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ALLEGHENY RIVER BASIN

CONEWANGO CREEK WATERSHED PROJECT SITE 19

CATTARAUGUS COUNTY, NEW YORK

INVENTORY No. NY 579

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Conewango Creek Watershed Project Site 19 (Inventory Number NY-579), Allegheny River Basin, Cattaraugus County, New York. Phase I Inspection Report,

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CONTRACT NO. DACW51-79-C0001

(10) George /Koch

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NEW YORK DISTRICT CORPS OF ENGINEERS

SEPTEMBER 1979

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Conewango Creek Watershed
Project Site 19
Cattaraugus County
Randolph

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

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The examination of documents and visual inspection of the Site 19 dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. The dam, however, has a number of problem areas, which if not remedied, have the potential for developing into hazardous conditions. These problem areas are as follows:

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1. Seepage encountered at the toe of the downstream slope near the left (north) abutment contact;

2. Erosion at the left abutment contact of the downstream face caused by runoff from the very steep abutment slope;

3. Incomplete structural stability investigations which did not include seismic and the observed seepage forces.

Investigations are required in these areas to ascertain the type and extent of remedial measures required. These investigations should include, but not be limited to, exploration, sampling and testing of soils in the vicinity of the seepage, and investigation of its source. In addition, stability analyses are required concerning the influence of seismic and seepage forces as recommended by the Corps of Engineers' "Guidelines" for Seismic Zone 2. Investigation of the cause of the left abutment contact erosion and remedial measures to repair these areas and inhibit future erosion is also required. These investigations must be completed within 1 year of notification; with remedial measures completed within the following construction season. In addition, repair of the abutment erosion must be completed during this construction season.

The following remedial actions should be completed during this construction season:

4. Repair the eroded area of the left abutment above the crest of the dam;

5. Remove the rock outcrops at the outlet of the plunge pool to prevent backing-up of plunge pool outflow, and periodically clean the soil and debris which has accumulated in the internal drainpipes.

6. Remove all tree growth which would inhibit flow at the entrance and exit of the auxiliary spillway. Provide a program of periodic cutting and mowing of the dam and auxiliary spillway surfaces, including debris removal from storms;

7. Repair the eroded access road and periodically monitor the erosion of the side channel adjacent to Bowen Road; repair as necessary;

8. Periodically monitor the left (north) abutment slope for signs of erosion and repair as required;

9. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system. Document this information for future reference;

10. Develop an emergency action plan.

The total discharge capacity of the spillways is adequate for the Probable Maximum Flood (PMF).

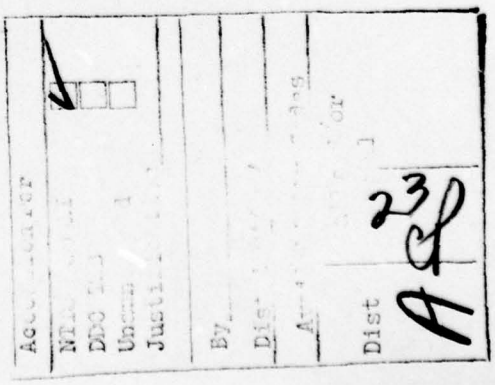
PREFACE

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 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 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.



ALLEGHANY RIVER BASIN
CONEWANGO CREEK WATERSHED PROJECT
SITE 19 DAM
NY 579
PHASE I INSPECTION REPORT

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PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Conewango Creek Watershed Project Site 19 Dam I.D. No. N.Y. 579
State Located:	New York
County Located:	Cattaraugus
River Basin:	Alleghany
Stream:	Battle Creek (tributary of Conewango Creek)
Date of Inspection:	August 28, 1979

ASSESSMENT

The examination of documents and visual inspection of the Site 19 dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. The dam, however, has a number of problem areas, which if not remedied, have the potential for developing into hazardous conditions. These problem areas are as follows:

1. Seepage encountered at the toe of the downstream slope near the left (north) abutment contact;

2. Erosion at the left abutment contact of the downstream face caused by runoff from the very steep abutment slope;

3. Incomplete structural stability investigations which did not include seismic and the observed seepage forces.

Investigations are required in these areas to ascertain the type and extent of remedial measures required. These investigations should include, but not be limited to, exploration, sampling and testing of soils in the vicinity of the seepage, and investigation of its source. In addition, stability analyses are required concerning the influence of seismic and seepage forces as recommended by the Corps of Engineers' "Guidelines" for Seismic Zone 2. Investigation of the cause of the left abutment contact erosion and remedial measures to repair these areas and inhibit future erosion is also required. These investigations must be completed within 1 year of notification; with remedial measures completed within the following construction season. In addition, repair of the abutment erosion must be completed during this construction season.

The following remedial actions should be completed during this construction season:

4. Repair the eroded area of the left abutment above the crest of the dam;

5. Remove the rock outcrops at the outlet of the plunge pool to prevent backing-up of plunge pool outflow, and periodically clean the soil and debris which has accumulated in the internal drainpipes.

6. Remove all tree growth which would inhibit flow at the entrance and exit of the auxiliary spillway. Provide a program of periodic cutting and mowing of the dam and auxiliary spillway surfaces, including debris removal from storms;

7. Repair the eroded access road and periodically monitor the erosion of the side channel adjacent to Bowen Road; repair as necessary;

8. Periodically monitor the left (north) abutment slope for signs of erosion and repair as required;

9. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system. Document this information for future reference;

10. Develop an emergency action plan.

The total discharge capacity of the spillways is adequate for the Probable Maximum Flood (PMF).

George Koch

George Koch, Chief
Dam Safety Section
New York State Department of
Environmental Conservation
NY License No. 45937

Approved By:

Clark H. Benn

Col. Clark H. Benn
New York District Engineer

Date: 28 Sept 79



Overview of Conewango Creek Watershed Project Site 19 Dam
Photo #1

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
CONEWANGO CREEK WATERSHED PROJECT
SITE 19 DAM
I.D. NO. NY 579
DEC #8B-3797
ALLEGHANY RIVER BASIN
CATTARAUGUS COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase 1 inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

Evaluation of the existing conditions of the subject dam to identify deficiencies and hazardous conditions, determine if they constitute hazards to life and property and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Site 19 dam consists of a 480 foot long homogeneous earth embankment, 65 feet high, with a principal and auxiliary spillway. The upstream slope is 1 vertical on 3.0 horizontal, and the downstream slope is 1 on 2.5. A 10 foot wide berm is located on the upstream slope at elevation 1489. The crest width is 20 feet.

An internal drainage system is located under the downstream portion of the dam to control the phreatic surface and provide a safe outlet for foundation seepage. A cutoff trench is located at the dam centerline to reduce seepage.

The principal spillway is a drop inlet structure consisting of a 2-stage reinforced concrete riser, a 24-inch diameter reinforced concrete pipe conduit, a plunge pool, and an excavated outlet channel.

The 200 foot wide auxiliary spillway, located beyond the right (south) abutment, is designed as an earth cut with vegetation. The side slopes are 1 on 3 and the channel is 400 feet long.

A 12-inch diameter cast iron pipe with reinforced concrete inlet serves as a reservoir drain. The drain is controlled by a manually operated 12-inch flat frame slide gate, the stem of which extends to the top of the principal spillway riser; having stem guides located on the inside of the riser.

b. Location
The dam is located on Battle Creek, a tributary of Conewango Creek and the Alleghany River, southwest of the Village of Randolph, New York.

c. Size Classification
The dam is 65 feet high and is classified as "intermediate" in size (40 t. 100 feet in height).

d. Hazard Classification
The dam is classified as high hazard, because of its location immediately above the homes along Bowen Road (County Rt. #8) and above the Village of Randolph.

e. Ownership
The dam is owned and operated by Conewango Creek Watershed Commission, Mr. Donald V. Crowell, President, R.D. #2, South Dayton, New York 14138.

f. Purpose of the Dam
The dam is a floodwater retarding structure.

g. Design and Construction History
The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service (SCS). Construction of the dam was completed in September 1971 by Northern Demolition Company, Buffalo, New York The SCS office located in Syracuse has all design and construction information.

h. Normal Operating Procedures
Normal flows are discharged through the principal spillway. This structure has sufficient capacity to store and discharge a 100-year flood without use of the auxiliary spillway. Storms in excess of this flood will discharge through the auxiliary spillway.

1.3 PERTINENT DATA

a. Drainage Area (sq. mi)	2.1
Height of dam (feet)	65
b. Discharge at Dam Site (cfs)	
Maximum known Flood	Unknown
Spillway at Auxiliary Spillway Crest (El. 1523.8)	81
Spillway at Maximum Design Pool (El. 1526.3)	1899
Spillway at Maximum Pool (El. 1529.6)	8242
Maximum Capacity of Reservoir drains	31
Total Discharge, Max. Pool	8242
Average Daily Discharge	Varies
c. Elevation (ft. above MSL-Datum)	
Top of Dam	1529.6
Max. Design Pool	1526.3
Auxiliary Spillway Crest	1523.8
Principal Spillway Crest	1510.8
Invert of Low Stage Inlet	1490.0
Invert of Reservoir Drain Inlet	1472.0

d. Reservoir (acres)

Surface Area Top of Dam	19.2
Surface Area at Crest of Auxiliary Spillway	16.3
Surface Area at Spillway Crest	10.3
Surface Area at Invert of Low Stage Riser	3.1

e. Storage (acre-foot)

Top of Dam	391
Auxiliary Spillway Crest	289
Principal Spillway Crest	114
Low Stage Riser Invert	20

f. Dam

Type: Homogeneous earth with keyed earth cutoff and internal drain.

Length (ft.)	480
Upstream Slope	1:3.0
Downstream Slope	1:2.5
Crest Width (ft.)	20

g. Spillway

Type: Ungated reinforced concrete drop inlet (2' x 6') rising 41 feet above 24-inch diameter reinforced concrete pipe invert; length of pipe 348 feet; plunge pool.

Weir Length (ft.)	12.0

h. Auxiliary Spillway

Type: Single grass-lined earth channel having trapezoidal grass section.

Bottom Width (ft.)	200
Side Slopes	1:3.0
Length of Level Section (in profile) (ft.)	50
Exit Slope (ft./ft.)	0.028

i. Reservoir Drain

Type: 12-inch diameter cast iron pipe with reinforced concrete inlet.

Control: Manually operated vertical slide gate mounted along inside of principal spillway riser.

SECTION 2: ENGINEERING DATA

2.1 GEOLOGY

The Conewango Creek Watershed Project Site 19 Dam is located in the glaciated portion of the Appalachian Uplands (northern extreme of the Appalachian Plateau) physiographic province of New York State. These uplands were formed by the dissection of the uplifted but flat lying sandstones, siltstones, and shales of the Late Upper Devonian Period (345 to 365 million years ago). The plateau surface is represented by flat-topped divides with drainage generally southward toward the Alleghany River system.

Glacial cover is generally thin, the deposits of which have resulted from glaciations during the Wisconsin glaciation, approximately 11,000 years ago.

2.2 SUBSURFACE INVESTIGATION

A subsurface investigation was conducted by SCS in 1968. This program consisted of 15 drill holes and 12 test pits at locations along the dam, auxiliary spillway, structural elements, and borrow area. Applicable subsurface information is included in Appendix G, Drawings #17 & 18.

In general, the soils in the vicinity are of glacial till origin, sandy gravels and gravelly sands overlying interbedded gray shales and sandstones, the shale exhibiting a highly weathered zone where covered by overburden. Depth to bedrock is extremely variable and in some borings was outcropping. The permeability of the upper surface soils is slow to very slow. The permeability of the lower surface soils is medium to rapid due to the lower percentage of fires.

2.3 EMBANKMENT AND APPURTENANT STRUCTURES

The dam was designed and construction supervised by SCS. "As-built" drawings of this dam are on file at the SCS office in Syracuse, New York. Selected drawings of the dam and appurtenances are included in Appendix G. The dam is a 65 foot high, 480 foot long, homogeneous earth embankment, having an earth cutoff trench and an internal drain system running parallel to the axis of the dam and outletting near the end of the principal spillway conduit. A reinforced concrete riser with a 24-inch diameter reinforced concrete pipe conduit and a plunge pool serves as the principal spillway. The reservoir drain system consists of a 12-inch diameter cast iron pipe and manually operated slide gate; is located upstream of the riser. The auxiliary spillway is a 200 foot wide vegetated earth channel located at the right (south) abutment.

2.4 CONSTRUCTION RECORDS

Complete construction records are available from the SCS office in Syracuse. No major changes were incorporated during construction.

2.5 OPERATION RECORD

Since the dam is an ungated floodwater retarding structure, no operating records are maintained regarding water levels. During periods of extreme rainfall, SCS personnel do monitor the reservoir.

2.6 EVALUATION OF DATA

The data presented in this report has been compiled from information obtained from Mr. Donald Lake, Head of the SCS Design Section in Syracuse, New York. This information appears adequate and reliable for Phase 1 inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Site 19 dam was conducted on August 28, 1979. The weather was cloudy and the temperature ranged in the seventies. The water surface was approximately 7 feet above the invert of the low stage inlet of the principal spillway riser (El. 1497 ±).

b. Embankment

No signs of distress were observed on the crest or slopes of the earth embankment (See photos #1 & 2). However, the following conditions were noted at the left (north) abutment contact:

1. Three seepage points were observed near the toe of the dam at the left abutment contact (See photo #11):

   Point #1: Appeared to be a potential "pipe" (i.e., a cylindrical hole approximately 2 inches in diameter), hole appeared to be directed horizontally toward the left abutment, flow rate 2 to 5 gpm (See photo #13);

   Point #2: Located approximately 2 feet below Point #1; flow was noted emerging vertically from beneath a rock, flow rate 2 to 5 gpm (See photo #12);

   Point #3: Located approximately 3 feet south of Points 2 & 3, flow emerging from soil in erosion area associated with the abutment contact erosion mentioned below, flow rate 1 gpm.

In all cases, no particle migration or discolored flow was observed.

2. Approximately 50 feet downstream from the crest, erosion at the abutment contact was observed (See photos #9 & 10). This erosion had occurred during a recent intense storm. The erosion continued down to the toe of the dam where deposition of the embankment was noted (See photos #5, 8 & 10). The maximum depth of erosion is approximately 3 feet. The erosion was initiated by the heavy runoff and the concentration of flow at the abutment contact by the very steep abutment slope.

3. A snowmobile trail along the crest and up the left abutment has initiated erosion of the very steep abutment soil. The eroded material has been deposited on the crest of the dam (See photo #14).

The embankment slopes and crest are heavily vegetated and require mowing. The 2 internal drains which outlet at the toe of the dam on either side of the principal spillway conduit were partially blocked with debris and soil. This blockage is believed to be a result of the backing-up of plunge pool water due to the constricting of outflow by rock outcrops at the outlet of the plunge pool (See photo #5). After the blockage was removed at each pipe, the following flow conditions were observed:

4. Seepage from the left (north) drain is estimated to be 3 to 5 gpm, with no particle migration or discolored flow. (See photos #6 & 8)

5. Seepage from the right (south) drain is estimated to be 1 to 2 gpm, with no particle migration. (See photo #7) The flow was rusty in nature and was observed to surge periodically. Every 2 to 5 seconds, the flow stopped completely then resumed its full flow. This surging is believed to be related to the surface tension of the water in the perforations of the pipe during low flow conditions.

c. Principal Spillway

The principal spillway consists of a vertical drop inlet structure, a reinforced concrete pipe founded on bedrock, and a plunge pool (See photos #4, 5 & 6). These components appear to be satisfactory with the exception of debris from a recent storm on top of the riser and the constricted outlet of the plunge pool.

d. Auxiliary Spillway

The vegetated auxiliary spillway (earth cut section) is located beyond the right (south) abutment of the dam (See photos #1, 2 & 3). This channel appears to be stable. Heavy vegetative growth in the channel requires mowing. In addition, tree growth at both the entrance and exit of the channel must be removed.

e. Reservoir Drain

The 12-inch diameter reservoir drain and manually operated slide gate may be used to lower the reservoir. This system is reported to be operational.

f. Downstream Channel

The downstream channel below the plunge pool is the original channel of Battle Creek. While some erosion of a side channel running parallel to Bowan Road (County Rt. #8) was observed, the downstream channel appears to be in reasonable condition. Extensive erosion was observed in the pipe backfill for the access road to the dam as it passes over the aforementioned side channel.

g. Reservoir

There are no visible signs of instability or sedimentation problems within the reservoir area. However, do to the steep left (north) abutment slope and the erosion encountered at the abutment contact, periodic observation is required to monitor future erosion problems.

3.2 EVALUATION

The problem areas observed during the inspection and the recommended remedial action or investigation are as follows:

1. Investigate the observed seepage at the toe of the dam to ascertain the extent and type of remedial action required;

2. Investigate the erosion of the left abutment contact on the downstream face and initiate repairs to prevent further erosion;

3. Repair the eroded area of the left abutment above the crest of the dam;

4. Remove the rock outcrops at the outlet of the plunge pool to prevent backing-up of plunge pool outflow, and clean the observed soil and debris from the internal drainpipes. Remove the tree growth noted at the entrance and exit of the auxiliary spillway;

5. Provide a program of periodic mowing and cutting of the embankment and auxiliary surfaces, including debris removal from storms;

6. Repair the eroded access road and periodically monitor the side channel to insure that future erosion does not endanger the dam and appurtenances;

7. Periodically monitor the left abutment slope for signs of erosion;

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system;

9. Develop an emergency action plan for notification of downstream residents and the proper governmental authorities.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

The normal water surface elevation is approximated by the invert of the low stage inlet of the principal spillway riser. Downstream flows are limited by the 24-inch diameter principal spillway pipe, except during extreme periods of runoff when the auxiliary spillway is in service. The dam provides 269 acre-feet of flood storage between normal water level and the crest of the auxiliary spillway.

4.2 MAINTENANCE OF THE DAM

The dam is maintained by the Conewango Creek Watershed Commission. Maintenance of the dam is not considered satisfactory as evidenced by the blockage in the internal drain system, heavy vegetation and tree growth, and erosion of the access road.

4.3 WARNING SYSTEM IN EFFECT

There is no warning system in effect or in preparation.

4.4 EVALUATION

The dam and appurtenances have not been maintained in satisfactory condition as noted in "Section 3: Visual Inspection".

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

Delineation of the watershed of the Site 19 dam was made using the USGS 7.5 minute quadrangles for Kennedy and Ivory, New York. The watershed consists of woodlands and fields situated in a rural section. Relief is generally steep. The drainage area is 1370 acres or 2.14 square miles.

5.2 ANALYSIS CRITERIA

The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers HEC-1 computed program, incorporating the "Snyder Synthetic Unit Hydrograph" method, and the "Modified Puls" flood routing procedure. The spillway design flood selected for analysis was the PMF in accordance with the recommended "guidelines" of the U.S. Army Corps of Engineers.

5.3 SPILLWAY CAPACITY

The principal and auxiliary spillways are ungated structures. The principal spillway operates under weir or orifice flow conditions depending upon the floodwater inflow to the reservoir pool. The auxiliary spillway was analyzed as a broad-crested weir having a discharge coefficient (c) of 3.087.

The spillways have sufficient capacity for discharging the peak outflow from the PMF. For this storm, the peak inflow is 4569 cfs and the peak outflow is 4530 cfs. When the spillways are discharging the peak outflow, the water surface will be 2.6 feet below the top of the dam. The maximum spillway capacity is calculated to be 8242 cfs. Further information concerning this analysis is included in Appendix D.

5.4 RESERVOIR CAPACITY

Normal flood control storage capacity of the reservoir between normal pool level and the crest of the auxiliary spillway is 269 acre-feet which is equivalent to a runoff depth of 2.4 inches over the drainage area. Surcharge storage capacity to the maximum high water elevation is an additional 102 acre-feet, equivalent to a runoff depth of 0.9 inches. Total storage capacity of the dam is 371 acre-feet, equivalent to 3.3 inches of direct runoff.

5.5 FLOODS OF RECORD

The maximum known flood occurred on August 7, 1979. The pool level at this time was reported to be approximately 9 feet above the principal spillway crest. The estimated discharge for this flood is as follows:

Elevation (USGS)	Discharge (cfs)
1520	75

5.6 OVERTOPPING POTENTIAL

Analysis indicates the total discharge capacity of the spillways is sufficient to prevent overtopping of the dam by the PMF.

5.7 EVALUATION

This dam has sufficient capability to impound and adequately discharge floodwaters expected to result from the PMF.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

No signs of major distress were observed in connection with the earth embankment. However, seepage was noted at the left abutment contact on the downstream face near the toe of the dam which requires further investigation.

b. Design and Construction Data

Stability analyses were conducted by SCS in 1969 during the design of the dam. The analyses were performed using the Modified Swedish Circle Method, assuming soil parameters of $\emptyset = 24^{o}$ c=250 psf and γ_d = 125.2 pcf. An additional analysis was also conducted assuming parameters of $\emptyset = 30^{o}$ c = 425 psf and γ_d = 129.2 pcf. The results of the stability analyses are as follows:

Case	Minimum Factor of Safety
1. Full drawdown, upstream slope = 1:3 10' berm at elevation 1489.5, $\emptyset = 24^{o}$, c = 250;	1.24
2. Full drawdown, same conditions as Case #1, $\emptyset = 30^{o}$, c = 425;	1.75
3. Steady state seepage, downstream slope = 1:2.5; no drain or berm $\emptyset = 24^{o}$, c = 250;	1.07
4. Steady state seepage, same conditions as Case #3 with internal drain @ c/b = 0.6.	1.33

Case 1, 3 and 4 were conducted using soil parameters which resulted from compaction to 95% of Standard Density. Case 2 was conducted using 100% Standard Density Soil parameters. During design, the following recommendations were incorporated in the design of the dam as a result of these analyses:

(1) Construct a homogeneous earth embankment of gravelly till materials compacted to a minimum density of 100% of Standard to provide adequate strength;

(2) Provide a 1:3 upstream slope with a 10-foot wide berm at the permanent pool elevation of 1489.5;

(3) Provide a 1:2.5 downstream slope with an internal drain located at a distance equal to 0.6 times the base width from the upstream toe of the dam.

Using these design considerations, the calculated factors of safety for the dam are in excess of the minimum factors recommended by the Corps of Engineers. No analysis similar to Case 4 was conducted using soil parameters consistent with the recommended 100% Standard Density. However, comparison of the values obtained for the upstream face (Case 1 & 2) indicates that an analysis for

the downstream slope using these soil parameters would result in a safety factor well in excess of the 1.5 minimum recommended factor. The dam is, therefore, considered to have adequate factors of safety for stability.

A summary of the analyses is included in Appendix F.

c. Post Construction Changes

No major post construction changes were noted during construction of the dam.

d. Seismic Stability

The dam is located in Seismic Zone 2. No stability analysis was conducted considering the effect of seismic forces as recommended by the Corps of Engineers' "Guidelines". In light of the seepage encountered at the toe of the dam and the lack of a seismic analysis, it is recommended that additional stability analyses be conducted.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase 1 inspection of the Conewango Creek Watershed Project Site 19 dam did not reveal conditions which constitute an immediate hazard to human life or property. The dam, however, has a number of problem areas which if left uncorrected may have the potential for the development of hazardous conditions. These areas are:

1. Seepage encountered at the toe of the dam near the left (north) abutment contact;

2. Erosion of the left abutment contact from abutment runoff;

3. Incomplete investigation of the structural stability of the dam concerning seepage encountered during the inspection and seismic forces.

b. Adequacy of Information

The information reviewed is considered adequate for Phase 1 inspection purposes.

c. Urgency

Investigation of the problem areas listed above must be initiated as soon as possible and completed within 1 year of notification to the owner. In addition, repair of the erosion at the abutment contact must be completed during this construction season. Investigation of the seepage noted should include, but not be limited to, exploration, sampling and testing of the soils in the vicinity of the seepage, and investigation of its source. In addition, stability analyses are required concerning the influence of seismic and seepage forces as recommended by the Corps of Engineers' "Guidelines" for Seismic Zone 2. Investigation of the cause of the left abutment contact erosion and remedial measures to repair these areas and inhibit future erosion is also required. Remedial action, as a result of the investigations, should be completed within the following construction season. The remaining recommended measures listed below should be completed during this construction season.

d. Need for Additional Investigation

To prevent the development of potentially hazardous conditions, investigations are required in the following areas:

1. Seepage investigation at the toe of the dam;

2. Control of erosion of the left abutment contact;

3. Structural stability analysis of the dam concerning seismic and seepage forces.

7.2 RECOMMENDED MEASURES

a. Results of the aforementioned investigations will determine the type and extent of remedial measures required.

The following improvements may be accomplished by maintenance forces:

b. Repair the eroded area of the left abutment above the crest of the dam.

c. Remove the rock outcrops at the outlet of the plunge pool to prevent backing-up of plunge pool outflow, and clean the debris and soil which has accumulated in the internal drainpipes.

d. Remove all tree growth at the entrance and exit of the auxiliary spillway. Provide a program of periodic cutting and mowing of the embankment and auxiliary spillway surfaces, including removal of debris from storms.

e. Repair the eroded access road and periodically monitor the ongoing erosion of the side channel adjacent to Bower Road (County Rt. #8).

f. Periodically monitor the left (north) abutment slope for signs of erosion and repair as required.

g. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system. Document this information for future reference.

h. Develop an emergency action plan for notification of downstream residents and the proper governmental authorities.

APPENDIX A

PHOTOGRAPHS





Downstream and Upstream Face of Dam
Note Auxiliary Spillway in Background
Photo #2 A&B



Auxiliary Spillway Looking Downstream
Photo #3



Principal Spillway Riser
Photo #4



Plunge Pool
Photo #5



Outlet of Principal Spillway Conduit
Photo #6



Right Internal Drain
Photo #7



Left Internal Drain
Photo #8



Erosion at Left Abutment Contact Viewed from Crest
Photo #9



Erosion Viewed from Toe of Dam
Photo #10



Seepage Near Left Abutment Contact and Toe
Photo #11



Seepage Point #2
Photo #12



Seepage Points #1 & 2
Photo #13



Erosion of Left Abutment at Crest of Dam
Note Deposition in Foreground
Photo #14

APPENDIX B

ENGINEERING DATA CHECKLIST

Check List
Engineering Data
Design Construction Operation

Name of Dam Conewango Site 19
I.D. # NY 579
Dec # 88-3797

Item	Remarks		
	Plans	Details	Typical Sections
Dam	Yes	Yes	Yes
Spillway(s)	"	"	"
Outlet(s)	"	"	"
Design Reports	Yes		
Design Computations Discharge Rating Curves Dam Stability Seepage Studies	Yes all on file at SCS office in Syracuse		
Subsurface and Materials Investigations	Yes See plans		

Item	Remarks
Construction History	On file at SCS in Syracuse
Surveys, Modifications, Post-Construction Engineering Studies and Reports	None
Accidents or Failure of Dam Description, Reports	None
Operation and Maintenance Records Operation Manual	None except for inspection during high flows, by SCS

APPENDIX C

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Conewango Creek Watershed Project Site 19

I.D. # NY 579 DEC # 88-3797

Location: Town Randolph County Cattaraugus

Stream Name Bells Creek

Tributary of Conewango Ck. & Allegheny River

Longitude (W), Latitude (N) 79°00'30" / 42°08'48"

Hazard Category C High

Date(s) of Inspection 8/28/79

Weather Conditions Cloudy 70's

b. Inspection Personnel Kenneth Harmer, Robert McCarty - DEC

Stephen Yerton, Dexter Case - SCS - Batavia

c. Persons Contacted Donald W Lake Jr. - SCS, Syracuse

d. History:

Date Constructed September, 1971 completed

Owner Conewango Creek Watershed Commission

Designer Soil Conservation Service, Syracuse

Constructed by Northern Demolition
Buffalo, N.Y.

2) Technical Data

Type of Dam Earth Embankment

Drainage Area 1370 Acres

Height 65 feet Length 980'

Upstream Slope 1:3.0 Downstream Slope 1:2.5

ten ft. wide
berm at 1489 (USGS)

2) Technical Data (Cont'd.)

External Drains: on Downstream Face None @ Downstream Toe None

Internal Components:

Impervious Core rock homogeneous earth

Drains Internal

Cutoff Type Compacted Earth

Grout Curtain None

3) Embankment

a. Crest

(1) Vertical Alignment good

(2) Horizontal Alignment good

(3) Surface Cracks none

(4) Miscellaneous snowmobile trail at left abutment near crest has initiated erosion of abutment - eroded material is piled on crest (see photo)

b. Slopes

(1) Undesirable Growth or Debris, Animal Burrows debris from recent storm, none except mowing of dam & auxiliary spillway

Growth or Borrows

(2) Sloughing, Subsidence or Depressions see abutment # 3-C

(3) Slope Protection none apparent

(4) Surface Cracks or Movement at Toe none

(5) Seepage see abutment # 3-C
none evident on slopes

(6) Condition Around Outlet Structure no slope protection for scour, flow in plunge pool backs up into internal drains causing deposition of debris & soil in pipes.

c. Abutments

good condition except for left downstream abutment contact

(1) Erosion at Embankment and Abutment Contact extensive at crest from snowmobile trail, & very extensive from swale in original grade below crest, max. depth 3 feet, about 50 ft from crest to toe

(2) Seepage along Contact of Embankment and Abutment

Three points observed at toe near outlet conduit - left abt. see sketch on next page (#5): Point #1, potential "pipe" - cylindrical hole 2" in diameter; Point #2, seepage from under rock; Point #3, seepage from erosion area. Point #1: 2-5 gpm, Point #2 2-5 gpm Point #3 — 1 gpm, all flow appears clear, no fine migration

(3) Seepage at toe or along downstream face

none evident - plunge pool may mask flow recommend dropping level of water in pool for examination

d. Downstream Area - below embankment

(1) Subsidence, Depressions, etc. none

(2) Seepage, unusual growth none

(3) Evidence of surface movement beyond embankment toe

none

(4) Miscellaneous

e. Drainage System

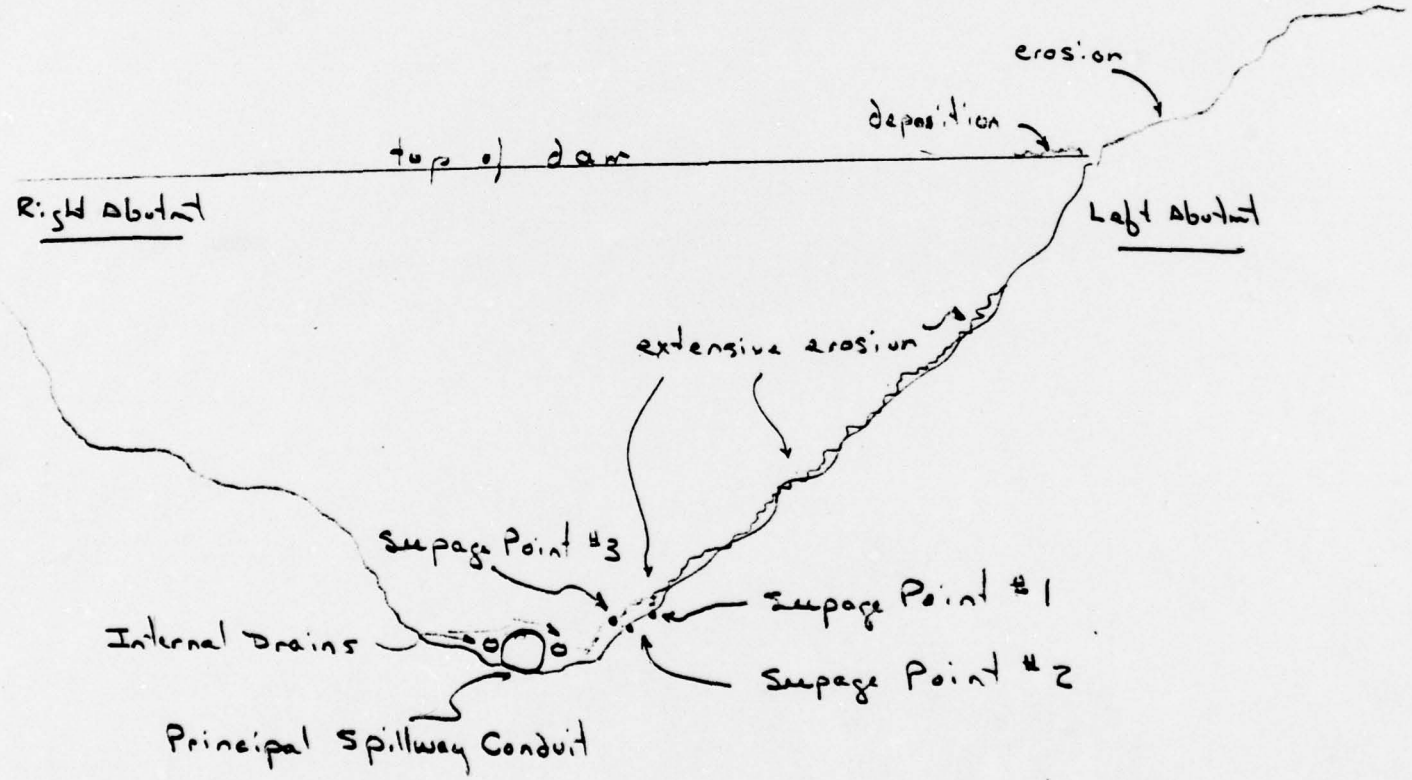
2 bit. coated corrugated metal pipes (10 inches in diam.) on each side of outlet pipe of principal spillway

(1) Condition of relief wells, drains, etc. _____

debris & soil blocking exit of pipes from high level of plunge pool

(2) Discharge from Drainage System left pipe: 3-5 gpm flow no particle migration

right pipe: surging water 1-3 gpm rusty color no fine migration; cycle of surge 3 to 5 seconds flow stops completely then flows fully again



Downstream Face of Dam
Looking Upstream

4) Instrumentation

(1) Monumentation/Surveys none other than for construction of dam

(2) Observation Wells none

(3) Weirs none

(4) Piezometers none

(5) Other

5) Reservoir

a. Slopes appear stable

b. Sedimentation no problems reported

6) Spillway(s) (including tail race channel)

a. General Standard SCS Design

b. Principle Spillway good condition, pipe conduit bedded on bedrock, circular depressions in right side of riser from bullets (target practice?) some debris on top from recent storm

c. ~~Emergency~~ or Auxiliary Spillway vegetated earth channel at right abutment. Trees at entrance and exit of channel heavy vegetation in channel requires cutting of trees & mowing

d. Condition of Tail race channel exit of plunge pool constricted so that flow backs up into internal drain pipes

e. Stability of Channel side/slopes appears stable

7) Downstream Channel

a. Condition (debris, etc.) reasonably good condition small bridge controls flow beneath county Rt #8 (Bowen Rd.)

b. Slopes some erosion of side channel (see #8 below) otherwise appears stable

c. Approximate number of homes numerous homes along county Rt. #8, the stream then flows thru the village of Randolph flow approximates path of Bowen Rd. (county Rt #8)

8) Miscellaneous channel running parallel to axis of dam coming from flow along county Rt #8 at right side enters downstream channel ≈ 50-100 feet below plunge pool. This channel is eroded substantially. also an access road, which has a large diameter pipe beneath, has severely eroded backfill. This pipe is upstream of the aforementioned channel. Repair work on the channel & pipes is required.

9) Structural

a. Concrete Surfaces

good condition

b. Structural Cracking none

c. Movement - Horizontal & Vertical Alignment (Settlement)

none evident

d. Junctions with Abutments or Embankments

appears good where observed

e. Drains - Foundation, Joint, Face

good condition

soil blocking drain pipes

f. Water passages, conduits, sluices

good condition

g. Seepage or Leakage none evident which is uncontrolled

h. Joints - Construction, etc. appear good

i. Foundation principal spillway founded on concrete pad founded on bedrock

j. Abutments N/A

k. Control Gates reported operational

l. Approach & Outlet Channels N/A

m. Energy Dissipators (plunge pool, etc.) plunge pool requires work to lower pool elev See section "6 Spillway(s)"

n. Intake Structures good condition

o. Stability appears stable

p. Miscellaneous

APPENDIX D

HYDROLOGIC/HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	1529.6	19.2	391
2) Design High Water (Max. Design Pool)	1526.3	17.5	331
3) Auxiliary Spillway Crest	1523.8	16.3	288.7
4) Pool Level with Flashboards	N/A		
5) Service Spillway Crest	1510.8	10.3	119.2
6) Invert of Low Stage Inlet	1490.0	3.1	19.6

DISCHARGES

	Volume (cfs)
1) Average Daily	varies
2) Spillway @ Maximum High Water	8242
3) Spillway @ Design High Water	1899
4) Spillway @ Auxiliary Spillway Crest Elevation	81
5) Low Level Outlet	31
6) Total (of all facilities) @ Maximum High Water	8242
7) Maximum Known Flood Aug 7, 1979 (El 1520)	75

CREST: ELEVATION: 1529.6 Top of Dam

Type: Earth Embankment

Width: 20 feet Length: 980 feet

Spillover Principal Spillway - 41 feet high, 2'x6' concrete riser

Location Center of upstream slope - Principal
At right abutment of embankment - Auxiliary

SPILLWAY:

PRINCIPAL		Auxiliary EMERGENCY
1510.8, low stage invert 1490.0	Elevation	1523.8
Reinforced Concrete	Type	Vegetated Earth
2'x6' Rectangular	Width	200 feet
	Type of Control	
Uncontrolled	Uncontrolled	Uncontrolled
	Controlled:	
—	Type (Flashboards; gate)	—
1	Number	1
weir length = 120 feet	Size/Length	length of level section 50 feet
	Invert Material	Earth - Glacial Till
	Anticipated Length of operating service	100 year Storm
348.33 ft. of 24" R/C pipe	Chute Length	400 feet
21.8 feet	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	—

OUTLET STRUCTURES/EMERGENCY DRAWDOWN FACILITIES:

Type: Gate ↘ Sluice ___ Conduit ↘ Penstock ___

Shape : Flat Frame Slide Gate ; Conduit : Round Cast Iron

Size: 12" 12" Diameter

Elevations: Entrance Invert 1472.0

Exit Invert 1459.5

Tailrace Channel: Elevation 1458.5 ± Exposed Bedrock

HYDROMETEROLOGICAL GAGES:

Type : None

Location: ___

Records:

Date - ___

Max. Reading - ___

FLOOD WATER CONTROL SYSTEM:

Warning System: None

Method of Controlled Releases (mechanisms):

none except for mechanically operated slide gate of reservoir drain system

DRAINAGE AREA: 1370 Acres 2.14 square miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Forest and Farm Land

Terrain - Relief: generally steep

Surface - Soil: Glacial Till

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

None

Potential Sedimentation problem areas (natural or man-made; present or future)

None

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

None

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: none

Elevation:

Reservoir:

Length @ Maximum Pool N/A (Miles)

Length of Shoreline (@ Spillway Crest) N/A (Miles)

U. S. DEPARTMENT OF AGRICULTURE — SOIL CONSERVATION SERVICE

DESIGN REPORT SUMMARY

I. Watershed data

A	Size of watershed	[illegible] sq. mi.
B	Drainage area	[illegible] acres
C	Time of concentration - Tc	2.37 hrs
D	Hydrologic group of soils	
	Natural Cover Type II	72.

II. Principal spillway

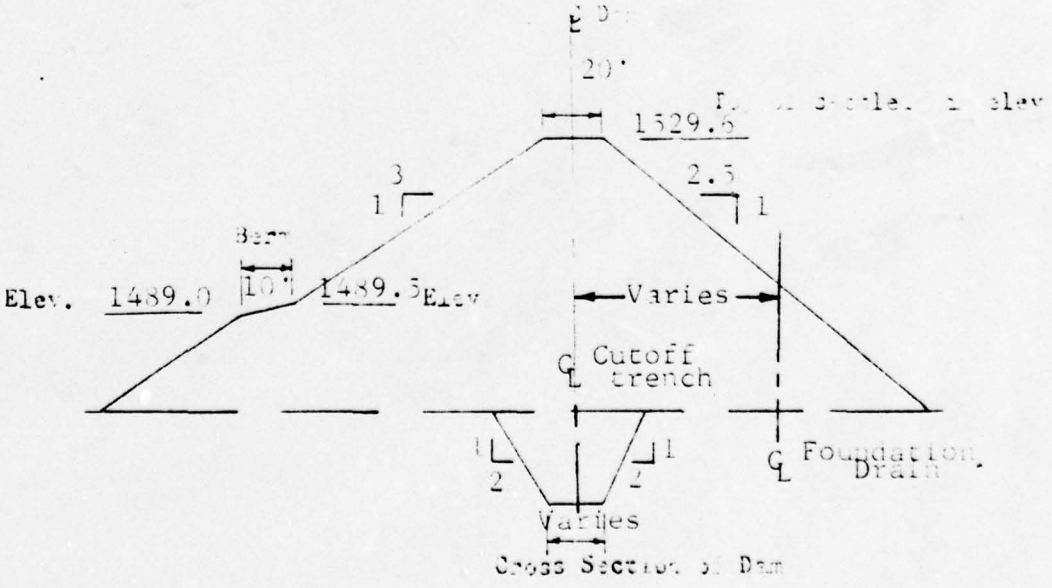
A	Conduit		
	1 Size (I.D.)	24	In.
	2 Length	345.23	Ft.
B	Riser		
	1 Size	2.0x6.0	Ft.
	2 Height (floor to crest)	41.00	Ft.
C	Weir length	12.0	Ft.
D	Reserve storage size	12.	In.
E	Low Stage Orifice	1.00 x1.42'	

III. Emergency spillway

A	Width	200	Ft.
B	Side slopes	3:1	
C	Length of level section	50.	Ft.
D	Exit slope	0.028	Ft./Ft.
E	Maximum velocity - [illegible] section (ESH)	7.3	Ft./Sec.
F	Duration of flow (ESH) through emergency spillway	6.25	Hrs.
G	Frequency of use	100	

IV. Earth fill

A	Height	65 Ft.
B	Volume	C.Y.
C	Compaction	Class A



Cross Section of Dam

DESIGN SECTION, SYRACUSE, N. Y.

Sheet 3

U.S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

Element of Structure	Determining Factor	Elev.	Surface Area Acres	Storage		Inflow		Peak Outflow c.f.s.
				Ac.-Ft.	* Inches	Volume Inches*	Rate c.f.s.	
Invert of orifice	50 yr sed. accumulation	1490.0	3.1	19.6	0.17	--	--	--
Crest of riser	1.0" storage 2/ Plus 100 yr. total sediment	1510.8	10.3	114.2 1/	1.00	--	--	31.
Crest of emergency spillway	Structure proportioning	1523.8	16.3	288.7 1/	2.53	--	--	81.
Design high water	ES-1020 Sh.4of5** moisture cond. II	1526.3	17.5	331. 1/	2.90	6.24	2413	1899
Top of dam	ES-1020 Sh.5of5** moisture cond. II	1529.6	19.2	391. 1/	3.43	21.14	8269	8242

*Volume expressed in inches of runoff from controlled watershed area of 1,370 acres.
**Refer to hydrologic criteria in National Engineering Memorandum SCS-27(Rev.).

1/ Does not include 46.2 ac. ft. of sediment storage.
2/ Established in the planning phase to provide desired level of protection.

Sheet 4

Sheet 4

DESIGN SECTION, SYRACUSE, N.Y.

Conewango Ck. DAM

Site 19, NY 579, DEC # 88-3797

D.A. = Drainage area in square miles

L = River mileage from the given station to the upstream limits of the drainage area

LCA = River mileage from the station to the center of gravity of the drainage area

PMP = Probable Maximum Precipitation in inches

t_p = Lag time from mid-point of unit rainfall duration, t_r, to peak of unit hydrograph, in hours.

t_r = Unit rainfall duration, equal to $\frac{t_p}{550}$, in hours.

C_t = Coefficient depending upon units and drainage basin characteristics

t_R = Unit rainfall duration other than standard unit, t_r, adopted in specific study, in hours.

t_{pR} = Lag time from mid-point of unit rainfall duratio t_R, to peak of unit hydrograph, in hours

D.A = 2.19 square miles, L = 2.3 miles, LCA = 1.14 miles

PMP = 23 inches C_t = 2.0,

C_p = 0.625 from average 640 C_p = 400

$t_p = C_t (L \cdot LCA)^{0.3} = 2.0(2.3 \times 1.14)^{.3} = 2.67$ hours

$t_r = \frac{t_p}{5.5} = \frac{2.67}{5.5} = .49$ hours (Use 1/2 hr. hydrograph)

$t_{pR} = t_p + 0.25(t_R - t_r) = 2.67 + \frac{1}{4}(1 - .99) = 2.80$ hrs.

From HMR 33 - Figure 2, Depth - Area - Duration

6 hour % = 111, 12 hour % = 123

24 hour % = 133, 48 hour % = 142

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MODIFIED FOR HONEYWELL APR 79
**********************************

**********************************************
THIS PROGRAM IS CURRENTLY BEING MODIFIED
TO RUN ON THE OGS HONEYWELL SYSTEM

PLEASE REPORT ANY UNUSUAL OPERATING PROBLEMS
TO MIKE TILLSON (RM. 423) PHE 7-5666
**********************************************
    1              A     CONEWANGO CREEK SITE 19  NY 579  DEC # 88-3797    ALLEGHENY RIVER BASIN
    2              A      SCS FLOOD CONTROL STRUCTURE                      CATTARAUGUS COUNTY
    3              A                                                       PMF - SNYDER UH
    4              B   100       0      30       0       0       0       0       0       0       0
    5              B1    5
    6              J     1       2       1
    7              J1  0.5       1
    8              K     0       1                                       1
    9              K1                      INFLOW HYDROGRAPH
   10              M     1       1    2.14            2.14                                   1
   11              P            23     111     123     133     142
   12              T                                                    1     0.1
   13              W   2.8   0.625
   14              X     4       4       1
   15              K     1       2                                       1
   16              K1                      ROUTED HYDROGRAPH AT DAM- NO BREACH
   17              Y                               1       1
   18              Y1    1                                          -1490     -1
   19              Y4 1490  1510.8  1523.8  1529.6
   20              Y5    0      31      81    8242
   21              $S 19.6   114.2   288.7     331     391
   22              $E 1490  1510.8  1523.8  1526.3  1529.6
   23              $$ 1490
   24              $D1529.6   3.087     .5     480
   25              K    99
   26              A
   27              A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
END OF NETWORK	

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MODIFIED FOR HONEYWELL APR 79
**********

**********
THIS PROGRAM IS CURRENTLY BEING MODIFIED
TO RUN ON THE DGS HONEYWELL SYSTEM

PLEASE REPORT ANY UNUSUAL OPERATING PROBLEMS
TO MIKE TILLSON (RM. 423) PH: 7-5666
**********

RUN  DATE 09/13/79
                    CONEWANGO CREEK SITE 19  NY 579  DEC # 88-3797     ALLEGHENY RIVER BASIN
                     SCS FLOOD CONTROL STRUCTURE                       CATTARAUGUS COUNTY
                                                                       PMF - SNYDER UH

                                          JOB SPECIFICATION
          NQ      NMIR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
         100         0       30        0        0        0        0        0        0        0
                                    JOPER      NWT    LROPT    TRACE
                                        5        0        0        0

                                MULTI-PLAN ANALYSES TO BE PERFORMED
                                    NPLAN= 1 NRTIO= 2 LRTIO= 1
                    RTIOS=   0.50   1.00

          **********       **********       **********       **********       **********

                                      SUB-AREA RUNOFF COMPUTATION

                                    INFLOW HYDROGRAPH
                          ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                              1       0       0       0       0       0       1       0       0

                                    HYDROGRAPH DATA
               IHYDG     IUHG    TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                   1        1     2.14      0.    2.14      0.      0.       0       1       0

                                      PRECIP DATA
                        SPFE     PMS      R6     R12     R24     R48     R72     R96
                          0.   23.00  111.00  123.00  133.00  142.00     0.      0.
     TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                        LOSS DATA
          LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
              0      0.      0.    1.00      0.      0.    1.00    1.00    0.10      0.      0.

                                  UNIT HYDROGRAPH DATA
                              TP=  2.80    CP=0.63    NTA=  0

                                    RECESSION DATA
                             STRTQ=    4.00    QRCSN=    4.00    RTIOR= 1.00
     APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 6.47 AND R= 5.18 INTERVALS

          UNIT HYDROGRAPH 31 END-OF-PERIOD ORDINATES, LAG=  2.83 HOURS, CP= 0.63  VOL= 1.00
          21      74.     151.     227.     285.     309.     291.     247.     203.     167.
```

21.	70.	131.	227.	285.	309.	291.	247.	203.	167.		
138.	114.	94.	77.	64.	52.	43.	36.	29.	24.		
20.	16.	13.	11.	9.	8.	6.	5.	4.	3.		
3.											

Q

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	0.30	1	0.00	0.	0.00	4.	1.02	1.30	51	0.06	0.01	0.05	17.
1.01	1.00	2	0.00	0.	0.00	4.	1.02	2.00	52	0.06	0.01	0.05	18.
1.01	1.30	3	0.00	0.	0.00	4.	1.02	2.30	53	0.06	0.01	0.05	20.
1.01	2.00	4	0.00	0.	0.00	4.	1.02	3.00	54	0.06	0.01	0.05	22.
1.01	2.30	5	0.00	0.	0.00	4.	1.02	3.30	55	0.06	0.01	0.05	24.
1.01	3.00	6	0.00	0.	0.00	4.	1.02	4.00	56	0.06	0.01	0.05	26.
1.01	3.30	7	0.00	0.	0.00	4.	1.02	4.30	57	0.06	0.01	0.05	28.
1.01	4.00	8	0.00	0.	0.00	4.	1.02	5.00	58	0.06	0.01	0.05	29.
1.01	4.30	9	0.00	0.	0.00	4.	1.02	5.30	59	0.06	0.01	0.05	30.
1.01	5.00	10	0.00	0.	0.00	4.	1.02	6.00	60	0.06	0.01	0.05	31.
1.01	5.30	11	0.00	0.	0.00	4.	1.02	6.30	61	0.18	0.13	0.05	34.
1.01	6.00	12	0.00	0.	0.00	4.	1.02	7.00	62	0.18	0.13	0.05	44.
1.01	6.30	13	0.01	0.	0.01	4.	1.02	7.30	63	0.18	0.13	0.05	63.
1.01	7.00	14	0.01	0.	0.01	4.	1.02	8.00	64	0.18	0.13	0.05	91.
1.01	7.30	15	0.01	0.	0.01	4.	1.02	8.30	65	0.18	0.13	0.05	126.
1.01	8.00	16	0.01	0.	0.01	4.	1.02	9.00	66	0.18	0.13	0.05	165.
1.01	8.30	17	0.01	0.	0.01	4.	1.02	9.30	67	0.18	0.13	0.05	201.
1.01	9.00	18	0.01	0.	0.01	4.	1.02	10.00	68	0.18	0.13	0.05	231.
1.01	9.30	19	0.01	0.	0.01	4.	1.02	10.30	69	0.18	0.13	0.05	256.
1.01	10.00	20	0.01	0.	0.01	4.	1.02	11.00	70	0.18	0.13	0.05	277.
1.01	10.30	21	0.01	0.	0.01	4.	1.02	11.30	71	0.18	0.13	0.05	294.
1.01	11.00	22	0.01	0.	0.01	4.	1.02	12.00	72	0.18	0.13	0.05	308.
1.01	11.30	23	0.01	0.	0.01	4.	1.02	12.30	73	1.02	0.97	0.05	337.
1.01	12.00	24	0.01	0.	0.01	4.	1.02	13.00	74	1.02	0.97	0.05	411.
1.01	12.30	25	0.07	0.	0.07	4.	1.02	13.30	75	1.23	1.18	0.05	549.
1.01	13.00	26	0.07	0.	0.07	4.	1.02	14.00	76	1.23	1.18	0.05	761.
1.01	13.30	27	0.08	0.	0.08	4.	1.02	14.30	77	1.53	1.48	0.05	1042.
1.01	14.00	28	0.08	0.	0.08	4.	1.02	15.00	78	1.53	1.48	0.05	1375.
1.01	14.30	29	0.10	0.	0.10	4.	1.02	15.30	79	1.86	1.81	0.05	1734.
1.01	15.00	30	0.10	0.	0.10	4.	1.02	16.00	80	5.90	5.85	0.05	2185.
1.01	15.30	31	0.13	0.	0.13	4.	1.02	16.30	81	1.43	1.38	0.05	2769.
1.01	16.00	32	0.40	0.21	0.19	8.	1.02	17.00	82	1.43	1.38	0.05	3399.
1.01	16.30	33	0.10	0.05	0.05	21.	1.02	17.30	83	1.12	1.07	0.05	3978.
1.01	17.00	34	0.10	0.05	0.05	40.	1.02	18.00	84	1.12	1.07	0.05	4396.
1.01	17.30	35	0.08	0.03	0.05	62.	1.02	18.30	85	0.09	0.04	0.05	4569.
1.01	18.00	36	0.08	0.03	0.05	83.	1.02	19.00	86	0.09	0.04	0.05	4439.
1.01	18.30	37	0.01	0.	0.01	97.	1.02	19.30	87	0.09	0.04	0.05	4072.
1.01	19.00	38	0.01	0.	0.01	102.	1.02	20.00	88	0.09	0.04	0.05	3612.
1.01	19.30	39	0.01	0.	0.01	96.	1.02	20.30	89	0.09	0.04	0.05	3120.
1.01	20.00	40	0.01	0.	0.01	87.	1.02	21.00	90	0.09	0.04	0.05	2637.
1.01	20.30	41	0.01	0.	0.01	75.	1.02	21.30	91	0.09	0.04	0.05	2200.
1.01	21.00	42	0.01	0.	0.01	64.	1.02	22.00	92	0.09	0.04	0.05	1834.
1.01	21.30	43	0.01	0.	0.01	53.	1.02	22.30	93	0.09	0.04	0.05	1531.
1.01	22.00	44	0.01	0.	0.01	45.	1.02	23.00	94	0.09	0.04	0.05	1282.
1.01	22.30	45	0.01	0.	0.01	38.	1.02	23.30	95	0.09	0.04	0.05	1077.
1.01	23.00	46	0.01	0.	0.01	32.	1.03	0.	96	0.09	0.04	0.05	908.
1.01	23.30	47	0.01	0.	0.01	27.	1.03	0.30	97	0.	0.	0.	768.
1.02	0.	48	0.01	0.	0.01	23.	1.03	1.00	98	0.	0.	0.	650.
1.02	0.30	49	0.06	0.01	0.05	20.	1.03	1.30	99	0.	0.	0.	550.
1.02	1.00	50	0.06	0.01	0.05	18.	1.03	2.00	100	0.	0.	0.	462.
									SUM	26.13	22.42	3.70	60097.
										(664.)	(570.)	(94.)	(1701.76)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4569.	3433.	1223.	599.	59864.
CMS	129.	97.	35.	17.	1695.
INCHES		14.92	21.27	21.69	21.69

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	4.	10.	20.	31.	41.	49.	51.	48.	43.
38.	32.	27.	22.	19.	16.	13.	11.	10.	9.
9.	9.	10.	11.	12.	13.	14.	15.	15.	16.
17.	22.	31.	46.	63.	82.	100.	116.	128.	138.
147.	154.	169.	205.	275.	381.	521.	687.	867.	1093.
1385.	1699.	1987.	2198.	2284.	2219.	2036.	1806.	1560.	1318.
1100.	917.	766.	641.	539.	454.	384.	325.	275.	231.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2284.	1717.	612.	299.	29932.
CMS	65.	49.	17.	8.	848.
INCHES		7.46	10.64	10.84	10.84
MM		189.54	270.17	275.40	275.40
AC-FT		851.	1213.	1237.	1237.
THOUS CU M		1050.	1497.	1526.	1526.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	8.	21.	40.	62.	83.	97.	102.	96.	87.
75.	64.	53.	45.	38.	32.	27.	23.	20.	18.
17.	18.	20.	22.	24.	26.	28.	29.	30.	31.
34.	44.	63.	91.	126.	165.	201.	231.	256.	277.
294.	308.	337.	411.	549.	761.	1042.	1375.	1734.	2185.
2769.	3399.	3978.	4396.	4569.	4439.	4072.	3612.	3120.	2637.
2200.	1834.	1531.	1282.	1077.	908.	760.	650.	550.	462.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4569.	3433.	1223.	599.	59864.
CMS	129.	97.	35.	17.	1695.
INCHES		14.92	21.27	21.69	21.69
MM		379.08	540.34	550.81	550.81
AC-FT		1702.	2427.	2474.	2474.
THOUS CU M		2100.	2993.	3051.	3051.

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HYDROGRAPH ROUTING

ROUTED HYDROGRAPH AT DAM- NO BREACH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.	0.	0.	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.	0.	0.	-1490.	-1

STAGE	1490.00	1510.80	1523.80	1529.60
FLOW	0.	21.00	81.00	8242.00
CAPACITY=	20	11%	20%	---

CAPACITY=	20.	114.	289.	331.	391.
ELEVATION=	1490.	1511.	1524.	1526.	1530.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1490.0	0.	0.	0.	0.	0.	0.	0.

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1529.6	3.1	1.5	480.

STATION 2, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	2.	2.	3.	4.	4.
5.	5.	5.	6.	6.	6.	6.	6.	6.	6.
6.	6.	6.	6.	7.	7.	7.	7.	7.	7.
7.	7.	8.	8.	9.	10.	11.	12.	13.	15.
17.	19.	20.	23.	26.	30.	35.	41.	50.	61.
75.	1287.	1991.	2120.	2273.	2246.	2096.	1875.	1632.	1388.
1162.	968.	808.	676.	567.	478.	404.	342.	289.	243.

STORAGE

20.	20.	20.	20.	20.	20.	20.	20.	20.	20.
20.	21.	21.	21.	21.	21.	21.	21.	21.	21.
21.	21.	21.	21.	21.	21.	21.	22.	22.	22.
22.	22.	22.	23.	24.	25.	27.	29.	31.	32.
34.	35.	36.	37.	38.	36.	38.	39.	39.	39.
39.	39.	39.	39.	40.	40.	40.	40.	41.	41.
42.	42.	43.	44.	46.	49.	52.	56.	60.	65.
71.	76.	82.	89.	98.	110.	127.	151.	181.	219.
268.	303.	312.	313.	315.	315.	313.	310.	307.	304.
302.	299.	297.	296.	295.	293.	293.	292.	291.	291.

STAGE

1490.0	1490.0	1490.1	1490.1	1490.1	1490.1	1490.1	1490.1	1490.2	1490.2
1490.2	1490.2	1490.2	1490.2	1490.2	1490.3	1490.3	1490.3	1490.3	1490.3
1490.3	1490.3	1490.4	1490.4	1490.4	1490.4	1490.4	1490.4	1490.4	1490.4
1490.5	1490.5	1490.5	1490.7	1490.9	1491.2	1491.6	1492.0	1492.4	1492.8
1493.1	1493.4	1493.6	1493.8	1493.9	1494.0	1494.1	1494.2	1494.2	1494.2
1494.3	1494.3	1494.3	1494.4	1494.4	1494.5	1494.5	1494.6	1494.7	1494.7
1494.8	1494.9	1495.1	1495.4	1495.8	1496.4	1497.1	1498.0	1499.0	1500.1
1501.2	1502.4	1503.7	1505.2	1507.2	1509.9	1511.8	1513.5	1515.8	1518.6
1522.2	1524.1	1525.2	1525.2	1525.4	1525.3	1525.2	1525.1	1524.9	1524.7
1524.6	1524.5	1524.3	1524.2	1524.1	1524.1	1524.0	1524.0	1523.9	1523.9

PEAK OUTFLOW IS 2273. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2273.	1628.	485.	234.	23375.
CMS	64.	46.	14.	7.	662.
INCHES		7.08	8.43	8.47	8.47
MM		179.80	214.17	215.07	215.07
AC-FT		808.	962.	966.	966.
THOUS CU M		996.	1186.	1191.	1191.

STATION 2, PLAN 1, RATIO 2

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	2.	2.	3.	4.	5.	6.	7.	8.
9.	10.	11.	11.	12.	12.	12.	12.	13.	13.
13.	13.	13.	13.	13.	13.	13.	14.	14.	14.
14.	15.	15.	16.	17.	19.	21.	24.	27.	30.
33.	36.	40.	44.	49.	56.	66.	79.	1762.	2012.
2600.	3212.	3803.	4274.	4530.	4498.	4200.	3760.	3266.	2776.
2324.	1936.	1616.	1352.	1134.	955.	807.	683.	578.	487.

STORAGE

20.	20.	20.	20.	20.	21.	21.	21.	21.	21.
21.	21.	22.	22.	22.	22.	22.	22.	22.	22.
23.	23.	23.	23.	23.	23.	23.	23.	24.	24.
24.	24.	25.	26.	28.	31.	34.	38.	42.	45.
48.	51.	53.	54.	55.	56.	57.	58.	58.	58.
58.	59.	59.	59.	60.	60.	61.	61.	62.	63.
63.	64.	66.	69.	72.	78.	84.	92.	101.	111.
122.	133.	144.	158.	176.	201.	236.	283.	309.	312.
319.	326.	334.	340.	343.	343.	339.	333.	327.	321.
316.	311.	307.	304.	301.	299.	297.	296.	295.	294.

STAGE

1490.0	1490.1	1490.1	1490.1	1490.2	1490.2	1490.2	1490.3	1490.3	1490.3
1490.4	1490.4	1490.4	1490.5	1490.5	1490.5	1490.6	1490.6	1490.6	1490.6
1490.7	1490.7	1490.7	1490.7	1490.8	1490.8	1490.8	1490.8	1490.9	1490.9
1490.9	1491.0	1491.1	1491.3	1491.8	1492.4	1493.2	1494.0	1494.9	1495.6
1496.3	1496.8	1497.3	1497.6	1497.9	1498.1	1498.3	1498.4	1498.4	1498.5
1498.5	1498.6	1498.6	1498.7	1498.8	1498.9	1499.0	1499.2	1499.3	1499.5
1499.6	1499.9	1500.2	1500.8	1501.6	1502.8	1504.2	1506.0	1508.0	1510.1
1511.4	1512.2	1513.1	1514.1	1515.4	1517.3	1519.9	1523.4	1525.0	1525.2
1525.6	1526.0	1526.4	1526.8	1527.0	1526.9	1526.7	1526.4	1526.1	1525.7
1525.4	1525.1	1524.9	1524.7	1524.5	1524.4	1524.3	1524.2	1524.2	1524.1

PEAK OUTFLOW IS 4530. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4530.	3435.	1105.	532.	53238.
CMS	128.	97.	31.	15.	1508.
INCHES		14.93	19.21	19.28	19.28
MM		379.28	488.03	489.84	489.84
AC-FT		1703.	2192.	2200.	2200.
THOUS CU M		2101.	2704.	2714.	2714.

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FORMULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 0.50	RATIO 2 1.00
HYDROGRAPH AT	1	2.14	1	2284.	4569.
	(	0.00)	(	64.69)(	129.38)(
ROUTED TO	2	2.14	1	2273.	4530.
	(	0.00)	(	64.37)(	128.29)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1490.00	1490.00	1529.60
STORAGE	20.	20.	391.
OUTFLOW	0.	0.	8242.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1525.36	0.	315.	2273.	0.	42.50	0.
1.00	1526.96	0.	343.	4530.	0.	42.50	0.

LIST OF REFERENCES

APPENDIX E

APPENDIX E

REFERENCES

1) U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, May 1961.

2) Soil Conservation Service, National Engineering Handbook, Section 4, Hydrology, August 1972 (U.S. Department of Agriculture).

3) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw-Hill, 1963.

4) T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley and Sons, 1965.

5) W.D. Thornbury, Principles of Geomorphology, John Wiley and Sons, 1969.

6) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.

7) Cornell University Agriculture Experiment Station (compiled by M.G. Cline and R.L. Marshall), General Soil Map of New York State and Soils of New York Landscapes, Information Bulletin 119, 1977.

APPENDIX F

STABILITY ANALYSES

SCS-803 (5-67)

UNITED STATES GOVERNMENT

Memorandum

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

TO : Richard J. Phillips, State Conservation Engineer, SCS, Syracuse, New York 13210

DATE: January 29, 1969

FROM : Lorn P. Dunnigan, Head, Soil Mechanics Laboratory, SCS, Lincoln, Nebraska 68508

SUBJECT: ENG 22-5, New York WP-08, Conewango Creek, Site No. 19 (Cattaraugus County)

ATTACHMENTS

1. Form SCS-354, Soil Mechanics Laboratory Data, 1 sheet.
2. Form SCS-355A & B, Triaxial Shear Test Data, 3 tests, 5 sheets.
3. Form SCS-352, Compaction and Penetration Resistance, 3 sheets.
4. Form SCS-357, Summary - Slope Stability Analysis, 2 sheets.
5. Form SCS-130, Drain Materials, 1 sheet.
6. Investigational Plans and Profiles.

DISCUSSION

FOUNDATION

A. Classification: Bedrock occurs at surface in the stream channel and the lower abutments. Shallow deposits of glacial till occur to depths of 3 feet on the left abutment. High-blow-count glacial till occurs to depths of 20 feet or more in the upper right abutment.

B. Shear Strength: Shear strength of the high-blow-count glacial till foundation materials is expected to be greater than that of the compacted borrow materials.

C. Permeability: Field permeability tests in the gravelly till yielded an average permeability rate of approximately one foot per day.

EMBANKMENT MATERIALS

A. Classification: The glacial till borrow materials generally have 45% to 65% coarse-grained material. Two samples were submitted to the Laboratory. The SC-SM sample, 102.2 (69W852), had 89% passing the 3/4-inch screen, 72% passing the No. 4 screen, and 40% fines. The CL sample 105.1 (69W853) had 89% passing the 3/4-inch screen, 76% passing the No. 4 screen, and 56% fines.

B. Compacted Dry Density: Standard Proctor compaction tests (ASTM D698, Method A) on the minus No. 4 fractions of the two samples above give dry densities of 126.5 pcf for the SC-SM sample and 125.0 pcf for the CL sample. A standard Proctor test on the minus 3/4-inch fraction of the SC-SM sample 102.2 (69W852) yielded a dry density of 129.0 pcf.

C. Shear Strength: Consolidated undrained triaxial shear tests were made on the minus No. 4 material and the minus 3/4-inch material of the SC-SM sample, 102.2 (69W852). The 1.4-inch triaxial test specimens on minus No. 4 material were molded at optimum moisture content to 95% Standard density and soaked for 7 days to saturate. Moisture contents when shear tested were approximately 87% of theoretical saturation. Total stress shear parameters of $\phi = 23.5°$ and $c = 800$ psf were interpreted from the test data.

The 4-inch test specimens of the minus 3/4-inch material were molded to 95% of Standard density. The materials were molded with moisture contents that were 100% of theoretical saturation. The shear test data for the 4-inch specimens with an average density of 125.2 pcf were interpreted to give saturated total stress shear parameters of $\phi = 24°$ and $c = 250$ psf. Effective stress parameters of $\bar{\phi} = 35°$ and $\bar{c} = 75$ psf were determined using the pore pressures measured in the test.

The material at 95% of Standard density had insufficient strength for the proposed 70-foot high dam so additional shear testing was done on 4-inch specimens of minus 3/4-inch material at 100% of Standard density. The shear test data for the 4-inch specimens with average dry densities of 129.2 pcf were interpreted to give saturated total stress shear parameters of $\phi = 30°$ and $c = 425$ psf. Effective stress shear parameters were $\bar{\phi} = 34.5°$ and $\bar{c} = 375$ psf.

D. Consolidation: Average consolidation potential of the gravelly till materials, compacted to 100% of Standard density on the minus 3/4-inch fraction, is estimated to be approximately 3% for the 64-foot high maximum section.

STABILITY ANALYSIS

Stability of the proposed embankment was checked using the SCS computer program. Embankment-only analyses of the maximum section were considered sufficient. The full drawdown analysis of the 3:1 upstream slope, using the shear parameters of $\phi = 24°$ and $c = 250$ psf for material compacted to 95% of Standard density on the minus 3/4-inch fraction, gave a minimum safety factor of only 1.24. Shear parameters of $\phi = 30°$ and $c = 425$ psf gave a minimum safety factor of 1.75 for the same analysis for the minus 3/4-inch material compacted to densities of 100% of Standard.

The downstream 2 1/2:1 slope with a drain at $c/b = 0.6$ gave a minimum safety factor of 1.33 for minus 3/4-inch material at 95% of Standard density. The downstream slope analysis was not made for material compacted to 100% of Standard density; however, a safety factor well over 1.5 would be obtained using the shear parameters for the minus 3/4-inch fraction at 100% Standard.

3 -- Richard J. Phillips -- 1/29/69
Lorn P. Dunnigan
Subj: ENG 22-5, New York WP-08, Conewango Creek, Site No. 19

RECOMMENDATIONS

A. Site Preparation: The Laboratory concurs with the field recommendations of clearing all loose and weathered rock from the base of the dam on the exposed bedrock of the floodplain.

B. Centerline Cutoff: The Laboratory concurs with the field recommendations of a cutoff to sound bedrock in the left abutment and a 5-foot deep cut-off in the right abutment. A bottom width of 20 feet is recommended in the left abutment cutoff below the permanent pool elevation, and a bottom width of 10 feet in the right abutment cutoff.

C. Drainage: A 6 to 8-foot deep trench drain with perforated pipe is recommended at c/b = 0.6 on the right abutment up to elevation 1500.0 to relieve seepage pressures in the coarse, gravelly till and weathered bedrock. A shallow trench drain is suggested below permanent pool elevation in the left abutment and on the bedrock across the floodplain.

The base materials as represented by Sample 2.1 are broadly graded so the filter limits can be quite coarse. A steeply graded drain material is needed to avoid segregation in placing the drain and to insure adequate capacity. ASTM Road Aggregate No. 78 is suggested for the drain material. See attached Form SCS-130 for gradations.

D. Embankment Design: The following are recommended:

1. Provide a homogeneous embankment of gravelly till materials. Control embankment density on the minus 3/4-inch fraction. Compact to a minimum density of 100% of Standard (ASTM D698, Method C) to provide adequate strength. Place with moisture contents at or near optimum to obtain the lowest permeability and the most flexibility.

2. Provide 3:1 upstream slopes with a 10-foot berm at the permanent pool elevation.

3. Provide a 2 1/2:1 downstream slope.

4. Provide an overfill of 2.0 feet across the floodplain to compensate for residual embankment settlement after construction is complete.

Prepared by:

Edgar F. Steele

Reviewed and Approved by:

Lorn P. Dunnigan

Attachments

cc: Richard J. Phillips (1)
B. S. Ellis, Syracuse, N. Y.
Jesse S. Wicks, Little Valley, N.Y.(2)
Neil F. Bogner, Upper Darby, Pa.

Form SCS 357
Rev. 6-65

MATERIALS TESTING REPORT | U.S. DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE | SUMMARY - SLOPE STABILITY ANALYSIS

PROJECT and STATE: [illegible] STATE HIGHWAY CIRCLE [illegible]

METHOD OF ANALYSIS: SWEDISH CIRCLE

ANALYZED AT: [illegible]

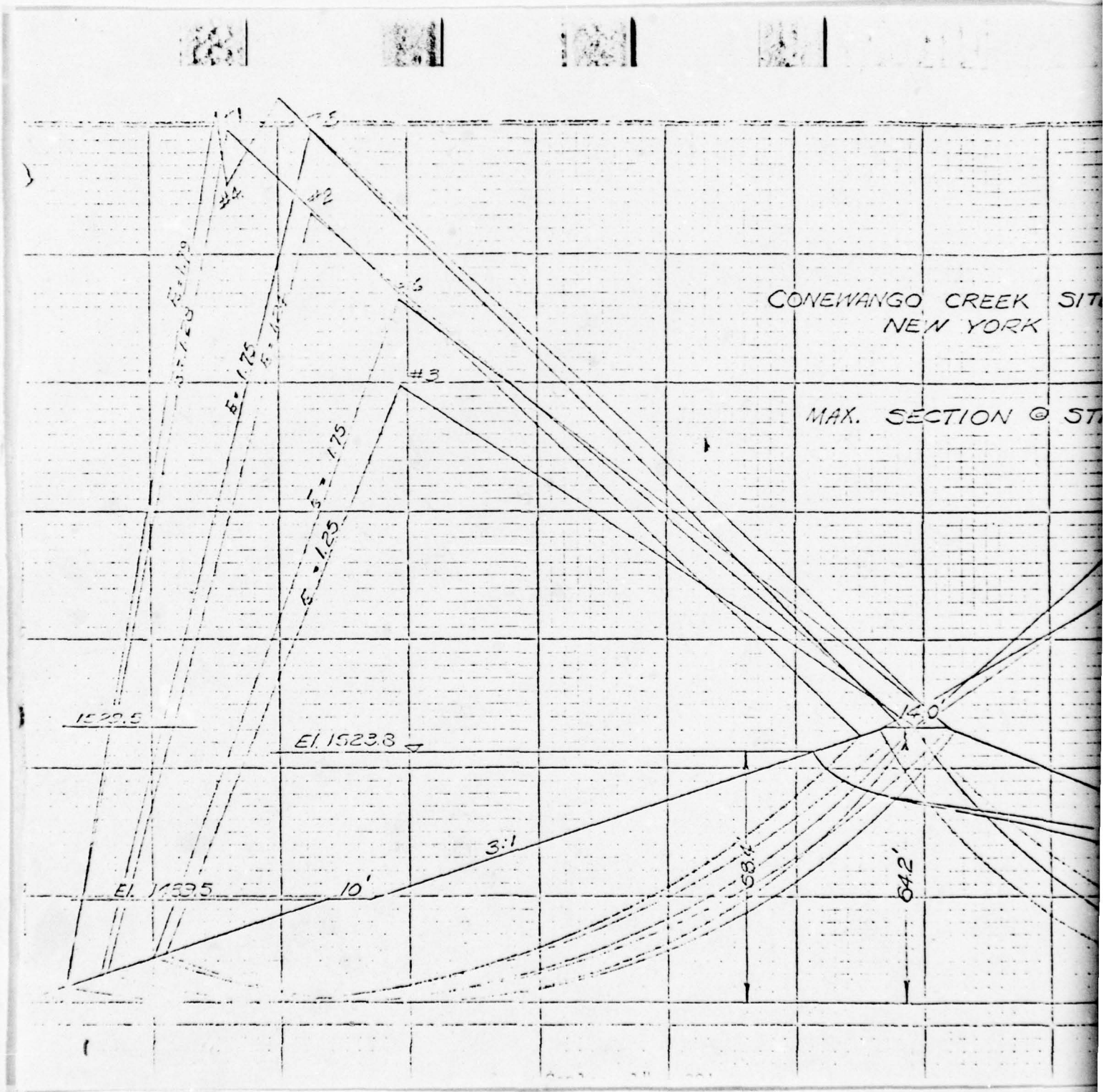
APPROVED BY:

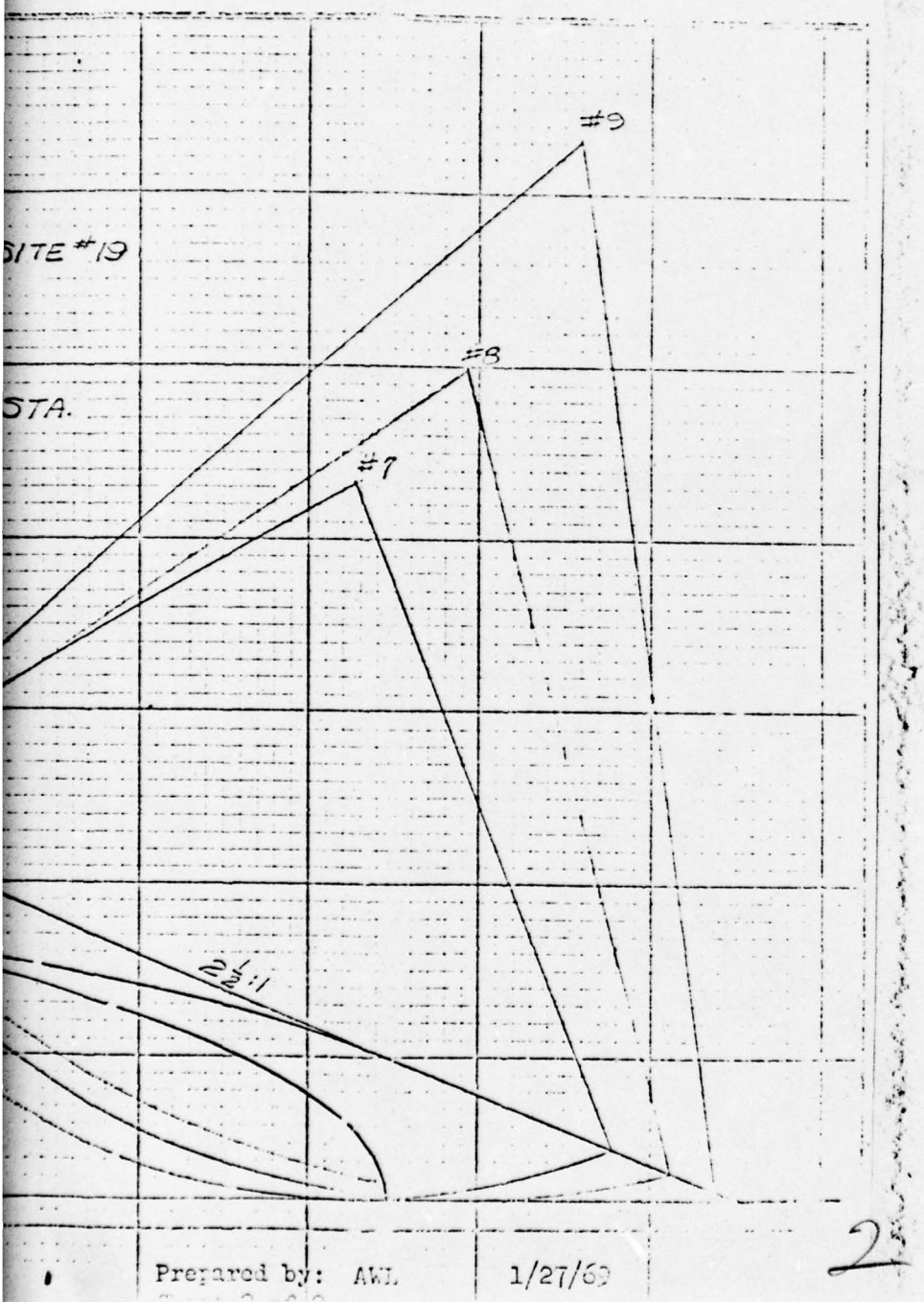
DATE:

	SOURCE AND USE OF MATERIALS	CLASSIFICATION	ADOPTED DESIGN DATA: γ_d (pcf)	γ_m (pcf)	γ_{sat} (pcf)	γ_{sub} (pcf)	ϕ (deg)	tan ϕ	c (psf)	REMARKS
①	< #4 Embank.	SC-SM	120.3	132.0	137.0	74.5	23.5	0.435	220	- CU
②	19" > #4 → Embank.	SC-SM	127.5	133.5	143.2	82.5	24	0.445	250	- CU B
③	→ Embank.	SC-SM	"	"	"	"	35	0.700	75	- CU C
④	19" > #4 → Embank.	SC-SM	132.5	144.2	146.0	235	32	0.577	425	- CU
⑤	→ Embank	SC-SM	"	"	"	"	34.5	0.637	375	- CU B
⑥										
⑦										
⑧										

TRIAL NO.		SLOPE	MAXIMUM SECTION CONDITIONS	F_s
1	Up	3:1	Full drawdown - 10' berm @ elev. 1433.5 - Arc cut thru emb (22°-252) only	1.23
2	Up	3:1	Same conditions as trial #1.	1.24
3	Up	3:1	Same conditions as trial #1.	1.25
4	Up	3:1	Same conditions as trial #1 but emb (30°-225) only.	1.79
5	Up	3:1	Same conditions as trial # 4.	1.75
6	Up	3:1	Same conditions as trial #4.	1.75
7	Do	2½:1	No drain - No berm - Arc cut thru emb (22°-252) only.	1.10
7A	Do	2½:1	Same conditions as trial #7 but drain @ c/b = 0.6	1.33
8	Do	2½:1	Same conditions as trial #7.	1.27
8A	Do	2½:1	Same conditions as trial #7 but drain @ c/b = 0.6.	1.34
9	Do	2½:1	Same conditions as trial # 7.	1.09

Sheet 1 of 2


CONEWANGO CREEK SIT
NEW YORK
MAX. SECTION @ ST
#1
#2
#3
#4
#5
5'-1.75
5'-1.25
5'-1.25
El. 1529.5
El. 1523.8
El. 1519.5
10'
3:1
14.0'
58.4'
64.2'



Prepared by: AWL 1/27/69

2

APPENDIX G

DRAWINGS

Room 422

Robert F. Flacke,

September 6, 1979

Mr. Lloyd E. Thomas
State Conservation Engineer
Soil Conservation Service
U.S. Department of Agriculture
771 Federal Building
100 South Clinton Street
Syracuse, New York 13200

Re: Conewango Creek Watershed
Project Site 19 Dam
DEC #8B-3797
Alleghany River Basin

Dear Mr. Thomas:

In accordance with this Department's Dam Safety Inspection Program and the Federal Inspection Program, an inspection of Conewango Creek Watershed Project Site 19 Dam was conducted on August 28, 1979. Those in attendance were Stephen Yorton, Soil Conservation Service, Dexter Case, Soil Conservation Service, Robert McCarty, Department of Environmental Conservation, and Kenneth Harmer, Department of Environmental Conservation.

A Phase I report will be completed and sent to you in November 1979.

Our concern at this time is the concentrated seepage and erosion which is occurring at the interface between the earth embankment and the left abutment. This leakage, if coming through the structure, could lead to serious erosion under high head conditions.

This office, therefore, requests that you investigate the problem and take the necessary remedial measures as soon as possible, during this construction season. In the interim, you are required to monitor the areas of concentrated seepage during periods of heavy runoff to determine if piping is occurring under high reservoir conditions.

Please feel free to call either myself or Mr. Harmer if you should have any questions regarding the above. Telephone (518) 457-5557.

We would appreciate being informed of actions taken in this matter.

Thank you

Sincerely,

Robert McCarty
Senior Civil Engineer
Dam Safety Section

cc: Mr. Henry Stamatel
Mr. Stephen C. Yorton
Mr. Donald Crowell

RM:kf

United States Department of Agriculture
Soil Conservation Service
771 Federal Building
100 S. Clinton Street
Syracuse, NY 13260

September 13, 1979

Mr. George Koch
Senior Civil Engineer
Dam Safety Section
NYS Department of
Environmental Conservation
50 Wolf Road
Albany, NY 12233

Re: EN-12- Conewango Creek Watershed - Site 19

Dear George:

We are in receipt of a letter from your office dated 9/6/79 from Mr. Robert McCarty. As a result of the telephone conversation between Mr. McCarty and Donald Lake of our office, I inspected the above site on September 6th and Donald Lake and Harry Hirth inspected the site September 7th.

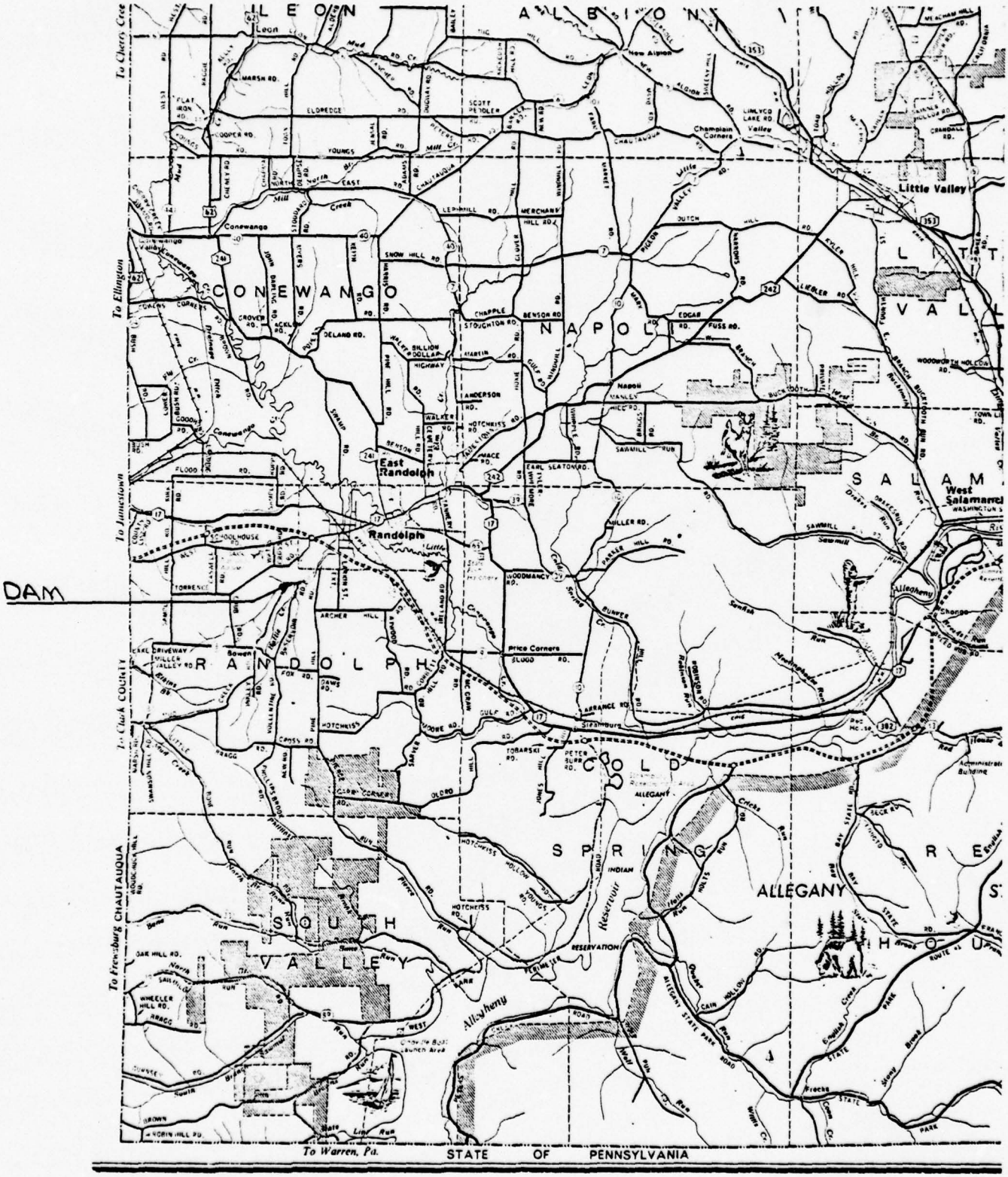
At the time of these inspections there was no concentrated seepage seen on the downstream left embankment abutment interface, though seepage through the shale on the left abutment further downstream was evident. This site will be monitored periodically and specifically at times of heavy runoff which can create high head conditions.

The gully eroded on the embankment near the left abutment will be repaired, the constricted area at the downstream end of the plunge pool will be cleaned out, the outlets of the drain pipes will be cleaned out and disturbed areas will be vegetated. This work will be accomplished by the local sponsors under operations and maintenance in the near future.

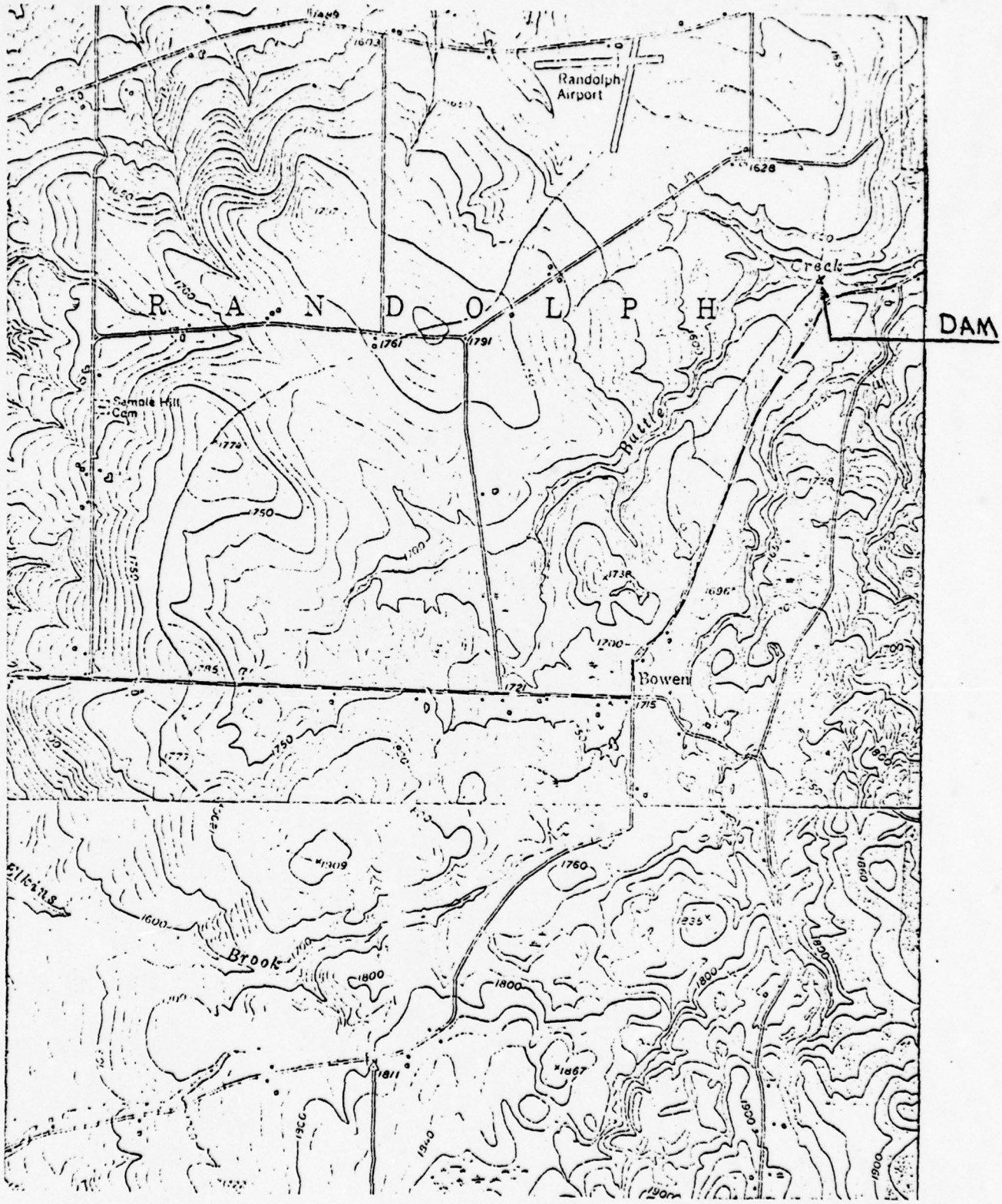
Sincerely,

Lloyd E. Thomas
State Conservation Engineer

cc: Henry Stamatel, Asst. STC, WR
D. Clark, DC
W. Wittmann, AC
D. Shields



VICINITY MAP



TOPOGRAPHIC MAP

List of Drawings

Conewango Creek Watershed Project Site 19

	Drawing Number
Plan of Storage Area	2
Plan of Structural Works	3
Cutoff Trench Excavation	4
Emergency Spillway	5
Fill Placement & Principal Spillway Excavation	6
Drainage System	7 & 8
Plan Profile of Principal Spillway	9
Riser Structural Details	10
Conduit Details	15
Log of Test Holes	17 & 18

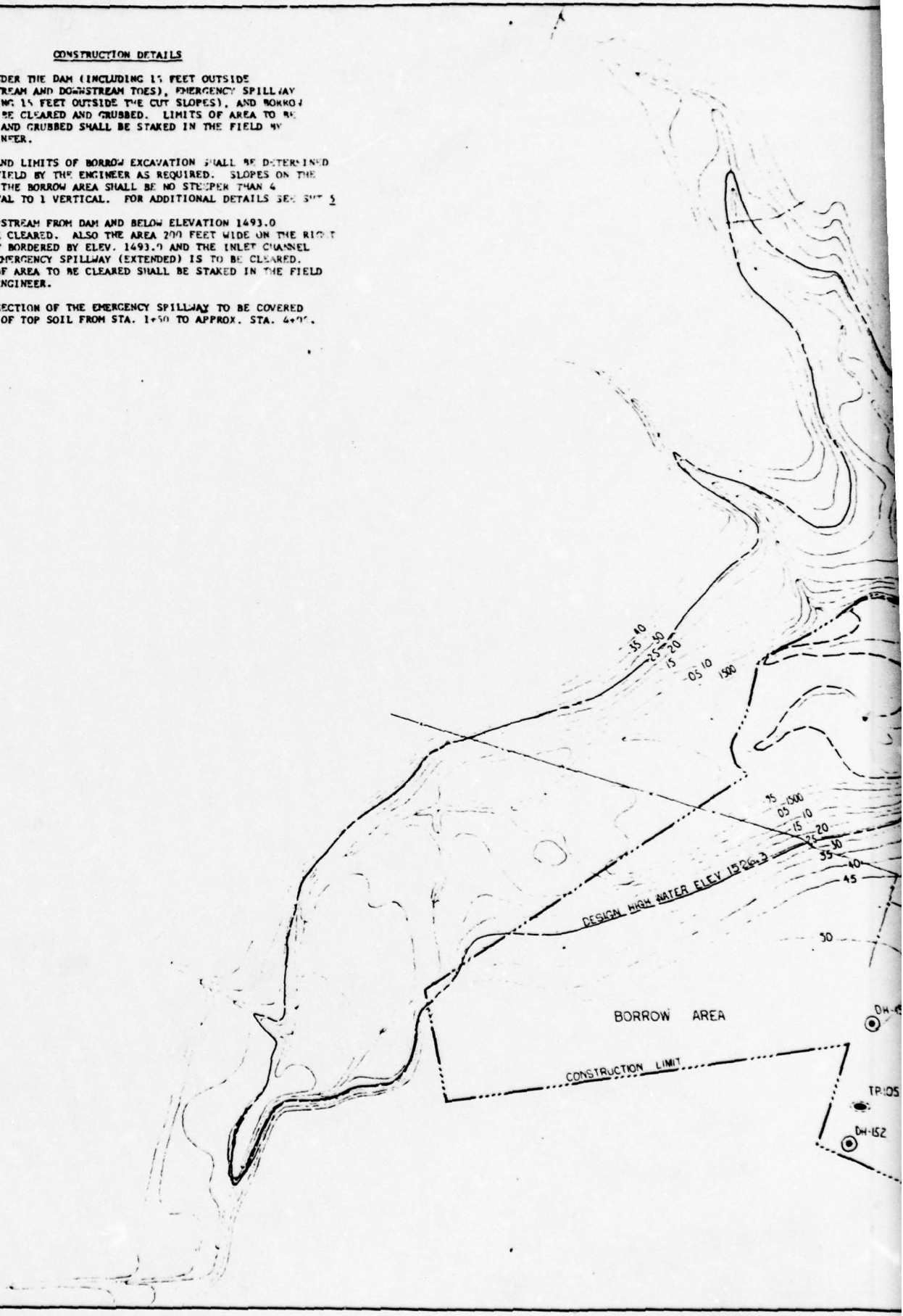
CONSTRUCTION DETAILS

1. AREAS UNDER THE DAM (INCLUDING 15 FEET OUTSIDE THE UPSTREAM AND DOWNSTREAM TOES), EMERGENCY SPILLWAY (INCLUDING 15 FEET OUTSIDE THE CUT SLOPES), AND BORROW AREA TO BE CLEARED AND GRUBBED. LIMITS OF AREA TO BE CLEARED AND GRUBBED SHALL BE STAKED IN THE FIELD BY THE ENGINEER.

2. DEPTHS AND LIMITS OF BORROW EXCAVATION SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER AS REQUIRED. SLOPES ON THE EDGE OF THE BORROW AREA SHALL BE NO STEEPER THAN 4 HORIZONTAL TO 1 VERTICAL. FOR ADDITIONAL DETAILS SEE SHT 5

3. AREAS UPSTREAM FROM DAM AND BELOW ELEVATION 1493.0 SHALL BE CLEARED. ALSO THE AREA 200 FEET WIDE ON THE RIGHT ABUTMENT BORDERED BY ELEV. 1493.0 AND THE INLET CHANNEL OF THE EMERGENCY SPILLWAY (EXTENDED) IS TO BE CLEARED. LIMITS OF AREA TO BE CLEARED SHALL BE STAKED IN THE FIELD BY THE ENGINEER.

4. BOTTOM SECTION OF THE EMERGENCY SPILLWAY TO BE COVERED WITH 6" OF TOP SOIL FROM STA. 1+50 TO APPROX. STA. 4+9[illegible].

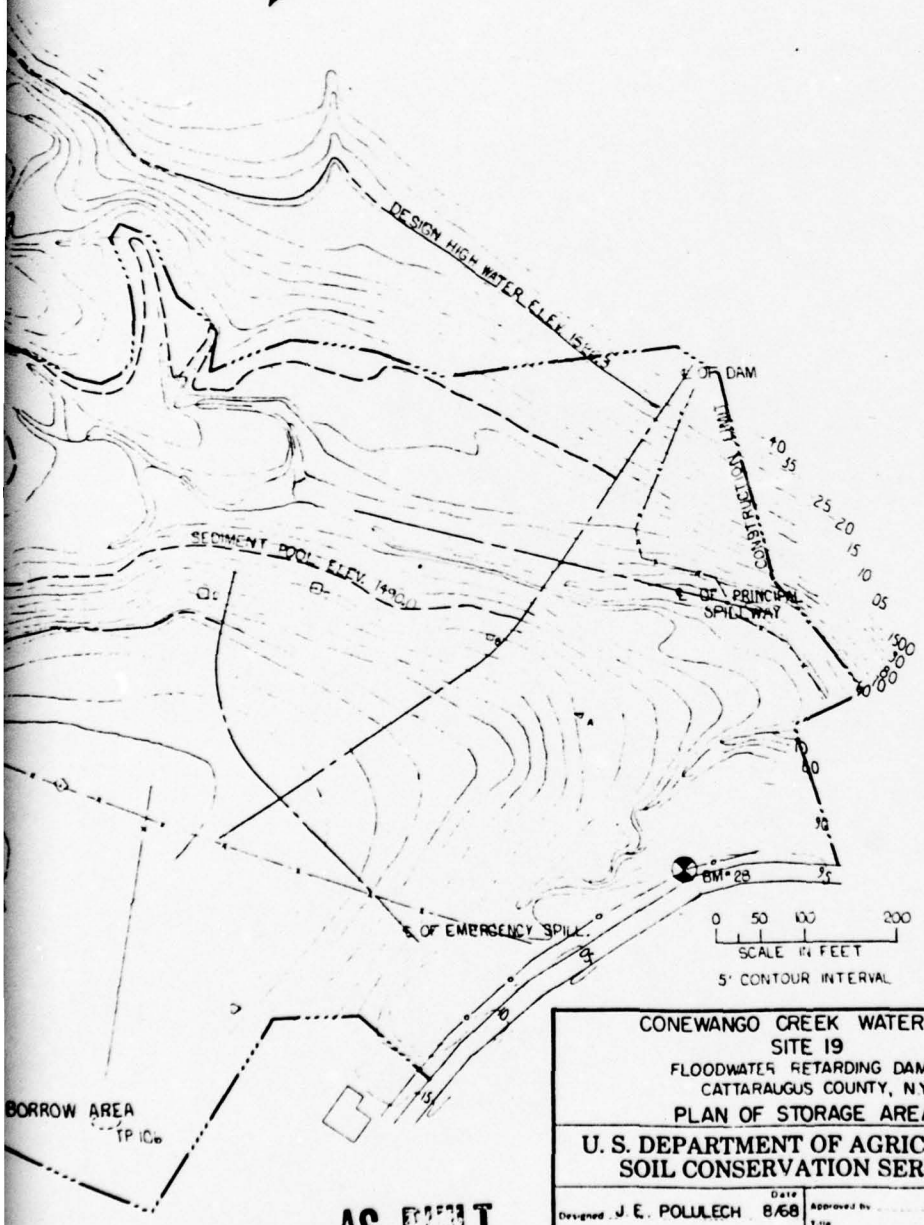


LEGEND
SEE SHEET 1

N

SOILS DETAILS

SEE SHEETS 17 & 18 FOR DESCRIPTIONS OF TEST PITS AND DRILL HOLES SHOWN ON SHEETS 2, 3, 4, 5, 6, 7, & 9



0 50 100 200
SCALE IN FEET
5' CONTOUR INTERVAL

CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, N.Y.
PLAN OF STORAGE AREA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

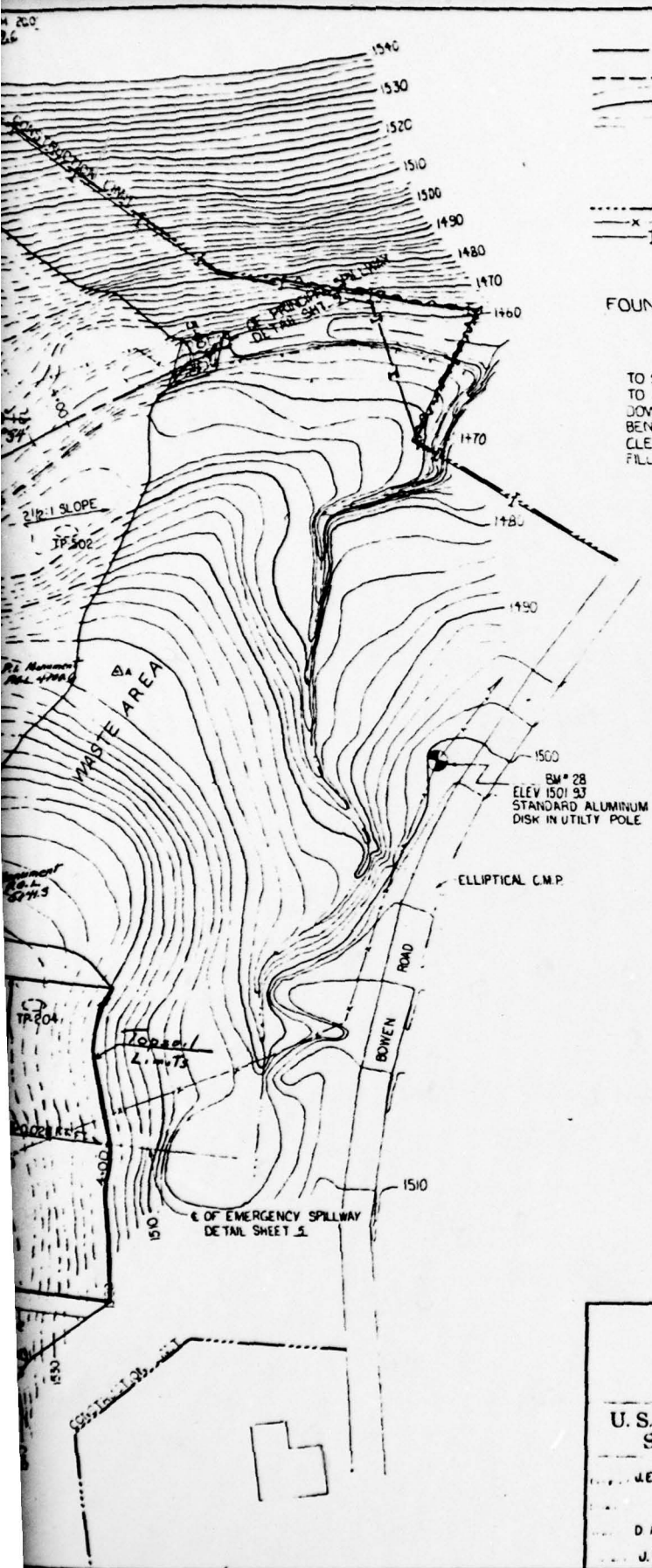
Designed	J. E. POLULECH	8/68	Approved by
Drawn			Title
Traced	W. GRAJKO	8/68	Title
Checked	J. E. P.	2/69	Sheet No. 2 of 19 — Drawing No. NY-2169-P

AS BUILT
9/25/71

Pg. 2

SCS-313 (9-64) -C


℄ OF DAM, TOP WIDTH 20.0'
ELEV. 1529.6
DESIGN HIGH WATER ELEV. 1528.2
CONSTRUCTION LIMIT, ELEV. 1493.0
SEDIMENT POOL ELEV. 1490.0
ELEV. 1489.0
ELEV. 1489.5
3:1 SLOPE
CURVE II
CURVE I
R=26.5
R=18.5
DH-35
DH-36
DH-37
DH-38
DH-39
DH-251
DH-252
DH-253
TP-201
TP-202
TP-203
TP-601
TP-103
TP-102
℄ OF 50' LEVEL SECTION
ELEV. 1523.8
SEDIMENT POOL ELEV. 1490.0
DESIGN HIGH WATER ELEV. 1526.2



LEGEND

- DESIGN HIGH WATER
- SEDIMENT POOL
- ℄ OF STREAM
- 1520 – CONTOUR LINES
- ROAD
- BENCH MARK
- TRAVERSE STATIONS
- DRILL HOLES
- TEST PIT (LOGGED & SAMPLED)
- TEST PIT (LOGGED ONLY)
- CONSTRUCTION LIMIT
- FENCE LINE (EXISTING)
- FENCE LINE (PLANNED)

FOUNDATION EXCAVATION DETAILS

SHAPE RIGHT ABUTMENT TO SLOPES NO STEEPER THAN TWO (2) HORIZONTAL TO ONE (1) VERTICAL, 200FT UPSTREAM AND 180FT DOWNSTREAM FROM ℄ OF DAM. REMOVE ALL ROCK BENCHES AND OVERHANGS TO PROVIDE A SMOOTH, CLEAN SURFACE FOR PLACEMENT OF COMPACTED FILL. SEE SHEET 4.

LAYOUT DATA CURVE I

Δ 52°39'	T = 91.57
R = 185	E = 21.42
D = 30°58'	M = 19.20
L = 170	

℄ STATION	DEFLECTION	℄ CHORD DIST.
2+00	0°00'	0.00
1+75	3°52'	24.98
1+50	7°45'	24.98
1+25	11°37'	24.98
1+00	15°29'	24.98
0+75	19°21'	24.98
0+50	23°14'	24.98
0+30	26°20'	19.98

LAYOUT DATA CURVE II

Δ = 21°47'	T = 50.65
R = 263	E = 4.83
D = 21°47'	M = 4.74
L = 100	

℄ STATION	DEFLECTION X	CHORD DIST.
3+50	0°00'	0.00
3+75	2°43'	24.99
4+00	5°27'	24.99
4+25	8°10'	24.99
4+50	10°54'	24.99

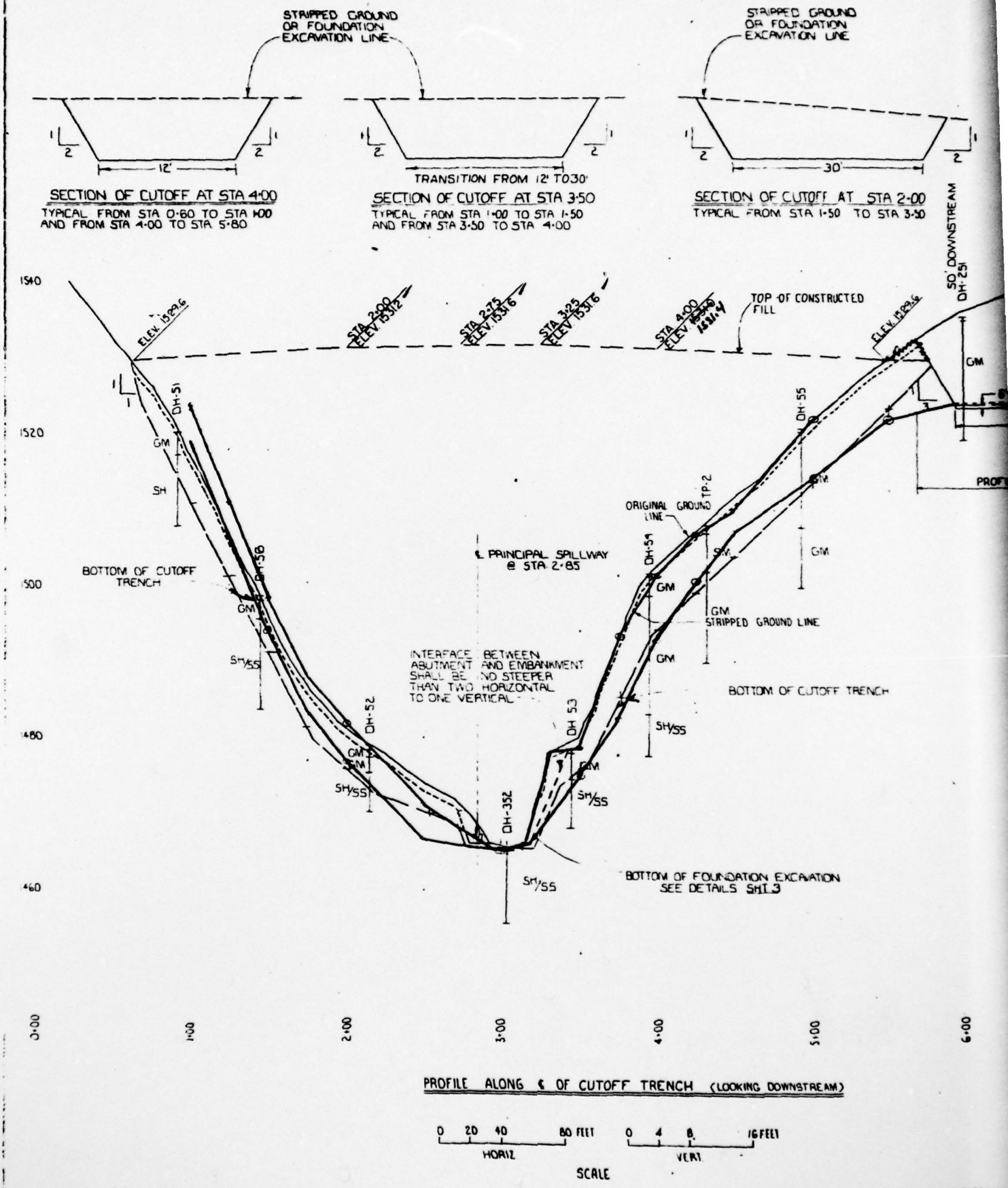
AS BUILT
9/25/91

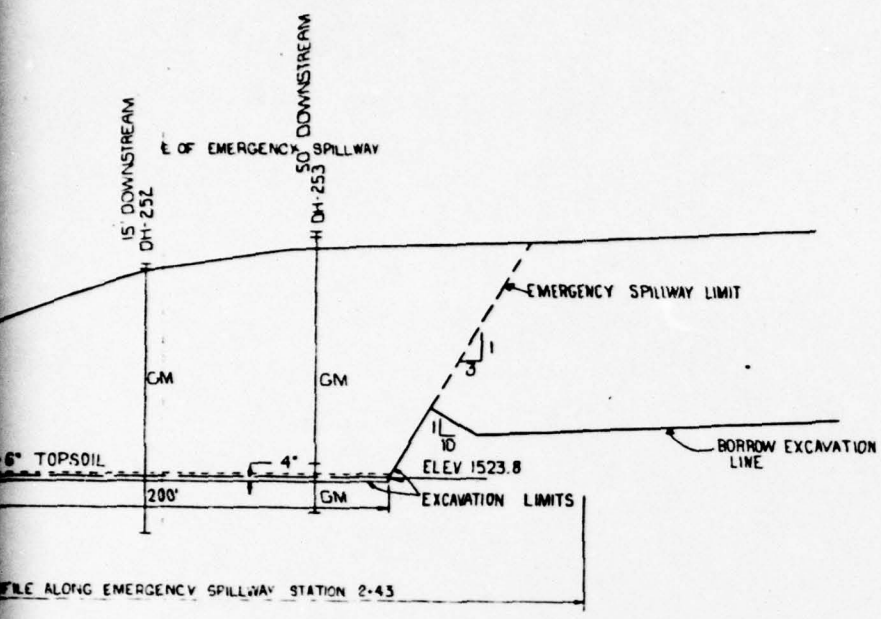
0 25 50 100
SCALE IN FEET
2' CONTOUR INTERVAL

CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, N.Y.
PLAN OF STRUCTURAL WORKS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date	Approved by / Title / Date
J.E. POLULECH	7/68	
D ANGELO	7/66	
J.E.P.	2/69	Sheet No. 3 of 19 — Drawing No. NY-2169-P


STRIPPED GROUND OR FOUNDATION EXCAVATION LINE
12'
SECTION OF CUTOFF AT STA 4·00
TYPICAL FROM STA 0·60 TO STA 1·00 AND FROM STA 4·00 TO STA 5·80
TRANSITION FROM 12' TO 30'
SECTION OF CUTOFF AT STA 3·50
TYPICAL FROM STA 1·00 TO STA 1·50 AND FROM STA 3·50 TO STA 4·00
30'
SECTION OF CUTOFF AT STA 2·00
TYPICAL FROM STA 1·50 TO STA 3·50
50' DOWNSTREAM
DH-291
1540
1520
1500
1480
1460
ELEV. 1529.6
STA 2·00 ELEV 1531.2
STA 2·75 ELEV 1531.6
STA 3·25 ELEV 1531.6
STA 4·00 ELEV 1531.4
TOP OF CONSTRUCTED FILL
ELEV. 1529.6
GM
SH
SH/SS
DH-51
DH-58
DH-52
DH-352
DH-53
DH-54
DH-55
BOTTOM OF CUTOFF TRENCH
ORIGINAL GROUND LINE
TP-2
℄ PRINCIPAL SPILLWAY @ STA 2·85
GM STRIPPED GROUND LINE
INTERFACE BETWEEN ABUTMENT AND EMBANKMENT SHALL BE NO STEEPER THAN TWO HORIZONTAL TO ONE VERTICAL
BOTTOM OF FOUNDATION EXCAVATION SEE DETAILS SHT 3
0·00
1·00
2·00
3·00
4·00
5·00
6·00
PROFILE ALONG ℄ OF CUTOFF TRENCH (LOOKING DOWNSTREAM)
0 20 40 80 FEET
HORIZ
0 4 8 16 FEET
VERT
SCALE



CUTOFF TRENCH CONSTRUCTION DETAILS

1 EXCAVATE INTO FIRM BEDROCK WHERE TRENCH BOTTOMS ON BEDROCK ALL EXPOSED ROCK IN THE BOTTOM OF TRENCH SHALL BE THOROUGHLY CLEANED OF LOOSE MATERIAL PRIOR TO THE BACKFILLING OPERATION.

2 FINAL DEPTH OF TRENCH TO BE DETERMINED BY THE ENGINEER AT THE TIME OF CONSTRUCTION

AS BUILT
9/25/91

CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
CUTOFF TRENCH EXCAVATION

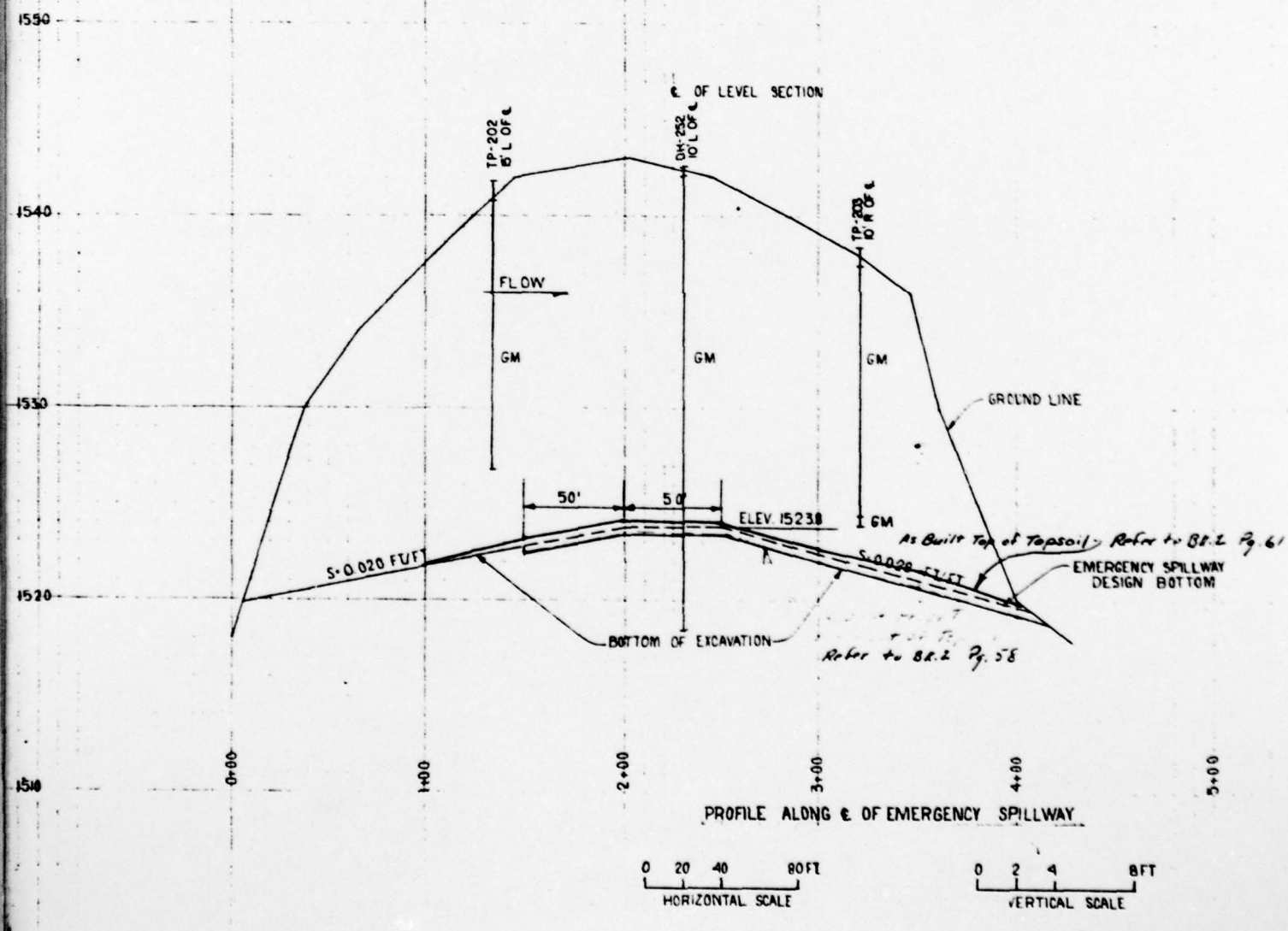
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

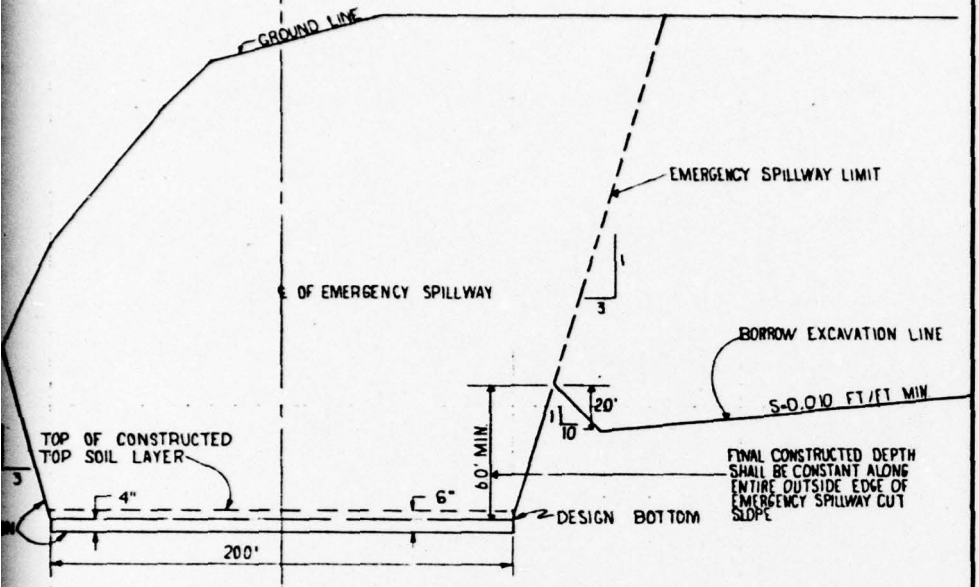
J.E POLULECH 7/68

W. GRAJKO JR 2/67

Pg. 1

JE POLULECH 2/69 4/19 NY-2169-P


1550
1540
1530
1520
1510
℄ OF LEVEL SECTION
TP-202
6' L OF ℄
DH-252
10' L OF ℄
TP-203
0' R OF ℄
FLOW
GM
GM
GM
GM
GROUND LINE
50'
50'
ELEV 1523.8
S=0.020 FT/FT
S=0.020 FT/FT
As Built Top of Topsoil - Refer to Bk.2 Pg.61
EMERGENCY SPILLWAY
DESIGN BOTTOM
BOTTOM OF EXCAVATION
Refer to Bk.2 Pg.58
0+00
1+00
2+00
3+00
4+00
5+00
PROFILE ALONG ℄ OF EMERGENCY SPILLWAY
0 20 40 80FT
HORIZONTAL SCALE
0 2 4 8FT
VERTICAL SCALE
EXCAVATION
LIMITS



SECTION OF EMERGENCY SPILLWAY AT STATION 2+00

TYPICAL FROM STATION 1+50 TO APPROX STATION 4+05
EXCAVATION LIMITS TO DESIGN BOTTOM FROM APPROX STATION 0+05 TO STATION 1+50.

AS BUILT
9/25/71

CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, N.Y.
EMERGENCY SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

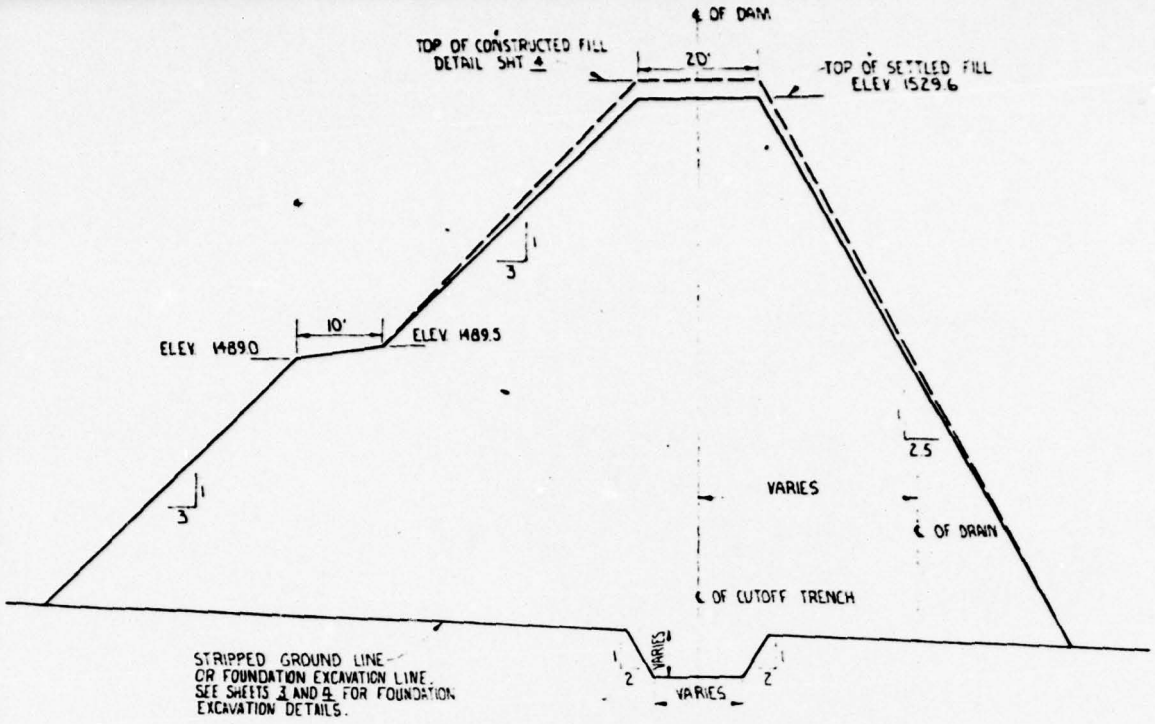
J.E. POLULECH	8/68	
B. BROSTEK	8/68	

Pg. 5

5 / 19 NY-2169-P

FORM SCS - 315 (NOV. 1955)

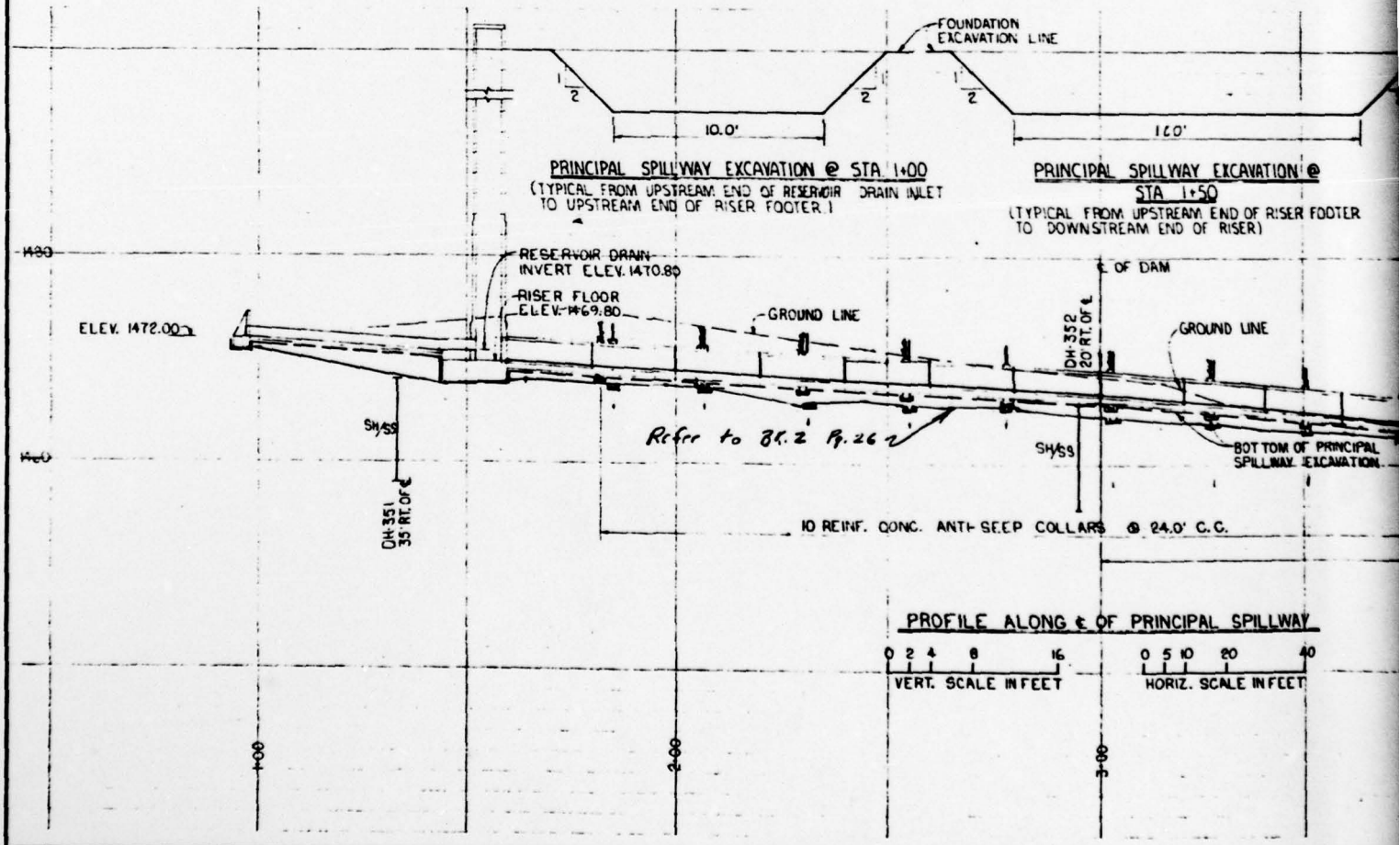
6+00



SECTION OF DAM AT STA 2+00

TYPICAL FROM APPROX. STA 0+62 TO STA 5+50

NOT TO SCALE

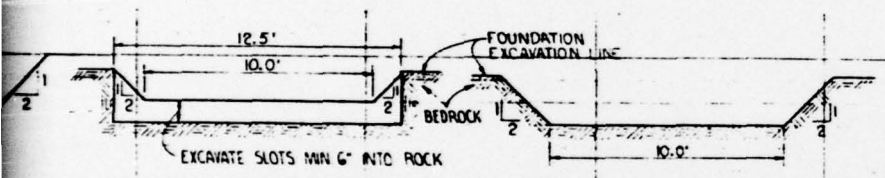


EARTH FILL REQUIREMENTS

MATERIAL [1]	MAX ROCK SIZE [2]	MAX LIFT THICK [3]	MIN REQUIRED WATER CONTENT [4]	COMPACTION [5]	
				CLASS	DEFINITION
'B' AS USED BY: 102 FROM 0.6' TO 12.5' 103 FROM 1.0' TO 13.0' 105 FROM 10.0' TO 14.0' 201 FROM 0.6' TO 15.0' 202 FROM 1.0' TO 15.0'	6"	9"	2 PERCENTAGE POINTS BELOW OPTIMUM	A	100 % OF MAXIMUM DENSITY BY ASTM D-698 METHOD C

SEE SHEET 17 FOR DESCRIPTION AND LOCATION OF MATERIALS B & C.
MAXIMUM ROCK SIZE PLACED IN BACKFILL COMPACTED BY MEANS OF HAND TAMPING OR MANUALLY DIRECTED POWER TAMPERS OR PLATE VIBRATORS SHALL BE 3 INCHES.
MAXIMUM LIFT THICKNESS PRIOR TO COMPACTION.
WATER CONTENT AT TIME OF COMPACTION.
FOR TYPICAL COMPACTION CURVE SEE SHEET 19

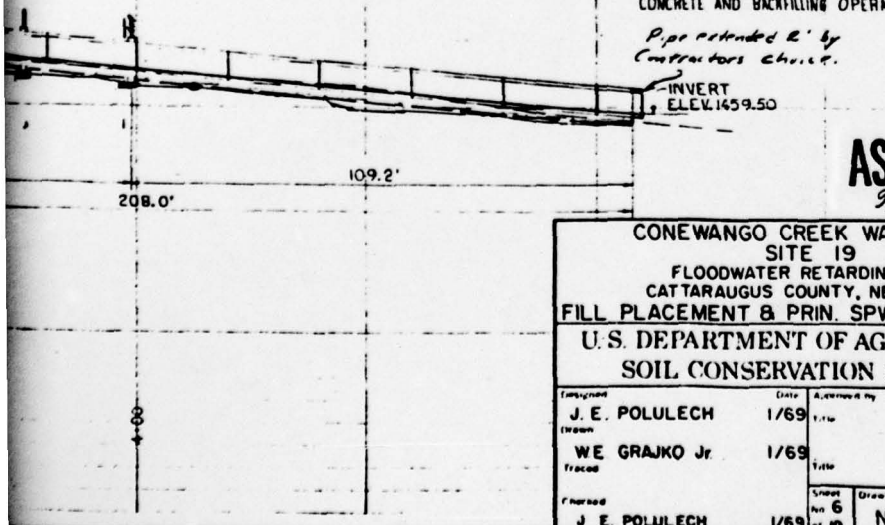
CONSTRUCTION DETAILS
1. THE FOUNDATION SURFACE THROUGHOUT THE BASE AREA OF THE DAM SHALL BE SCARIFIED (EXCEPT WHERE FOUNDATION IS BEDROCK) TO A DEPTH OF 6 INCHES AND COMPACTED PRIOR TO PLACEMENT OF MATERIAL.
2. TOP SOIL THAT IS SUITABLE FOR USE AND NOT USED ON THE SPECIFIED AREA OF THE EMERGENCY SPILLWAY SHALL BE INCORPORATED WITHIN THE SLOPES OF THE EARTH FILL AS DIRECTED BY THE ENGINEER



PRINCIPAL SPILLWAY EXCAVATION SECTION @ ANTI-SEEP COLLARS

PRINCIPAL SPILLWAY EXCAVATION @ STA 3+00
(TYPICAL FROM DOWNSTREAM END OF RISER TO OUTLET END OF 24" DIA PIPE)

PRINCIPAL SPILLWAY EXCAVATION DETAILS
1 EXCAVATE TO GRADE THROUGH WEATHERED ROCK ALONG PRINCIPAL SPILLWAY.
2 ALL ROCK IN THE BOTTOM OF THE TRENCH SHALL BE THOROUGHLY CLEARED OF LOOSE MATERIAL PRIOR TO PLACEMENT OF CONCRETE AND BACKFILLING OPERATION.

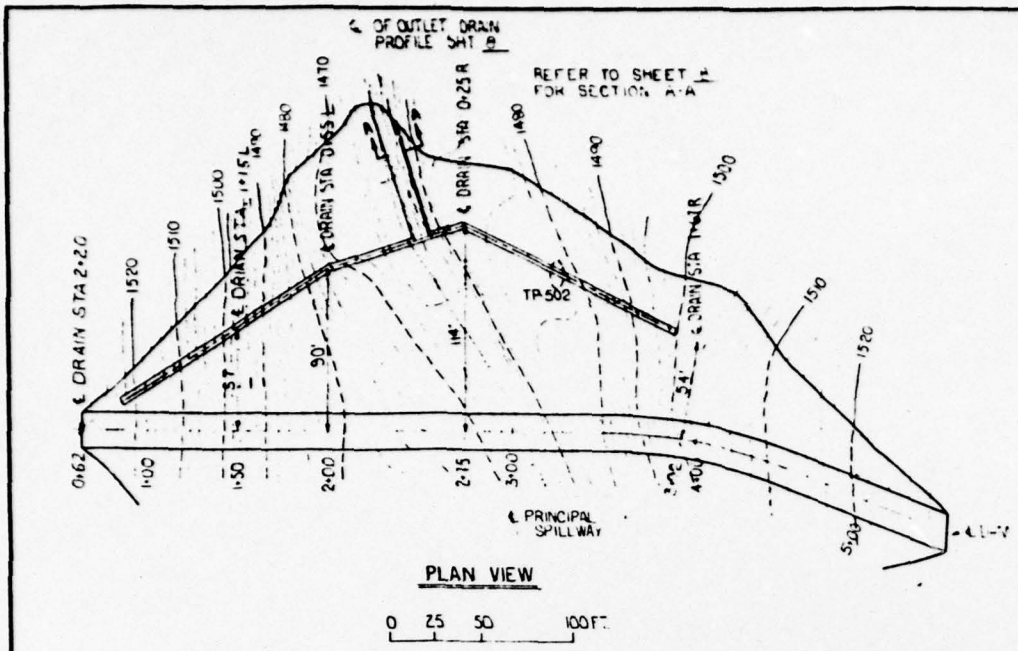


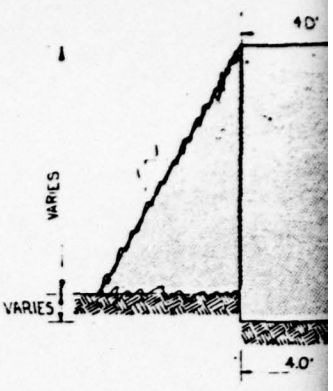
AS BUILT 9/25/71

CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
FILL PLACEMENT & PRIN. SPWY. EXCAVATION
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

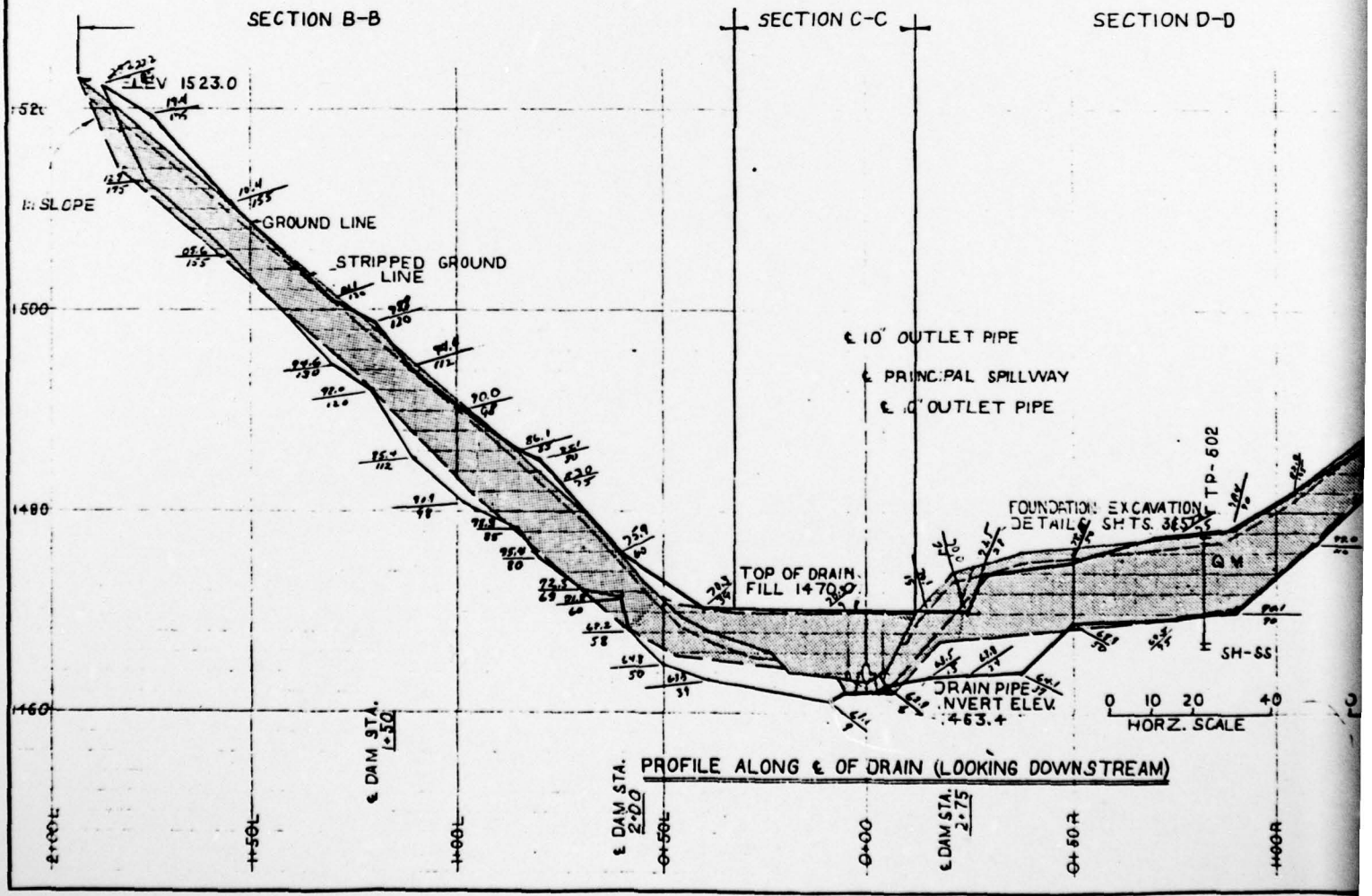
Designed	Date	Approved by
J. E. POLULECH	1/69	Title
Drawn: W E GRAJKO Jr.	1/69	Title
Traced		Pg. 6
Checked: J E. POLULECH	1/69	Sheet No 6 of 19 — Drawing No NY-2169-P

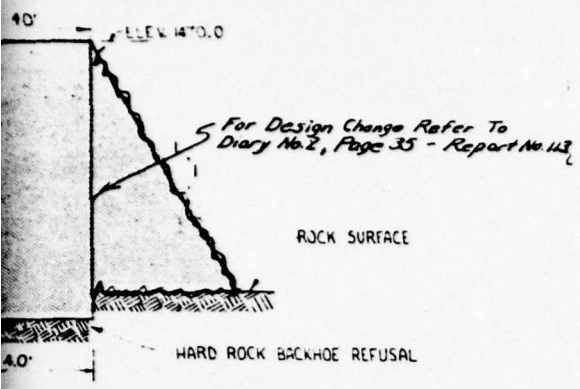
Form SCS-317 (November 1955)





SECTION C
TYPICAL SECTION
EXPOSED AFTER F





ON C-C
TION WHERE ROCK SURFACE WILL BE
ER FOUNDATION EXCAVATION OR STRIPPING

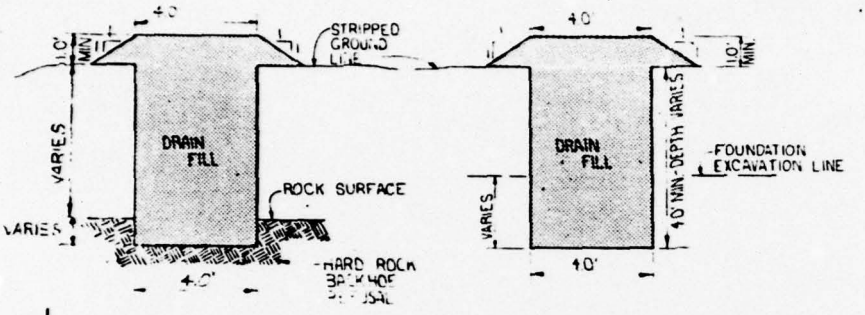
DRAINAGE SYSTEM DETAILS

ALL DRAIN PIPE SHALL CONFORM TO SPECIFICATION 10 AND SHALL BE 10" DIA SMOOTH (CLASS I (ANNULAR CORRUGATIONS), OR CLASS II (HELICAL CORRUGATIONS) TYPE A (FULLY BITUMINOUS) COATED PIPE.

THE PROFILES AT THE BOTTOM OF ALL EXCAVATIONS AS SHOWN ARE ONLY APPROXIMATE THE REQUIRED FINISHED GRADES WILL BE ESTABLISHED IN THE FIELD AT THE TIME OF CONSTRUCTION BY THE ENGINEER.

QUANTITY SUMMARY

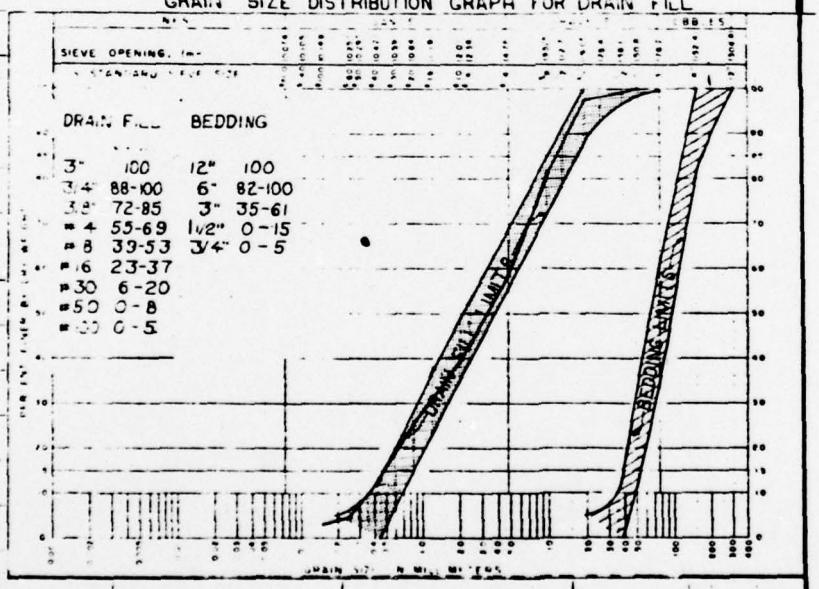
456 CU. YDS. DRAIN FILL
144 LIN. FT. STRAIGHT SECTION OF PERFORATED PIPE 10"
40 LIN. FT. STRAIGHT SECTION OF NON-PERFORATED PIPE 10"
2 METAL END CAP
14 CU. YDS. BEDDING



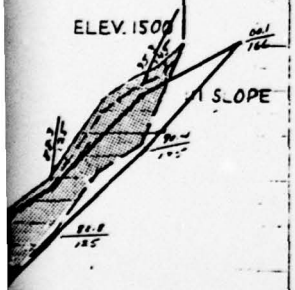
SECTION B-B

SECTION D-D

GRAIN SIZE DISTRIBUTION GRAPH FOR DRAIN FILL



DRAIN FILL		BEDDING	
3"	100	12"	100
3/4"	88-100	6"	82-100
3/8"	72-85	3"	35-61
#4	55-69	1 1/2"	0-15
#8	39-53	3/4"	0-5
#16	23-37		
#30	6-20		
#50	0-8		
#100	0-5		



0 4 8 16
VERT. SCALE

AS BUILT
9/25/91

CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
DRAINAGE SYSTEM DETAILS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

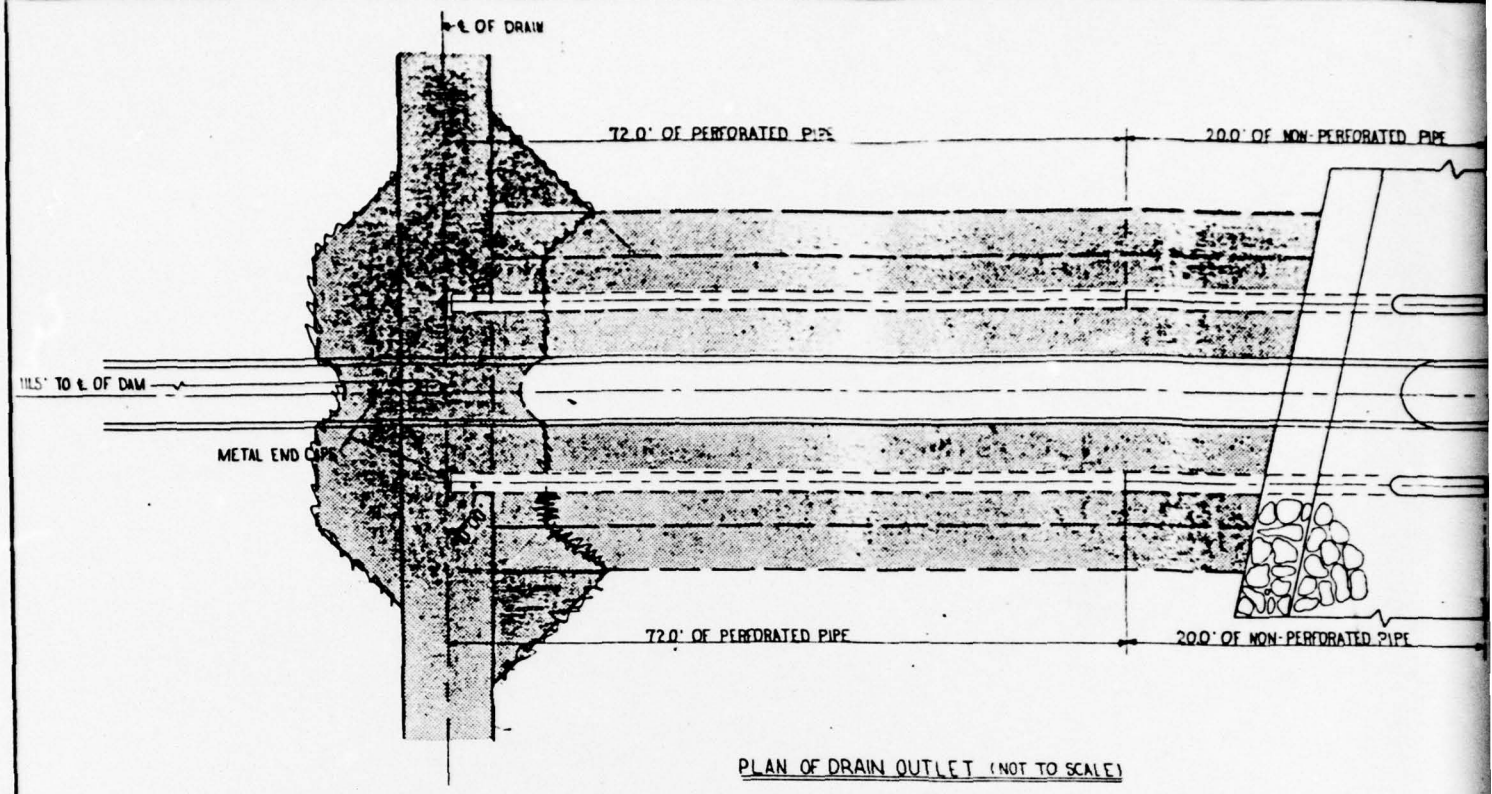
Designed	J. POLULECH	1/69	
Drawn	W. E. GRAJKO Jr.	1/69	
Traced			
Checked			

Sheet No. 7 of 19
Drawing No. NY-2169-P

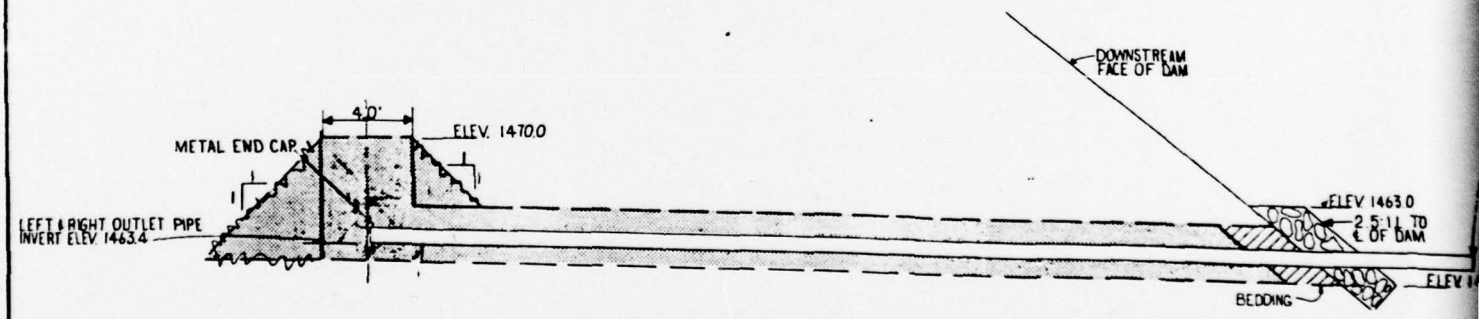
B-2

+50R
E. DAM STA. 3+92

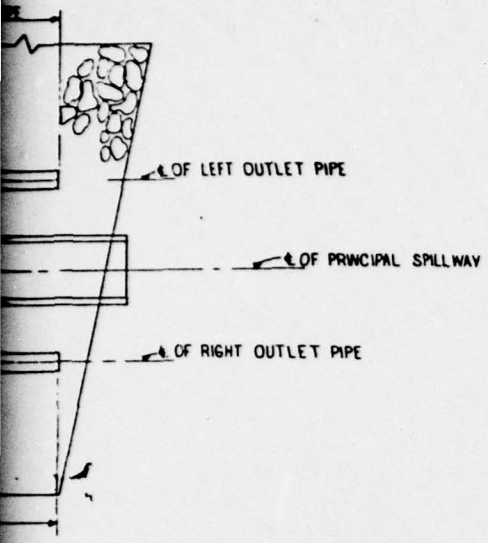
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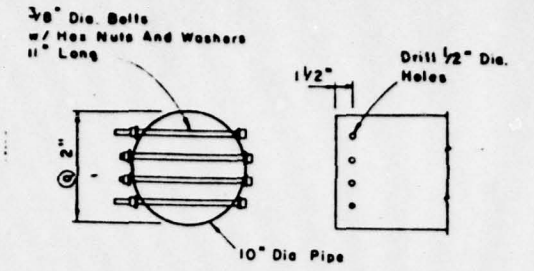


PLAN OF DRAIN OUTLET (NOT TO SCALE)



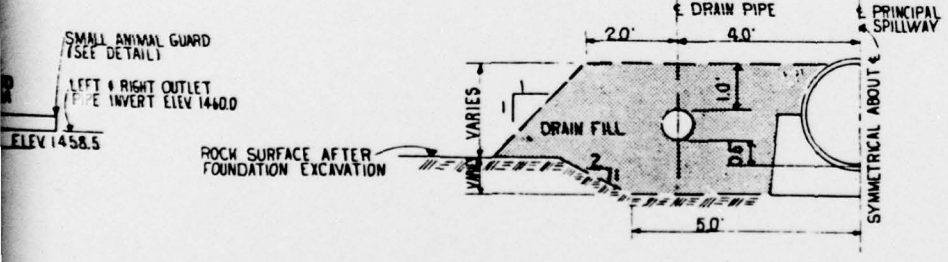
PROFILE ALONG DRAIN OUTLETS (NOT TO SCALE)





SMALL ANIMAL GUARD DETAILS

(NOT TO SCALE)



SECTION A-A (NOT TO SCALE)

AS BUILT

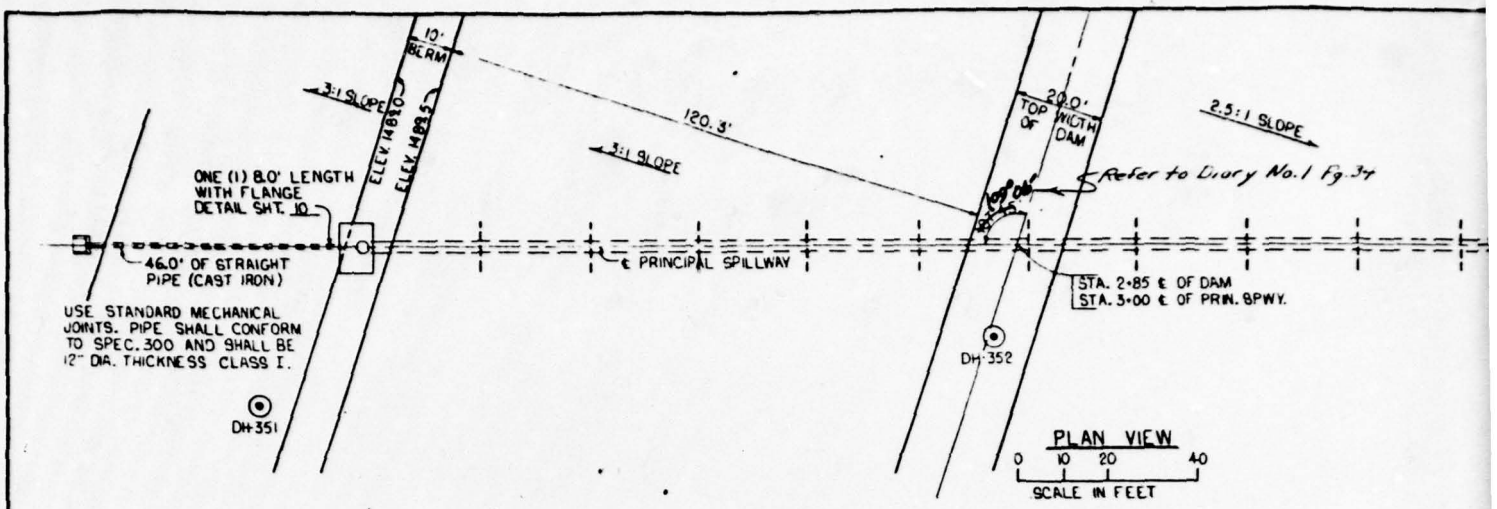
9/25/71

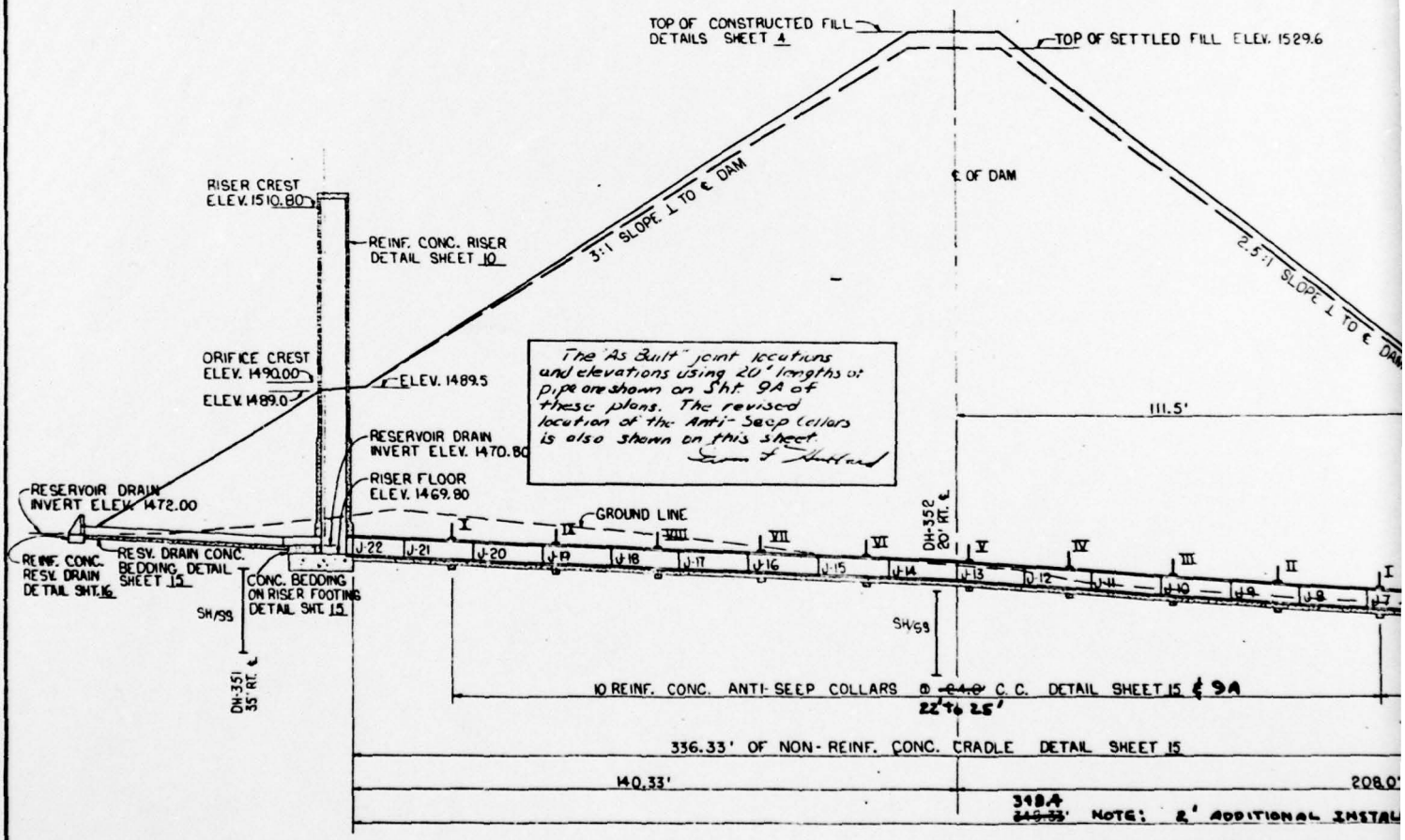
CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, N.Y.
DRAINAGE SYSTEM

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

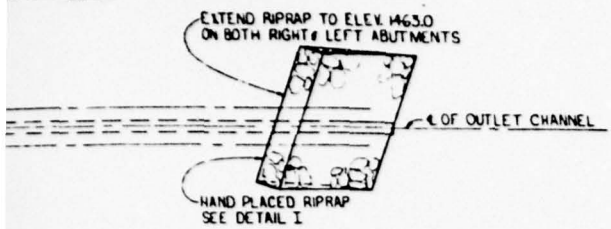
	Date		
Designed J.E. POLULECH	12/68	Approved by	
Drawn D.M. CRANE	12/68	Title	
Traced		Title	
Checked J.E. POLULECH	1/69	Sheet No. 8 of 19	Drawing No. NY-2169-P

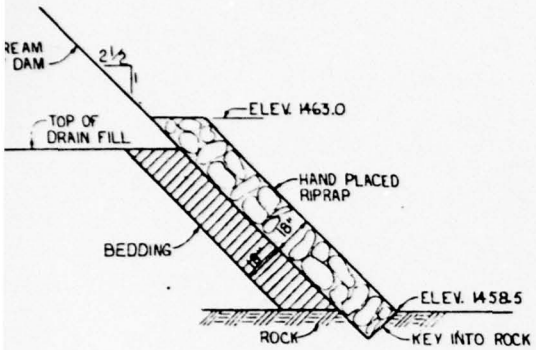
Pg. 8


10' BERM
3:1 SLOPE
ELEV. 1488.0
ELEV. 1483.5
120.3'
3:1 SLOPE
20.0' TOP WIDTH DAM
2.5:1 SLOPE
Refer to Drwg No. 1 Fig. 37
ONE (1) 8.0' LENGTH WITH FLANGE DETAIL SHT. 10
46.0' OF STRAIGHT PIPE (CAST IRON)
℄ PRINCIPAL SPILLWAY
STA. 2+85 ℄ OF DAM
STA. 3+00 ℄ OF PRIN. SPWY.
USE STANDARD MECHANICAL JOINTS. PIPE SHALL CONFORM TO SPEC. 300 AND SHALL BE 12" DIA. THICKNESS CLASS I.
DH-351
DH-352
PLAN VIEW
0 10 20 40
SCALE IN FEET


TOP OF CONSTRUCTED FILL DETAILS SHEET 4
TOP OF SETTLED FILL ELEV. 1529.6
RISER CREST ELEV. 1510.80
REINF. CONC. RISER DETAIL SHEET 10
3:1 SLOPE ⊥ TO ℄ DAM
℄ OF DAM
2.5:1 SLOPE ⊥ TO ℄ DAM
ORIFICE CREST ELEV. 1490.00
ELEV. 1489.0
ELEV. 1489.5
The "As Built" joint locations and elevations using 20' lengths of pipe are shown on Sht. 9A of these plans. The revised location of the Anti-Seep Collars is also shown on this sheet.
RESERVOIR DRAIN INVERT ELEV. 1470.80
RISER FLOOR ELEV. 1469.80
RESERVOIR DRAIN INVERT ELEV. 1472.00
GROUND LINE
111.5'
DH-352 20' RT. ℄
REINF. CONC. RESV. DRAIN DETAIL SHT. 16
RESV. DRAIN CONC. BEDDING DETAIL SHEET 15
CONC. BEDDING ON RISER FOOTING DETAIL SHT. 15
SH/59
SH/59
DH-351 35' RT. ℄
10 REINF. CONC. ANTI-SEEP COLLARS @ ~~8.4.0~~ C. C. DETAIL SHEET 15 & 9A
22' to 25'
336.33' OF NON-REINF. CONC. CRADLE DETAIL SHEET 15
140.33'
208.0'
348.4
~~349.33~~ NOTE: 2' ADDITIONAL INSTALL
PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY
0 10 20 40
HORIZ. SCALE IN FEET
0 5 10 20
VERT. SCALE IN FEET

AIN
L SHTS. 7 & 8





DETAIL I

RIPRAP DETAILS

ALL RIPRAP SHALL BE GRADED FROM A MAX. SIZE OF 18" TO A MIN. SIZE OF 3". A MAX. OF 20% SHALL BE LESS THAN 6" (≈ 10 LB.) AND A MAXIMUM OF 60% SHALL BE LESS THAN 12" (≈ 80 LB.)
BEDDING SHALL MEET GRADATION REQUIREMENTS SHOWN ON SHEET 7.

JOINT	DIST. FROM OUTLET	INVERT OF 24" DIA. PIPE	SLOPE
OUTLET	0	1459.50	0.03548 FT/FT
J1	16	1460.07	
J2	32	1460.64	
J3	48	1461.20	
J4	64	1461.77	
J5	80	1462.34	
J6	96	1462.91	
J7	112	1463.47	
J8	128	1464.04	
J9	144	1464.61	
J10	160	1465.18	
J11	176	1465.74	
J12	192	1466.31	
J13	208	1466.88	
J14	224	1467.25	0.02083 FT/FT
J15	240	1467.55	
J16	256	1467.88	
J17	272	1468.22	
J18	288	1468.55	
J19	304	1468.88	
J20	320	1469.22	
J21	336	1469.55	
J22	348	1469.80	

ABOVE DIMENSIONS FOR LENGTHS OF PIPE ARE BASED ON NOMINAL LENGTHS AND DO NOT INCLUDE CREEP.

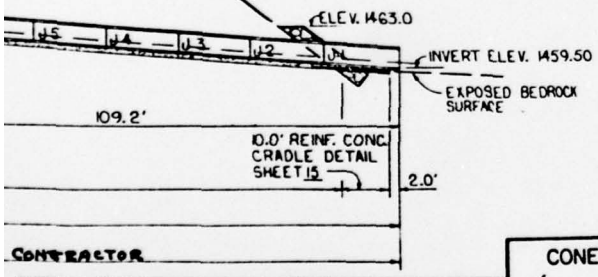
COLLAR	DIST. FROM	INVERT OF 24" DIA. PIPE
I	109	1463.37
II	133	1464.22
III	157	1465.07
IV	181	1465.92
V	205	1466.77
VI	229	1467.32
VII	253	1467.82
VIII	277	1468.32
IX	301	1468.82
X	325	1469.32

24" REINFORCED CONCRETE PIPE STRENGTH REQUIREMENTS

1. PRESURE HEAD 65.8 FT.
2. LOAD 50,975 LBS. PER LIN. FT. BASED ON O.D. OF 2.54 FT.
3. MIN. 3 EDGE BEARING STRENGTH FOR 0.001" CRACK 13,216 LBS. PER LIN. FT. FOR PRESTRESSED PIPE (AWWA C 301)

WHERE THE PIPE FURNISHED HAS AN OUTSIDE DIAMETER GREATER THAN THAT CALLED FOR ON THE PLANS, THREE EDGE BEARING STRENGTH OF THE PIPE FURNISHED MUST BE EQUAL TO OR GREATER THAN THE SPECIFIED THREE-EDGE BEARING STRENGTH MULTIPLIED BY THE RATIO OF THE OUTSIDE DIAMETER OF THE PIPE FURNISHED TO THE OUTSIDE DIAMETER SPECIFIED.

RAIN
AIL SHTS. 7 & 8



CONTRACTOR

AS BUILT
9/25/91

FABRICATION INSTRUCTIONS

~~(21) 16.0' SECTIONS~~
~~(1) 12.0' SECTION~~
~~ONE (1) SPIGOT RING WALL FITTING FOR 15" WALL~~

PIPE SUPPLIERS NOTE:
~~CAST OUTSIDE OF SPIGOT RING WITH CONCRETE ON ONE 16.0' SECTION~~

OR

(17) 20.0' SECTIONS
(1) 8.0' SECTION
ONE (1) SPIGOT RING WALL FITTING FOR 15" WALL

PIPE SUPPLIERS NOTE:
CAST OUTSIDE OF SPIGOT RING WITH CONCRETE ON ONE 20.0' SECTION

WHEN PIPE IS SUPPLIED IN 20.0' LENGTHS THE ENGINEER WILL PROVIDE THE CONTRACTOR WITH A REVISION OF THIS SHEET SHOWING ORDER OF INSTALLATION AND PIPE INVERT ELEVATIONS.

CONEWANGO CREEK WATERSHED PROJECT
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
PLAN PROFILE OF PRINCIPAL SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date
Designed	J.E. POLULECH	1/69
Drawn	D. ANGELO	1/69
Traced		
Checked	J. E. P.	2/69

Approved by ....
Title ....
Title ....

Sheet No. 9 of 19
Drawing No. NY-2169-P

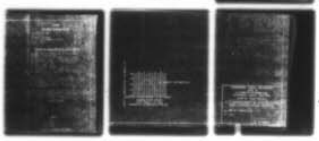
Pg. 10

SCS-ENGR-113B (APRIL 1963)

AD-A077 441 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. CONEWANGO CREEK WATERSHED PROJECT --ETC(U)
SEP 79 G KOCH DACW51-79-C-0001
UNCLASSIFIED NL

2 OF 2
AD
A077441



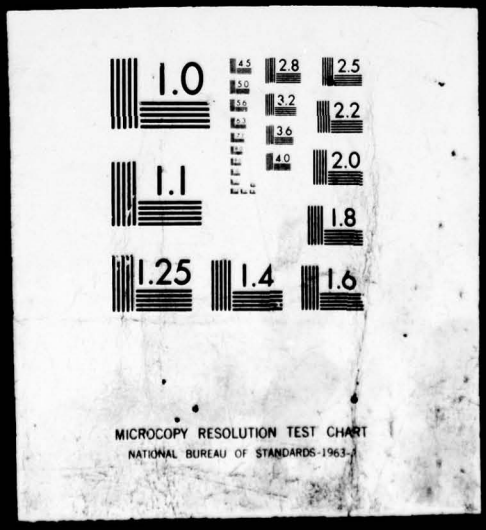


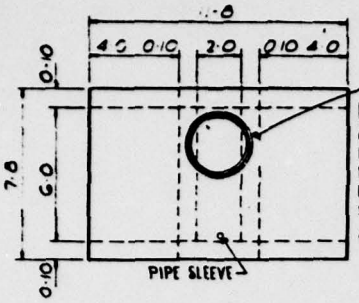
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2 OF 2

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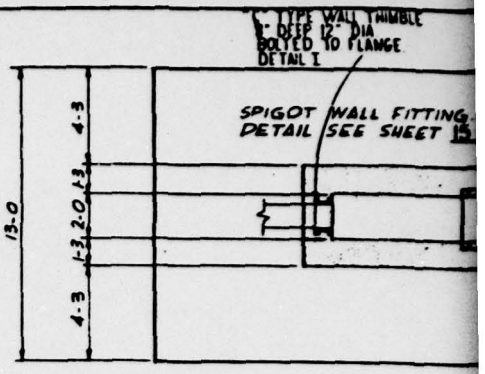


Manhole Assembly Details

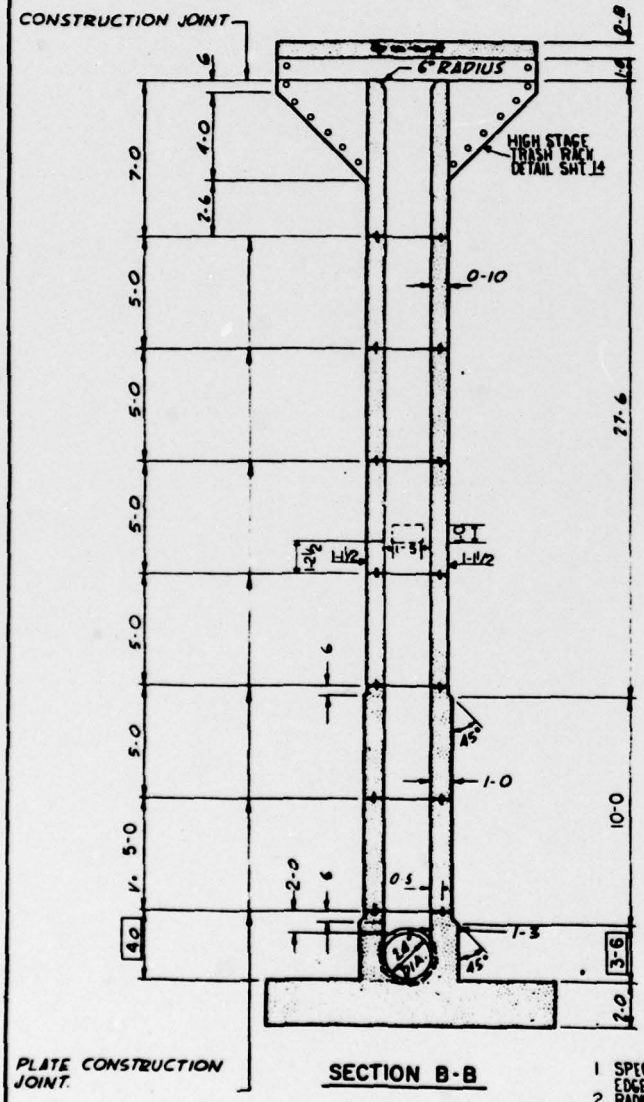
Circular Manhole Assembly
Minimum Clear Opening 30"
Neenah Foundry Company
Model R-6461-HH With
Stainless Cap Screws Or
Approved Equivalent.

FOR DETAIL OF TRASH-RACK ANGLES AND GRATING SEE SHEET 14

TOP PLAN



SECTION A-A



SECTION B-B



CONSTR. JOINT

¼" x 6" Steel Plate, Grade C, continuous thru constr. joint.
Splices shall be either:
1. Butt welded
2. Lapped 3" and bolted
3. Lapped 3" and fillet welded

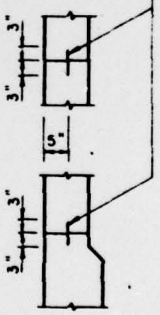
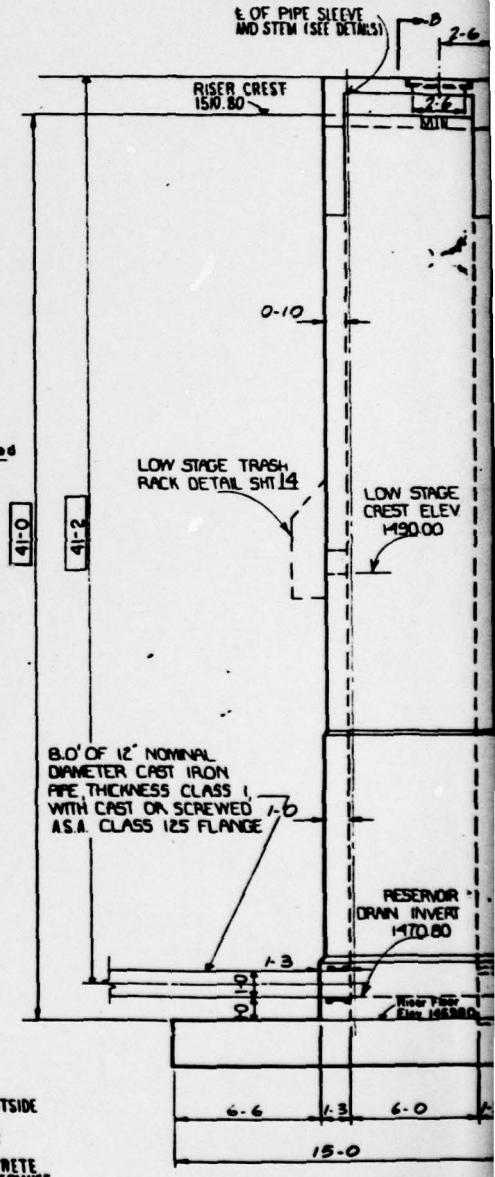


PLATE CONSTR. JOINT



SIDEWALL ELEVATION

CONCRETE

CONSTRUCTION DETAILS

1. SPECIFIED BAR DIMENSIONS ARE MEASURED TO OUTSIDE EDGE OF ALL BENDS.
2. RADIUS OF BENDS EQUALS 3 BAR DIAMETERS FOR SIZES EQUAL TO OR LESS THAN #7.
3. THE 2" AND 3" DISTANCE FROM SPECIFIED CONCRETE SURFACES ARE CLEAR DISTANCES. WHERE NOT OTHERWISE SPECIFIED ALL REINFORCING STEEL PLACED IN CONCRETE POURED AGAINST THE GROUND SHALL HAVE A MINIMUM OF 3" COVER. ALL REINFORCING STEEL PLACED IN CONCRETE POURED IN FORMS SHALL HAVE A MINIMUM OF 2" CLEAR COVER.
4. ALL EXPOSED EDGES OF CONCRETE TO HAVE A 3/4" CHAMFER UNLESS OTHERWISE NOTED.

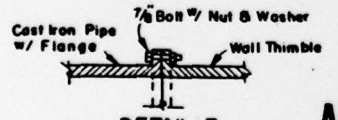
0 2 4 6
SCALE IN FEET
BOXED IN DIMENSIONS NOT TO SCALE

STEEL SCHEDULE

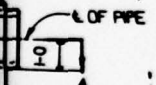
MARK	SIZE	QUANTITY	LENGTH	TYPE	B	C	TOTAL LENGTH
B1	6	15	12-6	1	–	–	187-6
B2	6	13	14-6	1	–	–	188-6
B3	7	24	9-9	1	–	–	234-0
B4	7	20	8-3	21	3-2	5-1	165-0
B5	6	13	14-6	1	–	–	188-6
B6	6	11	12-6	1	–	–	137-6
B7	7	6	12-6	1	–	–	75-0
B8	6	2	5-6	1	–	–	11-0
B9	5	5	6-0	21	1-0	5-0	30-0
B10	5	3	8-1	21	1-0	7-1	24-3
B11	5	10	8-1	21	1-0	7-1	80-10
B12	7	10	8-1	21	1-0	7-1	80-10
B13	5	2	6-0	21	1-0	5-0	12-0
B14	6	12	6-8	1	–	–	80-0
B15	5	7	2-8	1	–	–	18-8
B16	6	18	8-2	21	3-1	5-1	147-0
B17	6	4	5-11	21	0-10	5-1	23-8
B18	6	4	5-9	21	0-8	5-1	23-0
B19	6	2	6-7	21	1-6	5-1	13-2
B20	7	4	8-0	21	3-0	5-0	32-0
B21	7	20	4-4	1	–	–	86-8
B22	5	5	3-8	1	–	–	18-4
B23	5	2	4-8	1	–	–	9-4
B24	5	2	3-5	1	–	–	6-10
B25	5	2	3-7	1	–	–	7-2
R1	5	12	11-7	1	–	–	139-0
R2	7	4	11-7	1	–	–	46-4
R3	5	16	9-5	1	–	–	150-8
R4	7	8	9-5	1	–	–	75-4
R5	5	20	6-8	1	–	–	133-4
R6	5	10	2-8	1	–	–	26-8
R7	7	40	8-0	21	3-0	5-0	320-0
R8	5	20	6-8	1	–	–	133-4
R9	5	10	2-8	1	–	–	26-8
R10	6	36	7-8	21	2-10	4-10	276-0
R11	5	16	3-8	1	–	–	58-8
R12	5	8	3-8	1	–	–	29-4
R13	6	4	7-4	21	2-8	4-8	29-4
R14	5	10	11-7	1	–	–	115-10
R15	5	4	11-7	1	–	–	46-4
R16	5	12	11-7	1	–	–	139-0
R17	5	6	11-7	1	–	–	69-6
R18	5	20	6-8	1	–	–	133-4
R19	5	8	2-8	1	–	–	21-4
R20	6	40	7-4	21	2-8	4-8	293-4
R21	5	16	6-8	1	–	–	106-8
R22	5	8	2-8	1	–	–	21-4
R23	5	40	7-0	21	2-6	4-6	280-0
R24	5	10	11-7	1	–	–	115-10

MARK	SIZE	QUANTITY	LENGTH	TYPE	B	C	TOTAL LENGTH
R25	5	4	11-7	1	–	–	46-4
R26	5	12	11-7	1	–	–	139-0
R27	5	6	11-7	1	–	–	69-6
R28	5	10	6-8	1	–	–	66-8
R29	5	8	2-8	1	–	–	21-4
R30	5	32	7-0	21	2-6	4-6	224-0
R31	5	8	6-8	1	–	–	53-4
R32	5	8	2-8	1	–	–	21-4
R33	5	20	7-0	21	2-6	4-6	140-0
T1	5	10	6-6	1	–	–	65-0
T2	5	6	8-3	1	–	–	49-6
T3	5	10	6-9	1	–	–	67-6
T4	5	6	8-3	1	–	–	49-6
T5	5	12	6-8	1	–	–	80-0
T6	5	4	2-8	1	–	–	10-8
T7	5	2	3-8	1	–	–	7-4
T8	5	2	6-2	1	–	–	12-4
T9	5	2	8-8	1	–	–	17-4
T10	5	2	11-2	1	–	–	22-4
T11	5	24	7-0	21	2-6	4-6	168-0
T12	5	4	4-8	1	–	–	8-8
T13	5	4	3-5	1	–	–	13-8
T14	5	4	2-2	1	–	–	8-8
T15	5	4	7-3	19	1-8	5-7	29-0
T16	5	2	3-8	1	–	–	7-4
T17	5	2	6-2	1	–	–	12-4
T18	5	2	8-8	1	–	–	17-4
T19	5	2	11-2	1	–	–	22-4
T20	5	4	4-8	1	–	–	18-8
T21	5	4	3-5	1	–	–	13-8
T22	5	4	2-2	1	–	–	8-8
T23	5	4	7-3	19	1-8	5-7	29-0
T24	5	2	11-2	1	–	–	22-4
T25	4	12	6-8	1	–	–	80-0
T26	5	2	3-2	1	–	–	6-4
T27	4	6	11-2	1	–	–	67-0
T28	4	4	4-3	1	–	–	17-0
T29	5	20	5-11	21	1-5	4-6	118-4
T30	5	2	4-10	21	1-5	3-5	9-8
T31	5	2	2-3	21	1-5	0-10	4-6
T32	5	2	11-2	1	–	–	22-4
T33	4	6	11-2	1	–	–	67-0
T34	4	4	4-3	1	–	–	17-0

See Sht 13 For Bar Types



DETAIL I



SLIDE GATE DETAILS

1 12" DIA FLAT FRAME SLIDE GATE (SELF CONTAINED UNIT)
2 CLASS O-41
3 SLIDE GATE SHALL CONFORM TO SPEC 301 AND SHALL BE TYPE WHS-1
4 "C" TYPE WALL THIMBLE 8" DEEP
5 PIPE SLEEVE, STEM AND STEM GUIDES SIZED AND SPACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS, REMOVABLE T-HANDLE WRENCH, WRENCH SOCKET AND TOP OF STEM LOCATED WITHIN PIPE SLEEVE
6 PAINT IN ACCORDANCE WITH SPEC 22
7 HOLES DRILLED IN BACK FLANGE OF WALL THIMBLE BY GATE MANUFACTURER ACCORDING TO A.S.A. CLASS 125 FLANGE SPEC
DIAMETER OF BOLT CIRCLE - 17"
NUMBER OF BOLT HOLES - 12
DIAMETER OF BOLT HOLES - 1"

AS BUILT
9/25/91

QUANTITIES

STEEL

# 4 BARS	248-0	166 LBS.
# 5 BARS	3668-1	3826 LBS.
# 6 BARS	1598-6	2401 LBS.
# 7 BARS	1115-2	2279 LBS.
		8672 LBS.

= 422 + 0.74 V = 459 CU. YDS.

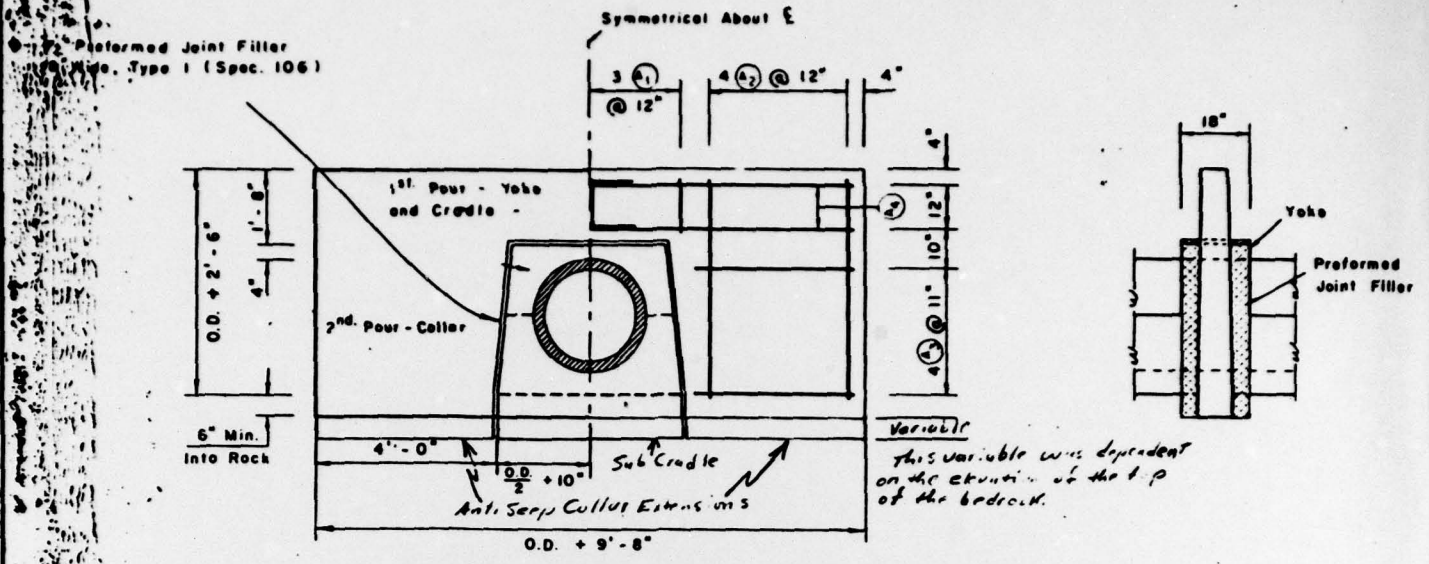
CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, N.Y.
RISER STRUCTURAL DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date
Designed	J.E. Pavlech	12/68
Drawn	D.M. Crane	12/68
Traced		
Checked	D.C. Chapman	1/69

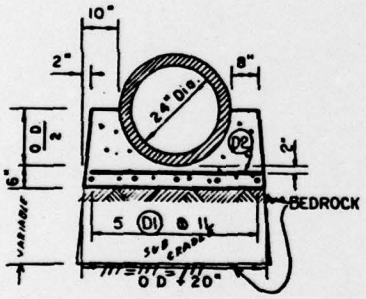
Approved by .....
Title .....
Title .....

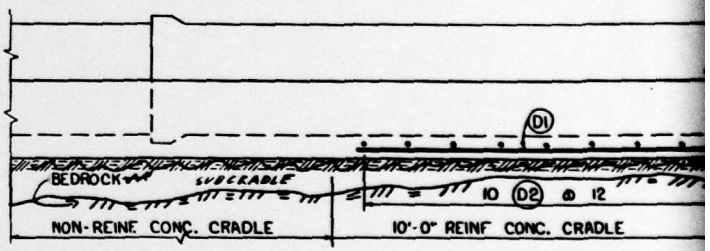
Sheet No. 10 of 13
Drawing No. NY-2169-P



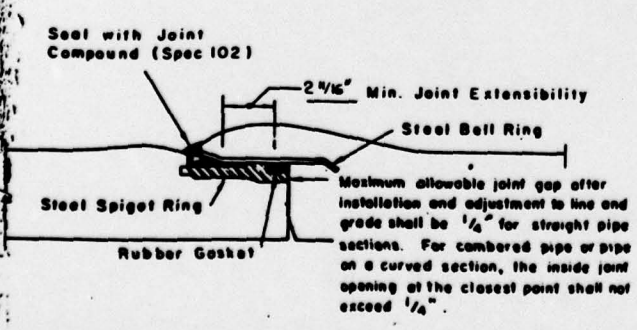
REINFORCED CONCRETE ANTI-SEEP COLLAR

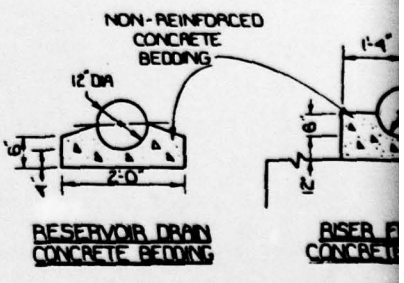
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REINFORCED CONCRETE CRADLE



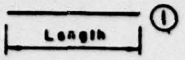


RESERVOIR DRAIN CONCRETE BEDDING

RISER F CONCRET

REINFORCED CONCRETE PIPE - JOINT DETAILS

BAR TYPE

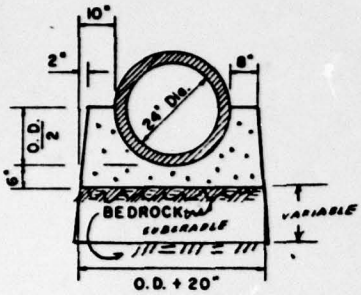


ANTI-SEEP COLLAR STEEL SCHEDULE

Mark	Size	Length	Type	Quan. / Collar	Total Quan	Total Length
A-1	4	1 - 3	1	5	50	62-6
A-2	4	4 - 8	1	8	80	373-4
A-3	4	3 - 6	1	8	80	280-0
A-4	4	6 - 9	1	4	40	270-0

CRADLE STEEL SCHEDULE

MARK	SIZE	LENGTH	TYPE	TOTAL QUAN	TOTAL LENGTH
D-1	5	9-3	1	5	46-3
D-2	5	3-8	1	10	36-8



NON-REINFORCED CONCRETE CRADLE

QUANTITIES (This Sheet Only)

STEEL

No. 4 Bar 985-10 • 859 Lbs.

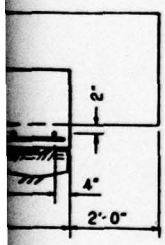
NO.5 BAR 82-11 • 87 Lbs.

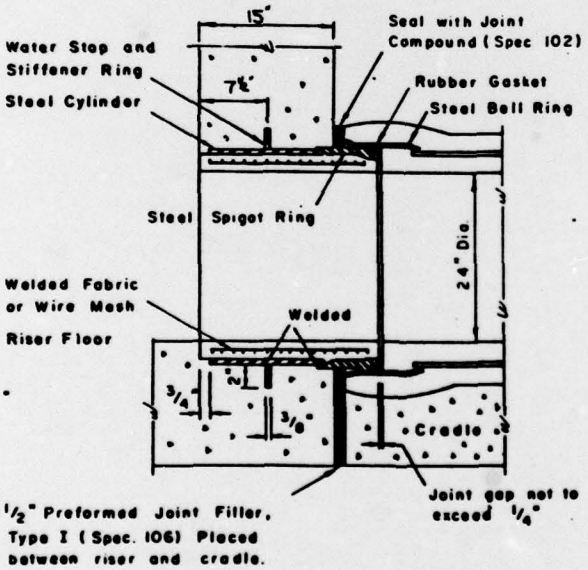
CONCRETE

REINFORCED ~~15.2~~ 16.8 CU YDS

NON-REINFORCED ~~62.6~~ 112.4 CU YDS

CONSTRUCTION DETAILS SEE SHEET 10





SPIGOT WALL FITTING

RISER FOOTING

AS BUILT
9/25/71

CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, N.Y.
CONDUIT DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed J.E. POLLUTECH	Date 12-68	Approved by	
Drawn J. DEVITA III	12-68	Title	
Traced		Title Pg. 16	
Checked D. CHAPMAN	1/69	Sheet no 15 of 19	Drawing No NY-2169-P

MATERIAL DESCRIPTIONS

A

Gravel, sandy, silty, 90% finer than 3" (45% gravel, 31% sand, 21% nonplastic fines) 10% +3" (60% 3"-6", 35% 6"-12", 5% +12") max. size +36", brown, moist-wet, medium-rapid permeability (in test pits); medium-very dense (N ranges from 14-219 blows/ft. with most of the material in the 20-40 blows/ft. range, glacial till. (GM)
D.S. #1

B

Sand, gravelly, clayey, 98% finer than 3" (28% gravel, 29% sand, 43% plastic fines) 2% +3" (65% 3"-6", 34% 6"-12", 1% +12") brown w/some mottling, moist, slow-medium permeability, LL and PI range from NP to LL 25, PI 7, loose very dense (N ranges from 6-249 blows/ft. with most of the material in the 20-30 blows/ft. range, glacial till. (SC-SM)
D.S. #2.1, 102.1, 102.2, 103.1, 201.1, 202.1

Note: Classification of samples of Mat'l B range from ML-CL to GM; description and % of coarse and fine materials taken from median curve of all samples represented.

C

Gravel, silty, clayey, 99% finer than 3" (39% gravel, 21% sand, 50% plastic fines) 1% +3" (80% 3"-6", 20% 6"-12") max. size +6", gray, moist, very slowly permeable, LL-22 PI-6, medium-dense (N ranges from 15-64 blows/ft. with most of the material in the 30-40 blows/ft. range) glacial till. (GC-GM)
D.S. #105.1

D

Topsoil, brown-black, soft, medium plasticity, organic matter.

E

[illegible] gray,

TP #105, Borrow Area

0.0 1.0 Topso

1.0 10.0

10.0 14.0

D.S. 105.1 @ 10'-14'

NOTE: Slight se

TP #106, Borrow Area

0.0 0.6 Topso

0.6 10.0

10.0 12.0

TP #201, Emer. Spillwy.

0.0 0.6 Topsoi

0.6 15.0

D.S. 201.1 @ 0.6'-15'

NOTE: 20% +3" Mat

TP #202, Emer. Spillwy.

1.0 1.0 Topsoi

1.0 15.0

D.S. 202.1 @ 1'-15'

NOTE: 30% +3" Ma

TP #203, Emer. Spillwy

0.0 1.0 Topso

1.0 14.0

14.0 14.5

NOTE: 40% +3" Ma
water infl

TP #204, Emer. Spillwy

Elev. 1538.3, 5/13/68

oil Material D

Material B (SC-SM)

Material C (GC-GM)

epage @ 4.0 ft.

Elev. 1548.2, 5/13/68

oil Material D

Material B (SC-SM)

Material C (GC-GM)

y., Elev. 1538.6, 5/14/68

oil Material D

Material B (GM)

at. @ 9.0-11.0 ft.

y., Elev. 1541.8, 5/14/68

il Material D

Material B (GM)

at. @ 9.0-15.0 ft.

y., Elev. 1538.4, 5/14/68

oil Material D

Material B (GM)

Material A (GM)

r. 14.0 ft.; Heavy

low @ 13.0 ft.

., Elev. 1532.0, 5/14/68

DH #, C/L of Dam, Elev. 1479.[illegible], [illegible]/[illegible]

Topsoil Material D

Material B (GM)

Material A (GM)
W.L.

Material E (GW-GM)

DH #, C/L of Dam, Elev. [illegible], 5/[illegible]

Topsoil Material D

Material A (GM)

Material E (GW-GM)
W.L.

DH #, C/L of Dam, Elev. [illegible], /1[illegible]

Topsoil Material D

Material B (GM)

Material A (GM)
W. L. @ 10.0

C/L

Borrow Area, Elev. [illegible], 7/29/69

0.5

Topsoil Material D

Material B (SC-SM)

Material C (GC-GM)
W.L.

Material A (GM)

Borrow Area, Elev. [illegible], [illegible]/69

Topsoil Material D

Material B (SC-SM)

Material C (GC-GM)
W.L.

Borrow Area, Elev. [illegible], 8/25/69

Topsoil Material D

Material B (GM)

DH #352, Emer. Spillwy., El

0.0

Topsoil Mate

10
RB
16
RB
47
66
55
28
249
119
47
38
20

Material B (G
W. L.

24.0

DH #352, Emer. Spillwy., El

0.0

Topsoil Mate

RB
16
RB
16
79
23
97
60

Material B (G

Material A (G

DH #[illegible], Prin. Spillwy., El

0.0

NX
70%
98%

Material E (s

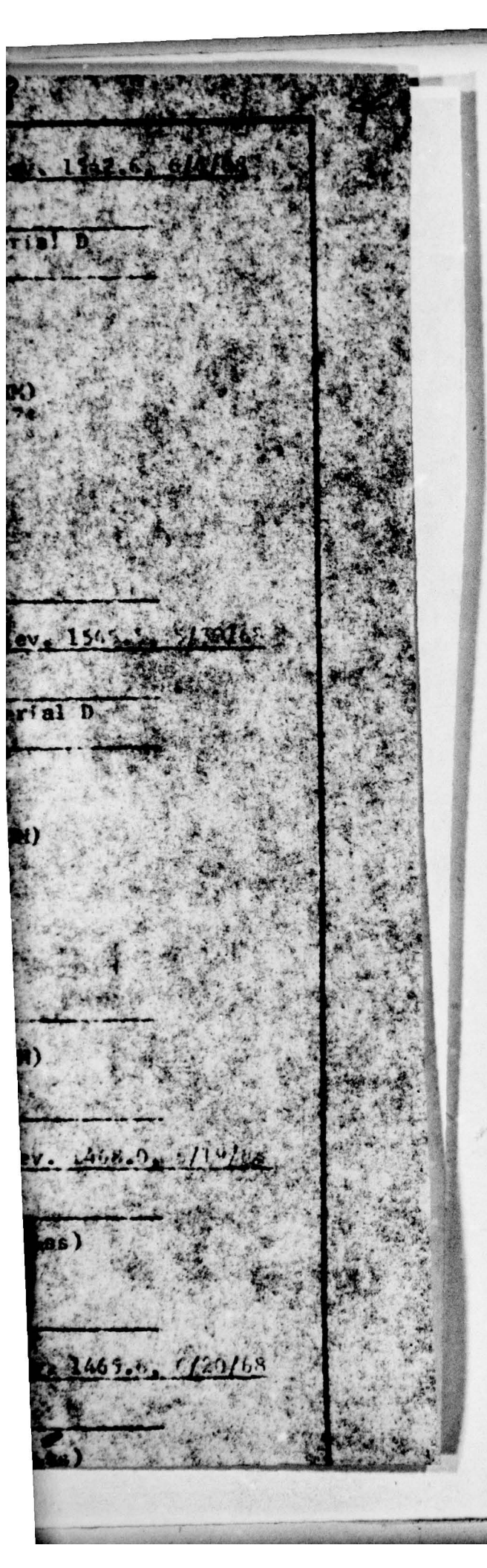
10.0

DH #352, Prin. Spillwy., El

0.0

NX

Material E (s



two major sets of joints (max. bearing N.0°W, N.5°E); horizontally bedded, beds of thin to medium thickness, some vertical fracture zones, several highly fossiliferous zones; sandstone is fine-medium grained; shale exhibits highly weathered surface where covered by overburde .
(hard)

BACKHOE PIT LOGS

TP #2, C/L of Dam, Elev. 1 [illegible] /4/

0.0	1.0	Topsoil Material D
1.0	6.2	Material B (SM)
6.0	18.0	Material A (GM)

D.S. 2.2 @ 1'-6'; 2.1 @ 6'-18'

TP #101, Borrow Area, Elev. 1541.0 /13/6

0.0	2.0	Topsoil Material D
2.0	16.0	Material B (SC-SM)

TP #102, Borrow Area, Elev. 1544.1, 5/13/6

0.0	0.6	Topsoil Material D
0.6	10.0	Material B (SC-SM)
10.0	[illegible]	Material C (GC-GM)

D.S. 102.1 &.102.2'@ 0.6-10'

NOTE: Seepage @ 0.6 ft.

TP #103, Borrow Area, Elev. 1546.8, 5/13/6

0.0	1.0	Topsoil Material D
1.0	13.0	Material B (ML-CL)

D.S. 103.1 @ 1'-13'

NOTE: Slight seepage @ 1.0 ft.

0.0	3.6	Topsoil Mat
0.6	11.0	Mat
11.0	14.0	Mat

NOTE: Heavy water flo

TP #302, Drai [illegible], Elev. 1

0.0	0.5	Topsoil Mat
0.5	10.	Mat

NOTE: See[illegible] 2.0"; 2 0.10-5 i crea wit[illegible]ept[illegible]; sever refusal on bedroc

TP #[illegible], Other, Elev. 1[illegible]

0.0	1.0	Topsoil Mat
1.0	4.3	Mat

NOTE: Re[illegible] on bedroc

DR[illegible] HOLE LOGS

NOTE: A[illegible]ppli[illegible] were [illegible]

D[illegible] #5[illegible], C/L [illegible], Elev. [illegible]

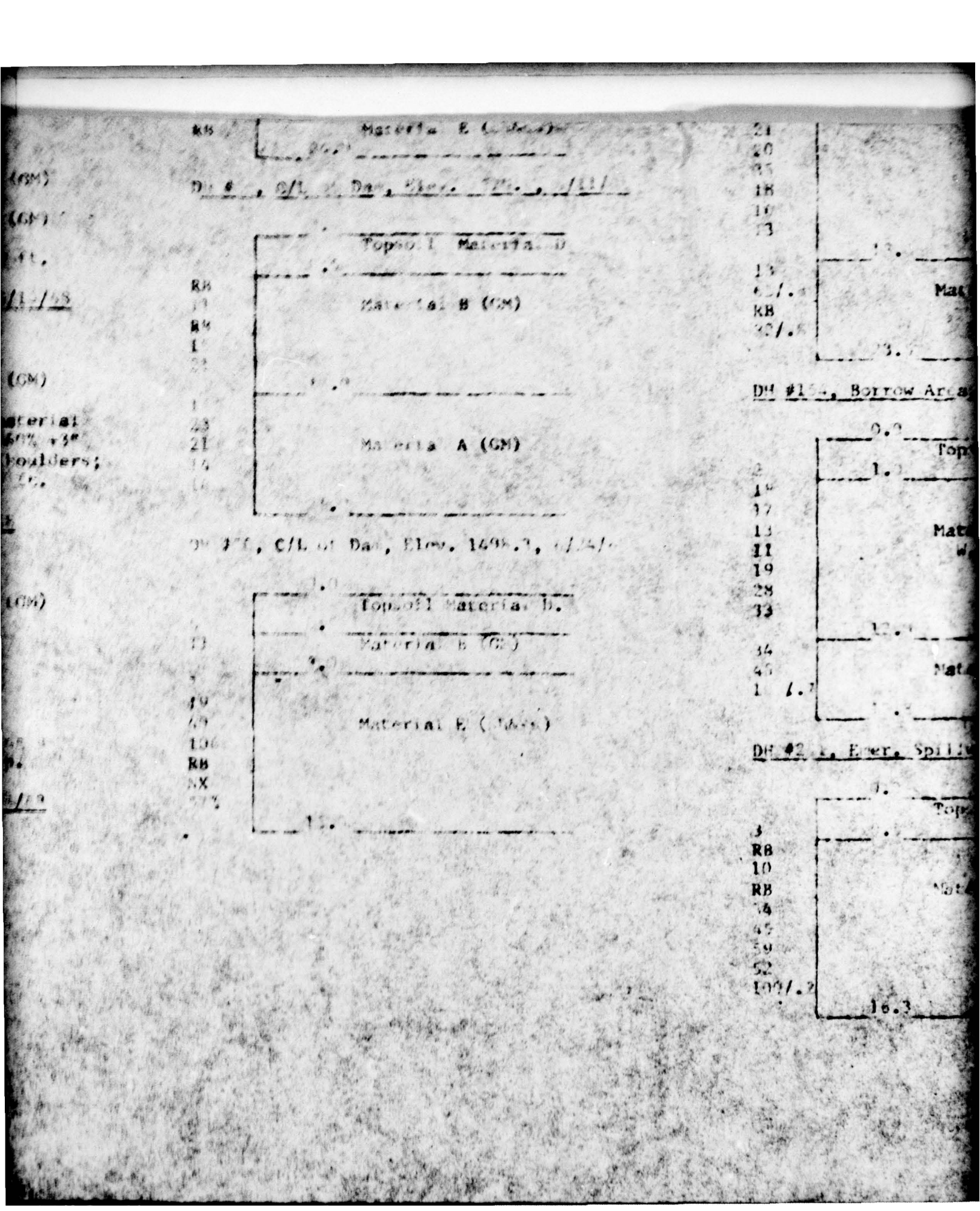
0.

15
20

Mater[illegible] (GM)

Mater[illegible] (ML)

RQ
NX


Material B (GM)
Material A (GM)
Topsoil Material B
Material B (GM)
Material B (GM)
Material B (GM)
Material A (GM)
Topsoil Material B.
Material B (GM)
Material B (GM)
Borrow Area
Topsoil
Material B (GM)
Material B (GM)
Material A (GM)
Topsoil
Material B (GM)
Material B (GM)
Material A (GM)

93%
40%

10.0'

ial E (class)

Elev. 1[illegible]

il Material D

rial B (GM)
L. 10.1'

rial E (class)

., Elev. [illegible]

l Material D

rial B (GM)

CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAUGUS COUNTY, NEW YORK
LOGS OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

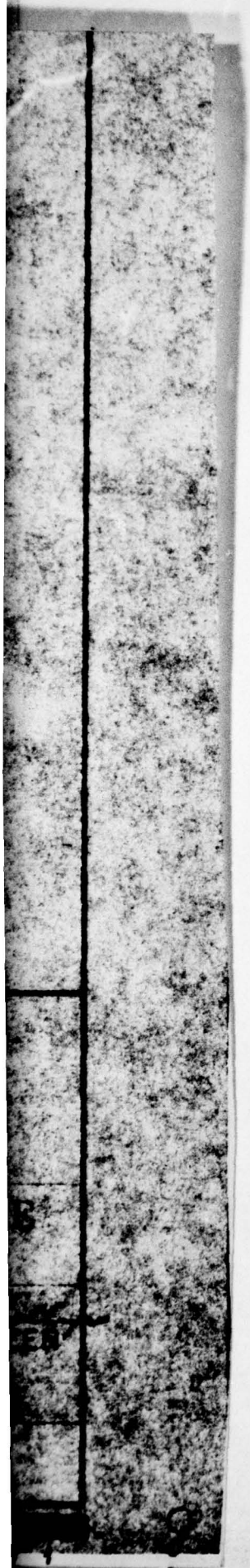
Logged Herbert Weaver 9-68

STATE CONS. ENGR.

17
18

NY-2169-P

SCS-[illegible]



Legend

DRILL HOLE NUMBERING SYSTEM

Centerline of dam	1-99
Borrow Area	101-199
Emergency spillway	201-299
Centerline of outlet structure	301-399
Stream channel	401-499
Relief wells	501-599

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GW	Well graded gravels, gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels, gravel-sand-silt mixtures
GC	Clayey gravels, gravel-sand-clay mixtures
SW	Well-graded sands, sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sands, sand-silt mixtures
SC	Clayey sands, sand-clay mixtures
ML	Silts, silty or fine sands, sandy or clayey silts
CL	Clays of low to medium plasticity, silty, sandy or gravelly clays
CH	Clays of high plasticity, fat clays
MH	Elastic silts, micaceous or diatomaceous silts
OL	Organic silts and organic silty clays of low plasticity
OH	Organic clays or silts of medium to high plasticity

NOTE: All classifications shown in the logs are based on laboratory tests of samples representative of the materials encountered. Significant deviations from the visual classifications are noted in the logs.

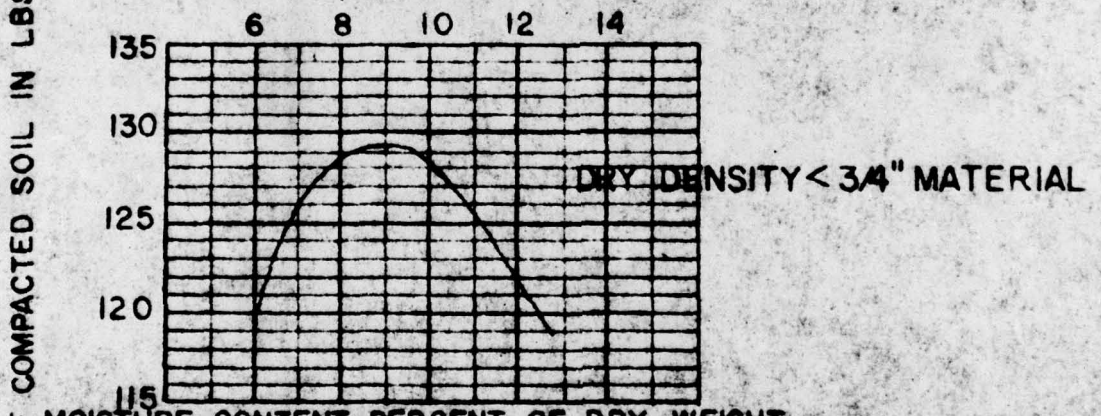
BEDROCK SYMBOLS

Bs	Basalt	Sc	Schist
Cg	Conglomerate	Sl	Slate
Gr	Granite	Ss	Sandstone
Ls	Limestone	Sh	Shale
Ma	Marble	Sv	Serpentine

SAMPLES

D	Disturbed
U	Undisturbed
Core	NX Core

KEY TO DRILL HOLE (DH) LOGS



COMPACTION CURVE
FIELD SAMPLE NO. 102.2
LABORATORY CLASSIFICATION – SC – SM

CONEWANGO CREEK WATERSHED
SITE 19
FLOODWATER RETARDING DAM
CATTARAGUS COUNTY, NEW YORK
LOGS OF TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Logged [illegible] Date 9-68

Approved by

Drawn

Title

Traced

Sheet No. 18

Drawing No.