HUDSON RIVER BASIN
CHESHIRE, MASSACHUSETTS

CHESHIRE RESERVOIR DAM
MA 00211

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NEW ENGLAND DIVISION, CORPS OF ENGINEERS
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Chershire Reservoir Dam is a stone masonry and concrete gravity dam about 50.5 feet long, and about 14 feet high with a dropped center spillway 40.5 feet long and a freeboard of 2.7 feet. Based on the Corps of Engineers guidelines, the dam seens to be in fair condition. Since the dam is classified as intermediate in size with a low hazard potential, the test flood, is 1/2 the Probalble Maximum Flood.

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CHESHIRE RESERVOIR DAM
MA 00211

HUDSON RIVER BASIN
CHESHIRE, MASSACHUSETTS

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.	MA 00211
Name of Dam:	CHESHIRE RESERVOIR DAM
Town:	CHESHIRE
State:	COMMONWEALTH OF MASSACHUSETTS
Stream:	HOOSIC RIVER
Date of Inspection:	26 OCTOBER 1978

BRIEF ASSESSMENT

Cheshire Reservoir Dam is a stone masonry and concrete gravity dam about 50.5 feet long, about 14 feet high with a dropped center spillway 40.5 feet long and a freeboard of 2.7 feet. The spillway is flanked upstream on the left by a low concrete and stone masonry wall which retains a railroad embankment and on the right by a concrete lined slope. The downstream training walls are stone masonry and concrete. Four 2-feet square sluiceways are equipped with manually controlled, damper type gates. Discharges over the spillway and through the sluiceways are into a channel which passes under Massachusetts Route No. 8 and then into the Hoosic River.

Phase I inspection and evaluation of Cheshire Reservoir Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the masonry and concrete dam and outlet works, the project appears to be in fair condition. The project, however, does have inadequacies and deficiencies which, if not remedied, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods for an area of 15.2 square miles, it was necessary to synthesize a test flood hydrograph for the contributing area. Since the dam is classified as intermediate in size, with a low hazard potential, the test flood, in accordance with Corps of Engineers guidelines, is one half the Probable Maximum Flood (1/2 PMF). The 1/2 PMF inflow-peak was 28,592 cfs. The adequacy of the spillway was tested by routing the flood through the reservoir using a computer routing technique. The peak outflow from the 1/2 PMF was 11,242 cfs corresponding to El 976.5 or about 2.75 feet above the top of the dam.

Since the dam is expected to be overtopped with an inflow equal to 1/2 PMF, it is considered that the spillway is not adequate from a hydraulic and hydrologic standpoint. However, since the potential hazard as a result of a breach of the dam is low, and it is considered that little increase in hazard would result from an overtopping and failure, further investigations and/or recommendations are not considered necessary at this time.

Remedial measures are recommended for implementation by the owner, within 12 to 24 months of receipt of this Phase I Inspection Report, to improve overall conditions. These measures, in general, are as follows:

- Repairs to dam and appurtenant structures
- Programs for operation, maintenance and inspection

Eugene O'Brien, P.E.
New York No. 29823

PREFACE

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

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

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

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

HOOSIC RIVER BASIN
CHESHIRE RESERVOIR DAM
INVENTORY NO. MA 00211
PHASE I INSPECTION REPORT

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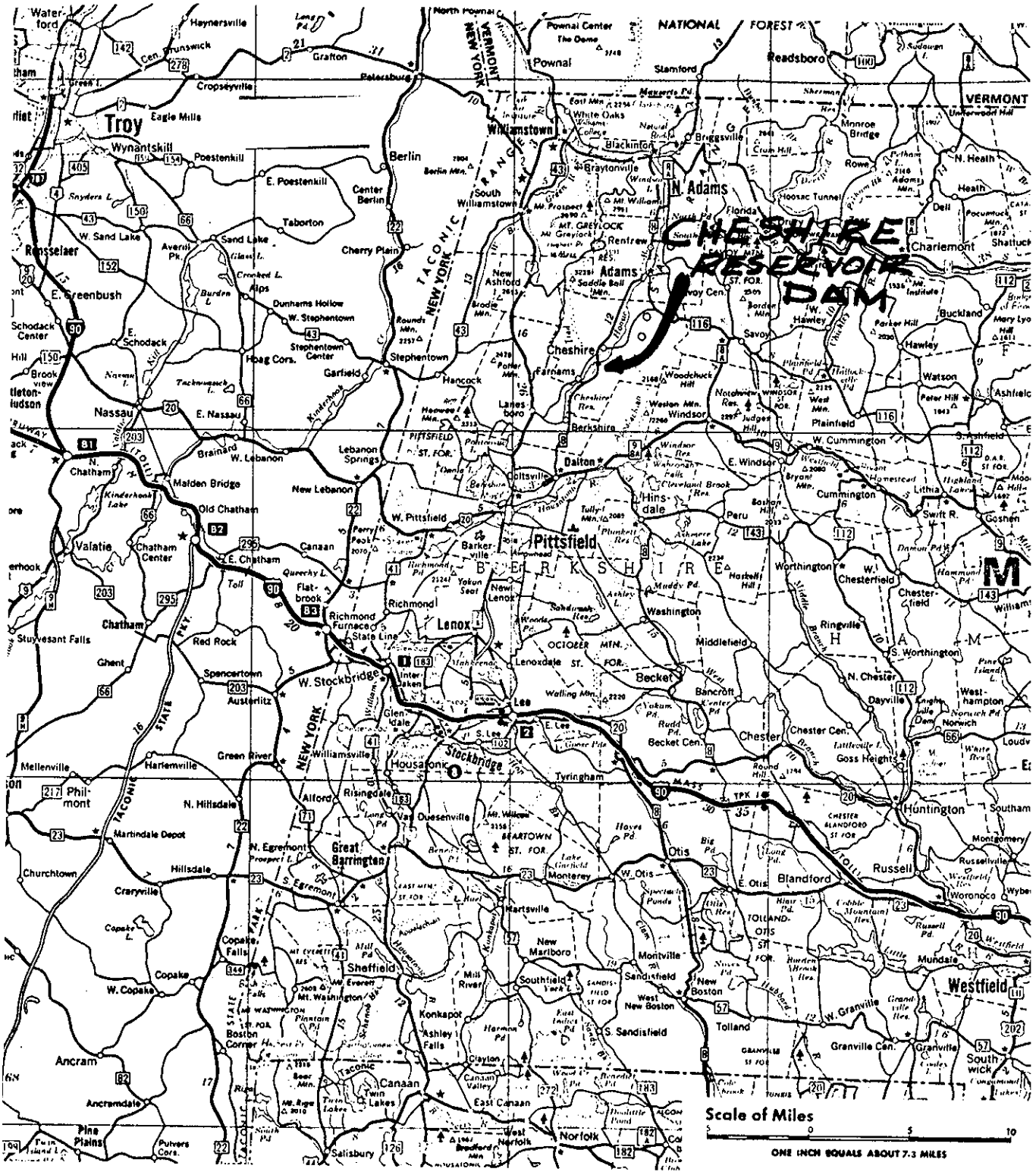
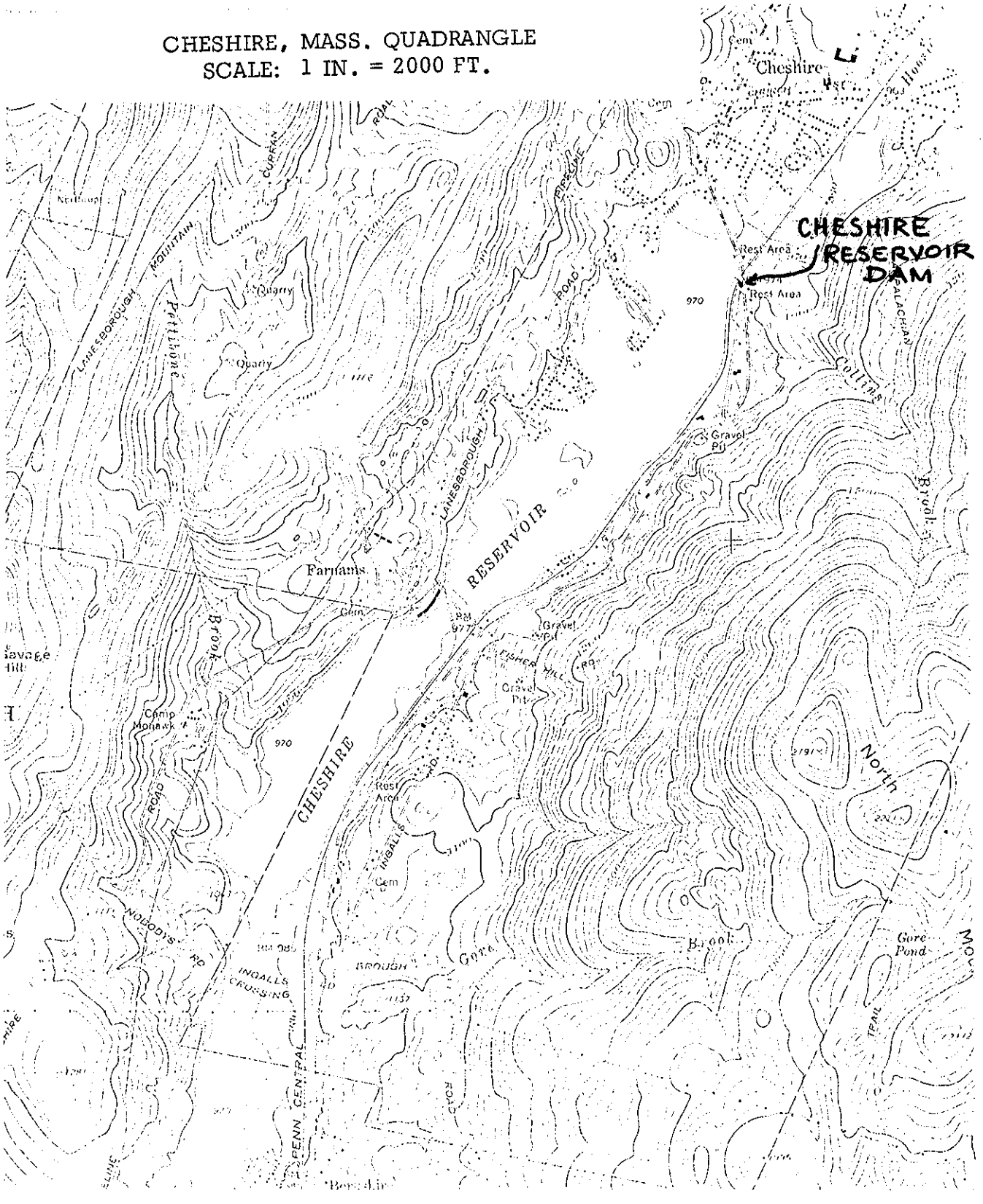


VICINITY MAP
CHESHIRE RESERVOIR DAM

CHESHIRE, MASS. QUADRANGLE
SCALE: 1 IN. = 2000 FT.



TOPOGRAPHIC MAP
CHESHIRE RESERVOIR DAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
HUDSON RIVER BASIN
INVENTORY NO. MA 00211
CHESHIRE RESERVOIR DAM
TOWN OF CHESHIRE
BERKSHIRE COUNTY, COMMONWEALTH OF MASSACHUSETTS

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. Tippetts-Abbett-McCarthy-Stratton 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 Tippetts-Abbett-McCarthy-Stratton under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW 33-78-C-0298 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 prepare 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 THE PROJECT

a. Description of Dam and Appurtenances

Cheshire Reservoir Dam is located on a pond adjacent to the Cheshire Reservoir. The pond and reservoir are separated by a railroad embankment with a connection provided by a 21 feet long railroad bridge.

The dam is a stone masonry gravity structure about 50.5 feet long and at least 14 feet high; it has a 40.5 feet long ungated dropped center spillway with a 2 feet wide, flat stone sill 2.7 feet below top of dam. The downstream face has two steps. It is reported the regulating outlet system is composed of four 2-foot square sluiceways with intake inverts reported at El 960.5, 961.0, 961.5 and 962.0. Discharges through the sluiceways are manually controlled by damper type gates. The gate controls are located on the crest of the spillway with access provided by a 4-foot wide foot bridge which spans the spillway.

The dam is flanked upstream on the left by a railroad embankment and on the right by a concrete-paved natural slope. The railroad embankment in the vicinity of the dam is retained by a low, stone masonry wall. The downstream training walls are stone masonry and concrete. Extension of the wall form the concrete abutments of a bridge which carries Massachusetts Route 8 over the spillway channel. Downstream of the bridge the flow continues in the natural stream bed of the Hoosic River.

b. Location

The dam is located on the Hoosic River, about 0.4 miles south of the intersection between Massachusetts Route No. 8 and Lanesborough Road in the southern section of the Town of Cheshire.

c. Ownership

Cheshire Reservoir Dam is owned by Hoosac Reservoir Company. The day-to-day operation and maintenance is managed by Hoosac Reservoir Company with assistance from Arnold Print Works Inc.

d. Purpose of Dam

The impoundment provided by the dam is for recreational purposes.

e. Design and Construction History

Original design and construction records are not available. It is reported that the dam was built in approximately 1870. It is reported that repairs to the dam were done in 1968 and 1977. In 1968 the stone masonry joints were repointed, the sluice gates were repaired and a new foot bridge was installed.

In 1977 the upstream and downstream faces of the dam were sealed and mortared. The records of these repairs are on file at Arnold Print Works Inc.

f. Normal Operating Procedures

There are no operating procedures. It is reported that the pond level is maintained at spillway crest except in winter, when it is kept at about one to two feet below the spillway crest. The sluice gates are operated as needed.

g. Size Classification

The dam is less than 40 feet high and has a maximum storage capacity of more than 1,000 acre-feet, but less than 50,000 acre-feet. It is, therefore, classified as an "intermediate" dam.

h. Hazard Classification

The dam is in the "low" hazard potential category because analysis indicates that a shallow depth flood wave would result from a dam failure. The wave would cause damage to the Church Street bridge. For details on selection of hazard potential category, see Section 5.1d.

i. Operator

The individual responsible for the day-to-day operation of the dam is:

Mr. Richard Miller, Plant Engineer
Arnold Prints Works, Inc.
Columbia Street
Adams, Mass. 01220
Telephone Number: (Home) 413-458-5837
(Office) 413-743-2600

1.3 PERTINENT DATA

a. Drainage Area

The drainage area contributing to the Cheshire Reservoir Dam is rectangular in shape, about 5 miles by 3.5 miles, with an area of 9728 acres (15.2 square miles). The reservoir is about 3.5 miles long by 0.25 miles wide, almost dividing the drainage area in two. The reservoir area is 6.2% of the total basin area. The reservoir is fed by numerous short brooks, entering at several different locations. The sub-basins of the brook are similar in physical features, with steep wooded slopes and little natural storage. These are expected to peak simultaneously during a basin-wide rain storm.

b. Discharge at Damsite

Discharge from the Cheshire Reservoir is over a stone masonry, concrete spillway and through four sluiceways. The total computed sluiceways discharge capacities are 178 cfs and 208 cfs with the water level at El 971.5 (spillway crest) and El 974.2 (top of dam) respectively.

The stone masonry spillway is 40.5 feet wide and has a crest width of 2.0 feet. The computed maximum discharge with a head equivalent to the top of dam, El 974.2, is 583 cfs. The total discharge at El 974.2 is 791 cfs.

c. Elevation (ft. above MSL)

Top of dam	974.2
Maximum pool-design surcharge	Unknown
Maximum pool-test flood surcharge	976.95
Full flood control pool	Not Applicable
Recreation pool	971.5
Spillway crest (gated)	Not Applicable
Upstream portal invert diversion tunnel	Not Applicable
Downstream portal invert diversion tunnel	Not Applicable
Streambed at centerline of dam	960 (est)
Maximum tailwater	Unknown

d. Reservoir (feet)

Length of maximum pool	19,000
Length of recreation pool	18,480
Length of flood control pool	Not Applicable

e. Storage (acre-feet)

Recreation pool (gross)	2142
Flood control pool	Not Applicable
Design surcharge	Unknown
Test flood surcharge (net)	4054
Top of dam (gross)	4000

f. Reservoir Surface (acres)

Top of dam	754.5
Test flood pool	890
Flood control pool	Not Applicable
Recreation pool	621.0
Spillway crest	621.0

g. Dam (See Spillway)

h. Diversion and Regulating Tunnel

Type	Not Applicable
Length	Not Applicable
Closure	Not Applicable
Access	Not Applicable
Regulating facilities	Not Applicable

i. Spillway

Type	Broad-crested
Length of weir, feet	40.5
Crest elevation, feet	971.5
Gates	None
U/S channel	None
D/S channel	See description in Sections 1.2 and 3.1

j. Regulating Outlets

The regulating outlets consist of an uncontrolled spillway and four sluiceways.

The stone masonry spillway is 40.5 feet in length, with a 2 feet wide flat stonesill,2.7 feet below the top of dam.

The four sluiceways, each 2 feet square are reported to have inverts at El 960.5, 961.0, 961.5 and 962. Sluiceway discharges are through damper type gates which are manually controlled from the spillway crest. It is reported that the gates are operable.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

There are no design data, drawings or specific memoranda available covering the construction of the original dam. A sketch of the dam section and plan, given in the Appendix was drawn from rough field measurements made at the time of the visual inspection. The elevations shown are approximate. Sketches showing a section of the dam are attached to field data obtained from U.S. Department of Agriculture, Soil Conservation, and included in the Appendix.

There is no information available on subsurface conditions.

2.2 CONSTRUCTION RECORDS

There are no construction records available.

2.3 OPERATING RECORDS

No records are kept by the owner of rainfall, pool elevation or gate operations.

2.4 EVALUATION OF DATA

a. Availability

Existing information was made available by Arnold Print Works, Inc. Adams, Mass.; Department of Public Works District No. 1, Commonwealth of Massachusetts, Pittsfield, Massachusetts; Department of Environmental Quality Engineering, Division of Waterways, Boston, Mass. and U. S. Department of Agriculture, Soil Conservation Service, Amherst, Mass.

b. Adequacy

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

c. Validity

In general, the information obtained from above mentioned sketches and personal interviews is consistent with observations made during the inspection and therefore considered reliable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The visual inspection of Cheshire Reservoir Dam was made on 26 October 1978. The weather was rainy with temperature about 60°F. The reservoir level at the time of inspection was at El 971.0, six inches below the spillway crest.

b. Dam

The sill and downstream face of the spillway are in fair condition. There is no evidence of distress or movement. Several leaks were observed on the downstream face. The water was spurting out from most of the leaks. (See Photograph No.2). A remnant of a 2.5 feet wide Massachusetts Route 8 old stone bridge pier is located in the center of and extending 10 feet downstream from, the face of the spillway. The headwalls of the spillway are in generally good condition. The presence of tailwater in the plunge pool made it impossible to observe the condition of the base of the dam or the existence of any underseepage.

c. Appurtenant Structures

The visible portion of the upstream left training wall and concrete lined approach slope is in generally good condition except at a few places on the wall the mortar is missing and the concrete is spalled. Both downstream training walls are in fair condition with spalled concrete and missing mortar at several places. The downstream left training wall is leaking at several locations.

The visible portion of the sluice gate operating stems are in good condition. It was reported that the gates are in operating condition, the operating handles are removed to prevent vandalism. The access foot bridge is in generally good condition.

d. Abutments

Except for the leakage noted on the downstream left training wall, no other seepage or unusual conditions were apparent at the abutments.

e. Downstream Channel

The downstream channel of the dam is in generally good condition, except where leakage is noted on the downstream left training wall. There is minor debris and few overhanging trees about 2000 feet downstream from the bridge crossing.

f. Reservoir Area

In the vicinity of the dam, there is no evidence of potentially unstable slopes or other unusual conditions which would adversely affect the dam.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection revealed several deficiencies which at present do not adversely affect the adequacy of the dam. However, these deficiencies do require attention and should be corrected before further deterioration leads to a hazardous condition. Recommended measures to improve these conditions are given in Section 7.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no formal operation procedures for the project.

4.2 MAINTENANCE OF DAM

There is no formal maintenance manual for the project. Maintenance is carried out as needed. The dam is visited two or three times a week by personnel from Arnold Prints Works, who "look at" the dam, operate the sluice gates as required, and clear out any accumulated trash. There is also a statewide program of inspection established several years ago by the Department of Environmental Quality Engineering, Division of Waterways. Copies of the Department's inspection reports, dated March 28, 1978, October 28, 1977 and December 11, 1972 are given in the Appendix. Prior to this, the County of Berkshire conducted the inspections, a copy of the County's report, dated September 17, 1968, is also included in the Appendix.

4.3 MAINTENANCE OF OPERATING FACILITIES

There is no established maintenance program for the operating facilities.

4.4 WARNING SYSTEM IN EFFECT

There is no warning system in effect.

4.5 EVALUATION

The maintenance and operating procedures for the dam and appurtenant structure are considered inadequate. Measures to improve these inadequacies are given in Section 7.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data

No design data or records of flood flows are available for the Cheshire Reservoir area. It was therefore necessary to synthesize a test flood for the contributing area of 9728 acres (15.2 square miles). The reservoir area at El 971.5 is 601 acres (0.94 square miles) or 6.2% of the basin. The reservoir is about 3.7 miles long with an average width of 0.25 miles and is divided into three storage areas by two roadway embankments. There are interconnecting culverts (5.0 feet diameter) beneath the roadways and the reservoir level is the same in these storage areas. The reservoir level is shown as El 970.0 on the USGS Quadrangle sheet for Cheshire, Mass., but the normal level equivalent to the spillway crest elevation is given as 971.5 (MSL).[1*] The drainage basin is approximately 5 miles long by 3.5 miles wide and borders the reservoir on three sides. The weighted stream length and elevation difference of the basin is 2.1 miles and 1043 feet, respectively. This gives an average basin slope of 9.4% and is indicative of floods with large peaks and short times of concentration. The lake is 3/4 the length of the basin with simultaneous inflow from at least 8 brooks. This feature increases the probability of very high flood peak discharges of relatively short duration.

The basin is approximately 80% wooded with well established hardwood forests. The storage available in Berkshire Pond which is upstream of the Cheshire Reservoir controls flow from approximately 15% of the basin. The swamp in the Muddy Brook sub-basin also provides some storage. It is probable that the combined storages of about 30% of the basin would modify storm runoffs.

b. Experience Data

It is reported by persons interviewed that during the 1938 flood the water level in the reservoir reached the edge of the Massachusetts Route 8 roadway. During the March 1977 flood, the water was flowing slightly above the railroad track.

c. Visual Inspection

At the time of inspection, the pond level was at El 971.0, six inches below the spillway crest. The spillway is in fair condition. The upstream approaches and the downstream training walls are in good and fair condition respectively. The presence of water made it impossible to observe the

* See end of Section for References.

condition of the channel floor. The natural channel is in good condition. It is reported that the operating mechanisms of the sluice gates are in good condition with the handles removed to prevent vandalism. At the time of inspection, it is reported that two sluice gates were open.

For further details see Section 3.1c.

d. Overtopping Potential

The potential for overtopping the dam was investigated on the basis of the adequacy of the spillway and the available surcharge storage to meet a potential emergency inflow. The dam, with a maximum storage capacity of 4000 acre-feet is classified as intermediate in size. In order to estimate the downstream hazard potential in the event of a dam failure, the U.S. Corps of Engineers' "Rule of Thumb" guidance was used. The estimate assumes: (a) the reservoir surface is at the top of the dam at the time of the breach, (b) a breach of 40% of the dam length (20.2 feet) occurs and (c) the channel has an average roughness coefficient (n) of 0.07. The estimated flood wave heights are as follows:

Distance Below Dam Feet	Peak Elevation Feet	Depth Feet	Discharge cfs
1400	963.2	3.2	1769
2500	960.2	3.2	1757
4000	962.0	8.0	1746

The relatively small flood wave is expected to cause very little damage. The visual inspection, corroborated by the information on USGS Quadrangle Map for Cheshire, Mass., indicates no development in the "flooded area" except the Church Street bridge, located about 4000 feet downstream of the dam could be damaged. The dam, therefore, is classified as a low hazard dam. Based on the size and hazard classification[2], one-half the Probable Maximum Flood was selected as the Test Flood.

For the analysis of the overtopping potential, it is assumed that (a) the entire reservoir acts as one unit, because the sub-basins are similar in size and physical features, and it is expected that the flood inflows would be simultaneous causing the level to rise as if there were no dividing dikes, (b) reservoir is at the spillway crest elevation at the start of the test flood, and (c) the four sluiceways are closed during the test flood. Two triangular unit hydrographs were developed.[3] One to represent unit runoff from the Berkshire Pond sub-basin and the second, using weighted length of water-course and elevation difference, for the Cheshire Reservoir basin.

The Probable Maximum 6-Hour rainfall over ten square miles was obtained from Weather Bureau sources[4] and reduced according to the Corps of Engineers recommendations.[5] It was assumed that there would be a loss of 0.2 inches per hour, resulting in an excess rainfall of 16.56 inches in 6 hours and distributed in accordance with the data published by the World Meteorological Organization.[6]

The design storm was first applied to the 1.56 square mile drainage area of the Berkshire Pond and the resulting hydrograph routed through the pond using a computerized technique. The outflow from the Berkshire Pond was then added to the computed inflow hydrograph of the Cheshire Reservoir basin to form the one half Probable Maximum Flood, and resulted in a peak inflow of 28,592 cfs.

The computed discharge capacity of the Cheshire Reservoir Dam spillway with the water level at El 974.2 (the top of the training walls) is 583 cfs. In addition, the total computed discharge capacity of four sluiceways with water level at El 971.5 and El 974.2 is 178 cfs and 208 cfs, respectively. It is assumed that the remnant of the old bridge pier located at the downstream face of the spillway is not expected to affect the discharge capacity of the spillway. The available surcharge storage between the spillway crest El 971.5 and the top of the Dam El 974.2 is estimated to be 1858 acre-feet.

5.2 EVALUATION OF THE ANALYSIS

The Test Flood (1/2 PMF), routed through the reservoir using a computer technique, results in a rise of the reservoir level to a maximum El 976.95, with a corresponding outflow discharge of 11,242 cfs. The dam is overtopped by 2.75 feet and the spillway capacity is only 5.2% of the Test Flood outflow. The spillway is considered inadequate from a hydrologic and hydraulic viewpoint.

References

[1] Report of Field Surveys Conducted by Soil Conservation Service, U.S. Department of Agriculture in Cooperation with Massachusetts Water Resources Commission. (See Appendix).

[2] Recommended Guidelines for Safety Inspection of Dams, Appendix D, U.S. Corps of Engineers.

[3] "Design of Small Dams," U.S. Department of Interior, Bureau of Reclamation, 1974.

References (cont'd)

[4]Hydrometeorological Report No. 33, 1956.

[5]EC 1110-2-27, U.S. Corps of Engineers, August 1, 1966.

[6]"Manual For Estimation of Probable Maximum Precipitation," World Meteorological Organization, Operational Hydrology Report No. 1, 1973.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate any serious structural problems with the dam. The deficiencies described in Section 3 require attention; the measures to improve the deficiencies are given in Section 7.

b. Design and Construction Data

No design computations or other data pertaining to the structural stability of the dam have been located. On the basis of past performance, visual inspection, as well as engineering judgment, the dam at present appears to be structurally adequate.

c. Operating Records

There are no operating records or reports available. It is reported that there have been no operational problems which would affect the stability of the dam.

d. Post-Construction Changes

It is reported that the dam was built in approximately 1870. There are no records of any modification to dam. In 1968 and 1977 repairs were made to the dam and are described in Section 1.2b.

e. Seismic Stability

The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines does not warrant seismic analyses.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Conditions

Phase I investigation of Cheshire Reservoir Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the dam and outlet works, the project appears to be in fair condition. The project, however, does have inadequacies and deficiencies which, if not remedied, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods for an area of 15.2 square miles, it was necessary to synthesize a test flood for the contributing area equal to one-half the Probable Maximum Flood (1/2 PMF). The 1/2 PMF inflow-peak was 28,592 cfs.

The adequacy of the spillway was tested by routing the Test Flood through the reservoir using computer routing technique. The water surface was assumed to be at the spillway crest at the start of the storm. The peak outflow from the routed flood (1/2 PMF) was 11,242 cfs corresponding to El 976.95 or 2.75 feet above the top of the dam. Since the dam is expected to be overtopped with an inflow equal to the 1/2 PMF, it is considered that the spillway is not adequate from a hydraulic and hydrologic standpoint. However, since the potential hazard as a result of a breach is low and it is considered that little increase in hazard would result from an overtopping and failure, further investigations and/or recommendations are not considered necessary at this time.

b. Adequacy of Information

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

c. Urgency

The remedial measures described in subsequent paragraphs should be undertaken by the owner within the next 12 to 24 months, after receipt of this Phase I Inspection Report.

d. Necessity for Additional Investigations

Additional investigations to assess the adequacy of the dam and appurtenant structures do not appear necessary.

7.2 RECOMMENDATIONS

None.

7.3 REMEDIAL MEASURES

a. Alternatives

None.

b. Operating & Maintenance Procedures

It is recommended that the following measures be undertaken by the owner within the next 24 months after receipt of this Phase I Inspection Report.

1. Establish a formal program of operation and maintenance, and initiate biennial inspection of the dam.

2. Provide round-the-clock surveillance during periods of unusually heavy precipitation.

3. Develop a formal system for warning downstream residents in case of emergency.

4. Repair leaks on the spillway and the downstream training walls.

5. Repair missing and spalled concrete and repoint all masonry walls.

6. The plunge pool floor at the base of the dam should be examined when the flow in the channel is at a minimum.

VISUAL INSPECTION CHECKLIST

APPENDIX A

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT CHESHIRE RESERVOIR DAM

DATE 10-26-78

TIME 9.30 AM

WEATHER Rainny - 60°F

W.S. ELEV. 971.0 U.S.

PARTY:

1. Harvey S. Feldman
2. Jyotindra H. Patel
3.
4.
5.
6.
7.
8.
9.
10.

PROJECT FEATURE	INSPECTED BY	REMARKS
1. All project features inspected by party members.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

DAM EMBANKMENT See spillway Weir, Approach and Discharge Channel comments.

Crest Elevation _____

Current Pool Elevation _____

Maximum Impoundment to Date _____

Surface Cracks _____

Pavement Condition _____

Movement or Settlement of Crest _____

Lateral Movement _____

Vertical Alignment _____

Horizontal Alignment _____

Condition at Abutment and at Concrete Structures _____

Indications of Movement of Structural Items on Slopes _____

Trespassing on Slopes _____

Sloughing or Erosion of Slopes or Abutments _____

Rock Slope Protection - Riprap Failures _____

Unusual Movement or Cracking at or near Toes _____

Unusual Embankment or Downstream Seepage _____

Piping or Boils _____

_____

Foundation Drainage Features _____

_____

Toe Drains _____

_____

Instrumentation System _____

_____

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE

Intake Channel is a pond adjacent to Cheshire Reservoir.

a. Approach Channel

Slope Conditions Right concrete lined slope is in good condition; left approach is railroad embankment retaining wall which is also in good condition.

Bottom Conditions Unable to accertain as pond was full.

Rock Slides or Falls None

Log Boom None

Debris Minor debris

Condition of Concrete Lining See comments above

Drains or Weep Holes None

b. Intake Structure Sluiceway openings with damboard type valves. Openings are submerged.

Condition of Concrete _____

Stop Logs and Slots _____

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - CONTROL TOWER

There is no control tower. The operating stems located on crest are not protected.

a. Concrete and Structural

General Condition _____

Condition of Joints _____

Spalling _____

Visible Reinforcing _____

Rusting or Staining of Concrete _____

Any Seepage or Efflorescence _____

Joint Alignment _____

Unusual Seepage or Leaks in Gate Chamber _____

Cracks _____

Rusting or Corrosion of Steel _____

b. Mechanical and Electrical

Air Vents None

Float Wells None

Crane Hoist None

Elevator None

Hydraulic System None

Service Gates Damper type gate valve which are reported in operating condition; and manually operated

Emergency Gates None

Lightning Protection System None

Emergency Power System None

Wiring and Lighting System None

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL

None. Outlet channel is spillway channel, See Comments Spillway weir .... and Discharge channel.

General Condition of Concrete _____

Rust or Staining _____

Spalling _____

Erosion or Cavitation _____

Visible Reinforcing _____

Any Seepage or Efflorescence _____

Condition at Joints _____

Drain Holes _____

Channel _____

Loose Rock or Trees Overhanging Channel _____

Condition of Discharge Channel _____

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS

a. Approach Channel Approach channel is a pond adjacent to Cheshire reservoir.

General Condition Generally in good condition

Loose Rock Overhanging Channel None

Trees Overhanging Channel None

Floor of Approach Channel It was impossible to determine because pond was full.

b. Weir and Training Walls

General Condition of Stone masonry Concrete See Misc. Comments

Rust or Staining None

Spalling Both training wall spalled.

Any Visible Reinforcing None

Any Seepage or Efflorescence Several leaks at downstream of weir and downstream left training wall.

Drain Holes None

c. Discharge Channel

General Condition is in good condition except leakage noted above

Loose Rock Overhanging Channel None

Trees Overhanging Channel [illegible] downstream from [illegible] NO. 8, there are few [illegible] trees.

Floor of Channel Impossible to observe because of water in the plunge pool.

Other Obstructions About 4 feet from weir the channel passes under Rt. No. 8 bridge.

PERIODIC INSPECTION CHECK LIST

PROJECT CHESHIRE RESERVOIR DAM DATE 10-26-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - SERVICE BRIDGE is 4 feet wide, steel grating and spans over the spillway

a. Superstructure

Bearings None

Anchor Bolts Anchor to the headwalls of spillway.

Bridge Seat None

Longitudinal Members Steel Channel and in good condition.

Under Side of Deck is bottom of steel grating and in good condition

Secondary Bracing Steel channel and in good condition

Deck is of steel grating and in good condition

Drainage System None

Railings steel railings both sides and in good condition

Expansion Joints None observed

Paint _____

b. Abutment and Piers

General Condition of ~~Concrete~~ Stone-masonry good

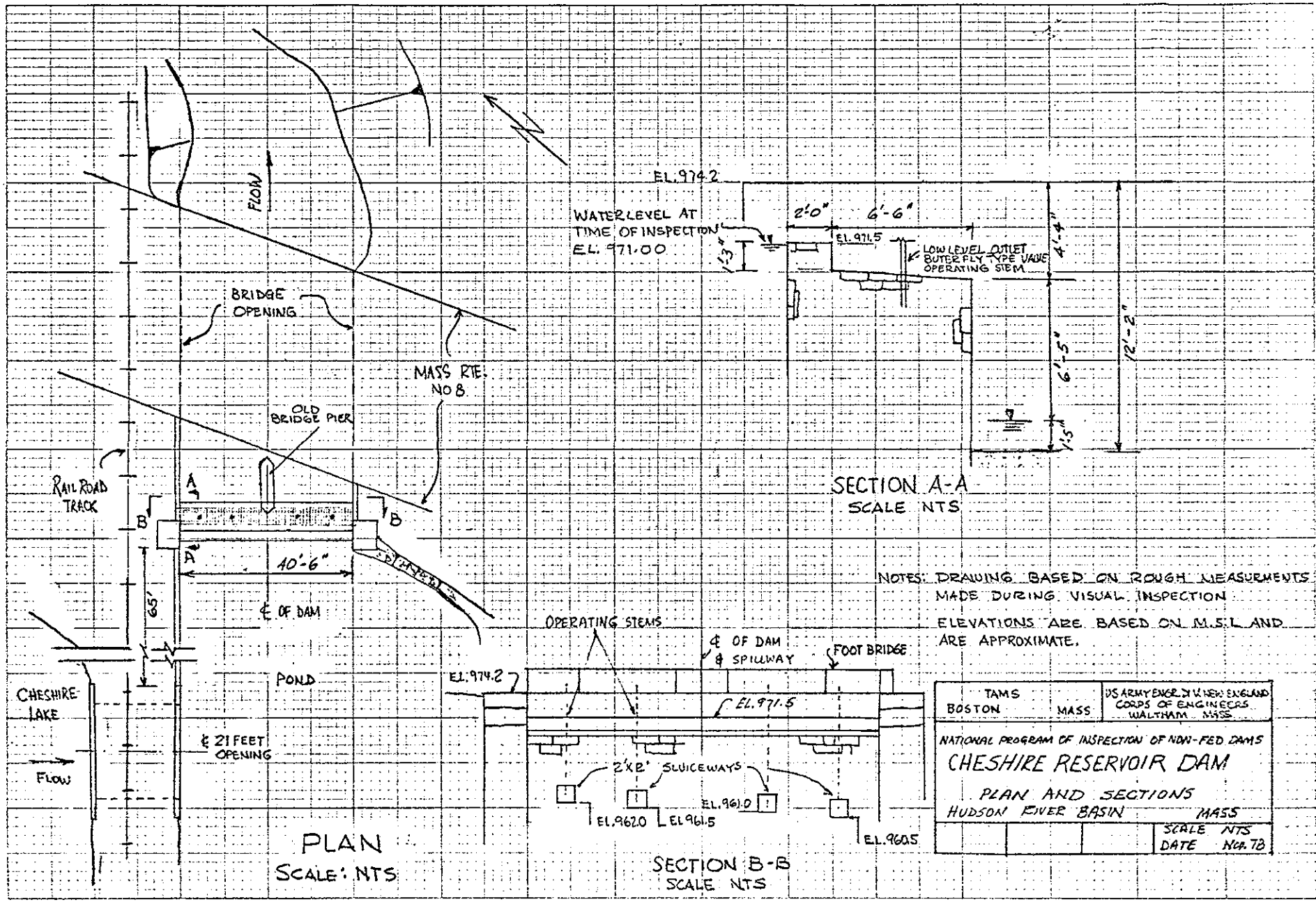
Alignment of Abutment Good.

Approach to Bridge on right is from Rt. 8 and on left is from earthen embankment.

Condition of Seat and Backwall ——

DRAWINGS, INSPECTION REPORTS AND OTHER DATA

APPENDIX B


FLOW
BRIDGE OPENING
MASS RTE. NO 8
OLD BRIDGE PIER
RAIL ROAD TRACK
A
B
40'-6"
65'
℄ OF DAM
POND
CHESHIRE LAKE
FLOW
℄ 21 FEET OPENING
PLAN
SCALE: NTS
EL. 974.2
WATER LEVEL AT TIME OF INSPECTION EL. 971.00
1'-3"
2'-0"
6'-6"
EL. 971.5
LOW LEVEL OUTLET BUTERFLY TYPE VALVE OPERATING STEM
4'-4"
6'-5"
12'-2"
1'-5"
SECTION A-A
SCALE NTS
OPERATING STEMS
℄ OF DAM & SPILLWAY
FOOT BRIDGE
EL. 974.2
EL. 971.5
2'X2' SLUICEWAYS
EL. 962.0
EL. 961.5
EL. 961.0
EL. 960.5
SECTION B-B
SCALE NTS
NOTES: DRAWING BASED ON ROUGH MEASUREMENTS MADE DURING VISUAL INSPECTION
ELEVATIONS ARE BASED ON M.S.L. AND ARE APPROXIMATE.
TAMS
BOSTON MASS
US ARMY ENGR. DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM MASS
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
CHESHIRE RESERVOIR DAM
PLAN AND SECTIONS
HUDSON RIVER BASIN MASS
SCALE NTS
DATE NOV. 78

The Commonwealth of Massachusetts
Executive Office of Transportation and Construction
Department of Public Works
DISTRICT # 1 OFFICE
VETERAN'S MEMORIAL HIGHWAY, LENOX
P.O. BOX 1151, PITTSFIELD 01201

September 22, 1978

SUBJECT WATERWAYS - District One
Onota Lake Dam 1-2-236-6
Cheshire Reservoir Dam 1-2-58-2

Mr. Harvey Feldman
Tibbit, Abbott, McCarthy, Stratton
345 Park Avenue
New York City 10022

Dear Sir

We have enclosed a copy of the latest District One Inspection Report for the subject dams.

Although the report for Cheshire Reservoir shows the structure to be in satisfactory condition, a problem developed in March 1978 and at the request of the Civil Defense Agency this office conducted a visual inspection on March 27, 1978. Several pressure leaks were noted in the face of the dam and the left abutment. We recommended the immediate lowering of the pond and advised the owners to retain the services of an engineering consultant to conduct an indepth investigation. The firm of Robert G. Brown & Associates was awarded a contract to perform this work.

Mr. Brown has not completed his study, but he has a considerable amount of information relative to the structure.

Mr. Brown can be reached at the following address should you desire to contact him: Robert G. Brown & Associates, Berkshire Common, South Street, Pittsfield, MA 01201, telephone: (413) 499-1560.

If we can be of any further assistance, please contact this office.

Very truly yours

Dean P. Amidon

Dean P. Amidon, P. E.
District Highway Engineer

RDJdic
Enclosures
cc SurLen

L-168

INSPECTION REPORT -- DAMS AND RESERVOIRS

1. Location: City/Town CHESHIRE Dam No. 1-2-58-2

Name of Dam Cheshire Reservoir Inspected by RDJordan-RSpaniol

Date of Inspection October 28, 1977

Previous Inspection November 3, 1975

2. Owner/s per: Assessors _____
Reg.of Deeds _____ Personal Contact _____

1. Arnold Print Works , Adams, MA
Name St. & No. City/Town/State Tel. No.

2. _____
Name St. & No. City/Town /State Tel No.

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.

4. No. of Pictures taken 1

5. Degree of Hazard: (If dam should fail completely)*

1. Minor _____ 2 Moderate X

3. Severe _____ 4. Disastrous _____

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

6. Outlet Control: Automatic _____ Manual X

Operative X Yes _____ No _____

Comments: _____

7. Upstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

L-168-A

DAM NO. 1-2-58-2

8. Downstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

9. Emergency Spillway

Condition: 1. Good _____ 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

10. Water level at time of inspection 0.3' above X below _____

top of dam _____

principal spillway X

other _____

11. Summary of Deficiencies Noted:

NONE Growth (Trees & Brush) on Embankment _____

" Animal Burrows and Washouts _____

" Damage to slopes or top of dam _____

" Cracked or damaged masonry _____

" Evidence of seepage _____

" Evidence of piping _____

" Erosion _____

" Leaks _____

" Trash and/or debris impeding flow _____

" Clogged or blocked spillway _____

" Other _____

L-168B

DAM NO. ± 1-2-58-2

12. Remarks & Recommendations; (Fully Explain)
PREVIOUS INSPECTION DATE: November 3, 1975

The dam has had considerable repair work done on it during the summer. The water was drawndown and the entire dam was sealed and mortared. (see phots)

No deficiencies were noted at this inspection.

For location see Topo Sheet 4-C.

13. Overall Condition:

X 1. Safe

____ 2. Minor repairs needed

____ 3. Conditionally safe - major repairs needed

____ 4. Unsafe

____ 5. Reservoir impoundment no longer esists (explain)

Recommend removal from inspection list

2

DEPARTMENT OF
ENVIRONMENTAL QUALITY ENGINEERING
DIVISION OF WATERWAYS

RECEIVED APR 18 1978

Referred To J. I.
Report back to
File

HOOSAC RESERVOIR CO.

c/o Arnold Print Works, Inc.
Adams, MA 01220

April 11, 1978

RE: Dam No. 1-2-58-2
Cheshire Reservoir

Mr. John J. Hannon, P.E.
Chief Engineer
The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Waterways
100 Nashua Street
Boston, Massachusetts 02114

Dear Mr. Hannon:

We have your letter of April 3 addressed to Arnold Print Works, Inc. regarding the above matter. Please be advised that the owner of the reservoir and the dam is the Hoosac Reservoir Co.

Also, relative to your recommendation, we are contacting Robert G. Brown & Associates, Inc., of Pittsfield, regarding a study of the conditions of the dam.

I presume that your department is aware that in early August of 1977, the dam underwent extensive repairs, and at that time at our request, Inspector Bob Jordan, of your division, looked at it.

We appreciate your interest and notice and will keep you advised of progress.

Very truly yours,
HOOSAC RESERVOIR CO.

E. J. Reinke
Controller

EJR:mhg

The Commonwealth of Massachusetts

Executive Office of Transportation and Construction

Department of Public Works

DISTRICT #1 OFFICE
VETERAN'S MEMORIAL HIGHWAY, LENOX
P.O. BOX 1151, PITTSFIELD 01201

DEPARTMENT OF
ENVIRONMENTAL QUALITY ENGINEERING
DIVISION OF WATERWAYS

RECEIVED APR 3 1978

Referred To J.I.
Report back to
File

March 30, 1978

SUBJECT WATERWAYS-District One
Cheshire Reservoir Dam
Dam #1-2-58-2

ATTENTION Mr. J. J. Hannon

Mr. David Standley, Commissioner

Department of Environmental Quality Engineering

Dear Sir

We have enclosed a copy of a supplementary inspection report for the subject project.

Very truly yours

Dean P. Amidon, P. E.
District Highway Engineer

RDJdic
Enclosure
cc SurLen

12. Remarks & Recommendations; (Fully Explain).
PREVIOUS INSPECTION DATE:
Supplementary Report: March 28, 1978

MARCH 28, 1978: On this date I was requested to inspect the dam by Deputy Chief Engineer Hannon.

Several people were present during the inspection including: Mr. Grizzi, Representing the Civil Defense Agency Area 4, Trooper Geo. Mott, Mass. State Police, Two Maintenance Men from Arnold Print Works, and the Cheshire Civil Defense Director.

Several leaks were visible through the face of the dam and at both abutments. Most of the leaks appear to be under pressure as the water was spurting out from the structure. Water level was approximately three inches above the spillway.

In my opinion, there was no immediate danger of failure, however, as a precautionary measure, I recommended lowering the impoundment. The gates were partially opened by the men from Arnold Print Works.

March 29, 1978: Checked water level at the dam. It was approximately 2" below the spillway crest. No pressure reduction of the leaks was noted. I therefore recommended that the lowering of the reservoir continue.

The owners repaired the upstream face of this structure in the summer of 1977. At the District inspection conducted in October 1977 no pressure leaks were noted.

Although this dam has a low head there is a large impoundment and a sudden failure could cause damage downstream. Due to the number and type of leaks observed, the District recommends that the owners be advised to retain a consultant to conduct an in depth analysis of the structure.

This office will continue to monitor the dam on a daily basis.

13. Overall Condition:

_____ 1. Safe _____

_____ 2. Minor repairs needed _____

_____ 3. Conditionally safe - major repairs needed _____

_____ 4. Unsafe _____

_____ 5. Reservoir impoundment no longer esists (explain)

Recommend removal from inspection list _____

L-168

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town CHESHIRE Dam No. 1-2-58-2

Name of Dam Cheshire Reservoir Inspected by RDJordan-RSpaniol

Date of Inspection October 28, 1977

Previous Inspection November 3, 1975

2. Owner/s per: Assessors _____
Reg. of Deeds _____ Personal Contact _____

1. Arnold Print Works Adams, MA
Name St. & No. City/Town/State Tel. No.

2. _____
Name St. & No. City/Town/State Tel No.

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.

4. No. of Pictures taken 1

5. Degree of Hazard: (If dam should fail completely)*

1. Minor _____ 2 Moderate X

3. Severe _____ 4. Disastrous _____

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

6. Outlet Control: Automatic _____ Manual X

Operative X Yes _____ No _____

Comments: _____

7. Upstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

L-168-A

DAM NO. 1-2-58-2

8. Downstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

9. Emergency Spillway

Condition: 1. Good _____ 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

10. Water level at time of inspection 0.3' above X below _____

top of dam _____

principal spillway X

other _____

11. Summary of Deficiencies Noted:

NONE Growth (Trees & Brush) on Embankment _____

" Animal Burrows and Washouts _____

" Damage to slopes or top of dam _____

" Cracked or damaged masonry _____

" Evidence of seepage _____

" Evidence of piping _____

" Erosion _____

" Leaks _____

" Trash and/or debris impeding flow _____

" Clogged or blocked spillway _____

" Other _____

12. Remarks & Recommendations; (Fully Explain)
PREVIOUS INSPECTION DATE: November 3, 1975

The dam has had considerable repair work done on it during the summer. The water was drawndown and the entire dam was sealed and mortared. (see phots)

No defieiencies were noted at this inspection.

For location see Topo Sheet 4-C.

13. Overall Condition:

X 1. Safe

____ 2. Minor repairs needed

____ 3. Conditionally safe - major repairs needed

____ 4. Unsafe

____ 5. Reservoir impoundment no longer esists (explain)

Recommend removal from inspection list

DEPARTMENT OF
ENVIRONMENTAL QUALITY ENGINEERING
DIVISION OF WATERWAYS

RECEIVED FEB 13 1976

Referred To Dam Section
Report back to
File

HOOSAC RESERVOIR CO.

c/o Arnold Print Works, Inc.
Adams, MA 01220

February 12, 1976

Mr. David Standley, Commissioner
The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engr.
Division of Waterways
100 Nashua Street
Boston, MA 02114

RE: Inspection - Dam #1-2-58-2
Cheshire
Cheshire Reservoir Dam

Dear Mr. Standley:

Relative to your letter of January 22 to Arnold Print Works concerning the above dam, please be advised that the owner of the reservoir and the dam is the above Hoosac Reservoir Co.

We note that on November 3, 1975, an engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam and that there still exists the following items to be done that were noted in letter dated February 25, 1974. These conditions will receive the required attention after weather conditions are suitable for such work.

1. Cleaning and repointing some of the masonry joints of the side walls and center pier.

2. Investigating and making the necessary repair to correct water flowing beneath the spillway capstones on the southerly side of the center pier.

We appreciate your report and advice and agree that we do not want conditions to become more serious.

Very truly yours,
HOOSAC RESERVOIR CO.

E. John Reinke
Controller

EJR:mhg

COUNTY OF BERKSHIRE, MASS.

INSPECTION OF DAMS

1-2-58-2

City or Town of Cheshire Date September 17, 1968

Name of Dam Cheshire Reservoir Inspector William A. Heaphy

Owner Arnold Print Works Inc. Address Lime St. Adams, Mass. Tel.

Caretaker Carl Northrup Address Melrose St. Adams, Mass Tel.

Location Northeast Corner of Lake 20' East of R.R. Tracks.

Type and Dimensions Stone Masonry 50' Long 15' high

Spillway, type and size Stone- 40' long 2'9" Freeboard

Outlets, type and size Four 3'X3' outlets (Stone Masonry) With Butterfly Valves, 30" high X 25" Wide

Flashboards, type and height None

Date Built 1870 Condition Fair

When last repaired 1968 By whose orders Owner

Nature of Repairs Pointing up Spillway to seal leaks, Repairs made to gates, New Footbridge built.

Purpose of Dam Industrial use

Approximate storage of water 67,000,000 cubic feet

Approximate area of water shed 15 square miles

Possible damage due to failure of dam Damage to bridge, State highway and Railroad

Remarks Water Level about 18" below spillway . Many leaks under stone slabs for full width of Spillway, about 6 being fairly large. Foot bridge deteriorating.

Recommendations That repairs be undertaken at once and completed before fall

L-169

DESCRIPTION OF DAM

DISTRICT ONE.

Submitted by R D Jordan

Dam No. 1-2-58-2

Date 12-11-72.

City/Town Cheshire

Name of Dam Cheshire Reservoir

---

1. Location: Topo Sheet No. 4-C.

   Provide 8-1/2" x 11" in clear copy of topo map with location of Dam clearly indicated.

   _____.

---

2. Year built: 1870. Year/s of subsequent repairs _____

---

3. Purpose of Dam: Water Supply _____. Recreational X.

   Irrigation _____. Other _____.

---

4. Drainage Area: 15 sq. mi. _____ acres.

---

5. Normal Ponding Area: 600 Acres; Ave. Depth _____.

   Impoundment: _____ gals; _____ acre ft.

---

6. No. and type of dwellings located adjacent to pond or reservoir _____

   i.e. summer homes etc. _____

---

7. Dimensions of Dam: Length 40'. Max. Height 14'.

   Slopes: Upstream Face vert.

   Downstream Face vert.

   Width across top 7'.

---

8. Classification of Dam by Material:

   Earth _____. Conc. Masonry _____. Stone Masonry x.

   Timber _____. Rockfill _____. Other _____.

---

9. A. Description of present land usage downstream of dam: _____
   50 %rural; 50 % urban.

   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 partial. No _____.

L-169 A

DAM NO. 1-2-58-2 .

10.

Risk to life and property in event of complete failure.

No. of people 150± .

No. of homes 40± .

No. of Businesses _____ .

No. of Industries _____ . Type _____ .

No. of Utilities _____ . Type _____ .

Railroads Penn Central .

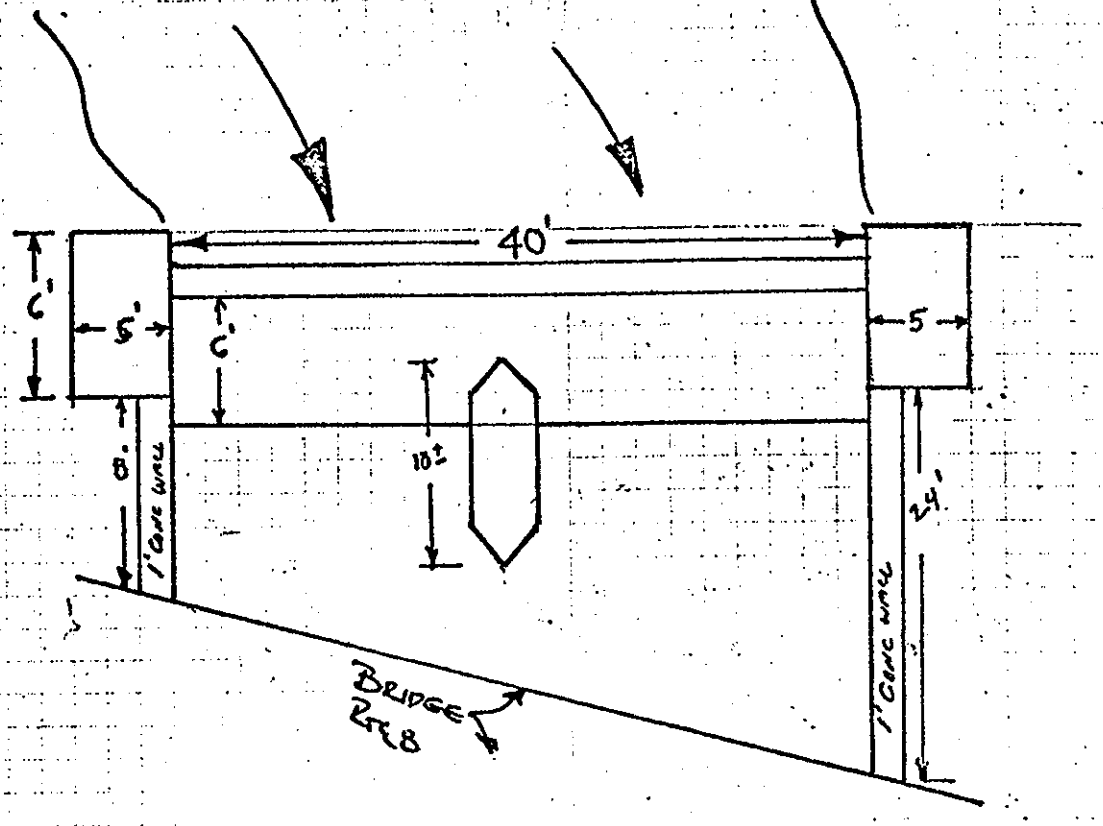
Other dams _____ .

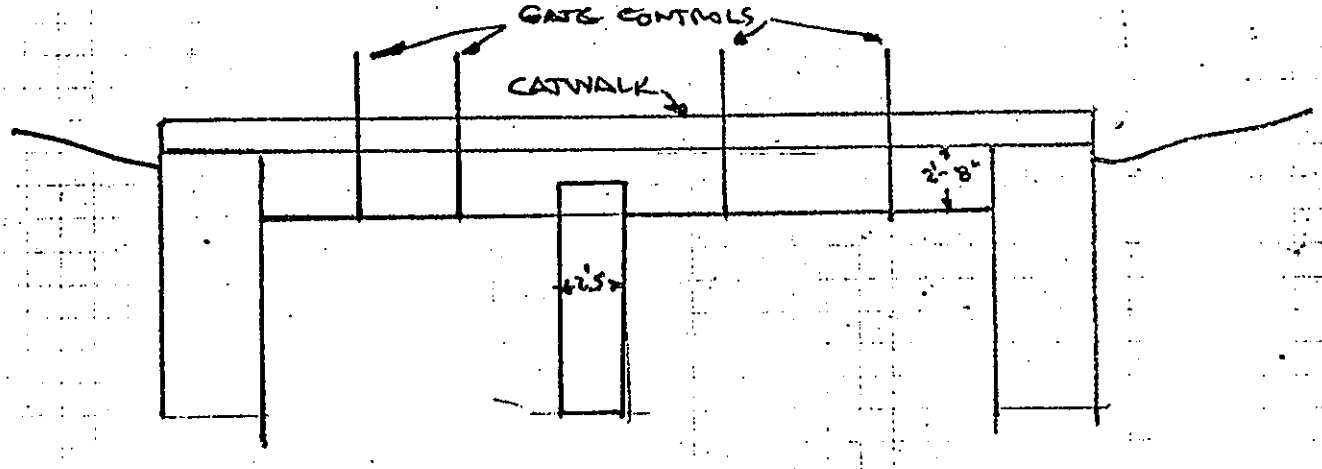
Other _____ .

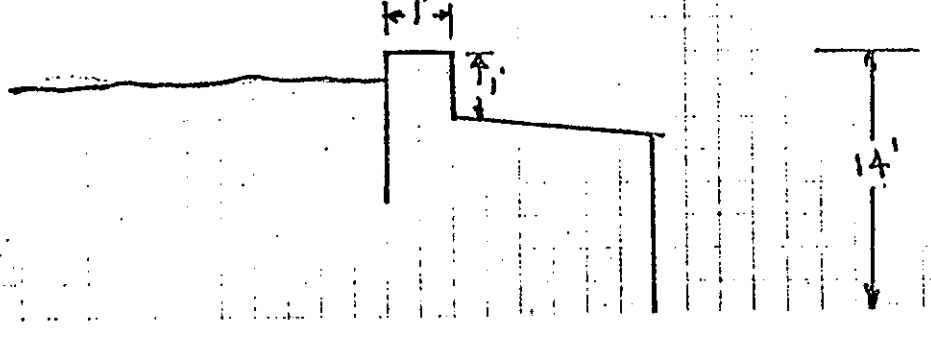
11.

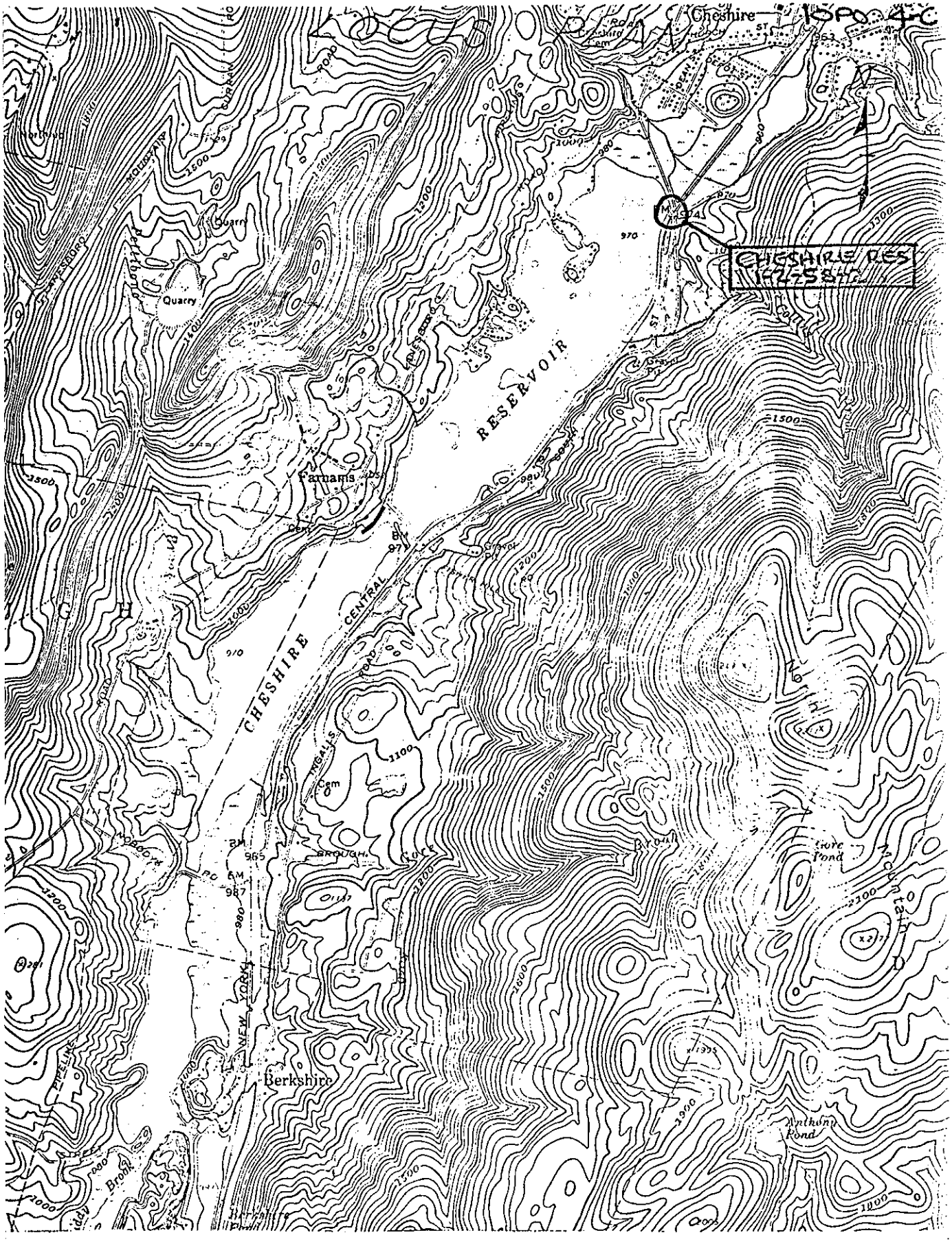
Attach Sketch of dam to this form showing section and plan on 8-1/2" x 11" sheet.

CHESHIRE RES
1-2-58-2








Cheshire
CHESHIRE RES
RESERVOIR
Farnams
CHESHIRE
CENTRAL
Quarry
Berkshire
Gore Pond
Anthony Pond
NEW YORK
PIPELINE
Brook

U. S. DEPT. OF AGRICULTURE
SOIL CONSERVATION SERVICE

John [illegible]
Hudson W/S
Field Trip
3/4/74 - 3/5/74

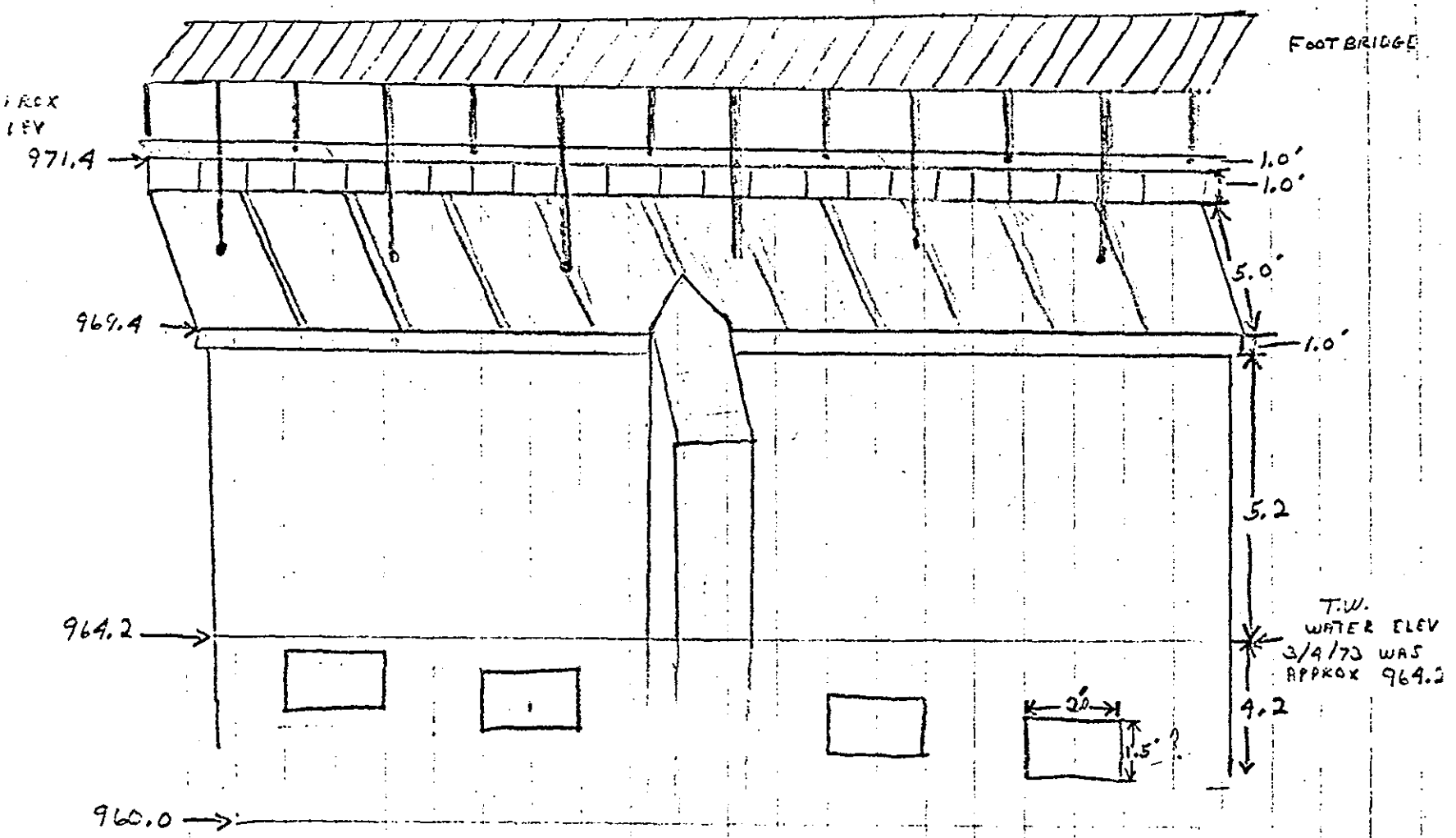
FIELD DATA

① CHESHIRE RESERVOIR OUTLET SPILLWAY

The reservoir and spillway are owned and controlled by the Hoosic River Realty Co., a subsidiary of Arnold Print Works Inc. in Adams. The Plant engineer did not have a drawing of the dam but thought one could be obtained through the State. I spoke to the Cheshire Town [illegible] concerning flooding at the reservoir. He referred me to Mr LeBoe who owns the package store across the street from the spillway. At one time he was the keeper of the dam and supplied me with info concerning it. There are four 2' box culverts on the bottom of the face of the dam. These are staggered at different elevations. - Looking closely they can be seen below the water line. See attached drawing

* GAGE READING AT RESERVOIR - 970.75

FRONT VIEW - LOOKING U/S AT FACE OF SPILLWAY ON CHESHIRE RESERVOIR



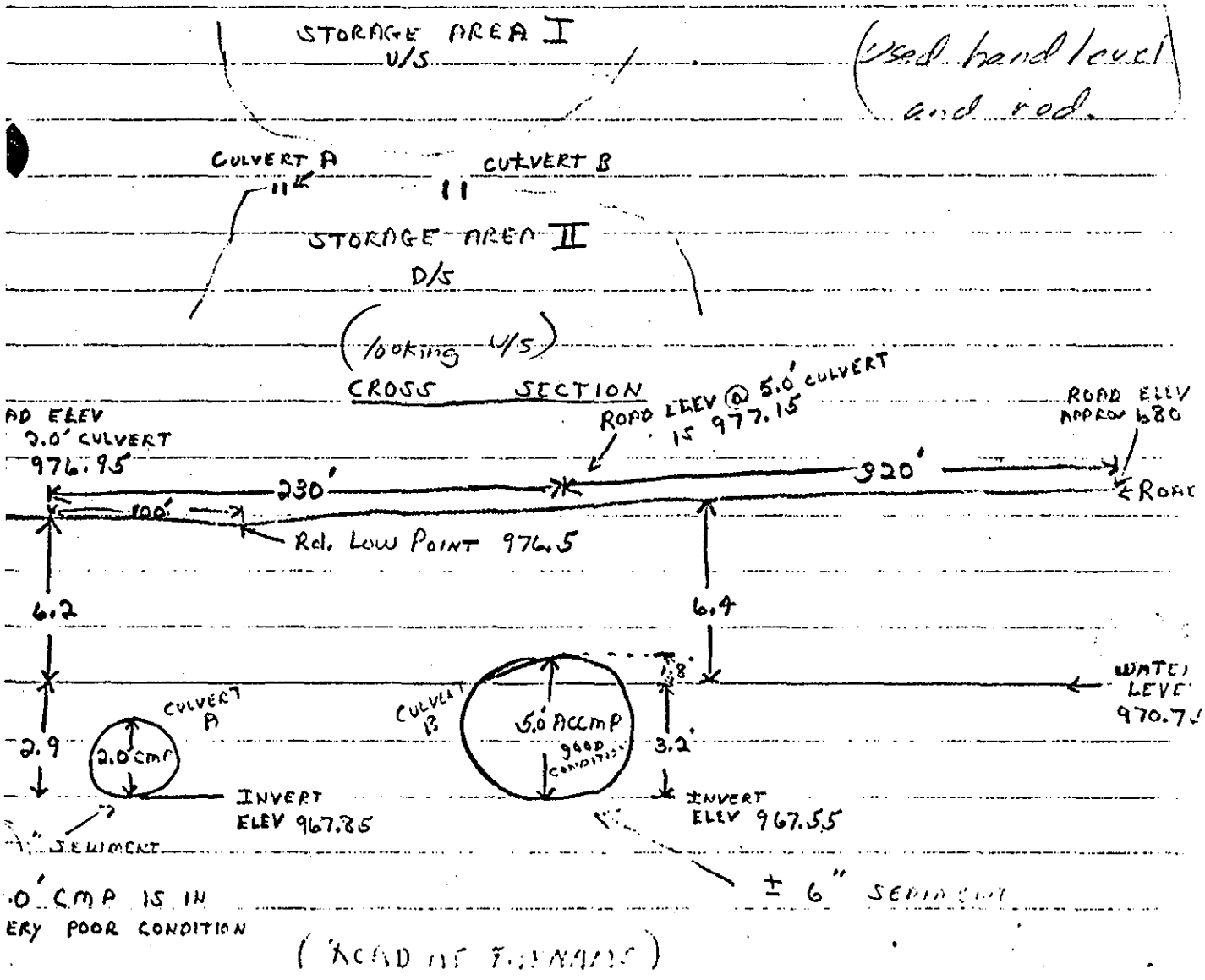
* CULVERTS ARE STAGGERED @ APPROX 6" ELEV. INTERVAL

* COULD NOT SEE OPENING ON BACK SIDE OF DAM BUT LB BOE THINKS THEY ARE ALL AT SAME ELEV, ALL OPEN TO BOTTOM (LARRY SHOULD HAVE INVERT ELEV) AND ARE 2' WIDE AND 1.5' high

② There are no openings, other than the one Larry L. has data for, under R.R. at reservoir.

③ Gage reading - 970.75

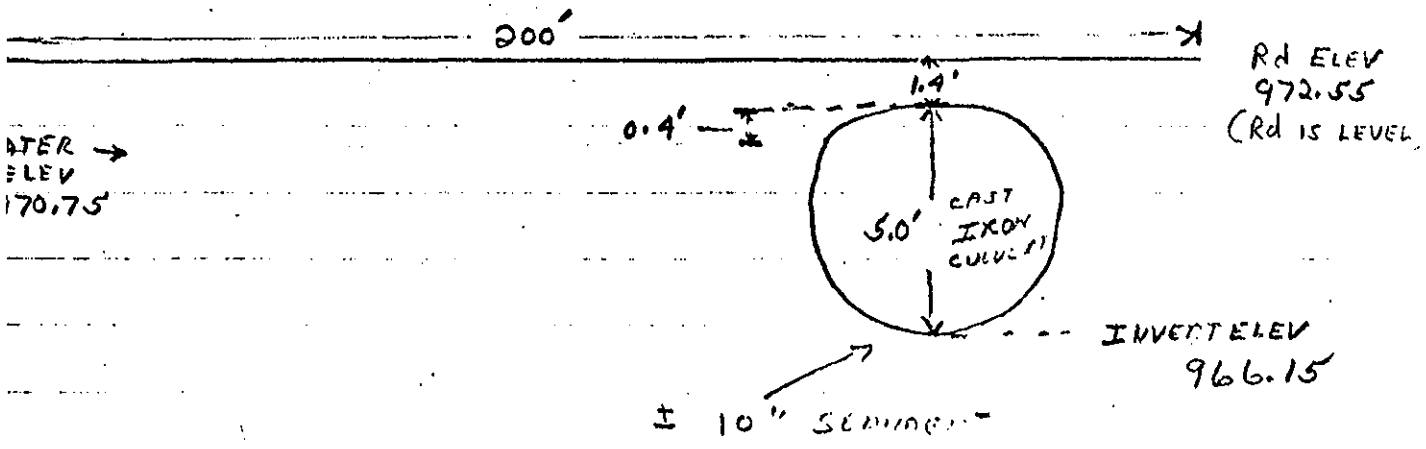
④ Road crossing between the two major reservoir storage areas

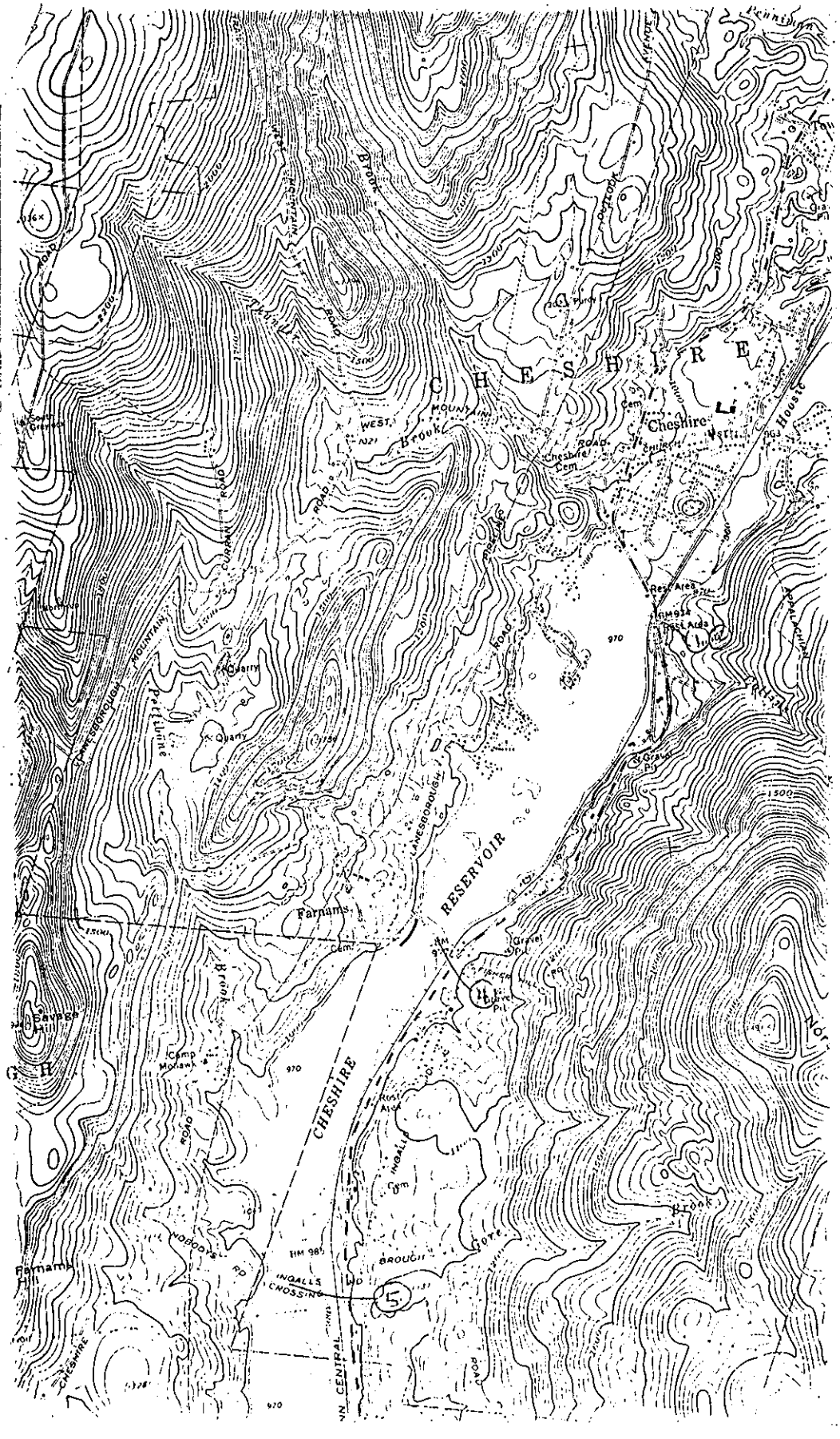


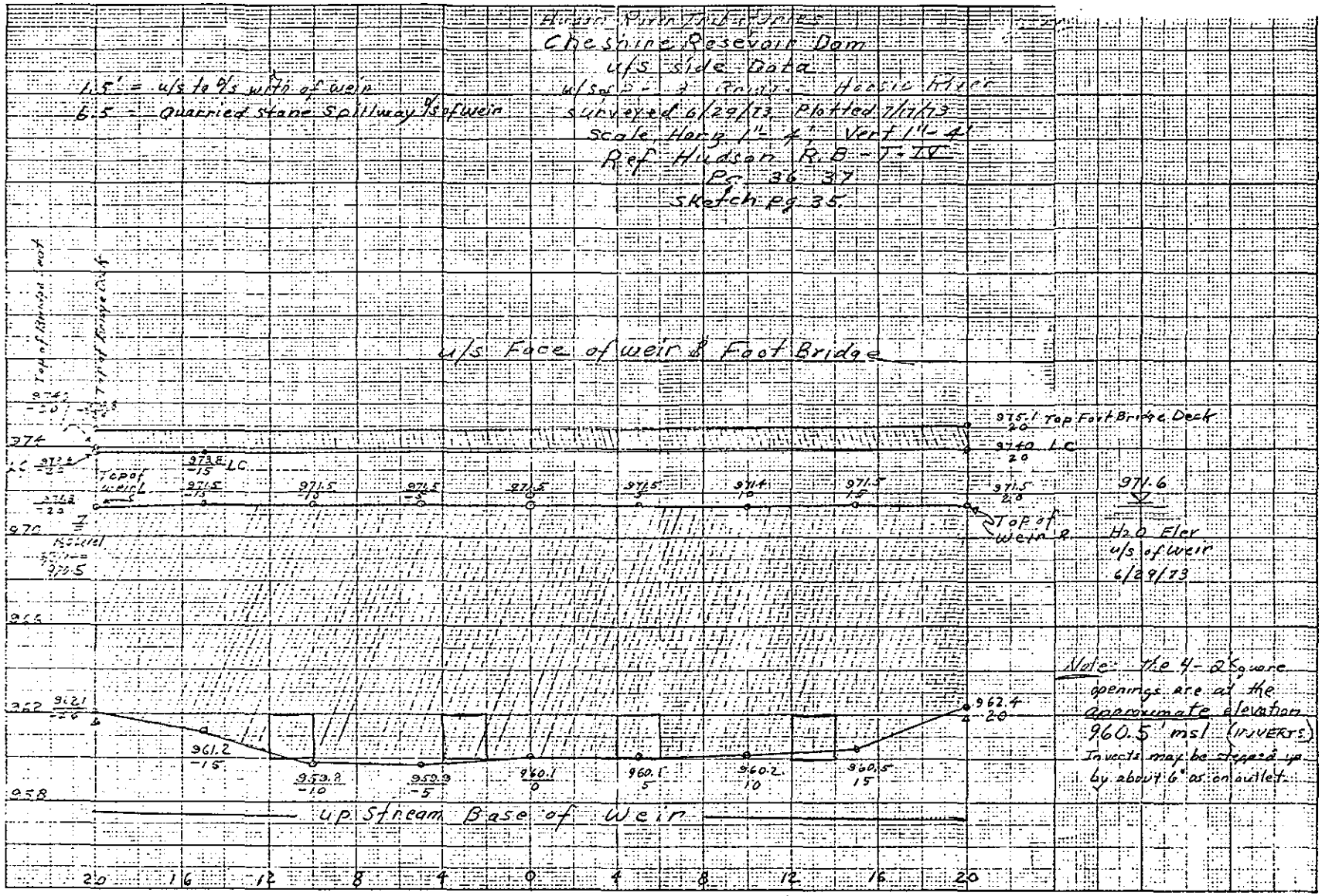
In addition I found a 2' ACCMP on the far left bank of storage area II. Its invert elev is approx 971.0 however this culvert does not drain storage area I (It was running today 3/4/79) I could not locate its source but it appears as if it may drain the road running above the left bank at this point.

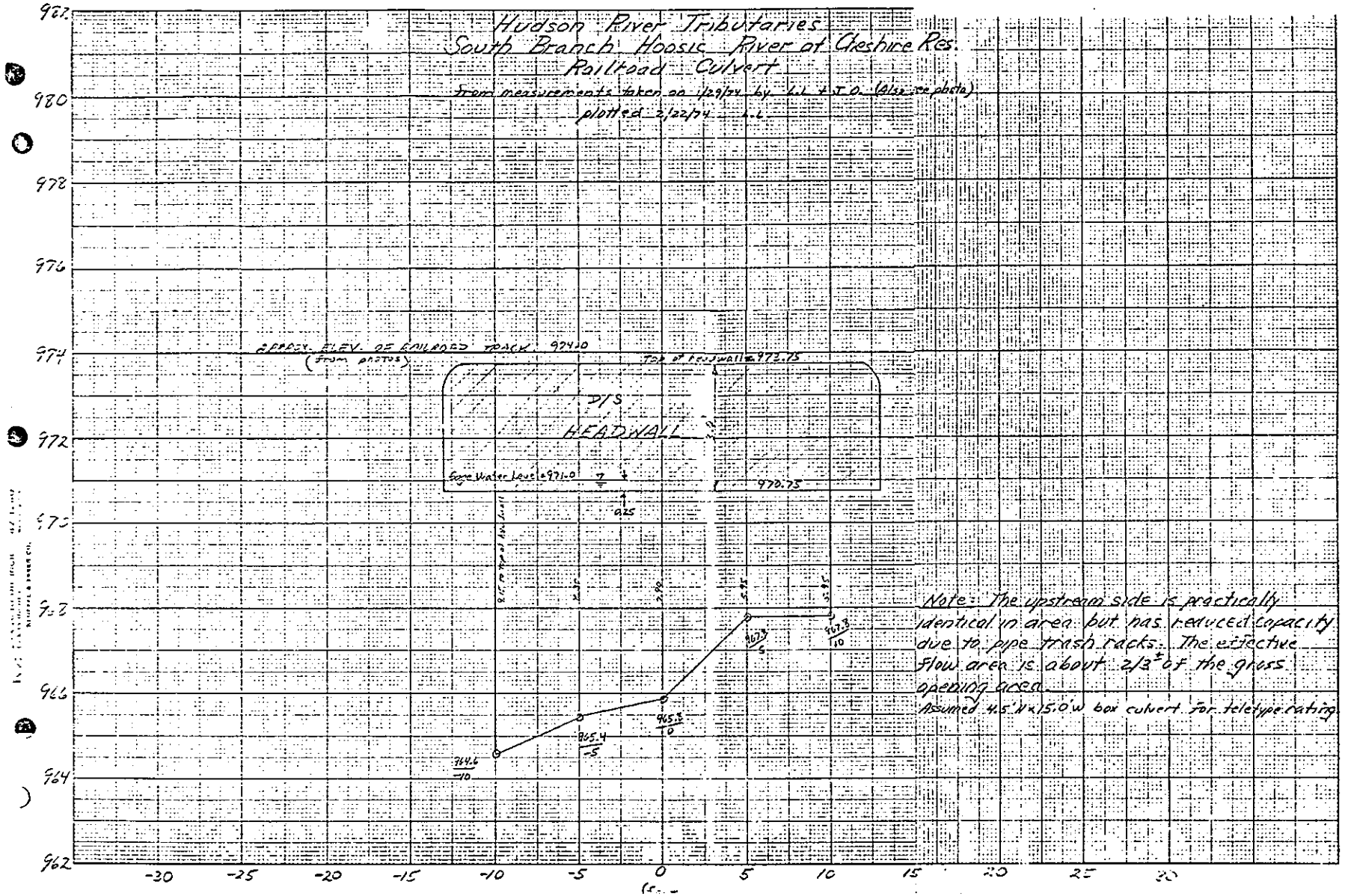
Nobody's Rd. -

This is now called Pingalli's Rd. Crossing




C H E S H I R E
Cheshire
Cheshire Cem
WEST MOUNTAIN ROAD
Brook
Rest Area
Quarry
LANESBOROUGH MOUNTAIN
Pettibone
LANESBOROUGH
RESERVOIR
Farnams
Cem
Gravel Pit
Savage Hill
Camp Mohawk
CHESHIRE
Rest Area
INGALLS
Cem
NOBODYS RD
INGALLS CROSSING
BROUGH
Gore
Farnams Hill
CHESHIRE
CENTRAL
970
1500
2000
2200
5


Cheshire Reservoir Dam
u/s side Data
Surveyed 6/29/73 Plotted 7/17/73
Scale Horiz 1" = 4' Vert 1" = 4'
Ref Hudson R.B. - T-IV
Pg. 36 37
Sketch pg 35
1.5' = u/s to o/s with of weir
6.5 = Quarried stone spillway o/s of weir
u/s Face of weir & Foot Bridge
Top of Bridge Deck
Top of weir
975.1 Top Foot Bridge Deck
974.0 LC
971.6
H2O Elev u/s of weir 6/29/73
Top of weir
Note: the 4-2' square openings are at the approximate elevation 960.5' msl (INVERTS)
Inverts may be stepped up by about 6" as on outlet.
up Stream Base of Weir
962.4
961.2
959.8
959.9
960.1
960.1
960.2
960.5
20 16 12 8 4 0 4 8 12 16 20


Hudson River Tributaries
South Branch Hoosic River at Cheshire Res.
Railroad Culvert
from measurements taken on 1/29/74 by L.L. + T.O. (Also see photo)
plotted 2/22/74 L.L.
APPROX. ELEV. OF RAILROAD TRACK 974.0
(from photos)
Top of headwall = 973.75
D/S
HEADWALL
Edge Water Level = 971.0
970.75
0.25
964.6
-10
965.4
-5
965.8
0
967.3
5
967.8
10
Note: The upstream side is practically identical in area but has reduced capacity due to pipe trash racks. The effective flow area is about 2/3± of the gross opening area.
Assumed 4.5'H x 15.0'W box culvert for teletype rating.
982
980
978
976
974
972
970
968
966
964
962
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30

WATER

& RELATED LAND

RESOURCES

OF

THE

BERKSHIRE REGION

MASSACHUSETTS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ECONOMIC RESEARCH SERVICE
FOREST SERVICE
IN COOPERATION WITH:
MASSACHUSETTS WATER RESOURCES COMMISSION
197·

BERKSHIRE REGION

MASSACHUSETTS

HYDROLOGIC DATA FOR SELECTED DAMS 1/

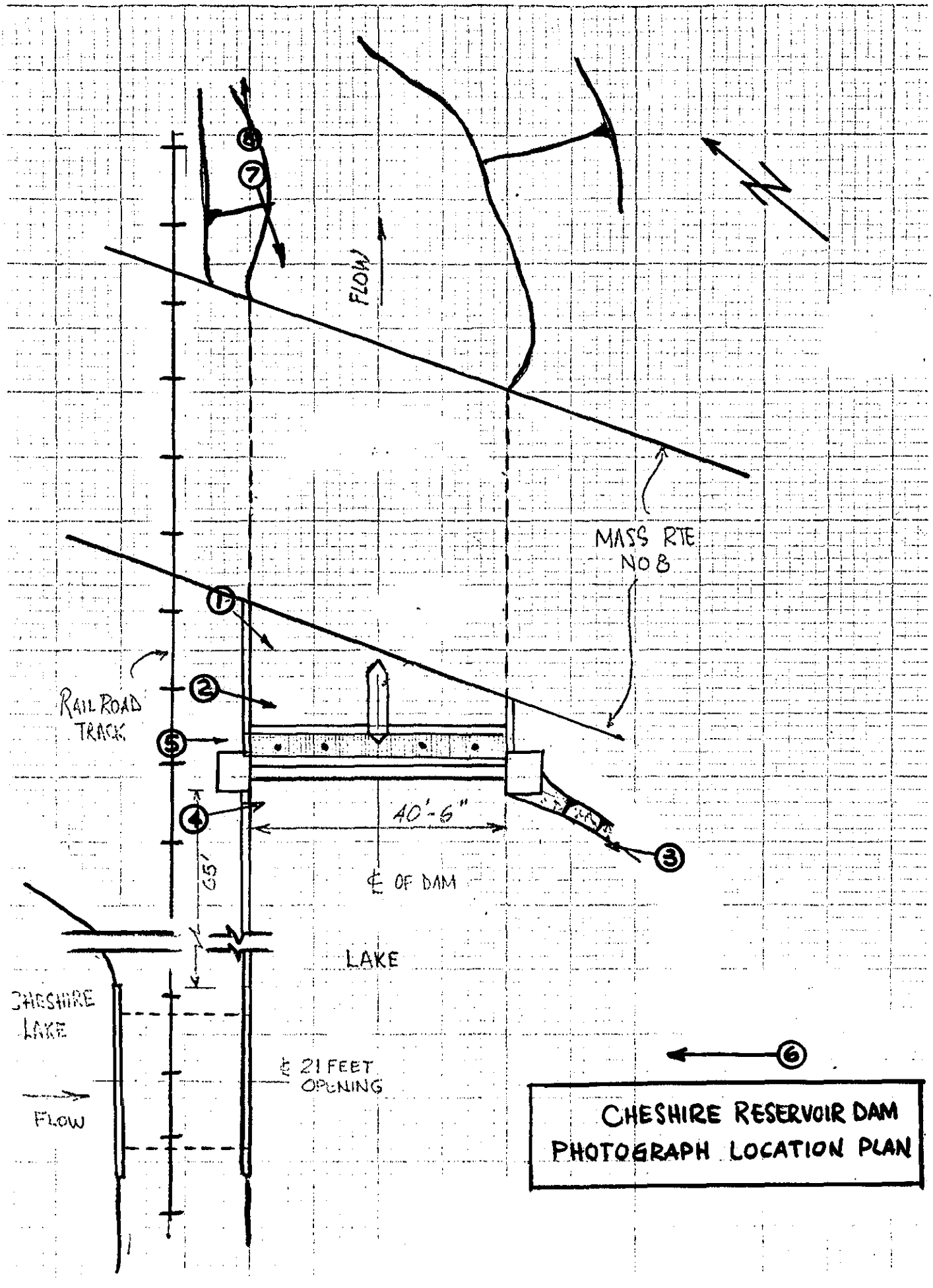
DAM	PROFILE LOCATION / STATION	DRAINAGE AREA Sq. Mi.	DAM DATA: TYPE 2/	DAM DATA: HEIGHT Feet	DAM DATA: TOP ELEVATION 4/ Feet	DAM DATA: NORMAL POOL AREA Acres	SPILLWAY DATA: TYPE 3/	SPILLWAY DATA: SIZE Feet	SPILLWAY DATA: CREST ELEVATION 4/ Feet	SPILLWAY DATA: PRESENT CAPACITY 8/ CFS	FLOOD DATA 5/ ELEVATION 7/: 10-YEAR Feet	FLOOD DATA 5/ ELEVATION 7/: 100-YEAR Feet	FLOOD DATA 5/ ELEVATION 7/: RARE Feet
HOUSATONIC STUDY AREA													
HOUSATONIC RIVER													
Valley Mill	Plate 2 40-45	170	Earth & Stone	10	954.4	156	Weir & Gate	139	949.0	6000	953.5	956.8	958.6
Columbia Mill	Plate 2 55-60	185	Timber Crib Rockfilled	19	914.1	9	Weir	116	906.7	5300	912.0	915.6	919.1
Willow Mill	Plate 2 90-95	243	Stone & Concrete	17	848.2	12	Weir	107	837.8	13000	844.1	847.0	849.7
Glendale	Plate 3 125-130	278	Concrete	20	816.9	0	Ogee Weir & Open Gate	180	810.8	13000	814.2	816.4	818.2
Monument Mills	Plate 3 135-140	279	Timber Crib	16	753.9	8	Wood Plank	119	747.9	6000	754.5	757.6	759.9
Rising Paper Co.	Plate 3 145-150	280	Timber Crib	24	726.4	15	Concrete Steel Plate	127	718.3	11000	724.3	727.0	729.1
HUDSON STUDY AREA													
NORTH BRANCH HOOSIC RIVER													
Briggsville	Plate 9 247+60	32	Concrete	17	939.6	1	Concrete Ogee Weir	133	935.1	4800	939.7	941.5	942.3
SOUTH BRANCH HOOSIC RIVER													
Cheshire Reservoir	Plate 10 103+50	15	Stone	11	974.0	550	Weir & Gates	40	971.5	450	972.1	973.1	974.7

1/ Information estimated for planning purposes only, should not be used for final design or construction.
2/ General dam construction type.
3/ General major spillway construction type.
4/ Mean Sea Level Datum (MSL).
5/ Floods that can occur under present watershed and flood plain conditions, see Text.
6/ CFS -- cubic feet per second.
7/ MSL: Elevations computed at the upstream side of the dam.

USDA SCS HYATTSVILLE MD 1979

PHOTOGRAPHS

APPENDIX C



CHESHIRE RESERVOIR DAM
PHOTOGRAPH LOCATION PLAN

2. VIEW OF CREST AND DOWNSTREAM FACE. NOTE PRESSURE LEAKS.

3. VIEW OF UPSTREAM APPROACH CHANNEL. NOTE STONE MASONRY WALL AND CONCRETE LINED SLOPE.

4. VIEW OF SPILLWAY CREST AND REMNANT OF BRIDGE PIER.

5. VIEW OF ACCESS WALKWAY TO LOW LEVEL GATE VALVE STEMS.

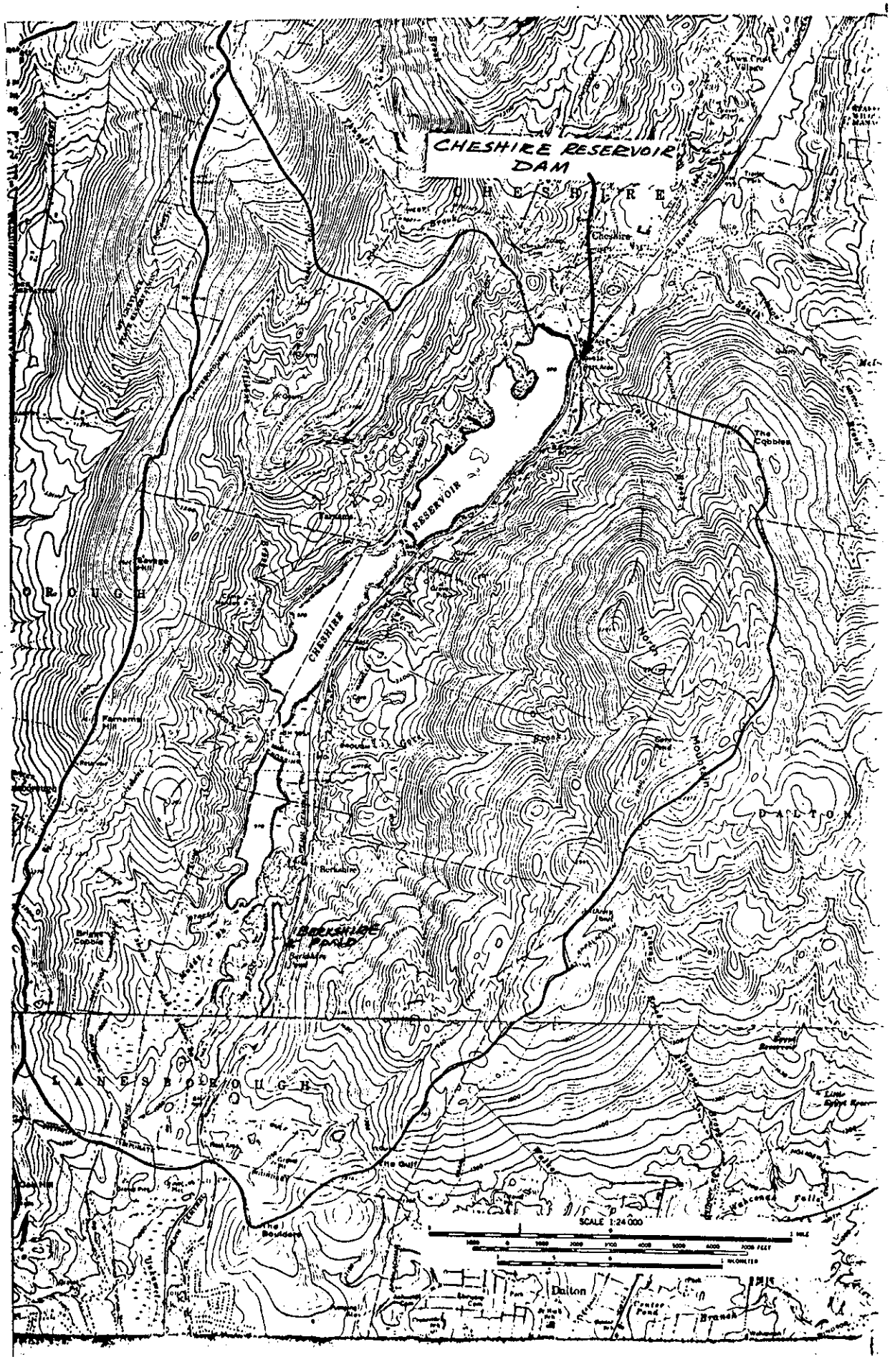
6. VIEW OF RAILROAD EMBANKMENT AND BRIDGE CROSSING CONNECTING LAKE TO APPROACH CHANNEL.

7. VIEW OF DOWNSTREAM CHANNEL LOOKING UPSTREAM. NOTE MASS. RTE. NO. 8 BRIDGE AND REMNANT OF OLD BRIDGE SUPPORT IN BACKGROUND.

8. VIEW OF DOWNSTREAM CHANNEL LOOKING DOWNSTREAM.

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX D


CHESHIRE RESERVOIR DAM
CHESHIRE
RESERVOIR
CHESHIRE
BERKSHIRE POND
DALTON
LANESBOROUGH
Dalton
SCALE 1:24 000

TAMS

Job No. 1497-18 | Sheet ____ of ____
Project INSPECTION CHESHIRE RESERVOIR | Date Oct 26, 78
Subject | By D.L.C
Ch'k. by

TOTAL $H \times A$ = 12934.84 $L \times A$ = 26.077 A = 12.4

weighted H 1043.1 weighted L 2.10 miles / 11,104 ft.

Mean slope = (1043.1/11104) 100 = 9.4 %

Assume for 9% basin slope, & an average velocity of 5 fps.

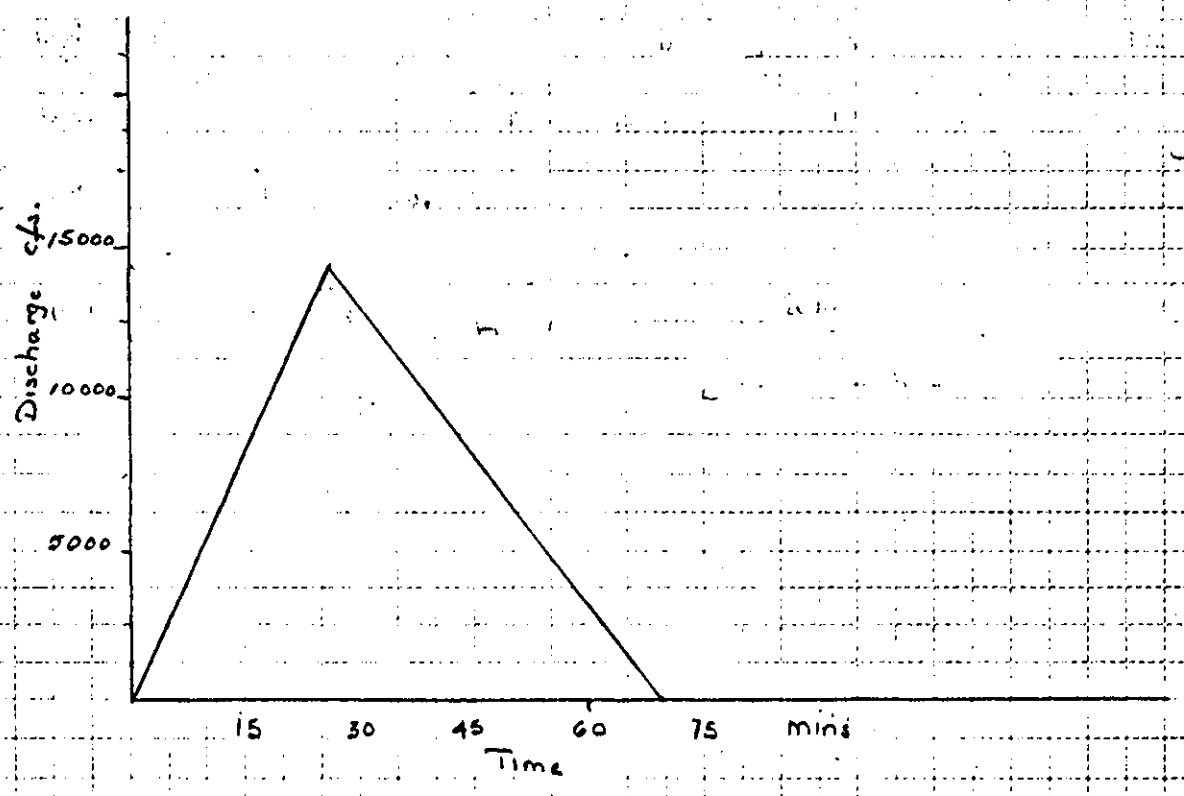
then estimated T_c = 11,104 / 5 = 37 mins or 0.62 hours

$D = \frac{1}{5} T_c$ = 0.12 hrs / 7.4 mins say 7.5 mins.

T_p = .0625 + 0.372 = 0.43 hrs / 26 mins

$Q_p = \frac{484 \times 12.4}{.43}$ = 13,957 cfs.

$T_b = 2.67 T_p$ = 1.15 hrs / 68.9 mins.



TAMS

Job No. 1497-18 | Sheet ____ of ____

Project INSPECTION CHESHIRE RESERVOIR | Date OCT 31 1978

Subject Head / Outflow discharge relation. Lower Reservoir. | By ____ | Ch'k. by ____

Spillway Length 40.5'

Crest width 2.0' Crest El 970 MSL*

Training wall ht 2.67 El 972.67 MSL

* El taken from USGS Quadrangle Map (7½ min. Series)

Assume spillway acts as broad-crested weir.
Assume flow over dam is critical C = 3.087

* El	Head	C	$Q = CLH^{3/2}$ (weir)	H_{Dam}	Q_{Dam}	Total Q	El
971.5	0	0				0	971.5
97	1.0	2.66	108			108	972.5
97	2.0	2.85	326			326	973.5
97	2.67	3.30	583	0		583	974.17
97	3.5	3.32	880	.33	764	1644	975
97	4.5	3.32	1284	1.33	3979	5263	976
97	6.5	3.32	2228	3.33	15,562	17,790	978
	8.5	3.32	3332	5.33	34,186	37,518	980

Weir acts as sharp crested weir at and above 3.0' head

LAMS

Job No. 1497-18

Project INSPECTION CHESHIRE RESERVOIR.

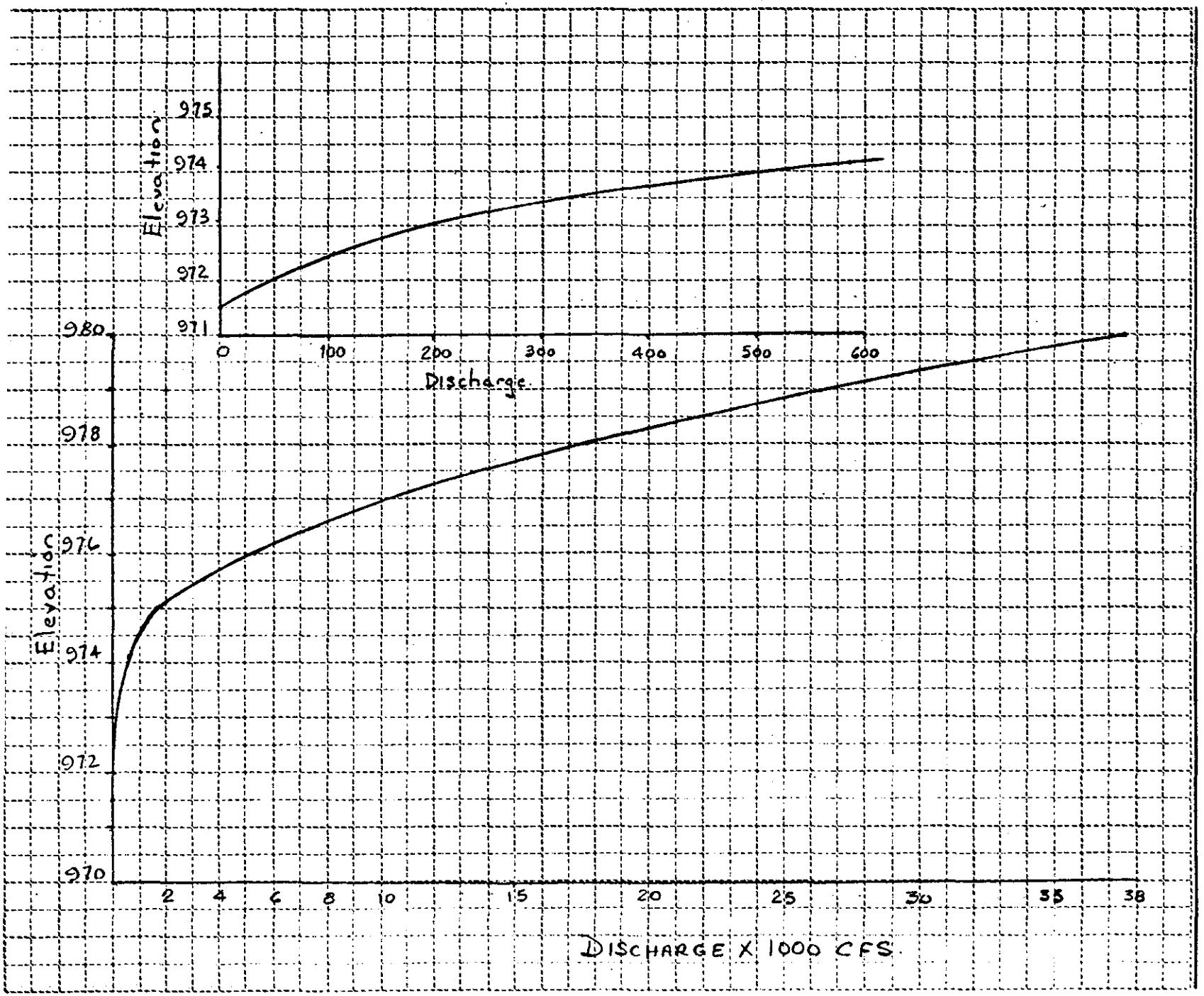
Subject OUTFLOW DISCHARGE RATING CURVE.

Sheet ____ of ____

Date OCT 31, 1978

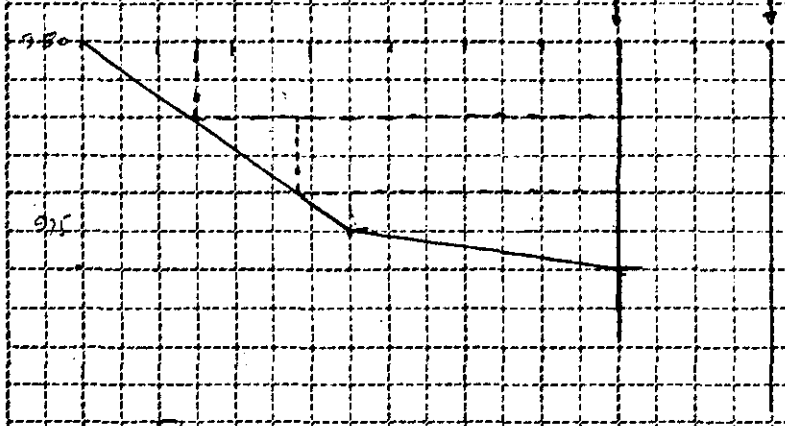
By D.C.C

Ch'k. by ____



TAMS

Job No. 1497-18 | Sheet ____ of ____
Project INSPECTION CHESHIRE RESERVOIR. | Date OCT 31, 1978
Subject Flow over road below Lower Pond | By D.L.C.
Ch'k. by ____



Assume flow across Road is critical C=3.087

Flow over roadway

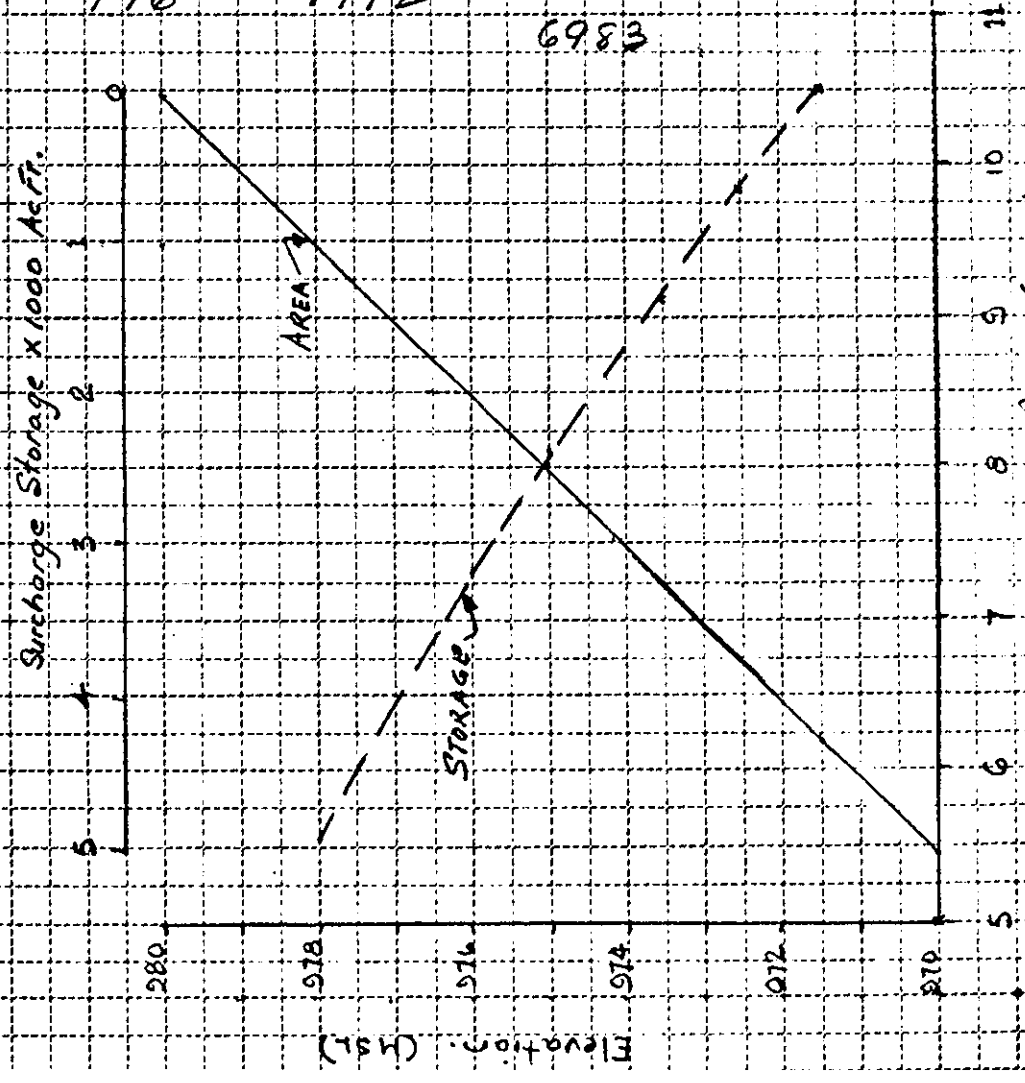
El	ΔArea	Total Area	L	Equiv H	C	$Q = 3.087 L H^{3/2}$	Q_L
974	0					0	178
975	350	350	700	.5		764	
976	770	1120	850	1.32		3979	
978	1940	3060	1130	2.71		15,562	
980	2500	5560	1400	3.97		34,186	

IAMS

Job No. 1497-18
Project INSPECTION CHESHIRE LAKE
Subject

Sheet ____ of ____
Date Nov 10, 1978
By D.L.C.
Ch'k. by

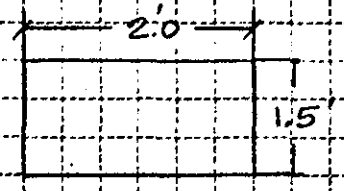
El	Area	Mean Area	Δ Vol	Surcharge Storage
971.5	621			0
		646	646	
972.5	671			646
		696	696	
973.5	721			1342
		737.75	516	
974.2	754.5			1858
		775.25	520	
975	796			2378
		821	821	
976	846			3199
		896	1792	
978	946			4991
		996	1992	
980	1046			6983



TAMS

Job No. 1497-18 | Sheet ____ of ____
Project: Inspection Cheshire Reservoir | Date: Nov. 7, 1977
Subject: Spillway sluiceways. | By: RH
Ch'k. by ____

W.S. El. 971.5 and 974.2, Low W.S. El. 964.2



Area = 2 × 1.5 = 3 D'

Use eq. for square box making $D = \sqrt{3} = 1.732$

$$H_T = \left[\frac{1.555\,(1+K_e)}{D^4} + \frac{287.64\,n^2\,L}{D^{16/3}}\right]\left(\frac{Q}{10}\right)^2$$

$n = 0.013$ $\qquad H_{T_H} = 974.2 - 964.2 = 10$ ft.

$D = 1.732$ $\qquad H_{T_L} = 971.5 - 964.2 = 7.3$

$L = 9'$

$K_e = 1.0$

<u>Q at W.S. El. 974.2</u>

$H_T = 10'$

$$10 = \left[\frac{1.555\,(2)}{1.732^4} + \frac{287.64\,(0.013^2)\,9}{1.732^{16/3}}\right]\left(\frac{Q}{10}\right)^2$$

$$10 = 0.369\left(\frac{Q}{10}\right)^2$$

$$Q = \sqrt{\frac{10}{0.369}}\,(10) = 52.1 \text{ cfs per culvert}$$

$Q_T = 52.1 \times 4 = 208.2$ cfs

TAMS

Job No. 497-18 | Sheet ____ of ____
Project Inspection Cheshire Reservoir | Date Nov 7 1978
Subject Sluiceway discharge computation | By RH
Ch'k. by

Q at W.S. El. 971.5

$H_T = 7.3$

$$7.3 = \left[\frac{1.555(2)}{1.732^4} + \frac{287.64(0.013)^2 9}{1.732^{16/3}}\right]\left(\frac{Q}{10}\right)^2$$

$$7.3 = 0.369\left(\frac{Q}{10}\right)^2$$

$$Q = \sqrt{\frac{7.3}{0.369}}\,(10) = 44.5 \text{ cfs}$$

$$Q_T = 44.5 \text{ cfs} \times 4 = 178 \text{ cfs}$$

CHESHIRE RESERVOIR JOB NO 1497 18
HOOSIC RIVER BASIN-BERKSHIRE COUNTY
SAFETY INSPECTION-TAMS NOV 78

HALF PMF

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
971.50	0.12	0.00	6.87	1	NO	YES	1.000	1.000	0.500	1.000	0.000

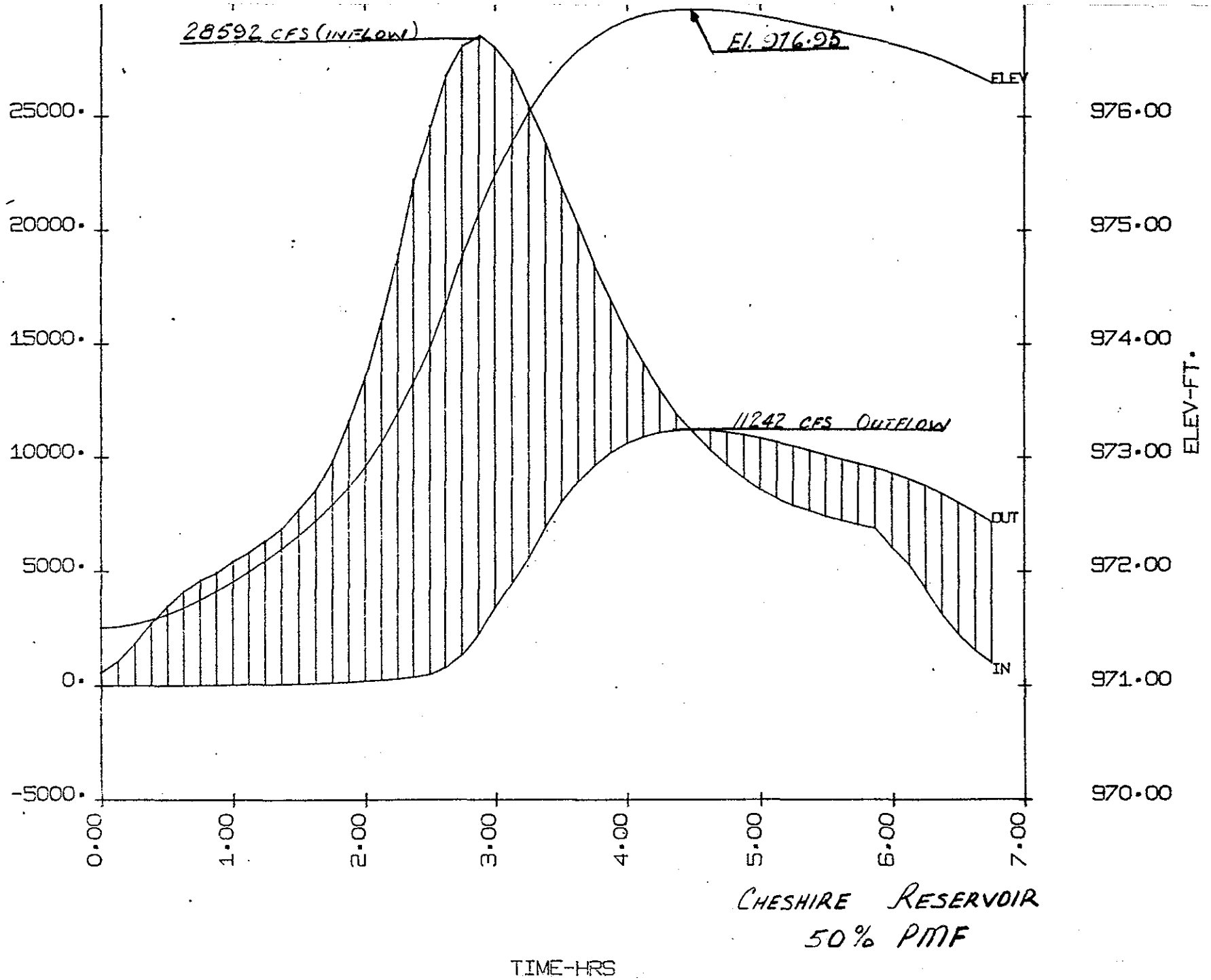
RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
971.50	0.0000	0.00
972.50	646.0001	108.00
973.50	1342.0002	326.00
974.17	1858.0002	583.00
975.00	2378.0004	1644.00
976.00	3199.0004	5263.00
978.00	4991.0009	17790.00
980.00	6983.0009	37518.00

MOORE BUSINESS FORMS, INC., HO PRINTED IN USA 22"

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00		0.0000	971.50
0.13	559.10	0.48	2.8854	971.50
0.25	1055.10	1.87	11.2110	971.51
0.38	1830.00	4.36	26.0812	971.54
0.50	2724.10	8.28	49.5391	971.57
0.63	3479.45	13.62	81.4691	971.62
0.75	4125.00	20.15	120.5737	971.68
0.88	4622.15	27.67	165.5082	971.75
1.00	4952.50	35.88	214.6357	971.83
1.13	5452.70	44.79	267.9648	971.91
1.25	5836.15	54.46	325.7725	972.00
1.38	6351.75	64.88	388.1203	972.10
1.50	6887.30	76.19	455.7753	972.20
1.63	7710.50	88.66	530.3253	972.32
1.75	8592.55	102.57	613.5473	972.44
1.88	9870.00	127.33	707.7403	972.58
2.00	11640.90	161.67	817.3573	972.74
2.13	13549.75	201.83	945.5964	972.93
2.25	16097.85	249.07	1096.4055	973.14
2.38	18942.65	304.86	1274.5380	973.40
2.50	22236.10	396.55	1483.6574	973.68
2.63	24580.90	514.65	1720.7734	973.99
2.75	26799.70	831.64	1979.8598	974.36
2.88	28138.75	1387.24	2252.1616	974.79
3.00	28592.45	2301.37	2527.1313	975.18
3.13	28031.05	3459.25	2789.8071	975.50
3.25	27068.20	4531.67	3033.0927	975.79
3.38	25398.95	5633.63	3252.0205	976.05
3.50	23805.95	6955.19	3441.0703	976.27
3.63	21888.40	8062.38	3599.4555	976.44
3.75	20233.75	8968.00	3729.0053	976.59
3.88	18443.20	9690.51	3832.3613	976.70
4.00	16912.55	10246.99	3911.9663	976.79
4.13	15413.00	10659.14	3970.9248	976.86
4.25	14153.30	10946.46	4012.0258	976.90
4.38	12990.15	11129.36	4038.1899	976.93
4.50	11922.50	11221.81	4051.4145	976.95
4.63	11102.35	11242.05	4054.3105	976.95
4.75	10328.10	11205.34	4049.0595	976.94
4.88	9653.90	11120.74	4036.9565	976.93
5.00	9092.00	10998.97	4019.5371	976.91
5.13	8602.70	10849.06	3998.0927	976.89
5.25	8212.35	10678.96	3973.7592	976.86
5.38	7901.25	10496.27	3947.6254	976.83
5.50	7666.05	10307.28	3920.5903	976.80
5.63	7424.45	10114.84	3893.0625	976.77
5.75	7236.45	9920.86	3865.3120	976.74
5.88	7051.80	9727.40	3837.6377	976.71
6.00	6878.35	9534.94	3810.1069	976.68

	TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
	6.13	6033.20	9320.41	3779.4184	976.64
	6.25	5289.00	9065.47	3742.9482	976.60
	6.38	4250.70	8766.19	3700.1362	976.55
	6.50	3139.55	8412.89	3649.5957	976.50
	6.63	2245.10	8014.33	3592.5820	976.43
	6.75	1539.60	7587.81	3531.5678	976.37
	6.88	999.50	7147.62	3468.5976	976.30
MAX. VALUES		28592.45	11242.05		976.95
MIN. VALVES		0.00	0.00		971.50

MOORE BUSINESS FORMS, INC. NO. PRINTED IN USA



CHESHIRE RESERVOIR
50% PMF

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

APPENDIX E