SUSQUEHANNA RIVER BASIN
TRIBUTARY TO SOUTH BRANCH TUNKHANNOCK CREEK
LACKAWANNA COUNTY

PENNSYLVANIA

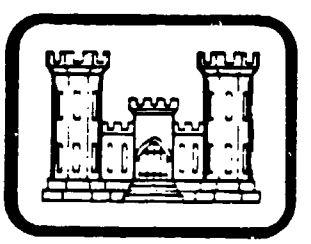
LEVEL II

DUCK POND DAM

NDI ID NO. PA-00379
DER ID NO. 35-98

NORTHEASTERN TECHNICAL CORPORATION

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



"Original contains color plates: All DTIC reproductions will be in black and white"

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

SUSQUEHANNA RIVER BASIN

TRIB. TO THE SOUTH BRANCH OF TUNKHANNOCK CREEK, LACKAWANNA COUNTY

PENNSYLVANIA

DUCK POND DAM

NDI ID No. PA 00379
DER ID No. 35-98

NORTHEASTERN TECHNICAL CORPORATION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Prepared By:

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

June 1981

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.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

NDI ID No. PA 00379, DER ID No. 35-98

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

CONTENTS

APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Duck Pond Dam NDI ID No. PA 00379 DER ID No. 35-98
Size:	Small (16.6 feet high; 170 acre-feet)
Hazard Classification:	Significant
Owner:	Northeastern Technical Corporation c/o Mr. Joseph Sasall Fleetville, Pennsylvania
State Located:	Pennsylvania
County Located:	Lackawanna
Stream:	Tributary to the South Branch of Tunkhannock Creek
Dates of Inspection:	5 Nov 80 & 26 Mar 81

The visual inspection and review of available data indicate that Duck Pond Dam is in fair condition. The lack of embankment protection from spillway flows and the inadequate spillway capacity are the primary deficiencies which cause concern for the safety of this dam. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for this facility is in the range of the 100 year flood to 1/2 the Probable Maximum Flood (PMF). Based on the size of the dam and degree of downstream hazard, the selected SDF is the 100 year flood.

The hydrologic and hydraulic computations indicate that the combination of reservoir storage and outlet works discharge capacity will not pass the SDF (100 year flood) prior to overtopping the embankment. In accordance with the criteria outlined and evaluated in Section 5.5 of this report, the discharge capacity for Duck Pond Dam is considered to be inadequate.

The following recommendations should be implemented without delay.

a. The owner should retain a qualified professional engineer experienced in dam design and construction to determine measures required to provide adequate spillway capacity. The need for a formal outlet works or other

drawdown facility should be evaluated by the engineer as part of this study, as well as the need for embankment protection from erosion due to spillway discharges. Remedial measures recommended by the engineer should be implemented by the owner without delay.

b. The cracks in the embankment should be monitored, and proper remedial action taken should any significant changes occur.

c. The trees on the downstream embankment slope should be removed and the embankment should be seeded.

d. A formal surveillance and downstream emergency warning system should be developed for use during periods of heavy or prolong precipitation.

e. An operation and maintenance manual or plan should be prepared for use as a guide in the operation and maintenance of the dam during normal and emergency conditions.

f. A schedule of regular inspection by a qualified engineer should be developed.

APPROVED BY:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
Commander and District Engineer

DATE: 28 July 81

DUCK POND DAM

OVERVIEW

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

DUCK POND DAM

NDI ID No. PA 00379

DER ID No. 35-98

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of non-federal dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the dam constitutes a hazard to human life and property.

1.2 Description of Project

a. Description of Dam and Appurtenances. Duck Pond Dam is an earthfill structure approximately 16.6 feet high and 285 feet in length (including spillway). The spillway facility is an uncontrolled trapezoidal broad-crested weir 22 feet wide at the top and 8 feet wide at the bottom. There are currently no outlet works provided for this dam. There is a township road located immediately downstream of the dam embankment, and all flow through the spillway must pass through a partially collapsed 36 inch concrete culvert through the roadway embankment.

Note: The U.S.G.S. 7.5 minute Quadrangle Sheet (Dalton, PA) indicates an approximate reservoir elevation of 1218, which is used as the spillway crest elevation for this report.

b. Location: Benton Township, Lackawanna County, PA
U.S.G.S. Quadrangle - Dalton, PA
Latitude 41° 36'; Longitude 75° 40.5'
Refer to Plates I & II, App. E.

c. Size Classification: Small: Height 16.6 feet, Storage 170 acre feet

d. Hazard Classification: Significant (Refer to Section 3.1.e)

e. Ownership: Northeastern Technical Corporation
c/o Mr. Joseph Sasall
P.O. Box 9
Fleetville, PA 18420

f. Purpose: None apparent

g. Design and Construction History:

Design information is limited to one drawing in PennDER files which provides a plan view and sections of the proposed dam. Due to subsequent changes by the current owner, it is not known whether the dam was built according to the original design.

No information concerning the construction of the dam is known to exist, other than the fact that the current owner has recently regraded the entire dam and modified the spillway structure.

h. Normal Operating Procedure:

No formal operating procedures exist. Inflow which exceeds the dam's storage capacity will flow over the uncontrolled spillway.

1.3 Pertinent Data

a. Drainage Area (square miles)

From files:	0.75
Computed for this report:	0.75
Use:	0.75

b. Discharge at Damsite (cubic feet per second)

Maximum known flood	unknown
Spillway with maximum pool (El. 1222.0)	280

c. Elevations (feet above mean sea level)

Top of Dam	1222.0
Normal pool	1218.0
Spillway Crest	1218.0
Streambed at toe	1205.4

d. Reservoir Length (feet)

Normal pool (El. 1218.0)	600
Maximum pool (El. 1222.0)	800

e. Storage (acre-feet)

Normal pool (El. 1218.0)	125
Maximum pool (El. 1222.0)	170

f. Reservoir Surface (acres)

Normal pool (El. 1218.0)	10
Maximum pool (El. 1222.0)	13

g. Dam

Note: Refer to plate in Appendix E for plan and sections.

Type	Earthfill
Length	285 feet including spillway
Top Width	18 feet
Height	16.6 feet
Side Slopes	
Upstream	1V:2.5H
Downstream	Varies 1V:1H to 1V:1.5H
Zoning	None
Cutoff	Concrete Corewall 3 feet into natural ground.
Grouting	None

h. Spillway

Type	Trapezoidal broad-crested weir
Location	Near right abutment
Length	Bottom - 8 Feet Top - 22 Feet
Crest Elevation	1218.0 MSL
Freeboard	4.0 Feet
Approach Channel	Reservoir
Downstream Channel	Earth and rock

SECTION 2

ENGINEERING DATA

2.1 Design.

The limited available data for Duck Pond Dam consist of files provided by PennDER. Information includes permit application reports and related correspondence, a PennDER inspection report dated 1957, and one design drawing which includes a plan and sections of the dam prior to initial construction. The reference datum of this drawing is unknown.

2.2 Construction

No information concerning original construction of the dam is known to exist. The current owner has substantially modified the dam over that shown on the available design drawing.

2.3 Operation.

No formal records of operation or maintenance exist. The PennDER inspection report dated September 1957 indicated the dam was in good condition at that time.

2.4 Evaluation.

a. Availability. All available written information was contained in the files provided by PennDER.

b. Adequacy. The available data, including that collected during the recent detailed visual inspection, are considered to be adequate to make a reasonable assessment of the dam.

SECTION 3

VISUAL INSPECTION

3.1 Observations

a. General. The overall appearance and general condition of Duck Pond Dam is fair. Noteworthy deficiencies are described below. The visual inspection checklist and field sketch are provided in Appendix A. Photographs taken during the inspection are reproduced in Appendix C.

On the day of the inspection, the reservoir pool was 5.5 feet below the spillway crest. The owner was not present during the inspection; however, the person in charge of the recent work on the dam was interviewed at the site. Mr. John Chernesky of PennDER was present for a portion of the inspection.

A brief review inspection was made on 26 March 1981. At that time, water was discharging through the spillway at a depth of approximately 0.1 foot. Significant changes which occurred subsequent to the initial inspection are noted below where appropriate.

b. Embankment. The embankment crest, upstream slope and part of the downstream slope have recently been regraded and are essentially devoid of vegetation. Several small (1-2 inch) trees are growing on the undisturbed center portion of the downstream face. The exact depth and method of regrading is unknown. The current owner conducts a training school for heavy equipment operators on the surrounding property. Apparently, the work on the dam was part of a training exercise. The upstream face of this dam slopes at 1V:2.5H. Longitudinal cracks up to 30 feet long and 10 inches in depth were evident on this slope beginning 40 feet to the left of the spillway and about five feet below the crest. On the day of the review inspection these cracks were covered by the higher reservoir pool; however, new cracks had developed at a higher elevation and to the left of the original cracks. At this time, minor erosion of the upstream face had occurred adjacent to the waterline. The 18 foot wide crest curves downstream and is relatively level except for a high spot adjacent to the spillway (See Exhibit A-2). The downstream face slopes at 1V:1H at the maximum section and 1V:1.5H toward the spillway and left abutment. Surface runoff along the township road immediately downstream of the dam is eroding the toe to the left of the maximum section. This runoff passes under the road via a box culvert which is in poor condition.

c. Appurtenant Structures. No drawdown facility was found for this structure; however the original design drawings indicated an 8-inch cast iron pipe with a valve chamber on the upstream slope. The earth and rock-lined spillway is located at the right end of the dam. No formal control section is provided in the spillway. The trapezoidal channel, which has a bottom width of 8 feet, has an informal riprap lining consisting of dumped and bladed rock. No additional protection of the embankment has been provided. Approximately 80 feet downstream of the spillway entrance is a 36 inch

culvert which conducts the flow under the township road. The culvert did not have headwalls at either end. The discharge end of the pipe is located in the middle of the roadway slope. Flows through the pipe must drop a vertical distance of about twelve (12) feet before entering the natural streambed. On the date of the review inspection, it was noted that severe erosion had occurred on the roadway slope at the discharge end of the culvert. Just upstream of the culvert entrance is a low area along the left bank of the spillway channel. Flows in excess of the capacity of the pipe culvert would pass through the low area and along the toe of the dam before entering a nearby roadway box culvert.

d. Reservoir. The partially wooded reservoir slopes are moderately sloping and appear stable. Sedimentation does not appear to be a problem at this time; however, a large area on the left bank is stripped of all vegetation and is being used for heavy equipment storage. Runoff from this area could result in the loss of reservoir storage if allowed to continue indefinitely.

e. Downstream Channel. The channel downstream of the dam is moderately sloping. The side slopes vary from 1V on 3H to 1V on 5H and are partially wooded. A culvert conveys the flow under Pennsylvania Route 107 approximately 800 feet below the dam. The floodplain widens as the stream passes through a swampy area 0.8 mile downstream of the dam. The floodplain then narrows and the stream passes under an improved dirt road via a small culvert. One house with the first floor 6.5 feet above the streambed is located on the right bank approximately 50 feet upstream of this culvert. Below this point the channel is confined with steep side slopes before crossing under Pennsylvania Route 438 and joining the South Branch of Tunkhannock Creek, 1.9 miles downstream of the dam. One house is located on the right bank just upstream of the Pennsylvania Route 238. The first floor is six feet above the streambed. The failure of Duck Pond Dam would create the potential for the loss of a few lives and property damage at these downstream residences. A significant hazard classification is considered appropriate.

f. Evaluation. The lack of positive protection of the embankment from spillway flows causes some concern for the safety of this structure. The cracks occurring on the upstream face do not appear to directly relate to the structural stability; however, they should be monitored for significant changes. Although erosion is not a problem at this time, the embankment should be seeded to prevent future problems with erosion. In addition, the runoff along the toe should be controlled. A method of drawing down the reservoir should also be developed.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure. The lake is normally maintained at the spillway crest, elevation 1218.0. Inflow is passed through the spillway channel and the 36 inch concrete conduit immediately downstream from the dam. Excess inflows would pass through the spillway channel until the backwater effects of the conduit cause a portion of flow to be diverted along the toe of the dam.

4.2 Maintenance of Dam. The condition of the dam and its appurtenances as observed by the inspection team was fair. Cracking of the upstream embankment face has occurred and local drainage runoff has eroded portions of the downstream face of the embankment. Limited erosion protection exists in the spillway discharge channel. In addition, no means exists to lower the level of the lake. No formal maintenance manual exists.

4.3 Maintenance of Operating Facilities. No operating facilities exist.

4.4 Warning System. No formal warning system exists.

4.5 Evaluation. Maintenance of the facility appears to be insufficient. The cracking of the upstream face of the embankment should be corrected. The need for additional erosion protection in the spillway discharge channel should be investigated. In addition, local drainage runoff should not be permitted to flow along the downstream toe of the embankment. A formal warning system for the protection of downstream inhabitants should be provided. Included in the plan should be provision for around- the- clock surveillance of the facility during periods of unusually heavy precipitation.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Design Data. No design reports, calculations or miscellaneous design data are known to exist for the facility, however, a drawing of the facility was found in PennDER files.

5.2 Experience Data. Records of reservoir levels and/or spillway discharges are not available. See Appendix C for photographs of embankment and spillway.

5.3 Visual Observations. On the date of the inspection, several conditions were observed that would prevent the facility from operating safely during a flood event. As noted in Section 4.5, the spillway approach and discharge channel have limited erosion protection. In addition, cracking of the upstream face of the embankment was observed.

5.4 Method of Analysis. The facility has been analyzed in accordance with procedures and guidelines established by the U.S. Army Corps of Engineers, Baltimore District, for Phase I hydrologic and hydraulic evaluations.

5.5 Summary of Analysis

a. Spillway Design Flood (SDF). In accordance with the procedures and guidelines contained in the National Guidelines for Safety Inspection of Dams for Phase I Investigations, the SDF for Duck Pond Dam ranges between the 100 year flood and the 1/2 Probable Maximum Flood (PMF). This classification is based on the relative size of dam (small) and the potential hazard of failure to downstream development (significant). Based on the small size and storage, the selected SDF is the 100 year flood.

b. Results of Analysis.

The 100 year flood peak is derived by averaging the peak flow value obtained from two regression equations. The first regression equation is from Bulletin 13, Floods in Pennsylvania Water Resources Bulletin. Guidelines are provided to determine the peak value by use of regional statistical data. The second regression equation is from the Hydrologic Study, Tropical Storm Agnes, North Atlantic Division, U.S. Army Corps of Engineers, 1975. Guidelines are provided to determine the flood peak by use of map coefficients and logarithmic equations. The following results are obtained.

100 year Flood Peak	CFS
Bulletin 13 -	455
North Atlantic Division - Tropical Storm Agnes -	920
Average 100 Year Flood Peak -	690

To determine the adequacy of the spillway, the average value for the 100 year flood is compared against the maximum outflow at low point top of dam. If the maximum outflow exceeds the 100 year average peak value derived

above, then the spillway is rated adequate. If however, the 100 year average peak value exceeds the maximum outflow at low point top of dam, the spillway is rated inadequate. Results are as follows:

	CFS
Maximum Outflow at top of dam -	280
Average 100 year flood peak	690

5.6 Spillway Adequacy.

Under existing conditions, Duck Pond Dam cannot pass the 100 year flood peak value. Since this structure cannot pass the selected SDF (100 year flood), the spillway is rated inadequate.

SECTION 6

Structural Stability

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(a) Embankment. Duck Pond Dam is a U-shaped earthfill structure of silty sandy gravel. The embankment has an 18 foot wide crest, an upstream slope of 2.5H:1V and a downstream slope that varies from 1H:1V to 1.5H:1V. Recent earthwork was done on the embankment to increase the height and width. A few trees (about 10) varying in size from 2 to 8 inches were located on the downstream face of the dam. Twelve inch riprap covered the upstream slope from the spillway elevation and below; erosion was not a problem. A 30 foot long series of longitudinal cracks, in excess of 10 inches deep, was observed in the upstream embankment, 40 feet left of the spillway and 5 feet below the crest elevation. The owner's representative stated that a similar crack existed on the dam before the recent earthwork was done. It could not be determined if the crack is the result of failure caused by a localized weak foundation problem or if soil is being washed into the riprap. A dirt road along the left side of the reservoir that crosses the left abutment causes some concern about erosion. The ditch along this road carries a large amount of runoff. This runoff is allowed to flow uncontrolled onto the left abutment and the township road immediately below, creating erosion channels.

(2) Appurtenant Structures. A trapezoidal spillway channel at the right abutment is the control structure for this dam. The spillway is cut into earth and partially protected by riprap. Flow from the spillway is required to pass through a 36 inch concrete culvert under the township road. Should this culvert fully collapse, water could pond in the low area between the dam and the road and allow the embankment to become saturated.

b. Design and Construction Data

(1) Embankment. The PennDER files contain one design drawing of the dam, consisting of a plan view, several cross-sections, and longitudinal sections. The embankment was designed to be straight with a 10 foot wide crest and slopes of 2H:1V. A cement masonry corewall shown in the embankment design varied from 6 to 10 feet in height with 3 feet of this corewall below natural ground. Grouted riprap was to be carried to the crest of the embankment.

(2) Appurtenant Structures. The drawing referred to in 6.1b(1) indicates that the corewall extended under the entire spillway. A cement masonry wall protected the embankment on the left side and the channel bottom contained grouted riprap protection. Additionally, an outlet works consisting of an 8 inch cast iron pipe, concrete encased, with a valve chamber with valve on the upstream slope was planned for the dam. No portions of the outlet works were visible during the inspection.

c. Operating Records. None

d. Post Construction Changes. No application for change is on file with PennDER. However, the embankment has been widened and raised. It is now U-shaped upstream instead of straight. The spillway has been modified, and the outlet works, if there is one, could not be observed.

e. Seismic Stability. The embankment appears to be statically stable even though a crack was observed on the upstream slope. The dam is located in Seismic Zone 1, and the seismic stability is considered adequate.

SECTION 7

ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment.

a. Safety. The visual inspection and review of available data indicate that Duck Pond Dam is in fair condition. The lack of embankment protection from spillway flows and the inadequate spillway capacity are the primary deficiencies which cause concern for the safety of this dam. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for this facility is in the range of the 100 year flood to 1/2 the Probable Maximum Flood (PMF). Based on the size of the dam and degree of downstream hazard, the selected SDF is the 100 year flood.

The hydrologic and hydraulic computations indicate that the combination of reservoir storage and spillway discharge capacity will not pass the SDF (100 year flood) prior to overtopping the embankment. In accordance with the criteria outlined and evaluated in Section 5.5, the spillway discharge capacity for Duck Pond Dam is considered to be inadequate.

b. Adequacy of Information. The data contained in PennDER files, in conjunction with data collected during the recent visual inspection, are considered to be adequate for making a reasonable assessment of this dam.

c. Urgency. The recommendations presented below should be implemented without delay.

d. Necessity for Additional Studies. The results of this inspection indicate a need for additional studies by a qualified professional engineer to determine measures necessary to provide adequate discharge capacity and embankment protection for this dam.

7.2 Recommendations.

a. The owner should retain a qualified professional engineer experienced in dam design and construction to determine measures required to provide adequate spillway capacity. The engineer should also evaluate the need for embankment protection from erosion due to spillway discharges and surface runoff. A method to drawdown the lake should be developed. Remedial measures recommended by the engineer should be implemented by the owner without delay.

b. The cracks in the embankment should be monitored, and proper remedial action taken should any significant changes occur.

c. The trees on the downstream embankment slope should be removed and the embankment should be seeded.

d. A formal surveillance and downstream emergency warning system should be developed for use during periods of heavy or prolonged precipitation.

e. An operation and maintenance manual or plan should be prepared for use as a guide in the operation and maintenance of the dam during normal and emergency conditions.

f. A schedule of regular inspection by a qualified engineer should be developed.

APPENDIX A

CHECKLIST - VISUAL INSPECTION

Check List
Visual Inspection
Phase 1

Name Dam Duck Pond DER No. 35-98 County Lackawanna State Pennsylvania

Date(s) Inspection 5 Nov. 80 Weather Ptly. Sunny Temperature 50°
26 Mar. 81 (Review)

Pool Elevation at Time of Inspection 1212.6 M.S.L. Tailwater at Time of Inspection 1205.4 M.S.L.

Inspection Personnel:

J. Bianco, C.O.E.
B. Cortright, C.O.E.
J. Evans, C.O.E.
R. Hecker, C.O.E.
J. Chernesky, PennDER (5 Nov 80 only)

B. Cortright Recorder

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS
Any Noticeable Seepage	None
Junction of Embankment With: Abutments Spillway	Good
Surface Cracks	Longitudinal cracks on U/S face approx. 5 feet below crest. Up to 30 feet long.
Crest Alignment: Vertical Horizontal	Vertical - Left abutment 0.8 foot lower than left spillway abutment. Horizontal - Good, convex downstream
Unusual Movement or Cracking at or beyond the Toe	None observed

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS
Sloughing or Erosion: Embankment Crest/Slopes Abutment Slopes	Erosion of downstream toe by surface runoff along road. Upstream face eroded vertically @ waterline (just above spillway crest.
Riprap Failures	Riprap up to spillway crest; 5 inches to 2.5 feet. Recently placed; no failures
Instrumentation	None
Staff Gage and Recorder	None
Miscellaneous	Dam recently regraded. Small trees on downstream face.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS
Intake Structure	None
Conduit	None
Outlet Structure	None
Outlet Channel	N/A
Emergency Gate	N/A

SPILLWAY

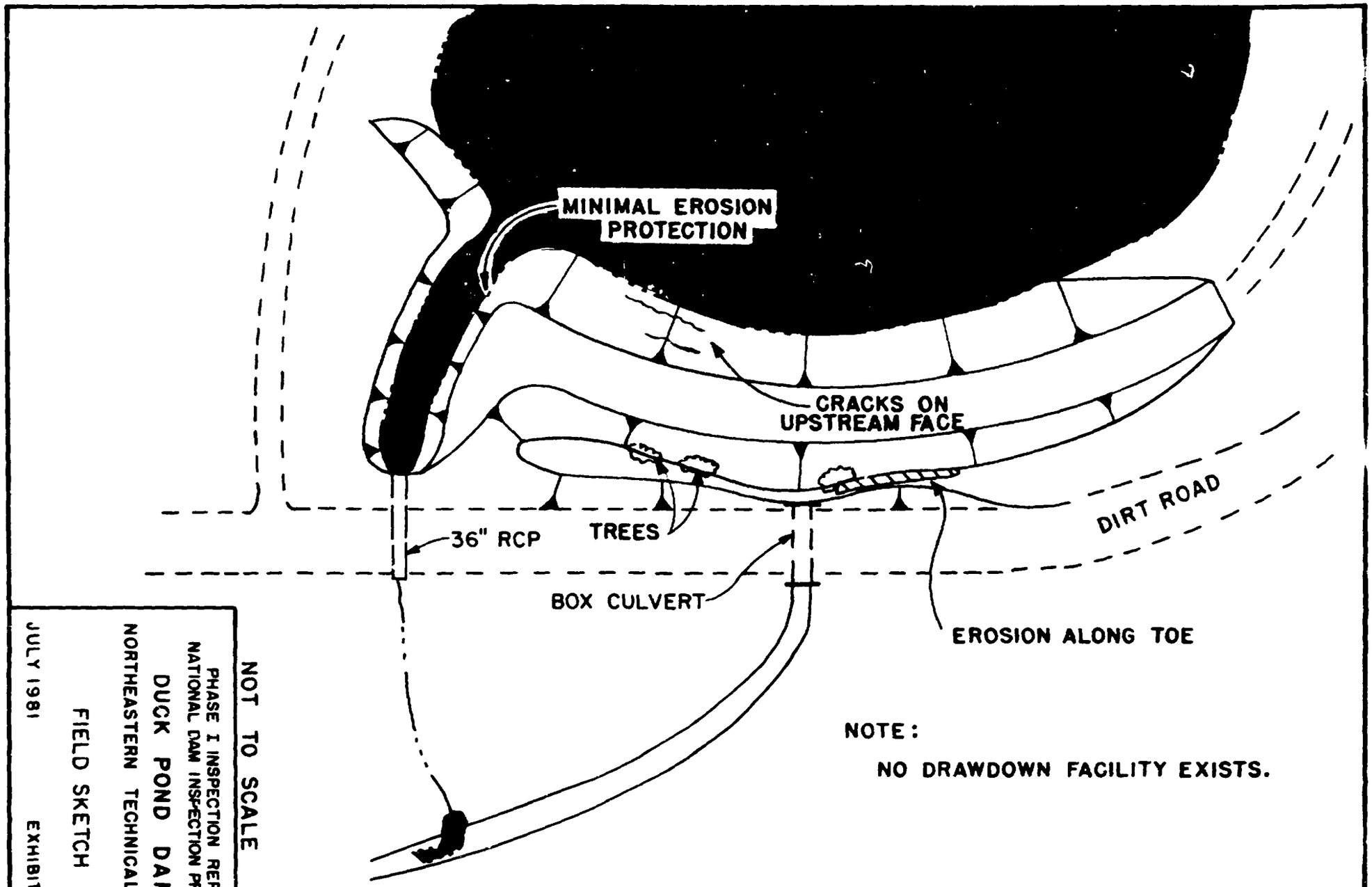
VISUAL EXAMINATION OF	OBSERVATIONS
Approach Channel	Reservoir; no obstructions.
Weir	No formal control; trapezoidal rock lined channel.
Discharge Channel	Lined with dumped rock; 36' concrete pipe-carrier flow under township road immediately d/s of dam. Some separation of d/s joints. Severe erosion at discharge end.

RESERVOIR

VISUAL EXAMINATION Cont	OBSERVATIONS
Slopes	Moderate and partially wooded. Appear stable.
Sedimentation	None observed.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS
Condition (Obstructions, etc.)	Bottom clear; some trees on side slopes. Road culvert 800 feet downstream (PA Route 107). Two additional road crossing 1.3 miles and 1.8 miles d/s.
Slopes	Generally moderate. Side slopes vary from 1V on 3H to 1V on 5H.
Approximate Number of Homes	Two homes, 1.3 miles and 1.9 miles downstream of dam.



NOT TO SCALE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

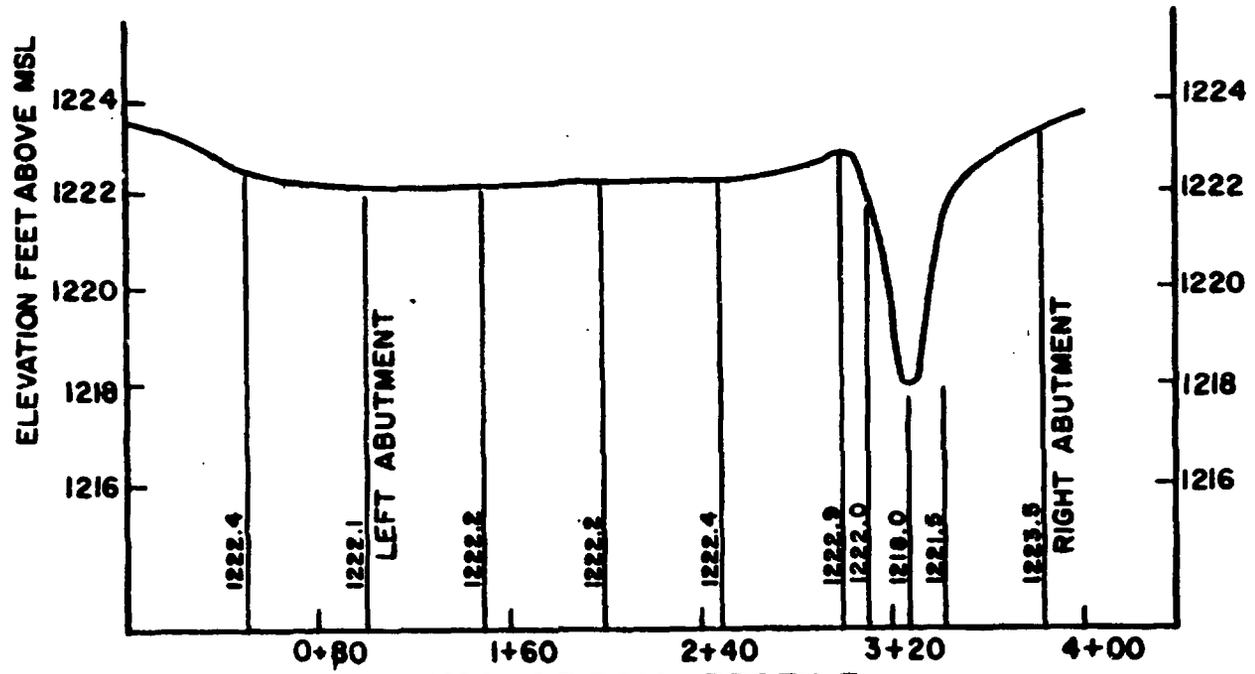
DUCK POND DAM

NORTHEASTERN TECHNICAL CORP.

FIELD SKETCH

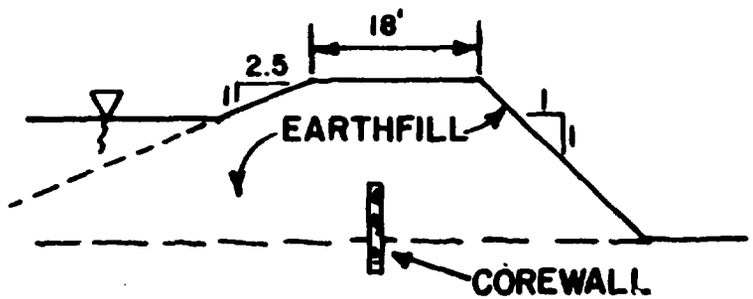
JULY 1981

EXHIBIT A-1



TOP OF DAM - PROFILE

SCALE- HORIZ. 1 IN. = 80 FT.
VERT. 1 IN. = 4 FT.



SECTION

SCALE: 1 IN = 20 FT.

NOTE: SECTION TAKEN AT DAM'S MAXIMUM SECTION

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DUCK POND DAM
NORTHEASTERN TECHNICAL CORP.

PROFILE & SECTION

JULY 1981

EXHIBIT A-2

APPENDIX B

CHECKLIST - ENGINEERING DATA

Appendix B - Engineering Data Checklist

Check List
Design, Construction, Operation
Phase I

Name of Dam: Duck Pond Dam
NDI ID#: PA 00379

ITEM	REMARKS
As-built Drawings	None
Regional Vicinity Map	U.S.G.S Quadrangle, Dalton, Pa - 7.5 Minute See Appendix E, Plate E-II
Construction History	None
Typical Sections of Dam	Cross and Longitudinal Sections of original dam on drawing dated 1930.
Outlets - Plan Details Constraints Discharge Ratings	Section of original outlet channel & location of original outlet shown on drawing dated 1930.
Rainfall/Reservoir Records	None

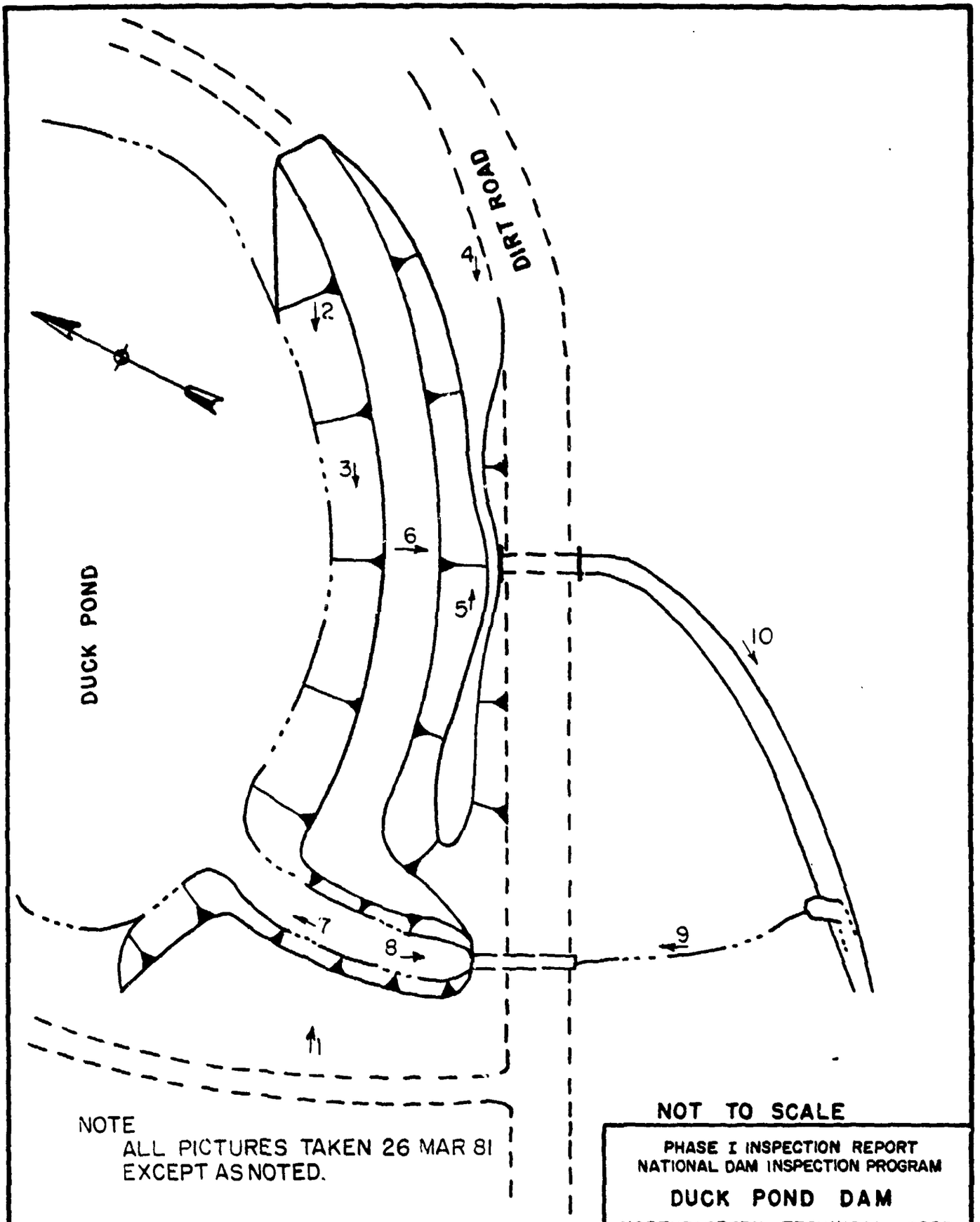
ITEM	REMARKS
Design Reports	None
Geology Reports	None
Design Computations Hydrology & Hydraulics Dam Stability Seepage Studies	None
Post-Construction Surveys of Dam	None reported
Borrow Sources	No Data

ITEM	REMARK
Monitoring Systems	None
Modifications	Dam and spillway recently regraded, and fill added
High Pool Records	None
Post-Construction Engineering Studies and Reports	None
Prior Accidents or Failure of Dam Description Reports	Unknown
Maintenance Operation Records	None

ITEM	REMARK
Spillway Plan Sections Details	Limited detail of original spillway on drawing dated 1930
Operating Equipment Plans & Details	None
Specifications	None
Miscellaneous	Permit application report and related correspondence, 1930-1931 PennDER insp. report dated 11 Sept 1957

APPENDIX C

PHOTOGRAPHS



NOTE
ALL PICTURES TAKEN 26 MAR 81
EXCEPT AS NOTED.

← LOCATION AND ORIENTATION OF CAMERA
3 PHOTOGRAPH IDENTIFICATION NUMBER

NOT TO SCALE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DUCK POND DAM

NORTHEASTERN TECHNICAL CORP.

PHOTOGRAPH LOCATION
PLAN

JULY 1981 EXHIBIT C-1

1. Crest and upstream face. Spillway in foreground (5 Nov 80).

2. Upstream face and right abutment.

3. [illegible] 5 Nov 80.

4. [illegible]
[illegible] 5 Nov 80.

5. Downstream face near maximum section.

6. Collapsing roadway box culvert (5 Nov 80).

7. Spillway approach and entrance.

8. 36 inch diameter concrete pipe at end of spillway channel. Note irregular riprap.

9. Erosion at outlet of 36-inch concrete pipe.

10. Downstream channel 700 feet below dam (5 Nov 80).

APPENDIX D

HYDROLOGY AND HYDRAULICS

BALTIMORE DISTRICT, CORPS OF ENGINEERS — PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS DUCK POND DAM — SHEET 1 OF ____ SHEETS

COMPUTED BY JPB — CHECKED BY ____ — DATE 5-7-81

DAM CLASSIFICATION:

SIZE OF DAM - SMALL
HAZARD - SIGNIFICANT
REQUIRED SDF - 100 YEAR FLOOD TO ½ PMF

DAM STATISTICS

HEIGHT OF DAM -	16.6 FEET
STORAGE AT NORMAL POOL -	125 AC-FT
STORAGE AT TOP OF DAM -	170 AC-FT
DRAINAGE AREA ABOVE DAMSITE -	0.75 mi^2

ELEVATIONS:

TOP OF DAM LOW POINT (FIELD) -	1222.0
NORMAL POOL -	1218.0
SPILLWAY CREST -	1218.0
STREAMBED AT TOE -	1205.4

HYDROGRAPH PARAMETERS:

RIVER BASIN - SUSQUEHANNA RIVER BASIN
ZONE - II
SNYDER COEFFICIENT
C_p = 0.62
C_t = 1.50

MEASURED PARAMETERS *
L = LENGTH OF LONGEST WATERCOURSE — L = 1.55
L_{CA} = LENGTH OF LONGEST WATERCOURSE TO CENTROID OF BASIN — L_{CA} = 0.85

* FROM U.S.G.S. QUAD SHEET ENTITLED DALTON, Pa. 7½ MINUTE SERIES, SCALE 1:24,000

NAEDS FORM 1232, 26 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS DUCK POND DAM SHEET 2 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 5-7-81

NOTE: ELEVATIONS ARE REFERENCED TO TOPOGRAPHIC DATA. SPILLWAY CREST WAS ASSUMED TO BE AT ELEVATION 1218. ALL ELEVATIONS WERE REFERENCED TO THIS VALUE.

t_p = SYNDER BASIN LAGTIME, HOURS

$t_p = C_t(LL_{CA})^{0.3}$; $t_p = 1.5(1.55(0.83))^{0.3} = 1.62$ HOURS

RESERVOIR CAPACITY:

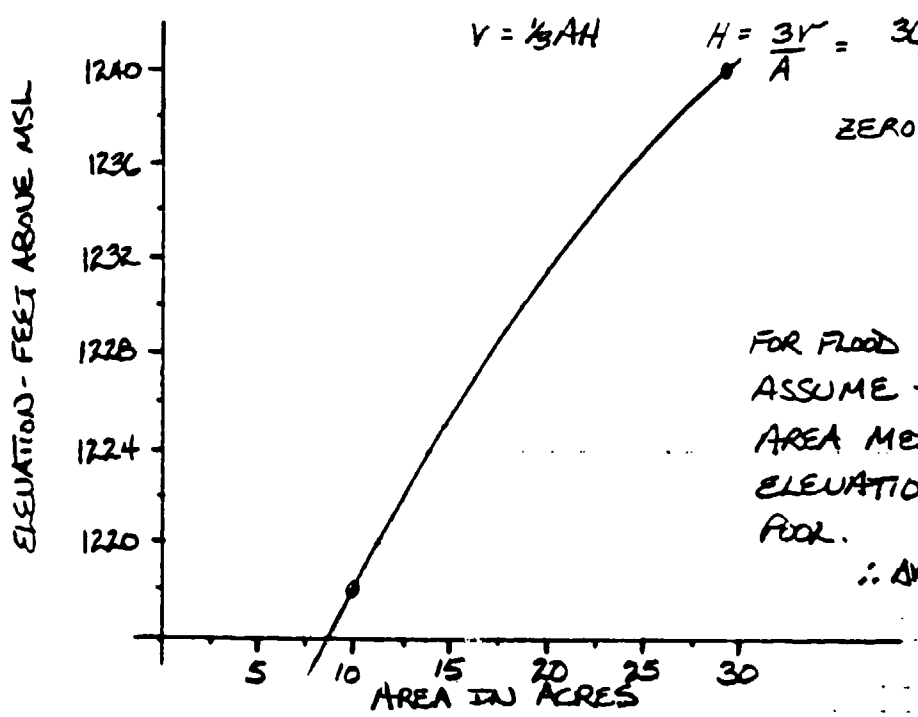
SURFACE AREA AT SPILLWAY CREST - 10 ACRES
SURFACE AREA AT ELEVATION 1240 - 29 ACRES

ASSUME CONICAL METHOD APPLIES TO FIND LOW POINT IN POOL, BELOW SPILLWAY CREST (EL. 1218)

VOLUME AT SPILLWAY CREST - 100 AC-FT.
(FROM PENNDER FILES, 32 MILLION GALLONS)

$V = \frac{1}{3}AH$ $H = \frac{3V}{A} = \frac{3(100\text{-FT})}{10\text{AC}} = 30$ FEET

ZERO STORAGE AT ELEVATION:
1218-30 = 1188



FOR FLOOD ROUTING PURPOSES, ASSUME THE AVERAGE END AREA METHOD IS SUITABLE TO ELEVATIONS ABOVE STARTING POOL.

$\therefore \Delta V = \left(\frac{A_1 + A_2}{2}\right)\Delta H$

NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS DUCK POND DAM SHEET 3 OF SHEETS

COMPUTED BY JPC CHECKED BY DATE 5-7-81

ELEVATION - STORAGE TABLE :

ELEVATION (MSL)	AREA (ACRES)	ΔH (FT)	$\Delta V = \left(\frac{A_1 + A_2}{2}\right)\Delta H$ (AC-FT)	CUMULATIVE VOLUME (AC-FT)
1188	0	—	—	0
1218	10	-	125	125
1219	11	1.0	10.5	135.5
1220	11.5	1.0	11.25	146.75
1221	12.1	1.0	11.55	158.30
1222 (TOD)	12.7	1.0	12.40	170.70
1223	13.4	1.0	13.05	183.75
1224	14.1	1.0	13.75	197.50
1225	15.0	1.0	14.55	212.05
1230	19.0	5.0	8500	297.05

NOTE: DRAINAGE AREA ABOVE DAM IS 0.75 mi^2

ELEVATION (MSL)	STORAGE (AC-FT)
1188	0
1218	125
1219	135
1220	147
1221	158
1222 (TOD)	170
1223	184
1224	198
1225	212
1230	297

NAEB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS DUCK POND DAM SHEET 4 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 5-7-81

SDF: BASED ON THE SMALL HEIGHT OF DAM AND THE SMALL STORAGE, THE SDF SELECTED FOR THIS POND WAS THE 100 YEAR FLOOD. THIS IS IN ACCORDA WITH THE GUIDENCE PROVIDED.

∴ USE SDF = 100 YEAR FLOOD.

PMP CALCULATION:

SINCE THE SDF SELECTED FOR THIS POND HAS BEEN THE 100 YEAR FLOOD, NO CALCULATIONS ARE NECESSA TO COMPUTE THE PROBABLE MAXIMUM PRECIPATATION (PMF) OR PROBABLE MAXIMUM FLOOD (PMF).

NADB FORM 1232, 28 MAR 74

EMERENGCY SPILLWAY CAPACITY:

NOTE: SPILLWAY IS LOCATED NEAR RIGHT ABUTMENT. SEE FIELD SKETCH IN APPENDIX A, EXHIBIT 1 AND PHOTOGRAPHS IN APPENDIX C.

SPILLWAY DATA:

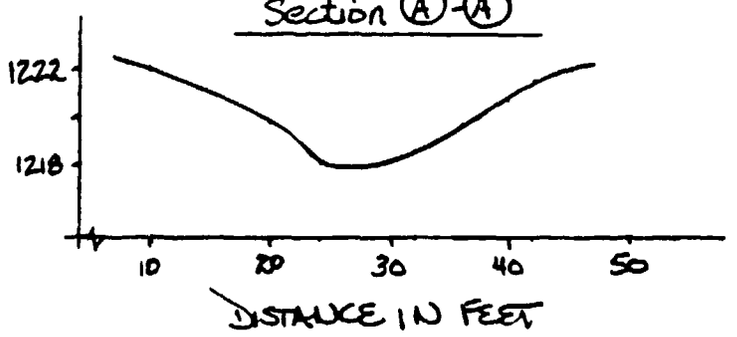
TYPE- TRAPEZODIAL SHAPED BROAD CRESTED WEIR

LENGTH- BOTTOM WIDTH- 8 FEET
TOP WIDTH - 22 FEET

CREST ELEVATION - 1218.0 MSL
LOW POINT TOP OF DAM - 1222.0 MSL
SPILLWAY FREEBOARD - 4.0 FEET
C VALUES SPILLWAY - 2.85
EMBANKMENT - 2.85

SPILLWAY SKETCH:

Section Ⓐ-Ⓐ ⊛

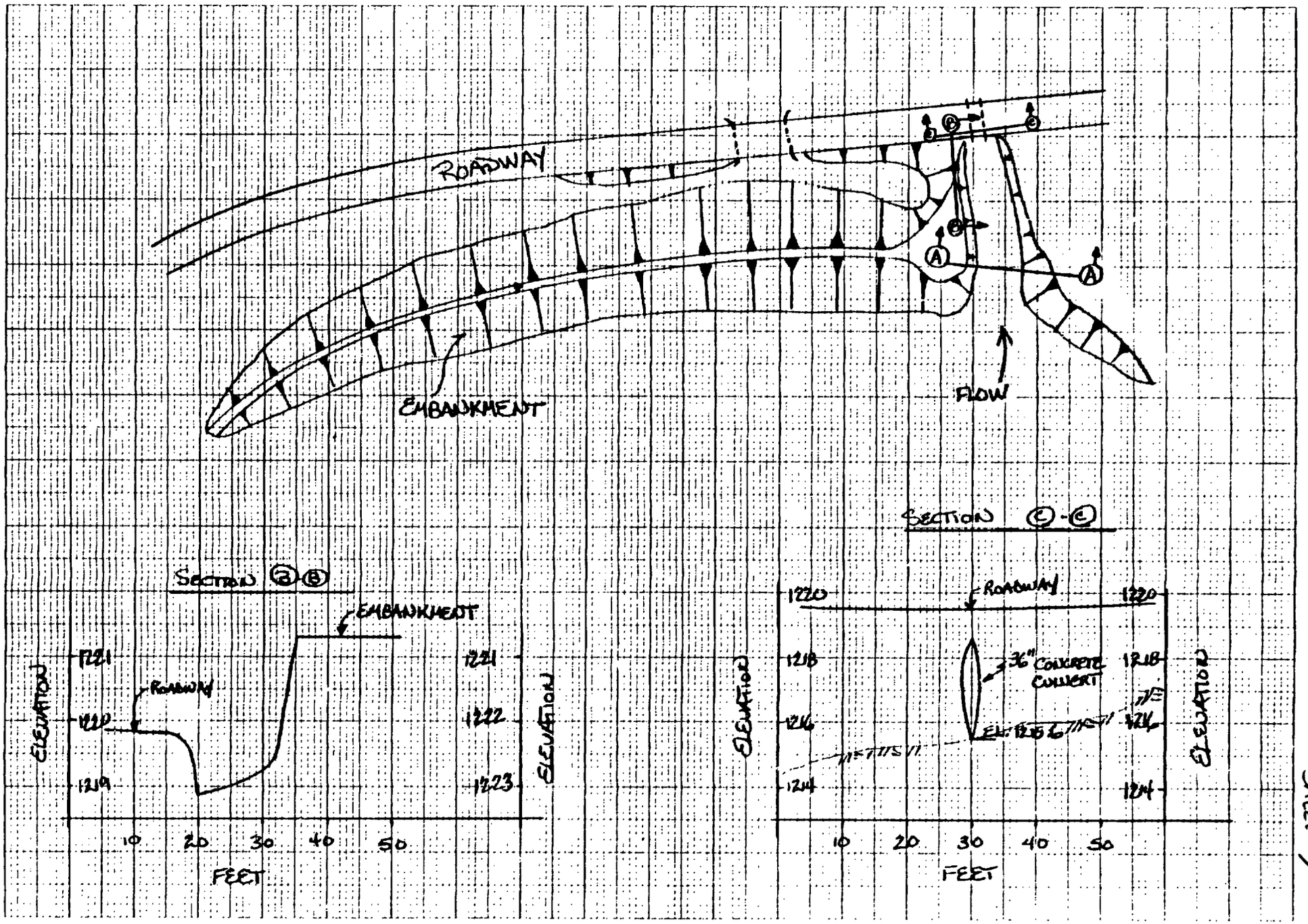


SEE SKETCH ON FOLLOWING PAGE FOR A BETTER UNDERSTANDING OF THIS FACILITY.

DUE TO THE UNUSUAL CONFIGURATION OF THE SPILLWAY, OUTLET PIPE AND LOW AREA ADJACENT TO THE EMBANKMENT, THE FOLLOWING VALUES ARE CALCULATED TO DETERMINE THE PEAK DISCHARGE CAPACITY OF THE SPILLWAY.

⊛ SEE NEXT PAGE FOR LOCATION OF CROSS SECTION.

NADB FORM 1232, 28 MAR 74



DUCK POND DAM

Sheet 6/

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS DUCK POND DAM SHEET 7 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 5-8-81

SPILLWAY RATING CURVE:

THIS ANALYSIS ASSUMES THAT THE SPILLWAY BEHAVES AS A BROAD-CRESTED WEIR. DISCHARGE CAN BE ESTIMATED BY:

$$Q = C L_T H_W^{3/2}$$

where: Q = DISCHARGE THRU SPILLWAY
L_T = Top width of WEIR
H_W = WEIGHTED HEAD, IN FEET, AVERAGE FLOW AREA
C = COEFFICIENT DISCHARGE

$C = 2.85$ from VARNELL & NAGLER FOR BROAD-CRESTED WEIR

TOP WIDTH OF SPILLWAY VS. RESERVOIR ELEVATION:

RESERVOIR ELEVATION (MSL)	TOP WIDTH (ft)
1218	0
1219	12
1220	16
1221	24
1222 *	30
1225 *	30
1230 *	30

* MAXIMUM TOP WIDTH OF SPILLWAY.

NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS — PAGE

SUBJECT: DAM SAFETY ANALYSIS

COMPUTATIONS: DUCK POND DAM — SHEET 8 OF ____ SHEETS

COMPUTED BY: JMB — CHECKED BY: ____ — DATE: 5-11-81

RESERVOIR ELEV. (MSL)	L_1 (Ft)	L_2 (Ft)	INCREMENTAL HEAD, H_i (Ft)	① INCREMENTAL FLOW AREA, A_i (Ft^2)	TOTAL FLOW AREA, A_T (Ft^2)	② WEIGHTED HEAD, H_W (Ft)	③ Q (CFS)
1218	0	-	-	-	-	-	0
1219	12	0	1.0	6.0	6.0	0.5	12.1
1220	16	12	1.0	14.0	20.0	1.25	63.7
1221	24	16	1.0	20.0	40.0	1.66	146.3
1222 (TOD)	30	24	1.0	27.0	67.0	2.23	284.7
1225	30	30	3.0	90.0	157.0	5.23	1022.6
1230	30	30	5.0	150.0	307.0	10.23	2797.6

① $A_i = [(L_1 + L_2)/2]\, H_i$

② $H_W = A_T / L_1$

③ $Q = C L_1 H_W^{3/2}$

$C = 2.85$

(TOD) = TOP OF DAM

THEREFORE, SPILLWAY RATING:

RESERVOIR ELEVATION (MSL)	Q (CFS)
1218	0
1219	12
1220	64
1221	146
1222	280
1225	1020
1230	2800

NOW, COMPARE THESE VALUES AGAINST BACKWATER VALUES FROM 36 INCH CONCRETE CONDUIT AND LOW LYING AREA ADJACENT TO TOE OF EMBANKMENT.

NADB FORM 1232, 28 MAR 74

DOWNSTREAM BACKWATER:

OUTFLOW THROUGH LOW LYING AREA ADJACENT TO SPILLWAY AND TOE OF EMBANKMENT. (SECTION ⑧ ⑮)

TOP WIDTH OF LOW AREA VS. RESERVOIR ELEVATION

RESERVOIR ELEVATION (MSL)	TOP WIDTH (ft)
1218.9	0
1219.0	5
1219.5	13
1219.8	18
1220.0	23

C = 2.85

RATING CURVE:

RESERVOIR ELEVATION (MSL)	L_1 (ft)	L_2 (ft)	INCREMENTAL HEAD, H_i (ft)	① INCREMENTAL FLOW AREA, A_i (ft^2)	TOTAL FLOW AREA, A_T (ft^2)	② WEIGHTED HEAD H_W (ft)	③ Q (cfs)
1218.9	0	-	-	-	-	-	0
1219.0	5	0	0.1	0.25	0.25	0.05	0.2
1219.5	13	5	0.5	4.50	4.75	0.36	8.0
1219.8	18	13	0.3	4.65	9.40	0.52	19.2
1220.0*	23	18	0.2	4.10	13.50	0.59	29.7

* - ABOVE THIS VALUE, FLOW OVER ROADWAY

① $A_i = [(L_1 + L_2)/2] H_i$

② $H_W = A_T / L_1$

③ $Q = C L_1 H_W^{3/2}$

NADB FORM 1232, 28 MAR 74

THE RATING THROUGH THE 36 INCH CONCRETE CONDUIT WILL ASSUME INLET CONTROL ONLY. SEE APPENDIX C FOR PHOTOGRAPHS OF DISCHARGE END OF PIPE. ONCE FLOW REACHES ELEVATION 1220.0, FLOW OVER THE ROADWAY WILL BE COMPUTED AS WEIR FLOW. THE SUM OF WEIR FLOW OVER THE ROADWAY, FLOW THROUGH CONDUIT, AND FLOW THROUGH THE LOW LYING AREA WILL BE COMPARED AGAINST THE PREVIOUSLY COMPUTED SPILLWAY RATING CURVE. LOWER OF THE TWO VALUES WILL DOMINATE AND THE RESERVOIR ELEVATION - OUTFLOW CURVE FINALLY DEVELOPED.

INLET CONTROL 1 - 36" CONCRETE CONDUIT D = 3 FEET

POOL ELEV. (MSL)	HW (ft)	HW/D	Q (CFS)
1215.6	-	-	0
1216.0	0.4	0.133	8
1217.0	1.4	0.467	11
1218.0	2.4	0.800	26
1219.0	3.4	1.133	45
1220.0	4.4	1.467	57
1221.0	5.4	1.800	70
1222.0	6.4	2.133	82
1225.0	9.4	3.133	100
1230.0	14.4	4.800	130

NOTE: CONDUIT IS GROOVED AND PROTECTING

SEE CHART 2- IN THIS APPENDIX PAGE D- . TAKEN FROM HYDRAULIC CHARTS FOR SELECTION OF HIGHWAY CULVERTS, U.S. DEPT. OF COMMERCE, BUREAU OF PUBLIC ROADS, DEC 1965.

NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS — PAGE

SUBJECT: DAM SAFETY ANALYSIS

COMPUTATIONS: DUCK POND DAM — SHEET 11 OF ____ SHEETS

COMPUTED BY: JPB — CHECKED BY: ____ — DATE: 5-12-81

WEIR FLOW OVER ROADWAY: C = 2.85

RESERVOIR ELEV (MSL)	L_1 (Ft)	L_2 (Ft)	(1) INCREMENTAL HEAD, H_i (Ft)	(1) INCREMENTAL FLOW AREA, A_i (Ft^2)	TOTAL FLOW AREA, A_T (Ft^2)	(2) WEIGHTED HEAD, H_w (Ft)	(3) Q (CFS)
1220.0	0	-	-	-	-	-	0
1221.0	40	0	1.0	20.0	20.0	0.5	40.3
1222.0	50	40	1.0	45.0	65.0	1.3	211.2
1225.0	90	50	3.0	180.0	245.0	3.5	1306.3
1230.0	100	70	5.0	425.0	670.0	6.7	4942.2

(1) $A_i = [(L_1 + L_2)/2] H_i$

(2) $H_w = A_T / L_1$

(3) $Q = C L_1 H_w^{3/2}$

TOTAL OUTFLOW FOR SPILLWAY: SPILLWAY OUTFLOW VS DOWNSTREAM CONDITIONS

RESERVOIR ELEVATION (MSL)	(A) $Q_{LOW\ AREA}$ (CFS)	(B) $Q_{CONDUIT}$ (CFS)	(C) $Q_{ROADWAY}$ (CFS)	(D) Q_{TOTAL} (CFS)	(E) Q_{SPILL} (CFS)	(F) Allowable Q (CFS)
1215.6	0	0	0	0	0	0
1218.0	0	26	0	26	0	0
1219.0	0.2	45	0	45	12	12
1220.0	30.0	57	0	87	64	64
1221.0	30.0	70	40	140	146	140
1222.0 (TOP)*	30.0	82	211	323	280	280
1225.0	30.0	100	1306	1436	1020	1020

Column (A) - from previous table

Column (B) - from previous table

Column (C) - from previous table

Column (D) - Sum of columns (A)+(B)+(C)

Column (E) - from previous table

Column (F) - Smaller value of either column (D) or (E)

*TOP = TOP OF DAM

MADB FORM 1232, 28 MAR 74

100 YEAR FLOOD ANALYSIS:

THE SELECTED SDF FOR DUCK POND DAM HAS BEEN THE 100 YEAR FLOOD. THIS IS BASED ON THE SIZE OF THE DAM AND THE HAZARD CATAGOREY OF THE DAM.

TO DEVELOP THE 100 YEAR FLOOD, TWO REGRESSION EQUATIONS WILL BE USED TO DETERMINE THE PEAK VALUE. THE AVERAGE OF THE TWO REGRESSION PEAKS WILL BE THE 100 YEAR FLOOD PEAK USED IN THIS ANALYSIS.

BULLENTIN 13 FLOOD PEAK:

FROM PLATE 1 - DUCK POND DAM IS IN REGION 2.

∴ THE REGRESSION EQUATION IS

$$Q_T = cA^x$$

where:

Q_T = PEAK FLOW FOR RETURN PERIOD T, IN YEARS
C = REGRESSION CONSTANT
A = DRAINAGE AREA IN SQUARE MILES
X = REGRESSION COEFFICIENT

RECALL DRAINAGE AREA = $0.75\ mi^2$

FOR 100 YEAR ANALYSIS:

$T = 100$ $A = 0.75\ mi^2$
$c = 564$ $X = 0.744$

$$Q_{100} = cA^x = 564(0.75)^{0.744} = 455.3\ cfs$$

$\therefore Q_{100} \approx 455\ cfs$ FROM BULLENTIN 13

NOW, COMPUTE THE 100 YEAR FLOOD PEAK FROM HYDROLOGIC STUDY - TROPICAL STORM AGNES, NORTH ATLANTIC DIVISION, 1975

NADB FORM 1232, 28 MAR 74

$$Log(Q_m) = C_m + 0.75 \log(A)$$

where: C_m = a map coefficient for mean log of annual peaks
Q_m = geometric mean of annual flood peaks, in CFS
A = drainage area in square miles

FROM FIGURE 21; $C_m = 2.15$

$$\therefore Log(Q_m) = 2.15 + 0.75 \log(0.75)$$

$$\log(Q_m) = \underline{2.0563}$$

now, compute the standard deviation

$$S = C_s - 0.05 \log(A)$$

where: S = STANDARD DEVIATION
C_s = a map coefficient for standard deviation

FROM FIGURE 22; $C_s = 0.35$

$$S = 0.35 - 0.05(\log(0.75))$$

$$\underline{\underline{S = 0.3563}}$$

now compute the 100 YEAR FLOOD PEAK from the following

$$Log(Q_{(p)}) = \log(Q_m) + K(P,g)\,S$$

where: $\log(Q_{(p)})$ = log of the annual flood peaks for a given EXCEEDENCE FREQUENCY
$\log(Q_m)$ = mean logarithm of annual flood peaks
$K(P,g)$ = STANDARD DEVIATE for a given EXCEEDENCE frequency (P) AND SKEW COEFFICIENT (g)
S = STANDARD DEVIATION, LOGS OF ANNUAL PEAKS

$\therefore$ WE NEED TO HAVE SKEW COEFFICIENT, FROM FIGURE 23

$$g = 0.30$$

$K(P,g) = 2.55$

THIS IS AN INTERPOLATED VALUE FROM EXHIBIT 39 - STATISTICAL METHODS IN HYDROLOGY, LEO R. BEARD, JAN. 1962.

$$\log(Q_{(P,)}) = \log(Q_m) + K(P,g)S$$

$$\therefore \log(Q_{100}) = 2.0563 + (2.55)(0.3563)$$

$$\log(Q_{100}) = 2.9649$$

$$Q_{100} = 922.4$$

THEREFORE, $Q_{100} = 920$ CFS FROM TROPICAL STORM AGNES REPORT, NORTH ATLANTIC DIVISION.

Now, Compute the 100 YEAR FLOOD PEAK BY AVERAGING the two regression EQUATIONS.

$$\therefore Q_{100} = \frac{455.3 + 922.4}{2} = 688.9$$

$$\therefore Q_{100} \cong 690 \text{ CFS}$$

SPILLWAY ADEQUACY:

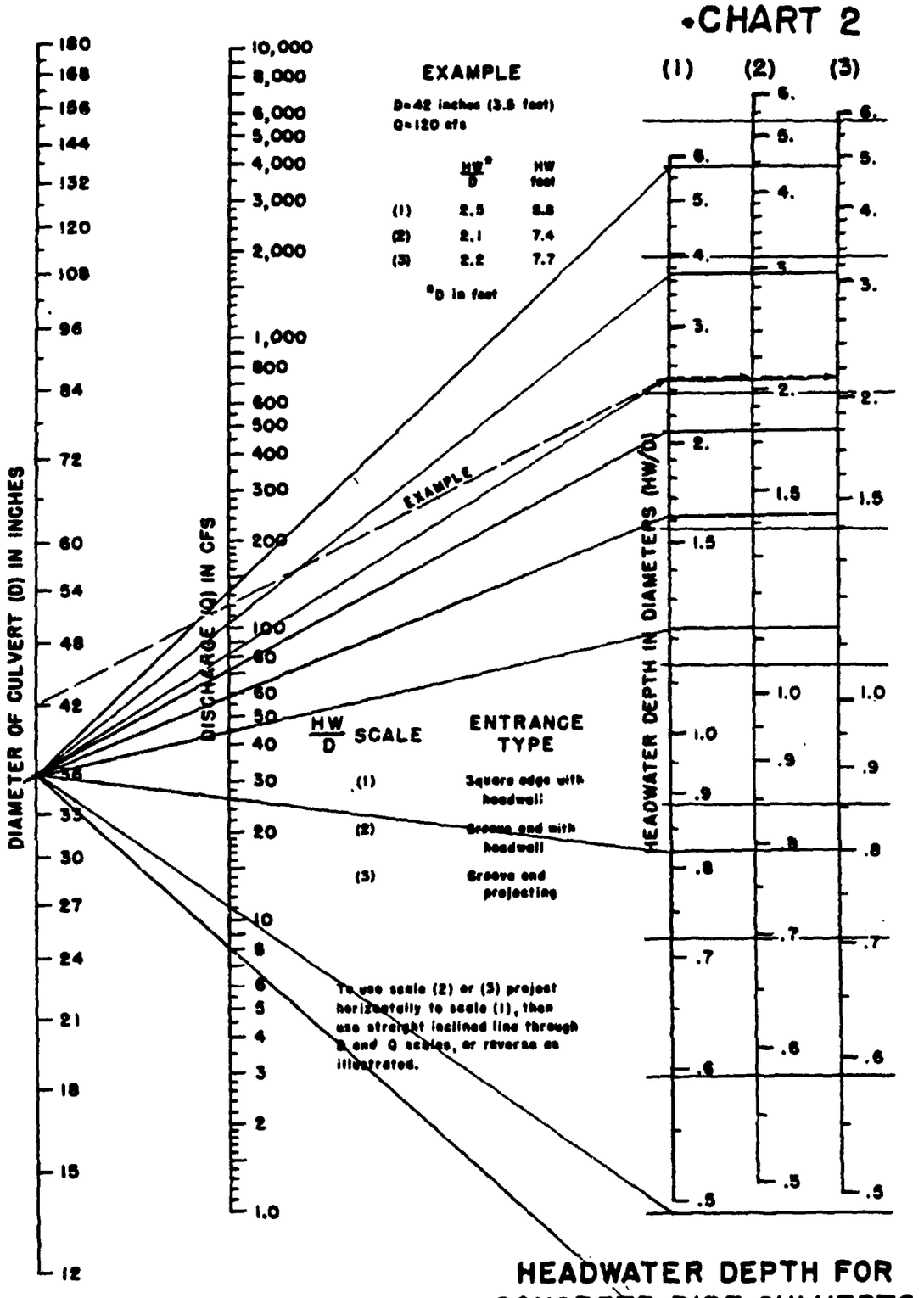
THE SPILLWAY IS CONSIDERED ADEQUATE IF THE MAXIMUM OUTFLOW THROUGH THE SPILLWAY AT LOW POINT TOP OF DAM IS GREATER THAN THE Q_{100} PEAK CALCULATED ABOVE. THEREFORE,

MAXIMUM OUTFLOW AT TOP OF DAM = 280 CFS
MAXIMUM INFLOW FOR 100 YEAR FLOOD = 690 CFS

SINCE, THE MAXIMUM INFLOW IS GREATER THAN THE MAXIMUM OUTFLOW, THE SPILLWAY IS RATED INADEQUATE

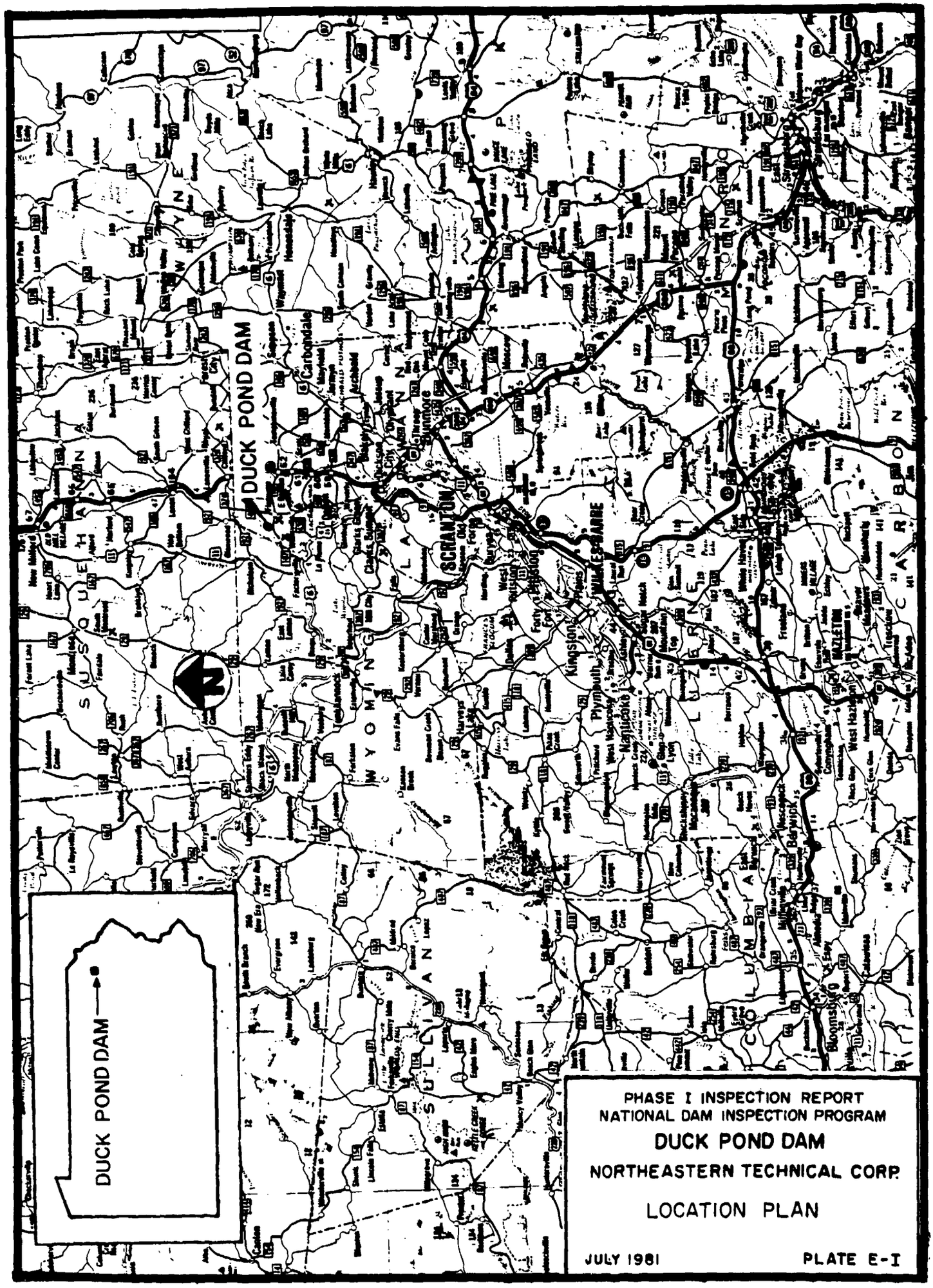
NADB FORM 1232, 28 MAR 74

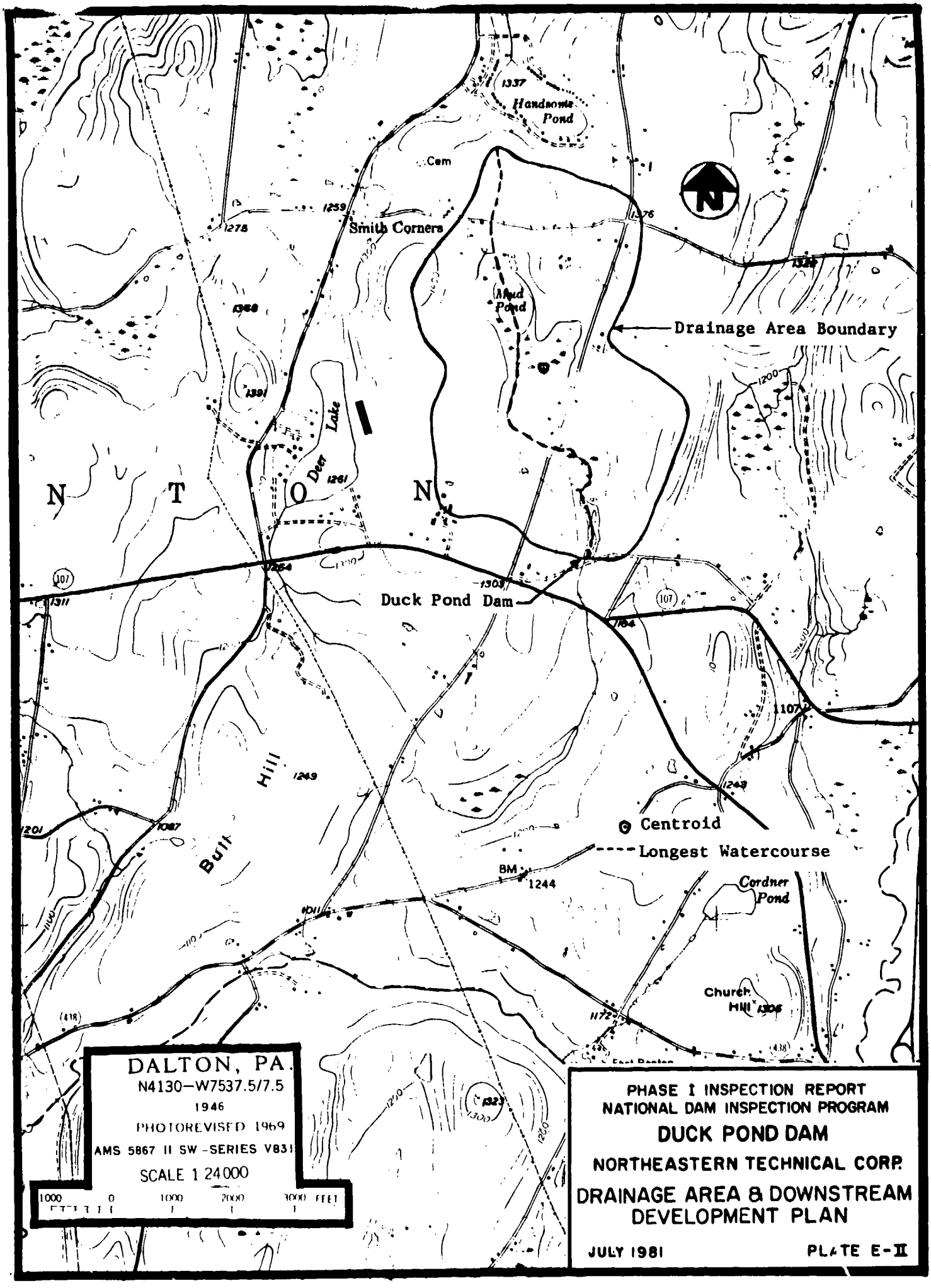
DUCK POND DAM



APPENDIX E

PLATES


DUCK POND DAM
Carbondale
SCRANTON
WILKES-BARRE
Kingston
Plymouth
Nanticoke
Bloomsburg
SUSQUEHANNA
WYOMING
LACKAWANNA
LUZERNE
COLUMBIA
SULLIVAN
DUCK POND DAM
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
DUCK POND DAM
NORTHEASTERN TECHNICAL CORP.
LOCATION PLAN
JULY 1981
PLATE E-I


Handsome Pond
Smith Corners
Mud Pond
Drainage Area Boundary
Deer Lake
Duck Pond Dam
Centroid
Longest Watercourse
Bull Hill
BM 1244
Cordner Pond
Church Hill
DALTON, PA.
N4130—W7537.5/7.5
1946
PHOTOREVISED 1969
AMS 5867 II SW-SERIES V831
SCALE 1 24000
1000 0 1000 2000 3000 FEET
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
DUCK POND DAM
NORTHEASTERN TECHNICAL CORP.
DRAINAGE AREA & DOWNSTREAM DEVELOPMENT PLAN
JULY 1981
PLATE E-II

LOCATION PLAN

'X' HEADWATERS SOUTH BRANCH OF THE TUNKHANNOCK CREEK

IN

BENTON TOWNSHIP, LACKAWANNA, COUNTY

ON THE FARM KNOWN AS THE

OWNER DR. J. B. CORSER.

ADDRESS 348 WYOMING, AVE.

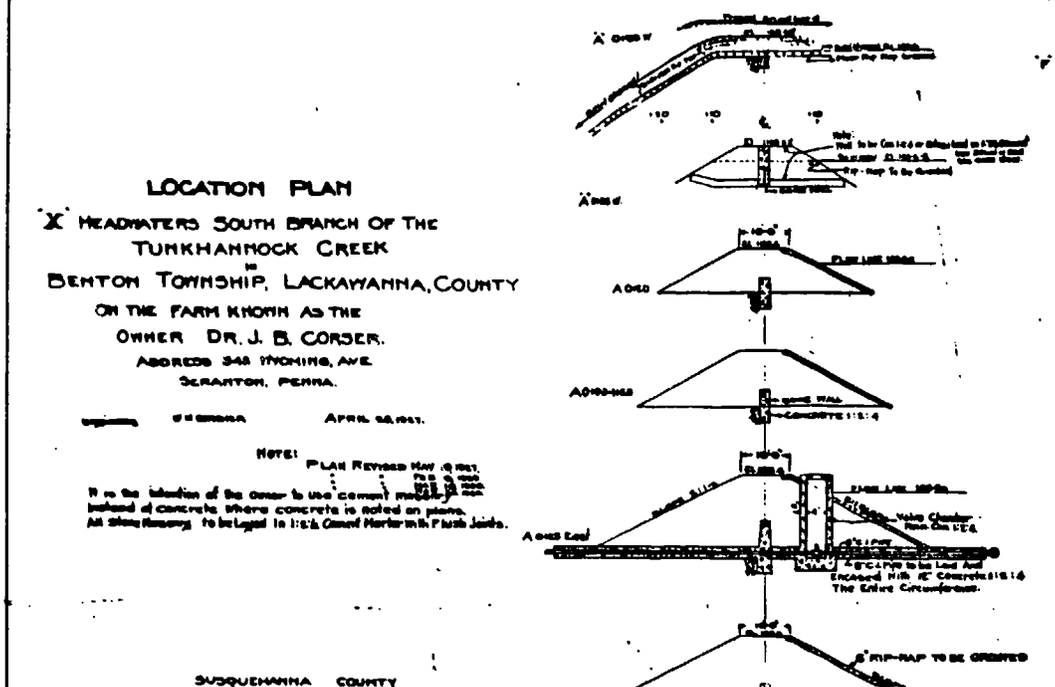
SCRANTON, PENNA.

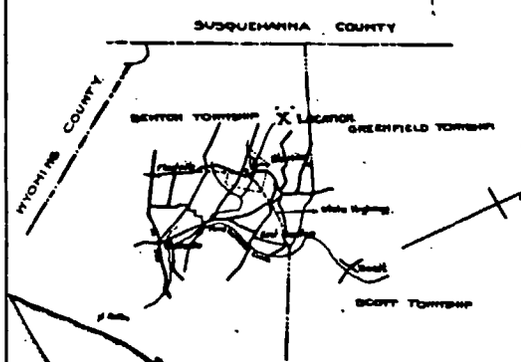
APRIL 28, 1921.

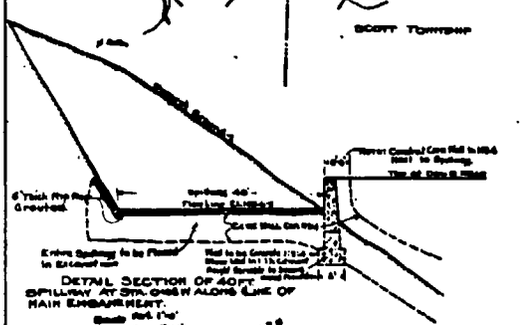
NOTE: PLAN REVISED MAY 19 1921.

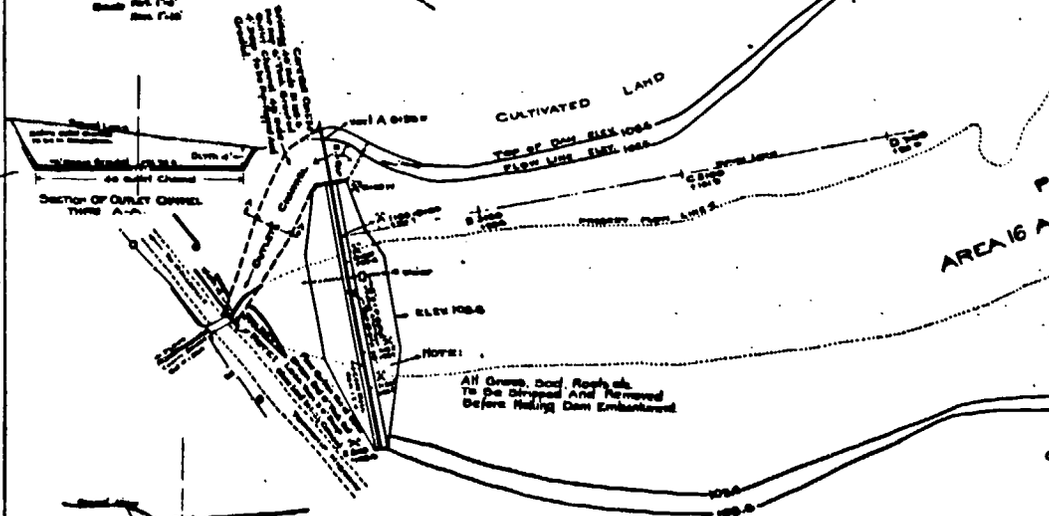
It is the intention of the owner to use cement mortar instead of concrete, where concrete is noted on plans.

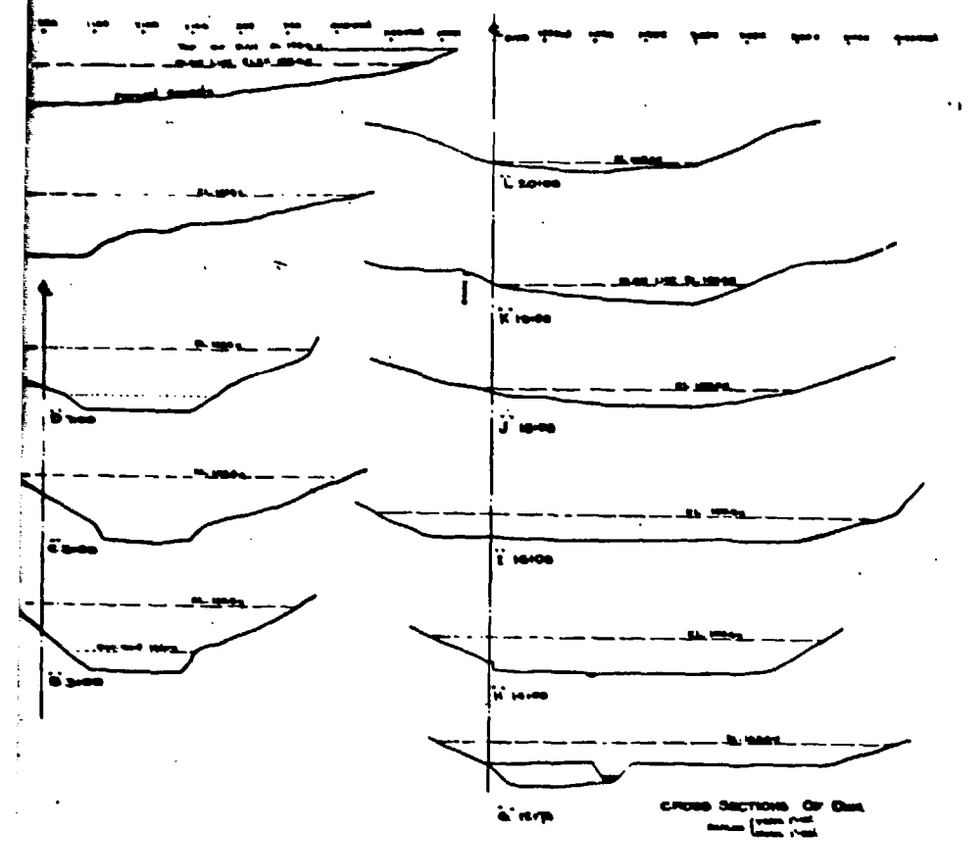
All Stone Masonry to be Laged in 1:2½ Cement Mortar with Flush Joints.



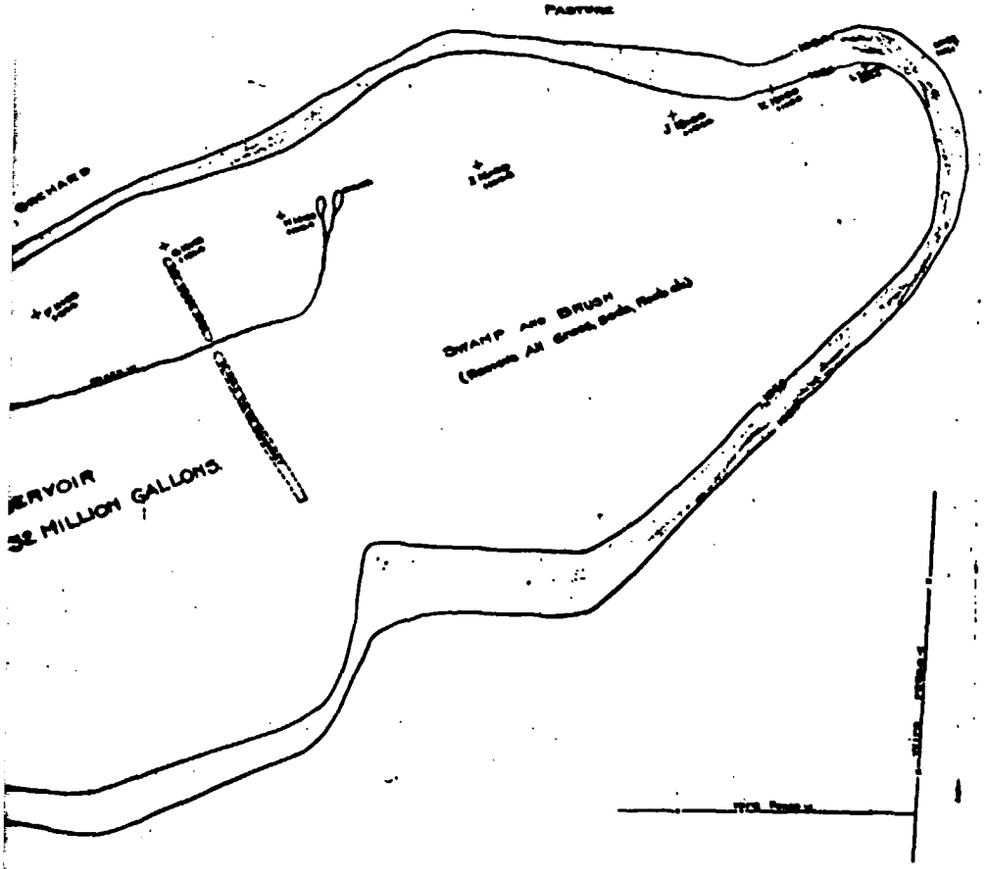








CROSS SECTIONS OF DAM



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DUCK POND DAM

NORTHEASTERN TECHNICAL CORP

JULY 1981 PLATE E-

APPENDIX F

GEOLOGY

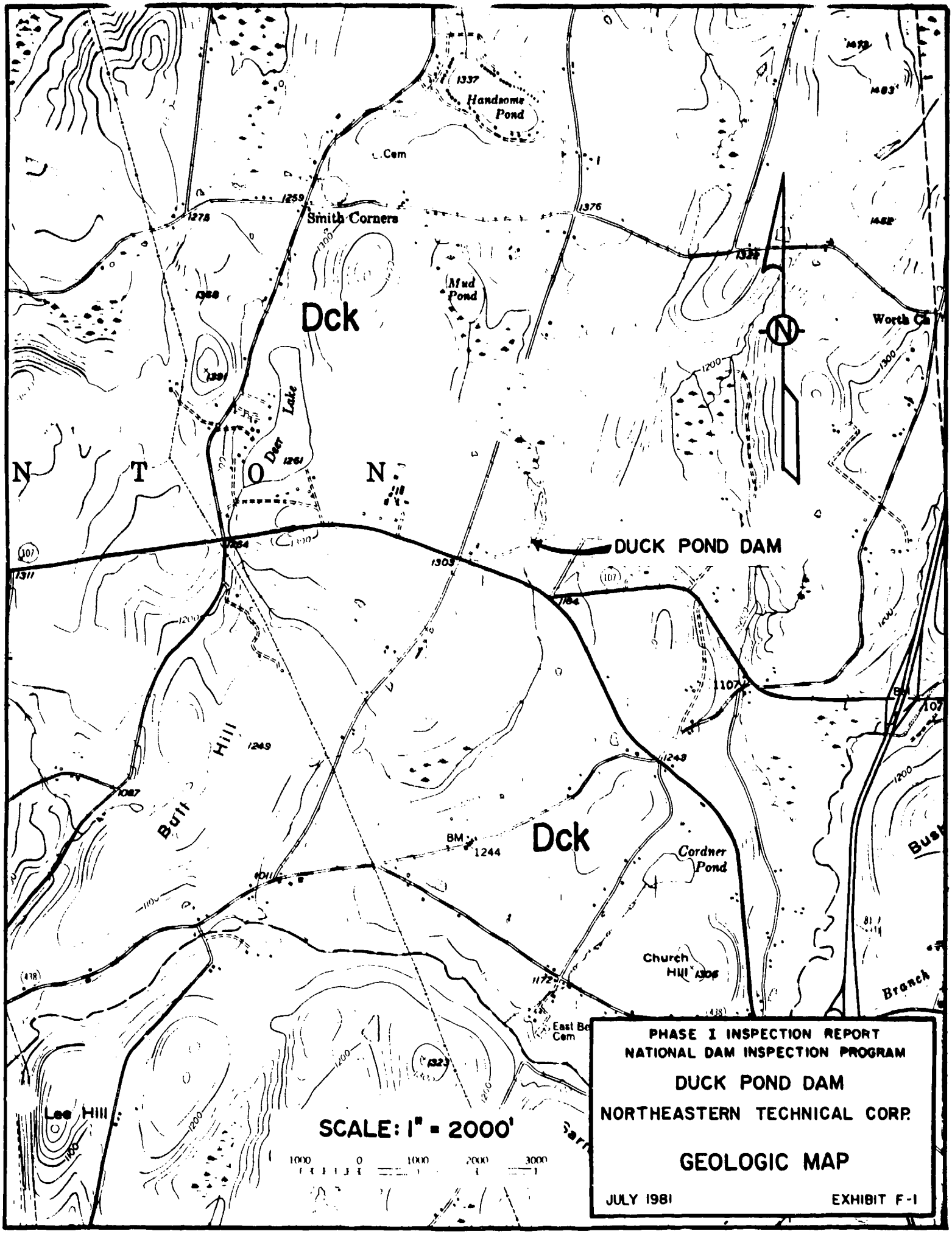
GENERAL GEOLOGY

The bedrock at Duck Pond Dam is of the Catskill Formation. Overlying the bedrock should be some Late Wisconsinan glacial drift. In and around the lakes in this area, the glacial drift may be over 2m thick. Peat deposits are believed to underlie portions of the lake.

Legend

(Bedrock)

Dck CATSKILL FORMATION UNDIVIDED - Succession of grayish - red sandstone, siltstone, and shale, generally in fining - upward cycles; some gray sandstone and conglomerate.


Handsome Pond
Smith Corners
Mud Pond
Dck
Deer Lake
N O R T H
DUCK POND DAM
Burt Hill
BM 1244
Dck
Cordner Pond
Church Hill
Lee Hill
SCALE: 1" = 2000'
1000 0 1000 2000 3000
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
DUCK POND DAM
NORTHEASTERN TECHNICAL CORP.
GEOLOGIC MAP
JULY 1981
EXHIBIT F-1