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NATIONAL DAM SAFETY PROGRAM. CLEAR LAKE DAM (INVENTORY NUMBER N--ETC(U)
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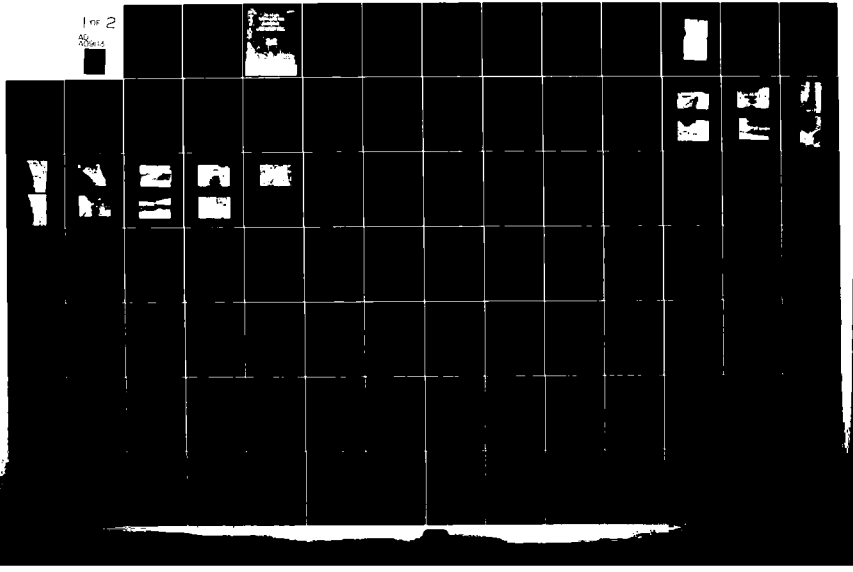

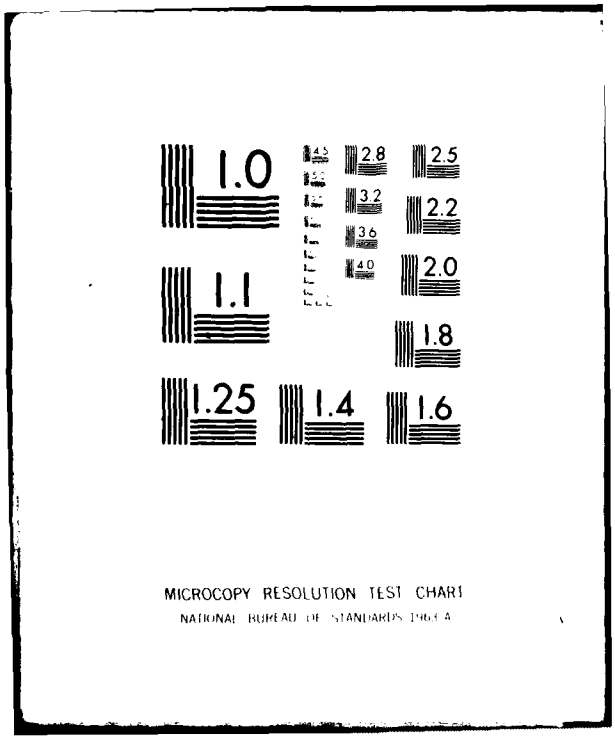
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Lake Erie Basin, Erie County, NY
Inventory No. 751

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National Dam Safety Program

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North Branch
Cattaraugus Creek

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 Clear Lake Dam and appurtenant structures did not reveal conditions which constitute a hazard to human life or property. The dam, however, has a number of problem areas which require remedial action. These areas are listed below.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

The discharge capacity of the spillway is inadequate for all floods in excess of 50% of the Probable Maximum Flood (PMF). During the 1/2 PMF event the water surface will be at the top of the dam and the outflow will be 4254 cfs. The spillway is therefore assessed as inadequate.

Within 1 year of notification the owner should complete the following remedial repairs or actions:

1. Repair the gunite portions of the spillway, spillway walls and piers. Caulk all joints where the gunite abuts to the original concrete. Clean and recaulk all spillway channel slab joints. Caulk all cracks discovered in these slabs. Also caulk the joint in the left upstream spillway wall. Monitor all joints periodically and recaulk as required.

2. Monitor biweekly the seepage at the toe of the right spillway wall and at the toe of the right embankment with the aid of weirs. Also monitor the spillway walls for signs of seepage. Provide a toe drain at the base of the embankment at the base of the embankment to collect seepage and dam runoff. Backfill all animal burrows, particularly those located directly above the seepage area and fill all future burrows.

3. Repair the eroded upstream slope of the earth embankments with heavy riprap.

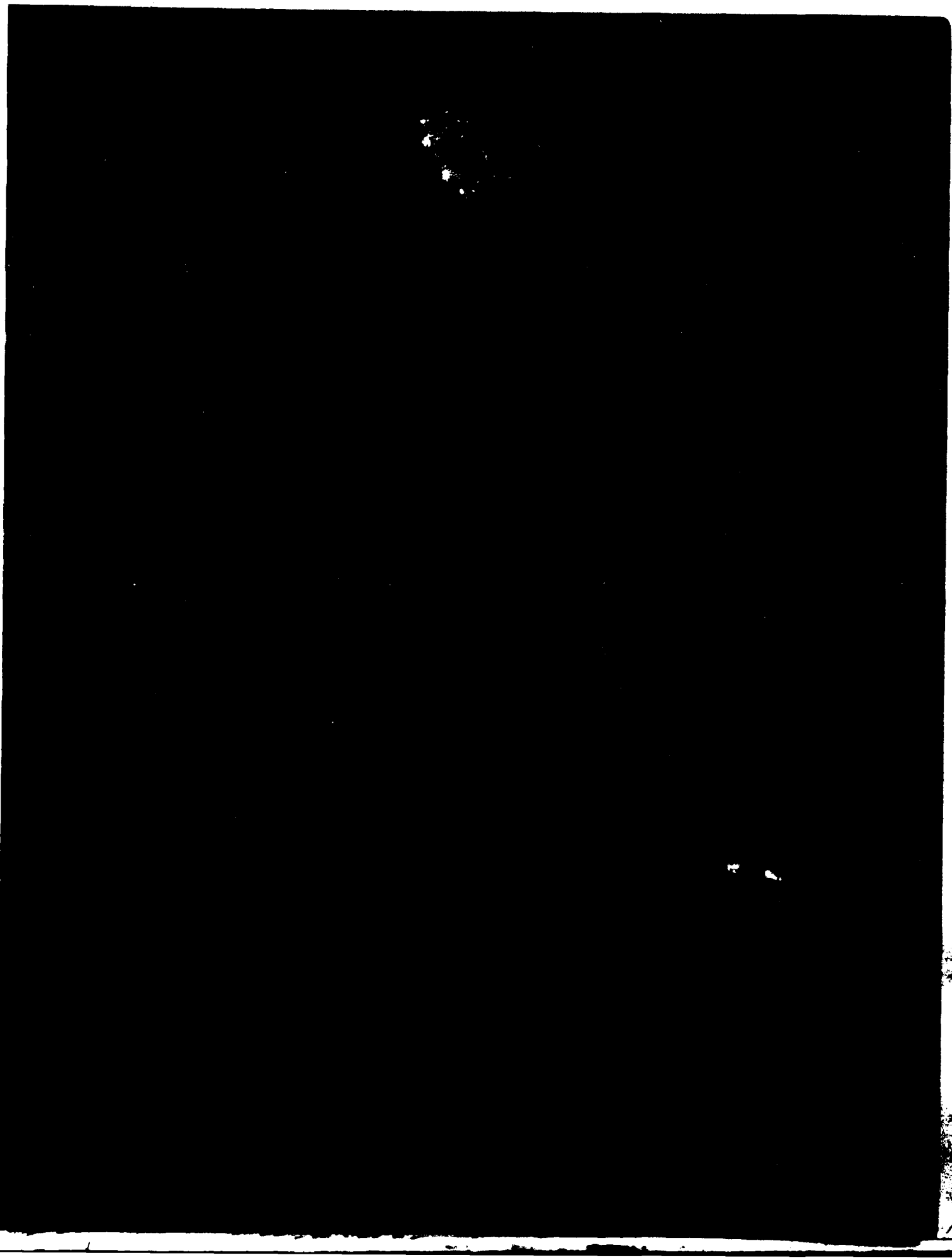
4. Monitor the settlement of the ditches adjacent to the spillway bridge and repair the cracked areas of the concrete on the bridge.

5. Examine the condition of the 48 inch diameter reservoir drain and return to operating condition.

6. Monitor the tilt of the left spillway wall for signs of ongoing movement. Also, repair the deteriorated concrete at the end of the spillway channel.

7. Remove all tree growth on the slopes and at the abutments of the embankments. Provide a program of periodic cutting and mowing of the embankment surfaces.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of all valves and gates. Document this information for future reference. Also develop an emergency action plan.



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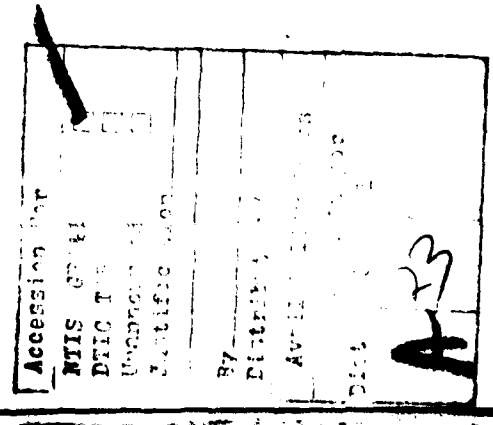
PREFACE

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.



(Inventory Number NY 75 D)

(10) George Koch

~~PHASE I INSPECTION REPORT~~
NATIONAL DAM SAFETY PROGRAM.
CLEAR LAKE DAM ~~I.D. NO. NY 751~~
~~[illegible]~~ LAKE ERIE BASIN,
ERIE COUNTY, NEW YORK.

Phase I Inspection Report.

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Clear Lake (I.D. No. NY 751)
State Located:	New York
County Located:	Erie
Stream:	North Branch of Clear Creek (tributory of Cattaraugus Creek)
Dates of Inspection:	October 3 and November 8, 1979 January 3, 1980

ASSESSMENT

The examination of documents and visual inspection of Clear Lake Dam and appurtenant structures did not reveal conditions which constitute a hazard to human life or property. The dam, however, has a number of problem areas which require remedial action. These areas are listed below.

The discharge capacity of the spillway is inadequate for all floods in excess of 50% of the Probable Maximum Flood (PMF). During the ½ PMF event the water surface will be at the top of the dam and the outflow will be 4254 cfs. The spillway is therefore assessed as inadequate.

Within 1 year of notification the owner should complete the following remedial repairs or actions:

1. Repair the gunite portions of the spillway, spillway walls and piers. Caulk all joints where the gunite abuts to the original concrete. Clean and recaulk all spillway channel slab joints. Caulk all cracks discovered in these slabs. Also caulk the joint in the left upstream spillway wall. Monitor all joints periodically and recaulk as required.

2. Monitor biweekly the seepage at the toe of the right spillway wall and at the toe of the right embankment with the aid of weirs. Also monitor the spillway walls for signs of seepage. Provide a toe drain at the base of the embankment at the base of the embankment to collect seepage and dam runoff. Backfill all animal burrows, particularly those located directly above the seepage area and fill all future burrows.

3. Repair the eroded upstream slope of the earth embankments with heavy riprap.

4. Monitor the settlement of the ditches adjacent to the spillway bridge and repair the cracked areas of the concrete on the bridge.

5. Examine the condition of the 48 inch diameter reservoir drain and return to operating condition.

6. Monitor the tilt of the left spillway wall for signs of ongoing movement. Also, repair the deteriorated concrete at the end of the spillway channel.

7. Remove all tree growth on the slopes and at the abutments of the embankments. Provide a program of periodic cutting and mowing of the embankment surfaces.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of all valves and gates. Document this information for future reference. Also develop an emergency action plan.

George Koch

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

Approved By:

Col. Clark H. Benn
New York District Engineer

Date: 22 MAY 80

Overview of Clear Lake Dam
Photo #1

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
CLEAR LAKE DAM I.D. No. NY 751
DEC #12D-493 LAKE ERIE BASIN
ERIE COUNTY NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

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

b. Purpose of Inspection

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

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Clear Lake Dam consists of a 100 feet long concrete ogee spillway constructed between 2 homogeneous earth embankments (right embankment length = 380 feet, left embankment length = 170 feet) the maximum height of which is 30 feet above the spillway channel. The upstream slope of the earth embankments are 1 vertical on 2.5 horizontal, the downstream slopes are 1 on 2 and the crest of the dam is 20 feet wide with a roadway section of asphaltic concrete. A concrete core wall located approximately 7 feet upstream from the centerline of the dam extends through the earth embankments. This core wall is 2 feet wide at top of the wall (El. 1220, approx. 2 feet below crest of dam), 5 feet wide at El. 1178. The core wall is founded on and embedded into the bedrock beneath the dam. An intake tower located near the upstream slope of the right embankment, and a 24 diameter cast iron pipe provides the control of flow for the water treatment plant, which is located below the right embankment. An additional 48" diameter cast iron pipe used for a reservoir drain is also located under the right embankment.

b. Location

The dam is located on the North Branch of Clear Creek, a tributory of Cattaraugus Creek, approximately 6.4 miles northeast of the Village of Gowanda, New York.

c. Size

The dam is 30 feet high and impounds approximately 650 acre-feet. The dam is classified as "small" in size (25 to 40 feet in height).

d. Hazard Classification

The dam is classified as high hazard, because of its location above the water treatment plant and the Cattaraugus Indian Reservation.

e. Ownership

The dam is owned and operated by the New York State Department of Mental Hygiene, Gowanda Psychiatric Center, Mr. Thomas Armstrong, Business Manager, Helmuth New York, 14079, Telephone (716) 532-3311.

f. Purpose of the Dam

The dam provides storage for the treatment and supply of water to Gowanda Psychiatric Center.

g. Design and Construction

The dam was designed and construction supervised by the State of New York, Department of State Engineer and Surveyor in 1924. The contractor for the construction of the dam is unknown. All plans and related documents are on file at the N.Y.S. Office of General Services, South Mall, Albany, New York.

h. Normal Operating Procedures

All flows in excess of the demand for water by Gowanda Psychiatric Center are discharged through the spillway.

1.3 PERTINENT DATA

a. Drainage Area (sq. mi.)	5.95
b. Elevations (ft./USGS)	
Top of Dam	1222.0
Spillway Crest	1216.0
Invert of Reservoir Drain	1178.25
c. Reservoir (acres)	
Surface Area @ Top of Dam	97.
Surface Area @ Spillway Crest	46.
d. Storage (AC-FT.)	
Top of Dam	1000
Spillway Crest	650
e. Dam	
Type: Homogeneous earth with concrete cutoff wall.	
Length: (ft.)	550'
Upstream Slope	1:2.5
Downstream Slope	1:2.0
Crest Width (ft.)	20
f. Spillway	
Type: Ungated reinforced concrete ogee section; concrete channel	
Weir Length(ft.)	91.0
Spillway Capacity: Top of Dam (cfs)	4250
g. Reservoir Drain	
Type: 48" and 24" cast iron pipes with reinforced concrete inlet and onlet	
Control: Manually operated valves.	

SECTION 2: ENGINEERING DATA

2.1 Geology

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

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

2.2 Subsurface Investigation

No subsurface investigation could be located for the project. However, the "General Soil Map of New York State" prepared by Cornell University Agriculture Experimental Station indicates that the surficial soils are Erie Soils of glacial till origin. These soils are formed on mostly thick glacial till which is either basal or maroinic. The till is from silt stone, shale, sandstone and in some locations, from limestone with a few crystallines. These soils occupy broad,mostly smooth sloping till mantled hills. The soil is somewhat poorly drained and the permeability is generally slow. The depth to bedrock is variable.

2.3 Embankment and Appurtenant Structures

The dam was designed and construction supervised by the State of New York, Department of State Engineer and Surveyor about 1924. Selected drawings are included in Appendix G. The treatment plant was constructed in 1957 and 158 and gunite was placed over the spillway surface, walls and the spillway bridge piers.

The dam is 30 feet high and consists of 2 homogeneous earth embankments separated by a concrete gravity spillway. Two cast iron pipes (24" and 48 " diameter) carry the reservoir flow from the concrete intake tower to the treatment plant.

2.4 Construction Records

No construction records are available for this dam.

2.5 Operation Record

All operating records concerning the water supply usage of the State facility are on file at the Gowanda Psychiatric Center.

2.6 Evaluation of Data

The information presented in this report has been compiled from information obtained in part from Mr. James Cassidy, Project Chief, NYS OGS, General Engineering and Mr. Howard Segar, Plant Manager, Gowanda Psychiatric Center. This information appears adequate and reliable for Phase I Inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The visual inspection of Clear Lake Dam was conducted on October 3 and November 8, 1979. The weather was cloudy and the temperature ranged in the forties. The reservoir level during the first inspection was at the spillway crest, and during the second was approximately 1 inch over the crest.

b. Embankments

The earth embankments are located at either end of the spillway and appear to be composed of silt and clay sized particles. (See Photos #1,2, 3& 14) The crest of the dam is formed by a paved highway, which is used for maintenance purposes only. The alignment of the crest appears to be good. However, 2 depressions were observed adjacent to the abutment walls of the spillway bridge. (See Photos #10 & 11) The left side depression was a maximum of approximately 8 inches in depth and was depressed for a distance of approximately 6 feet along the entire width of the crest. The right side depression was a maximum of approximately 6 inches in depth and was depressed for a distance of approximately 4 feet along the entire width of the crest. Drawing #66/5038 (See Appendix G) indicates that 2 asphalt concrete ditches were to be constructed adjacent to the spillway bridge. The depressions observed, were reported to have settled since this construction in 1966. This settlement is reflected in the cracking of the asphalt pavement (See Photos #10 & 11).

The upstream slope is very steep near the crest, then appears to flatten at the normal reservoir level. Wave action may be cutting into the slope. Some riprap appears to be present to protect the slope, but additional riprap is required.

The downstream slope is estimated to be generally 1 vertical on 2 horizontal with no evidence of sloughing, subsidence, surface cracks movement or depressions. Four animal burrows were observed near the midpoint of the slope approximately 50 feet right of the spillway buttress. Also numerous small trees and low brush were evident on the right embankment. (See Photos #1, 2, 4 & 7) Numerous large trees were growing on the left embankment (See Photos #3, 4, 6 & 9).

During the inspection of October 3, 1979 approximately 50 feet right of the right spillway wall near the toe of the slope, seepage was encountered flowing at a rate of 2 to 3 gallons per minute. The flow was clear and the area was excavated with a hand shovel to trace the origin of the seepage. The seepage appeared to be eminating from a cylindrical hole approximately 1 inch in diameter. The swale area alond the toe was soft due to the seepage flow, and the general grade was such that the flow was directed toward the spillway. During the inspection of November 8, 1979, no flow was observed. It is believed that the animal burrows and trees immediately above the seepage area are responsible for the flow, since none was apparent at the second inspection and the reservoir level was nearly identical.

No drainage system or instrumentation, in connection with the earth embankment, was observed.

c. Spillway

The spillway is mass concrete with an ogee crest, a concrete chute discharge channel and a highway bridge (with 3 piers tied into the spillway) traversing the spillway. (See Photos #4,5,6&7) The downstream face was originally stepped concrete, until 1966 when gunite and baffle blocks were constructed. During the storm of September 14, 1979, a portion of the gunite was lifted up from the downstream face of the spillway. (See Photos #4 & 6). The inspections revealed that the "J" bolts holding the gunite to the original concrete were rusted and loose, and the wire mesh reinforcing was rusted through in numerous places. Cracking at the junction of the gunite and original concrete, and also at the bottom of the ogee section has permitted seepage to enter the area between the gunite and the original structure. These factors coupled with the force of the spillway flow appear to be the cause of the gunite displacement. The gunite was removed by State personnel to facilitate the inspections. The gunite removed was placed on the right embankment near the spillway wall (See Photos #7 & 9). The remaining gunite was sounded and this indicated that portions of the ogee section, highway bridge piers, and the spillway walls have separated from the original concrete. The concrete of the original structure appears sound where observed.

The concrete slabs for the discharge channel are founded on bedrock. Several of these slabs have shifted and cracked. Vegetation is growing in the construction joints, and the concrete has eroded at one location near the left spillway wall to a depth of approximately 4 inches. A crack was observed running parallel to the dam approximately 5 feet below the energy dissipators. The spillway walls are stained at several locations and calcification was also evident. (See Photos #3, 4, 6, 7, 8 & 9). Seepage approximately 2 to 3 gallons per minute was eminating from beneath the right spillway wall. (See Photo #8) The flow was clear, but rusty deposits were present in the discharge channel. The lower section of the left spillway wall was tilted inward about 1/2 inch. A 2 inch wide construction joint was noted in the upstream left spillway wall, but no unusual movement was apparent. (See Photo #13). The end of the concrete discharge channel is deteriorating and requires repair (See Photos #4 & 9). Cracking of the left abutment of the spillway bridge was observed (See Photo #12).

d. Downstream Channel

The downstream channel is bedrock formed. A highway embankment, with a concrete culvert to pass the spillway flow, is located approximately 300 feet below the dam. (See Photos #9). The water treatment plant is located on the right side of the downstream channel between the dam and the highway embankment. (See Photo #1). The downstream channel is the North Branch of Clear Creek a tributory of Cattaraugus Creek.

e. Reservoir

There are no signs of instability or sedementation problems reported within the reservoir area.

f. Water Treatment Facility

This system consists of a concrete intake tower located in the reservoir, 2 cast iron pipes (24 and 48 inches), the treatment plant and an outlet below the highway embankment. This system is in excellent condition and all gates and valves are reported operational. (See Photos #1, 2, 7 & 9), except for the 48" reservoir drain which has not been operated for many years. It was reported that a creek developed in the 48 inch pipe and the staff at the plant was directed not to operate the drain system. The 24

inch pipe has been used consistently for this purpose. The 48 inch pipe was repaired in 1965 and is believed to be functional. However, the valve has not been operated since the repair work.

3.2 Evaluation

The problem areas observed during the inspections and the recommended remedial actions or investigations are as follows:

1. The gunite on the spillway, spillway piers and walls is deteriorated and not properly bonded to the original concrete. Remove this gunite and repair as required. Also caulk all joints where the existing sound gunite abuts the original concrete.

2. The spillway channel slabs are cracked and vegetation is growing in the joints. Remove all debris from these joints and caulk as required. Also caulk the joint in the left upstream spillway wall. All joints must be monitored in the future and recaulked as necessary to prevent seepage through the joints.

3. The seepage encountered at the toe of the right spillway wall should be monitored bi-weekly with the aid of weirs. Also monitor the spillway walls for signs of seepage. If the seepage rate increases appreciably repair measures will be required.

4. The seepage encountered at the toe of the right embankment should be monitored bi-weekly with the aid of weirs. In addition provide a toe drain at the base of the dam to collect this seepage and the run-off from the dam in the vicinity of treatment plant. The seepage may be related to percolation of dam surface runoff through the animal burrows directly above the seepage area. Backfill these burrows and monitor the dam for future burrows.

5. The steep upstream slope noted near the water line should be returned to its original design slope with the aid of large riprap to resist wave action.

6. The condition of the 48 inch diameter reservoir drain system is unknown. This system should be examined and returned to operating condition.

7. Monitor the settlement of the ditches adjacent to the spillway bridge and repair as required.

8. Repair the cracking area of the spillway bridge.

9. The tilting left spillway wall should be monitored for signs of ongoing movement. If this wall reaches a point where the tilting is critical, initiate repairs immediately.

10. Repair the concrete which has deteriorated at the downstream end of the spillway channel.

11. Remove all tree and vegetative growth on the slopes and at the abutments of the dam. Provide a program of periodic cutting and mowing of the embankment surfaces.

12. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of all valves and gates. Document this information for future reference. Also, develop an emergency action plan.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 Procedures

The normal water surface is approximated by the crest of the spillway. The reservoir surface may be lower due to the demand for water by the Gowanda Psychiatric Center. This demand is supplied by a 24 inch diameter cast iron pipe to the treatment plant and originates from three 16 inch valves and sluice gates located at different elevations on the sides of the intake tower.

4.2 Maintenance of the Dam

The dam is maintained by the Gowanda Psychiatric Center. Maintenance of the Dam is not considered satisfactory as evidenced by the deteriorated concrete elements of the spillway system, the erosion of the upstream slope the extensive vegetation on the slopes of the embankments and the questionable condition of the reservoir drain system.

4.3 Warning System

There is no warning system in effect or in preparation.

4.4 Evaluation

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

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Drainage Area Characteristics

Clear Lake Dam is located on the North Branch of Clear Creek approximately 1 mile northwest of Marshfield, the township of North Collins, Erie County, New York. The total drainage area at the dam is 5.95 square miles. The Topography is generally of mild slope with many tributaries to the creek and lake.

5.2 Analysis Criteria

The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers HEC-1 computer program, incorporating the "Snyder Synthetic Unit Hydrograph" method, and the "Modified Puls" flood routing procedure. The floods selected for analysis was the PMF and 1/2 PMF in accordance with the recommended guidelines of the Corps of Engineers.

5.3 Spillway Capacity

The Clear Lake spillway is an ungated ogee section, 100 feet long with three, 3' piers supporting an abandoned highway bridge. Originally a stepped structure, the spillway downstream of the crest had been recapped (1966) forming a smooth profile. Part of this cap was removed by the storm of September 14, 1979.

The spillway has a capacity of 4250 cfs at the top of dam which is essentially 1/2 the computed PMF. The dam would be overtopped by 1.7 feet at the PMF which is a flow of 9023 cfs out of the reservoir.

5.4 Reservoir Capacity

Capacity to normal water elevation is 650 acre feet. Surcharge storage to top of dam is an additional 350 acre feet, creating a total storage capacity of approximately 1000 acre feet to top of dam. The surcharge storage above spillway crest elevation is equivalent to 1.1 inches of runoff.

5.5 Floods of Record

The maximum known flood occurred on September 14, 1979. The pool level at this time was reported to be approximately 2 feet above the spillway crest. The estimated discharge for this flood is 870 cfs at an elevation of 1218. (USGS).

5.6 Overtopping Potential

The PMF analysis indicates the dam will be overtopped by 1.7 feet during the PMF. The water treatment plant would be inundated in the case of the PMF, but the spillway and highway culvert downstream would sufficiently handle the 1/2 PMF event without major damage to the plant.

5.7 Evaluation

The spillway is inadequate to pass the PMF flow of 9034 cfs, but is adequate to pass 1/2 of the PMF at 4254 cfs. The downstream channel will also pass the 1/2 PMF with minor flooding to the water treatment plant. The spillway is assessed as inadequate but not seriously so.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

No signs of major distress were observed in connection with the earth embankment or the spillway section. However, seepage was observed at the toe of the right embankment and at the toe of the right spillway wall. In addition the upstream slope is eroding near the water line and 2 depressions were observed adjacent to the spillway bridge abutments.

b. Design and Construction Data

No design or construction data could be located concerning the structural stability of the dam.

c. Stability Analysis

A stability analysis was conducted for the concrete gravity spillway section. The results of the analysis are as follows:

Case — Description of Loading Conditions

1. Normal Operating Conditions, reservoir at El. 1216 spillway crest, full uplift, no tailwater
2. Same as case 1, 7.5 kips/L.f. Ice load
3. Water at 1/2 PMF level (El. 1222) uplift as in case 1, tailwater = 6 feet
4. Water at PMF level (El. 1224) Uplift as in case 1, tailwater = 8 feet
5. Normal Conditions as in case 1 with seismic forces of 0.1 (seismic Zone 3)

Note: the sliding and overturning resistance of the buttress walls has been neglected. The shear strength of the cut-off wall beneath the dam has been included in the sliding stability analysis.

Case	Factor of Safety Overturning	Location of Resultant from Toe	Factor of Safety Sliding
1	2.54	20.8	8.18
2	1.97	16.8	5.70
3	2.00	19.7	5.33
4	1.87	19.4	4.78
5	2.00	17.1	5.44

Location of middle 1/3 is 10.3 to 20.7 feet from the toe.

These results indicate that the spillway portion analyzed is stable for all design conditions, and further investigation is not required.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 Assessment

a. Safety

The Phase I Inspection of Clear Lake Dam did not reveal conditions which constitute a hazard to human life or property. The embankment and spillway portions of the dam are not considered to be unstable. There are however, a number of problem areas which require attention.

b. Adequacy of Information

Information reviewed for the purposes of the Phase I Inspection report is considered adequate.

c. Urgency

The remedial measures listed below should be completed within 1 year of notification to the owner.

d. Need for Additional Investigation

No additional investigations are required at this time.

7.2 Recommended Measures

1. Repair the loose spalled and deteriorated gunite portions of the spillway, spillway piers and walls. Also caulk all joints where the existing gunite abuts the original concrete.

2. Clean and recaulk all spillway channel slabs joints and caulk all cracks notes in these slabs. Also caulk the joint in the left upstream spillway wall. Monitor these joints periodically and recaulk as required.

3. Monitor the seepage at the toe of the right spillwa- wall at bi-weekly intervals with the aid of weirs. Also, monitor the spillway walls for signs of seepage. Any appreciable increase in rate of flow will require investigation and repair.

4. Monitor bi-weekly with the aid of weirs, the seepage at the toe of the right embankment. In addition, provide a toe drain at the base of the embankment to collect the seepage and dam run-off. Backfill all animal burrows directly above the seepage area and fill any future burrows.

5. Repair the upstream slope of the earth embankments with large erosion resistent riprap.

6. Monitor the settlement of the ditchs adjacent to the spillway bridge.

7. Examine the condition of the 48 inch diameter reservoir drain system and restore it to operating conditions.

8. Repair the cracked areas of the spillway bridge.

9. Monitor the tilt of the left spillway wall for signs of ongoing movement.

10. Repair the deteriorated concrete at the end of the spillway channel.

11. Remove all tree growth on the slopes and at the abutments of the embankments. Provide a program of periodic cutting and mowing of the embankment surfaces.

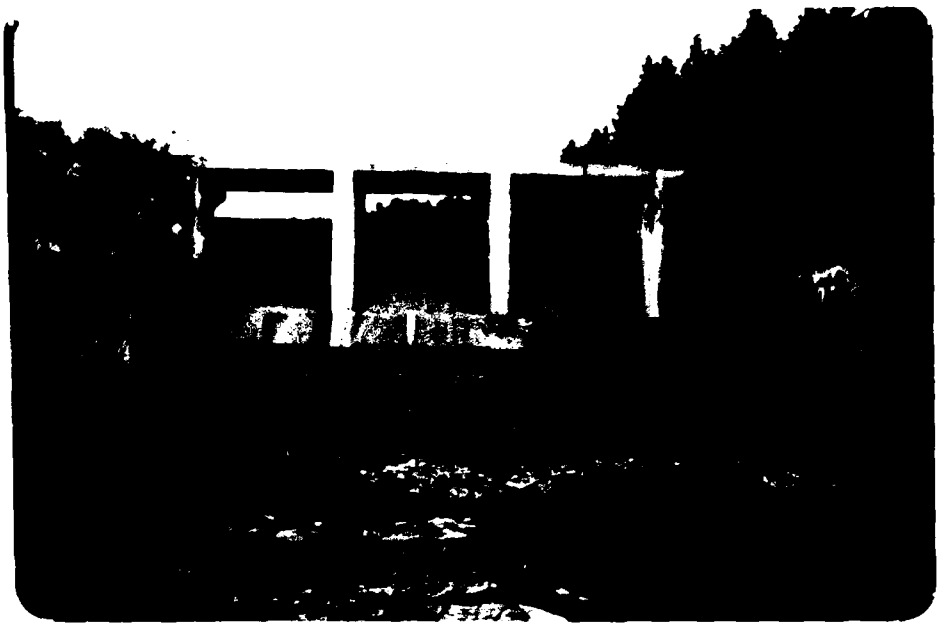
12. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of all valves and gates. Document this information for future reference. Also develop an emergency action plan.

APPENDIX A

PHOTOGRAPHS

Crest of Right Embankment
Spillway in Background, Intake Tower at Left
Photo #2

Left Embankment
Photo #3



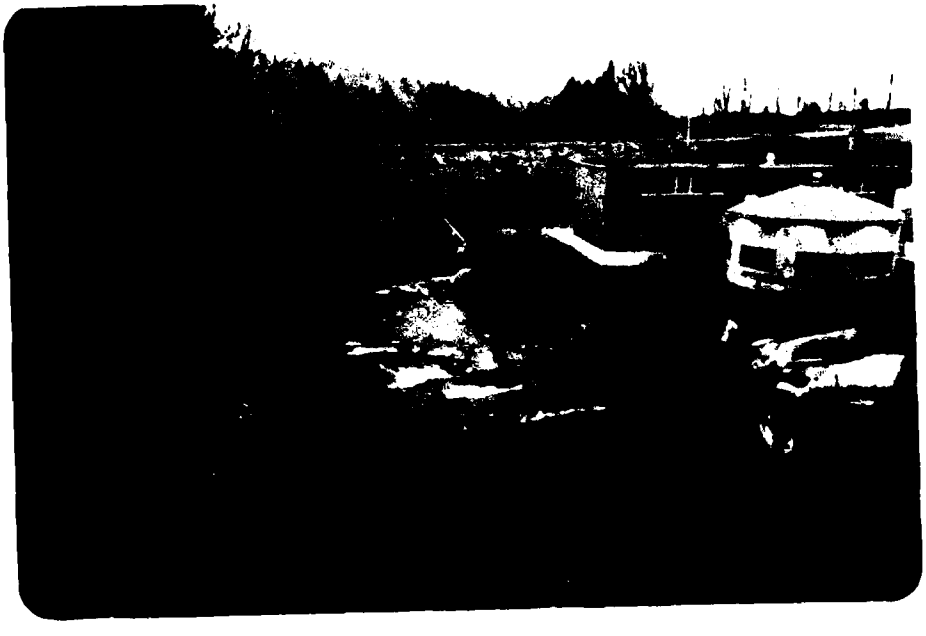
Spillway Downstream Face
Photo #4

Spillway Upstream Face
Photo #5

Left Spillway Wall
Photo #6 A&B

Right Spillway Wall
Photo #7 A&B

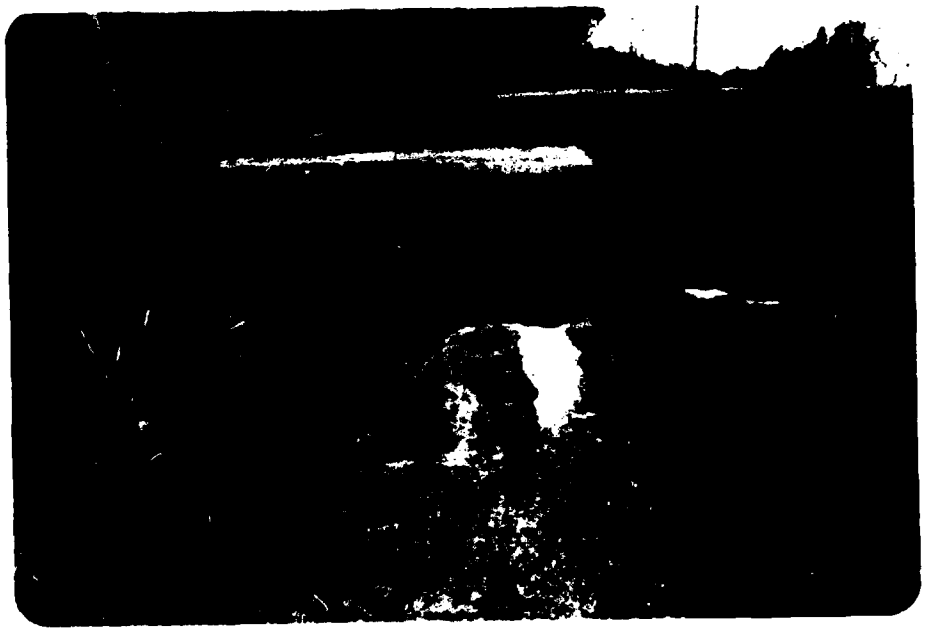
Seepage at Base of Right Spillway Wall (Rusty Area)
Photo #8



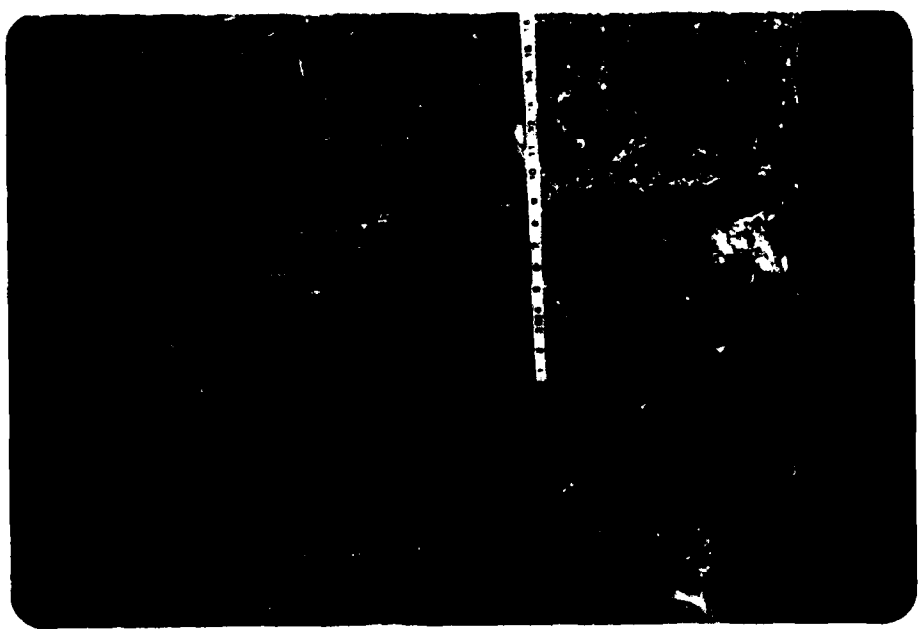
Downstream Channel
Note, Highway Embankment & Treatment Plant
Photo #9

Left Side of Spillway Bridge
Note depression
Photo #10

Right Side of Spillway Bridge
Note depression
Photo #11



Left Abutment of Spillway Bridge
Note Cracking
Photo #12



Joint in Left Spillway Wingwall (Upstream)
(immediately below Photo #12)
Photo #13

Seepage Near Toe of Right Embankment
Note:Soil was excavated to facilitate inspection
Photo #14

APPENDIX B

ENGINEERING DATA CHECKLIST

Check List
Engineering Data
Design Construction Operation

Name of Dam Clear Lake

I.D. # NY 751

Item	Remarks		
	Plans	Details	Typical Sections
Dam	Yes	Yes	Yes
Spillway(s)			
Outlet(s)			
Design Reports	None		
Design Computations	None		
Discharge Rating Curves	None		
Dam Stability	None		
Seepage Studies	None		
Subsurface and Materials Investigations	None		

Item	Remarks
Construction History	Plans for Alterations Dated Apr 20, 1925 construction assumed to be 1925 & probably 1926. Gunite repair on spillway & bridge 1966. Repair of cracked reservoir drain pipe (96" CIP) abt. 1965
Surveys, Modifications, Post-Construction Engineering Studies and Reports	None
Accidents or Failure of Dam Description, Reports	Failure of section of gunite on spillway during Sept 19, 1979 storm (Fredrick); no structural damage to spillway only unsound gunite
Operation and Maintenance Records Operation Manual	All records on file with Gaverden Psychiatric Center

APPENDIX C

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) **Basic Data**

a. General

Name of Dam Clear Lake Dam

Fed. I.D. # NY 751 DEC Dam No. 12 D - 493

River Basin Lake Erie

Location: Town North Collins County Erie

Stream Name North Branch Clear Creek

Tributary of Cattaraugus Creek

Latitude (N) 42° 33.2' Longitude (W) 78° 51.1'

Type of Dam Earth embankment with concrete spillway

Hazard Category "C" High

Date(s) of Inspection 10/3 & 11/8 1979

Weather Conditions cloudy, Temp = 40's

Reservoir Level at Time of Inspection at Spillway crest / 1" over crest at 2nd inspection

b. Inspection Personnel K. Harmer, R. McCarty - NYS DEC

[illegible] Howard Sugar, Robert P[illegible] (Principal Stationary Engr), Wayne [illegible] (Tr. Plant Operator)

c. Persons Contacted (Including Address & Phone No.)

Tom Ainsley (Bus Mgr.) Gowanda Psy. Ctr. (716) 532-3311

Howard Sugar (Plant Mgr.) (Same)

Paul Dwyer NYS Dept of Mental Hygiene 44 Holland Ave.

5th Fl. Albany NY (518) 474-3518

d. History:

Date Constructed 1925 Date(s) Reconstructed 1956, 1966, 1970

Designer N.Y.S. Office of General Services

Constructed By Unknown

Owner NYS Department of Mental Hygiene, Gowanda Psy. Ctr.

2) Embankment

a. Characteristics

(1) Embankment Material Appears to be low silt or clay

(2) Cutoff Type Concrete core wall in soil rock

(3) Impervious Core Concrete core wall 2' top width
≈ 9' base width founded on sound rock

(4) Internal Drainage System none

(5) Miscellaneous

b. Crest

(1) Vertical Alignment good except for depression adjacent to spillway bridge abutments which should be corrected soon

(2) Horizontal Alignment 6" drop at right of spillway and 9" drop at left of spillway with slight waves good

(3) Surface Cracks Some cracking of pavement in the vicinity of the depressions over the spillway abutments

(4) Miscellaneous observed higher than existing top of the dam and spillway. It is still used for maintenance

c. Upstream Slope

(1) Slope (Estimate) (V:H) drawings 1:2.5 very steep near crest then flatter at toe

(2) Undesirable Growth or Debris, Animal Burrows none, but slope should be mowed

(3) Sloughing, Subsidence or Depressions the area near the crest is very steep possibly from wave action. Also in the vicinity of the rocking shelters

(4) Slope Protection appears to be some riprap at
the toe

(5) Surface Cracks or Movement at Toe unobservable, unobservable

d. Downstream Slope

(1) Slope (Estimate - V:H) 1:2 see drawings

(2) Undesirable Growth or Debris, Animal Burrows 4 animal burrows
noted near midpoint of slope & right spillway abt., trees
growing on slopes also considerable brush

(3) Sloughing, Subsidence or Depressions few brush, rec. mowing proj.
none evident

(4) Surface Cracks or Movement at Toe none evident

(5) Seepage ≈ 50' right of right spillway bisects near toe
flow rate ≈ 3 gpm 10/3/79, 2 gpm 11/5/79. flow was clear
assumed to be from previous rain and broken pipes

(6) External Drainage System (Ditches, Trenches; Blanket)
none
soft wet area w/vegetation at toe, recommend toe drain system

(7) Condition Around Outlet Structure not observable
piped to treatment plant, plant in excellent condition

(8) Seepage Beyond Toe none evident

e. Abutments - Embankment Contact

some tree growth on left embankment

(1) Erosion at Contact

(2) Seepage Along Contact

3) Drainage System

a. Description of System ORIGINAL PLAN SHOWS SHOWS 6" tile drain SYSTEM, NOT CONFIRMED AFTER CONSTR. AS PLANS WERE ALTERED.

b. Condition of System

c. Discharge from Drainage System

4) Instrumentation (Momumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)

5) Reservoir

a. Slopes appear stable

b. Sedimentation no problems expected

c. Unusual Conditions Which Affect Dam ———

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) treated plant, highway embankment, Cattaraugus Indian Reservation

b. Seepage, Unusual Growth none

c. Evidence of Movement Beyond Toe of Dam none

d. Condition of Downstream Channel bedrock between dam and highway culvert

7) Spillway(s) (Including Discharge Conveyance Channel)

a. General Main concrete ogee crest w/ 3 piers highway (abandoned) bridge over spillway, concrete chute spillway. Downstream face was originally stepped in concrete, until 1966 when gunite was placed on face

b. Condition of Service Spillway During storm of Sept 19, 1979 a portion of gunite was lifted off downstream face "I" bolts and mesh reinforcing were noted and provided little support. Sounding of intact gunite indicates bottom of ogee section, piers and buttress walls are unsound. However the concrete of the original structure appears sound where observed.

c. Condition of Auxiliary Spillway _____

N/A: 0

d. Condition of Discharge Conveyance Channel Concrete slabs on bedrock, some slabs have shifted and cracked. The left wall has shifted inward = ½", vegetation is growing in construction joints, some erosion of concrete slabs a crack running parallel to dam was noted in slab = 5 feet below end of energy dissipaters. Rocky emerge beneath right spillway wall

8) Reservoir Drain/Outlet

Type: Pipe ✓ Conduit _____ Other _____

Material: Concrete _____ Metal ✓ Other _____

Size: 48" Length 280'

Invert Elevations: Entrance 1178.25 Exit _____

Physical Condition (Describe): Unobservable ✓

Material: Conc. Iron - See plans

Joints: _____ Alignment _____

Structural Integrity: Problems were reported in the 48" pipe and repairs were conducted in 1965. The drain has not been operated for many years. The adjacent 24" pipe is used when lowering of the reservoir is required.

Hydraulic Capability: _____

Means of Control: Gate _____ Valve ✓ Uncontrolled _____

Operation: Operable _____ Inoperable _____ Other Unknown

Present Condition (Describe): 24" is operable. 48" has not been operated

9) Structural

a. Concrete Surfaces spalled in 1966 (see drawings) guide is base of the spalls in some places storm of Sept 19, 1979 has eroded guide section on left face of spillway, erosion of some slab = 20' to dia. disp. (left side ±) 4" deep

b. Structural Cracking left outlet guide covering majority of structure, 1 crack parallel to dam ≈ 5 feet below face of dissipaters in slab, some cracks in highway bridge abutment (left) and bridge deck. (see photo)

c. Movement - Horizontal & Vertical Alignment (Settlement) spillway appears unchanged assume bedrock foundation, left spillway wall has moved ≈ ½"

d. Junctions with Abutments or Embankments appears adequate, except for left upstream spillway wall where a crack joint was noted (could be apparent movement.

e. Drains - Foundation, Joint, Face none in spillway several small face drains to relieve pressure build-up behind guide in walls of spillway outlet

f. Water Passages, Conduits, Sluices reported operational for treated plant intake tower in reservoir appears to be in good condition

g. Seepage or Leakage approx 2 to 3 gpm emanating from beneath right spillway at end of outlet channel flow is generally clear, but rusty deposits were present. Also seen slight seepage w/ dark stains and calcification on spillway outlet walls

h. Joints - Construction, etc. require maintenance, some are full of debris & vegetation. Joint between spillway and original concrete is opening up from high flow breach, this should be sealed

i. Foundation assumed to be bedrock, as evidenced in outlet channel

j. Abutments appear to be in good condition

k. Control Gates reported operational

l. Approach & Outlet Channels outlet channel is concrete slab over bedrock and exposed bedrock, before entering highway culvert. End section of concrete is deteriorated & should be repaired as required

m. Energy Dissipators (Plunge Pool, etc.) 3 rows of dissipator blocks at toe of spillway, good condition

n. Intake Structures appears to be in good condition, reported operational

o. Stability no problems noted

p. Miscellaneous

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

a. Description and Condition Water treatment plant and Appurtenances - Intake tower with 3-16" intakes El 1210, 1198.5 and 1183.5 on side of tower. A 48" Drum Reservoir Drain intake at El. 1179.25, 48" valve w/ all controls in tower. Tower located near toe of upstream face of right embankment. 2 pipes through embankment 24" & 48" CIP Exit invert El 1177.75 A 12" CIP is tapped into the 24" CIP and the 12" pipe feeds the treatment plant.

APPENDIX D

HYDROLOGIC/HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	1222.0	97.0	1000.0
2) Design High Water (Max. Design Pool)	–	–	–
3) Auxiliary Spillway Crest	–	–	–
4) Pool Level with Flashboards	–	–	–
5) Service Spillway Crest	1216.0	46.0	650.0

DISCHARGES

	Volume (cfs)
1) Average Daily	VARIES
2) Spillway @ Maximum High Water	4100.0
3) Spillway @ Design High Water	–
4) Spillway @ Auxiliary Spillway Crest Elevation	–
5) Low Level Outlet	370
6) Total (of all facilities) @ Maximum High Water	4500
7) Maximum Known Flood	670
8) At Time of Inspection	0.

CREST: ELEVATION: 1216.0

Type: UNGATED CONCRETE OGEE

Width: _____ Length: 100'

Spillover ---

Location LEFT SIDE THROUGH EMBANKMENT

SPILLWAY:

SERVICE		AUXILIARY
1216.0	Elevation	—
Concrete ogee	Type	—
100'	Width	—
	Type of Control	
Yes	Uncontrolled	—
	Controlled:	
—	Type (Flashboards; gate)	—
—	Number	—
—	Size/Length	—
	Invert Material	—
	Anticipated Length of operating service	—
60'	Chute Length	—
12'	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	—

HYDROMETEROLOGICAL GAGES:

Type : NONE.

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

_____

Method of Controlled Releases (mechanisms):

MANUAL VALVES (48" DRAIN)

_____

DRAINAGE AREA: 5.25 mi.²

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Rural, some agricultural use some wooded

Terrain - Relief: mild slope many inlets to lake & creek

Surface - Soil: glacial till well drained

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

no alterations planned,

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

None

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

None.

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

Location: —

Elevation: —

Reservoir:

Length @ Maximum Pool 1 mile (Miles)

Length of Shoreline (@ Spillway Crest) 2.25 (Miles)

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

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

PLEASE REPORT ANY UNUSUAL OPERATING PROBLEMS
TO MIKE TILLSON (RM, 423) PH: 7-5666
**********
    1              A1    CLEAR LAKE
    2              A2    PHASE I
    3              A2    PMF
    4              B   200       0      30       0       0       0       0       0       0       0
    5              B1    5

    6              J     1       2       1
    7              J1   .5       1
    8              K     0       1                       2               1
    9              K1    INFLOW TO CLEAR LAKE RES,
   10              M     1       1    5.95    5.95
   11              P     0    22.5     117     128     136     148
   12              T                                                    1      .1
   13              W   4.9    .625
   14              X  -2.0    -.05       1
   15              K     1       1                       2               1
   16              K1    ROUTE THROUGH CLEAR LAKE
   17              Y                               1       1
   18              Y1    1                                                -1216.0      -1
   19              Y4  1216    1217    1219    1221    1222    1225    1230
   20              Y5     0     307    1600    3450    4250    5700    7530
   21              SS     0     130     400     890    1675    3900
   22              SE  1190    1200    1210    1220    1230    1240
   23              SS  1216
   24              SD  1222      3.     1.5     600
   25              K     99
   26              A
   27              A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	1
END OF NETWORK	

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

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

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

RUN  DATE 01/14/80
                    CLEAR LAKE
                    PHASE I
                    PMF

                                JOB SPECIFICATION
      NQ      NHR     NMIN     IDAY     IHR     IMIN    METRC     IPLT     IPRT    NSTAN
     200        0       30        0       0        0        0        0        0        0
                          JOPER      NWT    LROPT    TRACE
                              5        0        0        0

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

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

                          SUB-AREA RUNOFF COMPUTATION

          INFLOW TO CLEAR LAKE RES.
                    ISTAQ   ICOMP   IECON   ITAPE   JPLT    JPRT   INAME  ISTAGE   IAUTO
                        1       0       0       0       2       0       1       0       0

                                HYDROGRAPH DATA
        IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
            1       1    5.95    5.95    5.95      0.      0.       0       0       0

                                PRECIP DATA
                    SPFE     PMS      R6     R12     R24     R48     R72     R96
                      0.   22.50  117.00  128.00  136.00  148.00      0.      0.
TRSPC COMPUTED BY THE PROGRAM IS 0.800

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

                              UNIT HYDROGRAPH DATA
                          TP=  4.90    CP=0.63    NTA=  0

                                RECESSION DATA
                          STRTQ=   -2.00    QRCSN=   -0.05    RTIOR= 1.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC=10.90 AND R= 9.11 INTERVALS

          UNIT HYDROGRAPH 55 END-OF-PERIOD ORDINATES, LAG=  4.89 HOURS, CP= 0.63  VOL= 1.00
    16.     58.    118.    187.    261.    338.    406.    456.    488.    502.
   491.    453.    406.    364.    326.    292.    262.    234.    210.    188.
```

56.	50.	45.	40.	36.	32.	29.	26.	23.	21.
19.	17.	15.	13.	12.	11.	10.	9.	8.	7.
6.	6.	5.	4.	4.					

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	0.30	1	0.00	0.	0.00	12.	1.03	2.30	101	0.	0.	0.	3057.
1.01	1.00	2	0.00	0.	0.00	12.	1.03	3.00	102	0.	0.	0.	2749.
1.01	1.30	3	0.00	0.	0.00	12.	1.03	3.30	103	0.	0.	0.	2470.
1.01	2.00	4	0.00	0.	0.00	12.	1.03	4.00	104	0.	0.	0.	2219.
1.01	2.30	5	0.00	0.	0.00	12.	1.03	4.30	105	0.	0.	0.	1992.
1.01	3.00	6	0.00	0.	0.00	12.	1.03	5.00	106	0.	0.	0.	1787.
1.01	3.30	7	0.00	0.	0.00	12.	1.03	5.30	107	0.	0.	0.	1603.
1.01	4.00	8	0.00	0.	0.00	12.	1.03	6.00	108	0.	0.	0.	1437.
1.01	4.30	9	0.00	0.	0.00	12.	1.03	6.30	109	0.	0.	0.	1289.
1.01	5.00	10	0.00	0.	0.00	12.	1.03	7.00	110	0.	0.	0.	1156.
1.01	5.30	11	0.00	0.	0.00	12.	1.03	7.30	111	0.	0.	0.	1037.
1.01	6.00	12	0.00	0.	0.00	12.	1.03	8.00	112	0.	0.	0.	931.
1.01	6.30	13	0.01	0.	0.01	12.	1.03	8.30	113	0.	0.	0.	835.
1.01	7.00	14	0.01	0.	0.01	12.	1.03	9.00	114	0.	0.	0.	749.
1.01	7.30	15	0.01	0.	0.01	12.	1.03	9.30	115	0.	0.	0.	673.
1.01	8.00	16	0.01	0.	0.01	12.	1.03	10.00	116	0.	0.	0.	604.
1.01	8.30	17	0.01	0.	0.01	12.	1.03	10.30	117	0.	0.	0.	542.
1.01	9.00	18	0.01	0.	0.01	12.	1.03	11.00	118	0.	0.	0.	486.
1.01	9.30	19	0.01	0.	0.01	12.	1.03	11.30	119	0.	0.	0.	452.
1.01	10.00	20	0.01	0.	0.01	12.	1.03	12.00	120	0.	0.	0.	452.
1.01	10.30	21	0.01	0.	0.01	12.	1.03	12.30	121	0.	0.	0.	452.
1.01	11.00	22	0.01	0.	0.01	12.	1.03	13.00	122	0.	0.	0.	452.
1.01	11.30	23	0.01	0.	0.01	12.	1.03	13.30	123	0.	0.	0.	452.
1.01	12.00	24	0.01	0.	0.01	12.	1.03	14.00	124	0.	0.	0.	452.
1.01	12.30	25	0.09	0.	0.09	12.	1.03	14.30	125	0.	0.	0.	452.
1.01	13.00	26	0.09	0.	0.09	12.	1.03	15.00	126	0.	0.	0.	452.
1.01	13.30	27	0.11	0.	0.11	12.	1.03	15.30	127	0.	0.	0.	452.
1.01	14.00	28	0.11	0.	0.11	12.	1.03	16.00	128	0.	0.	0.	452.
1.01	14.30	29	0.14	0.	0.14	12.	1.03	16.30	129	0.	0.	0.	452.
1.01	15.00	30	0.14	0.	0.14	12.	1.03	17.00	130	0.	0.	0.	452.
1.01	15.30	31	0.17	0.06	0.11	13.	1.03	17.30	131	0.	0.	0.	452.
1.01	16.00	32	0.54	0.49	0.05	23.	1.03	18.00	132	0.	0.	0.	452.
1.01	16.30	33	0.13	0.08	0.05	48.	1.03	18.30	133	0.	0.	0.	452.
1.01	17.00	34	0.13	0.08	0.05	86.	1.03	19.00	134	0.	0.	0.	452.
1.01	17.30	35	0.10	0.05	0.05	133.	1.03	19.30	135	0.	0.	0.	452.
1.01	18.00	36	0.10	0.05	0.05	187.	1.03	20.00	136	0.	0.	0.	452.
1.01	18.30	37	0.01	0.	0.01	245.	1.03	20.30	137	0.	0.	0.	452.
1.01	19.00	38	0.01	0.	0.01	300.	1.03	21.00	138	0.	0.	0.	452.
1.01	19.30	39	0.01	0.	0.01	345.	1.03	21.30	139	0.	0.	0.	452.
1.01	20.00	40	0.01	0.	0.01	379.	1.03	22.00	140	0.	0.	0.	452.
1.01	20.30	41	0.01	0.	0.01	399.	1.03	22.30	141	0.	0.	0.	452.
1.01	21.00	42	0.01	0.	0.01	401.	1.03	23.00	142	0.	0.	0.	452.
1.01	21.30	43	0.01	0.	0.01	385.	1.03	23.30	143	0.	0.	0.	452.
1.01	22.00	44	0.01	0.	0.01	358.	1.04	0.	144	0.	0.	0.	452.
1.01	22.30	45	0.01	0.	0.01	328.	1.04	0.30	145	0.	0.	0.	452.
1.01	23.00	46	0.01	0.	0.01	298.	1.04	1.00	146	0.	0.	0.	452.
1.01	23.30	47	0.01	0.	0.01	269.	1.04	1.30	147	0.	0.	0.	452.
1.02	0.	48	0.01	0.	0.01	242.	1.04	2.00	148	0.	0.	0.	452.
1.02	0.30	49	0.05	0.	0.05	218.	1.04	2.30	149	0.	0.	0.	452.
1.02	1.00	50	0.05	0.	0.05	197.	1.04	3.00	150	0.	0.	0.	452.
1.02	1.30	51	0.05	0.	0.05	178.	1.04	3.30	151	0.	0.	0.	452.
1.02	2.00	52	0.05	0.	0.05	160.	1.04	4.00	152	0.	0.	0.	452.
1.02	2.30	53	0.05	0.	0.05	145.	1.04	4.30	153	0.	0.	0.	452.
1.02	3.00	54	0.05	0.	0.05	131.	1.04	5.00	154	0.	0.	0.	452.
1.02	3.30	55	0.05	0.	0.05	119.	1.04	5.30	155	0.	0.	0.	452.
1.02	4.00	56	0.05	0.	0.05	108.	1.04	6.00	156	0.	0.	0.	452.
1.02	4.30	57	0.05	0.	0.05	98.	1.04	6.30	157	0.	0.	0.	452.
1.02	5.00	58	0.05	0.	0.05	89.	1.04	7.00	158	0.	0.	0.	452.
1.02	5.30	59	0.05	0.	0.05	81.	1.04	7.30	159	0.	0.	0.	452.

1.02	6.30	61	0.16	0.12	0.05	69.	1.04	8.30	161	0.	0.	0.	452.
1.02	7.00	62	0.16	0.12	0.05	70.	1.04	9.00	162	0.	0.	0.	452.
1.02	7.30	63	0.16	0.12	0.05	78.	1.04	9.30	163	0.	0.	0.	452.
1.02	8.00	64	0.16	0.12	0.05	95.	1.04	10.00	164	0.	0.	0.	452.
1.02	8.30	65	0.16	0.12	0.05	121.	1.04	10.30	165	0.	0.	0.	452.
1.02	9.00	66	0.16	0.12	0.05	156.	1.04	11.00	166	0.	0.	0.	452.
1.02	9.30	67	0.16	0.12	0.05	200.	1.04	11.30	167	0.	0.	0.	452.
1.02	10.00	68	0.16	0.12	0.05	249.	1.04	12.00	168	0.	0.	0.	452.
1.02	10.30	69	0.16	0.12	0.05	303.	1.04	12.30	169	0.	0.	0.	452.
1.02	11.00	70	0.16	0.12	0.05	358.	1.04	13.00	170	0.	0.	0.	452.
1.02	11.30	71	0.16	0.12	0.05	412.	1.04	13.30	171	0.	0.	0.	452.
1.02	12.00	72	0.16	0.12	0.05	462.	1.04	14.00	172	0.	0.	0.	452.
1.02	12.30	73	1.05	1.00	0.05	521.	1.04	14.30	173	0.	0.	0.	452.
1.02	13.00	74	1.05	1.00	0.05	613.	1.04	15.00	174	0.	0.	0.	452.
1.02	13.30	75	1.26	1.21	0.05	758.	1.04	15.30	175	0.	0.	0.	452.
1.02	14.00	76	1.26	1.21	0.05	968.	1.04	16.00	176	0.	0.	0.	452.
1.02	14.30	77	1.58	1.53	0.05	1259.	1.04	16.30	177	0.	0.	0.	452.
1.02	15.00	78	1.58	1.53	0.05	1643.	1.04	17.00	178	0.	0.	0.	452.
1.02	15.30	79	1.92	1.87	0.05	2124.	1.04	17.30	179	0.	0.	0.	452.
1.02	16.00	80	6.08	6.03	0.05	2766.	1.04	18.00	180	0.	0.	0.	452.
1.02	16.30	81	1.47	1.42	0.05	3597.	1.04	18.30	181	0.	0.	0.	452.
1.02	17.00	82	1.47	1.42	0.05	4548.	1.04	19.00	182	0.	0.	0.	452.
1.02	17.30	83	1.16	1.11	0.05	5548.	1.04	19.30	183	0.	0.	0.	452.
1.02	18.00	84	1.16	1.11	0.05	6536.	1.04	20.00	184	0.	0.	0.	452.
1.02	18.30	85	0.07	0.02	0.05	7451.	1.04	20.30	185	0.	0.	0.	452.
1.02	19.00	86	0.07	0.02	0.05	8203.	1.04	21.00	186	0.	0.	0.	452.
1.02	19.30	87	0.07	0.02	0.05	8726.	1.04	21.30	187	0.	0.	0.	452.
1.02	20.00	88	0.07	0.02	0.05	9005.	1.04	22.00	188	0.	0.	0.	452.
1.02	20.30	89	0.07	0.02	0.05	9034.	1.04	22.30	189	0.	0.	0.	452.
1.02	21.00	90	0.07	0.02	0.05	8799.	1.04	23.00	190	0.	0.	0.	452.
1.02	21.30	91	0.07	0.02	0.05	8318.	1.04	23.30	191	0.	0.	0.	452.
1.02	22.00	92	0.07	0.02	0.05	7704.	1.05	0.	192	0.	0.	0.	452.
1.02	22.30	93	0.07	0.02	0.05	7055.	1.05	0.30	193	0.	0.	0.	452.
1.02	23.00	94	0.07	0.02	0.05	6399.	1.05	1.00	194	0.	0.	0.	452.
1.02	23.30	95	0.07	0.02	0.05	5767.	1.05	1.30	195	0.	0.	0.	452.
1.03	0.	96	0.07	0.02	0.05	5186.	1.05	2.00	196	0.	0.	0.	452.
1.03	0.30	97	0.	0.	0.	4665.	1.05	2.30	197	0.	0.	0.	452.
1.03	1.00	98	0.	0.	0.	4197.	1.05	3.00	198	0.	0.	0.	452.
1.03	1.30	99	0.	0.	0.	3777.	1.05	3.30	199	0.	0.	0.	452.
1.03	2.00	100	0.	0.	0.	3398.	1.05	4.00	200	0.	0.	0.	452.
									SUM	26.64	22.91	3.73	210215.
										(677.)	(582.)	(95.)	(5952.63)

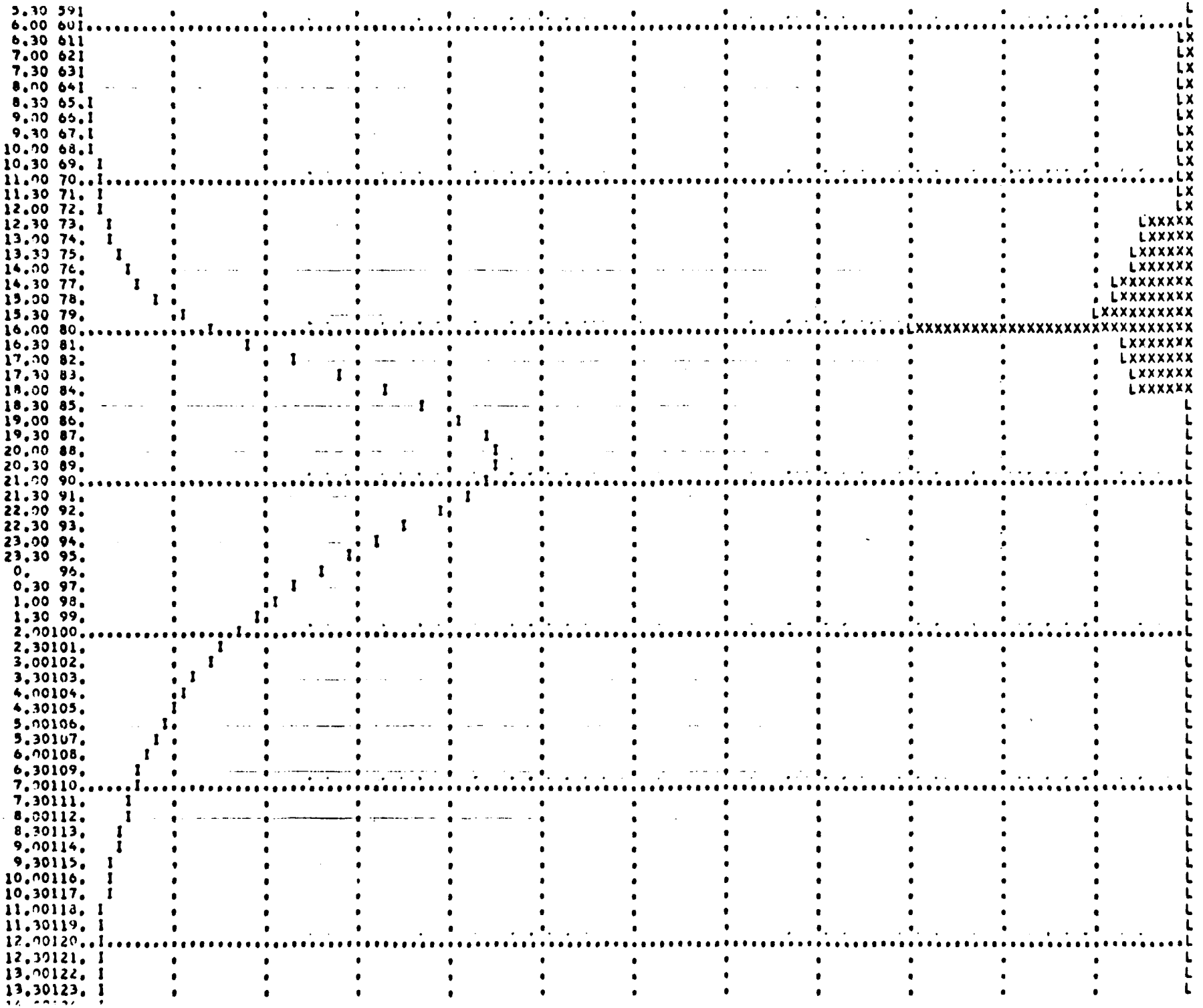
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9034.	7741.	3439.	1416.	209960.
CMS	256.	219.	97.	40.	5945.
INCHES		12.10	21.51	26.57	27.35
MM		307.39	546.32	674.97	694.81
AC-FT		3838.	6822.	8428.	8676.
THOUS CU M		4735.	8415.	10396.	10702.

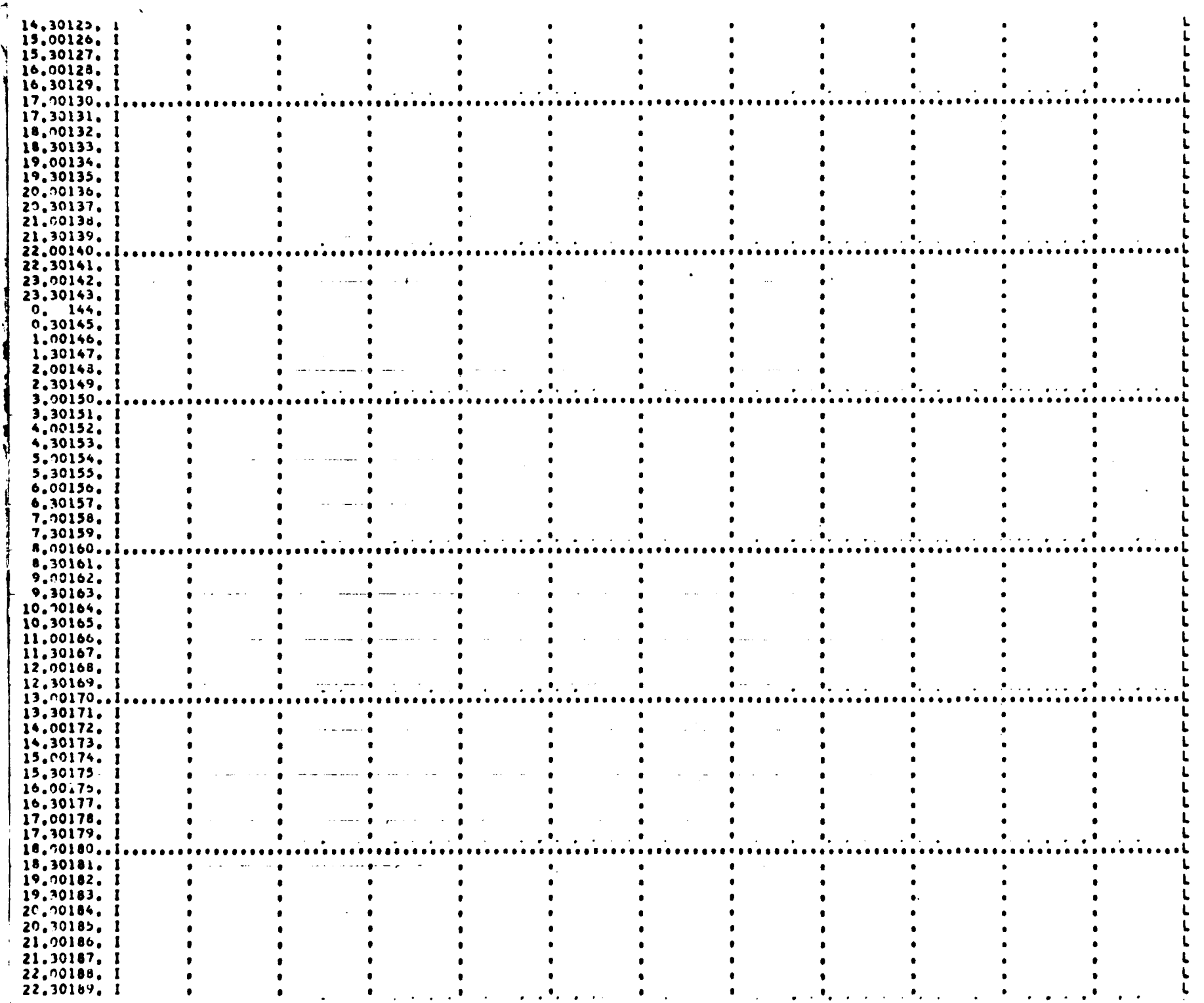
OVF

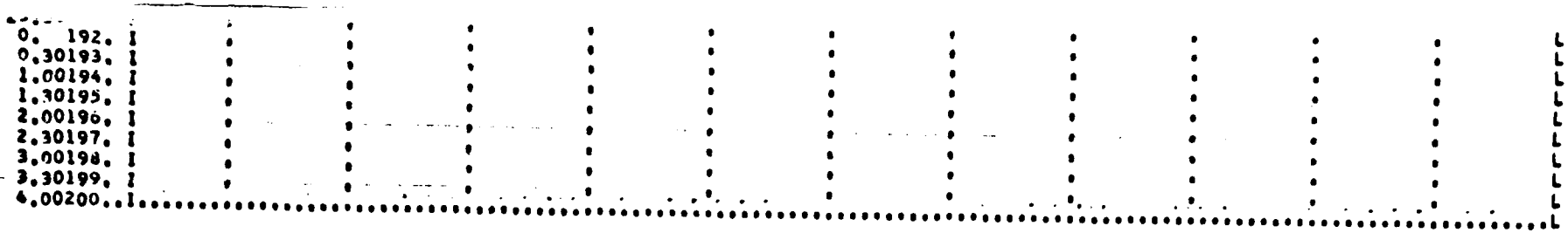
STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	2000.	4000.	6000.	8000.	10000.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	8.	6.	PRECIP(L) AND EXCESS(X) 4.	2.	0.
0.30	1I												L
1.00	2I												L
1.30	3I												L
2.00	4I												L
2.30	5I												L
3.00	6I												L
3.30	7I												L
4.00	8I												L
4.30	9I												L
5.00	10I												L
5.30	11I												L
6.00	12I												L
6.30	13I												L
7.00	14I												L
7.30	15I												L
8.00	16I												L
8.30	17I												L
9.00	18I												L
9.30	19I												L
10.00	20I												L
10.30	21I												L
11.00	22I												L
11.30	23I												L
12.00	24I												L
12.30	25I												L
13.00	26I												L
13.30	27I												LX
14.00	28I												LX
14.30	29I												LX
15.00	30I												LX
15.30	31I												LX
16.00	32I												LXX
16.30	33I												LX
17.00	34I												LX
17.30	35.I												LX
18.00	36.I												LX
18.30	37.I												L
19.00	38.I												L
19.30	39. I												L
20.00	40..I												L
20.30	41. I												L
21.00	42. I												L
21.30	43. I												L
22.00	44. I												L
22.30	45. I												L
23.00	46.I												L
23.30	47.I												L
0.	48.I												L
0.30	49.I												L
1.00	50.I												L
1.30	51.I												L
2.00	52.I												L
2.30	53.I												L
3.00	54.I												L
3.30	55.I												L
4.00	56.I												L
4.30	57I												L






0. 192.
0.30193.
1.00194.
1.30195.
2.00196.
2.30197.
3.00198.
3.30199.
4.00200.

OVH

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

6.	6.	6.	6.	6.	6.	6.	6.	6.	6.
6.	6.	6.	6.	6.	6.	6.	6.	6.	6.
6.	6.	6.	6.	6.	6.	6.	6.	6.	6.
6.	11.	24.	43.	67.	94.	122.	150.	173.	190.
200.	201.	192.	179.	164.	149.	135.	121.	109.	98.
89.	80.	73.	66.	59.	54.	49.	44.	40.	37.
34.	35.	39.	48.	61.	78.	100.	125.	151.	179.
206.	231.	261.	307.	379.	484.	630.	822.	1062.	1383.
1799.	2274.	2774.	3268.	3726.	4102.	4363.	4503.	4517.	4400.
4159.	3852.	3527.	3199.	2883.	2593.	2332.	2099.	1888.	1699.
1528.	1374.	1235.	1110.	996.	894.	801.	719.	645.	578.
519.	465.	418.	375.	336.	302.	271.	243.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4517.	3870.	1720.	708.	104980.
CMS	128.	110.	49.	20.	2973.
INCHES		6.05	10.75	13.29	13.68
MM		153.69	273.16	337.49	347.40
AC-FT		1919.	3411.	4214.	4338.
THOUS CU M		2367.	4207.	5198.	5351.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

12.	12.	12.	12.	12.	12.	12.	12.	12.	12.
12.	12.	12.	12.	12.	12.	12.	12.	12.	12.
12.	12.	12.	12.	12.	12.	12.	12.	12.	12.
13.	23.	48.	86.	133.	187.	245.	300.	345.	379.
399.	401.	385.	358.	328.	298.	269.	242.	218.	197.
178.	160.	145.	131.	119.	108.	98.	89.	81.	74.
69.	70.	78.	95.	121.	156.	200.	249.	303.	358.
412.	462.	521.	613.	758.	968.	1259.	1643.	2124.	2766.
3597.	4548.	5548.	6536.	7451.	8203.	8726.	9005.	9034.	8799.
8318.	7704.	7055.	6399.	5767.	5186.	4665.	4197.	3777.	3398.
3057.	2749.	2470.	2219.	1992.	1787.	1603.	1437.	1289.	1156.
1037.	931.	835.	749.	673.	604.	542.	486.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9034.	7741.	3439.	1416.	209960.
CMS	256.	219.	97.	40.	5945.
INCHES		12.10	21.51	26.57	27.35
MM		307.39	546.32	674.97	694.81
AC-FT		3838.	6822.	8428.	8676.
THOUS CU M		4735.	8415.	10396.	10702.

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HYDROGRAPH ROUTING

ROUTE THROUGH CLEAR LAKE

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

ROUTING DATA

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

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0. 0.		0.	-1216.	-1

STAGE	1216.00	1217.00	1219.00	1221.00	1222.00	1225.00	1230.00
FLOW	0.	307.00	1600.00	3450.00	4250.00	5700.00	7530.00
CAPACITY=	0.	130.	400.	890.	1675.	3900.	
ELEVATION=	1190.	1200.	1210.	1220.	1230.	1240.	

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1216.0	0.	0.	0.	0.	0.	0.	0.

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1222.0	3.0	1.5	600.

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	2.	3.	4.	4.	5.	5.	5.	5.	6.
6.	6.	6.	6.	6.	6.	6.	6.	6.	6.
6.	6.	6.	6.	6.	6.	6.	6.	6.	6.
6.	7.	9.	15.	24.	37.	53.	72.	93.	113.
132.	147.	158.	165.	166.	164.	159.	152.	144.	136.
125.	116.	107.	98.	90.	82.	75.	69.	63.	57.
52.	48.	46.	45.	47.	52.	61.	73.	87.	105.
125.	147.	169.	196.	229.	276.	369.	522.	702.	925.
1210.	1564.	2092.	2587.	2943.	3323.	3654.	3925.	4128.	4243.
4254.	4168.	4002.	3780.	3523.	3225.	2926.	2648.	2334.	2031.
1797.	1603.	1474.	1345.	1220.	1102.	993.	893.	803.	721.
647.	581.	521.	467.	420.	376.	338.	305.	289.	275.
263.	255.	248.	243.	239.	236.	234.	232.	231.	230.
229.	228.	228.	227.	227.	227.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.
226.	226.	226.	226.	226.	226.	226.	226.	226.	226.

STORAGE

694.	694.	695.	695.	695.	695.	695.	695.	695.	695.
695.	695.	695.	695.	695.	695.	695.	695.	695.	695.
695.	695.	695.	695.	695.	695.	695.	695.	695.	695.
695.	695.	695.	696.	698.	700.	702.	706.	709.	712.
715.	717.	719.	720.	721.	720.	719.	718.	717.	715.
714.	712.	711.	710.	708.	707.	706.	705.	704.	703.
702.	702.	701.	701.	702.	702.	704.	706.	708.	711.
714.	717.	721.	725.	731.	738.	748.	759.	773.	790.

1047.	1035.	1023.	1001.	976.	949.	924.	900.	880.	864.
851.	841.	831.	822.	812.	803.	795.	787.	781.	776.
769.	764.	759.	755.	752.	748.	745.	743.	740.	738.
736.	735.	734.	733.	732.	732.	731.	731.	731.	731.
731.	730.	730.	730.	730.	730.	730.	730.	730.	730.
730.	730.	730.	730.	730.	730.	730.	730.	730.	730.
730.	730.	730.	730.	730.	730.	730.	730.	730.	730.
730.	730.	730.	730.	730.	730.	730.	730.	730.	730.
730.	730.	730.	730.	730.	730.	730.	730.	730.	730.
730.	730.	730.	730.	730.	730.	730.	730.	730.	730.
730.	730.	730.	730.	730.	730.	730.	730.	730.	730.

STAGE

1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0
1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0
1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0
1216.0	1216.0	1216.0	1216.0	1216.1	1216.1	1216.2	1216.2	1216.3	1216.4
1216.4	1216.5	1216.5	1216.5	1216.5	1216.5	1216.5	1216.5	1216.5	1216.4
1216.4	1216.4	1216.3	1216.3	1216.3	1216.3	1216.2	1216.2	1216.2	1216.2
1216.2	1216.2	1216.1	1216.1	1216.2	1216.2	1216.2	1216.2	1216.3	1216.3
1216.4	1216.5	1216.6	1216.6	1216.7	1216.9	1217.1	1217.3	1217.6	1218.0
1218.4	1218.9	1219.5	1220.1	1220.5	1220.9	1221.3	1221.6	1221.8	1222.0
1222.0	1221.9	1221.7	1221.4	1221.1	1220.8	1220.4	1220.1	1219.8	1219.5
1219.2	1219.0	1218.8	1218.6	1218.4	1218.2	1218.1	1217.9	1217.8	1217.6
1217.5	1217.4	1217.3	1217.2	1217.2	1217.1	1217.0	1217.0	1216.9	1216.9
1216.9	1216.8	1216.8	1216.8	1216.8	1216.8	1216.8	1216.8	1216.8	1216.7
1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7
1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7
1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7
1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7
1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7
1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7
1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7	1216.7

PEAK OUTFLOW IS 4254. AT TIME 45.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4254.	3763.	1714.	704.	104113.
CMS	120.	107.	49.	20.	2948.
INCHES		5.88	10.72	13.21	13.56
MM		149.44	272.27	335.65	344.54
AC-FT		1866.	3400.	4191.	4302.
THOUS CU M		2302.	4194.	5170.	5307.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

```
      0.     1000.     2000.     3000.     4000.     5000.       0.       0.       0.       0.       0.       0.       0.
 0.30  11
 1.00  21
 1.30  31
 2.00  41
 2.30  51
 3.00  61
 3.30  71
 4.00  81
 4.30  91
 5.00 101.....................................................................................................
 5.30 111
 6.00 121
 6.30 131
 7.00 141
 7.30 151
 8.00 161
 8.30 171
 9.00 181
 9.30 191
10.00 201.....................................................................................................
10.30 211
11.00 221
11.30 231
12.00 241
12.30 251
13.00 261
13.30 271
14.00 281
14.30 291
15.00 301.....................................................................................................
15.30 311
16.00 321
16.30 331
17.00 341
17.30 3501
18.00 3601
18.30 37.1
19.00 38.1
19.30 39.01
20.00 40.01.....................................................................................................
20.30 41.01
21.00 42.01
21.30 43. 1
22.00 44. 1
22.30 45. 1
23.00 46.10
23.30 47.10
 0.   48.10
 0.30 49.1
 1.00 50.1.....................................................................................................
 1.30 51.1
 2.00 52.1
 2.30 53.1
 3.00 54.1
 3.30 55.1
 4.00 56.1
 4.30 5710
 5.00 5810
 5.30 5910
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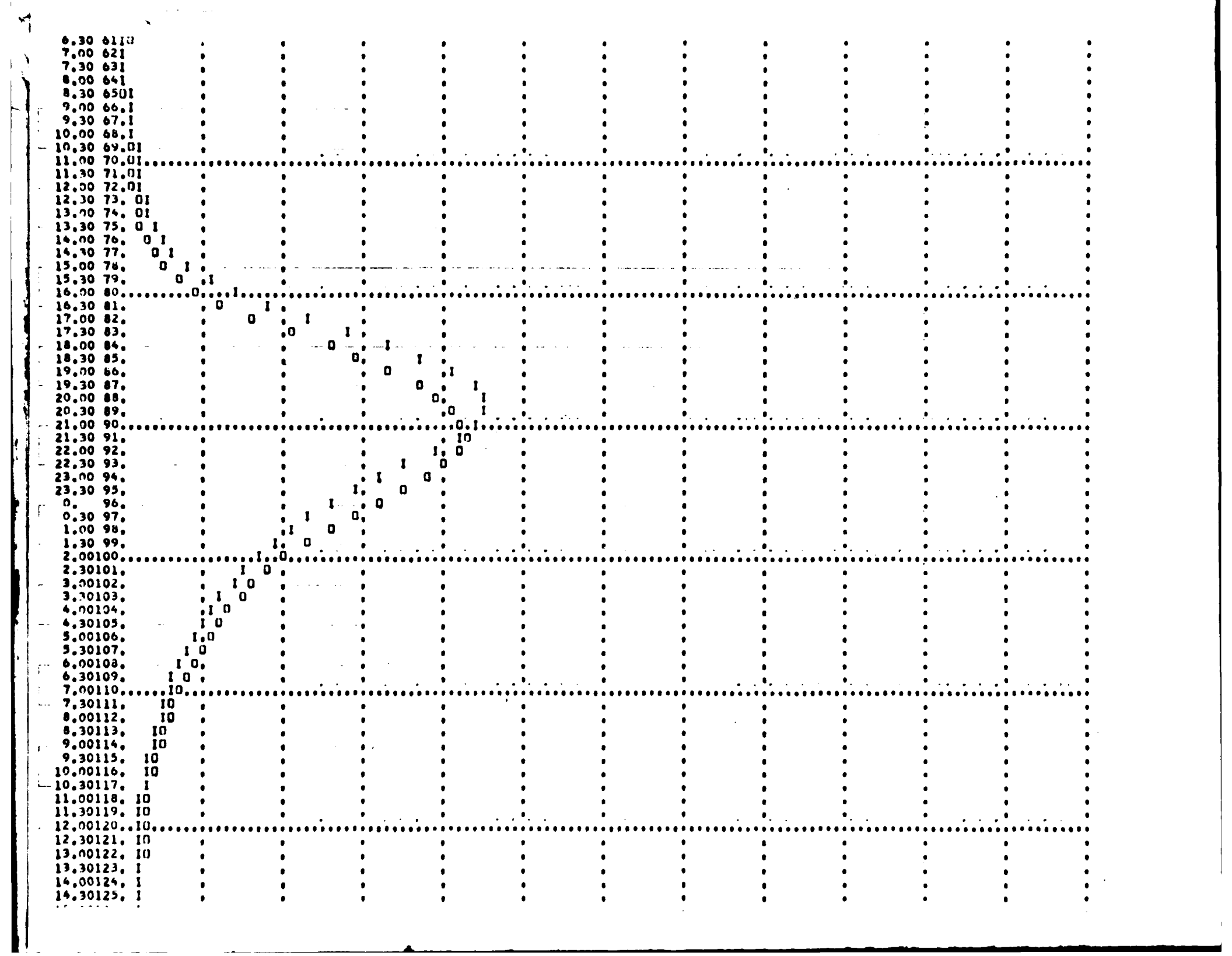

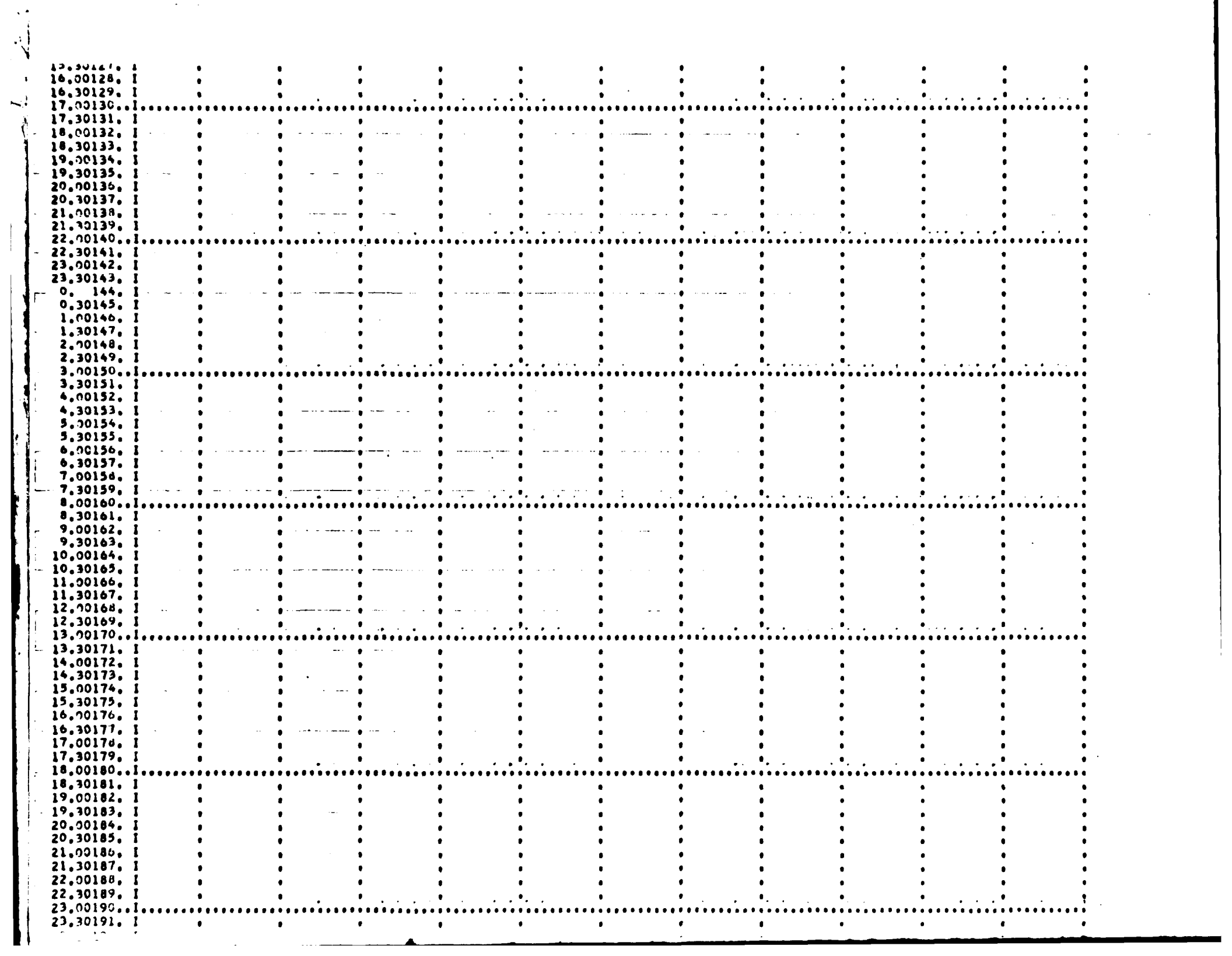
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20.00136.
20.30137.
21.00138.
21.30139.
22.00140.
22.30141.
23.00142.
23.30143.
0. 144.
0.30145.
1.00146.
1.30147.
2.00148.
2.30149.
3.00150.
3.30151.
4.00152.
4.30153.
5.00154.
5.30155.
6.00156.
6.30157.
7.00158.
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8.00160.
8.30161.
9.00162.
9.30163.
10.00164.
10.30165.
11.00166.
11.30167.
12.00168.
12.30169.
13.00170.
13.30171.
14.00172.
14.30173.
15.00174.
15.30175.
16.00176.
16.30177.
17.00178.
17.30179.
18.00180.
18.30181.
19.00182.
19.30183.
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21.30187.
22.00188.
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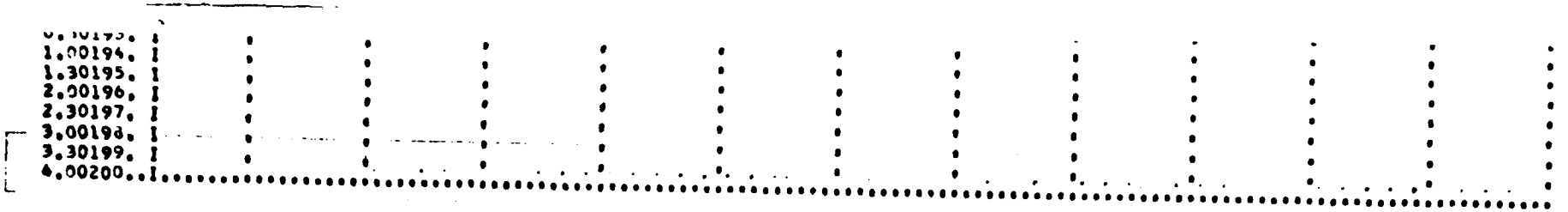
23.00190.
23.30191.


1.00194.
1.30195.
2.00196.
2.30197.
3.00198.
3.30199.
4.00200.

OVN

STATION 1, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

3.	5.	6.	8.	9.	9.	10.	10.	11.	11.
11.	11.	11.	12.	12.	12.	12.	12.	12.	12.
12.	12.	12.	12.	12.	12.	12.	12.	12.	12.
12.	13.	18.	30.	48.	74.	106.	144.	185.	226.
263.	295.	326.	345.	344.	331.	311.	297.	282.	265.
247.	229.	212.	195.	179.	164.	150.	137.	125.	114.
104.	96.	91.	90.	94.	105.	121.	145.	175.	211.
251.	293.	367.	453.	552.	686.	869.	1118.	1446.	1959.
2609.	3182.	3861.	4883.	6654.	7769.	8459.	8871.	9023.	8915.
8553.	8012.	7396.	6764.	6147.	5571.	5056.	4610.	4265.	4030.
3751.	3456.	3125.	2820.	2540.	2182.	1909.	1691.	1529.	1398.
1269.	1147.	1034.	930.	836.	751.	675.	606.	547.	506.
483.	470.	462.	458.	455.	454.	453.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.
452.	452.	452.	452.	452.	452.	452.	452.	452.	452.

STORAGE

694.	695.	695.	695.	695.	696.	696.	696.	696.	696.
696.	696.	696.	696.	696.	696.	696.	696.	696.	696.
696.	696.	696.	696.	696.	696.	696.	696.	696.	696.
696.	696.	697.	699.	702.	706.	711.	717.	724.	730.
736.	741.	744.	746.	746.	745.	743.	741.	739.	736.
733.	731.	728.	725.	723.	720.	718.	716.	714.	712.
711.	709.	709.	708.	709.	711.	713.	717.	722.	728.
734.	741.	748.	754.	762.	772.	786.	805.	829.	860.
897.	946.	1009.	1078.	1128.	1154.	1168.	1177.	1180.	1178.
1170.	1159.	1146.	1131.	1116.	1100.	1084.	1067.	1049.	1025.
998.	969.	941.	915.	891.	872.	857.	846.	836.	826.
816.	807.	798.	790.	783.	777.	771.	766.	761.	758.
756.	755.	755.	754.	754.	754.	754.	754.	754.	754.
754.	754.	754.	754.	754.	754.	754.	754.	754.	754.
754.	754.	754.	754.	754.	754.	754.	754.	754.	754.
754.	754.	754.	754.	754.	754.	754.	754.	754.	754.
754.	754.	754.	754.	754.	754.	754.	754.	754.	754.
754.	754.	754.	754.	754.	754.	754.	754.	754.	754.
754.	754.	754.	754.	754.	754.	754.	754.	754.	754.

STAGE

1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0
1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0
1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0	1216.0
1216.0	1216.0	1216.1	1216.1	1216.2	1216.2	1216.3	1216.5	1216.6	1216.7
1216.9	1217.0	1217.0	1217.1	1217.1	1217.0	1217.0	1217.0	1216.9	1216.9
1216.8	1216.7	1216.7	1216.6	1216.6	1216.5	1216.5	1216.4	1216.4	1216.4
1216.3	1216.3	1216.3	1216.3	1216.3	1216.3	1216.4	1216.5	1216.6	1216.7
1216.8	1217.0	1217.1	1217.2	1217.4	1217.6	1217.9	1218.3	1218.8	1219.4
1220.1	1220.7	1221.5	1222.4	1223.0	1223.4	1223.5	1223.7	1223.7	1223.7
1223.6	1223.4	1223.3	1223.1	1222.9	1222.7	1222.5	1222.3	1222.0	1221.7
1221.4	1221.0	1220.6	1220.3	1220.0	1219.6	1219.3	1219.1	1218.9	1218.7
1218.5	1218.3	1218.1	1218.0	1217.8	1217.7	1217.6	1217.5	1217.4	1217.3
1217.3	1217.3	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2

1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2
1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2
1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2
1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2
1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2
1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2	1217.2

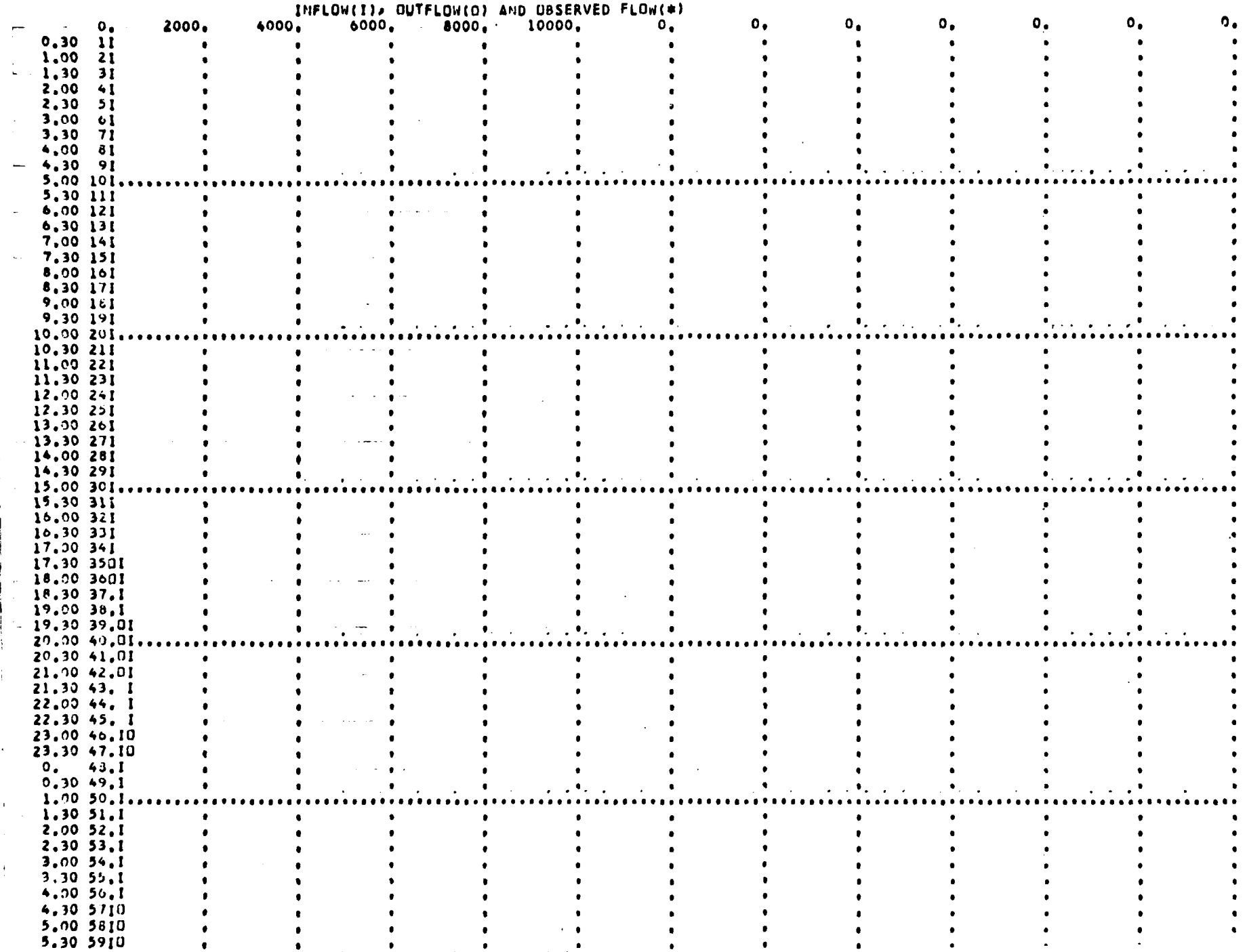
PEAK OUTFLOW IS 9023. AT TIME 44.50 HOURS

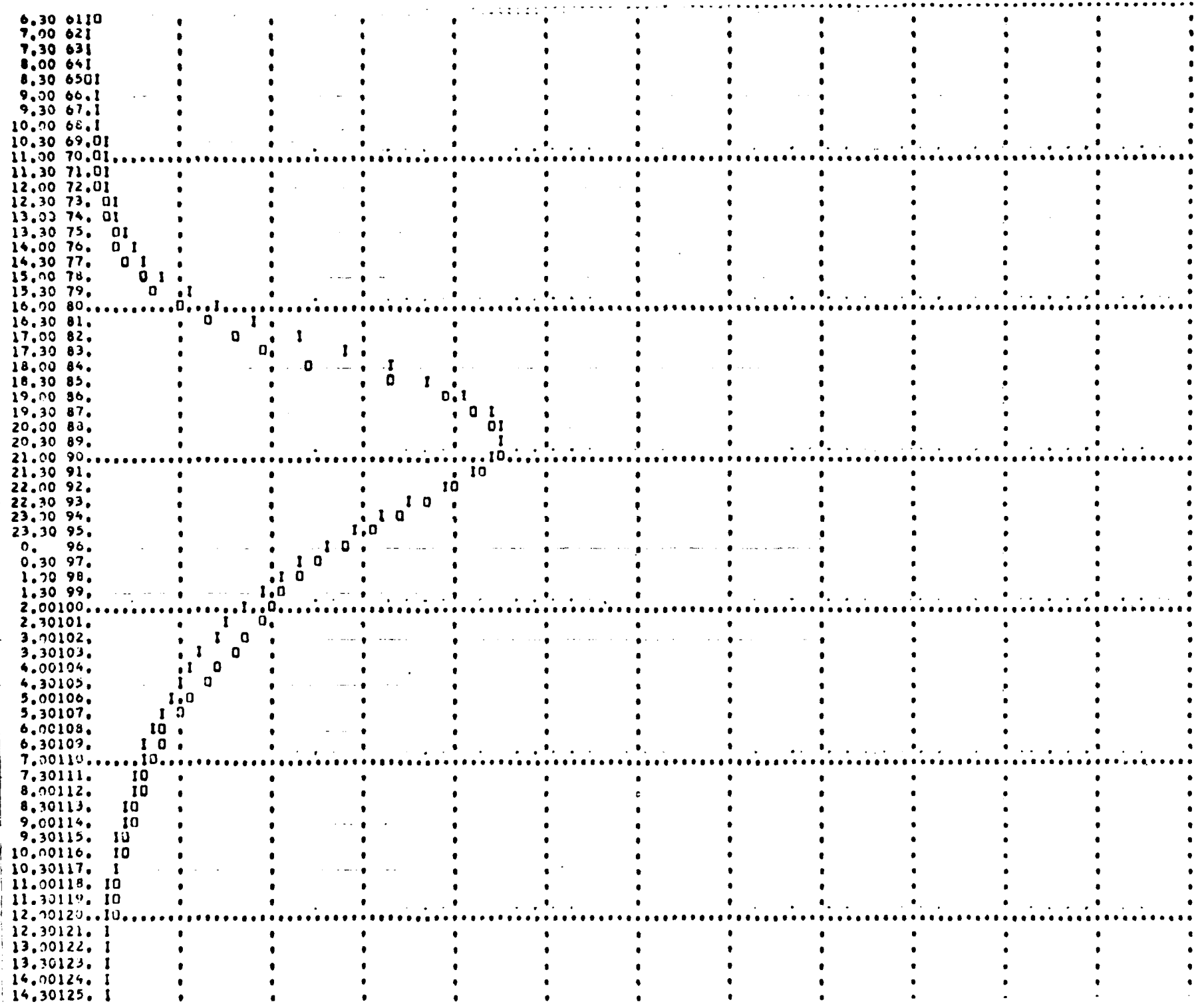
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9023.	7649.	3436.	1411.	208524.
CMS	255.	217.	97.	40.	5905.
INCHES		11.96	21.48	26.47	27.17
MM		303.75	545.71	672.27	690.05
AC-FT		3793.	6814.	8395.	8617.
THOUS CU M		4678.	8405.	10355.	10629.

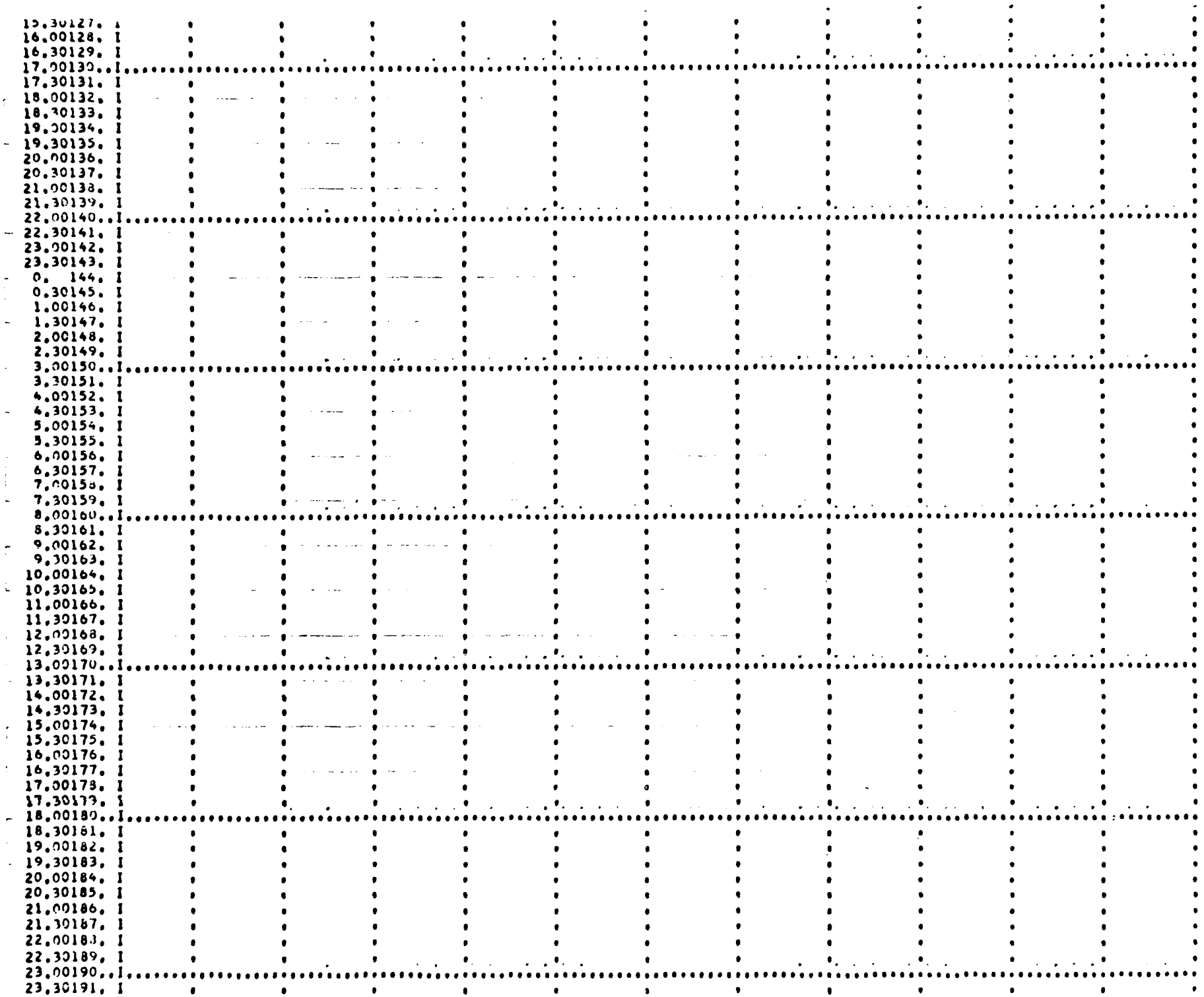
OVF

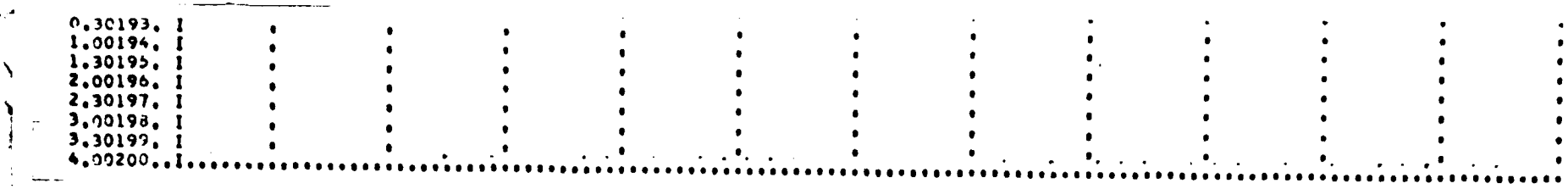
STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)





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1.30195. I
2.00196. I
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3.00198. I
3.30199. I
4.00200. I

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 0,50	 RATIO 2 1,00
HYDROGRAPH AT	1	5,95	1	4517,	9034,
	(	0,00)	(	127,91)(	255,82)(
ROUTED TO	1	5,95	1	4254,	9023,
	(	0,00)	(	120,46)(	255,49)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1216.00	1216.00	1222.00
STORAGE	694.	694.	1047.
OUTFLOW	0.	0.	4250.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1222.01	0.01	1047.	4254.	0.50	45.50	0.
1.00	1223.69	1.69	1180.	9023.	8.00	44.50	0.

APPENDIX E

REFERENCES

APPENDIX E

REFERENCES

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

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

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

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

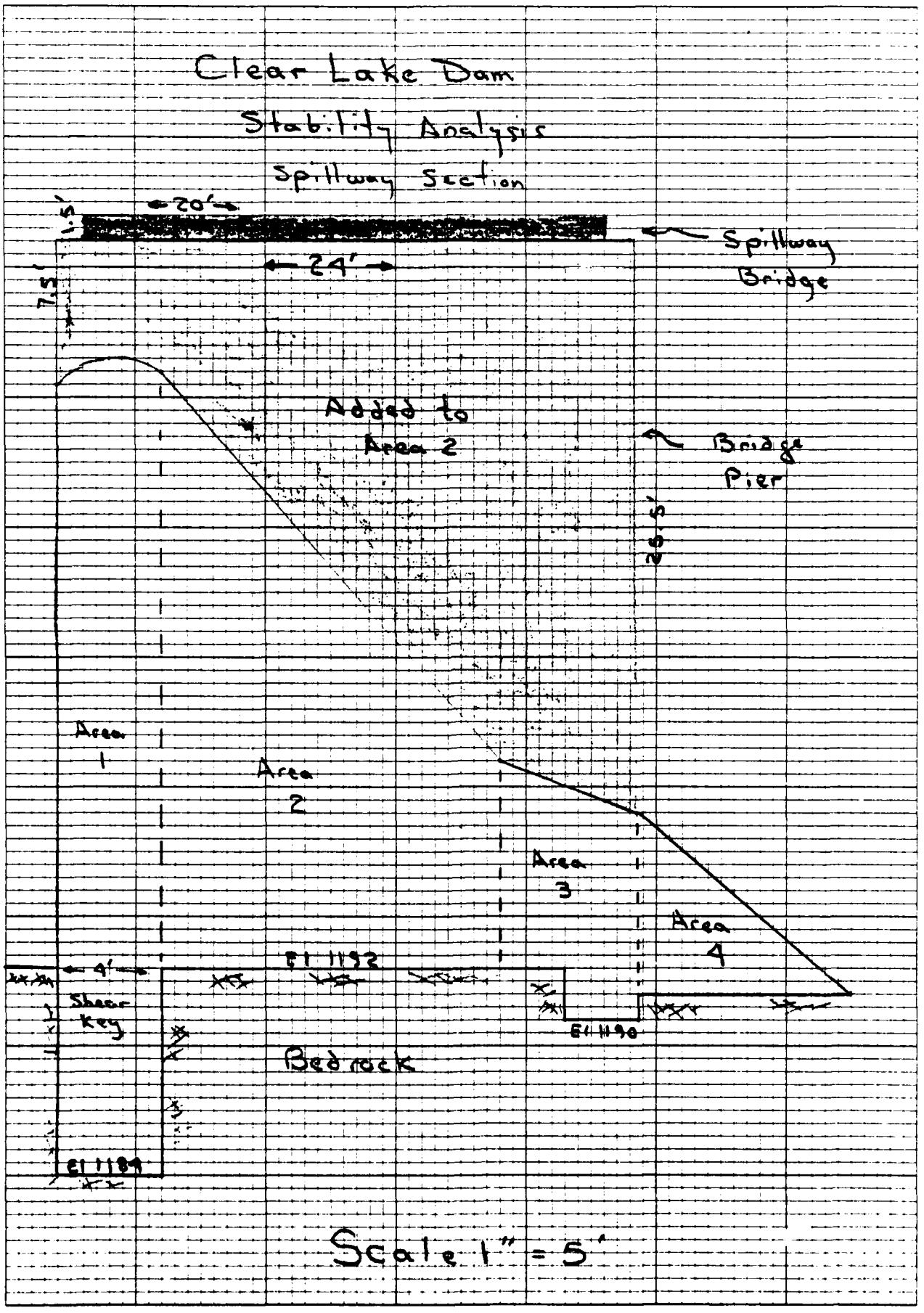
5) W.D. Thornbury, Principles of Geomorphology, John Wiley and Sons, 1969.

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

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

APPENDIX F

STABILITY ANALYSES



	Area	Moment Arm
Area 1	$31.5 \times 4 = 126$ lb/ft²	29
Area 2	$13 \times \left(\frac{23+9}{2}\right) = 201.5$ → 254.4	21.55

Bridge & Piers Adjustment

3 piers x 3' wide x height $\left(\frac{7.5+25.5}{2}\right)$ (16.5) x 24 long

÷ 100' (length of spillway) = 35.64 s.f./L.F.

x Moment Arm 16' = 570.24 's.f./LF

Bridge 20 feet wide x 1.5 feet thick = 30 sf/L.F.

x moment Arm 19' = 570 's.f./L.F.

Total = 1140.24 's.f./L.F.

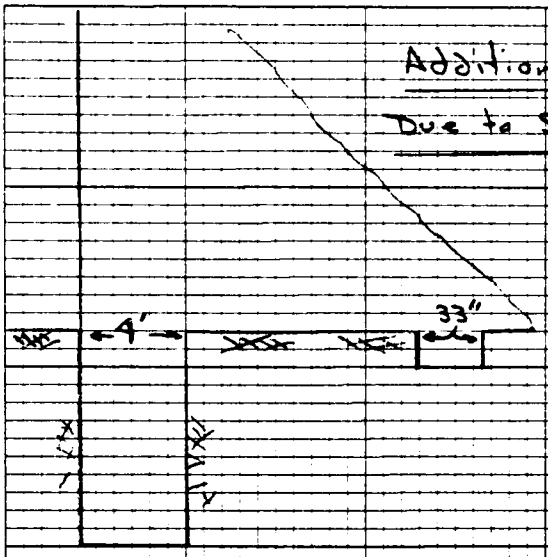
1140 ÷ Area 2 Moment Arm (21.55) = 52.90 s.f.

201.5 + 52.9 = 254.4 lb/ft²

Area 3	$6 \times \left(\frac{6+8}{2}\right) = 42$	11.15
Area 4	$\frac{1}{2}(8 \times 7) = 28$	$2\left(\frac{8}{3}\right) = 5.33$

Seismic Zone 3 $\alpha = .10$

Additional Resistance Due to Shear Key



Shear Strength of Concrete

$2\sqrt{2000}$ psi compressive strength (f'_c)

= 89.5 psi shear strength

Analysis is for a 1 foot thick section therefore surface of shear keys are

48" x 12" = 576 in² at heel

33" x 12" = 396 in² at toe

89.5 psi x 576 in² = 51,519 plf

+ 89.5 psi x 396 in² = 35,419 plf

86,938 plf

Total Shear Resistance of 4 Keys = 86.9 kips

↓

Sta 58

INPUT FOR STABILITY ANALYSIS PROGRAM

Input Location	Input Parameter Description
0	Unit Weight of Dam. ($K/ft.^3$)
1	Area of Segment #1 ($ft.^2$)
2	Location of Center of Gravity from toe (ft.) Segment #1
3	Area of Segment #2 ($ft.^2$)
4	Location of CG from toe, Seg. #2 (ft.)
5	Area of Segment #3 ($ft.^2$)
6	Location of CG from toe, Sg. #3 (ft.)
7	Total Base Width of Dam (ft.)
8	Height of Dam (ft.)
9	Ice Loading (K/L.F.)
10	Coefficient of Sliding
11	Unit Weight of Soil ($K/ft.^3$)
12	Coefficient of Active Soil Pressure - Ka
13	Coefficient of Passive Soil Pressure - Kp
14	Height of Water over Top of Dam (ft.)
15	Height of Soil for Active Pressure (ft.)
16	Height of Soil for Passive Pressure (ft.)
17	Height of Water in Tailrace Channel (ft.)
18	Unit Weight of Water ($K/ft.^3$)
19	Area of Segment #4 ($ft.^2$)
20	Location of CG from toe, Seg. #4 (ft.)
46	Height of Ice Load or Active Water
49	Location of Foundation Drains from Heel (ft.)
50	Seismic Coefficient (α)
58	Resistance from Benefit of Shear Key (Kips)

Stability Analysis
Input Parameters

	Case I	Case II	Case III	Case IV	Case V
00 =	.15				
01 =	126				
02 =	29				
03 =	254.4				
04 =	21.55				
05 =	42				
06 =	11.15				
07 =	31				
08 =	23.5				
09 =	0	7.5	0	0	0
10 =	0.6				
11 =	.15				
12 =	0				
13 =	566				
14 =	0	0	6	8	0
15 =	0				
16 =	8				
17 =	0	0	6	8	0
18 =	0.0629				
19 =	28				
20 =	5.33				
46 =	23.5				
50 =	0	0	0	0	0.1
58 =	86.9				

CLEAR LAKE DAM
STABILITY ANALYSIS
SPILLWAY SECTION

Case I Normal Loading

(a) 2.5392[illegible]

(b) 20.760[illegible]

(c) 8.1813[illegible]

Case II Ice Loading

(a) 1.9662[illegible]

(b) 16.8315[illegible]

(c) 5.7001[illegible]

Case III 1/2 PMF

(a) 2.0021[illegible]

(b) 19.7224[illegible]

(c) 5.3252[illegible]

Case IV PMF

(a) 1.8733[illegible]

(b) 19.3660[illegible]

(c) 4.7761[illegible]

Case V Seismic Loading

(a) 1.9968[illegible]

(b) 17.0987[illegible]

(c) 5.4438[illegible]

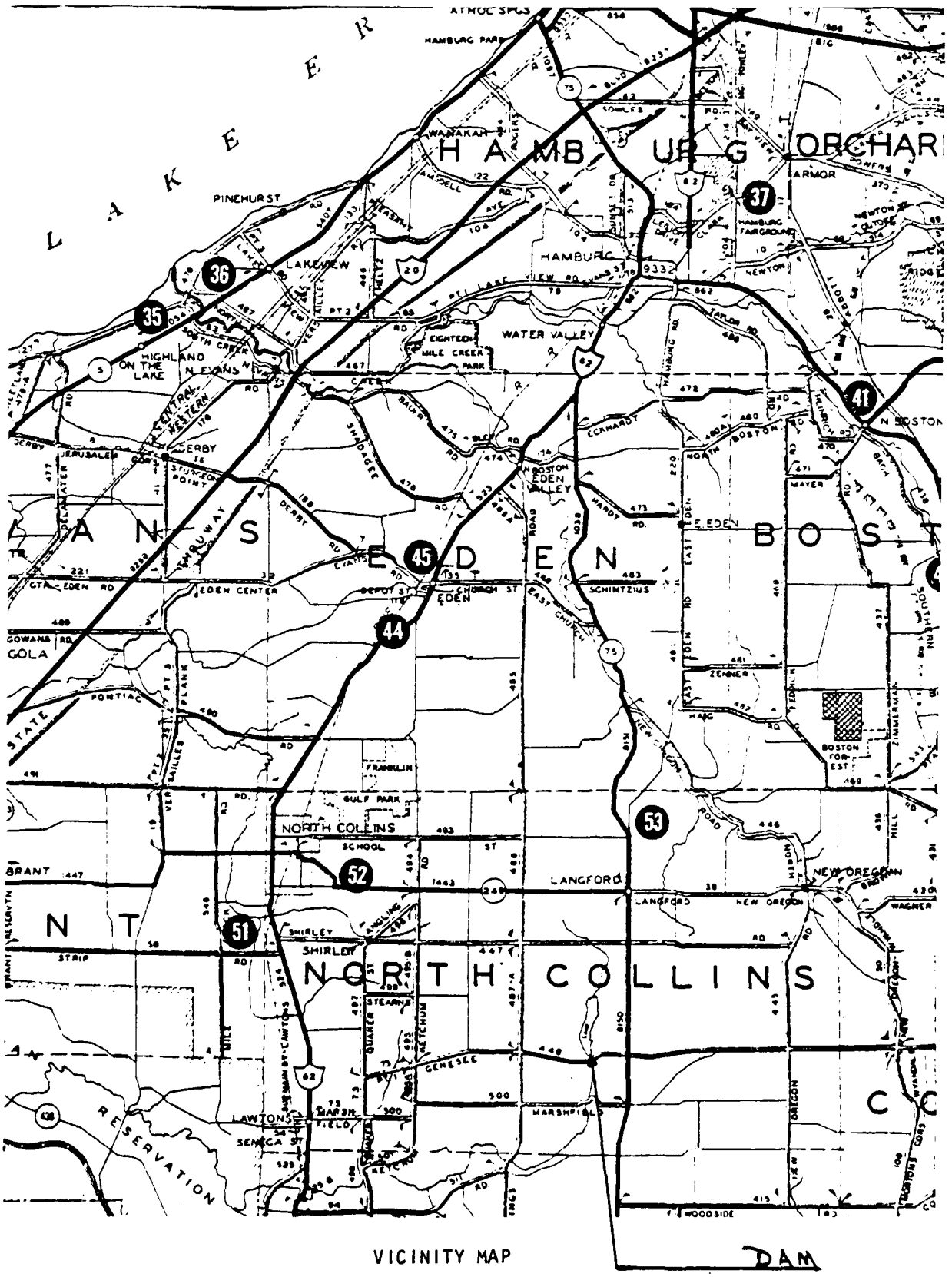
NOTE: (a) is the factor of safety for overturning;

(b) is the location of the resultant from the toe;

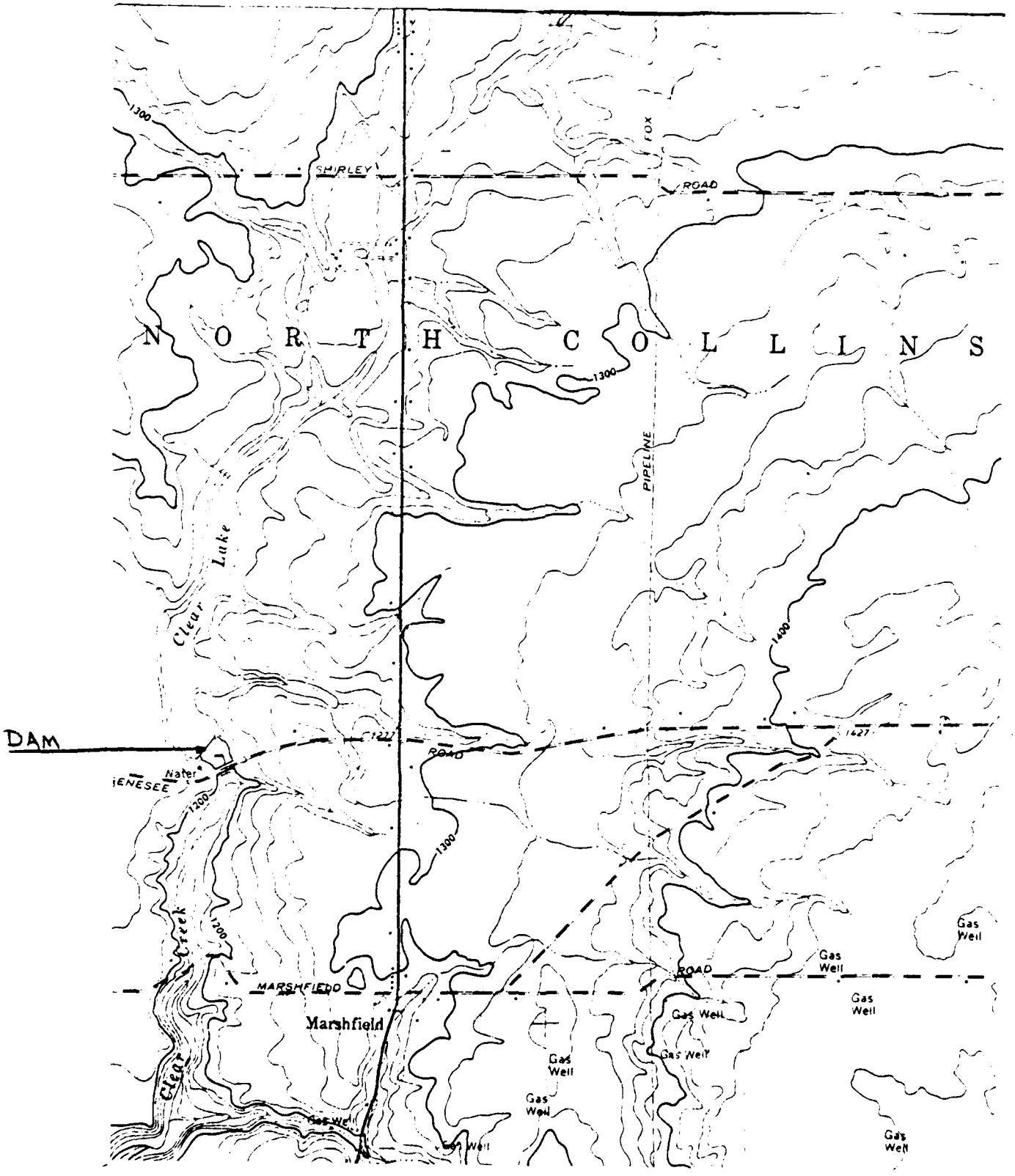
(c) is the factor of safety for sliding with the benefit of resistence from the shear key.

APPENDIX G

DRAWINGS



VICINITY MAP

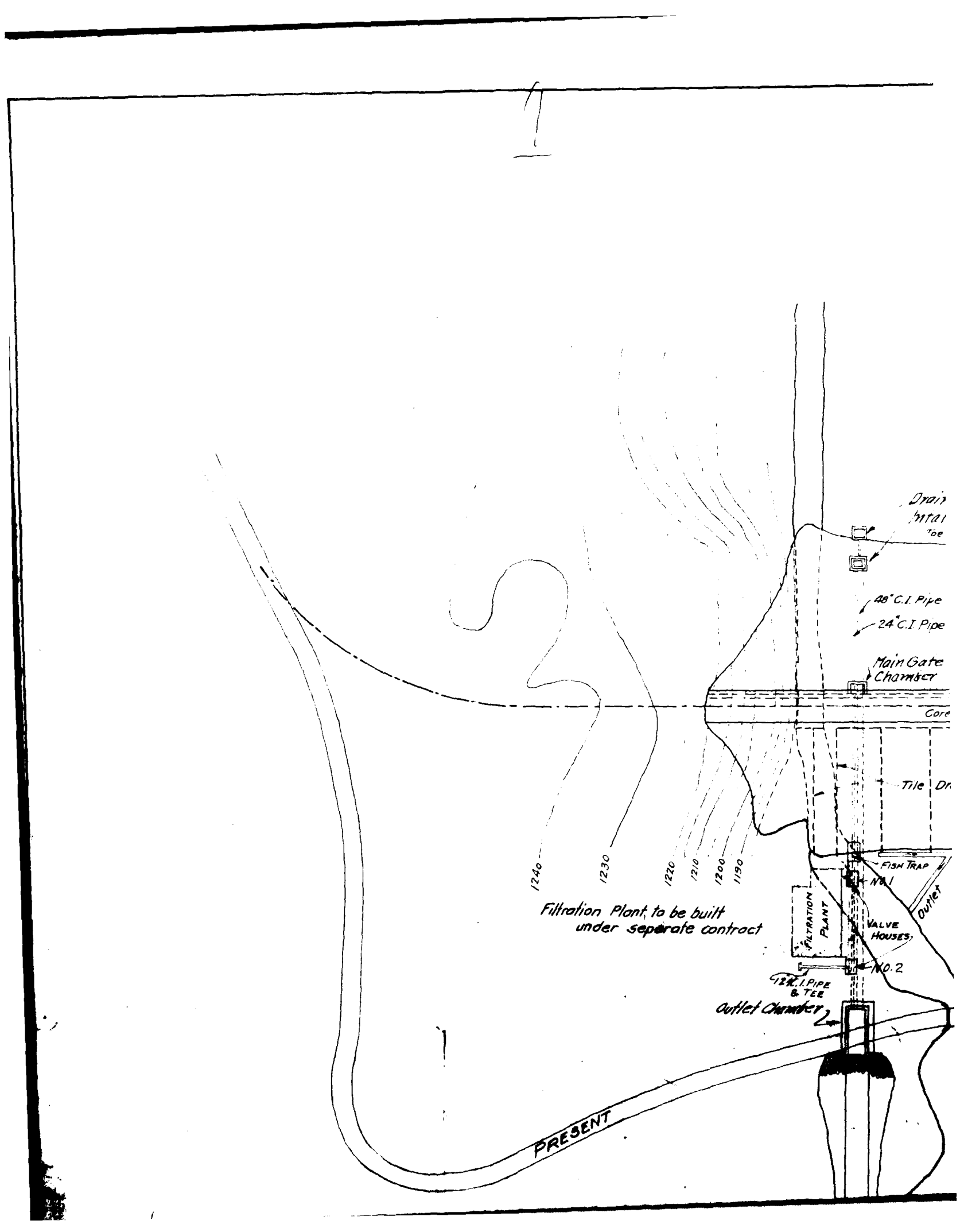


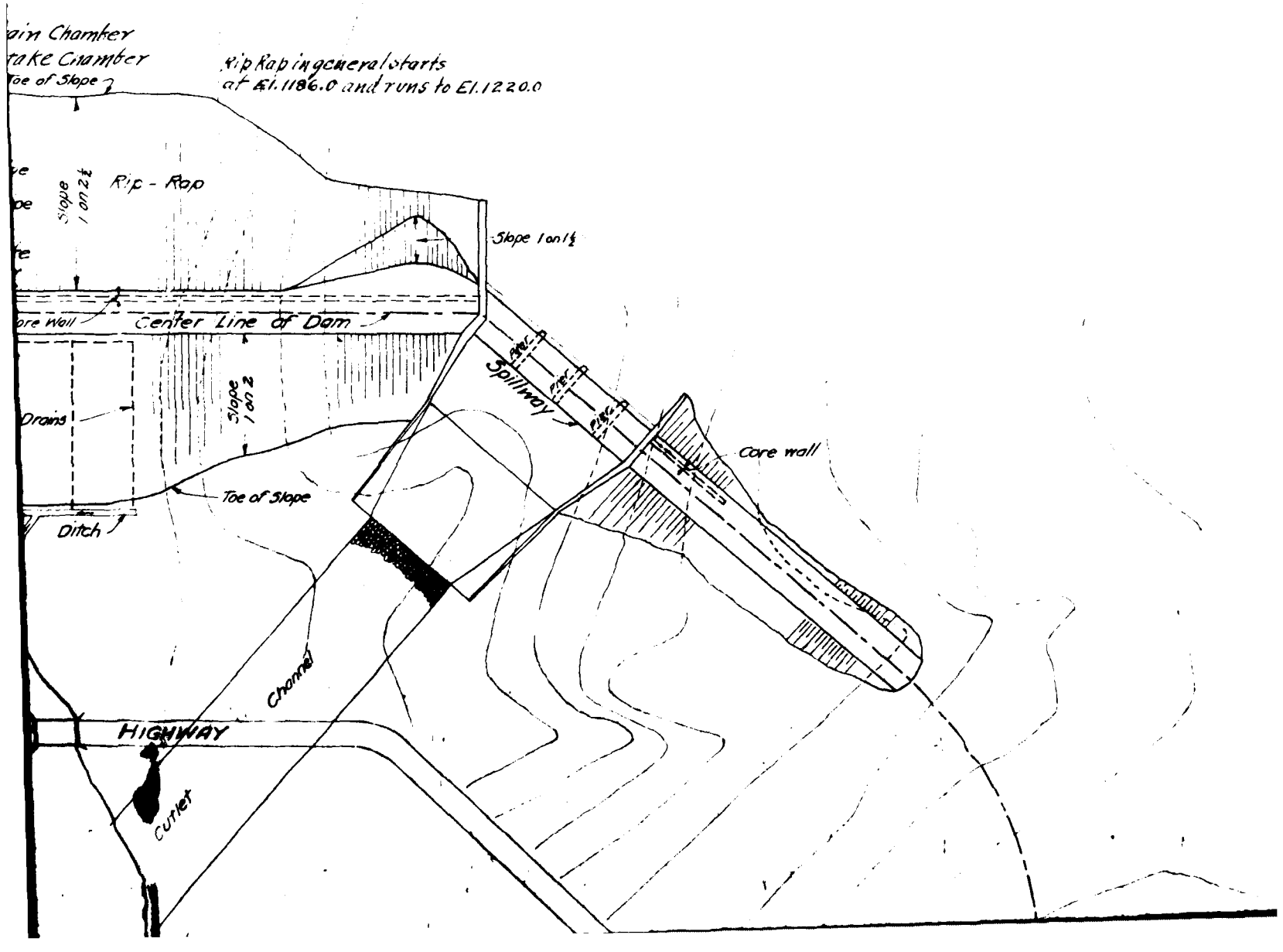
TOPOGRAPHIC MAP

CLEAR LAKE DAM

List of Drawings

	Drawing Number
General Layout of Dam	3
Plan and Longitudinal Section of Dam and Core-Wall	4
Roadway and Dam Sections	15
General Layout - Alteration 1	16
New Water Filtration Plant	57/50001
Change In Core Wall	Dated 1/18/25
Repairs to Bridge & Spillway Plan & Details	66/5038
Sections	66/5039


Drain
Intal
Toe
48" C.I. Pipe
24" C.I. Pipe
Main Gate
Chamber
Core
Tile Dr
1240
1230
1220
1210
1200
1190
Filtration Plant to be built
under separate contract
FISH TRAP
No 1
Outlet
FILTRATION
PLANT
VALVE
HOUSES
No. 2
12" C.I. PIPE
& TEE
Outlet Chamber
PRESENT

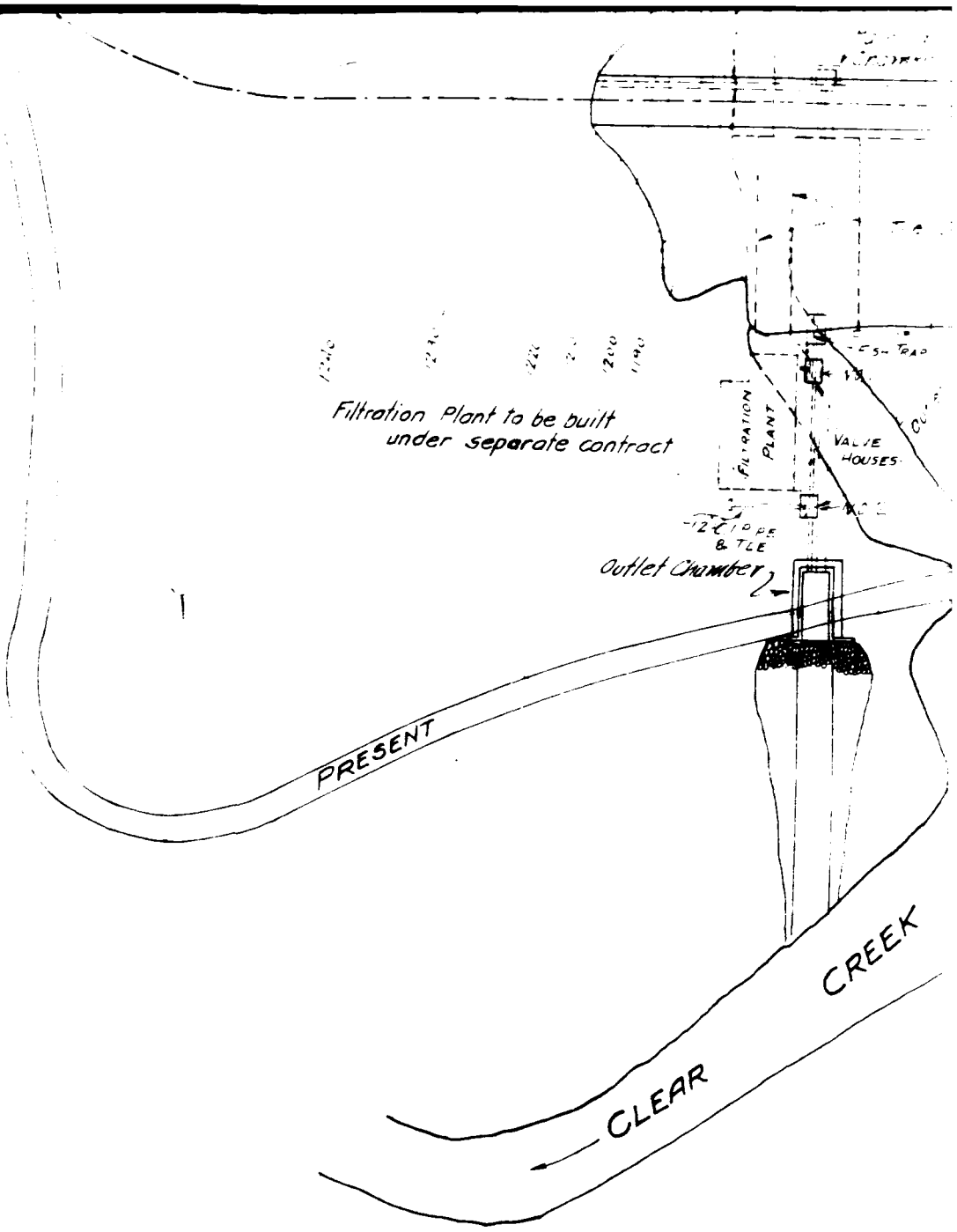

ain Chamber
rake Chamber
Toe of Slope
Rip Rap in general starts at El. 1186.0 and runs to El. 1220.0
Slope 1 on 2
Rip - Rap
Slope 1 on 1½
ore Wall
Center Line of Dam
Drains
Slope 1 on 2
Spillway
Core wall
Toe of Slope
Ditch
Channel
HIGHWAY
Culvert

Approved & Submitted Apr 2 1924

Thos J Morrison Division Engineer.

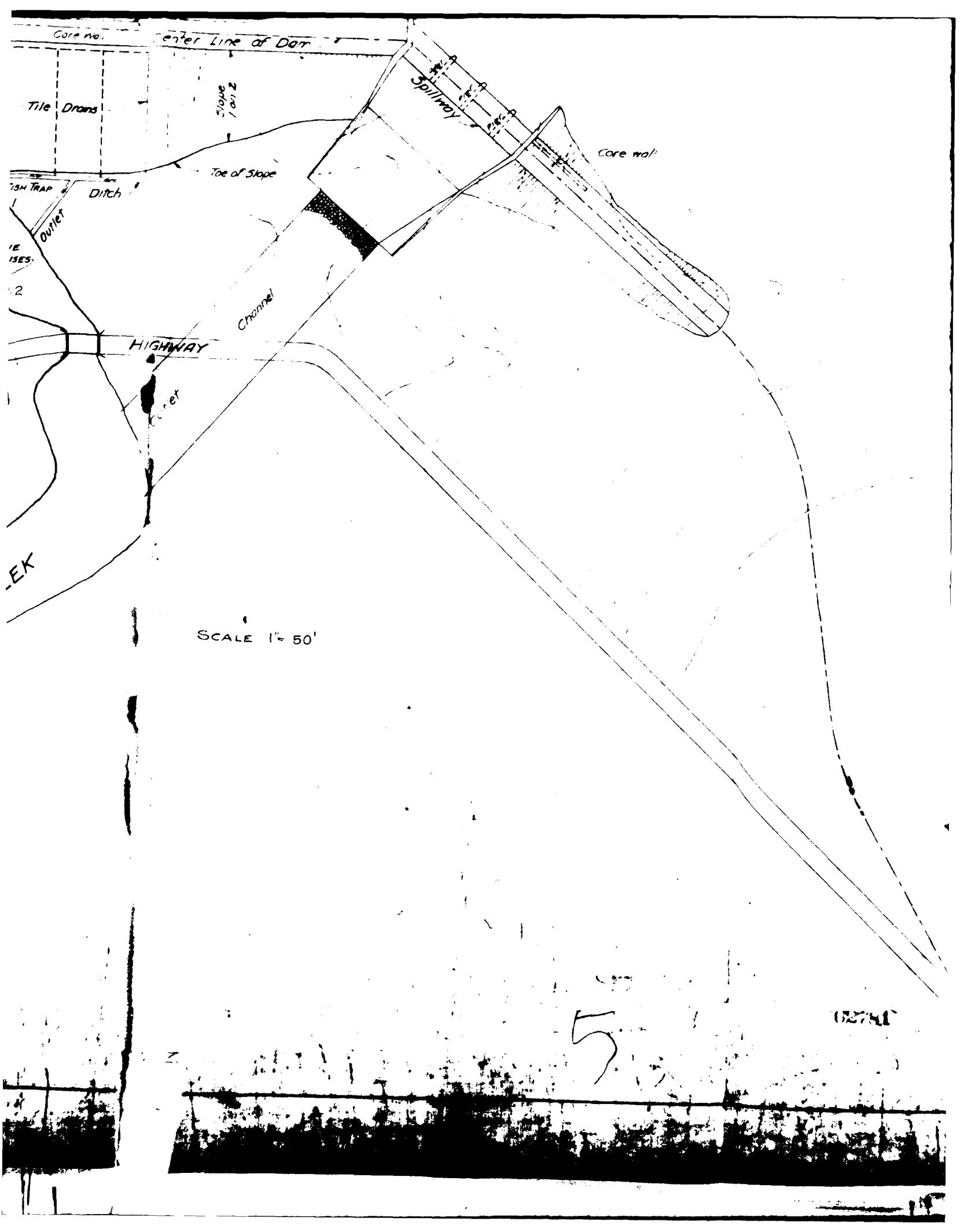
Examined and Approved May 19 1924.

Russell V Chapman Deputy State Engineer.



4

Made by [illegible]
Traced [illegible] Jan. 1914
Checked by [illegible]


Core wall
Center Line of Dam
Tile Drains
Slope 1 on 2
Spillway
Core wall
Toe of Slope
Ditch
Outlet
Channel
HIGHWAY
SCALE 1" = 50'

Division Engineer

May 19 1911

Deputy State Engineer

State of New York

DEPARTMENT OF STATE ENGINEER AND SURVEYOR

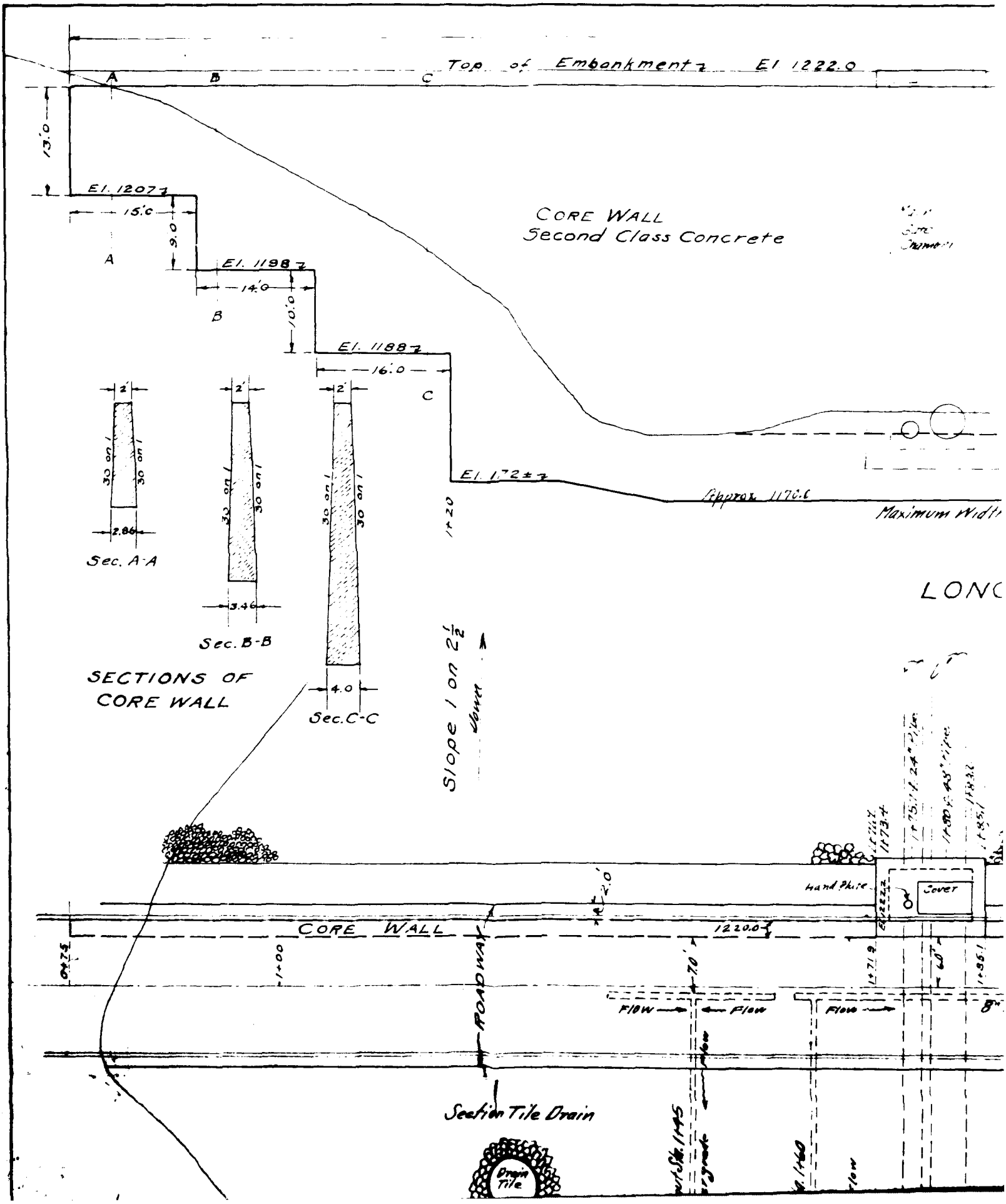
WATER SUPPLY SYSTEM FOR GOWANDA HOMEOPATHIC STATE HOSPITAL

CONTRACT

FOR CONSTRUCTING AN EARTH DAM
CORE-WALL, CONCRETE SPILLWAY AND WORK
IN THE TOWN OF NORTH COLLINS

Chapter 444, Laws of 1911

Contract Book


Top of Embankment ± El 1222.0
A
B
C
13.0
El. 1207 ±
15.0
9.0
El. 1198 ±
14.0
10.0
El. 1188 ±
16.0
CORE WALL
Second Class Concrete
El. 1172 ± (approx 1170.6)
Maximum Width
1+20
2'
30 on 1
2.86
Sec. A-A
3.46
Sec. B-B
4.0
Sec. C-C
SECTIONS OF CORE WALL
Slope 1 on 2½
Lower
LONG
Hand Hole
Cover
CORE WALL
1220.0
0+75
1+00
ROADWAY
70'
60'
Flow
Section Tile Drain
Drain Tile

2

365.81

D — Top of Core Wall E

Profile of Original Surface

Profile of Rock Surface

8' below Rock Surface

Bottom of Core Wall (Aporox. mate

D

4.0

SECTION D-D OF CORE WALL

ONGITUDINAL SECTION

Slope 1 on 2½ Down

SECTION OF CORE W

Top of Rip-rap El. 1220

CORE WALL

CENTER LINE

8" Tile

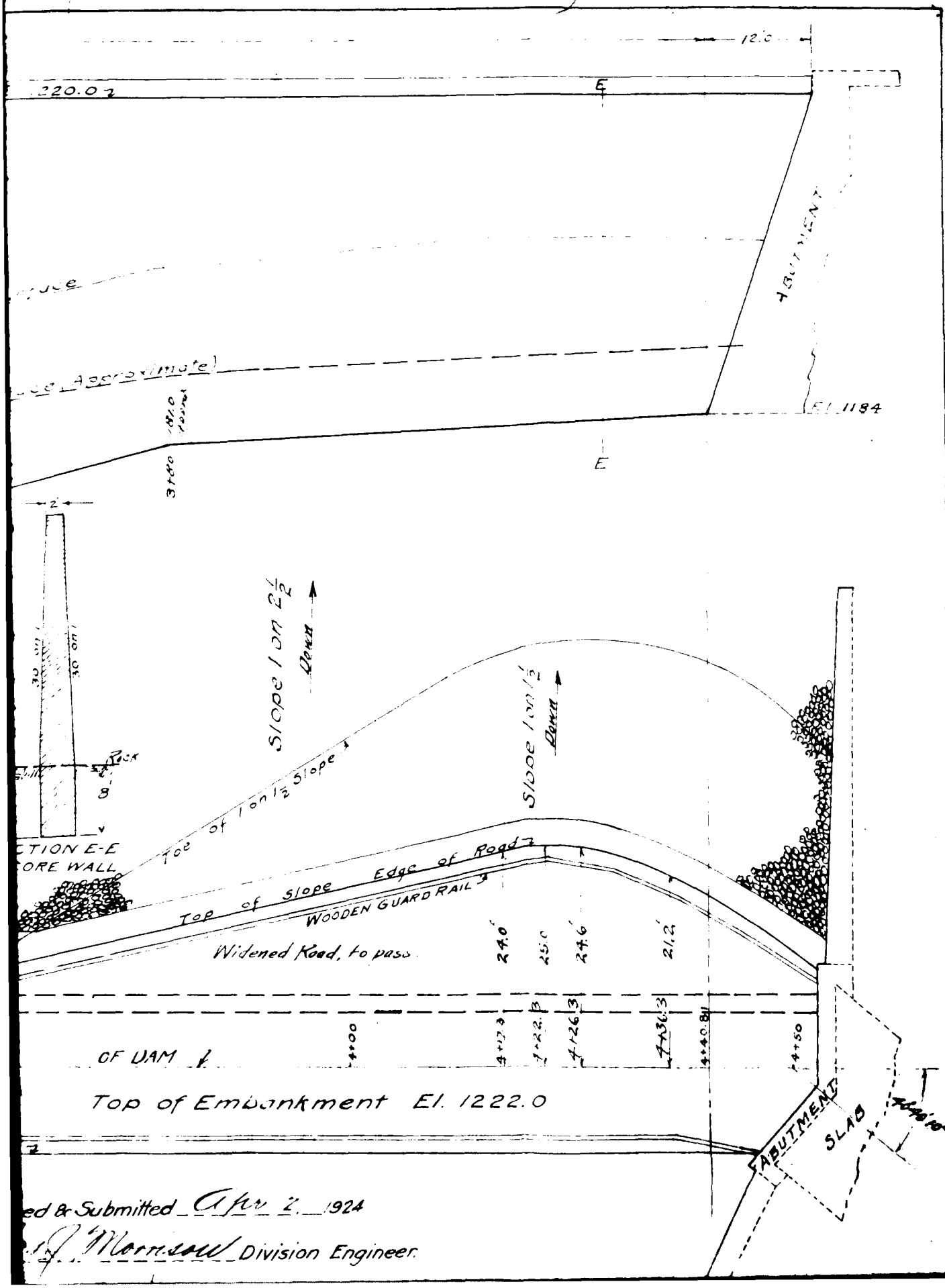
Flow

WOODEN GUARD RAIL

Top of Slope Edge of Road

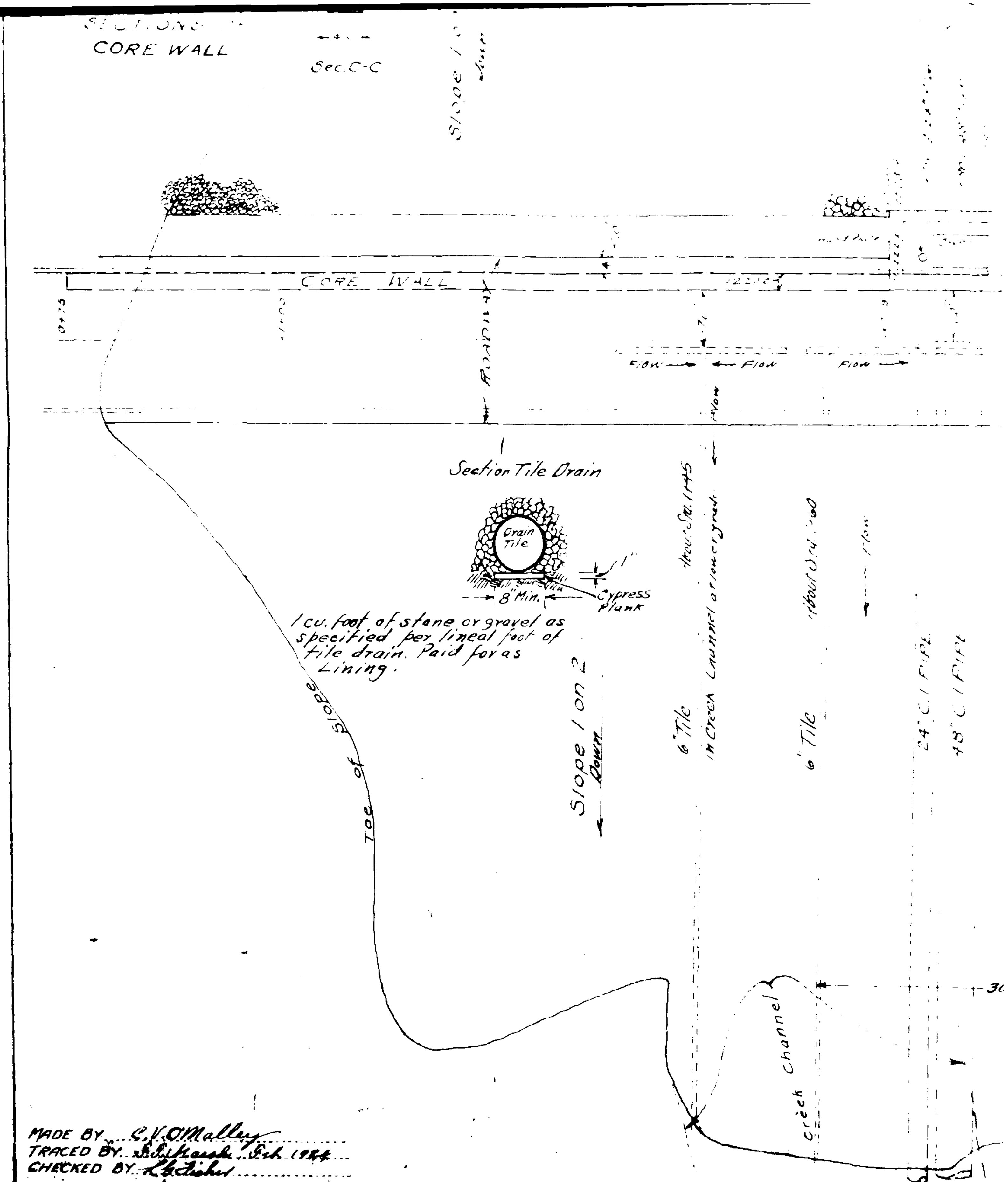
Note
8" Untiled Pipe about Sta. 2+20 I Should be low point. This Tile drain should be above 48" pipe. Drain Tile in creek Chunnel is at lower elevation and

Aproved &



ed & Submitted Apr 2 1924

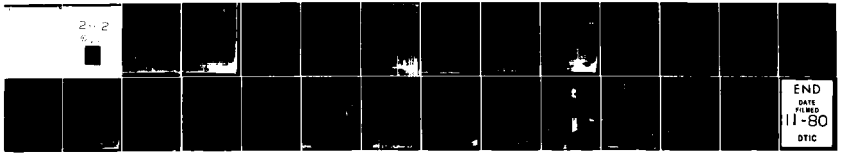
J. Morrison Division Engineer.

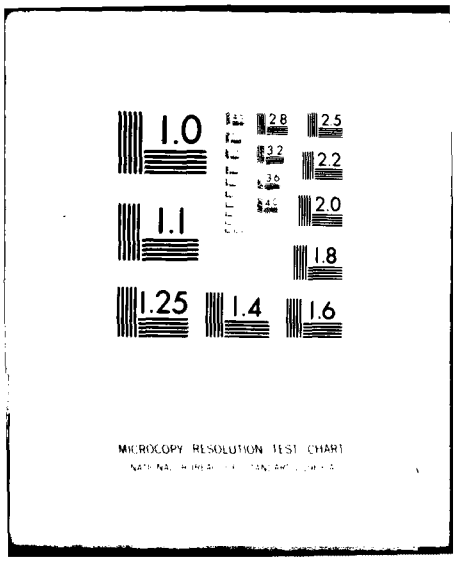


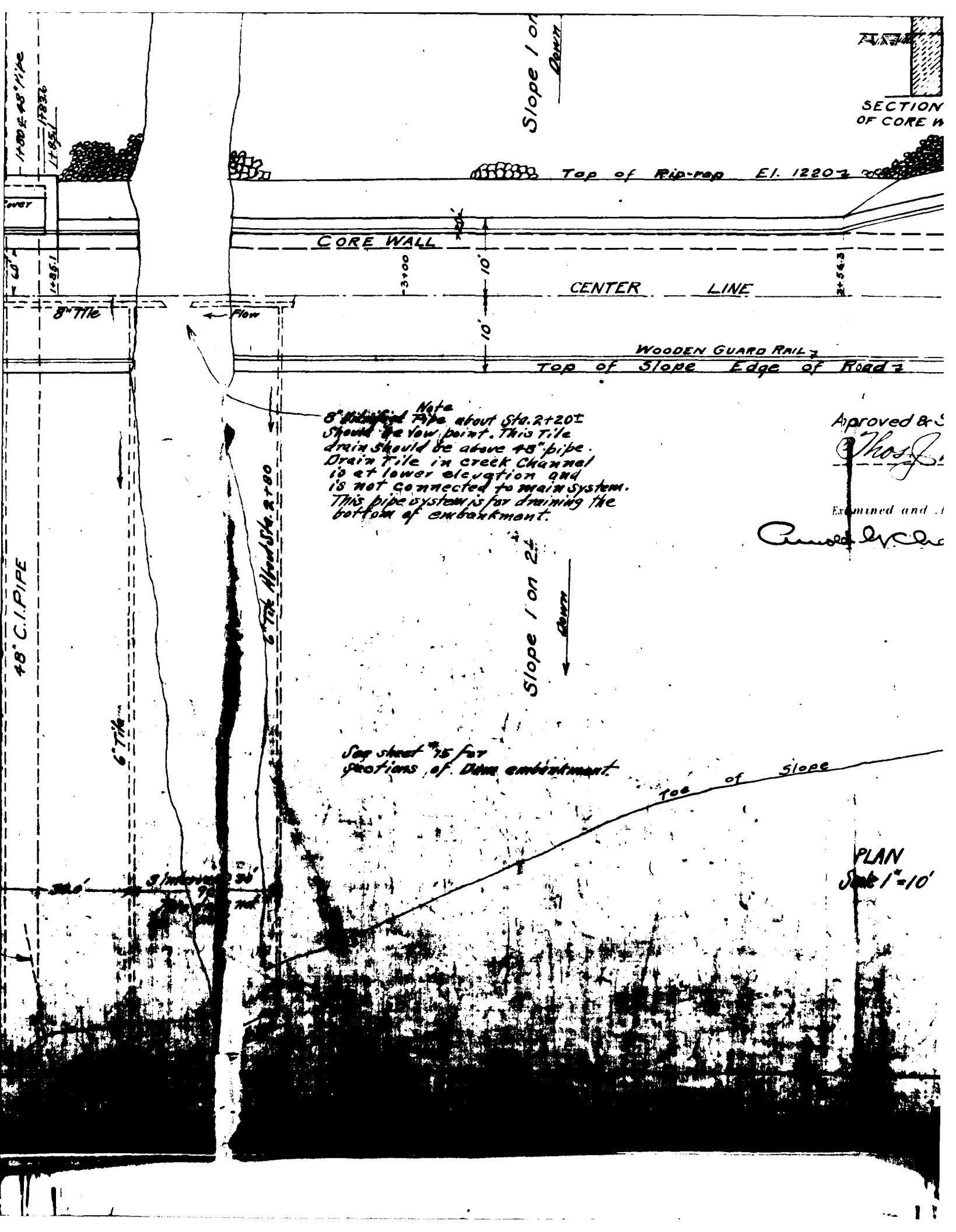
MADE BY C.V. O'Malley
TRACED BY Feb. 1924
CHECKED BY

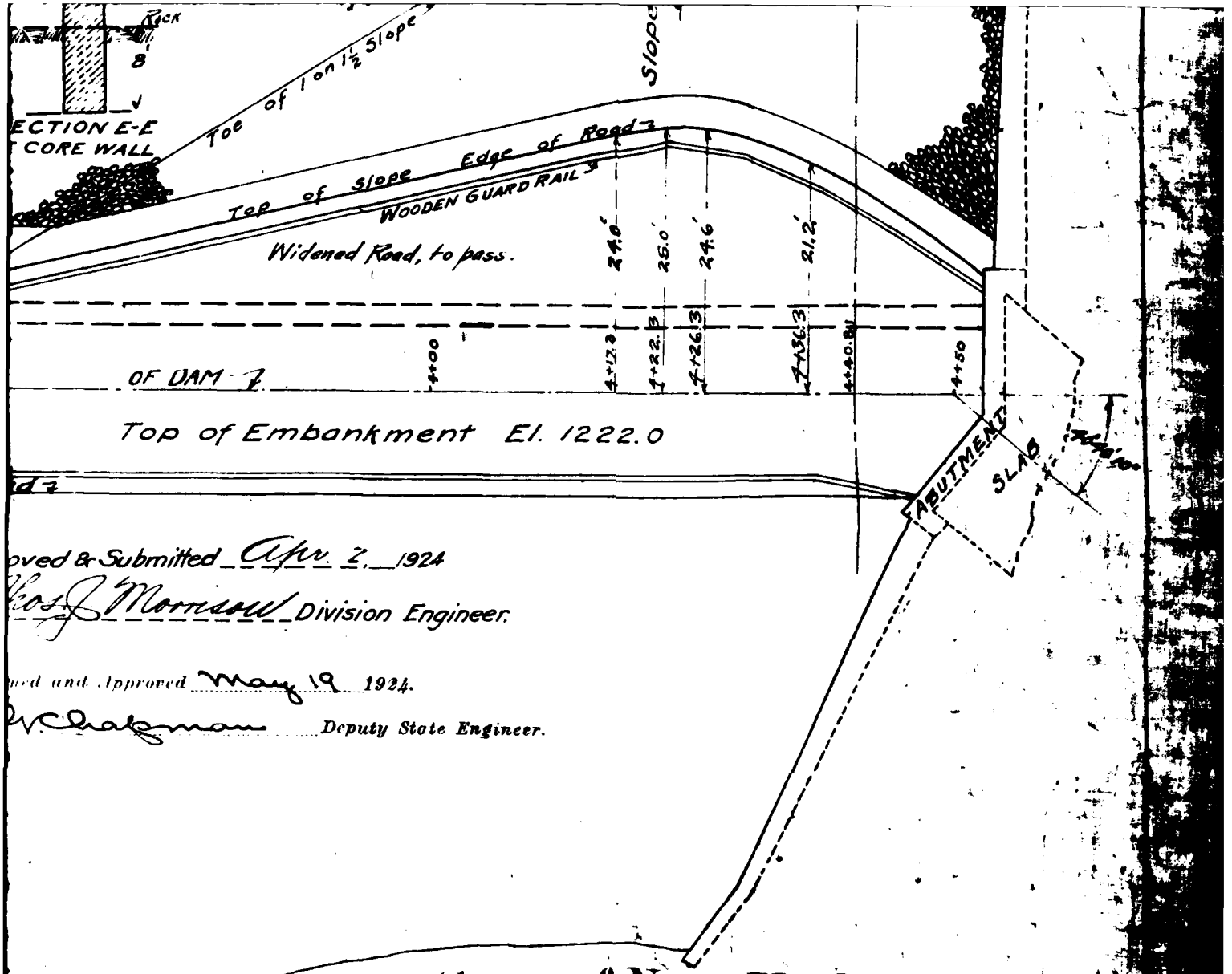
AD-A091 131 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. CLEAR LAKE DAM (INVENTORY NUMBER N--ETC(U)
MAY 80 G KOCH DACW51-79-C-0001

UNCLASSIFIED NL




1.0
1.1
1.25
1.4
1.6
2.8
3.2
3.6
4.5
2.5
2.2
2.0
1.8
MICROCOPY RESOLUTION TEST CHART


Slope 1 on
Down
SECTION
OF CORE W
Top of Rip-rap El. 1220±
CORE WALL
10'
CENTER LINE
3+56.3
8" Tile
Flow
WOODEN GUARD RAIL
Top of Slope Edge of Road
Note
8" Tile Pipe about Sta. 2+20 Should be low point. This Tile drain should be above 48" pipe. Drain Tile in creek Channel is at lower elevation and is not connected to main system. This pipe system is for draining the bottom of embankment.
Aproved &
Examined and
48" C.I. PIPE
6" Tile
Slope 1 on 2
Down
See sheet "5 for sections of Dam embankment
Toe of Slope
PLAN
Scale 1"=10'



oved & Submitted Apr. 2, 1924

Division Engineer.

ved and Approved May 19 1924.

Deputy State Engineer.

State of New York

DEPARTMENT OF STATE ENGINEER AND SURVEYOR

WATER SUPPLY SYSTEM FOR GOWANDA HOMEOPATHIC STATE HOSPITAL

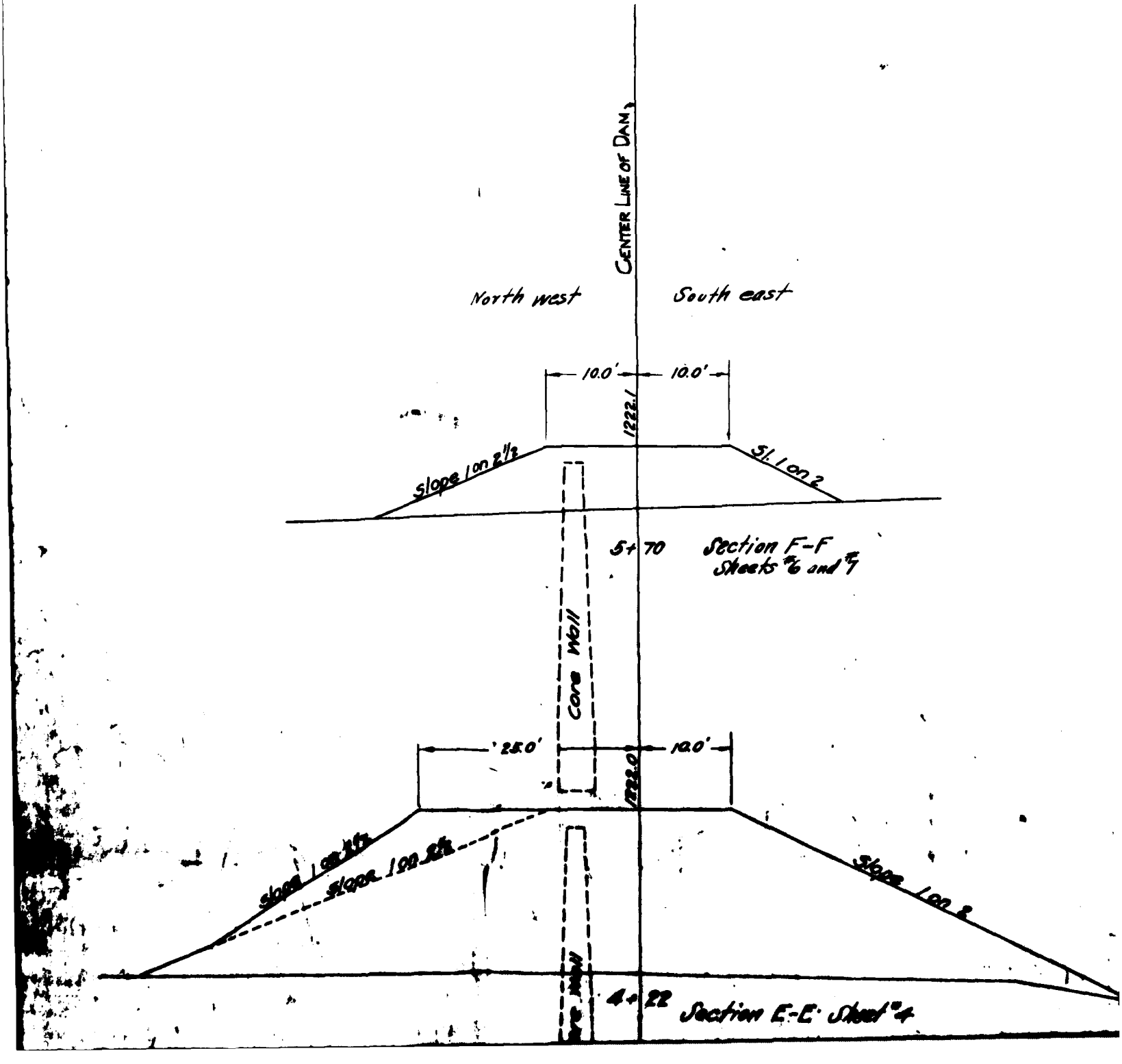
CONTRACT 1

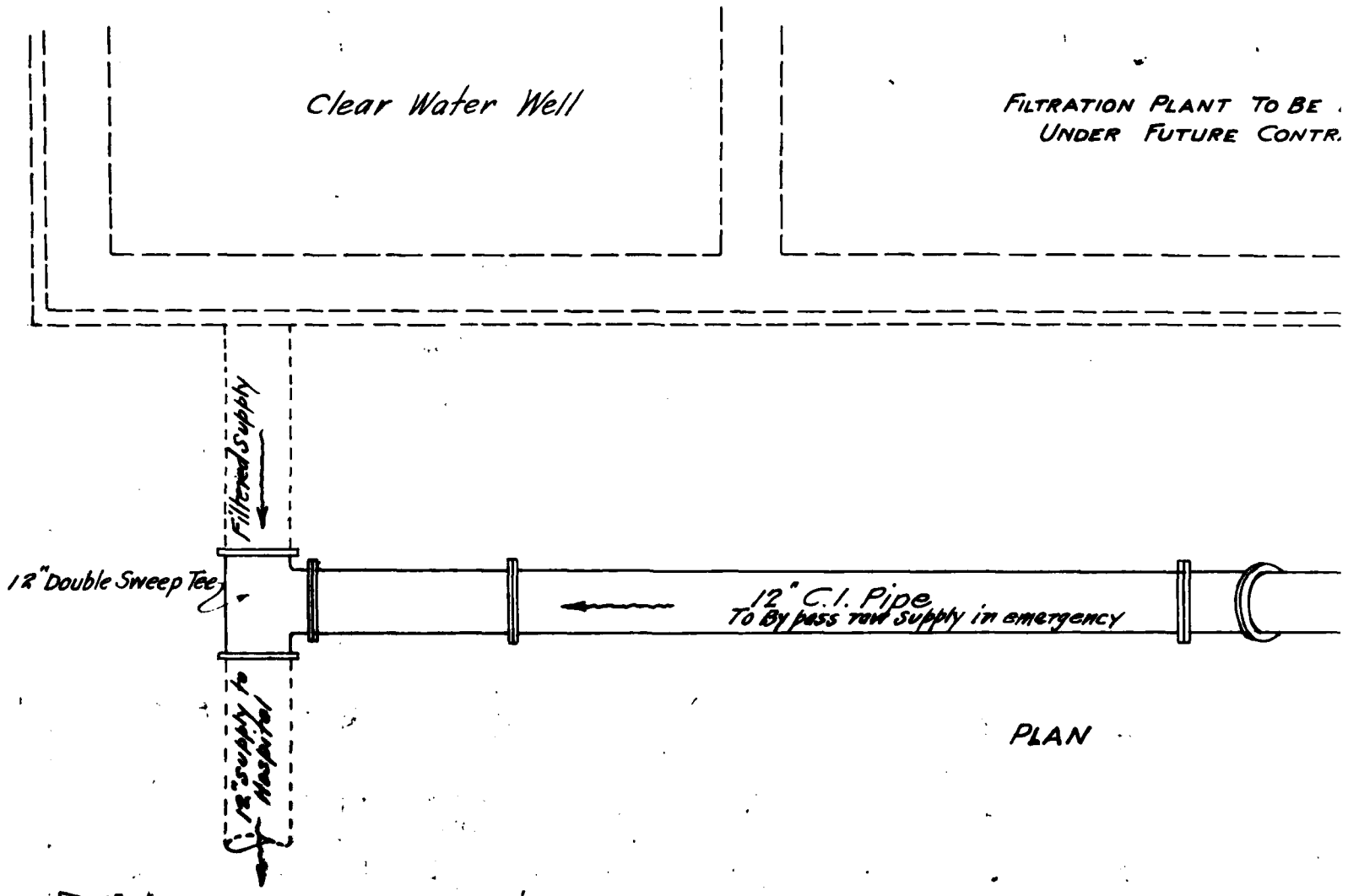
FOR CONSTRUCTING AN EARTH DAM WITH CONCRETE CORE-WALL, CONCRETE SPILLWAY AND [illegible]

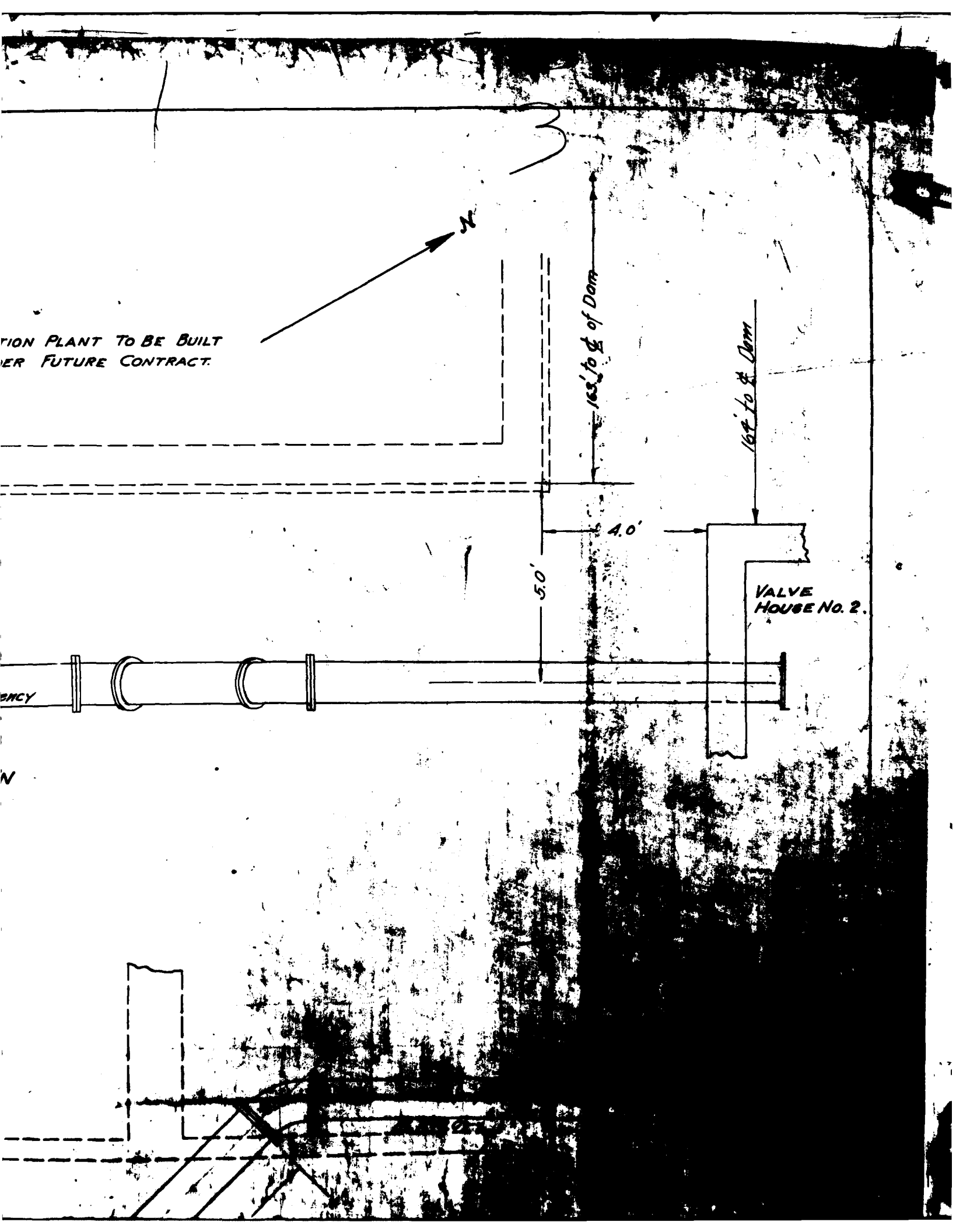
IN THE TOWN OF NORTH [illegible]

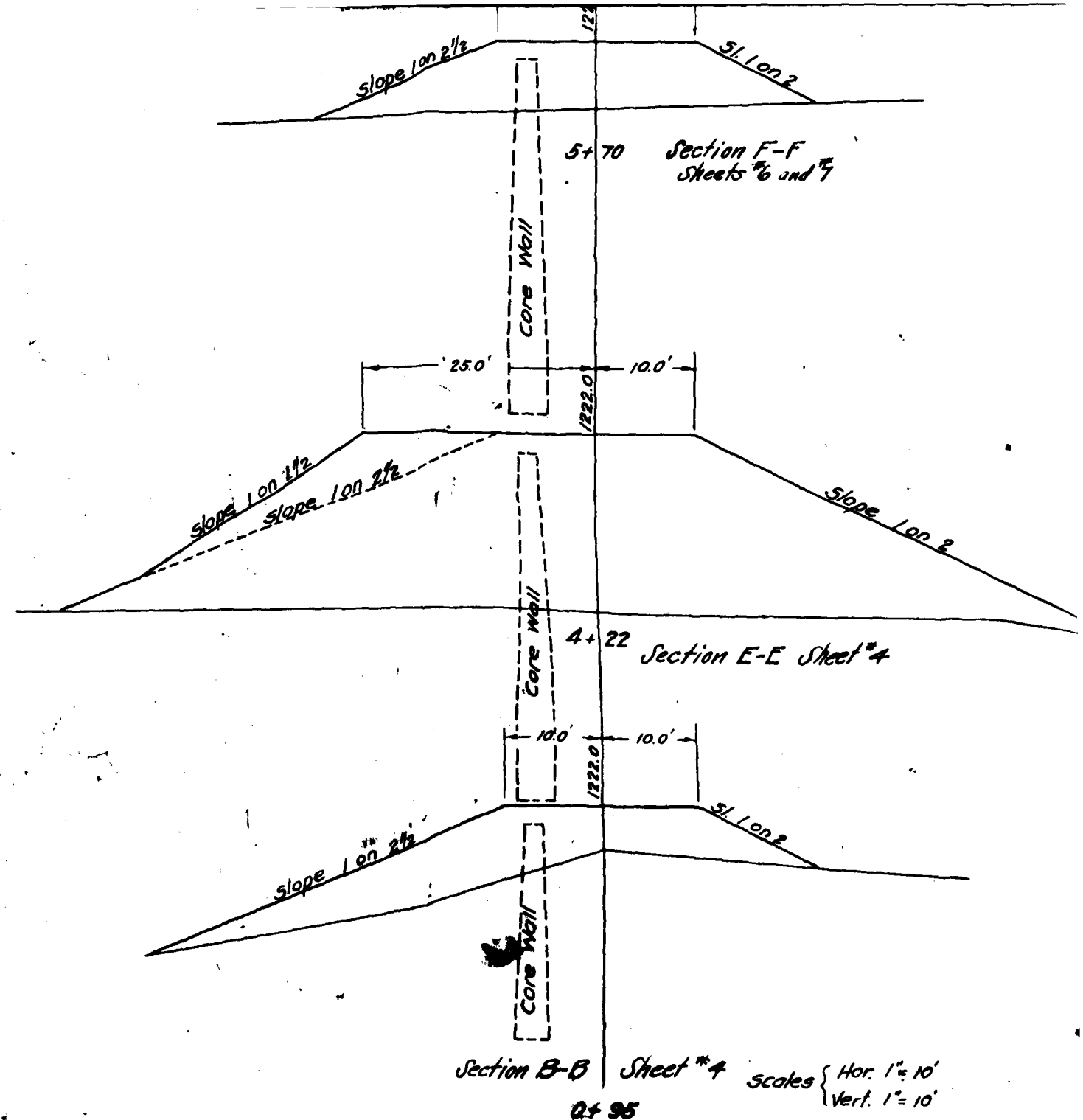
LAN
le 1"=10'

U2:82


CENTER LINE OF DAM
North west
South east
10.0'
10.0'
1222.1
slope 1 on 2 1/2
slope 1 on 2
5+70
Section F-F
Sheets #6 and #7
Core Wall
25.0'
10.0'
slope 1 on 1/2
slope 1 on 2
Core Wall
4+22
Section E-E Sheet #4

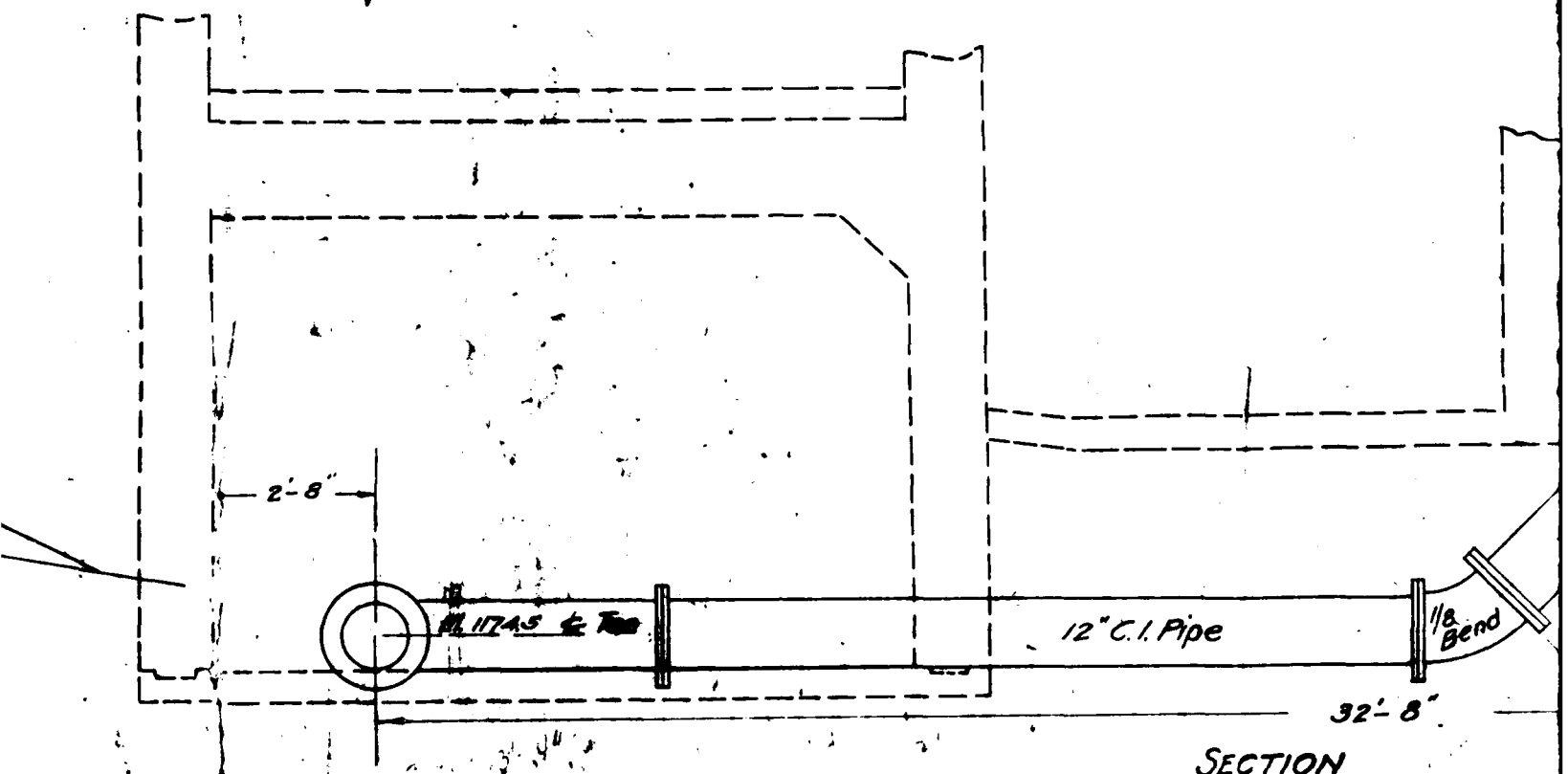

Clear Water Well
FILTRATION PLANT TO BE
UNDER FUTURE CONTR
Filtered Supply
12" Double Sweep Tee
12" C.I. Pipe
To By pass raw Supply in emergency
12" Supply to Manifold
PLAN
2'-8"


TION PLANT TO BE BUILT
ER FUTURE CONTRACT.
163'to ℄ of Dam
164'to ℄ Dam
4.0'
5.0'
VALVE
HOUSE No. 2.
ENCY
N



EXTRA SECTIONS THROUGH ROADWAY
& DAM EMBANKMENT.

PLAN



SECTION

Scale 1" = 2'

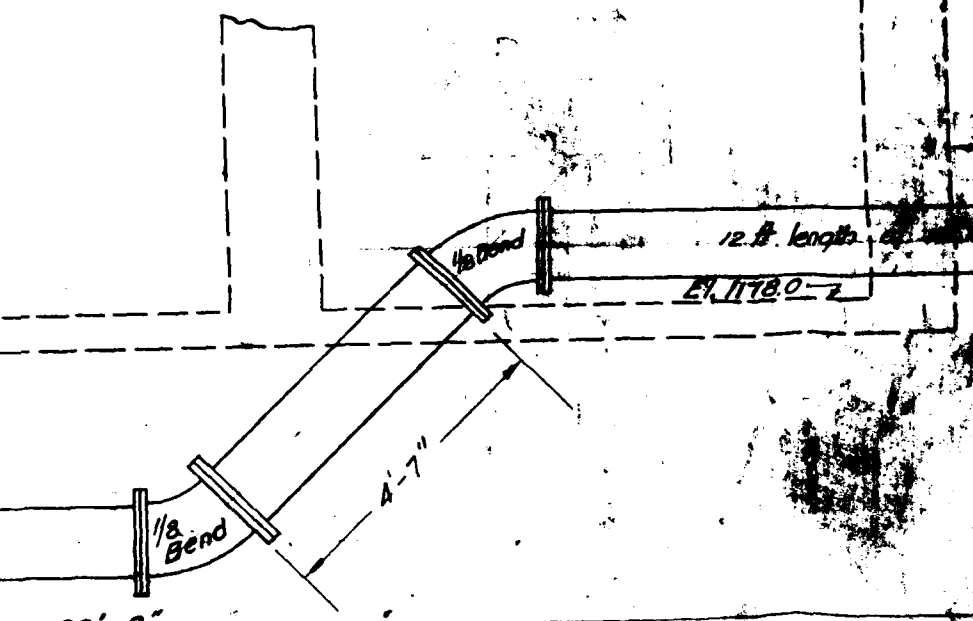
BY-PASS PIPE LINE TO CONVEY WATER AROUND FILTRATION PLANT.

Approved & Submitted Apr. 2 1924

Thos J. Morrison Division Engineer.

Examined and Approved May 19 1924.

Deputy State Engineer.



ION

1"= 2'

WATER

ANT.

24

ineer.

Engineer.

State of New York

DEPARTMENT OF STATE

WATER SU

HOMEC

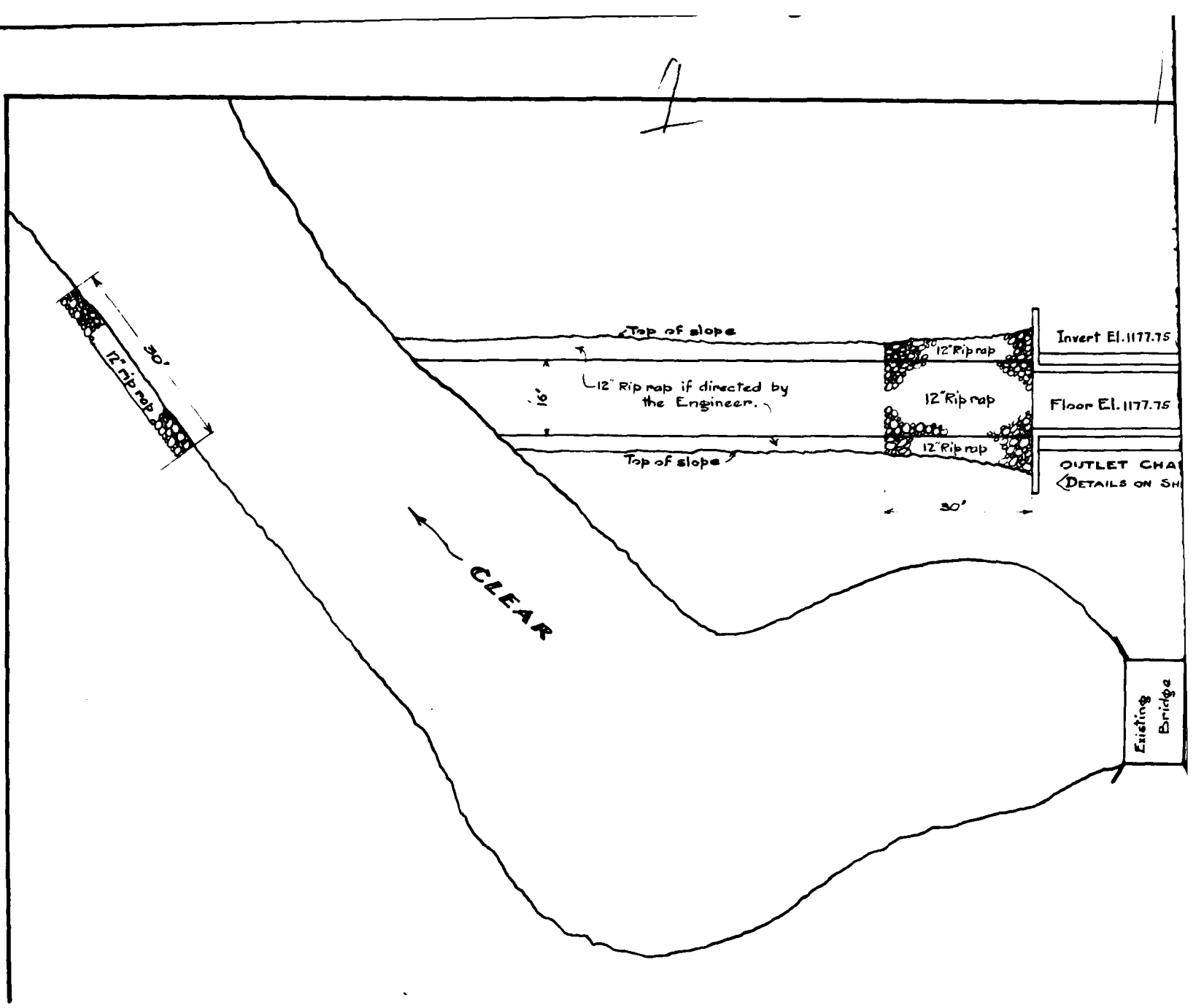
FOR CON

CORE-WALL CONCRETE

IN THE TOWN

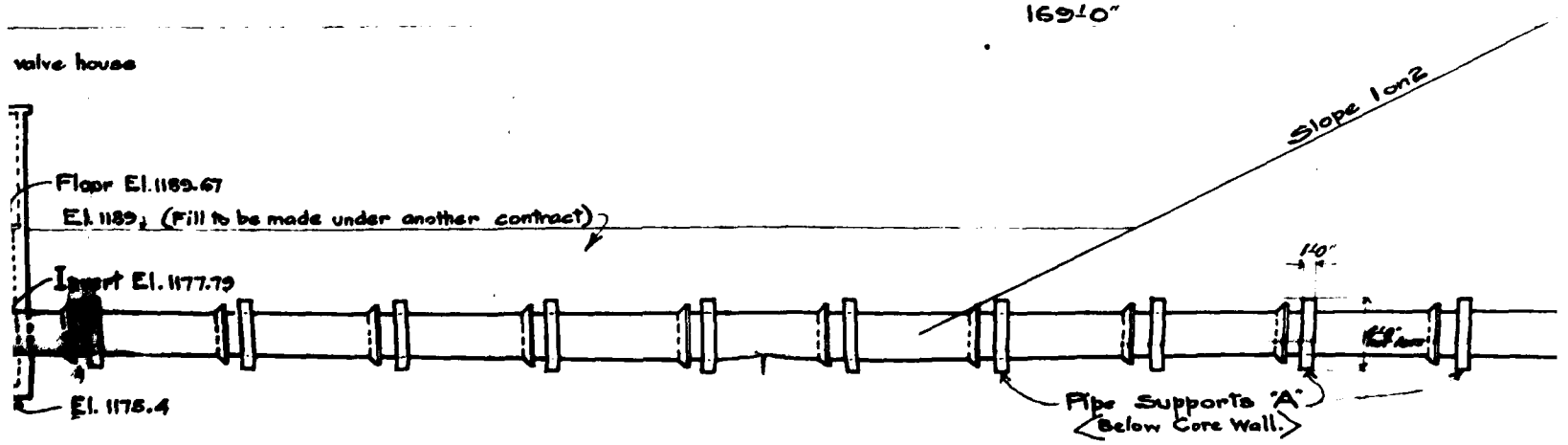
Chapter 225,

ROAD



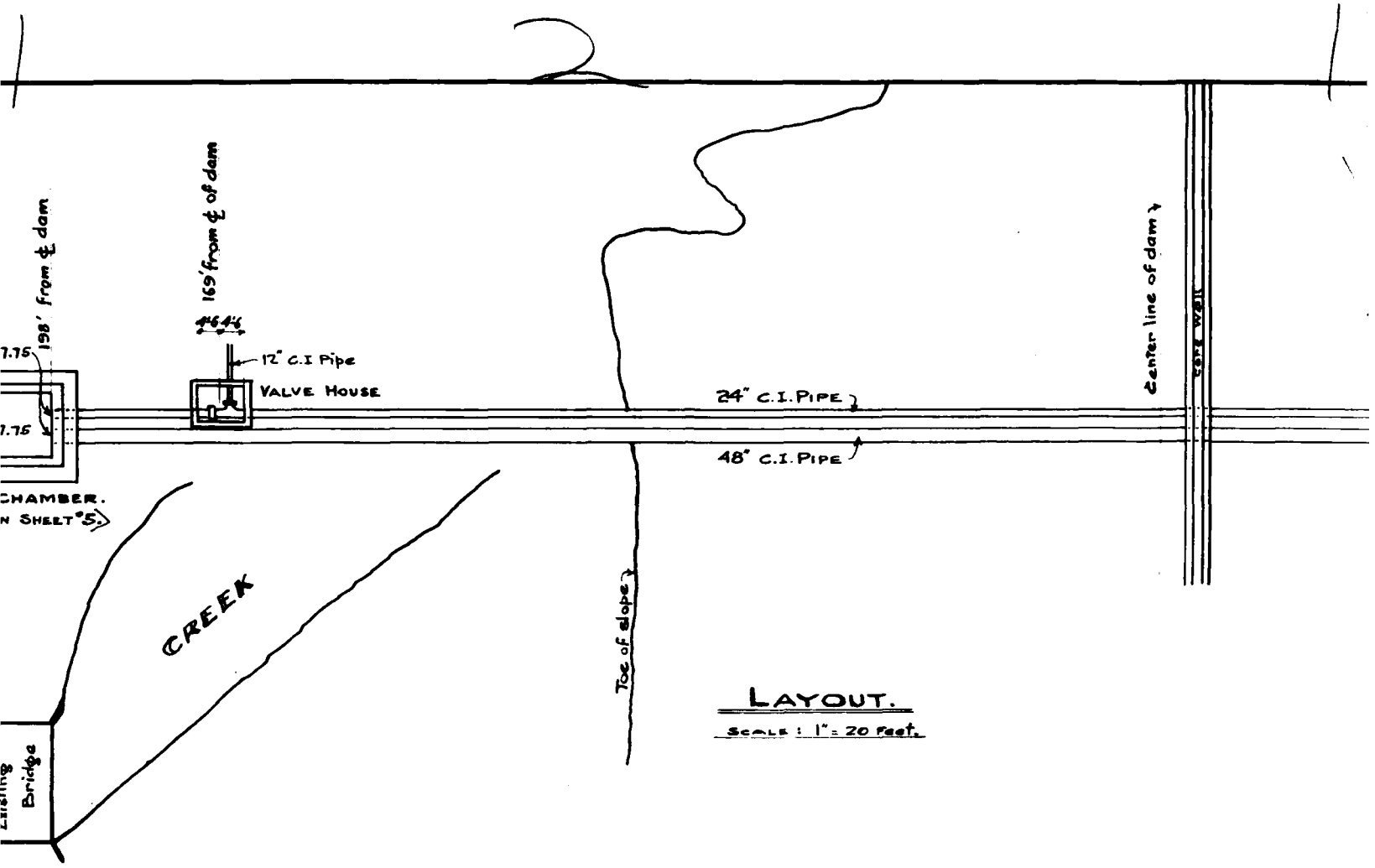
16'10"

valve house



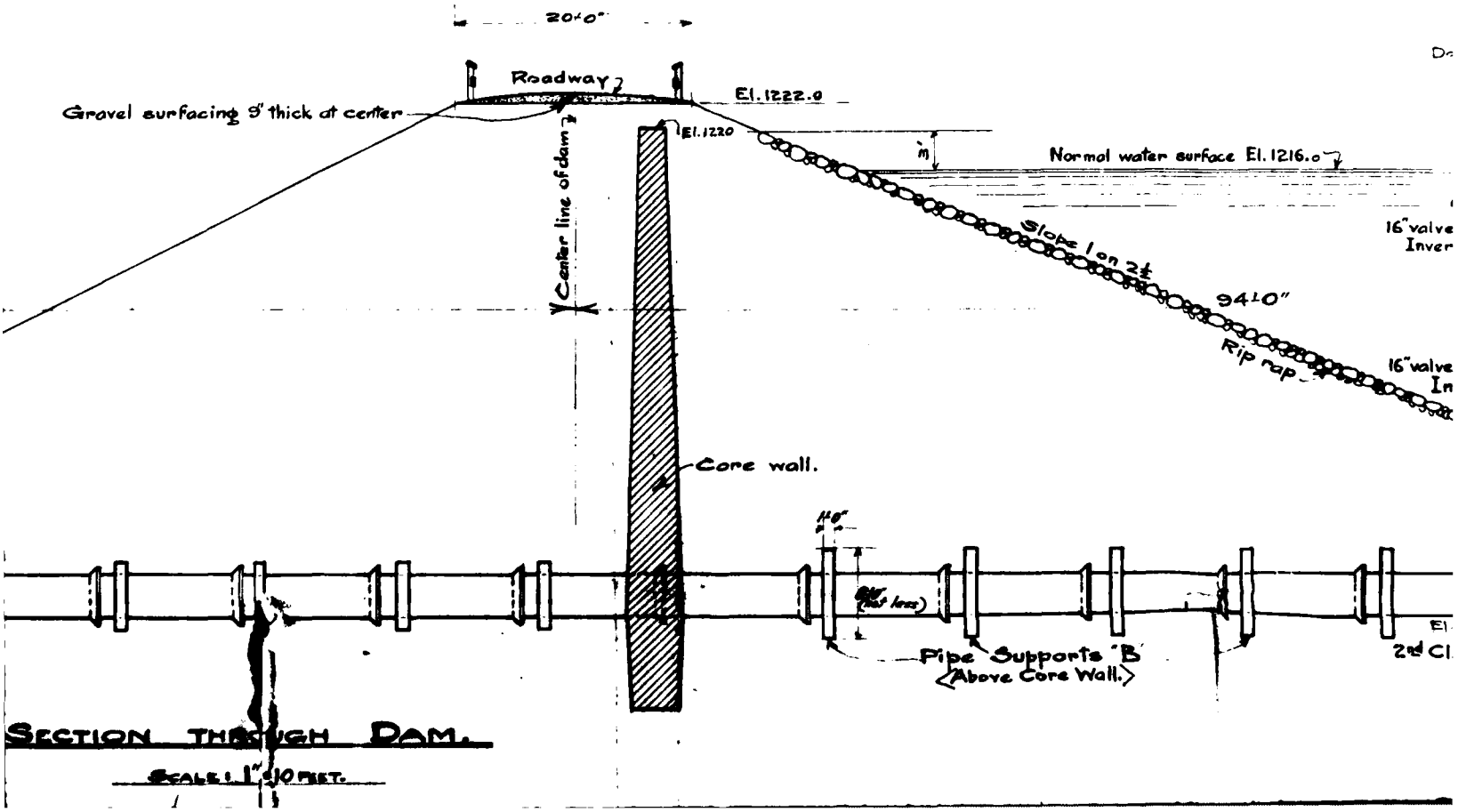
SEC

Lay one length of 12" pipe and close end with wooden cap.



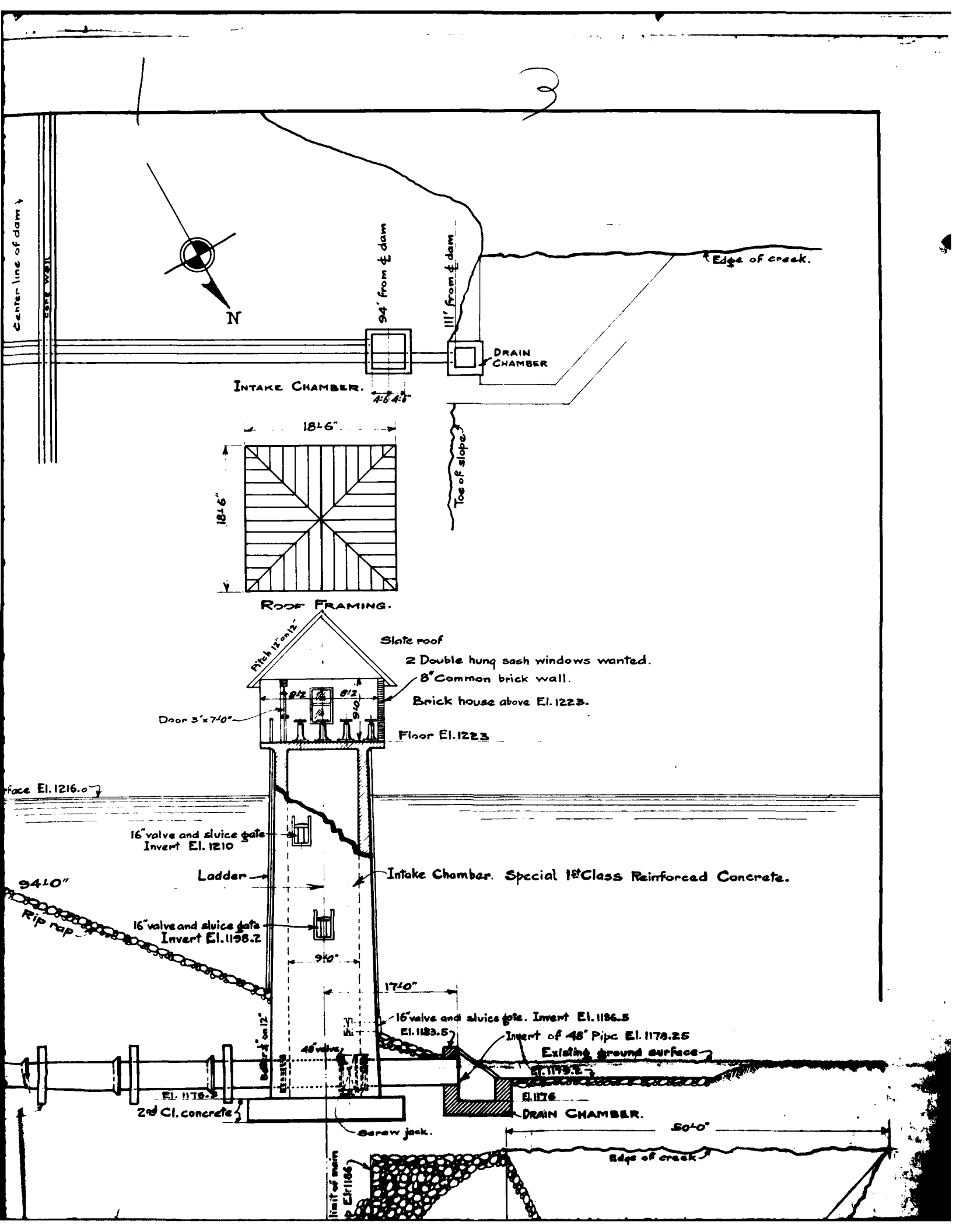
LAYOUT.

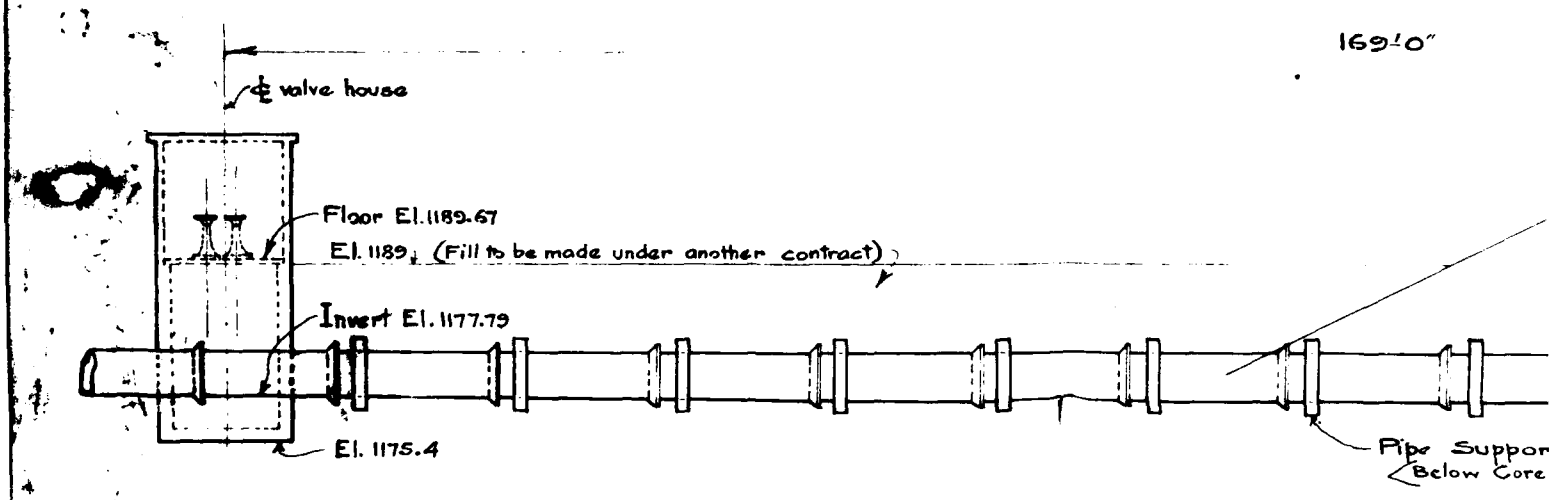
SCALE : 1" = 20 Feet.

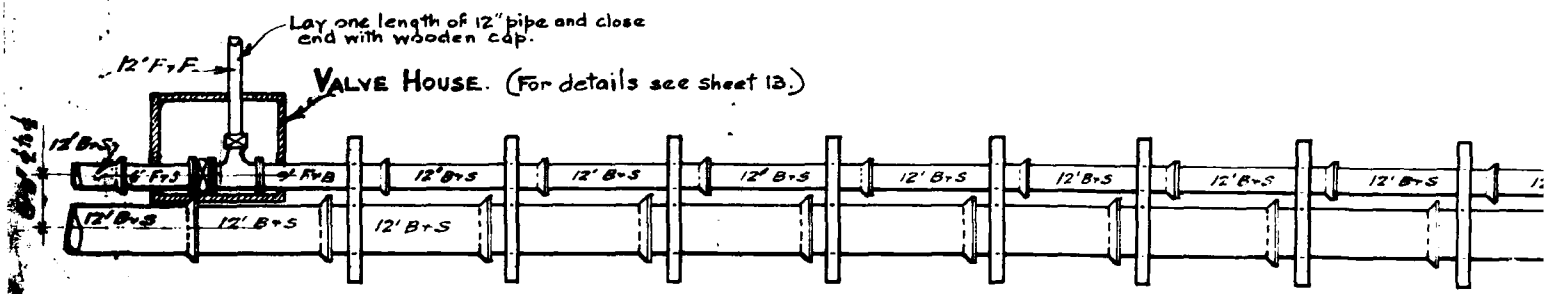


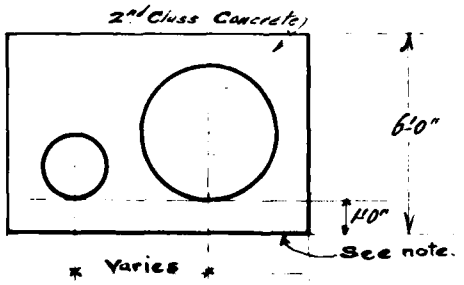
SECTION THROUGH DAM.

SCALE : 1" = 10 FEET.


Center line of dam
East wall
N
94' from ℄ dam
111' from ℄ dam
Edge of creek.
DRAIN CHAMBER
INTAKE CHAMBER.
4'6"
4'6"
18'6"
18'6"
Toe of slope
ROOF FRAMING.
Pitch 12" on 12"
Slate roof
2 Double hung sash windows wanted.
8" Common brick wall.
Brick house above El. 1223.
8'2"
8'2"
9'0"
Door 3'x7'0"
Floor El. 1223
face El. 1216.0
16" valve and sluice gate
Invert El. 1210
Ladder
Intake Chamber. Special 1st Class Reinforced Concrete.
9'10"
Rip rap
16" valve and sluice gate
Invert El. 1198.2
9'0"
17'0"
16" valve and sluice gate. Invert El. 1186.5
El. 1183.5
Invert of 48" Pipe El. 1178.25
Existing ground surface
48" valve
Batter 4" on 12"
El. 1179.2
El. 1176
El. 1179.2
2nd Cl. concrete
DRAIN CHAMBER.
Screw jack.
50'0"
Edge of creek
limit of main
p El. 1186



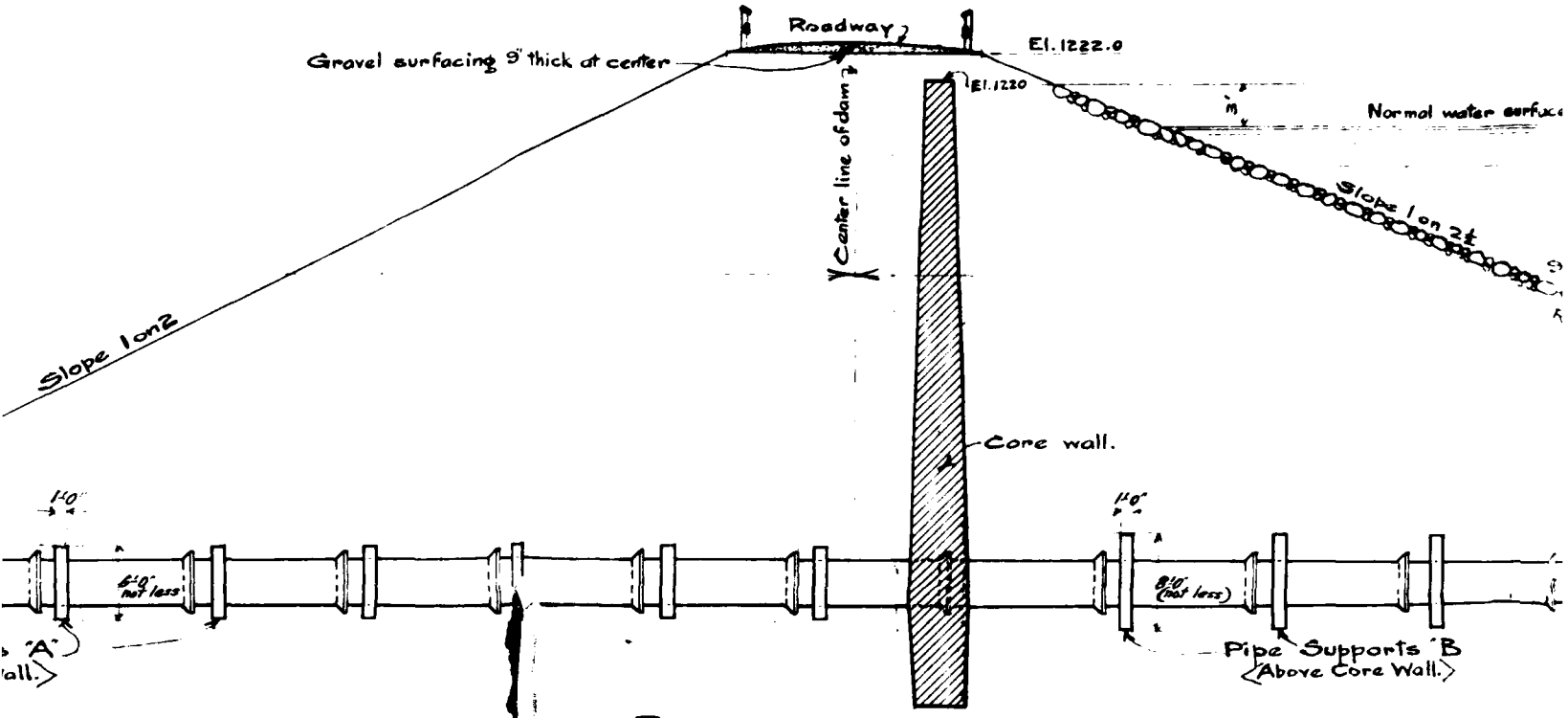




PIPE SUPPORTS 'A'.

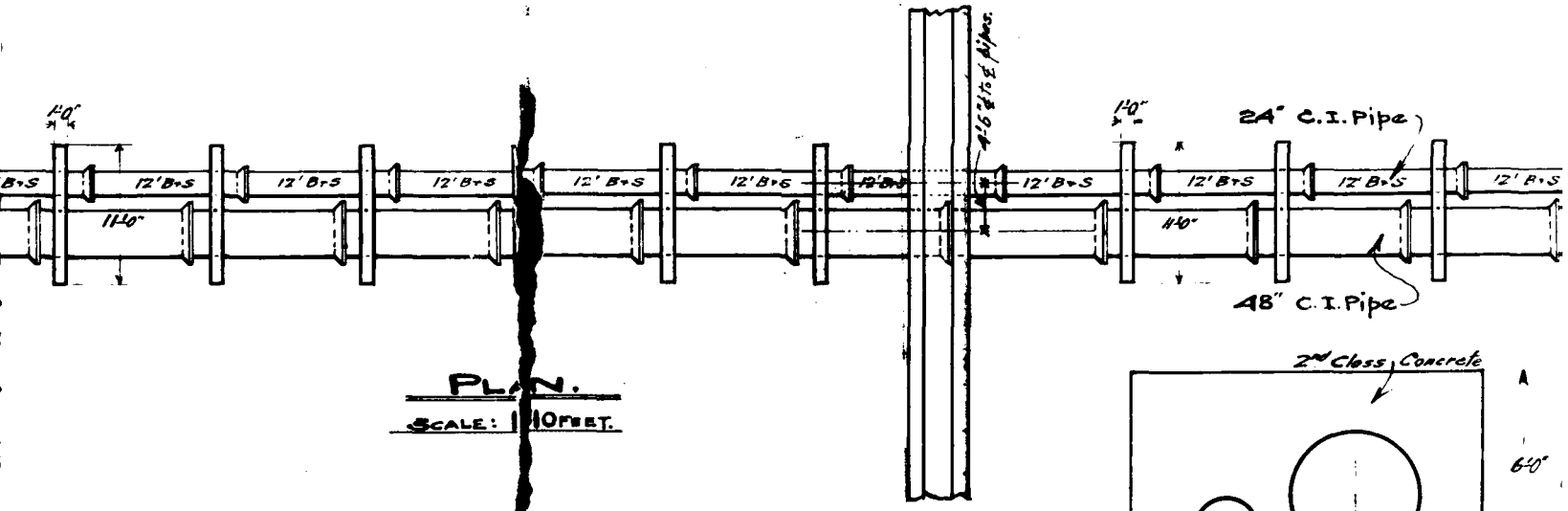
SCALE: 1"-4' NET.

MADE BY: H. W. Brundidge, March 1925
TRACED BY: J.M. ANGUS APRIL, 1925.
CHECKED BY: H.E. Bramard April 17-1925
APPROVED BY: A.H. Wood April 17-1925



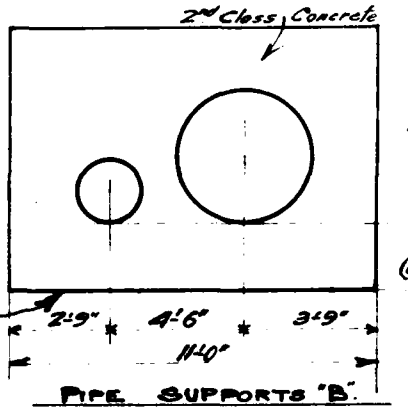
SECTION THROUGH DAM.

SCALE: 1" = 10 FEET.



PLAN.

SCALE: 1" = 10 FEET.

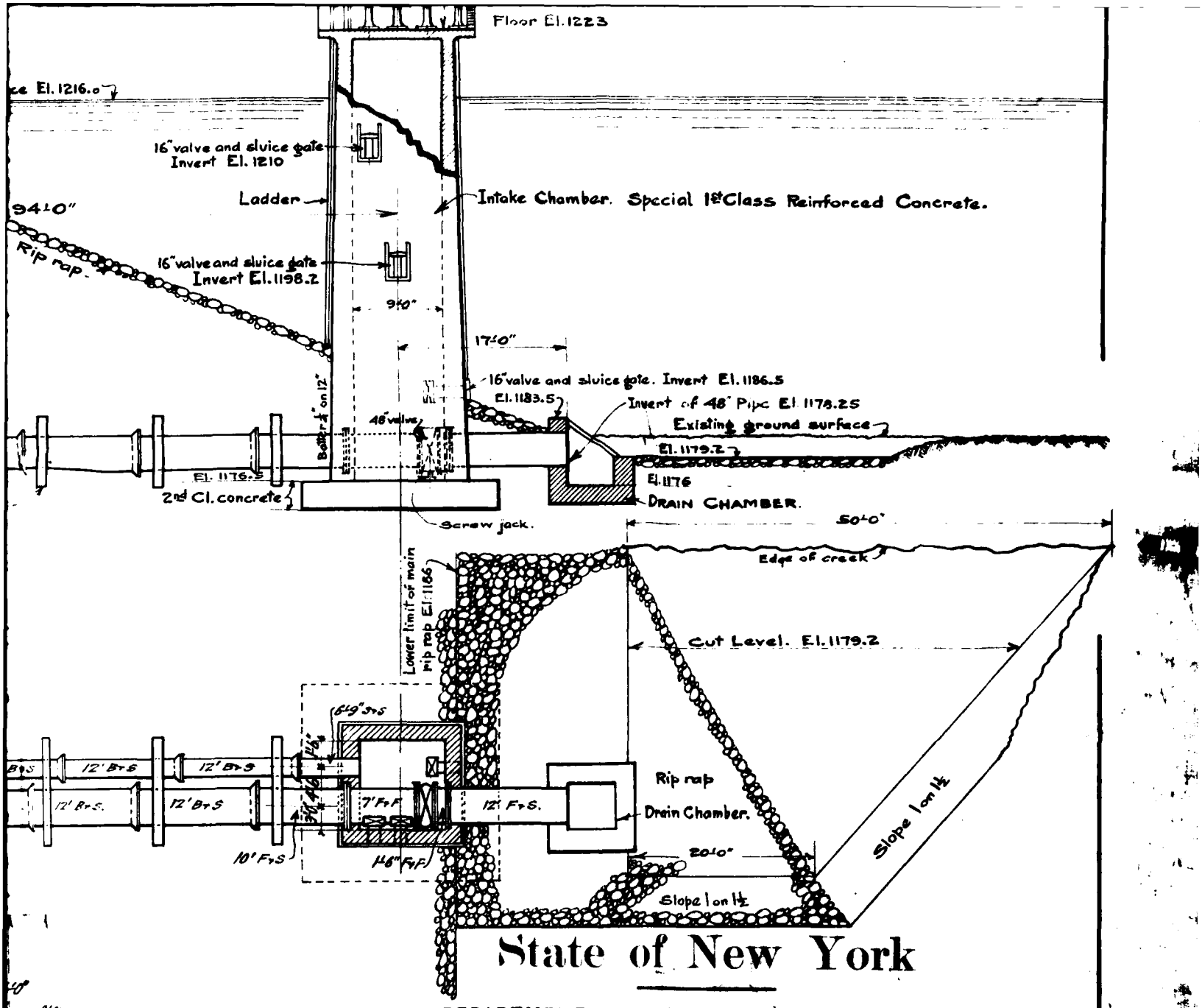


NOTE: Bottom of pipe support shall be carried down to rock or other suitable foundation, as directed by the Engineer.

PIPE SUPPORTS "B".

SCALE: 1" = 4 FEET.

5



State of New York

DEPARTMENT OF STATE ENGINEER AND SURVEYOR

WATER SUPPLY SYSTEM FOR GOWANDA HOMEOPATHIC STATE HOSPITAL

CONTRACT 1

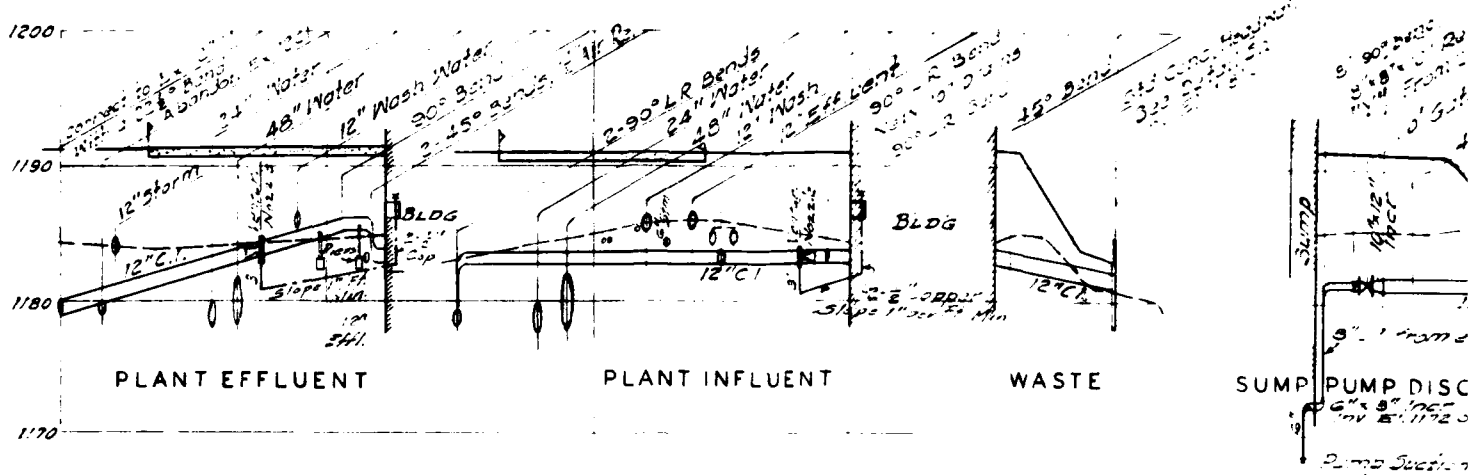
ALTERATION

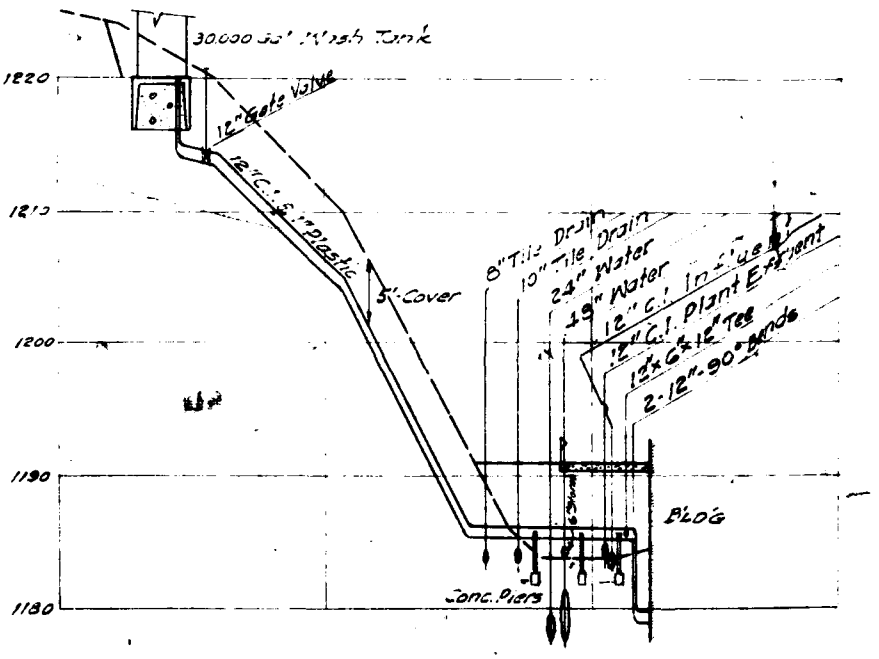
FOR CONSTRUCTING AN EARTH DAM WITH CONCRETE CORE-WALL, CONCRETE SPILLWAY AND APPURTENANCES, THERETO IN THE TOWN OF [illegible] Chapter 526, Laws of [illegible]

Examined and approved
April 20th 1926
[illegible]
Division Engineer

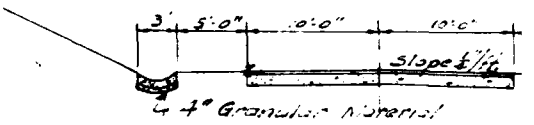
Examined and approved
April 21 1926
Frank R. Lamagna
Deputy State Engineer

18



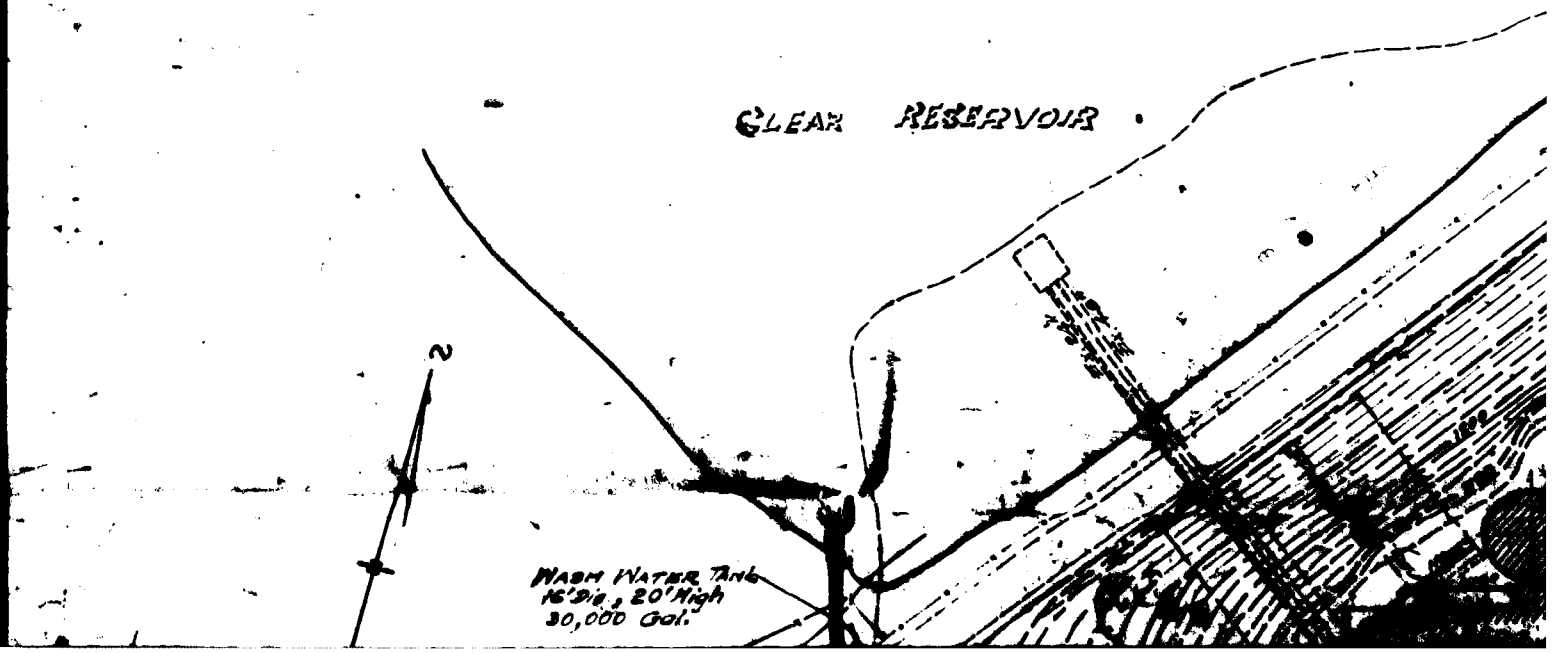


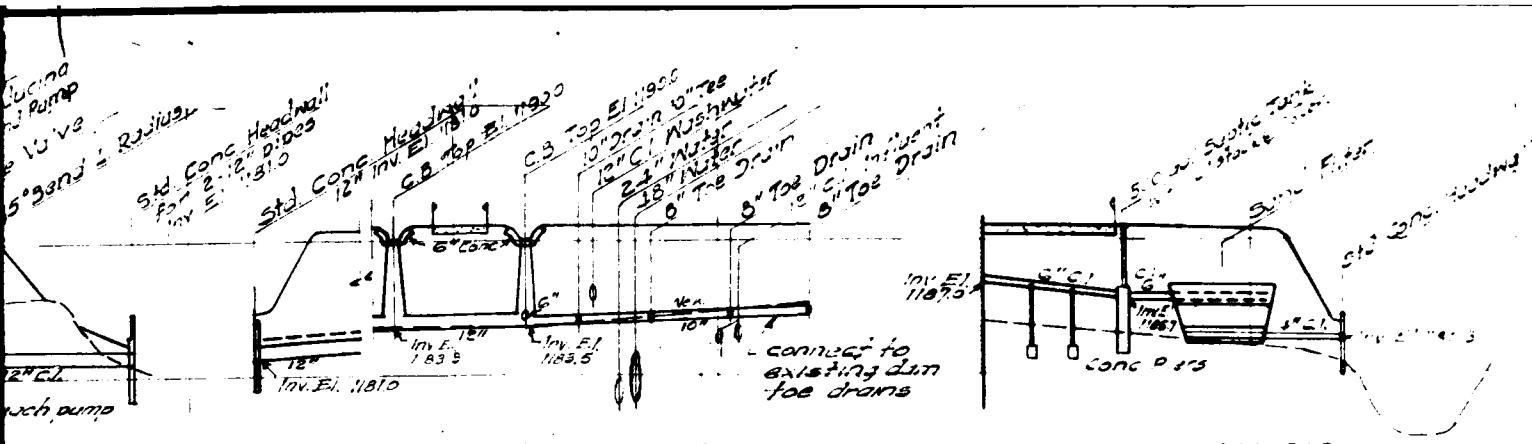
12" C.I. WASH WATER & PLASTIC TELL TALE



SECTION OF ROADW

SCALE 1" = 10'-0"





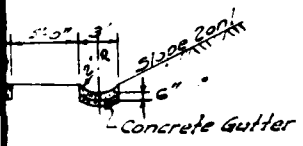
CHARGE

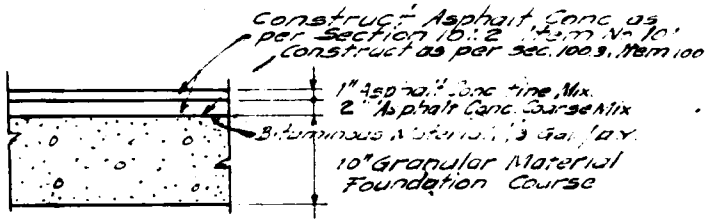
STORM & TOE DRAINS

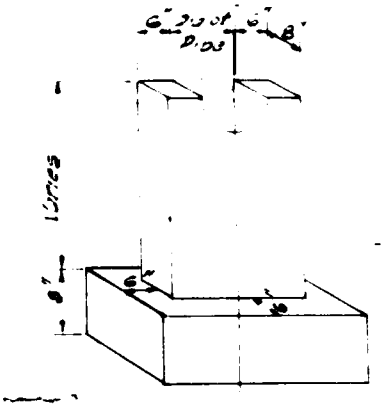
SANITARY

F I L E S

SCALE:- HOR. 1" = 50'
VERT. 1" = 10'







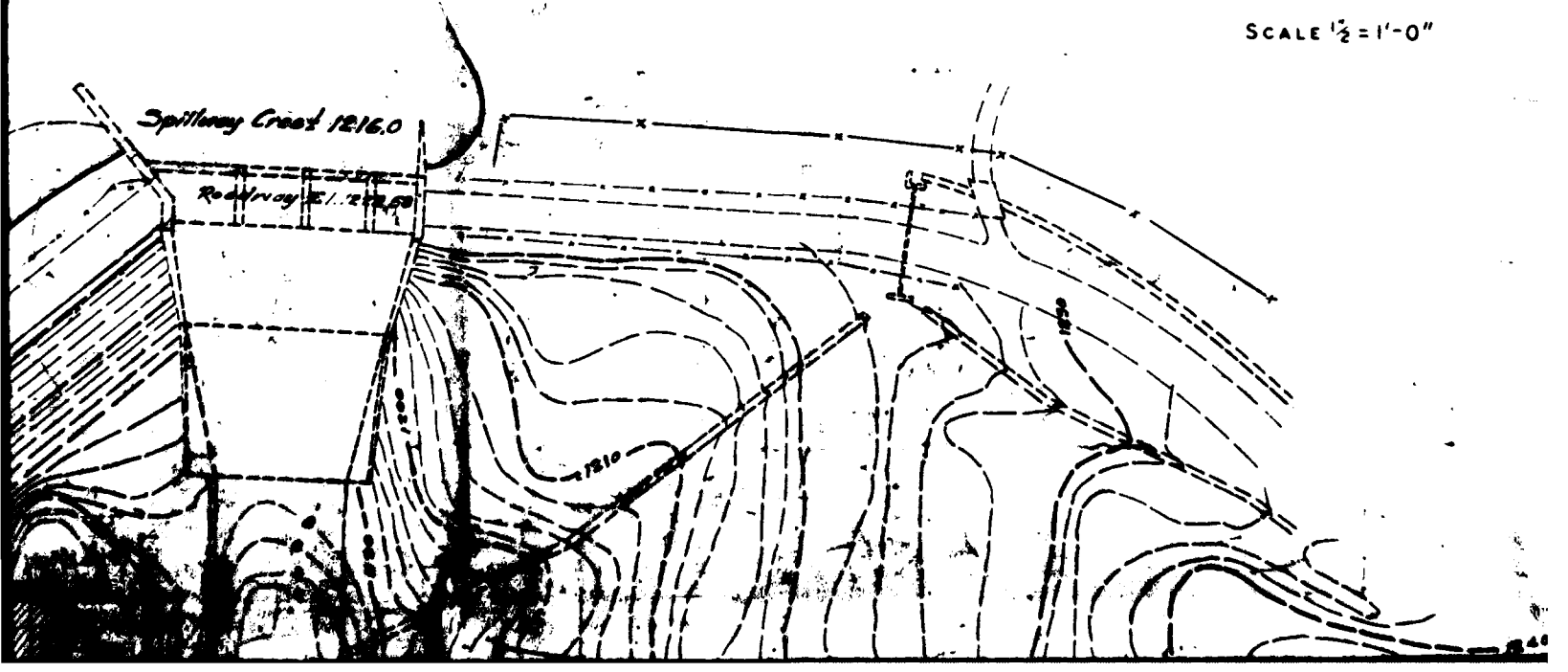
WAY

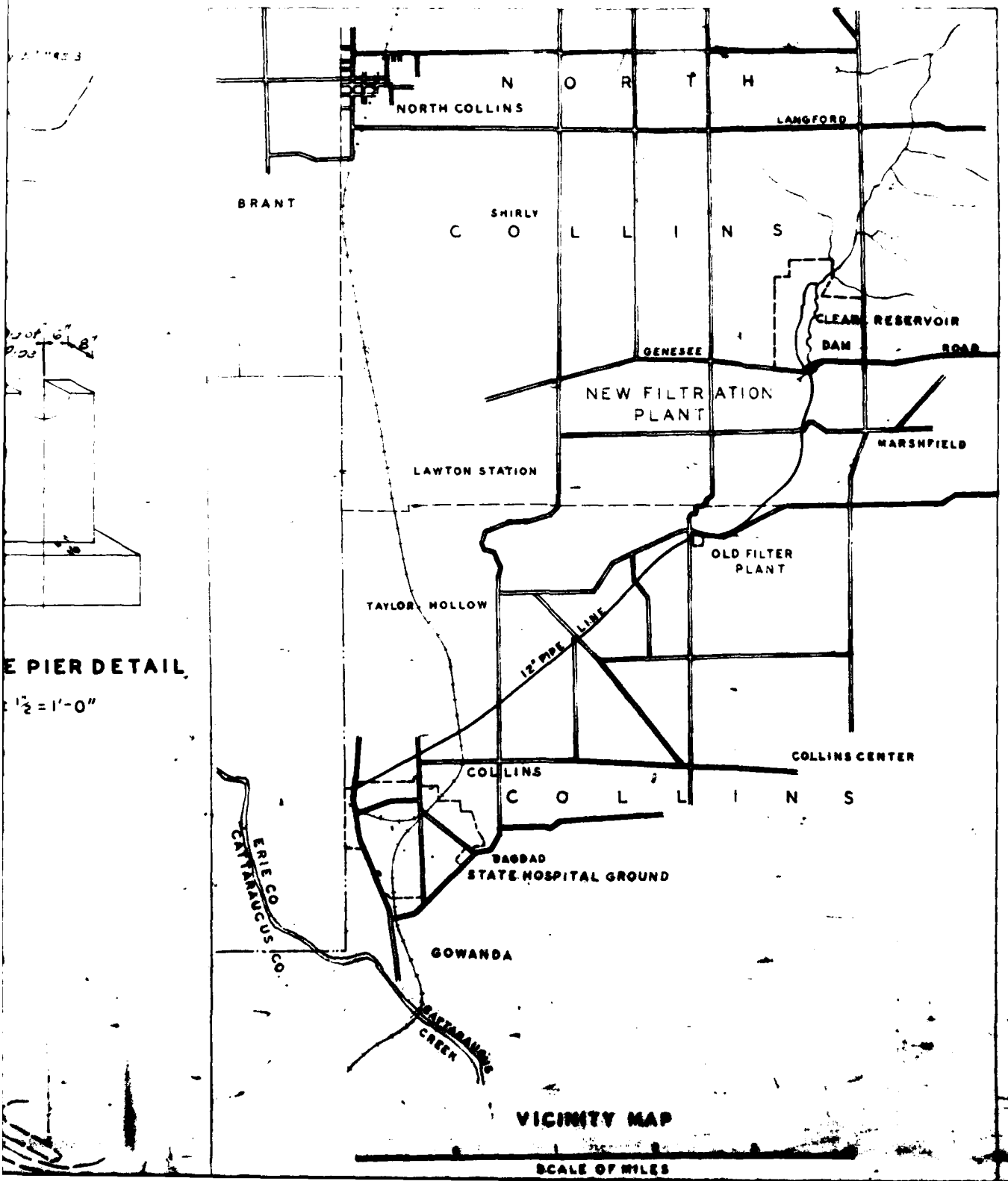
SECTION OF ROAD & PARKING AREA PAVEMENT

SCALE 1" = 1'-0"

CONCRETE PIER DETAIL

SCALE 1/2 = 1'-0"

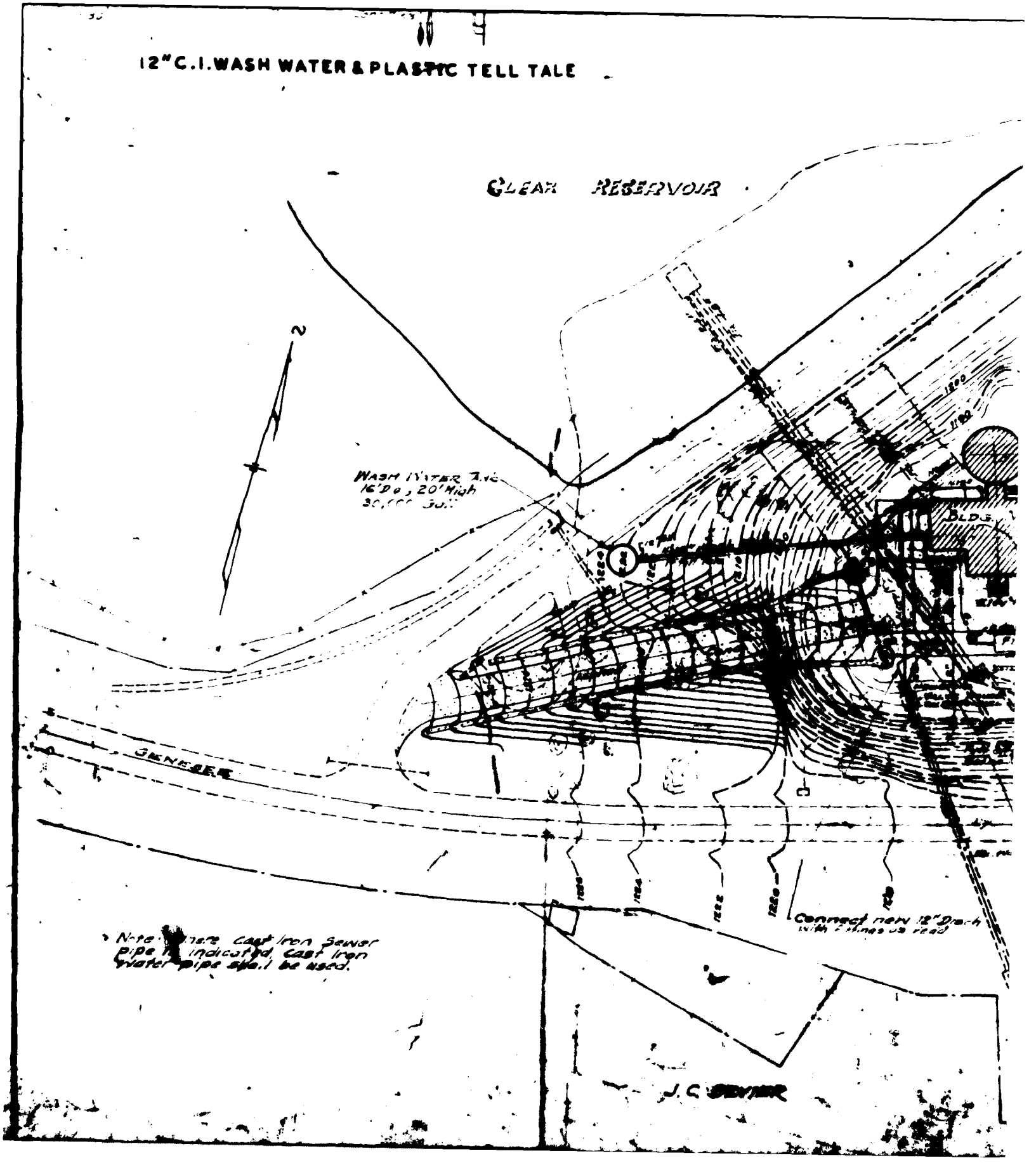




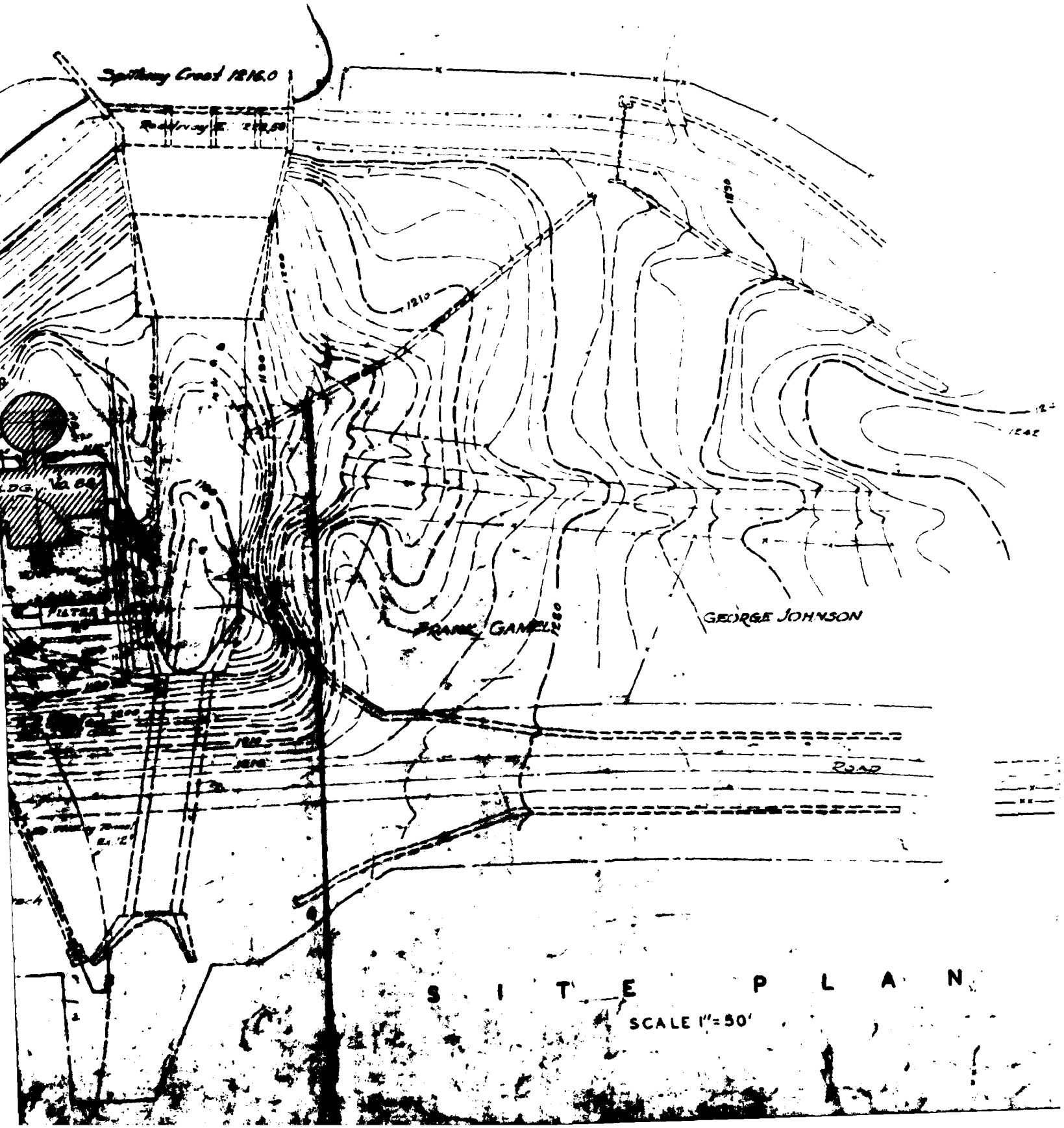
E PIER DETAIL

1½ = 1'-0"

12" C.I. WASH WATER & PLASTIC TELL TALE

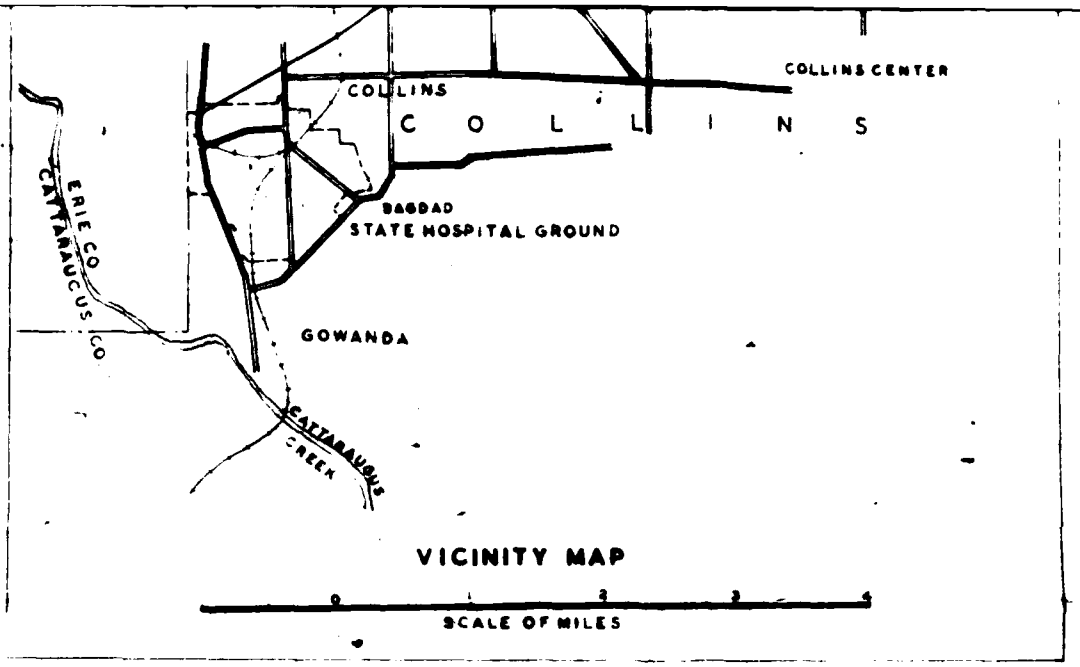


SCALE 1/2 = 1'-0"



SITE PLAN

SCALE 1" = 50'



240
1242

STD DETAIL SH. 55/S5001 accompanies these drawings.

(SHEET 31 of 31)

GOWANDA STATE HOSPITAL

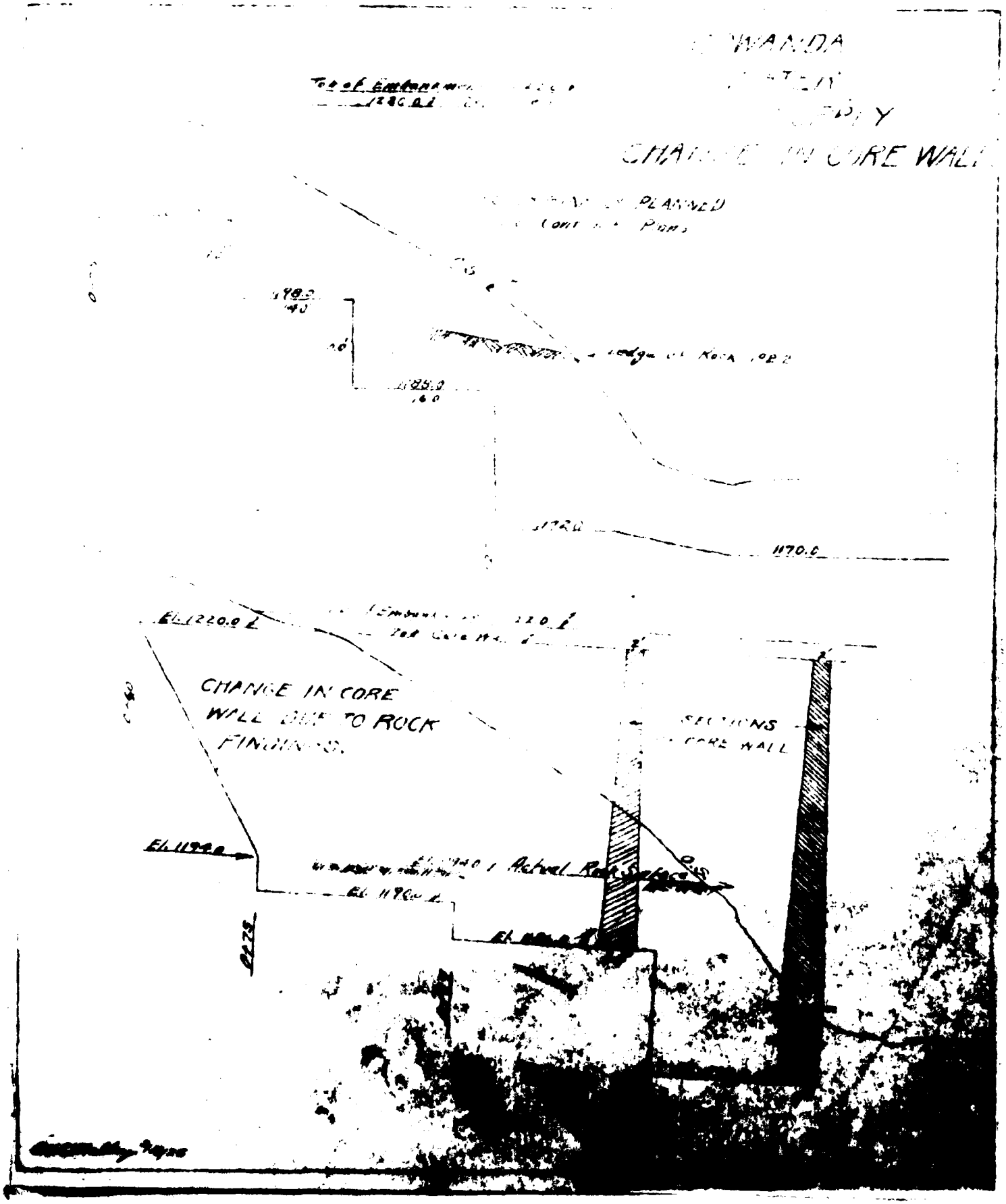
HELMUTH NEW YORK

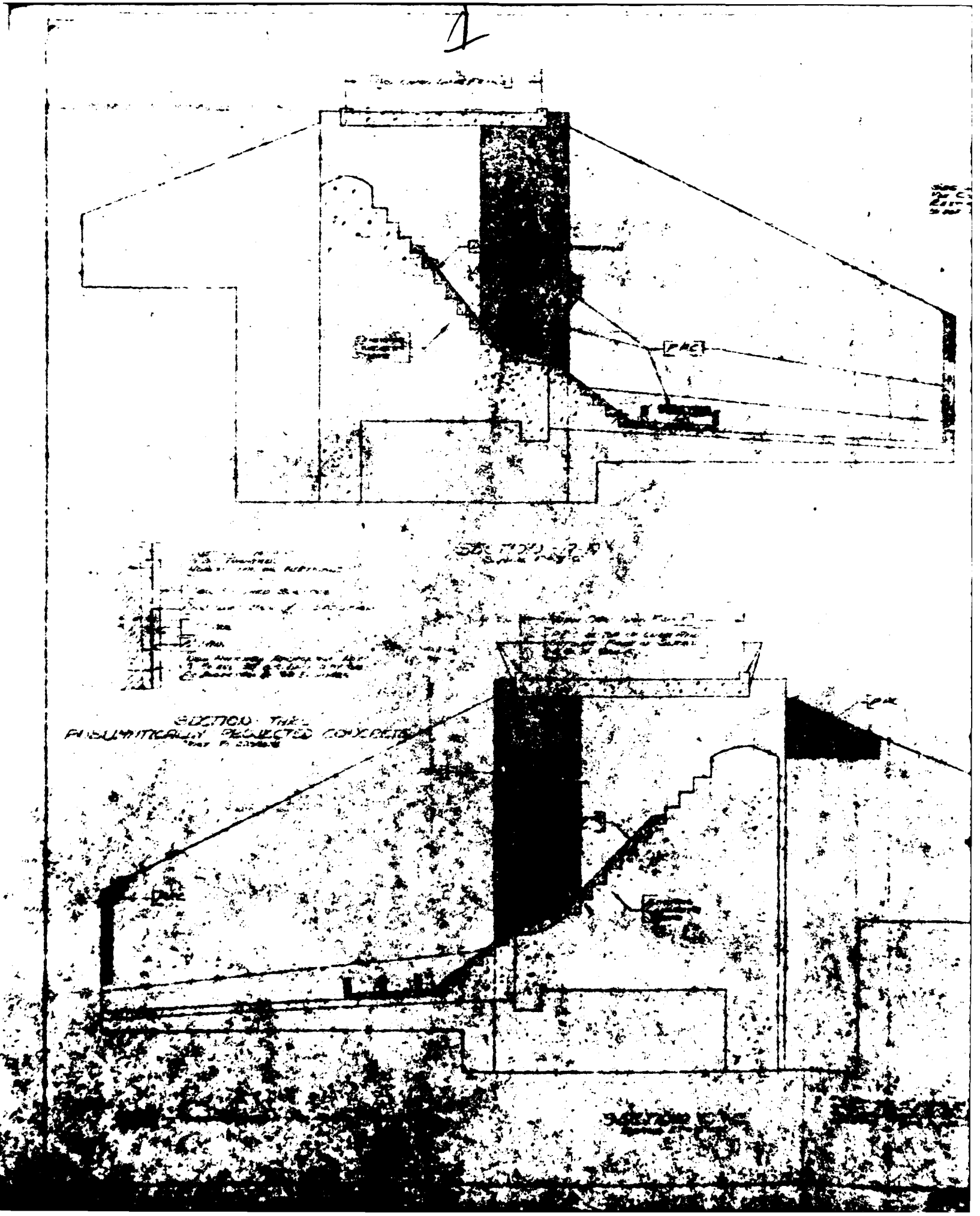
DRAWN BY GFF	GENERAL ENGINEERING	PROJECT NO. 13898
CHECKED BY R.F.H.	IMPROVEMENTS TO WATER SUPPLY	SPECIFICATION NO. 13898 G.E.
TRACED BY GFF	NEW WATER FILTRATION PLANT	DATE APR. 15, 1957
TRACING CHECKED BY R.F.H.	SITE, MAPS & PROFILES	SCALE As Shown
FIELD CHECK BY D.B.H.	STATE OF NEW YORK DEPARTMENT OF PUBLIC WORKS DIVISION OF ARCHITECTURE CARL E. LARSON STATE ARCHITECT	DRAWING NO. 57/5001
APPROVED		

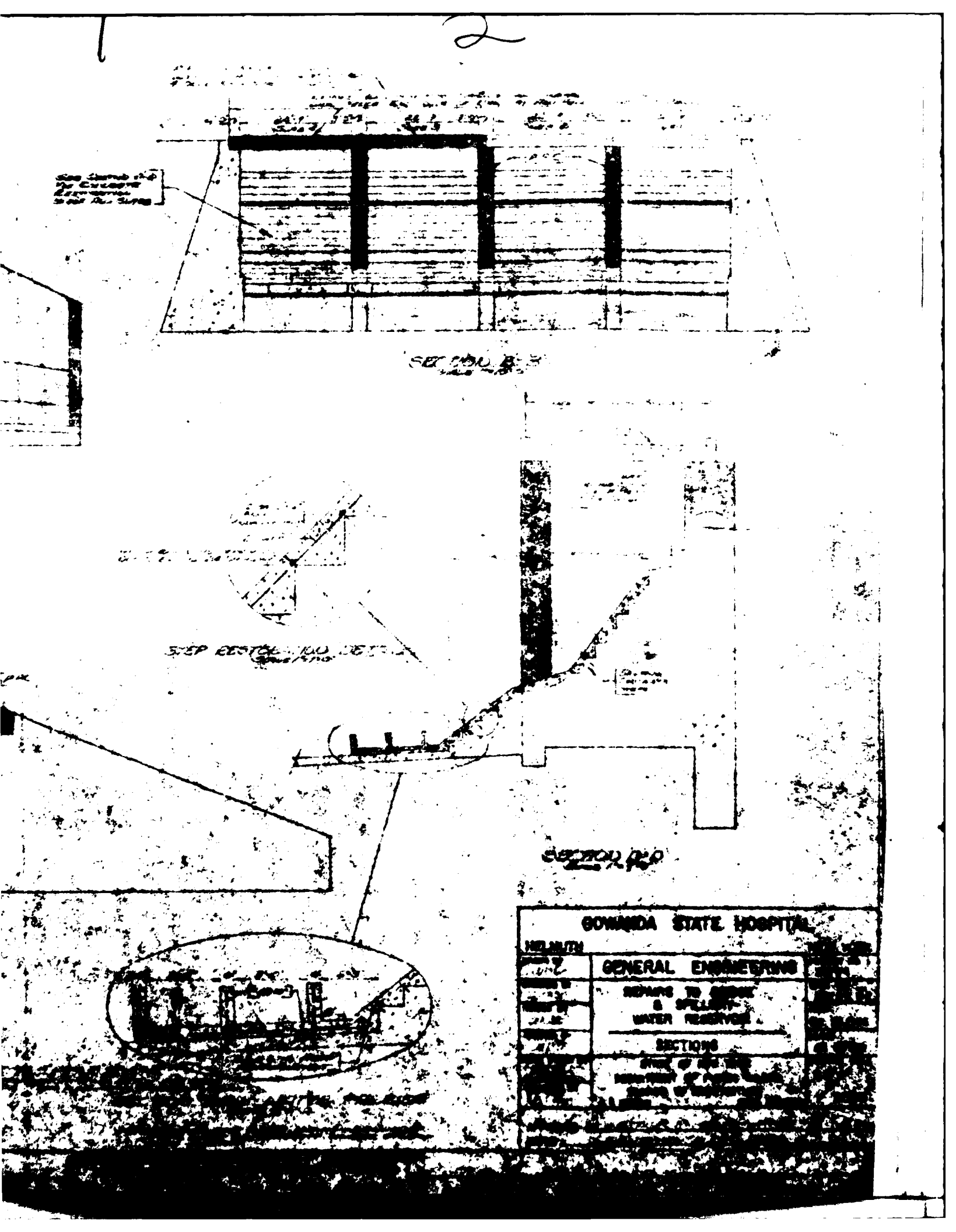
APPROVED Letter No. 6668 dtd 4-10 CNL

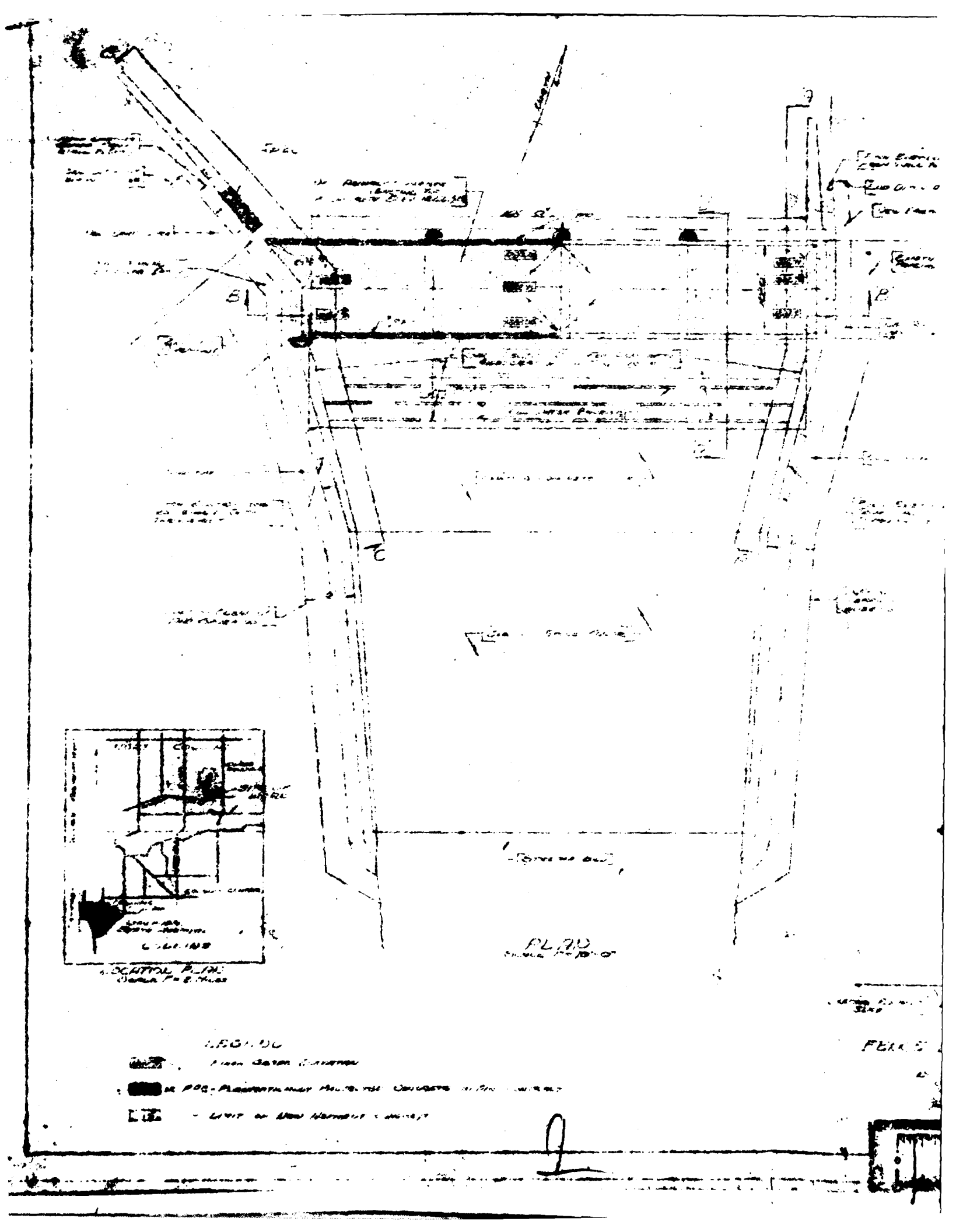
DATE Mar. 18, 1960

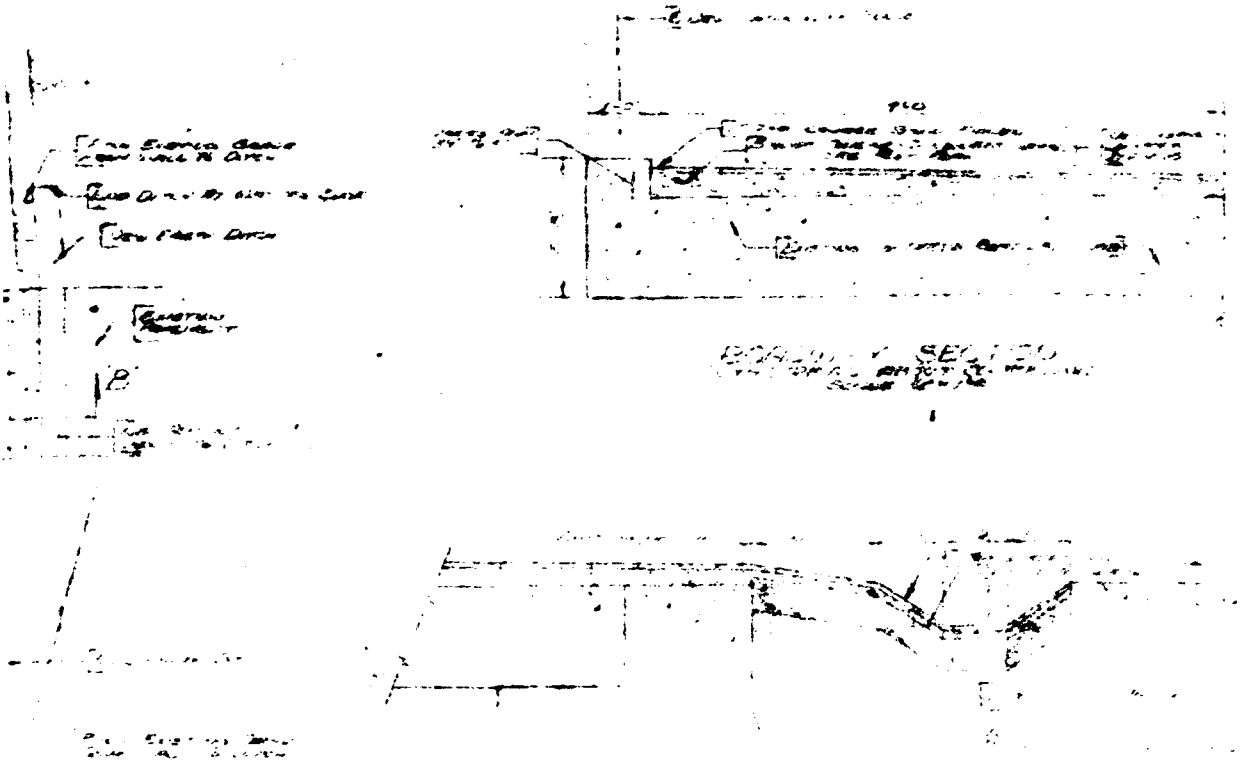
Existing Contours
New Contours
Sanitary Sewer, New
Storm Sewer, New
New C.I. Water

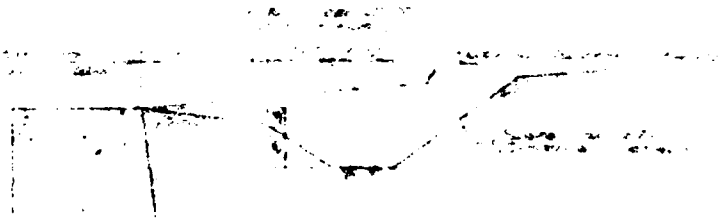

CHANGE IN CORE WALL
1170.0
EL 1220.0
CHANGE IN CORE
WALL DUE TO ROCK
FINISHING.
SECTIONS
CORE WALL
EL 1190.0
Actual Rock
EL 1170.0




GOWANDA STATE HOSPITAL
GENERAL ENGINEERING
SECTIONS







GOWANDA STATE HOSPITAL		
HELMUTH		NEW YORK
	GENERAL ENGINEERING	20704
	REPAIRS TO BRIDGE & SPILLWAY- WATER RESERVOIR	20704-65
	PLAN & DETAILS	AS NOTED
	STATE OF NEW YORK DEPARTMENT OF PUBLIC WORKS DIVISION OF ARCHITECTURE	68 / 8031

END

DATE
FILMED

11-80

DTIC