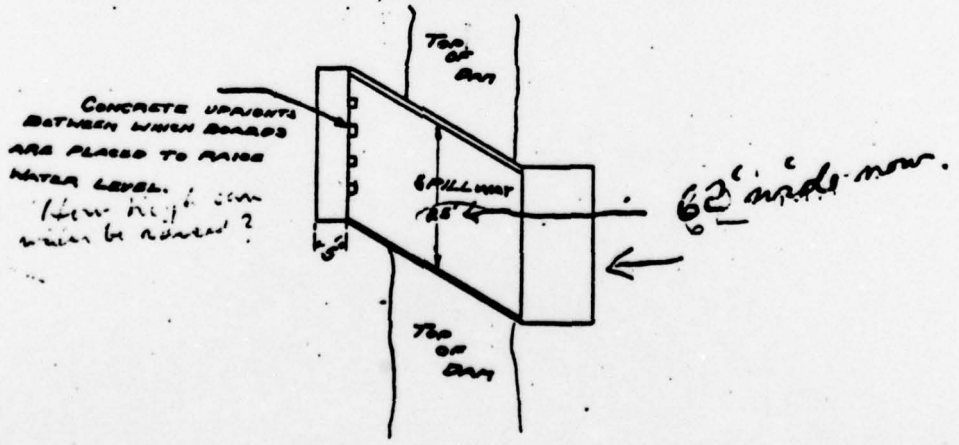


CROSS OF DAM

Stream is slow about 58' below top of dam.



CROSS OF SPILLWAY



PROJECTED PLAN OF SPILLWAY.

The total length of this dam is 725 feet. The spillway or waste-weir portion, is about 25 feet long, and the crest of the spillway is about 3.5 feet below the top of the dam.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: One pipe in the center of the dam. Internal diameter 20 inches.

At the time of this inspection the water level above the dam was -- ft. 2 in. ~~above~~ below the crest of the spillway.

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

Dam in very good condition. No leaks. Three years ago the dam was raised three feet in the middle. (Apr. 14, 1921 letter by General Manager of Elmira Water Board, denies above statement.)

See statement concerning inspection, which is included in Inspector McKim's weekly report dated Apr. 18, 1921.

Reported by Otto A. Badenhausen
(Signature)

603 E. Seneca St.
(Address—Street and number, P. O. Box or R. F. D. route)

Ithaca, N. Y.
(Name of place)

16 29 Chemung

8-22-24-3000 (6-1206)

STATE OF NEW YORK

DEPARTMENT OF

State Engineer and Surveyor

ALBANY

Report of a Structure Impounding Water

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

1. The structure is on Hoffman Creek, flowing into Chemung River in the Town of Elmira County of Chemung and about 3/4 of a mile from Corning Corners (intersection of Hoffman and Wood Hill Rds.
(Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

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

3. The name and address of the owner is Elmira Water Board, City Hall, Elmira, N.Y.

4. The structure is used for storage of water

5. The material of the right bank, in the direction with the current, is clay and rock; at the spillway crest elevation this material has a top slope of ✓ inches vertical to a foot horizontal on the center line of the structure, a vertical thickness at this elevation of ✓ feet, and the top surface extends for a vertical height of ✓ feet above the spillway crest. Is a natural side hill

6. The material of the left bank is ✓; has a top slope of ✓ inches to a foot horizontal, a thickness of ✓ feet and a height of ✓ feet. A natural side hil

7. The natural material of the bed on which the structure rests is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) clay

8. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Uniform and impervious.

9. If the bed is in layers, are the layers horizontal or inclined?..... If inclined what is the direction of the horizontal outcropping relative to the axis of the main structure and the inclination and direction of the layers in a plane perpendicular to the horizontal outcropping? No information

10. What is the thickness of the layers? No information

11. Are there any porous seams or fissures? No

12. The watershed at the above structure and draining into the pond formed thereby is 4 1/4 square miles.

13. The pond area at the spillway crest elevation is about 12 acres and the pond impounds 13,000,000 cubic feet of water.

14. The maximum known flow of the stream at the structure was.....cubic feet per second on No information (Date)

15. Has the spillway capacity ever been exceeded by a high flow? No.

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

16. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the above structure. Describe the location, the character and the use of buildings below the structure which might be damaged by any failure of the structure; of roads adjacent to or crossing the stream below the structure, giving the lowest elevation of the roadway above the stream bed and giving the shape, the height and the width of stream openings; and of any embankments or steep slopes that any flood could pass over. Also indicate the character and use made of the ground below the structure. Valley widens so fast doubt if flow could be so concentrated as to cause any damage except to wash away top soil of part of one farm.

17. WASTES. The spillway of the above structure is 36-0 feet long in the clear; the waters are held at the right end by a concrete wall the top of which is 3-6 feet above the spillway crest, and has a top width of 2-0 feet; and at the left end by a concrete wall, the top of which is 3-6 feet above the spillway crest, and has a top width of 2-0 feet.

18. There is also for flood discharge a pipe 20 inches inside diameter and the bottom is 40 feet below the spillway crest; and a (sluice, gate outlet) none feet wide in the clear by..... feet high, and the bottom is.....feet below the spillway crest.

19. APRON. Below the spillway there is an ~~apron~~ chute built of concrete (Material) and carried to a curb below the toe of the dam. feet wide and ..... feet thick. The downstream side of the apron has a thickness of ..... feet for a width of ..... feet.

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

---

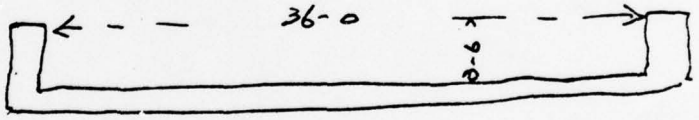
21. SKETCHES. A On the back of this report make a sketch to scale for each different B cross-section of the above structure at the greatest depth; giving the height and the depth from the surface of the foundation, the bottom width, the top width (for a concrete or masonry spillway at two feet below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

22. WATER SUPPLY. The waters impounded by the above structure have ~~(not)~~ been used for a public water supply since about 1875 by Elmira Water Works Co. to 1901, Elmira Water, Light and R.R. Co. 1901-1915, Elmira Water Board (municipal) 1915-1924.

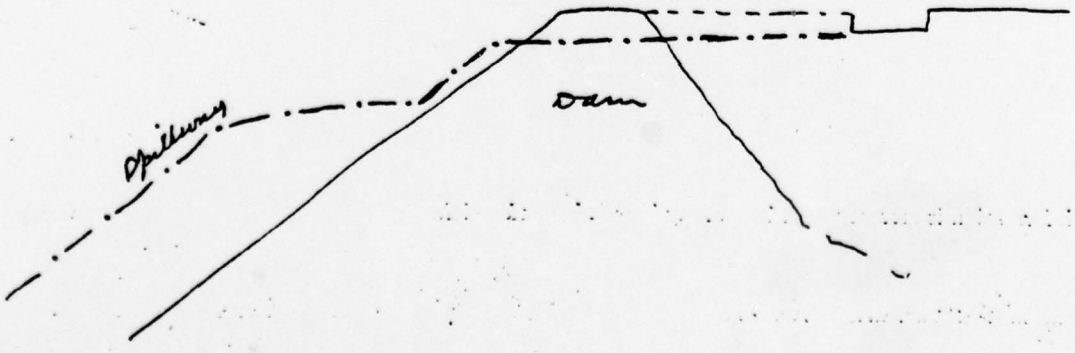
A. No information

B. No information

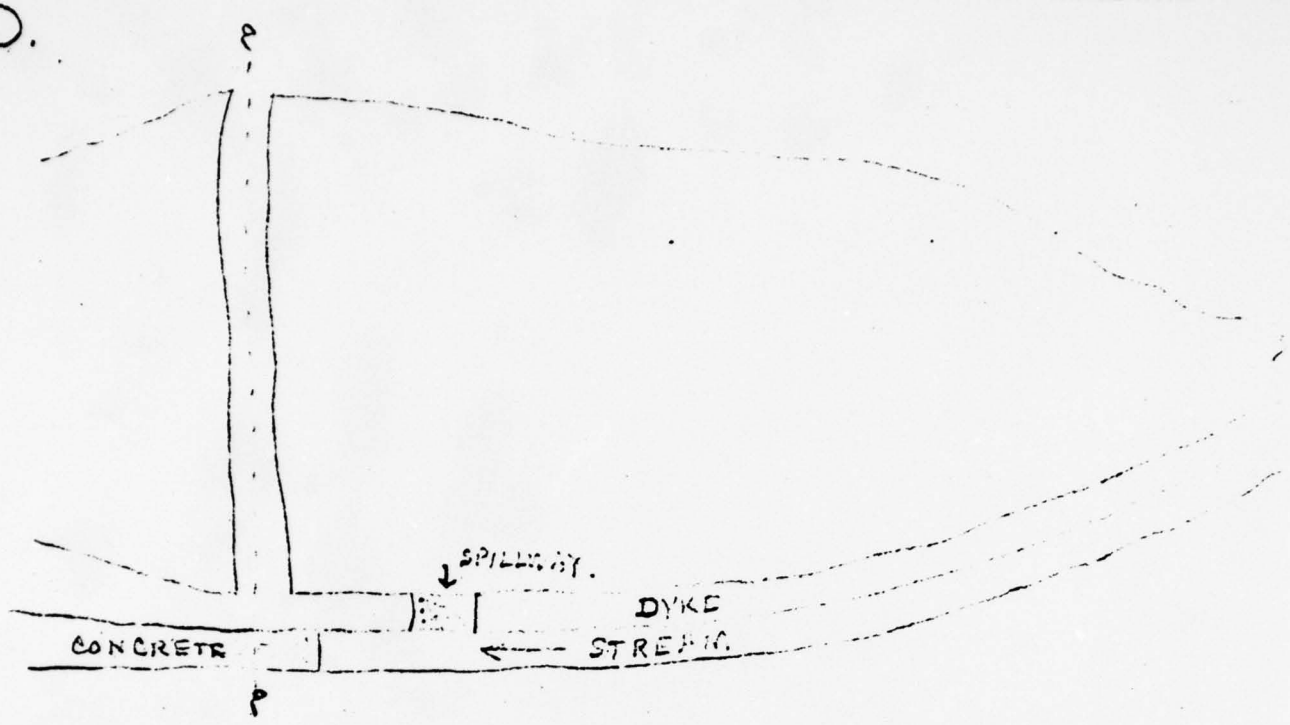
C. Spillway opening



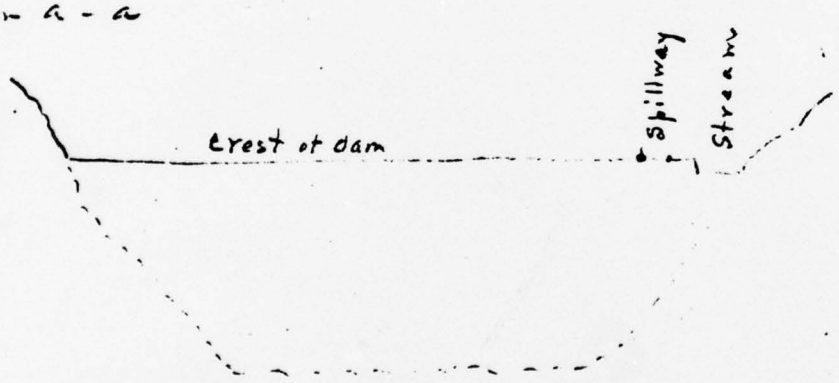
Spillway opens into stream carried around reservoir. The stream (and spillway water) go down a concrete chute built in the side hill.



D.



E. Section a - a



The above information is correct to the best of my knowledge and belief.

City Hall, Elmira, N.Y.
(Address of signer)

S M Beardsley
(Signature)

Octo. 28, 1924
(Date)

Genl Mgr. Elmira Water Board.
(A person signing for owner should indicate his title or authority)

6-6-31-500 (11E-7431)

STATE OF NEW YORK

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENGINEERING

ALBANY

61-1297 (new)

Received Aug. 25, 1930 Dam No. 164 (old)

Disposition Approved Nov. 21, 1930 Watershed Chemung

Foundation inspected

Structure inspected

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see last page of this application) for the approval of specifications and detailed drawings, marked Elmira Water Board - Proposed change of Dam and Spillway herewith submitted for the { ~~construction~~ / reconstruction } of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about November 1st, 1930 (Date)

1. The dam ~~will be~~ is on Hoffman Creek flowing into Chemung River in the town of Elmira, County of Chemung and One mile northwest of Carr's Corners Intersection of Hoffman & W Hill R
(Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

2. Location of dam is shown on the Chemung County quadrangle of the United States Geological Survey.

3. The name of the owner is Elmira Water Board

4. The address of the owner is City Hall, Elmira, N.Y.

5. The dam will be used for Water supply to Elmira

6. Will any part of the dam be built upon or its pond flood any State lands? No

7. The watershed above the proposed dam is 41 square miles.

8. The proposed dam will create a pond area at the spillcrest elevation of Approx 30 acres and will impound 15,000,000 cubic feet of water.

9. The maximum height of the proposed dam above the bed of the stream is 40 feet 6 inches.

10. The lowest part of the natural shore of the pond is Four feet vertically above the spillcrest, and everywhere else the shore will be at least _____ feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam Yes, but very little

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) _____

13. Facing down stream, what is the nature of material composing the right bank? Clay - A Hill

14. Facing down stream, what is the nature of the material composing the left bank? Clay

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Don't know. In use forty years and apparently water tight We are finding tough blue clay in our excavation at the upper end

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? No

17. WASTES. The spillway of the above proposed dam will be 100'-8" feet long in the clear; the waters will be held at the right end by a Concrete Wall the top of which will be 3-6 feet above the spillcrest, and have a top width of 1-6 feet; and at the left end by a Concrete wall the top of which will be 3-6 feet above the spillcrest, and have a top width of 1-6 feet.

18. The spillway is designed to safely discharge _____ cubic feet per second.

19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows:

There is a 20" line at the bottom to take out the mud. The proposed enlarged spillway for flood waters is shown on blue prints accompanying. There are gates at the upper end by which water may be by-passed through the canal alongside reservoir

20. What is the maximum height of flash boards which will be used on this dam? None

21. APRON. Below the proposed dam there will be an apron built of None feet long across the stream, _____ feet wide and _____ feet thick.

22. Does this dam constitute any part of a public water supply? Yes, City of Elmira

INSTRUCTIONS

Read carefully on the last page of this application the law setting forth the requirements to be complied with in order to construct or reconstruct a dam.

Each application for the construction or reconstruction of a dam must be made on this standard form, copies of which will be furnished upon request to the Chief Engineer, Division of Engineering, Department of Public Works, Albany, N. Y. The application must be accompanied by three sets of plans, and specifications. The information furnished must be in sufficient detail in order that the stability and safety of the dam can be determined. In cases of large and important dams assumptions made in calculating stresses and stability should be given.

Samples of materials to be used in the dam and of the material on which the dam is to be founded may be asked for, but need not be furnished unless requested.

If the dam constitutes a part of a public water supply, application should be made to the Water Power and Control Commission under Article XI of the Conservation Law.

An application for the construction or reconstruction of a dam must be signed by the prospective owner of the dam or his duly authorized agent. The address of the signer and the date must be given as provided for on the last page of the application form.

SECTION 948 OF THE CONSERVATION LAW

§ 948. **Structures for impounding water; inspection of docks; penalties.** No structure for impounding water and no dock, pier, wharf or other structure used as a landing place on waters shall be erected or reconstructed by any public authority or by any private person or corporation without notice to the superintendent of public works, nor shall any such structure be erected, reconstructed or maintained without complying with such conditions as the superintendent of public works may by order prescribe for safeguarding life or property against danger therefrom. No order made by the superintendent of public works shall be deemed to authorize any invasion of any property rights, public or private, by any person in carrying out the requirements of such order. The superintendent of public works shall have power, whenever in his judgment public safety shall so require, to make and serve an order directing any person, corporation, officer or board, constructing, maintaining or using any structure hereinbefore referred to, remove, repair or reconstruct the same within such reasonable time and in such manner as shall be specified in such order, and it shall be the duty of every such person, corporation, officer or board, to obey, observe and comply with such order and with the conditions prescribed by the superintendent of public works for safeguarding life or property against danger therefrom, and every person, corporation, officer or board failing, omitting or neglecting so to do, or who hereafter erects or reconstructs any such structure hereinbefore referred to without submitting to the superintendent of public works and obtaining his approval of plans and specifications for such structures when required so to do by his order or who hereafter fails to remove, erect or to reconstruct the same in accordance with the plans and specifications so approved shall forfeit to the people of this state a sum not to exceed five hundred dollars to be fixed by the court for each and every offense; every violation of any such order shall be a separate and distinct offense, and, in case of a continuing violation, every day's continuance thereof shall be and be deemed to be a separate and distinct offense. This section shall not apply to a dam where the area draining into the pond formed thereby does not exceed one square mile, unless the dam is more than ten feet in height above the natural bed of the stream at any point or unless the quantity of water which the dam impounds exceeds one million gallons; nor to a dock, pier, wharf or other structure under the jurisdiction of the department of docks, if any, in a city of over one hundred and seventy-five thousand population. This section as hereby amended shall not impair the effect of an order heretofore made by the conservation commission or commissioner under this section prior to the taking effect of chapter four hundred and ninety-nine of the laws of nineteen hundred and twenty-one, nor require the approval by the superintendent of public works of plans and specifications theretofore approved by such commission or commissioner under this section.

The foregoing information and accompanying plans and specifications are correct to the best of my knowledge and belief.

Elmira Water Board, Owner.

By H. M. Beardsley, Em. Mgr., authorized agent of owner.

Address of signer City Hall, Elmira N.Y. Date Aug. 23, 1920.

Form E-61. 7-12-40-800 (11E-83) 815-B
ORD- E-5-4

STATE OF NEW YORK

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENGINEERING

ALBANY

61-1297 (new)

Received Nov. 20, 1944 Dam No. 164 (old)

Disposition Appr. Nov. 20, 1944 Watershed Chemung

Foundation inspected

Structure inspected

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see third page of this application) for the approval of specifications and detailed drawings, marked Elmira Water Board, Hoffman Creek Reservoir Present and Proposed Spillway Dam 164 herewith submitted for the { ~~construction~~ / reconstruction } of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about October 30, 1945 (Date).

1. The dam will be on Hoffman Creek flowing into Chemung River in the town of Elmira County of Chemung and one mile northwest City of Elmira Line at Hoffman Street (Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)
2. Location of dam is shown on the New York-Penna. Elmira Sheet quadrangle of the United States Geological Survey.
3. The name of the owner is Elmira Water Board - City of Elmira, N.Y.
4. The address of the owner is 408 E. Market Street - Elmira, N.Y.
5. The dam will be used for Water supply
6. Will any part of the dam be built upon or its pond flood any State lands? No
7. The watershed above the proposed dam is 5 square miles.
8. The proposed dam will create a pond area at the spillcrest elevation of 40 acres and will impound 18,300,000 cubic feet of water. (maximum)

9. The maximum height of the proposed dam above the bed of the stream is 36 feet 6 inches.

10. The lowest part of the natural shore of the pond is 6 feet vertically above the spillcrest, and everywhere else the shore will be at least 10-50 feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam Yes

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) No change in dam

13. Facing downstream, what is the nature of material composing the right bank? No change in dam

14. Facing downstream, what is the nature of the material composing the left bank? No change in dam

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing effect of exposure to air and to water, uniformity, etc. Good

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? No

17. WASTES. The spillway of the above proposed dam will be 120 feet long in the clear; the waters will be held at the right end by a Concrete wall the top of which will be 3 feet above the spillcrest, and have a top width of One feet; and at the left end by a Concrete wall the top of which will be 3 feet above the spillcrest, and have a top width of One feet.

18. The spillway is designed to safely discharge 1950 cubic feet per second.

19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows:

1 - 16" Cast iron blow-off line

20. What is the maximum height of flash boards which will be used on this dam? None

21. APRON. Below the proposed dam there will be an apron built of None feet long across the stream, ... feet wide and ..... feet thick.

22. Does this dam constitute any part of a public water supply? Yes

INSTRUCTIONS

Read carefully on the third page of this application the law setting forth the requirements to be complied with in order to construct or reconstruct a dam.

Each application for the construction or reconstruction of a dam must be made on this standard form, copies of which will be furnished upon request to the Chief Engineer, Division of Engineering, Department of Public Works, Albany, N. Y. The application must be accompanied by three sets of plans, and specifications. The information furnished must be in sufficient detail in order that the stability and safety of the dam can be determined. In cases of large and important dams assumptions made in calculating stresses and stability should be given.

Samples of materials to be used in the dam and of the material on which the dam is to be founded may be asked for, but need not be furnished unless requested.

If the dam constitutes a part of a public water supply, application should be made to the Water Power and Control Commission under Article XI of the Conservation Law.

An application for the construction or reconstruction of a dam must be signed by the prospective owner of the dam or his duly authorized agent. The address of the signer and the date must be given as provided for on the last page of the application form.

SECTION 948 OF THE CONSERVATION LAW

§ 948. Structures for impounding water; inspection of docks; penalties. No structure for impounding water and no dock, pier, wharf or other structure used as a landing place on waters shall be erected or reconstructed by any public authority or by any private person or corporation without notice to the superintendent of public works, nor shall any such structure be erected, reconstructed or maintained without complying with such conditions as the superintendent of public works may by order prescribe for safeguarding life or property against danger therefrom. No order made by the superintendent of public works shall be deemed to authorize any invasion of any property rights, public or private, by any person in carrying out the requirements of such order. The superintendent of public works shall have power, whenever in his judgment public safety shall so require, to make and serve an order, setting forth therein his findings of fact and his conclusions therefrom, directing any person, corporation, officer or board, constructing, maintaining or using any structure hereinbefore referred to, either remove the said structure or to repair or reconstruct the same within such reasonable time and in such manner as shall be specified in such order, and it shall be the duty of every such person, corporation, officer or board, to obey, observe and comply with such order and with the conditions prescribed by the superintendent of public works for safeguarding life or property against danger therefrom, and every person, corporation, officer or board failing, omitting or neglecting so to do, or who hereafter erects or reconstructs any such structure hereinbefore referred to without submitting to the superintendent of public works and obtaining his approval of plans and specifications for such structures when required so to do by his order or hereafter fails to remove, erect or to reconstruct the same in accordance with the plans and specifications so approved shall forfeit to the people of this State a sum not to exceed five hundred dollars to be fixed by the court for each and every offense; every violation of any such order shall be a separate and distinct offense, and, in such case of a continuing violation, every day's continuance thereof shall be and be deemed to be a separate and distinct offense. Such order shall not contain any provision to compel the owner to make repairs or proceed with reconstruction as specified in this section by any type of construction other than that of the dam itself. In addition to said forfeiture upon the violation of any such order, the superintendent of public works shall have power to enter upon the lands and waters where such structures are located, for the purpose of removing, repairing or reconstructing the same, and to take such other and further precautions which he may deem necessary to safeguard life or property against danger therefrom. In removing, repairing and reconstructing such dam the superintendent shall not deviate from the method, manner or specifications contained in the original order. The superintendent of public works shall certify the amount of the costs and expenses incurred by him for the removal, repair or reconstruction aforesaid, or in anywise connected therewith, to the board of supervisors of the county or counties in which the said lands and waters are located, whereupon it shall be the duty of such board of supervisors to add the amount so certified to the assessment rolls of such locality or localities as a charge against the real property upon which the dam is located designated or described by the superintendent of public works as chargeable therewith, and to issue its warrant or warrants for the collection thereof. Thereupon it shall become the duty of such locality or localities through their proper officers to collect the amount so certified in the same manner as other taxes are collected in such locality or localities, and when collected to pay the same

to the superintendent of public works who shall thereupon pay the same into the state treasury. Any amount so levied shall thereupon become and be a lien upon the real property affected thereby, to the same extent as any tax levy becomes and is a lien thereon.

Any person in interest may, within thirty days from the service of any such order, appeal to the supreme court to determine the reasonableness of such order. At any time during such appeal to the supreme court upon at least three days' notice, the party appealing may apply for an order directing any question of fact to be tried and determined by a jury, and the court shall thereupon cause such question to be stated for trial accordingly and the findings of the jury upon such question shall be conclusive. Appeals may be taken from the supreme court to the appellate division of the supreme court and to the court of appeals in such cases, subject to the limitations provided in the civil practice act.

This section shall not apply to a dam where the area draining into the pond formed thereby does not exceed one square mile, unless the dam is more than ten feet in height above the natural bed of the stream at any point or unless the quantity of water which the dam impounds exceeds one million gallons; nor to a dock, pier, wharf or other structure under the jurisdiction of the department of docks, if any, in a city of over one hundred and seventy-five thousand population. This section as hereby amended shall not impair the effect of an order heretofore made by the conservation commission or commissioner under this section prior to the taking effect of chapter four hundred and ninety-nine of the laws of nineteen hundred and twenty-one, nor require the approval by the superintendent of public works, of plans and specifications theretofore approved by such commission or commissioner under this section.

The foregoing information is correct to the best of my knowledge and belief, and the construction will be carried out in accordance with the approved plans and specifications.

Elmira Water Board, Owner

By John G. Copley, authorized agent of owner.

Address of signer 408 E. Market St, Elmira N Y Date November 8, 1944

James M Paine

Form E-61. 3-24-47-500 (6D-671)
ORD. 7-05-46

STATE OF NEW YORK

DEC 8 1947
FLOOD CONTROL
RFD. TO

DEPARTMENT OF PUBLIC WORKS

ALBANY

Received December 8 1947 Dam No. 61-1297

Disposition App. April 6 1948 Watershed Chemung River

Foundation inspected

Structure inspected

REVISED

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see third page of this application) for the approval of specifications and detailed drawings, marked Elmira Water Board - Changes in Hoffman Creek Spillway and Discharge Channel herewith submitted for the { ~~construction~~ reconstruction } of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about during 1948-ff labor conditions permit.
(Date)

1. The dam will be on Hoffman Creek flowing into Chemung River in the town of Elmira County of Chemung and one mile northrest of City of Elmira line at Hoffman Street
(Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

2. Location of dam is shown on the New York-Pennsylvania-Elmira Sheet quadrangle of the United States Geological Survey.

3. The name of the owner is Elmira Water Board - City of Elmira N Y

4. The address of the owner is 408 E. Market Street - Elmira, N.Y.

5. The dam will be used for Water Supply

6. Will any part of the dam be built upon or its pond flood any State lands? No

7. The watershed above the proposed dam is 4.11 square miles.

8. The proposed dam will create a pond area at the spillcrest elevation of 40 acres and will impound 19,300,000 cubic feet of water.

9. The maximum height of the proposed dam above the bed of the stream is 36 feet 6 inches.

10. The lowest part of the natural shore of the pond is 6 feet vertically above the spillcrest, and everywhere else the shore will be at least 10-50 feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam Yes

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) No change in dam

13. Facing downstream, what is the nature of material composing the right bank? No change in dam

14. Facing downstream, what is the nature of the material composing the left bank? No change in dam

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing effect of exposure to air and to water, uniformity, etc. Good

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? No

17. WASTES. The spillway of the above proposed dam will be 120 feet long in the clear; the waters will be held at the right end by a concrete wall the top of which will be 5.25 feet above the spillcrest, and have a top width of One feet; and at the left end by a concrete wall the top of which will be 5.25 feet above the spillcrest, and have a top width of One feet.

18. The spillway is designed to safely discharge 5,140. cubic feet per second.

19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows:

None

(One 16" Cast Iron Blow-off only)

20. What is the maximum height of flash boards which will used on this dam? None

21. APRON. Below the proposed dam there will be an apron built of concrete feet long across the stream, 43 feet wide and 8 inches ~~feet~~ thick.

22. Does this dam constitute any part of a public water supply? Yes

INSTRUCTIONS

Read carefully on the third page of this application the law setting forth the requirements to be complied with in order to construct or reconstruct a dam.

Each application for the construction or reconstruction of a dam must be made on this standard form, copies of which will be furnished upon request to the Department of Public Works, Albany, N. Y. The application must be accompanied by three sets of plans, and specifications. The information furnished must be in sufficient detail in order that the stability and safety of the dam can be determined. In cases of large and important dams assumptions made in calculating stresses and stability should be given.

Samples of materials to be used in the dam and of the material on which the dam is to be founded may be asked for, but need not be furnished unless requested.

If the dam constitutes a part of a public water supply, application should be made to the Water Power and Control Commission under Article XI of the Conservation Law.

An application for the construction or reconstruction of a dam must be signed by the prospective owner of the dam or his duly authorized agent. The address of the signer and the date must be given as provided for on the last page of the application form.

SECTION 948 OF THE CONSERVATION LAW

§ 948. Structures for impounding water; inspection of docks; penalties. No structure for impounding water and no dock, pier, wharf or other structure used as a landing place on waters shall be erected or reconstructed by any public authority or by any private person or corporation without notice to the superintendent of public works, nor shall any such structure be erected, reconstructed or maintained without complying with such conditions as the superintendent of public works may by order prescribe for safeguarding life or property against danger therefrom. No order made by the superintendent of public works shall be deemed to authorize any invasion of any property rights, public or private, by any person in carrying out the requirements of such order. The superintendent of public works shall have power, whenever in his judgment public safety shall so require, to make and serve an order, setting forth therein his findings of fact and his conclusions therefrom, directing any person, corporation, officer or board, constructing, maintaining or using any structure hereinbefore referred to, either remove the said structure or to repair or reconstruct the same within such reasonable time and in such manner as shall be specified in such order, and it shall be the duty of every such person, corporation, officer or board, to obey, observe and comply with such order and with the conditions prescribed by the superintendent of public works for safeguarding life or property against danger therefrom, and every person, corporation, officer or board failing, omitting or neglecting so to do, or who hereafter erects or reconstucts any such stucture hereinbefore referred to without submitting to the superintendent of public works and obtaining his approval of plans and specifications for such structures when required so to do by his order or hereafter fails to remove, erect or to reconstruct the same in accordance with the plans and specifications so approved shall forfeit to the people of this State a sum not to exceed five hundred dollars to be fixed by the court for each and every offense; every violation of any such order shall be a separate and distinct offense, and, in such case of a continuing violation, every day's continuance thereof shall be and be deemed to be a separate and distinct offense. Such order shall not contain any provision to compel the owner to make repairs or proceed with reconstruction as specified in this section by any type of construction other than that of the dam itself. In addition to said forfeiture upon the violation of any such order, the superintendent of public works shall have power to enter upon the lands and waters where such structures are located, for the purpose of removing, repairing or reconstructing the same, and to take such other and further precautions which he may deem necessary to safeguard life or property against danger therefrom. In removing, repairing and reconstructing such dam the superintendent shall not deviate from the method, manner or specifications contained in the original order. The superintendent of public works shall certify the amount of the costs and expenses incurred by him for the removal, repair or reconstruction aforesaid, or in anywise connected therewith, to the board of supervisors of the county or counties in which the said lands and waters are located, whereupon it shall be the duty of such board of supervisors to add the amount so certified to the assessment rolls of such locality or localities as a charge against the real property upon which the dam is located designated or described by the superintendent of public works as chargeable therewith, and to issue its warrant or warrants for the collection thereof. Thereupon it shall become the duty of such locality or localities through their proper officers to collect the amount so certified in the same manner as other taxes are collected in such locality or localities, and when collected to pay the same

to the superintendent of public works who shall thereupon pay the same into the state treasury. Any amount so levied shall thereupon become and be a lien upon the real property affected thereby, to the same extent as any tax levy becomes and is a lien thereon.

Any person in interest may, within thirty days from the service of any such order, appeal to the supreme court to determine the reasonableness of such order. At any time during such appeal to the supreme court upon at least three days' notice, the party appealing may apply for an order directing any question of fact to be tried and determined by a jury, and the court shall thereupon cause such question to be stated for trial accordingly and the findings of the jury upon such question shall be conclusive. Appeals may be taken from the supreme court to the appellate division of the supreme court and to the court of appeals in such cases, subject to the limitations provided in the civil practice act.

This section shall not apply to a dam where the area draining into the pond formed thereby does not exceed one square mile, unless the dam is more than ten feet in height above the natural bed of the stream at any point or unless the quantity of water which the dam impounds exceeds one million gallons; nor to a dock, pier, wharf or other structure under the jurisdiction of the department of docks, if any, in a city of over one hundred and seventy-five thousand population. This section as hereby amended shall not impair the effect of an order heretofore made by the conservation commission or commissioner under this section prior to the taking effect of chapter four hundred and ninety-nine of the laws of nineteen hundred and twenty-one, nor require the approval by the superintendent of public works, of plans and specifications theretofore approved by such commission or comissioner under this section.

The foregoing information is correct to the best of my knowledge and belief, and the construction will be carried out in accordance with the approved plans and specifications.

ELMIRA WATER BOARD, Owner

By John G Copley, authorized agent of owner.

Address of signer 408 E. Market St - Elmira, N.Y. Date December 4, 1947

SUBJECT [illegible] FILE NO. [illegible]
ACC. NO. 35[illegible]6
SHEET
COMPUTER [illegible] 192[illegible] CHECKED BY [illegible] 19
MADE IN CONNECTION WITH [illegible] Dm
REFERENCE
CONT'D FROM ACC. [illegible]

[illegible] General Description:

Site as shown [illegible] Elmira [illegible] [illegible] on Hoffman Brook, about [illegible] upstream from the [illegible] limit of the City of Elmira, as [illegible] Sheet [illegible] p.

Difference in elevation between [illegible] river front, and [illegible] be about [illegible]16 ft. and the horizontal distance along the stream bed, about [illegible] miles.

[illegible] is formed [illegible]

Capacity to El. 1063 = 246± Acre-ft. by [illegible]

Channel passes across many streets in [illegible] portion of the city.

Water surface area (See [illegible] of Sheet [illegible])
= About 16 Acres at El. 1063± (Lip of [illegible])

[illegible] Area:

Health Dept. reports say 4.6 square [illegible]

Owners Supt. says about 4 square miles;

Estimated on U.S.G.S. map as 4.[illegible]

[illegible] well [illegible] which [illegible] about half mile above upstream end of [illegible] as shown [illegible]

Rises about [illegible] ft. on South [illegible] reservoir and [illegible] ft. " North "

[illegible] of [illegible] be, about 1-mile above the reservoir.

CONT'D ON ACC.

3,090,000

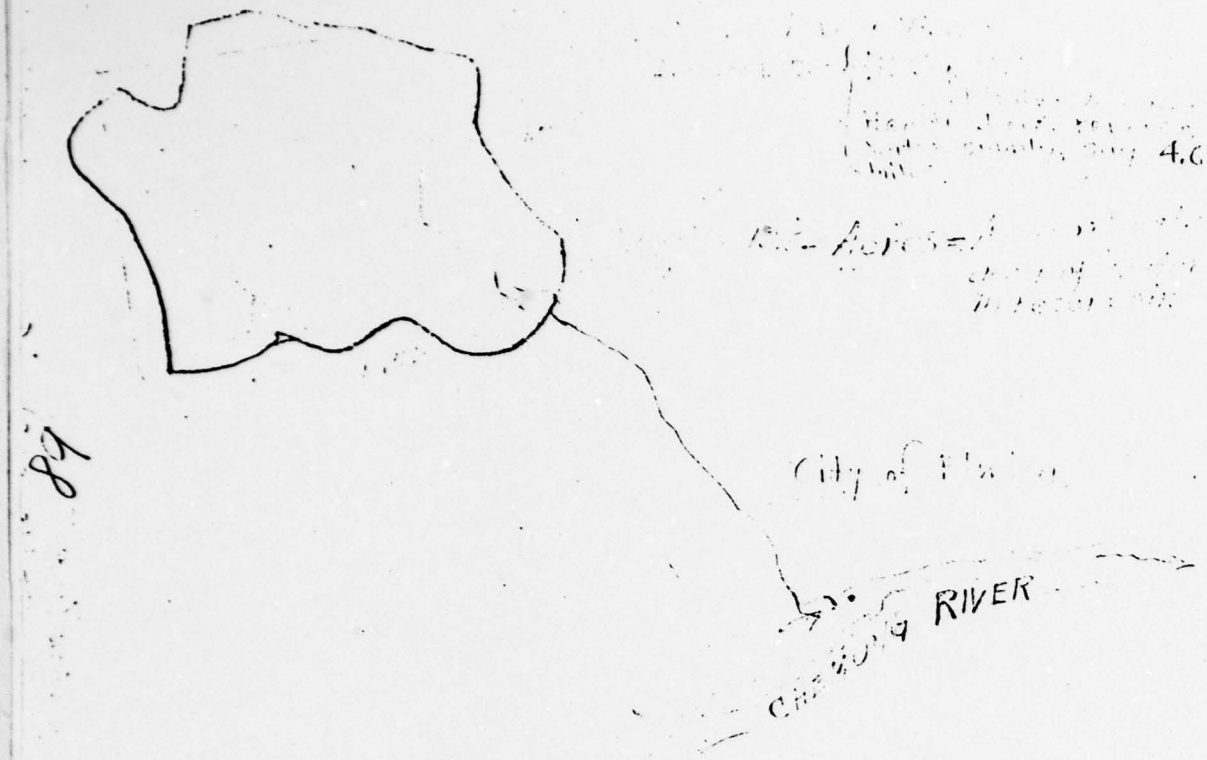
3,250,000 − 160,000

(1,700² − 400²) = [illegible]

Alt = 1,755 ±

Area Water surface at 3.5 below top = 702,000 □

≈ 16.1 ± Acres.


RIVER

(16-15679) Am. 104

SUBJECT Hoffman Creek above Elmira, N.Y. FILE NO. [illegible]
Earth dam and dike forming water supply storage reservoir ACC. NO. 353
SHEET
COMPUTER Test Apr 1921 CHECKED BY 19
MADE IN CONNECTION WITH Apr 4 '21, letter by Genl Mgr of Elmira Water Brd.
REFERENCE
CONT'D FROM ACC.

Papers:

1. U.S.G.S. map, Elmira quadrangle;
2. June, 1910 map of Hoffman Creek reservoir, with prints filed in re Water Supply Application #189, (Scale 1"=40');
3. June 22, 1916, report form completed for the da by this Commissions, Asst. Inspector of Dams; a accompanied by a photograph showing the main portion of the dam at top;
4. Aug. 15, 1917, press report of break, 10-ft. wide, at west end of dam;
5. Apr. 4, 1921, letter by General Manager of Elmira Water Board, H.M. Beardsley, proposing to raise floor of wasteway by 1 ft.;

Errors, Omissions or Lack of Clearness:

(See over.)

CONT'D ON ACC. 35

[illegible] Lake of Cle[illegible] [illegible]

1. Blue print, (paper 2" supra) shows a dike [illegible] [illegible] times as long as the dam extending along its [illegible] side. [illegible] for such dike are given, and a diversion canal flows its full length and immediately adjacent, presumably to carry excess water in [illegible] when reservoir is full. Such canal [illegible] receives waste water from the reservoir discharged through a concrete lined channel, located [illegible] from [illegible] end of main earth dam which is shown [illegible] 36 [illegible], [illegible] width [illegible], both slopes [illegible] freeboard above lip of wasteway, [illegible].

2. [illegible] shows elevation on top of dike as 1062.1, at point about 575 ft. N.W. from center of wasteway, [illegible] which is shown to be 1063.0 [illegible] [illegible], so readily appreciated how a failure at such low point might have occurred during a freshet, and as described by Aug. 15, 1917 news [illegible].

3. Presumably bulkhead gates at extreme [illegible] end of the reservoir were open, and [illegible] at time of such freshet and washout. If the dike had not been so low, a break might have been eroded in like manner in the main embankment, with a possible disastrous consequences;

4. [illegible] ([illegible], supra) indicates that core of dam is of puddle, and also, that "three years ago, (1913) dam was raised three feet in middle. No record [illegible] of any notice having been [illegible] [illegible] Commission) [illegible] at that time was [illegible] concrete [illegible] for [illegible] [illegible], to further raise [illegible] in reservoir.

5. [illegible] [illegible] that there is a flowing slough with [illegible] [illegible] down [illegible] from [illegible] embankment, [illegible] is at least [illegible].

6. (Ibid) Would water in canal erode or cause dike [illegible] periods of extreme flood [illegible]?

([illegible] [illegible] [illegible] 2)

SUBJECT ______ FILE NO. ______
ACC. NO. 3231
SHEET ______
COMPUTER ______ 1921 CHECKED BY ______ 19__
MADE IN CONNECTION WITH ______
REFERENCE ______ CONT'D FROM ACC.

Maximum Flood:

Maximum inflow rate if full flow of stream entering reservoir at upper end, would be, say [illegible]
= 1,300 [illegible]

Note: Mr. Hurley feels that inflow rate of 4,000 cfs would be limit. Mr. Sargent feels that 6,000 [illegible] may be expected, but that so great an area of city would be inundated under such conditions that neither the area affected nor the stage [illegible] would be materially increased if the reservoir should fail. He therefore questions whether a lower value might not be wisely assumed for maximum inflow [illegible] to be used in study.

Probably 4,000 cfs would be the reasonable limit, altho it may ~~[illegible]~~ be true that this reservoir might, (when long periods are considered) render a greater public service if well [illegible] as a flood equalization reservoir, than for water supply purposes.

Even 4000 cfs is a vast volume of water to safely carry in an earth channel.

The problem is worthy of careful study and the Division Engineer plans to make a personal examination and wishes Mr. McKim to inspect the structure soon.

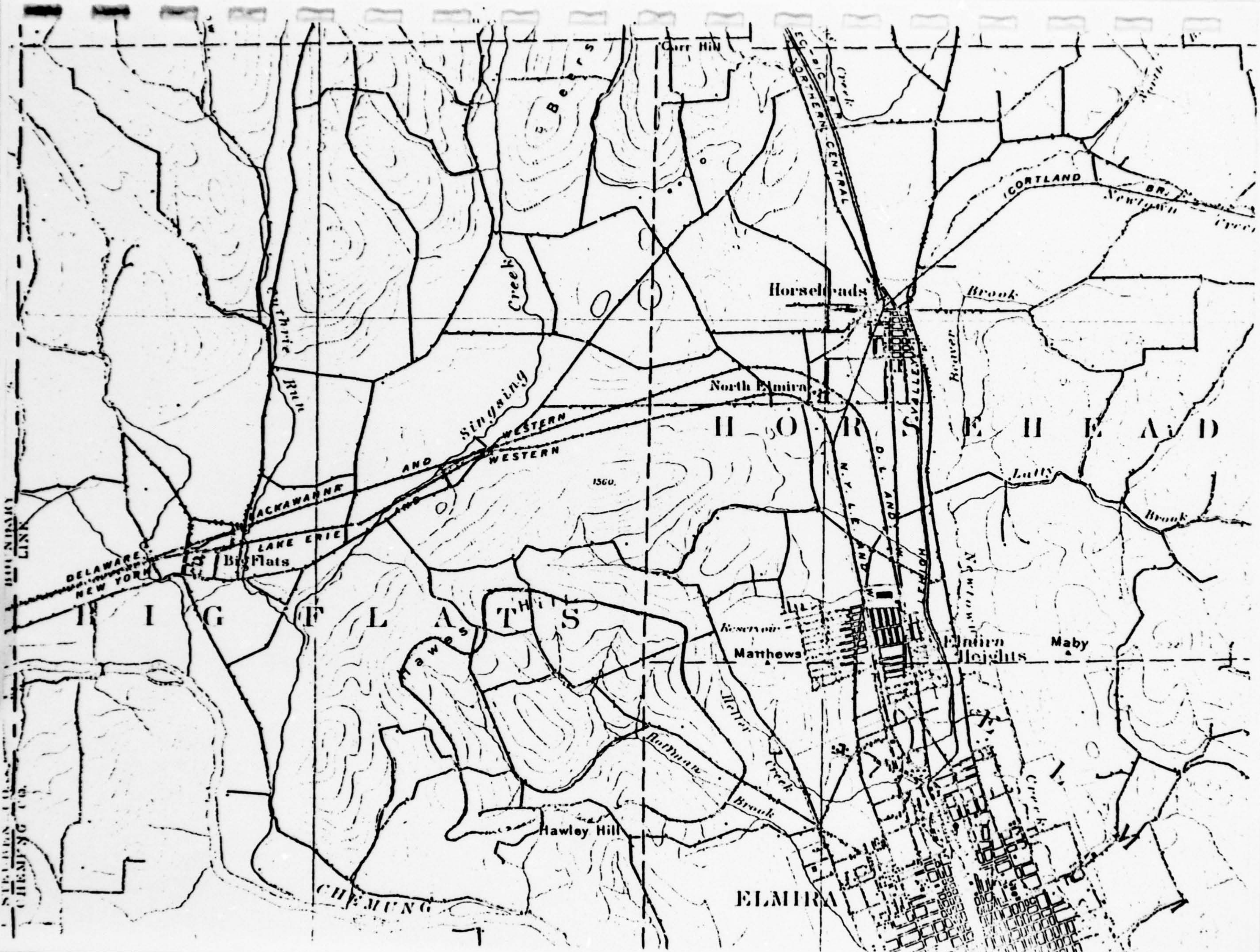
Wave Height:

[illegible] = 1700 ft. = [illegible] Miles

h = 1.5 [illegible] + (2.5 - [illegible]) = 2.6 ft. wave [illegible]

[illegible] downstream slope [illegible] to [illegible] grass [illegible] each spring.

CONT'D ON ACC.


HORSEHEADS
BIG FLATS
Horseheads
North Elmira
Big Flats
Elmira Heights
Matthews
Maby
Hawley Hill
Carr Hill
ELMIRA
CHEMUNG
Reservoir
Singsing Creek
Guthrie Run
Beaver Brook
Newtown Creek
Lally Brook
Hoffman Brook
Heller Creek
Hawes Hill
NORTHERN CENTRAL
CORTLAND BR.
N.Y.L.E. AND W.
D.L. AND W.
LEHIGH VALLEY
DELAWARE LACKAWANNA AND WESTERN
NEW YORK LAKE ERIE AND WESTERN
1360.
BOUNDARY LINE
STEUBEN CO.
CHEMUNG CO.

61

HEAVY RAIN TEARS OUT DA
AT RESERVOI

During the heavy rain of Mor
night and Tuesday morning the
ervoir which is located about ha
mile from Carr's Corners, overflc
at the west end of the dam and
very short time had torn a ra
hole some 10 feet wide through
dam. This is a record height for
water to reach at this place as
out-let has always been capabl
handling all surplus. It was
overflow that caused Hoffman
to rise so unexpectedly.

"Forests do not improve by
use any more than a man's m
grow stronger in idleness." The
woodlot is a small forest and
repay the owner who takes care

September 10, 1917.

Water Board,

Elmira, N. Y.

Gentlemen:-

It is reported that your reservoir near Carr's Corners has failed. We therefore enclose an application blank which is to be filled out and submitted together with plans in duplicate to this Commission for its approval, according to the provisions of the Conservation Law.

Yours very truly,

GEORGE D. PRATT, COMMISSIONER.

By _____

DIVISION ENGINEER.

MCF:MH.

ENC.

61

ELMIRA WATER BOARD

COMMISSIONERS

ARCHIE M. BOVIER
HENRY J. HAASE
THOMAS F. MILAN
CLAY W. HOLMES
FRANCIS E. BALDWIN

HENRY J. HAASE, PRESIDENT
JOHN J. McNEVIN, SECRETARY
H. M. BEARDSLEY, GENERAL MANAGER

OFFICES CITY HALL

ELMIRA, N. Y. September 13th, 1917

Conservation Commission

Mr A. H. Perkins, Division Engineer

Albany, N.Y.

Dear Sir:-

We have your communication of the 10th relative to the failure of our reservoir near Carr's Corners. I beg to say that you have been entirely misinformed as to this matter as the reservoir has not failed.

Will it be too much to ask that you advise us the source of your information?

Yours truly,

H.M. Beardsley

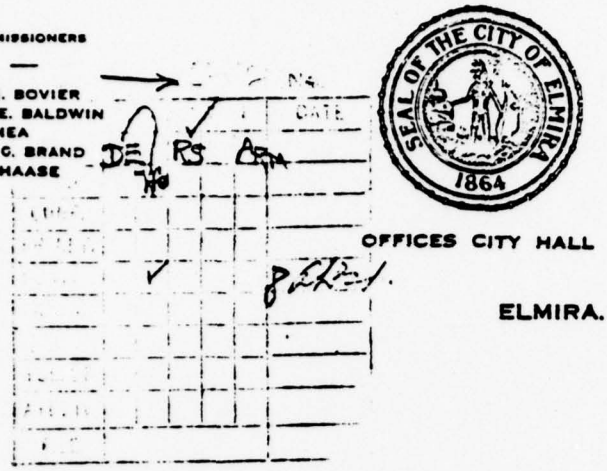
General Manager

HMB/C

ELMIRA WATER BOARD

COMMISSIONERS

ARCHIE M. BOVIER
FRANCIS E. BALDWIN
C. W. O'SHEA
CHARLES G. BRAND
HENRY J. HAASE



CHARLES G. BRAND
PRESIDENT

JOHN J. McNEVIN
SECRETARY

H. M. BEARDSLEY
GENERAL MANAGER

OFFICES CITY HALL

ELMIRA, N. Y., April 4th, 1921.

Conservation Commission,
Albany, N.Y.

Gentlemen:

In going over some matters the other day in connection with our water supply, we were told that your Commission had considerable jurisdiction in such matters, even to the extent of approving plans made for dams and storage reservoirs.

Will you kindly advise us if this is so and to just what particulars your supervision extends. If your work includes not only the question of the storage of water but also the details of the dams constructed, will you kindly advise us whether you set limits on the capacity of overflows and spill ways of existing reservoirs.

We have a reservoir with a capacity of about one hundred million gallons situated on a creek which has a water shed of about four square miles. The dam is about forty feet high and eight hundred feet long. There is a canal of ample capacity around the reservoir to take the excess water from the stream running into the reservoir. Our spillway or overflow from the reservoir empties into this canal.

We are convinced that the dam is amply strong enough to hold an additional foot of water and are contemplating raising the floor of the spillway for the purpose of giving us this additional storage.

We will be glad to have your suggestions and advice or ruling as the case may be, in the premises.

Very truly yours,

H. M. Beardsley

General Manager.

HMB/B

Done
Filed

U.S.G.S. 61.

April 8, 1921.

Subject: Hoffman Creek Reservoir.

Elmira Water Board,

Elmira, N. Y.

Attention of H. H. Beardsley, General Mgr.

Gentlemen:

We have your letter dated Apr. 4, 1921, from which it is our understanding that your Board maintains the dam and reservoir on Hoffman Creek, above and immediately northwesterly from the corporate limits of the City of Elmira, for storage in connection with the city's water supply system, and further, that for the purpose of increasing the volume of storage available in such reservoir, it is proposed to raise the lip of the spillway a vertical distance of one foot.

Aside from the jurisdiction conferred upon this Commission in relation to the taking of additional sources of water supply (see Article IX of Conservation Law mailed under separate cover), supervision is also exercised over dams, pursuant to the provisions of section 32 of such law (copy attached) for the purposes of public safety. If the information available at this office relating to such dam and reservoir is reliable, it would appear that no doubt can exist as to the importance of the Hoffman Brook Dam from the point of view of public safety. Before passing upon the question of raising the water surface elevation in such reservoir, it therefore appears necessary to request that you furnish a complete history of such dam and reservoir in all its details, from the time of its original construction down to the present. The fact is that such dam and reservoir, as previously maintained, do not appear to embody the factor of safety which seems to be required in consideration of its high location above a considerable portion of the City of Elmira.

In completing a report covering the history of such dam and reservoir, the following points seem pertinent:

(1) Originally, what was maximum height of main dam, and what was the original provision as to freeboard. (By the word "freeboard" we mean the difference in elevation from the lip of the spillway to the top of the earth embankment);

(2) Did entire flow of stream originally enter reservoir without passing head-gates?

(3) What were original dimensions of waste weir from such reservoir;

(4) Furnish the following information for each separate failure which has ever occurred in connection with such dam, dike and reservoir:

(a) Approximately what volume of water was stored at the time and what volume was released because of the failure;

(b) What was the cause, nature and full extent of the damage to the structure;

(c) Was life endangered?

(d) How much damage, if any, resulted to the property of others;

(e) In what manner was the failure repaired;

(f) What precautions were taken to prevent a re-occurrence of the conditions which caused such failure;

(5) It has been reported that about the year 1913 "the dam was raised 3 feet in the middle". What was the cause for, the exact location, and extent of the changes then made;

(6) Is upstream slope of main dam protected by riprapping or any other form of paving;

(7) Have observations ever been made to carefully determine (a) the volume of water discharged from the slough (bottom elevation about 58 feet below top of dam) just below main dam; (b) the relation, if any, of the

rate of discharge to the water surface elevations in the reservoir;

(8) Have floods from the Hoffman Creek Watershed ever endangered life or caused material damage to the property of others? (If so, state nature and extent, and as to the reservoir, describe conditions which prevailed at the same time);

(9) State probable maximum rate of discharge from Hoffman Creek Watershed, which the channel within the city limits would provide, without menace to life or serious destruction to property (other than mere water damage);

(10) State maximum rate of discharge which the flood relief channel around the reservoir would accommodate without endangering either the main dam or the outer slope of the long dike which extends upstream in a northwesterly direction and is located immediately adjacent to the flood relief channel. (Support such a statement by information as to critical cross section areas, uniform slopes, etc.);

(11) Furnish information or plans indicating details of construction of bulkhead gates for diverting flood flows into the canal at the upstream end of the reservoir;

(12) Furnish drawing or dimension sketch showing critical section of dike and subfoundation material down to the elevation of flood relief channel bottom. (We understand such dike forms the northeast side of the reservoir);

(13) If known, furnish drawing, dimension sketch, or complete information, indicating what precautions were taken to prevent water from the reservoir following the outlet pipe which pierces the main dam in the vicinity of the present gate-house;

(14) Furnish similar information concerning any other pipe piercing such dam.

This Commission's Inspector of Docks and Dams will make an examination of the Hoffman Creek Reservoir Dam as early as practicable and if we may have a prompt reply covering the information requested in this letter as far as practicable, it will facilitate the proper consideration of the application.

Very truly yours,

GEO. D. PRATT, Commissioner,

By

DIVISION ENGINEER.

JWH-HB.
3 & C.
Encs.(2)

Note: (by just after receiving reply to the preceding letter)- In view of the explanations included in such reply and in Mr. McKim's report dated April 18, 1921, Division Engineer has decided to permit the matter to drop. Just

ELMIRA WATER BOARD

RECEIVED

REC'D No.

COMMISSIONERS	CONSERVATION COMMISSION			DATE
	INFOR.			
ARCHIE M. BOVIER				
FRANCIS E. BALDWIN				
C. W. O'SHEA				
CHARLES G. BRAND				
HENRY J. HAASE	FPT.			
	PR. REPLY	✓		
	ACKN.			
	FOL. UP			
	ATD. TO	✓		
	FILE			

CHARLES G. BRAND
PRESIDENT

JOHN J. McNEVIN
SECRETARY

H. M. BEARDSLEY
GENERAL MANAGER

OFFICES CITY HALL

ELMIRA, N. Y., April 14th, 1921.

Conservation Commission,
Albany, N.Y.

Att'n Mr. A.H. Perkins, Division Engineer

Dear Sir:-

This will acknowledge your favor of the 8th and also the copy of Conservation Law received this morning.

After going over the matter carefully and having an engineer here from Cornell University, we have practically decided to make no changes in the overflow capacity of our present storage reservoir. Later we may consider the erection of an additional dam for storage purposes but shall of course submit to you in accordance with the provisions of the Law, our plans and specifications for such work when it is undertaken.

Some of the questions asked in your letter seem to imply some inaccuracy in your records and some misinformation as to present conditions. These we deem it wise to correct at once.

You ask the maximum height of the main dam and the original provisions as to freeboard. The greatest depth in the present dam is thirty-six feet and this has not been changed since the construction of the dam. The freeboard is approximately four feet, the spillway being sixty-two feet wide at its narrowest point and the concrete retaining wall on each side being as low as [illegible] feet, with the earth embankment running enough higher to make the total about four feet. The entire flow of the stream never entered the reservoir without passing head gates.

You ask for certain information for each separate failure which has ever occurred in the dam or reservoir. No failure of any sort has ever occurred and hence no life was endangered nor any property damage resulted.

I do not know where you got the information that about 1913 the dam was raised. The writer knows personally that it was not raised in that year nor for some years before that, nor at any time since. Men who have been connected with the Department for over twenty years have no knowledge of anything of the sort.

The upstream slope of the dam is protected by rip-

ELMIRA WATER BOARD

RECEIVED
APR 16 19[illegible]

COMMISSIONERS

ARCHIE M. BOVIER
FRANCIS E. BALDWIN
C. W. O'SHEA
CHARLES G. BRAND
HENRY J. HAASE

CHARLES G. BRAND
PRESIDENT

JOHN J. McNEVIN
SECRETARY

H. M. BEARDSLEY
GENERAL MANAGER

OFFICES CITY HALL

ELMIRA, N. Y.,

Conservation Commission - 2

rapping and the same is in good condition. There is no water discharged from the slough below the main dam.

No floods from Hoffman Creek water shed have ever endangered ~~the~~ life or caused material damage to any property in the City of Elmira. Some high water has occurred, of course, and some cellars have been filled with water but none of this was ever caused in any way by the fact that there was a dam or reservoir on the stream. Whatever water has ever come down through the City of Elmira in spring freshets has been regular normal flood water, in no way added to by any storage supply.

The other questions you ask apparently would require answering if we contemplated any additional structures in connection with the stream. As we do not at present contemplate any such work we have not endeavored to take steps to get the information together.

Very truly yours,

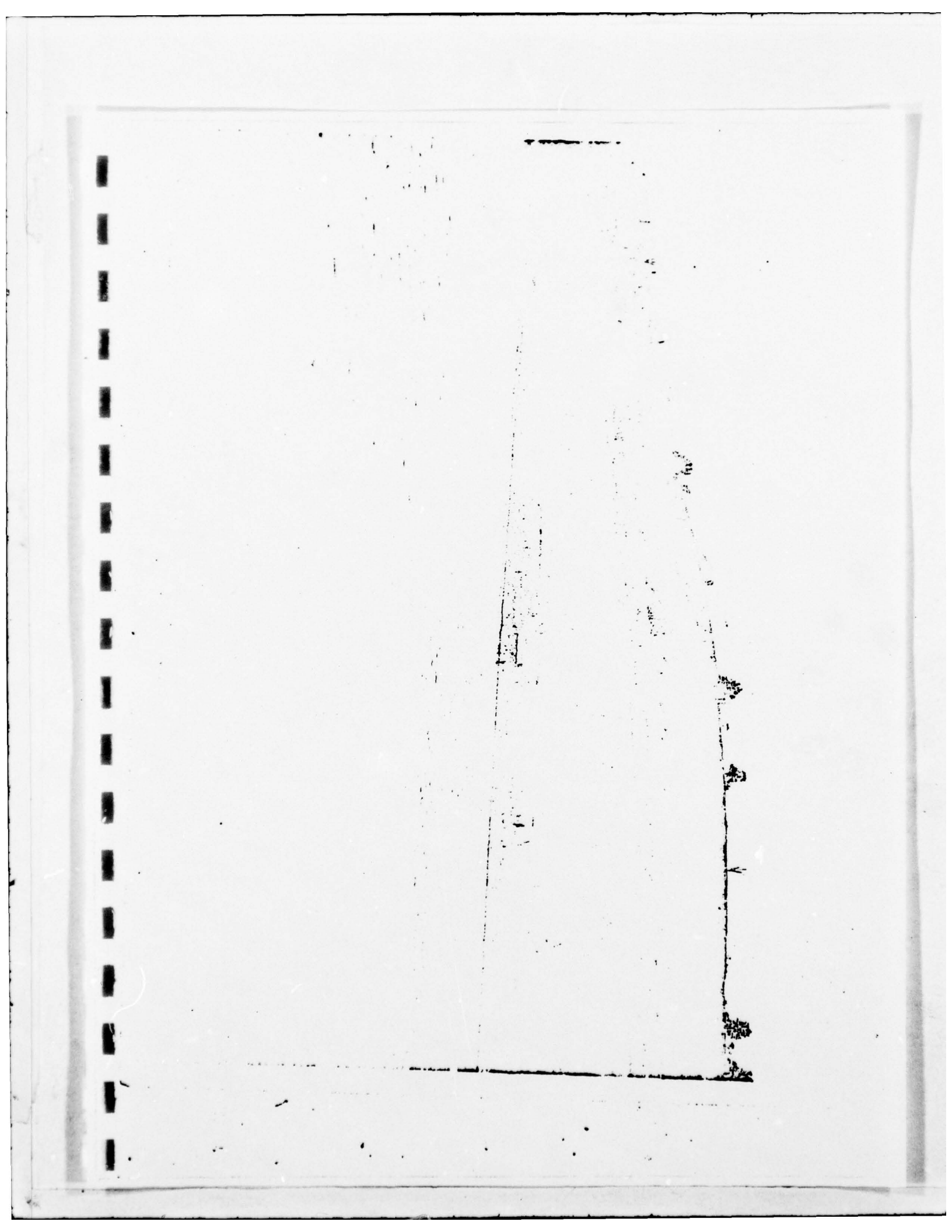
H. M. Beardsley

General Manager.

HMB/B

Since dictating this this a.m. your Mr. [illegible] has been here and has gone over the whole matter very carefully.
B.

Note by [illegible].
This letter, ~~still~~, intentionally or otherwise evades the direct inquiry made by me as to cause, nature and extent of washout which occurred as reported by news clipping.



ELMIRA WATER BOARD

COMMISSIONERS

ARCHIE M. BOVIER
FRANCIS E. BALDWIN
C. W. O'SHEA
CHARLES G. BRAND
HENRY J. HAASE

SEAL OF THE CITY OF ELMIRA 1864

OFFICES CITY HALL

CHARLES G. BRAND
PRESIDENT

JOHN J. McNEVIN
SECRETARY

H. M. BEARDSLEY
GENERAL MANAGER

ELMIRA, N. Y., May 7th, 1921.

In re Holliman
Brook Reservoir.

Rec'd					No.
CONSERVATION COMMISSION					DAT
INFOR.	DE	12		APM	
FEED.					
CONF.					
PR. RPT.					
[illegible]					
ACKN.					
FOL. UP					
		/			
FILE					

Conservation Commission,
Albany, N.Y.

Att'n A.H. Perkins, Division Engineer.

Gentlemen:-

This is to advise you that the statements you make with regard to our reservoir dam are correct so far as we know.

We are very glad to have had this opportunity to rectify the records in your office.

Very truly yours,

H. M. Beardsley

General Manager.

HMB/B

Town File VHe

Dam 164 Chemung.

April 28, 1921.

Subject: Hoffman Creek Reservoir.

Elmira Water Board,

Elmira, N. Y.

Attention of H. M. Beardsley, General Manager.

Gentlemen:

From your letter to this Commission dated April 14th, 1921, and from the report of conference which this Commission's Inspector of Docks and Dams, Mr. A. R. McKim, had with you on the same date, it is our understanding:

First: That the water surface elevation is not to be raised above the lip of the present spillway, or in other words, the freeboard between the bottom of the spillway and the top of the main earth embankment is not to be reduced;

Second: That some preliminary investigations have been made for the construction of a new dam above the present reservoir, but that sufficient notice will be given this Commission to permit a complete study of the plans before construction work is undertaken (application form enclosed);

Third: That as far as your knowledge and the records of your department extend, it does not appear that the Hoffman Creek Reservoir embankment has ever been raised since original construction; nor has the elevation of the wasteway crest ever been raised; nor has a failure of any kind ever occurred in connection with such reservoir;

Elmira Water Board,
April 28, 1921.

Fourth: That the damage reported to have occurred on Aug. 13th or 14th, 1917, was caused by waters passing outside of the dike through the flood relief channel, which waters overtopped a short portion of such dike and discharged into the reservoir basin; that no other damage occurred at that time;

Fifth: That to insure reasonable certainty that such dike would not again be overtopped by flood waters, even under worst conditions, a deeper and wider channel has been dredged along the upper half of the length of such dike forming the north side of Hoffman Creek reservoir, and that such dredging work is soon to be continued to a point well below the main reservoir embankment- thus providing a channel of ample dimensions and slope to insure the safe discharge of the maximum probable flood from the tributary watershed, which is certain at some future date to attain a dangerously high rate;

Sixth: That no water whatever is discharged from the slough located immediately below the northeasterly end of the main reservoir embankment, whether the reservoir is full to maximum flow-line or otherwise;

Seventh: That the crest width of the waste way which controls the water surface elevation in such reservoir, has recently been increased from 25 feet to 62 feet.

Please advise us promptly concerning any errors or inaccuracies which may have been included in the preceding statements.

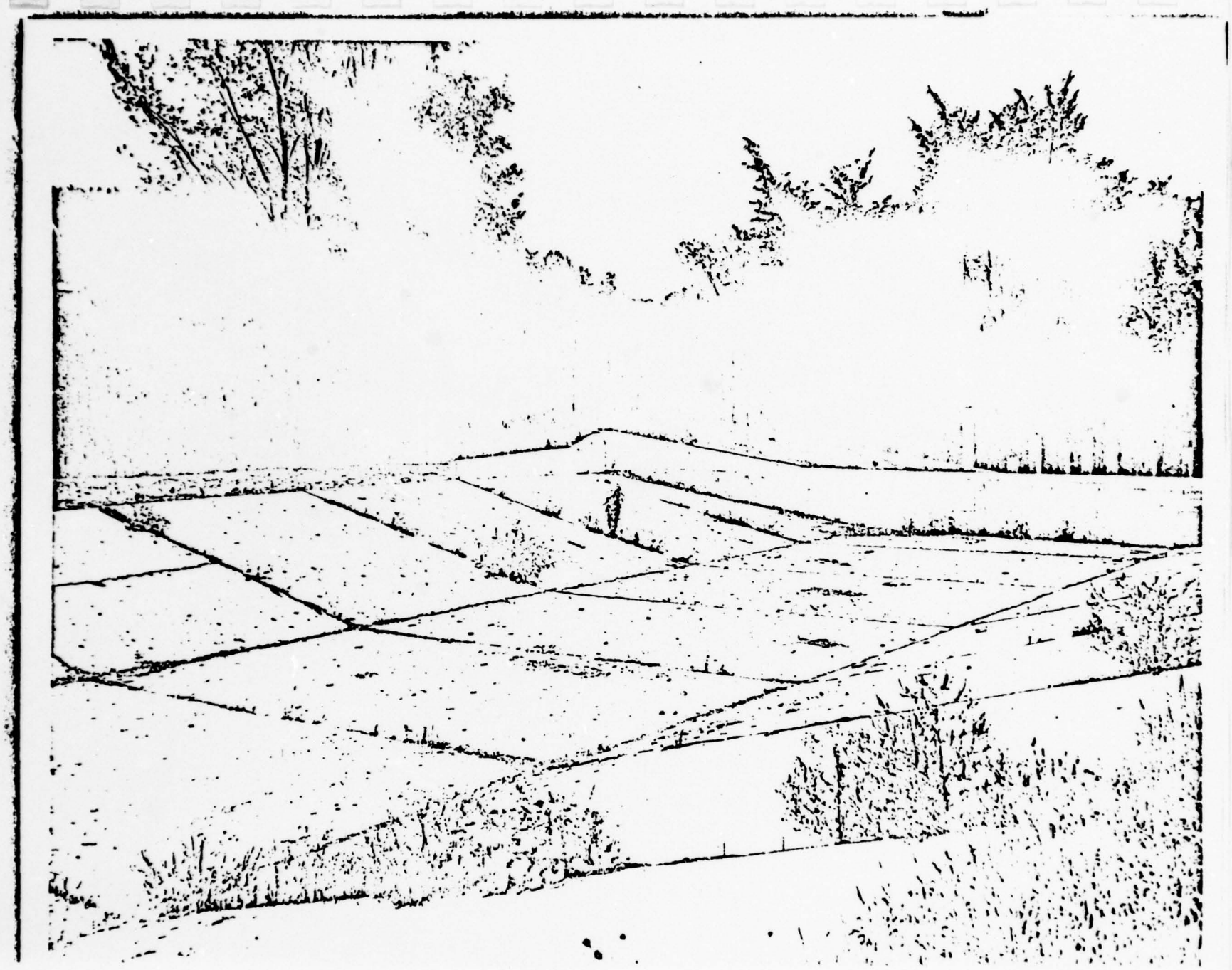
Very truly yours,

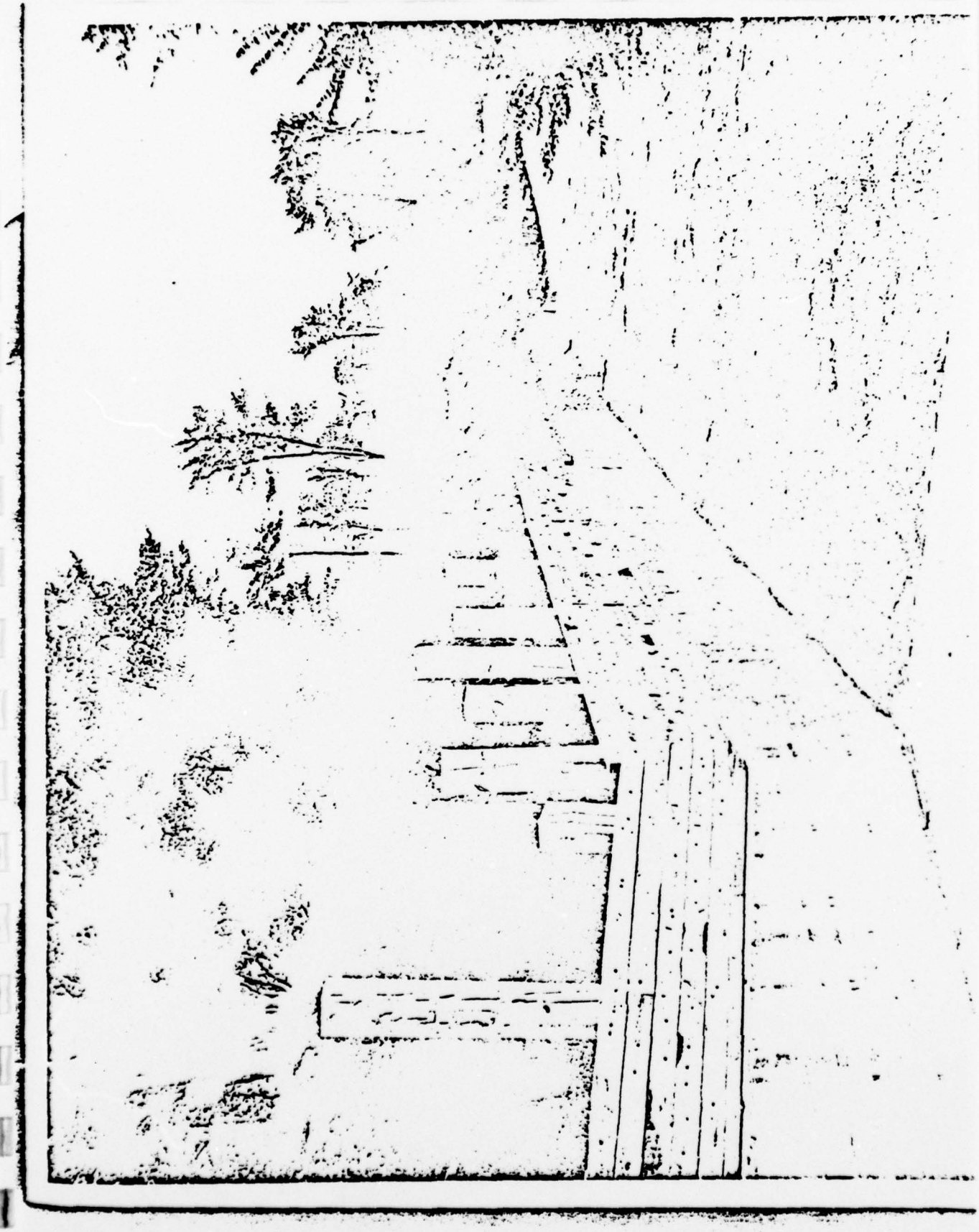
GEO. D. PRATT, Commissioner,

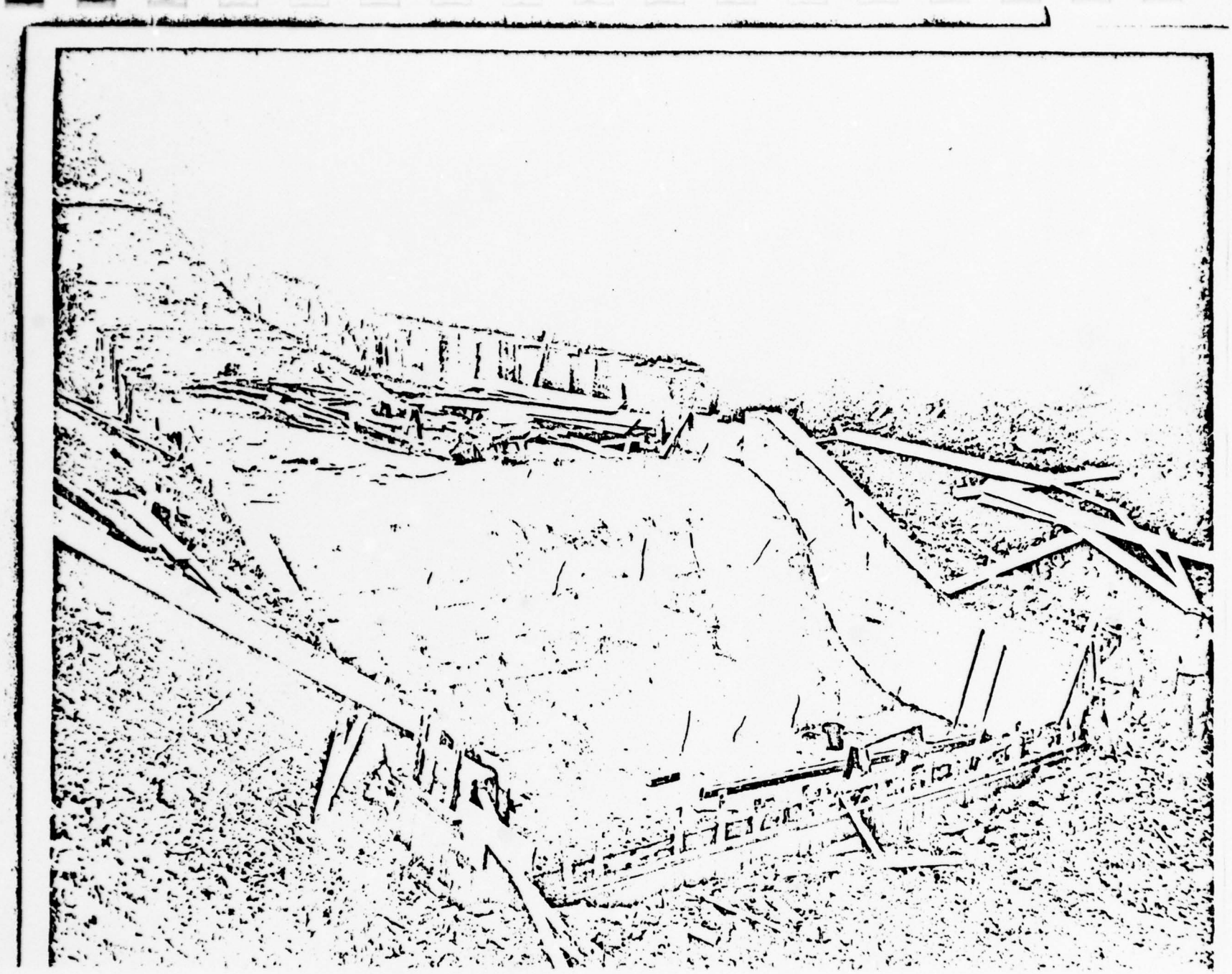
By

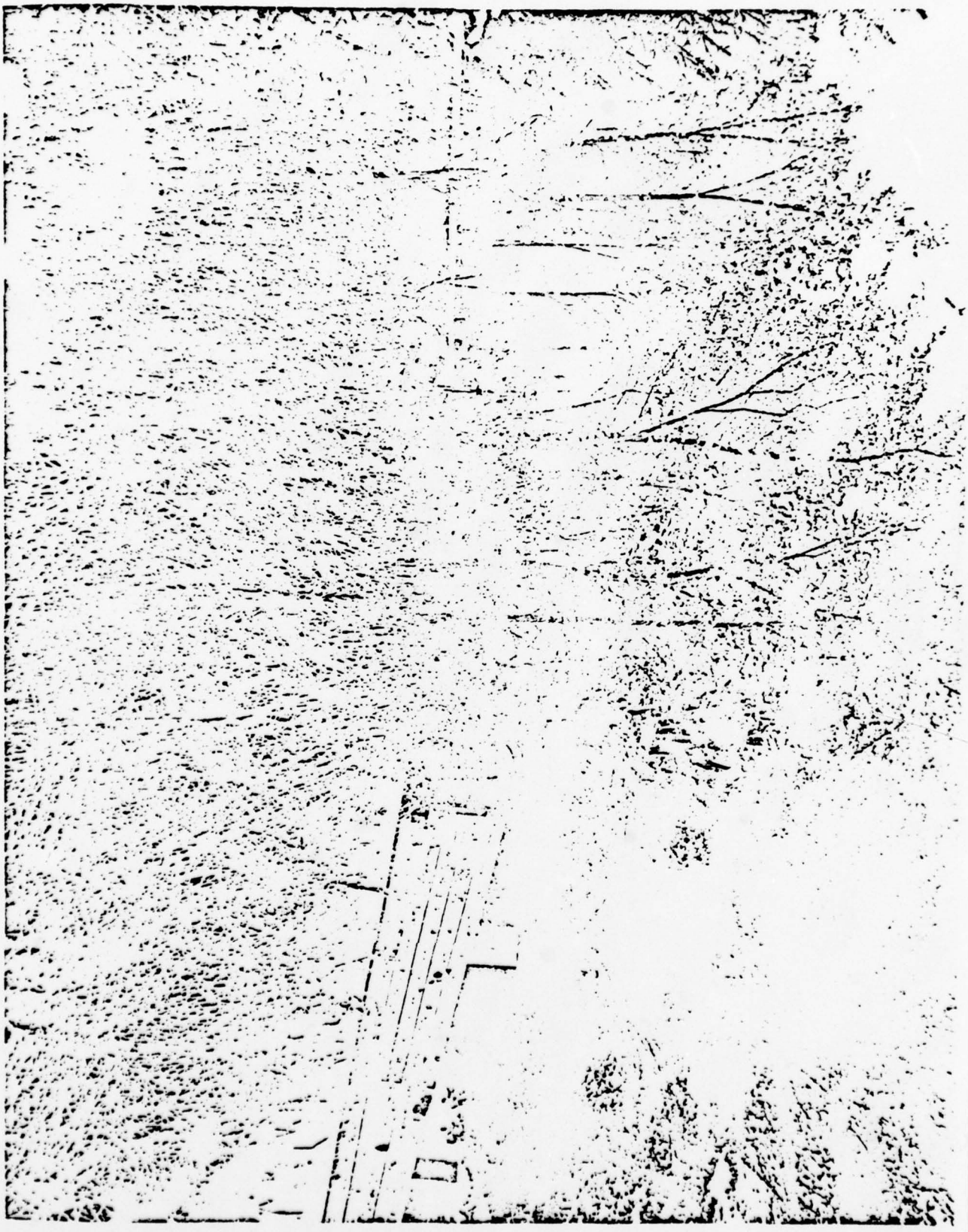
DIVISION ENGINEER.

JWH-HB.
3 & C.









Journal Building, Plaza,
P.O.Drawer 629

Dam 164, Chemung,
Elmira.

August 2, 1926.

Elmira Water Board,
City Hall,
Elmira, N. Y.

Attention of H. M. Beardsley, General Manager

Gentlemen:

Your letter to the Conservation Commission concerning Hoffman creek reservoir, has been forwarded to this department for reply.

We have no plans of the present structure and so can give you no very definite information.

The present embankment must be well compacted and the additional embankment can be fairly well compacted by teaming over during construction.

You are advised that under the provisions of Chapter 647 of the Laws of 1911, Section 22, as amended, it will be necessary for you to submit an application to and receive approval from this department before construction is commenced. An application blank is enclosed for this purpose. Kindly fill out the application as completely as possible and submit with plans in triplicate showing dimensions and depths into the natural bed of the present structure.

Very truly yours,

Roy G. Finch,
State Engineer

By

Assistant Deputy.

ARMcK/AEF,

Enclosure.

ELMIRA WATER BOARD

COMMISSIONERS

FRANCIS E. BALDWIN
C. W. O'SHEA
M. DOYLE MARKS
RAYMOND A. TURNBULL M. D.
ARCHIE M. BOVIER

SEAL OF THE CITY OF ELMIRA 1864

OFFICES CITY HALL

C. W. O'SHEA
PRESIDENT

JOHN J. McNEVIN
SECRETARY

H. M. BEARDSLEY
GENERAL MANAGER

Mr. Lester - Will you please look into this? HCS 164 Ch

ELMIRA. N. Y.. July 29th, 1926

RECEIVED OFFICE STATE ENG. JUL 1926 REFER TO ...

Hon. Alexander MacDonald,
Conservation Commission,
Albany, N.Y.

Dear Sir:-

As you know from the report filed with your Commission a year or two ago we have a storage reservoir located on Hoffman Creek northwest of the City of Elmira. This reservoir has become so filled up with gravel and silt that its capacity has been reduced twenty-five to thirty percent.

We are thinking of removing this material and the thought has occurred to us that it might be used to advantage on the lower slope of the dam and perhaps build up the dam six or eight feet. There will be plenty of material available to raise the dam more than that but the capacity of the water shed will not warrant any great increase in the size of the reservoir so that the surplus earth can be used on the lower side to make the slope one in three or perhaps one in four or one in five.

We assume that the enlargement of the dam will have to be reported to your Commission and with that in mind so that we may be able to make up specifications, we would like to ask whether, if the slope is made as much as one in three or more, it will be necessary to roll or otherwise compact the earth which is placed on the slope of the dam.

The present dam has a puddle clay core and there is a difference between the overflow line and the crest of three and one-half feet. If we should raise the height of the dam as much as eight feet we would assume that it would be advisable to put in a concrete core wall from the puddled core up to within three and one-half feet of the new crest.

The expense of this undertaking will be considerable and we do not wish to engage an engineer to make detailed plans and specifications unless we can get together enough information to make some preliminary figures as to the costs.

Contractors who have been seen concerning the matter do not wish to make figures for placing the earth unless they know whether or not the rolling is necessary and unless they know whether or not a concrete core wall has to be figured.

If you can let me know in a general way and informally what we should figure on approximately we will take up the matter with view of preparing more definite specifications later.

Yours very truly,

H. M. Beardsley

General Manager.

HMB:B

ELMIRA WATER BOARD

COMMISSIONERS

RAYMOND A. TURNBULL, M. D.
ARCHIE M. BOVIER
FRANCIS E. BALDWIN
C. W. O'SHEA
M. DOYLE MARKS

ARCHIE M. BOVIER, PRESIDENT
JOHN J. McNEVIN, SECRETARY
H. M. BEARDSLEY, GENERAL MANAGER

OFFICES CITY HALL

ELMIRA, N. Y., Sept. 8th, 1925

Hon. Roy G. Finch,
State Engineer,
Albany, N.Y.

Dear Sir:

We have yours of the 5th asking us to make a report on the dam which we repaired in the Chemung River. I am enclosing copy of this blank filled in as far as is possible but naturally a blank made up for use in reporting on dams built especially for impounding and storing water does not fit very closely to conditions surrounding an ancient mill dam which was used for running a grist mill fifty years ago and which has had no special function for the last twenty years except to keep up the level of the river for boating and water intakes. I regret our inability to give you any clearer report.

In your letter you acknowledged receipt of our report on the Hoffman Creek Reservoir dam dated Oct 28, 1924 and you speak of another dam owned by the City in the vicinity of the Hoffman Reservoir. I do not know of any such dam and cannot understand how there could be any record of such a dam in your Department. Some twenty years ago some tentative plans were made for the construction of an additional dam on Hoffman Creek but the proposition never got beyond the blue print stage.

Yours very truly,

H M Beardsley

General Manager.

HMB:B

ELMIRA WATER BOARD

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RAYMOND A. TURNBULL M. D.
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FRANCIS E. BALDWIN
C. W. O'SHEA
M. DOYLE MARKS

ARCHIE M. BOVIER
PRESIDENT

JOHN J. McNEVIN
SECRETARY

H. M. BEARDSLEY
GENERAL MANAGER

OFFICES CITY HALL

ELMIRA, N. Y., Oct. 28th, 1924

Hon. Dwight B. La Du,
Albany, N.Y.

Dear Sir:

In accordance with your recent circular we are enclosing herewith a report covering our storage reservoir on Hoffman Creek. We also enclose two photographs taken from about the center of the dam showing the location of the reservoir in a valley between two side hills and showing at the right of the pictures the spillway mentioned in the report.

The sketches on the report are not drawn to scale. We regret that we have no blue prints or drawings showing the construction of this dam but it has been in use forty or fifty years and is carefully inspected each year for possible damage by muskrats, woodchucks or other animals.

Very truly yours,

H. M. Beardsley

HMB:B

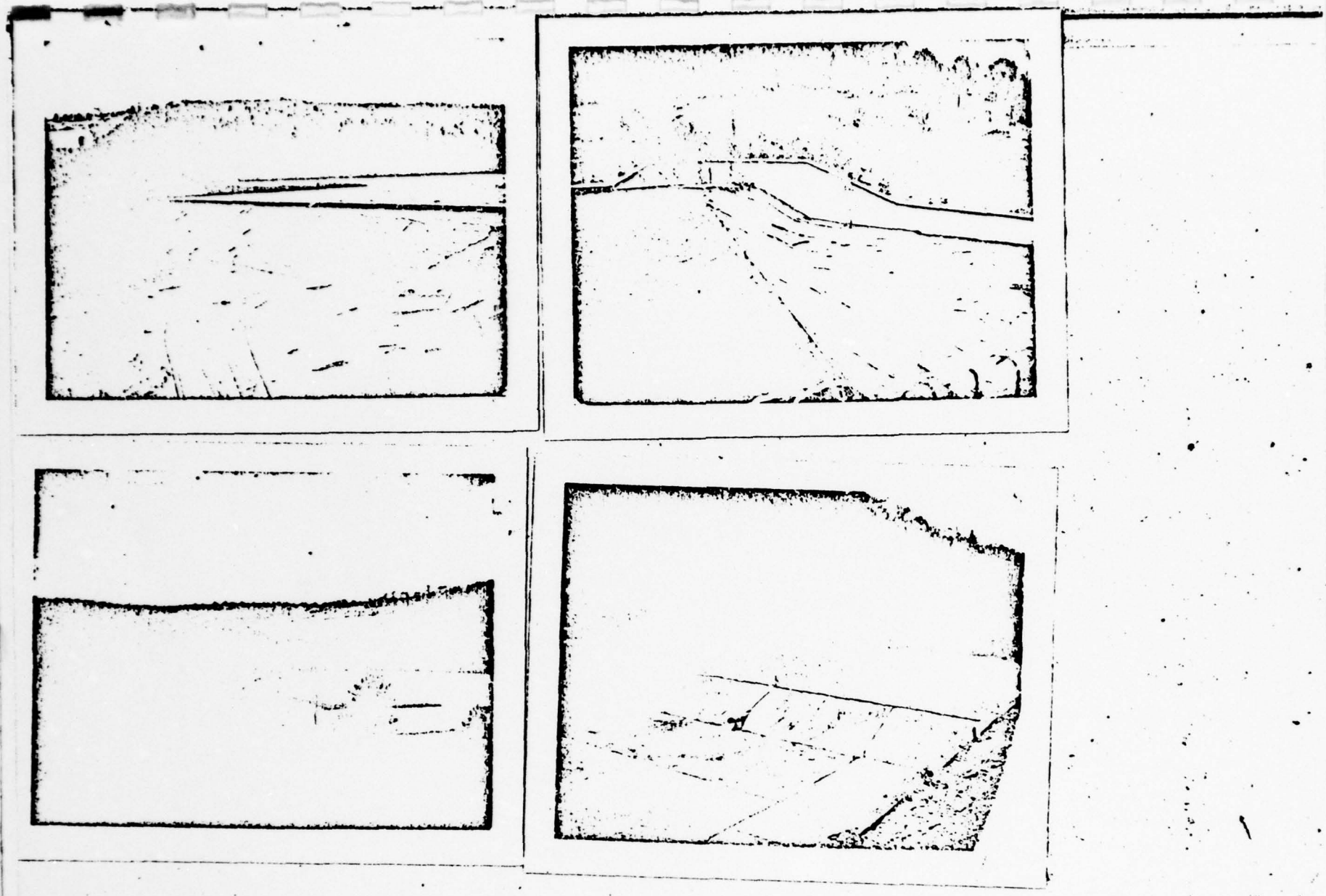
General Manager.

61-1297
5/12/77
Chemung
Cracks in Concrete spillway
Angle iron raising
water Level.

61-1297
5/12/77
Chemung
Cracks in Abutment

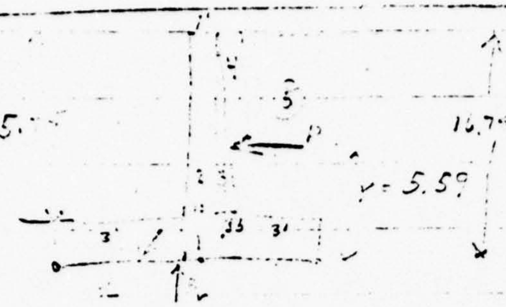
61-1297
5/12/77
Chemung
overall view of dam
Trees growing on dike

61-1297
Chemung
5/12/77
Upper end of Watershed
Old Dam



Rib $A_s = \frac{110000}{18000(2.57)12} = 0.766$ □"

Front $= .725$ □"



$P = \frac{2100\ 15.^{2} \ .27^{2}}{} = 331$

+21800 −4020 −8240 −1815 −1132

$4 \times 1150 = 1100$

$= 2360$

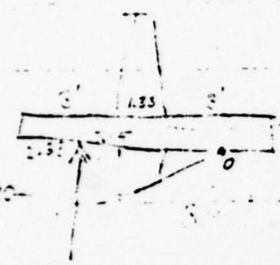
$= 392$

$= 262$

$\frac{21000}{8,836} =$

$x = \frac{3340(5.59) - 1100(\frac{2.5}{2}) - 2360(3.5) - 392(4.11) - \ldots}{8,836}$

$x = \frac{21000}{8836} = 2.38'$ $\frac{7.53}{3} = 2.49'$



$M = 8836 \times 1.20 = 10600$ $\frac{I}{c} = \frac{bh^2}{6} = 7.15$

$S = \frac{8836}{7.15} \pm \frac{10600}{8.51}$ $= 8.51$

$1235 + 1235 = \{2470^{\#}, 0$

$\frac{2470}{7.15} = \frac{x}{3}$ $x = 1035$

Front Base:

$P = \frac{2470 + 1035}{2} \times 3 = 5257$

$M = (5257 \times 1.7 \times 12) = 107,000$

$A_s = \frac{107,000}{18000(2.57)9} = 0.77$

Area furn 0.80"

Back Base

$wt. earth = 3 \times 15.75 \times 100 = 4725$

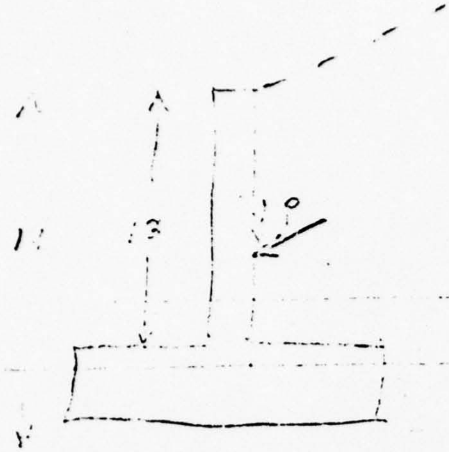
$M = 4725 \times 1.5 \times 12 = 85000 = \frac{470}{2} \times \frac{2.82}{3} \times 12 = 5500$

$A_s = \frac{80000}{18000(2.57)9} = 0.57$

Area furn $= 0.57$ □"

$x = \frac{4650 + 215}{3105 + 2150}$

$x = \frac{6800}{} = 1.2$



$k = .4$

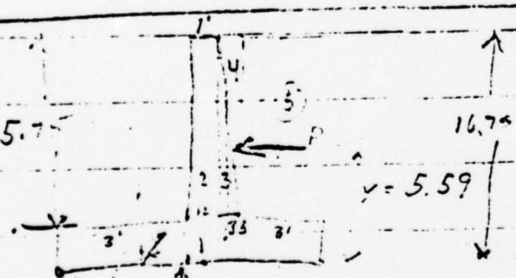
$P = \frac{1}{2}\ 100\ 13^2\ .4 = 3380\#$

$P_H = 3380\ (.8) = 2760$

$M = 2760 \times \frac{13}{3} \times 12 = 144{,}000$

Req $A_s = \frac{144\,000}{18000\ (.867)\,12} = 0.76\ \square''$

Furn $= .725\ \square''$



$P = \frac{1}{2}\,100\ 16.75^2\ .274 = 3840$

+21,500
-4020
-8240
-1615
-1100
-2700

$\frac{1}{2} \times 1 \times 150 = 1100$

= 2360

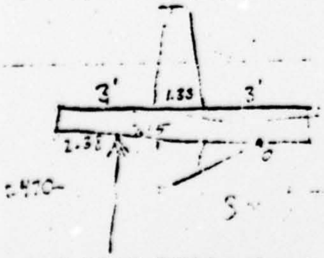
= 394

= 262

$\frac{4770}{8,836}$

$x = \frac{3840(5.59) - 1100(\frac{2.33}{2}) - 2360(3.5) - 394(4.11) - 262(\ldots)}{8,836}$

$x = \frac{21000}{8836} = 2.38'$ $\qquad \frac{7.33}{3} = 2.44'$



$M = 8836 \times 1.20 = 10\,600\#$ $\qquad \frac{I}{c} = \ldots$

$S = \frac{8836}{7.15} \pm \frac{10600}{8.51}$

$1235 \pm 1235 = \begin{cases} 2470\# \\ 0 \end{cases}$

$\frac{2470}{7.15} = \frac{x}{3} \quad x = 1035\#$

Front Base:

$P = \frac{2470 + 1035}{2} \times 3 = 5257\#$

$M = (5257 \times 1.7 \times 12) = 107{,}000$ About

ELMIRA WATER BOARD
CITY OF ELMIRA

CHEMUNG COUNTY · NEW YORK:

INSTRUCTIONS TO BIDDERS, PROPOSAL, FORM OF CONTRACT, BOND AND SPECIFICATIONS FOR THE CONSTRUCTION OF IMPROVEMENTS TO HOFFMAN CREEK DAM AND SPILLWAY CHANNEL

- - - - -

ELMIRA WATER BOARD OFFICIALS

Commissioners

H. Doyle Marks, President
F. A. Richmond
H. J. Lagonegro
C. A. Austin
W. W. Gregg

John G. Copley
General Manager

J. Leonard Newman
Secretary

- - - - -

September 1947

Barker & Wheeler, Engineers
36 State Street
Albany, New York.

James M. Caird
Cannon Building,
Troy, New York

ELMIRA WATER BOARD
CITY OF ELMIRA

CHEMUNG COUNTY NEW YORK

DETAILED SPECIFICATIONS FOR THE CONSTRUCTION OF IMPROVEMENTS TO HOFFMAN CREEK DAM AND SPILLWAY CHANNEL

---

1. General.

The work to be performed under this Contract is the complete improvement to Hoffman Creek Dam and Spillway Channel as indicated on the accompanying plans, and as herein specified.

The work under this contract, in general, involves the removal of portions of the existing spillway channel and walls, the construction of new walls, additions to the spillway channel, extension of the spillway, addition of embankment to the top of the existing earth dam, the construction of a diversion channel with outlet control works, and other work and incidentals as shown on the plans and as specified, or as directed.

In the performance of the work under this contract the Contractor shall properly protect the existing work and all new work from damage by water, and shall provide suitable facilities for the care of water as specified in the section "Pumping, Bailing, Draining and Coffer Dams" of the General Specifications.

2. Plans and Specifications.

These Detailed Specifications, the plans herein referred to, and the General Specifications attached hereto are complementary, and it is intended that they include all items of labor and materials and everything required and necessary to complete the work even though some items of work or materials may not be particularly mentioned or may have been inadvertently omitted from the plans or specifications, or both.

3. Discrepancies.

In case of discrepancies between the drawings and specifications, interpretations shall be given preference in the following order:

(a) Addenda (Later dates to take precedence over earlier dates)
(b) Detailed Specifications
(c) Drawings (Schedules or notes to take precedence over other data shown on drawings)
(d) General Specifications

Item No. 1
CLEARING

1. Description

Under this item the Contractor shall clear areas necessary to perform the work shown on the plans, as specified in the section "Clearing and Grubbing" of the General Specifications.

The attention of the Contractor is called to the location of the property line in the vicinity of the north wall beyond which property line the Owner has no rights of occupancy or use.

2. Payment.

The lump sum price bid under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to clear the areas as specified, or as directed.

Item No. 2
GRUBBING

1. Description.

Under this item the Contractor shall perform grubbing work as specified in the section "Clearing and Grubbing" of the General Specifications, over the entire area to be occupied by the new work. The area shall be grubbed to a depth of 12-inches and in the area to be occupied by the new embankment across the existing earth dam and under the embankment at the north end of the spillway, the material to a depth of 12-inches shall be completely removed and disposed of as specified.

2. Payment.

The unit price bid per cubic yard under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals as required to perform the work under this item as specified, or as directed.

The quantity to be paid for shall be the actual number of cubic yards of material grubbed and removed from the work, as determined by field measurements.

Item No. 3
Excavation and Backfill

1. Description

Under this item the Contractor shall perform all excavation and backfill work required for the improvement, as indicated on the plans and as specified, or as directed.

The specifications in the Sections "Excavation , Backfill and Embankment", "Trench Excavation" and "Pumping, Bailing, Draining and Cofferdams" of the General Specifications shall apply to the work under this item. The removal of any existing concrete, either in the walls or floor of the existing structure, will be done under Item No. 4. In general, the work under this item shall be the excavation necessary to construct the walls, spillway and floor slab; for the placing of the gravel fill under the concrete floor slab and along the back of the walls; trench excavation for the placing of the 4", 6" and 24" Vitrified Tile drains; for the construction of the diversion channel; the backfill of all structures and trenches with suitable material; and the care of water as may be required in the prosecution of the work.

2. Excavation Limits.

Excavation for masonry structures will be measured between vertical planes passing through the outside of the foundations of the structures and from the ground surface, after grubbing, to the neat lines of the bottom of the structures.

Excavation for the Vitrified Tile drains will be measured between vertical planes two feet wider than the internal diameter of the barrel of the pipes and extending from the outside of the bottom of the barrel of the pipe to the surface of the ground after grubbing, except that the volume of excavations made for other structures shall not be included in the volumes measured for the drains.

Any other earth excavation will be measured within the lines and grades actually given by the Engineer.

3. Payment

The unit price bid per cubic yard for excavation under this item shall include all costs for labor, material, tools, equipment and incidentals necessary to perform all excavation and backfill work for the construction of work as specified, or as directed. All earth work shall be measured in excavation only

and shall be included for payment only once. Payment will be made for the number of cubic yards of excavation removed within the above limits as determined from field measurements made by the Engineer.

Item No. 4.
REMOVING EXISTING CONCRETE

1. Description.

Under this item the Contractor shall remove all those portions of the existing concrete structures necessary to perform the work specified in this contract to lines and grades indicated on the plans, or as directed by the Engineer in the field. In general, the specifications under the Section "Excavation, Backfill and Embankment" of the General Specifications shall apply to the work under this item with the exception that no blasting will be allowed in connection with the removal of existing concrete, and any references to blasting and use of dynamite in the General Specifications shall be omitted.

2. Measurement.

Existing concrete removed will be measured to the actual dimensions of the structures as now exist in the field and for that portion actually removed.

3. Payment.

The unit price bid per cubic yard under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to complete the work under this item as specified, or as directed.

Item No. 5
Embankment

1. Description.

Under this item the Contractor shall perform such work as is necessary to construct the embankments to the lines and grades shown on the plans or as directed by the Engineer in the field. The embankments to be placed under this item include only the embankment over the existing earth dam, the embankments along the diversion channel and outlet works, the embankment at the north end of the spillway and the embankment to form the berm at the south end of the spillway channel. All other embankment is to be included under the backfill under Item

No. 3. The specifications in the section "Excavation, Backfill and Embankment" of the General Specifications shall apply to the work under this item. If, as determined by the Engineer, the material excavated and paid for under Item No. 3 of this contract is suitable for the construction of embankments and is not needed for backfill, it may be used to perform the work under this item.

2. Measurement.

Embankment shall be measured in cubic yards within the dimensions of the embankment actually placed above the prepared base. No material for embankment shall be measured at its place of excavation.

3. Payment.

The unit price bid per cubic yard under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to procure material from borrow pits, excavations and storage piles, to haul the material to the site and form the embankment and slopes, and to do all other work necessary and proper to complete the work under this item as specified, or as directed.

Item No. 6
FIRST CLASS CONCRETE

1. Description

Under this item the Contractor shall furnish and place all of the concrete work as shown on the plans or as directed by the Engineer. All concrete shall be first class concrete and the specifications contained in the Section "First, Second and Third Class Concrete" of the General Specifications shall apply to all concrete work under this item. In addition to the requirements in these General Specifications, one pound of "Pozzolith" or other equivalent integral powdered waterproofing satisfactory to the Engineer shall be added to each bag of cement in a dry state used in mixing of the first class concrete.

In locations shown on the contract drawings, or in such other locations as the Engineer may direct, construction and expansion joints shall be constructed as detailed on the contract drawings.

2. Measurement.

The volume of concrete to be paid for under this item shall be the actual number of cubic yards placed in accordance with the specifications and to the dimensions shown upon the contract plans or established by the Engineer in the field.

3. Payment.

The unit price bid per cubic yard under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to furnish and place all first class concrete, as indicated on the plans and as specified, or as directed.

Item No. 7
METAL REINFORCEMENT

1. Description

Under this item, the Contractor shall furnish and place all the metal reinforcing required for the concrete work in this improvement, including the dowels as detailed on the contract plans for expansion joints. The specifications in the section "Metal Reinforcement" of the General Specifications shall apply to the work under this Item.

2. Measurement and Payment.

The unit price bid per pound under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to furnish and place the metal reinforcement as indicated on the plans and as specified, or as directed.

Item No. 8
MISCELLANEOUS IRON AND STEEL

1. Description

Under this item the Contractor shall furnish and place the angle iron on the crest of the new spillway as shown on the plans, together with any other miscellaneous iron and steel indicated or required in this improvement.

2. Materials.

Angle iron shall fulfill the requirements of the latest specifications of the A.S.T.M. designation A-7 and shall be of standard manufacture and design as approved by the Engineer.

Bolts shall be of standard manufacture and design as approved by the Engineer.

3. Methods.

Iron and steel work shall be fabricated and erected in a thorough and workmanlike manner by mechanics skilled in their

line of work. All exposed joints shall be close fitting and all bolts, screws, etc., where exposed, shall be cut off flush with nuts or other adjacent metal.

Iron and steel work to be built in with masonry shall be of the form required for anchorage, or shall be provided with suitable anchors, expansion bolts, rods, shields, etc., as shown on the drawings, or as required.

All steel and iron work shall be erected true and in its designed location. Members shall be plumb or level where so designed.

Unless otherwise shown or specified, all joints shall be of such character and so assembled that they will be as strong and rigid as the adjoining section. Exposed joints, where specified, shall be welded their entire length and other work shall be continuously welded or spot welded as required.

Iron and steel work shall be cut, punched, drilled and tapped as required for the attachment of other work where shown on the drawings or where instructions for same are given.

2. Measurement and Payment.

The unit price bid per pound under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to furnish and install the miscellaneous iron and steel as indicated on the plans and as specified, or as directed. Payment will be based upon field weights of the materials incorporated in the work.

Item No. 9
Grouted Riprap

1. Description

Under this item the Contractor shall place grouted riprap on the side slopes of the spillway channel where indicated on the plans. This grouted riprap shall be as specified in the Section "Grouted Riprap" of the General Specifications.

2. Measurement and Payment.

The unit price bid per square yard under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to complete this item as indicated on the plans as specified, or as directed.

Item No. 10
4" VITRIFIED TILE DRAIN

1. Description.

Under this item the Contractor shall furnish and place the 4" drain tiles to the lines and grades given by the Engineer at locations shown on the contract plans or as directed by the Engineer in the field. The drain tile shall be bell and spigot vitrified tile pipe, and the specifications contained in the sections "Pipe" and "Vitrified Tile Pipe" of the General Specifications shall apply to the work and materials under this item, except that the tile shall be laid with open joints of approximately 1/4-inch, protected by tar paper and shall be surrounded with crushed stone as shown on the plans. Each length of tile shall be properly supported so that the spigot ends are centered in the bell ends. The excavation for placing the tile drain is to be performed under Item No. 3.

2. Measurement and Payment.

The unit price bid per linear foot under this item shall include all costs for labor, material, tools, equipment and necessary incidentals required to furnish and lay the 4-inch vitrified tile line, as indicated on the plans and as specified, or as directed.

The number of linear feet of tile pipe to be paid for shall be the actual length of tile lines in place as measured along the axis of the pipe.

Item No. 11
6" VITRIFIED TILE DRAIN

1. Description.

Under this item the Contractor shall furnish and place the 6" drain tile to the lines and grades given by the Engineer at locations shown on the contract plan or as directed by the Engineer in the field. The specifications contained in the sections "Pipe" and "Vitrified Tile Pipe" of the General Specifications shall apply to the work and materials under this item, except that the tile shall be laid with open joints of approximately 1/4-inch, protected by tar paper and shall be surrounded with crushed stone as shown on the plans. The excavation for placing the tile drain is to be performed under Item No. 3.

2. Measurement and Payment.

The unit price bid per linear foot under this item shall include all costs for labor, material, tools, equipment

and necessary incidentals required to furnish and lay the 6" vitrified tile line as indicated on the plans and as specified, or as directed.

The number of linear feet of tile pipe to be paid for shall be the actual length of tile lines in place as measured along the axis of the pipe.

Item No. 12
24" VITRIFIED TILE

1. Description.

Under this item the Contractor shall furnish and place the 24-inch vitrified tile extending from the end of the diversion channel to the spillway channel at the location shown on the plans and to the lines and grades given by the Engineer in the field or as shown on the plans. This drain line shall be made up with bituminous joints and the specifications in the sections "Pipe" and "Vitrified Tile Pipe" of the General Specifications shall apply to the work and materials under this item. The excavation for placing the tile drain is to be performed under Item No. 3.

2. Measurement and Payment.

The unit price bid per linear foot under this item shall include all costs for labor, material, tools, equipment and necessary incidentals required to furnish and lay the 24-inch vitrified tile line as indicated on the plans and as specified, or as directed.

The number of linear feet of tile pipe to be paid for shall be the actual length of tile lines in place as measured along the axis of the pipe.

Item No. 13
GRAVEL AND STONE FILL

1. Description.

Under this item, the Contractor shall furnish and place such gravel and stone filling as may be required along the 4-inch and 6-inch tile drains, the rear of the retaining walls, under the concrete floor slabs, and for such other foundation or filling purposes as may be required.

2. Gravel Fill.

The gravel fill shall be placed in the rear of the retaining walls and under the new concrete floor slabs, as detailed on the plans. The type of gravel required for this

purpose shall be coarse run of bank gravel with no material over 3-inches, and of a quality and grading satisfactory to the Engineer. The Contractor shall obtain the Engineer's approval of the material that he proposes to use for this purpose prior to the delivery of the material at the site of the work.

3. Stone Fill.

The crushed stone fill shall be carefully placed along and around the 4-inch and 6-inch vitrified drain tiles for a dimension as detailed on the Contract plans. The stone to be used is designated as screenings No. 2 which shall be retained on 3/4-inch circular opening and pass 1-1/2 inch circular opening.

4. Measurement and Payment.

The unit price bid per cubic yard under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to furnish and place such run of bank gravel and crushed stone fill as indicated upon the plans and as specified, or as ordered by the Engineer.

Payment under this item shall be for the actual number of cubic yards of gravel and crushed stone fill incorporated in the completed work as specified, or as ordered by the Engineer.

Item No. 14
SEEDING

1. Description.

Under this item the Contractor shall furnish and place a mixture of grass seed and oats or rye upon all surfaces of new embankment or fills and upon all new surfaces left exposed by excavation in the completed work, except the invert of the drainage channel, and upon other surfaces as required or directed so as to provide a new growth of grasses over all new surfaces, and other surfaces where the original grasses have been disturbed or destroyed.

After the final grading and shaping has been completed, grass seed mixture shall be scattered over the areas requiring seeding as specified, at a rate of approximately 10-pounds to each 1000-square feet, and the entire seeded area shall then be raked over to mix the seed with the top surface of earth.

The grass seed mixture shall be a mixture of those seeds which will grow in the particular earth left exposed in the completed work, and as approved by the Engineer.

2. Measurement and Payment.

The lump sum price bid under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to seed the areas as specified, or as directed.

CONTINGENT ITEMS

These items cover those classifications of work and material which may be involved in minor modifications or changes in the designs indicated upon the plans or the requirements of the work, found necessary or advisable during the construction.

Item No. 16
SECOND CLASS CONCRETE

1. Description

Under this item, the Contractor shall furnish and place such second class concrete as may be ordered by the Engineer in connection with the construction under this contract. The applicable portions of the section "First, Second and Third Class Concrete" of the General Specifications shall apply to the work under this item.

2. Payment.

The unit price bid per cubic yard for second class concrete under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals required to furnish and place second class concrete as ordered by the Engineer.

Payment will be made for the actual number of cubic yards of second class concrete furnished and placed in accordance with the directions of the Engineer and as determined by field measurements.

Item No. 17
ROCK EXCAVATION

1. Description.

Under this item the Contractor shall remove all rock that may be encountered in the excavation work required

for the construction of the improvement under this contract. Rock Excavation shall mean boulders exceeding 1/2 cubic yard in volume or solid ledge rock which, in the opinion of the Engineer, requires for its removal, channeling or wedging, or sledging or barring. No soft or disintegrated rock which can be handled with a pick and shovel with reasonable facility; no loose, shaken or previously blasted rock, or broken stone in rock filling or elsewhere; and no rock exterior to the maximum limits of measurement allowed which may fall into the excavation, will be measured or allowed for payment. Specifications in the section "Excavation, Backfill and Embankment" of the General Specifications will apply for rock excavation performed under this item except that no blasting will be permitted for the loosening and removal of rock.

2. Payment.

The unit price bid per cubic yard under this item shall include all costs for labor, materials, tools, equipment and necessary incidentals necessary for removing and disposing of the rock, and payment will be made for the number of cubic yards of rock removed between the limits specified under Item No. 3 "Excavation and Backfill".

Section 1

CLEARING AND GRUBBING

Under this section the Contractor shall perform all clearing and grubbing required within the area to be occupied by the work, as specified and as shown on the plans, or as directed.

The entire area shall be cleared of all trees, stumps, roots, brush, weeds, shrubs, and all other objectionable materials, except those trees and shrubs as are specified or directed to be left in place. All such materials removed in the clearing of the area shall be completely burned or removed from the site of the work. Trees and shrubs within the area which are to be left in place shall be adequately protected from damage, and excavated or piled materials shall not be deposited around them unless they are properly protected.

The entire original surface over excavation areas or upon which embankments or structures are to be built or which is to be seeded, planted, or surfaced, shall be completely stripped of top soil and shall be grubbed of all organic material, stumps, roots and objectionable materials. The material removed in the grubbing operation shall be completely burned or disposed of as directed. Top soil from the stripping operation shall be segregated, piled and stored as directed.

SECTION 2A
EXCAVATION, BACKFILL AND EMBANKMENT

1. Description.

Under this section the Contractor shall perform all excavation, grading and backfill, and form all embankments required for the construction and completion of the work as specified and as shown on the plans, or as directed, except such excavation and backfill as is included under "Trench Excavation". The material to be handled under this section shall include all materials of every name and nature.

2. [illegible]

It is expected that the [illegible] work [illegible] out by the use of modern and [illegible] equipment [illegible] repair so that the work will [illegible].

All excavation shall be [illegible] in open [illegible] faces, and tunnels longer than [illegible] feet will be allowed [illegible] special approval of the Engineer.

Where excavation is to [illegible] through [illegible] paving, the boundary of the area to be excavated shall be cut [illegible] line flush with the limits of the excavation and [illegible] the paving shall be adequately protected.

Grading existing surfaces to meet new grades shall be performed under this heading as required or as directed.

Excavation in new areas will be limited by the Engineer with regard being given to [illegible] construction, the [illegible] of other contractors, the necessity of [illegible] facilities in the area, and the comfort and [illegible] of persons residing in the neighborhood, or frequenting the area.

3. Excavation Limits.

Excavation limits shall be ample in width and [illegible] to perform work to be done or installed within the excavation, and the bottoms of all excavations shall be [illegible] to the [illegible] of the bottom of the structure and to the [illegible] lines of the [illegible] indicated on the plans, or as directed.

4. Excavation Below Grade.

Excavation below the lines and grades indicated on the plans shall be made to [illegible]

by the Engineer. The space so excavated shall be refilled with selected material as directed. The material selected, including the refilling operation complete, shall be paid for under appropriate items of the contract.

5. Unauthorized Excavation.

Excavation made beyond or below the lines and grades indicated or directed by the Engineer, shall be satisfactorily refilled by the Contractor at his own expense with selected material, as directed by the Engineer. Unauthorized excavation made below concrete or masonry structures shall be satisfactorily refilled and compacted with selected material, and if deemed necessary by the Engineer, shall be refilled with concrete at the Contractor's expense.

6. Protection of Excavation.

The Contractor shall [illegible] and remove such sheeting, shoring, [illegible] required to support thoroughly [illegible] to prevent any movement which [illegible] diminish the width [illegible] injure or delay the work or [illegible] completed work, structures or [illegible].

Such sheeting, shoring and/or [illegible] without the limits required for the [illegible] and shall in no case be braced against [illegible] pleted work, nor pass through forms [illegible].

All existing rock encountered [illegible] excavation shall be properly [illegible] and protected [illegible] entire construction period.

All water encountered [illegible] the excavation, shall be promptly [illegible] shall be kept dry until the [illegible] placed [illegible] has been completed.

The sides and bottoms of the excavations shall be [illegible] perly protected from frost, [illegible] to be built shall be removed and the space refilled with concrete or selected material, as directed by the Engineer at the expense of the Contractor.

7. [illegible]

Care must be taken [illegible] the Engineer, may be used, [illegible] piles, or poles, [illegible] structures, [illegible]

them, they shall be securely hung, braced and supported in place until the work is completed. Whenever it is necessary to interfere with said structures, the Contractor at his own expense shall maintain their respective services, and if necessary for that purpose, shall lay temporary pipes, or other structures.

The Contractor shall promptly restore broken services and shall repair all damage done to any of said structures through his acts or neglect. He shall leave them in as good condition as they were previous to the commencement of the work.

8. Excavation in Rock.

Rock encountered in the excavations may be loosened by blasting only with the express approval of the Engineer, and all directions of the Engineer shall be strictly followed. All blasting and storage of blasting materials and supplies shall be in complete compliance with Federal, State and local regulations, and the Contractor shall take all possible precautions against accidents from blasting. The Contractor shall be liable for all damage to persons or property caused by blasts or explosions. No blasts shall be made on Sundays and blasts shall be made on week days only during the ordinary working hours of the day, or immediately before or after them.

Blasting shall be done only by workmen skilled in this class of work. The rock shall be well covered and sufficient warning shall be given to all persons in the vicinity before blasting. In general, blasts shall be covered with suitable blasting mats and/or heavy timbers. No blasts are to be set off within 50-feet of the end of the completed work, and in general, all blasting work shall be completed within the excavation before other succeeding work is started therein.

Caps or other exploders shall in no instance be kept near the place where dynamite or explosives are stored, and no more than 100 pounds of dynamite shall be stored in the vicinity of the work at any time except by special permission.

9. Limits of Excavation in Rock.

Excavation in rock shall be limited, unless otherwise directed, so that no projection shall come within vertical planes 6-inches outside of the structure being built, and to the neat lines of the base of structure being built. In trenches the rock shall be removed to a point 6-inches below the under side of the barrel of the pipe.

Where excavation in rock is carried below the above limits, the additional space shall be refilled by the Contractor at his expense with concrete or with selected material, as directed by the Engineer.

Material removed from excavation in rock may be used in backfill and in forming embankments if such use is approved by The Engineer. The approval of the Engineer will be governed by the size and nature of the broken pieces of rock, and by the distribution of the rock that may be obtained in the backfill or embankments.

10. Placing of Materials around Excavations.

All excavation or other material shall be placed and piled so that free access may be had to all parts of the work and to all hydrants and valves in the vicinity, and so as not to endanger the work, and shall be kept neatly piled so as to inconvenience as little as possible, local travel and the work of other Contractors.

Reasonable and satisfactory provision shall be made across narrow excavations, and around larger excavations for all travel requiring ingress, egress and regress to the area of the work.

11. Disposal of Excavated Materials.

The materials excavated shall be deposited in such locations as will interfere as little as possible with the execution of the work and its several parts under this contract, or with the work of other contractors, or with local traffic, and in such manner as will provide the most suitable material for each purpose for which the material is to be used.

All surface materials covering the surface of the excavations, including top soil, pavement, paving gravel, broken stone, and any other materials, shall be removed and kept separate as specified, or as may be directed, and when suitable, shall be used again in resurfacing as specified or as directed.

All suitable material from the excavation shall be used as far as is practicable in the backfill and in forming embankments. All material in excess of these requirements and all material judged by the Engineer not suitable for such purposes shall, at the Contractor's expense, be removed from the site of the excavation and deposited and spread on selected areas within the limits of the work as directed, or, if allowed by the Engineer, on areas of the Contractor's selection outside the limits of the work.

12. Backfill

The excavations shall be carefully backfilled as soon as possible after examination and approval of the construction of the completed structure therein, with such of the excavated materials and in such order as may be directed. All voids shall be completely filled and especial care shall be taken to carefully refill pockets that may have developed below adjacent footings, pavements, or behind sheeting or shoring, with selected materials as directed by the Engineer. Stones, rock, or frozen material will not be allowed in the backfill within 2-feet of any pipe or structure. Suitable materials for backfill shall be placed in 6-inch layers and properly compacted by tamping or rolling, as directed by the Engineer. The direction of the Engineer as to the method of compacting will be governed by the use that is to be made of the surface of the ground after backfill and by the location of adjacent structures, and the depth of the new work.

Where, in the opinion of the Engineer, the soil is of such a character that water ramming will give satisfactory results, particularly in soil of a sandy or gravelly nature, water ramming, with the water furnished by the Contractor at his expense, will be required. Where this method is required, the first flooding shall be applied after the backfilling has been compacted as directed, up to 2-feet above the tops of the pipes, or 2-feet above subgrade of other structures, and before more than 6-feet of fill have been placed. The second flooding shall be applied during or after subsequent filling of the excavation, except that not more than 6-feet of fill shall be placed after one flushing before being flushed again, even if three or more flushings are required to compact the backfill properly. If required by the Engineer, water shall be introduced into the backfill through a hose nozzle forced into the material.

In water ramming an excess of water must be avoided in order to prevent flotation of structures caused by an unbalancing of pressure.

The surfaces of roadways and walks over backfilled excavations shall be kept in good and passible condition as specified and as directed, until such time as the final surfacing has been completed.

3. Embankment.

Embankments as shown on the plans shall be formed of suitable materials placed in 6-inch horizontal layers across the entire area to be filled, and properly compacted by tamping or rolling to the satisfaction of the Engineer. The Contractor shall form

the embankments so that the first layer of fill will properly bond with the stripped and grubbed surface, and so that each layer placed and compacted will properly bond with the underlying layer.

Embankments shall not be formed during freezing weather or with frozen material, nor shall they be formed when material already in the embankment is frozen.

The embankments shall be trimmed and shaped to the lines and grades shown on the plans for finished surface or for subgrade, as required or as directed by the Engineer.

14. Borrow Excavation.

If there is not sufficient suitable material from the excavations to provide the quantities required for backfill and forming embankments to the required lines and grades, the Contractor shall provide the required material from borrow pits selected by the Contractor after approval of the pits by the Engineer. No material for backfill or for forming embankments shall be excavated from approved borrow pits without 5-days prior notice to the Engineer.

SECTION 2B

TRENCH EXCAVATION AND BACKFILL

Under this section the Contractor shall make all excavation and backfill required for the construction of all pipe lines lying outside of the excavation limits of the structures to be built under this contract, as specified and as shown on the plans, or as directed.

In all pipe trenches suitable selected material shall be filled in around the pipe and to a height of 2-feet over the top of the pipe. This fill shall be brought up evenly on both sides of the pipe in layers of a thickness directed by the Engineer. Each layer shall be tamped and thoroughly consolidated to provide proper support and bearing for the pipe and so as not to disturb the line and grade of the pipe. The backfill of the trench above a height of 2-feet over the top of the pipe shall be as specified in the section "Excavation, Backfill and Embankment".

All other specifications given under "Excavation, Backfill and Embankment" shall apply to this section.

SECTION 20
PUMPING, BAILING, DRAINING AND COFFERDAMS

1. Description.

Under this section the Contractor shall furnish and operate a sufficient pumping plant; provide and maintain satisfactory drainage; furnish, construct, maintain and remove cofferdams and similar work wherever such dams and similar work may be required; and provide all labor, materials, tools, equipment and necessary incidentals required to properly prevent interference with or damage to the work by water, ice or snow, and to enable the work to be carried out in a proper and satisfactory manner, as specified or as directed.

Damage of any kind resulting from insufficient or improperly operated pumping facilities; from faulty construction of cofferdams; from failure to keep cofferdams in good condition; or from similar lack of proper conduct of the work, shall be made good by the Contractor at his own expense.

Drainage from excavations or flow pumping operations shall be satisfactorily conducted away from the work to a suitable point of discharge. All offensive water shall be removed from the work at once and shall be properly and safely disposed of.

Cofferdams shall be designed and located so as to restrict natural flow as little as practicable. The Contractor shall at all times take the necessary precautions to avoid damage to the work, adjacent structures, or banks resulting from a change in the location of normal or natural flow channels, or from a restriction of flow. Material scoured away by such obstructions shall be replaced by the Contractor with similar material.

All material deposited as a result of pumping, bailing, drainage or cofferdam work, shall be completely removed and disposed of by the Contractor to the satisfaction of the Engineer after the work is completed and facilities under this section are no longer needed.

SECTION 3
FIRST, SECOND AND THIRD CLASS CONCRETE

1. Description.

Under this section the Contractor shall furnish and place all the first, second, or third class concrete required for the complete construction of the work, as specified and as shown on the plans, or as directed.

All concrete for structures shall be first class concrete except as otherwise specified and concrete for refilling excavations below grade or for other foundation purposes, and for protection around pipes and other similar purposes, shall be second or third class concrete, as may be specified or directed by the Engineer.

2. Materials.

a. Portland Cement

Cement shall be first class Portland cement of a reputable brand, satisfactory to the Engineer. It shall be stored in weatherproof buildings having wooden floors raised above the ground, and sufficient stock shall be kept on hand to allow ample time for testing. All necessary facilities shall be provided by the Contractor to permit the inspection of the individual shipments, each of which shall be kept separate. All unsatisfactory cement shall be promptly removed from the work.

The cement shall conform to the latest specifications of the A.S.T.M., designation C-150 and tests will be made in general accordance thereto.

b. Fine Aggregate.

Fine aggregate shall consist of grains or particles of hard, durable rocks, the surfaces of which are not coated with any injurious material.

Fine aggregate shall be uniformly graded from coarse to fine so that when dry, 100% shall pass a 1/4-inch sieve; 90% to 100% shall pass a No. 4 sieve; 55% to 75% shall pass a No. 14 sieve; 10% to 25% shall pass a No. 48 sieve; and 2% to 8% shall pass a No. 100 sieve.

Fine aggregate may be rejected if it contains deleterious materials, or contains more than 2% by weight, or 4% by volume, of loam and silt. All fine aggregate shall be satisfactory when examined for organic material. All natural sand shall be thoroughly washed before using.

The Engineer shall have the right to reject the source of supply even if the fine aggregate submitted for testing complies with the specifications, provided in his opinion, after making an inspection of the pit and such other tests as he may deem advisable, there are indications that there is a likelihood of unsuitable material being mixed in with that which will meet the specifications.

c. Coarse Aggregate.

Coarse aggregate shall be well graded crushed stone or gravel, screened and graded [illegible]. It shall be clean [illegible] of a hard, durable and [illegible] character, and shall be [illegible] screened to well graded sizes, coarse to fine. That used in all concrete walls, floors or beams 8 inches thick or less, shall be screened to pass through a 1-inch ring and be retained on a 1/4-inch ring. The coarse aggregate for concrete in walls, beams or floors over 8 inches thick, may be screened to pass through a 1-1/2-inch ring and be retained on a 1/4-inch ring.

d. Water.

Water for mortar and concrete and for all other purposes shall be provided by and at the expense of the Contractor and shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

3. Compressive Strength.

The various classes of concrete shall develop compressive strength at the end of twenty-eight days as follows:

1st class concrete not less than 3000 lbs. per sq. in.
2nd class concrete not less than 1800 lbs. per sq. in.
3rd class concrete not less than 1200 lbs. per sq. in.

4. Proportioning.

a. Proportions.

First class concrete shall be mixed in the approximate

proportion of one part of Portland cement to two parts of fine aggregate to four parts of coarse aggregate.

Second class concrete shall be mixed in the approximate proportion of one part of Portland cement to two and one-half parts of fine aggregate to five parts of coarse aggregate.

Third class concrete shall be mixed in the approximate proportion of one part of Portland cement to three parts of five aggregate to six parts of coarse aggregate.

Fine and coarse aggregate shall be proportioned by direct weight on suitable, approved weighing devices or by other methods where specifically authorized by the Engineer. Portland Cement in standard unopened cloth or paper sacks, as packed by the manufacturer, may be considered as weighing 94 lbs. per sack.

The fine aggregate and the coarse aggregate will be so graded in size and relatively proportioned that the cement and sand together shall slightly more than fill the voids in the broken stone. One bag of cement shall be regarded as having the volume of one cubic foot and the sand and stone shall be measured when dry and loose.

The combined aggregate for first class concrete shall be of such composition of sizes that when separated by one No. 4 standard sieve the weight retained on the sieve shall be not less than one-half of the total, based on dry materials, except where adjustment is necessary, in the opinion of the Engineer, for working in special details.

b. Water Cement Ratio.

The proportioning of materials shall be based on the requirements for a plastic and workable mix with a water cement ratio not exceeding six gallons of water per sack of cement for first class concrete, and not exceeding 6.25 gallons of water per sack for second class concrete. The water cement ratio shall be based on the total net quantity of water in the cement mixture including the surface water carried by the aggregates as determined by moisture determinations made on representative samples of the aggregate.

c. Slump.

The consistency of the concrete mixture shall be such as to produce a concrete that can be thoroughly compacted. The

slump shall not exceed 6 inches in any case, and when vibration equipment is used, the slump shall not exceed three inches except as directed.

d. Measuring Ingredients.

All measurements of cement, fine and coarse aggregate, shall be made separately. Proportioning aggregates for fractional sacks of cement will not be permitted unless the cement is weighed for each batch. Weighing equipment shall be arranged to permit making compensation for changes in the weight of moisture contained in the aggregates. Weighing equipment shall meet the approval of the Engineer and shall be accurate within one per cent of the net load being weighed.

A satisfactory auxiliary device shall be used in connection with the scale beam to indicate or register at least the last 100 lbs. of each of the aggregates required for the batch. The weighing hopper shall be equipped with a means of adjusting the volume of the compartment in which the aggregates are weighed.

Water shall be measured by volume or weight by an approved device capable of accurate measurement to one pint, plus or minus, of the total amount of water required per batch.

e. Trial Batches.

Full size trial batches shall be made in the mixer, using the aggregates selected for the job, to establish the correct proportion of the mix to give proper workability without exceeding the water-cement ratio and slump specified and to provide test cylinders for the advance concrete tests. If the desired workability or strength is not obtained with the first combination of aggregates, then the proportions of fine and coarse aggregate shall be adjusted within the limits specified until the mix meets with the approval of the Engineer and produces the strength specified.

5 Forms.

The Contractor shall provide suitable forms of such shape, lines, grades and dimensions that the resulting concrete will conform with the plans. They shall be so designed and built that their removal will not result in damage to the concrete. Forms may be of wood or of metal. Wood forms shall be constructed of lumber of uniform thickness free from loose knots or other defects. Forms for exposed surfaces shall be plywood, dressed shiplap

or tongue and grooved material and for unexposed surfaces may be undressed material.

Openings, pockets, chases and inspection and cleaning openings shall be made in the form work where required or where directed.

Form material may be reused provided all nails are removed and all surfaces of the material are thoroughly cleaned and damaged places properly repaired.

Forms shall be sufficiently tight to prevent the leakage of mortar at the time of concreting.

Forms shall be strong and shall be rigidly braced, tied and supported so as to maintain their position and shape and to prevent any movement during and after concreting operations. They shall be designed to withstand the use of vibrators.

The inside surface of forms shall be coated with a non-staining mineral oil or other approved material and such coating shall be applied prior to the placing of metal reinforcement.

Forms shall be tied with internal ties of such type that when the forms are removed no metal will be within one inch of any surface.

The type of forms, their design and the type of form ties shall be approved by the Engineer before form work is started.

Forms, bracing or supports shall not be disturbed or removed until the concrete has adequately hardened and has attained sufficient strength to safely support its own weight and any loads upon it. Care shall be taken in removing forms to avoid damage to surfaces to be exposed.

Pipes or castings as shown on the drawings or as directed, shall be placed in the forms before concreting operations start and special care shall be taken to place them at the proper lines and grades.

All pipes passing through concrete walls shall be provided with a cast iron wall sleeve whether indicated upon the contract drawings or otherwise. Sufficient opportunity shall be given to the various trades and to other Contractors to install sleeves and other built-in work before proceeding with concreting operations.

6. Joints and Bonding.

In general, the location of both vertical and horizontal joints in the walls and floors of the structure shall be determined in the field by the Engineer, and shall be placed, insofar as practical, to meet the capacity of the Contractor's mixing plant, except that the plans indicate certain planes where joints will not be permitted.

When a horizontal joint is to be made, the Contractor shall so construct his forms that they do not project above the horizontal plane at the location of the joint so that copper seals and the necessary bonding can be placed at the end of the run where the joint is to be made. No horizontal or vertical joints shall be made in any concrete structure except with the approval of the Engineer, and then only with the insertion of copper seals and proper key ways. Details of such joints are shown on the drawings or will be furnished by the Engineer.

Contraction joints of a type approved by the Engineer, shall be located to allow contraction of the concrete between joints without intermediate uncontrolled cracks. Contraction joints shall be located only where they are not detrimental to the strength of the work and only at locations approved by the Engineer. All contraction joints shall be properly filled with approved mastic joint, caulking material or hot bituminous filler, as directed by the Engineer.

Old masonry surfaces on which new concrete is to be laid shall be thoroughly cleaned of foreign matter and laitance, moistened with water and shall be slushed with grout as specified.

7. Mixing Concrete.

The concrete shall be mixed by an approved batch mixing machine with the arrangements such as will secure the thorough mixing of each loading of concrete and the introduction of a uniform quantity of water at any stage of the loading and mixing process. The mixer drum shall rotate at a peripheral speed of about 200 ft. per minute and it shall not be loaded above its rated capacity.

The mixing time shall be not less than one minute after all materials are in the mixer drum, and shall be continued until every particle of aggregate is completely covered with mortar and until there is a uniform distribution of the materials and the whole mass is uniform in color and is homogeneous.

The concrete shall be used immediately after mixing and no concrete shall be used after its initial set has begun. The retempering of concrete will not be allowed.

The capacity of the mixing plant which the Contractor proposes to use shall be reported to the Engineer in ample time before the commencement of any concrete work, in order that he may determine whether or not the plant is adequate in capacity to make the pours or runs of concrete in such time as will insure the fundamental strength and stability of the concrete structures. The Engineer may order the Contractor to increase the capacity of his mixing plant if he deems it to the best interest of the work.

8. Transporting.

After mixing, the concrete shall be transported rapidly and deposited in place by methods which shall prevent segregation or loss of the ingredients. All methods used in transporting concrete shall be entirely satisfactory to the Engineer.

Concrete shall be handled from the mixer to the place of final deposit in carts, buggies, or conveyors, and shall not be spouted nor delivered by spout or trough from hoists, nor dumped into carts or buggies with a free fall of more than three feet. Every possible precaution shall be taken to prevent separation or loss of the ingredients while transporting and depositing the concrete. Delivery carts or buggies shall be kept on temporary runways and runway supports shall not bear upon reinforcing steel or fresh concrete and shall be independent of the forms unless the forms are especially designed to carry such loads.

9. Placing Concrete.

a. General

Concreting operations shall not be started until the Engineer has inspected and approved the preliminary work.

Concrete shall not be placed at any time except under the direct supervision of the Engineer, and not outside of regular working hours unless the Engineer is notified at least four hours in advance and a representative of the Engineer is present at the site during the concreting operation.

Concrete shall not be placed until all reinforcement is securely and properly fastened in its correct position, and form ties at construction joints have been retightened. Before

placement of concrete is started, all bucks, sleeves, hangers, pipes, conduits, bolts, wires and any other inserts required to be embedded therein shall be placed and anchored, the forms shall be oiled and the reinforcement cleaned.

Before beginning a run of concrete, hardened concrete and foreign material shall be removed from the inner surfaces of the mixing and conveying equipment and all conveyances shall be thoroughly cleaned at frequent intervals during the placing of the concrete.

Before depositing concrete, all debris shall be removed from the space to be occupied by the concrete.

To insure sufficient mortar at the junctures of old and the newly deposited concrete, the cleaned and moistened surface of the hardened concrete, including vertical and inclined surfaces, shall first be slushed with a covering of neat cement grout against which the new concrete shall be placed before the grout has attained its initial set. The grout shall consist of one part of cement to two parts sand, with enough water added to make a thick consistency.

b. Methods of Placing Concrete.

The methods of placing concrete shall meet with the approval of the Engineer.

The concrete shall be carried up level along the whole length of the section under construction and shall be deposited so as to prevent segregation of the ingredients and to avoid re-handling within the forms.

Concrete shall not be deposited under water and water shall not be allowed to rise upon or flow over concrete until it has properly set.

Special care must be exercised to prevent splashing the forms or reinforcement with concrete and any such splashes or accumulations of hardened or partially hardened concrete on the forms or reinforcement above the level of the concrete already in place must be removed before the work proceeds.

In handling, transporting or placing of concrete a free fall in excess of three feet will not be allowed except when the fall is through an "elephant trunk" attached to a suitable hopper.

The "elephant trunk" shall be moved about so as to maintain the surface of the concrete as nearly level as possible at all times.

Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If the section cannot be so placed, construction joints shall be placed at locations approved by the Engineer.

In placing concrete around pipes or built in work, the concrete shall first be placed only on one side of the pipe or casting until the concrete flushes through and comes out of the other side, after which placing of concrete shall be continued on the other side.

10. Compacting Concrete.

Deposited concrete shall be thoroughly compacted by the use of suitable tools properly manipulated. First class concrete placed in forms for walls and floors shall be compacted and consolidated by the use of mechanical vibrators if so directed by the Engineer. The vibrating equipment shall be well known and of a type approved by the Engineer. The use and number of vibrators used shall be as directed by the Engineer.

11. Care of New Concrete.

All exposed surfaces in finished and unfinished concrete shall be kept constantly moist by covering with saturated burlap, or by such other means as may be approved, for at least five days. No new work shall be laid during rainstorms, and freshly laid concrete shall be protected by canvas during storms to prevent the water from washing it; sufficient canvas covering shall be provided and kept ready at hand for this purpose. All fresh work shall be carefully protected from injury and no wheeling or walking on it will be allowed. Any portion injured shall be removed and replaced by the Contractor at his own expense.

12. Patching.

Immediately after removing forms, all concrete surfaces shall be inspected and any poor joints, voids, stone pockets and all tie holes shall be patched before the concrete is thor-

oughly dry. If for any reason, surfaces have voids or are unduly rough, the defective masonry shall be cut out and properly replaced if required. In case of slight imperfections the concrete may, if permitted, be plastered and floated to give a satisfactory appearance.

Defective areas shall be chipped away to a depth of not less than 1-inch with the edges perpendicular to the surface. The area to be patched and a space at least 6-inches wide entirely surrounding it shall be wetted to prevent absorption of water from the patching mortar. The patch shall be made of the same material and of the same proportions as used for the concrete except that the coarse aggregate shall be omitted and white cement shall be substituted for a part of the grey cement to match the color of the surrounding concrete. The amount of water used in mixing the mortar shall be as little as consistent with the requirements of handling and placing.

The mortar shall be thoroughly compacted into place and tie holes shall be filled solid using an Alamite gun or other device. The mortar shall then be screened off so as to leave the patch slightly higher than the surrounding surface and shall be left undisturbed for a period of one to two hours to permit initial shrinkage before being finally finished. The patch shall be finished in such a manner as to match the adjoining surface. Patches shall be kept wet for a period of at least seven days.

13. Finishing Concrete Surfaces.

The surfaces of all concrete walls and ceilings which will be exposed in the completed structure shall be smoothed by rubbing with carborundum brick operated by mechanics skilled in the particular method of finishing. The finishing process shall be carried on until the uneven surfaces are rubbed down, all marks of form boards removed, and the surface is smooth and uniform, and satisfactory to the Engineer. Surfaces which are finally to be covered with backfill, embankment or other material need not be finished with carborundum brick. All exposed edges shall be beveled as shown on the plans or as directed by the Engineer in the field.

The surfaces of concrete fills shall be accurately screeded and floated to conform to the designated levels or grades and shall be parallel to and at the required distance below the finish. Surfaces which are to receive membrane waterproofing or

other finishes shall be worked as required to receive the waterproofing or other finish.

The exposed concrete floors in the work, except where otherwise shown on the plans, shall have an integral mortar surface which shall be the minimum thickness required to slightly more than fill the voids in the concrete and to permit floating and troweling to true, even surfaces. The mortar shall be applied before the underlying concrete has started to set. The integral mortar surface shall be troweled to a uniform plane with a steel trowel and shall be free from ridges, depressions, or other defects. The troweling shall be sufficient to bring the finish to a hard, dense, impervious surface.

14. Concrete in Freezing Weather.

No concrete shall be mixed or deposited in freezing temperatures unless the ingredients entered into the mixture are properly heated to the satisfaction of the Engineer and suitable means be provided for maintaining the concrete at a temperature to prevent freezing for at least four days after placing or until the concrete has thoroughly hardened; and no concrete shall be deposited which may become subject to freezing temperature without special approval of the Engineer. Salts, chemicals, or other foreign materials shall not be used as an admixture to prevent freezing.

Any concrete showing indication of frost action shall be removed and replaced by the Contractor at his own expense.

15. Tests.

All materials to be incorporated in the concrete work shall be subjected to such standard tests as the Engineer may deem required to determine the suitability of the material to be incorporated in the work in accordance with the specifications.

a) Extent of Test.

Materials incorporated in the concrete construction shall be inspected and tested by the Contractor at his own expense, in separate independent laboratories if so directed, to establish their conformance with the specifications.

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b) Cement.

Tests shall be made on the entire cement requirements by an approved independent laboratory on car samples or bin (sealed) samples as may be desired.

c) Concrete Tests.

1. Standard Slump Tests. Field slump tests shall be made as required by the Engineer.

2. Advance Concrete Tests. Advance tests of the concrete shall be made in an independent laboratory in accordance with the latest methods of the A.S.T.M., designation C-39. Six standard 6-inch compression cylinders, 3 to be tested at 7 days and 3 at 28 days, shall be made with the proportioning and materials proposed to be used in the major part of the work. The slump should not be less than the greatest slump expected in the work, and such advance tests shall be repeated, if necessary because of changes in materials or if unsatisfactory results are obtained.

3. Concrete Test. During the progress of the work, and for each different mix of concrete, a set of two standard 6-inch concrete cylinders shall be made and tested in an independent laboratory for the first 25 cubic yards and for each additional 100 cubic yards of concrete that are placed during each and every day's operation. The cylinders of each set shall be molded from the same sample of concrete and tested at 7 days and 28 days. Making and curing concrete cylinders for test specimens, shall be governed by the latest methods of the A.S.T.M., designation C-31 and the testing of specimens shall be in accordance with the latest methods of the A.S.T.M., designation C-39. Results of these tests shall be promptly furnished to the Engineer.

SECTION 4
METAL REINFORCEMENT

1. Description.

Under this heading the Contractor shall furnish and place all the metal reinforcement required for the complete construction of the concrete work, as specified, and as shown on the plans, or as directed.

2. Type of Reinforcement.

Metal reinforcement shall be purchased only from firms of established reputation in its manufacture. Reinforcing bars shall be in accordance with the latest specifications for billet steel concrete reinforcing bars of the A.S.T.M., designation A-15. All steel for reinforcement shall be the intermediate grade of deformed bars. Wire or fabric reinforcement, where required, shall meet the latest specifications for cold drawn steel wire, A.S.T.M., designation A-82.

3. Bar List and Bending Schedule.

Before placing any order for material, the Contractor shall submit to the Engineer for approval a Bar List and Bending Schedule, prepared by a reputable steel company, of the reinforcement required in the structure and indicating the location of splices and dowels, and fabrication shall not be started until such shop drawings have been approved. Metal reinforcement delivered to the work shall be in accordance with the Bar List and Bending Schedule as approved by the Engineer.

4. Laps and Splices.

Splices shall not be made in reinforcement without approval of the Engineer unless called for on the drawings. Where splices are indicated or allowed, the bars shall be lapped at least a distance equal to 40 diameters of the bar.

Dowels shall be furnished and installed between horizontal or vertical construction joints. These dowels shall be of the size, length and spacing indicated on the drawings or directed by the Engineer.

At corners, all horizontal reinforcing shall be lapped past the intersection at least three feet. Additional metal reinforcing may be required at corners if so directed by the Engineer. Special reinforcement shall be placed over and around all openings to properly transmit stresses.

Extra bars shall be placed at all construction joints in the face opposite the main tensile reinforcement and shall run at right angles to the joint and project beyond the joint at least 40 diameters in each direction.

5. Placing Reinforcement.

Reinforcement shall be clean and reasonably free from rust when placed in the forms and shall be in a satisfactory condition when concreting operations are carried out.

All reinforcement whether round or square deformed bars, triangle mesh, or fabric reinforcing shall be placed in the forms before the concrete is poured. The Contractor shall place and securely fasten the reinforcement in such a manner that it will be rigid and hold its true position during all periods of depositing concrete within the forms, and until the concrete has hardened. The location of reinforcement and its spacing shall be as indicated on the plans or on the approved Bar List and Bending Schedule. Only the most modern and up-to-date methods of placing and securing reinforcement in place will be permitted, and such methods must be satisfactory to and approved by the Engineer in all cases.

The location of any laps or splices in reinforcing bars, due to the limiting length of commercial bars used in modern practice, must be approved by the Engineer before the bars are placed in position.

SECTION 5
Dry Riprap

1. Description.

Under this Section the Contractor shall furnish and place all the dry riprap required at the various locations, as shown on the plans and as specified, or as directed by the Engineer.

The dry riprap shall consist of a surfacing of large stones laid on a gravel bed.

2. Materials.

Stone for riprap shall be unhewn quarry or field stone of roughly cubical shape, sound and durable in character, having established weathering qualities and satisfactory to the Engineer. Stone which will disintegrate on exposure to air, sun, frost or water, shall not be used. The stone shall be of such size as is required for the particular location, but in general shall be one man stone with an approximate thickness of 12-inches and with at least one even surface.

The gravel bed for riprap shall be run of bank gravel of a character, size and grading approved by the Engineer.

3. Methods.

The total thickness of the riprap shall be not less than 18-inches including the gravel bed. The subgrade of the gravel bed shall be formed to the lines and grades indicated or required, and shall be firmly compacted to the satisfaction of the Engineer. The gravel bed shall be placed on the prepared subgrade to the thickness required to bring the face of the stone forming the riprap surface to the required lines and grades.

The stone for riprap shall be placed by hand to the line and grade shown on the plans, or established by the Engineer. Care shall be taken in depositing the stone so that the slope of the subgrade or gravel bed under the stone will not be disturbed or displaced.

The stones shall be firmly bedded in the gravel and shall be arranged in close contact, with joints broken and with the top faces set to the required lines and grades. High points shall be knocked off and the spaces between large irregular shaped stones shall be filled in with smaller stones or spalls and the whole surface thoroughly rammed. After ramming, the stones shall be tightened in place by driving spalls tightly in the joints.

Section 6
Grouted Riprap

1. Description

Under this section the Contractor shall furnish and place all the grouted riprap required at the various locations, as shown on the plans and as specified, or as directed.

The grouted riprap shall be a surfacing of large stone laid on a gravel bed and grouted in place with a cement grout.

2. Materials.

The stone and gravel bed for grouted riprap shall be as specified for dry riprap in the Section "Dry Riprap" of the General Specifications. The grout shall be a thin mortar of clean sharp sand of acceptable character and portland cement, mixed in the proportion of one part of cement to three parts of sand, and with a sufficient quantity of water to produce a mortar of soupy consistency such that it will readily fill all voids in the stone work.

3. Methods.

Grouted riprap shall be laid with the gravel bed and stone surfacing as specified for dry ripray in the section "Dry Riprap" of the General Specifications, except that the stones shall not be tightened in place by driving spalls but the joints shall be completely filled with mortar. Joint spaces shall be rodded during the pouring of grout to assure that the grout will penetrate the joint to the bottom of the stones. After grouting, the surfaces of the stones shall be reasonably cleaned of mortar and the entire surface protected from the elements. Traffic of any kind shall not be allowed on the riprap for a period of at least three days, or for a longer period if required by the Engineer.

Section 7.
PIPE

1. General.

The specifications under this section shall apply to the installation of all piping work under this contract.

2. Laying Pipe.

All pipe shall be laid true to the lines and grades indicated on the plans or as adjusted by the Engineer. Adequate clearance for properly jointing the pipe shall be provided at joints or connections, and pipe shall be laid with a full firm bearing.

Pipe shall not be laid in water, and water shall not be allowed to rise upon any pipe until the joints have been properly completed. The pipe line shall not be used to carry away water in the trenches, and the end of the line shall be kept properly plugged when not laying pipe so as to prevent the entrance of dirt or water.

3. Concrete Pipe Cradles.

Where in the opinion of the Engineer, the nature of foundation requires special support, pipe shall be supported on concrete cradles.

In the trenches, a cradle of such dimensions as ordered by the Engineer shall be constructed of 2nd Class Concrete. All specifications given elsewhere in these General Specifications and in the attached Detailed Specifications pertaining to concrete construction, earth excavation, and metal reinforcement shall apply to any concrete cradles ordered by the Engineer.

The construction of cradles shall be made in two steps; first, the base slab shall be poured and allowed to set to such an extent as to bear the weight of the pipe to be placed thereon. This base slab shall be shovel finished and true to the gradient of the pipe; second, after the pipe is in place and the joints have been accepted, and the grade and alignment have been checked, the remaining portions of the cradle shall be poured and allowed to set for at least three days free from water before any backfill whatever is placed around the pipe.

4. Pipe Supports.

At locations indicated on the plans or where ordered by the Engineer, the pipe shall be supported above the existing ground surface. The Contractor shall perform such excavation and furnish and place such 1st or 2nd Class concrete and metal reinforcement as may be required by the Engineer to properly and safely support the pipe above the existing surface.

In case it is decided to support the pipe structure on concrete piers or other types of pipe support above the surface, details of such construction will be furnished by the Engineer prior to the commencement of that portion of the work.

All specifications given elsewhere in these General Specifications and in the Detailed Specifications pertaining to concrete construction, earth excavation and metal reinforcement shall apply to any concrete pipe supports ordered by the Engineer.

Section 8
VITRIFIED TILE PIPE

1. Description.

Under this section the Contractor shall furnish and lay all vitrified tile pipe and specials required to complete the work, as specified and as shown on the plans, or as directed.

2. Former Specifications Applicable.

All former specifications given under Laying Pipe, Cradles, Supports and Testing shall apply to this section.

3. Vitrified Pipe.

All vitrified pipe and specials shall be of the best quality of salt glazed vitrified stone ware and unless otherwise specified shall conform with the latest standard specifications of the A.S.T.M., serial designation C-13 for clay sewer pipe. Vitrified pipe under 8 inches in diameter shall be furnished in 2-foot lengths, pipe 8, 10 and 12 inches in diameter shall be furnished in 3-foot lengths and pipe larger than 12 inches in diameter shall be furnished in 3 or 4-foot lengths.

4. Laying Vitrified Pipe.

The vitrified pipe shall be placed in trenches, excavated as elsewhere specified. All joints shall be made with "Sani-Tite", Hydraulic Development Corp., 510 Church St., New York City; "G.K.", Atlas Mineral Products Co., 710 Hamilton St., Allentown, Pa., "Ex-XL-Cell", Cochrane Chemical Co., 432 Danforth Avenue, Jersey City, N.J., Weston's Form and Gasket, A. A. Weston, Adams, Mass; or other equal jointing compound or method approved by the Engineer. In wet trenches or elsewhere, as directed by the Engineer, the Contractor shall be required to furnish and place the Weston Form and Gasket. The method of placing will be in accordance with the manufacturer's directions as interpreted by the Engineer.

The bell and spigot shall first be wiped and cleaned of dirt or other material. Unless otherwise directed, the pipe shall be laid uphill without any break in the line from manhole to manhole, and so that the spigot ends point in the direction of flow. The gaskets of dry cakum with long fibres loosely twisted into a strand, shall be firmly and evenly placed, leaving 1-1/2" deep annular space around the pipe for the joints, with no loose shreds of the gasket in the space to be filled by the compound. Proper joint runners

shall be used to provide for full and even joints and a sufficient number shall be provided to allow for the cooling of the joints before removal.

Joints shall be made at one pouring and at one side of the top of the pipe, so that the compound will run entirely around the pipe and completely fill the annular space. The jointing material shall be hot, so that it will flow easily until the entire annular space is filled, as directed, but care shall be taken not to overheat the jointing material. Jointing material shall be heated in oil-fired kettles, and shall be stirred constantly to keep it of uniform consistency. Overheated material will not be allowed to be used. Two pipes shall be jointed on the ground, where directed, and the double length so formed, placed in position in the trench. The interior of the joints shall be left perfectly smooth, and the pipe shall be carefully freed from dirt of every description.

If two lengths of pipe are joined above the trench a satisfactory wooden form approved by the Engineer shall be used to insure proper and perfect alignment being maintained during the joint pouring operation.

GENERAL CLAUSES CONCERNING THE CONDUCT OF THE WORK

Material and Workmanship

1. It is the intent of these specifications to describe definitely and fully the character of materials and workmanship required with regard to all ordinary features, and to require first class work and materials in all particulars. For any unexpected features arising during the progress of the work and not fully covered herein, the specifications shall be interpreted by the Engineer to require first class work and materials, and such interpretation shall be accepted by the Contractor.

Representative Always Present

2. The Contractor, in case of his absence from the work, shall have a competent representative or foreman present who shall follow without delay all instructions of the Engineer or his assistants in the prosecution and completion of the work, in conformity with the contract, and shall have full authority to supply labor and materials immediately.

Objectionable Employees.

3. The Contractor will be required to discharge any employee who, in the opinion of the Engineer, is objectionable or incompetent. This requirement shall not be made the basis of any claim for compensation or damages against the Owner or any of its officers or agents.

Proper Methods of Work and Proper Materials.

4. The Engineer shall have the power to direct the order and sequence of the work, which in general shall be such as to bring the several parts of this work to a successful completion at about the same time. If at any time before the commencement or during the progress of the work, the materials and appliances used or to be used, appear to the Engineer as insufficient or improper for securing the quality of work required, or the required rate of progress, he may order the Contractor to increase their efficiency or to improve their character, and the Contractor shall conform to such order; but the failure of the Engineer to demand any increase of such efficiency or improvement shall not release the Contractor from his obligation to secure the quality of the work or the rate of progress specified.

Claims and Protests

5. If the Contractor considers any work required of him to be outside the requirements of the contract or considers any record or ruling of the Engineers or Inspectors as unfair, he shall ask for written instructions or decision immediately and then file a written protest with the Owner against the same, within five days thereafter or be considered as having accepted the record or ruling.

Work in Bad Weather

6. During freezing, stormy or inclement weather, no work shall be done except such as can be done satisfactorily and in a manner to secure first class construction throughout.

Sanitary Regulations

7. Necessary sanitary conveniences for the use of the laborers on the work, properly secluded from observation, shall be erected and maintained by the Contractor in such manner and at such points as shall be approved, and their use shall be strictly enforced. The contents of the same shall be removed with sufficient frequency to prevent nuisance and disposed of to the satisfaction of the Engineer. The Contractor shall obey and enforce such other sanitary regulations and orders and shall take such precautions against infectious diseases as may be deemed necessary. In case any infectious disease occurs among his employees he shall arrange for the immediate removal of the patient from the work and his isolation from all persons connected with the work. The building of shanties or other structures for housing the men, tools, machinery or supplies will be permitted only at approved places, and the sanitary condition of the grounds in and at such shanties or other structures must at all times be maintained in a satisfactory manner.

Protection of Work

8. The Contractor shall place sufficient red lights on or near the work, and keep them burning from sunset to sunrise, shall erect suitable railings or barriers, and shall provide watchmen on the work by day or night, as required and deemed necessary for the safety of the work, the public and adjoining property. The Owner reserves the right to remedy any neglect on the part of the Contractor as regards

the protection of the work which may come to his attention, after 24 hours notice in writing, except in case of emergency, when he shall have the right to remedy any neglect without notice, and in either case to deduct the cost of such remedy from money due the Contractor.

Boundaries of Work and Contiguous Work

9. The Owner will provide rights of way for all work specified in this contract, and the Contractor shall not enter or occupy with men, tools or materials, any private ground outside the property of the Owner without the consent of the Owner and the approval of the Engineer. Other Contractors of the Owner may for all purposes required by their contract, enter upon the work and premises used by the Contractor and the Contractor shall give to other Contractors of the Owner all reasonable facilities and assistance for the completion of adjoining work.

Removal of Temporary Structures

10. On or before the completion of the work, the Contractor shall, without charge therefor, tear down and remove all buildings and other structures built by him for facilitating the carrying out of the work, and shall remove all rubbish of all kinds from the grounds which he has occupied, and shall leave the site of work clean and in good condition.

Injury to Service Pipes

11. In case any damage shall result to any service pipe for water or gas, or any private or public sewer or conduit, by reason of negligence on the part of the Contractor, he shall without delay and at his own expense repair the same to the satisfaction of the Engineer, and in case such repairs are not made promptly or satisfactorily, the Owner may have the repairs made by another Contractor or otherwise and deduct the cost of same from any moneys due or to become due the Contractor.

Public Utility Interference

12. All conduits, water mains and gas mains encountered in the construction shall be properly and safely taken care of by the Contractor, who shall upon encountering same notify the public corporation to whom they belong, in order that they may be changed in such a manner as not to interfere with the final construction.

Right of Way

13. Where the work called for extends upon or through private property, the Owner shall procure all necessary rights and deeds for access to the property, and the Contractor shall not proceed with this part of the work until the Owner has completed its negotiations with the property holders.

Interpretation of Plans, Etc.

14. On all plans, drawings, etc., the figured dimensions shall govern in the case of discrepancy between the scales and figures. The Contractor shall take no advantage of any error or omission in the plans or of any discrepancy between the plans and specifications and the Engineer shall make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the specifications and of the plans as construed by him, and his decision, approved by the Owner, shall be final.

Inspection.

15. All the materials and work necessary or proper for the building and completion of the work herein specified will be inspected by the Engineer or his inspectors, and the Contractor shall furnish him and his inspectors with all needed facilities for discharging the duties assigned to them. When in the judgment of the inspectors the work or materials are not in accordance with the specifications they shall have the power to stop the work, which shall not be resumed until the Engineer has rendered his opinion upon the matter in dispute. Condemned materials shall be promptly removed from the work. Work covered before inspection, or work done at unusual times in the absence of an inspector, will not be paid for.

The inspection of the work shall not release the Contractor from any of his obligations to fulfill his contract as herein specified, and defective work shall be made good, and unsuitable materials may be rejected notwithstanding such work and materials may have been previously accepted for payment.

Cleaning and Final Inspection.

16. All pipe lines and other structures shall be kept clean during construction and, as the work approaches completion, the Contractor shall systematically and thoroughly clean and make any needed repairs to the same. He shall furnish

at his own expense suitable tools and labor for cleaning out all dirt, mortar and foreign substances from the structures, and also the water for cleaning by flushing. Any leakage of water into any structure exceeding the limits specified, or any deviation from the proper grade for alignment of the structures or any other defect such as to make the work, in the opinion of the Engineer, fall short of first class work, shall be promptly corrected by the Contractor at his own expense. The cleaning and repairs shall be arranged, so far as practicable, to be completed upon finishing the construction work. Notice to begin this cleaning and repairing if such is needed, will be given in due season by the Engineer who, at the same time, will make his final inspection of the work. The Engineer will not prepare his final estimate of this portion of the work until after the final inspection is made. During this final inspection the Contractor at his own expense shall furnish suitable provision as to needed drainage, workmen and appliances.

Order of Work and Completion.

17. The order in which the work is to be performed is of particular importance in the execution of this contract, and the Contractor shall discuss the construction program with the Engineer and shall submit to and obtain the Engineer's approval of a work progress schedule showing the sequence in which he proposes to perform the work and the proposed progress and completion of the work.

Photographs.

18. On or about the twenty-fifth of each month, the Contractor shall have taken, developed, and printed, duplicate sets of at least five progress pictures, each 7" by 9". These photographs shall be taken at such points as will best show the progress of the construction work as designated by the Engineer.

Detailed Estimate.

19. Immediately after the award of the Contract, the Contractor shall submit for the Engineer's approval, a detailed estimate showing a breakdown of his bid for the work. This estimate when approved by the Engineer will be used in making up partial monthly estimates and may be used for computing changes. It shall show quantities, unit prices and amounts for all items of work that are involved in the construction and the sum of the amounts for each item of work shall equal the total bid for the work.

BARKER & WHEELER
Engineers

ALBANY — NEW YORK CITY

61-1297 Elmira Water Board

36 STATE ST.
ALBANY, N.Y.

July 6th, 1949.

N. Y. S. Department of Public Works
Gov. Alfred E. Smith State Office Bldg.
Albany, New York

Attention: Mr. Harry Clark

Subject: Changes in Hoffman Creek Spillway and Discharge Channel, Elmira Water Board, Elmira, New York.

Gentlemen:

In the Fall of 1947, the Water Board of the City of Elmira submitted for your approval plans showing proposed changes in Hoffman Creek Spillway and Discharge Channel. These plans were approved by your office.

During the course of the construction, it was decided to remove the wall which is marked, "This wall to remain" on Sheet No. 1. In this connection, a small plan was prepared showing how the work would be done. This plan is dated July 14th, 1948.

It was later decided also to remove the existing wall on the westerly side of the discharge channel and a drawing, No. 3A dated November 1948, was prepared for this purpose.

The work has now been completed in substantial accordance with the plans as changed, and we are enclosing with this letter one blueprint each of the two drawings covering the major changes in the construction work during the period of construction. This is in accordance with our telephone conversation of yesterday.

We trust that this is satisfactory.

Very truly yours,
BARKER & WHEELER

By J. K. Fraser
J. K. Fraser

JKF:DA
cc: Mr. John G. Copley

DAM INSPECTION REPORT
(By Visual Inspection)

Number	River Basin	Town	County	Hazard Class	Date & Inspector
-1297	Chemung	Elmira	Chemung	C	5/12/77 JSC

Stream = Hoffman Creek Owner = Elmira Water Board

Type of Construction

- [ ] Earth w/Concrete Spillway
- [ ] Earth w/Drop Inlet Pipe
- [ ] Earth w/Stone or Riprap Spillway
- [ ] Concrete
- [ ] Stone
- [ ] Timber
- [ ] Other _____

Use

- [x] Water Supply
- [ ] Power
- [ ] Recreation - [ ] High Density
- [ ] Fish and Wildlife
- [ ] Farm Pond
- [ ] No Apparent Use-Abandoned
- [ ] Flood Control
- [ ] Other _____

Estimated Impoundment Size 40 Acres## Estimated Height of Dam above Streambed 36 Ft.

Condition of Spillway

- [ ] Service satisfactory
- [ ] In need of repair or maintenance
- [ ] Auxiliary satisfactory
- [ ] In need of repair or maintenance

Explain: Cracks in spillway should be repaired

Condition of Non-Overflow Section

- [ ] Satisfactory
- [ ] In need of repair or maintenance

Explain: Trees growing on embankment. Embankment is so wide it probably won't effect the embankment

Condition of Mechanical Equipment

- [ ] Satisfactory
- [ ] In need of repair or maintenance

Explain: None

Siltation [ ] High [ ] Low

Explain: _____

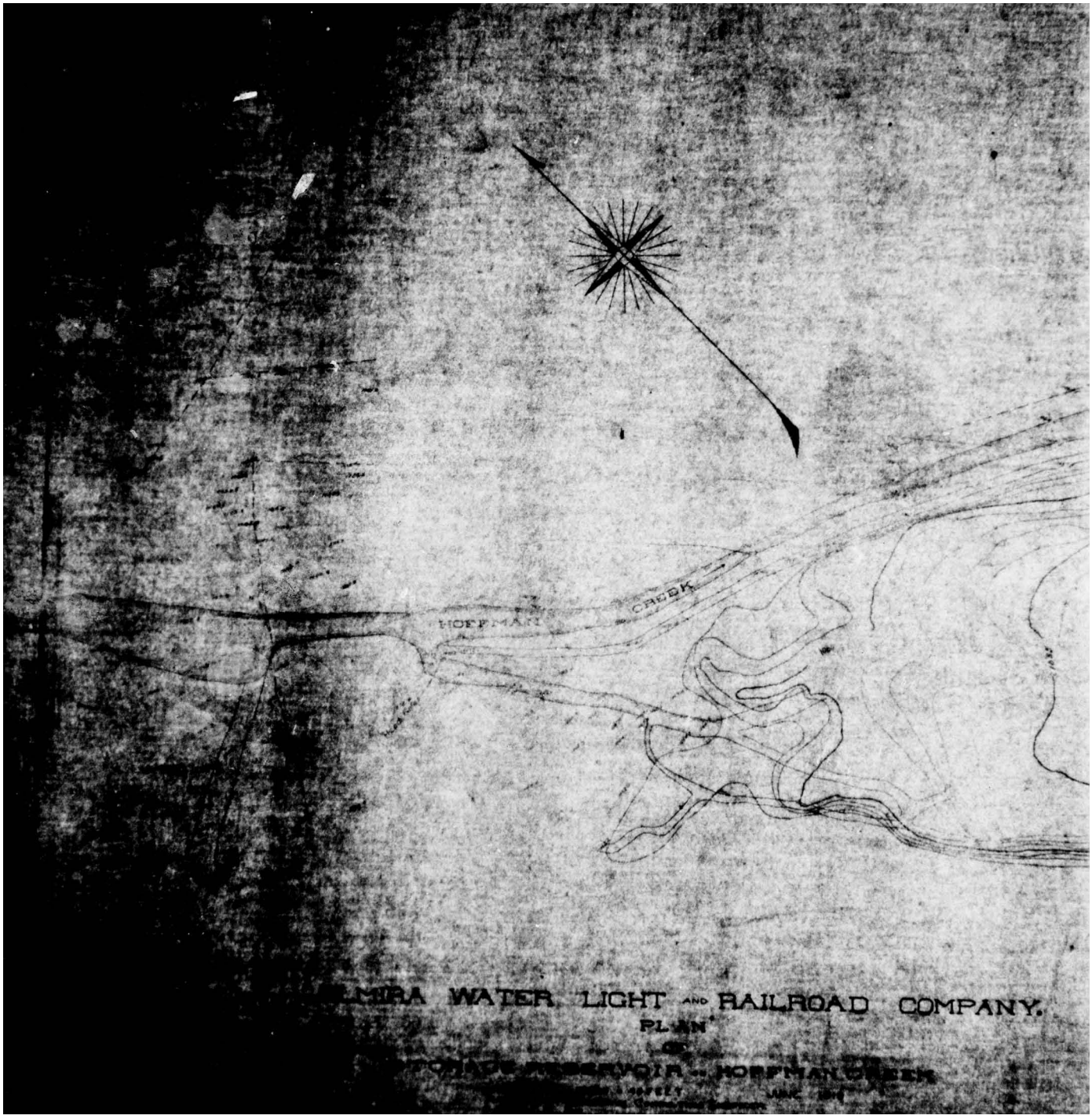
Remarks: Will write letter

Evaluation (From Visual Inspection)

Repairs req'd. beyond normal maint. [x] No defects observed beyond normal maint.

APPENDIX E

CONSTRUCTION DRAWINGS

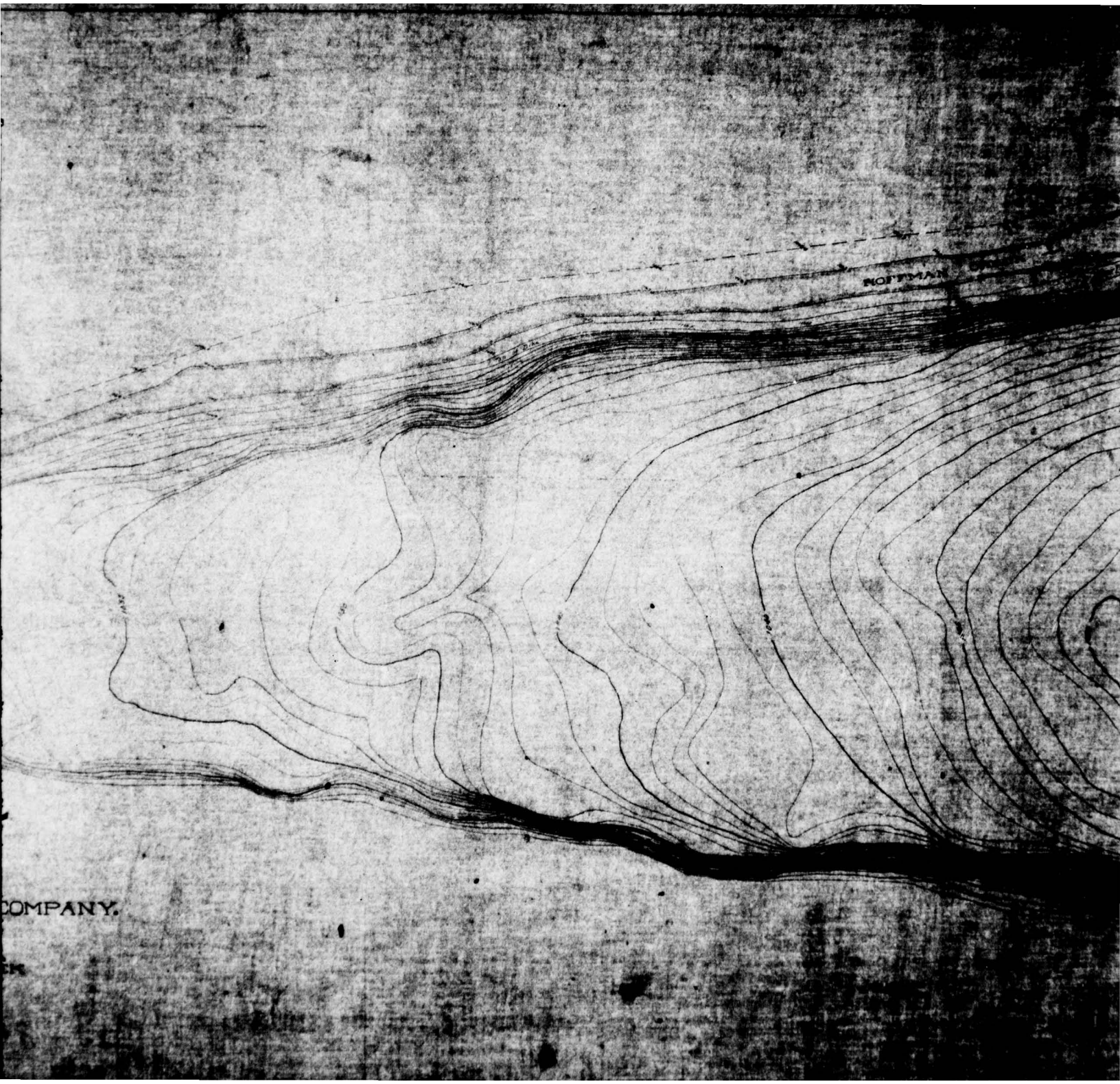


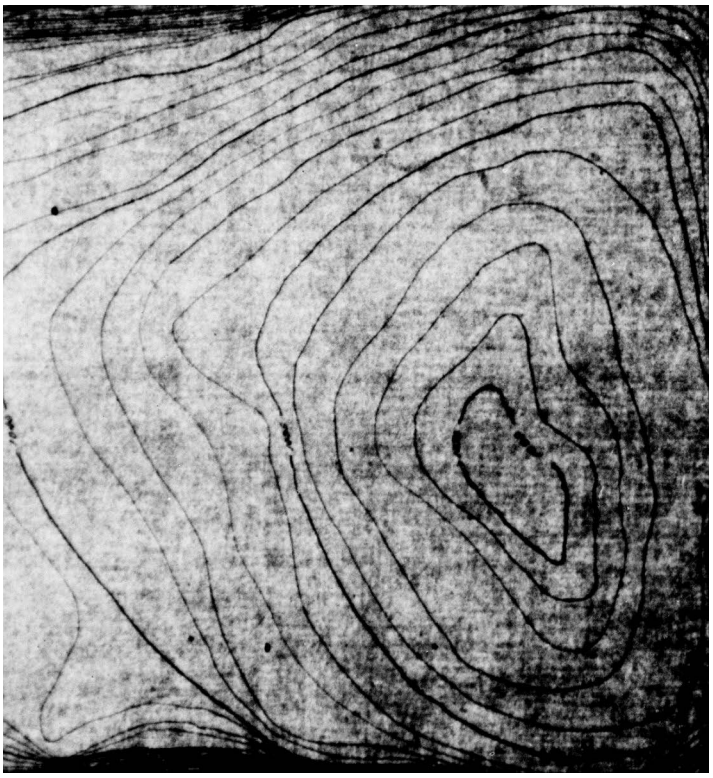
MIRA WATER LIGHT AND RAILROAD COMPANY.

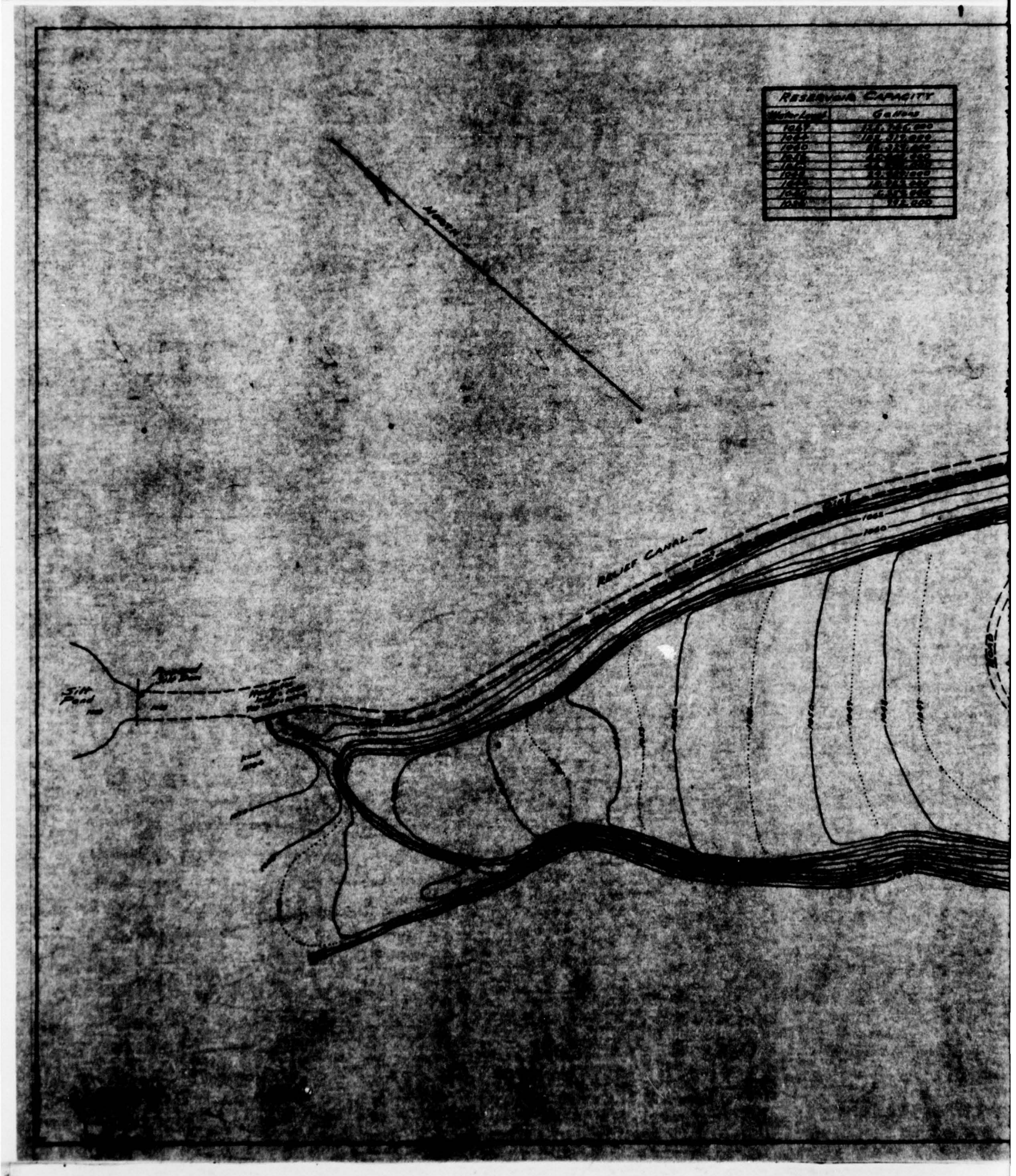
PLAN

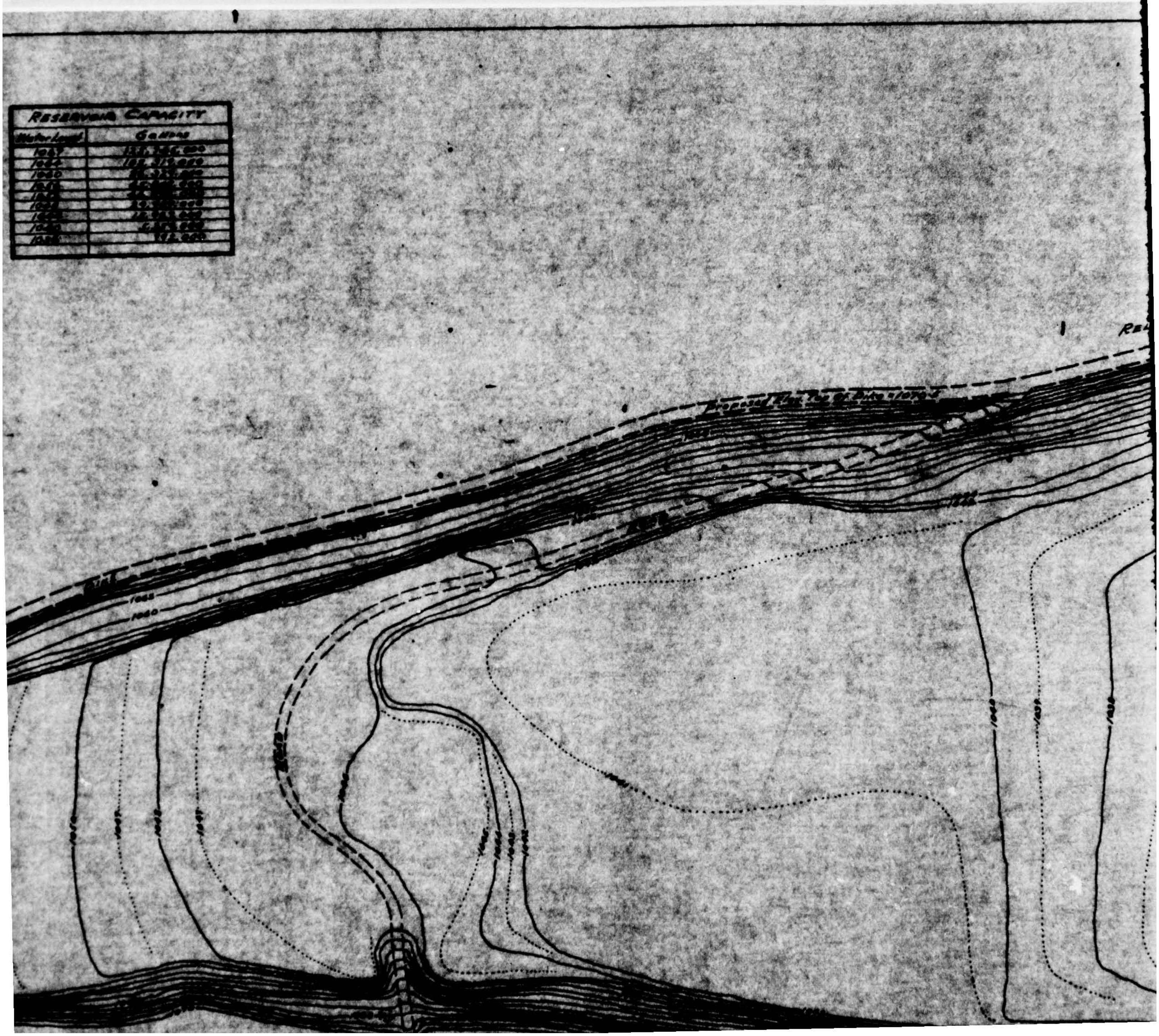
OF

RESERVOIR - HOFFMAN CREEK

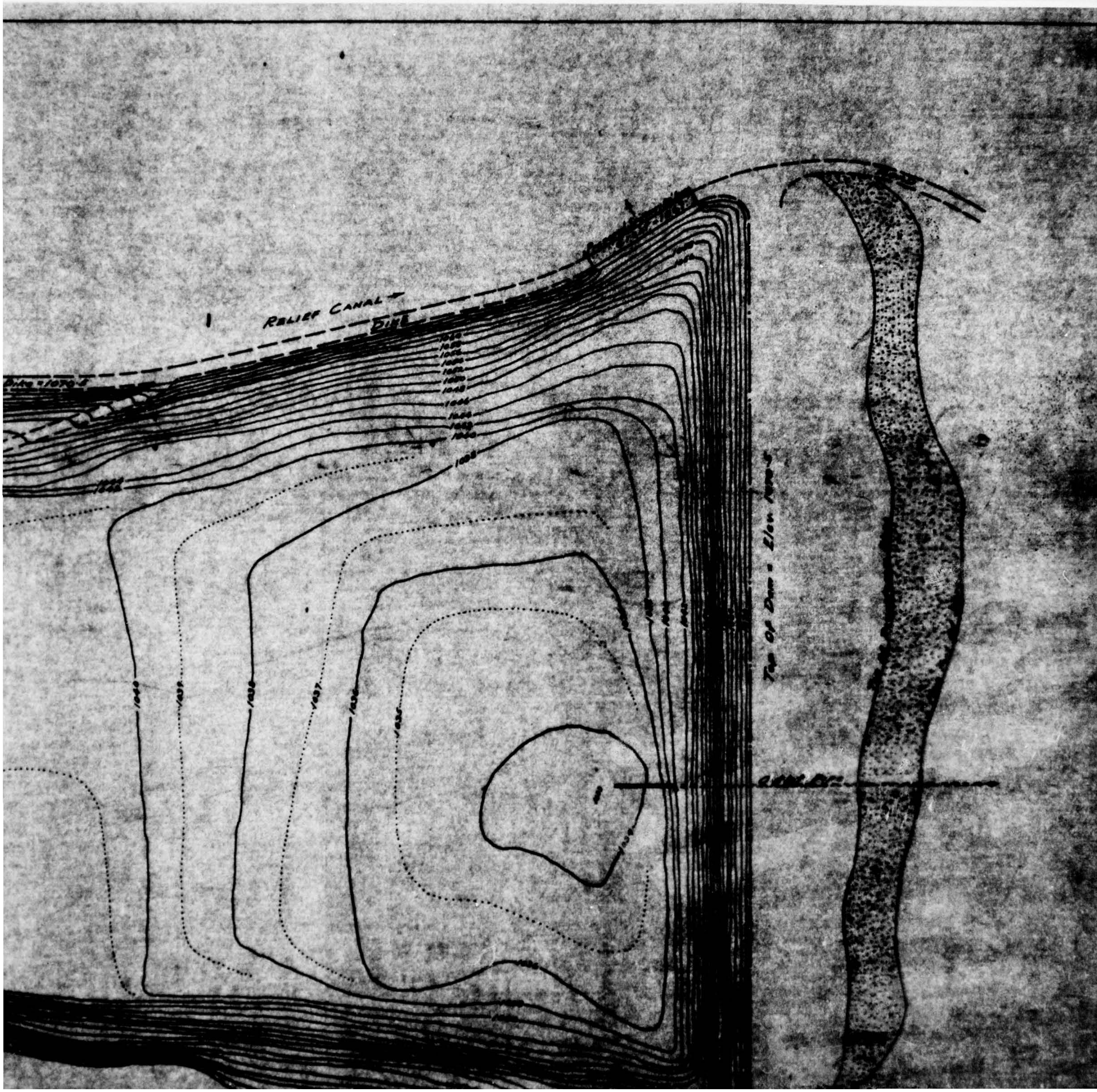

NORMAN
COMPANY.

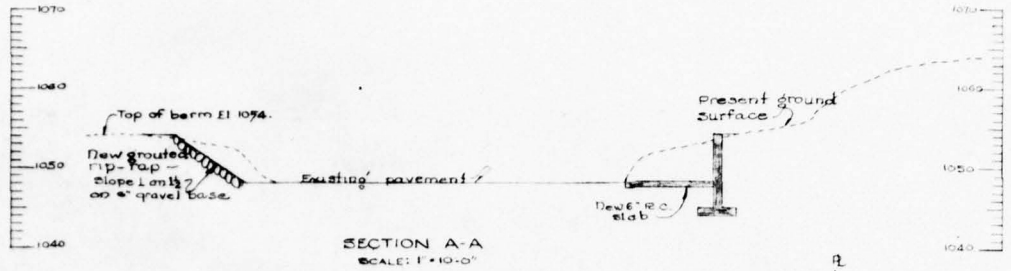



RESERVOIR CAPACITY
Water Level
Gallons
RELIEF CANAL
SILT POND

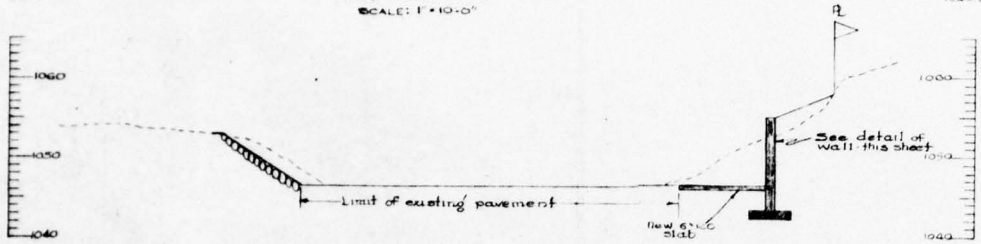


RESERVOIR CAPACITY	
Water Level	Gallons
[illegible]	[illegible]
1064	[illegible]
1060	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

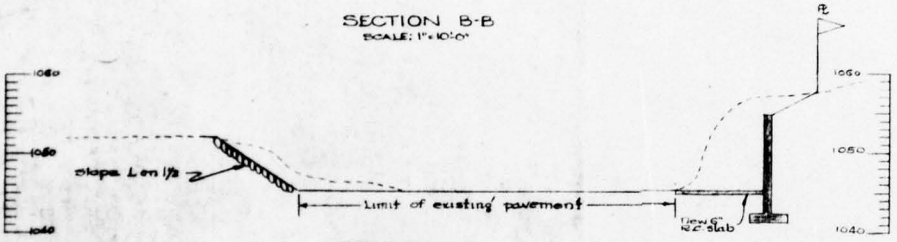

RELIEF CANAL
DIKE



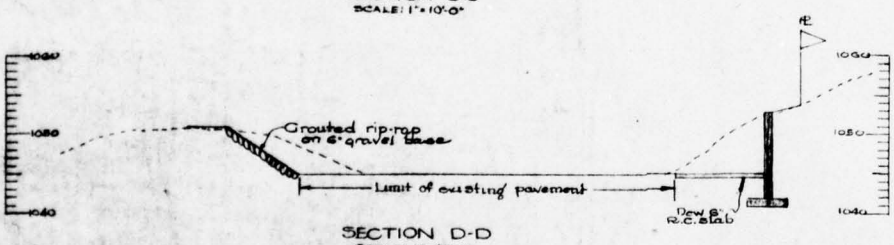
SECTION A-A
SCALE: 1" = 10'-0"



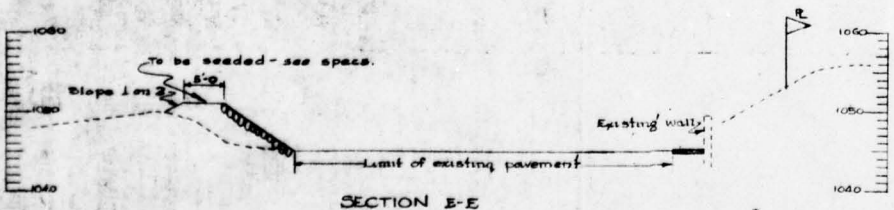
SECTION B-B
SCALE: 1" = 10'-0"



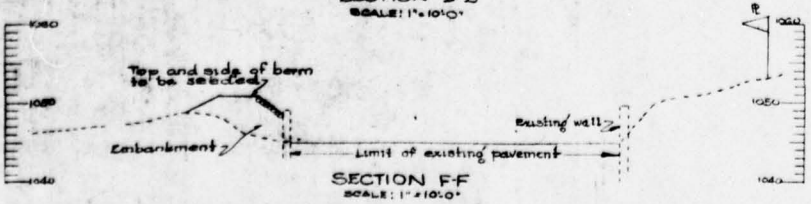
SECTION C-C
SCALE: 1" = 10'-0"



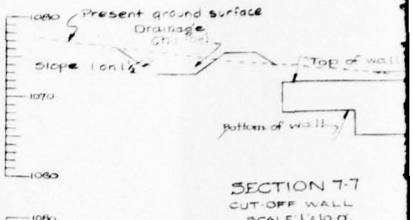
SECTION D-D
SCALE: 1" = 10'-0"



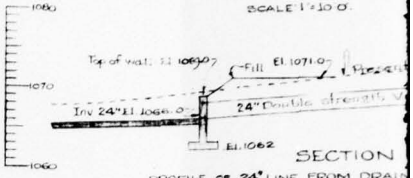
SECTION E-E
SCALE: 1" = 10'-0"



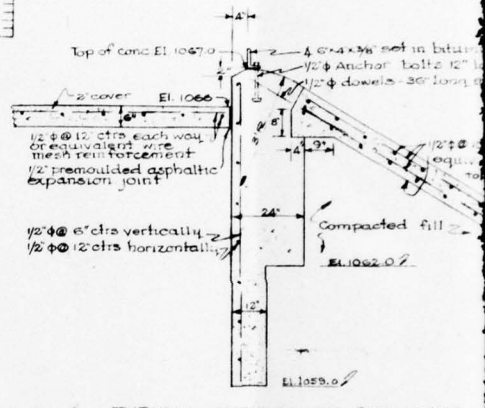
SECTION F-F
SCALE: 1" = 10'-0"



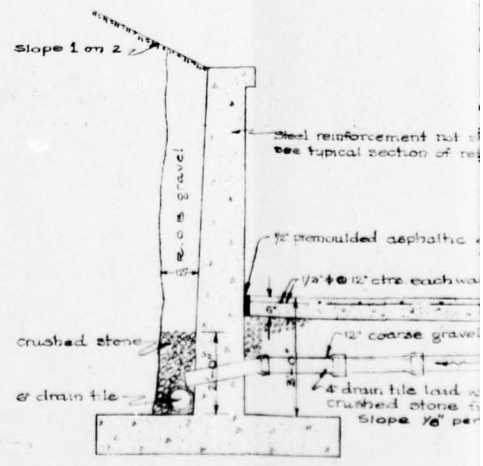
SECTION 7-7
CUT-OFF WALL
SCALE 1" = 10'-0"



SECTION
PROFILE OF 24" LINE FROM DRAIN
SCALE: 1

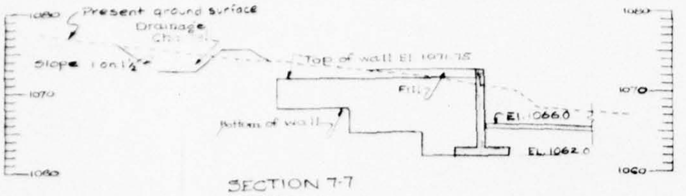


TYPICAL SECTION OF SPILLWAY
SCALE: ½" = 1'-0"

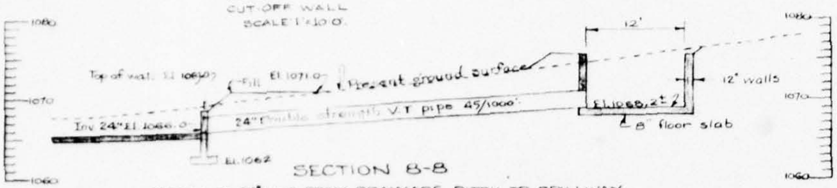


TYPICAL SECTION OF CHANNEL
SCALE: ½" = 1'-0"

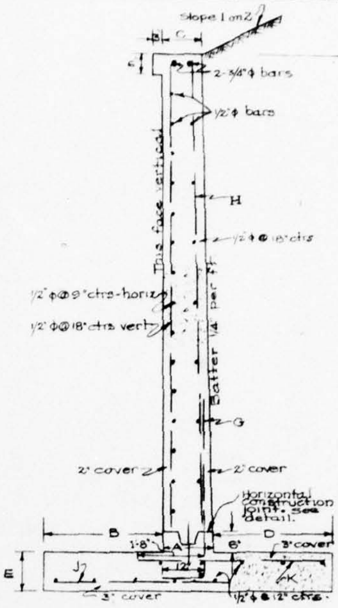
DRAWN BY: J.A.K.
TRACED BY: J.P.M.
CHECKED BY: R.W.V. J.K.F.



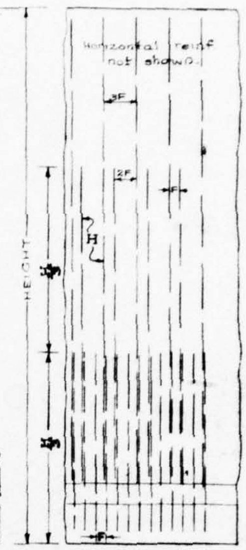
SECTION 7-7
CUT-OFF WALL
SCALE 1"=10'0"



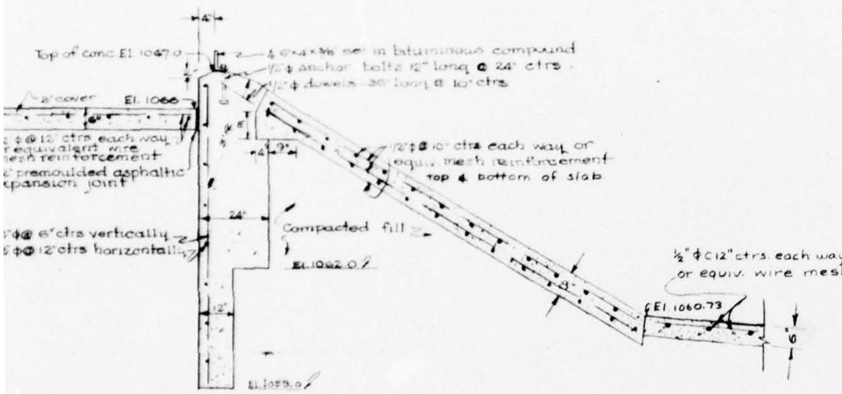
SECTION 8-8
PROFILE OF 24" LINE FROM DRAINAGE DITCH TO SPILLWAY
SCALE: 1"=10'-0"



TYPICAL SECTION OF RETAINING WALL
SCALE: 1/2" = 1'-0".



LONGITUDINAL SECTION OF RETAINING WALL SHOWING PLACEMENT OF REINFORCEMENT
SCALE: 1/2" = 1'-0"

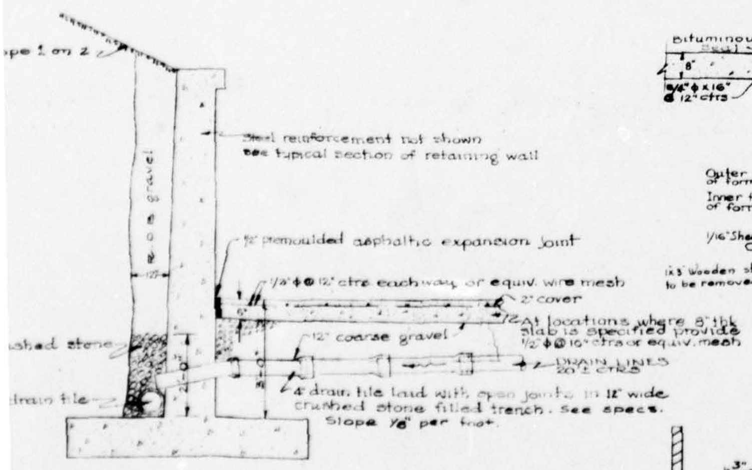


TYPICAL SECTION OF SPILLWAY
SCALE: 1/2"=1'-0".

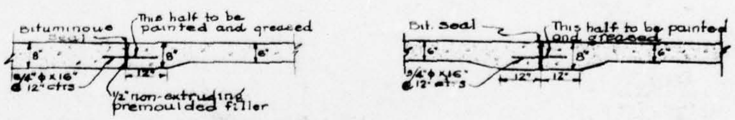
HEIGHT FROM	HEIGHT TO	A	B	C	D	E	F	G BARS	H BARS	J BARS	K BARS
5'-0"	6'-0"	as reqd	15"	8"	15"	12"	*	1/2"φ@ 12"	1/2"φ@ 12"	1/2"φ@ 12"	1/2"φ@ 12"
6'-0"	8'-0"	as reqd	18"	12"	18"	12"	*	1/2"φ@ 12"	1/2"φ@ 12"	1/2"φ@ 12"	1/2"φ@ 12"
9'-0"	15'-0"	as reqd	36"	12"	36"	12"	3/4"	1/2"φ@ 3/4"	1/2"φ SPACED AS INDICATED	1/2"φ@ 3 3/4"	1/2"φ@ 7 1/2"

* 1/2"φ @ 12" Vertically from construction joint to top of wall.

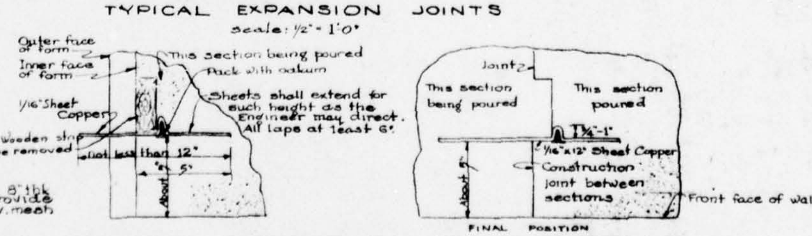
RETAINING WALL DIMENSION TABLE



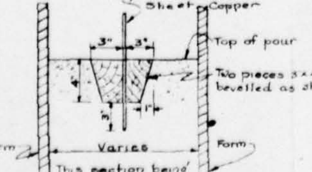
TYPICAL SECTION OF CHANNEL
SCALE: 1/2"=1'-0"



TYPICAL EXPANSION JOINTS
Scale: 1/2" = 1'0"



DETAIL OF PLACING COPPER STRIPS IN VERTICAL CONSTRUCTION JOINTS
Scale: 3"=1'0"



DETAIL OF HORIZONTAL JOINT WITH SHEET COPPER PROTECTION
Scale 1 1/2"=1'0"

ELMIRA WATER BOARD
CITY OF ELMIRA, N. Y.

CHANGES IN HOFFMAN CREEK SPILLWAY and DISCHARGE CHANNEL

PROFILES, SECTIONS and DETAILS

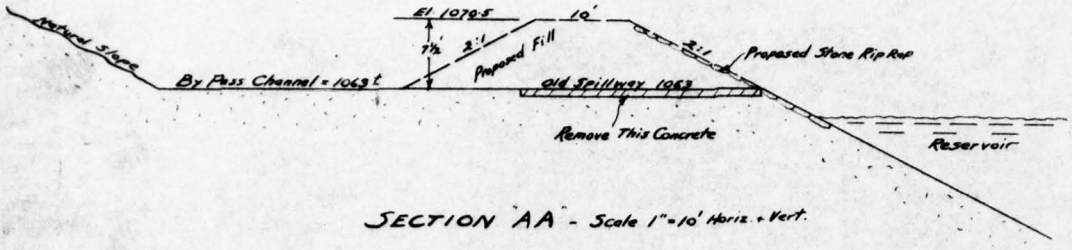
AUG 1947 | SCALES: AS INDICATED.

JAMES M. CAIRD

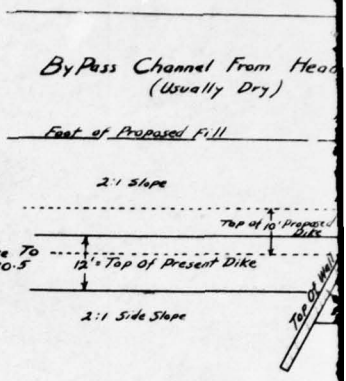
BARKER & WHEELER, Engineers
36 State St. – Albany, N.Y.
11 Park Pl. – New York

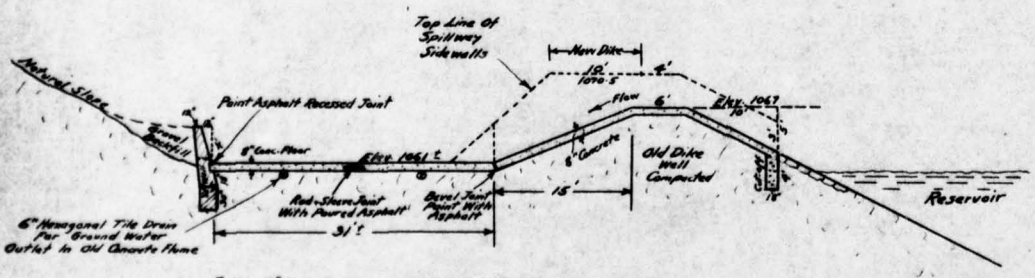
3 OF 3 SHEETS

2



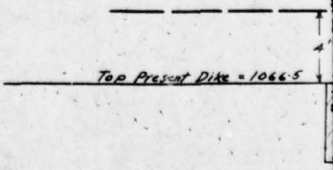
SECTION "AA" - Scale 1"=10' Horiz. + Vert.

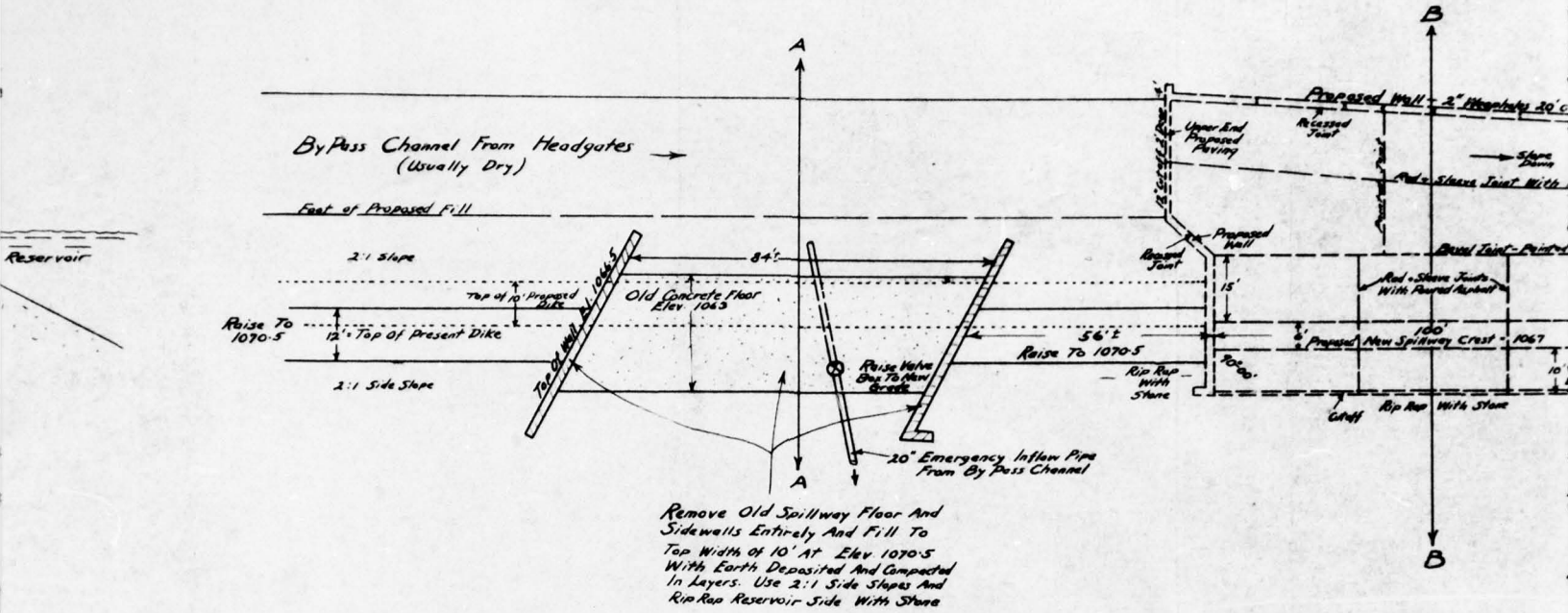




Entire 8" Concrete Slab To Be Reinforced With Steel Fabric 2" From Top, N.Y. State Highway Specif. Item 25-3. All Concrete 1:2:3½ Mix.

SECTION "BB" - Scale 1"=10' Horiz. = Vert.

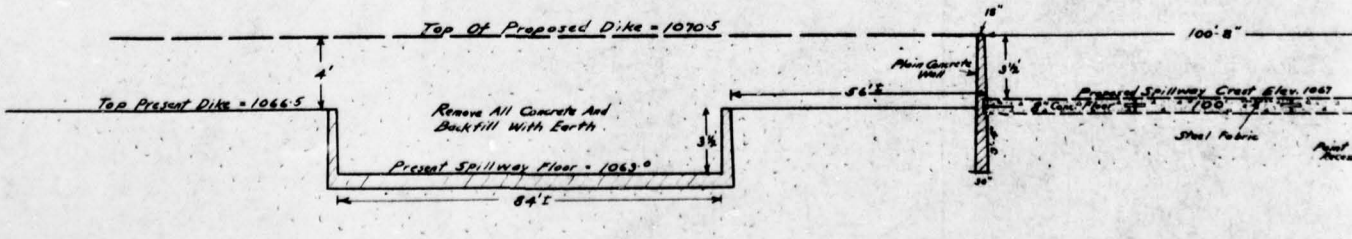




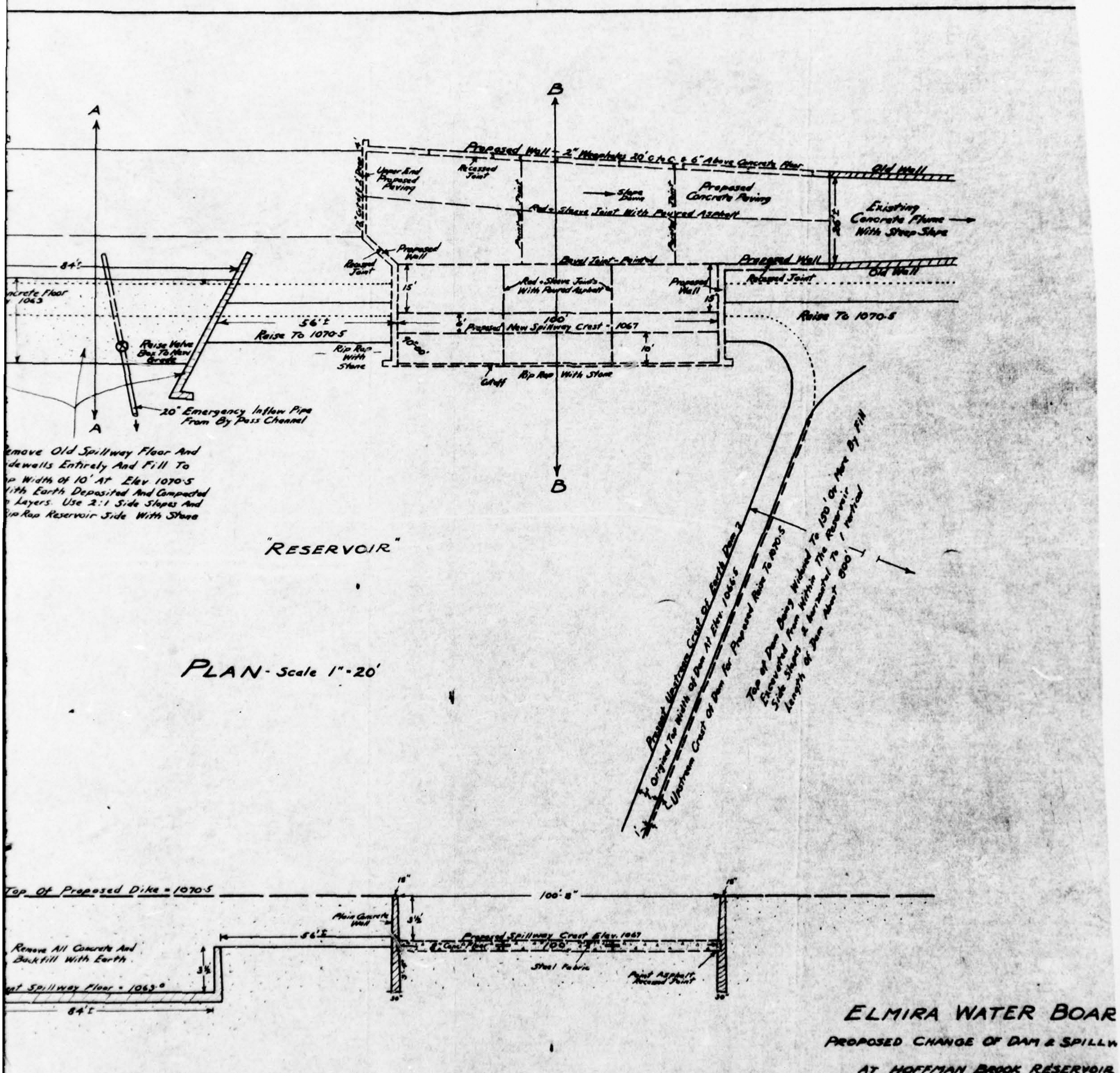
Remove Old Spillway Floor And Sidewalls Entirely And Fill To Top Width Of 10' At Elev 1070.5 With Earth Deposited And Compacted In Layers. Use 2:1 Side Slopes And Rip Rap Reservoir Side With Stone

"RESERVOIR"

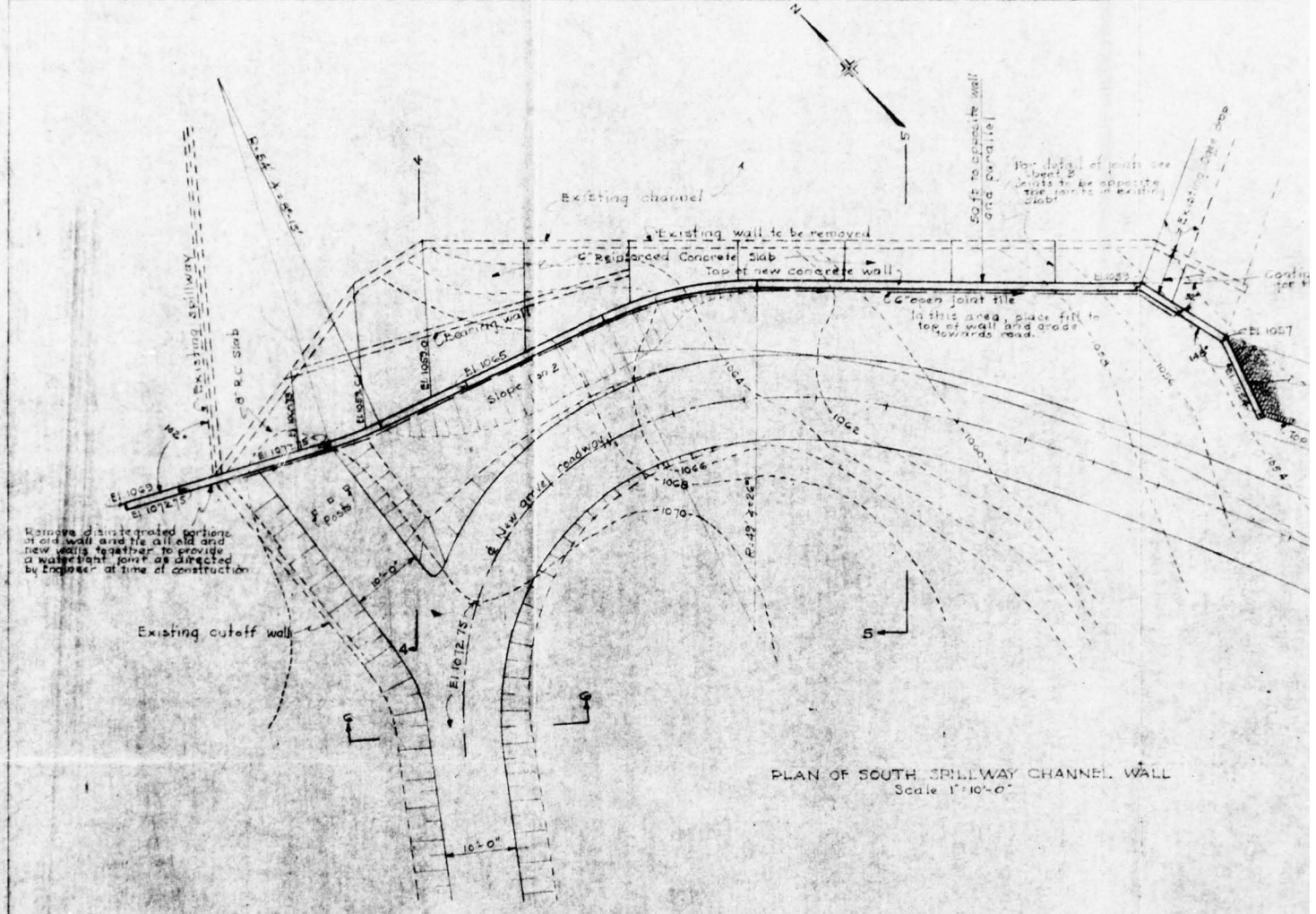
PLAN - Scale 1" = 20'



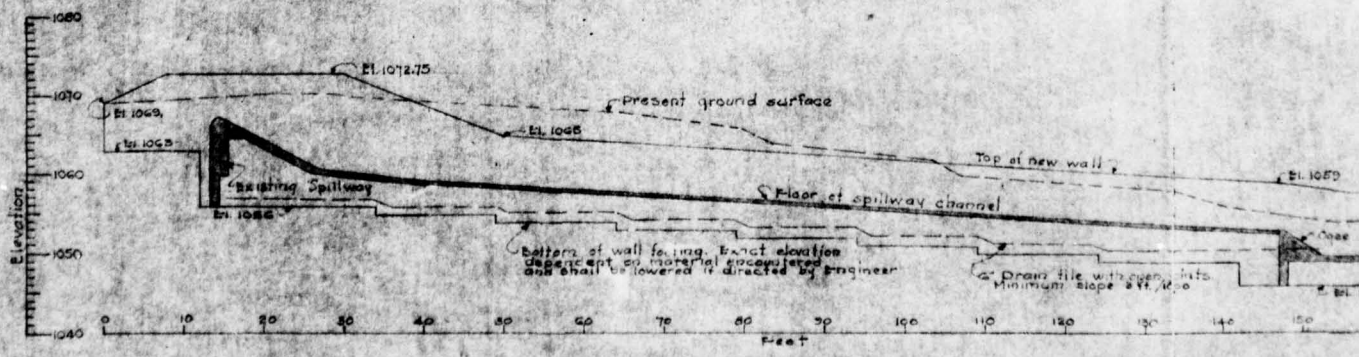
LONGITUDINAL SECTION ALONG CENTER OF SPILLWAY - { Horiz. Scale 1" = 20' / Vert. Scale 1" = 5'


Proposed Wall - 2" Weepholes 20' C to C & 6" Above Concrete Floor
Old Wall
Upper End Proposed Paving
Recessed Joint
Slope Down
Proposed Concrete Paving
Rod & Sleeve Joint With Poured Asphalt
Existing Concrete Flume With Steep Slope
Proposed Wall
Bevel Joint - Painted
Proposed Wall
Old Wall
Recessed Joint
Rod & Sleeve Joints With Poured Asphalt
Proposed Wall
Proposed New Spillway Crest - 1067
Raise To 1070.5
Raise To 1070.5
Rip Rap With Stone
Rip Rap With Stone
Raise Valve Box To New Grade
20" Emergency Inflow Pipe From By Pass Channel
Remove Old Spillway Floor And Sidewalls Entirely And Fill To Top Width of 10' At Elev 1070.5 With Earth Deposited And Compacted In Layers. Use 2:1 Side Slopes And Rip Rap Reservoir Side With Stone
"RESERVOIR"
PLAN - Scale 1" = 20'
Present Upstream Crest of Earth Dam
Original Top Width of Dam At Elev. 1066.5
Upstream Crest Of Dam For Proposed Raise To 1070.5
Top of Dam Being Widened To 15' Or More By Fill Excavated From Within The Reservoir Side Slopes 2 horizontal To 1 vertical Length of Dam About 800'
Top Of Proposed Dike = 1070.5
100' 8"
Plain Concrete Wall
Proposed Spillway Crest Elev. 1067
56'±
Remove All Concrete And Backfill With Earth
Steel Fabric
Paint Asphalt Recessed Joint
Present Spillway Floor - 1063.0
84'±
LONGITUDINAL SECTION ALONG CENTER OF SPILLWAY - Horiz. Scale 1" = 20' Vert. Scale 1" = 5'
ELMIRA WATER BOARD
PROPOSED CHANGE OF DAM & SPILLWAY
AT HOFFMAN BROOK RESERVOIR
Town Of Elmira, Chemung Co.
Scales As Shown
August 18, 1930
Carl Crandall, C.E.

3

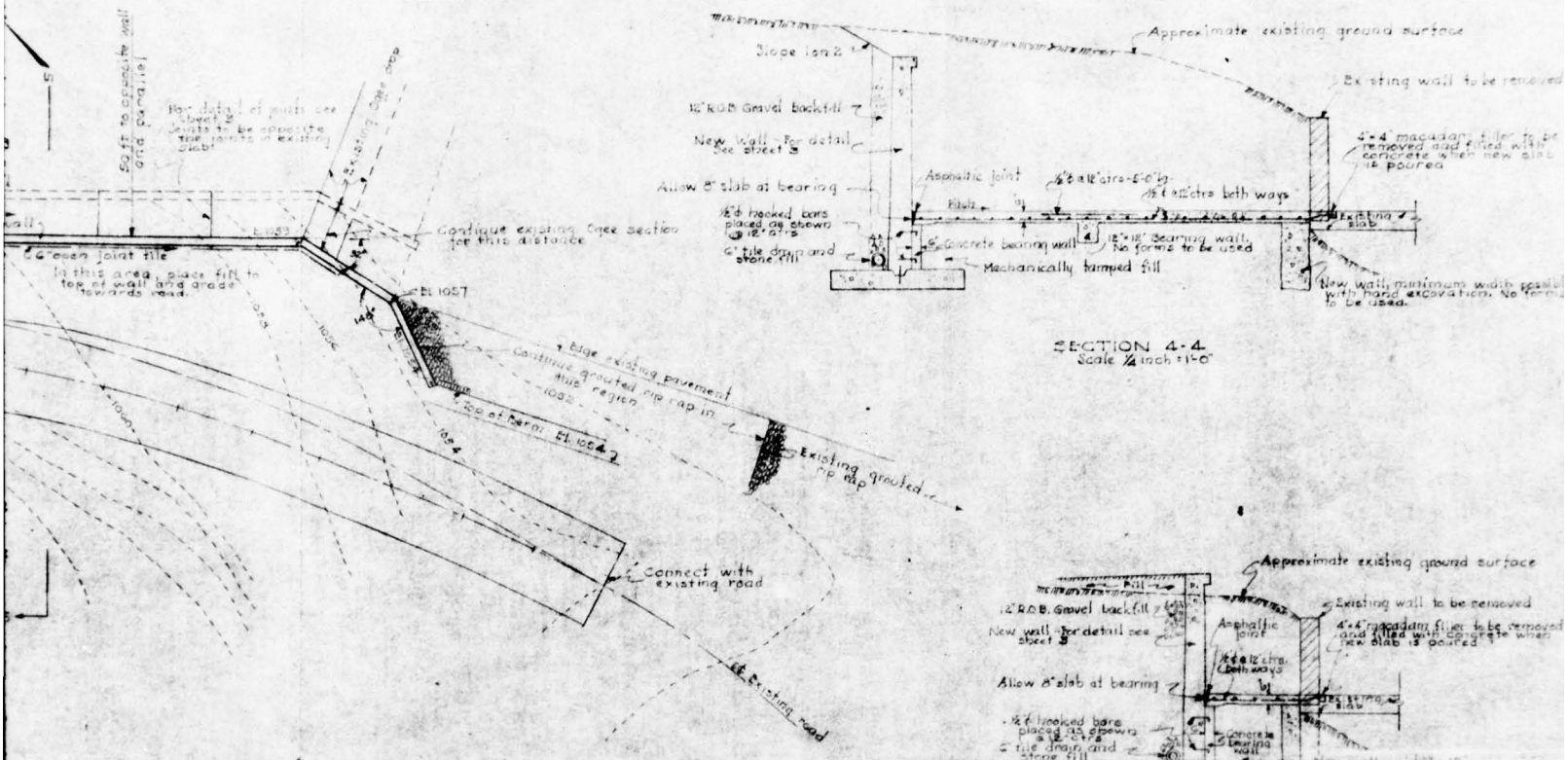


PLAN OF SOUTH SPILLWAY CHANNEL WALL
Scale 1"=10'-0"



PROFILE OF SOUTH SPILLWAY CHANNEL WALL
Scale 1 inch = 10'-0"

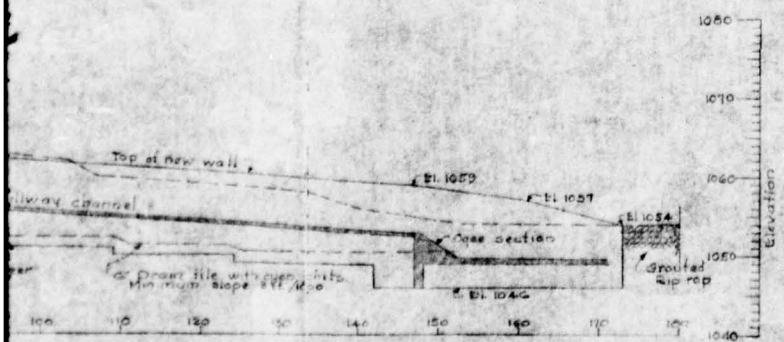
DRAWN BY : R.V.V.
TRACED BY : F.W.O.
CHECKED BY : RVV JCF



SOUTH SPILLWAY CHANNEL WALL
Scale 1"=10'-0"

SECTION 4-4
Scale ½ inch = 1'-0"

SECTION 5-5
Scale ½ inch = 1'-0"



Y CHANNEL WALL

Note: This sheet supersedes details pertaining to South Channel Spillway Wall shown on Sheets 1, 2 and 3 of plans dated Aug. 1947

ELMIRA WATER BOARD

CITY OF ELMIRA, N.Y.

CHANGES IN HOFFMAN CREEK SPILLWAY & DISCHARGE CHANNEL

PLAN, PROFILE AND SECTIONS OF REVISED LOCATION - SOUTH SPILLWAY WALL

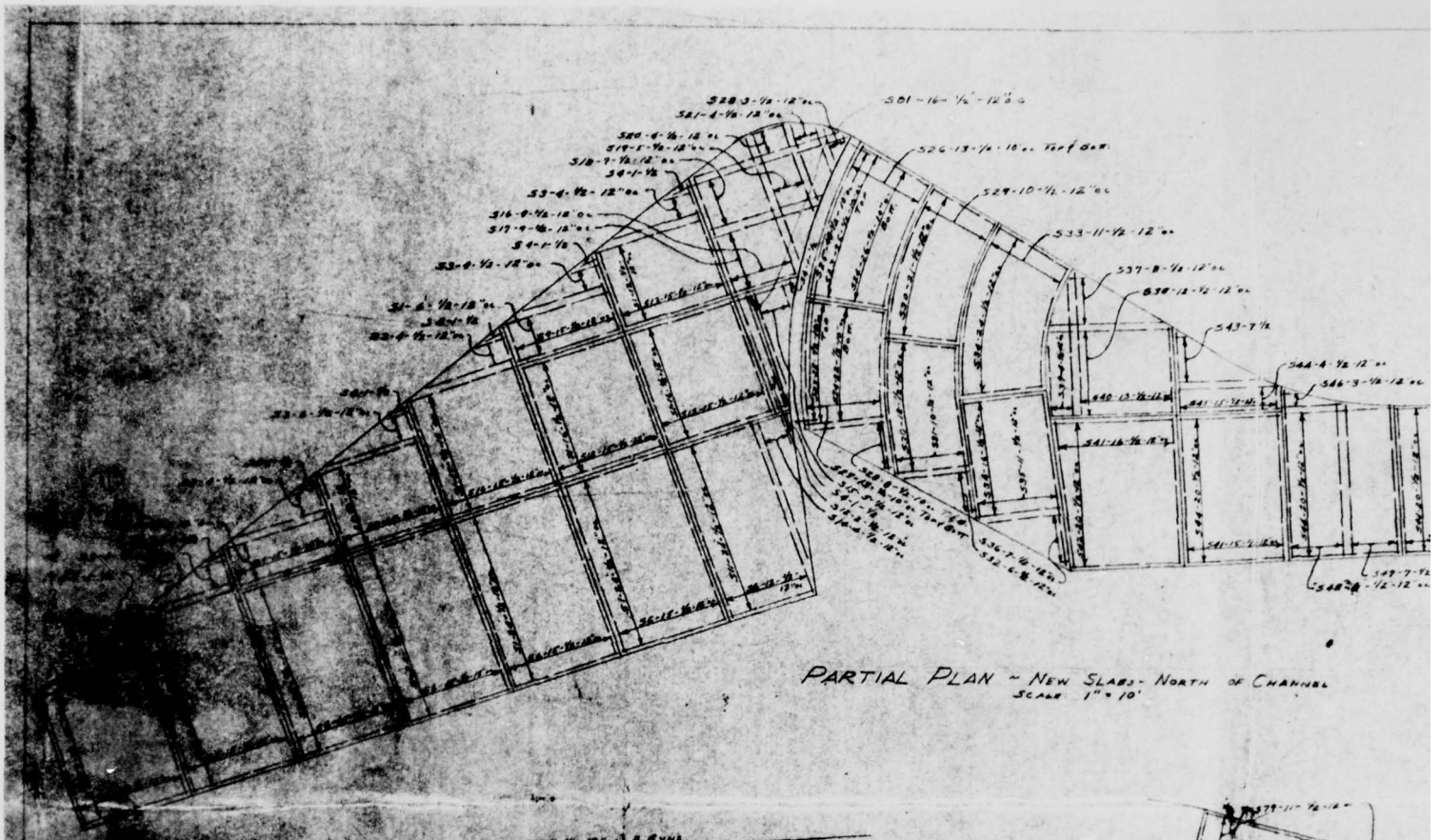
NOV. 1948

SCALES AS NOTED

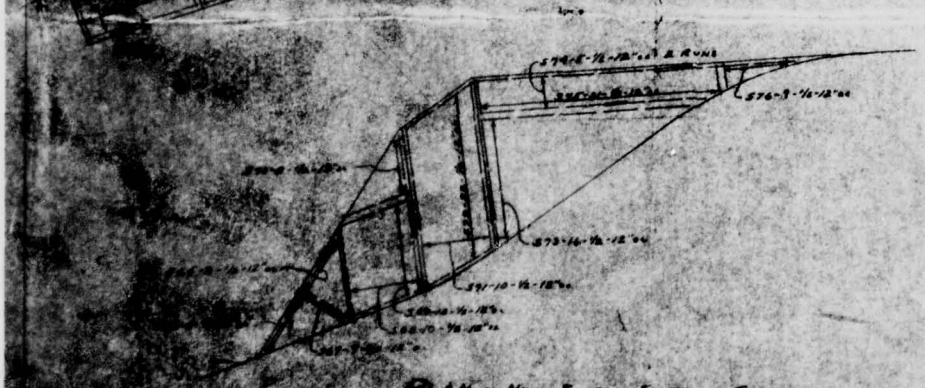
JAMES M. CAIRD
TROY, N.Y.

BARKER & WHEELER
Engineers
26 STATE ST. ALBANY, N.Y.
11 PARK PL., NEW YORK

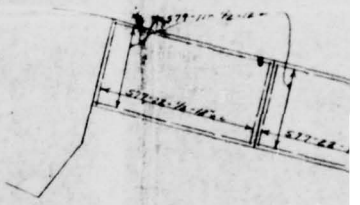
2



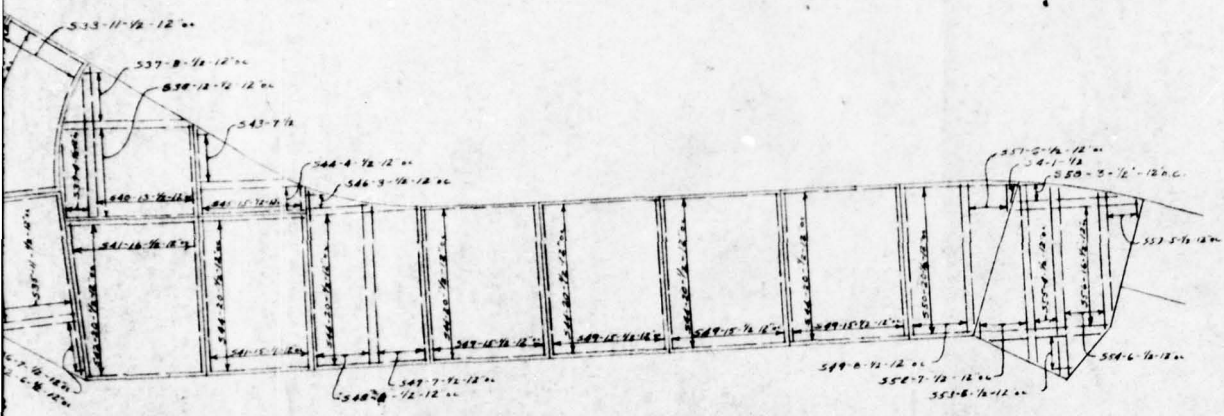
PARTIAL PLAN ~ NEW SLABS - NORTH OF CHANNEL
SCALE: 1" = 10'



PLAN ~ NEW SLABS - SOUTH OF CHANNEL
SCALE: 1" = 10'



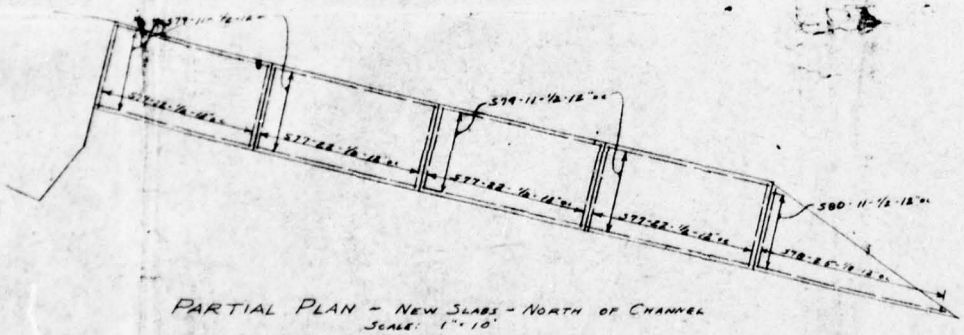
PARTIAL PLAN



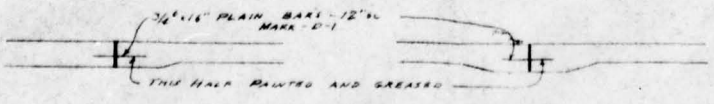
NEW SLABS - NORTH OF CHANNEL
SCALE 1" = 10'

MARK	NO	SIZE	LENGTH
575	31	½"	3'6" & 21'2"
576	9	do	10'6" & 3'0"
577	88	do	10'8"
578	25	do	10'6" & 10'0"
579	44	do	21'2"
580	11	do	2'0" & 8'5"
D-1	240	¾	1'4"
581	16	⅜	2'-6" to 8'-6"

* D1 - PLAIN ROUND BAR



PARTIAL PLAN - NEW SLABS - NORTH OF CHANNEL
SCALE: 1" = 10'



DETAIL OF EXPANSION JOINTS
SCALE: ½" = 1'0"

MARK	NO	SIZE	LENGTH
31	225	½"	14'8"
32	15	do	18'8" & 21'0"
33	7+4	do	9'6" & 12'6"
34	10	do	2'6"
35	15	do	24'5" & 27'6"
36	72	do	23'8"
37	15	do	6'10" & 10'9"
38	15	do	10'11" & 16'6"
39	15	do	6'8" & 10'8"
310	15	do	16'8" & 22'0"
311	24	do	11'6" & 16'6"
312	32	do	16'0"
313	15	do	10'4" & 15'7"
314	4	do	5'6" & 20'6"
315	5	do	36'6" & 13'6"
316	7	do	14'8" & 19'6"
317	9	do	8'8" & 14'8"
318	7	do	15'6" & 21'6"
319	5	do	12'6" & 18'4"
320	4	do	7'8" & 21'0"
321	4	do	6'6" & 11'0"
322	3	do	1'9" & 5'4"
323	48	do	10'8"
324	48	do	11'0"
325	48	do	3'0"
326	26	do	16'6" & 21'0"
327	26	do	17'0" & 21'6"
328	16	do	2'0" & 9'8"
329	10	do	16'0" & 20'8"
330	39	do	9'6"
331	10	do	18'0" & 22'6"
332	6	do	20'6" & 8'6"
333	11	do	3'6" & 23'6"
334	40	do	11'0"
335	11	do	15'9" & 22'6"
336	7	do	20'6" & 9'0"
337	8	do	26'6" & 14'8"
338	12	do	16'2"
339	4	do	9'6" & 18'0"
340	13	do	11'6" & 19'6"
341	31	do	19'6"
342	20	do	18'6" & 16'0"
343	7	do	20'6" & 11'6"
344	124	do	14'6"
345	15	do	2'4" & 10'10"
346	3	do	2'6" & 8'6"
347	7	do	19'6" & 20'0"
348	8	do	20'8" & 22'6"
349	68	do	19'0"
350	20	do	20'6" & 14'6"
351	6	do	24'6" & 18'0"
352	7	do	2'0" & 22'0"
353	5	do	2'0" & 14'6"
354	6	do	17'6" & 23'6"
355	4	do	22'6" & 23'6"
356	16	do	16'2" & 14'0"
357	5	do	2'0" & 12'6"
358	3	do	3'6" & 14'0"
365	8	do	2'0" & 7'8"
366	9	do	2'0" & 7'0"
367	7	do	2'0" & 14'2"
368	10	do	11'6" & 20'2"
369	12	do	9'6"
370	8	do	2'0" & 8'6"
371	10	do	20'2" & 21'6"
372	22	do	10'6"
373	16	do	2'0" & 24'6"
374	2+5	do	15'6" & 22'6"

ELMIRA WATER BOARD

CITY OF ELMIRA, N.Y.

CHANGES IN HOFFMAN CREEK SPILLWAY AND DISCHARGE CHANNEL

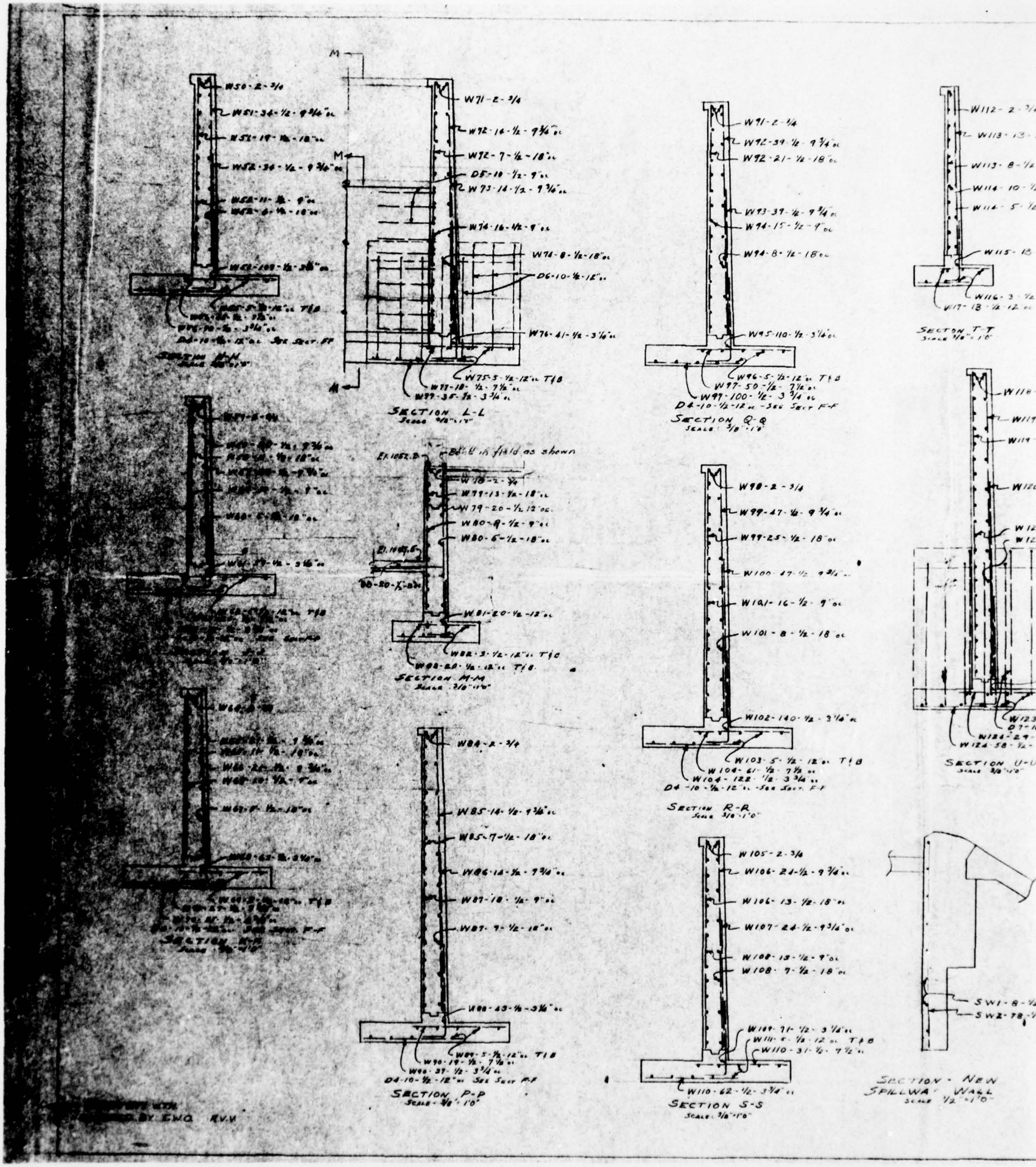
REINFORCING STEEL DETAILS

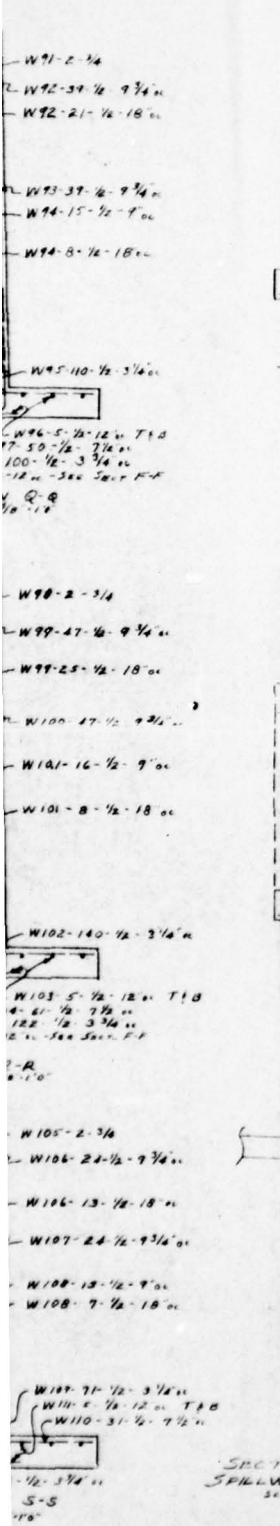
JUNE 1948

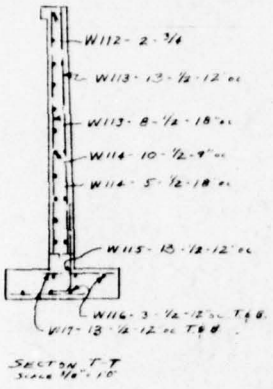
SCALES: AS INDICATED

BARKER & WHEELER
ENGINEERS
36 STATE ST. - ALBANY, N.Y.
11 PARK PL. - NEW YORK

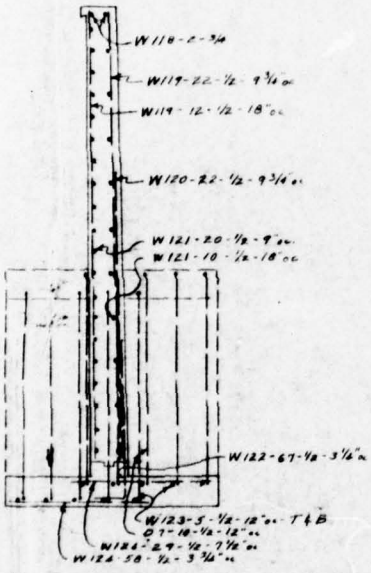
Sheet 1 of 2


W71-2-3/4
W72-16-1/2-9 3/4" oc
W72-7-1/2-18" oc
D5-10-1/2-9" oc
W73-16-1/2-9 3/4" oc
W74-16-1/2-9" oc
W74-8-1/2-18" oc
D6-10-1/2-12" oc
W76-41-1/2-3 1/4" oc
W75-5-1/2-12" oc T&B
SECTION L-L
W91-2-1/4
W92-39-1/2-9 3/4" oc
W92-21-1/2-18" oc
W93-39-1/2-9 3/4" oc
W94-15-1/2-9" oc
W94-8-1/2-18" oc
W95-110-1/2-3 1/4" oc
W96-5-1/2-12" oc T&B
W97-50-1/2-7 1/2" oc
W97-100-1/2-3 3/4" oc
D4-10-1/2-12" oc - See Sect F-F
SECTION Q-Q
SCALE: 3/8"=1'0"
SECTION T-T
Build in field as shown
W78-2-3/4
W79-13-1/2-18" oc
W79-20-1/2 12" oc
W80-9-1/2-9" oc
W80-6-1/2-18" oc
W81-20-1/2-12" oc
SECTION M-M
W98-2-3/4
W99-47-1/2-9 3/4" oc
W99-25-1/2-18" oc
W101-16-1/2-9" oc
W101-8-1/2-18" oc
W102-140-1/2-3 1/4" oc
W103-5-1/2-12" oc T&B
W104-122-1/2-3 3/4" oc
D4-10-1/2-12" oc - See Sect F-F
SECTION R-R
SECTION U-U
W84-2-3/4
W85-14-1/2-9 3/4" oc
W85-7-1/2-18" oc
W86-14-1/2-9 3/4" oc
W87-18-1/2-9" oc
W87-9-1/2-18" oc
D4-10-1/2-12" oc See Sect F-F
SECTION P-P
W105-2-3/4
W106-24-1/2-9 3/4" oc
W106-13-1/2-18" oc
W107-24-1/2-9 3/4" oc
W108-15-1/2-9" oc
W108-7-1/2-18" oc
W110-31-1/2-7 1/2" oc
W110-62-1/2-3 3/4" oc
SECTION S-S
SCALE: 3/8"=1'0"
SECTION - NEW SPILLWAY WALL
SCALE 1/2"=1'0"
BY EWO RVV

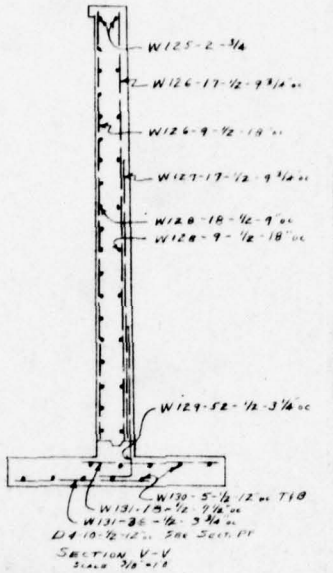




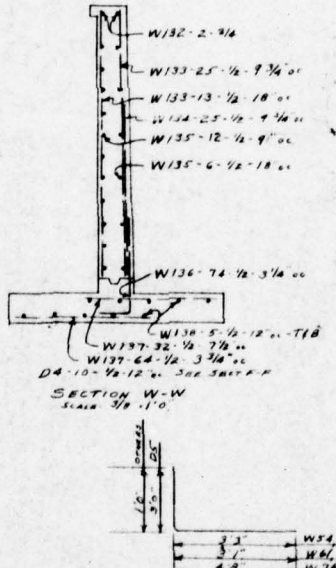
SECTION T-T
SCALE 1/8" = 1'0"



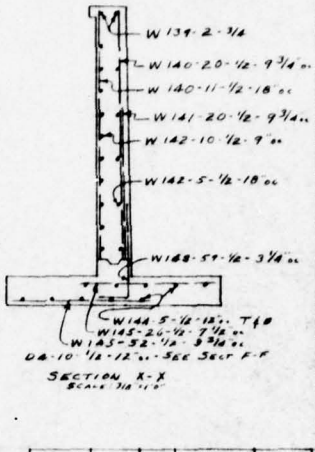
SECTION U-U
SCALE 3/8" = 1'0"



SECTION V-V
SCALE 3/8" = 1'0"



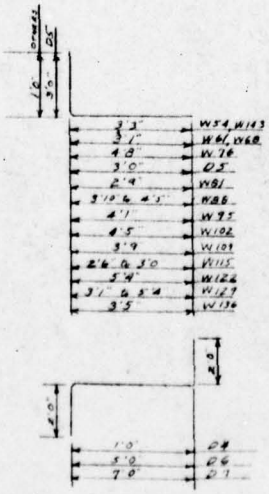
SECTION W-W
SCALE 3/8" = 1'0"

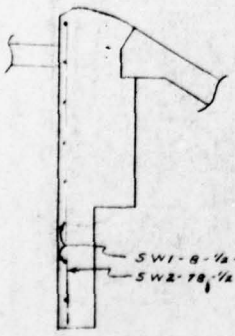


SECTION X-X
SCALE 3/8" = 1'0"

MARK	No	SIZE	LENGTH	TYPE
W120	22	1/2	10'-3"	ST
W121	30	1/2	19'8"	ST
W122	67	1/2	6'4"	L
W123	10	1/2	22'0"	ST
W124	87	1/2	5'0"	ST
W125	2	3/4	22'0"	
W126	17+9	1/2	84'6 15"	ST
W127	17	1/2	5'6"&10'0"	ST
W128	27	1/2	16'-0"	ST
W129	52	1/2	4'6"&6'4"	L
W130	10	1/2	10'6"	ST
W131	54	1/2	5'0"	ST
W132	4	3/4	27'6"	ST
W133	2(25+13)	1/2	710 6'4"	ST
W134	2+25	1/2	64'6"+2'	ST
W135	36	1/2	21'0"	ST
W136	148	1/2	4'5"	L
W137	192	1/2	5'0"	ST
W138	20	1/2	20'6"	ST
W139	2	3/4	16'-0"	ST
W140	20+11	1/2	7'10"&8'10"	ST
W141	20	1/2	4'8"&5'4"	ST
W142	15	1/2	17'0"	ST
W143	59	1/2	4'3"	L
W144	10	1/2	15'8"	ST
W145	78	1/2	5'0"	ST
D5	10	1/2	6'0"	L
D6	10	1/2	9'0"	
D7	10	1/2	11'0"	
SW1	8	1/2	38'6"	ST
SW2	78	1/2	7'6"	ST
D4	90	1/2	5'0"	
D8	20	1/2	2'8"	ST

MARK	No	SIZE	LENGTH	TYPE
W50	2	3/4	30'8"	ST
W51	34+9	1/2	74'&8'10"	ST
W52	34	1/2	44'&5'4"	ST
W53	17	1/2	29'10"	ST
W54	107	1/2	4'3"	L
W55	10	1/2	28'6"	ST
W56	135	1/2	5'0"	ST
W57	4	3/4	18'8"	ST
W58	2(24+1)	1/2	74'&84'	ST
W59	40	1/2	44'&5'0"	ST
W60	30	1/2	17'10"	ST
W61	138	1/2	4'1"	L
W62	20	1/2	16'6"	ST
W63	154	1/2	5'0"	ST
W64	2	3/4	19'8"	ST
W65	21+4	1/2	9'6"&84"	ST
W66	21	1/2	44'&5'0"	ST
W67	15	1/2	18'10"	ST
W68	63	1/2	4'1"	L
W69	10	1/2	17'6"	ST
W70	82	1/2	5'0"	ST
W71	2	3/4	13'-6"	ST
W72	41+7	1/2	124'&134'	ST
W73	14	1/2	78'&80'	ST
W74	24	1/2	1270"	ST
W75	10	1/2	11'6"	ST
W76	41	1/2	5'8"	L
W77	53	1/2	5'0"	ST
W78	2	3/4	20'6"	ST
W79	33	1/2	8'0"	ST
W80	14	1/2	19'10"	ST
W81	20	1/2	3'9"	L
W82	6	1/2	20'-0"	ST
W83	40	1/2	3'1"	ST
W84	2	3/4	13'0"	ST
W85	41+7	1/2	124'&134'	ST
W86	14	1/2	67'&78'	ST
W87	27	1/2	12'6"	ST
W88	63	1/2	470"&5'5"	L
W89	10	1/2	11'2"	ST
W90	56	1/2	5'0"	ST
W91	2	3/4	34'-10"	ST
W92	60	1/2	11'4"	ST
W93	39	1/2	7'0"	ST
W94	23	1/2	33'6"	ST
W95	116	1/2	5'1"	L
W96	10	1/2	31'10"	ST
W97	150	1/2	5'0"	ST
W98	2	3/4	89'6"	ST
W99	72	1/2	12'4"	ST
W100	47	1/2	7'8"	ST
W101	24	1/2	39'-9"	ST
W102	140	1/2	5'5"	L
W103	10	1/2	38'-9"	ST
W104	183	1/2	5'0"	ST
W105	2	3/4	22'-0"	ST
W106	37	1/2	10'4"	ST
W107	24	1/2	7'9"	ST
W108	20	1/2	21'-3"	ST
W109	71	1/2	4'9"	L
W110	93	1/2	5'0"	ST
W111	10	1/2	21'3"	ST
W112	2	3/4	15'6"	
W113	13+8	1/2	42'6"&1'	ST
W114	15	1/2	13'6"	ST
W115	18	1/2	3'6"&4'0"	L
W116	6	1/2	12'-0"	ST
W117	26	1/2	3'1"	ST
W118	2	3/4	18'0"	ST
W119	34	1/2	16'1"	ST





SECTION - NEW SPILLWAY WALL
SCALE 1/2" = 1'0"

ELMIRA WATER BOARD

CITY OF ELMIRA, N.Y.

CHANGES IN HOFFMAN CREEK SPILLWAY AND DISCHARGE CHANNEL

REINFORCING STEEL DETAILS

JUNE 1948

SCALES: AS INDICATED

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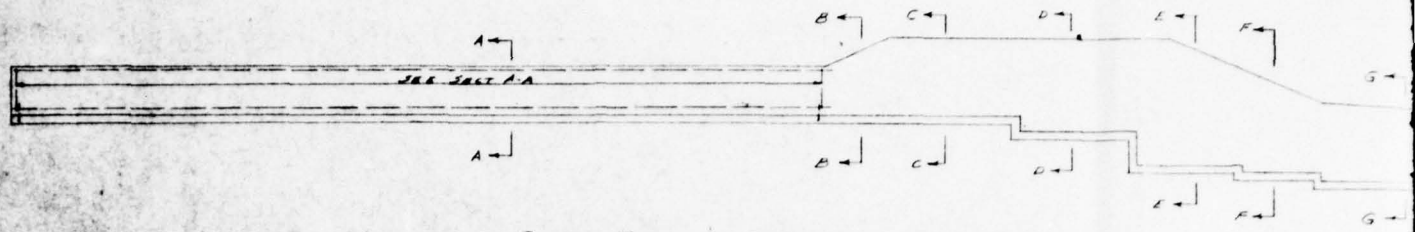
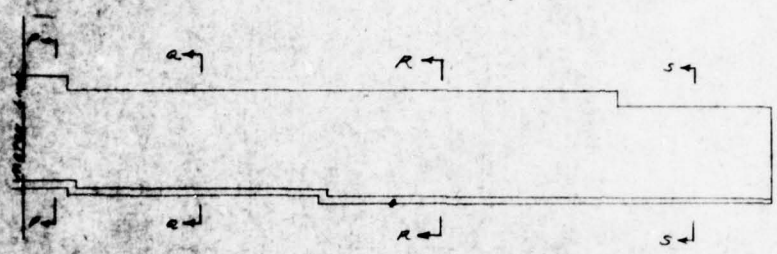
36 STATE STREET, BINGHAMTON, N.Y.
11 PARK PL. NEW YORK

Sheet 2 of 2

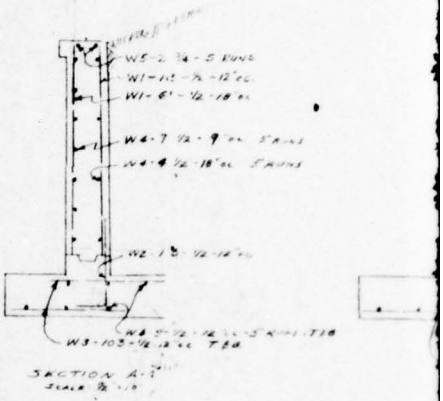
2



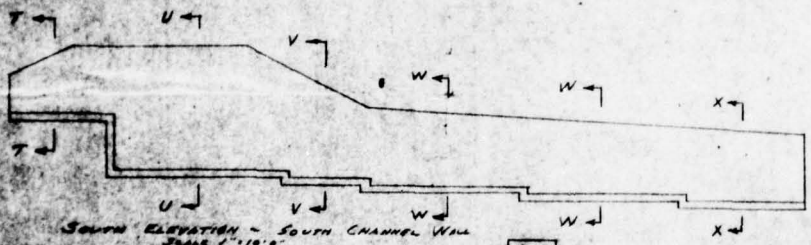
SOUTH ELEVATION - NORTH CHANNEL WALL
SCALE 1" = 10'



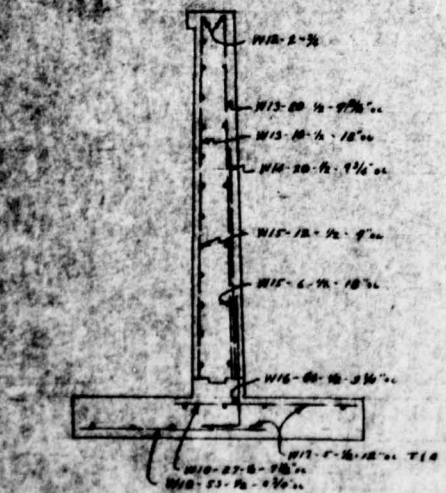
NORTH CHANNEL WALL CONT.
SCALE: 1" = 10'



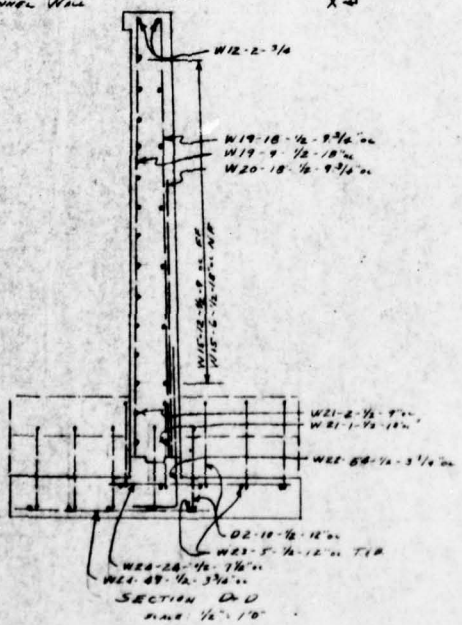
SECTION A-A
SCALE 1/2" = 1'0



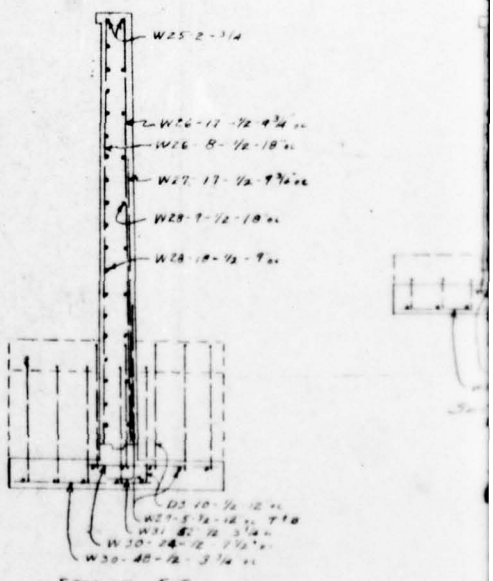
SOUTH ELEVATION - SOUTH CHANNEL WALL
SCALE 1" = 10'-0"



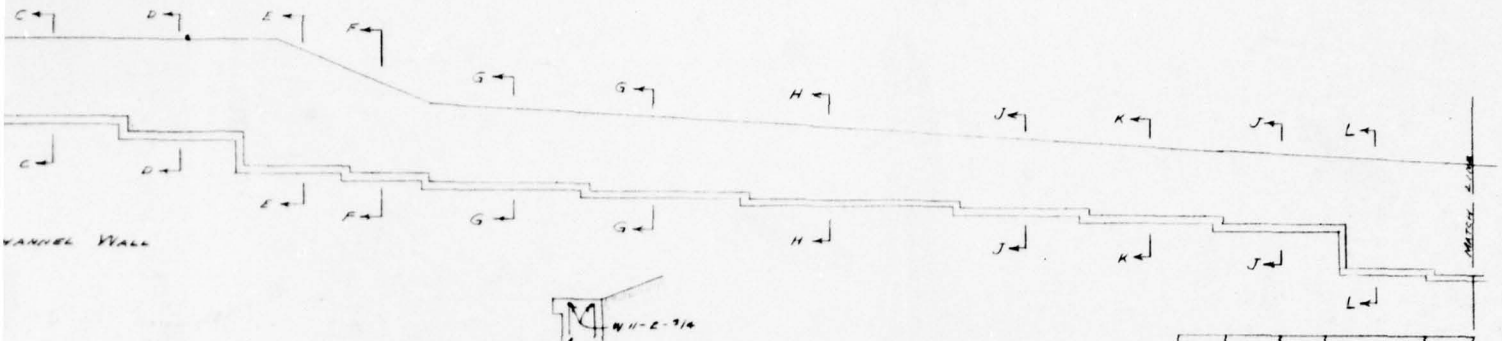
SECTION C-C
SCALE: 1/2" = 1'0"

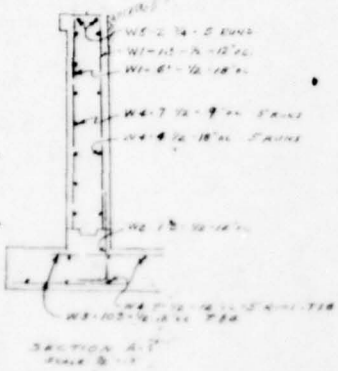


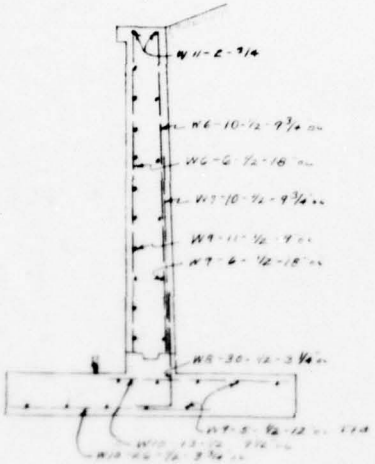
SECTION D-D
SCALE: 1/2" = 1'0"

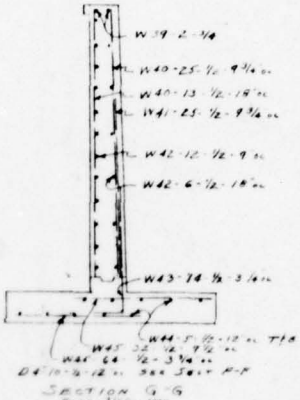


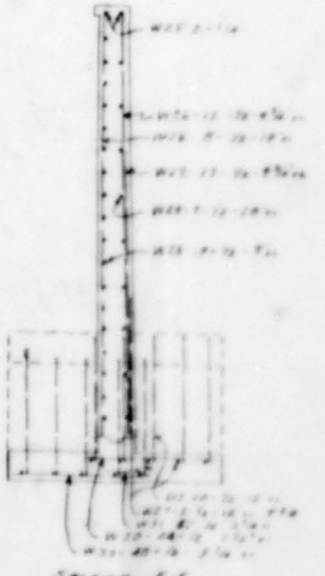
SECTION E-E
SCALE: 3/8" = 1'0"

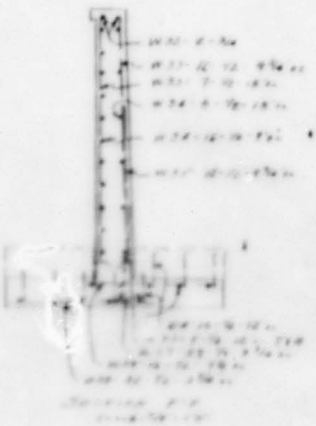


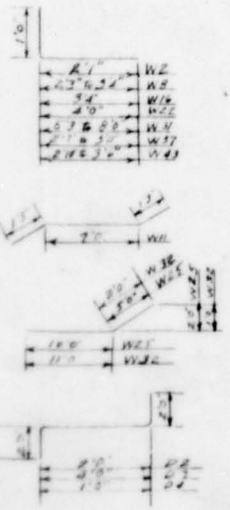












MARK	NO.	SIZE	LENGTH	TYPE
W1	172	1/8"	5'4"	ST
W2	103	1/2"	3'1"	L
W3	206	do	3'1"	ST
W4	200	do	22'6"	ST
W5	10	3/4	22'2"	ST
W6	10+6	1/2	5'6" to 9'3"	ST
W7	10	do	3'9" to 5'6"	ST
W8	30	do	3'3" to 4'4"	L
W9	27	do	11'4"	ST
W10	39	do	5'0"	ST
W11	2	3/4	11'6"	⌐
W12	2	3/4	33'6"	ST
W13	30	1/2	9'1"	ST
W14	20	do	5'8"	ST
W15	18	do	32'8"	ST
W16	61	do	4'4"	L
W17	10	do	16'4"	ST
W18	80	do	5'0"	ST
W19	27	do	11'1"	ST
W20	18	do	7'8"	ST
W21	3	do	17'2"	ST
W22	54	do	5'0"	L
W22	10	do	14'0"	ST
W24	71	do	5'0"	ST
W25	2	3/4	15'0"	⌐
W26	17+9	1/2	11'4" to 15'1"	ST
W27	17	1/2	7'6" to 9'1"	ST
W28	27	do	15'8"	ST
W29	10	do	14'6"	ST
W30	72	do	5'0"	ST
W31	52	do	6'3" to 10'0"	L
W32	2	3/4	13'0"	⌐
W33	12+7	1/2	8'4" to 12'6"	ST
W34	24	do	12'6"	ST
W35	12	do	3'10" to 6'6"	ST
W36	10	do	9'8"	ST
W37	37	do	3'7" to 4'11"	L
W38	48	do	5'0"	ST
W39	4	3/4	22'6"	ST
W40	2(13+13)	1/2	7'4" to 9'6"	ST
W41	25+25	do	4'4" to 5'8"	ST
W42	36	do	22'0"	ST
W43	2+74	do	3'10" to 4'6"	L
W44	20	do	20'6"	ST
W45	192	do	5'0"	ST
D2	10	do	6'0"	⌙
D3	10	do	8'0"	⌙
D4	20	do	5'0"	⌙

ELMIRA WATER BOARD

CITY OF ELMIRA NY

CHANGES IN HOFFMAN CREEK SPILLWAY AND DISCHARGE CHANNEL

REINFORCING STEEL DETAILS

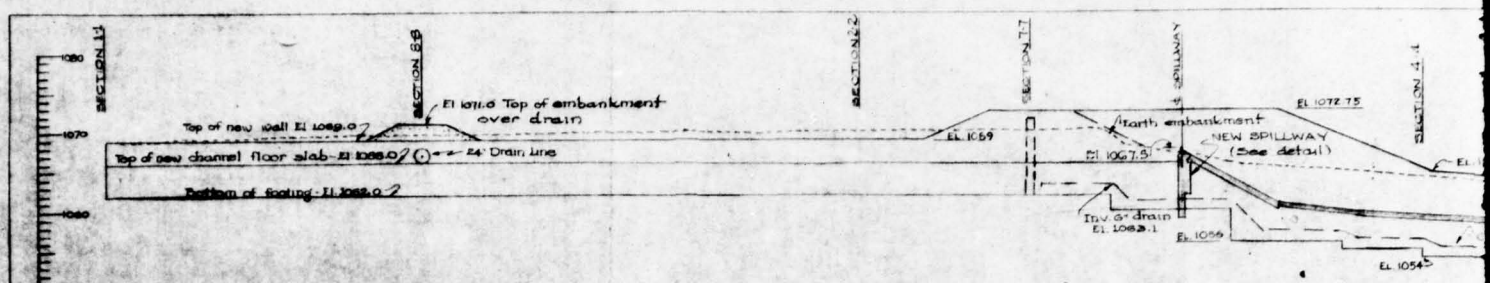
JUNE 1948

SCALES AS INDICATED

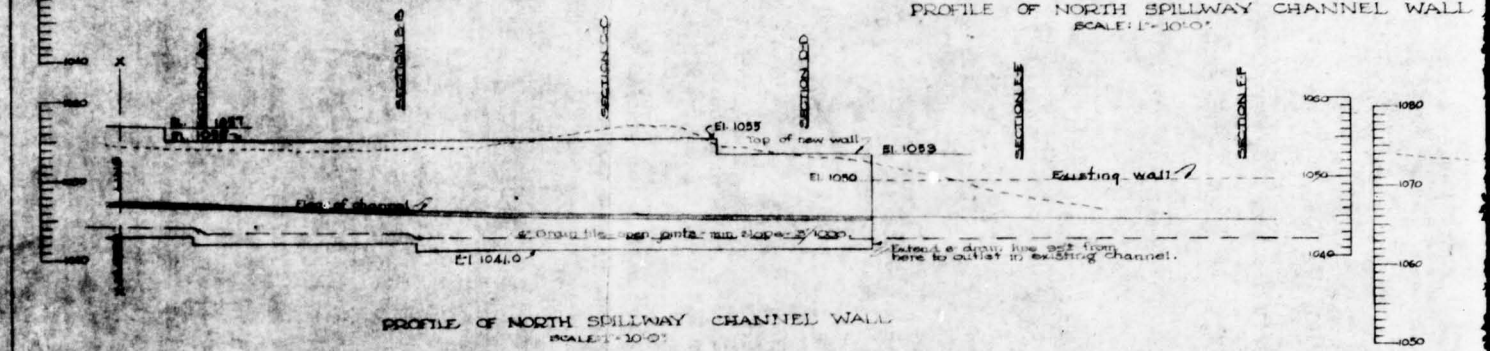
BARKER & WHEELER ENGINEERS

SHEET 2 OF 3

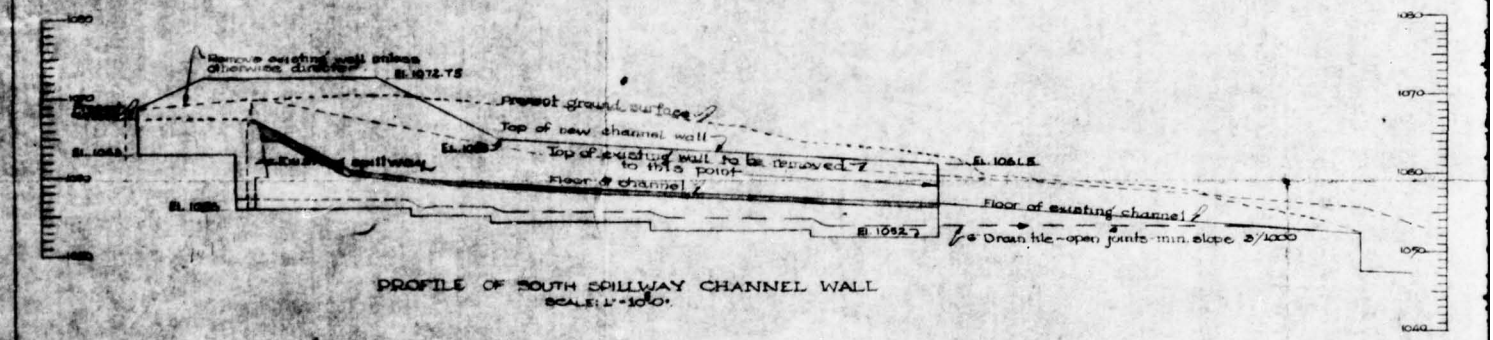
2



PROFILE OF NORTH SPILLWAY CHANNEL WALL
SCALE: 1"-10'-0"



PROFILE OF NORTH SPILLWAY CHANNEL WALL
SCALE: 1"-10'-0"



PROFILE OF SOUTH SPILLWAY CHANNEL WALL
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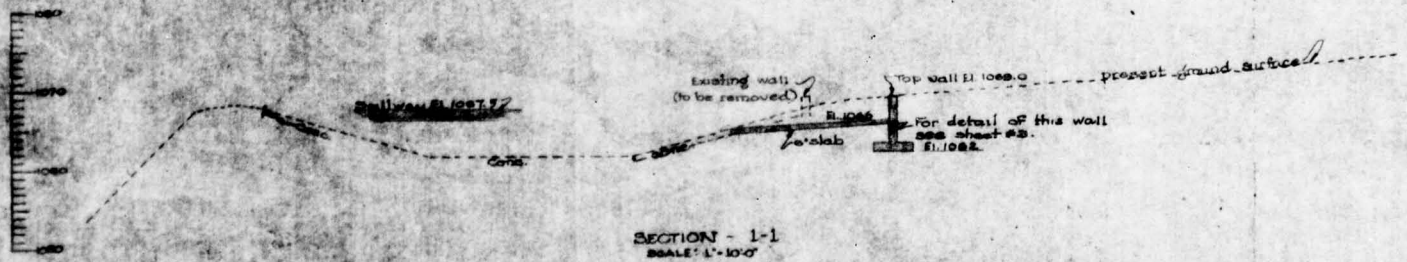
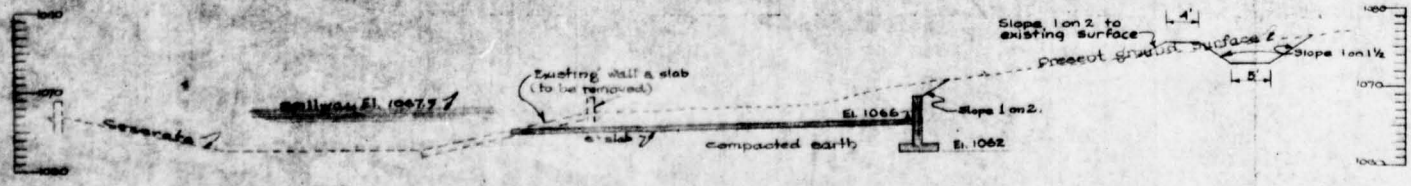
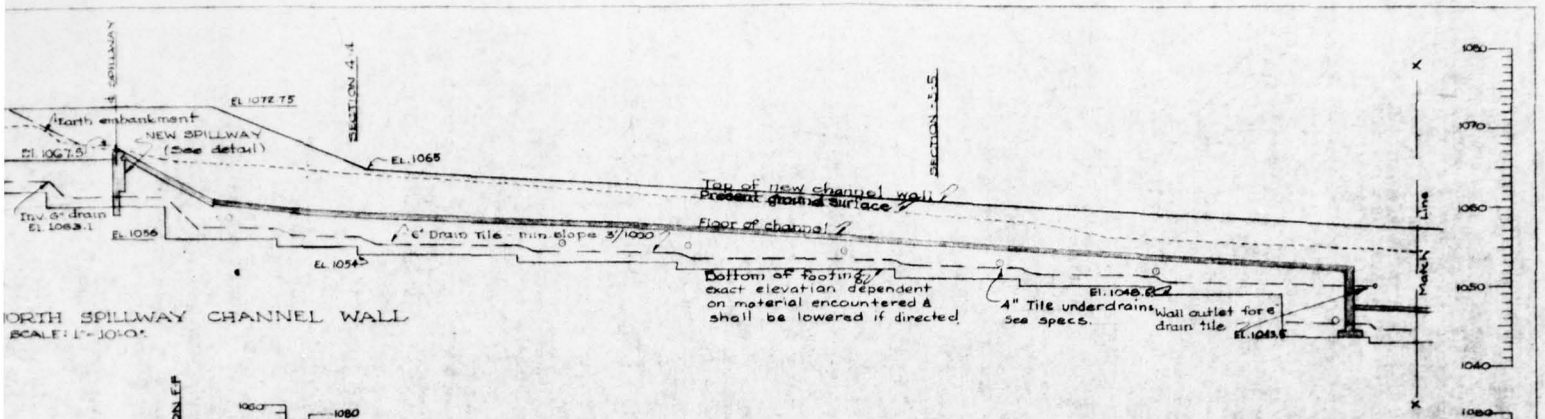


SECTION - 1-1
SCALE: 1"-10'-0"

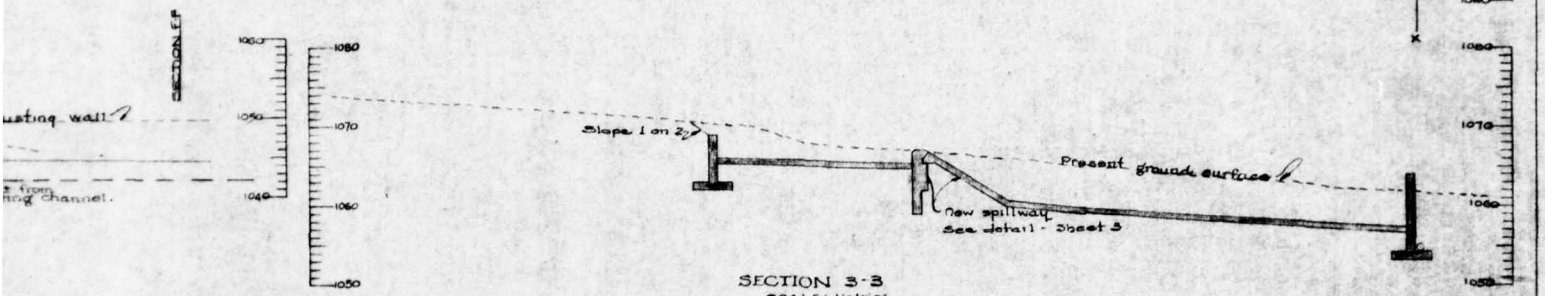


SECTION 2-2
SCALE 1"-10'-0"

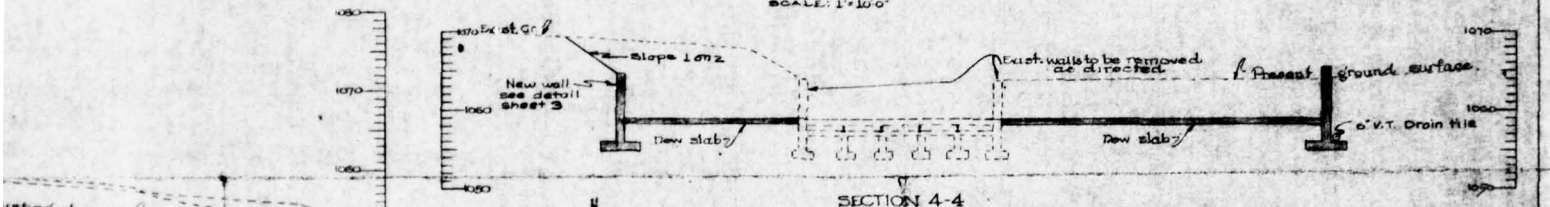
DRAWN BY: E.W.G.
TRACED BY: J.P.M.
CHECKED BY: E.W.G. - J.R.F.



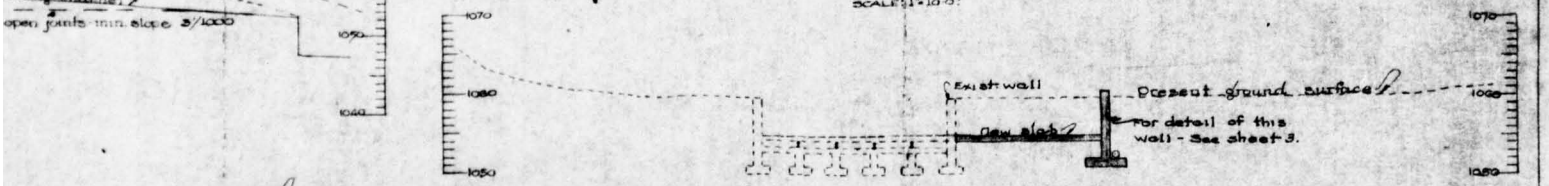
NORTH SPILLWAY CHANNEL WALL
SCALE: 1"=10'-0"

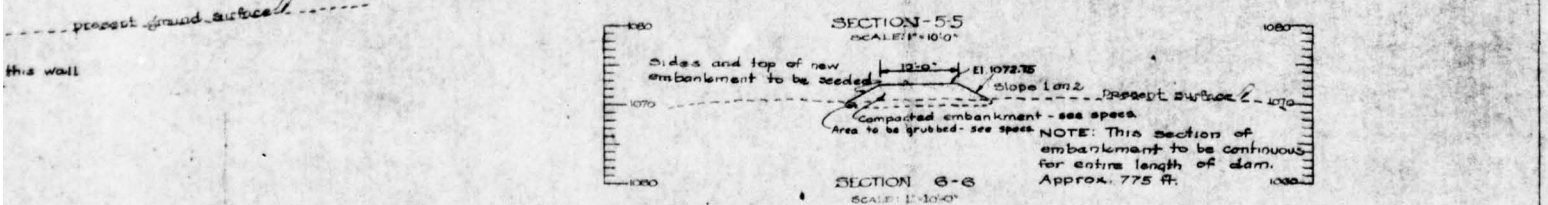


SECTION 3-3
SCALE: 1"=10'-0"



SECTION 4-4
SCALE: 1"=10'-0"





ELMIRA WATER BOARD
CITY OF ELMIRA, N.Y.

CHANGES IN HOFFMAN CREEK
SPILLWAY and DISCHARGE CHANNEL

PROFILES and SECTIONS

AUG. 1947

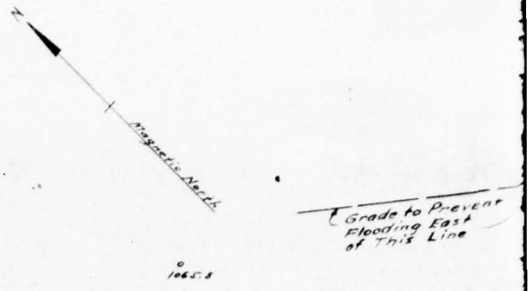
SCALE: 1"=10'-0"

JAMES M. CAIRD

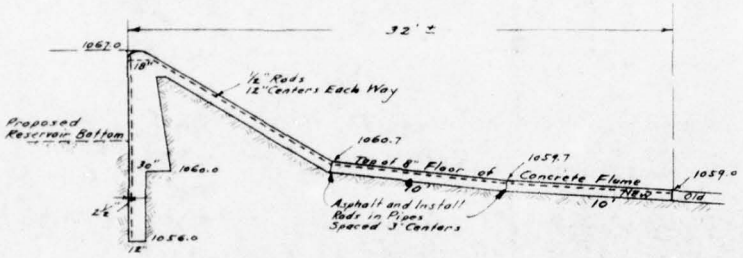
BARKER & WHEELER
- Engineers -
36 STATE ST. - ALBANY, N.Y.
11 PARK PL. - NEW YORK

2 OF 3 SHEETS

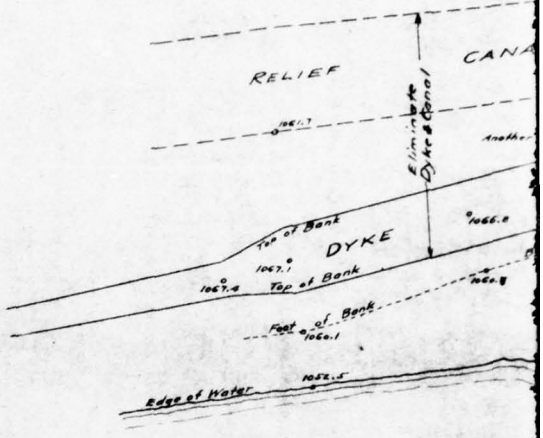
2



SECTION M-M Scale 1" = 4'

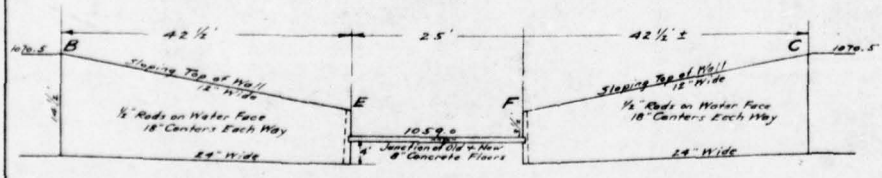


(Concrete 1:1½:3 With 2 Pounds of "Celite" Per Bag of Cement)



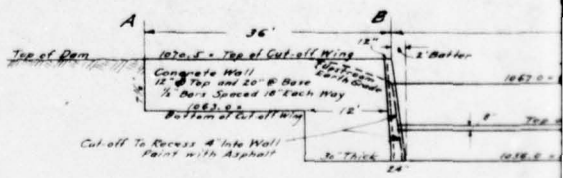
HOFFMAN BROOK RESERVOIR

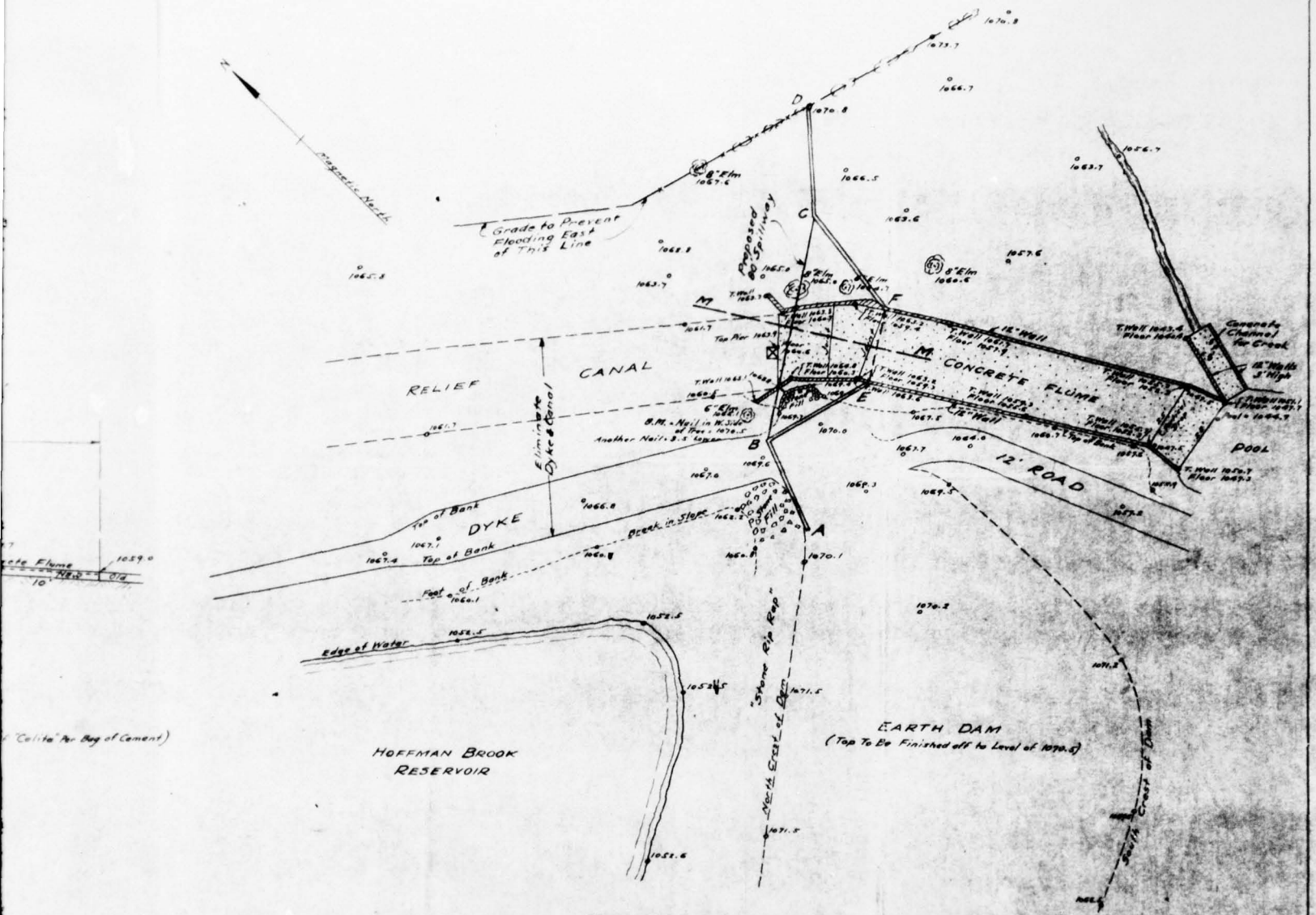
TOPO



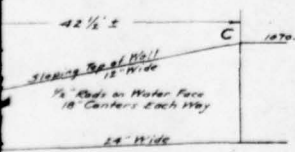
SECTION B-E-F-C Scale 1"=10'

SECTIO

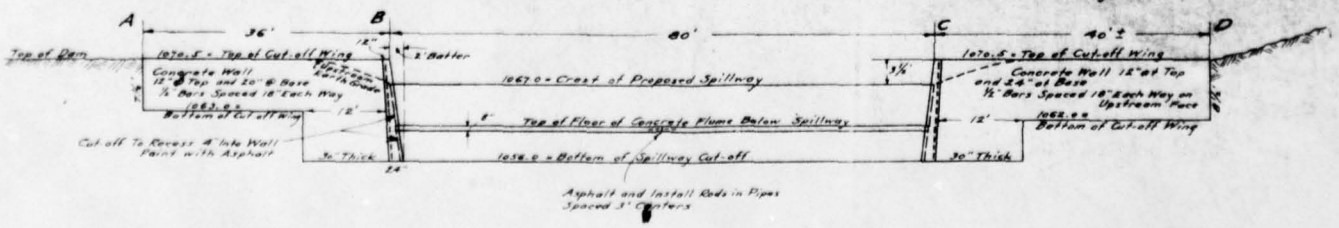




TOPOGRAPHICAL PLAN OF SITE - Scale 1" = 20'



SECTION A-B-C-D Scale 1" = 10'



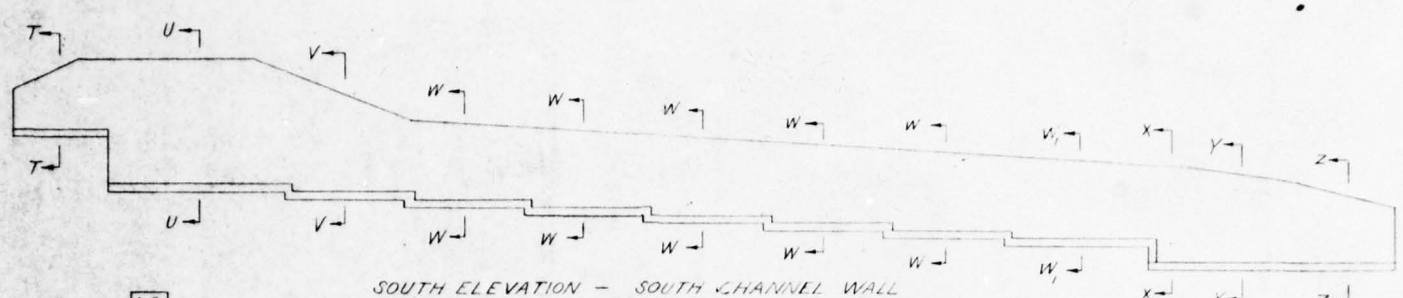
ELMIRA WATER BOARD

REVISED SPILLWAY FOR HOFFMAN RESERVOIR

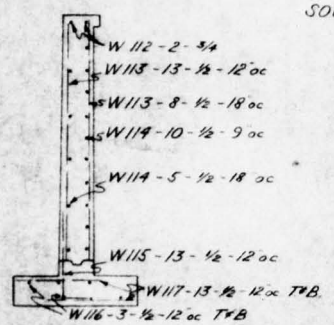
July 20, 1931 Scales As Shown

Carl Crandall, C.E., Ithaca, N.Y.

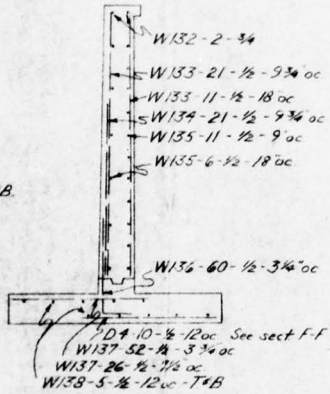
2



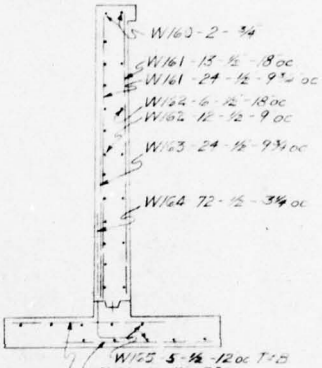
SOUTH ELEVATION — SOUTH CHANNEL WALL
Scale 1" = 10'-0"



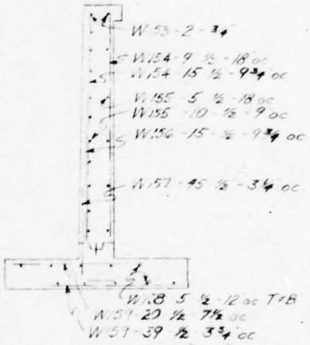
SECTION T-T
Scale 3/8" = 1'-0"



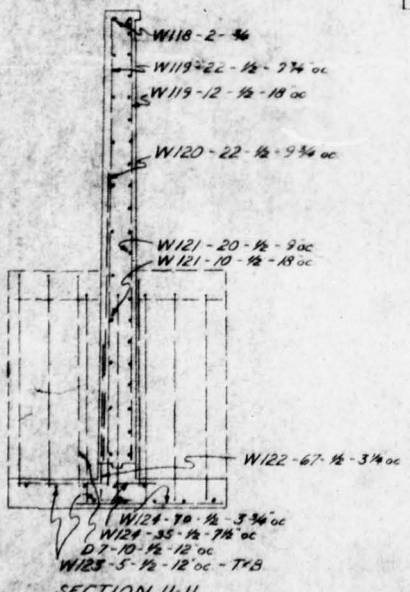
SECTION W-W
Scale 3/8" = 1'-0"



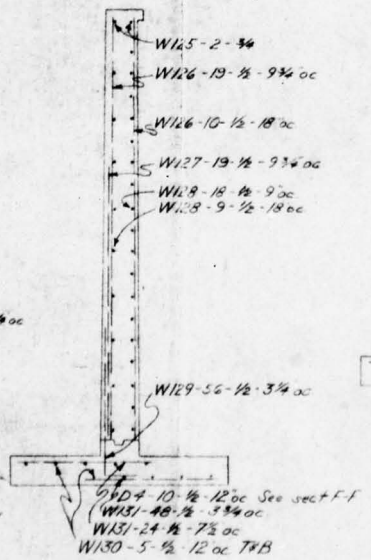
SECTION W1-W1
Scale 3/8" = 1'-0"



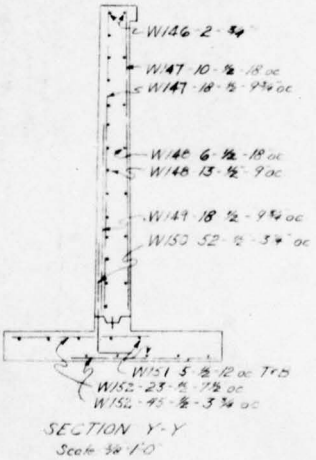
SECTION Z-Z
Scale 3/8" = 1'-0"



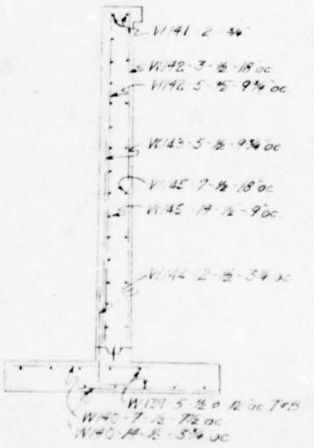
SECTION U-U
Scale 3/8" = 1'-0"



SECTION V-V
Scale 3/8" = 1'-0"

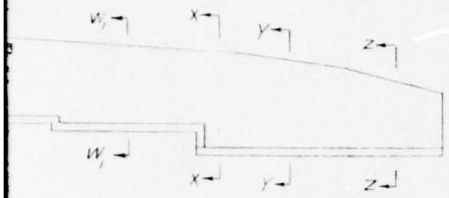


SECTION Y-Y
Scale 3/8" = 1'-0"



SECTION X-X
Scale 3/8" = 1'-0"

DRAWN BY R.V.V.
TRACED - H.L.
CHECKED - R.V.V.



For steel in slab use straight bars - ½ ø @ 12" ctrs bothways

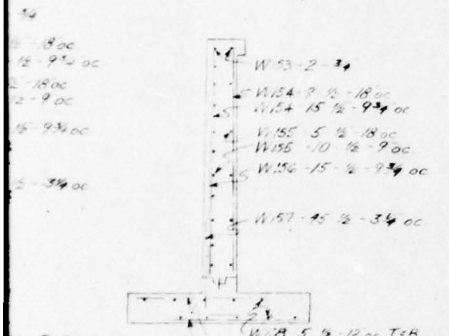
PLAN - New slab section - South of Channel
Scale 1" = 10'-0"

Mark	No.	Size	Length	Remarks
D 1	*1	½	6'-0"	
W160	*2	¾	25'-0"	St.
W161	3-24	½	8'-6 to 9'-2"	Use 320 and 369 of inventory
W162	18	½	19'-6"	Use 349 of inventory
W163	*24	½	5'-8 to 6'-1"	St.
W164	72	½	5'-2"	Use W62 of inventory
W165	*10	½	18'-2"	St.
W166	*1+61	½	5'-0"	St.
SW 1	*5	½	6'-6"	
D-10	*7	½	2'-0"	St.

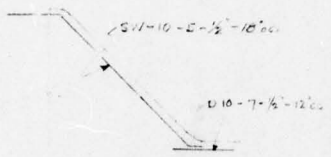
NOTE
Only the items marked thus * in above table are to be furnished by Steel Co Balance of steel in above table to be obtained from inventory at steel stores at filter plant as noted

NOTE
In addition to steel marked thus * in above table the Steel Co should furnish 2500 lin ft of ½ ø straight bars This steel to be used in slab

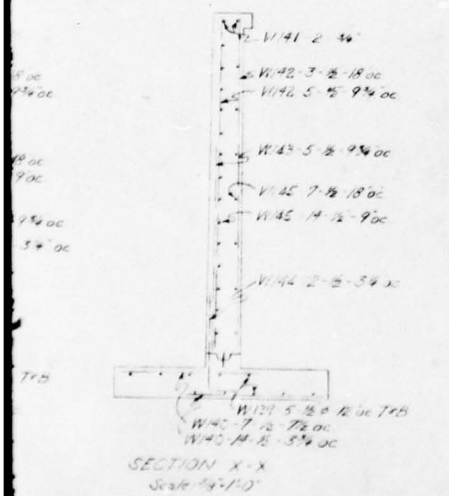
Mark	No.	Size	Length	Remarks
W112	2	¾	15'-6"	In inventory
W113	13+8	½	4'-4" to 8'-1"	Use W31 of inventory
W114	*15	½	13'-6"	St.
W115	13	½	5'-6 to 4'-6"	Use W37 of inventory
W116	6	½	13'-0"	Use 32 inventory
W117	26	½	3'-1"	In inventory
W118	*2	¾	18'-0"	St.
W119	*2+12	½	13'-1"	St.
W120	22	½	10'-3"	Use 323 of inventory
W121	*30	½	19'-8"	St.
W122	67	½	6'-4"	In inventory
W123	*10	½	22'-0"	St.
W124	105	½	5'-0"	Use 324 of inventory
D-7	10	½	11'-0"	In inventory
W125	*2	¾	27'-0"	
W126	*18+10	½	9'-0 to 15'-1"	St.
W127	13	½	6'-0 to 0'-0"	Use W-6 of inventory
W128	18+9	½	21'-0"	Use 5-6 of inventory
W129	66	½	4'-1" to 6'-4"	In inventory and W132
W130	*10	½	15'-6"	St.
W131	*2+98	½	5'-0"	St.
D-4	70	½	5'-0"	In inventory
W132	10	¾	20'-0"	Use W28 of inventory
W133	*5 (HH)	½	5'-2" to 9'-4"	St.
W134	*5 x 21	½	5'-5" to 6'-3"	St.
W135	85	½	15'-0"	Use 32 inventory
W136	*300	½	4'-5"	
W137	*390	½	5'-0"	St.
W138	*50	½	15'-6"	St.
W139	*10	½	4'-6"	St.
W140	*21	½	5'-0"	St.
W141	2	¾	7'-6"	Use W84 of inventory
W142	*5+3	½	11'-0 to 11'-6"	St.
W143	*5	½	7'-4 to 7'-8"	St.
W144	12	½	4'-8"	Use W22 of inventory
W145	*21	½	4'-6"	St.
W146	*2	¾	19'-0"	
W147	*10+18	½	9'-2 to 10'-10"	St.
W148	*19	½	13'-6"	St.
W149	*18	½	6'-1 to 6'-11"	St.
W150	52	½	4'-10 to 5'-5"	Use W48 of inventory
W151	*10	½	13'-6"	St.
W152	*28	½	5'-0"	St.
W153	2	¾	14'-6"	Use W25 of inventory
W154	*7+15	½	6'-1 to 9'-2"	St.
W155	*5+10	½	11'-6"	St.
W156	*5	½	4'-1" to 6'-1"	St.
W157	45	½	4'-2"	Use W48 of inventory
W158	*10	½	11'-6"	St.
W159	59	½	4'-6"	Use W16 of inventory



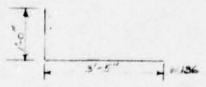
SECTION Z-Z
Scale ¾" = 1'-0"

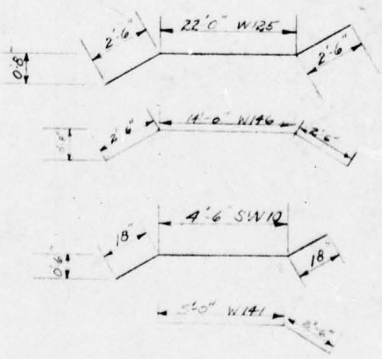


OGEE SECTION



SECTION X-X
Scale ¾" = 1'-0"



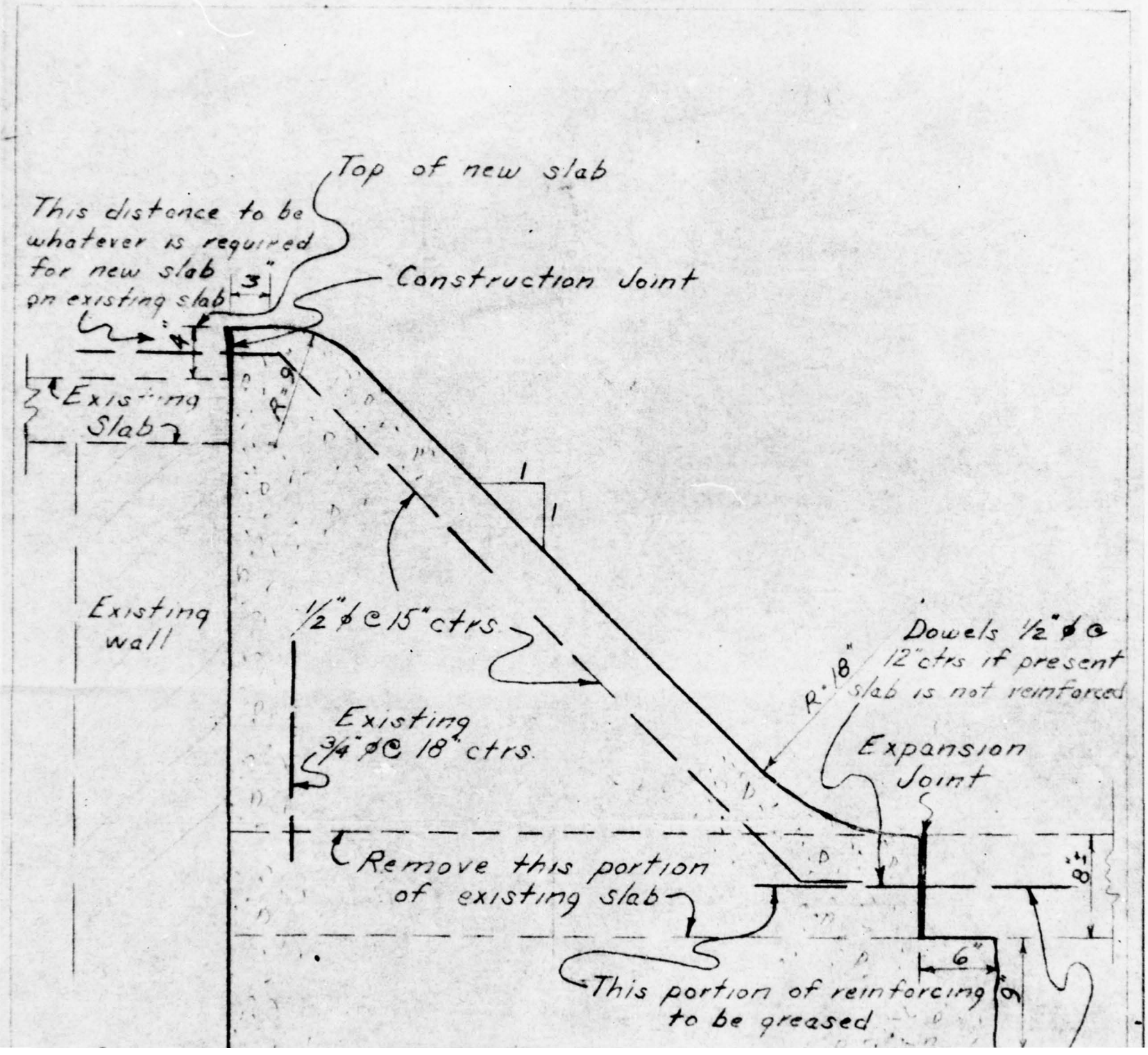


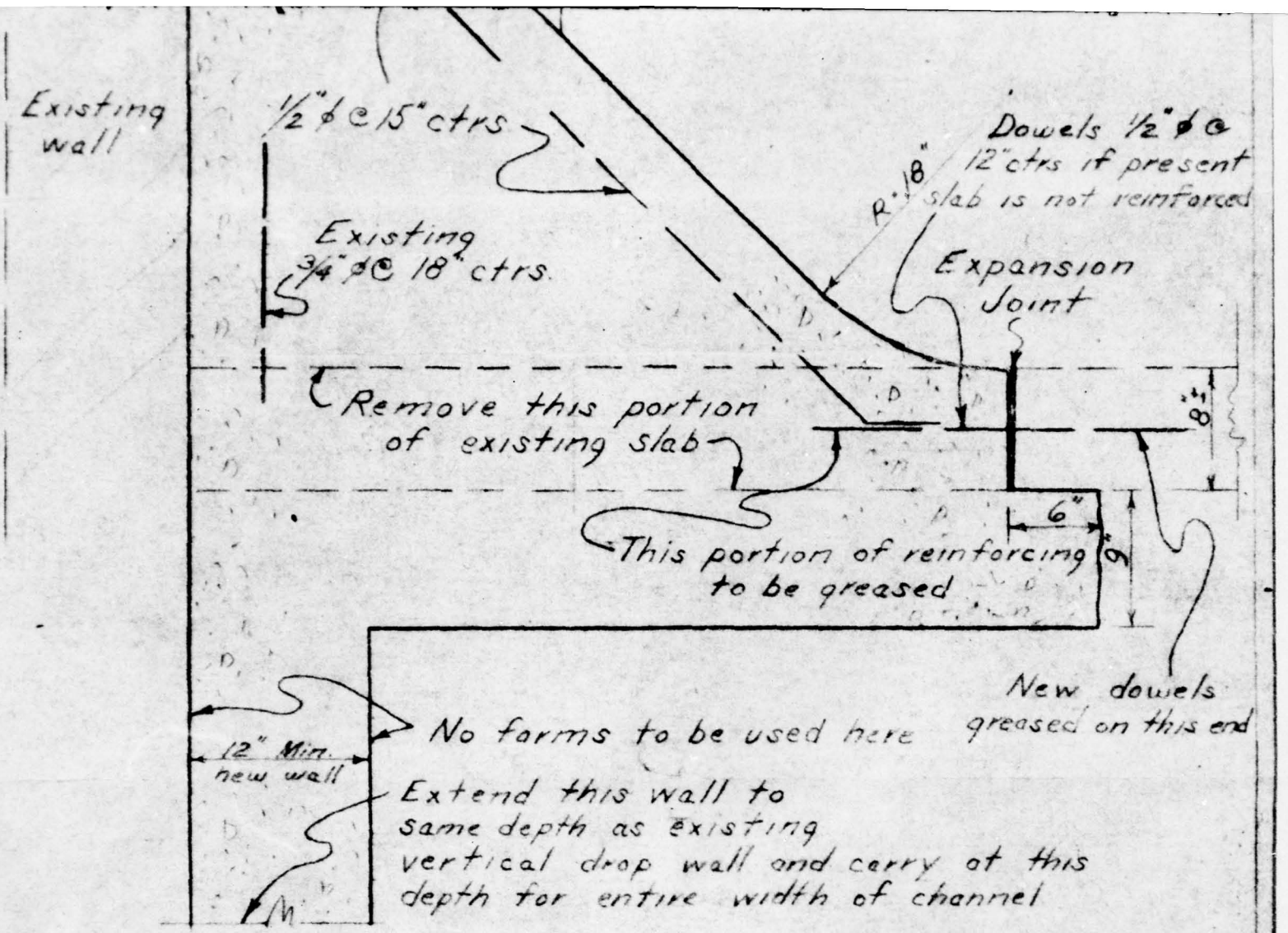
ELMIRA WATER BOARD
CITY OF ELMIRA N.Y.
Changes in Hoffman Creek Spillway and Discharge Channel
Reinforcing Steel Details for Revised Location Of South Spillway Channel Wall And Slab

NOV 1948
Scales As noted

BARKER & WHEELER
Engineers
36 State St — Albany N.Y.
11 Park Pl — New York
Sheet 3A of 4

2


Top of new slab
This distance to be whatever is required for new slab on existing slab
3"
Construction Joint
Existing Slab
R" 9
1
1
Existing wall
1/2" ϕ @ 15" ctrs
Existing 3/4" ϕ @ 18" ctrs.
Dowels 1/2" ϕ @ 12" ctrs if present slab is not reinforced
R" 18
Expansion Joint
Remove this portion of existing slab
8"±
6"
This portion of reinforcing to be greased
9"

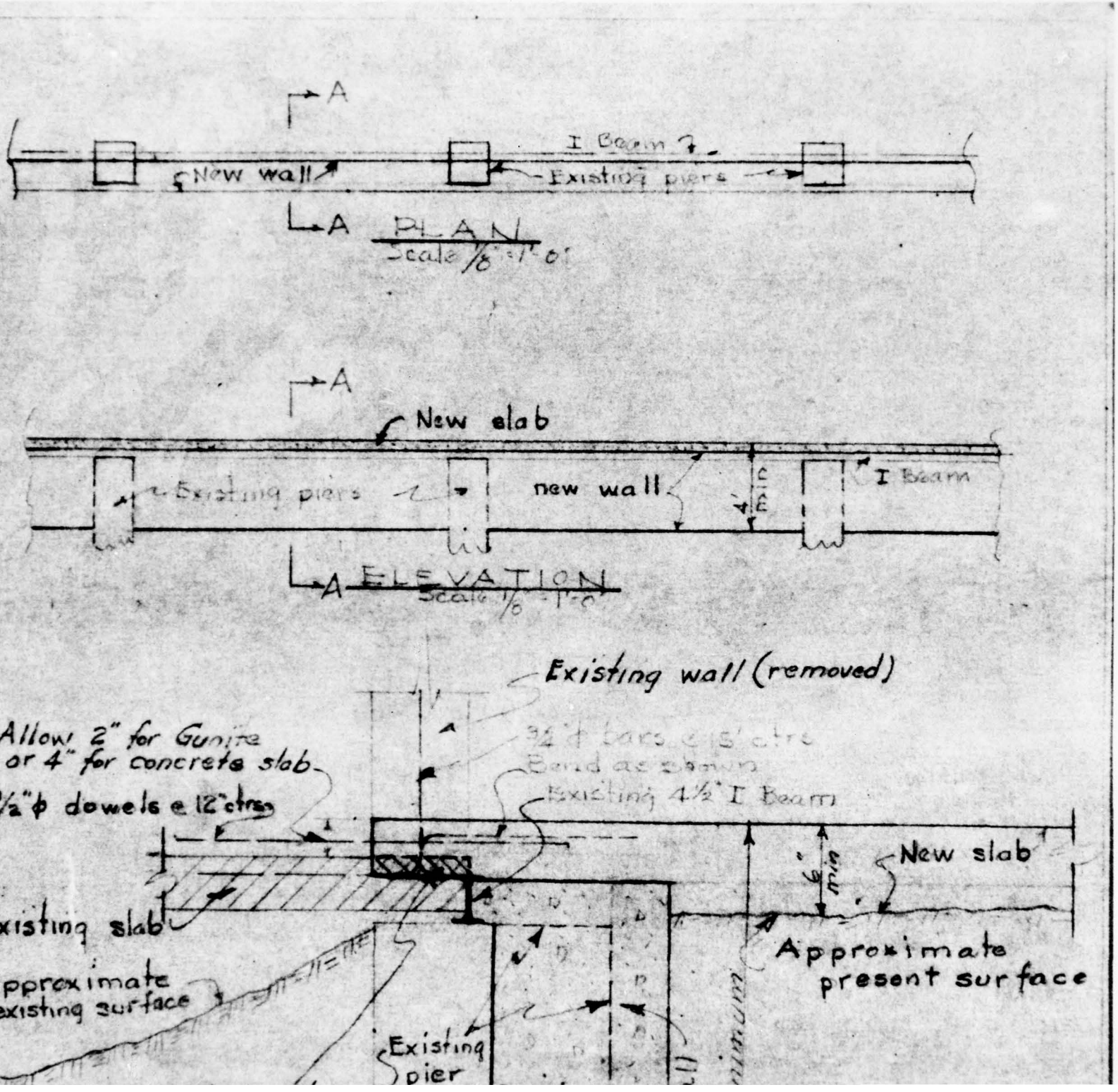


DETAIL OF PROPOSED OGEE SECTION
AT VERTICAL DROP
Scale 1" = 1'-0"

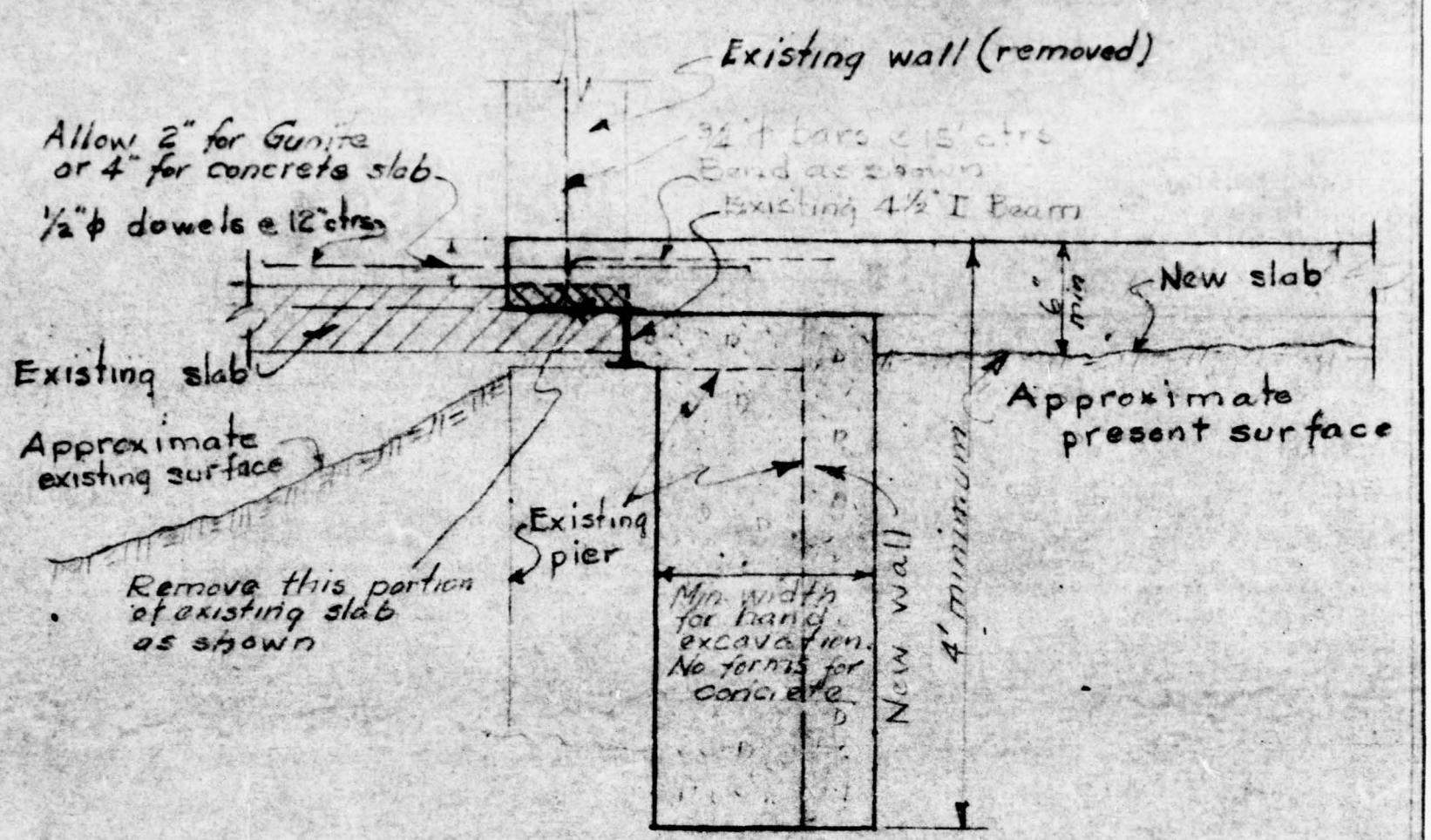
Elmira Water Board
City of Elmira, NY
HOFFMAN DAM

July 28, 1948

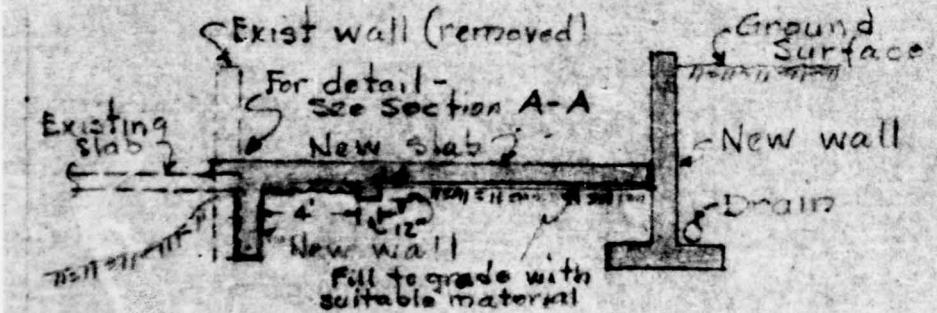
Barker & Wheeler Eng
36 State St. Albany


A
I Beam ?
New wall
Existing piers
A PLAN
Scale 1/8" = 1'-0"
A
New slab
Existing piers
new wall
I Beam
A ELEVATION
Scale 1/8" = 1'-0"
Existing wall (removed)
Allow 2" for Gunite or 4" for concrete slab
½"ϕ dowels @ 12" ctrs
Bend as shown
Existing 4½" I Beam
New slab
Existing slab
Approximate existing surface
Approximate present surface
Existing pier

A ELEVATION
Scale 1/8" = 1'-0"



SECTION A-A
Scale ¾" = 1'-0"



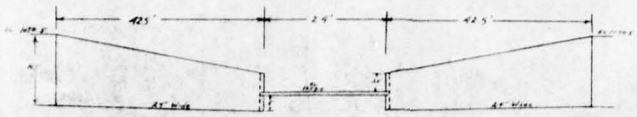
SECTION A-A - EXTENDED
Scale 1" = 10'-0"

HOFFMAN DAM
ELMIRA WATER BOARD
CITY OF ELMIRA, N.Y.

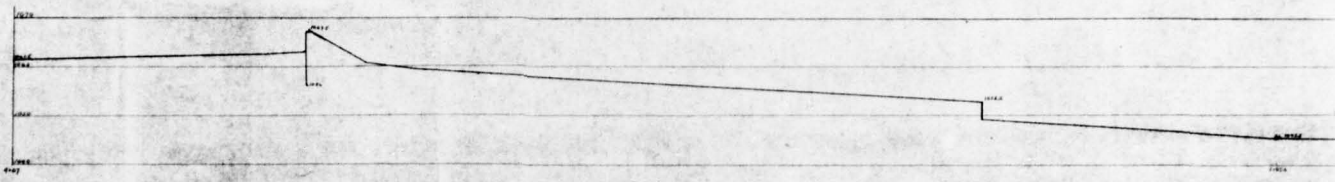
REVISED PLAN OF CONSTRUCTION AT JUNCTION OF SLABS

July 14, 1948.

Parker & Wheeler
Engineers.
36 State St, Albany, N.Y.

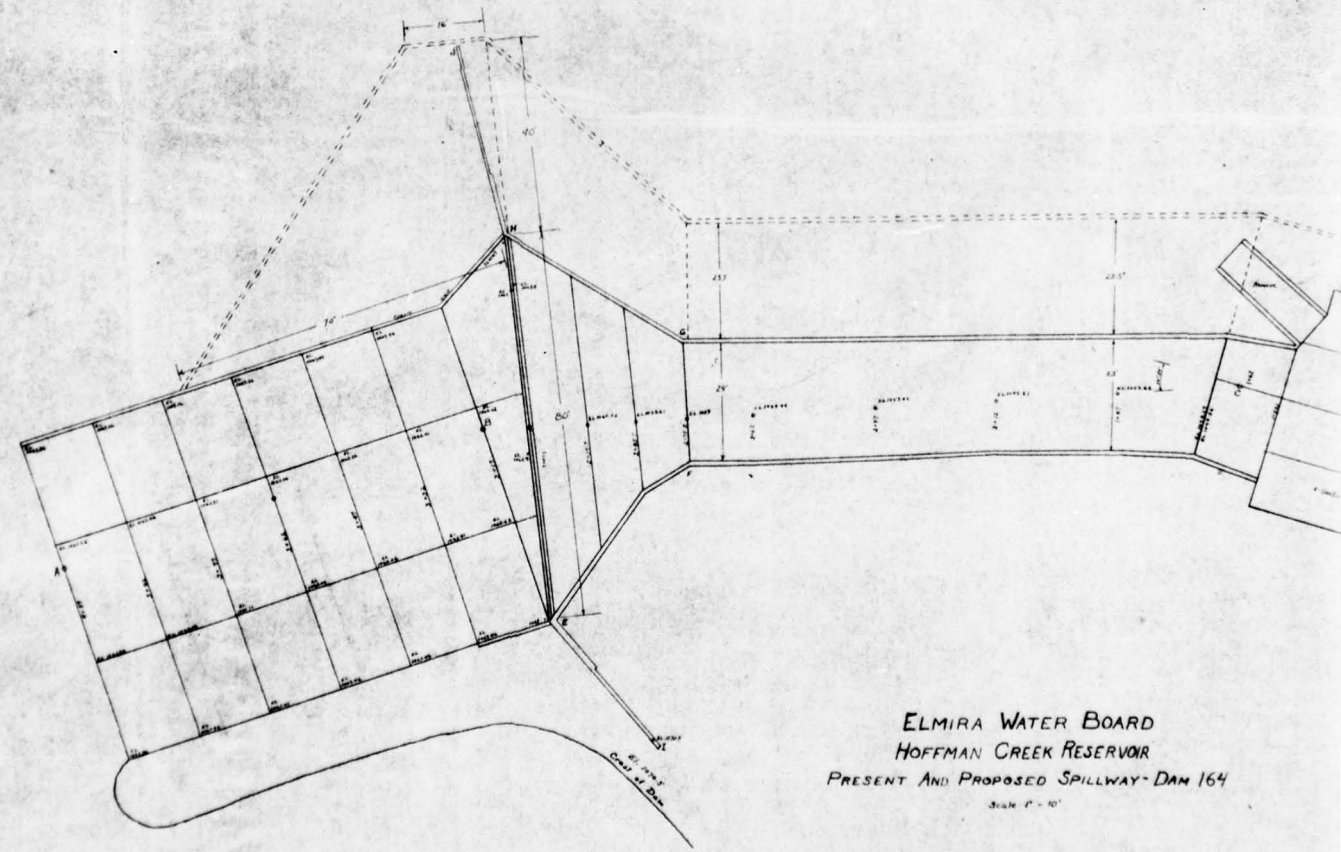


SECTION E-F-G-H



PROFILE OF SPILLWAY LINE A-B-C-D

Scale V-1"=10' H-1"=10'



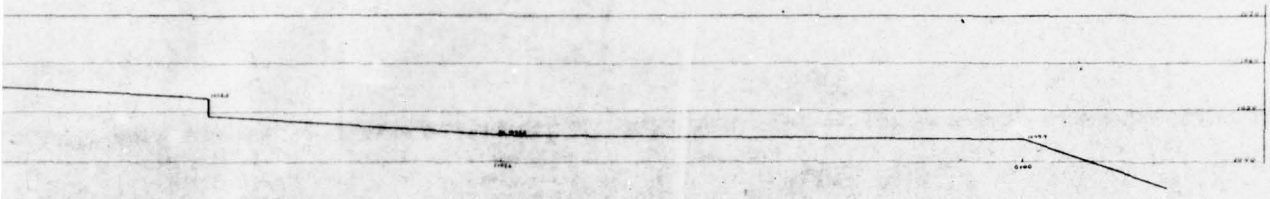
ELMIRA WATER BOARD

HOFFMAN CREEK RESERVOIR

PRESENT AND PROPOSED SPILLWAY - DAM 164

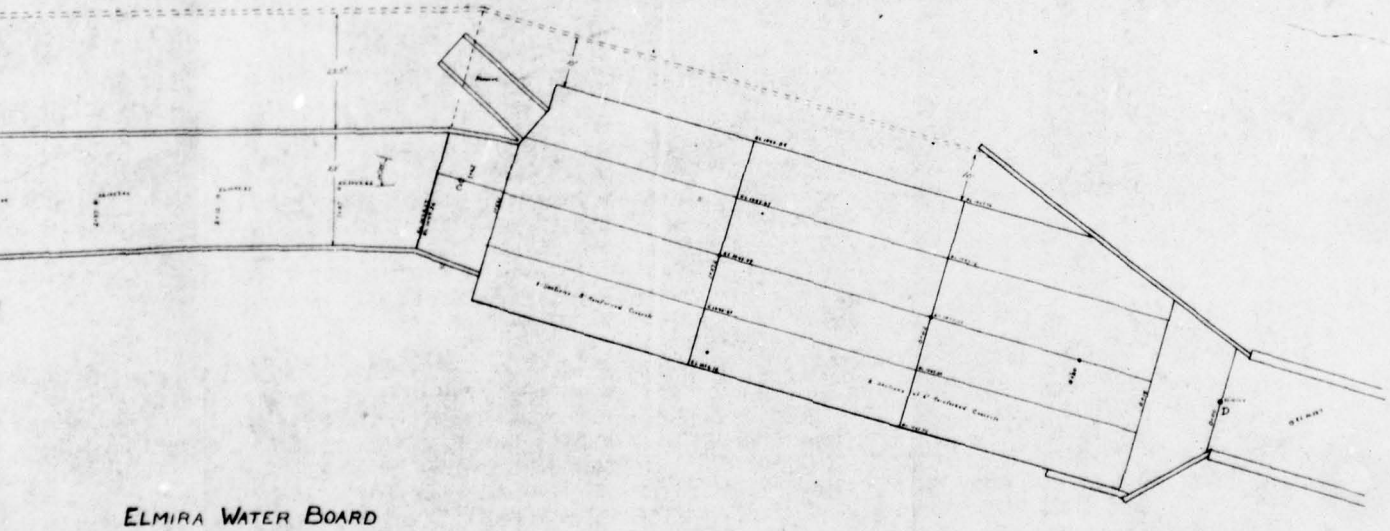
Scale 1" = 40'

SECTION I-E-H-J



PROFILE OF SPILLWAY LINE A-B-C-D

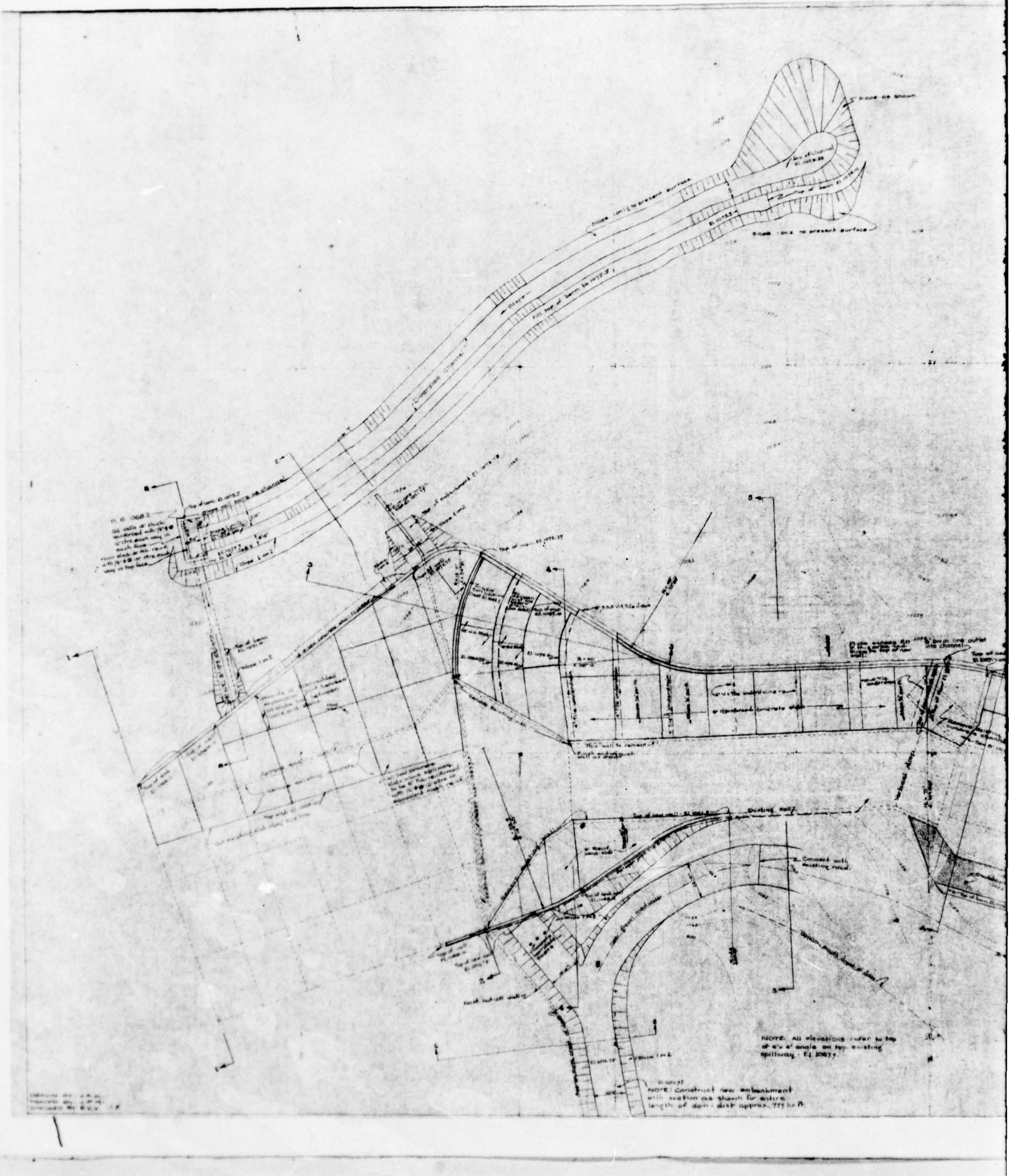
Scale V-1"=10' H-1"=10'



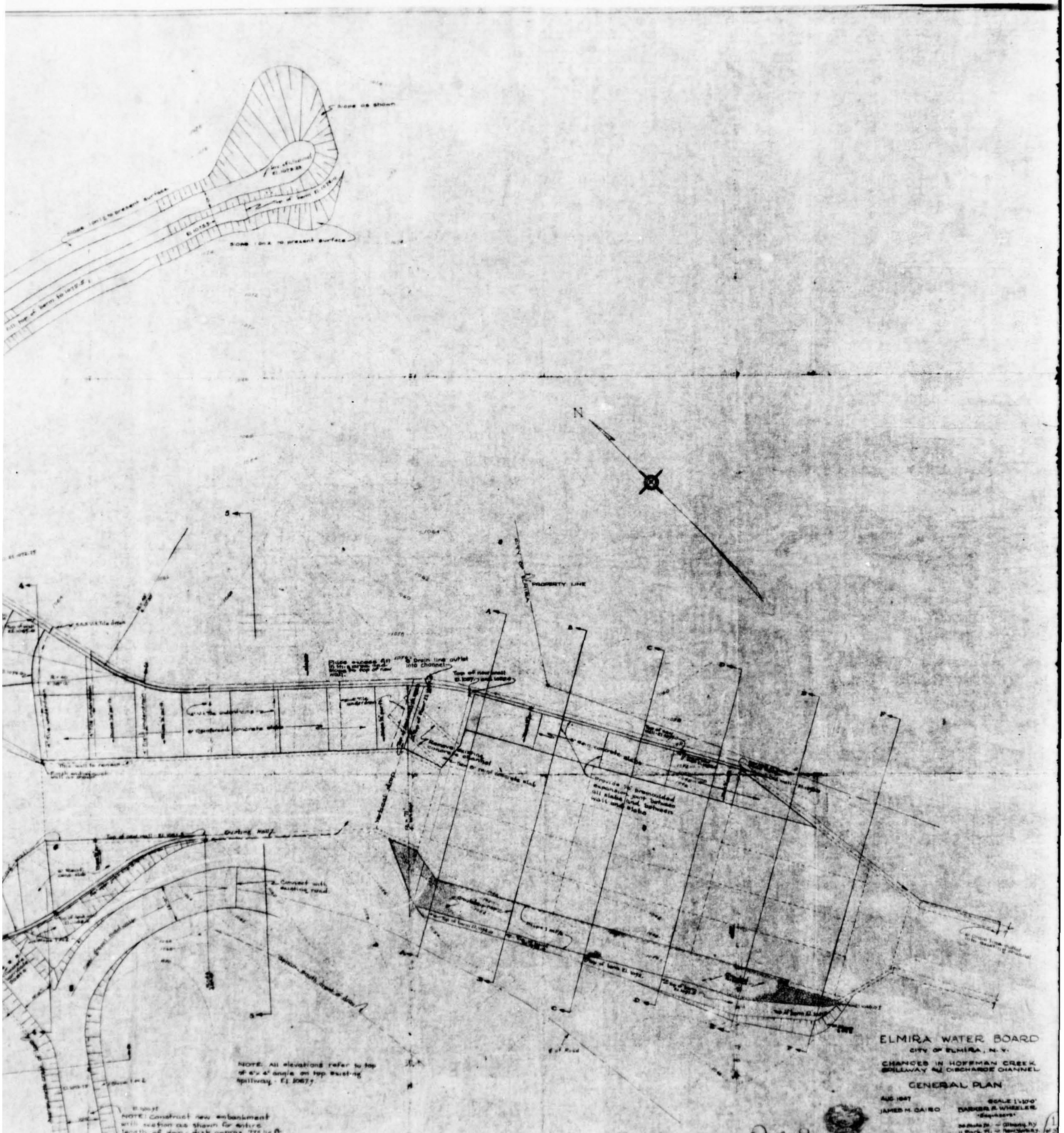
ELMIRA WATER BOARD
HOFFMAN CREEK RESERVOIR
PRESENT AND PROPOSED SPILLWAY - DAM 164

Scale 1" = 10'

2



Slope as shown
Slope 1 on 2 to present surface
Diversion Channel
Existing wall
Connect with existing road
NOTE: All elevations refer to top of 6'x 4' angle on top existing spillway - El. 1067.7.
NOTE: Construct new embankment with section as shown for entire length of dam - dist approx. 775 lin ft.


N
PROPERTY LINE
Slope as shown
Slope 1on2 to present surface
Reinforced concrete slabs
NOTE: All elevations refer to top of 6"x 4" angle on top existing spillway - El. 1067.7
NOTE: Construct new embankment with section as shown for entire length of dam - dist. approx. 775 lin ft.
ELMIRA WATER BOARD
CITY OF ELMIRA, N.Y.
CHANGES IN HOFFMAN CREEK SPILLWAY AND DISCHARGE CHANNEL
GENERAL PLAN
AUG. 1947
SCALE 1"=10'-0"
JAMES H. CAIRO
BARKER & WHEELER
Engineers

APPENDIX F

VISUAL CHECK LIST

CHECK LIST
VISUAL INSPECTION
PHASE I

NAME DAM Hoffman Creek Dam COUNTY Clemung STATE New York ID# NY 463

TYPE OF DAM Earthfill HAZARD CATEGORY High

DATE(s) INSPECTION August 30, 1978 WEATHER Clear-warm TEMPERATURE 80's

POOL ELEVATION AT TIME OF INSPECTION 1064.0 M.S.L. TAILWATER AT TIME OF INSPECTION None M.S.L.

INSPECTION PERSONNEL:

R. Jeffrey Kimball, P.E. - LRK
Ed Considine - Elmira Water Works
James T. Hockensmith - LRK

James T. Hockensmith RECORDER

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed - the area immediately downstream is used as a dump for waste soil and rock.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Very heavily vegetated on downstream slope and unobservable. Erosion at spillway water level on upstream face.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Appears to be good.	
RIPRAP FAILURES	None noted - a break in slope was observed above rip rap. This break in slope is near the emergency spillway level and is probably erosion.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Appears to be good.	
ANY NOTICEABLE SEEPAGE	None noted, heavy vegetation and dump at toe obscures visibility.	
STAFF GAGE AND RECORDER	None	
DRAINS	None	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	
STAFF GAGE OF RECORDER:	N/A	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	A 16" cast iron pipe acts as the outlet works. Condition unknown.	
INTAKE STRUCTURE	Type and condition of intake unknown.	
OUTLET STRUCTURE	16" CIP branches into two lines, one acts as a blowoff to clean and drain line and the other line goes to filter plant for water supply.	
OUTLET CHANNEL	Narrow channel until it hits City of Elmira, approximately 3,000 feet downstream.	
EMERGENCY GATE	None	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	119.5' long concrete weir with a 6" angle iron on top to form a sharp crested weir - good condition.	
APPROACH CHANNEL	Approximately 100' long, 100' wide open cut, concrete paved channel - good condition.	
DISCHARGE CHANNEL	Concrete paved channel in good condition, repaired in 1972 after partial failure during high flow.	
BRIDGE AND PIERS	None	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE AND PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Narrow channel for 3,000 feet. Fans into wide flood plain - City of Elmira	
SLOPES	Moderately steep for 3,000 feet.	
APPROXIMATE NO. OF HOMES AND POPULATION	2,000 - 3,000 people	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderately steep, heavily forested.	
SEDIMENTATION	Does not have any effect on storage capacity.	

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

APPENDIX G

ENGINEERING DATA CHECK LIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Hoffman Creek Dam

ID# NY 463

ITEM	REMARKS
AS-BUILT DRAWINGS	None known
REGIONAL VICINITY MAP	None
CONSTRUCTION HISTORY	None - Water Board and NYSCC has correspondence
TYPICAL SECTIONS OF DAM	None - one in 1916 - modified since
OUTLETS - PLAN	
- DETAILS	
- CONSTRAINTS	None
- DISCHANCE RATINGS	One reference in correspondence to capacity of emergency spillway
RAINFALL/RESERVOIR RECORDS	Unknown

ITEM	REMARKS
DESIGN REPORTS	None
GEOLOGY REPORTS	None
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None
POST-CONSTRUCTION SURVEYS OF DAM	None
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Many times - 1916, 1924, 1930, 1944, 1958
HIGH POOL RECORDS	None
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None - spillway exit channel damaged in 1972.
MAINTENANCE OPERATION RECORDS	None

REMARKS	
SPILLWAY PLAN	
SECTIONS	1930 plans
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	None

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Wooded - 4.3 square miles

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1067.5' (460 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N/A

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: Approximately 1072.5'

CREST:

a. Elevation 1067.5'
b. Type Sharp crested weir
c. Width .01'
d. Length 119.5'
e. Location Spillover Left abutment
f. Number and Type of Gates None

OUTLET WORKS:

a. Type 16" CI Pipe
b. Location Through embankment
c. Entrance inverts Unknown
d. Exit inverts Unknown
e. Emergency draindown facilities Through this pipe

HYDROMETEOROLOGICAL GAGES:

a. Type None
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE Unknown