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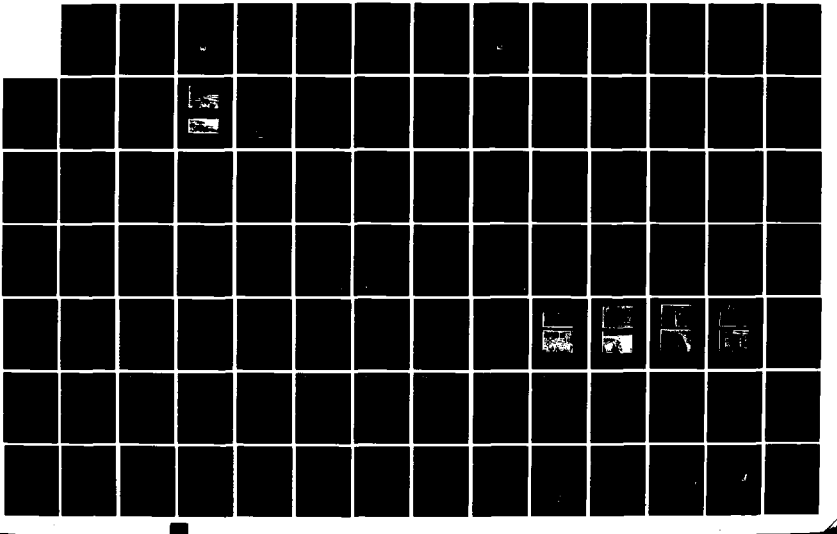

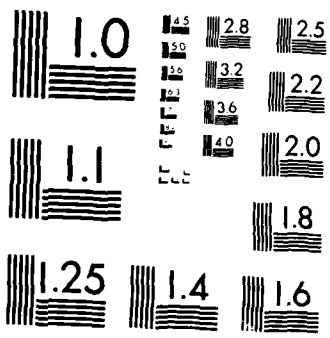

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NARRAGANSETT BAY BASIN
EAST PROVIDENCE, RHODE ISLAND

JAMES V. TURNER DAM
RI 01002

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

JANUARY 1981

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4. TITLE (and Subtitle) James V. Turner Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
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9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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18. SUPPLEMENTARY NOTES

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,

Narragansett Bay Basin
East Providence, RHode Island
Ten Mile River

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

THe dam is 22 ft.high and 820 ft. long. THe dam is judged to be in fair condition. There are items which require maintenance or evaluation. THe dam is intermediate in size with a high hazard potential. There are various recommendations which must be implemented by the owner.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED-E

JUN 15 1981

Honorable J. Joseph Garrahy
Governor of the State of Rhode Island
State House
Providence, Rhode Island 02903

Dear Governor Garrahy:

Inclosed is a copy of the James V. Turner Dam (RI-01002) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis. A brief assessment is included at the beginning of the report.

The preliminary hydrologic analysis has indicated that the spillway capacity for the James V. Turner Dam would likely be exceeded by floods greater than 37 percent of the Probable Maximum Flood (PMF). Our screening criteria specifies that a dam of this class which does not have sufficient spillway capacity to discharge fifty percent of the PMF, should be adjudged as having a seriously inadequate spillway and the dam assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structur l deficiency. It does indicate, however, that a severe storm may cau overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

It is recommended that within twelve months from the date of this report the owner of the dam engage the services of a professional or consulting engineer to determine by more sophisticated methods and procedures the magnitude of the spillway deficiency. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed. During periods of unusually heavy preciptiation, round-the-clock surveillance should be provided.

NEDED-E
Honorable J. Joseph Garrahy

I have approved the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the non-Federal Dam Inspection Program.

A copy of this report has been forwarded to the Department of Environmental Management, the cooperating agency for the State of Rhode Island. This report has also been furnished to the owner of the project, East Providence Water Works, Rumford, RI.

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

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

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

NARRAGANSETT BAY BASIN

EAST PROVIDENCE, RHODE ISLAND

JAMES V. TURNER DAM
RI 01002

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

JANUARY 1981

BRIEF ASSESSMENT

PHASE I INSPECTION REPORT

NATIONAL PROGRAM OF INSPECTION OF DAMS

Name of Dam:	JAMES V. TURNER DAM
Inventory Number:	RI 01002
State:	RHODE ISLAND
County:	PROVIDENCE
Town:	EAST PROVIDENCE
Stream:	TEN MILE RIVER
Owner:	EAST PROVIDENCE WATER WORKS
Date of Inspection:	OCTOBER 8, 1980 and NOVEMBER 20, 1980
Inspection Team:	PETER HEYNEN, P.E.
	HECTOR MORENO, P.E.
	TIMOTHY KAVANAUGH
	FRANK SEGALINE
	THEODORE STEVENS

The James V. Turner Dam was constructed in 1934 to impound a public water supply reservoir, but the reservoir is no longer used for this purpose. The entire project consists of an approximately 22 foot high earth embankment dam and several small dikes and berms around the reservoir. The dam is approximately 820 feet long and includes a 200 foot long concrete spillway and a concrete outlet structure. The spillway crest is 5 feet below the top of the dam, and with the reservoir level to the top of the dam, approximately 3100 acre-feet of water is impounded. Two 54 inch low-level outlets are located at the bottom of the outlet structure to the right of the spillway. An abandoned brick gatehouse located at the top of the outlet structure contains two manually operated lifts which operate the low-level outlets and a third lift which operates a sluice gate to a 66 inch raw water supply line to an abandoned filtration plant about 2600 feet downstream of the dam. Adjacent to the right end of the dam is the west dike, which is a 6 foot high, 730 foot long earth embankment. Two small dikes on the east shoreline and a berm on the west shoreline of the reservoir do not prevent water from flowing out of the reservoir to another watercourse. They appear to have been constructed mainly to provide access to portions of the reservoir shoreline and to a buried storm sewer line around the reservoir.

Based upon the visual inspection at the site and past performance, the project is judged to be in fair condition. There are items which require maintenance and/or evaluation, such as the inacessability of the gatehouse, brush and trees growing on the embankments and at the abutments, erosion of areas of the dam, presence of animal burrows in the embankments, and cracks and deterioration of the concrete.

In accordance with the Army Corps of Engineer's Guidelines, James V. Turner Reservoir Dam is classified as a high hazard, intermediate size dam. The test flood for Turner Reservoir Dam is the Probable Maximum Flood (PMF). Peak inflow to the reservoir at PMF is 24,000 cubic feet per second (cfs); peak outflow is 22,600 cfs with the dam overtopped by 2.0 feet. The spillway capacity with the reservoir level to the top of the dam is 8300 cfs, which is equivalent to 37% of the routed test flood outflow.

It is recommended that the owner retain the services of a registered professional engineer qualified in dam design and inspection to perform further studies as presented in Section 7.2. These include a more detailed analysis of the project discharge capacity, repair of the concrete training walls, removal of trees from the embankments, restoration of the outlet facilities and an evaluation of the condition of the spillway and downstream channel. Recommendations made by the engineer and should be implemented by the owner.

The above recommendations and further remedial measures presented in Section 7.3 should be instituted within one year of the owner's receipt of this report.

Peter M. Heynen, P.E.
Project Manager - Geotechnical
Cahn Engineers, Inc.

STATE OF CONNECTICUT
PETER M. HEYNEN
NO. 6018
REGISTERED
PROFESSIONAL ENGINEER

C. Michael Horton P.E.
Chief Engineer
Cahn Engineers, Inc.

STATE OF CONNECTICUT
CLARENCE M. HORTON
No. 8433
REGISTERED
PROFESSIONAL ENGINEER

This Phase I Inspection Report on James V. Turner 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 judgement and practice, and is hereby submitted for approval.

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

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

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

The information contained in this report is based on the limited investigation described above and is not warranted to indicate the actual condition of the dam. The integrity of the dam can only be determined by a means of a monitoring program and/or a detailed physical investigation. The accuracy of available data is assumed where not in obvious conflict with facts observable during the visual inspection.

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 inspection. 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 would necessarily 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 will 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 there of. 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 neccessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

SECTION 2: ENGINEERING DATA

2.1 DESIGN DATA

Available data consists of original drawings, entitled East Providence Reservoir, Contract 1, by Waterman Engineering Company dated March 1934, data sheet dated June 30, 1949, dam inspection report dated Sept. 20, 1978, a summary of run-off data prepared by the East Providence Water Company beginning in May 1922 until June 1927 and a dam inventory report.

The drawings and correspondence indicate the design features stated previously in this report. There were no engineering values, assumptions, test results or calculations available for the original dam design.

2.2 CONSTRUCTION DATA

There is no data available for the original construction of the dam other than the run-off data stated in 2.1.

2.3 OPERATIONS DATA

The reservoir was abandoned as a public water supply in 1970 because of poor water quality. Since that time, there has been no operational procedures followed at the dam.

2.4 EVALUATION OF DATA

a. Availability - Existing data was provided by the State of Rhode Island Department of Environmental Management. The owner made the project available for visual inspection.

b. Adequacy - There was no detailed engineering data available; therefore, the final assessment of this project must be based on visual inspection, performance history, hydraulic computations of spillway capacity, and hydrologic judgements.

c. Validity - A comparison of record data and visual observations reveals that the East Dikes were not built according to plan. The designed top elevations of East Dike No. 1 and East Dike No. 2 were 51.0 and 50.0 respectively, but field measurements indicate that the top elevation of each is approximately 48.0.

1. Invert:	Low-level outlets:	el. 29.5
	Supply main (at inlet):	el. 32.25
2. Size:	Low-level outlets	54 inch (2 low-level outlets)
	Supply main	66 inch
3. Description:	Low-level outlets	Unknown
	Supply main	Unknown
4. Control mechanism:		Manually operated sluice gates
5. Other:		N/A

4. Top width:	
Dam and dikes	15± ft.
5. Side slopes:	
Earth Dam	3H to 1V (Upstream) 4H to 1V (Downstream)
West dike	3H to 1V (Upstream) 1.5H to 1V (Downstream)
East dike #1	3H to 1V (Upstream) Variable (Downstream)
East dike 2	3H to 1V (Upstream and downstream)
6. Zoning:	N/A
7. Impervious core:	Concrete corewall (Earth dam only)
8. Cutoff:	Steel sheet-piling (Earth dam only)
9. Grout curtain:	N/A
10. Other:	N/A
h. Diversion and Regulating Tunnel -	N/A
i. Spillway	
1. Type:	Ogee
2. Length of weir:	200 ft.
3. Crest elevation:	46.0
4. Gates:	N/A
5. Upstream channel:	N/A
6. Downstream channel:	30± ft. concrete stilling pool 50± ft. stone pavement channel 1200± ft. unpaved channel
7. General:	N/A
j. Regulating Outlets	
2 - 54 inch low-level outlets 1 - 66 inch supply main	Considered abandoned at time of the inspection

4. Top of dam pool:	12,000± ft.
5. Test flood pool:	12,300± ft.

e. Reservoir Storage

1. Normal pool:	1300 acre-ft.
2. Flood control pool:	N/A
3. Spillway crest pool:	1300 acre-ft.
4. Top of dam pool:	3100 acre-ft.
5. Test flood pool:	4100 acre-ft.

f. Reservoir Surface

1. Normal pool:	275 acres
2. Flood control pool:	N/A
3. Spillway crest pool:	275 acres
4. Top of dam pool:	390 acres
5. Test flood pool:	460 acres

g. Dam and Dikes

1. Type:

Dam	
Left of spillway	Earth embankment
Right of spillway	Concrete gravity and earth fill
Dikes	
West dike	Earth embankment
East dike #1	Earth embankment
East dike #2	Earth embankment

2. Length:

Dam	820+ ft.
West dike	730± ft.
East dike #1	550± ft.
East dike #2	350± ft.

3. Height:

Dam	22.0 ft.
West dike	6± ft.
East dike #1	2± ft.
East dike #2	2± ft.

4. Ungated spillway capacity @ test flood el. 53.0:	13,700 cfs
5. Gated spillway capacity @ normal pool:	N/A
6. Gated spillway capacity @ test flood:	N/A
7. Total spillway capacity @ test flood el. 53.0:	13,700 cfs
8. Total project discharge @ test flood el. 53.0:	22,600 cfs

c. Elevations - The spillway crest elevation, on which all the elevations in this report are referenced, is assumed to be 46.0, as shown on Design Drawings sheets 1 through 4 by Waterman Engineering Co. (March 1934). This elevation was confirmed by a survey on Dec. 10, 1980 under the direction of Mr. Owen Devine, Superintendent of the East Providence Water Company and is approximately equal to elevation 46.0 on National Geodetic Vertical Datum (NGVD).

1. Streambed at toe of dam:	29.0±
2. Bottom of cutoff:	12.0
3. Maximum tailwater:	32.0±
4. Normal pool:	46.0
5. Full flood control pool:	N/A
6. Spillway crest (ungated):	46.0
7. Design surcharge (original design):	Not known
8. Top of Dam:	51.0
9. Top of west dike:	51.0
10. Test flood surcharge:	53.0

d. Reservoir Length

1. Normal pool:	11,500± ft.
2. Flood control pool:	N/A
3. Spillway crest pool:	11,500± ft.

f. Operator - Owen Devine
67 Talmer Avenue
Riverside, Rhode Island 02915
Tel: (401)433-3123

g. Purpose of Project - Originally for public water supply, but its use was discontinued because of poor water quality.

h. Design and Construction History - The following information is believed to be accurate, based on the available data, correspondence and an interview with the owner of the dam. The dam was designed by Waterman Engineering Company and constructed in 1934 to serve as a public water supply. Maximum flow over the spillway was reported in 1949 to be 15 inches above the spillway crest. This flow was assumed to have occured in 1936. Because of the vandalism to the gatehouse the handwheels to the gates were removed, the door was removed and the doorway opening sealed with concrete block and mortar and a window which is easily accessible was covered with a steel plate. There is no record of repairs or other alterations other than removing the handwheels and sealing the doorway and window to the gatehouse.

i. Normal Operational Proceedures - There are no formal operational procedures followed at the dam. The sluice gates for the two 54 inch low-level outlets and the 66 inch supply main are closed, inaccessible, and for all practical purposes, abandoned.

1.3 PERTINENT DATA

a. Drainage Area - The drainage area is 48 square miles of flat and coastal terrain with many areas of swampland to the east and northeast. The land is moderately to heavily developed.

b. Discharge at Damsite - Discharge is over the concrete spillway only. The two low-level outlets cannot be considered discharge structures because the present condition of the gatehouse prevents access for operation. These outlets are therefore considered abandoned.

1. Outlet Works 2 - 54 inch low level outlets invert el. 29.5:	Considered abandoned at time of inspection
66 inch supply main inlet invert el. 32.25:	Abandoned
2. Maximum known flood at damsite:	15 inches (el. 44.25) above spillway crest Assumed date 1936.
3. Ungated spillway capacity @ top of Dam el. 51.0	8300 cfs

The spillway, having a crest elevation of 46.0, is a 200 foot long concrete ogee type spillway with a 30± foot long, 2.0 foot deep concrete stilling pool approximately 14.5 feet (el. 31.5) below the spillway crest. The spillway crest, at el. 46.0, is 5 feet below the top of dam (el. 51.0). At each end of the spillway are concrete training walls which extend approximately 100 feet downstream from the spillway.

The masonry outlet structure, which is also the foundation of the brick gatehouse, is adjacent to the right end of the spillway. Within the gatehouse, which is presently sealed, there are three gate operating stands. If operable, these stands control flow through the two 54 inch low-level outlets and an abandoned 66 inch raw water supply main. The two low-level outlets discharge from the base of the gatehouse foundation into the spillway channel. The supply main is buried along the right side of the downstream channel and transmitted flow by gravity from the reservoir to the filtration plant approximately 2600 feet downstream of the dam. Reportedly, the filtration plant was abandoned in 1970 and the supply main shut off at the gatehouse.

To the right of the dam, the west dike extends in a northwesterly direction. The west dike has a height of 6 feet and a top width of about 15 feet. The upstream slope is riprapped and inclined at 3 horizontal to 1 vertical and the downstream slope is inclined at 2 horizontal to 1 vertical.

East Dike No. 1 is a 2 foot high irregularly shaped earth embankment built on a grade sloping upward away from the reservoir toward Ledge Road. A 16 inch storm sewer line is buried in, and adjacent to, the dike which serves as an access road to the sewer manholes. East Dike No. 2 is a 2 foot high earth embankment. The top of the dike is approximately 15 feet wide and also serves as an access road for nearby manholes to the storm sewer line. Neither of these dikes or the West Berm are necessary for the impoundment of water in the reservoir.

c. Size Classification - INTERMEDIATE - The project impounds 3100 acre-feet of water with the reservoir level to the top of the dam, which at elevation 51.0, is 22 feet above the streambed of Ten Mile River. According to recommended guidelines, a dam with a storage capacity between 1,000 and 50,000 acre-feet is classified as intermediate in size.

d. Hazard Classification - HIGH - If the dam were breached, there is potential for the loss of more than a few lives and extensive property damage to industrial buildings and numerous houses downstream of the dam.

e. Ownership - East Providence Water Works
Hunts Mill Road
Rumford, Rhode Island 02916
Owen Devine (Superintendent)
Tel: (401) 434-3311

1.2 DESCRIPTION OF PROJECT

a. Location - The dam is located on Ten Mile River in a densely populated area of the City of East Providence, County of Providence, State of Rhode Island. The dam is shown on the East Providence, Mass.-R.I. USGS Quadrangle Map having coordinates latitude N41°50.0' and longitude W71°20.5'.

b. Description of Dam and Appurtenances - As shown on Sheets B-1 hrough B-4, the dam is an earth embankment with a total length of approximately 820 feet including a 25 foot long masonry outlet structure, and a 200 foot long ogee type spillway. Adjacent to the right end of the dam is the 730± foot long west dike. Extending in a northerly direction from the end of the west dike to Newman Avenue (a distance of approximately 2600 feet) the shoreline was straightened by placing fill and grading it to the existing topography. This fill area, which was constructed at the same time as the dam, is referred to as the west berm. Two dikes are located on the east side of the impoundment. East Dike No. 1 is a low dike which closes a small depression at Ledge Road. East Dike No. 2 is a low dike located approximately midway between the dam and Newman Avenue. The portion of the reservoir north of Newman Avenue is shown on some maps as Central Pond (See Sheet D-2). Newman Avenue is on a man-made embankment with no apparent regulation of flow, i.e. water level is the same on both sides, and its ability to withstand head differentials is unknown. Therefore, the two water bodies are considered to be a single impoundment.

The earth embankment dam, which is adjacent to the left end of the spillway and approximately 22 feet high, contains a steel sheet pile cutoff and a concrete corewall (See Sheets B-1 through B-4). The top of the dam is approximately 15 feet wide and grass covered. The upstream slope is inclined at 3 horizontal to 1 vertical with riprap slope protection to about 2 feet from the top of the dam. The grass covered downstream slope is inclined at 4 horizontal to 1 vertical. The portion of the dam to the right of the outlet structure consists of a 20 inch thick concrete wall upstream and a grass covered earth embankment inclined at 3 horizontal to 1 vertical downstream. The top width is approximately 15 feet.

A 6 inch agricultural tile foundation drain is located along the footing on the downstream side of the corewall and outlets through the left spillway training wall to the spillway channel. This drain is located approximately at original ground elevation and is accessible from manholes near the toe of the downsteam slope. There are 16 inch diameter storm drains along both the east and west shorelines of the reservoir. These drains outlet to the spillway channel from the left and right spillway training walls, respectively. Manholes to the drain pipes are located at the top of the embankment section to the left of the spillway and at the toe of the west dike, to the right of the spillway (See Sheet B-2).

PHASE I INSPECTION REPORT

JAMES V. TURNER RESERVOIR DAM

SECTION I - 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. Cahn Engineers, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Rhode Island. Authorization and notice to proceed were issued to Cahn Engineers, Inc. under a letter of April 14, 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW 33-80-C-0052 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection Program - The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interests.

2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dam.

3. To update, verify and complete the National Inventory of Dams.

c. Scope of Inspection Program - The scope of this Phase I inspection report includes:

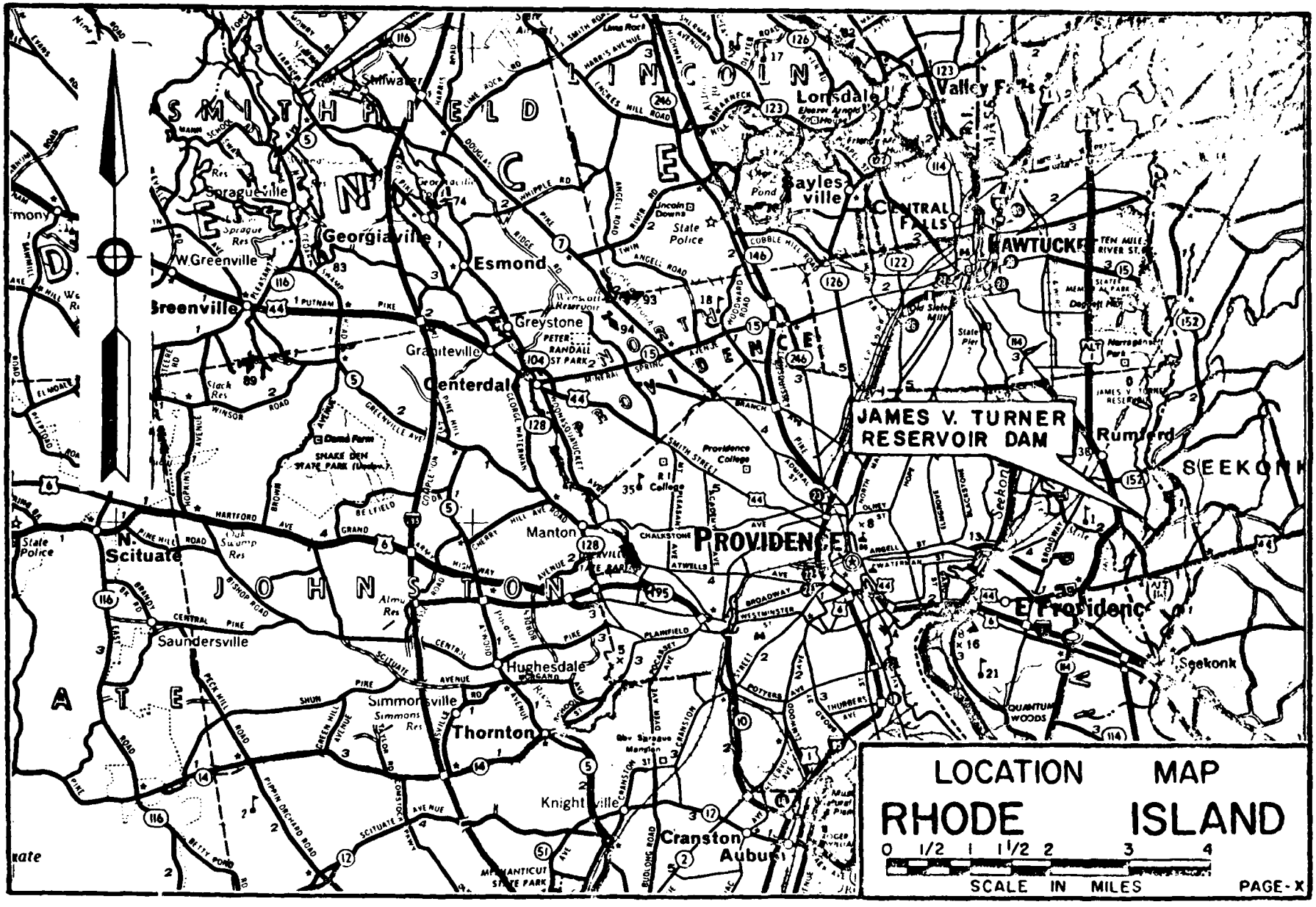
1. Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.

2. A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.

3. Computations concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.

4. An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgement on the safety or stability of the dam other than on a visual basis. The inspection is to identify those features of the dam which need corrective action and/or further study.


JAMES V. TURNER
RESERVOIR DAM
LOCATION MAP
RHODE ISLAND
0 1/2 1 1 1/2 2 3 4
SCALE IN MILES
PAGE-X

OVERVIEW FROM LEFT SIDE OF CHANNEL
(11-20-80)

OVERVIEW FROM RIGHT SIDE OF CHANNEL
(10-8-80)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS CAHN ENGINEERS INC. WALLINGFORD, CONN ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	James V. Turner Res. Dam Ten Mile River East Providence, RI CE# 27 785 KG DATE Jan. 1981 PAGE ix

APPENDICES

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SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General - The general condition of the project is fair. The inspection revealed several areas requiring maintenance and monitoring. At the time of the inspections the pond level was at elevation 46.2, i.e. 4.8 feet below the top of the dam with water flowing at a depth of 0.2 feet over the spillway crest.

b. Dam and Dikes

Dam

Top of Earth Dam - The grass cover on the dam is approximately 2 feet tall except for where trespassing along the top has worn a path. Some small trees and brush are also growing along the top (Photos 1 and 4).

Upstream Slope - The upstream slope is heavily overgrown with small to moderate size trees and brush (Photo 1). The growth of this vegetation has displaced riprap thus allowing wave action and surface runoff to begin eroding the slope.

Downstream Slope - The downstream slope is vegetated with tall grass, small trees and brush (Photo 4). There are many animal burrows approximately 8 to 12 inches in diameter in the embankment. The soil at the toe of the dam from the left of the spillway to the left abutment is wet. A back channel, which is the original streambed, extends from about the left abutment and connects with the spillway channel approximately 350 feet downstream of the spillway. This channel is approximately 30 feet wide at its widest point and is up to 3 feet deep (Photo 7). There is no apparent movement of the water in the channel and its depth is regulated by a small dam approximately 2500 feet downstream. No seepage along the toe of the slope was observed; however, observation was obscured in certain areas where the back channel extends to the toe of the dam. It appeared that the foundation drain was functioning properly. Discharge from the drain was clear and flowing at a rate of approximately 2 to 3 gallons per minute (gpm).

Spillway - Water was flowing over the spillway at the time of the inspection; therefore, the extent of the inspection was limited. The spillway crest shows no signs of irregularities (Photo 4). A concrete stilling pool extends from the toe of the spillway for a distance of about 30 feet. With water flowing over the spillway, the condition of the stilling pool could not be observed. Cracks up to 1 inch wide are present in the concrete training walls at construction joints and where the walls change slope or direction. The left wall has some spalling and deterioration on its face and above the drain outlet and the storm sewer outlet. The downstream end of the right wall is deteriorated and some minor spalling is present on the wall face (Photos 4,5,6).

West Dike

Top of West Dike - The top of the dike is irregular and overgrown with many small to moderate size trees and brush. Excessive trespassing along the top has worn a path through the protective grass mat (Photo 3).

Upstream Slope - The upstream slope is irregular and heavily overgrown with brush and small to moderate size trees (Photos 2, 3). Wave action has displaced riprap and eroded into the slope. Tree growth has also contributed to riprap displacement.

Downstream Slope - The downstream slope is also heavily overgrown with brush and small to moderate size trees. Some minor erosion is present from surface runoff. No seepage was observed at the time of the inspection (Photo 3).

East Dikes - The East Dikes are not necessary for the impoundment of water in the reservoir. They appear to have been constructed mainly for facilitating the alignment of storm sewer lines around the reservoir. Both dikes have irregular top elevations and are vegetated with trees and brush. However, the only possible damage resulting from overtopping and/or failure of the dikes would be to the storm sewers.

c. Appurtenant Structure - The brick gatehouse is in poor condition. All the windows are broken, graffiti covers the walls, wood trim is broken, roof shingles are torn off, etc. (Photo 8). The door has been removed and the opening sealed with concrete block and mortar. One window on the downstream side has been covered with a steel plate to prevent trespassing. The handwheels have been removed and stored by the East Providence Water Department to prevent vandals from opening the sluice gates. The low-level outlets could not be inspected because of the condition of the gatehouse. For all practical purposes the gatehouse has been abandoned.

d. Reservoir Area - The area surrounding the reservoir is generally wooded, flat coastal terrain. There are residential developments at several locations near the edge of the reservoir. The reservoir area includes the water body to the north of Newman Avenue, which is shown on the USGS topographic map (Sheet D-2) as Central Pond.

e. Downstream Channel - The downstream channel is a realigned channel of the Ten Mile River. From the stilling pool for about 50 feet the channel is lined with stone pavement. Beyond this pavement the channel bottom is soil and cobbles with riprap protection on the banks. Approximately 1200 feet downstream of the dam, the manmade channel joins the original river channel.

3.2 EVALUATION

Based upon the visual inspection, the project is assessed as being in fair condition. The following features which could influence the future condition and/or stability of the project were identified.

1. Erosion has occurred due to trespassing along the top of the dam and other embankments.

2. Trees, brush and burrowing animals could cause piping and/or seepage by creating flow paths, either along root systems or through holes, in the embankments. Trees, if uprooted, may produce depressions which may be critical to the stability of the dam.

3. Trees and brush growing through the riprap on the upstream slope will displace the riprap, thus leaving the underlying earth vulnerable to erosion.

4. The lack of riprap at the waterline on the upstream embankment will allow wave action to continue eroding into the embankment.

5. Freeze-thaw cycles can act within the cracks in the concrete structures, thus leading to further deterioration.

6. The condition and operability of the low level outlets is unknown because of the inaccessible condition of the gatehouse.

7. If there were an emergency where the low-level outlets had to be opened, with the gatehouse in its present condition, the time it would take to obtain the handwheels, gain access, and open the valves, if operable, may prove critical to the safe operation of the dam.

SECTION 4: OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES

a. General - No formal program of operation has been in effect since the reservoir was abandoned as a public water supply in 1970.

b. Description of any Warning System in Effect - No formal warning system is in effect.

4.2 MAINTENANCE PROCEDURES

a. General - There is no formal program of maintenance or inspection at the dam.

b. Operating Facilities - No formal prog m for maintenance of operating facilities is in effect.

4.3 EVALUATION

Operation and maintenance procedures are not performed. A formal program of operation and maintenance procedures should be implemented, including documentation to provide complete records for future reference. Also, an emergency action plan as well as a formal downstream warning system should be developed and implemented within the time frame indicated in Section 7.1c. Remedial operation and maintenance recommendations are presented in Section 7.3.

SECTION 5: EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL

The James V. Turner Reservoir Dam watershed is 48.0 square miles of flat and coastal wooded terrain typically containing large swamps and impoundments (Falls Pond, Manchester Pond Reservoir, Greenwood Lake and Digville Pond) which contribute to the sluggish runoff characteristics of the watershed.

The reservoir is formed by an earthfill dam with a concrete spillway, and three earthfill dikes. The available storage reduces the outflow from a Probable Maximum Flood (PMF) of 24,000 cubic feet per second (cfs) to 22,600 cfs and the ½ PMF outflow from 12,000 cfs to 11,000 cfs.

The top of the dam and west dike are approximately at elevation 51.0. Overtopping of the East Dikes will occur at a lower elevation, but this will only cause small depressions behind the dikes to be flooded. Therefore, the elevation of the top of the East Dikes in not significant in hydrualic computations. The reservoir is crossed by an embankment at Newman Avenue; however, this structure was not assumed to be capable of impounding water.

5.2 DESIGN DATA

No computations could be found for the original design of the dam.

5.3 EXPERIENCE DATA

No documented information is available. Presently no records are kept and the owner's previous flow records were destroyed in a fire. A flow of 15 inches in depth over the spillway is reported to have occured in 1936. Mr. Owen Devine, superintendant of the East Providence Water Works, reported that the most severe flood he could recall occured in March or April 1968, when sandbags had to be placed to prevent flooding of the filtration plant.

5.4TEST FLOOD ANALYSIS

Based upon the U.S. Army Corps of Engineers "Preliminary Guidance for Estimating Maximum Probable Discharges" dated March, 1978; the watershed classification (Flat and Coastal), and the watershed area of 48.0 square miles, a PMF of 24,000 cfs or 500 cfs per square mile is estimated at the damsite. In accordance with the size (intermediate) and hazard (high) classification, the test flood is the PMF. The reservoir level at the start of the test flood is considered to be at spillway crest elevation 46.0. The peak outflow for the test flood is estimated at 22,600 cfs and this flow will overtop the dam by 2.0 feet. Based on hydraulic computations, the spillway capacity to the first point of overtopping of the dam is 8,300 cfs which is equivalent to 37% of the routed test flood outflow (Appendix D-6).

5.5 DAM FAILURE ANALYSIS

Many houses and industrial/commercial structures with first floors less than 12 feet above the stream constitute the potential initial impact area in case of failure of Turner Dam. These are located in an approximately 12,000 foot long reach of the Ten Mile River between Turner Reservoir and the river's confluence with the Seekonk River. In particular, at least 10 houses with first floors between 6± feet and 10± feet above the stream are located in an area immediately downstream from Pawtucket Avenue (Route 1A-114).

The dam failure analysis is based on the April, 1978 Army Corps of Engineers "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs". With the reservoir level at the first point of overtopping of the dam, peak outflow before failure of the dam would be about 8,300 cfs and the peak failure outflow from the dam breaching would total about 48,300 cfs.

The prefailure depth of flow at the initial impact area would be 5.5 feet, or approximately 0.5 foot below the first floor of the lowest house in the impact area. A breach of the dam would result in a rapid 2.6 to 3.6 foot increase in water levels to depths of approximately 8.1 to 9.1 feet. This sudden outflow will cause rapid innundation of several houses by 2 or more feet, possibly causing loss of more than a few lives and substantial economic loss. Based on the dam failure analysis, James V. Turner Reservoir Dam is classified as a high hazard dam (Appendix D-11).

SECTION 6: EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATIONS

The visual inspection did not reveal any indications of immediate stability problems. There are areas of deterioration, and erosion, as described in Section 3, however they are not considered stability concerns at the present time.

6.2 DESIGN AND CONSTRUCTION DATA

The drawings and data available and listed in Appendix B were not sufficient to perform an in depth stability analysis of the project. No engineering assumptions, data or calculations could be found for the original design of the dam.

6.3 POST CONSTRUCTION CHANGES

There are no known post-construction changes to the project other than the sealing of the gatehouse doorway and window.

6.4 SEISMIC STABILITY

The project is in Seismic Zone 2 and according to the Recommended Guidelines, need not be evaluated for seismic stability.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition - Based upon the visual inspection of the site and past performance, the project appears to be in fair condition. However, there are areas which require maintenance, repair and monitoring.

Based upon the Army Corps of Engineers' "Preliminary Guidance for Estimating Maximum Probable Discharges" dated March, 1978, the watershed classification and hydraulic/hydrologic computations, peak inflow to the reservoir at test flood is 24,000 cubic feet per second (cfs); peak outflow is 22,600 cfs with the dam overtopped 2.0 feet. Based upon our hydrualic computations, the spillway capacity to the top of the dam is 8300 cfs, which is equivalent to approximately 37% of the routed test flood outflow.

b. Adequacy of Information - The information available is such that an assessment of the condition and stability of the project must be based solely on visual inspection, past performance and sound engineering judgement.

c. Urgency - It is recommended that the measures presented in Section 7.2 and 7.3 be implemented within one year of the owner's receipt of this report.

7.2 RECOMMENDATIONS

It is recommended that further studies be made by a registered professional engineer qualified in dam design and inspection pertaining to the following items. Recommendations made by the engineer should be implemented by the owner.

1. A detailed hydraulic/hydrologic analysis to determine the adequacy of the project discharge and existing outlet facilities.

2. With the gatehouse and low-level outlets restored to operating condition, the reservoir level should be lowered to where no water is flowing over the spillway so that the condition of the spillway stilling pool, paved channel, and unpaved channel can be evaluated.

3. Removal of all trees and tree stumps from the embankments and abutments and from within 25 feet of the toe of the dam and west dike. This should include removal of root systems and proper backfilling.

4. The slopes of the dam and west dike should be regraded and riprap slope protection replaced to prevent further erosion by wave action and surface runoff.

5. The possibility of seepage contributing flow to the back-channel at the toe of the embankment should be investigated.

6. Cracks in the concrete structures should be filled and spalling repaired to prevent further deterioration of the concrete.

7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures - The following measures should be undertaken by the owner within the length of time indicated in Section 7.1.c, and continued on a regular basis.

1. Round-the-clock surveillance should be provided during periods of heavy precipitation or high project discharge. A formal downstream warning system should be developed to be used in case of emergencies at the dam.

2. A formal program of operation and maintenance procedures should be instituted and fully documented to provide accurate records for future reference. The maintenance procedures should include a monthly inspection by the owner or owner's representative.

3. A comprehensive program of inspection by a registered professional engineer qualified in dam inspection should be instituted on a biennial basis.

4. Brush should be removed from the embankments and from within 25 feet of the toe as part of the regular maintenance of the project.

5. Grass should be re-established at the eroded areas particularly where trespassing has caused erosion along the tops of the embankments.

6. Grass on the slopes and at the top of the dam and west dike should be mowed as part of regular maintenance procedures.

7. Animal burrows should be properly backfilled.

8. The gatehouse should be restored to a condition where it would be accessible by authorized personnel only and the gates should be operational upon entry. Gate lifts should be maintained and exercised on a regular basis.

7.4 ALTERNATIVES

This study has identified no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT James V. Turner Reservoir Dam DATE: 10-8-80 11-20-80

TIME: Morning Morning

WEATHER: Sunny, fair Snow on ground sunny

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

PARTY:	INITIALS:	DISCIPLINE:
1. Peter Heyroth	PH	Geotechnical
2. Ted Stevens	TS	Geotechnical
3. Tim Kavanaugh	TK	Geotechnical
4 Hector Morena	HM	Hydraulic
5. Frank Segatine	FS	Survey
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Earth Embankments	PH, TS, TK, HM	
2.	West Dike	PH, TS, TK, HM	
3.	Spillway	PH, TS, TK, HM	
4.	Low-level Outlets	PH, TS, TK, HM	
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT James V. Turner Reservoir Dam DATE 10-8-80 & 11-20-80

PROJECT FEATURE Earth Embankments BY PH, IS, IK, HM

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	El. 51.0
Current Pool Elevation	46.2 (both inspection dates)
Maximum Impoundment to Date	Not known
Surface Cracks	None
Pavement Condition	Grass covered — Trees & brush on slopes
Movement or Settlement of Crest	None observed
Lateral Movement	
Vertical Alignment	Appears good
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	Abutment heavily overgrown with trees
Indications of Movement of Structural Items on Slopes	None observed
Trespassing on Slopes	2 ft wide path along top
Sloughing or Erosion of Slopes or Abutments	Some erosion behind each spillway training wall near top of dam. Erosion on upstream embankment.
Rock Slope Protection-Riprap Failures	Some riprap displaced by tree growth
Unusual Movement or Cracking at or Near Toes	None observed.
Unusual Embankment or Downstream Seepage	Standing water (Back channel) extending from left abutment connecting with spillway channel approx. 350 ft downstream of spillway structure. (original stream bed).
Piping or Boils	None observed
Foundation Drainage Features	6" agricultural clay pipe, left side of spillway only.
Toe Drains	N/A
Instrumentation System	None

PERIODIC INSPECTION CHECK LIST

PROJECT James V. Turner Reservoir Dam DATE 10-8-80 & 11-20-80

PROJECT FEATURE West Dike BY PH, TS, TK, HM

AREA EVALUATED		CONDITION
DIKE EMBANKMENT		
Crest Elevation		51.0 ± (Irregular)
Current Pool Elevation		46.2 (Both inspection dates)
Maximum Impoundment to Date		Not Known
Surface Cracks		None observed
Pavement Condition		Grass covered - Overgrown with trees and brush
Movement or Settlement of Crest		None observed
Lateral Movement		
Vertical Alignment		Appears good
Horizontal Alignment		
Condition at Abutment and at Concrete Structures		N/A
Indications of Movement of Structural Items on Slopes		N/A
Sloughing or Erosion of Slopes or Abutments		wave action eroding upstream slope. some erosion of downstream slope
Rock Slope Protection-Riprap Failures		Riprap displaced on upstream slope
Unusual Movement or Cracking at or Near Toes		None observed
Unusual Embankment or Downstream Seepage		None observed
Piping or Boils		None observed
Foundation Drainage Features		None
Toe Drains		None
Instrumentation System		None
Trespassing on Slopes		Foot path worn along top of dike

PERIODIC INSPECTION CHECK LIST

PROJECT James V Turner Reservoir Dam DATE 10-8-80 & 11-20-80

PROJECT FEATURE Spillway BY AH, TS, TK, HM

AREA EVALUATED		CONDITION
OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS		
a) Approach Channel		
General Condition		Fair
Loose Rock Overhanging Channel		None
Trees Overhanging Channel		None
Floor of Approach Channel		N/A
b) Weir and Training Walls		
General Condition of Concrete		Fair
Rust or Staining		Some staining of training walls
Spalling		Some spalling of training walls and possibly weir.
Any Visible Reinforcing		Deterioration at downstream end of right training wall.
Any Seepage or Efflorescence		
Drain Holes		
c) Discharge Channel		
General Condition		Good
Loose Rock Overhanging Channel		None
Trees Overhanging Channel		None
Floor of Channel		Natural streambed.
Other Obstructions		Bridge crossing channel approx. 1200 ft. downstream of spillway

EAST PROVIDENCE WATER COMPANY

TEN MILE WATERSHED

53 SQUARE MILES AT HUNTS MILLS

SUMMARY OF STATISTICS FOR 1923

MONTH	TOTAL YIELD MIL GALS	YIELD OF 1 SQ MILE MIL GALS PER DAY	YIELD OF 1 SQ MILE CU FT PER SEC.	RAINFALL INCHES	RAINFALL COLLECTED INCHES	PER CENT COLLECTED
Jan	56648	3.447	5.320	6.78	6.15	70
Feb	2050.3	1.382	2.132	2.06	2.22	108
Mar	5429.8	3.305	5.100	3.12	5.13	167
Apr	3829.7	2.409	3.717	5.52	4.06	74
May	2330.2	1.426	2.200	1.34	2.51	187
June	1010.9	.636	.981	5.17	1.05	21
July	743.3	.454	.700	3.43	.79	23
Aug.	482.1	.294	.453	1.65	.51	31
Sept.	408.2	.259	.400	1.39	.44	32
Oct.	709.1	.428	.660	4.90	.76	15
Nov.	991.4	.623	.962	4.30	1.08	25
Dec.	3314.9	2.009	3.100	5.93	3.74	60
YEAR	269523	1.390	2.144	47.67	29.01	61

SUMMARY OF STATISTICS FOR 1922

May	3756.5	2.286	3.528	5.25	3.62	70
June	4743.4	2.989	4.604	6.98	5.09	73
July	4499.7	2.738	4.226	7.45	4.84	65
Aug.	2129.9	1.296	2.000	6.48	2.27	35
Sept	2663.3	1.685	2.600	3.42	2.97	84
Oct	1647.2	1.002	1.547	3.18	1.78	56
Nov.	1321.9	0.842	1.300	1.26	1.45	115
Dec	14062	0.855	1.320	2.80	1.54	55

YIELD

OF THE

TEN MILE RIVER WATERSHED

The concrete abutment walls are in generally good condition. However, the concrete has begun to ~~spall~~ spall and break off along top cap at the base of wall on the right (west) side. Also, efflorescence has begun on left wall at construction joint half way up wall [see photo #1].

Outlet Works - The gatehouse is presently abandoned and beginning to show signs of neglect and disrepair. The door has been removed and replaced with concrete block units. The windows have all been busted out. The foundation is of concrete construction and appears to be in good condition. The walls are brick and roof is asphalt shingles and wood construction. The approach channel is clear and unobstructed. The handles of the manually operated gate valves have been removed and the present condition of gate-lifting mechanism is unknown but there is no visually apparent reason to doubt their operability.

~~Recs~~ Comments / Recommendations - The dam appears to be in good condition. However, ~~the owner should initiate~~ ~~as~~ rehabilitation of the embankment should be started before the growth of trees become a significant deterrent ~~to the~~ to the safety of the structure.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

DAM INSPECTION REPORT

DAM: # 407 RIVER: Ten Mile River WATERSHED: Ten Mile R. DATE: Sept 20, 1978

NAME: Turner Res. Dam TOWN: East Prov. INSPECTED BY: Earle F. Lout, Jr

OWNER: City of East Prov. c/o Water Dept OTHER INTERESTED PARTY:

REASON FOR INSPECTION: Annual Insp. — N.P.S.I.D.; low hazard

* * * * * * * * * *

REPORT: Current Pool Elevation: full, 2"(±) over crest of spillway

General: Built in 1934 and formerly used for water supply

Embankment: Earthen dam w/ 12" concrete core wall. Downstream slope is beginning to be overgrown with brush and many small trees. Also, much marsh type vegetation has established itself along toe of embankment. Pond side of embankment is lined with large sized rip-rap with many small/medium sized trees growing along bank. Crest is flat with wide grassed path along its entire length. [see photo #6.]

Spillway: 200' wide concrete "ogee"-type spillway. The approach channel to spillway is clear and unobstructed with no overhanging trees or rocks on either side. The concrete crest shows no signs of irregularities. The concrete face of spillway shows signs of aeration almost up to the crest across the entire width, indicating ~~to~~ a spalling, scoured condition.

D O

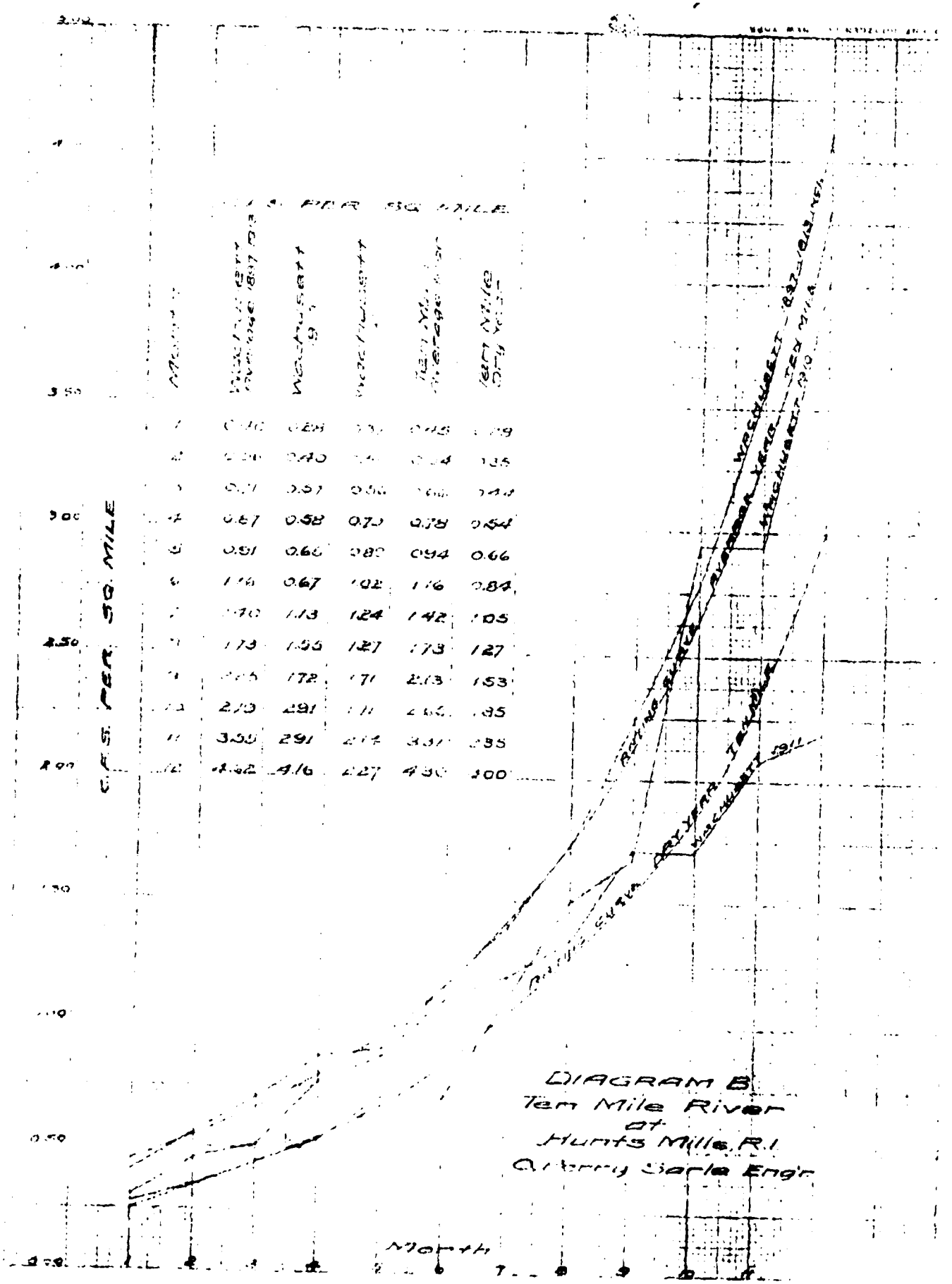
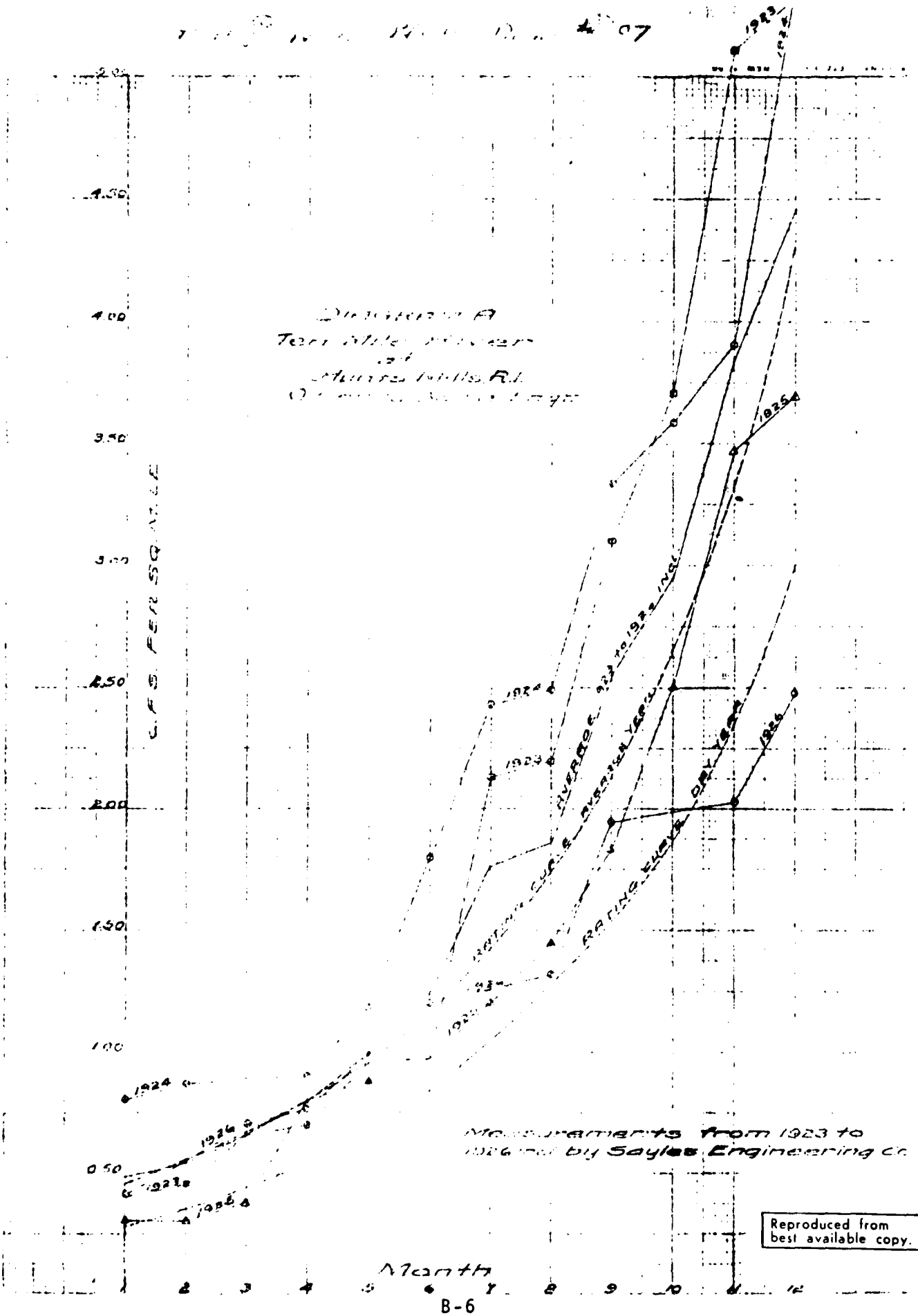


DIAGRAM B
Ten Mile River
at
Hunts Mills, R.I.
Albany Surface Engr.



Measurements from 1923 to 1926 inc. by Sayles Engineering Co.

The spillway appears to be ample for discharge of any freshet and the waste gates are surplusage for this purpose.

The characteristics of this drainage area indicates that the run-off during the dry months of the year will be higher than that of a stream of normal features. This condition of run-off is proved by the measurements of discharge made by the East Providence Water Co. beginning in 1921 and continuing for 5 years.

These measurements were supervised by me (O. F. Earle, Engr.) and from these I designed rating curves of discharge for an average year and for a year of low run-off. These were checked against the Wachusett River yields as that drainage area and the 10 Mile River are to some extent similar.

(4) Maximum, minimum, and average rainfall and run off on water shed

See tables with yield arranged month by month from 1922 to 1926, depth in inches, inches collected and per cent collected.

(5) Stream gaugings and any other stream flow characteristics readily available.

#407

Capacity of Spillway

crest elev. =	Elev. 46.0)		
Top of abut.=	" 51.0)	ht.=	5 ft.
Approx. elev. of valley flow at dam		elev.	34

Use p = 12 in Hazen Tables

Q = (in c. f. s.) for sharp edge weir for 5' ht. =	38.21
Multiplier based on Hazen's K =	1.20

Then disch. over weir= 38.21 x 1.2 = 45.85 c. f. s. per ft. of length

Length of spillway= 200'

Total Disch. Capacity = 200 x 45.85 = 9170 c. f. s. or 191 c. f. s. per sq. mile of drainage area over 48 sq. miles.

WORKS DAM #407

6/30/49

Providence Water Works Dam ...

... started May, 1934

... Concrete Core wall and steel sheet-pile cut-off ... refusal.

... 170 c. f. s. Disch. Capacity

El. 51.0

46.0

... Water Dept.)

... 405,000,000 gals.

Capacity ... water surface at Elev. 46.0 ... If contours are known, the average depth ... a little more or less than 50% of the depth at the dam.

Max. depth of reservoir 12'

Aver. depth of reservoir 6'

... results obtained by ... (2" = 1 mile)

... freshets ... this ... discharge from 48 sq. miles for ... c. f. s. per sq. mile, which is about one-fifth of the capacity of the spillway ... Water Dept. reported to J. V. ... over spillway to date (1949) has been 15" (of 5 ft. crest) Probably ... time of ... freshet.

Developed by Div. of Harbors & Rivers

... 27 ... 0.425 sq. ...

State of Rhode Island

INTER-DEPARTMENTAL COMMUNICATION

[illegible] 19[illegible]

TO [illegible]

[illegible] Department of Harbors & Rivers

[illegible]

DEPT. [illegible] Division of Harbors & Rivers

SUBJECT:

[illegible] prepare a summary of available statistics on the Ten Mile River [illegible] the East Providence Water Supply System in Hunts Mills, Rumford, [illegible] which should include the following:

1) Data on the dam, such as date of construction, type, length, height, spillway length and capacity, elevation of dam and spillway, ownership, etc.

2) Storage capacity, surface area, maximum and average depth of reservoir, etc.

3) Gross tributary drainage area. Land and water areas on watershed, etc.

4) Maximum, minimum and average rainfall and runoff on watershed.

5) Stream gaugings and any other stream flow characteristics readily available.

Henry Ise, Chief

[illegible]

JAMES V. TURNER RESERVOIR DAM

SUMMARY OF DATA AND CORRESPONDENCE

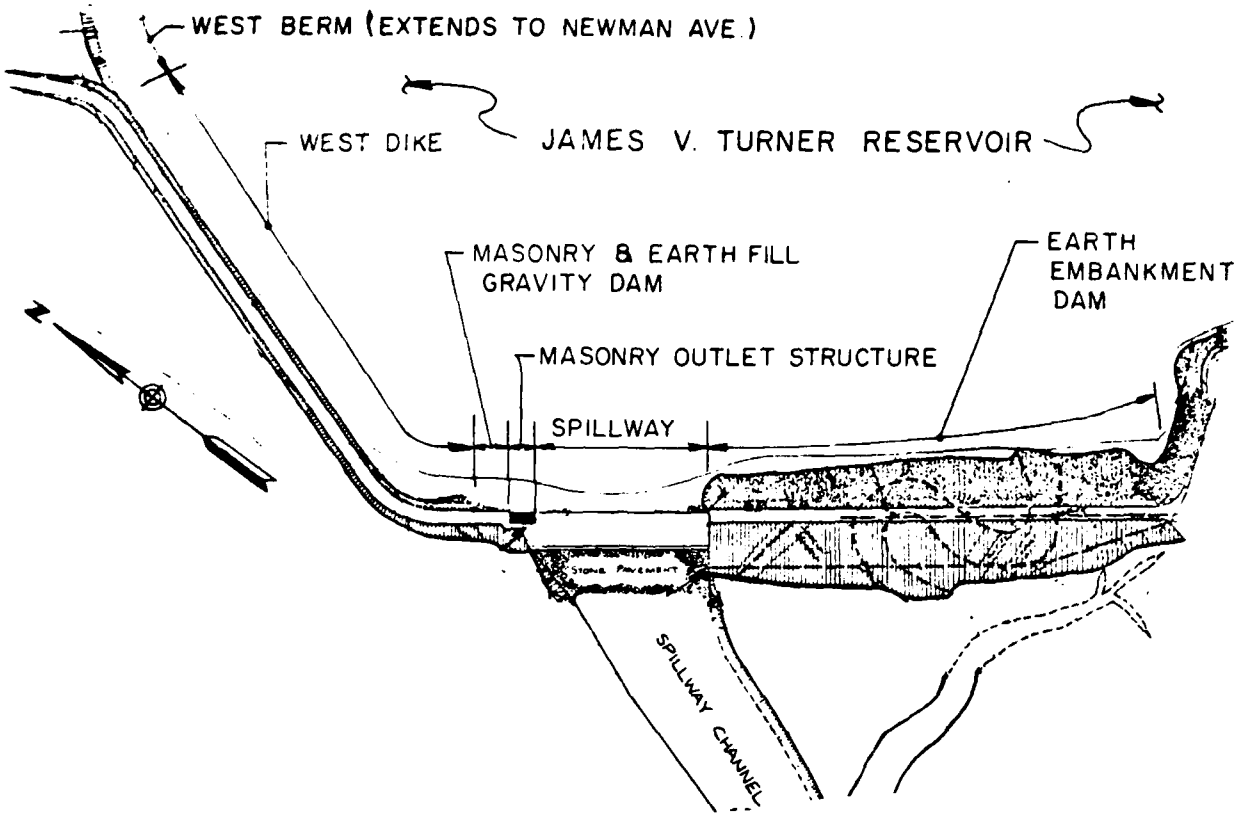
JAMES V. TURNER RESERVOIR DAM

EXISTING PLANS

East Providence Reservoir
East Providence Rhode Island
Contract No. 1
Waterman Engineering Co.
March 1934

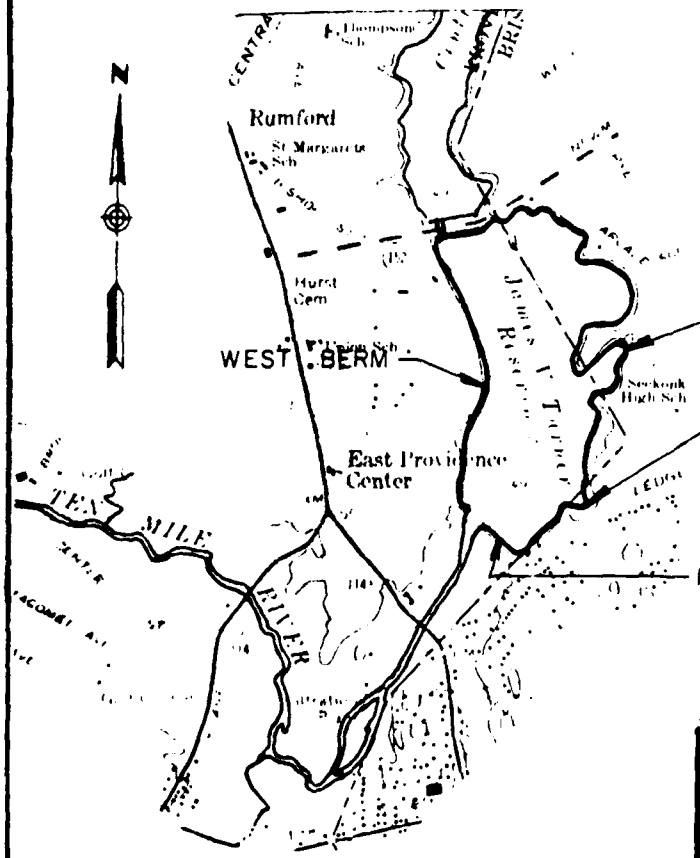
Sheet 1	General Plans - Sections of Dam - Drains
Sheet 2	Profile Along Dam - Borings - Etc.
Sheet 3	West Wing Wall - Gate House
Sheet 4	East Spillway Wall - Details, Manholes, Corewall, Underdrains, Etc.

Note: Selected segments of the above listed existing plans have been compiled to produce sheets B-1, B-2, B-3 and B-4 within this section.



MAIN DAM AND DIKE

100 0 100 200



NOTE:

SEE SHEET B-2

DAM/DIKES LOCATION PLAN

2000 1000 0 2000 4000

CAHN ENGINEERS INC. WALLINGFORD CONNECTICUT ENGINEER	U.S. ARMY ENGI... DIV. NEW ENGLAND CORPS ... NEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

DAM/DIKES LOCATION PLAN

JAMES V. TURNER RESERVOIR DAM

TEN MILE RIVER PROVIDENCE, R.I.

DWN. BY	CKD. BY	APP. BY	SCALE: AS NOTED	
RJB	TJK	RMH	DATE: JAN., 1981	SHEET B-1

APPENDIX B

ENGINEERING DATA AND CORRESPONDENCE

PERIODIC INSPECTION CHECK LIST

PROJECT James V. Turner Reservoir Dam DATE 10-8-80 & 11-20-80

PROJECT FEATURE Low-level Outlets BY RH, IS, IK, HM.

AREA EVALUATED		CONDITION
OUTLET WORKS-OUTLET STRUCTURE AND OUTLET CHANNEL		
General Condition of Concrete		Fair
Rust or Staining		Some minor staining from construction joints
Spalling		Minor spalling at construction joints
Erosion or Cavitation		None observed
Visible Reinforcing		None observed
Any Seepage or Efflorescence		None observed
Condition at Joints		Minor staining and spalling
Drain Holes		None
Channel		Discharge directly into spillway channel
Loose Rock or Trees Overhanging Channel		None
Condition of Discharge Channel		Fair.

EAST PROVIDENCE WATER COMPANY

TEN MILE WATERSHED

53 SQUARE MILES AT HUNTS MILLS

SUMMARY OF STATISTICS FOR [illegible]

MONTH	TOTAL YIELD MILS. GALS	YIELD OF 1 SQ. MI. MIL. GALS. PER DAY	YIELD OF 1 SQ. MI. CU. FT. PER SEC.	RAINFALL INCHES	RAINFALL COLLECTED INCHES	PER CENT COLLECTED
Jan	3816.7	2.323	3.585	4.90	4.12	84
Feb	2400.5	1.614	2490	3.34	2.71	81
Mar	4158.2	2.531	3.906	3.20	4.48	140
Apr	5501.5	3.460	5.340	4.29	5.82	136
May	3555.6	2.164	3.340	3.35	3.85	115
June	1846.8	1.161	1.792	0.99	2.00	202
July	924.0	0.562	0.868	1.31	1.01	77
Aug	944.1	0.575	0.888	5.47	1.04	19
Sept	2507.8	1.577	2434	6.96	2.71	39
Oct	964.2	0.587	0.906	0.23	1.00	436
Nov	724.5	0.525	0.810	1.71	0.91	53
Dec	1265.1	0.770	1.188	2.06	1.36	66
YEAR	286894	1.487	2.295	3.31	31.11	85

SUMMARY OF STATISTICS FOR 2 YEARS 1923-24

Jan.	9481.5	2.935	4.452	6.84	5.13	75
Feb.	4530.8	1.498	2.311	2.70	2.46	91
Mar	9582.0	2.918	4.503	3.16	5.15	163
Apr.	9331.2	2.934	4.528	4.90	5.00	102
May	5885.8	1.795	2.770	2.34	3.16	135
June	2857.7	0.898	1.386	3.08	1.54	50
July	1667.3	0.508	0.784	2.37	0.90	38
Aug.	1426.2	0.434	0.670	3.56	0.77	22
Sept.	2916.0	0.918	1.417	4.17	1.53	36
Oct.	1667.3	0.507	0.783	2.60	0.87	34
Nov.	1715.9	0.574	0.886	3.00	0.99	33
Dec.	4500.0	1.369	2.144	3.99	2.46	62
YEAR	55641.8	1.442	2.219	42.11	29.97	70

EAST PROVIDENCE WATER COMPANY

TEN MILE WATERSHED

52.3 SQUARE MILES AT CENTRAL POND.
53.0 " " " HUNTS MILLS.

SUMMARY OF STATISTICS FOR 1925

MONTH	TOTAL YIELD MIL. GALS.	YIELD OF 1 SQ. MILE MIL. GALS. PER DAY	YIELD OF 1 SQ. MILE CU. FT. PER SEC.	RAINFALL INCHES	RAINFALL COLLECTED INCHES	PER CENT COLLECTED
Jan.	1285.6	0.783	1.208	4.38	1.40	32
Feb.	3556.2	2.398	3.700	2.00	3.84	192
Mar.	3696.2	2.249	3.471	4.39	3.95	90
Apr.	2585.5	1.626	2.510	2.02	2.77	137
May	1546.8	0.942	1.453	1.79	1.66	93
June	913.7	0.575	0.887	2.65	1.01	38
July	863.8	0.525	0.811	4.13	0.95	23
Aug.	401.8	0.247	0.382	2.06	0.43	21
Sept.	311.0	0.198	0.306	2.49	0.35	14
Oct.	321.4	0.198	0.306	4.04	0.36	9
Nov.	991.4	0.632	0.975	5.14	1.08	21
Dec.	1928.4	1.189	1.835	3.92	2.08	53
YEAR	18401.8	.962	1.487	39.01	19.88	52

SUMMARY OF STATISTICS FOR 3 YEARS 1923-1925

Jan.	10767.1	2.218	3.371	6.02	3.89	65
Feb.	8087.0	1.798	2.774	2.47	2.92	118
Mar.	13278.2	2.695	4.159	3.57	4.75	133
Apr.	11916.7	2.531	3.855	3.94	4.25	108
May	7432.6	1.511	2.331	2.16	2.67	124
June	3771.4	0.791	1.220	2.93	1.27	43
July	2531.1	0.513	0.793	2.95	0.91	31
Aug.	1828.0	0.372	0.574	3.06	0.66	22
Sept.	3227.0	0.678	1.047	3.61	1.16	32
Oct.	1908.7	0.404	0.624	3.08	0.70	23
Nov.	2707.3	0.533	0.915	3.71	1.02	28
Dec.	6508.4	1.323	2.041	3.97	2.33	59
YEAR	74043.5	1.285	1.975	41.47	26.53	65

EAST PROVIDENCE WATER COMPANY

TEN MILE WATERSHED

523 SQUARE MILES AT CENTRAL POND

SUMMARY OF STATISTICS FOR 1926

MONTH	TOTAL YIELD MIL. GALS.	YIELD OF 1 SQ. MILE		RAINFALL INCHES	RAINFALL COLLECTED INCHES	PER CENT COLLECTED
		MIL. GALS. PER DAY	CU. FT. PER SEC.			
Jan.	1064.7	0.645	0.996	2.79	1.17	42
Feb.	1850.7	1.264	1.950	5.49	2.03	37
Mar.	3656.0	2.255	3.480	3.63	4.07	112
Apr.	3071.5	1.958	3.021	2.72	3.35	123
May	2089.2	1.288	1.988	2.79	2.32	83
June	1224.7	0.780	1.204	1.74	1.31	75
July	803.5	0.496	0.765	3.32	0.86	26
Aug.	743.3	0.458	0.707	4.28	0.81	19
Sept.	427.7	0.272	0.420	1.68	0.47	28
Oct.	582.6	0.359	0.554	5.15	0.62	12
Nov.	1341.4	0.855	1.319	5.45	1.47	27
Dec.	1197.5	0.818	1.262	3.21	1.44	45
YEAR	18052.8	.954	1.472	42.25	19.92	47

SUMMARY OF STATISTICS FOR 4 YEARS 1923-1926

Jan.	11831.8	1.824	2.752	5.21	3.21	62
Feb.	9937.7	1.664	2.568	3.22	2.70	84
Mar.	16934.2	2.585	4.239	3.58	4.58	128
Apr.	14988.2	2.388	3.647	3.63	4.03	111
May	9521.8	1.455	2.245	2.32	2.58	111
June	4996.1	0.788	1.216	2.64	1.35	51
July	3334.6	0.509	0.786	3.05	.90	29
Aug.	2571.3	0.393	0.607	3.38	.69	20
Sept.	3654.7	0.576	0.890	3.13	.96	31
Oct.	2571.3	0.393	0.606	3.60	.68	19
Nov.	4048.7	0.659	1.016	4.15	1.13	27
Dec.	7705.9	1.196	1.846	3.78	2.11	56
YEAR	92096.3	1.202	1.868	41.69	24.92	60

CODING SHEET — DAM INVENTORY — Card #1 Page #1

IDENTIFICATION DATA

1. Dam number . . . . . 1 [0][4][0][7]

2. City/town . . . . . 5 [1][0] East Providence

3. U.S.G.S. quad sheet number . . . . . 7 [1][5] East Providence

4. Owner/operator . . . . . 9 [ ][ ][ ][ ]

5. Water rights owner . . . . . 13 [ ][ ][ ][ ]

6. Type of ownership -- local . . . . . 17 [ ]

7. Type of ownership -- public . . . . . 18 [ ]

8. Type of public access . . . . . 19 [ ]

9. Designed purpose of dam . . . . . 20 [C] Municipal Water Supply

10. Current use of dam . . . . . 21 [ ]

WATERSHED DATA

11. Drainage basin . . . . . 22 [1][0] Ten Mile River

12. Stream name . . . . . 24 [1][0][1] Ten Mile River

13. Area of watershed (nearest tenth sq. mi.) 27 [0][4][8].[0]

14. Design storm frequency . . . . . 31 [3]

15. S.C.S. Hydrologic curve number . . . . . 32 [ ][ ][ ]

16. Peak discharge rate of watershed (C.F.S.) 35 [0][1][8][7][2]

(OVER)

CODING SHEET — N.I. INVENTORY — Card #1 Page #2

POOL DATA:

17. Elevation--normal water level of pool . . . 040 | 049.0

18. Elevation--pool bottom @ dike (1/10 ft.) . . 044 | 0340

19. Elevation--downstream channel bed @ dike . . . 048 | [ ]

20. Area of pool surface (nearest acre) . . . . 052 | 0122

21. Normal storage cap. of pool (nr t acre ft.) 056 | 00732

22. Water quality of pool . . . . . 061 | C

SPILLWAY DATA:

23. Type of spillway . . . . . 063 | R

24. Type of material in spillway . . . . . 064 | C

25. Elevation--crest of spillway (1/10 ft.) . . 065 | 0460

26. Max. safe depth of flow over spillway . . . 069 | 5.0

27. Width of spillway (nearest ft.) . . . . . 071 | 200

28. Max. flow capacity of spillway (C.F.S.) . . 074 | 09170

29. Condition of spillway . . . . . 079 | [ ]

ID:

Card number . . . . . 080 | 1

CODING SHEET DAM INVENTORY Card #2 Page #1

ID:

30. Dam number . . . . . 1 [0407]

WASTE WATER OUTLET DATA:

31. Type of waste water outlet . . . . . 5 [P] Pipe and Valve

32. Waste water outlet size (sq. ft.) . . . . . 6 [032]

33. Max. flow cap. of waste water outlet (C.F.S.). . . 9 [ ]

34. Condition of waste water outlet . . . . . 14 [ ]

DIKE DATA:

35. Elevation--top of dike (1/10 ft.) . . . . . 15 [051].[0]

36. Length of dike (excl. spillway) (nearest ft.). . . 19 [1750]

37. Top width of dike (nearest ft.). . . . . 23 [ ]

38. Type of construction of dike. . . . . 25 [F] Fill

39. Type of material in dike . . . . . 26 [EC] Earth, Compacted

40. Condition of dike.. . . . . 28 [ ]

FLOOD CONTROL DATA:

41. Elevation--expected high water (1/10 ft.). . . . . 29 [ ].[ ]

42. Flood control storage capacity (nrst acre ft.) . . 33 [ ]

43. Max. storm discharge cap. of dam (C.F.S.) . . . . . 38 [ ]

44. Flood control structure--type . . . . . 43 [ ]

(OVER)

DATA ON ASSOCIATED STRUCTURES:

45. Drain valve type . . . . . [44:]

46. Drain valve size (sq. ft.) . . . . . [45:]

47. Drain valve location (sta. on C/L of dam) . . . [47:] + [ ]

48. Draw down valve type . . . . . [50: P] Pipe and Valve

49. Draw down valve size (sq. ft.) . . . . . [51: 24]

50. Draw down valve location (sta. on C/L of dam) . . [53:] + [ ]

51. Fish ladder--elevation of floor @ dam (1/10 ft.) [56:] . [ ]

52. Fish ladder rise (nearest ft.) . . . . . [60:]

53. Fish ladder width (nearest ft.) . . . . . [62:]

54. Fish ladder--design depth of flow (nrst ft.) . . [63:]

55. Fish ladder--general location . . . . . [64:]

56. Fish ladder--type of fish . . . . . [65:]

GENERAL STATUS OF DAM:

57. Year dam built . . . . . [66:]

58. Date last modification completed (mo./yr.) . . [70:] / [ ]

59. Date of last inspection (mo./yr.) . . . . . [74: 06] / [49]

60. General condition of dam . . . . . [78:]

61. Note or remark . . . . . [79:]

ID:

62. Card number . . . . . [80: 2]

APPENDIX C

DETAIL PHOTOGRAPHS

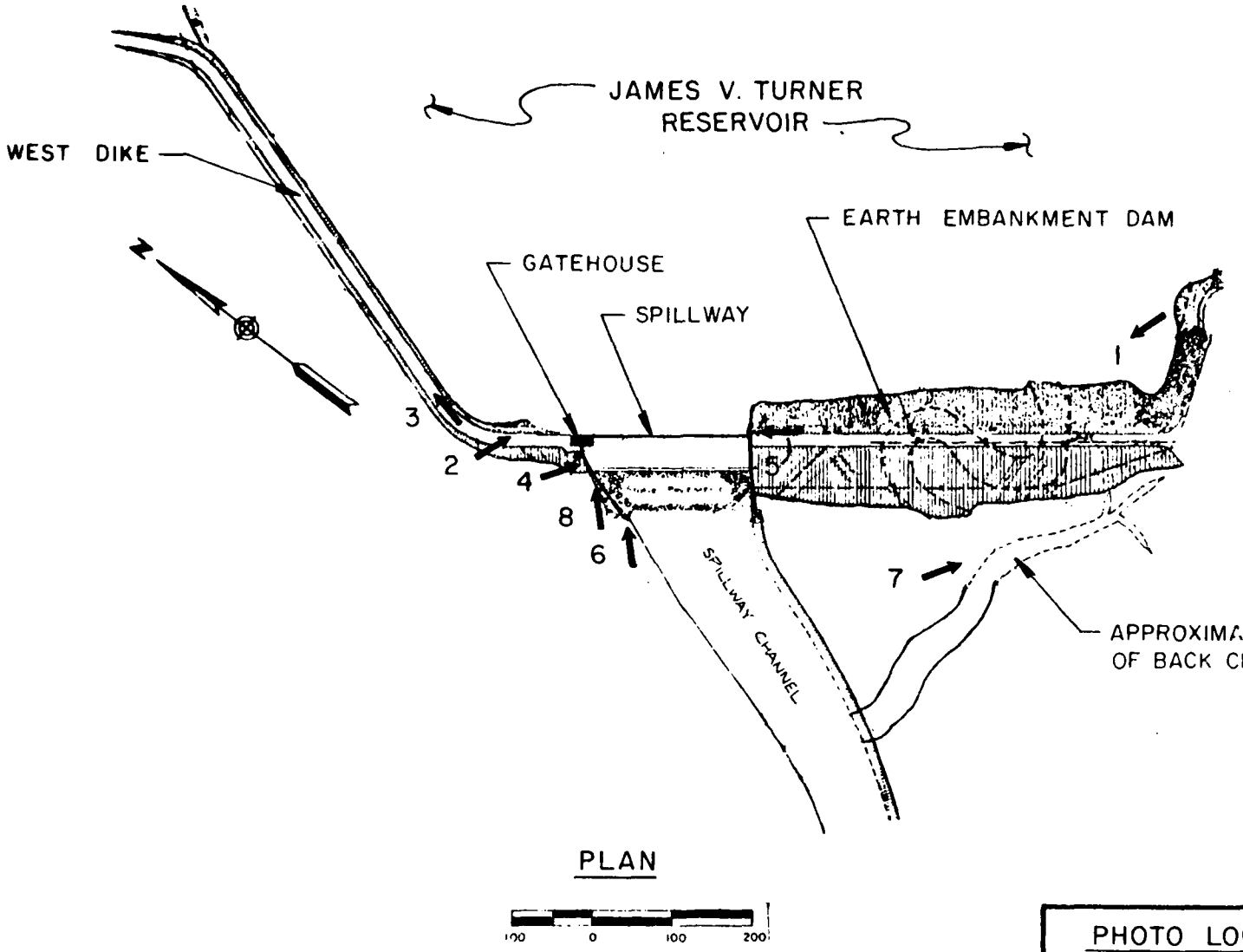


PHOTO LOCATION PLAN

JAMES V. TURNER
RESERVOIR DAM

SHEET C-1

Photo 1 - Upstream slope from left abutment.
(11-20-80)

Photo 2 - Upstream slope of West Dike.(11-20-80)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS. CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	James V. Turner Res. Dam Ten Mile River East Providence, RI CE# 27785 KG DATE Jan.1981 PAGE C-1

Photo 3 - Top of West Dike. (10-8-80)

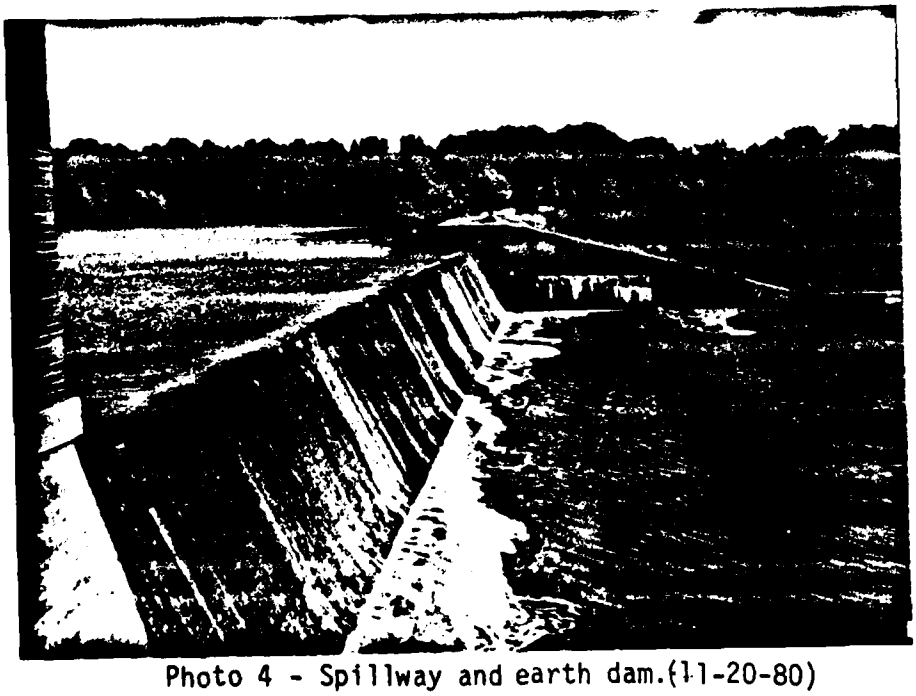


Photo 4 - Spillway and earth dam.(11-20-80)

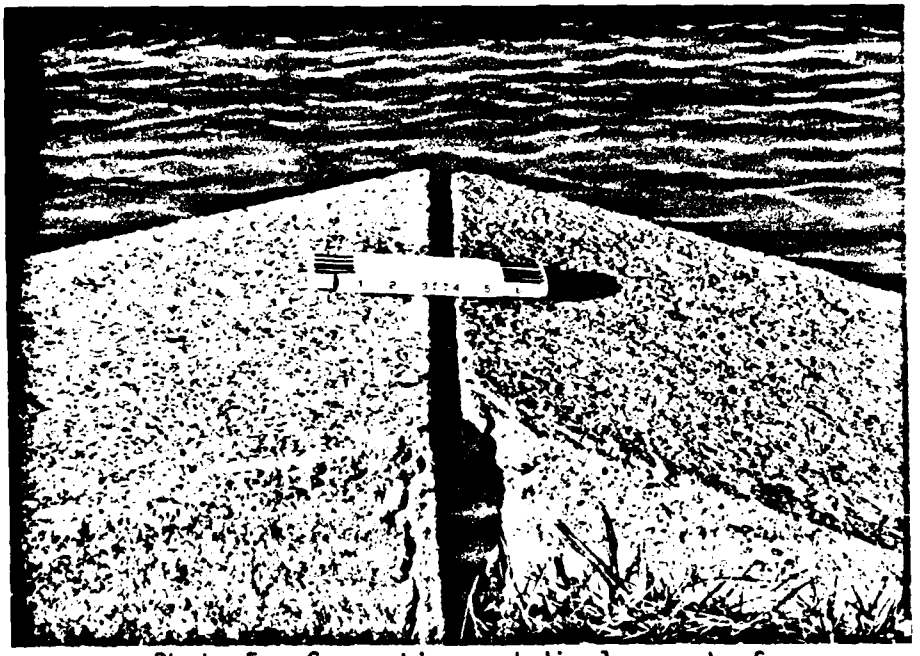


Photo 5 - Separation and displacement of left spillway training wall.(11-20-80)

Photo 6 - Deterioration of downstream end of right spillway training wall.(11-20-80)

Photo 7 - Backchannel at toe of earth dam. (11-20-80)

Photo 8 - Gatehouse and outlet structure. (11-20-80)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS. CAHN ENGINEERS INC. WALLINGFORD, CONN ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	James V. Turner Res. Dam Ten Mile River East Providence, RI CE# 27 785 KG DATE Jan. 1981 PAGE C-4

APPENDIX D

HYDRAULICS/HYDROLOGIC COMPUTATIONS

MAXIMJM PROBABLE FLOOD INFLOWS
NED RESERVOIRS

	Project	Q (cfs)	D.A. (sq. mi.)	MPF cfs/sq. mi.
1.	Hall Meadow Brook	26,600	17.2	1,546
2.	East Branch	15,500	9.25	1,675
3.	Thomaston	158,000	97.2	1,625
4.	Northfield Brook	9,000	5.7	1,580
5.	Black Rock	35,000	20.4	1,715
6.	Hancock Brook	20,700	12.0	1,725
7.	Hop Brook	26,400	16.4	1,610
8.	Tully	47,000	50.0	940
9.	Barre Falls	61,000	55.0	1,109
10.	Conant Brook	11,900	7.8	1,525
11.	Knightville	160,000	162.0	987
12.	Littleville	98,000	52.3	1,870
13.	Colebrook River	165,000	118.0	1,400
14.	Mad River	30,000	18.2	1,650
15.	Sucker Brook	6,500	3.43	1,895
16.	Union Village	110,000	126.0	873
17.	North Hartland	199,000	220.0	904
18.	North Springfield	157,000	158.0	994
19.	Ball Mountain	190,000	172.0	1,105
20.	Townshend	228,000	106.0(278 total)	820
21.	Surry Mountain	63,000	100.0	630
22.	Otter Brook	45,000	47.0	957
23.	Birch Hill	88,500	175.0	505
24.	East Brimfield	73,900	67.5	1,095
25.	Westville	38,400	99.5(32 net)	1,200
26.	West Thompson	85,000	173.5(74 net)	1,150
27.	Hodges Village	35,600	31.1	1,145
28.	Buffumville	36,500	26.5	1,377
29.	Mansfield Hollow	125,000	159.0	786
30.	West Hill	26,000	28.0	928
31.	Franklin Falls	210,000	1000.0	210
32.	Blackwater	66,500	128.0	520
33.	Hopkinton	135,000	426.0	316
34.	Everett	68,000	64.0	1,062
35.	MacDowell	36,300	44.0	825

PRELIMINARY GUIDANCE

FOR ESTIMATING

MAXIMUM PROBABLE DISCHARGES

IN

PHASE I DAM SAFETY

INVESTIGATIONS

New England Division
Corps of Engineers

March 1978

JAMES V. TURNER RESERVOIR DAM

IV) SUMMARY

1) TEST FLOOD = PMF ≈ 24000 CFS
(PARALLEL COMPUTATIONS HAVE BEEN MADE FOR ½ PMF ≈ 12000 CFS AND ARE ALSO SUMMARIZED BELOW)

2) PERFORMANCE AT PEAK FLOOD CONDITIONS:

a) PEAK INFLOWS: Q_{I_1} = PMF ≈ 24000 CFS Q'_{I_1} = ½ PMF ≈ 12000 CFS
b) PEAK OUTFLOWS: Q_{B_3} ≈ 22600 CFS Q'_{B_3} ≈ 11000 CFS
c) SPILLWAY CAPACITY: (SEE TABLE P. D-6)
d) PERFORMANCE:
i) AT TEST FLOOD OVERTOPPED (DAM)* (±) 2.0' (W.S. ELEV. 53' NGVD)
ii) AT ½ PMF: OVERTOPPED (DAM)* (±) 0.6' (W.S. ELEV. 51.6' NGVD)

3) DOWNSTREAM FAILURE CONDITIONS:

a) PEAK FAILURE OUTFLOW: Q_{P_1} ≈ 54800 CFS
b) FLOOD DEPTH IMMEDIATELY D/S FROM DAM: Y_0 ≈ 11.6'
c) CONDITIONS NEAR PAWTUCKET AVE. (RTE #114) - ((±) 6000' D/S FROM DAM)
i) STAGE BEFORE FAILURE: Y_2 ≈ 5.5' (Q_2 ≈ 8300 CFS)
ii) STAGE AFTER FAILURE: Y_3 ≈ 9.1' (Q_{P_2} ≈ 28900 CFS)
iii) RAISE IN STAGE AFTER FAILURE: ΔY ≈ 3.6'
d) CONDITIONS NEAR NORTH BROADWAY - ((±) 9500' D/S FROM DAM)
i) STAGE BEFORE FAILURE: Y_2 ≈ 5.5' (Q_2 ≈ 8300 CFS)
ii) STAGE AFTER FAILURE: Y_3 ≈ 8.1' (Q_{P_3} ≈ 22000 CFS)
iii) RAISE IN STAGE AFTER FAILURE: ΔY ≈ 2.6'

*NOTE: EAST DIKE #2 OVERTOPPED BY (±) 3.0' AT TEST FLOOD AND (±) 1.6' AT ½ PMF

JAMES V. TURNER RESERVOIR DAM

III). SELECTION OF TEST FLOOD

1) CLASSIFICATION OF DAM ACCORDING TO NED-ACE GUIDELINES:

a) SIZE: * STORAGE (MAX) ≅ 3100 AC-FT (1000 < S < 50000 AC-FT)
* HEIGHT (MAX) ≅ 22' (H < 25 FT)

*STORAGE: SEE P. D-5 ; HEIGHT. SEE P. D-7

∴ SIZE CLASSIFICATION: INTERMEDIATE

b) HAZARD POTENTIAL: AS A RESULT OF THE D/S FAILURE ANALYSIS AND IN VIEW OF THE IMPACT THAT FAILURE OF J.V. TURNER RES. DAM MAY HAVE ON THE POTENTIAL IMPACT AREA (P. D-7), THE DAM IS CLASSIFIED AS HAVING:

HAZARD CLASSIFICATION: HIGH

2) TEST FLOOD PMF = 24000 CFS

THIS SELECTION IS BASED ON THE RESULTS OF THE PREVIOUS ANALYSIS AND CLASSIFICATION.

b) RESERVOIR STORAGE AT TIME OF FAILURE:

$S_{@S1'} = 3100^{AC\text{-}FT}$ (SEE P. D-5) $S/2 = 1550^{AC\text{-}FT}$

c) APPROXIMATE STAGE AT POTENTIAL IMPACT AREAS AFTER FAILURE:

$Q_{P_1} = 54800^{CFS}$; $Y_1 = 11.6'$; $V_1 = 3800^{AC\text{-}FT} > S/2$ ON REACH $L = 10000'$

∴ SUBDIVIDE THE REACH TO HAVE $V \leq S/2$ (SEE NED-ACE GUIDELINES)

REACH L (FT)	Q_{P_1} (CFS)	Y_1 (FT)	V_1 (AC-FT)	Q_{P_2} (CFS)	Y_2 (FT)	V_2 (AC-FT)	$\bar{V}$ (AC-FT)	Q_{P_3} (CFS)	Y_3 (FT)
2000	54800	11.6	770	41200	10.4	620	690	42500	10.5
2000	42500	10.5	640	33800	9.6	540	590	34500	9.7
2000	34500	9.7	540	28500	9.0	470	510	28900	9.1
3500	28900	9.1	830	21100	8.0	660	745	22000	8.1

d) APPROXIMATE STAGE BEFORE FAILURE:

$Q_S = 8300^{CFS}$ (SEE P.'S D-6 & D-8) ∴ $H_S = 5.5'$

e) RAISE IN STAGE D/S FROM S. WINNER RES. DAM:

DEPENDING ON THE LOCATION ALONG THE RIVER WITHIN THE POTENTIAL IMPACT AREA THE RAISE IN STAGE FROM FAILURE OF S. WINNER RES. DAM IS ESTIMATED TO BE BETWEEN (±) 6' AT THE DAM AND (±) 4' TO 3' AT THE REACH D/S FROM PAWTUCKET AVE (SEE #14)

c) BREACH WIDTH (SEE NED-ACE D/S FAILURE GUIDELINES)

$W = 0.4 \times 670 \approx 268'$ ASSUME $W_b \approx \underline{268'}$

d) ASSUMED WATER DEPTH AT TIME OF FAILURE: $Y_o \approx 22'$ (ELEV. 51' TO ELEV. 29')

e) SPILLWAY DISCHARGE AT TIME OF FAILURE. $Q_s = 8300^{cfs}$ (SEE P. D-6)

f) BREACH OUTFLOW (SEE NED-ACE GUIDELINES)

$$Q_b = \frac{8}{27} W_b \sqrt{g}\, Y_o^{3/2} \approx 46500^{cfs}$$

g) PEAK FAILURE OUTFLOW (Q_{p_1}) TO TEN MILE RIVER.

$$Q_{p_1} = Q_s + Q_b \approx \underline{54800^{cfs}}$$

3) FLOOD DEPTH * IMMEDIATELY D/S FROM DAM:

$Y \approx 0.44 Y_o = \underline{9.7'}$

*(FROM RETREATING WAVE THEORY APPLIED TO DAM FAILURE)

4) ESTIMATE OF D/S FAILURE CONDITIONS AT POTENTIAL IMPACT AREAS:

(SEE NED-ACE GUIDELINES FOR ESTIMATING D/S FAILURE HYDROGRAPHS)

a) THE CHANNEL D/S FROM J. V. TURNER RES. DAM IS IN AVERAGE, TRAPEZOIDAL IN CROSS SECTION WITH (±) 100' BASE AND (±) 80" AND 150" TO 1" SIDE SLOPES. THE AVE. SLOPE OF THE CHANNEL IS (±) 0.11% (ASSUME $n = 0.050$ FOR THE RIVER AT FLOOD STAGE).

JAMES V. TURNER RESERVOIR DAM.

II) DOWNSTREAM FAILURE HAZARD

1) POTENTIAL IMPACT AREA

MANY HOUSES OF WHICH AT LEAST TEN HAVE FIRST FLOOR ELEVATIONS BETWEEN 5' AND 10' ABOVE THE STREAM; INDUSTRIAL AND COMMERCIAL STRUCTURES, ALL WITH FIRST FLOORS LESS THAN (1) 12' ABOVE THE STREAM, ARE LOCATED ALONG THE TEN MILE RIVER IN THE (2) 12000' LONG REACH BETWEEN THE J.V. TURNER RES. DAM AND ITS CONFLUENCE WITH THE SEEKONK RIVER. THIS TEN MILE RIVER REACH, PARTICULARLY S/E FROM PAWTUCKET AVE. (RTE #114), CONSTITUTE THE POTENTIAL INITIAL IMPACT AREA IN CASE OF FAILURE OF J.V. TURNER RESERVOIR DAM.

NO DATA IS AVAILABLE AS TO DETERMINE THE ACTUAL IMPACT WHICH FAILURE OF EITHER ONE OF THE EAST DIKES MAY HAVE ON THE LEDGE ROAD/ARCADE AVE. AREA. HOWEVER, THE CONTOURS ON THE U.S.G.S. EAST PROVIDENCE, R.I.-MASS. QUADRANGLE SHOW ALL THE TERRAIN BETWEEN THE DIKES AND THE RUNNINS RIVER TO BE IN GENERAL ABOVE ELEVATION 50' NGVD AND THEREFORE, FAILURE OF THESE DIKES WITH TOP ELEVATIONS OF 48' AND 48' NGVD, WOULD NOT SEEM TO HAVE OTHER THAN A RELATIVELY LOW FLOODING EFFECT OVER THIS POTENTIAL IMPACT AREA.

2) FAILURE AT J.V. TURNER RESERVOIR DAM.

ASSUME SURCHARGE TO TOP OF DAM (ELEV. 51' NGVD)

a). HEIGHT OF DAM*: $H_{MAX} \cong 22'$ (TOP OF DAM ELEV. 51' NGVD - TOE OF EMBANKMENT AT OLD STREAMBED (2) ELEV. 29' NGVD)

b). MID-HEIGHT LENGTH*: $L \cong 670'$

*FROM "EAST PROVIDENCE RESERVOIR - CONTRACT NO. 1 - SHEET 2" DRAWING, DATED MARCH 1934.

(iii) PEAK OUTFLOWS (Q_{P_3} & Q'_{P_3})

$Q_{P_3} \cong 22600^{CFS}$ $H_3 \cong 7.0'$ (ELEV. 53.0' NGVD)

$Q'_{P_3} \cong 11000^{CFS}$ $H'_3 \cong 5.6'$ (ELEV. 51.6' NGVD)

(DETERMINED* ON THE OUTFLOW RATING CURVE (P.D-4) BY USING THE APPROX. ROUTING NED-ACE GUIDELINES "SURCHARGE STORAGE ROUTING" ALTERNATE METHOD AND 19" MAX. PROBABLE R.O. IN NEW ENGLAND).

*SEE EXAMPLE BELOW

3) SPILLWAY CAPACITY RATIO TO PEAK CONDITIONS:

SPILLWAY CAPACITY TO:	SURCH* H (FT)	W.S. ELEV. (FT-NGVD)	SPILLWAY CAPACITY (CFS)	SPILLWAY CAPACITY AS % OF PEAK OUTFLOWS	
				Q_{P_3} (22600 CFS)	Q'_{P_3} (11000 CFS)
LOW POINT**	2.0	48.0	2100	9.3	19
TOP OF DAM	5.0	51.0	8300	37	75
1/2 PMF	5.6	51.6	9800	—	89
PMF	7.0	53.0	13700	61	—

*SURCHARGE ABOVE SPILLWAY CREST (ELEV. 46' NGVD)

** OVERTOPPING OF EAST DIKE #2 (SEE PP. D-2 & D-3) CAUSING LOCAL FLOODING WITH NO OR NEGLIGEABLE OVERFLOW TOWARDS RUNNING RIVER.

EXAMPLE OF PEAK OUTFLOW DETERMINATION:

1) FOR HYPOTHETICAL SURCHARGES: $H_a = 8.5'$ AND $H_b = 4.5'$:

$V_a = 3580^{AC-FT}$; $S_a = 1.40"$; $(Q_{P_2})_a \cong 22200^{CFS}$ $\quad Q_{P_2} = Q_{P_1}(1 - \frac{S}{19})$

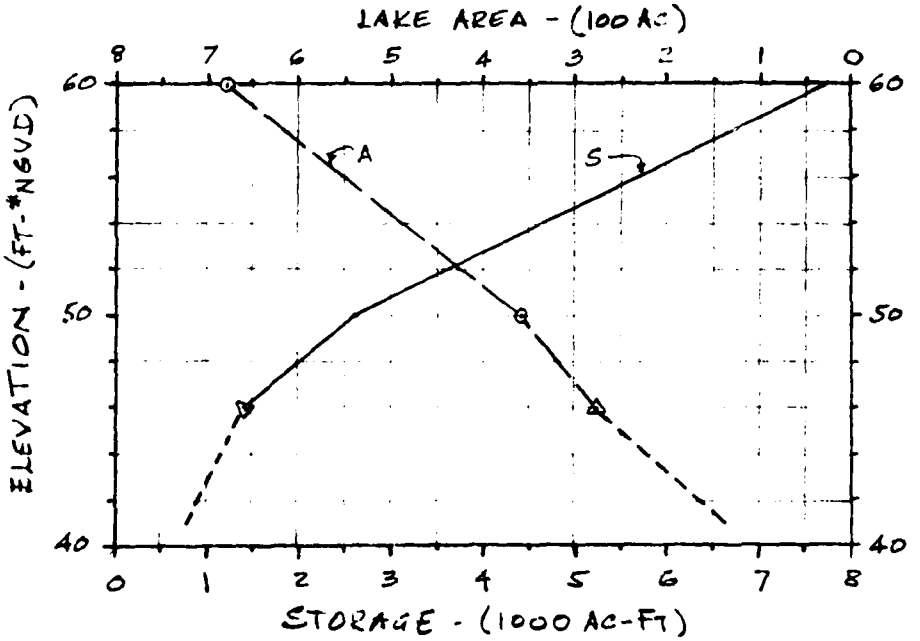
$V_b = 1560^{AC-FT}$; $S_b = 0.61"$; $(Q_{P_2})_b \cong 23200^{CFS}$

2) INTERSECT OF LINE $(Q_{P_2})_b$ W/RATING CURVE (P. D-4) DETERMINES Q_{P_3} AND H_3

INVENTORY OF DAMS, LISTS ONLY THE AREA (±122 AC) AND STORAGE CAPACITY (±732 AC-FT) OF THE RESERVOIR SOUTH FROM NEWMAN AVE., AS THOSE OF THE J.V. TURNER RESERVOIR DAM (RI DAM #407).

BECAUSE THE PRESENT EXTENT OF SEPARATION BETWEEN THE TWO WATER BODIES IS UNKNOWN AND BECAUSE THE ROAD EMBANKMENT IS A MAN-MADE STRUCTURE WHOSE STRUCTURAL CONDITION TO WITHSTAND A DIFFERENTIAL HEAD IS UNKNOWN, IT WILL BE ASSUMED THAT THE TWO WATER BODIES ARE A SINGLE IMPOUNDMENT FORMED BY THE J.V. TURNER RES. DAM, WITH NO CONTROL/REGULATION AT NEWMAN AVE.

iii) LAKE AREA/STORAGE CURVES - J.V. TURNER RESERVOIR

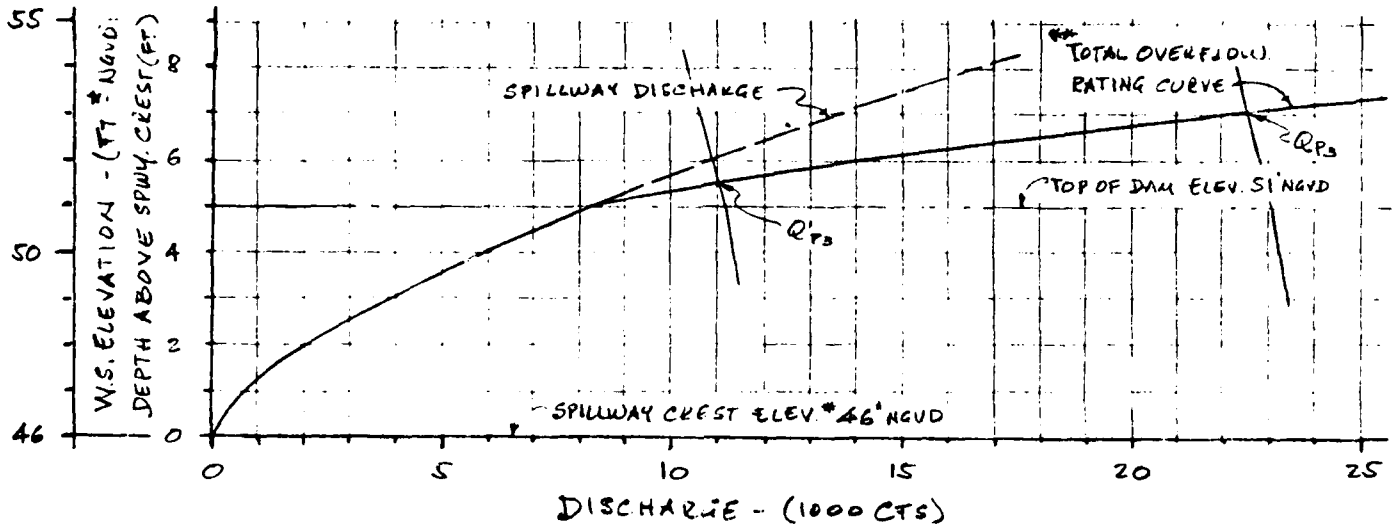


△ DATA FROM R.I. DEPT. OF PUBLIC WORKS, DIV. OF HARBORS AND RIVERS - "NOTES IN EAST PROV W. WORKS DAM #407", DATED 6/30/49

○ AREAS MEASURED ON USGS EAST PROVIDENCE, MASS.-RI QUADRANGLE SHEET (1971)

* SEE NOTE p. D-2

iii) JAMES V. TURNER RESERVOIR DAM - OUTFLOW RATING CURVE:



*SEE NOTE p. D-2

**EAST DIKES OVERFLOW NOT INCLUDED. SEE p.p. D-2 & D-3

b) SURCHARGE DEPTHS TO PASS PEAK INFLOWS (Q_{P_1} & Q'_{P_1})

i) @ $Q_{P_1} \cong$ PMF = 24000 CFS $H_1 \cong 7.2'$

ii) @ $Q'_{P_1} \cong \frac{1}{2}$ PMF = 12000 CFS $H'_1 \cong 5.7'$

C) EFFECT OF SURCHARGE STORAGE - PEAK OUTFLOWS

i) WATERSHED D.A. = 48.0 Sq mi (SEE p. D-1)

ii) LAKE AREA / STORAGE

J.V. TURNER RESERVOIR AND CENTRAL POND NETCALLY FORM A SINGLE RESERVOIR DIVIDED BY AN EMBANKMENT CROSSING (PROBABLY A PORTION OF THE ORIGINAL CENTRAL POND DAM) AT NEWMAN AVE. THE TOTAL AREA (±278 AC) AND STORAGE CAPACITY (±425 MG) OF THE TWO WATER BODIES ARE LISTED AS TURNER'S ON THE N.J. D.E.P.W., DIV. OF HARBORS AND RIVERS DATA SHEET "NOTES ON EAST PROV. W. WORKS DAM #407" DATED 2/20/80 LISTED DATA TITLE N.J. DEP'T

IS EXPECTED THROUGH THIS AREA FOR RESERVOIR LEVELS BELOW (*) ELEV. 53' MSD.

CONSEQUENTLY, IT IS ASSUMED THAT NO OVERFLOW (ONLY FLOODING OF CONFINED AREAS) WILL RESULT FROM OVERTOPPING OF THE EAST DIKES WITHIN THE RANGE OF EXPECTED SURCHARGES.

ii) THEREFORE, THE OVERFLOW RATING CURVE FOR SURCHARGES (H) ABOVE THE SPILLWAY CREST CAN BE APPROXIMATED AS FOLLOWS:

1') SECTION AB: $Q^*_{1B} = 0.4 \times 3 \times 2.0 (H-5)^{5/2} = \underline{2.4 (H-5)^{5/2}}$

2') SECTION BC (DAM): $Q_{BC} = 2.7 \times 560 (H-5)^{3/2} = \underline{1510 (H-5)^{3/2}}$

3') SPILLWAY (SECTION DE):

$$Q_S = Q_{DE} = 3.7 \times 200\, H^{3/2} = \underline{740\, H^{3/2}}$$

4') SECTION FG (RIGHT-SIDE DIKE).

$$Q_{FG} = 2.0 \times 770 (H-5)^{3/2} = \underline{1540 (H-5)^{3/2}}$$

5') SECTION GH: $Q_{GH} = 0.4 \times 28 \times 2.0 (H-5)^{5/2} = \underline{22.4 (H-5)^{5/2}}$

THE TOTAL OVERFLOW RATING CURVE IS APPROXIMATED BY THE SUM OF ALL THE APPLICABLE FORMULAE ON ITEMS (1') THRU (5'):

$$Q = 740\, H^{3/2} + 3050 (H-5)^{3/2} + 24.8 (H-5)^{5/2}$$

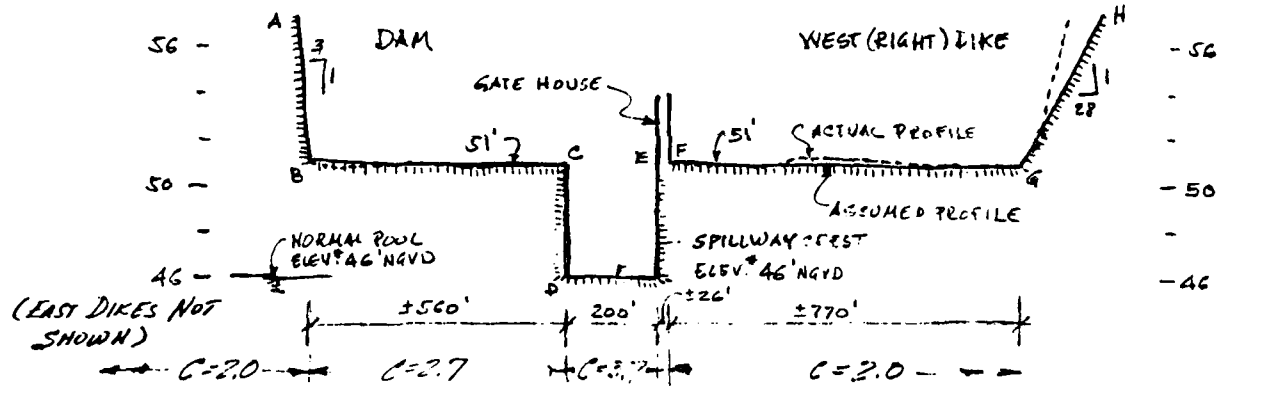
(SEE PLOT ON P. D-4)

*NOTE: FLOW OVER SLOPED SECTIONS BY APPLICATION OF FORMULA GIVEN BY THE USGS ON "MEASUREMENT OF PEAK DISCHARGE AT DAMS BY INDIRECT METHODS" BY HULSING (APPLICATIONS OF HYDRAULICS):

$$Q = \frac{2cb}{5(h_b - h_a)}\left[h_b^{5/2} - h_a^{5/2}\right]$$ WHERE: Q = DISCH.; c = DISCH. COEFF., b = LENGTH; h_a & h_b = STATIC HEAD REFERED TO HIGH & LOW ENDS OF WEIR, RESPECTIVELY.

DAM AND DIKES. TOP OF DAM AND ADJACENT WEST (RIGHT) DIKE AT (±) ELEV. 51* NGVD. (SEE OVERFLOW PROFILE). EAST DIKE #1 (AT LEDGE ROAD) (±) 550' LONG WITH ADJACENT TERRAIN AT (±) 16" AND 13" TO 1' SLOPE. EAST DIKE #2 (SOUTH FROM ARCADE AVE.), (±) 350' LONG WITH ADJACENT TERRAIN AT (±) 60" AND 15" TO 1' SLOPE. TOP ELEV. OF EAST DIKES #1 AND #2 ASSUMED TO BE ELEVS. 48' NGVD AND 48' NGVD, RESPECTIVELY, AS SHOWN ON "EAST PROVIDENCE RESERVOIR - CONTRACT No 1 - SHEET No 1" DRAWING, DATED MARCH, 1934.

ASSUME C=3.7 FOR THE SPILLWAY DISCHARGE, C=2.7 FOR THE DAM AND C=2.0 FOR THE DIKES AND ADJACENT TERRAIN (PERIMETER).



NOTE: DATA FROM C.E. OBSERVATIONS ON 10/8/80 BY HLL & F.S.

JAMES V. TURNER RESERVOIR DAM
APPROXIMATE OVERFLOW PROFILE

NO DETAILED SURVEY OF THE TERRAIN EXTENDING TO THE EAST (LEFT) OF THE RESERVOIR NEAR ARCADE AVE AND LEDGE ST. IS AVAILABLE AS TO DETERMINE WHETHER OVERFLOW TOWARDS RUNNINS RIVER WILL RESULT FROM THE OVERTOPPING OF THE EAST DIKES. HOWEVER, EXCEPT FOR SMALL, POCKET DEPRESSIONS, THE U.S.G.S. EAST PROVIDENCE, MASS. - R.I. QUADRANGLE (1971) SHOWS ALL EXISTING TERRAIN ALONG THE EAST (LEFT) SHORE OF THE RESERVOIR ABOVE ELEVATION 50' NGVD AND THEREFORE, NO OR NEGLIGEABLE OVERFLOW

*NOTE: SPILLWAY CREST ELEVATION 46' AS SHOWN ON "EAST PROVIDENCE RESERVOIR - CONTRACT" DWGS (SHEETS No 1 TO 4), DATED MARCH 1934 AND OTHER DATA SOURCES BY THE F.J. DEPT. OF PUBLIC WORKS, DIV. OF HARBORS AND RIVERS, IS ASSUMED TO BE ON NATIONAL GEODETIC VERTICAL DATUM (NGVD).

HYDROLOGIC/HYDRAULIC INSPECTION

JAMES V. TURNER RESERVOIR DAM, EAST PROVIDENCE, R.I.

I) PERFORMANCE AT PEAK FLOOD CONDITIONS:

1) PROBABLE MAXIMUM FLOOD (PMF)

a) WATERSHED CLASSIFIED AS "FLAT AND COASTAL", TYPICALLY CONTAINING LARGE SWAMPS AND IMPOUNDMENTS (FALLS POND, MANCHESTER POND &c., GREENWOOD LAKE AND DODGEVILLE POND)

b) WATERSHED AREA: DA = 48.0 Sq. mi

NOTE: D.A. FROM R.I. DEPARTMENT OF PUBLIC WORKS, DIVISION OF HARBORS AND RIVERS' NOTES IN EAST PROV. W. WORKS: DAM #407" DATED 6/30/47 AND DAM INVENTORY. T.L. NOTED HURRICANE, MAY THE 1932-1927 TEN MILE RIVER R.O. DATA AT CENTRAL POND DAM (OLD DAM ½ MILE FROM J.V. TURNER DAM) SHOWS D.A 52.3 Sq mi. (USE MORE RECENT DATA DA=48 Sq mi)

c) PEAK FLOODS (FROM NED-ACE GUIDELINES' - GUIDE CURVES FOR PMF):

i) FROM GUIDE CURVES: CSM = 500 CFS/Sq mi

ii) PMF = 48.0 × 500 = 24000 CFS

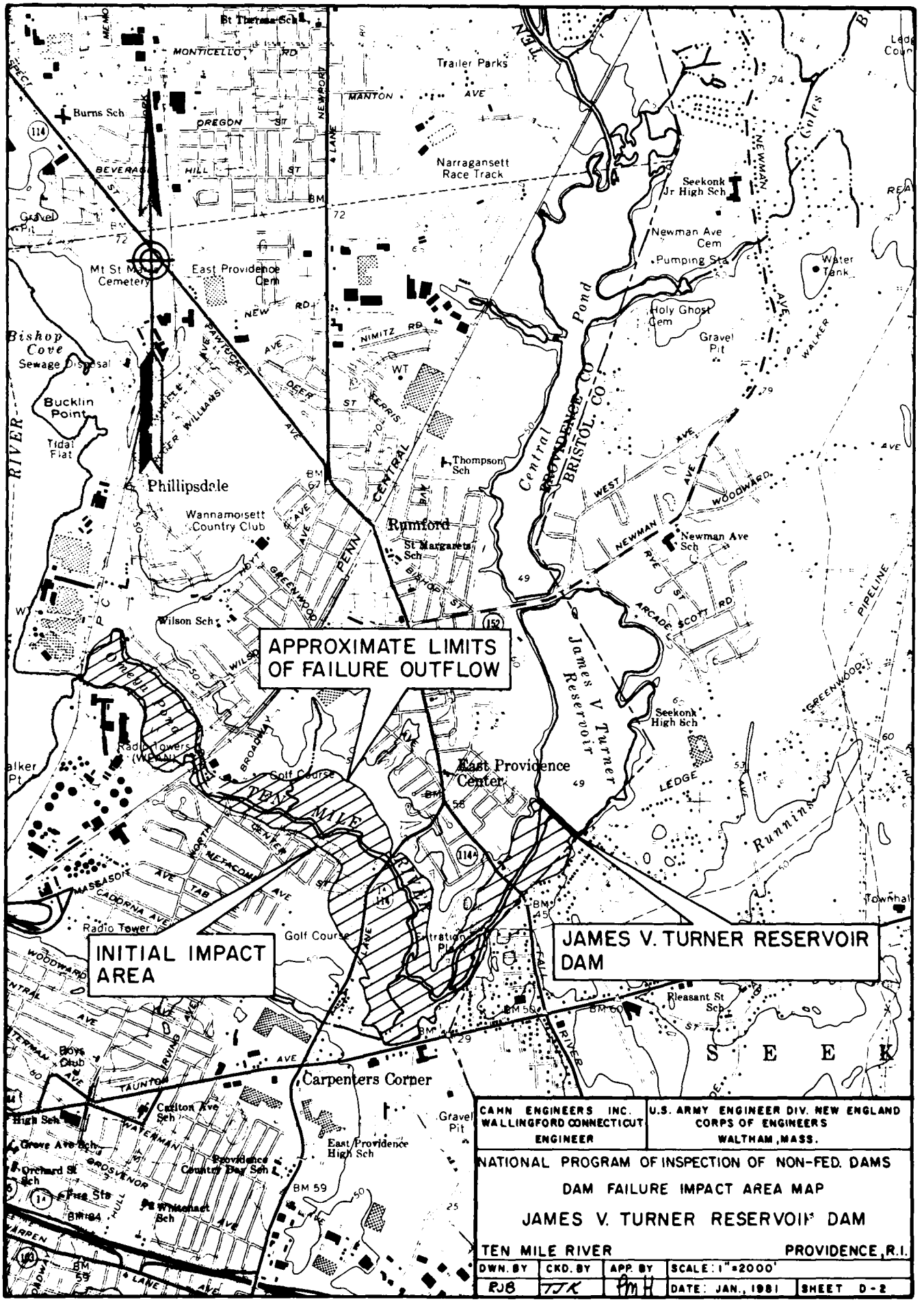
iii) ½ PMF = 12000 CFS

2) SURCHARGE AT PEAK INFLOWS (PMF AND ½ PMF)

a) OUTFLOW RATING CURVE:

i) SPILLWAY AND OVERFLOW PROFILE OF DAM
OGEE TYPE. SPILLWAY (+) 200' LONG WITH CREST ELEV.* 46' NGVD. EARTH FILL

*FROM R.I. DEPT. OF PUBLIC WORKS, DIV. OF HARBORS & RIVERS DATA AND DWGS. - SEE NOTE p. D-2



CAHN ENGINEERS INC. WALLINGFORD CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

DAM FAILURE IMPACT AREA MAP

JAMES V. TURNER RESERVOIR DAM

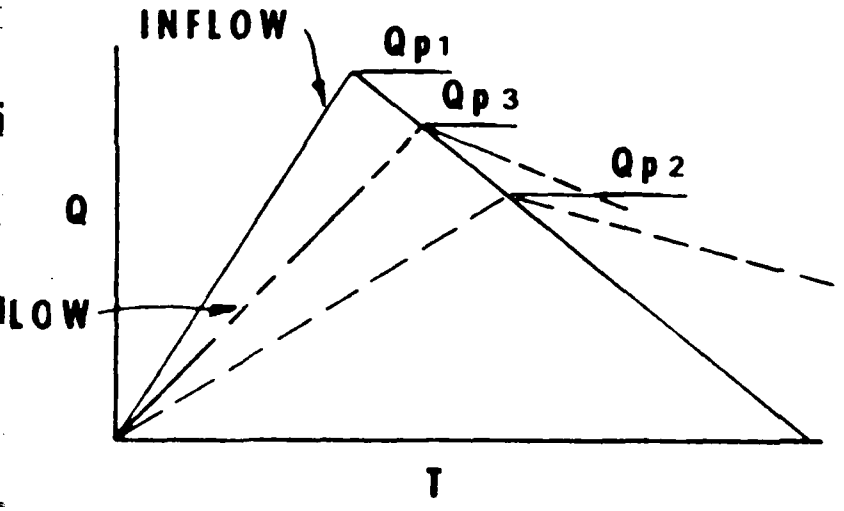
TEN MILE RIVER PROVIDENCE, R.I.

DWN. BY	CKD. BY	APP. BY	SCALE: 1"=2000'	
RJB	JJK	[illegible]	DATE: JAN., 1981	SHEET D-2

MAXIMUM PROBABLE FLOWS BASED ON TWICE THE STANDARD PROJECT FLOOD (Flat and Coastal Areas)

	River	SPF (cfs)	D.A. (sq. mi.)	MPF (cfs/sq. mi.)
1.	Pawtuxet River	19,000	200	190
2.	Mill River (R.I.)	8,500	34	500
3.	Peters River (R.I.)	3,200	13	490
4.	Kettle Brook	8,000	30	530
5.	Sudbury River.	11,700	86	270
6.	Indian Brook (Hopk.)	1,000	5.9	340
7.	Charles River.	6,000	184	65
8.	Blackstone River.	43,000	416	200
9.	Quinebaug River	55,000	331	330

ESTIMATING EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES



STEP 1: Determine Peak Inflow (Qp_1) from Guide Curves.

STEP 2: a. Determine Surcharge Height To Pass "Qp_1".

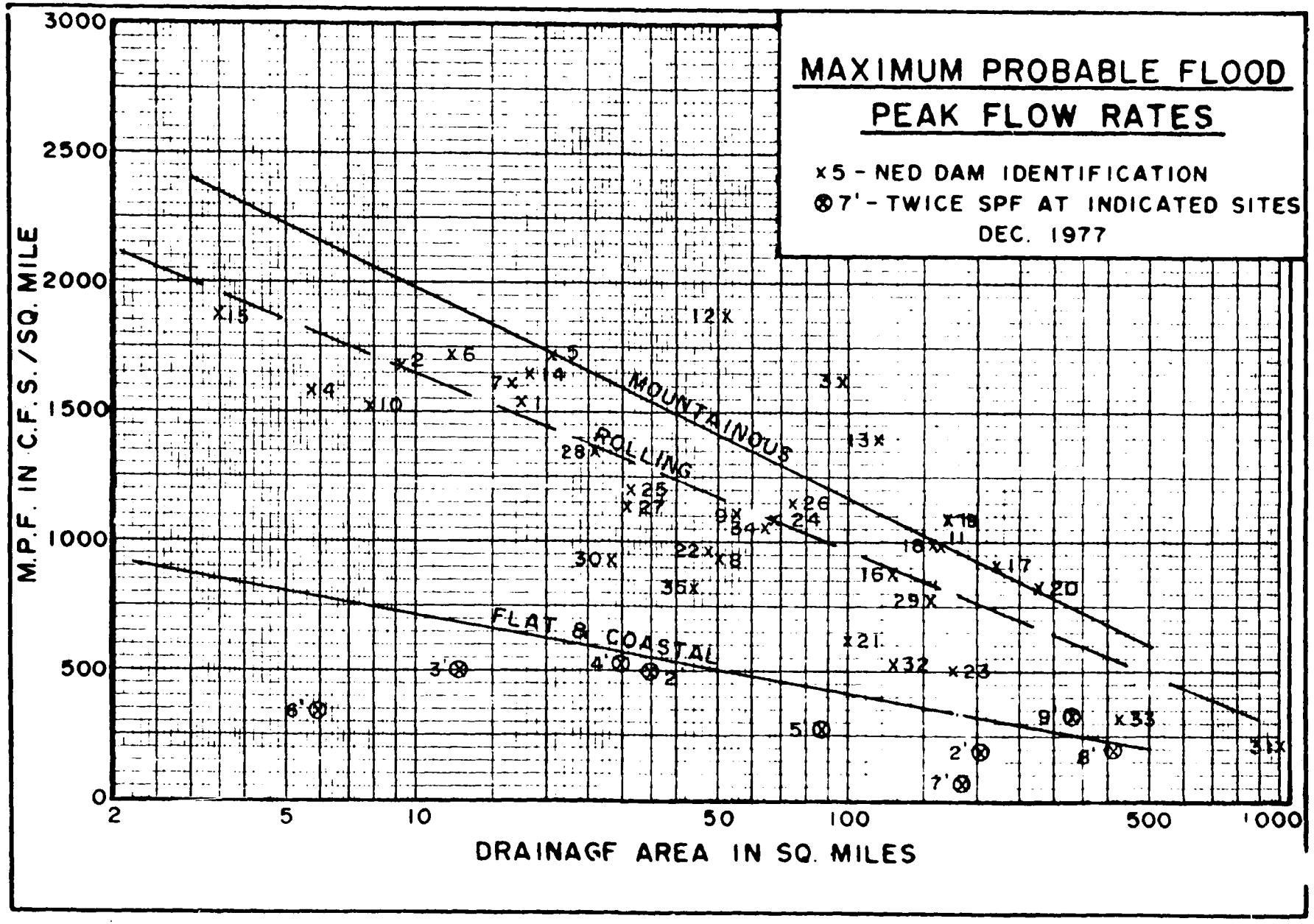
b. Determine Volume of Surcharge ($STOR_1$) In Inches of Runoff.

c. Maximum Probable Flood Runoff In New England equals Approx. 19", Therefore:

$$Qp_2 = Qp_1 \times \left(1 - \frac{STOR_1}{19}\right)$$

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Qp_2"

b. Average "$STOR_1$" and "$STOR_2$" and Determine Average Surcharge and Resulting Peak Outflow "Qp_3".


MAXIMUM PROBABLE FLOOD
PEAK FLOW RATES
x5 - NED DAM IDENTIFICATION
⊗7' - TWICE SPF AT INDICATED SITES
DEC. 1977
M.P.F. IN C.F.S./SQ. MILE
DRAINAGE AREA IN SQ. MILES
3000
2500
2000
1500
1000
500
0
2
5
10
50
100
500
1000
MOUNTAINOUS
ROLLING
FLAT & COASTAL
x15
x4
x10
x2
x6
x14
x1
x5
12x
3x
13x
28x
x25
x27
9x
34x
x26
24
x18
11
18x
x17
x20
16x
29x
30x
22x
x8
35x
x21
x32
x23
x33
31x
3'⊗
4'⊗
⊗2
6'⊗
5⊗
9⊗
2'⊗
8'⊗
7'⊗

SURCHARGE STORAGE ROUTING SUPPLEMENT

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Qp_2"

b. Avg "$STOR_1$" and "$STOR_2$" and Compute "Qp_3".

c. If Surcharge Height for Qp_3 and "$STOR_{AVG}$" agree O.K. If Not:

STEP 4: a. Determine Surcharge Height and "$STOR_3$" To Pass "Qp_3"

b. Avg. "Old $STOR_{AVG}$" and "$STOR_3$" and Compute "Qp_4"

c. Surcharge Height for Qp_4 and "New $STOR_{Avg}$" should Agree closely

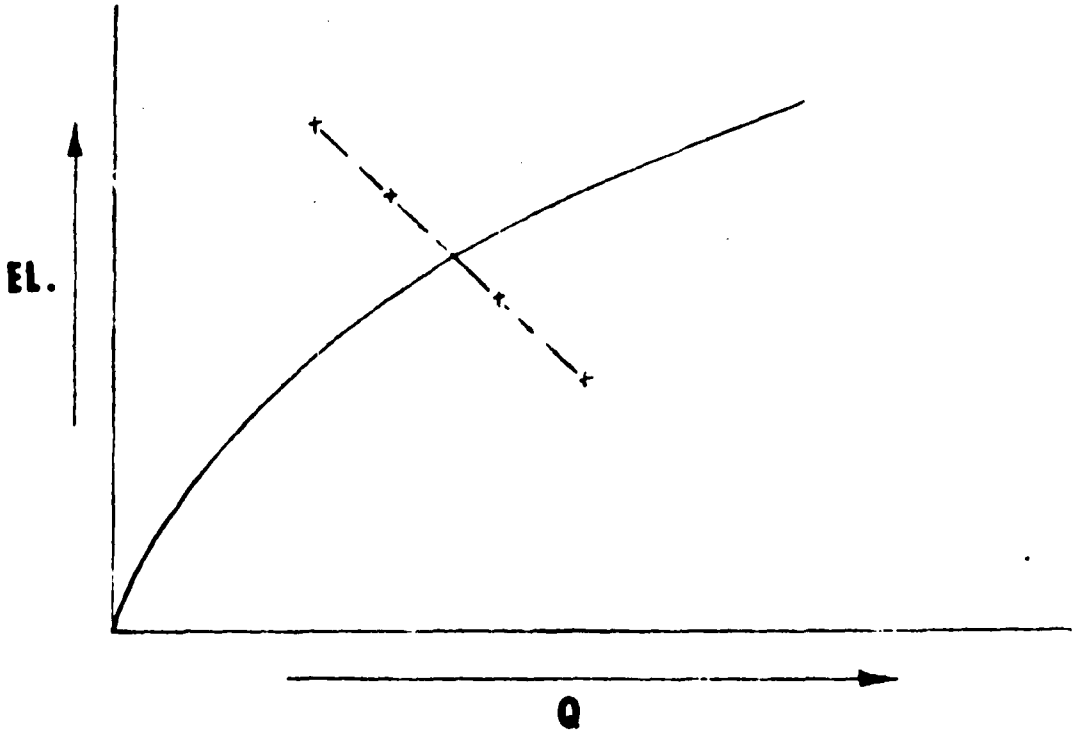
SURCHARGE STORAGE ROUTING ALTERNATE

$$Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR}{19}\right)$$

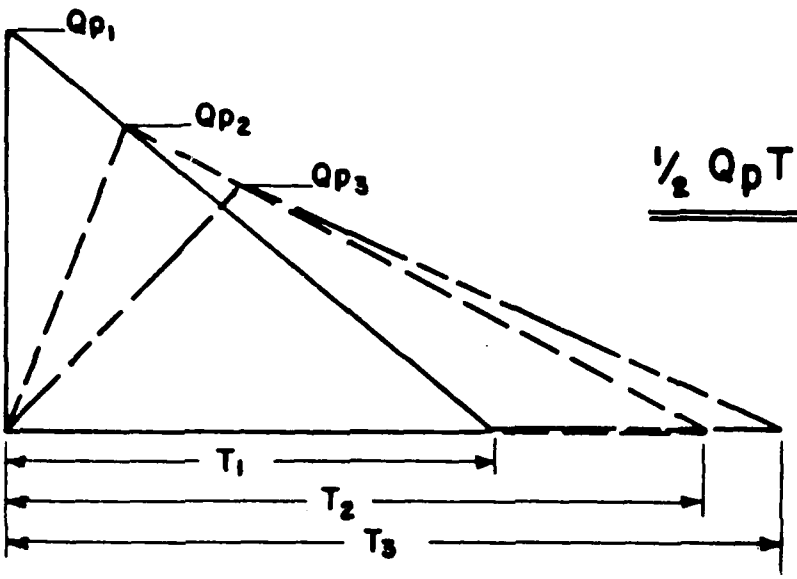
$$Q_{p2} = Q_{p1} - Q_{p1}\left(\frac{STOR}{19}\right)$$

FOR KNOWN Q_{p1} AND 19'' R.O.

Q_{p2}	STOR	EL.
≡≡≡	≡≡≡	≡≡≡



"RULE OF THUMB" GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS



$\frac{1}{2} Q_p T = 12 S$

STEP 1: DETERMINE OR ESTIMATE RESERVOIR STORAGE (S) IN AC-FT AT TIME OF FAILURE.

STEP 2: DETERMINE PEAK FAILURE OUTFLOW (Q_{p1}).

$$Q_{p_1} = \frac{8}{27} W_b \sqrt{g} Y_o^{\frac{3}{2}}$$

W_b = BREACH WIDTH - SUGGEST VALUE NOT GREATER THAN 40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT.

Y_o = TOTAL HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE.

STEP 3: USING USGS TOPO OR OTHER DATA, DEVELOP REPRESENTATIVE STAGE-DISCHARGE RATING FOR SELECTED DOWNSTREAM RIVER REACH.

STEP 4: ESTIMATE REACH OUTFLOW (Q_{p2}) USING FOLLOWING ITERATION.

A. APPLY Q_{p1} TO STAGE RATING, DETERMINE STAGE AND ACCOPMANYING VOLUME (V_1) IN REACH IN AC-FT. (NOTE: IF V_1 EXCEEDS 1/2 OF S, SELECT SHORTER REACH.)

B. DETERMINE TRIAL Q_{p2}.

$$Q_{p_2}(\text{TRIAL}) = Q_{p_1}\left(1 - \frac{V_1}{S}\right)$$

C. COMPUTE V_2 USING Q_{p2} (TRIAL).

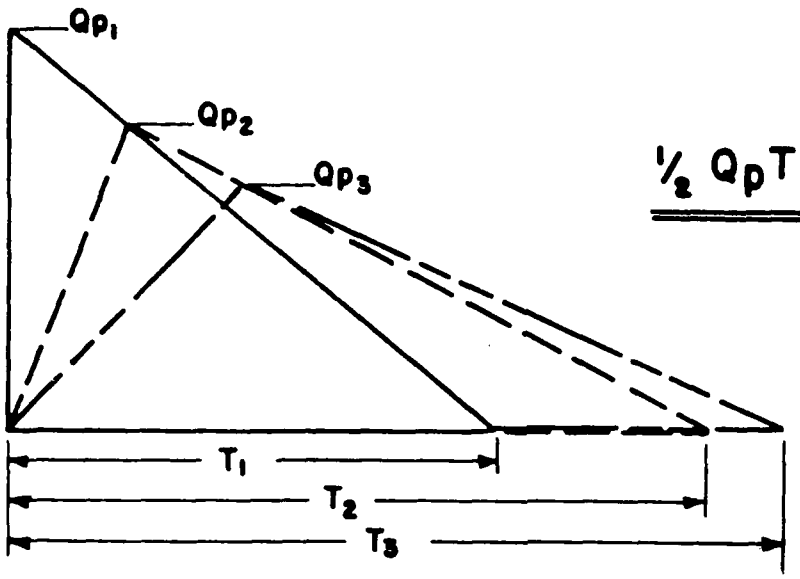
D. AVERAGE V_1 AND V_2 AND COMPUTE Q_{p2}.

$$Q_{p_2} = Q_{p_1}\left(1 - \frac{V_{AVG}}{S}\right)$$

STEP 5: FOR SUCCEEDING REACHES REPEAT STEPS 3 AND 4.

APRIL 1978

"RULE OF THUMB" GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS



$\frac{1}{2} Q_p T = 12 S$

STEP 1: DETERMINE OR ESTIMATE RESERVOIR STORAGE (S) IN AC-FT AT TIME OF FAILURE.

STEP 2: DETERMINE PEAK FAILURE OUTFLOW (Q_{p1}).

$$Qp_1 = \frac{8}{27} W_b \sqrt{g} Y_o^{\frac{3}{2}}$$

W_b = BREACH WIDTH - SUGGEST VALUE NOT GREATER THAN 40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT.

Y_o = TOTAL HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE.

STEP 3: USING USGS TOPO OR OTHER DATA, DEVELOP REPRESENTATIVE STAGE-DISCHARGE RATING FOR SELECTED DOWNSTREAM RIVER REACH.

STEP 4: ESTIMATE REACH OUTFLOW (Q_{p2}) USING FOLLOWING ITERATION.

A. APPLY Q_{p1} TO STAGE RATING, DETERMINE STAGE AND ACCOPMANYING VOLUME (V_1) IN REACH IN AC-FT. (NOTE: IF V_1 EXCEEDS 1/2 OF S, SELECT SHORTER REACH.)

B. DETERMINE TRIAL Q_{p2}.

$$Qp_2(\text{TRIAL}) = Qp_1 \left(1 - \frac{V_1}{S}\right)$$

C. COMPUTE V_2 USING Q_{p2} (TRIAL).

D. AVERAGE V_1 AND V_2 AND COMPUTE Q_{p2}.

$$Qp_2 = Qp_1 \left(1 - \frac{V_{avg}}{S}\right)$$

STEP 5: FOR SUCCEEDING REACHES REPEAT STEPS 3 AND 4.

APRIL 1978

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) STATE	(2) IDENTITY NUMBER	(3) DIVISION	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST	(10) NAME	(13) LATITUDE (NORTH)	(14) LONGITUDE (WEST)	(15) REPORT DATE DAY | MO | YR
RI	1002	NED	RI	007	01				JAMES V TURNER RESERVOIR DAM	4150.0	7120.5	00FEB81

(11) POPULAR NAME	(12) NAME OF IMPOUNDMENT
	JAMES V TURNER RESERVOIR

(16) REGION	(17) BASIN	(18) RIVER OR STREAM	(19) NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	(20) DIST FROM DAM (MI.)	(21) POPULATION
01	09	TEN MILE RIVER	EAST PROVIDENCE	1	48207

(22) TYPE OF DAM	(23) YEAR COMPLETED	(24) PURPOSES	(25) STRUCTURAL HEIGHT (FT.)	(26) HYDRAULIC HEIGHT (FT.)	(27) IMPOUNDING CAPACITIES MAXIMUM (ACRE–FT.)	(28) NORMAL (ACRE–FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
MEDT	1930	SC	60	22	3100	1300	NED	N	N	N	N	

(29) REMARKS
P1 CONCRETE P3 ABANDONED AS WATER SUPPLY P4 APPROXIMATE

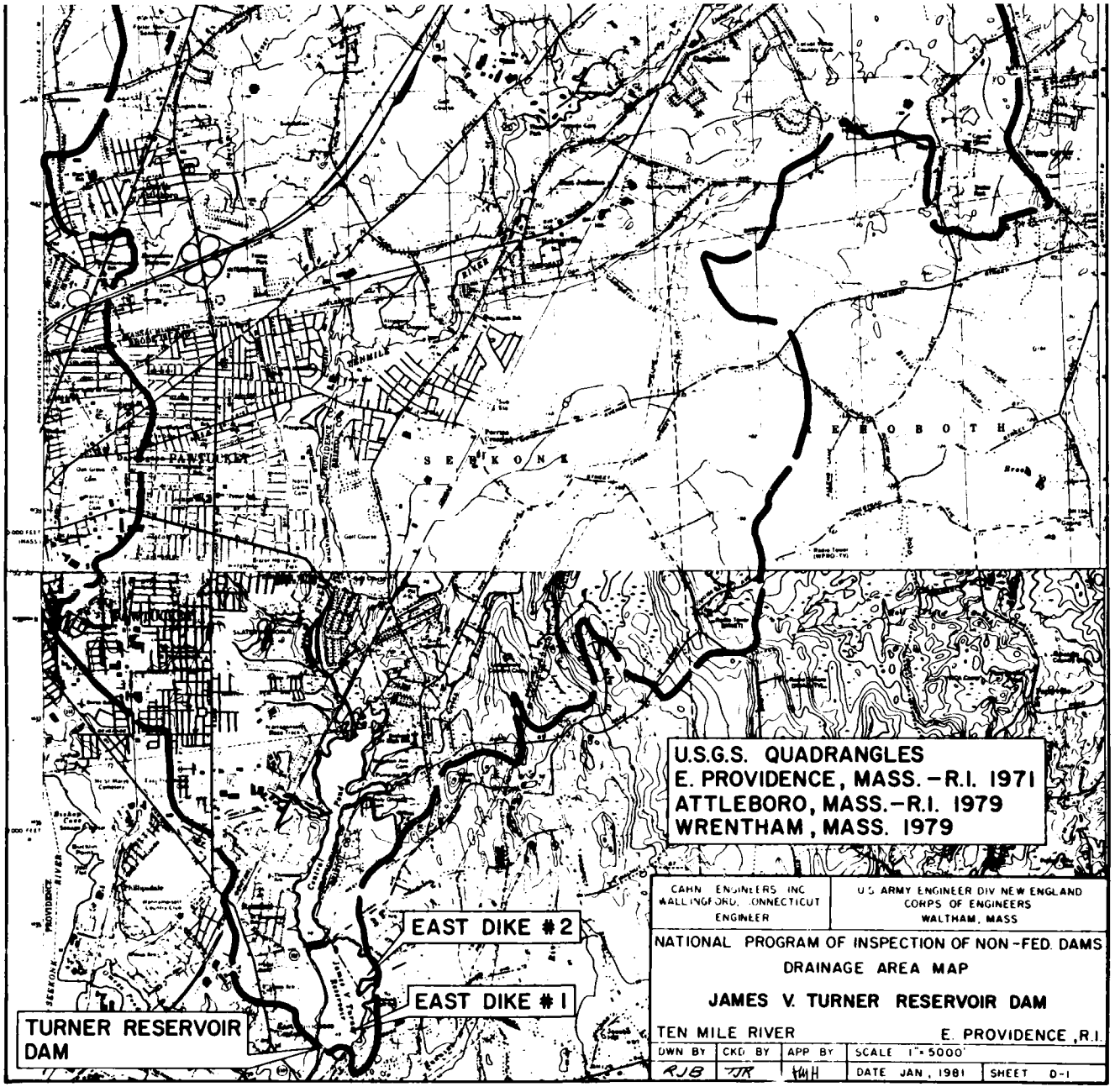
(30) D/S HAS	(31) SPILLWAY CREST LENGTH	(32) SPILLWAY TYPE	(33) SPILLWAY WIDTH (FT.)	(34) MAXIMUM DISCHARGE (FT.)	(35) VOLUME OF DAM (CY)	(36) POWER CAPACITY INSTALLED (MW)	(37) POWER CAPACITY PROPOSED (MW)	(38) NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	820	U	200	8300												

(39) OWNER	(40) ENGINEERING BY	(41) CONSTRUCTION BY
E PROVIDENCE WATER WORKS	WATERMAN ENGINEERING CO	UNKNOWN

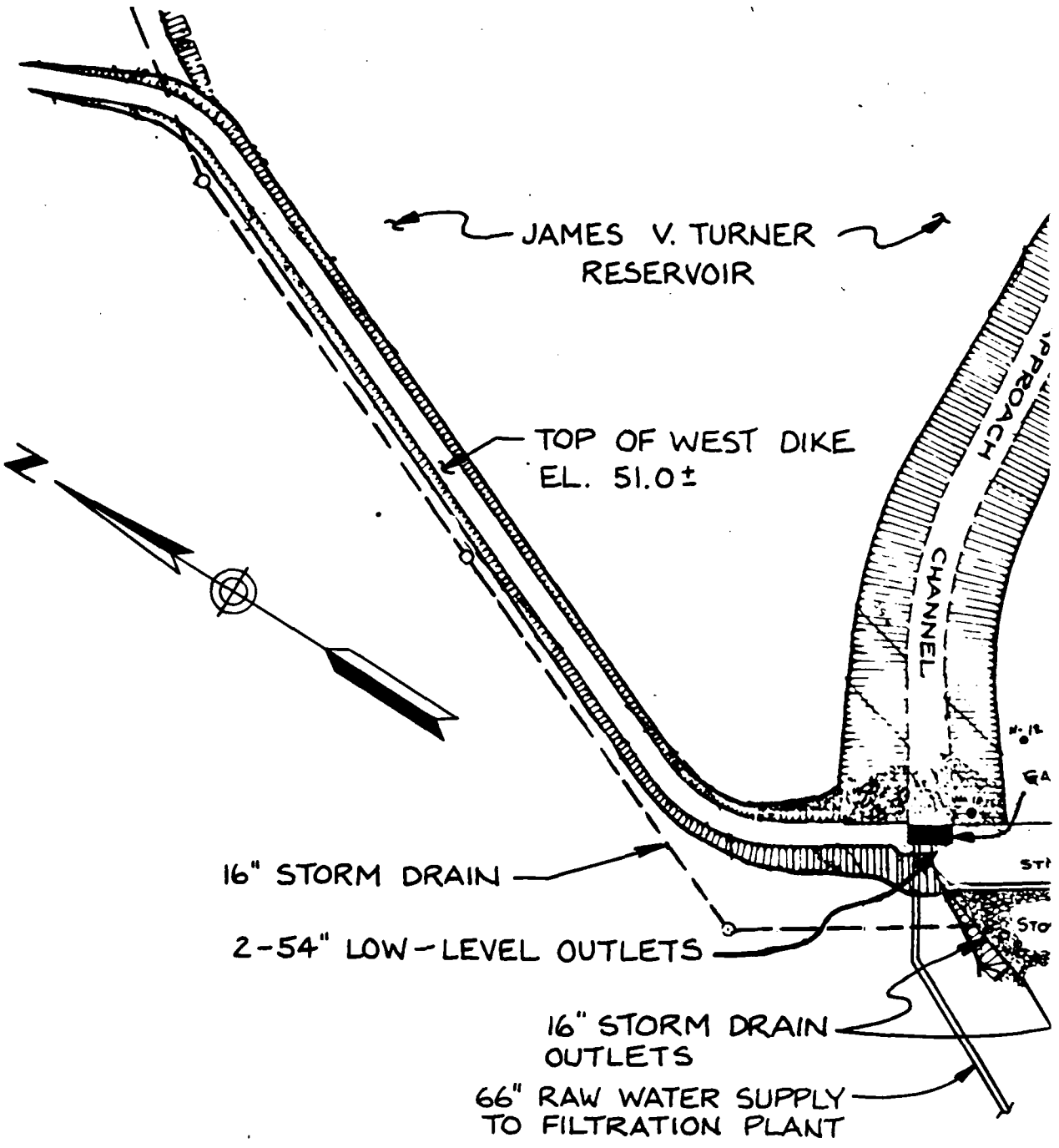
(42) REGULATORY AGENCY DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	RI DEM	RI DEM

(43) INSPECTION BY	(44) INSPECTION DATE DAY | MO | YR	(45) AUTHORITY FOR INSPECTION
CAHN ENGINEERS INC	20NOV80	PL 92-367

(46) REMARKS


EAST DIKE #2
EAST DIKE #1
TURNER RESERVOIR DAM
U.S.G.S. QUADRANGLES
E. PROVIDENCE, MASS. – R.I. 1971
ATTLEBORO, MASS. – R.I. 1979
WRENTHAM, MASS. 1979
CAHN ENGINEERS INC
WALLINGFORD, CONNECTICUT
ENGINEER
U.S. ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
DRAINAGE AREA MAP
JAMES V. TURNER RESERVOIR DAM
TEN MILE RIVER
E. PROVIDENCE, R.I.
DWN BY RJB
CKD BY JR
APP BY HH
SCALE 1"=5000'
DATE JAN. 1981
SHEET D-1


DRAINAGE AREA
48 SQ. MI.
Plainville
PLAINVILLE
NORTH ATTLEBOROUGH
MANSFIELD
NORTON

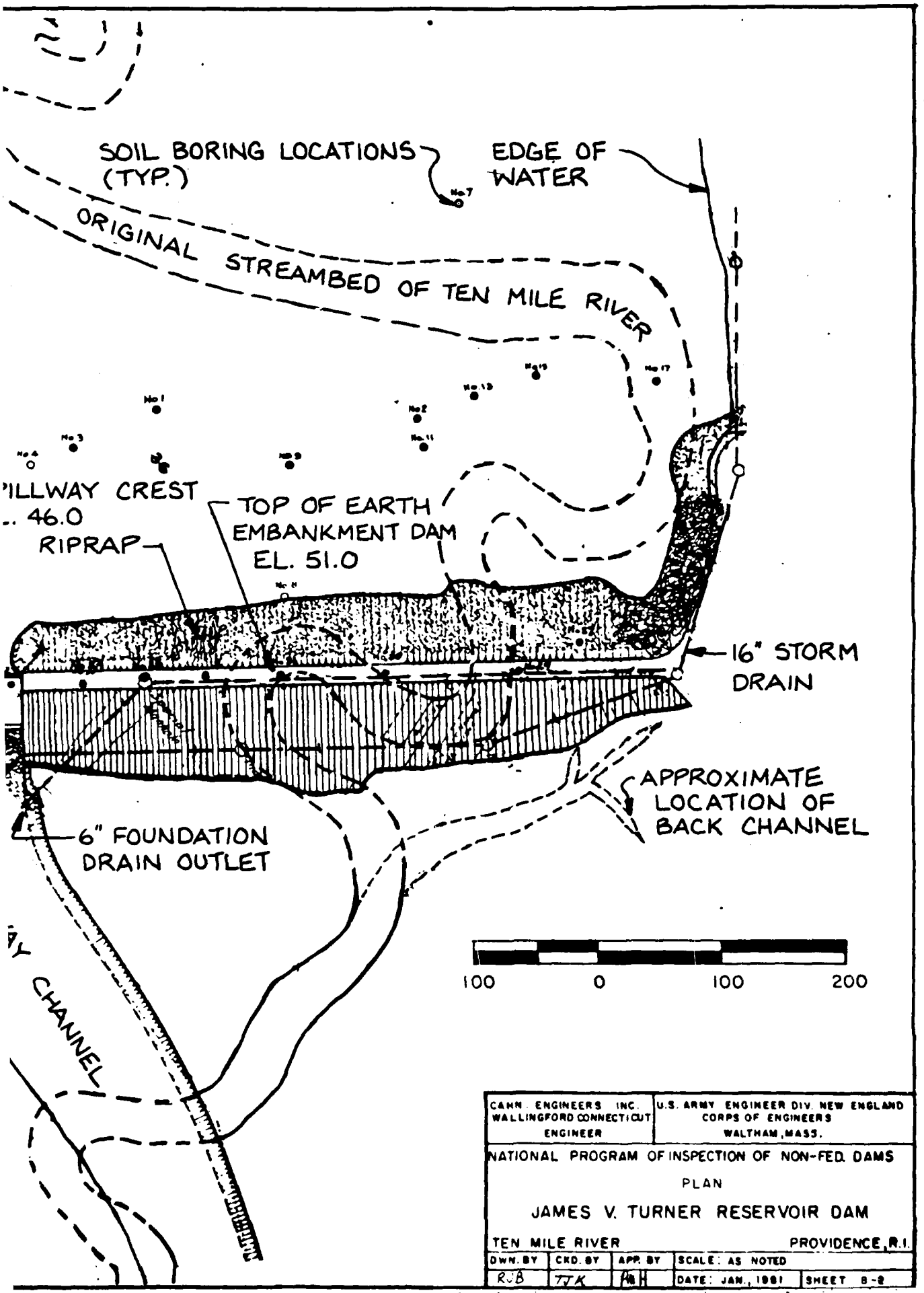


NOTE:

1. DRAWING ON SHEETS B-1, B-2, B-3 & B-4 WERE COMPILED FROM CONSTRUCT DRAWINGS ENTITLED EAST PROVIDENCE RESERVOIR, CONTRACT No.1-SHEI I THRU 4 BY WATERMAN ENGINEERING CO. DATED MARCH, 1934 & CAHN ENGINEERS INSPECTION OF THE DAM ON NOV. 20, 1980. NOT ALL TOPOGR/ AND/OR STRUCTURAL FEATURES ARE NECESSARILY IDENTIFIED.

2. ELEVATIONS WERE TAKEN FROM THE WATERMAN CONSTRUCTION DRAWINC DESCRIBED IN NOTE 1. AND ARE ASSUMED TO BE N.G.V.D. SPILLWAY CRE: ELEVATION IS 46.0.

3. SOIL PROFILE ALONG CENTERLINE OF DAM SHOWN ON SHEET B-3



CAHN ENGINEERS INC. WALLINGFORD CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

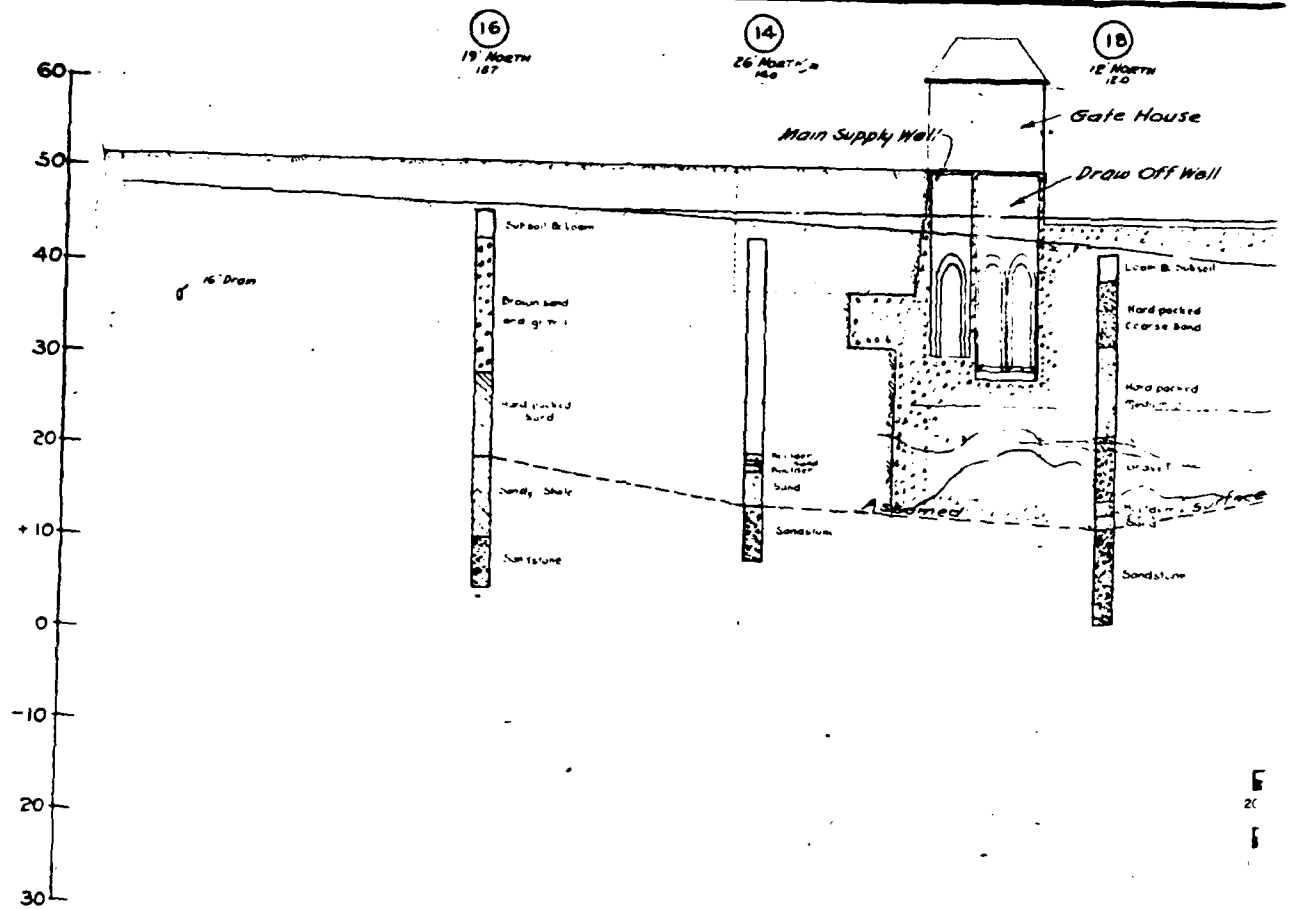
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

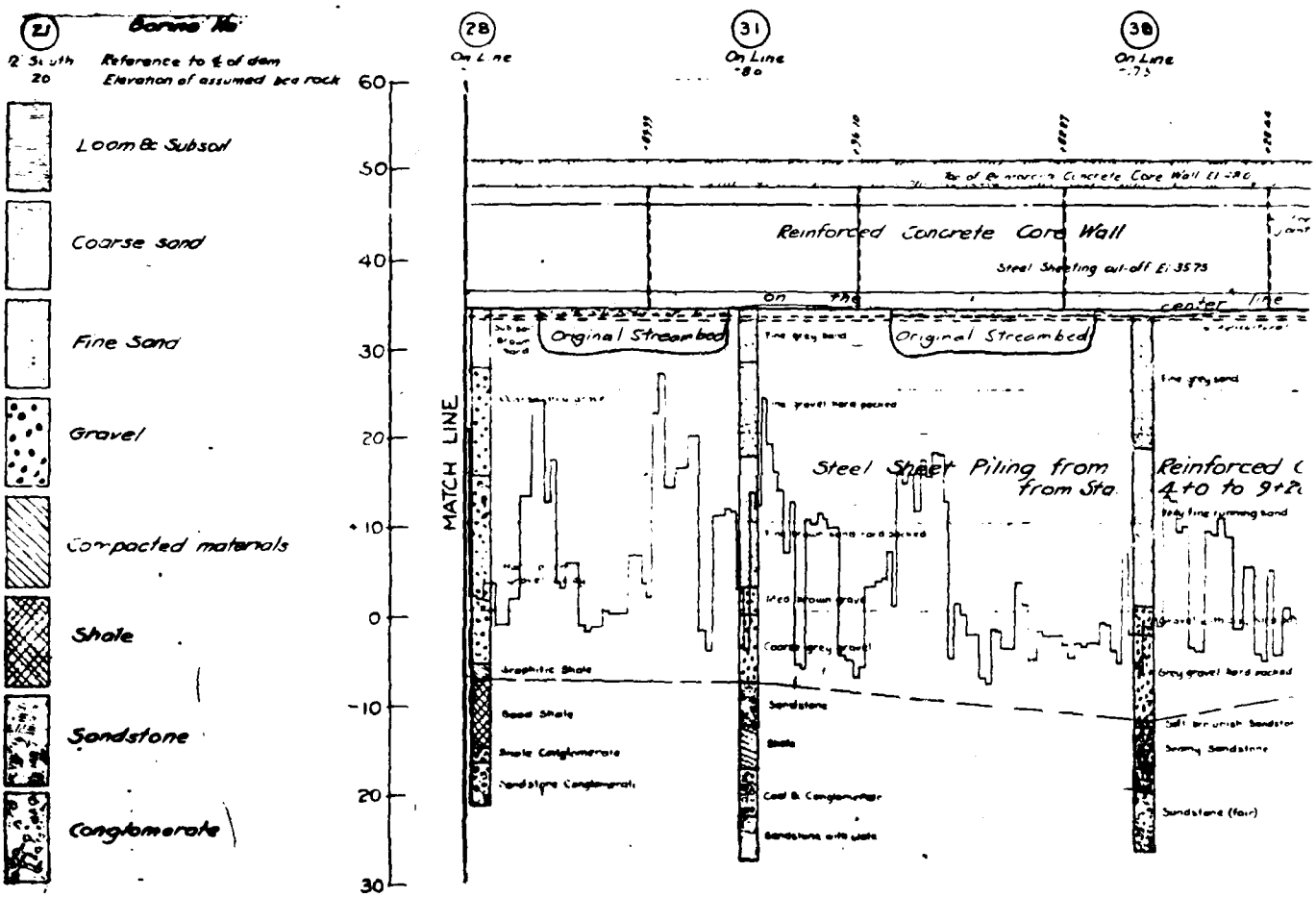
PLAN

JAMES V. TURNER RESERVOIR DAM

TEN MILE RIVER PROVIDENCE, R.I.

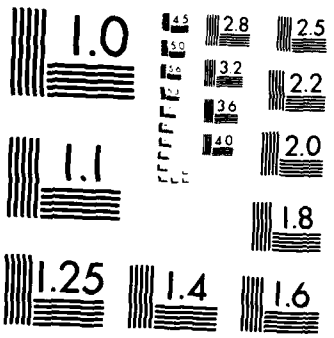
DWN. BY	CKD. BY	APP. BY	SCALE: AS NOTED	
R.J.B	T.J.K	[illegible]	DATE: JAN., 1981	SHEET 8-2

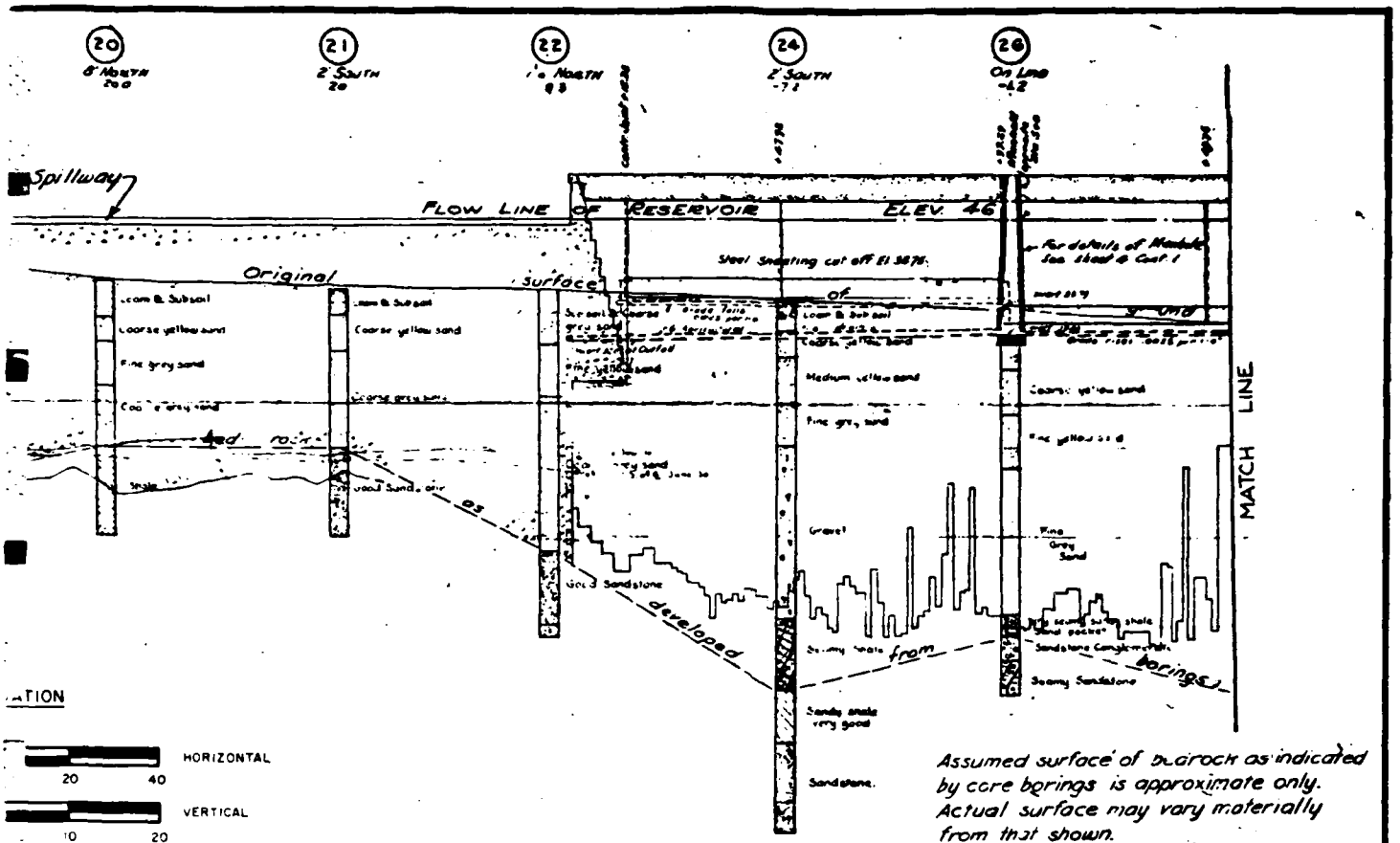

16
19' North
187
14
26' North
180
18
12' North
180
Gate House
Main Supply Well
Draw Off Well
Assumed
Sandstone
60
50
40
30
20
+10
0
-10
20
30


21
Borne No
2' South
20
Reference to ℄ of dam
Elevation of assumed bed rock
Loam & Subsoil
Coarse sand
Fine Sand
Gravel
Compacted materials
Shale
Sandstone
Conglomerate
28
On Line
31
On Line
-80
38
On Line
-175
Reinforced Concrete Core Wall
Steel Sheeting cut-off El 3575
On the center line
Original Streambed
Original Streambed
Steel Sheet Piling from
from Sta
MATCH LINE
Graphitic Shale
Sandstone
Shale
Coal & Conglomerate
Sandstone (fair)
60
50
40
30
20
+10
0
-10
20
30

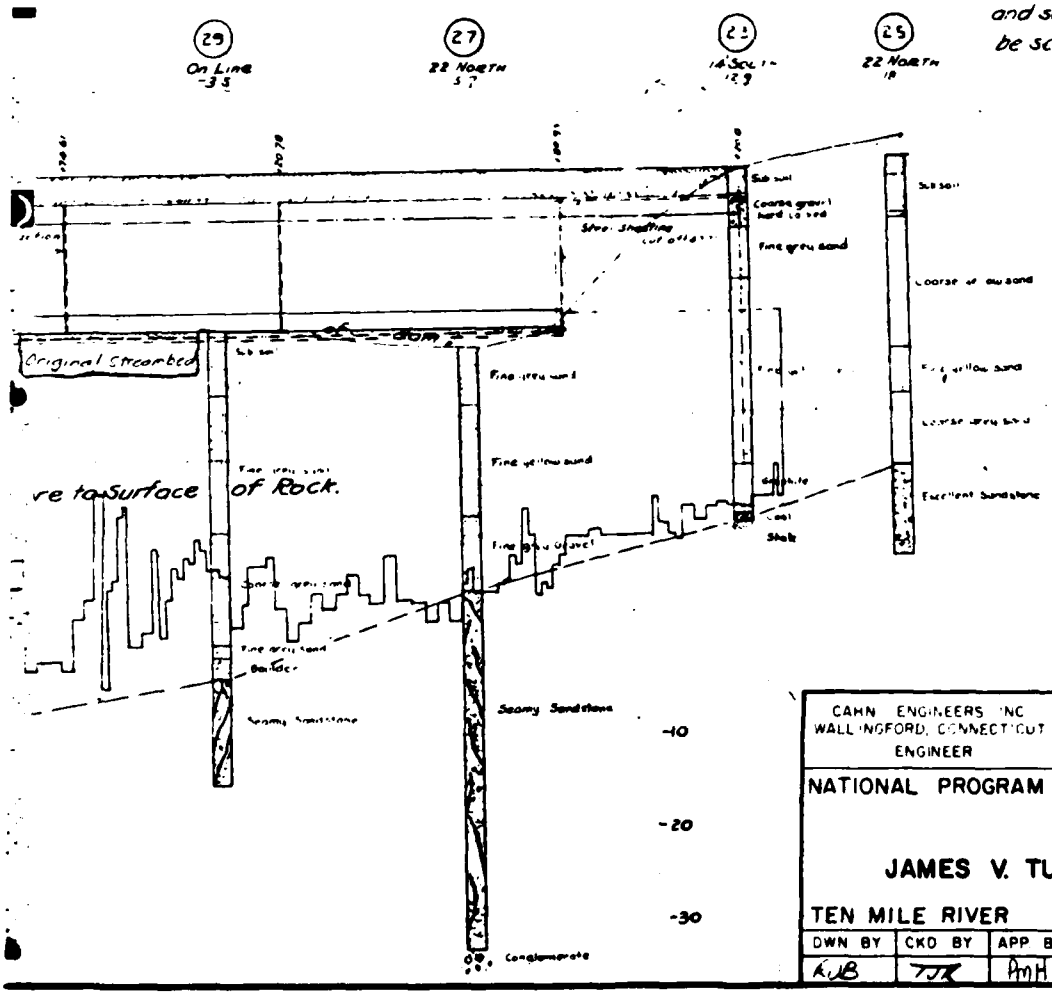
AD-A156 019 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS JAMES V TURNER DAM (R.. (U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV JAN 81 2/2

UNCLASSIFIED F/G 13/13 NL





Assumed surface of bedrock as indicated by core borings is approximate only. Actual surface may vary materially from that shown. Records of subsurface investigations and samples taken from the holes may be seen at the office of the Engineer.



re to Surface of Rock.

NOTES:
SEE SHEET B-2.

CAHN ENGINEERS INC WALLINGFORD, CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

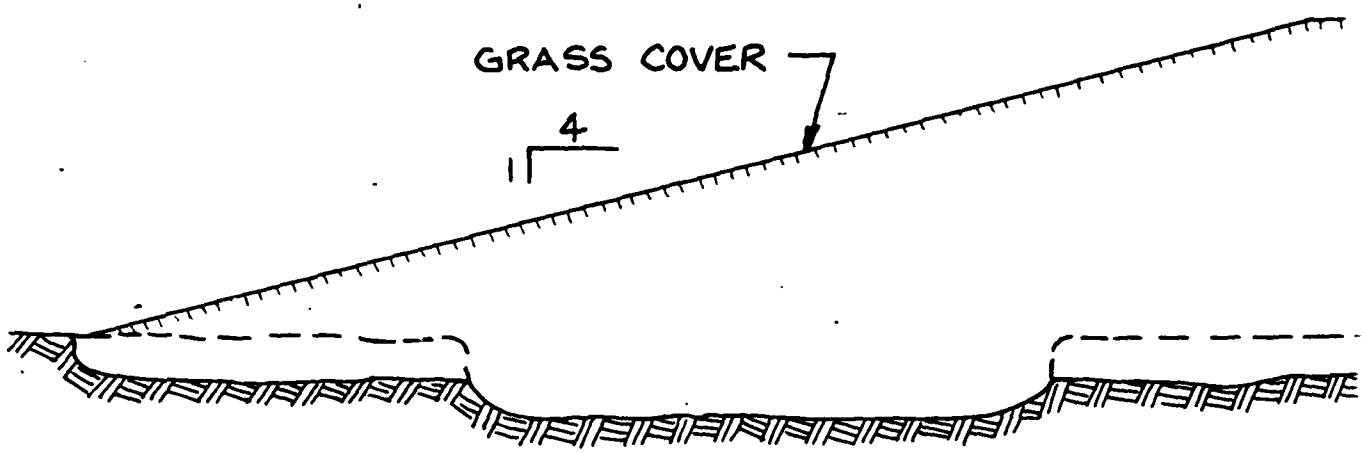
ELEVATION

JAMES V. TURNER RESERVOIR DAM

TEN MILE RIVER — E. PROVIDENCE, R.I.

DWN BY	CKD BY	APP BY	SCALE AS NOTED	
KJB	JJK	AMH	DATE JAN, 1981	SHEET B-3

TOP OF DAM EL. 51.(

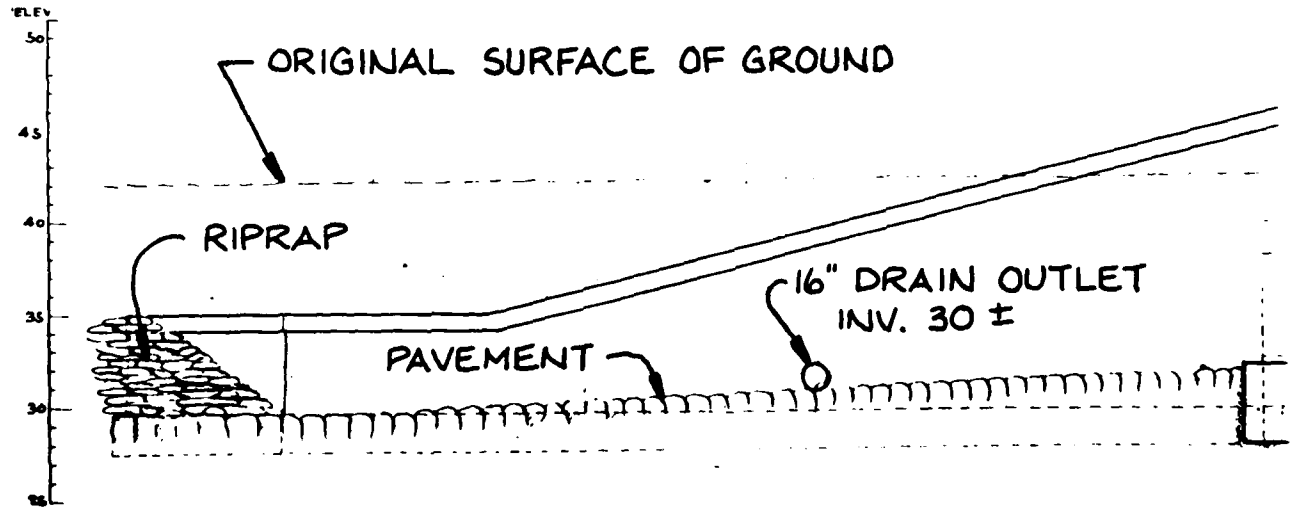


HORIZ. AND VERTICAL

10 0 10 20

SECTION THR

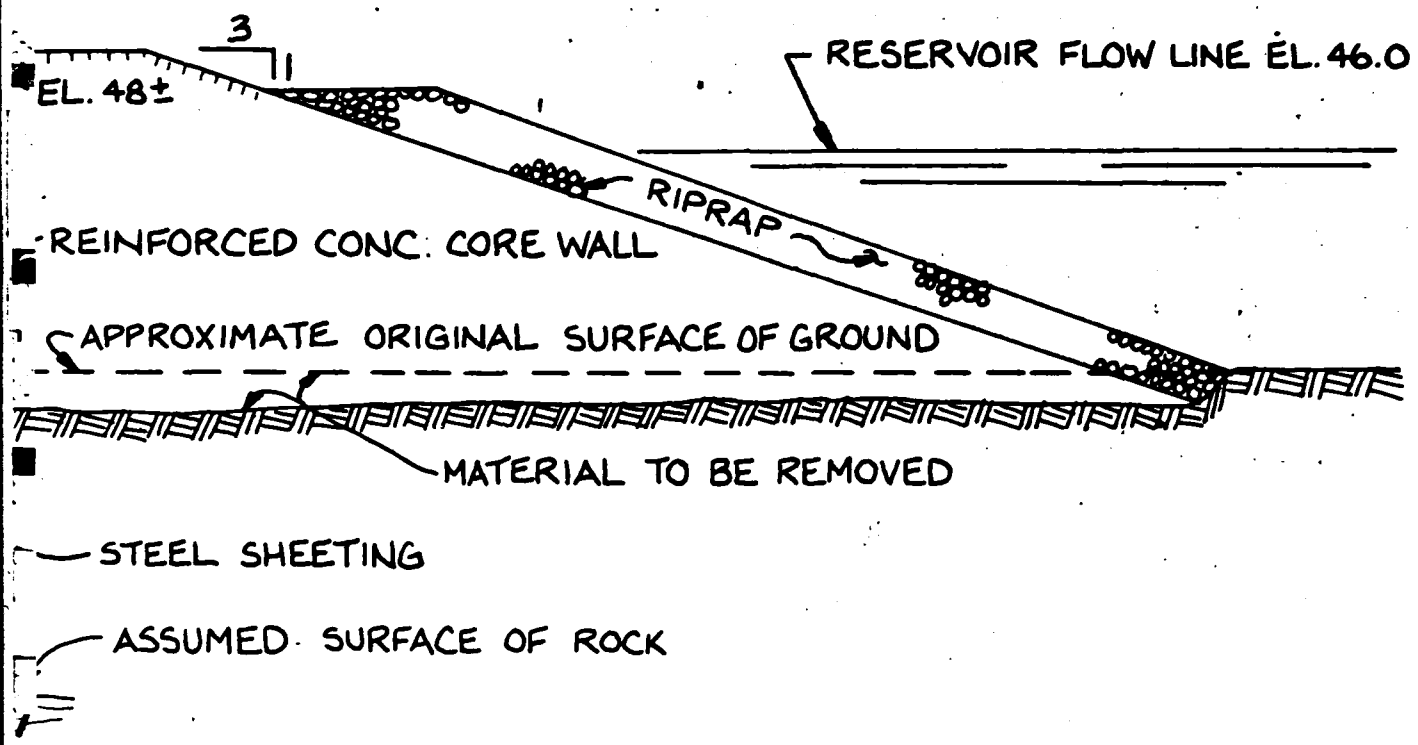
CONC. W



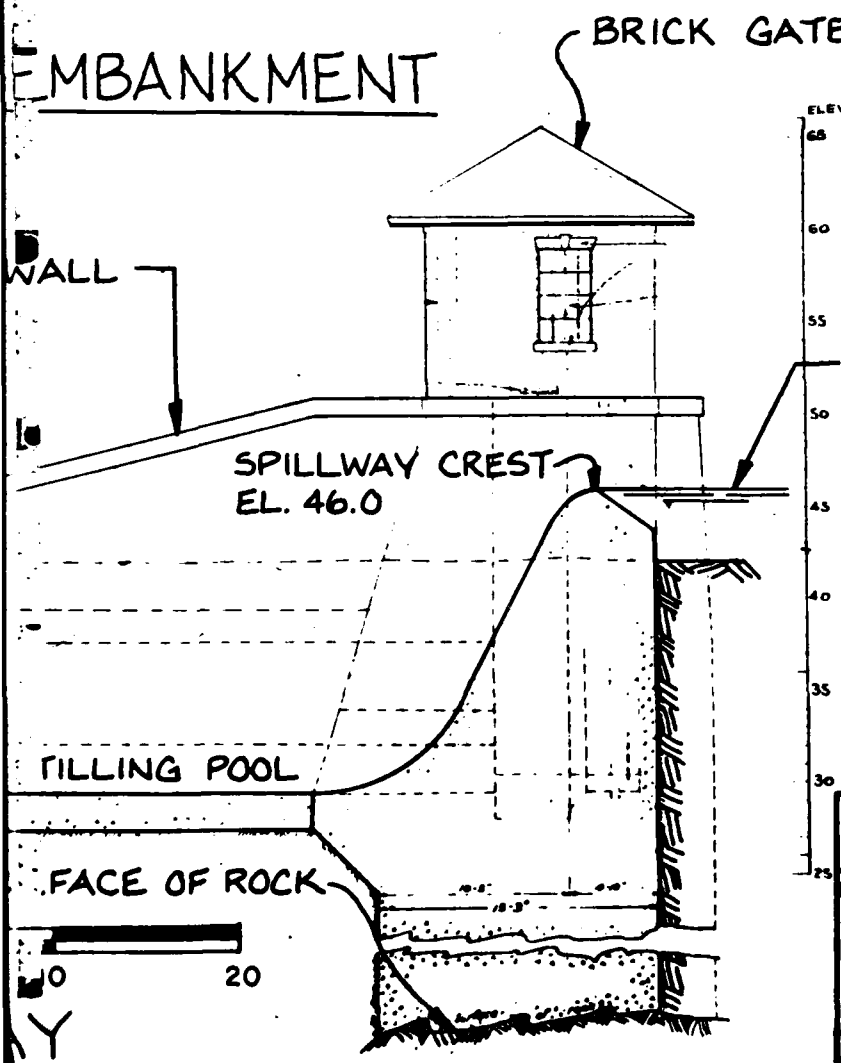
HORIZ. AND VERTICAL

10 0

SECTION THRU SPILL



EMBANKMENT



NOTES:

SEE SHEET B-2.

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NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

SECTIONS

JAMES V. TURNER RESERVOIR DAM

TEN MILE RIVER PROVIDENCE, R.I.

DWN. BY	CKD. BY	APP. BY	SCALE: AS NOTED

END

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