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Hudson River Basin, Dutchess County, New York

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Mt. Beacon Reservoir Dam
Dutchess County
Dry Brook

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

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The examination of documents and the visual inspection of Mt. Beacon Reservoir Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

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Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 16 percent of the PMF. The overtopping of the dam could cause dam failure, thus significantly increasing the hazard to the loss of life downstream. The spillway is therefore adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam.

Structural stability analysis based on available information and the visual inspection indicates that the stability of the non-overflow section against overturning and sliding is inadequate for all loading conditions.

It is therefore recommended that within 3 months of notification to the owner, detailed hydrologic/hydraulic investigations of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed and their affect upon the overtopping potential of the dam. The results of these investigations will determine the appropriate remedial measures which will be required to achieve a spillway capacity adequate to discharge the outflow from at least the one-half PMF. Within twelve months of the date of notification to the owner, modifications to the structure, deemed necessary, as a result of the studies, should have been completed. At the same time, a detailed investigation of the structural stability of the non-overflow section should be performed. In the interim, a detailed emergency action plan must be developed. Also, around-the-clock surveillance of the structure must be provided during these periods.

In addition, the dam has a number of problem areas which, if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within twelve (12) months.

1. Establish a systematic program to observe and monitor changes in seepage occurring at the outlets of the seepage drains located on the downstream face of the gravity sections.
2. Backfill low area at the left abutment with concrete to the level of the crest of the dam.
3. Determine the sources of seepage occurring at the spillway right abutment contact, and in the vicinity of downstream from the toe of the dam near the left abutment. Monitor the seepage biweekly with the aid of weirs.
4. Remove the vegetation in the spillway channel and the area downstream from the toe of the dam. Provide a program of periodic cutting and mowing of these areas.
5. Repair the side walls of the spillway and the reservoir drain channels.
6. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the reservoir drain system. Document this information for future reference. The aforementioned emergency action plan should be maintained and updated periodically during the life of the structure.

HUDSON RIVER BASIN
MT. BEACON RESERVOIR
DUTCHESS COUNTY, NEW YORK
INVENTORY NO. N.Y. 26

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST 1980

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HUDSON RIVER BASIN

MT. BEACON RESERVOIR

DUTCHESS COUNTY, NEW YORK
INVENTORY NO. N.Y. 26

**PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**

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to be inspected by [unclear]

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NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST 1980

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 investigations, 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 aid 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.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
MOUNT BEACON RESERVOIR DAM
I.D. NO. N.Y. 26
D.E.C. NO. 537
HUDSON RIVER BASIN
DUTCHESS COUNTY, NEW YORK

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
MOUNT BEACON RESERVOIR DAM
I.D. NO. N.Y. 26
D.E.C. NO. 537
HUDSON RIVER BASIN
DUTCHESS COUNTY, NEW YORK

Name of Dam: Mt. Beacon Reservoir Dam
(I.D. No. N.Y. 26)

State Located: New York

County Located: Dutchess

Stream: Dry Brook

Basin: Hudson River

Date of Inspection: July 24, 1980

ASSESSMENT

The examination of documents and the visual inspection of Mt. Beacon Reservoir Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 16 percent of the PMF. The overtopping of the dam could cause dam failure, thus significantly increasing the hazard to the loss of life downstream. The spillway is therefore adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in



spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam.

Structural stability analysis based on available information and the visual inspection indicates that the stability of the non-overflow section against overturning and sliding is inadequate for all loading conditions.

It is therefore recommended that within 3 months of notification to the owner, detailed hydrologic/hydraulic investigations of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed and their affect upon the overtopping potential of the dam. The results of these investigations will determine the appropriate remedial measures which will be required to achieve a spillway capacity adequate to discharge the outflow from at least the one-half PMF. Within twelve months of the date of notification to the owner, modifications to the structure, deemed necessary as a result of the studies, should have been completed. At the same time, a detailed investigation of the structural stability of the non-overflow section should be performed. In the interim, a detailed emergency action plan must be developed. Also, around-the-clock surveillance of the structure must be provided during these periods.

In addition, the dam has a number of problem areas which, if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within twelve (12) months.

1. Establish a systematic program to observe and monitor changes in seepage occurring at the outlets of the seepage drains located on the downstream face of the gravity sections.

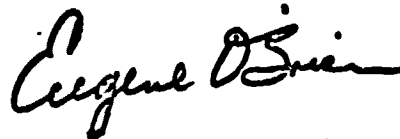
2. Backfill low area at the left abutment with concrete to the level of the crest of the dam.

3. Determine the sources of seepage occurring at the spillway right abutment contact, and in the vicinity of downstream from the toe of the dam near the left abutment. Monitor the seepage biweekly with the aid of weirs.

4. Remove the vegetation in the spillway channel and the area downstream from the toe of the dam. Provide a program of periodic cutting and mowing of these areas.

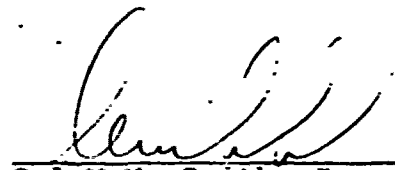
5. Repair the side walls of the spillway and the reservoir drain channels.

6. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the reservoir drain system. Document this information for future reference. The aforementioned emergency action plan should be maintained and updated periodically during the life of the structure.



Eugene G. Brien, P.E.
New York No. 29823

Approved by:



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

Date:

30 Sep 80



1. OVERVIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROJECT
MOUNT BEACON RESERVOIR DAM
I.D. NO. N.Y. 26
D.E.C. NO. 537
HUDSON RIVER BASIN
DUTCHESS COUNTY, NEW YORK

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the State of New York, Department of Environmental Conservation by a letter dated 7 January 1980, in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367, 8 August 1972.

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 THE PROJECT

a. Description of the Dam and Appurtenant Structures

The Mount (Mt.) Beacon Reservoir Dam consists of about a 350 foot long, 35 foot high gunite surfaced concrete masonry gravity, and concrete buttress dam with a spillway at the right side of the dam. According to available drawings dated July 1922 (See Appendix A), the gravity section under the gunite surface is masonry with concrete at the downstream face of the masonry; the upstream and downstream faces of the section are 7V:1H and 0.37V:1H, respectively; and the crest is about 8.5 feet wide. The dam is made up of 10 buttresses forming eleven (11) bays. The width of each buttress is about 2.5 feet. The length of bays varies between 21 to 22 feet, except for the two end bays. The bay at the left abutment is about 32 feet wide and at the right abutment, about 73 feet, of which 43 feet serves as the spillway. The spillway is broad crested, ungated and has a sill about 8 feet wide and the crest is 1.5 feet from the top of the dam. The downstream face of the spillway is "ogee shaped" and is flanked on the left and the right by a buttress and a wing wall, respectively. The discharge over the spillway flows into a natural channel with sides protected by 2 foot wide concrete walls except at the right side a portion of which is rock.

The 22-inch diameter cast iron reservoir drain is located about 150 feet from the right abutment. Flows from the drain are controlled by two manually operated gate valves located upstream and downstream of the dam. The upstream gate valve is operated from a control located at the top of the dam, with access from a steel decked platform. The downstream gate valve is operated from a control located in a gate house at the toe of the dam. Discharges from the drain are into a natural channel whose sides are protected by concrete walls about 25 feet long. About 30 feet downstream from the drain outlet, the reservoir drain channel joins the spillway channel (See Photograph 7). The channel continues downstream (Dry Brook) to a water supply storage pond.

b. Location

The dam is located about 0.75 mile from the intersection of East Main Street and Mountain Avenue in the City of Beacon.

c. Size Classification

The dam is 35 feet high and has a reservoir capacity of 575 acre-feet. Therefore, the dam is classified as "small".

d. Hazard Classification

The dam is in the high hazard potential category because 3000 feet downstream from the dam is located the City of Beacon. There are several homes, a water supply filtration plant, and a water supply storage tank.

e. Ownership

Mt. Beacon Dam is owned by the City of Beacon, 427 Main Street, Beacon, New York, 12508, Tel. No. (914) 831-0932. The person to contact is Mr. Mark Giodano, Superintendent of Water Department.

f. Purpose of Dam

The impoundment provided by the dam is used for water supply. It is reported that the impoundment supplies about 20 percent of the city's water supply.

g. Design and Construction History

Original design and construction records are not available. It is reported that the dam was built in 1889. According to a dam section shown on the available drawing of 1913 (Plate No. 3 in Appendix A), it appears that the original dam was a rubble masonry concrete dam and later was raised and concrete buttresses added. The drawing and available information also proposed the strengthening of the downstream face of each buttress by providing a 3 foot thick concrete strut. The construction records of these repairs could not be located. The available drawings of 1922 (Plates 4 through

6 in Appendix A) proposed the following modifications to the dam. The construction records of these modifications could not be located.

a. The masonry gravity section between the buttresses to be strengthened by placing concrete struts and seepage drains installed between the masonry and concrete struts.

b. The geometry of the stepped downstream face of the spillway to be modified to "ogee shaped".

c. The new spillway channel walls to be relocated to accommodate the spillway modification.

d. The upstream face of the dam to be surfaced with "gunite".

It is reported that the upstream gate valve for the reservoir drain was added subsequent to the original construction; the date is unknown. Also, it is reported that the entire dam was surfaced with gunite in 1978.

h. Normal Operating Procedures

The flow from the reservoir is from the spillway and/or reservoir drain. It is reported that 300,000 gallons of water per day are released from the reservoir through either the reservoir drain or the reservoir drain and spillway.

1.3 PERTINENT DATA

a.	<u>Drainage Area</u> , Square Miles	0.25
b.	<u>Discharge at Dam</u> , cfs	
	Maximum Known Flood at Site	Unknown
	Ungated Spillway at Maximum Pool	210
	Reservoir Drain	67.5
c.	<u>Elevation</u> , Feet Above MSL	
	Top of Dam, Feet	1286.5
	Spillway, Feet	1285.0
d.	<u>Reservoir</u>	
	Length of Normal Pool, Feet	1300
	Surface Area of Maximum Pool, Acres	20.7
	Surface Area of Normal Pool, Acres	20
e.	<u>Storage</u> , Acre-Feet	
	Spillway Crest	575
	Top of Dam	606

- f. Dam
Type
- Masonry Concrete
Gravity Section
and Concrete Buttress
- Length (Feet) 350
Height (Feet) 35
Crest Width (Feet) 8.5
Side Slopes
Upstream 7V:1H
Downstream 0.37V:1H
- g. Spillway
Type
- Uncontrolled, Broad
Crested
- Crest Width (Feet) 43+
Slopes
Upstream 7V:1H
Downstream "Ogee Shaped"
- h. Reservoir Drain
Type
- 22-Inch
Upstream and Down-
stream Manually
Operated Gate
Controls Valves

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

Mt. Beacon Reservoir is located in the western portion of the New England Uplands physiographic province of New York State. The durable Precambrian rocks of this area are reflected in the landforms of significant topographic relief. The rocks at the reservoir site include hornblende granite gneiss with subordinate lencogranite.

2.2 SUBSURFACE INVESTIGATION

No subsurface investigation could be located for the project. However, surface cover in the vicinity of Mt. Beacon Reservoir is described as "Rockland" (Refs. 9 and 10). Rock outcrops, stones and steep slopes are characteristics of this area of very thin glacial till over bedrock.

2.3 DESIGN RECORDS

The dam is reported to have been constructed in about 1889. There are no design data or specific design memoranda available for the project features. However, there are four drawings, one dated November, 1913 (Plate 3 in Appendix A) and three dated July, 1922 (Plates 4 through 6 in Appendix A) obtained from the New York State Department of Environmental Conservation. The 1913 drawing shows the original dam cross section, a modified section, and the suggested method of strengthening the buttresses. The 1922 drawing shows the strengthening of the gravity section between buttresses, new geometry of downstream face of the spillway, the relocation of the spillway channel walls and the gunite surfacing of the upstream face. There are no construction records of the modification.

It is reported that the upstream gate valve was added to the reservoir drain and the entire dam was resurfaced by applying gunite in 1978. There are no construction records available of the addition of the valve and resurfacing.

2.4 CONSTRUCTION RECORDS

There are no construction records for the original dam or subsequent modifications available for the project.

2.5 OPERATION RECORDS

There are no available operation records for the project and gates. However, there are weekly records of the reservoir level kept at the Department of Public Works and the City Engineers Office. There are no rainfall readings

taken at the dam site. However, it is reported that rainfall readings are taken at Texaco Research Center, located 1.5 mile downstream from the dam.

2.6 EVALUATION OF DATA

Existing information was made available from the owner and the New York State Department of Environmental Conservation.

The information obtained from available data and the visual inspection is considered adequate for the Phase I inspection and evaluation.

There is one inconsistency in the available drawings: the July, 1922 drawing (Plate No. 6) indicates nine buttresses, whereas ten buttresses were observed during the visual investigation.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The visual inspection of Mt. Beacon Reservoir was made on 24 July 1980. The weather was sunny with temperature at about 80°F. It was reported that rain occurred the previous night and the reservoir level was at about El 1281.5, 3.5 feet below the spillway crest.

b. Dam

The gunite surface on the bays (gravity sections) and buttresses appears to be in generally good condition. The horizontal and vertical alignment of the dam are uniform and there is no indications of movement. The crest and the upstream face above the waterline appears to be in good condition except at several locations, the gunite surface has hairline to 1/8 inch wide longitudinal, and transverse cracks. The downstream face of the dam appears to be in good condition. There are several hairline to 1/8 inch wide cracks in the gunite surface which are calcified and some of the cracks show evidence of seepage. There are seepage drain outlets located at different elevations on the downstream face of several bays. Some of the drains are active. The seepage was minor at all bays except at the third bay from the left abutment which was estimated at about 1.5 gpm.

At about 50 feet downstream from the toe of the dam and about 45 feet from the left abutment there is a saturated area caused by seepage. The source of the seepage could not be determined. The flow is estimated to be about 4 to 5 gallons per minute, with no signs of migration of fines.

The entire area downstream from the toe of the dam is covered with overgrown grass, bushes and saplings (See Photograph No. 3).

c. Spillway

The spillway appears to be in good condition except minor cracking of the gunite surface at the crest and the downstream face. The entire right abutment spillway contact which is bedrock was saturated as a result of seepage. The source of seepage could not be determined. The flow is estimated to be about 1 gallon per minute, but there are no signs of migration of fines.

d. Appurtenant Structures

The upstream and downstream gate valves of the reservoir drain were operated during the inspection. The reservoir drain and both regulating gate valves are in good operating condition.

At the outlet of the reservoir drain there are five (5) pipes of varying diameters (See Photograph No. 6). The purpose and upstream extent of these pipes could not be determined, nor could anyone explain their purpose.

e. Abutments

There is a low area at the left abutment and it is about 2 inches lower than the level of the dam crest (See Photograph No. 12). Otherwise, there are no signs of seepage or other unusual conditions. At the right abutment except for the seepage mentioned in Section 3c, there are no signs of unusual conditions.

f. Downstream Channel

The spillway and reservoir drain channels join at about 10 feet from the dam to form a downstream channel which consists of boulders and bedrock. The spillway channel floor is bedrock and is overgrown with trees, bushes and saplings. The reservoir drain channel whose sides are protected by concrete walls, appears to be in good condition except the walls are spalled at several locations. The right wall of the reservoir drain channel, where the spillway and reservoir drain channel join, is undermined (See Photograph No. 7).

g. Reservoir Area

In the vicinity of the dam there is no evidence of sloughing, potentially unstable slopes or other unusual conditions which would adversely effect the dam. No evidence of excessive sedimentation was observed. The reservoir was relatively clean.

3.2 EVALUATION OF OBSERVATIONS

The visual observations made during the course of the investigation revealed several deficiencies which at present do not adversely affect the adequacy of the dam. However, these deficiencies do require attention and should be corrected. The following is a summary of the problem areas encountered, in order of importance, with appropriate recommended actions:

1. Establish a systematic program to observe and monitor changes in seepage occurring at the outlets of the seepage drains located on the downstream face of the gravity sections.
2. Low area at the left abutment should be backfilled with concrete to the level of the crest of the dam.
3. Determine the sources of seepage occurring at the spillway right abutment contact, and in the vicinity near the left abutment downstream from the toe of the dam. Monitor the seepage biweekly with the aid of weirs.

4. The vegetation in the spillway channel and the area downstream from the toe of the dam should be removed. Provide a program of periodic cutting and mowing of these areas.

5. Repair the side walls of the spillway and the reservoir drain channels.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

The flow from the reservoir is over the spillway and/or through the reservoir drain. It is reported that depending upon inflow, 300,000 gallons of water per day are released from the reservoir either through the reservoir drain or over the spillway.

4.2 MAINTENANCE OF THE DAM

The dam is maintained by the owner. It is reported that the dam is "looked at" once a week by the owner's maintenance crew. However, maintenance of the dam is considered inadequate as evidenced by the growth of vegetation in the spillway channel; downstream from the toe of the dam; seepage at the right abutment contact and the condition of the spillway and reservoir channel walls.

4.3 WARNING SYSTEM IN EFFECT

There is no warning system in effect or in preparation.

4.4 EVALUATION

The dam and appurtenances have not been maintained in satisfactory condition as noted in Section 3, "Visual Inspection".

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

Mt. Beacon Reservoir is located about one mile east of Beacon, in Dutchess County, New York, Hydrologic Unit Code 02020008. The watershed, contributing to the reservoir, is 0.25 square mile and consists entirely of steep wooded slopes with peaks above El 1500. There are no defined stream channels in the basin as determined from the 1957 West Point Quadrangle (See Topographic Map in Appendix A) and there was no land development observed at the time of the inspection.

5.2 ANALYSIS CRITERIA

The analysis of the spillway capacity of this dam was performed using the U.S. Army Corps of Engineers HEC-1 DB computer program (Ref. 1).

Because of the small drainage area and steep slopes, (from 0.10 to 0.36 feet per foot) it was assumed that the runoff equals excess rainfall. Rainfall losses over the land area were assumed to be constant at 0.1 inch per hour after an initial loss of 0.2 inch. No losses were deducted for rain falling directly on the reservoir. A Probable Maximum Flood (PMF) peak of 1480 cfs was computed from the 24 hour, 200 square mile Probable Maximum Precipitation of 22 inches (Ref. 2).

5.3 SPILLWAY CAPACITY

The uncontrolled spillway is 43.32 feet long, with a crest width of 8.0 feet, at El 1285, 1.5 feet below the top of the dam. The maximum discharge capacity of the spillway with water level at El 1286.5 (top of dam) is 210 cfs. The discharge through the 22-inch diameter reservoir drain is 67.5 cfs with a head of 20.0 feet.

5.4 RESERVOIR CAPACITY

The normal capacity of Mt. Beacon Reservoir is reported to be 575 acre-feet at the spillway crest, El 1285. The computed surcharge storage, between El 1285 and El 1286.5 (top of dam) is 31 acre-feet, which is equivalent to about 2.3 inches of runoff over the entire basin. The maximum capacity of the reservoir is 606 acre-feet.

5.5 FLOODS OF RECORD

There are no records available of floods. However, there are weekly records of the reservoir levels available at the Department of Public Works and City Engineers Office.

5.6 OVERTOPPING POTENTIAL

The potential of the dam being overtopped was investigated on the basis of the spillway discharge capacity and the available surcharge storage to meet the selected design flood inflows. Analysis indicates the spillway does not have sufficient capacity to pass the outflow from one-half the PMF, and overtopping would occur for all storm events exceeding 16 percent of the PMF.

The PMF, routed through the reservoir, resulted in peak outflow of 1293 cfs, and a corresponding maximum water surface El 1287.35, 0.85 feet above the top of the dam. One-half the PMF routed through the reservoir resulted in peak outflow of 572 cfs, and a corresponding maximum water surface El 1286.96, 0.46 feet above the top of dam.

5.7 EVALUATION

The dam does not have sufficient spillway capacity to pass either the PMF or one-half the PMF without overtopping of the dam. The overtopping could cause the failure of the dam, thus significantly increasing the hazard to loss of life downstream. Therefore, the spillway is assessed as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation

Visual observation did not indicate conditions which would affect the structural stability of the dam. The observed seepages at the downstream face of the gravity sections and at the spillway right abutment contact and downstream from the toe of the dam in the vicinity of the left abutment are not detrimental to the stability or safety of the dam at the present time.

b. Design and Construction Data

The original preconstruction design computations regarding the structural stability of the dam are not available.

c. Operating Records

It is reported there are available records of the reservoir levels from 1960 to date at the Water Department. There are no records of the gate operation available. No major operation problems which would affect the stability of the dam were reported.

d. Post-Construction Changes

There are no recorded post-construction changes. However, there are four drawings, one dated November, 1913 (Plate 3 in Appendix A) and another three dated July, 1922 (Plates 4 through 6 in Appendix A) obtained from the New York State Department of Environmental Conservation. The 1913 drawing shows the original dam cross section, the modified section, and the suggested method for strengthening the buttresses. The 1922 drawing shows the strengthening of the gravity sections between buttresses, new geometry of downstream face of the spillway, the relocation of the spillway channel walls and the gunite surfacing of the upstream face. There are no construction records of the modifications.

It is reported that the upstream gate valve was added to the reservoir drain and the entire dam was resurfaced with gunite in 1978. There are no construction records of the addition of the valve and the resurfacing.

e. Seismic Stability

According to the recommended Corps guidelines, the dam is located in Seismic Zone No. 1. However, based on past earthquake history, the New York State Geological Survey considers the dam site to be in Zone 2. Based on this assessment, the dam is considered to be in Seismic Zone 2. The results of the seismic stability are described in Section 6.2.

6.2 STRUCTURAL STABILITY ANALYSIS

Structural stability analyses for a non-overflow section and spillway section were performed. The results of the analyses are as follows:

NON-OVERFLOW SECTION

<u>Case</u>	<u>Loading Condition</u>	<u>Location of Resultant</u>	<u>Sliding F.S. (See Appendix E)</u>
a	Normal loading condition, reservoir level at spillway crest, no ice load	Outside middle third	1.21
b	Normal loading condition, reservoir level at spillway crest, with ice load	Outside middle third	1.06
c	Unusual loading: flood level equal to 1/2 PMF	By comparison with Case a, the results are relatively the same	
d	Extreme loading: flood level equal to PMF	By comparison with Case a, the results are relatively the same	
e	Unusual loading: reservoir level at spillway crest, and earthquake forces	Outside Middle Half	1.04

OVERFLOW SECTION (SPILLWAY)

<u>Case</u>	<u>Loading Condition</u>	<u>Location of Resultant</u>	<u>Sliding F.S. (See Appendix E)</u>
a	Normal loading condition, reservoir level at spillway crest, no ice load	Within Middle Third	2.64
b	Normal loading condition, reservoir level at spillway crest, with ice load	Within Middle Third	1.83
c	Unusual loading: flood level equal to 1/2 PMF	Within Middle Half	2.04
d	Extreme loading: flood level equal to PMF	By comparison with Case c, the location of the resultant and the sliding F.S. almost the same	
e	Unusual loading: reservoir level at spillway crest, and earthquake forces	Within Middle Third	2.07

The results of the stability analyses indicate that stability of the non-overflow section of the dam against overturning and sliding are inadequate for all loading conditions. However, the stability of the spillway section against overturning and sliding are adequate for all loading conditions.

It is therefore recommended that a more detailed structural stability analyses be performed. Field investigations should be carried out to obtain additional information regarding the uplift pressure within and under the base of the non-overflow section, the quality of the foundation, the geometry and extent of the non-overflow structure, and the condition of the non-exposed concrete. The information should then be incorporated into a more detailed structural stability evaluation.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Examination of the available documents and visual inspection of Mt. Beacon Reservoir Dam and appurtenant structures did not reveal any conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would be overtopped for all storms which exceed approximately 16 percent of the Probable Maximum Flood (PMF). The overtopping of the dam could cause dam failure, thus significantly increasing the hazard to the loss of life downstream. The spillway is therefore adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency. The structural stability analyses based on available information and visual inspection indicates that the stability against overturning and sliding for the overflow section of the dam is adequate whereas for the non-overflow section is inadequate.

b. Adequacy of Information

The information and data available were adequate for performance of this investigation.

c. Need for Additional Investigations

Since the spillway is considered to be "seriously inadequate", additional hydrologic/hydraulic investigations are required to more accurately determine the site specific characteristics of the watershed. After the in-depth hydrologic/hydraulic investigations have been completed, remedial measures must be initiated to provide spillway capacity sufficient to discharge the outflow from the one-half PMF event. In addition, an investigation of the structural stability of the non-overflow section of the dam is required.

d. Urgency

The additional hydrologic/hydraulic and structural stability investigations which are required must be initiated within 3 months from the date of notification. Within 12 months of notification, remedial measures as a result of this investigation must be initiated, with completion of this measure during the following year. In the interim, develop an emergency action plan for the notification of downstream residents and proper around-the-clock surveillance of the dam during periods

of extreme runoff. The other problem areas listed below must be corrected within one year from notification.

7.2 RECOMMENDED MEASURES

1. Establish a systematic program to observe and monitor changes in seepage occurring at the outlets of the seepage drains located on the downstream face of the geometry section.

2. Backfill low area at the left abutment with concrete to the level of the crest of the dam.

3. Determine the sources of seepage occurring at the spillway right abutment contact, and in the vicinity of downstream from the toe of the dam near the left abutment. Monitor the seepage biweekly with the aid of weirs.

4. Remove the vegetation in the spillway, and the area downstream from the toe of the dam. Provide a program of periodic cutting and mowing of these areas.

5. Repair the side walls of the spillway and reservoir channels.

6. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the reservoir drain system. Document this information for future reference. The aforementioned emergency action plan should be maintained and updated periodically during the life of the structure.

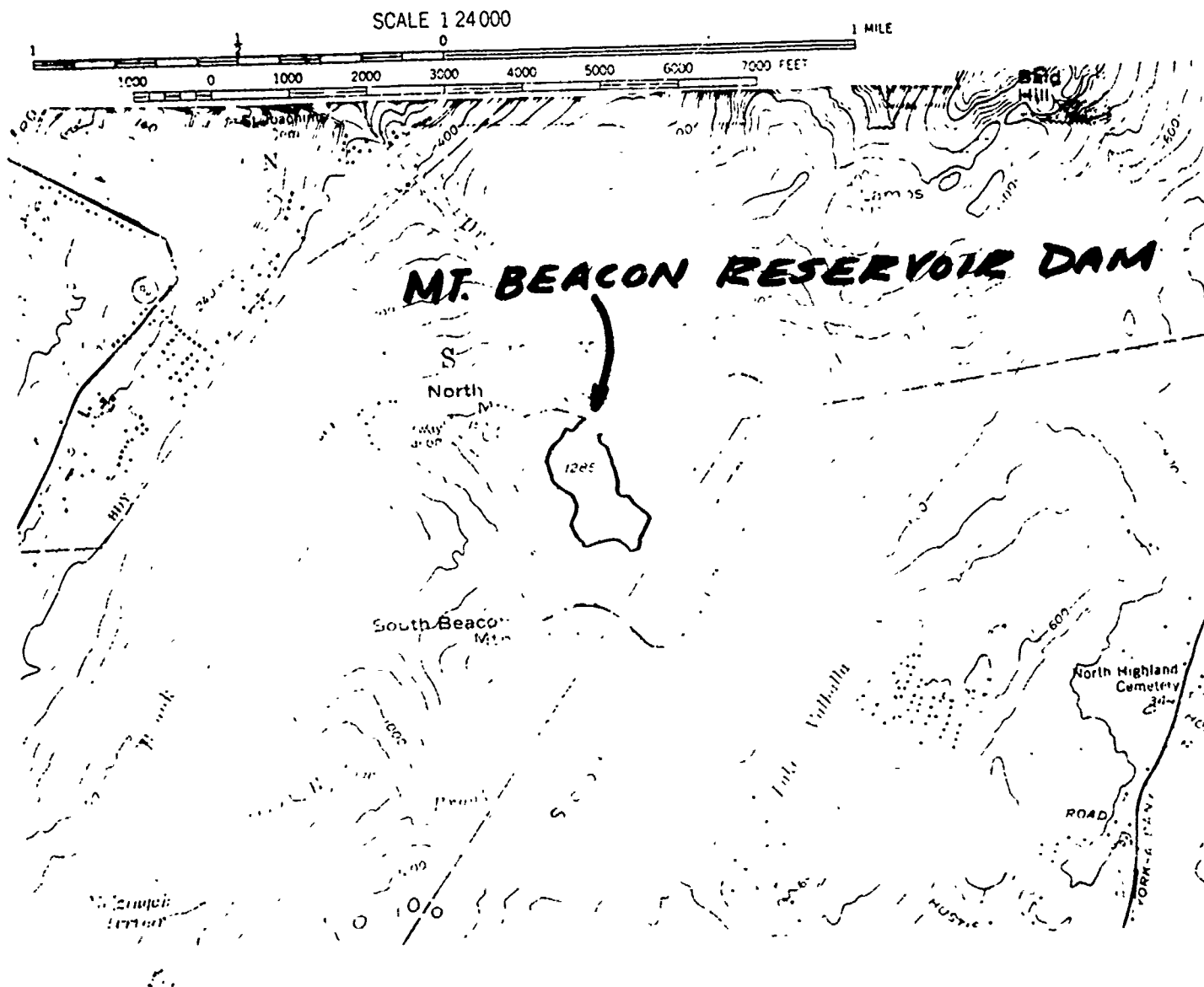
DRAWINGS

APPENDIX A

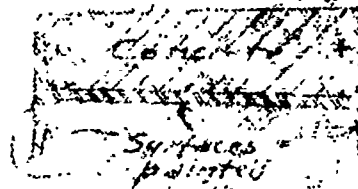


VICINITY MAP
MT. BEACON RESERVOIR DAM

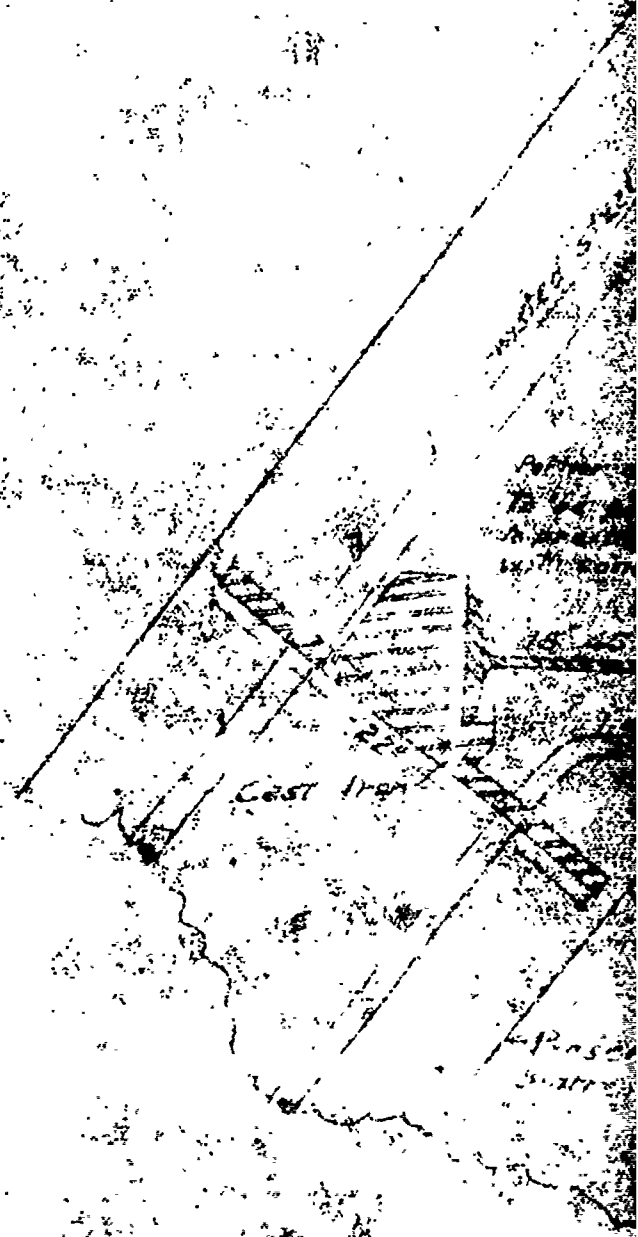
WEST POINT QUAD
New York



TOPOGRAPHIC MAP
MT. BEACON RESERVOIR DAM

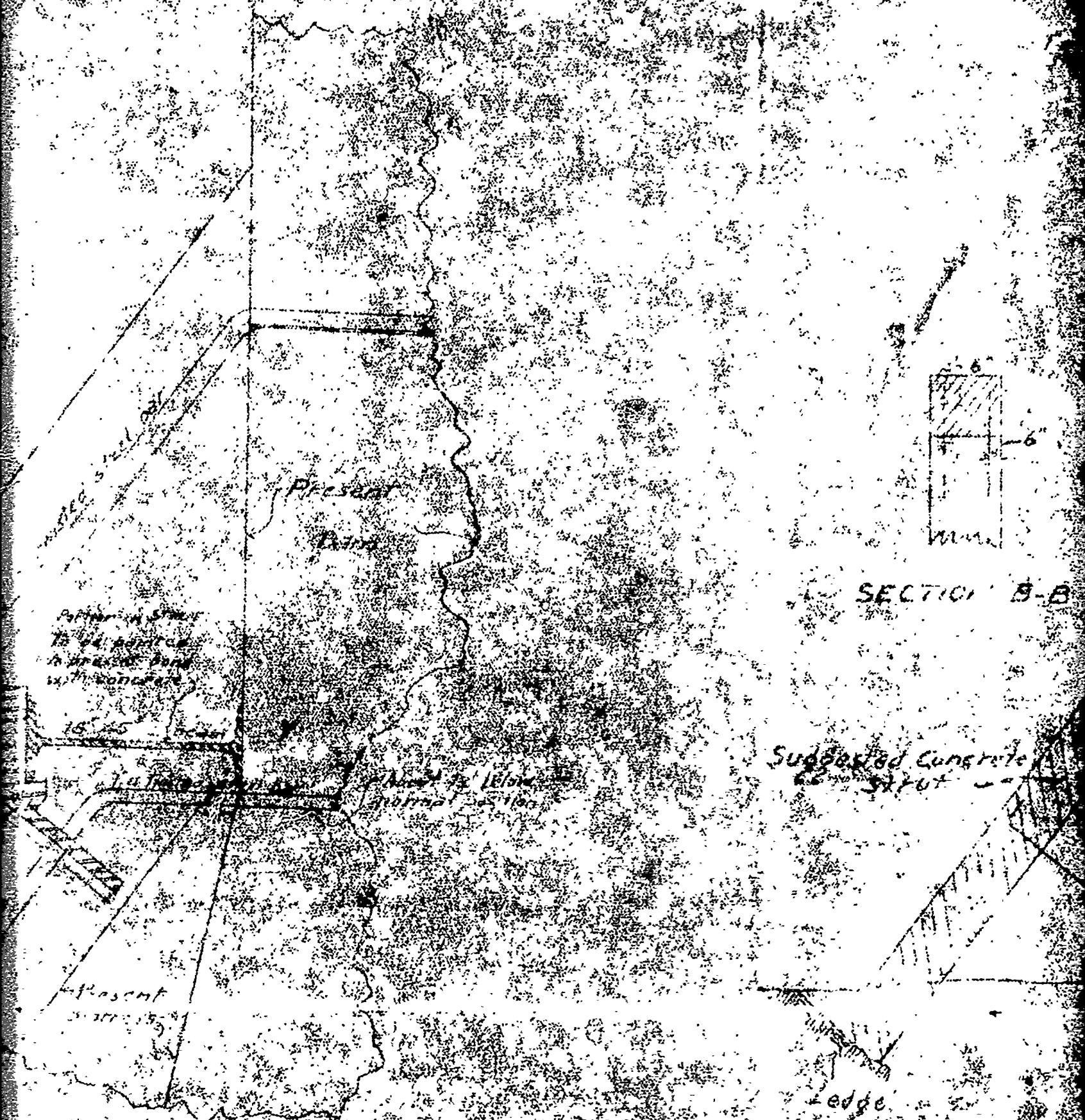


SECTION ON T BEAM
BETWEEN BUTTRESSES



DETAIL AT STRU
CRACKS IN FACE

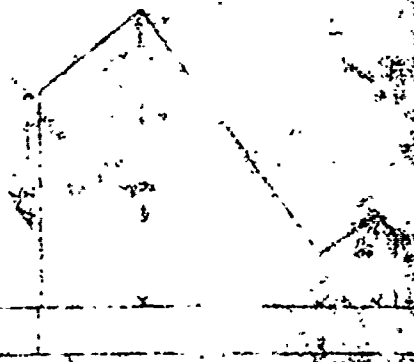
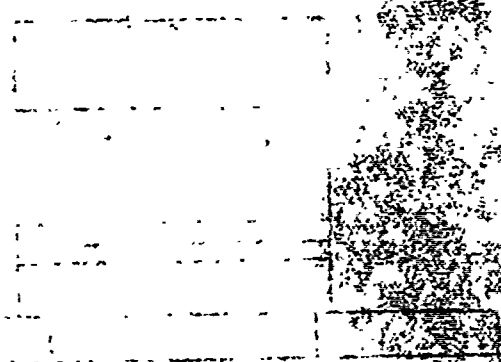
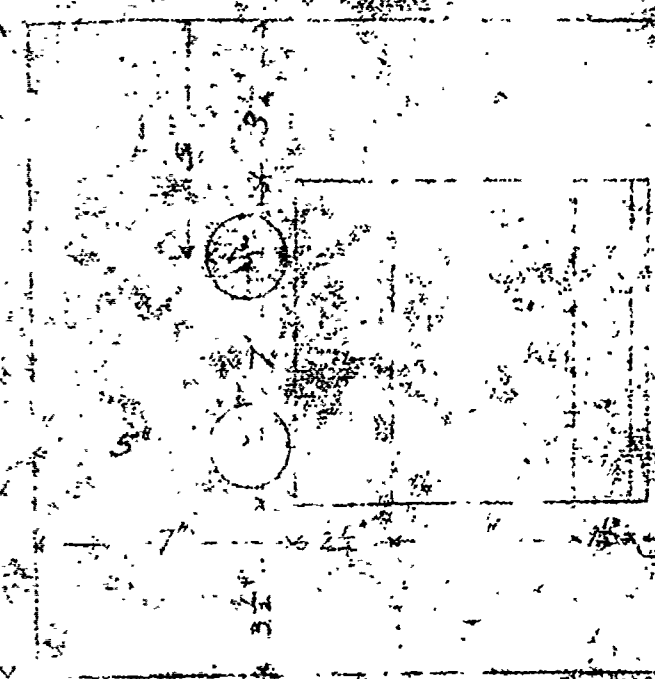
10



STRUT ADJOINING
FACE OF DAM



DETAIL W. STRUT
CRACKS IN FACE OF



END ELEVATION

SIDE ELEVATION

CAST IRON BEARING PLATE

SCALE

Present

Ledge

STRUT ADJOINING
FACE OF DAM

Scale 1 in to 10 ft

To be used in
by Ernest H. C.
Moses L. Smith
J. H. H. H.

Sept 1914
Revised



ELEVATION

NOTE
Scale 1 in to 10 ft

SECTION AT MAXI

36

Section 10

SUGGESTED METHOD OF STRENGTHENING BEACH

To accompany report

by Ernest W. Clarke

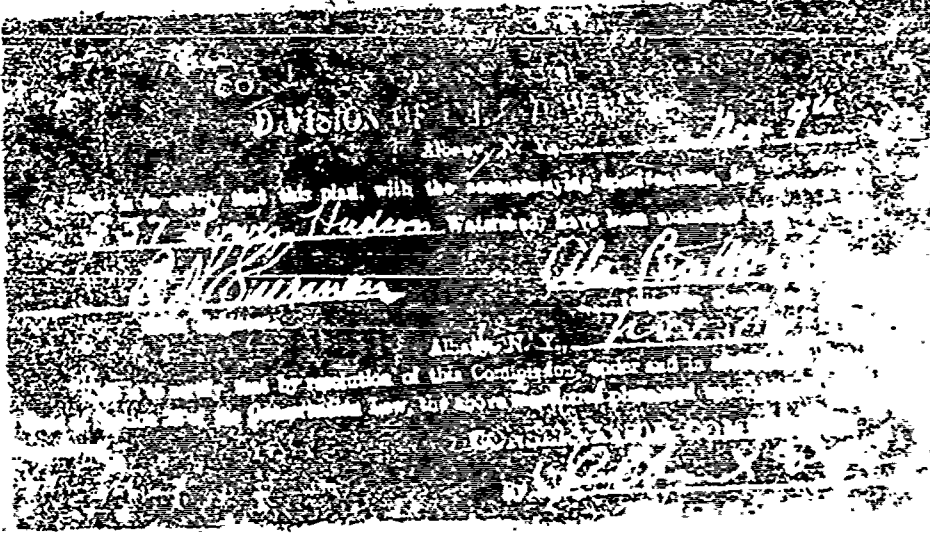
Master Street Com. Accounts and

Joseph H. Sherman - Com. Public Works

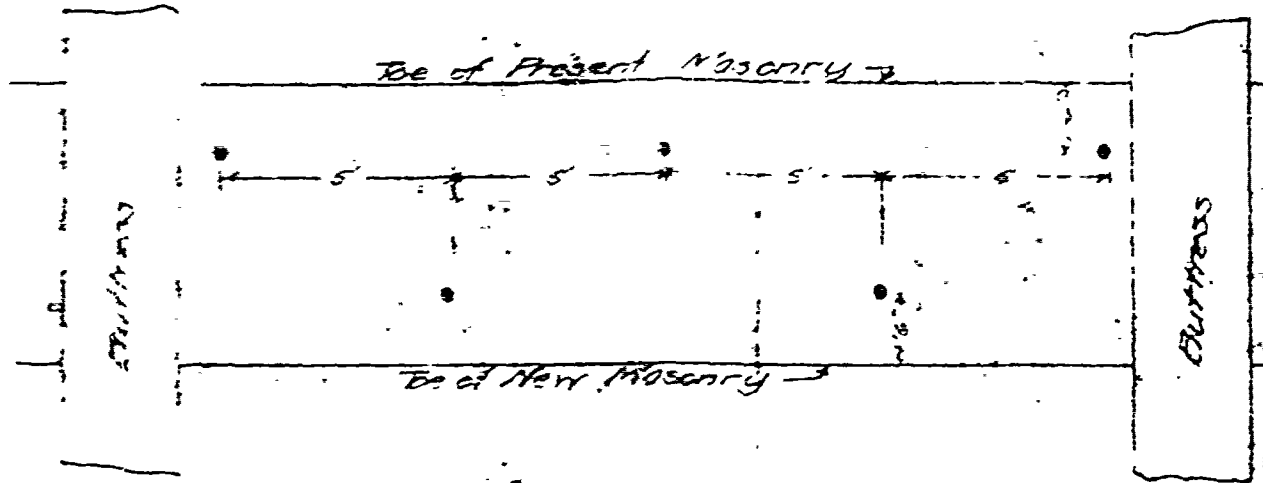
City of Boston

Dorchester Co. N.Y.

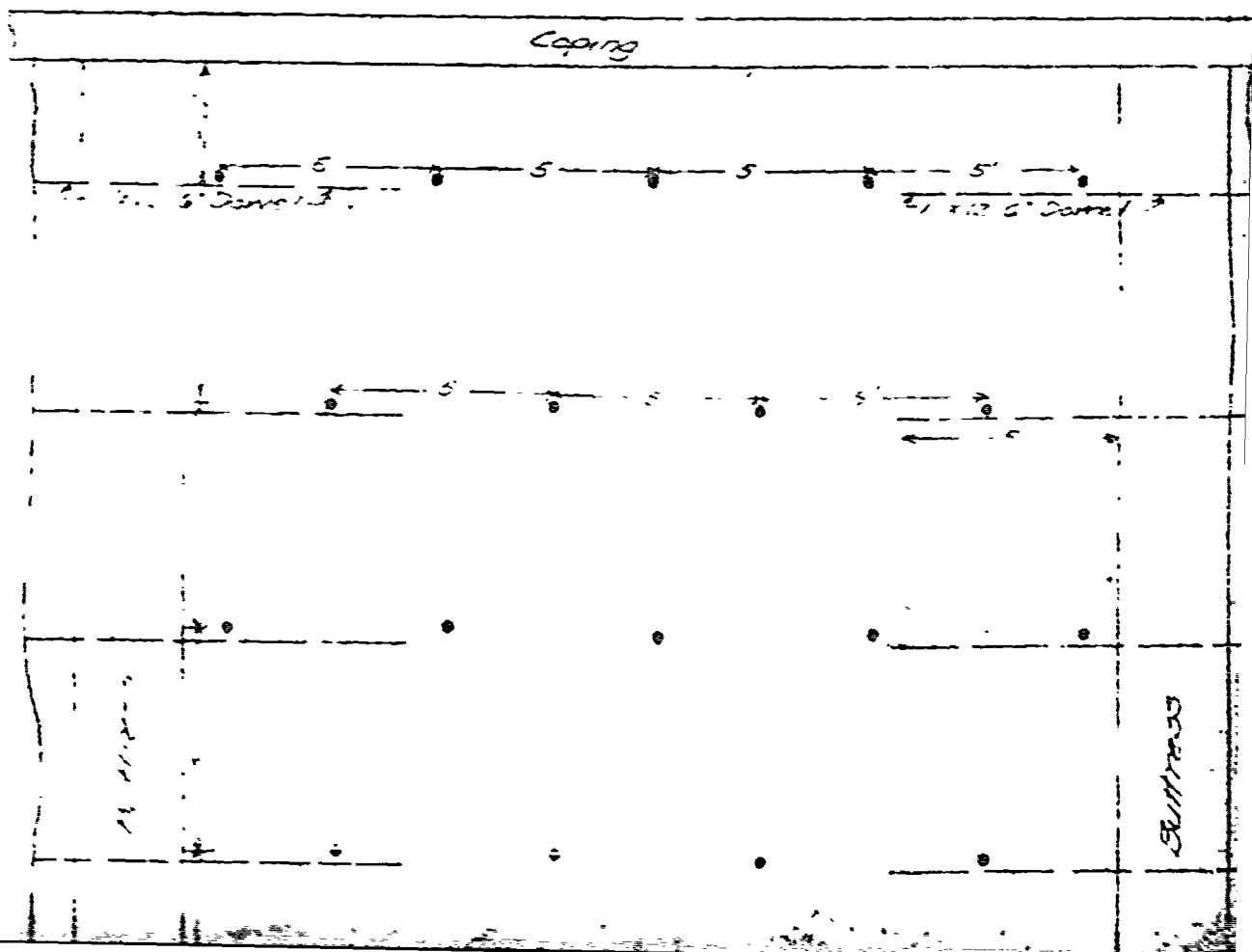
E. W. Clarke



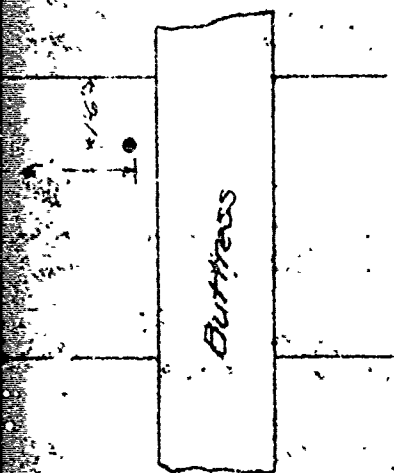
A



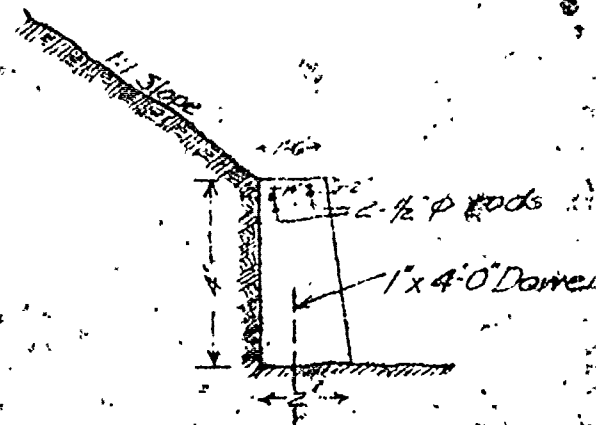
Dowels in Main Dam Footing
1/2 x 8-0" Dowels, set 3-0" in foundation rock



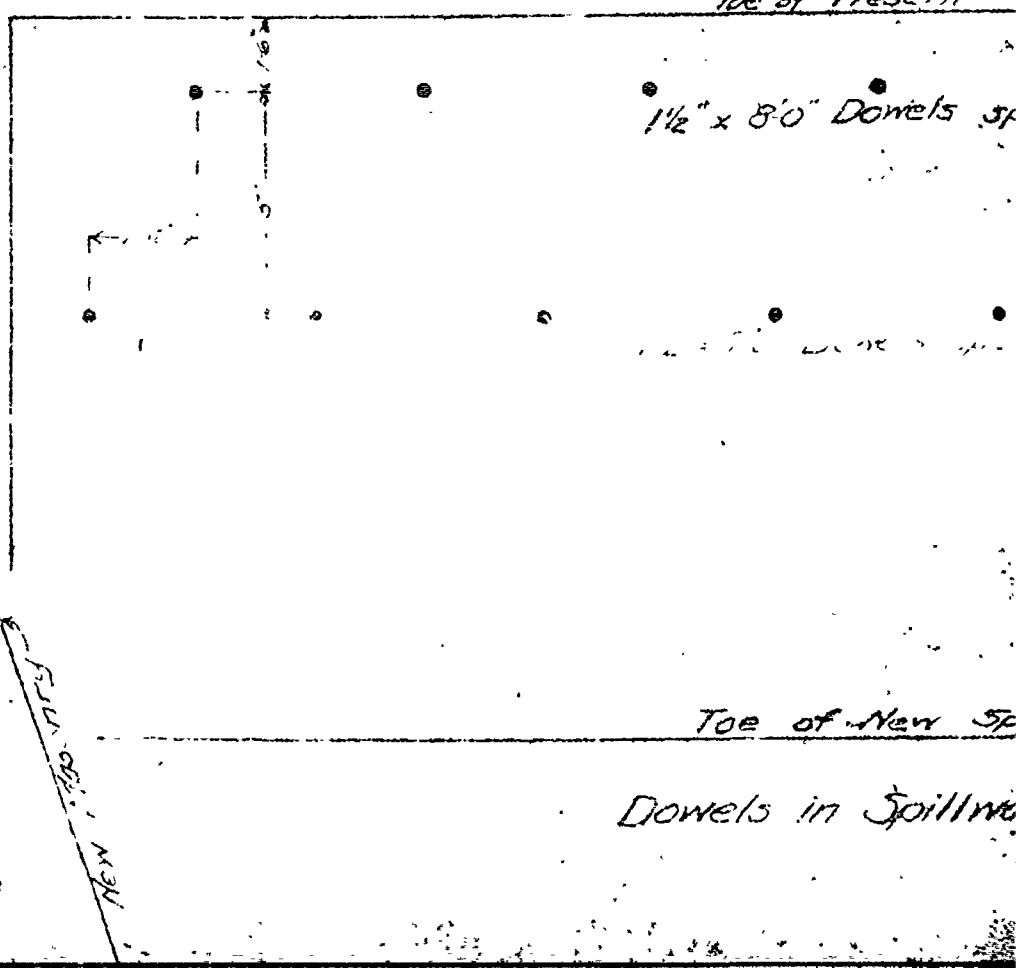
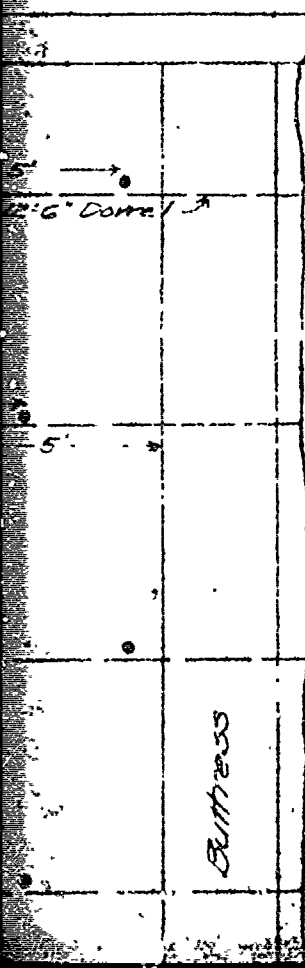
12

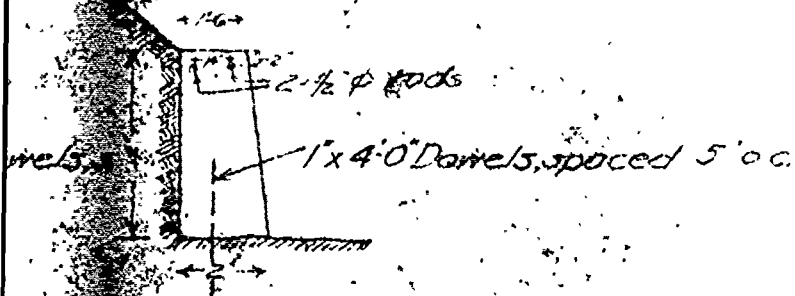


rock



Section of Canal Wall





at Coral Woli

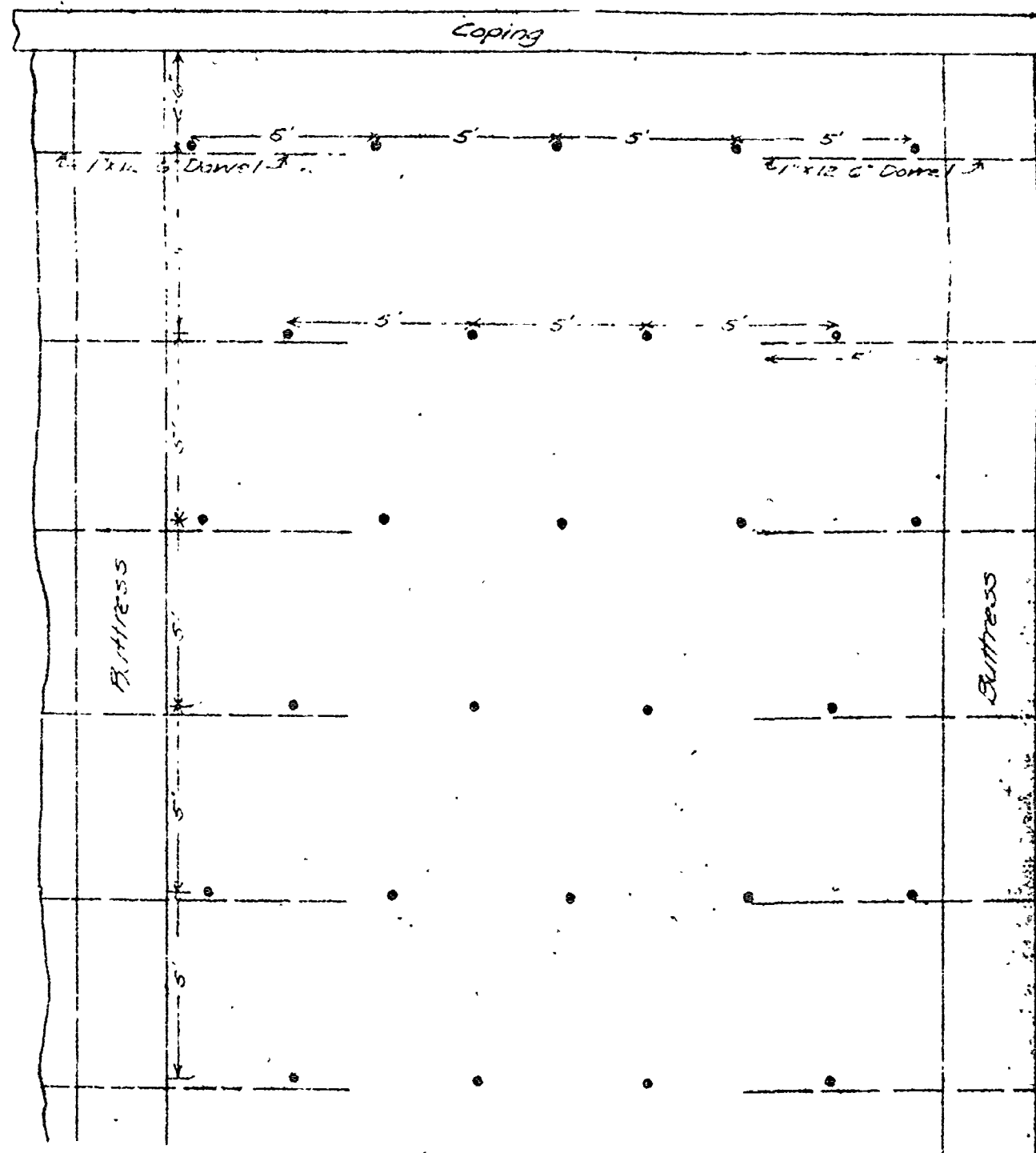
Spillway Toe of Present Spillway

Spillway Toe of Present Spillway

Spillway Toe of Present Spillway

Spillway Toe of New Spillway

Spillway Toe of New Spillway



Dowels in Face of Present Dam
1" Dowels, set 3'-0" in the old masonry

Toe of Present Spillway

1 1/2" x 8'0" Dowels spaced

Toe of New Spillway

Dowels in Spillway

Dowels thru Buttress
1" x 12'6" 100'

Buttress

Face of Old Masonry Pier to 500'

Face of New Masonry Pier to 500'

2'6"

Spillway Toe of Present Spillway

Spillway Toe of New Spillway

Spillway Toe of New Spillway

Spillway Toe of New Spillway

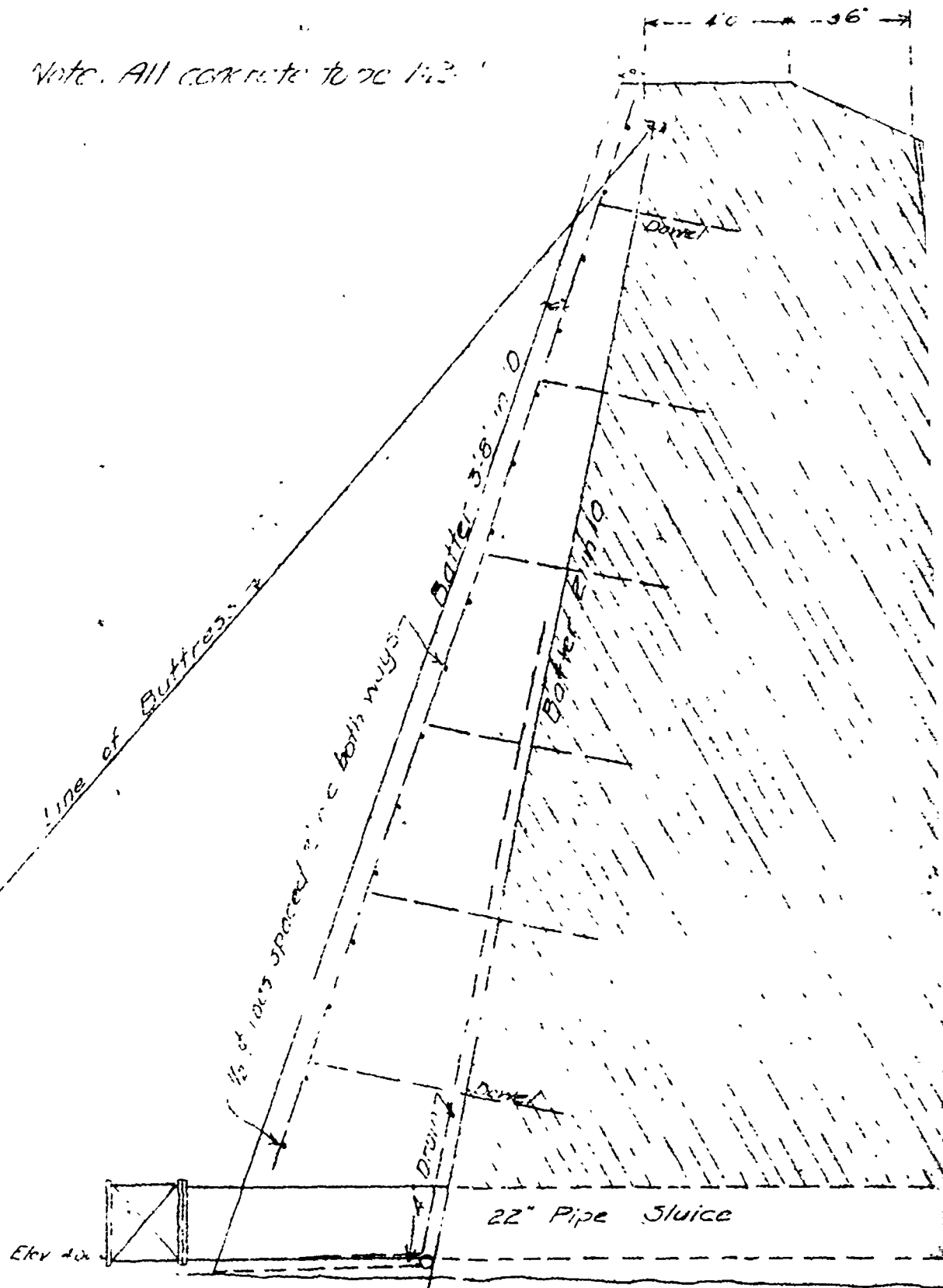
DAM AT STORAGE RESERVOIR
CITY OF BEACON
NEW YORK
Scale 1"=4'

George W. Krieger, Jr.

NEW YORK

July 1954

Note: All concrete to be 142.

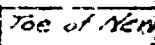
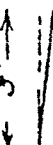


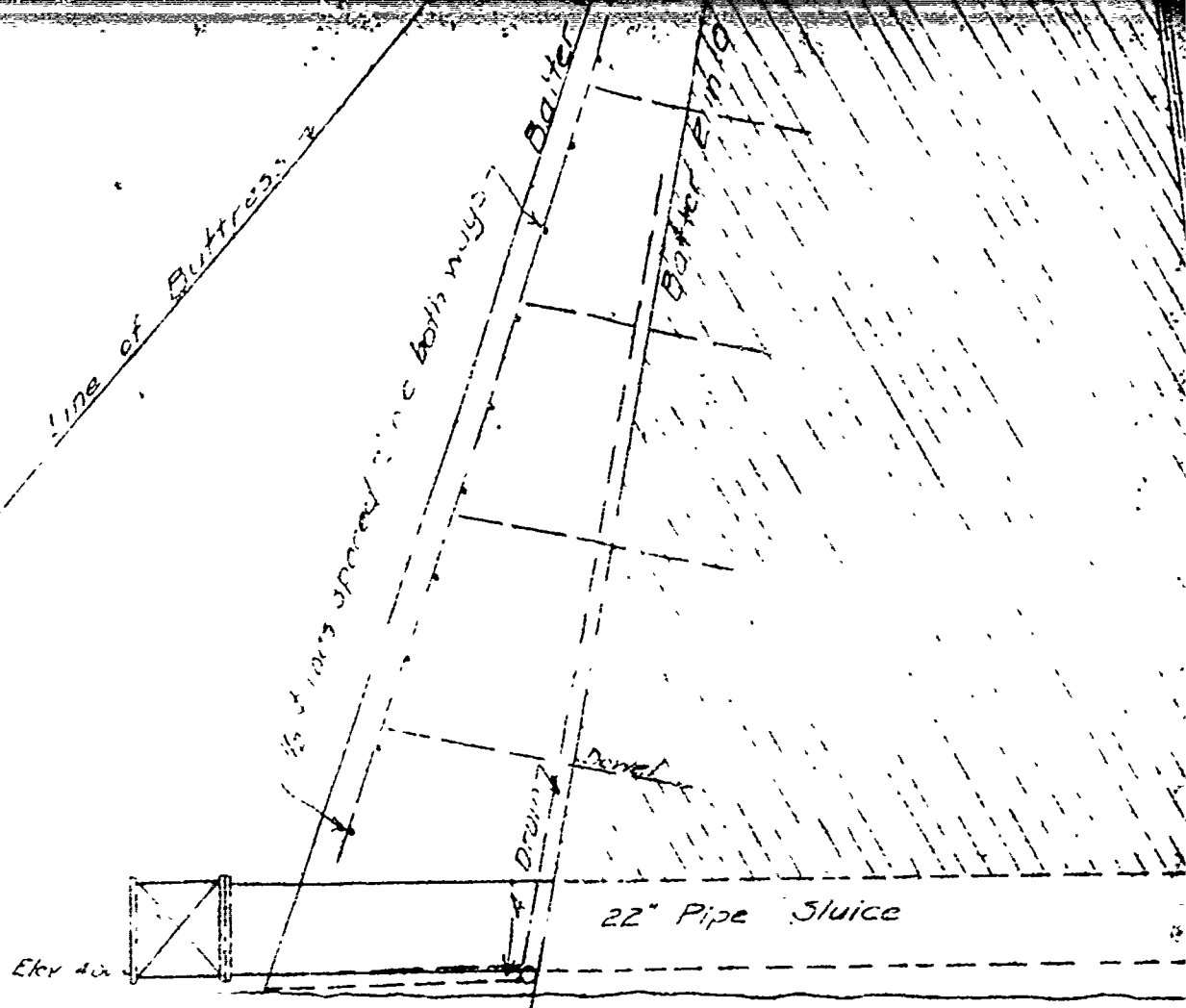
Typical Section
Scale 1" = 4'

6

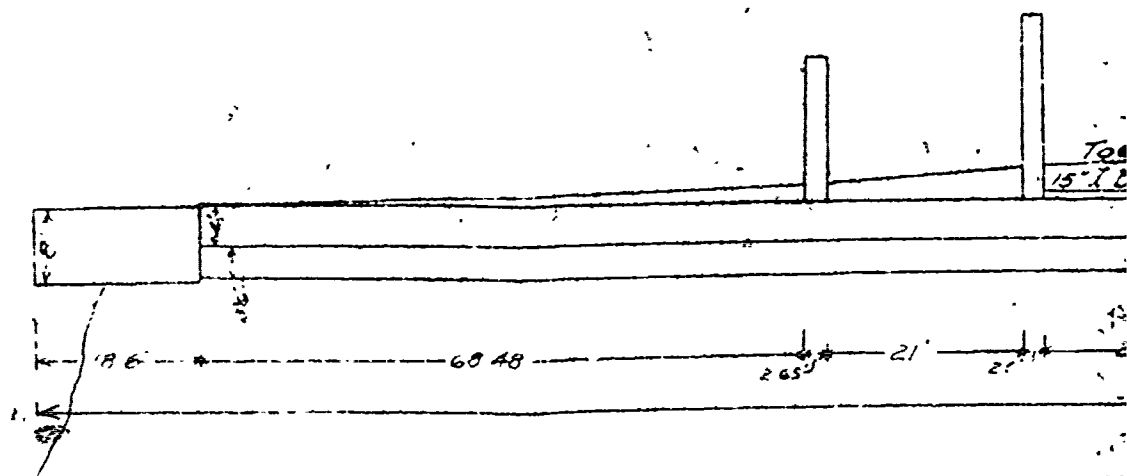


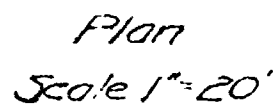
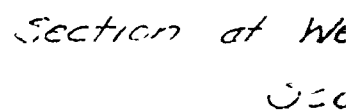
W-116

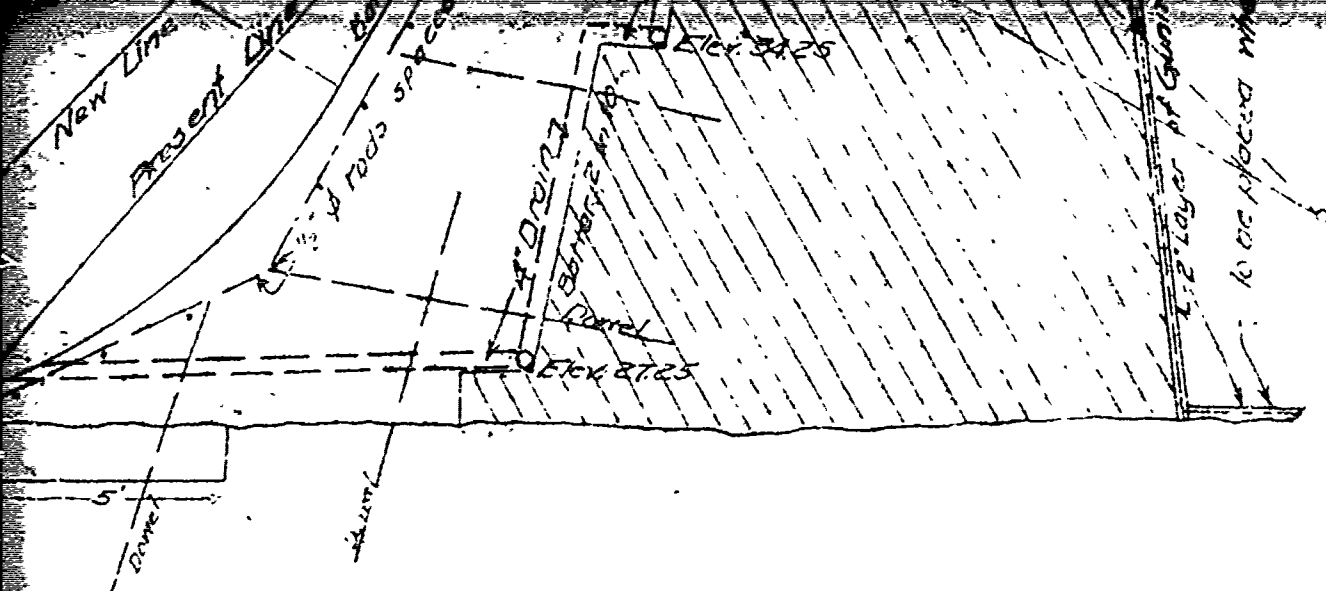




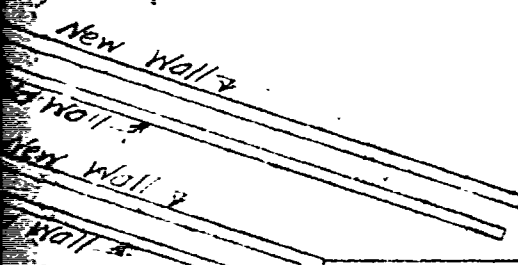
Typical Section
Scale 1"=4'



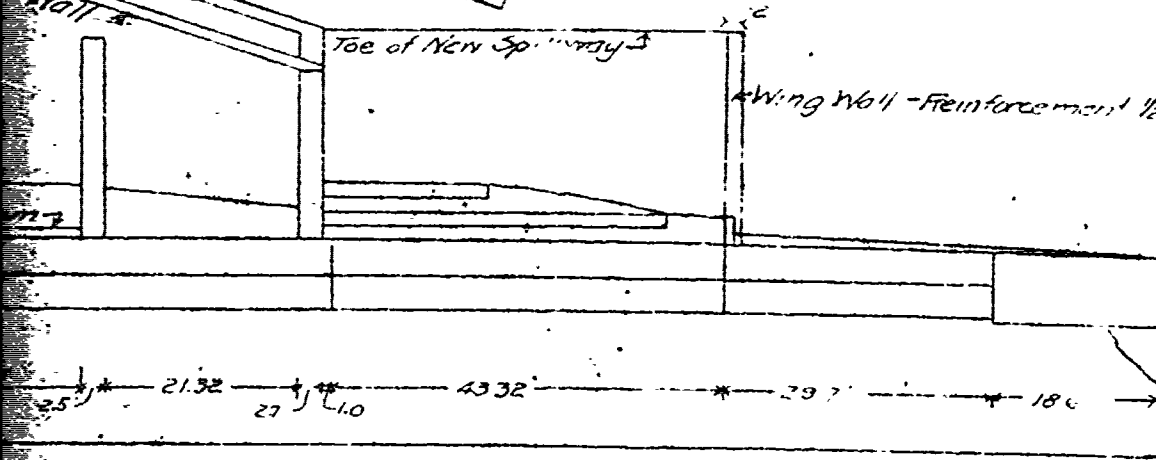




Section at West End of Spillway
Scale 1" = 4'

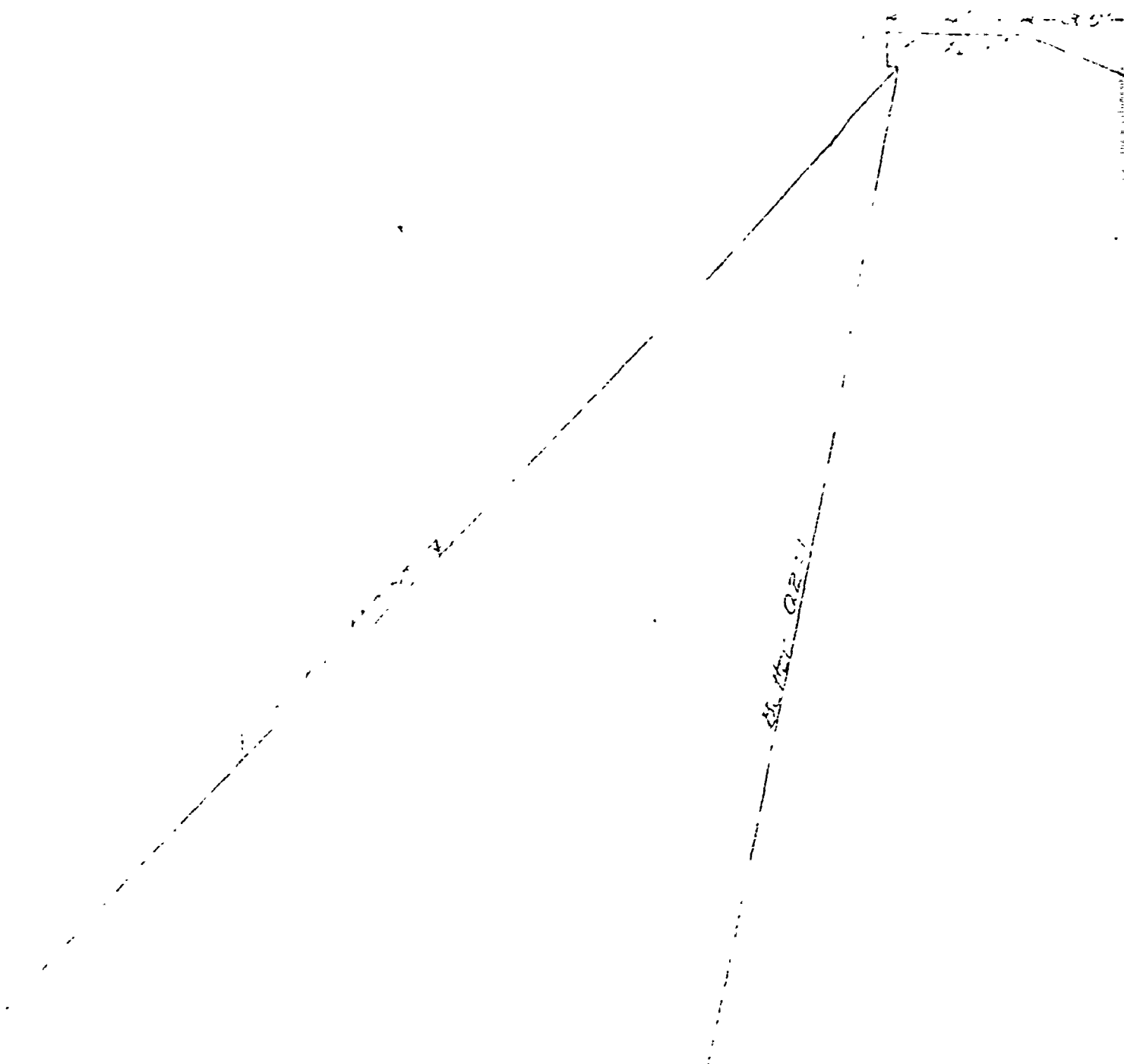


Note: Old walls to be removed.
New walls to be built as shown.



DAM AT STORAGE RESERVOIR
CITY OF BEACON
NEW YORK

George W. Kramer, Jr.



Typical Section
Scale 1" = 4'

2-2-35 +

11-15.4

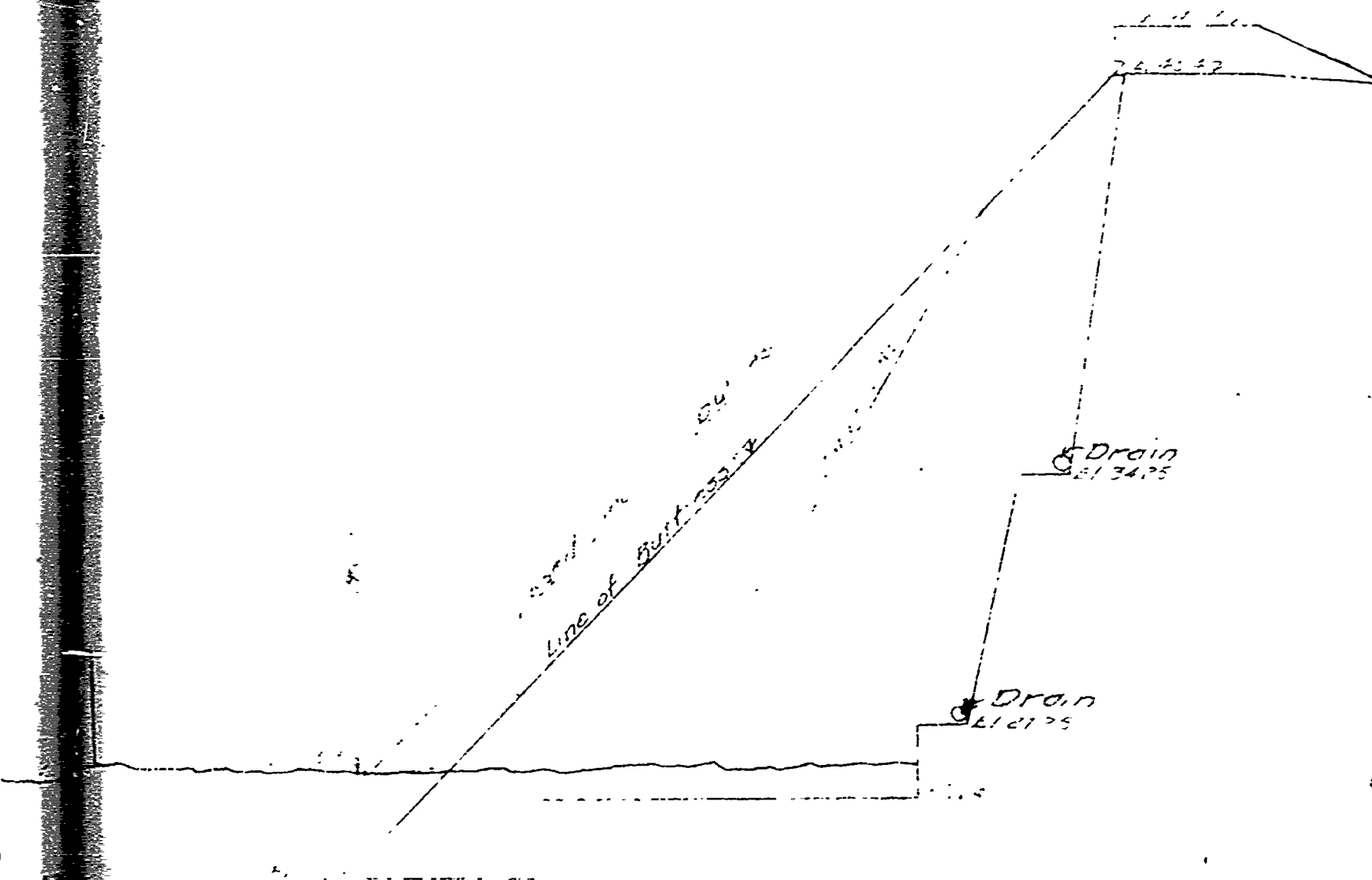
Apurak, Gorge, C. 12.1

Proctor
inlet
6.1.1966

Section
1-4'

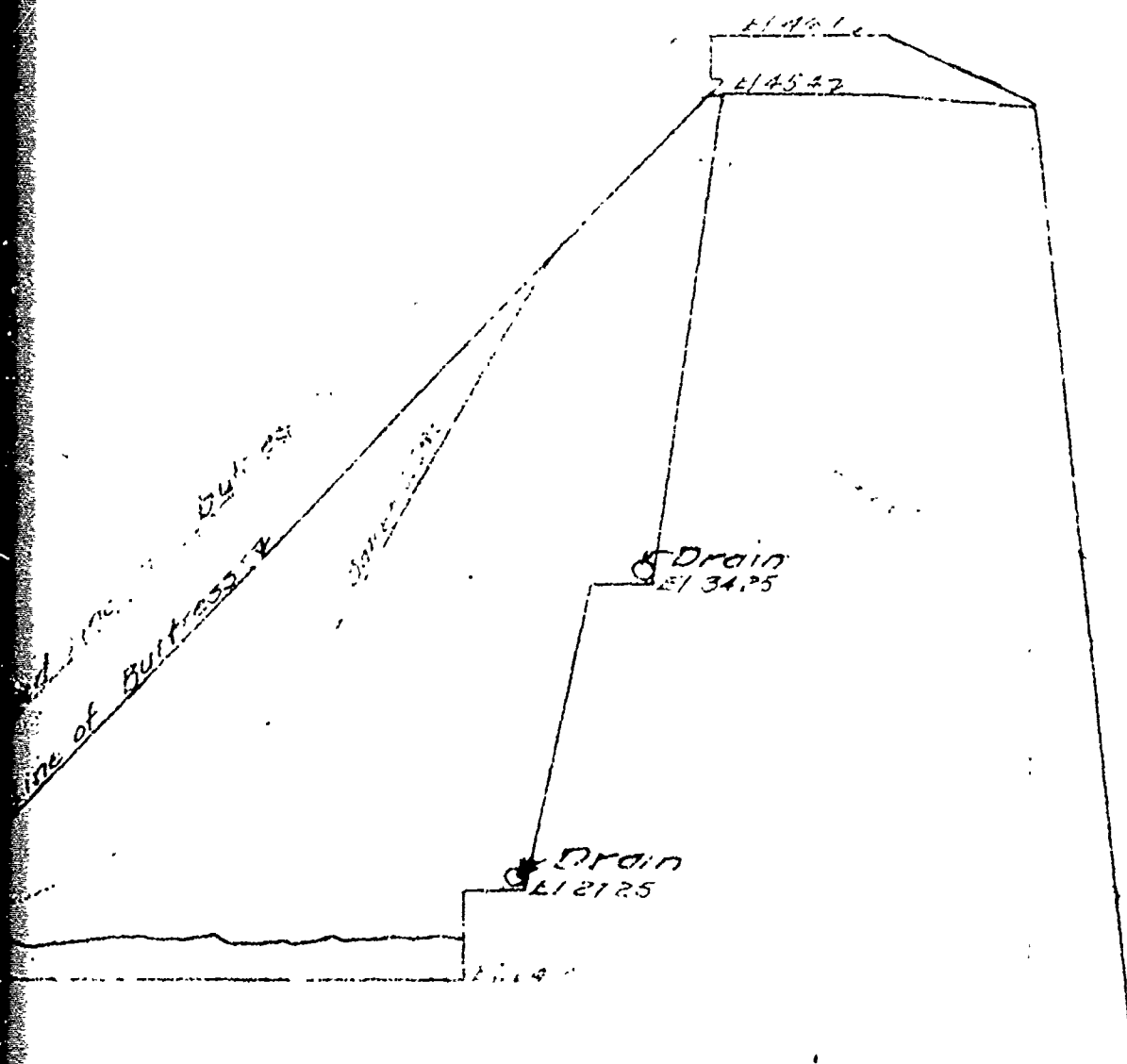
Note: - Co. xre
1' Donel's
of dar
stream
cement





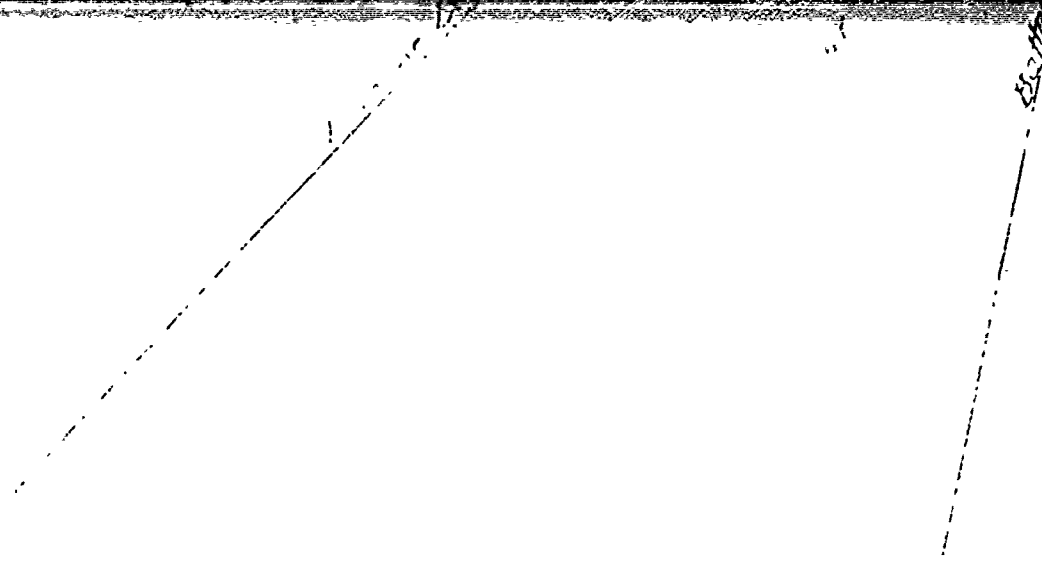
Section of dam showing location of buttress

Concrete - concrete four 1" x 2" on
 1' Dams, spaced 5' on center placed in face
 of dam and in buttresses.
 Upstream face of dam to be covered with 2" layer
 cement gun grout in 15' reinforcement. —



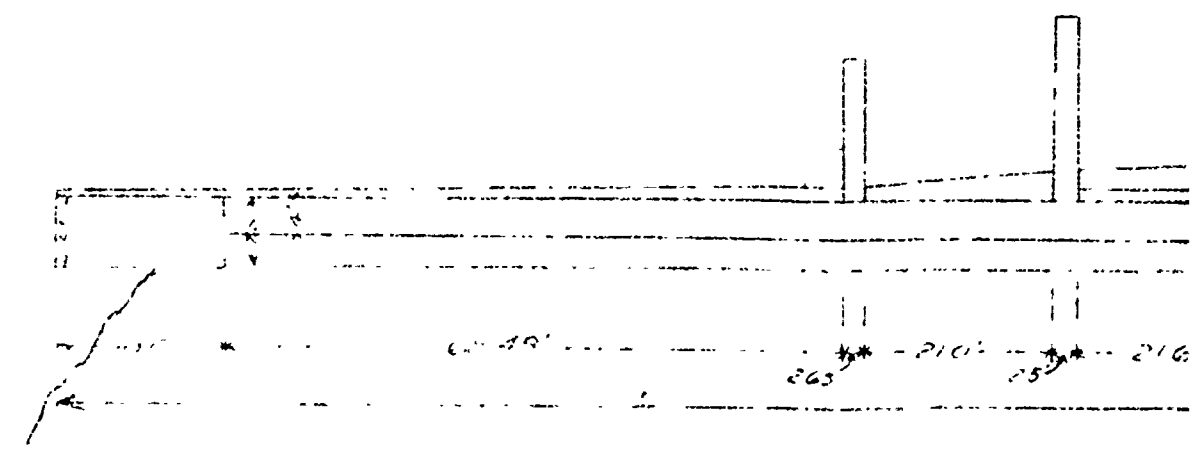
Section of Driftway at West End
1932

... be placed in face
... covered with 2" layer
... reinforcement. —



Section

Typical Section
Scale 1"=4'



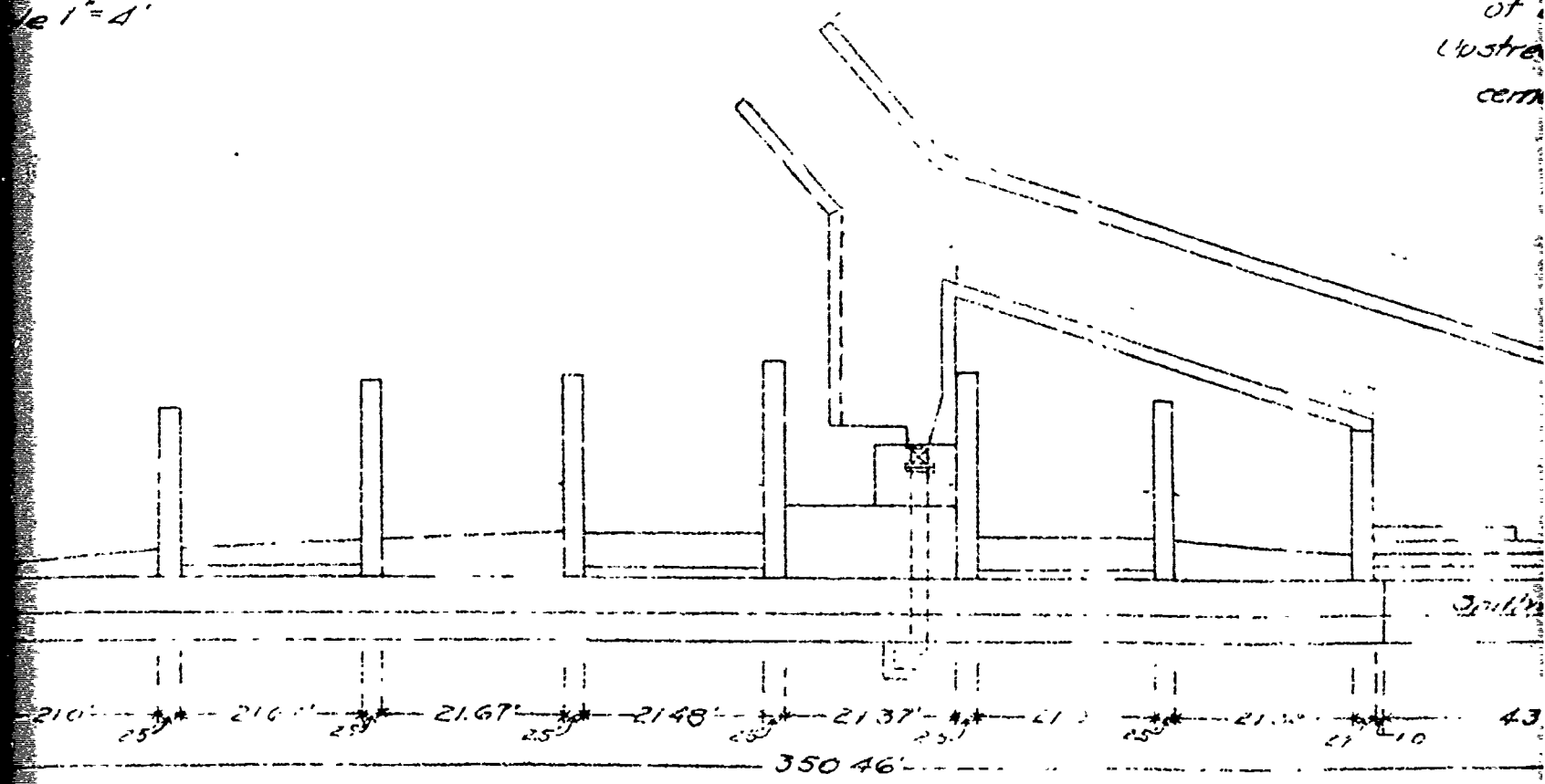
H

Access

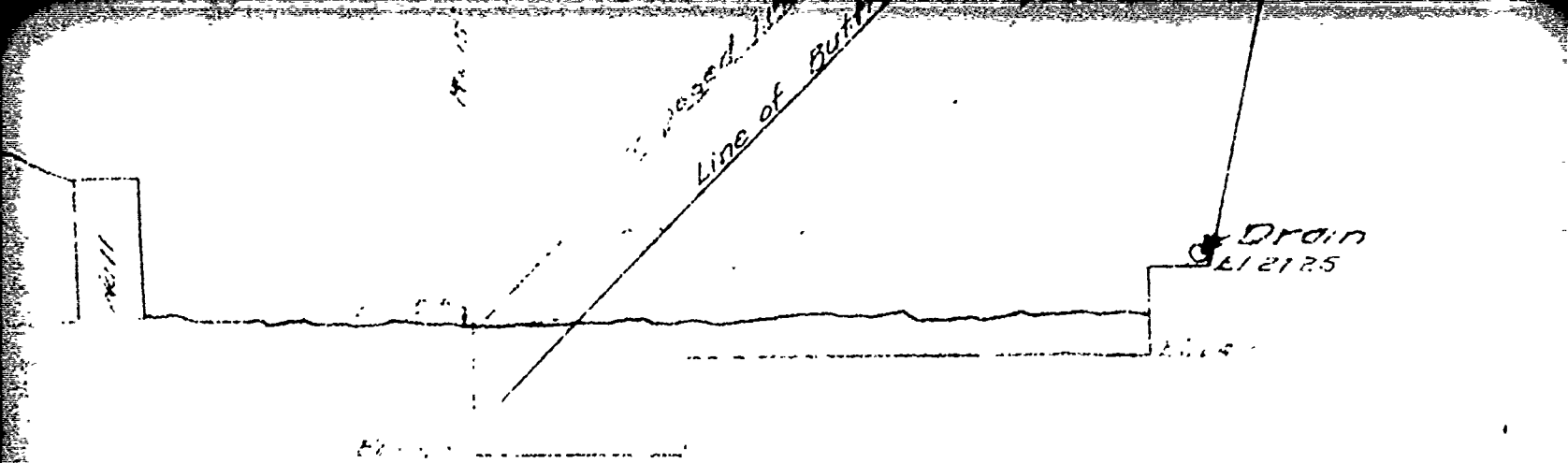
Probable
inlet
culvert

Note - Co.
1" Down
of
Upstream
center

Section
1" = 4'

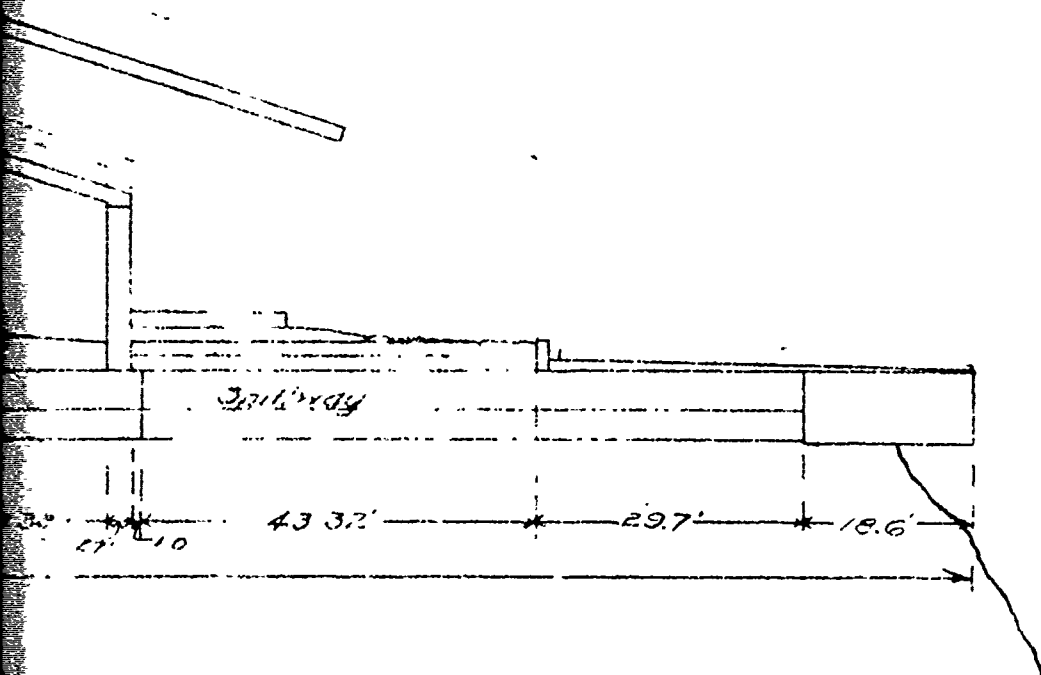


Plan
Scale 1" = 20'



Section of Spillway at West End

Note - Concrete to be 1:2 1/4 m. —
 1" Dowels, spaced 5' o.c. to be placed in face
 of dam and in cutlasses.
 Upstream face of dam to be covered with 2" layer
 cement gun grout in mesh reinforcement. —



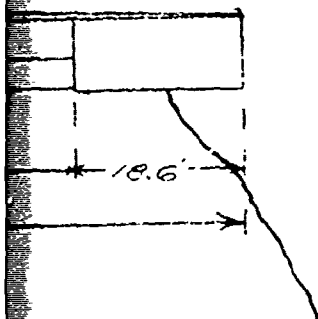
DAM AT
 CITY
 N.
 J.
 Geo

to of Butte

Drain
412125

Section of Grillage at West End

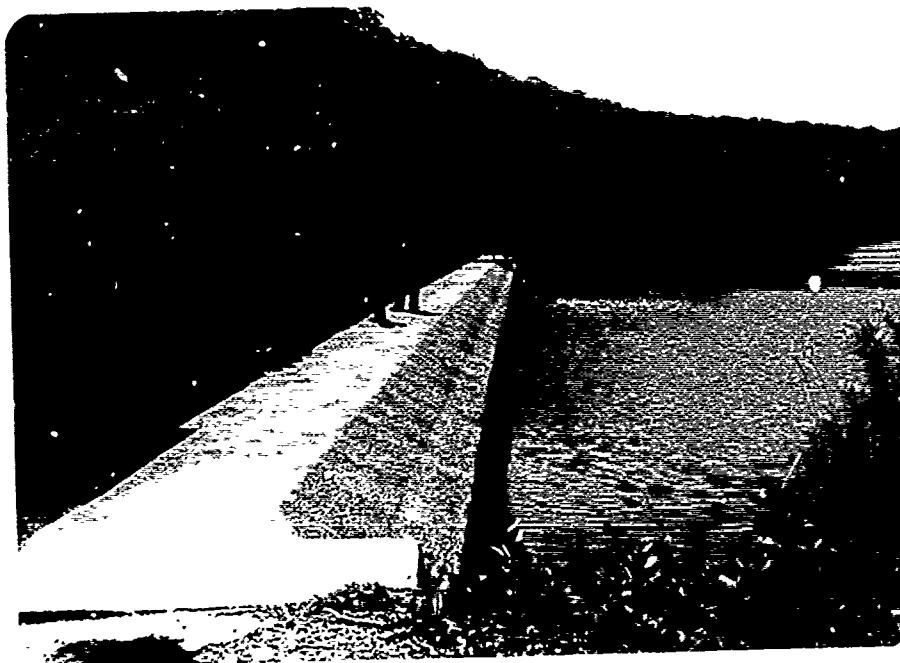
to be placed in face
es.
covered with 2" layer
reinforcement. —



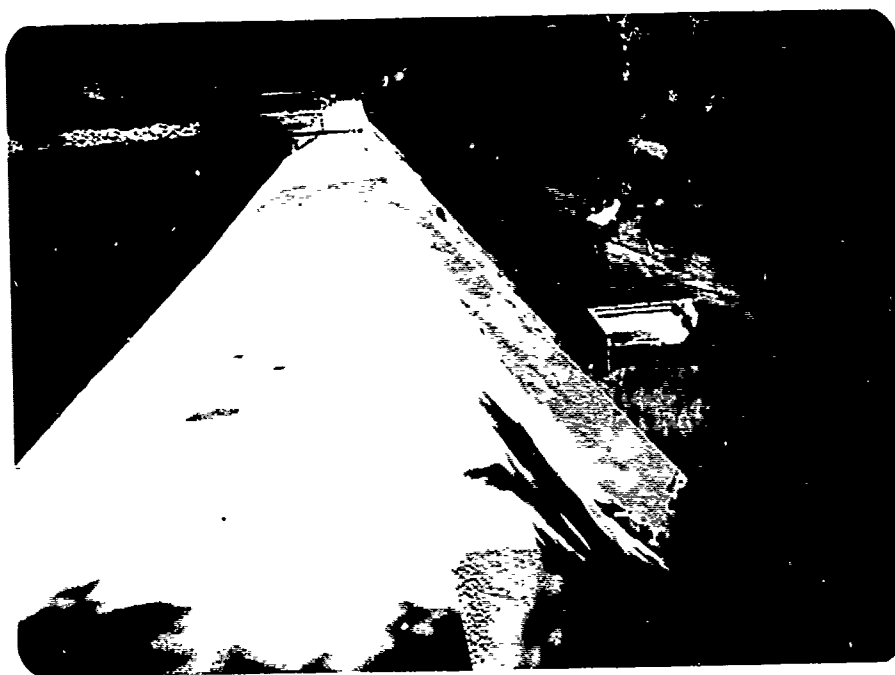
DAM AT STORAGE RESERVOIR
CITY OF BEACON
NEW YORK
July 1922
George W. Krieger, Jr.

PHOTOGRAPHS

APPENDIX B



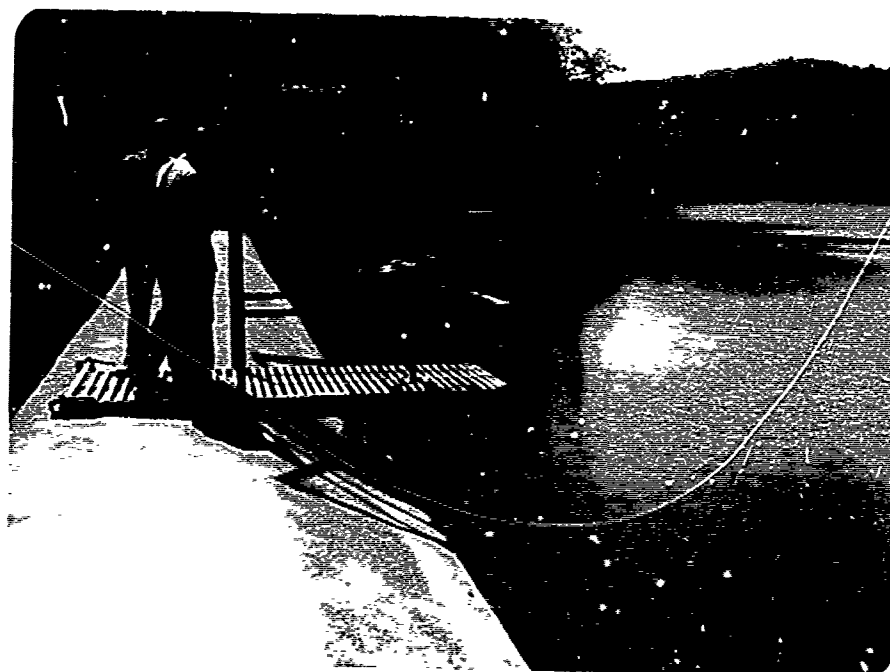
2. UPSTREAM VIEW OF DAM



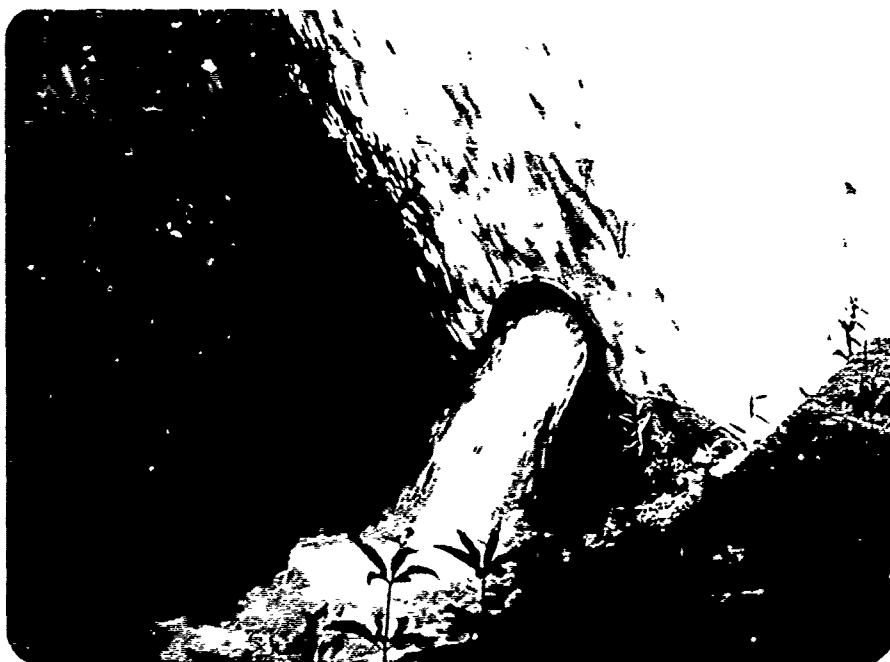
3. VIEW OF SPILLWAY AND DOWNSTREAM OF DAM.
NOTE: VEGETATION AT TOE OF DAM.



4. VIEW OF UPSTREAM REGULATING CONTROL FOR RESERVOIR DRAIN.



5. VIEW OF AREA DOWNSTREAM OF DAM. NOTE: THE GATE HOUSE IN WHICH DOWNSTREAM REGULATING CONTROL IS LOCATED.



6. VIEW OF RESERVOIR DRAIN OUTLET. NOTE: 6-INCH DIAMETER PIPE NEXT TO DRAIN.



7. VIEW OF DOWNSTREAM CHANNEL AT JUNCTION OF SPILLWAY AND RESERVOIR DRAIN CHANNELS MEET.



8. VIEW OF DOWNSTREAM CHANNEL.

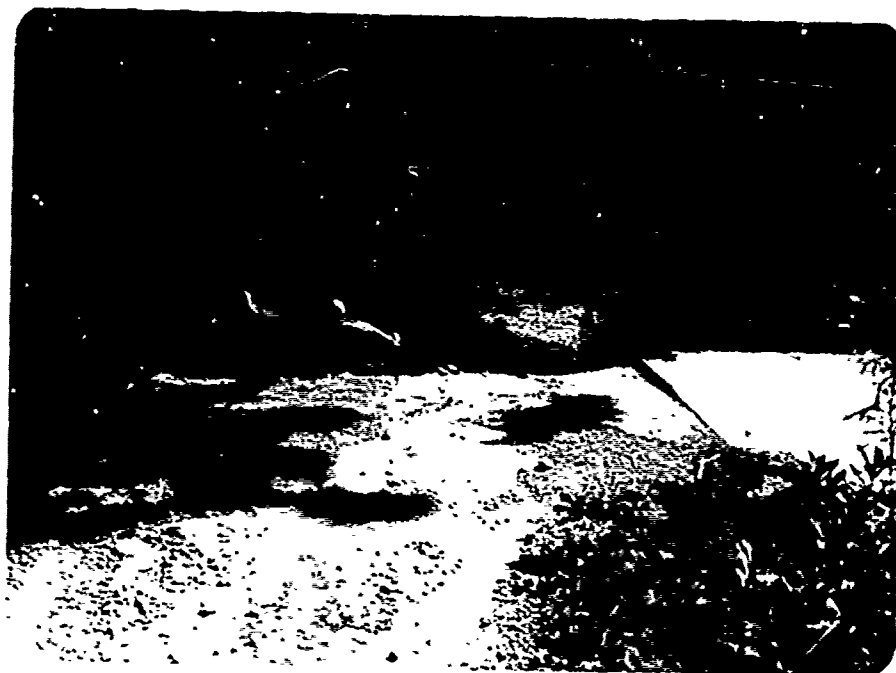


9. VIEW OF SEEPAGE DRAINS ON DOWNSTREAM
FACE OF DAM.

10. VIEW AT RIGHT ABUT-
MENT AND SPILLWAY
CONTACT. NOTE:
SEEPAGE.



11. VIEW OF SEEPAGE AREA 50 FT DOWNSTREAM FROM DAM.



12. VIEW OF LEFT ABUTMENT. NOTE: THAT
CONTACT IS LOWER THAN DAM CREST.

VISUAL INSPECTION CHECKLIST

APPENDIX C

VISUAL INSPECTION CHECKLIST

a) Basic Data

a. General

Name of Dam MT. BEACON RESERVOIR
Fed. I.D. # N.Y. 26 DEC Dam No. 537
River Basin HUDSON
Location: Town BEACON County DUTCHESS
Stream Name DRY BROOK
Tributary of HUDSON RIVER
Latitude (N) 41° 29' Longitude (W) 74° 56'
Type of Dam CONCRETE FAIRFAX TYPE VASCONY COUNTY AND
CONCRETE BUTTRESS DAM
Hazard Category HIGH
Date(s) of Inspection 7-24-80
Weather Conditions SUNNY; 82°F
Reservoir Level at Time of Inspection _____

b. Inspection Personnel HARVEY FELMAN & JYOTIRMOUL H Patel

c. Persons Contacted (Including Address & Phone No.) _____
MR. MARK GIOZZANO, Supt. of Water Dept.
427 Main St.
Beacon N.Y. 12523
TEL. 914-831-0722

d. History:
Date Constructed 1899-1892 * Date(s) Reconstructed 1904, 1922,
and 1974
Designer Unknown
Constructed By Unknown
Owner CITY OF BEACON

* Based on application of construction or reconstruction
dated 10/10/1913.

2) Embankment NONE

a. Characteristics

- (1) Embankment Material _____

- (2) Cutoff Type _____

- (3) Impervious Core _____

- (4) Internal Drainage System _____

- (5) Miscellaneous _____

b. Crest

- (1) Vertical Alignment _____

- (2) Horizontal Alignment _____

- (3) Surface Cracks _____

- (4) Miscellaneous _____

c. Upstream Slope

- (1) Slope (Estimate) (V:H) _____
- (2) Undesirable Growth or Debris, Animal Burrows _____

- (3) Sloughing, Subsidence or Depressions _____

(4) Slope Protection _____

(5) Surface Cracks or Movement at Toe _____

d. Downstream Slope

(1) Slope (Estimate - V:H) _____

(2) Undesirable Growth or Debris, Animal Burrows _____

(3) Sloughing, Subsidence or Depressions _____

(4) Surface Cracks or Movement at Toe _____

(5) Seepage _____

(6) External Drainage System (Ditches, Trenches; Blanket) _____

(7) Condition Around Outlet Structure _____

(8) Seepage Beyond Toe _____

e. Abutments - Embankment Contact

(1) Erosion at Contact _____

(2) Seepage Along Contact _____

3) Drainage System

a. Description of System From available drawings, three 4" dia drains were installed at the downstream face of the original dam during the 1922 rehabilitation of the dam.

b. Condition of System The drains are within the dam, therefore could not be ascertained.

c. Discharge from Drainage System All the drains outlets at the downstream face were active.

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

NONE Except a V notch weir installed in the downstream channel about 25 feet from the Reservoir Drain Outlet. Weir measures the flow from the drain and the spillway.

5) Reservoir

- a. Slopes Within vicinity of the dam, reservoir slopes are stable, and no incidence of adverse conditions reported.
- b. Sedimentation No evidence of excessive sedimentation observed; lake water relatively clear; and no floating debris.
- c. Unusual Conditions Which Affect Dam None observed.

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) Several homes
Water treatment plant and storage tank (water supply)
located about 50 feet from dam.
- b. Seepage, Unusual Growth About 50 feet downstream from the crest of the dam and in line with the first buttress from the left abutment there is a spongy area where seepage is observed. Vegetation along the downstream of the dam.
- c. Evidence of Movement Beyond Toe of Dam None observed.
- d. Condition of Downstream Channel good except overgrown trees on the banks and minor debris at the floor of the channel.

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

Spillway is about 43 feet in length; the spillway channel is about 15 feet wide, which joins reservoir drain channel (see drawings in appendix).

a. General

Spillway is broad crested; uncontrolled and was rehabilitated several times; downstream face is sloping. Entire spillway surface is "gunite"

- b. Condition of Service Spillway Good condition; there are several hair line to 1/8" wide transverse and longitudinal cracks at the crest and downstream face of the spillway. At several locations at the downstream face there is minor seepage. At crest, near the right side of the spillway, a small cavity about 6" square gunite is missing.

c. Condition of Auxiliary Spillway None

d. Condition of Discharge Conveyance Channel Good except

minor vegetation and debris in the floor
of the channel, and overgrown trees at the sides
the channel.

3) Reservoir Drain/Outlet

Type: Pipe ☒ Conduit _____ Other _____

Material: Concrete _____ Metal ☒ Other _____

Size: 20 INCH (I.D.)** Length 30 Ft ±**

Invert Elevations: Entrance _____ Exit 1274**

Physical Condition (Describe): _____ Unobservable ☒

Material: _____

Joints: _____ Alignment _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate (2) Valve _____ Uncontrolled _____

Operation: Operable ☒ Inoperable _____ Other _____

Present Condition (Describe): There are two gate valves located
at upstream and downstream of the dam. Both gate valves
were operated and generally in good condition. The
operating stem of the downstream gate is rusted; however
does not effect the operation.

** For available drawing, there are no other data on
the drain, in records of the owner.

9) Structural

The entire dam is rehabilitated by applying a gunite surfacing.

⑦

- a. Concrete Surfaces Name Visible. The gunite at downstream face of the dam and buttresses appeared in relatively good conditions except at several locations there are hairline to 1/8" wide minor cracks some of which are covered with lime deposits. At the crest there also minor cracks.
- b. Structural Cracking except as noted above there were not other structural cracking visible
- c. Horizontal & Vertical Alignment (Settlement) There is no change in either the horizontal or vertical alignment.
- d. Junctions with Abutments or Embankments The junction between the dam and the left abutment is in good condition except there is a depression which is about 2 inches lower than the crest of the dam. The junction between the right abutment and the dam (spillway portion) is good except there is minor seepage occurring at the contact. The seepage is about 1 Gpm.
- e. Drains - Foundation, Joint, Face There are drain outlets at several locations along the downstream face of the dam. All drains were flowing.
- f. Water Passages, Conduits, Sluices 20" Reservoir drain; not accessible.
- g. Seepage or Leakage At several locations at downstream face of the dam, there are seepages through the gunite particularly at the lift joints. The other seepage through weep hole and at the joint abutment contact are described above in e and d. respectively.

h. Joints - Construction, etc. Entire surface is granite therefore
no joints observed; except granite lift joints.

i. Foundation According to available information, the
dam is on Rock.

j. Abutments Abutments are good conditions except minor
seepage occurring at right abutment contact.

k. Control Gates No structural control gates.

l. Approach & Outlet Channels No approach channel; the
Outlet channels for reservoir drain and spillway are
in good conditions. The ^{concrete} walls of the reservoir drain
channel are heavily spalled. The concrete walls of the spillway
channel are spalled at several locations.

m. Energy Dissipators (Plunge Pool, etc.) None

n. Intake Structures None

o. Stability Visual observations do not indicate any
stability problems.

p. Miscellaneous

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX D

TAMS

Job No. 1551-

Project MT BEACON RESERVOIR DAM INSPECTION

Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS

Sheet 1 of 5

Date Aug 4 1980

By JLC

Ch'k. by _____

200 SQ Mile 24 Hour PMP = 22"

INCR
RAIN

% of INDEX RAINFALL, 6 HR - 111% - 24.42 - 24.42
(for 10 SQ MILE)

12 HR 121% 26.62 - 2.20

24 HR 133% 29.26 - 2.64

Redistributed rainfall.

LAKE AREA - 20 Acres
LAND AREA - 139 Acres

0-6 2.2

6-12 24.42

12-24 2.64

Time

Losses

LAND R/O

LAKE R/O

TOTAL R/O

0-1	0.2	0.2	-	4	4
2	0.3	.1	27.8	6	33.8
3	0.3	.1	27.8	6	33.8
4	0.4	.1	41.7	8	49.7
5	0.5	.1	55.6	10	65.6
6	0.5	.1	55.6	10	65.6
7	2.42	.1	33.5	48.4	383.
8	2.94	.1	407.	58.8	466.
9	3.66	.1	507.	73.2	580.
10	9.28	.1	1290.	186.	1480.
11	3.43	.1	475.	68.6	544.
12	2.69	.1	373.	53.8	427.
13	.60	.1	82.	12.	94.
14	3	.1	27.8	6	33.8
15	3	.1	27.8	6	33.8
16	3	.1	27.8	6	33.8
17	3	.1	27.8	6	33.8
18	3	.1	27.8	6	33.8
19	.1	.1	0	2	2
20	.1	.1	0	2	2
21	.1	.1	0	2	2
22	.1	.1	0	2	2
23	.1	.1	0	2	2
24	.04	.04	0	0.8	0.8

TAMS

Job No. 1551-05

Project Mt BEACON RESERVOIR

Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS.

SPILLWAY RATING

Sheet 2 of 5

Date AUG 4, 80

By D.L.C

Ch'k. by _____

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

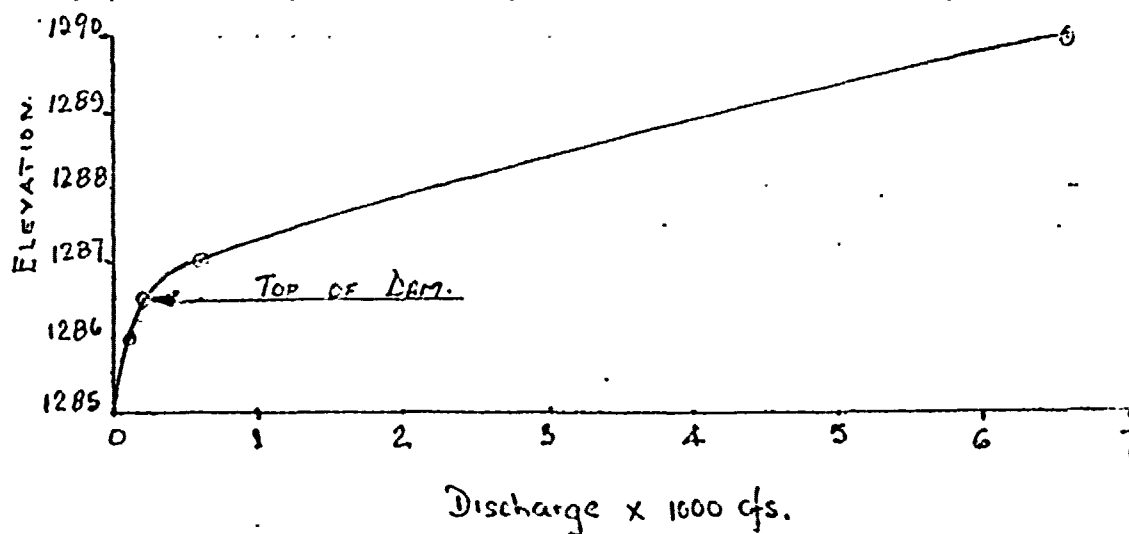
USE $C = 2.63$

$L = 43.32'$

EL.	H	Q_s	$Q_D (L=307')$	Q_T
1285	0			0
1286	1	110		110
1286.5	1.5	210	0	210
1287	2	320	0.5	280
1290	5	1270	3.5	5290
1300	15	6620	13.5	40050
				46670.

Q_D ~ flow over dam.

Q_T total discharge.



TAMS

Job No. 1551-65

Project MT BEACON RESERVOIR

Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS

ELEVATION / AREA / VOLUME

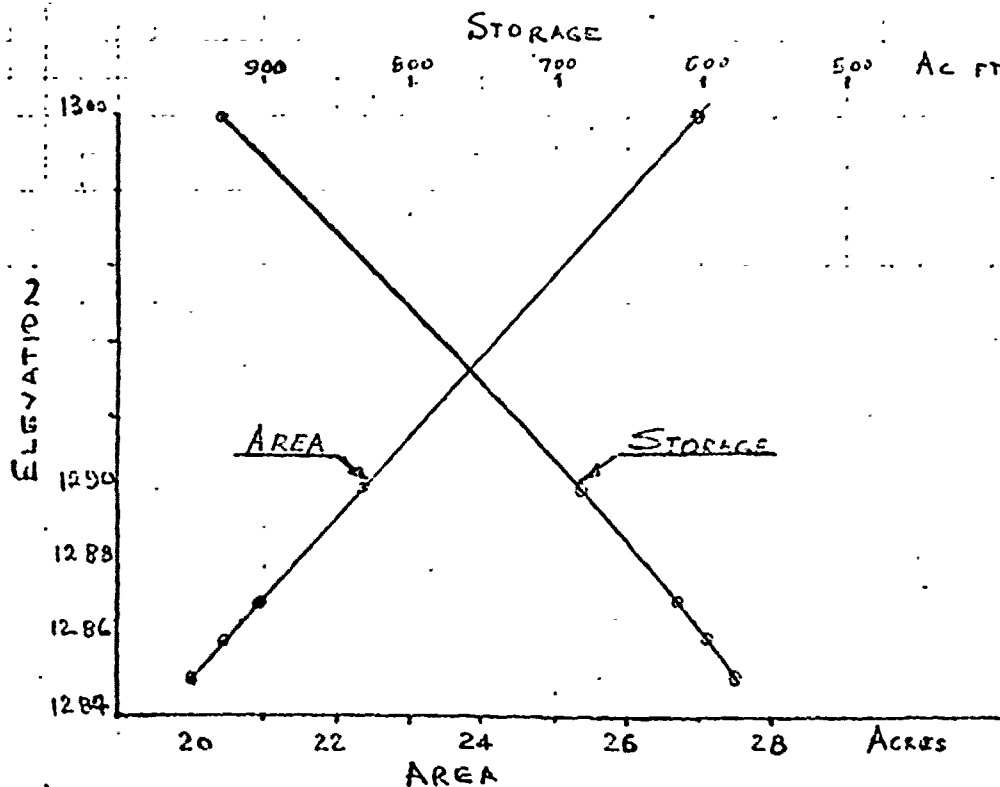
Sheet 3 of 5

Date AUG 4 1980

By D.L.C

Ch'k. by _____

EL.	Δ H	AREA.	Mean Area	Δ Vol	STORAGE (Ac ft)
1285		20			575.
	1.0		20.25	20.25	
1286		20.5			595.
	0.5		20.6	10.3	
1286.5		20.7			606.
	0.5		20.8	10.4	
1287		20.9			616.
	3.0		21.6	64.8	
1290		22.3			681.
	10.0		24.65	246.5	
1300		27			927.



TAMS

Job No. 1551-05

Sheet 4 of 5

Project Mt - Beacon Reservoir

Date Aug 4, 1904

Subject Valley, cross sections

By Q.E.

Ch'k. by _____

STATION - 350

DISTANCE , ELEVATION.

1800 1300

1820 1280

1850 1260

1900 1240

2000 1238

2070 1240

2100 1260

2150 1280

2190 1300

STATION - 7400

DISTANCE ELEVATION.

1850 1520

1880 500

1910 480

1950 460

2000 440

2070 460

2170 480

2210 500

2290 520

TAMS

Job No. 1551-02

Sheet 5 of 5

Project Mt. Lebanon Reservoir

Date Aug 4, '60

Subject Valley cross section

By G.F.

Ch'k. by _____

STATION. 2200.

DISTANCE ELEVATION.

1810 820

1850 800 .

1890 780

1920 760

2000 740 .

2100 760

2150 780

2200 800

2250 820 .

1950

HYDROGRAPH AT STA 1 FOR FLUX 1, STIO 2

[illegible][illegible]

ગાંધીનગર મહાનગરપાલિકા

[illegible][illegible]

TOPP.	DAY DATA	EXP	DATE
1262.5	0.0	0.0	0.0

STATION 2. PLAN 1. RATIO 1

[illegible]

2000

Year	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

Year	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1975	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100

Figure 1 is a line graph showing the percentage of the total population in the labor force by age group from 1970 to 1990. The Y-axis represents the percentage of the total population in the labor force, ranging from 0 to 100. The X-axis represents the year, ranging from 1970 to 1990. The graph shows six age groups: 15-24, 25-34, 35-44, 45-54, 55-64, and 65+. The 15-24 age group shows a steady decline from approximately 25% in 1970 to 15% in 1990. The 25-34 age group shows a slight increase from approximately 15% in 1970 to 20% in 1990. The 35-44 age group shows a slight increase from approximately 10% in 1970 to 15% in 1990. The 45-54 age group shows a slight increase from approximately 5% in 1970 to 10% in 1990. The 55-64 age group shows a slight increase from approximately 2% in 1970 to 5% in 1990. The 65+ age group shows a slight increase from approximately 1% in 1970 to 2% in 1990.

ROUTING DATA

INPS	ISAME	ISPY	INWP	LSTR
1	1	0	2	0

ROUTING DATA

LAG	AVSWK	Y	TR	STORA	ISPRAT
0	0.000	0.000	0.000	0.	0.

STATION

PLANET	PLANET	PLANET	PLANET	PLANET
1230.0	1230.0	1230.0	1230.0	1230.0

STATION

PLANET	PLANET	PLANET	PLANET	PLANET
1230.0	1230.0	1230.0	1230.0	1230.0

STATION

PLANET	PLANET	PLANET	PLANET	PLANET
1230.0	1230.0	1230.0	1230.0	1230.0

STATION

PLANET	PLANET	PLANET	PLANET	PLANET
1230.0	1230.0	1230.0	1230.0	1230.0

STATION

PLANET	PLANET	PLANET	PLANET	PLANET
1230.0	1230.0	1230.0	1230.0	1230.0

STATION

PLANET	PLANET	PLANET	PLANET	PLANET
1230.0	1230.0	1230.0	1230.0	1230.0

1950 FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLUM-PATIC ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CFS); VOLUMES PER SECOND
 AREA IN SQUARE MILES (SQ. MI.)

RATIOS APPLIED TO FLOWS

STATION	AREA	PLAN	RATIO 1	RATIO 2
			1.00	.50
1	.25	1	1.00	740
2	.65	1	41.91	20.93
3	.25	1	1.00	572
4	.65	1	30.42	16.19
5	.25	1	1.00	568
6	.65	1	30.42	16.19
7	.25	1	1.00	540
8	.65	1	30.42	15.53
9	.25	1	1.00	547
10	.65	1	30.42	15.49

STABILITY ANALYSIS

APPENDIX E

Job No. 1551-04TIPPETTS-ARBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS
NEW YORKSheet A of Project DAM CITY OF BEACONDate 8-6-80Subject STABILITY ANALYSISOVERFLOW SECTIONBy HBCINDEXChk. by SHEET No. DESCRIPTION
I ASSUMPTIONS, LOADING CONDITIONS & STABILITY CRITERIA

1) TYPICAL CROSSSECTION - D.L. MARKS

2) PLAN - BETWEEN BUTTRESSES

3) DEAD LOADS

4) HYDROSTATIC FORCES

5) CASE 1 - SUMMARY NORMAL LOADING W/O ICE
RESULTANT WITHIN MIDDLE THIRD

$$\text{Max } p = 1.52 \text{ K/FT}^2 = 10.6 \text{ psi} \quad \text{FFS} = 2.64 > 1.5 \text{ OK}$$

6) CASE 2 NORMAL LOADING PLUS ICE LOAD
RESULTANT WITHIN MIDDLE THIRD

$$\text{Max } p = 1.06 \text{ K/FT}^2 = 7.4 \text{ psi} \quad \text{FFS} = 1.83 > 1.50 \text{ OK}$$

7) CASE 5 NORMAL LOADING WITH $ER=0.05$ LAKE LEVEL 1265

8) " SUMMARY LOADS RESULTANT WITHIN MIDDLE THIRD

$$\text{Max } p = 1.36 \text{ K/FT}^2 = 9.5 \text{ psi} \quad \text{FFS} = 2.07 > 1.25$$

9) CASE 3 $\frac{1}{2}$ PMF

SUMMARY LOADS RESULTANT WITHIN MIDDLE THIRD

$$\text{FFS} = 2.04 > 1.25$$

10) CASE 4 PMF NOT CRITICAL, BY INSPECTION

Job No. 1551-04 TIPPETTS-ABBETT-McCARTHY-STRATTON
 ENGINEERS AND ARCHITECTS NEW YORK
 Project DAM CITY OF BEACON, N.Y.
 Subject STABILITY ANALYSIS
OVERFLOW SECTION

Sheet I of 1
 Date 8-4-80
 By HCL
 Chk. by

ASSUMPTIONS

- 1) THE UNIT WT OF CONCRETE ASSUMED 150 pcf
- 2) ICE LOAD OF 5000 psf ACTING 1 FOOT FROM TOP OF DAM (C.O.F.E. CRITERIA)
- 3) DAM SITE IS SEISMIC, ZONE 2
- 4) ANGLE OF INTERNAL RESISTANCE OF ROCK $\phi = 45^\circ$

LOADING CONDITION

EL. 1285

CASE 1) NLC LAKE LEVEL @ SPILLWAY CREST, NO ICE LOAD

CASE 2) NLC PITTO, WITH ICE LOAD

UNUSUAL
 3) EXCEPT LC LAKE LEVEL @ $\frac{1}{2}$ PMF $\frac{V}{H}$ 1286.96
 $\frac{V}{H}$ 1266.7 *

EXTREME LC " " @ PMF $\frac{V}{H}$ 1287.35
 $\frac{V}{H}$ 1267.0 *

STABILITY CRITERIA:

The stability criteria against overturning and sliding were evaluated as follows.

Overturning - Stability is considered adequate if the resultant of all forces falls within the middle third of the base under the normal loading condition and within middle half of the base under the unusual and extreme loading conditions.

Sliding - Stability along the base of the structure is evaluated using the friction factor of safety (FFS) which is equal to $\frac{V \tan \phi}{H}$, where V is the sum of vertical forces acting on the base, H is the sum of all horizontal forces and $\tan \phi$ is Friction Factor. the stability with respect to sliding is considered adequate if the FFS exceeds 1.50 under normal loading conditions, 1.25 under unusual loading conditions and 1.1 under extreme loading conditions.

Job 14.

Project

DAM CITY OF BEA CON, N.Y.

Subject

STABILITY ANALYSIS

OVERFLOW SECTION

Sheet 1 of

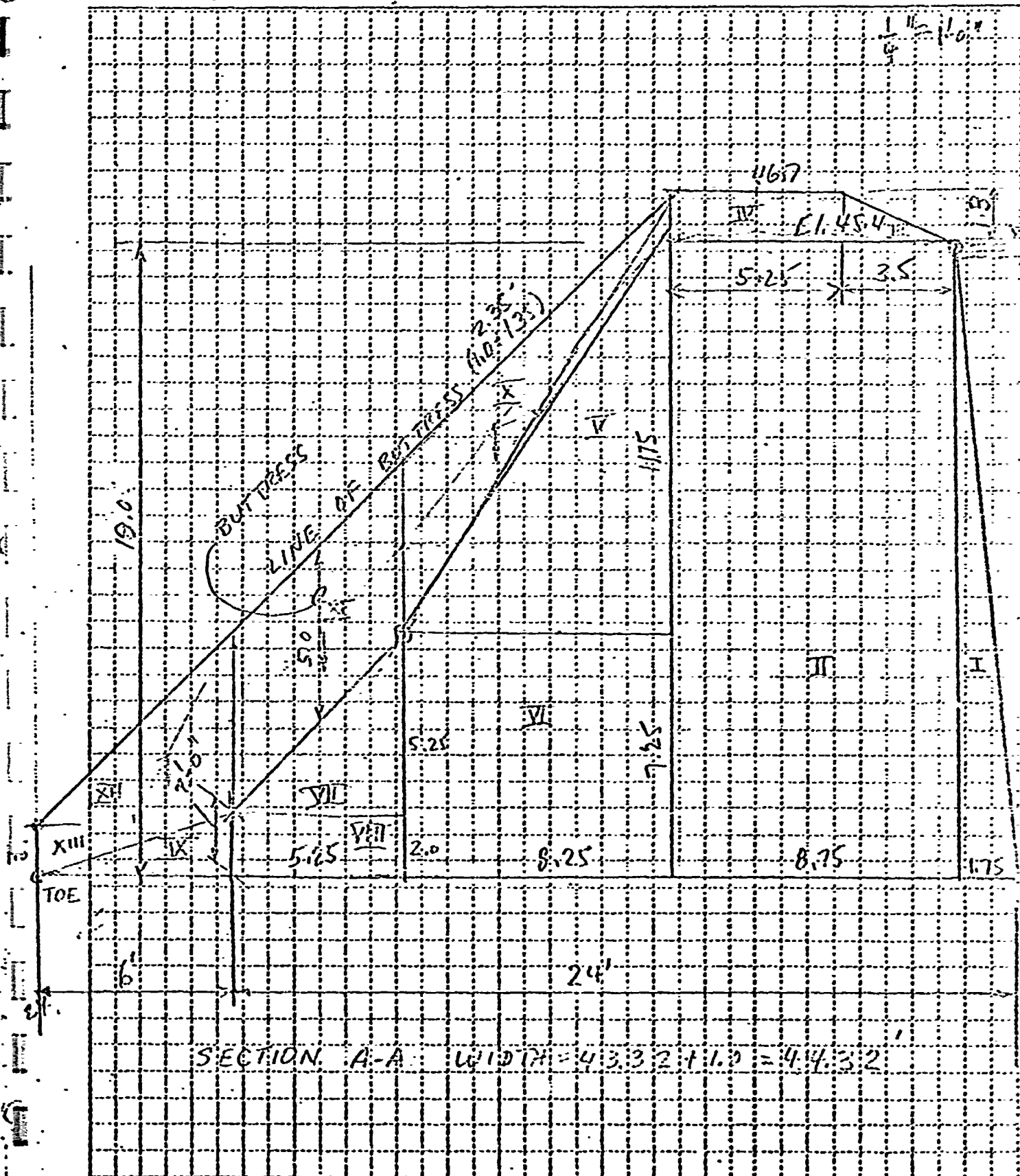
Date _____

B-4-00

By

HEL

Ch'k. by



TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS
NEW YORK

Job No. _____

Project DAM CITY OF BEACON

Subject STABILITY ANALYSIS

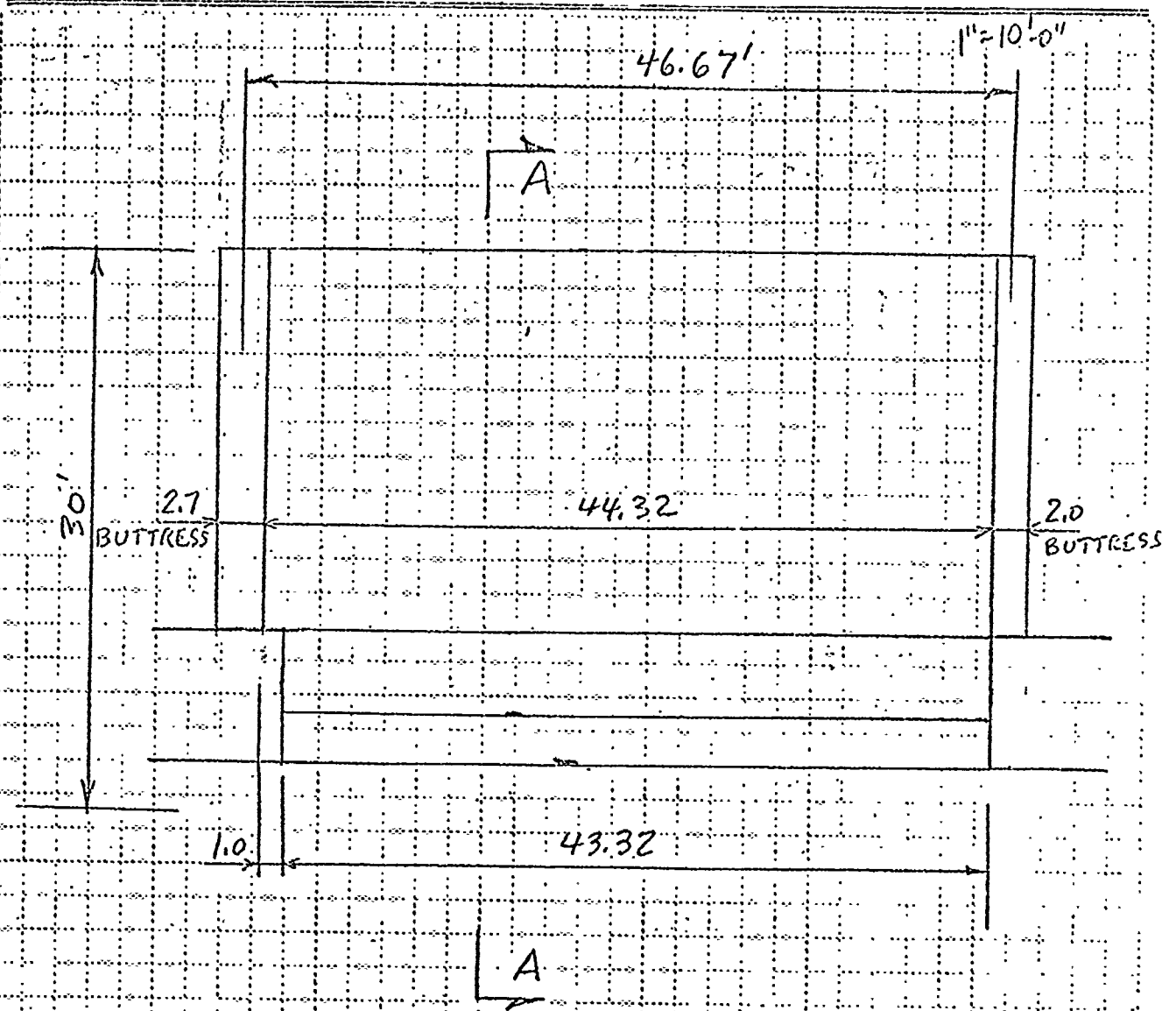
OVER FLOW SECTION

Sheet 2 of _____

Date 8-4-80

By HBL

Ch'k. by _____



PLAN

$$A = 46.67 \times 30 = 1400 \text{ FT}^2$$

TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS
NEW YORK

Job No. _____

Project DAM CITY OF BEACON, N.Y.

Subject STABILITY ANALYSIS

OVERFLOW SECTION

Sheet 3 of _____

Date 8-4-80

By HBL

Chk. by _____

DEAD LOADS

6.648

M @ TOE

I	$19 \times 1.75 \times \frac{1}{2} \times 44.32 \times 0.150 =$	110.52	$\times 28.83 =$	3,186
II	$19 \times 8.75 \times 44.32 \times 0.150 =$	1105.23	$\times 23.87 =$	26,382
III	$1.3 \times 3.5 \times \frac{1}{2} \times 3.35 \times 0.150 =$	1.14	$\times 27.7 =$	31
IV	$1.3 \times 5.25 \times 3.35 \times 0.150 =$	3.43	$\times 23.87 =$	82
V	$11.75 \times 8.25 \times \frac{1}{2} \times 44.32 \times 0.150 =$	322.22	$\times 16.75 =$	5,397
VI	$7.25 \times 8.25 \times 44.32 \times 0.150 =$	397.63	$\times 15.38 =$	6,116
VII	$5.25 \times 5.25 \times \frac{1}{2} \times 44.32 \times 0.150 =$	91.62	$\times 9.5 =$	870
VIII	$2.0 \times 5.25 \times 44.32 \times 0.150 =$	69.80	$\times 8.63 =$	602
IX	$2.0 \times 6.0 \times \frac{1}{2} \times 44.32 \times 0.150 =$	39.89	$\times 4.0 =$	160
X	$2.75 \times 16.0 \times \frac{1}{2} \times 2.35 \times 0.150 =$	7.76	$\times 14.5 =$	112
XI	$7.5 \times 4 \times 2.35 \times 0.150 =$	10.58	$\times 9.15 =$	97
XII	$8.5 \times 4.9 \times \frac{1}{2} \times 2.35 \times 0.150 =$	7.34	$\times 4.2 =$	31
XIII	$1.5 \times 6.0 \times \frac{1}{2} \times 2.35 \times 0.150 =$	4.23	$\times 2.0 =$	8

$$\bar{x} = \frac{44,463}{2,227.31} = 19.96'$$

$$\downarrow \frac{1}{2,171.39 \text{ KIP}}$$

$$\curvearrowright 43,074 \text{ F.T.K.I.}$$

Job No. 1551-04

TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS
NEW YORK

Sheet 4 of

Project

Date 8-4-80

Subject STABILITY ANALYSIS CASE 1 & 2
OVERFLOW

By HBL

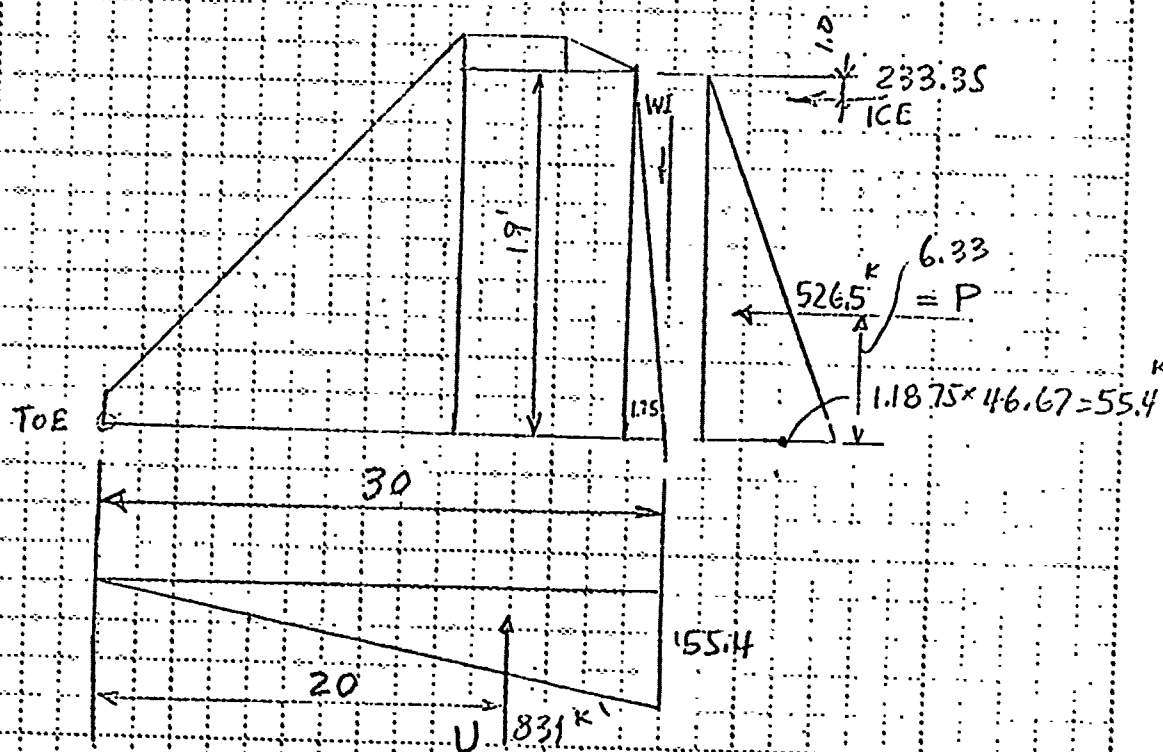
Chk. by

HYDROSTATIC FORCES

CASE I NORMAL LOADING WL @ CREST No ICE

CASE II NORMAL LOADING WL @ CREST ICE 1'-0" BELOW CREST

$$5 \times 46.67 = 233.35 \times 18 = 4200 \text{ K}$$



$$W = 1.75 \times 19 \times 2 \times 0.625 = 1.04 \times 46.67 = 48.5 \text{ K} \times 29.42 = 1427 \text{ K}$$

$$P = 526.5 \times 6.33 = 3333 \text{ K}$$

$$U = 831 \times 20 = 16620 \text{ K}$$

$$19953 \text{ K}$$

TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS
NEW YORK

Job No. _____

Project DAM CITY OF BEACON, N.Y.

Subject STABILITY ANALYSIS CASE 1
OVERFLOW SECTION

Sheet 5 of _____

Date 8-4-80

By HPL

Ch'k. by _____

NORMAL LOADING W/O ICE

$$\begin{array}{r} \text{SH. 3.} \quad \downarrow \quad 2171.4 \\ \text{SH. 4.} \quad \quad \quad 48.5 \\ \hline 2219.9 \end{array} \quad \begin{array}{r} 43074 \\ 1427 \\ \hline 44501 \end{array}$$

$$\begin{array}{r} \uparrow \quad 831 \\ \text{EV} \downarrow \quad 1388.9 \end{array} \quad \begin{array}{r} 19,953 \\ \hline \text{EM} = 24,548 \text{ "k"} \end{array}$$

$$\frac{\text{EM}}{\text{EV}} = \frac{24,548}{1388.9} = 17.67'$$

$$\frac{1388.9}{46.67} = 29.76 \text{ k/1}$$

$$e = \frac{30}{2} - 17.67 = 2.67'$$

V/S FROM BASE ϕ
RESULTANT WITHIN MIDDLE THIRD

$$\phi = \frac{29.76}{30} \left(1 \pm 6 \times \frac{2.67}{30} \right) = .992 (1 \pm .534)$$

10.6 kps
1.52
.46 KSF

$$\text{F.F.S.} = \tan \phi \frac{\text{EV}}{\text{EH}} = \frac{1388.9}{526.5} = 2.64$$

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TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS
NEW YORKProject DAM CITY OF BEACON, N.Y.Sheet 6 of _____Subject STABILITY ANALYSIS CASE 2 WITH ICE
OVERFLOW SECTIONDate 8-4-80By HBL

Ch'k. by _____

$$\begin{aligned} \text{FROM SH. 5} \quad \Sigma H &= 526.5^K \\ \Sigma V &= 1388.9^K \end{aligned}$$

$$\Sigma M_5 = 24,548^K$$

$$\text{SH. 4 ICE } H = 233.35^K$$

$$M = \frac{4200}{2}$$

$$\Sigma M_6 = 20,348^K$$

$$x = \frac{20348}{1388.9} = 14.65$$

$$e = \frac{30}{2} - 14.65 = 0.35' \text{ O/S FROM BASE \&}$$

$$\rho = \frac{29.76}{30} \left(1 \pm \frac{6 \times 35}{30} \right) = 0.992 (1 \pm 0.07)$$

$$\frac{1.06}{0.92} \text{ KSF}$$

$$\text{FFS} = \frac{\tan \phi \Sigma V}{\Sigma H} = \frac{1388.9}{760} = 1.83 > 1.500^K$$

$$\rho_{AV} = \frac{V}{A} = \frac{1388.9}{1400} = 0.992 \text{ KSF}$$

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Subject STABILITY ANALYSIS

By HBL

OVERFLOW SECTION

CASE 5

Chk. by

CASE 5 EQ = 0.05

ZONE 2

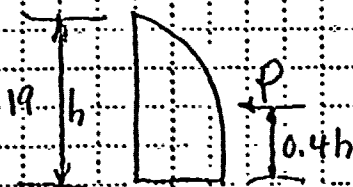
I	110.52	$\times 0.05 = 5.5$	$\times 6.33 =$	34.8
II	1105.23	$= 55.3$	$\times 9.50 =$	525.4
III	1.14	$= 0.06$	$\times 19.43 =$	1.2
IV	3.43	$= 0.17$	$\times 19.65 =$	3.3
V	322.22	$= 16.1$	$\times 11.17 =$	179.8
VI	397.63	$= 19.9$	$\times 3.63 =$	72.2
VII	91.62	$= 4.6$	$\times 3.75 =$	17.3
VIII	69.80	$= 3.5$	$\times 1.0 =$	3.5
IX	39.89	$= 2.0$	$\times .67 =$	1.3
X	7.76	$= 0.4$	$\times 13.5 =$	5.4
XI	10.58	$= 0.5$	$\times 7.5 =$	3.8
XII	7.34	$= 0.4$	$\times 3.7 =$	1.5
XIII	4.23	$= 0.2$	$\times 1.0 =$	0.2

108.6 K

35.2
849.7 K

HYDRO DYNAMIC

C = 0.69



$$P_e = C A W h$$

$$\tan \phi \frac{1.75}{19.0} = 0.0921$$

$$5.26^\circ$$

$$V_e = P = 0.69 \times 0.05 \times 0.0625 \times 1.9^2 = .7784 \times 46.67 = 36.3$$

$$M_p = 0.4 \times 19 \times 36.3 = 276 K$$

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ENGINEERS AND ARCHITECTS
NEW YORKProject DAM CITY OF BEACON N.Y.Subject STABILITY ANALYSISOVERFLOW SECTION CASE 5 EQ (NO ICE)Sheet 8 of Date 8-6-80By HBLCh'k. by SH.3 ↓ 2171.4^K↘ 43074^{IK}

SH.4 ↓ 48.5

← 526.5

↘ 1427^{IK}↘ 19953^{IK}

↑ 831

SH.5 ↓ 1388.9 = ΣV

↘ 24,548

SH.7 DL

← 108.6^K850^{IK}← 635.1^K23,698^{IK}

HYDRODYNAMIC

← 36.3

276

ΣH = ← 671.4^K ΣM = 23,422^{IK}

$$\frac{\Sigma M}{\Sigma V} = \frac{23,422}{1388.9} = 16.86'$$

$$e = \frac{30}{2} - 16.86 = 1.86' \text{ FROM BASE}$$

RESULTANT WITHIN MIDDLE THIRD

$$p = \frac{29.76}{30} \left(1 + \frac{6 \times 1.86}{30} \right) = .992 (1 \pm .37)$$

$$p_{MAX} = 1.36 \text{ K/FT}^2 = 9.5 \text{ psi}$$

$$p_{MIN} = 0.62 \text{ K/FT}^2$$

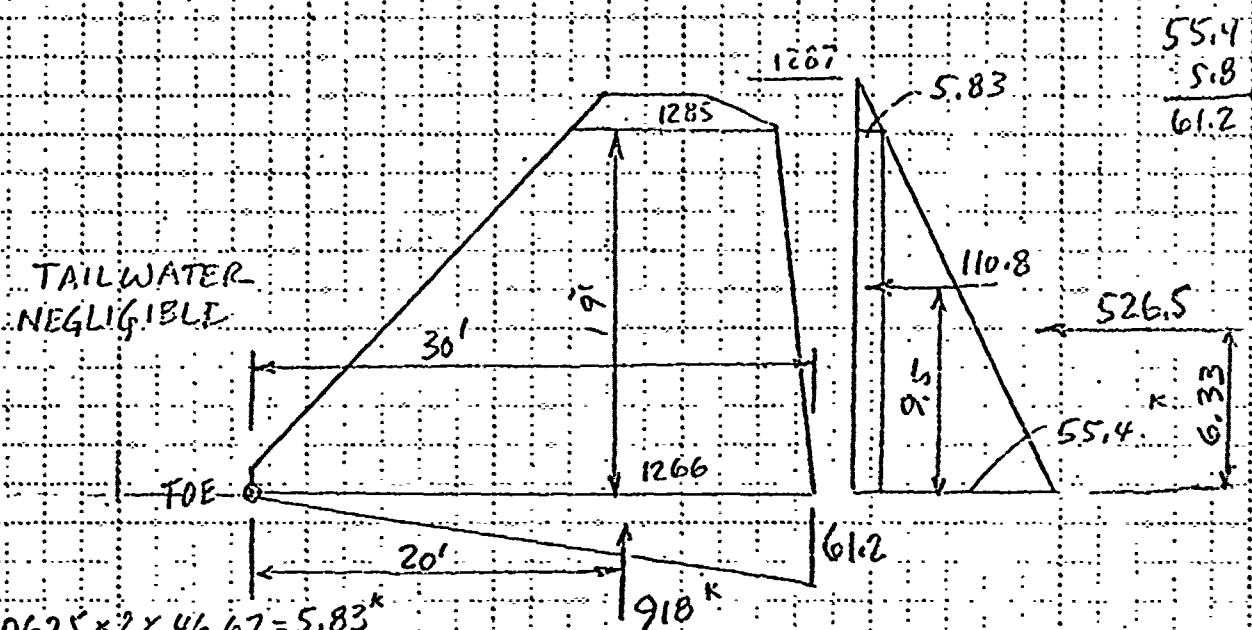
$$F.F.S. = \tan \phi \frac{\Sigma V}{\Sigma H} = \frac{1388.9}{671.4} = 2.07 > 1.25 \text{ OK}$$

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CASE 3 1/2 PMF UNUSUAL L.C.

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LAKE LEVEL U/S 1287 P/S 1266.7 (NEGLECT)



$$0.625 \times 2 \times 46.67 = 5.83^k$$

$$0.625 \times 21 \times 46.67 = 61.25$$

$$\begin{array}{r} 5.83 \\ 61.25 \\ \hline 55.42 \end{array}$$

$$V = 918 \times 20 = 18360^k$$

$$P_1 = 526.5 \times 6.33 = 3333$$

$$P_2 = 110.8 \times 9.5 = 1053$$

$$\Sigma P = 637.3^k$$

$$\Sigma M = 22746^k$$

$$D.L. \downarrow 2219.9$$

$$918$$

$$\Sigma V = 1301.9$$

$$44501$$

$$22746$$

$$\Sigma M = 21755^k$$

$$\frac{\Sigma M}{\Sigma V} = \frac{21755}{1301.9} = 16.71$$

$$e = \frac{30}{2} - 16.71 = 1.71 \text{ U/S FROM BASE}$$

RESULTANT WITHIN MIDDLE THIRD

$$F.F.S = \tan \phi \frac{\Sigma V}{\Sigma H} = \frac{1301.9}{637.3} = 2.04 > 1.25$$

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ENGINEERS AND ARCHITECTS
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Subject STABILITY ANALYSIS OVERFLOW SECTION
CASE 4 PMF EXTREME L.C.

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By HBL

Ch'k. by

LAKE LEVEL U/S 1287.35

D/S 1267

BY INSPECTION, COMPARE WITH CASE 3 UNUSUAL L.C.

LOADS ALMOST SAME AS $\frac{1}{2}$ PMF

∴ CASE 4 NOT CRITICAL

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ASSUMPTIONS

- 1) THE UNIT WT. OF CONCRETE ASSUMED 150 pcf
- 2) ICE LOAD OF 5000 psf ACTING 1 FOOT
FROM TOP OF DAM (C.O.E. CRITERIA)
- 3) DAM SITE IS SEISMIC ZONE 2

LOADING CONDITION

- CASE 1) NLC LAKE LEVEL @ SPILLWAY CREST, NO ICE LOAD
- CASE 2) NLC PITTO, WITH ICE LOAD
- 3) UNUSUAL ~~EXC. EXT.~~ LC LAKE LEVEL @ $\frac{1}{2}$ PMF
- 4) EXTREME LC " " @ PMF

STABILITY CRITERIA:

The stability criteria against overturning and sliding were evaluated as follows.

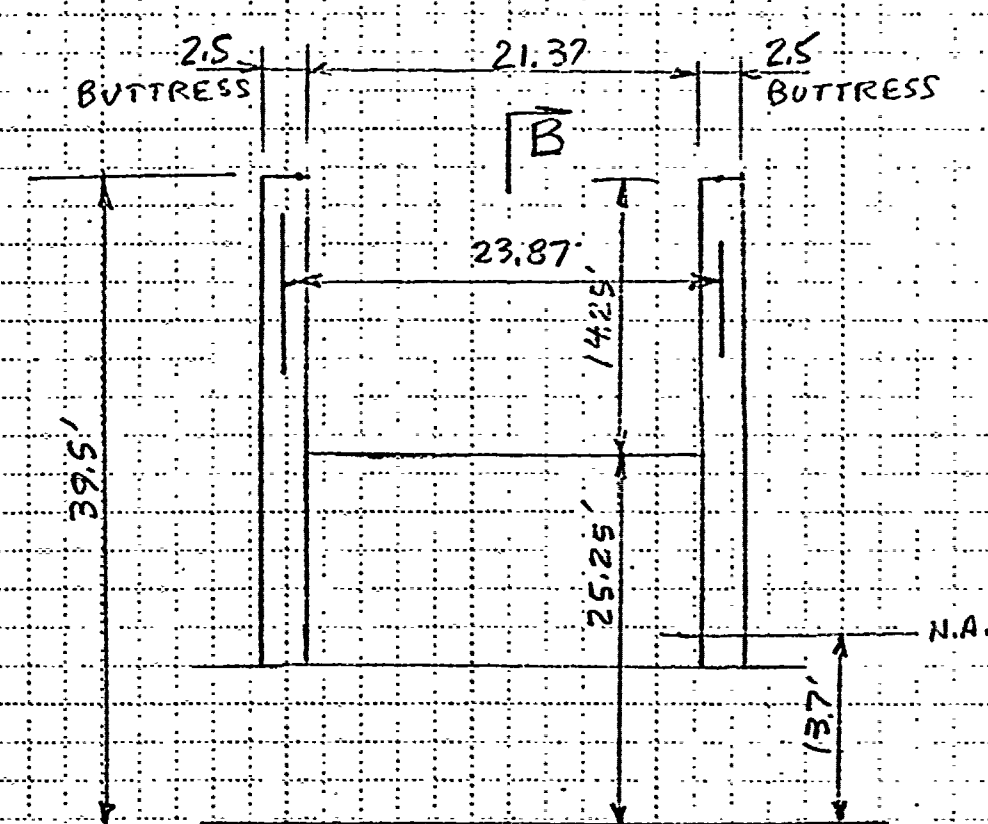
Overturning - Stability is considered adequate if the resultant of all forces falls within the middle third of the base under the normal loading condition and within middle half of the base under the unusual and extreme loading conditions.

Sliding - Stability along the base of the structure is evaluated using the friction factor of safety (FFS) which is equal to $V \tan \phi / H$, where V is the sum of vertical forces acting on the base, H is the sum of all horizontal forces and $\tan \phi$ is Friction Factor. The stability with respect to sliding is considered adequate if the FFS exceeds 1.50 under normal loading conditions, 1.25 under unusual loading conditions and 1.1 under extreme loading conditions.

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NON OVER FLOW SECTION

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PLAN

B

$$A_1 \quad 2.5 \times 39.5 = 98.8 \times 19.5 = 1927$$

$$A_2 \quad 21.37, 25.25 = 539.6 \times 12.63 = 6815$$

$$\frac{638.4 \text{ ft}^2}{8742 \text{ ft}^3}$$

$$x' = \frac{3742}{638.4} = 13.7$$

TIPPETTS-ABBETT-McCARTHY-STRATTON

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Subject STABILITY ANALYSIS CASE I

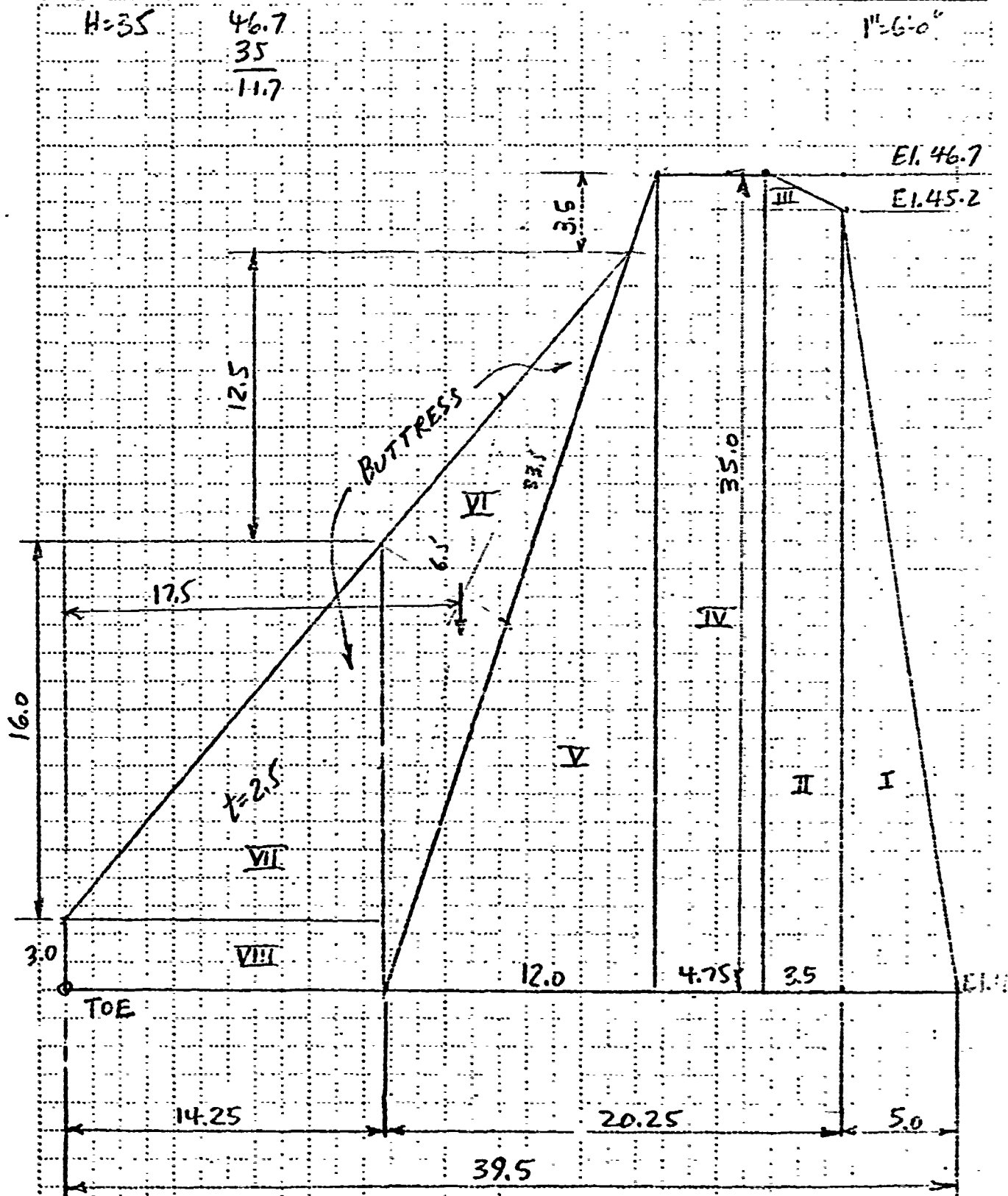
NON OVERFLOW SECTION

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SECTION B-B

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 Project DAM CITY OF BEACON, N.Y.
 Subject STABILITY ANALYSIS CASE I
NON-OVER FLOW SECTION

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 ENGINEERS AND ARCHITECTS
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DEAD LOADS

I	$33.5 \times 5.0 \times \frac{1}{2} \times 21.37 \times 0.150 = 268.84$	$\times 36.17 = 9,724$
II	$33.5 \times 3.5 \times 21.37 \times 0.150 = 375.85$	$\times 32.75 = 12,309$
III	$1.5 \times 3.5 \times \frac{1}{2} \times 21.37 \times 0.150 = 26.97$	$\times 32.17 = 868$
IV	$35 \times 4.75 \times 21.37 \times 0.150 = 112.19$	$\times 28.62 = 3,211$
V	$35 \times 12 \times \frac{1}{2} \times 21.37 \times 0.150 = 673.16$	$\times 22.25 = 14,978$
VI	$33.5 \times 6.5 \times \frac{1}{2} \times 2.5 \times 0.150 = 40.83$	$\times 17.5 = 715$
VII	$16 \times 14.25 \times \frac{1}{2} \times 2.5 \times 0.150 = 42.75$	$\times 9.5 = 406$
VIII	$3 \times 14.25 \times 2.5 \times 0.150 = 16.03$	$\times 7.13 = 114$

$$\Sigma = \frac{42,325}{1556.62} = 27.19'$$

$$\downarrow \frac{3344}{1556.62}^k$$

$$(+)\frac{4.20}{42,325}$$

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HYDROSTATIC FORCES

1"=10'-0"

$$\downarrow W_1 = 5 \times 33.5 \times \frac{1}{2} \times 0.625 = 5.23 \times 23.87 = 124.84 \times 36.17 = \sim 4515^k$$

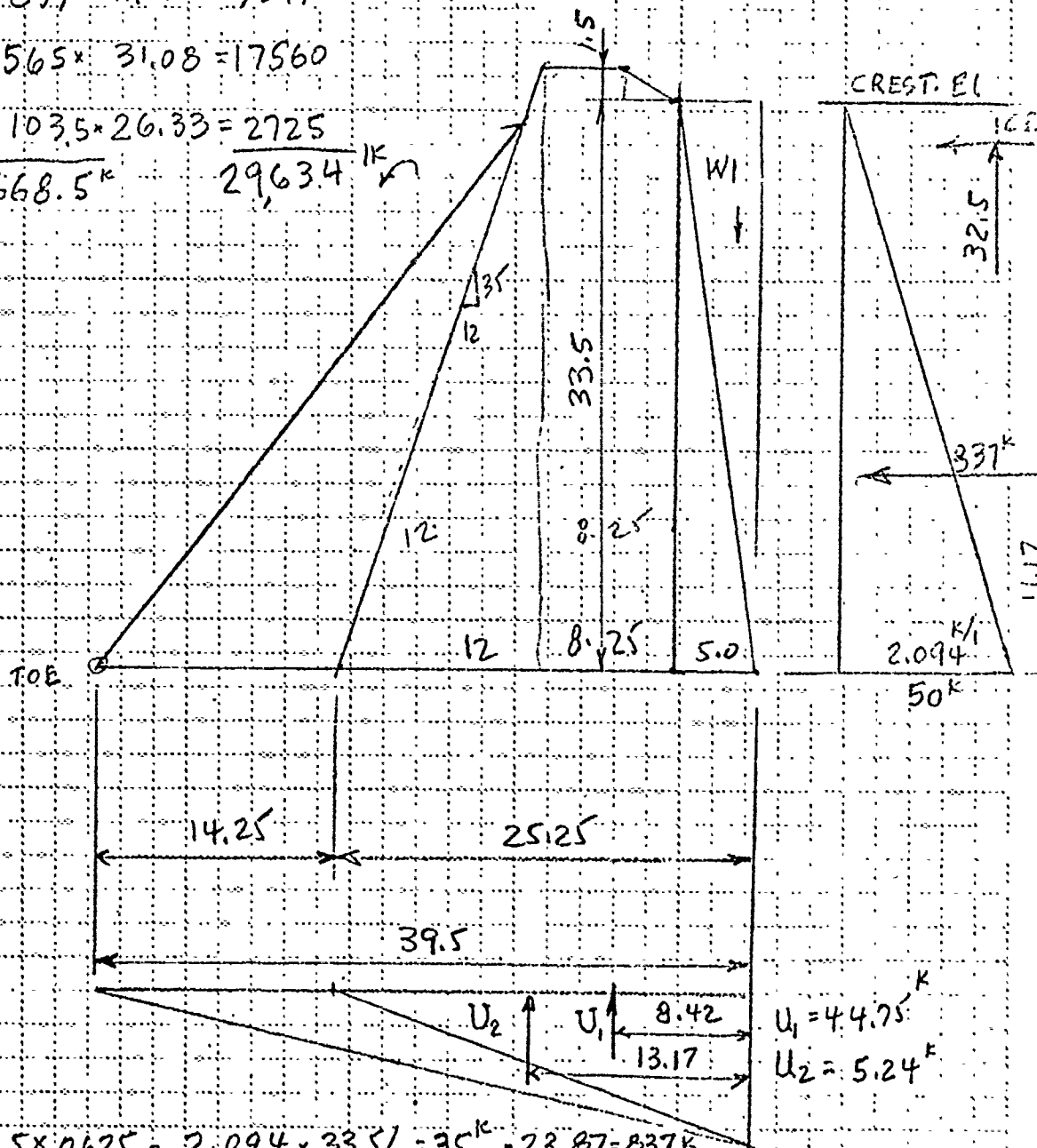
$$\leftarrow P = 837 \times 11.17 = 9349^k$$

$$\uparrow U_1 = 565 \times 31.08 = 17560$$

$$U_2 = 103.5 \times 26.33 = 2725$$

$$\uparrow 668.5^k$$

$$2963.4^k$$



$$P = 33.5 \times 0.625 = 2.094 \times 33.5 / 2 = 35^k \times 23.87 = 837^k$$

$$U_1 = 2.094 \times 21.37 = 44.75^k$$

$$U_1 = 44.75 \times 25.25 / 2 = 565^k$$

$$U_2 = 2.094 \times 2.5 = 5.24^k$$

$$U_2 = 5.24 \times 39.5 / 2 = 103.5^k$$

$$2.094 \times 23.87 = 50^k$$

$$\begin{array}{r} 39.5 \\ 13.17 \\ \hline 26.33 \end{array}$$

$$\begin{array}{r} 39.5 \\ 8.42 \\ \hline 31.08 \end{array}$$

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NON OVER FLOW SECTION

CASES 1 AND 2

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CASE 1 NORMAL LOADING NO ICE

$$\text{SH. 3} \quad \downarrow 1556.62^{\text{K}} \quad 42,325^{\text{IK}} \quad \rightarrow$$

$$\text{SH. 4} \quad \downarrow 124.84 \quad 4515$$

$$\downarrow 1681.46^{\text{K}} \quad 46,840^{\text{IK}}$$

$$\uparrow 668.5 \quad 29634 \quad \leftarrow$$

$$\Sigma V = \downarrow 1012.96 \quad 17,206 \quad \rightarrow$$

$$\Sigma H = 837^{\text{K}} \quad \text{FFS} = \frac{\Sigma V \tan \phi}{\Sigma H} = 1.21$$

$$\bar{X} = \frac{\Sigma M}{\Sigma V} = \frac{17206}{1013} = 16.99'$$

CASE 2 NORMAL LOADING WITH ICE 1'-0" BELOW CREST

$$\text{ICE} \quad 23.87 \times 5 = 119.35 \times 32.5 = 3879^{\text{IK}}$$

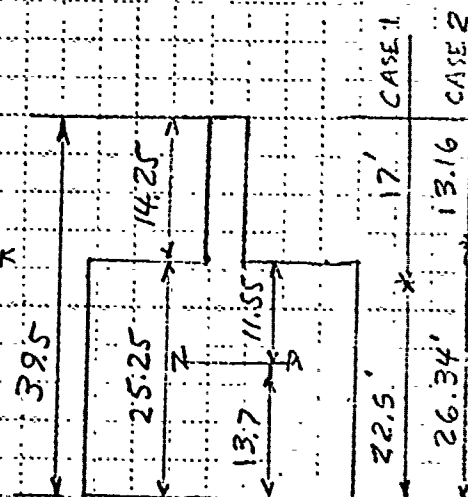
$$\Sigma H = 837 + 119.35 = 956.35^{\text{K}}$$

FRICTION
FACTOR OF
SAFETY

$$\text{FFS} = \frac{\Sigma V \tan \phi}{\Sigma H} = \frac{1012.96}{956.35} = 1.06$$

$$\Sigma M = 17,206 - 3879 = 13,327^{\text{IK}}$$

$$\bar{X} = \frac{\Sigma M}{\Sigma V} = \frac{13327}{1013} = 13.16'$$



RESULTANT FROM N.A.

NOTE IF ENTIRE BASE IS NOT IN COMPRESSION
REVISE UPLIFT FORCES. $\bar{X}$ = LOCATION OF RESULTANT ΣV

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 By 4BL
 Ch'k. by

CASE 5 $EQ. = 0.05$ ZONE 2

I	$268.84 \times .05 = 13.4$	$\times 11.17 =$	150
II	375.85	$18.8 \times 16.75 =$	315
III	26.97	$1.35 \times 34.0 =$	46
IV	112.19	$5.6 \times 17.5 =$	98
V	673.16	$33.7 \times 11.67 =$	393
VI	40.83	$2.0 \times 17.0 =$	34
VII	42.75	$2.1 \times 8.33 =$	17
VIII	16.03	$0.8 \times 1.5 =$	1

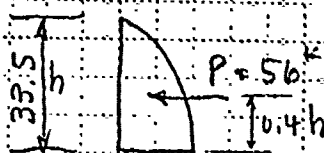
$\leftarrow 77.75^K$

1054^K

HYDRO DYNAMIC
 ZANGERS METHOD

$C = 0.67$ @ BASE

$\tan \psi = \frac{S}{33.5} = .14925$ $\psi = 8.4^\circ$
 $C = .67$



$P_e = C \Delta w h$ $V_e = P_e y$
 $V_e = P = .67 \times 0.05 \times .0625 \times 33.5^2 = 2.35 \times 23.87 = 5$

$M_P = 0.4 \times 33.5 \times 56 = 750^K$

56
 78
837
 971

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CASE 5 UNUSUAL L.C.

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WATER LEVEL @ SPILLWAY CREST EQ = 0.05g

DEAD LOADS	↓	1557 ^K	↪	42,325 ^{IK}	} 46840 ^{IK}
HYDRO " WI	↓	125 ^K	↪	4515 ^{IK}	
U	↑	669 ^K	↪	29634 ^{IK}	} 44787 ^{IK}
← P _{HYDRO}		837 ^K	↪	9349 ^{IK}	
← EQ _{DL}		78 ^K	↪	1054 ^{IK}	
← EQ _{HYDRO}		56 ^K	↪	750 ^{IK}	

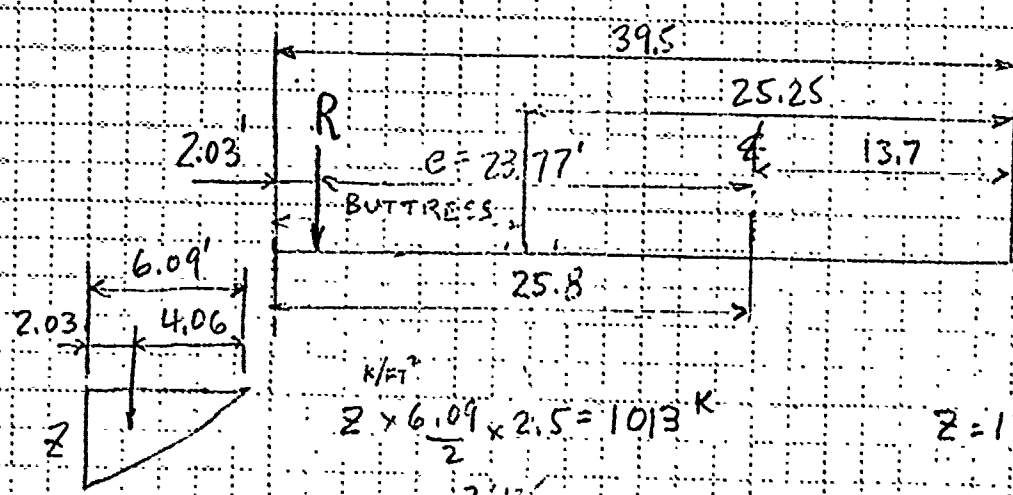
837
 78
 56
 971

1682
 669
 1013

FFS = $\frac{\tan \phi \sum V = 1013^K}{\sum H = 971} = 1.04$

↪ EM = $\frac{2053}{2053}$

LOCATION OF RESULTANT $\frac{\sum M}{\sum V} = \frac{2053}{1013} = 2.03'$



39.5
 15.73
 23.77

$\frac{K}{FT^2}$
 $2 \times \frac{6.09}{2} \times 2.5 = 1013^K$
 7.125

$2 = 133^K/FT^2$
 $.924^K/IN^2$

UNDER BUTTRESS

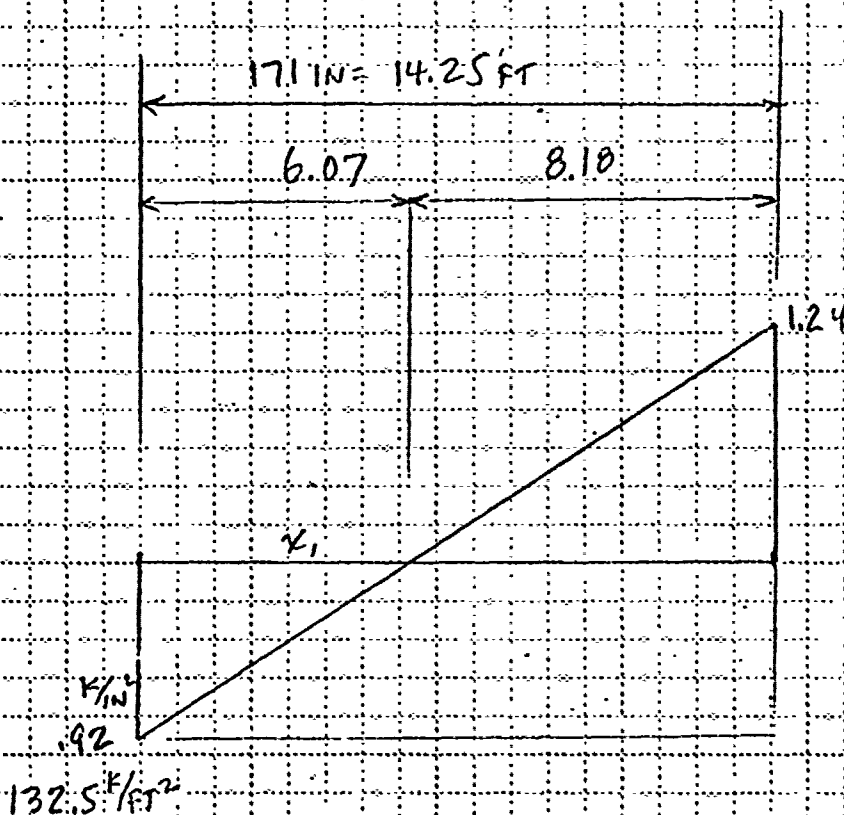
I RESULTANT OUTSIDE MIDDLE HALF
 AND ALMOST OUTSIDE OF STRUCTURE

II ROCK BEARING STRESS $133^K/FT^2$ IS EXCESSIVE

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 ENGINEERS AND ARCHITECTS NEW YORK
 Project BEACON RESERVOIR
 Subject STABILITY ANALYSIS NON OVERFLOW MONOLITH
CASE 5

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COMPUTER CHECK



$$\frac{X_1}{.92} = \frac{171}{2.16}$$

$$X = 72.8 \text{ IN} = 6.07 \text{ FT}$$

$$\frac{X_2}{1.24} = \frac{171}{2.16}$$

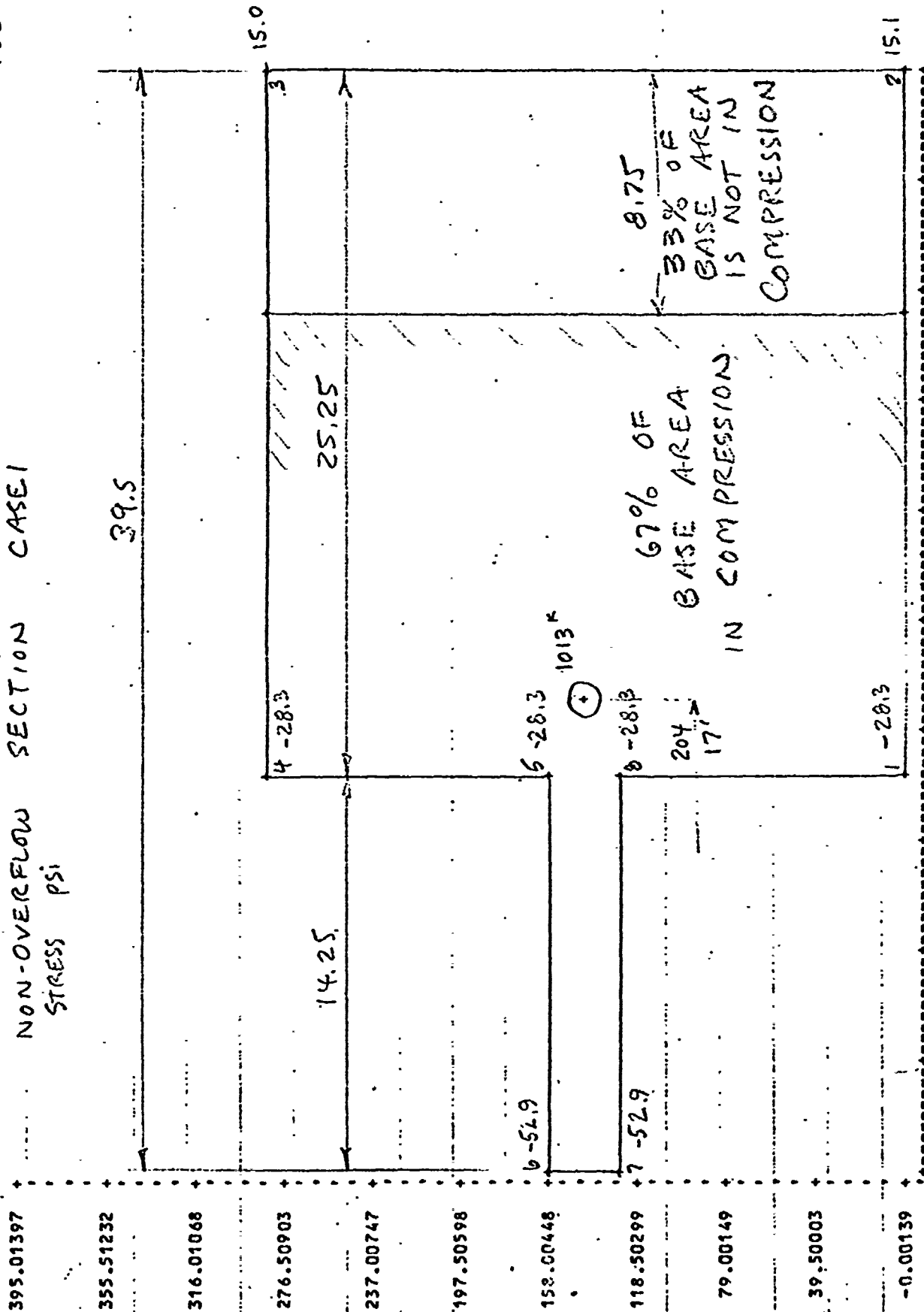
$$X = 98.17 \text{ IN} = 8.18 \text{ FT}$$

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HBL

DAM CITY OF BEACON, N.Y.
NON-OVERFLOW SECTION CASE I
STRESS PSI

sh 10A



1551-04

DAM CITY OF BEACON N.Y.

STRUCTURAL STABILITY ANALYSIS

8-7-80

HBL

Sh 1 of 2

NON OVERFLOW SECTION

CASE 1) NORMAL LOADING CONDITION; RESERVOIR LEVEL AT
SPILLWAY CREST EL. 1285; NO ICE LOAD

FIRST TRIAL - Base area assumed 100% in
compression with uplift varying linearly from
100% of head water at heel to zero at toe.

Calculations indicate that, with this
assumption, only 67% of base area is
actually in compression and sliding F.S. = 1.21
These results indicate that the section is
inadequate ^{for CASE 1} especially since a second
trial would produce a lower percentage of
base in compression and a lower sliding F.S.
A revised uplift diagram would decrease
the vertical load and reduce the
stabilizing moment.

The base area should be 100% in compression
for the normal loading condition.

CASE 2)

Same as CASE 1 with ice load added.

FIRST TRIAL: With base area assumed 100% in
compression, calculations indicate that only
39.7% of base area is in compression and
sliding F.S. = 1.06. These results indicate
that the section is inadequate for CASE 2.
See comments to case 1.

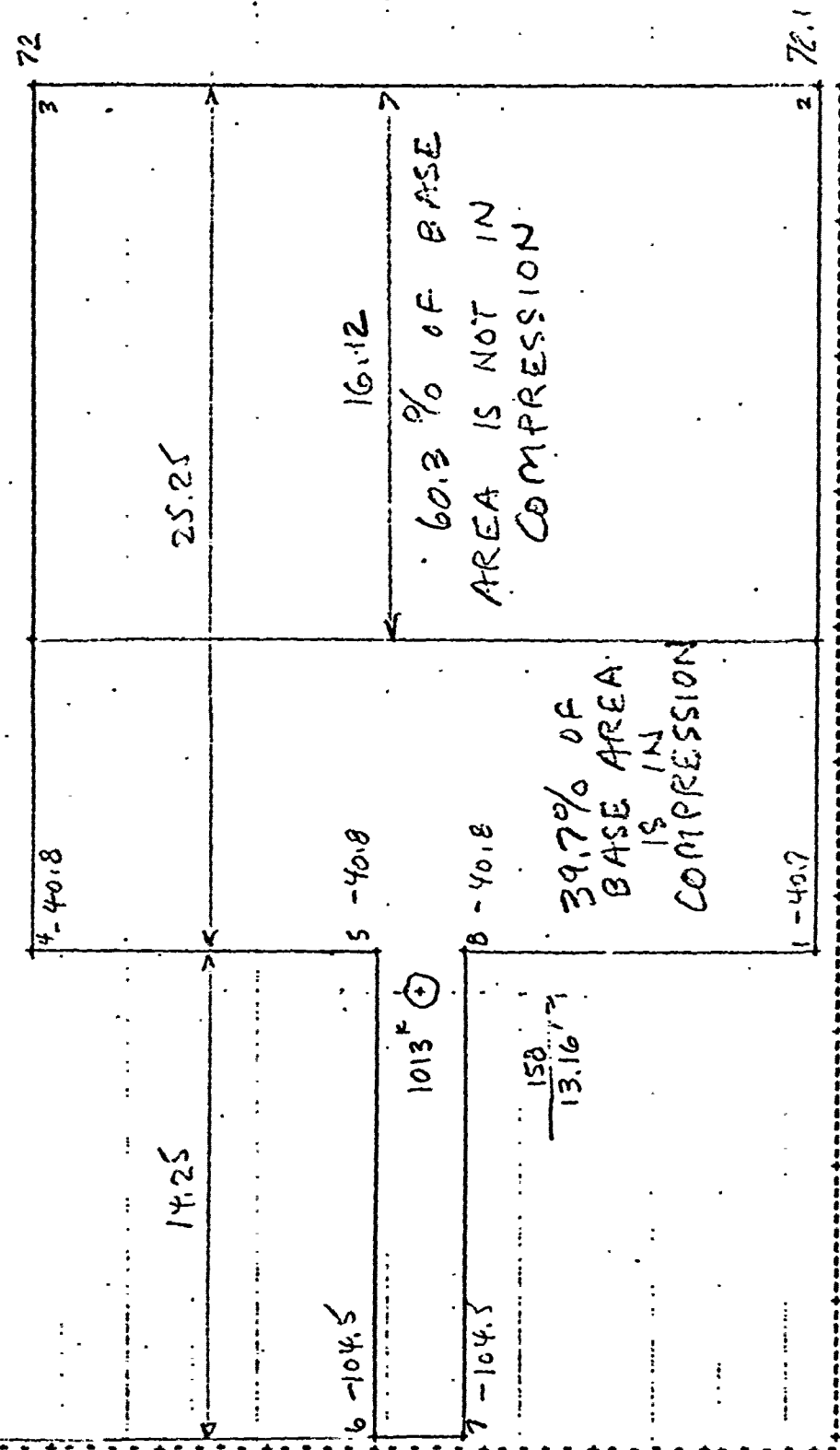
15104
 DAM - CITY OF BEACON N.Y.
 NON-OVERE SECTION CASE 2
 HBL

Sh 10B

395.01397
 355.51232
 316.01068
 276.50903
 237.00747
 197.50598
 158.00448
 118.50299
 79.00149
 39.50003
 -0.00139

STRESS ps

39.5



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HBL

Sh 2 of 2

STRUCTURAL STABILITY ANALYSIS NON OVERFLOW SECTION

CASES 3 AND 4) These cases are less critical than case 2 because of the magnitude of the $\frac{1}{2}$ PMF and PMF water levels which are only slightly higher than the normal loading conditions

$\frac{1}{2}$ PMF is considered an UNUSUAL LOADING CONDITION

PMF is considered an EXTREME LOADING CONDITION

CASE 5) UNUSUAL LOADING CONDITION

Lake level at spillway crest EL. 1285

plus EQ. = 0.05 g.

FIRST TRIAL - Base assumed 100% in compression
calculations indicate a sliding F.S. = 1.04,
^{pressure}
~~rock~~ on rock = 133 kip per square
foot and a very small percentage of
the base in compression. A second
trial with a revised uplift diagram
would indicate less favorable
results. The section is inadequate
for case 5.

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SHEET No. DESCRIPTION

I. ASSUMPTIONS, LOADING CONDITIONS & STABILITY CRITERIA

- 1) PLAN - BETWEEN BUTTRESSES
- 2) TYPICAL CROSS SECTION D.L. MARKS
- 3) DEAD LOADS
- 4) HYDROSTATIC FORCES
- 5) CASE 1 SUMMARY NORMAL LOADING W/O ICE

$$F.F.S. = 1.21 < 1.50 \text{ N.G.}$$

CASE 2

$$F.F.S. = 1.06 < 1.50 \text{ N.G.}$$

- 6) CASE 5 NORMAL LOADING WITH $EQ = 0.05$ LAKE LEVEL 1285
DL & HYDRODYNAMIC LOADS

- 7) CASE 5 SUMMARY RESULTANT OUTSIDE MIDDLE HALF
 $F.F.S. = 1.04 < 1.25$ $P_{MAX} = 133 \text{ K/FT}^2$

- 8) COMPUTER CHECKED MANUALLY

- 9) CASES 3 AND 4 ARE LESS CRITICAL THAN CASE 2
BY INSPECTION

10, 10A, 10B) BASE AREA IN COMPRESSION

COMPUTER
CHECK

REFERENCES

APPENDIX F

References

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3. "Standard Project Flood Determination", EM-1110-2-1411, Army Corps of Engineers, Washington, D.C., Rev. 1965
4. "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", Hydrometeorological report No.33. April 1956.
5. "National Program of Inspection of Dams", Vol. 3, Department of the Army, Office of the Chief of Engineers, 1975
6. "Flood Hydrograph Analyses and Computations", EM-1110-2-1405, U.S. Army Corps of Engineers, August, 1959
7. "Recommended Guidelines for Safety Inspection of Dams", Department of the Army, Office of the Chief of Engineers, Appendix D
8. "The Geology of New York State", by Broughton, J.E., et al., N.Y. State Museum and Science Service, Geological Survey, Albany, New York, Map and Chart Series: No. 5, 1962
9. "Soil Association Map of New York State", by M.G. Cline, New York State College of Agriculture, Cornell University, Ithaca, New York, February, 1963
10. "Orange County Soils. Soil Association Leaflet 2", by E.G. Knox, et al., New York State College of Agriculture, Cornell University, Ithaca, New York, October, 1954

OTHER DATA

APPENDIX G

OCT. 7 1913
CHAIRMAN
DIVISION INLAND WATERS
JOHN D. MOORE
Chief Engineer
ALBERT E. HOYT
SECRETARY
JOHN J. FARRELL
ASST. SECRETARY

STATE OF NEW YORK



CONSERVATION COMMISSION
ALBANY

Dam No 557 Lower Hudson
COMMISSIONER
JOHN D. MOORE
RICHARD W. SHERMAN
CHIEF ENGINEER
ALEX. RICE MCKIM
INSPECTOR OF DAMS AND PANS

RECEIVED

OCT 8 1913

DIVISION INLAND WATERS

J. D. M.

Albany, N. Y.

Serial No. 132

Application filed Oct 27th 1913

Approved by Commission Nov 10th 1913

Material Tag No.

Foundations inspected

Final inspection

This application for the reconstruction of a dam has been examined by C.R.P. of the Forestry Bureau, and we find that the proposed dam will not cause the flooding of any part of the Forest Preserve.

C.R.P.

APPLICATION FOR CONSTRUCTION OR RECONSTRUCTION OF A DAM

Beacon, N.Y.
(Address of Applicant)

Application is hereby made to the Conservation Commission of the State of New York, in compliance with the provision of Chap. LXV of the Consolidated Laws, the Conservation Law, for approval of the detailed specifications and plans, marked

Suggested Method of Strengthening Beacon Dam
herewith submitted, for the { construction } of the dam herein described. All provisions of law will be complied with in the erection of the said dam, whether specified herein or not.

October 4th 1913
(Date)

{ Signature of
Applicant }

Morad Lamont

Com. act.

LOCATION AND GENERAL DATA

Site of dam is on _____
(Name of stream)
a branch of _____
(Name of stream), within the
limits of the town of Town of South Hill, County of DeKalb.

(Give approximate distance from well-known bridge, dam, village or mouth of stream, so that work can be located on map of state)

Purpose of dam..... Glenn-Colusa Water Tunnel - City of
Prosser.....

Reasons for making changes in existing structure. It is possible that the existing structure might fail if subjected to the pressure of the full reservoir.

DATA AND DIMENSIONS

General:

Materials of which dam is to be constructed. The present dam is rubble masonry with concrete face (down stream) and concrete buttresses. The additions are to be concrete.

Area of watershed above dam.....0.27.....square miles.

Area of water surface of pond at level of spillway crest. 2.8 acres.

Capacity of reservoir (at above level) 2500000 cubic feet.

Length of spillway crest.....feet.

Maximum depth of water on spillway crest. Spillway is 1.5 ft. below top of dam crest.

Maximum discharging capacity of spillway 17" deep..... 250..... cubic feet per second.

Maximum discharging capacity of spillway per square mile of drainage area.....

925.....cubic feet per second.

Concrete portion:
Length on top..... *about 300* feet.
Length in stream bed..... " *250* feet.
Maximum height above stream bed..... *30* feet.
Maximum height above foundation bed..... *35* feet.
Maximum width of base..... *about 19* feet.
Maximum width of top..... *7 1/2* feet.
Elevation of top above maximum water level in pond..... *1.5* feet.
Elevation of top above spillway crest..... *1.5* feet.
Nature of foundations..... *logs*

Earth portion:

None

Embankment:

Length on top feet.
Length in stream bed.....feet.
Maximum height above stream bed.....feet.
Maximum width of base.....feet.
Maximum width of top.....feet.
Elevation of top above maximum water level in pond.....feet.
Elevation of top above spillway crest.....feet.
Slope, upstream face.....
Slope, downstream face.....

Core wall:

None

Material.....
Elevation of top above spillway crest.....feet.
Width of top.....feet.
Batter of faces.....
Maximum height above foundations.....feet.
Maximum width of base.....feet.

1
Fill out a form as complete as possible for each dam in your district and send to State Conservation Commission, Albany, N. Y.

1. Name and address of owners *Village of Matteawan N. Y.*
2. Date of construction *1889 - 1892 - 1901*
3. Uses of impounded water *Household and Municipal*
4. Character of foundation bed *Rock*
5. Material of waste spill *Concrete*
6. Length of waste and depth below dam *43 ft — 1 ft 3 3/4 in*
7. Total length of dam including waste *346 ft*
8. Material of dam *Stone and Concrete Masonry*
9. Discharges, size and location *20 in pipe near bottom of dam*

Below sketch section of waste and section of dam, with greatest heights and top thickness and bottom thickness. On opposite side sketch general plan of dam and give distance from a bridge or from a tributary stream.

537 Avenue Jefferson
Nearest town *Shahkill*

A. J. Connelley Matteawan N. Y.
(Signature, address and date.)
Matteawan N. Y.
May 2nd

REPORT ON COMPLETION OF WORK

CONSERVATION COMMISSION — DIVISION OF INLAND WATERS

Albany.....

On.....I inspected the above work and found that it
had been completed in a satisfactory manner.

Approved:

.....
Inspector of Docks and Dams.

.....
Chief Engineer.

INSTRUCTIONS TO APPLICANTS

Requirements for Plans.—Before beginning the construction, reconstruction, alteration or extension of a structure for impounding water, the owner of the proposed structure shall submit, in duplicate, to the Conservation Commission complete drawings showing the location of the dam, the flow line of the impounded water, the boundary lines and the ownership of the property affected, the nature of the foundation bed, the character of the materials to be employed, the size and the location of the discharge and control gates, the general and special features of the dam, and such dimensions as are necessary for the calculation of the stresses and the erection of the structure.

Drawings shall be on sheets of uniform size 24 inches wide by 36 inches long. Each sheet shall have a white space 2½ inches high by 5½ inches long below the title to receive the stamp of approval. On each sheet of every set of drawings there shall be clearly printed a conspicuous title in which shall appear the name of the county, the name of the city, village or town, and the name of the stream in which the dam is located, and the name of the owner thereof. The scale of the drawings shall be stated under the title. When the designs have been approved by the Commission, one set will be returned to the owner, with such approval endorsed thereon. Copies in duplicate of the specifications under which the dam is to be constructed shall accompany the plans.

Inspection.—The name of the inspector and a statement of his experience in such work must be sent to the Commission. There must also be sent a sample of at least one-half a cubic foot of sand and of cement, and twenty cubic inches of the stone for concrete or masonry to be used in the structure, and of the natural materials in the foundation bed. The foundation bed, after it has been cleared and prepared, must be inspected subject to approval by the Inspector of the Commission. The inspection of materials takes about ten days in the laboratory. On request tags will be sent for labeling the materials.

State Engineer and Surveyor

ALBANY

Received July 22^d 1922 Dam No. 537 L Hudson Watershed
 Disposition Plans approved July 22^d 1922 Serial No. 463
 Site inspected _____
 Foundation inspected _____
 Structure inspected _____

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the State Engineer, Albany, N. Y., in compliance with the provisions of Chapter LXV of the Consolidated Laws and Chapter 647, Laws of 1911, Section 22 as amended, for the approval of specifications and detailed plans, marked Dam, Beacon Reservoir

City of Beacon, Dutchess County N.Y.
 herewith submitted for the { construction } of a dam located as stated below. All provisions of law will be
 { reconstruction }
 complied with in the erection of the proposed dam.

1. The dam will be on a branch of Fishkill Creek in the town
 of Fishkill County of Dutchess
 and is two (2) miles from City of Beacon (So. Beacon Hill)
(Give exact distance and direction from a well-known bridge, dam, village, main cross-roads or mouth of a stream)

2. The name and address of the owner is City of Beacon N.Y.

3. The dam will be used for Water Supply

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

5. The watershed at the proposed dam draining into the pond to be formed thereby is less than 1/2 Sq. mile
0.543, 18
 square miles.

6. The proposed dam will have a pond area at the spillcrest elevation of 150 acres
 and will impound _____ cubic feet of water.

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

8. The maximum known flow of the stream at the dam site was _____ cubic feet per second on _____
 (Date)

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

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

11. The material of the right bank, in the direction with the current, is Rock Ledge; at the spillcrest elevation this material has a top slope of.....inches vertical to a foot horizontal on the center line of the dam, a vertical thickness at this elevation of.....feet, and the top surface extends for a vertical height of.....feet above the spillcrest.

12. The material of the left bank is Rock Ledge; has a top slope of.....inches to a foot horizontal, a thickness of.....feet, and a height of.....feet.

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

14. If the bed is in layers, are the layers horizontal or inclined? no If inclined what is the direction of the slope relative to the center line of the dam and the inches vertical to a foot horizontal?

15. What is the thickness of the layers?

16. Are there any porous seams or fissures?

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

18. There will be also for flood discharge a pipe 22 inches in diameter and the bottom will be.....feet below the spillcrest, a sluice or gate.....feet wide in the clear by.....feet high, and the bottom will be.....feet below the spillcrest.

19. **APRON.** Below the proposed dam there will be an apron built of.....feet long,.....feet wide and.....feet thick. The downstream side of the apron will have a thickness of.....feet for a width of.....feet.

20. **PLANS.** Each application for a permit of a dam over 12 feet in height must be accompanied by a location map and complete working drawings of the proposed structure. Each drawing should have a title giving the parts shown, the name of the town and county in which the dam site is located, and the name of the owner and of the engineer.

The location map (U. S. Geological Quadrangle or other map) should show the exact location of the proposed dam; of buildings below the dam which might be damaged by any failure of the dam; of roads adjacent to or crossing the stream below the dam, giving the lowest elevation of the roadway above the stream bed and giving the shape, the height and the width of stream openings; and of any embankments or steep slopes that any flood could pass over.

Also indicate the character and use made of the ground.

The complete working drawings should give all the dimensions necessary for the calculations of the stability of the structure, and all the information asked for below under "Sketches." There may be attached to the plans any written reports, calculations, investigations or opinions that may aid in showing the data and method used by the designer.

21. **SKETCHES.** For small and unimportant structures, if plans have not been made, on the back sheet of this application make a sketch to scale for each different cross-section at the highest point; showing the height and the depth from the surface of the foundation, the bottom width, the top width (for a concrete or masonry spill at 18 inches below the crest), the elevation of the top in reference to the spillcrest, the length of the section, and the material of which the section is to be constructed. Mark each section with a capital letter. Also sketch a plan; show the above sections by their top lines, giving the mark and the length of each; the openings by their horizontal dimensions; and the abutments by their top width and top lengths from the upstream face of the spillcrest and give the elevation of the top in reference to the spillcrest.

22. **ELEVATIONS.** Also give the elevations, if possible from the Mean Sea Level, of at least two permanent Bench Marks; of the spillcrest for any existing dam on the proposed dam site, at the middle and at both ends of the spill; and of the spillcrest for the above proposed dam.

23. **SAMPLES.** When so instructed, send samples of the materials to be used in the construction of the proposed dam, using shipping tags which will be furnished. For sand one-half a cubic foot is desired; for cement, three pints; and for the natural bed, twenty cubic inches.

24. **INSPECTION.** State how inspection is to be provided for during construction _____

*Drains between new and old concrete shown
on plan. to have three (3) outlets in each
panel between buttresses.*
Geo. W. Krieger Jr.

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

P.O. Box 116, Coughkeepsie
(Address of signer)

July 22, 1922
(Date)

George W. Krieger, Jr.
Consulting Engineer
(A person signing for Applicant should indicate his title or authority).



NEW YORK

ROBERT L. CAHILL, MAYOR
JOSEPH A. GALLIO, COMMISSIONER OF ACCOUNTS
LEONARD P. COUGHLIN, COMMISSIONER OF PUBLIC SAFETY
CHARLES J. MILLER, COMMISSIONER OF FINANCE
RALPH M. FLYNN, COMMISSIONER OF PUBLIC WORKS
THOMAS J. LYNCH, CITY JUDGE

March 7, 1974

Mr. George A. VanEtten
Dam Safety Program
N. Y. State Dept. of Environmental Conservation
50 Wolf Road--Room 601
Albany, New York 12201

Re: Registered Dam No. 537
Upper Water Supply Reservoir
City of Beacon

Dear Mr. Van Etten:

Referring to your letter of March 1, 1974 regarding resurfacing of Dam 537. This dam has been completely rehabilitated.

All loose concrete has been removed and where evidence of cracking was indicated all concrete was notched and morphologically replaced. 10 x 10 wire mesh was placed over all surfaces and 1/2" rebars were placed on upstream face. Complete surface was then covered with gunite to a minimum depth of 2" to as much as 6" in some areas. The entire structure was grouted internally.

I consider the Dam in A-1 condition at this time.

Very truly yours,

Harry C. Ingerson
Harry C. Ingerson
City Engineer

cc: Com. Flynn

74 MAR 12 1974

Division of Resource Management Services
Bureau of Water Regulation

January 17, 1973

Honorable Robert L. Cahill
City Hall
Bencon, New York 12508

Dear Mayor Cahill:

Registered Dam No. 537
Water Supply Reservoir
City of Bencon

Last summer, our dam inspection team, as part of the Department's program on Dam Safety, made a visual survey of the above-subject dam. The dam was not classified as unsafe, but the inspectors did note that maintenance was needed.

The report indicates that concrete surfaces at or near the overflow section were spald and leakage was observed near the spillway about 18 inches below the crest.

If the impoundment and height of the dam were less, the report would have been routine.

However, the hazard is high enough to mention that a program of maintenance and repair should be followed by the City.

If you have any questions, please contact this office at (518)457-7418.

Very truly yours,

Stanford Zeccolo
Senior Hydraulic Engineer

SZ:ls

City of Bencon

DER DAM INSPECTION REPORT

21	14	22	000537	042772	003
SS	CRY	YR AP.	DAM NO.	INS. DATE	USE TYPE

AS PLANT INSPECTION		
☐ Location of Sp'way and outlet	☐ Elevations	
☐ Size of Sp'way and Outlet	☐ Geometry of Non-overflow section	

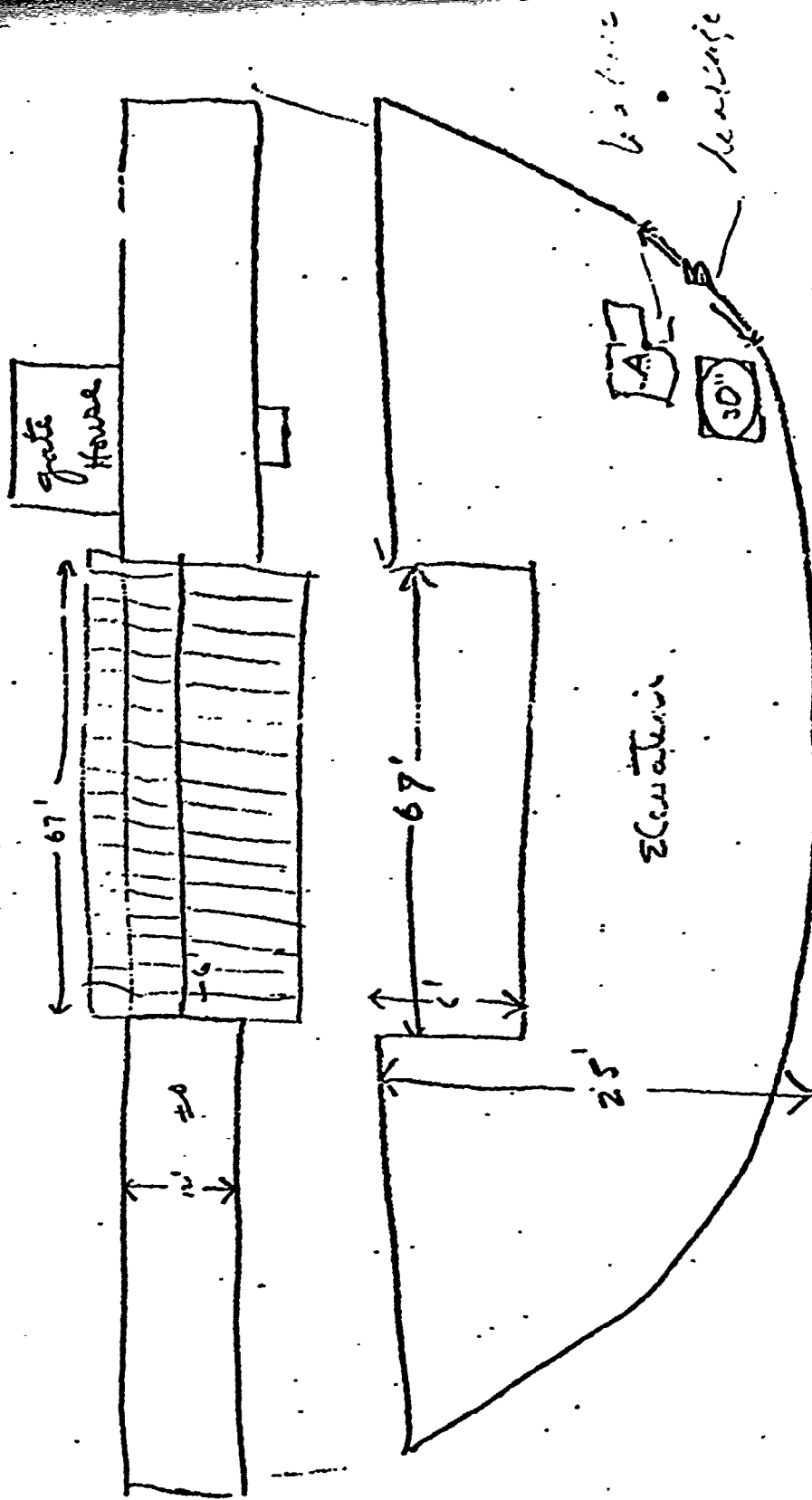
GENERAL CONDITION OF NON-OVERFLOW SECTION		
☐ Settlement	☒ Cracks	☐ Deflections
☒ Joints	☒ Surface of Concrete	☒ Leakage
☐ Undermining	☐ Settlement of Embankment	☐ Crest of Dam
☐ Downstream Slope	☐ Upstream Slope	☐ Toe of Slope

GENERAL COND. OF SP'WAY AND OUTLET WORKS		
☐ Auxiliary Spillway	☐ Service or Concrete Sp'way	☐ Stilling Basin
☐ Joints	☒ Surface of Concrete	☐ Spillway Toe
☒ Mechanical Equipment	☐ Plunge Pool	☒ Drain

☒ Maintenance	☒ Hazard Class
☒ Evaluation	☒ Inspector

COMMENTS:

Surface of concrete is spald
 Some leakage near spillway about 18"
 below crest



A - small run of water

B - along this section there is a little seeping