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Phase I Inspection Report

Owasco Lake Outlet Dam

Oswego River Basin, Cayuga County, New York

Inventory No. NY 776

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Owasco Lake Outlet Dam

Cayuga County

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. Owasco Lake Outlet Dam did not reveal any conditions which pose an immediate threat to life or property. Additional studies are recommended. The dam would be overtopped and become unstable by either the PMF or $\frac{1}{2}$ the PMF. However, there would be no significantly increased hazard to loss of life

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20.→ (Continued)

downstream as compared to pre-overtopping failure. Minor deficiencies (joint needing repointing, gullies) are noted.

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OSWEGO RIVER BASIN

OWASCO LAKE OUTLET DAM

CAYUGA COUNTY, NEW YORK

INVENTORY No. NY 776

PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

SEPTEMBER 1979

79 10 21 1979

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.

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PHASE I INSPECTION REPORT
 NATIONAL DAM SAFETY PROGRAM
 OWASCO LAKE OUTLET DAM
 I.D. NO. N.Y. 776
 #64B-367
 OSWEGO RIVER BASIN
 CAYUGA COUNTY, NEW YORK

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PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Owasco Lake Outlet Dam I.D. No. NY 776
State Located:	New York
County:	Cayuga
Watershed:	Oswego River Basin
Stream:	Owasco Lake Outlet
Date of Inspection:	August 2, 1979

ASSESSMENT

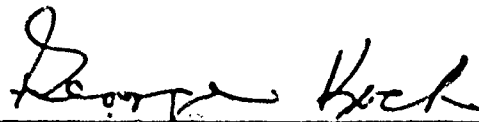
Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, additional studies should be undertaken to further evaluate conditions affecting the dam.

Using the Corps of Engineers' Screening Criteria for initial review of spillway adequacy, it has been determined that the dam would be overtopped by either the PMF (Probable Maximum Flood) or $\frac{1}{2}$ the PMF. Based on the structural stability analysis, the dam would be unstable under the depth of overtopping associated with the PMF and only marginally stable under the depth resulting from $\frac{1}{2}$ the PMF. However, dam failure from overtopping would not significantly increase the hazard to loss of life downstream from that which would exist just before overtopping failure. Therefore, the spillway capacity is adjudged as being inadequate.

The structural stability analysis performed for this report indicates that for severe conditions (ice loading, PMF) the safety factors fall below 1.0. A more detailed analysis is required.

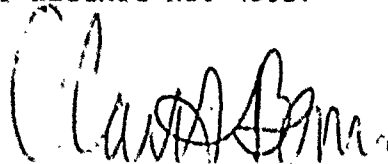
The structural stability analysis should be commenced within 6 months of the date of final approval of this report. Within 18 months of the date of approval, modifications to the structure deemed necessary as a result of this analysis should be made.

There were several minor deficiencies noted on this structure as well. Some of the joints between the masonry blocks needed to be repointed. Small gullies had formed on the downstream slopes near the abutments. These minor deficiencies should be corrected within 1 year of the date of approval of this report.



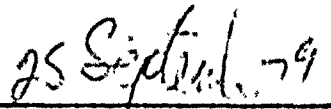
George Koch, Chief
Dam Safety Section
New York State Department
of Environmental Conservation
NY License No. 45937

Approved By:



Col. Clark H. Benn
New York District Engineer

Date:





Overview - Owasco Lake Outlet Dam I.D. No. N.Y. 776



Overview - Downstream Face

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
OWASCO LAKE OUTLET DAM
I.D. NO. N.Y. 776
#64B-367
OSWEGO RIVER BASIN
CAYUGA 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

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam

The Owasco Lake Outlet Dam, also known as the State Dam, is a masonry and concrete dam with a principal spillway channel, flow in which is controlled by a tainter gate, and an auxiliary spillway along the crest of the dam.

The main section of the dam is a masonry structure which is approximately 90 feet long and 13.5 feet high. There are reinforced concrete wingwalls on either end of the masonry portion of the dam. Steel sheet piling extends out from the outside concrete wingwall on either end of the dam.

The principal spillway channel is formed by two wingwalls on the western end of the structure. The channel is 13.7 feet wide. Flow in the channel is controlled by the tainter gate.

The crest of the masonry section is designed to act as the auxiliary spillway. It is divided into five sections by the piers of a foot bridge which crosses the crest. There are stop gates on each of the sections which can be raised to increase the outflow.

There is an abandoned canal to the west of the principal spillway. The portion of this canal upstream of the dam has been filled with soil. One of the rows of sheet piling extends in front of this embankment section. The downstream portion of this canal is used as a settling basin for back flushing the filters of the water treatment plant.

b. Location

This dam is located on Owasco Lake Outlet in the City of Auburn. It is approximately one mile upstream of the Mill Street Dam and about two miles downstream of the northern end of Owasco Lake. The western end of the dam can be reached from Pulsifer Drive which is located off N.Y. Route 38.

c. Size Classification

The dam is 20 feet high and the reservoir has a storage capacity of 54,233 acre-feet. Therefore, the dam is in the large size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

The dam is classified as "high" hazard due to the presence of a large number of homes and commercial establishments in the City of Auburn as well as the Mill Street Dam located downstream of this dam.

e. Ownership

The dam is owned by the City of Auburn. The City Engineer is Mr. Michael O'Neil. The City Engineer's office is at 24 South Street, Auburn, New York 13021 and the phone number is (315) 252-9531.

f. Purpose of Dam

The dam was originally constructed to provide a pool for generating power for several mills downstream of the dam. The primary uses of the dam now are to maintain the level of Owasco Lake and to regulate outflows from the lake.

g. Design and Construction History

The dam was originally constructed in about 1836. No information concerning the original design or construction was available. The structure has been repaired or reconstructed several times since the original construction. The most recent reconstruction was in 1972, to repair damages caused by tropical storm Agnes. This reconstruction was designed by O'Brien and Gere Engineers, Inc. of Syracuse, New York.

h. Normal Operating Procedures

Outflows from the dam are regulated in accordance with a prescribed schedule so as to control the levels of the lake. Operational requirements governing minimum and maximum flows at various times of the year take precedence over the strict adherence to the prescribed schedule. These requirements are outlined in the "Operation and Maintenance Manual for Local Flood Protection Project on Owasco Outlet at Auburn, New York", prepared by the Corps of Engineers, Buffalo District.

1.3 PERTINENT DATA

- a. Drainage Area 207 sq. miles
- b. Discharge at Dam Water Surface Elevation (cfs)
- | | | |
|-----------------------------|--------|------|
| Spillway Gates - Fully Open | 717.0 | 4061 |
| | 716.5 | 3804 |
| | 715.2 | 2459 |
| Tainter Gate - Fully Open | 717.0 | 1731 |
| | 716.5 | 1700 |
| | 713.27 | 1483 |
| | 710.72 | 1287 |
- c. Elevation (USGS Datum)
- | | |
|--|-------------------------|
| East Abutment (sheet piling) | 717.0 |
| West Abutment (sheet piling) and Center Pier | <u>Top-of-Dam</u> 716.5 |
| Top of Foot Bridge over Stop Gates | 715.87 |
| Bottom of Foot Bridge over Stop Gates | 715.12 |
| Top of Stop Gates | 713.27 |
| Spillway Crest | 710.72 |
| Crown of Tainter Gate | 706.45 |
| Invert of Tainter Gate | 699.45 |
- d. Reservoir Surface Area
- | | |
|----------------|--------------|
| Spillway Crest | 10 sq. miles |
|----------------|--------------|
- e. Storage Capacity: Owasco Lake Flood Channel (Acre-Feet)
- | | | | |
|----------------|--------|-----|--------|
| East Abutment | 54,000 | 233 | 54,233 |
| West Abutment | 60,000 | 222 | 60,222 |
| Spillway Crest | 17,600 | 112 | 17,712 |
- f. Dam
- Masonry with Reinforced Concrete Walls and Steel Sheet Piling extending from ends.
- | | |
|-----------------------------------|---------|
| Dam Length (total) | 258 ft. |
| Crest Elevation @ West Abutment | 716.5 |
| Width of Auxiliary Spillway Crest | 6.5 ft. |
- g. Spillway
- Principal Spillway
- Type: Channel 13.7 feet wide with tainter gate.
- Auxiliary Spillway
- Type: Concrete cap on crest of masonry. Divided into five sections by piers of foot bridge, each section 17.4 ft. wide by 4.4 ft. high. Stop gates in place on each of the sections with lift machinery also in place.
- h. Reservoir Drain - None

i. Appurtenant Structures

Abandoned canal to west of principal spillway.
Sheet piling and embankment section block entrance.
Downstream portion used as settling basin.

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Owasco Lake Outlet Dam is located near the border between the glaciated Alleghany Plateau physiographic province and the Erie-Ontario plains province of New York State. This portion of the Alleghany Plateau is cut by the Finger Lake troughs, which are glacially modified valleys of preglacial rivers. The bedrock in the area is predominantly limestone overlaid by shale, siltstone, and sandstone. These rock forms are from the Devonian period of the Paleozoic Era. The surficial soils are the result of glaciations during the Cenozoic Era, the last of which was the Wisconsin glaciation.

b. Subsurface Investigation

No subsurface information was available concerning the foundation of the original dam. Six borings and two probe holes were progressed in 1972 to provide information for the reconstruction done that year. These borings indicate that the subsurface conditions generally consist of sand and gravel overlying thin-bedded shale. The first several feet of the shale are highly weathered.

2.2 DESIGN RECORDS

No records were available from the original design of the structure. Plans for the 1972 reconstruction, prepared by O'Brien and Gere Engineers, Inc., were available and have been included in Appendix F.

2.3 CONSTRUCTION RECORDS

The only construction records available were from the 1972 reconstruction. Plans prepared by O'Brien and Gere have been included in Appendix F.

2.4 OPERATION RECORDS

Lake levels are recorded daily on the staff gage on the east pier. Records are kept for the City of Auburn's water treatment plant.

2.5 EVALUATION OF DATA

Data concerning the original design and construction of the dam was very limited. The information concerning the 1972 reconstruction which was available included a set of plans which outlined most of the important details on the structure. The information available appears to be adequate and reliable for the purpose of the Phase 1 inspection.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Owasco Lake Outlet Dam was conducted on August 2, 1979. The weather was clear and the temperature in the eighties. The water surface at the time of the inspection was slightly below the gates of the auxiliary spillway. The tainter gate on the principal spillway was partially opened.

b. Masonry Section and Wingwalls

The masonry and the concrete cap which is on top of it appeared to be in good condition. There were some joints between blocks of masonry which needed to be repointed. The sheet pile wingwalls which extend from each abutment section were also in good condition. There were small gullies caused by surface runoff on the downstream slope at the abutments on either end of the masonry section.

c. Spillways

Both the principal and the auxiliary spillway sections appeared to be in satisfactory condition.

d. Downstream Channel

The downstream channel was in satisfactory condition. There was a wingwall and riprap extending well downstream of the dam on the east bank. The west bank was an earthfill on a steep slope with several gullies caused by surface runoff.

e. Reservoir/Upstream Channel

Owasco Lake is approximately two miles upstream of the dam. The channel between the lake and the dam was upgraded as part of a local flood protection project by the Corps of Engineers, Buffalo District, in 1961. The channel appeared to be stable and in good condition.

f. Appurtenant Structures - Abandoned Canal

The inlet to the canal on the western end of the dam has been blocked. Downstream of the axis of the dam, the canal is still in existence and is used as a settling basin. The sides of the canal were in satisfactory condition.

3.2 EVALUATION OF OBSERVATIONS

Visual observations of this dam revealed the following deficiencies:

1. Several joints between blocks of masonry needing to be repointed;
2. Small gullies on the downstream slope at each abutment;
3. Erosion and gullies on west bank of downstream channel.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

This dam is operated according to procedures outlined in the "Operation and Maintenance" manual for the flood protection project. Outlet flows are regulated so as to control the levels of the lake in accordance with a prescribed schedule. A set of operational requirements governing minimum and maximum flows at various times of the year take precedence over strict adherence to the prescribed schedule.

4.2 MAINTENANCE OF DAM

The dam is inspected and maintained by the City of Auburn in accordance with the requirements stated in the "Operation and Maintenance" manual. Maintenance of the dam and appurtenant structures is performed as required. Minor deficiencies which were noted, small gullies at each abutment and joints needing to be repointed, are items which should be corrected by increased maintenance efforts.

4.3 WARNING SYSTEM IN EFFECT

No apparent warning system for downstream evacuation of residents during extreme flood is present.

4.4 EVALUATION

While the operation procedures for this structure are satisfactory, additional maintenance effort is required. Minor deficiencies noted in Section 3.2 should be corrected through increased maintenance.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The delineation of the contributing watershed to this dam is shown on the map entitled "Drainage Area - Owasco Lake Outlet Dam" (Appendix C). The irregular-shaped, north-south oriented watershed of some 207 square miles is about 32 miles long and has a maximum width of 10 miles. The watershed exhibits relatively steep topography with elevations rising from the lake level of 710 to the ridges at elevations near 1600. The major tributary within the watershed is named Owasco Inlet which empties into Owasco Lake. The 11-mile long lake has a surface area of 10 square miles and is linked to the dam site by an improved channel. The 1.8-mile long floodway channel, only a portion of the entire 21-mile long Owasco Outlet which flows northerly from Owasco Lake through the City of Auburn to the Seneca River, drains some 2 square miles of the entire watershed's 207 square miles.

5.2 ANALYSIS CRITERIA

Existing hydrologic/hydraulic information (Ref. 1a, 1c) concerning the Owasco Lake Watershed was used to obtain elevation-storage capacity data, elevation-surface area data, watershed characteristics, and improved floodway channel data.

The analysis of the spillway capacity of this dam was performed using the Corps of Engineers HEC-1 computer program, Dam Safety version. A standard project Flood (SPF) hydrograph (Ref. 1d) developed for Owasco Lake was input directly into the program, which then flood routed this hydrograph using the "Modified Puls" method over the spillway. The spillway design flood selected for analysis was the Probable Maximum Flood (PMF) in accordance with the recommended guidelines of the U.S. Army Corps of Engineers. The PMF storm event is approximately twice the size of the SPF storm event.

5.3 SPILLWAY CAPACITY

The concrete and masonry spillway structure consists of a tainter gate with an upstream debris trashrack and a broad-crested weir topped by five vertical-lift sluice gates. The tainter gate has a maximum opening of 7 x 13.7 feet and was analyzed for orifice flow conditions. This gate is the primary control device used in regulating the levels in Owasco Lake. The five sluice gates atop the overflow spillway section are normally in the closed position. However, for this analysis, the gates were analyzed under orifice flow conditions when fully opened, allowing for maximum discharges to occur in the downstream channel. Since this dam is a maintained regulating structure, operation of the gates was a reasonable assumption made during the analysis.

The spillway does not have sufficient capacity for discharging the peak outflow from one-half the PMF. For this storm event, the peak inflow is 70,684 cfs and the resulting peak outflow is 10,354 cfs. The computed spillway capacity with all gates fully open is 5,763 cfs.

5.4 RESERVOIR CAPACITY

The reservoir impounded by this dam consists of Owasco Lake and the 1.8-mile long improved floodway channel from the lake to the dam. The normal water surface varies between lake elevations 710 and 715. A schematic drawing showing the annual time-variation of lake levels is included in Appendix C. The impounded storage capacity for the spillway crest elevation of 710.72 is 17,712 acre-feet. Surge storage capacities to the top-of-dam elevations of 716.5 at the west abutment and 717.0 at the east abutment adds 42,510 acre-feet and 46,521 acre-feet respectively. This surge is equivalent to 3.8 inches and 4.2 inches respectively of direct runoff over the entire drainage area. The total storage capacity of the dam at elevation 716.5 is 60,222 acre-feet.

5.5 FLOODS OF RECORD

The maximum known flood in the watershed occurred on June 25, 1972 during tropical storm Agnes when a lake elevation of 716.88 was recorded. This storm event caused cracking in the existing masonry walls at the tainter gate, resulting in the need for structural repairs which were completed after September 1972. Hence, the existing "new" dam has not been subjected to a similar major flood event. However, if the lake level were to reach this same 716.88 elevation and all gates were fully opened, the discharge would be approximately 6086 cfs.

5.6 OVERTOPPING POTENTIAL

Analysis indicates the spillway does not have sufficient discharge capacity for one-half the PMF. The computed depth of overtopping at the west abutment (elevation 716.5) is 3.49 feet for this storm event. Overtopping would occur for all storm events exceeding 30% of the PMF, under flow conditions having all gates fully open.

5.7 EVALUATION

This dam does not have sufficient spillway capacity to adequately discharge the peak outflow from one-half the PMF with all gates fully open. Prior studies (Ref. 1a) have determined that serious damage can occur downstream when discharges exceed 1,500 cfs. However, dam failure from overtopping would not significantly increase the hazard to loss of life downstream from that which would exist just prior to overtopping failure, because discharges would have already exceeded 1500 cfs. Therefore, the spillway is assessed as being inadequate.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual inspection of the structure did not reveal any signs of major distress. The masonry appeared to be in good condition with no seepage between block and only a few of the joints needed to be repointed.

b. Data Review and Stability Evaluation

The primary source of structural and subsurface information for this dam was the set of plans for the work performed in 1972. Cross-sections shown on these plans were used to perform a structural stability analysis.

The following conditions were analyzed:

- a. Normal conditions with water level at masonry crest;
- b. Water level at masonry crest with an ice load of 7,500 lb./ft.;
- c. One-half PMF, water flowing over the masonry crest at a depth of 5 feet;
- d. PMF, water flowing over the masonry crest at a depth of 13 feet.

The analyses performed (See Appendix D) indicate that the factors of the safety against overturning and sliding are as follows:

<u>Case</u>	<u>Factors of Safety</u>	
	<u>Overturning</u>	<u>Sliding</u>
a. Reservoir at masonry crest, no ice;	1.82	2.26
b. Reservoir at masonry crest, ice load 7,500 lb./ft.	.84	1.07
c. One-half PMF, water flowing over masonry at depth of 5 feet;	1.34	1.38
d. PMF, water flowing over masonry at depth of 13 feet.	.94	.84

The safety factors against both overturning and sliding for all conditions are below recommended levels. The analyses indicate that for the extreme conditions (ice load or PMF), the dam is not stable.

A more detailed structural stability analysis is required. Field investigations are required to obtain more information about the quality of the rock upon which the dam is founded. This information should then be incorporated into a more detailed structural stability evaluation. Based on the results of this evaluation, it should be determined whether modifications to the structures are required.

d. Seismic Stability

This dam is located in Seismic Zone 2. Due to the location, a seismic stability analysis was performed in accordance with Corps of Engineers guidelines. The seismic analysis was performed for normal conditions with the water level at the masonry crest. The safety factor against overturning with seismic considerations included is 1.67 and against sliding is 1.45.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase 1 inspection of the Owasco Lake Outlet Dam revealed that the spillway capacity is inadequate and outflows from either the IMF or $\frac{1}{2}$ the PMF would overtop the dam. This overtopping could cause breaching of the dam. However, dam failure from overtopping would not significantly increase the hazard to loss of life downstream from that which would exist just prior to overtopping failure, because discharges at the dam would have already exceeded 1500 cfs, previously determined as the maximum allowable non-damaging downstream discharge.

The stability analyses which were performed for the structure indicate that for severe conditions (ice loading, PMF), the safety factors fall below 1.0. In addition, several minor deficiencies were noted which should be corrected through increased maintenance efforts.

b. Adequacy of Information

The information for the preparation of this report was adequate.

c. Need for Additional Investigations

Further analysis of the structural stability is required. This analysis should be a more detailed study than was made for this report. Included should be a series of subsurface investigations to obtain more information about the rock foundation and a determination as to whether modifications to the structure are required to increase the stability.

d. Urgency

The additional investigations which are required should be commenced within 6 months of the date of final approval of this report. Within 18 months of the date of approval, modifications to the structure deemed necessary as a result of the stability analysis should be made. Other deficiencies outlined should be corrected within 1 year of the date of approval of this report.

7.2 RECOMMENDED MEASURES

- a. After the structural stability analysis has been completed, appropriate remedial work should be performed.
- b. Joints between blocks of masonry which are missing mortar should be repointed.
- c. Small gullies and erosion on the downstream slope of the abutments and on the west bank of the downstream channel should be regraded.

APPENDIX A

PHOTOGRAPHS



Trashrack at Inlet to Principal Spillway



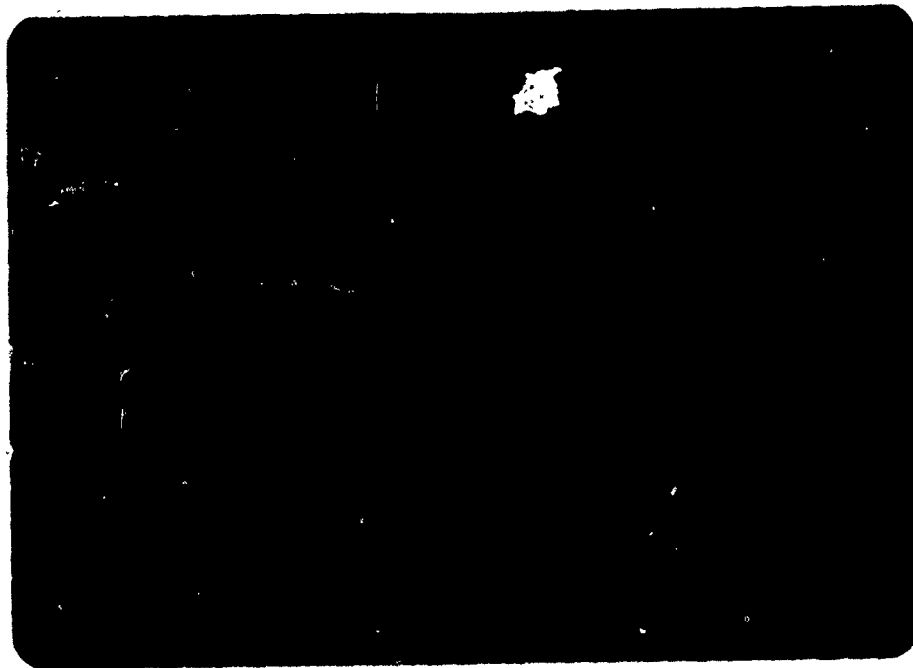
Tainter Gate - Principal Spillway Outlet



Principal Spillway, Note Gully at Right



Close-up of Erosion at Western Abutment



Erosion Gully at Eastern Abutment



Stop-gates and Lifting Devices on Auxiliary Spillway

APPENDIX B

VISUAL INSPECTION CHECKLIST

1

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam OWASCO LAKE OUTLET

I.D. # N.Y. 776

Location: ^{STY.} ~~Town~~ AUBURN County CAYUGA

Stream Name OWASCO LAKE OUTLET

Tributary of _____

Latitude (N) _____ Longitude (W) _____

Hazard Category C

Date(s) of Inspection 8/2/79

Weather Conditions 80° SUNNY

b. Inspection Personnel R. WARRENDER, W. LYNCK

c. Persons Contacted MICHAEL O'NEIL, CITY ENGINEER

d. History:

Date Constructed 1836 - RECONSTRUCTED 1972

Owner CITY OF AUBURN

Designer OF RECONSTRUCTION - O'BRIEN & GERE

Constructed by _____

2) Technical Data

Type of Dam CONCRETE CAP OVER MASONRY ~~WALL~~

Drainage Area _____

Height 135 ft Length 90 ft

Upstream Slope _____ Downstream Slope _____

4) Instrumentation

(1) Monumentation/Surveys _____

(2) Observation Wells _____

(3) Weirs _____

(4) Piezometers _____

(5) Other _____

5) Reservoir

a. Slopes - OWASCO LAKE

b. Sedimentation NONE APPARENT

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

PRIMARY WITH TAINTER GATE - 5 SECTION OVERFLOW

SECTION FOR AUXILIARY WITH STOP GATES

- a. General NEW CONCRETE FACINGS OVER MASONRY

JOINTS OF MASONRY OKAY - ^{SOME} NEED REPOINTING

- b. Principle Spillway TAINTER GATE - APPEARS TO BE CORRUGATED

METAL SHEETS HELD BY RADIAL ANGLE PIECES

STRUCTURALLY SATISFACTORY

- c. Emergency or Auxiliary Spillway CONCRETE CAP ON MASONRY

FORMS CREST - STOP GATES IN PLACE ON ALL SECTIONS

SATISFACTORY CONDITION

- d. Condition of Discharge Conveyance Channel - NATURAL CHANNEL

EAST SIDE - R.P.-RAA LINED WITH 4 50' BEYOND END OF EAST

ABUTMENT WALL, WEST SIDE - EARTH FILL ON STEEP

SLOPE - EROSION EVIDENT THROUGH STONE ON SLOPE

- e. Stability of Channel side/slopes EAST - SATISFACTORY

WEST - STEEP IN AREA OF BACKFILL (1:1)

7) Downstream Channel

a. Condition (debris, etc.) NONE - SLOUGHING & EROSION GULLIES
ON WEST SIDE

b. Slopes EAST - LOW - WOODED TO EDGE
WEST - SLOUGHING & GULLIES

c. Approximate number of homes CITY OF AUBURN

8) Reservoir Drain/Outlet - NONE - OTHER THAN PRINCIPAL SPILLWAY

Type: Pipe _____ Conduit _____ Other _____

Material: Concrete _____ Metal _____ Other _____

Size: _____ Length _____

Invert Elevations: Entrance _____ Exit _____

Physical Condition (describe): _____ Unobservable _____

Material: _____

Joints: _____ Alignment: _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate _____ Valve _____ Uncontrolled _____

Operation: Operable _____ Inoperable _____ Other _____

Present Condition (describe): _____

9) Structural

- a. Concrete Surfaces SATISFACTORY
- b. Structural Cracking NONE ON CONCRETE MASONRY - SOME JOINTS NEED REPOINTING
- c. Movement - Horizontal & Vertical Alignment (Settlement) NONE
- d. Junctions with Abutments or Embankments SATISFACTORY UPSTREAM
DOWNSTREAM - SOME MATERIAL REMOVAL BEHIND STEEPED WALL
ON EAST - LARGE DUMPED STONE - SOME EROSION HAS OCCURRED
ON WEST
- e. Drains - Foundation, Joint, Face NONE
- f. Water passages, conduits, sluices SATISFACTORY
- g. Seepage or Leakage MINOR LEAKAGE UNDER STOPGATES
NO LEAKAGE BETWEEN BLOCKS OF MASONRY

- h. Joints - Construction, etc. SATISFACTORY
- i. Foundation OKAY
- j. Abutments SATISFACTORY EXCEPT FOR SLIGHT EROSION ON
DOWNSTREAM SLOPE - ^{NATURAL} SOIL & EMBANKMENT BEYOND EITHER END
- k. Control Gates SATISFACTORY
- l. Approach & Outlet Channels
- m. Energy Dissipators (plunge pool, etc.) RI RAP IN NATURAL CHANNEL
- n. Intake Structures TRASHRACK - SATISFACTORY
- o. Stability
- p. Miscellaneous SHEET PILING - INTERLOCK & ALIGN. OKAY
CANAL AT SIDE - UPSTREAM FILLED IN WITH SOIL & SHEET
PILING AT UPSTREAM END - DOWNSTREAM, CANAL IS STILL
IN SATISFACTORY CONDITION

APPENDIX C

HYDROLOGIC/HYDRAULIC
ENGINEERING DATA AND COMPUTATIONS

OWASCO LAKE OUTLET DAM
"STATE DAM" NY-776

1

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam - WEST ABUT.	<u>716.5</u>	<u>—</u>	<u>60,222</u>
2) Design High Water (Max. Design Pool)	<u>NA</u>	<u>—</u>	<u>—</u>
3) Auxiliary Spillway Crest	<u>710.72</u>	<u>6400</u>	<u>17,712</u>
4) <u> </u> <u> </u>	<u>—</u>	<u>—</u>	<u>—</u>
5) Service Spillway Crest	<u>706.45</u>	<u>—</u>	<u>—</u>
TAINTER GATE < TOP INVERT	<u>699.45</u>	<u>—</u>	<u>—</u>

DISCHARGES

	<u>Volume</u> (cfs)
1) Average Daily	<u>VARIES</u>
2) Spillway @ Maximum High Water	<u>—</u>
3) Spillway @ Design High Water	<u>—</u>
4) Spillway @ Auxiliary Spillway Crest Elevation	<u>—</u>
5) Low Level Outlet	<u>—</u>
6) Total (of all facilities) @ Maximum High Water	<u>—</u>
7) Maximum Known Flood - @ ELEV 716.88	<u>NA</u>
8) At Time of Inspection WATER SURFACE @ ELEV. 712.8	<u>NA</u>

CREST:

ELEVATION: 116.5Type: STEEL SHEET PILING w/ EARTH BACKFILLWidth: VARIES Length: 258 FTSpillover MASONRY STRUCTURE CAPPED w/ CONCRETE ; TAILWATER GATE & 5 SLUICE GATESLocation CENTER - 113 FT

SPILLWAY:

PRINCIPAL

AUXILIARY

TOP @ 706.45 WEIR @ 699.45 Elevation CREST @ 710.72 TOP @ 713.27

TAILWATER GATE Type 5 GATES 2.55' HIGH

13.7' Width NET - 87'

Type of Control

Uncontrolled

Controlled:

MECHANICAL LIFT DEVICE Type MECHANICAL LIFT DEVICES
(; gate)

Number

Size/Length

Invert Material CONCRETE CAP OVER MASONRY

Anticipated Length
of operating service

Chute Length NA

SAME Height Between Spillway Crest & Approach Channel Invert
(Weir Flow) 10' (±)

HYDROMETEROLOGICAL GAGES: USGS
UPSTREAM - #04235396

USGS
#04235500- DOWNSTREAM

Type: NON-RECORDING

WATER-STAGE RECORDER

Location: 1.8 MILES UPSTREAM FROM DAM

4 MILES DOWNSTREAM FROM DAM

Records:

Date - 1912 TO PRESENT

NOV. 1912 TO PRESENT

(DATUM = MSL)

Max. Reading - ELEV. 716.88

Q = 3250 cfs

6/25/70

ELEV. 540.2

6/23/70

FLOOD WATER CONTROL SYSTEM:

Warning System: NA

Method of Controlled Releases (mechanisms):

COEFS OF EUGAS

TWATER GATE

1

SLUICE GATES

IN ACCORDANCE WITH

O&M MANUAL

SEPT. 1961

DRAINAGE AREA: 207 SQ MILES

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: FORESTED & FARMLAND

Terrain - Relief: STEEP

Surface - Soil: RELATIVELY PERMEABLE SCS - SOIL GROUP
B - HOMERIDGE & LAUSING
C - LANGFORD

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

NA

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

NA

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

HOMES & LAKESIDE FACILITIES IMMEDIATELY SURROUNDING
QUASCO LAKE (ABOVE ELEV. 715)

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

Location: NA

Elevation: _____

Reservoir:

Length 10 - QUASCO LAKE + 1.8 FLOODWAY 11.8 (Miles)
CHANNEL

Length of Shoreline (@ Spillway Crest) > 23.6 (Miles)

PROJECT GRID

JOB QUASCO LAKE OUTLET DAM		SHEET NO. 1/	CHECKED BY	DATE
SUBJECT		COMPUTED BY WCL		DATE 9/4/79

DRAINAGE AREA:

[COOPS EUGES DES MEMO 5/19/60] QUASCO LAKE = 120.1 SQ MILES
LAKE SURFACE = 10 SQ MILES

DISTANCE TO DAM = 1.8 MILES
TOTAL " TO OUTLET = 17 MILES TOTAL ADDITIONAL AREA TO OUTLET = 21 SQ MILES

ADDITIONAL DR. AREA (LAKE TO DAM) = $\frac{1.8}{17} \times \frac{PA}{21} \Rightarrow DA = 2.2 \text{ SQ MILES}$

TOTAL AREA (DAM) = 126.2 SQ MILES

[EGGS WATER DATA REPORT 74-1 1977]

GAGE "042539" 1.5 MILES UPSTREAM FROM DAM DA = 205.1 SQ MILES
+ 21.2
207.2 SQ MILES

USE 207.2 SQ MILES ←

TRANSMISSION FACTOR: $TF = 1 - \frac{0.3005}{(DA)^{.7718}}$
TF = 0.383



NCBED-PH

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

I.D. # NY-776

NEW YORK STATE

14 July 1975 16 07 3 JU

George Koch, Senior Hydraulic Engineer
Bureau of Facilities & Construction Mgmt.
New York State Dept. of Environmental
Conservation
50 Wolf Road
Albany, NY 12233

CONSTRUCTION

Dear Mr. Koch:

This is in reply to your letter, dated 25 June 1975, requesting available hydrologic and hydraulic data for Owasco Lake and Outlet.

A search of our files revealed that we have not determined an outlet capacity or a spillway design flood for the State Dam. However, rating curves and stage, storage, area, and outflow data have been developed under the direction of Mr. Allan Tedrow, Chief, Program Development Group, New York State Department of Environmental Conservation. I suggest you contact Mr. Tedrow regarding these data.

In June 1962, a local flood protection project was completed on Owasco Lake Outlet. Inclosure 1 is a copy of the Design Memorandum, dated May 1960, for this project. Improvements to the State Dam discussed in this memorandum were to have been made by local interests.

I am also inclosing unit and standard project flood hydrograph data for Owasco Lake developed by the Buffalo District under the Section 214 Program. These data may be of use to you in determining a spillway design flood inflow hydrograph. Flood routings can then be accomplished using Mr. Tedrow's stage-storage data to determine the resultant outflow.

I trust this information will be of assistance to you.

Sincerely yours,

Bernard C. Hughes
BERNARD C. HUGHES
Colonel, Corps of Engineers
District Engineer

Incl
as stated



OSWEGO BASIN-STANDARD-PROJECT STUDY CENTERED ON S-H-BASIN C
 DEVELOPMENT OF FLOOD HYD. GRAPH ON AREA C-1 (OWASCO) (F) D.A. 2015M
 FROM FROM GENERAL STUDY OF OSWEGO BASIN 73-02-1211

ISIA	NET MUNDG	WCLW	TPNCH	ORCSN	EXIA	RTIMP		
-0	1	56	-0	-0	-0	1.50	.047	
DS	TR	TP	CP	IC	WTIOR	WTIOL	WCVRY	E
201.00	40.00	-0.00	-0.000	-0.00	1.00	-0.00	-0.00	-0.00

STANDARD PROJECT FLOOD HYDROGRAPH ON AREA C-1

UNIFORM LOSS AND INITIAL LOSSES

NR	BASEL	DELTA	STARTD	STORM	SPFF	PMS	TUSPC	TRSDA
96	.02	.50	121	-0.00	9.50	-0.00	1.000	606.00

HR	MIN	H-HR	LOSS	EXCESS	UNIT HD	PECSN	FLOW
1	0	0.00	0.00	0.00	21353	121	121
2	0	0.00	0.00	0.00	4351	121	121
3	0	0.00	0.00	0.00	1989	121	121
4	0	0.00	0.00	0.00	2517	121	121
5	0	0.00	0.00	0.00	3250	121	121
6	0	0.00	0.00	0.00	4340	121	121
7	0	.01	.01	0.00	5353	121	121
8	0	.01	.01	0.00	5916	121	121
9	0	.01	.01	0.00	6153	121	121
10	0	.01	.01	0.00	6176	121	121
11	0	.01	.01	0.00	5971	121	121
12	0	.01	.01	0.00	5700	121	121
13	0	.03	.03	0.00	5390	121	121
14	0	.03	.03	0.00	4948	121	121
15	0	.04	.04	0.00	4468	121	121
16	0	.10	.10	0.00	3017	121	121
17	0	.04	.04	0.00	3611	121	121
18	0	.03	.03	0.00	3246	121	121
19	0	0.00	0.00	0.00	2919	121	121
20	0	0.00	0.00	0.00	2624	121	121
21	0	0.00	0.00	0.00	2359	121	121
22	0	0.00	0.00	0.00	2120	121	121
23	0	0.00	0.00	0.00	1906	121	121
24	0	0.00	0.00	0.00	1714	121	121
25	0	.01	.01	0.00	1541	121	121
26	0	.01	.01	0.00	1385	121	121
27	0	.01	.01	0.00	1245	121	121
28	0	.01	.01	0.00	1119	121	121
29	0	.01	.01	0.00	1006	121	121
30	0	.01	.01	0.00	905	121	121
31	0	.03	.03	0.00	813	121	121
32	0	.03	.03	0.00	731	121	121
33	0	.03	.03	0.00	657	121	121
34	0	.03	.03	0.00	591	121	121
35	0	.03	.02	.01	531	121	375
36	0	.03	.02	.01	478	121	308
37	0	.12	.02	.10	429	121	2340
38	0	.14	.02	.12	386	121	3364
39	0	.18	.02	.16	347	121	4556
40	0	.45	.02	.43	312	121	10885
41	0	.17	.02	.15	280	121	7047
42	0	.13	.02	.11	252	121	5617
43	0	.01	.01	0.00	227	121	3897
44	0	.01	.01	0.00	204	121	4146
45	0	.01	.01	0.00	183	121	5055

1-Hr. Unit
Hydrograph

SPF IN-FLOW
HYDROGRAPH

INCH 2 1000

46	n	.01	.01	0.00
47	n	.01	.01	0.00
48	n	.01	.01	0.00
49	n	.04	.02	.02
50	n	.04	.02	.02
51	n	.04	.02	.02
52	n	.04	.02	.02
53	n	.04	.02	.02
54	n	.04	.02	.02
55	n	.15	.02	.13
56	n	.15	.02	.13
57	n	.15	.02	.13
58	n	.15	.02	.13
59	n	.15	.02	.13
60	n	.15	.02	.13
61	n	.44	.02	.66
62	n	.82	.02	.80
63	n	1.02	.02	1.00
64	n	2.54	.02	2.56
65	n	.45	.02	.93
66	n	.75	.02	.73
67	n	.04	.02	.06
68	n	.04	.02	.06
69	n	.04	.02	.06
70	n	.04	.02	.06
71	n	.04	.02	.06
72	n	.04	.02	.06
73	n	0.00	0.00	0.00
74	n	0.00	0.00	0.00
75	n	0.00	0.00	0.00
76	n	0.00	0.00	0.00
77	n	0.00	0.00	0.00
78	n	0.00	0.00	0.00
79	n	.01	.01	0.00
80	n	.01	.01	0.00
81	n	.01	.01	0.00
82	n	.01	.01	0.00
83	n	.01	.01	0.00
84	n	.01	.01	0.00
85	n	.05	.02	.03
86	n	.06	.02	.04
87	n	.07	.02	.05
88	n	.14	.02	.15
89	n	.06	.02	.04
90	n	.05	.02	.03
91	n	.01	.01	0.00
92	n	.01	.01	0.00
93	n	.01	.01	0.00
94	n	.01	.01	0.00
95	n	.01	.01	0.00
96	n	.01	.01	0.00
97	n			
98	n			
99	n			
100	n			
101	n			
102	n			
103	n			
104	n			
105	n			
106	n			

105
148
133
120
108
97
87
78
70
63
57

121	5851
121	6309
121	6701
121	7040
121	8444
121	8720
121	8343
121	8013
121	5624
121	7624
121	8013
121	7944
121	8022
121	8147
121	8448
121	20254
121	27138
121	33914
121	70614
121	48823
121	41145
121	30826
121	32376
121	37548
121	42243
121	45310
121	46602
121	45377
121	43820
121	41848
121	19451
121	30612
121	33545
121	30479
121	27502
121	24916
121	22441
121	20245
121	18244
121	17044
121	15827
121	14604
121	15861
121	12942
121	11247
121	9808
121	9148
121	8642
121	8219
121	7750
121	7237
121	6723
121	6149
121	5643
121	5204
121	4729
121	4278
121	3842
121	3405
121	3144
121	2819

Peak

INCL 2 2nd

[illegible]

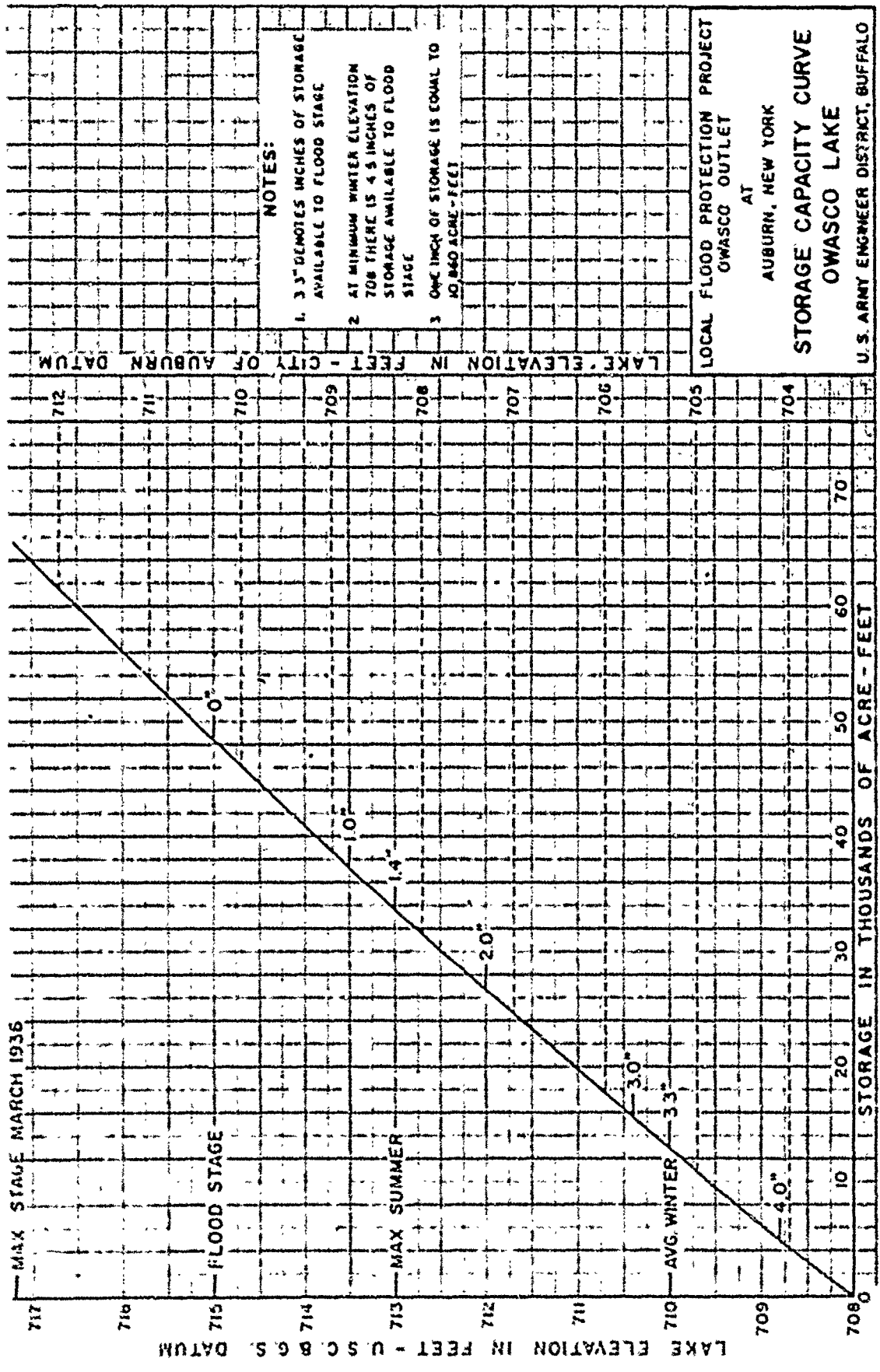
Inc 2 Inc 2

PROJECT GRID

JOB OLASCO LAKE OUTLET DAM		SHEET NO. 9/	CHECKED BY	DATE	
SUBJECT HYDROGRAPH PARAMETERS		COMPUTED BY WCL		DATE 9/4/79	
LAG TIME:		[CORR ENGRS DES MEMO 5/19/80]			
$t_p = C_p(L \times L_x)$		$L = 30$			
$t_p = 4(30 \times 15)$		$L_x = 0.5L = 15$			
$t_p = 0.25 \text{ HRS}$		$C_p = 4$			
TIME CAUSEWAY DURATION:		[DESIGN NOT SHOWN]			
$t_p = \frac{7}{5.5} \times 0.25 = 0.25 \text{ HRS}$		$[USE 5.5 \text{ HRS} = t_p]$			
ADJUSTED LAG TIME:		$T_p = t_p + 0.25(t_p - t_r)$			
$T_p = 0.25 + 0.25(5 - 4.55)$		[CORR ENGRS DES MEMO 5/19/80]			
$T_p = 0.25 \text{ HRS}$		$LAG = 2.24 \text{ HRS}$			
SOIL LOSS DATA:		$C_p = 0.25$			
INITIAL LOSS RATE = 1.0 "/hr		[CORR ENGRS DES MEMO 5/19/80]			
CONSTANT LOSS RATE = 0.5 "/hr					
BASE FLOW: USE $1.25 \text{ / (5000 ft}^2 \text{ DA)}$		$Q_{\text{BASE}} = 114 \text{ cfs}$			
DMP-PRECIPITATION:					
200 SQMI		DURATION = 24 HR			
24 HR	24 HR	6	2	24	48
24 HR	24 HR	75	29	100	96
24 HR	24 HR	78	30	100	100
24 HR	24 HR	80	30	100	110

PROJECT GRID

JOB OLWASCO LAKE OUTLET DAM		SHEET NO. 3/		CHECKED BY	DATE
SUBJECT STAGE - STORAGE DATA (LAKE + CHANNEL)				COMPUTED BY WCL	DATE 9/4/79
[CHIPS EXPRS. 0.5 M. MANUAL 9/1/261]:				PLATE A2 - OLWASCO LAKE (STORAGE CAPACITY CURVE)	
STAGE	(DATE A2) STORAGE (AC-FT)	CHANNEL STORAGE (SHT 14) EARTH		ROCK	TOTAL (AC-FT)
708.5	3000	18	11		3079
709	4200	74	10		4286
710	12800	97	10		12900
(CHIPS) 710.72	17000	98	14		17112
711	19500	102	15		19617
712	24600	117	17		24734
713	32400	133	19		32552
714	42800	50	20		42970
715	48400	68	22		48590
716	56000	187	24		56211
716.5					60222
717	64000	307	26		64233
CHANNEL (LAKE TO DAM):					
L = 1.5 MILES = 7504'					
ROCK SECTION:			EARTH SECTION:		
L = 1444'			L = 5040'		
BOT. WIDTH = 30'			BOT. WIDTH = 30'		
SIDE SLOPE: 1.5:1 H			SIDE SLOPE: 1.5:2.5 H		
ELEV. INLET = 700			ELEV. INLET = 700 - 702 (701)		



NOTES:

1. 3" DEMOTES INCHES OF STORAGE AVAILABLE TO FLOOD STAGE
2. AT MINIMUM WINTER ELEVATION 708 THERE IS 4.5 INCHES OF STORAGE AVAILABLE TO FLOOD STAGE
3. ONE INCH OF STORAGE IS EQUAL TO 10,840 ACRE- FEET

LOCAL FLOOD PROTECTION PROJECT
OWASCO OUTLET
AT
AUBURN, NEW YORK
STORAGE CAPACITY CURVE
OWASCO LAKE
U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE A2

DAM: NY-776

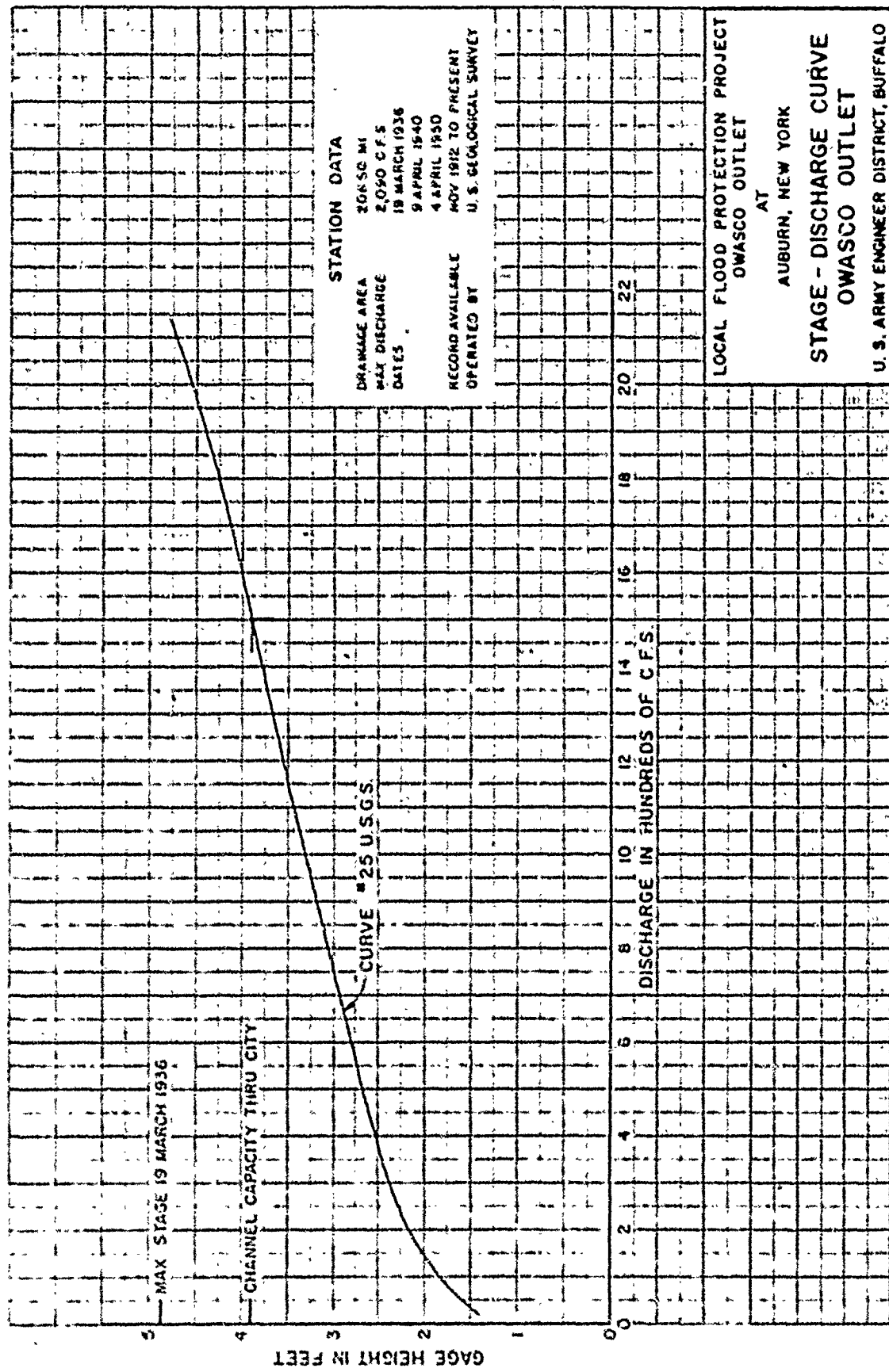
PROJECT GRID

JOB OWASCO LAKE OUTLET DAM					SHEET NO. 4		CHECKED BY		DATE	
SUBJECT STAGE - STORAGE DATA (FLOOD CHANNEL)					COMPUTED BY WCL		DATE 9/4/79			
GEOMETRICS - SEE SHT 3/										
EARTH SECTION - U.S. 5060'					ROCK SECTION - L. 1444'					
STAGE	DEPTH (REF + 701)	WIDTH	AREA	VOL (AC-FT)	DEPTH (REF + 700)	WIDTH	AREA	VOL (AC-FT)		
705	7.5	47.5	354.5	68	8.5	47	397.2	11		
709	8	70	400	74	9	48	431	12		
710	9	75	472.5	87	10	50	490	13		
710.72	9.72	75.6	507.8	98	10.72	51.4	474.72	14		
711	10	80	550	102	11	52	451	15		
712	11	85	532.5	117	12	54	504	17		
713	12	90	720	133	13	56	559	19		
714	13	95	812.5	150	14	58	616	20		
715	14	100	810	168	15	60	675	22		
716	15	105	1012.5	187	16	62	736	24		
717	16	110	1120	207	17	64	799	26		
TOTAL AREA					AC-FT					
43540										

PROJECT GRID

[NOT
USED]

JOB OWASCO LAKE OUTLET DAM		SHEET NO. 5/		CHECKED BY		DATE	
SUBJECT STAGE - DISCHARGE (CURVE #35 - USGS)				COMPUTED BY WCL		DATE 9/4/79	
[CONFS. ENGINEER OFM. MANUAL 9/19/77]: PLATE A4 - OWASCO OUTLET (STAGE-DISCHARGE CURVE)							
USGS - 4.7 = CURVE (USGS GAGE #715.48) 710.781 = 0 (WATER DATA RPT. 76-1 1977 GAGE #0403529)							
USE 710.8 (CURVE)							
STAGE	GAGE HT	DISCHARGE	STAGE	GAGE HT	DISCHARGE		
				3.3	980		
712.3	1.5	35		3.4	1045		
	1.6	50		3.5	1150		
712.5	1.7	70		3.6	1240		
	1.8	80	714.5	3.7	1325		
	1.9	115		3.8	1410		
	2.0	140		3.9	1500		
	2.1	175		4.0	1595		
713	2.2	215		4.1	1675		
	2.3	255	715	4.2	1755		
	2.4	310		4.3	1830		
	2.5	380		4.4	1895		
	2.6	450		4.5	1965		
713.5	2.7	520		4.6	2030		
	2.8	595	715.5	4.7	2090		
	2.9	670					
	3.0	745					
	3.1	825					
714	3.2	910					



DAM: NY-776

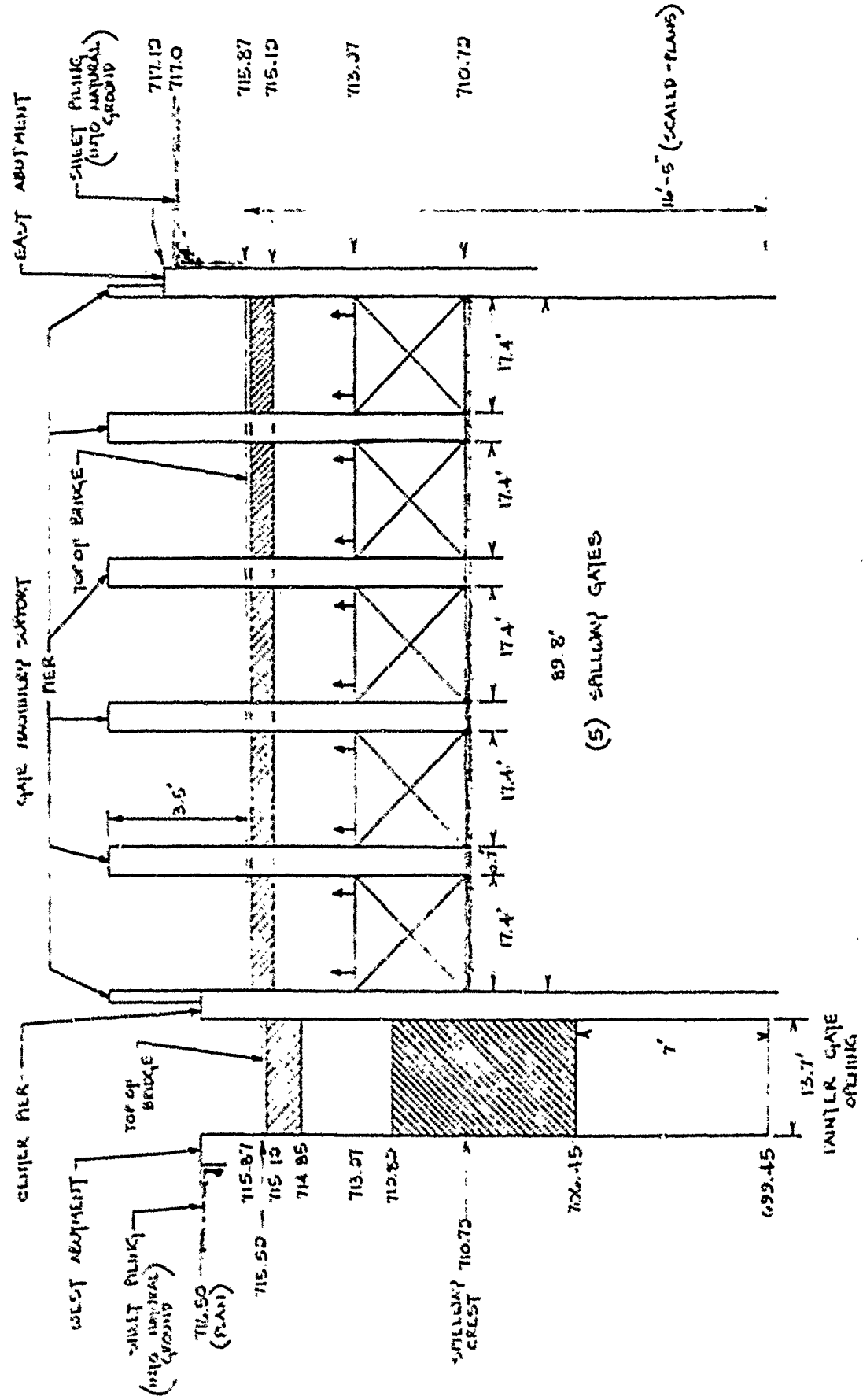
OWASCO LAKE OUTLET DAM "SPALE DAM"

114-776

MEASUREMENTS & ELEVATIONS - 8/19

L (HILL) = 70'

L (HILL) = 75'



PROJECT GRID

JOB OWASCO LAKE OUTLET DAM				SHEET NO. 6/		CHECKED BY		DATE	
SUBJECT STAGE - DISCHARGE : Tainter Gate				COMPUTED BY JCL		DATE 9/5/79			
DIMENSIONS & ELEVATIONS									
GROSS INVERT (GATE OPENING) - SPREAD FROM PANS									
WIDTH - FIELD MEASUREMENT									
GROSS ELEV. = 706.45				706.70 - 8'					
INVERT ELEV. = 699.45									
WIDTH = 13.7'									
$Q = C A \sqrt{2gH} = 4.815 A \sqrt{H}$				H					
C = 0.6									
A = 13.7 H (MAX. = 95.9 ft ²)				Y					
H - MEASURED TO CENTER ELEV. OF GATING				3.5'					
CONDITIONS: WATER SURFACE @ 411' DAM CREST = 710.70 (REF. 699.45)									
ELEV.	GATING HT.	AREA	GATING ORIFICE ELEV.	H	Q				
699.45	—	—		11.27	—				
700	0.55	7.54	699.70	11	120				
701	1.55	21.24	700.20	10.5	381				
702	2.55	34.24	700.70	10	532				
703	3.55	48.14	701.20	9.5	732				
704	4.55	62.34	701.70	9	900				
705	5.55	76.04	702.20	8.5	1067				
706	6.55	89.74	702.70	8	1222				
706.45	7.0	95.9	702.95	7.77	1287				

PROJECT GRID

JOB OWASSCO LAKE OUTLET DAM		SHEET NO. 7/		CHECKED BY		DATE	
SUBJECT STAGE-DISCHARGE : TAINTER GATE				COMPUTED BY WCL		DATE 9/5/79	
CURVED ELEV = 706.45							
INLET ELEV = 699.45							
WIDTH = 13.7'		$Q = CA \sqrt{2gH} = 461.7 \sqrt{H}$					
@ FULL OPEN: AREA = 95.9 FT ²		C = 0.6					
CENTER OF GRADE ELEV = 702.95							
		710.72					
→ CONDITION: GATE FULLY OPEN - WATER SURFACE @ SPILLWAY CREST & ABOVE (REF = 702.95)							
STAGE	H	Q	STAGE	H	Q		
710.72	7.77	2857	719	16.05	1850		
711	8.05	3101	720	17.05	1906		
712	8.35	3299	721	18.05	1962		
712.32	8.67	3451	722	19.05	2015		
713	9.05	3644	723	20.05	2067		
713.27	10.32	4283					
714	11.05	4535					
714.55	11.90	4593					
715	12.05	4603					
715.12	12.17	4611					
715.52	12.57	4637					
715.87	12.92	4660					
716	13.05	4668					
716.50	13.55	4700					
717	14.05	4721					
717.5	14.55	4741					
718	15.15	4791					

PROJECT GRID

JOB OWASCO LAKE OUTLET DAM		SHEET NO. 8/	CHECKED BY	DATE
SUBJECT STAGE - DISCHARGE : SPILLWAY GATES		COMPUTED BY WCL		DATE 9/5/79
5 OPENINGS @	17.4' WIDE =	87' (NET)	EACH NET. I BEAM = 0.7' WIDE	
4 FLANGES @	0.7'	2.8'	FLANGE	
NO ABUTMENT CONTRACTION		89.8' (TOTAL)		
WITH RILEY CONTRACTION				
$Q = C L H^{3/2}$		$L = L' - 2(NK_1 + K_2)H$	$N = 4$	$L' = 89.8'$
		$L = 87 - 0.14H$	$K_1 = 0.02$	$K_2 = 0$
CONDITION: GATES FULLY OPEN - MAX. OPENING HT = 4.8' (ELEV. = 715.52)				
BROAD-TREATED WEIR		$C = 3.037$ (MAX)	WEIR FLOW	
STAGE	H	L	Q	
710.00	—	87	—	
711	0.28	86.96	39.8	
712	1.28	86.3	388	
712.32	2.10	86.54	874	
713	3.28	86.44	921	
713.27	2.55	86.59	1038	
714	3.28	86.48	1580	
714.35	4.13	86.34	2237	
715	4.28	86.32	2359	
BOTTOM GIRDER 715.12	4.45	86.3	2459	
1 USE CRIFICE FLOW				
(5.47 * 10)				

PROJECT GRID

JOB OWASCO LAKE OUTLET DAM		SHEET NO. 9/	CHECKED BY	DATE
SUBJECT STAGE-DISCHARGE : GATES (TAMTER & SPILLWAY)		COMPUTED BY WCL	DATE 9/5/79	

TAMTER GATE - OPENING ABOVE CONCRETE BAFFLE TO UNDERSIDE OF BRIDGE :

WEIR FLOW - ELEV. (712.82 TO 714.85)

LOW HEAD → ELEV. (714.85 TO 715.52) ← CHECK : USE ORIFICE FLOW

ORIFICE FLOW

ORIFICE FLOW - ELEV. (714.85 TO 715.52)

GEOMETRICS:

L = 13.7' NO PIERS ; NO ABUTMENT CONTRACTION

C = 3.1

$Q = 2.64 \frac{3}{2}$ WEIR FLOW

STAGE	H	C	Q
712.82	—	—	—
713	0.18	1.3	—
713.27	0.45	1.3	—
714	1.18	54	—
714.85	2.03	103	—
715	2.18	0.15	208
715.52	2.70	0.67	356

LOW HEAD

ORIFICE FLOW

(THEORETICAL)

$Q = \frac{2}{3} L \sqrt{2g} (h_2 - h_1)^{3/2}$

$h = h_2 - h_1$

$= \frac{2}{3} L \sqrt{2g} \left(\frac{h_2^{3/2} - h_1^{3/2}}{h_2 - h_1} \right)$

$Q = C A \sqrt{2g} \left(\frac{h_2^{3/2} - h_1^{3/2}}{h_2 - h_1} \right)$

C = 0.6

A = 27.31 (2.03 x 13.7)

h x 1

h₂ - ORIF. ELEV. = 713.82

h₁ - ORIF. ELEV. = 714.85

DO NOT USE

PROJECT GRID

JOB OWASCO LAKE OUTLET DAM		SHEET NO. 10/		CHECKED BY		DATE	
SUBJECT STAGE - DISCHARGE : GATES (Tainter & Spillway)				COMPUTED BY WCL		DATE 9/5/79	
Tainter Gate - Opening Above Concrete Baffle				ORIFICE		FLOW	
TOP ELEV. = BOTTOM CURVED = 714.85							
BOT. ELEV. = 712.82							
WIDTH = 13.7'				$Q = CAV \sqrt{2gH} = 133.94 \sqrt{H}$			
AREA = 27.81				$C = 0.6$			
CENTER ORIFICE @ ELEV. 713.84							
STAGE	H	Q					
714.85	1.01	135					
715	1.16	144					
715.12	1.28	151					
715.52	1.68	174					
715.87	2.03	191					
716	2.16	197					
716.5	2.66	218					
717	3.06	235					
717.5	3.66	256					
718	4.06	273					
SPILLWAY GATES: 5 VERTICAL LIFT UNITS, MAX. LIFT = 4.8'							
BOT. @ 714.8'		TOTAL = 37'		BOT. GATE		TOP GATE	
WING AREA = 417.6 sq'		CLOSED		710.72		713.87	
C = 0.6		FULLY OPEN		715.52		718.67	
		BOTTOM - BRIDGE CURVED		715.12			
		CENTER ORIFICE @ ELEV. 712.82					
STAGE	H	Q	$Q = CAV \sqrt{2gH} = 2010.71 \sqrt{H}$				
715.12	2.2	2982					
715.52	2.6	3242	ORIFICE FLOW				
715.87	2.95	3453					
716	3.28	3529					
716.5	3.58	3602					
717	4.08	4161					

PROJECT GRID

JOB OWASCO LAKE OUTLET DAM		SHEET NO. 11/		CHECKED BY	DATE
SUBJECT STAGE - DISCHARGE : TAUNTER GATE - BRIDGE OVERFLOW ABUTMENT OVERFLOW		COMPUTED BY WCL		DATE 9/5/79	
WEST ABUTMENT:			EAST ABUTMENT:		
C = 3.027			BROAD-CRESTED WEIR		
L = 75' (MU)			C = 3.027		
716.50			L = 70' (MU)		
TOP ELEV.			717.0		
Q = 0.14 ²			WEIR FLOW ←		
Q	H	STAGE	H	Q	
—	—	716.5	—	—	
20	0.5	717	—	—	
113	0.92	717.12	0.12	9	
230	1.0	717.5	0.5	74	
425	1.5	718	1.0	214	
TAUNTER GATE - FLOW OVER BRIDGE			WEIR FLOW ←		
C = 3.027			Q = 0.14 ²		
STAGE	H	Q			
715.52	—	—			
715.87	0.35	9			
716	0.48	14			
716.5	0.95	41			
717	1.48	74			
717.5	1.98	113			
718	2.48	165			

PROJECT GRID

[illegible]

ROUTED HYDROGRAPH AT DAM - NO BREACH ALL DATES-FULL OPEN

K1	Y	1	1	-710.72	-1	
Y1	3					
Y4	710.72	711	712.80	713.27	714	715.12
Y6	715.5	715.67	716	717.5	718	
Y8	720.7	720.8	721	722.5	723	724
Y10	725.9	726	727	728	729	730
Y12	731.1	732	733	734	735	736
Y14	736.3	737	738	739	740	741
Y16	741.5	742	743	744	745	746
Y18	746.7	747	748	749	750	751
Y20	751.9	752	753	754	755	756
Y22	757.1	758	759	760	761	762
Y24	762.3	763	764	765	766	767
Y26	767.5	768	769	770	771	772
Y28	772.7	773	774	775	776	777
Y30	777.9	778	779	780	781	782
Y32	783.1	784	785	786	787	788
Y34	788.3	789	790	791	792	793
Y36	793.5	794	795	796	797	798
Y38	798.7	799	800	801	802	803
Y40	803.9	804	805	806	807	808
Y42	809.1	810	811	812	813	814
Y44	814.3	815	816	817	818	819
Y46	819.5	820	821	822	823	824
Y48	824.7	825	826	827	828	829
Y50	829.9	830	831	832	833	834
Y52	835.1	836	837	838	839	840
Y54	840.3	841	842	843	844	845
Y56	845.5	846	847	848	849	850
Y58	850.7	851	852	853	854	855
Y60	855.9	856	857	858	859	860
Y62	861.1	862	863	864	865	866
Y64	866.3	867	868	869	870	871
Y66	871.5	872	873	874	875	876
Y68	876.7	877	878	879	880	881
Y70	881.9	882	883	884	885	886
Y72	887.1	888	889	890	891	892
Y74	892.3	893	894	895	896	897
Y76	897.5	898	899	900	901	902
Y78	902.7	903	904	905	906	907
Y80	907.9	908	909	910	911	912
Y82	913.1	914	915	916	917	918
Y84	918.3	919	920	921	922	923
Y86	923.5	924	925	926	927	928
Y88	928.7	929	930	931	932	933
Y90	933.9	934	935	936	937	938
Y92	939.1	940	941	942	943	944
Y94	944.3	945	946	947	948	949
Y96	949.5	950	951	952	953	954
Y98	954.7	955	956	957	958	959
Y100	959.9	960	961	962	963	964

THE PROGRAM IS CURRENTLY BEING MODIFIED TO WORK WITH THE LOS ALAMOS SYSTEM

PLEASE REPORT ANY UNUSUAL OPERATING PROBLEMS
TO THE YOUNG MAN 4231 PH. 1-5000

BOOK DATE 09/12/79

075VPP0 037100 131100 024 HY-776

OSWEGO RIVER BASIN
CAYUGA COUNTY
PRF - CORPS SPF UH

NO	TIME	DAY	JOB SPECIFICATION	IPLT	IPRT	INSTAN
100	1	U	INR U INPT METRC	U	0	0
			JOPEA U LHOPT TRACE	U		

MULTI-PLAN ANALYSES TO BE PERFORMED
MULTIPLAN PARTIAL 2 LAYO- 1

STILL 1.00 2.00

14-00000 COMPUTATION

ISIAQ	ILUTP	IFCON	ITAPE	JPLT	JPRP	INAME	ISTAGE	IAUTO
INFLW HYDRAPH								

WYOMING DAY

[illegible]

CF	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL
CHS	70084.	439 0.	35034.	16123.	1227650.
INCHES	2002.	1240.	1515.	474.	54740.
AC-FT		1.98	6.44	9.02	9.19
THOUS CU M		50.21	163.01	229.07	233.43
		21811.	71575.	99511.	101409.
		26944.	67670.	122745.	125086.

HYDROGRAPH AT STA 1 FOR PLAN 1, RATIO 1

CF	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL
CHS	70084.	439 0.	35034.	16123.	1227650.
INCHES	2002.	1240.	1515.	474.	54740.
AC-FT		1.98	6.44	9.02	9.19
THOUS CU M		50.21	163.01	229.07	233.43
		21811.	71575.	99511.	101409.
		26944.	67670.	122745.	125086.

CF	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL
CHS	70084.	439 0.	35034.	16123.	1227650.
INCHES	2002.	1240.	1515.	474.	54740.
AC-FT		1.98	6.44	9.02	9.19
THOUS CU M		50.21	163.01	229.07	233.43
		21811.	71575.	99511.	101409.
		26944.	67670.	122745.	125086.

HYDROGRAPH AT STA 1 FOR PLAN 1, RATIO 2

CF	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL
CHS	70084.	439 0.	35034.	16123.	1227650.
INCHES	2002.	1240.	1515.	474.	54740.
AC-FT		1.98	6.44	9.02	9.19
THOUS CU M		50.21	163.01	229.07	233.43
		21811.	71575.	99511.	101409.
		26944.	67670.	122745.	125086.

CF	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL
CHS	70084.	439 0.	35034.	16123.	1227650.
INCHES	2002.	1240.	1515.	474.	54740.
AC-FT		1.98	6.44	9.02	9.19
THOUS CU M		50.21	163.01	229.07	233.43
		21811.	71575.	99511.	101409.
		26944.	67670.	122745.	125086.

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000
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REF. CUFFLOW IS 10354. AT TIME 02.00 HOURS

	PLANK	6-IN. UP	24-IN. HIGH	72-IN. HIGH	TOTAL VOLUME
CF	10334.	10315.	10326.	8375.	903059.
CM	293.	242.	284.	237.	25572.
INCHES		0.46	1.00	4.52	6.76
MM		11.79	45.73	114.71	171.40
2-FT		51.6.	194.87.	49234.	74633.
INDUS CU M		6313.	24530.	61470.	92058.

STATION 1, PLAIN 1, RAYIN 2
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

104234.	109420.	110622.	111744.	112087.	114350.	115074.	116239.	118241.	120247.	122253.	124259.	126265.	128271.	130277.	132283.	134289.	136295.	138301.	140307.	142313.	144319.	146325.	148331.	150337.	152343.	154349.	156355.	158361.	160367.	162373.	164379.	166385.	168391.	170397.	172403.	174409.	176415.	178421.	180427.	182433.	184439.	186445.	188451.	190457.	192463.	194469.	196475.	198481.	200487.	202493.	204499.	206505.	208511.	210517.	212523.	214529.	216535.	218541.	220547.	222553.	224559.	226565.	228571.	230577.	232583.	234589.	236595.	238601.	240607.	242613.	244619.	246625.	248631.	250637.	252643.	254649.	256655.	258661.	260667.	262673.	264679.	266685.	268691.	270697.	272703.	274709.	276715.	278721.	280727.	282733.	284739.	286745.	288751.	290757.	292763.	294769.	296775.	298781.	300787.	302793.	304799.	306805.	308811.	310817.	312823.	314829.	316835.	318841.	320847.	322853.	324859.	326865.	328871.	330877.	332883.	334889.	336895.	338901.	340907.	342913.	344919.	346925.	348931.	350937.	352943.	354949.	356955.	358961.	360967.	362973.	364979.	366985.	368991.	370997.	372103.	374109.	376115.	378121.	380127.	382133.	384139.	386145.	388151.	390157.	392163.	394169.	396175.	398181.	400187.	402193.	404199.	406205.	408211.	410217.	412223.	414229.	416235.	418241.	420247.	422253.	424259.	426265.	428271.	430277.	432283.	434289.	436295.	438301.	440307.	442313.	444319.	446325.	448331.	450337.	452343.	454349.	456355.	458361.	460367.	462373.	464379.	466385.	468391.	470397.	472403.	474409.	476415.	478421.	480427.	482433.	484439.	486445.	488451.	490457.	492463.	494469.	496475.	498481.	500487.	502493.	504499.	506505.	508511.	510517.	512523.	514529.	516535.	518541.	520547.	522553.	524559.	526565.	528571.	530577.	532583.	534589.	536595.	538601.	540607.	542613.	544619.	546625.	548631.	550637.	552643.	554649.	556655.	558661.	560667.	562673.	564679.	566685.	568691.	570697.	572703.	574709.	576715.	578721.	580727.	582733.	584739.	586745.	588751.	590757.	592763.	594769.	596775.	598781.	600787.	602793.	604799.	606805.	608811.	610817.	612823.	614829.	616835.	618841.	620847.	622853.	624859.	626865.	628871.	630877.	632883.	634889.	636895.	638901.	640907.	642913.	644919.	646925.	648931.	650937.	652943.	654949.	656955.	658961.	660967.	662973.	664979.	666985.	668991.	670997.	672103.	674109.	676115.	678121.	680127.	682133.	684139.	686145.	688151.	690157.	692163.	694169.	696175.	698181.	700187.	702193.	704199.	706205.	708211.	710217.	712223.	714229.	716235.	718241.	720247.	722253.	724259.	726265.	728271.	730277.	732283.	734289.	736295.	738301.	740307.	742313.	744319.	746325.	748331.	750337.	752343.	754349.	756355.	758361.	760367.	762373.	764379.	766385.	768391.	770397.	772403.	774409.	776415.	778421.	780427.	782433.	784439.	786445.	788451.	790457.	792463.	794469.	796475.	798481.	800487.	802493.	804499.	806505.	808511.	810517.	812523.	814529.	816535.	818541.	820547.	822553.	824559.	826565.	828571.	830577.	832583.	834589.	836595.	838601.	840607.	842613.	844619.	846625.	848631.	850637.	852643.	854649.	856655.	858661.	860667.	862673.	864679.	866685.	868691.	870697.	872703.	874709.	876715.	878721.	880727.	882733.	884739.	886745.	888751.	890757.	892763.	894769.	896775.	898781.	900787.	902793.	904799.	906805.	908811.	910817.	912823.	914829.	916835.	918841.	920847.	922853.	924859.	926865.	928871.	930877.	932883.	934889.	936895.	938901.	940907.	942913.	944919.	946925.	948931.	950937.	952943.	954949.	956955.	958961.	960967.	962973.	964979.	966985.	968991.	970997.	972103.	974109.	976115.	978121.	980127.	982133.	984139.	986145.	988151.	990157.	992163.	994169.	996175.	998181.	1000187.	1002193.	1004199.	1006205.	1008211.	1010217.	1012223.	1014229.	1016235.	1018241.	1020247.	1022253.	1024259.	1026265.	1028271.	1030277.	1032283.	1034289.	1036295.	1038301.	1040307.	1042313.	1044319.	1046325.	1048331.	1050337.	1052343.	1054349.	1056355.	1058361.	1060367.	1062373.	1064379.	1066385.	1068391.	1070397.	1072403.	1074409.	1076415.	1078421.	1080427.	1082433.	1084439.	1086445.	1088451.	1090457.	1092463.	1094469.	1096475.	1098481.	1100487.	1102493.	1104499.	1106505.	1108511.	1110517.	1112523.	1114529.	1116535.	1118541.	1120547.	1122553.	1124559.	1126565.	1128571.	1130577.	1132583.	1134589.	1136595.	1138601.	1140607.	1142613.	1144619.	1146625.	1148631.	1150637.	1152643.	1154649.	1156655.	1158661.	1160667.	1162673.	1164679.	1166685.	1168691.	1170697.	1172703.	1174709.	1176715.	1178721.	1180727.	1182733.	1184739.	1186745.	1188751.	1190757.	1192763.	1194769.	1196775.	1198781.	1200787.	1202793.	1204799.	1206805.	1208811.	1210817.	1212823.	1214829.	1216835.	1218841.	1220847.	1222853.	1224859.	1226865.	1228871.	1230877.	1232883.	1234889.	1236895.	1238901.	1240907.	1242913.	1244919.	1246925.	1248931.	1250937.	1252943.	1254949.	1256955.	1258961.	1260967.	1262973.	1264979.	1266985.	1268991.	1270997.	1272103.	1274109.	1276115.	1278121.	1280127.	1282133.	1284139.	1286145.	1288151.	1290157.	1292163.	1294169.	1296175.	1298181.	1300187.	1302193.	1304199.	1306205.	1308211.	1310217.	1312223.	1314229.	1316235.	1318241.	1320247.	1322253.	1324259.	1326265.	1328271.	1330277.	1332283.	1334289.	1336295.	1338301.	1340307.	1342313.	1344319.	1346325.	1348331.	1350337.	1352343.	1354349.	1356355.	1358361.	1360367.	1362373.	1364379.	1366385.	1368391.	1370397.	1372403.	1374409.	1376415.	1378421.	1380427.	1382433.	1384439.	1386445.	1388451.	1390457.	1392463.	1394469.	1396475.	1398481.	1400487.	1402493.	1404499.	1406505.	1408511.	1410517.	1412523.	1414529.	1416535.	1418541.	1420547.	1422553.	1424559.	1426565.	1428571.	1430577.	1432583.	1434589.	1436595.	1438601.	1440607.	1442613.	1444619.	1446625.	1448631.	1450637.	1452643.	1454649.	1456655.	1458661.	1460667.	1462673.	1464679.	1466685.	1468691.	1470697.	1472703.	1474709.	1476715.	1478721.	1480727.	1482733.	1484739.	1486745.	1488751.	1490757.	1492763.	1494769.	1496775.	1498781.	1500787.	1502793.	1504799.	1506805.	1508811.	1510817.	1512823.	1514829.	1516835.	1518841.	1520847.	1522853.	1524859.	1526865.	1528871.	1530877.	1532883.	1534889.	1536895.	1538901.	1540907.	1542913.	1544919.	1546925.	1548931.	1550937.	1552943.	1554949.	1556955.	1558961.	1560967.	1562973.	1564979.	1566985.	1568991.	1570997.	1572103.	1574109.	1576115.	1578121.	1580127.	1582133.	1584139.	1586145.	1588151.	1590157.	1592163.	1594169.	1596175.	1598181.	1600187.	1602193.	1604199.	1606205.	1608211.	1610217.	1612223.	1614229.	1616235.	1618241.	1620247.	1622253.	1624259.	1626265.	1628271.	1630277.	1632283.	1634289.	1636295.	1638301.	1640307.	1642313.	1644319.	1646325.	1648331.	1650337.	1652343.	1654349.	1656355.	1658361.	1660367.	1662373.	1664379.	1666385.	1668391.	1670397.	1672403.	1674409.	1676415.	1678421.	1680427.	1682433.	1684439.	1686445.	1688451.	1690457.	1692463.	1694469.	1696475.	1698481.	1700487.	1702493.	1704499.	1706505.	1708511.	1710517.	1712523.	1714529.	1716535.	1718541.	1720547.	1722553.	1724559.	1726565.	1728571.	1730577.	1732583.	1734589.	1736595.	1738601.	1740607.	1742613.	1744619.	1746625.	1748631.	1750637.	1752643.	1754649.	1756655.	1758661.	1760667.	1762673.	1764679.	1766685.	1768691.	1770697.	1772703.	1774709.	1776715.	1778721.	1780727.	1782733.	1784739.	1786745.	1788751.	1790757.	1792763.	1794769.	1796775.	1798781.	1800787.	1802793.	1804799.	1806805.	1808811.	1810817.	1812823.	1814829.	1816835.	1818841.	1820847.	1822853.	1824859.	1826865.	1828871.	1830877.	1832883.	1834889.	1836895.	1838901.	1840907.	1842913.	1844919.	1846925.	1848931.	1850937.	1852943.	1854949.	1856955.	1858961.	1860967.	1862973.	1864979.	1866985.	1868991.	1870997.	1872103.	1874109.	1876115.	1878121.	1880127.	1882133.	1884139.	1886145.	1888151.	1890157.	1892163.	1894169.	1896175.	1898181.	1900187.	1902193.	1904199.	1906205.	1908211.	1910217.	1912223.	1914229.	1916235.	1918241.	1920247.	1922253.	1924259.	1926265.	1928271.	1930277.	1932283.	1934289.	1936295.	1938301.	1940307.	1942313.	1944319.	1946325.	1948331.	1950337.	1952343.	1954349.	1956355.	1958361.	1960367.	1962373.	1964379.	1966385.	1968391.	1970397.	1972403.	1974409.	1976415.	1978421.	1980427.	1982433.	1984439.	1986445.	1988451.	1990457.	1992463.	1994469.	1996475.	1998481.	2000487.	2002493.	2004499.	2006505.	2008511.	2010517.	2012523.	2014529.	2016535.	2018541.	2020547.	2022553.	2024559.	2026565.	2028571.	2030577.	2032583.	2034589.	2036595.	2038601.	2040607.	2042613.	2044619.	2046625.	2048631.	2050637.	2052643.	2054649.	2056655.	2058661.	2060667.	2062673.	2064679.	2066685.	2068691.	2070697.	2072703.	2074709.	2076715.	2078721.	2080727.	2082733.	2084739.	2086745.	2088751.	2090757.	2092763.	2094769.	2096775.	2098781.	2100787.	2102793.	2104799.	2106805.	2108811.	2110817.	2112823.	2114829.	2116835.	2118841.	2120847.	2122853.	2124859.	2126865.	2128871.	2130877.	2132883.	2134889.	2136895.	2138901.	2140907.	2142913.	2144919.	2146925.	2148931.	2150937.	2152943.	2154949.	2156955.	2158961.	2160967.	2162973.	2164979.	2166985.	2168991.	2170997.	2172103.	2174109.	2176115.	2178121.	2180127.	2182133.	2184139.	2186145.	2188151.	2190157.	2192163.	2194169.	2196175.	2198181.	2200187.	2202193.	2204199.	2206205.	2208211.	2210217.	2212223.	2214229.	2216235.	2218241.	2220247.	2222253.	2224259.	2226265.	222827
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PEAK FLOW AND STORAGE (END OF PERIOD) COMPANY FUR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2
				1.00	2.00
HYD. GRAPH AT	1	207.00	1	70384.	141368.
	(	0.00)	(	2001.55)	(4003.10)
ADDED TO	1	207.00	1	10354.	25774.
	(	0.00)	(	293.19)	(729.84)

1/3 PMF PMF

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

ELEVATION
STORAGE
OUTFLOW

INITIAL VALUE
710.72
17712.
1287.

SPILLWAY CREST
710.72
17712.
1287.

TOP OF DAM
717.00
64233.
6180.

RATIO
OF
PMF
1.00
2.00

1/2 PMF
PMF

MAXIMUM
RESTRAINED
W.S. ELEV
719.92
725.18

MAXIMUM
DEPTH
DOWN DAM
2.99
11.18

MAXIMUM
STORAGE
AC-FY
88204.
153535.

MAXIMUM
OUTFLOW
CFS
10354.
25774.

DURATION
OVER TOP
HOURS
66.00
121.00

TIME OF
MAX OUTFLOW
HOURS
62.00
60.00

TIME OF
FAILURE
HOURS
0.
0.

[illegible]

YOU'VE GOT THE MOST POWERFUL SYSTEM
YOU'VE EVER SEEN. IT'S CALLED BELL & HOWELL.

PLEASE REPLY BY AIRMAIL OR TELETYPE
TO THE DIRECTOR (Rm. 603) FBI (7-5066)

1 A 013500 LAKE CHARLEY DALLAS TX-770
2 A
3 CITY OF AUBURN

OSWEGO RIVER BASIN
CAYUGA COUNTY
PMF - CORPS SPF UM

High Yield

	M	-1		207	0.86	1
10	N	121	121	121	335	3264
11	N	10185	7007	3597	5055	4550
12	N	6024	6123	6013	5029	7050
13	N	4492	20239	27136	33914	8167
14	N	42443	45110	46092	45377	37598
15	N	27582	24710	22481	10254	30479
16	N	11237	9221	9144	8662	12942
17	N	5294	6729	4270	3467	5693
18	N	1495	1767	1541	1392	2117
19	N	477	396	320	264	663
20	N	122	100	123	171	207
21	N	148	143	130	125	151
22	N	321	121	121	121	121
23	N	321	121	121	121	121

3	3	3
21	21	21
2	2	2

PEAK FLOW AND STORAGE (EACH OF PERIOD) SUMMARY FURNISHING PLAN-RATIO ECHIDMIC COMPUTATIONS
FLOOD IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPER. ATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIOS APPLIED TO FLOODS				RATIO 5	RATIO 6
						RATIO 3	RATIO 4	RATIO 5	RATIO 6		
				0.40	0.62	0.66	0.66	1.00	2.00		
HYDROGRAPH AT	1	207.00	1	42410.	53824.	46051.	48065.	70684.	141368.		
		(66724.10)		(1273.23)	(1260.96)	(1321.02)	(1361.05)	(2061.55)	(4003.10)		
ADDED TO	1	207.00	1	2057.	3411.	6136.	6321.	10354.	25774.		
		(66724.10)		(160.47)	(144.54)	(173.76)	(178.99)	(293.19)	(729.64)		
								1/2 PMF	PMF		

COMPARISON OF DAM SAFETY ANALYSIS

PLATE 1

RATIO UP P-1	MAXIMUM ACCELERATION JIP RELATIVE	MAXIMUM DEPTH UNDER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION EVEY TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.60	716.30	1.	57137.	5667.	0.	63.00	0.
0.62	716.26	3.	62233.	5811.	0.	63.00	0.
0.64	716.94	3.	63745.	6135.	0.	63.00	0.
0.68	717.13	6.13	65257.	6321.	14.00	63.00	0.
1.00	719.99	2.99	84204.	10234.	66.00	62.00	0.
2.00	723.18	11.18	153935.	25774.	121.00	60.00	0.

1/2 PMF. ——— PMF

ELEVATION STAGE GATE	INITIAL VALUE	SPIELWAY CREST	TUP OF DAM
0111.3	710.72	710.72	717.00
	17714.	17712.	44233.
	1487.	1287.	6188.

STREAMS TRIBUTARY TO LAKE ONTARIO

411

94255396 ONASCO LAKE NEAR AUBURN, NY

LOCATION.--Lat 42°53'56", long 76°32'17", Cayuga County, Hydrologic Unit 94140201, on west side of breakwater at city of Auburn water intake and pumping station, 1 mi (1.6 km) south of city limits of Auburn, and 1.8 mi (2.9 km) upstream from State dam.

DRAINAGE AREA.--105 mi² (273 km²)

PERIOD OF RECORD.--October 1967 to current year Records since 1912 collected by, and in files of, city of Auburn.

GAGE.--Nonrecording gage read once daily by employees of city of Auburn Water Division. Datum of gage (revised) is at mean sea level. Reference mark at elevation 715.48 ft (218.975 m) above mean sea level.

REMARKS.--Lake elevation regulated by gates on outlet at State dam. Area of water surface, 10.6 mi² (27.5 km²).

COOPERATION.--Records furnished by city of Auburn.

EXTREMES FOR PERIOD OF RECORD --Maximum observed elevation, 716.88 ft (218.905 m) June 25, 1977; minimum observed, 709.11 ft (216.371 m) Mar. 10-14, 1969.

EXTREMES OUTSIDE PERIOD OF RECORD --Maximum observed elevation since 1912, 716.91 ft (218.914 m) Mar. 23, 1936, Apr. 9, 1948.

EXTREMES FOR CURRENT YEAR --Maximum observed elevation, 713.93 ft (217.606 m) Oct. 1, minimum observed, 710.30 ft (216.400 m) Jan. 12, 11.

ELEVATION, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976
INSTANTANEOUS OBSERVATIONS AT 9700

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	713.93	711.63	711.64	711.14	710.99	712.76	711.33	712.47	713.01	712.72	712.66	712.70
2	713.63	711.26	711.64	711.60	710.97	712.81	711.26	712.44	713.03	712.70	712.71	712.49
3	713.39	711.27	711.61	711.34	710.60	713.11	711.36	712.66	712.94	712.71	712.73	712.71
4	713.87	711.18	711.62	710.92	710.82	713.59	711.42	712.35	712.95	712.62	712.73	712.73
5	712.68	711.16	711.95	710.88	710.73	713.74	711.44	712.33	712.99	712.55	712.70	712.71
6	712.66	711.13	711.61	710.72	710.64	713.73	711.38	712.24	712.63	712.46	712.67	712.78
7	712.56	711.18	711.71	710.61	710.59	713.53	711.30	712.32	712.82	712.50	712.63	712.64
8	712.33	711.87	711.74	710.49	712.30	713.29	711.41	712.45	712.61	712.50	712.78	712.66
9	712.15	711.83	711.73	710.42	710.41	712.36	711.45	712.33	712.60	712.60	712.80	712.60
10	712.61	711.83	711.92	710.30	710.36	712.81	711.49	712.39	712.90	712.66	712.51	712.71
11	711.66	711.82	712.14	710.36	710.37	712.53	711.52	712.66	712.93	712.69	712.50	712.72
12	711.71	711.86	712.10	710.39	710.37	712.30	711.55	712.63	712.84	712.71	712.65	712.69
13	711.60	711.12	712.03	710.30	710.00	712.16	711.50	712.61	712.60	712.66	712.63	712.63
14	711.66	711.29	712.02	710.33	710.46	711.90	711.61	712.74	712.60	712.97	712.72	712.61
15	711.73	711.27	711.93	710.33	710.54	711.70	711.64	712.13	712.64	712.69	712.79	712.63
16	711.78	711.30	711.92	710.29	710.62	711.63	711.63	712.37	712.82	712.78	712.79	712.61
17	711.74	711.33	711.92	710.33	711.06	711.51	712.43	712.50	712.85	712.55	712.71	712.64
18	711.82	711.34	711.83	710.23	711.05	711.30	712.36	712.82	712.82	712.62	712.71	712.60
19	711.95	711.34	711.72	710.22	712.44	711.24	712.24	712.44	712.80	712.64	712.71	712.60
20	711.95	711.37	711.65	710.22	712.43	711.26	712.29	712.63	712.76	712.70	712.73	712.63
21	711.92	711.44	711.64	710.34	712.44	711.14	712.13	713.29	713.04	712.76	712.73	712.54
22	711.70	711.51	711.50	710.36	712.91	711.30	712.80	713.00	712.82	712.70	712.73	712.48
23	711.71	711.54	711.46	710.36	713.20	711.20	711.80	712.90	712.74	712.63	712.72	712.43
24	711.80	711.37	711.41	710.78	713.12	711.34	711.76	712.64	713.29	712.73	712.71	712.31
25	711.65	711.34	711.39	710.29	712.40	711.26	711.70	712.64	713.61	712.64	712.71	712.27
26	711.60	711.50	711.33	710.41	712.86	711.16	712.11	712.65	713.29	712.72	712.70	712.20
27	711.93	711.59	711.33	710.44	712.84	711.10	712.75	712.65	712.53	712.71	712.70	712.14
28	711.63	711.57	711.33	710.97	712.44	711.00	712.67	712.73	712.51	712.72	712.73	712.10
29	711.60	711.46	711.30	711.45	712.74	711.05	712.54	712.82	712.54	712.73	712.75	712.15
30	711.58	711.44	711.31	711.25	---	710.90	712.57	712.85	712.55	712.74	712.72	712.10
31	711.44	---	711.20	711.03	---	710.95	---	712.94	---	712.62	712.72	---
MEAN	712.92	711.32	711.45	710.50	711.43	712.64	711.81	712.67	712.95	712.69	712.71	712.50
MAX	713.93	711.64	712.12	711.14	711.20	713.74	711.54	713.29	713.29	712.97	712.80	713.10
MIN	711.44	711.82	710.20	710.30	710.36	710.95	711.83	712.24	712.53	712.48	712.51	712.10

WTD YR 1976 MEAN 712.85 MAX 713.93 MIN 710.30
CAL YR 1975 MEAN 711.95 MAX 714.75 MIN 710.46

STREAMS TRIBUTARY TO LAKE ONTARIO

04235500 CHASCO OUTLET NEAR AUBURN, NY

LOCATION. --LAT 42°35'40"N, LONG 76°35'54"W, Cayuga County, Hydrologic Unit 8440201, on left bank 2.5 mi (4.0 km) downstream from center of Auburn, and 1 mi (1.6 km) downstream from State dam at outlet of Chasco Lake.

DRAINAGE AREA. --206 mi² (534 km²).

PERIOD OF RECORD. --November 1912 to current year. Prior to October 1966, published as "Chasco Lake Outlet."

REVISED RECORDS. --USF 324 1913-14, 1916, 1910(M), 1912(M), 1915(M), 1919, 1912(M) WRD NY 1967 Drainage area.

GAGE. --water-stage recorder and concrete control. Datum of gage is 533.92 ft (162.719 m) above mean sea level.

REMARKS. --Records fair. Diurnal fluctuation caused by mills in Auburn seasonal regulation at State dam. Diversion from Chasco Lake near station 20235500 by city of Auburn for municipal water supply; sewage returns to outlet upstream from station.

AVERAGE DISCHARGE. --51 years (1913-74), 267 ft³/s (7.524 m³/s).

EXTREMES FOR PERIOD OF RECORD. --Maximum discharge, 3,250 ft³/s (92.0 m³/s) June 23, 1972, gage height, 6.18 ft (1.88 m), minimum, about 1 ft³/s (0.03 m³/s) Dec. 1, 1936, minimum gage height, 1.19 ft (0.363 m) June 26, 1973, minimum daily discharge, 1 ft³/s (0.03 m³/s) Nov. 11, 1954.

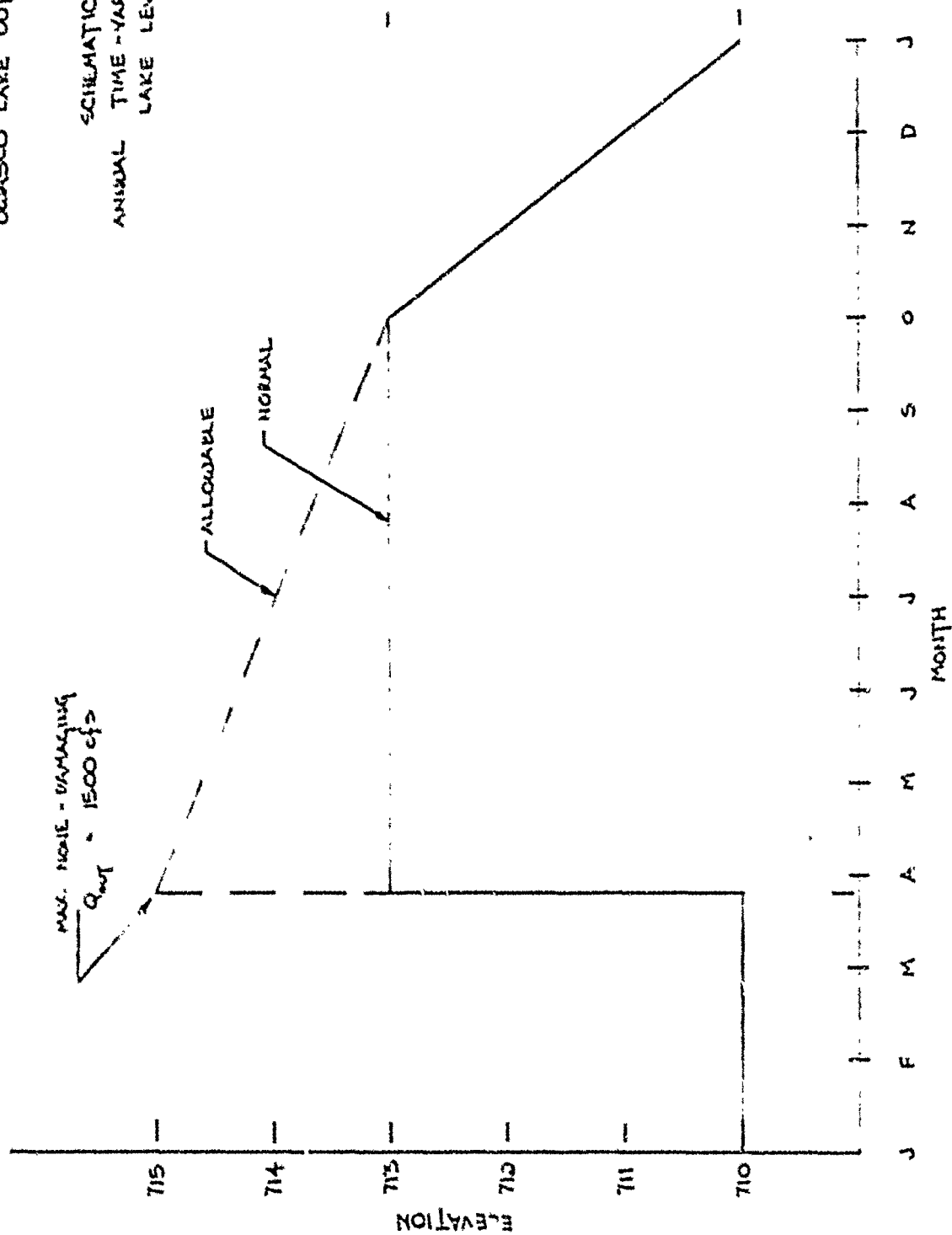
EXTREMES FOR CURRENT YEAR. --Maximum discharge, 1,720 ft³/s (48.7 m³/s) Mar. 4, gage height, 4.10 ft (1.250 m); minimum, 1 ft³/s (0.03 m³/s) Oct. 24, gage height, 1.32 ft (0.402 m).

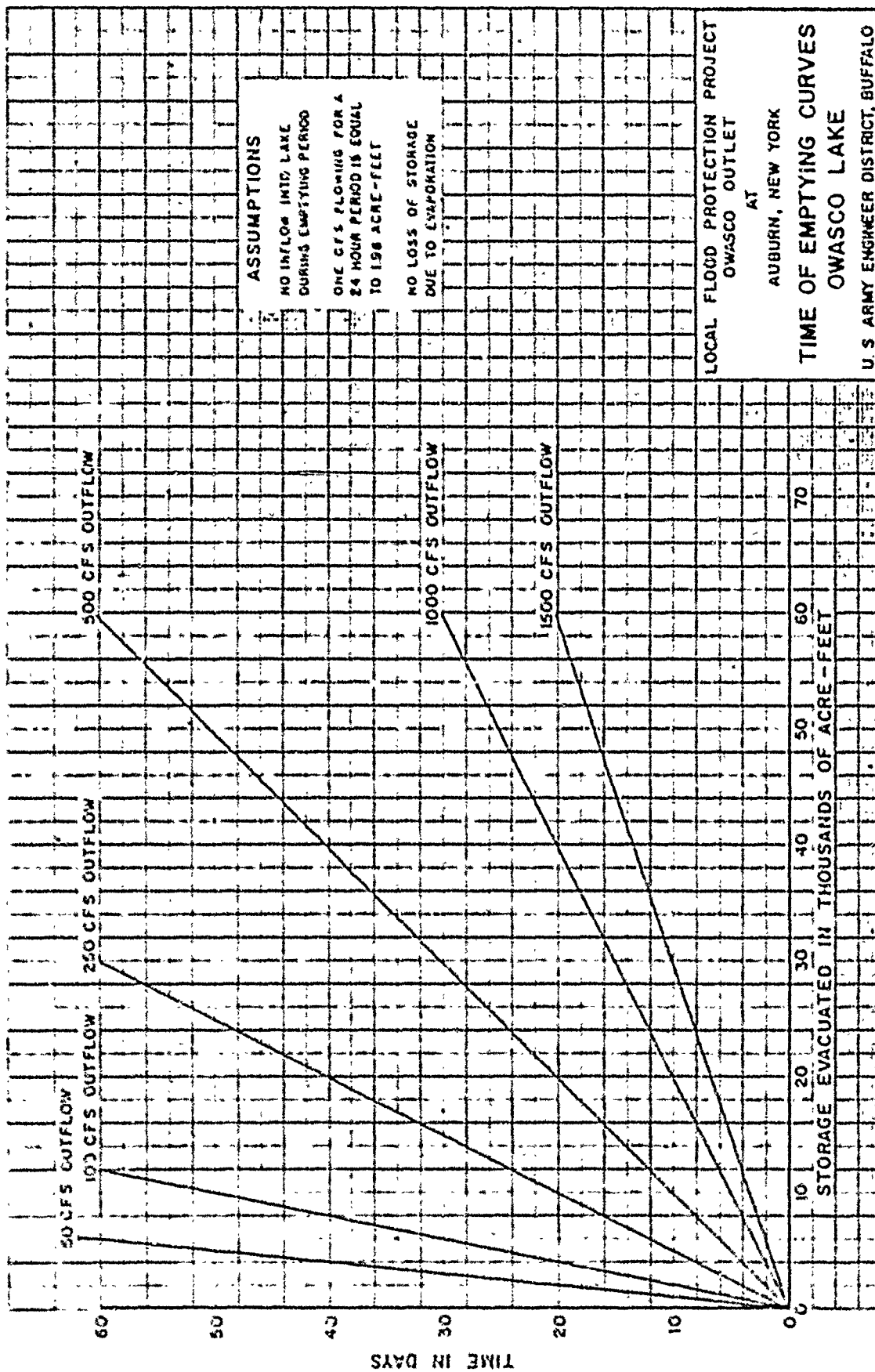
DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1410	646	215	629	653	1250	263	666	320	74	69	65
2	1240	646	267	621	662	1260	146	662	327	277	66	60
3	1130	377	277	596	639	1660	162	666	616	660	167	39
4	1950	271	277	586	631	1640	177	766	255	625	193	26
5	646	316	277	596	627	1650	191	655	366	617	190	35
6	646	297	292	596	621	1660	656	320	362	220	186	36
7	762	267	353	596	615	1620	637	56	362	60	176	36
8	796	267	380	572	611	1650	57	60	236	71	266	36
9	750	257	328	519	667	1240	57	67	66	60	596	27
10	725	262	298	565	665	1260	56	67	50	66	666	101
11	637	266	637	565	373	1240	55	56	166	70	21	190
12	565	267	526	632	616	1180	56	216	266	666	63	195
13	230	277	669	251	123	1010	53	661	257	1030	79	111
14	23	292	656	230	121	950	53	539	200	1190	166	25
15	21	292	637	170	126	690	93	611	266	1130	210	35
16	173	292	621	160	151	667	720	565	756	1070	366	30
17	316	292	636	170	296	620	691	291	362	566	260	62
18	262	292	565	150	931	662	617	661	225	150	66	25
19	297	780	526	160	1150	698	662	611	327	129	66	86
20	656	666	566	56	1210	566	662	666	251	66	65	270
21	750	226	662	50	1230	567	750	1210	650	123	66	262
22	667	266	652	67	1280	560	750	1260	750	71	62	250
23	362	257	632	66	1360	561	705	1180	796	226	65	260
24	70	186	617	66	1260	570	672	912	626	331	66	221
25	62	262	611	66	1250	626	716	560	320	166	62	210
26	20	262	666	150	1310	562	611	621	267	62	61	213
27	252	262	666	250	1280	669	657	221	300	61	56	200
28	596	252	611	613	1270	660	692	57	179	61	66	190
29	560	257	620	565	1170	665	926	55	72	195	65	193
30	566	282	620	665	---	657	919	56	61	596	62	185
31	675	---	537	660	---	399	---	55	---	290	61	---
TOTAL	17360	9350	12562	11276	22280	28066	12786	15667	18276	18222	6216	2672
MEAN	560	279	437	366	708	901	437	500	362	326	136	172
MAX	1610	666	608	665	1360	1650	726	1310	1150	1190	596	270
MIN	20	66	215	66	116	290	53	67	66	61	21	36
TOT FOR 1975	TOTAL	127965	MEAN	351	MAX	1790	MIN	10				
TOT FOR 1976	TOTAL	150255	MEAN	435	MAX	1650	MIN	20				

QUASCO LAKE OUTLET 1/2 DAM
HY-776

SCHEMATIC ANNUAL TIME-VARIATION OF LAKE LEVELS





ASSUMPTIONS

- NO INFLOW INTO LAKE DURING EMPTYING PERIOD
- ONE CFS FLOWING FOR A 24 HOUR PERIOD IS EQUAL TO 198 ACRE-FEET
- NO LOSS OF STORAGE DUE TO EVAPORATION

LOCAL FLOOD PROTECTION PROJECT
OWASCO OUTLET

AT

AUBURN, NEW YORK

TIME OF EMPTYING CURVES OWASCO LAKE

U. S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE A3

DAM: NY-776

TABLE A1 Average monthly precipitation in inches

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Auburn Water Works (1)	2.21	2.24	3.09	2.67	2.96	2.78	3.16	2.40	2.52	2.08	2.72	2.50	32.13
Locke H W (2)	2.21	2.19	2.92	2.93	3.44	3.60	3.99	3.45	2.25	3.13	2.82	2.62	36.55
Cortland (1)	2.70	2.63	3.54	3.09	3.71	3.64	4.15	3.85	3.21	3.33	3.01	3.16	40.02
Average	2.37	2.35	3.18	2.90	3.37	3.34	3.77	3.23	2.99	3.11	2.85	2.76	36.22

(1) Long-term Weather Bureau Mean
(2) 29-year average

TABLE A2 Mean monthly snowfall in inches

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Auburn Water Works (1)	18.4	17.8	14.3	3.2	.1	T	T	T	T	.4	6.8	15.1	76.1
Cortland (2)	15.0	15.1	12.5	3.9	.3	T	T	T	T	.3	5.4	11.9	64.4
Average	16.7	16.4	13.4	3.6	.2	T	T	T	T	.4	6.1	13.5	70.3

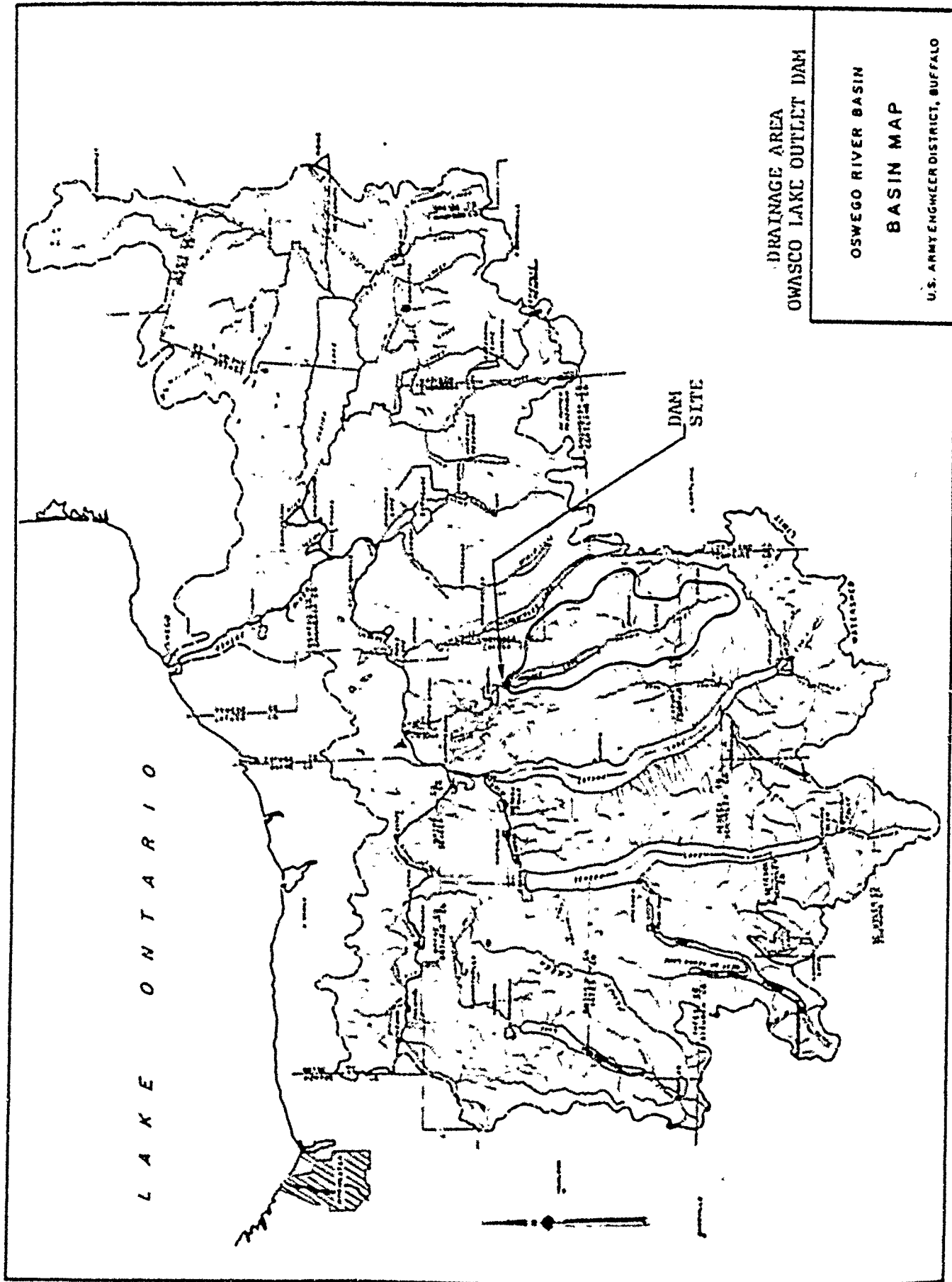
(1) 62-year average
(2) 60-year average
T = Trace

TABLE A3 Average monthly evaporation in
inches and acre-feet

Station	: May	: June	: July	: Aug.	: Sept.	: Oct.
Ithaca Cornell U. (1)	: 4.29	: 5.16	: 5.87	: 4.94	: 3.35	: 2.14
Aurora Research Farm	: 4.75	: 6.16	: 6.42	: 5.62	: 4.04	: 2.65
Average in Inches	: 4.52	: 5.66	: 6.14	: 5.28	: 3.70	: 2.40
Average loss in Acre- feet (2)	: 2,700	: 3,300	: 3,600	: 3,100	: 2,200	: 1,400

(1) Long-term Weather Bureau Mean

(2) Average loss due to evaporation in lake storage based on a
summer lake elevation of 713.0



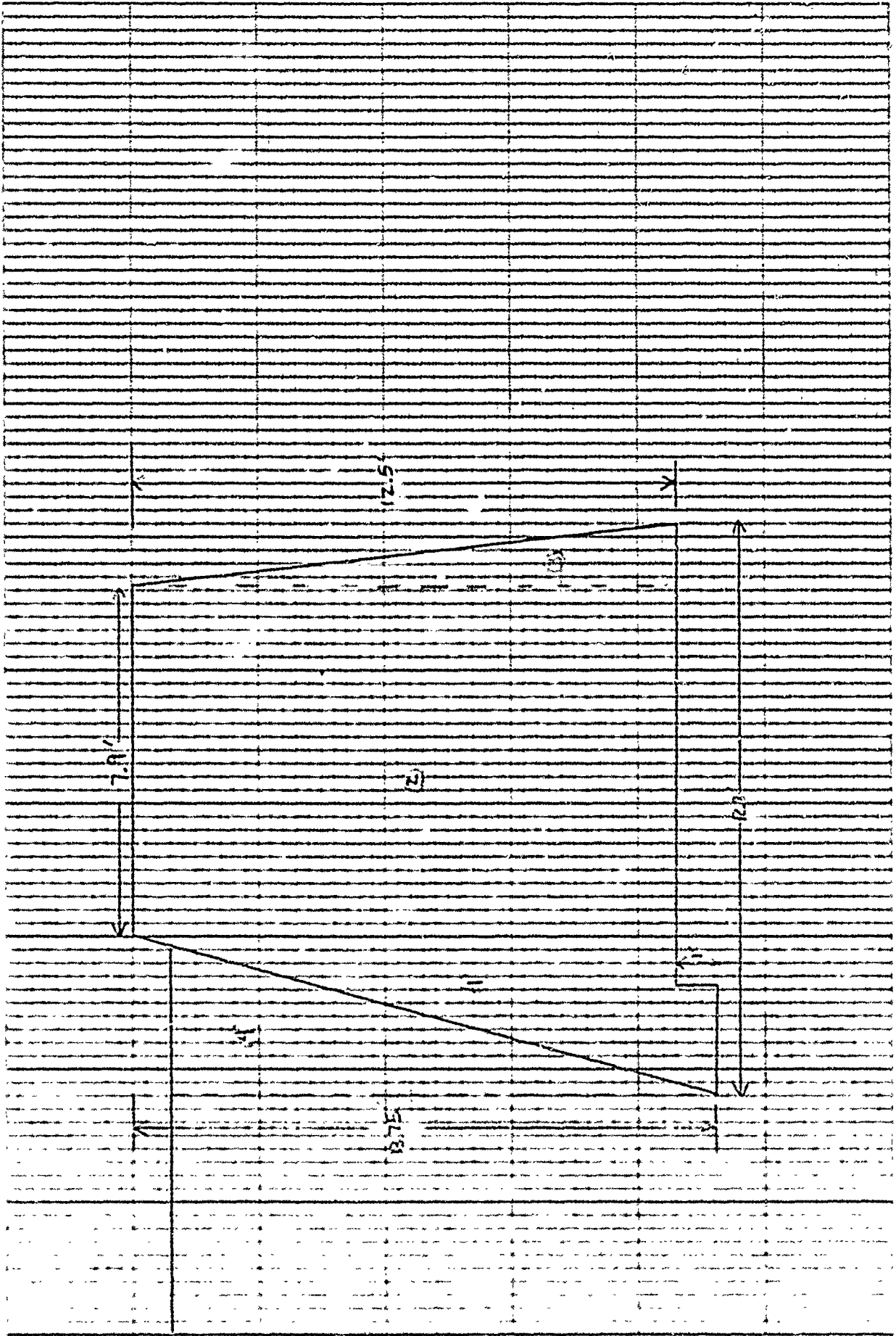
APPENDIX D

STABILITY COMPUTATIONS

10.4 IN TO THE 10.4 IN. 1.2 IN. 1.2 IN.

46 0700

10.4 IN TO THE 10.4 IN. 1.2 IN. 1.2 IN.



PROJECT GRID

JOB OWASCO LAKE OUTLET DAM		SHEET NO. 1	CHECKED BY	DATE
SUBJECT STAB. - ANALYSIS		COMPUTED BY RLW		DATE 9/14/79
COMPUTE AREAS & MOMENTS AREAS				
AREA NO.	AREA	DIST. OF FORM CENTER TO TOE		
(1)	$\frac{1}{2}(3.5)(13.75) + (11)(1) = 25.75$	10.9		
(2)	$(7.8)(12.5) = 98.75$	5.4		
(3)	$\frac{1}{2}(1.4)(13.5) = 9.45$	1.94		
(4)	$\frac{1}{2}(3.5)(12.75)(.12) + \frac{(4.5)(.12)^2}{2} = 17.55$	11.61		
CALCULATE EFFECT OF ABBON TO INCREASE SOIL RESISTANCE				
AREA $(1.3)(1.2) = 1.56$ $(1.3)(1.8) = 2.34$ $(1.3)(1.4) = 1.82$ $(1.3)(1.0) = 1.3$ $(27.03)(.15 \text{ K/ft}) = 4.05 \text{ K}$ $4.05 = \text{active force } (4.05)(.55) = 2.23 \text{ K}$ PASSIVE PRESSURE OF SOIL ON ABBON $P_p = \frac{1}{2}(0.6)(20)(4.25)^2 = 1.63 \text{ K}$ TOTAL HORIZONTAL FORCE = $2.23 - 1.63 = 0.60 \text{ K}$				

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
QUASCO LAKE CUTLET DAM	2		
SUBJECT		COMPUTED BY	DATE
STABILITY ANALYSIS		RLW	9/14/79
REVISED SLIDING SAFETY FACTORS			
NORMAL CONDITIONS			
$F.S. = \frac{\text{RESISTING FORCE} + \text{HORIZ. APREN. FORCE}}{\text{SLIDING FORCE}} = \frac{11.24 + 3.86}{6.68} = 2.26$			
ICE LOADING			
$F.S. = \frac{11.24 + 3.86}{14.12} = 1.07$			
W.P.W.F.			
$F.S. = \frac{11.24 + 3.86}{13.77} = 1.38$			
P.W.F.			
$F.S. = \frac{11.24 + 3.86}{17.83} = .84$			

PROJECT GRID

JOB	DUNBAR LAKE COAST DAM	SHEET NO.	3	CHECKED BY		DATE	
SUBJECT	SEASONAL STABILITY ANALYSIS	COMPUTED BY	R.W.	DATE	9/4/79		
1. CALCULATE WATER AT COAST - 11.0' ICE 1. CALCULATE WATER AT COAST - 11.0' ICE $P_w = C \times W \times h = (.7)(.1)(.06124)(12.75) = .056$							
2. CALCULATE MOMENT & FORCE ON EARTH DAM $M_o = 1.299 \times 12.75 = .299(.056)(12.75) = 2.71$ $V_o = .726(P_o) = (.726)(.056)(12.75) = .52$							
3. PERCENT LOSS OF COAST = 5.0' $(.75)(.05) = .192 \times 5.0'$							
4. REVISED OVERALL STABILITY SAFETY FACTOR - SEASONAL ANALYSIS $F.S. = \frac{P_{w, \text{initial}}}{\text{OVERTURNING MOMENT} - \text{EARTH DAM MOMENT}} = \frac{11.2126}{12.87 + 2.71} = 1.67$							
5. REVISED SEASONAL STABILITY SAFETY FACTOR - SEASONAL ANALYSIS $F.S. = \frac{\text{RESISTING FORCE}}{\text{OVERTURNING MOMENT} - \text{EARTH DAM MOMENT}} = \frac{0.48}{6.64 + 2.71} = 1.45$							

INPUT TO STABILITY ANALYSIS PROGRAM

<u>INPUT ENTRY</u>	<u>PROGRAM No.</u>
Unit Weight of Dam (K/ft^3)	0
Area of Segment No. 1 (ft^2)	1
Distance from Center of Gravity of Segment No. 1 to Downstream Toe (ft)	2
Area of Segment No. 2 (ft^2)	3
Distance from Center of Gravity of Segment No. 2 to Downstream Toe (ft)	4
Area of Segment No. 3 (ft^2)	5
Distance from Center of Gravity of Segment No. 3 to Downstream Toe (ft)	6
Base Width of Dam (Total) (ft)	7
Height of Dam (ft)	8
Ice Loading (K/L ft.)	9
Coefficient of Sliding	10
Unit Weight of Soil (K/ft^3)	11
Active Soil Coefficient - K_a	12
Passive Soil Coefficient - K_p	13
Height of Water over Top of Dam or Spillway (ft)	14
Height of Soil for Active Pressure (ft)	15
Height of Soil for Passive Pressure (ft)	16
Height of Water in Tailrace Channel (ft)	17
Weight of Water (K/ft^3)	18
Area of Segment No. 4 (ft^2)	19
Distance from Center of Gravity of Segment No. 4 to Downstream Toe (ft)	20
Height of Ice Load or Active Water (ft)	46

ICE LOAD
7.5 ksf

1. *Phragmites australis* (Cav.) Trin. ex Steud.

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Arar and Collins (1971). The concentration of chlorophyll was expressed as $\mu\text{g mL}^{-1}$ of the sample.

PMF

0.13	RCL	1
23.8		
23.8	RCL	2
10.5		
10.5	RCL	3
98.8		
98.8	RCL	4
5.4		
5.4	RCL	5
8.8		
8.8	RCL	6
0.94		
0.94	RCL	7
12.9		
12.9	RCL	8
13.75		
13.75	RCL	9
0.		
0.	RCL	10
0.85		
0.85	RCL	11
0.06		
0.06	RCL	12
0.23		
0.23	RCL	13
3.		
3.	RCL	14
5.		
5.	RCL	15
12.75		
12.75	RCL	16
3.		
3.	RCL	17
3.		
3.	RCL	18
0.0624		
0.0624	RCL	19
17.85		
17.85	RCL	20
11.61		
11.61	RCL	46
12.75		

0.15	RCL	1
23.8		
23.8	RCL	2
10.5		
10.5	RCL	3
98.8		
98.8	RCL	4
5.4		
5.4	RCL	5
8.2		
8.2	RCL	6
0.94		
0.94	RCL	7
12.9		
12.9	RCL	8
13.75		
13.75	RCL	9
0.		
0.	RCL	10
0.65		
0.65	RCL	11
0.06		
0.06	RCL	12
0.23		
0.23	RCL	13
3.		
3.	RCL	14
13.		
13.	RCL	15
12.75		
12.75	RCL	16
3.		
3.	RCL	17
3.		
3.	RCL	18
0.0624		
0.0624	RCL	19
17.85		
17.85	RCL	20
11.61		
11.61	RCL	46
12.75		

[illegible]

← F.S. VS. OVERTURNING →

0.142	RCL
	1
23.8	
23.8	RCL
	2
10.5	
10.5	RCL
	3
98.8	
98.8	RCL
	4
5.4	
5.4	RCL
	5
8.8	
8.8	RCL
	6
0.94	
0.94	RCL
	7
12.9	
12.9	RCL
	8
13.75	
13.75	RCL
	9
0.	
0.	RCL
	10
0.65	
0.65	RCL
	11
0.06	
0.06	RCL
	12
0.33	
0.33	RCL
	13
3.	
3.	RCL
	14
0.	
0.	RCL
	15
12.75	
12.75	RCL
	16
3.	
3.	RCL
	17
3.	
3.	RCL
	18
0.0624	
0.0624	RCL
	19
17.85	
17.85	RCL
	20
11.61	
11.61	RCL
	46
12.75	

APPENDIX E

REFERENCES

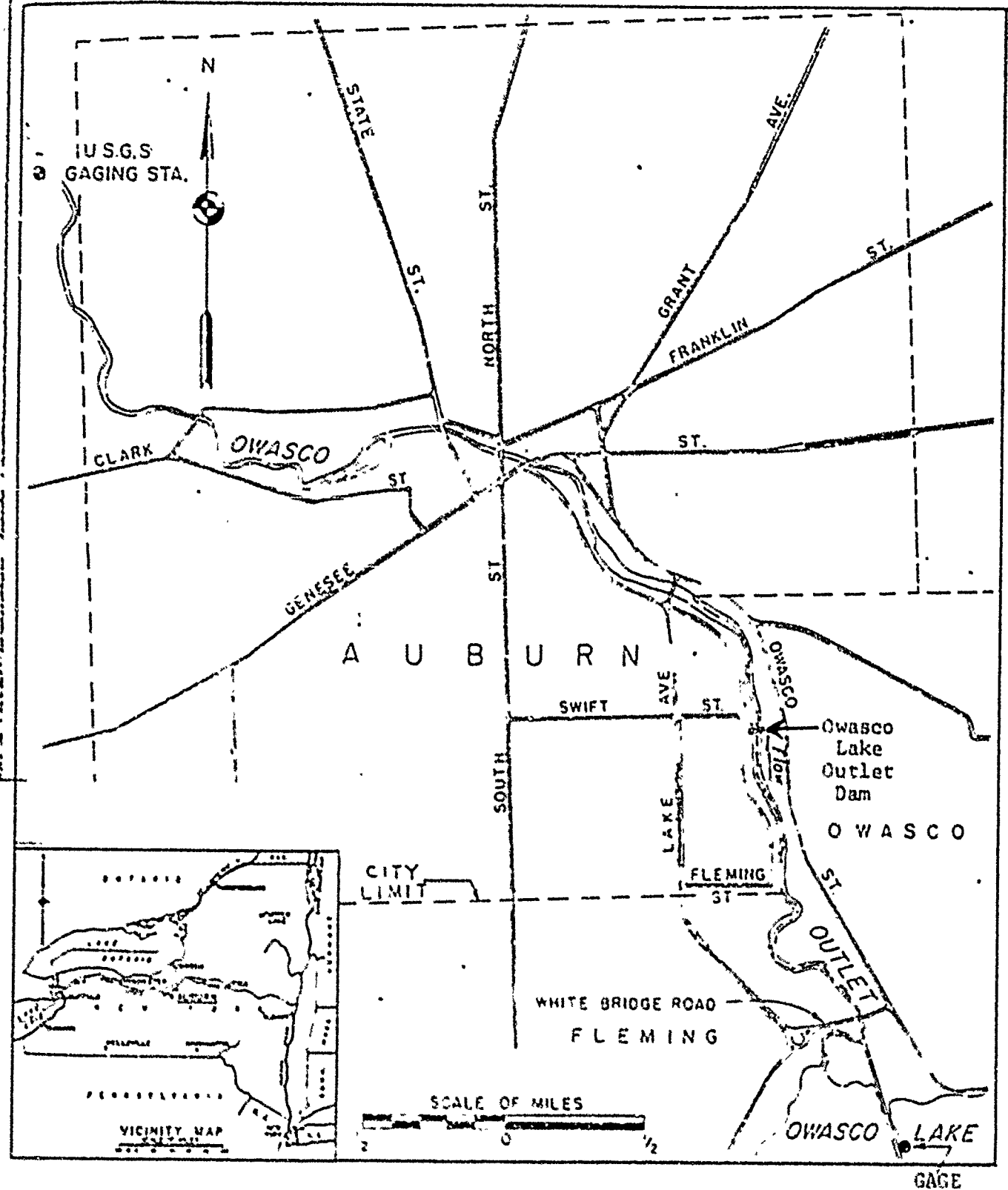
APPENDIX E

REFERENCES

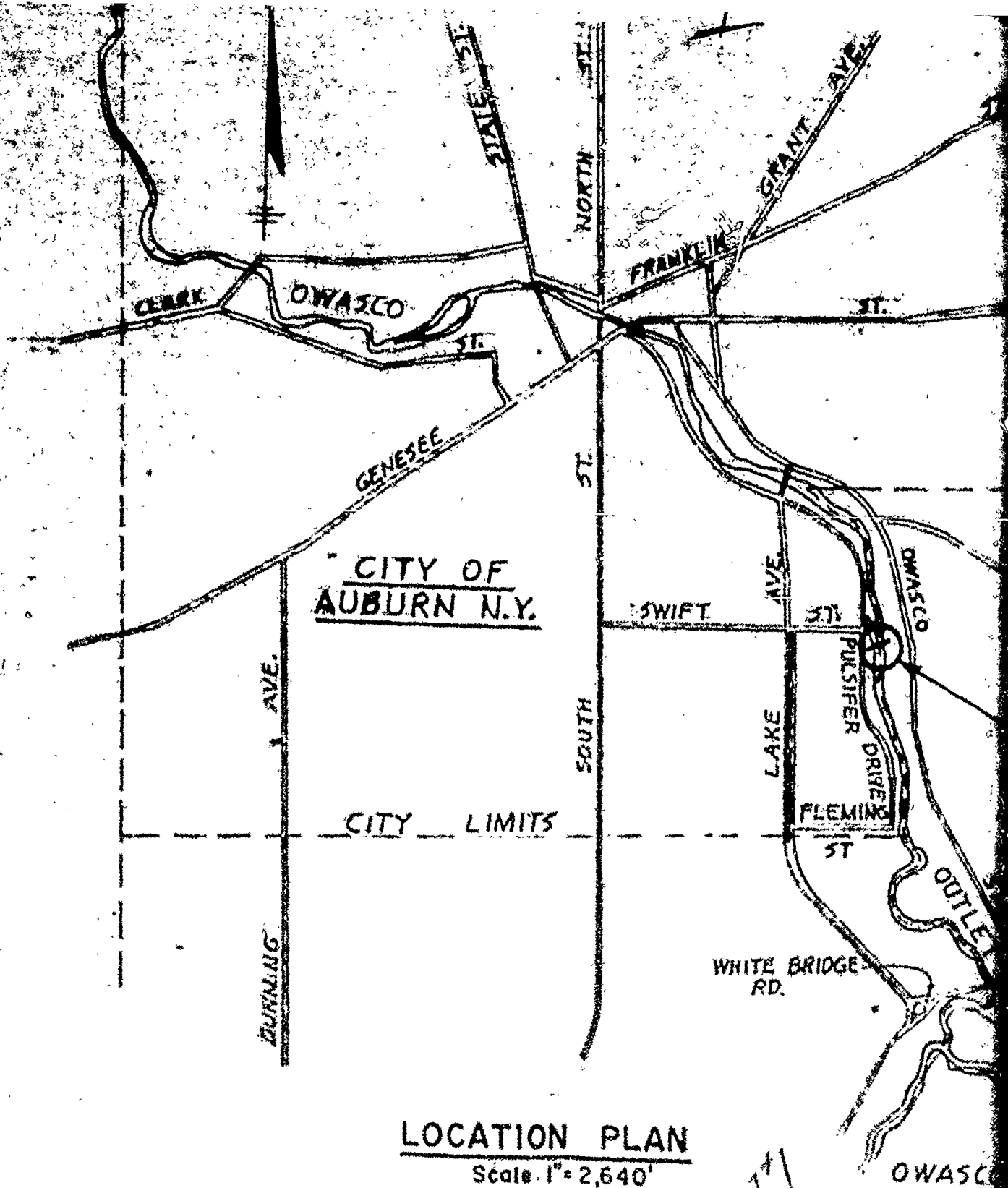
- 1) U.S. Army, Corps of Engineers:
 - a) Design Memorandum on Local Flood Protection - Auburn, New York; Buffalo District, May 1960.
 - b) HEC-1 Flood Hydrograph Package - Dam Safety Version, September 1978.
 - c) Operation and Maintenance Manual for Local Flood Protection Project on Owasco Outlet at Auburn, New York; Buffalo District, September 1961.
 - d) Owasco Lake - Standard Project Flood Hydrograph; Buffalo District; July 14, 1975 letter.
- 2) U.S. Department of Agriculture, Soil Conservation Service; National Engineering Handbook; Section 4 - Hydrology, August 1972.
- 3) U.S. Department of the Interior, Bureau of Reclamation:
 - a) Design of Small Dams, 2nd Edition (Rev. report), 1977.
 - b) Hydraulic and Excavation Table, 11th Edition, (Reprinted) 1974.
- 4) U.S. Department of the Interior, Geological Survey; Water Resources Data for New York - Water Year 1976 - Vol. 1, USGS Report NY-76-1, 1977.
- 5) H. W. Ming and E. F. Brater; Handbook of Hydraulics, 5th Edition, McGraw-Hill, 1963.
- 6) R. K. Linsley, Jr., M. A. Kohler, and J. L. H. Paulhus; Hydrology for Engineers, 2nd Edition, McGraw-Hill, 1975.
- 7) University of the State of New York; Geology of New York, Education Leaflet 29, (Reprint) 1973.

APPENDIX F

DRAWINGS



LOCATION MAP
OWASCO LAKE OUTLET DAM
NY-776



PROJECT
SITE

CO LAKE

Left
Abutment

Existing Stone to
be used for stone

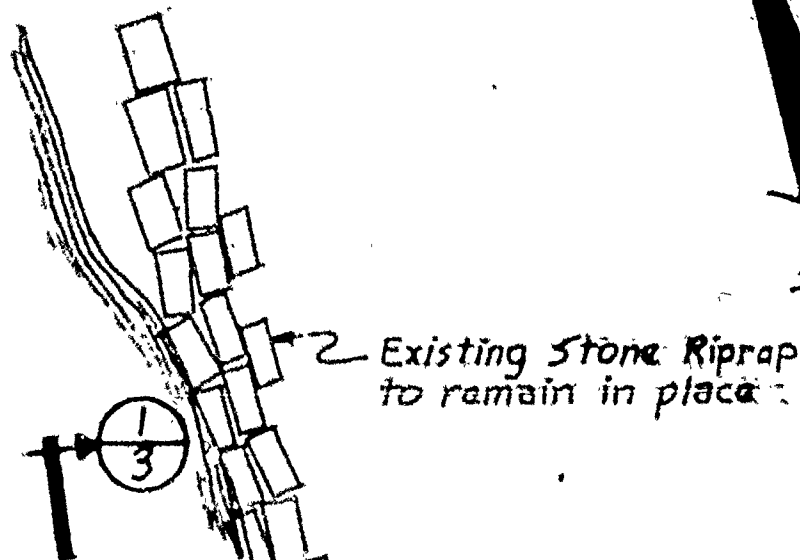
2
2

5
2

P 8 (2.0')

Center
Pier

Existing Stone
removed and



Reinforced
Concrete Lining

Right
Abutment

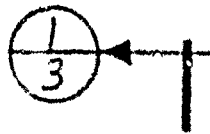
Existing
Stone &
Fill

Stone to be
used for
rip rap

METHOD OF SECTIONING

The drawing upon which a section, view or detail is taken and the drawing upon which the section detail has been shown is cross referenced with the following:

Drawing where section is taken.



The number in the upper half of the circle is the section number. The bottom number refers to the drawing number on which the section was taken.

Drawing where section is shown.



This is shown under each section. The top number is the section number. The bottom number refers to the drawing number where the section was taken.

GENERAL NOTES

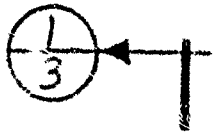
- 1) All elevations refer to the USC & GS datum.
- 2) All concrete placed in the work shall be entrained and shall have a minimum compressive strength of 4000 psi.
- 3) All exposed edges of concrete shall be finished 1/4-inch.
- 4) All reinforcing steel shall be bent to clear existing stone masonry, embedded items, piling, etc., a minimum of 1-inch.
- 5) All reinforcing steel shall be detailed in accordance with ACI 315, 'Manual of Standard Detailing'.

existing
Gravel

METHOD OF SECTIONING

The drawing upon which a section, view or detail has been taken and the drawing upon which the section, view or detail has been shown is cross referenced with symbols as follows:

Drawing where section is taken.



The number in the upper half of the circle is the section number. The bottom number refers to the sheet number on which the section can be found.

Drawing where section is shown.



This is shown under each section. The top number is the section number. The bottom number refers to the sheet number where the section has been taken.

GENERAL NOTES

- 1) All elevations refer to the USC & GS datum.
- 2) All concrete placed in the work shall be air-entrained and shall have a minimum 28 day compressive strength of 4000 psi.
- 3) All exposed edges of concrete shall be chamfered $\frac{3}{4}$ -inch.
- 4) All reinforcing steel shall be bent to clear existing stone masonry, embedded items, sheet piling, etc., a minimum of 1-inch.
- 5) All reinforcing steel shall be detailed in accordance with ACI 315 "Manual of Standard Practice"

EXPLORATION NOTES

- 1) Soils explorations were made during the period 15-25 August, 1972.
B-1, etc. indicate core holes
P-7, etc. indicate probes
- 2) Borings Number 1, 2, 3, and 6 were made with a drilled in casing and sampled with a 2" sampler. Borings number 3A, 4 and 5 were made with a 4" driven casing and sampled with a 3" sampler. Rock cores were obtained on borings number 1, 3A and 5 with a 2" M Series double tube core barrel.
- 3) Probes number 7 and 8 were made by driving an A rod probe to refusal.
- 4) Elevation of probe shown thus (-7.5') indicates rock at 7.5 feet below soil surface.
- 5) The blows per foot shown on the Boring Logs indicate the energy required to penetrate one foot of soil material.
a) 2" sampler : 140 lb weight falling 30"
b) 3" sampler : 300 lb weight falling 24"
- 6) Soils and rock descriptions are from visual examination of the samples.
- 7) Boring B-3 refused on batter of retaining wall.

Steel Sheet
Pile Wall
Top of Wall
El. 716.25

B-5

El. 713.6

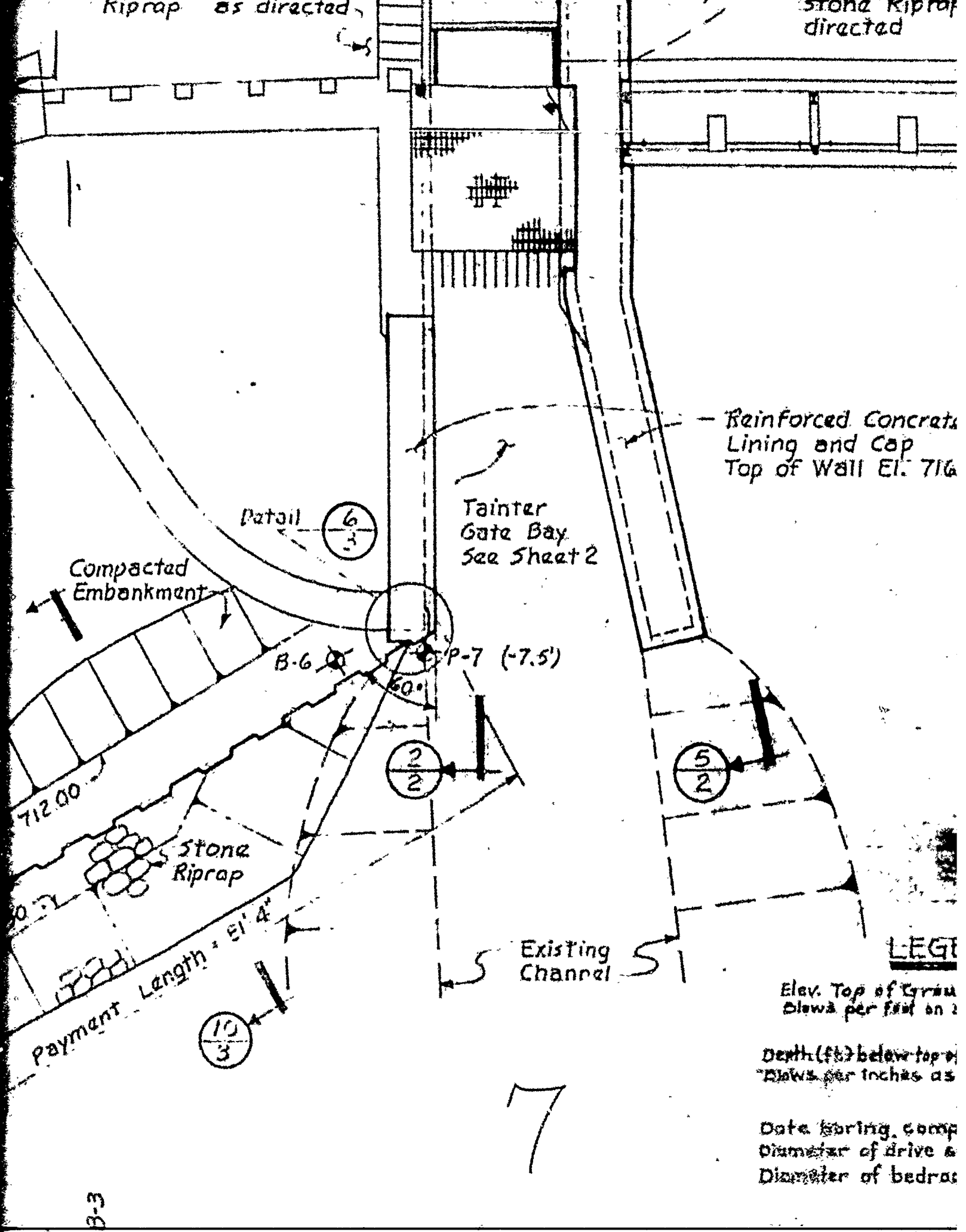
IN FEET (TYP)

IN FEET (TYP)

6

Riprap as directed

Stone Riprap directed



Tainter Gate Bay
See Sheet 2

Reinforced Concrete
Lining and Cap
Top of Wall El. 716

Compacted
Embankment

Detail

$\frac{6}{3}$

B-6

P-7 (-7.5')

$\frac{2}{2}$

$\frac{5}{2}$

Stone
Riprap

Payment Length = El. 4'

$\frac{10}{3}$

Existing
Channel

LEG

Elev. Top of Gravel
Blows per foot on

Depth (ft) below top of
Blows per inch as

Date boring, comp
Diameter of drive &
Diameter of bedrock

OWASCO OUTLET

Reinforced Concrete
Lining and Cap
Top of Wall
El. 716.50



Detail

7/3

Payment Length = 40'

Detail

7/3

El. 713.50

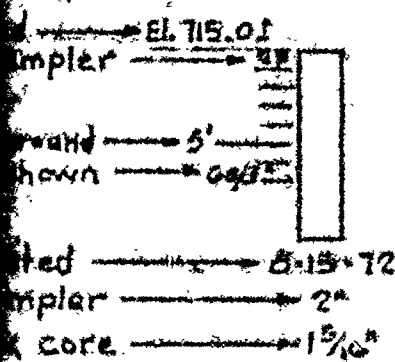
Stone
Riprap

Existing Stone
Masonry Wall to be
partially removed and
the area reshaped
as shown

SITE PLAN

Scale 1" = 10'-0"

ND (Subsurface Exploration)

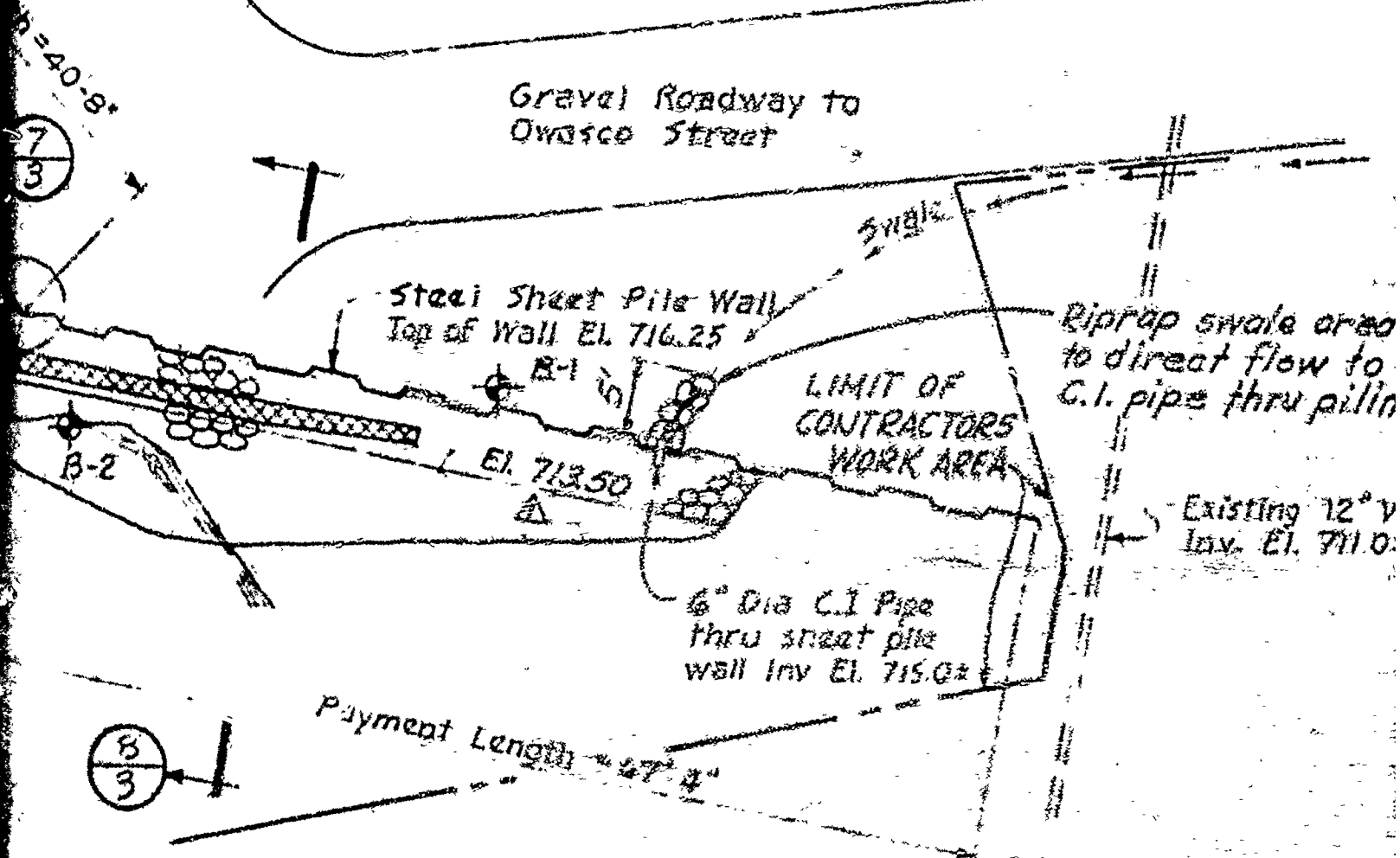


UNITED SOIL CLASSIFICATION SYMBOLS

- GP Gravel or sandy gravel, poorly graded
- GM Gravel or sandy gravel, silty
- SM Sand or gravelly sand, silty
- ML Silt, inorganic, low to no plasticity
- PT Peat or highly organic

Concrete. Reinforce all concrete not shown with #5 @ 12 Horizontal or Longitudinal #4 @ 12 Vertical or Transverse.

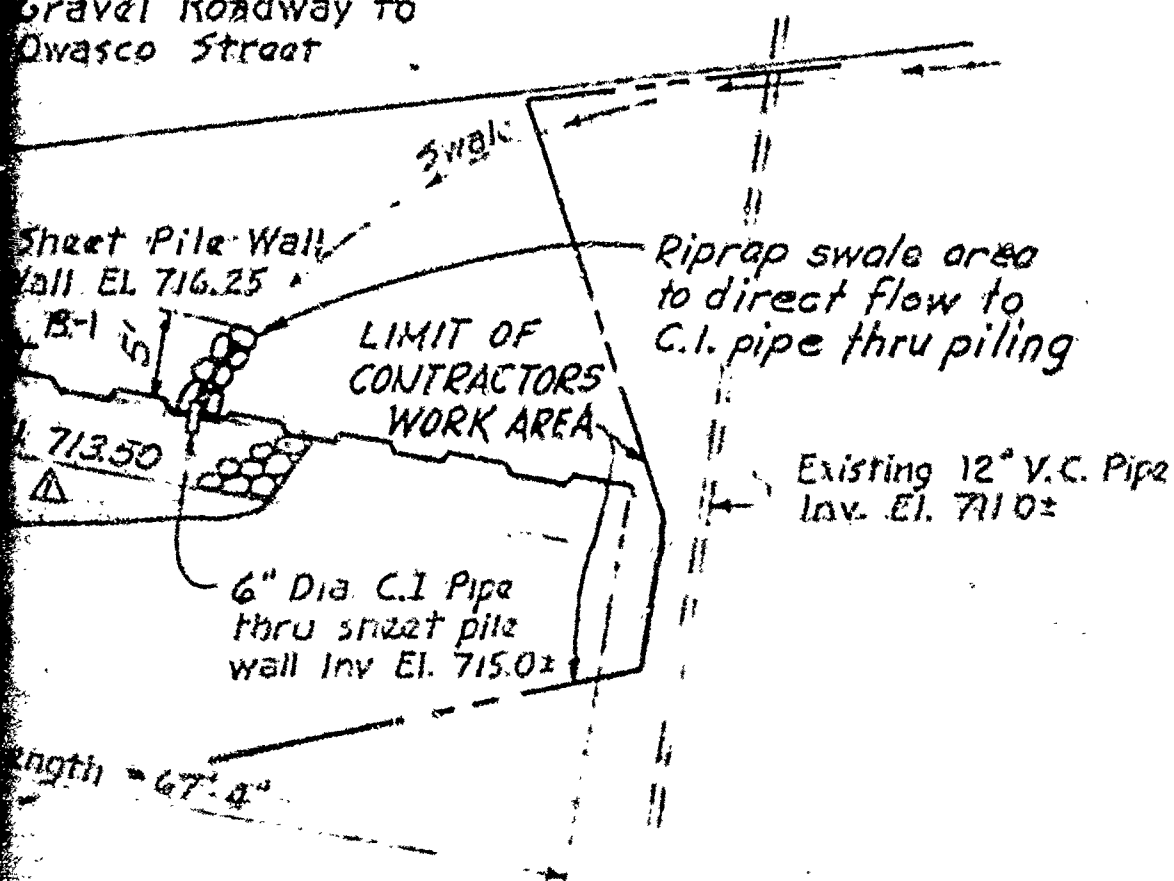
- 6) Backfill shall not be placed against new lining until approved by the Contractor.
- 7) All dimensions shall be verified in the field.
- 8) For additional definition of contractor work see Sht. 4 of 4



ACI 318, "Building Code Requirements for Reinforced Concrete". Reinforce all concrete not otherwise shown with #5 @ 12 Horizontal or Longitudinal, and #4 @ 12 Vertical or Transverse.

- 6) Backfill shall not be placed against new concrete lining until approved by the Contracting Officer.
- 7) All dimensions shall be verified in the field.
- 8) For additional definition of contractor work areas, see Sht. 4 of 4.

Gravel Roadway to
Qwasco Street



9

10

were obtained on borings number 1, 3A and 5 with a 2" M series double tube core barrel.

3) Probes number 7 and 8 were made by driving an A rod probe to refusal.

4) Elevation of probe shown thus (-7.5') indicates rock at 7.5 feet below soil surface.

5) The blows per foot shown on the Boring Logs indicate the energy required to penetrate one foot of soil material.

a) 2" sampler : 140 lb weight falling 30"

b) 3" sampler : 300 lb weight falling 24"

6) Soils and rock descriptions are from visual examination of the samples.

7) Boring B-3 refused on batter of retaining wall.

Steel Sheet
Pile Wall
Top of Wall
El. 716.25

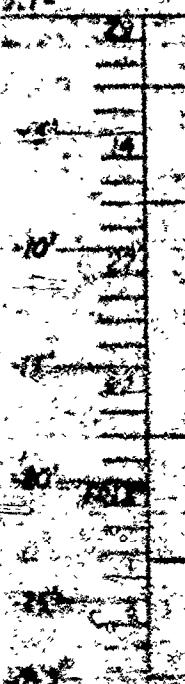
B-5

DEPTH IN FEET (TYPE)

BLOWS/FOOT (TYPE)

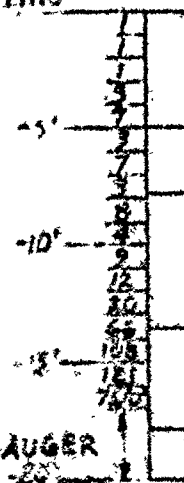
B-1

El. 715.12



El. 711.0 ±

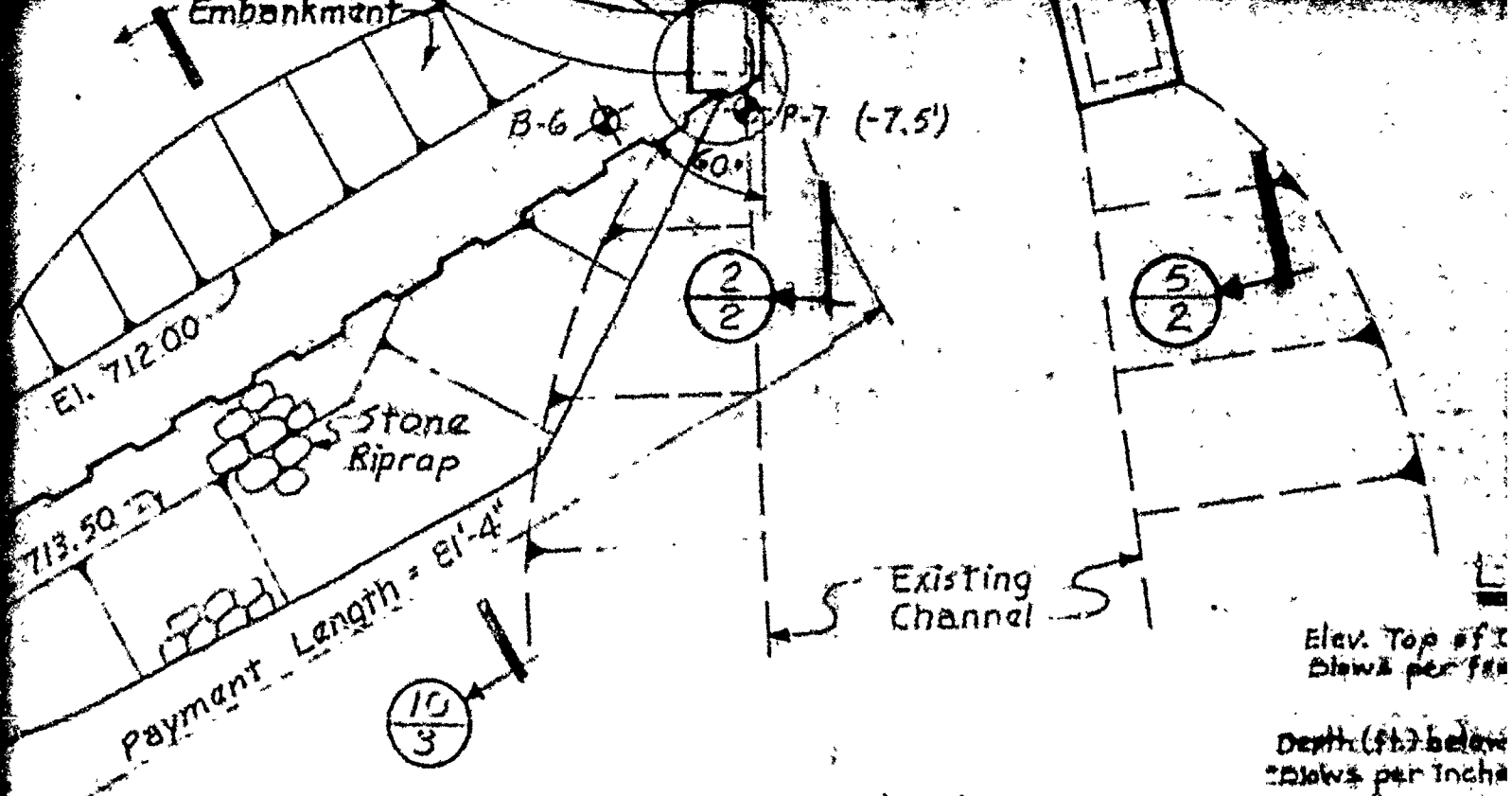
B-2



AUGER

8-16-72

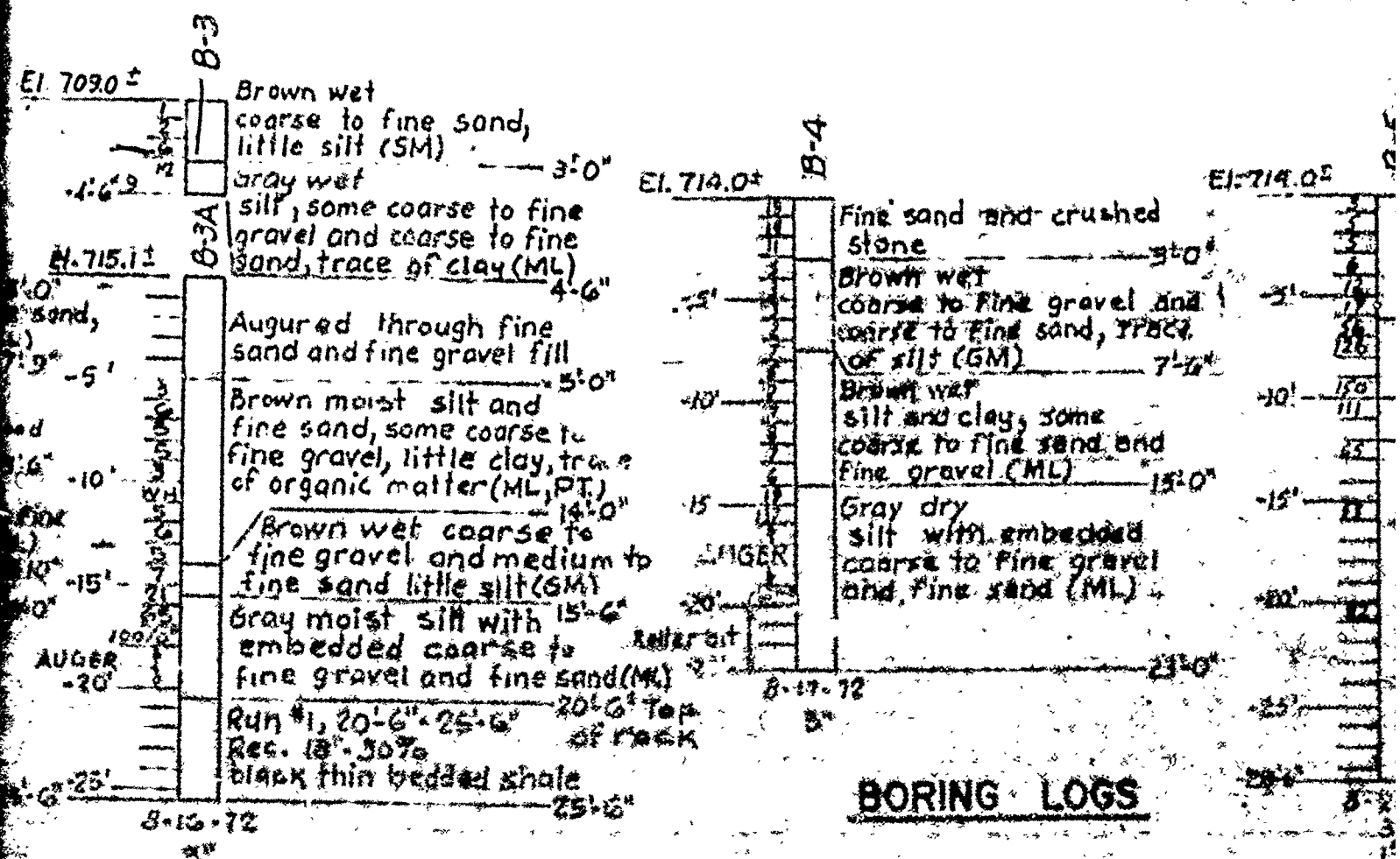
2"



Elev. Top of
Blows per foot

Depth (ft.) below
Blows per inch

Date boring,
Diameter of dr
Diameter of b



BORING LOGS

SITE PLAN

Scale 1" = 10'-0"

Stone
Riprap

9
3

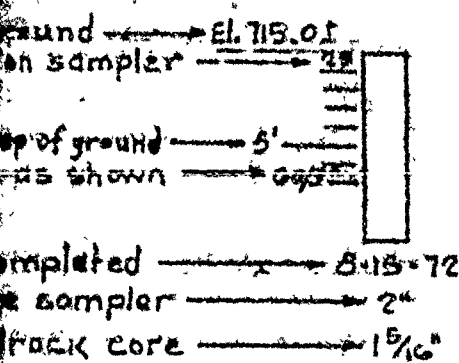
Existing Stone
Masonry Wall to be
partially removed and
the area reshaped.
as shown

El. 713.50

B-3A

B-3

GEND (Subsurface Exploration)



UNITED SOIL CLASSIFICATION SYMBOLS

- GP Gravel or sandy gravel, poorly graded
- GM Gravel or sandy gravel, silty
- SM Sand or gravelly sand, silty
- ML Silt, inorganic, low to no plasticity
- PT Peat or highly organic

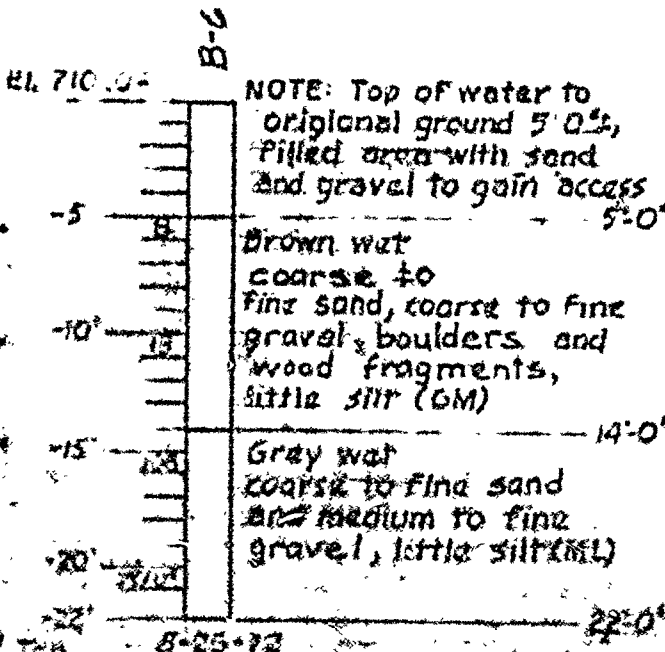
8

Brown moist fine
to coarse sand, fine to
coarse gravel and silt,
little clay (SM) — 4'-0"

Brown moist
silt with embedded fine
sand and fine gravel (ML) — 10'-0"

Brown wet
coarse to fine gravel and
coarse to fine sand (GP) — 12'-0"

Gray moist
silt with embedded
coarse to fine gravel
and fine sand (ML) — 22'-0"



INDEX

SHEET NUMBER

1 of 4 SITE

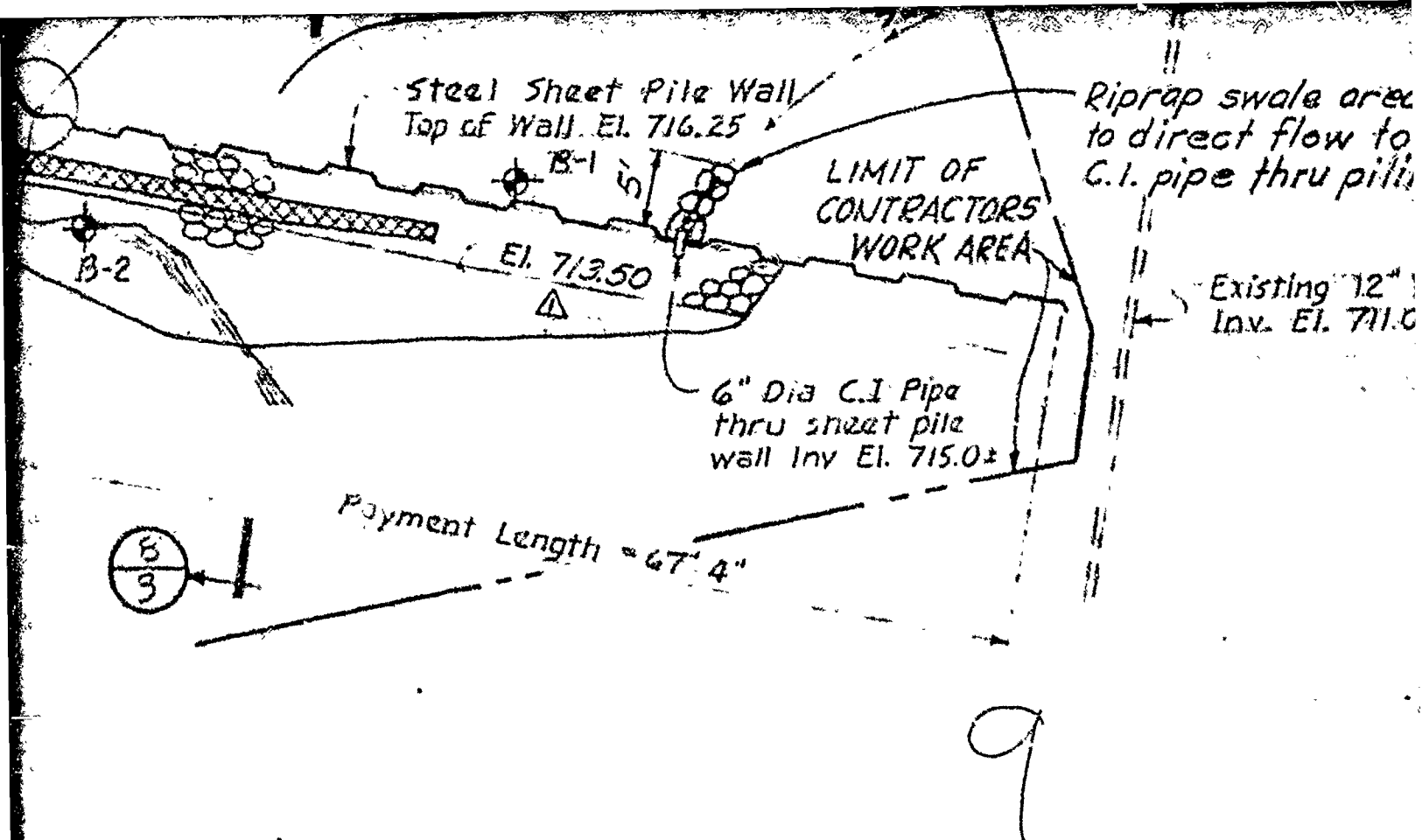
2 of 4 LEFT

3 of 4 RIGHT

4 of 4 CENTER

Run #1, 23'-6" to 26'-6" — 21'-6" TOP
of Rock

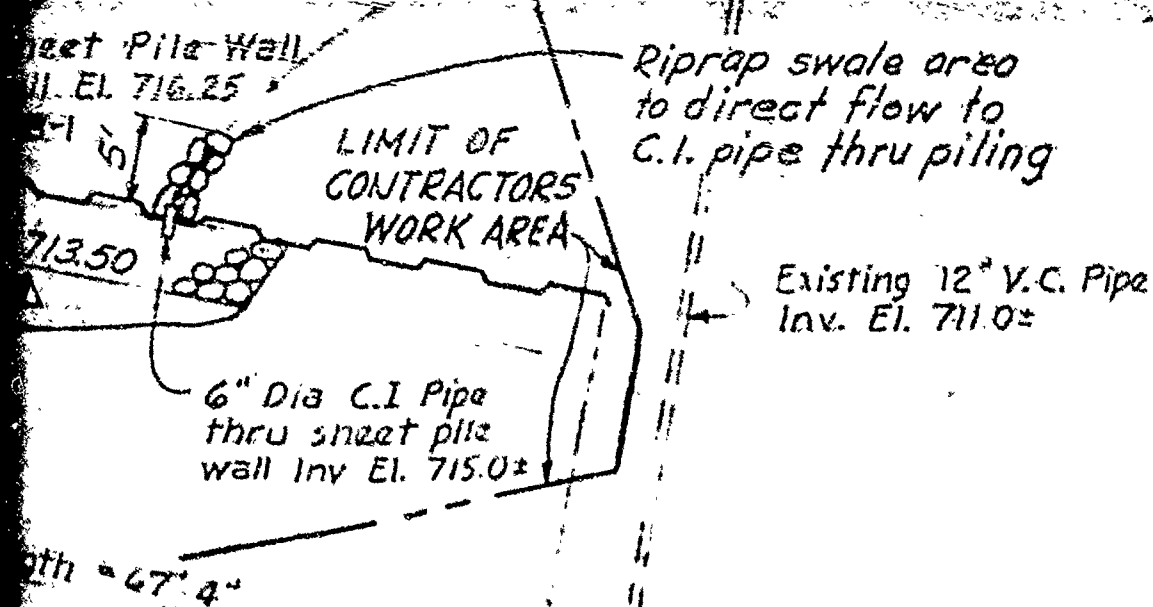
Black thin bedded SHALE



INDEX TO DRAWINGS

- TITLE
- RIGHT ABUTMENT & CENTER PIER SECTIONS & DETAILS
- RIGHT ABUTMENT & MISCELLANEOUS SECTIONS & DETAILS
- EXISTING CONDITIONS - AUGUST, 1972

 O'BRIEN & GERE ENGINEERING INC. Syracuse, New York		U.S. ARMY STATE DA OWASCO AUBURN, I SITE PLAN & GE
DESIGNED: GAA	DATE: 11/14/72 Revised in accordance with an	
DRAWN: DRT & GPK		
CHECKED: RKM		
SUBMITTED: <i>[Signature]</i>		
RECOMMENDED: <i>[Signature]</i>	CHIEF, ENGRG. DIVISION, BUFFALO DISTRICT OFFICE	
APPROVED: <i>[Signature]</i>	COL. E. DISTRICT ENGINEER	
TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW 49-73-B-0001		DATE: SCALE: SHEET



9

10

11/14/72		Revised in accordance with amendment 0002		File
REV.	DATE	DESCRIPTION		BY
 O'BRIEN & GERE ENGINEERS INC. Syracuse, New York		U.S. ARMY ENGINEER DISTRICT, BUFFALO CORPS OF ENGINEERS BUFFALO, NEW YORK 14207		
DESIGNED: GAA DRAWN: DRT & GPK CHECKED: RKM SUBMITTED: <i>[Signature]</i>		STATE DAM REPAIRS OWASCO OUTLET AUBURN, NEW YORK SITE PLAN & GENERAL NOTES		
RECOMMENDED: <i>[Signature]</i> CHIEF/ENGR. DIVISION, BUFFALO DISTRICT OFFICE				
APPROVED: <i>[Signature]</i> SO. C.E. DISTRICT ENGINEER		DATE: 20 SEPTEMBER 1972 SCALE: AS SHOWN		
TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW49-73-B-0021		DRAWING NUMBER 239-ADR-1/1 SHEET 1 OF 4		

1

Existing
Left Abutment

1
2

Steel Sheet
Pile Wall

New Conc. Lining & Cap

2
2

Flow

Existing Precast
Concrete Channel

Concrete Anchor,
Max. Spacing
4'-0" o.c. Staggered
(Typ.)

New Concrete
Lining & Cap

5
2

1'-0" Typ.

1'-0" 2'-0" 4'-0"

1
2

No
Pro
for
Sec
Det

2

Stone Masonry
Buttment Wall

New Concrete

Trashrack
not shown

Existing
Concrete
Lining

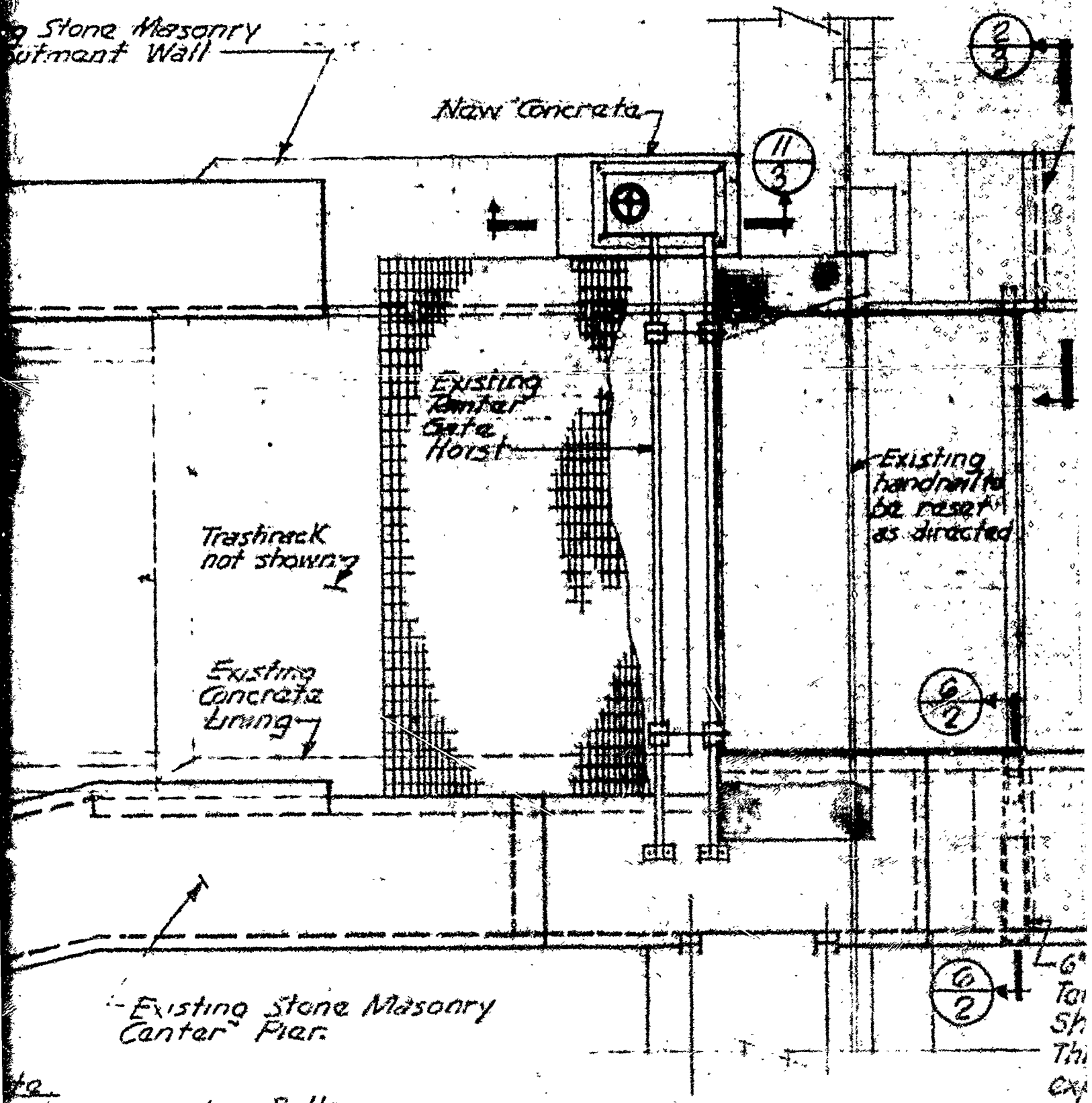
Existing
Center
Gate
Hoist

Existing
handrail to
be reset
as directed

Existing Stone Masonry
Center Pier

Install new anchor Bolts
in pier for bearing. See
Detail 3 for Typical

LEFT ABUTMENT AND CENTER PIER





Weap hole

Existing Concrete Lining

Flow →

Deteriorated Concrete Lining to be repaired - Similar to opposite wall. See Sec. 2 this sheet and Section 2, Sheet 3.

6" ID Pipe Sleeve for Joints. Bolt Bearing. Shaft removal. Provide threads top for exposed end.

2
2

5
2

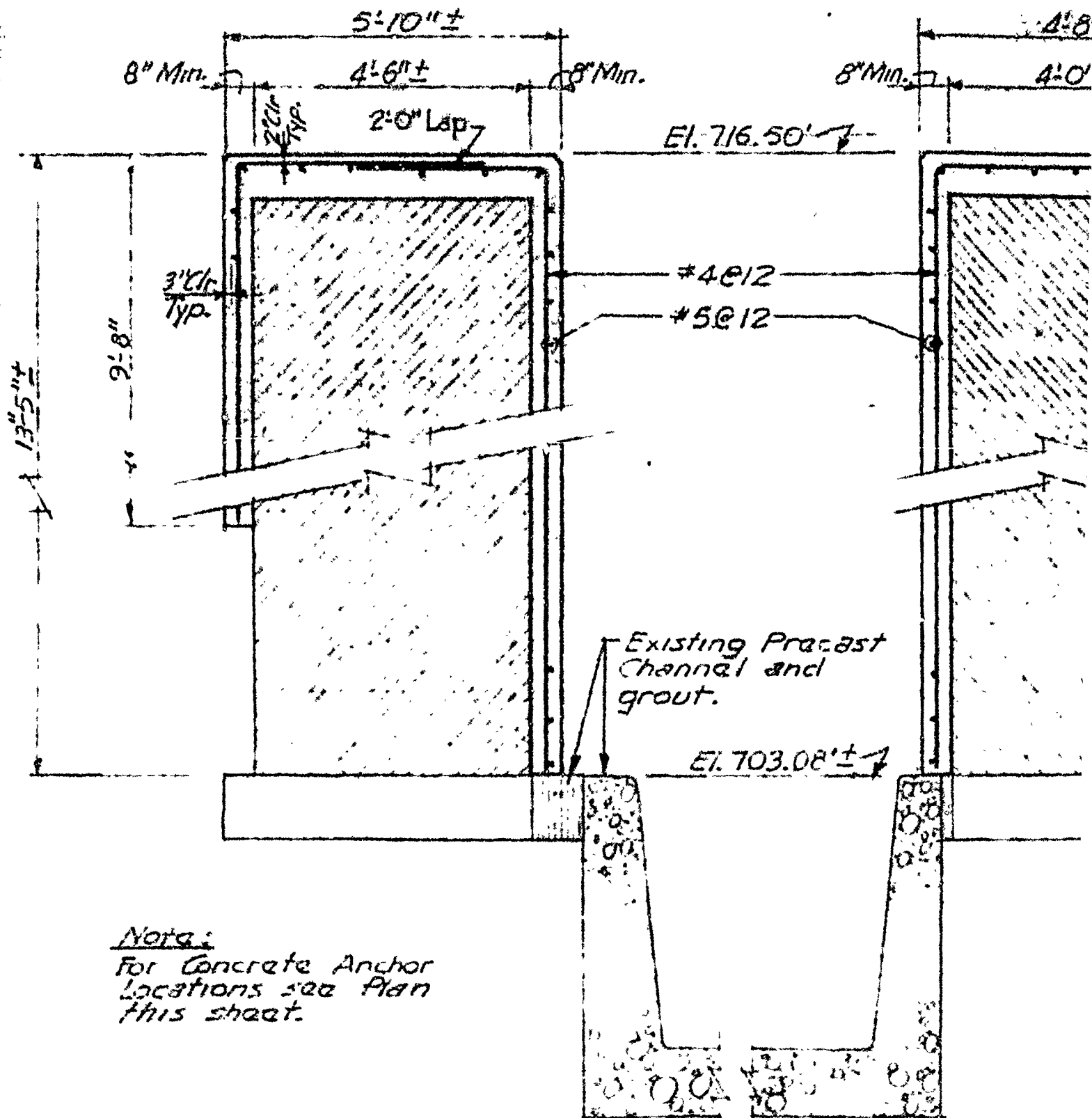
13'-5"

PIER - PLAN

existing stone masonry
existing stone masonry

existing concrete lining

4



Note:
For Concrete Anchor
Locations see Plan
this sheet.

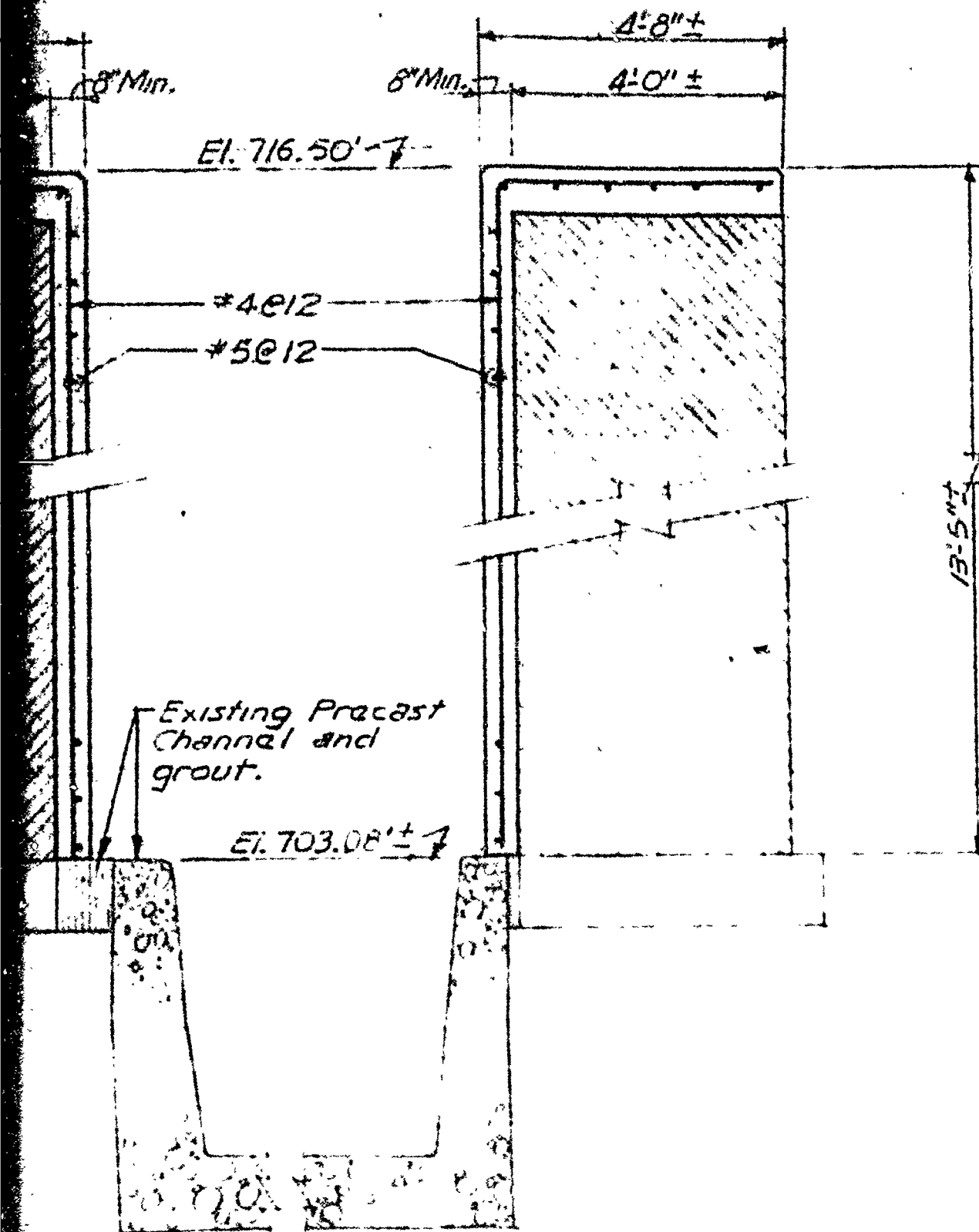
SECTION 1
Scale: 1/2" = 1'-0"

6'-7"±

4

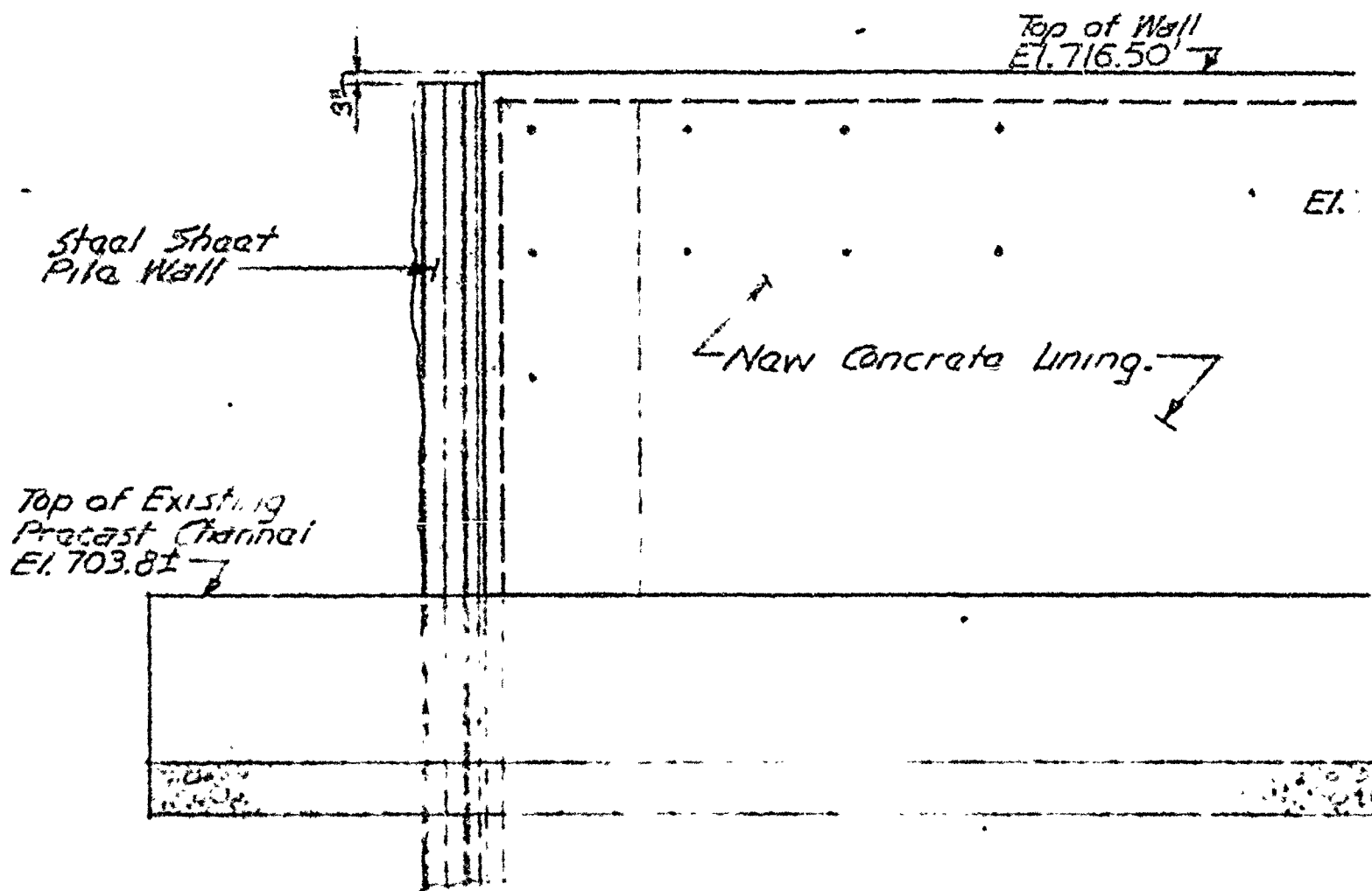
1

5

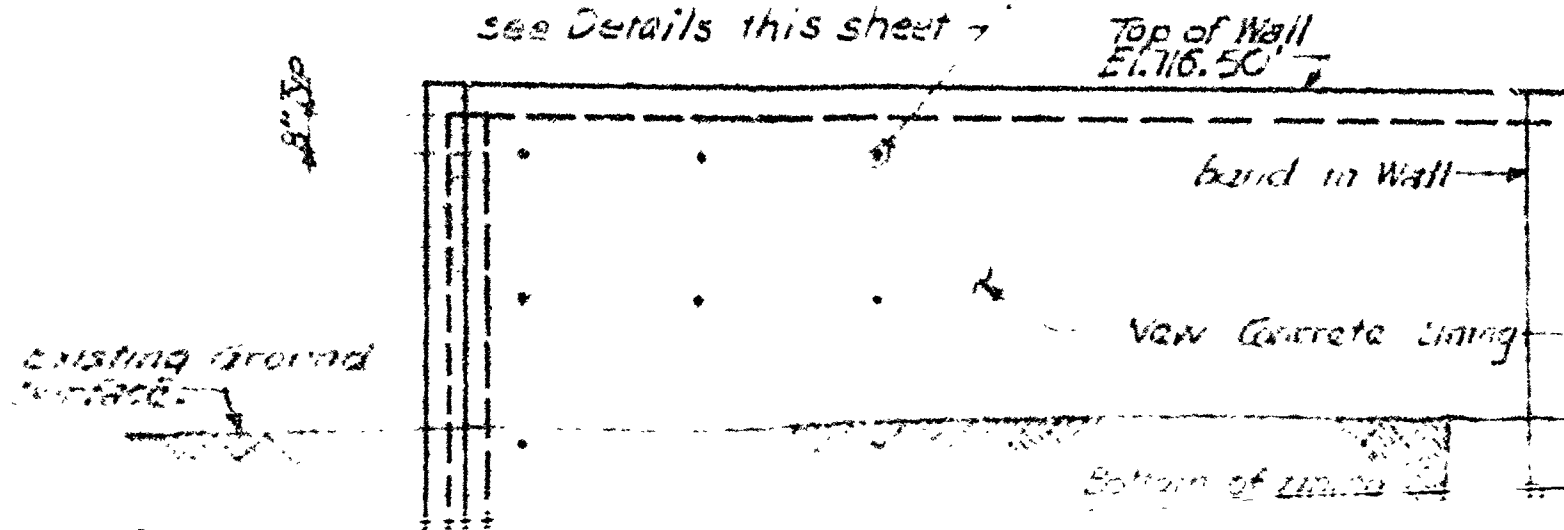


SECTION 1
Scale: $\frac{1}{2}'' = 1'-0''$ 2

6



Grouted in reinforcing
bar anchors. Max.
spacing @ 3'-0" c/c Vert
and 4'-0" c/c Horiz. Typ
all faces. For installation,
see Details this sheet



13-6"±

El. 712.5'±

Existing trashrack
& Platform.

Standard file

Tainter Gate
No. shown
See sheet 3 -

Existing Gate 7

Existing Concrete Lining.

1 Deteriorated
1 Concrete Lining
1 to be replaced

195

 ± 0.08

SECTION

Scale: $\frac{1}{4}'' = 1'-0''$

$$\frac{2}{1}$$


6:00"

4183"

31011

1:00

7-#57

#4012748

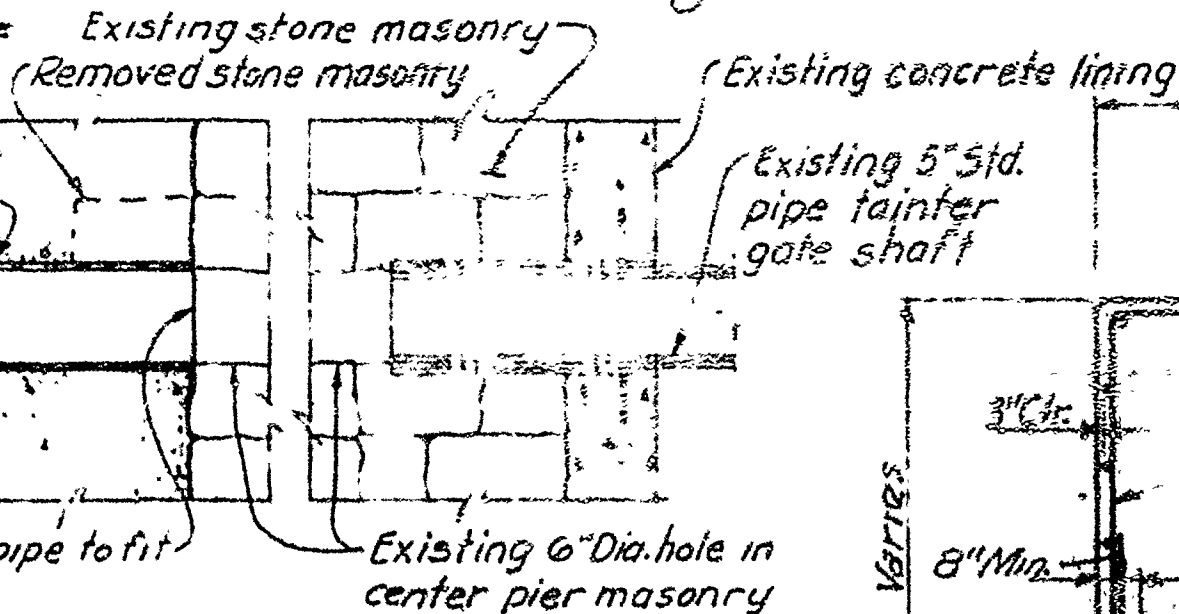
4-75

 $6.0 \pm$

#4@12

New 6'

R-PLAN



SECTION 6/2

Not to Scale

Tainter Bearing

4" Weep Hole (This wall only)

6'-0"

Existing Conc. Lining. Do not disturb exist. bond between Lining and sound Stone Masonry

Remove all existing loose displaced pieces of stone masonry

Varies

3" C/L

8" Min.

1'-6" TYP

Existing Stone Masonry

Remove all loose and deteriorated stone masonry to the approximate limits shown

7-#5

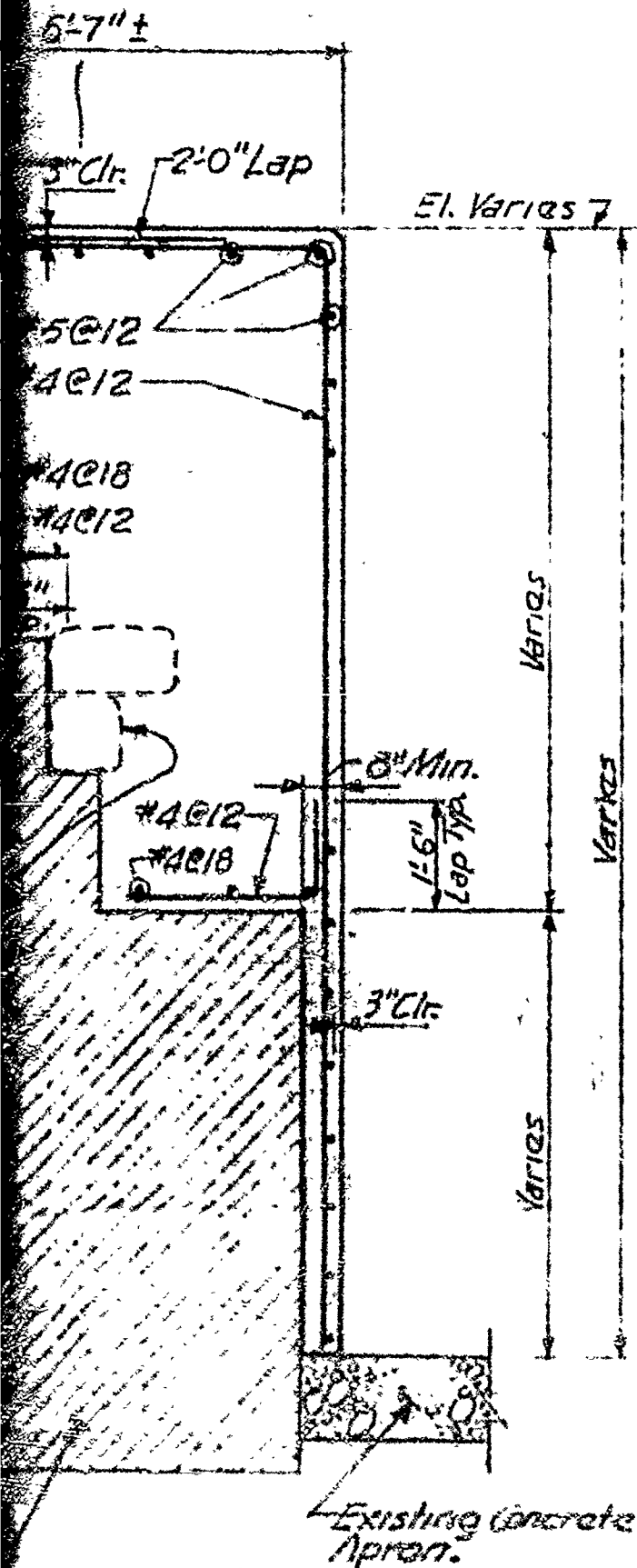
5-#6 @ 12"

5'-0"

1'-6"

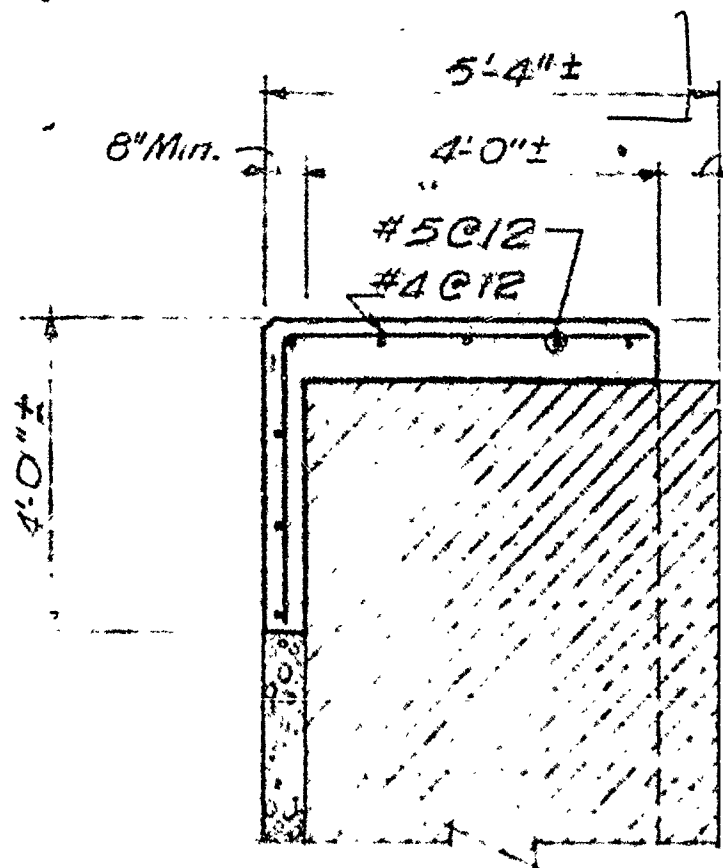
6" pipe

Scale

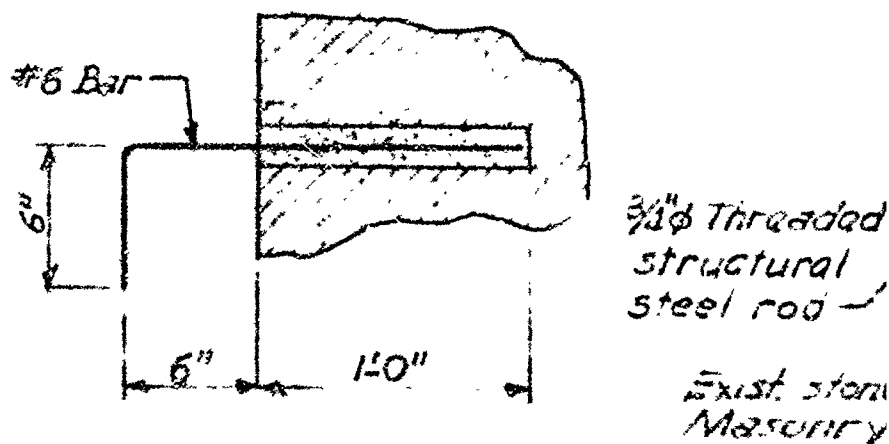


SECTION 3
Scale: 1/2" = 1'-0" 2

SECTION 1
Scale: 1/2" = 1'-0" 2



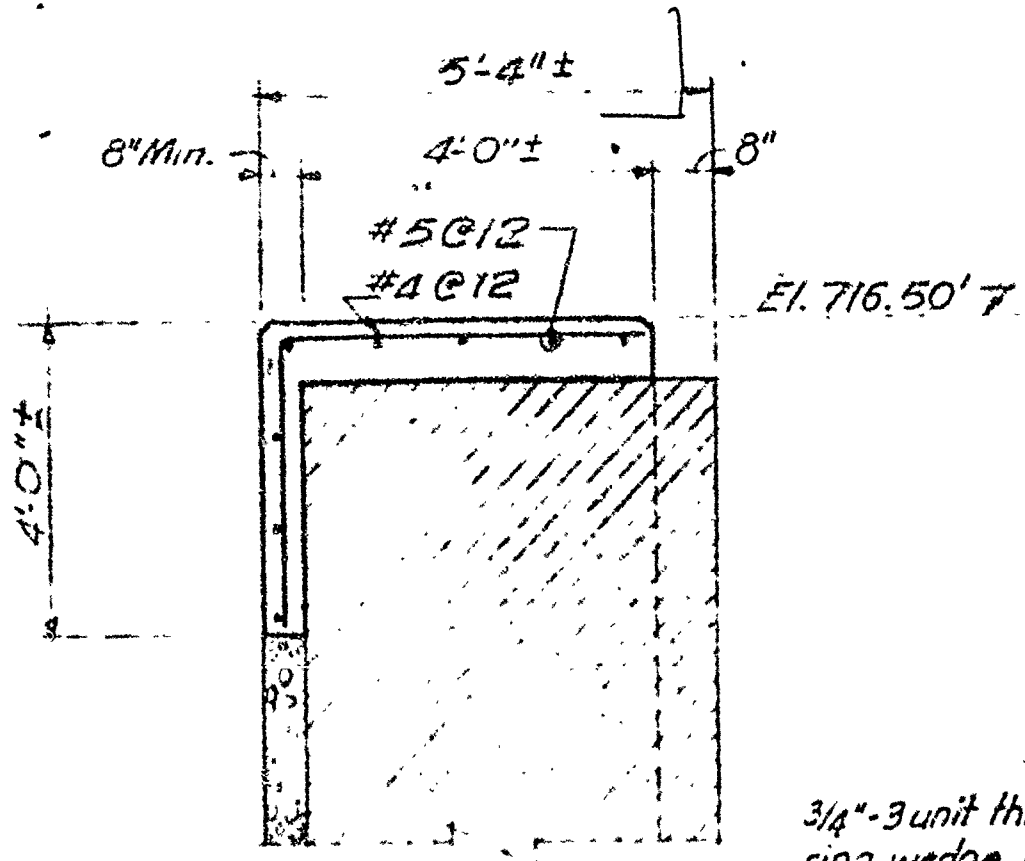
SECTION 4
Scale: 1/2" = 1'-0" 2



GROUTED-IN REINFORCING BAR ANCHORS

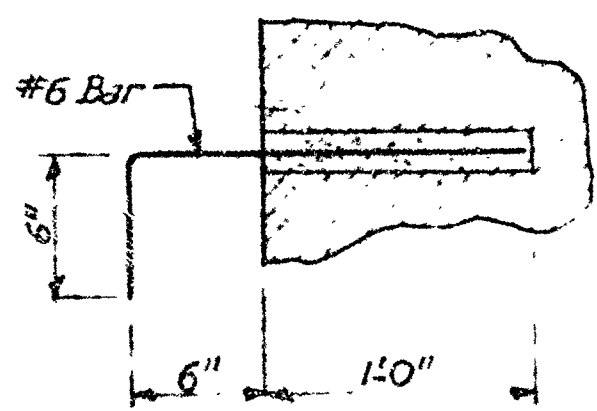
Scale: 1 1/2" = 1'-0"

SECTION 1
Scale: 1/2" = 1'-0" (2)



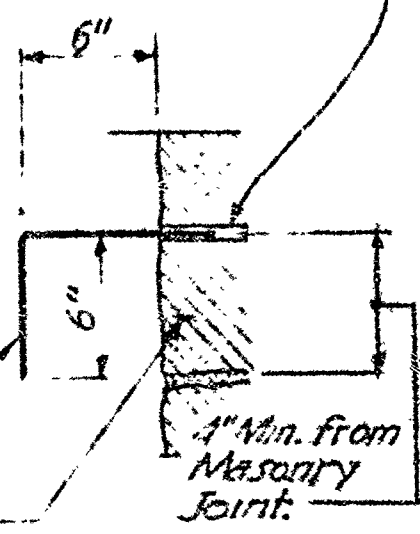
SECTION 4
Scale: 1/2" = 1'-0" (2)

3/4"-3 unit threaded ring wedge cinch anchor, Type 2 or equal. Anchor in sound stone masonry only.



3/4" Threaded structural steel rod

Exist. stone Masonry



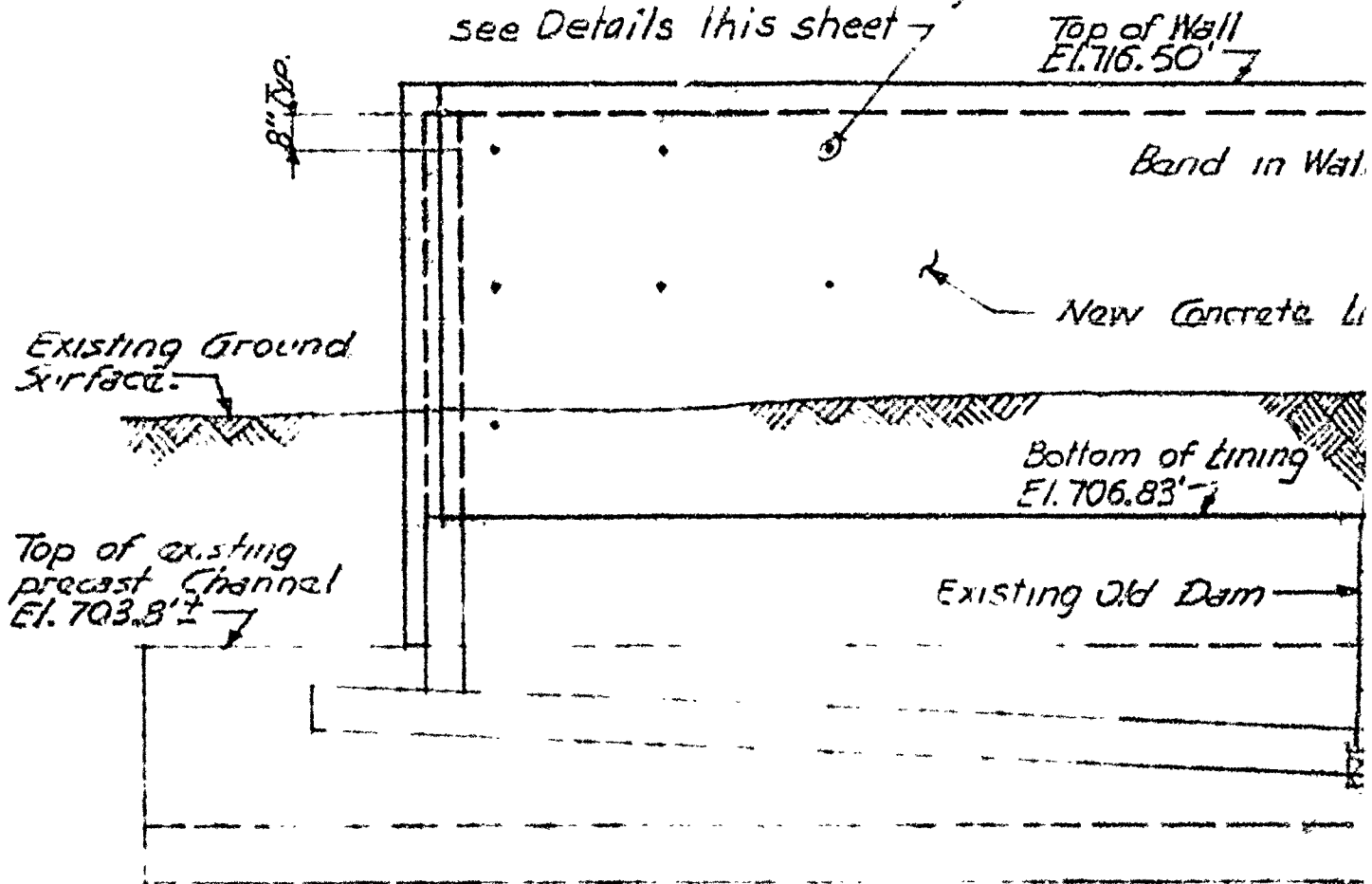
GROUTED-IN REINFORCING
BAR ANCHORS

Scale: 1/2" = 1'-0"

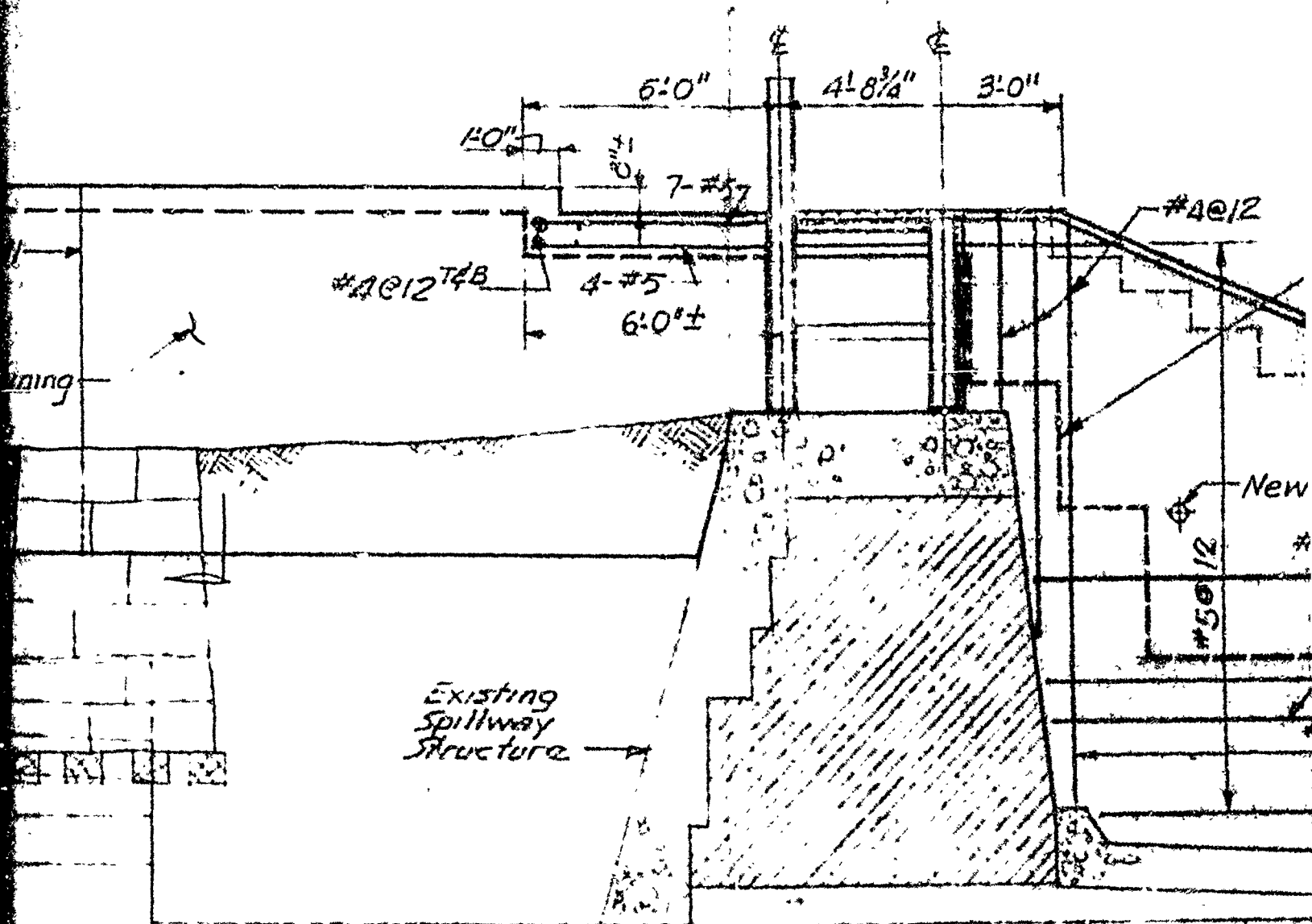
ALTERNATE
CONCRETE
ANCHORS

Scale: 1/2" = 1'-0"

Grouted in reinforcing
bar anchors. Max.
spacing @ 3'-0" o.c. Vert.
and 4'-0" o.c. Horiz. Typ.
all faces. For installation,
see Details this sheet



SECTION $\frac{2}{1}$ $\frac{2}{2}$
 Scale: $\frac{1}{4}" = 1'-0"$



SECTION $\frac{5}{1}$ $\frac{5}{2}$
 Scale: $\frac{1}{4}" = 1'-0"$

12

of stone masonry

Existing Masonry

3
2

Remove all loose and
Deteriorated stone Masonry
to the approximate limits shown

7-#5

5-#6 @ 12

5'-0"

1'-6"

New 6" pipe

#5 @ 12

3'-0"
Min

El. 705.65'

#4 @ 12

#1 @ 12

#5 @ 12

3-#6

#5 @ 12 x

3'-0"
3'-0"

Bottom of
Lining El. 695.5'

Approximate
Rock El. 694.0'

7-#6

6
2

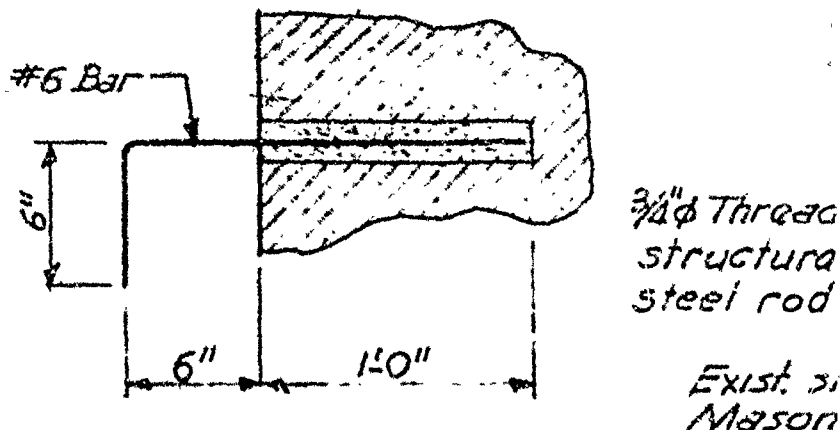
3-#10x8'-0" Bars
grouted into Rock
12" Diameter rock core

3
2

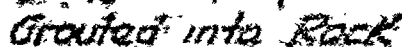
1'-10" 2 0 2 4 6 8 10

1 0 1 2 3 4

Scale: $\frac{1}{2}'' = 10''$ 2


$$1/2 : 1/8 = 1/4 \quad 2$$

Calc: $1\frac{1}{2}'' = 1.0''$



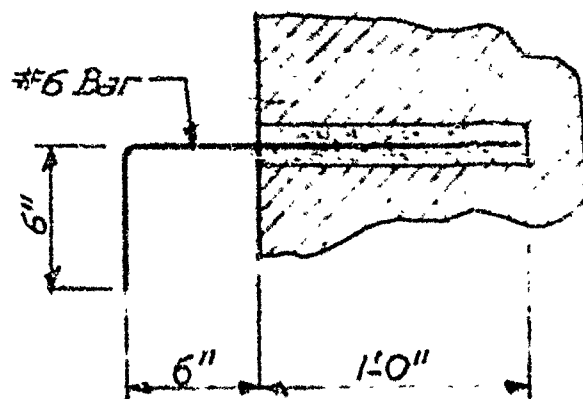
Scale: 1/4" = 40' (2)

REV.	DATE	DESCRIPTION
 O'BRIEN & GERE ENGINEERS, INC. Syracuse, New York		U.S. ARMY
DESIGNED: GAA	STATE DAM OWASCO AUBURN, MA LEFT ABUTMENT SECTIONS	
DRAWN: DRT		
CHECKED: RKM		
SUBMITTED: <i>R. L. [Signature]</i>		
RECOMMENDED: <i>Bernard H. [Signature]</i> CHIEF, ENGRG. DIVISION, BUFFALO DISTRICT OFFICE		
APPROVED: <i>[Signature]</i> COL, CE, DISTRICT ENGINEER	DATE:	SCALE:
TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW 63-73-B-0021		SHEET

Scale: $\frac{1}{2}" = 1'-0"$

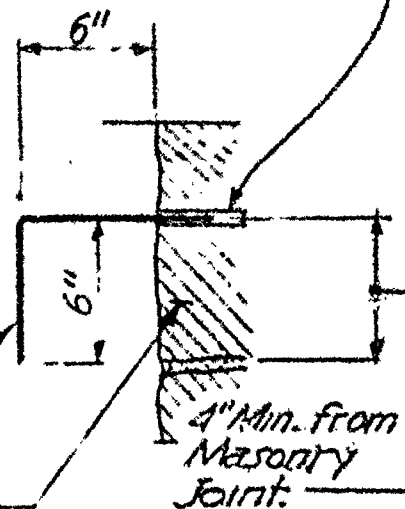
2

masonry only.



$\frac{3}{4}" \phi$ Threaded structural steel rod

Exist. stone Masonry



GROUTED-IN REINFORCING BAR ANCHORS

Scale: $1\frac{1}{2}" = 1'-0"$

ALTERNATE CONCRETE ANCHORS

Scale: $1\frac{1}{2}" = 1'-0"$

REV.	DATE	DESCRIPTION	BY
 O'BRIEN & GERE ENGINEERS, INC. Syracuse, New York		U.S. ARMY ENGINEER DISTRICT, BUFFALO CORPS OF ENGINEERS BUFFALO, NEW YORK 14207	
DESIGNED: GAA DRAWN: DRT CHECKED: RKM SUBMITTED: <i>P. J. [Signature]</i>		STATE DAM REPAIRS OWASCO OUTLET AUBURN, NEW YORK LEFT ABUTMENT & CENTER PIER SECTIONS & DETAILS	
RECOMMENDED: <i>Barry H. [Signature]</i> CHIEF, ENGRG. DIVISION, BUFFALO DISTRICT OFFICE			
APPROVED: <i>[Signature]</i> COL. C.E. DISTRICT ENGINEER			
TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW 43-73-B-0021		DATE: 20 SEPTEMBER 1972 SCALE: AS SHOWN DRAWING NUMBER 239-ADR-1/2 SHEET 2 OF 4	

Concrete Anchors
(Typ.) Maximum
Spacing 3'-0" o.c. Vert.
& 4'-0" o.c. Horiz.

El. 703.50'

8'-6"

8' Typ.

6" Groutad-In
Reinf. Bar
C36c Vert.

New
Concrete

TYPICAL CONSTRUCTION

JOINT

Scale: $\frac{3}{8}" = 1'-0"$

Constr. Jt.

Bottom El. 695.0

24'-0"±

24'-0"±

42'-0"±

6"±

#4 Add'l

Old Band
at Joint

Existing
Stone
Masonry

1/2"

4"

4"

3/4" Chamfer

El. 70

4'-8"±

4

2'

27'-6" ±

4'-8 3/4"

Ad Alt. Bars

isting
ne
onry

Concrete
Anchor
(Typ)

4
3

101.59'

New Concrete ---
Bearing Lining
Wall Constr Jt

Existing Concrete
Apron

Existing
Spillway
Structure

6'-0" ±

4
3

SECTION 1

Scale: 1/4" = 1'-0"

1
1

#4212

Sheet 1 of 1

4 8 1

2'-0"

22'-0"±



Concrete Anchor (Typ)

EL. 716.50'

New Concrete Lining

Existing Ground Surface

Cut Back
Fillat on
Existing Lining

Existing
Concrete Lining



Existing Old Dam

Steel
Sheet
Piling

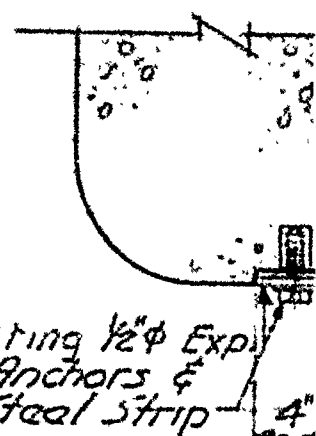
Top of Wall
EL. 716.50

#5@12

SECTION (3)
Not to Scale

8"

4'-0"



Existing 1/2" Exp
Anchors &
Steel Strip

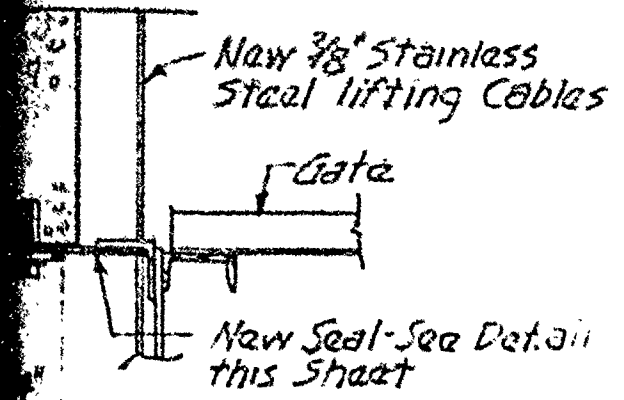
TOP

Existing Side R.

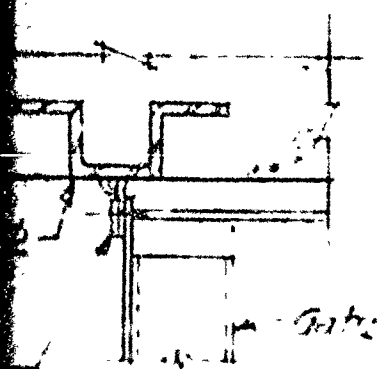
New Seal -
See Detail -
This Sheet

New 3/8" Stainless
Lifting Cables
Fastened to
Bottom of Gate.
Encase Bottom
in 2' Rubber
Dredge.

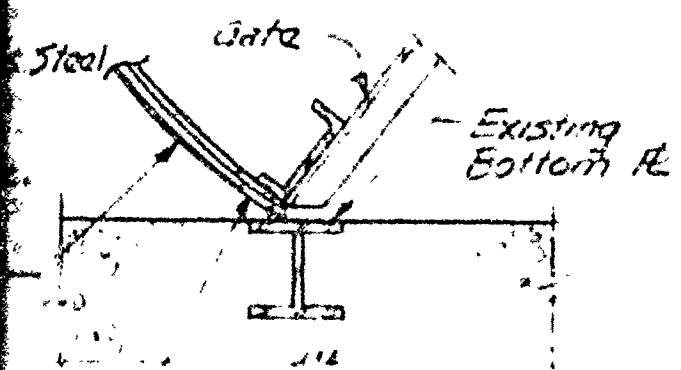
PAINTER



TOP SEAL



SIDE SEAL

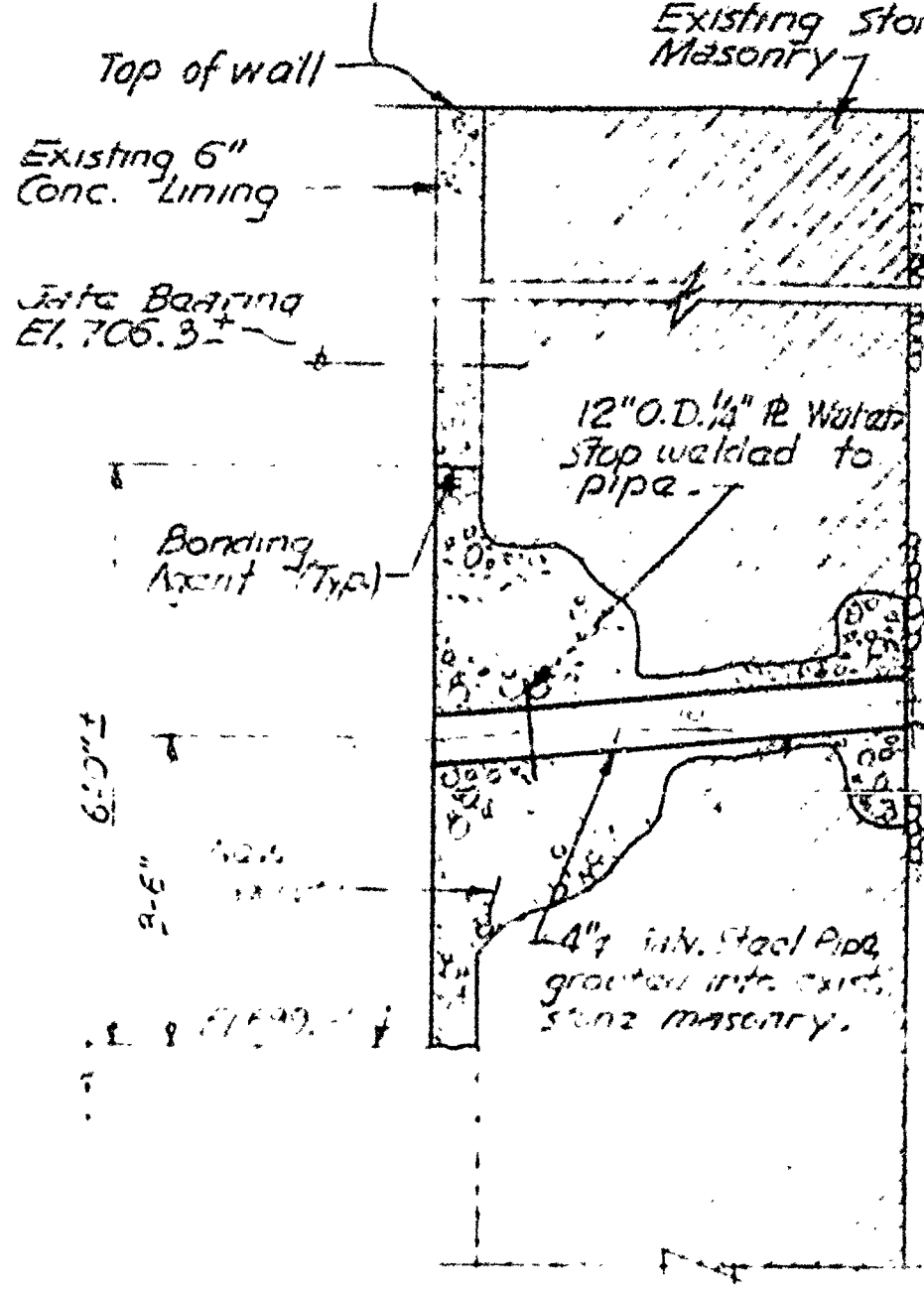


New Seal See Detail this Sheet

BOTTOM SEAL

OVER GATE DETAIL

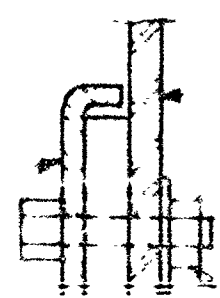
Not to Scale

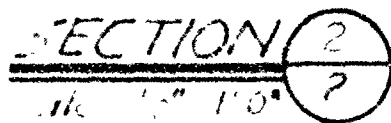


SECTION (2/2)

Scale: 1/2" = 1'-0"

New steel 22 Clamp

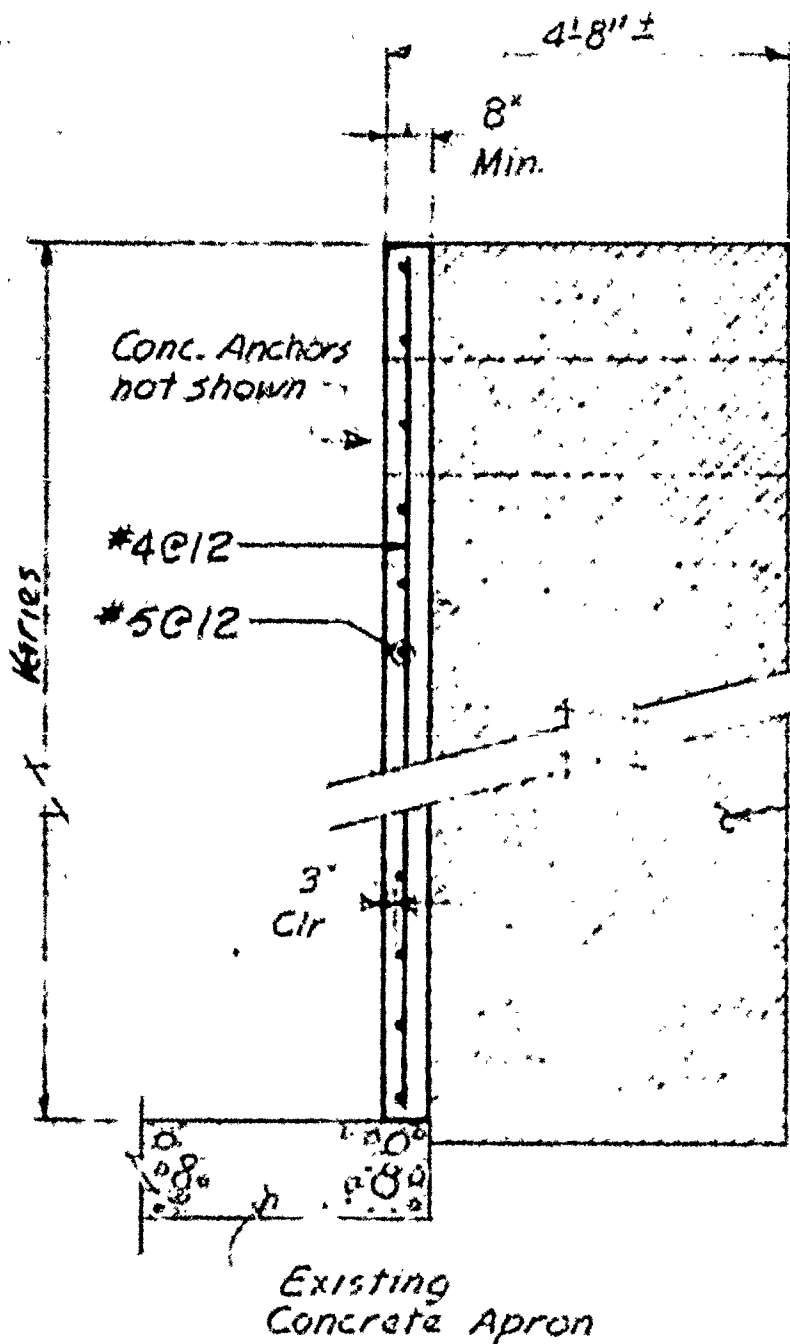




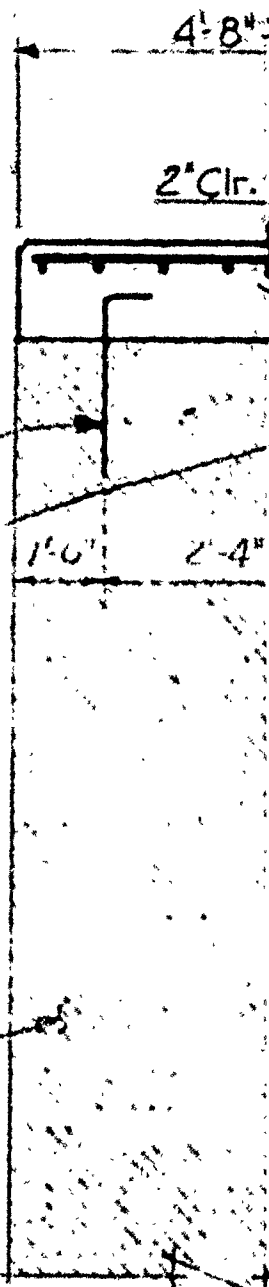
1. All existing Reinf bars shall be cleaned and straightened.
2. All existing concrete and masonry of 1" minimum thickness. Feathering will not be allowed.
3. Provide anchors into existing stone Masonry as directed.



Working Date 12/12/19

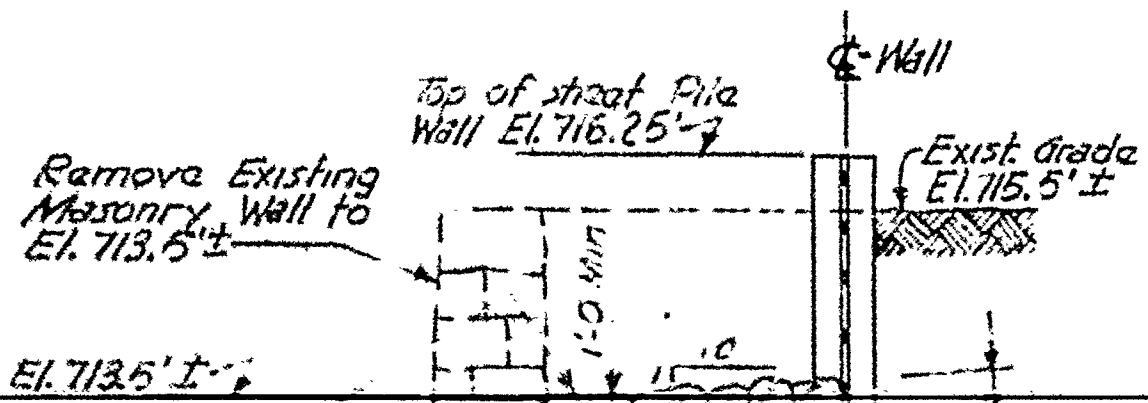


Concrete Anchors
@ 4'-0" o.c.
staggered
see sheet 2
for Details



SECTION 4
Scale: 1/2" = 1'-0"

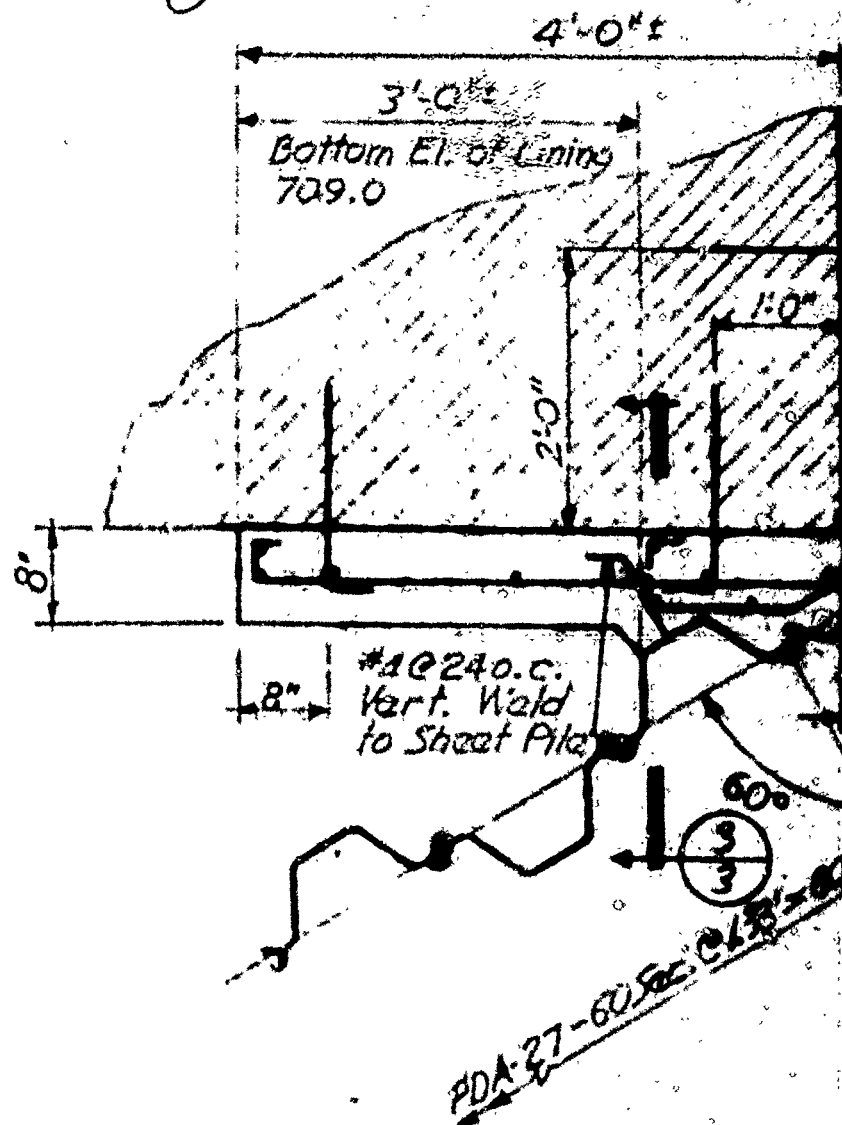
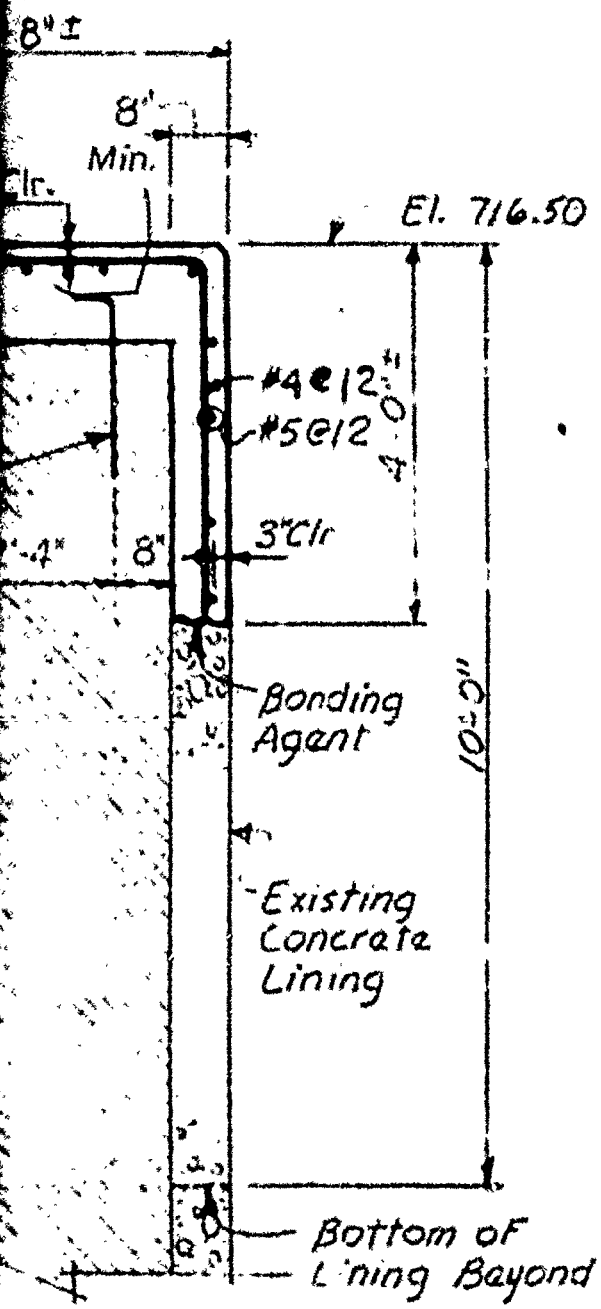
SECT
Scale: 1/2"



Scale: 1/4" = 1'-0"

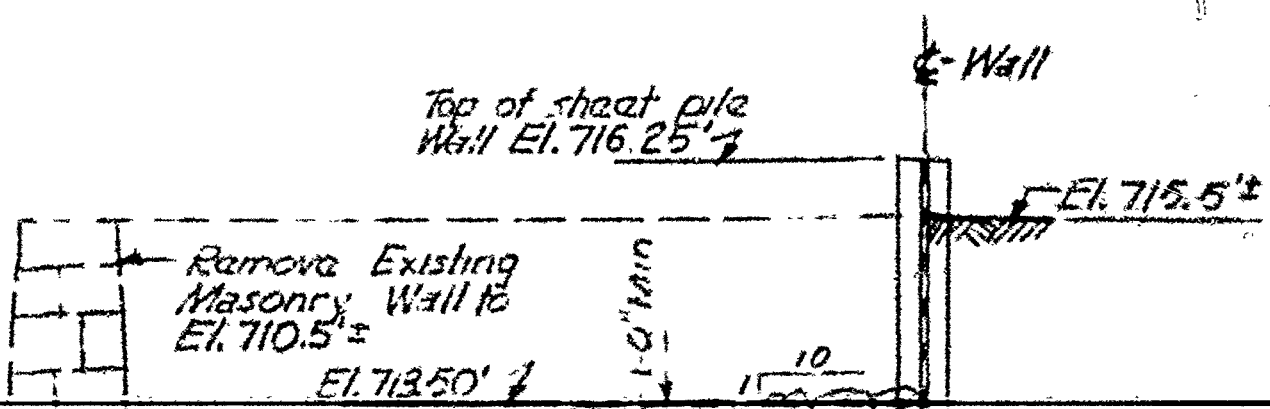
8

Steel Sheet Pile



DETAIL 6
Scale: 1/4" = 1'-0"

SECTION 5
3



TAINTER

SECTION 3
 Not to Scale

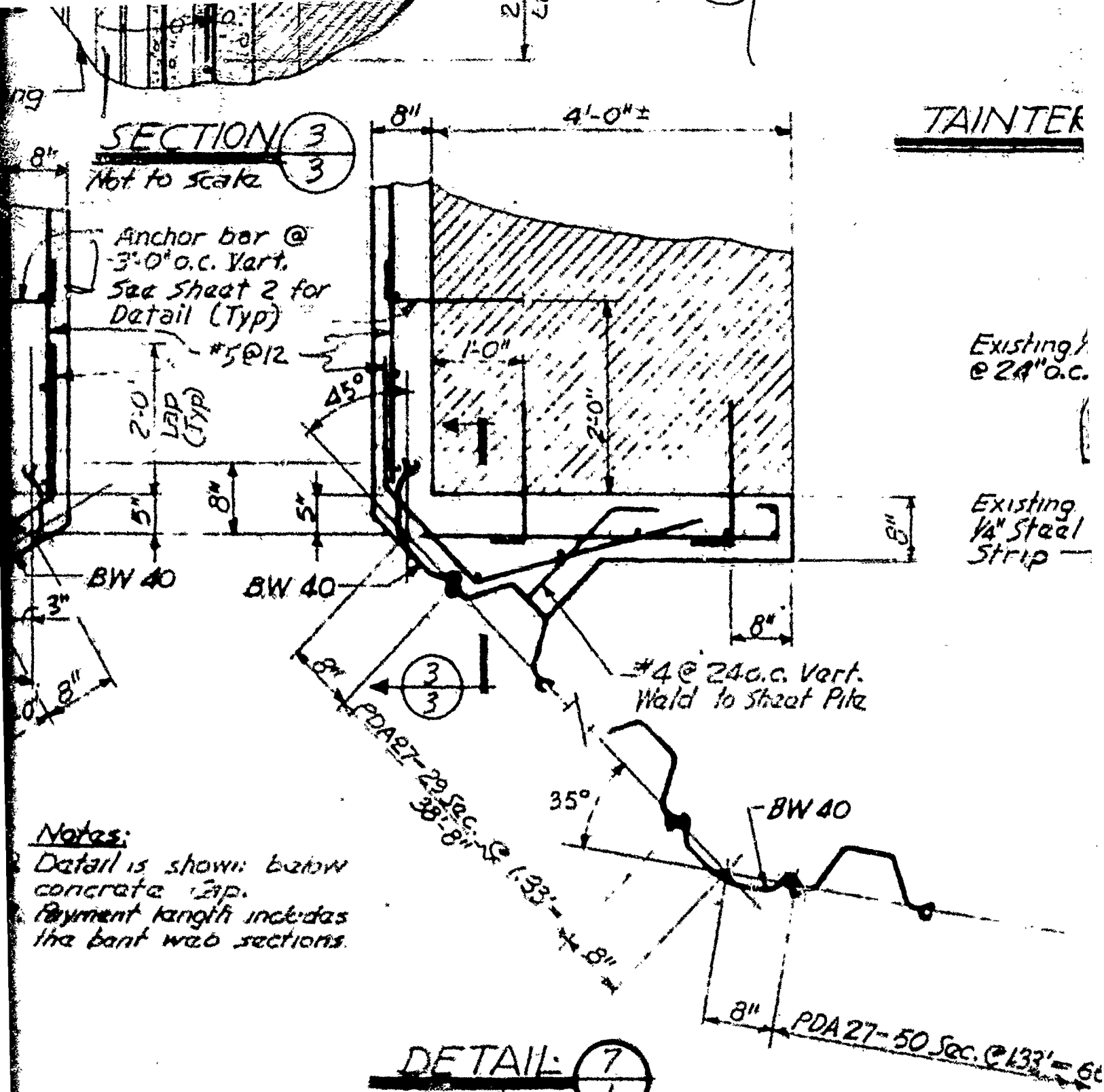
Anchor bar @
 3'-0" o.c. Vert.
 See Sheet 2 for
 Detail (Typ)

#5 @ 12

2'-0" LRP (Typ)

Existing
 @ 24" o.c.

Existing
 1/4" Steel
 Strip

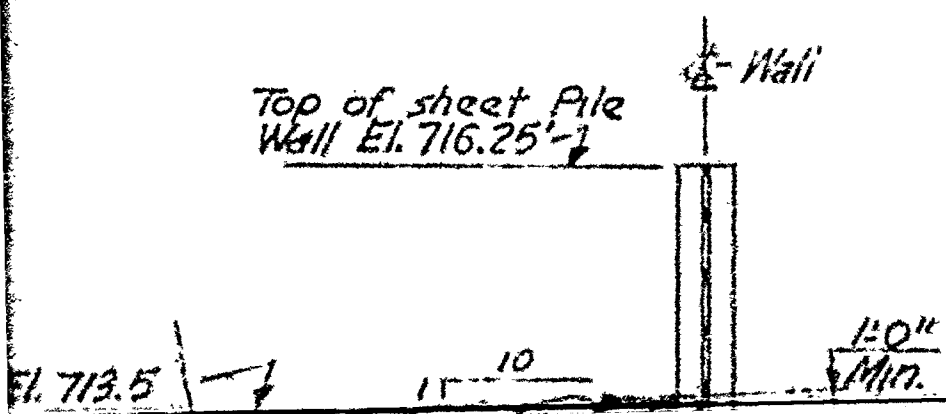


Notes:

Detail is shown below
 concrete cap.
 Payment length includes
 the bent web sections.

DETAIL 7
 Scale: 3/4" = 1'-0"

Top of sheet pile
 Wall El. 716.25'-7

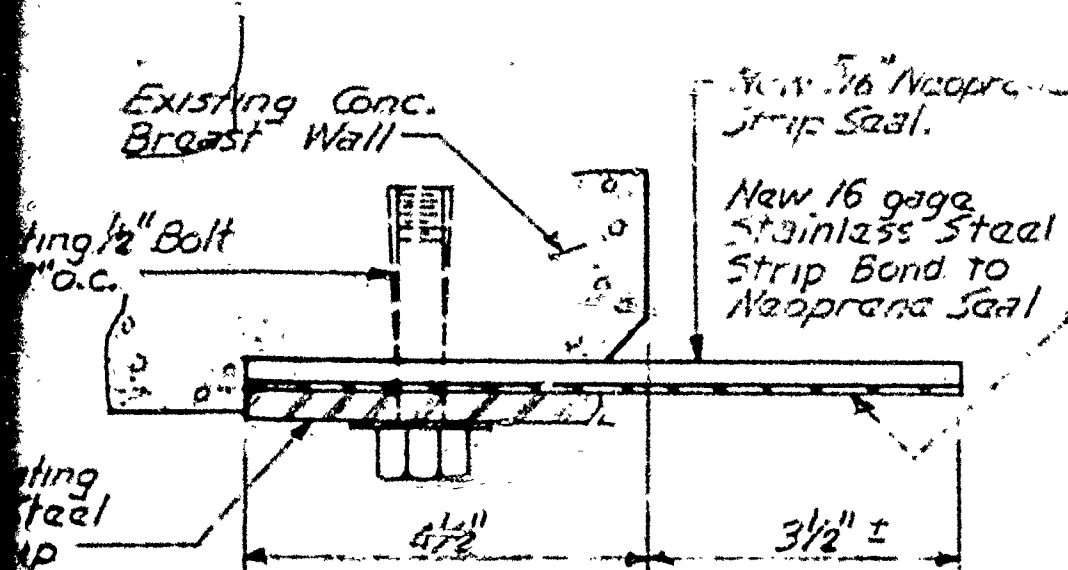


BOTTOM SEAL

10

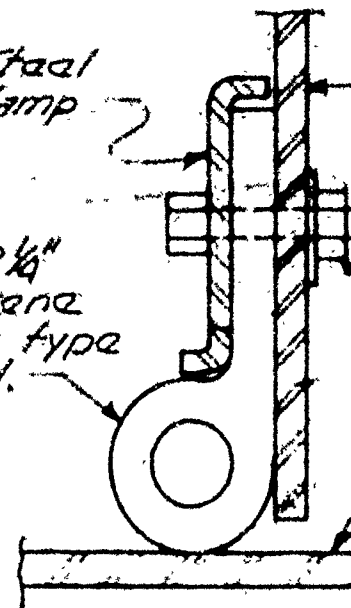
TER GATE DETAILS

Not to Scale



New Steel Zee Clamp

New 2 1/4" Neoprene Hollow type 3" Seal



Notes:

- 1) Provide new bolts as required to replace damaged bolts.
- 2) Installation of the seals shall be as approved or directed by the Contracting officer.

TOP SEAL DETAIL

Not to Scale

BOTTOM & SIDE

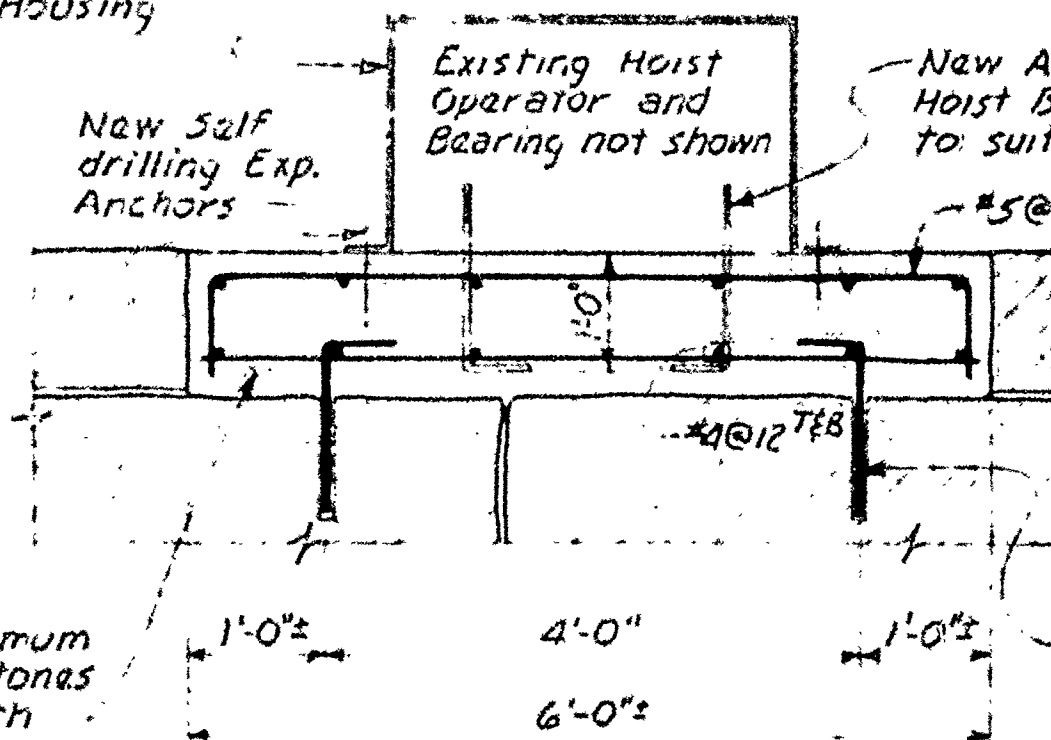
Existing Gate Hoist Operator Housing

New Self drilling Exp. Anchors

Existing Hoist Operator and Bearing not shown

New A Hoist B to suit

33' = 66'-8"



Remove a minimum of 2 existing stones and replace with Concrete

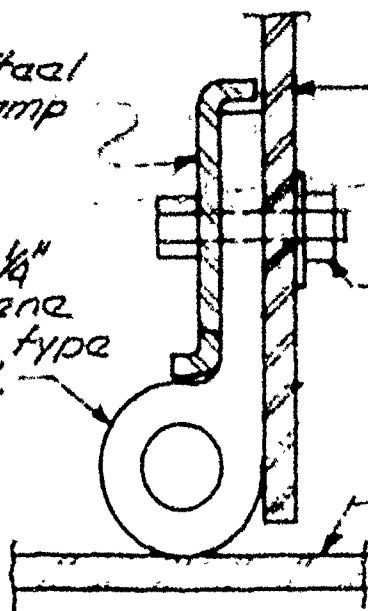
New Steel
Zee Clamp

Existing
Gate SRin R.

New 2 1/4"
Neoprene
Hollow type
5" Seal.

Existing Bolts

Exist. Rubbing R.



ired to replace damaged bolts.
shall be as approved or
ing officer.

BOTTOM & SIDE SEAL DETAIL

Not to Scale

Existing Hoist
Operator and
Bearing not shown

New Anchor Bolts for
Hoist Bearing-Size and location
to suit the existing bearing

#5@12 T&B

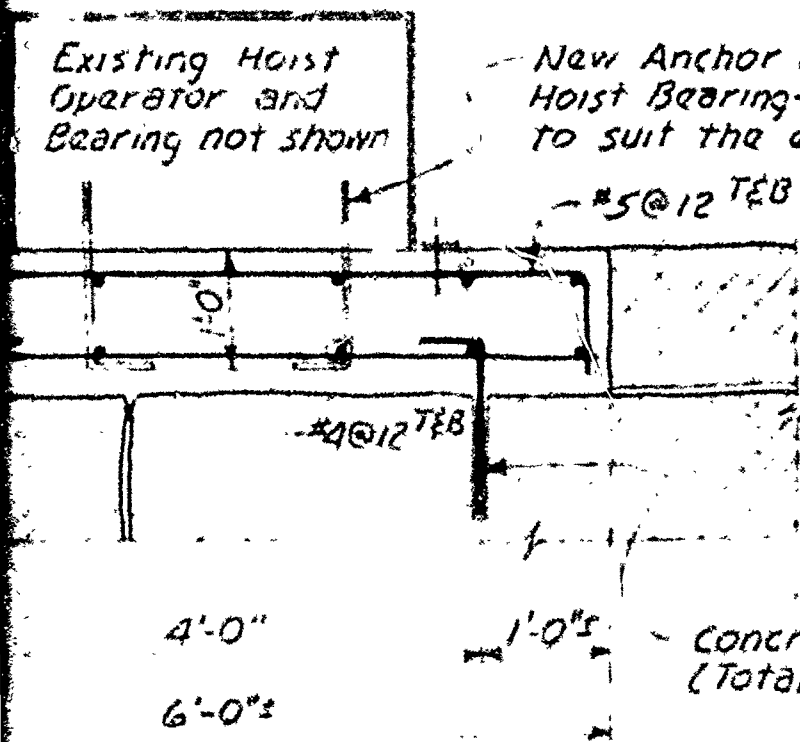
#4@12 T&B

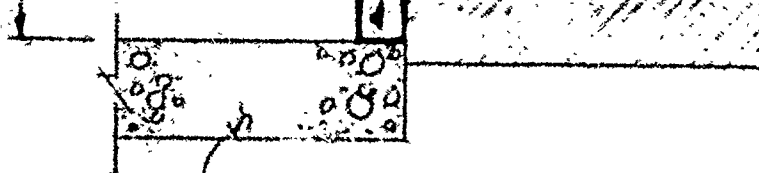
4'-0"

6'-0"

1'-0"

Concrete Anchors
(Total 4)

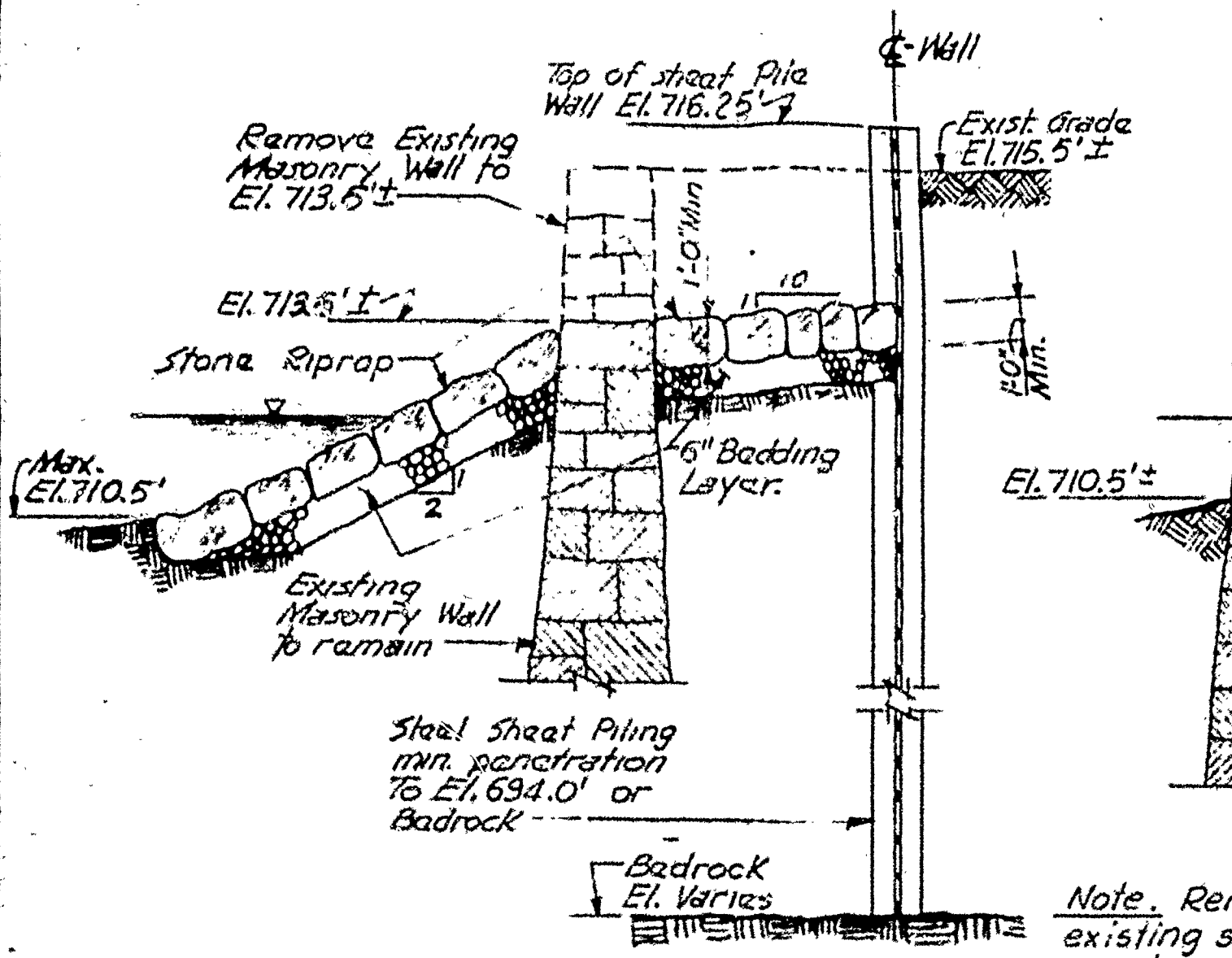




Existing
Concrete Apron

SECTION 4
Scale: 1/2" = 1'-0"

SECTION 3
Scale:



Note. Re existing s may be us

SECTION 8
Scale: 3/8" = 1'-0"

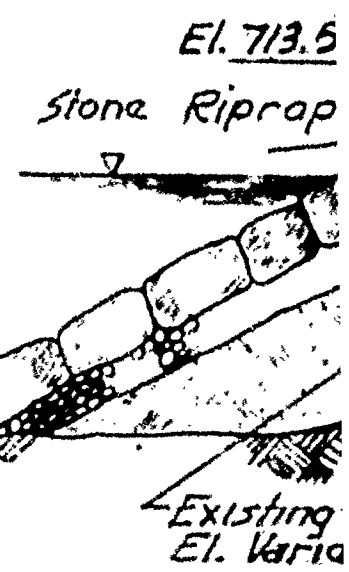
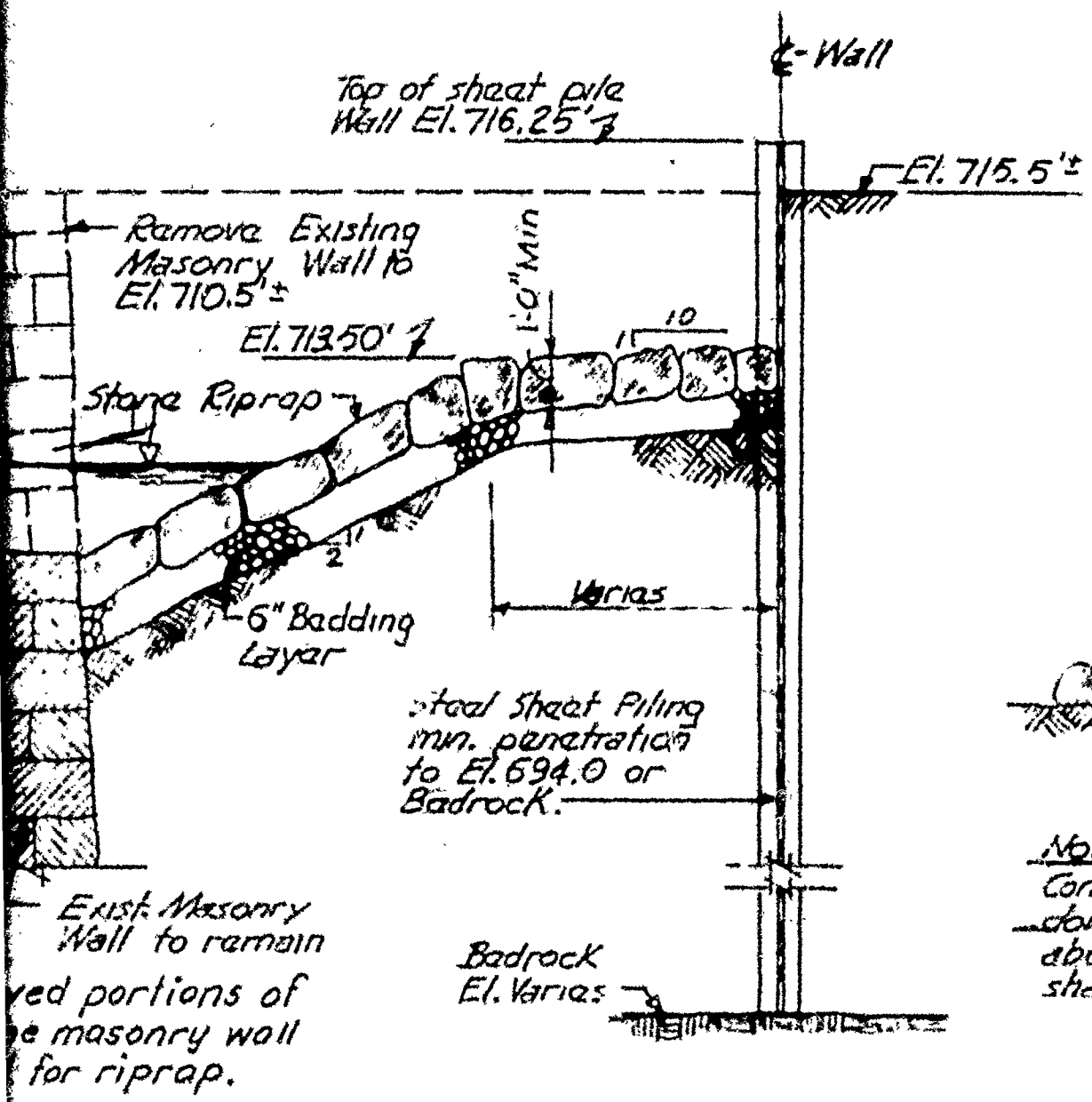
17

Bottom of
Lining Bayard

DETAIL 6
Scale: $\frac{3}{4}" = 1'-0"$

2. Paying
the b

SECTION 5
Scale: $\frac{3}{4}" = 1'-0"$



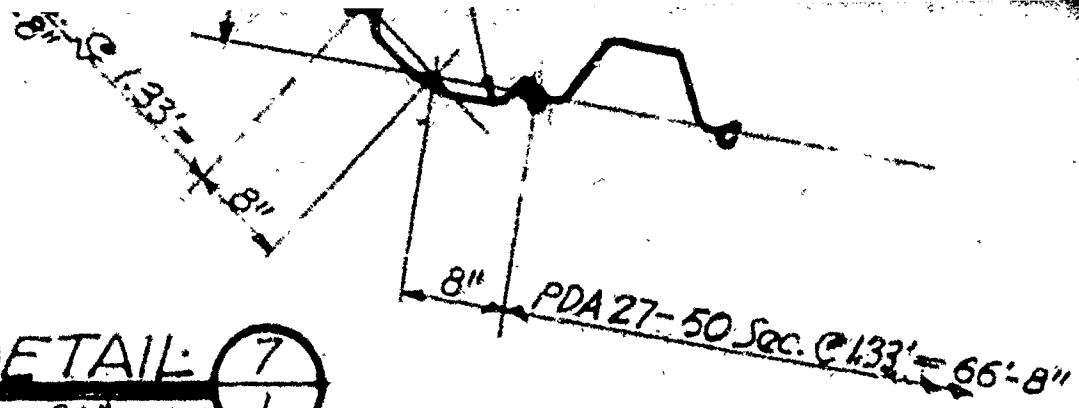
Note:
Compacted Embankment
down stream of the
above the limits sho
shall be by Others.

SECTION 9
Scale: $\frac{3}{8}" = 1'-0"$

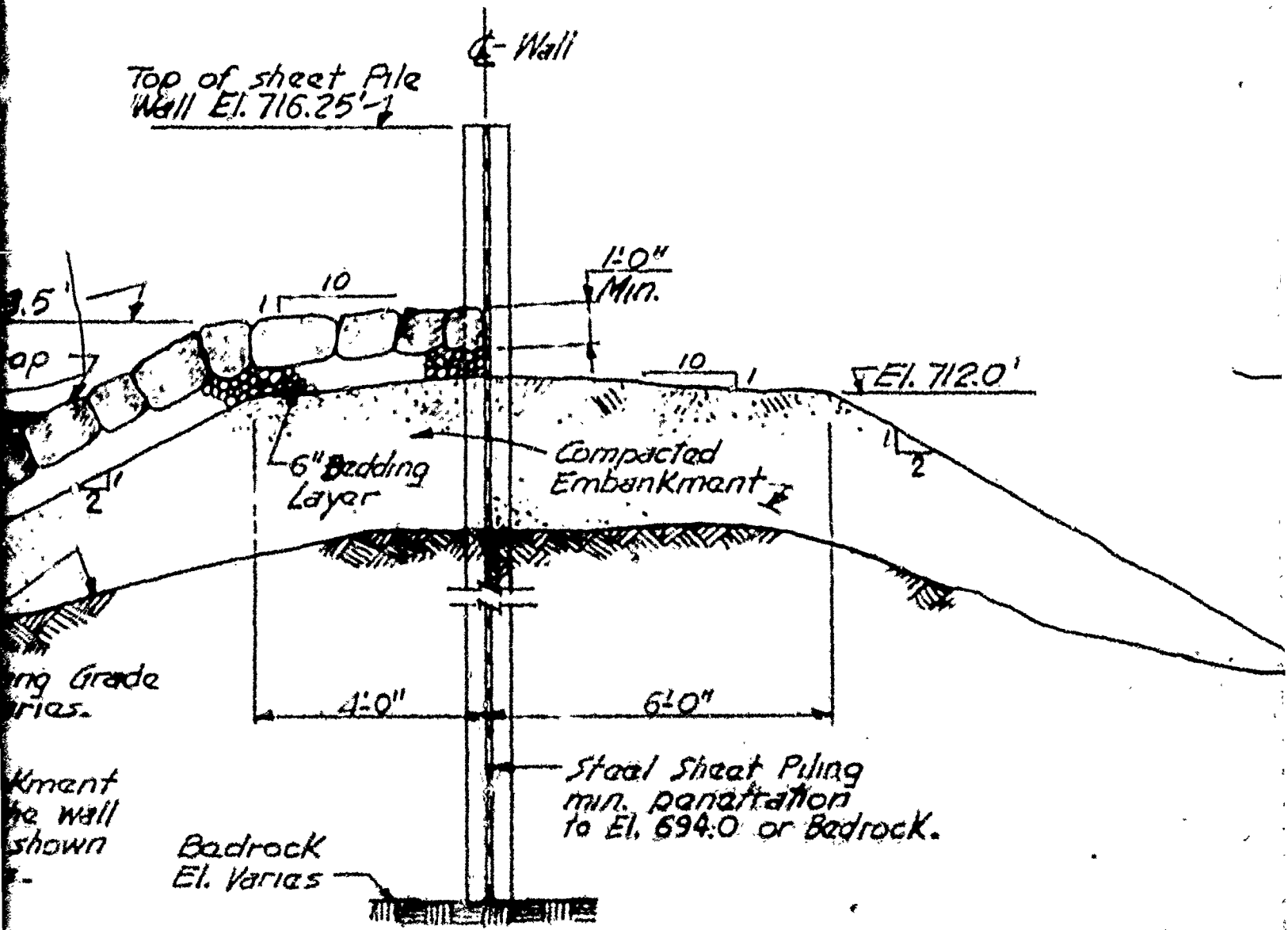
SECTION
Scale:

12

Wall is shown below
 concrete Cap.
 element length includes
 bant web sections.



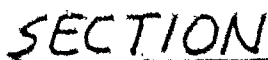
DETAIL 7
 Scale: 3/4" = 1'-0"



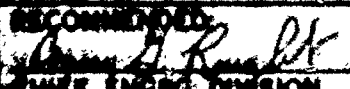
SECTION 10
 Scale: 3/8" = 1'-0"

REV.	DATE	DESCRIPTION
 O'BRIEN & GERE ENGINEERS INC. Syracuse, New York		U.S. ARMY
DESIGNED: GAA	STATE DAM OWASCO AUBURN, N RIGHT ABUTMENT & SECTIONS &	
DRAWN: DRT		
CHECKED: BKM		
SUBMITTED: <i>[Signature]</i>		
RECOMMENDED: <i>[Signature]</i>		
CHIEF, ENGR. DIVISION, BUFFALO DISTRICT OFFICE		
APPROVED: <i>[Signature]</i>	DATE:	
COL, C.E. DISTRICT ENGINEER		SCALE:
TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW 49-73-B-0021		SHEET

1013: bearing-free and location
to suit the existing bearing



Scale $\frac{3}{4}'' = 1'-0''$

REV.	DATE	DESCRIPTION	BY
 O'BRIEN & GERE ENGINEERS INC. Syracuse, New York		U.S. ARMY ENGINEER DISTRICT, BUFFALO CORPS OF ENGINEERS BUFFALO, NEW YORK 14207	
DESIGNED: GAA DRAWN: DRT CHECKED: RKM SUBMITTED: 		STATE DAM REPAIRS OWASCO OUTLET AUBURN, NEW YORK RIGHT ABUTMENT & MISCELLANEOUS SECTIONS & DETAILS	
RECOMMENDED:  CHIEF, ENGRG. DIVISION, BUFFALO DISTRICT OFFICE			
APPROVED:  COL, C.E. DISTRICT ENGINEER		DATE: 20 SEPTEMBER 1972 SCALE: AS SHOWN	
TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW 49-73-B-0021		DRAWING NUMBER 239-ADR-1/3 SHEET 3 OF 4	