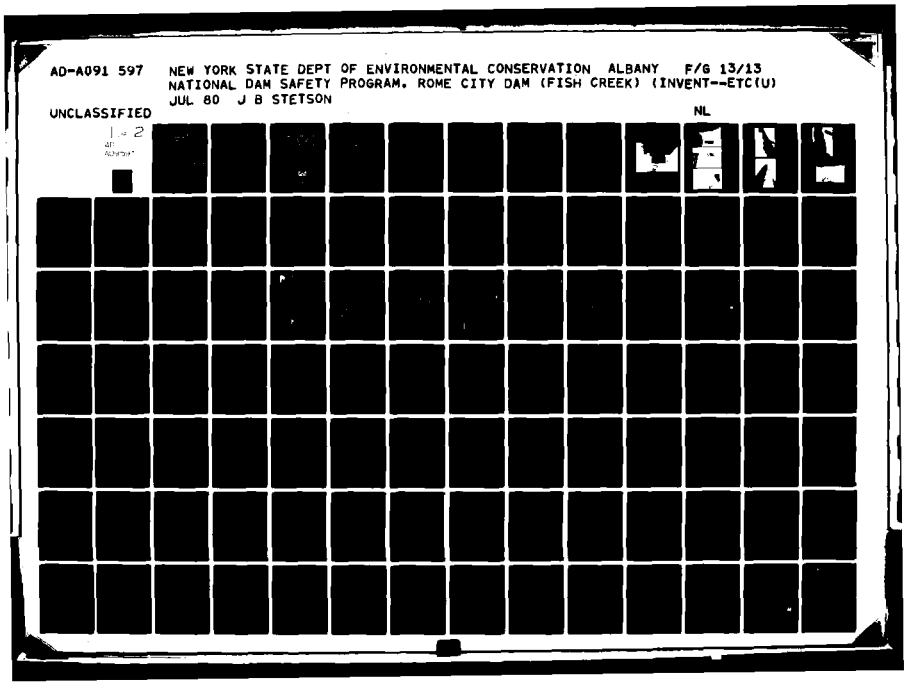
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Fish Creek
Rome City Dam

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 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 require further surveillance and remedial work.

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LEVEL II

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The structural stability analysis indicates satisfactory stability for the dam under all considered loading conditions.

The hydrologic/hydraulic analysis indicates that the spillway will pass 42% of the Probable Maximum Flood (PMF). A concrete parapet wall on the concrete gravity dam is at an elevation 3 feet above the crest of the auxiliary earth fill dam located 350 feet to the east of the main structure. The concrete gravity dam will be topped by 5.5 feet by the PMF and the earthen dike will be topped by 8.5 feet by the PMF. The 1/2 PMF will not top the concrete gravity structure but will top the earthen dike by one foot. The earthen dike is less than 5 feet high over most of its length and reaches a maximum height of only 7 feet. Failure of this embankment would not cause release of large enough volumes of impounded water to significantly increase the downstream hazard. The spillway capacity, therefore, is assessed as inadequate.

The following is a list of recommended measures to be undertaken to insure safety of this facility.

1. The seepage near the left abutment should be kept under surveillance to detect any worsening of this condition. A program of surveillance should be developed and coordinated with the Dam Safety Section of the New York State Department of Environmental Conservation. Inspections of the area should be made at least four times yearly and photographs taken of this site. The quantity of flow should be measured as an attempt to detect any worsening of this seepage. Formal reports should be made of these inspections and copies submitted to the Dam Safety Section for their review.

2. Leakage around the pipes in the inlet structure should be repaired within six months.

3. Trees and brush should be removed from the slope of the earth fill dam. The slopes should be grassed and maintained to allow inspection of the slopes.

4. A flood warning and emergency evacuation system should be implemented to alert the public in the event conditions occur which could result in failure of the dam.

5. A formalized inspection system should be initiated to develop data on the conditions and maintenance operations at the facility.

OSWEGO RIVER BASIN

ROME CITY DAM (FISH CREEK)

LEWIS COUNTY
NEW YORK

INVENTORY Nº NY 558

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

(6) Rome City Dam (Fish Creek), Inventory number NY-55
Oswego River Basin. Lewis County, New York.
Phase I Inspection Report.

CONTRACT NO. DACW-51-79-C0001

(10) John B. Stolz

(15)

NEW YORK DISTRICT CORPS OF ENGINEERS

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PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. 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.

TABLE OF CONTENTS

FIGURES

APPENDIX

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Rome City Dam (Fish Creek), NY 558

State Located New York
County Located Lewis
Stream Fish Creek
Date of Inspection June 18, 1980

ASSESSMENT OF GENERAL CONDITIONS

The examination of documents and visual inspection of the 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 require further surveillance and remedial work.

The structural stability analysis indicates satisfactory stability for the dam under all considered loading conditions.

The hydrologic/hydraulic analysis indicates that the spillway will pass 42% of the Probable Maximum Flood (PMF). A concrete parapet wall on the concrete gravity dam is at an elevation 3 feet above the crest of the auxiliary earth fill dam located 350 feet to the east of the main structure. The concrete gravity dam will be topped by 5.5 feet by the PMF and the earthen dike will be topped by 8.5 feet by the PMF. The 1/2 PMF will not top the concrete gravity structure but will top the earthen dike by one foot. The earthen dike is less than 5 feet high over most of its length and reaches a maximum height of only 7 feet. Failure of this embankment would not cause release of large enough volumes of impounded water to significantly increase the downstream hazard. The spillway capacity, therefore, is assessed as inadequate.

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3. Trees and brush should be removed from the slope of the earth fill dam. The slopes should be grassed and maintained to allow inspection of the slopes.

4. A flood warning and emergency evacuation system should be implemented to alert the public in the event conditions occur which could result in failure of the dam.

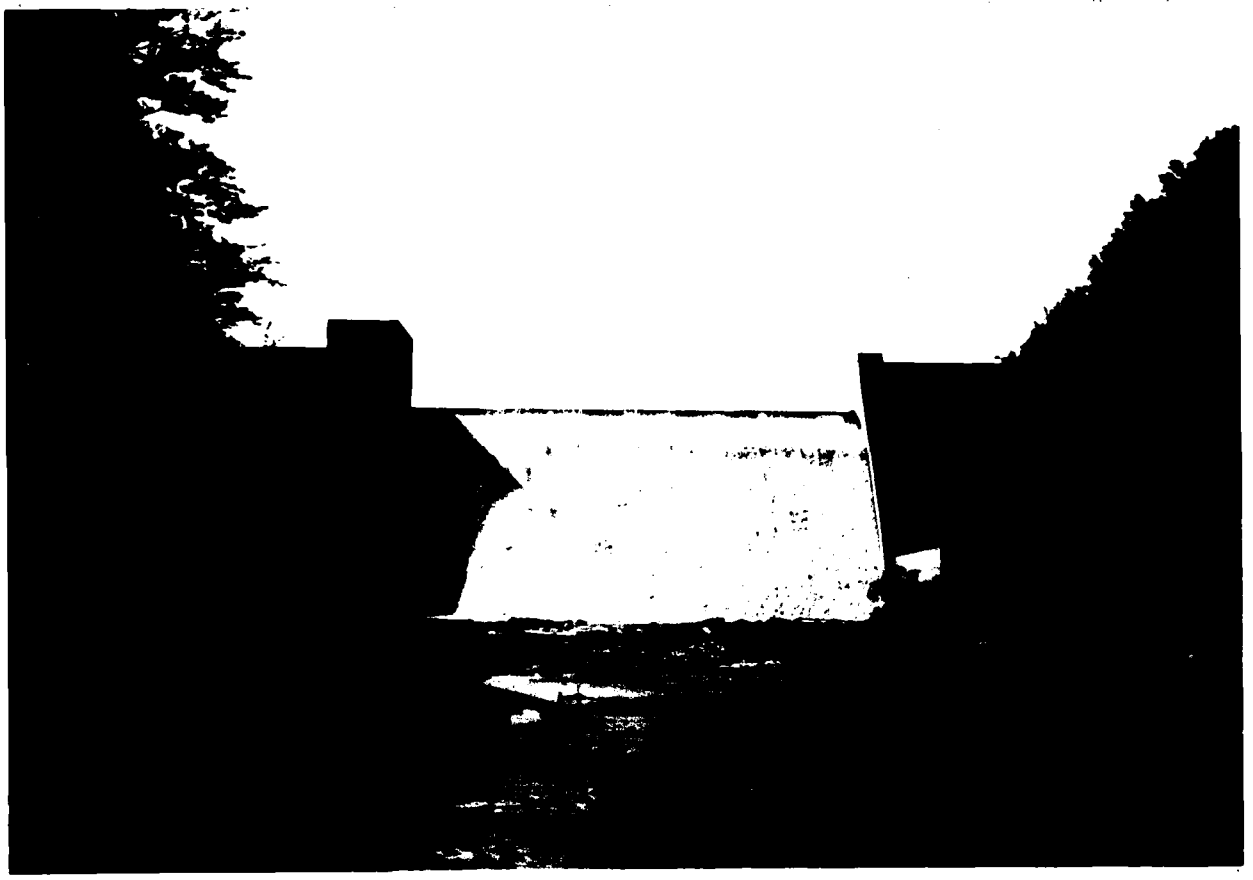
5. A formalized inspection system should be initiated to develop data on the conditions and maintenance operations at the facility.

Dale Engineering Company

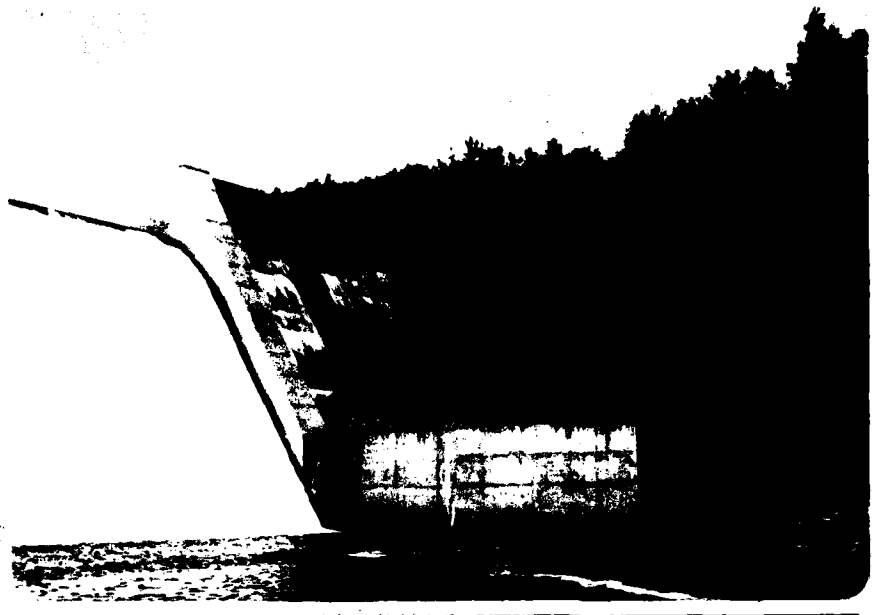
John B. Stetson, President

26 SEP 1980

Approved By: Col. W. M. Smith, Jr.
Date: New York District Engineer



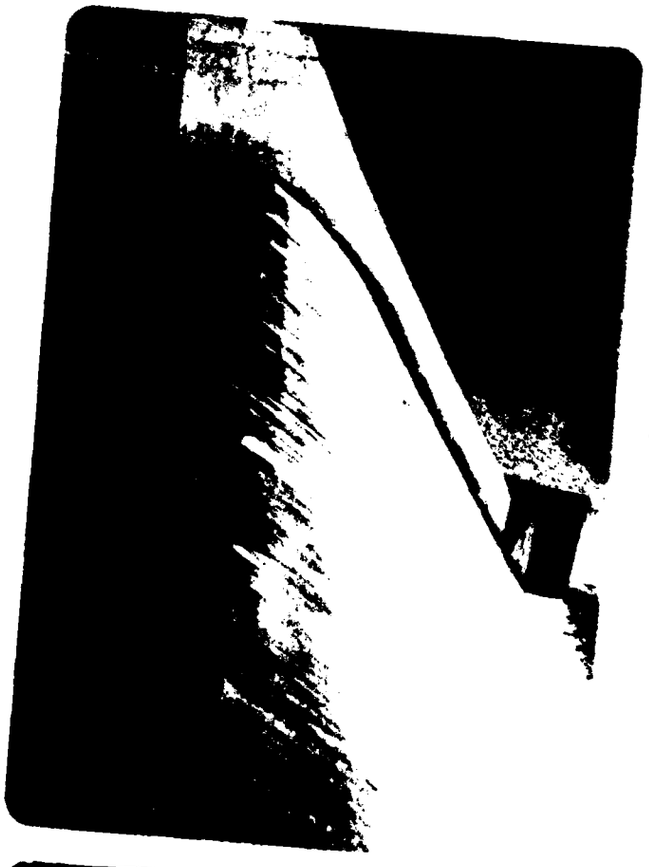
1. Overview of Rome City Dam (Fish Creek)



2. View of left abutment. Note seepage on face of non-overflow section and seepage flow over training wall of plunge pool.

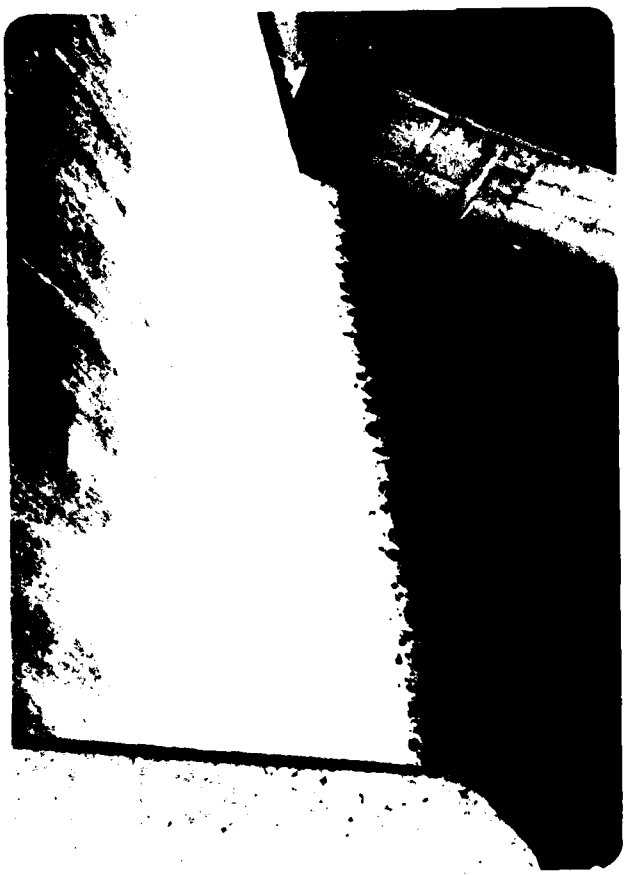
3. Close up of seepage on face of dam near left abutment.

4. Close-up of seepage.



5. Crest of spillway viewed from right side of dam.

6. Crest of spillway viewed from left side of dam.



7. Plunge pool

8. Receiving stream

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - ROME CITY DAM (FISH CREEK) ID# - NY 558

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and The New York State Department of Environmental Conservation.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the existing condition of the Rome City Dam and appurtenant structures, owned by the City of Rome, New York, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the State of New York.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Rome City Dam is located in the Town of Lewis, in Lewis County, approximately 13 miles north of the Village of Taberg on the east branch of Fish Creek. The dam is a concrete gravity structure, 515 feet long with a maximum height of approximately 85 feet above the stream bed. An ogee crested spillway 150 feet long is centered in the structure. The dam is used to provide water for flow augmentation in the east branch of Fish Creek. A downstream dam owned by the City of Rome is the source of the city's public water supply. During high water periods flow over the spillway of the dam is used to augment the flow in the downstream channel. During low water, flow is conducted from the impoundment through two, 36 inch diameter outlet pipes. Flow through the outlet pipes is controlled by 18 inch cone valves located in a Control Tower situated to the right of the

spillway section. The inlet to the cone valves consist of an intake tower with a series of gates to allow flow into the structure from three different elevations in the impoundment.

An earthen dike section, approximately 300 feet long, with a maximum height of 7 feet, is located approximately 350 feet east of the left abutment of the dam. This section contains the impoundment in a saddle between two hills located in this area.

b. Location

The Rome City Dam is located in the Town of Lewis, Lewis County, New York.

c. Size Classification

The maximum height of the dam is approximately 85 feet. The volume of the impoundment is approximately 4300 acre feet. Therefore, the dam is in the Intermediate Size Classification as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

The east branch of Fish Creek, the receiving stream from the Rome City Dam impoundment flows for approximately 15 miles through a narrow steep sided gorge to the Village of Taberg. Numerous residential properties are situated on the banks of the creek in the village. Therefore, the dam is in the High Hazard Category as defined by The Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the City of Rome, New York.

Contact: City Engineer
City Hall
Rome, New York 13440
Telephone: 315-336-6000

f. Purpose of the Dam

The dam is used for flow augmentation in the east branch of Fish Creek, the public water supply source for the City of Rome.

g. Design and Construction History

The plans included in this report, Figures 2 through 9 are dated 1957 and construction of the facility was completed in 1958. No other information regarding the construction history is available.

h. Normal Operational Procedures

The facility is operated by the City of Rome. Flow through the discharge conduits is regulated to augment flow in Fish Creek.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of Rome City Dam is 93.7 square miles.

b. Discharge at Dam Site

No discharge records are available for this site.

Computed Discharges:

Ungated Spillway, Top of Dam	35,120 cfs
*Gated Drawdown	216 cfs

c. Elevation (Feet Above MSL)

Top of Earthen Embankment	1295.0
Top of Dam with Parapet Walls	1298.0
Spillway Crest	1280.0
Stream Bed at Centerline of Dam	1210.0

d. Reservoir

Length of Normal Pool	9000± FT

e. Storage

Top of Dam	8625 Acre Feet
Normal Pool	4345 Acre Feet

f. Reservoir Area

Top of Dam	380 Acres
Spillway Pool	210 Acres

g. Dam

Type - Concrete Gravity.
Length - 515 Feet.
Height - 85 Feet.
Freeboard Between Normal Reservoir and Top of Dam - 18 Feet.
Top Width - 18 Feet.
Side Slopes - Upstream - Vertical; Downstream - 0.74 on 1
Zoning - None.
Impervious Core - None.
Grout Curtain - None.

*Discharge through two, 18 inch cone valves fully opened.

Type - Earth Dike
Length - 300 Feet.
Height - 7 Feet.
Freeboard Between Normal Reservoir and Top of Dam - 15 Feet.
Top Width - 10 Feet.
Side Slopes - 2-1/2 Feet Horizontal, 1 Foot Vertical, both upstream and downstream.
Zoning - None.
Impervious Core - None.
Grout Curtain - None.

h. Spillway

Type - Ogee Crest.
Length - 150 Feet.
Crest Elevation - 1280.0 Feet.
Gates - None.
U/S Channel - Impoundment.
D/S Channel - Natural Stream Channel.

i. Regulating Outlets

2 - 36 inch diameter outlet pipes each controlled by an 18 inch diameter cone valve.

SECTION 2 - ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

Geologically, Fish Creek Dam is located in the Tug Hill Plateau or Cuesta, part of the Mohawk section of the Appalachian Plateau Province.

The dam foundation and both abutments are sited in bedrock of Upper Ordovician Oswego Sandstone of the Lorraine Group. The rock unit varies from light-to-medium-gray siltstone to fine-grained sandstone with some interbeds of shaly, gray, silty mudstone. Beds of siltstone and sandstone are horizontal and range in thickness from two to twelve inches. Current cross-bedding is present in places. The rock is non-calcareous. Overall, the rock is considered as durable, resistant, and of reasonable strength.

Two major joint sets are present. One set has relatively straight planes that trend N55E and are vertical. Spacing is from 6 to 14 inches. The second set has curvilinear planes that are vertical with a general trend of N35W. Spacing is from 6 to 14 inches.

Overburden in the area is glacial drift. The drift is mostly till. In some places stratified sand and gravel overlies the till. Thus, permeability will vary from place to place.

b. Subsurface investigations

Records of subsurface investigations for this structure are included in Appendix B. The plans, Figures 2 through 9 in the report, indicate that the structure is founded on bedrock.

2.2 DESIGN RECORDS

No records other than the plans were available from the original design of the dam. A preliminary report on the dam project is included in Appendix B.

2.3 CONSTRUCTION RECORDS

No information was available concerning the construction of this dam.

2.4 OPERATIONAL RECORDS

Water levels at the impoundment are monitored by a recording level indicator. No other operational records are available.

2.5 EVALUATION OF DATA

The data presented in this report was obtained from the Department of Environmental Conservation files. The information available appears to be reliable and adequate for a Phase I inspection report.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The Rome City Dam was inspected on June 18, 1980. The Dale Engineering Company Inspection Team was accompanied on the inspection by Mr. Fallman of the City of Rome, Department of Engineering.

b. Dam

At the time of the inspection, the water level in the impoundment was approximately 6 inches above the spillway level. The flow over the spillway obscured the surface over the concrete from view. The pattern of the flow on the face of the spillway indicated some deterioration at the face of horizontal joints. A few isolated areas of noticeable deterioration were observed on the crest of the spillway. Minor surficial deterioration at construction joints of the non-overflow sections was also noted. Noticeable seepage is occurring at both horizontal and vertical joints on the downstream face of the dam near the left abutment. Substantial flow was also detected on the ground near the left abutment. Flow from this area continues down the abutment slopes and over the traning wall of the plunge pool (See Photo #2). Although there was flowing water at the toe of the slope, the inspection crew did not detect signs of piping or slope instability in the area. Visual observation did not disclose physical displacement of the alignment of the structure. Minor spalling of concrete was observed on the left wing wall of the plunge pool.

c. Appurtenant Structures

An earthen dike section, approximately 300 feet long, is located just to the east of the dam. This structure was necessary to contain the impoundment through a saddle between two small hills. The maximum height of this earthen section is approximately 7 feet. The top width is approximately 10 feet and side slopes, both up and downstream, are 2-1/2 horizontal on 1 vertical. The dike is presently heavily overgrown with trees and brush.

d. Control Outlet

The control structure for the dam outlet is located on the upstream face of the dam near the right end of the spillway. Leakage was detected around piping through the walls of the intake structure.

e. Reservoir Area

The reservoir area extends approximately 9000 feet to the north. There are no known areas of bank instability around or near the impoundment.

f. Downstream Channel

The downstream channel is formed in bedrock and forms a deep steep sided gorge for approximately 15 miles downstream.

3.2 EVALUATION

The visual inspection revealed that the dam is generally in good condition with only minor surface spalling of the concrete surfaces. No misalignment of structural elements of the dam were detected in the visual inspection. The seepage near the left abutment should be kept under surveillance. The flow which was observed on the downstream face of the concrete dam was not severe. However, this flow would not account for the quantity of water detected on the ground and flowing over the face of the training wall. It would appear that additional and more substantial seepage is occurring below the ground line. Further surveillance should be maintained regarding the quantity and severity of this seepage to detect any change in the quantity of the flow. Immediate remedial action should be taken should the flow increase.

Tree and brush growth should be removed from the earthen dike section. The slopes should be replanted with grass and should be mowed periodically so that the surfaces may be easily inspected.

Leakage around the outlet pipe in the control structure should be repaired.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The normal operating procedure for this structure is to augment flow in Fish Creek, the source of public water supply for the City of Rome. Flow is normally augmented in high waters by discharge over the spillway of the dam. During low water conditions, the cone valves in the outlet structure are manipulated to provide flow to the receiving stream.

4.2 MAINTENANCE OF THE DAM

Maintenance and operation of the dam is controlled by the City of Rome, New York. Periodic visits are made to the site to check on conditions of the facilities. No formal reporting system is in effect at this site.

4.3 MAINTENANCE OF OPERATING FACILITIES

The control outlet is presently in operating condition. Piping in the outlet structure were in the process of being painted at the time of the inspection.

4.4 DESCRIPTION OF WARNING SYSTEM

No warning system is in effect at present.

4.5 EVALUATION

The dam and appurtenances are normally inspected by representatives of the City of Rome. The facility is presently in good condition. There is no evidence of deterioration caused by lack of maintenance. Since the dam is in the High Hazard Classification, a warning system should be implemented to alert the public should conditions occur which could result in failure of the dam. A formal reporting system should be implemented to record conditions at the dam. Special attention should be directed toward monitoring areas of seepage near the left abutment.

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The Rome City Dam is located in the southwest portion of Lewis County. The dam has a drainage area of 93.7 square miles, which is characterized by sparsely populated, wooded hillsides. The reservoir has a surface area of approximately 210 acres and is situated on the East Branch of Fish Creek which flows in a southerly direction through a narrow valley.

5.2 ANALYSIS CRITERIA

The purpose of this investigation is to evaluate the dam and spillway with respect to their flood control potential and adequacy. This has been assessed through the evaluation of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the flood through the reservoir and the dam's spillway system. The PMF event is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration loss and concentration of run-off of a specific location that is considered reasonably possible for a particular drainage area. Since the dam is in the Intermediate Dam Category and is a High Hazard, the Recommended Guidelines for Safety Inspection of Dams (Ref. 1) require that the spillway be capable of passing the Probable Maximum Flood.

The hydrologic analysis was performed using the unit hydrograph method to develop the flood hydrograph. Due to the limited scope of this Phase I investigation, certain assumptions, based on experience and existing data were used in this analysis and in the determination of the dam's spillway capacity to pass the PMF.

The U.S. Army Corps of Engineers' Hydrologic Engineering Center's Computer Program HEC-1 DB using the Modified Puls Method of flood routing was used to evaluate the dam, spillway capacity, and downstream hazard.

Unit hydrographs were defined by Snyder coefficients, C_t and C_p. Snyder's C_t was estimated to be 2.0 for the drainage area and C_p was estimated to be 0.625. The drainage area was divided into sub-areas to model the variability in hydrologic characteristics within the drainage basin. Run-off, routing and flood hydrograph combining was then performed to obtain the inflow into the reservoir.

The Probable Maximum Precipitation (PMP) was 19 inches according to Hydrometeorological Report (HMR #33) for a 24-hour duration storm, 200 square mile basin, while loss rates were set at 1.0 inches initial abstraction and 0.1 inches/hour continuous loss rate. The loss rate function yielded 83 percent run-off from the PMF. The peak for the PMF inflow hydrograph was 85,372 cfs and the 1/2 PMF inflow peak

was 41,602 cfs. The relatively small storage capacity of the reservoir only reduced these peak flows to 83,707 cfs for the PMF and 39,231 cfs for the 1/2 PMF.

5.3 SPILLWAY CAPACITY

The spillway is an ogee-crested weir type structure 150 feet in length. Weir coefficients ranging from 2.94 to 4.15 over the heads encountered in routing the PMF were assigned for the spillway rating curve development. The crest elevation of the main portion of the non-overflow section of the dam is 1295. Concrete parapets on the non-overflow section and steel sheeting extending from the non-overflow section into natural ground prevent overtopping of the main portion of the dam and abutments for water surface elevations below 1298. However, an earthen dike approximately 300 feet long was constructed as part of the original dam project in a saddle about 350 feet east of the dam to an approximate crest elevation of 1295. Therefore, the top of dam elevation was assumed to be 1295 for this analysis. The discharge capacity of the spillway at the top of dam elevation is 35,120 cfs.

SPILLWAY CAPACITY

Flood	Peak Discharge	Capacity as % of Flood Discharge
PMF	83,707 cfs	42%
1/2 PMF	39,231 cfs	90%

5.4 RESERVOIR CAPACITY

The reservoir storage capacity was obtained from "Preliminary Report on Fish Creek Dam" (Ref. 21) which showed good correlation with estimates from USGS mapping. The resulting estimates of the reservoir storage capacity are shown below:

Top of Dam	8625 Acre Feet
Spillway Crest	4345 Acre Feet

5.5 FLOODS OF RECORD

There are no accurate records of flood discharges at the site. A review of pertinent publications revealed the maximum discharges shown below for sites on the East Branch of Fish Creek near the dam site (Ref. 19).

Gage Location	Drainage Area (Sq. Mi.)	Period of Record	Date	Maximum Discharge(cfs)
Constableville, New York	75	1924-1932	4/08/28	5,520
Point Rock, New York	109	1897-1899	1897	8,400

It should be noted that these flood discharges occurred before construction for the present structure, however, they do give an indication of the magnitude of previous flood flows for the creek.

5.6 OVERTOPPING POTENTIAL

The HEC-1 DB analysis indicates that the dam will be overtopped as follows:

Flood	Maximum Depth Over Dam	
	Concrete Gravity	Earthen Dike
PMF	5.5 Feet	8.5 Feet
1/2 PMF	---	1.0 Feet

The earthen dike is less than 5 feet high for most of its length, reaching a maximum height of about 7 feet over a short section approximately 30 feet long. There is some riprap on the upstream slope of the dike. Considering the low height of the embankment and that the downstream hazard is about 13 miles downstream in Taberg, it is felt that, under the 1 foot of water cresting the dike during the 1/2 PMF, the degree of erosion would not be great enough to cause the release of large enough volumes of the impounded water to significantly increase the downstream hazard.

5.7 EVALUATION

The hydrologic/hydraulic analysis establishes the spillway capacity as 42% of the Probable Maximum Flood (PMF). The concrete gravity non-overflow portion of the dam will be overtopped by 5.5 feet by the PMF, but will not be overtopped by the 1/2 PMF, whereas the earthen dike portion of the dam will be overtopped by 8.5 and 1.0 feet under the PMF and 1/2 PMF, respectively. However, in the opinion of the inspection team, the 1.0 foot of water cresting the dike during the 1/2 PMF is not expected to cause the release of a large enough volume of water to significantly increase the downstream hazard to loss of life. Therefore, the spillway is assessed as inadequate according to the Corps of Engineers screening criteria.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

This concrete dam is designed with a center spillway aligned with the downstream Fish Creek Channel; this spillway represents the most visible section of the dam structure. The dam's non-overflow sections to each side of the spillway have but little of their downstream sides exposed because of the presence of the downstream channels steep earth banks which adjoin the dam location.

Spillway flow was occurring at the time of the field inspection limiting the physical detail visible for evaluation. Some deterioration of construction joints in the spillway section and non-overflow sections were apparent but did not appear severe. Overall, the condition of the exposed concrete sections is considered fair to good.

Observations indicate the dam retains structural stability with no sign of structural movements evident. However, some seepage occurs through the dam's left non-overflow section (facing downstream) at various points. These seepage sources appear to be associated with the locations of construction joints but all origins could not be identified, particularly those at or near the ground line. For the right non-overflow section, the downstream face was dry but signs of past seepage exist; the earth slope in front of this section indicated dampness. Because of the spillway flow and topography in front of the adjacent dam sections, existance of underdam seepage could not be determined.

The tower for the outlet works is constructed to be part of the headwall structure where the spillway and right non-overflow section join. Within this concrete tower, below the reservoir level, wall seepage occurs at a number of locations. Seepage/leakage is occurring around one intake pipe where it passes through the tower wall. No signs of structural damage are evident within the tower.

The fuse-plug earthen dam for the emergency spillway route situated east of the main dam provides a structurally stable appearance but does have trees growing on the upstream and downstream slopes.

b. Seismic Stability

No known faults exist in the vicinity of the dam. Earthquakes in the area are rather infrequent. The area is located within Zone 2 of the

Seismic Probability Map. Some of the earthquakes for the area are tabulated below:

Date	Intensity Modified Mercalli	Location Relative to Dam
1853	VI	18 miles N
1963	III	18 miles E
1979	IV-V	20 miles NE
1980	III	23 miles NE

c. Data Review and Stability Evaluation

Design drawings available for review show the plan and elevation for the dam and cross sections for the spillway and non-overflow sections but do not include information on the properties of the dam and foundation materials. As part of the present study, stability evaluations have been performed for the dam spillway section subject to forces expected under the normal operations condition and certain possible flood conditions. Actual properties of the dam's construction materials and foundations were not determined as part of this study; where information on properties were necessary for computations but lacking, assumptions felt to be practical were made. These stability computations assumed a dam cross-section based on dimensions indicated by the plans included in this report. It should be considered that in areas where deterioration has occurred the section dimensions would be less than indicated by the plans, with some adverse effect on the structural strength expected. The analysis also assumed the dam section to be a monolith possessing necessary internal resistance to shear and bending occurring as a result of loading.

The results of the stability computations are summarized in the table following this page. The stability analyses are presented in Appendix D.

The engineering studies indicte satisfactory stability against overturning and sliding effects for the dam subject to forces possible during a normal summer operation and the winter operation which includes the effects of an ice loading. Satisfactory stability is also indicated where seismic effects are imposed onto the normal summer operating condition.

For the 1/2 PMF and PMF conditions, satisfactory stability against overturning and sliding is indicated. For evaluating these cases, the analysis assumed that lateral pressures acting against the upstream and downstream faces of the dam were at the upstream and downstream flood levels respectively.

RESULTS OF STABILITY COMPUTATIONS

	Loading Condition	Factor of Safety* Overturning	Factor of Safety* Sliding**	Location of Resultant Passing through Base***
(1)	Water level at spillway elevation, uplift on base (no ice)	2.3	6.5	0.52b
(2)	Water level at spillway elevation, uplift on base plus 7.5 kips per lineal foot ice load	2.2	6.2	0.50b
(3)	Water levels against upstream face and downstream face based on 1/2 PMF elevations, uplift acting on base as computed for normal operating condition	1.81	4.7	0.41b
(4)	Water level against upstream face and downstream face based on PMF elevations, uplift acting on base as computed for normal operating condition	1.65	4.2	0.37b
(5)	Water level at spillway elevation, uplift on base, seismic affects applicable to Zone 2	1.98	5.4	0.47b

* These factors of safety indicate the ratio of moments resisting overturning to those moments causing overturning, and the ratio of forces resisting sliding to those causing sliding.

** As determined applying the friction-shear method.

*** Indicated in terms of dam's base dimension, b, measured from the toe of the dam.

Critical to the analysis and resulting indication of stability are the items of uplift water pressure acting on the base of the dam and the relative permeability of the site's foundation rock. For the "normal operating conditions" case, the analysis uplift force was based on a full headwater hydrostatic pressure acting on the dam's upstream corner and a zero tailwater hydrostatic pressure acting on the dam's downstream corner. Uplift pressures were assumed to vary linearly between the dam's upstream and downstream corners, and to act upon 100 percent of the dam base.

Uplift as computed for the normal operating condition was also assigned to the flood conditions studied, assuming that uplift pressures would not increase significantly over a relatively short flood stage time period because of an expected low foundation rock permeability.

Though the visual inspection and engineering analysis indicate no immediate stability problem, the through-the-dam leakage does imply the presence of structural discontinuities and/or deterioration. It is recommended that further surveillance be maintained to determine the extent of the noted leakage. In the event that conditions in this area become more severe, immediate investigations should be undertaken to determine the source and cause of this seepage and the necessary remedial actions should be promptly completed.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

The Phase I inspection of the Rome City Dam did not indicate conditions which would constitute an immediate hazard to human life or property.

The structural stability analysis indicates satisfactory stability for the dam under all considered loading conditions.

The hydrologic/hydraulic analysis indicates that the spillway will pass 42% of the PMF. A concrete parapet wall on the concrete gravity dam is at an elevation 3 feet above the crest of the auxiliary earth fill dam located just to the east of the main structure. The concrete gravity dam will be topped by 5.5 feet by the PMF and the earthen dike will be topped by 8.5 feet by the PMF. The 1/2 PMF will not top the concrete gravity structure but will top the earthen dike by one foot. The earthen dike is less than 5 feet high over most of its length and reaches a maximum height of only 7 feet. Failure of this embankment would not cause the release of large enough volumes of impounded water to significantly increase the downstream hazard. The spillway capacity, therefore, is assessed as inadequate.

The following specific safety assessments are based on the Phase 1 Visual Examination and Analysis of Hydrology and Hydraulics and Structural Stability:

1. Minor seepage is occurring through the concrete near the left abutment. It appears that additional and more substantial seepage is occurring below the ground line on the left abutment.

2. Visual observations indicate minor surface spalling on concrete surfaces of the structure.

3. The earth fill dam is overgrown with trees and brush.

4. Leakage is taking place around the piping in the wall of the outlet structure.

5. No warning system is presently in affect to alert the public should conditions occur which could result in failure of the dam.

b. Adequacy of Information

The information available is adequate for this Phase 1 investigation.

c. Urgency

A surveillance program should be undertaken immediately to detect any change in the amount of seepage as indicated in Item 1 of the Safety Assessment. The minor spalling of concrete surfaces should be repaired during normal maintenance procedures. A warning system should be developed for the facility and placed in effect within two years.

d. Need for Additional Investigation

No additional investigations relative to the safety of this structure are necessary at the present time. However, in the event that the seepage near the left abutment becomes more severe, investigations should be undertaken to detemine the source and severity of the seepage and remedial action should be taken as soon as possible.

7.2 RECOMMENDED MEASURES

The following is a list of recommended measures to be undertaken to insure safety of the facility:

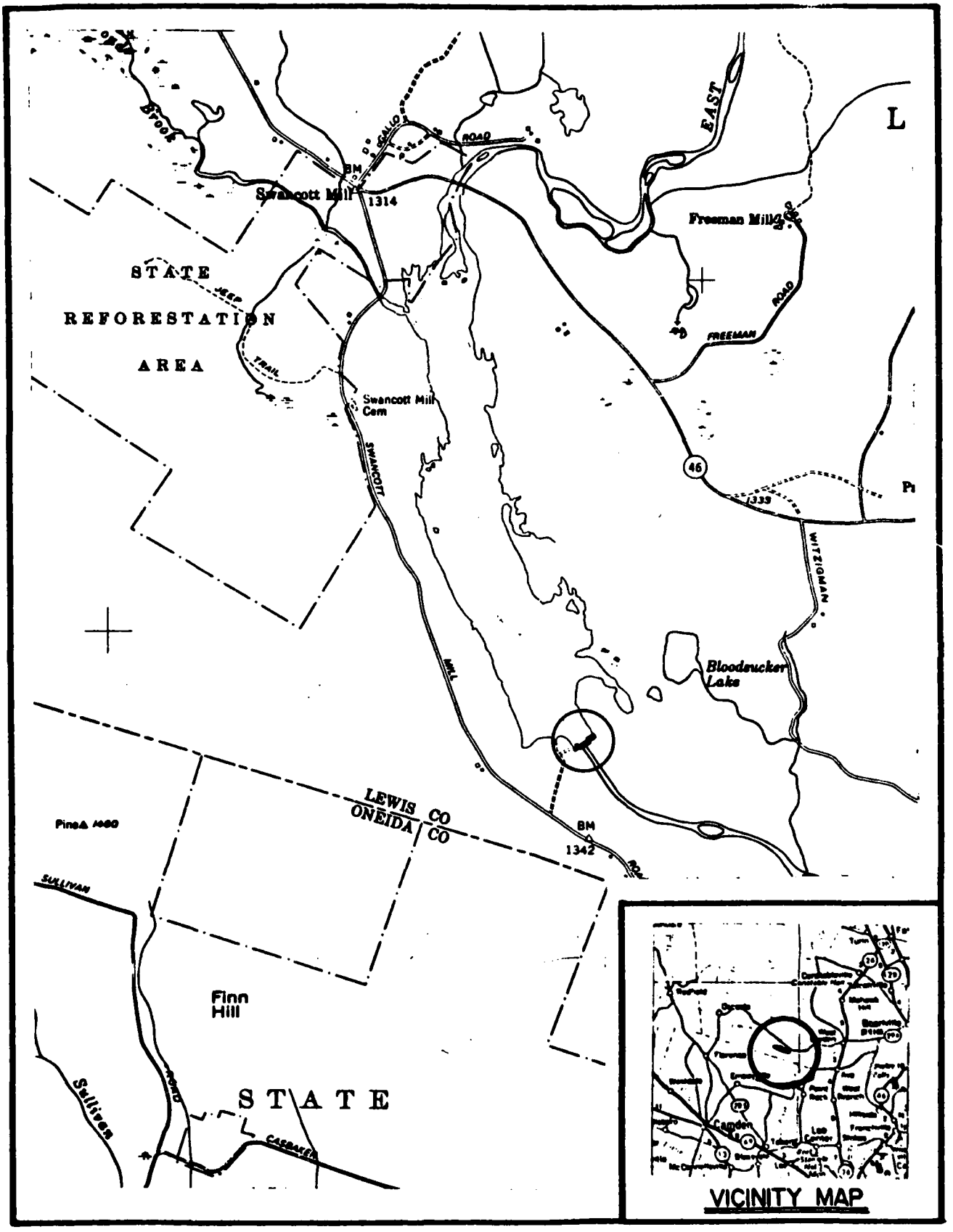
1. The seepage near the left abutment should be kept under surveillance to detect any worsening of this condition. Inspections of the area should be made at least four times yearly and photographs taken of the site. The quantity of the flow should be measured as an attempt to detect any worsening of the seepage. Formal reports should be made of these inspections and copies submitted to the New York State Department of Environmental Conservation Dam Safety Section for their review.

2. Leakage around the piping in the inlet structure should be repaired within six months.

3. Remove trees and brush from the slopes of the earth fill dam.

4. A flood warning and emergency evacuation system should be implemented to alert the public in the event conditions occur which could result in failure of the dam.

5. A formalized inspection system should be initiated to develop data on the conditions and maintenance operations at the facility.



LOCATION PLAN

FIGURE 1

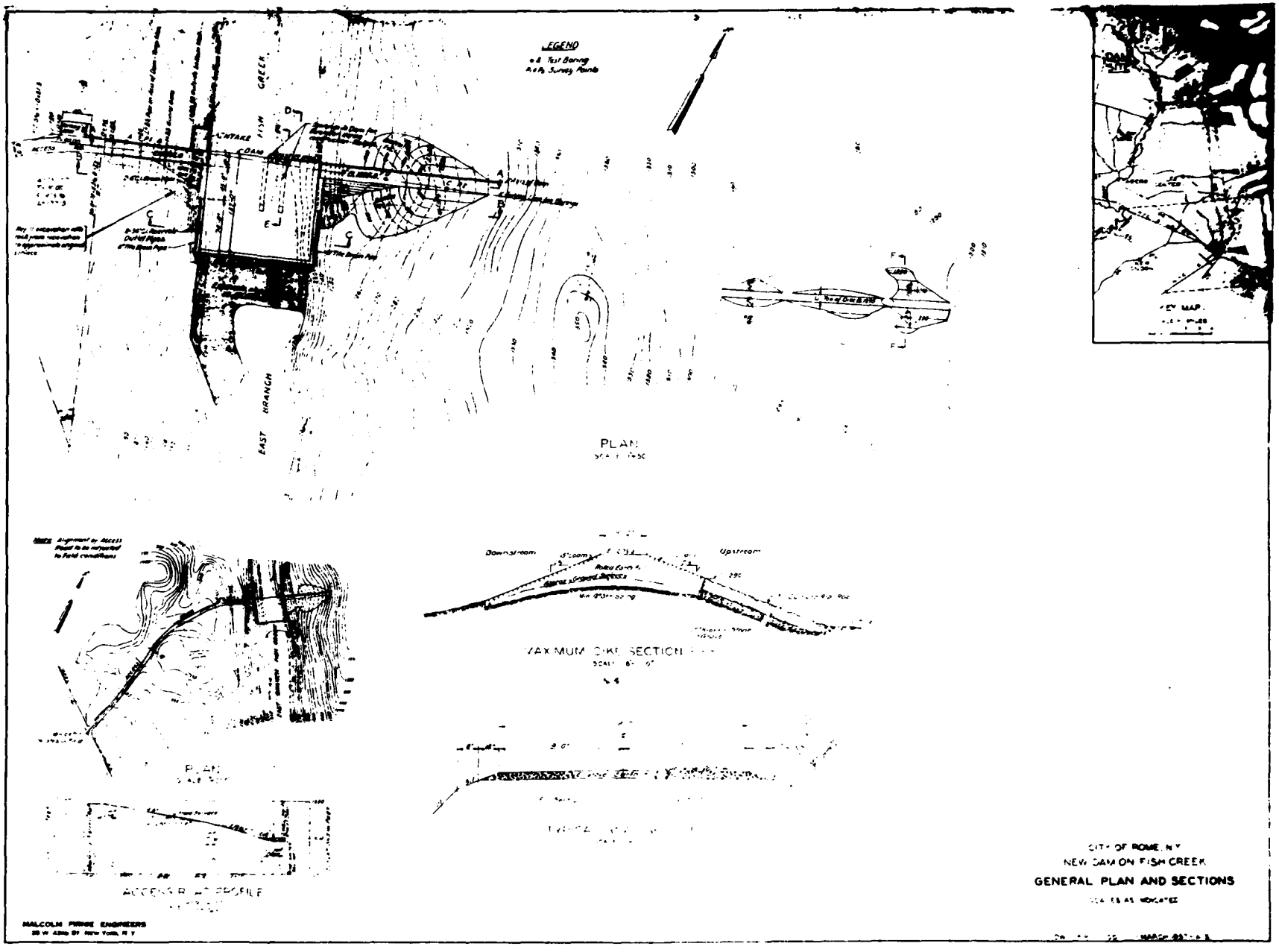

LEGEND
EAST BRANCH
PLAN
MAXIMUM DIKE SECTION
PLAN
ACCESS ROAD PROFILE
MALCOLM PIRNIE ENGINEERS
CITY OF ROME, N.Y.
NEW DAM ON FISH CREEK
GENERAL PLAN AND SECTIONS

FIGURE 2

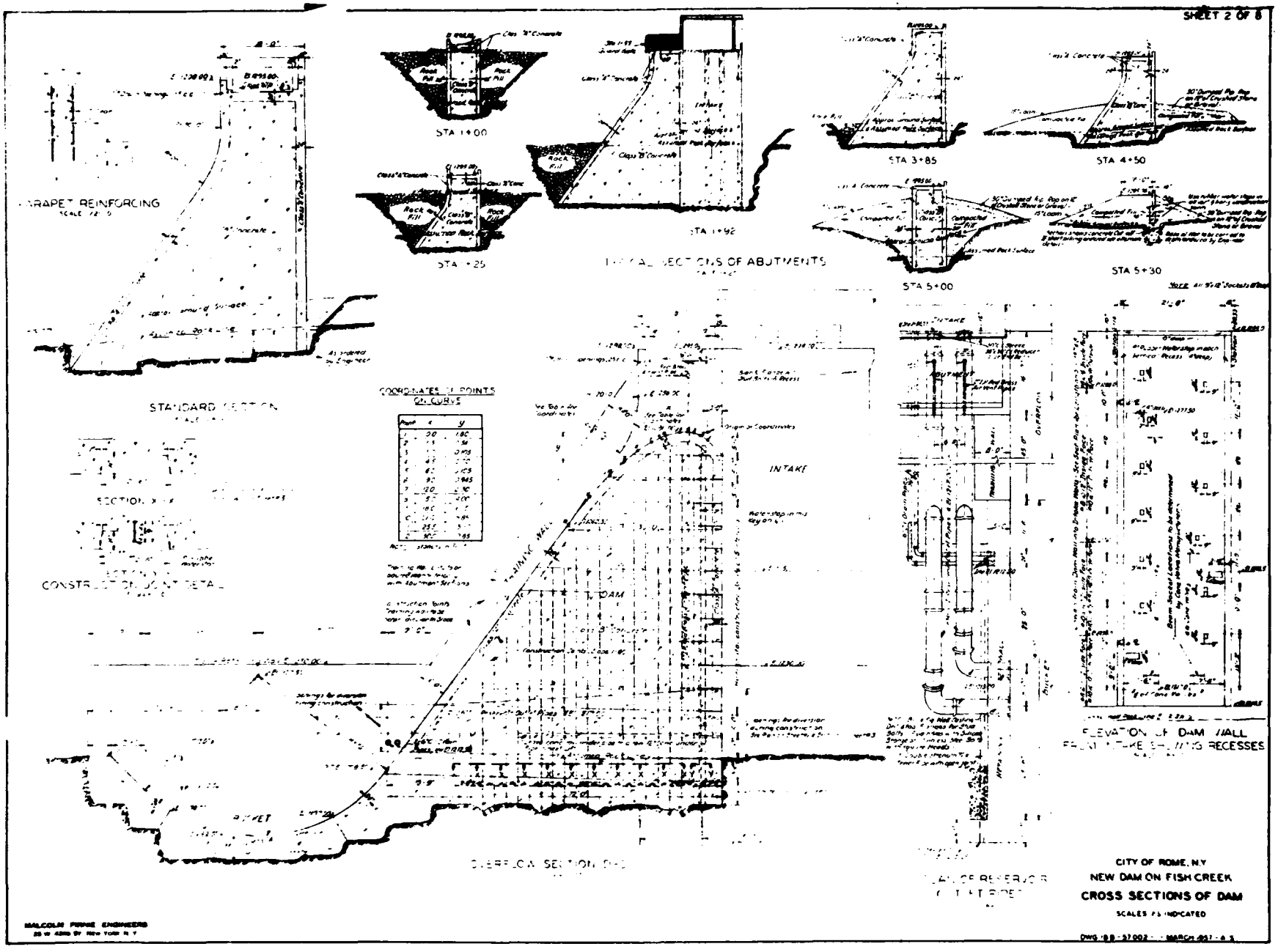

SHEET 2 OF 8
PARAPET REINFORCING
STA 1+00
STA 1+92
STA 2+25
TYPICAL SECTIONS OF ABUTMENTS
STA 3+85
STA 4+50
STA 5+00
STA 5+30
STANDARD SECTION
COORDINATES OF POINTS ON CURVE
INTAKE
DAM
TRAINING WALL
OVERFLOW SECTION
ELEVATION OF DAM WALL
CITY OF ROME, N.Y.
NEW DAM ON FISH CREEK
CROSS SECTIONS OF DAM
SCALES AS INDICATED

FIGURE 3

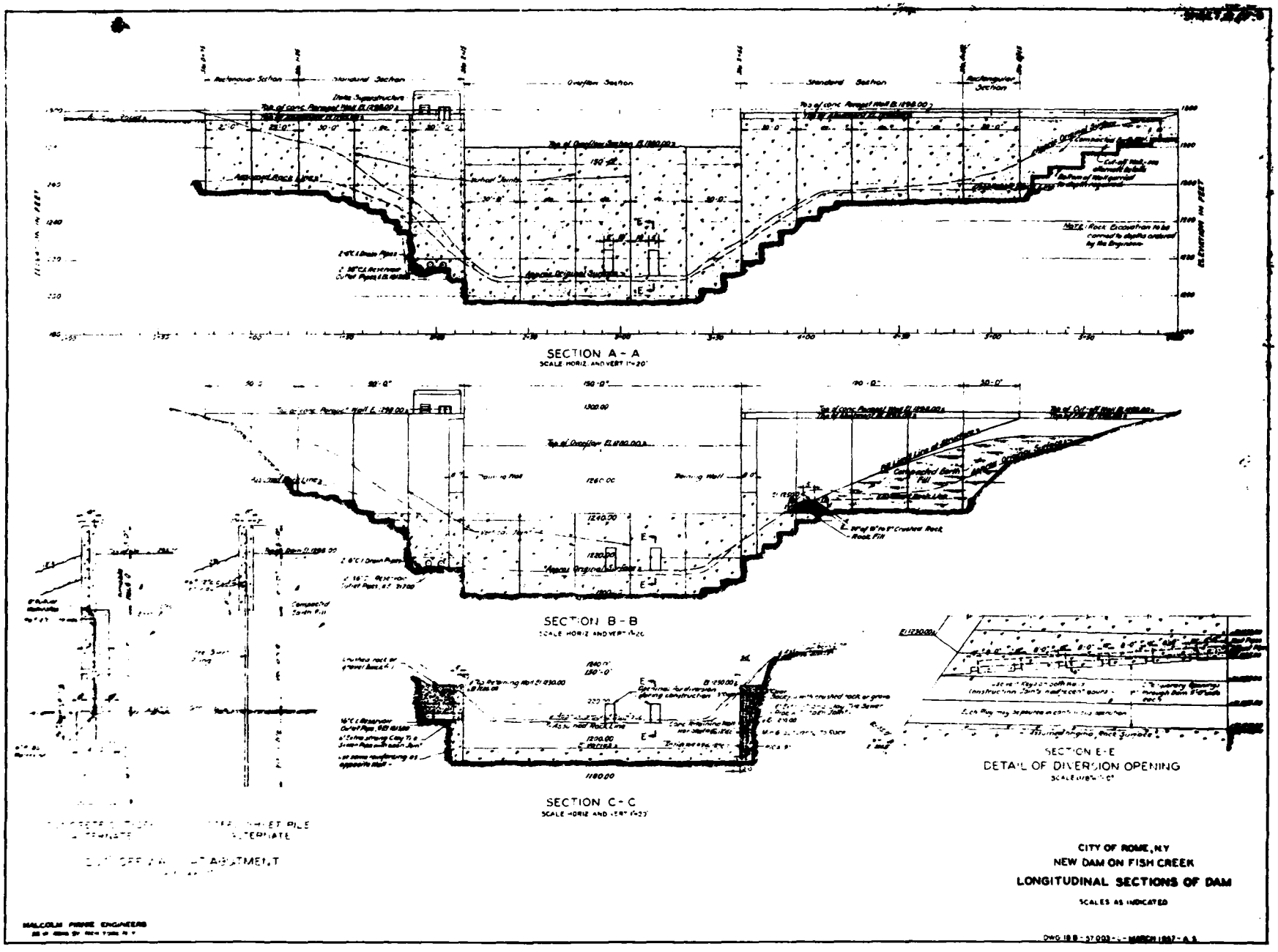

SECTION A - A
SCALE HORIZ. AND VERT. 1"=20'
SECTION B - B
SCALE HORIZ. AND VERT. 1"=20'
SECTION C - C
SCALE HORIZ. AND VERT. 1"=20'
SECTION E-E
DETAIL OF DIVERSION OPENING
CITY OF ROME, N.Y.
NEW DAM ON FISH CREEK
LONGITUDINAL SECTIONS OF DAM
SCALES AS INDICATED
MALCOLM PIRNIE ENGINEERS

FIGURE 4

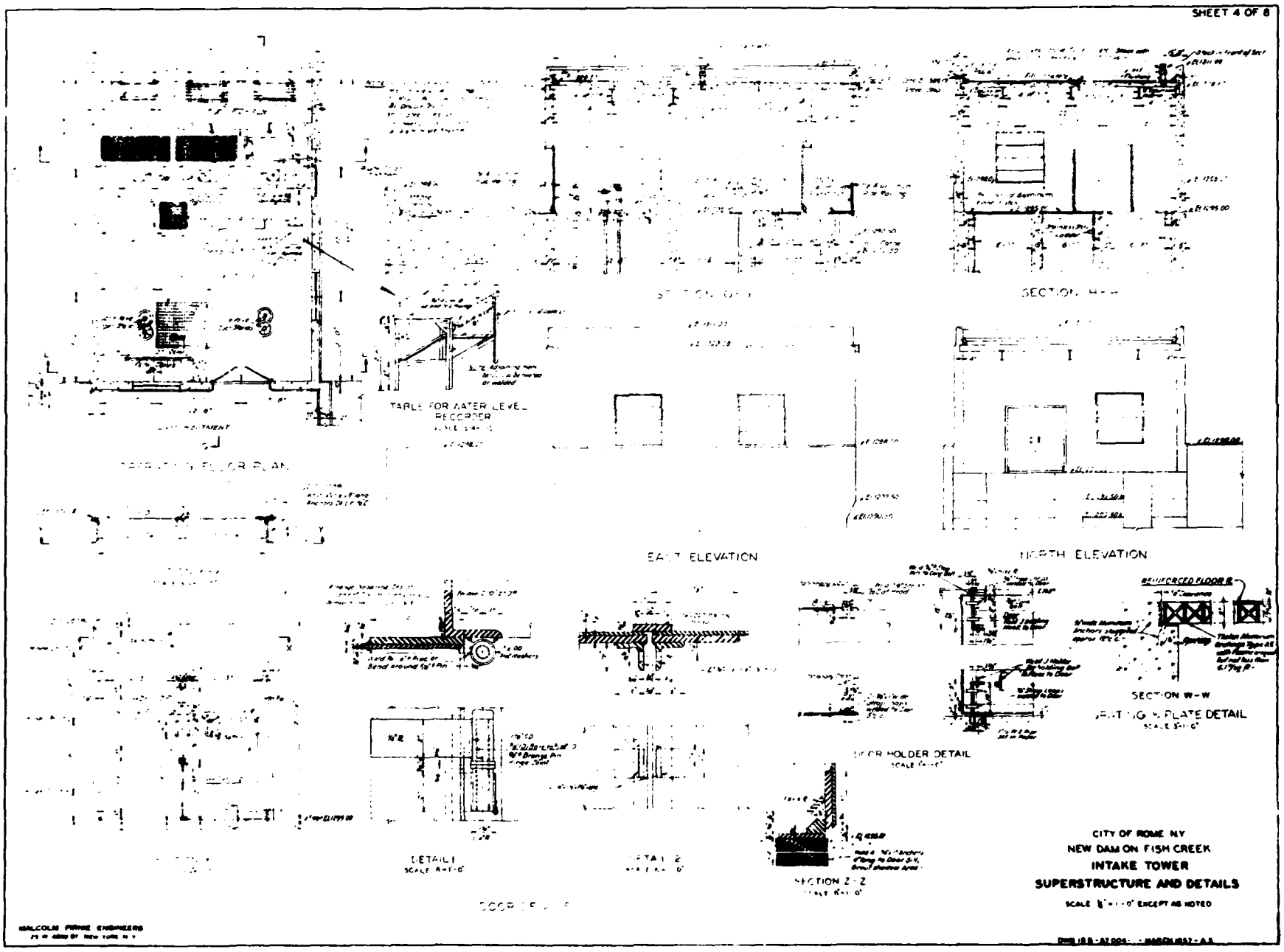

SHEET 4 OF 8
TABLE FOR WATER LEVEL RECORDER
EAST ELEVATION
NORTH ELEVATION
SECTION W-W
DETAIL 1
SECTION Z-Z
CITY OF ROME NY
NEW DAM ON FISH CREEK
INTAKE TOWER
SUPERSTRUCTURE AND DETAILS
MALCOLM PIRNIE ENGINEERS

FIGURE 5

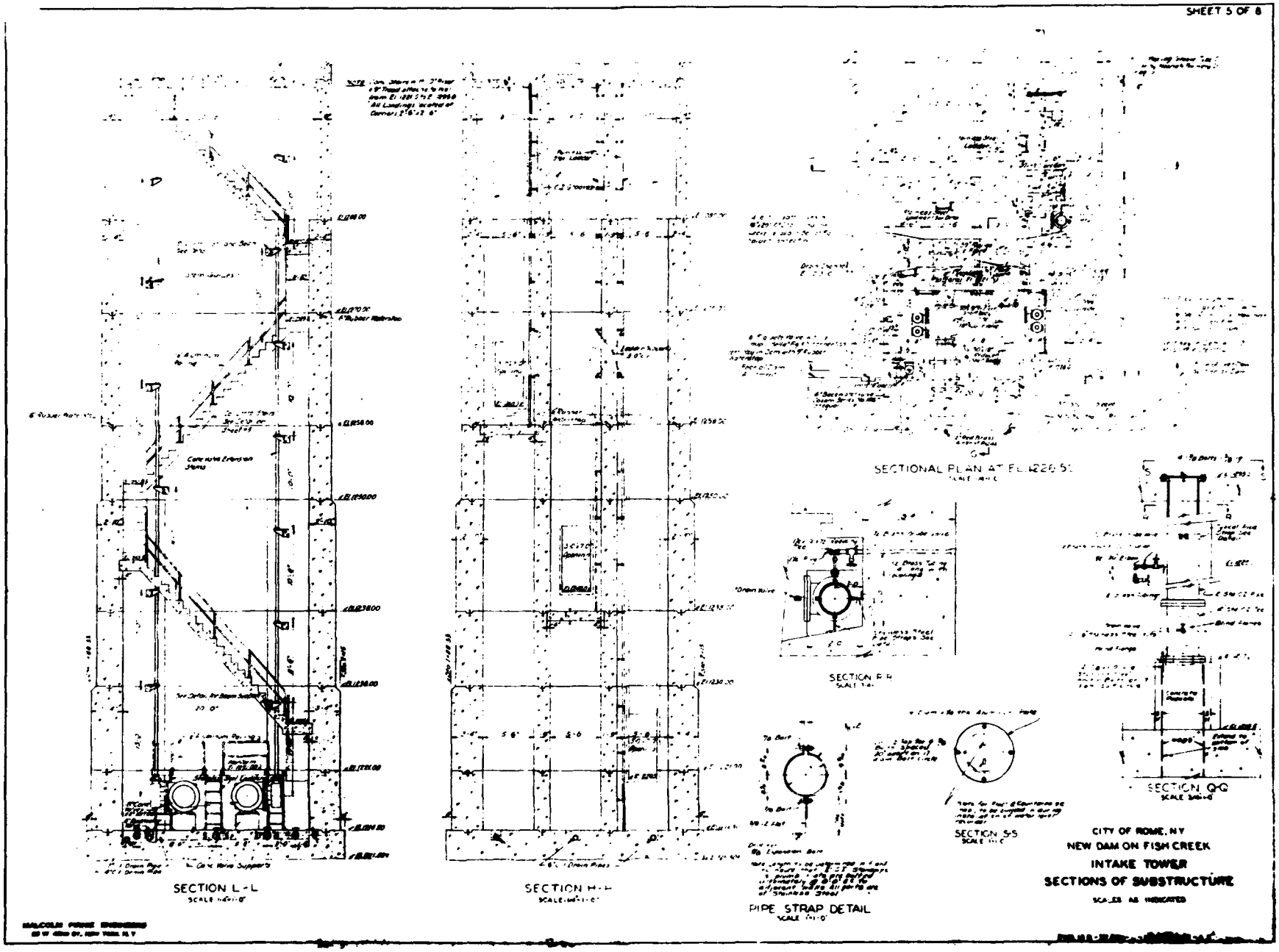

SECTION L-L
SCALE 1/4"=1'-0"
SECTION H-H
SCALE 1/4"=1'-0"
SECTIONAL PLAN AT EL. 1228.50
SECTION P-P
SECTION Q-Q
SECTION S-S
PIPE STRAP DETAIL
CITY OF ROME, N.Y.
NEW DAM ON FISH CREEK
INTAKE TOWER
SECTIONS OF SUBSTRUCTURE
SCALES AS INDICATED
MALCOLM PIRNIE ENGINEERS

FIGURE 6

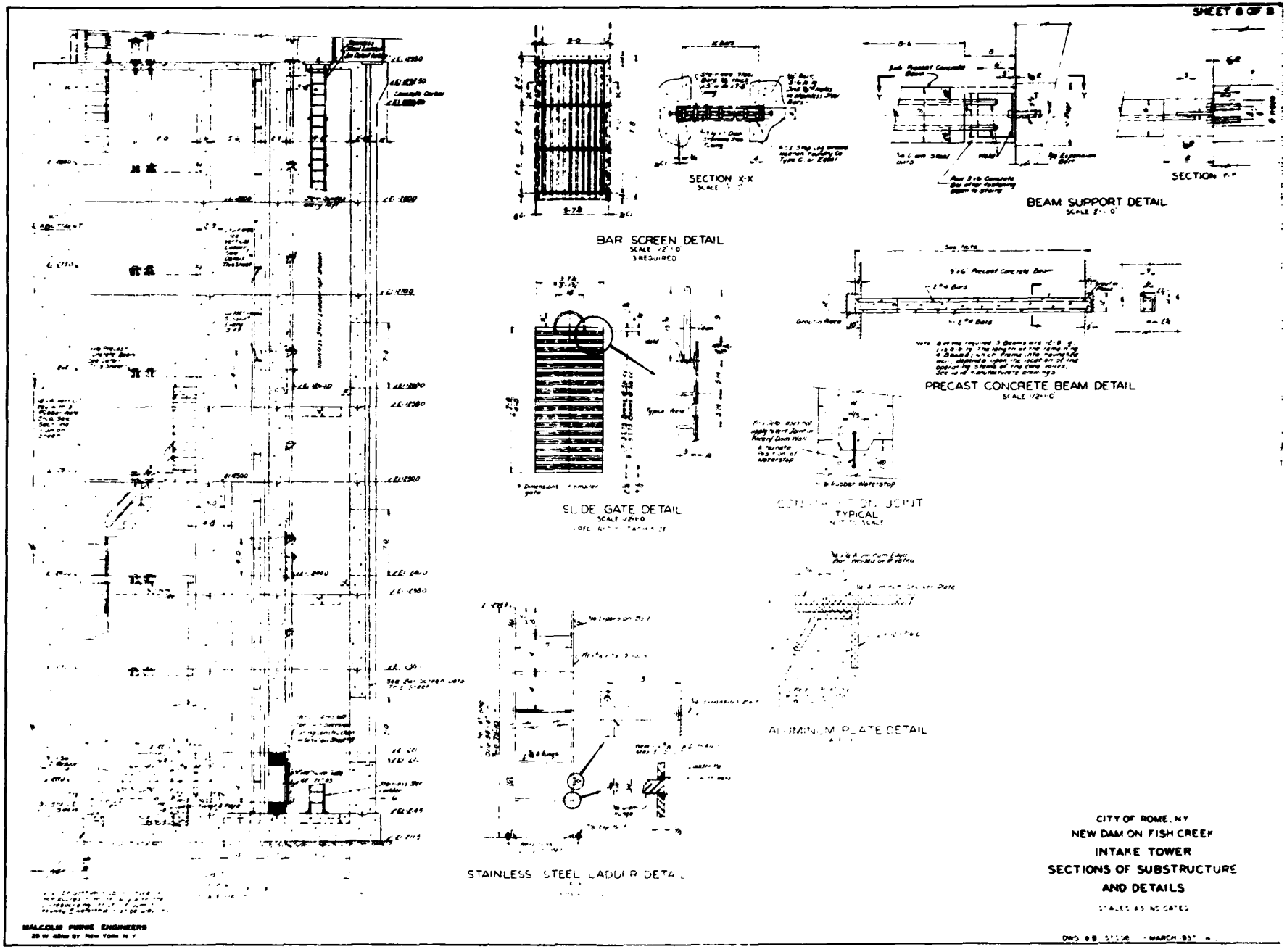

SHEET 8 OF 8
BAR SCREEN DETAIL
SECTION X-X
BEAM SUPPORT DETAIL
SECTION
PRECAST CONCRETE BEAM DETAIL
SLIDE GATE DETAIL
TYPICAL
ALUMINUM PLATE DETAIL
STAINLESS STEEL LADDER DETAIL
CITY OF ROME, NY
NEW DAM ON FISH CREEK
INTAKE TOWER
SECTIONS OF SUBSTRUCTURE
AND DETAILS
MALCOLM PIRNIE ENGINEERS

FIGURE 7

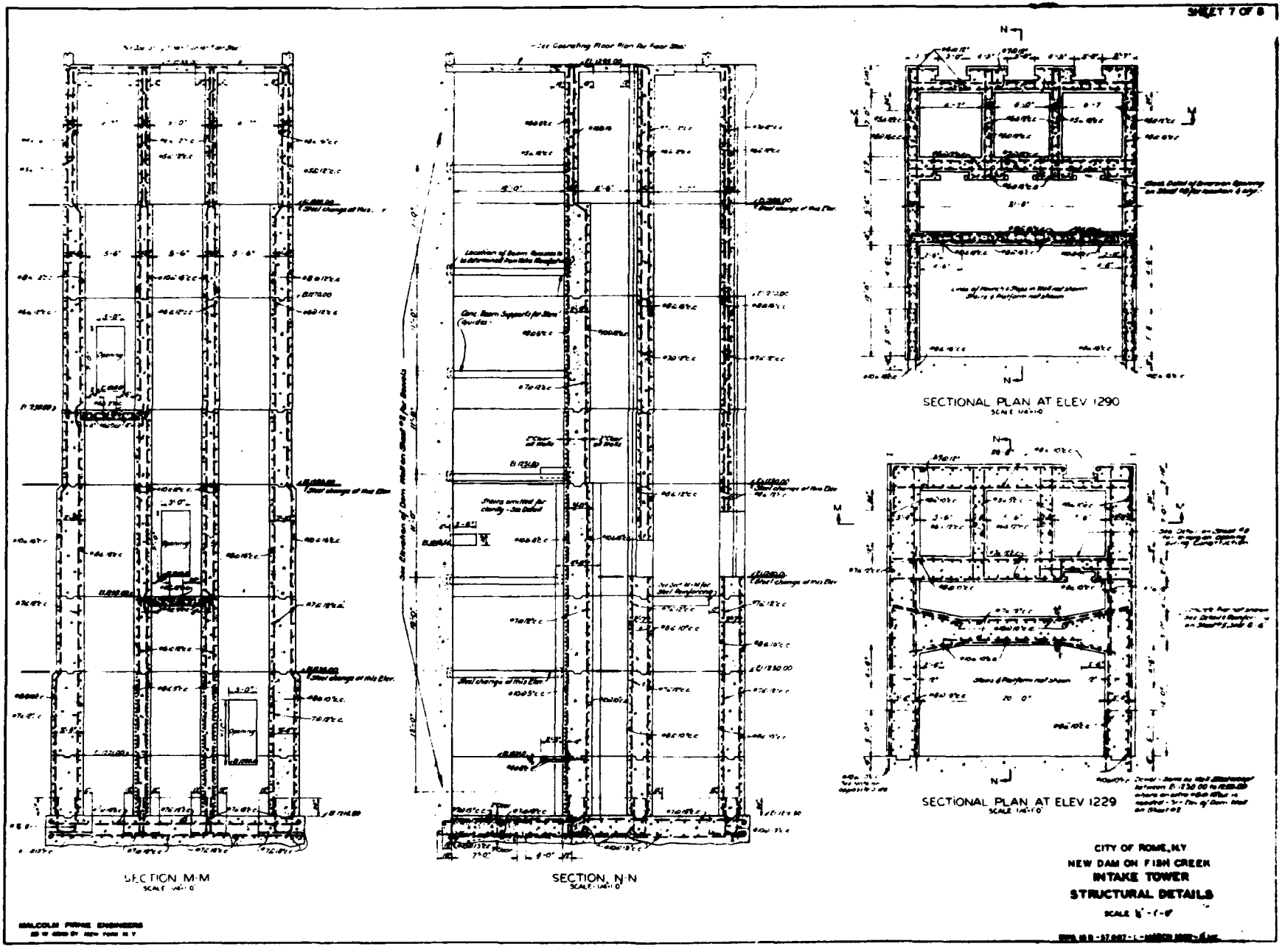
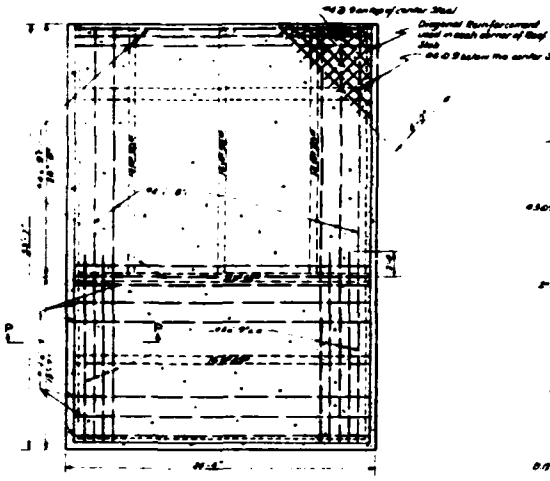
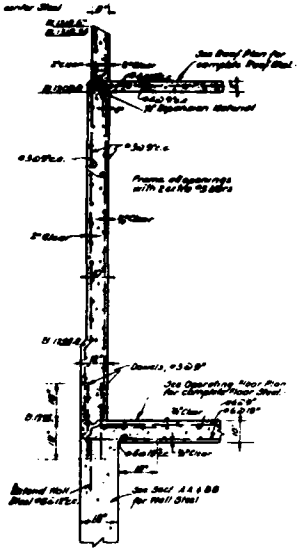

SECTION M-M
SCALE 1/4"=1'-0"
SECTION N-N
SCALE 1/4"=1'-0"
SECTIONAL PLAN AT ELEV 1290
SCALE 1/4"=1'-0"
SECTIONAL PLAN AT ELEV 1229
SCALE 1/4"=1'-0"
CITY OF ROME, N.Y.
NEW DAM ON FISH CREEK
INTAKE TOWER
STRUCTURAL DETAILS
SCALE 1/4"=1'-0"
MALCOLM PIRNIE, ENGINEERS

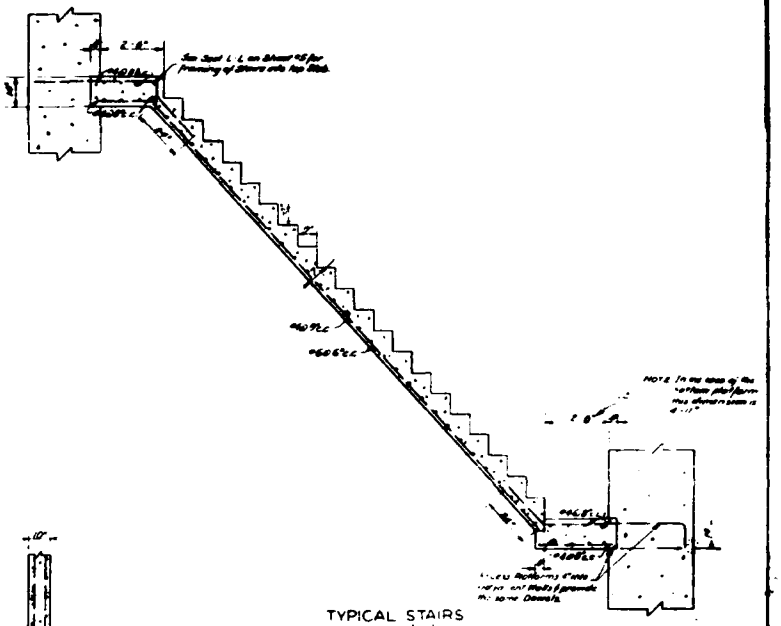
FIGURE 8



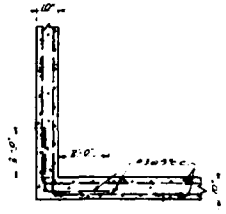
SECTIONAL PLAN OF ROOF
SCALE 1/4"=1'-0"



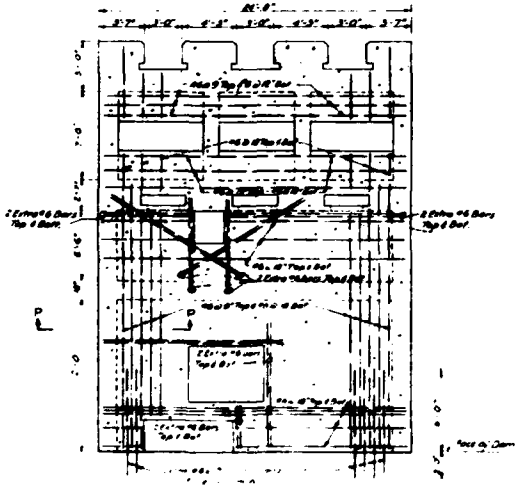
SECTION P-P
SCALE 1/2"=1'-0"



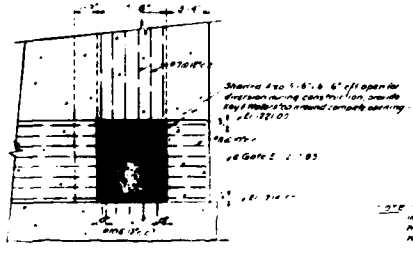
TYPICAL STAIRS
SCALE 1/2"=1'-0"



TYPICAL SUPERSTRUCTURE
HORIZONTAL JOINT
SCALE 1/2"=1'-0"



SECTIONAL PLAN OF OPERATING FLOOR



ELEVATION OF WALL FOR
DIVERSION DURING CONSTRUCTION
SCALE 1/4"=1'-0"

MALCOLM PIRNIE ENGINEERS

CITY OF ROME N.Y.
NEW DAM ON FISH CREEK
INTAKE TOWER
STRUCTURAL DETAILS
SCALES AS INDICATED

FIGURE 9

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam Rome City Reservoir County Lewis State New York ID # NY 558

Type of Dam Concrete Gravity Hazard Category High

Date(s) Inspection 6/18/80 Weather Sunny Temperature 80° +

Pool Elevation at Time of Inspection 1280.5 ± M.S.L. Tailwater at Time of Inspection No measurement taken

Inspection Personnel:

J. A. Gomez	Dale Engineering Company	
F. W. Byszewski	Dale Engineering Company	
D. F. McCarthy	Dale Engineering Company	
H. Muskatt	Dale Engineering Company	
Mr. Fallman	City of Rome	

J. A. Gomez Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	Noticeable seepage from both vertical and horizontal joints of left non-overflow section. At toe of slope of this section, there's substantial flow coming out of the ground near the non-overflow wall.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Non-overflow walls tie into what appears to be natural ground. Steel sheet piling extends from end of left non-overflow section back into natural ground at the same top elevation as non-overflow section.	
DRAINS	No deficiencies observed.	
WATER PASSAGES	See section on outlet works.	
FOUNDATION	Dam and abutment walls appear to be founded on sandstone. Downstream of dam, many blocks of rock from outcrops loosened and removed probably due to frost wedging.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Minor spalling of concrete on left wing-wall of bucket dissipator.	
STRUCTURAL CRACKING	No significant structural cracking observed.	
VERTICAL & HORIZONTAL ALIGNMENT	Alignment appeared good; did not observe any signs of structural instability.	
MONOLITH JOINTS	Some deterioration along monolith joints.	
CONSTRUCTION JOINTS	Some deterioration of both horizontal and vertical joints	
STAFF GAGE OF RECORDER	None observed.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	Embankment in saddle to east of concret dam. Upstream and downstream slopes are treed. Upstream face rip rapped. Road (trail)along embankment crest.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed	
VERTICAL AND HORIZONTAL AL!NEMENT OF THE CREST	No anomalies observed	
RIPRAP FAILURES	None observed	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Difficult to differentiate between embankment and natural ground. No anomalies observed.	
ANY NOTICEABLE SEEPAGE	None observed.	
STAFF GAGE AND RECORDER	Not applicable	
DRAINS	None known.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Flow over spillway obscured face. Pattern of flow indicated some deterioration of face at horizontal joints. A few isolated areas of noticeable deterioration on crest.	Ogee shaped
APPROACH CHANNEL	Reservoir	
DISCHARGE CHANNEL	Fish Creek. Rock bottom and side slopes.	Discharges into concrete submerged bucket dissipator.
BRIDGE AND PIERS	None	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not applicable	
APPROACH CHANNEL	Not applicable	
DISCHARGE CHANNEL	Not applicable	
BRIDGE AND PIERS	Not applicable	
GATES AND OPERATION EQUIPMENT	Not applicable	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Outlet conduits: Two 36" C.I. pipes	
INTAKE STRUCTURE	Leakage occurring through the wall of the intake tower under one of the pipes passing through. Some wetness on walls of concrete intake tower.	Two 36" diameter C.I. Reservoir outlets controlled by 18" cone valves in intake tower. Pipes @ elev. 1215.5 (Spillway crest @ elev. 1280)
OUTLET STRUCTURE	Outlets through right training wall of bucket dissipator.	
OUTLET CHANNEL	Bucket dissipator pool	
EMERGENCY GATE	Flow through outlets controlled by 18" cone valves.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Rocky bottom and side slopes, tree covered banks. Stream fairly clean.	
SLOPES	Supercritical through much of reach below dam, although not real steep.	
APPROXIMATE NO. OF HOMES AND POPULATION	Two or three houses about 10,000 feet downstream, which are about 30 feet above stream level. Hamlet of Point Rock about 5½ miles downstream. Numerous houses along creek banks in Taberg - about 13 miles downstream.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed	
OBSERVATION WELLS	None observed	
WEIRS	None observed	
PIEZOMETERS	None observed	
OTHER	None observed	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Tree-covered. No signs of instability noted near dam.	
SEDIMENTATION	Not observed due to reservoir depth	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM Rome City Reservoir

ID # NY 558

ITEM	REMARKS
AS-BUILT DRAWINGS	None available
REGIONAL VICINITY MAP	U.S.G.S. Map
CONSTRUCTION HISTORY	D.E.C. files, applications
TYPICAL SECTIONS OF DAM	1957 plans
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	1957 Plans 1960 rating chart for 18" cone valves of outlet pipes
RAINFALL/RESERVOIR RECORDS	None available

ITEM	REMARKS
DESIGN REPORTS	No Design Report known. Design Notes may be obtainable from Malcolm Pirnie.
GEOLOGY REPORTS	1954 "Report on Water Supply" by O'Brien & Gere 1957 "Supplementary Report" by Malcolm Pirnie
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Design computations may be obtainable from Malcolm Pirnie. Efforts to locate these were unsuccessful due to time frame of this project.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	1954 Report by O'Brien & Gere 1957 Report by Malcolm Pirnie
POST-CONSTRUCTION SURVEYS OF DAM	None known
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SYSTEMS	None known
MODIFICATIONS	None known
HIGH POOL RECORDS	None known
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None known
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Not applicable
MAINTENANCE OPERATION: RECORDS	No formal records

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	1957 plans
OPERATING EQUIPMENT PLANS & DETAILS	1957 plans

CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 93.7 sq. miles

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 4345 ac-ft @ elev. 1280

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 9885 ac-ft @ elev. 1298

ELEVATION MAXIMUM DESIGN POOL: 8625 ac-ft. @ elev. 1295

ELEVATION TOP DAM: 1298 (concrete gravity), 1295 (earthen dike)

CREST:

a. **Elevation** 1280
b. **Type** Ogee crested
c. **Width** Not applicable
d. **Length** 150 ft.
e. **Location Spillover** Center of Dam
f. **Number and Type of Gates** Not applicable

OUTLET WORKS:

a. **Type** Two 36" diameter C.I. pipes
b. **Location** Right non-overflow
c. **Entrance Inverts** 1215.5
d. **Exit Inverts** 1211.5
e. **Emergency Draindown Facilities** Low level outlets
2 - 36" C.I. pipes

HYDROMETEOROLOGICAL GAGES:

a. **Type** Not applicable
b. **Location** Not applicable
c. **Records** Not applicable

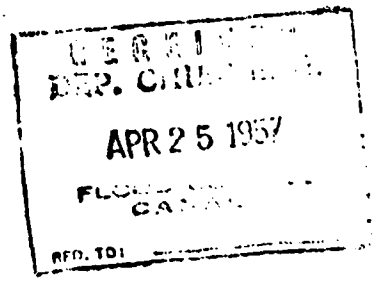
MAXIMUM NON-DAMAGING DISCHARGE: Unknown

APPENDIX B

PREVIOUS INSPECTION REPORTS/RELEVANT CORRESPONDENCE

Form E-61. 8-14-52-2M (2D-202)
Ord. 7-05-58

STATE OF NEW YORK



DEPARTMENT OF PUBLIC WORKS

ALBANY

Received 4/25/57 Dam No. 102-2546

Disposition appv. 4/25/57 Watershed Oswego

Foundation inspected .....

Structure inspected .....

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see third page of this application) for the approval of specifications and detailed drawings, marked New Dam on Fish Creek, City of Rome, N. Y.

herewith submitted for the { construction / ~~reconstruction~~ } of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about September 15, 1958 (Date)

1. The dam will be on E. Branch Fish Creek flowing into same in the town of Lewis County of Lewis and 4-1/2 miles north by northwest of Point Rock Village (Give exact distance and direction from a well-known bridge, dam, village, main cross-roads or mouth of a stream)
2. Location of dam is shown on the Point Rock quadrangle of the United States Geological Survey.
3. The name of the owner is City of Rome, N. Y.
4. The address of the owner is City Hall, Rome, N. Y.
5. The dam will be used for Water Supply
6. Will any part of the dam be built upon or its pond flood any State lands? Yes This was called to attention of [illegible]
7. The watershed above the proposed dam is 100 square miles.
8. The proposed dam will create a pond area at the spillcrest elevation of 210 acres and will impound 187,000,000 cubic feet of water.

9. The maximum height of the proposed dam above the bed of the stream is 35 feet 0 inches.

10. The lowest part of the natural shore of the pond is not applicable feet vertically above the spillcrest, and everywhere else the shore will be at least ..... feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam possible flooding of Point Rock Bridge

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) sandstone

13. Facing downstream, what is the nature of material composing the right bank? sandstone

14. Facing downstream, what is the nature of the material composing the left bank? sandstone

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Hard sandstone with some thin shaly layers. Insoluble. No evidence of perviousness or disintegration on exposure to air or water.

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? Not indicated by borings or siesmic survey

17. WASTES. The spillway of the above proposed dam will be 150 feet long in the clear; the waters will be held at the right end by a masonry section the top of which will be 15 feet above the spillcrest, and have a top width of 18 feet; and at the left end by a masonry section the top of which will be 15 feet above the spillcrest, and have a top width of 18 feet.

18. The spillway is designed to safely discharge 32,000 cubic feet per second.

19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows: None but auxiliary earth dike will be overtopped at flow of 32,000 cfs permitting much larger discharge.

20. What is the maximum height of flash boards which will be used on this dam? None

21. APRON. Below the proposed dam there will be an apron built of concrete - 65 feet long across the stream, 150 feet wide and min. 5 feet thick.

22. Does this dam constitute any part of a public water supply? yes

INSTRUCTIONS

Read carefully on the third page of this application the law setting forth the requirements to be complied with in order to construct or reconstruct a dam.

Each application for the construction or reconstruction of a dam must be made on this standard form, copies of which will be furnished upon request to the Department of Public Works, Albany, N. Y. The application must be accompanied by three sets of plans, and specifications. The information furnished must be in sufficient detail in order that the stability and safety of the dam can be determined. In cases of large and important dams assumptions made in calculating stresses and stability should be given.

Samples of materials to be used in the dam and of the material on which the dam is to be founded may be asked for, but need not be furnished unless requested.

If the dam constitutes a part of a public water supply, application should be made to the Water Power and Control Commission under Article XI of the Conservation Law.

An application for the construction or reconseruction of a dam must be signed by the prospective owner of the dam or his duly authorized agent. The address of the signer and the date must be given as provided for on the last page of the application form.

SECTION 948 OF THE CONSERVATION LAW

§ 948. Structures for impounding water; inspection of docks; penalties. No structure for impounding water and no dock, pier, wharf or other structure used as a landing place on waters shall be erected or reconstructed by any public authority or by any private person or corporation without notice to the superintendent of public works, nor shall any such structure be erected, reconstructed or maintained without complying with such conditions as the superintendent of public works may by order prescribe for safeguarding life or property against danger therefrom. No order made by the superintendent of public works shall be deemed to authorize any invasion of any property rights, public or private, by any person in carrying out the requirements of such order. The superintendent of public works shall have power, whenever in his judgment public safety shall so require, to make and serve an order, setting forth therein his findings of fact and his conclusions therefrom, directing any person, corporation, officer or board, constructing, maintaining or using any structure hereinbefore referred to, either remove the said structure or to repair or reconstruct the same within such reasonable time and in such manner as shall be specified in such order, and it shall be the duty of every such person, corporation, officer or board, to obey, observe and comply with such order and with the conditions prescribed by the superintendent of public works for safeguarding life or property against danger therefrom, and every person, corporation, officer or board failing, omitting or neglecting so to do, or who hereafter erects or reconstructs any such structure hereinbefore referred to without submitting to the superintendent of public works and obtaining his approval of plans and specifications for such structures when required to do so by his order or hereafter fails to remove, erect or to reconstruct the same in accordance with the plans and specifications so approved shall forfeit to the people of the State a sum not to exceed five hundred dollars to be fixed by the court for each and every offense; every violation of any such order shall be a separate and distinct offense, and, in such case of a continuing violation, every day's continuance thereof shall be and be deemed to be a separate and distinct offense. Such order shall not contain any provision to compel the owner to make repairs or proceed with reconstruction as specified in this section by any type of construction other than that of the dam itself. In addition to said forfeiture upon the violation of any such order, the superintendent of public works shall have power to enter upon the lands and waters where such structures are located, for the purpose of removing, repairing or reconstructing the same, and to take such other and further precautions which he may deem necessary to safeguard life or property against danger therefrom. In removing, repairing and reconstructing such dam the superintendent shall not deviate from the method, manner or specifications contained in the original order. The superintendent of public works shall certify the amount of the costs and expenses incurred by him for the removal, repair or reconstruction aforesaid, or in anywise connected therewith, to the board of supervisors of the county or counties in which the said lands and waters are located, whereupon it shall be the duty of such board of supervisors to add the amount so certified to the assessment rolls of such locality or localities as a charge against the real property upon which the dam is located designated or described by the superintendent of public works as chargeable therewith, and to issue its warrant or warrants for the collection thereof. Thereupon it shall become the duty of such locality or localities through their proper officers to collect the amounts so certified in the same manner as other taxes are collected in such locality or localities, and when collected, to pay the same to the superintendent of public works

who shall thereupon pay the same into the treasury. Any amount so levied shall thereupon become a lien upon the real property affected thereby, to the same extent as any tax levy becomes and is a lien thereon.

Any person in interest may, within thirty days from the service of any such order, appeal to the supreme court to determine the reasonableness of such order. At any time during such appeal to the supreme court upon at least three days' notice, the party appealing may apply for an order directing any question of fact to be tried and determined by a jury, and the court shall thereupon cause such question to be stated for trial accordingly and the findings of the jury upon such question shall be conclusive. Appeals may be taken from the supreme court to the appellate division of the supreme court and to the court of appeals in such cases, subject to the limitations provided in the civil practice act.

This section shall not apply to a dam where the area draining into the pond formed thereby does not exceed one square mile, unless the dam is more than ten feet in height above the natural bed of the stream at any point or unless the quantity of water which the dam impounds exceeds one million gallons; nor to a dock, pier, wharf or other structure under the jurisdiction of the department of docks, if any, in a city of over one hundred and seventy-five thousand population. This section as hereby amended shall not impair the effect of an order heretofore made by the conservation commission or commissioner under this section prior to the taking effect of chapter four hundred and ninety-nine of the laws of nineteen hundred and twenty-one, nor require the approval by the superintendent of public works, of plans and specifications theretofore approved by such commission or commissioner under this section.

The foregoing information is correct to the best of my knowledge and belief, and the construction will be carried out in accordance with the approved plans and specifications.

City of Rome, N. Y. ....., Owner

By Malcolm Pirnie Engineers ....., authorized agent of owner.

Address of signer 25 West 43rd Street, N.Y. 36, N.Y. Date April 22, 1957

Robert D. Mitchell

By: Robert D. Mitchell - Partner

N.Y. License # 21860

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DAM INSPECTION REPORT
(By Visual Inspection)

Dam Number	River Basin	Town	County	Hazard Class*	Date & Inspector
102-2546	Oswego	Lewis	Lewis	B-C	8/4/76 KDH BC

Type of Construction

- ☐ Earth w/concrete spillway
- ☐ Earth w/drop inlet pipe
- ☐ Earth w/stone or riprap spillway
- ☑ Concrete
- ☐ Stone
- ☐ Timber

Use

- ☑ Water Supply
- ☐ Power
- ☑ Recreation
- ☐ Fish and Wildlife
- ☐ Farm Pond
- ☐ No Apparent Use-Abandoned

Estimated Impoundment Size

- ☐ 1-5 acres
- ☐ 5-10 acres
- ☑ Over 10 acres 210 Ac

Estimated Height of Dam above Streambed

- ☐ Under 10 feet
- ☐ 10-25 feet
- ☑ Over 25 feet ~~20'~~ 110'

Condition of Spillway

- ☑ Service satisfactory
- ☐ In need of repair or maintenance

- ☑ Auxiliary satisfactory
- ☐ In need of repair or maintenance

Explain: _____

_____

Condition of Non-Overflow Section

- ☑ Satisfactory
- ☐ In need of repair or maintenance Explain: _____

_____

Condition of Mechanical Equipment

- ☑ Satisfactory ?
- ☐ In need of repair or maintenance Explain: _____

_____

Evaluation (From Visual Inspection)

- ☑ No defects observed beyond normal maintenance
- ☐ Repairs required beyond normal maintenance

*Explain Hazard Class, if Necessary _____

1. River Basin - Nos. 1-23 on Compilation Sheets
2. County - Nos. 1-62 Alphabetically
3. Year Approved -
4. Inspection Date - Month, Day, Year
5. Apparent use -
   1. Fish & Wildlife Management
   2. Recreation
   3. Water Supply
   4. Power
   5. Farm
   6. No Apparent Use
6. Type -
   1. Earth with Aux. Service Spillway
   2. Earth with Single Conc. Spillway
   3. Earth with Single non-conc. Spillway
   4. Concrete
   5. Other
7. As-Built Inspection - Built substantially according to approved plans and specifications

Location of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications.
2. Not built according to plans and specifications and location appears to be detrimental to structure.
3. Not built according to plans and specifications but location does not appear to be detrimental to structure.

Elevations

1. Generally in accordance to approved plans and specifications as determined from visual inspection and use of hand level.
2. Not built according to plans and specifications and elevation changes appear to be detrimental to structure.
3. Not built according to plans and specifications but elevation changes do not appear to be detrimental to structure.

Size of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications as determined by field measurements using tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

Geometry of Non-overflow Structures

1. Generally in accordance to originally approved plans and specifications as determined from visual inspection and use of hand level and tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

General Conditions of Non-Overflow Section

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

(Type) For boxes listed on condition under non-overflow section.
1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.

General Condition of Spillway and Outlet Works

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

Items) For boxes listed conditions listed under spillway and outlet works.

1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.
4. Dam does not contain this feature.

Maintenance

1. Evidence of periodic maintenance being performed.
2. No evidence of periodic maintenance.
3. No longer a dam or dam no longer in use.

(S.C.S.) Hazard Classification Downstream

CLASSIFICA
CORPS. ENG
(III)
(II)
(I)

1. (A) Damage to agriculture and county roads.
2. (B) Damage to private and/or public property.
3. (C) Loss of life and/or property.

Evaluation - Based on Judgment and Classification in Box Nos.

Evaluation for Unsafe Dam

1. Unsafe - Repairable.
2. Unsafe - Not Repairable.
3. Insufficient evidence to declare unsafe.

RIVER BASINS

(1) LOWER HUDSON
(2) UPPER HUDSON
(3) MOHAWK
(4) LAKE CHAMPLAIN
(5) DELAWARE
(6) SUSQUEHANNA
(7) CHEMUNG
(8) OSWEGO
(9) GENESEE
(10) ALLEGHENY
(11) LAKE ERIE
(12) WESTERN LAKE ONTARIO
(13) CENTRAL LAKE ONTARIO
(14) EASTERN LAKE ONTARIO
(15) SALMON RIVER
(16) BLACK RIVER
(17) WEST ST. LAWRENCE
(18) EAST ST. LAWRENCE
(19) RACQUETTE RIVER
(20) ST. REGIS RIVER
(21) HOUSATONIC
(22) LONG ISLAND
(23) OSWEGATCHIE
(24) GRASSE

COUNTIES

STATE NAME: NEW YORK

STATE ABBREVIATION: NY

STATE CODE: 36

CODE	COUNTY NAME
1	ALBANY
2	ALLEGANY
3	BRONX
4	BROOME
5	CATTARAUGUS
6	CAYUGA
7	CHAUTAUQUA
8	CHEMUNG
9	CHENANGO
10	CLINTON
11	COLUMBIA
12	CORTLAND
13	DELAWARE
14	DUTCHESS
15	ERIE
16	ESSEX
17	FRANKLIN
18	FULTON
19	GENESEE
20	GREENE
21	HAMILTON
22	HERKIMER
23	JEFFERSON
24	KINGS
25	LEWIS
26	LIVINGSTON
27	MADISON
28	MONROE
29	MONTGOMERY
30	NASSAU
31	NEW YORK
32	NIAGARA
33	ONEIDA
34	ONONDAGA
35	ONTARIO
36	ORANGE
37	ORLEANS
38	OSWEGO
39	OTSEGO
40	PUTNAM
41	QUEENS
42	RENSSELAER
43	RICHMOND
44	ROCKLAND
45	ST LAWRENCE
46	SARATOGA
47	SCHENECTADY
48	SCHOHARIE
49	SCHUYLER
50	SENECA
51	STEUBEN
52	SUFFOLK
53	SULLIVAN
54	TIOGA
55	TOMPKINS
56	ULSTER
57	WARREN
58	WASHINGTON
59	WAYNE
60	WESTCHESTER
61	WYOMING
62	YATES

CITY OF ROME
NEW YORK

PRELIMINARY REPORT
ON
FISH CREEK DAM

September 1956

MALCOLM PIRNIE ENGINEERS
25 West 43rd Street
New York 36, N.Y.

CITY OF ROME
NEW YORK

PRELIMINARY REPORT ON FISH CREEK DAM

I. GENERAL

In August 1953 the firm of O'Brien and Gere were retained by the City of Rome to study its water supply requirements, and to survey methods of providing for them. As a result of their studies a storage dam in the east branch of Fish Creek was recommended to provide water to augment low flows at the present intake. The City of Rome accepted the recommendation for a dam on Fish Creek at the approximate location proposed by O'Brien and Gere. During the summer of 1956 an application was made to the Water Power and Control Commission for permission to construct such a dam and divert up to 25 mgd at the existing intake below Point Rock. Such diversion was granted subject to maintaining a minimum flow below the diversion of 6 mgd.

In 1956 the firm of MALCOLM PIRNIE ENGINEERS was engaged to prepare plans and specifications for the new dam. A restudy of the yield of the supply and its estimated cost were included as part of the engineering contract.

II. DESCRIPTION OF SYSTEM

The present system consists of a diversion dam on Fish Creek between Point Rock and Taberg, an intake, tunnel and pipe line to distribution reservoirs in the town of Stokes and two transmission mains to the City.

The diversion dam has contributing drainage area of about 150 square miles. It has a flow line at Elevation 716 and a negligible amount of storage. The overflow spillway is 135 feet long. It was reconditioned by guniting a few years ago and is now in good condition.

The transmission line to the Stokes Reservoirs consists of about 5,533 feet of tunnel equivalent in diameter to a 64-inch pipe and about 31,000 feet of gravity aqueduct with an equivalent diameter of 37 inches. The gravity aqueduct limits flow to the Stokes Reservoirs to about 21 mgd. The Stokes Reservoirs have a capacity of 65 million gallons and from them two metered transmission mains 30 inches in diameter lead to the City.

The actual quantity diverted from Fish Creek is not known with any degree of certainty, since the only measurements are taken at the outlet of the Stokes Reservoirs and some leakage from the transmission line between Fish Creek and the Stokes Reservoirs is suspected.

III. WATER REQUIREMENTS

Present consumption of the City is about 12 million gallons per day. In 1955 a maximum day's flow of 19.3 million gallons was measured with a maximum week's average of about 17 mgd. The present yield of the system is about 18 mgd in the driest weather, of this 6 mgd are required by the Water Power and Control Commission to be released downstream leaving about 12 mgd for the City. Stringent curtailment during dry weather is necessary to meet the release requirement.

O'Brien and Gere have estimated a population of between 60,000 and 70,000 persons by 1990, with an expected average annual demand for water of between 15.7 and 18.4 mgd. Other estimates of population have been made since their report which predict a population by 1990 of 10 to 15 per cent greater than the O'Brien and Gere estimate.

In addition, recent enlargements of Griffiss Air Base and associated industrial developments have caused some concern as to the adequacy of the earlier estimates.

As a result, application to the Water Power and Control Commission was made for a diversion of 25 mgd and the application was granted. We have reviewed all of the above data and are of the opinion that in view of the small additional cost of providing a larger supply, the City is justified in developing its supply to a total dependable yield of 25 mgd.

IV. STORAGE REQUIRED

We have made an independent check of the yield based upon an average annual diversion of 25 mgd to the tunnel and a minimum stream flow of 6 mgd.

Examination of the Taberg and Water Department records indicates the following average runoff for the driest periods of record. In most cases the critical period was three months or less in duration, but in several years four very dry months were experienced.

Year	Months	Taberg Ave. mgd*	Diversion Dam Average mgd
1923	July, Aug., Sept.	55	34
1930	Aug., Sept., Oct.	60	41
1933	July, Aug., Sept.	38	33
	June, July, Aug., Sept.	38	38
1934	July, Aug., Sept.	52	45
1936	June, July, Aug.	48	40
1937	July, Aug., Sept.	48	38
1939	July, Aug., Sept.	34	31
	June, July, Aug., Sept.	50	36
1941	June, July, Aug.	43	36
1949	June, July, Aug.	43	33
1955	June, July, Aug.	45	30

* Does not include Rome diversion

The most critical dry period in the 32-year record is obviously in 1939.

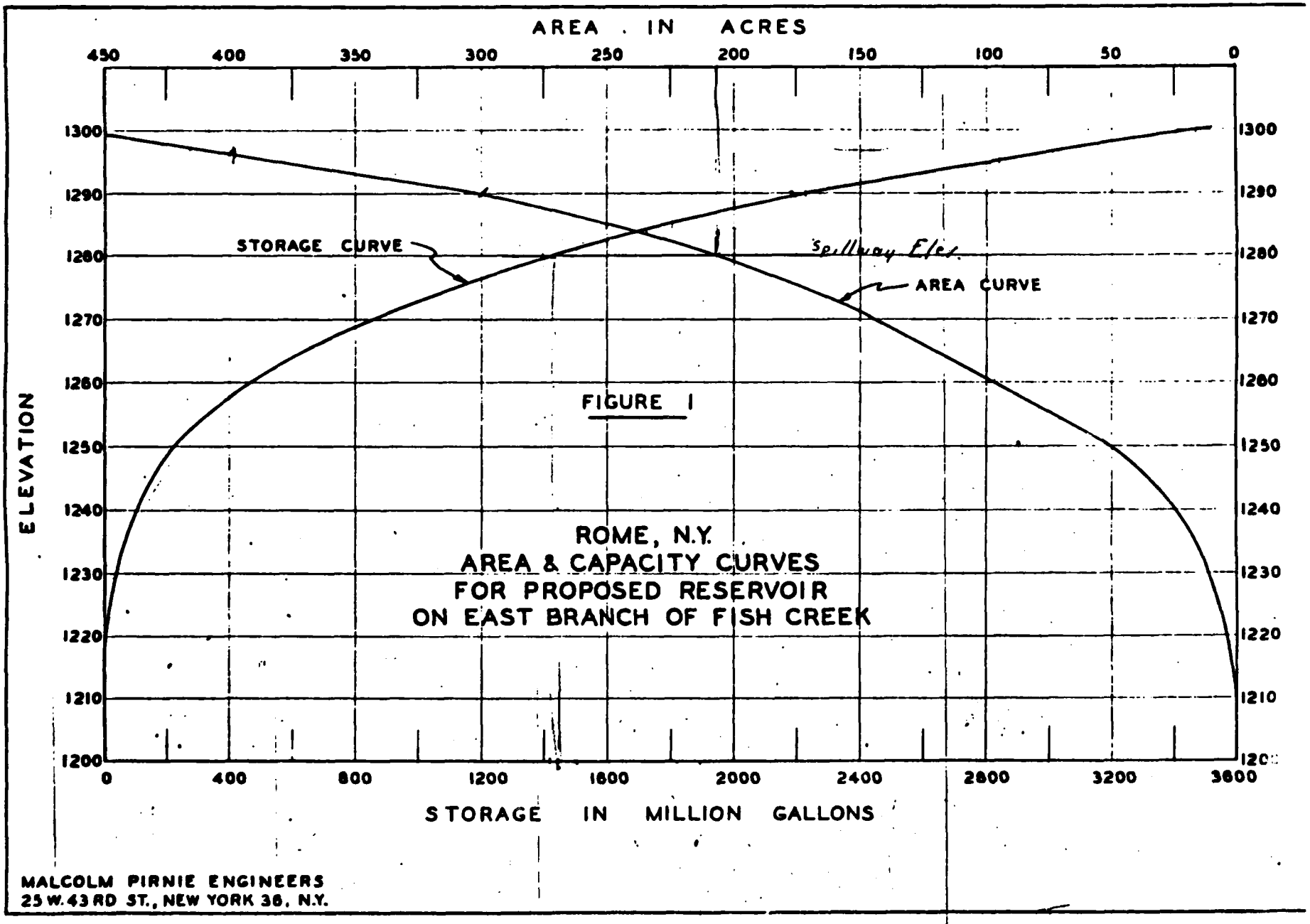
In computing storage required, we have assumed that during the three-month dry period water consumption will be 135 per cent of average annual. This assumption is based on 1955 experience. For an average annual diversion of 25 mgd it may thus be assumed that during the period studied 25 x 1.35 = 33.5 mgd will be used.

During the June, July and August period of 1939 precipitation at Highmarket was reported as 11.46 inches. During 1952 evaporation at Boonville was reported as 18.88 inches, while rainfall was 12.19 inches. Although evaporation records are inadequate and at best only an approximation of real conditions, we estimate that evaporation during a three-month dry period will be 6 to 12 inches in excess of rainfall on the water surface of the reservoir. At an average reservoir area, 12 inches represent a water loss of approximately 50 million gallons in about 92 days, or an average of roughly 0.5 mgd. We believe this a conservative figure to use. During the dry period approximately 970 million gallons must be released from the reservoir to flow downstream to the diversion point. Experience has shown that it is not always possible to deliver the exact amount of water as certain unexplained losses often occur and lag sometimes causes water to be wasted. We have, therefore, allowed a liberal factor for these losses. The flow required at the diversion dams, in our computations, was developed as follows:

City of Rome	33.5 mgd
Evaporation	0.5 mgd
Channel Losses	1.0 mgd
Required Minimum Stream Flow	6.0 mgd
	41.0 mgd = 63 cfs

During the three-month dry period of 1939, runoff at the diversion dam computed from Water Department records averaged 31 mgd, while requirements as shown above were 41 mgd. In such a period the difference of 10 mgd would have to be supplied from storage. This flow for the 92-day period would amount to about 920 million gallons of storage. We have also computed requirements over this period on a day-by-day basis and find that 970 million gallons of storage are required. This is reasonably good check of computations using daily and monthly flows.

We believe it to be good practice in designing water supply reservoirs to allow 25 per cent reserve. Applying this factor increases the required storage to 1,300 million gallons. Referring to the depth volume curve shown in Figure 1 for the proposed reservoir, we see that 1,300 million gallons will be stored at a flow line of 1,278 feet above sea level. Therefore, the flow line elevation of 1,280 recommended by O'Brien and Gere appears adequate for water supply requirements.


AREA . IN ACRES
450
400
350
300
250
200
150
100
50
0
1300
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
STORAGE CURVE
Spillway Elev.
AREA CURVE
ELEVATION
FIGURE 1
ROME, N.Y.
AREA & CAPACITY CURVES
FOR PROPOSED RESERVOIR
ON EAST BRANCH OF FISH CREEK
0
400
800
1200
1600
2000
2400
2800
3200
3600
STORAGE IN MILLION GALLONS
MALCOLM PIRNIE ENGINEERS
25 W. 43 RD ST., NEW YORK 36, N.Y.

V. FLOOD FLOWS

The records of the United States Geological Survey of the flow of Fish Creek taken at Taberg below the Rome diversion show a maximum flow of 13,600 cfs in thirty-two years of record. We have made a flood probability study of floods at Taberg and find that, based on an extension of the record, a flood of 74 cubic feet per second per square mile can be expected once in 100 years, and a flood of 92 cubic feet per second per square mile once in 1,000 years. The corresponding flood flows for the smaller area at the storage dam site would be 103 and 130 cubic feet per second per square mile, respectively. If the 1,000 year flood were used for design, the spillway would be designed to pass safely a flow of 13,500 cubic feet.

These values are low compared to floods that have been experienced elsewhere. In Connecticut, for example, the 1938 floods on certain streams had maximum amplitudes equal to about five times the average of the annual floods in the river. The August and October floods of 1955 had peaks in excess of ten times the average annual.

On the later basis a flood of over 500 cubic feet per second per square mile might occur. This is equivalent to 50,000 cubic feet per second which is a large quantity of water to be handled by the spillway of a small dam.

We believe that the spillway can be designed to pass the most probable floods without damage and unprecedented floods with only minor damage. Since spillway design and overall project design are inseparable, the subject will be discussed further in a later section of this report.

VI. LOCATIONS

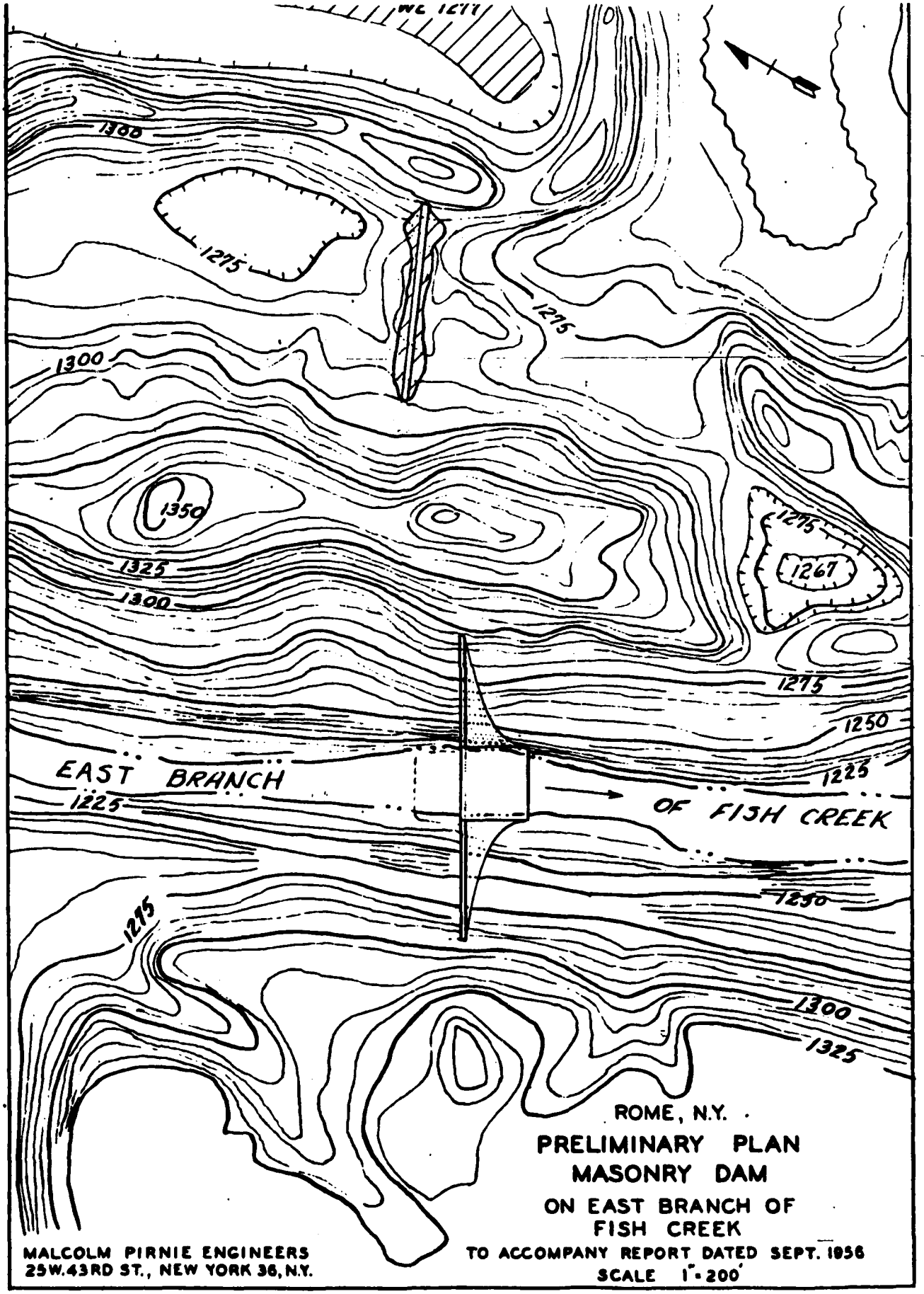
A field and office study of the dam site area has been made and the desirability of the site recommended by O'Brien and Gere confirmed. Our tentative location is about 300 feet downstream from the O'Brien and Gere site. The location is such that a saddle at approximately flow line elevation exists a few hundred feet easterly from the dam site. This saddle can be used as an auxiliary spillway in the case of a masonry dam on Fish Creek, or be used to construct the spillway in case an earth dam is constructed.

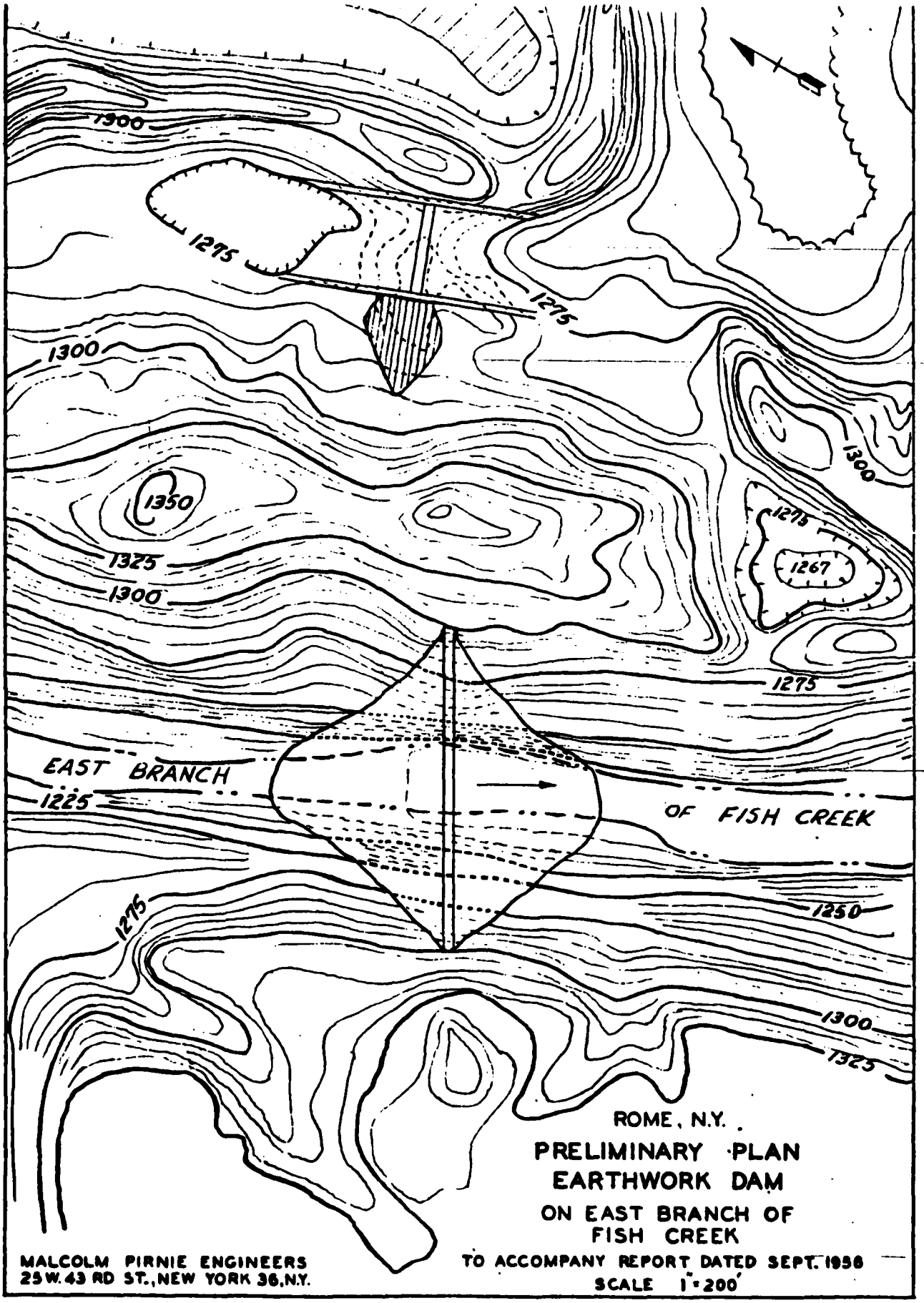
VII. ALTERNATE DAM TYPES

Alternate layouts have been made for a concrete masonry dam and an earth fill dam.

The concrete dam would consist of an overflow section approximately 150 feet long at Elevation 1280 flanked on either end by a non-overflow section extending to Elevation 1295. A gate house on the upstream side of the dam would permit releasing water downstream as required. The spillway capacity with the flood line at Elevation 1295 would be about 32,000 cfs, which is much greater than probably will ever occur. At that height an earth dike across the saddle would be overtopped and the combined capacity of the two waterways would equal the flood flow. A plan is shown in Figure 2.

The earth dam would consist of an earth fill across the river with a spillway constructed in the before-mentioned saddle. Since a greater freeboard is required for an earth dam than a concrete dam, the top of the earth dam should be built to about Elevation 1300. The spillway should be at Elevation 1280 and the dike at the spillway at Elevation 1295 to provide a safety plug which would be washed out before the main dam could fail. A plan is shown in Figure 3.


WL 1277
1300
1275
1275
1300
1350
1325
1300
1275
1267
1275
1250
EAST BRANCH
1225
1225
OF FISH CREEK
1250
1275
1300
1325
ROME, N.Y.
PRELIMINARY PLAN
MASONRY DAM
ON EAST BRANCH OF
FISH CREEK
TO ACCOMPANY REPORT DATED SEPT. 1956
SCALE 1"=200'
MALCOLM PIRNIE ENGINEERS
25 W. 43RD ST., NEW YORK 36, N.Y.



ROME, N.Y.

PRELIMINARY PLAN
EARTHWORK DAM
ON EAST BRANCH OF
FISH CREEK

TO ACCOMPANY REPORT DATED SEPT. 1958

SCALE 1" = 200'

MALCOLM PIRNIE ENGINEERS
25 W. 43 RD ST., NEW YORK 36, N.Y.

VIII. COSTS

We have made estimates of the costs of the two different types of dams using construction costs prevailing at the present time. The concrete masonry dam is estimated to cost about $1,500,000. Preliminary figures for an earth dam indicate approximately the same cost, but the estimate is less precise because information on underground conditions in the spillway location is not known and will not be known until the boring program has been completed. Also, analyses of available fill materials should be carried out before a final decision is made.

As soon as this information is available, we will submit a supplementary report covering the results of the boring program and revised cost estimates of the two alternative dam types.

IX. CONCLUSIONS AND RECOMMENDATIONS

Our studies have demonstrated the feasibility of constructing a dam on Fish Creek for the purpose of augmenting low flows of Fish Creek at the City of Rome intake. We find that a dam built to a flow line Elevation 1280 at the location shown on Figures 2 and 3 will impound almost 1,400,000 gallons of water and will guarantee an average annual draft of 25 mgd in a year as dry as 1939 with 25 per cent reserve storage. Information now available indicates that either an earth or masonry dam could be constructed at no significant difference in cost. We believe that the site is particularly suited to a masonry dam and that a masonry dam represents a slightly safer type of construction for this site.

However, our recommendation as to type of dam will be deferred until the completion of boring program which will provide the information necessary for a final choice.

MALCOLM PIRNIE ENGINEERS

CITY OF ROME
NEW YORK

SUPPLEMENTARY REPORT
ON
FISH CREEK DAM

JANUARY 1957

Return to S.H. Zingerline

MALCOLM PIRNIE ENGINEERS
25 West 43rd Street
New York 36, N.Y.

CITY OF ROME
NEW YORK

SUPPLEMENTARY REPORT
ON
FISH CREEK DAM

JANUARY 1957

I. GENERAL

Our report of September 1956 entitled "Preliminary Report on Fish Creek Dam" dealt with matters pertaining to the site and type of dam on the East Branch of Fish Creek, yield of the project and preliminary cost estimates. It was prepared before borings had been made at the site.

This supplementary report includes as Appendix 1, results of borings made at the site, recommends specifically the construction site and type of construction, and presents revised cost estimates based on the boring results.

II. BORINGS

The borings, described in detail in Appendix 1, conformed the fact that a satisfactory masonry dam can be constructed at the site shown in our September report or at the O'Brien and Gere site. The boring in the saddle to the east of the creek showed that the saddle is filled to at least 30 feet in depth with overburden and is not suitable

for a spillway location. The borings also show that the depth to rock on the banks at the lower site is considerably greater than had been supposed, thereby requiring a careful evaluation of the lower site compared to the one 300 feet upstream. Profiles of the two sites are attached to Appendix 1.

No further consideration has been given to earth dam construction since a saddle spillway is considered not to be feasible.

III. COST ESTIMATES

We estimate costs of the dams at the two sites as follows:

	Upstream	Downstream
Control of Water During Construction	$ 50,000	$ 50,000
Earth Excavation	12,000	26,000
Rock Excavation	110,000	130,000
Compacted Earth Embankment	7,000	4,000
Grouting	5,000	5,000
Concrete Masonry	1,440,000	1,580,000
Steel Reinforcing	30,000	30,000
Cast Iron Pipe and Fittings	25,000	25,000
Valves and Gates	30,000	30,000
Roadway	10,000	10,000
Gate House Superstructure	15,000	15,000
Miscellaneous Work	10,000	10,000
	$1,744,000	$1,915,000
Clearing and Grubbing Reservoir Site	80,000	80,000
	$1,824,000	$1,995,000
Contingencies	90,000	100,000
	$1,914,000	$2,095,000
Engineering, Legal, etc.	131,000	145,000
Total Project Cost Excluding Land	$2,045,000	$2,240,000

Construction at the upper site will apparently result in a cost approximately $195,000 less than at the lower site. We believe that the chances of realizing this savings are good enough to warrant constructing the dam on the upper site. Certain advantages of topography and slightly large storage capacity at the lower site are not great enough to compensate for the added cost.

The estimates given in this report are higher than those given in the O'Brien and Gere report and in our report of September 1956. These increases in cost are caused by the fact that rock was found on the dam abutments at a considerably lower elevation than previously assumed and because we are advised by the Contractor working in the Rome area that construction costs are expected to be higher next summer because of the active construction program now being developed in this area.

IV. PROGRAM

The major design features of the dam are adaptable to either site and design has progressed sufficiently so that plans and specifications for either site can be prepared promptly. In view of the saving in cost possible by use of the upper site we recommend that we be authorized immediately to proceed with preparation of plans and specification for a dam at that location.

MALCOLM PIRNIE ENGINEERS

APPENDIX 1

ROCK BORINGS FOR THE PROPOSED DAM
ON FISH CREEK, ROME, NEW YORK

Drilling by Sprague and Henwood, Inc. started on the proposed sites for Fish Creek Dam on October 9, 1956 and was completed December 21, 1956. The unusually rugged terrain and bad weather encountered in the latter part of November and December caused many delays resulting in considerable loss of time.

The drilling rig used by Sprague and Henwood was a 4 cylinder gasoline engine with a screw type feed. The core obtained was size AX (1-3/8" diameter). The cores were placed in appropriate AX core boxes and stored in a city warehouse arranged for by Mr. Zingerline, the City Engineer of Rome, New York.

A total of eight (8) borings were taken on the lower dam site proposed by Malcolm Pirnie Engineers. These borings are designated by numerals 1 through 7 and 13.

A total of five (5) borings were taken on the upper dam site proposed by O'Brien and Gere. The upper site is located approximately 300 feet north of the one suggested by Malcolm Pirnie Engineers. These borings are designated by letters A, B, C, D and E.

One boring, designated by the numeral 12, was taken in the saddle easterly from the river. The boring logs taken along each of the proposed sites are summarized on Pages 3 to 9. Figure 1 is a location plan and Figure 2 shows profiles taken along the centerline of the sites proposed by Malcolm Pirnie Engineers and O'Brien and Gere respectfully. On these profiles are plotted the findings of the borings taken at each site. Included on the profile of the O'Brien and Gere site is the rock profile obtained from the seismographic survey.

Material found in Boring Summary is generally referred to as shale. However, the rock varied from black shale to a fine grained gray sandstone with all intermediate gradations. The bulk of material can be identified as a sandy shale or shaly sandstone.

Rome, New York

Summary of Borings Along Lower Dam Site

Boring No. 1

Date: October 9, 1956

Ground Elevation: 1293.0

From	To	Remarks
0'-0"	31'-0"	Yellow sandy clay with gravel and boulders.
31'-0"	33'-6"	1'-6" Recovery - Gray shale. 12" seam of conglomerate of clay and pebbles. Rock starts at 33'-6".
33'-6"		Start of rock.
33'-6"	44'-0"	6'-11" Recovery - Gray shale with lenses of soft black shale.
44'-0"	67'-6"	22'-6" Recovery - Gray shale with lenses of soft black shale. Wash water stopped coming up at 48'-0".
67'-6"	96'-0"	27'-9" Recovery - Gray shale with lenses of soft black shale.

Note: Water Level at 70'-0"

Boring No. 2

Date: October 12, 1956

Ground Elevation: 1275

From	To	Remarks
0'-0"	17'-0"	Sandy clay with small and large boulders.
17'-0"	46'-0"	25'-1" Recovery - Beginning of rock 17'-0". Gray shale with lenses of soft black shale. Started losing water at 18'-3" and lost all water at 24'-0".

Boring No. 2 cont'd.

From	To	Remarks
46'-0"	74'-0"	26'-6" Recovery - Gray shale with lenses of soft black shale. Vertical seams throughout sections of core very soft making core recovery difficult.
74'-0"	78'-0"	3'-5" Recovery - Gray shale with 1" seam filled with clay.
78'-0"	99'-6"	21'-5" Recovery - Gray shale - Horizontal seams. Rock appears sound.

Note: Water Level at 45'-6"

Boring No. 3

Date: October 19, 1956

Ground Elevation: 1213

From	To	Remarks
0'-0"	3'-6"	Boulders + topsoil. Start of rock at 3'-6"..
3'-6"	5'-0"	Gray shale and black soft shale. Good rock starts at about 5'-0" down. 1'-0" recovery.
5'-0"	34'-6"	Gray shale with lenses of soft black rock. 26'-1" recovery. Recovery and condition of rock improved below 5'-0".

Note: Water Level at 3'-10"

Boring No. 4

Date: November 5, 1956

Ground Elevation: 1209

From	To	Remarks
0'-0"	4'-0"	3'-5" Recovery - Gray shale with lenses of soft black shale - rock weathered.

Boring No. 4 cont'd.

From	To	Remarks
4'-0"	9'-0"	4'-1" Recovery - some clay brought upon wash water. Solid rock starts at 5'-0".
9'-0"	29'-0"	19'-0" Recovery - Gray shale with lenses of soft black shale.

Boring No. 5

Date: November 7, 1956

Ground Elevation: 1260

From	To	Remarks
0'-0"	14'-0"	4" topsoil, sandy clay + boulders below.
14'-0"	24'-0"	10" Recovery - Gray shale - Rock in poor condition - Lost water at 22'-5".
24'-0"	31'-9"	5'-3" Recovery - Gray shale 3" of soft black rock mixed with clay. Horizontal seams. Rock starts at 24'-0".
31'-9"	52'-0"	19'-6" gray shale with horizontal seams. Lenses of soft black shale. Below 31'-9" rock appears solid.

Note: Final Water Level 7'-7" down

Boring No. 6

Date: October 18, 1956

Ground Elevation 1210

From	To	Remarks
0'-0"	2'-0"	Boulders and topsoil.
2'-7"	6'-6"	2'-9" Recovery - Top of rock starts at 2'-7". Rock soft with horizontal seams.

Boring No. 6 cont'd.

From	To	Remarks
6'-6"	9'-10"	Good rock starts at about 6'-6". 3'-0" recovery - Horizontal seams.
9'-10"	26'-10"	14'-5" Recovery - Horizontal seams with lenses of soft black rock.
26'-10"	56'-0"	27'-4" Recovery. Poor recovery in some sections horizontal seams. Lenses of soft black rock.

Note: Lost Water at 8'-6" - Final Water Level 2'-7"

Boring No. 7

Date: November 2, 1956

Ground Elevation: 1209

From	To	Remarks
0'-0"	4'-2"	3'-11" Recovery - Rock solid but weathered. Horizontal seams throughout.
4'-2"	9'-0"	4'-1" Recovery - Gray shale - upper portion of core weathered.
9'-0"	25'-0"	15'-7" Recovery - Gray shale with lenses of soft black shale.

Boring No. 13

Date: November 12, 1956

Ground Elevation: 1288

From	To	Remarks
0'-0"	36'-0"	6' of topsoil - Sandy clay with large and small boulders.
36'-0"	41'-7"	1'-7" Recovery - Gray shale. Vertical iron stained seams with traces of clay.

Boring No. 13 cont'd.

From	To	Remarks
41'-7"	54'-0"	8" Recovery - (Boulders)
54'-0"	60'-0"	3'-8" Recovery - Gray shale with lenses of black soft shale. Horizontal seams. Rock starts at 54'-0".
60'-0"	77'-0"	15'-8" Recovery - Gray shale with lenses of soft black shale.

Note: Water Level 26'-0" down

Summary of Borings Taken Along Upper Dam Site

Boring A

Date: December 15, 1956

Ground Elevation: 1294

From	To	Remarks
0'-0"	31'-0"	Topsoil, sandy clay and boulders below.
31'-0"	35'-0"	8" Recovery - Gray shale - Core ground up. Rock starts at about 31'-0".
35'-0"	38'-0"	1'-4" Recovery - Gray shale - Good recovery below Elevation 35'-0".
38'-0"	43'-0"	5'-0" Recovery - Gray shale with some iron stained seams.

Note: Water Level at 18'-7"

Boring B

Date: December 21, 1956

Ground Elevation: 1282

From	To	Remarks
0'-0"	20'-0"	Topsoil - sandy clay below. Some clay on boulders.

Boring B cont'd.

From	To	Remarks
20'-0"	21'-0"	8" Recovery - Start of rock at 20'-0". Gray shale with horizontal seams.
21'-0"	27'-6"	5'-7" Recovery - Hard gray shale with horizontal seams. Horizontal lenses of soft black shale.

Note: Final Water Level at 4'-0"

Boring C

Date: December 5, 1956

Ground Elevation: 1284

From	To	Remarks
0'-0"	33'-6"	Topsoil with sandy clay over-burden mixed with boulders.
33'-6"	36'-0"	2'-6" Recovery - Gray shale - Start of rock at 33'-6". Lost water at 34'-0".
36'-0"	41'-0"	41'-5" Recovery - Gray shale with horizontal seams.

Note: Water Level at 31'-3"

Boring D

Date: December 3, 1956

Ground Elevation: 1261

From	To	Remarks
0'-0"	4'-0"	Topsoil + sandy clay + boulders.
4'-0"	9'-0"	4'-0" Recovery - Sandstone with brown spots throughout. Start of rock at 4'-0".

Boring D cont'd.

From	To	Remarks
9'-0"	14'-0"	2'-6" Recovery - Gradual gradation from sandstone to gray shale. Bottom portion of core is sound and does not have any brown spots. Solid rock starts about 12'-0" down.

Boring E

Date: November 19, 1956

Ground Elevation: 1259

From	To	Remarks
0'-0"	1'-6"	Topsoil with sandy clay with boulder
1'-6"	11'-0"	6'-10" Recovery - Weathered sandstone with brown spots throughout. Iron stained seams and iron stained vertical cracks. Rock starts at 1'-6".
11'-0"	15'-0"	2'-11" Recovery sandstone with brown spots throughout. Horizontal seams and vertical cracks.
15'-0"	42'-0"	25'-0" Recovery - Gradual gradation from sandstone to sandy gray shale. Horizontal seams and vertical cracks. Brown spots in upper portions of core.
42'-0"	52'-0"	9'-10" Recovery - Gray sandy shale with lenses of black soft rock.

Summary of Boring Taken in Saddle

Boring No. 12

Date: December 12, 1956

Ground Elevation: 1290

From	To	Remarks
0'-0"	21'-0"	6" of topsoil sandy clay and boulders.
21'-0"	30'-0"	Course to fine sand. Core barrel sinks with slight downward pressure and flushing action of wash water.

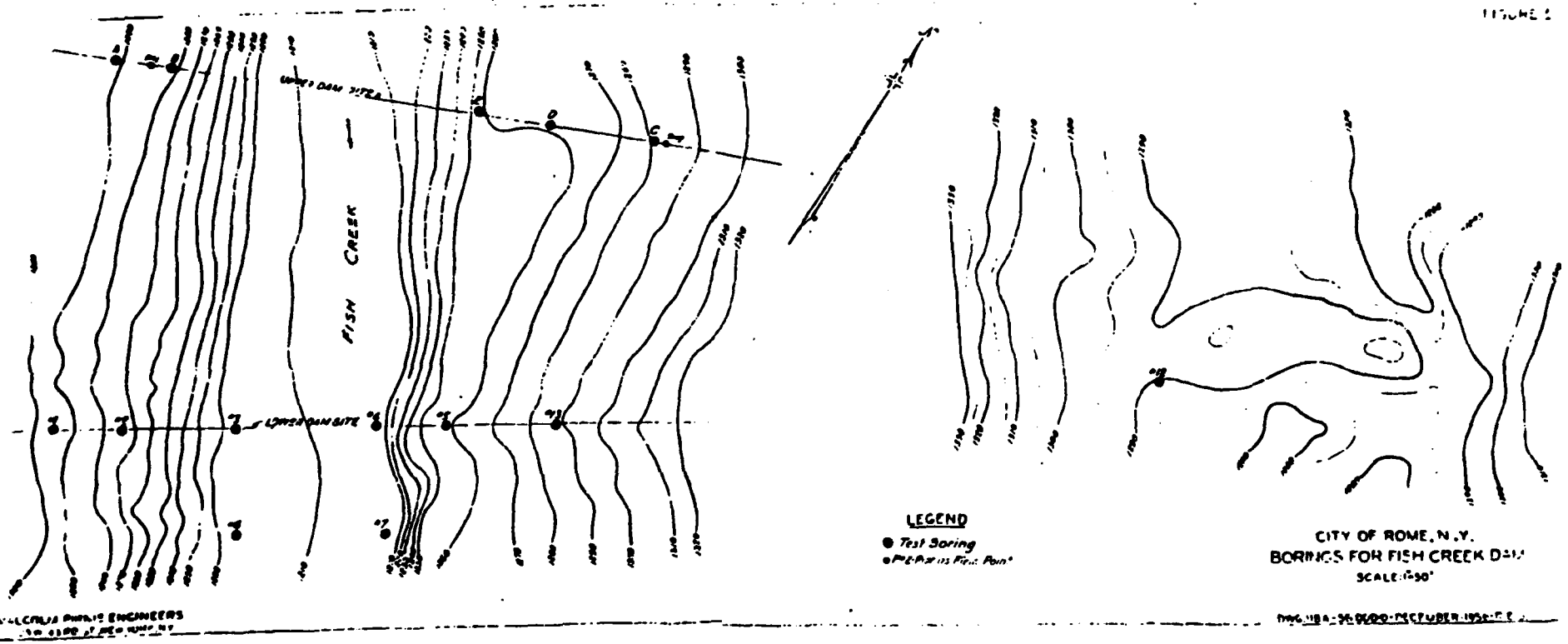
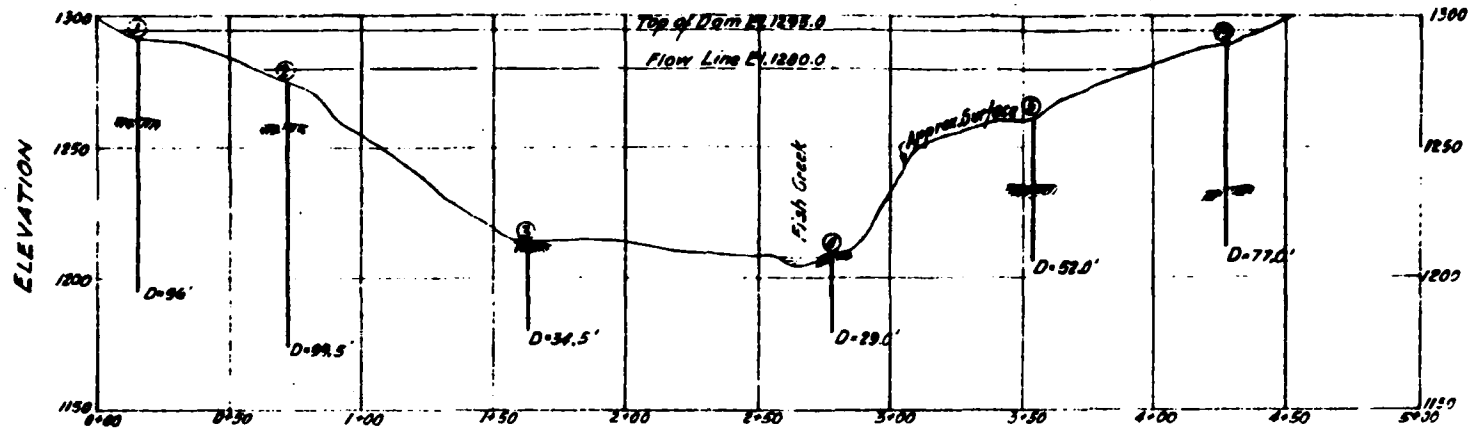
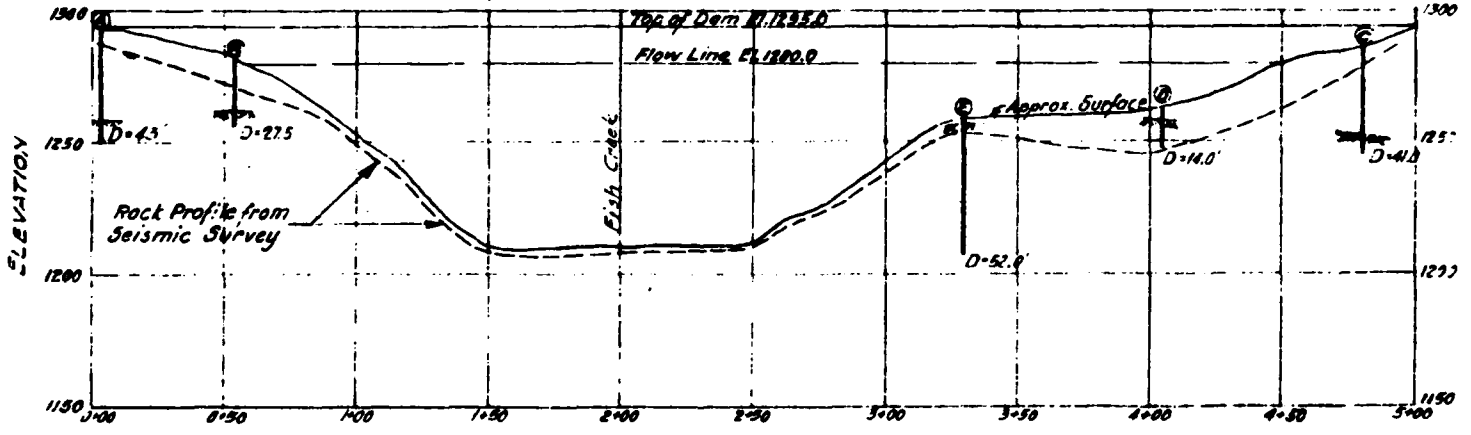

FISH CREEK
LEGEND
Test Boring
CITY OF ROME, N.Y.
BORINGS FOR FISH CREEK DAM

FIGURE 2



LOWER DAM SITE



UPPER DAM SITE

CITY OF ROME, N. Y.

PROFILE OF PROPOSED SITE

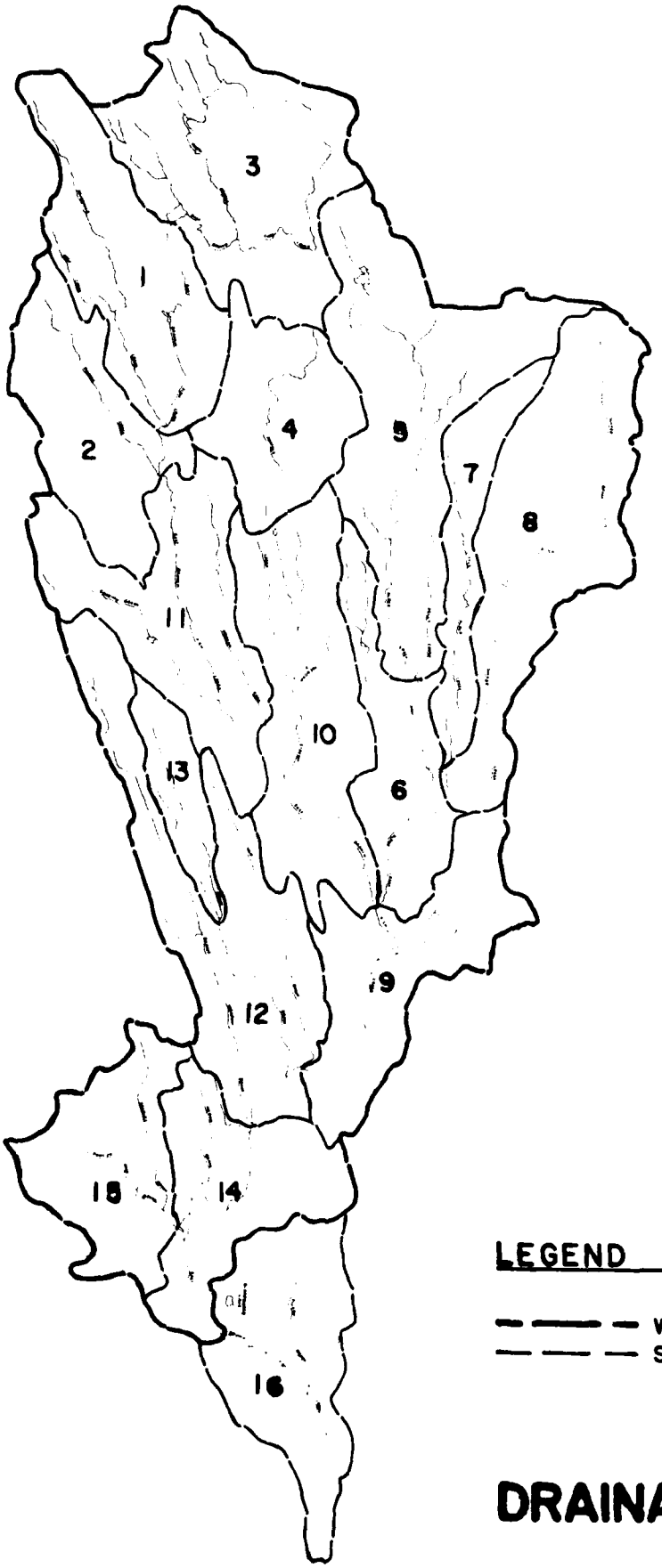
SCALE: HORIZ. & VERT. 1" = 50'

DWG. 118A-56.0C1-0-DECEMBER 1956-A.S.

MALCOLM PIRNIE ENGINEERS
25 W. 43RD. ST., NEW YORK 36, N.Y.

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



LEGEND

WATERSHED AREA
SUB AREA

DRAINAGE BASIN

STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501
TEL 315-797-5800

DESIGN BRIEF

PROJECT NAME NEW YORK STATE DAM INSPECTIONS DATE 3.24.80

SUBJECT ROME CITY DAM PROJECT NO. 2397

SUB AREA - AREAS DRAWN BY JPG

		AREA
SUB AREA	1	6.01 SQ MI
	2	5.85 SQ MI
	3	9.99 SQ MI
	4	4.66 SQ MI
	5	9.88 SQ MI
	6	4.52 SQ MI
	7	3.26 SQ MI
	8	9.16 SQ MI
	9	6.18 SQ MI
	10	7.44 SQ MI
	11	6.01 SQ MI
	12	8.38 SQ MI
	13	2.04 SQ MI
	14	5.19 SQ MI
	15	5.13 SQ MI
	16	5.51 SQ MI

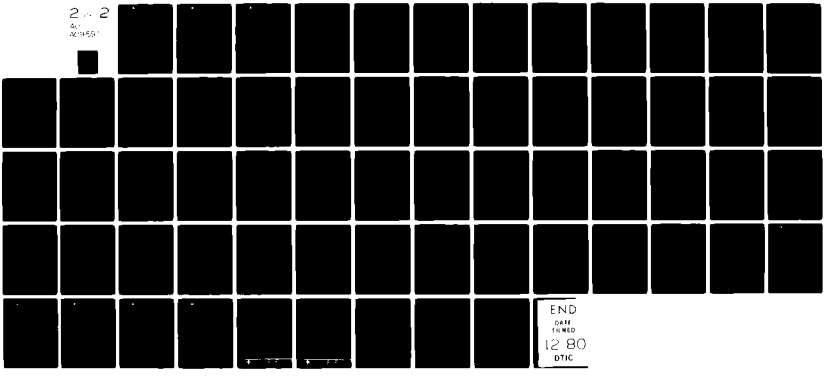
TOTAL - ABOVE DAM 98.7 SQ MI

LAKE (IMPOUNDMENT) AREA - 210.0 ACRES

AD-A091 597 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. ROME CITY DAM (FISH CREEK) (INVENT--ETC(U)
JUL 80 J B STETSON

UNCLASSIFIED NL

2 of 2
AD A091597



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12 80
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STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501
TEL 315-797-5800

DESIGN BRIEF

PROJECT NAME NEW YORK STATE DAM INSPECTIONS DATE 3-24-80

SUBJECT ROME CITY DAM PROJECT NO. 2377

ESTIMATE OF SNYDER'S PARAMETERS DRAWN BY JPG

640 C_p

.625 FOR ALL SUB AREAS

SUB AREA	C_t	L_{ca}	L	$(L_{ca}L)^{.3}$	t_p
1	2.0	3.03	5.87	2.37	4.74
2	2.0	1.48	3.98	1.70	3.40
3	2.0	3.56	6.36	2.55	5.10
4	2.0	2.08	4.13	1.91	3.82
5	2.0	4.24	9.28	3.01	6.02
6	2.0	2.65	6.82	2.38	4.76
7	2.0	3.56	7.01	2.63	5.25
8	2.0	6.78	10.04	3.55	7.10
9	2.0	2.65	5.38	2.22	4.44
10	2.0	2.35	6.89	2.31	4.62
11	2.0	2.54	5.08	2.15	4.30
12	2.0	2.92	8.48	2.62	5.24
13	2.0	1.93	4.02	1.85	3.70
14	2.0	2.65	4.55	2.11	2.68
15	2.0	1.25	3.26	1.52	3.04
16	2.0	3.60	5.98	2.51	5.02

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TEL 315-797-5800

DESIGN BRIEF

PROJECT NAME NEW YORK STATE DAM INSPECTIONS DATE 3.24.80

SUBJECT ROME CITY DAM PROJECT NO. 2399

DEPTH - AREA - DURATION DRAWN BY JPG

PMF

INDEX RAINFALL - 19.0"; 24 DURATION
200 Sq Mi
Lat. ~ 43°30' Long. ~ 75°37'

DURATION	% INDEX	DEPTH
6 HR	84	15.96"
12 HR	98	18.62"
24 HR	109	20.71"
48 HR	114	21.66"

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TEL 315-797-5800

DESIGN BRIEF

PROJECT NAME 1980 Dam Inspections DATE

SUBJECT Rome City Dam PROJECT NO.

Spillway Rating Curve DRAWN BY

Ogee-shaped section
Coordinates of spillway shown on plans
Indicate the design head $H_d = 15'$
$L = 150'$
$Q = C\ L\ H^{3/2}$
C based on discharge head: Fig. 14-4 of Open Channel Hydraulics - Chow for $h/H_d > 1.33$, h = spillway height
$C_d = 4.03$

Elev.	H	H/H_d	C/C_d	C	Q
1280	0			—	0
1281	1'	.067	.73	2.94	441 cfs
1282	2	.133	.76	3.06	1298
1283	3	0.2	.78	3.14	2447
1284	4	.266	.81	3.26	3912
1285	5	.333	.84	3.39	5685
1286	6	.4	.87	3.51	7738
1287	7	.467	.89	3.59	9973
1288	8	.533	.91	3.67	12456
1289	9	.6	.925	3.73	15107
1290	10	.67	.94	3.79	17978
1291	11	.73	.96	3.87	21178
1292	12	.8	.97	3.91	24380
1293	13	.867	.98	3.95	27771
1294	14	.93	.99	3.99	31351
1295	15	1.0	1.0	4.03	35118
1296	16	1.07	1.01	4.07	39072
1298	18	1.2	1.02	4.11	47080
1300	20	1.33	1.025	4.13	55410
1302	22	1.47	1.03	4.15	64235
1304	24	1.6	1.03	4.15	73190

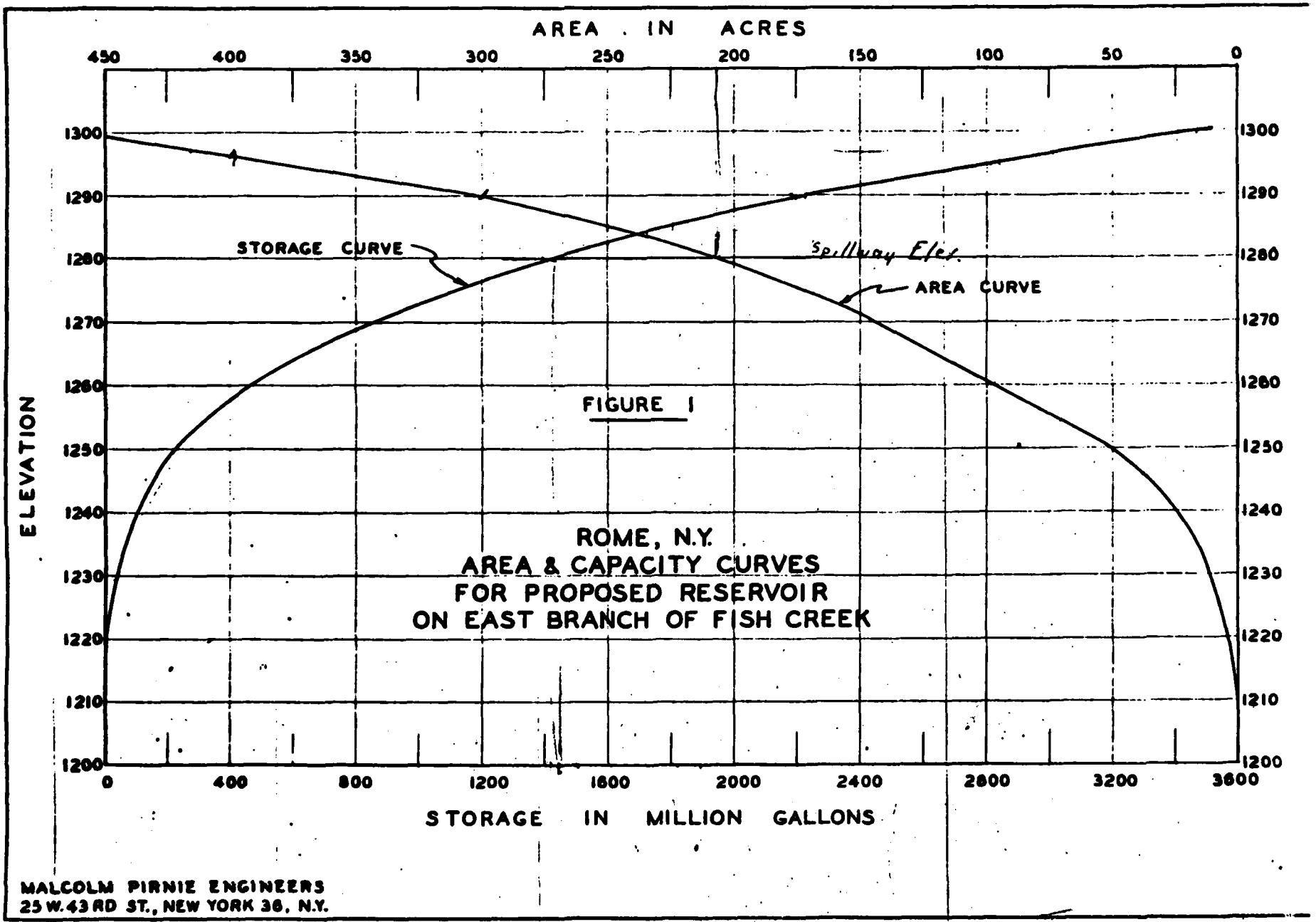

FIGURE 1

ROME, N.Y.
AREA & CAPACITY CURVES
FOR PROPOSED RESERVOIR
ON EAST BRANCH OF FISH CREEK

MALCOLM PIRNIE ENGINEERS
25 W. 43 RD ST., NEW YORK 36, N.Y.

BOYD DAM - ROME, N. Y.

Discharge Through 18-inch Cone Valves MGD for Cone Valve Opening Shown

Elev. Res.-Ft.	1/4 15	3/8 23	1/2 30	5/8 38	3/4 45	7/8 53	Full 60	(Indicator) (Turns)
1,230	-	5	8	13	18	25	35	
1,235	-	6	9	15	21	29	40	
1,240	-	7	10	16	23	32	44	
1,245	-	8	11	18	26	35	48	
1,250	5	8	12	19	28	38	52	
1,255	5	9	13	21	30	41	55	
1,260	6	10	14	22	32	44	58	
1,265	6	10	15	23	33	46	62	
1,270	6	11	16	25	35	48	66	
1,275	7	11	17	26	37	50	68	
1,280	7	11	18	27	39	52	70	

Chart applies to clean bar rack and one intake gate open.

Cone valve calibrated by A.W. Douglas
Malcolm Pirnie Engrs.
25 W. 43rd Street
New York 36, N.Y.

January 1960

```
(0001)   A1       ROSE CITY RESERVOIR
(0002)   A2       HEC-1DB (SNYDER PARAMETERS)
(0003)   A3       EMF-DAM OVERTOPPING ANALYSIS
(0004)   B     90         1          0          0          0          0          0          0          4
(0005)   B1    5
(0006)   J        1          7          1
(0007)   J1    0.2        0.3        0.4        0.5        0.6        0.8        1.0
(0008)   K        0        300          0          0          0          0          1
(0009)   K1       RUNOFF SUBAREA 3
(0010)   M        1          1        1..          0       93.7          0          0          0          1
(0011)   P                  19.         84         98        109        114
(0012)   T                   0          0          0          0          0        1.0        0.1          0       0.01
(0013)   a     5.1      0.625
(0014)   X    -2.5      -0.10        1.6
(0015)   K        1        100          0          0          0          0          1
(0016)   K1       CHANNEL ROUTE THRU SUBAREA 1
(0017)   Y        0          0          0          1          1
(0018)   Y1       1          0          0          0          0          0         -1
(0019)   Y6    0.060      0.040      0.060       1740       1790      18000     0.0111
(0020)   Y7      100       1790        325       1750        462       1742        466       1740        480       1740
(0021)   Y7      464       1742        525       1750        825       1790
(0022)   K        3        100          0          0          0          0          1
(0023)   K1       RUNOFF SUBAREA 1
(0024)   M        1          1         6.          0       93.7          0          0          0          1
(0025)   P        0         19.         84         98        109        114
(0026)   T        0          0          0          0          0          0        1.0        0.1          0       0.01
(0027)   a     4.74      0.625
(0028)   X    -2.5       -0.10        1.6
(0029)   K        2        100          0          0          0          0          1
(0030)   K1       COMBINE 2 HYDROGRAPHS 1 + 3 = 1
(0031)   K        1        200          0          0          0          0          1
(0032)   K1       CHANNEL ROUTE THRU SUBAREA 2
(0033)   Y                   0          0          1          1
(0034)   Y1       1          0          0          0          0          0         -1
(0035)   Y6    0.060      0.040      0.060       1220       1220       3600     0.0056
(0036)   Y7      100       1770        325       1730        462       1722        466       1720        480       1720
(0037)   Y7      464       1722        525       1730        825       1770
(0038)   K        3        200          2          0          0          2          1
```

```
(0038)   K1      RUNOFF SUBAREA 2
(0040)   M       1       1     5.65        0     93.7        0        0        0        1
(0041)   P       0      19.      .4       98      109      114
(0042)   T       0       0       0        0        0        0      1.0      0.1        0     0.01
(0043)   W     3.4   0.625
(0044)   X    -2.0   -0.10     1.6
(0045)   K       2     200       0        0        0        0        1
(0046)   K1      COMBINE 2 HYDROGRAPHS 1 + 2 = 2
(0047)   K       1    1100       0        0        0        0        1
(0048)   K1      CHANNEL ROUTE THRU SUBAREA 11
(0049)   Y       0       0       0        1        1
(0050)   Y1      1       0       0        0        0        0       -1
(0051)   Y6    0.0     0.04    0.00     1610     1680    23200   0.0047
(0052)   Y7    100     1680     900     1620      936     1613      942     1610      958     1610
(0053)   Y7    964     1613    1000     1620     1650     1680
(0054)   K               1100       0        0        0        0        1
(0055)   K1      RUNOFF SUBAREA 11
(0056)   M       1       1     6.0        0     93.7        0        0        0        1
(0057)   P       0      19.      .4       98      109      114
(0058)   T       0       0       0        0        0        0      1.0      0.1        0     0.01
(0059)   W     4.5   0.625
(0060)   X    -2.0   -0.10     1.6
(0061)   K       2    1100       0        0        0        0        1
(0062)   K1      COMBINE 2 HYDROGRAPHS 11 + 2 = 11
(0063)   K       1    1001       0        0        0        0        1
(0064)   K1      CHANNEL ROUTE TO CONFLUENCE WITH AREA 4 IN AREA 10
(0065)   Y       0       0       0        1        1
(0066)   Y1      1       0       0        0        0        0       -1
(0067)   Y6    0.0     0.04    0.00     1600     1660     4400   0.0023
(0068)   Y7    100     1660     500     1620      675     1603      681     1600      719     1600
(0069)   Y7    725     1603     800     1620     1000     1640
(0070)   K               400       0        0        0        0        1
(0071)   K1      RUNOFF SUBAREA 4
(0072)   M       1       1    4.66        0     93.7        0        0        0        1
(0073)   P       0      19.      .4       98      109      114
(0074)   T       0       0       0        0        0        0      1.0      0.1        0     0.01
(0075)   W     3.2   0.625
(0076)   X    -2.0   -0.10     1.6
```

```
(0077)   K       1     1001          0         0         0         0         1
(0078)   K1        CHANNEL ROUTE TO CONFLUENCE WITH AREA 11 IN AREA 10
(0079)   Y                 0         0         1         1
(0080)   Y1      1         0         0         0         0         0        -1
(0081)   Y6  0.260     0.040    0.060      1600      1660     20000    0.0088
(0082)   Y7    100      1600       500      1620       675      1603       681      1600       719      1600
(0083)   Y7    725      1605       800      1620      1000      1640
(0084)   K       2     1001          2         0         0         0         1
(0085)   K1        COMBINE 2 HYDROGRAPHS 11 + 4 = 11
(0086)   K       1     1000          0         0         0         0         1
(0087)   K1        CHANNEL ROUTE THRU SUBAREA 10
(0088)   Y                 0         0         1         1
(0089)   Y1      1         0         0         0         0         0        -1
(0090)   Y6  0.260     0.040    0.060      1560      1620     16000    0.0025
(0091)   Y7    100      1620       500      1580       672      1583       678      1580       722      1580
(0092)   Y7    725      1585       800      1580      1000      1600
(0093)   K       0     1000          0         0         0         0         1
(0094)   K1        RUNOFF SUBAREA 10
(0095)   M       1         1      7.44         0      93.7         0         0         0         1
(0096)   P               19.        84        98       109       114
(0097)   T       0         0         0         0         0         0       1.0       0.1         0      0.01
(0098)   W    4.62     0.625
(0099)   X   -2.3     -0.16       1.6
(0100)   K       2     1000          0         0         0         0         1
(0101)   K1        COMBINE 2 HYDROGRAPHS 10 + 11 = 10
(0102)   K       0      700          0         0         0         0         1
(0103)   K1        RUNOFF SUBAREA 7
(0104)   M       1         1      3.20         0      93.7         0         0         0         1
(0105)   P               19.        84        98       109       114
(0106)   T       0         0         0         0         0         0       1.0       0.1         0      0.01
(0107)   W    5.25     0.625
(0108)   X   -2.6     -0.16       1.6
(0109)   K       0      800          0         0         0         0         1
(0110)   K1        RUNOFF SUBAREA 6
(0111)   M       1         1      9.16         0      93.7         0         0         0         1
(0112)   P               19.        84        98       109       114
(0113)   T       0         0         0         0         0         0       1.0       0.1         0      0.01
(0114)   W    7.1      0.625
```

```
(C115)  X   -2.0   -0.10     1.
(C116)  K      2      800       0       0       0       0       1
(C117)  K1     COMBINE 2 HYDROGRAPHS 8 + 7 = 8
(C118)  K      1      601       0       0       0       0       1
(C119)  K1     CHANNEL ROUTE TO CONFLUENCE WITH 5 IN AREA 6
(C120)  Y                                      1       1
(C121)  Y1     1                               0       0       0      -1
(C122)  Y6  0.060   0.040   0.060    1615    1645    1000  0.005
(C123)  Y7   100    1645     350    1625     538    1617     542    1615     558    1615
(C124)  Y7   562    1617     700    1625    1500    1625
(C125)  K                     500       0       0       0       0       1
(C126)  K1     RUNOFF SUBAREA 5
(C127)  A      1       1    9.66       0    93.7       0       0       0       1
(C128)  F                    19.      84      98     109     114
(C129)  T                     0       0       0       0       0     1.0     0.1       0    0.01
(C130)  W   6.02   0.625
(C131)  X   -2.0   -0.10     1.6
(C132)  K      1      601       0       0       0       0       1
(C133)  K1     CHANNEL ROUTE TO CONFLUENCE WITH 8 IN AREA 6
(C134)  Y      0       0       0       1       1
(C135)  Y1     1       0       0       0       0       0      -1
(C136)  Y6  0.060   0.040   0.060    1615    1645    7200  0.0083
(C137)  Y7   100    1645     350    1625     538    1617     542    1615     558    1615
(C138)  Y7   562    1617     700    1625    1500    1625
(C139)  K      2      601       0       0       0       0       1
(C140)  K1     COMBINE 2 HYDROGRAPHS 6 + 5 = 8
(C141)  K      1      600       0       0       0       0       1
(C142)  K1     CHANNEL ROUTE THRU SUBAREA 6
(C143)  Y      0       0       0       1       1
(C144)  Y1     1       0       0       0       0       0      -1
(C145)  Y6  0.060   0.040   0.060    1560    1590   14200  0.0039
(C146)  Y7   100    1590     350    1570     536    1563     542    1560     558    1560
(C147)  Y7   564    1563     700    1570    1500    1590
(C148)  K      0      600       0       0       0       0       1
(C149)  K1     RUNOFF SUBAREA 6
(C150)  A      1       1    4.32       0    93.7       0       0       0       1
(C151)  F                    19.      84      98     109     114
(C152)  T                     0       0       0       0       0     1.0     0.1       0    0.01
```

```
(0153)   M    4.76    0.625
(0154)   X   -2.0     -0.10     1.6
(0155)   K       5      1000       0         0         0         0         1
(0156)   K1       COMBINE 5 HYDROGRAPHS 10 + 6 + 8 = 10
(0157)   K       1       900       0         0         0         0         1
(0158)   K1       CHANNEL ROUTE THRU SUBAREA 9
(0159)   Y        0         0         0         1         1
(0160)   Y1       1         0         0         0         0         0        -1
(0161)   Y6    0.060     0.040     0.060      1445      1495      1780    0.0065
(0162)   Y7     100      1495       650      1455      1050      1448      1056      1445      1144      1445
(0163)   Y7    1152      1448      1225      1475      2100      1495
(0164)   K                900         0         0         0         0         1
(0165)   K1       RUNOFF SUBAREA 9
(0166)   M        1         1     6.16         0      93.7         0         0         0         1
(0167)   P        0       19.        84        98       109       114
(0168)   T                  0         0         0         0         0       1.0       0.1         0      0.01
(0169)   M    4.44    0.625
(0170)   X   -2.0     -0.10     1.6
(0171)   K       2       900       0         0         0         0         1
(0172)   K1       COMBINE 2 HYDROGRAPHS 9 + 10 = 9
(0173)   K       1      1201       0         0         0         0         1
(0174)   K1       CHANNEL ROUTE TO CONFLUENCE WITH 13 IN AREA 12
(0175)   Y        0         0         0         1         1
(0176)   Y1       1         0         0         0         0         0        -1
(0177)   Y6    0.060     0.040     0.060      1430      1470      1600    0.0094
(0178)   Y7     100      1470       650      1434       948      1433       954      1430      1046      1430
(0179)   Y7    1052      1433      1150      1434      1800      1470
(0180)   K        0      1300         0         0         0         0         1
(0181)   K1       RUNOFF SUBAREA 13
(0182)   M        1         1     2.04         0      93.7         0         0         0         1
(0183)   P        0       19.        84        98       109       114
(0184)   T                  0         0         0         0         0       1.0       0.1         0      0.01
(0185)   M    3.72    0.625
(0186)   X   -2.0     -0.10     1.6
(0187)   K       1      1201       0         0         0         0         1
(0188)   K1       CHANNEL ROUTE TO CONFLUENCE WITH 9 IN AREA 12
(0189)   Y        0         0         0         1         1
(0190)   Y1       1         0         0         0         0         0        -1
```

```
(0191)  YA   .[illegible]  0.040   0.060    1430    1470    14630  0.0113
(0192)  Y7    100   1470    850   1434    948   1433    954   1430   1046   1430
(0193)  Y7   1052   1433   1150   1434   1800   1470
(0194)  K       2   1201      0      0      0      0      1
(0195)  K1        COMBINE 2 HYDROGRAPHS 9 + 13 = 9
(0196)  K       1   1200      0      0      0      0      1
(0197)  K1        CHANNEL ROUTE THRU SUBAREA12
(0198)  Y         0      0      0      1      1
(0199)  Y1        1      0      0      0      0      0     -1
(0200)  Y6  .063      .040   0.060   1375   1415   5000  0.011
(0201)  Y7    1      1415    850   1379    948   1378    954   1375   1046   1375
(0202)  Y7   1 52   1378   1150   1379   1800   1415
(0203)  K       0   1200      0      0      0      0      1
(0204)  K1        RUNOFF SUBAREA 12
(0205)  M         1      1   8.38      0   93.7      0      0      0      1
(0206)  P         0    19.     84     98    109    114
(0207)  T                0      0      0      0      0    1.0    0.1      0   0.01
(0208)          5.24   0.625
(0209)  A       -2.    -0.1     1.6
(0210)  K         2   1200      0      0      0      0      1
(0211)  K1        COMBINE 2 HYDROGRAPHS 9 + 12 = 12
(0212)  K       1     1401      0      0      0      0      1
(0213)  K1        CHANNEL ROUTE TO RESERVOIR IN SUBAREA 14
(0214)  Y         0      0      0      1      1
(0215)  Y1        1      0      0      0      0      0     -1
(0216)  Y6  0.063   0.040   0.060   1280   1345  10400  0.0091
(0217)  Y7    100   1345    320   1285    354   1283    360   1280    460   1280
(0218)  Y7    466   1283    500   1285    650   1345
(0219)  K         1   1500      0      0      0      0      1
(0220)  K1        RUNOFF SUBAREA 15
(0221)  M         1      1   5.13      0   93.7      0      0      0      1
(0222)  P         0    19.     84     98    109    114
(0223)  T         0      0      0      0      0      0    1.0    0.1      0   0.01
(0224)  A       3.4   0.625
(0225)  A       -2.    -0.1     1.6
(0226)  K         1   1401      0      0      0      0      1
(0227)  K1        RUNOFF SUBAREA 14
(0228)  M         1      1   5.19      0   93.7      0      0      0      1
```

```
(0229)  P            19.        4        98       109       114
(0230)  T             0         0         0         0       1.0      0.1        0      0.08
(0231)  *    [illegible]   0.025
(0232)  X   [illegible]   -0.10      1.0
(0233)  K             3      140         0         0         0         1
(0234)  KI        COMBINE 3 HYDROGRAPHS AT RESERVOIR 12 + 15 + 14 = 14
(0235)  K             1      140         0         0         0         1
(0236)  KI        ROUTE THRU RESERVOIR AND OVER DAM
(0237)  Y                                   1         1
(0238)  Y1            1                     0         0         0    -1280.       -1
(0239)  Y4   [illegible]     1281      1282      1283      1284      1285      1286      1287      1288      1289
(0240)  Y4   [illegible]     1292      1294      1296      1298      1300      1302      1304
(0241)  Y5                    441      1296      2447      3912      5685      7738      9973     12456     15107
(0242)  Y5   [illegible]    24380     31350     39070     47080     55410     64235     73190
(0243)  Y5                     20        75       270       645      1385      2590      4345      6830     10650
(0244)  Y6   [illegible]
(0245)  Y6   [illegible]    1220      1230      1240      1250      1260      1270      1280      1290      1300
(0246)  Y6   [illegible]
(0247)  Y6   [illegible]
(0248)  Y6   [illegible]     2.0       1.5       380
(0249)  K             1      160         0         0         0         0         1
(0250)  KI        CHANNEL ROUTE BELOW DAM
(0251)  Y             0         0         1         1
(0252)  Y1            1         0         0         0         0         0        -1
(0253)  Y6   [illegible]     .04       .04      1210      1300      2000     0.005
(0254)  Y7   [illegible]    1300       260      1220       270      1217       290      1210       350      1210
(0255)  Y7   [illegible]    1217       410      1220       540      1300
(0256)  K    [illegible]
(0257)  A
(0258)  A
(0259)  A
(0260)  A
(0261)  A
```

OVERVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	300
ROUTE HYDROGRAPH TO	1[illegible]
RUNOFF HYDROGRAPH AT	100
COMBINE 2 HYDROGRAPHS AT	100
ROUTE HYDROGRAPH TO	200
RUNOFF HYDROGRAPH AT	200
COMBINE 2 HYDROGRAPHS AT	200
ROUTE HYDROGRAPH TO	1100
RUNOFF HYDROGRAPH AT	1100
COMBINE 2 HYDROGRAPHS AT	1100
ROUTE HYDROGRAPH TO	1001
RUNOFF HYDROGRAPH AT	400
ROUTE HYDROGRAPH TO	1001
COMBINE 2 HYDROGRAPHS AT	1001
ROUTE HYDROGRAPH TO	1000
RUNOFF HYDROGRAPH AT	1000
COMBINE 2 HYDROGRAPHS AT	1000
RUNOFF HYDROGRAPH AT	700
RUNOFF HYDROGRAPH AT	[illegible]00
COMBINE 2 HYDROGRAPHS AT	[illegible]00
ROUTE HYDROGRAPH TO	[illegible]01
RUNOFF HYDROGRAPH AT	500
ROUTE HYDROGRAPH TO	[illegible]01
COMBINE 2 HYDROGRAPHS AT	501
ROUTE HYDROGRAPH TO	600
RUNOFF HYDROGRAPH AT	[illegible]
COMBINE 2 HYDROGRAPHS AT	100[illegible]
ROUTE HYDROGRAPH TO	900
RUNOFF HYDROGRAPH AT	900
COMBINE 2 HYDROGRAPHS AT	900
ROUTE HYDROGRAPH TO	1201
RUNOFF HYDROGRAPH AT	1300
ROUTE HYDROGRAPH TO	1201
COMBINE 2 HYDROGRAPHS AT	1201
ROUTE HYDROGRAPH TO	1200
RUNOFF HYDROGRAPH AT	1200
COMBINE 2 HYDROGRAPHS AT	1200
ROUTE HYDROGRAPH TO	1401
RUNOFF HYDROGRAPH AT	1500
RUNOFF HYDROGRAPH AT	1400
COMBINE 2 HYDROGRAPHS AT	1400
ROUTE HYDROGRAPH TO	14[illegible]
ROUTE HYDROGRAPH TO	1[illegible]

END OF NETWORK

****
****

SUB-AREA RUNOFF COMPUTATION

HYDROGRAPH DATA

RECIP DATA

LOSS DATA

UNIT HYDROGRAPH DATA
TP= 5.10 CP=0.63 NTA= 0

RECESSION DATA
STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.00

```
[illegible] END-OF-PERIOD [illegible]DINATES, LAG=  [illegible] HOURS, CP= 0.63  VOL= 1.00
  [illegible]   [illegible]7.   [illegible]   652.   [illegible]   798.   698.   558.   446.   357.
  [illegible]   [illegible]   1[illegible]   140.   11[illegible]   95.   75.   63.   48.   38.
  [illegible]   [illegible]   [illegible]   1[illegible]   1[illegible]   1[illegible]   8.

                           END-OF-PERIOD FLOW
 [illegible]   [illegible]   RAIN  EXCS  LOSS  COMP [illegible]   MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q

                                                  SUM  1[illegible].75  15.53   3.22  112691.
                                                      ( 476.)( 394.)(  82.)( 3191.05)

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

                           HYDROGRAPH ROUTING

 [illegible] SUBAREA 1
          ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME   ISTAGE   IAUTO
          1       1       [illegible]  [illegible]  0      0      1       0        0
                           ROUTING DATA
 QLOSS    CLOSS   AVG     IRES    ISAME   IOPT   IPMP           LSTR
 [illegible]  [illegible]  0.00    1       1       0      0              0

          NSTPS   NSTDL   LAG     AMSKK   X       TSK    STORA   ISPRAT
          [illegible]  [illegible]        [illegible]  [illegible]  0.000  -1.     0

[illegible]
---------------------------

 [illegible](1)   [illegible](2)   [illegible](3)   ELNVT   ELMAX   RLNTH   SEL
 [illegible]   [illegible]   [illegible]   [illegible]   179[illegible]   18[illegible]   [illegible]111

[illegible] COORDINATES--STA,ELEV,STA,ELEV--ETC
  1[illegible]  1[illegible]  325.0  17[illegible]  4[illegible]  1742.00  4[illegible].00  1740.00  480.00  1740.00
  4[illegible]  17[illegible]  525.[illegible]  17[illegible]  [illegible]5.0[illegible]  1790.[illegible]

[illegible]    .         22.45     93.47     22[illegible].16   425.99    669.73    951.02    1269.87   1626.27
    24[illegible]     [illegible]2[illegible].7   3427.3[illegible]  3971.55   4553.[illegible]7   5172.53   5829.35   6[illegible]23.73   7255.65

[illegible]    .[illegible]      3[illegible]5.97    1614.1[illegible]   4499.62   9620.9[illegible]   17603.8[illegible]  28206.04  41573.01  57866.28
    [illegible]991.[illegible]  12[illegible]4.77  1557[illegible].16  169182.47  226598.59  268117.0[illegible]  313897.65  364[illegible]98.06  418873.38

[illegible]   174[illegible]   174[illegible]   1745.2[illegible]   1747.[illegible]   1750.53   1753.16   1755.75   1758.42   1761.05
    17[illegible]   17[illegible]   1771.5    1774.21   1776.[illegible]4   1779.47   1782.10   1784.73   1787.36

[illegible]    .         3[illegible]5.97    1614.1[illegible]   4499.62   9620.9[illegible]   17603.88  26206.04  41573.01  57866.28
    [illegible]   1[illegible]4.77   [illegible]   169182.47  226598.59  268117.0[illegible]  313897.65  364[illegible]96.06  418873.38
```

[illegible]

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

SUB-AREA RUNOFF COMPUTATION

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
[illegible]		0	1	0	0	1	0	0

HYDROGRAPH DATA

IHYD	IUH	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.[illegible]	[illegible]	93.7[illegible]	.[illegible]	1.000	0	1	0

PRECIP DATA

SPFE	R6S	R6	R12	R24	R48	R72	R96
0.00	1[illegible].00	[illegible]4.00	9[illegible].00	10[illegible].00	114.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .960

LOSS DATA

LOSS	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.01

UNIT HYDROGRAPH DATA

TP= 4.74 CP=[illegible].63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.00

UNIT HYDROGRAPH 20 END-OF-PERIOD ORDINATES, LAG= 4.74 HOURS, CP= 0.63 VOL= 1.0

[illegible]	1[illegible].	314.	447.	511.	482.	395.	313.	248.	197.
1[illegible].	1[illegible].	[illegible].	[illegible].	[illegible].	49.	39.	31.	24.	19.
15.	1[illegible].	1[illegible].	8.	6.	5.				

END-OF-PERIOD FLOW

[illegible]	[illegible]	PERIOD	RAIN	EXCS	LOSS	COMP Q	[illegible]	[illegible]	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	1[illegible].75	15.53	3.22	68191.

(470.3(594.3(62.3(1930.95?

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

COMBINE HYDROGRAPHS

COMBINE [illegible] HYDROGRAPHS 1 + 3 = 1

ICST	ICOMP	ICON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	2	2	9		0	1	0	0

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

HYDROGRAPH ROUTING

[illegible] ROUTE THRU SUBAREA [illegible]

ICST	ICOMP	ICON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
[illegible]	1	2	8	[illegible]	0	1	0	0

ROUTING DATA

CLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
[illegible]	[illegible]	[illegible]	1	1	0	0	0

STPS	NSTPS	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

[illegible] DATA FOR [illegible] ROUTING

[illegible] (1)	[illegible] (2)	[illegible](3)	ELEVT	ELMAX	ELMIN	SEL
[illegible]	0.04	0.0500	1763.	1770.0	3600.	0.00560

[illegible] SECTION CROSS-SECTION--STA,ELEV,STA,ELEV---ETC

1 [illegible]	1770..	565.0	767 [illegible]	400.00	1760.00	400.00	1760.00	
4?4.??	1?6?.?(	565.0	1?0 [illegible]	665.00	1770.??			

ST [illegible]	[illegible]	4.42	1?.??	45.63	85.20	133.95	190.20	253.97	325.25
	4? .34	5?4.1(	685.4?	794.31	91(.65	1034.51	1165.87	1304.75	1451.13
[illegible]	[illegible]	637.62	1146.53	3176.71	6837.9	1?5 3.7(	20034.31	29528.66	41101.52
	[illegible]	5?49?.2(	11 5?5.??	134373.3	1?0949.44	190439.34	222956.66	258?13.19	297519.25
[illegible]	176 .	1766.?(	1765.2(	1727.??	1730.53	1733.16	1735.79	1738.42	1741.05
	176 .3?	1748.49	1751.5?	1754.21	1756.84	1759.47	1762.1(	1764.73	1767.36
FL	[illegible]	637.62	1146.53	3176.01	6837.9	1?5 3.7(	20034.31	29528.66	41101.52
	?.?3?.??	5?49?.2(	11?0?5.??	134373.3	1?0949.44	190439.34	222956.66	258?13.19	297519.25

?AAI[illegible] [illegible] IS 1727..

?AAI[illegible] [illegible] IS 1?2?..

[illegible] IS [illegible].1

[illegible] IS [illegible].

[illegible] IS [illegible].7

[illegible] IS [illegible].

[illegible] IS [illegible].

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

SUB-AREA RUNOFF COMPUTATION

RUNOFF STORAGE #

IST	ICOMP	ICON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYD	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	[illegible]	0.00	93.70	0.70	0.000	0	1	0

PRECIP DATA

SPFE	PAR	PC	R12	R24	R48	R72	R96
[illegible]	[illegible]	[illegible]	92.[illegible]	[illegible]	114.00	0.00	0.00

TRSPC COMPUTED BY THE PRECIP RATIO IS [illegible]

LOSS DATA

LOSS	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
[illegible]	[illegible]	[illegible]	1.00	0.00	1.00	1.00	1.00	0.10	0.00	0.1

UNIT HYDROGRAPH DATA

TP= 5.40 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG= 3.41 HOURS, CP= 0.63 VOL= 1.00

50.	551.	57.	476.	579.	419.	303.	219.	159.	115.
2.	0.	44.	32.	23.	17.	12.	9.	6.	

0

END-OF-PERIOD FLOW

CA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	18.75	15.53	3.22	69665.
										(476.)	(394.)	(82.)	(1972.69)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 1 + 2 = 2

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

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

HYDROGRAPH ROUTING

CHANNEL TYPE THRU SUBAREA 11

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1100	1	0	0	0	0	1	0	0

ROUTING DATA

SLSS	CLOSS	AVSS	IRES	ISAME	IOPT	IPMP	LSTR
0.00	0.00	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	2	2	0.000	0.000	0.000	-1.	0

CHANNEL DEPTH CHANNEL LENGTH

Z(1)	Z(2)	Z(3)	ELEVT	ELMAX	FLNTH	SEL
0.0	0.0	0.0	1061.	1660.00	6320.00	0.0047

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

1 0.00 1060.00 950.00 1060.00 950.00 1613.00 942.00 1610.00 950.00 1610.00
950.00 1613.00 1000.00 1600.00 1650.00 1660.00

STAGE	0.0	46.63	152.56	336.92	670.38	1178.55	1861.37	2716.90	3751.13
	6554.67	7852.97	9066.97	11532.00	13613.35	15868.13	18297.90	20902.36	23681.52
OUTFLOW	0.0	446.6	1935.70	4760.20	9755.24	18213.61	30994.95	48389.77	72629.61
	140554.22	175611.62	239268.97	301903.31	374072.38	456317.75	549166.50	653133.13	768720.25
STAGE	1061.00	1610.6	1617.57	1621.05	1624.74	1628.42	1632.10	1635.79	1639.47
	1646.84	1650.52	1654.21	1657.89	1661.58	1665.26	1668.95	1672.63	1676.31
FLOW	0.0	446.6	1935.70	4760.20	9755.24	18213.61	30994.95	48389.77	72629.61
	140554.22	175611.62	239268.97	301903.31	374072.38	456317.75	549166.50	653133.13	768720.25

MAXIMUM STAGE IS 1620.4

MAXIMUM STAGE IS 1622.2

MAXIMUM STAGE IS 1625.5

MAXIMUM STAGE IS 1625.1

[illegible] IS [illegible]

[illegible] IS [illegible]

[illegible] IS [illegible]

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

S[illegible]-AREA RUNOFF COMPUTATION

RESERVOIR ROUTING 11

IST	IC	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
11						1	0	0

HYDROGRAPH DATA

IPRT	IAU	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
	1	0.[illegible]	0.0	93.7[illegible]	0.0[illegible]	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.[illegible]	1[illegible].00	[illegible]4.00	9[illegible].0	1[illegible].00	114.00	0.00	0.00

TRSPC COMPUTED BY THE PMS RATIO IS .765

LOSS DATA

LOSS	STRKS	DLTKS	RTIOL	STRTL	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
[illegible]	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.10	0.00	0.01

UNIT HYDROGRAPH DATA

TP= [illegible].30 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH [illegible]4 END-OF-PERIOD ORDINATES, LAG= 4.31 HOURS, CP= 0.63 VOL= 1.00

34.	154.	3[illegible].	51[illegible].	559.	494.	384.	296.	229.	177.
13[illegible].	105.	1.	[illegible]3.	4[illegible].	37.	29.	22.	17.	13.
1.	1.	0.	0.						

END-OF-PERIOD FLOW

[illegible]	[illegible]	[illegible]FLEX	RAIN	EXCS	LOSS	COMP Q	[illegible]RO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	18.75	15.53	3.22	69163.
										(476.)(	394.)(	82.)(	1958.48)

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

COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 11 + 2 = 11

[illegible]	[illegible]	[illegible]	[illegible]	JPLT	JPRT	INAME	ISTAGE	IAUTO
11	2	[illegible]	[illegible]	[illegible]	0	1	0	0

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

HYDROGRAPH ROUTING

[illegible] ROUTED TO CONFLUENCE WITH AREA 4 IN AREA 10

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1 1	1	0	3	[illegible]	0	1	0	0

ROUTING DATA

[illegible]	CLOSS	AVG	IRES	ISAME	IPRT	IWRP	LSTR
[illegible]	[illegible]	[illegible]	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

[illegible] CHANNEL [illegible]

[illegible](1)	[illegible](2)	[illegible](3)	[illegible]	ELMAX	RLNTH	SEL
[illegible]	[illegible]	[illegible]	[illegible]	1500.0	4400.	0.00250

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	STA	ELEV	STA	ELEV	ETC
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	719.00	1000.00
725.00	10	[illegible]	[illegible]	1022.00	1000.00	1040.00			

ST[illegible]	[illegible]	14.15	30.24	77.15	130.86	199.39	282.73	382.07	501.25
[illegible]	[illegible]	[illegible]	1179.42	1398.76	1630.42	1872.15	2123.95	2385.83	2657.77
OUTFL [illegible]	[illegible]	467.00	1049.37	4263.06	8023.16	13281.97	20257.45	28909.60	39782.72
[illegible]	[illegible]	[illegible]	111496.25	132368.81	170358.13	205962.00	245206.81	288128.50	334770.06
STA[illegible]	10 [illegible]	16 [illegible].15	1606.52	1609.47	1612.63	1615.79	1618.95	1622.10	1625.26
1631.5	1634.73	1637.89	1641.05	1644.21	1647.37	1650.52	1653.68	1656.84	
FLO[illegible]	[illegible].0	467.00	1049.37	4263.06	8023.16	13281.97	20257.45	28909.60	39782.72
69524.14	[illegible]	111496.25	132368.81	170358.13	205962.00	245206.81	288128.50	334770.06	

MAXIMUM STAGE IS [illegible].5

MAXIMUM STAGE IS [illegible].

MAXIMUM STAGE IS [illegible].4

MAXIMUM STAGE IS [illegible].

MAXIMUM STAGE IS [illegible].

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SUBAREA RUNOFF COMPUTATION

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4			-	3	3	1	C	0

HYDRO RAIN DATA

I YR	IDA	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	4.[illegible]	C.CC	93.70	C.CC	C.CCC	0	1	0

PRECIP DATA

SPF	PXS	R6	R12	R24	R48	R72	R96
.[illegible]	[illegible]	[illegible]4.CC	[illegible]	1.[illegible]	114.30	C.00	C.00

TRSPC COMPUTED BY THE PROGRAM IS [illegible]

LOSS DATA

LOSS	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	C.CC	[illegible]	1.[illegible]	C.CC	[illegible].[illegible]C	1.[illegible]	1.CC	C.1C	C.CC	C.[illegible]

UNIT HYDROGRAPH DATA

TP= 3.CC CP=[illegible].63 NTA= C

RECESSION DATA

STRTQ= -2.CC QRCSN= -C.1C RTIOR= 1.60

UNIT HYDROGRAPH 21 END-OF-PERIOD ORDINATES, LAG= 3.CC HOURS, CP= C.63 VOL= 1.CC

[illegible]	[illegible].8.	[illegible]	465.	4[illegible].	359.	268.	200.	149.	111.
2.	42.	[illegible].	35.	[illegible].	19.	14.	11.	8.	6.
4.									

END-OF-PERIOD FLOW

[illegible]	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
		SUM	18.75	15.53	3.22	54625.
			(476.)	(394.)	(82.)	(1546.81)

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HYDROGRAPH ROUTING

CHANNEL ROUTE TO CONFLUENCE WITH AREA 11 IN AREA 10

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1 1	1		3	3	0	1	C	0

ROUTING DATA

			IN= S	IS= E	ISFT	IHRF		LSTR
			1	1	0	0		0
	ISTAS	NSTEL	LAG	AMSKK	X	TSK	STORA	ISFRAT
							-1.	0

CROSS SECTION CHARACTERISTICS

CROSS SECTION ELEVATION--TA/LEV--TA/LEV--ETC

ST									
OUTFL									
STA									
FL									

MAXIMUM STAGE IS

MAXIMUM STAGE IS

MAXIMUM STAGE IS

MAXIMUM STAGE IS

MAXIMUM STAGE IS

MAXIMUM STAGE IS

MAXIMUM STAGE IS

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 11 + 4 = 11

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

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HYDROGRAPH ROUTING

CHANNEL ROUTING THROUGH SUBAREA 1

IHR	IMIN	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1		0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	ITMP	LSTR
.	.	0.00	1	1	0	0	0

STRS	NSTPS	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

CHANNEL ROUTING CHARACTERISTICS

(1)	(2)	QB(1)	ELEVT	ELEVA	ELSTR	SEL
[illegible]	[illegible]	0.00000	1260.	1600.00	1600.	0.00250

CROSS SECTION	DIST	ELEV--STA,ELEV,STA,ELEV--ETC
1	0.	0.00 1580.00 722.00 1580.00
[illegible]	[illegible]	[illegible]

ST FLOW	1600.9	2[illegible].1[illegible]	0.00 3[illegible].51	0.00 38[illegible].12	0.00 4046.52	0.00 5525.54	0.00 6441.18	119.64 7393.45	540.45 8382.35
CLIFL	2[illegible].[illegible]	[illegible]	0.00 [illegible]	0.00 [illegible].95	0.00 111115.52	0.00 143773.63	0.00 180428.03	577.53 221089.88	4835.72 265783.50
STM	1580. 1[illegible].1	1[illegible].1 1594.71	1[illegible].[illegible] 1597.[illegible]	1[illegible].47 1[illegible].5	1572.63 1[illegible].21	1575.79 1[illegible].37	1578.95 1610.52	1582.10 1613.68	1585.26 1616.84
CL	2[illegible].[illegible]	[illegible]	0.00 [illegible]	0.00 [illegible].97	0.00 111115.52	0.00 143773.63	0.00 180428.03	577.53 221089.88	4835.72 265783.50

MAXIMUM STAGE IS [illegible]

MAXIMUM STAGE IS 1587.

MAXIMUM STAGE IS [illegible]

MAXIMUM STAGE IS [illegible]

MAXIMUM STAGE IS 1591.1

MAXIMUM STAGE IS 1591.[illegible]

MAXIMUM STAGE IS [illegible]

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

SUB-AREA RUNOFF COMPUTATION

RUNOFF OPERATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
100	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IRUNG	ICOD	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	7.44	0.00	95.70	0.0	0.000	0	1	0

PRECIP DATA

SPFE	PAS	PC	R15	R24	R48	R72	R96
..	1..	94.0	9..	1 ..0	114.0	0.0	0.0

TRSPC COMPUTED BY THE PROGRAM IS .45

LOSS DATA

LOSS	STRKS	ULTKS	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
...	..	1.00	0.00	..0	1.00	1.00	0.10	0.00	0.00	0..1

UNIT HYDROGRAPH DATA

TP= 4.62 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -1.10 RTIOR= 1.60

UNIT HYDRO RAIN 2% END-OF-PERIOD ORDINATES, LAG= 4.64 HOURS, CP= 0.63 VOL= 1.00

5.	459.	403.	271.	644.	590.	462.	382.	302.	239.
10.	150.	119.	94.	74.	59.	47.	37.	29.	23.
1.	15.	12.	9.	7.	6.				

END-OF-PERIOD FLOW

HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
								SUM	18.75	15.53	3.22	84710.
									(476.)	(394.)	(82.)	(2398.72)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 10 + 11 = 10

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
100	2	0	0	0	0	1	0	0

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SUB-AREA RUNOFF COMPUTATION

ISTAE	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
						1	0	0

HYDROGRAPH DATA

IHYDR	IUNIT	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	5.00	0.00	93.70	0.00	1.000	0	1	0

PRECIP DATA

SPFE	PXTP	R6	R12	R24	R48	R72	R96
0.00	3.00	4.00	7.00	10.00	114.00	0.00	0.00

INSPE CC ROUTED BY THE PRECIP IS .750

LOSS DATA

LOSS	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.01

UNIT HYDROGRAPH DATA

TP= 5.25 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 200 ORDINATES LAG= 5.26 HOURS, CP= 0.63 VOL= 1.00

1.	27.	131.	195.	259.	251.	228.	186.	150.	122.
99.	80.	65.	52.	46.	34.	26.	22.	18.	15.
12.	10.	8.	6.	5.	4.	3.	3.	2.	

END-OF-PERIOD FLOW

HYDR	AREA	PERIOD	RAIN	EXCS	LOSS	COMP Q	END-OF-PERIOD	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	10.75	15.53	3.22	36507.
										(476.)(394.)(82.)(1033.76)			

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SUB-AREA RUNOFF COMPUTATION

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

HYDROGRAPH DATA

IHYDR	IUNIT	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	4.10	0.00	93.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PXTP	R6	R12	R24	R48	R72	R96

BASIC C [illegible] BY TIME OF RAINFALL .05

LOSS DATA

LOSS	STRKS	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
	.0	1.	.0	.0	1.0	1.00	0.10	0.00	0.1

UNIT HYDROGRAPH DATA

TP= 7.10 CP=0.65 NTA= 0

RECESSION DATA

STRTQ= -2. QRCSN= -1. RTIOR= 1.60

UNIT HYDROGRAPH AND END-OF-PERIOD ORDINATES, LAG= 7.25 HOURS, CP= 0.65 VOL= 1. 0

67.	99.	147.	319.	913.	494.	534.	531.	479.	410.
55.	89.	234.	219.	1 7.	100.	137.	117.	100.	85.
45.	66.	55.	46.	39.	33.	28.	24.	21.	18.
13.	15.	11.	9.	7.	6.	5.	4.		

END-OF-PERIOD FLOW

AC.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	AC.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	18.75	15.53	3.22	98558.
										(476.)(394.)(82.)(2790.85)			

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COMBINE HYDROGRAPHS

COMBINE 1 HYDROGRAPHS + 2 = 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IHLTO
3	2		2	1	1	1	0	0

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HYDROGRAPH ROUTING

CHANNEL ROUTE TO CONFLUENCE WITH 2 IN AREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IHLTO
4 1	1		2	1	0	1	0	0

ROUTING DATA

CLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
.0	.00	0.0	1	1	1	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.00	0.00	0.000	-1.	0

[illegible] WITH CHANNEL ROUTING

(1) (2) (3) ELEVT ELEV ELEV DEL
.0 .4 .6 1615. 1645. 1677. .5

CROSS SECTION COORDINATES,ELEVATIONS,LEVEL--ETC
1. 1645. 55. 1600. 55. 1617. 547. 1615. 558. 1615.00
558. 1617. 0. 1600. 1. 1645.

ST HYD	.00	.07	.21	.43	12.11	40.42	51.16	63.19	105.71
	1.00	687.53	2.04	56.02	375.03	423.36	471.60	520.55	570.22
OUTFLOW	.0	95.48	304.97	1057.75	2366.18	4347.54	7269.03	11715.94	22934.51
	56631.5	77695.11	1.22 3.52	129544.56	159473.56	192525.13	228047.31	266198.75	306945.88
STAGE	1611.00	1611.15	1611.18	1611.24	1621.36	1622.69	1624.47	1626.05	1627.63
	1603.27	1632.37	1633.48	1633.56	1627.10	1636.66	1640.26	1641.84	1643.42
FLOW	.0	95.48	304.97	1057.75	2366.18	4347.54	7269.03	11715.94	22934.51
	56631.5	77695.11	1.22 3.52	129544.56	159473.56	192525.13	228047.31	266198.75	306945.88

MAXIMUM STAGE IS .00
MAXIMUM STAGE IS 1621.36
MINIMUM STAGE IS 1611.00
MAXIMUM STAGE IS 1633.56
MAXIMUM STAGE IS 1627.10
MAXIMUM STAGE IS 1636.66
MAXIMUM STAGE IS 1643.42

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SUB-AREA RUNOFF COMPUTATION

RUNOFF (SUBAREA)
ISTAG ICOMP IECON ITAPE JPLT JPRT INAME ISTAGE IAUTO
20 0 0 0 0 0 1 0 0

HYDROGRAPH DATA
IHYDG IUHG TAREA SNAP TRSDA TRSPC RATIO ISNOW ISAME LOCAL
1 1 9.00 0.00 95.70 0.00 0.000 0 1 0

PRECIP DATA
SPFE PMS R6 R12 R24 R48 R72 R96
.00 19.00 24.00 99.00 109.00 114.00 0.00 0.00

TRSPC COMPUTED BY THE PROGRAM IS .95

LOSS DATA

LOSS	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	.00	.00	1.00	0.00	.00	1.00	1.70	.10	0.00	0.1

UNIT HYDROGRAPH DATA

TP= 0.02 CP=0.65 NTA= 0

RECESSION DATA

STRTQ= -2.0 QRCSN= -1.1 RTIOR= 1.60

UNIT HYDROGRAPH 0 PERIODS AVERAGED RATES, LAG= 5.00 HOURS, CP= 0.63 VOL= 1.00

40.	155.	360.	480.	570.	670.	566.	488.	405.	
337.	279.	232.	193.	160.	133.	110.	92.	76.	63.
52.	44.	37.	30.	25.	21.	17.	14.	12.	10.
.	.	.							

END-OF-PERIOD FLOW

HYDRO	AREA	PEAK	RAIN	EXCS	LOSS	COMP Q	COMP EV	-MIN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	18.75	15.53	3.22	108742.
										(476.)(394.)(82.)(3079.23)			

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HYDROGRAPH ROUTING

CHANNEL ROUTE TO CONFLUENCE WITH 1 IN AREA 1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	ICLTQ
0 1	1	3	0	0	0	1	0	0

ROUTING DATA

RLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IEMP	LSTR
0.0	1.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1		0	0.000	0.000	0.000	-1.	0

SUBAREA ROUTING OPTION

IRD(1)	IRD(2)	IRD(3)	ELEVT	ELMAX	RLNTH	SEL
0.0	1.04	0.000	1615.	1645.0	7200.	0.10000

CROSS SECTION OF ROUTING--STA,ELEV,STA,ELEV--ETC

10.00	1643.00	500.00	1626.00	530.00	1617.00	542.00	1615.00	550.00	1615.00
560.	1617.	7...0	1626.	15...0	1625.00				

ST HYDRO	0.0	5.0	15.70	42.69	88.45	147.00	224.54	454.99	761.12
10 .01	1711.3	2007.10	2300.97	2700.00	3046.17	3345.49	3647.97	4105.59	

CTIC	[illegible]	[illegible]	[illegible]	1564.1	2997. 7	56[illegible]1.41	9365.49	15[illegible]94.94	29549.06
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]1.44	293818.56	242[illegible]73.31	395472.31
STA	1[illegible]9.0	1[illegible].5	1[illegible].14	1619.74	1621.36	1622.69	1624.47	1[illegible]26.05	1627.63
	1[illegible].77	1[illegible].31	1[illegible].45	1635.59	1637.10	1638.60	1640.26	1[illegible]41.84	1643.42
FL	[illegible]	1[illegible].6	[illegible]	1564.1	2997. 7	56[illegible]1.41	9365.49	15[illegible]94.94	29549.06
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]1.44	293818.56	242[illegible]73.31	395472.31

[illegible] IS [illegible].1

[illegible] IS [illegible].9

[illegible] IS [illegible].

[illegible] IS [illegible].1

[illegible] IS [illegible].0

[illegible] IS [illegible].4

[illegible] IS [illegible].1

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

COMBINE HYDROGRAPHS

COMBINE [illegible] HYDROGRAPHS 6 + 5 = 8

IST[illegible]G	IC[illegible]E	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
[illegible] 1	[illegible]	[illegible]	[illegible]	[illegible]	0	1	C	0

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HYDROGRAPH ROUTING

CH[illegible]EL ROUTE THRU SUBAREA 6

IST[illegible]	IC[illegible]E	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	1	C	0

ROUTING DATA

[illegible]LOSS	CL[illegible]SS	AVG	IRES	ISA[illegible]E	ICPT	IPMP	LSTR
C.C	[illegible].CC	C.CC	1	1	0	0	0

[illegible]STPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	[illegible]	0	[illegible].C	C.CCC	C.CCC	-1.	C

[illegible] [illegible] CHANNEL ROUTING

---

(1) (2) (3) (4) (5) (6) (7) (8)

[illegible]

CROSS SECTION COMPRESSATES--STA--ELEV--STA--ELEV--ETC

1 [illegible] 1560.00 550.00 [illegible] 550.00 1560.00 542.00 1560.00 550.00 1560.00

564.00 1560.00 [illegible] [illegible] [illegible] 1560.00

ST RATE	[illegible]	[illegible]	63.14	59.98	134.19	245.79	394.77	582.29	812.19
	1554.69	1757.[illegible]	2150.41	2691.82	3307.49	3616.03	4187.22	4701.08	5457.60
OUTFLO	[illegible]	4.31	[illegible]	751.11	1666.30	3202.65	5645.82	8952.98	13424.74
	264[illegible]	35163.77	45598.16	57866.72	71972.11	88141.67	106447.81	126598.19	149898.06
STAGE	1554.60	1561.59	1565.16	1564.74	1566.32	1567.89	1569.47	1571.05	1572.63
	1573.79	1577.35	1571.[illegible]	1580.55	1582.10	1583.66	1585.26	1586.84	1588.42
FLO	[illegible]	4.31	63.29	751.11	1666.00	3202.65	5645.82	8952.98	13424.74
	264[illegible]	35163.77	45598.16	57868.72	71972.11	88141.67	106447.81	126598.19	149898.06

MAXIMUM STAGE IS [illegible].1

MAXIMUM STAGE IS [illegible].2

MAXIMUM STAGE IS [illegible].3

MAXIMUM STAGE IS 1571.1

MAXIMUM STAGE IS [illegible]71.4

MAXIMUM STAGE IS 1573.

MAXIMUM STAGE IS 1574.4

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUB-AREA

IST A	ICOMP	IECON	ITAPE	JPLT	JPPT	INAME	ISTAGE	IAUTO
[illegible]	[illegible]	[illegible]	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDR	IUNIT	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	4.52	[illegible]	93.7[illegible]	0.00	1.000	0	1	0

FRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	1.00	44.00	98.0[illegible]	109.00	114.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS [illegible].85

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIOR
	0.00	[illegible]	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.1

UNIT HYDROGRAPH DATA
Tp= 4.76 CP= .63 NTA= 0

RECESSION DATA
STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.00

UNIT HYDROGRAPH [illegible]-PERIOD ORDINATES, LAG= 4.76 HOURS, CP= 0.63 VOL= 1.0

65.	121.	[illegible]	334.	304.	368.	298.	237.	188.	149.
118.	94.	[illegible]	59.	47.	37.	30.	23.	19.	15.
12.	9.	7.	6.	5.	4.				

END-OF-PERIOD FLOW

[illegible]	HR.	PERIOD	RAIN	EXCS	LOSS	COMP Q	[illegible]	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	18.75	15.53	3.22	51340.
										(476.)	(394.)	(82.)	(1453.79)

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COMBINE HYDROGRAPHS

COMBINE [illegible] GRAPHS 1, + 0 + 0 = 10

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	3	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU SUBAREA 9

IST 9	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
9	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IPRT	IPMP	LSTR
.00	.0	0.0	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

[illegible] DEPTH CHANNEL ROUTING

[illegible](1)	[illegible](2)	[illegible](3)	EL[illegible]	ELMAX	[illegible]	SEL
.0	.4	.0	1445.	1495.0	1780.	.0[illegible]

CROSS SECTI... ...REDIATE--STA,ELEV,STA,ELEV--ETC

1 ... 1445.00 1144.00 1445.00
115 ... 1445.0

ST SAME									
	34...	43...	52...	43...	73...	1...	1436.82	1900.52	2428.68
							10...	11...	13778.84
OUTFL...									
			46...	10...	17923.57	28...	42551.77	59793.97	80683.06
	1...	1...	...	...	...98.56	353538.88	421642.63	499785.56	588737.00
STAGE	1445.0	1447...	145...	1452.89	1455.53	1458.16	1460.79	1463.42	1466.05
	1471.31	1473...	1476.5...	1479.21	1481.84	1484.47	1487.10	1489.73	1492.36
FL...									
			46...	10...	17923.57	28...	42551.77	59793.97	80683.06
	1...	1...	...	...	...98.56	353538.88	421642.63	499785.56	588737.00

MAXIMUM STAGE IS 1453.8

MAXIMUM STAGE IS 1453.3

MAXIMUM STAGE IS 1457.

MAXIMUM STAGE IS 1457.4

MAXIMUM STAGE IS 1459.7

MAXIMUM STAGE IS 1461.7

MAXIMUM STAGE IS 1465.0

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SUB-AREA RUNOFF COMPUTATION

...OFF ...EA...

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	ILTO
1	1	0	2	0	0	1	0	0

HYDROGRAPH DATA

IHYD	AL...	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.16	0.0	93.72	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.0...	1...00	...4.00	9...0...	109.00	114.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS ...0e5

LOSS DATA

...IT	STRKR	...LTK...	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP

[illegible] 1.00 [illegible] [illegible] 1.00 1.00 0.10 0.00 0.1

UNIT HYDROGRAPH DATA
TP= 4.44 CP= .65 NTA= 0

RECESSION DATA
STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.00

UNIT HYDROGRAPH 25 END-OF-PERIOD ORDINATES, LAG= 4.43 HOURS, CP= 0.62 VOL= 1.0
26. 134. 351. 551. 554. 499. 395. 310. 243. 190.
149. 117. 92. 72. 57. 44. 35. 27. 21. 17.
13. 10. 8. 6. 5.

END-OF-PERIOD FLOW
[illegible] HR. [illegible] PERIOD RAIN EXCS LOSS COMP Q VOLUME HR.MN PERIOD RAIN EXCS LOSS COMP Q

SUM 18.75 15.53 3.22 70733.
(476.)(394.)(82.)(2002.93)

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COMBINE HYDROGRAPHS

COMBINE HYDROGRAPHS 9 + 10 = 9
IST A ICOMP IECON ITAPE JPLT JPRT INAME ISTAGE IAUTO
[illegible] 2 1 0 0 0 1 0 0

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HYDROGRAPH ROUTING

CHANNEL ROUTE T CONFLUENCE WITH 13 IN AREA 12
IST-A ICOMP IECON ITAPE JPLT JPRT INAME ISTAGE IAUTO
[illegible] 1 0 0 0 0 1 0 0

ROUTING DATA
CLOSS CLOSS AVG IRES ISAME IOPT IPMP LSTR
[illegible] 0 [illegible] 1 1 0 0

NSTPS NSTDL LAG AMSKK X TSK STORA ISPRAT
1 0 0 0.000 0.000 0.000 -1. 0

[illegible] CHANNEL ROUTING

GN(1) GN(2) GN(3) ELEVT ELMPA RLNTH SEL
0.0500 0.0400 0.0600 1430.0 1470.0 1600. 0.00940

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

ST [illegible]	0.0	7.44	20.57	47.57	90.29	120.55	166.54	218.86	277.51
	415.8	491.44	575.42	669.72	762.35	865.32	974.61	1090.24	1212.20
LTEL	.0	116.00	[illegible]	1,419.79	20210.17	33622.81	50913.32	72359.83	98242.77
	1,442.13	2,52[illegible]	[illegible]	303745.25	361897.06	426324.13	497267.88	574966.75	659656.00
[illegible]	1431.[illegible]	1434.11	1434.21	1436.32	1438.42	1440.53	1442.63	1444.74	1446.84
	1431.[illegible]	1453.16	1455.26	1457.37	1459.47	1461.58	1463.68	1465.79	1467.89
RL	.0	116.00	[illegible] 72.63	1641[illegible].79	20210.17	33622.81	50913.32	72359.83	98242.77
	1,442.13	2,52[illegible]	[illegible]	303745.25	361897.06	426324.13	497267.88	574966.75	659656.00

MAXIMUM STAGE IS 1436.4

MAXIMUM STAGE IS 1438.3

MAXIMUM STAGE IS 1420.4

MAXIMUM STAGE IS 1440.4

MAXIMUM STAGE IS 1441.3

MAXIMUM STAGE IS 1442.4

MAXIMUM STAGE IS 1444.2

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SUB-AREA RUNOFF COMPUTATION

[illegible] FOR SUBAREA IS

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1000	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDR	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.64	0.00	93.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R1	R24	R24	R48	R72	R96
0.00	19.00	2.00	9.00	104.00	114.00	0.00	0.00

TRSPC COMPUTED BY THE PER RAT IS 0.000

LOSS DATA

LOSS	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.01

UNIT HYDROGRAPH DATA

TP= 5.7 CP= .63 VTA= 0

RECESSIO DATA
STRTQ= -2.00 QRCSN= -.10 RTIOR= 1.60

UNIT HYDR STAT 21 EXCESS-PERIOD ORDINATES, LAG= 5.72 HOURS, CP= 0.63 VOL= 1.00
1. 7. 17. 29. 21. 155. 114. 85. 63. 47.
35. 26. 19. 14. 11. 8. 6. 4. 3. 2.

END-OF-PERIOD FLOW
PK.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q PK.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q

SUM 15.75 15.53 3.22 24009.
(400.)(394.)(82.)(609.75)

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HYDROGRAPH ROUTING

CHANNEL ROUTE TO CONFLUENCE WITH I' AREA 12
ISTAQ ICOMP IECON ITAPE JPLT JPRT INAME ISTAGE IAUTO
12 1 1 0 0

ROUTING DATA
RLNSS CLOSS AVG IRES ISAME IOPT IFMP LSTR
.06 .000 0.00 1 1 0 0 0

NSTPS NSTOL LAG AMSKK X TSK STORA ISPRAT
1 0 2 0.00 0.000 0.000 -1. 0

ROUTE DATA CHANNEL ROUTING

XX(1) XX(2) XX(3) ELMXT ELMAX ELMTH SEL
.06 .40 .60 1430.00 1470.00 1460.00 .113

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
1000. 0 1470. 1000.00 1434.00 944.00 1433.00 954.00 1430.00 1046.00 1430.00
1 50. 1430. 1150.00 1434.00 1000.00 1470.00)

ST FLOW 0. 67.00 187.63 434.33 738.14 1100.02 1519.67 1997.08 2532.26
3773.93 4414.41 5250.66 6074.67 6956.46 7896.03 8893.36 9948.45 11061.31

OUTFLOW 0.07 1271.94 4465.51 11420.03 22152.75 36864.59 55622.19 79336.47 107714.94
180270.16 258531.38 275875.00 333029.00 396789.75 467428.63 545212.38 630402.75 723257.38

STAGE 1430.00 1432.11 1434.61 1436.36 1438.46 1440.53 1442.63 1444.74 1446.84
1451.50 1453.19 1455.24 1457.37 1459.47 1461.56 1463.68 1465.79 1467.89

FL	1c71.94	4463.51	1142[illegible].15	6215[illegible].79	36[illegible]4.54	55c22.19	79[illegible]36.47	107714.94
1	2[illegible].1[illegible]	[illegible]3E31.5[illegible]	[illegible]3E[illegible]3.[illegible]	[illegible]33[illegible]2[illegible].0	[illegible]9[illegible]89.79	4c74[illegible]8.63	545212.38	6304[illegible]2.75	723257.38

[illegible]XI[illegible] STAGE IS 1[illegible]3[illegible].

[illegible]XI[illegible]M STAGE IS 1451.2

[illegible]XI [illegible]M STAGE IS 1451.6

[illegible]XI[illegible]A STAGE IS 1[illegible]5[illegible].

[illegible]XI[illegible]OB STAGE IS 1[illegible]5[illegible].2

[illegible]XI[illegible]O STAGE IS 1[illegible]5[illegible].3

[illegible]XI[illegible]OF STAGE IS 1[illegible]5[illegible]..

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

COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS W + 13 = 7

IST[illegible]G	IC[illegible]MP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1[illegible] 1	2	3	0	0	0	1	0	0

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU SUBAREA12

IST[illegible]G	IC[illegible]MP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
12 [illegible]	1	7	0	0	0	1	0	0

ROUTING DATA

QL[illegible]SS	CL[illegible]SS	AVQ	IRES	ISAVE	ICPT	IPMP	LSTR
[illegible].0	[illegible].[illegible]	[illegible].67	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

[illegible]PAL DEPTH CHA[illegible]EL ROUTING

R(1)	[illegible]R(2)	WM(3)	ELMAX	ELMAX	RLNTH	SEL
[illegible].0000	[illegible].0400	0.0000	1375.[illegible]	1415.[illegible]	5000.	0.0110[illegible]

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

1[illegible].[illegible] 1413.[illegible] [illegible]5[illegible].[illegible] 1375.00 9[illegible].[illegible] 1375.00 1046.00 1375.00

1052.[illegible] 1[illegible].[illegible] 1[illegible]5[illegible].00 1374.00 1[illegible]0.00 1415.00

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1[illegible]3.1[illegible]	1535.78	17[illegible].17	[illegible].37	[illegible]39[illegible].35	[illegible]7[illegible]4.1[illegible]	5345.67	3407.00	3788.12
[illegible]	[illegible]	1[illegible]34.94	[illegible]	112[illegible].4[illegible]	[illegible]1[illegible]6[illegible].[illegible]	36371.95	55076.20	78[illegible]6.25	106275.47
	3[illegible]2[illegible].[illegible]	[illegible]22[illegible]43[illegible].[illegible]	[illegible].[illegible]	32[illegible]57[illegible].5	7[illegible]14[illegible]7.19	4[illegible]11[illegible]2.0[illegible]	537926.38	621[illegible]76.25	713592.CC
T[illegible]	1373.	1[illegible]7.11	1[illegible].21	13[illegible]1.3[illegible]	1[illegible]5.4[illegible]	13[illegible]5.5[illegible]	1387.63	1[illegible]9.74	1391.84
	13[illegible].	139[illegible].1[illegible]	14[illegible].2[illegible]	14[illegible]3.37	14[illegible]4.47	14[illegible]6.5[illegible]	1408.68	1410.79	1412.89
[illegible]	[illegible]	1254.[illegible]	[illegible]	112[illegible]7.4[illegible]	[illegible]18[illegible]2.[illegible]	36371.95	55076.20	78[illegible]6.25	106275.47
	1[illegible]3[illegible].[illegible]	[illegible]22[illegible]43[illegible].[illegible]	[illegible].25	32[illegible]57[illegible].5[illegible]	3[illegible]14[illegible]7.19	4[illegible]11[illegible]2.06	537926.38	621[illegible]76.25	713592.CC

MAXIMUM STAGE IS [illegible]3[illegible]1.7

MAXIMUM STAGE IS [illegible]3[illegible]3.1

MAXIMUM STAGE IS [illegible]1[illegible]4.[illegible]

MAXIMUM STAGE IS [illegible]3[illegible]5.[illegible]

MAXIMUM STAGE IS [illegible]3[illegible]6.[illegible]

MAXIMUM STAGE IS [illegible]3[illegible]7.[illegible]

MAXIMUM STAGE IS [illegible]3[illegible]7.[illegible]

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 12

IST[illegible]	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
12	[illegible]	3	C	3	0	1	C	C

HYDROGRAPH DATA

IHYDR	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	[illegible].5[illegible]	0.00	93.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PXS	R6	R12	R24	R48	R72	R96
[illegible].0[illegible]	1[illegible].[illegible]3	[illegible]4.0[illegible]	9[illegible].[illegible]3	1[illegible]3.[illegible]0	114.00	0.00	0.00

1-SPEC COMPUTED BY THE PROGRAM IS [illegible].[illegible]3

LOSS DATA

LSOPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
1	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.01

UNIT HYDROGRAPH DATA

TP= 3.24 CP=0.63 VTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.00

UNIT HYDR RAIN 29 P.D= P-PERIOD ORDINATES, LAG= 5.25 HOURS, CP= 0.63 VOL= 1.00

[illegible]	1[illegible].	5[illegible].	[illegible].	615.	647.	565.	477.	386.	312.
[illegible]	[illegible]4.	1[illegible].	134.	1[illegible].	87.	71.	57.	46.	37.
[illegible].	64.	[illegible].	10.	15.	10.	8.	7.	6.	

END-OF-PERIOD FLOW

[illegible] HR.	[illegible]	[illegible]	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
								SUM	18.75	15.53	3.22	93876.
									(476.)	(394.)	(82.)	(2658.27)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS + 12 = 12

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
[illegible]	2	3	2	[illegible]	0	1	0	0

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HYDROGRAPH ROUTING

CHANNEL ROUTE TO RESERVOIR IN SUBAREA 14

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
14[illegible]	1	0	0	[illegible]	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
[illegible]	[illegible]	[illegible]	1	1	[illegible]	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

COMPUTE DEPTH CHANNEL ROUTING

Z(1)	Z(2)	Z(3)	ELMAX	ELMAX	RLNTH	SEL
[illegible]	[illegible]4.0	0.060	12[illegible].	1345.0	1040.	0.00[illegible]0

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

1[illegible] 1345.00 3[illegible].00 12[illegible].00 354.00 12[illegible].00 [illegible]0.00 12[illegible].00 460.00 12[illegible].00

[illegible]0.00 12[illegible].00 5[illegible].00 12[illegible].00 [illegible]0.00 1345.00

ST FACE	[illegible]	[illegible]7.9	2[illegible].64	403.21	6[illegible]4.33	[illegible]51.99	10[illegible]6.20	1366.95	1674.24

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL	.00	2 31.5	1 [illegible]1.1[illegible]	2[illegible]5.[illegible]	[illegible]91.1[illegible]	55639.27	85492.34	115961.56	151431.84
	[illegible]1[illegible]	[illegible]9[illegible]	[illegible]471 5.[illegible]	41[illegible]1.[illegible]	4 01[illegible]4.[illegible]	556[illegible]2.[illegible]	638443.25	727[illegible]0.63	823706.88
STAGE	1[illegible] .	1[illegible]3.4[illegible]	[illegible][illegible].[illegible]	1[illegible] .26	1[illegible]92.6[illegible]	1297.1[illegible]	1300.53	1303.95	1307.37
	1[illegible]4.21	1317.[illegible]	[illegible][illegible].[illegible]	1[illegible]4.47	1[illegible]7.[illegible]	1[illegible]1.31	1334.[illegible]	1[illegible]8.16	1341.58
FL	.00	2 31.5	1 [illegible]1.1[illegible]	2[illegible]5.[illegible]	[illegible]91.16	55639.27	85492.34	115961.56	151431.84
	[illegible]1[illegible].[illegible]	[illegible]9[illegible].[illegible]	[illegible]471[illegible].	41[illegible]1.[illegible]	4[illegible]1 4.5	55[illegible].[illegible]	638443.25	727[illegible]6.63	823706.88

MAXIMUM STAGE IS [illegible].1

MAXIMUM STAGE IS [illegible]

MAXIMUM STAGE IS [illegible]1.[illegible]

MAXIMUM STAGE IS [illegible]

MAXIMUM STAGE IS [illegible]

MAXIMUM STAGE IS [illegible]

MAXIMUM STAGE IS [illegible]

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SUB-AREA RUNOFF COMPUTATION

FOR FP SEQUENCE IS

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	I-CTO
15	1		0	1		1	0	0

HYDROGRAPH DATA

IHYD	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	5.13	0.0	3.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.0	1[illegible].[illegible]	[illegible]4.[illegible]	[illegible].[illegible]	1[illegible]9.[illegible]	114.00	0.00	0.00

TAPE IS FILED BY THE FPQ RAT IS [illegible].[illegible]

LOSS DATA

LKRT	STRKS	DLTKS	RTIOL	EPAIP	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
0.00	0.00	0.00	1.00	0.00	[illegible].[illegible]	1.00	1.00	0.10	0.00	0.[illegible]1

UNIT HYDROGRAPH DATA

TP= 0.04 CP= .63 NTA= 0

PROCESSING DATA

TP= -2.00 GRCSN= -0.10 RTIOR= 1.60

UNIT HYDRO RAIN TO END-OF-PERIOD ORDINATES, LAG= 3.15 HOURS, CP= 0.63 VOL= 1.00

1 2.	30%.	514.	68%.	514.	343.	251.	155.	104.	70.
47.	31.	21.	14.	9.	6.				

END-OF-PERIOD FLOW

HR.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	HR.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	18.75	15.53	3.22	62451.
										(476.)	(394.)	(82.)	(1768.41)

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SUB-AREA RUNOFF COMPUTATION

RUNOFF TO AREA 14

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
14	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYD	IUH	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
	1	5.19	0.0	93.7	0.00	0.000	0	1	

PRECIP DATA

SPFE	PAS	R6	R12	R24	R48	R72	R96
0.0	14.00	14.00	94.00	109.00	114.00	0.00	0.00

TRSPC COMPUTED BY THE PAS RAT IS .965

LOSS DATA

LOSS	STRKS	DLTKS	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.00	0.50	1.00	0.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 2.65 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDRO RAIN TO END-OF-PERIOD ORDINATES, LAG= 2.66 HOURS, CP= 0.63 VOL= 1.00

194.	515.	736.	635.	452.	285.	188.	124.	82.	54.
35.	23.	16.	10.	7.					

END-OF-PERIOD FLOW

HR.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	HR.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	18.75	15.75	2.99	64749.
										(476.)	(400.)	(76.)	(1833.49)

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COMBINE HYDROGRAPHS

COMBINE [illegible] HYDROGRAPHS AT RESERVOIR 16 + 15 + 14 = 14

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
14	2	1	0		0	1	0	0

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HYDROGRAPH ROUTING

ROUTE THROUGH RESERVOIR AND OVER DAM

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
14	1	0	0	1	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
.20	.20	.20	1	1	1	0	0

ISTRS	NSTPS	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1260.	-1

TAINTER	16	1[illegible]	1[illegible]	12[illegible]	12[illegible]	12[illegible]	1286.00	1287.00	1288.00	
	12[illegible]	1292.[illegible]	1294.[illegible]	1296.[illegible]	1298.[illegible]	1300.00	1302.00	1304.00		
FLOW		441.0	1[illegible]	2447.0	391[illegible]	5685.00	7738.00	9573.00	12456.00	
	179 0.0	243 0.0	2139.00	3927[illegible]	4708[illegible]	55410.00	64235.00	73190.00		
STAGE	CITY=	[illegible]	[illegible]	99.	279.	645.	1365.	2590.	4345.	6830.	10650.
	1	[illegible]								
ELEVATION=		[illegible]	1[illegible]	1[illegible]	1245.	1255.	1260.	1270.	1280.	1290.	1300.
		[illegible]								

CREL	SPWID	COOR	EXPW	ELEVL	COQL	CAREA	EXPL
1280.	50.0	.00	.00	.00	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1296.0	2.6	1.5	350.

PEAK OUTFLOW IS [illegible]. AT TIME 47.[illegible] HOURS

PEAK STORAGE IS [illegible] AT TIME 47.00 HOURS

PEAK OUTFLOW IS 31[illegible]. AT TIME 47.00 HOURS

PEAK STORAGE IS [illegible] AT TIME 47.00 HOURS

PEAK OUTFLOW IS [illegible] AT TIME [illegible] HOURS

PEAK STORAGE IS [illegible] AT TIME [illegible] HOURS

PEAK OUTFLOW IS [illegible] AT TIME [illegible] HOURS

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HYDROGRAPH ROUTING

CHANNEL ROUTE - ELEV DATA

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0

ROUTING DATA

NSTPS	ITYPE	X	IPMP	LSTR
1	1	.1	0	0

ISTPS	NSTPL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

NSTPS	ITYP	ISEC	ELEVT	ELMAX	RLNTH	SEL
1	4	1	[illegible]	[illegible]	2000.	0.0500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

1 [illegible] 13 [illegible] 270.0 1220.00 270.00 1217.00 270.00 1210.00 350.00 1210.00

5 5.00 1217.00 400.00 1220.00 540.00 1300.0

ST HYD	0	17.1	42.35	74.27	110.34	149.76	193.30	240.71	291.97
	4 0.1	46.93	535.07	676.25	822.72	759.01	841.18	927.21	1017.11
OUTFLO	0	23[illegible].17	9252.75	21210.53	37538.20	58129.98	82996.84	112195.83	145828.50
	2260[illegible].59	2741[illegible].31	3264[illegible].63	3836[illegible].25	4460[illegible].31	5135[illegible].25	5863[illegible].63	6640[illegible].88	7484[illegible].88
STAGE	121[illegible]	1[illegible].74	1219.47	1224.21	1228.95	1233.68	1238.42	1243.16	1247.89
	1257.37	1[illegible].10	1[illegible].84	1271.58	1[illegible].32	1[illegible].05	1285.79	1[illegible].53	1295.26
FLO	0	23[illegible].17	9252.75	21210.53	37538.20	58129.98	82996.84	112195.83	145828.50
	2260[illegible].59	2741[illegible].31	3264[illegible].63	3836[illegible].25	4460[illegible].31	5135[illegible].25	5863[illegible].63	6640[illegible].88	7484[illegible].88

MAXIMUM STAGE IS 1[illegible].9

MAXIMUM STAGE IS 1[illegible].

MAXIMUM STAGE IS 1[illegible].1

MAXIMUM STAGE IS 1[illegible].

[illegible] IS [illegible]

[illegible] IS [illegible]

[illegible] IS [illegible]

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PEAK FLOW AND STAGE (PEAK OF FLOOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 0.20	RATIO 2 0.30	RATIO 3 0.40	RATIO 4 0.50	RATIO 5 0.60	RATIO 6 0.80	RATIO 7 1.00
HYDROGRAPH AT	3	1..	1	1947.	292..	3894.	4867.	5841.	7787.	9734.
		(5.0.)		(55.15)(	82.69)(	110.28)(	137.82)(	165.39)(	220.52)(	275.64)(
ROUTED TO	1	10.00	1	1939.	2910.	3880.	4876.	5849.	7799.	9762.
		(25.90)		(54.91)(	82.40)(	109.88)(	138.08)(	165.63)(	220.84)(	276.44)(
HYDROGRAPH AT	1	0..	1	1229.	1844.	2459.	3074.	3688.	4918.	6147.
		(15.94)		(34.81)(	52.22)(	69.63)(	87.03)(	104.44)(	139.25)(	174.06)(
2 COMBINED	1	14.00	1	3116.	4674.	6237.	7823.	9385.	12514.	15656.
		(41.44)		(88.29)(	132.44)(	176.62)(	221.52)(	265.76)(	354.35)(	443.32)(
ROUTED TO	2	14..	1	2127.	4691.	6256.	7829.	9423.	12549.	15680.
		(41.44)		(88.55)(	132.43)(	177.16)(	221.69)(	266.82)(	355.35)(	444.02)(
HYDROGRAPH AT	2	5..5	1	1460.	2220.	2960.	3700.	4440.	5920.	7400.
		(15.15)		(41.91)(	62.86)(	83.82)(	104.77)(	125.72)(	167.63)(	209.54)(
2 COMBINED	2..	21.85	1	4363.	6592.	8774.	11016.	13264.	17704.	22165.
		(56.59)		(123.53)(	186.39)(	248.44)(	311.93)(	375.59)(	501.31)(	627.64)(
ROUTED TO	1100	21.85	1	4239.	6371.	8506.	10694.	12888.	17205.	21596.
		(56.59)		(120.02)(	180.42)(	240.87)(	302.82)(	364.96)(	487.20)(	611.54)(
HYDROGRAPH AT	110	5.00	1	1510.	1964.	2619.	3274.	3929.	5238.	6548.
		(15.54)		(37.08)(	55.63)(	74.17)(	92.71)(	111.25)(	148.33)(	185.42)(
2 COMBINED	11	27.85	1	5447.	8196.	10922.	13714.	16512.	22037.	27636.
		(72.13)		(154.23)(	231.92)(	309.23)(	388.33)(	467.57)(	624.02)(	782.56)(
ROUTED T	1..	27.85	1	5459.	8225.	10957.	13776.	16582.	22139.	27817.
		(72.13)		(154.59)(	232.91)(	310.27)(	390.09)(	469.56)(	626.92)(	787.69)(
HYDROGRAPH AT	4..	4.00	1	1099.	1646.	2197.	2747.	3296.	4394.	5493.
		(12.. 7)		(31.11)(	46.66)(	62.22)(	77.77)(	93.33)(	124.44)(	155.54)(
ROUTED T	1..	4.00	1	1084.	1625.	2167.	2709.	3251.	4343.	5429.
		(12.. 7)		(30.69)(	46.02)(	61.36)(	76.71)(	92.05)(	122.99)(	153.72)(
2 COMBINED	1..	32.51	1	6450.	9711.	12936.	16252.	19554.	26083.	32746.

	([illegible])	(1[illegible].64)([illegible]74.[illegible])(306.37)(460.62)(553.72)(738.56)(927.27)(
[illegible]LTED T	1 [illegible]	3[illegible].31 ([illegible]4.[illegible])	1	[illegible]661. (17[illegible].15)(	9411. 296.49)(	1[illegible]61. 356.[illegible])(	15969. 452.77)(	19325. 547.22)(	25959. 735.07)(	32682. 925.44)(
HYDR [illegible]M [illegible]AT	1 [illegible]	7.44 (19.[illegible])	1	154[illegible]. (43.[illegible])(	2359. 65.4[illegible])(	3[illegible]7[illegible]. 87.[illegible])(	3649. 103.[illegible])(	4619. 130.79)(	6159. 174.39)(	7698. 217.99)(
[illegible] C[illegible]MBI[illegible]D	1 [illegible]	39.95 (1 3.47)	1	7[illegible]36. (21[illegible].22)(	11[illegible]2. 328.54)(	15503. 439.[illegible])(	19642. 556.20)(	23708. 671.34)(	31[illegible]3. 900.55)(	39987. 1132.29)(
HYDR GRAD [illegible]AT	7	5.[illegible]6 ([illegible].44)	1	618. (17.51)(	927. [illegible]6.26)(	1236. 35.[illegible])(	1546. 43.76)(	1855. 52.52)(	2473. 70.02)(	3091. 87.53)(
HYDR GRAD [illegible]AT	[illegible]	9.16 ([illegible]3.7[illegible])	1	1410. (39.92)(	2115. 59.[illegible])(	[illegible]8[illegible]0. 79.[illegible])(	3525. 99.[illegible])(	4230. 119.77)(	5640. 159.70)(	7050. 199.62)(
[illegible] C[illegible]MBI[illegible]D	[illegible]	1[illegible].4[illegible] ([illegible]2.17)	1	1984. (56.1[illegible])(	2976. [illegible]4.27)(	3968. 11[illegible].36)(	4960. 140.45)(	5952. 168.54)(	7936. 224.72)(	9920. 280.90)(
[illegible]OUTED T[illegible]	[illegible]	1[illegible].42 (32.17)	1	1966. (56.25)(	2982. 84.44)(	3970. 112.43)(	4960. 140.[illegible])(	5963. 168.86)(	7968. 225.[illegible])(	9928. 281.12)(
HYDR GRAD[illegible] AT	5	9.8[illegible] (25.[illegible])	1	1[illegible]16. [illegible].[illegible])(	[illegible]574. 72.[illegible])(	3432. 97.1[illegible])(	4290. 121.49)(	5149. 145.79)(	6865. 194.39)(	8581. 242.99)(
[illegible]OUTED T[illegible]	[illegible]	[illegible].[illegible] ([illegible]5.59)	1	1702. (48.19)(	2553. 72.29)(	3401. 96.31)(	4253. 120.44)(	5103. 144.50)(	6800. 192.56)(	8501. 240.73)(
[illegible] C[illegible]MBI[illegible]D	5[illegible]	[illegible]2.30 (57.7[illegible])	1	3[illegible]68. (104.44)(	5535. 156.73)(	7371. 208.73)(	9219. [illegible]61.06)(	11066. 313.36)(	14768. 418.18)(	18429. 521.85)(
[illegible]OUTED T[illegible]	5[illegible]	[illegible]2.30 (57.7[illegible])	1	3606. (102.11)(	5423. 153.57)(	7274. 205.97)(	9102. [illegible]57.74)(	10957. 310.25)(	14645. 414.71)(	18317. 518.68)(
HYDR[illegible]GRAD[illegible] AT	[illegible]	4.62 (11.71)	1	924. ([illegible]3.16)(	1386. 39.24)(	1846. 52.32)(	2309. 65.39)(	2771. 78.47)(	3695. 104.63)(	4619. 130.79)(
[illegible] C[illegible]MBI[illegible]D	1[illegible]	66.77 (172.93)	1	11[illegible]68. (336.[illegible])(	18018. 510.[illegible])(	24125. 683.14)(	30444. 862.[illegible])(	36748. 1040.60)(	49227. 1393.95)(	61840. 1751.12)(
[illegible]OUTED T	[illegible]	66.77 (172.93)	1	11916. (337.41)(	17973. 508.93)(	24042. 680.79)(	30214. 855.29)(	36354. 1029.42)(	48524. 1374.03)(	61061. 1729.05)(
HYDR[illegible]GRAD[illegible] AT	9[illegible]	[illegible].1[illegible] (14.[illegible]1)	1	1311. (37.13)(	1967. 55.69)(	2622. 74.26)(	3278. 92.[illegible])(	3934. 111.39)(	5245. 148.52)(	6556. 185.64)(
[illegible] C[illegible]MBI[illegible]D	90[illegible]	72.95 (1[illegible]8.94)	1	12959. (366.95)(	19537. 553.25)(	26126. 739.87)(	32817. 929.27)(	39738. 1125.27)(	53367. 1511.18)(	67181. 1902.36)(
[illegible]OUTED T	12[illegible]	7[illegible].[illegible]5	1	1[illegible]9[illegible]2.	19548.	2[illegible]1[illegible].	3258[illegible].	39705.	53305.	67108.

	(1 [illegible])	([illegible])	([illegible])	(741.00)	([illegible])	(1124.31)	(1509.42)	(1900.30)	
[illegible] AT	15 [illegible]	1	490.	735.	979.	1224.	1469.	1959.	2448.
	(5.[illegible])	(13.87)	([illegible])	(27.75)	(34.67)	(41.60)	(55.47)	(69.33)	
ROUTED T	12 [illegible]	1	475.	713.	951.	1188.	1441.	1919.	2399.
	(5.[illegible])	(13.46)	(20.19)	(26.92)	(33.65)	(40.80)	(54.34)	(67.93)	
[illegible] C [illegible] ITED	12 [illegible]	1	13525.	20293.	26895.	33832.	40992.	55022.	69255.
	(14[illegible])	(377.32)	(566.9[illegible])	(761.57)	(958.02)	(1160.77)	(1558.04)	(1961.07)	
ROUTED T	12 [illegible]	1	13542.	20163.	26951.	33946.	40838.	54801.	69094.
	(194.[illegible])	(377.79)	(570.96)	(763.18)	(961.23)	(1156.41)	(1551.80)	(1956.51)	
[illegible] YDR [illegible] [illegible] AT	12[illegible] [illegible]	1	1592.	2387.	3183.	3979.	4775.	6366.	7958.
	(21.[illegible])	(45.07)	([illegible])	(90.14)	(112.67)	(135.21)	(180.28)	(225.35)	
[illegible] C [illegible] DI ED	12[illegible] [illegible]	1	14018.	22377.	29904.	37636.	45613.	61168.	77052.
	(215.[illegible])	(419.59)	([illegible])	(846.78)	(1065.73)	(1291.61)	(1732.07)	(2181.86)	
ROUTED T	14 [illegible]	1	14057.	22462.	30050.	37796.	45466.	60786.	76694.
	(215.[illegible])	(420.71)	([illegible])	([illegible])	(1070.32)	(1287.44)	(1721.33)	(2171.73)	
[illegible] YDR [illegible] [illegible] AT	15 [illegible]	1	1406.	2109.	2812.	3515.	4218.	5624.	7030.
	(5.[illegible])	(39.42)	(59.72)	(79.63)	(99.54)	(119.45)	(159.26)	(199.08)	
[illegible] YDR [illegible] [illegible] AT	14[illegible] [illegible]	1	1511.	2266.	3022.	3777.	4532.	6043.	7554.
	(5.[illegible])	(42.78)	(64.17)	([illegible])	(106.95)	(128.34)	(171.12)	(213.90)	
[illegible] C [illegible] DI ED	14[illegible] [illegible]	1	16269.	24525.	33044.	41602.	50521.	67730.	85372.
	(242.[illegible])	(455.03)	([illegible])	(935.70)	(1178.04)	(1430.59)	(1917.91)	(2417.45)	
ROUTED T	14[illegible] [illegible]	1	15560.	23190.	31037.	39231.	47788.	66388.	83707.
	(242.[illegible])	(435.51)	([illegible])	(879.87)	(1110.91)	(1353.21)	(1879.89)	(2370.31)	
ROUTED T	16 [illegible]	1	15573.	23159.	31105.	39230.	47674.	66538.	83633.
	(242.[illegible])	(435.32)	([illegible])	(877.97)	(1110.88)	(1349.97)	(1884.15)	(2368.22)	

PLAN 1 STATION 100

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
0.20	1939.	1745.6	45.00
0.30	2910.	1746.4	45.00
0.40	3880.	1747.3	45.00
0.50	4850.	1748.1	45.00
0.60	5819.	1748.8	45.00
0.80	7759.	1749.6	45.00
1.00	9702.	1750.6	45.00

PLAN 1 STATION [illegible]

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
[illegible]	31[illegible]7.	1727.8	45.00
[illegible]	4[illegible]91.	1729.3	45.00
[illegible]	6[illegible]56.	1730.1	45.00
[illegible]	7[illegible]29.	1731.0	45.00
[illegible]	9423.	1731.7	45.00
[illegible]	1[illegible]549.	1733.2	45.00
1.00	15[illegible]0.	1734.3	45.00

PLAN 1 STATION 1100

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
[illegible]	4239.	1620.4	45.00
[illegible]	6378.	1622.2	45.00
[illegible]	85[illegible]6.	1623.8	45.00
[illegible]	10[illegible]94.	1625.1	45.00
[illegible]	12[illegible]8.	1626.1	45.00
[illegible]	17205.	1626.0	45.00
1.00	21596.	1629.4	45.00

PLAN 1 STATION 1101

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
[illegible]	5459.	1610.5	45.00
[illegible]	8225.	1612.8	45.00
[illegible]	10957.	1614.4	45.00
[illegible]	13776.	1616.0	45.00
[illegible]	16582.	1617.3	45.00
[illegible]	22139.	1619.6	45.00
1.00	27[illegible]17.	1621.7	45.00

PLAN 1 STATION 1001

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
[illegible]	1[illegible]4.	1603.3	44.00
[illegible]	1[illegible]25.	1604.0	44.00
[illegible]	2167.	1604.6	44.00
[illegible]	2709.	1605.2	44.00
[illegible]	3251.	1605.9	44.00
[illegible]	4343.	1606.8	44.00
1.00	5429.	1607.5	44.00

PLAN 1 STATION 1000

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.20	6221.	1585.8	46.00
.30	9411.	1587.0	46.00
0.40	12581.	1588.3	45.00
0.50	15669.	1589.2	45.00
0.60	19325.	1590.1	45.00
0.80	25959.	1591.8	45.00
1.00	32262.	1593.2	45.00

PLAN 1 STATION CC1

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
0.20	1906.	1620.9	46.00
0.30	2952.	1621.8	46.00
0.40	3970.	1622.6	46.00
0.50	4966.	1623.2	46.00
0.60	5963.	1623.8	46.00
0.80	7960.	1624.7	46.00
1.00	9928.	1625.4	46.00

PLAN 1 STATION CC1

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
0.20	1702.	1620.1	46.00
0.30	2553.	1620.9	46.00
0.40	3401.	1621.6	46.00
0.50	4253.	1622.1	46.00
0.60	5103.	1622.6	46.00
0.80	6800.	1623.4	46.00
1.00	8501.	1624.1	46.00

PLAN 1 STATION CC0

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
0.20	3636.	1566.1	46.00
0.30	5423.	1569.3	46.00
0.40	7274.	1570.3	46.00
0.50	9102.	1571.1	46.00
0.60	10927.	1571.6	46.00
0.80	14645.	1573.0	46.00
1.00	18317.	1574.0	46.00

PLAN 1 STATION CC0

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
[illegible]	11916.	1453.5	46.00
[illegible]	17973.	1455.5	46.00
0.40	24[illegible]42.	1457.0	46.00
0.50	30[illegible]4.	1458.4	46.00
[illegible]	36354.	1459.6	46.00
[illegible]	45[illegible]4.	1461.7	46.00
1.00	61[illegible]1.	1463.6	45.00

PLAN 1 STATION 1201

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	12[illegible]2.	1436.9	46.00
0.30	19546.	1438.3	46.00
0.40	26168.	1439.4	46.00
0.50	32[illegible]80.	1440.4	46.00
0.60	39[illegible]5.	1441.3	45.00
0.80	53305.	1442.9	45.00
1.00	67[illegible]8.	1444.2	45.00

PLAN 1 STATION 1201

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
[illegible].20	475.	1430.8	44.00
[illegible].30	713.	1431.2	44.00
0.40	951.	1431.6	44.00
0.50	11[illegible]8.	1432.0	44.00
[illegible].60	1441.	1432.2	44.00
0.80	1919.	1432.5	44.00
1.00	2399.	1432.8	44.00

PLAN 1 STATION 1200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	13342.	1391.7	46.00
0.30	20163.	1393.1	46.00
[illegible].40	26951.	1394.2	46.00
0.50	33946.	1395.2	46.00
0.60	40[illegible]3.	1396.0	45.00
0.80	54[illegible]1.	1397.6	45.00
1.00	69[illegible]94.	1398.9	45.00

PLAN 1 STATION 1401

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS

.2	14[illegible]7.	1[illegible].1	46.0[illegible]
.3[illegible]	[illegible].	1[illegible].3	46.0[illegible]
.4[illegible]	3[illegible]50.	1291.9	46.00
[illegible].5[illegible]	[illegible].	1293.5	46.00
.6[illegible]	454[illegible]0.	1294.[illegible]	46.0[illegible]
.[illegible]	[illegible].	1297.2	45.00
1.[illegible]	7[illegible]4.	1299.4	45.00

[illegible] DAM SAFETY ANALYSIS

[illegible] 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
[illegible]	[illegible]	[illegible]	1296.00
[illegible]	4545.	4545.	9086.
[illegible]	..	0.	47.80.

RATIO	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
.20	[illegible]	[illegible]	6[illegible]5.	15380.	0.00	47.00	0.00
.30	[illegible]	[illegible]	[illegible]44[illegible].	[illegible]3136.	0.00	47.00	0.00
.40	[illegible]	0.00	824.	31[illegible]37.	0.00	47.00	0.00
.50	[illegible]	[illegible]	9137.	39[illegible]31.	0.00	46.00	0.00
.60	[illegible]	[illegible].10	9943.	47[illegible]68.	2.00	46.00	0.00
.80	[illegible]	3.20	11[illegible]77.	[illegible]346.	6.00	46.00	0.00
1.00	[illegible]	5.50	11[illegible]3.	63707.	8.00	46.00	0.00

PLAN 1 STATION 1600

RATIO	MAXIMUM FLOW CFS	MAXIMUM STAGE FT	TIME HOURS
0.20	15[illegible]73.	1221.9	47.00
.30	23159.	1224.8	47.00
0.40	31 [illegible]5.	1227.1	47.00
0.50	39[illegible]30.	1229.3	47.00
0.60	47674.	1231.3	46.00
.80	66558.	1235.3	46.00
1.00	[illegible]3[illegible]55.	1238.5	46.00

APPENDIX D

STABILITY ANALYSIS

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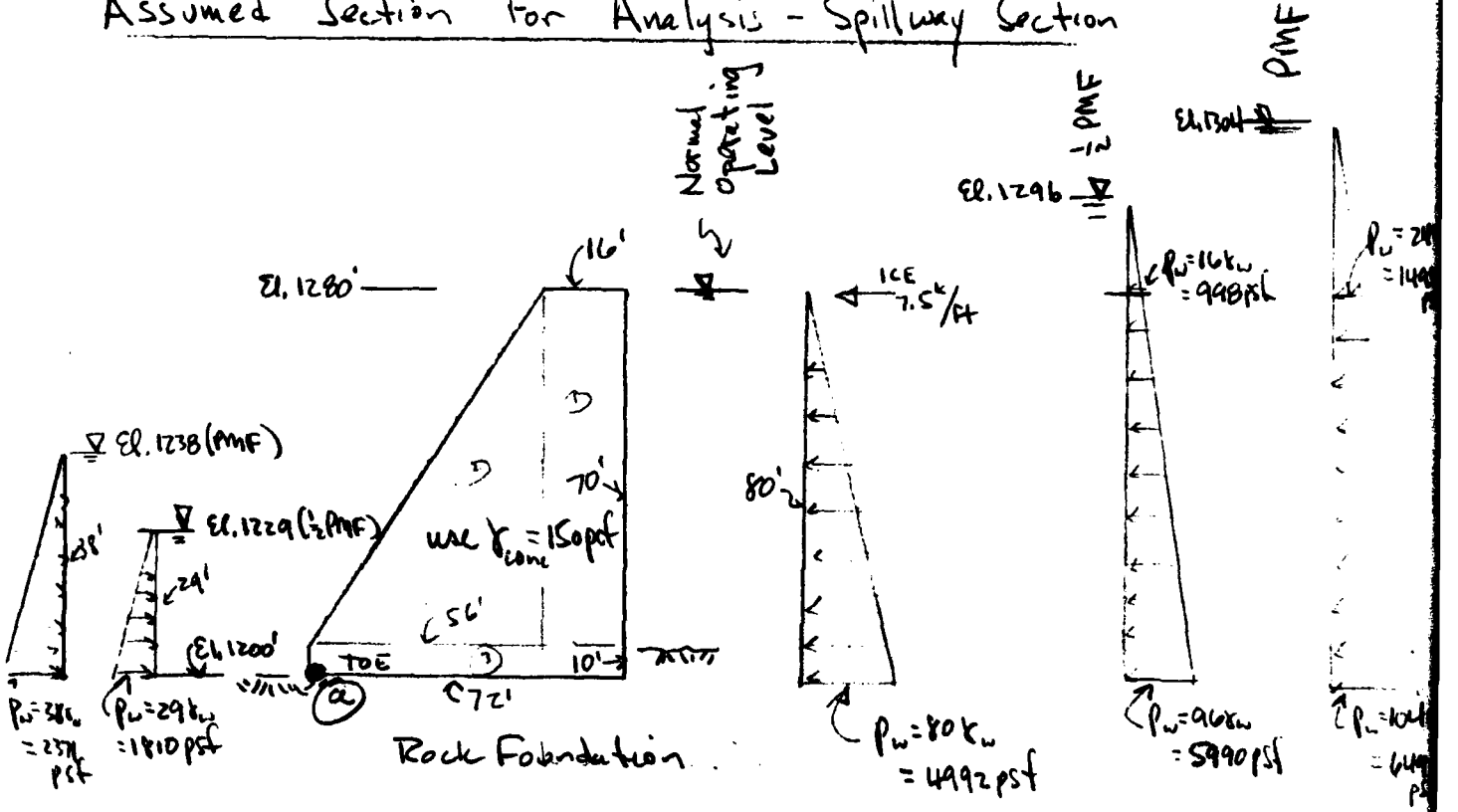
DESIGN BRIEF

OJECT NAME ROME CITY DAM (AKA FISH CREEK, BOYD DAM) DATE 7/20/80

SUBJECT STABILITY ANALYSIS PROJECT NO.

DRAWN BY DFM

Assumed Section for Analysis - Spillway Section



$$\text{Weight of Dam} = (150)^{\text{kcf}}\left[(16\times70') + \left(\tfrac{1}{2}\times70\times56'\right) + (10'\times72')\right] = (150)(3800^{\text{kft}}) = 570^{\text{k}}$$

(16×70' = 1120; ½×70×56' = 1960; 10'×72' = 720)

$$M_{toe} \text{ due to mass of dam} = (150)\left[(10\times72\times\tfrac{72}{2}) + \left(\tfrac{1}{2}\times56\times70\right)\left(\tfrac{2\times56}{3}\right) + (16\times70)\left(\tfrac{16}{2}+56\right)\right]$$

$$= (150)\left[25{,}920 + 73{,}173 + 71{,}680\right] = 25{,}616^{\text{FT-KIP}}$$

Location of cg measured from (a) = $\frac{25616^{\text{k}}}{570^{\text{k}}}$ = 44.94' from toe

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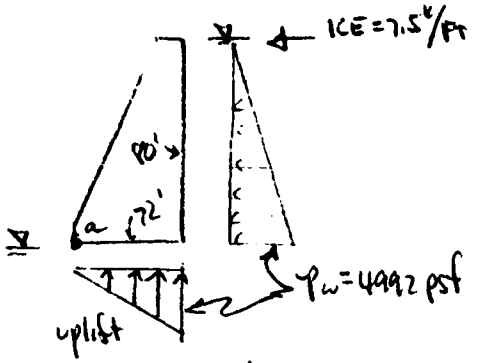
Case I. WL at normal operating levels



lateral force upstream water = $\frac{1}{2} \times 4.99 \times 80 =$

uplift force = $\frac{1}{2} \times 72 \times 4.99^{ksf} = 180$

Resistance to Overturning

M_a causing overturning due to upstream H_2O, ice, uplift

$= \left(4.992 \times \frac{80'}{2} \times \frac{80'}{3}\right) + \left(7.5^{k}/ft \times 79'\right) + \left(4.992 \times \frac{72}{2}\right)\left(\frac{2}{3} \times 72\right) =$

$= 5325^{lk} + 593^{lk} + 5751^{lk} = 11{,}669^{lk}$

FS against overturning $= \frac{\Sigma M_a \text{ resisting}}{\Sigma M_a \text{ causing}} = \frac{25{,}616}{11{,}669} = 2.2 \pm$

Position of Resultant measured from toe, $d = \frac{\Sigma M_a}{\Sigma V} = \frac{(25616 - 11669)^{lk}}{570 - 180} = \frac{13947}{390} =$

$d = 35.8\ ft = \frac{35.8}{72}(b) = 0.50\ b$ - ok -

Resistance to Sliding - using friction-shear/bond method, assuming $\tau = 100$ psi bond between dam and fdtn, $\mu = 0.65$

FS against sliding $= \frac{\mu(W - \text{uplift}) + \tau b}{\text{ice + lateral } H_2O \text{ force}}$

$= \frac{(0.65)(570^{k} - 180^{k}) + (100 \times 72^{ft} \times 1^{ft} \times 144)^{psf}}{(7.5^{k} + 200^{k})} = \frac{253 + 1036}{208} = 6.2$ (ok)

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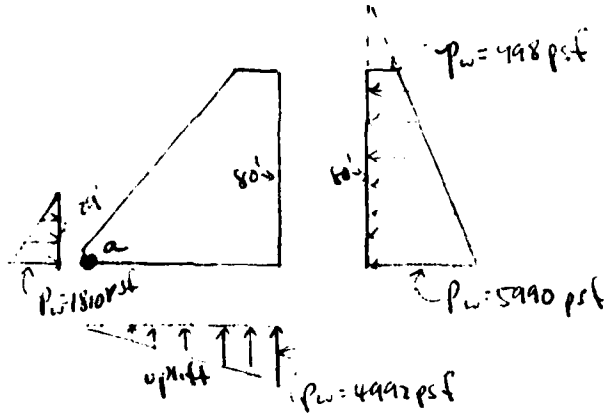
Case II: WL @ ½ PMF



Resistance to Overturning

M_a causing overturning due to upstream H_2O, uplift

$= \left(.998 \times 80 \times \frac{80}{2}\right) + \left(5990 - 998\right)\left(\frac{80}{2} \times \frac{80}{3}\right) + 5751 =$

$= 3194 + 5325 + 5751 = 14{,}270^{k}$

M_a resisting overturning due to wt. dam, downstream H_2O

$= 25{,}616 + \left(1.81 \times \frac{29}{2} \times \frac{29}{3}\right) = 25{,}870^{k}$

FS against overturning $= \frac{25{,}870^{k}}{14{,}270^{k}} = 1.81 \pm$

Position of resultant, $d = \frac{\Sigma M_a}{\Sigma V} = \frac{(25{,}870 - 14{,}270)^{k}}{390^{k}} = 29.7' = 0.41\,b$

Resistance to Sliding

FS against sliding $= \dfrac{(0.65)(570 - 180) + (100 \times 72 \times 1 \times 144) + \left(1.81 \times \frac{29}{2}\right)}{\left(\frac{1}{2}\right)(80)(.998 + 5.990)} = 4.7$

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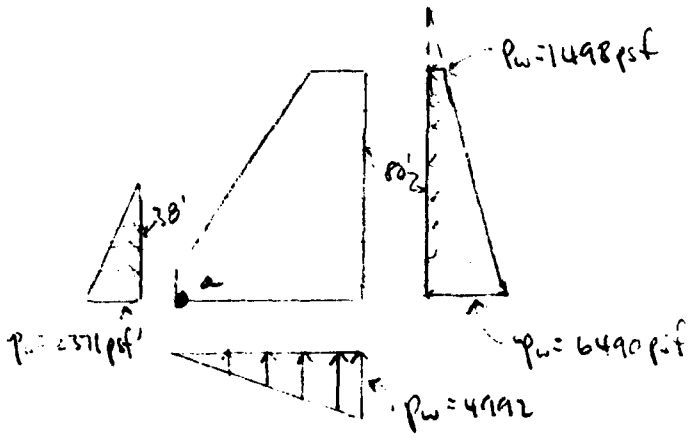
Case III . WL @ PMF



Resistance to Overturning

M_a causing overturning due to upstream H_2O, uplift

$$(1.498 \times 80 \times \tfrac{80}{2}) + 5{,}325 + 5{,}751 = 15{,}870^{1K}$$

M_a resisting overturning due to wt. dam, downstream H_2O

$$= 25{,}616 + \left(2.371 \times \tfrac{38}{2} \times \tfrac{38}{3}\right) = 26{,}187^{1K}$$

$$\text{FS against overturning} = \frac{26{,}187^{1K}}{15{,}870^{1K}} = 1.65$$

$$\text{Position of Resultant, } d = \frac{\Sigma M_a}{\Sigma V} = \frac{26{,}157 - 15{,}870}{390^{1K}} = 26.45' = 0.37\,b$$

Resistance to Sliding

$$\text{FS against sliding} = \frac{(0.65)(570-180) + (100 \times 72 \times 1 \times 144) + (\tfrac{1}{2} \times 2.371 \times 38)}{(\tfrac{1}{2})(80)(1.498 + 6.490)} = 4.2 \pm$$

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SUBJECT PROJECT NO.

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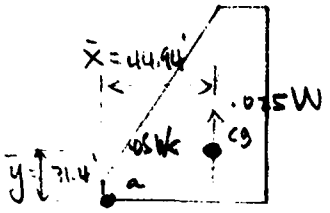
Case IV - WL @ spillway elevation, plus seismic effects - use Zanger coefficients

horiz. coef. = .05
vertical coef = .025



$\bar{x}$ = 44.94' (see sheet 1)

$\bar{y} = \dfrac{(110)(10\times72\times5) + (\frac{1}{2}\times70\times56)(\frac{70}{3}+10) + (16\times70)(\frac{70}{2}+16)}{570^{k}}$

$= \dfrac{17900}{570} = 31.4'$

Resistance to overturning

M/x causing overturning due to: upstream H_2O = 5325^{k}

uplift = 5751

seismic on dam = $(.05W)(31.4') + (.025W)(44.94')$
= 895^{k} + 640^{k} = 1535^{k}

seismic - dam/water = $(0.130)(.73)(.0624\times.05\times80\times80\times\frac{2}{3})$
= 350^{k}

FS against overturning = $\dfrac{25,616}{5325 + 5751 + 1535 + 350}$ = 1.98

Position of Resultant, d = $\dfrac{(25,616 - 12,961)^{k}}{570^{k}(1-.025) - 180}$ = $\dfrac{12,655^{k'}}{376^{k}}$ = 33.6' = 0.41 b

Resistance to Sliding

FS against sliding = $\dfrac{(0.65)(556-180) + 1036}{200 + .05(570) + -(.73\times.05\times.0624\times80^{2}\times.73)}$ = 5.4

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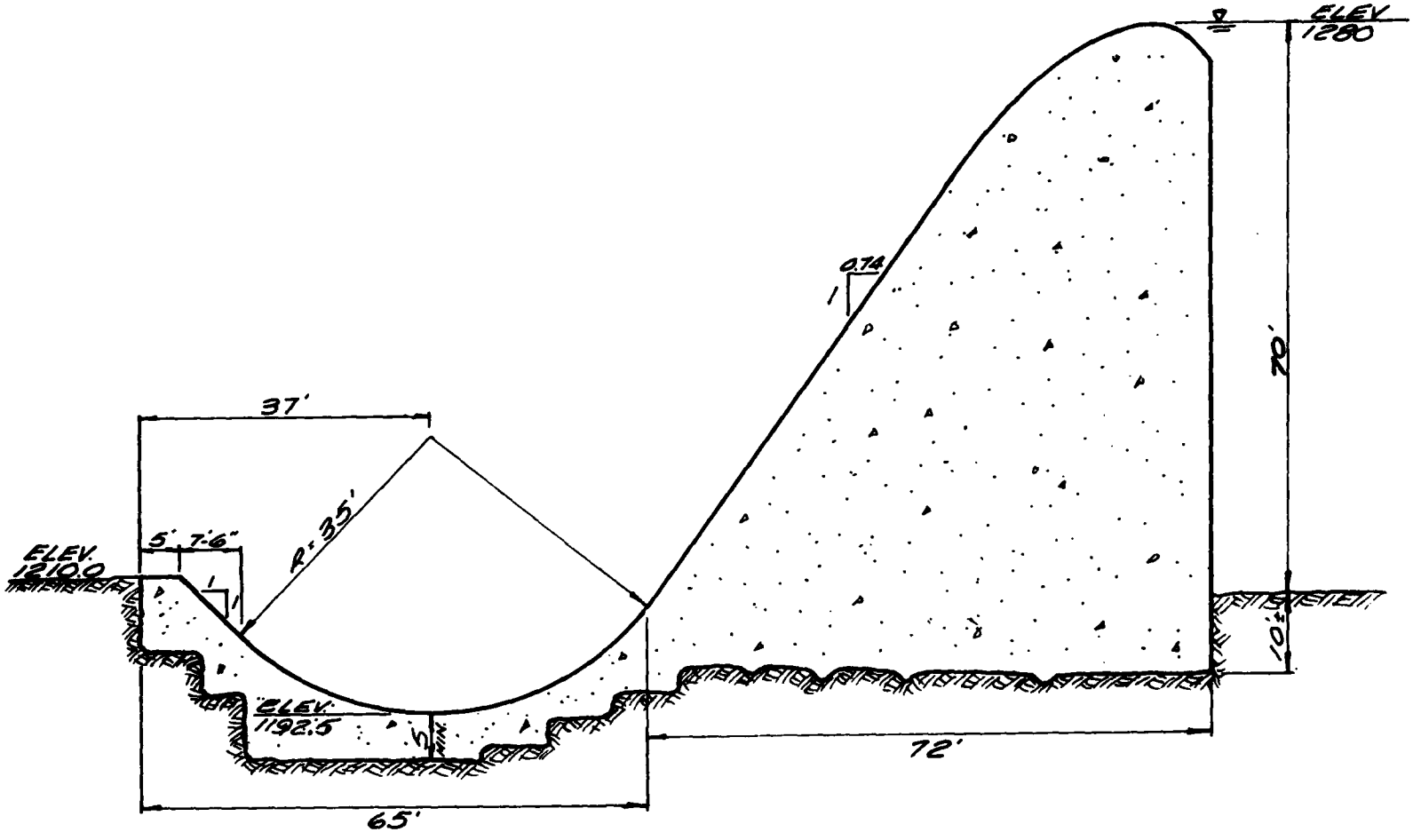
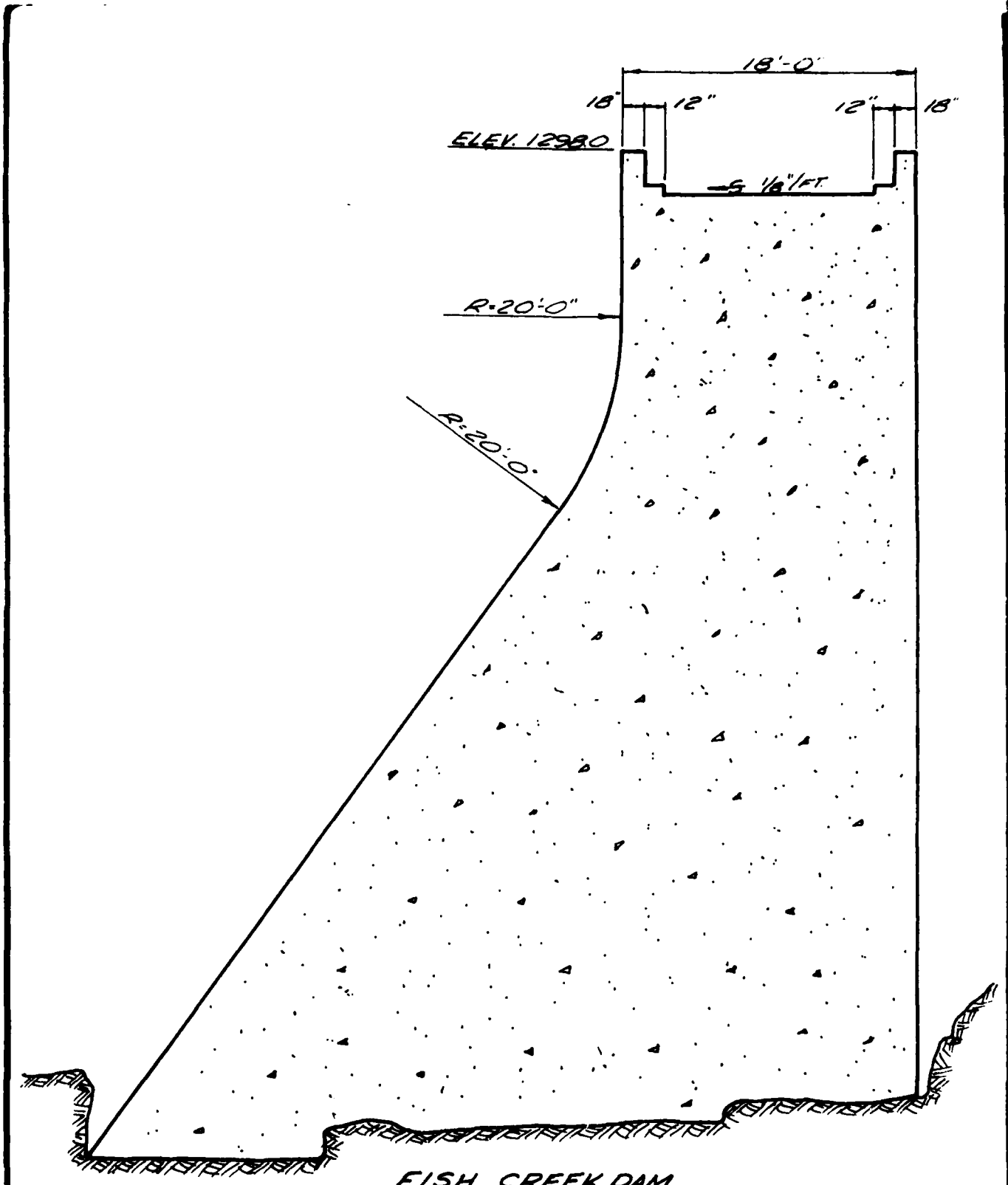
CHKD

SCALE: 1"=20'



FISH CREEK DAM
SPILLWAY SECTION



FISH CREEK DAM
NON OVERFLOW SECTION
SCALE: 1/8"=1'-0"

STETSON • DALE

DATE	DRAWN
6-26-80	O.M.E.
JOB 2399	APP'D

APPENDIX E

REFERENCES

APPENDIX

REFERENCES

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