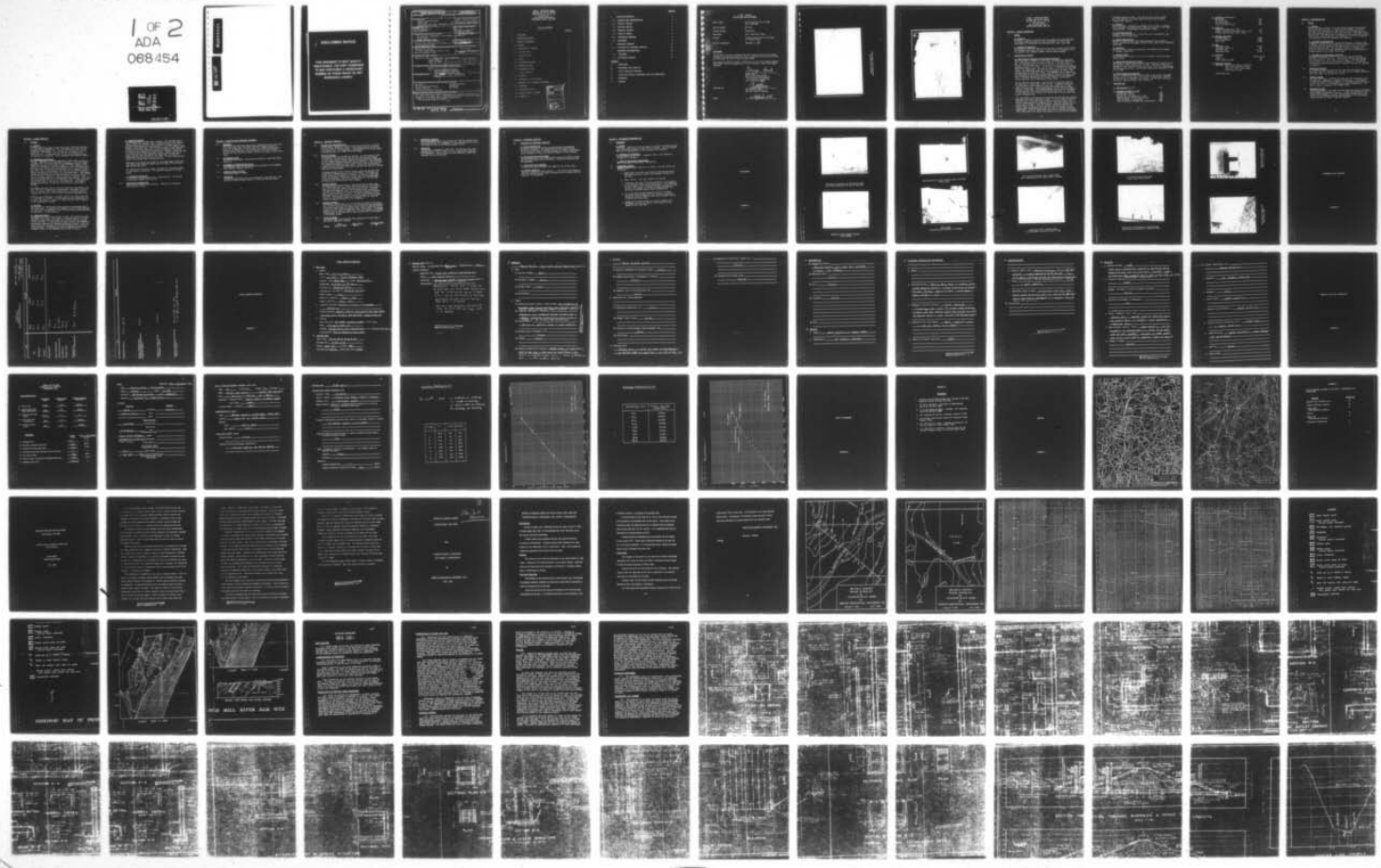
AD-A068 454 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/2
NATIONAL DAM SAFETY PROGRAM. TRINITY DAM, INVENTORY NUMBER NY 1--ETC(U)
SEP 78 G KOCH DACW51-78-C-0035
UNCLASSIFIED NL

1 OF 2
ADA
068454



DDC FILE COPY

AD A068454

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DDC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle)

Phase I Inspection Report
Trinity Dam N.Y.
Long Island River Basin, Westchester County,
Inventory No. N. Y. 129

5. TYPE OF REPORT & PERIOD COVERED
Phase I Inspection Report
National Dam Safety Program

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)

(10) George Koch, P.E.

8. CONTRACT OR GRANT NUMBER(s)

(15) DACW-51-78-C-0035

9. PERFORMING ORGANIZATION NAME AND ADDRESS

New York State, Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS

New York State Department of Environmental Conservation/ 50 Wolf Road
Albany, New York 12233

(11) 12. REPORT DATE
22 Sept[illegible] 1978

13. NUMBER OF PAGES

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)

Department of the Army
26 Federal Plaza/ New York District, CofE
New York, New York 10007

15. SECURITY CLASS. (of this report)
UNCLASSIFIED

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; Distribution unlimited.

(12) 147 p. Inventory no. NY 129.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

(6) National Dam Safety Program. Trinity Dam, Long Island River Basin, Westchester County, New York ([illegible]). Phase I Inspection Report.

18. SUPPLEMENTARY NOTES

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

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Westchester County
Trinity Dam
Mill River

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.

Trinity Dam was judged to be safe.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

393 970

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TRINITY DAM I.D. No. NY 129
DEC #232B-3370
LONG ISLAND RIVER BASIN
WESTCHESTER COUNTY, NEW YORK

TABLE OF CONTENTS

		PAGE NO.
-	ASSESSMENT	
-	OVERVIEW PHOTOGRAPH	
1	PROJECT INFORMATION	1
1.1	GENERAL	1
1.2	DESCRIPTION OF PROJECT	1
1.3	PERTINENT DATA	2
2	ENGINEERING DATA	4
2.1	DESIGN	4
2.2	CONSTRUCTION RECORDS	4
2.3	OPERATION RECORD	4
2.4	EVALUATION OF DATA	4
3	VISUAL INSPECTION	5
3.1	FINDINGS	5
3.2	EVALUATION OF OBSERVATIONS	6
4	OPERATION AND MAINTENANCE PROCEDURES	7
4.1	PROCEDURE	7
4.2	MAINTENANCE OF DAM	7
4.3	WARNING SYSTEM IN EFFECT	7
4.4	EVALUATION	7

ACCESSION for
NTIS White Section
DDC Buff Section
UNANNOUNCED
JUSTIFICATION
BY
DISTRIBUTION/AVAILABILITY CODES
Dist. SPECIAL
A 23

		PAGE NO.
5	HYDROLOGIC/HYDRAULIC	8
5.1	DRAINAGE AREA CHARACTERISTICS	8
5.2	ANALYSIS CRITERIA	8
5.3	SPILLWAY CAPACITY	8
5.4	RESERVOIR CAPACITY	8
5.5	FLOODS OF RECORD	8
5.6	OVERTOPPING POTENTIAL	9
5.7	EVALUATION	9
6	STRUCTURAL STABILITY	10
6.1	EVALUATION OF STRUCTURAL STABILITY	10
7	ASSESSMENT/RECOMMENDATIONS	11
7.1	ASSESSMENT	11
7.2	RECOMMENDED MEASURES	11

APPENDIX

A. PHOTOGRAPHS

B. ENGINEERING DATA CHECKLIST

C. VISUAL INSPECTION CHECKLIST

D. HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS

E. REFERENCES

F. DRAWINGS

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Trinity Dam (I.D. No. NY 129) DEC # 2328-3370
State Located:	New York
County Located:	Westchester
Watershed:	Long Island River Basin
Stream:	Tributary of Mill River (tributary of Rippowan River)
Date of Inspection:	September 7, 1978

ASSESSMENT

Trinity Dam is an earth embankment dam with a morning glory type spillway located in the upstream slope, the visual inspection of which did not reveal any conditions that would render the dam unsafe.

The reservoir detention volume is sufficient to retain the Probable Maximum Flood (PMF) without overtopping even if no allowance is made for spillway capacity.

George Koch

George Koch
Chief, Dam Safety Section
New York State Department of
Environmental Conservation
N.Y. License No. 45937

Approved by:

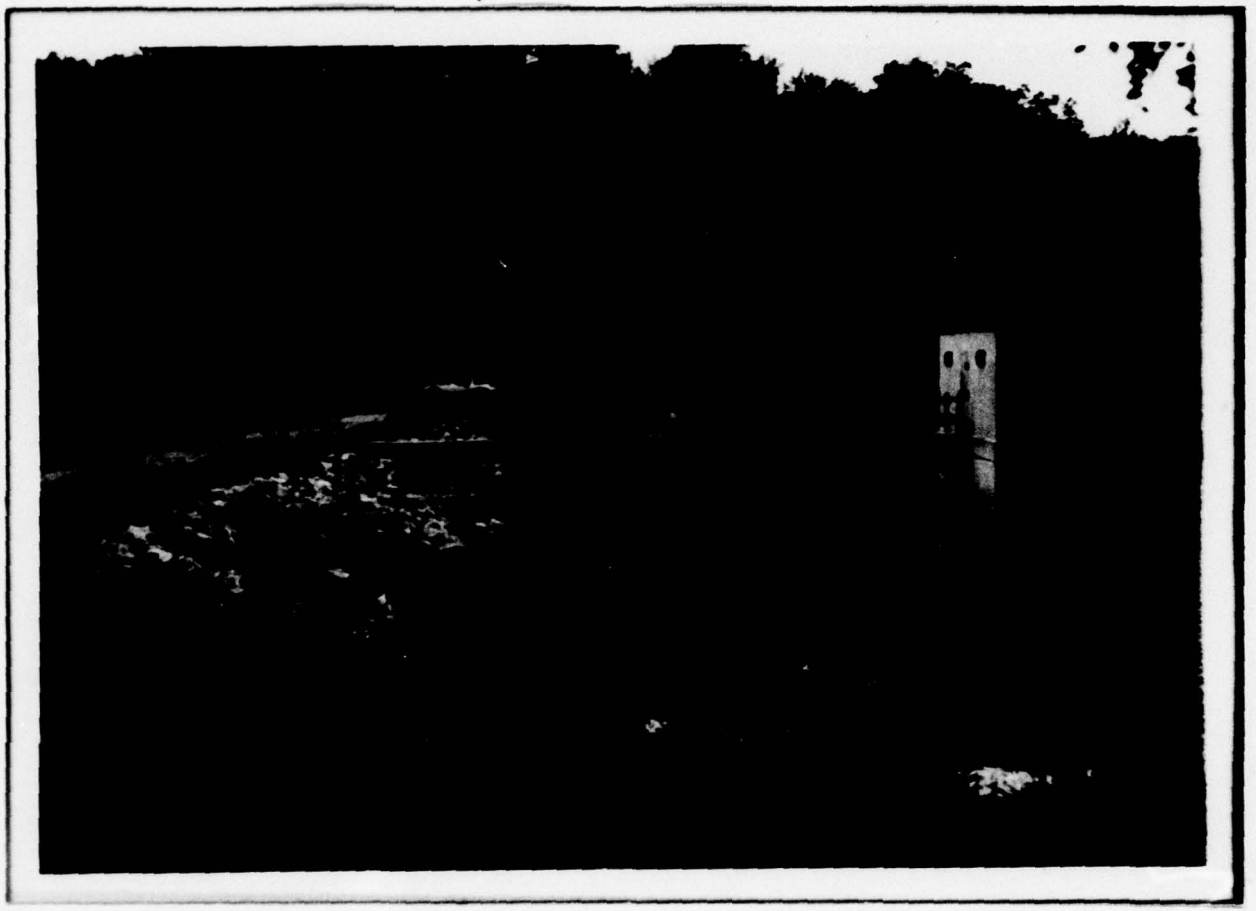
Clark H. Benn

Col. Clark H. Benn
New York District Engineer

Date: 22 September 1978



Overview of Trinity Dam
Downstream Slope looking West



Overview of Trinity Dam
Upstream slope and Intake Tower
Looking west

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TRINITY DAM I.D. NO. NY 129
DEC #232B-3370
LONG ISLAND RIVER BASIN
WESTCHESTER COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

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

b. Purpose of Inspection

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

1.2 DESCRIPTION OF PROJECT

a. Description of the Dam and Appurtenant Structures

The Trinity Dam is composed of a 300 feet long zoned earth embankment with a morning glory type spillway located in the upstream slope of the dam. The maximum height of the dam is 46 feet. The crest width is 20 feet. The upstream slope is 1 vertical on 2.75 horizontal and the downstream slope is 1 on 2.25. The spillway is attached to the upstream face of the intake tower, the access to which is via a 52 feet long foot bridge. The downstream slope and crest are covered with grass. The upstream slope is covered by riprap. The embankment has an impervious core extending from the crest to the bottom of the cut-off trench. More pervious material was placed upstream and downstream of the impervious core. The plans indicate that the cut-off trench is approximately 70 feet wide and 7 to 10 feet below original grade.

The spillway and intake tower is constructed of reinforced concrete. The elevation of the spillway crest is 471.0. Flashboards measuring 2.67 feet were in place above a 4" high steel channel on all three sides of the spillway. Inside dimensions of the spillway are 5 feet wide and 10 feet long. The distance between the top of the flashboards and the bottom of the reinforced concrete spillway cover is 5.33 feet. A trash rack was also in place on all three sides of the spillway from crest to concrete cover.

The intake tower is constructed of reinforced concrete and has 3 manually operated sluice gates located as follows: a 24 inch intake centered at elevation 461.0, a 36 inch intake centered at elevation 436.5, and a 48 inch intake centered at elevation 437.0. The floor elevation of the intake tower is 430.0. A 48 inch diameter reinforced concrete pipe, with an invert of 430.0, directs the flow from the spillway and the intakes under the dam where the flow exits into a reinforced concrete impact basin. From the impact basin, the flow is directed to and under Trinity Pass Road via a riprap lined channel and a twin 48 inch diameter

reinforced concrete culvert. The flow joins Mill River, beneath Mill River Dam and is directed toward the Laurel and the North Stamford water supplies

b. Location

The Trinity Dam is located on a tributary of Mill River, a tributary of the Rippowan River approximately 6000 feet northeast of the Pound Ridge Town Hall. Pound Ridge is the nearest village.

c. Size Classification

The dam is 46 feet high and is classified as an "intermediate" dam (between 40 and 100 feet high).

d. Hazard Classification

The dam is classified as "high" hazard because of the recreation facility and housing development currently under construction immediately downstream.

e. Ownership

The Trinity Dam is owned and operated by the Stamford Water Company of Stamford, Connecticut.

f. Purpose of Dam

The dam provides storage for the city of Stamford, Connecticut water supply system.

g. Design and Construction History

The dam and its appurtenant structures were designed by Malcolm Pirnie, Environmental Consulting Engineers, in 1964. Bids were received on December 8, 1964, and Poirier and McLane, Inc. of NY, NY., were awarded the construction contract. The dam was scheduled for completion in the fall of 1966.

h. Normal Operating Procedures

Water is released from the reservoir either by any of the 3 Low Level outlets or over the spillway. A flow rate of approximately 250,000 gallons per day is released to Mill River. The Low Level outlets are centered at elevations 436.5, 437.0 and 461.0.

1.3 PERTINENT DATA

a. Drainage Area (sq. mi)	0.65
b. Discharge at Dam Site (cfs)	
Maximum know flood	650
Maximum pool (El 479)	1,600
Maximum pool w/flashboards (El 474)	800
Maximum capacity of low level outlets	200
Total Discharge at Maximum pool	1,800
Total Discharge at Maximum pool w/flashboards	1,000

c. Evaluation (USGS datum)

Top of dam	479
Spillway Crest	471
Tail Race Channel	427
Invert Low Level outlet	430

d. Reservoir

Length of maximum pool, miles	1.4
Length of shoreline (spillway crest), miles	2.8
Surface area (spillway crest), acres	110

e. Storage (acre-feet)

Spillway crest	2,550
Top of flashboards	2,900
Top of dam	3,500

f. Dam

Embankment type	earth
Embankment length, ft.	300
Upstream slope	1:2.75
Downstream slope	1:2.25

g. Spillway

Type	morning glory
Length, ft.	20
Crest elevation (USGS)	471

h. Regulating Outlets

Upstream: Three sluice gates at elevations 436.5, 437.0 and 461.0 control the flow to the 4 feet diameter outlet pipe (El 432)

Downstream: None

SECTION 2: ENGINEERING DATA

2.1 DESIGN

a. Geology

The Trinity Dam is located in the "New England Uplands" physiographic province of New York State. A report entitled "Geology of the Mill River Dam Site" prepared by Mr. Matt Walton, Consulting Geologist, in May 1964 included a section as the Trinity Dam site. The report states that the dam is located on hard, feldspathic biotite gneiss and granite. There were no faults reported in the immediate vicinity of the dam and the rock under the dam was expected to be competant.

b. Subsurface Investigations

A subsurface investigation for the dam was conducted in February 1964. In general, the soil at the dam consists of from 3.5 to 10 feet of sand, silt and gravel over bedrock. The water table was from 0 to 3 feet below the ground surface. The high water levels are probably the result of the old Trinity Dam impoundment which was in existence prior to construction to the current Trinity Dam.

c. Embankment and Appurtenant Structures

The dam was designed by Malcolm Pirnie, Consulting Environmental Engineers, of White Plains, NY. Twenty-eight drawings were prepared for "Contract No. 2 - Mill River & Trinity Dams." Selected drawings concerning the Trinity Dam are included in Appendix F. In addition, all available subsurface and geologic information available is included in Appendix F.

2.2 CONSTRUCTION RECORDS

No information regarding construction, other than the name of the contractor (Poirier & McLane, Inc., NY, NY) and the intended completion date (Fall 1966), was available for review.

2.3 OPERATION RECORD

The outlet discharge is checked twice each day and the reservoir level once each day. Vegetation is mowed twice each year. No maintenance or operation manual has been prepared. All maintenance and repair work records are on file in the Stamford Water Company headquarters. The dam is visually inspected on an irregular basis.

2.4 EVALUATION OF DATA

The data presented in this report has been made available by the Stamford Water Company and Malcolm Pirnie, Inc. In addition, personnel of the Stamford Water Company have contributed valuable observations of the structure's performance, operation and maintenance. This information appears adeuate for Phase I inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

A visual inspection of the Trinity Dam and the surrounding watershed was conducted on September 7, 1978. The weather was clear and the temperature approximately 70°. A gentle rain occurred prior to the inspection. The reservoir level at the time of inspection was Elevation 472.5, 1.5 feet above the spillway crest elevation due to the presence of flashboards. These flashboards were leaking slightly.

B. Embankment and Abutments

The earth embankment, which was completed in 1966, shows no signs of distress. The vertical and horizontal alignment of the crest appears unchanged, with no visible cracks on the embankment slopes or crest. There is no evidence of sliding or sloghing. A small depression was observed in the backfill near the northeast corner of the impact basin. This depression is probably due to the loss of soil through a crack or open joint in an 8 inch diameter vitrified clay pipe which traverses beneath the depression and outlets into the impact basin. Considerable discoloration of concrete was observed beneath this pipe on the interior wall of the basin, possibly a result of the soil migration. Grass covers the exposed portions of the embankment and some small pine trees were observed near the toe of the downstream slope. Riprap placed on the upstream slope of the dam is in good condition. No evidence of seepage was observed. No problems were observed at either earth abutment.

No problem areas were found in the area immediately downstream of the toe. The only drainage system incorporated in the design is surface drain to collect run-off from the bench area at elevation 455 and transport the flow via an 8" vitrified clay pipe to the impact basin.

Elevations are referenced to the upper floor of the intake tower and it is assumed to be 479.00. No instrumentation was incorporated into the dam. The reservoir slopes are in good condition with no reports of any sedimentation problems.

c. Spillway

The spillway is a morning glory type located on the upstream side of the intake tower. Flashboards were measured to be 36 inches above the spillway crest. No emergency or auxilliary spillway has been provided. The spillway is in good condition.

d. Downstream Channel

The condition of the tailrace channel is good, with sufficient riprap and stable side slopes. This channel is directed toward 2 - 48 inch diameter reinforced concrete pipes, which serve as culverts beneath Trinity Pass Road. At the entrance to these culverts, the presence of considerable vegetation and improper grading has resulted in the flow being directed to the west with the flow approaching the culverts at an oblique angle. The vegetation should be removed and the channel regraded so that the flow approaches the culverts correctly.

e. Regulating Outlets

A reinforced concrete intake tower, located in the upstream slope is used to control the reservoir level (through the use of the attached spillway) and draw off water from the reservoir through a 24 inch diameter intake centered at elevation 461.0, a 36 inch diameter intake centered at elevation 436.5, and a 48 inch diameter intake centered at elevation 437.0, each controlled by manually operated sluice gates. All controls were reported to be operational. However, the 48 inch gate valve could not be closed completely, possibly due to some debris. Access into the lower portions of the intake tower could not be accomplished due to the flow from this valve. A foot bridge provides access to the intake tower from the dam crest.

Some minor calsification was evident in the intake tower on the first level behind the inspection ladder and at the base of the structure near the Low Level drain.

The inspection of the outlet conduit revelaed only the minor problem of joint material separation. This should be repaired in the near future.

f. Structural Evaluation

All concrete surfaces appear to be in good condition. No cracking or detrimental movement was observed.

3.2 EVALUATION OF OBSERVATIONS

Only minor deficiencies were observed. There are no indications that the dam is unsafe.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

The Trinity Dam discharges approximately 250,000 gallons per day into Mill River which flows into Laurel and North Stamford Reservoirs. Water can be augmented in Trinity Lake, via a Saddle Dam located on the east side of the lake, from the adjacent Mill River Reservoir. The rate of flow from Trinity Dam is set by sluice gates in the intake tower.

4.2 MAINTENANCE OF DAM

The dam and appurtenant structures are maintained in good operational condition.

4.3 MAINTENANCE OF OPERATING FACILITIES

The operating facilities are maintained by personnel of the Stamford Water Company, Stamford Connecticut.

4.4 WARNING SYSTEMS IN EFFECT

No warning system is present

4.5 EVALUATION

The dam and appurtenant works are maintained in good condition. The maximum estimated drawdown capacity is 200 cubic feet per second.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

Trinity Dam is located on a brook flowing into Mill River in the town of Pound Ridge, Westchester County. The drainage area at the dam is 0.65 square miles. The topography is characterized by hills and ridges interspersed with flat valleys containing swamps.

5.2 ANALYSIS CRITERIA

No hydrologic data is available for the dam. For the purpose of this investigation, the dam and the spillway were analyzed with respect to their flood control potential and were assessed through the development of Probable Maximum Flood (PMF) for the watershed. The "Dimensionless Hydrograph Method" of the Soil Conservation Service (SCS) was used to establish the hydrograph peak inflow. A short-cut, approximation method of flood routing was then used to determine the reservoir storage/peak outflow relationship.

A probable maximum 6 hour rainfall of 25.2 inches was selected using the Rainfall Frequency Atlas of the United States - TP.40 (Ref. 7). Direct runoff was estimated at 19 inches. An SCS curve number (CN) of 60 was selected to account for the soil and land use development within the watershed. The time of concentration of 1.30 hours was estimated using the SCS design report summary.

5.3 SPILLWAY CAPACITY

The morning glory type spillway is ungated and open on three sides. The inside dimensions are 10 feet wide on one side and 5 feet wide on each of the two sides, making the total width 20 feet. The design indicates no flashboards, but 2'-8" flashboards were installed on top of 4" metal channels on top of the spillway reducing the maximum head possible from 8 feet to 5 feet. No data was available on the discharge rating of the spillway, so the weir coefficient was assumed to be 3.5. The computed capacities at maximum head are 1,600 cfs without flashboards and 800 cfs with flashboards.

5.4 RESERVOIR CAPACITY

The length of the reservoir is 1.4 miles and the length of the shoreline is 2.8 miles at Spillway Crest, the measurements being approximate. The reservoir capacities at spillway crest, top of flashboards and top of dam are 2,550, 2,900 and 3,500 acre feet, respectively. The storage capacity curve is shown in Appendix E. The curve indicates a surcharge storage above the spillway crest of 950 acre-feet which is equivalent to 144 percent of PMF.

5.5 FLOODS OF RECORD

The highest water level recorded since completion of Trinity Dam in the Fall of 1966 are as follows:

	Date	Elev. (Ft.)	Discharge (cfs)
Highest	June 21, 1972	475.3	650

5.6 OVERTOPPING POTENTIAL

The maximum capacities of the spillway are 1,600 cfs without flashboards and 800 cfs with flashboards. Since the reservoir can store 144 percent of PMF, no overtopping potential exists.

5.7 EVALUATION

The spillway is adequate to handle PMF. The dam has a very small watershed and was built primarily to store excess water from Mill River Reservoir. The two reservoirs are connected by Saddle Dam equipped with two sluice gates.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

No signs of distress of the dam and appurtenances were observed during the inspection. The depression near the northeast corner of the energy dissipator is probably caused by a break in the surface drain line where it enters the concrete headwall of the dissipator.

b. Design and Construction Data

Design computations or data regarding the structural stability of the dam and appurtenances are not available. Construction data was also not available.

c. Post-Construction Changes

In 1967 3 feet high flashboards were added to the spillway crest.

d. Seismic Stability

The dam is located in Seismic Zone No. 1. The seismic coefficient is small and the dam shows no signs of instability so a seismic stability analysis is not warranted.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I inspection of Trinity Dam did not reveal any condition which would constitute a hazard to human life or property. The earth embankment and its appurtenances is not considered to be unstable.

b. Adequacy of Information

For the purpose of the Phase I inspection report, the information reviewed for is adequate.

c. Need for Additional Investigation

There is no need for additional investigations.

7.2 RECOMMENDED MEASURES

Remedial measures, which should be initiated in the near future, are as follows:

a. Remove small trees which are growing at and near the toe of the downstream slope to permit the unimpeded inspection of this area.

b. Repair joints in the outlet conduit, as required.

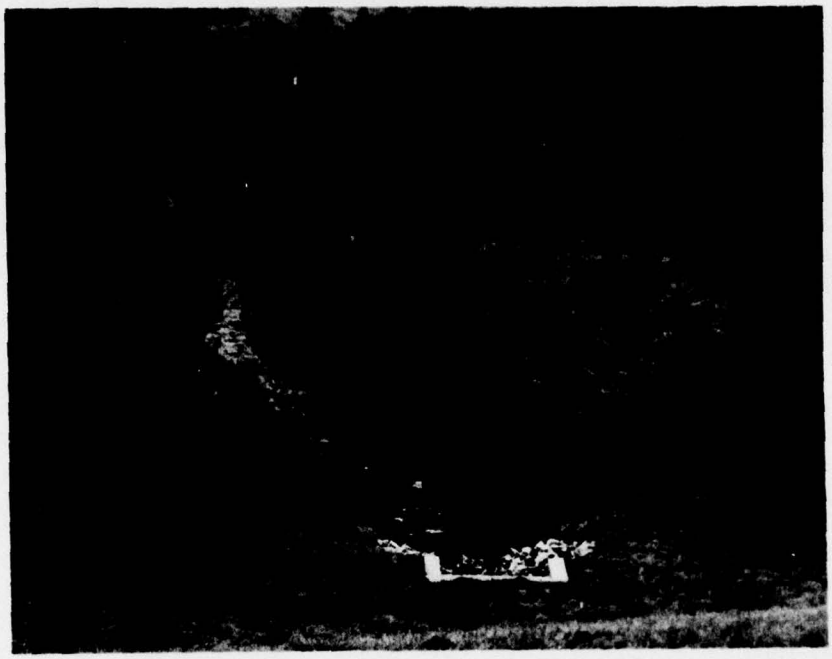
c. Investigate the cause of the minor depression in the backfill at the northeast corner of the impact basin. This depression may be a result of soil migration through the cracks or joints of the 8 inch diameter vitrified clay bench surface drain pipe which traverses directly below the depression.

d. All sluice gates and appurtenances should be inspected periodically and systematically and repaired as required. Particular attention should be paid to the improper closing of the 48 inch sluice gate.

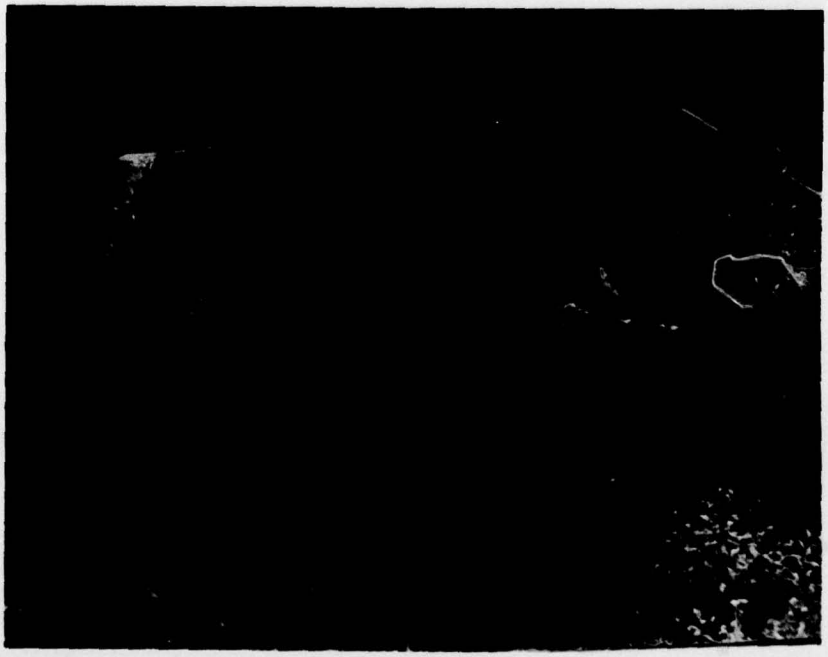
e. Regrade the tailrace channel as required to permit the unimpeded flow from the channel to the highway culverts beneath Trinity Pass Road.

PHOTOGRAPHS

APPENDIX A



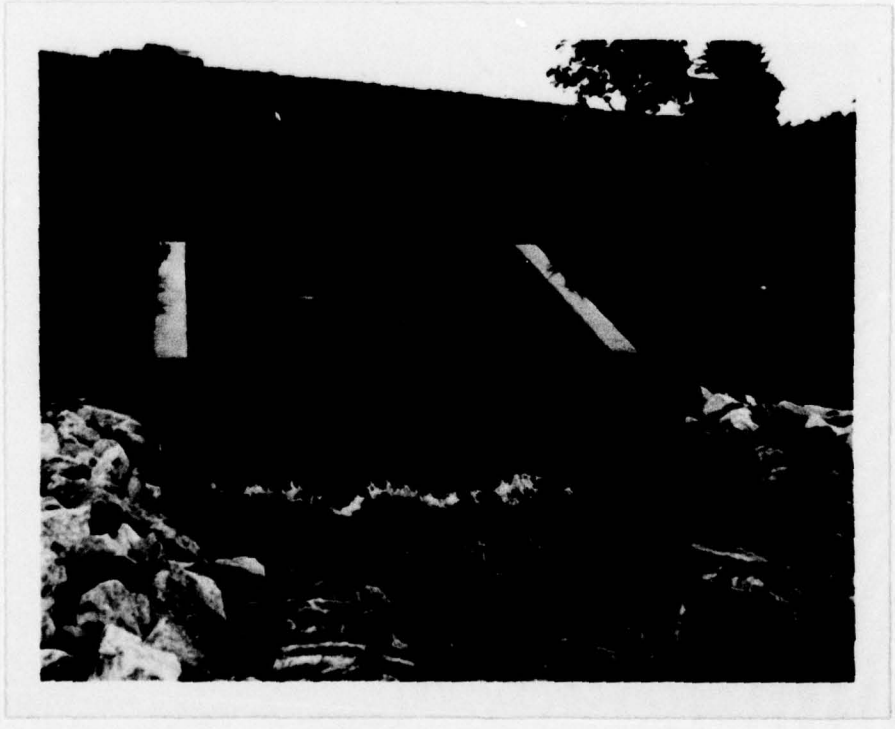
Downstream Area from top of Dam looking south
note highway embankment and culvert head wall



Headwall and 48" diameter Culverts
under highway



Downstream Slope of Dam & Spillway Outlet Structure
looking north



Impact Basin
note bench where inspector is standing



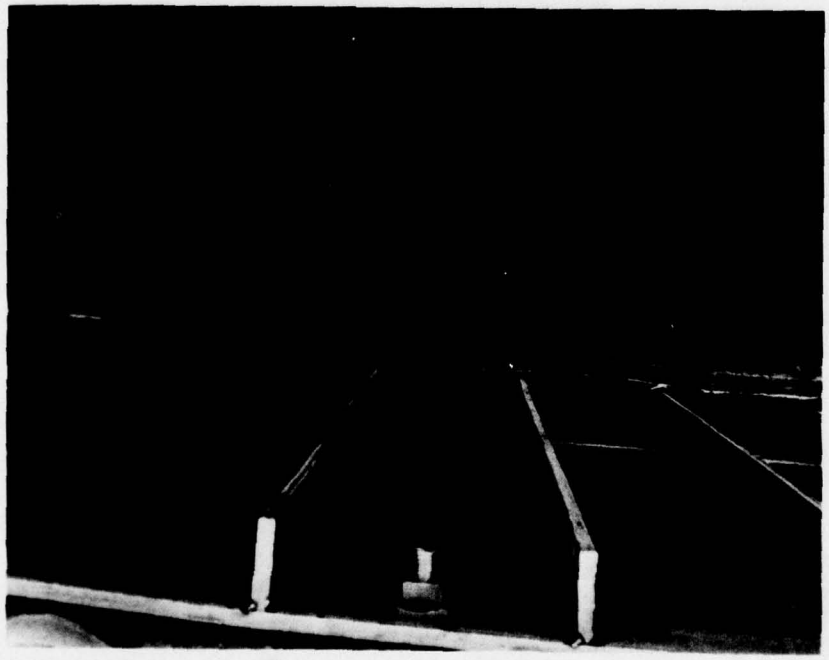
48" Reinforced Concrete Pipe in Impact Basin
and 8" vitrified Clay Pipe (Berm drain) in corner



North East Corner of Impact Basin
note settlement of backfill above 8" pipe



24" Culvert beneath Access Road
west of dam, looking south



Trash Rack and Flashboards on Spillway Crest
looking down from platform to reservoir level



East Face of Saddle Dam
note sluice gates



West Face of Saddle Dam
outlet to Trinity Lake

ENGINEERING DATA CHECKLIST

APPENDIX B

Check List
Engineering Data
Design Construction Operation

Name of Dam Trinity

I.D. # NY 129

~~Dec~~ # 2328-3370

Item	Remarks		
	Plans	Details	Typical Sections
Dam	Yes	Yes	Yes
Spillway(s)	Yes	Yes	Yes
Outlet(s)	Yes	Yes	Yes
Design Reports	None		
Design Computations	Yes -		
Discharge Rating Curves	On plans		
Dam Stability	None		
Seepage Studies	None		
Subsurface and Materials Investigations	Yes Soils & Seismic		

Item	Remarks
Construction History	None found
Surveys, Modifications, Post-Construction Engineering Studies and Reports	None
Accidents or Failure of Dam Description, Reports	None
Operation and Maintenance Records Operation Manual	All available information in the offices of the Stamford Water Co.

VISUAL INSPECTION CHECKLIST

APPENDIX C

VISUAL INSPECTION CHECKLIST

1) **Basic Data**

a. General

Name of Dam Trinity Dam

I.D. # NY 129 DEC # 232B-3370

Location: Town Pound Ridge County Westchester

Stream Name Tributary of Mill River

Tributary of Rippowan River

Longitude (W), Latitude (N) 73°33'16" 41°12'51"

Hazard Category High

Date(s) of Inspection Sept. 7, 1978

Weather Conditions Clear 70°F

b. Inspection Personnel M. Islam, K. Harmer, T. Stoddard, R. McCarty

c. Persons Contacted Joseph E. Suttile - Superintendent 203-323-8309

Glen Thornhill - Chief Engr. 203-324-3163 Stanford Water Co.

d. History:

Date Constructed Bid 12/8/64 scheduled completion Fall 1966

Owner Stamford Water Co.

Designer Malcolm Pirnie Inc. (Mr. S.J. Najarian - contact) White Plains NY

Constructed by Poirier & McLane Corp. NY, NY.

2) **Technical Data**

Type of Dam Zoned Earth Embankment

Drainage Area 0.65 sq. mi.

Height scaled 46' Length 300'

Upstream Slope 1:2.75 Downstream Slope 1:2.25

2) Technical Data (Cont'd.)

External Drains: on Downstream Face Bench surface drain @ Downstream Toe None

Internal Components:

Impervious Core Impervious material from borrow area

Drains No internal drains

Cutoff Type Impervious earth similar to core material See sheet #13 of plans in appendix

Grout Curtain

Specifications indicate that a single row of grout holes was to be drilled along the axis of the dam at 20' centers and 20' in depth with a maximum hole diameter of 2.5 inches neat cement and water was to be used for small joints in the bedrock.

maximum 1 part cement to 1 part sand with water was to be used for larger joints in the bedrock.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

3) **Embankment**

Zoned Earth Type A & B material Type A more impervious

a. Crest

(1) Vertical Alignment Good

(2) Horizontal Alignment Good

(3) Surface Cracks None

(4) Miscellaneous

b. Slopes

(1) Undesirable Growth or Debris, Animal Burrows Near and above toe of downstream slope several small trees were observed - should be moved away from toe for inspection purposes in future.

(2) Sloughing, Subsidence or Depressions Depression near northeast corner of impact basin in backfill - probably due to loss of fines thru joints or cracks in 8" v.t. clay pipe directly below

(3) Slope Protection Riprap on upstream slope in good condition

(4) Surface Cracks or Movement at Toe None

(5) Seepage None

(6) Condition Around Outlet Structure Possible cracking or joint widening of 8" v.t. clay pipe in N.E. corner of impact basin - pipe serves as outlet for surface drain in bench of downstream face, no other problems observed.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

c. Abutments

Earth to Earth contact

(1) Erosion at Embankment and Abutment Contact None

(2) Seepage along Contact of Embankment and Abutment

None

(3) Seepage at toe or along downstream face

None

d. Downstream Area - below embankment

(1) Subsidence, Depressions, etc. None

(2) Seepage, unusual growth None

(3) Evidence of surface movement beyond embankment toe

None

(4) Miscellaneous

e. Drainage System

Surface drain in center of bench on downstream face at elevation 955 to impact basin via 8" vit. clay pipe.

(1) Condition of relief wells, drains, etc. NONE

(2) Discharge from Drainage System NONE

4) Instrumentation

(1) Monumentation/Surveys Assumed elevation from upper floor of Intake Tower El. 479.00

(2) Observation Wells None

(3) Weirs None

(4) Piezometers None

(5) Other

5) Reservoir

a. Slopes Good condition - appear stable

b. Sedimentation No problems reported

6) Spillway(s) (including tail race channel)

a. General

b. Principle Spillway Morning Glory Type in upstream face crest elevation 971.0, inside dimensions of chamber 5' wide, 10' long, open on 3 sides, flash boards in place height: 1ft

c. Emergency or Auxiliary Spillway None designed a drainage pipe under the access road to the dam (west side near outflow gate) may provide an outlet if reservoir level is high, culvert: 24" Reinforced Concrete

d. Condition of Tail race channel Good, sufficient riprap in channel bottom & on slopes

e. Stability of Channel side/slopes good

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

7) **Downstream Channel**

a. Condition (debris, etc.) Channel discharges into 2 - 48" RCP. culverts in highway embankment of Trinity Pass Rd., some minor debris - channel should be realigned to direct flow into culverts - design capacity of culverts = 450 c/s

b. Slopes good condition

c. Approximate number of homes A recreation facility with tennis courts & swimming pool lies adjacent to Mill River and a new housing development is in progress along the west side of the river.

8) **Miscellaneous**

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

9) Structural

a. Concrete Surfaces good

Some minor calcification apparent on first level behind ladder & at base near low level drain, complete inspection of intake tower base impossible due to leaking of 98" intake gate El 437. possible debris beneath gate

b. Structural Cracking

NONE

c. Movement - Horizontal & Vertical Alignment (Settlement)

NONE

d. Junctions with Abutments or Embankments

N/A

e. Drains - Foundation, Joint, Face

Surface drain - possible crack at north east corner of impact basin in backfill - small depression observed there.

f. Water passages, conduits, sluices good condition with the exception of possible debris in intake at El. 437.0 would not close completely. Inspection of outlet conduit: some minor joint material separation, repair as required

g. Seepage or Leakage

NONE

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

h. Joints - Construction, etc. Good condition

i. Foundation No problems observed

j. Abutments N/A

k. Control Gates good condition

l. Approach & Outlet Channels good condition

m. Energy Dissipators (plunge pool, etc.) impact basin in good condition

n. Intake Structures good condition some leakage of flash boards

o. Stability good

p. Miscellaneous

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX D

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	479	120	3500
2) Design High Water (Max. Design Pool)	478	120	3400
3) Auxiliary Spillway Crest	None	—	—
4) Pool Level with Flashboards	474	115	2900
5) Service Spillway Crest	471	110	2550

DISCHARGES

	Volume (cfs)	Volume w/Flashboards (cfs)
1) Average Daily	0.4	0.4
2) Spillway @ Maximum High Water	1600	800
3) Spillway @ Design High Water	1300	550
4) Spillway @ Auxiliary Spillway Crest Elevation	—	—
5) Low Level Outlet	200	200
6) Total (of all facilities) @ Maximum High Water	200	200
7) Maximum Known Flood	unknown	—

CREST: ELEVATION: 471.0, w/flashboards 474.0

Type: Morning Glory - Three sided

Width: 5 feet Length: 10 feet

Spillover Reinforced concrete - with flashboards

Location Adjacent to intake tower

SPILLWAY:

PRINCIPAL		EMERGENCY
471.0	Elevation	NONE
Morning Glory	Type	
	Width	
	Type of Control	
Controlled	Uncontrolled	
	Controlled:	
Flashboards	Type (Flashboards; gate)	
Three -11 inch high boards	Number	
2.67 feet high + 0.33' high	Size/Length	
Steel channel	Invert Material	
	Anticipated Length of operating service	
N/A	Chute Length	
18 feet	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	

OUTLET STRUCTURES/EMERGENCY DRAWDOWN FACILITIES:

Type: Gate _____ Sluice ↘ Conduit ↘ Penstock _____

Shape : Sluice - flat square Conduit - 48" round - RCP

Size: 1 - 24 inch, 1 - 36 inch, and 1 - 48 inch

Elevations: Entrance Invert 461.0, 436.5, and 437.0 respect.

Exit Invert 430.0

Tailrace Channel: Elevation 427.0

HYDROMETEROLOGICAL GAGES:

Type : Reservoir elevation and Rain gage - taken daily

Location: adjacent to intake tower

Records:

Date - 1967 or 1968

Max. Reading - 475.5

FLOOD WATER CONTROL SYSTEM:

Warning System: None

Method of Controlled Releases (mechanisms):

manual opening of sluice gate(s)

DRAINAGE AREA: 0.65 sq.mi

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Forested

Terrain - Relief: Steep side slopes with 1 swamp

Surface - Soil: sand and gravel

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

None

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

No problems reported or anticipated

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

N/A

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

Location: None

Elevation:

Reservoir:

Length @ Maximum Pool 1.1 (Miles)

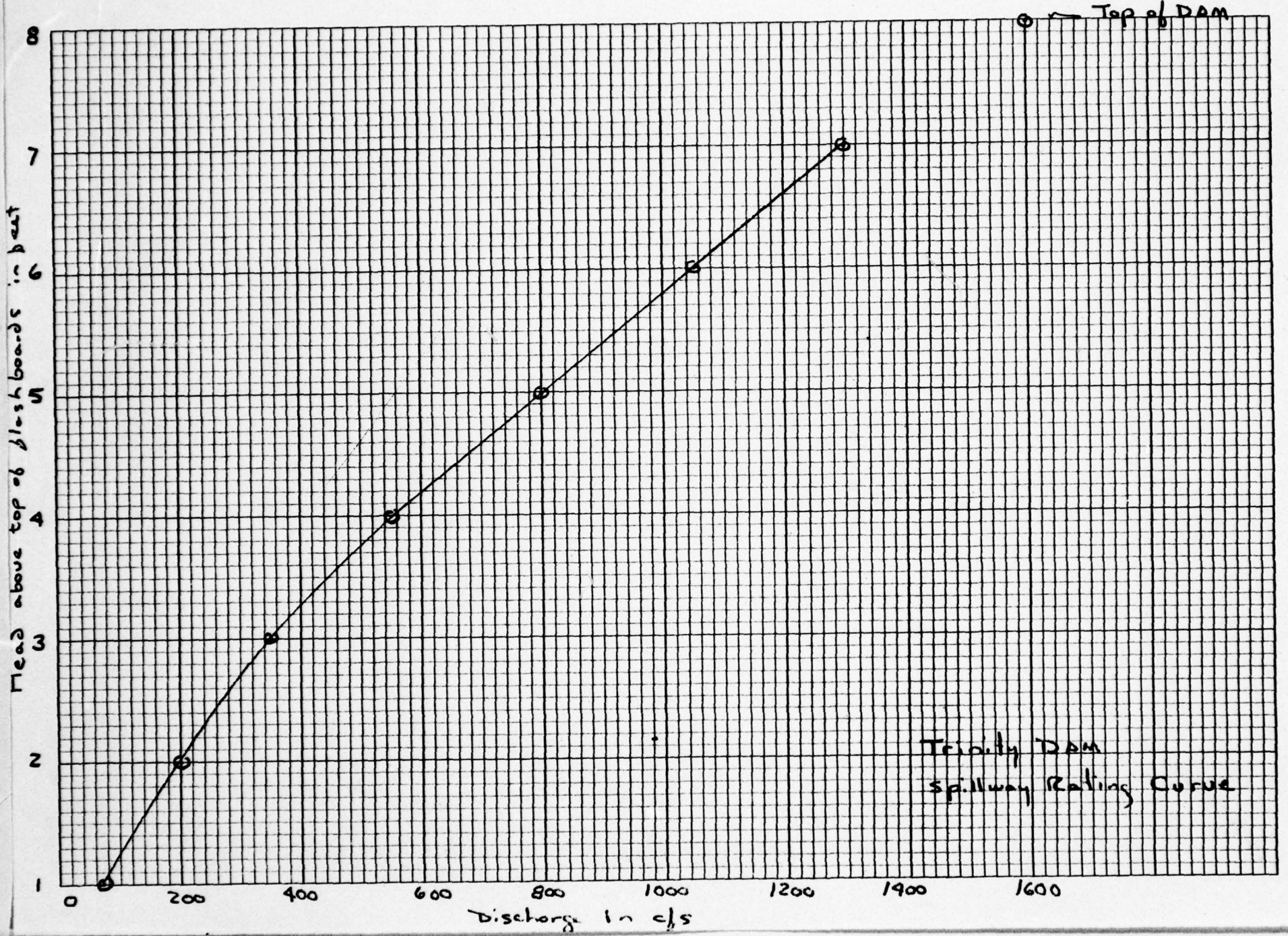
Length of Shoreline (@ Spillway Crest) 3.0 (Miles)

Spillway Rating Curve

$Q = CLH^{3/2}$ where C = Coefficient of discharge
L = Length of spillway
H = Head of water over spillway
Q = Discharge over spillway

H (ft.)	C	L (ft.)	Q (cfs)
1	3.5	20	70
2	3.5	20	200
3	3.5	20	350
4	3.5	20	550
5	3.5	20	800
6	3.5	20	1050
7	3.5	20	1300
8	3.5	20	1600

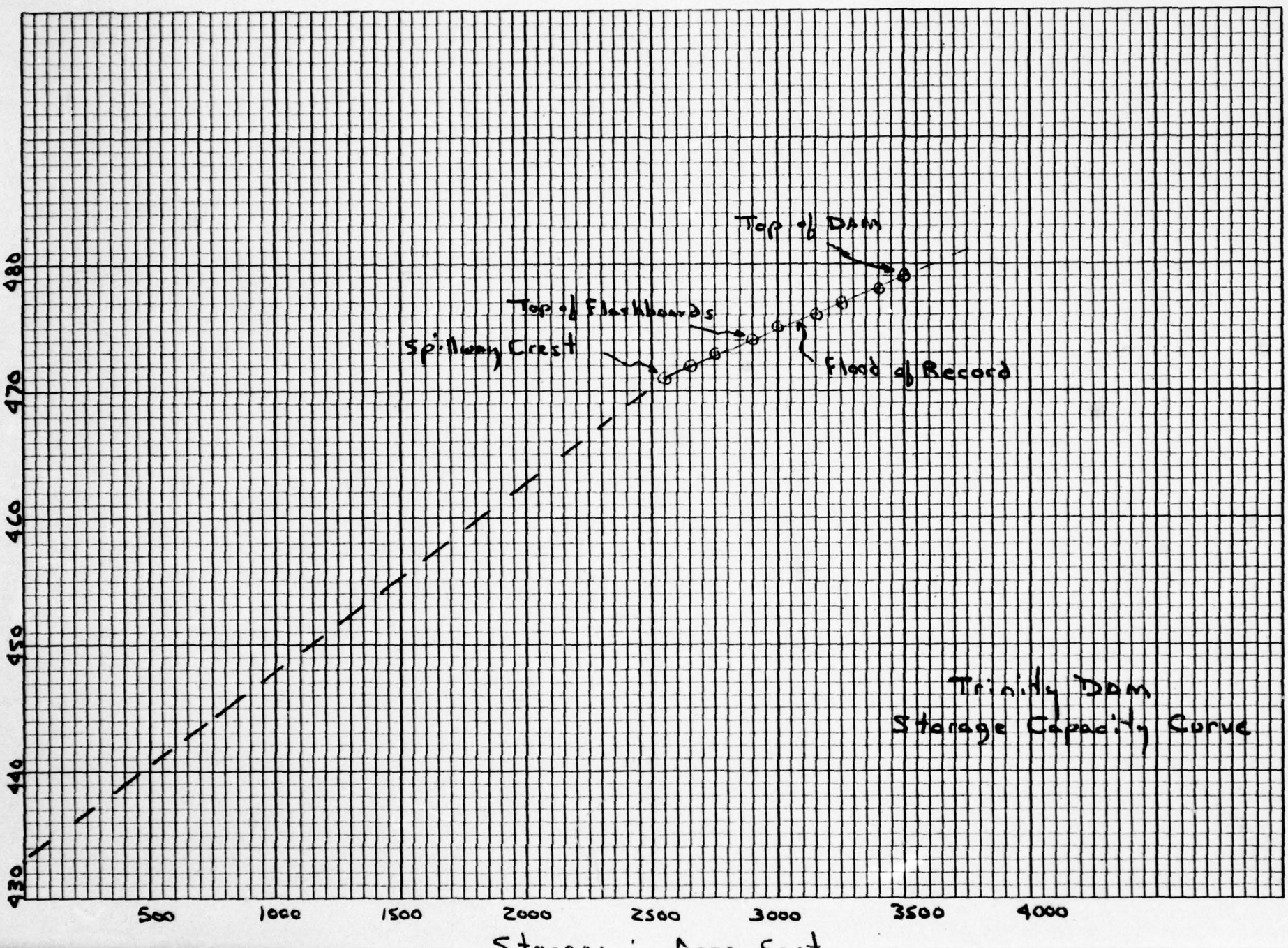
KEUFFEL & ESSER CO. MADE IN U.S.A.



Storage Capacity Curve

ELEVATION (FT.)	TOTAL VOLUME (ACRE-FEET)
471	2550
472	2650
473	2750
474	2900
475	3000
476	3150
477	3250
478	3400
479	3500

KEUFFEL & ESSER CO. MADE IN U.S.A.



LIST OF REFERENCES

APPENDIX E

APPENDIX E

REFERENCES

1. University of the State of New York: Geology of New York, Education Leaflet 20 (Reprinted 1973)

2. William D. Thornbury: Principles of Geomorphology, John Wiley and Sons (1969)

3. T. William Lambe and Robert V. Whitman: Soil Mechanics, John Wiley and Sons (1969)

4. Soil Conservation Service: Hydrology, Section 4 (1971)

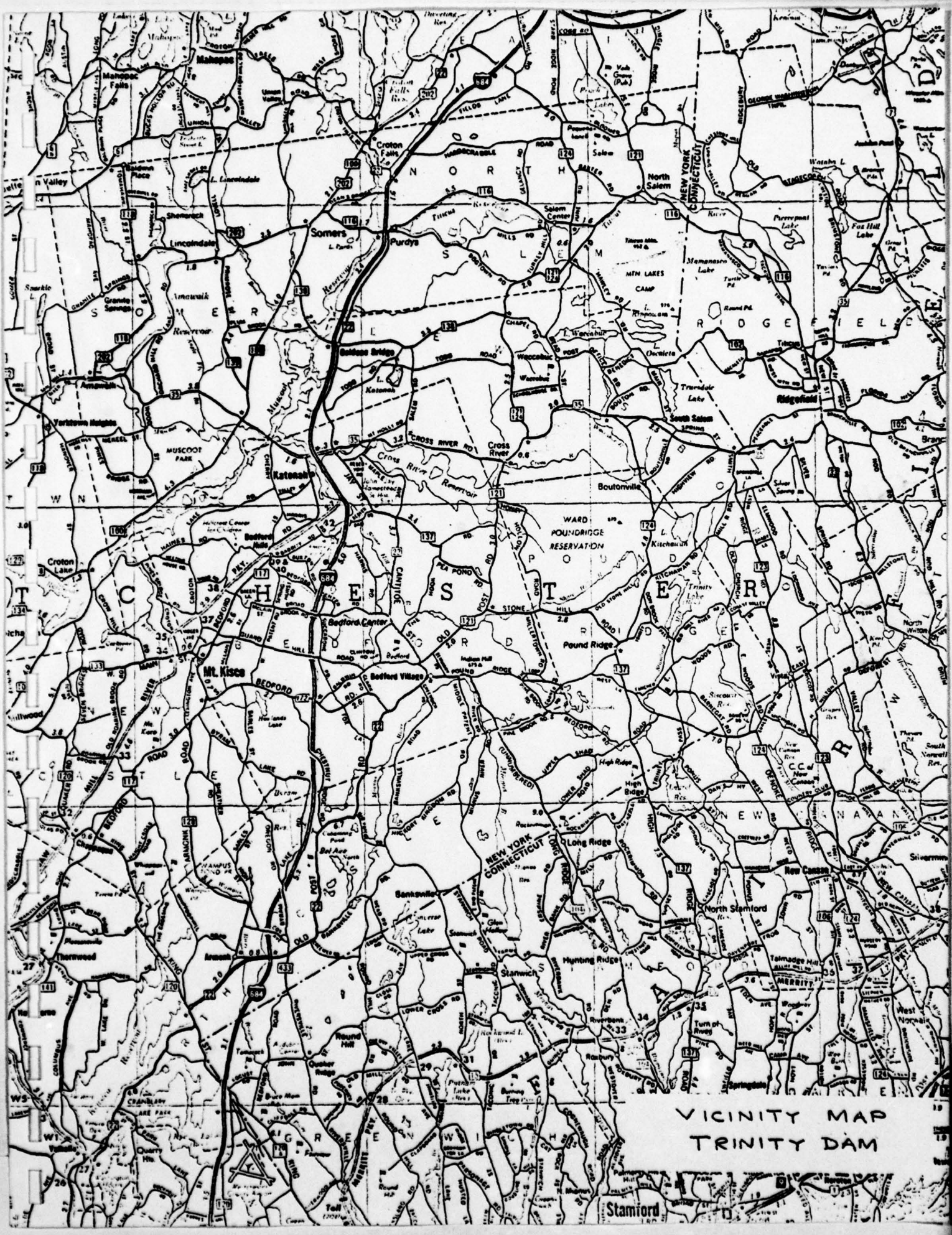
5. Ven Te Chow: Open-Channel Hydraulics, McGraw-Hill Book Company (1959)

6. H.W. King and E.F. Brater: Handbook of Hydraulics, 5th edition, McGraw-Hill Book Company (1963)

7. U.S. Department of Commerce: Technical Paper No. 40. Rainfall Frequency Atlas of the United States (1961)

DRAWINGS

APPENDIX F


Mahopac
Mahopac Falls
Croton Falls
Baldwin Place
Somers
Purdys
North Salem
Lincolndale
Shenorock
Granite Springs
Amawalk
Yorktown Heights
Muscoot Park
Katonah
Cross River
Boutonville
Ridgefield
South Salem
Waccabuc
Golden Bridge
Bedford Hills
Croton Lake
Bedford Center
Bedford Village
Mt. Kisco
Pound Ridge
Ward Poundridge Reservation
Trinity Pond
Stone Hill
Old Stone Hill
Chappaqua
Thornwood
Pleasantville
Banksville
Long Ridge
New Canaan
North Stamford
Stamford
Hunting Ridge
Starrwich
Round Hill
Quaker Ridge
Riverbend
Turn of River
Rockrimmon
Talmadge Hill
Merritt
Springdale
New York
Connecticut
Cross River Reservoir
Muscoot Reservoir
Amawalk Reservoir
Lake Lincolndale
Lake Katonah
Lake Waccabuc
Mamanasco Lake
Fox Hill Lake
Trinity Lake
Silvermine
Saxon Woods
Mountain Lakes Camp
Mt. Kisco Country Club
Waccabuc Country Club
Cranberry Lake Park
Quarry Hill
Tall Oaks
Pound Ridge Reservation
Croton Reservoir
Kensico Reservoir
Titicus Reservoir
Rippowam
Saw Mill River
Mianus River
Byram River
Croton River
Titicus River
Rippowam River
Kisco River
Cross River
Bedford
Pound Ridge
Lewisboro
North Salem
Somers
Yorktown
New Castle
Greenwich
Stamford
North Stamford
Harrison
Rye
Port Chester
Rye Lake
Blind Brook
Purchase
Merrick Road
Old Post Road
Bedford Road
Cantitoe Road
Long Ridge Road
Ridgefield
Danbury
Norwalk
Westport
Wilton
Darien
New Canaan
Greenwich
Stamford
Harrison
Rye
Port Chester
Rye Lake
Blind Brook
Purchase
Merrick Road
Old Post Road
Bedford Road
Cantitoe Road
Long Ridge Road
Ridgefield
Danbury
Norwalk
Westport
Wilton
Darien
New Canaan
Greenwich
Stamford
North


Boston Lookout Tower
RIDGE
ION
Raven Rocks
Gilmore Pond
Lake Kitchawan
River
Mill
KITCHAWAN
ROAD
OLD
Knapp Baptist Cem
Waterbury Cem
Hoyt Cem
Trinity Lake
HILL
STONE
BM 650
BROOK
Substation
ROAD
TRINITY
Brown Cem
CONANT
LANE
East Woods
P O U N D R I D G E
BM 621
Pound Ridge
WOODS
EAST
Pound Ridge Cem
484
FANCHER
PASS
PARNEGAT
Sisconni Reservoir
Horseshoe Hill
Scotts Corners
TOPOGRAPHIC MAP
TRINITY DAM

APPENDIX F

List of drawings included for the Phase I Investigation of Trinity Dam

Drawings	Drawing No.
General Plan & Location Plan	18
Profile, Sections & Details	19
Intake Tower Plans Sections & Details	20
Details	21
Saddle Dam Plan Sections & Details	10
Subsurface Investigation	—

GEOLOGY OF THE MILL RIVER DAM SITE,

Pound Ridge, New York

A report based on surface geology and
core drilling.

MATT WALTON
Consulting Geologist

May 1964

The surface geology in the vicinity of the Hill River dam site has been described in an earlier report based on the available surface outcrops. Since then considerable diamond drilling has been done and some of the subsurface relationships have been clarified. Reference is made to the geologic map which accompanied the earlier report, copies of which are appended to this report, for a general view of the geology of the area.

An isometric diagram has been prepared for this report showing most of the results of drilling and the surface geology in the immediate vicinity of the proposed dam. Projections of the geology are made to vertical sections along the lines of drill holes near the center of the dam and on the faces of the block.

There are four major rock units involved in the construction of the dam. The ridge forming the west abutment is capped by a body of amphibolite. This dark, dense rock occurs as lenses or pods in a major formation of dolomitic marble. Because the amphibolite is relatively resistant to erosion it has controlled the topography and determined the site of the abutment, but since all the layers of rock dip westward 40 degrees to 60 degrees, the amphibolite is little involved with the construction except along the upper parts of the spillway. It presents no problems.

The amphibolite is underlain at the site by dolomitic marble. This is a massive to streaky, granular, medium grained gray to greenish gray rock which readily discolors and crumbles to a coarse sandy or gravelly material on weathering. It contains frequent lenses or layers of more siliceous material which is more resistant. The marble is subject to solution by groundwater which tends to develop solution cavities and open seams along sets of joints and bedding planes. Where the marble is massive, these openings may be small and widely spaced, but in other places there can

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

overlay a network of subsurface drainage-ways. Systems of cavities may locally be clay-filled, or they may exist as open channels. Since the marble will not be structurally loaded to any significant degree, the principal problem it presents is in grouting to seal off possible leakage. Formations of this kind are notably unpredictable in this respect. The grout take may be expected to vary widely from hole to hole, but it will be surprising if in some places the marble does not take exceptionally large amounts of grout.

Within the marble near its base is a layer one hundred to two hundred feet thick of quartzite and quartz schist, probably representing the so-called Lawrence Quartzite which some geologists have found elsewhere at or near the base of the Inwood Marble. This rock is fine-grained, thin-bedded, hard and brittle. It is light to dark gray depending on mica content, and it contains a good deal of pyrite which causes it to weather rapidly along joints and discolor to rusty tones. Foliation and lineation are both strong, and it is closely jointed. At the dam site this unit is probably involved with two faults and further shattering is to be expected. Although the rock itself is hard, the jointing and shattering may be expected to give it a high over-all porosity. If it were not adequately protected by a blanket of impervious overburden it could be a real leakage problem. Large grout takes can be anticipated in it. Some marble appears to lie beneath this unit, but its thickness is not known.

The east abutment of the dam rests on westward dipping biotite-muscovite-garnet gneiss with much interlayered pegmatite and granite. This should be a firm, hard rock with good structural properties. It should present no special or abnormal problems with respect to grouting.

Two faults intersect near the center of the dam and involve the marble, the quartz schist, and the gneiss. There is probably considerable shattering

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

in the work along these draft cones, and here again a good blanket of impervious overburden is the best protection against leakage.

From the foregoing it is evident that care should be taken to maintain an impervious blanket of overburden on the floor of the valley above the dam. Borrowing from the floor of the valley for construction of the dam should not be allowed to penetrate beneath an adequate thickness of impervious material. Grout quantities are hard to estimate, and considerable flexibility should be allowed in setting up the prices for this item.

Core drilling at the site of the gap dam on the west side of the reservoir confirms that it will be located on massive dolomitic marble, as will the channel dam to Trinity Lake. The problems are the same with respect to grouting. Erosion of the channel may be severe at first, but it discharges into a large marshy flat before entering the main part of Trinity Lake and most of the eroded material will probably be trapped here without ill effect.

The new structure raising Trinity Lake is located on hard, feldspathic biotite gneiss and granite. This rock should present no problems.

End.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

(1)

Clarence Blair - Land Dam

REPORT ON SEISMIC SURVEY

POUND RIDGE, NEW YORK

FOR

CLARENCE BLAIR & ASSOCIATES

NEW HAVEN, CONNECTICUT

BY

WESTON GEOPHYSICAL ENGINEERS, INC.

JULY, 1963

REPORT OF SEISMIC SURVEY IN POUND RIDGE, NEW YORK FOR CLARENCE BLAIR & ASSOCIATES, NEW HAVEN, CONNECTICUT

Introduction

Seismic studies were completed during the week of June 23, 1963, in Pound Ridge New York, at the proposed Mill River Dam Site and in the vicinity of Trinity Lake Dam.

A basic twenty foot geophone interval was maintained along all lines of investigation. Routine seismic field procedure was used except for the underwater work in Trinity Lake. Here, land instead of underwater geophones and cables had to be used.

Results

The results of this study are presented on the profile plates of this report. Because of the characteristics of the seismic method, localized shallow and deep spots are averaged out resulting in a bedrock profile that is unrealistically smooth.

Mill River Dam Site

The purpose of the seismic study at this location was to determine if anomalous bedrock conditions existed that would make it desirable to shift the proposed axis of the dam.

Since the results of the study are consistent with what had been anticipated for the area, it is doubtful that there is any advantage, from

a bedrock criterion, in shifting the proposed axis.

A bedrock depth in the order of 45' below river elevation should be anticipated at the deepest part of the valley. This could not be confirmed along the proposed axis but is inferred from the bedrock trends along line NM, HJ, KL, and QL. It is suggested that this be confirmed by a boring station at 5+75.

Alternate seismic interpretations are possible for shot points G and station 2+20. Since highly weathered bedrock, or as much as 30' of till may be present, it is recommended that a boring be placed where line GF intersects the base line.

Trinity Lake

The purpose of the survey in this area was to obtain subsurface information that could be used as a guide in deciding the best means to raise the water elevation of Trinity Lake.

Seismic line R-S was shot along the top of the dam. The seismic velocity from the upper part of the core is identical to the velocity measured for the bedrock of the area.

Seismic line T-U shot below the dam indicates that the shallow bedrock of both side slopes is continuous.

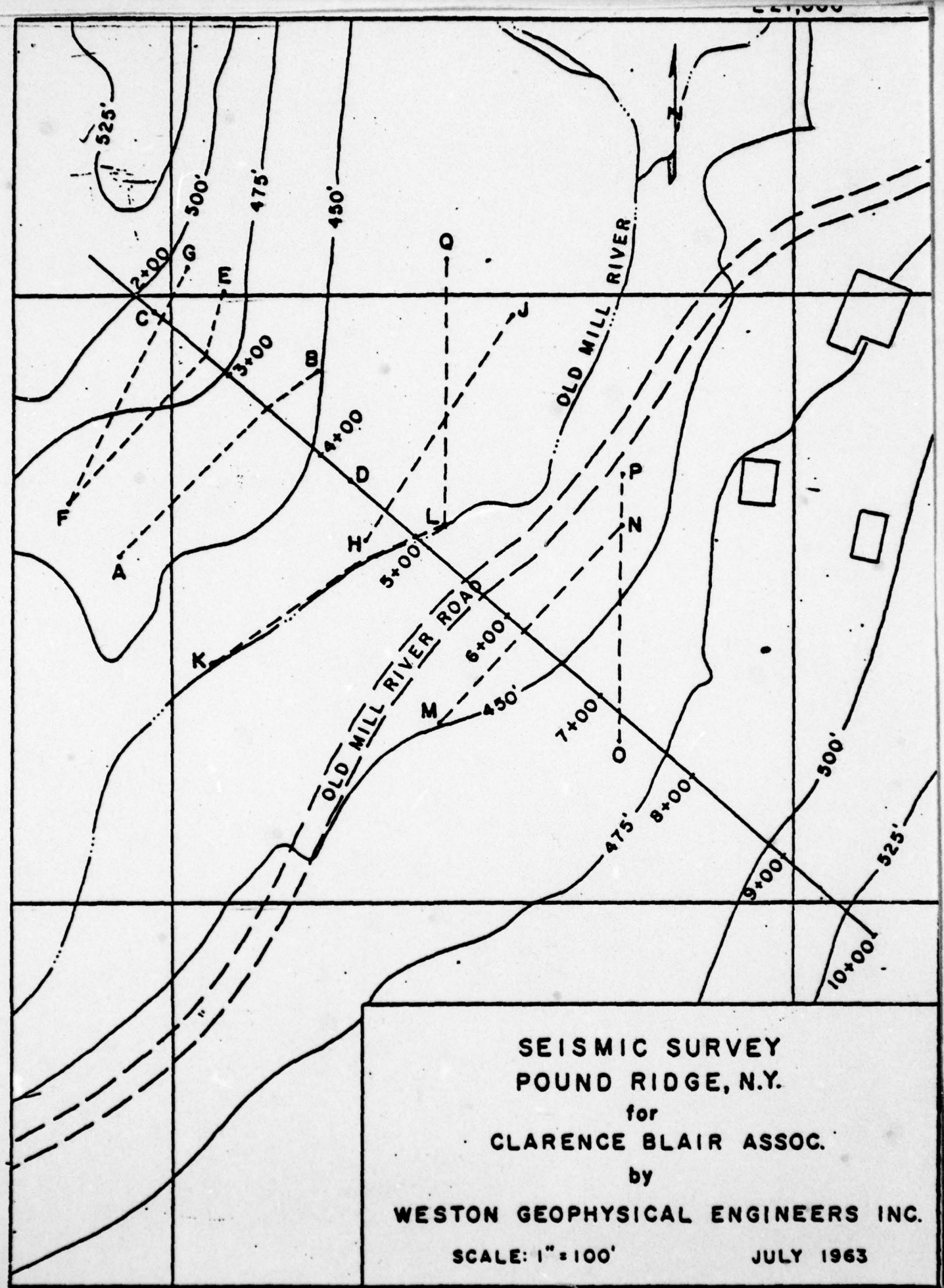
Our land cables and geophones became saturated with water by the

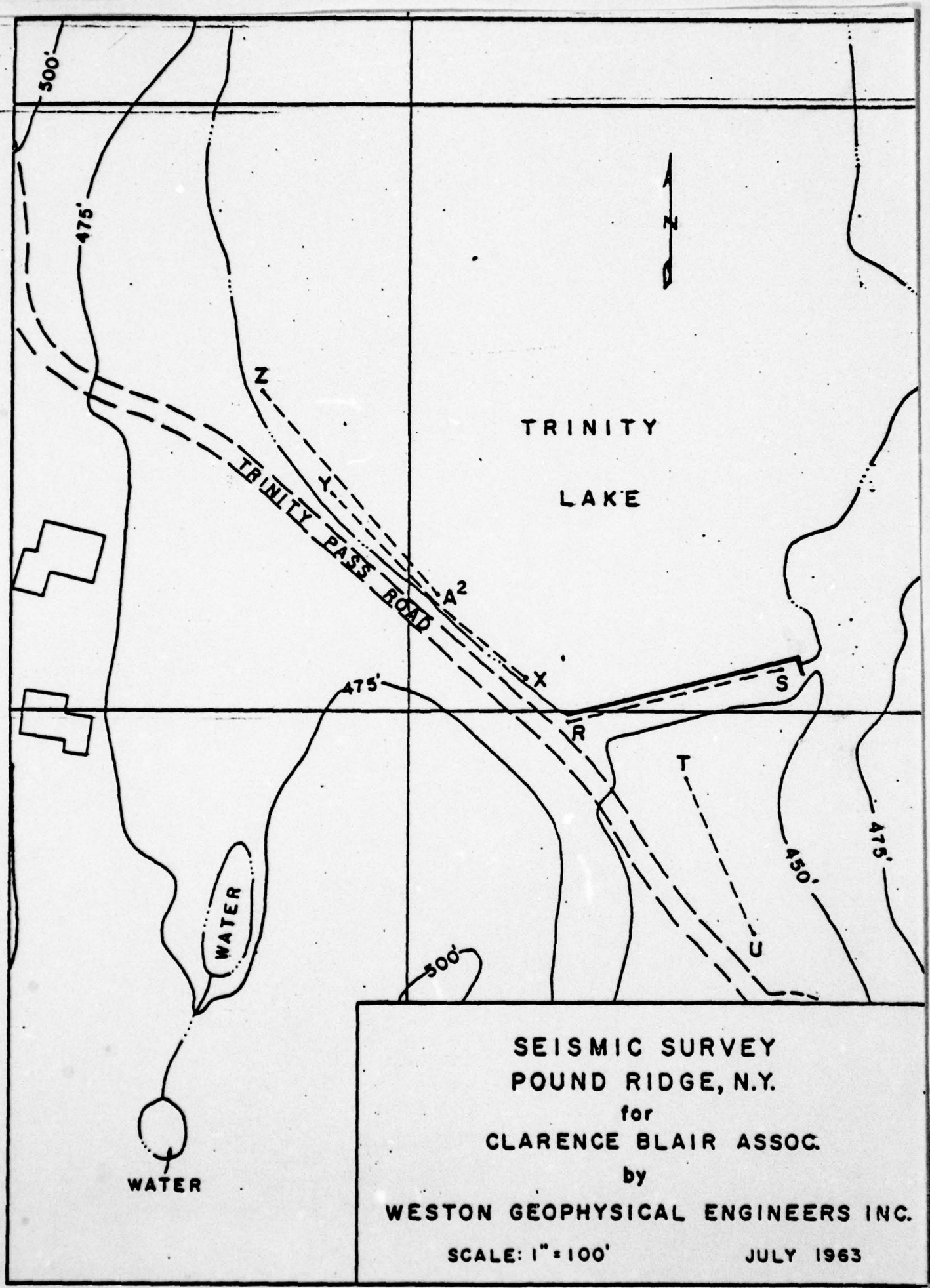
time points Y and Z were shot. This resulted in very poor data for these points. Accordingly, the bedrock profile between Y and Z should be checked by a boring placed half way between them.

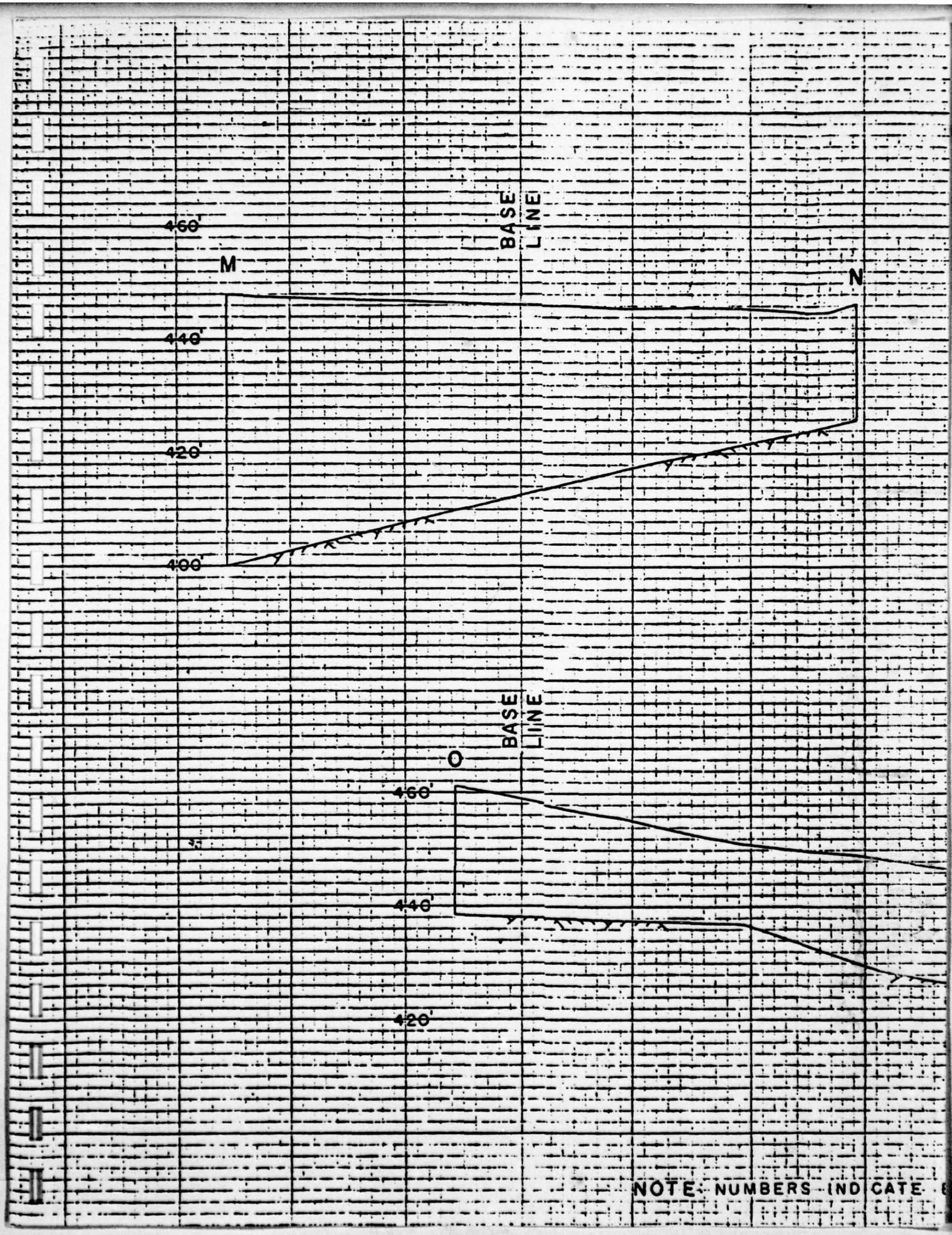
WESTON GEOPHYSICAL ENGINEERS, INC.

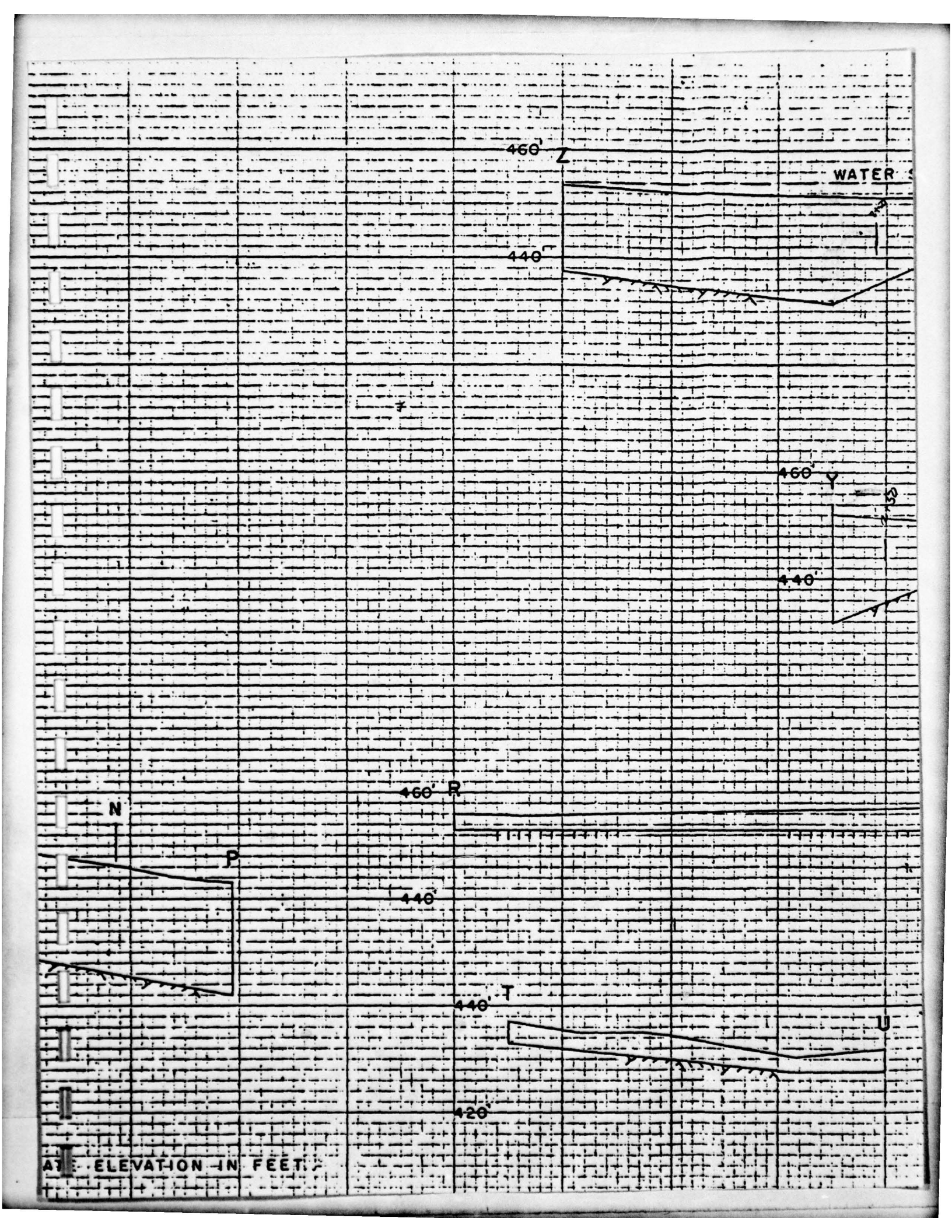
Thomas F. Sexton

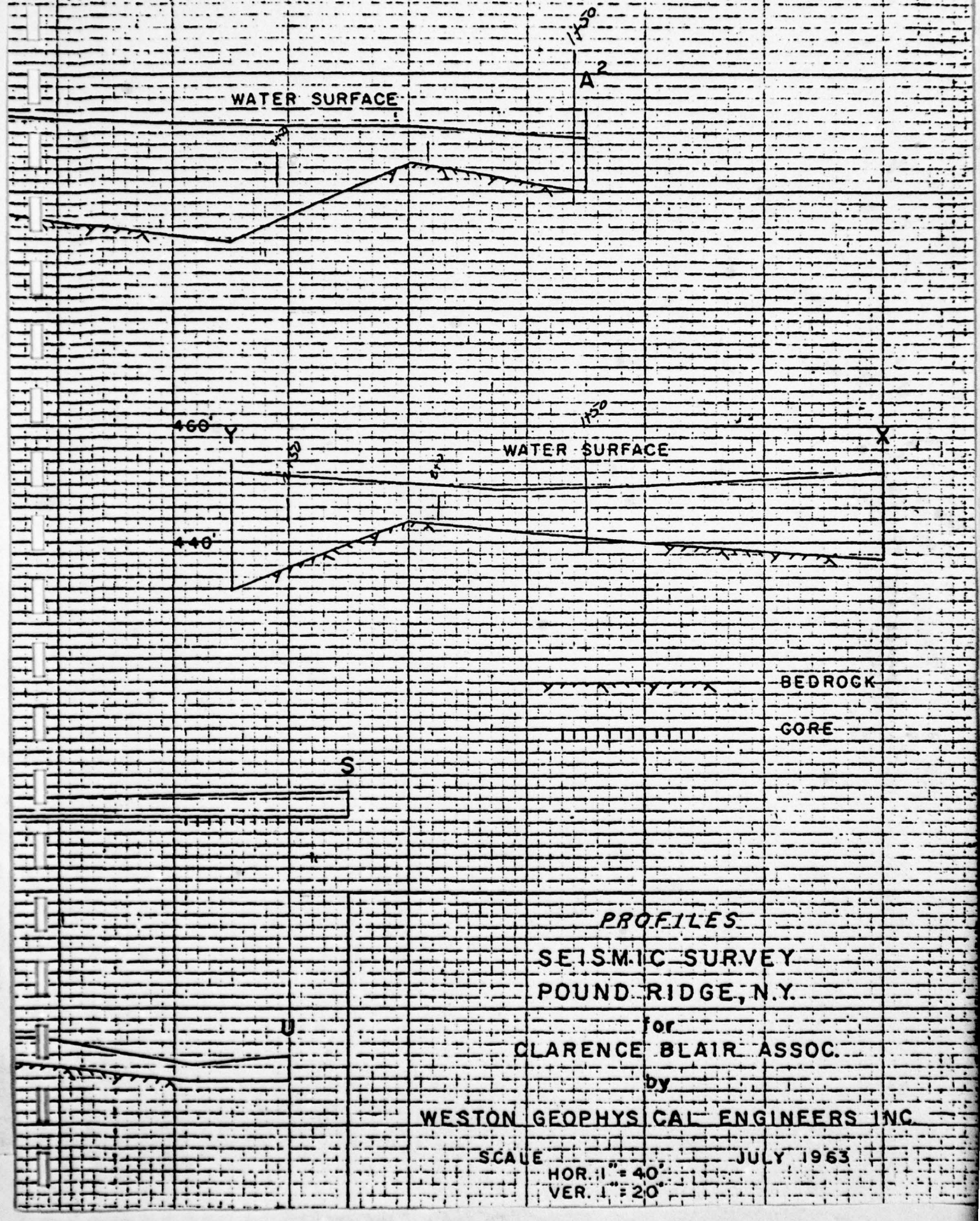
TFS:dk


525'
500'
475'
450'
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
A
B
C
D
E
F
G
H
J
K
L
M
N
O
P
OLD MILL RIVER
OLD MILL RIVER ROAD
SEISMIC SURVEY
POUND RIDGE, N.Y.
for
CLARENCE BLAIR ASSOC.
by
WESTON GEOPHYSICAL ENGINEERS INC.
SCALE: 1" = 100'
JULY 1963


500'
475'
N
TRINITY
LAKE
TRINITY PASS ROAD
Z
A²
X
S
R
T
U
475'
450'
475'
500'
WATER
WATER
SEISMIC SURVEY
POUND RIDGE, N.Y.
for
CLARENCE BLAIR ASSOC.
by
WESTON GEOPHYSICAL ENGINEERS INC.
SCALE: 1" = 100'
JULY 1963


460'
M
BASE LINE
N
440'
420'
400'
O
BASE LINE
460'
440'
420'
NOTE- NUMBERS IND CATE


460'
L
WATER
440'
460'
V
440'
460'
R
N
P
440'
440'
T
U
420'
ELEVATION IN FEET



PROFILES

SEISMIC SURVEY

POUND RIDGE, N.Y.

for

CLARENCE BLAIR ASSOC.

by

WESTON GEOPHYSICAL ENGINEERS INC.

SCALE
HOR. 1" = 40'
VER. 1" = 20'

JULY 1963

LEGEND

- Inwood dolomite marble
- Inwood dolomite marble (inferred beneath overburden)
- Thin-bedded, rusty weathering quartzite
- Amphibolite
- Amphibolite (inferred beneath overburden)
- Fordham gneiss
- Fordham gneiss (inferred beneath overburden)
- *Granite (Pegmatite)*
- Siscowit granite gneiss and schist
- Siscowit granite gneiss and schist (inferred beneath overburden)
- 50 Strike and dip of foliation or layering
- 40 Mineral or fabric lineation, plunge
- 50 Minor fold lineation, shear sense and plunge
- Geologic contacts; dashed where inferred, short dashes where inferred from other work
- Unconsolidated overburden

N 60,0

N 58,0

(inferred beneath overburden)

Fordham gneiss

Fordham gneiss
(inferred beneath overburden)

Granite (Pegmatite)

Siscowit granite gneiss and schist

Siscowit granite gneiss and schist
(inferred beneath overburden)

50 Strike and dip of foliation or layering

40 Mineral or fabric lineation, plunge

50 Minor fold lineation, shear sense and plunge

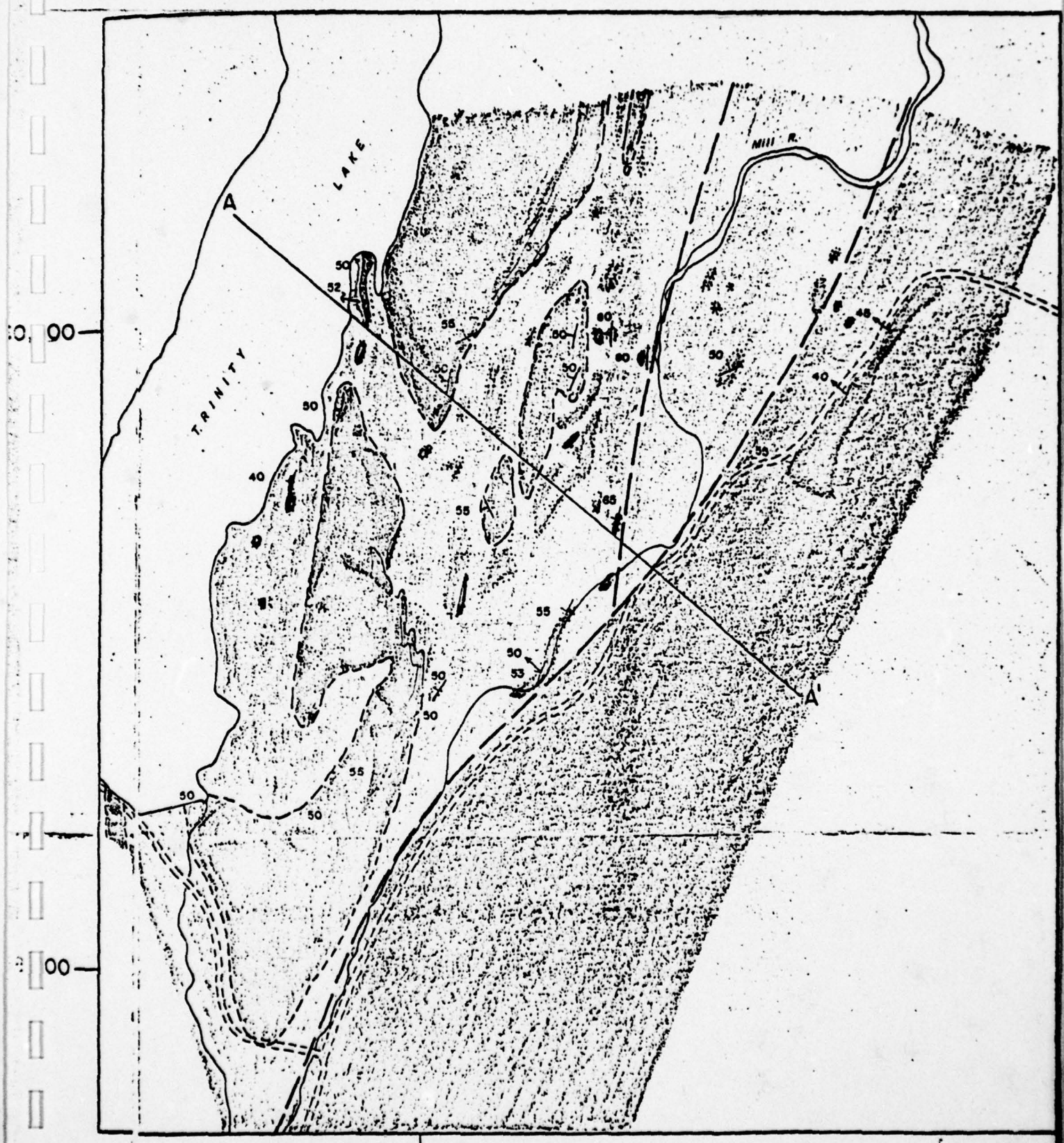
N 58,000

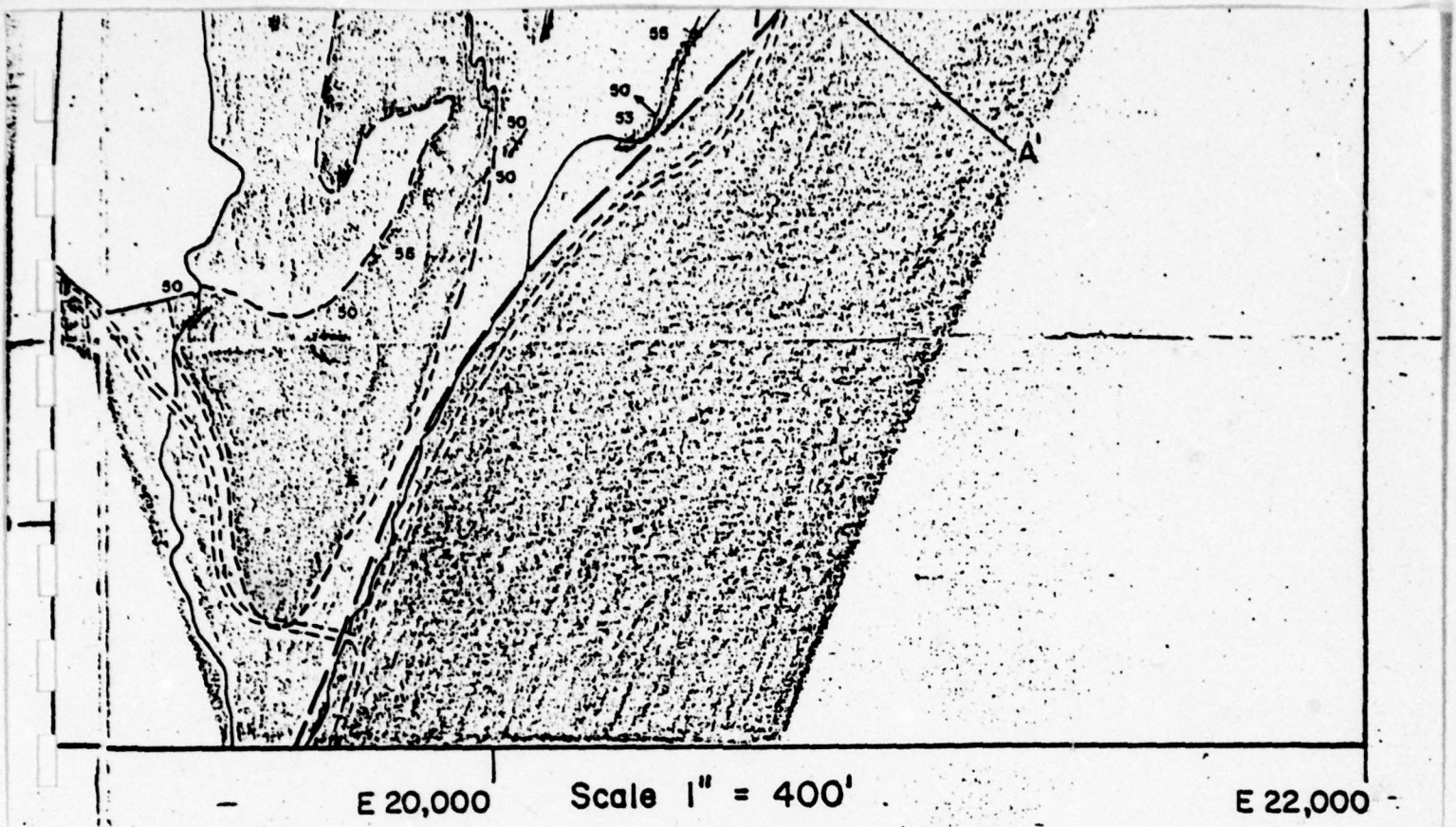
Geologic contacts; dashed where inferred,
short dashes where inferred from other work

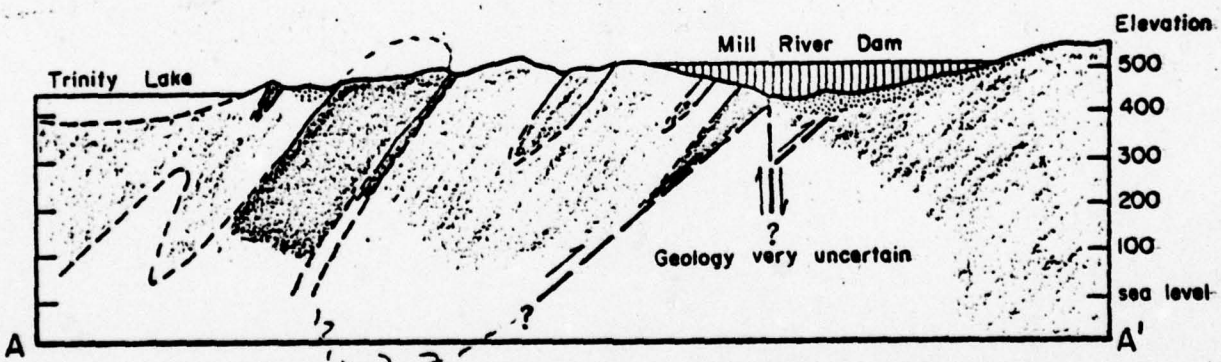
Unconsolidated overburden

N

GEOLOGIC MAP OF PROP


LAKE
TRINITY
MIII R.
A
A'
50
52
55
60
50
50
50
40
55
55
50
53
50
50
55
50
50
40
55
E 20,000
Scale 1" = 400'
E 22,000
Elevation





Geologic cross section from surface outcrops

OSED MILL RIVER DAM SITE

COMPACTED EMBANKMENT

ITEM 5A - CLASS A
ITEM 5B - CLASS B

WORK INCLUDED

5.1 Under Items 5A and 5B, the Contractor shall excavate and place from borrow pits or from materials stored from excavations, suitable material for construction of the earth dam and shall roll it to the proper degree of compaction and to the required lines and grades as shown and specified.

CLASSIFICATION OF MATERIALS

5.2 The earth for embankments shall be obtained from the designated borrow pit areas. If suitable material is obtained from excavations it may be used in the work.

Class A material is the more impervious material found in the borrow areas. It shall be selected to vary in size such that 25 to 45 per cent of the portion passing a No. 4 sieve will be finer than 0.08 mm. It shall compact by the procedures of AASHO Specification T-99 to at least 120 pounds dry weight per cubic foot at 10 to 12 per cent moisture.

Class B material is the coarser fraction in the borrow area. It shall be selected such that 35 per cent or less of the portion passing the No. 4 sieve will be finer by weight than 0.08 mm, and will compact as tested by AASHO Specification T-99 to at least 120 pounds dry weight per cubic foot at 7 to 10 per cent moisture.

PREPARATION OF SURFACES UNDER EMBANKMENT

5.3 Prior to placing the embankment on earth surfaces the earth shall be plowed or harrowed to a depth of at least 8 inches with the addition of water, if required. Where embankment is placed on or against rock or concrete, the surface shall be cleaned thoroughly to the satisfaction of the Engineer and moistened if necessary to assure a good bond. All holes and depressions shall be filled with Class A embankment placed in layers moistened with water, if necessary, and tamped with mechanical tampers to 95 per cent of maximum density as specified in Paragraph 5.4. As soon as surfaces have been made reasonably level the balance of the embankment shall be constructed as specified in Paragraph 5.4.

CONSTRUCTION OF EARTH FILL DAM

5.4 Materials for the construction of compacted embankment shall be transported in approved conveying units of such size and having such bearing tread areas that the completed fill shall not be unduly rutted by their passage. Equipment shall not be used if it is so heavy as to cause non-uniform consolidation of the earth fill. All earth fill surfaces which are too smooth to bind properly with succeeding layers shall be loosened by disking or harrowing or other approved means before the succeeding layer is placed thereon. The earth fill material shall be evenly and uniformly spread in layers as nearly as practicable to 7 inches thick.

All stones greater than 6 inches in diameter and all roots and other perishable materials shall be removed prior to rolling. Smaller stones shall be kept apart and not permitted to accumulate in groups. A sufficient number of men shall be available when the spreading and rolling is being done to remove all oversize stones, roots and other unsuitable materials and to separate the smaller stones. All excavation, transportation and placing operations shall be such as will produce a satisfactory mixture and gradation of materials after they have been spread and compacted. No frozen material shall at any time be used in the construction of the rolled earth dam and no materials shall be placed on the dam which is frozen or loosened by freezing. The spreading equipment shall be Light-weight and no other equipment, except sprinklers or harrows as necessary shall pass over any layer which is being prepared for rolling before the rolling is completed. Dumping, spreading, sprinkling and compacting operations shall be carried out systematically so as not to interfere with each other. Portions of the earth fill which are too near rock or concrete structures for proper compacting with rolling equipment shall be thoroughly compacted in 3-inch layers by tamping with mechanical tampers.

Embankment shall be compacted to 95 per cent of maximum density at the approximate optimum moisture content determined by the standard procedure of AASHO Specification T-99, latest revision. The Engineer's specific requirements as to selection of materials, water content and degree of compaction will be varied as necessary to obtain an earth fill of the required dry weight, imperviousness and stability.

MOISTURE CONTROL

5.5 The moisture content of materials in the earth dam shall be controlled to meet the requirements of Section 5.4. When necessary, moisture shall be added by use of approved sprinkling equipment. Water shall be added uniformly and each layer shall be thoroughly disked or harrowed to provide proper mixing. Any layer found too wet for proper compaction

shall be allowed to dry before it is rolled. Placing or rolling of material on earth fills will not be permitted during or immediately after rainfalls which increase the moisture content beyond the limit of satisfactory compaction. The earth fill shall be brought up uniformly and its top shall be kept graded and sloped so that a minimum of rain water will be retained thereon. Compacted earth fill that is damaged by washing shall be acceptably replaced by the Contractor.

ROLLING

5.6 Approved tamping rollers shall be used for compacting all parts of the embankment which they can effectively reach. Each drum of a roller shall have an outside diameter of not less than 5 feet and shall be not less than 4 feet nor more than 6 feet in length. The space between two adjacent drums, when on a level surface, shall be not less than 12 inches nor more than 15 inches. Each drum shall be free to pivot about an axis parallel to the direction of travel. Each drum shall be equipped with a suitable pressure-relief valve.

At least one tamping foot shall be provided for each 100 square inches of drum surface. The space measured on the surface of the drum, between the centers of any two adjacent tamping feet, shall be not less than 9 inches. The length of each tamping foot from the outside surface of the drum shall be maintained at not less than 9 inches. The cross-sectional area of each tamping foot shall be not more than 10 square inches at a plane normal to the axis of the shank, 6 inches from the drum surface, and shall be maintained at not less than 7 square inches nor more than 10 square inches at a plane normal to the axis of the shank, 8 inches from the drum surface.

The weight of a roller when fully loaded shall be not less than 4,000 pounds per foot of length of drum. The loading used in the roller drums and operation of the rollers shall be as required to obtain the required compaction. If more than one roller is used on any one layer of fill, all rollers so used shall be of the same type and essentially of the same dimensions and weight. Tractors used for pulling rollers shall have sufficient power to pull the rollers satisfactorily when drums are fully loaded with sand and water. During the operation of rolling, the Contractor shall keep the spaces between the tamping feet clear of materials which would impair the effectiveness of the tamping rollers.

It is intended that the number of trips of the roller required over each layer shall be such as will give at least 50 per cent coverage. It is anticipated that 10 to 12 trips of a single roller drum will produce the required degree of compaction. Tandem drums may be used to reduce the number of trips. In order to perform this operation to best advantage,

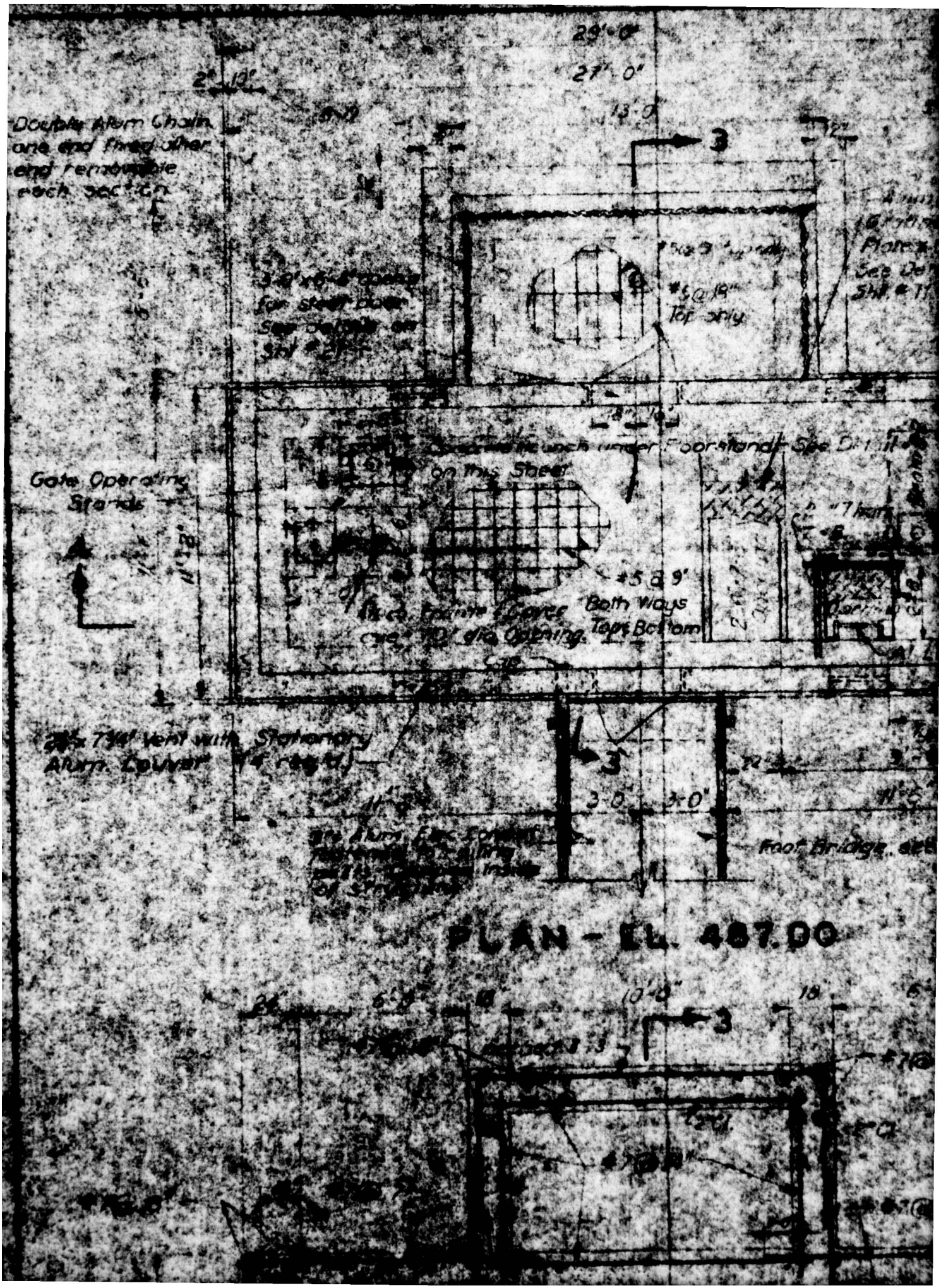
the moisture content of the top two layers must be right, otherwise the embankment will sink and weave under the roller or material trucks, indicating that moisture content is excessive and compaction inadequate. If such condition develops to the extent considered unsatisfactory by the Engineer, he will order operations suspended until the embankment solidifies. Adjacent roller trips shall overlap to insure proper coverage. All parts of the embankment shall be compacted to the extent ordered by the Engineer in accordance with the results and requirements described and specified hereinabove. In the early part of the work, various numbers of roller trips will be tried in order to determine the proper compaction method. The Contractor shall vary the number of roller trips as directed and shall cooperate with the Engineer in obtaining a solid, tight embankment. Other types of rollers may be used if it can be shown to the satisfaction of the Engineer that equal or better results can be obtained. If the Contractor wishes to make such substitution, he shall demonstrate the effectiveness of the roller by actual soil compaction results with laboratory work performed by an approved soil testing laboratory.

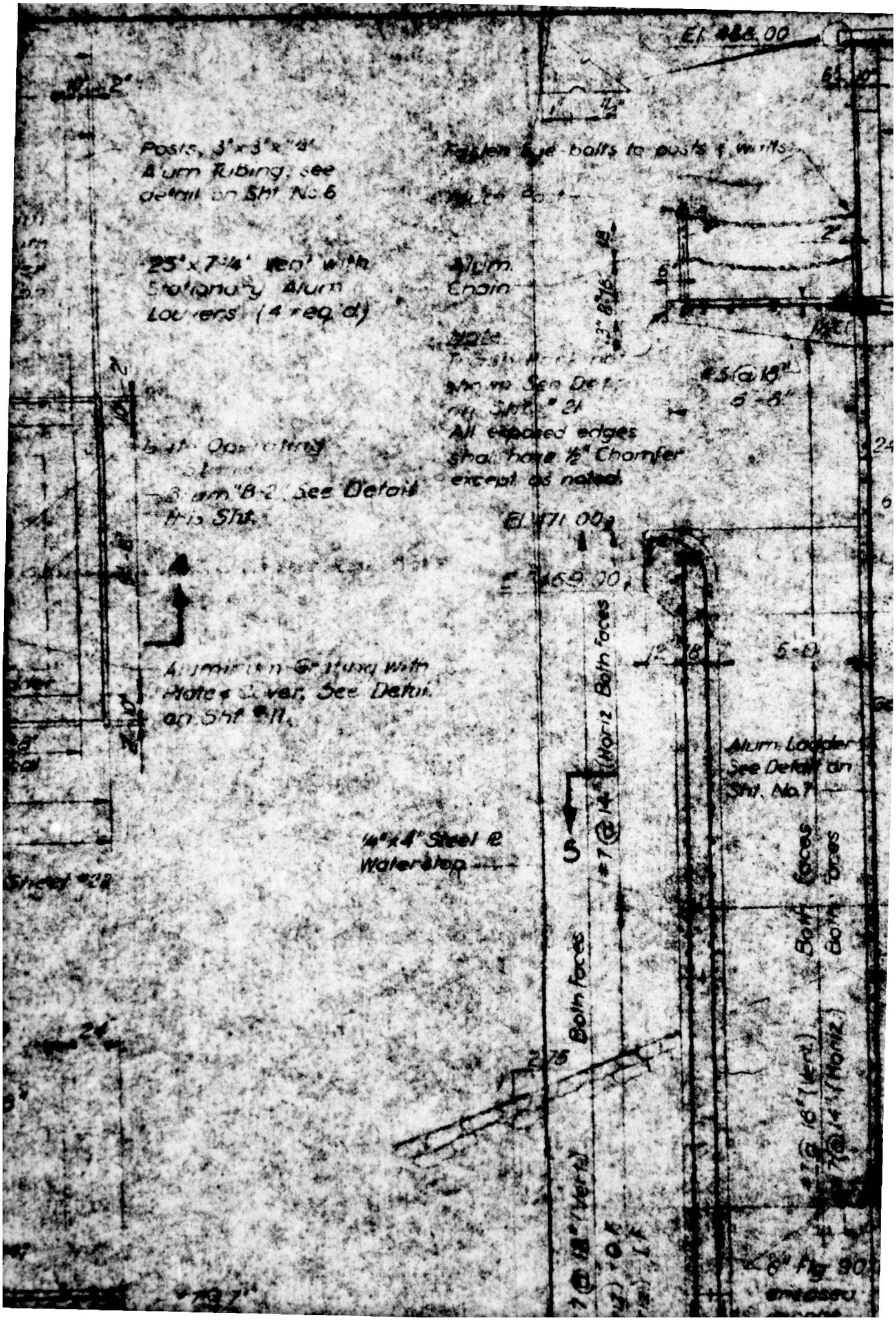
FINISHING ENBANKMENT

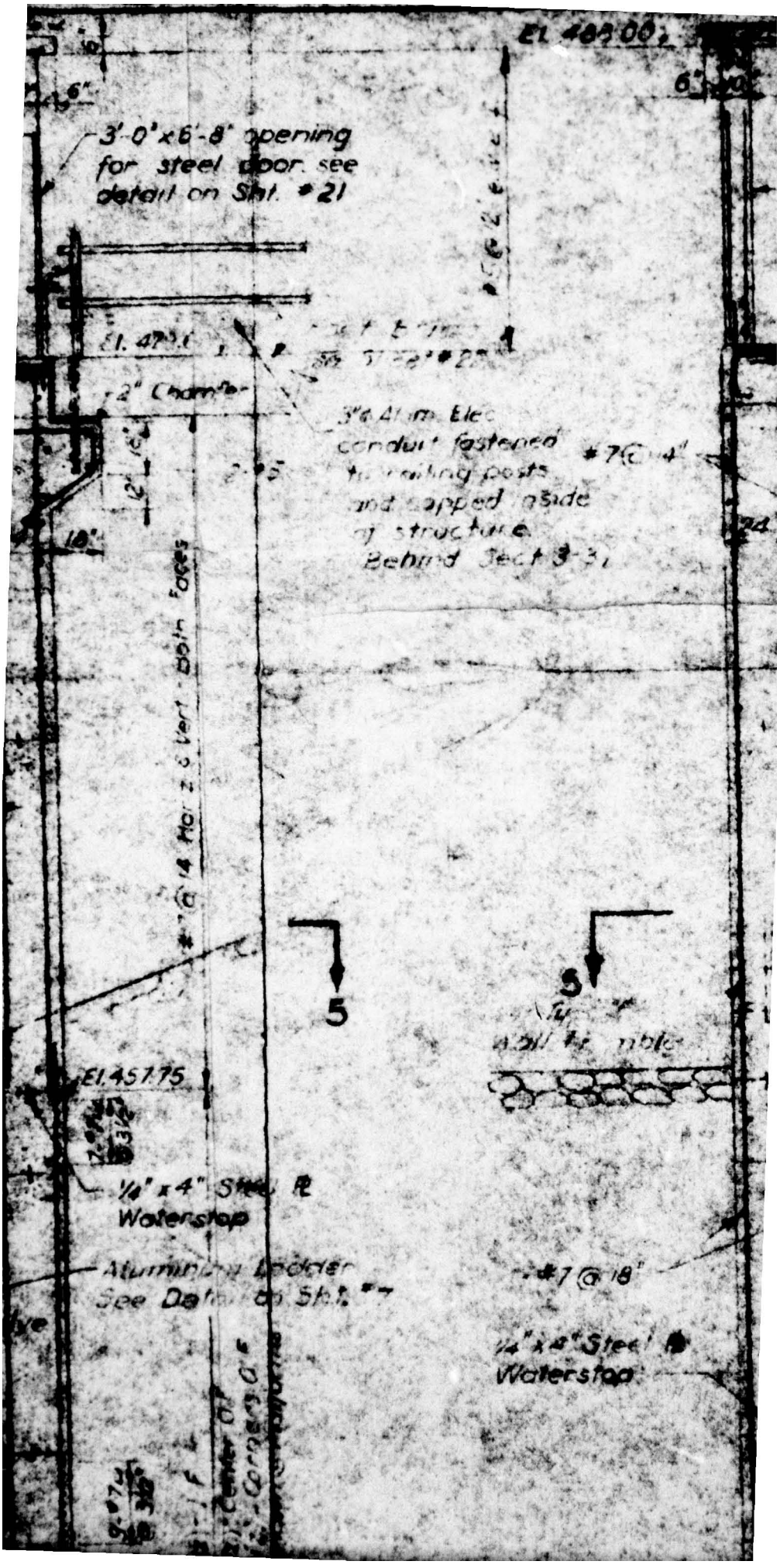
5.7 The embankment shall be constructed to the elevations, lines, grades and cross-sections as directed by the Engineer which shall be in general as shown on the drawings with such increased heights and widths as deemed necessary by the Engineer to allow for later shrinkage and settlement, but in no case will such increase exceed 3 per cent of the dimensions shown on the drawings. The embankment shall be maintained in a manner satisfactory to the Engineer and surfaces shall be compact and accurately graded before riprap, paving or topsoil is placed on them.

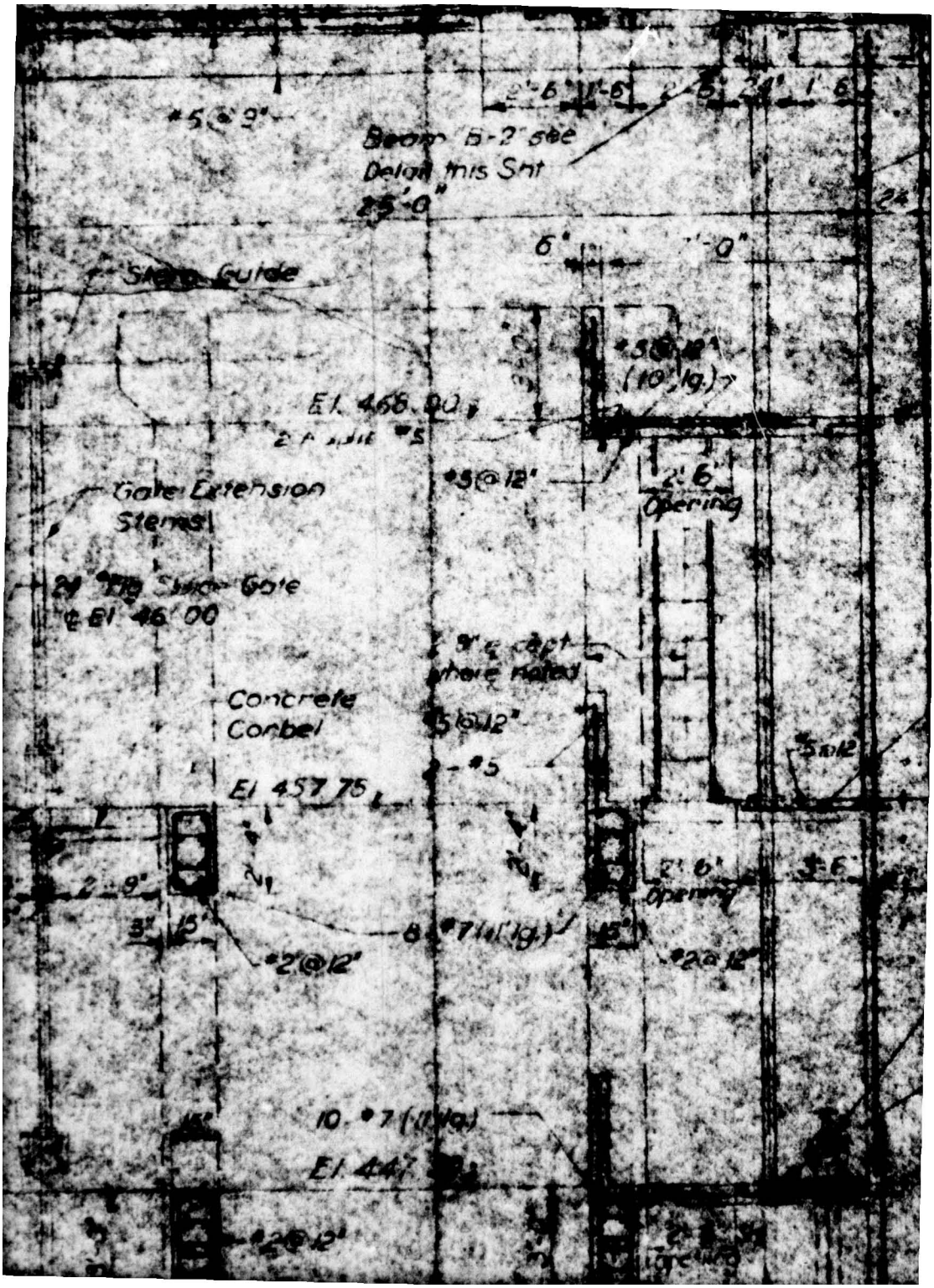
MEASUREMENT AND PAYMENT

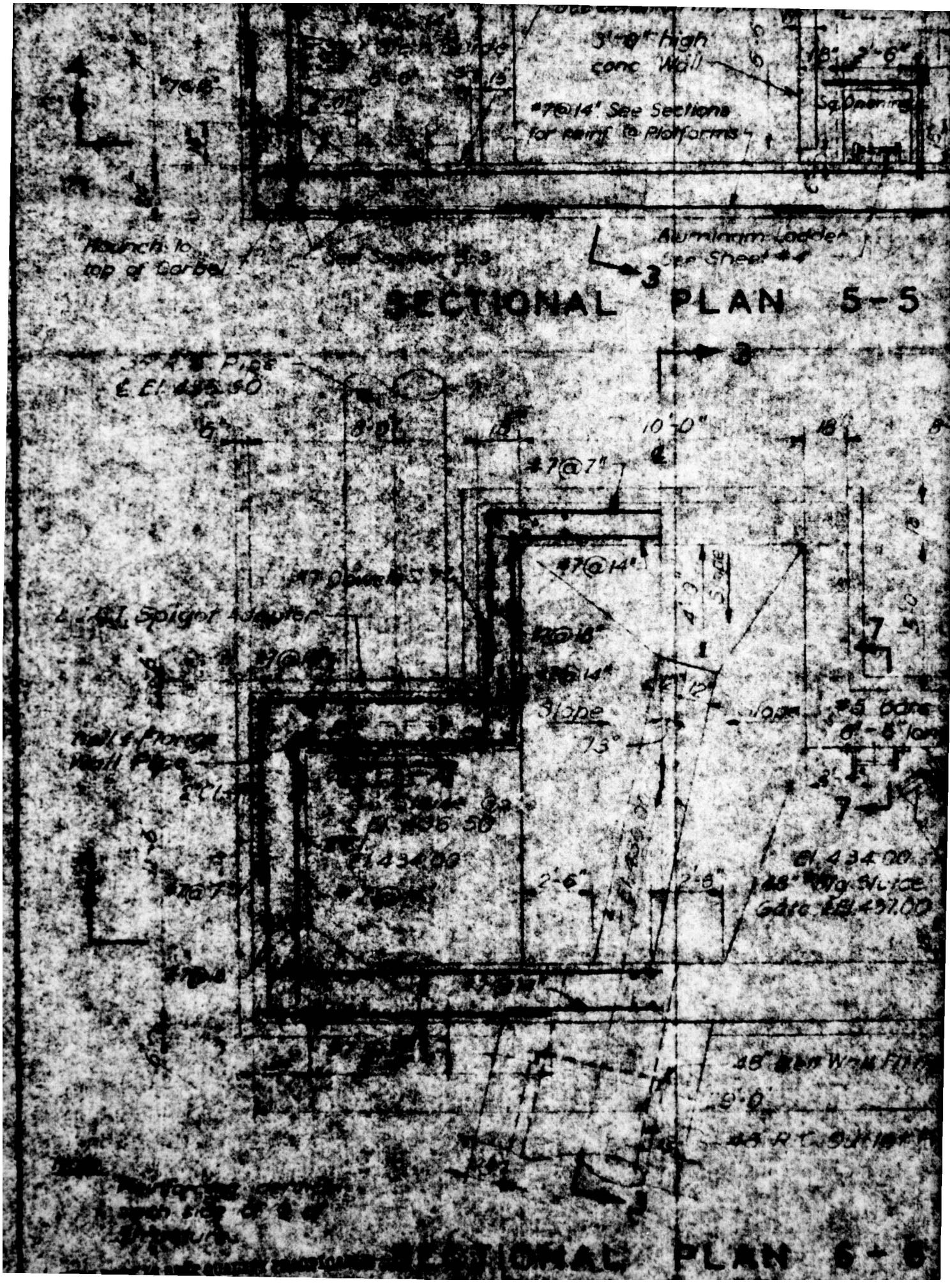
5.8 The quantity to be paid for under Items 5A and 5B shall be the number of cubic yards of rolled earth embankment placed to the limits shown on the drawings or ordered by the Engineer. No allowance will be made for increased quantities because of settlement during construction or for additional fill to increase depth of fill by 3 per cent, as required in Section 5.7. The unit price bid for Items 5A and 5B shall be full payment for all labor, tools, equipment, materials and other expenses necessary for excavating, transporting, spreading and rolling the materials and controlling the moisture to produce the compacted embankment, complete as shown and specified.

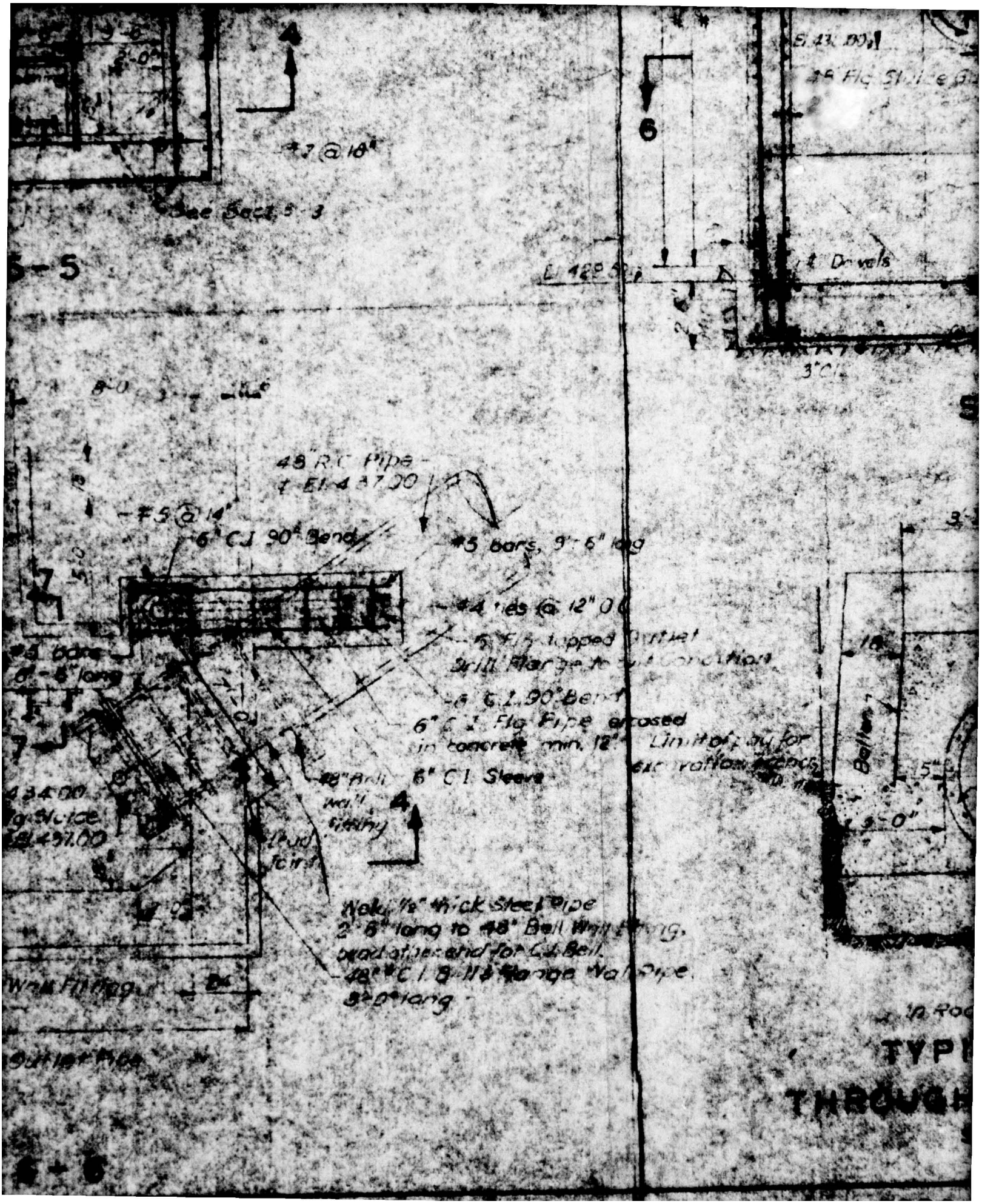

29'-0"
27'-0"
13'-0"
2'-10"
Double Alum Chain one end fixed other end removable each section
3-8"x6" openings for steel doors See Detail on Sht # 2
#5 @ 18" Top Only
Gate Operating Stands
#5 @ 9" Both Ways Tops Bottom
Footing Encloses 2 Circ. 10' dia Openings
2'-6"x 7'-4" Vent with Stationary Alum. Louver
3'-0"
3'-0"
Foot Bridge, see
PLAN - EL. 487.00
10'-0"
18"

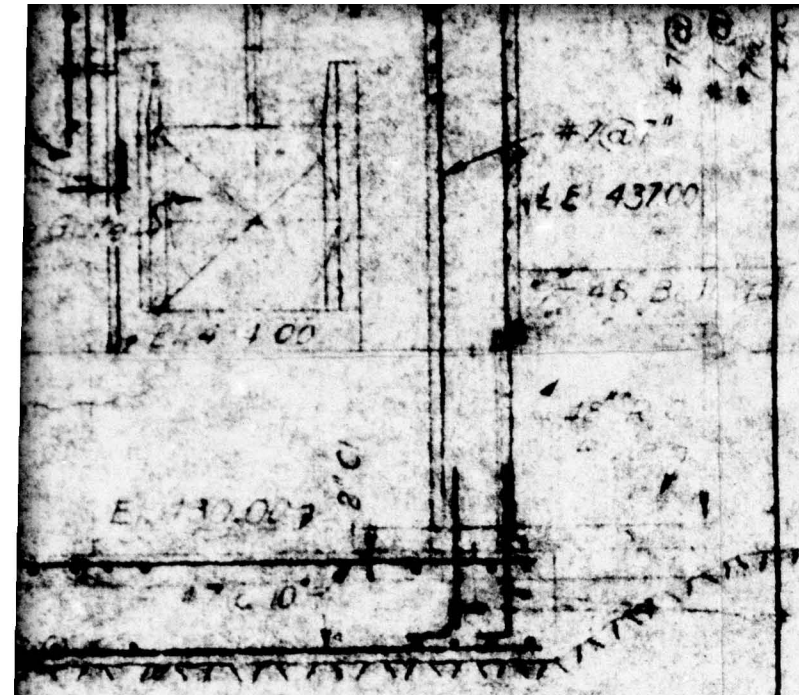

El. 488.00
Posts, 3"x3"x"4" Alum Tubing; see detail on Sht No. 6
Fasten eye-bolts to posts & walls
25"x7¾" Req'd with Stationary Alum Louvers (4 req'd)
Alum. Chain
#5 @ 18" 5'-8"
All exposed edges shall have ½" Chamfer except as noted.
El. 471.00
669.20
Aluminum Grating with Hatch Cover, See Detail on Sht #11.
¼"x4" Steel Waterstop
Both faces
#7 @ 14" (Horiz)
Alum. Ladder See Detail on Sht. No. 7
6" Pipe


El 403.00
3'-0"x6'-8" opening for steel door see detail on Sht. #21
El. 401.1
2" Chamfer
3"ø Alum. Elec conduit fastened to railing posts and capped inside of structure. Behind Sect 3-3
#7@14" Horiz & Vert Both Faces
5
5
El. 457.75
1/4"x4" Steel R Waterstop
Aluminum Ladder See Detail on Sht. #7
#7 @ 18"
1/4"x4" Steel R Waterstop

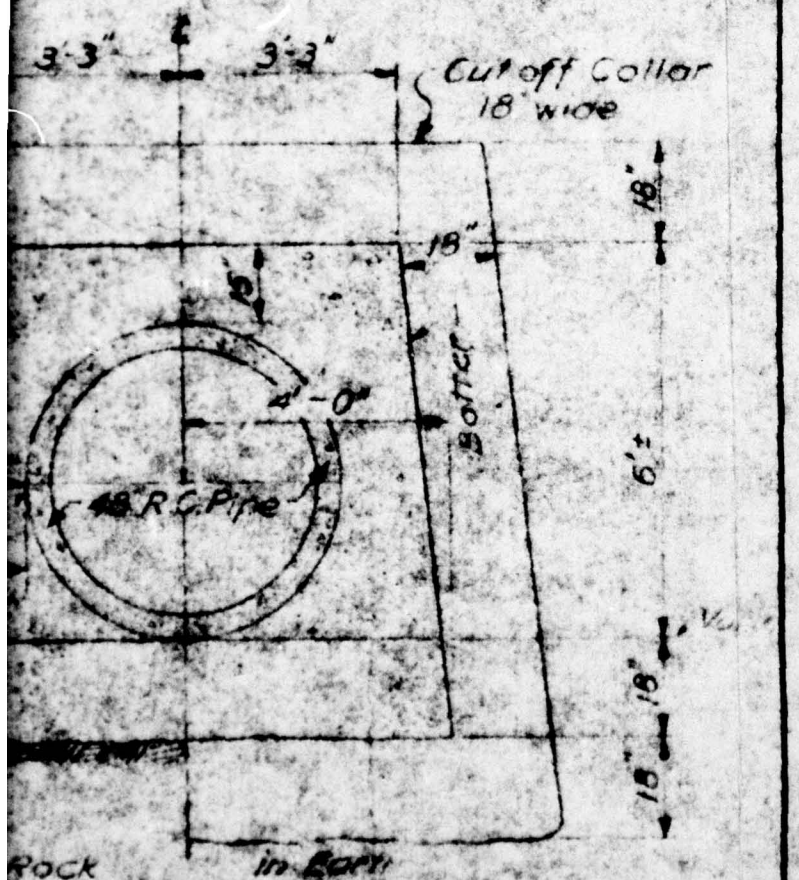

Beam B-2 See Detail this Sht
Slide Gate
El. 468.00
Gate Extension Stems
Concrete Corbel
El 457.75
Opening
Opening
El 447


3'-0" High conc Wall
"7@14" See Sections for reinf. to Platforms
Aluminum Ladder See Sheet #4
Haunch to top of Corbel
SECTIONAL PLAN 5-5
10'-0"
#7@7"
#7@14"
Slope
7.5°
#5 Bars
6'-6" long
2'-6"
El 434.00
Gate El 437.00
SECTIONAL PLAN 6-6

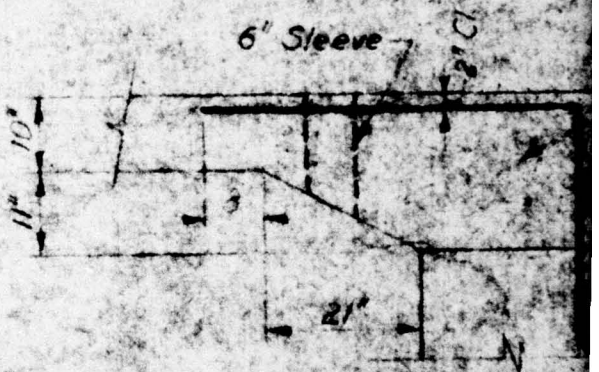

#7 @ 18"
See Sect. S-3
S-5
6
48" R.C. Pipe
#5 @ 14"
6" C.I. 90° Bend
#3 bars, 9'-6" long
#4 ties @ 12" O.C.
6" C.I. Flg. Pipe encased in concrete min. 12"
48" Bell 6" C.I. Sleeve
Weld 1/2" thick steel pipe
2'-6" long to 48" Bell
48" C.I. B-II 1/2 flange Valve
32 bolts
Wall Fitting
Butter Plate
S-6
TYP
THROUGH



SECTION 3-3

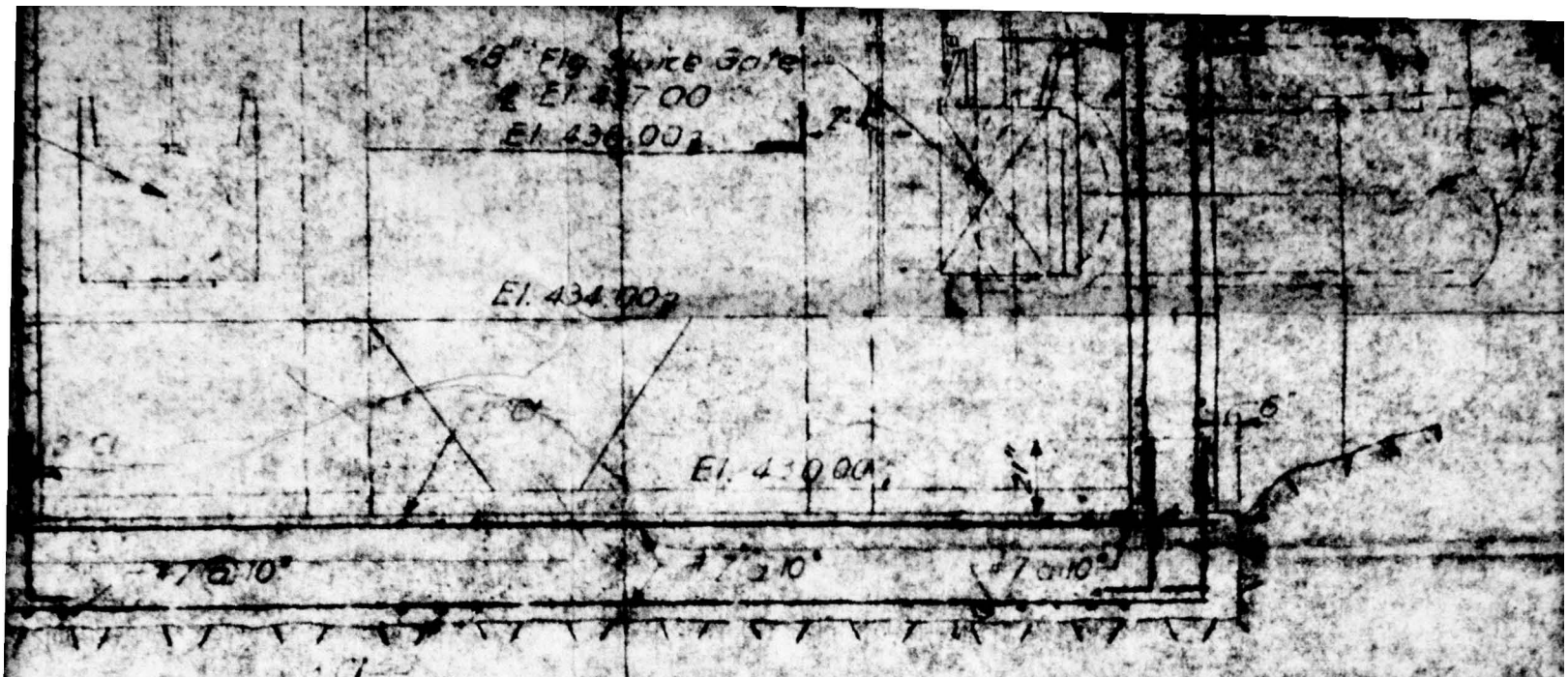


PICAL SECTION
H OUTLET CONDUIT
SCALE: 3/8" = 1'-0"



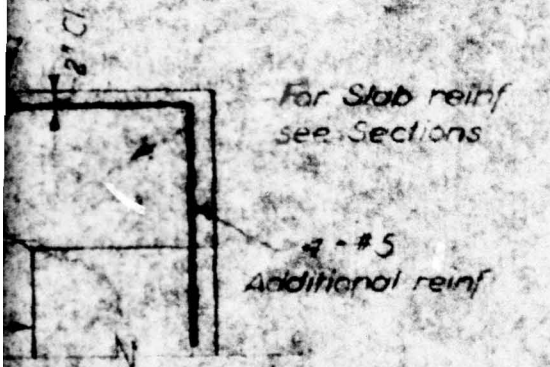
CONCRETE HAUNC
SCALE: 1/2" = 1'



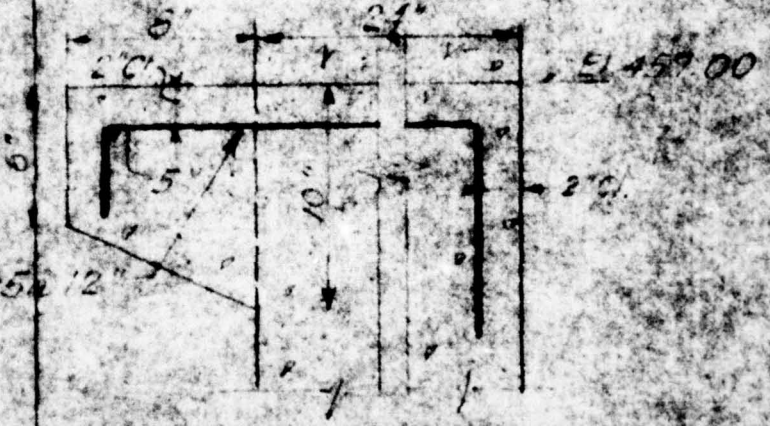


SECTION 4-4

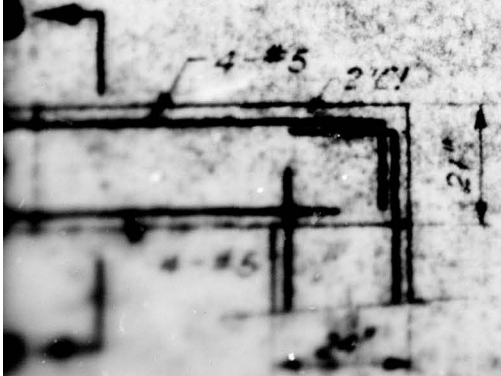
THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

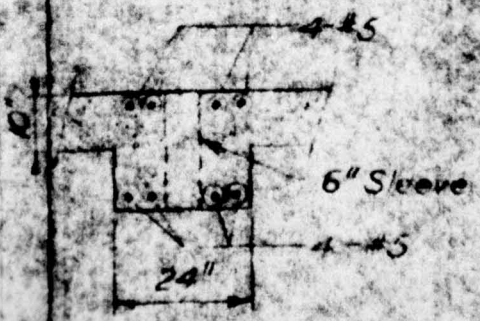


AUNCH DETAIL
1/2" = 1'-0"



CORBEL DETAIL
SCALE: 1 1/2" = 1'-0"



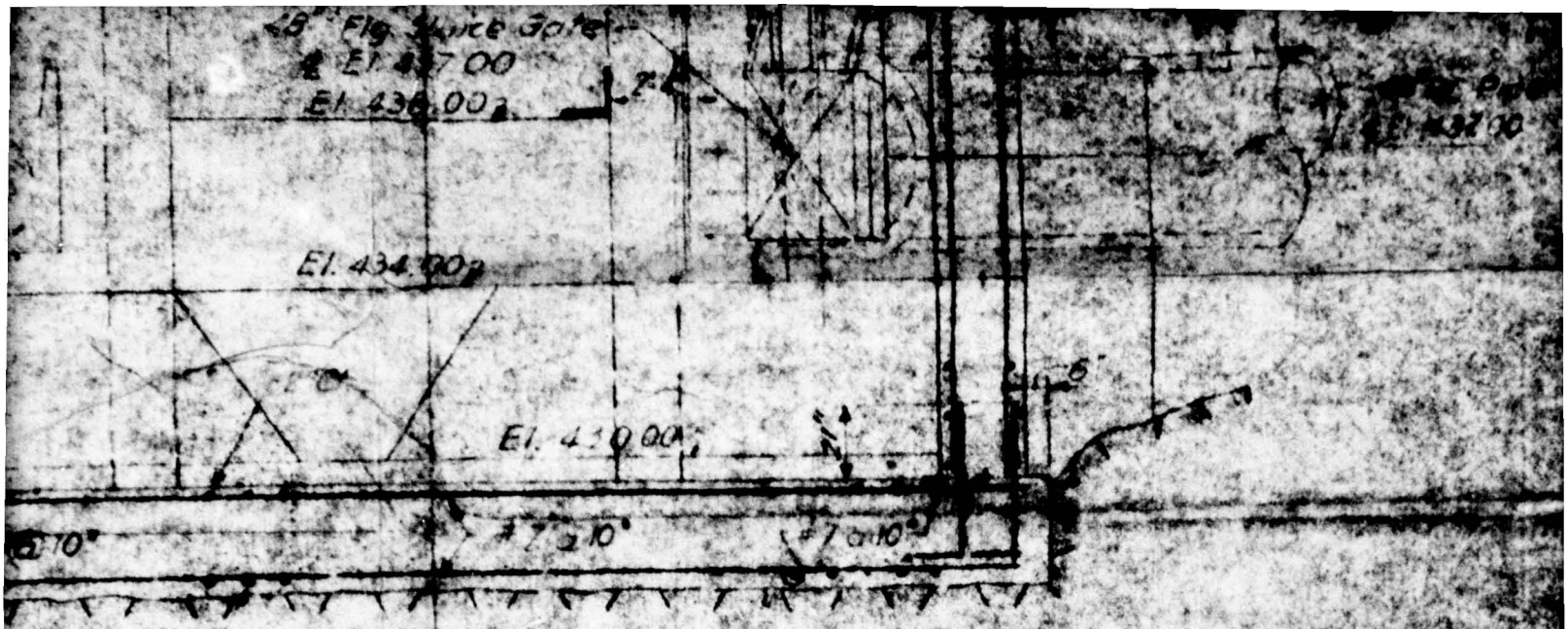




SECTION 8-8

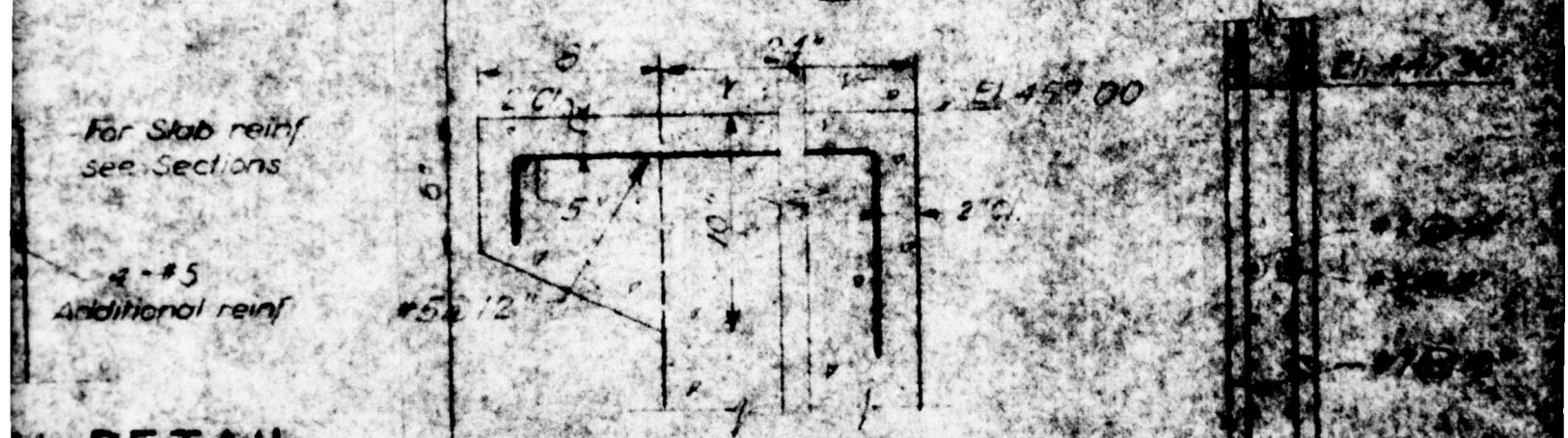
BEAM "B-2"

SECTION 7



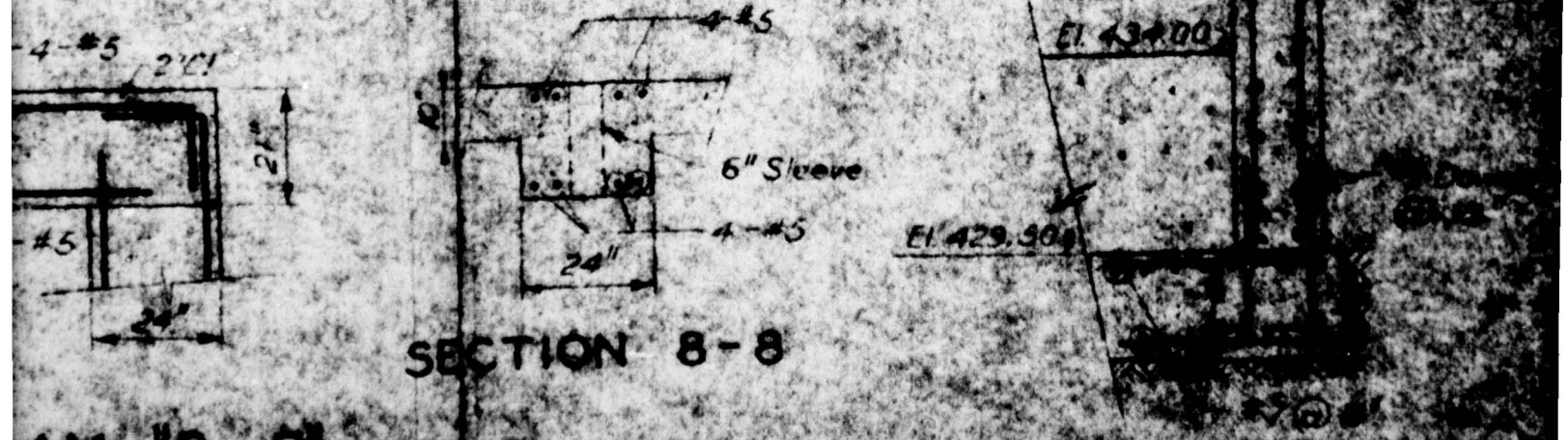
SECTION 4-4

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC



H DETAIL
-0"

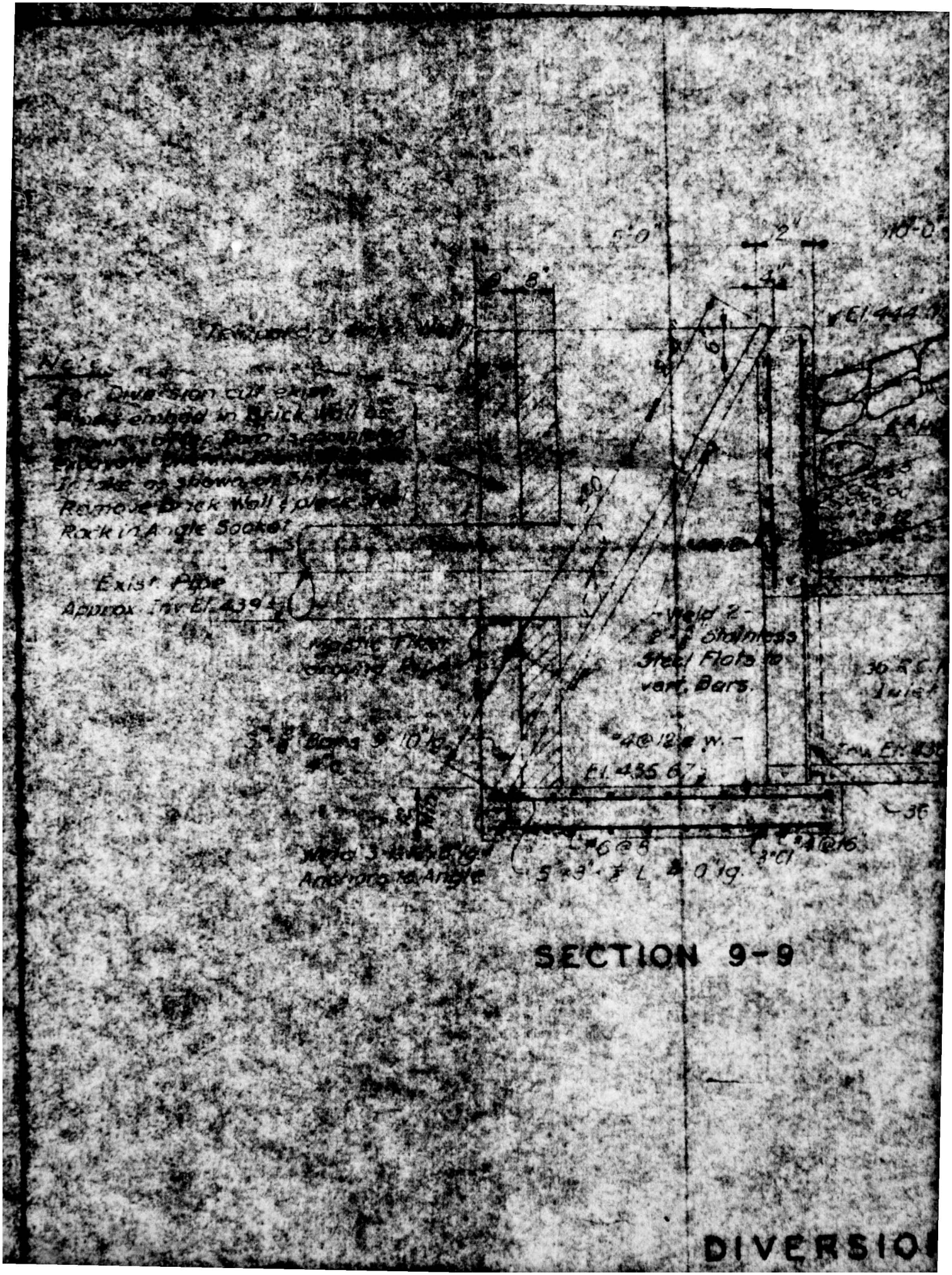
CORBEL DETAIL
SCALE: 1 1/2" = 1'-0"

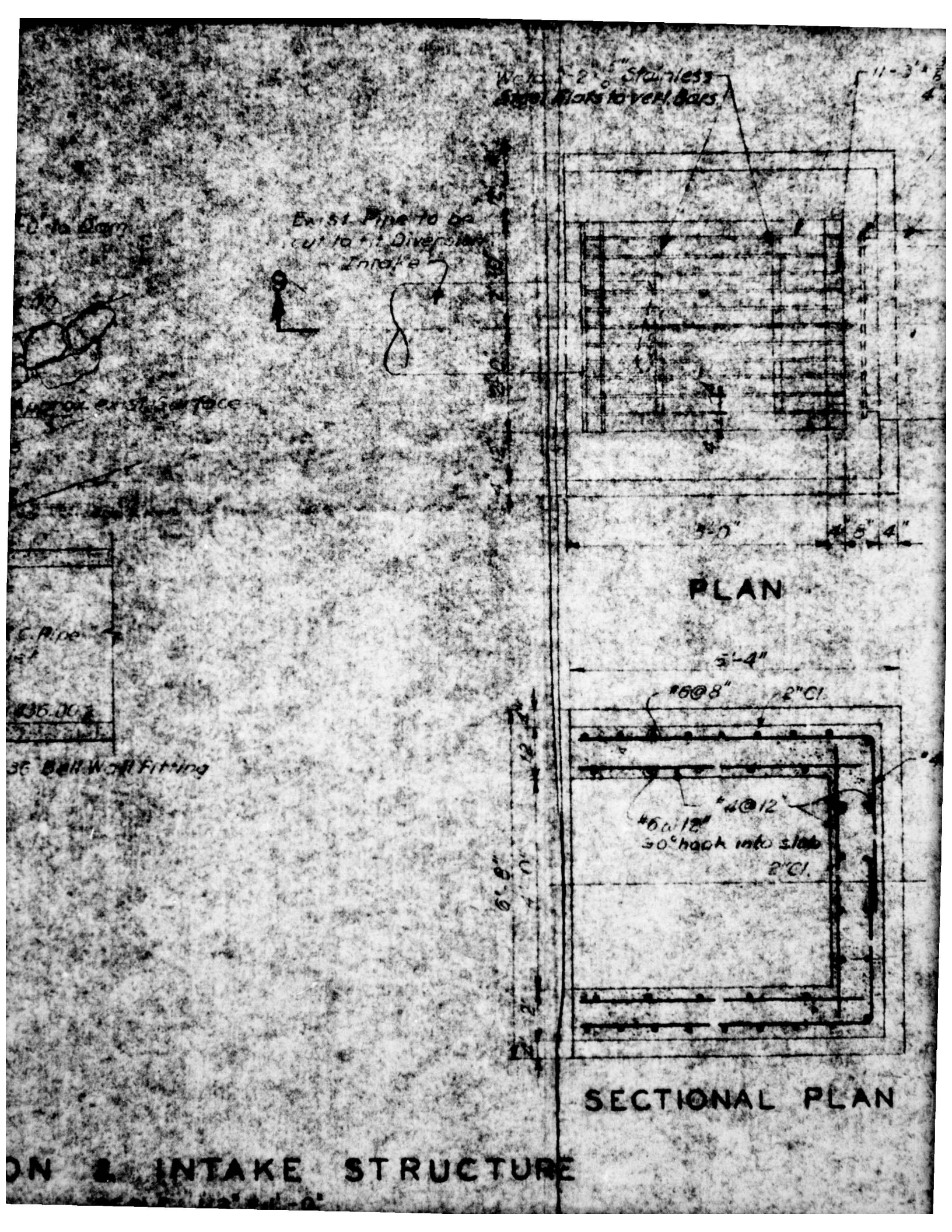


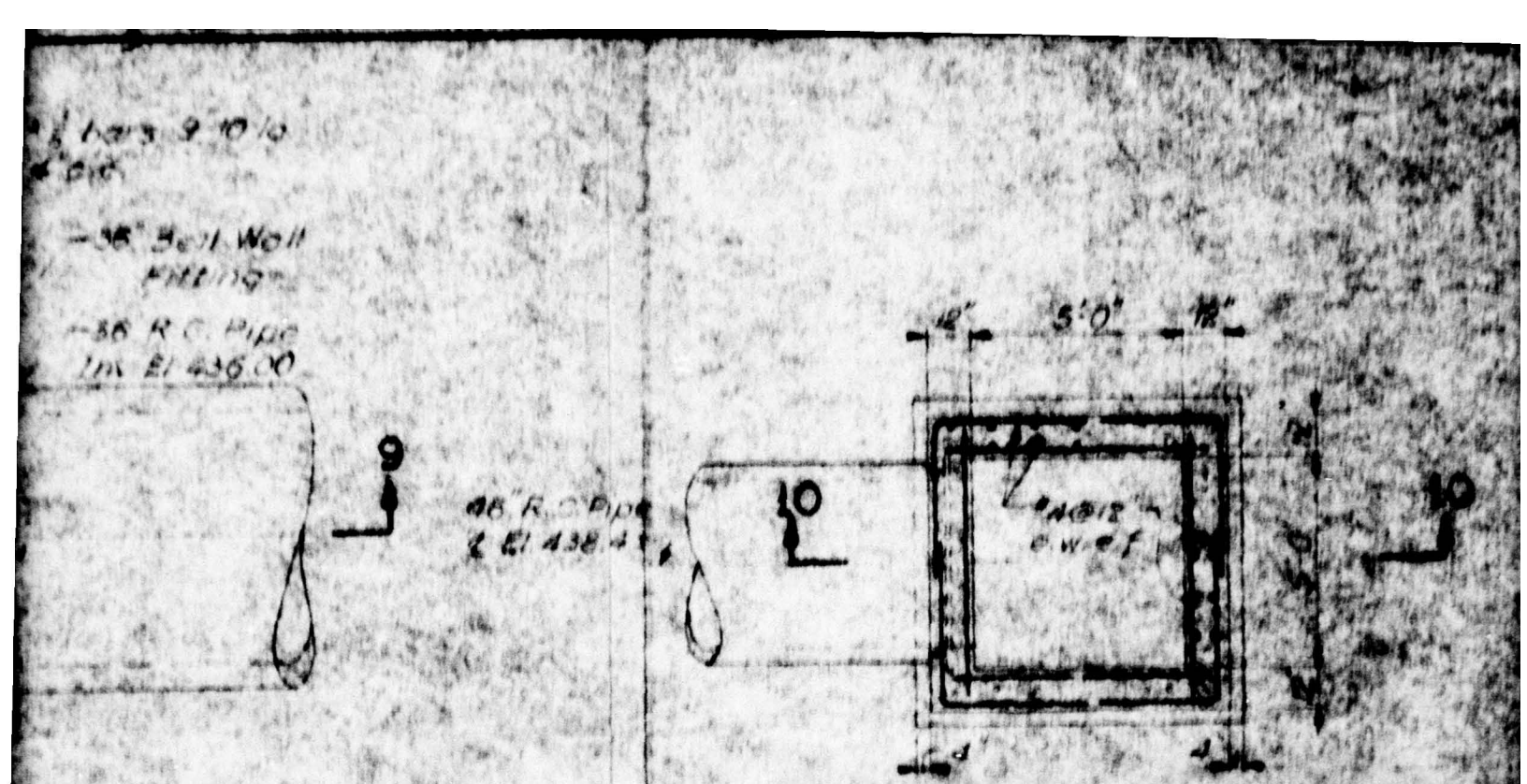
SECTION 8-8

AM "B-2"
ALE: 3/8" = 1'-0"

SECTION 7-7


5'-0"
2"
4"
Existing Brick Wall
Existing Pipe
Approx. Inv. El. 439±
Remove Brick Wall & place
Rock in Angle Socket
Weld 2-
Stainless
Steel Plate to
vert. Bars.
@ 12" c. w.
El. 435.67
Weld 3 Bars
Across to Angle
SECTION 9-9
DIVERSIO

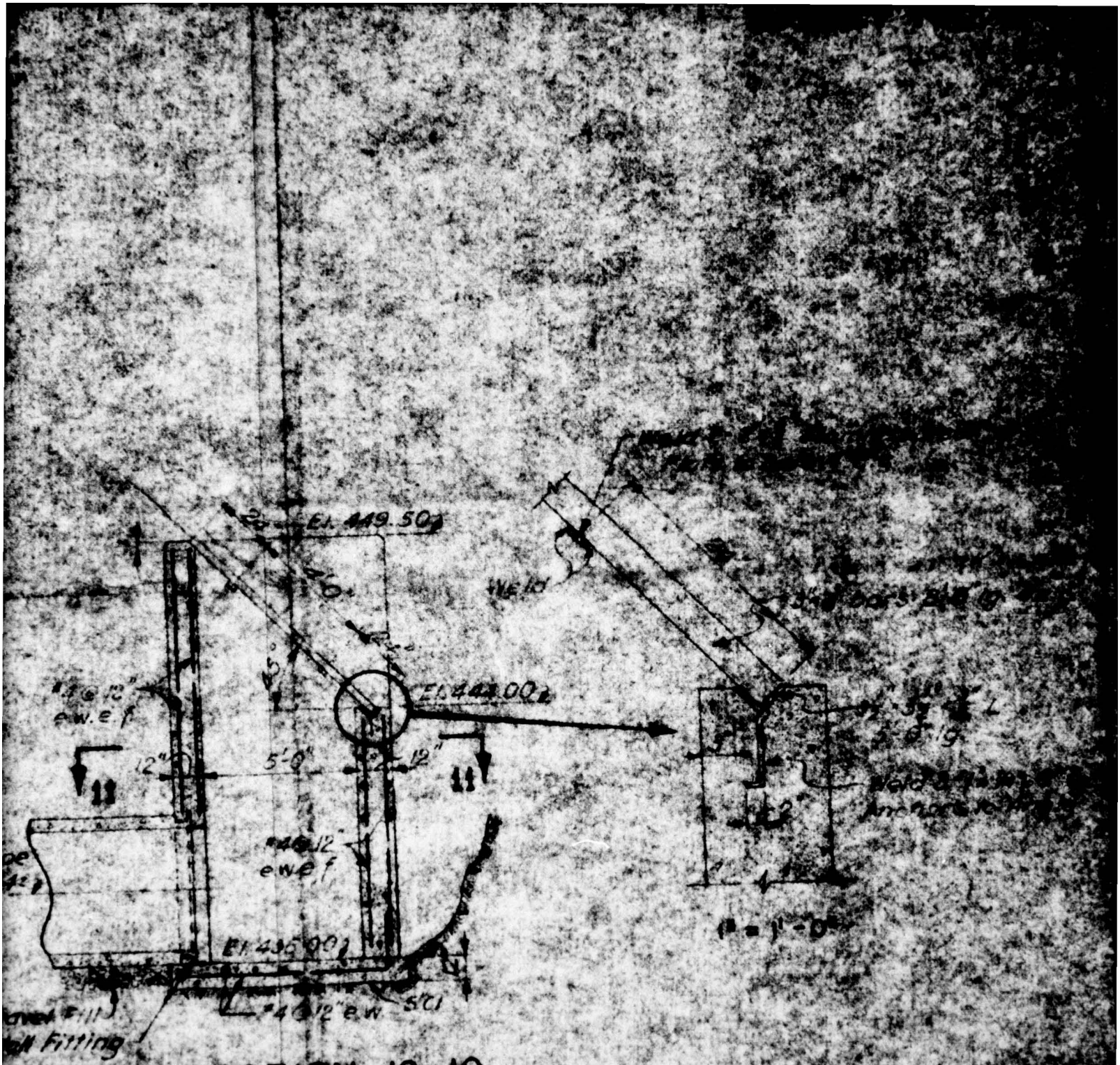

Weld 2" Stainless Steel Bars to Vert. Bars
11-3"
Exist. Pipe to be cut to fit Diversion Intake
3'-0"
5'-4"
PLAN
5'-4"
#6@8"
2"Cl.
#4@12"
#6@12"
90° hook into slab
2"Cl.
SECTIONAL PLAN
INTAKE STRUCTURE



SECTIONAL PLAN II-II

PLAN

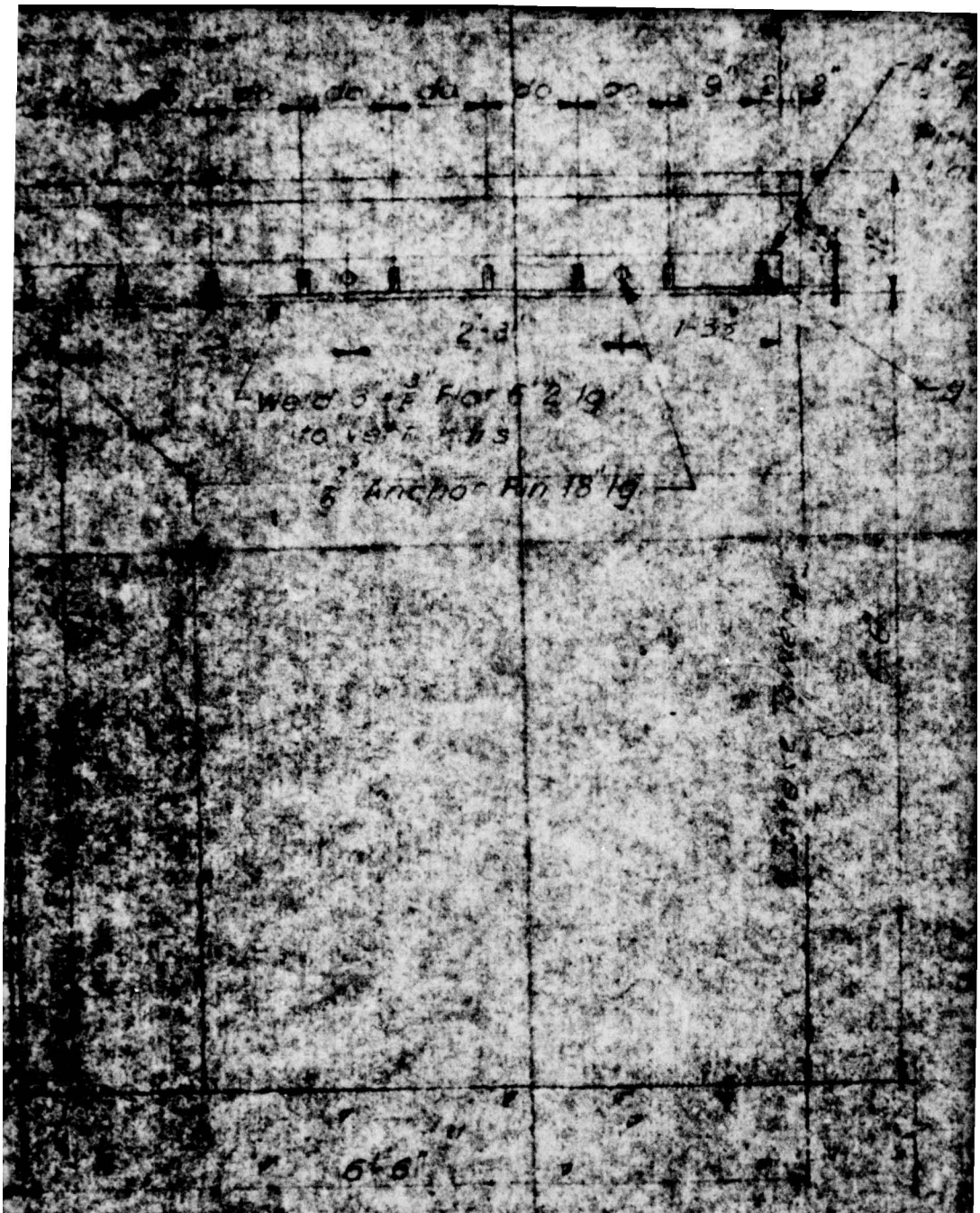
OVERF



SECTION 10-10

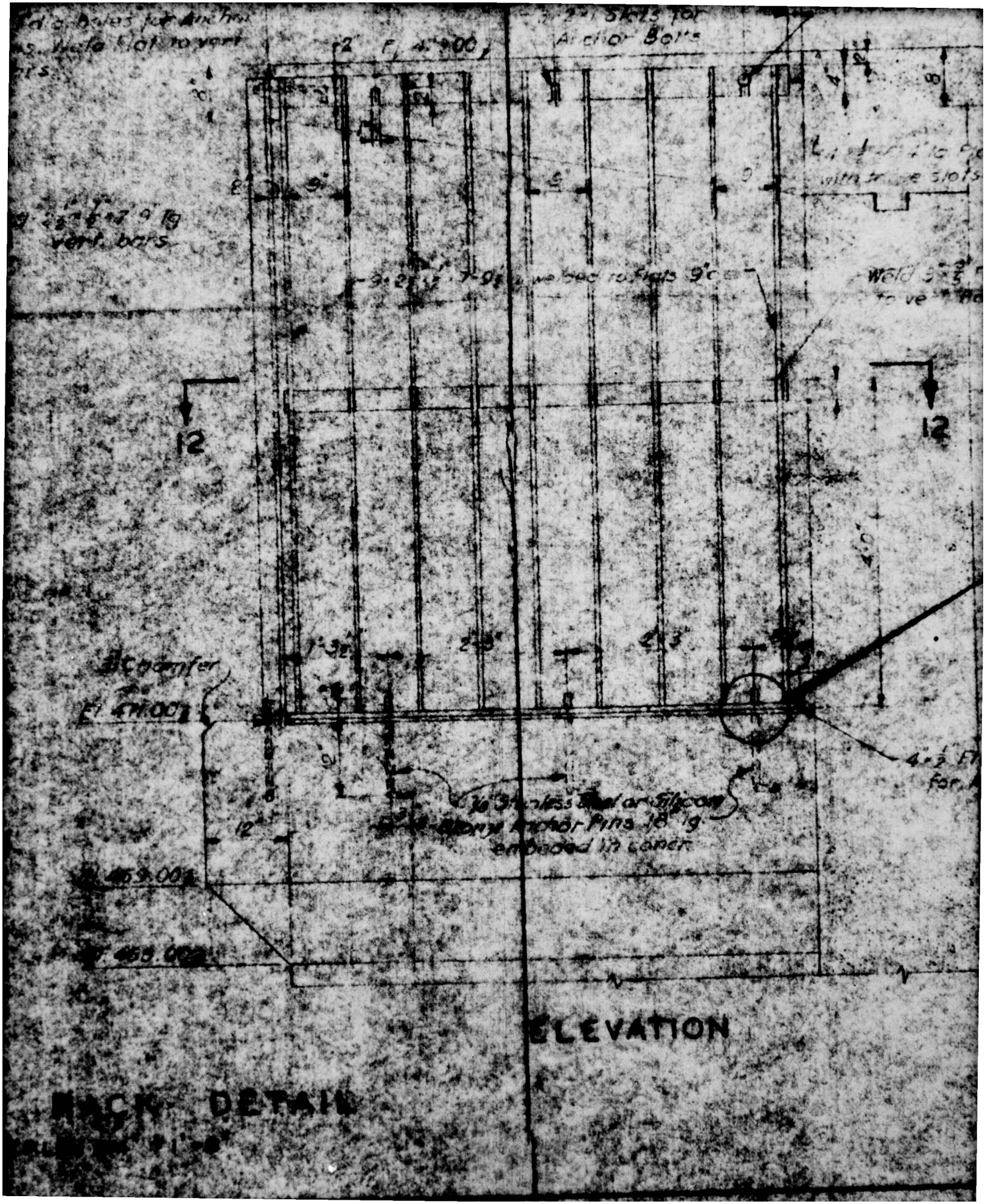
LOW & INTAKE STRUCTURE

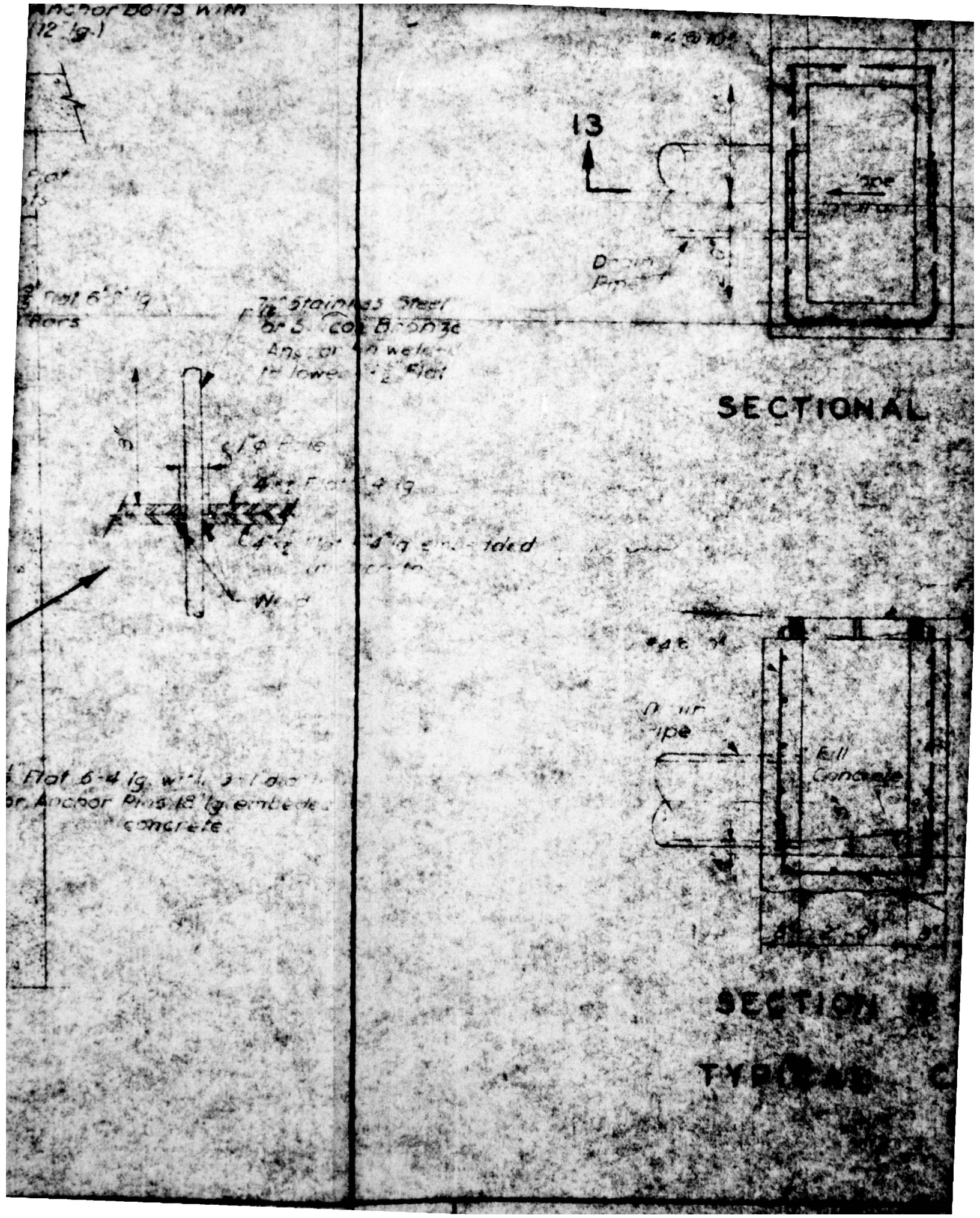
CALE: 1/4" = 1'-0" EXCEPT AS NOTED

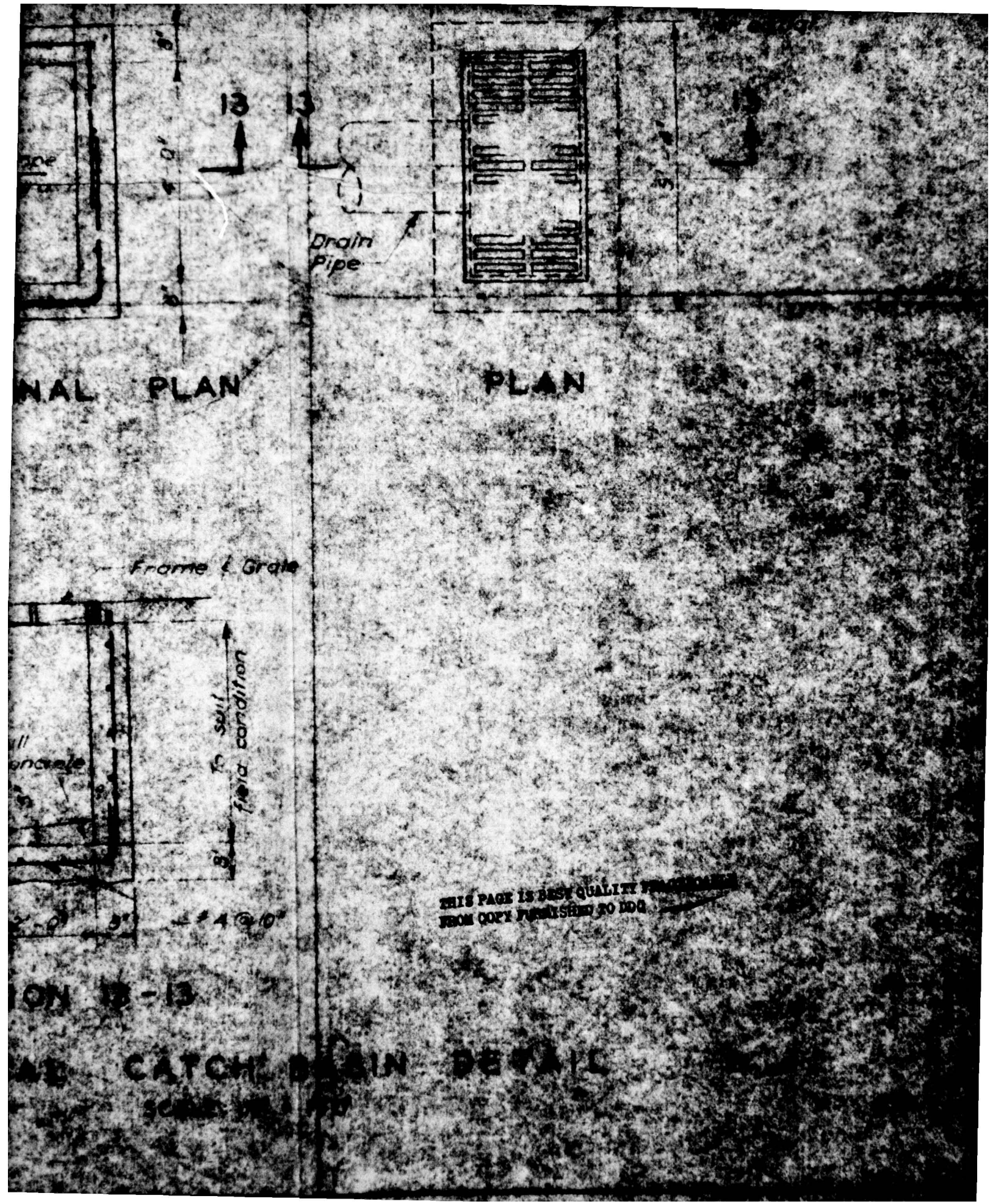


SECTIONAL PLAN 12-12

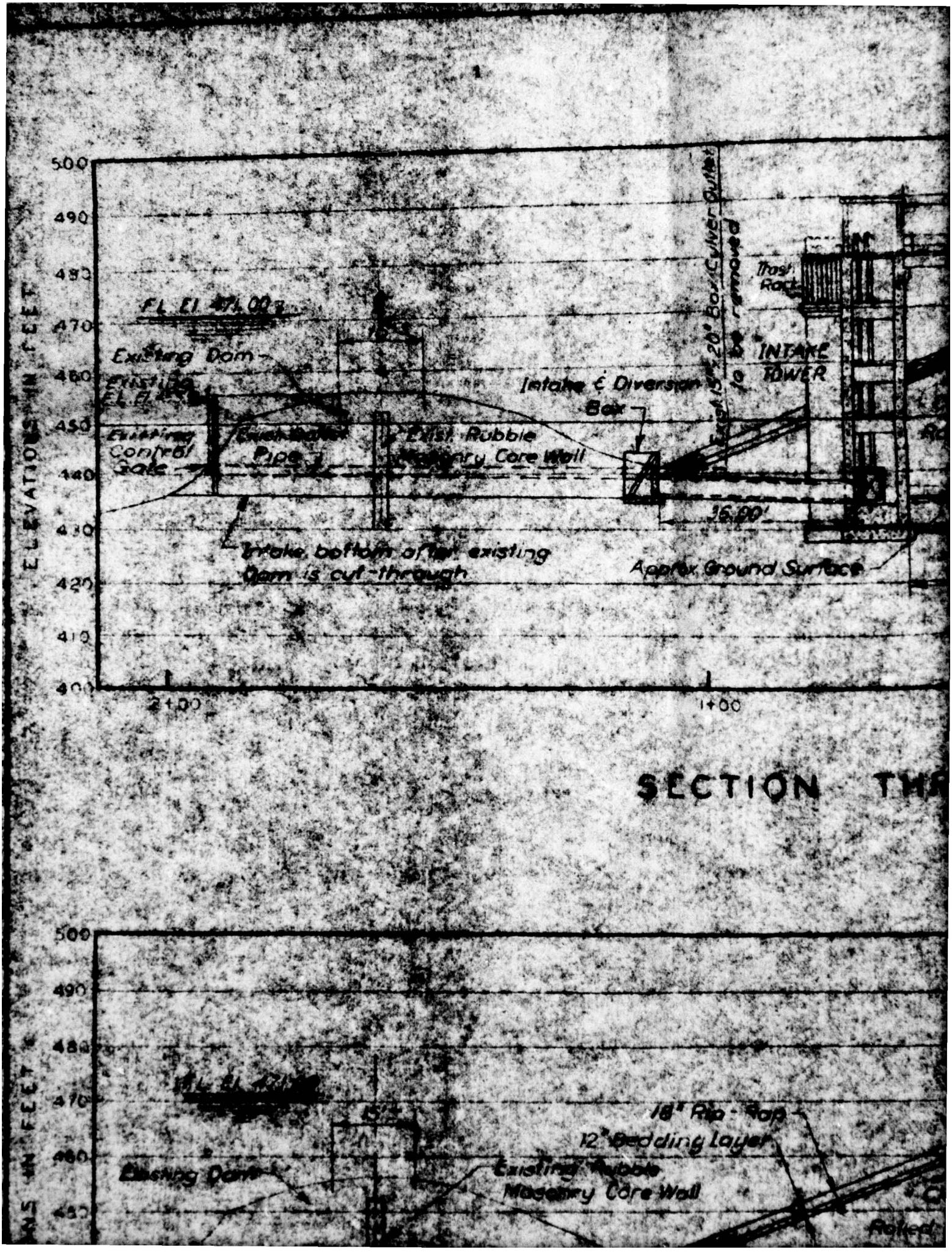
...ments of Trash Rack
...Stiffeners Steel
...Bars


Anchor Bolts
12
12
ELEVATION
BACK DETAIL

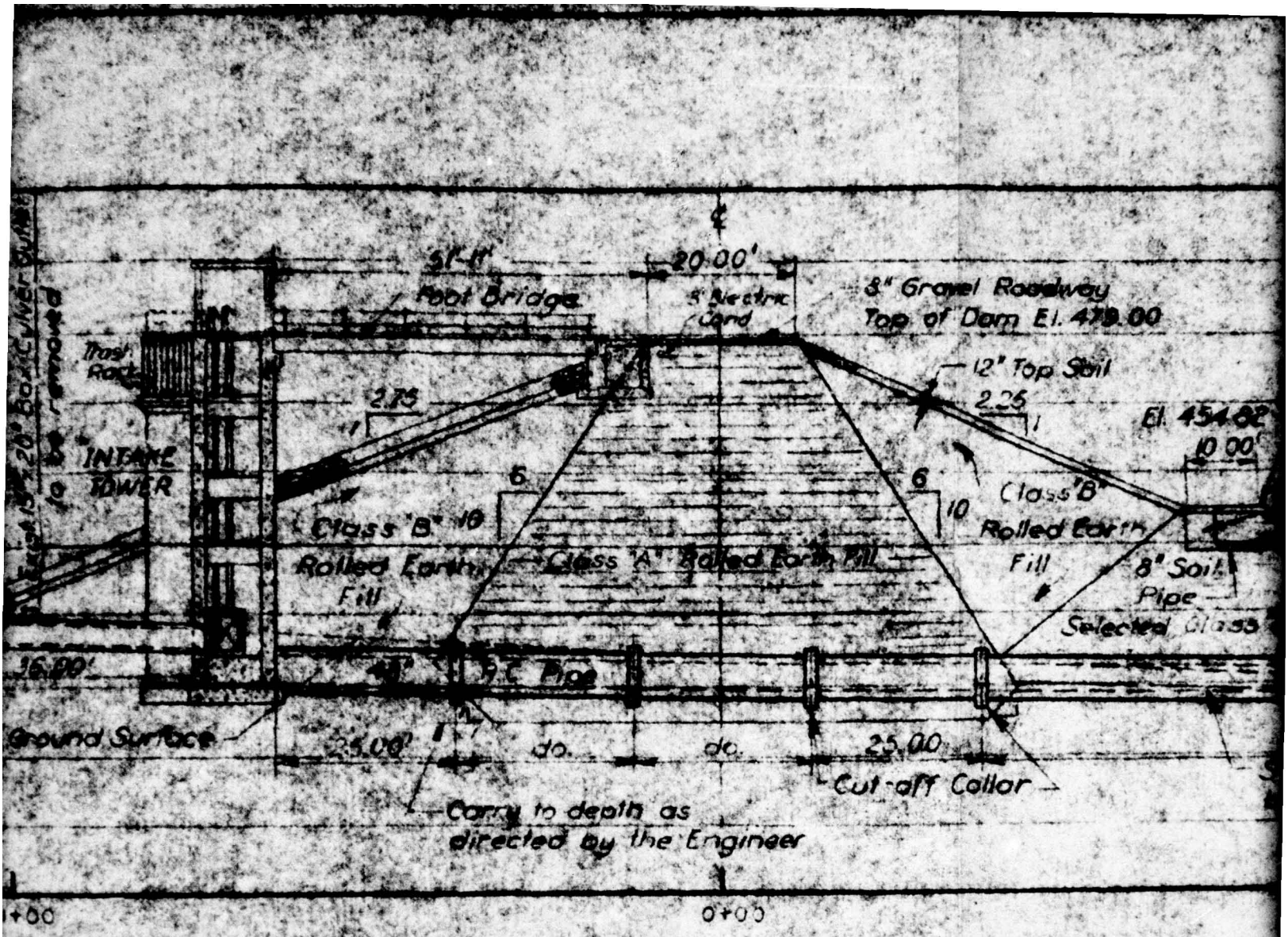

Anchor Bolts with
(12" lg.)
13
Drain Pipe
SECTIONAL
Drain Pipe
Fill Concrete
SECTION
TYP



THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

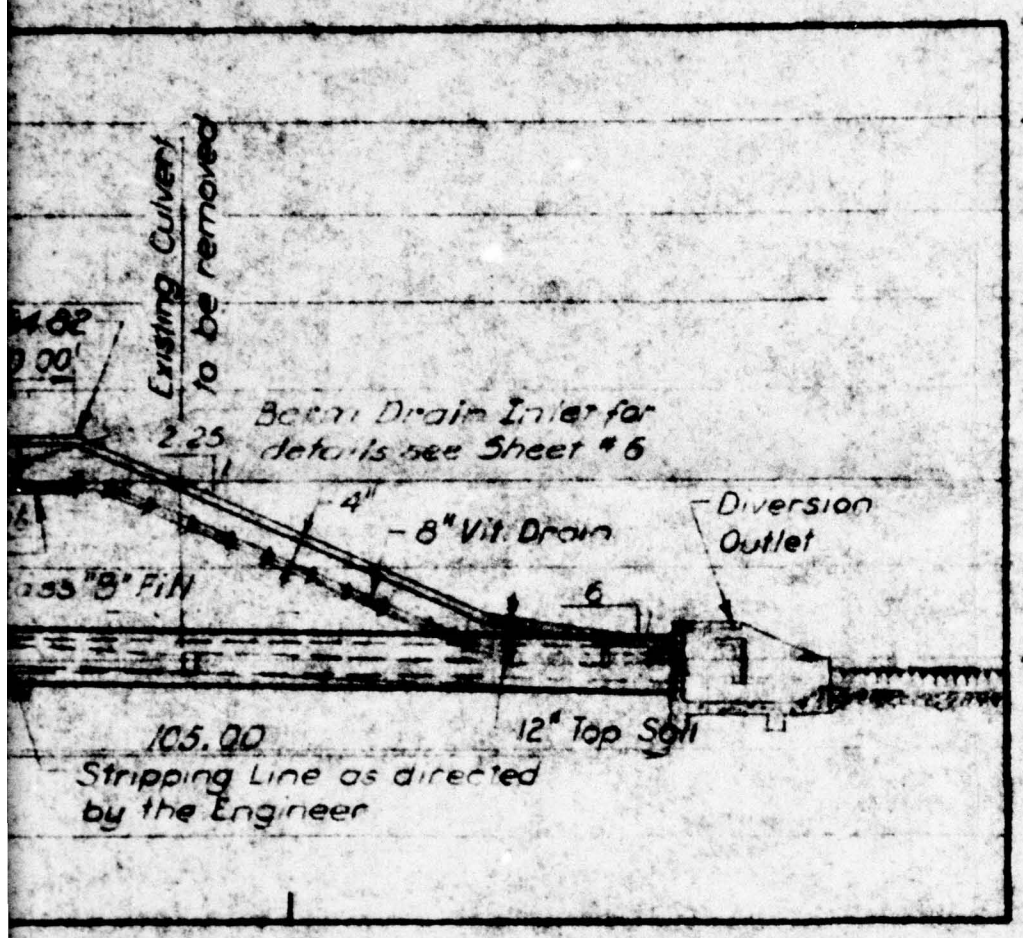

ELEVATIONS IN FEET
500
490
480
470
460
450
440
430
420
410
400
2+00
1+00
FL EL 471.00
Existing Dam
Existing Control Gate
Existing Outlet Pipe
Exist. Rubble Masonry Core Wall
Intake & Diversion Box
Intake, bottom of last existing Dam is cut-through
Approx Ground Surface
Thrust Rock
INTAKE TOWER
36.00'
18" Rip-Rap
12" Bedding Layer
Existing Rubble Masonry Core Wall
Existing Dam

SECTION THR

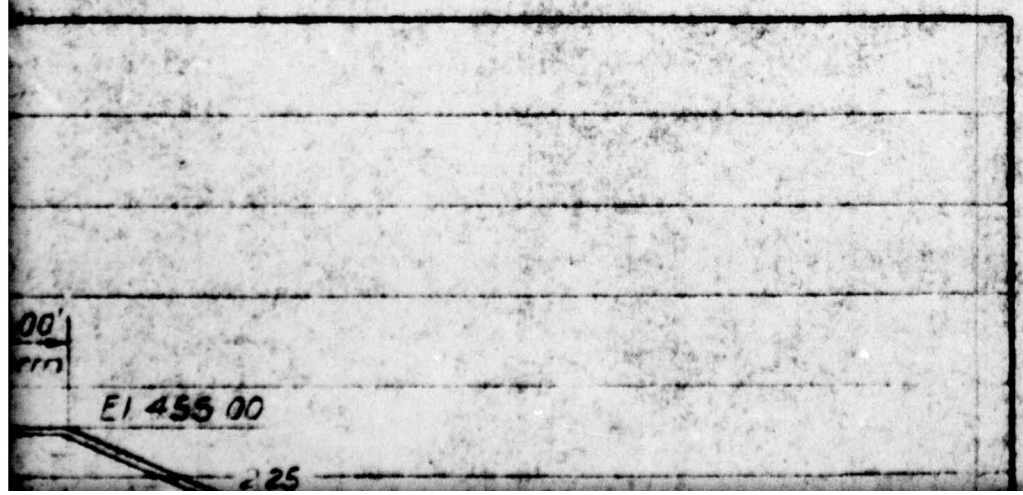


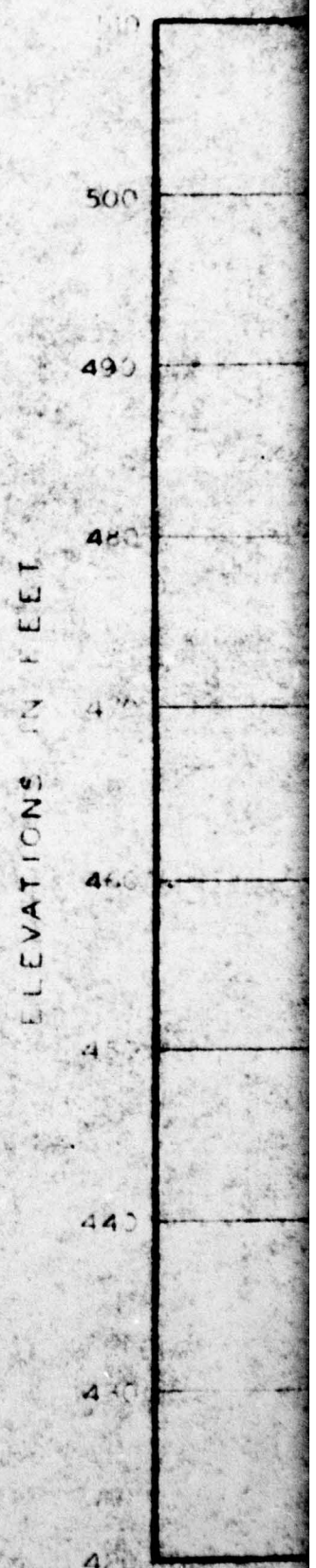
CTION THROUGH DIVERSION & INTAKE C

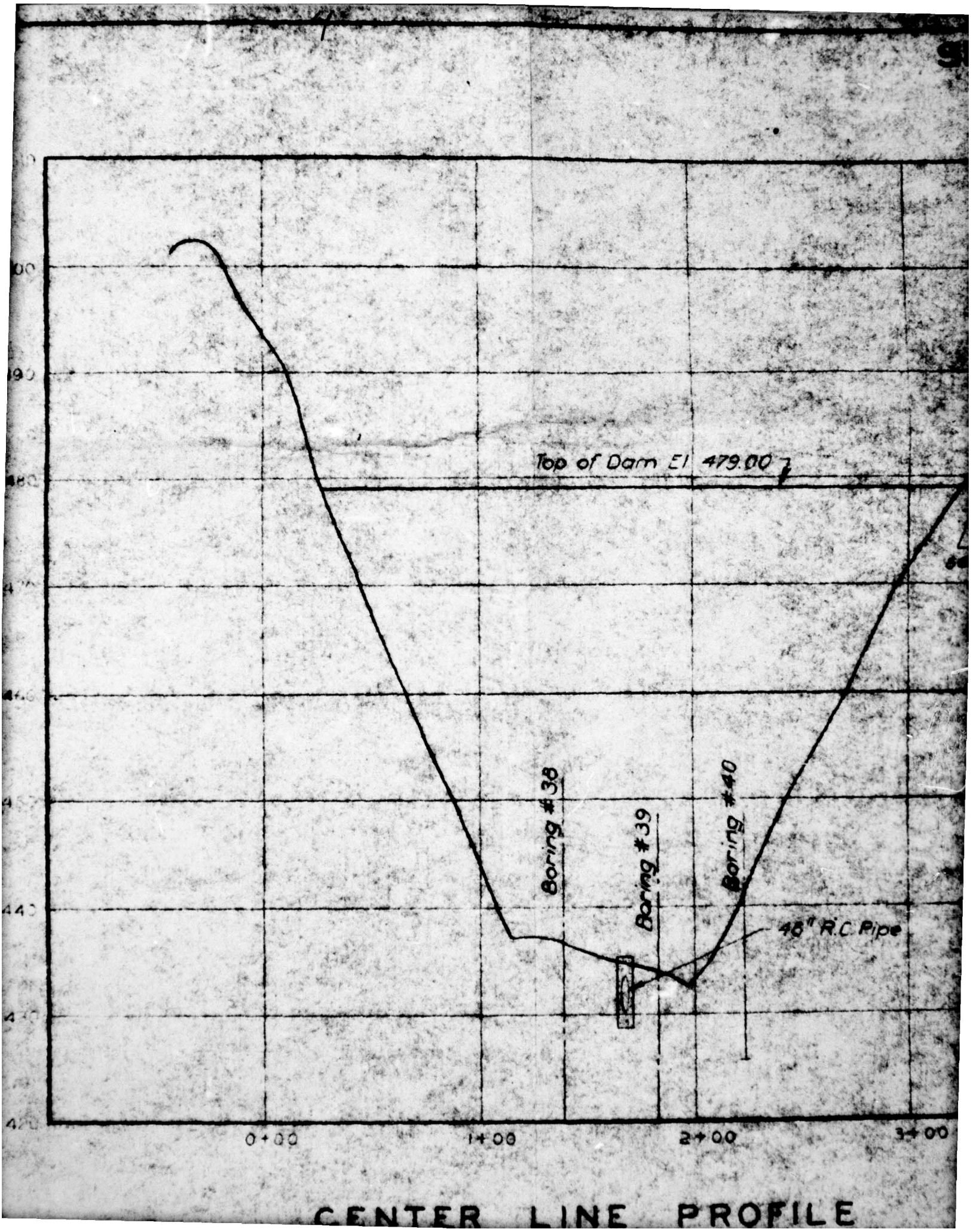
SCALE : 1" = 20'


Existing Culvert to be removed
Beam Drain Inlet for details see Sheet # 6
2.25
4"
8" Vit. Drain
Diversion Outlet
6
12" Top Soil
105.00
Stripping Line as directed by the Engineer
500
490
480
470
460
450
440
430
420
410
400
ELEVATIONS IN FEET

CONDUITS


El 455.00
2.25
500
490
480
470
460
450
ELEVATIONS IN FEET


500
490
480
440
420
ELEVATIONS IN FEET

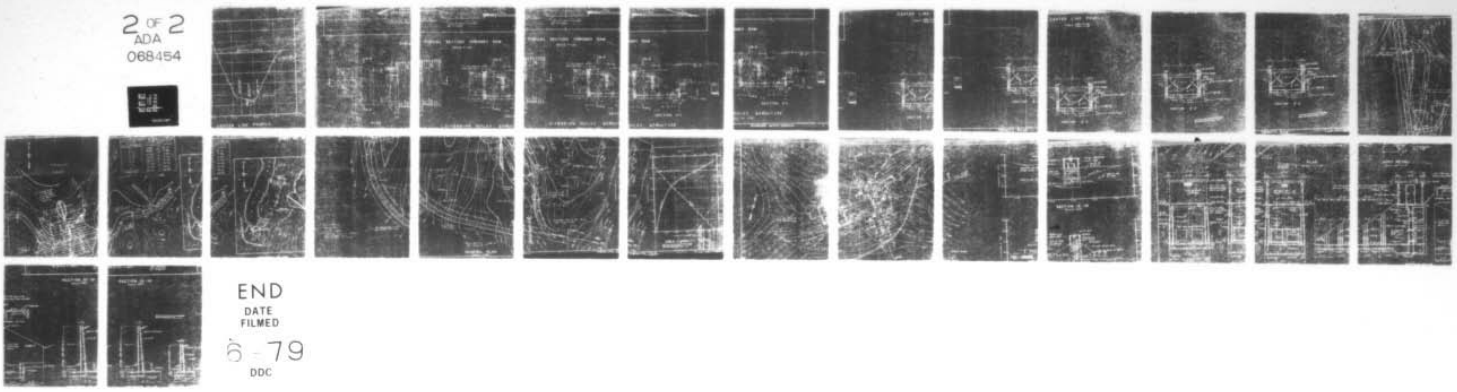


CENTER LINE PROFILE

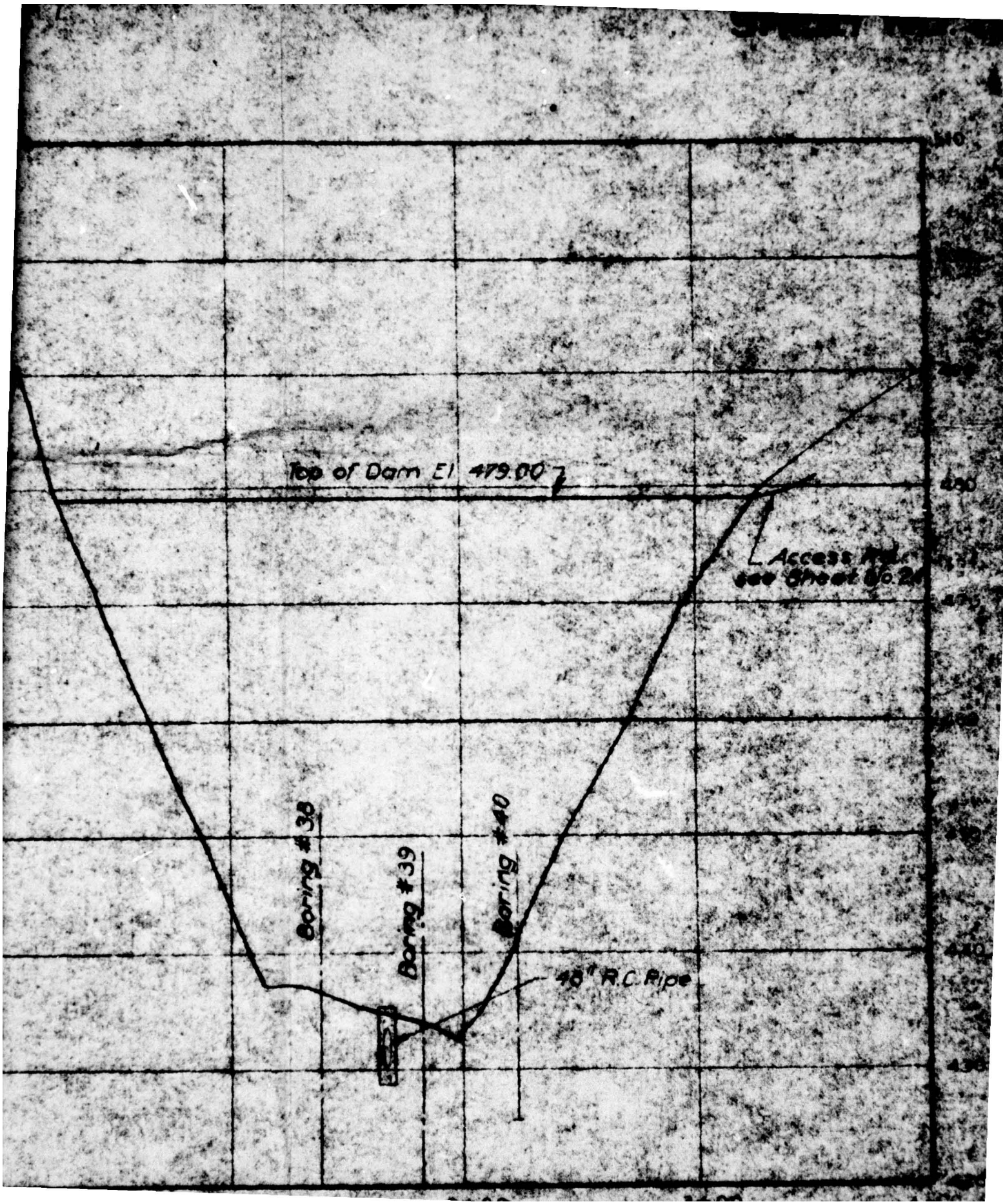
AD-A068 454 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/2
NATIONAL DAM SAFETY PROGRAM. TRINITY DAM, INVENTORY NUMBER NY 1--ETC(U)
SEP 78 G KOCH DACW51-78-C-0035

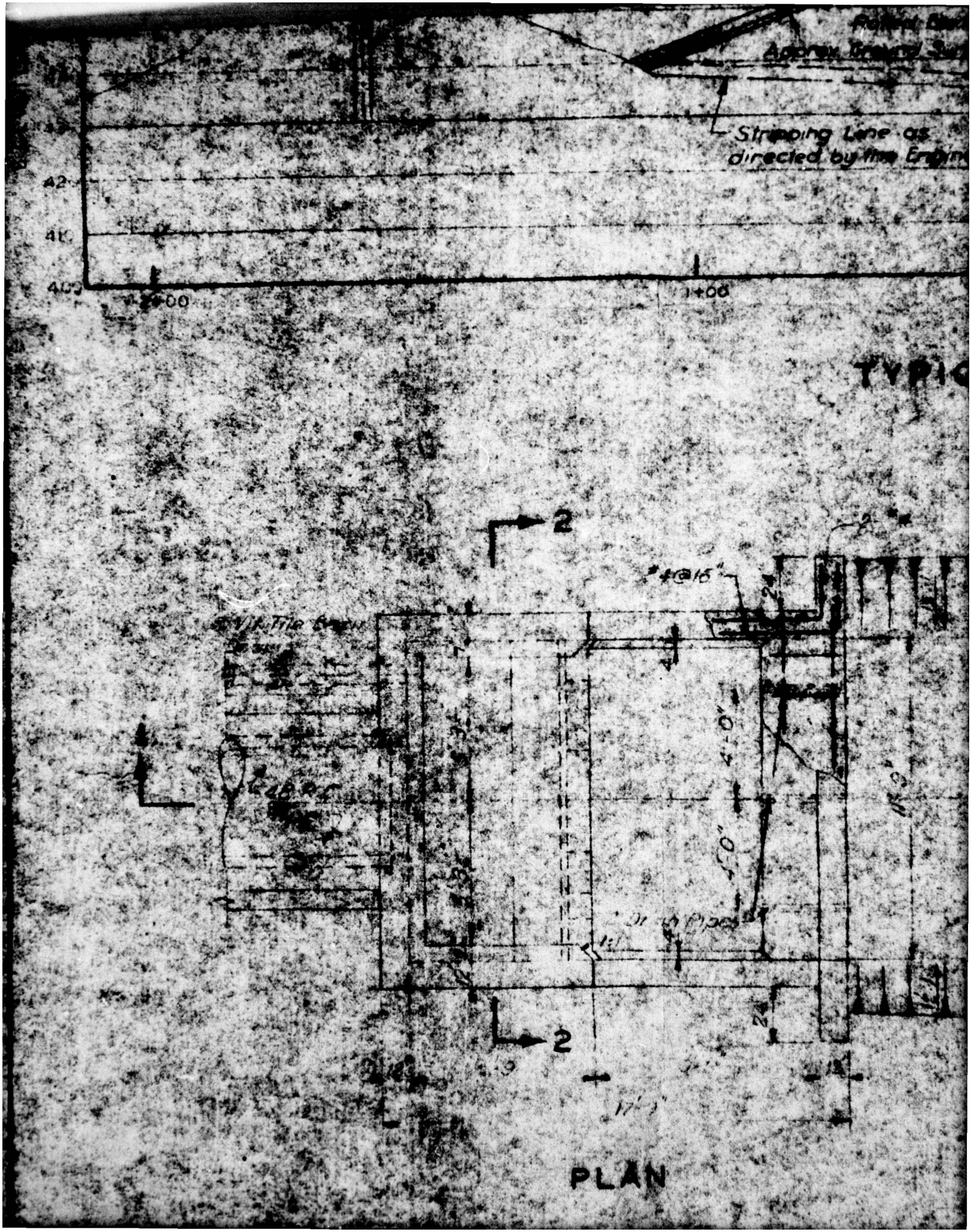
UNCLASSIFIED NL

2 OF 2
ADA
068454



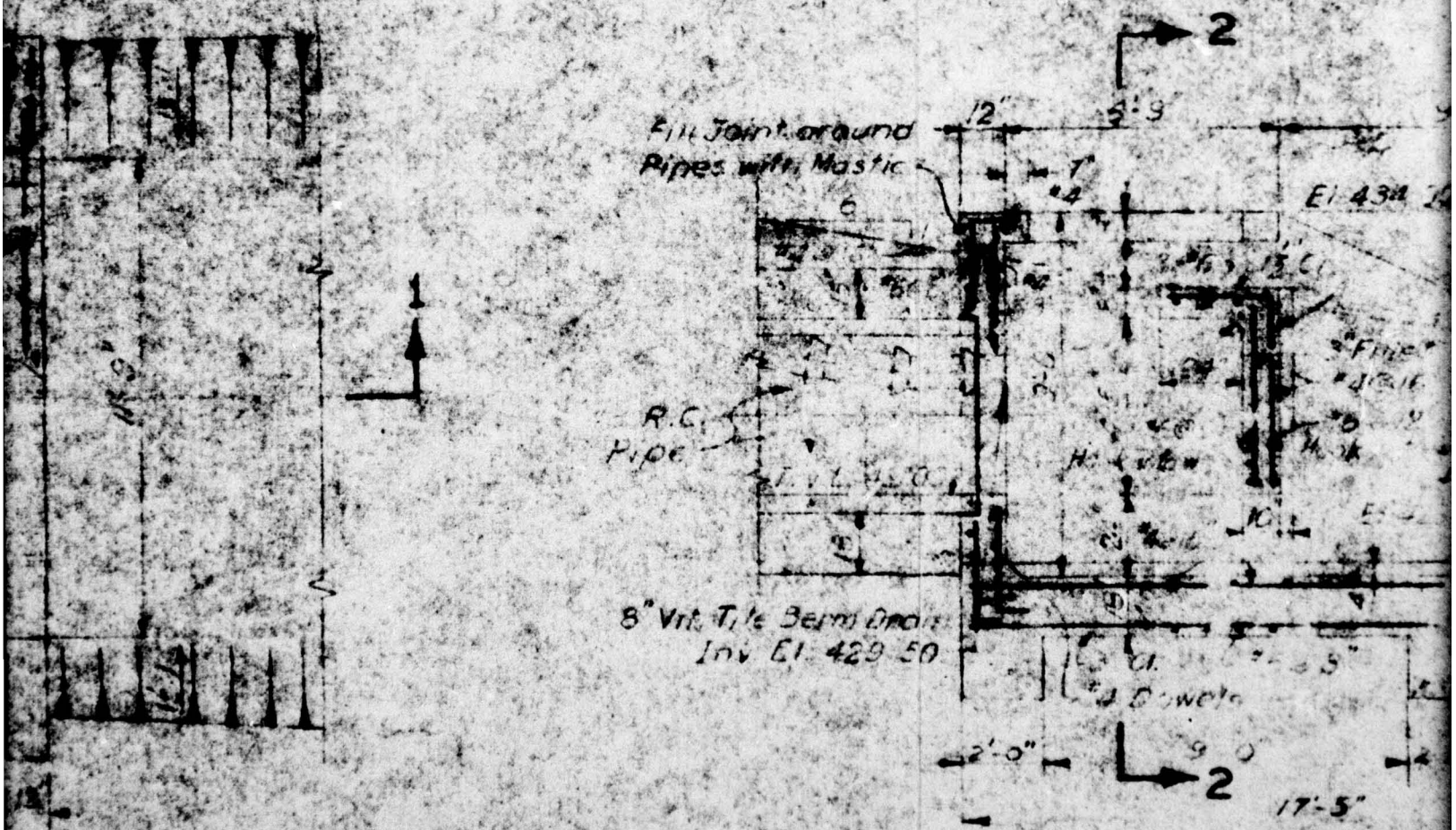
END
DATE
FILMED
6-79
DDC


Top of Dam El 479.00
Boring #38
Boring #39
Boring #40
48" R.C. Pipe


Stripping Lane as
directed by the Engin
42
41
40
1+00
TYPIC
2
#4@16"
2
PLAN

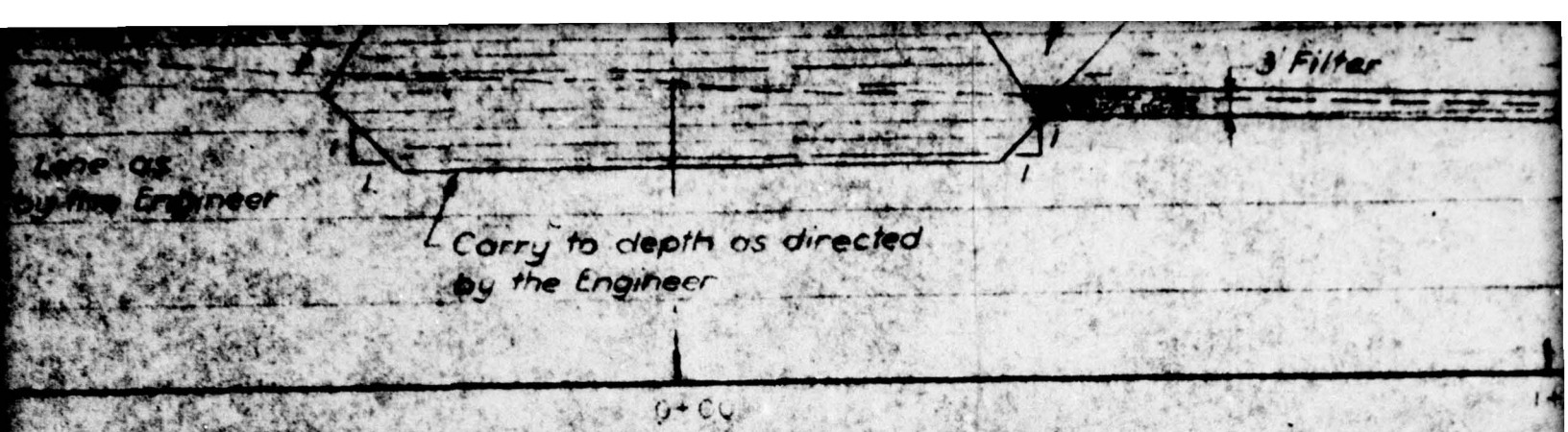
TYPICAL SECTION THROUGH DAM

SCALE: 1" = 20'



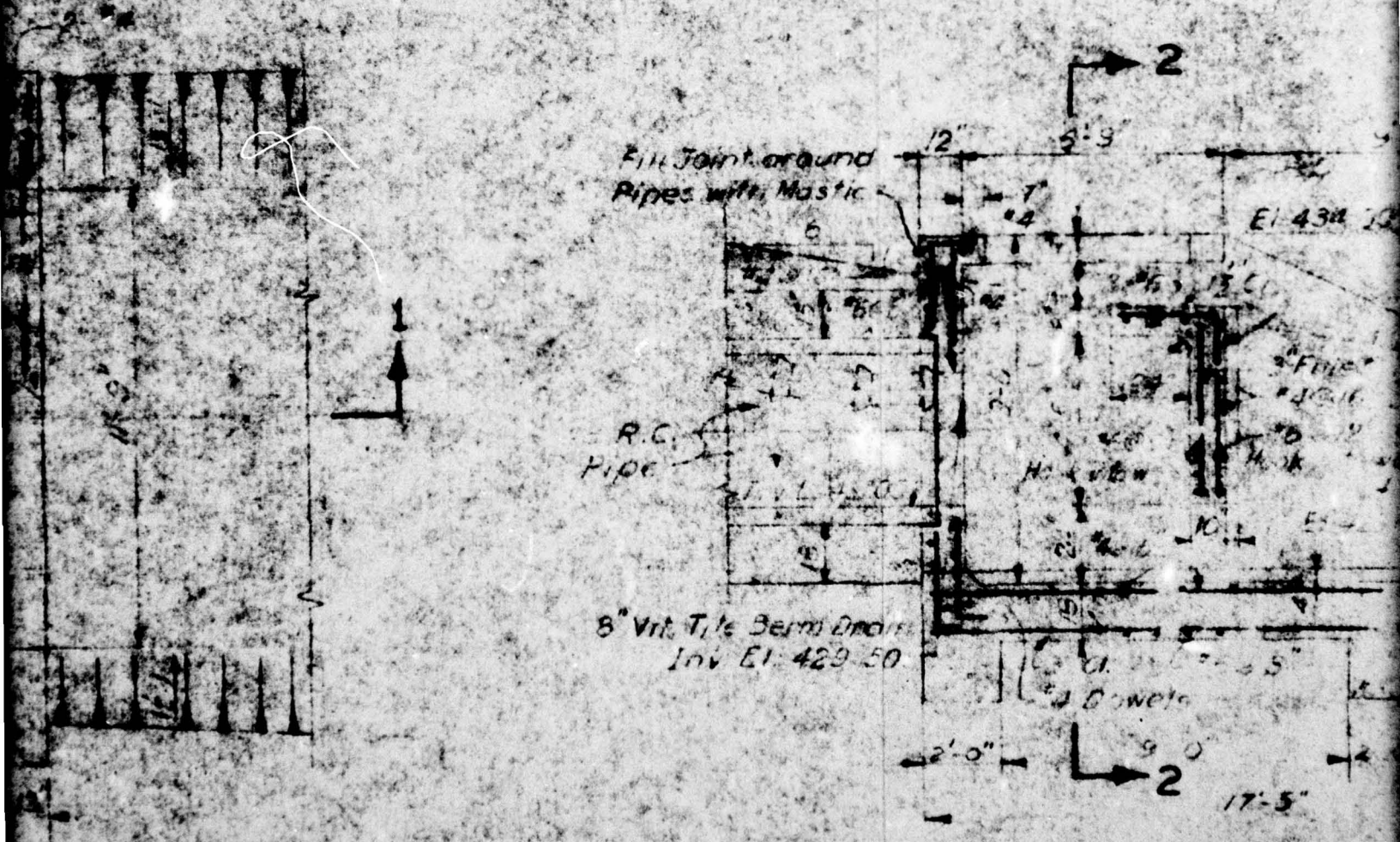
SECT

DIVERSION OUTLET STRUC



TYPICAL SECTION THROUGH DAM

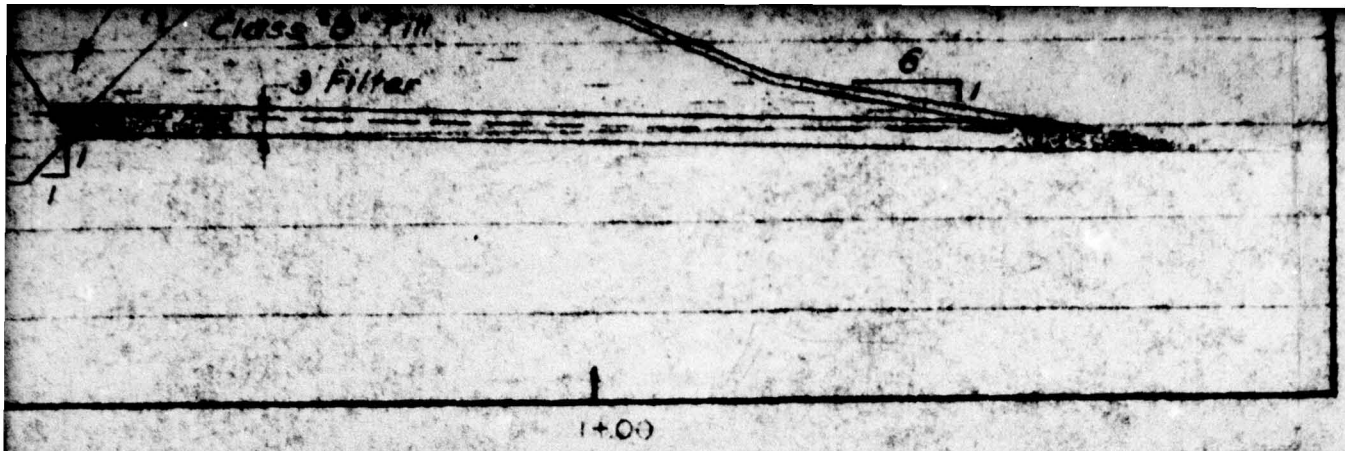
SCALE: 1" = 20'



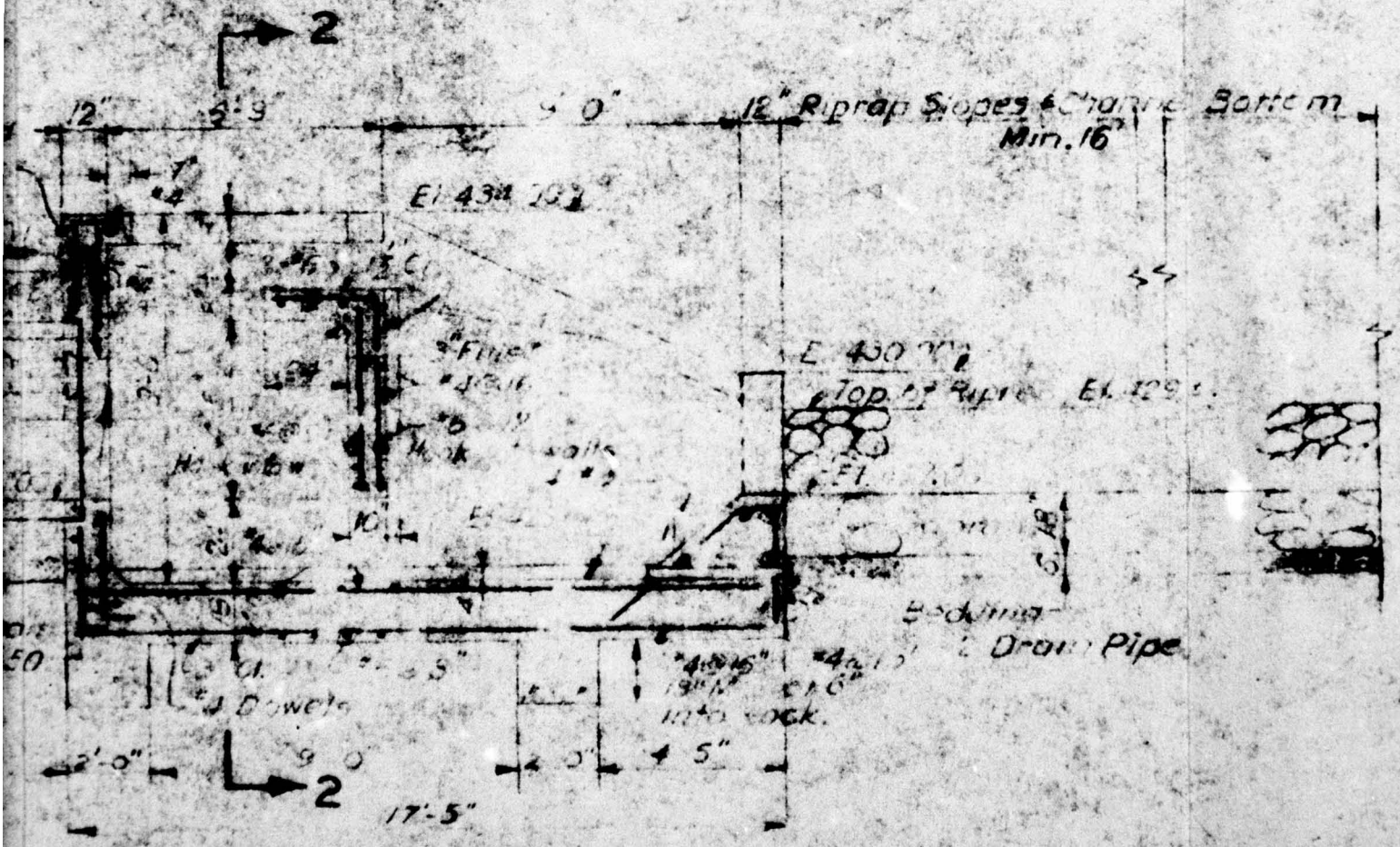
SECT

DIVERSION OUTLET STRUC

SCALE: 1/4" = 1'-0"



UGH DAM

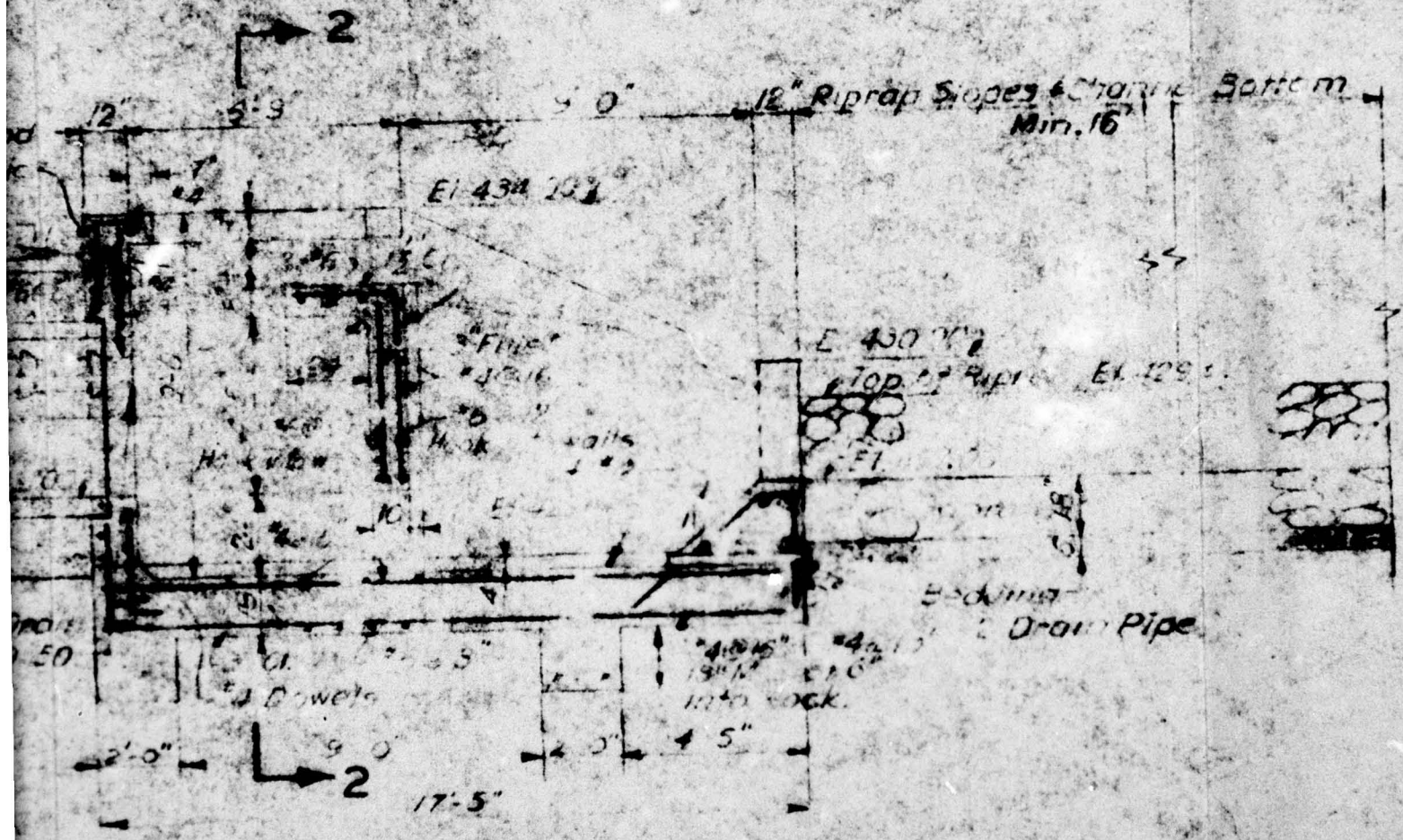


SECTION 1-1

UTLET STRUCTURE



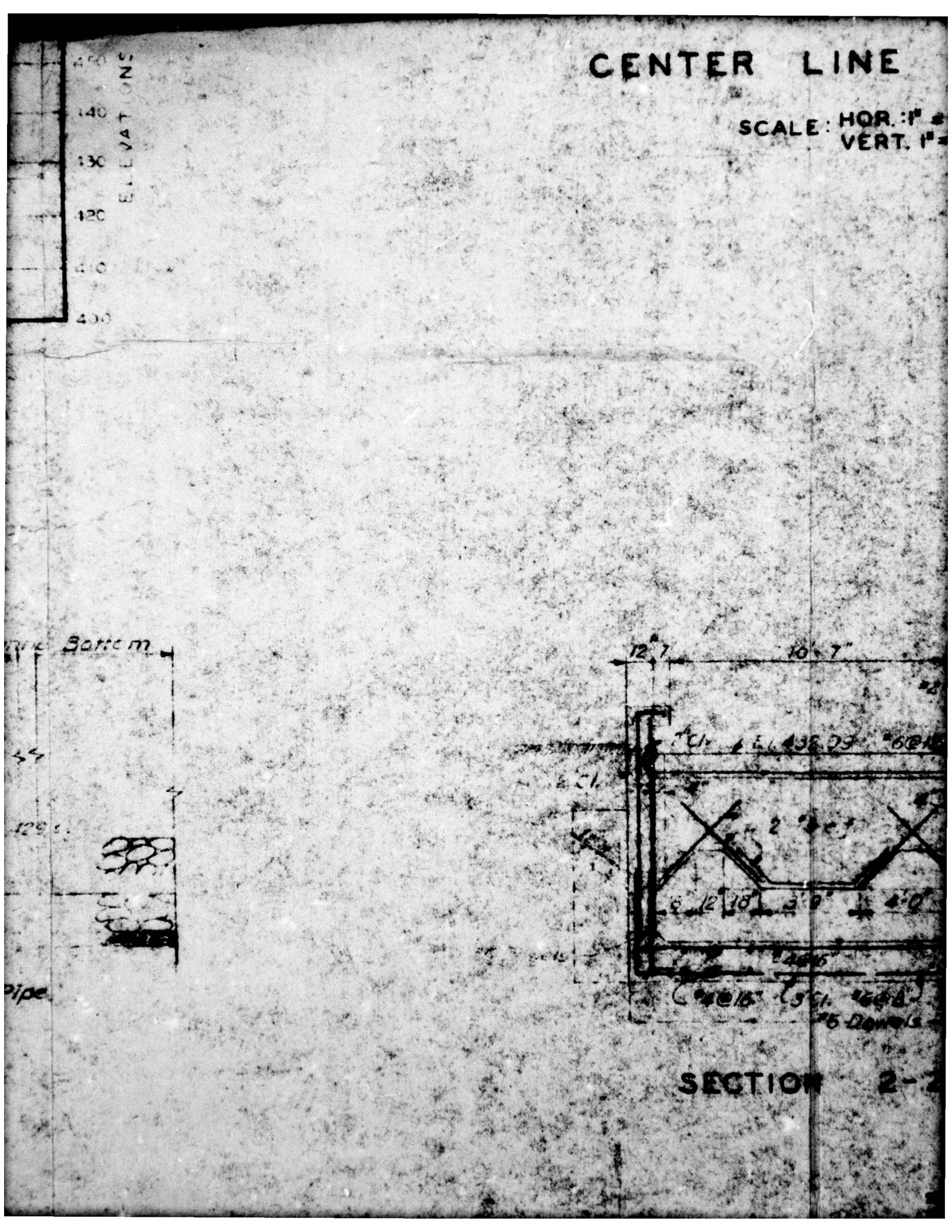
OUGH DAM

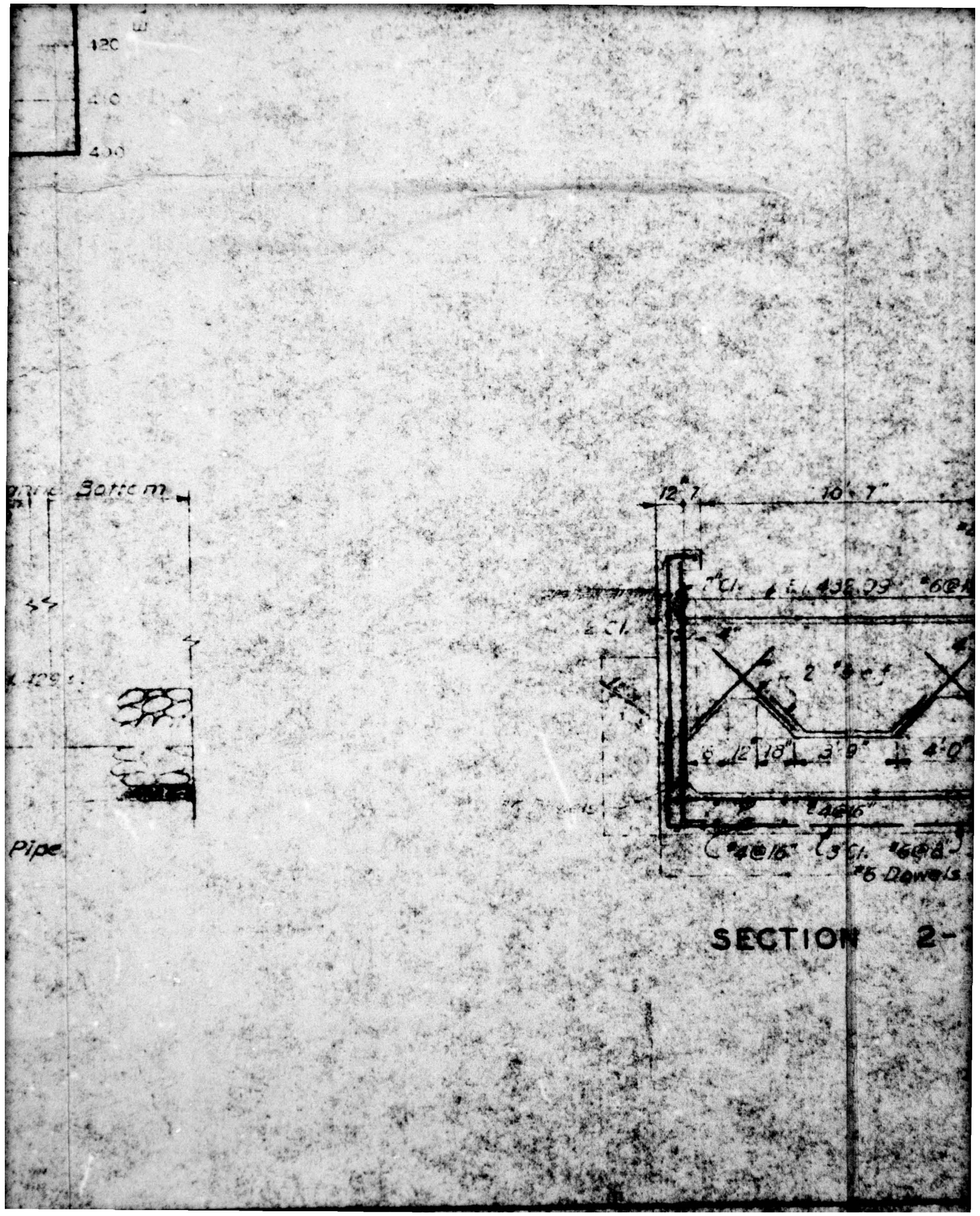


SECTION 1-1

OUTLET STRUCTURE

SCALE: 1/4" 1'-0"

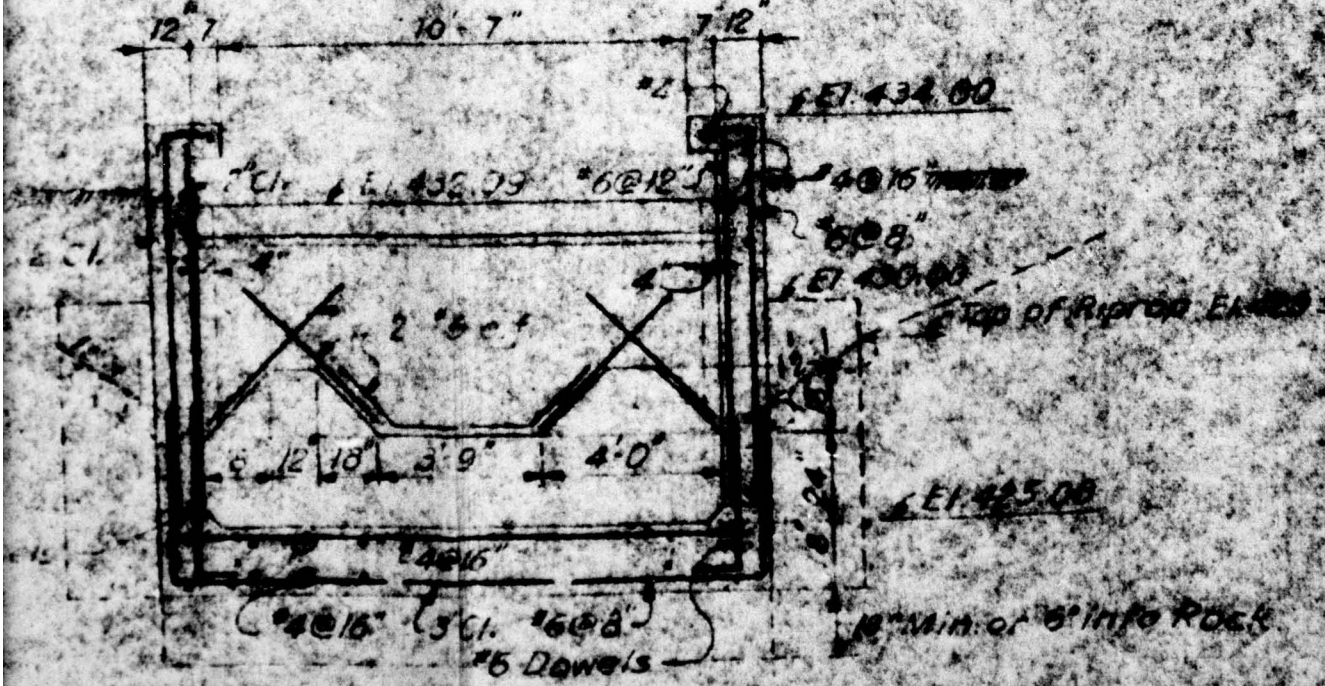

CENTER LINE
SCALE: HOR. :1"
VERT. 1"
ELEVATIONS
450
440
430
420
410
400
Bottom
pipe
12" 7"
10' 7"
#6 Dowels
SECTION 2-2



SECTION 2-

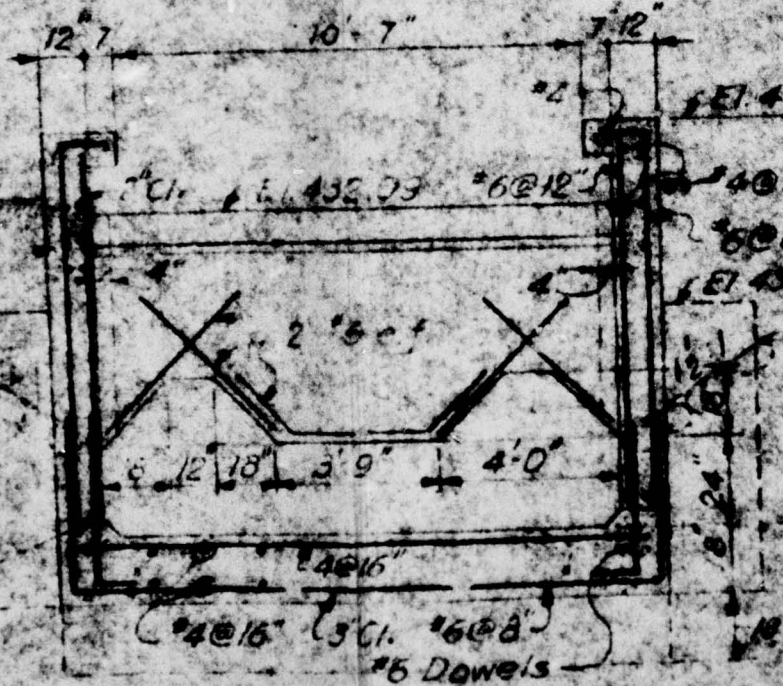
CENTER LINE PROFILE

SCALE: HOR. 1" = 50'
VERT. 1" = 10'



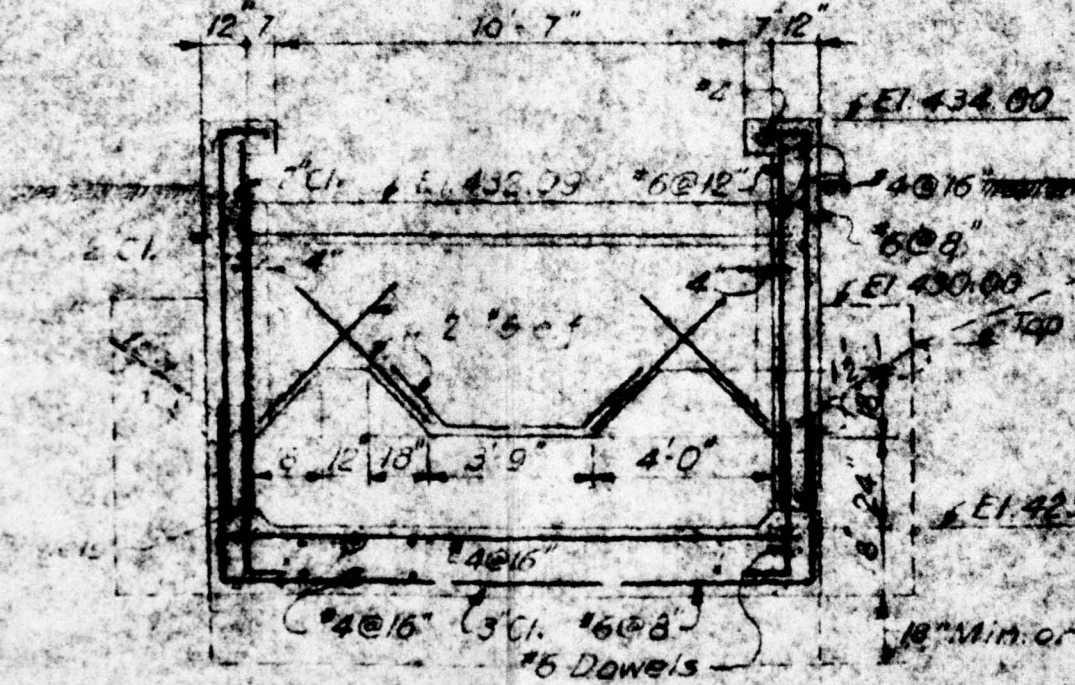
SECTION 2-2

VERT. 1"=10'



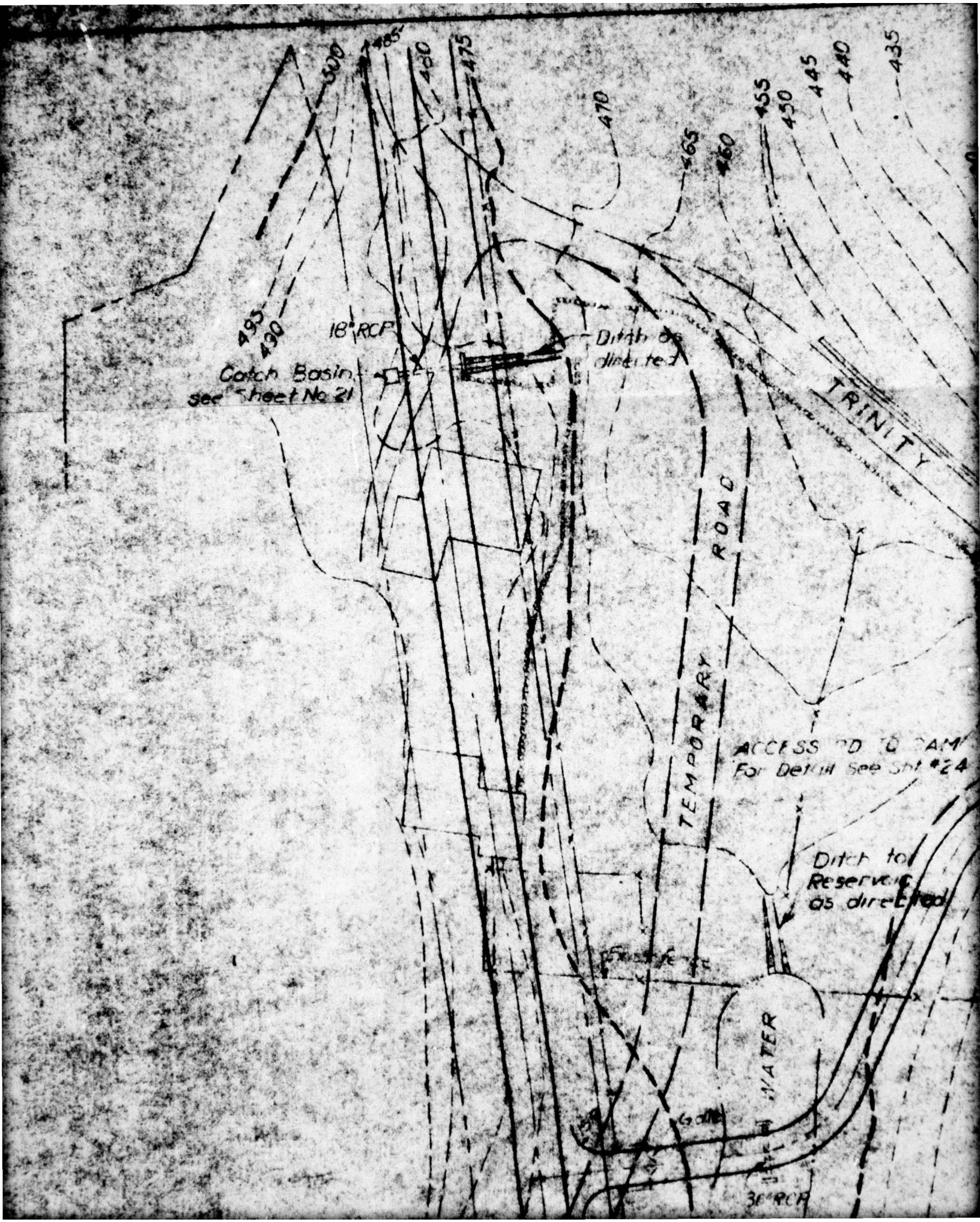
SECTION 2-2

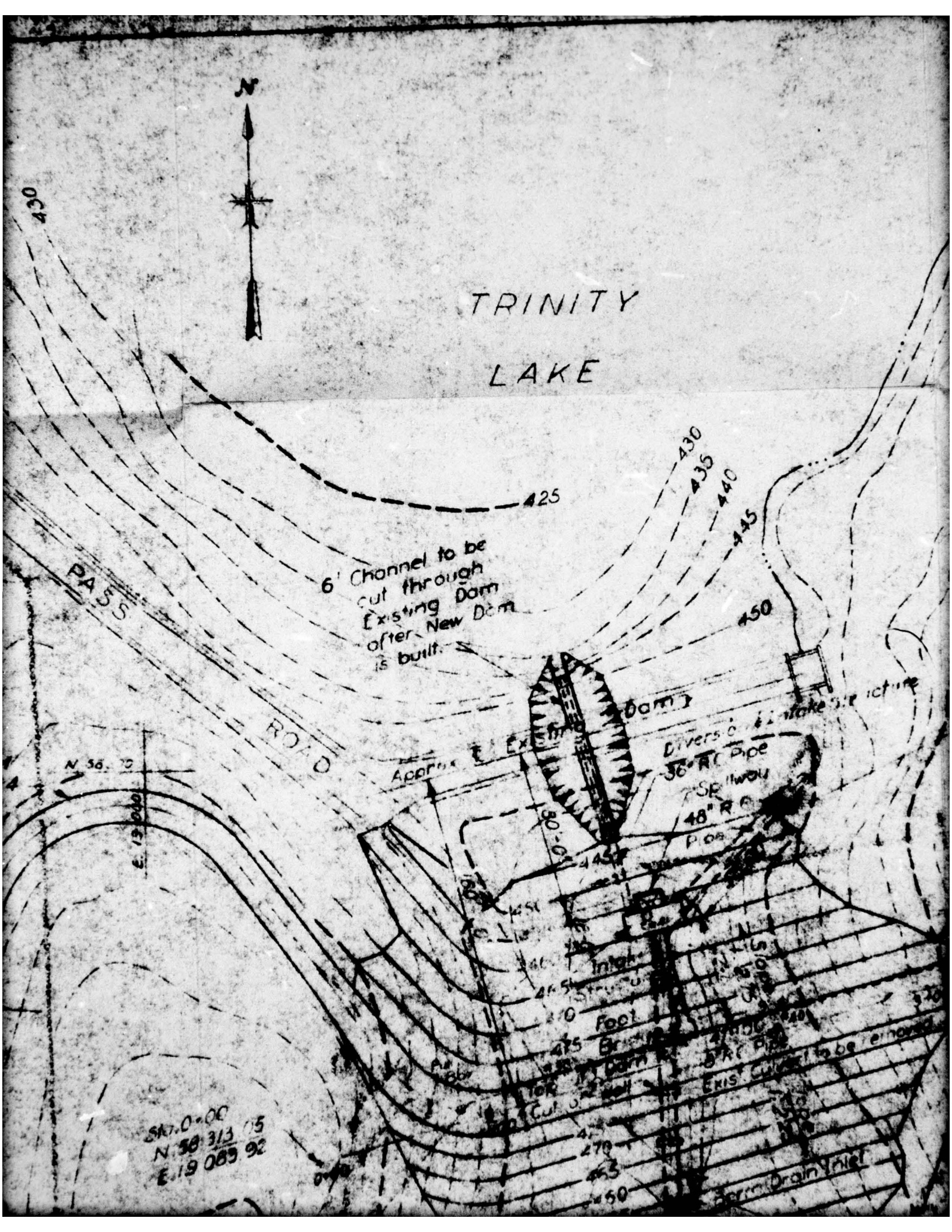
THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DTIC

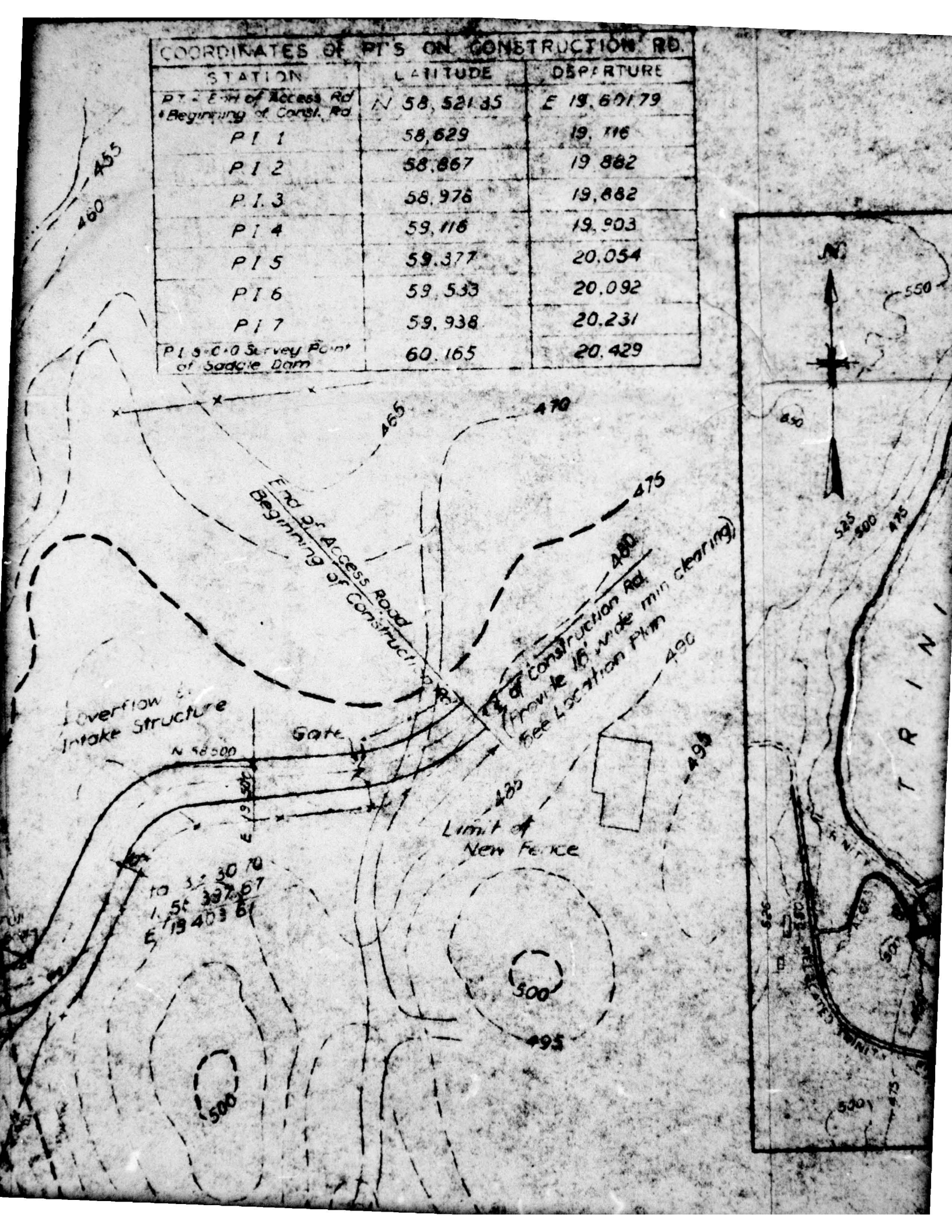


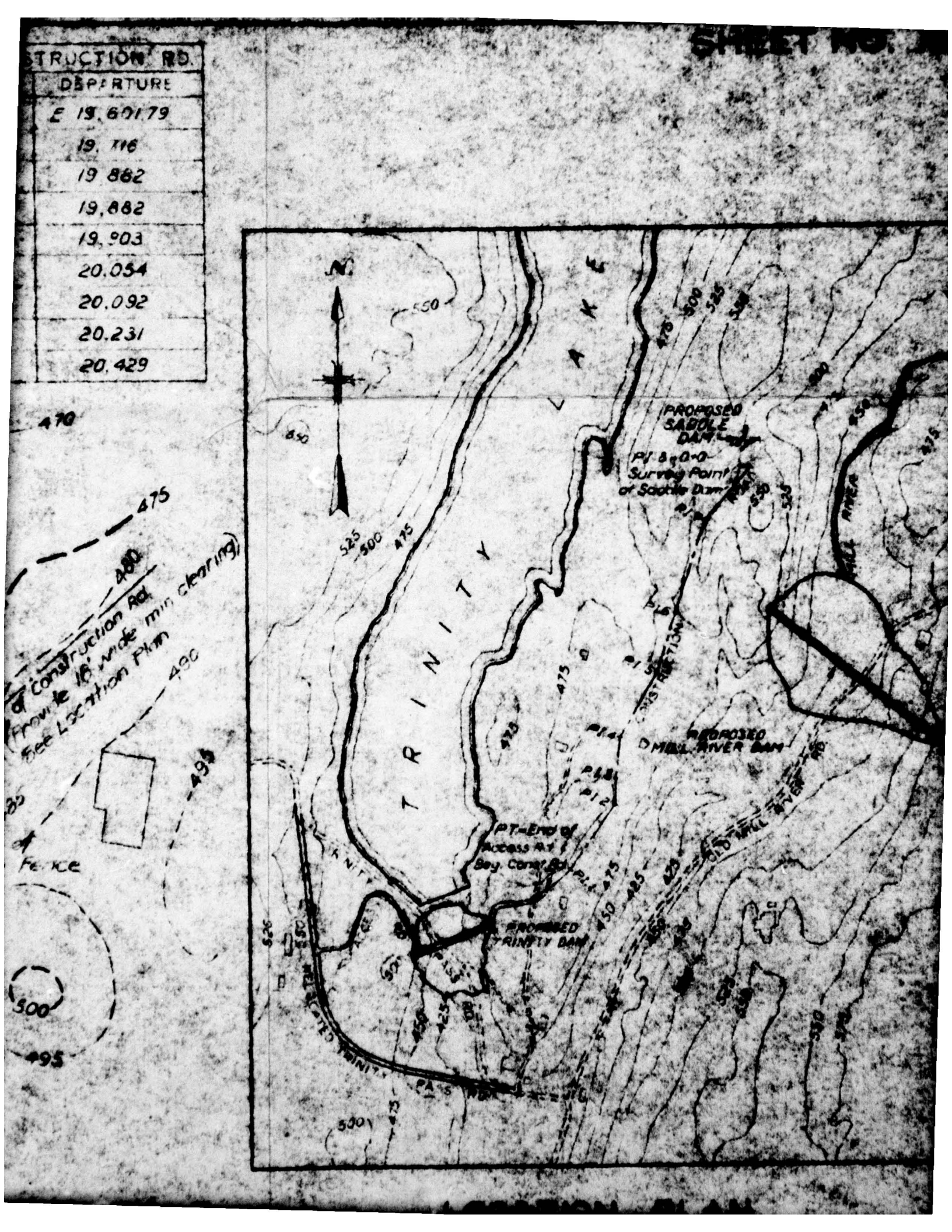
SECTION 2-2

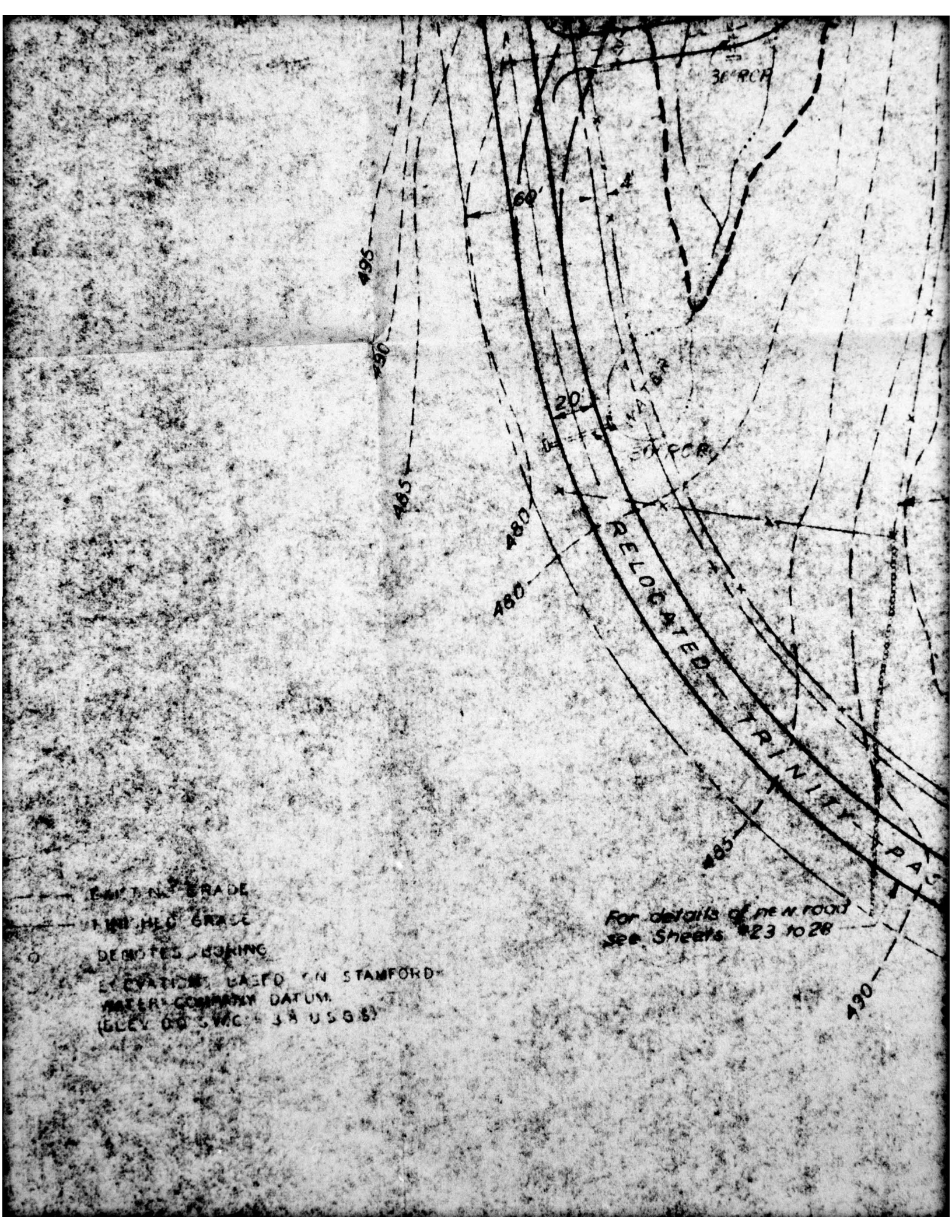
THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

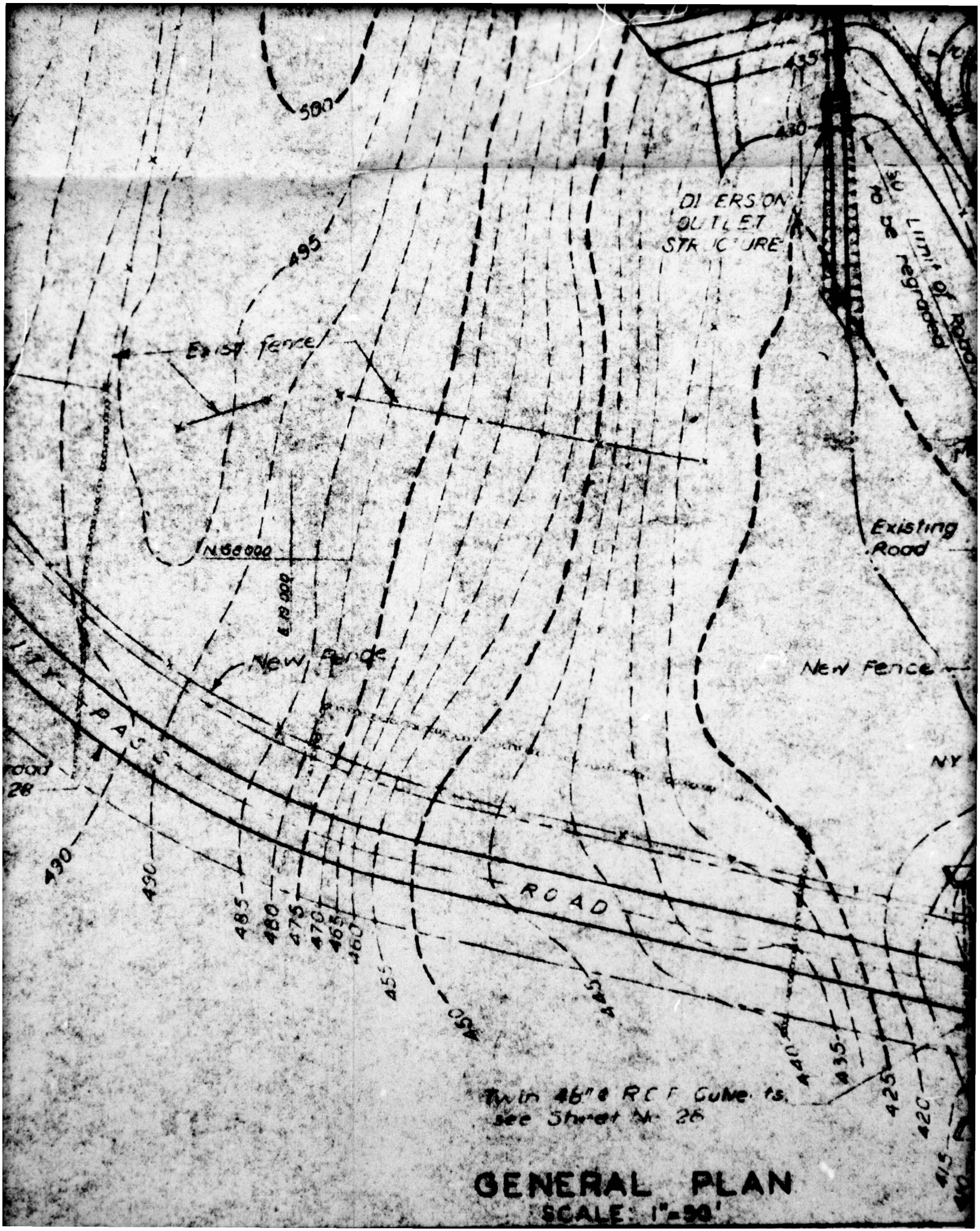

500
485
480
475
470
465
460
455
450
445
440
435
495
490
18" RCP
Catch Basin
see Sheet No 21
Ditch as directed
TRINITY
TEMPORARY
ROAD
ACCESS RD TO DAM
For Detail See Sht #24
Ditch to
Reservoir
as directed
WATER
6" DIP
30" RCP


N
TRINITY
LAKE
430
425
435
440
445
450
6' Channel to be cut through Existing Dam after New Dam is built.
PASS
ROAD
Dam
Intake
Feet
Sta. 0+00
N 30 313 15
E 19 089 92


COORDINATES OF PT'S ON CONSTRUCTION RD.
STATION | LATITUDE | DEPARTURE
PT - End of Access Rd & Beginning of Constr. Rd | N 58,521.35 | E 19,601.79
P I 1 | 58,629 | 19,716
P I 2 | 58,867 | 19,882
P.I. 3 | 58,976 | 19,882
P I 4 | 59,118 | 19,903
P I 5 | 59,377 | 20,054
P I 6 | 59,533 | 20,092
P I 7 | 59,938 | 20,231
P.I.S.-C.O Survey Point of Saddle Dam | 60,165 | 20,429
End of Access Road
Beginning of Construction Rd.
End of Construction Rd. (Provide 16' wide min. clearing) See Location Plan
Overflow & Intake Structure
Gate
N 58500
E 19500
Limit of New Fence
N
TRINI
455
460
465
470
475
480
485
490
495
500
525
550

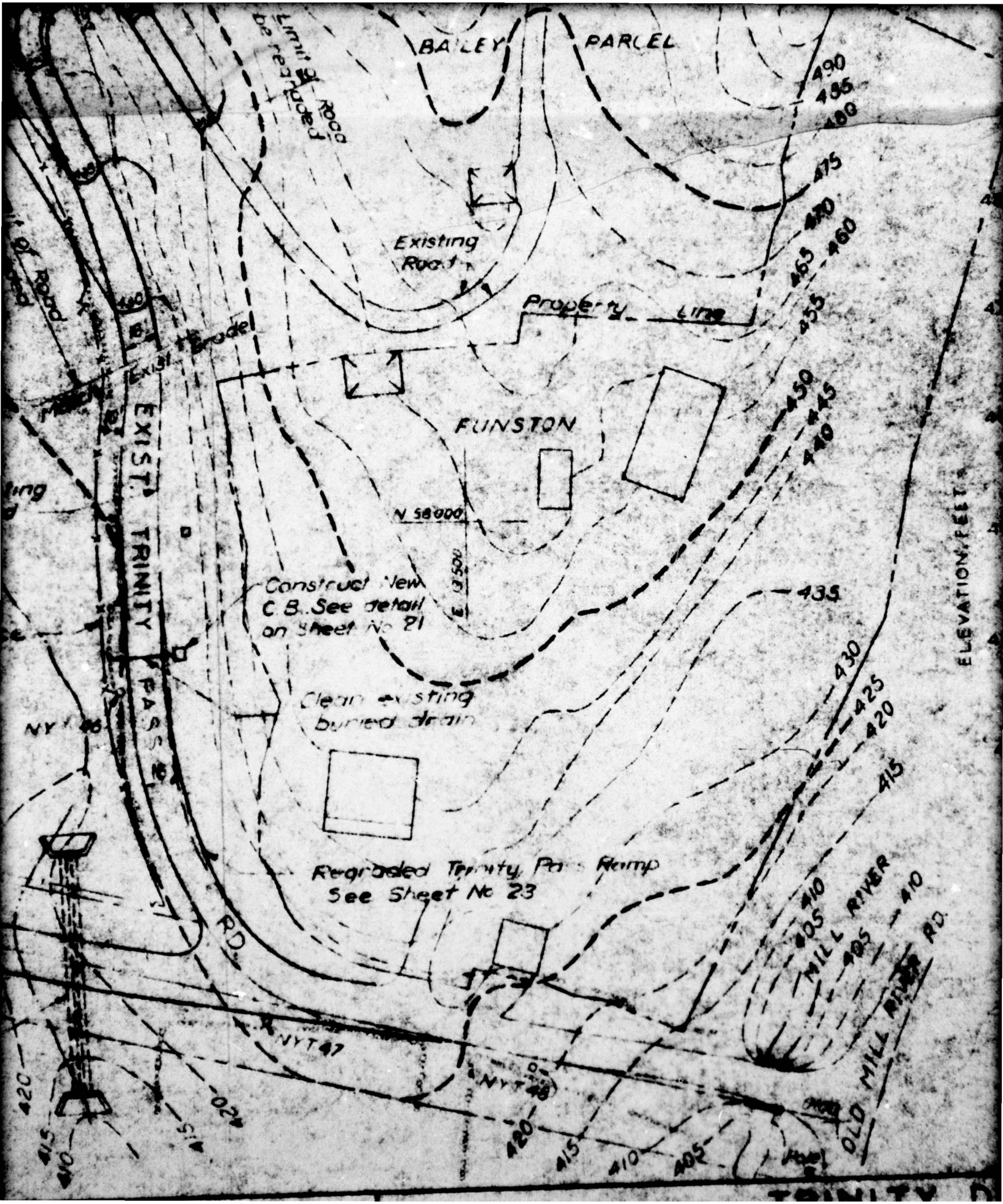

STRUCTION RD.
DEPARTURE
E 19,601.79
19,716
19,862
19,882
19,903
20,054
20,092
20,231
20,429
SHEET NO.
N.
TRINITY
LAKE
PROPOSED SADDLE DAM
Pt 8 of 0-0 Survey Point of Saddle Dam
PROPOSED MILL RIVER DAM
PT-End of Access Rd. to Bay Const. Rd.
PROPOSED TRINITY DAM
OLD MILL
RELOCATED TRINITY
Fence
of Construction Rd.
From 16' wide min. clearing)
See Location Plan
470
475
480
490
495
500
525
550
575
600
625
650

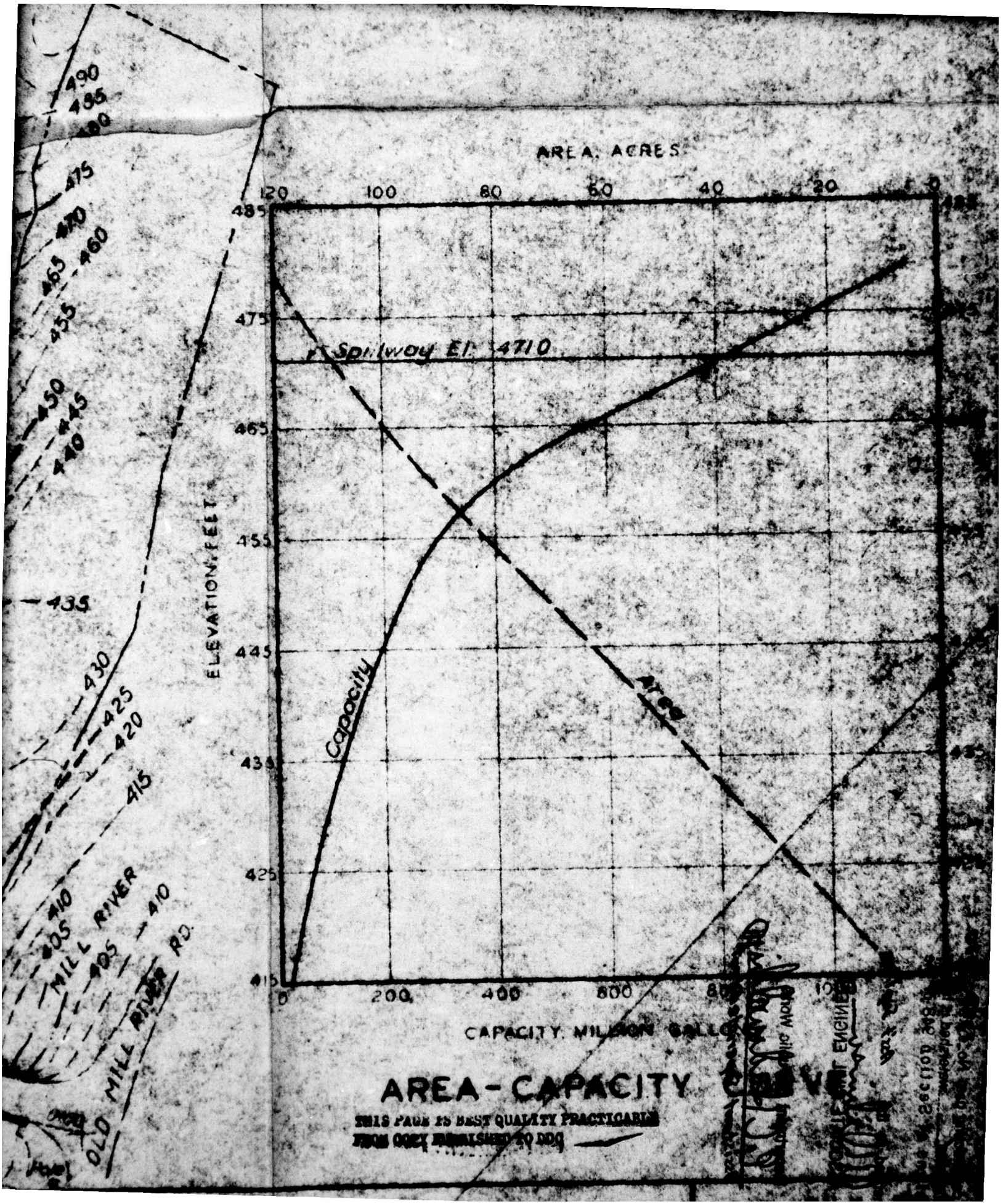

36" RCP
60'
4
495
490
20'
54" RCP
485
480
480
RELOCATED TRINITY PAS
485
490
For details of new road
see Sheets #23 to 28
DENOTES BORING
EXCAVATION BASED ON STAMFORD
WATER COMPANY DATUM
(ELEV. 00 S.W.C. = 38 U.S.G.S.)



GENERAL PLAN

SCALE: 1"=50'

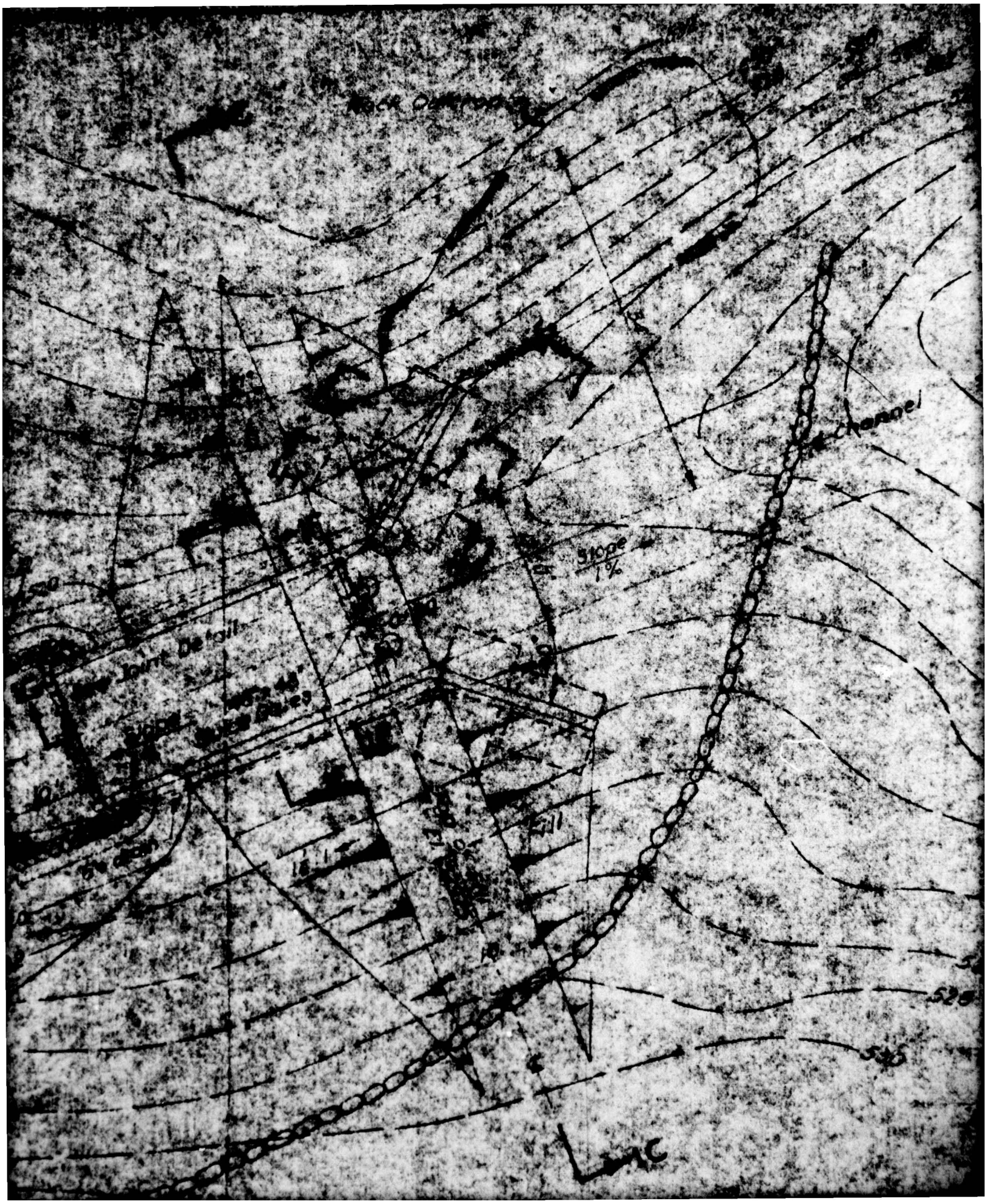

BAILEY PARCEL
Limit of Road to be regraded
Existing Road
Property Line
FUNSTON
N 58000
E 3500
Construct new C.B. See detail on Sheet No 21
Clean existing buried drain
Regraded Trinity Pass Ramp See Sheet No 23
EXIST. TRINITY PASS RD.
MILL RIVER
OLD MILL RIVER RD.
NYT 46
NYT 47
NYT 48
ELEVATION, FEET
490
485
480
475
470
465
460
455
450
445
440
435
430
425
420
415
410
405

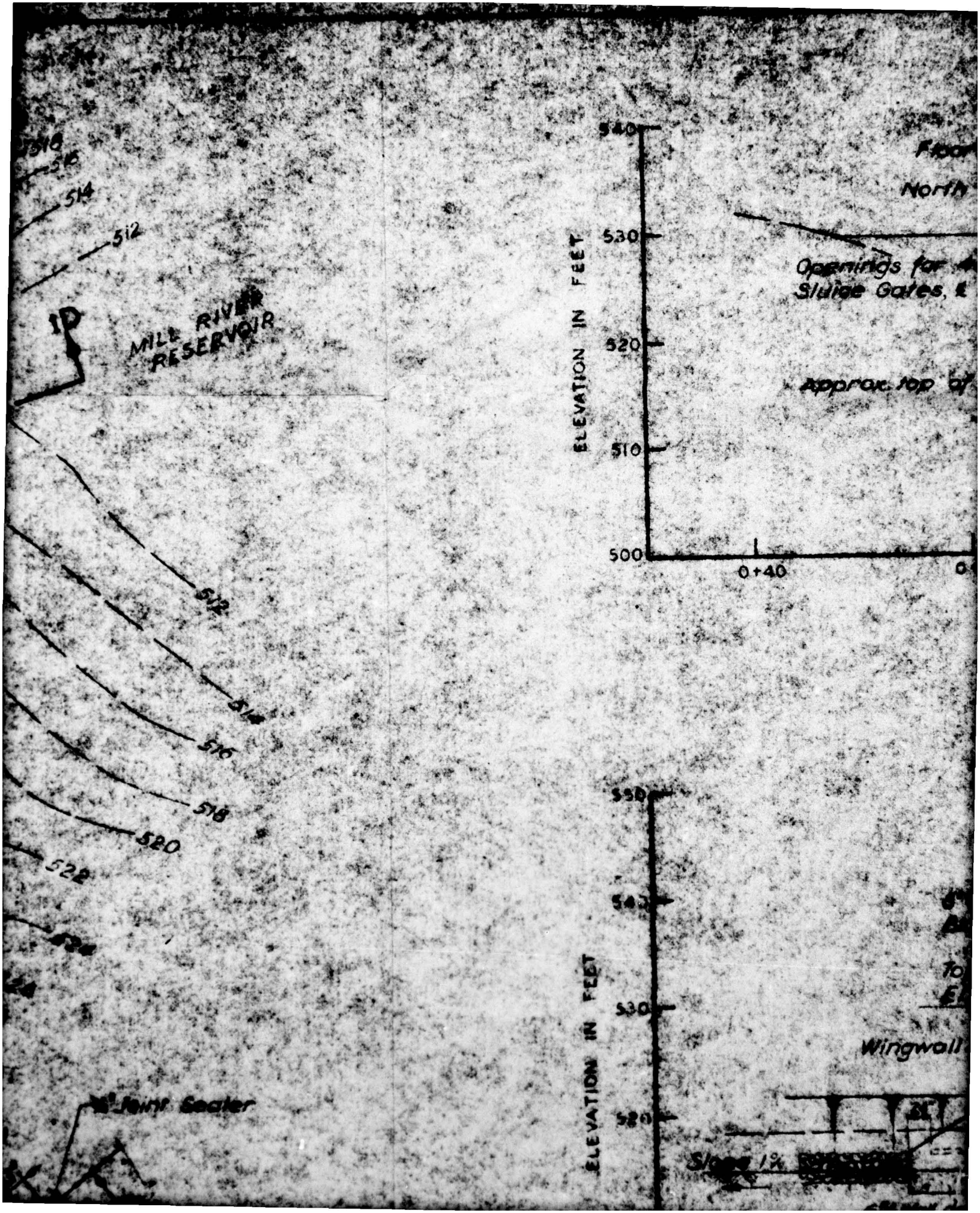


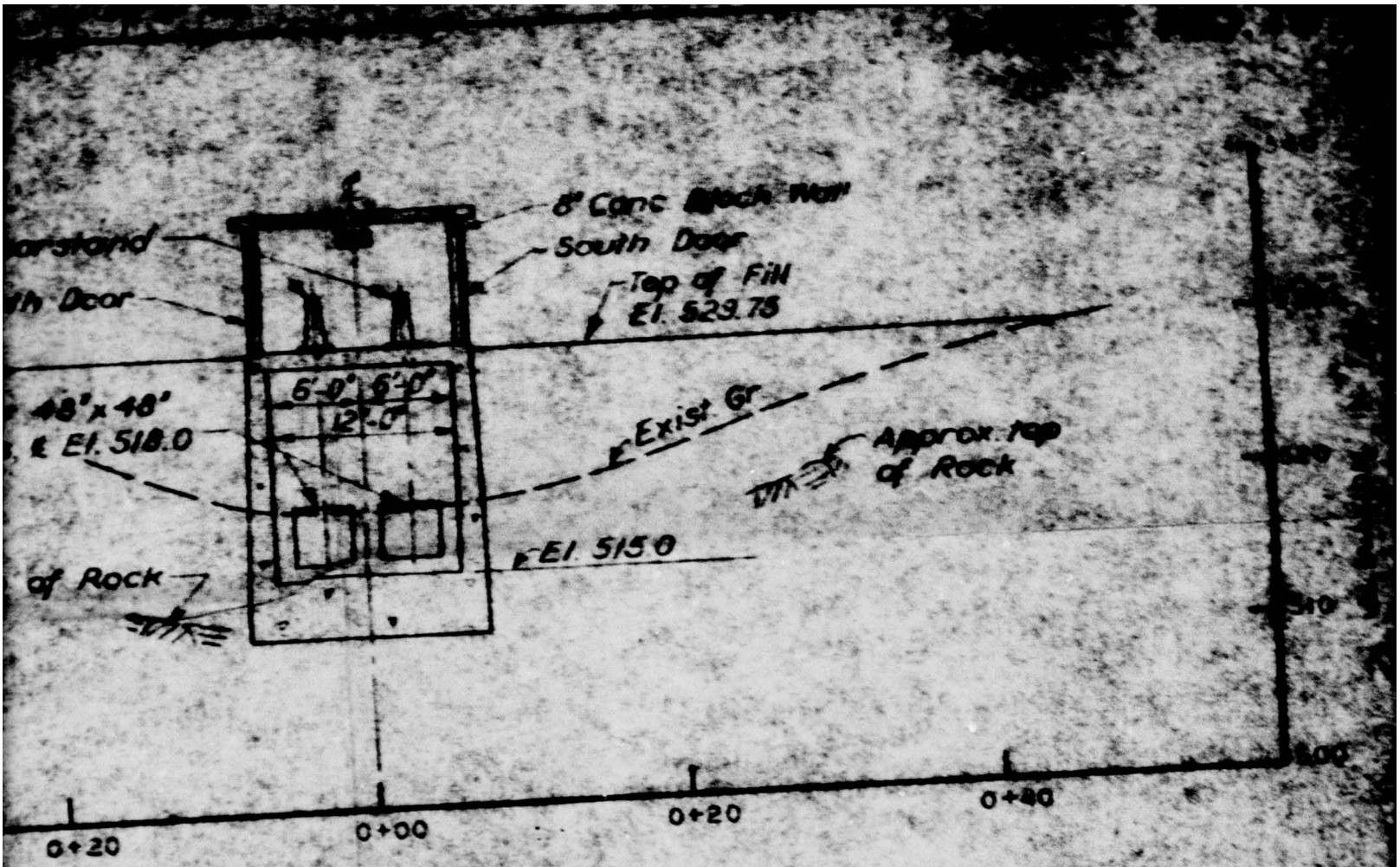
AREA-CAPACITY CURVES

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

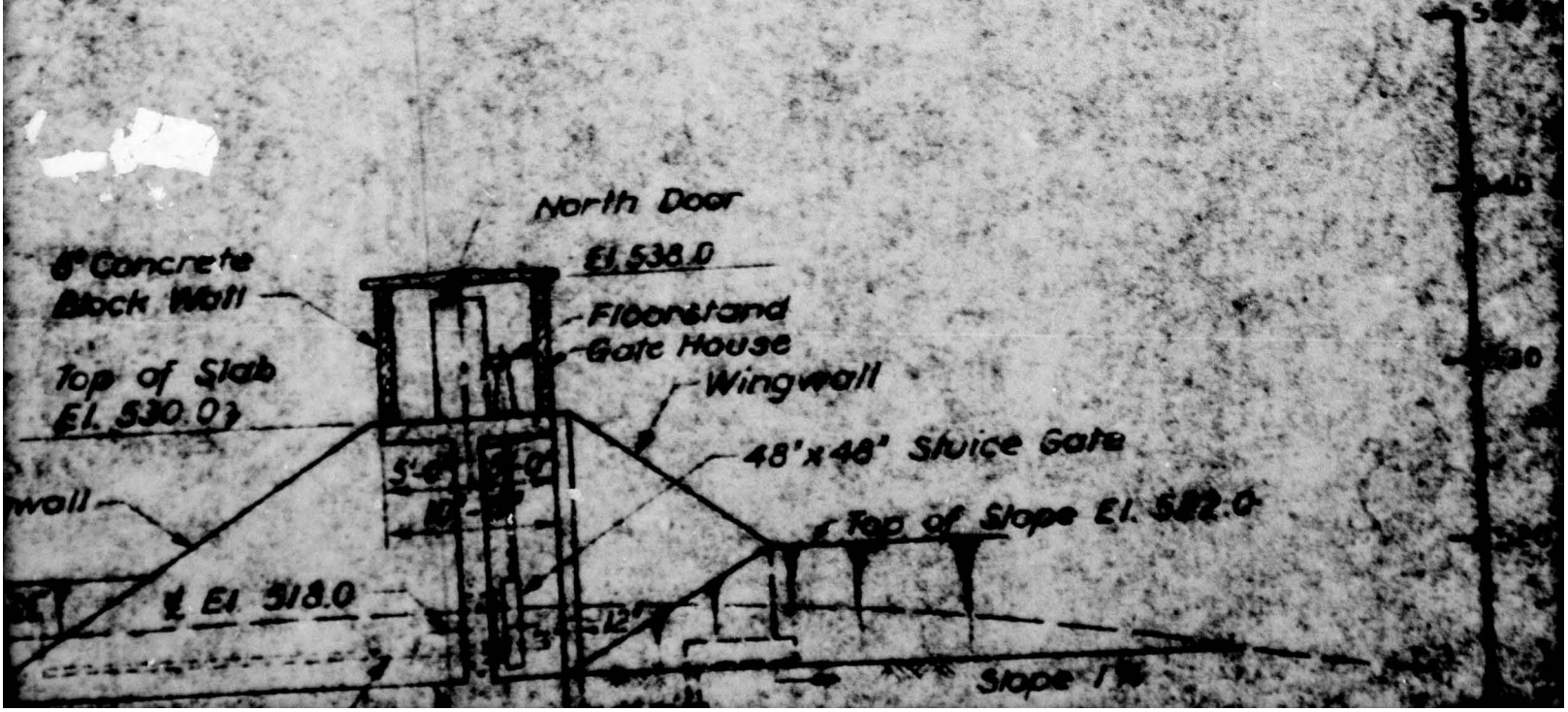

N.
TO TRINITY RESERVOIR
510
512
514
516
518
520
522
524

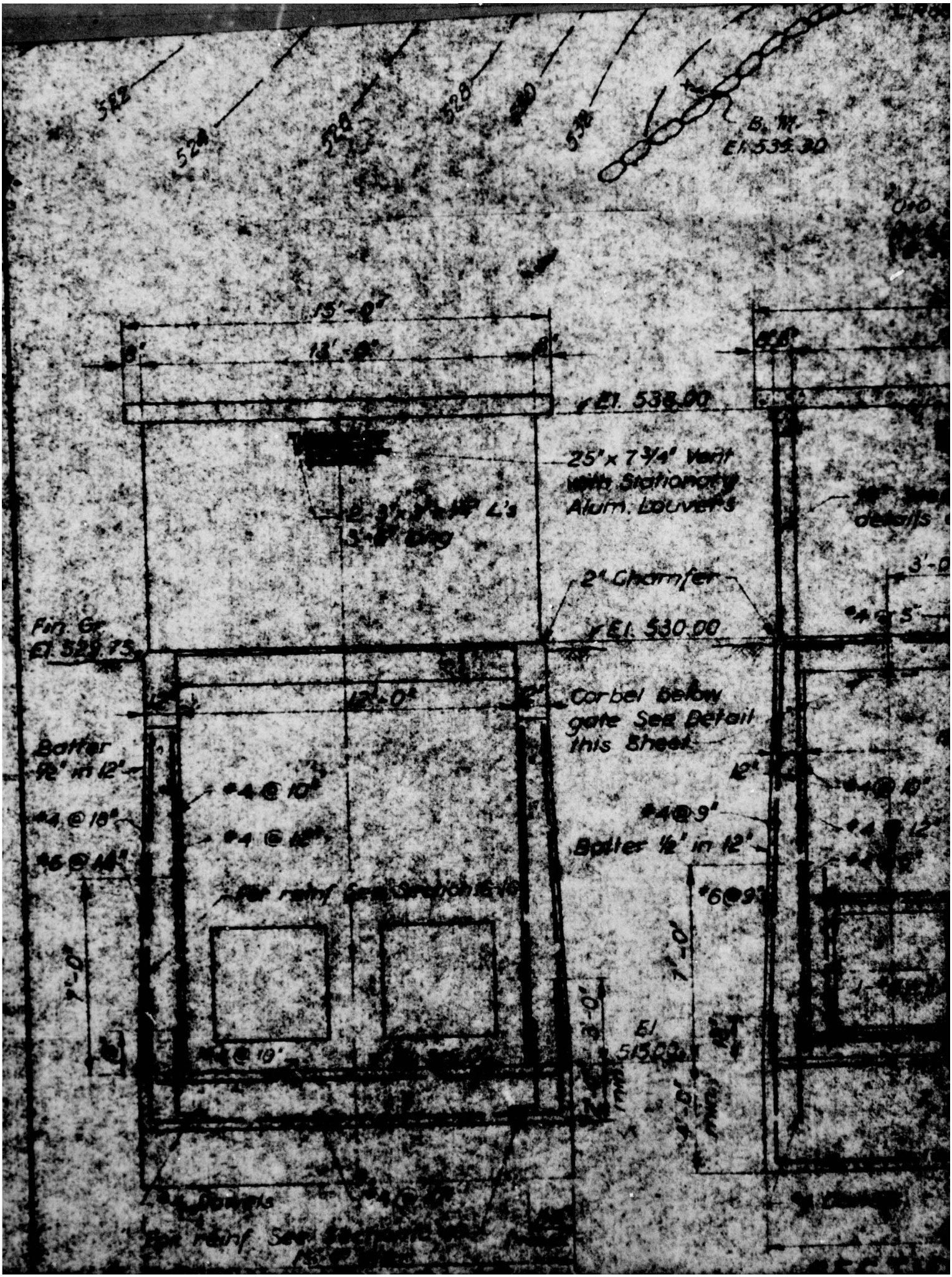

Rock Outcrop
Channel
Slope
1%
Joint Detail
Fill
525
525
Line

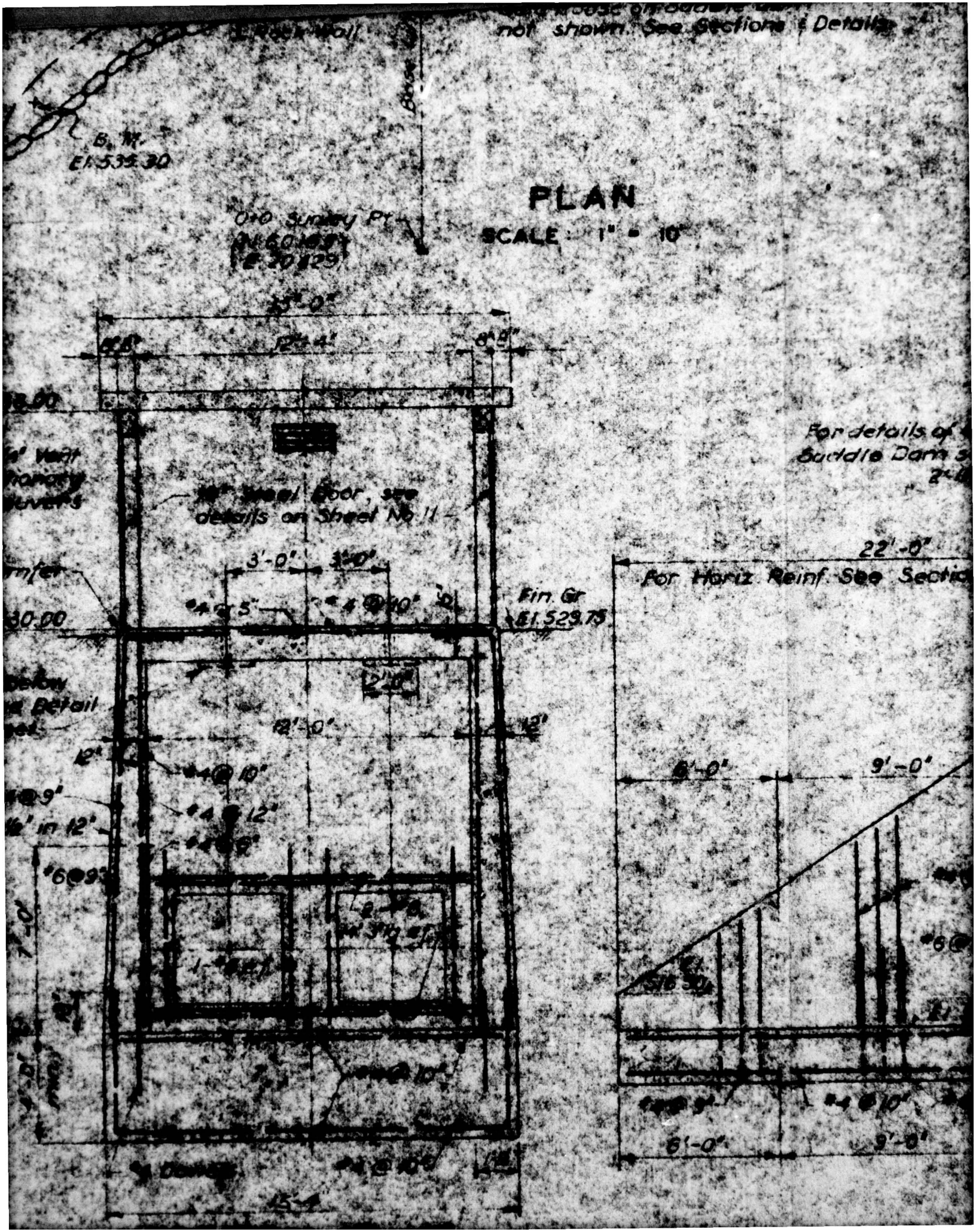

516
514
512
MILL RIVER RESERVOIR
512
514
516
518
520
522
540
530
520
510
500
ELEVATION IN FEET
0+40
Floor
North
Openings for
Sluice Gates,
Approx. top of
550
540
530
520
ELEVATION IN FEET
Wingwall
Slope 1%
Joint Sealer

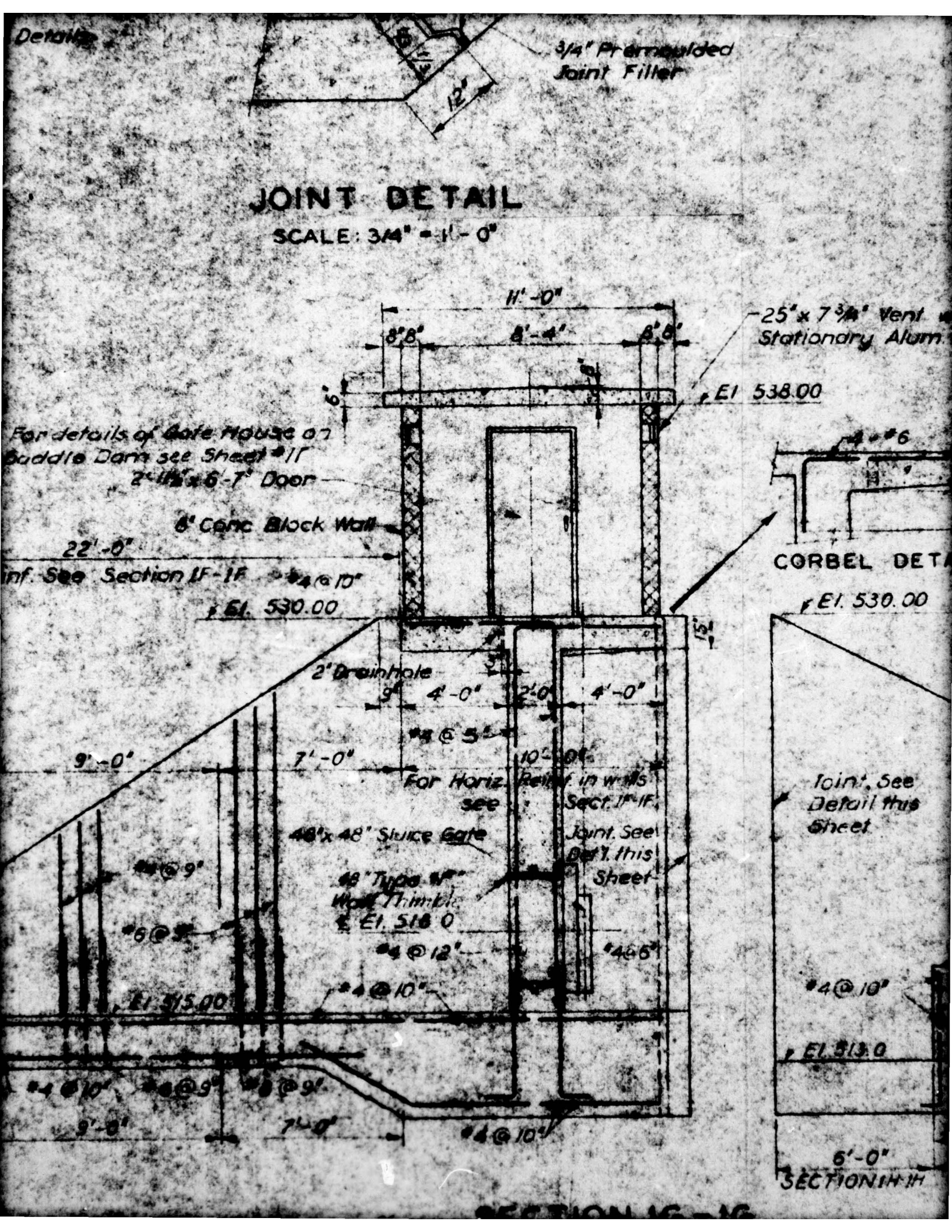


SECTION 1C -1C
SCALE: 1"=10'




B. M.
El. 535.30
15'-0"
13'-0"
El. 538.00
25" x 7 3/4" Vent
with Stationary
Alum. Louvers
2" Chamfer
El. 530.00
Fin. Gr.
El. 529.75
12'-0"
Corbel below
gate See Detail
this Sheet
Batter
1/2" in 12"
#4 @ 10"
#4 @ 12"
#6 @ 11"
#4 @ 9"
Batter 1/2" in 12"
#6 @ 9"
#4 @ 10"
#4 @ 12"
El
515.00


not shown. See Sections & Details
B. M.
El. 535.30
PLAN
SCALE: 1" = 10"
O+0 Survey Pt
N 60 W
E 30 E 29
35'-0"
12'-4"
8'-8"
Fin. Gr
El. 529.75
3'-0"
3'-0"
#4 @ 5"
#4 @ 10"
12'-0"
#4 @ 10"
#4 @ 12"
#6 @ 9"
45'-4"
For details of
Buddle Dam
22'-0"
For Horiz. Reinf. See Section
6'-0"
9'-0"
#4 @ 10"


Details
3/4" Premoulded Joint Filler
12"
JOINT DETAIL
SCALE: 3/4" = 1'-0"
11'-0"
8'-8"
8'-4"
8'-8"
6"
25" x 7 3/4" Vent
Stationary Alum
El 538.00
For details of Gate House on Saddle Dam see Sheet #11
2'-11 1/2" x 6'-7" Door
8" Conc Block Wall
22'-0"
Inf. See Section 1F-1F
#4 @ 10"
El. 530.00
2" Drainhole
3"
4'-0"
2'-0"
4'-0"
#4 @ 5"
9'-0"
7'-0"
For Horiz. see
48" x 48" Sluice Gate
48" Type M Wall Thimble
El. 518.0
#4 @ 9"
#6 @ 5"
#4 @ 12"
#4 @ 10"
El. 515.00
#4 @ 10"
#4 @ 9"
#3 @ 9"
9'-0"
7'-0"
#4 @ 10"
15'
10'-0"
Relief in walls
Sect. 1F-1F.
Joint. See Det'l. this Sheet
#4 @ 6"
CORBEL DETA
El. 530.00
Joint. See Detail this Sheet
#4 @ 10"
El. 513.0
6'-0"
SECTION 1H-1H

Top of Slab. El. 515.0

500

SECTION 1D-1D

SCALE: 1"=10'

6" x 7¾" Vent with
Stationary Alum Louvers

8.00

2" Chamfer

4-#6

CORBEL DETAIL

El. 530.00

Joint, See
Detail this
Sheet

El. 522.50

#4@10"

El. 515.0

#4@10"

El. 513.0

#4@10"

18"

6'-0"

9'-0"

SECTION H-H

SECTION J-J

15"

Batter ½

#6@8"

#4@10"

Varies - See Section 1C-1C

#4@10"

2'-0"
min.

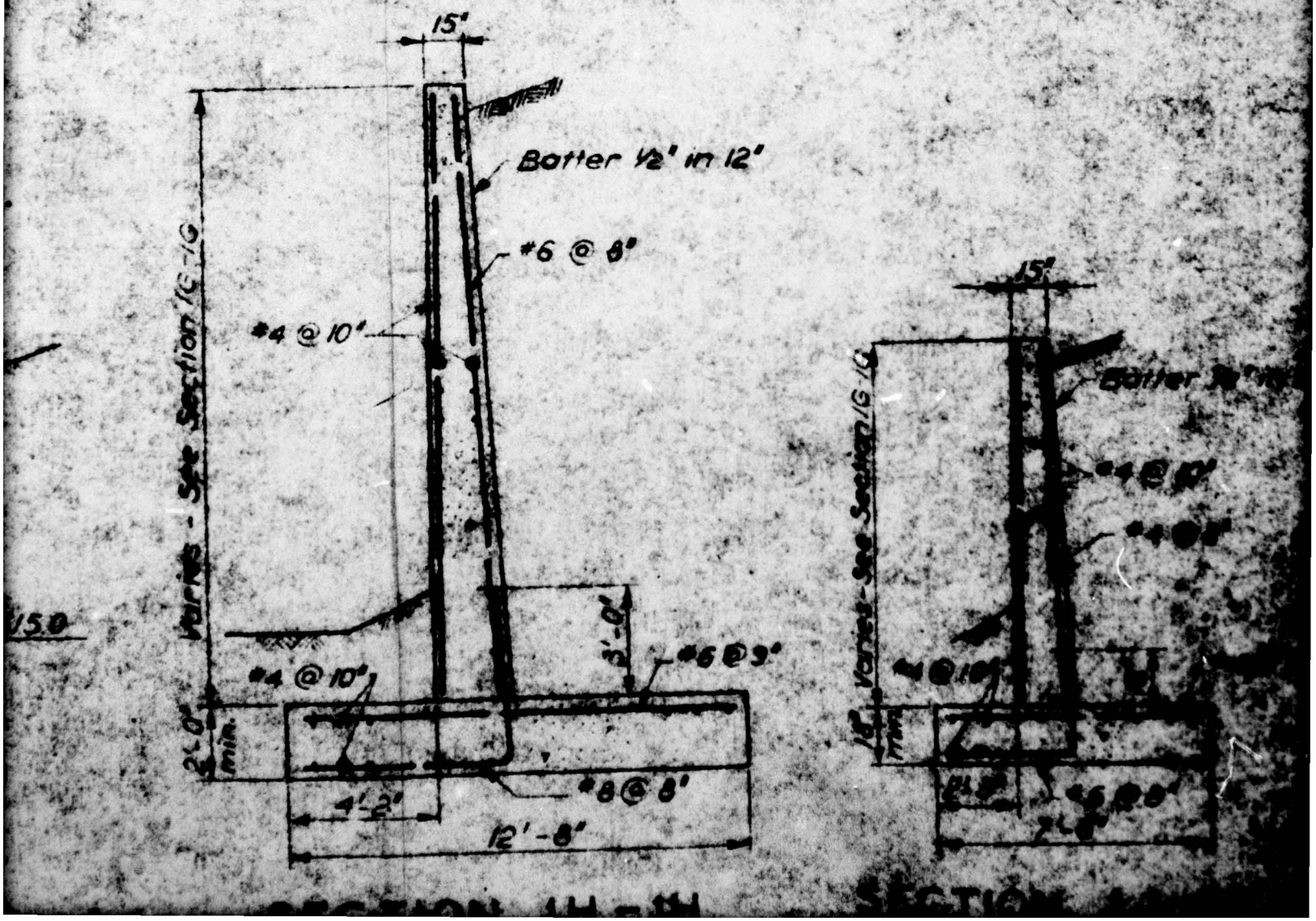
4'-2"

12'-8"

SECTION 1D-1D

SCALE: 1"=10'

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC



SECTION 1H-1H

SECTION