

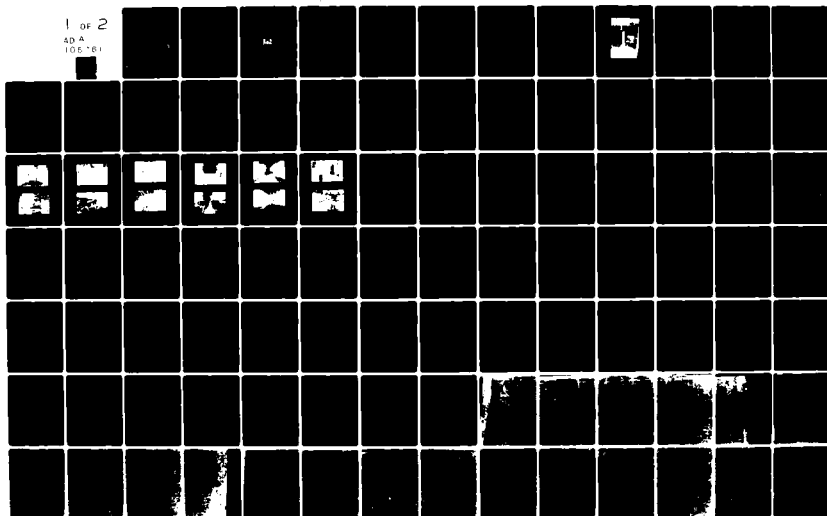
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NATIONAL DAM SAFETY PROGRAM. MEAD RESERVOIR DAM (INVENTORY NUMB--ETC(U)
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report provides information and analysis 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. Visual inspection of this dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further engineering investigations.		

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An area of concentrated seepage was noted at the downstream toe of the embankment. This area was approximately in line with the concrete gate house. Seepage was emerging at a rate estimated to be 10 to 20 gallons per minute. While only one area of concentrated seepage was noted, the entire area beyond the downstream toe was wet and swampy. Water was flowing out of the hillside in several areas immediately downstream of the embankment- right abutment contact.

The structural stability analysis performed for the spillway section indicates that safety factors are below recommended values for all conditions studied. The sliding safety factors for severe loading conditions such as ice loading or flood flows indicate that the section would be unstable if subjected to these loads.

It is recommended that within 3 months of the date of notification of the owner, investigations into the seepage and structural stability problems should be commenced. Remedial measures which are required based on these investigations should be completed within 18 months.

The hydrologic/hydraulic analyses performed indicate that the outflows from all storms exceeding 54% of the Probable Maximum Flood (PMF) will result in flow over the emergency relief weir segment of the embankment. The dam does have sufficient spillway capacity to pass one-half the PMF without the embankment being overtopped. Therefore, the spillway capacity is rated as inadequate.

**LAKE CHAMPLAIN BASIN
MEAD RESERVOIR DAM
CLINTON COUNTY, NEW YORK
INVENTORY NO. N.Y. 237
PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**



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**NEW YORK DISTRICT CORPS OF ENGINEERS
AUGUST, 1981**

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PREFACE

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

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

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

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

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
MEAD RESERVOIR DAM
I.D. NO. NY-237
DEC NO. 218B-236
LAKE CHAMPLAIN BASIN
CLINTON COUNTY, NEW YORK

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Mead Reservoir Dam (I.D. No. NY-237)
State Located:	New York
County:	Clinton
Watershed:	Lake Champlain Basin
Stream:	Mead Brook
Date of Inspection:	June 16, 1981

ASSESSMENT

Visual inspection of this dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further engineering investigations.

An area of concentrated seepage was noted at the downstream toe of the embankment. This area was approximately in line with the concrete gate house. Seepage was emerging at a rate estimated to be 10 to 20 gallons per minute. While only one area of concentrated seepage was noted, the entire area beyond the downstream toe was wet and swampy. Water was flowing out of the hillside in several areas immediately downstream of the embankment- right abutment contact.

The structural stability analysis performed for the spillway section indicates that safety factors are below recommended values for all conditions studied. The sliding safety factors for severe loading conditions such as ice loading or flood flows indicate that the section would be unstable if subjected to these loads.

It is recommended that within 3 months of the date of notification of the owner, investigations into the seepage and structural stability problems should be commenced. Remedial measures which are required based on these investigations should be completed within 18 months.

The hydrologic/hydraulic analyses performed indicate that the outflows from all storms exceeding 54% of the Probable Maximum Flood (PMF) will result in flow over the emergency relief weir segment of the embankment. The dam does have sufficient spillway capacity to pass one-half the PMF without the embankment being overtopped. Therefore, the spillway capacity is rated as inadequate.

Several other deficiencies were noted on this structure. These deficiencies should be corrected within 12 months of the date of notification of the owner. Among the actions required are the following:

1. All trees and brush growing on the dam should be cut to permit a more detailed visual inspection of the embankment.
2. The minor leakage through the upper portion of the spillway gravity section should be eliminated.
3. Grass and weeds growing through the joints between concrete slabs on the spillway discharge exit channel should be removed.
4. The joints between the slabs on the exit channel should be sealed to stop the flow of water beneath the slabs.
5. Debris and sediment in the lower plunge pool should be removed and brush and trees growing immediately downstream of the end of the plunge pool should be cut.
6. An emergency action plan for the notification and evacuation of downstream resident should be developed.

George Koch

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Approved By:

W.M. Smith, Jr.

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

Date:

26 Aug 81



OVERVIEW
MEAD RESERVOIR DAM
I.D. NO. NY 237

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
MEAD RESERVOIR DAM
I.D. NO. NY-237
DEC NO. 218B-236
LAKE CHAMPLAIN BASIN
CLINTON COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-237.

b. Purpose of Inspection

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

1.2 DESCRIPTION OF PROJECT

a. Description of Dam

The Mead Reservoir Dam is an earth dam with a concrete core wall. The dam has a concrete gravity overflow spillway section and two low level outlet pipes.

The dam is 673 feet long and a maximum of 65 feet high. The crest width is 12 feet. The upper portion of the upstream slope is 1 vertical on 2 horizontal. The lower portion of this slope is 1 vertical on 3 horizontal. The downstream slope varies from 1 vertical on 1.5 horizontal near the top of the slope to 1 vertical on 3 horizontal at the bottom. On the higher embankment section, there is an 8 foot wide berm near the middle of the downstream slope.

A concrete core wall extends from the spillway section to 75 feet from the right end of the dam. The plans indicate that there is no core wall to the left of the spillway section. The core wall is about 18 inches wide at the base and tapers to 8 inches wide at the top. It is supported on a spread footing located a minimum of 4 feet into natural ground. One 30 foot long segment of the core wall near the spillway section is supported on sheet piling.

The spillway is a 20 foot high, Cyclopean concrete overflow section which is 40 feet long. At the downstream toe of the

gravity section, there is a 20 foot long plunge pool for energy dissipation. A 2 foot wide drainage channel extends from the downstream end of the plunge pool to a point on the outlet channel. This drainage channel is 66 feet long and a maximum of 8 feet deep. The spillway channel below the plunge pool proceeds down the natural slope. The channel is paved with concrete slabs for erosion protection. These slabs are placed on the slope of a trapezoidal cut to form the left side of the spillway channel. The plans indicate that there is an under-drain running down the entire slope beneath these slabs. The right side of the channel is formed by a reinforced concrete retaining wall.

There is another plunge pool at the base of the channel. A vertical concrete wall which is 5 feet high forms the downstream end of this plunge pool. There is a conduit which extends from the right wall in the lower plunge pool to the natural stream channel (a total of about 80 feet). This conduit drains the lower plunge pool during low flows.

There is a circular concrete gatehouse located on the crest of the dam to the right of the spillway section. This gatehouse contains the control mechanisms for three inlet pipes and two low level outlet pipes. There are two 20 inch pipes and one 24 inch pipe, each with a different invert elevation. The intakes to these pipes are concrete structures located in the reservoir. The two outlet pipes are a 24 inch pipe which is the main water supply line and another 24 inch pipe leading to a 42 inch concrete blow-off pipe. This 42 inch pipe extends for 175 feet to a headwall just beyond the downstream toe of the dam and outlets into the natural stream channel. There is a concrete box outlet structure at the end of this conduit.

There is an 18 inch conduit which enters the reservoir beyond the right end of the embankment. This pipe permits the diversion of water from the Saranac River into this reservoir.

b. Location

This dam is located off Rand Hill Road in the Town of Plattsburgh, New York. It is about 1 mile north-west of the intersection of Rand Hill Road and New York State Route 3 in the hamlet of West Plattsburgh.

c. Size Classification

This dam is 65 feet high and has a storage capacity of 2827 acre-feet. Therefore, the dam is in the intermediate size category as defined by the "Recommended Guidelines for Safety Inspection of Dams."

d. Hazard Classification

This dam is classified as a high hazard structure due to the presence of two state highway (NY Rte 374 and NY Rte 3) and five homes adjacent to the stream channel downstream of the dam.

e. Ownership

This dam is owned by the City of Plattsburgh, New York. Mr. George M. Miller is the City Engineer. His address is City Hall, Plattsburgh, New York 12901. His phone number is (518-563-7730.)

f. Purpose of Dam

This dam impounds a reservoir used for water supply by the City of Plattsburgh.

g. Design and Construction History

Available correspondence indicates that a dam has existed at this site since the mid-1800's. The original structure was a timber crib dam which partially failed in the early 1900's. This crib dam was completely removed and the dam which presently exists was constructed in 1923. The dam was designed by Metcalf and Eddy, Consulting Engineers of Boston, Massachusetts.

h. Normal Operating Procedures

There are no prescribed operating procedures for this structure. Water is withdrawn from the reservoir as required for water supply.

1.3

PERTINENT DATA

<u>a. Drainage Area (sq. mi.)</u>	6.39
<u>b. Discharge at Dam (cfs)</u>	
Spillway at Maximum High Water	2827
24" Blow-off Pipe (water level at spillway crest)	101
<u>c. Elevation (USGS Datum)*</u>	
Top of Dam	541.5
Crest of Emergency Relief Weir, (Embankment Section)	540.5
Spillway Crest	533.0
Invert of Bottom Low Level Inlet	465.0
* (USGS Datum= Plan Datum + 16.5)	
<u>d. Reservoir - Surface Area (acres)</u>	
Top of Dam (Emergency Relief Weir Crest)	105
Spillway Crest	74
<u>e. Storage Capacity (acre-feet)</u>	
Top of Dam (Emergency Relief Weir Crest)	1895
Spillway Crest	1228

f. Embankment

Type: Compacted zoned earth embankment with concrete core wall; most impervious soil in section surrounding core wall; stone fill segments at both upstream and downstream toe.

Embankment Length (ft)	550
Slopes (V:H) Upstream- Upper Slope	1 on 2
Lower Slope	1 on 3

Downstream- Varies from 1 on 1.5 to 1 on 3
(8 ft. Wide berm on higher section)

Crest Width (ft)	12
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g. Corewall

Type: Concrete wall with spread footing buried in existing ground; one 30 ft. long segment supported on sheet piles.

Length: (ft) (from left end of spillway to 75 feet from right end of dam)	370
--	-----

Width (in.) Crest	8
Base	18

h. Spillway

Type: Ungated Cyclopean concrete overflow section, with plunge pool at toe of gravity section, paved channel down the natural slope, and plunge pool at toe of slope. A conduit drain extends from lower plunge pool over to natural stream channel.

Length of Weir (ft)	40
---------------------	----

i. Low Level Inlets/Outlets

(1) Inlets - Two 20 inch pipes and one 24 inch pipe each with a different invert elevation lead from the reservoir to the gatehouse; there is a concrete intake structure in the reservoir for each pipe; flow through each pipe is controlled by valves in the gatehouse

(2) Outlets - Two 24 inch pipes; flow controlled by valves in the gatehouse; one pipe is the main water supply line while the other leads to a 42 inch concrete blow-off pipe; 42 inch conduit is 175 feet long and outlets through a concrete box structure.

j. Appurtenant Structures

(1) Gatehouse - Circular concrete structure located on crest of dam; contains control mechanisms for valves on all the inlet and outlet pipes; another 8 inch diameter pipe leads from sump in gatehouse to the 42 inch pipe; this pipe can drain the gatehouse.

(2) Diversion Inlet - 18 inch pipe outleting at a concrete headwall beyond right end of embankment; pipe allows diversion of water from Saranac River into the reservoir.

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Mead Reservoir Dam is located in the Champlain lowlands physiographic province of New York State. The Champlain Lake Plain is a low, relatively flat area underlain with marine clays and limestone. Drift deposits and peak bogs are common in the northeast portion of the plain. Bedrock in the area is from the Ordovician era (435 to 500 million years ago). A review of the "Brittle Structures Map of New York" indicates that there is a normal fault which runs through the reservoir, approximately 1500 feet to the west of the dam.

Surficial soils in the area are the result of glaciations during the Cenozoic Era, the last of which was the Wisconsin glaciation.

b. Subsurface Investigations

There was some subsurface information available for this dam. Logs from 11 test pits were shown on the 1923 plans. These logs indicated that the foundation consists of muck and loam underlain by clay. At the right end of the dam, there was up to 30 feet of sand overlying the clay.

2.2 DESIGN RECORDS

The present dam was designed by Metcalf and Eddy, Consulting Engineers of Boston, Massachusetts. A complete set of plans as well as other design information is available at the City Engineer's office in Plattsburgh. Selected sheets from these plans have been included in Appendix F.

2.3 CONSTRUCTION RECORDS

The dam was constructed in 1923 by the Bluff Point Stone Company. Metcalf and Eddy performed the construction inspection. The available plans are record plans and therefore, represent the as-built condition of the structure.

2.4 OPERATION RECORDS

No operation records are maintained on this structure.

2.5 EVALUATION OF DATA

Information used for the preparation of this report was obtained from the Department of Environmental Conservation files and from the City of Plattsburgh's files. The information available appeared to present reasonably accurate data concerning the structure.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Mead Reservoir Dam was conducted on June 16, 1981. The weather was sunny with the temperature in the eighties. The water level at the time of the inspection was about 6 inches below the spillway crest.

b. Embankment

Visual inspection was hampered by trees, brush and weeds growing on the embankment. The problem was most severe on the lower portion of the downstream slope to the right of the spillway section. A bamboo-like weed completely covered this portion of the slope, making a close inspection impossible. Trees and brush covered the upper portion of this slope and most of the remainder of the embankment as well.

The crest of the embankment was slightly uneven with several minor irregularities noted. At the left end of the dam, the crest of the embankment slopes gradually downward. This segment of the embankment with a lower crest level is called an emergency relief weir on the plans.

Several deficiencies were noted on the downstream slope. The entire area along the downstream toe of the high embankment section (to the right of the spillway section) was wet and swampy. One area of concentrated clear seepage was noted at the toe of the slope approximately in line with the concrete gatehouse. Seepage was emerging at a rate estimated to be 10 to 20 gallons per minute and was forming a small pool of water beyond the toe. The City Engineer was aware of the existence of this seepage and stated that it had been occurring for a long period of time.

There was also water emerging at several points along the natural slope immediately downstream of the contact between the embankment and the right abutment. These points were all below the berm which is located near the middle of the downstream slope. Water was also flowing off the adjacent hillside and into the downstream channel near the concrete headwall at the end of the 42 inch blow-off pipe. It could not be determined whether these flows were the result of seepage through the dam or hillside groundwater.

c. Spillway

The spillway was in satisfactory condition. There were some small cracks in the abutment walls and some spalling on the downstream face of the gravity section. Minor leakage through the gravity section was also noted. This leakage was exiting about 2 feet below the spillway crest. There was some localized erosion on the upstream embankment slope for about 20 feet from the spillway's right abutment. This erosion was believed to be the result of wave action.

A small amount of water was flowing out of the concrete channel which drains the upper plunge pool. This water flowed over the concrete slabs which line the exit channel and then disappeared beneath the slabs. The water then reappeared approximately 50 feet downstream and flowed over the remainder of the slabs. There was grass and weeds growing through the joints between several of the slabs at the lower end of the channel. Some minor cracking was noted on the channel walls. The lower plunge pool was partially filled with sediment and debris. Brush and weeds were growing in this plunge pool as well. There was some debris around the inlet to the lower plunge pool drain conduit. A spring was observed bubbling up through the bottom of the lower plunge pool. This spring was probably related to the underdrain pipes beneath the spillway channel.

d. Low Level Inlets/Outlets

These pipes were unobservable at the time of inspection. The valves which control flow through these pipes are located in the gatehouse on the crest of the dam. These valves are reported to be operational. Mr. St. Clair of the Water and Sewer Department said that all of the valves were operated approximately one month before the Phase I inspection.

The concrete box outlet structure at the outlet end of the 42 inch conduit was visible at the downstream toe of the embankment. This outlet structure and the downstream pool appear to be in satisfactory condition. There was a small stream of water off the hillside which was flowing over the concrete structure and into the pool.

e. Appurtenant Structures - Gatehouse and Diversion Pipe

Both the gatehouse and diversion inlet pipe appeared to be in good condition. Some small cracks were noted in the gatehouse concrete walls.

f. Reservoir

There were no indications of soil instability in the reservoir area.

g. Downstream Channel

The channel below the outlet to the 42 inch blow-off pipe was covered with brush and trees. It was about 15 feet wide and had side slopes of 1 vertical on 1 horizontal.

3.2 EVALUATION OF OBSERVATIONS

Visual inspection revealed several deficiencies on this structure. The following items were noted:

1. Trees, brush and weeds covering most of the embankment, especially the lower portion of the downstream slope to the right of the spillway, making a detailed inspection impossible.

2. One area of concentrated seepage at the downstream toe of the slope approximately in line with the concrete gate house;
3. The overall wet and swampy conditions along the entire downstream toe of the higher embankment section;
4. Several points near the embankment - right abutment contact where water was emerging and flowing off the slope;
5. Minor leakage through the upper portion of the concrete spillway section;
6. Water flowing beneath the concrete slabs on the spillway discharge channel;
7. Grass and weeds growing through some of the joints between slabs on the exit channel;
8. Debris and sediment in the lower plunge pool.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no formal operating procedures for this dam. Water is withdrawn from the reservoir as required. Water can be diverted from the Saranac River into a small pond and then into Mead Reservoir by means of an 18 inch conduit which outlets through a concrete headwall located beyond the right end of the embankment.

4.2 MAINTENANCE OF DAM

Normal maintenance of the dam is performed by the City of Plattsburgh's Water and Sewer Department. The gates are operated regularly and minor repairs are performed as required.

4.3 WARNING SYSTEM IN EFFECT

No apparent warning system for evacuation of downstream residents is in effect.

4.4 EVALUATION

The operation procedures for this dam are satisfactory. Increased maintenance efforts are needed to repair the deficiencies noted in Section 3.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

Delineation of the watershed for this reservoir was made using the USGS 7.5 minute quadrangle sheets for Morrisonville and West Chazy, New York. The 6.39 square mile drainage area consists of forested lands. The City owns or controls much of the watershed. Relief in the drainage area ranges from steep (slopes of 12%-20%) in the upper reaches to moderate (4%-7.5%) in the vicinity of the reservoir. Hilltops within the watershed rise as much as 1000 feet above the normal reservoir level.

5.2 ANALYSIS CRITERIA

The analysis of the floodwater retarding capability of the dam was performed using the Corps of Engineers HEC-1 computer program, Dam Safety version. This program uses the Snyder Synthetic Unit hydrograph and the "Modified Puls" flood routing procedure. The spillway design flood selected for analysis was the Probable Maximum Flood (PMF) in accordance with the recommended guidelines of the U.S. Army Corps of Engineers. The PMF event is that hypothetical storm event resulting from the most critical combination of rainfall, minimum soil retention and direct runoff that is considered reasonably possible for a particular watershed.

5.3 SPILLWAY CAPACITY

The dam has an ungated spillway section. For the purposes of this analysis, it was assumed that there was no flow through the low level inlet/outlet pipes. The spillway is 40 feet long with concrete abutment walls at either end. The spillway was analyzed as a weir with a discharge coefficient C , which varied from 3.2 to 3.72. The effective length of the spillway was reduced to account for the turbulence caused by the abutments. The computed spillway capacity for the water surface at the top of the dam is 2827 cfs.

5.4 RESERVOIR CAPACITY

The normal water surface in the reservoir is at or near the spillway crest elevation. The impounded capacity for this elevation is 1228 acre-feet. Surge storage capacity between the spillway crest (elev. 533) and the top of the emergency relief weir (elev. 540.5) is 667 acre-feet which is equivalent to a direct runoff depth of 1.96 inches over the drainage area. The total storage capacity is 1895 acre-feet.

5.5 FLOODS OF RECORD

No information was available regarding the maximum known flood.

5.6 OVERTOPPING POTENTIAL

Analysis indicates that the dam does not have sufficient spillway capacity to adequately discharge the outflows from the PMF. For this storm, the peak inflow is 6580 cfs and the peak outflow is 6136 cfs. The analysis indicates that the emergency relief weir segment of the embankment would be overtopped by all storms exceeding 54% of the PMF. The higher main embankment section would be overtopped by all storms exceeding 67% of the PMF.

For one-half of the PMF, the peak outflow is 2606 cfs. The maximum water surface would be 0.42 feet below the crest of the emergency relief weir.

5.7 EVALUATION

The dam does not have sufficient spillway capacity to discharge the peak outflow from the PMF. The outflows from one-half the PMF will not result in the dam or the emergency relief weir segment being overtopped. Therefore, the spillway capacity of this dam is rated as inadequate.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual inspection of this structure revealed several deficiencies which affect the stability of this structure. Trees and brush covering most of the embankment hampered the inspection. The area along the entire downstream toe was wet and swampy. One area of concentrated seepage was noted. This seep was approximately in-line with the concrete gate house. Water was flowing out of the nearby hillside in several areas immediately downstream of the embankment - right abutment contact.

b. Data Review and Stability Evaluation

No design information concerning the stability of either the earth embankment section or the concrete spillway section was available. The construction plans included cross sections of both segments as well as limited foundation information.

A stability analysis of the spillway section was performed for this report in accordance with the "Recommended Guidelines for Safety Inspection of Dams". The results of the stability analysis are as follows:

<u>Case</u>	<u>Overturning Safety Factor</u>	<u>Resultant in Middle Third</u>	<u>Sliding Safety Factor</u>
a. Normal conditions, water surface at spillway crest	1.58	No	1.12
b. Case a. plus ice load of 5,000 lb/ft	1.14	No	0.81
c. 1/2 PMF Flow; Water surface 7.1 feet over spillway	1.16	No	0.65
d. Water surface at top of relief weir embankment section	1.14	No	0.64
e. Normal conditions with seismic coefficient of 0.10	1.52	No	0.82

These analyses indicate that the spillway section is marginally stable under normal conditions. The sliding safety factor for severe loading condition such as ice loading or flood flows falls below 1.0, indicating that the section would be unstable if subjected to these loads.

Further investigations are required to better assess the stability of the spillway section. Subsurface explorations and concrete cores are

required to obtain information about the structure, the foundation conditions, and the effectiveness of the cutoff wall beneath the spillway section. Stability analyses should then be performed using this data. Based on the results of these analyses, the need for and extent of modifications to the structure should be determined.

c. Seismic Stability

This structure is located in Seismic Zone 3. A seismic stability analysis was performed assuming a seismic coefficient of 0.1. The results of this analysis (shown on page 13) indicate that the safety factors against sliding are below 1.0 when seismic considerations are included. Therefore, when modifications to the structure are made, seismic stability criteria should also be met.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I inspection of the Mead Reservoir Dam revealed several deficiencies on the structure. One area of concentrated seepage was noted at the downstream toe of the embankment. In addition, the entire area beyond the downstream toe was wet and swampy. Water was flowing out of the hillside in several areas immediately downstream of the embankment -right abutment contact. Visual inspection was hampered by trees and brush which cover the entire embankment.

The structural stability analysis performed for the spillway section of this dam indicates that safety factors are below recommended values for all conditions studied. The sliding safety factor for severe loading conditions such as ice loading and flood flows indicates that the section would be unstable if subjected to these loads.

The dam does not have sufficient spillway capacity to pass the Probable Maximum Flood (PMF). The outflows from one-half the PMF will not overtop the dam or the emergency relief weir segment of the embankment. Therefore, the spillway capacity has been rated as inadequate.

b. Adequacy of Information

The information available for the preparation of this report was fairly complete and appeared to be reasonably accurate.

c. Need for Additional Investigations

Further investigation of the structural stability and seepage problems on this dam are required. The structural stability investigations should include subsurface explorations and concrete cores to obtain information about the structure, its foundation conditions, and the effectiveness of the cutoff wall beneath the spillway section. This data should then be incorporated into a detailed stability evaluation and, if necessary, modifications to the structure should then be designed.

Investigations into the causes of the wet areas beyond the downstream toe, with special emphasis on the one area of concentrated seepage, are required. As a result of these investigations, methods of treatment should be devised and implemented.

d. Urgency

Investigations of the structural stability and seepage problems should be commenced within 3 months of the date of notification of the owner. Remedial measures deemed necessary as a result of these investigations should be completed within 18 months. Other deficiencies noted on the structures should be corrected within 12 months.

7.2 RECOMMENDED MEASURES

1. Cut all trees and brush growing on the dam to permit a more detailed visual inspection of the embankment.
2. Design and implement a method of treatment of the wet areas near the downstream toe, especially the one area of concentrated seepage.
3. Modify the spillway structure as necessary based on the structural stability analysis.
4. Eliminate the minor leakage through the upper portion of the concrete gravity section.
5. Remove grass and weeds growing through the joints between slabs on the exit channel.
6. Remove debris and sediment in lower plunge pool on the exit channel, also clear brush and trees growing immediately downstream of the end of the plunge pool.
7. Seal the concrete slabs on the spillway channel to prevent water from flowing between cracks and under the slabs.
8. Develop an emergency action plan for the notification and evacuation of downstream residents.

APPENDIX A

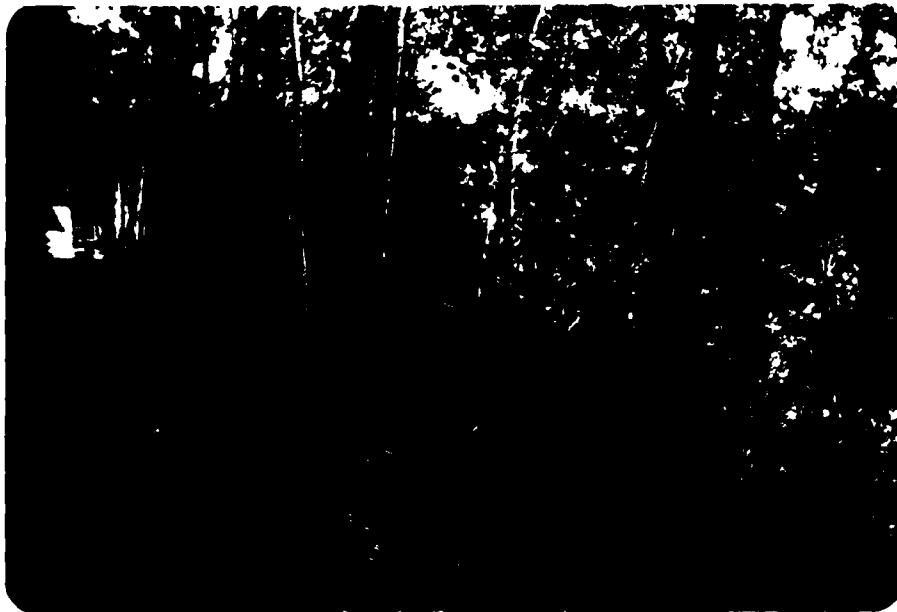
PHOTOGRAPHS



CREST OF EMBANKMENT AT LEFT END- LOOKING
TOWARD SECTION CALLED EMERGENCY BELIEF VEIR



CREST OF EMBANKMENT AT RIGHT END OF DAM
NOTE TREES ON WESTERN SLOPE



CREST AND DOWNSTREAM SLOPE
AT RIGHT END OF DAM



DIVERSION CONDUIT INTO RESERVOIR
AT RIGHT END OF DAM



BALEGO TYPE REEDS GROWING
ON THE DOWNSTREAM SLOPE



AREA OF CONCENTRATED SEEPAGE
AT DOWNSTREAM TOE OF EMBANKMENT



SPILLWAY SECTION
NOTE LEAKAGE THROUGH DAM NEAR CREST



DRAINAGE CHANNEL FROM UPPER
PLUNGE POOL TO EXIT CHANNEL



SPILLWAY EXIT CHANNEL
NOTE WATER APPEARING FROM BETWEEN SLABS



SPILLWAY EXIT CHANNEL LOOKING DOWNSTREAM
NOTE DEBRIS OR PLUNGE POOL



CONCRETE GATEHOUSE ON CREST OF EMBANKMENT



OUTLET STRUCTURE FOR 42 INCH BLOW-OFF LINE

APPENDIX B

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST1) Basic Data

a. General

Name of Dam MEAD RESERVOIR DAM
Fed. I.D. # 237 DEC Dam No. 218B-236
River Basin LAKE CHAMPLAIN
Location: Town PLATTSBURGH County CLINTON
Stream Name MEAD BROOK
Tributary of SARANAC RIVER
Latitude (N) 44° 43.4' Longitude (W) 73° 30.6'
Type of Dam EARTH WITH CONCRETE CORE WALL
Hazard Category C
Date(s) of Inspection 6/16/81
Weather Conditions 80° SUNNY
Reservoir Level at Time of Inspection ± 6" BELOW SPILL CREST

b. Inspection Personnel R. WARRENDER, W. LYNICK

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

<u>GEORGE MILLER, CITY ENGINEER</u>	<u>GARY ST. CLAIR</u>
<u>CITY HALL</u>	<u>WATER & SEWER DEPT.</u>
<u>PLATTSBURGH, N.Y. 12901</u>	<u>MAIN MILL ST. PLATTSBURGH</u>
<u>(518) 563-7730</u>	<u>(518) 563-1120</u>

d. History:

Date Constructed 1923 Date(s) Reconstructed _____Designer METCALF & EDDY, BOSTON, MASS.Constructed By BLUFF POINT STONE CO.Owner CITY OF PLATTSBURGH

2) Embankment

a. Characteristics

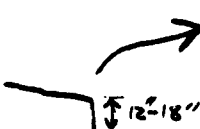
- (1) Embankment Material GLACIAL TILL - IMPERVIOUS SOIL
NEAREST CENTER
- (2) Cutoff Type CONCRETE WALL
- (3) Impervious Core CONCRETE CORE WALL
- (4) Internal Drainage System NONE
- (5) Miscellaneous _____

b. Crest

- (1) Vertical Alignment SLIGHTLY IRREGULAR ON RIGHT END - ON LEFT END
CREST DROPS GRADUALLY TO FORM RELIEF WIER - ON FILL
- (2) Horizontal Alignment SATISFACTORY - CREST IS
SOMEWHAT NARROW
- (3) Surface Cracks NONE
- (4) Miscellaneous TREES & BRUSH AT LEFT END - AT RIGHT END
ROOTS FROM LARGE PINE TREES WERE GROWING OVER THE TOP
OF THE CORE WALL

c. Upstream Slope

- (1) Slope (Estimate) (V:H) 1 ON 2½
- (2) Undesirable Growth or Debris, Animal Burrows TREES & BRUSH
GROWING ON SLOPE
- (3) Sloughing, Subsidence or Depressions SLIGHT SCOUR PROBLEM
FOR 20' BEYOND RIGHT END OF SPILLWAY. PROBABLY CAUSED
BY WAVE ACTION - LACKS EMBANKMENT MATERIAL BELOW
ABUTMENT WALLS - ABOUT 2' DOWN ON EITHER SIDE OF
SPILLWAY



12-18"

(4) Slope Protection 6"-18" RIPRAP TO ABOUT 1' TO 2' BELOW THE CREST

(5) Surface Cracks or Movement at Toe UNOBSERVABLE

d. Downstream Slope

(1) Slope (Estimate - V:H) FAIRLY STEEP; ESPECIALLY UPPER PART

(2) Undesirable Growth or Debris, Animal Burrows SUBSTANTIAL TREES & BRUSH GROWTH; LOWER PART OF SLOPE IS COVERED WITH KNEE HIGH BAMBOO LIKE GRASS. - MAKES DETAILED INSPECTION IMPOSSIBLE.

(3) Sloughing, Subsidence or Depressions NO EVIDENCE - TREES ON SLOPE ARE RELATIVELY STRAIGHT - NO SIGNS OF SLOPE MOVEMENT.

(4) Surface Cracks or Movement at Toe NONE NOTED

(5) Seepage ~~ENTIRE~~ ONE POINT OF CONCENTRATED SEEPAGE NOTED AT DOWNSTREAM TOE IMMEDIATELY BELOW GATEHOUSE SUBSTANTIAL CLEAR SEEPAGE EXITING IN ONE SPOT RATE ESTIMATED TO BE 10-20 GAL/MIN

(6) External Drainage System (Ditches, Trenches; Blanket) NONE

(7) Condition Around Outlet Structure SOME SEEPAGE INTO POOL - MOSTLY WATER COMING OFF HILL SIDE

(8) Seepage Beyond Toe ENTIRE AREA BEYOND TOE IS WET AND SWAMPY

e. Abutments - Embankment Contact

STEEP CONTACT AT RIGHT ABUT. - OUTLET STRUCTURE IS AT THE TOE IN THIS AREA

93-15-3(9/80)

(1) Erosion at Contact NONE NOTED

(2) Seepage Along Contact SEEPAGE OR GROUND WATER OUT OF HILLSIDE
EXITING AT SEVERAL POINTS BELOW THE BERM ELEVATION
ONE POINT IS AT BASE OF SLOPE & WATER FLOWS INTO
PLUNGE POOL.

3) Drainage System

a. Description of System NONE

b. Condition of System _____

c. Discharge from Drainage System _____

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

NONE

5) Reservoir

- a. Slopes TREED TO EDGE OF RESERVOIR - CITY CONTROLS
LAND TO EDGE OF RESERVOIR - LAKE PRIMARILY SPRING FED - LITTLE
FLOW.
- b. Sedimentation NOT APPARENT
- c. Unusual Conditions Which Affect Dam NONE - USED TO BE A BRIDGE
ACROSS TOP OF SPILLWAY BUT IT NO LONGER EXISTS

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) NY RTE 374; NY RTE 3
SEVERAL HOMES BELOW RTE 3 ONE HOME JUST DOWNSTREAM OF DAM
- b. Seepage, Unusual Growth ENTIRE AREA BEYOND TOE IS WET
- c. Evidence of Movement Beyond Toe of Dam NONE
- d. Condition of Downstream Channel 6'-10' DEEP 10'-20' WIDE
SIDE SLOPES OF 1 ON 1 LINED WITH BRUSH & TREES

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

CONCRETE GRAVITY SPILLWAY SECTION - PAVED CONCRETE DISCHARGE
CHANNEL - 2 PLUNGE POOLS FOR ENERGY DISSIPATION

- a. General GRAVITY SECTION - SATISFACTORY - MINOR CRACKS ON
ABUTMENT WALLS - MINOR SPALLING ON D.S. FACE - SOME
MINOR SEEPAGE THRU CONCRETE EXITING ON DOWNSTREAM
FACE 2 FEET ABOVE CREST.
- b. Condition of ~~Spillway~~ Spillway - PAVED DISCHARGE CHANNEL -
SOME WEEDS & GRASS GROWING THROUGH JOINTS BETWEEN
SLABS - MINOR CRACKING ON CHANNEL WALLS
FLOW FROM UPPER PLUNGE POOL DRAIN CHANNEL FLOWING
UNDER SLABS & RE APPEARING ABOUT 50' DOWN SLOPE

c. Condition of Discharge Conveyance Channel GENERALLY SATISFACTORY

PLUNGE POOL AT END OF CHANNEL PARTIALLY
FILLED WITH SEDIMENT & DEBRIS. BEYOND END
OF PLUNGE POOL THE GROUND IS BRUSH & TREES

d. Structural Condition of Spillway Components

SOME CRACKS & MINOR SPALLING OF CONCRETE
ON SPILLWAY SECTION & DISCHARGE CHANNEL

8) LOW LEVEL INLETS/OUTLETS

a. General 3 INLET PIPES & 2 OUTLET PIPES - ALL LEAD
TO OR FROM GATE HOUSE VALVES IN GATE HOUSE

b. Condition of Inlets UNOBSERVABLE

c. Condition of Outlets MOSTLY UNOBSERVABLE - ONLY
CONCRETE OUTLET STRUCTURE VISIBLE - APPEARED
TO BE IN SATISFACTORY CONDITION - SOME SEEPAGE
OR WATER OFF HILLSIDE FLOWING ALONG OUTLET
STRUCTURE

9) STRUCTURAL - COVERED IN SPILLWAY SECTION

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)a. Description and Condition

GATEHOUSE - CONTAINS CONTROL MECHANISM FOR
INLET & OUTLET PIPES - CONCRETE ON BOTH
INTERIOR & EXTERIOR APPEARS TO BE SATISFACTORY
WITH ONLY MINOR SURFACE CRACKS

18 INCH DIVERSION PIPE (INFLOW) - HEAD WALL FOR PIPE
LOCATED AT RIGHT END OF EMBANKMENT - CONCRETE
IN GOOD CONDITION - PIPE DIVERTS WATER
FROM SARANAC RIVER TO A SMALL POND AND THEN
TO MEAD RESERVOIR.

11) Operation Procedures (Lake Level Regulation):

GRAVITY FED 24" SUPPLY LINE FROM GATEHOUSE TO
TREATMENT PLANT - WATER IS WITHDRAWN AS REQUIRED
NORMAL RESERVOIR FLUCUATION IS 2'-3' DURING A
VERY DRY SUMMER

MAXIMUM KNOWN FLOOD IS ABOUT 1' OVER THE CREST
OF SPILLWAY

WATER TREATMENT PLANT MANNED 18 HOURS PER DAY
TREATMENT PLANT - (518) 563-1188

APPENDIX C

HYDROLOGIC/HYDRAULIC
ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

1

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam	<u>541.5</u>	<u> </u>	<u> </u>
2) ~~Design High Water~~ ^{Top of Emergency Relief Weir} (Max. Design Pool)	<u>540.5</u>	<u>105</u>	<u>1895</u>
3) Auxiliary Spillway Crest	<u> </u>	<u> </u>	<u> </u>
4) Pool Level with Flashboards	<u> </u>	<u> </u>	<u> </u>
5) Service Spillway Crest	<u>533.0</u>	<u>74</u>	<u>1228</u>

* USGS DATUM = PLAN DATUM + 16.5'

DISCHARGES

	<u>Volume</u> (cfs)
1) Average Daily	<u> </u>
2) Spillway @ Maximum High Water - <u>Top of Dam</u>	<u>3374</u>
3) Spillway @ Design High Water <u>Top of Relief Weir</u>	<u>2827</u>
4) Spillway @ Auxiliary Spillway Crest Elevation	<u> </u>
5) Low Level Outlet - <u>24" Blow Off Pipe</u>	<u>101</u>
6) Total (of all facilities) @ Maximum High Water <u>(Top of Relief Weir)</u>	<u>2827</u>
7) Maximum Known Flood	<u> </u>
8) At Time of Inspection	<u> </u>

CREST:

ELEVATION: 540.5Type: EARTH WITH CONCRETE CORE WALLWidth: 12 FT Length: 673 FTSpillover CONCRETE OGEE SECTIONLocation NEAR RIGHT END OF EMBANKMENT

SPILLWAY:

SERVICE

AUXILIARY

533.0Elevation NONECONCRETE - MASSType EMERGENCY RELIEF WEIR EMBANKMENT4'Width SECTION WOULD PROBABLY FAIL IF
SUBJECTED TO OVERTOPPING

Type of Control

✓

Uncontrolled

Controlled:

Type
(Flashboards; gate)

Number

Size/Length

Invert Material

Anticipated Length
of operating service

Chute Length

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

HYDROMETEROLOGICAL GAGES:

Type : NONE

Location: _____

Records:

Date - NONE

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

Method of Controlled Releases (mechanisms):

LOW LEVEL OUTLETS - 24" PIPE LEADING TO
BLOW OFF & 24" WATER SUPPLY LINE

DRAINAGE AREA: 6.39 Sq Mi 4090 ACRES

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: FOREST - CITY OWNS MOST OF DRAINAGE AREA

Terrain - Relief: STEEP TO MODERATE

Surface - Soil: GLACIAL TILL

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)

NONE

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

NONE

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

Location: NONE

Elevation: _____

Reservoir:

Length @ Maximum Pool _____ (Miles)

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

PROJECT GRID

JOB MEAD RESERVOIR DAM NY 237		SHEET NO. 1		CHECKED BY		DATE	
SUBJECT WATERSHED PARAMETERS				COMPUTED BY RLW		DATE 7/9/81	
SNYDER SYNTHETIC UNIT HYDROGRAPH PARAMETERS							
$L = 14 \text{ in} = 5.40 \text{ mi.}$							
$L_{CA} = 6.7 \text{ in} = 2.6 \text{ mi.}$							
USE $C_T = 2.0$							
LAG TIME (HRS): $t_p = C_T (L \times L_{CA})^{0.3}$							
$= 2.0 (5.4 \times 2.6)^{0.3} = 4.42 \text{ HOURS}$							
UNIT RAINFALL DURATION (HRS): $t_r = \frac{t_p}{3.5}$							
$t_r = \frac{4.42}{3.5} = .80 \text{ HRS} \leftarrow \text{USE } 0.50 \text{ HRS}$							
ADJUSTED LAG TIME (HRS): $TP = t_p + 0.25(t_r - t_p)$							
$= 4.42 + 0.25(0.50 - 0.80)$							
$TP = 4.35$							
PERKINS COEFFICIENT							
USE $C_p = 0.625$							
RAINFALL - PMF							
REF: HMR #33							
ZONE 1 INDEX PMF = 15" (200 SQ MI / 24 HR)							
ADJUSTMENT FOR		DURATION		6	12	24	48 - HRS
TIME & DA		% OF INDEX		111	123	132	142

PROJECT GRID

JOB	MEAD RESERVOIR DAM NY 237	SHEET NO.	2	CHECKED BY		DATE	
SUBJECT	WATERSHED PARAMETERS			COMPUTED BY	RLW	DATE	7/9/81

DRAINAGE AREA - TAKEN FROM 2 USGS 7½ MINUTE QUAD
SHEETS - MORRISONVILLE - WEST CHAZY

PLANIMETERED AREAS - MORRISONVILLE QUAD 19.28 IN²
WEST CHAZY QUAD 25.26 IN²
44.54 IN²

$(44.54 \text{ IN}^2) \left(\frac{1 \text{ AC}}{4840 \text{ IN}^2} \right) = 9.2 \text{ ACRES} \Rightarrow 6.39 \text{ SQ. MI.}$

BASE FLOW:

INITIAL AT 1 CSM = 6 CFS

QRCSN = .1 (10% OF PEAK Q)

RTICR = 1.5

LOSSES (SOIL INFILTRATION)

INITIAL 1.0 CONSTANT 0.1

PROJECT GRID

JOB MEAD RESERVOIR DAM NY 232		SHEET NO. 3	CHECKED BY	DATE
SUBJECT STAGE-STORAGE DATA			COMPUTED BY RLW	DATE 7/9/81
REF: LOCATION PLAN - SHEET 1 OF 11				
PREPARED BY METCALF & EDDY, CONSULTING ENGINEERS				
ALL AREAS PLANIMETERED ON THE 1"=200' SCALE PLAN				
ELEVATION*	PLANIMETERED AREA (K ²)	SURFACE AREA (ACRES)		
491.5	3.7	3.4		
506.5	18.6	17.1		
521.5	45.8	42.1		
→ SPILLWAY CREST 533	80.2	73.6		
→ TOP OF DAM** 540.5	114.8	105.4		
* ELEVATIONS CONVERTED FROM PLAN DATUM TO USGS DATUM				
USGS DATUM = PLAN DATUM + 16.5'				
** TOP OF EMERGENCY RELIEF WIER WHICH IS PART OF EMBANKMENT				
RESERVOIR AREA SHOWN ON USGS QUAD SHEET 69.8 ACRES				

PROJECT GRID

JOB MEAD RESERVOIR DAM NY 237		SHEET NO. 4		CHECKED BY	DATE
SUBJECT SPILLWAY DISCHARGES				COMPUTED BY RLW	DATE 7/10/81
WEIR FLOW : $Q = C L H^{3/2}$					
ABUTMENT $L = L' - 2(NK_F + K_a)H \Rightarrow L = 40 - .4H$					
CONTRACTION					
$N = 0$					
$L' = 40 \text{ FT } K_a = 0.2$					
C - VARIES WITH H — USE TABLE 5-13 (KING & BRATER)					
BASED ON MODEL 5-17 (HANDBOOK OF HYDRAULICS 5TH ED)					
ELEV	H	L	C	Q (CFS)	
SPILLWAY CREST USGS DATUM 533	0	—	—	—	
	0.5	39.8	3.20*	45.0	
	1.0	39.6	3.40*	134.6	
	1.5	39.4	3.60*	260.6	
	2.0	39.2	3.67	406.9	
	2.5	39.0	3.70	570.4	
	3.0	38.8	3.72	750.0	
	4.0	38.4	3.72	1142.8	
	5.0	38.0	3.72	1580.4	
	6.0	37.6	3.72	2055.7	
	7.0	37.2	3.72	2562.9	
TOP OF DAM (RELIEF WEIR)	540.5	7.5	37.0	2827.0	
TOP OF MAIN EMBANKMENT	541.5	8.5	36.6	3374.0	
	10.0	36.0	3.72	4234.9	
* THE COEFFICIENTS FOR THESE LOW HEADS HAVE BEEN REDUCED TO ACCOUNT FOR THE EFFECT OF THE FILL UPSTREAM OF THE OGE					

PROJECT GRID

JOB	MEAD RESERVOIR DAM NY 237	SHEET NO.	5	CHECKED BY		DATE	
SUBJECT	LOW LEVEL INLET / OUTLET CAPACITIES			COMPUTED BY	RLW	DATE	7/10/81

CALCULATE FLOW THROUGH EACH OF THE INLET PIPES WITH WATER SURFACE AT SPILLWAY CREST (USGS DATUM 533)

UPPER PIPE - 20" DIAMETER CAST IRON PIPE - 35' LONG INVERT 501.0

PIPE FLOW

$$Z_1 + \frac{P_1}{\gamma} + \alpha \frac{V_1^2}{2g} = Z_2 + \frac{P_2}{\gamma} + \alpha \frac{V_2^2}{2g} + \sum h_L$$

$$P_1 = 0 \quad V_1 = 0 \quad P_2 = 0 \quad h_L = K \frac{V^2}{2g}$$

$$Z_1 = 533 \quad Z_2 = (501 + 0.833) = 501.83$$

$$Z_1 - Z_2 = \sum K \frac{V^2}{2g}$$

$$533 - 501.83 = \frac{V^2}{2g} + \left[0.5 + 0.525 + 0.19 \right] \frac{V^2}{2g}$$

$\downarrow$ $\downarrow$ $\downarrow$
 ENTRANCE PIPE GATE
 LOSS LOSS LOSS
 (0.015)(35)

$$31.17 = (1 + 1.215) \frac{V^2}{2g} \Rightarrow V = \sqrt{\frac{31.17(2)(32.2)}{2.215}} = 30.10 \text{ FPS}$$

$$Q = VA = (30.10 \text{ FPS})(2.88 \text{ FT}^2) = 86.6 \text{ cfs}$$

MIDDLE PIPE - 20" DIAMETER CAST IRON PIPE - 75' LONG INVERT 485.0

$$533 - 485.83 = \frac{V^2}{2g} + \left[0.5 + 1.125 + 0.19 \right] \frac{V^2}{2g}$$

$\downarrow$ $\downarrow$ $\downarrow$
 ENTRANCE PIPE GATE
 LOSS LOSS LOSS
 (0.5)(75)

$$47.17 = [1 + 1.815] \frac{V^2}{2g} \Rightarrow V = \sqrt{\frac{47.17(2)(32.2)}{2.815}} = 32.8 \text{ FPS}$$

$$Q = VA = (32.8 \text{ FPS})(2.88 \text{ FT}^2) = 94.5 \text{ cfs}$$

PROJECT GRID

JOB	MEAD RESERVOIR DAM NY 267	SHEET NO.	6	CHECKED BY		DATE	
SUBJECT	LOW LEVEL INLET/OUTLET CAPACITIES			COMPUTED BY	RLW	DATE	7/10/81

LOWER 24" PIPE - THIS PIPE IS CONNECTED TO OUTLET PIPE INVERT 465.0
 PIPE IS 135' LONG FROM INTAKE TO GATE HOUSE
 3.5' BETWEEN VALVES
 8' WITH BEND TO OUTLET INTO 42" PIPE

$$533 - 466 = \frac{V^2}{2g} + \left[\underset{\substack{\downarrow \\ \text{ENTRANCE} \\ \text{LOSS}}}{0.5} + \underset{\substack{\downarrow \\ \text{PIPE} \\ \text{LOSS}}}{2.025} + \underset{\substack{\downarrow \\ \text{GATE} \\ \text{LOSS}}}{0.19} + \underset{\substack{\downarrow \\ \text{PIPE} \\ \text{LOSS}}}{0.53} + \underset{\substack{\downarrow \\ \text{GATE} \\ \text{LOSS}}}{0.19} + \underset{\substack{\downarrow \\ \text{PIPE} \\ \text{LOSS}}}{0.12} + \underset{\substack{\downarrow \\ \text{BEAD} \\ \text{LOSS}}}{0.08} \right] \frac{V^2}{2g}$$

$(0.15)(135)$ $(0.15)(35)$ $(0.15)(8)$

$\frac{R_B}{S} = \frac{8.5}{2}$

$K_B = 2(4) = 0.8$
 FROM DESIGN OF
 SMALL DAMS 4.45

$$67 = (1 + 3.158) \frac{V^2}{2g}$$

$$V = \sqrt{\frac{67.0(2)(32.2)}{4.158}} = 32.2 \text{ FPS}$$

$$Q = VA = (32.2 \text{ FPS})(3.14) = 101.1 \text{ cfs}$$

NEW YORK STATE
DEPT OF ENVIRONMENTAL CONSERVATION
FLOOD PROTECTION BUREAU

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

A1 MUD RESERVOIR DAM NY 237

A2 PHASE 1 REPORT

A3 PAF ANALYSIS WITH RATIOS

B 150 0 30 0 0 0 0 0

B1 5

J 1 6 1

J1 .50 .54 .55 .67 .69 1.0

K 1

K1 INFLOW HYDROGRAPH

M 1 1 6.39

P 15 111 123 132 142

T 1.0 0.1

W 4.35 .625

X 6 -.1 1.5

K 1 1 2

K1 ROUTED OUTFLOW SPILLWAY CREST ELEV 533 USGS

Y 1 1

Y1 1 -533 -1

Y4 533 534 535 536 537 539 540 540.5 541.5 543

Y5 0 134.6 406.2 750.0 1142.8 2055.7 2562.9 2827.0 3374.0 4234.9

Y4 3.4 17.1 42.1 73.6 105.4

Y4 491.5 506.5 521.5 533.0 540.5

Y4 533

Y4 540.5 3.1 1.5 150

K 99

A

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

 NEW YORK STATE
 DEPT OF ENVIRONMENTAL CONSERVATION
 FLOOD PROTECTION BUREAU

RUN DATE 07/10/81
 HEAD RESERVOIR DAM NY 237
 PHASE 1 REPORT
 PMF ANALYSIS WITH RATIOS

JOB SPECIFICATION									
NO	NHR	NMIN	IDAY	JHR	JMIN	MEIRC	IPLI	IPRI	NSIAN
150	0	30	0	0	0	0	0	0	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
 NPLAN= 1 NRTIO= 6 LRTIO= 1
 RTIOS= 0.50 0.54 0.55 0.57 0.68 1.00

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SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH									
ISTAQ	ICOMP	IECON	IIAFC	JPLI	JPRI	INAME	ISTAGE	IAUTO	
1	0	0	0	0	0	1	0	0	

HYDROGRAPH DATA									
INVDG	IUG	TAREA	SNAP	TRSDA	RSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	6.39	0.	6.39	0.	0.	0	1	0

PRECIP DATA				
SPFE	PMS	R6	R12	R24
0.	15.00	111.00	123.00	132.00
			R48	R96
			142.00	0.

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA									
LROPT	STRKR	DLTKR	RTIOL	ERAIN	STKKS	RTIOK	STRTL	CNSTL	ALSMX
0	0.	0.	1.00	0.	0.	1.00	1.00	0.10	0.
									RTIMP
									0.

UNIT HYDROGRAPH DATA
 TP= 4.35 CP=0.63 NTA= 0

RECESSION DATA

STRIO= 6.00 ORCSN= -0.10 RTIOE= 1.50
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.79 AND RE 8.04 INTERVALS

UNIT HYDROGRAPH 48 END-OF-PERIOD ORIGINATES, LAG= 4.35 HOURS, CP= 0.63 VOL= 1.00									
22.	83.	167.	262.	365.	462.	538.	586.	606.	588.
534.	472.	417.	368.	325.	287.	253.	224.	197.	174.
154.	136.	120.	106.	93.	83.	73.	64.	57.	50.
44.	39.	35.	30.	27.	24.	21.	19.	16.	14.
13.	11.	10.	9.	8.	7.	6.	5.		

END-OF-PERIOD FLOW

0

NO. DA	HR. MN	PERIOD	RAIN	EXUS	LOSS	COMP. U	PO. DA	HR. MN	PERIOD	RAIN	EXUS	LOSS	COMP. U
1.01	0.30	1	0.00	0.	0.00	0.	1.02	14.00	76	0.80	0.75	0.05	732.
1.01	1.00	2	0.00	0.	0.00	0.	1.02	14.30	77	1.00	0.95	0.05	976.
1.01	1.30	3	0.00	0.	0.00	0.	1.02	15.00	78	1.00	0.95	0.05	1295.
1.01	2.00	4	0.00	0.	0.00	0.	1.02	15.30	79	1.21	1.16	0.05	1689.
1.01	2.30	5	0.00	0.	0.00	0.	1.02	16.00	80	3.85	3.80	0.05	2212.
1.01	3.00	6	0.00	0.	0.00	0.	1.02	16.30	81	0.93	0.88	0.05	2887.
1.01	3.30	7	0.00	0.	0.00	0.	1.02	17.00	82	0.93	0.88	0.05	3642.
1.01	4.00	8	0.00	0.	0.00	0.	1.02	17.30	83	0.73	0.68	0.05	4409.
1.01	4.30	9	0.00	0.	0.00	0.	1.02	18.00	84	0.73	0.68	0.05	5149.
1.01	5.00	10	0.00	0.	0.00	0.	1.02	18.30	85	0.05	0.00	0.05	5796.
1.01	5.30	11	0.00	0.	0.00	0.	1.02	19.00	86	0.05	0.00	0.05	6269.
1.01	6.00	12	0.00	0.	0.00	0.	1.02	19.30	87	0.05	0.00	0.05	6533.
1.01	6.30	13	0.01	0.	0.01	0.	1.02	20.00	88	0.05	0.00	0.05	6580.
1.01	7.00	14	0.01	0.	0.01	0.	1.02	20.30	89	0.05	0.00	0.05	6591.
1.01	7.30	15	0.01	0.	0.01	0.	1.02	21.00	90	0.05	0.00	0.05	5993.
1.01	8.00	16	0.01	0.	0.01	0.	1.02	21.30	91	0.05	0.00	0.05	5490.
1.01	8.30	17	0.01	0.	0.01	0.	1.02	22.00	92	0.05	0.00	0.05	4961.
1.01	9.00	18	0.01	0.	0.01	0.	1.02	22.30	93	0.05	0.00	0.05	4430.
1.01	9.30	19	0.01	0.	0.01	0.	1.02	23.00	94	0.05	0.00	0.05	3926.
1.01	10.00	20	0.01	0.	0.01	0.	1.02	23.30	95	0.05	0.00	0.05	3470.
1.01	10.30	21	0.01	0.	0.01	0.	1.03	0.	96	0.05	0.00	0.05	3067.
1.01	11.00	22	0.01	0.	0.01	0.	1.03	0.30	97	0.	0.	0.	2712.
1.01	11.30	23	0.01	0.	0.01	0.	1.03	1.00	98	0.	0.	0.	2398.
1.01	12.00	24	0.01	0.	0.01	0.	1.03	1.30	99	0.	0.	0.	2120.
1.01	12.30	25	0.05	0.	0.05	0.	1.03	2.00	100	0.	0.	0.	1875.
1.01	13.00	26	0.05	0.	0.05	0.	1.03	2.30	101	0.	0.	0.	1657.
1.01	13.30	27	0.06	0.	0.06	0.	1.03	3.00	102	0.	0.	0.	1465.
1.01	14.00	28	0.06	0.	0.06	0.	1.03	3.30	103	0.	0.	0.	1294.
1.01	14.30	29	0.08	0.	0.08	0.	1.03	4.00	104	0.	0.	0.	1143.
1.01	15.00	30	0.08	0.	0.08	0.	1.03	4.30	105	0.	0.	0.	1010.
1.01	15.30	31	0.09	0.	0.09	0.	1.03	5.00	106	0.	0.	0.	892.
1.01	16.00	32	0.29	0.	0.29	0.	1.03	5.30	107	0.	0.	0.	787.
1.01	16.30	33	0.07	0.	0.07	0.	1.03	6.00	108	0.	0.	0.	695.
1.01	17.00	34	0.07	0.01	0.06	0.	1.03	6.30	109	0.	0.	0.	644.
1.01	17.30	35	0.06	0.01	0.05	0.	1.03	7.00	110	0.	0.	0.	618.
1.01	18.00	36	0.06	0.01	0.05	0.	1.03	7.30	111	0.	0.	0.	594.
1.01	18.30	37	0.00	0.	0.00	0.	1.03	8.00	112	0.	0.	0.	570.
1.01	19.00	38	0.00	0.	0.00	0.	1.03	8.30	113	0.	0.	0.	547.
1.01	19.30	39	0.00	0.	0.00	0.	1.03	9.00	114	0.	0.	0.	526.
1.01	20.00	40	0.00	0.	0.00	0.	1.03	9.30	115	0.	0.	0.	505.
1.01	20.30	41	0.00	0.	0.00	0.	1.03	10.00	116	0.	0.	0.	485.
1.01	21.00	42	0.00	0.	0.00	0.	1.03	10.30	117	0.	0.	0.	465.
1.01	21.30	43	0.00	0.	0.00	0.	1.03	11.00	118	0.	0.	0.	447.
1.01	22.00	44	0.00	0.	0.00	0.	1.03	11.30	119	0.	0.	0.	429.
1.01	22.30	45	0.00	0.	0.00	0.	1.03	12.00	120	0.	0.	0.	412.
1.01	23.00	46	0.00	0.	0.00	0.	1.03	12.30	121	0.	0.	0.	396.
1.01	23.30	47	0.00	0.	0.00	0.	1.03	13.00	122	0.	0.	0.	380.
1.02	0.	48	0.00	0.	0.00	0.	1.03	13.30	123	0.	0.	0.	365.
1.02	0.30	49	0.04	0.	0.04	0.	1.03	14.00	124	0.	0.	0.	350.
1.02	1.00	50	0.34	0.	0.04	0.	1.03	14.30	125	0.	0.	0.	336.
1.02	1.30	51	0.04	0.	0.04	0.	1.03	15.00	126	0.	0.	0.	323.
1.02	2.00	52	0.04	0.	0.04	0.	1.03	15.30	127	0.	0.	0.	310.
1.02	2.30	53	0.04	0.	0.04	0.	1.03	16.00	128	0.	0.	0.	298.
1.02	3.00	54	0.04	0.	0.04	0.	1.03	16.30	129	0.	0.	0.	286.
1.02	3.30	55	0.04	0.	0.04	0.	1.03	17.00	130	0.	0.	0.	275.
1.02	4.00	56	0.04	0.	0.04	0.	1.03	17.30	131	0.	0.	0.	264.
1.02	4.30	57	0.04	0.	0.04	0.	1.03	18.00	132	0.	0.	0.	253.
1.02	5.00	58	0.04	0.	0.04	0.	1.03	18.30	133	0.	0.	0.	243.
1.02	5.30	59	0.04	0.	0.04	0.	1.03	19.00	134	0.	0.	0.	234.
1.02	6.00	60	0.04	0.	0.04	0.	1.03	19.30	135	0.	0.	0.	224.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5482.	2324.	836.	120446.
CAS	186.	155.	24.	3411.
INCHES	7.98	13.53	14.61	14.61
MM	202.70	343.78	371.06	371.14
AC-FT	2718.	4610.	4976.	4977.
THOUS CU M	3353.	5687.	6138.	6139.

HYDROGRAPH AT STA						I FOR PLAN I, RATIO 1					
3.	3.	3.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
7.	7.	7.	6.	6.	6.	5.	5.	5.	5.	5.	5.
3.	3.	3.	2.	2.	2.	2.	2.	2.	2.	2.	2.
5.	10.	19.	32.	48.	67.	88.	109.	129.	149.	170.	191.
148.	185.	220.	279.	361.	488.	648.	845.	1106.	1421.	1796.	2336.
443.	2205.	2575.	2898.	3135.	3266.	3290.	3195.	2996.	2796.	2596.	2396.
745.	2215.	1963.	1735.	1534.	1356.	1199.	1060.	937.	829.	732.	647.
829.	647.	572.	505.	446.	394.	348.	322.	309.	297.	285.	274.
297.	274.	263.	252.	242.	233.	223.	215.	206.	198.	190.	182.
198.	182.	175.	168.	162.	155.	149.	143.	137.	131.	125.	119.
127.	122.	117.	112.	108.	103.	99.	95.	92.	88.	84.	81.
84.	81.	78.	75.	72.	69.	66.	64.	61.	58.	55.	52.

HYDROGRAPH AT STA			1 FOR PLAN 1, RTIO 2		
3.	3.	3.	3.	2.	2.
2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	3.	5.
8.	7.	7.	7.	5.	4.
3.	2.	2.	2.	2.	1.
3.	3.	3.	3.	2.	2.

2.	11.	21.	30.	40.	50.	60.
160.	200.	238.	301.	395.	527.	111.
1559.	2381.	2781.	3130.	3385.	3528.	3491.
2965.	2392.	2120.	1874.	1656.	1465.	1295.
895.	699.	617.	545.	481.	425.	375.
321.	296.	284.	273.	262.	251.	241.
214.	205.	197.	189.	174.	161.	154.
142.	131.	126.	121.	116.	112.	107.
95.	88.	84.	81.	78.	74.	72.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
3553.	2960.	1255.	452.	65041.
101.	84.	36.	13.	1842.
	4.31	7.31	7.89	
	109.46	185.64	200.37	200.41
	1468.	2490.	2687.	2688.
	1811.	3071.	3314.	3315.

THOUS CU M

HYDROGRAPH AT STA

1 FOR PLAN 1, RTIO 3

3.	3.	3.	3.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.
8.	8.	8.	8.	6.	6.	6.
3.	3.	2.	2.	2.	2.	2.
5.	11.	21.	35.	53.	74.	96.
163.	203.	242.	307.	403.	537.	712.
1588.	2425.	2832.	3188.	3448.	3593.	3515.
3020.	2437.	2159.	1908.	1687.	1492.	1319.
912.	806.	712.	629.	490.	433.	354.
326.	313.	289.	278.	267.	256.	246.
218.	209.	201.	185.	171.	164.	157.
145.	139.	134.	123.	118.	114.	109.
97.	93.	86.	82.	75.	76.	73.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
3619.	3015.	1278.	460.	66245.
102.	85.	36.	13.	1876.
	4.39	7.44	8.03	
	111.49	189.08	204.06	204.13
	1495.	2536.	2737.	2737.
	1844.	3128.	3376.	3377.

THOUS CU M

HYDROGRAPH AT STA

1 FOR PLAN 1, RTIO 4

4.	4.	3.	3.	3.	3.	3.
3.	2.	2.	2.	2.	2.	2.
2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	2.	3.	4.	5.
9.	10.	9.	8.	8.	7.	7.
4.	3.	3.	2.	2.	2.	2.
6.	14.	26.	43.	65.	90.	117.
198.	248.	295.	374.	490.	654.	868.
1934.	2440.	2954.	3450.	4200.	4377.	4408.
3678.	3324.	2968.	2550.	2055.	1817.	1607.
1110.	867.	766.	677.	597.	527.	466.
398.	367.	352.	338.	325.	312.	299.
265.	244.	235.	225.	216.	208.	192.
177.	170.	163.	150.	144.	139.	128.
118.	109.	104.	100.	91.	89.	85.

THOUS CU M

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
4708.	3673.	1557.	560.	80699.
125.	104.	44.	16.	2285.
	5.35	9.07	9.79	9.79
	135.61	230.33	248.61	248.66
	1821.	3089.	3334.	3335.
	2247.	3810.	4112.	4113.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 5

4.	3.	3.	3.	3.	3.
4.	3.	3.	3.	3.	3.
2.	2.	2.	2.	2.	2.
2.	2.	1.	1.	1.	1.
1.	1.	2.	3.	4.	5.
10.	9.	9.	8.	7.	6.
4.	3.	3.	2.	2.	2.
14.	26.	44.	66.	91.	119.
224.	300.	379.	496.	663.	881.
2476.	3501.	3741.	4263.	4442.	4474.
3373.	3013.	2360.	2086.	1844.	1631.
996.	778.	687.	606.	535.	473.
388.	357.	343.	330.	316.	304.
258.	248.	229.	220.	203.	195.
172.	165.	153.	146.	141.	135.
110.	106.	102.	98.	94.	90.
					86.
					83.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
4474.	3728.	1581.	569.	81903.
127.	106.	45.	16.	2319.
	5.43	9.20	9.93	9.94
	137.84	233.77	252.32	252.37
	1048.	3135.	3384.	3384.
	2280.	3867.	4174.	4175.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 6

5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.
4.	3.	3.	3.	3.	3.
2.	2.	2.	2.	2.	2.
2.	2.	3.	4.	6.	8.
14.	14.	13.	11.	10.	9.
6.	5.	4.	4.	3.	3.
21.	39.	64.	97.	134.	175.
370.	441.	558.	732.	976.	1295.
3642.	5149.	5796.	6269.	6533.	6580.
4430.	3926.	3470.	3067.	2712.	2398.
1465.	1143.	1010.	892.	787.	695.
570.	526.	505.	485.	465.	447.
594.	547.	505.	485.	465.	447.
396.	365.	336.	323.	310.	298.
243.	234.	224.	215.	207.	199.
176.	162.	150.	144.	138.	132.
					127.
					122.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
6580.	5482.	2324.	836.	120448.
186.	155.	66.	24.	3411.
	7.98	13.53	14.61	14.61
	202.70	343.78	371.06	371.14
	2718.	4610.	4976.	4977.
	3353.	5687.	6138.	6139.

[illegible]

4.30 571
5.00 581
5.30 591
6.00 601
6.30 611
7.00 621
7.30 631
8.00 641
8.30 6501
9.00 6601
9.30 670 1
10.00 680 1
10.30 69.0 1
11.00 70.0 1
11.30 71.0 1
12.00 72.0 1
12.30 73.0 1
13.00 74. 0 1
13.30 75. 0 1
14.00 76. 0 1
14.30 77. 0 1
15.00 78. 0 1
15.30 79. 0 1
16.00 80. 0 1
16.30 81. 0 1
17.00 82. 0 1
17.30 83. 0 1
18.00 84. 0 1
18.30 85. 0 1
19.00 86. 0 1
19.30 87. 0 1
20.00 88. 0 1
20.30 89. 0 1
21.00 90. 0 1
21.30 91. 0 1
22.00 92. 0 1
22.30 93. 0 1
23.00 94. 0 1
23.30 95. 0 1
0. 96. 0 1
0.30 97. 0 1
1.00 98. 0 1
1.30 99. 0 1
2.00 100. 0 1
2.30 101. 0 1
3.00 102. 0 1
3.30 103. 0 1
4.00 104. 0 1
4.30 105. 0 1
5.00 106. 0 1
5.30 107. 0 1
6.00 108. 0 1
6.30 109. 0 1
7.00 110. 0 1
7.30 111. 0 1
8.00 112. 0 1
8.30 113. 0 1
9.00 114. 0 1
9.30 115. 0 1
10.00 116. 0 1
10.30 117. 0 1

11.00119. 1 0.
11.30119. 1 0.
12.00120. 1 0.
12.30121. 1 0.
13.00122. 1 0.
13.30123. 1 0.
14.00124. 1 0.
14.30125. 1 0.
15.00126. 1 0.
15.30127. 1 0.
16.00128. 1 0.
16.30129. 1 0.
17.00130. 1 0.
17.30131. 1 0.
18.00132. 1 0.
18.30133. 1 0.
19.00134. 1 0.
19.30135. 1 0.
20.00136. 1 0.
20.30137. 1 0.
21.00138. 1 0.
21.30139. 1 0.
22.00140. 1 0.
22.30141. 1 0.
23.00142. 1 0.
23.30143. 1 0.
0. 144. 1 0.
0.30145. 1 0.
1.00146. 1 0.
1.30147. 1 0.
2.00148. 1 0.
2.30149. 1 0.
3.00150. 1 0.

STATION 1, PLAN 1, RATIO 6
END-OF-PERIOD HYDROGRAPH ORDINATES

		OUTFLOW									
0.	1.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
0.	1.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.	3.	3.	3.	3.	2.	2.	2.	2.	2.	2.	2.
2.	3.	3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
4.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
5.	6.	6.	7.	7.	7.	7.	7.	7.	7.	7.	7.
6.	6.	6.	11.	11.	11.	11.	11.	11.	11.	11.	11.
7.	91.	109.	174.	174.	174.	174.	174.	174.	174.	174.	174.
8.	1505.	1958.	2483.	3153.	4207.	5129.	5761.	6089.	6136.	6136.	6136.
9.	5956.	5621.	5215.	4322.	3902.	3526.	3194.	2914.	2722.	2722.	2722.
10.	2541.	2358.	2173.	1834.	1675.	1523.	1379.	1246.	1131.	1131.	1131.
11.	1044.	966.	897.	835.	789.	753.	694.	623.	592.	592.	592.
12.	562.	535.	509.	485.	463.	442.	404.	389.	375.	375.	375.
13.	361.	348.	335.	322.	310.	298.	276.	265.	255.	255.	255.
14.	245.	235.	226.	217.	208.	192.	185.	177.	170.	170.	170.

STORAGE

[illegible]

STAGE

[illegible]

PEAK OUTFLOW IS 6136. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6136.	5038.	2786.	822.	118380.

3554.
14.56
364.77
4892.
6034.

23.
14.56
364.75
4891.
6034.

63.
15.31
358.18
4535.
5594.

143.
7.33
186.27
2498.
3081.

174.

100
1000'S
MM
AC-FT
THOUS CU M

4.50 571
5.00 581
5.50 591
6.00 601
6.50 611
7.00 621
7.50 631
8.00 641
8.50 6501
9.00 6601
9.50 6701
10.00 6801
10.50 6901
11.00 70.01
11.50 71.01
12.00 72.01
12.50 73.01
13.00 74.01
13.50 75.01
14.00 76.01
14.50 77.01
15.00 78.01
15.50 79.01
16.00 80.01
16.50 81.01
17.00 82.01
17.50 83.01
18.00 84.01
18.50 85.01
19.00 86.01
19.50 87.01
20.00 88.01
20.50 89.01
21.00 90.01
21.50 91.01
22.00 92.01
22.50 93.01
23.00 94.01
23.50 95.01
0.50 96.01
0.50 97.01
1.00 98.01
1.50 99.01
2.00 100.01
2.50 101.01
3.00 102.01
3.50 103.01
4.00 104.01
4.50 105.01
5.00 106.01
5.50 107.01
6.00 108.01
6.50 109.01
7.00 110.01
7.50 111.01
8.00 112.01
8.50 113.01
9.00 114.01
9.50 115.01
10.00 116.01
10.50 117.01

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

OPERATION	STATION	AREA	PLAN	RATIO	RATIOS APPLIED TO FLOWS					
					RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
					0.50	0.54	0.55	0.67	0.68	1.00
HYDROGRAPH AT	1	6.39	1	3290.	3553.	3619.	4408.	4474.	6580.	
		(15891.55)	(	93.16)	100.61)	102.47)	124.83)	126.69)	186.31)	(
ROUTED TO	1	6.39	1	2606.	2821.	2888.	3797.	3869.	6136.	
		(15891.55)	(	73.78)	79.90)	81.77)	107.52)	109.57)	173.75)	(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	ELEVATION STORAGE OUTFLOW	INITIAL VALUE		SPILLWAY CREST	TOP OF DAM		DURATION OVER TOP HOURS	MAXIMUM OUTFLOW CFS	TIME OF MAX OUTFLOW		TIME OF FAILURE HOURS
			533.00	1228.		533.00	540.50			HOURS	HOURS	
0.50	540.08		0.	0.	1228.	0.	1892.	0.	2606.	46.00	0.	0.
0.54	540.49			0.	1228.	0.	1894.	0.	2621.	46.00	0.	0.
0.55	540.59			0.09	1228.	0.	1905.	1.00	2888.	45.50	0.	0.
0.67	541.47			0.97	1228.	0.	1999.	4.00	3797.	45.50	0.	0.
0.68	541.52			1.02	1228.	0.	2006.	4.50	3869.	45.50	0.	0.
1.00	543.04			2.54	1228.	0.	2170.	7.50	6136.	45.00	0.	0.

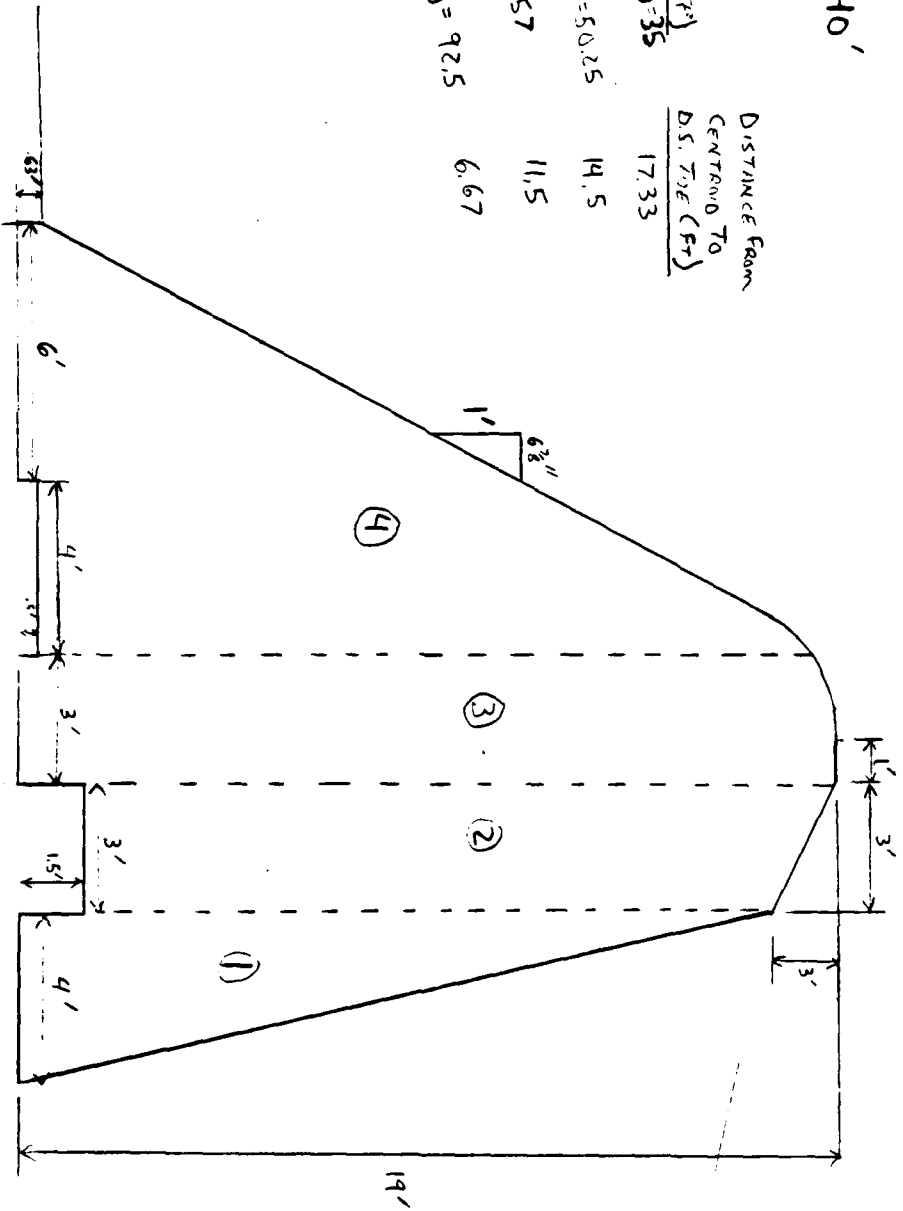
APPENDIX D
STABILITY COMPUTATIONS

MEAD RESERVOIR DAM I.D. NO. 237

CROSS SECTION OF SPILLWAY
GRAVITY SECTION

SCALE 1" = 40'

SEGMENT	AREA (ft ²)	DISTANCE FROM CENTROID TO D.S. TOE (ft)
①	$\frac{1}{2}(4)(17.5) = 35$	17.33
②	$(3)(16.75) = 50.25$	14.5
③	$(3)(19) = 57$	11.5
④	$\frac{1}{2}(10)(18.5) = 92.5$	6.67



STRUCTURAL STABILITY ANALYSIS

This analysis was based on a cross section of the spillway segment shown on the plans. A normal analysis was performed including both overturning and sliding analysis. Since the foundation conditions and the effectiveness of the cutoff wall was unknown, full uplift was assumed at the upstream toe, decreasing to the tailwater pressure at the downstream toe.

ANALYSIS CONDITIONS

1. Normal conditions; water surface at spillway crest
2. Same as #1 plus ice load of 5,000 pounds per linear foot.
3. 1/2 PMF; water surface 7.1 feet over the spillway crest
4. Flood flows; water surface 7.5 feet over the spillway crest (at top of relief weir embankment segment)
5. Seismic conditions - water at spillway crest with seismic coefficient of 0.1.

STABILITY ANALYSIS PROGRAM - WORK SHEET

<u>INPUT ENTRY</u>		<u>ANALYSIS CONDITION</u>				
		1	2	3	4	5
Unit Weight of Dam (K/ft ³)	0	0.15	0.15	0.15	0.15	0.15
Area of Segment No. 1 (ft ²)	1	35	35	35	35	35
Distance from Center of Gravity of Segment No. 1 to Downstream Toe (ft)	2	17.33	17.33	17.33	17.33	17.33
Area of Segment No. 2 (ft ²)	3	50.25	50.25	50.25	50.25	50.25
Distance from Center of Gravity of Segment No. 2 to Downstream Toe (ft)	4	14.5	14.5	14.5	14.5	14.5
Area of Segment No. 3 (ft ²)	5	57	57	57	57	57
Distance from Center of Gravity of Segment No. 3 to Downstream Toe (ft)	6	11.5	11.5	11.5	11.5	11.5
Base Width of Dam (Total) (ft)	7	20	20	20	20	20
Height of Dam (ft)	8	19	19	19	19	19
Ice Loading (K/L ft.)	9	—	5.0	—	—	—
Coefficient of Sliding	10	0.65	0.65	0.65	0.65	0.65
Unit Weight of Soil (K/ft ³) (default 10)	11	0.055	0.055	0.055	0.055	0.055
Active Soil Coefficient - Ka	12	0.24	0.24	0.24	0.24	0.24
Passive Soil Coefficient - Kp	13	4.11	4.11	4.11	4.11	4.11
Height of Water over Top of Dam or Spillway (ft)	14	—	—	7.1	7.5	—
Height of Soil for Active Pressure (ft)	15	16	16	16	16	16
Height of Soil for Passive Pressure (ft)	16	0.63	0.63	0.63	0.63	0.63
Height of Water in Tailrace Channel (ft)	17	2	2	5	5	2
Weight of Water (K/ft ³)	18	0.0624	0.0624	0.0624	0.0624	0.0624
Area of Segment No. 4 (ft ²)	19	92.5	92.5	92.5	92.5	92.5
Distance from Center of Gravity of Segment No. 4 to Downstream Toe (ft)	20	6.67	6.67	6.67	6.67	6.67
Height of Ice Load or Active Water (ft) (does not include 14)	46	19	19	19	19	19
Seismic Coefficient (g)	50	—	—	—	—	0.1
<u>RESULTS OF ANALYSIS</u>						
Factor of Safety vs. Overturning		1.58	1.14	1.16	1.14	1.52
Distance From Toe to Resultant		6.53	3.24	2.63	2.41	6.09
Factor of Safety vs. Sliding		1.12	0.81	0.65	0.64	0.82

APPENDIX E

REFERENCES

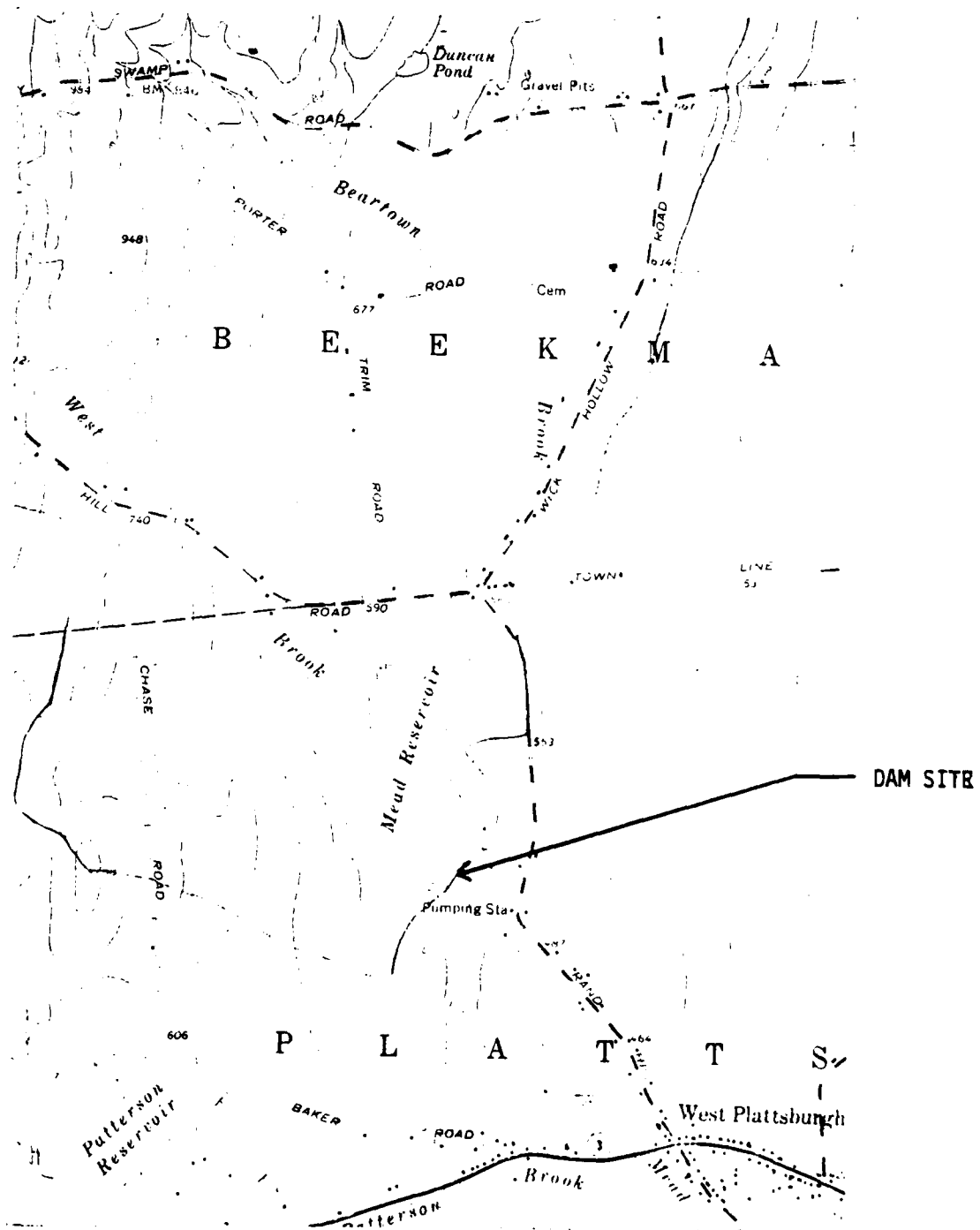
APPENDIX E

REFERENCES

- 1) U.S. Department of Commerce; Weather Bureau;
Hydrometeorological Report No. 33 - Seasonal Variation of the Probable
Maximum Precipitation East of the 105th Meridian for Areas from 10 to
1,000 Square Miles and Durations of 6, 12, 24, and 48 Hours, April 1956.
- 2) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition,
McGraw-Hill, 1963.
- 3) University of the State of New York, Geology of New York, Education
Leaflet 20, Reprinted 1973.
- 4) Elwyn E. Seelye, Design, 3rd edition, John Wiley and Sons, Inc., 1960.
- 5) U.S. Department of the Interior, Bureau of Reclamations;
Design of Small Dams, 2nd edition (rev. reprint), 1977.

APPENDIX F

DRAWINGS

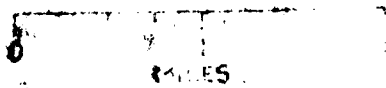


TOPOGRAPHIC MAP
MEAD RESERVOIR DAM

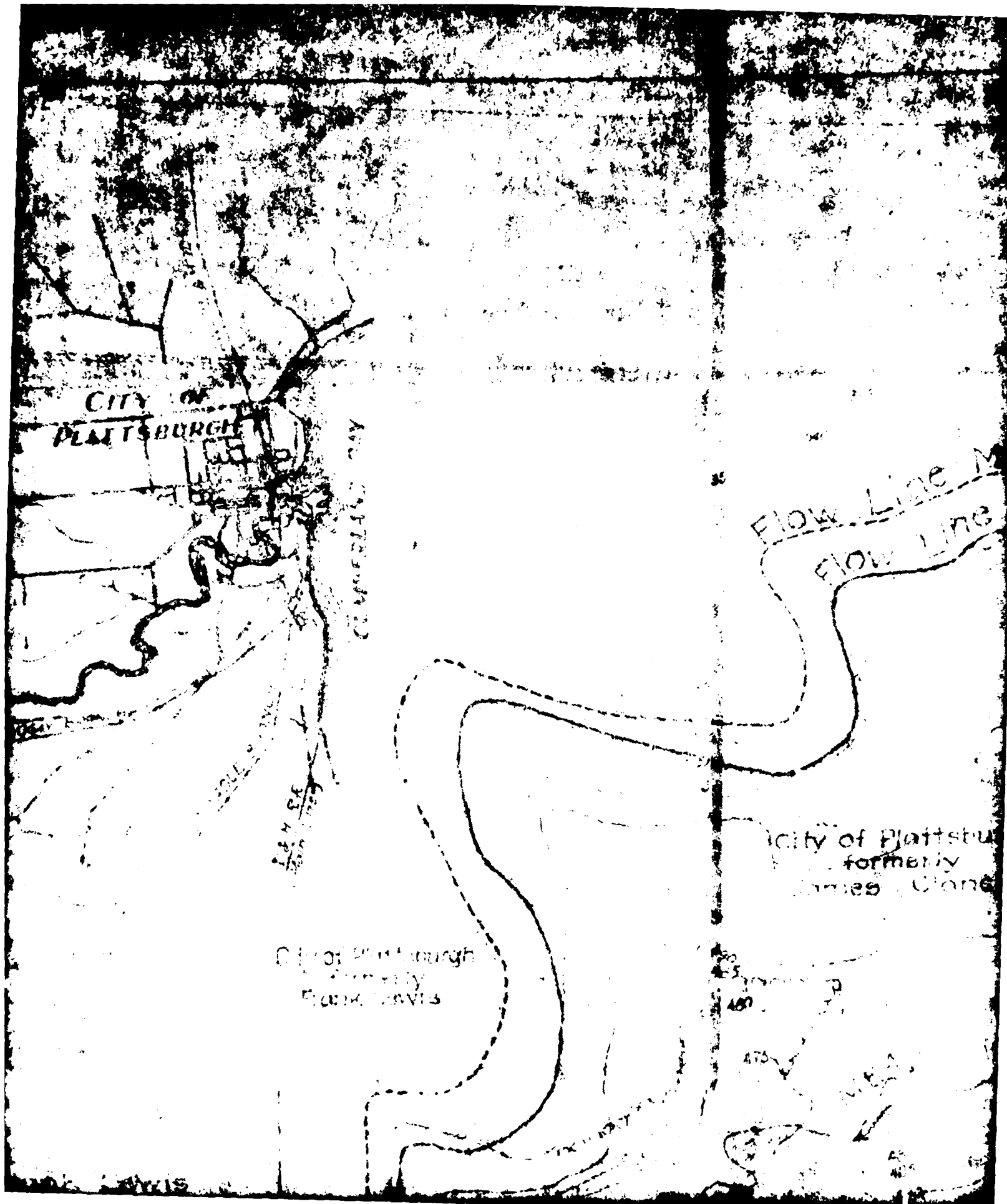
I.D. NO. NY 237



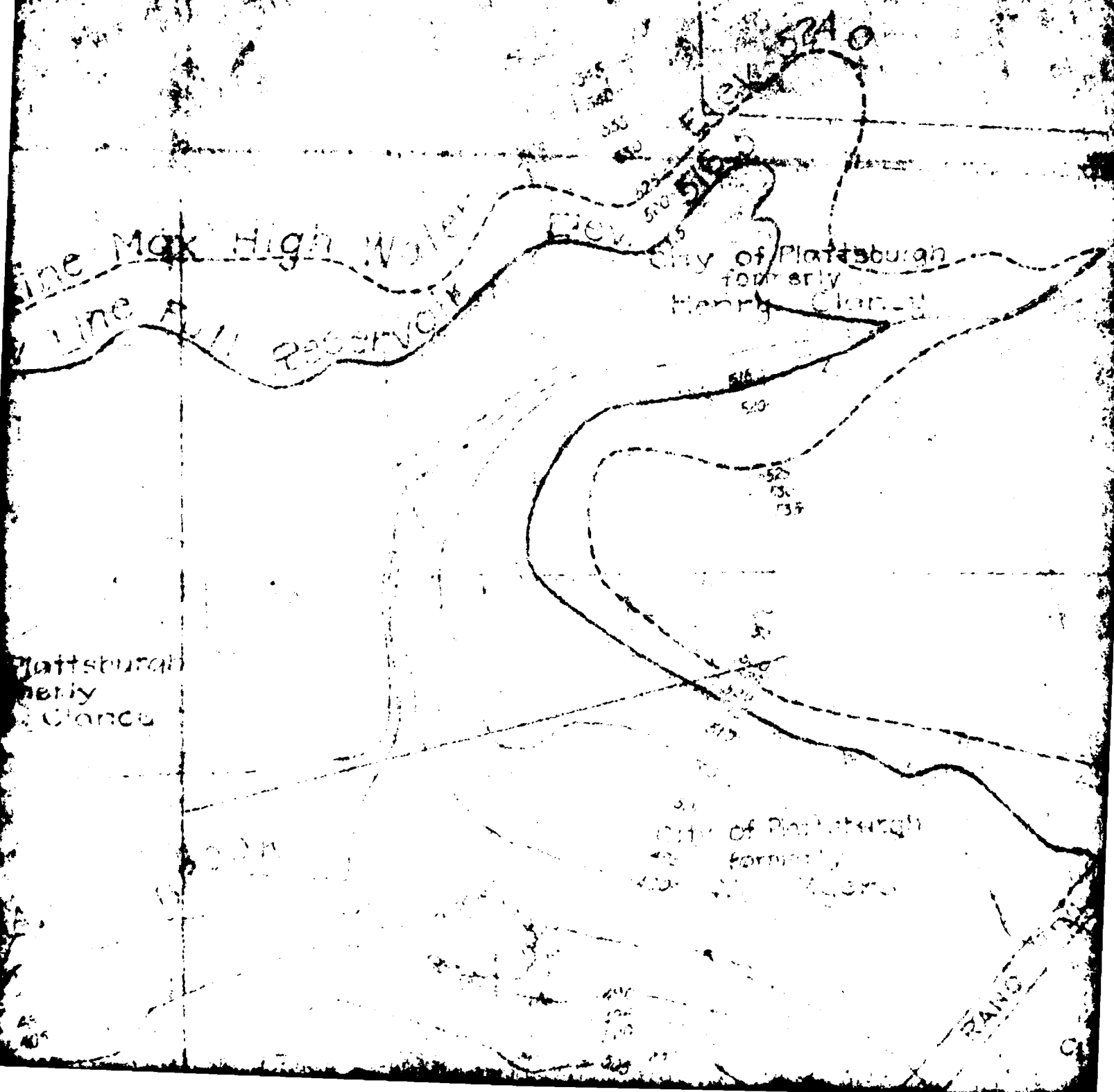
Location Plan



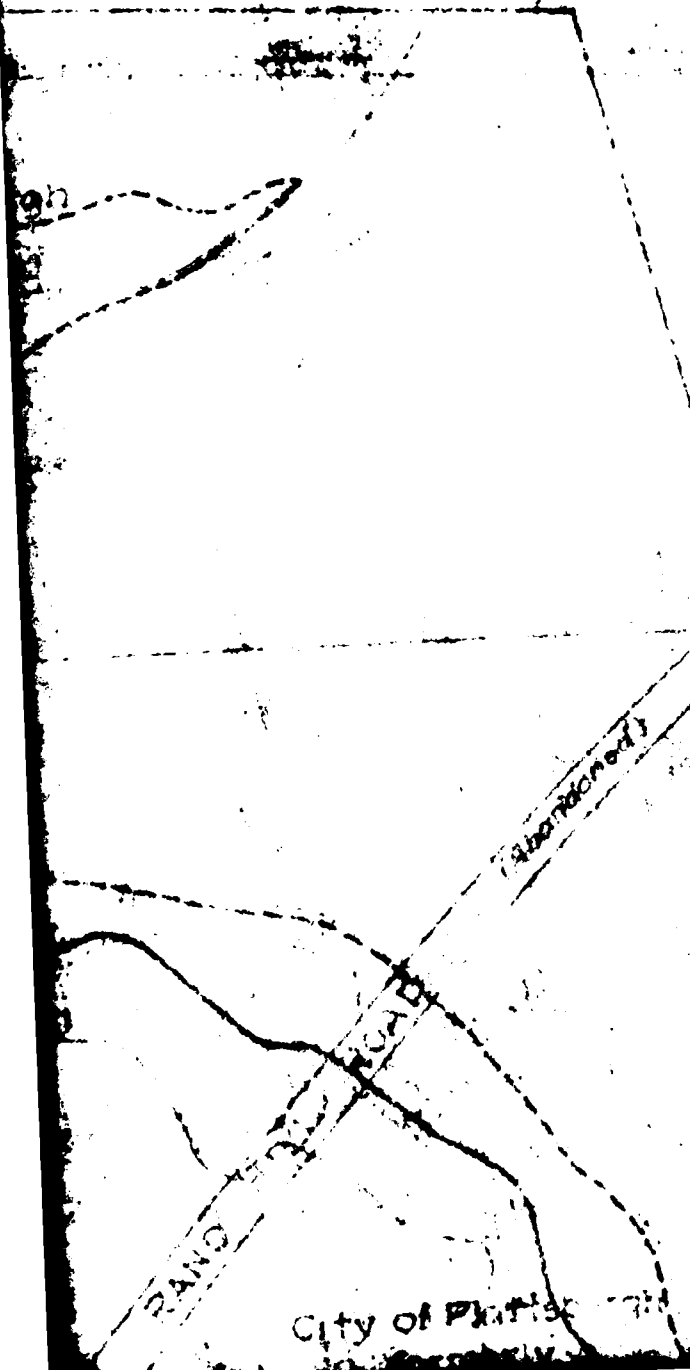
WEST BRANCH
WEST PORTSMOUTH
SABING
DELAWARE
DISTRICT RESERVOIR
PU
0
MILES

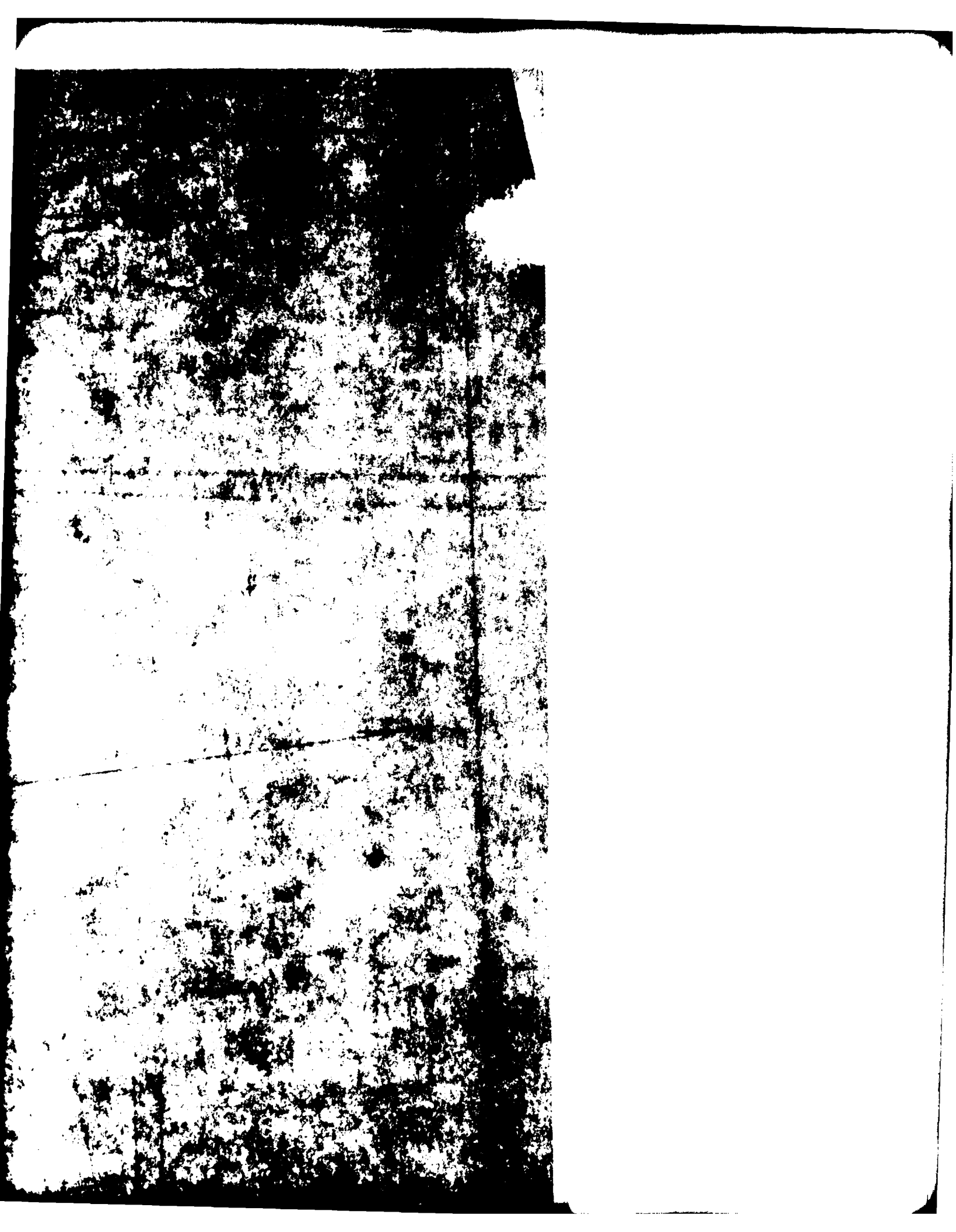


Mrs. J. B.



Mrs. J. B. H. H. H.





CO. BURN'S

WEST
HATFIELD

DITCH
SUPPLY LINE
Not to scale

RA 21

Riley

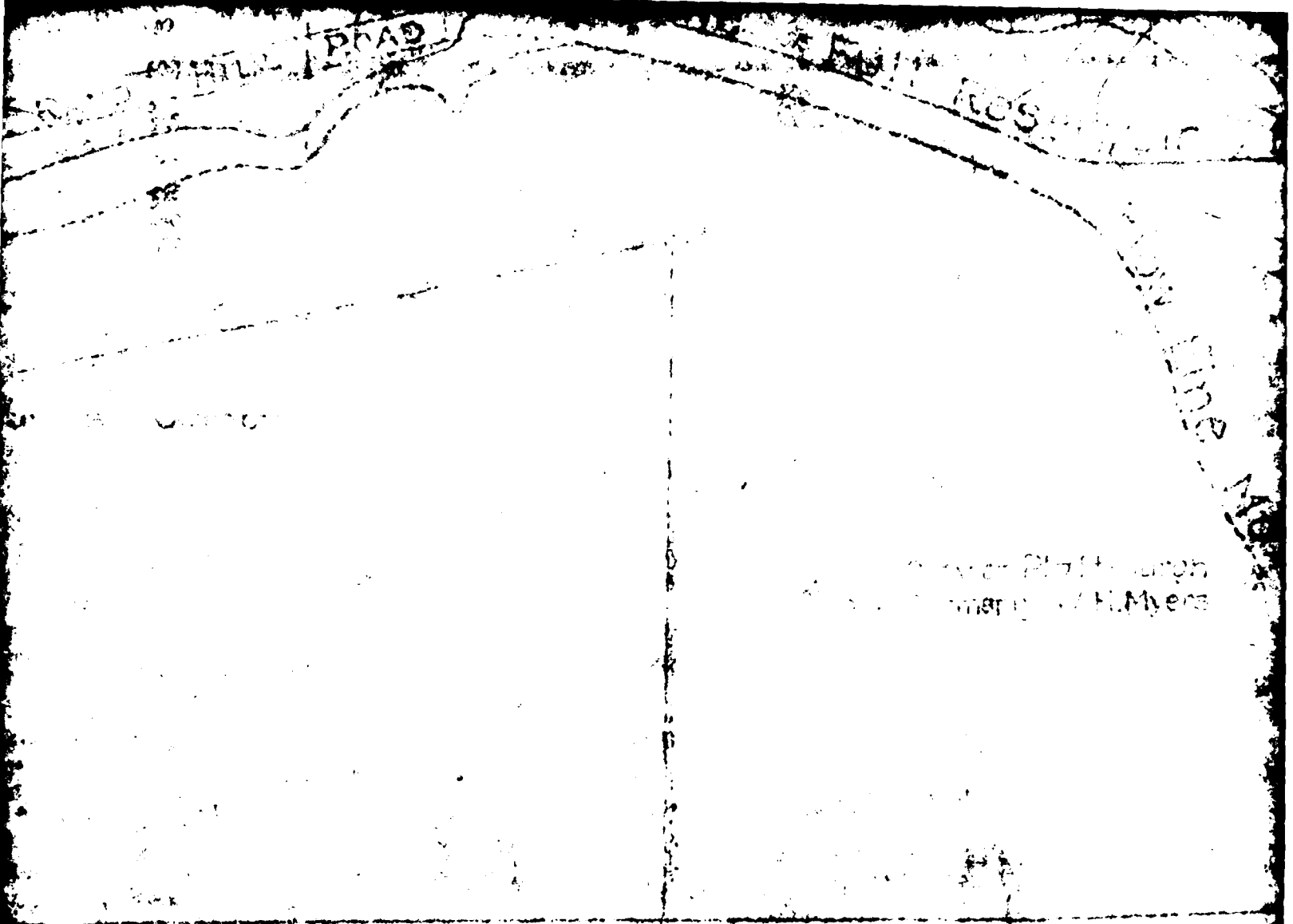
John Riley
House

John Riley
House

J. Riley

City of Raleigh
formerly H.C.

Plan of Meade



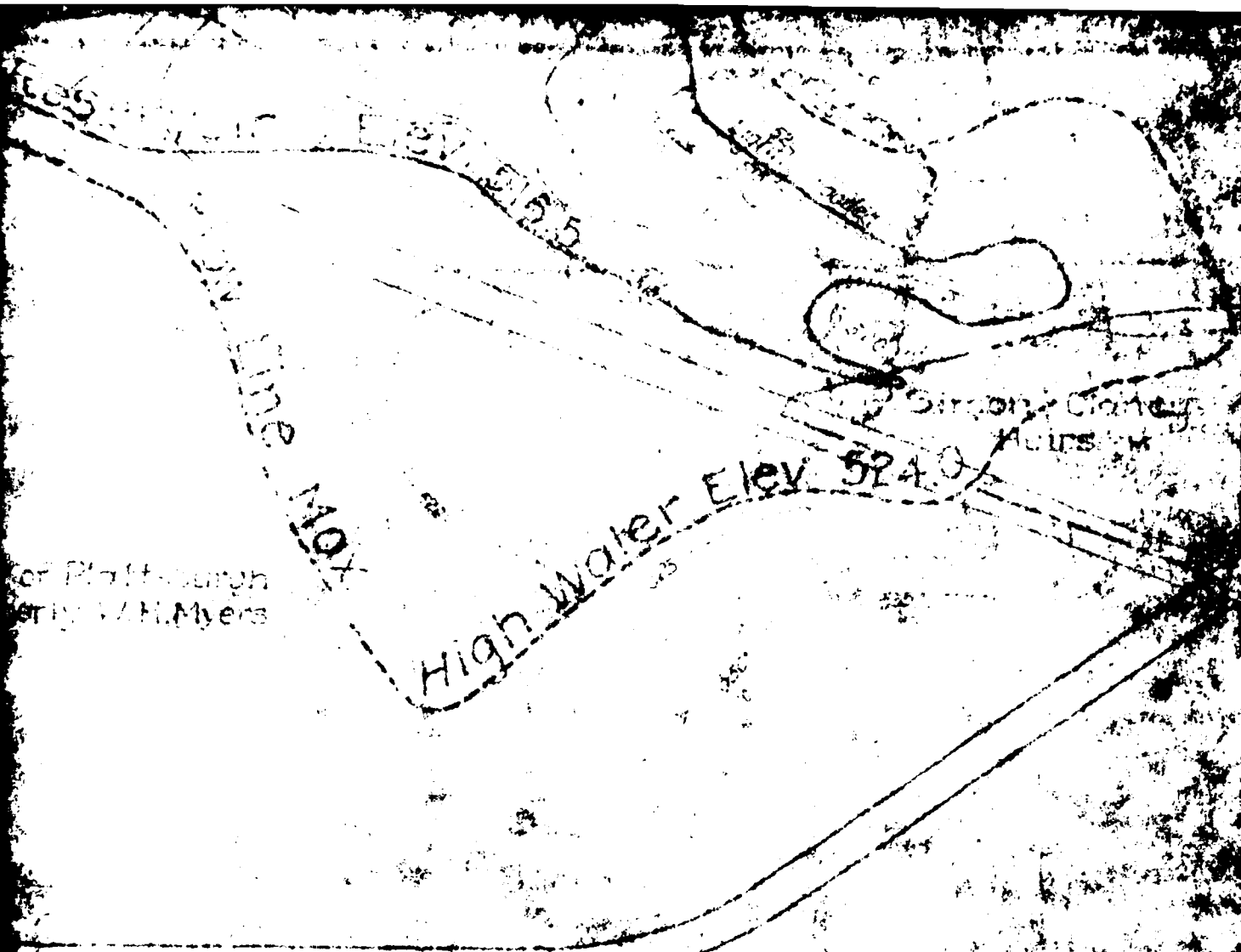
Right of Way Road Mill Road Relocation

of Matteaugus
formerly H. Clancy

City of Plattburgh
formerly V.A.

Mead Brook Relocation
State of N.Y.

Notes: All structures within the R.O.W. of the
Matteaugus River and the structure of
the bridge are to be demolished and
replaced with a new structure of
steel and concrete. The new bridge
will be 100 feet long and 20 feet
wide.



City of Plattsmouth
formerly V.H. Myers

City of Plattsmouth
formerly V.H. Myers

Local
S.A.

5.4 ft. of water of flow
and structure of head
as shown by the
flow and structure
of the dam.

5240

RECORD PLAT

WATERSHED

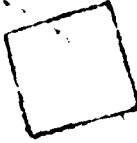
HEAD BROOK

LOCATION

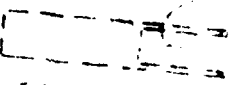
STATE

0
14
00

475



Sod Chloride



Chlorination House



475

1A

1

465

Old Brook Channel

MEAD BROOK

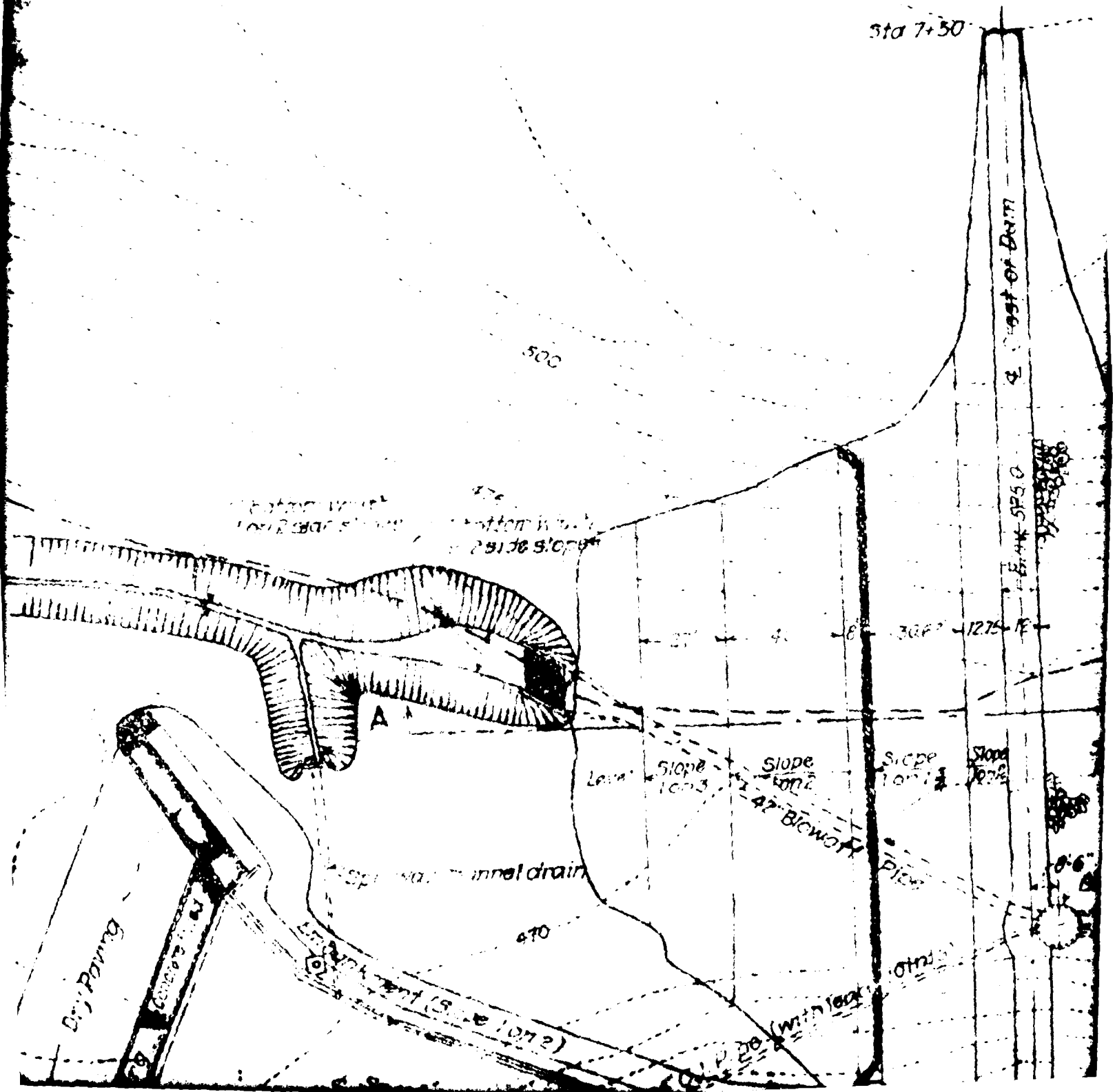
Brook channeling of
existing brook bedrock
existing brook bedrock
Chlorination House

Pipe

Long Paving

Leaving

13



H-50

Elev 525.0 - Crest of Dam

500

Stone Riprap

52

A

475

Stone Lani 2

Slope on 3

Gate House

20"

20"

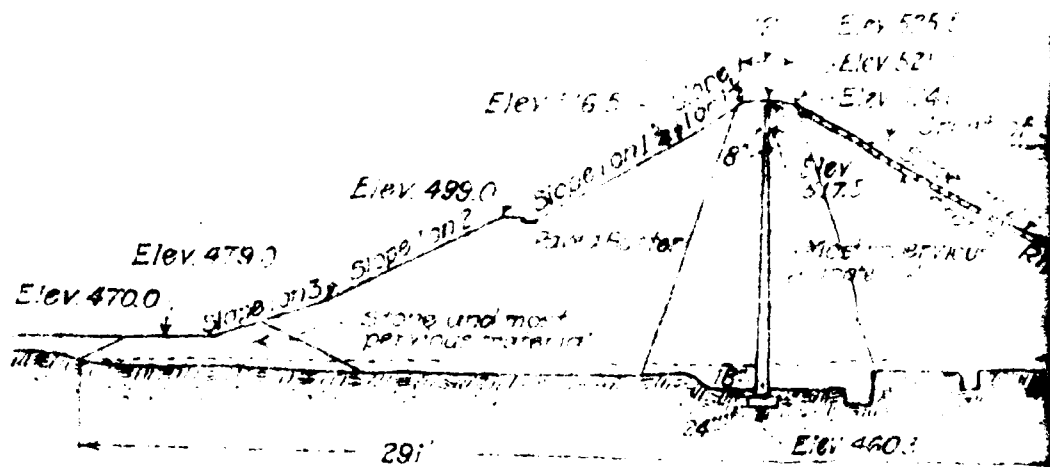
Intakes

Stone Riprap

24"

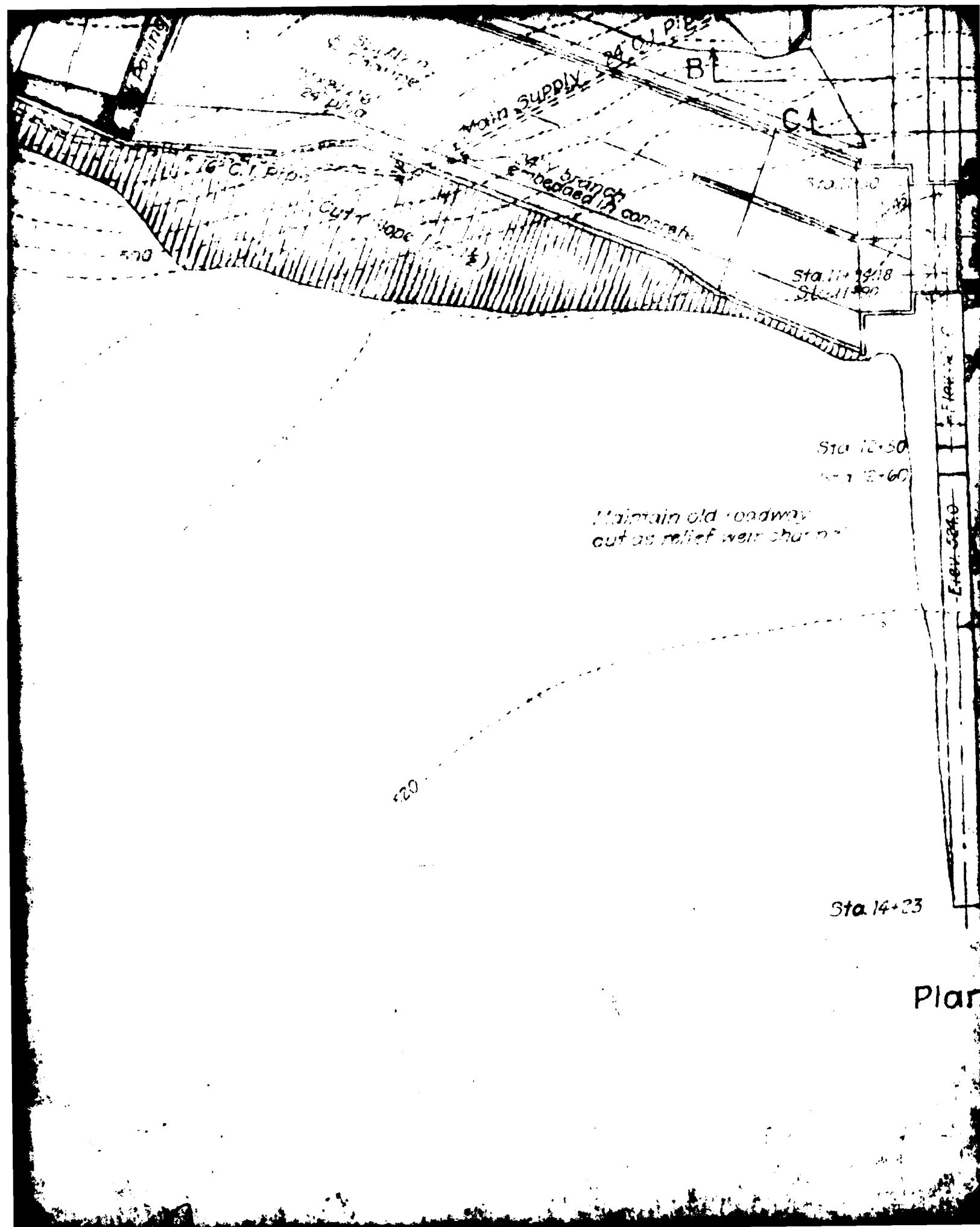
B

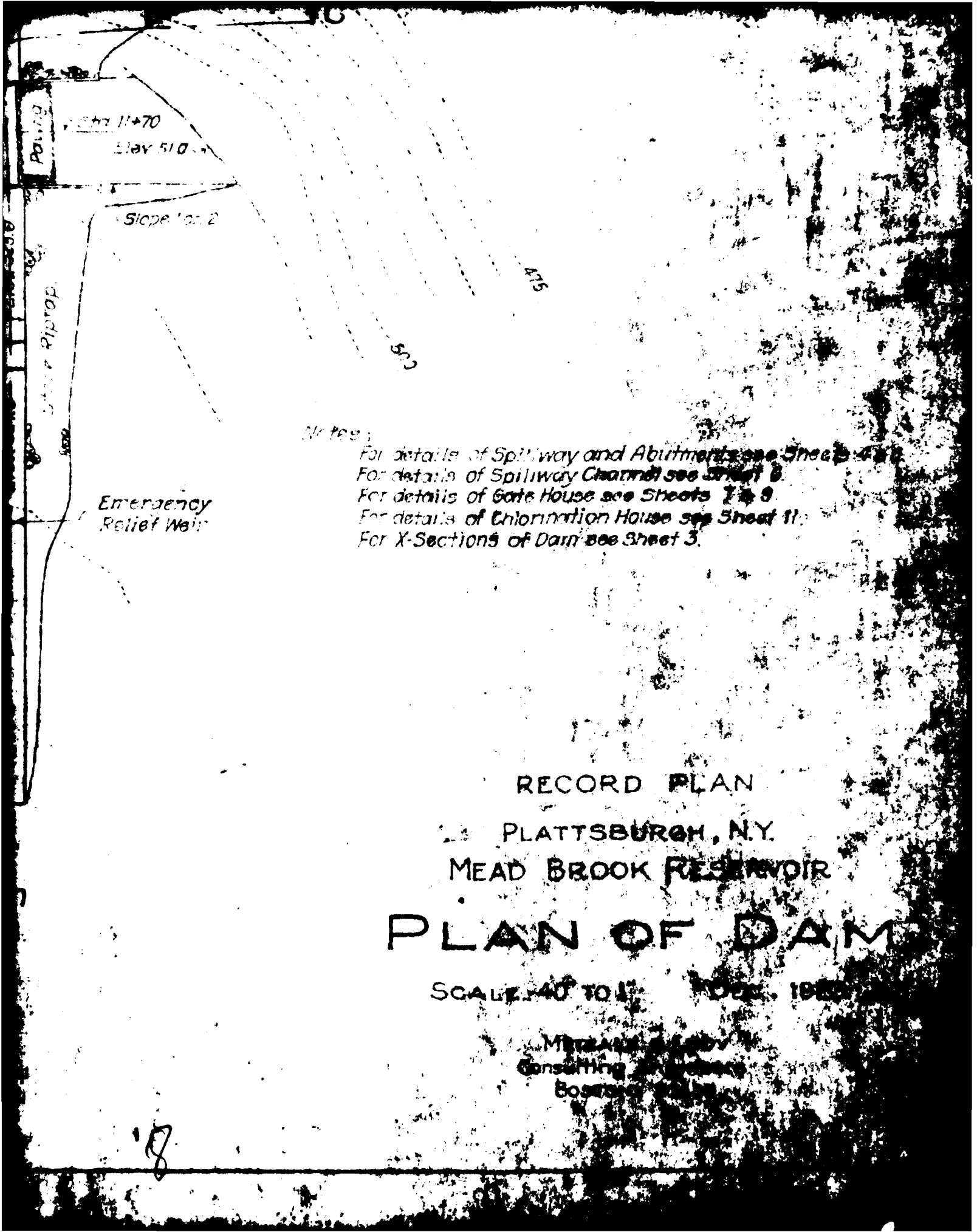
C



Section A-A

Drawn by C.E.C.
 Traced by E.S.B.
 Checked by





Notes:

For details of Spillway and Abutments see Sheets 4 & 5

For details of Spillway Channel see Sheet 6

For details of Gate House see Sheets 7 & 8

For details of Chlorination House see Sheet 11

For X-Sections of Dam see Sheet 3

Emergency
Relief Weir

RECORD PLAN

PLATTSBURGH, N.Y.

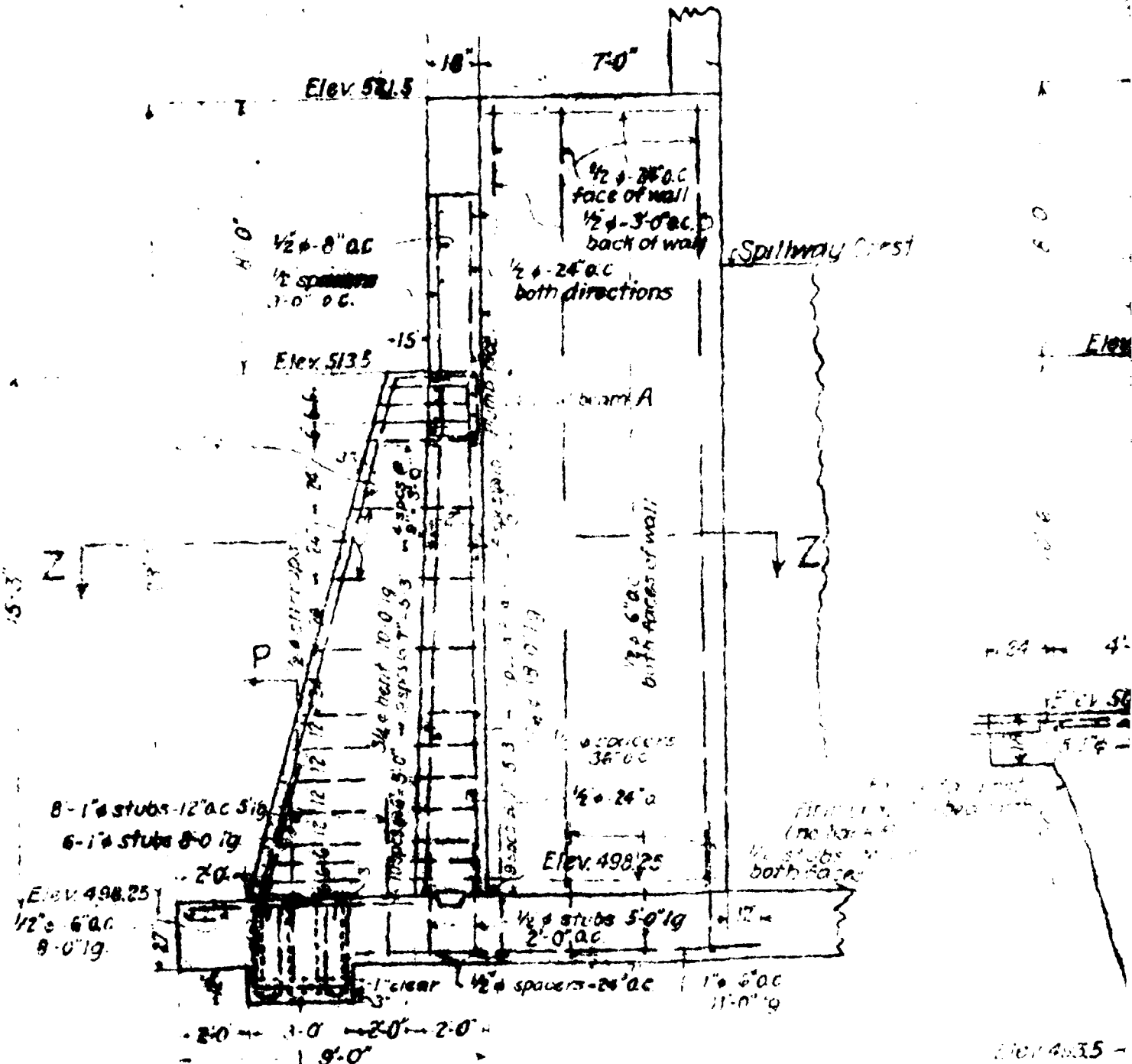
MEAD BROOK RESERVOIR

PLAN OF DAM

SCALE 1/4" TO 1' DEC. 1925

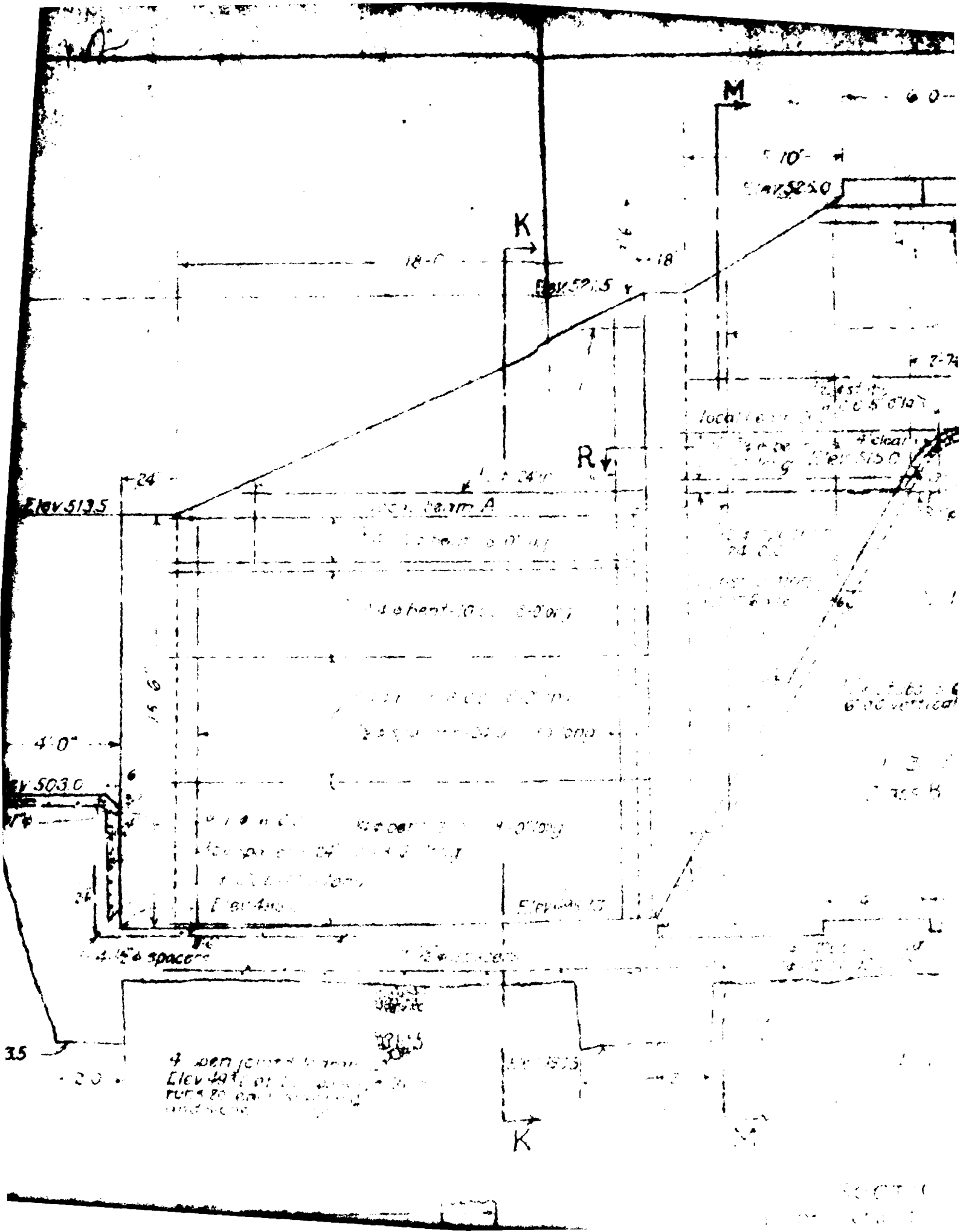
MERRILL & LLOYD
Consulting Engineers
Boston, Mass.

17



Section K-K





AD-A105 761

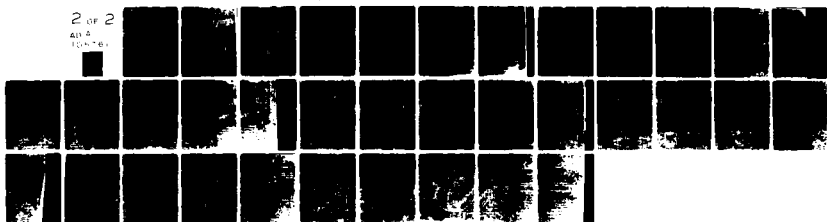
NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. MEAD RESERVOIR DAM (INVENTORY NUMB--ETC(U)
AUG 81 G KOCH DACW51-79-C-0001

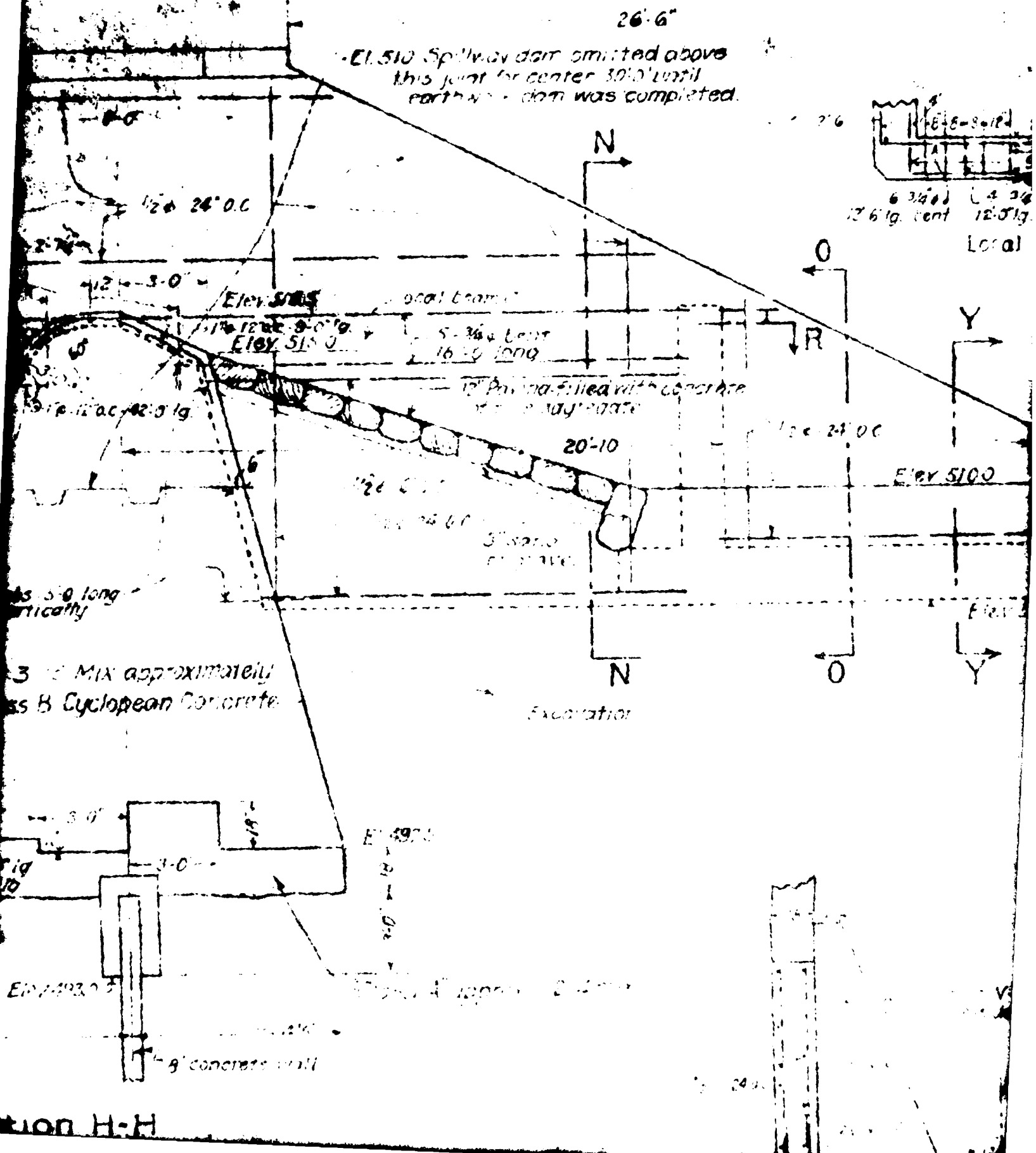
UNCLASSIFIED

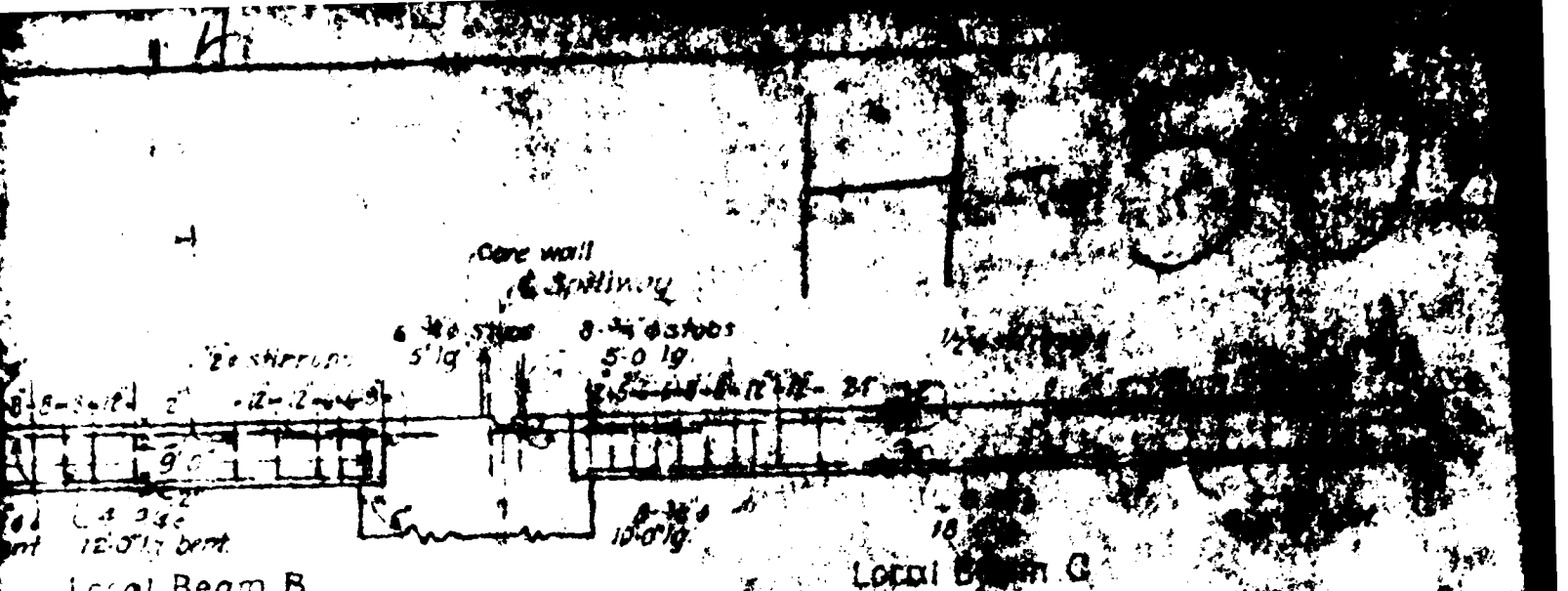
NL

2 OF 2

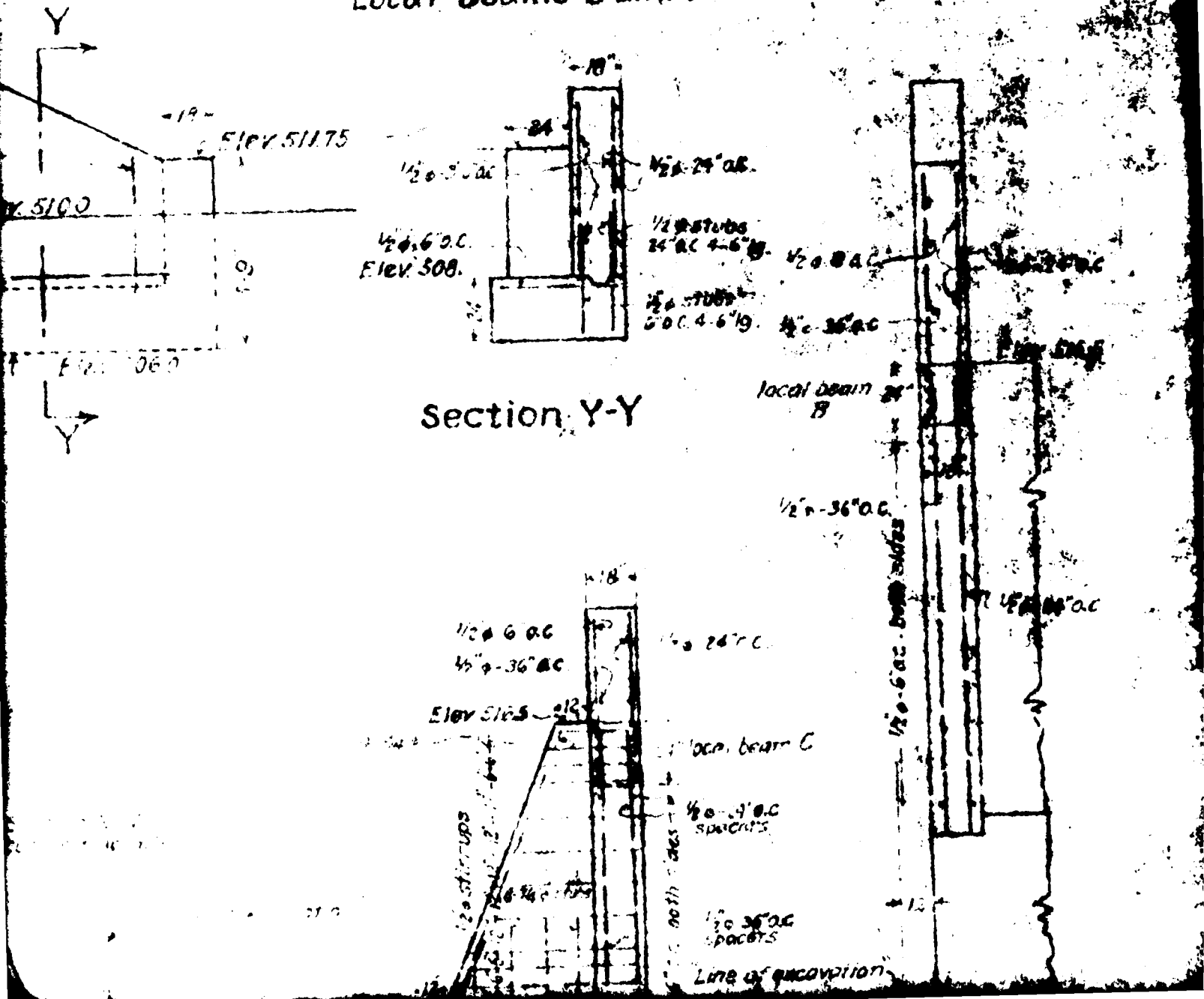
AD-A
105 761

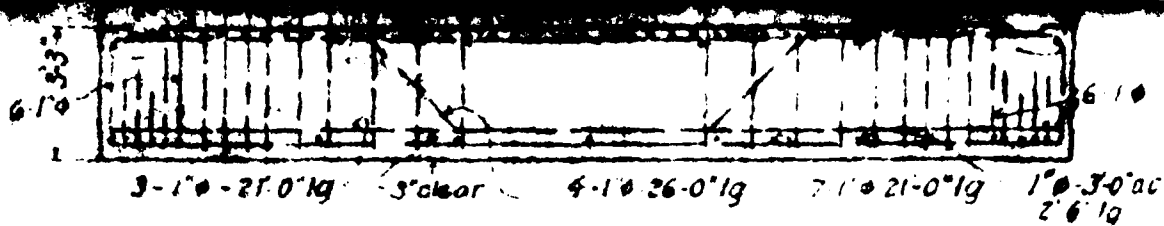




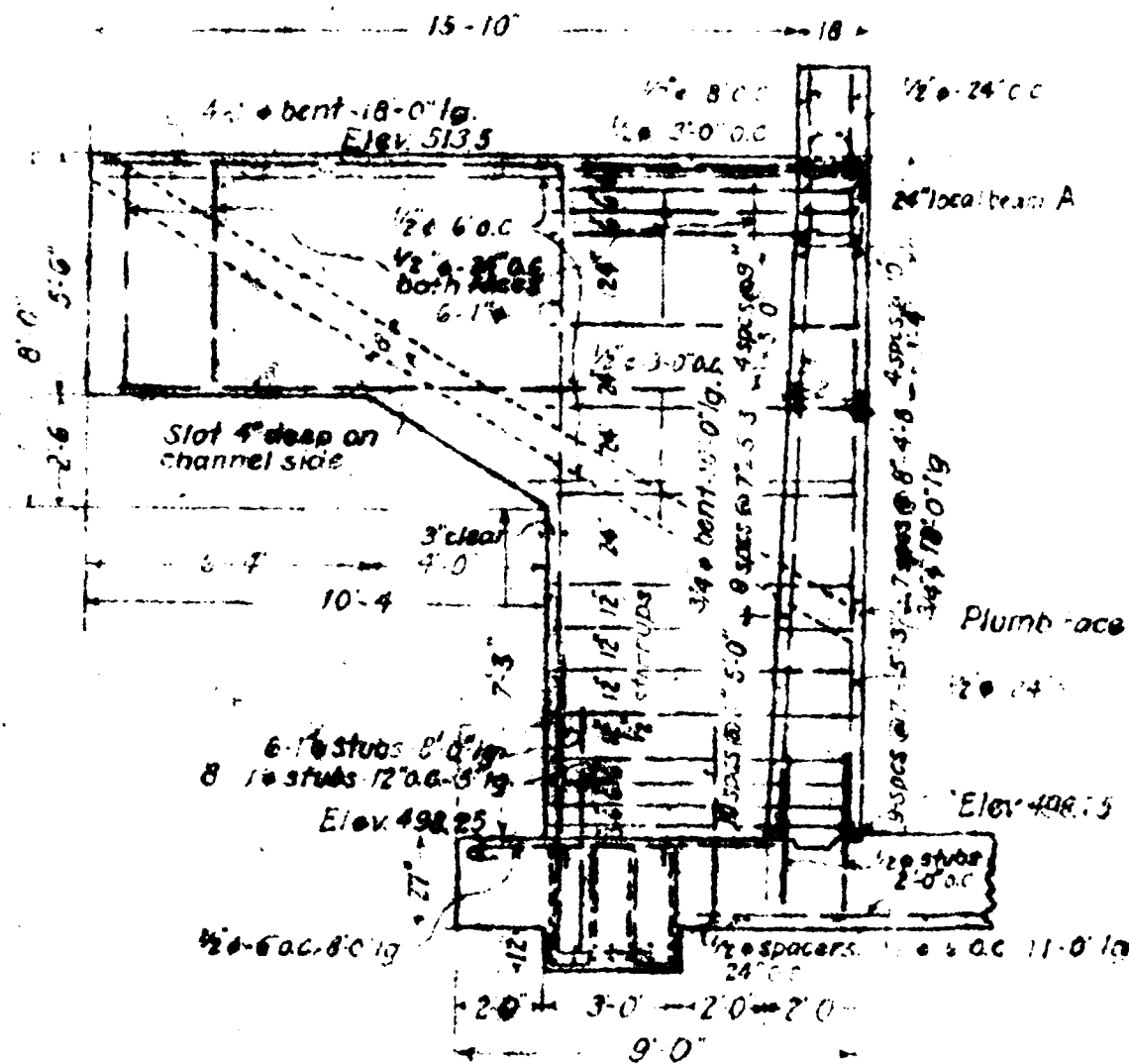


Sectional Plan R-R
Local Beams B and C





Section P-P



Section L-L.

Drawn by ESS

Tracy in ESO

Checked by *[Signature]*

4/18/66

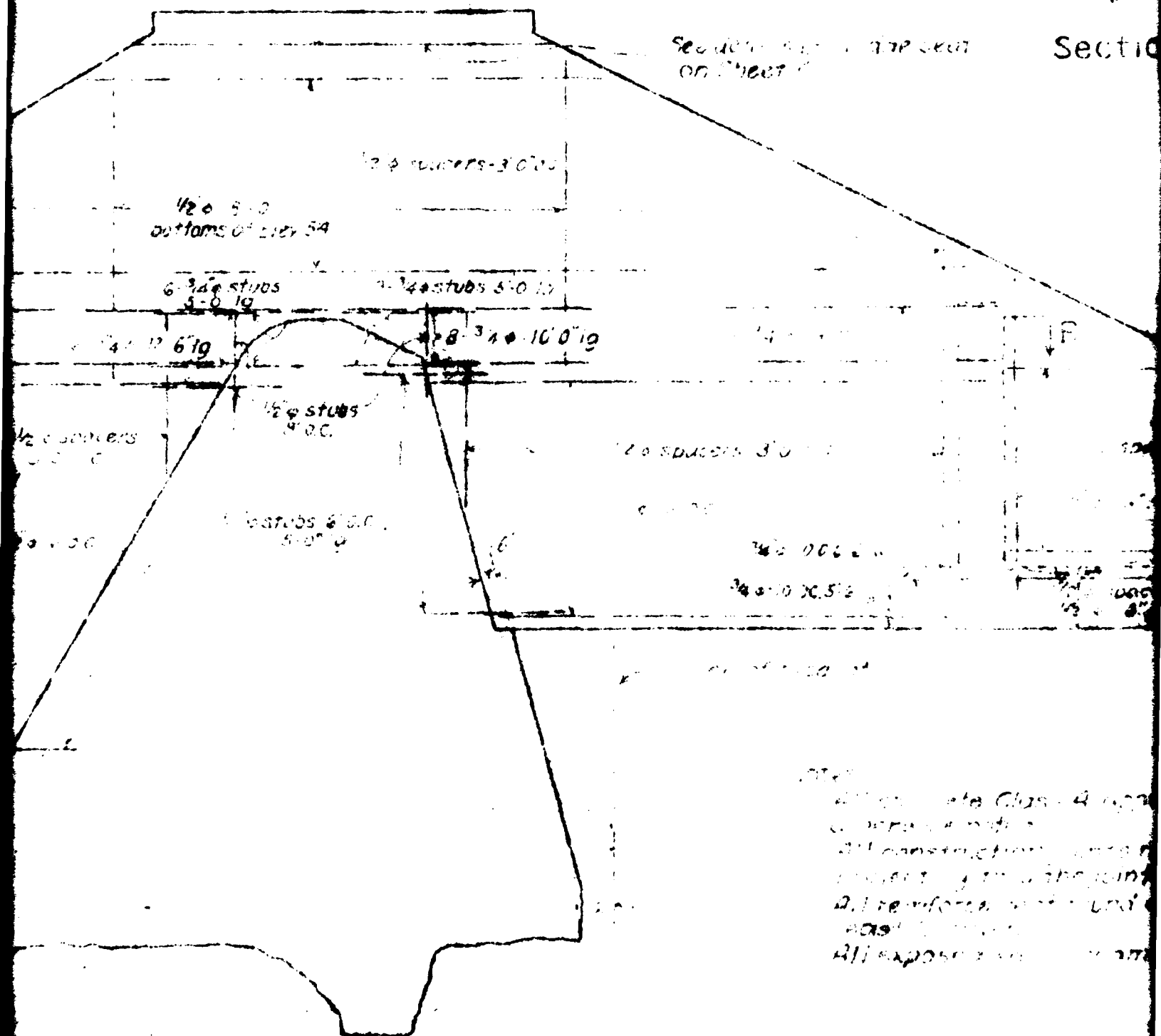
5

Reinforcement in Foot of Wall

2000

See also page 107 of sheet
on sheet 1

Section



100

All concrete Class 4 or greater

All construction joints

All reinforcement steel

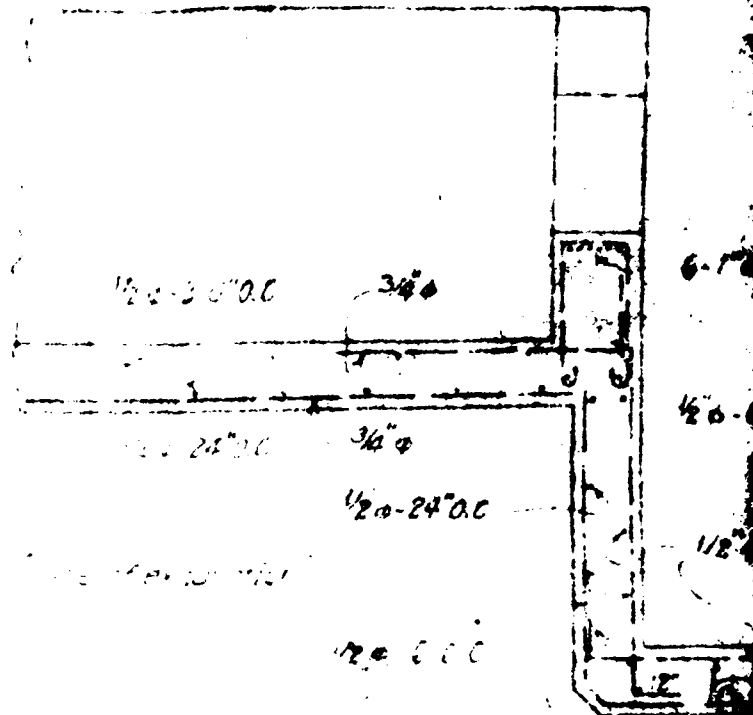
All exposed rebar

Section J-J

Reinforcement in back of Wall

Section O-O

Section N-N



Sectional Plan Z-Z

RECORD

PLATTSBURGH

MEAD BROOK

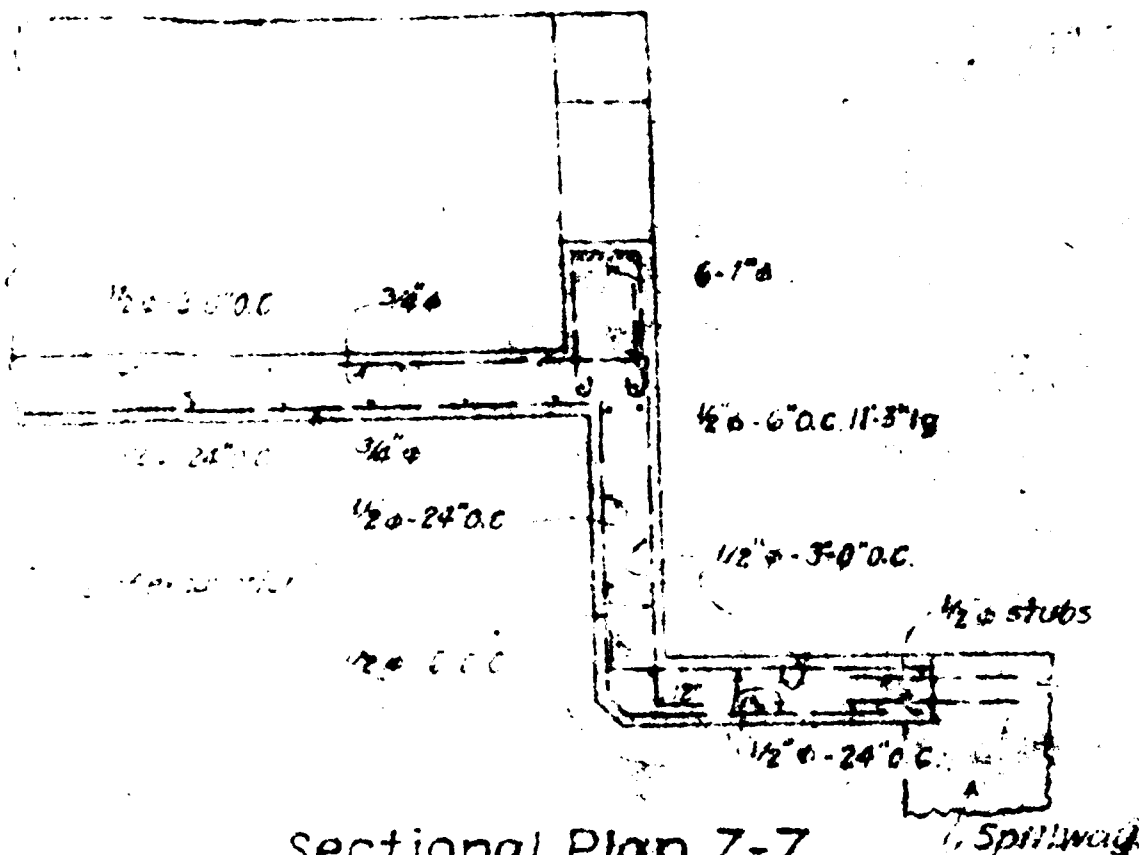
SPILLWAY

SCALE 1/4" = 1'

MEAD BROOK
CONSULTING

Section N-N

Section M-M



Sectional Plan Z-Z

RECORD PLAN

PLATTSBURGH, N.Y.

MEAD BROOK RESERVOIR

SPILLWAY ABUTMENTS

SCALE 3/4" = 1'

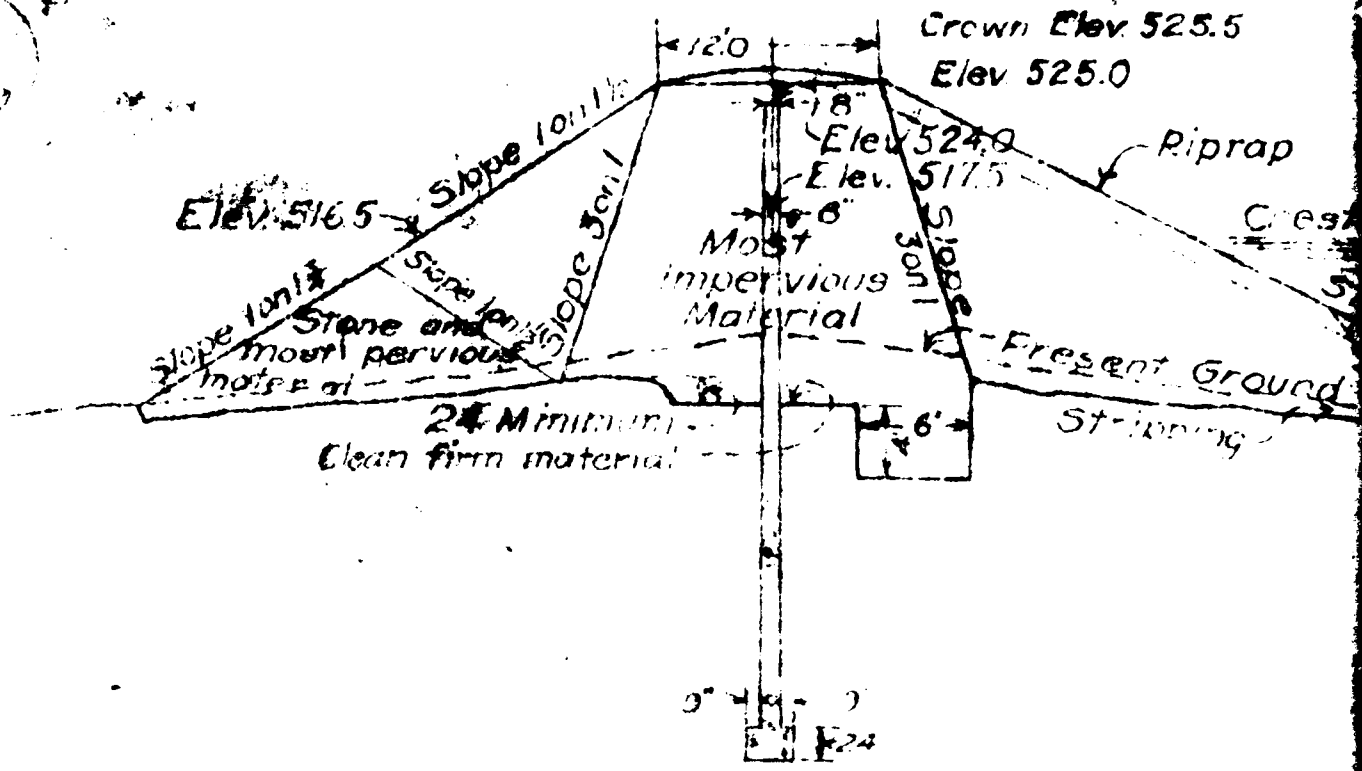
DEC 1923

MEAD

CONSULTING

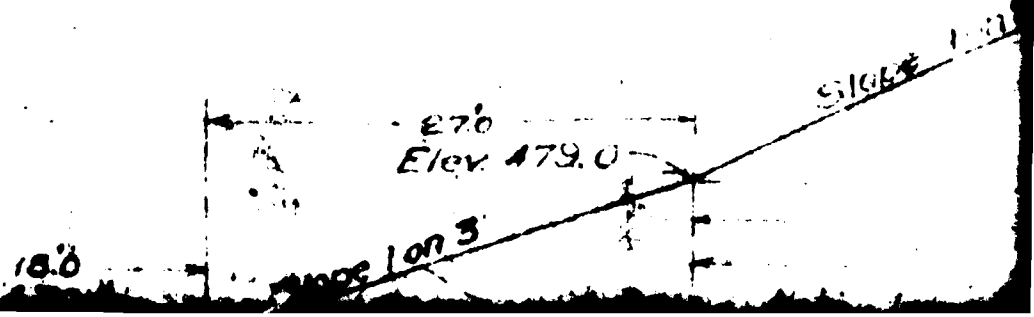
ENGINEERS

205
H
8193



Section C-C

Scale 10' to 1"

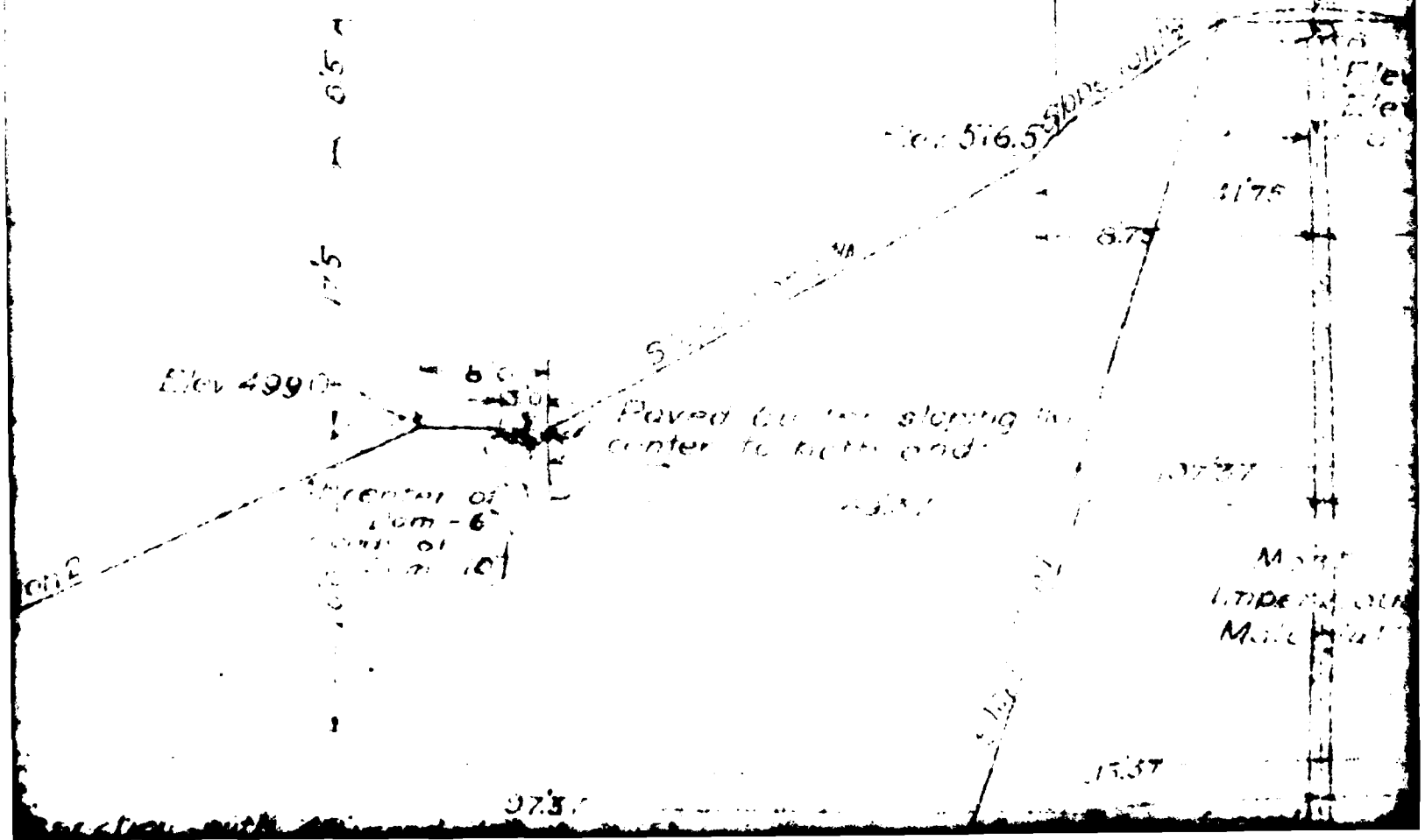


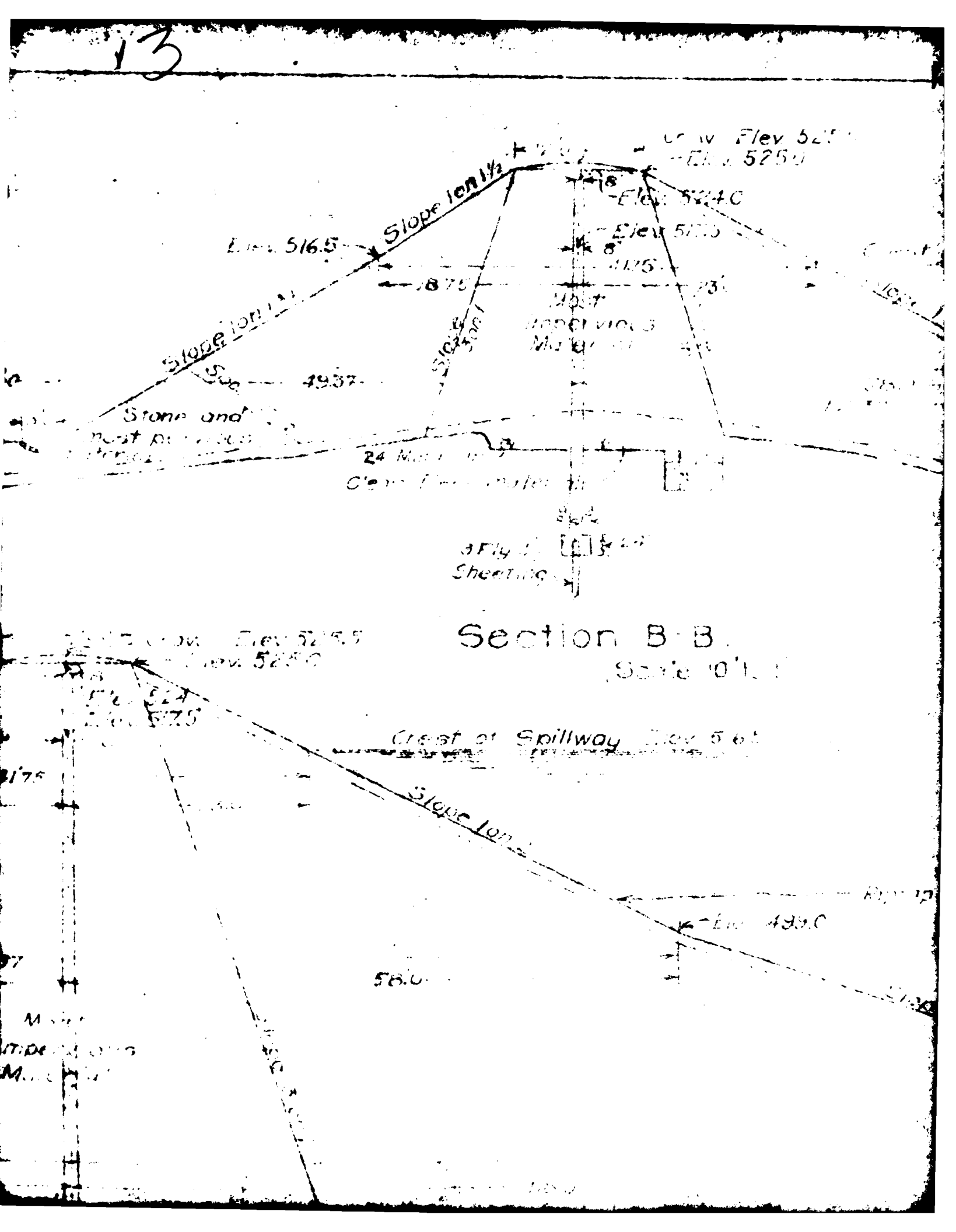
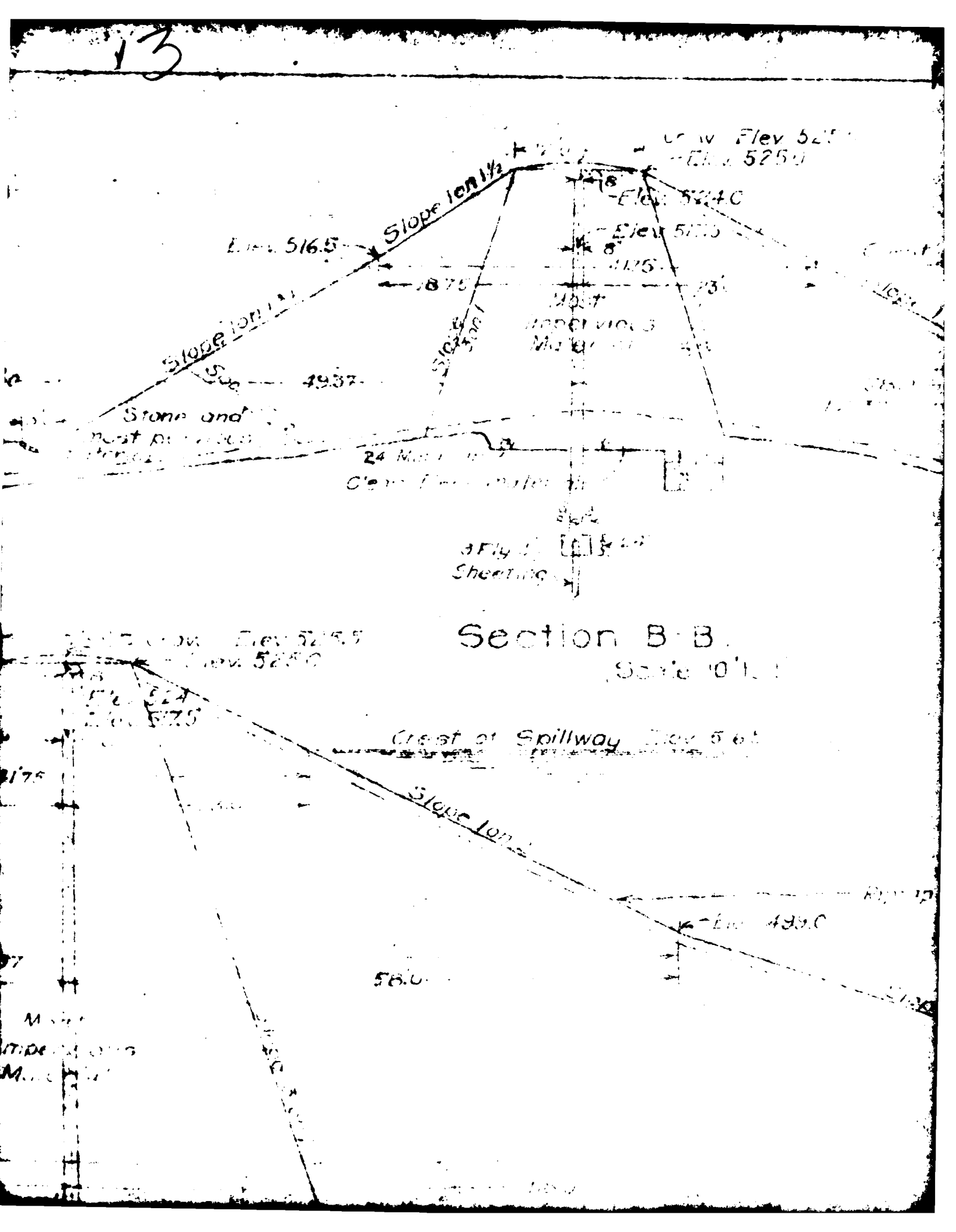
17

p

rest of Spillway Elev. 516.5

Slope 1 on 2
and Surface Stone Fill





14

4500

East of Spillway, Elev 516.5

Left Lane

Riprap

Elev 499.0

Slope 1 on 3

Stripping

State RR

Rip 12

Slope 1 on 3

Elev 478.0

1-502

23
Stone Hill

Elev. 170.0

Slope

Stone and
most pervious material

Note

Slope

Strip

2 ft return wall
on upstream side

Sta 0+50

Sta 0+52 (Top of wall)

Sta 0+55

Crest of

Top

Elev. 521.0

Coarse Sand

Elev. 500.0

Elev. 490.0

Yellow loam and sand

Coarse Sand

Sta 0+50

Sta 0+52

Sta 0+55

Clay

Elev. 521.0

Elev. 512.5

18' OC
Ditto on piling
Ditto on walls

12" concrete Class A

Reinforcing in Section
same as in Section D

2' thick

Shipping line under dam

10' OC

Excavations

10' OC

Line of excavation

073

with 42 cond. in 1 mi

See also Section
Elev. 400.3
Elev. 400.3
Elev. 400.3

Elev. 400.3

Section

Sta 10+45

A ←

Dam Elev. 525.5

of Core Wall Elev. 524.0

D

Coarse
Fine Yellow Sand
Yellow Sand
Clay

Top of
Sta 10+45

Muck

Clay

Top of
Sta 10+45

Muck

Clay

Clay

Clay

Clay

Elev. 400.3

A ←

D

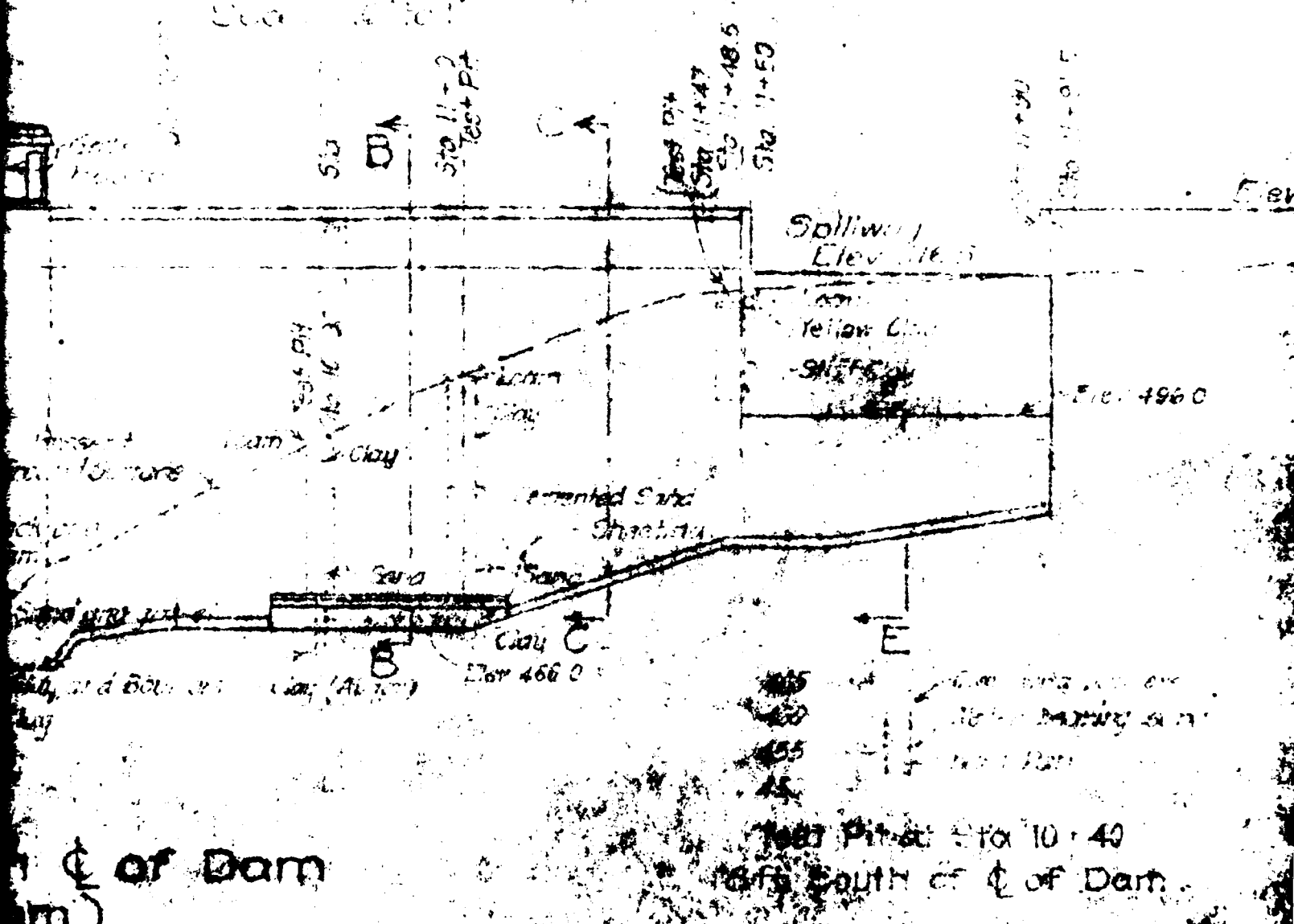
Elev. 400.3

See also Section

Longitudinal Section on C of D
(Looking Upstream)

Scale 20' to 1"

Section A-A



Present Ground Surface

Elev 525.5

Elev 524.0 by Emergency Flood

Loam

Yellow

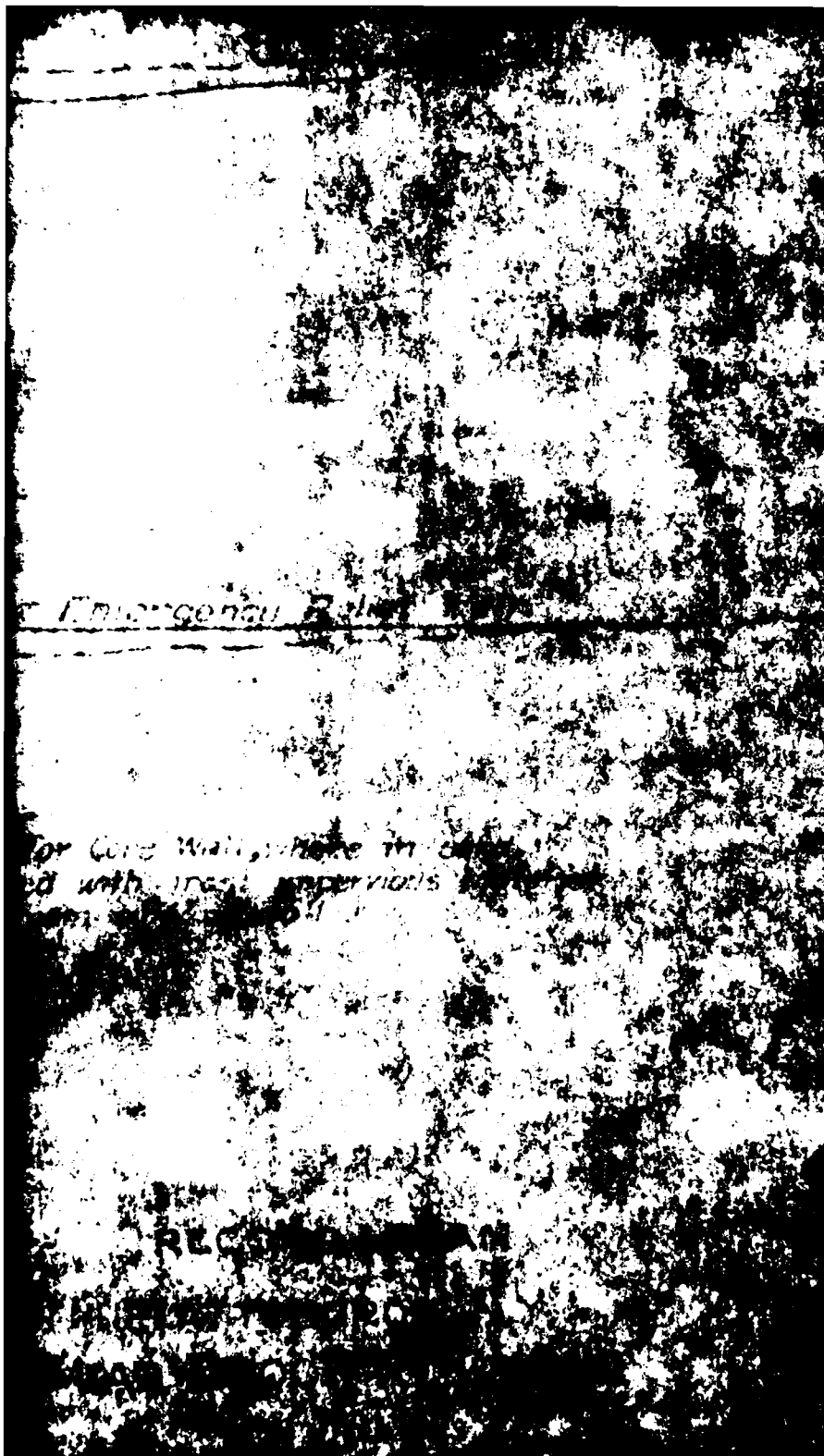
Shut day

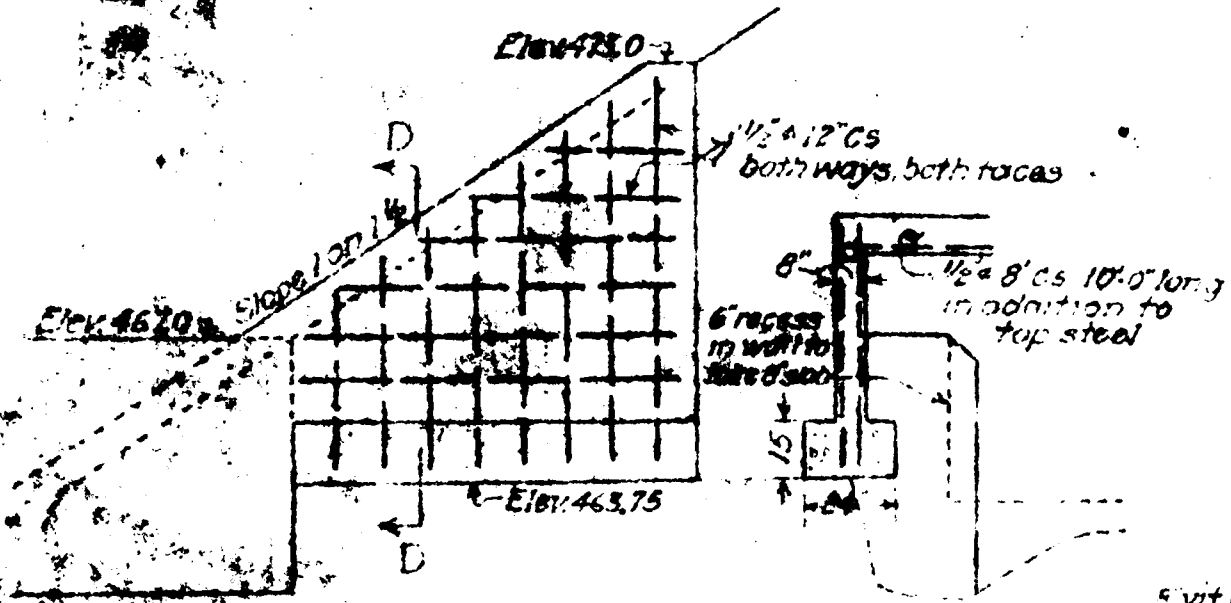
Elev. 496.0

Note - trench for Core Wall, where it is
backfilled with loose materials
as instructed by the Corps.

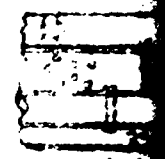
40

Dam



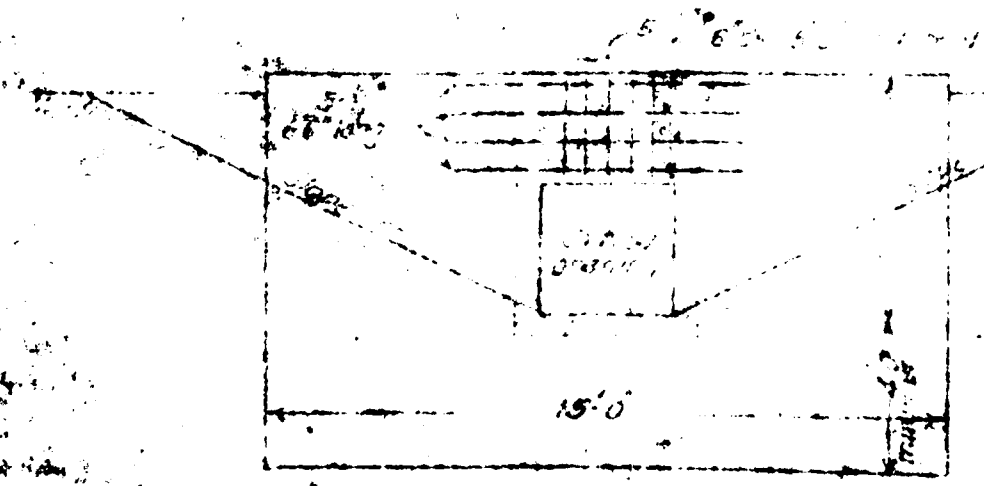


Elevation
East End of Wall at Sta. 3+02.1
Scale 1/4" = 1'



5 vit pipe open joints
Graded crushed

Section E-



Elevation
Details of Drain Head
Scale 1/4" = 1'

Side of 2 of 1000
ore-stone 1000

4000 Wall

Section

Section of continuous construction joints
through first and last
see Detail below.

Plan Scale 40:1

Scale 6 ft. 00

pipe

Typical Section Scale: 1" = 100'

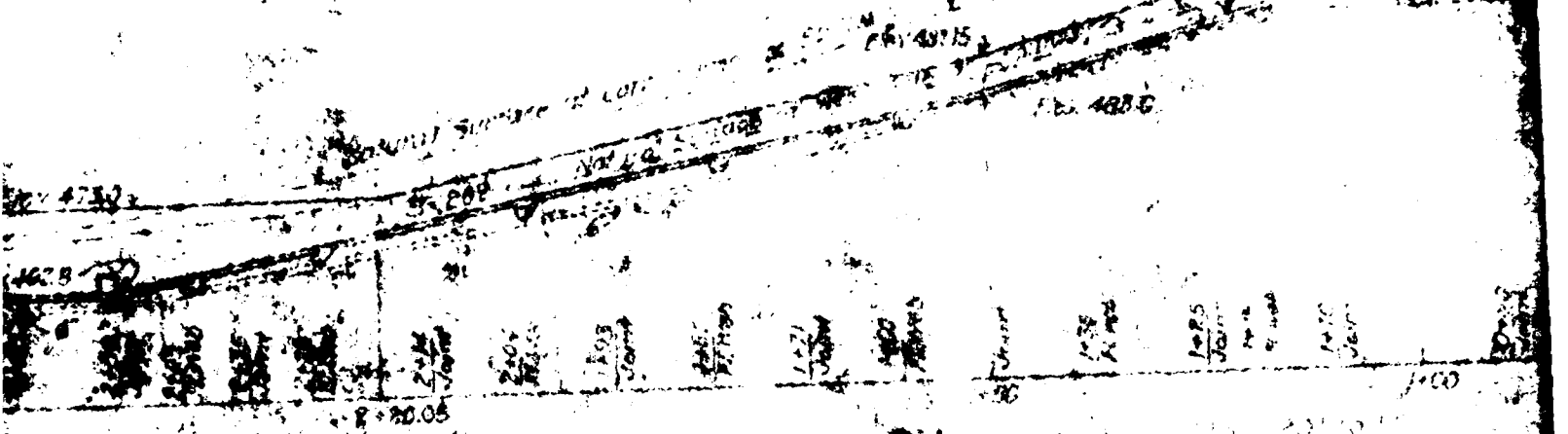
197

$$19.2 + 19.7 = 38.9$$

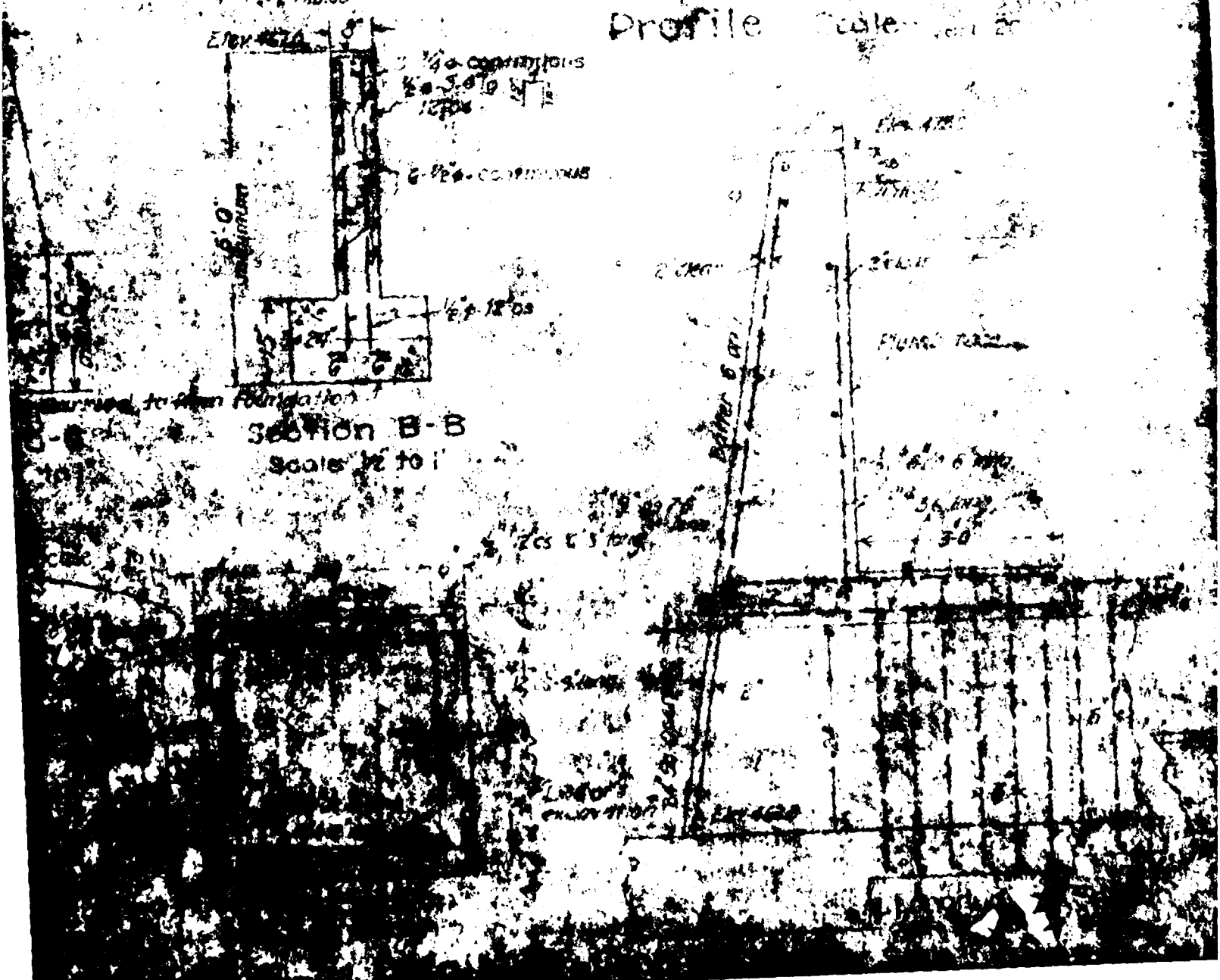
Slope Slab Sta. 1+93 to Sta. 3+00.1
 Scale 1/4" to 1'

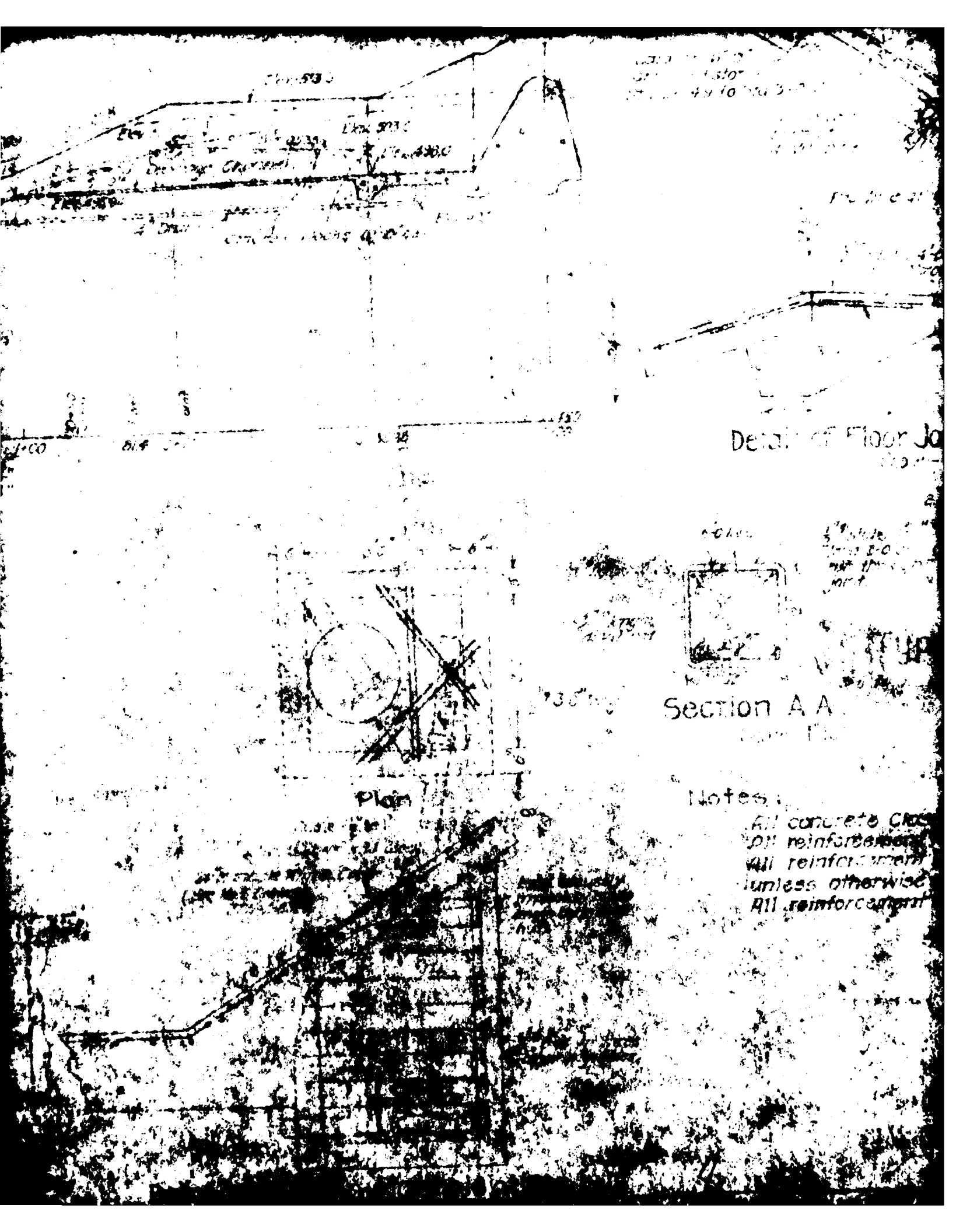
of Concrete Drain

1/4" to 1'



Profile Scale 1/4" to 1'





Detail of Floor Jo

Section A A

Notes:

- All concrete class
- All reinforcement
- All reinforcement
- unless otherwise
- All reinforcement

Typical Section

Sta 0+33.5 to Sta 0+81.4
Sta 1+34.9 to Sta 1+60.1
Scale 1" = 10'

of Floor Joint

Detail of Typical Floor Joint

Detail of Floor Web

Scale 1" = 10'

RECORD PLAN

PLATTSBURGH

HEAD BROOK ROAD

SPIELWAN

Scale 1" = 10'

Concrete Class A approximately 1:2:4 mixture
with round deformed rods.
Reinforcement lags 30 diameters at apices
otherwise noted.
Reinforcement has at least 2" cover

Section

3-5 8110-8.4
3-5 8110-001

DEPT OF
FLOOR WOOD
Scale 1/4"

RECORD PLAN

PLATTSBURGH

HEAD BROOK RIVER

SPILLWAY

Scale 1/4"

Scale 1/4"

Scale 1/4"

985
2739

Floor El 526.0
Floor Drain

1/2" Dia
Drain

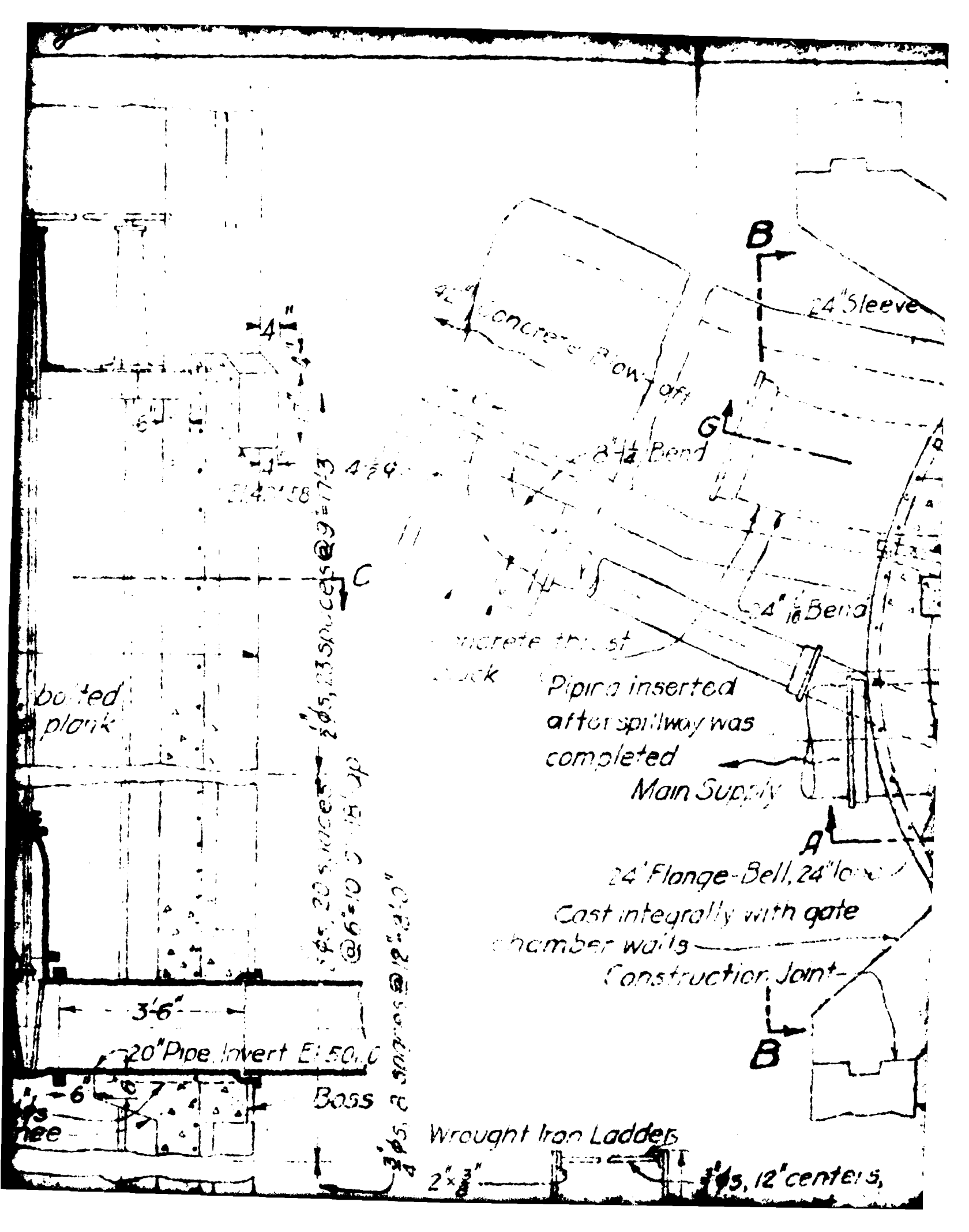
El. 518.0

2-3 3/4" LS 6' long, bolt
through over stop plate

lap 3"

total length = 53'-0"
25 per foot

3 1/2" LS
Concrete knee



4"

4 1/2" 58

1" 20 5, 23 spaces @ 9" = 17' 3"
@ 6" = 10' 0" 18' 0" up

bolted plank

20" Pipe Invert El 50.0

Base

Concrete Flow off

8 1/2" Bend

B

24" Sleeve

G

24" 16" Bend

Concrete thrust block

Piping inserted after spillway was completed

Main Supply

A

24" Flange-Bell, 24" long

Cast integrally with gate chamber walls

Construction Joint

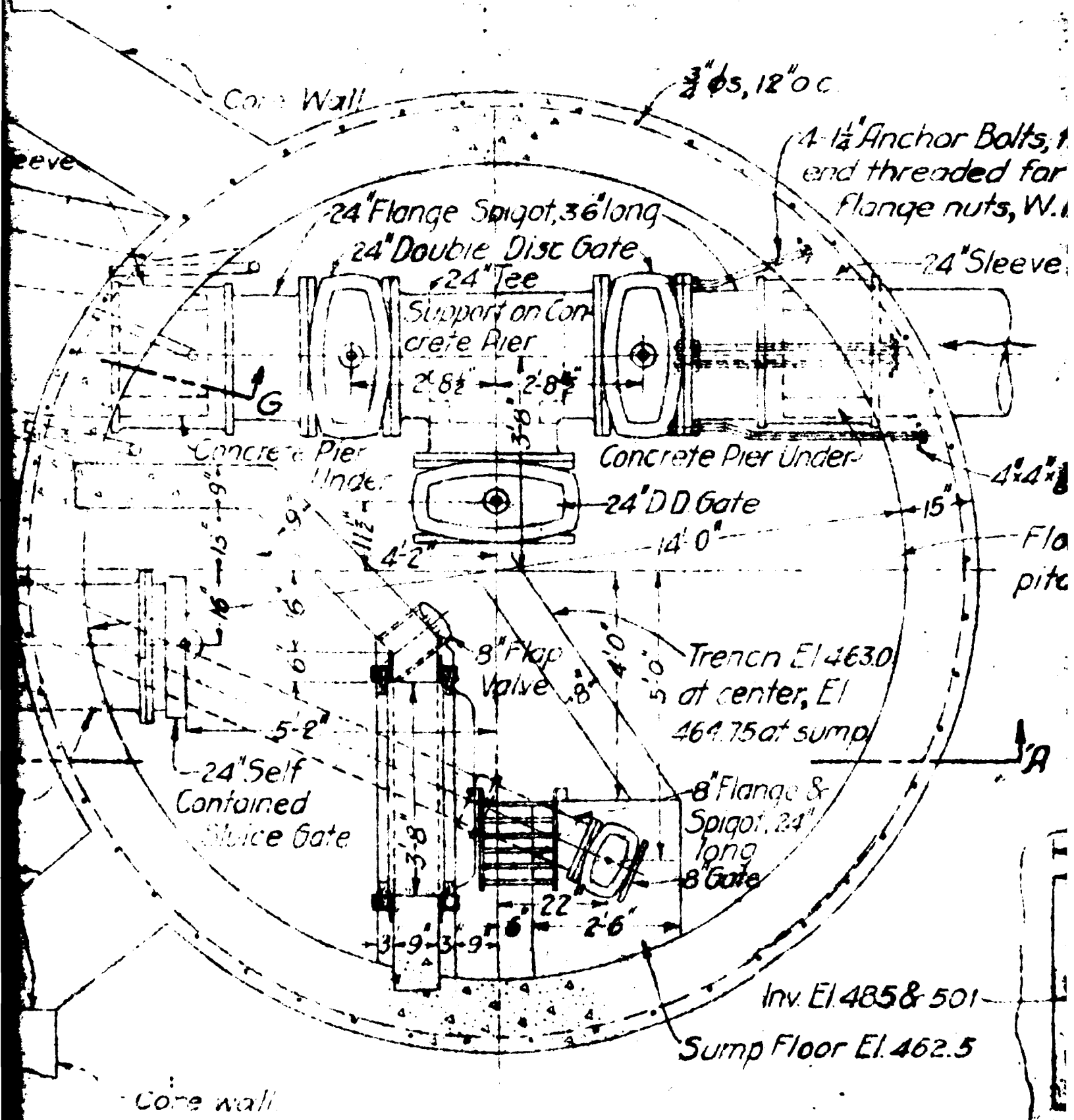
B

Wrought Iron Ladders

2" x 3"

1" 20 5, 12" centers

13



4

$\frac{1}{16} \times 12$ " Copper Strip
Cut-off Grooves

2" Groove

fts, free
for
W.I.
eve

El. 464.5

Flange inserted
after seal
was completed

Bulkhead
Fill with concrete
 $\frac{1}{16} \times 12$ " Copper Strip

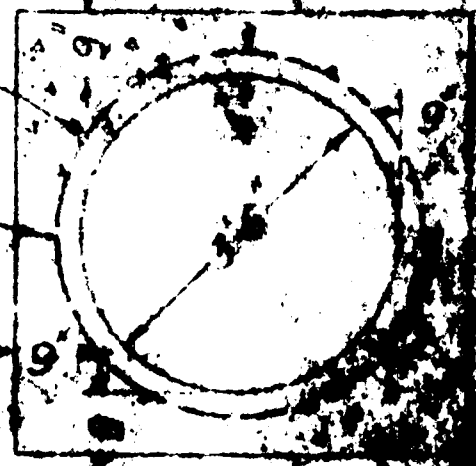
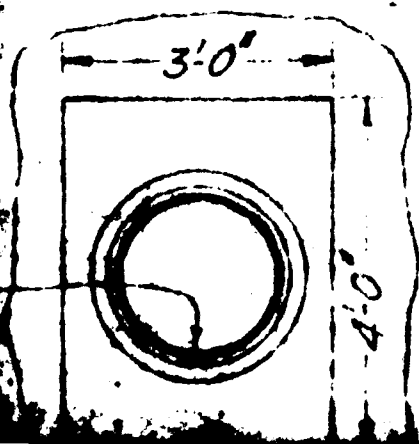
$\frac{1}{4} \times \frac{3}{8}$ " Plate washers

Section "G-6"
Scale 1" = 1'-0"

Floor El. 464.0 at circumference
pitched to El. 463.0 at center

$\frac{1}{2}$ " ϕ s, 6" centers

6- $\frac{1}{2}$ " ϕ spacers



Section through

Screen Guides, Total
Cast Iron 32.9 lbs.

EI. 472.0

EI. 472.25

EI 470

24" Pipe
Invert E. 469

24" Cast Iron
Disc Gate

EI 468.0

24" B.B. Disc
Gate

24" B.B. Disc
Gate

EI 464.0

5" Pipe
Invert EI 462.75

8" Flop Valve

EI 461.0

EI 460
EI 460

Section "A-A"

16" 15 12 centers,
ends upset
13" W 1 Bar (2 ea)

Ab: noch
erwartet

Ladder Details
Scale 1"=40"

20" Pipe, Invert El. 485.0

Boss

105-240.c.

Blow-off.

2- $\frac{3}{4}$ " studs every 5'-0"

15.00

Mam Supply

305, 120.C

24" Pipe, Invert El. 4650

100

-E/ 470.0

REF 4640

E/462.75

El 462.5

ends upset

3" W.I. Bar (2 each 10 ft. length)

Section "D-D"

Scale $\frac{1}{2}$ " = 1'-0"

Core m...

Adjustable Stem
Guides

low-off.

5'-0"

2'-0"

apply

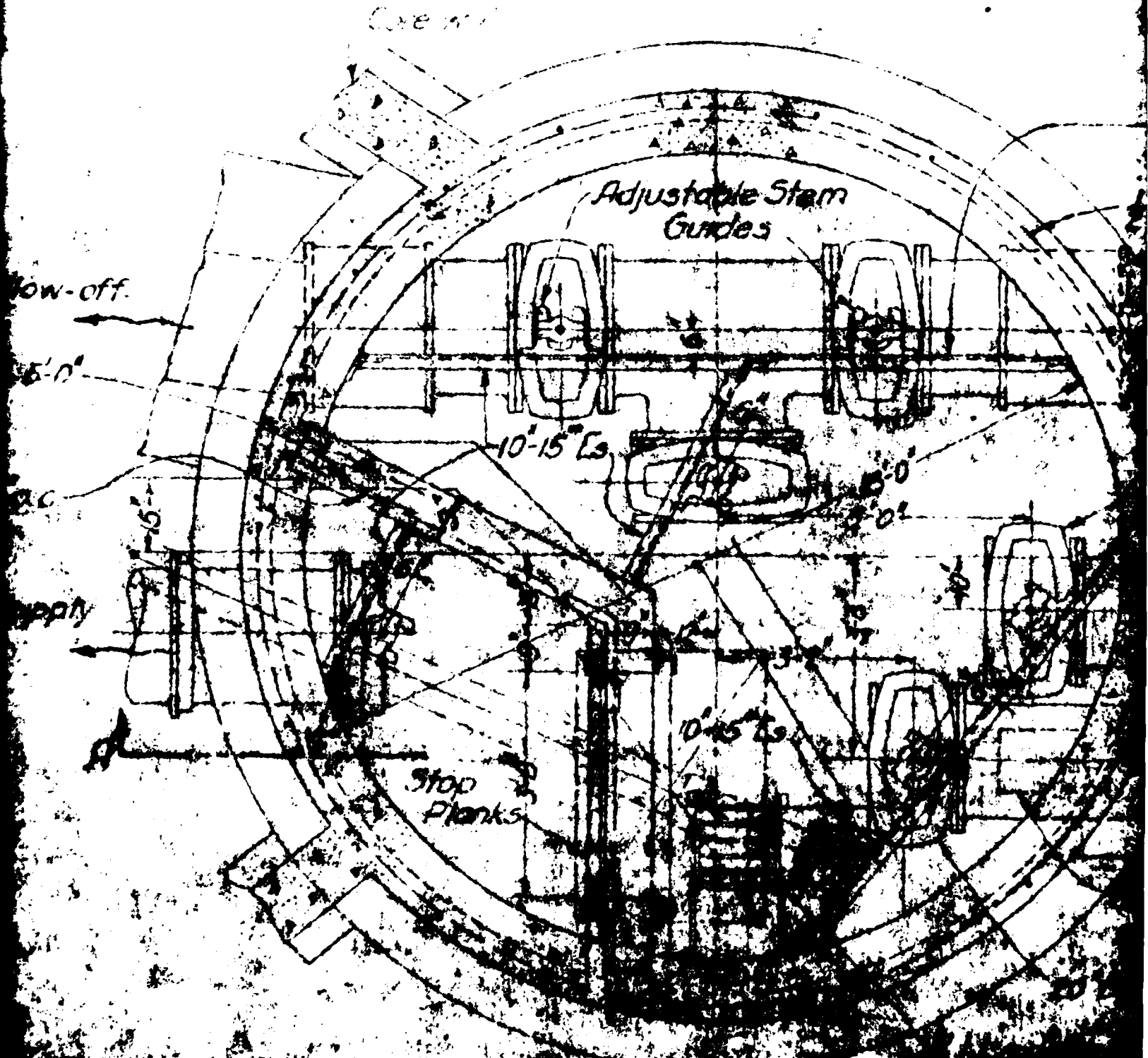
10'-15" Ls

5'-0"

5'-0"

10'-15" Ls

Stop
Planks



Elevation at Boss
Scale 1/8" = 1'-0"



Is at Elevations 484, 494, 507 & 517

1/2" Is. 24 centers

Inlet at El. 465

Notes

All components

All materials

All work

All items

For

Double Disc Bolt

10 Flange Bolt 2" long

Inlet at El. 485

Inlet at El. 501

PL

HEAD

5



94 507 & 517

Section 1 Scale 1/2"

Notes

All concrete work to be done by 4/1/57

All reinforcement to be done by 4/1/57

Long

For 6' x 6' x 6' x 6' x 6' x 6'

RECORD

PLAN

HEAD BRIDGE