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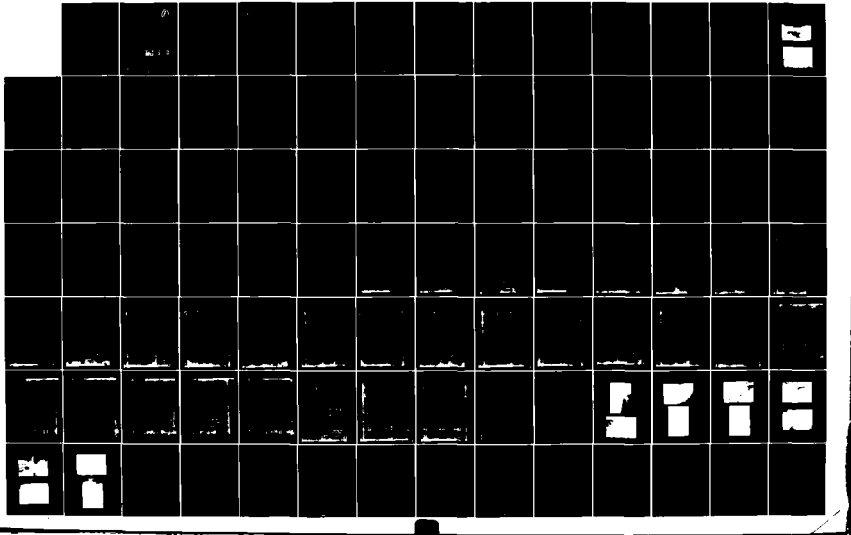

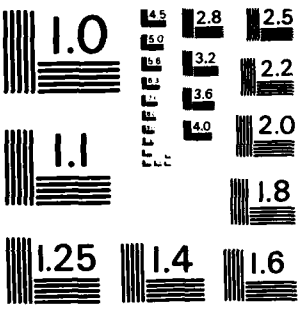

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CONNECTICUT RIVER BASIN
PORTLAND, CONNECTICUT

PORTLAND RESERVOIR DAM

CT 00149

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JUNE 1979

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

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

DAMS, INSPECTION, DAM SAFETY,

Conn. River Basin
Portland, Conn.
Portland Reservoir Dam

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

Portland Reservoir Dam is an earthfill dam with an impervious core, about 400 ft. long, with a maximum height of about 28 ft. A 450 ft. long earthfill embankment serves as a right abutment closure dike. The test flood inflow equals 9,350 cfs. The dam appears to be in good condition, but there is extensive erosdon along the upstream face of the right abutment dike. Portland Reservoir is utilized as a water storage facility for the Town of Portland, Conn.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:

NEDED

SEP 24 1979

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

I am forwarding to you a copy of the Portland Reservoir Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Portland Water Works, Town Hall, Portland, Connecticut 06605, ATTN: Mr. Seiserman, Director of Public Works.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

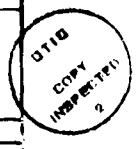
I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

Max B. Scheider

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated



PORTLAND RESERVOIR DAM

CT 00149

CONNECTICUT RIVER BASIN
PORTLAND, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.:	CT 00149
Name of Dam:	Portland Reservoir Dam
Town:	Portland
County and State:	Middlesex County, Connecticut
Stream:	Reservoir Brook
Date of Inspection:	24 April and 9 May 1979

BRIEF ASSESSMENT

Portland Reservoir Dam is an earthfill dam with an impervious core, about 400 ft. long, with a maximum height of about 28 ft. A 450 ft. long earthfill embankment serves as a right abutment closure dike. The spillway is a 94 ft. long ungated overflow ogee crest located about 300 ft. from the left abutment. A wet well and gate house just to the right of the spillway on the crest of the earth embankment houses the control valves for the inlet and outlet pipes. There are two inlet pipes (20 in. dia. and 12 in. dia. pipes with 20 in. and 12 in. gate valves, respectively) and three outlet pipes (20 in. dia. and two 8 in. dia. pipes with 20 in. and 8 in. gate valves). There is also a 16 in. dia. blowoff pipe that has an in-line valve controlled at the manhole just downslope of the gate house. A water treatment plant is situated at the downstream toe of the dam.

Portland Reservoir is utilized as a water storage facility for the Town of Portland, Connecticut. It is about 2,300 ft. long and has a surface area of 30.3 acres at spillway crest level. The drainage area is 3.52 sq. mi. (2,255 acres) and the maximum storage to top of dam is 510 acres; the size classification is thus small. Because a breach of the dam would affect about 16 homes and 3 local roadways, with the possibility of loss of more than a few lives and the probability of appreciable economic losses, it has been classified as having a high hazard potential. Based on small size and high hazard, the range for the test flood is ½ PMF to PMF. The selected test flood is the full PMF.

The spillway is capable of discharging 2,140 cfs at elevation 316.5 MSL, the low point of the right abutment closure dike. Surcharge capacity from the spillway crest, elevation 313.0 MSL to the low point of the right abutment closure dike, elevation 316.5 MSL, is only 3.5 ft.

The test flood inflow equals 9,350 cfs. The routed test flood outflow (8,450 cfs) overtops the dam by about 2.3 ft.. The spillway is adequate to pass about 25 percent of the routed test flood outflow without overtopping the dam.

The dam appears to be in good condition, but there is extensive erosion along the upstream face of the right abutment dike. Brush growth has begun to intrude on the upstream face of the dike. Along the crest of the dam to the left of the spillway there are several mature trees.

Within one year after receipt of this Phase I Inspection Report, the owner, the Town of Portland, should retain the services of a competent registered professional engineer, and implement the results of his evaluation of the following: (1) whether the dam and dike embankment should be raised and leveled to the elevation of the spillway training walls; (2) whether an impervious blanket and a riprap facing should be provided on the upstream side of the dike; and (3) the source of leakage along the spillway's left downstream wingwall.

The owner should also implement the following operational and maintenance procedures: (1) restore riprap on the upstream face of the dike, particularly in the area to the right of the gate house; (2) redress the riprap located on the downstream side of the dam near the spillway outlet; (3) repair the spalled panel on the left side of the spillway chute; (4) clear growth from the embankment and in the channel immediately downstream of the spillway; (5) monitor flows from the left and right toe drains, and the collector outlet located about 200 ft. downstream of the dam; (6) restore heavily worn pathways on the embankment; (7) institute procedures for an annual periodic technical inspection of the dam and appurtenant works; and (8) establish a formal surveillance and flood warning plan.

Peter B. Dyson
Project Manager

COMMONWEALTH OF MASSACHUSETTS
PETER
BRIAN
DYSON
No. 18452
REGISTERED
PROFESSIONAL ENGINEER

This Phase I Inspection Report on Portland Reservoir Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Joseph W. Finegan

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

Joseph A. McElroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

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

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

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

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

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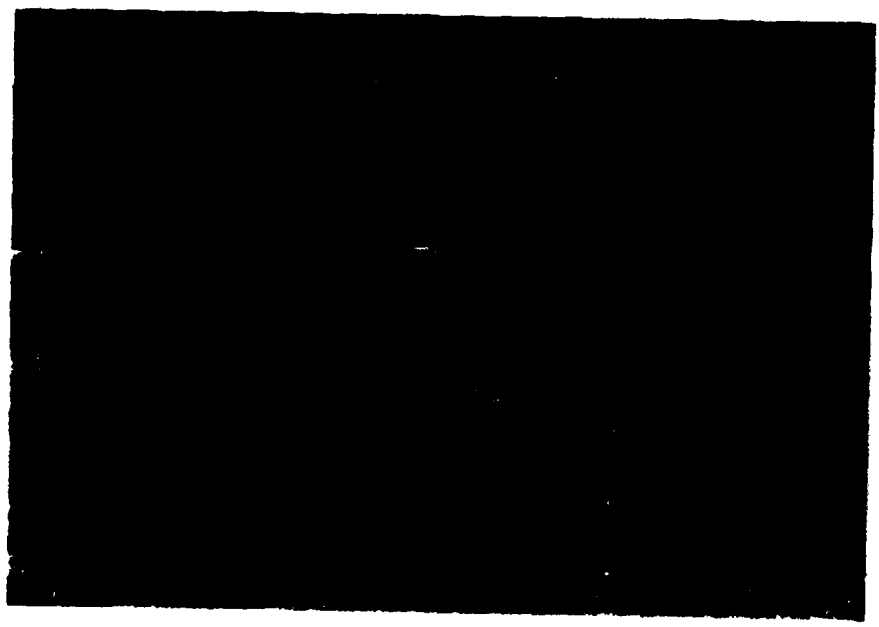
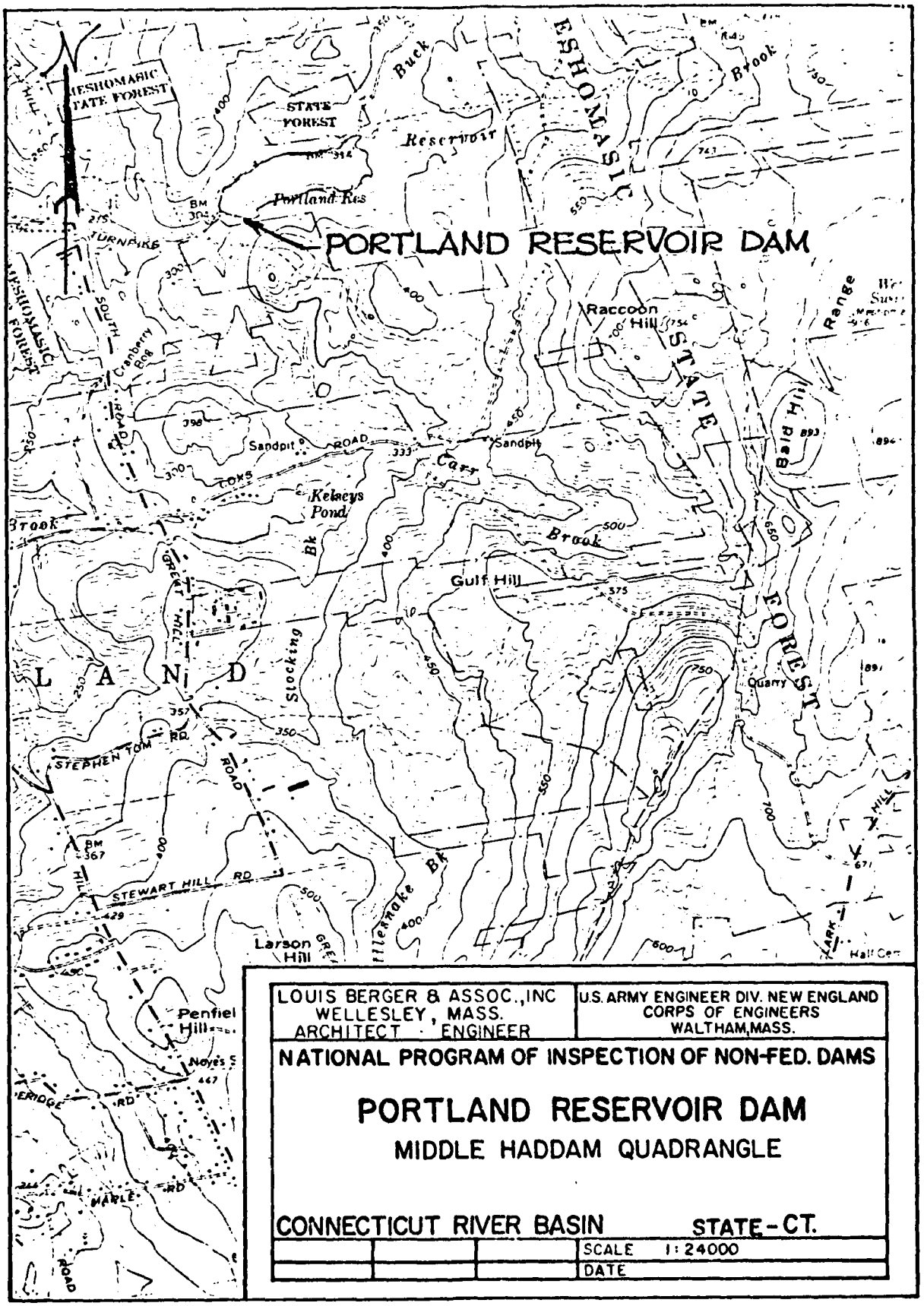
Overview from Right Abutment



Overview from Left Abutment



LOUIS BERGER & ASSOC., INC WELLESLEY, MASS. ARCHITECT · ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

PORTLAND RESERVOIR DAM

MIDDLE HADDAM QUADRANGLE

CONNECTICUT RIVER BASIN STATE - CT.

			SCALE 1:24000
			DATE

PHASE I INSPECTION REPORT

PORTLAND RESERVOIR DAM CT 00149

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Louis Berger & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to Louis Berger & Associates, Inc. under a letter of 19 March 1979 from John P. Chandler, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0051 has been assigned by the Corps of Engineers for this work.

b. Purpose.

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) Update, verify and complete the National Inventory of Dams.

1.2 Description of Project.

a. Location. Portland Reservoir Dam is located in the town of Portland, Middlesex County, Connecticut. The dam is reached via State Highways 17A, 17 and the Old Marlborough Turnpike. The reservoir and dam are situated near the headwaters of Reservoir Brook, a tributary of the Connecticut River. The normal storage level of the reservoir is 312.5 MSL, while the confluence of Reservoir Brook and the Connecticut River, about 2.7 miles below the dam, is about 10 MSL. The dam is shown on U.S.G.S., Quadrangle, Middle Haddam, Connecticut, with coordinates approximately at N41°36'53", W72°34'14'.

b. Description of Dam and Appurtenances.

(1) Description of Dam. Portland Reservoir Dam is an earthfill structure about 28 ft. high and 400 ft. long. The dam is a reconstructed and raised structure built in 1963-64 over an existing dam, to increase the storage capacity of Portland Reservoir. The original dam had a crest elevation of about 304.5; the new dam has its crest at elevation 313.0 MSL.

The original dam was constructed of stone. Its upstream face was nearly vertical while the downstream face was stepped on about a 1 to 1 slope. The old dam was left in place when the new embankment was constructed, and it now forms the downstream toe of the new dam.

The new dam was built with its baseline at the upstream face of the existing dam. Steel sheet piling with a concrete cap was constructed about 18 ft. upstream of the baseline. Grout holes, 5 ft. on centers, were made 25 ft. deep into rock from Sta. 0+90 to Sta. 1+10 and from Sta. 2+35 to Sta. 2+60 (see Appendix B).

The embankment section consists of a core of impermeable material within shells of pervious material. The impermeable core is 10 ft. wide at the top with a 1 to 1 slope on both the upstream and downstream sides and is cut into the original ground by varying amounts. The crests of the pervious shells vary in width from 10 ft. on the right side of the spillway, to 34 ft. on the left side of the spillway. The upstream slope of the embankment is 2½ horizontal to 1 vertical and the grass-covered downstream slope is 2 horizontal to 1 vertical. The upper portions of the upstream slopes are riprapped on both sides of the spillway, as are the downstream toes in the vicinity of the spillway. No other riprap is present. Toe drains are located along the embankment on both sides of the spillway.

A 450 ft. long earthfill closure dike serves as the right abutment of the dam. The closure dike is situated essentially perpendicular to the dam. The crest width is about 15 ft. The upstream slope is 2½:1 and the grass-covered downstream slope is 3:1. There is no longer any riprap on the upstream slope.

(2) Spillway. The spillway for Portland Reservoir is located about 300 ft. to the right of the left abutment. The spillway is a 94 ft. long ungated ogee crest built over the original masonry dam. The upstream slope is vertical up to elevation 309.0 MSL. From there to the crest of the spillway, elevation 313.0 MSL, the upstream slope is 1:1. The average downstream slope is about 2:1. The top of the spillway training walls is at elevation 319.5 MSL.

The channel downstream from the crest consists of a 28 ft. long energy dissipating stilling basin with 25 sawtoothed baffle blocks and a terminal wall. The entire structure is constructed of concrete. At the center of the ogee, 12 ft. of the crest are depressed 6 in. Popcorn drains are located beneath the structure at both the upstream and downstream toes. The popcorn drains are connected to cast iron draw pipes which lead to a manhole. A 16 in. dia. pipe outlets from the manhole into Reservoir Brook.

(3) Outlets. Two inlet pipes to the wet well and gate house are provided at selected levels for releasing stored waters from the reservoir. A 20 in. dia. inlet pipe (El. 300.0 MSL) and a 12 in. dia. inlet pipe (El. 295.0 MSL) lead from the upstream face of the spillway to the wet well and gate house where they are controlled by 20 in. and 12 in. gate valves, respectively. From the wet well and gate house a 20 in. dia. outlet pipe and two 8 in. dia. outlet pipes (with 20 in. and 8 in. gate valves) lead to the treatment facility located just downstream of the dam. A 16 in. dia. blowoff pipe, at about elevation 290 MSL, leads from the upstream toe of the spillway to a manhole located on the downstream slope of the embankment just below the gate house. There a 16 in. in-line valve controls flows to the downstream channel.

c. Size Classification. Portland Reservoir Dam is about 28 ft. high impounding a storage of 375 acre-ft. to spillway crest and about 510 acre-ft. to top of dam. In accordance with size and capacity criteria promulgated in the Recommended Guidelines for Safety Inspection of Dams, the project is categorized in the small classification.

d. Hazard Classification. A breach failure of the dam at Portland Reservoir would release water down Reservoir Brook to the Connecticut River. In the reaches below the dam, the discharge channel first parallels the south side of Old Marlborough Turnpike for about 2,500 ft. before crossing under the Turnpike. It is estimated that a breach of the dam would cause a flood stage of about 14.5 ft. at this location, thereby flooding Old Marlborough Turnpike, Cotton Hill Road and two adjacent dwellings. Reservoir Brook parallels the north side of Old Marlborough Turnpike in the next reach and would flood about 3 dwellings. At about 4,500 ft. downstream from the dam, the flood stage drops rapidly to about 8.5 ft. because of a wider flood plain. However, this stage is high enough to cause damage to a small subdivision of homes located near the intersection of Old Marlborough Turnpike and Thompson Hill Road. As many as 11 homes could be affected in this area. The brook then crosses under Thompson Hill Road and some flooding of this intersection can be expected. Only minor flooding is anticipated downstream from this point. A total of 16 dwellings and three local roads would be expected to suffer serious damage, with the loss of more than a few lives. Consequently, Portland Reservoir Dam has been classified as having a high hazard potential, in accordance with the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership. Portland Reservoir Dam is owned by the Portland Water Works, Town Hall, Portland, Connecticut.

f. Operator. Mr. Joseph Seiserman, Director of Public Works, Town of Portland, Town Hall, Portland, Connecticut. Telephone: (203) 342-2880.

g. Purpose of Dam. Portland Reservoir Dam is operated in conjunction with other water storage facilities, for providing municipal water supplies to the Town of Portland.

h. Design and Construction History. No documentation on design or construction has been recovered for the original dam and it is not known when it was built. The dam was raised and reconstructed in 1963-64 to increase water storage capacity for the Town of Portland. The reconstructed dam was designed by Argraves Engineers. Construction plans and a limited amount of hydraulic design data were recovered (see Appendix B).

i. Normal Operating Procedure. No written operating procedures were disclosed. The treatment plant for the facility is located just downstream of the dam and operators visit the site on a daily basis.

1.3 Pertinent Data.

a. Drainage Area. The drainage area contributing to Portland Reservoir Dam is situated near the headwaters of Reservoir Brook. The drainage area encompasses a total of about 3.52 sq. mi. (2,255 acres), of which about 30 acres are occupied by the reservoir. The longest circuitous stream course contributing to the lake is about 14,000 ft. long with an elevation difference of about 417 ft., or a slope of about 157 ft. per mile. The drainage area has a length of about 2.3 miles and a maximum width of about 2.5 miles. The basin is nearly all forested, containing only two open fields, and is sparsely populated, and is best described as hilly to mountainous terrain.

b. Discharge at Damsite.

(1) Outlet Works Conduit. Release of stored water from Portland Reservoir Dam is provided by a 20 in. dia. pipe and a 12 in. dia. pipe to the wet well and gate house, from which there are a 20 in. dia. and two 8 in. dia. outlet pipes to the treatment facility. A 16 in. dia. blowoff pipe, which is controlled by a 16 in. valve, located in a manhole just below the gate house is also provided and discharges into Reservoir Brook. The capacity of the blowoff pipe is approximately 25 cfs with the water surface at the test flood elevation and about 24 cfs with water surface at the top of dam. The inlet invert of the blowoff pipe is at about elevation 290.

(2) Maximum Known Flood at Damsite. No records are available of flood flows into Portland Reservoir, nor of spillway releases and surcharge heads during such inflows. The highest known head above the spillway crest recalled by Town personnel was about 1.33 ft., which would yield a discharge of about 500 cfs over the spillway.

(3) Ungated Spillway Capacity at Top of Dam. The spillway at the reservoir is an ungated concrete, ogee spillway. The total spillway capacity at top of dam, elevation 316.5 MSL, is 2,140 cfs.

(4) Ungated Spillway Capacity at Test Flood Elevation. The ungated spillway capacity is about 4,750 cfs at test flood elevation 318.8 MSL.

(5) Gated Spillway Capacity at Normal Pool Elevation. Not applicable

(6) Gated Spillway Capacity at Test Flood Elevation. Not applicable

(7) Total Spillway Capacity at Test Flood Elevation. The total spillway capacity at the test flood elevation is the same as (4) above, 4,750 cfs at elevation 318.8 MSL.

(8) Total Project Discharge at Test Flood Elevation. The spillway is inadequate to handle the test flood and the dam would be overtopped by about 2.3 ft. at elevation 318.8 MSL. The total discharge through the spillway and over the top of the dam would be about 8,450 cfs.

c. Elevations (Ft. above MSL).

(1) Streambed at centerline of dam - 288.5

(2) Maximum tailwater - Not available

(3) Upstream invert of outlet culvert - 290.0±

(4) Recreation Pool - Not applicable

(5) Full flood control pool - Not applicable

(6) Ungated spillway crest - 312.5

(7) Design surcharge (original design) - Unknown

(8) Top of dam - Varies from 316.5 (low point of right abutment closure dike) to 319.5 (top of spillway training walls)

(9) Test flood design surcharge - 318.8

d. Reservoir

(1) Length of maximum pool - 2,300 ft.

(2) Length of recreation pool - Not applicable

(3) Length of flood control pool - Not applicable

e. Storage (acre-ft.)

(1) Recreation pool - Not applicable

(2) Flood control pool - Not applicable

(3) Spillway crest pool El. 312.5 - 375

(4) Top of dam El. 316.5 - 510

(5) Test flood pool El. 318.8 - 610

f. Reservoir Surface (acres)

(1) Recreation pool - Not applicable

(2) Flood control pool - Not applicable

(3) Spillway crest El. 312.5 - 30.3

(4) Top of dam El. 316.5 - 40.0

(5) Test flood pool El. 318.8 - 48.0

g. Dam

(1) Type - Dam: Earthfill with impervious core
Dike: Earthfill

(2) Length - Dam: 400 ft., Dike: 450 ft.

(3) Height - Dam: 28 ft., Dike: varies from 0 to 28 ft.

(4) Top width - Varies from 10 ft. to 34 ft.

(5) Side slopes - Upstream 2½ horizontal to 1 vertical
Downstream 2 horizontal to 1 vertical

(6) Zoning - Unknown impervious core, with pervious shell

(7) Impervious core - Unknown impervious material

(8) Cutoff - Partial masonry wall

(9) Grout curtain - Unknown (some grout holes on plans)

h. Diversion and Regulating Tunnel - None

i. Spillway

(1) Type - Concrete ogee

(2) Length of weir - 94 ft.

(3) Crest elevation - 312.5 at 12 ft. wide notch, remainder 313.0

(4) Gates - None

(5) Upstream channel - None

(6) Downstream channel - Stilling basin with concrete stilling blocks and energy dissipating wall discharging into a natural channel.

j. Regulating Outlets

(1) Inverts - 16 in. dia. blowoff - 290±

- 12 in. dia. - 295

- 20 in. dia. - 300

(2) Size - 12 in. dia. and 20 in. dia. inlet pipes to wet well, 20 in. dia. and two 8 in. dia. outlet pipes to treatment facility

- 16 in. dia. blowoff pipe

(3) Description - Cast iron pipes

(4) Control Mechanism - Gate valves in wet well at gate house with control hoist. All gate valves are the same size as the pipes they control.

(5) Other - 16 in. dia. blowoff pipe regulated by 16 in. in-line gate valve.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

No data on the design of the original dam has been found. The 1963-64 reconstruction of the dam was designed by Argraves Engineers. Copies of design drawings are included in Appendix B.

2.2 Construction Data

No information relating to construction of the original dam has been found and probably none exists. The reconstructed dam was completed in 1964 under the supervision of the design engineers, Argraves Engineers. The firm of John J. Mozzochi and Associates, inspected the work on behalf of the State Water Resources Commission. A certificate of approval for the work was issued on November 19, 1964. The limited amount of correspondence located relative to construction is included in Appendix B.

2.3 Operation Data

No specific operation data or operation and maintenance manuals have been issued, either by the design engineers or the operating agency. There appear to be no formal operating records.

2.4 Evaluation

a. Availability. The reconstruction plans, correspondence concerning construction of the dam and appurtenances, previous inspection reports and the visual observations of the inspection team form the basis for the information presented in this report.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Validity. The validity of the engineering data acquired covering the dam is considered acceptable and is not challenged.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General. The visual inspection of Portland Reservoir Dam took place on 24 April and 9 May 1979. On both days the reservoir was about 2 in. above the low center section of the spillway crest. The dam was judged to be in generally good condition, but a few items require attention (see Sections 7.2 and 7.3).

b. Dam. The dam is an earthfill embankment about 400 ft. long with a 94 ft. wide concrete ogee spillway section. A 450 ft. long earthfill embankment serves as a right abutment closure dike. The dam is a reconstructed and raised structure built in 1963-64 over an existing dam (see Photo Nos. 1-5, Appendix C). The dam has an ogee spillway with a 6 in. deep, 12 ft. wide recessed center section. A wet well and gate house is located on the crest of the dam immediately to the right of the spillway. According to the licensing plans and borings, the dam is founded on "hardpan" about 8 ft. above bedrock.

The profile of the crest of the right abutment closure dike is not horizontal. There is about a 2 ft. difference in elevation between the gate house and a point about 450 ft. to the right of the gate house; elevation 318.5 versus elevation 316.5 respectively. The top of the embankment is about 10 ft. wide. Extensive erosion of this gravel embankment has occurred on the upstream slope, which is not protected with riprap. The upstream slope was also covered with brush and saplings.

At the toe of the spillway's right wingwall, two drains flowing at about 0.5 gpm each were discharging onto the randomly placed riprap at the end of the energy dissipator. The upper drain is for surface drainage from a catch basin on the access road, and the lower serves the right toe drain. The riprap in this area had become displaced, voids had appeared, and loss of ground was evident (see Photo No. 7, Appendix C).

Approximately 200 ft. downstream of the spillway's energy dissipator, another drain issues from the right bank of the downstream channel. On plan it appears to serve the "pop-corn" drains at the toe of the new ogee section, and beneath the spillway apron. The discharge approached 1.0 to 2.0 gpm, some of it from seepage around the pipe.

There has been considerable slope erosion at the toe of the left wingwall to the extent that the dislodged riprap cannot check the deterioration of the slope. Just below the end of the left wingwall the toe drain outlet, largely obscured by the irregular riprap, discharged at about 0.1 gpm. The flow was clear, with no suspended fines (see Photo No. 6, Appendix C).

The left embankment was heavily overgrown with mature conifers. The crest of the dam itself is of gravelly sand and there had been no attempt at planting or of soil protection. The left upstream slope, as on the right closure dike, was becoming heavily invaded with young brush and saplings. Some few feet beyond the limits of the left abutment, rock outcrops were noted (see Photo No. 8, Appendix C).

c. Appurtenant Structures. The spillway is located at the center of the dam and consists of a 94 ft. long ogee crested weir. While the ogee section, apron, and energy dissipator all appeared to be in fair condition, a rather severe but localized concrete spalling at the bottom of the spillway's top left panel was apparent. Also, where the left wingwall joins the abutment wall, there was a leak at the bottom of the joint. The leak was slight but persistent and obviously of long duration. This seep had badly discolored the concrete and has caused its deterioration (see Photo Nos. 9-12, Appendix C).

The brick gate house and wet well with trash racks appeared to be in fair condition with some minor deterioration of the brick. All control gates were reported to be operative, as was the blowoff valve.

d. Reservoir Area. The shoreline around the reservoir is wooded and appeared stable with evidences of frequent outcrops of bedrock. An inspection of the road embankment to the north of the reservoir was made to examine the relative heights of the roadway and the reservoir proper. In this area the roadway is very low-lying and has in the past been frequently overtopped. A culvert has been installed under the roadway, essentially to act as an equalizer between the reservoir and the marshy, poorly drained lagoon to the north of it. There are no homes or other structures on the shoreline of the reservoir.

e. Downstream Channel. Immediately below the stilling basin, the channel is becoming overgrown with trees, some mature, but most saplings. The channel parallels the south side of Old Marlborough Turnpike. There are no homes in close proximity to the stream until the brook crosses under Old Marlborough Turnpike about 2,500 ft. below the dam. Two houses could be affected by high water. Shortly beyond this point the brook crosses under Cotton Hill Road and then parallels Old Marlborough Turnpike to the north. A few homes located in this reach of the brook could also be affected by high water. About 4,500 ft. downstream of the dam the stream passes near a small housing development before crossing under Thompson Hill Road. Houses in this area could be affected by unusually high water. At about 2.7 miles below the dam Reservoir Brook joins the Connecticut River.

3.2 Evaluation

In general the visual inspection of the dam adequately revealed key characteristics of the project as they may relate to its stability and integrity, permitting an assessment to be made of those features affecting the safety of the structure. The dam and appurtenant structures appear to be in generally good condition, except for the right abutment closure dike which is only in fair condition.

The irregular profile of the dam and right abutment closure dike prevent the entire discharging capacity of the spillway to be utilized; the right abutment closure dike is overtopped at elevation 316.5 MSL while the top of the spillway training wall is at elevation 319.5 MSL.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

The Portland Reservoir facility is operated by personnel of the Portland Water Works Department, who daily visit the treatment plant about 100 ft. below the dam. Reservoir operation entails mainly the release of stored water from the reservoir as water supply needs warrant. The outlets from the reservoir to the treatment plant are pressure pipes, with valves at the outlet of the pipes such that day-to-day regulation of the outlet valves are not required. No documented operating procedures have been prepared.

4.2 Maintenance of Dam

Little maintenance of the dam is required except for periodic cutting of brush and trees and maintaining the riprap in good condition. No documented maintenance instructions have been prepared.

4.3 Maintenance of Operating Facilities

No specific maintenance program is in effect. It is presumed that some maintenance to the gates and valves controlling the intake pipes has been performed in the past to keep the mechanisms operative.

4.4 Description of any Warning System in Effect

No warning system is in effect at Portland Reservoir Dam.

4.5 Evaluation

The Portland Reservoir Dam is of recent construction with simple operating devices for regulating flows from the reservoir. Maintenance involves periodic growth removal from the embankment, surveillance regarding seeps, slope damage, animal burrows, etc., and maintenance of the riprap slope protection. A formal warning system should be developed.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General. Portland Reservoir Dam is an earthfill embankment, impounding a normal storage of about 375 acre-ft., with provision for an additional 135 acre-ft. of capacity in its surcharge space to the top of the dam. The dam and reservoir are maintained by the Town of Portland for water supply purposes. The 94 ft. wide concrete ogee spillway has a 12 ft. wide notch at elevation 312.5 MSL. The main spillway crest, at elevation 313.0 MSL, is capable of discharging about 2,140 cfs with surcharge to elevation 316.5 MSL. At this elevation water begins to overtop a low point in the right abutment closure dike. The topographic characteristics of the 3.52 sq. mi. (2,255 acre) drainage basin can best be described as hilly to mountainous terrain and heavily forested, with elevations ranging from 313 MSL at the spillway crest to about elevation 916 MSL.

b. Design Data. There is a limited amount of design data available for the dam (see Appendix B).

c. Experience Data. No records are available regarding past operation, surcharge encroachments, or flows through the spillway. The maximum past inflows are unknown. The highest observed flow over the main spillway crest was 1 ft. 4 in., which would yield a discharge of about 500 cfs.

d. Visual Observations. There are no present evidences either along the reservoir or in the downstream channel to indicate extreme high water levels or signs of any major spillway outflows. No one contacted could recollect any such occurrences.

e. Test Flood Analysis. Reservoir area and capacity curves and tables, for use in flood routings, are shown on Sheet D-1 and Figure 1, Sheet D-2, Appendix D. For determining surface areas and surcharge capacities, planimetered areas were taken from contours delineated on USGS 2,000 ft. per in. quadrangle sheets and from plans received from the State of Connecticut DEP.

The test flood chosen to evaluate the hydrologic and hydraulic capacity of Portland Reservoir Dam was selected in accordance with the criteria presented in the Recommended Guidelines for Safety Inspection of Dams. Since this dam is classified as small in size with a high hazard potential, the range for the test flood is ½ PMF to PMF. Because of the possibility of extensive damage downstream of the reservoir the full PMF was selected for the evaluation.

Precipitation data was obtained from Hydrometeorological Report No. 33, which for the Connecticut area approximates 24.0 in. of 6 hour point rainfall over a 10 sq. mile area. This value was then reduced by 20 percent to allow for basin size, shape and fit factors. The 6 hour rainfall was distributed into one hour incremental periods as suggested in COE Publication EC 1110-2-1411.

A triangular incremental unitgraph was assumed for the inflow hydrographs, using a computed lag time value of 2.2 hours to derive a time-to-peak for the triangular hydrograph of 2.2 hours (see computations on Sheets D-3 thru D-7, Appendix D).

A test flood inflow hydrograph is shown on Fig. 2, Sheet D-7. Appendix D, indicating a peak inflow of about 9,350 cfs or a CSM of about 2,660.

Discharge tables and curves for the spillway and for over the top of the dam are shown on Sheets D-8 thru D-12 and Fig. 3, Sheet D-13, Appendix D. The spillway capacity at the low point of the right abutment dike, elevation 316.5 MSL, is 2,140 cfs.

Flood routings were performed for both 1/2 and full PMF. Results of these routings are shown on Sheets D-14, D-15 and D-16 and are summarized as follows:

Flood Magnitude	Max. Routed Outflow cfs	Max. Res. El. ft. MSL	Max. Head Over Dam ft.
1/2 PMF	3,950	317.6	1.1
PMF (Test Flood)	8,450	318.8	2.3

From the above table, it can be seen that the project will not pass the routed test flood outflow without overtopping the dam by 2.3 ft. The project, however, can handle 25 percent of the routed test flood outflow without overtopping the dam.

Drawdown of the reservoir is possible through the 16 in. dia. blow-off pipe.

f. Failure Analysis. As discussed above, the dam would be overtopped by the routed test flood outflow. Also, a breach owing to structural failure of the dam by piping or sloughing is a possibility. A breach from overtopping was assumed with the water level at the top of dam, elevation 316.5, the lowest part of the right abutment closure dike. The "rule of thumb" criteria suggested in the NED March 1978 Guidance Report was used for the breach analysis. With a breach width of 40 percent of the dam length at mid-height or about 125 ft., an outflow of about 31,000 cfs would be realized (see Sheets D-17 thru D-21, Appendix D).

In the reaches below the dam, the outflow would first cross the Old Marlborough Turnpike, between the Turnpike's intersection with South Road and Cotton Hill Road, approximately 2,500 ft. downstream from the Dam. The flood stage at this point is about 14.5 ft., which is about 9.0 ft. higher than the brook's stage just prior to failure of the dam, and would inundate the roadway intersections and two adjacent dwellings on Cotton Hill Road. As the stream continues, paralleling the Old Marlborough Turnpike to the north, several additional dwellings would also become flooded.

At approximately 4,500 ft. downstream from the dam, the flood stage drops rapidly to about 8.5 ft., due to a widening of the stream bed. This stage is about 6 ft. higher than the brook's stage just prior to failure, high enough to cause significant damage to a small subdivision of homes located north of the stream off Thompson Hill Road.

Reservoir Brook then crosses under Thompson Hill Road and several homes immediately adjacent to the intersection of Thompson Hill Road and Old Marlborough Turnpike would also be affected. Though some flooding of this intersection can be expected, only minor flooding from this point downstream is anticipated.

In summary, a total of 16 dwellings and three roadway crossings would suffer significant damage, should a breach of this type occur (see Figure 5, Sheet D-22, Appendix D).

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation. The field investigations of the embankment revealed no significant displacement or distress which would warrant the preparation of slope stability computations based on assumed soil properties and engineering factors.

The dam appears to be in good condition, but deficiencies described under Section 7 should be corrected.

b. Design and Construction Data. No design or construction data regarding the original masonry dam was recovered. Plans for the 1963-64 reconstruction of the dam, prepared by Argraves Engineers, were reviewed. No plans or calculations of value to a stability assessment are available.

c. Operating Records. Operating records are maintained by Portland's Water Department. There are no operating records of any significance to structural stability.

d. Post-Construction Changes. No post-construction changes are known which would adversely affect the stability or integrity of the dam.

e. Seismic Stability. The dam is located in Seismic Zone No. 1, and in accordance with Phase I guidelines, does not warrant seismic analysis.

SECTION 7
ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. On the basis of the Phase I visual examination, Portland Reservoir Dam appears to be in good condition. The deficiencies revealed indicate that further investigations are required; the principal items of concern are the structural integrity of the right abutment closure dike and the seepage along the spillway's left downstream wingwall.

b. Adequacy of Information. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency. The recommendations and remedial measures enumerated below should be implemented by the owner within one year after receipt of this Phase I Inspection Report.

d. Need for Additional Investigations. Additional investigations are required as recommended in Para. 7.2.

7.2 Recommendations

It is recommended that the Town of Portland should retain the services of a competent registered professional engineer to make further investigations of the following , and should implement the results of his studies regarding:

(1) Whether the dam and dike embankment should be raised and leveled to the elevation of the spillway training walls.

(2) Whether an impervious blanket and riprap facing should be provided on the upstream face of the right abutment closure dike.

(3) The source of leakage at the joint between the spillway's left downstream wingwall and the left abutment.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

(1) Restore and redress riprap on the upstream face of the dike, particularly in the area to the right of the gate house.

(2) Redress riprap located on the downstream side of the dam near the outlet of the spillway.

(3) Repair the spalled panel on the left side of the downstream face of the spillway crest.

(4) Clear growth from the dam embankment on both sides of the spillway, and in the channel immediately below the spillway.

(5) Monitor flows from the left and right toe drains, and the collector drain outlet located about 200 ft. downstream of the dam.

(6) Restore heavily worn pathways on the embankment.

(7) Procedures for an annual periodic technical inspection of the dam and appurtenant works should be instituted.

(8) A formal surveillance and flood warning plan should be developed, including round-the-clock monitoring during heavy rainfall.

7.4 Alternatives

There appear to be no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Portland Reservoir Dam

DATE 24 April and 9 May 1979

TIME 2:00 PM

WEATHER April 24 - Clear & Warm
May 9 - Clear & Hot

W.S. ELEV. 312.6 U.S. ____ DN.S.

PARTY:

1. Peter B. Dyson
2. Pasquale E. Corsetti
3. Carl J. Hoffman
4. Roger F. Berry
5. James Reynolds
6. Joseph Seiserman
7. Edwin Marcum
8. ____
9. ____
10. ____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydrologic	Roger F. Berry	
2.	Hydraulics/Structures	Carl J. Hoffman	
3.	Soils and Geology	James Reynolds	
4.	General Features	Peter B. Dyson	
5.	General Features	Pasquale E. Corsetti	
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT Portland Reservoir Dam DATE 24 April and 9 May 1979

PROJECT FEATURE Earthfill Dam NAME

DISCIPLINE Soils/Geology NAME James Reynolds

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	317.0 left abutment 318.5 right abutment
Current Pool Elevation	312.6
Maximum Impoundment to Date	314.3±
Surface Cracks	None
Pavement Condition	Not applicable
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	Frequent
Sloughing or Erosion of Slopes or Abutments	Upstream face locally eroded through wave action.
Rock Slope Protection - Riprap Failures	See Note (1) - next page
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	Seepage around outlet of underdrain collector, 200 ft. downstream of dam
Piping or Boils	None
Foundation Drainage Features	See Note (2) - next page
Toe Drains	See Note (3) - next page
Instrumentation System	None

Dam Embankment Notes

(1) Riprap dislodged at downstream ends of both spillway wingwalls. Riprap not sufficient on upstream face, particularly near gate house.

(2) Popcorn drains beneath heel of spillway and spillway apron; functional collector outfalls 200 ft. downstream at 1-2 gpm.

(3) Toe drains functional at 0.5 gpm right, 0.1 gpm left. Surface drain outlets above right toe drain.

PERIODIC INSPECTION CHECKLIST

PROJECT Portland Reservoir Dam DATE 24 April and 9 May 1979

PROJECT FEATURE R. Abutment Closure Dike NAME

DISCIPLINE Soils/Geology NAME James Reynolds

AREA EVALUATED	CONDITIONS
DIKE EMBANKMENT	
Crest Elevation	Varies from 316.5 to 318.5
Current Pool Elevation	312.6
Maximum Impoundment to Date	314.3(±)
Surface Cracks	None
Pavement Condition	Not applicable
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	Frequent
Sloughing or Erosion of Slopes or Abutments	Yes, extensive erosion along upstream face
Rock Slope Protection - Riprap Failures	No longer evident
Unusual Movement or Cracking at or near Toes	None evident
Unusual Embankment or Downstream Seepage	None evident
Piping or Boils	None evident
Foundation Drainage Features	None evident
Toe Drains	None evident
Instrumentation System	None evident

PERIODIC INSPECTION CHECKLIST

PROJECT Portland Reservoir Dam DATE 24 April and 9 May 1979

PROJECT FEATURE Gate House NAME C. Hoffman

DISCIPLINE Structures NAME

AREA EVALUATED	CONDITIONS
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	Fair
Condition of Joints	Minor deterioration
Spalling	None
Visible Reinforcing	N/A
Rusting or Staning of Concrete	None
Any Seepage or Efflorescence	None
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	None Evident
Cracks	Minor
Rusting or Corrosion of Steel	N/A
b. Mechanical and Electrical	N/A
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lighting Protection System	
Emergency Power System	
Wiring and Lighting System in Gate Chamber	

PERIODIC INSPECTION CHECKLIST

PROJECT Portland Reservoir Dam DATE 24 April and 9 May 1979

PROJECT FEATURE Outlet Works NAME James Reynolds

DISCIPLINE Structures/Hydraulics/Soils NAME Carl Hoffman

AREA EVALUATED	CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	N/A
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	Wet well and gate house
Condition of Concrete	Brick structure - fair
Stop Logs and Slots	None

PERIODIC INSPECTION CHECKLIST

PROJECT Portland Reservoir Dam DATE 24 April and 9 May 1979

PROJECT FEATURE Outlet Channel NAME

DISCIPLINE Hydraulics/Structures NAME Carl Hoffman

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	Outlet Channel is a natural channel
Rust or Staining	Not applicable
Spalling	Not applicable
Erosion or Cavitation	Not applicable
Visible Reinforcing	Not applicable
Any Seepage or Efflorescence	Not applicable
Condition at Joints	Not applicable
Drain Holes	None
Channel	
Loose Rock or Trees Overhanging Channel	Some trees
Condition of Discharge Channel	Growth in channel

PERIODIC INSPECTION CHECKLIST

PROJECT Portland Reservoir Dam DATE 24 April and 9 May 1979

PROJECT FEATURE Spillway NAME

DISCIPLINE Structures NAME Carl Hoffman

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	None
General Condition	Not applicable
Loose Rock Overhanging Channel	Not applicable
Trees Overhanging Channel	Not applicable
Floor of Approach Channel	Not applicable
b. Weir and Training Walls	
General Condition of Concrete	Fair to Good
Rust or Staining	Minor
Spalling	Some spalling on top panel, left side of spillway.
Any Visible Reinforcing	No
Any Seepage or Efflorescence	Yes. Leaking joint at left downstream wingwall.
Drain Holes	Yes
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	No
Trees Overhanging Channel	Some
Floor of Channel	Light growth in floor of channel
Other Obstructions	None

PERIODIC INSPECTION CHECKLIST

PROJECT Portland Reservoir Dam DATE 24 April and 9 May 1979

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
Outlet Works-Transition and Conduit	N/A
Outlet Works-Service Bridge	N/A

APPENDIX B

ENGINEERING DATA

STATE OF CONNECTICUT

WATER RESOURCES COMMISSION

STATE OFFICE BUILDING · HARTFORD 15, CONNECTICUT

CERTIFICATE OF APPROVAL

November 19, 1964

3

Portland Connecticut Water Works
Town Hall
Portland, Connecticut

TOWN: Portland
RIVER: Reservoir Brook
TRIBUTARY:
CODE NO.: C 31.5 R 2.0

Gentlemen:

NAME AND LOCATION OF STRUCTURE: Portland Water Works Dam located south of Old Marlborough Turnpike in the Town of Portland.

DESCRIPTION OF STRUCTURE AND WORK PERFORMED: Construction of dam at an existing site on Reservoir Brook in accordance with plans prepared by Argraves Engineers dated May 6, 1963.

CONSTRUCTION PERMIT ISSUED UNDER DATE OF: August 26, 1963

This certifies that the work and construction included in the plans submitted, for the structure described above, has been completed to the satisfaction of this Commission and that this structure is hereby approved in accordance with Section 25-114 of the 1958 Revision of the General Statutes.

The owner is required by law to record this Certificate in the land records of the town or towns in which the structure is located.

WATER RESOURCES COMMISSION

BY: _____
William S. Wise, Director

JOHN J. MOZZOCHI AND ASSOCIATES
CIVIL ENGINEERS

GLASTONBURY, CONN.
217 HEBRON AVENUE
PHONE 633-9401

PROVIDENCE 3, R. I.
200 DYER STREET
PHONE GAspee 1-0420

JOHN J. MOZZOCHI
ASSOCIATES
OWEN J. WHITE
JOHN LUCHS, JR.
ECTOR L. GIOVANNINI

November 2, 1964

REPLY TO: Glastonbury

William P. Sander-Engineer-Geologist
Water Resources Commission
State Office Building
Hartford 15, Connecticut

Re: Our File 57-73-58
Portland Reservoir Dam
Portland, Connecticut

Dear Mr. Sander:

The referenced dam has been under construction since March, 1964. At the request of Newman Argraves, Consulting Engineer for the Portland Water Company, I made a final inspection of the project on October 30, 1964. I had made three previous inspection visits to this project while it was under construction and can certify that it was built in substantial comformity to the plans.

I recommend that a Final Permit be issued for this project.

Very truly yours,

John J. Mozzochi and Associates
Civil Engineers

JJM:hk

BOARD OF SELECTMEN

TOWN OF PORTLAND

P. O. BOX 71

PORTLAND, CONN.

July 17, 1963

Mr. William S. Wise
Water Resources Commission
State Office Building
Hartford, Connecticut

Dear Mr. Wise:

I am enclosing 2 copies of Application For Construction Permit For Dam, for the Portland Connecticut Water Works.

Under separate coverage, I am forwarding to your attention 2 sets of plans and specifications on the dam, for your inspection and approval.

If there is anything further needed, please do not hesitate to notify me. I would appreciate your advising me of the results as soon as possible.

Thanking you, I am

Very truly yours,

John V. Anderson
First Selectman

JVA:S

July 23, 1963

Mr. John J. Mozzochi
Consulting Engineer
217 Hebron Avenue
Glastonbury, Connecticut

Dear Mr. Mozzochi:

Under the terms of your contract as consultant to this Commission, would you please review the enclosed plans for the proposed Portland Water Works Dam and notify this office of your recommendations as to whether a construction permit should be issued or not.

Very truly yours,

William P. Sander
Engineer - Geologist

WPS:dlp
enc.

FORM D-4

STATE OF CONNECTICUT
WATER RESOURCES COMMISSION
State Office Building,
Hartford, Connecticut

COMMISSION
RECEIVED
JUL 10 1963
ANSWERED
REFERRED
FILED

APPLICATION FOR CONSTRUCTION PERMIT FOR DAM

Owner PORTLAND CONNECTICUT WATER WORKS Date July 9, 1963

P.O. Address Town Hall Portland, Connecticut

Tel. No. DI 2-2880

Location of Structure:

Town Portland, Conn. Shown on USGS Quadrangle Middle Haddam

Name of Stream Reservoir Brook at 1 1½ inches south of Lat. 41-37'-30"
north
and 7 inches east of Long. 72-37'-30"
west

Directions for reaching site from nearest village or route intersection:
(see sketch on reverse side) Dirrections below are from Portland, Conn.

Take Route 17 North about 3 miles to Fogelmarks Corners thence follow Old Marlbourgh Turnpike 2.2 Miles to the site.

This is an application for: (New Construction) (Alteration) (Repair) (Removal)
(check one or more of above)

This pond is to be used for: Water Supply Reservoir

Dimensions of Pond: width 1000' length 2300' area 40± Acres

Maximum depth of water immediately above dam: 27'

Total length of dam: 850' ±

Length of spillway: 94'

Height of abutments above spillway: 6½'

Type of spillway construction: Concrete

Type of dike construction: Earth Embankment

Spillway section will be set on: (Bedrock) (Gravel) (Clay) (Till)
(check one of above)

Remarks:

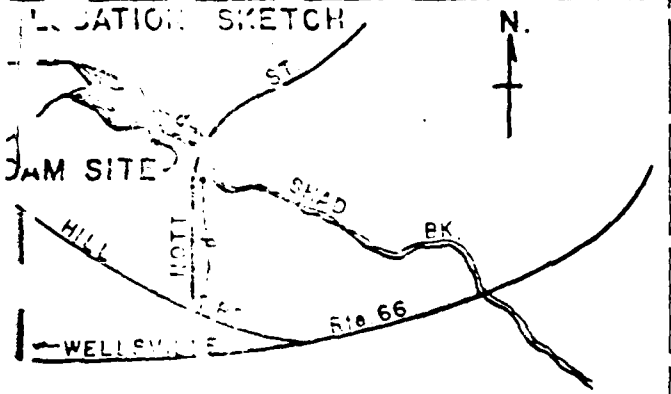
Signed: John V. Anderson
(owner)

Name of Engineer, if any ARGRAVES ENGINEERS

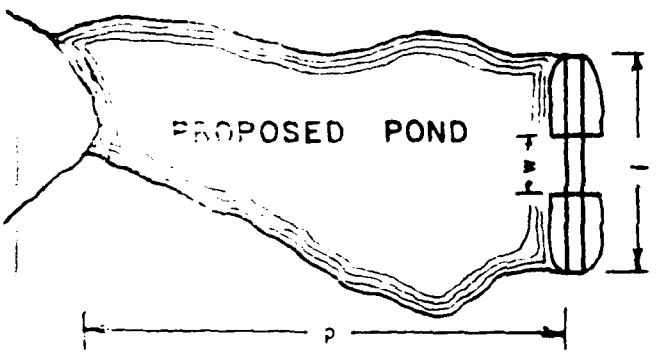
Note: Show details of

SAMPLE DATA

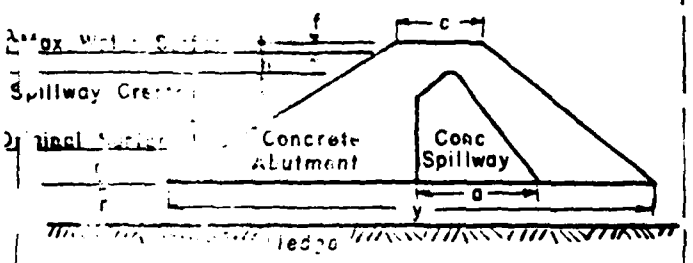
LOCATION SKETCH



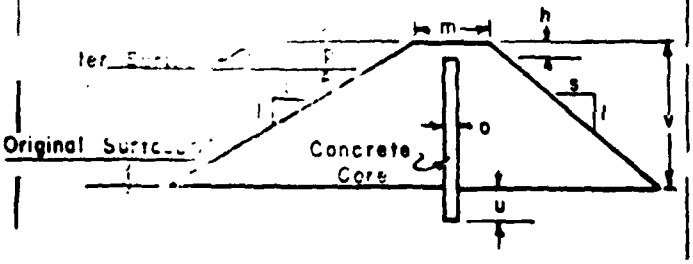
SITE PLAN



SPILLWAY SECTION



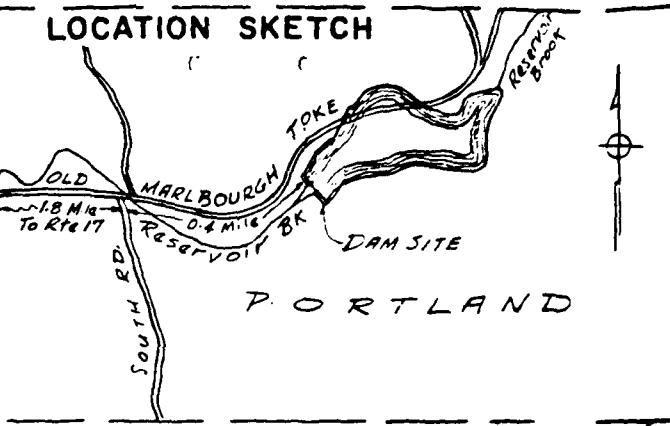
DIKE SECTION



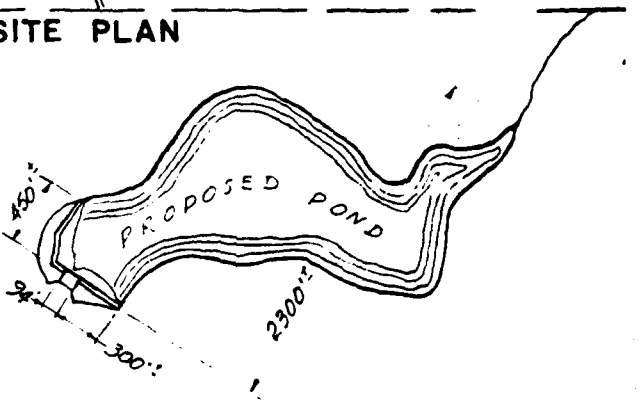
APPLICANT'S DATA

Show only features of sample which are applicable and dimensions which reflect your intent.

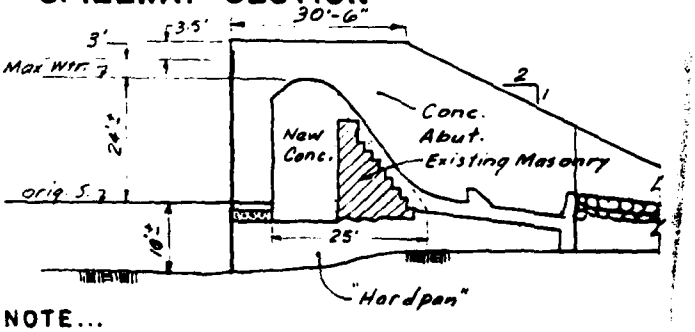
LOCATION SKETCH



SITE PLAN

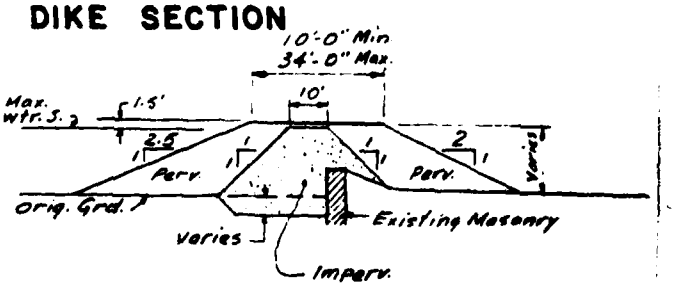


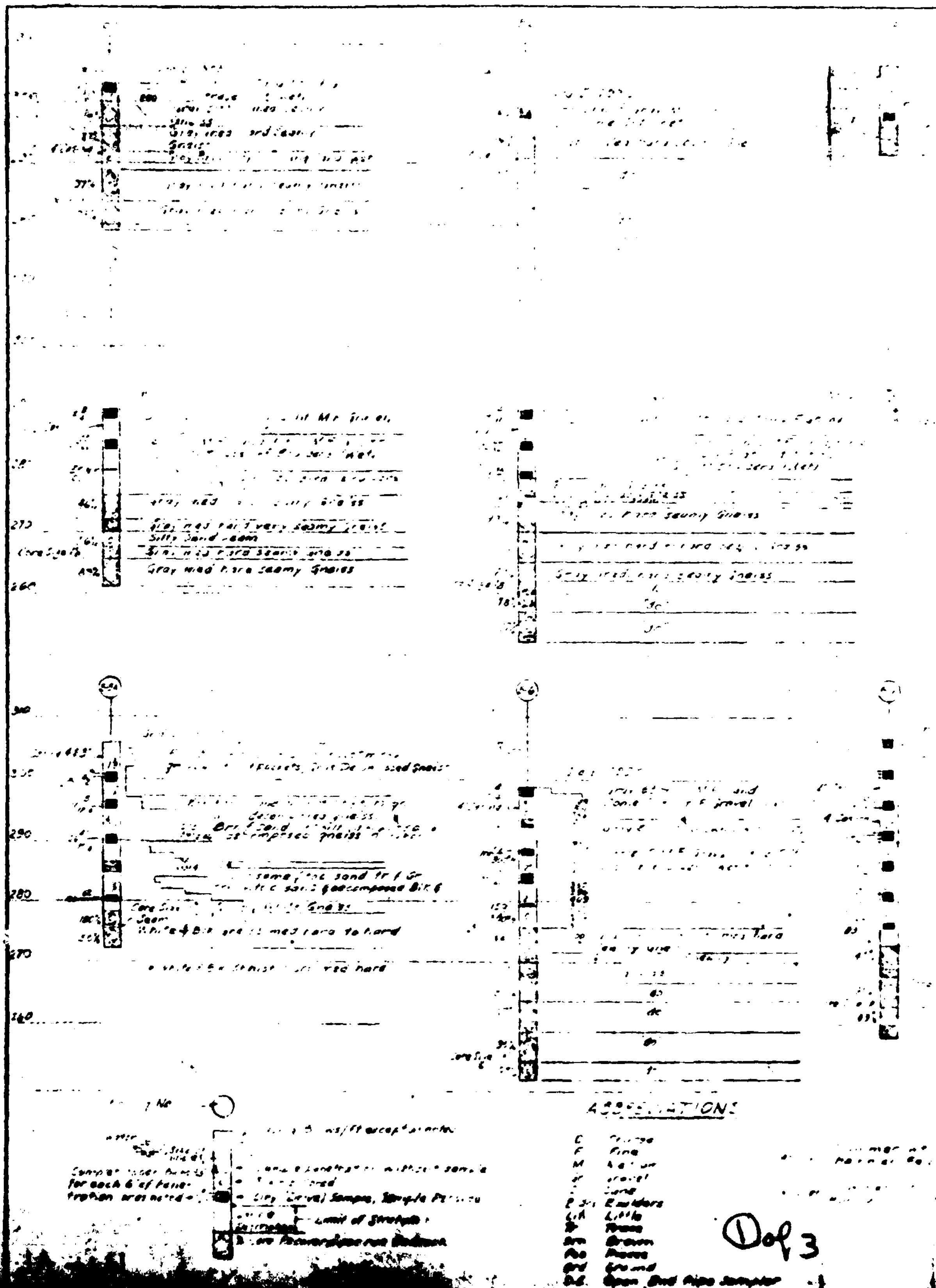
SPILLWAY SECTION



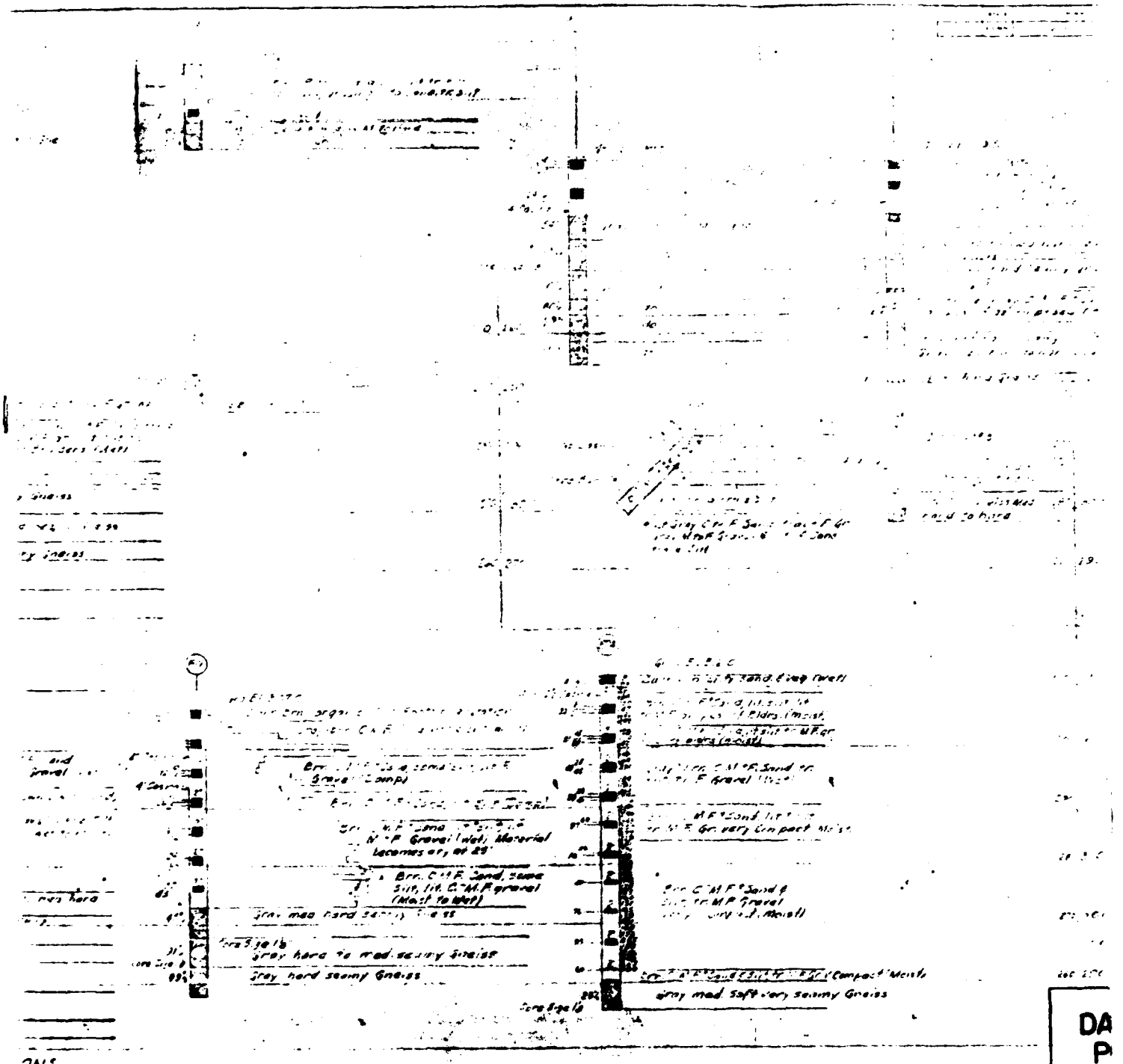
NOTE...
If there are two methods of discharge **Show Both**

DIKE SECTION





Gray med fair very seamy Gneiss
Silty Sand Loam
Gray med hard seamy Gneiss
270
260
300
290
280
White & Blk Gneiss med hard to hard
Limit of Strata
ABBREVIATIONS
C Coarse
F Fine
B Boulders
Lit Little
Tr Trace
Brn Brown
Pcs Pieces
Grd Ground
O.E. Open End Pipe Sampler
1 of 3



NOTES

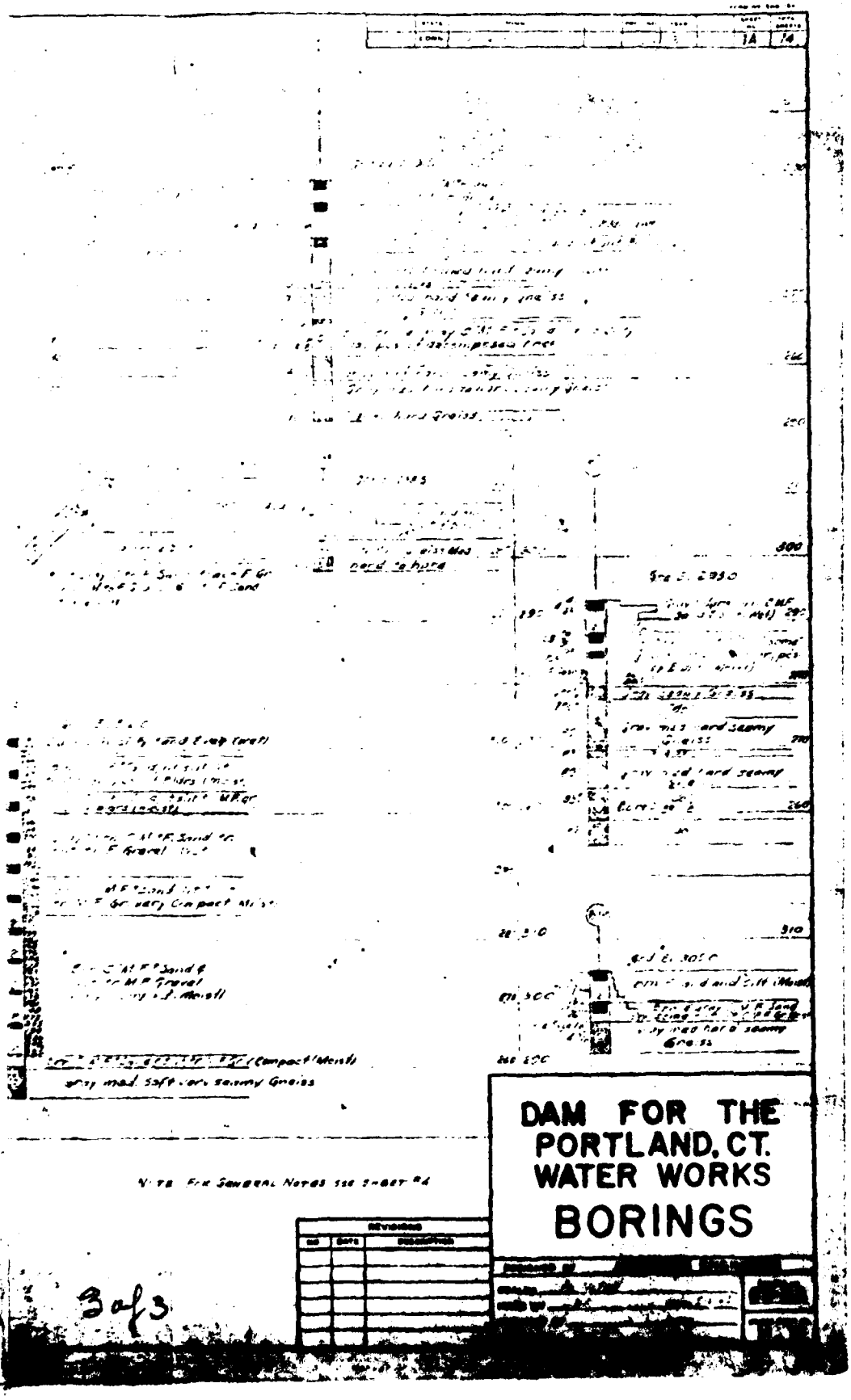
NOTE: FOR GENERAL NOTES SEE SHEET #4

Hammer wt. = 300#
Hammer Fall = 24"

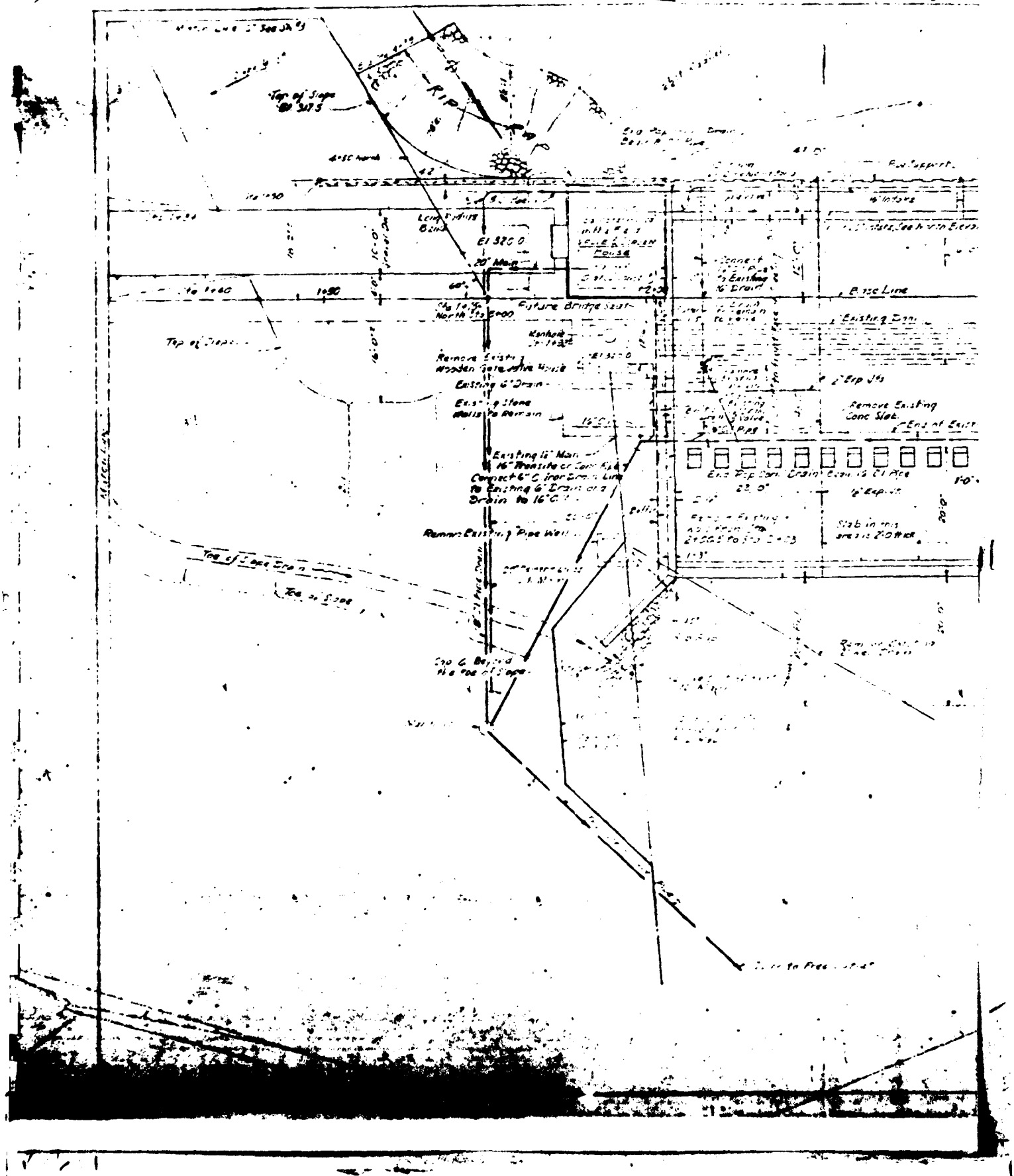
Hammer wt. = 140#
Hammer Fall = 30"

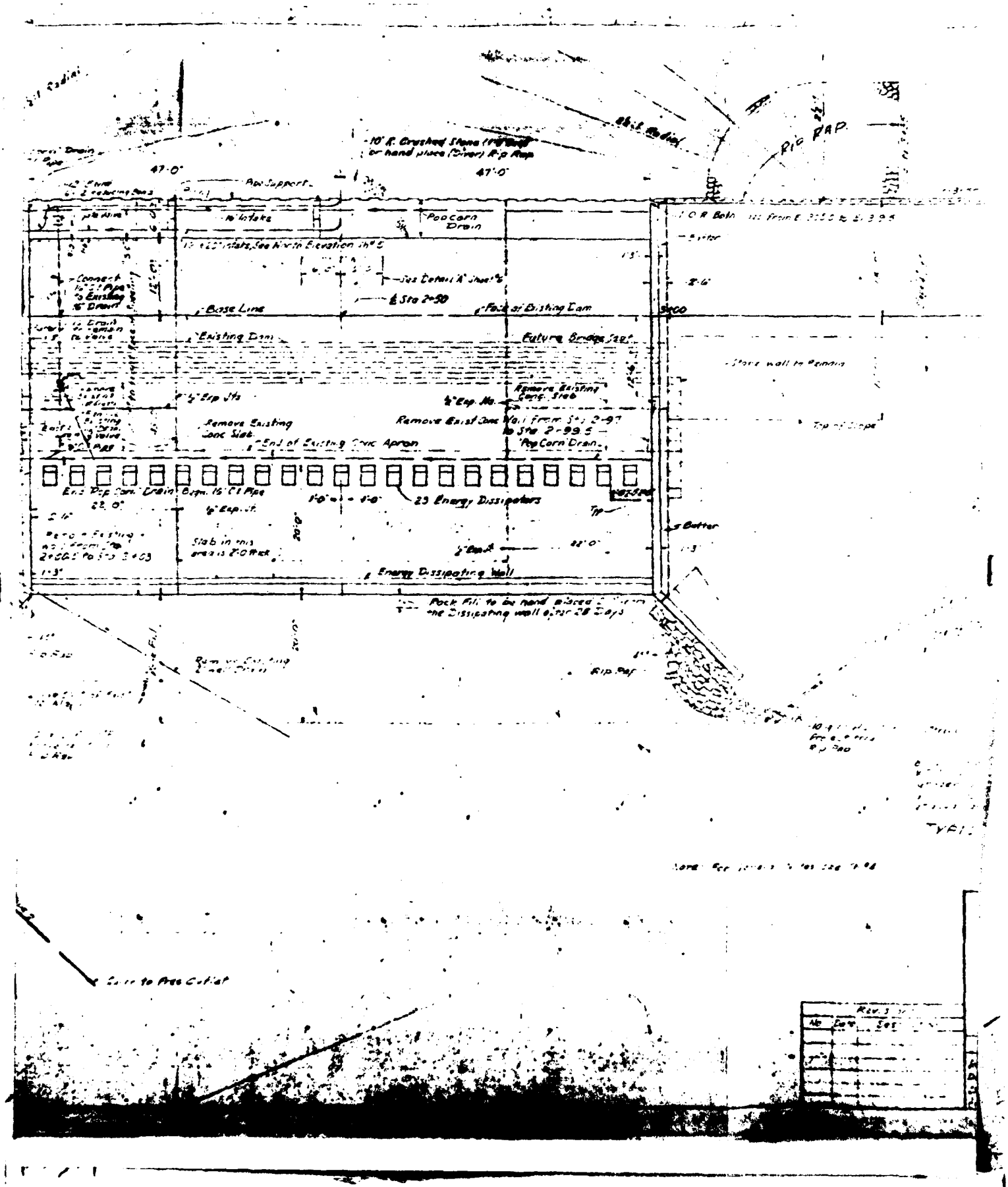
REVISIONS		
NO	DATE	DESCRIPTION

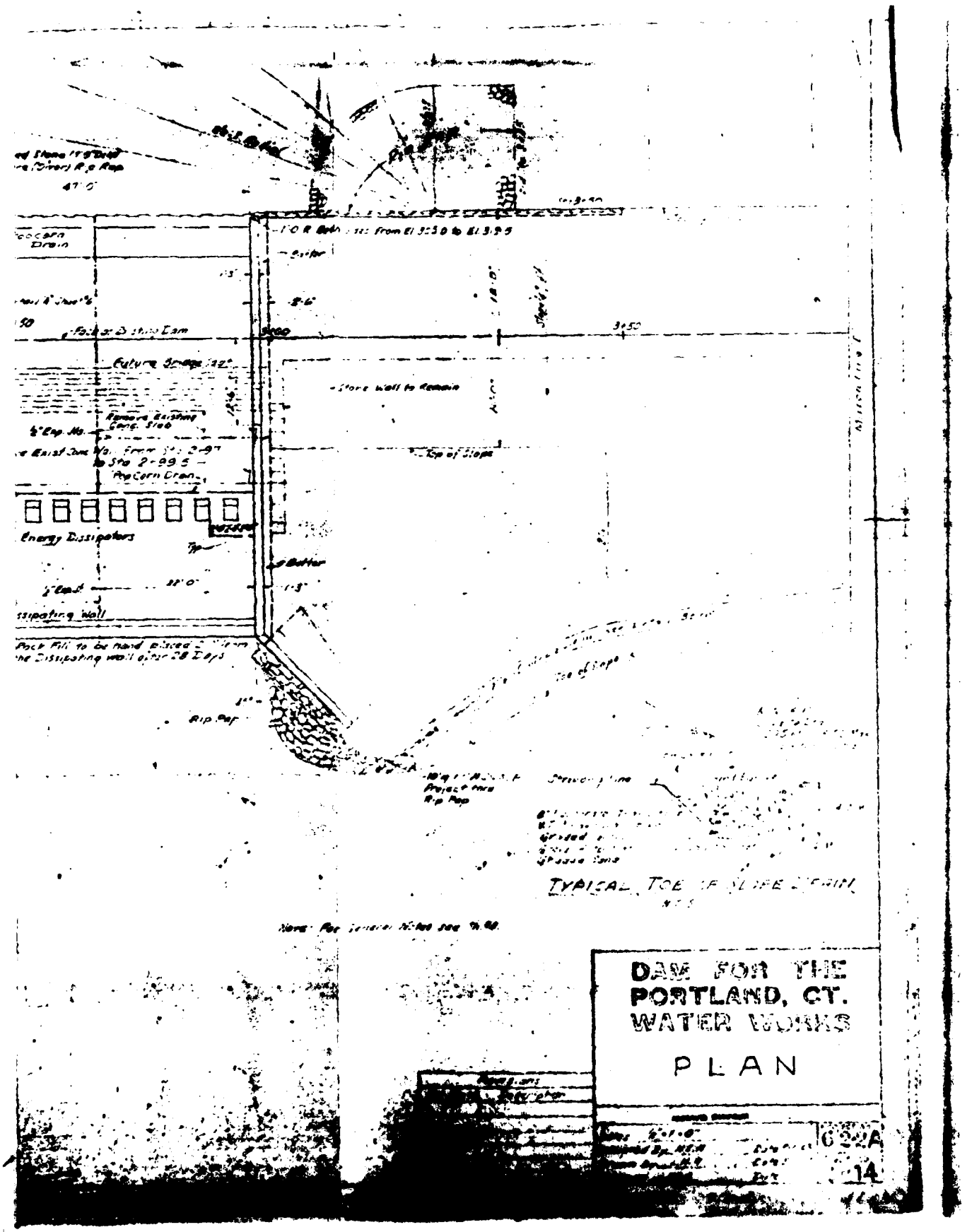
DESIGNED
SCALED
MADE BY
CHECKED
APPROVED

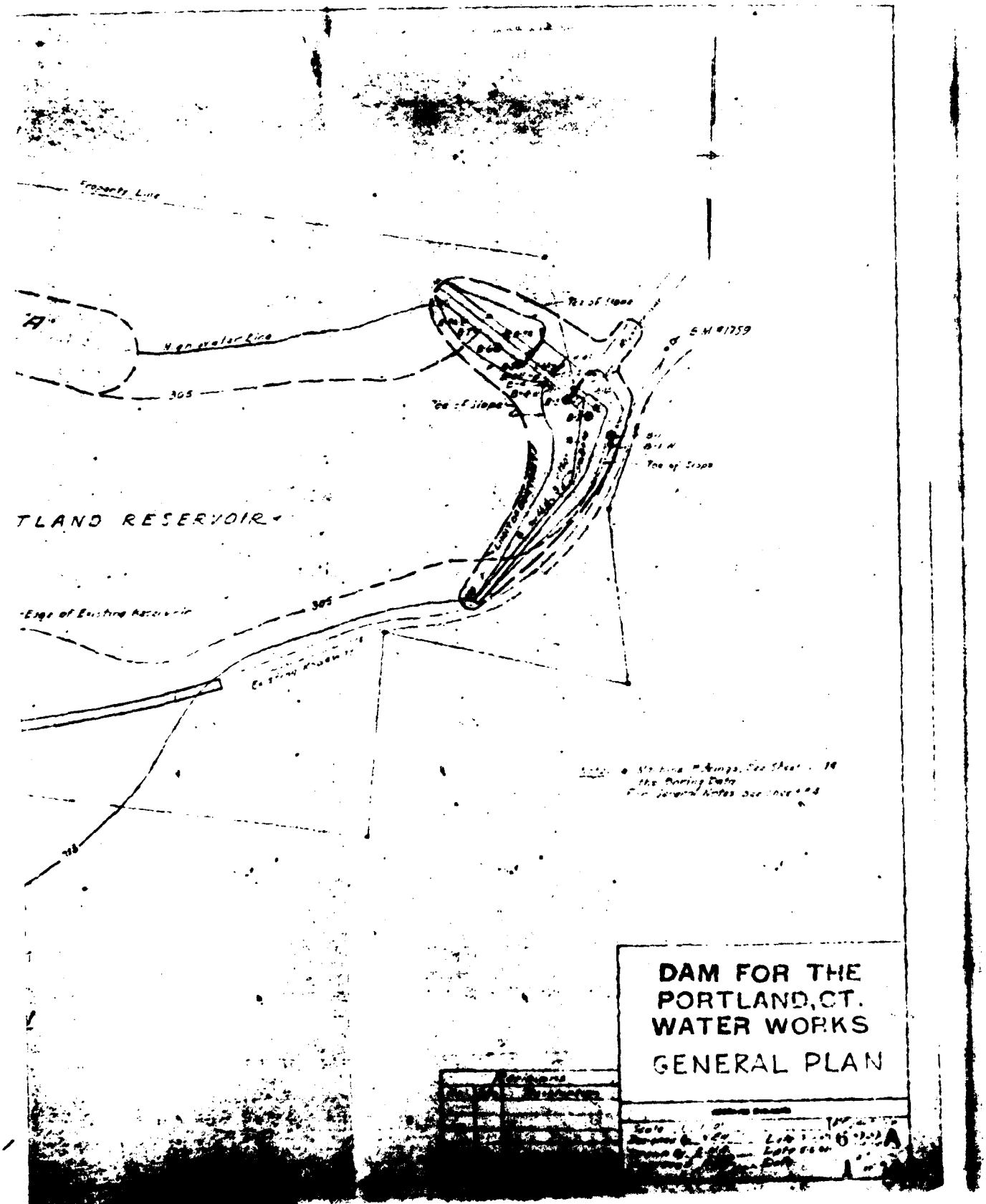


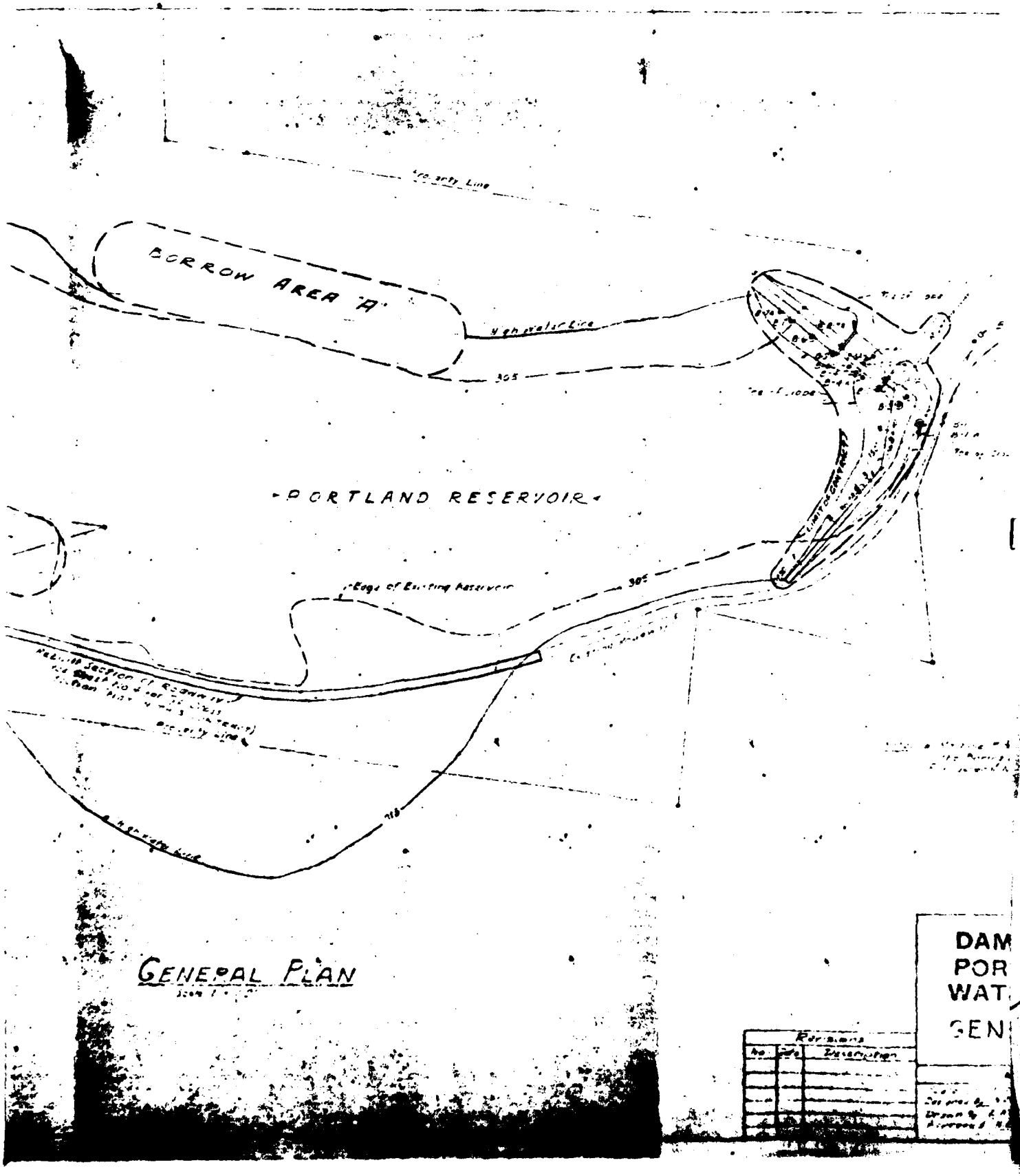
3 of 3

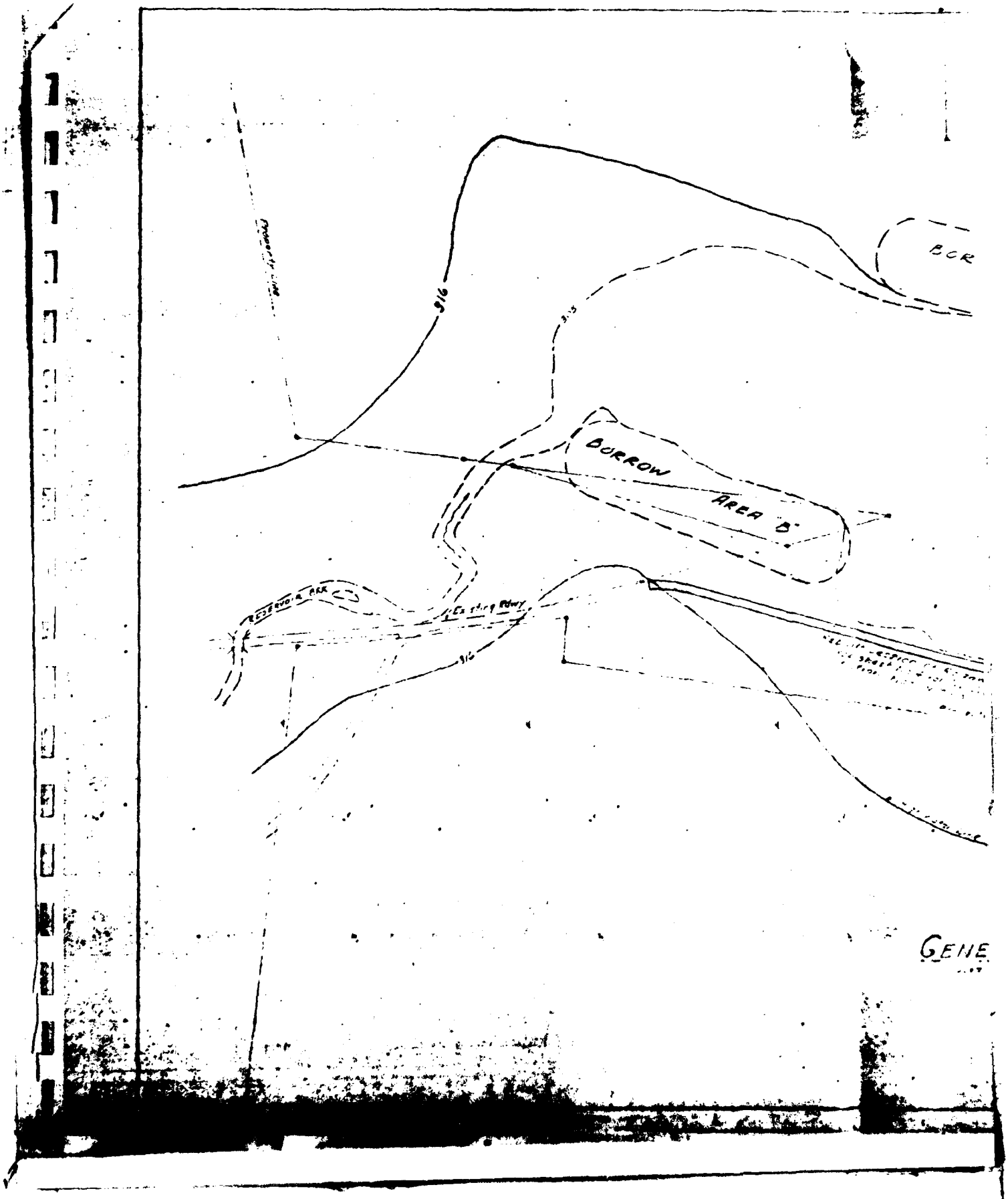

Top of Slope
El 320.0
20" Main
Future Bridge Seat
Existing Dam
Base Line
Remove Existing
Wooden Retaining Wall
Existing 6" Drain
Existing Stone
Walls to Remain
Remove Existing
Conc Slab
Existing 12" Main
16" Manhole or Conc Pipe
Connect 6" C.I. Iron Drain Line
to Existing 6" Drain and
Drain to 16" C.
Remove Existing Pipe Wall
Top of Slope
Top of Slope
Top of Slope
Slab in this
area is 20" thick

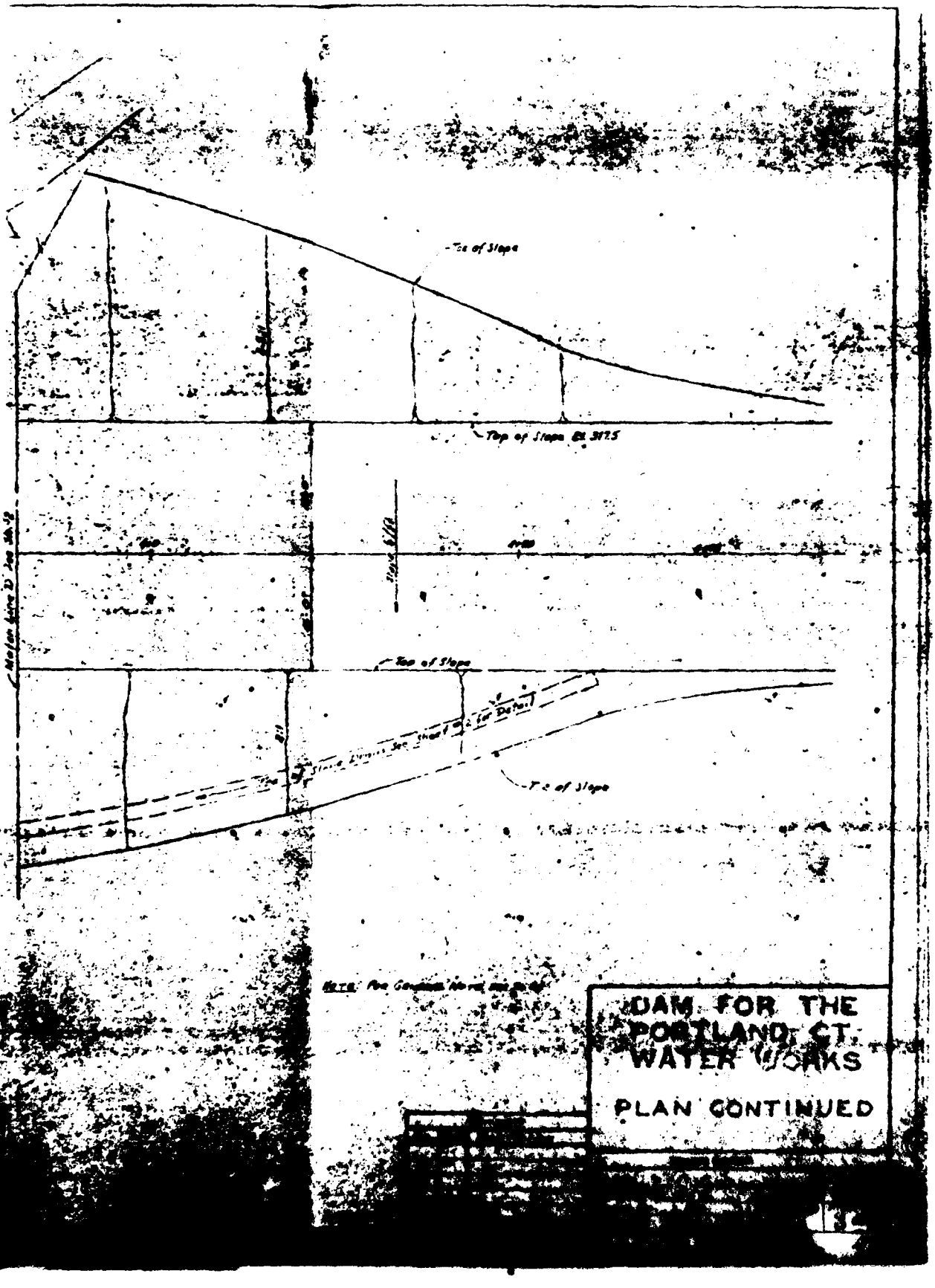

Rip Rap
47'-0"
Pier Support
Pop Corn Drain
Base Line
Face of Existing Dam
Existing Dam
Future Bridge Seat
Remove Existing Conc. Slab
End of Existing Conc. Apron
23 Energy Dissipators
Energy Dissipating Wall
Rip Rap
Top of Slope
Top of Batter

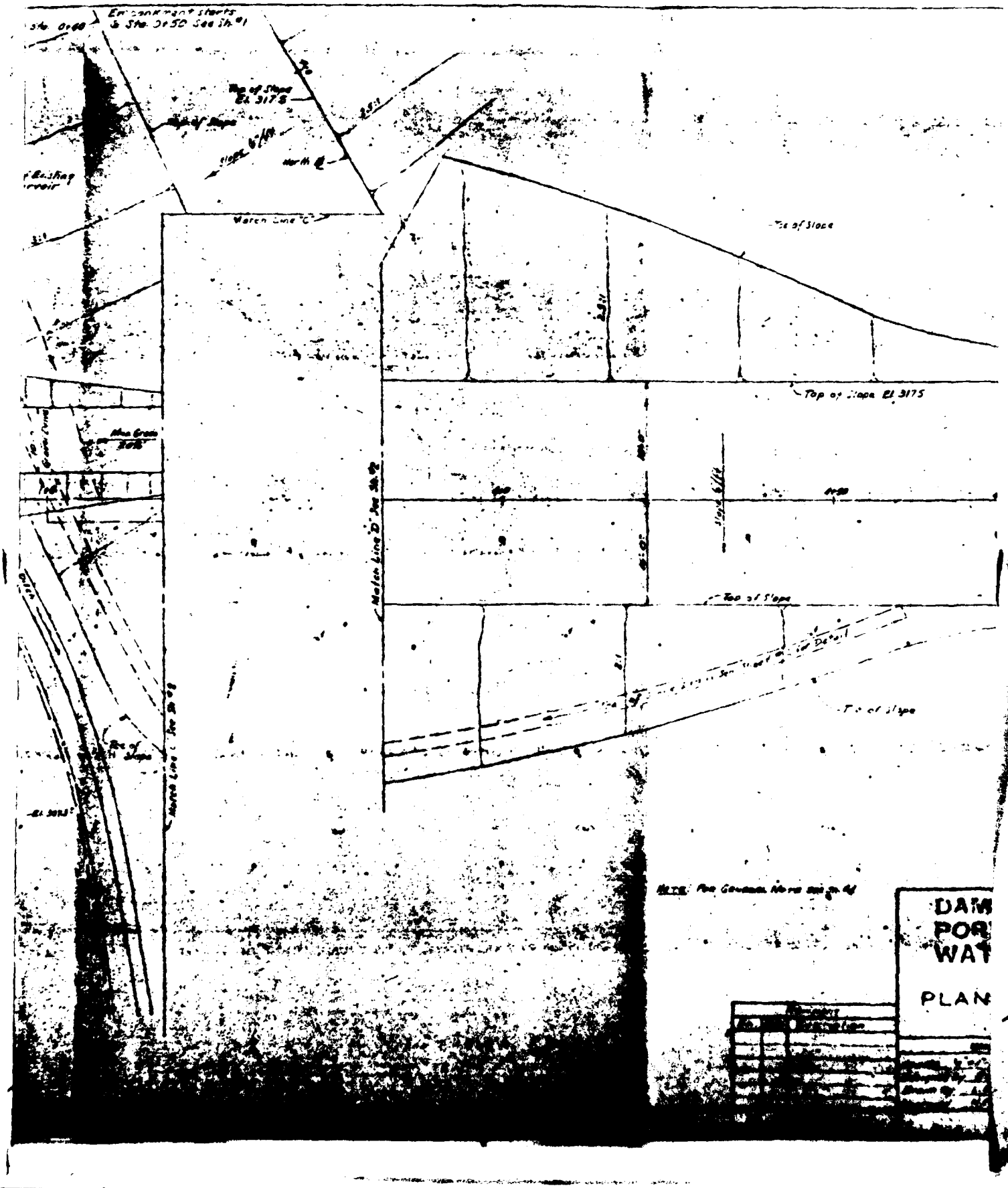

Energy Dissipators
Rip Rap
TYPICAL TOE OF SLOPE DRAIN
DAM FOR THE
PORTLAND, CT.
WATER WORKS
PLAN
14

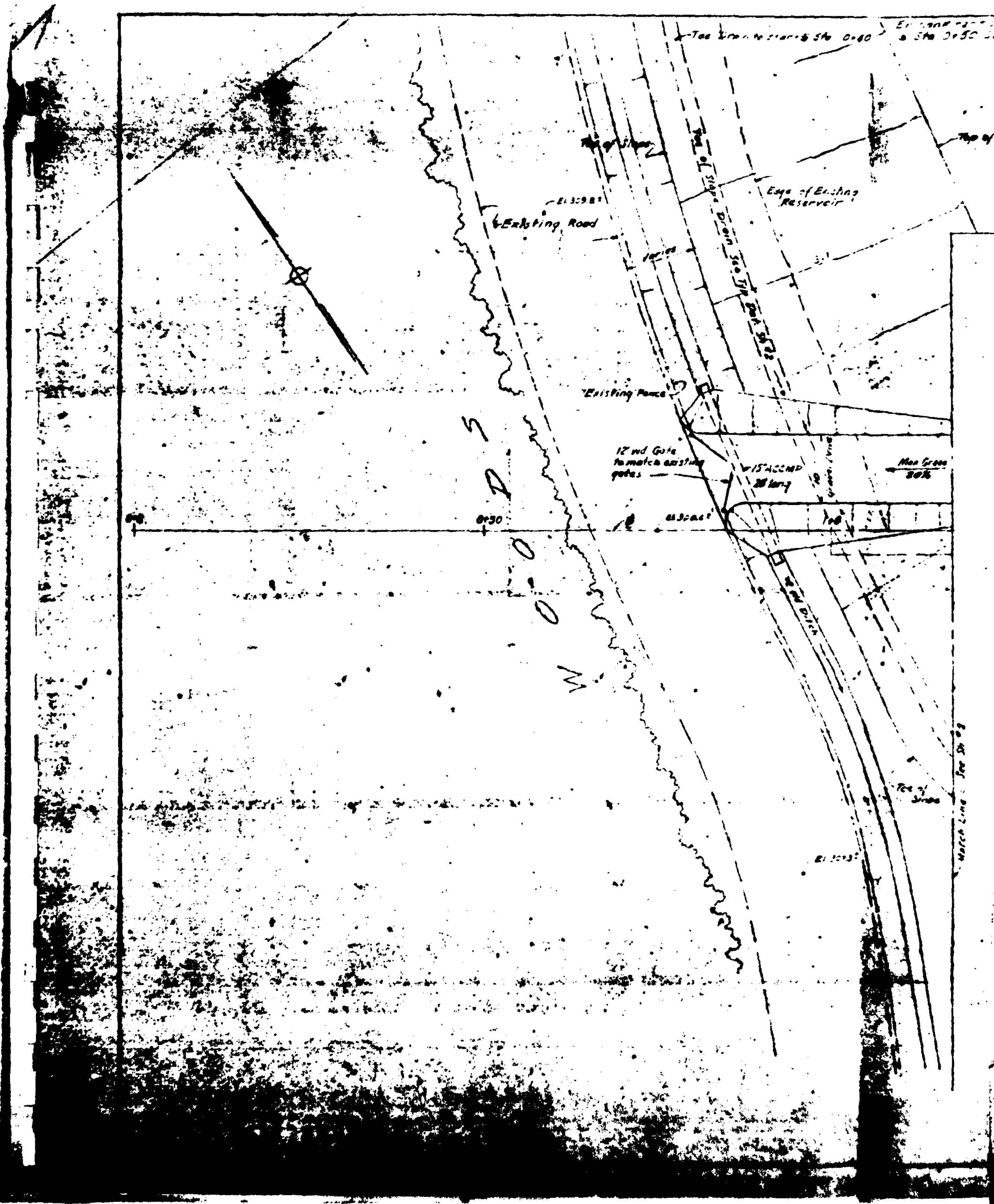

Property Line
High Water Line
305
Top of Slope
Top of Slope
TLAND RESERVOIR
Edge of Existing Reservoir
305
DAM FOR THE
PORTLAND, CT.
WATER WORKS
GENERAL PLAN

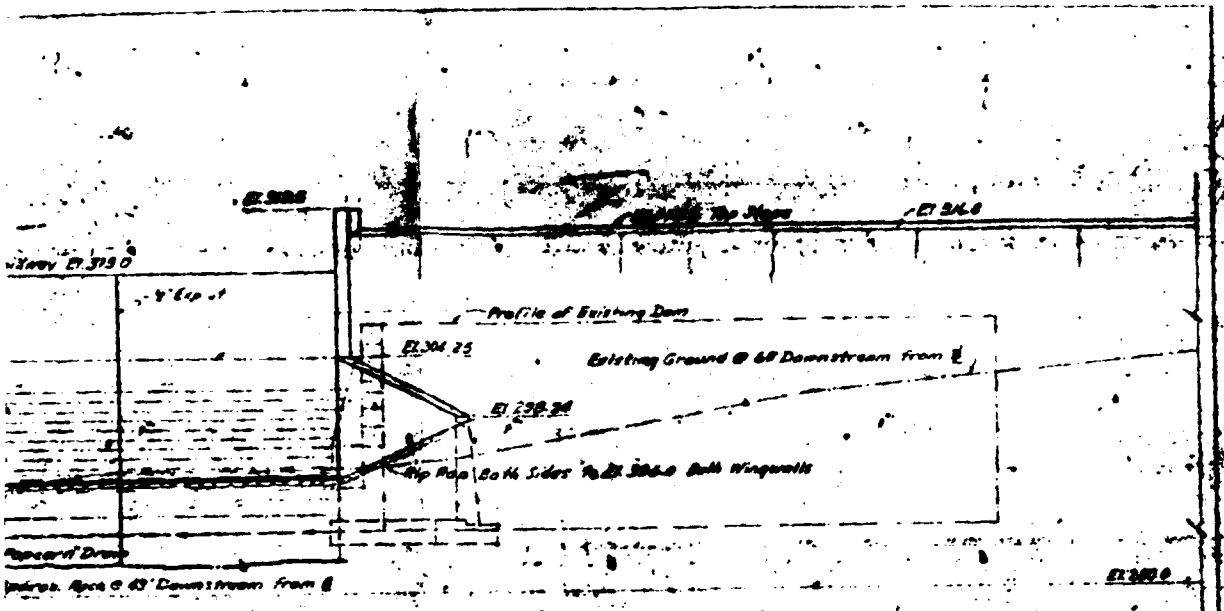

BORROW AREA "A"
PORTLAND RESERVOIR
Edge of Existing Reservoir
GENERAL PLAN
DAM
POR
WAT
GEN


BCR
BORROW
AREA B
GENE

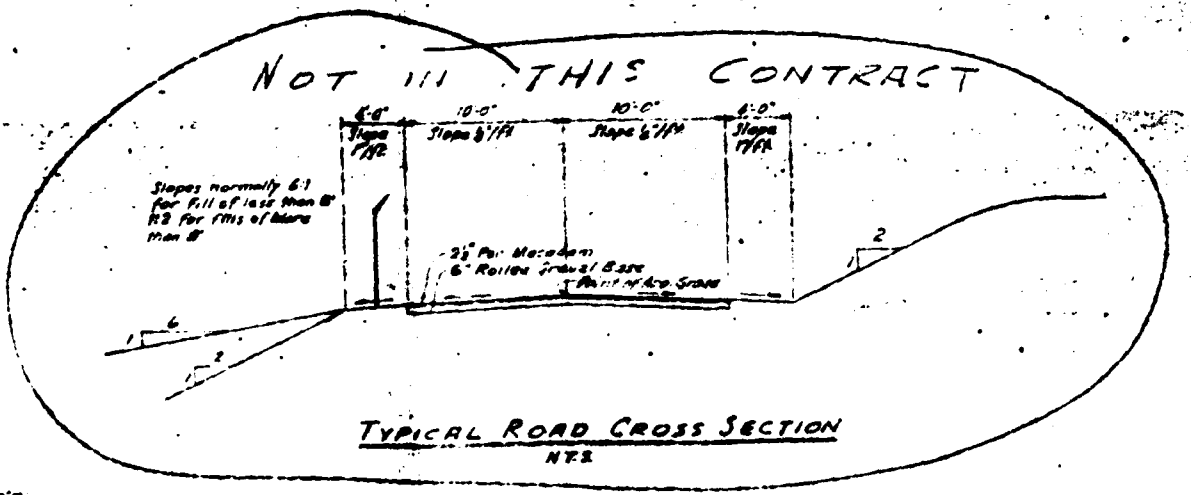

Toe of Slope
Top of Slope El. 317.5
Toe of Slope
Toe of Slope
DAM FOR THE
PORTLAND CT.
WATER WORKS
PLAN CONTINUED


Top of Slope
Top of Slope El. 3175
Top of Slope
Top of Slope
DAM
POR
WAT
PLAN

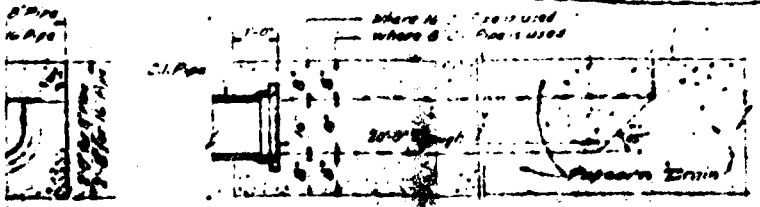

Existing Road
Edge of Existing Reservoir
Existing Fence
12' wd Gate to match existing gates
15" ACCMP 28' long
Max Grade 30%
0+30
Toe of Slope



NOT IN THIS CONTRACT



TYPICAL ROAD CROSS SECTION
N.T.S.

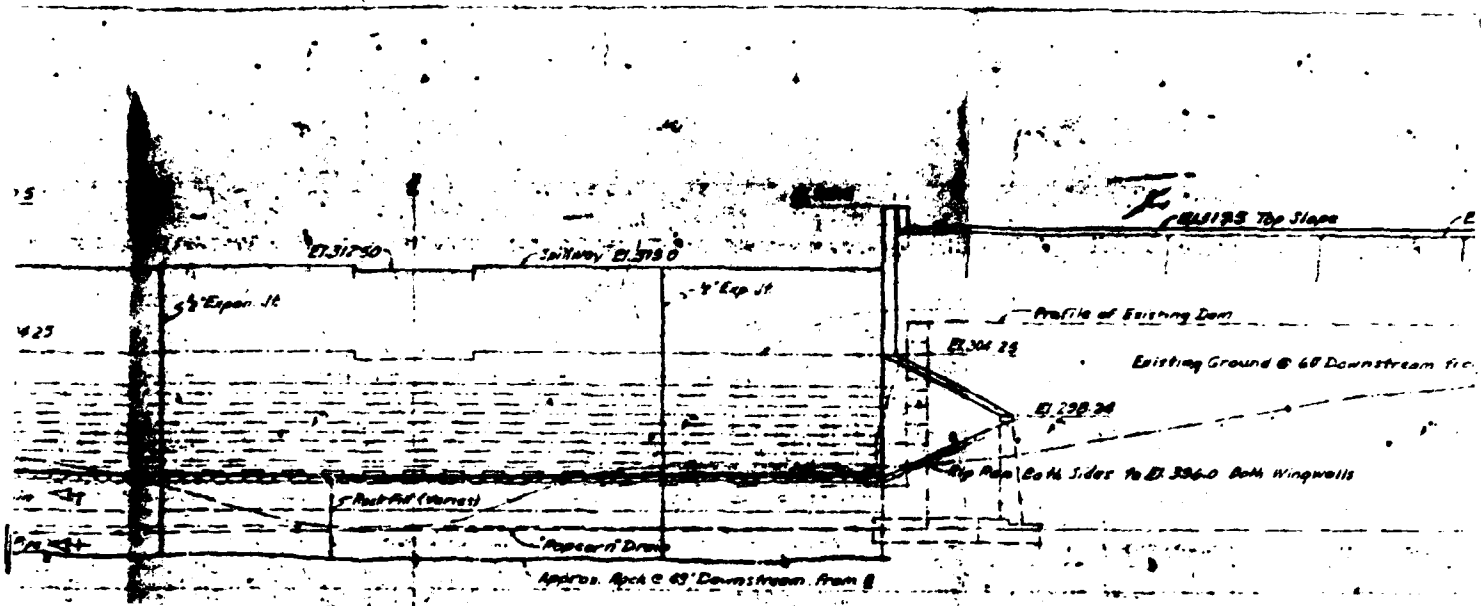


VIEW

SECTION 'P-P'
N.T.S.

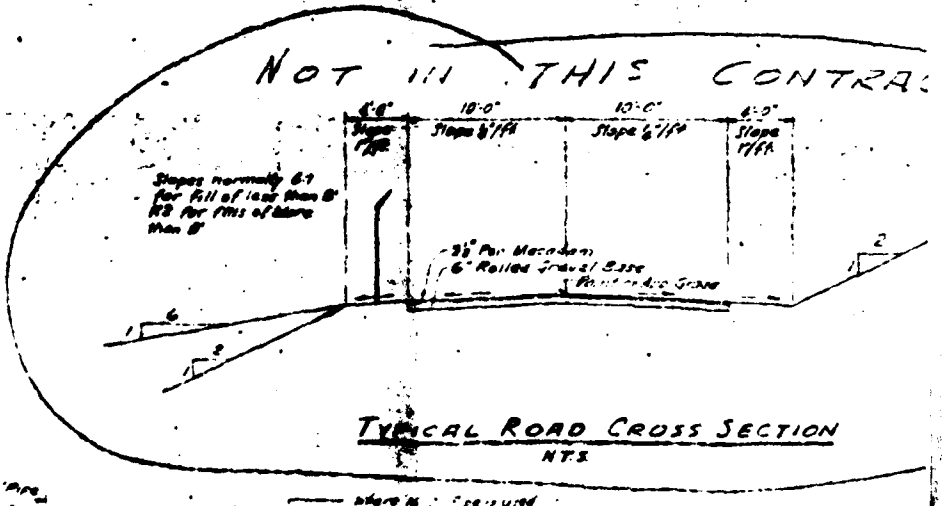
DAM FOR THE PORTLAND, CT. WATER WORKS

S. ELEVATION & GENERAL NOTES

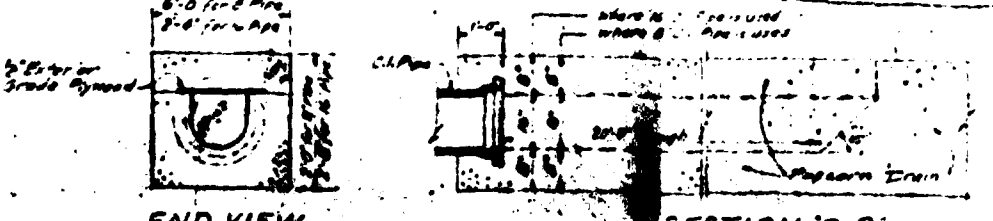


SOUTH ELEVATION
Scale ½"=1'-0"

NOT IN THIS CONTRA



TYPICAL ROAD CROSS SECTION
N.T.S.



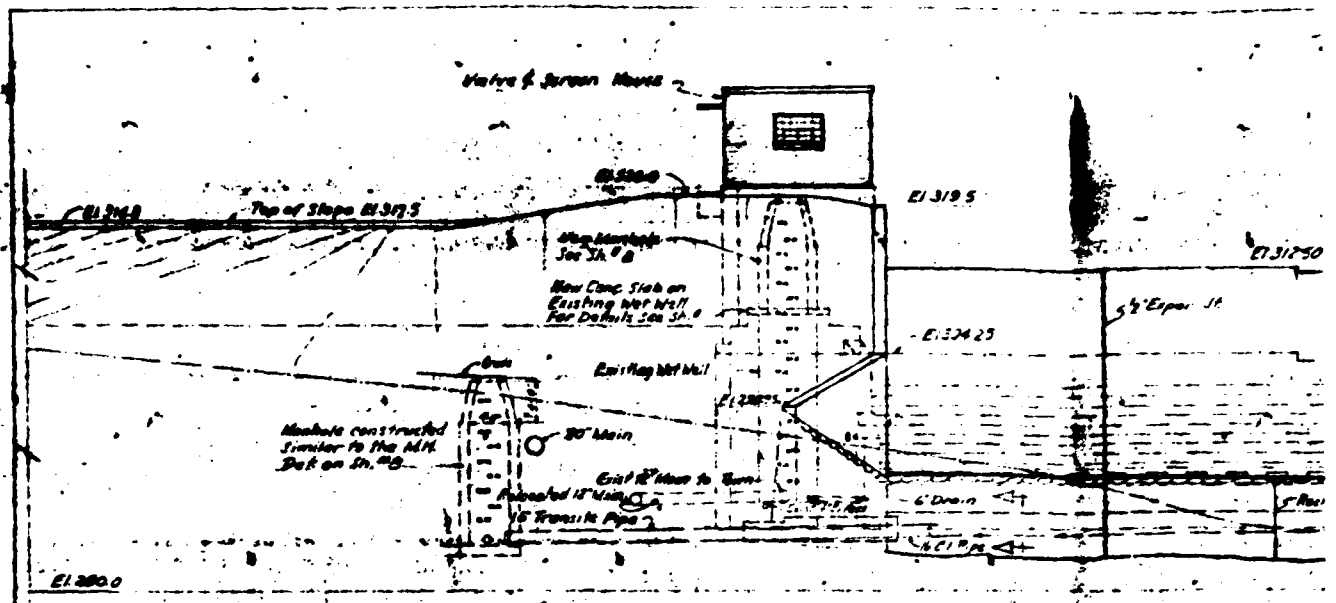
END VIEW
N.T.S.

SECTION 'P-P'
N.T.S.

Revisions

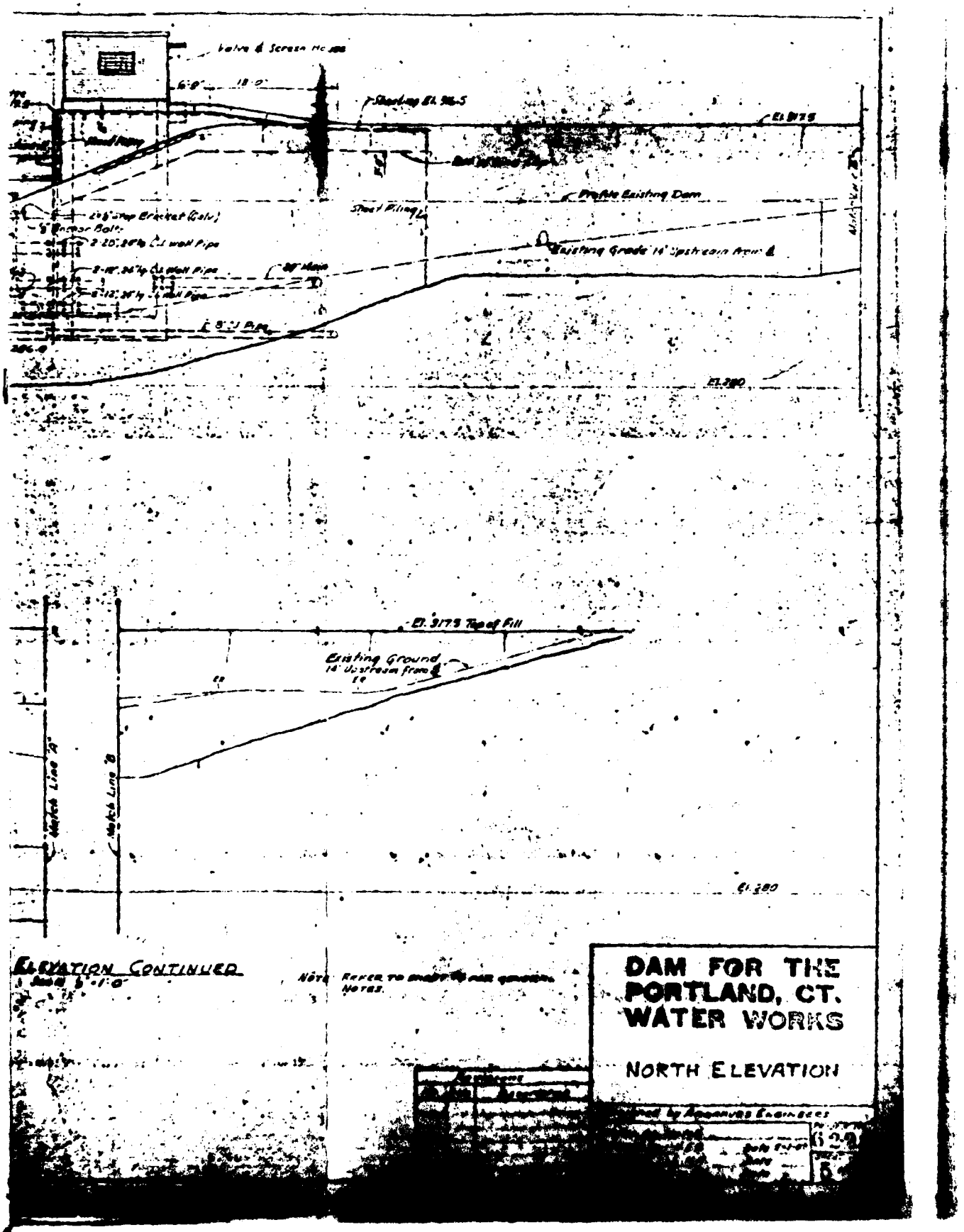
DA
PO
WA
S. E
GE

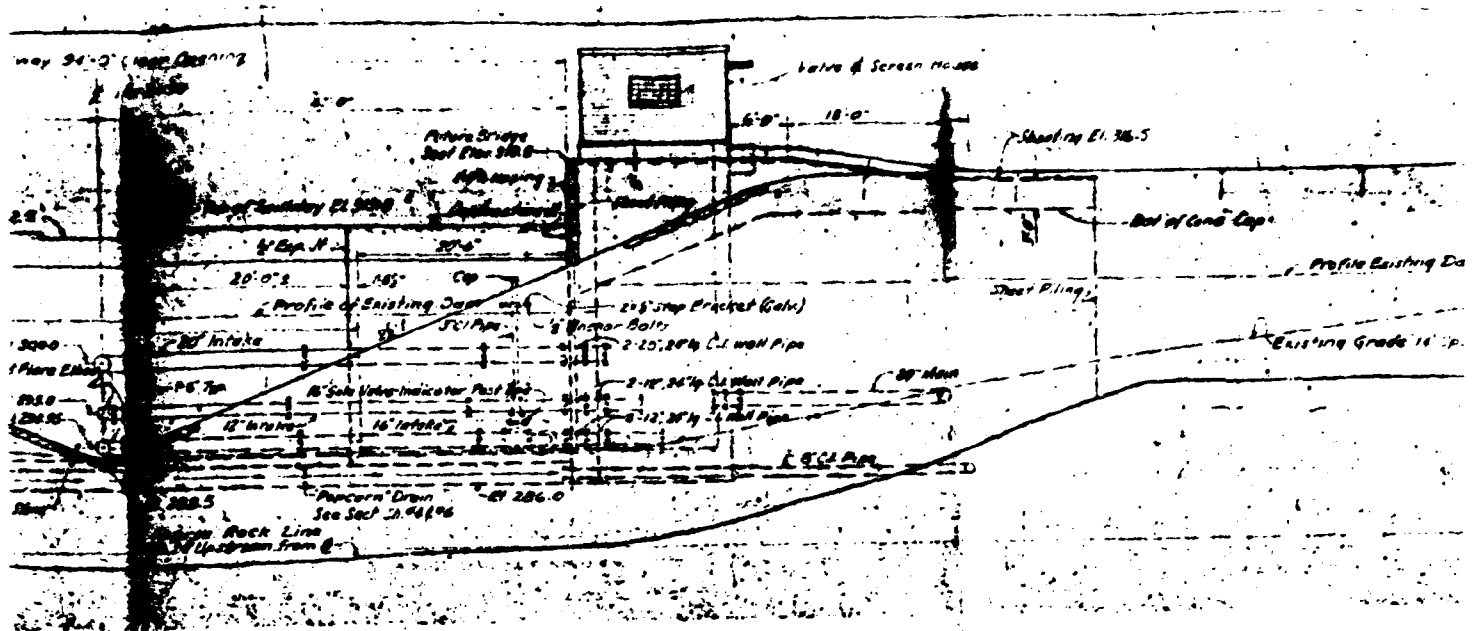
Scale
Designed By
Drawn By
Approved



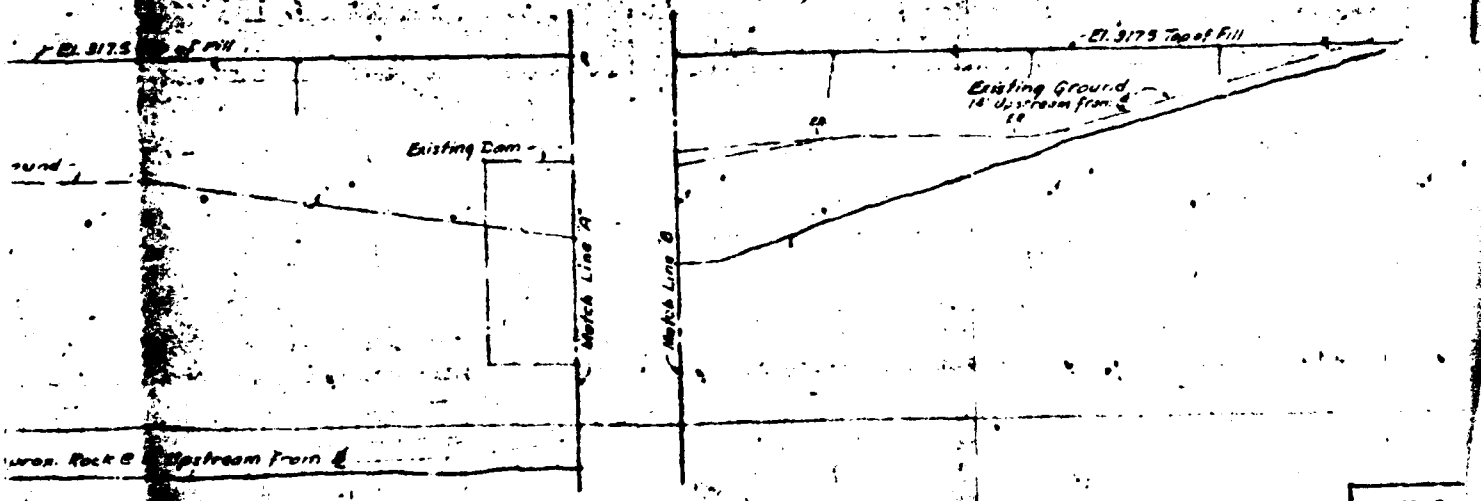
GENERAL NOTES

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH PLANS AND SPECIFICATIONS ENTITLED "DAM FOR THE PORTLAND, CT. WATER WORKS BY RICHARDS ENGINEERS DATED 7-15-63
2. BENCH MARK TO BE USED IS SHOWN ON SHEET NO 1, B.M. #1359 ELEV. 324.30.
3. ALL FOOTINGS AND FOUNDATION SHALL BE CARRIED DEEPER THAN SHOWN IF NECESSARY TO BE ON FIRM UNDISTURBED SOIL HAVING A SAFE BEARING CAPACITY OF AT LEAST 2.5 TONS PER
4. ALL AREAS DISTURBED BY CONSTRUCTION SHALL BE LEFT WITH SLOPES AND EMBANKMENTS NOT STEEPER THAN ONE (1) VERTICAL TO TWO (2) HORIZONTAL
5. ALL CONCRETE SHALL BE AIR-ENTRAINED AND HAVE AN ULTIMATE COMPRESSIVE STRENGTH OF 3000 LBS PSI @ 28 DAYS
6. EXPOSED EDGES OF CONCRETE SHALL BE BEVELED 1 x 1" UNLESS DIMENSIONED OTHERWISE
7. A FLOOD WITH A RECURRENCE OF ABOUT ONCE IN 25 YEARS IS ESTIMATED TO BE ABOUT 380 CFS (MEAN ANNUAL) THE 15"ø DRAIN AND THE 20" INTAKE CAN TAKE ABOUT 70 CFS WITH ELEVATION OF THE RESERVOIR AT 307 FT. REFER TO NOTE #1 FOR ADDITIONAL FLOOD RATES
8. THE CONTRACTOR IS FULLY RESPONSIBLE FOR CONTROL OF STREAM FLOW DURING CONSTRUCTION AND USE OF THE FACILITIES ALL ABOVE ESTIMATES OF STREAM FLOW DOES NOT RELIEVE HIM FROM HIS RESPONSIBILITY IN THIS REGARD NOR FROM HIS LIABILITY TO REPAIR AT HIS OWN EXPENSE ANY DAMAGE CAUSED BY FLOODING
9. THUS — — — — REPRESENTS THE EXISTING STRUCTURE OR EXISTING STRATA
10. CLASS 'A' EMBANKMENT CLAY, SILT, AND AND GRAVEL COMPACTED TO 7 LAYERS
    CLASS 'B' EMBANKMENT PORTIONS SAME & GRAVEL COMPACTED BY CRAWLER TYPE TRACTOR
    CLASS 'C' EMBANKMENT PORTIONS SAME AS CLASS 'B' OR CONTRACTOR'S OPTION FOR DIKING PURPOSES.
11. WATERSHED AREA 3.36 SQ. MILES
    EXISTING DAM: SPILLWAY CAPACITY WITHOUT OVERTOPPING = 360 CFS PER SQ MILE OF WATERSHED.
    (BUILT 1889) MAX. OBSERVED OVERTOPPING 1938 WAS 6".
    NEW DAM: DESIGN SPILLWAY CAPACITY 530 CFS. PER SQ. MILE.
    MAX WITHOUT OVERTOPPING = 1000 CFS. PER SQ MILE.
12. ALL CONCRETE IN THE GRAVITY SECTION OF THE DAM WILL BE POURED IN LIFTS OF NOT LESS THAN 5 FEET.
13. THE CONTRACTOR SHALL FURNISH ALL NECESSARY CABLE PREVENTERS FOR VALVES REQUIRING SAME
14. THE INFORMATION INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE DRAWINGS IS BASED ON LIMITED INVESTIGATIONS AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE ENCOUNTERED.
15. BORING AND SUB-SURFACE DATA MAY BE EXAMINED BY THE CONTRACTOR AT THE OFFICE OF RICHARDS ENGINEERS, MIDDLETOWN, CONN.


Valve & Screen House
Sheeting El. 386.5
El. 387.5
Profile Existing Dam
Steel Piling
Existing Grade 14' Upstream from ℄
El. 380
El. 387.5 Top of Fill
Existing Ground 14' Upstream from ℄
Match Line 'A'
Match Line 'B'
El. 380
ELEVATION CONTINUED
DAM FOR THE PORTLAND, CT. WATER WORKS
NORTH ELEVATION



NORTH ELEVATION



NORTH ELEVATION CONTINUED

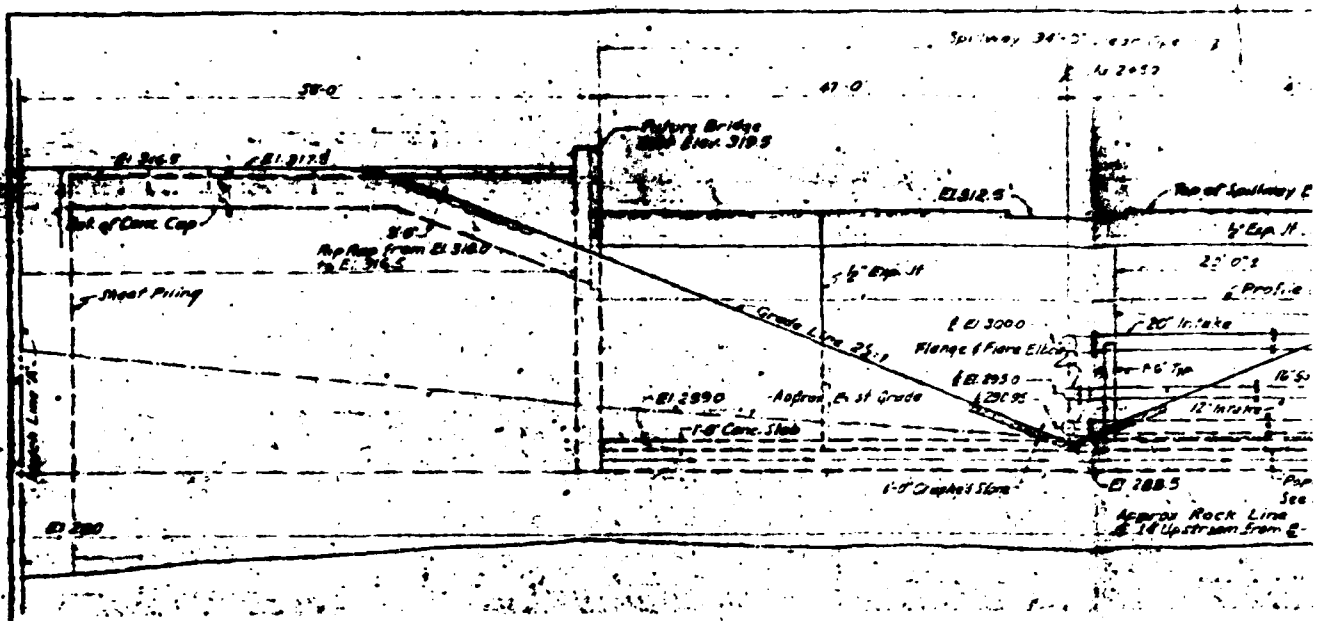
Refer to sheet 06 for general notes.

DAM
POW
WA

NOR

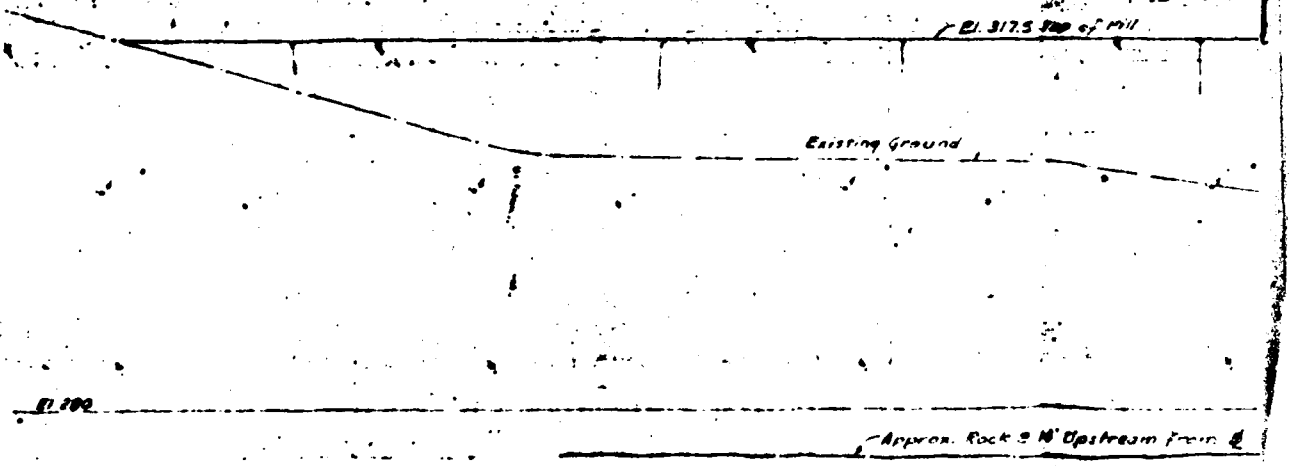
Revisions		
No.	Date	Description

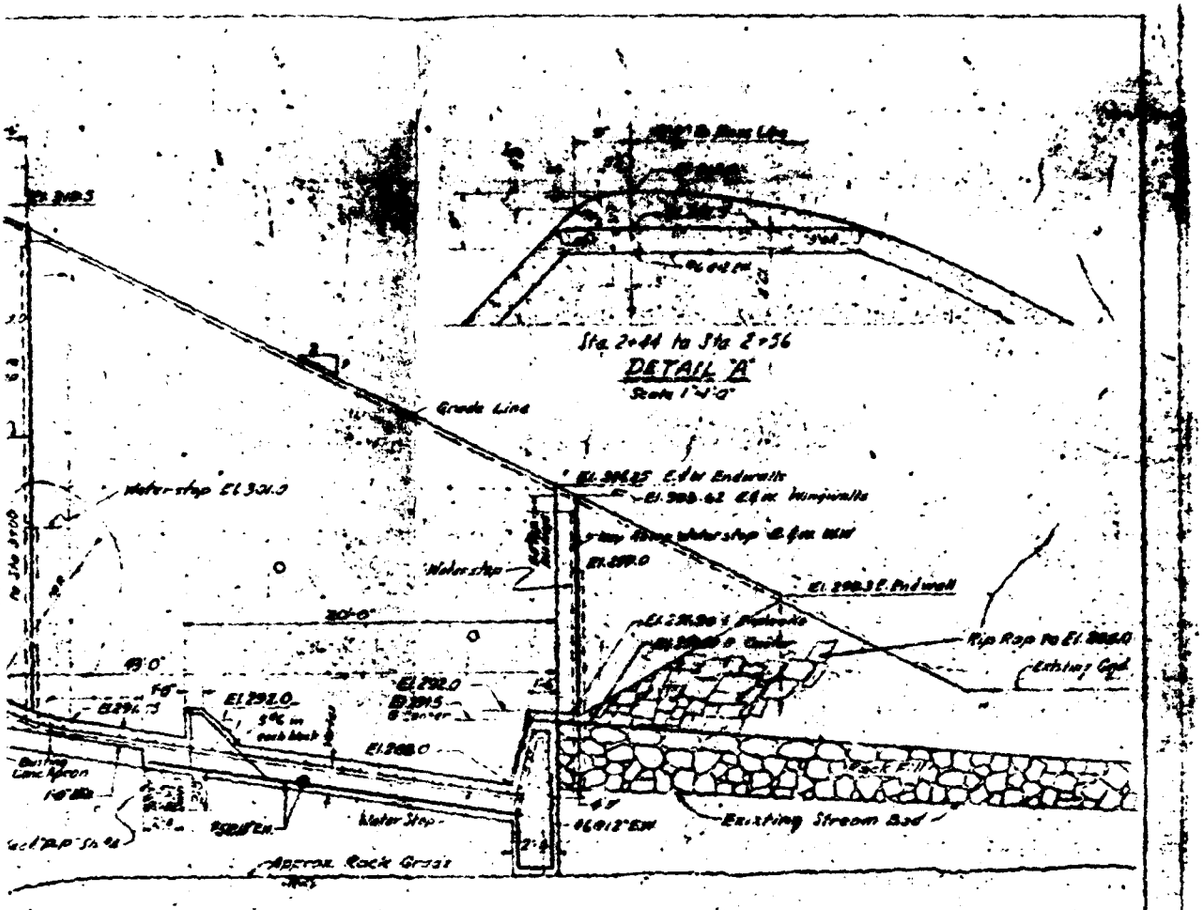
Designed
Scale
Designed By
Drawn By
Approved



NORTH ELEVATION

Scale ½" = 1'-0"



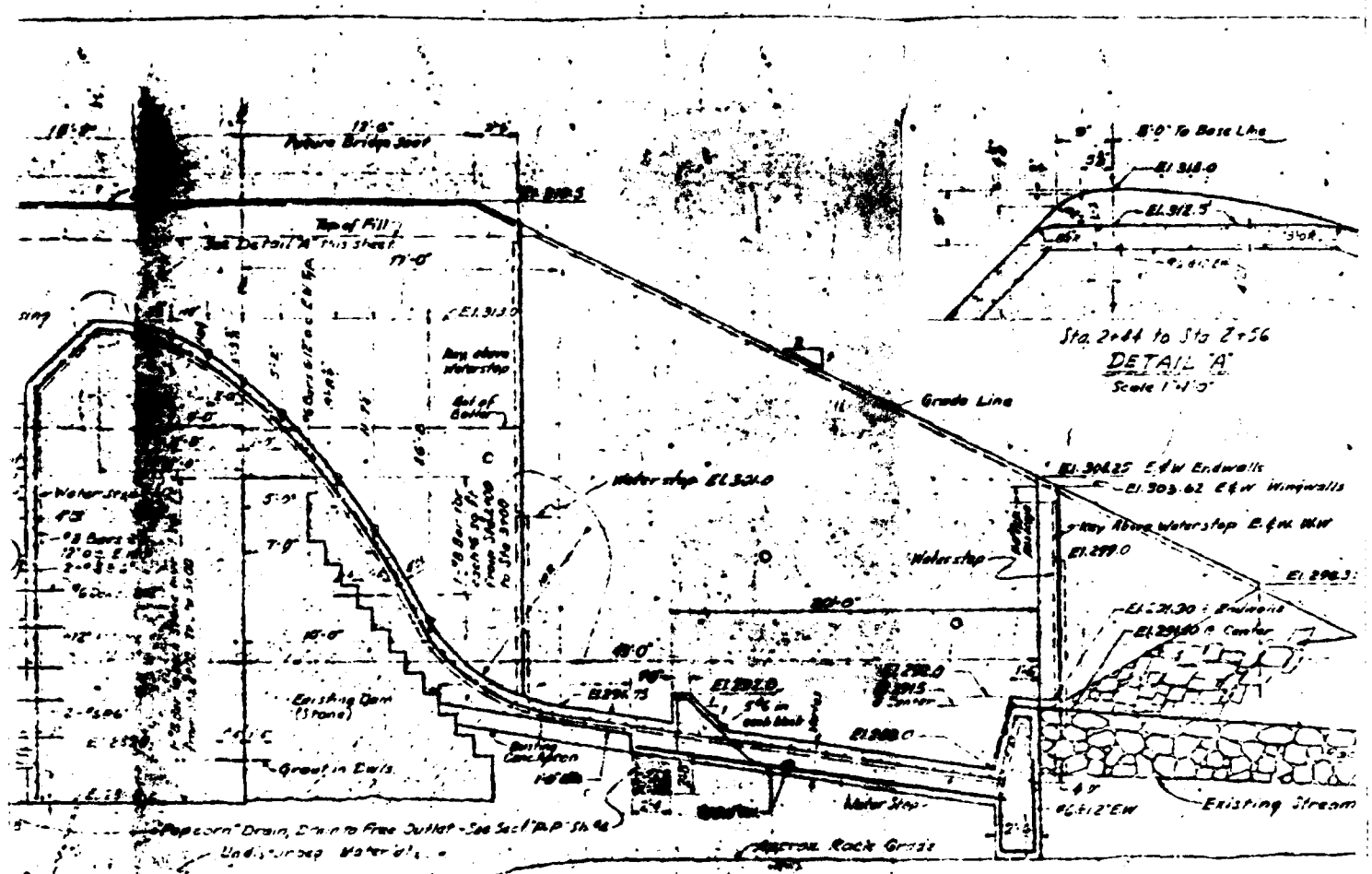


TO STA 2+97

Note: Refer to Sheet #4 for General Notes

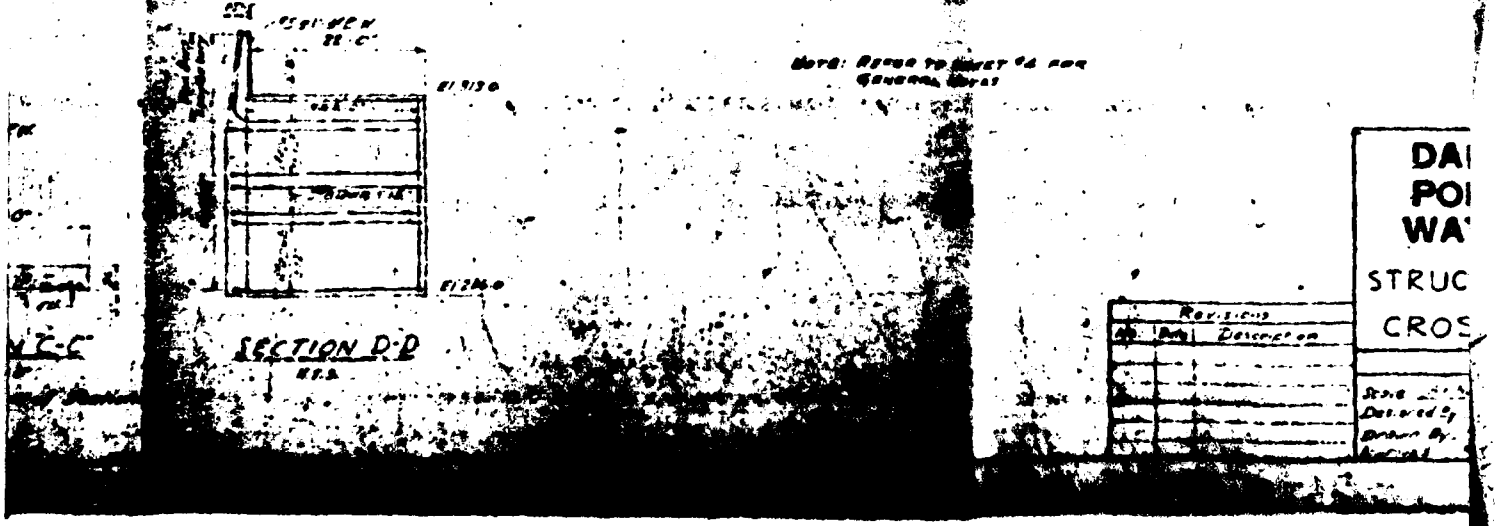
DAM FOR THE PORTLAND, CT. WATER WORKS

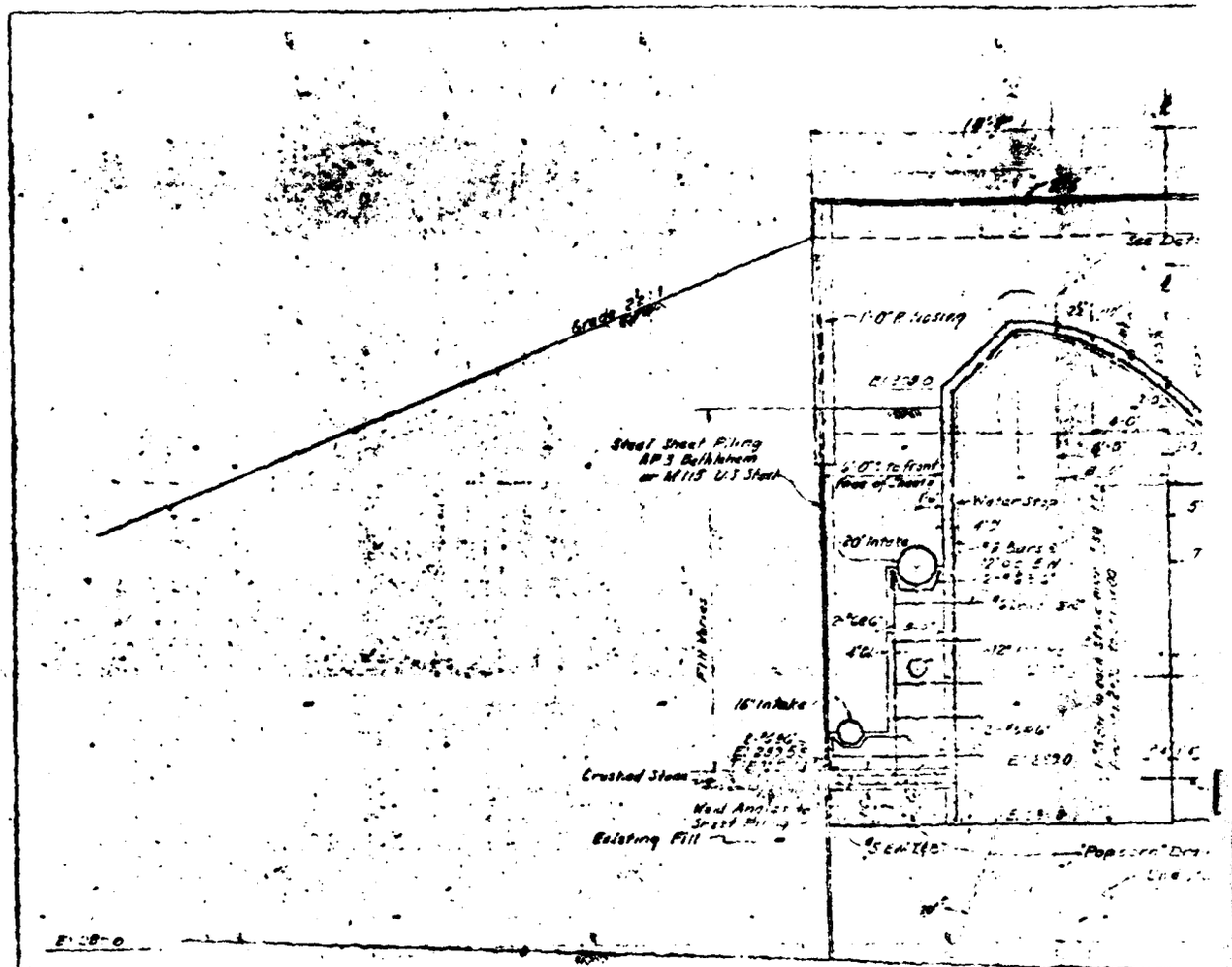
STRUCTURAL DETAILS AND CROSS SECTIONS



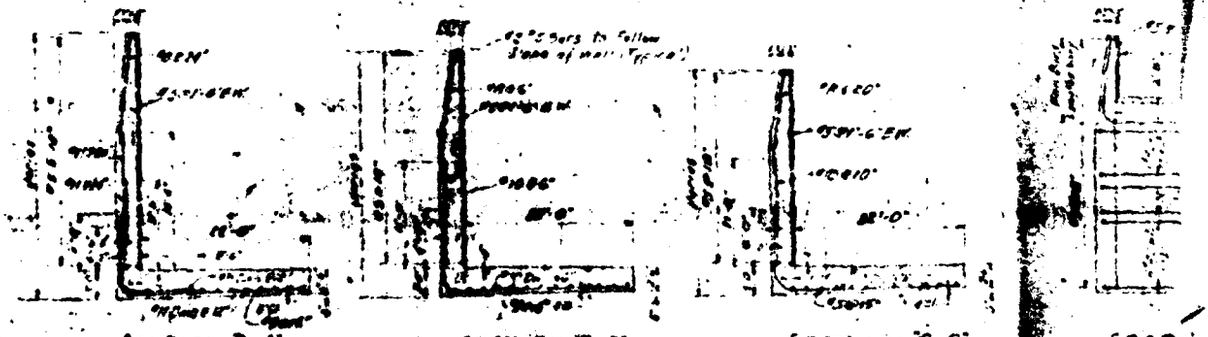
TYPICAL CROSS SECTION FROM STA. 2+09 TO STA. 2+87

Scale 1/4"=1'-0"





TYPICAL CROSS SEC

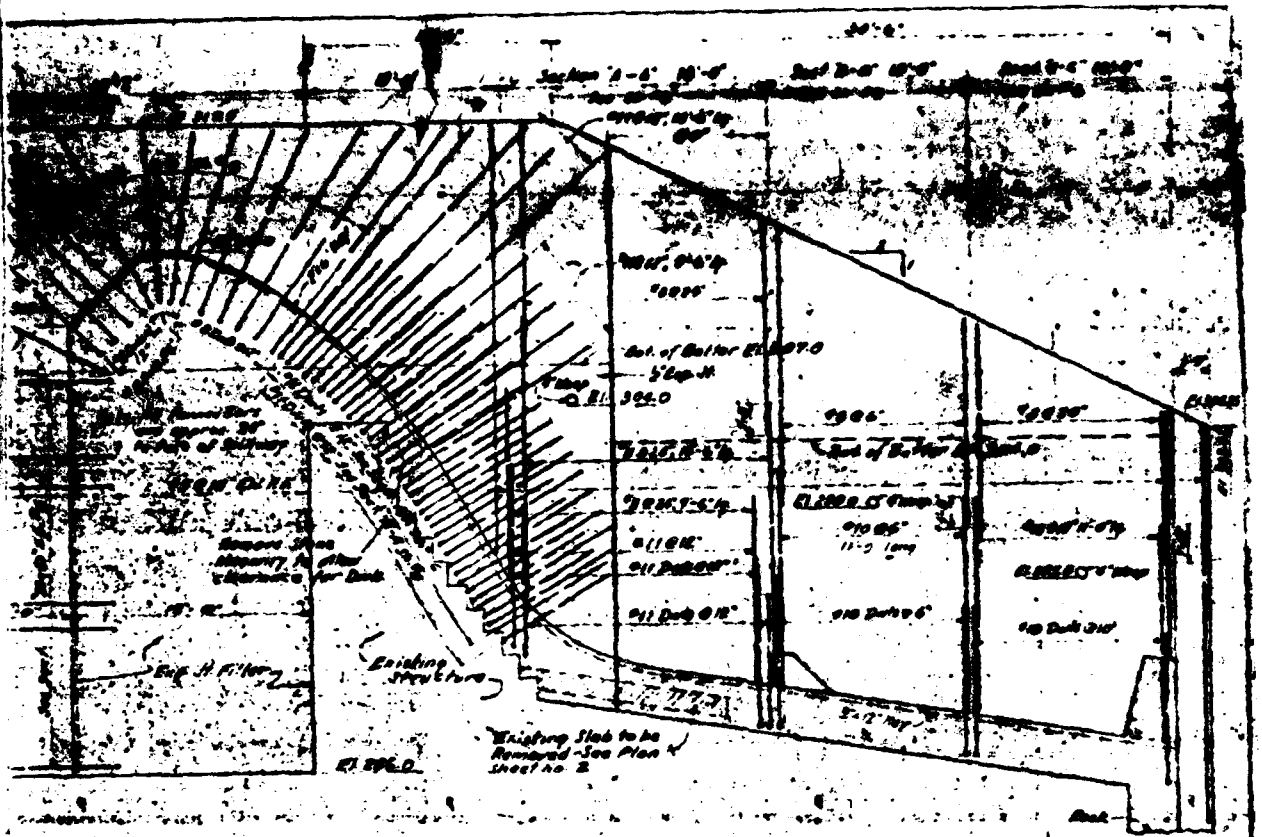


SECTION A-A

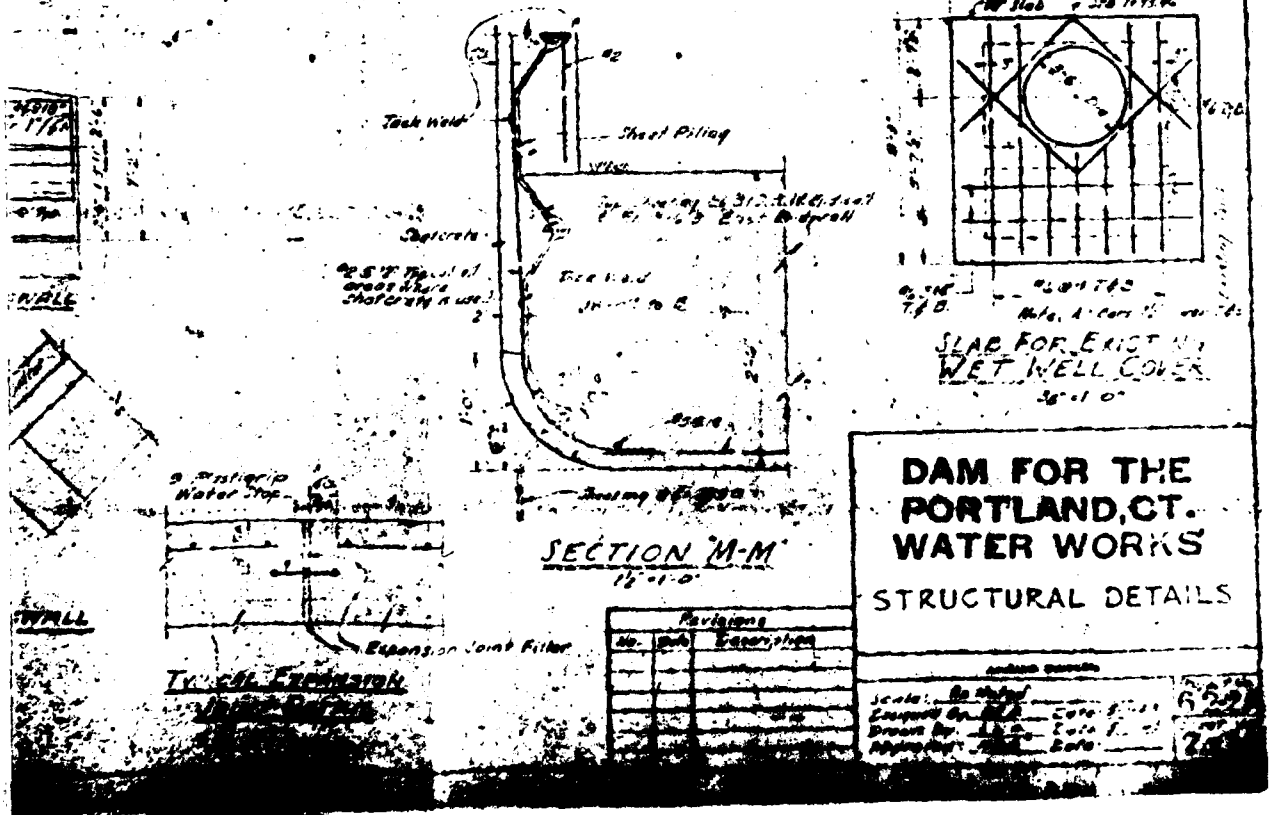
SECTION B-B'

SECTION C-C'

SECT



EAST ENDWALL ELEVATION

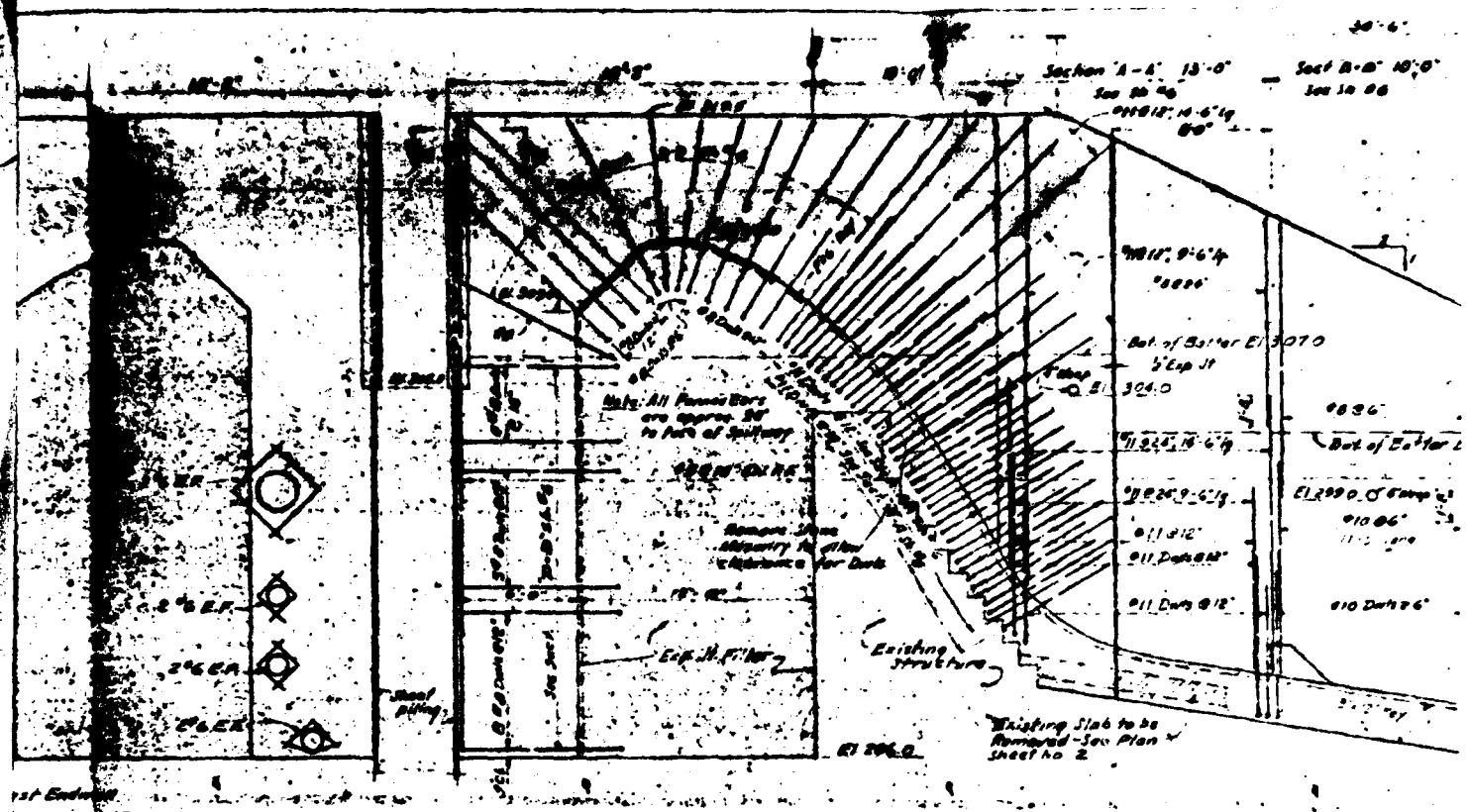


SECTION M-M

SLAB FOR EXISTING WET WELL COVER

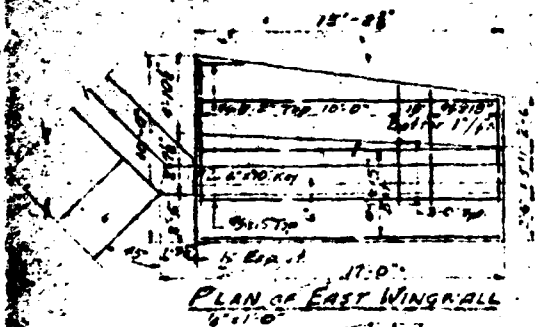
DAM FOR THE PORTLAND, CT. WATER WORKS

STRUCTURAL DETAILS

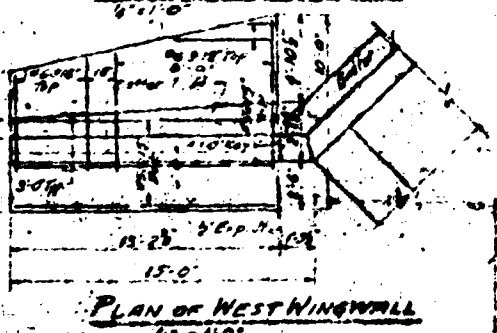


ELEVATION

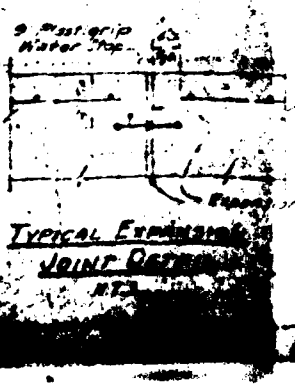
EAST ENDWALL ELEVATION



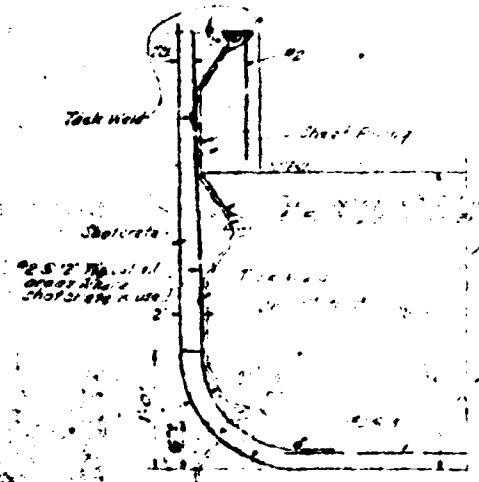
PLAN OF EAST WINGWALL



PLAN OF WEST WINGWALL

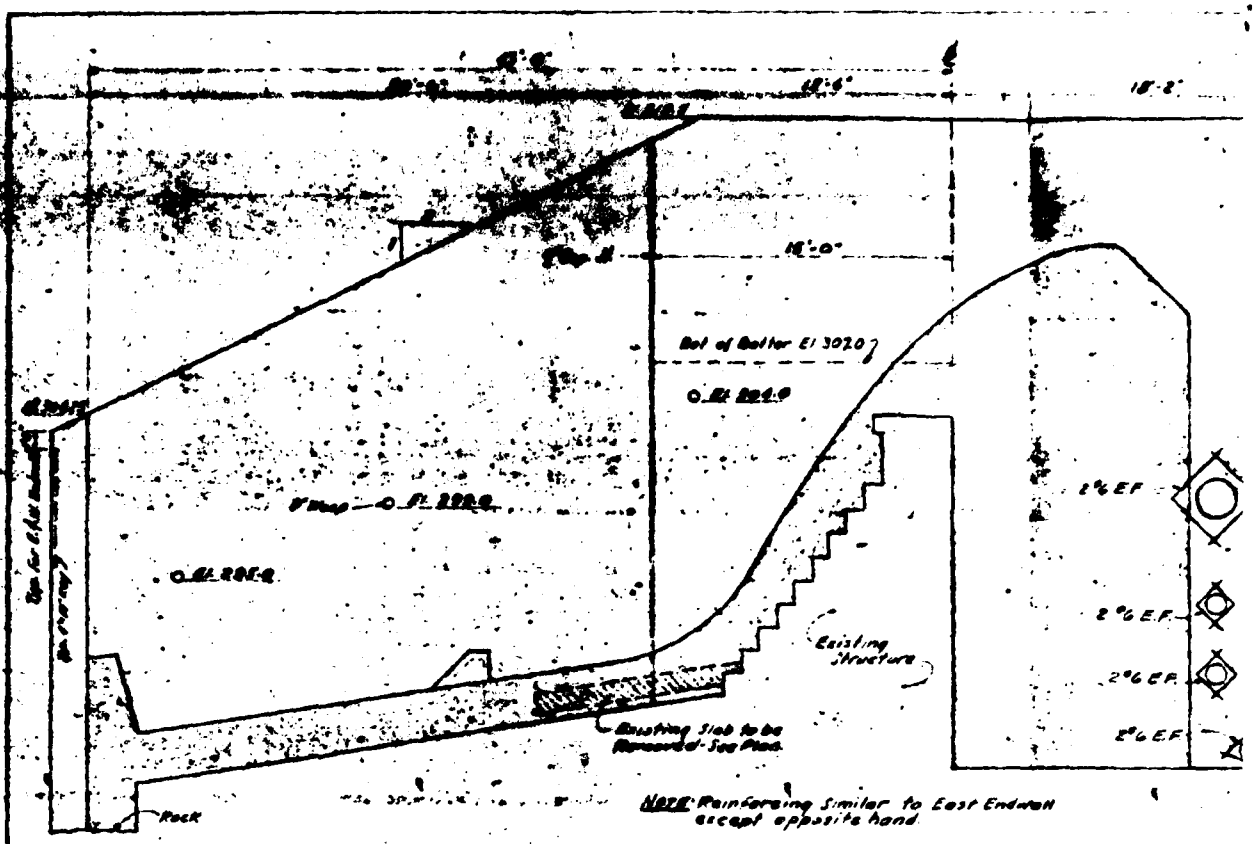


TYPICAL EXPANSION JOINT SECTION



SECTION M-M

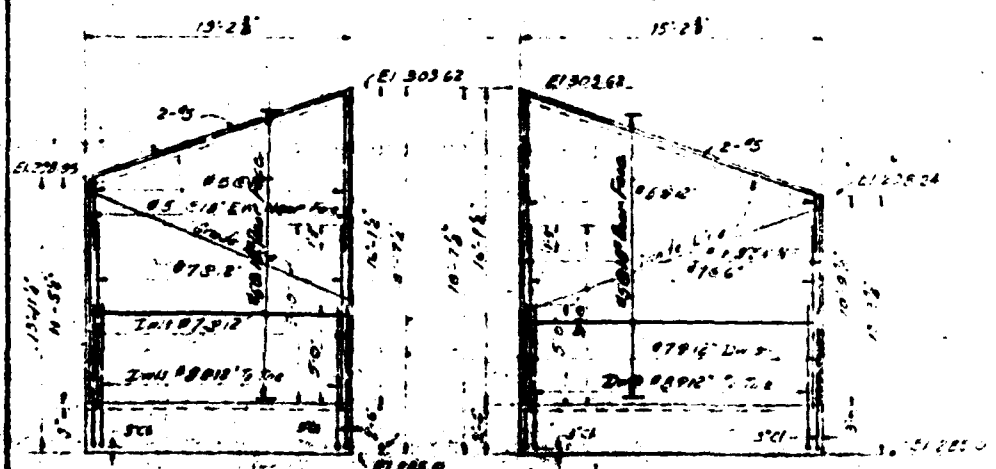
DA
PO
WA
STRU



NOTE: Reinforcing Similar to East Endwall except opposite hand

WEST ENDWALL ELEVATION

4" = 1'-0"



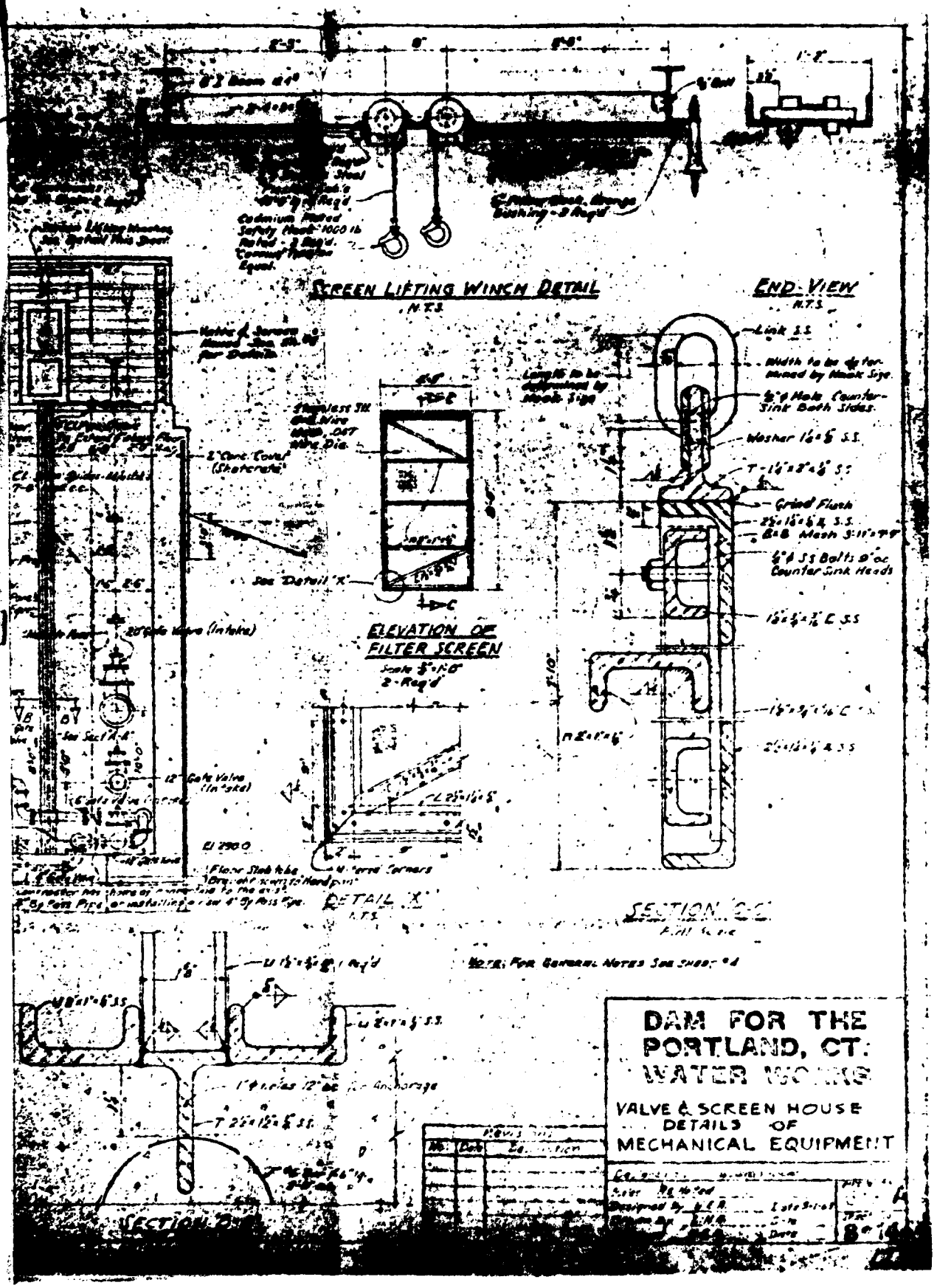
ELEVATION OF W.W.W.

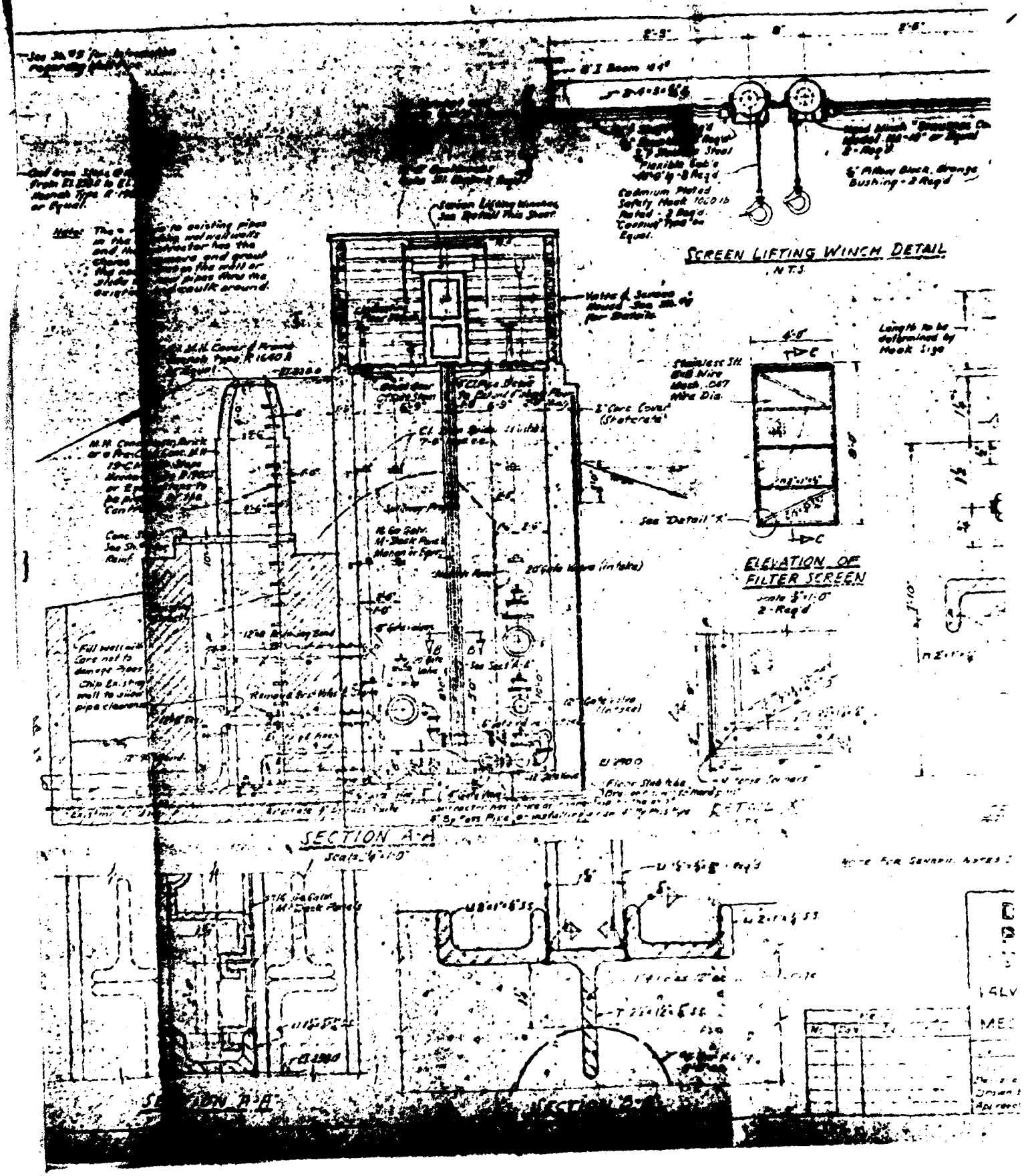
4" = 1'-0"

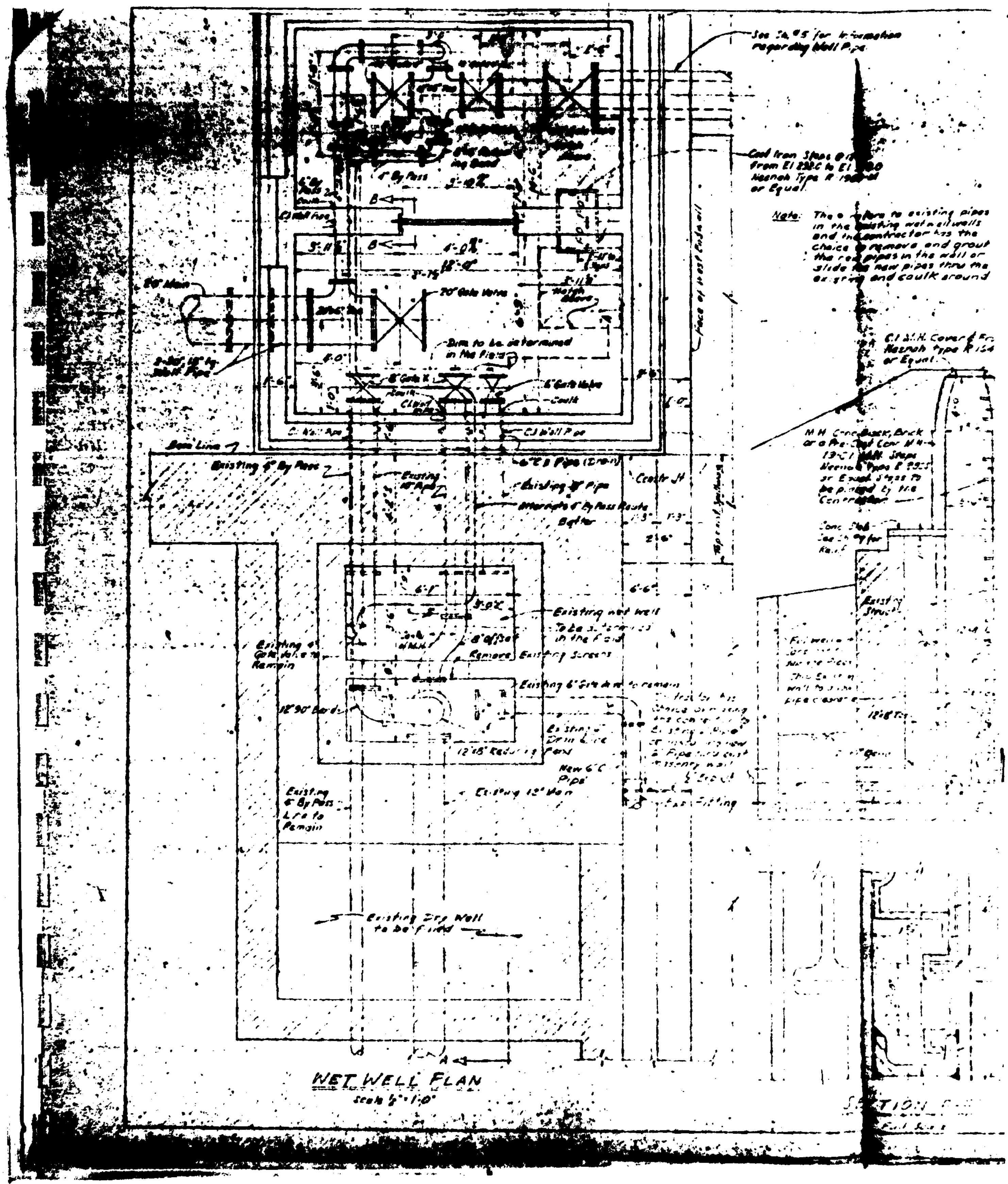
ELEVATION OF E.W.W.

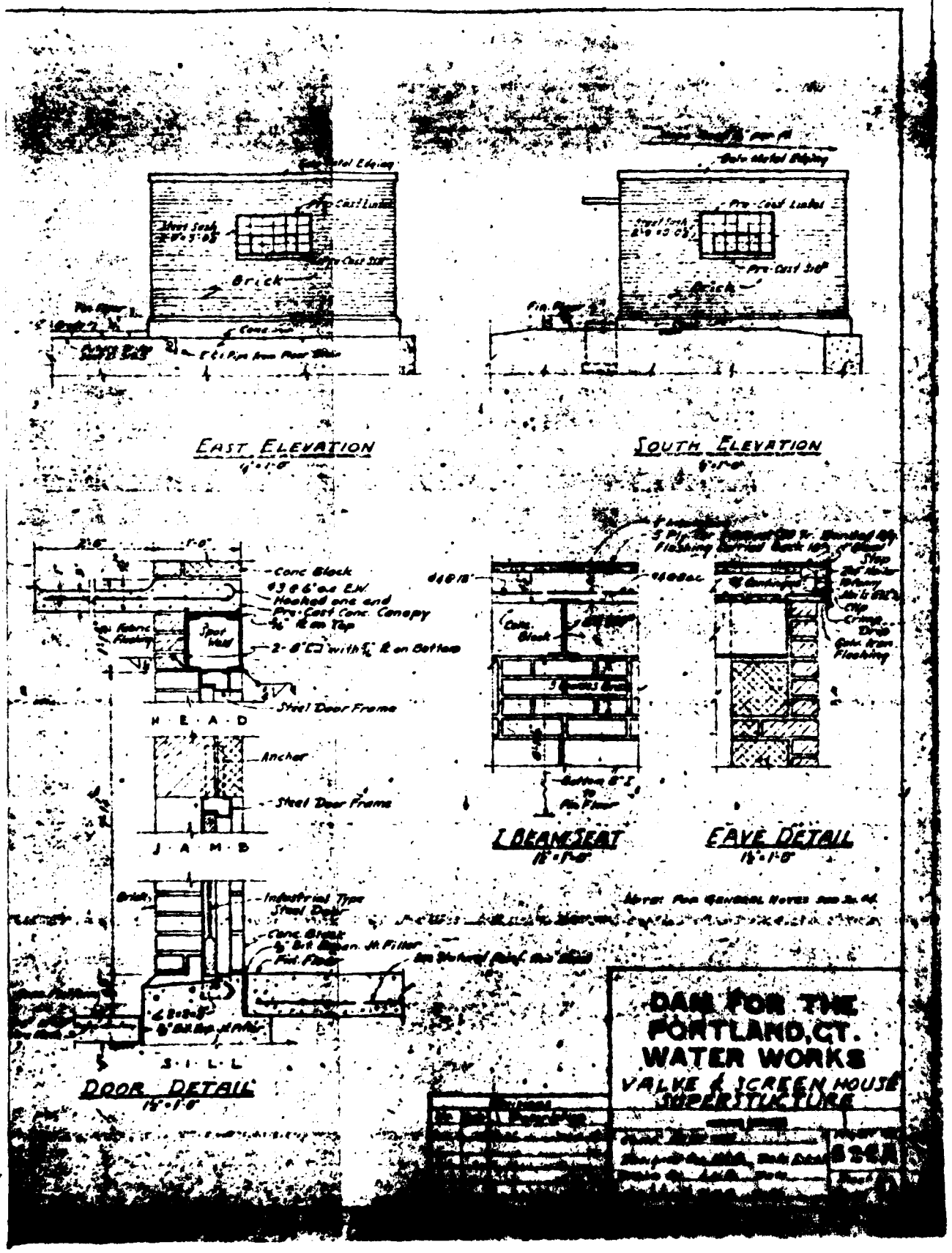
4" = 1'-0"

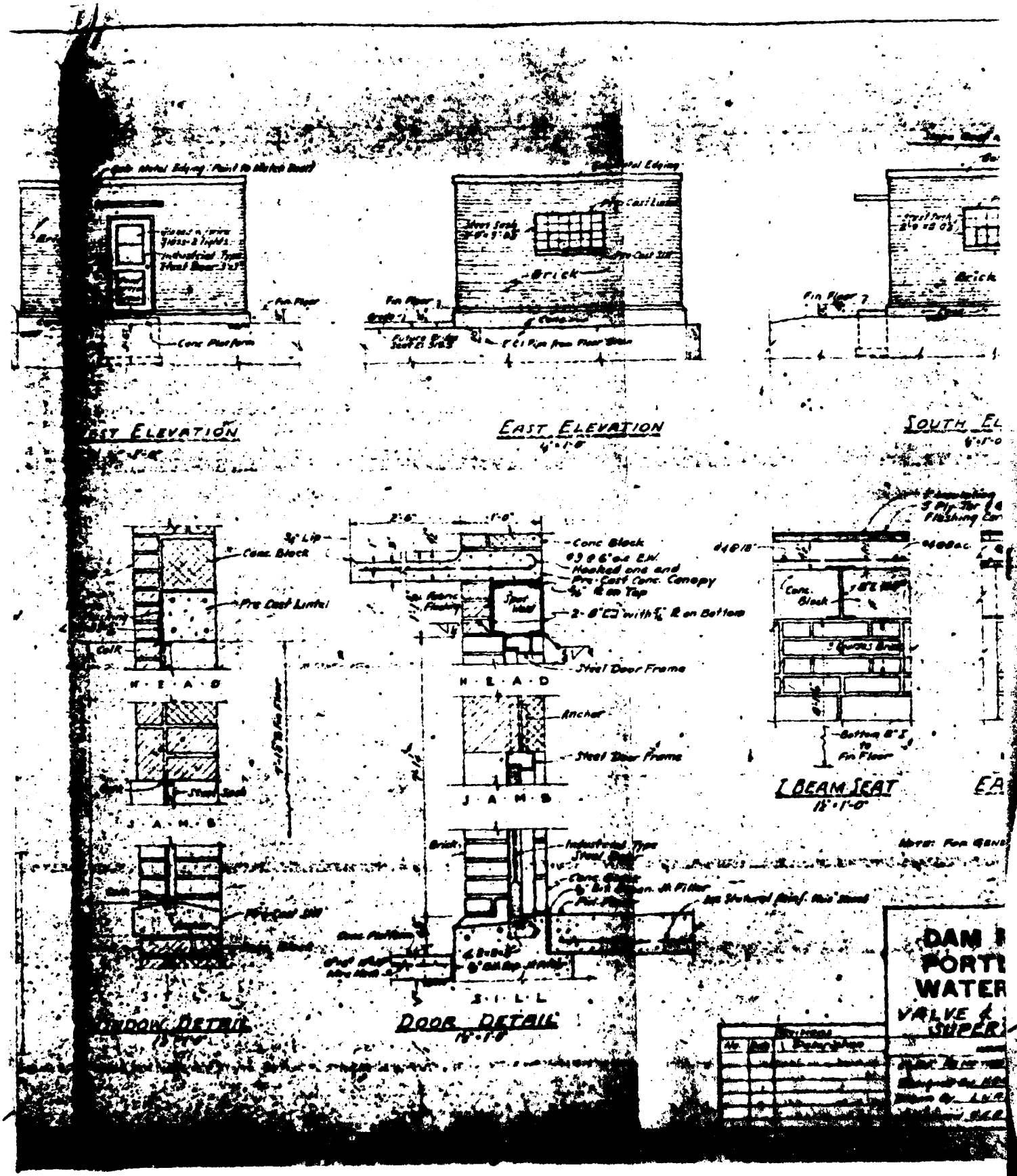
Note: For General Notes see Sheet No 4

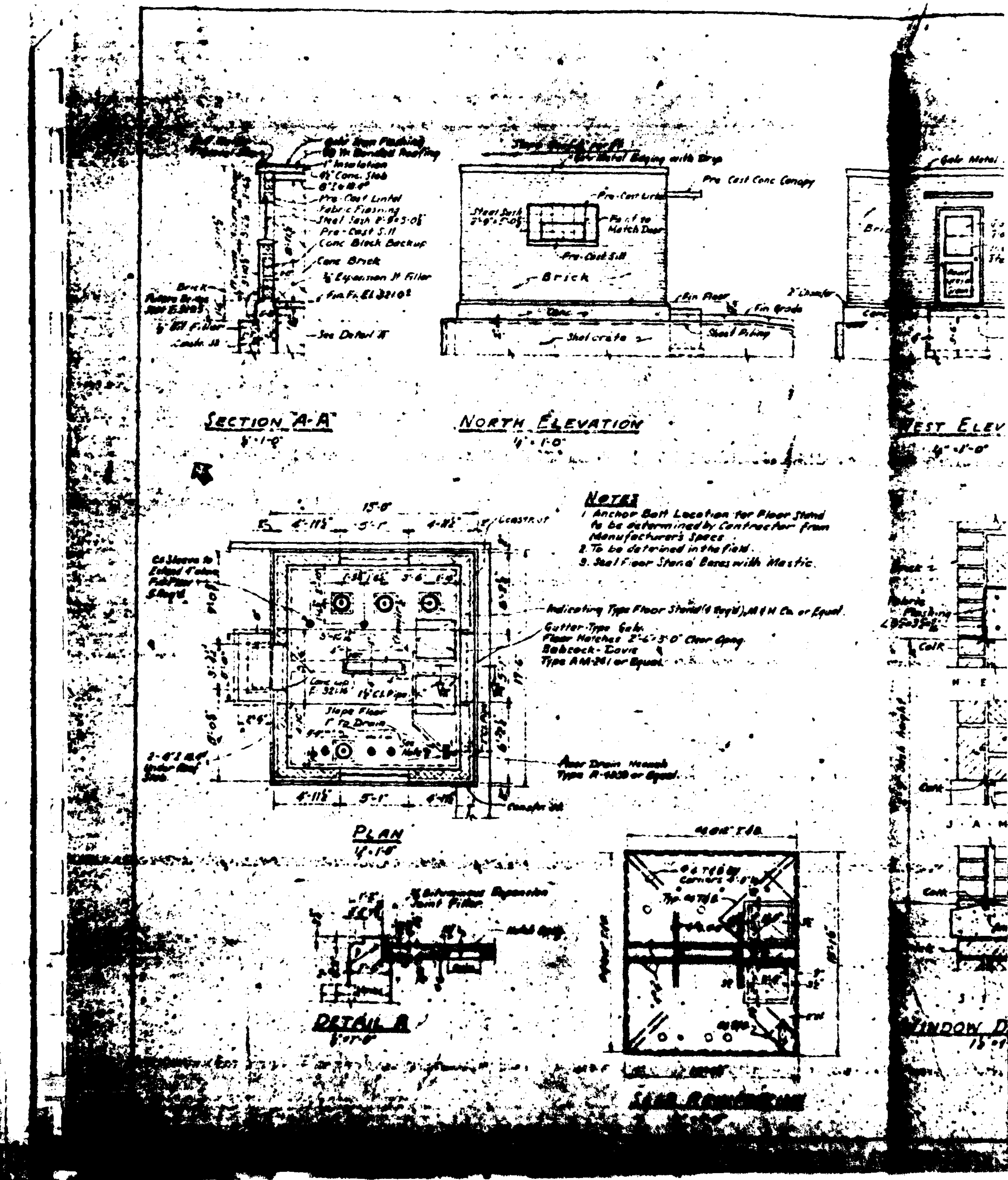

SCREEN LIFTING WINCH DETAIL
N.T.S.
END VIEW
N.T.S.
ELEVATION OF FILTER SCREEN
Scale 3/8"=1'-0"
2-Req'd
DETAIL 'X'
N.T.S.
SECTION C-C
SECTION D-D
DAM FOR THE PORTLAND, CT. WATER WORKS
VALVE & SCREEN HOUSE
DETAILS OF
MECHANICAL EQUIPMENT


SCREEN LIFTING WINCH DETAIL
N.T.S.
ELEVATION OF FILTER SCREEN
SECTION A-A
Scale 1/4"=1'-0"


See Sh. #5 for information regarding Wall Pipe
Cast Iron Steps
Keenah Type R 1981 or Equal
Note: These refers to existing pipes in the existing wet well walls and the contractor has the choice to remove and grout the rem pipes in the wall or slide the new pipes thru the existing and caulk around
20" Gate Valve
Dim to be determined in the Field
8" Gate V
6" Gate Valve
Caulk
C.I. Wall Pipe
Base Line
Existing 6" By Pass
6" C.I. Pipe (Drain)
Existing 8" Pipe
Alternate 6" By Pass Route Better
C.I. M.H. Cover & Fr. Neenah type R 164 or Equal
Existing wet well
Remove Existing Screens
Existing 6" Gate Valve to Remain
12" 90° Bend
12"x8" Reducing Bend
New 6" C.I. Pipe
Existing 12" Main
Existing 6" By Pass Line to Remain
Existing Dry Well to be filled
WET WELL PLAN
Scale 1/2" = 1'-0"

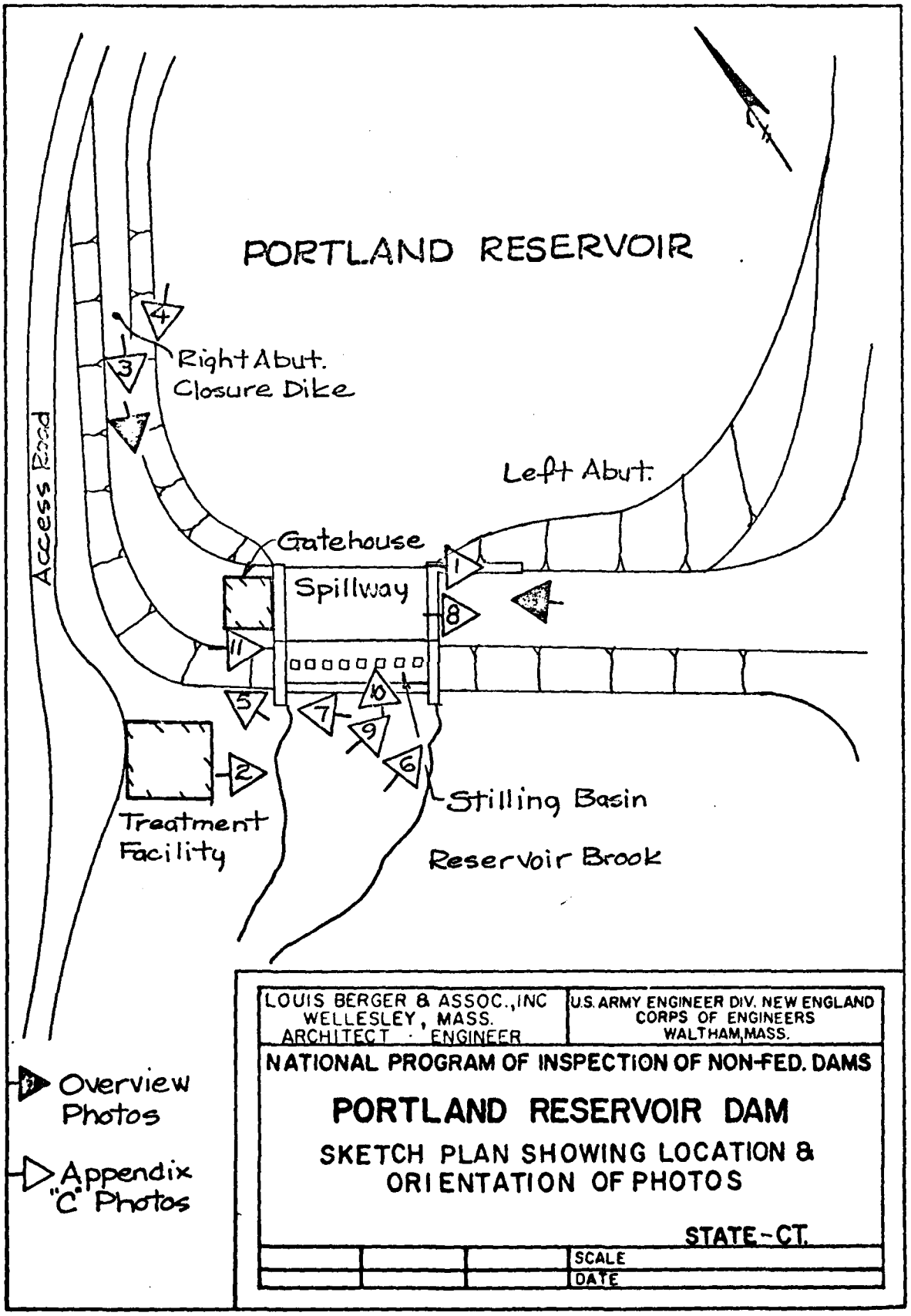

Brick
EAST ELEVATION
SOUTH ELEVATION
Conc Block
Hooked one end
Pre-Cast Conc Canopy
Steel Door Frame
H E A D
Anchor
Steel Door Frame
J A M D
Industrial Type
Steel Door
S I L L
DOOR DETAIL
I BEAM SEAT
EAVE DETAIL
DAM FOR THE
PORTLAND, CT.
WATER WORKS
VALVE & SCREEN HOUSE
SUPERSTRUCTURE


EAST ELEVATION
EAST ELEVATION
SOUTH EL
Brick
Fin Floor
Conc Floor Form
Conc Block
Pre Cast Lintel
Steel Door Frame
Anchor
HEAD
JAMB
SILL
I BEAM SEAT
Bottom of S to Fin Floor
WINDOW DETAIL
DOOR DETAIL
DAM
FORT
WATER
VALVE


Pre Cast Conc Canopy
Pre-Cast Lintel
Fabric Flashing
Pre-Cast Sill
Conc Block Backup
Conc Brick
Brick
Conc
Shotcrete
Fin Floor
Fin Grade
Steel Piling
See Detail "B"
SECTION "A-A"
NORTH ELEVATION
1/4" = 1'-0"
WEST ELEV
NOTES
1 Anchor Bolt Location for Floor Stand to be determined by Contractor from Manufacturer's Specs.
2. To be determined in the field.
3. Seal Floor Stand Bases with Mastic.
15'-0"
4'-11 1/2"
5'-1"
Indicating Type Floor Stand (4 Req'd), M & H Co. or Equal.
Gutter-Type Galv.
Floor Hatches 2'-6" x 5'-0" Clear Opng.
Babcock-Davis
Type AM-241 or Equal.
Slope Floor
PLAN
1/4" = 1'-0"
DETAIL B
WINDOW D

APPENDIX C

PHOTOGRAPHS



LOUIS BERGER & ASSOC., INC WELLESLEY, MASS. ARCHITECT · ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

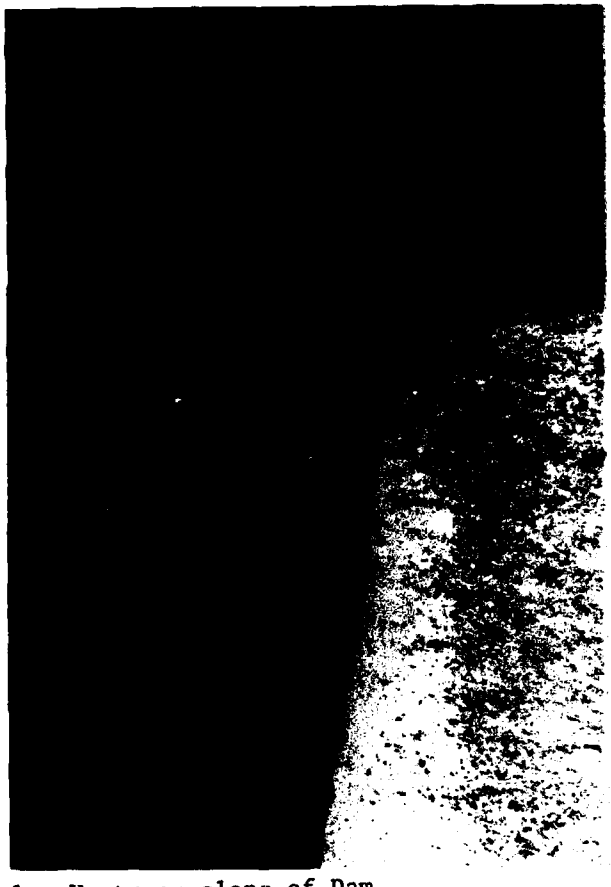
PORTLAND RESERVOIR DAM

SKETCH PLAN SHOWING LOCATION & ORIENTATION OF PHOTOS

STATE - CT.

			SCALE
			DATE

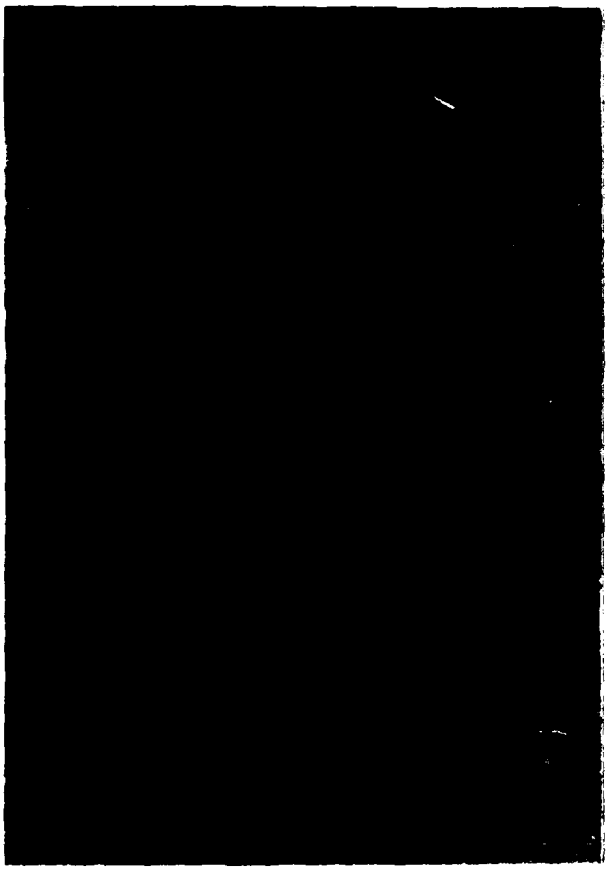
PORTLAND RESERVOIR DAM



1. Upstream slope of Dam

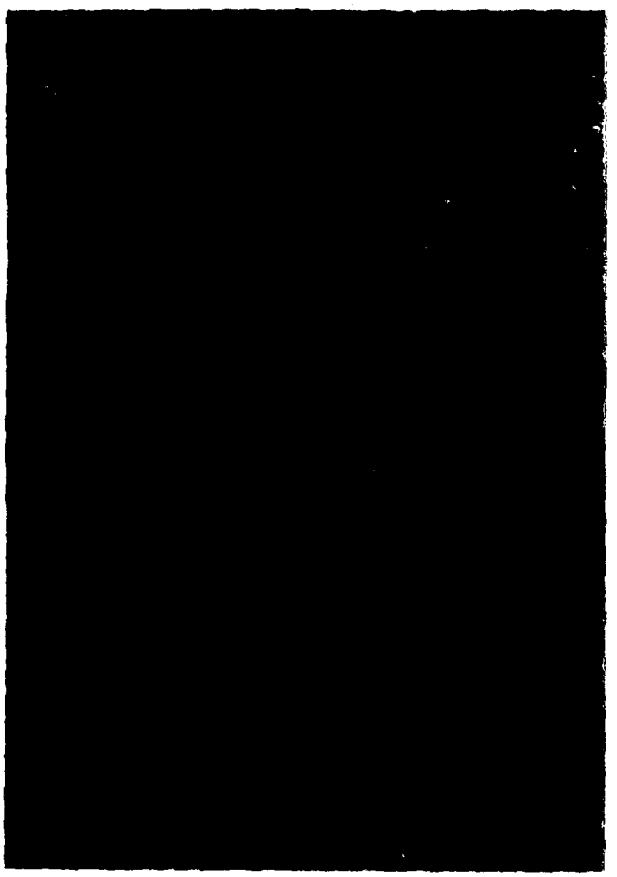
2. Downstream slope of Dam

3. Upstream slope of Dike



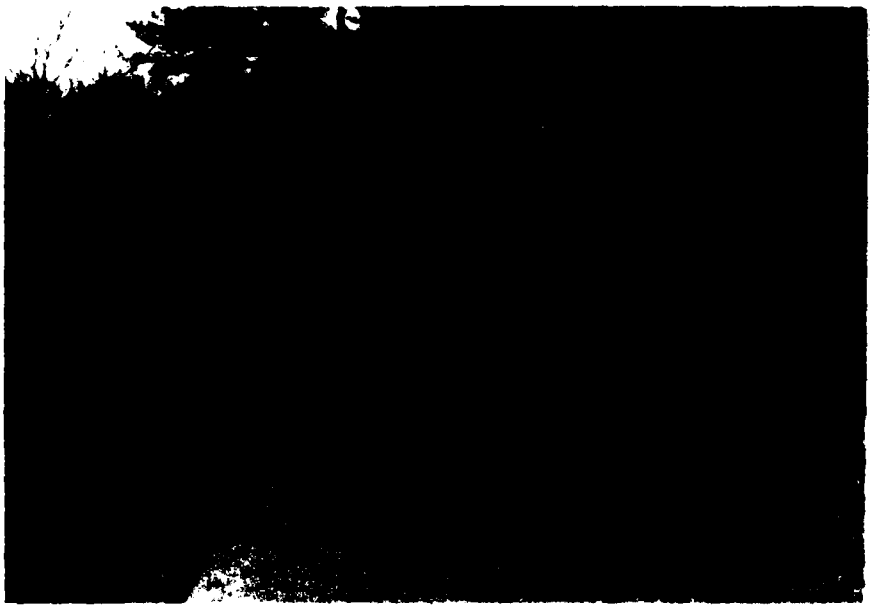
4. Upstream slope of dike showing displaced riprap, erosion and brush growth.

5. Downstream slope of Dike



6. Dislodged riprap, covering toe drain at end of left downstream wingwall.

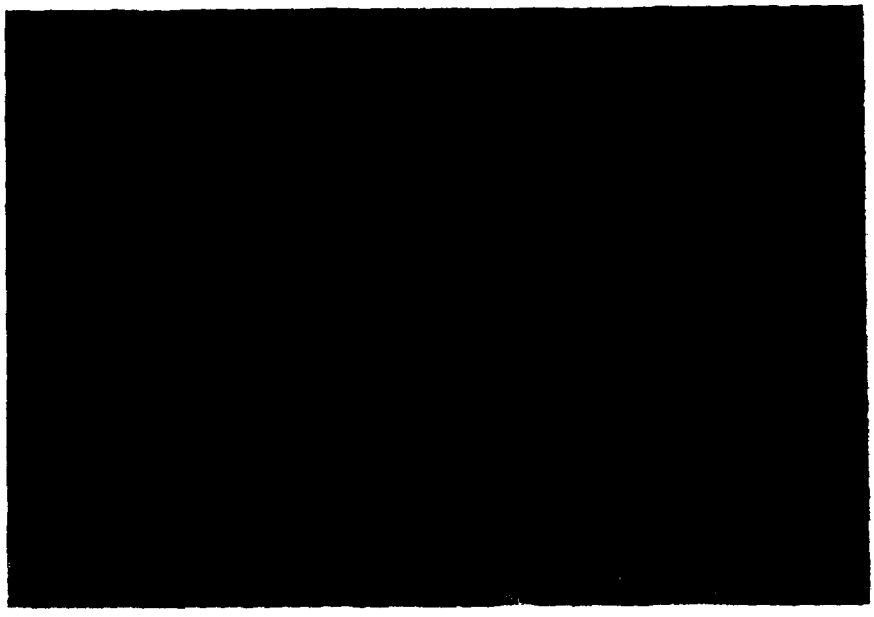
7. Irregular riprap and surface water drain at end of right downstream wingwall.



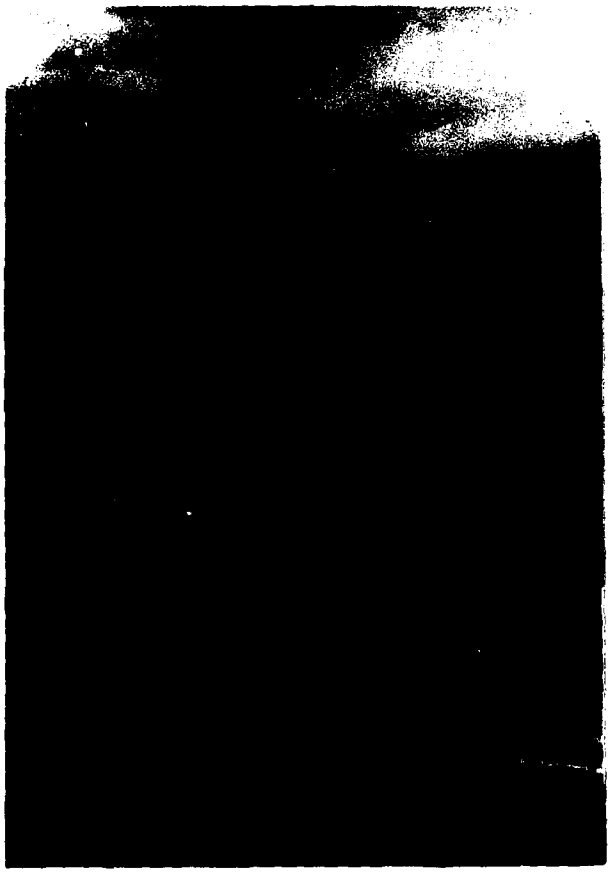
8. Crest of left embankment section.

9. Seeping left wingwall joint.

10. Spalled left panel joint.



11. Spillway crest, showing notch and spalled panel joint.



12. Gate house, spillway and stilling basin.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

BY PLL DATE 5.3.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1 OF

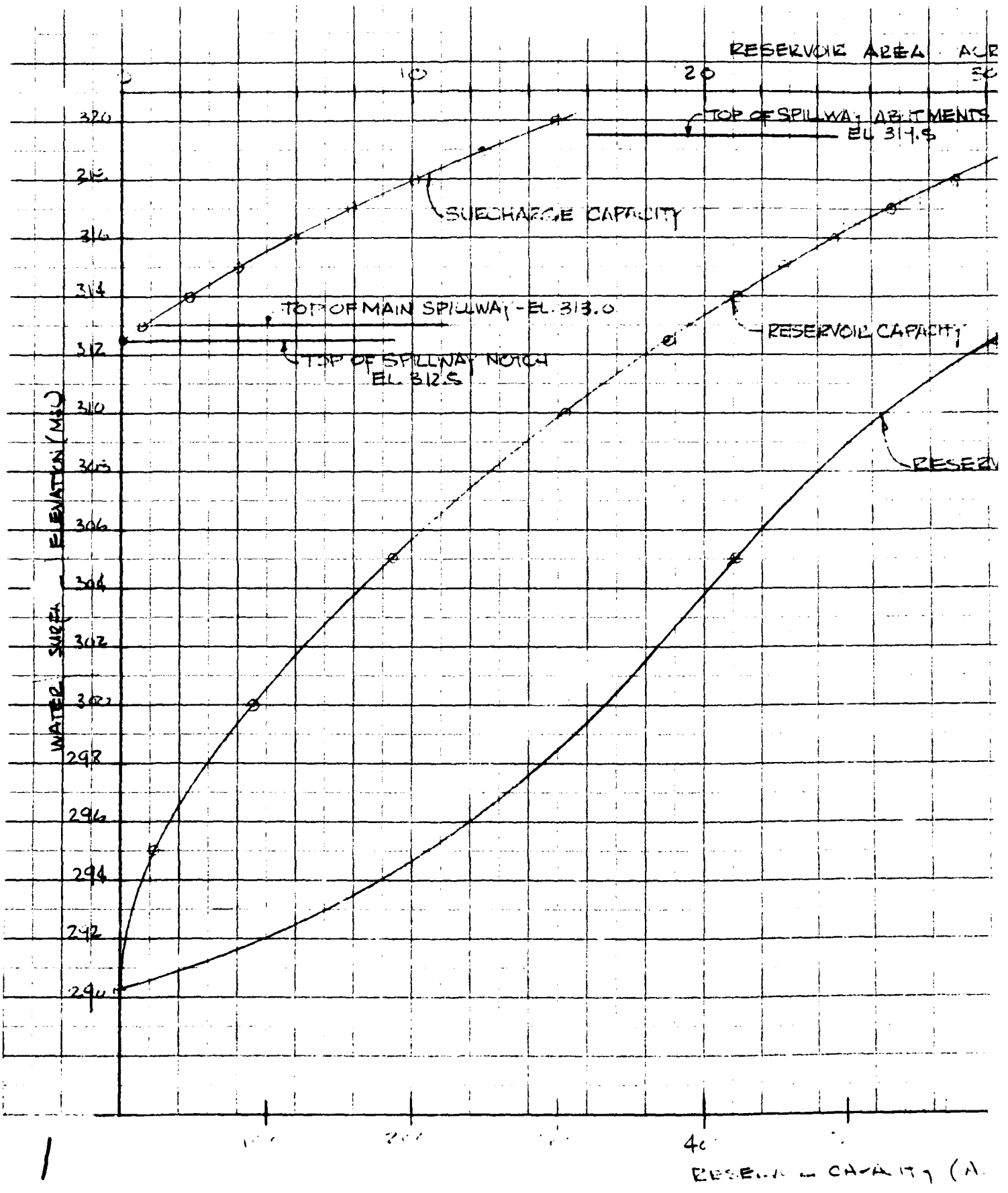
CHKD. BY DATE INSPECTION OF DAMS PROJECT

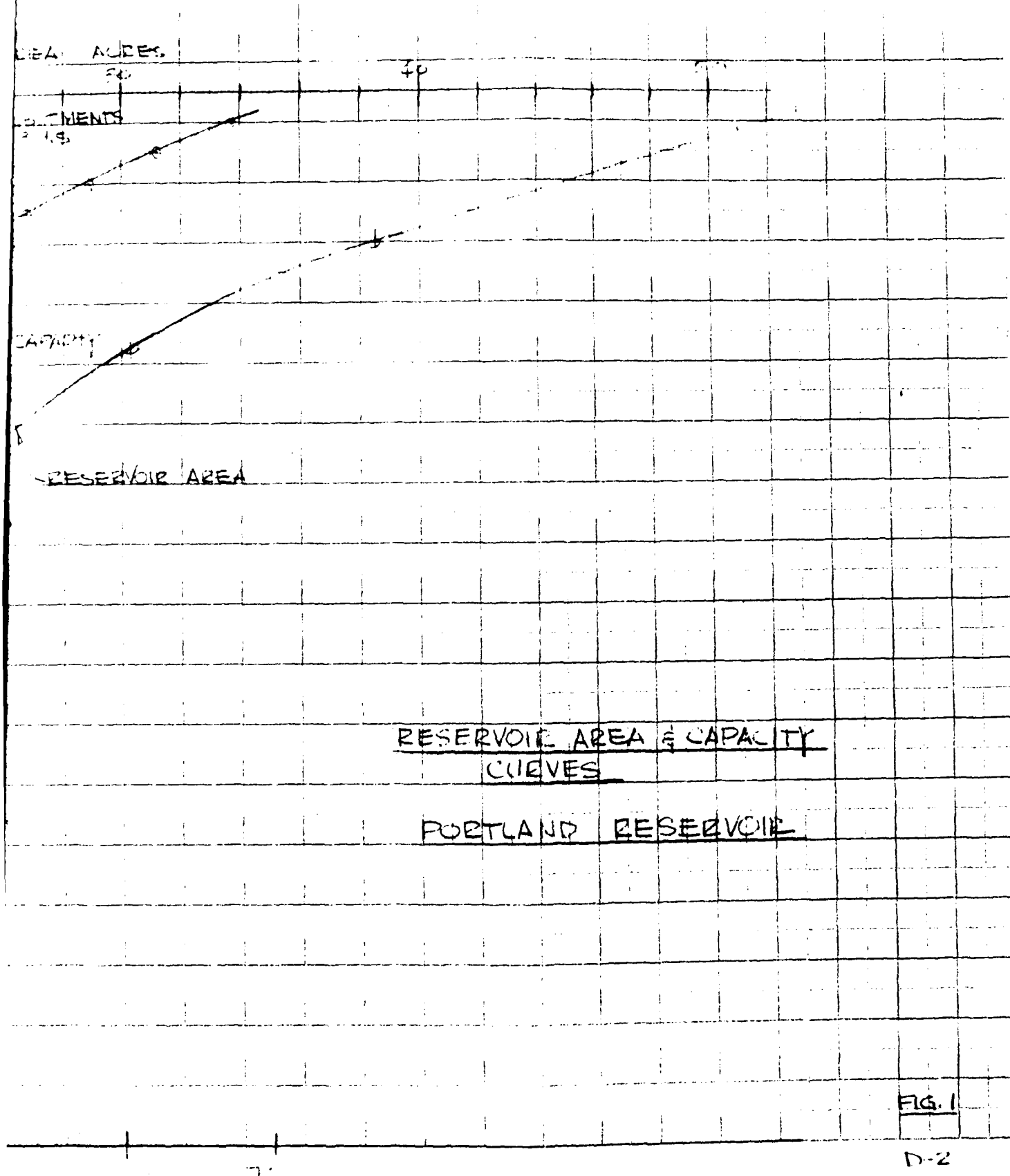
SUBJECT PORTLAND RESERVOIR

CAPACITY ANALYSIS

ELEV MSL	AREA AC	AV. AREA AC	HT. FT.	INCR. STOR AC-FT	CUM. STOR AC-FT	SURCHARGE AC. FT	REMARKS
290.3	0 *						INV. 16" INTAKE
295	10.6	5.3	4.7	24.9	24.9		
300	16.6	13.6	5	68.0	92.9		
305	21.1 *	18.8	5	94.0	186.9		
310	26.4	23.7	5	118.5	305.4		
312.5	30.3 *	28.3	2.5	70.7	376.1	0	(NOTCH) SPILLWAY
313.0	31.0	30.6	0.5	15.3	391.4	15.3	MAIN SPILLWAY
314.0	32.9	31.9	1	31.9	423.3	47.2	
315.0	35.2	34.0	1	34.0	457.3	81.2	
316.0	38.5 *	36.8	1	36.8	494.1	118.0	
317.0	41.8	40.1	1	40.1	534.2	158.1	
318.0	45.2	43.5	1	43.5	577.7	201.6	
319.0	48.5	46.8	1	46.8	624.5	248.4	
320.0	52.0	50.2	1	50.2	674.7	298.6	

* AREA MEASURED BY PLANIMETER FROM PLANS & USGS MAP. ALL OTHER POINTS TAKEN OFF DEVELOPED CURVE.


RESERVOIR AREA
10
20
TOP OF SPILLWAY ABUTMENTS
EL 314.5
SURCHARGE CAPACITY
TOP OF MAIN SPILLWAY - EL 313.0
TOP OF SPILLWAY NOTCH
EL 312.5
RESERVOIR CAPACITY
RESERV
WATER SURFACE ELEVATION (MSL)
320
316
314
312
310
306
304
302
298
296
294
292
40



RESERVOIR AREA & CAPACITY
CURVES

PORTLAND RESERVOIR

FIG. 1

D-2

2

BY _____ DATE 5.2.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1 OF

CHKD. BY _____ DATE _____ INSPECTION OF DAMS PROJECT

SUBJECT DRAINAGE AREA - HUTLAND RESERVOIR

QUAD SHEET — AREA CALC

MIDDLE HADDAM —

$14.80^{[1]}$ $\frac{29.64^{[1]}}{2} = 14.82^{[1]}$

$\frac{14.82^{[1]} \times 4,000,000 \text{ SF/Sl.}}{43,560} = 1360.9 \text{ AC}$

GLASTONBURY —

$9.69^{[1]}$ $\frac{19.48^{[1]}}{2} = 9.74^{[1]}$

$\frac{9.74^{[1]} \times 4,000,000 \text{ SF/Sl.}}{43,560} = 894.4 \text{ AC}$

2255.3 AC

DRAINAGE AREA = 2255.3 AC = 3.52 SQ. MI.

BY RPC DATE 5.2.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 2 OF

CHKD. BY DATE INSPECTION OF DAMS PROJECT

SUBJECT RAND RESERVOIR — HYDROLOGY

DRAINAGE AREA = 2255.3 AC = 3.52 SQ MI.

RESERVOIR AREA = $0.34^{[1]}$ $\frac{0.66^{[1]}}{2} = \frac{0.33^{[1]} \times 4,020,020}{43,560}$

= 30.3 AC = 1.3% of D.A.

CAPACITY AT NORMAL STORAGE: 48 AC-FT (ACOE INVENTORY)
150 MG (= 459 AC-FT) TOWN

SPILLWAY CREST ELEVATION 313.0
(312.5 CTR NOTCH)

RESERVOIR LENGTH = 2200' ±
" WIDTH = 600' ±

TRIBUTARIES TO DRAINAGE AREA

L	ΔH	S
13,500	714-313= 401	0.030
14,000	730-313= 417	0.030
11,800	897-313= 584	0.049
11,600	780-313= 467	0.040
11,000	916-313= 603	0.055
14,000	890-313 = 577	0.041
6 | 75,900		6 | 0.245

12,650 = L_{AV} = 2.40 MI. S_{AV} = 0.041 = 215.6 FT/MI.

LAG TIME FOR UNIT HYDROGRAPH

$LAG = K \left(\frac{L L_{CA}}{\sqrt{S}}\right)^{0.33}$

$= 3.75 \left(\frac{2.4(1.2)}{\sqrt{215.6}}\right)^{0.33}$

$= 3.75 (0.196)^{0.33} = 2.19$ SAY 2.2 HRS

$L_{CA} = L_{AV}/2 = \frac{2.4 \text{ MI.}}{2} = 1.2$ MI.

S = 215.6 FT/MI.

K = 3.75 CURVE B (MIXED COVER)

BY [illegible] DATE 5.3.79 — LOUIS BERGER & ASSOCIATES INC. — SHEET NO. 3 OF

CHKD. BY _____ DATE _____ — INSPECTION OF DAMS — PROJECT _____

SUBJECT PORTLAND RESERVOIR — HYDROLOGY

CHECK VELOCITY:

$$V = \frac{12,650'}{3600 \times 2.2 \text{ HR}} = 1.6 \text{ FPS} \quad \text{OK} \checkmark$$

PG. 70 DSD - FOR S = .03 to .04 - V_{AV} = 3 FPS NAVDOCKS
" S = .04 to .07 V_{AV} = 2 FPS TEXAS

∴ V_{AV} = 1.6 FPS FOR S_{AV} = .041 IS O.K. —

CALC. T_p (TIME TO PEAK

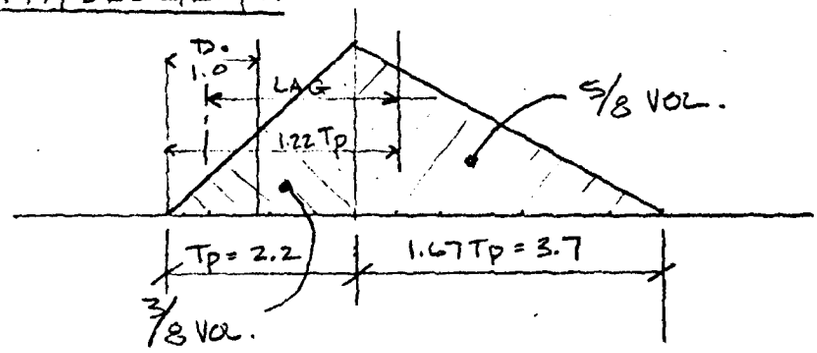
$$T_p = \frac{LAG}{1.22} + \frac{D}{2(1.22} = 0.82 LAG + 0.42 D$$

$$= 0.82(2.2) + 0.42(1)$$

$$= 1.804 + 0.42 = 2.22 \quad \text{SAY } 2.2 \text{ HRS}$$

D = 1.0 (SET)
PG 69 DSD
(MODIFIED)

UNIT HYDROGRAPH



Q_p Q TO PEAK

$$Q_{P_1} = \frac{484 A Q}{T_p}$$

A = 3.52 SQ. MI.
Q = 1" (UNIT)
T_p = 2.2 HRS

$$= \frac{484(3.52)(1)}{2.2} = 774.4 \text{ CFS}$$

RAINFALL 24" RAINFALL IN 6HRS (ACOE SET)

$$PMF = 0.8(24") - 0.4 = 18.8 \text{ IN}$$
$$D\text{-}S$$

FIT FACTOR = 0.8
INFIL. = 0.4

BY _____ DATE 5-2-79 | LOUIS BERGER & ASSOCIATES INC. | SHEET NO. 4 OF

CHKD. BY _____ DATE _____ | INSPECTION OF DAMS | PROJECT _____

SUBJECT _____ | PORTLAND RESERVOIR

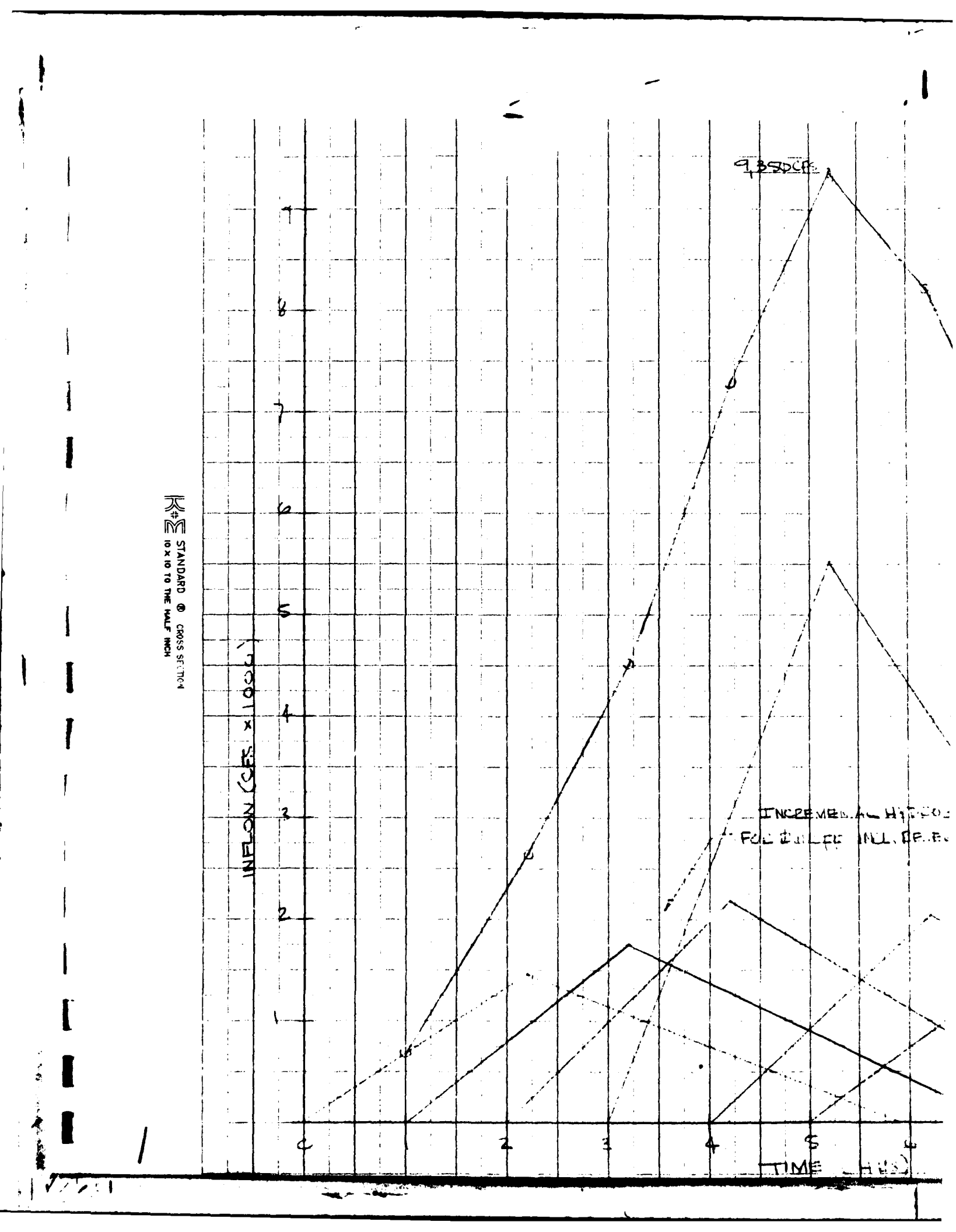
FLOOD HYDROGRAPH FOR PMF – INFLOW

$Q_p(1") = 774$ CFS

TIME HR	RAINFALL % *	RAINFALL IN	Q_p CFS	BEGIN HR	PEAK HR	END HR	
0							
1	10	1.88	1455	0	2.2	5.9	
2	12	2.26	1749	1	3.2	6.9	
3	15	2.82	2183	2	4.2	7.9	
4	38	7.14	5526	3	5.2	8.9	
5	14	2.63	2036	4	6.2	9.9	
6	11	2.07	1602	5	7.2	10.9	

* DISTRIB. OF MAX. 6 HRS SPS OF PMP IN %

– EM 1110-2-1411 (ACOE)


9,350CFS
INFLOW (CFS x 1000)
TIME - HRS
0
1
2
3
4
5
6
7
8
9

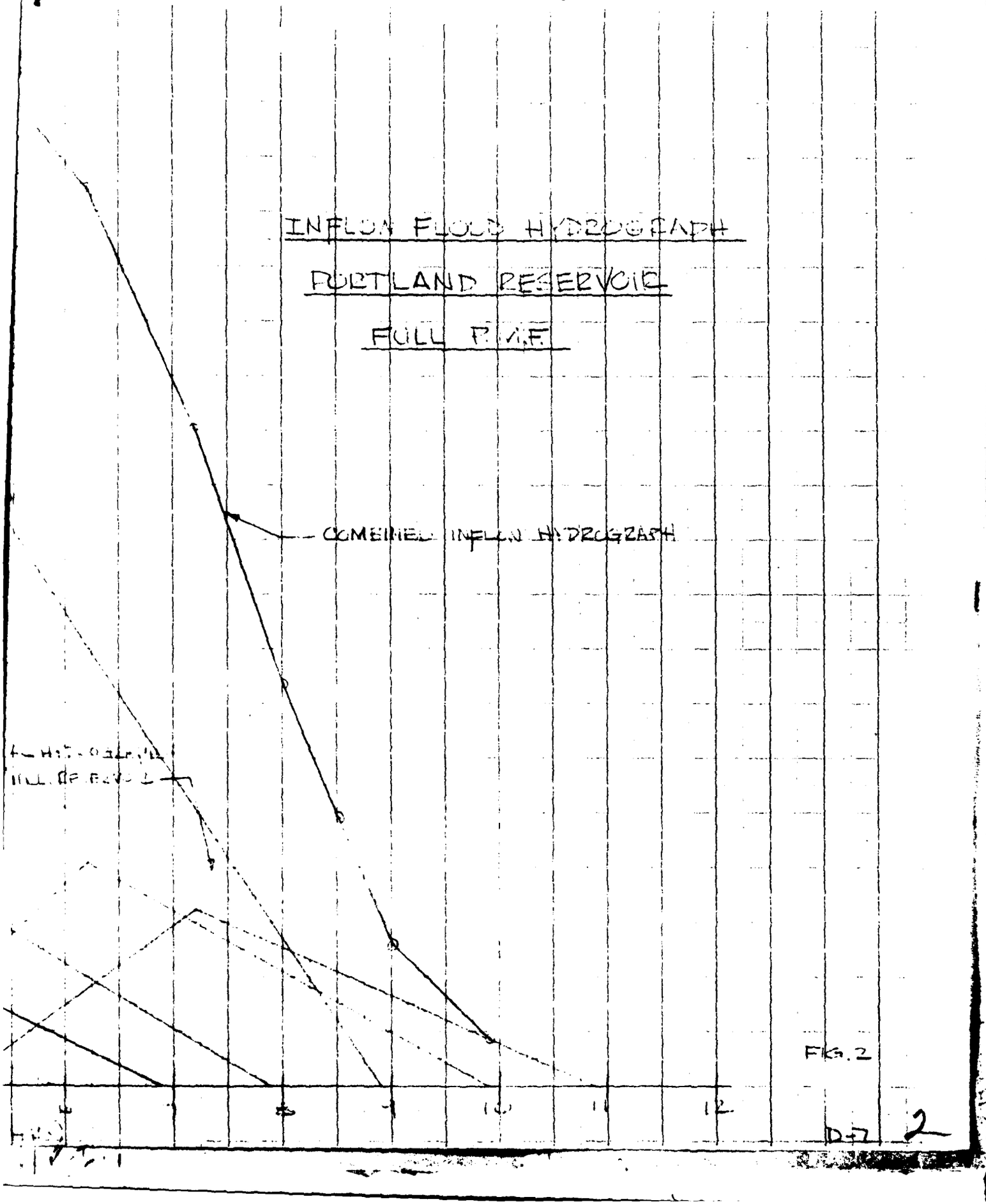

INFLOW FLOOD HYDROGRAPH
PORTLAND RESERVOIR
FULL P.M.F.
COMBINED INFLOW HYDROGRAPH
12

FIG. 2

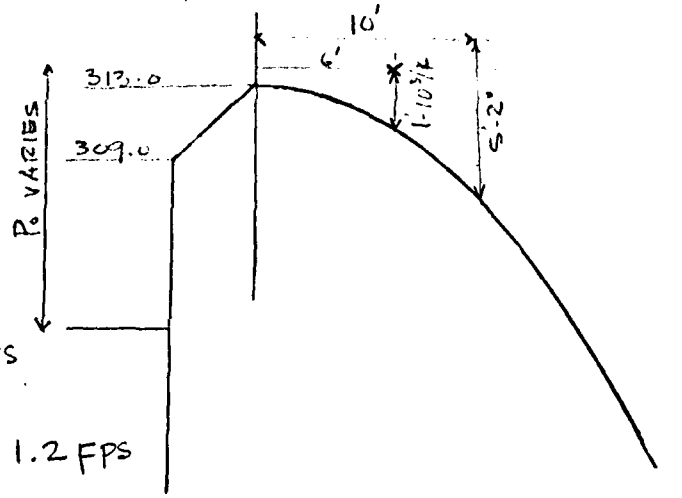
D-7 2

BY RCH DATE 5.3.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1 OF

CHKD. BY _____ DATE _____ INSPECTION OF DAMS PROJECT _____

SUBJECT DISCHARGE ANALYSIS - PORTLAND RESERVOIR

OGEE WIER



GIVEN: $X = 10'-0"$
$Y = 5'-2"$

P_o (VARIES) $P_{o(AV.)} = \frac{25+5}{2} = 14.5'$

ASSUME $H_o = 3'$, $C = 4$

$q = C H_o^{3/2} = 4(3)^{3/2} = 20.8$ CFS

Approach $V = \frac{20.8}{P_o + H_o} = \frac{20.8}{14.5+3} = 1.2$ FPS

$h_a = \frac{V^2}{2g} = \frac{(1.2)^2}{64.4} = 0.022$

$\frac{h_a}{H_o} = \frac{0.022}{3} = 0.007$

FROM FIG 2.47 DSD - $n = 1.775$ $K = 0.54$ 45° SLOPE

$$\frac{Y}{H_o} = K\left(\frac{X}{H_o}\right)^n$$

$$\frac{5.16}{H_o} = 0.54\left(\frac{10'}{H_o}\right)^{1.775}$$

$$\frac{5.16}{0.54} = H_o\left(\frac{10}{H_o}\right)^{1.775}$$

$$9.55 = H_o\left(\frac{10^{1.775}}{H_o^{1.775}}\right)$$

$$9.55 = \frac{10^{1.775}}{H_o^{0.775}}$$

$$H_o^{0.775} = \frac{10^{1.775}}{9.55} = \frac{59.6}{9.55} = 6.24'$$

$H_o = 10.7'$ (REVISE CALC)

BY RCC DATE 5.3.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 2 OF

CHKD. BY DATE INSPECTION OF DAMS PROJECT

SUBJECT DISCHARGE ANALYSIS - PORTLAND ME.

GIVEN $X = 10'$

$Y = 5'-2"$

P_o AV = 14.5

ASSUME $H_o = 319.5 - 313 = 6.5'$

$C = 4$

$q = CH_o^{3/2} = 4(16.6) = 66.3$

$V = \frac{66.3}{14.5+6.5} = \frac{66.3}{21} = 3.15$ FPS

$h_a = \frac{V^2}{2g} = \frac{3.15^2}{64.4} = 0.154$

$\frac{h_a}{H_o} = \frac{0.154}{6.5} = .024$

FROM FIG 247 DSD - $n = 1.77$ $K = 0.54$ 45° SLOPE

$$\frac{Y}{H_o} = K\left(\frac{X}{H_o}\right)^n$$

$$\frac{5.16}{H_o} = 0.54\left(\frac{10}{H_o}\right)^{1.77}$$

$$\frac{5.16}{0.54} = H_o\left(\frac{10^{1.77}}{H_o^{1.77}}\right)$$

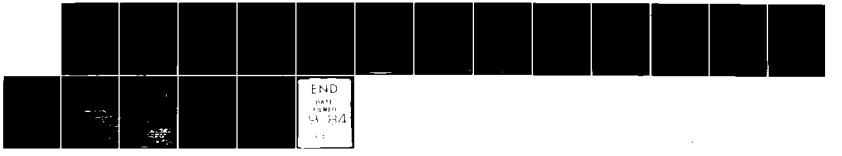
$$9.55 = \frac{10^{1.77}}{H_o^{0.77}}$$

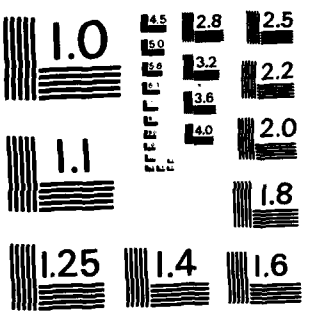
$$H_o^{0.77} = \frac{58.9}{9.55} = 6.16$$

$$\underline{H_o = 10.6'}$$

AD-A143 346 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS PORTLAND RESERVOIR DA..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV JUN 79 2/2

UNCLASSIFIED F/G 13/13 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

BY _____ DATE 5.3.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 3 OF

CHKD. BY _____ DATE _____ INSPECTION OF DAMS PROJECT _____

SUBJECT DISCHARGE ANALYSIS - PORTLAND RES.

CHECK OGEE USING ANOTHER PT. ON CURVE

$x = 6'$

$Y = 1' - 10\frac{3}{4}" = 1.9'$

$P_o (AV.) = 14.5'$

ASSUME $H_o = 10.5'$, $C = 4'$

$q = C H_o^{3/2} = 4(10.5)^{3/2}$

$= 136$ CFS

$h_a = \frac{V^2}{2g} = \frac{5.44^2}{64.4} = 0.46$

$V = \frac{136}{P_o + H_o} = \frac{136}{14.5 + 10.5} = \frac{136}{25}$

$= 5.44$ FPS

$\frac{h_a}{H_o} = \frac{0.46}{10.5} = .044$

FROM FIG 247 DSD — $n = 1.76$, $K = 0.54$

$$\frac{Y}{H_o} = K \left(\frac{x}{H_o}\right)^n$$

$$\frac{1.9}{H_o} = 0.54 \left(\frac{6}{H_o}\right)^{1.76}$$

$$\frac{1.9}{0.54} = H_o \left(\frac{6^{1.76}}{H_o^{1.76}}\right) = \frac{23.4}{H_o^{0.76}}$$

$$3.52 = \frac{23.4}{H_o^{0.76}} \qquad H_o^{0.76} = \frac{23.4}{3.52} = 6.64$$

$H_o = 12'$

USE $H_o = 11.0'$

$\frac{P_o}{H_o} = \frac{14.5}{11} = 1.32$ FIG 249 — $C_o = 3.92$

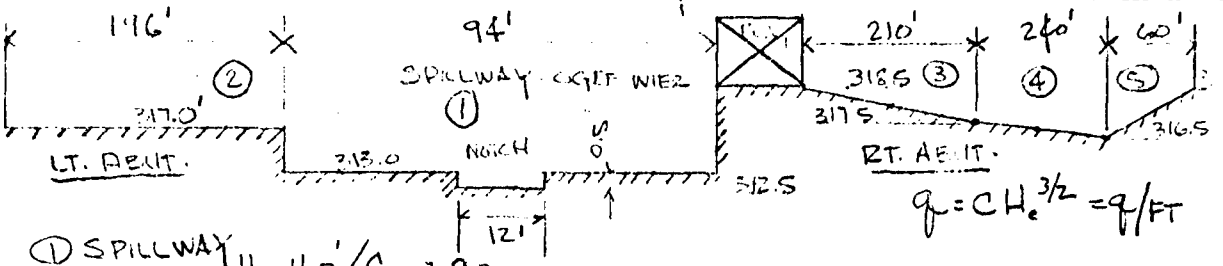
FIG. 251 — FOR 3:3 SLOPE - REDUCE $0.994 \times 3.92 = 3.90$

$\therefore \quad H_o = 11.0' \quad C_o = 3.90$

BY _____ DATE 5.4.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 4 OF

CHKD. BY _____ DATE _____ PROJECT PORTLAND RESERVOIR

SUBJECT DISCHARGE ANALYSIS



$q = CH_e^{3/2} = q/FT$

① SPILLWAY $H_o = 11.0'/C_o = 3.90$

ELEV.	H_e	H_e/H_o	C/C_o	C	q/FT	L=94' ΔQ	Σ Q①	REMARKS
312.5	0							NOTCH
313.0	0.5	L= 12'		2.8	1.0	12	12	SPILLWAY CREST
314	1.0	0.09	.82	3.20	3.20	301	313	
315	2.0	0.18	.85	3.31	9.36	880	892	
316	3.0	0.27	.88	3.43	17.82	1675	1687	
317	4.0	.36	.89	3.47	27.76	2609	2621	
317.5	4.5	.41	.90	3.51	33.50	3149	3161	TOP ABUTMENT
318	5.0	.45	.91	3.55	39.69	3730	3742	
318.5	5.5	.50	.92	3.59	46.31	4353	4365	
319	6.0	.54	.93	3.63	53.35	5015	5027	
320	7.0	.64	.95	3.71	68.71	6459	6471	
321	8.0	.73	.96	3.74	84.65	7955	7967	
322	9.0	.82	.98	3.82	103.14	9695	9707	

② LT. ABUTMENT L= 196'

ELEV.	H_e ②	—	—	C	q/FT	ΔQ②
317	0					0
317.5	0.5	———	———	2.8	1.0	196
318.0	1.0	———	———	"	2.8	549
318.5	1.5	———	———	"	5.1	1008
319	2.0	———	———	"	7.9	1552
320	3.0	———	———	"	14.5	2852
321	4.0	———	———	"	22.4	4390
322	5.0	———	———	"	31.3	6136

BY ___ DATE 5.4.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 5 OF

CHKD. BY ___ DATE ___ INLET OF DAM PROJECT ___

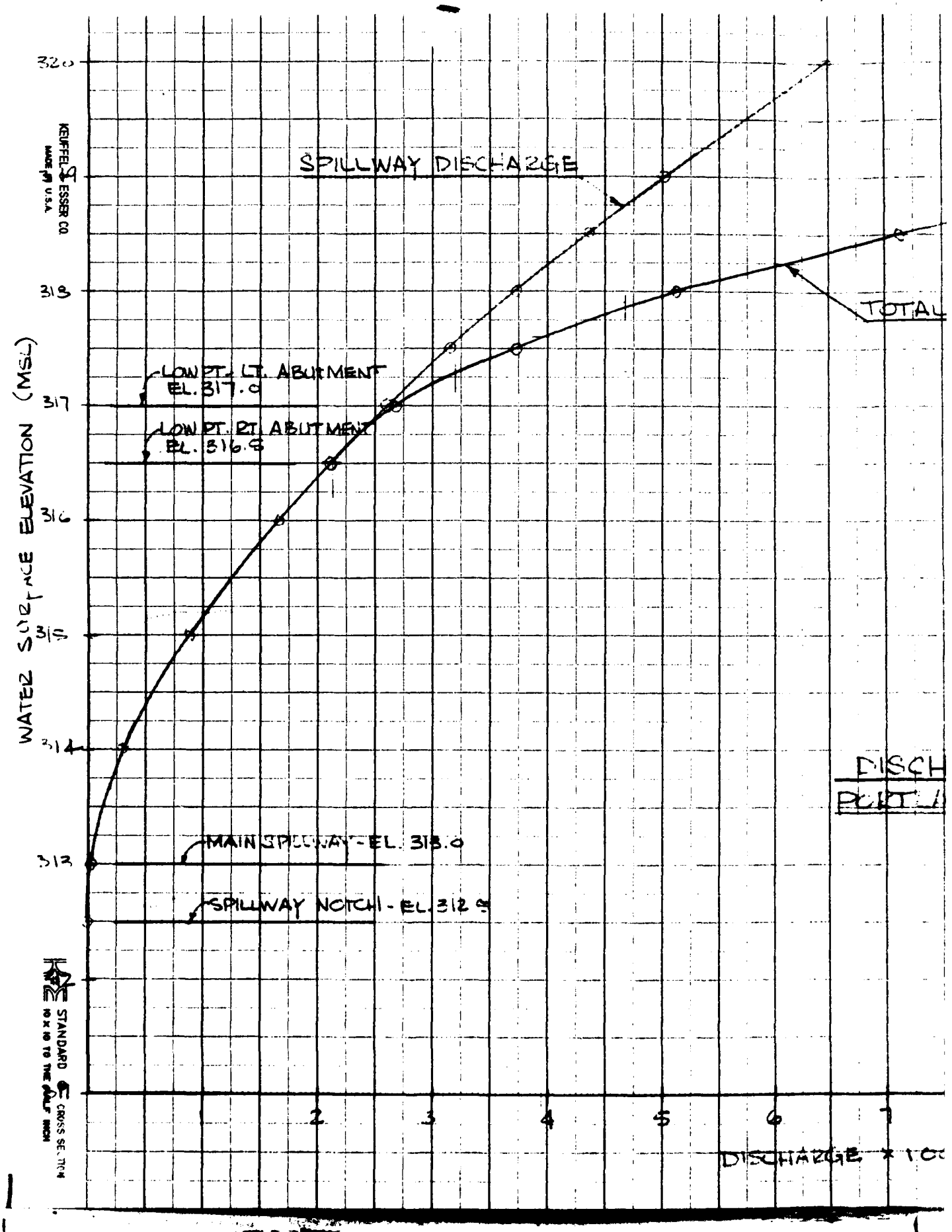
SUBJECT PORTLAND RESERVOIR - DISCHARGE ANALYSIS

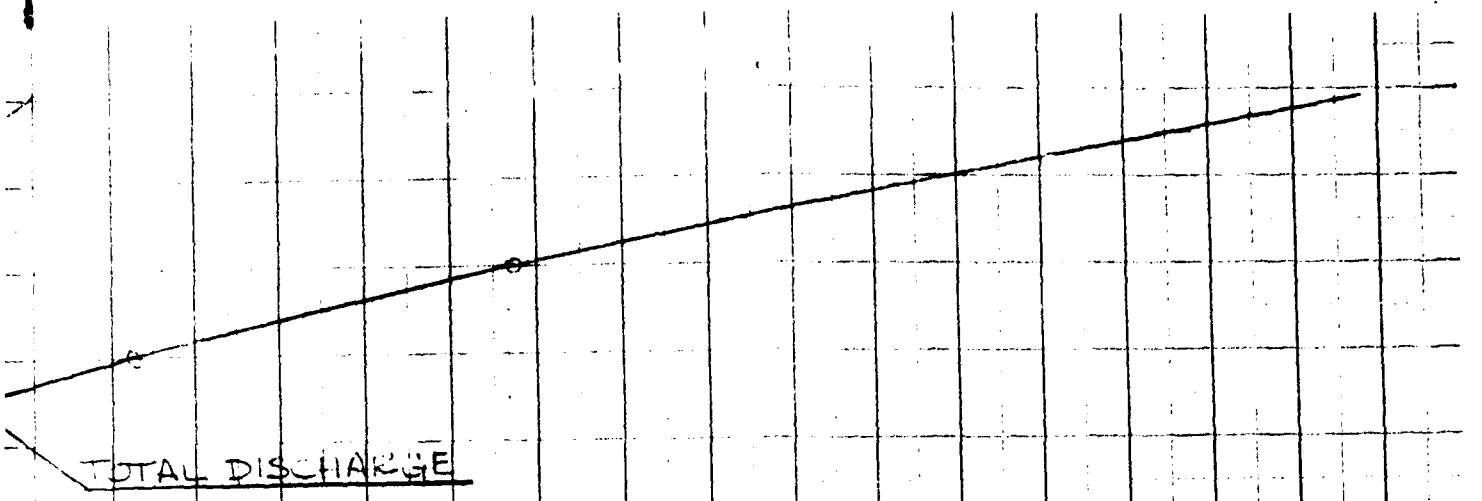
LT ABUTMENT (3), (4) & (5) $q = CH^{3/2}$ FOR □ ; $q/2$ FOR ▱

	(3) L=210'				(4) L=240'				(5) L=60'			
ELEV	H_3	C	q/FT	ΔQ_3	H_4	C	q/FT	ΔQ_4	H_5	C	q/FT	ΔQ_5
316.5					0	—	—	—	0	—	—	—
317.0					0.5	2.8	L=120 0.5 L=240	59	0.5	2.8	L=15 0.5	7
317.5	0	—	—	—	1.0	2.8	1.4	336	1.0	"	L=30 1.4	42
318.0	0.5	2.8	L=105 0.5 L=210	52	1.5 HAV.	"	2.8	672	1.5	"	L=45 2.6	117
318.5	1.0 HAV.	"	1.4	294	1.5	"	5.1	1224	2.0	"	L=60 4.0	240
319.0	1.0	2.8	2.8	588	2.0	"	7.9	1896	1.5 HAV	"	5.1	306
320.0	2.0	"	7.9	1663	3.0	"	14.5	3480	2.5	"	11.1	666
321.0	3.0	"	14.5	3055	4.0	"	22.4	5376	3.5	"	18.3	1098
322.0	4.0	"	22.4	4704	5.0	"	31.3	7512	4.5	"	26.7	1602

SUMMARY

	SPILLWAY	LT. ABT.		RT. ABT.		
ELEV	ΔQ_1	ΔQ_2	ΔQ_3	ΔQ_4	ΔQ_5	ΣQ CFS
312.5	0					0
313.0	12					12
314.0	313					313
315.0	892					892
316.0	1687					1687
316.5				0	0	
317.0	2621	0		59	7	2687
317.5	3161	196	0	336	42	3735
318.0	3742	549	52	672	117	5132
318.5	4365	1008	294	1224	240	7131
319.0	5027	1552	588	1896	306	9369
320.0	6471	2852	1663	3480	666	15,132
321.0	7967	4390	3055	5376	1098	21,886
322.0	9707	6136	4704	7512	1602	29,661


SPILLWAY DISCHARGE
TOTAL
LOW PT. LT. ABUTMENT EL. 317.0
LOW PT. RT. ABUTMENT EL. 316.9
MAIN SPILLWAY - EL. 313.0
SPILLWAY NOTCH - EL. 312.9
WATER SURFACE ELEVATION (MSL)
DISCHARGE
320
319
318
317
316
315
314
313
312
2
3
4
5
6
7
KEUFFEL & ESSER CO.
MADE IN U.S.A.
STANDARD CROSS SECTION



DISCHARGE CURVE
PUMP AND RESERVOIR

FIG. 3

BY: _____ DATE 5.7.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1 OF

CHKD. BY _____ DATE _____ INSPECTION OF DAMS PROJECT _____

SUBJECT FLOOD ROUTING - PORTLAND RESERVOIR

AD = 2255 AC. = 3.52 SQ MI.
HT. DAM = 25' ±
STORAGE = 486 AC FT (ACOE)
459 AC-FT (TOWN)
391 AC-FT (CALCED)
8.0 SIZE CLASSIFICATION = SMALL

HAZARD POTENTIAL = HIGH

INSPECTION OF PMF

1. PEAK INFLOW Q_{P_1} = 9,350 CFS - FROM INFLOW HYDROGRAPH

2.a. SURCHARGE HT. FOR Q_{P_1} = 319.0 (FROM DISCHARGE CURVE)

b. VOLUME OF SURCHARGE ($STOR_1$) = 624 AC-FT (CAPACITY CURVE

$$STOR_1 \text{ (IN INCHES)} = \frac{624 \text{ AC-FT.} \times 12}{2255 \text{ AC}} = 3.32 \text{ INCHES}$$

c. $$Q_{P_2} = Q_{P_1}\left(1 - \frac{STOR_1}{19}\right) = 9350\left(1 - \frac{3.32}{19}\right)$$

$$= 9350 - 1634 = 7716 \text{ CFS}$$

3a. SURCHARGE HT FOR Q_{P_2} = 318.6 FT (FROM DISCHARGE CURVE)

b. VOLUME OF SURCHARGE ($STOR_2$) = 600 AC-FT

$$STOR_2 \quad \frac{600 \times 12}{2255} = 3.19 \text{ INCHES}$$

$$\text{AVER. STOR} = \frac{STOR_1 + STOR_2}{2} = \frac{3.32 + 3.19}{2} = 3.25 \text{ INCHES}$$

$$\frac{3.25 \text{ INCH} \times 2255}{12} = 610.7 \text{ AC-FT}$$

SURCHARGE HT (AVER) = 318.8 FT. (FROM CAPACITY CURVE)

FOR SURCHARGE HT. = 318.8 FT.

Q_{P_3} (PEAK OUTFLOW) = 8,450 CFS

MAX. SPILLWAY CAN HANDLE BEFORE ABUTMENTS OVERTOPPED IS A EL. 316.5 – Q_{MAX} = 2,140 CFS

∴ SPILLWAY INADEQUATE TO HANDLE FULL PMF
OVERTOPPED DAM BY 318.8 – 316.5 = 2.3 FT.

CHECK 1/2 PMF

Q_{P_1} = 9350 ÷ 2 = 4675 CFS

2a. SURCHARGE HT. = 317.9 FT

b. VOL. OF SURCHARGE ($STOR_1$) = 568 AC-FT

$STOR_1$ (IN INCHES) = $\frac{568 \times 12}{2255}$ = 3.0 INCHES

∴ $Q_{P_2} = Q_{P_1} \times \left(1 - \frac{STOR_1}{9.5}\right) = 4675\left(1 - \frac{3.0}{9.5}\right)$

= 4675 – 1476 = 3199 CFS

3a. SURCHARGE HT. = 317.3 FT

b. VOLUME OF SURCHARGE ($STOR_2$) = 544 AC-FT

($STOR_2$) = $\frac{544 \times 12}{2255}$ = 2.9 INCHES

AVER. STOR = 2.95 INCHES

BY PC DATE 5.7.76 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 3 OF

CHKD. BY DATE INSPECTION OF DAMS PROJECT

SUBJECT FLOOD ROUTING - PORTLAND RESERVOIR

AV. STOR = 2.95 INCHES

$$\frac{2.95 \times 2255}{12} = 55 \text{ AC-FT}$$

SURCHARGE HT. (AV) = 317.6 (FROM CAPACITY CURVE)

∴ $Q_{2/3}$ = 3,950 CFS

∴ SPILLWAY INADEQUATE TO HANDLE ½ PMF
OVERTOP DAM BY 317.6 - 316.5 = 1.1 FT

BY [illegible] DATE 5.7.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1 OF

CHKD. BY _____ DATE _____ PROJECT INSPECTION OF DAMS

SUBJECT FAILURE ANALYSIS - PECK AND RESERVOIR

STEP 1: RESERVOIR STORAGE AT FAILURE
ASSUME WATER ELEV. AT TOP OF DAM. W/O OVERTOPPING - SAY EL. 316.5

FROM CAPACITY CURVE - STORAGE AT EL. 316.5 = 510 AC-FT

STEP 2: PEAK OUTFLOW AT FAILURE

$$Q_{P_1} = 8/27\, W_b \sqrt{g}\, Y^{1.5}$$

$$Q_{P_1} = 8/27\,(125')\,(\sqrt{32.2})\,(28)^{1.5}$$

$$= 31{,}138 \text{ CFS SAY } \underline{31{,}000 \text{ CFS}}$$

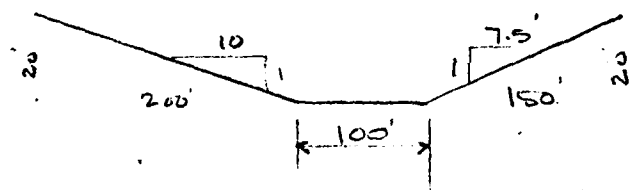
W_b = 40% DAM WIDTH AT MID HEIGHT
$= 0.40(316) = 126$
$= 125'$ @ EL. 302.5

Y_o = TOTAL HT. WATER LEVEL TO BED ELEV.
$= 316.5 - 288.5 = 28'$

STEP 3:

STAGE-DISCHARGE RATING CURVE FOR DOWNSTREAM REACH.

TYPICAL SECTION AT 1500' DOWNSTREAM.



USING MANNING FORMULA - $Q = VA = \left(\frac{1.486}{n} R^{2/3} S^{1/2}\right) A$

USE $n = 0.14$ (HDS #3 - PG 100.

$S_{AV.} = \frac{50}{1500} = .033$

H	A(SF)	P(LF)	$R^{2/3}$	$1.486/n$	$S^{1/2}$	Q CFS
5	719	188	2.45	10.61	0.182	3402
10	1875	276	3.59	"	"	12,998
15	3469	364	4.50	"	"	30,142
20	5500	452	5.29	"	"	56,193.
				"	"	

BY: [illegible] DATE 5.8.79 | LOUIS BERGER & ASSOCIATES INC. | SHEET NO. 2 OF

CHKD. BY: DATE | INSPECTION OF DAMS | PROJECT

SUBJECT: FAILURE ANALYSIS - PORTLAND RESERVOIR

STEP 4: $Q_{P_1} = 31{,}000$ CFS FROM S-D CURVE:

$STAGE_1 = 15.2$ FT

ESTIMATE Q_{P_2}

STORAGE (S) = 510 AC $\quad S/2 = 255$ AC-FT

TRY $L_{BREACH_1} = 1500'$

$$A_1 = \frac{15.2 \times 10 \times 15.2}{2} + 100 \times 15.2 + \frac{15.2 \times 7.5 \times 15.2}{2}$$

$$= 1155 + 1520 + 866 = 3541 \text{ S.F.}$$

$$V_1 = \frac{3541 \text{ SF} \times 1500'}{43560} = 121.9 \text{ AC-FT} \quad \text{OK.}$$

$$\text{TRIAL } Q_{P_2} = Q_{P_1}\left(1 - \frac{Vol_1}{S}\right) = 31{,}000\left(1 - \frac{122}{510}\right) = 23{,}580 \text{ CFS}$$

TRIAL $STAGE_2 = 13.7'$

$$A_2 = \frac{13.7 \times 10 \times 13.7}{2} + (13.7 \times 100) + \frac{13.7 \times 7.5 \times 13.7}{2}$$

$$= 938 + 1370 + 704 = 3012 \text{ SF}$$

$$V_2 = \frac{3012 \times 1500}{43{,}560} = 103.7 \text{ AC-FT}$$

$$V_{AV} = \frac{V_1 + V_2}{2} = \frac{121.9 + 103.7}{2} = 112.8 \quad \text{SAY } 113 \text{ AC-FT}$$

$$Q_{P_2} = Q_{P_1}\left(1 - \frac{113}{510}\right) = 24{,}131 \text{ CFS}$$

$STAGE_2 = 13.8$ FT

∴ AT 1500' D/S - $Q_{P_2} = 24{,}131$ CFS

$STAGE_2 = 13.8$ FT

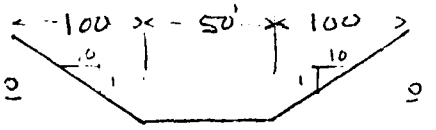
BY _____ DATE 5.8.79 | LOUIS BERGER & ASSOCIATES INC. | SHEET NO. 3 OF ____

CHKD. BY _____ DATE _____ | INSPECTION OF DAMS | PROJECT _____

SUBJECT PORTLAND — FAILURE ANALYSIS

AT 2700' D/S (100' PAST ROAD CROSSING)

SECTION:



$S_{AV} = \frac{30'}{1200} = .025$

H	A(SF)	P(LF)	$R^{2/3}$	$1.486/n$		C	Q_{CFS}
5	500	150.5	2.23	10.61		58	1869
10	1500	251.0	3.29	"		"	8,273
15	3000	351.5	4.18	"			21,021
17	3740	391.7	4.50	"		"	28,213

FOR $Q_{P_2} = 24,131$ CFS

$STAGE_2 = 15.8$ CFS

TRY $L_{REACH_2} = 1200'$

$A_2 = (15.8 \times 10 \times 15.8) + (15.8 \times 50) = 3286$ SF

$V_2 = \frac{3286 \times 1200}{43560} = 90.5 < 255$ OK

TRIAL $Q_{P_3} = Q_{P_2}\left(1 - \frac{V_2}{S}\right) = 24131\left(1 - \frac{91}{510}\right) = 19,825$ CFS

TRIAL $STAGE_3 = \underline{14.6 \text{ FT}}$

$A_3 = (14.6 \times 10 \times 14.6) + 50 \times 14.6 = 2861$

$V_3 = \frac{2861 \times 1200}{43,560} = 78.8$ AC-FT

$V_{AV} = \frac{V_2 + V_3}{2} = \frac{90.5 + 78.8}{2} = 84.6$ AC-FT

$Q_{P_3} = Q_{P_2}\left(1 - \frac{84.6}{510}\right) = 24,131(.834) = 20,128$ CFS

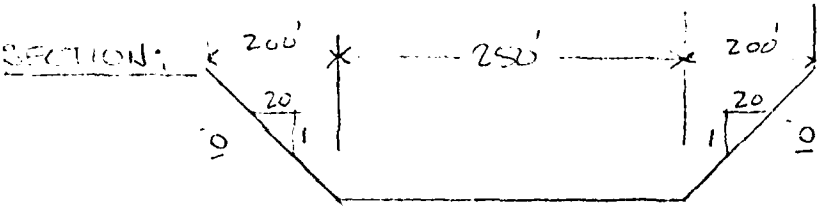
$\underline{STAGE_3 = 14.7 \text{ FT}}$

∴ AT 2700 D/S:
$Q_{P_3} = 20,128$ CFS
$STAGE_3 = 14.7'$ FT

BY ____ DATE 5.8.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 4 OF
CHKD. BY ____ DATE ____ FAILURE ANALYSIS PROJECT ____
SUBJECT PORTLAND RESERVOIR

AT 4500' D/S (NEXT TO SMALL SUBDIVISION)

SECTION:



$S_N = \frac{25}{1800} = .014$

+I	A (SF)	P (LF)	$R^{2/3}$	1.486/n	S½	Q CFS
5	1750	450.2	2.47	10.61	.118	5,412
10	4500	650.5	3.63	"	"	20,451
15	8250	850.7	4.55	"	"	46,996

FOR Q_{P_3} - 20,128 CFS
$STAGE_3$ = 10.0 FT — AREA WIDENS

TRY L_{REACH_3} = 1800'

$A_3 = 10 \times 20 \times 10 + (250 \times 10) = 2000 + 2500 = 4500$ SF

$V_3 = \frac{4500 \times 1800}{43560} = 186 < 255 = S/2$ O.K.

TRIAL $Q_{P_4} = Q_{P_3}(1 - \frac{V_3}{S}) = 20,128(1 - \frac{186}{510}) = 12,787$ CFS

TRIAL $STAGE_4$ = 8.2 FT

$A_4 = (8.2 \times 20 \times 8.2) + 250 \times 8.2 = 3395$ SF

$V_4 = \frac{3395 \times 1800}{43560} = 140$ AC-FT

$V_{AV} = \frac{186 + 140}{2} = 163$ AC-FT

$Q_{P_4} = Q_{P_3}(1 - \frac{V_{AV}}{S}) = 20,128(1 - \frac{163}{510}) = 13,695$ CFS

$STAGE_4$ = 8.4 FT

∴ AT 4500' D/S Q_{P_4} = 13,695 CFS
HT. = 8.4 FT

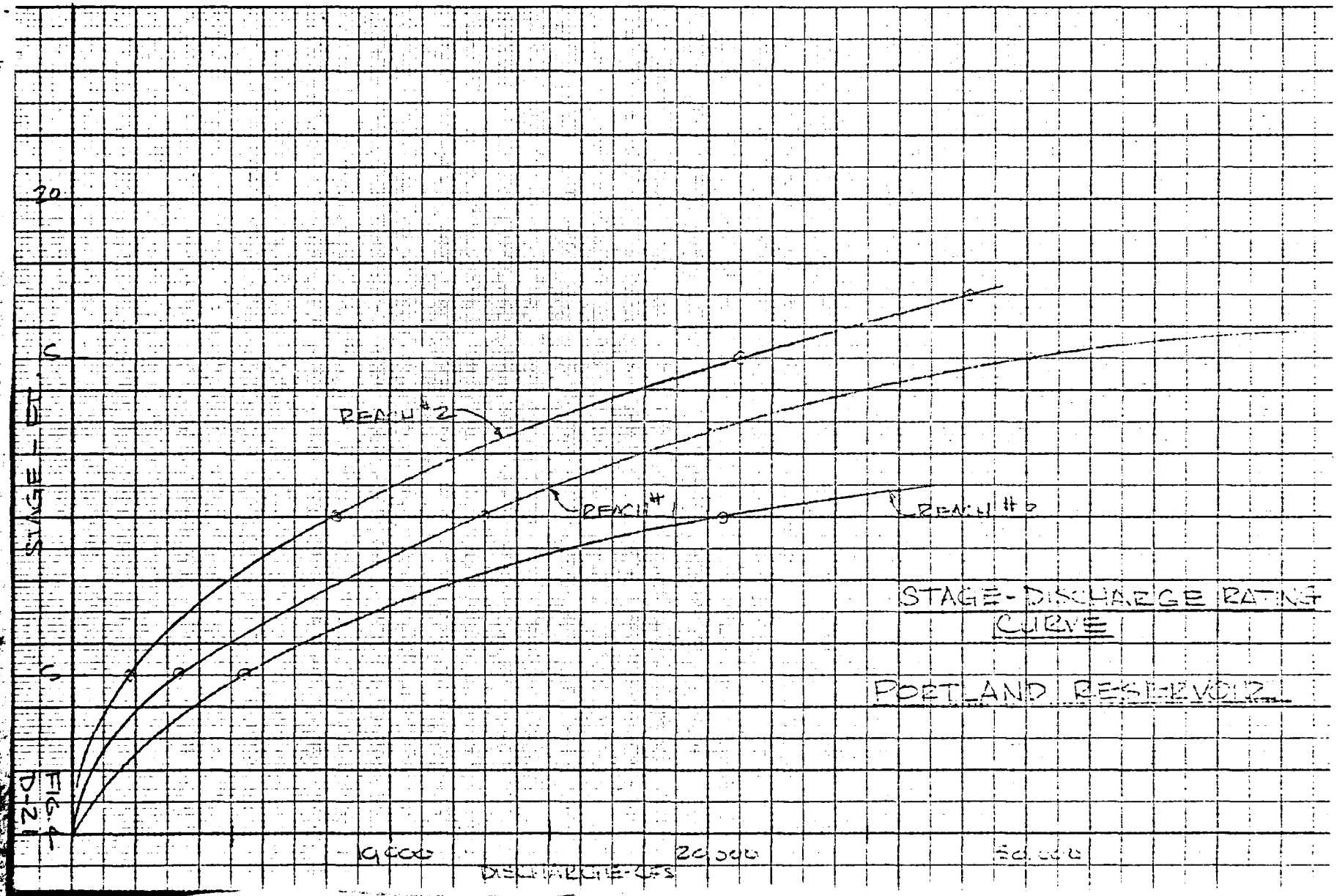
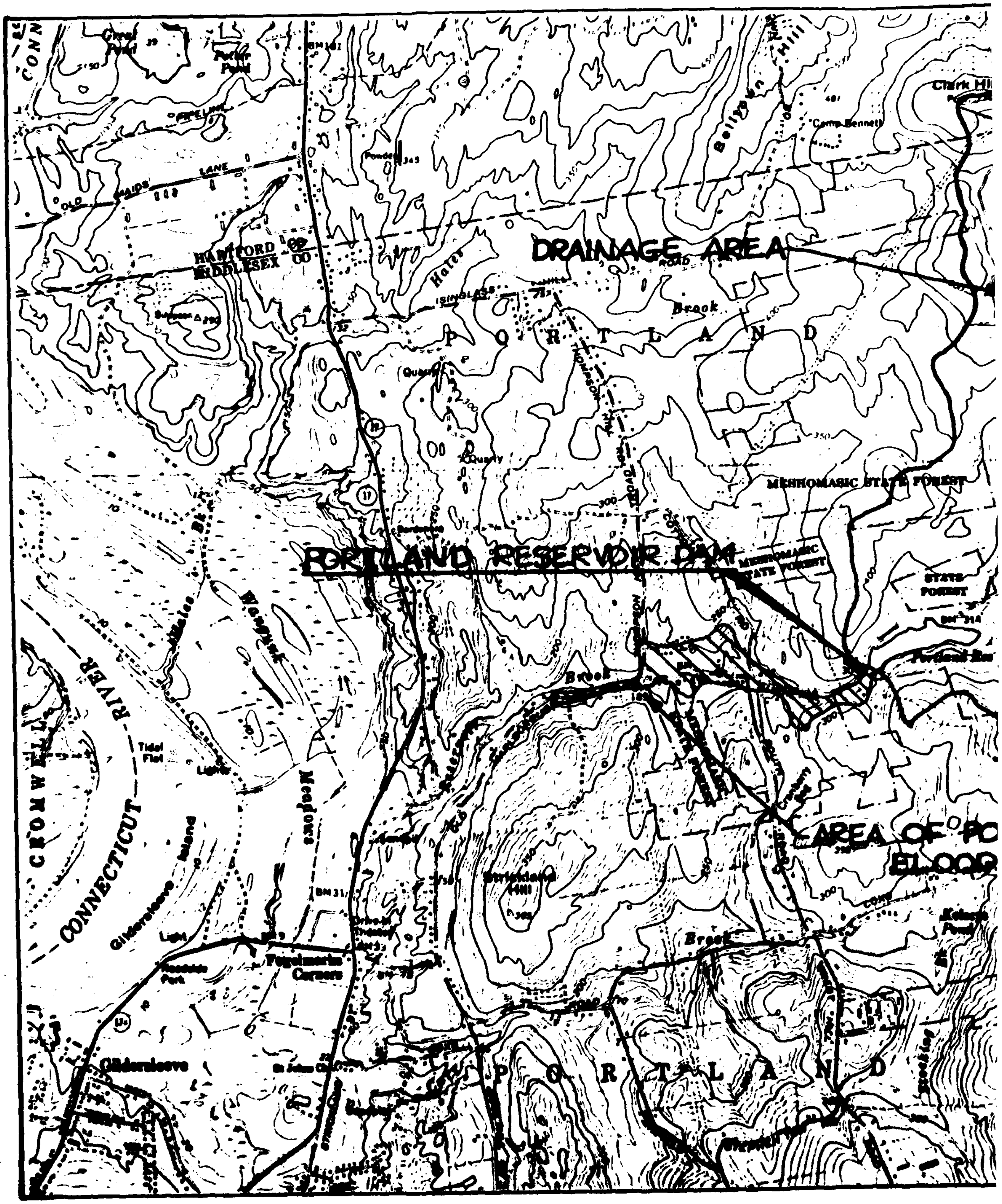
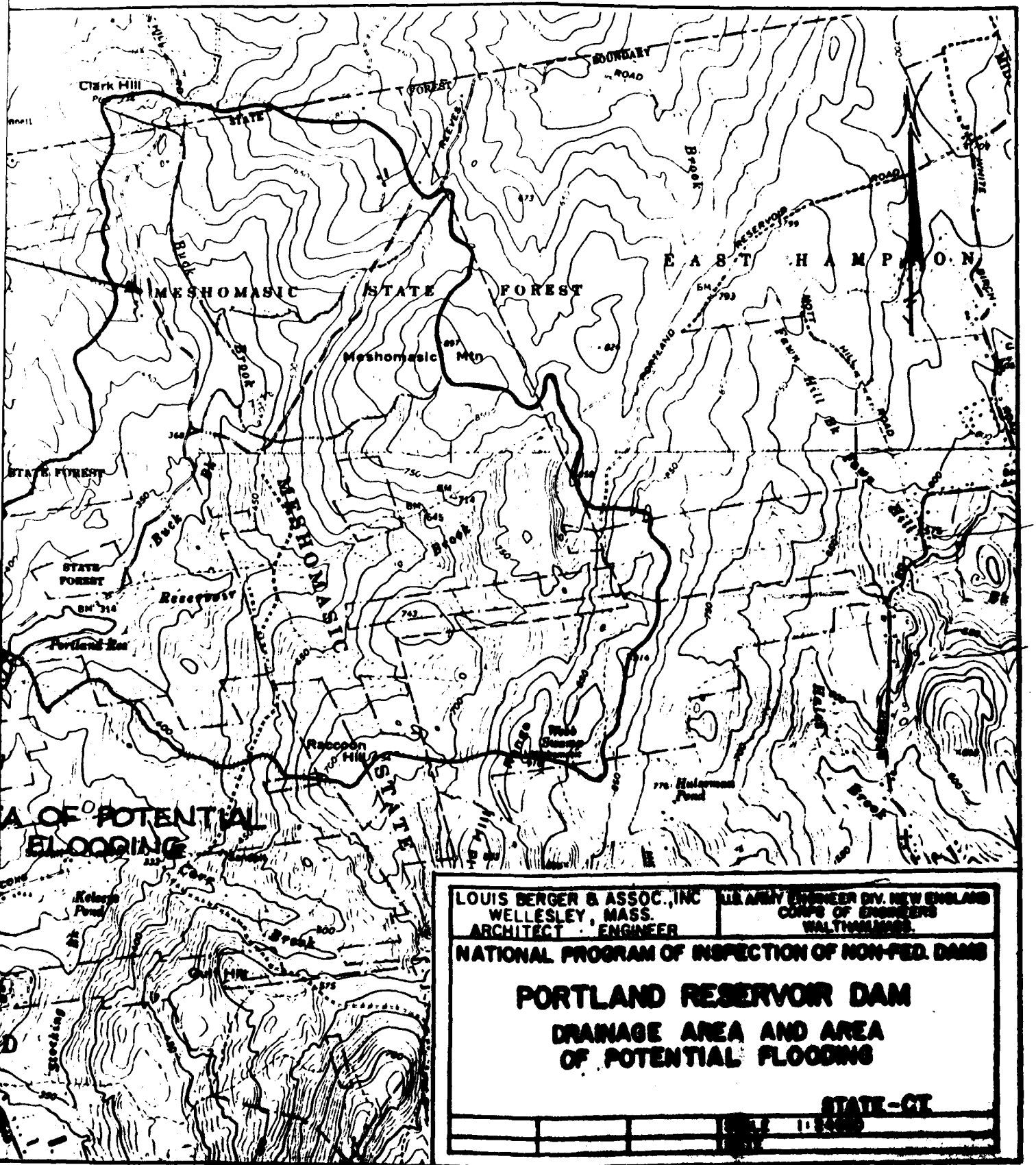


Fig 4
D-21


DRAINAGE AREA
PORTLAND RESERVOIR DAM
AREA OF
P O R T L A N D
P O R T L A N D
HARTFORD CO
MIDDLESEX CO
MESHOMASIC STATE FOREST
MESHOMASIC STATE FOREST
STATE FOREST
CONNECTICUT
RIVER
CROMWELL
Camp Bennett
Clark Hill
Brook
Brook
Quarry
Tidal Flat
Light
Gildersleeve



LOUIS BERGER & ASSOC., INC WELLESLEY, MASS. ARCHITECT · ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

PORTLAND RESERVOIR DAM

DRAINAGE AREA AND AREA OF POTENTIAL FLOODING

STATE - CT

SCALE 1:

FIGURE 5 - SHEET D-22

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NO.	DIVISION	STATE	COUNTY	CONGR. DIST.	STATE	COUNTY	CONGR. DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
CT	[illegible]	NED	CT	007	02				PORTLAND RESERVOIR DAM	4136.9	7234.2	25JUN79

POPULAR NAME	NAME OF IMPOUNDMENT
	PORTLAND RESERVOIR

REGION BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST FROM DAM (MI.)	POPULATION
[illegible]	RESERVOIR BROOK	PORTLAND	4	8900

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUC. HEIGHT (FT)	HYDRAU. HEIGHT (FT)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
[illegible]	[illegible]	S	30	24	510	375	NED	N	N	N	N	25JUN79

REMARKS

D/S HAZ	SPILLWAY LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)
1	550	U	94	2140	34200											

OWNER	ENGINEERING BY	CONSTRUCTION BY
TOWN OF PORTLAND,CONN	HARGRAVES ENGINEERS	

REGULATORY AGENCY DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	CT DEP

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
LOUIS BERGER + ASSOCIATES, INC	24APR79	PL92-367

REMARKS

3-INCLUDES DIKE 450 FT LONG

END

DATE
FILMED

9-84

DTIC