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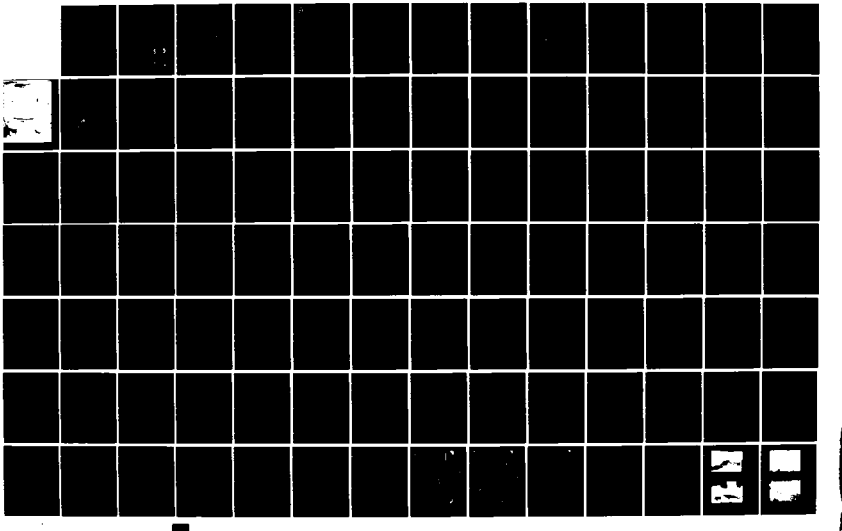

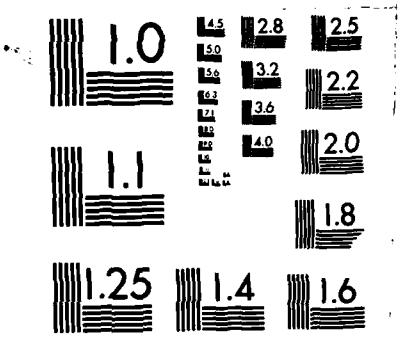

(1)

CONNECTICUT RIVER BASIN

WESTFIELD, MASSACHUSETTS

ARM BROOK
MULTIPLE PURPOSE DAM
MA 00604

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

AUGUST 1978

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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,
Connecticut River Basin
Westfield, Massachusetts
Arm Brook

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

The dam is a 760 ft. long, 59 ft. high earth embankment dam. The visual inspection did not disclose any findings that indicate immediate unsafe condition. Although the dam is in generally good condition, it is recommended that certain measures be taken.

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

REPLY TO
ATTENTION OF

NEDED

DEC 22 1978

Honorable Michael S. Dukakis
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor Dukakis:

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

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, the City of Westfield, Flood Control Commission, City Hall, 59 Court Street, Westfield, Massachusetts 01085.

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

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

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

ARM BROOK
MULTIPLE PURPOSE DAM
MA 00604

CONNECTICUT RIVER BASIN
WESTFIELD, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

Identification No.	MA 00604
Name of Dam:	Arm Brook
City:	Westfield
County and State:	Hampden County, Massachusetts
Stream:	Arm Brook
Date of Inspection:	May 31, 1978

This dam is a 760 foot long, 59 foot high earth embankment dam. Just beyond the left abutment there is a 184 foot wide vegetated spillway cut through natural ground. The dam was designed in 1962 by the Soil Conservation Service of the U.S. Department of Agriculture. The construction contract was let by the "Commonwealth of Massachusetts Water Resources Commission" also in 1962. The dam was built for multipurpose usage of flood retention and recreation. It is operated and maintained by the City of Westfield through a formal agreement with the Soil Conservation Service.

The visual inspection did not disclose any findings that indicate an immediate unsafe condition.

Based on size and hazard classifications in accordance with Corps guidelines, the test flood is the Probable Maximum Flood. The spillway for this dam is capable of passing the PMF without overtopping the dam.

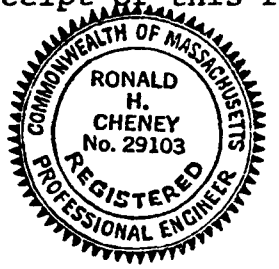
Indepth engineering data was made available by the Soils Conservation Service office in Amherst, Massachusetts.

Although this dam is in generally good condition, it is recommended that certain measures be taken.

The owner should determine the reason for previous siltation within the impact basin since this could be the indication of a serious problem. Surface erosion channels on the embankment

should be repaired and barriers erected to prevent trespassing by motor vehicles. The caps on the observation wells should be modified to allow easy access for observation during future inspections. Determination that the draw down gate on the intake structure is in working order should be made by the owner.

The foregoing should be addressed within one year after the receipt of this report.



Ronald H. Cheney

Ronald H. Cheney, P.E.
Associate

Hayden, Harding & Buchanan, Inc.
Boston, Massachusetts

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

Charles G. Tiersch

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

Fred J. Ravens Jr

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

Saul Cooper

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

SEP [illegible] 1978

PREFACE

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

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

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external

Arm Brook

nditions, and is evolutionary in nature. It would be correct to assume that the present condition of the dam ll continue to represent the condition of the dam at some int in the future. Only through continued care and spection can there be any chance that unsafe conditions : detected.

Phase I inspections are not intended to provide detailed ydrologic and hydraulic analyses. In accordance with the stablished Guidelines, the Spillway Test flood is based on the stimated "Probable Maximum Flood" for the region (greatest easonably possible storm runoff), or fractions thereof. ecause of the magnitude and rarity of such a storm event, a inding that a spillway will not pass the test flood should not e interpreted as neccessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway apacity and serves as an aide in determining the need for more etailed hydrologic and hydraulic studies, considering the size f the dam, its general condition and the downstream damage otential.

TABLE OF CONTENTS

ion 4.5 Continued

eroded paths created by this trespassing are not now affect-
the safety of the dam, it should not be allowed to continue
finitely.

SECTION 4
OPERATIONAL PROCEDURES

. Procedures

Being a flood retention,recreational facility with only ;ingle intake structure there are no indepth operation proce-:es required. With the gate on the 24 inch intake closed, a)l to elevation 196.0, top of side wall weir elevation, is .ntained. This is the normal operating procedure.

! Maintenance of Dam

By agreement with the Soils Conservation Service and the :y of Westfield, it is the city's responsibility to maintain is dam. At the time of inspection there was a good cover of :f on both the upstream and downstream slopes. It was evi-)t however that trespassing by motorbike was taking place on e downstream slope and crest of dam.

3 Maintenance of Operating Facility

As noted in Section 3.1c, the intake structure was inspected om the shore. The state inspection report of 1976 questions ether the control shaft for the gate on the 24" inlet at the take structure is bent and operable. This was not confirmed nce the structure could not be reached. Picture No. 9 (See pendix C) indicates that this may be so. The cover placed er the shaft does not appear vertical. The wheel for opera-ng this gate is stored at the Public Works Garage South Broad reet in Westfield.

The impact basin was found to be in good condition.

4 Description of Warning Systems

There are no warning systems associated with this dam.

5 Evaluation

Generally this dam appears in good condition. The ann... spection by the Soil Conservation Service along with City per-nnel appears to keep on top of maintenance requirements. Tres-ssing by motorbikes should not however be allowed. Although

ction 3.1 Continued

Observation wells and relief wells that have been installed in the area of the outlet works were capped and rusted and could not be examined.

The spillway channel was inspected and found to be in good condition. A drainage system installed along the northeast slope of the spillway appears to be working well.

d. Reservoir Area

The normal surface elevation at this reservoir is 196.0 which retains approximately 141 a.f. The visual inspection showed the area in the vicinity of the dam to be in general agreement with the USGS map. A description of the drainage area is given in Section 1.3a of this report. The amount of siltation in the reservoir is not known.

e. Downstream Channel

The outlet channel was examined and found to be in good condition. The slopes are wooded but pose no obstruction to free flow. The channel can be seen in Photos 7 and 8.

.2 Evaluation

Visual examination reveals no immediate safety problems; however, barricades should be erected to discourage vehicular traffic on the dam.

ection 3.1 Continued

There is a surface water erosion channel at the ontact between the embankment and the left abutment. The "chan-el" is well turfed with little or no soil erosion above the levation of the downstream berm (about Elev. 190). Below this levation the channel has been eroded to a depth of 12 inches nd at the time of inspection grass was growing in the channel.

There was a damp area on the left abutment 150 ft. ownstream of the dam axis and about 100 ft. left of the outlet ipe. The area, which is about 30 ft. long and 12 feet wide is hown in Photo 2. There was a small amount of surface water in he area at the time of inspection but no flow was observed. here is no siltation within the area and as can be seen in hoto 3, the area is well grassed.

The right abutment area downstream of the dam was raversed. No seepage was observed in the abutment between the am and the outlet works. Particular attention was given to those reas of the outlet channel where seepage had been noted soon fter dam construction as shown on SCS drawings of the spillway evision.

The dam has a seepage drain at the downstream toe hich exits into the impact basin. At the time of inspection the utlet pipes for the seepage drain were below water and it was ot possible to determine if they were functioning.

c. Appurtenant Structures

The intake structure was inspected from the water sur-ace up. There is no service bridge to this intake and water urrounds it under normal operating conditions. With the water urface elevation at 196.0, the distance to the shore is approxi-ately 80 feet. The structure was therefore examined from this istance with use of 7 power binoculars. The structure appeared o be in good condition with water flowing freely over the weirs. he 42" diameter outlet pipe was also flowing freely.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General

The Phase I inspection of this dam was made on May 31, 1978. The water behind the dam at that time was equal to the sidewall weirs at elevation 196.0, on the intake structure. This is the normal operating condition for this dam. The upstream slope and the intake structure were inspected above this water level.

b. Dam

Visual inspection of the embankment showed no signs of distress.

Upstream Slope

The upstream slope above approximately elevation 196 was traversed and found to be in good condition. An excellent turf and grass covers the slope as can be seen in Photo 4*.

Crest

The crest of the dam has no pavement. No evidence of cracking or misalignment was observed.

Downstream Slope

The face of the downstream slope was traversed along four lines: (1) along the crest, (2) at approximately elevation 293 (midway between the crest and berm), (3) along the berm, and (4) along the downstream toe.

The slope is in good condition with an excellent turf and grass cover. There is an erosion channel on the face from the crest to the toe which has been formed by trespassing with trailbikes. This erosion channel can be seen in Photo 1.

No seepage or damp areas were observed along the toe of the dam.

*See Appendix C for this and all subsequent photos.

SECTION 2
ENGINEERING DATA

2.1 Design

This dam was designed by the "Soil Conservation Service" of the U.S. Department of Agriculture. Initial construction drawings, design calculations and construction specifications are dated 1962. Additional designs were made and are dated 1964 and 1966. All of the above indepth engineering data was made available through the Soil Conservation Service office in Amherst, Massachusetts.

2.2 Construction

Construction was started in 1962 with the official contract being let by the "Commonwealth of Massachusetts Water Resources Commission". Supervision was by the Soil Conservation Service. Two relief wells were added at the downstream toe in 1965 due to a silt boil being noticed in this area. In 1966 the 42" diameter outlet pipe was extended from just beyond the downstream toe some 53 feet and a concrete impact basin and relief trench added. The relief trench is in the outlet channel just below the impact basin.

2.3 Operation

This dam is maintained and operated by the City of Westfield through a formal agreement between the City and the Soil Conservation Service. The dam is inspected yearly by the Soil Conservation Service and a formal report made.

2.4 Evaluation

a. Availability

Complete engineering data and construction drawings were made available as well as past inspection reports.

b. Adequacy

The data made available was totally sufficient for a Phase I report in all respects.

c. Validity

The visual inspection of this facility showed no reason to question the validity of the information supplied.

g. Dam

(1) Type----------Gravity, straight earth embankment
(2) Length----------760' not including spillway which is cut through existing ground
(3) Height----------59 feet including cutoff
(4) Top Width-------16 feet
(5) Side Slopes-----3½:1 U.S., 3:1 D.S.
(6) Zoning----------3 zones
(7) Impervious Core-Class B-2, ML and ML to CL soils
(8) Cutoff----------12 foot wide trench
(9) Grout Curtain---None
(10) Others----------6" diameter seepage drains at downstream edge of core

h. Spillway

(1) Type----------Vegetated earth spillway
(2) Length of Weir--184 feet
(3) Crest elevation-213.5
(4) Gates----------None
(5) U/S Channel-----Vegetated 2% slope
(6) D/S Channel-----Vegetated 2.5% slope
(7) General---------30 foot wide level section at crest

i. Regulating Outlets

Water level is controlled by the 42" diameter concrete pipe outletting from the concrete box drop inlet. The invert of this pipe is 167.0 at the drop inlet sloping to 160.99 at its outlet at the impact basin beyond the toe of the dam. The 42" pipe is ungated. The inlets into the intake box consist of a 24" diameter gated opening at invert 167.0 and two side wall weirs at elevation 196.0. Normally the gate is kept closed, and a pool at elevation 196.0 maintained behind the dam.

closed, a retained pool at elevation 196.0 is created and water flows over the weirs. The 42" diameter outlet is ungated.

The dam was constructed for detention of a 100 year frequency storm. The actual maximum detention since construction was completed was not determined. The vegetated spillway is ungated and has a capacity of 6,975 cfs (2,082csm) at elevation 216.5.

c. Elevation (ft. above MSL)

(1)	Top of Dam	218.5
(2)	PMF Surcharge	216.5
(3)	Full Flood Control Pool	213.5
(4)	Spillway Crest Ungated	213.5
(5)	Recreation Pool	196.0
(6)	Upstream Portal Invert Diversion Tunnel	None
(7)	Stream bed at Centerline of Dam	162±
(8)	Maximum Tailwater	200.0±

Level of Massachusetts Turnpike embankment just downstream.

d. Reservoir

(1)	Length of Recreation Pool	2500'±
(2)	Length of Flood Control Pool	5200'±
(3)	Length of PMF Pool	5300'±

e. Storage (acre-feet)

(1)	Recreation Pool	141
(2)	Flood Control Pool	725
(3)	PMF Surcharge	890
(4)	Top of Dam	980

f. Reservoir Surface (acres)

(1)	Recreation Pool	13
(2)	Spillway Crest	55
(3)	PMF Pool	64
(4)	Top of Dam	70

draw down pipe. Consequently two relief wells were added at the downstream toe in 1965.

In 1966 the outlet pipe was extended downstream and an impact basin constructed. At this same time a relief trench was installed accross the outlet channel just beyond the impact basin.

1.3 Pertinent Data

a. Drainage Area

A drainage area of 2,144 acres (3.35 s.m.) extends northerly of the dam with the main drainage path being Arm Brook. The brook is about 3.22 miles long with a change in elevation of about 115 feet.The stream has a fairly even drop in elevation along its entire length. It is intercepted by several roads and ponds which could influence flow.

The area is heavily wooded with some rolling hills and extensive "flat" areas. One large swamp exists to the northwest of the dam. The area contains numerous roads, homes, a railroad line, power line, various buildings and part of the Barnes Municipal Airport. Many homes are located near the dam, to the northeast.

Below the dam there is extensive urban development. The Massachusetts Turnpike is about 700 feet to the south of the dam. Beyond the turnpike is the City of Westfield.

b. Discharge at Dam Site

This structure has a reinforced concrete intake structure from which exits a 42" diameter concrete pipe at invert 167.0. There are two methods by which water flows into this structure. A 24" diameter inlet at invert 167.0 which is gated by a slide gate is one method by which water is allowed to enter. The other is over the two side walls which are constructed to form weirs at elevation 196.0. When the slide gate at the 24" diameter inlet is

Section 1.2 Continued

c. Size Classification

This dam has a maximum hydraulic height of 56 feet and a storage capacity of 980 a.f. with water to the dam's crest. As such, according to the recommended guide lines, it is classified as intermediate in size.

d. Hazard Classification

Approximately 700 feet down stream two 8 foot diameter A.C.C.M.P.'s carry the outlet channel beneath the Massachusetts Turnpike. Should this dam fail, the water would overtop the turnpike, and flow into the Powdermill Brook water course. This brook flows through heavily developed areas which were severly damaged during the August 1955 flood. Therefore, according to the guidelines, this dam carries a high hazard potential.

e. Ownership

This dam is owned by the City of Westfield and has always been under their jurisdiction.

f. Operation

The dam is maintained and operated by the "Flood Control Commission" located at 59 Court Street, City Hall, Westfield, Massachusetts. Mr. Gary Bulazo is Chairman (tel. 413-568-7418).

g. Purpose of Dam

This dam was originally built as a multipurpose dam, for use as a flood retention dam during periods of heavy precipitation and as a recreational facility. There appears to be very little if any recreational activity taking place.

h. Design and Construction History

This dam was designed in 1962 by the Soil Conservation Service of the U.S. Department of Agriculture. Construction was sponsored by the "Commonwealth of Massachusetts Water Resources Commission" also in 1962. Construction was completed in 1963 and the recreational pool was in operation for about one year when a silt boil was noticed at the outlet end of the 42" diameter

Section 1.2 Continued

b. Dam Appurtenances

This dam is a 760 foot long, 59 foot high earth embankment dam. The upstream slope is built on a 3.5 H to 1 V slope with a 25 foot wide berm at approximate mid height. The downstream slope is built on a 3 H to 1 V slope with a 15 foot wide berm at approximate mid height. The top width of the dam is 16 feet.

Just beyond the left or easterly abutment a 184 foot wide vegetated spillway has been cut through natural ground.

At the approximate center of the dam just above the upstream toe is located a reinforced concrete box drop inlet. Two of the sidewalls of this box are constructed to form weirs which allow entry of the water. At the base of this box is a 24" diameter slide gate and a 42" diameter concrete pipe. This 42" diameter pipe is ungated and continues under the dam discharging into a reinforced concrete impact basin beyond the downstream toe of the dam. This pipe has reinforced concrete anti seep collars placed around its perimeter at 24 foot centers beginning 84 feet from the intake structure and continuing downstream for 168 feet.

The downstream slope has a 6" diameter seepage drain system located 85 feet from the dam center line. Where this system is intercepted by the 42" outlet pipe, the drains turn and run parallel to this pipe outletting into the impact basin.

Two relief wells are located at the downstream toe 20 and 25 feet off the center line of the 42" outlet pipe. The 6" drain from these wells also empties into the impact basin.

PHASE I

NATIONAL DAM INSPECTION PROGRAM

ARM BROOK

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Hayden, Harding & Buchanan, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Hayden, Harding & Buchanan, Inc. under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW 33-78-C-0307 has been assigned by the Corps of Engineers for this work.

b. Purpose

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

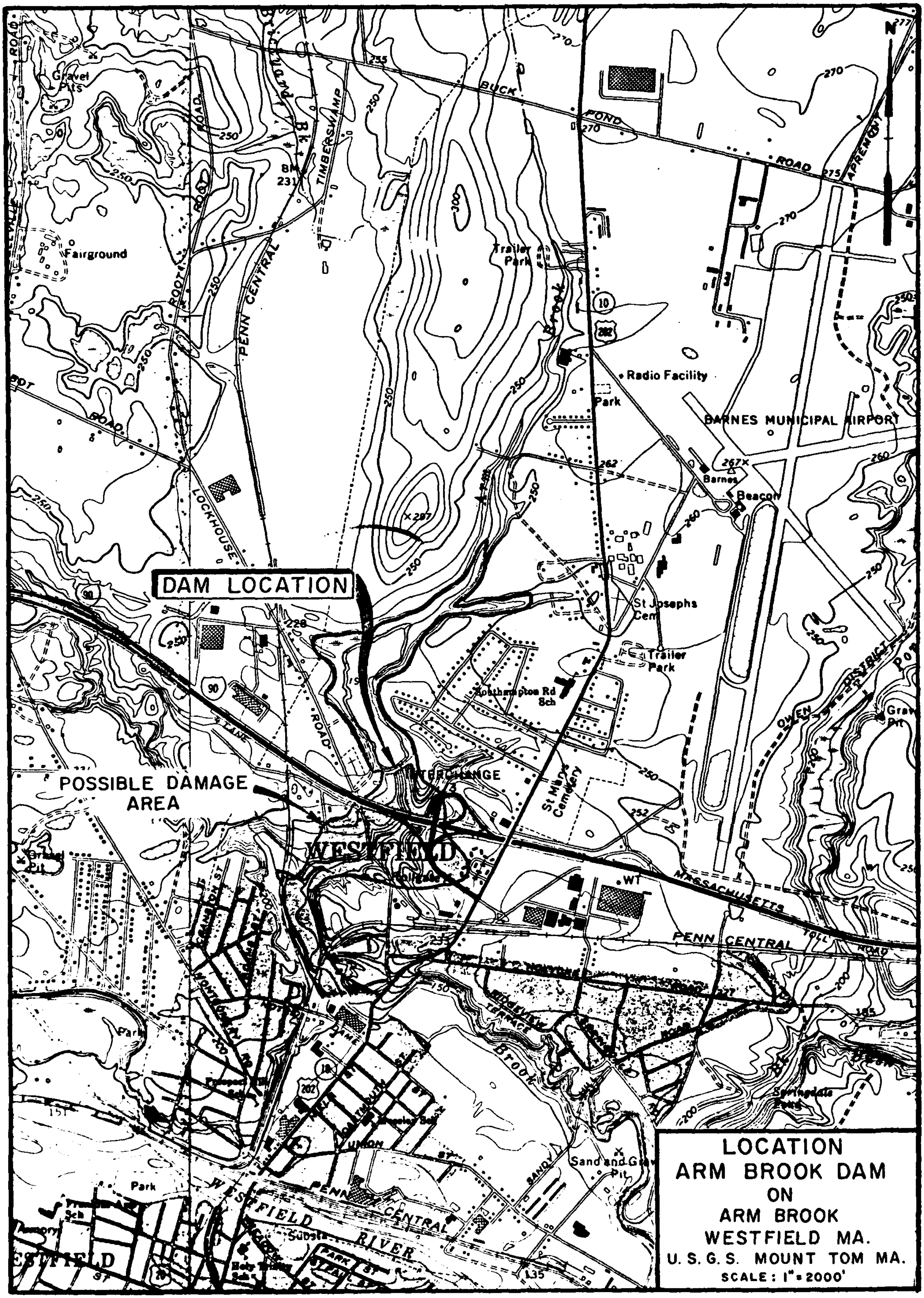
(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

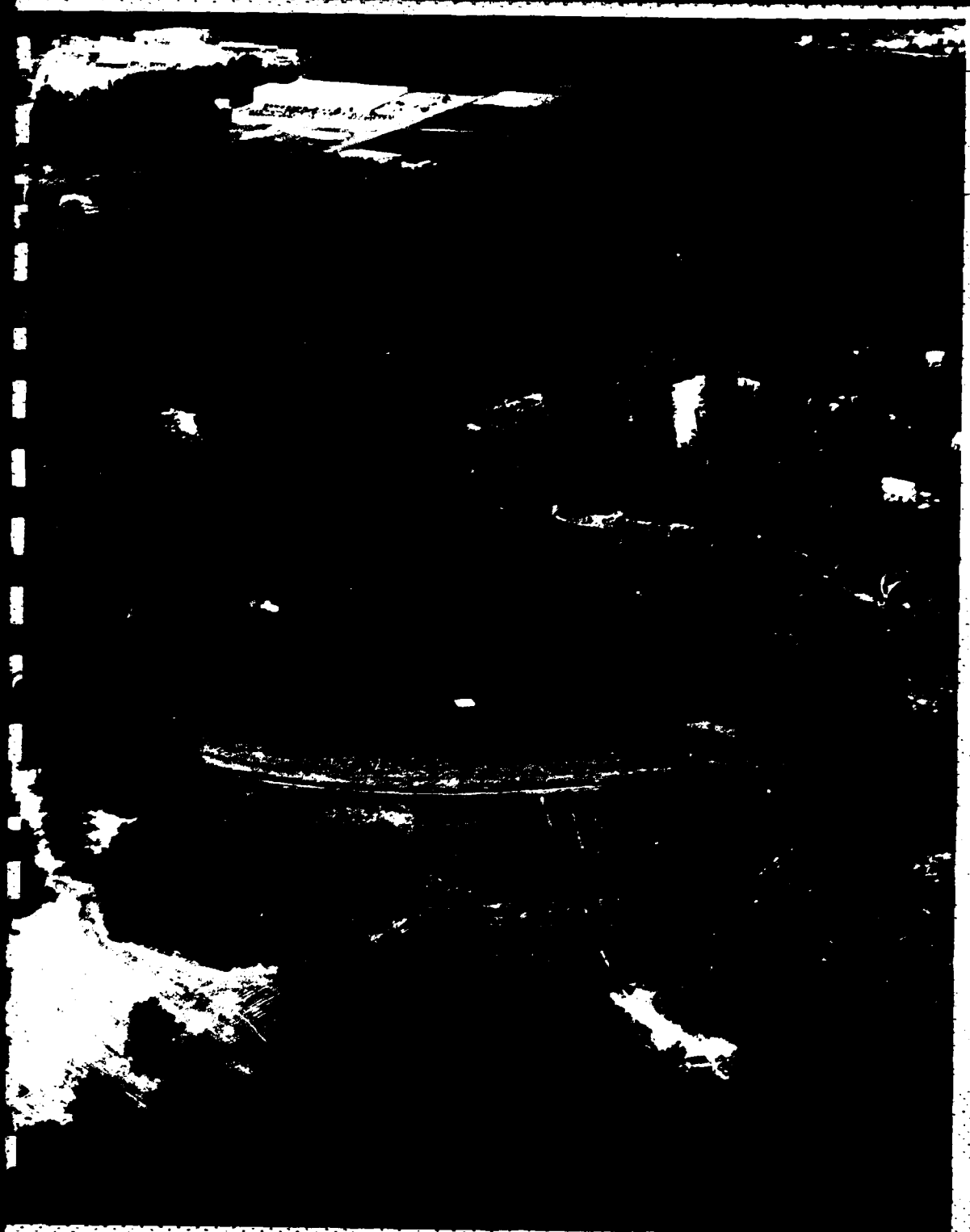
(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

The Arm Brook dam is located in the City of Westfield in Hampden County, Massachusetts.


DAM LOCATION
POSSIBLE DAMAGE AREA
WESTFIELD
BARNES MUNICIPAL AIRPORT
Radio Facility
Fairground
Gravel Pits
Trailer Park
St Josephs Cem
St Marys Cemetery
Northampton Rd Sch
INTERCHANGE
PENN CENTRAL
MASSACHUSETTS TOLL ROAD
BUCK POND ROAD
TIMBERSWAMP
LOCKHOUSE ROAD
WESTFIELD RIVER
Sand and Gravel Pit
Springdale Park
UNION ST
Armory
N
LOCATION
ARM BROOK DAM
ON
ARM BROOK
WESTFIELD MA.
U. S. G. S. MOUNT TOM MA.
SCALE : 1" = 2000'



SECTION 5
HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

Complete hydraulic design information was furnished by the Soil Conservation Service and reviewed. This information revealed that the dam was designed for the retention of a 100 year flood. The August 1955 flood, which was greater than a 500 year frequency storm for this area, was also routed through this facility, concluding that this storm would not endanger the structure.

b. Experience Data

Maximum impoundments and spillway flows to date were not made available. This facility has been designed for the retention of a 100 year frequency storm. As such, and being built in 1962, the amount of water having passed the spillway, if any, is probably small.

c. Visual Observations

Visual observations of the drainage area and general vicinity of the dam show them to be in general agreement with the area USGS map. A description of the drainage area is given in Section 1.3a of this report.

d. Overtopping Potential

This dam carries an intermediate classification for size with a high hazard potential. As such, it should be capable of passing a PMF. This test flood was computed by checking the drainage area supplied by the Soil Conservation Service and using Corps discharge design curves. A PMF inflow of 7330 cfs (2188 csm) was developed and resulted in an outflow of 6975 cfs (2082 csm) at elevation 216.5. Since the top of this dam is at elevation 218.5, this dam will not overtop.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The visual inspection did not disclose any apparent stability problems.

b. Design and Construction Data

Design drawings and construction specifications exist and indicate the dam is a zoned embankment consisting of a wide central core consisting of inorganic silt and silty clay. The upstream and downstream shells of the embankment consist of sandy silt, silty sand and well graded sand with no distinction of material location or volumes.

There is a cut-off trench below the core section.

The upstream slope of the embankment has a slope of 3.5 H: 1 V with a 25 ft. wide berm at midheight of the slope.

The downstream slope of the embankment has a slope of 3 H: 1 V with a 15 ft. wide berm at about midheight.

c. Operating Records

Some operating records are available including a plot of reservoir level to 1968 which indicates the reservoir had never exceeded an elevation significantly above 196 which is the crest elevation of the intake structure.

Shortly after construction the Soil Conservation Service (SCS) recognized a problem of high uplift pressures at the downstream toe and installed observation wells and piezometers to monitor water levels. Readings of these wells up to 1968 are available. Based on an evaluation of the well readings and reservoir level it was established that the uplift pressures were not a result of the reservoir but of an artesian aquifer which existed in the stream valley. The measures which were taken to alleviate the uplift pressures are discussed in Section 6.1d.

Section 6.1 Continued

This dam has been inspected by the Soil Conservation Service yearly from 1966 to 1977 and has been inspected by the Commonwealth of Massachusetts in 1974 and 1976.

In the 1971, 1972 and 1974 SCS inspection reports it was noted that the impact basin was full of silt and should be cleaned out. No silt was observed at the time of this inspection.

No comment concerning the source of this silt was made in the reports and several mechanisms which would explain siltation of the impact basin would indicate potential stability problems. These mechanisms include:

1. Water from the dam's interior drainage system which exits by pipe into the impact basin.
2. Water from relief well system which exits into the impact basin.
3. Leakage of the 42" diameter outlet conduit which allows internal erosion around the conduit.

It is possible that the silt was a result of leakage of the slide gate at the bottom of the intake structure. Another mechanism could have been general flooding of the outlet work due to runoff from storm water. The 1972 SCS report does mention that the inspection followed a heavy rain.

Since the observation of silt in the impact basin could indicate internal erosion was taking place, it is important that measures be taken to evaluate this observation. Recommendations for making this evaluation are made in Section 7.2.

d. Post-construction Changes

In 1966 construction of a new outlet works was undertaken to alleviate the instability that had been observed in that area of the dam soon after construction.

The construction changes consisted of extending the outlet conduit approximately 45 feet beyond the toe of the dam and installing a concrete impact basin.

Section 6.1 Continued

A relief trench was constructed 12 feet downstream of the impact basin. Plans and specifications for this construction are available.

e. Seismic Stability

The dam is located in Seismic Zone 2 and, according to USCE guidelines, it is assumed that there is no hazard from earthquake loading.

SECTION 7
ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

The visual inspection did not disclose any findings that indicate an immediate unsafe condition, and the dam is in generally good condition.

b. Adequacy of Information

The information made available by the Soil Conservation Service was totally adequate for a Phase I level of investigation.

c. Urgency

Although this dam is in generally good condition, the recommendation in Section 7.2 regarding the determination for the siltation within the impact basin as referred to by the SCS inspections of 1971, 1972 and 1974 should be addressed within one year after the receipt of this report. As noted in Section 6.1c of this report, this could be the indication of a serious condition. The remaining recommendation, remedial measures are not of an urgent nature. However, they are basically normal operational or maintenance procedures. As such they should be addressed within one year after receipt of this report.

d. Necessity of Additional Investigation

The findings of the visual investigation do not warrant additional investigation. However, the owner should engage a knowledgeable consulting engineer to determine the reason for previous siltation within the impact basin.

7.2 Recommendations

a. The owner should engage a knowledgeable consulting engineer to assist with the investigation of the source of the silt that has been observed deposited in the impact basin during previous inspection.

The investigation should consist of lowering the reservoir just below the crest of the drop inlet structure. This would mean lowering the reservoir about 1.5 feet. The slide gate should then be closed to stop all flow of water through the outlet works.

Water flowing from the internal drainage system and the relief wells should be observed and sampled to determine if it is silty.

The interior of the 42" diameter outlet pipe should be inspected.

b. The owner should determine that the draw down gate is in working order. The preceding will automatically determine this. Repairs if required to the stem should be made.

7.3 Remedial Measures

Although this dam is in generally good condition, it is considered important that the following items be accomplished.

a. Alternatives

Not applicable to this report.

b. Operation and Maintenance

1) Repair all surface erosion channels.

2) Traffic barriers should be erected to discourage vehicular traffic on the dam.

3) Caps for the observation wells should be modified to allow easy access to the observation wells for future inspections.

4) The owner should develop a formal system for warning downstream residents in case of emergency.

APPENDIX A

VISUAL INSPECTION CHECK LIST

VISUAL INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Arm Brook DATE May 31, 1978

TIME 9:15 A.M.

WEATHER Sunny 78°

W.S. ELEV. 196.0 U.S. ____ DN.S.

PARTY:

1. Ron Cheney, H H & B
2. Dan LaGatta, G E I
3. Cecil Currin, S C S
4. Leonard Colson, Westfield
5. David Phillips, Westfield
6. ____
7. ____
8. ____
9. ____
10. ____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Embankment Dam	D. P. LaGatta	
2.	Intake Structure	R. Cheney	
3.	Impact Basin	R. Cheney	
4.	Spillway	D. P. LaGatta	
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST

PROJECT Arm Brook DATE May 31, 1978

PROJECT FEATURE Embankment Dam NAME D. P. LaGatta

DISCIPLINE Geotechnical Engineer NAME R. Cheney
Structural Engineer

AREA EVALUATED	CONDITIONS
AM EMBANKMENT	
Crest Elevation	218.5
Current Pool Elevation	196.0
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed
Pavement Condition	No pavement
Movement or Settlement of Crest	None observed
Lateral Movement	None observed
Vertical Alignment	No misalignment observed
Horizontal Alignment	No misalignment observed
Condition at Abutment and at Concrete Structures	Good - see text explaining minor erosion at left abutment contact
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	Motorbikes have worn paths on down stream slope.
Sloughing or Erosion of Slopes or Abutments	None observed
Rock Slope Protection - Riprap Failures	No riprap
Unusual Movement or Cracking at or near Toes	None observed
Unusual Embankment or Downstream Seepage	Minor seepage area on left abutment downstream of dam. See text.
Piping or Boils	None observed
Foundation Drainage Features	Unable to observe drainage because outlets below water surface of stilling basin.
Toe Drains	Unable to measure flow of water level in relief wells.
Instrumentation System	Unable to determine water level in observation wells because could not remove caps

PERIODIC INSPECTION CHECK LIST

OJECT Arm Brook DATE May 31, 1978

OJECT FEATURE Embankment Dam NAME D.P. LaGatta

SCIPLINE Geotechnical Engineer NAME R. Cheney
Structural Engineer

AREA EVALUATED	CONDITIONS
LET WORKS - INTAKE CHANNEL AND NTAKE STRUCTURE	
Approach Channel	This facility has no approach channel
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
Intake Structure	
Condition of Concrete	Good
Stop Logs and Slots	No stop log slots

PERIODIC INSPECTION CHECK LIST

JECT Arm Brook DATE May 31, 1978

JECT FEATURE Embankment Dam NAME D. P. LaGatta

CIPLINE Geotechnical Engineer NAME R. Cheney
Structural Engineer

AREA EVALUATED	CONDITIONS
ET WORKS - CONTROL TOWER	Control tower and intake structure are one and the same.
Concrete and Structural	
General Condition	Good
Condition of Joints	Good
Spalling	None observed
Visible Reinforcing	None observed
Rusting or Staining of Concrete	None observed
Any Seepage or Efflorescence	None observed
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	
Cracks	None observed
Rusting or Corrosion of Steel	None observed
Mechanical and Electrical	
Air Vents	One 24" dia slide gate on intake structure. Not able to check due to water surrounding structure.
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System in Gate Chamber	

PERIODIC INSPECTION CHECK LIST

ECT Arm Brook DATE May 31, 1978

ECT FEATURE Embankment Dam NAME D. P. LaGatta

IPLINE Geotechnical Engineer NAME R. Cheney
Structural Engineer

AREA EVALUATED	CONDITIONS
T WORKS - TRANSITION AND CONDUIT	
eneral Condition of Concrete	One outlet pipe. 42 inch dia concrete pipe flowing freely.
ust or Staining on Concrete	
palling	
rosion or Cavitation	
racking	
lignment of Monoliths	
lignment of Joints	
umbering of Monoliths	

PERIODIC INSPECTION CHECK LIST

:T Arm Brook DATE May 31, 1978

:T FEATURE Embankment Dam NAME D. P. LaGatta

'LINE Geotechnical Engineer
Structural Engineer NAME R. Cheney

AREA EVALUATED	CONDITIONS
WORKS - OUTLET STRUCTURE AND ET CHANNEL	
ral Condition of Concrete	Good to Excellent
or Staining	None observed
ling	None observed
ion or Cavitation	None observed
ble Reinforcing	None observed
Seepage or Efflorescence	None observed
lition at Joints	Good.
n Holes	None
ınel	Good Condition
oose Rock or Trees Overhanging Channel	Heavily wooded but channel free and clear
ondition of Discharge Channel	Good

PERIODIC INSPECTION CHECK LIST

Arm Brook — DATE May 31, 1978

FEATURE Embankment DAm — NAME D. P. LaGatta

.INE Geotechnical Engineer — NAME R. Cheney
Structural Engineer

AREA EVALUATED	CONDITIONS
NORKS - SPILLWAY WEIR, APPROACH ISCHARGE CHANNELS	
roach Channel	
eneral Condition	Good
oose Rock Overhanging Channel	None
rees Overhanging Channel	None
loor of Approach Channel	Good
r and Training Walls	None
ieneral Condition of Concrete	Vegitated spillway with soil slope training walls
lust or Staining	
spalling	
lny Visible Reinforcing	
lny Seepage or Efflorescence	
)rain Holes	
scharge Channel	Extreme downstream end of discharge channel is heavily wooded
ieneral Condition	
.oose Rock Overhanging Channel	Spills into existing brook channel which empties into outlet channel
Trees Overhanging Channel	
Floor of Channel	
)ther Obstructions	

kes continue to present a problem in wearing paths up and down
, across the emergency spillway and up the emergency spillway

it

; with fertilizer this fall. On the dike use 400 lbs. per acre
-16; on the emergency spillway and other grass areas use 400 lbs.
: 10-10-10 or equivalent. Mow all areas.

ILL DAM SITE

ons here are the same as last year with the exception that the
t the upper end of the last pipe of the principal spillway has
eaned and caulked. The following work should be done at this

- Small trees in the emergency spillway and on the side slopes should be removed. The trees growing in the entrance to the emergency spillway present a very serious hazard in the event of a flood.
- Riprap at the outlet channel should be repaired and replaced where needed.
- Two gullies at the right end of the dam on the upstream face, one near the top of the embankment and one near the lower berm should be repaired to discourage further erosion.
- A fence or a barricade should be erected to prevent vehicular traffic on the various sections of the dam and spillway.
- Logs and rubber tires in pond at the riser and twigs inside the riser should be removed. If allowed to remain as they are they may cause plugging of the riser.
- Vegetative cover is predominantly grass on all areas and is generally in excellent condition. Topdress this fall with 400 lbs. per acre 10-10-10 fertilizer or equal. Mow all areas.
- Fill in three (3) wood chuck holes right of principal spillway, along outlet channel.
- Dump should be pushed back from Flood Pool edges.

Submitted by W. Warren /usd and J. Elasmar /usd

William Warren
District Conserv.

James J. Elasmar
Project Engineer

Kennedy, WRC (3) (1 for DPW)
Elasmar
Warren (5)
Basinger
Moustakis
Verdi (2)
gr. File

REPORT OF ANNUAL INSPECTION

POWDERMILL WATERSHED

May 24, 1971

June 17, 1971

DAM SITE

1, 1971, the following met at the Armbrook Dam Site for the
of conducting the annual inspection of the Armbrook and Powder-
es:

Nick Roselli, Conservation Commission
Kevin Maguire, Water Resources Commission
L. T. Lee, D.N.R. - Forests and Parks
Alfred Midura, Flood Control Commission
William Warren, Soil Conservation Service
James J. Elasmar, Soil Conservation Service

nd of the Emergency Spillway is still eroded. It appears to
ame as it was a year ago. Recommendation is again made to fill
h a well graded drain material to within a foot of the top grade,
and seed. Dead trees should be removed from this area.

left bank of the stream at the lower end of the berm ditch was
ded. This condition seems worse than it was a year ago. It is
ded that a drop inlet be built with a 12-inch pipe to carry the
to the stream.

iron slime was noted in the bed of the stream just to the right
bservation well. Conditions same as a year ago.

t pool looks fairly clean, however, large logs and two pieces
ete pipe should be removed from the edge of the pool south of the

Basin is completely full of silt and should be cleaned out.

Inlet of the emergency spillway the area was covered with water.
commended that approximately 300 feet of tile drain be installed
metal pipe at the end emptying about 6-inches above the pool.

s are still needed to keep traffic off dike and emergency spillway.

ic Conditions

ive cover over all has continued to improve and is in good to
t condition. Some areas on the upstream face of the dam are
mewhat thin and weak. The downstream face of the dam has an
t stand of birdsfoot trefoil mixed with grass while on the
n face the trefoil is coming in quite well. On the emergency
and other sloped areas, grasses predominate.

otor bikes continue to present a problem in wearing paths up and own the dike, across the emergency spillway and up the emergency pillway slopes.

opdress with fertilizer this fall. On the dike use 400 lbs. per cre of 8-16-16; on the emergency spillway and other grass areas use 00 lbs. per acre 10-10-10 or equivalent. Mow all areas.

OWDERMILL DAM SITE

tructural Conditions and Recommendations

1. Small trees are growing in the emergency spillway and on the side slopes. They should be removed.

2. Riprap in the outlet channel is misplaced or missing. The area involved is about 6 feet x 10 feet on each side of the outlet of the principal spillway. This riprap should be repaired or replaced where needed.

3. A fence or a barricade should be erected to prevent vehicular traffic on the various sections of the dam and spillway.

4. Several large logs line the upstream shore of the dam and block the spillway opening. These must all be removed. Remove two logs at the low stage of the riser.

5. The sediment pool at the site is now full of sand.

Agronomic Conditions and Recommendations

1. Vegetative cover is predominantly grass on all areas and is generally in excellent condition. Topdress this fall with 400 lbs. per acre 10-10-10 fertilizer or equal. Mow all areas.

2. Barren sandy areas and the small gully at the right end of upstream face of the dam should be filled with loam and seeded down using 1 pound of Tall Fescue and 1/4 pound Redtop per 1000 square feet after mixing in 20 pounds of 10-10-10 fertilizer per 1000 square feet.

GENERAL

Locks and protective iron caps have been placed over the gate mechanisms at both dams to prevent unauthorized operation. So far this has worked well and the gate at Powdermill Dam is open as it should be.

Submitted by:

James J. Elasmar/ntl
Project Engineer

and

William Warren
District Conservationist

cc: C. Kennedy, WRC (3) (1 for DPW)
J. Elasmar
D. Basinger
A. Verdi (2)
C. Mills
W. Warren (5)
C. Moustakis
W. Annable
Engr. File

United States Department of Agriculture
Soil Conservation Service
29 Cottage Street
Amherst, Massachusetts 01002

REPORT OF THE ANNUAL INSPECTION

POWDERMILL WATERSHED

July 24, 1972

On May 12, 1972, the following met at the Arm Brook Dam Site to conduct the annual inspection of the two Powdermill Brook Watershed structures:

Alfred Midura, Westfield Flood Control Commission
Lendrum L. Lee, DNR-Division of Forests and Parks
Kenneth Healey, Hampden Conservation District
Thomas Lewicke, Massachusetts Division of Water Resources
Walter Ayers, Westfield Park Department
William F. Warren, U.S. Soil Conservation Service

ARM BROOK DAM SITE

Structural Conditions and Recommendations

On this date, after heavy rains, water was going through the high stage of the principal spillway and the system was functioning properly.

Outlet end of the Emergency Spillway is still eroded. It appears to be the same as it was a year ago. Recommendation is again made to fill area with a well graded drain material to within a foot of the top grade, topsoil and seed. Dead trees should be removed from this area.

Area on left bank of the stream at the lower end of the berm ditch is also eroded. It is recommended that a drop inlet be installed with a 12-inch pipe to carry the drainage to the stream.

Impact Basin is full of silt and should be cleaned out.

Barriers are still needed to keep traffic off dike and emergency spillway.

A tire in the outlet channel should be removed.

The permanent pool appears to be in fairly clean condition.

Agronomic Conditions

Vegetative cover over all has continued to improve and is in good to excellent condition. Some areas on the upstream face of the dam are still somewhat thin and weak. The downstream face of the dam has an excellent stand of birdsfoot trefoil mixed with grass while on the upstream face the trefoil is coming in quite well. On the emergency spillway and other sloped areas, grasses predominate.

dermill Site

uctural Conditions and Recommendations

pool area and the outlet channel contain excessive amounts of sediment. the town would like the Soil Conservation Service's assistance in deter- ing the exact source of the sediments and the effects upon the dam opera- n and the downstream area, a request should be submitted through the pden Conservation District, 4 Whalley Street, Hadley, Mass. 01035.

following work should be done at this site:

Riprap that is missing in the outlet channel should be replaced.

Pool area and the outlet channel contain excessive sediments. It is recommended that these areas be studied to determine possible need for clean out or control of gate operation.

A fence or a barricade should be erected to prevent vehicular traffic on the various sections of the dam and spillway.

Remove logs and rubber tire from low stage of the riser.

·onomic Conditions and Recommendations

ıss is thin with some small bare areas on the lower dike slopes and berm ːause of very poor sandy soil. The worst areas should be dug out six inches ɐp, repacked with loam and seeded. Work in 50 pounds limestone and 20 ınds 10-10-10 fertilizer per 1000 square feet before seeding one pound tall ɔcue and 1/8 pound redtop per 1000 square feet in September.

ɐ upper slopes of the dike and the emergency spillway are in good grass ver. Topdress all areas annually with 300 pounds 10-10-10 per acre or equi- lent and mow once a year. At least 25% of the Nitrogen should be derived ɔm an organice source, ureaform or equivalent.

ɐ trees in the emergency spillway noted in previous reports have been cut t. To prevent sprouting, the stumps or foliage should be treated with chemi- l brush killer.

: C. Kennedy, WRC (3)
J. Elasmar
D. Basinger
A. Verdi (3)
C. Mills
W. Warren (7)
C. Moustakis
W. Annable
Hampden Cons. District
City of Westfield (2)

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
29 Cottage Street
Amherst, Massachusetts 01002

June 20, 1973

REPORT OF ANNUAL INSPECTION
POWDERMILL BROOK WATERSHED

May 14, 1973, the following met at the Arm Brook Site of the Powdermill ook Watershed in the City of Westfield, Massachusetts for the purpose of nducting the annual inspection of the Arm Brook Site and the Powdermill Site:

Walter Ayers, Director of Parks, City of Westfield
Kevin Maguire, Water Resources Commission, Boston
William Warren, Soil Conservation Service, Hadley
James J. Elasmar, Soil Conservation Service, Otis

NERAL

e City of Westfield is responsible for the operation and the maintenance of ese sites.

M BROOK SITE

ructural Conditions and Recommendations

e outlet of the emergency spillway is eroded. It is recommended to fill this ea with a well graded drain material to within a foot of the top grade, top- il and seed. The area on the left bank of the stream at the lower end of the rm ditch is also eroded. It is recommended that a drop inlet be built with a -inch pipe to carry the drainage to the stream. The outlet channel is full silt and should be cleaned out. The logs should be removed from the upstream e of the dam. The concrete in the riser and the impact basin looks good.

the town would like assistance from Soil Conservation Service on the design the drop inlet described above, a request should be submitted through the mpden Conservation District, 4 Whalley Street, Hadley, Mass. 01035.

ronomic Conditions and Recommedations

getative cover is generally good to excellent although it is thinner on the per slopes of the dike than on the lower because of poorer soil. Wearing paths by bikes is still a problem.

pdress all areas annually with 300 pounds 10-10-10 or equivalent per acre and w once a year. At least 25% of the Nitrogen should be derived from an organic urce, ureaform or equivalent.

ne tree seedlings have been set out up to the toe of the dike. Trees should t be planted or allowed to get started within thirty feet of the dike or in e channel and side slopes of the emergency spillway.

July 2, 1974

REPORT OF ANNUAL INSPECTION

POWDERMILL BROOK WATERSHED

On June 26, 1974, the following met at the Powdermill Brook Watershed in the City of Westfield, Massachusetts for the purpose of conducting the annual inspection of the Powdermill Site and the Arm Brook Site:

Walter Ayers	Director of Parks, City of Westfield
Alfred Meduri	Flood Control Commission, Westfield
Kevin Maguire	Water Resources Commission, Boston
Cecil B. Currin	Soil Conservation Service, Amherst
William Warren	Soil Conservation Service, Hadley
James J. Elasmar	Soil Conservation Service, Otis

POWDERMILL SITE

STRUCTURAL CONDITIONS AND RECOMMENDATIONS

The outlet channel contains sediment that should be removed. A 12" corregated drain, left of the outlet and 75 feet away, should be cleaned. Riprap should be replaced in the outlet channel. Logs and other debris should be removed from the riser area. Site looks much better than it did a year ago.

AGRONOMIC CONDITIONS AND RECOMMENDATIONS

Report will be submitted by William Warren

ARM BROOK SITE

STRUCTURAL CONDITIONS AND RECOMMENDATIONS

Logs and other debris should be removed from the riser area and from the edges of the permanent pool. Sediment in the outlet channel and in the impact basin should be removed. Remove three wood planks from the impact basin. Eroded areas on left bank of the stream at the lower end of the berm ditch should be rebuilt. Install 200 feet of 4" drain perforated pipe from the catch basin along the toe of slope of the left bank of the stream to drain area.

AGRONOMIC CONDITIONS AND RECOMMENDATIONS

Report will be submitted by William Warren

Submitted by:

James J. Elasmar
Project Engineer

May 9, 1975

REPORT OF ANNUAL INSPECTION

POWDERMILL BROOK WATERSHED

On May 8, 1975, the following met at the Powdermill Brook Watershed in the City of Westfield, Massachusetts, for the purpose of conducting the annual inspection of the Powdermill Site and the Armbrook Site:

Alfred Neduri	Flood Control Commission - Westfield
Walter Ayers	Director of Parks - Westfield
Beverly Storey	Flood Control Commission - Westfield
Allen Brownlee	Flood Control Commission - Westfield
Michael Lorenzatti	Flood Control Commission - Westfield
Kevin Maguire	Water Resources Commission - Boston
William Warren	Soil Conservation Service - Hadley
James Elasmar	Soil Conservation Service - Otis

Powdermill Site

1. Remove logs and debris from entrance of emergency spillway.
2. Clean branches and other debris from trash rack of riser.
3. Remove shurbs and foreign growth from lip of emergency spillway.
4. Fill in three animal holes in emergency spillway.

The site looks very good.

Armbrook Site

1. Remove logs from edge of permanent pool.
2. Eroded area on left bank of stream at lower end of berm ditch should be repaired.
3. Repair eroded areas of berm.
4. Replace Manhole cover.
5. Remove logs and debris from Impact Basin.
6. Fill area at end of spillway.

Agronomic Conditions and Recommendation for the above sites will be submitted by William Warren.

James J. Elasmar
Project Engineer
Otis, Mass.

MA-AS-TRIAL
3/22/76

OPERATION AND MAINTENANCE INSPECTION RECORD

U.S. Dept. of Agriculture
Soil Conservation Service

Project Powdermill Brook Watershed Inspection Date 4/22/76

Site Name/No. Ann Brook Site Type Multiple Purpose

Type of Inspection: Special ☐ Annual ☑ Structure Operation: Satisfactory ☑ Unsatisfactory ☐

Sponsoring Local Organization: City of Westfield and Hampden Cons. District

Present for Inspection: Same as for Powdermill Site

ITEM	Condition * S or U	Maintenance & Needed Repairs	Estimated Costs	Agreed Date Repairs to be Complet
1. Vegetation	S	Topdress 300 Lb/ac 10-10-10. Test Ph for lime needed. Seed wear area with 100 Lb lime 20 Lb 0-20-20, ½ Lb Crownvetch, ½ Lb Red Fescue per 1000 sq. ft.	$20 per ac.	Spring '76
2. Fences				
3. Principal Spillway	U	Rubble to be removed from impact basin and clean bars out down stream	$200	By Sept 30 '76.
4. Emergency Spillway	S			
5. Embankment & Riprap	S			
6. Reservoir Area	S	Remove logs	$30	Spring '76
7. Gates or Valves	S			
8. Outlet Channels	U	See above item 3		
9. Structure Drainage Outlets	S			
10. Access Rd.	S			
11.				

REMARKS: (over)

* S = Satisfactory; U = Unsatisfactory

William D. Moore (District Conservationist) Cecil B. Cutting (Project Engineer) Beverly Storey (SLO Representative)

(Report due, annually: July 1)

O&M INSPECTION RECORD

CHECK LIST

The items to be checked at time of inspection may include, but not be limited to, the following:

1. Vegetation (Structure & Channels)
   a. Need for cutting &/or spraying
   b. Need for reseeding
   c. Need for fertilizing
   d. Evidence of winter injury

2. Fences
   a. Loose or damaged posts
   b. Loose or broken wires
   c. Accumulated debris in fence
   d. Condition of gates and gaps

3. Principal Spillway
   a. Obstructions in spillway
   b. Condition of outlet and riser
      (1) Signs of seepage
      (2) Separation of joints
      (3) Cracks, breaks, or deterioration of concrete
      (4) Differential settlement
   c. Sediment level in relation to the top of riser
   d. Scour at outlet
   e. Condition of trash racks

4. Emergency Spillway
   a. Erosion
   b. Sedimentation
   c. Weeds, logs, or other obstructions, reducing channel capacity
   d. Deposition of sloughing

5. Embankment
   a. Settlement or cracking
   b. Erosion
   c. Leakage
   d. Rodent, wildlife, or livestock damage
   e. Wave damage

6. Reservoir Area
   a. Undesirable vegetative growth
   b. Cut or fallen trees
   c. Slash and other debris
   d. Erosion of banks

7. Gates and Valves
   a. Damage by debris, ice or freezing

8. Channels
   a. Sedimentation
   b. Bank cutting
   c. Debris accumulation
   d. Condition of riprap or other works of improvement
      (1) Undermining
      (2) Damage or deterioration
      (3) Adjacent channel scouring
   e. Adjacent property damage

9. Structure Drainage Outlets
   a. Drainage outlet pipes
      (1) Clean or dirty water?
      (2) Rodent guard attached and functioning?
      (3) Pipes free-flowing, no obstructions?
      (4) Evidence of seepage?
      (5) Adjacent to pipes
      (6) Lower 1/3 downstream slope & flood plain?
   b. Rock toe drains
      (1) Free draining into stilling basin or collection channels?
      (2) Clean or dirty water?

10. Safety Hazards
11. Signs
12. Vandalism

REMARKS (continued)

Distribution: Mass.Div. of Water Resources
FmHA (if loan involved)
SCS

AR-AS-TRIAL
3/22/76

INSPECTION RECORD

Soil Conservation Service

Project Powdermill Brook Watershed Inspection Date 5/12/77

Site Name/No. Acme Brick site Type Multiple Purpose

Type of Inspection: Special ☐ Annual ☑ Structure Operation: Satisfactory ☑ Unsatisfactory ☐

Sponsoring Local Organization: City of Westfield and Hampden Conservation Dist

Present for Inspection: Sam as Powdermill site

ITEM	Condition * S or U	Maintenance & Needed Repairs	Estimated Costs	Agreed Date Repairs to be Complete
1. Vegetation	S	Topdress 300 Lb/Acre 10-10-10. Place 6" loam in 2 bare spots upstream and downstream slopes of west end of dam. Re- 1000 sq.ft.	#35/Acre for topdress	By Sept 30 '77
~~2. Fences~~	—	Apply 100 Lb limestone, 20 Lb 10-20-20, 2 Lb bordajseed, 2 Lb each Crownvetch, Red Fescue in late August	Seeding #200	
3. Principal Spillway	U	Clean out impact basin after dredging outlet channel	#200	Aug 30 '77
4. Emergency Spillway	U	Gully formed at outlet end. Fill with coarse sandy gravel and cover the banks so formed with 2" mix crushed stone 12 inches thick	#300	Aug 30, 77
5. Embankment & Riprap	S			
6. Reservoir Area	S	Remove a few logs from shoreline	#10	Aug 30, 77
7. Gates or Valves	S			
8. Outlet Channels	U	Silted almost 1/2 the outlet pipe diameter. Remove stump and log and dredge outlet channel to free outlet	#800	Aug 30, 77
9. Structure Drainage Outlets	S			
10. Access Rd.	S			
11.				

REMARKS:(over)

* S = Satisfactory; U = Unsatisfactory

(District Conservationist) (Project Engineer) (SLO Representative)

(Report due,annually: July 1)

LIST OF ENGINEERING DATA

1. Construction Drawings of Original Installation
2. Construction Drawings of Relief Wells
3. Construction Drawings of Extension to Principal Spillway - Draw Down Conduit
4. Watershed Work Plan
5. Design Folder Covering Soils, Structural and Hydraulic Design for Original Installation
6. Design Folder Covering Design of Extension to Principal Spillway - Draw Down Conduit
7. Itemized Proposal and Specifications for Original Construction
8. Itemized Proposal and Specifications for Construction of Extension of Principal Spillway - Draw Down Conduit

All of the above information is located at:

U.S. Department of Agriculture
Soils Conservation Service
20 Cottage Street
Amherst, Massachusetts 01002

Arm Brook

APPENDIX B

1. LIST OF DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS

2. PAST INSPECTION REPORTS

3. PLANS AND DETAILS

PERIODIC INSPECTION CHECK LIST

PROJECT Arm Brook

DATE May 31, 1978

PROJECT FEATURE Embankment Dam

NAME D. P. LaGatta

DISCIPLINE Geotechnical Engineer
Structural Engineer

NAME R. Cheney

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	This facility has no Service bridge.
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment and Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat and Backwall	

REPORT OF ANNUAL INSPECTION

May 13, 1970

On May 12, 1970 the following met at the Armbrook Dam Site for the purpose of conducting the annual inspection of the Armbrook and Powdermill Sites.

Nick Roselli	Conservation Commission
William Bennett	Flood Control Commission
Thomas Doucette	Water Resources Commission
Thomas Lewicke	Water Resources Commission
George McDonnell	Hampden County Hydraulic Engineer
William Warren	Soil Conservation Service
James Elasmar	Soil Conservation Service

ARMBROOK DAM:

Outlet end of the Emergency Spillway is eroded. This condition is the same as it was a year ago. It is recommended to fill this area with a well graded material (stone fill) to within a foot of the top grade, topsoil and seed. This should stabilize the area from future erosion until a major storm occurs.

Area on left bank of the stream at the lower end of the berm ditch, was also eroded. This condition is also the same as last year. It is recommended that a drop inlet be built with a 12" pipe to carry the drainage to the stream.

The observation well downstream and to the right of the outlet structure has a solid iron cap on the top of the well pipe. This should be replaced with a heavy screen or the solid cap should be drilled.

Typical iron slime was noted in the bed of the stream just to the right of the observation well. Condition same as a year ago. Water has been tested and found not polluted.

In the beach area it was noted that water runs over the berm and spills over onto the beach causing rills. It was recommended that a drop inlet be built and the berm raised so that this water run-off will no longer top the berm.

Vegetative cover on the dam is in better condition than last July but this could be at least partly due to the season. The thinner areas should be seeded in early fall to a mixture containing Crownvetch, such as 1/2 lb. Tall Fescue, 1/2 lb. Red Fescue, 1/4 lb. Crownvetch per 1000 sq. ft. Rake in 100 lbs. ground limestone and 12 lbs. 8-16-16 fertilizer per 1000 sq. ft. before seeding. All grassed areas need fertilizing with 300-500 lbs. 8-16-16 per acre annually and annual mowing. Where the legumes are prevalent over areas of significant size, the fertilizer to be applied should be approximately 400 lbs. of 0-20-20 per acre.

A considerable area of grass die-back was evident around the control section of the emergency spillway. This may be due to smothering by last years tall growth; if grass does not recover this summer, reseed in early fall as above.

Barriers to vehicular traffic are still needed to keep such traffic off dike and emergency spillway.

Annual Inspection continued, May 12, 1970. May 13, 1970

POWDERMILL DAM:

Conditions here are the same as last year. The following is a repetition of the report of last year.

This being a flood control dam normally has no pool. On the day of the inspection there was a pool as a result of the gate being closed.

The joint at the upper end of the last pipe of the principal spillway needs to be cleaned and caulked.

All brush growth and small trees in the emergency spillway and on the side slopes should be cut.

Riprap at the outlet channel should be repaired and replaced where needed.

Two gullies at the right end of the dam on the upstream face, one near the top of the embankment and one near the lower berm, should be repaired to discourage further erosion.

A fence or a barricade should be erected to prevent vehicular traffic on the various sections of the dam and spillway.

Logs in pond at the riser and twigs inside the riser should be removed. Large logs lying on the ground in the pond area directly across from the principal spillway and to the west of the riser should all be removed and disposed of. If allowed to remain as they are they will be floated away in time of flood flow and may cause plugging of the riser.

Vegetative cover is very good in the emergency spillway (much of it Witch Grass) and better than last July on the dam. However, as last year, grass is poor on both berms, below the upstream berm and in some other individual areas. Soils in these places are particularly sandy and drouthy. Seed to Fescue-Crownvetch mixture same as outlined for Armbrook. All areas to be mowed annually and topdressed with 300 to 500 lbs. 8-16-16 fertilizer.

REPORT OF ANNUAL INSPECTION
POWDERMILL BROOK WATERSHED
WESTFIELD, MASS.
1969

An inspection was performed May 23, 1969 with the following participants:
George H. McDonnell, County Engineer
Thomas Doucette, WRC
James Elasmar, SCS

A supplemental inspection was performed July 8, 1969 by the following:
Roger LaPlante, Director, Parks and Recreation Department, City of Westfield
William F. Warren, SCS

ARM BROOK SITE

Beach Area

Problems: Gullies are being washed in the beach by runoff from the road and especially below the catch basin at the south end of the beach. In the latter case pine needle debris is clogging the catch basin grate. Erosion occurs below the outlet of the storm drain.

Corrective Measures: 1. A bituminous concrete curb along the beach side of the road the full length of the beach to lead road water to the catch basin.

2. Conversion of the catch basin to a drop inlet to eliminate the clogging grate.

3. Stone channel from storm drain outlet to the pond. Shape subgrade 2 feet below finish grade. Place 12" bank run gravel topped with 12" of riprap stone. Finished channel to be saucer shaped 6' wide on top and 12" deep in the middle.

4. A bituminous concrete paved waterway is needed in the incipient gully at the north end of the beach.

Dike

Problems: Grass on the top half of both sides and top of the dike and on the berm downstream is thin and weak. The soil is especially sandy and drouthy in these areas. Vehicular traffic is damaging the grass on the dike. (The lower slopes of the dike are in excellent trefoil and common vetch cover.)

Corrective Measures: 1. Fence the dam to exclude unauthorized vehicles.

2. Seed thin areas in September or early April to Crown-vetch. Rake in 100 lb. ground limestone and 12 lb. 8-16-16 fertilizer or equivalent per 1000 sq. ft. and seed 20 lb. Crownvetch and 20 lb. Tall Fescue per 1000 sq. ft.. A less desirable alternative would be to topdress to strengthen the existing grass with 10 lb. of 15-8-12 per 1000 sq. ft. three times a year (April 10, May 10, Sept. 10).

Emergency Spillway

Problems: At the outlet end ground water seepage is weakening the toe of the bank and causing sloughing.

Corrective Measures: A subsurface (tile) drain installed across the slope back in the bank to intercept seepage and lead it to a protected outlet. The bank would then be regraded and seeded down using the same treatment and seed as specified for the dike.

Outlet Structure

Problems: Mr. LaPlante pointed out the danger of people falling from the concrete headwall into the stilling basin.

Corrective Measures: 1. Steel posts leaded into holes drilled in the concrete headwall and wing walls with chain link fence installed.

General

Condition of riser and principal spillway is good. The beach area is clean and aside from need for erosion protection is in good condition. A small amount of debris is to be removed from the right and left upstream corners of the permanent pool. Grass and legume cover other than those areas discussed above is in excellent condition although not fertilized this year. A maintenance level of fertilization should be carried on - 300 lb. 8-16-16 per acre annually.

POWDERMILL SITE

Dike

Problems: Vehicular traffic is damaging the vegetation and causing erosion. A small gully is starting in the upstream west corner of the dike. Vegetation on the dike top, the downstream and upstream berms and below the upstream berm on the east end is very thin.

Corrective Measures: 1. Seed thin areas to Crownvetch and Tall Fescue or fertilize grass as outlined for Arm Brook.

2. Fence out traffic.

3. Stop and heal incipient gully by diverting water over onto adjacent well sodded waterway. Then fill in the gully with loam and seed to Crownvetch and Tall Fescue as above.

Emergency Spillway

Problems: Small trees and large brush are growing up at the entrance to the emergency spillway constituting a potentially serious threat to its ability to accept heavy flows.

Corrective Measures: All woody vegetation to be cut away from the emergency spillway entrance. Drench freshly cut stumps with brush killer cut with kerosene to prevent sprouting.

Principal Spillway

Problems: Joint caulking at upper end of last pipe has fallen out exposing it to ice and frost action which could eventually pry this section loose causing major damage. Stone riprap on the right bank of the outlet channel is missing exposing the bank to erosion.

Corrective Measures: 1. Repair pipe joint with bituminous compound.
2. Repair riprap with angular riprap stone placed a minimum of 12" in thickness or dumped in 18" thick. Stone size 12" in least dimension.

Pool Area

Problems: Car body in upper end of pool area. Pool is being flooded by unauthorized closing of the gate with attendant frequent complaints from abuttors.

Corrective Measures: 1. Remove car body.

2. Use what methods are necessary to keep drain gate open.

General

Trefoil and grass cover is good on the emergency spillway and other areas not mentioned above. Maintenance topdressing with 300 lbs. per acre 8-16-16 or equivalent and annual mowing should be carried on. The dike above the upstream berm should receive 500 lbs. per acre annually. Logs in the pool area left of the riser should be removed.

This is to acknowledge receipt by the Mayor's office of this report.

John J. Palczynski · 8-26-69

John J. Palczynski, Mayor

Report of Annual Inspection
PL-566 Structures

May 23,1969
Date

ite Armbrook Town Westfield Watershed Powdermill

articipants in Inspection:

eorge H. McDonnell County Engineer

homas Doucette WRC

ames Elasmar SCS

. Vegetative Evaluation: Embankment slopes, top & gutters and emergency spillway; need for fertilizing, lime, re-seeding, mowing, erosion control, etc.

Crown vetch much better than last year. Grass cover good, however there are small areas that need lime and fertilizer.

3. Principal spillway & appurtenances: Stability, condition of concrete & steel, water tightness of gate, rip-rap at outlet, etc.

Condition of riser and principal spillway in good condition.

C. Permanent Pool: Water quality, debris, undesirable vegetation, etc.

Small amount of debris to be removed from right and left upstream corners of permanent pool.

). Facilities & Miscellaneous: Beach, boat ramp, bath house, access road, fences, signs, barricades, etc.

Beach clean and in good condition.

WESTFIELD
Sponsor responsible for Operation and Maintenance

By James J Elasmar

Report of Annual Inspection
PL-566 Structures

May 23,1969
Date

ite Powdermill Town Westfield Watershed Powdermill

articipants in Inspection:

eorge H. McDonnell County Engineer

homas Doucette WRC

ames Elasmar SCS

. Vegetative Evaluation: Embankment slopes, top & gutters and emergency spillway; need for fertilizing, lime, re-seeding, mowing, erosion control, etc.

Mowings are producing some matting, but in general protection is good. Fertilize and lime needed in top of dam and upstream toe of dam. Gully, right corner of upstream slopes same as last year.

3. Principal spillway & appurtenances: Stability, condition of concrete & steel, water tightness of gate, rip-rap at outlet, etc.

Joint upper end of last pipe needs to be cleaned and caulked. Brush in Emergency spillway should be cut. Riprap at outlet channel should be repaired. Fence shoul be erected to prevent traffic from top of dam and from upstream toe of dam.

). Permanent Pool: Water quality, debris, undesirable vegetation, etc.

Logs in pool area left of riser should be removed. Pool area should be drained.

). Facilities & Miscellaneous: Beach, boat ramp, bath house, access road, fences, signs, barricades, etc.

WESTFIELD
Sponsor responsible for Operation and Maintenance

By James J. Elasmar

l Inspection - Powdermill Brook Watershed,
April 30, 1968

ril 30, the following people met at the Arm Brook site, Powder-
Brook Watershed, for the purpose of conducting an annual inspec-
of both the Arm Brook and Powdermill Brook sites: Roger Leplante,
ield Parks and Recreation Department; George Hartley and Nicholas
li, Hampden Conservation District; George McDonnell, Hampden
y Engineer; Tom Doucette, Massachusetts Water Resources Commis-
Charles Conlin, Christopher Moustakis, Karl Klingelhofer, and
Elasmar, Soil Conservation Service.

eplante could only be present for the Arm Brook inspection.

Brook site

entire area was walked by the inspection team and an overall
ral improvement of the area was noted over that observed the
ious year. There are a number of items still needing attention
h are itemized below.

1. The entire vegetated area needs to be limed and fertilized according to soil tests, as soon as possible, even though fertilizer was applied last fall. It was reported by Mr. Leplante that a contract was being entered into with Agway to apply fertilizer, in the near future, according to soil test.

2. There are a number of small areas where some filling and re-seeding will be required.

   a. Wheel tracks across top of dam - wait until next year to re-evaluate need.

   b. Gutters - left side of dam looking downstream on both the upstream and downstream slopes - sodding after filling is recommended rather than seeding.

   c. Left bank of inlet portion of emergency spillway.

   d. Gully on beach area - fill only, no seeding required.

3. A barricade is definitely needed to stop traffic along the woods above the emergency spillway.

4. Pick up and dispose of floating debris around edges of permanent pool.

Asphalt curb should be raised around catch basin at beach to prevent overtopping. It is also recommended that a different type of grating be installed which will not plug so easily. A diversion channel should extend each way from the catch basin to better collect runoff in this area and lead it to the catch basin.

Relief Well No. 2 (right side looking downstream) - all gravel should be cleaned out of the well casing, as soon as possible.

The well extending up out of the relief trench below the outlet structure should likewise be cleaned out.

Caps should be added to relief wells #1 and 2 and the relief trench well. The relief trench well cap should have a screened top to permit easy observation.

A new plaque should be installed to replace the one stolen.

A pipe outlet structure should be installed at the outlet of the diversion which runs along the left abutment (looking downstream).

Riprap on the slopes immediately below the outlet structure should be picked up and replaced.

An iron deposit was noted on the right downstream corner of the relief trench. This should be watched on future visits to the site.

An evaluation should be made in July as to the need for mowing.

Leplante stated that items 1, 2b, 3, 6, 7 and 8 would be taken of by Memorial Day, if at all possible.

lermill Brook site

inspection party walked the entire site and again noted some ovement of the vegetative stand over that observed during last s' inspection. Even though the area was fertilized last fall, her general improvement of the turf is necessary. Items needing ntion are listed below:

. Lime and fertilizer should be applied to the entire area according to soil test. It was understood that this site is to be fertilized in the very near future according to soil test, as noted under the Arm Brook site.

. Any bare areas should be re-seeded.

. A gulley has developed in the left downstream gutter which should be filled with coarse gravel or as an alternative loam and seeded.

. The joint between the first and second sections of pipe at the outlet of the principal spillway should be filled with an asphalt compound.

. Trash around the inlet to the principal spillway should be removed and disposed of.

. All logs lying around the edge of the flood pool should be stockpiled and burned or buried or other wise disposed of. This includes all logs and other debris to an elevation 10 feet above the permanent pool.

. The entrance to the pipe culvert at the inlet of the emergency spillway (left side looking downstream) should be cleaned out.

. All brush (mostly wild cherry) at the entrance of the emergency spillway should be cut and stumps treated or entire trees and shrubs sprayed with a foliage herbicide.

. A fence and barricade is seriously needed to prevent vehicle entrance to the dam site area along the right abutment looking downstream (powerline side).

. An evaluation should be made in July as to the need for mowing.

rding to the Operation and Maintenance Agreement the Sponsoring l Organization is responsible for preparing the Annual Inspection rt and distributing copies to the interested parties. It is ested that this provision be put into effect for all future ections.

s also requested that the Sponsoring Local Organization provide Soil Conservation Service with a report on all maintenance costs n annual basis as provided for in the Operation and Maintenance ement.

Karl R. Klingelhofer
State Conservation Engineer/ntl

Water Resources Commission
Leplante
Mayor of Westfield
County Engineer
Conlin
Elasmar
K. Klingelhofer
W. S. Unit File

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
29 Cottage Street
Amherst, Massachusetts 01002

ANNUAL INSPECTION
POWDERMILL BROOK WATERSHED
May 29, 1967

, 1967, the following people met at the Arm Brook site,
l Brook Watershed, for the purpose of conducting an annual
n of both the Arm Brook and Powdermill Brook sites: Tom
Water Resources Commission, Massachusetts; Hans vanLeer,
of Conservation Services, Massachusetts; Lewis Allessio, Parks
ation Department, Westfield; Edward Barry, Superintendent of
tment of Public Works, Westfield; George Horosco, Foreman,
t of Public Works, Westfield; Charles Conlin, Charles Holden,
ier Moustakis, Karl Klingelhofer, Soil Conservation Service.

atives of the City of Westfield were not present for the
spection.

k Site

he past year, the principal spillway was extended, an impact
ded, and a drainage berm and deep relief trench installed to
the foundation problem which existed at this site. This work
to have successfully corrected the problem that existed and
can now be made of this site.

s been practically no maintenance of the vegetative cover at
e since it was constructed and it is deteriorating. The inspection
out the following maintenance needs as follows:

Lime and fertilizer should be based on current soil tests. In lieu of soil tests, the entire vegetated area should be fertilized with 75 pounds per acre of nitrogen, 50 pounds of P_2O_5, and 50 pounds of K_2O annually and 2 tons per acre of lime every 2 or 3 years.

Mowing is not now needed, but an evaluation for this need should be made by the local Soil Conservation Service technician during the summer and a report prepared by August 18.

All unauthorized vehicular traffic should be excluded from the dam site and emergency spillway areas. This will require the installation of gates and barriers.

Debris along the entrance to the emergency spillway should be removed.

There is a small gully which has developed on the edge of the berm along the left side of the entrance section of the emergency spillway. This should be filled with well-graded gravel ranging in size from three inches to medium sand. Bare areas on the slopes of the emergency spillway should be over-seeded.

. The outlet for the diversion along the left abutment on the downstream side of the dam should be partially filled with well-graded gravel plus a top layer of coarse rock (three to six inches in size). This area should not be completely filled, leaving a depressed section to confine the flowing water.

. The left gutter on the downstream side of the dam now covered with jute netting should be over-seeded.

. The access road needs to be re-graded for improved surface drainage.

. The gully in the beach area should be filled. It is recommended that a catch basin type drain be installed before filling to prevent future overflow in this area.

lessio explained that the Parks and Recreation Department had ssigned the responsibility for maintenance of this site, and ned their plans for performing the needed work. The Westfield ment of Public Works has agreed to assist the Parks and Recrea- Department in this work.

rmill Brook Site

enance needs are as follows:

1. The entire vegetated area needs fertilizing and possibly liming as outlined in item #1 pertaining to the Arm Brook site.

2. Mowing will probably be needed during the late summer or early fall and an evaluation of this need should be made by the local Soil Conservation Service technician of this need during the summer and a report prepared by August 18.

3. Vehicular traffic is causing serious damage to the berm and slopes of the embankment. All unauthorized vehicles should be excluded by the construction of suitable barriers.

4. The left gutter on the upstream slope of the dam has been seriously damaged by traffic. It now needs to be fertilized and reseeded. At the base of this gutter, two gullys have developed which should be filled with well-graded gravel ranging in size from three-inch to medium-size sand, Sufficient gravel may be available at the base of these gullys.

5. Debris has collected in the trash rack of the principal spillway riser that should be cleaned out. There is also some debris around the edges of the sediment pool and at the outlet of the principal spillway that should be disposed of.

6. Willow shoots in the entrance and exit sections of the emergency spillway should be kept mowed or sprayed to prevent their development into trees.

The outlets to the toe drainage system (small diameter corrugated pipe) at the outlet of the principal spillway should be cleaned out to make sure they are free draining.

The sedimentation problem which has developed at the city sanitary land fill area should be controlled by the installation of desilting basins.

Karl R. Klingelhofer/mgc
State Conservation Engineer

eorge McDonnell, County Engineer
eorge Hartley, Chairman, Hampden Cons. District
alcolm Graf, Water Resources Commission
on Weinle, Westfield, City Engineer
arold J. Martin, mayor of Westfield
harles Conlin, NRCC, West Springfield
ewis Allessio, Parks & Recreation Dept., City Hall, Westfield
. Klingelhofer
tis Project Office
. Moustakis
Dr. Isgur, C.O.Brown
W.S. File

DAM NO. 2-7-329-14

SPILLWAY: Available Yes. Needed ____.

Above Normal Water 17½ Ft.

4' - on ____ Ft. Height 5 Ft. Material Turf.
ttom
on: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs X. 4. Urgent Repairs ____.

s: Some erosion evident on side slopes of spillway.

EL AT TIME OF INSPECTION: 22½ Ft. Above ____. Below X.

1 X F.L. Principal Spillway ____.

Freeboard 22½ Ft.

OF DEFICIENCIES NOTED:

(Trees and Brush) on Embankment None Found

Burrows and Washouts None Found

to Slopes or Top of Dam None Noted

d or Damaged Masonry None Found

ce of Seepage None Evident

ce of Piping None Found

None Found

n Yes. On emergency spillway side slopes

and/or Debris Impeding Flow None Found

d or Blocked Spillway None

ET CONTROLS AND DRAWDOWN

ion and Type: Center of dam - 10' - 6" W. x 31' H. concrete drop box inlet with 48" diameter conduit outlet.

ols N/A, TYPE:.

atic____. Manual____. Operative Yes____, No____.

nts: 2 - each openings - 10' - 6" W. x 1' - 7" H. at top of drop box inlet.

ion and Type: At bottom of drop - inlet - 24" slide gate sluice.

ols Yes, Type: 24" diameter ARMCO Model 35-05C or equal slide gate.

atic____. Manual X. Operative Yes X, No____.

nts: Unable to verify by field inspection as to type of controls.

ion and Type: Easterly end dam - swale spillway - 184' wide on bottom, 5'± below top of dam, side slopes 2:1.

ols No, Type:.

atic____. Manual____. Operative Yes____, No____.

nts: Some areas appear unturfed.

esent Yes X, No____. Operative Yes X, No____.
See Item No. 2 above.

FACE: Slope 3½:1, Depth Water at Dam 29'.

Turf X. Brush & Trees____. Rock fill____. Masonry____. Wood____.

1. Good X.
2. Minor Repairs_____.
3. Major Repairs_____.
4. Urgent Repairs_____.

Slope appeared well turfed and stable.

M FACE: Slope 3:1.

Turf X. Brush & Trees____. Rock Fill____. Masonry____. Wood____.

1. Good X.
2. Minor Repairs_____.
3. Major Repairs_____.
4. Urgent Repairs_____.

Appeared well turfed and stable.

OK FILE

INSPECTION REPORT - DAMS AND RESERVOIRS

:

n Westfield . County Hamoden . Dam No. 2-7-329-14 .

Dam Arm Brook Dam .

Mass. Rect.
et No. 12A . Coordinates: N 421,200 , E 264,000 .

Date
d by: Russell C. Salls,P.E., On Jan. 15, 1974 . Last Inspection 1970 .

As of December 14, 1973

essors , Reg. of Deeds , Prev. Insp. , Per. Contact X .

of Westfield,
rvation Commission, Municipal Building, Westfield, Massachusetts
St. & No. City/Town State Tel. No.

St. & No. City/Town State Tel. No.

St. & No. City/Town State Tel. No.

ER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

as above
St. & No. City/Town State Tel. No.

o. of Pictures Taken None . Sketches See description of Dam.
lans, Where January, 1962 construction plans U.S.S.C.S. plan .
No. M.A.-411-P. Copy in possession of Conservation Commission.

OF HAZARD: (if dam should fail completely)*

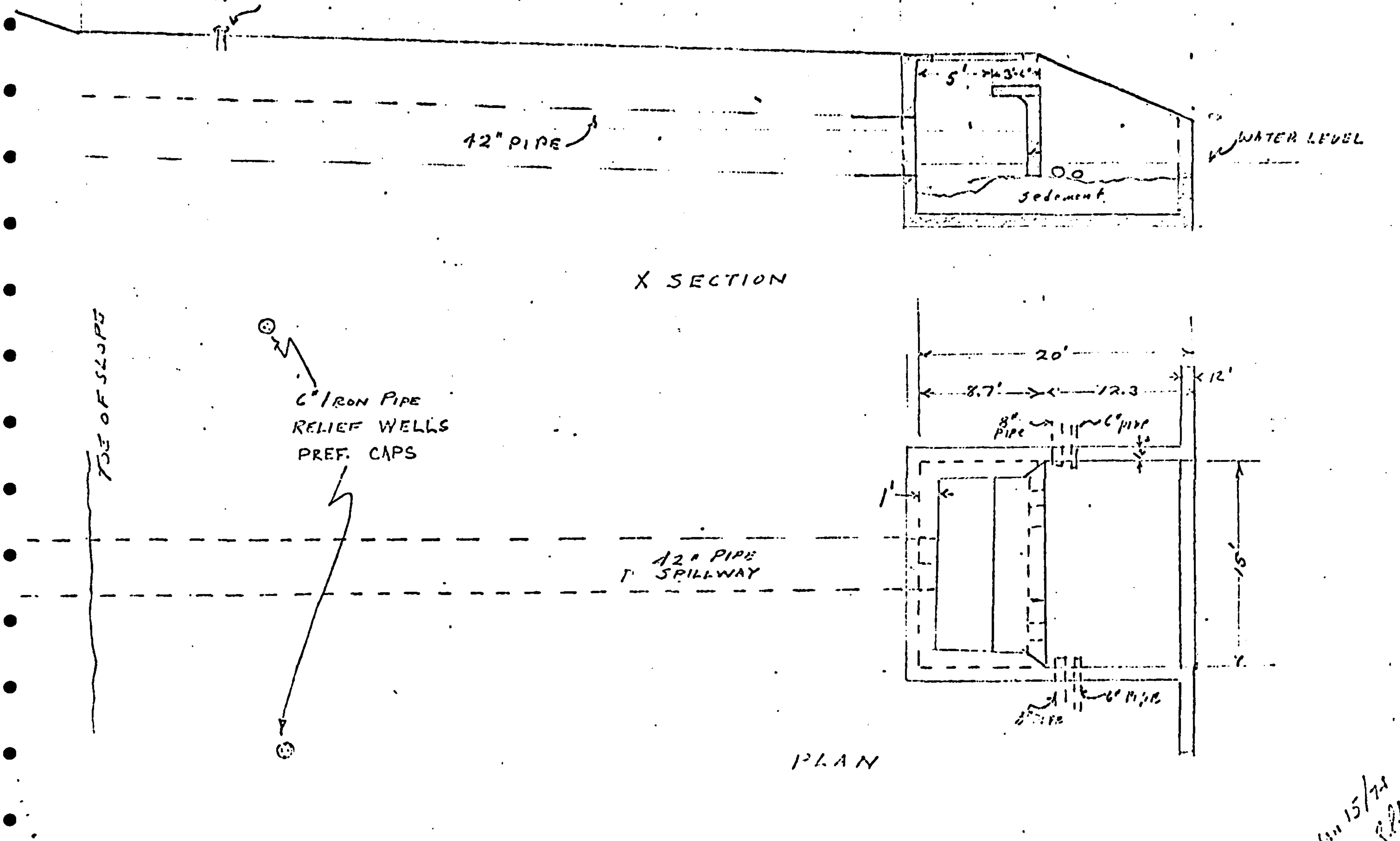
. Minor . 3. Severe .

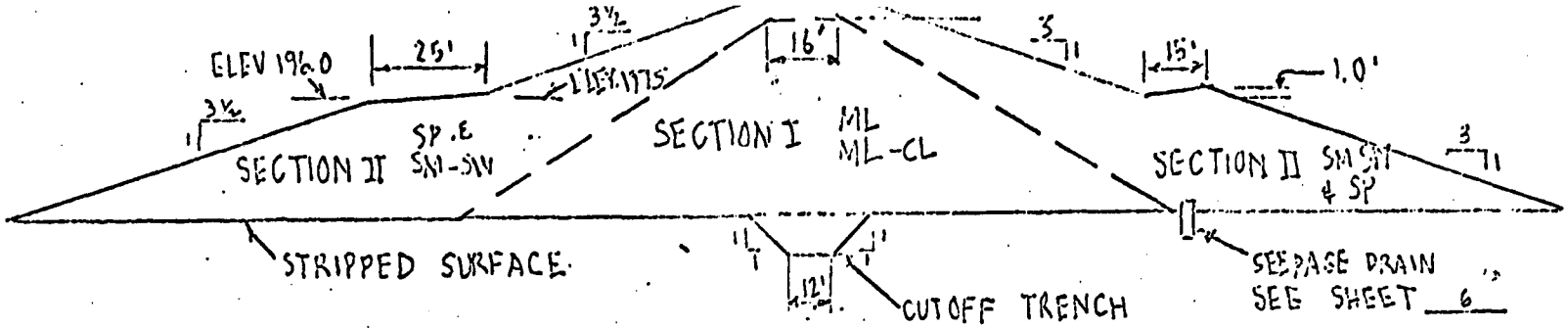
. Moderate . *4. Disastrous X .

s: * Assuming dam was at flood capacity at time of failure

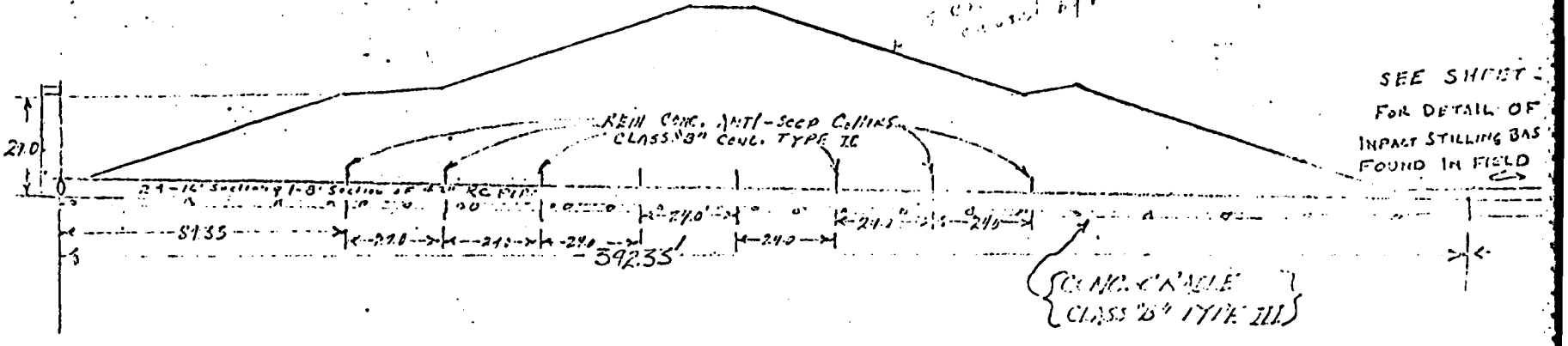
ating may change as land use changes (future development).

BASIN - BUILT PER ... SMALL DAMS" Pg 306 - FIGURE 217





TYPICAL EMBANKMENT SECTION



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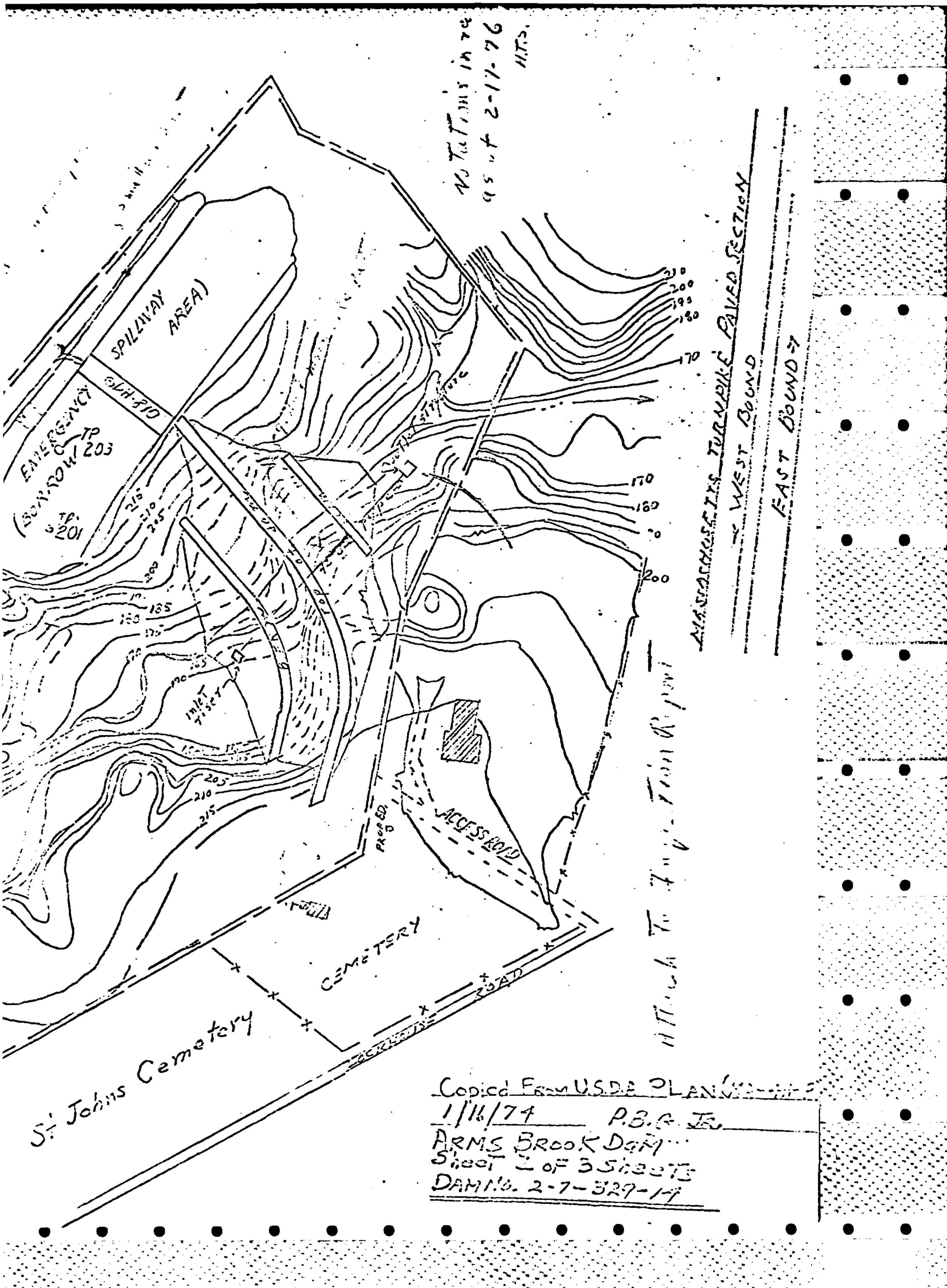
P.B.G. JR. 1/11/74 No. NA-III-P
Sheet 2 of 3 Sheets



EMERGENCY SPILLWAY AREA)
(BORROW
TP 203
TP 201
MASSACHUSETTS TURNPIKE PAVED SECTION
WEST BOUND
EAST BOUND
210
200
190
180
170
200
215
210
205
185
ACCESS ROAD
CEMETERY
ROAD
St Johns Cemetery
Copied From U.S.D.A. PLAN
1/16/74
ARMS BROOK DAM
Sheet 2 of 3 Sheets
DAM No. 2-7-329-14

width of 1½' ± and 6" to 18" deep.
its location and the extent of erosion occurring, this gully could
come a major threat to the safety of the dam. A path has been worn
he turf cover along the entire length of the top of the dam.
lam normally impounds approx. 46 million gallons of water but at flood
point of overflowing swale spillway crest would impound 235 million
)lus.
.strict recommends that the owners of this dam be requested to take
ıte early action to remedy the above listed problems and make all
ıecessary to maintain this dam in a safe condition.
.strict also suggests that copies of any correspondence from your
) owners of this dam be sent to the Mayor of Westfield and to
ıs Real, Vice Chairman of the City of Westfield Conservation Commissio
)ears that the basic cause of most of the erosion occurring on this
:eated by motorized recreational vehicles using the area. The dam
;omewhat isolated and it appears that there is very minor supervision
:ea.

VERALL CONDITION:

1. Safe_____.
2. Minor repairs needed X.
3. Conditionally safe - major repairs needed_____.
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____.

REMARKS AND RECOMMENDATIONS: (Fully Explain)

is an earthen embankment dam built in 1962 under the provisions of Law 566 and is now administered by the Westfield Conservation Commissic , during a conversation with Mr. Thomas Real, Vice Chairman of the ld Conservation Commission, he stated that all maintenance funds had leted from the commission's operating budget for maintenance of this da Powder Mill Brook, Dam No. 2-7-329-15, for the present fiscal year. ars questionable as to who or what city dept. is now funded or respons maintenance of these two flood control dams. Mr. Real stated that thi ll he had part time Ceta employees mow over the Armbrook embankment and emergency spillway structure. This appears to have been the total of any maintenance on the dam for the past year.
ral problems are developing which need attention before they become mor and pose a hazard to safety of dam.
problems noted in this inspection are as follows. The control shaft fo ration of drawdown gate appears to have been bent by vandals at the top eet of shaft and it is questionable if control could be used in its pre ndition. An area on the northeasterly side slope of the swale spillway stream from crest of spillway, approx. 20' long, and extending from top of slope, appeared to be devoid of any turf cover and showed slight

.

should be repaired and a good turf cover developed. On this same side nd directly opposite crest of spillway, a motor bike path on slope has to a width of 2'±, and 6" to 12" deep from top to toe of side slope. 100' downstream from crest of swale spillway a small washout was noted northeasterly side slope. This washout is 2'± deep, 3'± in width, and length vertically down the slope. At the toe of this washout a delta s has formed and a small flow of water was noted emerging from gully 6" p the slope above fines delta. This would appear to indicate a sub- water course might exist which has caused the washout and continuing of side slope at this location. The District recommends that owners b ed to investigate this condition and take necessary action to correct t g problem.

he downstream slope of the main embankment and directly over the line o p inlet conduit outlet pipe is a motor bike path extending from the top to the toe of slope or berm level. This path has eroded from surface

DAM NO. 2-7-329-14

GENCY SPILLWAY: Available yes. Needed _____.

eight Above Normal Water 17½ Ft.

idth 184 Ft. Height 5 Ft. Material Turf.

ondition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs X. 4. Urgent Repairs _____.

omments: A rather large area of slight erosion on northeasterly side slope of emergency spillway upstream of crest was noted. Directly in line with crest of spillway on slope is a motor bike path badly eroded. Approx. 100' downstream from crest of spillway is a small washout of side slope - see remarks.

ER LEVEL AT TIME OF INSPECTION: 23½ Ft. Above _____. Below X.

op Dam X F.L. Principal Spillway _____.

ther _____.

Normal Freeboard 22½ Ft.

MARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment None noted.

Animal Burrows and Washouts yes - see remarks and recommendations.

Damage to Slopes or Top of Dam yes - see items #8 and #9.

Cracked or Damaged Masonry None found.

Evidence of Seepage None found.

Evidence of Piping None found.

Leaks None found.

Erosion yes - see items #6, #8, #9, and remarks and recommendations.

Trash and/or Debris Impeding Flow None found.

Clogged or Blocked Spillway None found.

Other Snowmobile and motor bike trails over top and slopes of embankment are causing serious erosion problems.

LETS: OUTLET CONTROLS AND DRAWDOWN

o. 1 Location and Type: Center of Dam - 10½'W.x 31'H. conc. drop box inlet with 48" diameter conduit outlet.

Controls None, TYPE: _____.

Automatic ____. Manual ____. Operative Yes ____, No ____.

Comments: At top of drop inlet box there are 2 ea. openings 10½'W.x 1'-7"H. Box appears sound - water flowing freely into box.

o. 2 Location and Type: At bottom of drop inlet - 24" dia. sluice.

Controls yes, Type: 24"dia.ARMCO Model 35-05C or equal slide gate.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: Unable to verify by field inspection as to type of controls. Control shaft appears bent at top.-See remarks.

lo. 3 Location and Type: Easterly end of dam - Swale spillway, 184' wide on bottom - invert 5'± below top of dam - side slopes 2: grade.

Controls None, Type: _____.

Automatic ____. Manual ____. Operative Yes ____, No ____.

Comments: Northeasterly slope of spillway has areas of erosion - see item #9.

Drawdown present Yes X, No ____. Operative Yes unk, No ____.

Comments: See item #2 above. Questionable if control is operable.

M UPSTREAM FACE: Slope 3½:1, Depth Water at Dam 29'.

Material: Turf X. Brush & Trees ____. Rock fill ____. Conc. Masonry X. Wood ____. on overflow structure.

Other _____.

Condition: 1. Good X. 3. Major Repairs ____.

2. Minor Repairs ____. 4. Urgent Repairs ____.

Comments: Turfed cover of upstream slope appears stable. Has been mowed over - no brush visible.

M DOWNSTREAM FACE: Slope 3:1.

Material: Turf X. Brush & Trees ____. Rock Fill ____. Masonry ____. Wood ____.

Other _____.

Condition: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs ____. 4. Urgent Repairs X.

Comments: A motor bike path extending from top of embankment to toe of first slope or berm level has eroded into a gully 6"to 18" deep and 1' t 1½' wide.

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/Town Westfield. County Hampden. Dam No. 2-7-329-14.

Name of Dam Arm Brook Dam.

Topo Sheet No. 12 A. Mass. Rect. Coordinates: N 421,200, E 264,000.

Inspected by: Harold T. Shumway, On Feb. 17, 1976. Date Last Inspection 1-15-74.

---

2. OWNER/S: As of February 17, 1976

per: Assessors ____, Reg. of Deeds ____, Prev. Insp. X, Per. Contact X.

	Name	St. & No.	City/Town	State	Tel. No.
1.	City of Westfield Conservation Commission	Municipal Building	Westfield	Mass.	
2.					
3.					

---

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name	St. & No.	City/Town	State	Tel. No.
Mr. Thomas Real Vice-Chairman of Conservation Commission	Municipal Building	Westfield		

---

4. DATA:

No. of Pictures Taken none. Sketches See description of Dam.
Plans, Where Jan. 1962 construction plans U.S.S.C.S. plan No. M.A.- Copy in possession of Conservation Commission.

---

5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor ____.
2. Moderate ____.
3. Severe ____.
4. Disastrous X.

Comments: Assuming dam was at flood capacity at time of failure. Capaci
at flood stage approx. 235 million gallons.

*This rating may change as land use changes (future development).

The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

October 19, 1976

City of Westfield
Conservation Commission
Municipal Building
Westfield, Massachusetts
ATT: Mr. Thomas Real

RE: Inspection Dam #2-7-329-14
Arm Brook Dam
Westfield

Gentlemen:

On February 17, 1976 , an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be City of Westfield. If this information is incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams-Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however the following conditions were noted that require attention:

> Control shaft of drawdown gate in need of repairs. Motor bike paths should be reloamed and reseeded. There is evidence of fines forming from a small flow of water emerging from the slope downstream of the swale spillway. This should be investigated and corrected. It appears that there is very little supervision of the area.

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the Dam as indicated above.

Very truly yours,

JOHN J. HANNON, P.E.
CHIEF ENGINEER

A.MC:hlb
cc:Hon. John J. Rhodes

The tile drain outlet which is located along the shore line at the inlet to the emergency spillway is apparently covered over. This should be located and uncovered.

There is an abundance of litter in the woods along the access road which should be cleaned up.

POWDERMILL BROOK SITE

For the Powdermill Brook site, the same comments and recommendations regarding lime, fertilizer and mowing as were made for the Arm Brook site, apply. Here again the vegetation is in desperate need of proper care.

The manhole cover for the riser has been removed. This should be replaced.

There is a log near the riser that should be removed and disposed of.

The stand of vegetation that exists on both of these sites is adequate. With proper care and maintenance, a dense turf would develop. This turf is especially important and is needed in the emergency spillways. Sufficient funds and the means for doing this work were to have been established according to the Operations and Maintenance Agreement that was signed by the City of Westfield.

Karl R. Klingelhofer

Karl R. Klingelhofer, State Cons.Engr./wmb

cc: George McDonnell, County Engr.,
Tighe & Bond, 211 Bowers and Pequot Sts.,
Holyoke, Mass. 01040
George Hartley, Chairman, Hampden Cons.District
Malcolm Graf, Director, Water Resources Commission
Don Weinle, Westfield City Engineer
Harold J. Martin, Mayor of Westfield
Conlin, WUC, West Springfield
Klingelhofer
R. Brown
W.S. file

POWDERMILL BROOK WATERSHED ANNUAL INSPECTION

by

Karl R. Klingelhofer
State Conservation Engineer
Soil Conservation Service
29 Cottage Street
Amherst, Mass. 01002

June 9, 1966

On June 9, 1966, the following people met at the Arm Brook site, Powdermill Brook Watershed, for the purpose of conducting an annual inspection of both the Arm Brook and Powdermill Brook sites:

Donald Kirby, Water Resources Commission, Massachusetts
George Hartley, Chairman, Hampden Conservation District
Nicholas Roselli, Hampden Conservation District
George McDonnell, Hampden County Engineer
Karl R. Klingelhofer, Soil Conservation Service

The City of Westfield was notified of this inspection, but did not send a representative.

ARM BROOK SITE

During the past year two relief wells were installed and the riprap reconstructed under contract to alleviate a foundation condition which exists at this dam site. The work performed did not solve the problem and additional work is planned. Within the next two months a new contract is expected to be awarded for the extension of the principal spillway conduit by 48 feet, the addition of an impact basin at the outlet of this conduit, the construction of a filter berm to an elevation that will cover the conduit extension and the installation of a deep relief trench extending to the aquifer that exists at approximately a 25-foot depth. It is anticipated that this work will solve the problem which has existed at this site -- the work to be completed by winter of 1966.

There has been practically no maintenance of the vegetative cover which exists at this site and it is rapidly deteriorating. Fertilization is desperately needed. Sixty pounds per acre of nitrogen, sixty pounds of P_2O_5, and sixty pounds of K_2O should be applied. About 50 per cent of the nitrogen should be in the inorganic form.

The dam and emergency spillway should be mowed during the summer months.

There are two gullys in the beach area which should be repaired. Recommendations for the repair of these gullys can be obtained from the Soil Conservation Service.

It is quite possible that this site should be re-limed. Suggest that the local County Agent or an SCS technician be asked to check the PH and recommend a liming rate.

OVERALL CONDITION:

1. Safe X .
2. Minor repairs needed .
3. Conditionally safe - major repairs needed .
4. Unsafe .
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list .

REMARKS AND RECOMMENDATIONS: (Fully Explain)

This dam was built in 1962 under the provisions of Public Law 566 and is now administered by the Westfield Conservation Commission. The embankment is well shaped and mowed with a growth of turf over both slopes. There were some areas on the side slopes of the emergency spillway where traffic, snowmobiles etc., have caused erosion.

At the time of inspection the recreational pool was full and water was overflowing the crest of the drop inlet riser. As well as could be determined from the shore the riser was full of debris and in satisfactory condition.

At the downstream end of the 42" concrete pipe conduit about 70'± beyond the toe of the slope an impact type concrete stilling basin has been built instead of the riprap stilling basin shown at the toe of slope on the original plans. The ends of two 6" iron pipe relief wells extend above the flat area at the toe of slope about 15 - 20 feet from the toe.

The overall condition of the dam appears to be satisfactory at this time.

CS/js /sd

DISTRICT II.

Submitted by Russell C. Salls, P. E. Dam No. 2-7-329-14

Date January 15, 1974 City/~~Town~~ Westfield

Name of Dam Arm Brook Dam

Location: Topo Sheet No. 12A Mass. Rect. Coordinates N 421,200 E 264,000

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.

On Arm Brook just north of Mass. Pike - reached via ~~Access~~ Road off Lockhouse Road, right about ¼ mile north of Mass Pike, ¼ mile on Access Road.

Year built 1962 Year/s of subsequent repairs _____

Purpose of Dam: Water Supply _____ Recreational X Flood control, fish & wildlife development.
Flood Control _____ Irrigation _____ Other _____

Drainage Area: _____ sq. mi. 2144 acres.
Type: City, Bus. & Ind. 5% Dense Res. _____ Suburban 15% Rural, Farm 40%
Wood & Scrub Land 40% Slope: Steep _____ Med. 20% Slight 80%.

Normal Ponding Area: 13 Acres; Ave. Depth 10½' to 11'
Impoundment: 45.9 Million gals.; 141 acre ft.
Silted in: Yes _____ No X Approx. Amount Storage Area _____
Flood storage area 55 acres. Flood water storage additional 575 acre ft.

No. and type of dwellings located adjacent to pond or reservoir _____
i.e. summer homes etc. 1 - park pavilion

Dimensions of Dam: Length 753'± Max. Height 55'
Freeboard 22½'
Slopes: Upstream Face 3½:1
Downstream Face 3:1
Width across top 16'

Dam No. 2-7-329-14

8.

Classification of Dam by Material:

Earth X Conc. Masonry _____ Stone Masonry _____

Timber _____ Rockfill _____ Other _____

8.

Dam Type: Gravity X Straight X Curved, Arched _____ Other _____

Overflow _____ Non-overflow X

Curved on westerly end.

9.

A. Description of present land usage downstream of dam:

15 % rural; 85 % ~~urban~~ developed

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure? Yes _____ No X - Not before developed area.

C. Character Downstream Valley: Narrow 50% Wide 50% Developed 85%

Rural 15% Urban _____

10.

Risk to life and property in event of complete failure.

No. of people 3

No. of homes 3

No. of businesses 2 - Retail

No. of industries 1 Type Sterling Radiator Company

No. of utilities 4 Type Telephone and electric distribution li
sewer and water mains.

Railroads 2 - New York, New Haven and Hartford Railroad
Boston and Albany Railroad

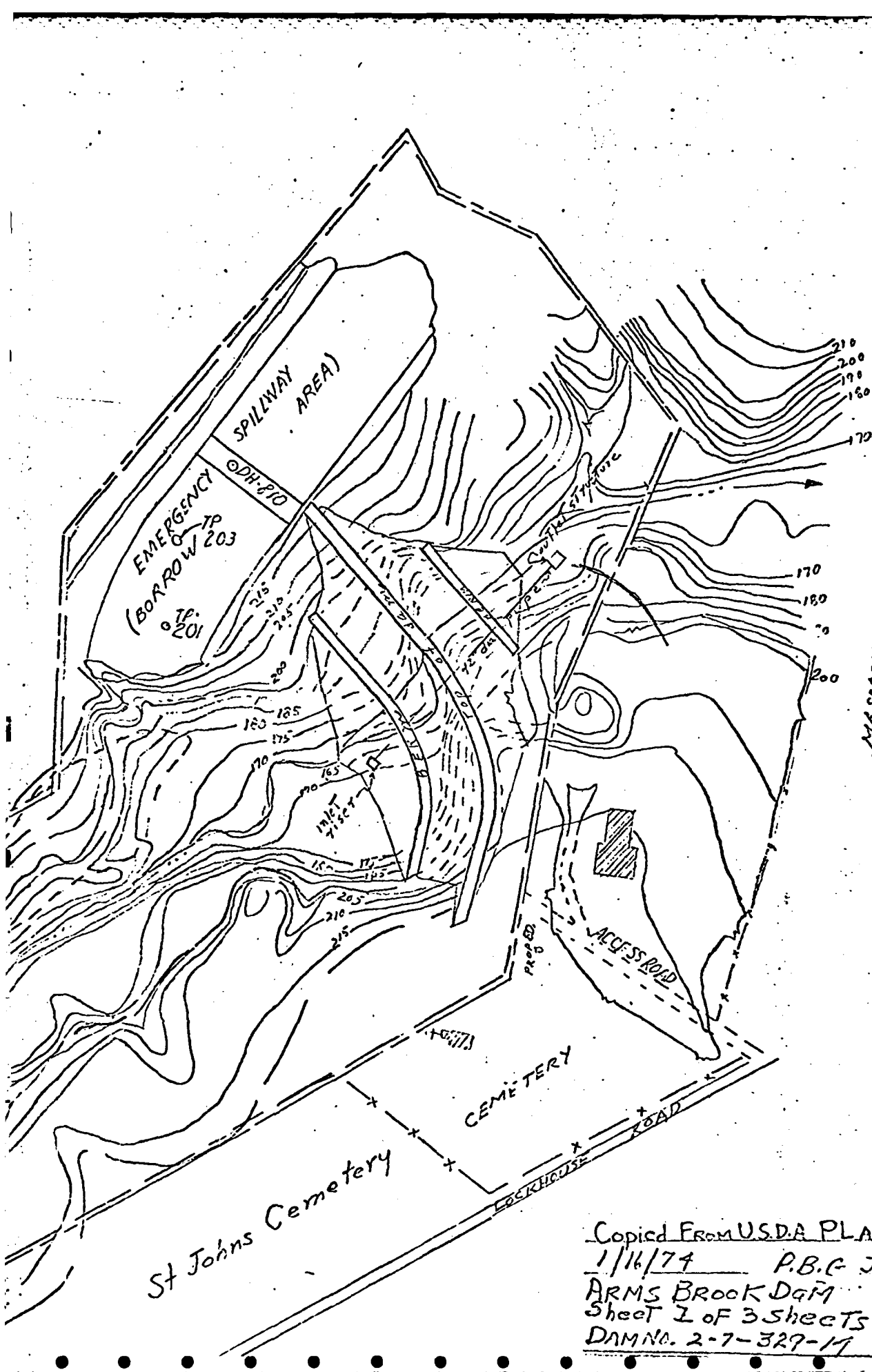
Other dams None

Other Several Town Highway bridges and bridge carrying Routes 202 and 10.

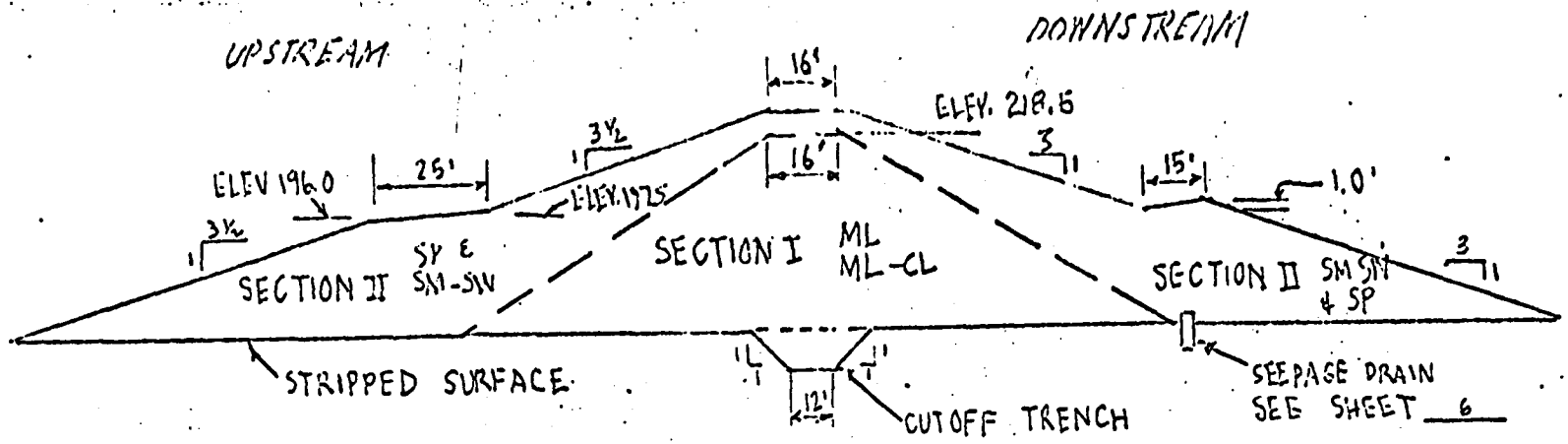
11.

Attach Sketch of dam to this form showing section and plan on 8½" x 11" sheet.

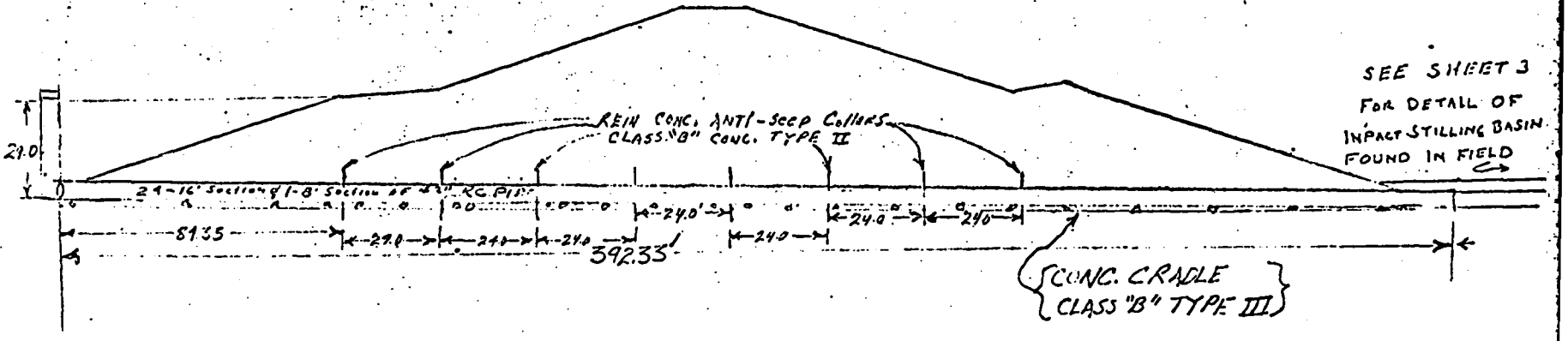
RCS/vk/sd
Attachments
Locus Plan
Sketches



Copied From U.S.D.A PLAN Via-Ill-
1/16/74 P.B.C Jr.
ARMS BROOK DAM
Sheet 1 of 3 Sheets
DAM NO. 2-7-329-14



TYPICAL EMBANKMENT SECTION



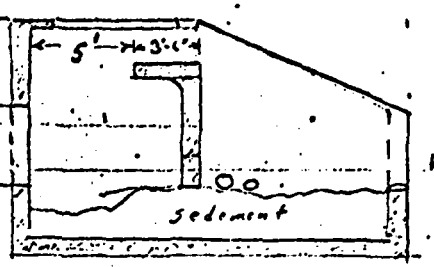
COPIED FROM DEPT. OF AGRIC PLAN
P.B.G. JR. 1/11/74 No. MA-111-P
Sheet 2 of 3 Sheets

OUTLET 42" PIPE SPILLWAY
REPLACES RIP RAP STILLING
BASIN - BUILT PER "DESIGN OF
SMALL DAMS" Pg 306 - FIGURE 217

70'±

2 6" IRON PIPE RELIEF WELLS
PREF. CAPS

42" PIPE

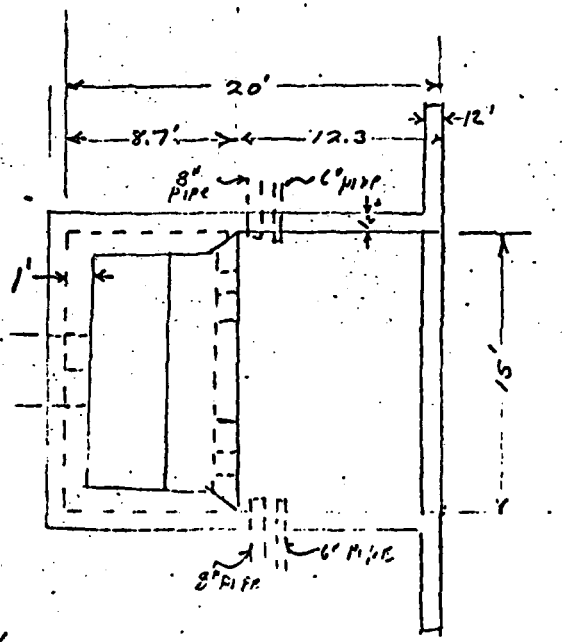


X SECTION

TOE OF SLOPE

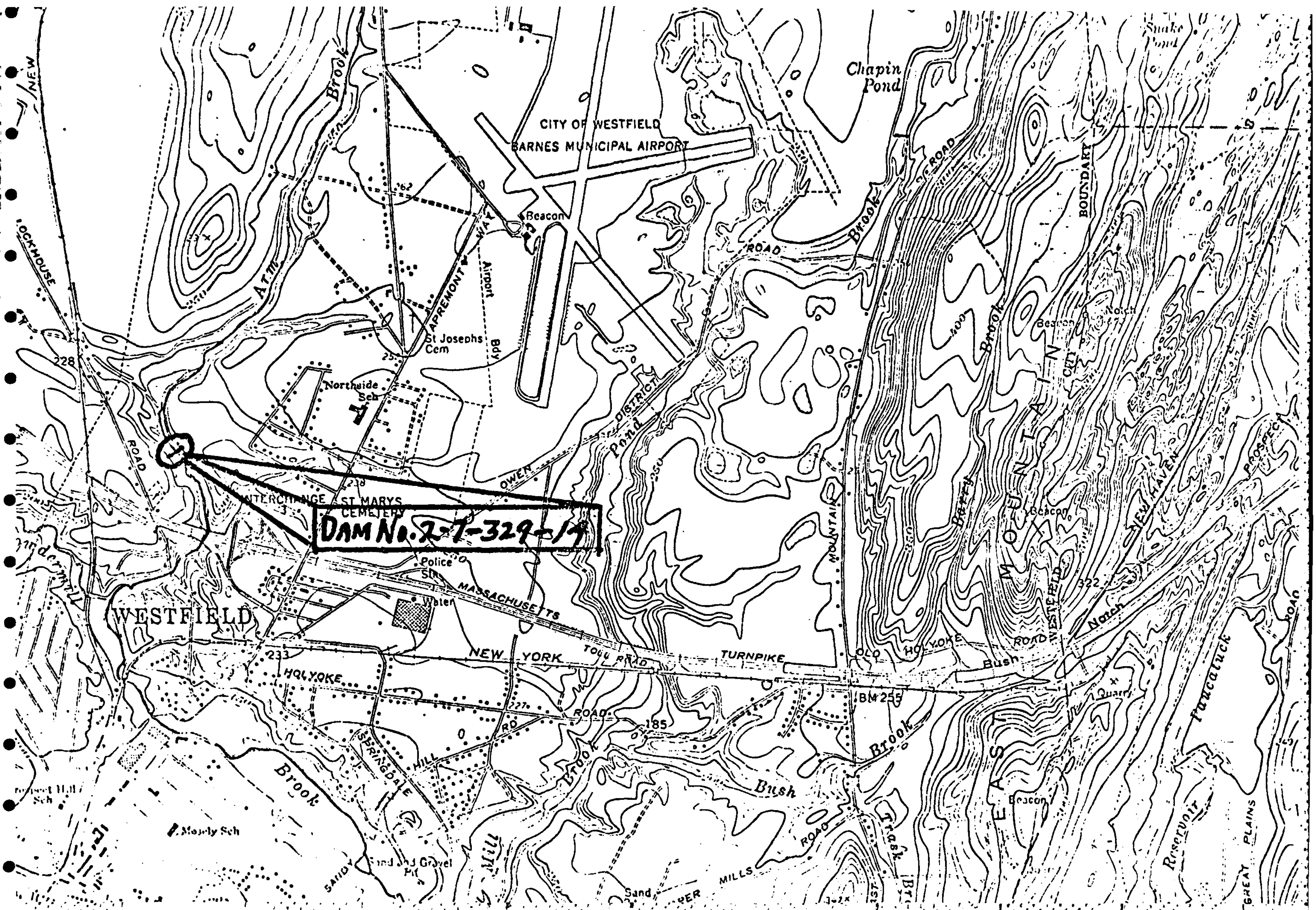
6" IRON PIPE
RELIEF WELLS
PREF. CAPS

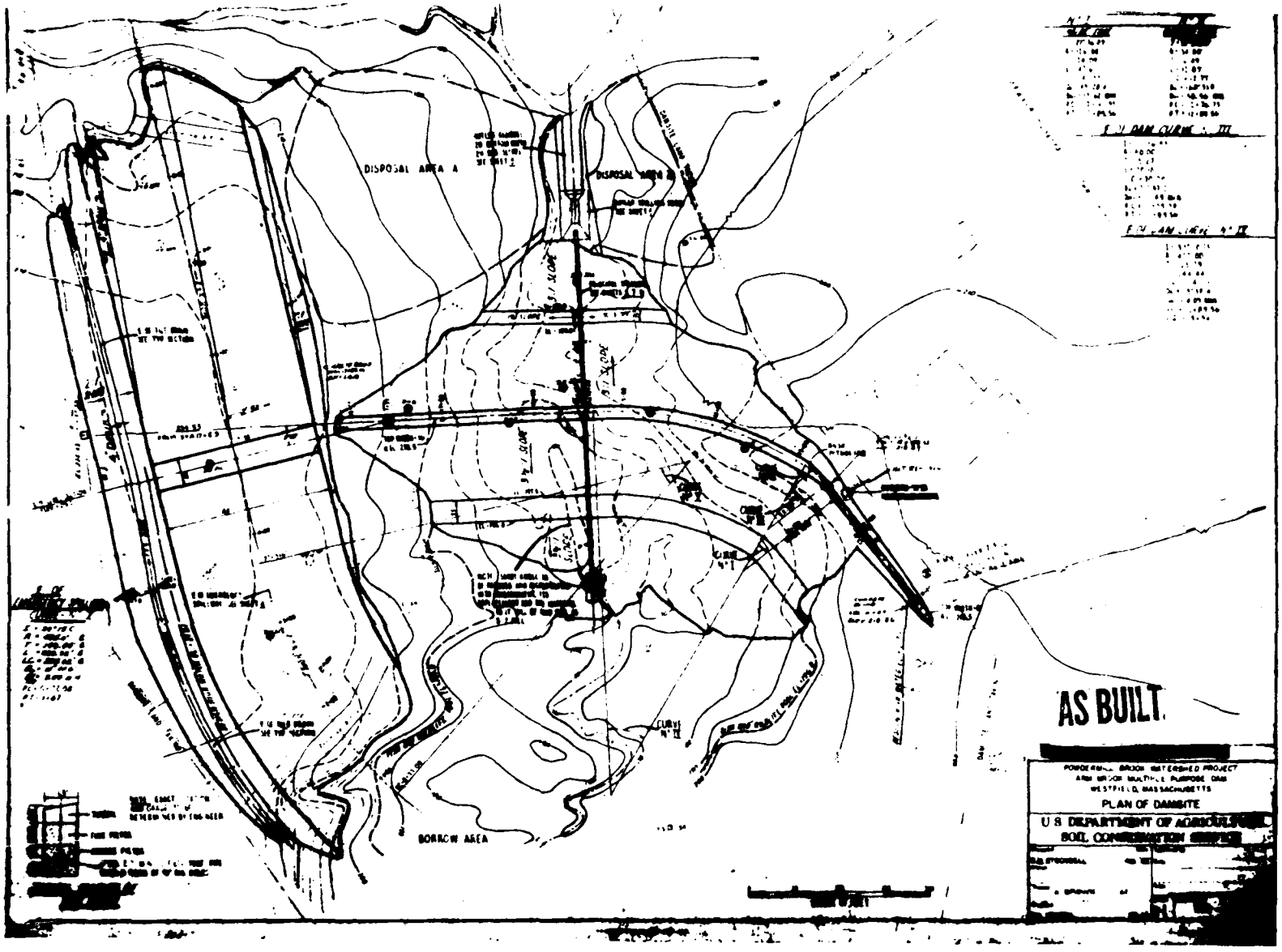
42" PIPE
SPILLWAY

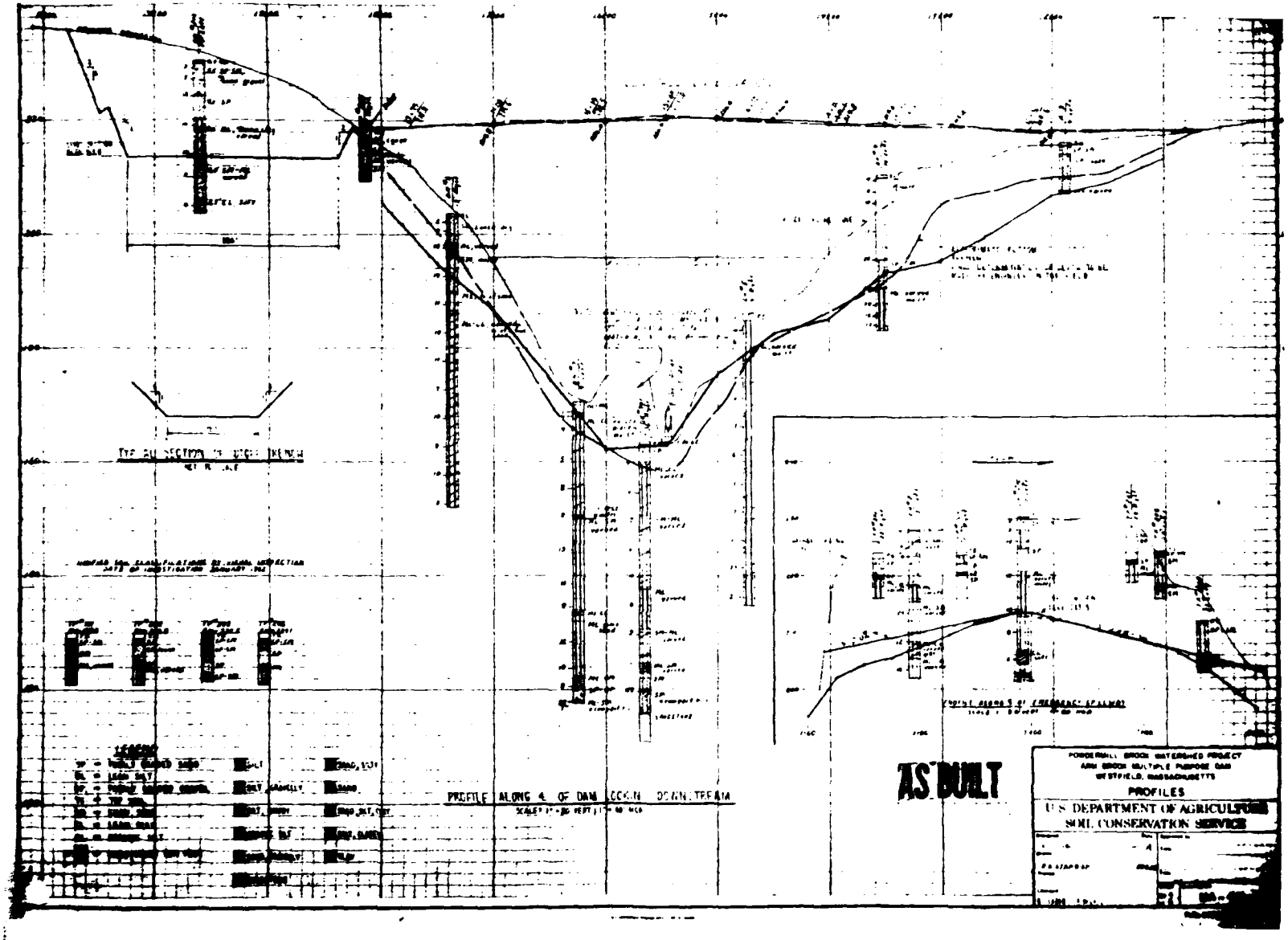


PLAN

JAN 15/72


DAM No. 2-7-329-19
CITY OF WESTFIELD
BARNES MUNICIPAL AIRPORT
Beacon
Airport Bdy
St Josephs Ccm
Northside Sch
ST MARYS CEMETERY
INTERCHANGE 3
Police Sta
Water
MASSACHUSETTS
NEW YORK TOLL ROAD
TURNPIKE
WESTFIELD
HOLYOKE
ROAD
SPRINGDALE
HILL RD
Brook
Arm Brook
Pond
DISTRICT
OWEN
MOUNTAIN
OLD HOLYOKE ROAD
WESTFIELD
Notch
Bush
BM 255
Barry Brook
Chapin Pond
Snake Pond
BOUNDARY
CITY
M O U N T A I N
E A S T
NEW HAVEN
PROSPECT
Quarry
Tucacuck
Reservoir
GREAT PLAINS
Trask
Bush Brook
Mill
MILLS ROAD
Sand
Sand and Gravel Pit
Mosely Sch
LOCKHOUSE
NEW
228
233
185
322





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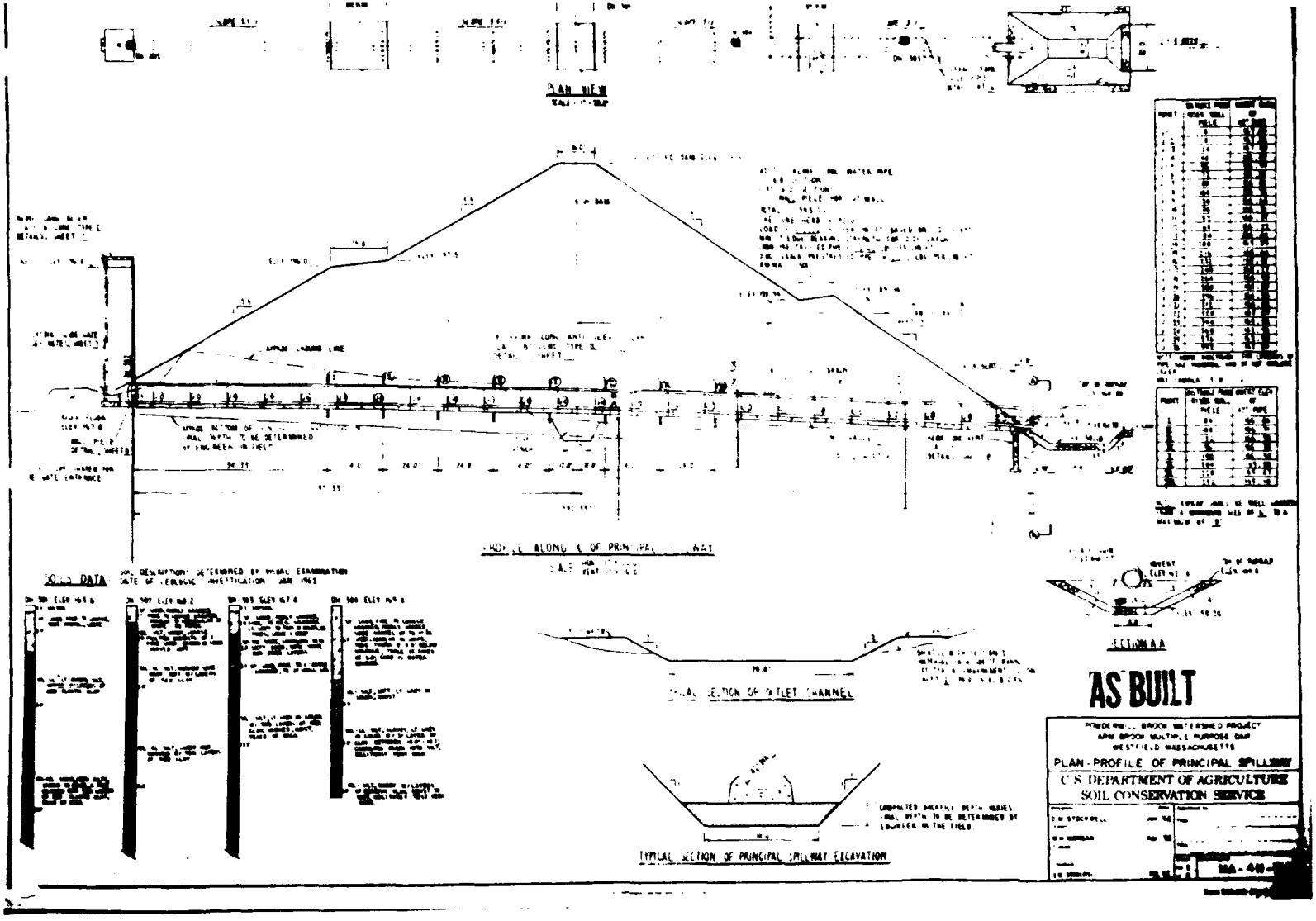
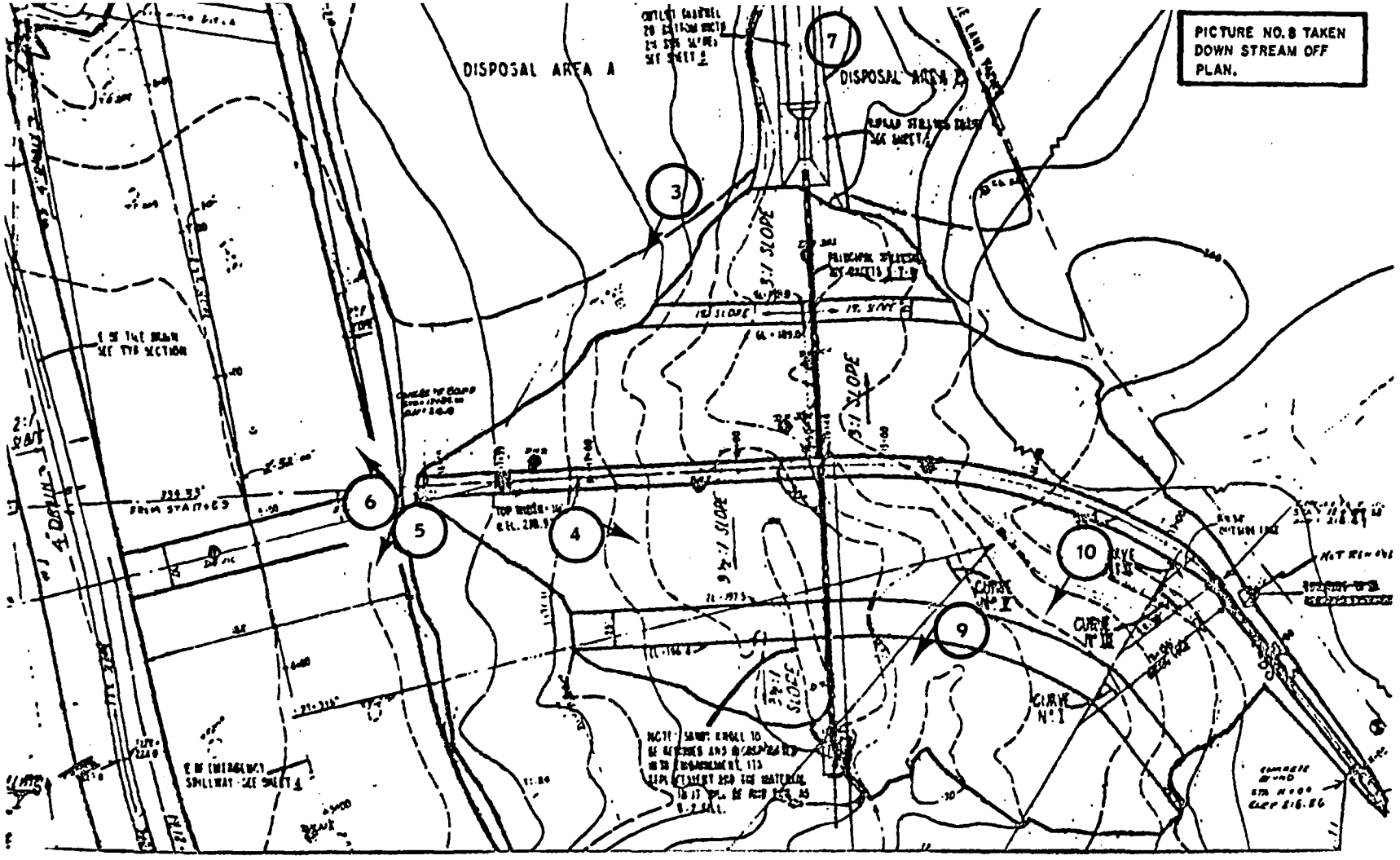


APPENDIX C

PHOTOGRAPHS

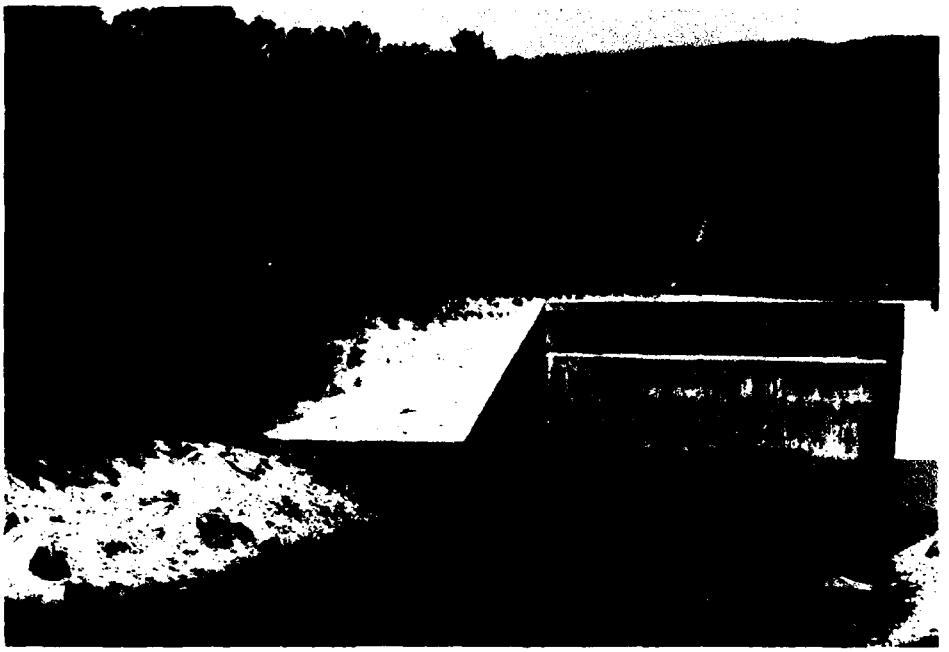


LOCATION OF PHOTOGRAPHS

ARM BROOK DAM

WESTFIELD MA.

AUG. 1978



)TO NO. 1 - Downstream face of dam and outlet structure

)TO NO. 2 - Left abutment from outlet channel, inspection party at about the location of seepage area

FO NO. 3 - Close up of seepage area downstream abutment area

TO NO. 4 - Upstream face of dam from left abutment

AD-A156 161 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS ARM BROOK MULTIPLE PU..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV AUG 78 2/2

UNCLASSIFIED F/G 13/13 NL

END

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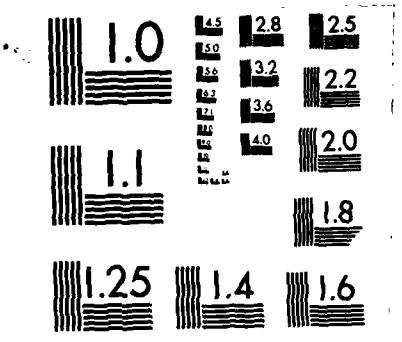


PHOTO NO. 5 - Inlet area of vegetated spillway

PHOTO NO. 6 - Outlet area of vegetated spillway

PHOTO NO. 7 - Outlet channel just below outlet structure

PHOTO NO. 8 - Outlet channel twin culvert at Mass. Pike

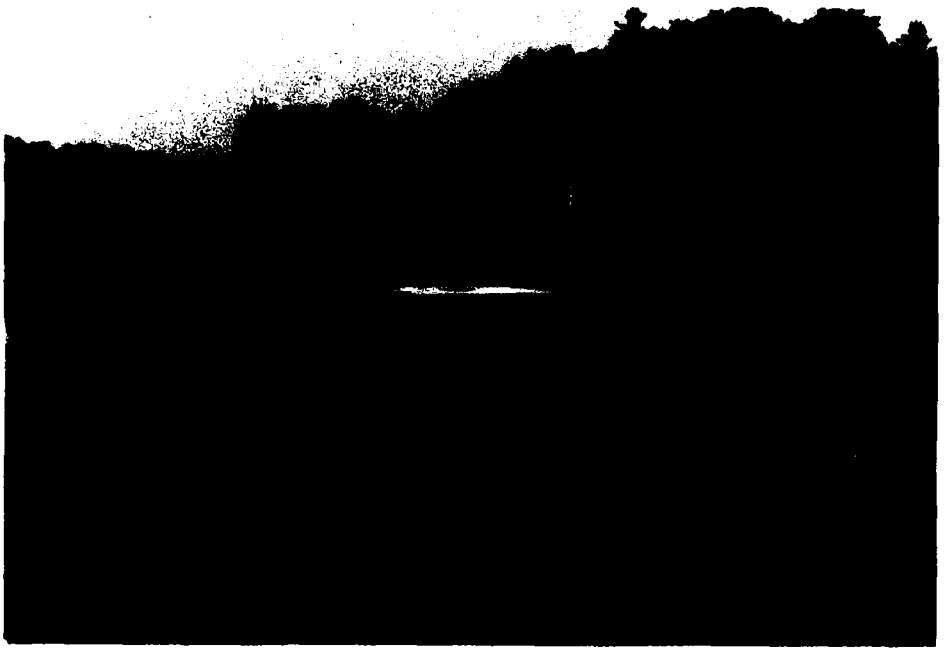


PHOTO NO. 9 - Inlet structure

PHOTO NO. 10 - General view of normal impoundment

APPENDIX D

1. HYDROLOGIC COMPUTATION
2. DRAINAGE AREA

Dam designed in 1962 ± by U.S. Dept of Agriculture - Soil Conservation Service. Multipurpose dam

A = 3.35 sq. mi.
T_c = 5.74 hrs
Duration Curve B
" Time 6 hrs
Freq. 100 yr.
Rainfall 3.74 in.

original data was not found.

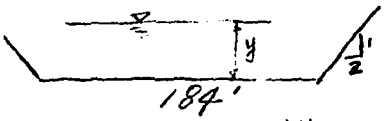
Check dc. as a PMF - Corps flood Curve 6

Armbrook Site

Drainage Area = 3.35 Sq. Mi. = 2145 Acres

Q_{P_1} = 2188 CFS/Sq. Mile

= 2188 × 3.35 = 7330 cfs = Q_{P_1}



$S = 2.53 \times 10^{-2}$

$$R = \frac{A}{P} = \frac{(184 + 2y)y}{184 + 2y\sqrt{1+2^2}}$$

$V = 12$ fps, $A = \frac{7330}{12} = 611.$ Sq. Ft.

$(184 + 2y)y = 611$ get $y = 3.21$, $611.25 \approx 611$

Check S

$$V = \frac{1.486}{n} R^{2/3} S^{1/2}$$

$$R = \frac{(184 + 2\times 3.21)3.21}{184 + 2\times 3.21\sqrt{1+2^2}} = 3.08$$

@ $n = 0.04$ $\quad 12 = \frac{1.486}{0.04}(3.08)^{2/3} S^{1/2}$

$S = 0.023 < 2.53 \times 10^{-2}$ no good

Try $V = 15$ fps $\quad A = \frac{7330}{15} = 489$ Sq. Ft.

$(184 + 2y)y = 489$ get $y = 2.58$ $\quad 488 \approx 489$

Check S

$$R = \frac{(184 + 2\times 2.58)2.58}{184 + 2\times 2.58\sqrt{1+2^2}} = 2.50$$

@ $n = 0.04$ $\quad 15 = \frac{1.486}{0.04}(2.50)^{2/3} S^{1/2}$

$S = .048 > 2.53 \times 10^{-2}$ no good

= 12.5 fps, $A = \frac{7330}{12.5} = 587$ Sq. Ft.

$(184 + 2y)y = 587$ · get $y = 3.09$ · $587.7 \approx 587$ ✓

ck S $R = \frac{(184 + 2\times 3.09)3.09}{184 + 2\times 3.09\sqrt{1+2^2}} = 2.97$.

@ $n = 0.04$ $12.5 = \frac{1.486}{0.04}(2.97)^{2/3} S^{1/2}$

$S = .026 \approx 2.53\times 10^{-2}$. Say OK.

Emergency Crest @ El. 213.5

3.09

216.59 ✓ ≈ 217.1 ′

(Design High Water)
per calculation

Calculation Sheet (Storage Capacity Curve).

@ El. 216.59 Volume = 890 ′ Acre Ft.

@ El. 213.5 Volume = 725 ✓

165 ′ Acre Ft. ← Surcharge Storage Volume

STOR$_1$ = 165 Acre Ft. / 2145 Acre = 0.07692

= 0.92 in

$QP_2 = QP_1\left(1 - \frac{0.92}{19}\right)$

$= 7330(1 - 0.0484) = 6975$ · cfs.

V = 12 fps, $A = \frac{6975}{12} = 581$ ·

$(184 + 2y)y = 581$; get $y = 3.06$ · $581.8 \approx 581$ ✓

ck S $R = \frac{(184 + 2\times 3.06)3.06}{184 + 2\times 3.06\sqrt{1+2^2}} = 3.05$

@ n = 0.04 $12 = \frac{1.486}{0.04}(3.05)^{2/3} S^{1/2}$

$S = .024 \approx 2.53\times 10^{-2}$ · OK ··

Emergency Crest @ El. 213.5

3.06

216.56 ✓

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO
JOB
SUBJECT
CLIENT

on calculation sheet (Storage Capacity Curve)

El. 216.56 Volume = 890 Acre Ft.

El. 213.5 Volume = 725

165. Acre Ft. ← Surcharge Storage Volume

$STOR_2 = 165 \text{ Acre Ft.} / 2145 \text{ Acre} = 0.07692$

$= 0.92 \text{ in}$

Avg. $STOR = \frac{0.92 + 0.92}{2} = 0.92$.

Resulting Peak Outflow $QP_3 = 7330\left(1 - \frac{0.92}{19}\right)$

$= 6975 \text{ cfs}$.

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SHEET NO. 5
JOB Dam Insp.
SUBJECT Arm [illegible]
CLIENT Corps

Arm Brook

Tailwater

At Mass Turnpike Turn 8' CMP plan elev. indicate inv could be El 160 ± this is rough check only

Q = 6975 cfs ÷ 2 = 3500 cfs/pipe

Let n = 0.024
S = 0.005 '/'
D = 96"

A = $\frac{\pi}{4}(8)^2$ = 50.24 sf
C = π (8) = 25.12
r = 2 [illegible] = 2.519

[illegible] = 1.6 [illegible]

V	$V^2/2g$	Hf	Hs	Hc	Q
[illegible]					1005
40					2010
60					[illegible]
65					[illegible]
70	76.09	76.09	141.74		3517.

[illegible] this Hc [illegible] will overtop roadway at Elev 212±

PHC

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SHEET NO. [illegible]
JOB Dam [illegible]
SUBJECT [illegible]
CLIENT CCE [illegible]

Check of Spillway capacity calculations

Use Broad crested weir formula

$Q = C L H^{1.5}$ H = energy head = $h + V^2/2g$

(h: water height over crest; V: velocity)

From previous calculations

$h = 3.09'$ $V = 12.5$ fps

$H = 3.09' + \frac{12.5^2}{2g} = 5.5'$ use $C = 3.2$ so

$Q = (3.2)(184)(5.5)^{1.5} = 7595$ cfs > PMF = 7330 cfs

In addition have capacity to pass about 400 cfs through outlets in dam.

∴ spillway has the capacity to pass the PMF & flood elevations calculated by above are not significantly different from previously calculated normal depth solution.

Spillway crest elev = 213.5 MSL, Top of dam elev = 216.5

For PMF have approx. 3' of water flowing over spillway

elev = 216.5

The dam will not overtop

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SHEET NO. [illegible]
JOB Dam [illegible]
SUBJECT [illegible]
CLIENT COE-NED

Stage Discharge (C from King [illegible] 10-12)

L	A	P	R	n	S	V	$V^2/2g$	H	$H^{3/2}$	C	Q
184	184	186	.989	.04	2.53×10^{-4}	5.86	0.53	1.53	1.89	3.28	1141
"	368	188	1.96	"	"	9.25	1.33	3.33	6.05	3.32	3714
"	552	190	2.91	"	"	12.04	2.25	5.25	12.0	3.46	7640
"	736	192	3.83	"	"	14.46	3.25	7.25	19.52	3.59	12895
"	920	194	4.74	"	"	16.67	4.32	9.32	28.45	3.65	19107

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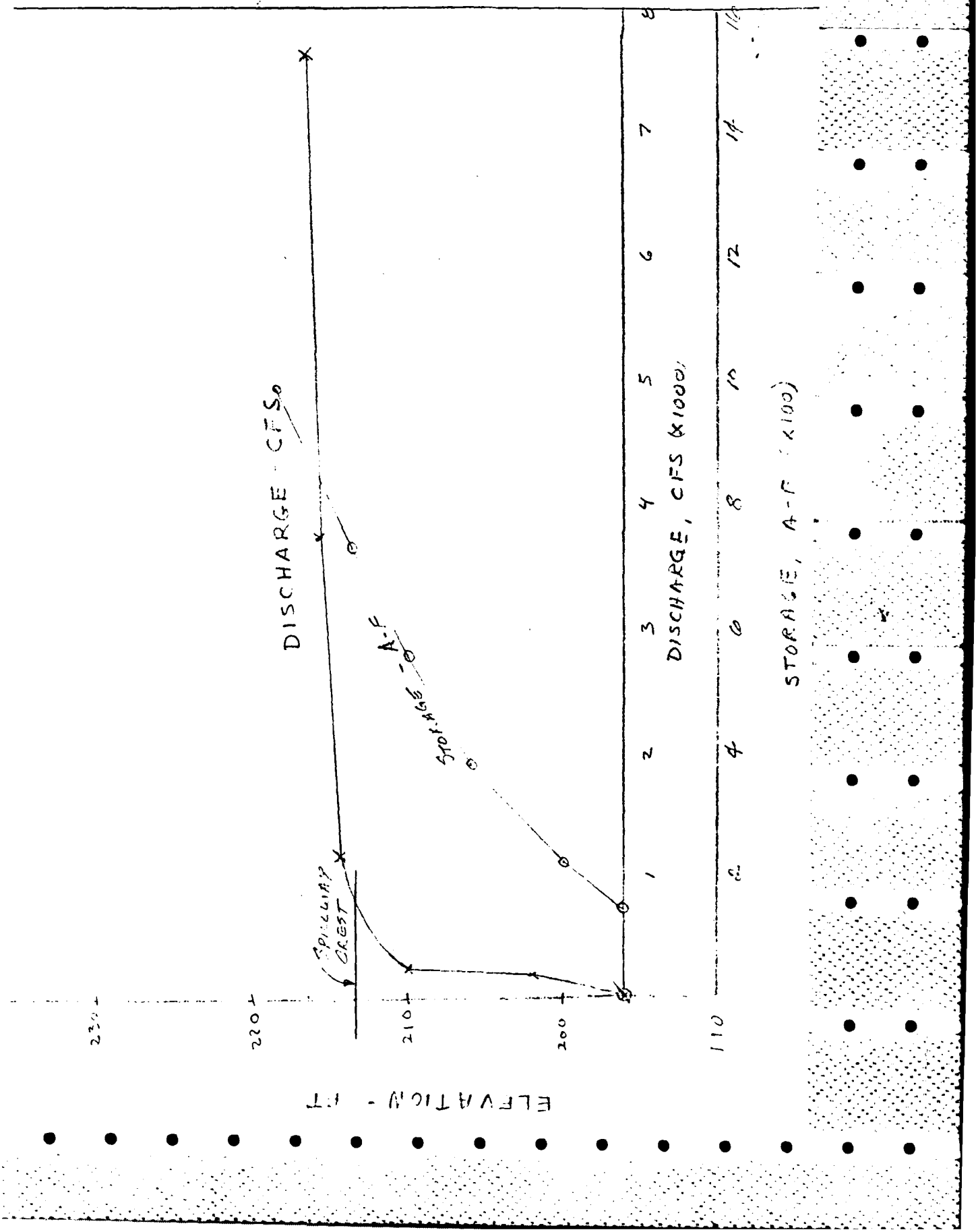
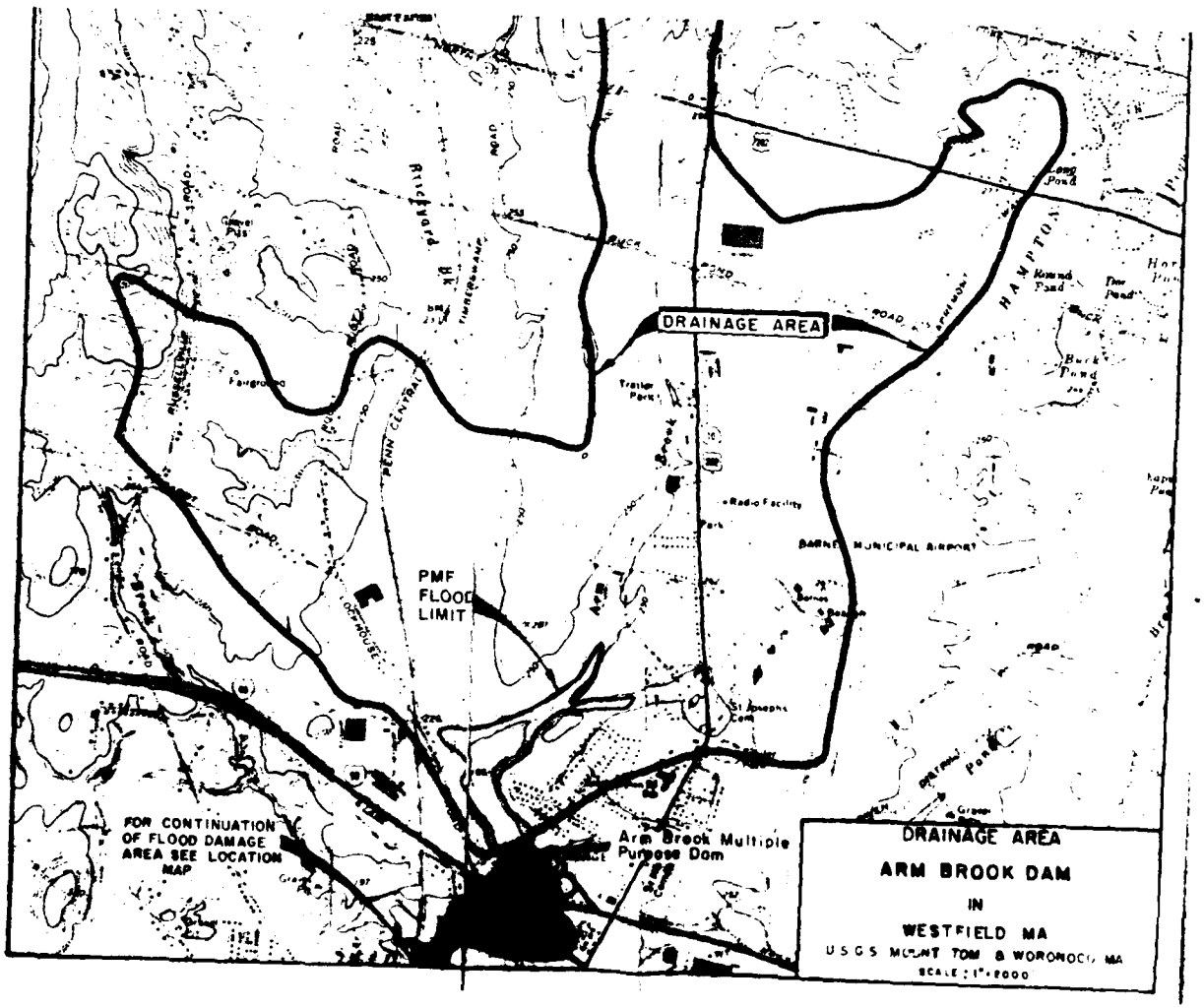
BOSTON, MASSACHUSETTS

SHEET NO. E-5
JOB D...
SUBJECT Area R...
CLIENT C...

STAGE DISCHARGE / STORAGE




DRAINAGE AREA
PMF
FLOOD
LIMIT
FOR CONTINUATION
OF FLOOD DAMAGE
AREA SEE LOCATION
MAP
Arm Brook Multiple
Purpose Dam
DRAINAGE AREA
ARM BROOK DAM
IN
WESTFIELD MA
USGS MOUNT TOM & WORONOCO MA
SCALE 1"=2000
PENN CENTRAL
HAMPTON
BARNES MUNICIPAL AIRPORT

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

END

FILMED

8-85

DTIC