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CORPS OF ENGINEERS BALTIMORE MD BALTIMORE DISTRICT  
NATIONAL DAM INSPECTION PROGRAM. BRONSON POND DAM (NDI ID NUMBE--ETC(U)  
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DELAWARE RIVER BASIN  
TRIBUTARY TO MIDDLE CREEK, WAYNE COUNTY

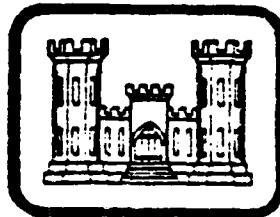
PENNSYLVANIA

# BRONSON POND DAM

NDI ID NO. PA-00143  
DER ID NO. 64-42

MR. HAYDEN M. BAGNICK

## PHASE I INSPECTION REPORT NATIONAL DAM INSPECTION PROGRAM



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DELAWARE RIVER BASIN  
MIDDLE CREEK, WAYNE COUNTY  
PENNSYLVANIA

(6) National Dam Inspection Program.

Number 2

BRONSON POND DAM  
(NDI ID ~~PA~~ 00143  
DER ID ~~PA~~ 64-42)

HAYDEN M. BAGNICK

Delaware River Basin,  
Middle Creek, Wayne County,  
Pennsylvania. Phase I  
Inspection Report.

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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

Prepared By:

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

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plates. All DTIC reproduct-  
ions will be in black and  
white"

(11) FEBRUARY 1981

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## 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.

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 Justification

NDI ID No. PA-00143 DER ID No. 64-42

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

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C	Photographs.
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E	Plates.
F	Geology.

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION  
AND  
RECOMMENDED ACTION

NAME OF DAM: Bronson Pond Dam  
NDI ID No. 00143  
DER ID No. 64-42

SIZE: Small (8.3 feet high; 385 acre-feet)

HAZARD CLASSIFICATION: Significant

OWNER: Mr. Hayden M. Bagnick  
RD #2  
Waymart, Pennsylvania 18472

STATE LOCATED: Pennsylvania

COUNTY LOCATED: Wayne

STREAM: Middle Creek

DATE OF INSPECTION: 4 November 1980

The visual inspection and review of available design and construction information indicate that Bronson Pond Dam is in fair condition. The primary deficiency noted during the inspection was the lack of any spillway or outlet facilities for the dam. Based on the size and hazard classification of the dam, the recommended Spillway Design Flood (SDF) varies between the 100-year flood and one-half the Probable Maximum Flood (PMF). Based on the size of the dam and reservoir, and the downstream conditions, the 100-year flood has been selected as the SDF.

The hydrologic and hydraulic computations indicate that the combinations of reservoir storage and overflow discharge capacity pass the 100-year flood without overtopping the dam. For this reason, the overflow capacity for Bronson Pond Dam is considered to be inadequate.

## BRONSON POND DAM

The following studies and remedial measures are recommended to be undertaken by the owner, in approximate order of priority, without delay:

(1) Retain a qualified professional engineer to further assess measures required to provide adequate spillway capacity and evaluate the need for providing a drawdown facility for the dam.

(2) Periodically monitor the seepage through the dam and take appropriate remedial action should any significant change in the flow rate or turbidity occur.

(3) Establish uniform profile and width for the dam crest.

(4) Develop a formal surveillance and downstream emergency warning system for use during periods of heavy or prolonged precipitation.

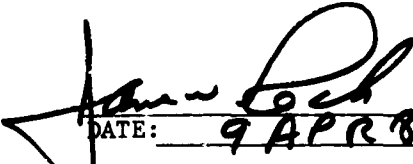
(5) Prepare an operation and maintenance manual or plan for use as a guide in the operation of the dam during normal and emergency conditions.

(6) Develop and implement a schedule of regular inspections by a qualified engineer.

APPROVED BY:

DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT, CORPS OF ENGINEERS

DATE: 9 APR 81

  
JAMES W. PECK  
Colonel, Corps of Engineers  
District Engineer

BRONSON POND DAM



Overview  
V



PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRONSON POND DAM

NDI ID NO. PA 00143

DER ID NO. 64-42

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.

Note: The U.S.G.S. Quadrangle Sheet (Waymart, PA) indicates a reservoir elevation of 1403, which is used in this report as normal pool elevation.

Bronson Pond Dam is an earth and rockfill structure approximately 8 feet high and 100 feet in length. The dam was constructed at the outlet of a natural lake, with no spillway or other outlet facilities.

Available records indicate the dam was originally constructed as it now appears (without spillway). The owner has been adding random rockfill to the downstream face periodically over the last 55-60 years. All normal inflow currently passes over or through the rockfill structure.

b. Location. South Canaan Township, Wayne County

U.S.G.S. Quadrangle - Waymart, PA

Latitude 41° 31.5'

Longitude 75° 26.2'

Ref. Appendix E, Plate I & II

c. Size Classification. Small: Height - 8.3 feet

Storage - 385 Acre-feet

d. Hazard Classification. Significant (Refer to Section 3.1.E)

e. Ownership. Mr. Hayden M. Bagnick

R.D. #2

Waymart, Pennsylvania 18472

f. Purpose. Recreation

g. Design and Construction History. No information on the original design and construction of the dam are known to exist other than the fact that it was built prior to 1913. The current owner and available records indicate that stone fill has been added to the downstream face on a periodic basis; however, there are no records of any other modifications being made to the dam.

h. Normal Operating Procedure. The reservoir is normally maintained at or near top of dam. Inflow occurring when the lake is at or above top of dam passes over and through the rockfill embankment.

1.3 Pertinent Data.

a. Drainage Area. (square miles)

From files:	3.0
Computed for this report:	2.4
Use:	2.4

b. Discharge at Damsite. (cfs)

Maximum known flood	Unknown
Spillway at maximum pool	N/A

c. Elevation. (feet above msl.)

Note: Reservoir elevation of 1403 shown on Waymart, PA  
U.S.G.S. quadrangle is used as normal pool elevation.

Top of Dam (low point)	1403.1
Spillway crest	N/A
Streambed at toe	1394.8

d. Reservoir Length. (miles)

Maximum pool (El. 1403.1)	0.42
---------------------------	------

e. Storage. (acre-feet)

Maximum pool (El. 1403.1)	385
---------------------------	-----

f. Reservoir Surfaces. (acres)

Maximum pool (El. 1403.1)	54
---------------------------	----

g. Dam.

Note: Refer to plates in Appendix A for profile & section.

<u>Type</u>	Rock with some earthfill.
-------------	------------------------------

<u>Crest Length</u>	100 feet.
---------------------	-----------

	<u>Height</u>	8.3 feet.
	<u>Crest Width</u>	20 feet, average.
	<u>Side Slopes</u>	IV:10H 1V:1.7H
	<u>Zoning</u>	None.
	<u>Cutoff</u>	None reported.
	<u>Grouting</u>	None reported.
h.	<u>Outlet Works.</u>	None.
i.	<u>Spillway.</u>	None; excess flow passes over crest.

## SECTION 2

### ENGINEERING DATA

2.1 Design. The available data for Bronson Pond Dam consists of files provided by the Pennsylvania Department of Environmental Resources (PennDER). Information available includes State inspection reports and various related correspondence. No plans or design details are known to exist.

2.2 Construction. No information is available on the original construction of the dam. PennDER inspection reports and discussion with the current owner indicate that stone fill has been placed on the downstream face periodically over the last 55-60 years. There is no record of any other modifications being made to the dam.

2.3 Operation. No formal records of operation or maintenance exist. The owner lives nearby and visits the dam regularly. Any maintenance found to be necessary is performed by the owner. A PennDER report in July 1917 recommended that a spillway be provided for the dam, which apparently was never accomplished.

2.4 Evaluation.

a. Availability. All available written information and data was contained in the permit 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 OBSERVATIONS

#### 3.1 Observations.

a. General. The overall appearance of the dam is fair. There is no spillway or outlet works to prevent excess runoff from flowing over the dam crest. Maintenance appears to consist of periodic dumping of additional rock on the downstream face. On the day of inspection the pool was at its normal level of about 0.1 feet below the crest.

The visual inspection checklist and sketches of the general plan, profile and section of the dam, as surveyed during the inspection, are presented in Appendix B. The survey datum is the reservoir elevation obtained from the U.S.G.S. Waymart, PA quadrangle map dated 1946. Mr. Hayden M. Bagnick, owner, accompanied the inspection team.

Photographs taken on the day of inspection are reproduced in Appendix C.

b. Dam. The crest and downstream slope are rough and irregular consisting of dumped field stone that vary in size from a few inches up to one foot. The 20 foot crest width varies due to the random placement of stones on the downstream face. The owner states that he adds some stones to the downstream face each spring. The slope of the downstream face averages 1V:1.7H with localized areas 3 to 4 feet wide having slopes of 1V:1H. The upstream face is very flat with a slope of 1V:10H.

Since there is no outlet works or spillway, all excess runoff must flow over the crest of the dam. Three logs and two tree stumps, which are on the upstream side of the crest, may obstruct flows over the crest until sufficient depth is reached to dislodge and remove them.

Water can be heard flowing through the rocks near the downstream toe. This flow, which is clear, exits the rocks about 50 feet downstream of the toe and is estimated to flow at a rate of approximately 4 gallons per minute.

Two large trees, two and one-half feet in diameter, are growing on the right abutment adjacent to the crest. Additional trees are growing on the abutments adjacent to the downstream face.

c. Appurtenant Structures. There is no outlet works or spillway for this dam. All excess runoff flows over the crest of the dam.

d. Reservoir Area. The reservoir area has relatively flat, wooded side slopes with no residential development. These slopes appear stable with no potential for slides. Sedimentation is not reported to be a problem for this lake.

e. Downstream Channel. The first 1,200 feet of the downstream channel is a tree lined pool 20-30 feet wide which is formed by a small masonry dam near the owner's house. Approximately 4,400 feet below the dam one house and one mobile home are located on opposite sides of the stream with first floor levels approximately 9 feet above the stream-bed. The channel then passes under a road and meanders to Lake Quinn, one mile downstream of Bronson Pond Dam. Based on these observations, Bronson Pond Dam is judged to present a significant hazard to loss of life in the event of a dam failure.

f. Evaluation. The fact that there is no formal spillway causes concern for the ultimate integrity of this impoundment; however, the large mass of rock which has been placed on the dam over the years would

make it highly unlikely that a catastrophic failure due to overtopping could occur. Overtopping the dam could cause a gradual, progressive failure.

The flow rate does not appear to be an excessive amount for a dam of rockfill construction, but should be monitored to detect any significant increases in flow.



SECTION 4  
OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure. The facility has no regulating capability. No outlet facility or spillway exists. Inflow into the reservoir is stored until seepage and evaporation lower the pool level. Inflows of sufficient volume overtop the embankment when the storage capacity of the reservoir is exceeded. No formal operations manual exists.

4.2 Maintenance of Dam. The condition of the dam as observed by the inspection team is fair. Basic maintenance such as keeping the embankment clear is performed by the owner. No formal maintenance manual exists.

4.3 Maintenance of Operating Facilities. No operating facilities exists.

4.4 Warning System. No formal warning system exists.

4.5 Evaluation. Maintenance of the facility appears to be adequate at this time. No means currently exist to lower the elevation of the lake if necessary, nor does any spillway facility exist. Formal manuals of maintenance and operation are recommended to ensure that all needed maintenance is identified and performed regularly. In addition, a formal warning system for the protection of downstream inhabitants should be developed. Included in the plan should be a provision for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

## SECTION 5

### HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data. No design reports, calculations or miscellaneous design data are available for the facility. However, in 1917 calculations were determined for the "equalizing potential" of Bronson Pond Dam on a downstream structure. Data developed in that report is contained in PennDER files.

5.2 Experience Data. Records of reservoir levels are not available. Discussion with the owner indicated that the dam had been overtopped, by up to 1.5 feet during the May 1942 flood. No other overtoppings have been reported. No other records of past performance are known to exist.

5.3 Visual Observations. On the date of the inspection, no conditions were observed that would prevent the facility from operating as an overflow weir. Since there are no operating facilities or spillway, normal inflow is stored until seepage and evaporation lower the pool level. Inflows larger than the storage capacity of the reservoir overtop the embankment.

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 or hydraulic evaluations. This analysis has been performed using a modified version of the HEC-1 program developed by the U.S. Army, Corps of Engineers, Hydrologic Engineering Center, Davis, California. Capabilities of the program are briefly outlined in the preface contained in Appendix D.

### 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 Investigation, the SDF for Bronson Pond Dam ranges between the 100 year flood and one-half Probable Maximum Flood (PMF). This classification is based on the relative size of the dam (small) and the potential hazard of dam failure to downstream development (significant). Due to the small storage (less than 400 ac. ft.) and small height of the dam (less than 10 feet) the SDF selected was the 100 year flood.

b. Results of the Analysis. Bronson Pond Dam was evaluated under near normal operating conditions. The starting lake elevation was set at Elevation 1403. The top of embankment (low point) was Elevation 1403.1. Since there are no regulating facilities or spillway, inflow is stored until excess flow overtops the embankment and flows downstream. The drainage area above Bronson Pond Dam is approximately 2.4 square miles.

Development of the 100 year flood peak is derived by using Technical Paper-40 (TP-40) hypothetical rainfall, and the 100 year regression equation for the Delaware River Basin - Regional Frequency Study, Upper Delaware, New York District, 1975. Parameters are determined and input into the regression equation to develop the 100 year flood peak. TP-40 rainfall is then input into the HEC-1 program and loss rates are adjusted until the peak inflow in the HEC-1 program is within 10% of the value found in the regression equation. Results are as follows:

Regression Equation Peak: 950 CFS

Peak Inflow HEC-1: 1030 CFS

(Note: This is within 10%, which is considered acceptable)

Results of routing the 100 year flood through Bronson Pond Dam indicated that the embankment would be overtopped to a maximum depth of 2.1 feet for a total duration of overtopping of 26 hours.

Since the structure is a significant hazard, no breach analysis is required.

5.6 Spillway Adequacy. Under existing conditions Bronson Pond Dam cannot accommodate the 100 year flood (SDF). Since this structure is a significant hazard, and no formal spillway exists, the embankment was evaluated as an overflow section, and is rated inadequate.

SECTION 6  
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) Embankment. Visual observations of Bronson Pond Dam indicate that the dam is in fair condition. The dam is constructed of earth and field stones varying in size from a few inches up to 1 foot. It is approximately 8 feet high, has an average crest width of 20 feet, and a downstream slope of 1.7 H:1V. Since the pond is a natural lake, the upstream slope is mild at 10H:1V. Clear water is seeping through the embankment stone at approximately 4 gpm.

(2) Appurtenant Structures. There is no outlet works or spillway.

b. Design and Construction Data.

(1) Embankment. None

(2) Appurtenant Structures. None

c. Operating Records. None. No structures exist to be operated.

d. Post Construction Changes. No formal construction changes have been made. However, field stones have been dumped on the dam from time to time. This has widened the crest to an average width of 20 feet and slightly increased the height.

e. Seismic Stability. The dam is located in Seismic Zone 1. Based on visual observations, it is statically stable. Therefore, the seismic stability is considered adequate.

## SECTION 7

### ASSESSMENT AND RECOMMENDATIONS

#### 7.1 Dam Assessment.

a. Safety. The visual inspection and review of available design and construction information indicate that Bronson Pond Dam is in fair condition. The primary deficiency noted during the inspection was the lack of any spillway or outlet facilities for the dam.

The hydrologic and hydraulic computations indicate that the combination of reservoir storage and overflow discharge capacity cannot pass the SDF (100-year flood) without overtopping the dam. Therefore, in accordance with guidance outlined and evaluated in Section 5.5 the overflow capacity for Bronson Pond Dam is considered to be inadequate.

b. Adequacy of Information. The available information contained in PennDER files, in conjunction with data collected during the 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 to develop plans for providing adequate spillway capacity for this dam.

#### 7.2 Recommendations.

a. The owner should retain a qualified professional engineer to further assess measures required to provide adequate spillway capacity and evaluate the need for providing a drawdown facility for the dam.

b. The seepage through the dam should be periodically monitored, and appropriate remedial action taken should any significant turbidity or change in the flow rate occur.

c. A uniform profile and width should be established for the dam crest.

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 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



CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: Bronson Pond Dam County: Wayne State: Pennsylvania

Date(s) Inspection: 4 November 1980 Weather: Cloudy Temperature: 50°

Pool Elevation at Time of Inspection: 1403.0 msl Tailwater at Time of Inspection: 1394.8 msl

Inspection Personnel:

J. Bianco (C.O.E.)

J. Evans (C.O.E.)

E. Hecker (C.O.E.)

H. M. Bagnick, Owner

B. Cortright (C.O.E.), Recorder

# EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS
CREST ALIGNMENT: Horizontal Vertical	Irregular due to random placement of rock. Varies 0.7' between high and low points.
SURFACE CRACKS:	None observed
JUNCTION OF EMBANKMENT WITH: Abutments Spillway	Good, trees on right end. Dam crest acts as ungated spillway.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Unable to determine due to nature of structure. Rock is dumped periodically at random on downstream face.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.

# EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS
FOUNDATION	Unknown - not observed.
RIPRAP FAILURES	No formal riprap - Dam surface is all rock of various sizes.
ANY NOTICEABLE SEEPAGE	Water can be heard trickling through rocks just beyond d/s toe. Water seen exiting rocks 50' beyond toe at rate of approximately 4 gpm clear.
INSTRUMENTATION	None.
MISCELLANEOUS	Several large trees on right abutment up to 2.5 feet in diam. Brush and trees on d/s face at left abutment.

# SPILLWAY

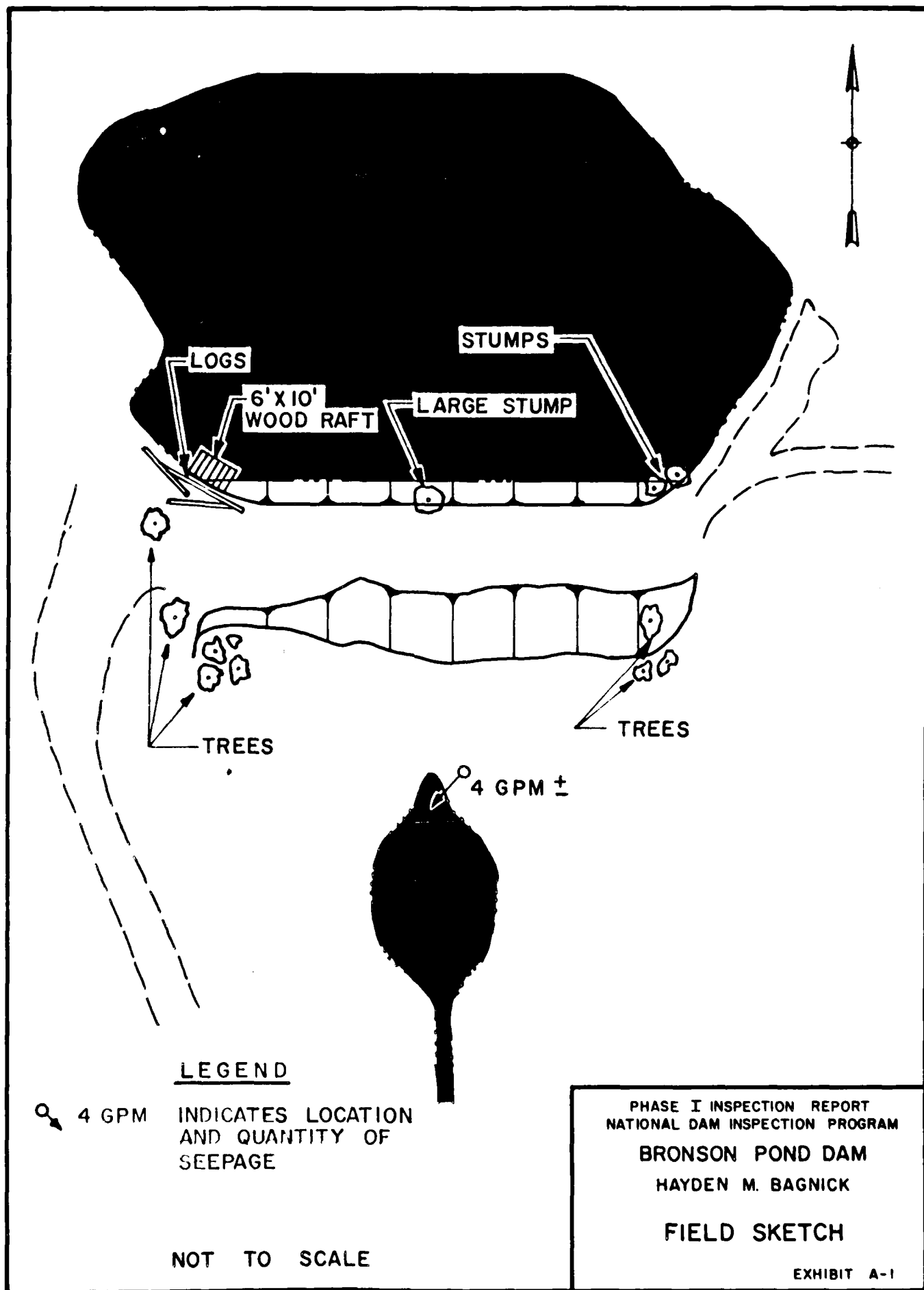
VISUAL EXAMINATION OF	OBSERVATIONS
WEIR	No formal control. Broad crested; entire crest of dam acts as spillway.
APPROACH CHANNEL	Reservoir; bottom slopes @ 1V:10H. Partially obstructed by logs and stumps that have floated in.
DISCHARGE CHANNEL	Rock lined - trees on side slopes.

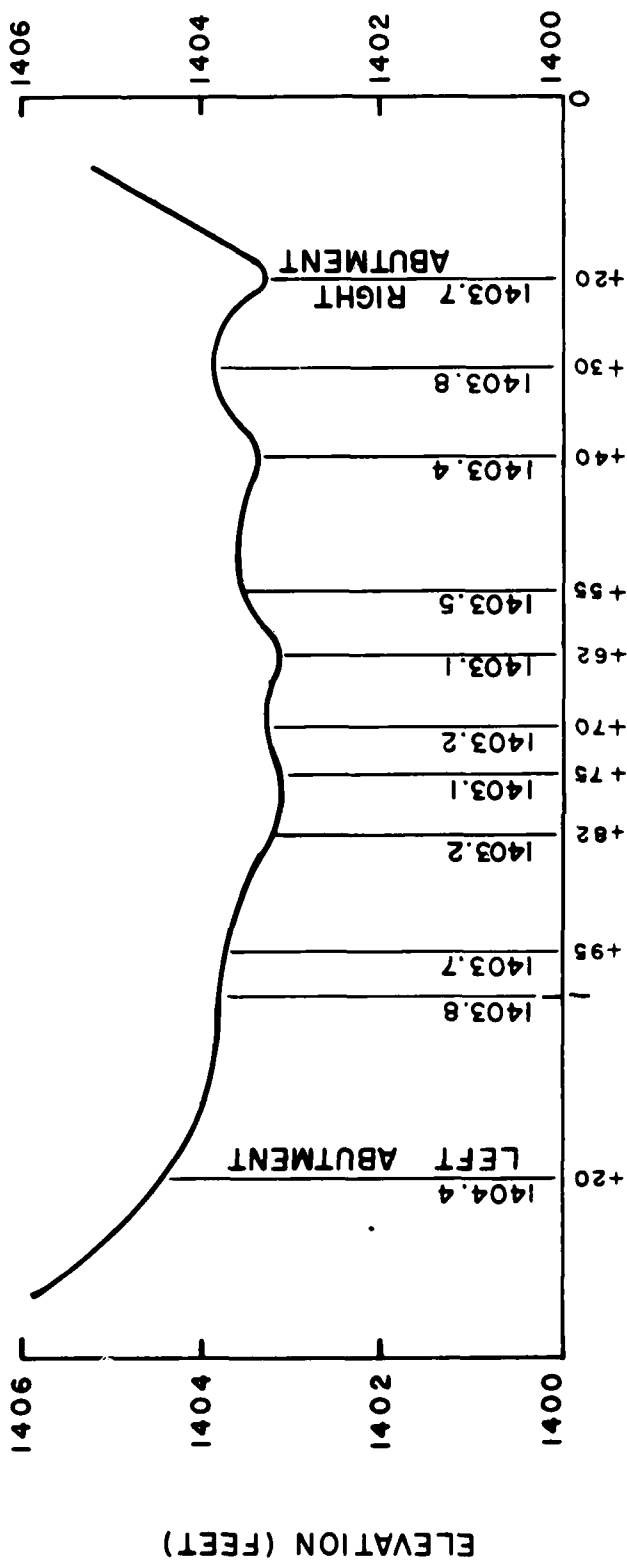
RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS
SLOPES	Flat to moderate; wooded. No residential development. Appear stable.
SEDIMENTATION	None observed or reported.

# DOWNSTREAM CHANNEL

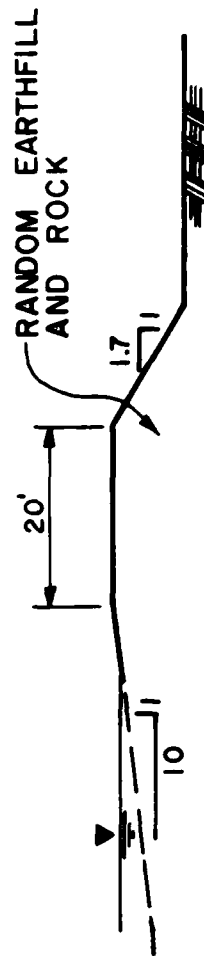
VISUAL EXAMINATION OF	OBSERVATIONS
CONDITION: Obstructions	Trees along stream banks. Small dam 1,200' downstream and large highway culvert 1,700' from dam; road crossing @ 4,500' from dam. Lake Quinn is 1.0 mile downstream of Bronson Pond Dam.
SLOPES: Channel Sides	Flat in channel. Flat to 1V:2H.
APPROXIMATE NUMBER OF HOMES	Two houses 4,400 feet downstream approximately 9 feet above streambed.





### TOP OF DAM - PROFILE

HORIZ.: 1 IN. = 20 FT.  
SCALE - VERT.: 1 IN. = 2 FT.



### EMBANKMENT SECTION

SCALE: 1 IN. = 20 FT.

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

BRONSON POND DAM

HAYDEN M. BAGNICK

PROFILE AND SECTION

EXHIBIT A-2



APPENDIX B

CHECKLIST - ENGINEERING DATA

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE 1

NAME OF DAM    Bronson Pond Dam

NDI ID #    PA    00143

DER ID #    64-42

ITEM

REMARKS

As-Built Drawings

None

Regional Vicinity Map

U.S.G.S. Waymart Quadrangle 7 1/2 minute Quad Sheet. See Appendix E, Plate E-2.

Construction History

Original embankment completed prior to report filed in 1917. Stone fill added to downstream face on periodic basis, over period of 55-60 years.

Typical Sections of Dam

None

Outlets - Plan  
Details  
Constraints  
Discharge Ratings

N/A

Rainfall/Reservoir Records

None

Design Reports

None

Geology Reports

None

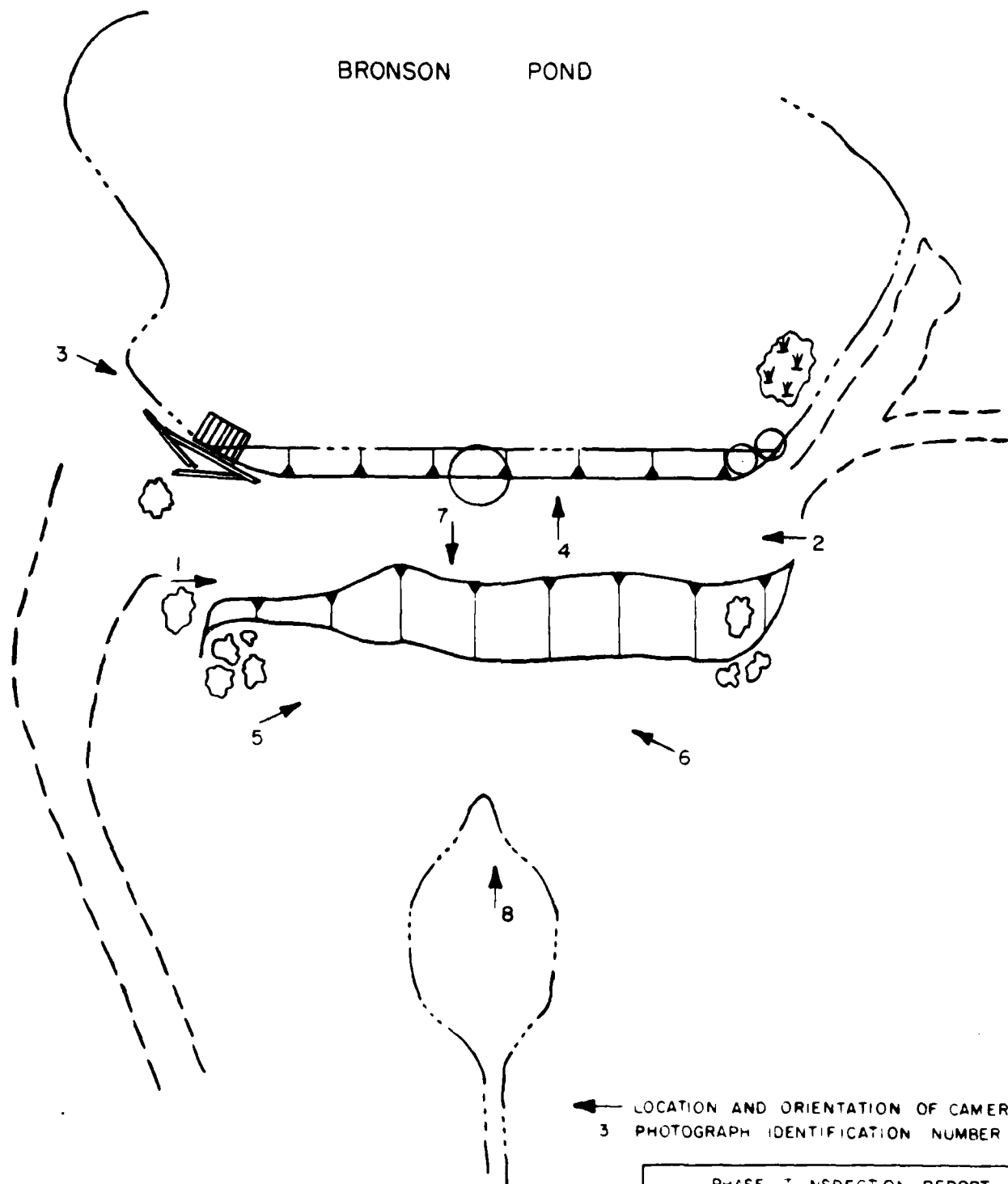
ITEM	REMARKS
Design Computations Hydrology & Hydraulics Dam Stability Seepage Studies	In 1917 a report was filed to the state for a proposed change at a downstream structure, W.W. Kiser's dam (File No. 64-46) 2.75 miles downstream of Bronson Pond Dam. This report included in its study the equalizing potential of Bronson Pond on this downstream structure.
Materials Investigations Boring Records Laboratory Field	None
Post-Construction Surveys of Dam	None
Monitoring Systems	None
Modifications	Additional fill had been added on the downstream face from time to time.
High Pool Records	Dam overtopped in May 1942, to a height of approximately 1.5 feet.
Post-Construction Engineering Studies and Reports	The 1917 report for proposed changes to W.W. Kiser's Dam included an Hydrologic evaluation of this dam for equalizing potential.
Prior Accidents or Failure of Dam Description Reports	None reported.
Maintenance Operation Records	None

<u>ITEM</u>	<u>REMARKS</u>
Spillway Plan	N/A
Sections Details	
Operating Equipment Plans & Details	N/A
Specifications	None
Miscellaneous	None
Previous Inspections	1965 (PennDer) 1952, 1948, 1938, 1933, 1927, by State Personnel. Requested a spillway to be built as none exist.

APPENDIX C

PHOTOGRAPHS

BRONSON POND



NOT TO SCALE

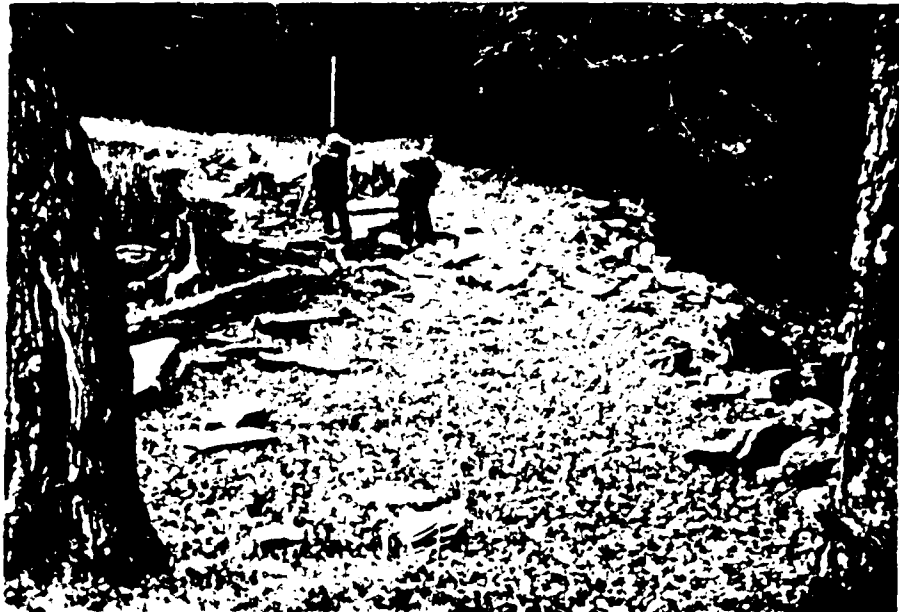
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BRONSON POND DAM

HAYDEN M BAGNICK

PHOTOGRAPH  
LOCATION PLAN

EXHIBIT C-1



1. Embankment crest and left abutment.



2. Embankment crest and left abutment.



Fig. 1. Cross-section of the river at the site.



Fig. 2. River and surrounding landscape at the site.





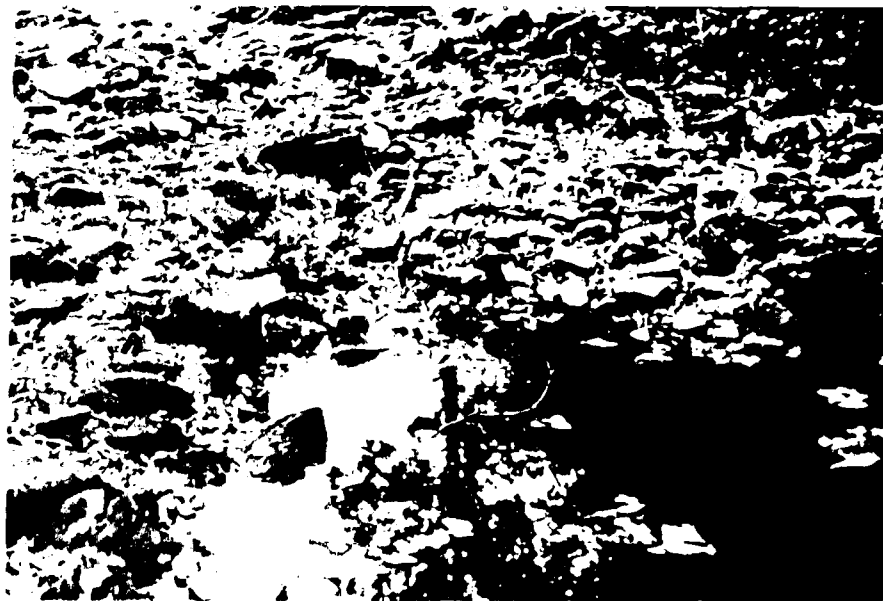
5. Downy Birch, Alder, and Willow in wetland.



6. Downy Birch, Alder, and Willow in wetland. Body of water in background.



7. Downstream channel (upstream of low flow)



8. Seepage (with no rock near embankment)

APPENDIX D

HYDROLOGY AND HYDRAULICS

## PREFACE

The modified HEC-1 program is capable of performing two basic types of hydrologic analyses: 1) the evaluation of the overtopping potential of the dam; and 2) the estimation of the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. Briefly, the computational procedures typically used in the dam overtopping analysis are as follows:

- a. Development of an inflow hydrograph(s) to the reservoir.
- b. Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.
- c. Routing of the outflow hydrograph(s) from the reservoir to desired downstream locations. The results provide the peak discharge(s), time(s) of the peak discharge(s), and the maximum stage(s) of each routed hydrograph at the downstream end of each reach.

The evaluation of the hydrologic-hydraulic consequence resulting from an assumed structural failure (breach) of the dam is typically performed as shown below.

- a. Development of an inflow hydrograph(s) to the reservoir.
- b. Routing of the inflow hydrograph(s) through the reservoir.
- c. Development of a failure hydrograph(s) based on specified breach criteria and normal reservoir outflow.
- d. Routing of the failure hydrograph(s) to desired downstream locations. The results provide estimates of the peak discharge(s), time(s) to peak and maximum water surface elevations of failure hydrographs for each location.

HYDROLOGY & HYDRAULIC ANALYSIS  
DATA BASE

NAME OF DAM: BRONSON POND DAM

PROBABLE MAXIMUM PRECIPITATION (PMP) = N/A - 100 YEAR FLOOD ANALYSIS INCHES/24 HOURS

DELAWARE RIVER BASIN

STATION	1	2	3
STATION DESCRIPTION	BRONSON POND DAM		
DRAINAGE AREA (SQUARE MILES)	2.38		
CUMULATIVE DRAINAGE AREA (SQUARE MILES)	2.38		
ADJUSTMENT OF PMF FOR DRAINAGE AREA LOCATION (%)			
6 Hours 12 Hours 24 Hours 48 Hours 72 Hours	N/A  (100 YEAR FLOOD ANAL.)		
SNYDER HYDROGRAPH PARAMETERS			
Zone $C_p$ $C_t$ $L^t$ (MILES) $L_{ca}$ (MILES) $t_p = C_t (L \cdot L_{ca})^{0.3}$ (HOURS)	1 0.45 1.23 2.92 1.33 1.85		
SPILLWAY DATA	ROCK FILL DAM		
CREST LENGTH (FEET) FREEBOARD (FEET)	N/A N/A		

(1) HYDROMETEOROLOGICAL REPORT - 33, U. S. Army Corps of Engineers, 1955.

(2) Hydrologic zone defined by Corps of Engineers, Baltimore District, For Determination of Snyder Coefficients ( $C_p$  and  $C_t$ ).

(3) Snyder Coefficients

- (4)  $L$  = Length of longest watercourse from dam to basin divide.  
 $L_{ca}$  = Length of longest watercourse from dam to point opposite basin centroid.

SUBJECT DAM SAFETY INSPECTIONCOMPUTATIONS BROWN'S POND SHEET 1 OF 10 SHEETSCOMPUTED BY JPB CHECKED BY \_\_\_\_\_ DATE 12-10-82DAM CLASSIFICATION:

SIZE OF DAM - Small

HAZARD - Significant

REQUIRED SDF - 100 YEAR TO 1/2 PMF

DAM STATISTICS:

HEIGHT OF DAM - 8.3 FT

STORAGE AT NORMAL POOL - 380 AC-FT

STORAGE AT TOP OF DAM - 385 AC-FT

DRAINAGE AREA ABOVE DAM SITE - 2.38 mi.<sup>2</sup>ELEVATIONS \*

TOP OF DAM LOW POINT (FIELD) - 1403.1

NORMAL POOL - 1403.0

STREAMBED AT CENTERLINE OF DAM - 1395.0

HYDROGRAPH PARAMETERS:

RIVER BASIN - DELAWARE

ZONE - 1

SYNDER COEFFICIENTS:

 $C_p - 0.45$  $C_e - 1.23$ 

MEASURED PARAMETERS - DETERMINED FROM "1" QUAD SHEET

 $L$  = LENGTH OF THE LONGEST WATERCOURSE:  $L = 2.92$  mi. $L_{CA}$  = LENGTH OF THE LONGEST WATERCOURSE TO CENTROID OF BASIN:  $L_{CA} = 1.33$  mi.

\* - NOTE. ELEVATIONS ARE REFERENCED TO U.S.G.S QUAD SHEET WAYMART, PA. GIVING LAKE ELEVATION AT 1403 ASSUMING TO BE NORMAL POOL.

SUBJECT DAM SAFETY INSPECTIONCOMPUTATIONS BROWSON'S PONDSHEET 2 OF 12 SHEETSCOMPUTED BY JPB CHECKED BY \_\_\_\_\_ DATE 12-11-80 $t_p$  = SNYDERS BASIN LAG TIME TO PEAK IN HOURS

$$\begin{aligned}
 t_p &= C_L (L L_{CA})^{0.3} \\
 &= 1.23 (292 (1.33))^{0.3} \\
 &= 1.85 \text{ hours}
 \end{aligned}$$

RESERVOIR CAPACITY

- SURFACE AREA AT NORMAL POOL ( $\frac{64}{103}$ ) = 54 ACRES
- SURFACE AREA AT ELEVATION 1420 = 184 ACRES

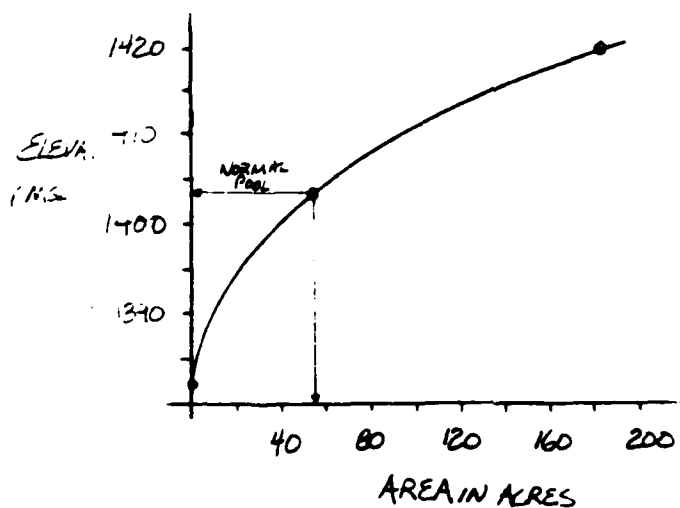
ASSUME CONICAL METHOD APPLIES TO FIND  
LOW POINT IN POOL, BELOW NORMAL POOL.

VOLUME AT NORMAL POOL = 380 AC. FT. (FROM FLOODING  
F.W.E.)

$$V = \frac{1}{3} A h$$

$$A = \pi r^2 =$$

$$\therefore h = \frac{3V}{A} = \frac{3(380)}{54} = 21.1 \quad \text{LOW POINT AT 58}$$



ELEVATION-AREA CURVE

FOR FLOOD ROUTING PURPOSES,  
ASSUME THE AVERAGE END  
AREA METHOD IS SUITABLE  
TO ELEVATIONS ABOVE  
NORMAL POOL - EL. 1405.

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



SUBJECT DAM SAFETY INSPECTIONCOMPUTATIONS BROWNSON'S PONDSHEET 3 OF 10 SHEETSCOMPUTED BY JPB

CHECKED BY

DATE 12-11-80ELEVATION-STORAGE TABLE

ELEVATION (MSL)	AREA (ACRES)	$\Delta H$ (FT)	$\Delta V = \frac{(A_1 + A_2)}{2} \Delta H$	CUMULATIVE VOLUME (AC.-FT.)	<u>Cur</u>
1382	0	-	(conical method) 380	0	0
1403	54	2	116	380	380
1405	62	5	390	496	500
1410	94	5	605	896	890
1415	148	5	830	1491	1490
1420	184			2321	2320

NOTE: DRAINAGE AREA ABOVE DAM =  $\approx 38 \text{ mi}^2$ 1" OF RUNOFF FROM THE BASIN  $\approx$  VOLUME = AREA  $\times$  DEPTH CONVECTED TO D.

$$\therefore (1 \text{ in.} \times \frac{1 \text{ ft}}{12 \text{ in.}}) (238 \text{ mi}^2) (\frac{6400 \text{ ac}}{\text{mi}^2}) = V \approx 127 \text{ AC.-FT.}$$

AT TDA 1403.1 THE STORAGE IS APPROXIMATELY 385 AC.-FT.

 $\therefore$ 

ELEVATION (MSL)	STORAGE (AC.-FT.)
1382.0	0
1403.0	380
1403.1 (TDA)	385
1405.0	500
1410.0	890
1415.0	1490
1420.0	2320

DATA TO BE  
INPUT ON  
SS & SE CARD.

SUBJECT DAM SAFETY INSPECTIONCOMPUTATIONS BRONSON E. MADD SHEET 1 OF 10 SHEETSCOMPUTED BY PB CHECKED BY \_\_\_\_\_ DATE 3-5-81SDF:

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 ACCORDANCE WITH THE GUIDANCE PROVIDED.

$\therefore$  USE SDF = 100 YEAR FLOOD

RAINFALL FOR 100 YEAR PRECIPITATION IS SHOWN ON PAGE D-10 AND PAGE D-11.

PMP CALCULATIONS:

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

SUBJECT DAM SAFETY INSPECTIONCOMPUTATIONS BRONSON'S PONDSHEET 5 OF        SHEETSCOMPUTED BY JPB CHECKED BY        DATE 12-11-80EMERGENCY SPILLWAY CAPACITY:

SINCE THERE IS NO FORMAL SPILLWAY STRUCTURE THERE ARE NO CALCULATIONS HERE. HOWEVER, THE ENTIRE DAM IS A ROCK FILL AND WOULD ACT AS A BROAD-CRESTED WEIR. THE EMBANKMENT RATING CURVE IS COMPUTED IN THE FOLLOWING SECTION.

EMBANKMENT RATING CURVE:

THIS ANALYSIS ASSUMES THAT THE EMBANKMENT BEHAVES AS A BROAD CRESTED WEIR IF OVERTOPPING OCCURS. DISCHARGE CAN BE ESTIMATED BY:

$$Q = CLH_w^{3/2}$$

WHERE:

Q = DISCHARGE OVER EMBANKMENT IN CFS

L = LENGTH OF EMBANKMENT OVERFLOW IN FEET

H<sub>w</sub> = WEIGHTED HEAD IN FEET, AVERAGE FLOW AREA WEIGHTED ABOVE LOW POINT OF DAM

C = COEFFICIENT OF DISCHARGE

C = 2.85 FROM VARNELL &amp; NAGLER FOR BROAD-CRESTED WEIR

LENGTH OF EMBANKMENT INUNDATED  
VS. RESERVOIR ELEVATION:

<u>RESERVOIR ELEVATION (MSL)</u>	<u>EMBANKMENT LENGTH (FT)</u>
<u>1403.1</u>	<u>0</u>
<u>1403.2</u>	<u>14</u>
<u>1403.6</u>	<u>60</u>
<u>1404.0</u>	<u>100</u>
<u>1405.0</u>	<u>115</u>
<u>1410.0 *</u>	<u>130</u>
<u>1415.0 *</u>	<u>130</u>
<u>1420.0 *</u>	<u>130</u>

D-8

PROJECT: WATER TREATMENT PLANTLOCATION: WATER TREATMENT PLANTDESIGNED BY: J. H. C.

CHECKED BY:

DATE: 10/1/55

- \* ASSUME WATER TREATMENT PLANT MAXIMUM LENGTH REACHED AT ELEV. 1410. NOTE MIN. ELEVATION IS 0.1 FEET ABOVE T.O.C.

MEASUREMENT RATING TABLE

RESERVOIR ELEVATION (MSL)	L <sub>1</sub> (FT)	L <sub>2</sub> (FT)	MINIMUM HEAD (H <sub>1</sub> ) (FT)	DESIGNATED FLOW AREA (A <sub>1</sub> ) (SQ. FT.)	DESIGNATED HEAD (H <sub>2</sub> ) (FT)	DESIGNATED FLOW AREA (A <sub>2</sub> ) (SQ. FT.)
1403.1	0	—	—	—	—	—
1403.2	14	0	—	—	—	0.5
1403.6	60	14	—	—	—	2.3
1404.0	100	60	—	—	—	4.5
1405.0	115	100	—	—	—	5.0
1410.0*	130	115	5.0	500	5.0	500
1415.0*	130	130	5.0	500	5.0	3300
1420.0*	130	130	5.0	500	5.0	23500

\* - SEE ABOVE

$$① A_c = H_c \left[ (L_1 + L_2) \cdot 2 \right]$$

$$② H_w = A_1 / L_1$$

$$③ Q = C L H_w^{3/2}$$

NOTE: THE TOTAL FLOW

IS THE SUM OF

THE FLOWS AT

EACH POINT

DATA TO BE INPUT ON Y4 &amp; Y5 CARDS

RESERVOIR ELEVATION (MSL)	TOTAL OUTFLOW (CFS)
1403.1	0
1403.2	0.5
1403.6	2.3
1404.0	4.5
1405.0	5.0
1410.0	500
1415.0	3300
1420.0	23500

SUBJECT

DAM SAFETY INSPECTION

COMPUTATIONS

BROWSON'S POND

SHEET

7

OF

7

SHEETS

COMPUTED BY

JPB

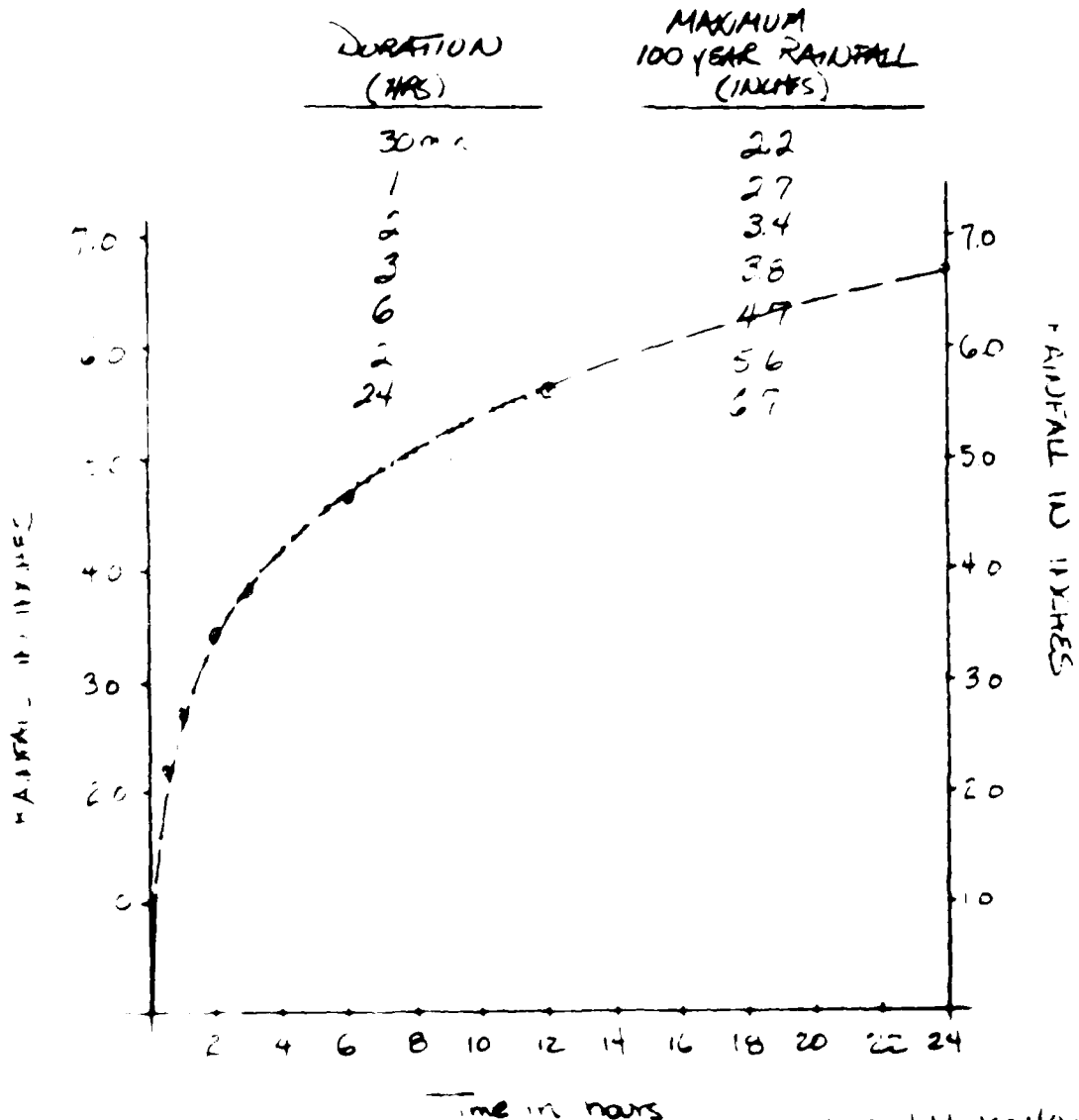
CHECKED BY

DATE

12-11-80100 YEAR FLOOD ANALYSIS:

THE SELECTED SDF FOR BROWSON'S POND HAS BEEN SELECTED TO BE THE 100 YEAR FLOOD. THIS IS BASED ON THE SIZE AND HAZARD CATEGORY.

TO DEVELOP THE 100 YEAR FLOOD, THE RAINFALL MUST FIRST BE DETERMINED. THIS CAN BE DONE BY USING TD-40 AND PLOTTING THE MASS CURVE OF RAINFALL AS FOLLOWS



NOTE: 1 block = 40 mm  
1/2 block = 20 mm

SUBJECT DAM SAFETY INSPECTIONCOMPUTATIONS BROWNSON'S PONDSHEET 8 OF 1 SHEETSCOMPUTED BY JPB CHECKED BY \_\_\_\_\_ DATE 12-12-80

## CALCULATIONS TO DETERMINE 100 YEAR RAINFALL PATTERN

TIME	TOTAL RAINFALL	INCREMENTS	TIME	TOTAL RAINFALL	INCREMENTS
0.33	1.60	1.60	12.33	5.69	0.04
0.66	2.20	0.60	12.66	5.73	0.04
1.00	2.80	0.60	13.00	5.77	0.04
1.33	3.40	0.60	13.33	5.81	0.04
1.66	4.00	0.60	13.66	5.85	0.04
2.00	4.60	0.60	14.00	5.89	0.04
2.33	5.20	0.60	14.33	5.93	0.04
2.66	5.80	0.60	14.66	5.97	0.04
3.00	6.40	0.60	15.00	6.01	0.04
3.33	7.00	0.60	15.33	6.05	0.04
3.66	7.60	0.60	15.66	6.09	0.04
4.00	8.20	0.60	16.00	6.13	0.04
4.33	8.80	0.60	16.33	6.17	0.04
4.66	9.40	0.60	16.66	6.21	0.04
5.00	10.00	0.60	17.00	6.25	0.04
5.33	10.60	0.60	17.33	6.29	0.04
5.66	11.20	0.60	17.66	6.33	0.04
6.00	11.80	0.60	18.00	6.37	0.04
6.33	12.40	0.60	18.33	6.41	0.04
6.66	13.00	0.60	18.66	6.45	0.04
7.00	13.60	0.60	19.00	6.49	0.04
7.33	14.20	0.60	19.33	6.53	0.04
7.66	14.80	0.60	19.66	6.57	0.04
8.00	15.40	0.60	20.00	6.61	0.04
8.33	16.00	0.60	20.33	6.65	0.04
8.66	16.60	0.60	20.66	6.69	0.04
9.00	17.20	0.60	21.00	6.73	0.04
9.33	17.80	0.60	21.33	6.77	0.04
9.66	18.40	0.60	21.66	6.81	0.04
10.00	19.00	0.60	22.00	6.85	0.04
10.33	19.60	0.60	22.33	6.89	0.04
10.66	20.20	0.60	22.66	6.93	0.04
11.00	20.80	0.60	23.00	6.97	0.04
11.33	21.40	0.60	23.33	7.01	0.04
11.66	22.00	0.60	23.66	7.05	0.04
12.00	22.60	0.60	24.00	7.09	0.04

THESE VALUES WILL BE INPUTTED IN REVERSE ORDER  
TO ATTEMPT TO MATCH THE PEAK FROM THE FOLLOWING  
REGRESSION EQUATIONS

$$\log(Q_m) = C_m + 0.87 \log(A) \quad *$$

where:  $C_m$  = a map coefficient for mean  $\log$  of  
annual peak

$Q_m$  = geometric mean of annual flood peaks  $m^3/s$

$A$  = drainage area,  $mi^2$

\* FROM - REGIONAL FREQUENCY STUDY, UPPER DELAWARE NEW YORK DISTRICT

SUBJECT LAM SAFETY INSPECTIONCOMPUTATIONS BRUNSON'S FLOOD SHEET 1 OF        SHEETSCOMPUTED BY JPR CHECKED BY        DATE 2-12-80

$$\therefore \log(Q_m) = C_m + 0.87 \log(A) \quad \text{and } A = 2.38$$

$$\text{FROM FIGURE 2} \quad C_m = 1.79$$

$$\therefore \log(Q_m) = 1.79 + 0.87 \log(2.38)$$

$$\log(Q_m) = 2.1176$$

now, compute the standard deviation

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

where  $S$  = standard deviation

$C_s$  = a map coefficient for standard deviation

$$\therefore \text{FROM FIGURE 3} \quad C_s = 0.354$$

$$S = 0.354 - 0.05 \log(2.38)$$

$$S = 0.3352$$

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 peak exceeds  
for a given exceedance frequency

$\log(Q_m)$  = mean logarithm of annual flood peak

$K(P, g)$  = standard deviate for a given  
EXCEEDANCE FREQUENCY ( $P$ )  
and SKEW COEFFICIENT ( $g$ )

$S$  = STANDARD DEVIATION, LOGS OF  
ANNUAL PEAKS

we need to have SKEW COEFFICIENT, FROM FIGURE 5

$$g = 0.31$$

interpolated value from  
chart.

$$\log(Q_p) = \log(Q_m) + K(P, g) S$$

$$* K(P, g) = 2.557$$

\* FROM EXHIBIT 39 - STATISTICAL METHODS IN HYDROLOGY LEO R. BEARD JAN 1962

SUBJECT DAM SAFETY INSPECTIONCOMPUTATIONS BRONSON'S POND SHEET 10 OF 10 SHEETSCOMPUTED BY JPB CHECKED BY \_\_\_\_\_ DATE 12-12-80

$$\log(Q_{100}) = \log(Q_m) + K(P_g) S$$

$$\log(Q_{100}) = 2.1176 + (2557)(0.3352)$$

event per  
100 years

$$\log(Q_{100}) = 2.97471$$

$$Q_{100} = 943 \text{ CFS}$$

CALL  
IT ~ 950 CFS

$\therefore$  100 year flood peak is  $Q_{100} \approx 950 \text{ CFS}$

NOW ADJUST RAINFALL IN HEC-1 PROGRAM WITH THESE RATES TO APPROXIMATE PEAK OF 950 CFS, TO WITHIN 10%.

PEAK FLOW IN HEC-1 PROGRAM IS 1030 CFS

AND IS WITHIN 10% ✓ ok



UJF ... HEC10R UPDATE TO THE DAMBREAN ROUTINE.  
 TH1 ROUTINE NOW UTILIZES A  
 BREACH WIDTH WHICH IS EQUAL TO  
 ZERO UPON INITIATION OF FAILURE  
 AND GROWS TO A VALUE EQUAL  
 TO BRWD AT THE END OF THE  
 FAILURE PERIOD

FOR TECHNICAL ASSISTANCE CONTACT  
 ARLEN FELDMAN, JOHN PETERS, OR PAUL ELY  
 AT THE HYDROLOGIC ENGINEERING CENTER  
 916-440-2329 (FIS 448-2329)

1\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (FC-1)  
 DAM SAFETY VERSION JI 1978

LAST MODIFICATION 01 80  
 \*\*\*\*\*

1	A1	BRONSONS FOND	DER NO. 90-64-42	12-11-80	WILL USE DATA TO GET PMF
2	A2	DAM SAFETY INSPECTION PROGRAM	*** PRELIMINARY ***		
3	A3	OVERTOPPING ANALYSIS			
4	B	144	0	0	0
5	B1	3	0	0	0
6	N	0	0	0	0
7	N1	RUNOFF FROM DRAINAGE AREA ABOVE BRONSONS FOND			
8	M	0	1	2.38	0
9	D	72	6.69	0.02	0.02
10	D1	0.02	0.02	0.02	0.02
11	D1	0.02	0.02	0.03	0.03
12	D1	0.03	0.03	0.03	0.03
13	D1	0.04	0.04	0.04	0.04
14	D1	0.04	0.04	0.05	0.05
15	D1	0.06	0.06	0.06	0.06
16	D1	0.10	0.10	0.07	0.07
17	D1	0.60	1.60	0.15	0.15
18	T	0	0	0	0
19	W	1.85	0.45	0	0
20	X	-1.5	-0.05	2	1.5
21	K	1	0	0	0
22	N1	ROUTING ZPMF'S THRU BRONSONS FOND			
23	Y	0	0	0	0
24	Y1	0	0	0	0
25	Y1	1403.1	1403.2	1403.6	1403.0
26	Y5	0	0.5	23.0	95.0
27	Y5	0	380	385	500
28	Y5	1382.0	1403.0	1403.1	1405.0
29	Y5	1403.0	1403.1	1405.0	1410.0
30	Y5	1403.0	1403.1	1405.0	1410.0
31	N	99			

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT  
 ROUTE HYDROGRAPH TO  
 END OF NETWORK

1\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 DAM SAFETY VERSION JULY 1978

LAST MODIFICATION 01 APR 80

\*\*\*\*\*

BRONSON FOND DAM  
 OVERTOPPING ANALYSIS

BRONSONS FORD OFR NO. 70-64-42 WILL USE DATA TO GET PMF  
DAM SAFETY INSPECTION PROGRAM 12-11-80  
OVERTOPPING ANALYSIS \*\*\* PRELIMINARY \*\*\*

JOB SPECIFICATION									
NQ	NHR	NMIN	IDAT	IHR	IMIN	MIKLC	IFLT	IFRT	NSTAN
144	0	20	0	0	0	0	0	0	0
			JOFER	NWT	LRPT	TRACL			
			3	0	0	0			

[illegible]

## SUB-AREA RUNOFF COMPUTATION

**RUNOFF FROM DRAINAGE AREA ABOVE BRONSUNS POND**

ISTAQ	I	ICOMP	IECON	ITAPE	JFLT	JPRT	INAME	ISTAGE	IAUTO
	1	Q	Q	Q	Q	Q	1	Q	Q

		HYDROGRAPH DATA							
INHYDG	IUHG	TAREA	SNAP	TRSDA	TRSCF	RATIO	ISNOW	ISAME	LOCAL
0	1	2.30	0.00	2.38	0.00	0.000	0	1	0

PRECIP DATA	
NP	STORM
72	6.69
	PRECIP PATTERN
	0.00
	DAN

[illegible]

## LOSS DATA

LROPT	STRN	DLTR	RTIOL	ERAIN	STRNS	RTIUN	STRTL	CNSTL	ALSHX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.50	.27	0.00	0.00

UNIT HYDROGRAPH DATA

## RECESSION DATA

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CI\* AND TI\* ARE IC= 5.85 AND R= 8.91 INTERVALS

UNIT HYDROGRAPH 51	END-OF-PERIOD ORIGINATES,	LAG=	1.80	HOURS, CP=	.45	VOL=	1.00
24.	91.	184.	278.	347.	372.	352.	314.
224.	200.	179.	160.	143.	120.	114.	102.
							81.

### BRANSON FORD DAYS

PAGE 24

END-OF-PERIOD FLOW														
0	MD, DA	HR, MN	PERIOD	RATH	EXCS	LOSS	COMP Q	MD, DA	HR, MN	PERIOD	RATH	EXCS	LOSS	COMP Q

[illegible]

MYIKURAH KULTINU

## ROUTING ZFMF'S THRU BKONSON'S FUND.

[illegible]

STAGE	1403.10	1403.20	1403.40	1404.00	1405.00	1410.00	1415.00	1420.00
FLOW	0.00	.50	23.00	95.00	520.00	5310.00	13300.00	23500.00

CAPACITY=	0.	385.	500.	1490.	2320.
-----------	----	------	------	-------	-------

ELEVATION=	1382.	1403.	1403.	1405.	1410.	1415.	1420.
------------	-------	-------	-------	-------	-------	-------	-------

CRFL	SPWID	COBW	EXFW	ELEV	CO2L	CAREA	LXPL
1	1	1	1	1	1	1	1

1403.0 0.0 0.0 0.0 0.0 0.0

TOPEL	COGID	EXFD	DATE
1403.1	0.0	0.0	0.

Bronson Ford Dam

## QVERTOPPING ANALYSIS

7/5 2100

\*\*\*\*\*

RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
AREA IN SQUARE MILES(SQUARE KILOMETERS)

HYDROGRAPH AT	PEAK	6-HOUR	24 HOUR	72 HOUR	AREA
1	1030.	630.	204.	103.	2.30
(	29.17)(	17.80)(	5.77)(	2.91)(	6.16)

ROUTED TO	1	717.	522.	190.	93.	2.38
(	20.30)(	14.79)(	5.37)(	2.69)(	6.16)	

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
STORAGE	1403.00	1403.00	1403.10
OUTFLOW	300.	300.	385.
	0.	0.	0.

RATIO	MAXIMUM	MAXIMUM	MAXIMUM	DURATION	TIME OF
OF	RESERVOIR	STORAGE	OUTFLOW	OVER TOP	FAILURE
100 YEAR FLOOD	W.S.ELEV	AC-FT	CFS	HOURS	HOURS
1.00	1405.21	516.	717.	20.00	0.00

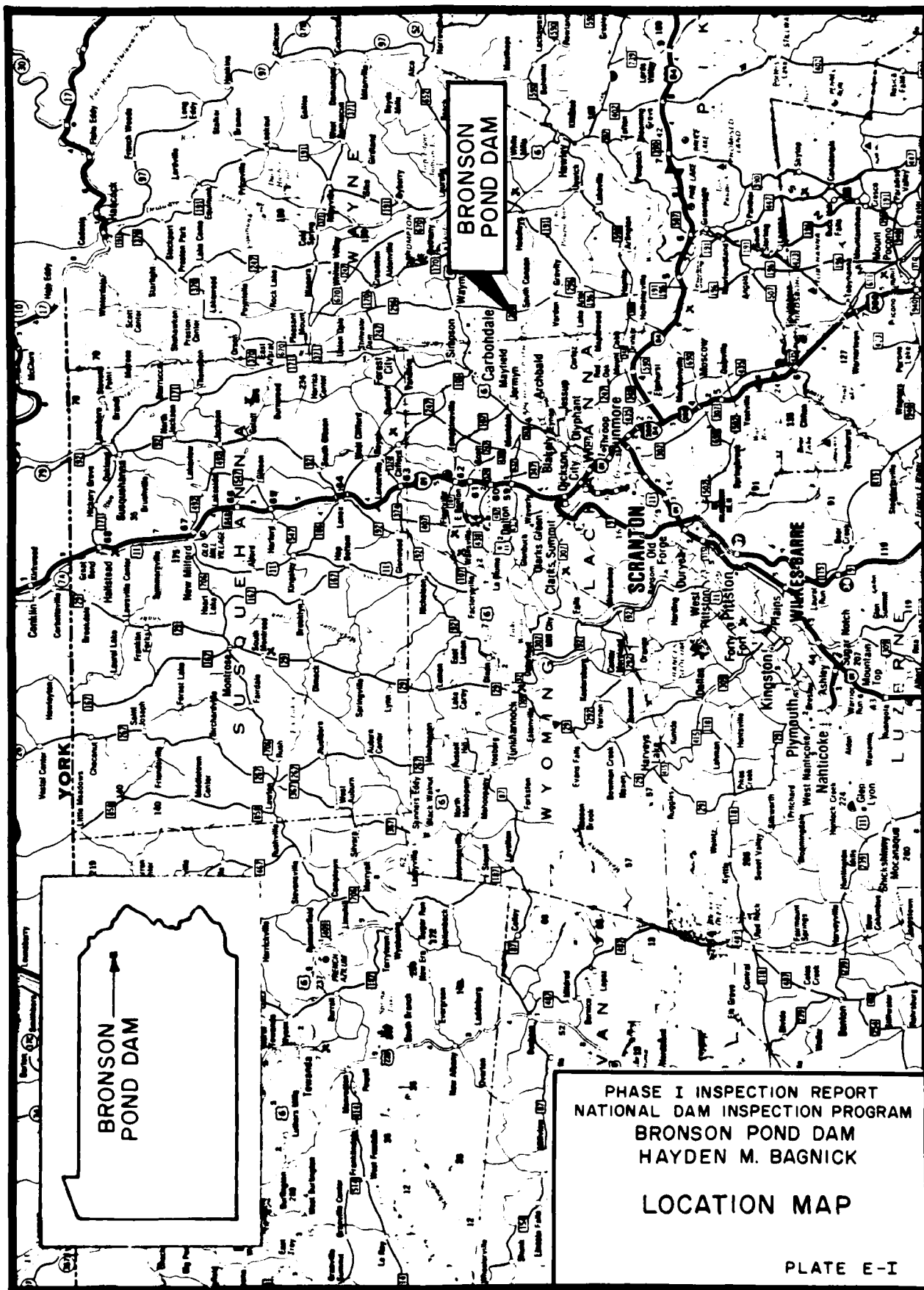
\*\*\*\*\*  
FLOOD HYDROGRAPH PACKAGE (HEC-1)  
DAM SAFETY VERSION JULY 1978  
LAST MODIFICATION 01 APR 80  
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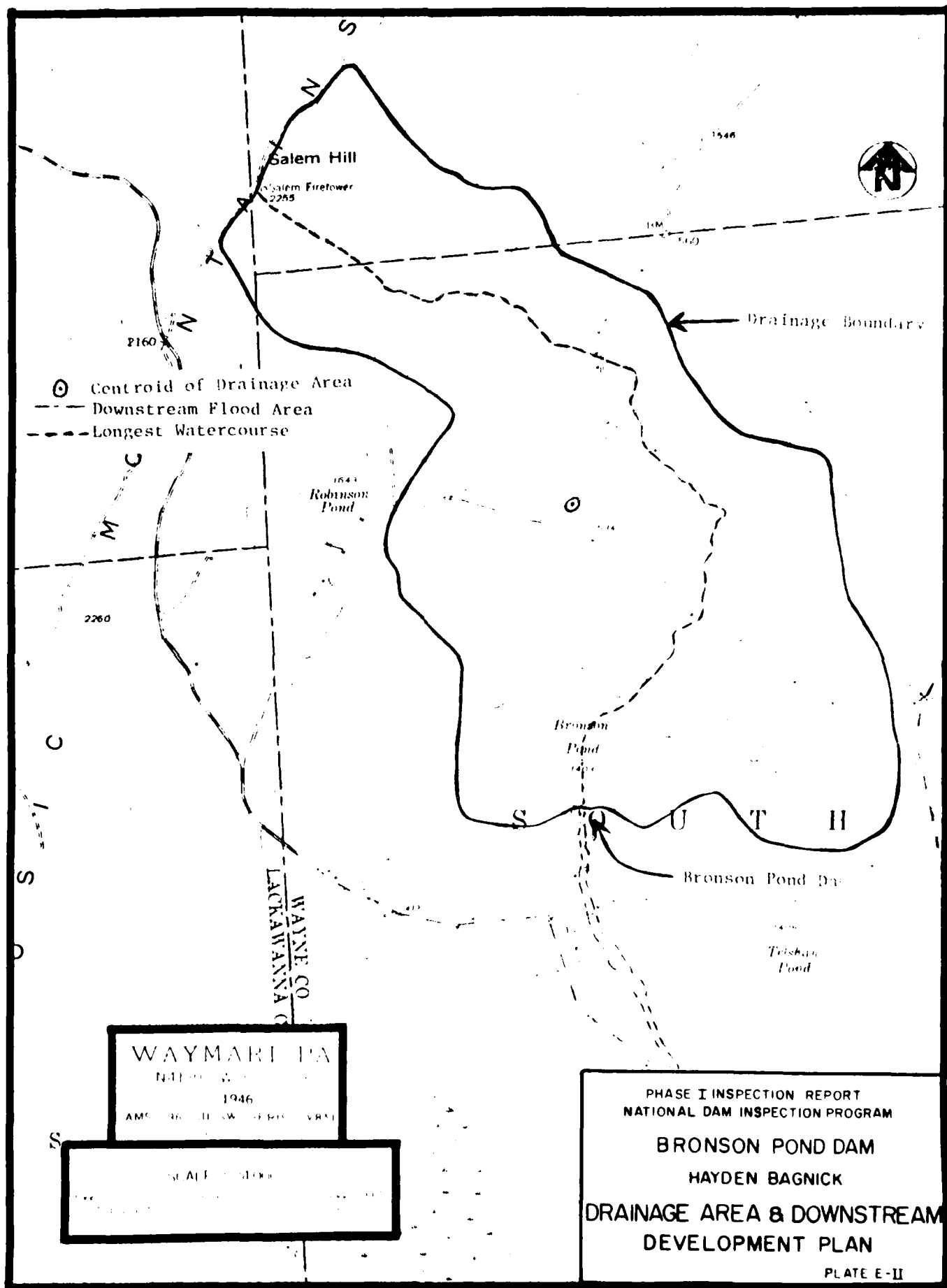
BRANDSAD ROAD DAM  
OVERTOPPING ANALYSIS

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APPENDIX E

PLATES





APPENDIX F

GEOLOGY



## BRONSON POND DAM

### GENERAL GEOLOGY

Bedrock at Bronson Pond Dam is the Poplar Gap member of the Catskill Formation. It is medium-gray and light-olive-gray, fine- to coarse-grained sandstone and conglomerate with interbedded pale-red and grayish-red siltstone and shale. The rock is well bedded with sandstone and conglomerate thickly to very thickly bedded; shale and siltstone beds are medium to thick. Joints and cleavage are well developed in thick bedded rocks and are widely spaced; cleavage fractures are closely spaced. Fractures are open in surface exposures. Rock exposures are resistant to weathering. Fragments of sandstone and conglomerate are blocky and slabby, siltstone and shale fragments are platy, chippy and hackly.

Unconsolidated material overlying the bedrock surface may be thick. Water well drill records showing 48 feet of glacial till in a domestic well near Lake Quinn. The unconsolidated material is sand and gravel with minor amounts of clay.

#### Legend (Bedrock)

Dcd      CATSKILL FORMATION DUNCANNON MEMBER - Grayish-red sandstone, siltstone, and claystone in fining-upward cycles; conglomerate occurs at the base of some cycles.

Dcpp     CATSKILL FORMATION, PACKERTON MEMBER THROUGH POPLAR GAP - Fine  
to medium-grained gray sandstones, well-indurated to quartzite;  
sandstones grade upward into grayish-red siltstones and shales.

