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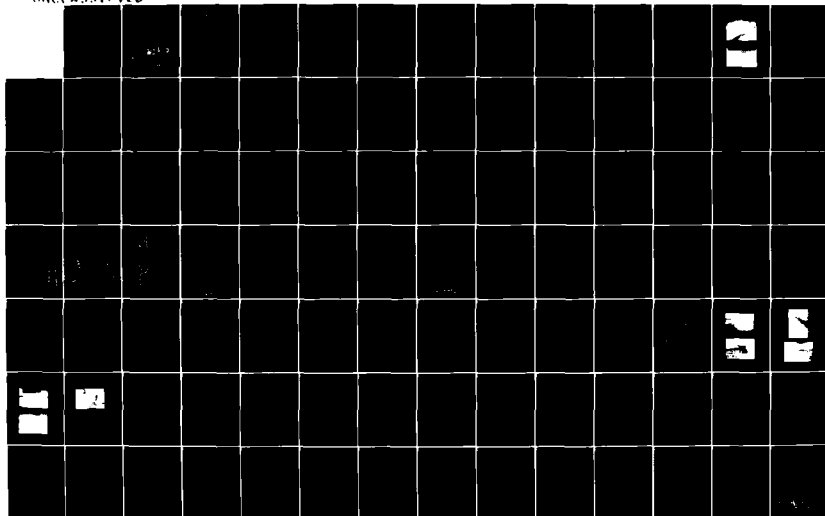
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
SLATERSVILLE RESERVOIR (U) CORPS OF ENGINEERS WALTHAM
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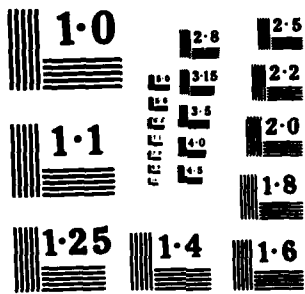
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AD-A156 749

BLACKSTONE RIVER BASIN
NO. SMITHFIELD, RHODE ISLAND

SLATERSVILLE RESERVOIR MIDDLE DAM

RI 02502

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) → The dam is a composite masonry and earth dam. The entire length of the dam is 310 ft. The range for the test flood is $\frac{1}{2}$ PMF to PMF. The dam is judged to be in generally fair condition owing to the absence of dewatering facilities. It is intermediate in size with a significant hazard potential. There are recommendations and remedial measures which should be undertaken by the owner.		

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SLATERSVILLE RESERVOIR MIDDLE DAM

RI 02502

BLACKSTONE RIVER BASIN
NORTH SMITHFIELD, RHODE ISLAND

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.: RI 02502
Name of Dam: Slatersville Reservoir Middle Dam
Town: North Smithfield
County and State: Providence County, Rhode Island
Stream: Branch River
Date of Inspection: 23 April and 10 May 1979

BRIEF ASSESSMENT

Slatersville Reservoir Middle Dam is a composite masonry and earth dam consisting of a 150 ft. downstream ashlar-faced masonry overflow section, an ashlar-faced masonry, earth filled right abutment about 40 ft. long and an ashlar-faced masonry, earth filled left abutment about 120 ft. long. The entire length of the dam is about 310 ft. It is a run-of-the-river dam and is the mid-dam of three dams forming the Slatersville Reservoirs, which once furnished the water needs for a mill located downstream but no longer serve that purpose.

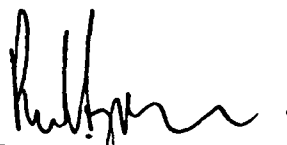
The pond behind the dam is about 4,800 ft. long and has a surface area at spillway level of about 74 acres. The drainage area above the dam is 88.5 sq mi. and the maximum storage to the top of dam is estimated at about 1,330 acre-ft. The height of the dam is about 26 ft.; the size classification is governed by storage and is thus intermediate. A breach of the dam would affect part of an industrial complex, three homes, a restaurant and two local roads. The dam has been classified as having a significant hazard potential. Based on intermediate size and significant hazard, the range for the test flood is $\frac{1}{2}$ PMF to PMF. The selected test flood for this project is $\frac{1}{2}$ PMF.

The dam is judged to be in generally fair condition owing to the absence of de-watering facilities. Water was flowing to a depth of about 2 in. over the crest of the spillway at the time of the inspection, so it was not possible to observe the condition of the downstream ashlar face. Nevertheless, the water appeared to be flowing uniformly along the downstream face with no evidence of turbulence, or missing or eroded elements. A few trees are growing on the right abutment.

The test flood inflow equals 19,000cfs. The routed test flood outflow (18,700cfs) overtops the non-overflow section. The test flood would overtop the abutments by about 4.35 ft. The spillway can pass 5,670 cfs or about 30 percent of the routed test flood outflow without overtopping the abutments.

Within one year after receipt of this Phase I Inspection Report, the owner, The Dudley Development Corp., should retain the services of a registered professional engineer and implement the results of his evaluation of the following: (1) assess further the potential for overtopping and the adequacy of the spillway; (2) study the feasibility of providing a means to safely drain the ponded water above the dam; and, (3) inspect the spillway during periods of low or no flow conditions.

7
The owner should also implement the following operating and maintenance measures:
(1) clear trees and brush from the right abutment; (2) develop a formal surveillance and flood warning plan; and, (3) institute procedures for an annual periodic technical inspection of the dam.



Peter B. Dyson
Project Manager



PREFACE

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

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

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

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

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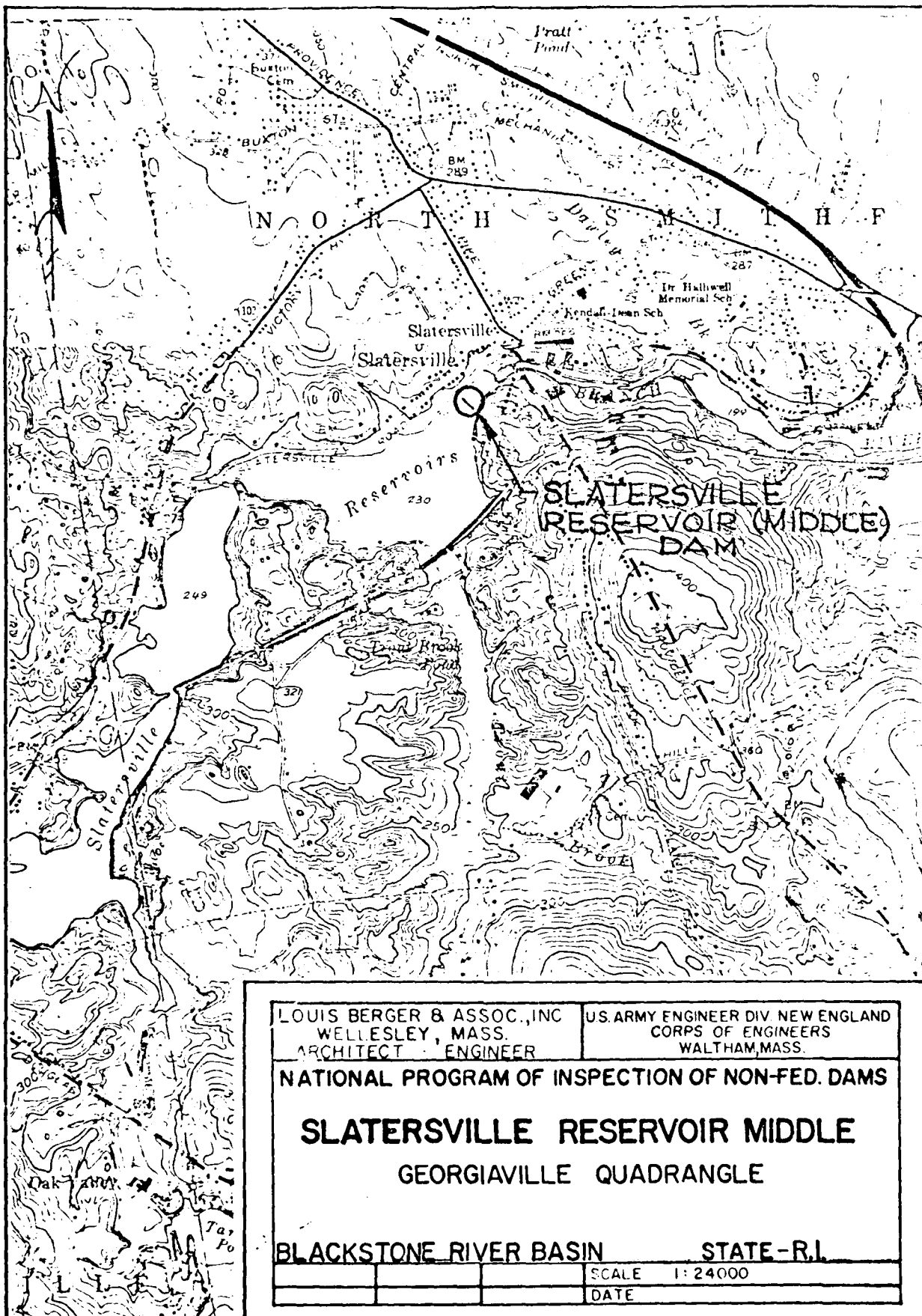
SLATERSVILLE RESERVOIR MIDDLE DAM



Overview from Right Abutment



Overview from Lower Dam



SECTION 7
ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. On the basis of the Phase I visual examination, Slatersville Reservoir Middle Dam appears to be in fair condition, owing to the absence of dewatering facilities. The deficiencies revealed indicate that a further investigation should be carried out and that some remedial work is needed. The major concerns with the overall integrity of the dam are as follows:

1. The spillway will only pass about 30 percent of the routed test flood outflow.
2. The lack of facilities for drawing down the reservoir.

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

c. Urgency. The recommendations and remedial measures enumerated below should be implemented by the owner within one year after receipt of this Phase I Inspection Report.

d. Need for Additional Investigations. Additional investigations are required as recommended in Para. 7.2.

7.2 Recommendations

It is recommended that the owner, Dudley Development Corp., should retain the services of a competent registered professional engineer to make further investigations of the following, and should implement the results:

- (1) Make a thorough study of the hydrology of the drainage basin and evaluate further the potential for overtopping and the inadequacy of the spillway.
- (2) Study the feasibility of providing a means to safely drain the reservoir.
- (3) Inspect the spillway during period of low or no flow conditions.

7.3 Remedial Measures

a. Operating and Maintenance Procedures.

- (1) Remove tree and brush growth from the right abutment.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation. There are no design calculations available for review of the structural stability of the dam and appurtenant structures. However, the investigations and findings described herein do not indicate any displacement or distress which would warrant the preparation of structural stability calculations based on assumed soil properties and engineering factors. The dam is now stable, but deficiencies described under Section 7 should be corrected.

b. Design and Construction of Dam. No plans or calculations of value to a stability assessment are available for the dam.

c. Operating Records. There are no records which indicate the manner in which the dam has been operated.

d. Post-Construction Changes. There are no known records of any post-construction changes, although there is some verbal authority, at least, for a 1956 reconstruction. From inspection of the dam, however, it is unlikely that this reconstruction, of whatever scope, could have affected adversely the stability of the dam.

e. Seismic Stability. The dam is located in Seismic Zone No. 1 and in accordance with Phase I guidelines does not warrant seismic analyses.

Results of Dam Failure

River Section	Reservoir @ Elev. 237.85 Before Breach of Structure		Reservoir @ Elev. 237.85 After Breach of Main Overflow Section	
	Discharge cfs	River Stage Ft.	Discharge cfs	River Stage Ft.
16+00	5,670	7.4	14,610	12.6
*46+00	5,670	6.0	13,120	8.0
69+00	5,670	7.4	12,477	10.5
91+00	5,670	8.3	10,955	10.3
**146+00	5,670	8.8	9,936	11.7

*Estimated Stage Above Crest of Dam at Old Mill Pond

**Confluence with Blackstone River

In summary, about two industrial buildings, three homes, a restaurant, and two roadways are within the area of potential flooding (see Appendix D, Figure 3, Sheet D-21).

Flood Magnitude	Max. Routed Outflow cfs	Max. Res. El. ft. MSL	Max. Head Over Dam ft.	Max. Disch. Over Dam cfs
½ PMF (Test Flood)	19,000	242.20	4.35	18,700
PMF	38,000	246.05	8.2	37,200

From the above table, it can be seen that the project will not pass the routed test flood outflow without overtopping the dam by 4.35 ft. The project, however, can handle 30 percent of the routed test flood outflow without overtopping the dam. The spillway capacity at the top of dam is 5,670 cfs.

f. Dam Failure Analysis. As discussed above, the dam would be overtopped by the routed test flood outflow. Also a breach owing to structural failure of the dam by piping is a possibility. For this analysis a breach was assumed with the water level at the top of dam. The "rule of thumb" criteria suggested in the NED March 1978 Guidance Report was used. With a breach width of 40 percent of the dam length, or about 60 ft., an outflow of about 16,870 cfs, which includes 3,500 cfs from the intact portion of the spillway, would be realized (see Sheets D-11 thru D-20, Appendix D). It was also assumed that Slatersville Lower Reservoir Dam located about 600 ft. downstream of the middle dam would be washed out.

In reaches below the dam the outflow first passes under the Providence Turnpike through a masonry, twin-arch bridge. Beyond the bridge a mill is located high on the left bank and an industrial complex occupies the right bank at a lower elevation. The flow is then confined to a narrow ravine as it threads its way to another mill dam and pond. This lower dam is located about 1.10 miles below Slatersville Reservoir Middle Dam. Below this dam the river is again confined to a steep ravine until it reaches the vicinity of the Smithfield Expressway and the Louisquisset Pike. In this area the river valley widens but no structures exist in the valley. Beyond the Louisquisset Pike the river narrows and is confined until it reaches its confluence with the Blackstone River at a point about 2.76 miles below the Slatersville Reservoir Middle Dam.

The most significant area to be impacted as a result of a breach of the dam would be the area extending immediately downstream of the dam for a distance of about one-half mile. The Providence Pike and a few industrial buildings located within this reach would sustain significant damage if a breach should occur. The only other structures that would sustain damage are three houses and a restaurant which are north of the river and are located about 3,800 ft. downstream of the Slatersville Reservoir Middle Dam. At this location the river stage would increase in depth on the order of 2 ft. to 5 ft. River valley routing downstream would produce discharges as shown in the following table. Also shown is the river stage just prior to failure.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General. The Slatersville Reservoir Middle Dam is a run-of-the-river type project, originally constructed to furnish the water needs of a mill located downstream. It is the mid-dam of three dams which retain a series of ponds forming the reservoir system. It is basically a low storage-high spillage dam. It consists of an ashlar masonry overflow dam and two ashlar faced earth-fill abutments.

b. Design Data. No hydrologic or hydraulic design data was retrieved for Slatersville Reservoir Middle Dam.

c. Experience Data. No records are available in regard to past operation of the dam. There is one plan available which shows a high water mark recorded at the dam during the November 4, 1927 flood. The plan indicates that the water was 5 ft. above the crest of the dam on that date, which would correspond to a discharge of about 5,300 cfs. U.S.G.S. Gauging Station 01111500 at Forestdale, R.I. is located about 1.17 miles downstream of the dam. According to U.S.G.S. Water Supply Papers, the maximum discharge at the site since 1886 was about 5,800 cfs occurring on March 19, 1936, by computation of flow over a dam located 1 mile upstream of the gauge. The highest discharge recorded at the gauge itself was 5,470 cfs occurring on January 25, 1979. The drainage area for the Gauge is 91.2 sq. mi. compared with a drainage area above Slatersville Reservoir Middle Dam of 88.5 sq. mi.

d. Visual Observations. No evidence which would indicate possible high flows through the reservoir area or in the downstream channel were noted.

e. Test Flood Analysis. Slatersville Reservoir Middle Dam is about 26 ft. high and impounds about 1,330 acre-ft. to the top of dam; therefore, it is classified as intermediate in size. Because of downstream conditions, the hazard potential is classified as significant. In accordance with Recommended Guidelines for Safety Inspection of Dams, the recommended test flood is one half the probable maximum flood to a full maximum flood (PMF). A test flood of a magnitude corresponding to $\frac{1}{2}$ PMF was selected for the evaluation.

The NED March 1978 Preliminary Guidance Memorandum for Estimating Probable Discharges was used for estimating the maximum probable flood peak flow rate, which was then divided by two to arrive at the test flood value. The test flood inflow for Slatersville Reservoir Middle Dam, having a drainage area of 88.5 sq. mi., was determined to be about 215 CSM or about 19,000 cfs. Flood routings through the reservoir were performed for both the $\frac{1}{2}$ and the full PMF in the analysis. Results of these routings are shown on Sheets D-8, D-9, and D-10, and are summarized as follows:

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

The Dudley Development Corp. is the owner and operator of the dam. There are neither operating devices at the dam nor any documented operating procedures for the dam.

4.2 Maintenance of Dam

There is no specific maintenance program in effect at Slatersville Reservoir Middle Dam.

4.3 Maintenance of Operating Facilities

The original gates in the filled-in canal have been removed. There are now no operating facilities for the dam.

4.4 Warning System

No warning system is in effect at Slatersville Reservoir Middle Dam.

4.5 Evaluation

The dam serves no useful purpose at the present, though the owner has shown interest recently in installing a small hydroelectric facility. Maintenance involves periodic growth removal from the abutments, surveillance regarding seeps, repair of ashlar masonry and keeping the spillway crest clear of debris. The owner should establish a formal warning system for the dam in the event of an emergency.

d. Reservoir Area. The reservoir behind the dam is a ponding of the Branch River. The upper reaches of the ponded area extend to the tailwaters of the Slaterville Reservoir Upper Dam. The reservoir area offers frequent evidence of rock outcrops, generally foliated gneisses. The slopes are partly wooded and are stable.

e. Downstream Channel. Immediately downstream of the dam, another ponding of the Branch River is formed by the Slatersville Reservoir Lower Dam. The lower dam is located about 600 ft. downstream of the Middle Dam. The river beyond the Lower Dam is contained in a generally deep valley with little valley storage available. About 400 ft. downstream of the Lower Dam a masonry, twin-arch bridge carries the Providence Pike roadway over the river. Just beyond the bridge, a historic mill complex is located high on the left bank and an industrial development is located at lower elevations on the right bank. From this point the river follows a steep ravine until it empties into a mill pond about 2,500 ft. below the Providence Pike. Here the river channel widens until it reaches another dam. Beyond this dam the valley is narrow to its confluence with the Blackstone River, about 2.76 miles below the Slatersville Reservoir Middle Dam (see Photo Nos. 6 and 7, Appendix C).

3.2 Evaluation

In general the visual inspection of the dam adequately revealed key characteristics of the project as they may relate to its stability and integrity, permitting an assessment to be made of those features affecting the safety of the structure. The only exception to the above was that, due to the flow over the crest of dam, it was not possible to observe the condition of the ashlar face of the spillway at the time of the inspection. However, the water appeared to be flowing uniformly with no evidence of turbulence or missing or eroded elements. There was no sign of seepage in the abutments, nor signs of animal burrows. There was a small amount of growth on the right abutment. The Slatersville Reservoir Middle Dam was judged to be in fair condition owing to the absence of dewatering facilities.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General. The visual inspection of Slatersville Reservoir Middle Dam took place on 23 April and 10 May 1979. On 23 April the water was about 2 inches above the spillway crest. The discharge over the spillway was estimated to be about 25 cfs. There was no evidence of any major maintenance problems, but one item requires attention (See Section 7.3). The dam was judged to be in fair condition owing to the absence of dewatering facilities.

b. Dam. The dam is a run-of-the-river dam with an overall length of 310 ft. It is the mid-dam of three dams which retain a series of ponds making up the Slatersville Reservoir Complex. The reservoirs were formerly used for processing water in the mill community of Slatersville. All three dams are of the same general construction. The middle dam has a 150 ft. long, gently arched upstream spillway, between two earthfilled ashlar faced abutments. The northerly or left abutment is about 120 ft. long and the south, right abutment is about 40 ft. long. The left abutment contains a filled-in canal that once connected the entire reservoir system to the mill complex downstream. The ashlar facing of the spillway and of the abutments was judged to be in excellent condition. Although there was evidence of trespass on the approach slopes to the right abutment, the abutment was nevertheless in very good condition. A resident in the neighborhood informed the inspection party that the dam had been repaired in 1956, at which time the impoundment had been drawdown. It is unknown how the reservoir was drawdown.

c. Appurtenant Structures. The overflow portion or spillway of the dam is an ashlar faced masonry gravity structure with mortared joints. The downstream face has a slight batter, and it is estimated that the upstream slope is $2\frac{1}{2}$ horizontal to 1 vertical. The top of the spillway is about 3 ft. wide with a capstone sill. The coping, or capstone, is a carefully shaped, 20 in. thick granite slab about 3 ft. wide, with provision for flashboards. A detail of a similar dam top indicates that the capstone or coping is set on the granite masonry with a rubble interface between the capstone and the gravel backfill. Sections on drawings of a similar dam indicate that the upstream side of the masonry spillway has been filled with granular material on a slope of $2\frac{1}{2}$ horizontal to 1 vertical from coping to base. Water passing over the spillway appeared to be flowing uniformly with no evidence of turbulence or missing or eroded elements. Nevertheless, the downstream face should be inspected under low or no flow conditions (See Section 7.2).

There are no dewatering facilities at this dam. A sluiceway through the left abutment was plugged and abandoned prior to 1939. The gate mechanisms have been completely removed (see Photo Nos. 1-5, Appendix C).

SECTION 2 - ENGINEERING DATA

2.1 Design Data

No design data of the nineteenth century dam or appurtenances has been recovered and probably none exists. One drawing has been located for the Slatersville Upper Dam which is dated 1886. The drawing is typical of all three Slatersville Dams and it is believed that all three dams were constructed at about the same time as part of one construction project.

2.2 Construction Data

No records or correspondence regarding construction have been found. The Rhode Island Department of Environmental Management, Division of Land Resources has made available a set of 5 drawings showing plan views of the dams in the Slatersville Reservoir Complex. These plans show the dams as they existed in 1941. Copies of these plans are included in Appendix B.

2.3 Operation Data

There are no operating devices at this dam.

2.4 Evaluation of Data

a. Availability. Since little engineering data is available, it is not possible to make an assessment of the safety of the dam. The basis of the information presented in this report is principally the visual observations of the inspection team.

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

c. Validity. Not applicable

- 7
- (3) Height - 26 ft. $\pm$
 - (4) Top width - Varies
 - (5) Side slopes - overflow section - Downstream slight batter
Upstream $2\frac{1}{2}$ horizontal to 1 vertical
 - (6) Zoning - Unknown
 - (7) Impervious core - Unknown
 - (8) Cutoff - Unknown
 - (9) Grout curtain - Unknown
 - h. Diversion and Regulating Tunnel - Not applicable
 - i. Spillway
 - (1) Type - Overflow gravity dam
 - (2) Length of weir - 150 ft.
 - (3) Crest elevation - 232.6
 - (4) Gates - None
 - (5) Upstream channel - Natural river channel
 - (6) Downstream channel - Natural river channel
 - (7) General - Spillway flows directed into small reservoir
 - j. Regulating Outlets - None

- (3) Upstream portal invert diversion tunnel - Not applicable
(4) Recreation pool - Not applicable
(5) Full flood control pool - Not applicable
(6) Ungated spillway crest - 232.6
(7) Design surcharge (original design) - Unknown
(8) Top of non-overflow abutment - 237.85
(9) Test flood design surcharge - 242.2

d. Reservoir

- (1) Length of maximum pool - 4800 ft.
(2) Length of recreation pool - Not applicable
(3) Length of flood control pool - Not applicable

e. Storage (acre-ft.)

- (1) Recreation pool - Not applicable
(2) Flood control pool - Not applicable
(3) Spillway crest pool El. 232.6 - 740
(4) Top of non-overflow abutment El. 237.85 - 1330
(5) Test Flood Pool El. 242.2 - 2050

f. Reservoir Surface (acres)

- (1) Recreation pool - Not applicable
(2) Flood control pool - Not applicable
(3) Spillway crest El. 232.6 - 74
(4) Top of non-overflow abutment El. 237.85 - 140
(5) Test flood pool El. 242.2 - 205

g. Dam

- (1) Type - Gravity overflow with downstream masonry section and upstream earth fill
(2) Length - 310 ft.

i. Normal Operating Procedure. There are no operational procedures for Slatersville Reservoir Middle Dam.

1.3 Pertinent Data

a. Drainage Area. The drainage area above Slatersville Reservoir Middle Dam consists of about 88.5 sq. mi., described in general as flat and coastal area. It is located in the northeast corner of Rhode Island and its northern reaches extend into the State of Massachusetts. In the upper reaches of the drainage area the topography is generally heavily wooded, rolling terrain. The lower reach area is more urbanized and tends to be flatter. The area contains numerous old power plants and reservoirs, the largest being Pascoag Reservoir located about 11 miles upstream of Slatersville Reservoir Middle Dam.

b. Discharge at Damsite.

(1) Outlet works conduit. None

(2) Maximum known flood at Damsite. The maximum discharge at the damsite is unknown. An old plan of the dam showing stages recorded in November, 1927 indicates that the stage at the damsite was about 5 ft. above the crest of the dam on November 4, 1927. A stage of 5 ft. would correspond to a discharge of about 5,300 cfs. U.S.G.S. Station 01111500, at Forestdale, R.I., having a drainage area of 91.2 sq. mi., is located about 1.17 miles downstream of the dam. According to U.S.G.S. Water Supply Papers the maximum discharge at the site since 1886 was about 5,800 cfs on March 19, 1936, by computation of flow over a dam located 1 mile upstream of the gage. The highest discharge recorded at the gage was 5,470 cfs on January 25, 1979.

(3) Ungated Spillway Capacity at Top of Dam. The total spillway capacity at top of abutments, elevation 237.85 is 5,670 cfs.

(4) Ungated Spillway Capacity at Test Flood Elevation. The ungated spillway capacity is about 13,700 cfs at test flood elevation 242.2 MSL.

(5) Gated Spillway Capacity at Normal Pool Elevation. Not applicable

(6) Gated Spillway Capacity at Test Flood Elevation. Not applicable

(7) Total Spillway Capacity at Test Flood Elevation. The total spillway capacity at the test flood elevation is the same as (4) above, 13,700 cfs at elevation 242.2 MSL.

(8) Total Project Discharge at Test Flood Elevation The total project discharge at test flood is 18,700 cfs at elevation 242.2 MSL.

c. Elevations (Ft. above MSL)

(1) Streambed at centerline of dam - 212.0

(2) Maximum tailwater - Unknown

is unknown. A cap-stone sill along the spillway crest serves as a control. The total length of the dam is about 310 ft. There are no dewatering facilities for the reservoir.

c. Size Classification. Slatersville Reservoir Middle Dam has a hydraulic height of about 26 ft. above downstream river level, and impounds a normal storage of about 740 acre-ft. to spillway crest level and a maximum of about 1,330 acre-ft. to the top of dam. In accordance with size and capacity criteria given in Recommended Guidelines for Safety Inspection of Dams, capacity governs and the project falls into the intermediate category and therefore is classified accordingly.

d. Hazard Classification. The Branch River below Slatersville Reservoir Middle Dam flows through a rather narrow ravine before entering the Blackstone River about 2.76 mi. downstream of the dam. About 2,500 ft. downstream of the dam, the valley widens and an industrial complex is located on the right bank. It is estimated that the stage of the river in this reach, due to a breach of the dam, would be about 12.5 ft. high and cause severe flooding of a portion of the industrial complex. Beyond this point the valley is narrow until it reaches an old mill pond site. It is anticipated a local road, three houses and a restaurant would sustain damage in this area.

A sudden breach of the dam would probably cause the loss of a few lives and result in appreciable community and industrial economic losses. Consequently, Slatersville Reservoir Middle Dam has been classified as having a significant hazard potential, in accordance with the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership. Slatersville Reservoir Middle Dam is owned by the Dudley Development Corp., 58 Hamlet Avenue, Woonsocket, R.I. 02895.

State of Rhode Island records indicate that the dam was owned by The Kendall Company in 1946. The dam is believed to have been constructed around 1886 for John W. Slater for use in his textile milling operation.

f. Operator. Mr. Herbert Sturgis, General Manager, Holliston Sand Company, c/o Dudley Development Corp., 58 Hamlet Avenue, Woonsocket, R.I. 02895. Telephone: (401) 766-5010

g. Purpose of Dam. The dam was originally constructed to create industrial water storage for John W. Slater's milling operations. At the present time the reservoir is not utilized, except possibly for fishing and boating.

h. Design and Construction History. No information is available regarding design and construction of the dam. The dam is believed to have been constructed around 1886 by John W. Slater for use in his textile milling operations. J. W. Ellis, C.E., of Woonsocket, R.I. designed the Slatersville Reservoir Upper Dam and it is believed that he was designer of the Middle Dam also.

PHASE I INSPECTION REPORT

SLATERSVILLE RESERVOIR MIDDLE DAM RI 02502

SECTION 1 - PROJECT INFORMATION

1.1 General.

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Louis Berger & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Rhode Island. Authorization and notice to proceed was issued to Louis Berger & Associates, Inc. under a letter of 19 March 1979 from John P. Chandler, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0051 has been assigned by the Corps of Engineers for this work.

b. Purpose.

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

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

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

1.2 Description of Project.

a. Location. The Slatersville Reservoirs and Dams are located on the Branch River near the community of Slatersville in the town of North Smithfield, Providence County, Rhode Island. The Slatersville Reservoir Middle Dam is one of three dams located along the river forming the reservoirs. The Slatersville Reservoir Middle Dam is located about 2.76 miles upstream from the Branch River's confluence with the Blackstone River. The dam site is shown on U.S.G.S., Quadrangle, Georgiaville, Rhode Island, with coordinates approximately at N 41° 59' 51", W 71° 34' 57".

b. Description of Dam and Appurtenances. Slatersville Reservoir Middle Dam is a run-of-the-river dam constructed about 1886 as part of a mill complex. The use of the dams and reservoirs for the mill has been abandoned and the dam no longer serves its original intent.

Essentially the dam consists of a 150 ft. long ashlar masonry arched overflow section, with left and right ashlar masonry faced earth-fill abutments. To the left of the left abutment there is a filled-in canal. This canal once extended from the upper reservoir to the mill site located below the lower dam. The downstream slope of the overflow section has a slight batter and the upstream slope

- (2) Develop a formal flood warning plan to follow in the event of an emergency, including round-the-clock monitoring during heavy precipitation.
- (3) Institute procedures for an annual periodic technical inspection of the dam and its appurtenant structures.

7.4 Alternatives

The only practical alternative would be to breach the dam under the auspices of a registered professional engineer with due consideration of environmental effects.

APPENDIX A
INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

PARTY ORGANIZATION

PROJECT Slatersville Reservoir Middle Dam DATE 23 Apr. & 10 May 1979

TIME 9:00 AM

WEATHER ²³ Apr. Clear, Sunny
¹⁰ May Clear, Hot

W.S. ELEV. 232.8 U.S. DN.S.

PARTY:

- | | |
|--------------------------------|-----------|
| 1. <u>Peter B. Dyson</u> | 6. _____ |
| 2. <u>Pasquale E. Corsetti</u> | 7. _____ |
| 3. <u>Roger F. Berry</u> | 8. _____ |
| 4. <u>Carl J. Hoffman</u> | 9. _____ |
| 5. <u>James Reynolds</u> | 10. _____ |

PROJECT FEATURE

INSPECTED BY

REMARKS

- | | | |
|-----|----------------------|----------------------|
| 1. | Hydrologic | Roger F. Berry |
| 2. | Hydraulic/Structural | Carl J. Hoffman |
| 3. | Soils and Geology | James Reynolds |
| 4. | General Features | Peter B. Dyson |
| 5. | General Features | Pasquale E. Corsetti |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |

PERIODIC INSPECTION CHECKLIST

PROJECT Slatersville Reservoir Middle Dam DATE 23 April & 10 May 1979

PROJECT FEATURE Ashlar Masonry Dam NAME C. Hoffman

DISCIPLINE Structures NAME _____

AREA EVALUATED	CONDITIONS
----------------	------------

DAM EMBANKMENT

Crest Elevation	232.6 MSL
Current Pool Elevation	232.8 MSL
Maximum Impoundment to Date	Not known
Surface Cracks	N/A
Pavement Condition	N/A
Movement or Settlement of Crest	None observed
Lateral Movement	None observed
Vertical Alignment	Appears Good
Horizontal Alignment	Appears Good
Condition at Abutment and at Concrete Structures	Appears Good
Indications of Movement of Structural Items on Slopes	N/A
Trespassing on Slopes	Some on abutments (minor)
Sloughing or Erosion of Slopes or Abutments	None observed
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or near Toes	Inaccessible, could not observe
Unusual Embankment or Downstream Seepage	None observed
Piping or Boils	None observed
Foundation Drainage Features	None evident
Toe Drains	None evident
Instrumentation System	None evident

PERIODIC INSPECTION CHECKLIST

PROJECT Slatersville Reservoir Middle Dam DATE 23 Apr. & 10 May 1979

PROJECT FEATURE Spillway NAME C. Hoffman

DISCIPLINE Structures NAME _____

AREA EVALUATED	CONDITIONS
----------------	------------

OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS

a. Approach Channel

General Condition	Good
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	None observed
Floor of Approach Channel	Inaccessible

b. Weir and Training Walls

General Condition of Concrete	Granite Block - Good weir not accessible
Rust or Staining	N/A
Spalling	N/A
Any Visible Reinforcing	N/A
Any Seepage or Efflorescence	None observed
Drain Holes	None evident

c. Discharge Channel

General Condition	Good
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	Yes
Floor of Channel	Not observed
Other Obstructions	None observed

PERIODIC INSPECTION CHECKLIST

PROJECT Slatersville Reservoir Middle Dam DATE 23 April & 10 May 1979

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
----------------	------------

- | | |
|--|----|
| - Outlet Works - Control Tower | NA |
| - Outlet Works - Intake Channel and Intake Structure | NA |
| - Outlet Works - Transition and Conduit | NA |
| - Outlet Works - Outlet Structure and Outlet Channel | NA |
| - Outlet Works - Service Bridge | NA |

APPENDIX B
ENGINEERING DATA

DIVISION OF HARBORS AND RIVERS

SURVEY OF DAMS IN RHODE ISLAND

French River Basin #46 Slatersville (Middle) Dam #3

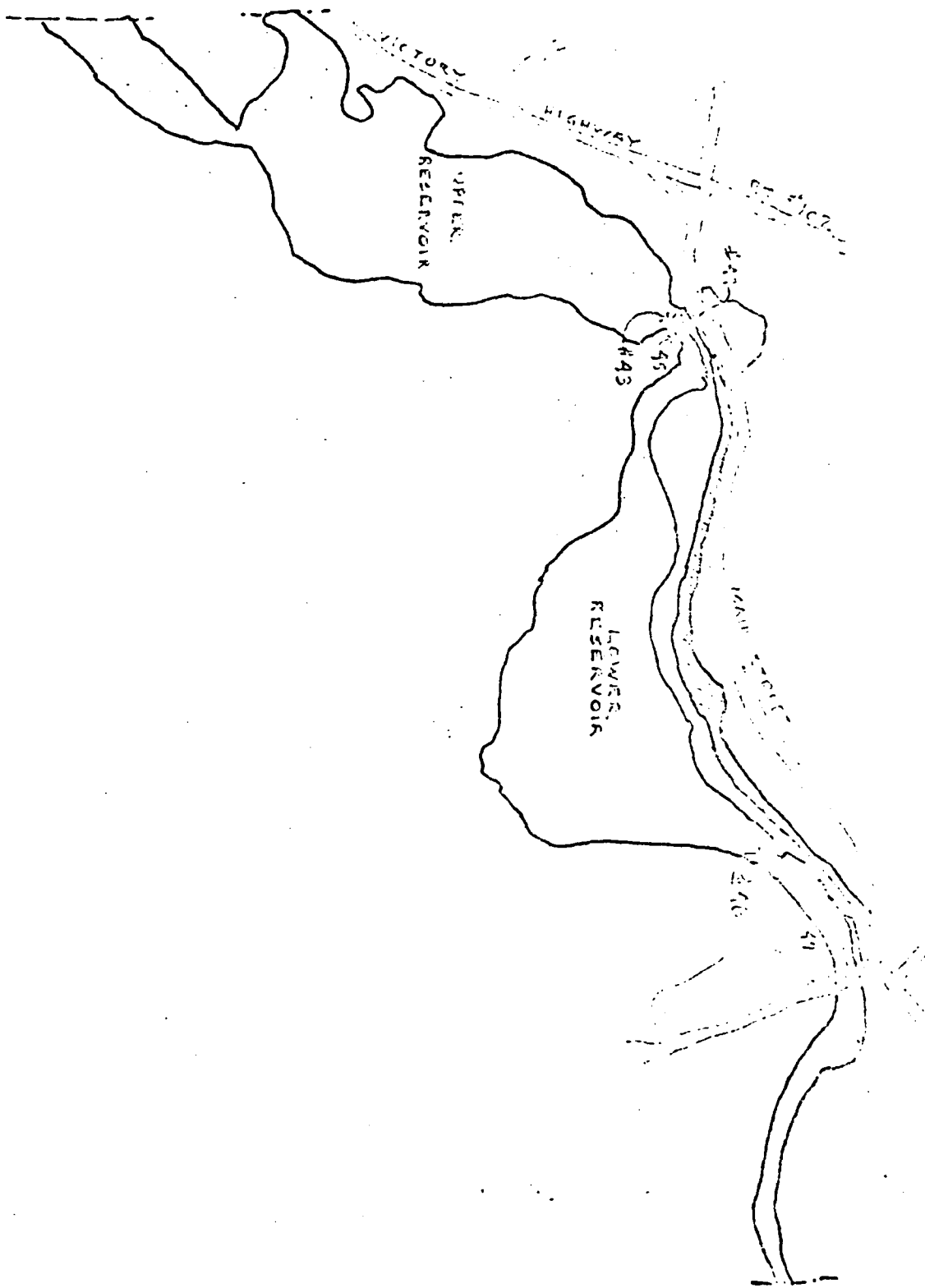
Drainage Area 93.9 Sq. Mi.

Pond Area 102 Acres

February 1948

Spillway 150' X 3.2' deep, capacity 7500 c.f.s.

Estimated extreme freshet 6028 c.f.s.



7

COPY OF FULL REPORT AS CONTAINED IN VARIOUS EDITIONS
OF COMMISSIONERS OF DAMS AND RESERVOIRS.

1893 - Upper dam built of stone and appearing in good condition
and safe. A long trench conveys the water to the mill.
Total fall at Slatersville is 37 feet.

1894 - A plan showing the flow of the stream at this point was
made by the Branch River during the flood of 1893. This plan was
aid of this Department by the owner and is in the possession of
the company has a plan of their entire reservoir system
which comprises some four dams and an efficient system, made
to secure a copy of it for office use as an aid towards
studying the habits of the Branch River in the future.
The four dams mentioned are structures of solid masonry
of ample proportions with spillways the entire width of
the river and the whole work is in excellent condition
being constantly repaired and kept up when necessary.

R.I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HARBORS AND RIVERS
SPECIAL INSPECTION REPORT

DATE:

INSPECTED BY: JOHN V. KELLY
E. H. FILKINS, PLANT ENGR.

WATERSHED: BLACKSTONE

DAM NO. 49 NAME: SLATERSVILLE (MIDDLE)

ON: RIVER BRANCH RIVER

OWNER: KENDALL COMPANY (SLATERSVILLE BRANCH)

ADDRESS: SLATERSVILLE FINISHING CO., SLATERSVILLE, R. I. TEL. WCON. 130

REPORT ON: NEW CONSTRUCTION

REPAIRS

INSPECTION ONLY: X

PLANS BY:

APPROVED:

CONTRACTOR:

INSPECTION REPORT BY JOHN V. KELLY REASON: ROUTINE

DATE: 9/22/49

TICKET:

REFERENCE CALL:

1. E. H. FILKINS, PLANT ENGINEER, SLATERSVILLE, REG. TEL. WCON. 1302 JR.
2. E. H. WILKES, JR., PLANT MANAGER, SLATERSVILLE

SPILLWAY:

TITLE:

CONDITION GOOD. MASSIVE CURVED MASONRY SPILLWAY, MEDIUM TALL, EXTENDS ACROSS ENTIRE RIVER. NO TRENCHES AT THIS DAM. NEEDS SOME POINTING ON ABUTMENTS AND FACE OF DAM. DAM GATES THROUGH ABUTMENT AT NORTH END OF SPILLWAY NEEDS NEW STEPS. SEE PLAN OVER. SO REQUESTED OF FILKINS, PLANT ENGINEER.

CONDITION:

DRAW-OFF CAN:

NUMBER:

CONDITION:

TRENCHES & WEIRS:

IMPROVEMENT:

YES:

CONDITION:

APPROACHES:

EROSION:

BRUSHES & TREES:

RIPRAP:

PRESENT USE:

WHO CONTROLS:

WHO CONTACT:

AS FILE:

INSTRUCTIONS:

IN EMERGENCY:

CALL:

DEPARTMENT OF NATURAL RESOURCES

DAM INSPECTION REPORT

DAM: 46 RIVER: Branch WATERSHED: Blackstone
Branch
NAME: Slatersville Res/ TOWN: N. Smithfield
Middle
OWNER: Dudley Development Corp.
58 Hamlet Avenue
Woonsocket, RI 02895

REPORT ON: General Condition of Dam

REASON FOR INSPECTION: N.P.S.I.D. - Low/Small Hazard
Annual Inspection

INSPECTION BY:
Earle Prout
Carmin Asprinio

DATE OF INSPECTION: April 6, 1978

REPORT:

Crest of spillway appears to be in excellent condition. Earth-filled, masonry block-faced embankment showing no signs of erosion or scouring. Some pointing of blocks on downstream side of spillway could be done but not considered to be urgent.

Dam has one draw-off gate which has been permanently closed since prior to 1939. Gate mechanism has been completely removed. (see photo 1)

Comments

Dam in good condition. No remedial action is suggested.

SCALE 1" = 50'

TRENCH

46

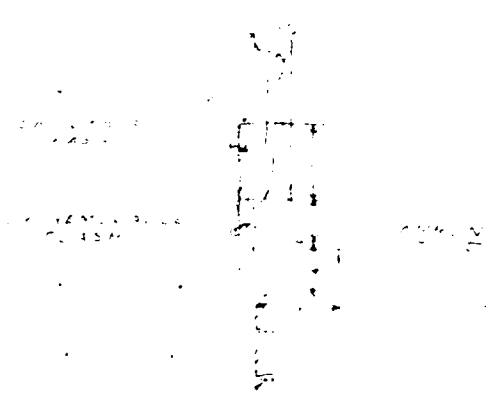
48 SLATERSVILLE
MIDDLE - #2

46

PLAN NO. BR-48

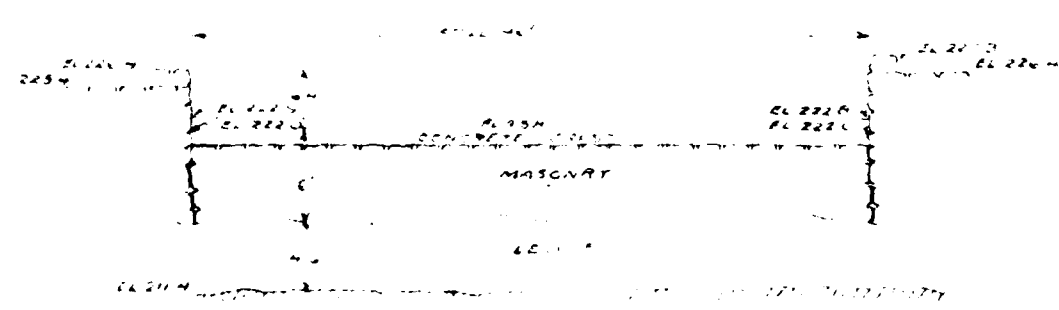
2

1. 8-8
 1. 10
 476



DETAIL - FLA HBRARD CONSTRUCTION
 SCALE 1" = 2'

47A

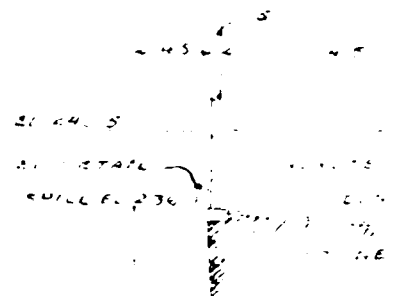


ELEVATION OF SPILL ~~504~~
 SCALE 1" = 10'
 LOOKING UPSTREAM

47B

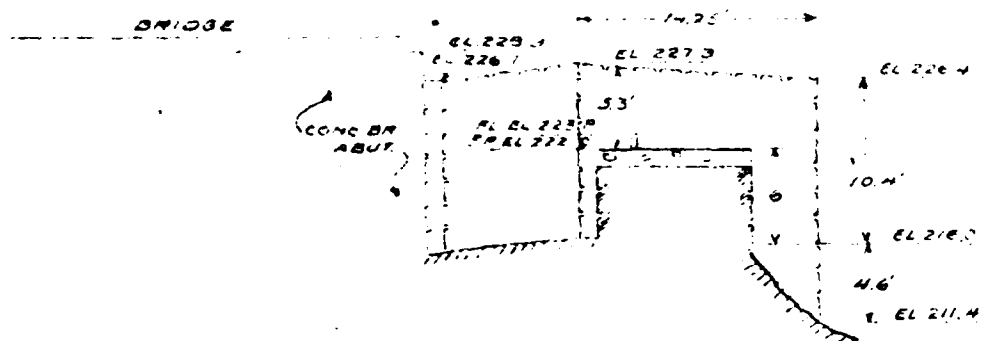
2

47A 47B



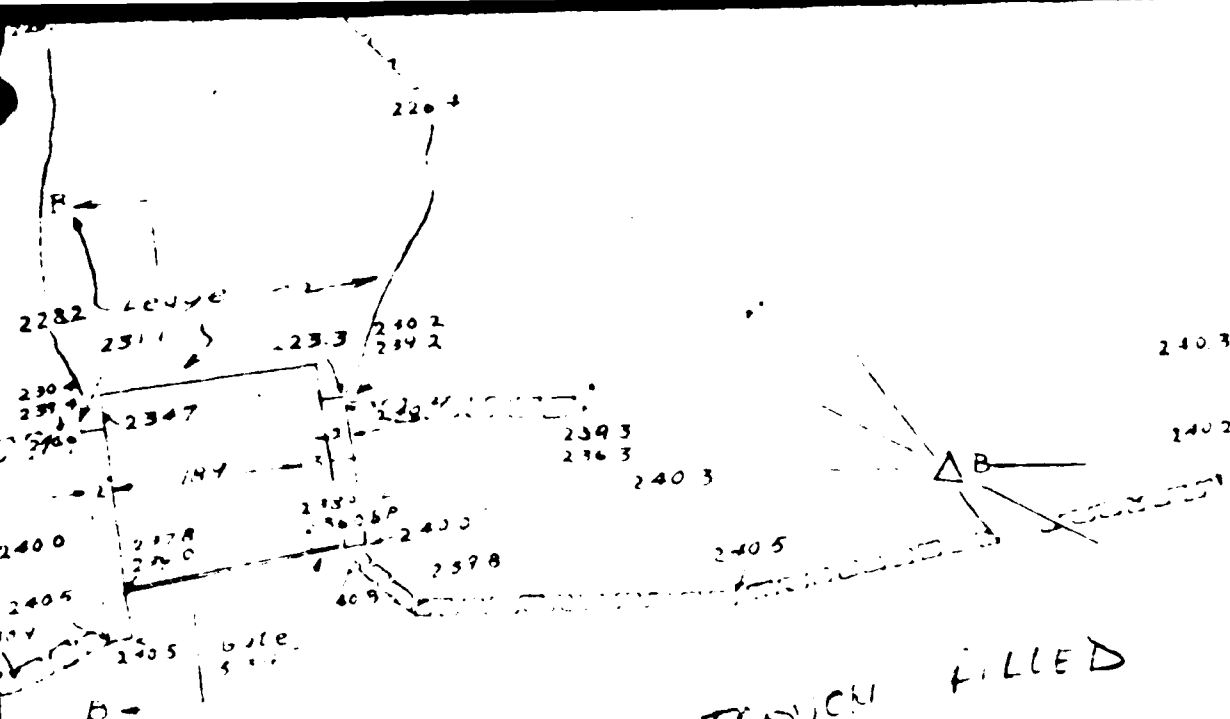
4.7 A

SECTION B-B
SCALE 1"=10'



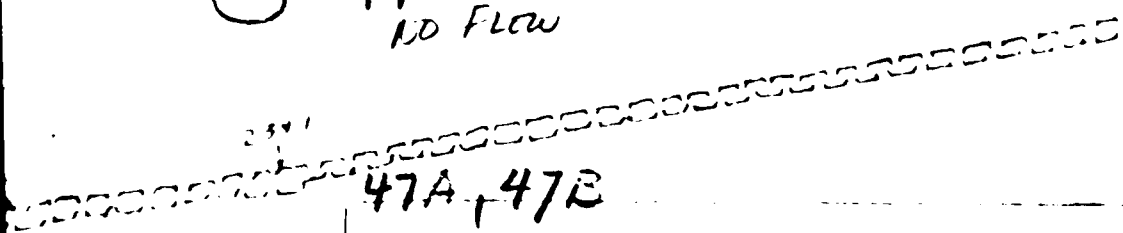
SECTION D - D
SCALE 1" = 10'

47 B



(50) 47A
NO FLOW

TRENCH FILLED



47A, 47B

50 ~~50-A~~ SLATERSVILLE

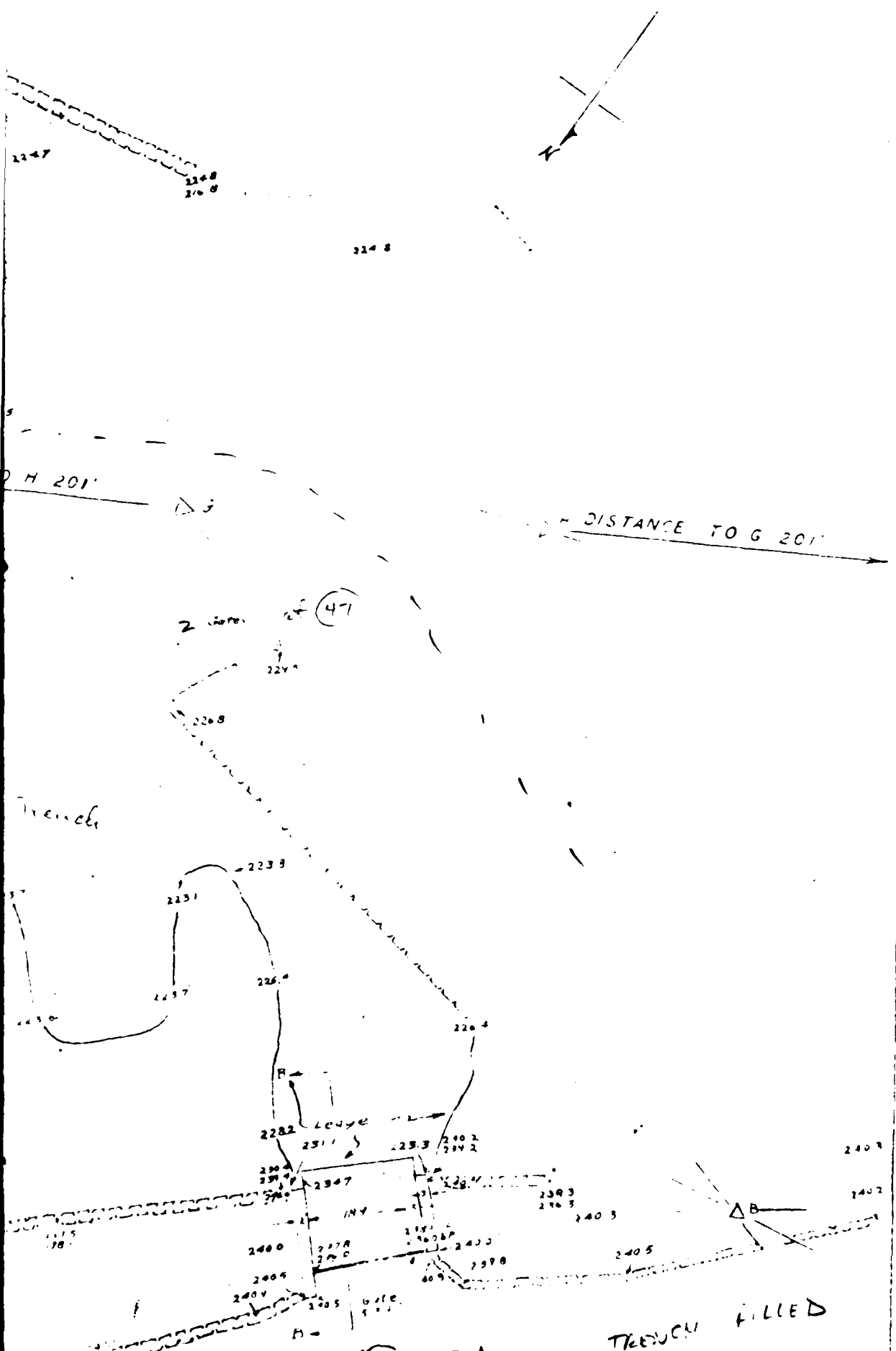
R. I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS & RIVERS
BY THE
WORKS PROJECTS ADMINISTRATION

(4)

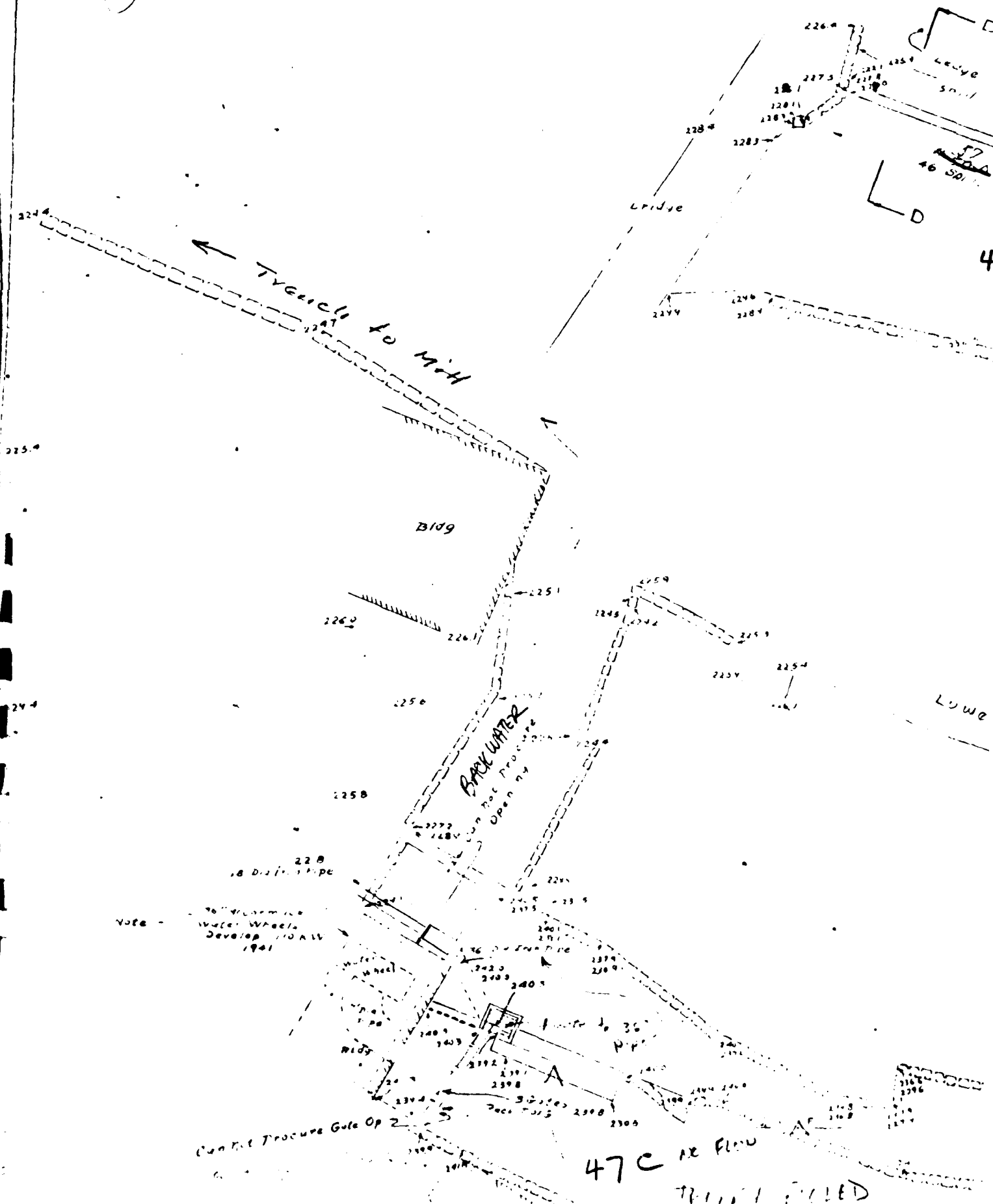
PLAN NO.

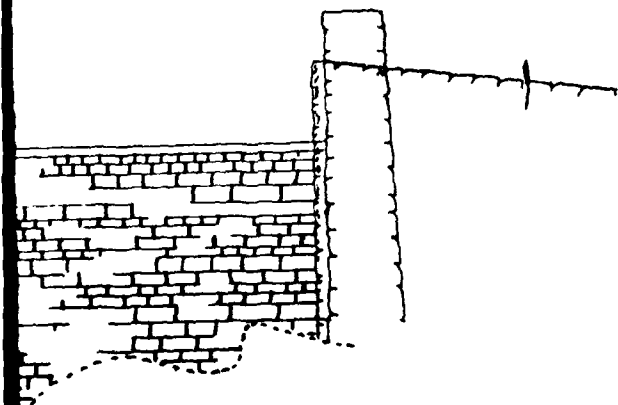
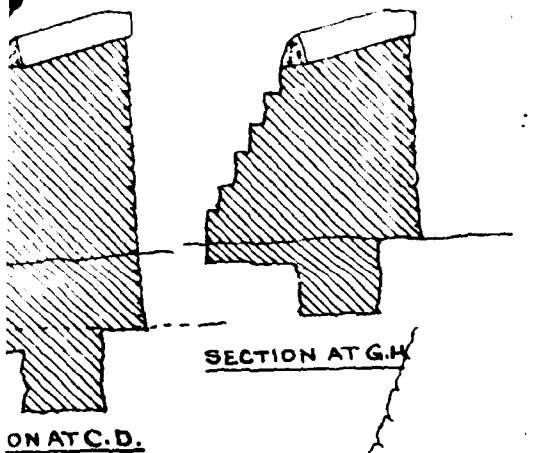
47A
B-50
47B
50-A

③



①



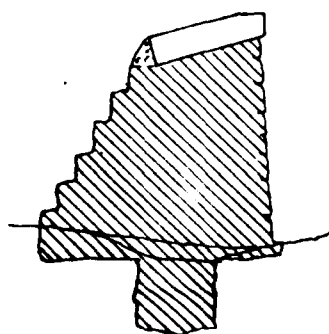


Dam #47
New # 47 (1946)

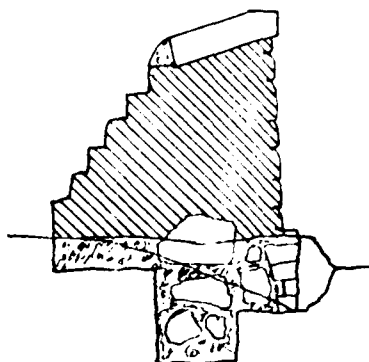
Dam #47



5/28

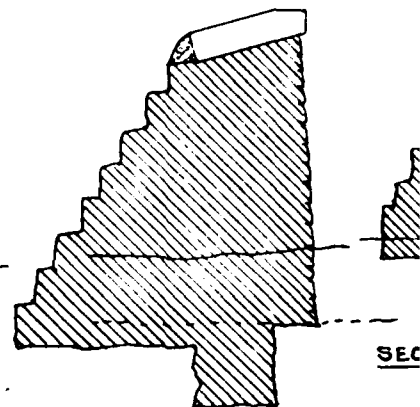


SECTION AT A-B



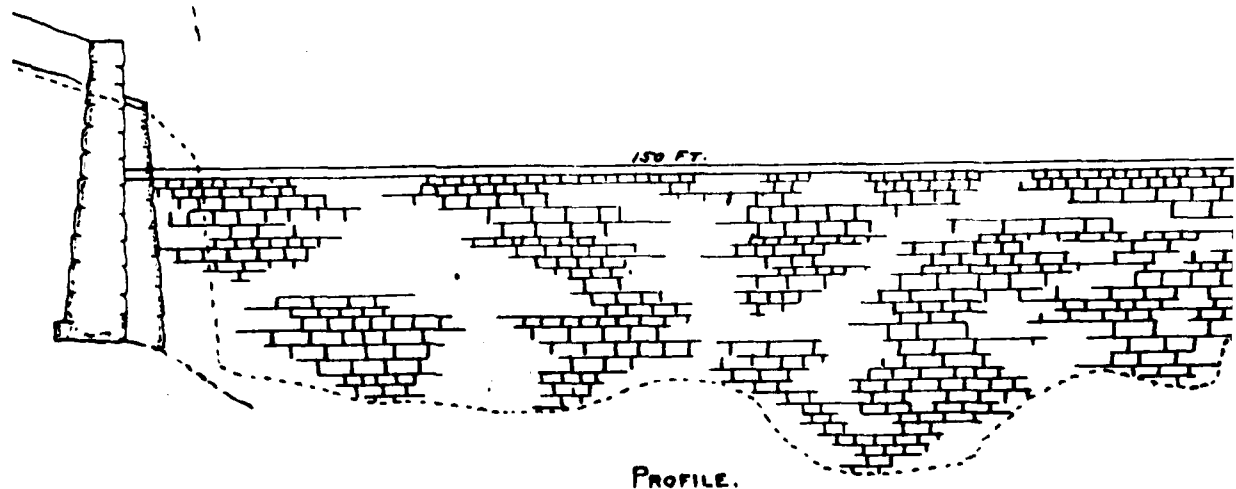
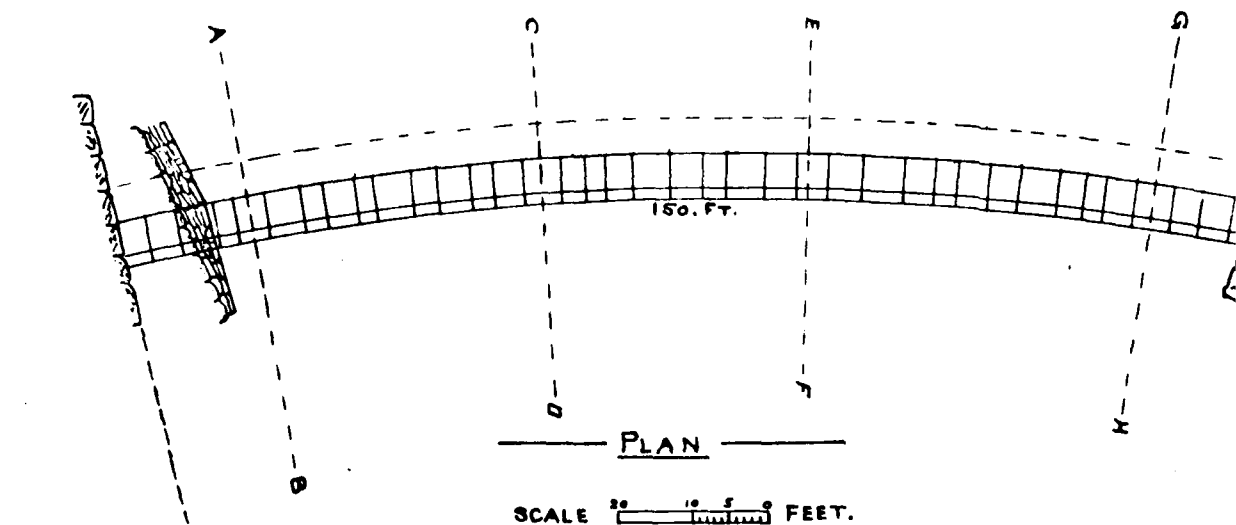
SECTION AT E-F.

SCALE  FEET.



SECTION AT C.D.

SEC



STONE DAM AT SLATERSVILLE R.I.

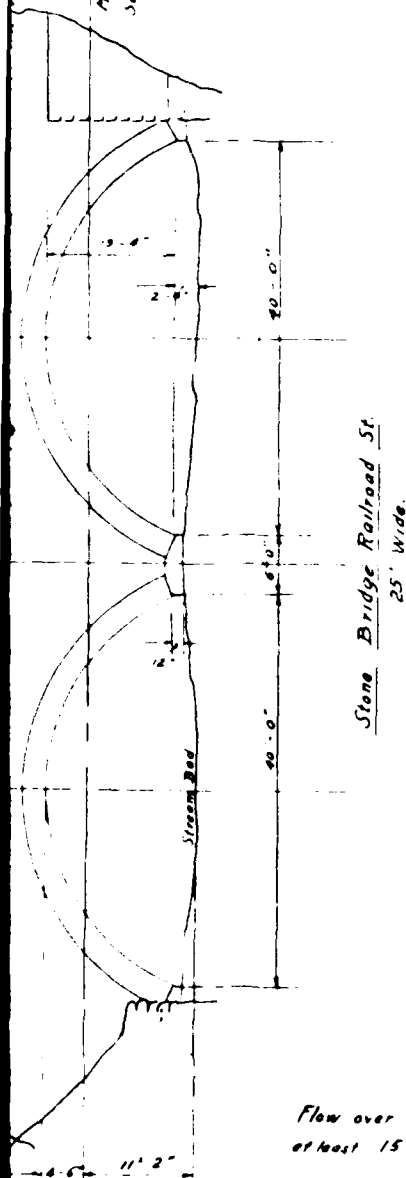
J.W. ELLIS, C.E.

JUNE-1895.

350

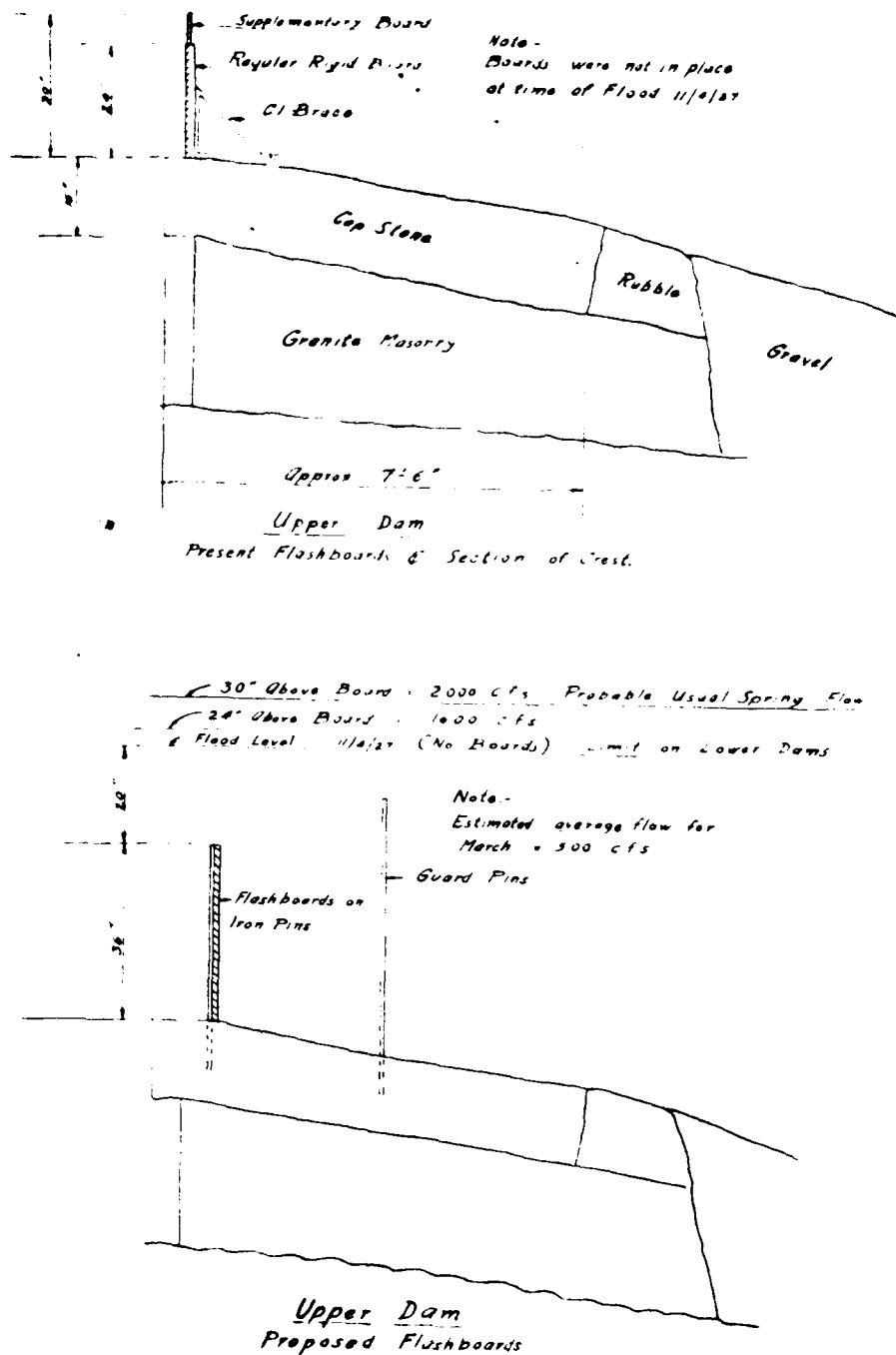
①

Water Level 11/1/27
Measured in Stock Water
South Bank Up-Stream Side



Flowing Area 1
100 sq ft approx
Area Used
By Flow Water
1200 sq ft c

Flow over dams measured
at least 15 ft Back of Face



SLATERSVILLE FINISHING CO.

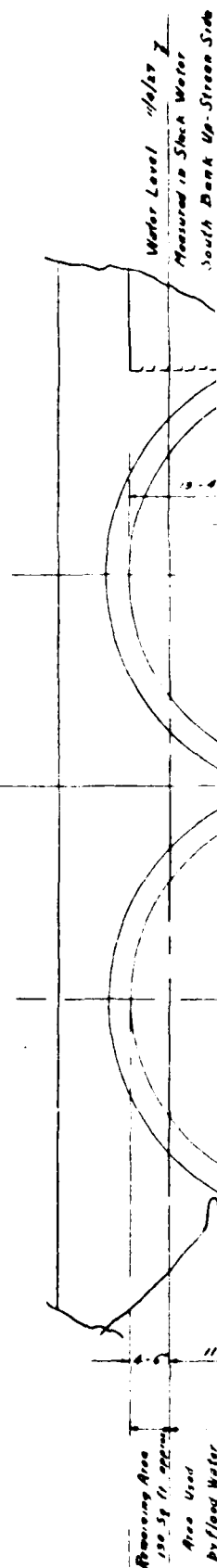
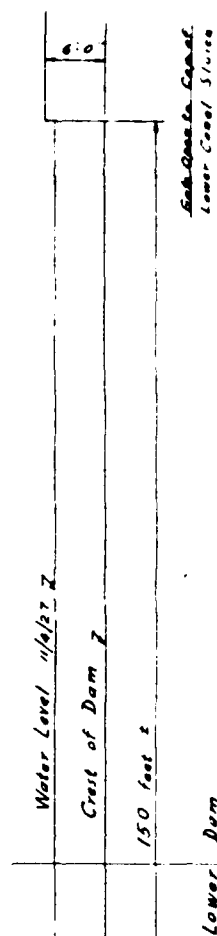
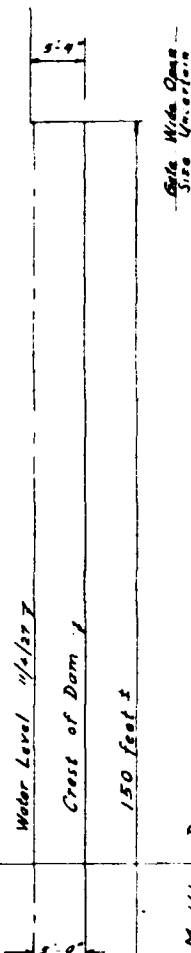
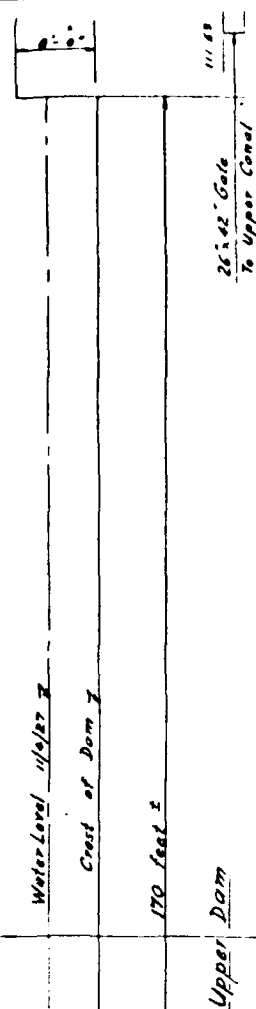
NOV. 8, 1927.

X-14

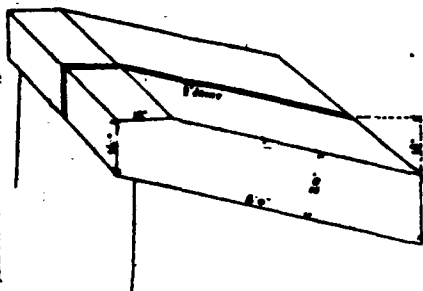
DRW-1-27-43-47-

(2)

North Abutments



South Abutments



Section of Cap-stone

Specification

to be built for John H. Davis, North Smithfield, R.I.

(or called) about one mile above Statesville.

to be cleaned of all roots, loose stones, rocks etc. to the solid rock or ledge

surface of the ledge to such depth as may be directed by the
and dimensions as shown on plans, and shall consist of well
withstand to be laid above in cement mortar, and bedded
roughly filled and flushed gaps with cement mortar a bed-
stone eight (8) inches in thickness to receive coping
of ashlar work, pointed on beds and built with rock face, and to lay
less than eight (8) inches in thickness. The horizontal joints
lay shall be laid with regard to breaking joints in the adjoining
four (4) feet back, the face work herein described shall be
making so as to insure a perfect piece of work.

to be cut to the dimensions given on the plans to fit just on beds and
work and shall project out (1) inches over the face of the stone
to set into the corner below said stone being thoroughly
in Portland Cement and vertical joints to be carefully jointed.

shank's Cement subject to the test and approval of the Engineer
not current to two parts clean sharp sand, mixed fresh for

considered as meaning John H. Davis or his duly authorized

(4)

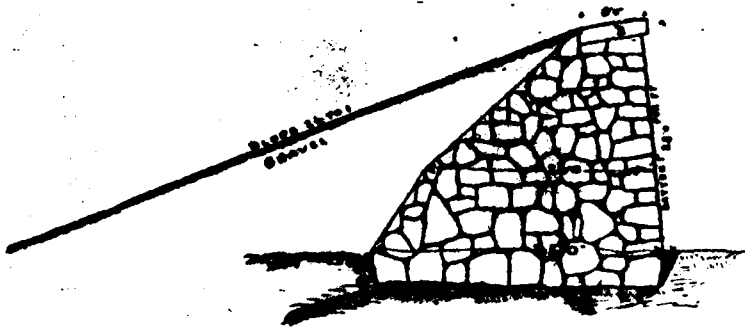
Room

Two Tumbler # 43

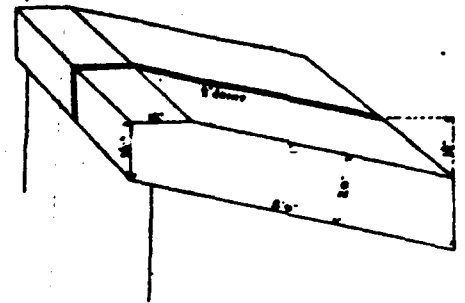
B
3-19

Don #43

(B)



Section through. A.A.



Section of Cap-stone

Scale 1"-10'.

Specification

Specification for a Stone Dam to be built for John H. Bates North River

The dam is to be located on the Branch River (so called) about one mile above Statesville. The foundations and approaches shall be thoroughly cleaned of all earth, loose stone, roots & undergrowth.

The foundations for the dam shall extend below the surface of the ledge to such depth as an Engineer in charge, and shall be built to the form and dimensions as shown on plans, and shall be built with masonry (with the exception of the buttresses) to be laid close in contact with the breast face, and all interstices to be thoroughly filled and flushed with concrete, with the kind at top of stone of not less than eight (8) inches in thickness.

The face of the buttresses to be of granite or covered ashlar work, pointed on beds and beds joints not exceeding one half (1/2) inch, no corner shall be of less than eight (8) inches in thickness. They shall be laid with regard to the rising courses on fifth (5) of face to be heads of full size four (4) feet back, the face work, thoroughly finished with the masonry that forms the backing so as to insure a perfect finish.

The faces to be pointed with Portland Cement.

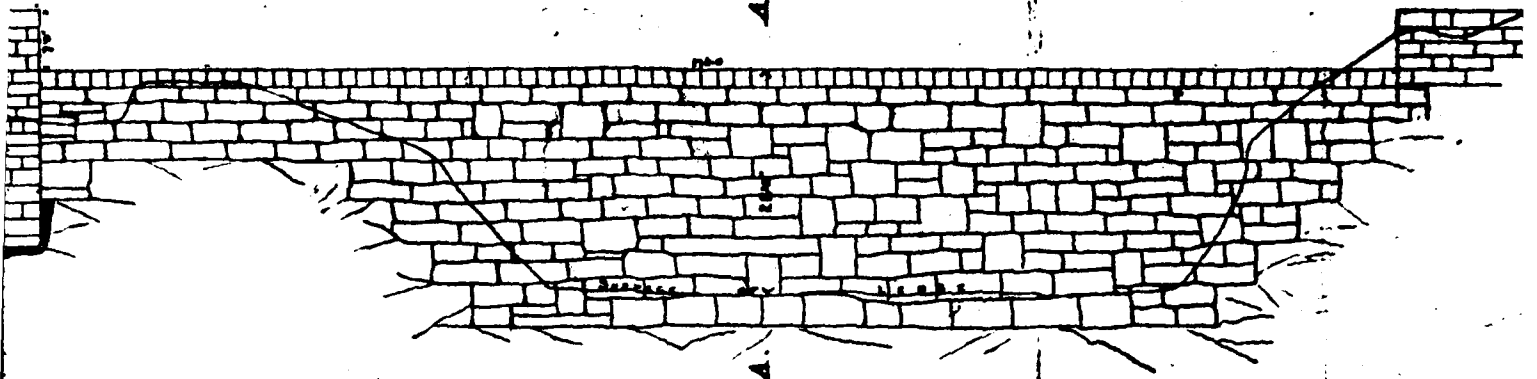
The coping or weather stone of the dam shall be cut to the dimensions given on the plans, and to lay its joints not exceeding one half (1/2) inch and shall project out (1) inches. They shall be finished with at least two (2) courses set into the courses below, and, after being set into the lower courses, to set in Portland Cement and retained at with the dam.

The cement used to be of the best quality Hydraulic Cement subject to the test in charge, to be mixed in the proportion of one part cement to two parts stone, sharp the work at least anchored immediately after.

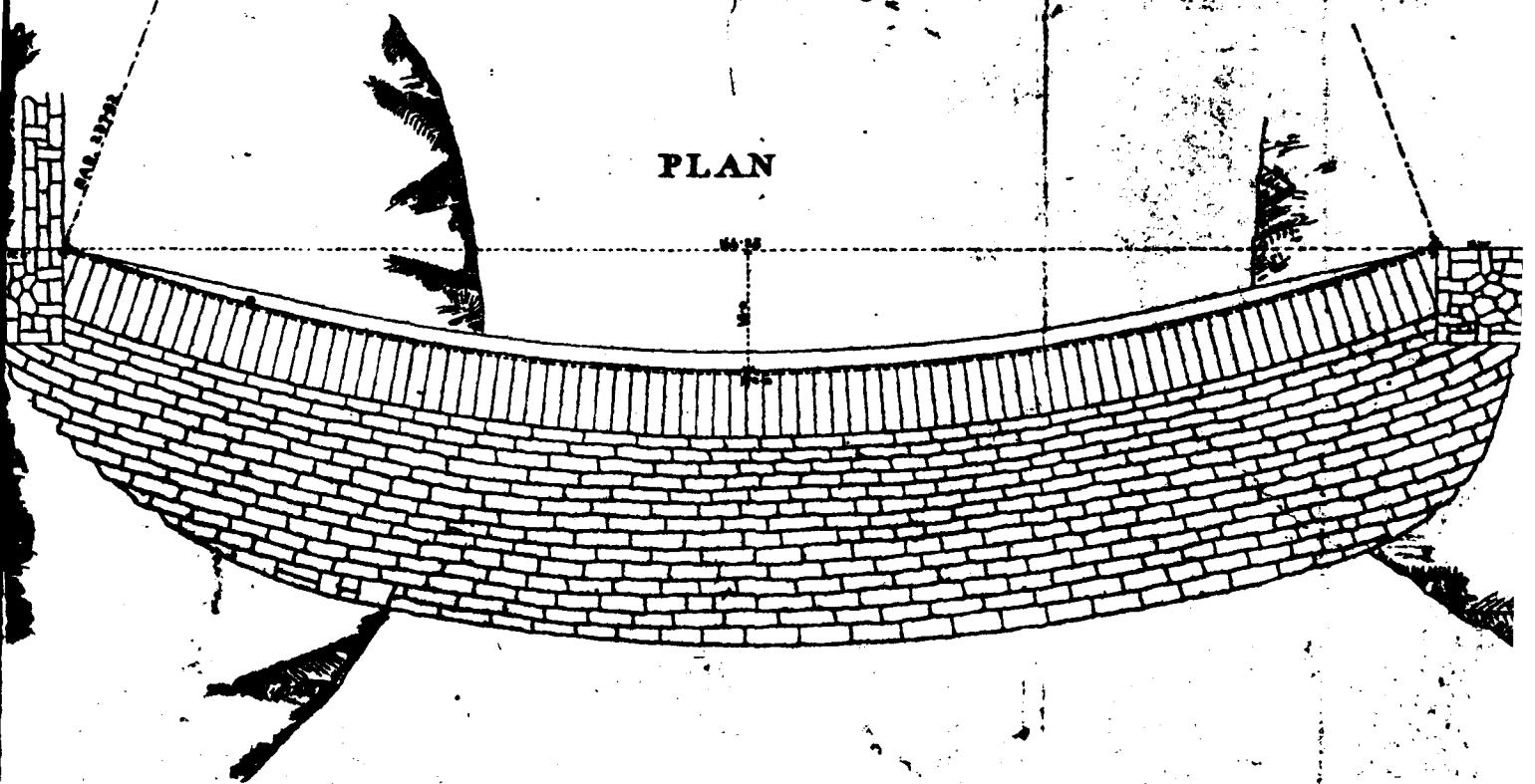
When the work Engineer is used it is to be considered as meaning John H. Bates & agent.

(2)

Elevation



PLAN



2

PLAN
of
PROPOSED DAM

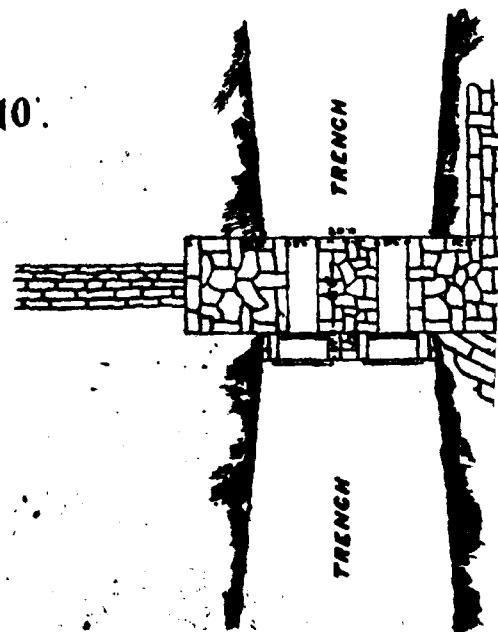
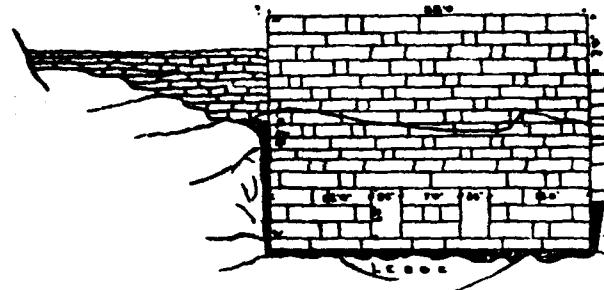
for
JOHN W. SLATER.

SLATERSVILLE, R.I.

1886

J.W. Ellis C.E.
Woonsocket R.I.

Scale 1" = 10'



47A¹ 47B

50⁵⁷

SLATERSVILLE

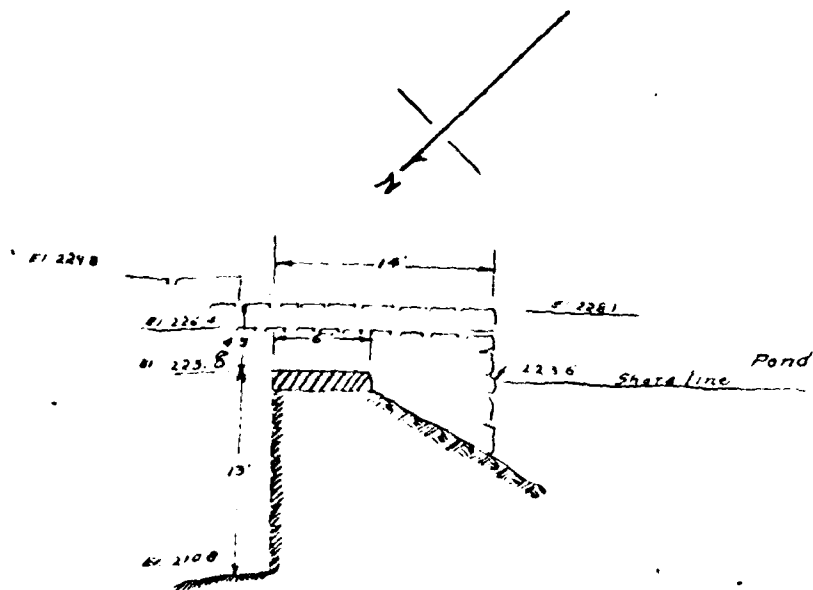
R. I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF HARBOUR & RIVERS
BY THE
WORKS PROJECTS ADMINISTRATION

DATE

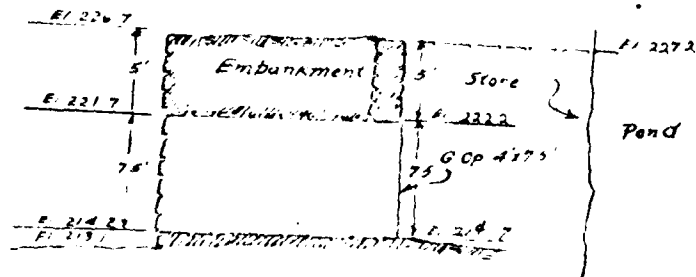
PLAN NO.

B-50⁵⁷

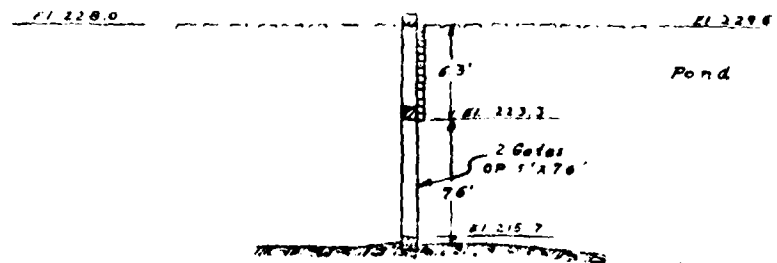
47A¹ 47B



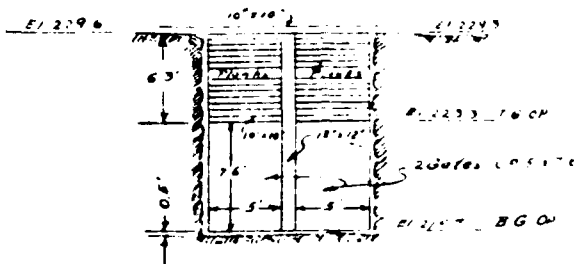
SECTION A - A (47)
SCALE 1" = 10'



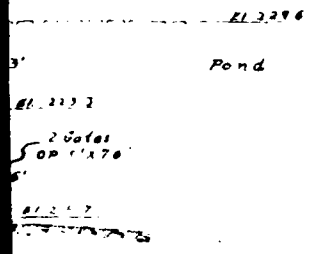
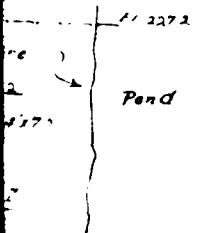
SECTION B - B (47)
SCALE 1" = 10'



SECTION C - C (47)
SCALE 1" = 10'



ELEVATION D-D
SCALE 1" = 10"

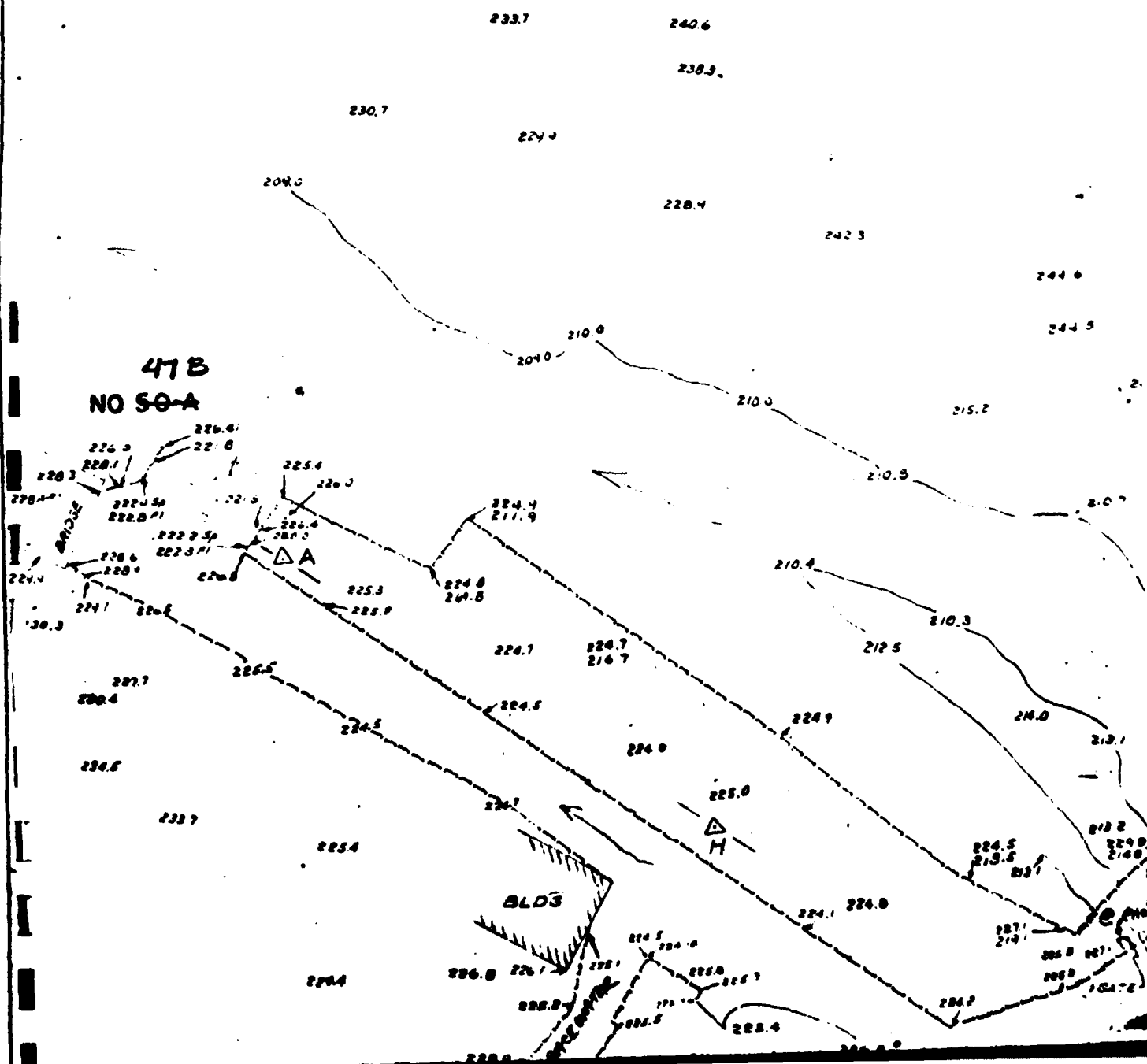
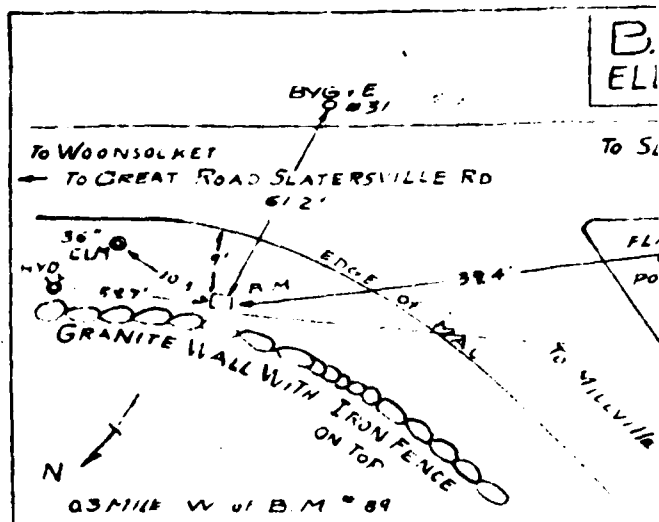


47 /

49	SLATERSVILLE	
LOWER - #4		
R. I. DEPARTMENT OF PUBLIC WORKS DIVISION OF HARBORS & RIVERS BY THE WORKS PROJECTS ADMINISTRATION 47		
DATE 1-16-41 DRAWN BY A.R.	PLAN NO.	B-49

3

0



B.M. 90
ELEV 269 167

TO SLATERSVILLE

FLAG
POLE

TO MILLVILLE

HYG. E
#31
SLATERSVILLE RD
2'

EDGE OF MA
TH IRON FENCE
ON TOP

M = 89

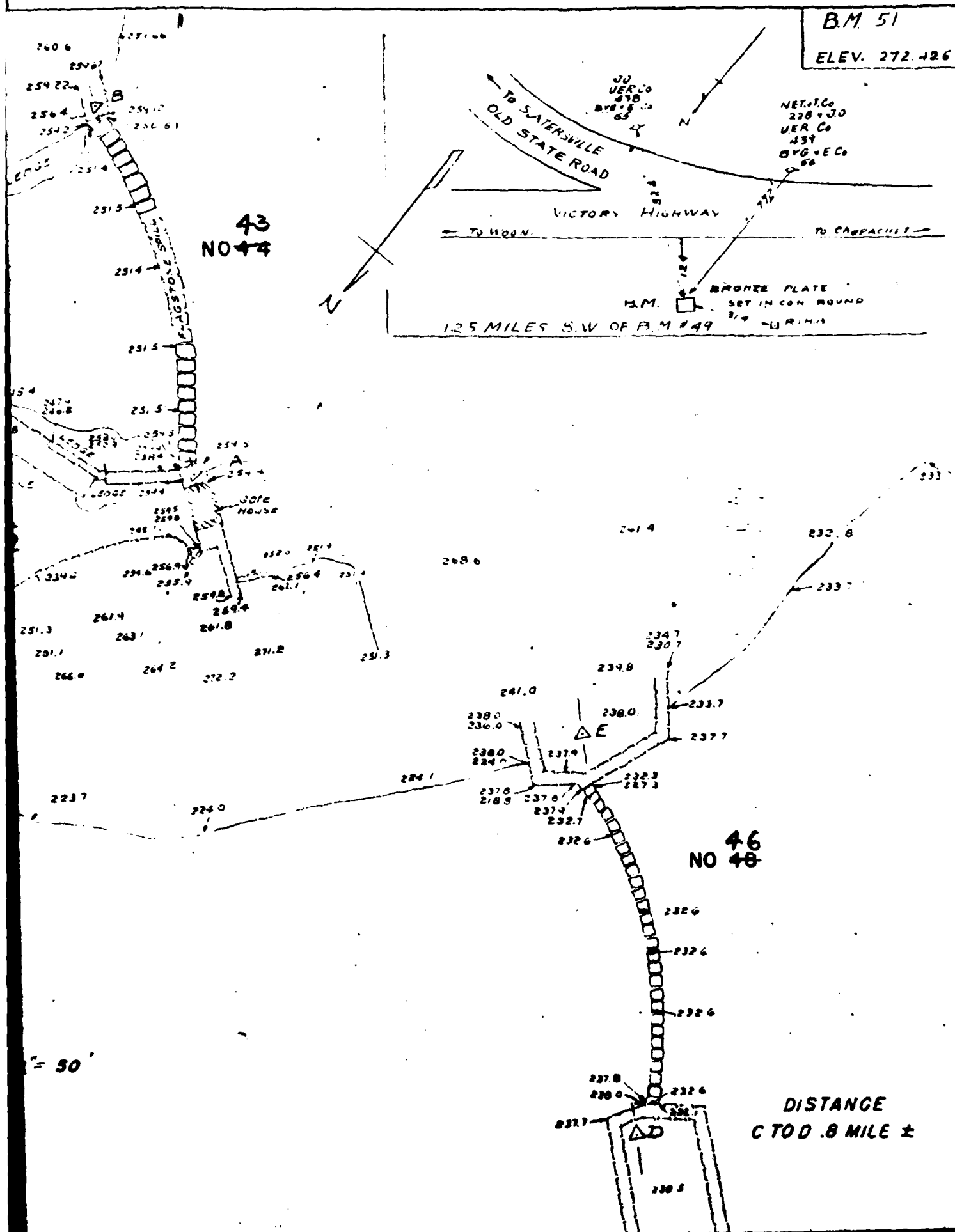
SCALE 1" = 50'

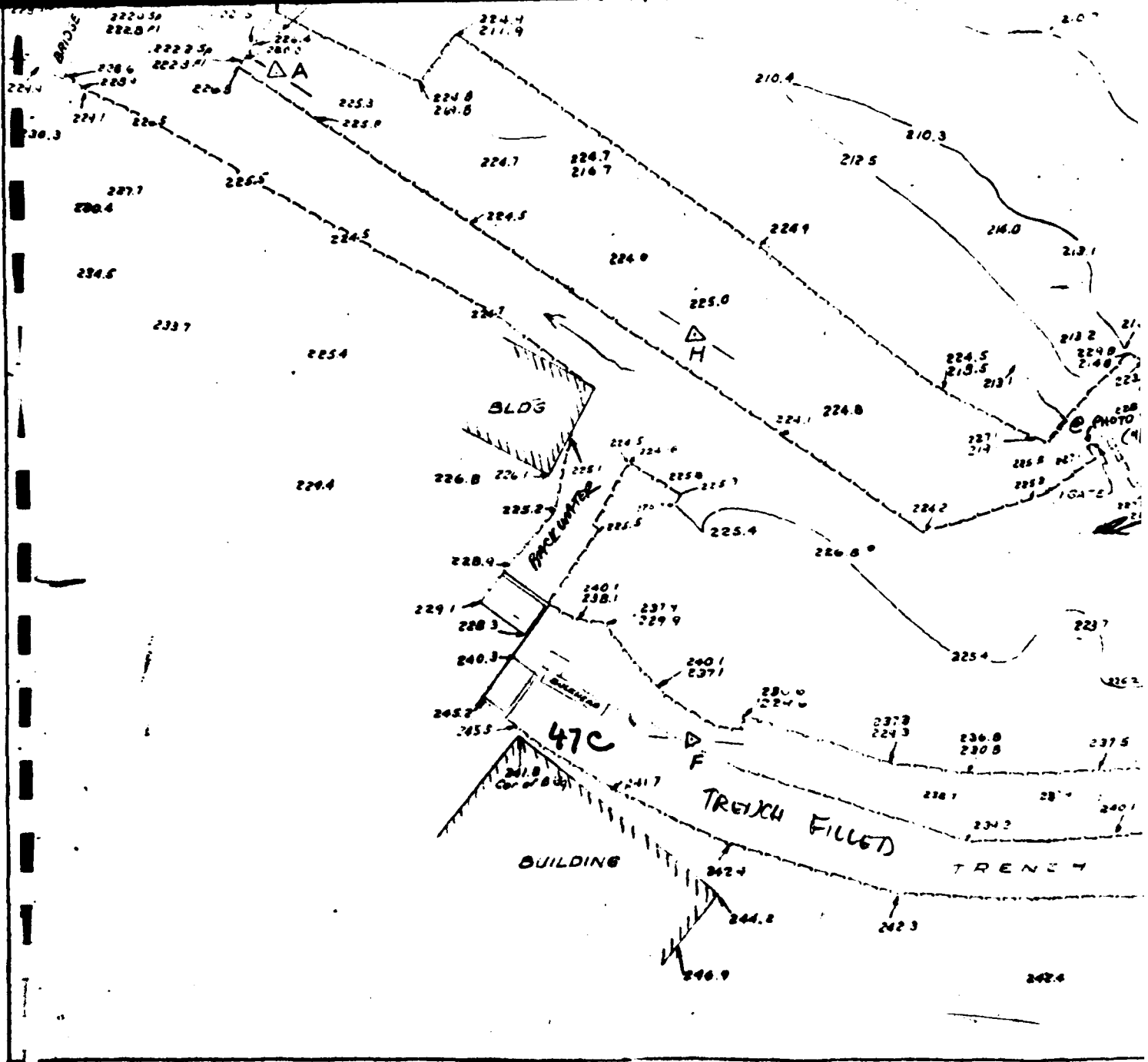
DISTANCE
D TO C .8 MILE ±

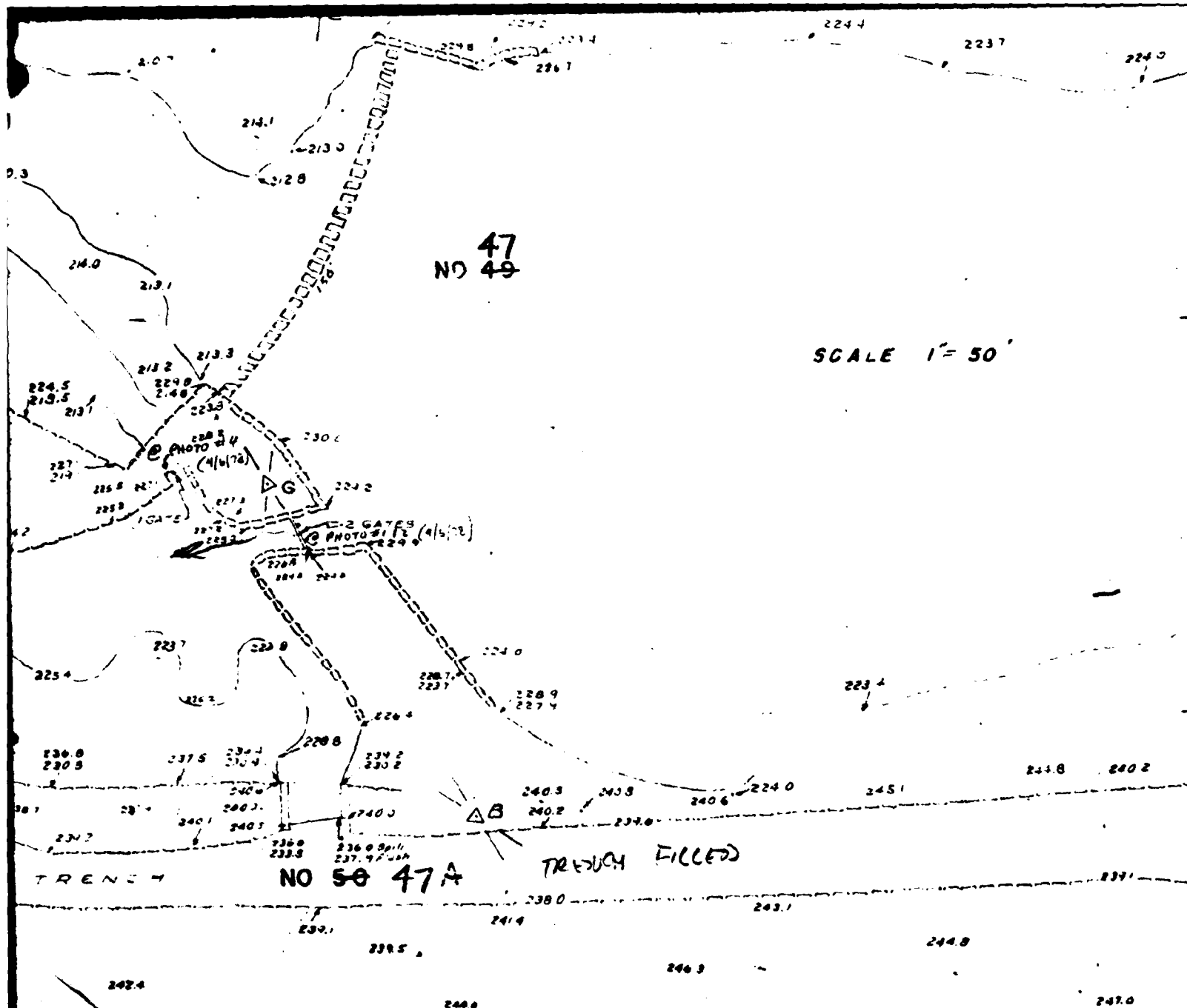
NO 45
44

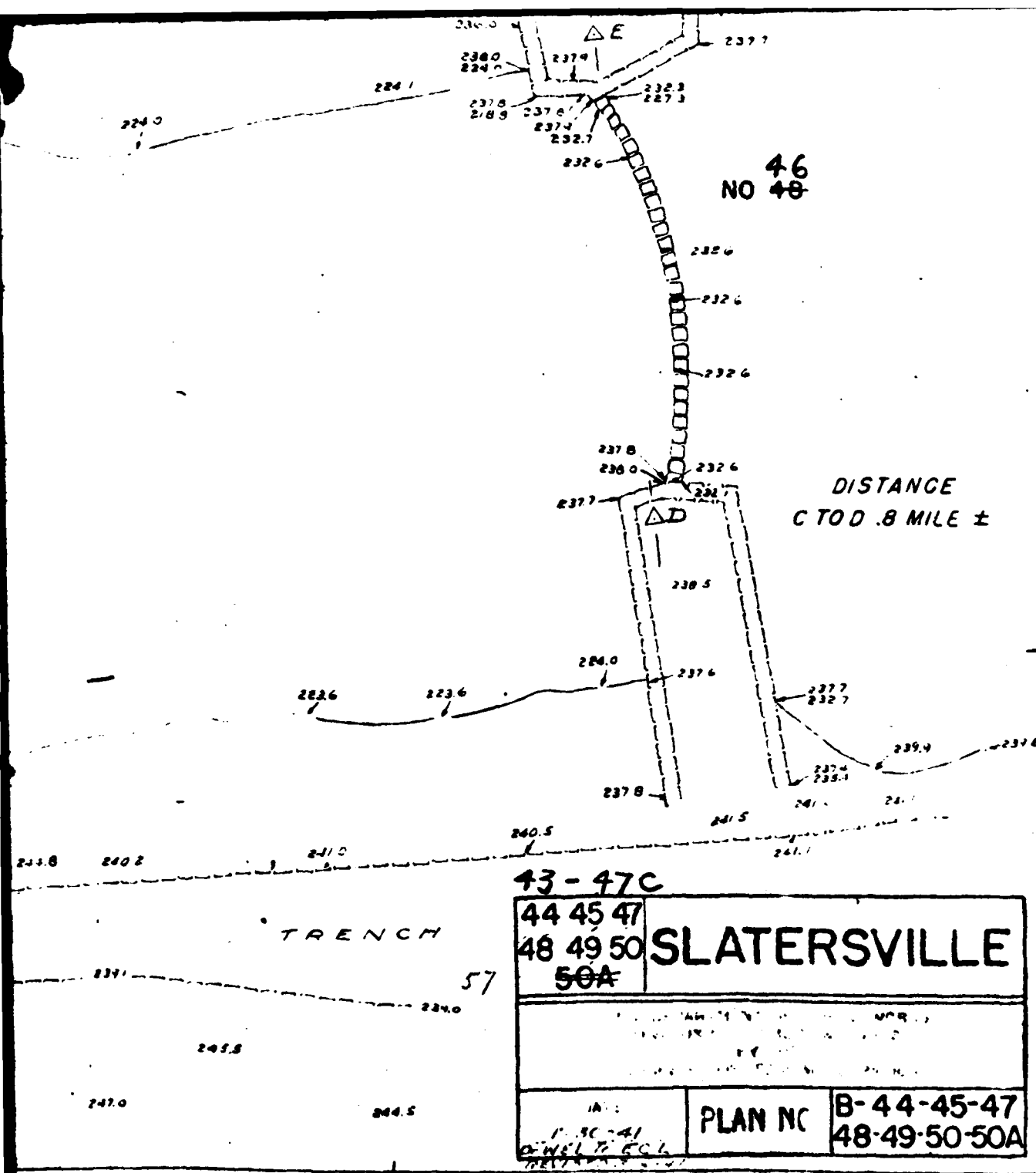
NO 47
49

SCALE 1" = 50'



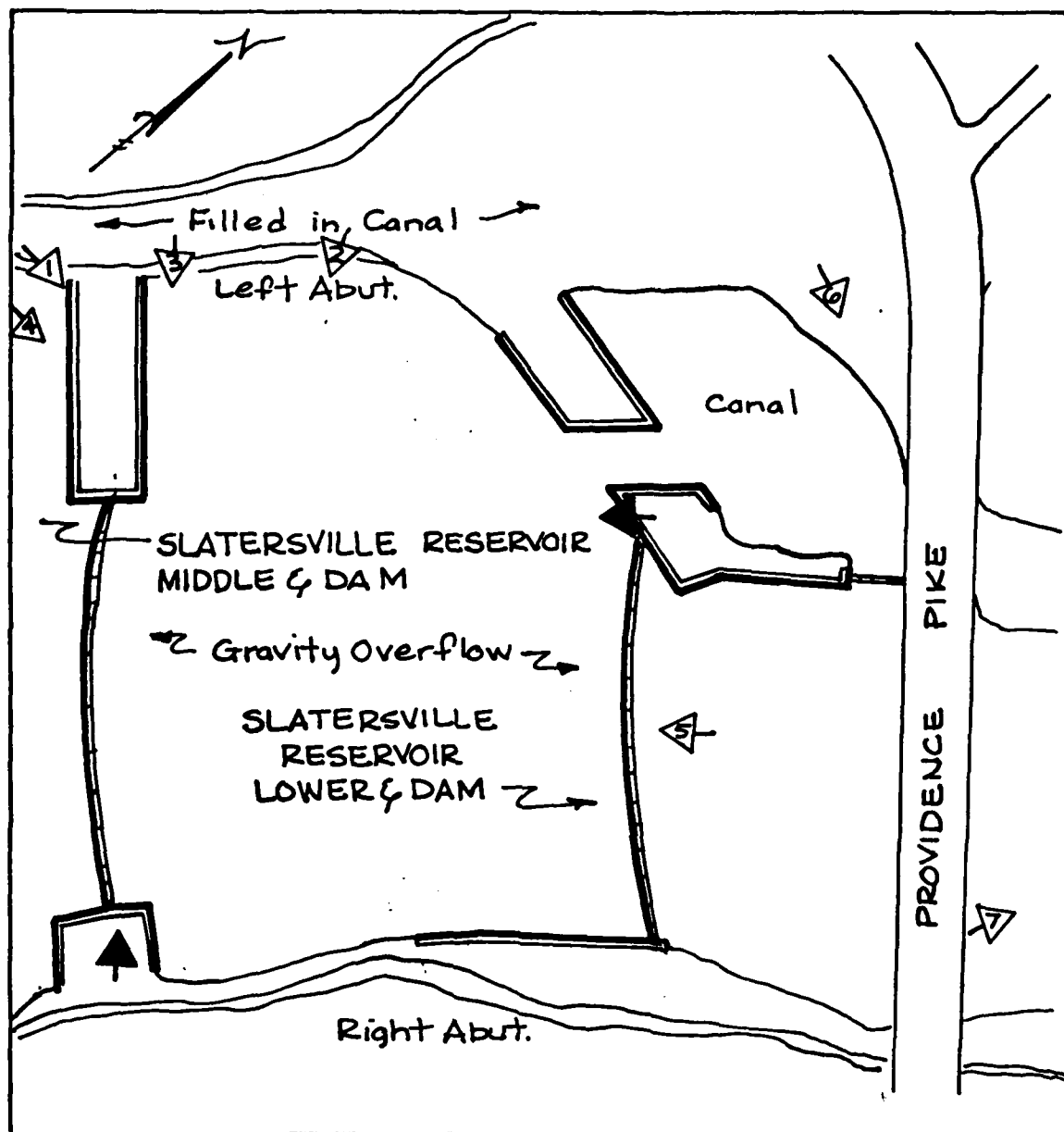






APPENDIX C

PHOTOGRAPHS



LOUIS BERGER & ASSOC., INC.
WELLESLEY, MASS.
ARCHITECT ENGINEER

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

SLATERSVILLE RESERVOIR MIDDLE

SKETCH PLAN SHOWING LOCATION &
ORIENTATION OF PHOTOS

STATE - R.I.

			SCALE
			DATE

SLATERSVILLE RESERVOIR MIDDLE DAM



1. Upstream face of ashlar masonry.

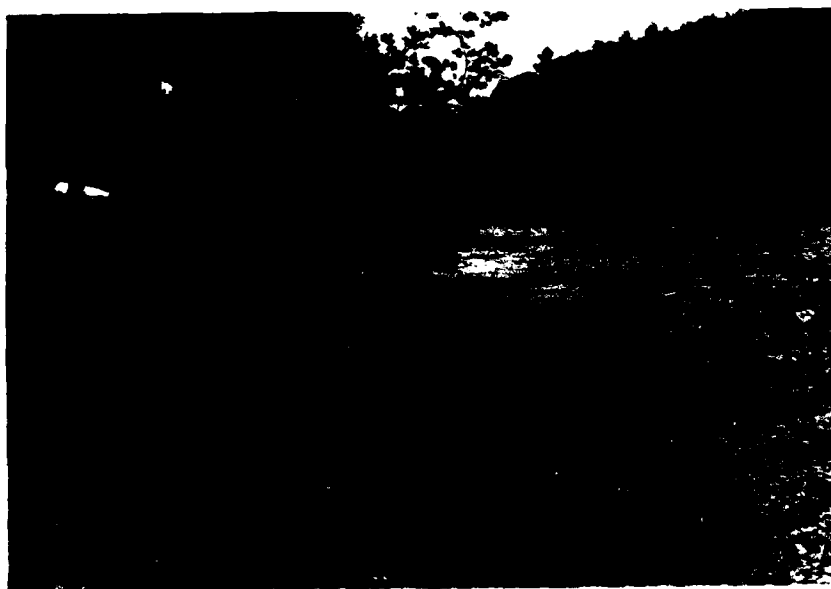


2. View of spillway and downstream face of ashlar masonry.

SLATERSVILLE MIDDLE RESERVOIR DAM



3. Downstream face of ashlar masonry.



4. Upstream face of ashlar masonry and reservoir shoreline.

BY REB DATE 6/12/79

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 8 OF 7

CHKD. BY _____ DATE _____

INSPECTION OF DAM

PROJECT _____

SUBJECT SLATEKVILLE MIDDLE DAM

$$Q_{P2} = 19,000 \left(1 - \frac{0.278}{9.5} \right)$$

$$Q_{P2} = 18,450 \text{ CFS}$$

STEP 3 2. SURCHARGE HT $Q_{P2} = 242.16$

$$STOR_2 = 1280$$

$$STOR_2 = \frac{1280 \text{ AC-FT}}{56514 \text{ AC}} \times 12 \text{ IN/FT} = 0.272$$

b. $\text{AVE STOR} = 0.275$

$$\frac{0.275 \text{ IN} \times 56514 \text{ AC}}{12} = 1295 \text{ AC-FT}$$

$$\text{SURCHARGE HT} = 242.20$$

$$Q_{P3} = 18,700 \text{ CFS}$$

SPILLWAY INADEQUATE TO PASS $\frac{1}{2}$ PMF

$$\text{OVERTOPPING BY } 242.20 - 237.85 = 4.35 \text{ FT}$$

BY RF2 DATE 6/13/79

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 7 OF 7

CHKD. BY DATE

INSPECTION OF DAMS

PROJECT

SUBJECT SUTTERSVILLE MIDDLE DAM

STEP 3

a. SURCHARGE HT (Q_{p2}) = 246.03

b. VOLUME OF SURCHARGE = 2090

$$STOR_2 = \frac{2090 \text{ AC.FT}}{56514 \text{ ACES}} \times 12 \text{ INCHS} = 0.44 \text{ INCHS}$$

$$\text{AVE STOR} = 0.445 \text{ INCHS}$$

$$\frac{0.445 \text{ IN} \times 56514 \text{ AC}}{12 \text{ IN/FT}} = 2096 \text{ AC.FT}$$

$$\text{ELEV @ } 2096 \text{ AC.FT} \therefore 246.05$$

$$\text{@ } 246.05 \quad Q_{p2} = 37,200 \text{ CFS}$$

SPILLWAY INADEQUATE TO PASS PMF

$$\text{OVERTOPPING BY } 246.05 - 237.85 = 8.2 \text{ FT}$$

$$\text{CHECK } 1/2 \text{ PMF} = 38,600 \div 2 = 19,000 \text{ CFS} =$$

$$\text{STEP 1} \quad Q_{p1} = 19,000 \text{ CFS}$$

$$\text{STEP 2} \quad \text{a. SURCHARGE HEIGHT} = 242.28$$

$$\text{b. VOLUME OF SURCHARGE} = 1310 \text{ AC.FT}$$

$$STOR_1 = \frac{1310 \text{ AC.FT}}{56514 \text{ AC}} \times 12 \text{ IN/FT} = 0.278$$

$$\text{c. } Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR_1}{9.5}\right)$$

D-9

BY REB DATE 6/13/79

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 4 OF 7

CHKD. BY DATE INSPECTION OF DAMS

PROJECT SLATESVILLE MIDDLE DAM

SUBJECT SLATESVILLE MIDDLE DAM

RESERVOIR ROUTING

DRAINAGE AREA = 88.30 sq. mi = 56514 ACRES

SIZE CLASSIFICATION = SMALL

HAZARD CLASSIFICATION = HIGH

INSPECTION FLOOD $\frac{1}{2}$ PMF TO PMF

CALCULATE PMF USING "PRELIMINARY GUIDANCE FOR ESTIMATING MAXIMUM PROBABLE DISCHARGE IN PHASE I DAM SAFETY INVESTIGATIONS, MARCH, 1978".

USE FLAT & COSTAL CURVE

c 88.30 sq mi PMF IN CFS/MI² = 430

$88.30 \text{ sq mi} \times 430 \text{ CFS/MI}^2 = 37,969 \text{ CFS}$

SAY PMF = 38,000 = PEAK INFLOW

STEP 1 $Q_{P1} = 38000 \text{ CFS}$

STEP 2 2. SURCHARGE HEIGHT = 246.20

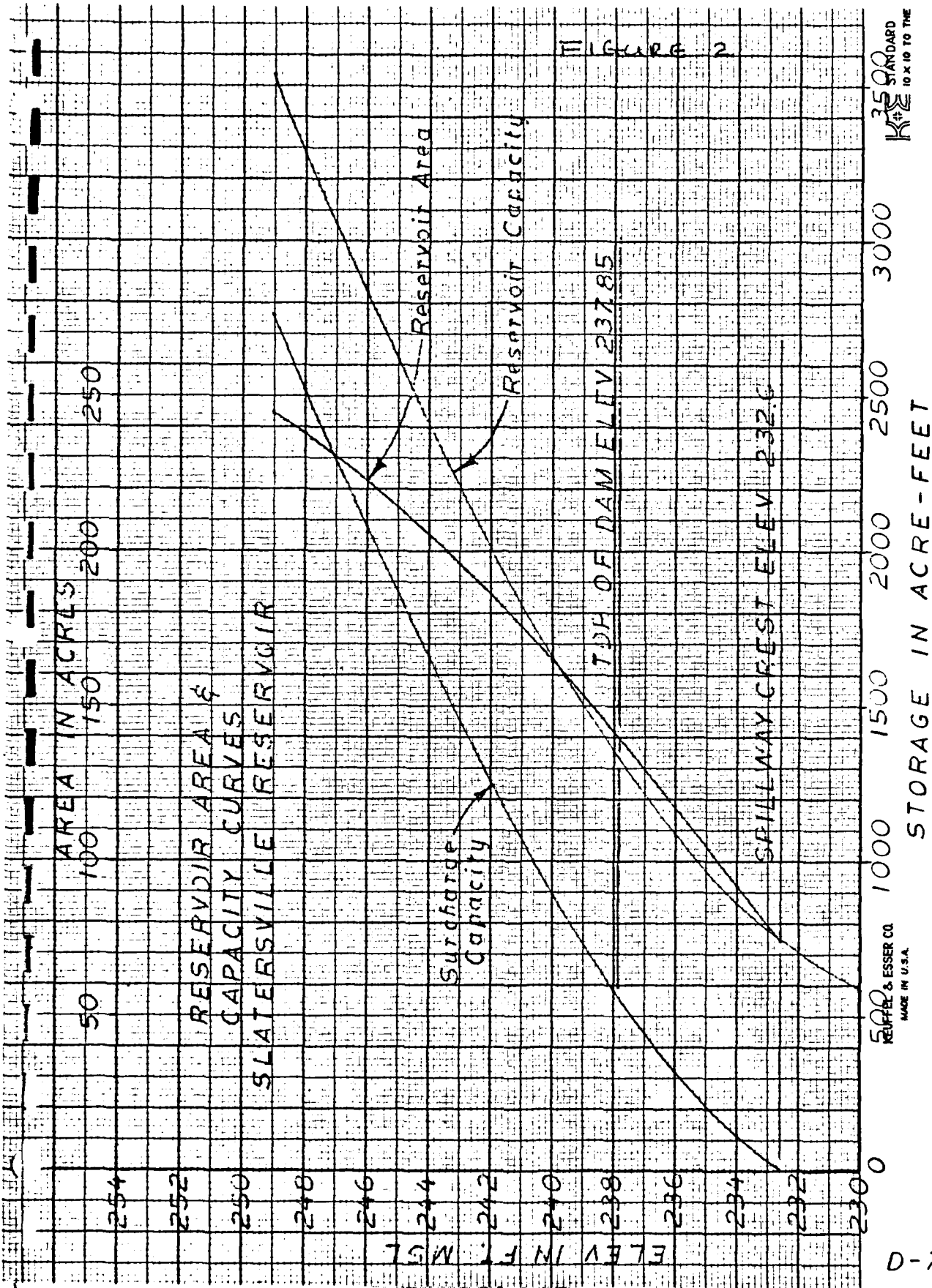
b. VOLUME OF SURCHARGE = 2120 ACRE-FT

$\text{STOR}_1 = \frac{2120 \text{ ACRE-FT}}{56514 \text{ ACRE}} \times 12 \text{ IN/FT} = 0.45 \text{ INCHES}$

c. $Q_{P2} = Q_{P1} \times \left(1 - \frac{\text{STOR}_1}{19}\right)$

$= 38,000 \left(1 - \frac{0.45}{19}\right) = 38,000 (1 - .024)$

$Q_{P2} = 37,088$



D-7

D-7

BY RFB DATE 6/13/79

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 5 OF 7

CHKD. BY _____ DATE _____

INSPECTION OF DAMS

PROJECT _____

SUBJECT SLATEKSVILLE

MIDDLE DAM

ELEV FT	E			F			G			ΣQ			ELEV FT
	L	H	Q	L	H	Q	L	H	Q	L	H	Q	
233.6	0	0	0			0	0	0	0	465			
234.6	0	0	0			0	0	0	0	1315			
235.6	0	0	0			0	0	0	0	2416			
236.6	113	.38	7			7	0	0	0	3727			
237.85	30	1	75			75	0	0	0	5669			
238.85		2	212			212	3	5	3	8079			
239.85		3	360			360	6	1	15	10188			
241.85		5	838			838	9	2	64	17955			
243.85		7	1389			1389	12	3	234	26271			
245.85		9	2025			2025	24	4	480	35955			
247.85		11	2736			2736	30	5	837	46760			
249.85		12	3118			3118	33	5.5	1064	52550			

D-6

BY: REF DATE: 6/13/74

CHKD. BY: _____ DATE: _____

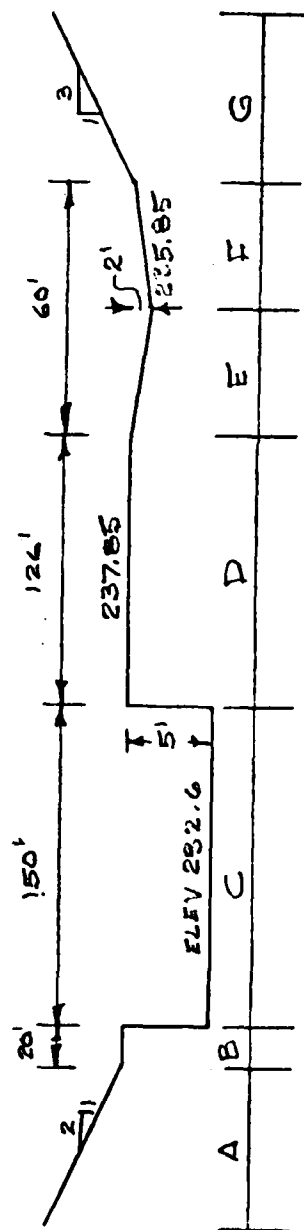
SUBJECT: SLATESVILLE MIDDLE DAM

LOUIS BERGER & ASSOCIATES INC.

INSPECTION OF DAM

SHEET NO. 4 OF _____

PROJECT _____



ELEV FT	A, C=2.8			B, C=2.8			C, C=3.1			D, C=2.6		
	L	H	Q	L	H	Q	L	H	Q	L	H	Q
232.6	0	0	0	0	0	0	150	1	465	0	0	0
234.6	0	0	0	0	0	0	1315	2	1315	0	0	0
235.6	0	0	0	0	0	0	2416	3	2416	0	0	0
236.6	0	0	0	0	0	0	3720	4	3720	0	0	0
237.85	0	0	0	0	0	0	5594	5.25	5594	0	0	0
238.85	2	.5	2	20	1	56	7266	6.25	7266	126	1	328
239.85	4	1	11	20	2	158	9077	7.25	9077	2	2	927
241.85	8	2	64	20	4	448	13032	9.25	13032	4	4	2621
243.85	12	3	175	20	6	823	17546	11.25	17546	6	6	4815
245.85	16	4	358	20	8	1267	22427	13.25	22427	8	8	7413
247.85	20	5	626	20	10	1771	27692	15.25	27692	10	10	10360
248.85	22	5.5	795	20	11	2043	30460	16.25	30460	11	11	11952

D-5

FIGURE 1, Sh. D-4

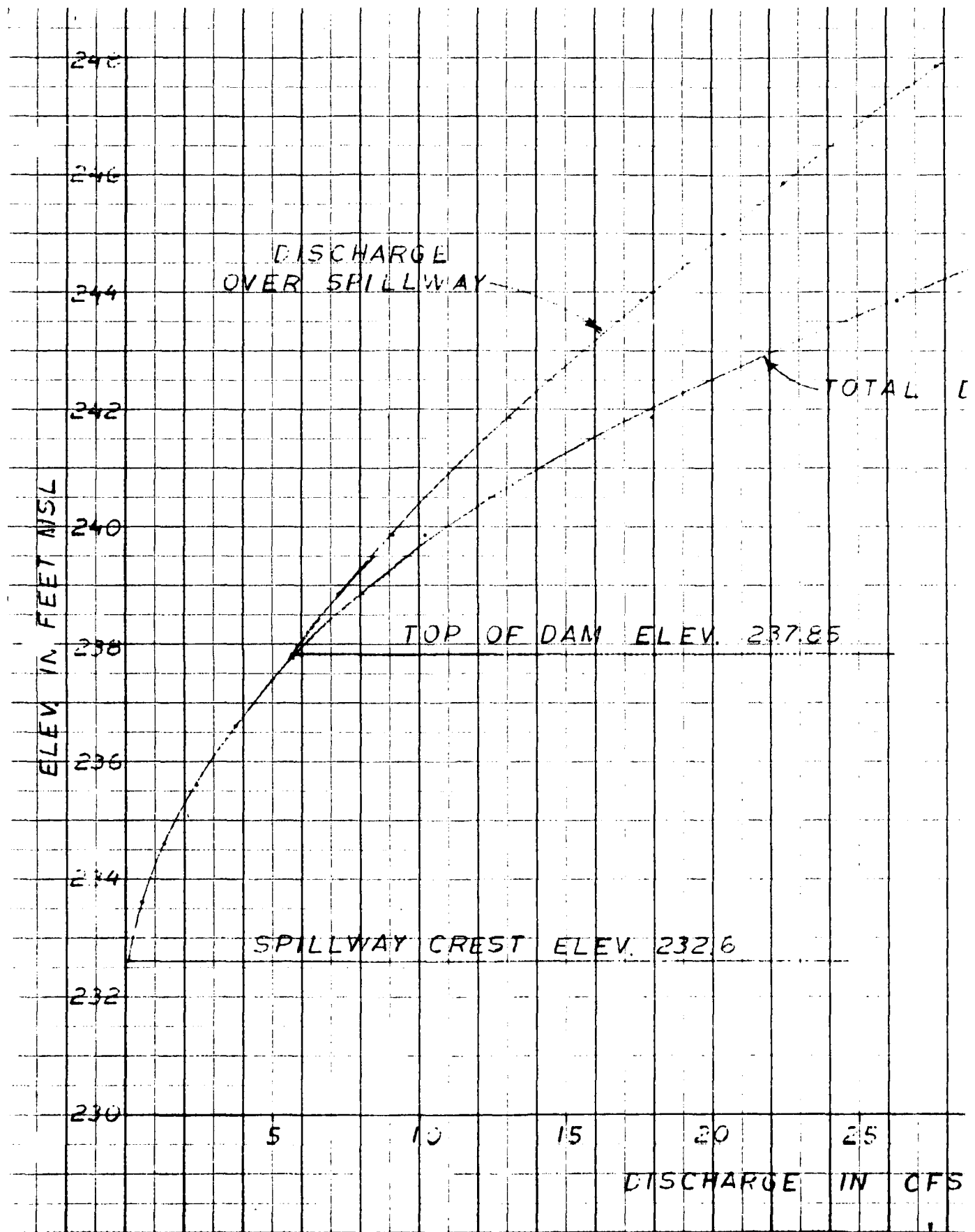
TOTAL DISCHARGE

237.85

DISCHARGE CURVE
SLATERSVILLE RESERVOIR

25 30 35 40 45 50
FLOW IN CFS X 10³

D-4



BY RFB DATE 6/12/79 LOUIS BERGER & ASSOCIATES INC.
 CHKD. BY _____ DATE _____ INSPECTION OF DAM
 SUBJECT SLATERVILLE MIDDLE DAM

SHEET NO. 3 OF 7
 PROJECT _____

ELEV MSL	AREA AC	AVE AREA	HT FT	INC STOR AC-FT	CUM STOR AC FT	SURCHARGE STOR AC FT
212	0					
214	7.2	3.6	2	7.2	7.2	
216	14.4	10.8	↑	21.6	28.8	
218	21.7	18.0		36.0	64.8	
220	28.9	25.3		50.6	115.4	
222	36.1	32.5		65.0	180.4	
224	43.3	39.7		79.4	259.8	
226	50.6	47.0		94.0	353.0	
228	57.8	54.2		108.5	461.5	
230	65.0	61.4	↓	122.8	584.3	
232	72.2	68.6	2	137.2	721.5	
232.6	74.4	73.3	0.6	44.0	765.5	0
234	92.0	83.2	1.4	116.5	882.0	116
236	117.0	104.5	2	209.0	1091.0	325
238	141.5	129.2	↑	258.4	1349.4	584
240	164.2	153.0		306.0	1655.4	890
242	186.0	175.2		350.4	2005.8	1240
244	205.5	195.8		391.6	2397.4	1632
246	222.5	214.0	↓	428.0	2825.4	2060
248	238.0	230.2	2	460.4	3285.8	2520
249	244.7	241.4	1	241.4	3527.2	2761

BY RFB DATE 6/13/79 LOUIS BERGER & ASSOCIATES INC.
CHKD. BY _____ DATE _____ INSPECTION OF DAMS
SUBJECT SALTICREEK MIDDLE DAM

SHEET NO. 2 OF _____
PROJECT _____

RESERVOIR AREA COMPUTATIONS

NORMAL RESERVOIR SURFACE ELEV 230

READING #2	35.03	#3	35.82	
" #1	34.20	#2	35.03	Ave = 0.81
	0.83		0.79	

$$\text{AREA} = 0.81 \times 91.83 = 74.38 \text{ ACRES}$$

AREA @ ELEV 240

READING #2	37.28	#3	39.07	
" #1	35.49	#2	37.28	Ave = 1.79
	1.79		1.79	

$$\text{AREA} = 1.79 \times 91.83 = 164.38 \text{ ACRES}$$

AREA @ ELEV 249

READING #2	44.30	#3	46.97	
READING #1	41.64	#2	44.30	Ave = 2.665
	2.66		2.67	

$$\text{AREA} = 2.665 (91.83) = 244.73 \text{ ACRES}$$

BY: JKH DATE 4/3/77

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 1 OF 1

CHKD. BY: DATE

INSPECTION OF DAMS - CONN. & RI

PROJECT

SUBJECT

SLATTERSVILLE RESERVOIR - DRAINAGE AREA

FIND: ENTIRE AREA ABOVE RESERVOIR
LOWER DAM No. 47

PLANIMETER NO. 3651-30

INDEX @ 89.9

1.0 = 1 sq in

USGS Sheet

Ave Reading (sq in)

Clayville, RI
Chepachet, RI

$$\frac{12.69}{382.49 \frac{\text{sq in}}{\text{sq in}}} - (0.50 + 10.27 + 29.47) = 347.25$$

Georgiaville, R.I.

$$(10.4 \times 5.9) + 22.24 + 14.25 - 2.32 = 95.53$$

Thompson, Conn, RI

$$5.59 + 0.86 + 16.30 + 14.65 = 37.40$$

Oxford, Mass, Conn, RI
Uxbridge, Mass, RI.

$$\frac{21.83}{(13 \times 5.3) + 7.31 + 21.30 + 0.72 = 98.23}$$

Blackstone, Mass, RI.

$$3.47 + 0.14 = 3.61$$

TOTAL = 616.54 sq in

Scale: $(1")^2 = (2,000')^2$

4,000,000 sq ft/sq in

$$\text{Area} = \frac{616.54 \text{ sq in} \times 4,000,000 \text{ sq ft/sq in}}{43,560 \text{ sq ft/ACRE}} = 56,615.24 \text{ ACRES}$$

$$56,615.24 \div 640 \text{ ACRES/sq mi} = 88.46 \text{ sq mi}$$

ADJUST AREA FOR DIFFERENCE BETWEEN DAM 46 & 47

READING #2 77.63	#3 78.73	#4 79.83	$\Delta A = 1.1 \text{ sq in}$
" #1 75.93	#2 77.63	#3 78.73	$A = 615.44$
1.7	1.1	1.1	

$$\text{AREA} = \frac{615.44 \times 4,000,000}{43,560} = 56,514 \text{ ACRES} = 88.30 \text{ sq mi}$$

D-1

APPENDIX D
HYDROLOGIC AND HYDRAULIC COMPUTATIONS

SLATERSVILLE RESERVOIR MIDDLE DAM



7. Downstream channel beyond Providence Pike Bridge.

SLATERSVILLE RESERVOIR MIDDLE DAM



5. View of Middle Dam and Lower Reservoir and Dam.



6. Downstream twin arch masonry bridge (Providence Pike).

BY RFB DATE 6/12/79

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 9 OF

CHKD. BY _____ DATE _____

INSPECTION OF DAMS

PROJECT _____

SUBJECT _____

SLATERSVILLE MIDDLE DAM

FAILURE ANALYSIS

STEP 1: RESERVOIR STORAGE AT FAILURE

ASSUME WATER ELEV AT TOP OF DAM 237.85

FROM CAPACITY CURVE $S = 1330 \text{ AC/FT}$

$$H = 237.85 - 212.0 \approx 26 \text{ FT}$$

$$W = 40\% \text{ OF } 150 = 60 \text{ FT}$$

STEP 2 PEAK FAILURE OUTFLOW

$$Q_{PI} = 8/27 W \sqrt{g} Y_0^{3/2}$$

$$Q_{PI} = 1.68 (60) (26)^{3/2}$$

$$Q_{PI} = 13,363 \text{ CFS}$$

ADD SPILLWAY FLOW :

$$Q_{SPILLWAY} = \frac{90}{150} (5594) + 150 = 3506$$

$$Q_{PI \text{ TOTAL}} = 13,363 + 3506 = 16,869$$

$$\text{SAY } Q_{PI} = 16,870 \text{ CFS}$$

SECTION BELOW PROVIDENCE PIKE

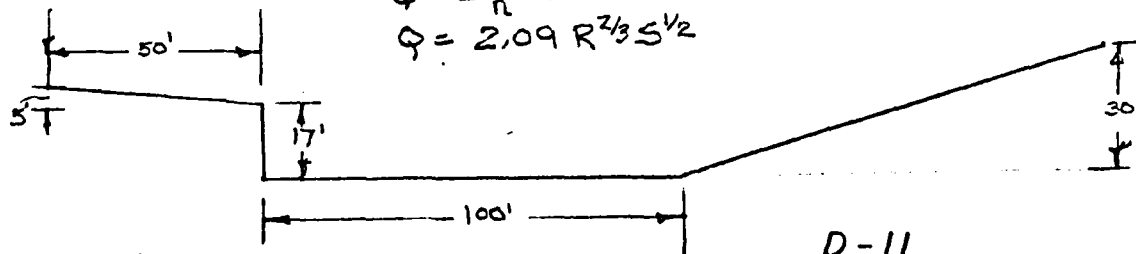
$$n = 0.045$$

$$S = \frac{212 - 180}{8000} = .004$$

$$S^{1/2} = .0632$$

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

$$Q = 2.09 R^{2/3} S^{1/2}$$



BY REP DATE 6/14/79

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 10 OF 10

CHKD. BY DATE

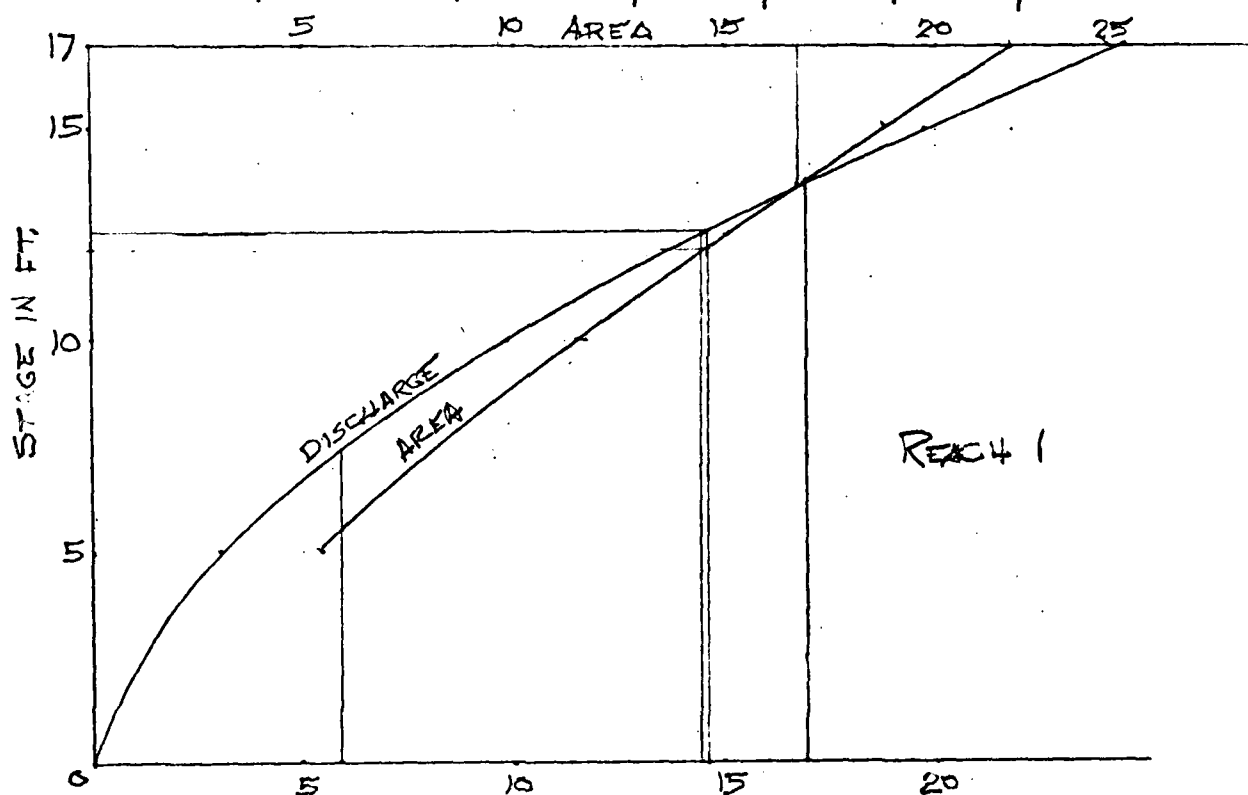
INSPECTION OF DAK

PROJECT

SUBJECT SLATTERY LE MIDDLE DAK

FAILURE ANALYSIS

DEPTH	Δ AREA	EAREA	WP	R	$R^{2/3}$	Q
5	542	542	122.4	4.43	2.70	3053
10	625	1167	144.8	8.06	4.02	9805
15	709	1876	167.2	11.22	5.02	19652
17	306	2182	176.2	12.35	5.36	24444
20	520	2712	216.7	12.51	5.39	30550



Q IN CFS X 10^3
STA 0+00 TO STA 32+00

ESTIMATE REACH OUTFLOW FOR REACH #1
TO POND JUST ABOVE GAGING STATION.

$$Q_{P1} = Q_{INFLOW} = 16,870$$

REACH LENGTH = 2300 FT.

D-12

BY RFB DATE 6/14/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 11 OF 12
 CHKD. BY DATE INSPECTION OF DAM PROJECT SLATKREVILLE MIDDLE DAM
 SUBJECT FAILURE ANALYSIS

STAGE = 13.8, AREA $\approx$ 1670, 96 ACRE-FT

ADD VOLUME BETWEEN DAM & PROVIDENCE PIKE

$$\Delta V = \frac{(1000)(13.8)(300)}{43,560} = 95.04$$

$$V_1 = 96 + 95 = 191 \text{ ACRE-FT}$$

$$Q_{P2}(\text{TRIAL}) = 16,870 \left(1 - \frac{191}{1330}\right) = 16,870(1 - .144)$$

$$Q_{P2}(\text{TRIAL}) = 14,440 \text{ CFS}$$

STAGE = 12.5, AREA $\approx$ 1500, 79.2

ADD VOLUME BETWEEN DAM & PROVIDENCE PIKE

$$\Delta V = \frac{1000 \times 12.5 \times 300}{43,560} = 86$$

$$V_2 = 79 + 86 = 165 \text{ ACRE-FT}$$

$$V_{\text{AVE}} = \frac{191 + 165}{2} = 178 \text{ ACRE-FT}$$

$$Q_{P2} = 16870 \left(1 - \frac{178}{1330}\right) = 16,870(1 - .134)$$

$$Q_{P2} = 14610, \text{ STAGE} = 12.6 \text{ FT}$$

BY REF DATE 6/14/79

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 12 OF

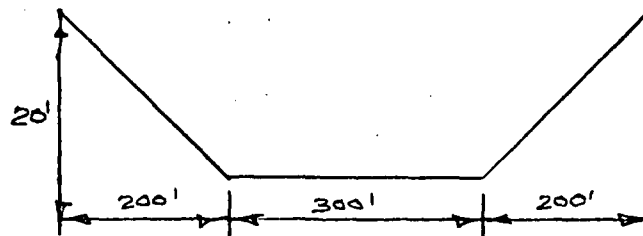
CHKD. BY DATE INSPECTION OF DAMS

PROJECT

SUBJECT SLATEKILLE MIDDLE DAM FAILURE ANALYSIS

STA 32+00 TO STA 60+00

REACH 2, L = 2600 FT

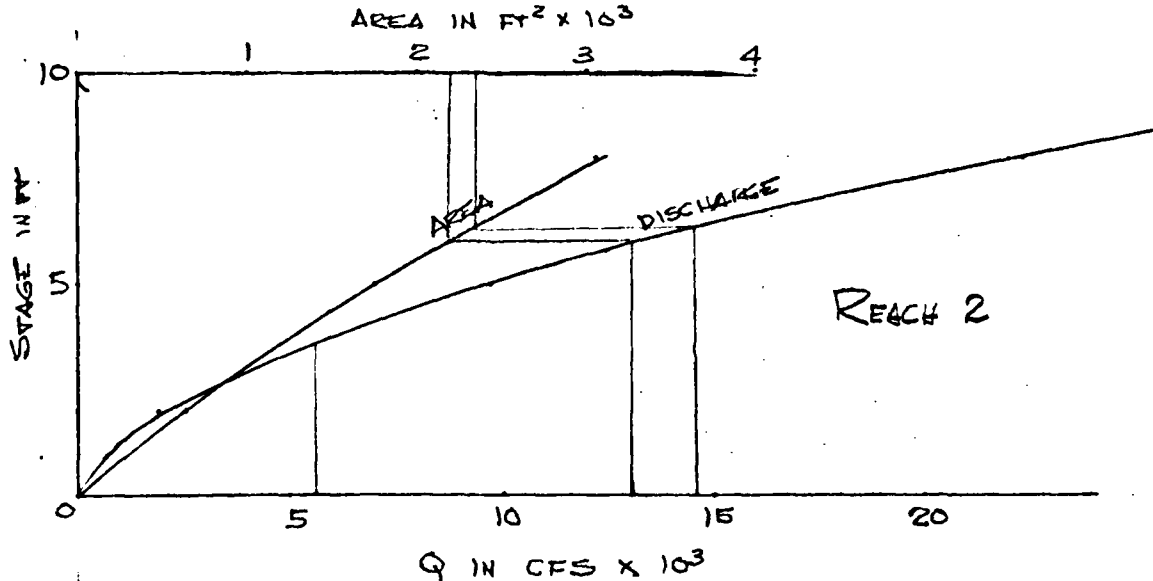


$$S/\bar{P} = 0.0632$$

$$n = 0.045$$

$$Q = 2.09 AR^{2/3}$$

DEPTH	ΔAREA	Σ AREA	P	R	$R^{2/3}$	Q
2	620	620	340.2	1.82	1.49	1930
5	1130	1750	460.4	4.37	2.67	9765
8	1290	3040	460.8	6.60	3.52	22365
10	960	4000	501	11.98	5.24	43804



$$OPI \text{ INFLOW} = 14,610$$

$$\text{STAGE} = 6.3 \text{ FT} \therefore \text{AREA} = 2360$$

$$V_1 = 141 \text{ AC-FT}$$

D-14

BY RFB DATE 6/14/79

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. 13 OF

CHKD. BY _____ DATE _____

INSPECTION OF DAMS

PROJECT _____

SUBJECT SLACKSVILLE MIDDLE DAM

$$Q_{P2} (TRIG) = 14,610 \left(1 - \frac{141}{1330}\right) = 14,610 (1 - .106)$$

$$Q_{P2} = 13060$$

$$STAGE = 6 \text{ FT} \therefore AREA = 2190 \quad Y_2 = 131$$

$$VAVE = \frac{141 + 131}{2} = 136 \text{ ACRE-FT}$$

$$Q_{P3} = 14,610 \left(1 - \frac{136}{1330}\right) = 14,610 (1 - .102)$$

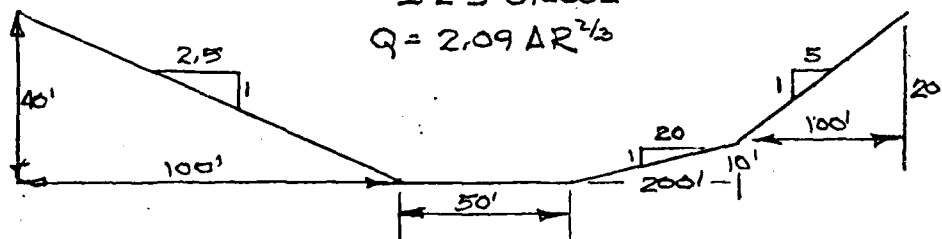
$$Q_{P3} = 13,120 \text{ CFS}$$

STA 60+00 TO STA 76+00 REACH 3
L = 1600 FT

$$n = 0.045$$

$$S^{1/2} = 0.0632$$

$$Q = 2.09 AR^{2/3}$$



DEPTH	Δ AREA	AREA	WP	R	R ^{2/3}	Q
2	145	145	95.4	1.52	1.32	400
5	386	531	163.7	3.24	2.19	2430
8	589	1120	231.7	4.83	2.86	6694
10	505	1625	277.1	5.56	3.25	11038
12	565	2190	292.7	7.48	3.83	17530

BY RFB DATE 6/15/79

LOUIS BERGER & ASSOCIATES INC.

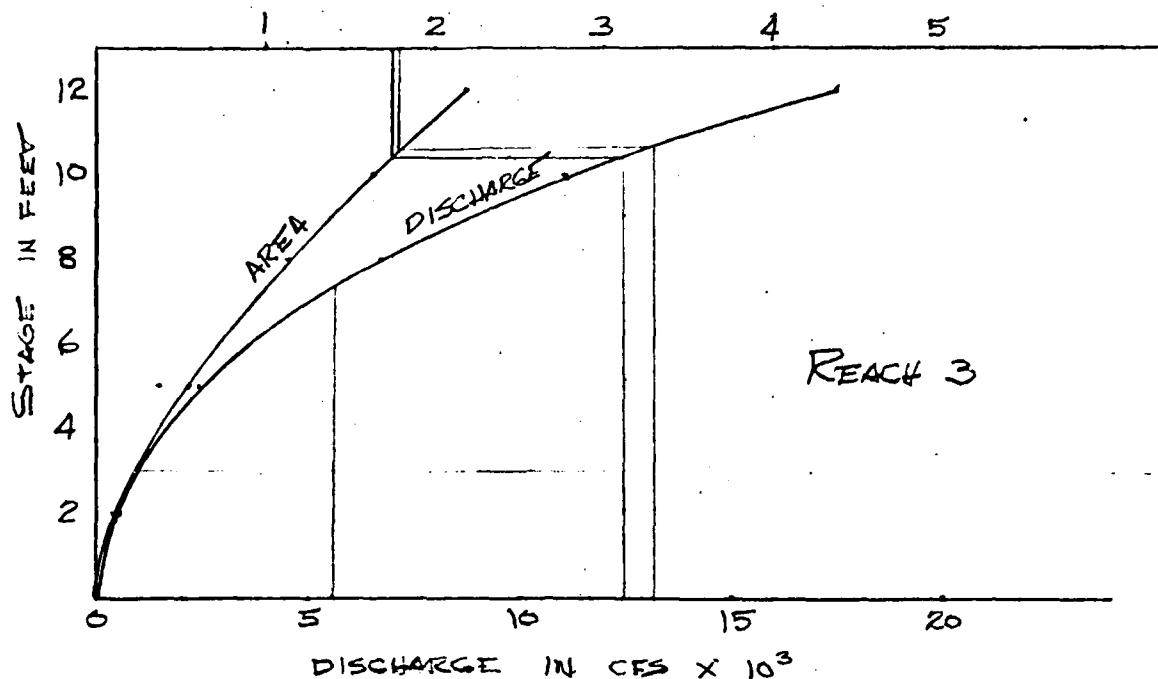
SHEET NO. 14 OF 14

CHKD. BY DATE

INSPECTION OF DAM

PROJECT

SUBJECT SLATEKSVILLE MIDDLE DAM - FLOODING ANALYSIS



$$Q_{P3} \quad 13,120 \quad \text{STAGE} = 10.6 \quad \text{AREA} = 1790$$

$$V_1 = \frac{(1790)(1600)}{48,560} = 65.7 \text{ ACRE-FT}$$

$$Q_{P4}(\text{TRIAL}) = 13,120 \left(1 - \frac{66}{1330}\right) = 13,120 (1 - .05)$$

$$Q_{P4}(\text{TRIAL}) = 12,460$$

$$\text{STAGE} = 10.4 \text{ FT} \quad \text{AREA} = 1730 \quad V_2 = 64.3$$

$$V_{AVE} = 65 \text{ ACRE-FT}$$

$$Q_4 = 13,120 \left(1 - \frac{65}{1330}\right) = 13,120 (1 - .049)$$

$$Q_4 = 12,477 \text{ CFS}$$

$$\text{STAGE} = 10.5$$

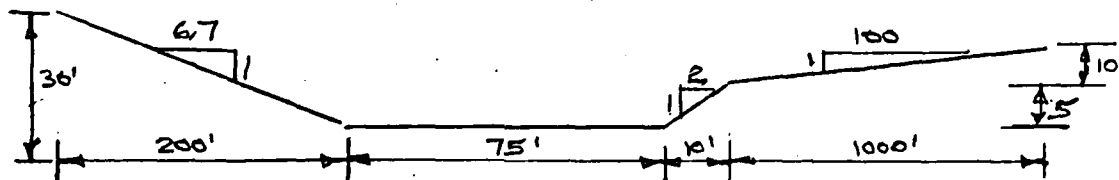
D-16

BY RFB DATE 6/15/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 15 OF 7
 CHKD. BY DATE INSPECTION OF DAMS PROJECT SLATERSVILLE MIDDLE DAM, FAILURE ANALYSIS
 SUBJECT STA 76+00 TO STA 106+00

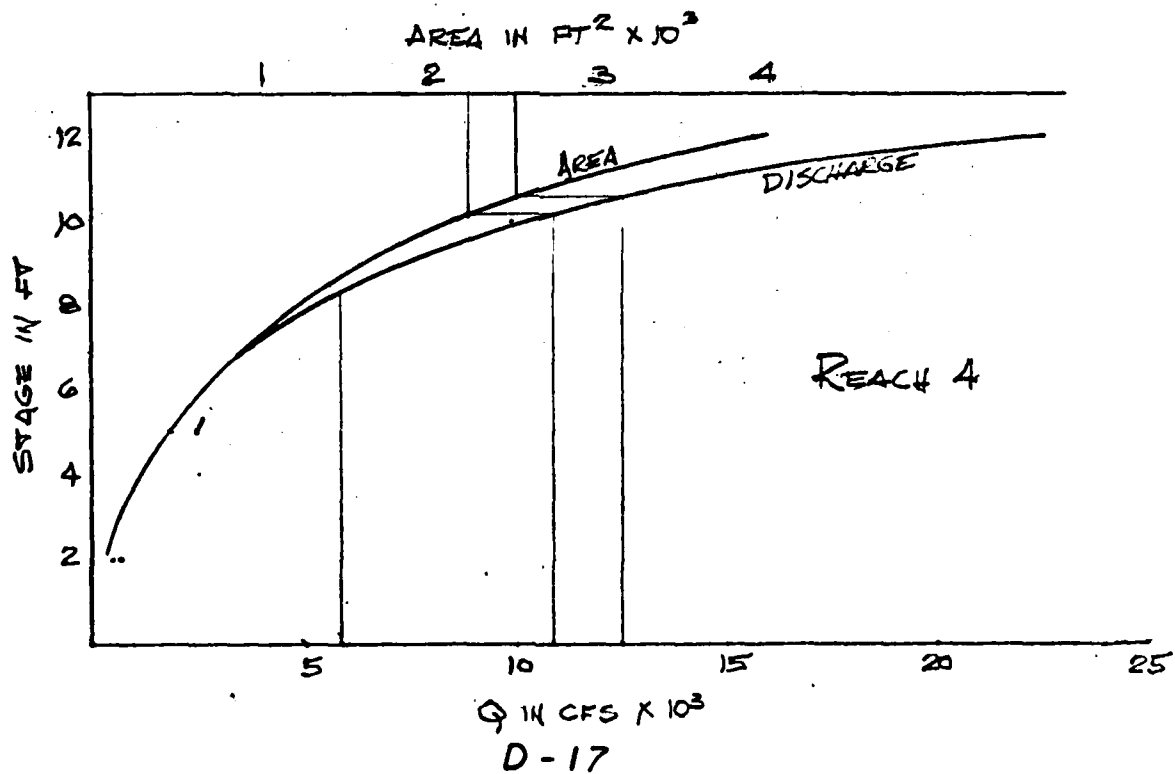
$$n = 0.045$$

$$S^{1/2} = .0632$$

$$Q = 2.09 R^{2/3} A$$



DEPTH	Δ AREA	Σ AREA	W.P.	R	$R^{2/3}$	Q
2	161	161	93	1.73	1.44	484
5	323	484	120	4.03	2.53	2560
7	425	909	334	2.72	1.95	3704
10	1233	2142	654	3.77	2.21	9893
12	1785	3927	867	4.53	2.74	22488



BY RFB DATE 6/22/74 LOUIS BERGER & ASSOCIATES INC. SHEET NO. 16 OF 7
 CHKD. BY DATE INSPECTION OF DAMS PROJECT SLATEKSVILLE MIDDLE DAM, FAILURE ANALYSIS

$$Q_{P4} = 12,477 \text{ CFS} \quad \text{STAGE} = 10.6 \text{ FT}$$

$$\text{AREA} = 2500 \quad V_1 = \frac{2500 \times 3000}{43,560} = 172 \text{ ACRE-FT}$$

$$Q_{F5} (\text{TRIAL}) = 12,477 \left(1 - \frac{172}{1330}\right) = 12,477 (1 - .129)$$

$$Q_{P5} (\text{TRIAL}) = 10,870$$

$$\text{STAGE} = 10.2, \quad A = 2220 \quad V_2 = 153 \text{ ACRE-FT}$$

$$Q_5 = 12477 \left(1 - \frac{153 + 172}{1330}\right) = 12477 (1 - .122)$$

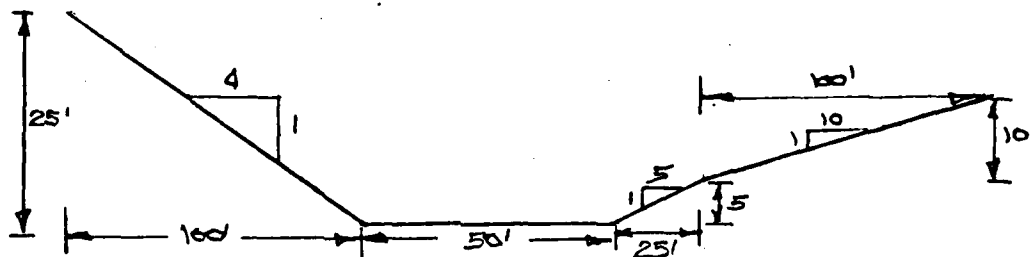
$$Q_5 = 10,955 \quad \text{STAGE} = 10.3$$

STA 106+00 to STA 146+00

$$n = 0.045$$

$$S^{1/2} = 0.0632$$

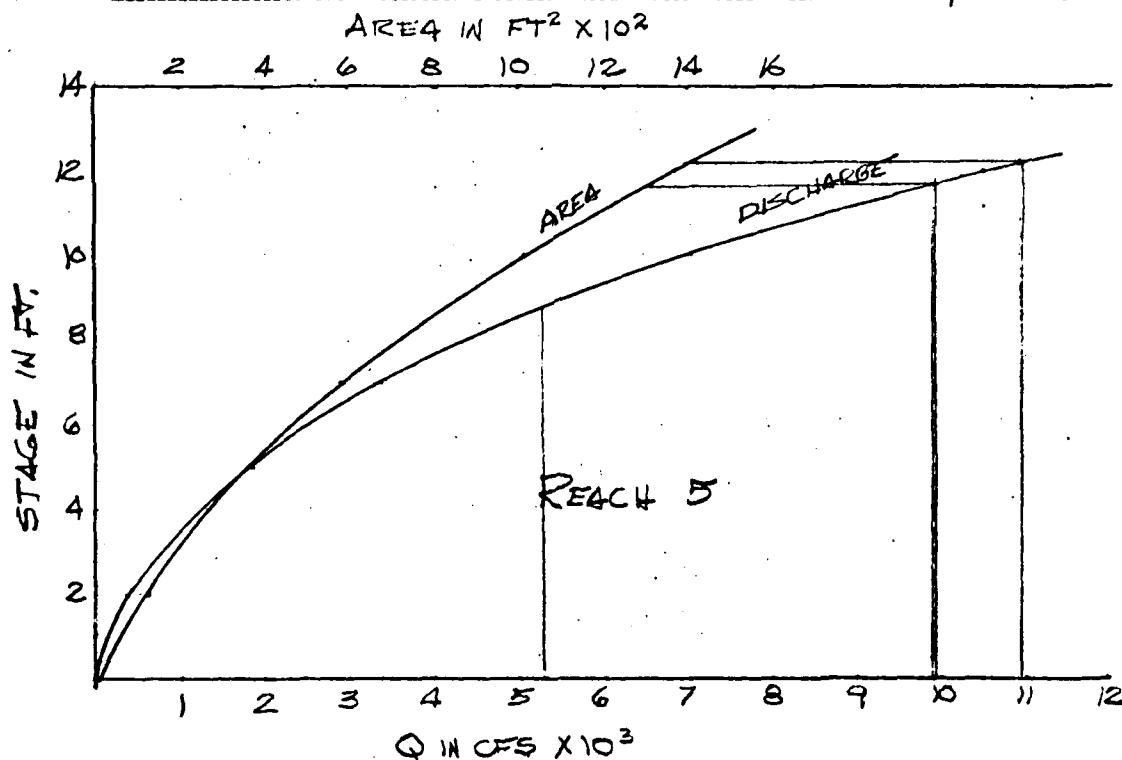
$$Q = 2.09 R^{2/3} A$$



DEPTH	ΔAREA	AREA	W.P.	R	$R^{2/3}$	Q
2	118	118	68.4	1.73	1.41	355
5	244	362	96.1	3.77	2.42	1830
7	218	580	124.4	4.66	2.79	3382
10	432	1012	167.0	6.06	3.33	7043
12	358	1370	195.3	7.01	3.67	10508

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BY: RFB DATE 6/22/79 LOUIS BERGER & ASSOCIATES INC. SHEET NO. 17 OF 7
 CHKD. BY: _____ DATE _____ INSPECTION OF LAKE PROJECT _____
 SUBJECT: SLATFILL MIDDLE DAM - FAILURE ANALYSIS



$$Q_5 = 10,955 \quad \text{STAGE} = 12.2 \quad \text{AREA} = 1400$$

$$V_1 = \frac{1400 \times 4000}{43,560} = 128.6 \text{ ACRE-FT}$$

$$Q_6(\text{TRIAL}) = 10,955 \left(1 - \frac{128.6}{1330}\right) = 10,955 (1 - .097)$$

$$Q_6(\text{TRIAL}) = 9892 \text{ CFS} \quad \text{STAGE} = 11.6 \quad \text{AREA} = 1300$$

$$V_2 = \frac{1300 \times 4000}{43,560} = 119.4 \quad V_{\text{AVE}} = 124 \text{ ACRE-FT}$$

$$Q_6 = 10,955 \left(1 - \frac{124}{1330}\right) = 10,955 (1 - .093)$$

$$Q_6 = 9936 \text{ CFS}$$

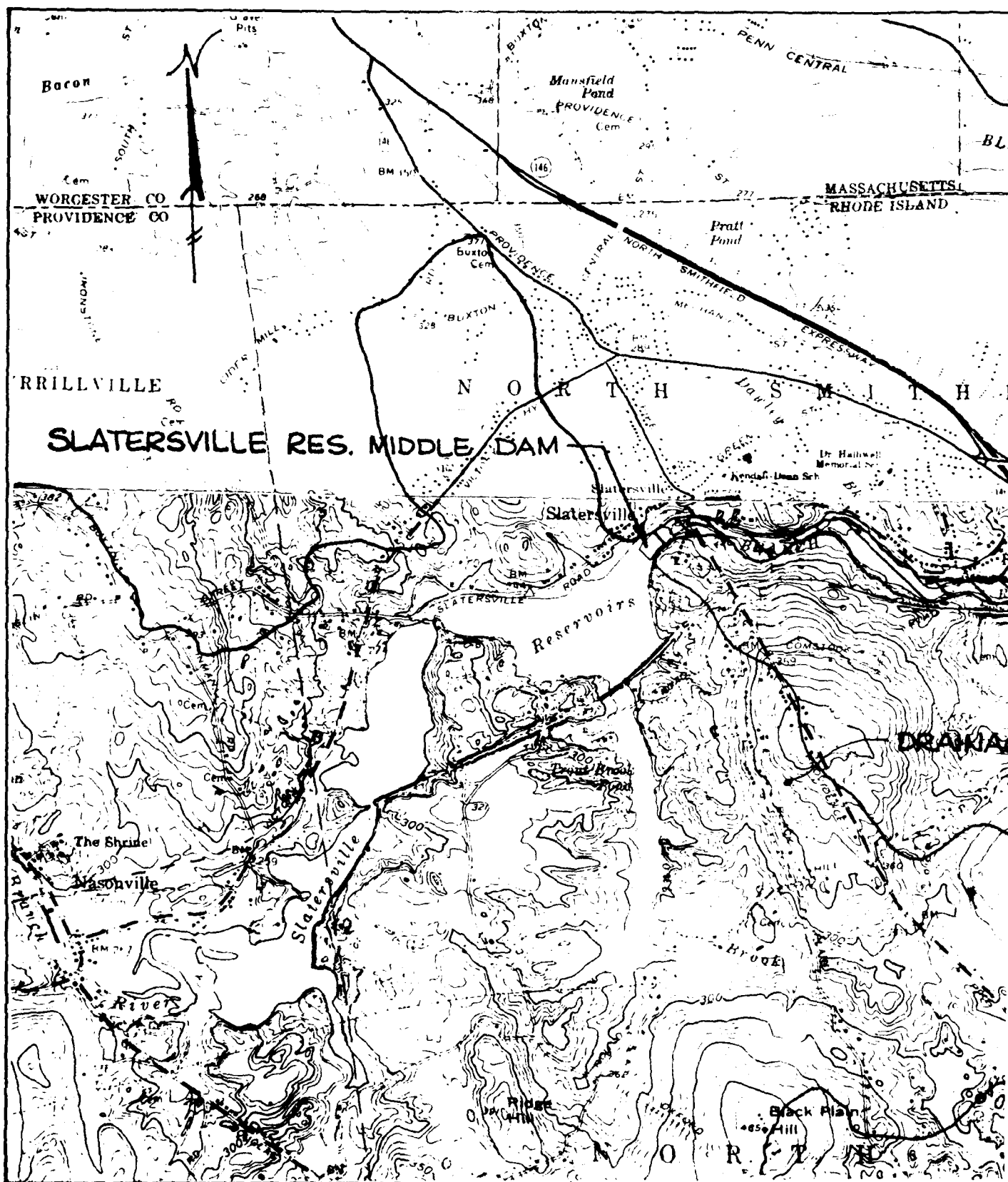
$$\text{STAGE} = 11.7 \text{ FT}$$

BY REF DATE 6/22/79 LOUIS BERGER & ASSOCIATES INC. SHEET NO. 18 OF 7
 CHKD. BY 11/22/79 DATE 11/22/79 PROJECT SLATERSVILLE MIDDLE DAM - FAILURE ANALYSIS
 SUBJECT SLATERSVILLE MIDDLE DAM - FAILURE ANALYSIS

SUMMARY OF STAGES

Q SPILLWAY = 5594 CFS

RIVER STA	TO RIVER STA	FAILURE STAGE	SPILLWAY STAGE	Δ STAGE
0+00	32+00	12.6	7.4	5.2
32+00	60+00	6.1	3.6	2.5
60+00	76+00	10.5	7.4	3.1
76+00	106+00	10.3	8.3	3.0
106+00	146+00	11.7	8.8	2.9



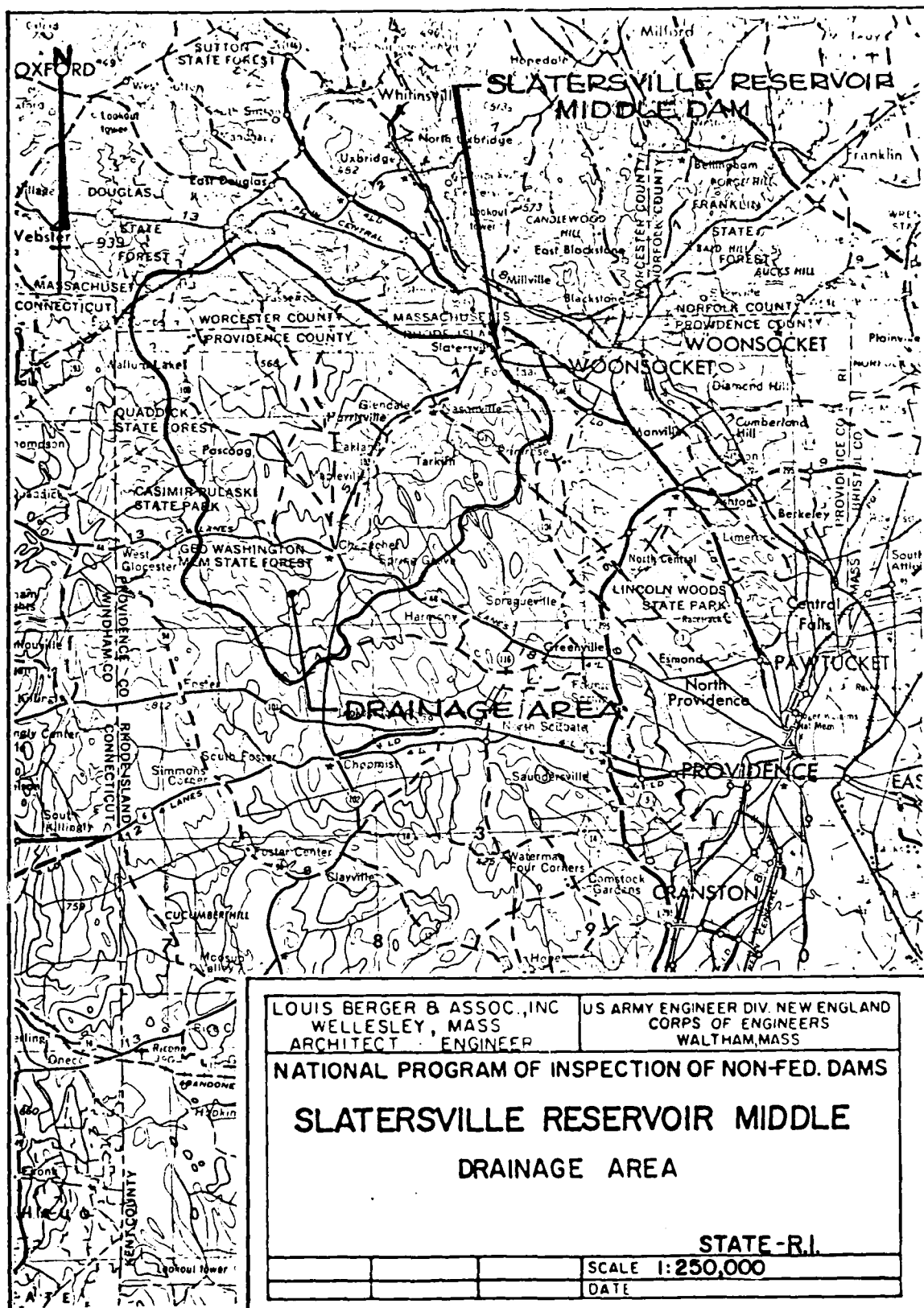


FIGURE 4- SHEET D-22

APPENDIX E
INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

END