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NATIONAL DAM SAFETY PROGRAM. LOCK C-12 DAM, INVENTORY NUMBER NY--ETC(U)
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Whitehall

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.

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 investigations are necessary to further evaluate conditions affecting the dam and increased maintenance efforts especially on the Outer Forebay wall, should be undertaken.

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Additional detailed structural stability analyses of the dam and appurtenant structures, using the site specific characteristics of the underlying bedrock foundation and the physical condition of the dam's concrete, should be completed within six (6) months of the date of notification of the owner. Based upon the results of the detailed investigations, appropriate remedial measures deemed necessary to insure the safety and integrity of the dam and appurtenant structures should be undertaken and completed within eighteen (18) months of the date of notification of the owner.

The Outer Forebay wall deficiencies related to deteriorated concrete surfaces, leakage beneath the new concrete cap, and removal of the established vegetation should be repaired and/or corrected within twelve (12) months. A detailed emergency operation-action plan and warning system should be deveioped and implemented. Additional normal maintenance efforts are required to prevent further concrete deterioration at joints and on the fascias of the bridge support piers, the East Canal abutment wall, and the navigation lock walls.

The spillway, while not having sufficient discharge capacity for passing one-half the Probable Maximum Flood (PMF), is considered to be inadequate. For this storm event, a high tailwater condition occurs and results in flooding of the downstream hazard areas. Therefore, dam failure would not significantly increase the hazard to loss of life downstream from that which would exist just before an overtopping-induced failure. In addition, large discharges are not controlled by the flow depth over the spillway, but by the volume of water able to flow through upstream constrictions along the Canal channel.

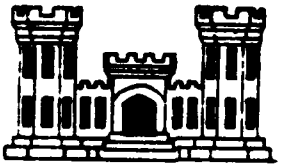
LAKE CHAMPLAIN BASIN

LOCK C-12 DAM

WASHINGTON COUNTY, NEW YORK

INVENTORY NO. N.Y. 796

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

APRIL, 1980

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.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LOCK C-12 DAM I.D. No. NY-796
(#240-990 LAKE CHAMPLAIN BASIN)
WASHINGTON COUNTY

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Lock C-12 Dam I.D. No. NY-796 (#240-990 Lake Champlain)
State Located:	New York
County Located:	Washington
Watershed:	Lake Champlain Basin
Stream:	Champlain Canal
Date of Inspection:	October 16, 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 investigations are necessary to further evaluate conditions affecting the dam and increased maintenance efforts especially on the Outer Forebay wall, should be undertaken.

Additional detailed structural stability analyses of the dam and appurtenant structures, using the site specific characteristics of the underlying bedrock foundation and the physical condition of the dam's concrete, should be completed within six (6) months of the date of notification of the owner. Based upon the results of the detailed investigations, appropriate remedial measures deemed necessary to insure the safety and integrity of the dam and appurtenant structures should be undertaken and completed within eighteen (18) months of the date of notification of the owner.

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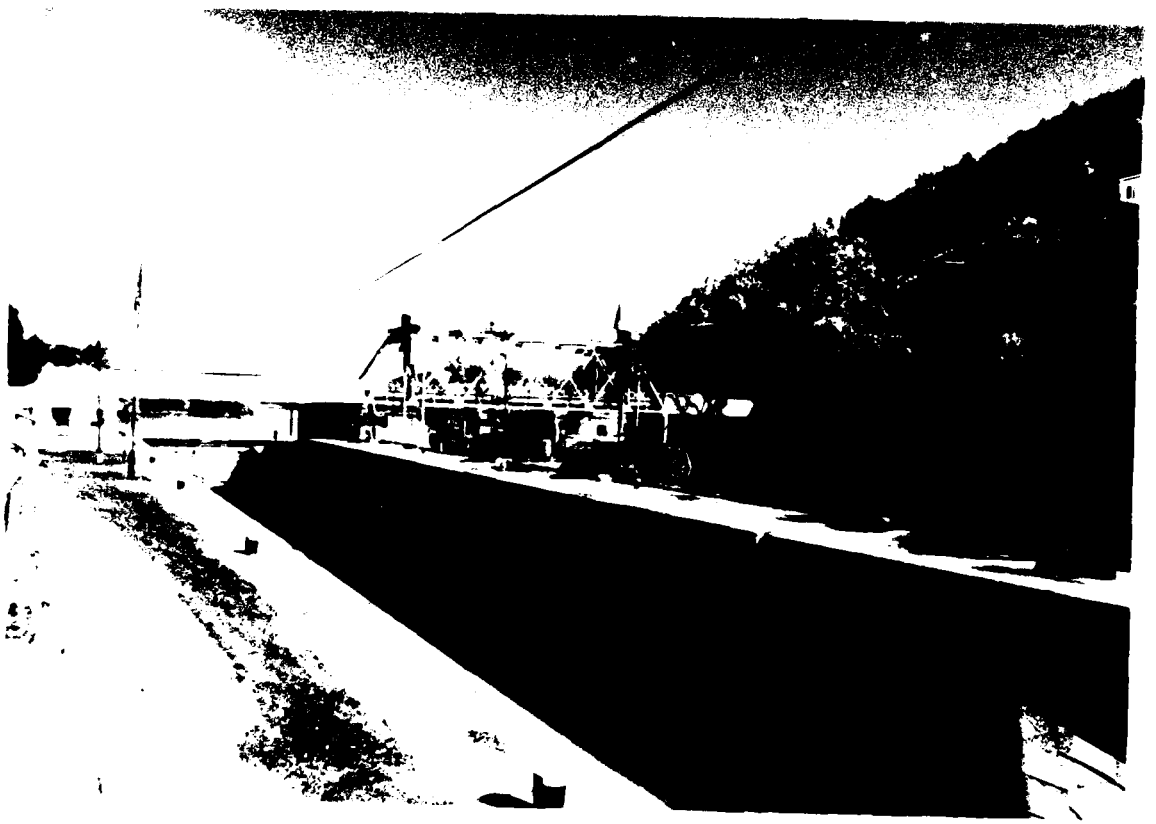
Date: 27 Jun 80



OVERVIEW - LOCK C-12 DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LOCK C-12 DAM
I.D. No. NY-796
#240-990 LAKE CHAMPLAIN
WASHINGTON 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 they constitute hazards to human life and property, and to recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of the Dam and Appurtenant Structures

The Lock C-12 Dam is a concrete gravity dam with a gated spillway. The 90 foot long spillway section rises some 13 feet above its rock foundation to the fixed crest, whereupon a steel radial gate provides an additional 8 feet of water level control to the centerline-of-bearings at the gate anchorage. The gate opening is controlled from an overhead bridge by a manually-operated chain-counterweight lifting mechanism.

The East concrete pier immediately adjacent to the spillway separates the dam from the Forebay. This 11 foot wide pier is also a supporting structure for the overhead bridge. This East Forebay leads to six siphon-spillway units located within the Outer Forebay wall, a small sluice gate near the end of the Forebay, and the closed, inoperable head gates of the abandoned silk mill. Across the 26 foot wide Forebay entrance is a submerged needle dam which has at its Eastern end, the East Canal wall and bridge abutment.

The West concrete wall immediately adjacent to the spillway is the East wall of the navigation lock. This 20 foot wide wall is also a supporting structure for the overhead bridge. The 45 foot wide lock has a 6 foot wide, concrete, West abutment. Beyond this West abutment is a roadway embankment leading to the overhead bridge. The Canal-side embankment slope is entirely protected with hand-placed granite paving blocks upstream of, beneath, and downstream of the bridge crossing.

b. Location

The dam is located on the Champlain Canal, in the Northern portion of the Village of Whitehall near the intersection of Broad Street and Clinton Avenue. The site is approximately one-half mile North of the highway intersection of State Route 22 and US Route 4.

c. Size Classification

This dam is 28 feet high and the impoundment has a storage volume of 1200 acre-feet. Therefore, the dam is classified as an intermediate size dam (storage capacity between 1000 and 50,000 acre-feet.)

d. Hazard Classification

The dam is classified "high" hazard because of the immediate downstream residences adjacent to the Canal and the serious economic impacts of a loss of navigation through the lock.

e. Ownership

The Lock C-12 Dam is owned by the State of New York - Department of Transportation (NYS-DOT), Waterways Maintenance Subdivision. It is located in DOT-Region One, whose headquarters are in Albany, New York.

Waterways Maintenance Subdivision:
New York State - DOT
Main Office - State Campus
1220 Washington Avenue
Albany, New York 12232

Region One:
New York State - DOT
84 Holland Avenue
Albany, New York 12208

Director:
Joseph Stellato
(AC-518) 457-4420

Waterways Maintenance:
Engineer - John Hulchanski,
(AC-518) 474-6715

f. Purpose of the Dam

The primary purpose is for navigation through Lock 12 on the Champlain Canal. The impounded waters behind the dam provide a storage pool used for gravity inflow to the lock. The tailwater is the level of Lake Champlain.

g. Design and Construction History

The present dam was constructed at the site in about the year 1912. It replaced a masonry dam which existed on a slightly different alignment between the East Lock wall and the silk mill gates. This dam had been constructed prior to 1906.

h. Normal Operational Procedures

The water level in the Canal pool is maintained at a constant elevation of 112 (BCD - Barge Canal Datum) by adjustment of the gate opening. Short duration water level fluctuations occur in the immediate vicinity of the dam whenever the navigation lock is operated during boat passages. Gage readings in the upper pool are recorded daily throughout the year and hourly gate opening adjustments are made to maintain the 112 elevation. If lower level upstream water elevations are maintained for long durations, slope instability along the upstream Canal banks is possible.

1.3 PERTINENT DATA

a. Drainage Area (square miles) 429

b. Discharges at Dam

	(COMPUTED) DISCHARGE				
STAGE*	RADIAL GATE	SIPHON SPILLWAY (6 UNITS)	SLUICE GATE	OUTER FOREBAY WALL	TOTAL (CFS)
104	---				---
108.6	4759		---		4759
111	6435	---	51		6486
114	7732	324	126	---	8182
119	10285	366	337	1908	12896

*BARGE CANAL DATUM (BCD)

c. Elevations (Barge Canal Datum - BCD)

Top of Dam (Top of Lock wall)	119.0
Outer Forebay Wall	114.0
Normal Pool	112.0
Sluice Gate Crest	108.6
Spillway Crest	104.0
Siphon Spillway Inlet Invert	103.0
Needle Dam Sill @ Forebay Entrance	102.0
Lock C-12 Invert	90.0

d. Storage Capacity (Acre-Feet)

Top-of-Dam	1200
Normal Pool	700
Spillway Crest	200

e. Dam

		(Feet)
Type:	Concrete gravity structure	
Length:	Lock C-12	71
	Spillway Crest	90
	East Pier	11
	Outer Forebay Wall	63
	Sluice Gate	6

		(Feet)
Height:	(Structural)	
	Lock (East Wall)	28
	Spillway Crest	13
	East Pier	27.5
	Outer Forebay Wall	22

f. Spillway

Principal Spillway:

Type: Fixed crest with a steel radial gate controlled manually by an overhead chain-counterweight lifting mechanism.

Siphon-Spillway (6 units):

Location: Within the Outer Forebay Wall
Size: Inlet Port - (2 x 4.3) feet
Outlet Port - (2 x 2.2) feet
Throat - 1.0 feet

g. Reservoir Drain

None

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Lock C-12 Dam is located in the Hudson-Champlain Lowlands physiographic province of New York State. The underlying sedimentary bedrock consisting primarily of limestones and shales were formed during the Cambrian and Ordovician geologic periods, some 435 to 570 million years ago. A review of the "Brittle Structures Map of the State of New York" indicated that there are no faults in the immediate vicinity of the dam. The present surficial soils are the result of glaciations which occurred during the Cenozoic Era, the last being the Wisconsin glaciation of some 11,000 years ago.

b. Subsurface Investigations

No records of subsurface investigations were available. Based upon the available plans and the site characteristics, it appears that the structure is founded on rock.

2.2 DESIGN/CONSTRUCTION RECORDS

No records were available for the original masonry dam which was replaced by the existing dam about the year 1912. Plans, dated February 1906 to August 1910 and identified as Contract 15, Champlain Canal, Section 3 show the existing dam, lock and appurtenant structures as they presently exist. Selected contract drawings are included in Appendix F. Plans identified as Contract 33 show details of the overhead bridge and the gate lifting mechanism.

2.3 OPERATION RECORDS

This site has a resident lock attendent on a continuous basis. Water surface gage readings are recorded daily throughout the year and the radial gate is adjusted as frequently as necessary to maintain an upstream Canal elevation of 112. Gage records date back to 1916.

2.4 EVALUATION OF DATA

The data presented in this report was obtained during the site inspection and from the files of the NYS-DOT Waterways Maintenance Subdivision offices. The information is considered adequate for Phase I inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the dam and appurtenant structures was conducted on October 16, 1979. The weather was sunny and clear, with temperatures near 50°F. The water surface at the time of inspection was approximately 0.5 feet below the top of the gate, which was opened approximately 0.1 feet above the spillway crest.

b. Dam - Spillway

The overall condition of the dam was satisfactory. The gate and lifting mechanism were operational. The structural members comprising the gate exhibited minor areas of removed paint and surficial rusting. The downstream face of the concrete gravity structure exhibited a roughened surface with exposed aggregate visible across the entire face. The overhead bridge appeared to be in satisfactory condition.

c. Appurtenant Structures

The Outer Forebay Wall was the mostly severely deteriorated structure directly affecting the dam site. The upper three feet of the wall was new concrete in satisfactory condition, placed atop the existing concrete wall. Leakage through the interface was evident at two primary areas; between the two most right and two most left siphon spillway discharge portals, indicated by the dark areas in photo 7, Appendix A. No horizontal displacement along this interface was evident.

The outer face of this wall exhibited a high degree of concrete surface deterioration. Not only was the roughened surface irregular because of the loss of aggregate, but several areas had longitudinal steel reinforcement exposed, hanging, and even ending in mid-air. In addition, vegetation had established itself on the roughened lower fascia, near the above mentioned concrete interface. The siphon spillways and the small sluice gate were functioning satisfactorily.

There was no significant leakage occurring through the silk mill forebay gates even though the mill itself was in ruins. The East bridge support pier and the East Canal abutment wall exhibited only minor concrete surface cracking and spalling.

The navigation Lock C-12 concrete walls exhibited minor concrete surface cracking and spalling. Concrete deterioration around construction joints in the Lock walls was also evident. The most significant deficiency affecting the Lock is the sagging and collapsed downstream protection pier. Repair work to this pier which separates the natural streambed from the barge channel is scheduled for the near future. This pier does not affect the structural integrity of the dam.

d. Reservoir

There were no indications of soil or channel wall instability in the immediate vicinity of the dam. During conversations at the time of inspection, it was reported that sloughing of the upstream channel earth side slopes, both along the Canal and the tributaries, can occur if the normal pool drops below elevation 112 for any lengthy time interval.

e. Downstream Channel

The spillway and siphons discharge immediately into the natural bedrock channel. The area further downstream of the dam is a wide channel bordered by wetlands and low-lying areas. The water surface elevation is that of Lake Champlain. No unusual conditions were noticed in this downstream area.

3.2 EVALUATION OF OBSERVATIONS

Visual observations revealed deficiencies affecting primarily the Outer Forebay Wall. These deficiencies were:

1) Leakage through the interface at the new concrete cap-old wall contact.

2) Concrete surface deterioration to the extent of totally exposed steel reinforcement.

3) Vegetation growing on the wall's deteriorated surface.

Other deficiencies observed were relatively minor in nature. These consisted of rusting metal on the spillway gate, surficial concrete deterioration on the spillway's downstream fascia, and some concrete surficial cracking and spalling on the East Canal bridge support pier, East Canal abutment wall, and the navigation lock walls.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURE

Normal pool in the upstream Canal is maintained at elevation 112 (BCD) by adjusting the gate opening as necessary. Short duration fluctuations occur in the immediate vicinity of the dam whenever the Lock is operated during boat passages. The siphon spillways are continuous discharge units.

4.2 MAINTENANCE OF DAM

The dam, i.e., the concrete gravity section, gate and overhead bridge structure are maintained by the owner and were in satisfactory condition.

4.3 MAINTENANCE OF APPURTENANT STRUCTURES

The appurtenant structures, i.e., the Outer Forebay wall and navigation Lock are also maintained by DOT. The Forebay wall requires increased maintenance efforts to keep the concrete deterioration from worsening and to stop the leakage. The Lock is satisfactorily maintained since a resident operator is in daily attendence at the site throughout the year.

4.4 WARNING SYSTEM IN EFFECT

No apparent warning system is present.

4.5 EVALUATION

Operation and maintenance of the spillway and navigation Lock is satisfactory. Additional maintenance is necessary to prevent further deterioration of the Outer Forebay concrete wall. In addition, a detailed emergency warning system should be developed.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The delineation of the contributing watershed to this dam is shown on the map titled "Drainage Area Map; Lock C-12 Dam" (Appendix C). The irregular but somewhat rectangular shaped east-west oriented watershed of some 429 square miles drains the landscape via four distinct subbasins; i.e., Halfway Creek, Mettawee River, Big Creek at Smith's Basin, and Wood Creek/Champlain Canal. The northward-flowing Champlain Canal separates the relatively gentle-sloping Halfway Creek subbasin on the West from the more rugged Big Creek and Mettawee River subbasins on the East. The Wood Creek/ Champlain Canal subbasin drains the immediate lands abutting the Canal along its entire 25 mile length, from Dunham's Basin to this site. Land use within the drainage area is predominantly agricultural or open land with developed areas located in New York at Whitehall, Fort Ann, Queensbury and Glens Falls, Granville, and in Vermont, at Pawlet and Dorset. The predominant vegetative cover consists of open grassed fields and pasture, agricultural cropland, and heavily forested areas.

Halfway Creek enters the Canal at Fort Ann after having flowed in a Northeasterly direction from its headwaters for some 21 miles. The main channel slope is quite flat upstream of Fort Ann, rising some 380 feet in approximately 19 miles. However, near its headwaters, the channel slope becomes steeper, rising some 860 feet in 2 miles. A major tributary to Halfway Creek is the Southerly-flowing Bishop Brook which passes through Hadlock Pond. Other sizeable bodies of water within the subbasin are Glen Lake and Lake Nebo.

The 40 mile long Mettawee River enters the Canal just south of Whitehall after having flowed in a Northwesterly direction from its headwaters on Dorset Peak in Vermont. The main channel slope is quite flat upstream to East Rupert, Vermont, rising some 740 feet in approximately 33 miles. However, the remaining 7 miles exhibits a rapid increase in channel slope, rising some 3040 feet to the top of Dorset Peak. Many small streams channel runoff to the major tributaries from the rugged, steep-sloped hills which rise to elevations above 1000. The major tributaries include Castle Creek, Indian River, Flower Brook, Wells Brook and Mill Brook which conveys discharges from Lake St. Catherine and Little Pond, the largest bodies of water within the subbasin.

Big Creek at Smith's Basin is a smaller tributary that enters the Canal about 1.5 miles upstream from Fort Ann. Although the main channel has a moderate slope (1% - 7% range), numerous small streams and tributaries drain the steep-sloped hills which rise to elevations ranging from 800 to 1300. There are no sizeable bodies of water within this subbasin.

5.2 ANALYSIS CRITERIA

No hydrologic/hydraulic information was available regarding the original design for this dam. Therefore, the analysis of the spillway capacity of the dam was performed using streamflow gaging station records (Appendix C) and the Corps of Engineers HEC-1 computer program, Dam Safety version. The computer modeling parameters for the drainage area were adjusted such that a known areal rainfall over the subbasins produced a known runoff

water surface elevation at the dam. The final parameters were then used for the analysis of the spillway design flood. The spillway design flood selected was the Probable Maximum Flood (PMF) in accordance with the Recommended Guidelines of the Corps of Engineers.

5.3 SPILLWAY CAPACITY

The 90 foot long concrete gravity spillway structure with its single moveable radial gate is the primary control structure at the site. It was analyzed for orifice flow using a discharge coefficient C of 0.6 for conditions of 1) a constant head (at elevation 112)/variable opening and 2) a 7 foot maximum opening/variable head (above elevation 112.)

Additional normal discharge capacity at the site is obtained from facilities located at the Outer Forebay Wall. These include a six-unit siphon spillway and a small sluice gate. No additional capacity was considered available from the forebay gates at the entrance to the abandoned silk mill.

Computed discharges for all site facilities are as follows:

ELEV. (BCD)		DISCHARGE (cfs)
119	Top of Lock C-12	12,900
114	Top of Outer Forebay Wall	8,180
111	Radial Gate @ maximum opening	6,490

The Champlain Canal channel upstream of the dam passes through the Village of Whitehall in a confined, walled cross-section. An immediate upstream constriction occurs at a bridge spanning the Canal. Using the dimensions at the constriction, a maximum discharge of 8000 cfs through the section would be possible before the Canal walls would be overtopped. Hence, the spillway capacity is not controlled by the available head at the dam site but by the capacity and upstream conditions occurring in the Canal. Therefore, a water surface profile analysis is more appropriate for this site than the analysis used herein. This analysis was not conducted as part of this report.

The flood analysis performed for this dam indicates that the spillway does not have sufficient capacity for discharging one-half the PMF. For this storm event, the peak inflow and peak outflow is 111,400 cfs. The computed spillway capacity with the radial gate fully open and a water surface at the top-of-dam is 10,285 cfs.

5.4 RESERVOIR CAPACITY

The reservoir at normal pool impounded by this dam lies primarily within the limits of the existing Canal channel; extending approximately 4.9 miles upstream to Lock C-11. Additional storage occurs upstream along the Mettawee River main stem plus low areas directly abutting the Canal. The normal water surface is at or near elevation 112. The impounded capacity for this elevation is 700 acre-feet. Surcharge storage capacity to the top-of-dam elevation of 119 adds 500 acre-feet for a total storage capacity of 1200 acre-feet. The storage capacity at the spillway crest (elevation 104) is 200 acre-feet.

5.5 FLOODS OF RECORD

The maximum known flood in the watershed occurred on November 4, 1927 when gage readings of 120.5 (upstream) and 105.2 (tailwater) were recorded. On March 14, 1977 another major flood occurred with peak water surface elevations of 119.9 and 105.6 recorded at 7 p.m. This latter storm event was used for calibrating the computer model. A third significant flood occurred on March 3, 1936 when the respective water surface elevations rose to 119.5 and 106.6 For all three events, the radial gate was in a fully open position.

5.6 OVERTOPPING POTENTIAL

Records indicate that the dam and its adjacent structures have been overtopped at least three times within the past 55 years. No dam failure has been recorded. The maximum depth of overtopping is dependent upon the maximum flow that can pass through the Canal at its upstream constrictions and not on a depth determined by the PMF analysis.

5.7 EVALUATION

The spillway capacity is inadequate for the peak outflow from one-half the PMF. For this storm event and lesser recorded storm events, a high tailwater condition resulting in flooding of the downstream hazard areas would occur. Therefore, dam failure would not significantly increase the hazard to loss of life downstream from that which would exist just before an overtopping-induced failure.

In addition, large discharges at the site are not controlled by the depth of water flowing over the spillway and other facilities but by the amount of water able to flow through upstream constrictions along the Canal. These constrictions reduce the possibility of dam failure due to overtopping.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

No close-up visual observation of the spillway crest was possible because of the flow emerging from beneath the radial gate. However, both the vertical and horizontal alignments of the crest were normal, indicating no structural displacements existed. The structural steel members comprising the gate were in satisfactory condition. There was no major cracking, settlement, or misalignment noticeable at the Lock. The downstream protection pier deterioration does not affect the structural integrity of the dam.

The Outer Forebay wall exhibited significant concrete deterioration to the extent of fully exposed and hanging steel reinforcement as well as leakage through the interface between the new concrete cap and the older concrete gravity portion. This deterioration, if allowed to continue, could seriously affect the capability of this wall to continue to impound the reservoir.

b. Design and Construction Data

The subsurface and structural information used in the stability analyses was obtained from the contract drawings included in Appendix F.

c. Data Review and Stability Evaluation

The stability analyses performed used the cross-section information indicated on the contract drawings plus certain simplifying assumptions regarding the concrete and subsurface bedrock materials. The Outer Forebay wall section was considered a solid gravity section with no deduction made for the siphon spillway area. The spillway section analyses did not include the presence of the radial gate. The following conditions were analyzed:

SPILLWAY CREST:

1) Normal water elevation @ 112.0
2) Maximum known flood; HW @ 120.5; TW @ 105.2
3) Same as 1) plus a 0.10g seismic acceleration

OUTER FOREBAY WALL:

4) Normal water elevation @ 112.0
5) Same as 4) plus a 5000 lb/ft ice load
6) Maximum known flood; HW @ 120.5
   TW @ 105.2
7) Upstream canal flood wall limit; HW @ 122.0
   TW @ 105.2
8) Same as 4) plus a 0.10g seismic acceleration

The factors of safety for overturning and sliding obtained from the analyses are as follows:

CONDITION	FACTOR OF SAFETY OVERTURNING	SLIDING
Spillway Crest:		
1) Normal	1.17	1.00
2) Maximum known flood	0.94	0.80
3) 1) plus seismic	1.02	0.83
Outer Forebay Wall:		
4) Normal	1.83	1.63
5) 4) plus ice	1.19	1.16
6) Maximum known flood	1.16	0.91
7) Canal limit	1.09	0.84
8) 4) plus seismic	1.47	1.16

The analyses for both the spillway crest section and the Outer Forebay wall indicate less than desireable factors of safety for all loading conditions. The structure did withstand the 1927 maximum flood event although the analyses indicates the structures should not have been capable of doing so. Hence, the analyses is suspect due to the lack of detailed subsurface information and material parameters (both for the rock and concrete) necessary to undertake an in-depth study.

d. Seismic Stability

This dam is located in Seismic Zone 2. A seismic stability analysis for both structural sections was performed in accordance with Corps of Engineers' guidelines. The condition analyzed was for normal water levels subjected to a seismic acceleration of 0.10g. The results indicated acceptable factors of safety against overturning but unacceptable factors of safety against sliding.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I inspection of the Lock C-12 Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the Outer Forebay wall will require increased maintenance and repair efforts to correct the more serious deficiencies of leakage and concrete deterioration noted on this part of the dam.

The spillway, while not having sufficient discharge capacity for passing one-half the PMF, is considered to be inadequate. During periods of unusually heavy precipitation and high runoff occurring over the watershed, continuous surveillance should be provided both at the dam and in the downstream areas to warn of high floodwater conditions. Such surveillance procedures and other measures deemed necessary should be developed, documented and placed in readiness for future use as part of a detailed emergency operation-action plan. A warning system should also be developed and implemented; to be used in the event of dam failure. Such procedures and warning system should also take into account upstream conditions along the Canal and tributaries affected by possible slope failures resulting from loss of the reservoir pool.

b. Adequacy of Information

The information available for the preparation of this report was adequate except for the following:

1) detailed subsurface information regarding the site's bedrock characteristics

2) the structural integrity of the foundation rock-concrete interface

3) upstream channel discharge and storage capacities available during periods of high runoff from the watershed.

c. Necessity for Additional Investigations

Additional detailed investigations are required to determine the structural stability of the dam and appurtenant structures, primarily the Outer Forebay wall. Such investigations should take into account the site specific characteristics of the dam site, including the physical condition of the structural concrete and the underlying foundation materials.

d. Urgency

The structural stability investigations required should be completed within six (6) months of the date of notification of the owner. Based upon the results of these investigations, appropriate remedial measures deemed necessary to insure the safety and integrity of the dam and appurtenant structures should be undertaken and completed within eighteen (18) months of the date of notification of the owner.

The concrete surface deficiencies and leakage at the Outer Forebay wall should be corrected within twelve (12) months of the date of notification of the owner. All other deficiencies can be corrected during normal maintenance operations.

7.2 RECOMMENDED MEASURES

The following actions should be undertaken:

a) Complete an in-depth structural stability analysis of the dam and appurtenant structures, primarily the Outer Forebay wall, taking into account the site specific characteristics of the underlying bedrock foundation and the physical condition of the structural concrete.

b) Repair the deteriorated concrete surfaces, halt the leakage beneath the new concrete cap, and remove the vegetation on the Outer Forebay wall.

c) Repair the minor concrete deterioration at the joints and on the fascias of the bridge support piers, Canal abutment wall, and navigation lock walls.

d) Develop and implement a detailed emergency operation-action plan and warning system.

e) Perform periodic maintenance as necessary on the radial gate and its operating lift mechanism.

APPENDIX A
PHOTOGRAPHS

Photo 1
Upstream Approach

Photo 2
Downstream Approach

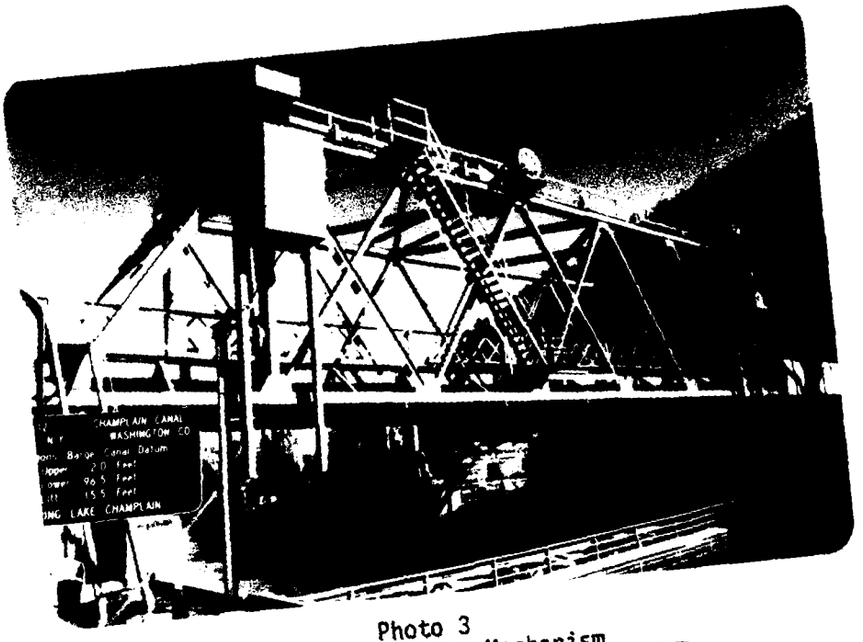


Photo 3
Spillway Gate Lift Mechanism

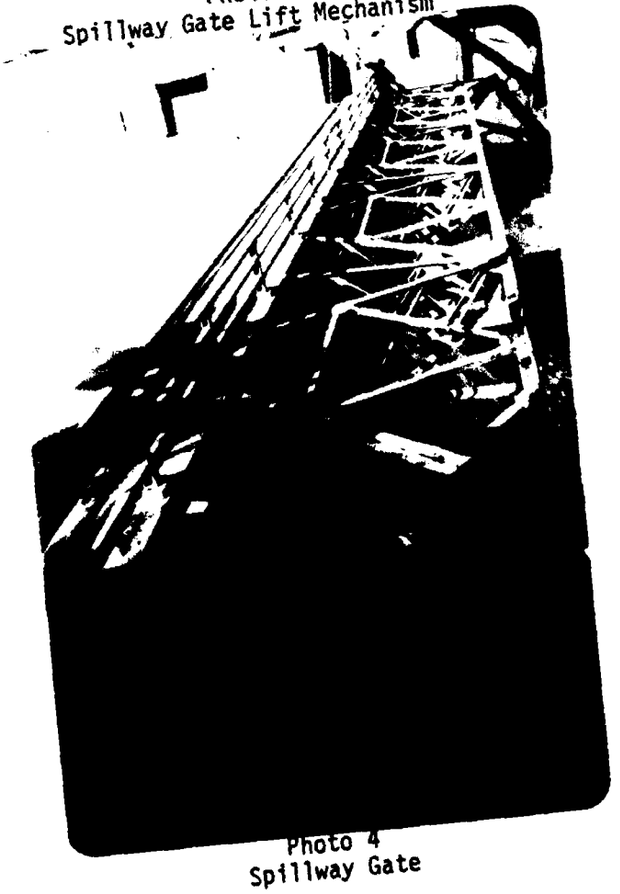


Photo 4
Spillway Gate

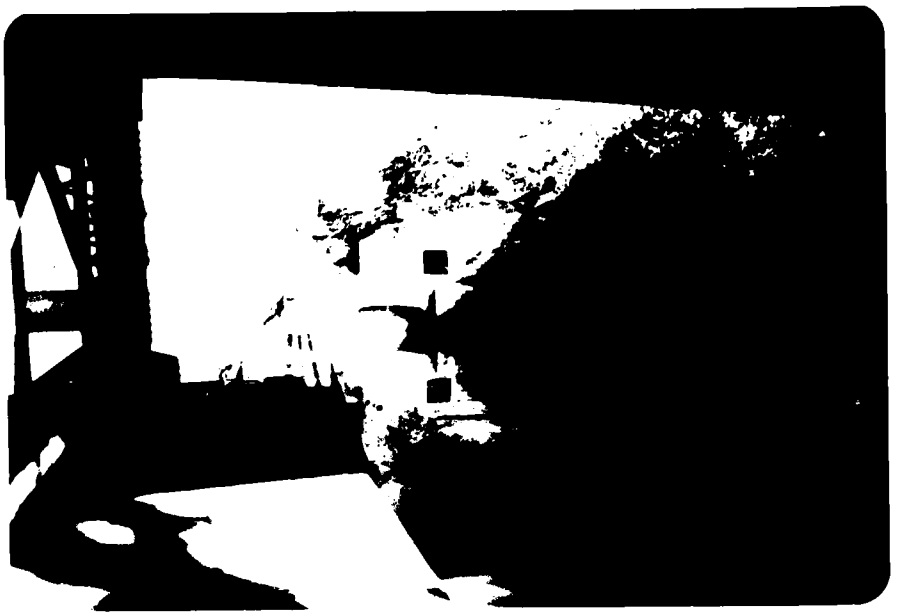


Photo 5
East Forebay

Photo 6
Sluice Gate @ Outer Forebay Wall

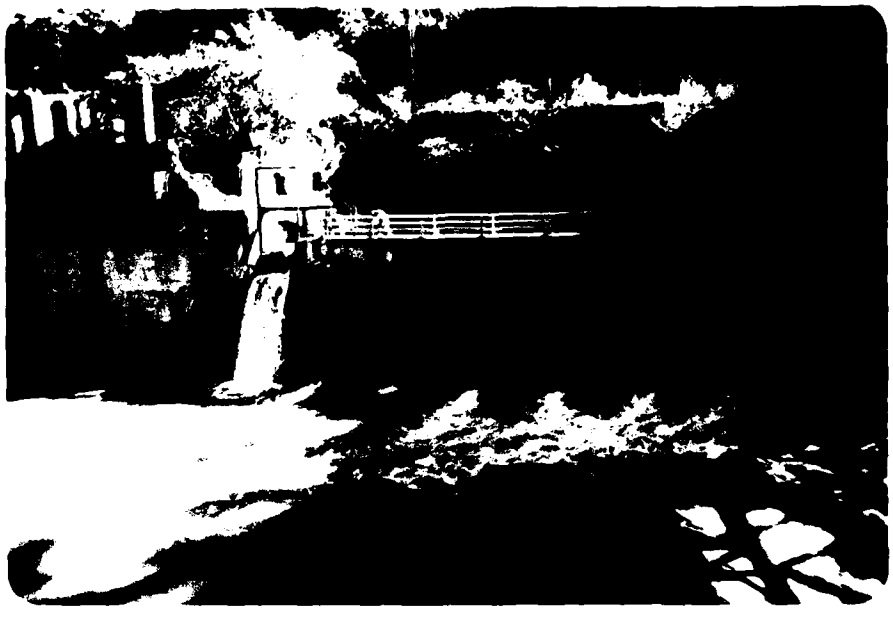


Photo 7. Outer Forebay Wall
Siphon Spillway Outlet Portals

Photo 8. Outer Forebay Wall Deterioration

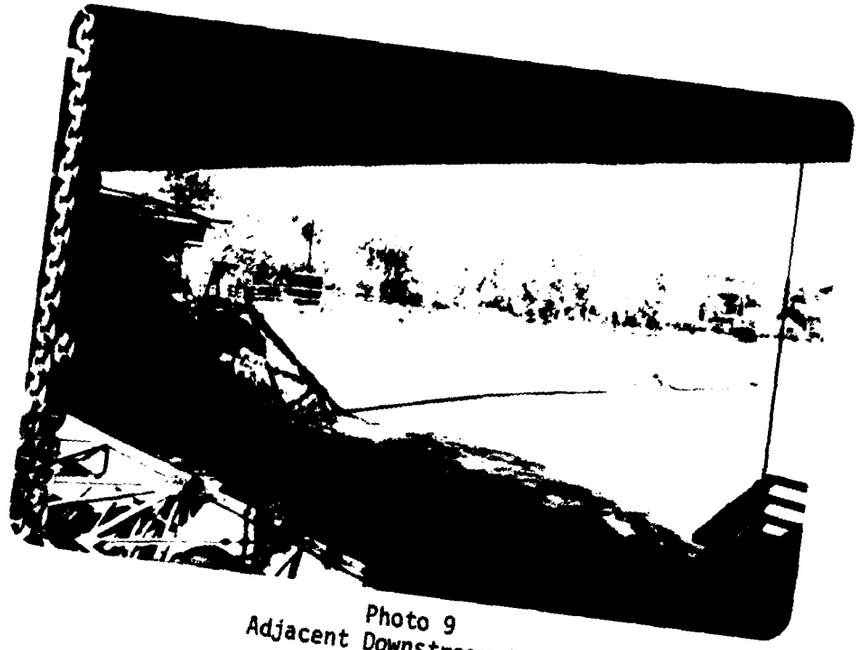


Photo 9
Adjacent Downstream Channel

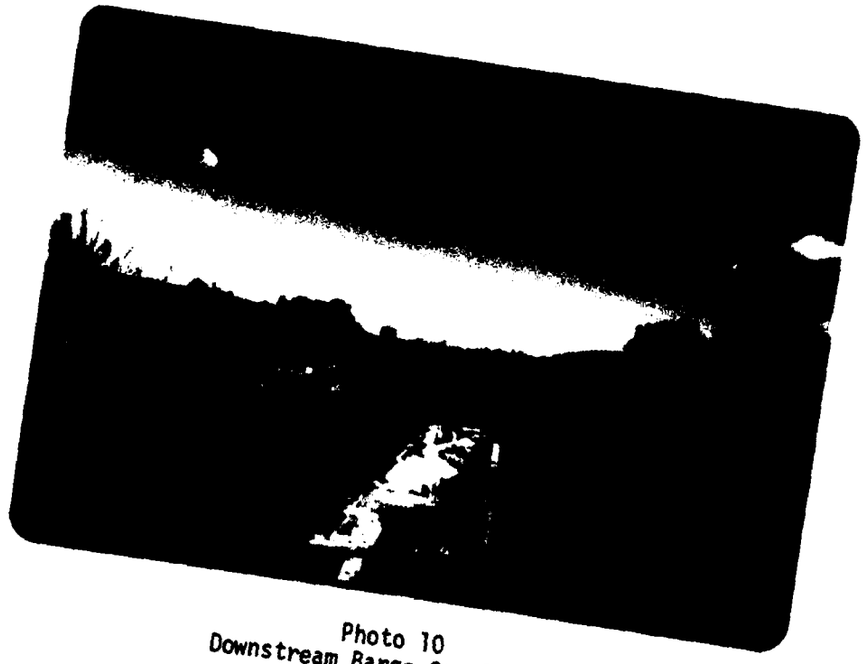


Photo 10
Downstream Barge Canal Channel

APPENDIX B
VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam LOCK C-12 DAM

Fed. I.D. # NY-796 DEC Dam No. 240C-990

[redacted] Basin LAKE CHAMPLAIN

Location: VILLAGE [redacted] WHITEHALL, County WASHINGTON

Stream Name CHAMPLAIN BARGE CANAL

Tributary of LAKE CHAMPLAIN

Latitude (N) _____ Longitude (W) _____

Type of Dam CONCRETE GRANITY W/ MOVEABLE RADIAL GATE

Hazard Category C

Date(s) of Inspection 10/16/79

Weather Conditions CLEAR 50°F

Reservoir Level at Time of Inspection ELEV. 112± (BCD)

b. Inspection Personnel R. WARRENDER W. LYNICK

c. Persons Contacted (Including Address & Phone No.) NYS-DOT, REGION 1

J. HUNTINGTON (WATERWAYS) (518) 474-6715

W. CULLIGAN (CANAL SECT. SUPERINTENDENT) (518) 747-4613

d. History:

Date Constructed (CIRCA) 1912 Date(s) Reconstructed _____

Designer NY - STATE ENGINEER

Constructed By _____

Owner NYS-DOT WATERWAYS MAINTENANCE SUBDIVISION

2) Embankment

a. Characteristics NO EMBANKMENT

(1) Embankment Material _____

(2) Cutoff Type _____

(3) Impervious Core _____

(4) Internal Drainage System _____

(5) Miscellaneous _____

b. Crest NO EMBANKMENT

(1) Vertical Alignment _____

(2) Horizontal Alignment _____

(3) Surface Cracks _____

(4) Miscellaneous _____

c. Upstream Slope NO EMBANKMENT

(1) Slope (Estimate) (V:H) _____

(2) Undesirable Growth or Debris, Animal Burrows _____

(3) Sloughing, Subsidence or Depressions _____

(4) Slope Protection _____

(5) Surface Cracks or Movement at Toe _____

d. Downstream Slope NO EMBANKMENT

(1) Slope (Estimate - V:H) _____

(2) Undesirable Growth or Debris, Animal Burrows _____

(3) Sloughing, Subsidence or Depressions _____

(4) Surface Cracks or Movement at Toe _____

(5) Seepage _____

(6) External Drainage System (Ditches, Trenches; Blanket) _____

(7) Condition Around Outlet Structure _____

(8) Seepage Beyond Toe _____

e. Abutments - Embankment Contact NO EMBANKMENT

(1) Erosion at Contact _____

(2) Seepage Along Contact _____

3) Drainage System

a. Description of System NONE

b. Condition of System _____

c. Discharge from Drainage System _____

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

NONE

5) Reservoir

a. Slopes (IMMEDIATELY UPSTREAM) - WALLED CHANNEL

b. Sedimentation N/A

c. Unusual Conditions Which Affect Dam UPSTREAM AREAS ALONG CANAL & TRIBUTARIES POSSIBLE SLOPE SLOUGHING IF POOL DROPS BELOW ELEV 112 (BCD)

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) 15 HOMES/RESIDENCES

b. Seepage, Unusual Growth N/A

c. Evidence of Movement Beyond Toe of Dam NO

d. Condition of Downstream Channel SATISFACTORY

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

FIXED CONCRETE CREST W/ RADIAL GATE; OVERHEAD LIFT MECHANISM
OUTER FOREBAY WALL W/ 6 SIPHON SPILLWAY UNITS & SMALL MAN SLUICE GATE

a. General SATISFACTORY EXCEPT FOR OUTER FOREBAY WALL (CONCRETE DETERIORATION)

b. Condition of Service Spillway CONCRETE CREST - SURFACE DETERIORATION; UNEVEN SURFACE; LARGE AGGREGATE EXPOSED
STEEL GATE - SURFICIAL RUSTING; MINOR PAINT REMOVAL; OPERATIONAL (WINTER - AIR BUBBLER TO PREVENT ICE CONTACT)

c. Condition of Auxiliary Spillway - REFER TO OUTER FOREBAY WALL

d. Condition of Discharge Conveyance Channel NATURAL BEDROCK @ SITE - SATISFACTORY

8) Reservoir Drain/Outlet

Type: Pipe _____ Conduit _____ Other NAVIGATION LOCK C-12

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 - OUTER FOREBAY WALL

a. Concrete Surfaces CONSIDERABLE CONC. DETERIORATION; EXPOSED HANGING & DANGLING RE-STEEL ALL ALONG LOWER ½ OF WALL
LOCK WALLS - SOME SPALLING & FASCIA CRACKING ESPECIALLY @ CONSTRUCTION JOINTS

b. Structural Cracking NONE APPARENT ALONG DAM, FOREBAY WALL, OR LOCK

c. Movement - Horizontal & Vertical Alignment (Settlement) NONE APPARENT ALONG DAM; DOWNSTREAM PROTECTION PIER SLABS - POOR CONDITION

d. Junctions with Abutments or Embankments SATISFACTORY

e. Drains - Foundation, Joint, Face N/A

f. Water Passages, Conduits, Sluices LOG SLUICE - SATISFACTORY
SIPHON SPILLWAYS - OPERATIONAL

g. Seepage or Leakage OUTER FOREBAY WALL - 5.5' BELOW TOP OF WALL; NEAR CONC INTERFACE (NEW CAP OVER OLD WALL)

h. Joints - Construction, etc. LOCK - SOME CONC SPALLING & CRACKING @ CONSTRUCTION JOINTS

i. Foundation N/A

j. Abutments - @ EAST CANAL WALL - SOME CONC SPALLING & CRACKING ON FASCIA WEST EMBANKMENT - STONE BLOCK RIPRAP - SATISFACTORY

k. Control Gates SATISFACTORY

l. Approach & Outlet Channels SATISFACTORY

m. Energy Dissipators (Plunge Pool, etc.) - NATURAL ROCK OUTCROP

n. Intake Structures N/A

o. Stability

p. Miscellaneous

APPENDIX C
HYDROLOGIC/HYDRAULIC
ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

LOCK C-12 DAM
NY-796

AREA-CAPACITY DATA:

	BARGE CANAL DATUM (BCD)	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1)	Top of Dam	119.0		1200
2)	Design High Water (Max. Design Pool)	N/A		N/A
3)	Auxiliary Spillway Crest OUTER FOREBAY WALL	114.0		—
4)	Pool Level [redacted]	112.0		700
5)	[redacted] Spillway Crest	104.0		200

DISCHARGES

		Volume (cfs)	
1)	Average Daily	N/A	
2)	Spillway @ Maximum High Water (GATE FULLY OPEN)	10285	(ELEV. 119)
3)	Spillway @ Design High Water	N/A	
4)	Spillway @ Auxiliary Spillway Crest Elevation	N/A	
5)	Low Level Outlet	N/A	
6)	Total (of all facilities) @ Maximum High Water	12896	(ELEV. 119)
7)	Maximum Known Flood	N/A	
8)	At Time of Inspection	N/A	

CREST: DAM (BCD) ELEVATION: ~~1000~~ 119.0

Type: VARIES - CONC WALLS OF VARIABLE WIDTHS

Width: N/A Length: LOCK - 71' EAST PIER - 11' FOREBAY WALL - 69'

Spillover - RADIAL GATE

Location - NEAR CENTER OF ENTIRE IMPOUNDING STRUCTURE

SPILLWAY:

SERVICE [redacted]		AUXILIARY [redacted]
104.0	(BCD) Elevation	114.0
RADIAL GATE OVER FIXED CONCRETE CREST	Type	OUTER FOREBAY CONC. WALL
90'	Width	7.5'
	Type of Control	
N/A	Uncontrolled	✓
✓	Controlled:	
RADIAL STEEL GATE	Type (Flashboards; gate)	N/A
1	Number	N/A
95.4'	Size/Length	63' + 6.1' SLUICE GATE
	Invert Material	CONCRETE
	Anticipated Length of operating service	
N/A	Chute Length	N/A
7' - 13'	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	18' - 22'

ADDITIONAL DISCHARGE AVAILABLE FROM 6 SIPHON SPILLWAY UNITS WITHIN OUTER FOREBAY WALL

HYDROMETEROLOGICAL GAGES:

Type : STAFF GAGES ON UPPER & LOWER POOLS

Location: _____

Records:

Date -	(BACK TO 1916) 11/4/27	3/14/77	3/3/36
Max. Reading -	HW - 120.5 TW - 105.2	119.9 105.6	119.5 106.6

FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

Method of Controlled Releases (mechanisms):

OPERATION OF GATE TO MAINTAIN AN UPSTREAM POOL @ 112.0

FREQUENCY OF OPERATION - AS NECESSARY

DRAINAGE AREA: 429 SQ MILES

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: PRIMARILY AGRICULTURAL, OPEN LAND & FORESTS

Terrain - Relief: FLAT TO STEEP (WEST SUBBASINS - FLAT; EAST SUBBASINS - STEEP)

Surface - Soil: HIGHLY VARIABLE (SAND, GRAVEL; ROCK OUTCROPS)

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

N/A

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

N/A

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

NO

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

Location: N/A

Elevation: _____

Reservoir:

Length @ NORMAL Pool (TO LOCK C-11) 4.87 (Miles)

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

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
DAM @ LOCK C-12	1/		
SUBJECT		**COMPUTED BY**	**DATE**
DRAINAGE AREA: USGS 15' QUAD. & 7.5' QUAD.		WCL	11/26/79

CALIBRATION: 1.0 = 1.0 IN²
MAP SCALE 1:62500
1 IN² = 692.744 ACRES
1 IN² = 0.973 SQ MILES

(15 MIN) QUAD. SHT.	PLANIMETERED AREA	
LAKE	0.66	
LUZERNE	0.05	
		0.71
GLENS FALLS	39.11	
	27.86	
	27.62	
		94.59
BOLTON LANDING	0.13	
WHITEHALL	39.48	
FORT ANN	24.76	
	24.76	
	24.84	
	24.76	
	24.70	
	30.00	
	12.21	
		166.03
CASTLETON VT.	0.40	
	0.93	
		1.33
PAWLET VT.	31.43	
	27.23	
	24.79	
	17.72	
	34.83	
		136.00
(15 MIN) SUBTOTAL	= 438.27 IN²	
(7.5 MIN) SUBTOTAL	= 22.27 IN²	

MAP SCALE 1:24000
1 IN² = 91.827 ACRES

(7.5 MIN) QUAD. SHT	PLANIMETERED AREA
WEST RUPERT	6.14
MANCHESTER	5.79
	10.34
	16.13

AREA
426.4 SQ MILES
3.2 SQ MILES
429.6 SQ MILES

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
DAM @ LOCK C-12	2/		
SUBJECT		**COMPUTED BY**	**DATE**
DRAINAGE AREA - SUBBASINS		WCL	12/79

SMITH BASIN:
USGS 15' QUAD - FORT ANN

PLANIMETERED AREA = 35.05

DR. AREA = 34.1 SQ MILES

PLANIMETER CALIBRATION
1.0 = 1.0 IN^2

MAP SCALE
1:62500
1 IN^2 = 622.744 ACRES
1 IN^2 = 0.973 SQ MI.

[PUBLISHED VALUE = 33.5 SQ MI.] ←

METTAWEE RIVER @ GRANVILLE (GAGE):
USGS 15' QUAD:

	PLANIMETERED AREA
FORT ANN	0.90
PAWLET VT.	27.16
	27.23
	25.70
	34.84
	114.89
CASTLETON VT.	0.93
(15 MIN) SUBTOTAL =	116.72 IN^2
(7.5 MIN) SUBTOTAL =	22.27 IN^2

DR. AREA = 116.8 SQ MILES ←

[PUBLISHED VALUE = 115 SQ MILES]

USGS 7.5 MIN QUAD	PLANIMETERED AREA
WEST RUPERT	6.14
MANCHESTER	5.79
	10.34
	16.13

AREA
113.6 SQ MILES
3.2 SQ MILES

DR. AREA = 116.8 SQ MILES ←

METTAWEE RIVER - SUBBASIN (TOTAL):
USGS 15' QUAD:

	PLANIMETERED AREA
WHITEHALL	16.45
FORT ANN	35.36
	27.78
	63.14
CASTLETON VT.	0.40
	0.93
	1.33

	PLANIMETERED AREA
PAWLET VT.	31.43
	27.23
	24.79
	17.72
	34.83
	136.00

(15 MIN) SUBTOTAL = 216.92 IN^2 = 211.1 SQ MI.

(7.5 MIN) SUBTOTAL (ABOVE) = 22.27 IN^2 = 3.2 SQ MI.

214.3 SQ MI.

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
DAM @ LOCK C-10	3/		
SUBJECT		COMPUTED BY	DATE
DRAINAGE AREA - SUBBASINS		WCL	12/79

CALIBRATION : 1.0 = 1.0 SQ IN.

HALFWAY CREEK - SUBBASIN (TO IT'S CONFUENCE WITH A LARGE SOUTHERLY-FLOWING TRIBUTARY @ KANES FALLS)

USGS 15' QUAD.	PLANIMETERED AREA
GLENS FALLS	26.72
	39.11
	65.83
LAKE LUZERNE	0.66
	0.05
	0.71

(1 IN^2 = 0.973 SQ MI) Σ = 66.54 IN^2 AREA 64.7 SQ MILES ←

HALFWAY CREEK - SUBBASIN (TO FORT ANN; JUST BELOW KANES FALLS)

USGS 15' QUAD.	PLANIMETERED AREA
FORT ANN	5.16
GLENS FALLS	15.12
	26.72
	39.11
	80.95
LAKE LUZERNE	0.66
	0.05
	0.71
WHITEHALL	0.65

(1 IN^2 = 0.973 SQ MI) Σ = 87.47 IN^2 AREA 85.1 SQ MILES ←

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	4/		
SUBJECT		**COMPUTED BY**	**DATE**
RAINFALL - BASE FLOW - INFILTRATION PARAMETERS		WCL	12/79

PMP RAINFALL : DR. AREA = 429.6 SQ MI.

200 SQ MI 24 HR	% - 6	12	24	48
P = 18.5"	64	79	90	96

SOIL LOSS RATE :

MAJOR SOIL GROUP = SCS GROUP C :

INITIAL LOSS = 1"
CONSTANT LOSS = 0.1"

BASE FLOW :

SUBBASIN →	BIG CREEK	HALFWAY CREEK	METTAWEE RIVER	CANAL & WOOD CREEK
CSM	0.15	0.3	0.25	0.15
CFS	5	25	55	15

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Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	5/		
SUBJECT		**COMPUTED BY**	**DATE**
UNIT HYDROGRAPH - PARAMETERS		WCL	12/27/79

STORAGE INDEX - S_t :

S_t = % OF LAKES, PONDS, SWAMPS (SURFACE AREA) + 0.5%

1) BIG CREEK = 0.08 + 0.5 = 0.58

2) HALFWAY CREEK = 2.78 + 0.5 = 3.28

3) METTAWEE RIVER = 1.4 + 0.5 = 1.9

4) WOOD CREEK & CANAL = 0.12 + 0.5 = 0.62

SLOPE @ 10% - 85% LOCATIONS - $S_{10/85}$:

SUBBASIN	TOTAL DISTANCE	@10%	@85%	ΔL	ELEV. @10%	ELEV. @85%	$S_{10/85} = \frac{\Delta E}{\Delta L}$ — MILES
BIG CREEK	63708'	6371	54152	47781	139	822.2	75.50
HALFWAY CREEK	114230'	11423	97096	85673	200	477.8	17.12
METTAWEE	212845'	21284	180918	159634	122.6	944	27.17
WOOD CREEK & CANAL	133908'	13391	113822	100431	112.4	222.3	5.778

	TOTAL DIST. (IN MILES) (L)
1)	12.06
2)	21.63
3)	40.31
4)	25.36

$$T_c = 5.33 \frac{L^{0.602} S_t^{0.231}}{S_{10/85}^{0.448}}$$

$$R = 17.6 \frac{L^{0.339} S_t^{0.268}}{S_{10/85}^{0.296}}$$

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB		SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM		6/		
SUBJECT			COMPUTED BY	DATE
UNIT HYDROGRAPH - PARAMETERS			WCL	12/27/79

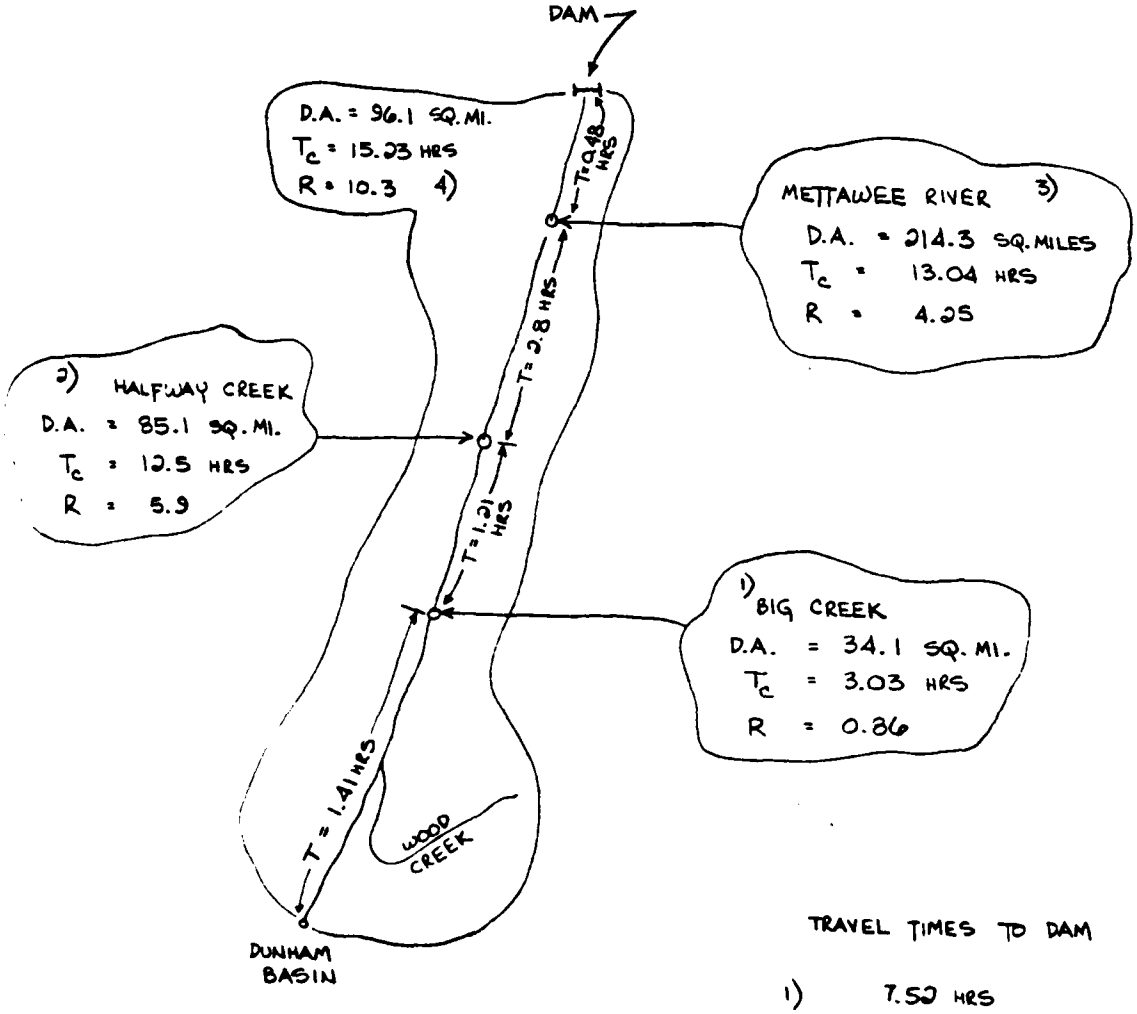
SUBBASIN	0.602 L	0.339 L	0.231 S_L	0.258 S_L
1) BIG CREEK	4.477	2.326	0.8818	0.8689
2) HALFWAY CREEK	6.364	2.835	1.316	1.359
3) METTAWEE	9.257	3.501	1.160	1.180
4) WOOD CREEK & CANAL	7.003	2.992	0.8955	0.8840

SUBBASIN	0.448 $S_{10/85}$	0.86 $S_{10/85}$	T_c (HRS)	R
1)	6.939	1.21	3.03	0.86
2)	3.570	11.50	12.50	5.90
3)	4.39	17.11	13.04	4.25
4)	2.194	4.50	15.23	10.3

LOCK C-12 DAM

WCL 12/27/79

STORM RUNOFF - SCHEMATIC



TRAVEL TIMES TO DAM

1) 7.50 HRS

2) 15.78 HRS

3) 13.50 HRS

4) 15.23 HRS

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	6B/		
SUBJECT		COMPUTED BY	DATE
MAXIMUM KNOWN FLOOD RAINFALL VS. BASIN RUNOFF		WCL	1/4/80

MAX. KNOWN FLOOD - MARCH 14, 1977 @ LOCK C-12

CRESTED @ 7PM: ELEV. 119.9 RADIAL GATE - FULLY OPEN ≈ 9'

TAILWATER ELEV. 105.6

NOAA CLIMATOLOGICAL DATA: MARCH, 1977 [NO SNOW ON GROUND]

DATE → / WEATHER STATION ↓		12	13	14	15	16
WHITEHALL:						
(8AM)	RAINFALL	—	0.24	2.44	0.05	—
(4PM)	TEMP MAX	60	60	47	46	47
	MIN	28	37	39	36	35
GLENS FALLS AIRPORT:						
(NOON)	RAINFALL	—	2.50	0.47	—	0.18
(NOON)	TEMP MAX	66	51	47	50	46
	MIN	28	44	39	37	29
SMITH BASIN:						
(8AM)	RAINFALL	—	—	0.62	0.15	—

RAINFALL DISTRIBUTION: (TOTALS)

DURATION →	6 (ASSUMED)	12	24	48	72
WHITEHALL	0.06	0.12	0.24	2.68	2.73
GLENS FALLS	0.62	1.25	2.50	2.97	2.97
SMITH BASIN	0	0	0	0.60	0.77
	[0.08	0.16	0.31]		

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	7/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - STORAGE DATA		WCL	12/27/79

THE STORAGE VOLUME DOES NOT INCLUDE BACKWATER EFFECTS UP THE METTAWEE RIVER OR LOW SUPPLY PONDING AREAS DIRECTLY ALONG THE CANAL ITSELF.

X-SECTION END-AREAS: DIST TO LOCK C-11

			STORAGE VOL. (AC-FT) (DEPTH = 12')
IN ROCK:	A = 1128 FT²	25708'	6666
IN EARTH:	A = 1188 FT²		701 (USE) ←
RIVER:	A = 2400 FT²		1416

STORAGE VOLUMES: ASSUME EARTH SECTION FOR DIST = 25708'
SIDE SLOPES = 1V:2H

DESCR.	ELEV.	H	WIDTH BOT.	WIDTH TOP	WIDTH AVE.	TRAP. AREA	RECT AREA	TOTAL VOL. (AC-FT)
CHANNEL BOTTOM	100	—	75	75	75	0	0	0
SIPHON INTAKE INVERT	103	3		87	81	243		143
CREST - DAM	104	4		91	83	332		196
SIPHON INTAKE CROWN	105	5		95	85	425		251
SLUICE GATE	108.6	8.6		109.4	92.2	792.9		468
MAX. GATE BOT. OPENING	111	11		119	97	1067		630
→ NORMAL POOL	112	12	75	123	99	1188	0	701 ←
TOP - WALL SIPHON	114	2		123		1188	246	846
TOP - LOCK	119	7		123			861	1209
MAX. GATE TOP OPENING	119.75	7.75		123			953	1263
LOW POINT - ROAD	120	10		123			1230	1457
BOT. BRIDGE	128.9	16.9		123		1188	2078	1927

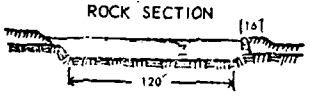
7A/

LOCK C-18 DAM

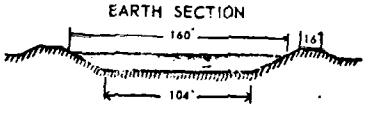
TYPICAL X-SECTIONS
OF
CANAL

TYPICAL CHANNEL SECTIONS
ERIE CANAL - WATERFORD TO THREE RIVERS
OSWEGO CANAL - THREE RIVERS TO OSWEGO

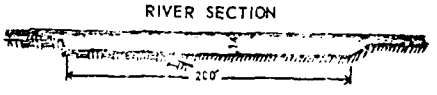
ROCK SECTION



EARTH SECTION

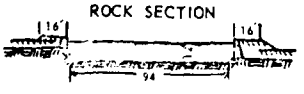


RIVER SECTION

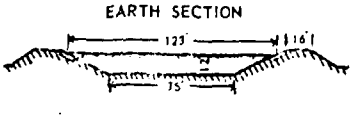


TYPICAL CHANNEL SECTIONS
CHAMPLAIN CANAL, CAYUGA & SENECA CANAL,
ERIE CANAL - FROM THREE RIVERS TO TONAWANDA

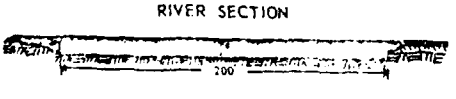
ROCK SECTION



EARTH SECTION



RIVER SECTION



00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	8/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : RADIAL GATE		WCL	12/28/79

ORIFICE FLOW - UNDER CONSTANT HEAD (W.S. @ ELEV. 112) WITH FULLY OPEN GATE WITH W.S. RISING FROM EL 112 & UPWARD

$Q = CA\sqrt{2gH}$

$Q = 4.815 A\sqrt{H}$

C = 0.60

A = VARIES WITH AMOUNT OF OPENING

$A_{MAX} = 7 \times 90 = 630\ FT^2$

H - MEASURED TO ℄ OF OPENING

	BOTTOM GATE ELEV.	(REF. EL 112.0) OPENING	H	(L=90') A	Q (cfs)
CREST	104	0	8	0	
	105	1	7.5	90	1186
	108.6	4.6	5.7	414	4759
	109	5	5.5	450	5081
	110	6	5	540	5814
MAX OPENING	111	7	4.5	630	6435

CONSTANT HEAD @ EL 112.0
VARIABLE OPENING

$Q = CA\sqrt{2gH} = 3033\sqrt{H}$

	WATER ELEV.	(REF. EL 107.5) OPENING	H	A	Q
	112	7	4.5	630	6435
	114		6.5		7732
	116		8.5		8842
TOP LOCK	119		11.5		10285
TOP GATE @ MAX. OPENING	119.75		12.25		10615
	122	7	14.5	630	11549

CONSTANT OPENING @ 7'
VARIABLE HEAD

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	9/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : SIPHON SPILLWAY (6 UNITS)		WCL	12/31/79

REF: DESIGN OF SMALL DAMS (1977) BUREC — HANDBOOK OF HYDRAULICS KING & BRATER 5TH ED.

DISCHARGE @ THROAT OF SIPHON SPILLWAY:

$$Q = 8.02\, B \sqrt{h_{vs}} \left(\frac{R}{c}\right)^{\log_e \frac{R_s}{R_c}}$$

FROM SECTION B-B :

$B = 8.6'$

$R_c = 0.5'$

$R_s = 1.1'$

THROAT AREA $= 4.3\ ft^2$

$$h_{VS} = h_{SA} + h_s - \Sigma h_{LU}$$

WHERE $h_{SA} = 21'$ @ EL. = 1000

$h_s \approx 0.1'$ @ ELEV 112.1

$f(\frac{V^2}{2g}) \longrightarrow h_{LU}$ = ENTRANCE GRATING + ROUNDED ENTRANCE CORNERS + BEND LOSS + CONVERGING SECTION + CONDUIT FRICTION LOSS

$K(\frac{V^2}{2g})$: K : 1.0 + 0.1 + 0.1 + 0.2 + $(\frac{fL}{D})$

$\Sigma K = 2.1$ (THROAT) $= 6.5$ (TOTAL)

CONDUIT FRICTION LOSS: (THROAT)

L (TO THROAT) = 10.5'

L (TOTAL) = 34'

HT VARIES FROM 2' TO 0.5' TO 2'

WIDTH VARIES FROM 4.3' TO 8.6' TO 2.2'

APPROX EQUIV. D = 18"

$$f = \frac{185\, n^2}{D^{.333}}$$

CAST IRON LINING (TUBERCULATED) (DIRTY)

RANGE n = 0.015 TO 0.035

(USE n = 0.025)

$$f = \frac{185 (.025)^2}{(1.5)^{.333}} = 0.101$$

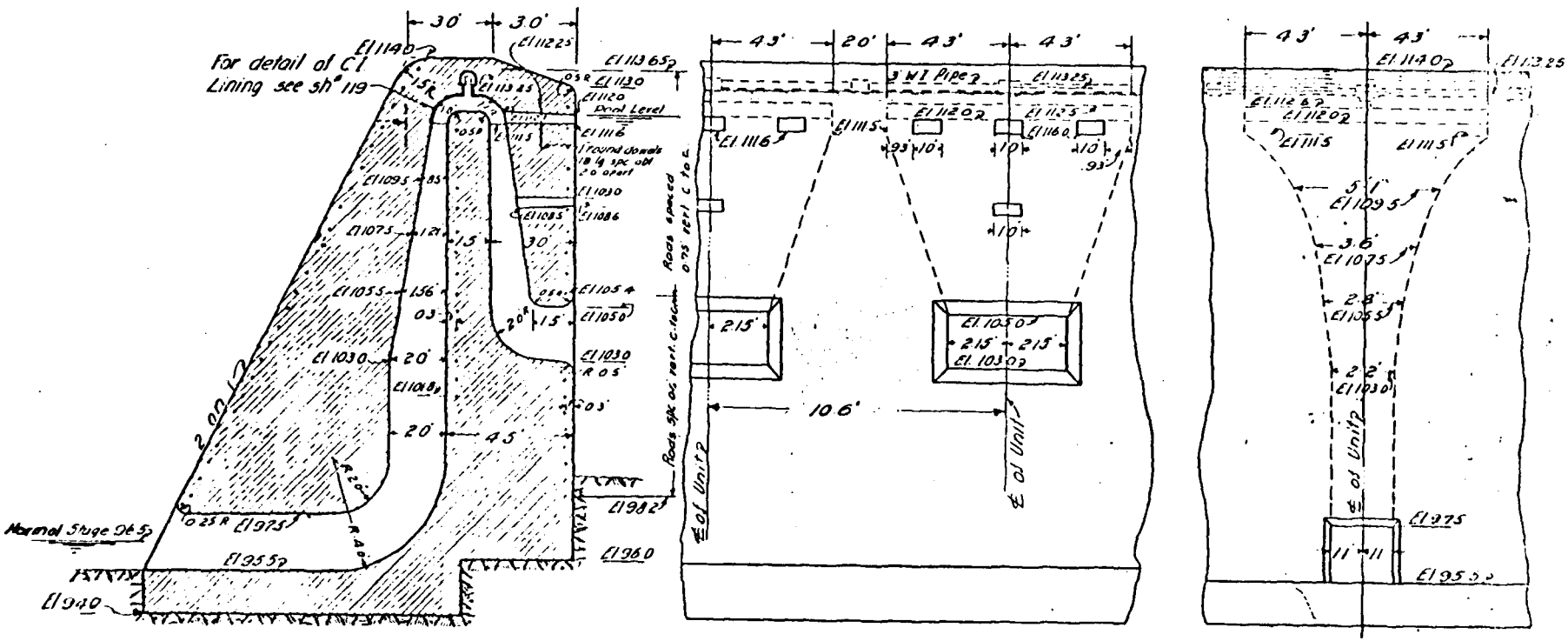
$$\frac{fL}{D} = \frac{(0.101)(10.5)}{(1.5)} = 0.7 \quad \text{(TO THROAT)}$$

$$\frac{fL}{D} = 2.3 \quad \text{(TOTAL)}$$

$$\therefore h_{VS} = 21.1 - 2.1 \frac{V_s^2}{2g}$$

OUTER FOREBAY WALL

SIPHON SPILLWAY - TYPICAL SECTION



SECTION B-B

REAR ELEVATION

FRONT ELEVATION

SIPHON SPILLWAY @ LOCK C-12 DAM
(6 UNITS)

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	10/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : SIPHON SPILLWAY (6 UNITS)		WCL	12/31/79

$$H_1 + \frac{P_1}{\gamma} + \frac{V_1^2}{2g} = H_5 + \frac{P_5}{\gamma} + \frac{V_5^2}{2g} + \Sigma h_L$$

$P_1 = 0 \quad V_1 \approx 0 \quad H_5 = 0 \quad P_5 = 0$

$$\therefore H_1 = \frac{V_5^2}{2g} + \Sigma h_L$$

$$h_L = 6.5\frac{V_5^2}{2g}$$

$$V_5 = \sqrt{\frac{2g\,H_1}{7.5}}$$

$$V_5 = 2.93\sqrt{H_1}$$

$$h_{VS} = 21.1 - 2.1\frac{V_5^2}{2g}$$

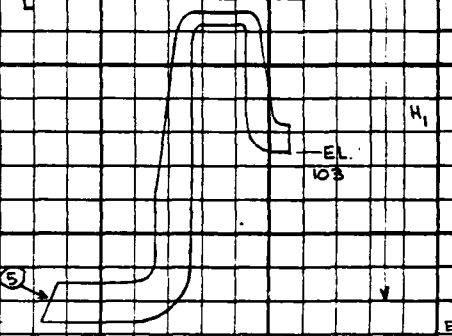
$$Q = 8.02\,B\sqrt{h_{VS}}\left(\frac{R_c}{R_c}\right)\log_e\left(\frac{R_s}{R_c}\right)$$

$$Q = 27.19\sqrt{h_{VS}}$$

(REF EL 96.5) (PORTAL = 4.4 ft²)

WATER SURFACE ELEV.	H_1	V_5	$Q = AV_5$	h_{VS}	Q	(6 UNITS) Q
112	15.5	11.53	50	14.18	102	300
114	17.5	12.26	54	13.29	99	324
116	19.5	12.94	57	12.39	95	342
119	22.5	13.90	61	11.06	90	366
119.75	23.25	14.13	62	10.72	89	372
122	25.5	14.79	65	9.72	85	390

USE (× 6 UNITS)



00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	11/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : SLUICE GATE		WCL	12/31/79

SLUICE GATE : WITHOUT STOPLOGS (3.3' HIGH)

CLEAR OPENING = 5.4' w/ END CONTRACTIONS

$Q = CLH^{3/2}$ USE $C = 3.1$

$L = L' - 2(NK_p + K_a)H$ $N = 0$, $K_a = 0.2$

$L = 5.4 - 0.4H$

	WATER SURFACE ELEV.	H	L	Q
CREST	108.6	—	5.4	—
	109	0.4	5.24	4.1
	110	1.4	4.84	24.8
	111	2.4	4.44	51.2
NWS	112	3.4	4.04	78.5
	114	5.4	3.24	126
	SUBMERGED 116	7.4		202
TOP LOCK	119	10.4		337
	119.75	11.15		374
	122	13.4		492

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	12/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : EAST - OUTER FOREBAY WALL		WCL	12/31/79

$Q = CLH^{3/2}$

CLEAR OPENING = 64' w/ ROUNDED ABUTMENT CONTRACTION

C VARIES WITH H HEAD - BROAD CRESTED WEIR (HANDBOOK OF HYDR TABLE 5-3)

L VARIES " HEAD - $L = L' - 2(NK_p + K_a)H$ $N = 0$ $K_a = 0.1$

$L = 64 - 0.2H$

	WATER SURFACE ELEV.	H	L	C	Q
CREST	114	—	64	2.41	—
	115	1	63.8	2.68	171
	116	2	63.6	2.64	475
	117	3	63.4	2.65	873
	118	4	63.2	2.67	1350
TOP LOCK	119	5	63	2.71	1908
	119.75	5.75		2.76	2397
	122	8		2.76	3934

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	13		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE: { TOP OF LOCK 12 + WEST ABUT. { EAST PIER + MILL ABUT.		WCL	12/31/79

$Q = C L H^{3/2}$ [LOCK 12]

C = 2.6 BROAD-CRESTED WEIR

L - VARIES WITH DEPTH : SIDE SLOPE = 1V : 1H WEST; EAST = VERTICAL
BOT. WIDTH = 76'

	WATER SURFACE ELEV.	H	TOP WIDTH	L AVE	Q
TOP LOCK	119	—	76	76	—
	119.75	0.75	76.75	76.375	129
	120	1	77	76.5	199
	121	2	78	77	566
	122	3	79	77.5	1047

$Q = C L H^{3/2}$ [EAST PIER]

C = 2.6 BROAD-CRESTED WEIR

L = 38' EAST PIER = 28'; MILL ABUT = 10'

$Q = 98.8 H^{3/2}$

	WATER SURFACE ELEV.	H	Q
TOP LOCK	119	—	—
	119.75	0.75	64.2
	120	1	98.8
	121	2	279
	122	3	513

00-15-1 (3/78)
Formerly CA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	14/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : SUMMARY		WCL	12/31/79

STAGE (ELEV.)	RADIAL GATE	SIPHON SPILLWAY (6 UNITS)	SLUICE GATE	EAST - OUTER FOREBAY WALL	WEST ABUTMENT & LOCK 12	EAST PIER & MILL ABUT.	(CFS) TOTAL
104	—	—	—	—	—	—	—
105	1186	—	—	—	—	—	1186
108.6	4759	—	—	—	—	—	4759
111	6435	—	51	—	—	—	6486
112	6435	300	78	—	—	—	6813
114	7732	324	106	—	—	—	8162
116	8842	342	202	475	—	—	9861
119	10285	366	337	1908	—	—	12896
119.75	10615	372	374	2397	129	193 64	13951 (13758)
122	11549	390	492	3934	1047	513	17925

00-15-1 (3/78)
Formerly GA-17

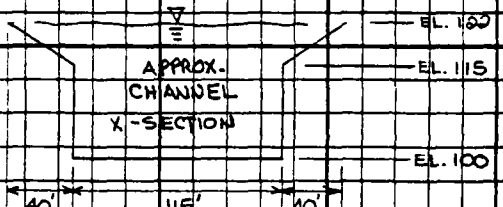
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK C-12 DAM	15/		
SUBJECT: BARGE CANAL CHANNEL CAPACITY : APPROACH TO LOCK		COMPUTED BY: WCL	DATE: 12/31/79

CONTR # 15 ; SHT Ko

CONSTRICTION OCCURS @
WILLIAM ST - SAUNDERS ST BRIDGE



SHT 15/a :

IF WATER SURFACE REACHES ELEV. 122 ; WATER WILL FLOW THRU THE VILLAGE VIA BROAD ST ; END-AROUNDING THE WEST ABUTMENT.

$V = \frac{1.486}{n} r^{2/3} S^{1/2}$ $\quad n = 0.04$ $\quad S = 0.000115 = \frac{1}{8680}$

$r = \frac{A}{WP} = 12.42 = \frac{2810}{226.2}$

$V = \frac{1.486}{(.04)} (12.42)^{2/3} (.000115)^{1/2}$

$A = (115 \times 15) + (155 \times 7)$

$V = 2.14$ fps $\quad A = 2810$

$Q = AV = (2810)(2.14) = 6013$ cfs $\quad WP = 145 + 2(40.6)$

$WP = 226.2$

$V = 2.85$ fps @ $n = 0.03$

$Q = 8008$ cfs

1

PMF
ANALYSIS

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

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

PLEASE REPORT ANY UNUSUAL OPERATING PROBLEMS
TO MIKE TILLSON (RM. 423) 2 1 7-5560
*****************************************
   1          A LOCK Ca12 DAM       NY-796                          LAKE CHAMPLAIN BASIN
   2          A                     HYSDOT-WATERWAYS                WASHINGTON COUNTY
   3          A                     MULTIPLE SUBBASINS              CLARK UH
   4          B    150      1       0       0       0       0       0       2       0       0
   5          B1     5
   6          J      1      2       1
   7          J1   0.5      1
   8          K      0   348C                                       1
   9          K1                    BIG CREEK AT SMITH BASIN
  10          M      1      0    34.1            429.6                              1
  11          P          18.5      64      79      90      96
  12          T                                                     0    0.02
  13          W   7.52   0.66
  14          X      5      5       1
  15          K      0   65HC                                       1
  16          K1                    HALFWAY CREEK AT FT ANN
  17          M      1      0    85.1            429.6                              1
  18          P          18.5      64      79      90      96
  19          T                                                     0    0.02
  20          W  15.78    5.9
  21          X     25     25       1
  22          K      0  214MR                                       1
  23          K1                    METTAWEE RIVER AT WHITEHALL
  24          M      1      0   214.5            429.6                              1
  25          P          18.5      64      79      90      96
  26          T                                                     0    0.02
```

```
K      55     5?
K      (      ?6JCC                                       1
K1                      ?J?S CREEK AND CHAMPLAIN CANAL
M      1      ?       9?.?          429.?                          1
P             1?.5    6?     7?     5?     ??
T                                                         0    C.02
V  15.23      1?.?
X     15      15      ?
K      4      1                                           1
K1                      COMBINED HYDROGRAPHS AT DAM
K      1      C12                   2                     1
K1                      ROUTED HYDROGRAPH AT DAM - NO BREACH
Y                                   1      1
Y1     1                                                -112    -1
Y4   104      105     10?.?   111   112    114    116    119
Y5     0      1186    475?    6?13  8162   9861   12896  13758
$S     0      143     196     251   468    630    701    846    1209   1263
$E   100      103     104     105   108.6  111    112    114    119    119.75
$$   104
$D   119      2.6     1.5     114
K     99
A
A
A
A
A
```

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

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

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

RUN DATE 01/04/80
            LOCK C-12 DAM          NY-794                        LAKE CHAMPLAIN BASIN
                                   NYSDOT-WATERWAYS              WASHINGTON COUNTY
                                   MULTIPLE SUBBASINS            CLARK UH

                                         JOB SPECIFICATION
        NQ      NHR     NMIN     IDAY     IHR     IMIN    METRC      IPLT     IPRT    NSTAN
       150        1        0        0       0        0        0         2        0        0
                                 JOPER     NWT    LROPT    TRACE
                                     5       0        0        0

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


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

                                 SUB-AREA RUNOFF COMPUTATION

                                  BIG CREEK AT SMITH BASIN
                          ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                           5430       0       0       0       0       0       1       0       0

                                          HYDROGRAPH DATA
             IHYDG    IUHG    TAREA    SNAP    TRSDA   TRSPC    RATIO   ISNOW   ISAME   LOCAL
                 1       0    34.10      0.   429.60      0.       0.       0       1       0

                                           PRECIP DATA
                       SPFE     PMS      R6      R12     R24      R48      R72      R96
                         0.   18.50   64.00    79.00   90.00    96.00       0.       0.
TRSPC COMPUTED BY THE PROGRAM IS 0.897

                                            LOSS DATA
         LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
             0      0.      0.    1.00      0.      0.    1.00      0.    0.02      0.      0.

                                       UNIT HYDROGRAPH DATA
                              TC=  7.52     R=  6.86    NTA=  0

                                          RECESSION DATA
                          STRTQ=   5.00    QRCSN=   5.00    RTIOR= 1.00

              UNIT HYDROGRAPH 1? END-OF-PERIOD ORDINATES, LAG=   4.57 HOURS, CP= 0.82  VOL= 1.00
      [illegible]   1775.   27[illegible].   [illegible]   3[illegible]7.   3665.   2981.   1328.   692.   183.
```

PERIOD	RAIN	EXCS	LOSS	COMP Q	END-OF-PERIOD FLOW	HR..MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	0.00	0.	0.01	5.	1.04	4.00	76	0.	0.	0.	5.
1.01	0.00	0.	0.01	5.	1.04	5.00	77	0.	0.	0.	5.
1.01	0.00	0.	0.01	5.	1.04	6.00	78	0.	0.	0.	5.
1.01	0.00	0.	0.01	5.	1.04	7.00	79	0.	0.	0.	5.
1.01	0.00	0.	0.01	5.	1.04	8.00	80	0.	0.	0.	5.
1.01	0.00	0.	0.01	5.	1.04	9.00	81	0.	0.	0.	5.
1.01	7.00	7	0.03	0.01	0.02	9.	1.04	10.00	82	0.	0.	0.	5.
1.01	8.00	8	0.03	0.01	0.02	22.	1.04	11.00	83	0.	0.	0.	5.
1.01	9.00	9	0.03	0.01	0.02	44.	1.04	12.00	84	0.	0.	0.	5.
1.01	10.00	10	0.03	0.01	0.02	71.	1.04	13.00	85	0.	0.	0.	5.
1.01	11.00	11	0.03	0.01	0.02	101.	1.04	14.00	86	0.	0.	0.	5.
1.01	12.00	12	0.03	0.01	0.02	130.	1.04	15.00	87	0.	0.	0.	5.
1.01	13.00	13	0.07	0.05	0.02	176.	1.04	16.00	88	0.	0.	0.	5.
1.01	14.00	14	0.08	0.06	0.02	272.	1.04	17.00	89	0.	0.	0.	5.
1.01	15.00	15	0.11	0.09	0.02	434.	1.04	18.00	90	0.	0.	0.	5.
1.01	16.00	16	0.27	0.25	0.02	758.	1.04	19.00	91	0.	0.	0.	5.
1.01	17.00	17	0.19	0.16	0.02	1231.	1.04	20.00	92	0.	0.	0.	5.
1.01	18.00	18	0.08	0.06	0.02	1661.	1.04	21.00	93	0.	0.	0.	5.
1.01	19.00	19	0.01	0.	0.01	1949.	1.04	22.00	94	0.	0.	0.	5.
1.01	20.00	20	0.01	0.	0.01	2041.	1.04	23.00	95	0.	0.	0.	5.
1.01	21.00	21	0.01	0.	0.01	1850.	1.05	0.	96	0.	0.	0.	5.
1.01	22.00	22	0.01	0.	0.01	1478.	1.05	1.00	97	0.	0.	0.	5.
1.01	23.00	23	0.01	0.	0.01	980.	1.05	2.00	98	0.	0.	0.	5.
1.02	0.	24	0.01	0.	0.01	519.	1.05	3.00	99	0.	0.	0.	5.
1.02	1.00	25	0.12	0.10	0.02	268.	1.05	4.00	100	0.	0.	0.	5.
1.02	2.00	26	0.12	0.10	0.02	290.	1.05	5.00	101	0.	0.	0.	5.
1.02	3.00	27	0.12	0.10	0.02	529.	1.05	6.00	102	0.	0.	0.	5.
1.02	4.00	28	0.12	0.10	0.02	884.	1.05	7.00	103	0.	0.	0.	5.
1.02	5.00	29	0.12	0.10	0.02	1285.	1.05	8.00	104	0.	0.	0.	5.
1.02	6.00	30	0.12	0.10	0.02	1658.	1.05	9.00	105	0.	0.	0.	5.
1.02	7.00	31	0.41	0.39	0.02	2123.	1.05	10.00	106	0.	0.	0.	5.
1.02	8.00	32	0.41	0.39	0.02	2812.	1.05	11.00	107	0.	0.	0.	5.
1.02	9.00	33	0.41	0.39	0.02	3698.	1.05	12.00	108	0.	0.	0.	5.
1.02	10.00	34	0.41	0.39	0.02	4770.	1.05	13.00	109	0.	0.	0.	5.
1.02	11.00	35	0.41	0.39	0.02	5925.	1.05	14.00	110	0.	0.	0.	5.
1.02	12.00	36	0.41	0.39	0.02	7000.	1.05	15.00	111	0.	0.	0.	5.
1.02	13.00	37	1.06	1.04	0.02	8233.	1.05	16.00	112	0.	0.	0.	5.
1.02	14.00	38	1.27	1.25	0.02	9997.	1.05	17.00	113	0.	0.	0.	5.
1.02	15.00	39	1.59	1.57	0.02	12541.	1.05	18.00	114	0.	0.	0.	5.
1.02	16.00	40	4.34	4.32	0.02	17413.	1.05	19.00	115	0.	0.	0.	5.
1.02	17.00	41	1.49	1.47	0.02	24368.	1.05	20.00	116	0.	0.	0.	5.
1.02	18.00	42	1.17	1.15	0.02	30947.	1.05	21.00	117	0.	0.	0.	5.
1.02	19.00	43	0.18	0.16	0.02	35542.	1.05	22.00	118	0.	0.	0.	5.
1.02	20.00	44	0.18	0.16	0.02	36412.	1.05	23.00	119	0.	0.	0.	5.
1.02	21.00	45	0.18	0.16	0.02	33229.	1.06	0.	120	0.	0.	0.	5.
1.02	22.00	46	0.18	0.16	0.02	27219.	1.06	1.00	121	0.	0.	0.	5.
1.02	23.00	47	0.18	0.16	0.02	19206.	1.06	2.00	122	0.	0.	0.	5.
1.03	0.	48	0.18	0.16	0.02	11620.	1.06	3.00	123	0.	0.	0.	5.
1.03	1.00	49	0.	0.	0.	6891.	1.06	4.00	124	0.	0.	0.	5.
1.03	2.00	50	0.	0.	0.	4122.	1.06	5.00	125	0.	0.	0.	5.
1.03	3.00	51	0.	0.	0.	2930.	1.06	6.00	126	0.	0.	0.	5.
1.03	4.00	52	0.	0.	0.	2165.	1.06	7.00	127	0.	0.	0.	5.
1.03	5.00	53	0.	0.	0.	1525.	1.06	8.00	128	0.	0.	0.	5.
1.03	6.00	54	0.	0.	0.	929.	1.06	9.00	129	0.	0.	0.	5.
1.03	7.00	55	0.	0.	0.	445.	1.06	10.00	130	0.	0.	0.	5.
1.03	8.00	56	0.	0.	0.	147.	1.06	11.00	131	0.	0.	0.	5.
1.03	9.00	57	0.	0.	0.	35.	1.06	12.00	132	0.	0.	0.	5.
1.03	10.00	58	0.	0.	0.	5.	1.06	13.00	133	0.	0.	0.	5.
1.03	11.00	59	0.	0.	0.	5.	1.06	14.00	134	0.	0.	0.	5.
1.03	12.00	60	0.	0.	0.	5.	1.06	15.00	135	0.	0.	0.	5.
1.03	13.00	61	0.	0.	0.	5.	1.06	16.00	136	0.	0.	0.	5.
1.03	14.00	62	0.	0.	0.	5.	1.06	17.00	137	0.	0.	0.	5.

[illegible]													
1.03	21.00	69	0.	0.	0.	5.	1.07	21.00	141	0.	0.	0.	5.
1.03	22.00	70	0.	0.	0.	5.	1.07	22.00	142	0.	0.	0.	5.
1.03	23.00	71	0.	0.	0.	5.	1.07	23.00	143	0.	0.	0.	5.
1.04	0.	72	0.	0.	0.	5.	1.07	0.	144	0.	0.	0.	5.
1.04	1.00	73	0.	0.	0.	5.	1.07	1.00	145	0.	0.	0.	5.
1.04	2.00	74	0.	0.	0.	5.	1.07	2.00	146	0.	0.	0.	5.
1.04	3.00	75	0.	0.	0.	5.	1.07	3.00	147	0.	0.	0.	5.
							1.07	4.00	148	0.	0.	0.	5.
							1.07	5.00	149	0.	0.	0.	5.
							1.07	6.00	150	0.	0.	0.	5.
									SUM	15.94	15.09	0.84	331728.
										(405.)(	383.)(	21.)(	9393.49)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	36412.	31872.	13024.	4602.	331725.
CMS	1031.	874.	369.	130.	9393.
INCHES		0.42	14.21	15.06	15.08
MM		213.91	369.97	382.64	383.09
AC-FT		15326.	25833.	27383.	27415.
THOUS CU M		18853.	31864.	33777.	33816.

0V.

HYDROGRAPH AT STA 34EC FOR PLAN 1, RTIO 1

3.	3.	3.	3.	3.	3.	5.	11.	22.	36.
51.	65.	[illegible]	[illegible]	217.	[illegible]	611.	831.	985.	1020.
925.	739.	[illegible]	[illegible]	134.	[illegible]	265.	442.	642.	829.
1062.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4116.	4999.	6271.	8706.
12194.	15494.	17771.	[illegible]	10615.	13610.	9648.	5910.	3446.	2061.
1465.	1083.	753.	465.	222.	74.	17.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	18206.	15476.	6512.	2301.	165863.
CMS	516.	437.	184.	65.	4697.
INCHES		4.21	7.11	7.53	7.54
MM		106.96	180.49	191.32	191.54
AC-FT		7654.	12916.	13692.	13708.
THOUS CU M		9441.	15932.	16889.	16908.

HYDROGRAPH AT STA 34EC FOR PLAN 1, RTIO 2

5.	5.	5.	5.	5.	5.	9.	22.	44.	71.
101.	139.	175.	272.	434.	756.	1271.	1661.	1969.	2041.
1850.	1478.	980.	510.	268.	290.	529.	884.	1285.	1658.
2123.	2612.	3698.	4770.	5925.	7000.	8233.	9997.	12541.	17413.
24338.	30987.	35542.	36412.	33229.	27219.	19296.	11820.	6891.	4122.
2930.	2165.	1525.	929.	445.	147.	35.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	36412.	30472.	13024.	4602.	331725.
CMS	1031.	874.	369.	130.	9393.
INCHES		8.42	14.21	15.06	15.08
MM		213.91	360.97	382.64	383.09
AC-FT		15308.	25833.	27383.	27415.
THOUS CU M		18883.	31864.	33777.	33816.

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SUBAREA RUNOFF COMPUTATION

HALFWAY CREEK AT FT AND

SUB-AREA RUNOFF COMPUTATION

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	55.1[illegible]	0.	429.00	0.	0.	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.	1[illegible].50	[illegible]	79.00	90.00	96.00	0.	0.

TRSPC COMPUTED BY THE PROGRAM IS 0.897

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.	0.	1.00	0.	0.	1.00	0.	0.02	0.	0.

UNIT HYDROGRAPH DATA
TC= 15.70 R= 5.90 NTA= 0

RECESSION DATA
STRTQ= 25.00 QRCSN= 25.00 RTIOR= 1.00

UNIT HYDROGRAPH 41 END-OF-PERIOD ORDINATES, LAG= 12.30 HOURS, CP= 0.79 VOL= 1.00

97.	355.	706.	1096.	1506.	1916.	2327.	2730.	3092.	3364.
3537.	3610.	3614.	3531.	3361.	3065.	2653.	2238.	1889.	1594.
1345.	1135.	957.	808.	681.	575.	485.	409.	345.	291.
246.	207.	175.	148.	125.	105.	89.	75.	63.	53.
45.									

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	0.01	0.	0.01	25.	1.04	4.00	76	0.	0.	0.	1179.
1.01	2.00	2	0.01	0.	0.01	25.	1.04	5.00	77	0.	0.	0.	984.
1.01	3.00	3	0.01	0.	0.01	25.	1.04	6.00	78	0.	0.	0.	794.
1.01	4.00	4	0.01	0.	0.01	25.	1.04	7.00	79	0.	0.	0.	626.
1.01	5.00	5	0.01	0.	0.01	25.	1.04	8.00	80	0.	0.	0.	473.
1.01	6.00	6	0.01	0.	0.01	25.	1.04	9.00	81	0.	0.	0.	250.
1.01	7.00	7	0.03	0.01	0.02	26.	1.04	10.00	82	0.	0.	0.	160.
1.01	8.00	8	0.03	0.01	0.02	28.	1.04	11.00	83	0.	0.	0.	95.
1.01	9.00	9	0.03	0.01	0.02	34.	1.04	12.00	84	0.	0.	0.	78.
1.01	10.00	10	0.03	0.01	0.02	42.	1.04	13.00	85	0.	0.	0.	63.
1.01	11.00	11	0.03	0.01	0.02	54.	1.04	14.00	86	0.	0.	0.	51.
1.01	12.00	12	0.03	0.01	0.02	68.	1.04	15.00	87	0.	0.	0.	41.
1.01	13.00	13	0.07	0.05	0.02	91.	1.04	16.00	88	0.	0.	0.	32.
1.01	14.00	14	0.08	0.06	0.02	124.	1.04	17.00	89	0.	0.	0.	25.
1.01	15.00	15	0.11	0.09	0.02	189.	1.04	18.00	90	0.	0.	0.	25.
1.01	16.00	16	0.27	0.25	0.02	295.	1.04	19.00	91	0.	0.	0.	25.
1.01	17.00	17	0.10	0.08	0.02	460.	1.04	20.00	92	0.	0.	0.	25.
1.01	18.00	18	0.08	0.06	0.02	667.	1.04	21.00	93	0.	0.	0.	25.
1.01	19.00	19	0.01	0.	0.01	900.	1.04	22.00	94	0.	0.	0.	25.
1.01	20.00	20	0.01	0.	0.01	1142.	1.04	23.00	95	0.	0.	0.	25.
1.01	21.00	21	0.01	0.	0.01	1311.	1.05	0.	96	0.	0.	0.	25.
1.01	22.00	22	0.01	0.	0.01	1619.	1.05	1.00	97	0.	0.	0.	25.
1.01	23.00	23	0.01	0.	0.01	1817.	1.05	2.00	98	0.	0.	0.	25.
1.02	0.	24	0.01	0.	0.01	1991.	1.05	3.00	99	0.	0.	0.	25.
1.02	1.00	25	0.12	0.10	0.02	2128.	1.05	4.00	100	0.	0.	0.	25.
1.02	2.00	26	0.12	0.10	0.02	2237.	1.05	5.00	101	0.	0.	0.	25.
1.02	3.00	27	0.12	0.10	0.02	2328.	1.05	6.00	102	0.	0.	0.	25.
1.02	4.00	28	0.12	0.10	0.02	2417.	1.05	7.00	103	0.	0.	0.	25.
1.02	5.00	29	0.12	0.1[illegible]	0.02	2475.	1.05	8.00	104	0.	0.	0.	25.
1.02	6.00	30	0.12	0.11	0.02	2533.	1.05	9.00	105	0.	0.	0.	25.
1.02	7.00	31	0.41	0.3[illegible]	0.02	2522.	1.05	10.00	106	0.	0.	0.	25.
1.02	8.00	32	0.41	0.3[illegible]	0.02	2775.	1.05	11.00	107	0.	0.	0.	25.
1.02	9.00	33	0.41	0.39	0.02	3[illegible]	1.05	12.00	108	0.	0.	0.	25.
1.02	10.00	34	0.41	0.39	0.02	3[illegible]	1.05	13.00	109	0.	0.	0.	25.
1.02	11.00	35	0.41	0.39	0.02	4175.	1.05	14.00	110	0.	0.	0.	25.

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17.00	113	0.	0.	0.	25.
1.02	15.00	39	[illegible]	[illegible]	[illegible]	[illegible]	1.05	18.00	114	0.	0.	0.	25.
1.02	16.00	40	[illegible]	[illegible]	[illegible]	[illegible]	1.05	19.00	115	0.	0.	0.	25.
1.02	17.00	41	[illegible]	1.17	0.02	[illegible]	1.05	20.00	116	0.	0.	0.	25.
1.02	18.00	42	[illegible]	1.15	0.02	[illegible]	1.05	21.00	117	0.	0.	0.	25.
1.02	19.00	43	0.18	0.16	0.02	[illegible]	1.05	22.00	118	0.	0.	0.	25.
1.02	20.00	44	0.18	0.16	0.02	[illegible]	1.05	23.00	119	0.	0.	0.	25.
1.02	21.00	45	0.18	0.16	0.02	[illegible]	1.06	0.	120	0.	0.	0.	25.
1.02	22.00	46	0.18	0.16	0.02	[illegible]	1.06	1.00	121	0.	0.	0.	25.
1.02	23.00	47	0.18	0.16	0.02	[illegible]	1.06	2.00	122	0.	0.	0.	25.
1.03	0.	48	0.18	0.16	0.02	41779.	1.06	3.00	123	0.	0.	0.	25.
1.03	1.00	49	0.	0.	0.	43725.	1.06	4.00	124	0.	0.	0.	25.
1.03	2.00	50	0.	0.	0.	44770.	1.06	5.00	125	0.	0.	0.	25.
1.03	3.00	51	0.	0.	0.	[illegible]	1.06	6.00	126	0.	0.	0.	25.
1.03	4.00	52	0.	0.	0.	44041.	1.06	7.00	127	0.	0.	0.	25.
1.03	5.00	53	0.	0.	0.	42318.	1.06	8.00	128	0.	0.	0.	25.
1.03	6.00	54	0.	0.	0.	39745.	1.06	9.00	129	0.	0.	0.	25.
1.03	7.00	55	0.	0.	0.	36362.	1.06	10.00	130	0.	0.	0.	25.
1.03	8.00	56	0.	0.	0.	[illegible]	1.06	11.00	131	0.	0.	0.	25.
1.03	9.00	57	0.	0.	0.	[illegible]	1.06	12.00	132	0.	0.	0.	25.
1.03	10.00	58	0.	0.	0.	24393.	1.06	13.00	133	0.	0.	0.	25.
1.03	11.00	59	0.	0.	0.	20958.	1.06	14.00	134	0.	0.	0.	25.
1.03	12.00	60	0.	0.	0.	17967.	1.06	15.00	135	0.	0.	0.	25.
1.03	13.00	61	0.	0.	0.	15352.	1.06	16.00	136	0.	0.	0.	25.
1.03	14.00	62	0.	0.	0.	13068.	1.06	17.00	137	0.	0.	0.	25.
1.03	15.00	63	0.	0.	0.	11076.	1.06	18.00	138	0.	0.	0.	25.
1.03	16.00	64	0.	0.	0.	9362.	1.06	19.00	139	0.	0.	0.	25.
1.03	17.00	65	0.	0.	0.	7903.	1.06	20.00	140	0.	0.	0.	25.
1.03	18.00	66	0.	0.	0.	6668.	1.06	21.00	141	0.	0.	0.	25.
1.03	19.00	67	0.	0.	0.	5626.	1.06	22.00	142	0.	0.	0.	25.
1.03	20.00	68	0.	0.	0.	4747.	1.06	23.00	143	0.	0.	0.	25.
1.03	21.00	69	0.	0.	0.	4006.	1.07	0.	144	0.	0.	0.	25.
1.03	22.00	70	0.	0.	0.	3380.	1.07	1.00	145	0.	0.	0.	25.
1.03	23.00	71	0.	0.	0.	2852.	1.07	2.00	146	0.	0.	0.	25.
1.04	0.	72	0.	0.	0.	2395.	1.07	3.00	147	0.	0.	0.	25.
1.04	1.00	73	0.	0.	0.	2010.	1.07	4.00	148	0.	0.	0.	25.
1.04	2.00	74	0.	0.	0.	1685.	1.07	5.00	149	0.	0.	0.	25.
1.04	3.00	75	0.	0.	0.	1410.	1.07	6.00	150	0.	0.	0.	25.

SUM 15.94 15.09 0.84 828561.
(405.)(383.)(21.)(23462.23)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	44866.	43410.	29191.	11478.	828538.
CMS	1270.	1229.	827.	325.	23462.
INCHES		4.75	12.76	15.06	15.09
MM		120.53	324.19	382.42	383.40
AC-FT		21526.	57899.	68299.	68474.
THOUS CU M		26551.	71418.	84246.	84462.

DV!

HYDROGRAPH AT STA 05HC FOR PLAN 1, RTIO 1

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13.	14.	17.	21.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	334.	450.	571.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1164.	1204.	1238.	1259.
1511.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2971.	3526.	4493.	5705.
7393.	9915.	[illegible]	[illegible]	15753.	[illegible]	19441.	20865.	21853.	22385.
22433.	22121.	21137.	[illegible]	[illegible]	[illegible]	14116.	12192.	10479.	8984.
7676.	6534.	5539.	4581.	3351.	5334.	2413.	2374.	2093.	1690.
1426.	1125.	[illegible]	[illegible]	705.	[illegible]	432.	397.	313.	236.
125.	86.	47.	[illegible]	32.	[illegible]	20.	16.	13.	13.
13.	13.	13.	13.	13.	13.	13.	13.	13.	13.
13.	13.	13.	13.	13.	13.	13.	13.	13.	13.
13.	13.	13.	13.	13.	13.	13.	13.	13.	13.
13.	13.	13.	13.	13.	13.	13.	13.	13.	13.
13.	13.	13.	13.	13.	13.	13.	13.	13.	13.
13.	13.	13.	13.	13.	13.	13.	13.	13.	13.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	22433.	21735.	14595.	5739.	414269.
CMS	635.	615.	413.	163.	11731.
INCHES		2.37	6.38	7.53	7.55
MM		60.26	162.10	191.21	191.70
AC-FT		10773.	28050.	34149.	34237.
THOUS CU M		13276.	35709.	42123.	42231.

HYDROGRAPH AT STA 05HC FOR PLAN 1, RTIO 2

25.	25.	25.	25.	25.	25.	26.	28.	34.	42.
54.	68.	91.	128.	187.	295.	460.	667.	900.	1142.
1331.	1619.	1817.	1951.	2125.	2237.	2328.	2407.	2476.	2538.
2622.	2736.	3055.	3544.	4175.	4958.	5947.	7252.	8976.	11409.
14735.	18636.	22207.	27245.	31463.	35396.	38823.	41723.	43726.	44770.
44865.	44041.	42313.	39744.	36362.	32361.	28232.	24383.	20958.	17967.
15352.	13068.	11073.	9362.	7903.	6653.	5626.	4747.	4006.	3380.
2852.	2335.	2019.	1685.	1419.	1179.	984.	794.	626.	473.
250.	160.	95.	78.	63.	51.	41.	32.	25.	25.
25.	25.	25.	25.	25.	25.	25.	25.	25.	25.
25.	25.	25.	25.	25.	25.	25.	25.	25.	25.
25.	25.	25.	25.	25.	25.	25.	25.	25.	25.
25.	25.	25.	25.	25.	25.	25.	25.	25.	25.
25.	25.	25.	25.	25.	25.	25.	25.	25.	25.
25.	25.	25.	25.	25.	25.	25.	25.	25.	25.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	44866.	43410.	29191.	11478.	826534.
CMS	1270.	1229.	827.	325.	23462.
INCHES		4.75	12.76	15.06	15.09
MM		120.53	324.12	382.42	383.40
AC-FT		21526.	57899.	68299.	68474.
THOUS CU M		26551.	71416.	84246.	84462.

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

SUB-AREA RUNOFF COMPUTATION

METTAWEE RIVER AT WHITEHALL

ISTAQ ICOMP IECON ITAPE JPLT JPRT INAME ISTAGE IAUTO

216	0	0	3	0	0	1	0	0	

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	214.30	0.	429.00	0.	0.	0	1	0

PRECIP DATA

SPFE	PB	R12	R24	R48	R72	R96
0.	11.50	84.00	79.00	90.00	96.00	0.	0.

TRSPC COMPUTED BY THE PROGRAM IS 0.397

LOSS DATA

LKOPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.	0.	1.00	0.	0.	1.00	0.	0.02	0.	0.

UNIT HYDROGRAPH DATA

Tc= 13.52 R= 0.25 RTA= 0

RECESSION DATA

STRTQ= 55.00 QRCSN= 55.00 RTIOR= 1.00

UNIT HYDROGRAPH 31 END-OF-PERIOD ORDINATES, LAG= 10.14 HOURS, CP= 0.81 VOL= 1.00

914.	1497.	2219.	4445.	5986.	7498.	8951.	10165.	10938.	11270.
11219.	10915.	10039.	8761.	7024.	5546.	4378.	3456.	2729.	2154.
1701.	1342.	1060.	837.	661.	522.	412.	325.	257.	203.
160.									

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	0.01	0.	0.01	55.	1.04	4.00	76	0.	0.	0.	156.
1.01	2.00	2	0.01	0.	0.01	55.	1.04	5.00	77	0.	0.	0.	114.
1.01	3.00	3	0.01	0.	0.01	55.	1.04	6.00	78	0.	0.	0.	81.
1.01	4.00	4	0.01	0.	0.01	55.	1.04	7.00	79	0.	0.	0.	55.
1.01	5.00	5	0.01	0.	0.01	55.	1.04	8.00	80	0.	0.	0.	55.
1.01	6.00	6	0.01	0.	0.01	55.	1.04	9.00	81	0.	0.	0.	55.
1.01	7.00	7	0.03	0.01	0.02	58.	1.04	10.00	82	0.	0.	0.	55.
1.01	8.00	8	0.03	0.01	0.02	70.	1.04	11.00	83	0.	0.	0.	55.
1.01	9.00	9	0.03	0.01	0.02	92.	1.04	12.00	84	0.	0.	0.	55.
1.01	10.00	10	0.03	0.01	0.02	126.	1.04	13.00	85	0.	0.	0.	55.
1.01	11.00	11	0.03	0.01	0.02	172.	1.04	14.00	86	0.	0.	0.	55.
1.01	12.00	12	0.03	0.01	0.02	229.	1.04	15.00	87	0.	0.	0.	55.
1.01	13.00	13	0.07	0.05	0.02	310.	1.04	16.00	88	0.	0.	0.	55.
1.01	14.00	14	0.07	0.05	0.02	464.	1.04	17.00	89	0.	0.	0.	55.
1.01	15.00	15	0.11	0.09	0.02	704.	1.04	18.00	90	0.	0.	0.	55.
1.01	16.00	16	0.27	0.25	0.02	1123.	1.04	19.00	91	0.	0.	0.	55.
1.01	17.00	17	0.10	0.08	0.02	1760.	1.04	20.00	92	0.	0.	0.	55.
1.01	18.00	18	0.11	0.09	0.02	2594.	1.04	21.00	93	0.	0.	0.	55.
1.01	19.00	19	0.01	0.	0.01	3433.	1.04	22.00	94	0.	0.	0.	55.
1.01	20.00	20	0.01	0.	0.01	4205.	1.04	23.00	95	0.	0.	0.	55.
1.01	21.00	21	0.01	0.	0.01	5005.	1.05	0.	96	0.	0.	0.	55.
1.01	22.00	22	0.01	0.	0.01	5704.	1.05	1.00	97	0.	0.	0.	55.
1.01	23.00	23	0.01	0.	0.01	6332.	1.05	2.00	98	0.	0.	0.	55.
1.02	0.	24	0.01	0.	0.01	6654.	1.05	3.00	99	0.	0.	0.	55.
1.02	1.00	25	0.12	0.10	0.02	6734.	1.05	4.00	100	0.	0.	0.	55.
1.02	2.00	26	0.12	0.10	0.02	6761.	1.05	5.00	101	0.	0.	0.	55.
1.02	3.00	27	0.12	0.10	0.02	6723.	1.05	6.00	102	0.	0.	0.	55.
1.02	4.00	28	0.12	0.10	0.02	6615.	1.05	7.00	103	0.	0.	0.	55.
1.02	5.00	29	0.12	0.10	0.02	6440.	1.05	8.00	104	0.	0.	0.	55.
1.02	6.00	30	0.12	0.10	0.02	6204.	1.05	9.00	105	0.	0.	0.	55.
1.02	7.00	31	0.41	0.39	0.02	6644.	1.05	10.00	106	0.	0.	0.	55.
1.02	8.00	32	0.41	0.39	0.02	7444.	1.05	11.00	107	0.	0.	0.	55.
1.02	9.00	33	0.41	0.39	0.02	9872.	1.05	12.00	108	0.	0.	0.	55.
1.02	10.00	34	0.41	0.39	0.02	10805.	1.05	13.00	109	0.	0.	0.	55.
1.02	11.00	35	0.41	0.39	0.02	12455.	1.05	14.00	110	0.	0.	0.	55.
1.02	12.00	36	0.41	0.39	0.02	13488.	1.05	15.00	111	0.	0.	0.	55.

[illegible]							[illegible]						
1.05	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	14.00	114	0.	0.	0.	55.
1.05	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	15.00	115	0.	0.	0.	55.
1.05	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	16.00	116	0.	0.	0.	55.
1.05	17.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	17.00	117	0.	0.	0.	55.
1.05	18.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	18.00	118	0.	0.	0.	55.
1.05	19.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	19.00	119	0.	0.	0.	55.
1.05	20.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	20.00	120	0.	0.	0.	55.
1.05	21.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	21.00	121	0.	0.	0.	55.
1.05	22.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	22.00	122	0.	0.	0.	55.
1.05	23.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.06	23.00	123	0.	0.	0.	55.
1.06	0.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.07	0.	124	0.	0.	0.	55.
1.06	1.00	50	0.	0.	0.	133191.		1.07	1.00	125	0.	0.	0.	55.
1.06	2.00	51	0.	0.	0.	130014.		1.07	2.00	126	0.	0.	0.	55.
1.06	3.00	52	0.	0.	0.	125120.		1.07	3.00	127	0.	0.	0.	55.
1.06	4.00	53	0.	0.	0.	119369.		1.07	4.00	128	0.	0.	0.	55.
1.06	5.00	54	0.	0.	0.	113717.		1.07	5.00	129	0.	0.	0.	55.
1.06	6.00	55	0.	0.	0.	108219.		1.07	6.00	130	0.	0.	0.	55.
1.06	7.00	56	0.	0.	0.	102885.		1.07	7.00	131	0.	0.	0.	55.
1.06	8.00	57	0.	0.	0.	97752.		1.07	8.00	132	0.	0.	0.	55.
1.06	9.00	58	0.	0.	0.	92832.		1.07	9.00	133	0.	0.	0.	55.
1.06	10.00	59	0.	0.	0.	88130.		1.07	10.00	134	0.	0.	0.	55.
1.06	11.00	60	0.	0.	0.	83647.		1.07	11.00	135	0.	0.	0.	55.
1.06	12.00	61	0.	0.	0.	79383.		1.07	12.00	136	0.	0.	0.	55.
1.06	13.00	62	0.	0.	0.	75336.		1.07	13.00	137	0.	0.	0.	55.
1.06	14.00	63	0.	0.	0.	71504.		1.07	14.00	138	0.	0.	0.	55.
1.06	15.00	64	0.	0.	0.	67883.		1.07	15.00	139	0.	0.	0.	55.
1.06	16.00	65	0.	0.	0.	64469.		1.07	16.00	140	0.	0.	0.	55.
1.06	17.00	66	0.	0.	0.	61256.		1.07	17.00	141	0.	0.	0.	55.
1.06	18.00	67	0.	0.	0.	58236.		1.07	18.00	142	0.	0.	0.	55.
1.06	19.00	68	0.	0.	0.	55401.		1.07	19.00	143	0.	0.	0.	55.
1.06	20.00	69	0.	0.	0.	52743.		1.07	20.00	144	0.	0.	0.	55.
1.06	21.00	70	0.	0.	0.	50254.		1.07	21.00	145	0.	0.	0.	55.
1.06	22.00	71	0.	0.	0.	47925.		1.07	22.00	146	0.	0.	0.	55.
1.06	23.00	72	0.	0.	0.	45748.		1.07	23.00	147	0.	0.	0.	55.
1.07	0.	73	0.	0.	0.	43716.		1.08	0.	148	0.	0.	0.	55.
1.07	1.00	74	0.	0.	0.	41820.		1.08	1.00	149	0.	0.	0.	55.
1.07	2.00	75	0.	0.	0.	40053.		1.08	2.00	150	0.	0.	0.	55.
1.07	3.00	76	0.	0.	0.	38408.								
1.07	4.00	77	0.	0.	0.	36878.								
1.07	5.00	78	0.	0.	0.	35457.								
1.07	6.00	79	0.	0.	0.	34139.								
1.07	7.00	80	0.	0.	0.	32918.								
1.07	8.00	81	0.	0.	0.	31788.								
1.07	9.00	82	0.	0.	0.	30744.								
1.07	10.00	83	0.	0.	0.	29780.								
1.07	11.00	84	0.	0.	0.	28891.								
1.07	12.00	85	0.	0.	0.	28072.								
1.07	13.00	86	0.	0.	0.	27318.								
1.07	14.00	87	0.	0.	0.	26624.								
1.07	15.00	88	0.	0.	0.	25986.								
1.07	16.00	89	0.	0.	0.	25399.								
1.07	17.00	90	0.	0.	0.	24859.								
1.07	18.00	91	0.	0.	0.	24362.								
1.07	19.00	92	0.	0.	0.	23904.								
1.07	20.00	93	0.	0.	0.	23482.								
1.07	21.00	94	0.	0.	0.	23092.								
1.07	22.00	95	0.	0.	0.	22732.								
1.07	23.00	96	0.	0.	0.	22399.								
1.08	0.	97	0.	0.	0.	22091.								
1.08	1.00	98	0.	0.	0.	21806.								
1.08	2.00	99	0.	0.	0.	21542.								
1.08	3.00	100	0.	0.	0.	21297.								
1.08	4.00	101	0.	0.	0.	21070.								
1.08	5.00	102	0.	0.	0.	20859.								
1.08	6.00	103	0.	0.	0.	20663.								
1.08	7.00	104	0.	0.	0.	20480.								
1.08	8.00	105	0.	0.	0.	20309.								
1.08	9.00	106	0.	0.	0.	20150.								
1.08	10.00	107	0.	0.	0.	20000.								
1.08	11.00	108	0.	0.	0.	19859.								
1.08	12.00	109	0.	0.	0.	19726.								
1.08	13.00	110	0.	0.	0.	19600.								
1.08	14.00	111	0.	0.	0.	19480.								
1.08	15.00	112	0.	0.	0.	19366.								
1.08	16.00	113	0.	0.	0.	19257.								
1.08	17.00	114	0.	0.	0.	19153.								
1.08	18.00	115	0.	0.	0.	19053.								
1.08	19.00	116	0.	0.	0.	18958.								
1.08	20.00	117	0.	0.	0.	18867.								
1.08	21.00	118	0.	0.	0.	18779.								
1.08	22.00	119	0.	0.	0.	18695.								
1.08	23.00	120	0.	0.	0.	18614.								
1.09	0.	121	0.	0.	0.	18536.								
1.09	1.00	122	0.	0.	0.	18461.								
1.09	2.00	123	0.	0.	0.	18389.								
1.09	3.00	124	0.	0.	0.	18319.								
1.09	4.00	125	0.	0.	0.	18252.								
1.09	5.00	126	0.	0.	0.	18187.								
1.09	6.00	127	0.	0.	0.	18124.								
1.09	7.00	128	0.	0.	0.	18064.								
1.09	8.00	129	0.	0.	0.	18005.								
1.09	9.00	130	0.	0.	0.	17948.								
1.09	10.00	131	0.	0.	0.	17893.								
1.09	11.00	132	0.	0.	0.	17840.								
1.09	12.00	133	0.	0.	0.	17788.								
1.09	13.00	134	0.	0.	0.	17738.								
1.09	14.00	135	0.	0.	0.	17689.								
1.09	15.00	136	0.	0.	0.	17642.								
1.09	16.00	137	0.	0.	0.	17596.								
1.09	17.00	138	0.	0.	0.	17551.								
1.09	18.00	139	0.	0.	0.	17508.								
1.09	19.00	140	0.	0.	0.	17466.								
1.09	20.00	141	0.	0.	0.	17425.								
1.09	21.00	142	0.	0.	0.	17385.								
1.09	22.00	143	0.	0.	0.	17346.								
1.09	23.00	144	0.	0.	0.	17308.								
1.10	0.	145	0.	0.	0.	17271.								
1.10	1.00	146	0.	0.	0.	17235.								
1.10	2.00	147	0.	0.	0.	17200.								
1.10	3.00	148	0.	0.	0.	17166.								
1.10	4.00	149	0.	0.	0.	17133.								
1.10	5.00	150	0.	0.	0.	17101.								

SUM	15.94	15.09	0.84	2085481.
	(405.)	(383.)	(21.)	(59054.25)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	133191.	127144.	77157.	28905.	2085426.
CMS	3772.	3600.	2185.	819.	59053.
INCHES		5.52	13.40	15.06	15.09
CM		140.18	340.28	382.44	383.22
AC-FT		63047.	153039.	171999.	172349.
THOUS CU M		77747.	188775.	212158.	212590.

0V

HYDROGRAPH AT STA 214AR FOR PLAN 1, RTIO 1

[illegible]	28.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.	46.	63.
[illegible]	115.	[illegible]	[illegible]	152.	[illegible]	[illegible]	1232.	1716.	2147.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3301.	3307.	3240.	3262.
3322.	3722.	[illegible]	[illegible]	5727.	[illegible]	[illegible]	12474.	15539.	19915.
25919.	[illegible]	4051.	[illegible]	54277.	[illegible]	[illegible]	66222.	66595.	65007.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23556.	19142.	15468.	12409.
[illegible]	7737.	[illegible]	[illegible]	3735.	[illegible]	2325.	1775.	1328.	955.
[illegible]	313.	[illegible]	[illegible]	104.	[illegible]	57.	41.	28.	28.
[illegible]	28.	[illegible]	[illegible]	[illegible]	[illegible]	28.	28.	28.	28.
[illegible]	28.	[illegible]	[illegible]	[illegible]	[illegible]	28.	28.	28.	28.
[illegible]	28.	[illegible]	[illegible]	[illegible]	[illegible]	28.	28.	28.	28.
[illegible]	28.	[illegible]	[illegible]	[illegible]	[illegible]	28.	28.	28.	28.
28.	28.	[illegible]	[illegible]	[illegible]	[illegible]	28.	28.	28.	28.
28.	28.	[illegible]	[illegible]	[illegible]	[illegible]	28.	28.	28.	28.
28.	28.	28.	[illegible]	[illegible]	[illegible]	28.	28.	28.	28.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	66595.	63572.	30578.	14453.	1042713.
CMS	1886.	[illegible]	1092.	409.	29526.
INCHES		2.76	6.79	7.53	7.54
MM		70.09	170.14	191.22	191.61
AC-FT		31523.	76519.	86000.	86175.
THOUS CU M		38883.	94385.	106079.	106295.

HYDROGRAPH AT STA 214AR FOR PLAN 1, RTIO 2

55.	55.	55.	55.	55.	55.	58.	70.	92.	126.
172.	229.	315.	461.	704.	1123.	1756.	2564.	3433.	4295.
5075.	5734.	6332.	6654.	6784.	6791.	6723.	6615.	6480.	6404.
6644.	7444.	8872.	10691.	13455.	16448.	20192.	24948.	31079.	39830.
51837.	66121.	81025.	95503.	108554.	119600.	127819.	132444.	133191.	130014.
123120.	112949.	99717.	84815.	70435.	57752.	47112.	38283.	30936.	24817.
19743.	15373.	12256.	9433.	7571.	5958.	4650.	3551.	2656.	1910.
1012.	625.	360.	271.	207.	156.	114.	81.	55.	55.
55.	55.	55.	55.	55.	55.	55.	55.	55.	55.
55.	55.	55.	55.	55.	55.	55.	55.	55.	55.
55.	55.	55.	55.	55.	55.	55.	55.	55.	55.
55.	55.	55.	55.	55.	55.	55.	55.	55.	55.
55.	55.	55.	55.	55.	55.	55.	55.	55.	55.
55.	55.	55.	55.	55.	55.	55.	55.	55.	55.
55.	55.	55.	55.	55.	55.	55.	55.	55.	55.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	133191.	127144.	77157.	28905.	2085426.
CMS	3772.	3600.	2185.	819.	59053.
INCHES		5.52	13.40	15.06	15.09
MM		140.18	340.28	382.44	383.22
AC-FT		63047.	153039.	171999.	172349.
THOUS CU M		77767.	188770.	212158.	212590.

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SUB-AREA RUNOFF COMPUTATION

WOOD CREEK AND CHAMPLAIN CANAL

ISTAQ ICOMP IECON ITAPE JPLT JPRT INAME ISTAGE IAUTO

							ISTAGE	IOUT
							1	0

HYDROGRAPH DATA

IHYD	IUHG	TAREA	SNAP	TRDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	96.10	0.	439.61	0.	0.	0	1	0

PRECIP DATA

SPFE	PAS	PB	X12	X24	R48	R72	R96
0.	13.50	50.00	77.00	90.00	96.00	0.	0.

TRSPC COMPUTED BY THE PROGRAM IS 0.397

LOSS DATA

LKPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.	0.	1.00	0.	0.	1.00	0.	0.02	0.	0.

UNIT HYDROGRAPH DATA

Tc= 15.23 R= 19.30 TA= 0

RECESSION DATA

STRTQ= 15.00 QRCSN= 15.00 RTIOR= 1.00

UNIT HYDROGRAPH 63 END-OF-PERIOD ORDINATES, LAG= 13.37 HOURS, CP= 0.68 VOL= 1.00

62.	255.	511.	826.	1159.	1506.	1868.	2233.	2570.	2843.
3047.	3185.	3257.	3259.	3177.	2976.	2706.	2457.	2230.	2023.
1836.	1666.	1512.	1372.	1245.	1129.	1025.	930.	844.	766.
695.	630.	572.	519.	471.	427.	388.	352.	319.	290.
263.	239.	217.	197.	178.	162.	147.	133.	121.	110.
100.	90.	82.	74.	67.	61.	56.	50.	46.	42.
38.	34.	31.							

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	0.01	0.	0.01	15.	1.04	4.00	76	0.	0.	0.	5239.
1.01	2.00	2	0.01	0.	0.01	15.	1.04	5.00	77	0.	0.	0.	4754.
1.01	3.00	3	0.01	0.	0.01	15.	1.04	6.00	78	0.	0.	0.	4313.
1.01	4.00	4	0.01	0.	0.01	15.	1.04	7.00	79	0.	0.	0.	3908.
1.01	5.00	5	0.01	0.	0.01	15.	1.04	8.00	80	0.	0.	0.	3545.
1.01	6.00	6	0.01	0.	0.01	15.	1.04	9.00	81	0.	0.	0.	3217.
1.01	7.00	7	0.03	0.01	0.02	16.	1.04	10.00	82	0.	0.	0.	2920.
1.01	8.00	8	0.03	0.01	0.02	17.	1.04	11.00	83	0.	0.	0.	2651.
1.01	9.00	9	0.03	0.01	0.02	21.	1.04	12.00	84	0.	0.	0.	2407.
1.01	10.00	10	0.03	0.01	0.02	28.	1.04	13.00	85	0.	0.	0.	2186.
1.01	11.00	11	0.03	0.01	0.02	37.	1.04	14.00	86	0.	0.	0.	1985.
1.01	12.00	12	0.03	0.01	0.02	48.	1.04	15.00	87	0.	0.	0.	1802.
1.01	13.00	13	0.07	0.05	0.02	65.	1.04	16.00	88	0.	0.	0.	1634.
1.01	14.00	14	0.09	0.06	0.02	95.	1.04	17.00	89	0.	0.	0.	1481.
1.01	15.00	15	0.11	0.09	0.02	142.	1.04	18.00	90	0.	0.	0.	1342.
1.01	16.00	16	0.27	0.25	0.02	223.	1.04	19.00	91	0.	0.	0.	1217.
1.01	17.00	17	0.10	0.08	0.02	349.	1.04	20.00	92	0.	0.	0.	1103.
1.01	18.00	18	0.08	0.06	0.02	511.	1.04	21.00	93	0.	0.	0.	999.
1.01	19.00	19	0.01	0.	0.01	700.	1.04	22.00	94	0.	0.	0.	897.
1.01	20.00	20	0.01	0.	0.01	902.	1.04	23.00	95	0.	0.	0.	804.
1.01	21.00	21	0.01	0.	0.01	1110.	1.05	0.	96	0.	0.	0.	720.
1.01	22.00	22	0.01	0.	0.01	1315.	1.05	1.00	97	0.	0.	0.	643.
1.01	23.00	23	0.01	0.	0.01	1510.	1.05	2.00	98	0.	0.	0.	574.
1.02	0.	24	0.01	0.	0.01	1682.	1.05	3.00	99	0.	0.	0.	511.
1.02	1.00	25	0.12	0.10	0.02	1827.	1.05	4.00	100	0.	0.	0.	436.
1.02	2.00	26	0.12	0.10	0.02	1952.	1.05	5.00	101	0.	0.	0.	362.
1.02	3.00	27	0.12	0.10	0.02	2053.	1.05	6.00	102	0.	0.	0.	285.
1.02	4.00	28	0.12	0.10	0.02	2132.	1.05	7.00	103	0.	0.	0.	147.
1.02	5.00	29	0.12	0.10	0.02	2191.	1.05	8.00	104	0.	0.	0.	94.
1.02	6.00	30	0.12	0.10	0.02	2232.	1.05	9.00	105	0.	0.	0.	54.
1.02	7.00	31	0.41	0.39	0.02	2257.	1.05	10.00	106	0.	0.	0.	46.
1.02	8.00	32	0.41	0.39	0.02	2268.	1.05	11.00	107	0.	0.	0.	38.
1.02	9.00	33	0.41	0.39	0.02	2267.							

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	111	[illegible]	[illegible]	0.	15.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	112	0.	0.	0.	15.
1.02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17.00	113	0.	0.	0.	15.
1.02	15.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	114	0.	0.	0.	15.
1.02	16.00	[illegible]	4.04	[illegible]	0.02	[illegible]	1.05	[illegible]	115	0.	0.	0.	15.
1.02	17.00	[illegible]	1.49	1.47	0.02	[illegible]	1.05	20.00	116	0.	0.	0.	15.
1.02	18.00	[illegible]	1.17	1.15	0.02	[illegible]	1.05	21.00	117	0.	0.	0.	15.
1.02	19.00	[illegible]	0.18	0.16	0.02	[illegible]	1.05	22.00	118	0.	0.	0.	15.
1.02	20.00	[illegible]	0.13	0.15	[illegible]	[illegible]	1.05	23.00	119	0.	0.	0.	15.
1.02	21.00	[illegible]	0.13	0.15	0.02	[illegible]	1.06	0.	120	0.	0.	0.	15.
1.02	22.00	[illegible]	0.11	0.10	0.02	[illegible]	1.06	1.00	121	0.	0.	0.	15.
1.02	23.00	47	0.11	0.15	0.02	[illegible]	1.06	2.00	122	0.	0.	0.	15.
1.03	[illegible]	[illegible]	0.13	0.16	0.02	[illegible]	1.06	3.00	123	0.	0.	0.	15.
1.03	1.00	[illegible]	0.	0.	0.	[illegible]	1.06	4.00	124	0.	0.	0.	15.
1.03	2.00	50	0.	0.	0.	[illegible]	1.06	5.00	125	0.	0.	0.	15.
1.03	3.00	51	0.	0.	0.	[illegible]	1.06	6.00	126	0.	0.	0.	15.
1.03	4.00	52	0.	0.	0.	41517.	1.06	7.00	127	0.	0.	0.	15.
1.03	5.00	53	0.	0.	0.	[illegible]	1.06	8.00	128	0.	0.	0.	15.
1.03	6.00	54	0.	0.	0.	39498.	1.06	9.00	129	0.	0.	0.	15.
1.03	7.00	55	0.	0.	0.	37362.	1.06	10.00	130	0.	0.	0.	15.
1.03	8.00	56	0.	0.	0.	34748.	1.06	11.00	131	0.	0.	0.	15.
1.03	9.00	57	0.	0.	0.	32022.	1.06	12.00	132	0.	0.	0.	15.
1.03	10.00	58	0.	0.	0.	[illegible]	1.06	13.00	133	0.	0.	0.	15.
1.03	11.00	59	0.	0.	0.	[illegible]	1.06	14.00	134	0.	0.	0.	15.
1.03	12.00	60	0.	0.	0.	24556.	1.06	15.00	135	0.	0.	0.	15.
1.03	13.00	61	0.	0.	0.	22345.	1.06	16.00	136	0.	0.	0.	15.
1.03	14.00	62	0.	0.	0.	20306.	1.06	17.00	137	0.	0.	0.	15.
1.03	15.00	63	0.	0.	0.	[illegible]	1.06	18.00	138	0.	0.	0.	15.
1.03	16.00	64	0.	0.	0.	16768.	1.06	19.00	139	0.	0.	0.	15.
1.03	17.00	65	0.	0.	0.	15235.	1.06	20.00	140	0.	0.	0.	15.
1.03	18.00	66	0.	0.	0.	13825.	1.06	21.00	141	0.	0.	0.	15.
1.03	19.00	67	0.	0.	0.	12547.	1.06	22.00	142	0.	0.	0.	15.
1.03	20.00	68	0.	0.	0.	11316.	1.06	23.00	143	0.	0.	0.	15.
1.03	21.00	69	0.	0.	0.	10333.	1.07	0.	144	0.	0.	0.	15.
1.03	22.00	70	0.	0.	0.	9378.	1.07	1.00	145	0.	0.	0.	15.
1.03	23.00	71	0.	0.	0.	8511.	1.07	2.00	146	0.	0.	0.	15.
1.04	0.	72	0.	0.	0.	7724.	1.07	3.00	147	0.	0.	0.	15.
1.04	1.00	73	0.	0.	0.	7010.	1.07	4.00	148	0.	0.	0.	15.
1.04	2.00	74	0.	0.	0.	6362.	1.07	5.00	149	0.	0.	0.	15.
1.04	3.00	75	0.	0.	0.	5774.	1.07	6.00	150	0.	0.	0.	15.

SUM 15.94 15.09 0.84 933231.
(405.)(383.)(21.)(26426.16)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	41537.	40379.	25353.	12814.	933215.
CMS	1176.	1142.	631.	363.	26426.
INCHES		3.90	11.37	14.89	15.06
MM		99.16	288.80	378.08	382.41
AC-FT		12958.	57221.	76251.	77125.
THOUS CU M		24347.	71815.	44055.	95133.

OVT

HYDROGRAPH AT STA 96CC FOR PLAN 1, RTIO 1

8.	8.	9.	8.	[illegible]	[illegible]	[illegible]	9.	11.	14.
16.	24.	33.	47.	71.	111.	174.	256.	350.	451.
555.	653.	755.	861.	[illegible]	970.	1032.	1081.	1125.	1166.
1214.	1294.	1429.	[illegible]	[illegible]	2215.	2625.	3162.	3864.	4639.
6158.	7750.	9575.	11400.	13291.	15112.	16102.	16275.	19442.	20256.
20705.	20769.	20440.	19749.	18661.	17374.	16011.	14686.	13441.	12278.
11192.	10103.	[illegible]	[illegible]	7617.	6913.	6273.	5693.	5167.	4689.
4255.	3862.	3505.	3191.	2887.	2620.	2377.	2156.	1954.	1773.
1608.	1460.	1326.	1204.	1093.	992.	901.	817.	741.	671.
615.	551.	[illegible]	448.	402.	360.	322.	287.	256.	218.
141.	143.	74.	47.	27.	23.	19.	16.	13.	10.
8.	8.	4.	8.	3.	8.	8.	8.	8.	8.
8.	8.	3.	8.	8.	8.	8.	8.	8.	8.
8.	8.	3.	8.	8.	8.	8.	3.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	20769.	20165.	14677.	6407.	466607.
CMS	588.	571.	416.	181.	13213.
INCHES		1.55	5.68	7.44	7.53
MM		49.58	144.34	189.04	191.21
AC-FT		9999.	29111.	38126.	38563.
THOUS CU M		12334.	35907.	47027.	47566.

HYDROGRAPH AT STA 96CC FOR PLAN 1, RTIO 2

15.	15.	15.	15.	15.	15.	16.	17.	21.	28.
37.	48.	65.	95.	142.	223.	349.	511.	700.	902.
1110.	1315.	1510.	1682.	1827.	1952.	2063.	2162.	2251.	2332.
2427.	2588.	2857.	3251.	3776.	4429.	5250.	6323.	7727.	9678.
12315.	15513.	19077.	22617.	26582.	30224.	33605.	36550.	38385.	40516.
41409.	41537.	40893.	39498.	37362.	34748.	32022.	29371.	26883.	24556.
22345.	20360.	18498.	16788.	15235.	13825.	12547.	11386.	10333.	9378.
8511.	7724.	7010.	6362.	5774.	5239.	4754.	4313.	3908.	3545.
3217.	2920.	2651.	2407.	2186.	1985.	1802.	1634.	1481.	1342.
1217.	1103.	999.	897.	804.	720.	643.	574.	511.	436.
362.	285.	147.	94.	54.	46.	38.	32.	26.	20.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	41537.	40329.	29353.	12814.	933215.
CMS	1176.	1142.	831.	363.	26426.
INCHES		3.90	11.37	14.89	15.06
MM		99.16	288.68	378.08	382.41
AC-FT		19998.	58221.	76251.	77125.
THOUS CU M		24667.	71815.	94055.	95133.

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COMBINE HYDROGRAPHS

COMBINED HYDROGRAPHS AT DAM

ISTAQ ICOMP IECON ITAPE JPLT JPRT INAME ISTAGE IAUTO

SUM OF 4 HYDROGRAPHS AT 1 PLAN 1 RTIO 1

[illegible]	[illegible]	50.	50.	50.	50.	54.	69.	96.	134.
1?2.	23?.	320.	460.	754.	119?.	1898.	2702.	3501.	4189.
471?.	53??.	[illegible]	5419.	5503.	5635.	5822.	6034.	6246.	6465.
[illegible]	7315.	9357.	13232.	13765.	16437.	19610.	24261.	30162.	39165.
51?23.	65579.	[illegible]	[illegible]	[illegible]	106222.	109801.	111272.	111346.	109711.
[illegible]	[illegible]	92227.	[illegible]	72352.	62509.	53700.	46022.	39391.	33673.
2?743.	24500.	26919.	[illegible]	15357.	15219.	11414.	9845.	8503.	7336.
6190.	5375.	4652.	4154.	3699.	3283.	2926.	2596.	2297.	2039.
1763.	1570.	1463.	1272.	1154.	1048.	952.	863.	783.	714.
651.	594.	542.	491.	445.	402.	364.	330.	298.	260.
223.	165.	116.	69.	70.	65.	67.	58.	55.	53.
50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
50.	50.	50.	50.	50.	50.	50.	50.	50.	50.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	111346.	108576.	72792.	28848.	2089452.
CMS	3153.	3075.	2061.	817.	59167.
INCHES		2.35	6.30	7.50	7.54
MM		59.73	160.14	190.40	191.53
AC-FT		53849.	144380.	171659.	172682.
THOUS CU M		66422.	178091.	211738.	213000.

SUM OF 4 HYDROGRAPHS AT 1 PLAN 1 RTIO 2

1[illegible].	1[illegible].	1[illegible].	1[illegible].	1[illegible].	1[illegible].	109.	136.	191.	267.
3[illegible].	4[illegible].	[illegible].	[illegible].	1[illegible].	2[illegible].	3795.	5404.	7001.	8379.
9437.	10197.	1[illegible].	1[illegible].	11056.	11279.	11643.	12068.	12492.	12931.
1[illegible].	15[illegible].	18513.	22[illegible].	27[illegible].	32[illegible].	39621.	48521.	60324.	78330.
1[illegible].	1[illegible].	1[illegible].	1[illegible].	1[illegible].	212445.	219602.	222543.	222693.	219423.
21[illegible].	20[illegible].	13[illegible].	1[illegible].	14[illegible].	12[illegible].	10[illegible].	92643.	78782.	67346.
5[illegible].	[illegible].	41[illegible].	[illegible].	30713.	26437.	22[illegible].	19690.	17000.	14673.
12[illegible].	1[illegible].	[illegible].	[illegible].	7[illegible].	6579.	5856.	5193.	4594.	4078.
3527.	3[illegible].	2[illegible].	2545.	2309.	2096.	1903.	1726.	1566.	1427.
1302.	1131.	1004.	902.	8[illegible].	805.	72[illegible].	659.	596.	521.
447.	3[illegible].	2[illegible].	17[illegible].	139.	131.	123.	117.	111.	105.
100.	100.	1[illegible].	100.	100.	10[illegible].	100.	100.	100.	100.
100.	100.	1[illegible].	100.	100.	100.	100.	100.	100.	100.
100.	100.	100.	100.	100.	100.	100.	100.	100.	100.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	222693.	217192.	145584.	57696.	4178904.
CMS	6305.	6150.	4122.	1634.	118333.
INCHES		4.70	12.61	14.99	15.08
MM		119.46	320.28	380.79	383.06
ACRE-FT		107509.	288761.	343317.	345364.
THOUS CU M		132644.	356161.	423476.	426000.

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HYDROGRAPH ROUTING

ROUTED HYDROGRAPH AT DAM - NO BREACH

ISTAG	ICOMP	ITCON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
C12	1	0	0	2	0	1	0	0

ROUTING DATA

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

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.	0.	0.	-112.	-1

STAGE	104.00	105.00	108.00	111.00	112.00	114.00	116.00	119.00	
FLOW	0.	1186.00	4759.00	6913.00	8182.00	9861.00	12896.00	13758.00	
CAPACITY=	0.	143.	196.	251.	468.	630.	701.	846.	1209.	1263.
ELEVATION=	100.	103.	104.	105.	109.	111.	112.	114.	119.	120.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
104.0	0.	0.	0.	0.	0.	0.	0.

DAM DATA

TOPEL	COOD	EXPD	DAMWID
119.0	2.6	1.5	114.

STATION C12, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1043.	261.	62.	51.	50.	50.	52.	61.	81.	113.
155.	207.	277.	395.	595.	945.	1467.	2141.	2919.	3669.
4[illegible]5.	[illegible]788.	5678.	5278.	5404.	5517.	5663.	5845.	6048.	6260.
6553.	7135.	8030.	9560.	12112.	13454.	16048.	21081.	26945.	34934.
4[illegible]38.	56568.	74013.	87619.	97539.	104625.	108997.	110992.	111403.	110269.
107251.	102104.	94674.	85446.	75452.	65649.	56663.	48766.	41924.	36021.
30932.	26558.	22836.	19709.	17112.	15010.	13623.	12518.	9551.	8494.
7674.	6127.	5379.	4716.	4381.	3606.	3203.	2846.	2523.	2235.
1965.	1723.	1531.	1375.	1244.	1119.	1007.	913.	828.	753.
6[illegible].	626.	571.	526.	471.	426.	386.	349.	316.	281.
246.	207.	154.	106.	81.	66.	64.	60.	57.	54.
51.	50.	50.	50.	50.	50.	50.	50.	50.	50.
50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
50.	50.	50.	50.	50.	50.	50.	50.	50.	50.

STORAGE

201.	20[illegible].	199.	19[illegible].	198.	198.	198.	199.	200.	201.
203.	20[illegible].	208.	214.	224.	240.	268.	309.	356.	402.
44[illegible].	470.	493.	509.	519.	529.	539.	554.	570.	586.
61[illegible].	650.	714.	82[illegible].	954.	1140.	1417.	1704.	1969.	2276.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
207.	205.	203.	201.	200.	199.	199.	199.	199.	199.
198.	198.	198.	198.	198.	198.	198.	198.	198.	198.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

STAGE

135.7	134.2	134.1	134.0	134.0	134.0	134.0	134.1	134.1	134.1
135.1	134.2	134.2	134.3	134.5	134.8	105.2	106.0	106.7	107.5
135.1	135.3	[illegible]	139.2	139.4	139.5	109.7	109.9	110.1	110.4
115.7	111.3	112.2	113.7	115.5	118.0	121.9	125.9	129.5	133.8
139.2	145.2	150.4	154.6	158.1	160.4	161.8	162.4	162.5	162.2
141.2	153.5	157.2	154.1	150.5	147.8	143.5	140.2	137.2	134.4
131.4	129.3	127.0	124.9	122.9	120.0	118.5	115.8	113.6	112.4
111.2	110.2	109.4	108.9	107.5	107.4	107.0	106.7	106.3	106.1
105.9	105.5	105.2	105.2	105.1	104.9	104.8	104.8	104.7	104.6
104.6	104.5	104.5	104.4	104.4	104.4	104.3	104.3	104.3	104.2
104.2	104.2	104.1	104.1	104.1	104.1	104.1	104.1	104.0	104.0
104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0
104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0
104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0
104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0	104.0

PEAK OUTFLOW IS 111403. AT TIME 42.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	111403.	109713.	72605.	28848.	2090572.
CMS	3155.	3078.	2054.	817.	59198.
INCHES		2.35	5.30	7.50	7.54
MM		59.79	159.93	190.39	191.64
AC-FT		53987.	144189.	171655.	172775.
THOUS CU M		66604.	177354.	211734.	213114.

STATION C12, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1883.	317.	114.	101.	103.	106.	104.	122.	162.	225.
310.	415.	553.	739.	1189.	1702.	2648.	4267.	5672.	7131.
5565.	9375.	10132.	10674.	10905.	11121.	11432.	11825.	12247.	12670.
13025.	13503.	15318.	19450.	24430.	30093.	36591.	44854.	55869.	72001.
95652.	123605.	151293.	175157.	196217.	210014.	218418.	222141.	222811.	220351.
214030.	203517.	186352.	169548.	149523.	129838.	111948.	96221.	82598.	70640.
60091.	51950.	44549.	38191.	32894.	28427.	24665.	21450.	18697.	16371.
14342.	13314.	11265.	9252.	8363.	7211.	6439.	5810.	5180.	4571.
3749.	3450.	3154.	2749.	2468.	2257.	2048.	1859.	1687.	1533.
1397.	1274.	1151.	1040.	941.	852.	772.	698.	632.	563.
488.	413.	303.	211.	162.	137.	128.	121.	114.	108.
103.	100.	100.	100.	100.	100.	100.	100.	100.	100.
100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
100.	100.	100.	100.	100.	100.	100.	100.	100.	100.

STORAGE

293.	211.	201.	201.	201.	201.	201.	202.	204.	206.
210.	215.	222.	233.	251.	286.	352.	438.	540.	646.
734.	794.	859.	880.	896.	906.	921.	940.	960.	981.
1024.	1144.	1364.	1621.	1863.	2095.	2335.	2612.	2948.	3393.
3777.	4511.	5193.	5634.	6045.	6295.	6444.	6510.	6521.	6478.
6367.	6178.	5900.	5546.	5150.	4745.	4356.	3995.	3665.	3363.
3086.	2832.	2601.	2391.	2202.	2029.	1871.	1722.	1580.	1439.
1286.	1007.	913.	796.	717.	651.	600.	551.	501.	457.
419.	389.	365.	346.	330.	316.	303.	292.	281.	272.
264.	256.	250.	244.	240.	236.	232.	228.	225.	222.
219.	215.	210.	206.	204.	202.	202.	202.	201.	201.
201.	201.	201.	201.	201.	201.	201.	201.	201.	201.
201.	201.	201.	201.	201.	201.	201.	201.	201.	201.
201.	201.	201.	201.	201.	201.	201.	201.	201.	201.
201.	201.	201.	201.	201.	201.	201.	201.	201.	201.

STAGE

105.7	104.3	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.2
104.3	104.3	104.5	104.7	105.0	105.6	106.7	108.1	109.7	111.2
112.5	113.4	114.2	114.5	114.7	114.8	115.0	115.3	115.6	115.9
116.5	118.1	121.2	124.7	128.1	131.3	134.6	138.5	143.1	149.3
157.4	166.3	174.4	181.2	185.2	189.6	191.7	192.6	192.8	192.2
190.5	188.0	184.2	179.2	173.7	168.1	162.7	157.7	153.1	148.9
145.1	141.5	138.3	135.4	132.6	130.4	128.2	126.1	124.1	122.2
120.1	117.5	114.9	113.3	112.2	111.3	110.6	109.3	109.1	108.4
107.4	107.3	106.9	106.6	106.3	106.1	105.9	105.7	105.5	105.3
105.2	105.1	105.0	104.9	104.8	104.7	104.7	104.6	104.5	104.5
104.4	104.3	104.3	104.2	104.1	104.1	104.1	104.1	104.1	104.1
104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1
104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1
104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1
104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1

PEAK OUTFLOW IS 222811. AT TIME 49.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	222811.	217438.	145473.	57694.	4180026.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1?7.	[illegible]117.	1534.	11[illegible]365.
[illegible]		.71	12.5[illegible]	14.79	15.09
[illegible]		110.5[illegible]	321.34	310.73	383.17
AC-FT		107315.	283541.	343303.	345457.
THOUS CU M		132[illegible]8.	355910.	423458.	426115.

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

OPERATION	STATION	AREA	PLAN	RATIO 1 (0.5)	RATIO 2 1.00	RATIOS APPLIED TO FLOWS
HYDROGRAPH AT	34BC	34.10	1	11220.	30412.	
	(	0.00)	(	317.69)(	861.07)(	
HYDROGRAPH AT	38HC	35.10	1	22433.	44200.	
	(	0.00)	(	635.22)(	1251.45)(	
HYDROGRAPH AT	214HR	214.30	1	66595.	133191.	
	(	0.00)	(	1885.77)(	3771.54)(	
HYDROGRAPH AT	96WCC	96.10	1	20769.	41537.	
	(	0.00)	(	588.10)(	1176.20)(	
4 COMBINED	1	429.60	1	111346.	222693.	
	(	0.00)	(	3152.93)(	6305.95)(	
ROUTED TO	C12	429.60	1	111403.	222811.	
	(	0.00)	(	3154.59)(	6309.30)(	

PMF

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
[illegible]	112.00	104.00	119.00
STORAGE	701.	196.	1209.
OUTFLOW	3182.	0.	13758.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	192.53	73.53	4343.	111403.	30.00	49.00	0.
1.00	192.78	73.78	4521.	222811.	39.00	49.00	0.

MARCH 14, 1977 EVENT

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

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

PLEASE REPORT ANY UNUSUAL OPERATING PROBLEMS
TO MIKE TILLSON (RM, 423) PH: 7-5566
*************************************
    1    A LOCK C-12 DAM        NY-766                              LAKE CHAMPLAIN BASIN
    2    A                      HYSOFT-WATERWAYS                    WASHINGTON COUNTY
    3    A                      MULTIPLE SUBBASINS                  CLARK UH
    4    B   150      1         0      C      0      0      0      2      0      0
    5    61    5
    6    J     1      2         1
    7    J1  0.5      1
    8    K     0   348C                                        1
    9    K1                     BIG CREEK AT SMITH BASIN
   10    M     1      0      34.1         429.6                                   1
   11    P         0.77        10     21     40     81    100
   12    T                                                     0   0.02
   13    V  7.52   0.85
   14    X     5      5         1
   15    K     0   85HC                                        1
   16    K1                     HALFWAY CREEK AT FT ANN
   17    M     1      0      85.1         429.6                                   1
   18    P         2.97        21     42     84    100    100
   19    T                                                     0   0.02
   20    V 15.73    5.9
   21    X    25     25         1
   22    K     0  214MR                                        1
   23    K1                     METTAWEE RIVER AT WHITEHALL
   24    M     1      0     214.3         429.6                                   1
   25    P         2.73         2      4      8     98    100
   26    T                                                     0   0.02
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X      55      55      1
K       0   95300                                                1
K1                     ?ILD CREEK AND CHAMPLAIN CANAL
?       1       1    96.1          429.0                                           1
?            2.73      ?        ?        ?        9?      100
?                                                          0.    ?.02
V   15.23    10.3
X      15      15      1
K       4       1                                                1
K1                     COMBINED HYDROGRAPHS AT DAM
K       1     012                               2                1
K1                     ROUTED HYDROGRAPH AT DAM - NO BREACH
Y                                       1       1
Y1      1                                                     -112      -1
Y4    104     105   103.0     111     112     114     116     119
Y5      0    1156    4759    6617    8182    9861   12896   13758
$S      0     143     176     251     468     630     701     846    1209    1263
$E    100     103     104     105   108.6     111     112     114     119  119.75
$$    104
$D    119     2.6     1.5     114
K      99
A
A
A
A
A
```

PARTIAL LIST OF SOURCE FOR STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	240C
RUNOFF HYDROGRAPH AT	250C
RUNOFF HYDROGRAPH AT	2141R
RUNOFF HYDROGRAPH AT	90KCC
COMBINE 4 HYDROGRAPHS AT	1
ROUTE HYDROGRAPH TO	C12

END OF NETWORK

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS	
				RATIO 1 0.50	RATIO 2 1.00
HYDROGRAPH AT	34BC	34.10 (0.00)	1	16. (0.44)(	32. 0.91)(
HYDROGRAPH AT	65NC	85.10 (0.00)	1	1980. (56.04)(	3959. 112.11)(
HYDROGRAPH AT	214MR	214.30 (0.00)	1	5251. (148.70)(	10503. 297.40)(
HYDROGRAPH AT	96MCC	96.10 (0.00)	1	1920. (54.34)(	3841. 108.76)(
4 COMBINED	1	429.60 (0.00)	1	7215. (204.29)(	14429. 408.59)(
ROUTED TO	C12	429.60 (0.00)	1	7206. (204.06)(	14172. 401.31)(

SUMMARY OF DAM SAFETY ANALYSIS

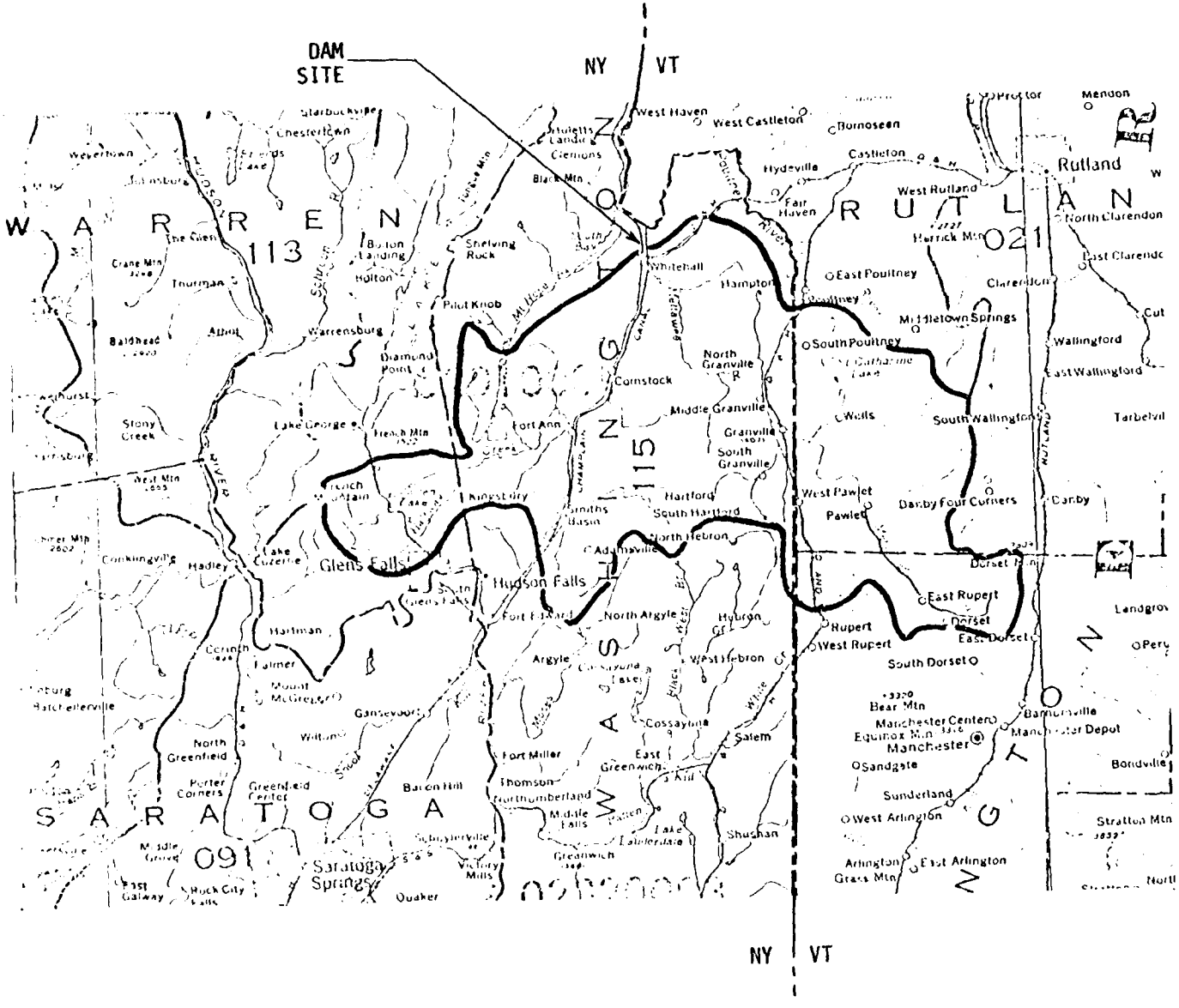
PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	112.00	104.00	119.00
STORAGE	701.	196.	1209.
OUTFLOW	112.	0.	13758.

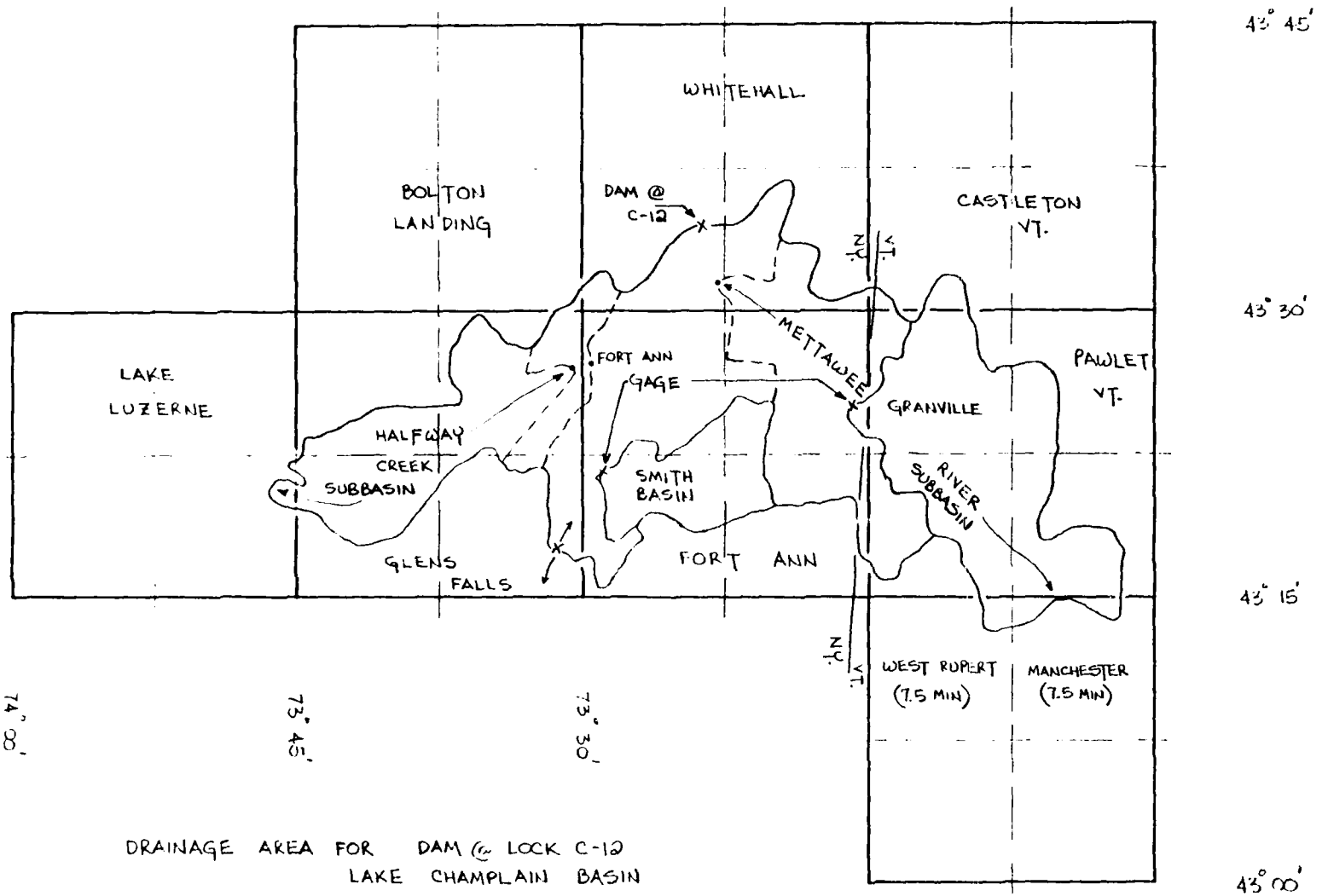
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	111.29	0.	701.	8162.	0.	0.	0.
1.00	119.76	0.76	1264.	14172.	4.00	29.00	0.

MARCH 14, 1977 EVENT — COMPUTER MODEL

119.9 — GAGE READING



DRAINAGE AREA MAP - LOCK C-12 DAM



DRAINAGE AREA FOR DAM @ LOCK C-12
LAKE CHAMPLAIN BASIN

Discharge measurements made at low-flow partial-record stations during water year 1966 -- Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		St. Lawrence River basin -- Continued				
2718	Little Chazy River near Chazy, N. Y.	Lat 44°50'46", long 73°27'24", at bridge on Slosson Road, 1.5 miles west of US Highway 9, 3.2 miles southwest of Chazy, Clinton County.	35.4	1956-61, 1963, 1966	3-18-66	1.88
2727	North Branch Saranac River near Clayburg, N. Y.	Lat 44°35'33", long 73°52'34", at bridge on State Highway 3 and 365, 2.0 miles west of Clayburg, Clinton County.	125	1956-61, 1966	8-22-66	100
2738	Little Ausable River near Valcour, N. Y.	Lat 44°35'39", long 73°29'48", at bridge on town road, at Laphams Mills, 2.8 miles southwest of Valcour, Clinton County.	87.8	1956-61, 1966	8-18-66	14.8
2748	East Branch Ausable River at Keene Valley, N. Y.	Lat 44°11'31", long 73°47'08", at bridge on Village Park Road, at Keene Valley, Essex County.	49.2	1946, 1948, 1957-61, 1966	8- 5-66	14.3
*2762	Bouquet River at New Russia, N. Y.	Lat 44°09'51", long 73°58'30", at bridge on county road, 0.2 mile east of US Highway 9, at New Russia, Essex County.	37.8	1948-49, 1951, 1953-54, 1957-61, 1966	7-28-66	7.19
2769	English Brook at Lake George, N. Y.	Lat 43°28'25", long 73°43'25", at bridge on Big Hollow Road, 300 ft southwest of US Highway 9, about 500 ft upstream from Big Hollow Branch, at Lake George, Warren County, and 1 mile upstream from mouth.	5.03	1961-66	7-14-66	1.12
2790.1	Trout Brook at Ticonderoga, N. Y.	Lat 43°50'46", long 73°26'28", at bridge on State Highway 9N, 0.2 mile west of village line of Ticonderoga, Essex County, and 0.9 mile upstreams from mouth.	24.6	1962-66	9-30-66	3.72
→ 2791	Big Creek at Smiths Basin, N. Y.	Lat 43°21'23", long 73°29'16", at highway bridge 0.35 mile upstream from mouth, 0.5 mile east of Smiths Basin, Washington County, and 4.8 miles west of Hartford.	33.5	1961-64, 1966	7-14-66	1.86

* Also a crest-stage partial-record station.

AD-A087 790 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. LOCK C-12 DAM, INVENTORY NUMBER NY--ETC(U)
JUN 80 G KOCH DACW51-79-C-0001

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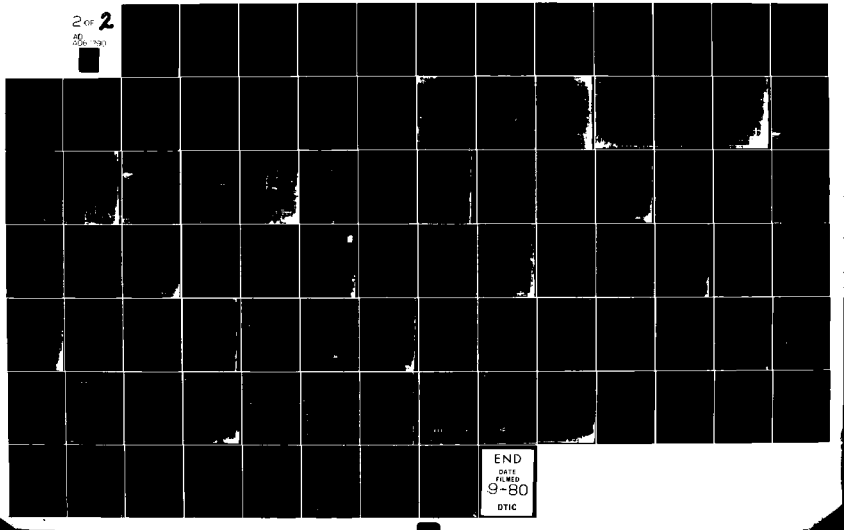
2 OF 2



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Discharge measurements made at miscellaneous sites during water year 1966 -- Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
St. Lawrence River basin -- Continued						
West Branch Ausable River Tributary	West Branch Ausable River	Lat 44°26'47", long 73°43'22", 0.2 mile upstream from mouth and 1.2 miles southeast of Black Brook, Clinton County,			8-22-66	1.79
Johns Brook	East Branch Ausable River	Lat 44°11'25", long 73°48'00", at bridge on county highway, 0.65 mile west of Keene Valley, Essex County,	18.2	1948, 1954	8- 3-66	13.2
East Branch Ausable River	Ausable River	Lat 44°15'23", long 73°47'38", at bridge on State Highway 73 in Keene, Essex County,	93.1	1938, 1948, 1953-54	8-23-66	218
East Branch Ausable River Tributary	East Branch Ausable River	Lat 44°24'24", long 73°40'58", at bridge on county road off State Highway 9N, 1 mile northwest of North Jay, Essex County.			8-22-66	.17
Palmer Creek	Ausable River	Lat 44°28'39", long 73°40'27", at bridge on State Highway 9N, 0.3 mile north of Au Sable Forks, Clinton County.		1911, 1948, 1950	8-23-66	6.12
Green Street Brook	do.	Lat 44°27'19", long 73°36'12", at bridge at Rogers, Essex County, N. Y. and 0.2 mile upstream from mouth.			8-23-66	1.13
Roaring Brook	Bouquet River	Lat 44°10'02", long 73°37'23", 0.5 mile upstream from mouth and US Highway 9 and 0.8 mile northwest of New Russia, Essex Countyv	9.03	1963	8- 3-66	2.34
The Branch	do.	Lat 44°13'14", long 73°36'53", at bridge on State Highway 9N, 0.1 mile west of Town Line of Elizabethtown, Essex County,			7-28-66	*8.15
North Branch Bouquet River	do.	Lat 44°21'05", long 73°32'38", at bridge on US Highway 9 at Deerhead, Essex County,			8-23-66	6.40
Church Brook	North Branch Bouquet River	Lat 44°20'16", long 73°34'10", 0.7 mile northwest of Fairview Cemetery and 1.6 miles southwest of Deerhead, Essex County,			8-23-66	.58
Church Brook	do.	Lat 44°20'08", long 73°33'12", at bridge on Reber Road, 0.4 mile southeast of Fairview Cemetery and 1 mile southwest of Deerhead, Essex County,			8-23-66	.74
Spruce Mill Brook	do.	Lat 44°17'23", long 73°36'40", at bridge 2.7 miles northwest of Lewis, Essex County.			8-23-66	1.46
Spruce Mill Brook	do.	Lat 44°17'07", long 73°34'26", at bridge on county road off US Highway 9 and 0.8 mile northwest of Lewis, Essex County.			8-23-66	1.88
Mill Brook	Lake Champlain	Lat 44°03'40", long 73°30'50", at bridge on county road at Moriah Center, Essex County.			7-27-66	*4.86
Mill Brook	do.	Lat 44°03'09", long 73°28'47", at bridge along Forge Hollow Road, 1.0 mile west of Port Henry, Essex County.			7-27-66	*6.76
Putnam Creek Tributary	Putnam Creek	Lat 43°58'28", long 73°27'58", at bridge on New York State Fish Hatchery Road, 0.1 mile upstream from mouth, and 0.2 mile southeast of Crown Point Center, Essex County.			6-30-66 8-15-66	*1.20 .71
Putnam Creek	Lake Champlain	Lat 43°58'31", long 73°27'54", at bridge at Fish Hatchery, 200 ft downstream from Bennie Brook, and 0.2 mile east of Crown Point Center, Essex County.			7-28-66	*5.05
Pivendle Creek	do.	Lat 43°52'51", long 73°25'23", at bridge on county road 2.1 miles north of Ticonderoga, Essex County.			7-15-66	*1.08
Big Hollow Branch	English Brook	Lat 43°38'13", long 73°44'12", 600 ft below diversion dam, 1 mile upstream from mouth, and 1.2 miles northwest of Lake George, Warren County.	2.10	1961	7-14-66	0
Trout Brook	Lake George Outlet	Lat 43°48'40", long 73°29'34", at bridge on county road 0.4 mile west of Valley View Church and 3.9 miles southwest of Ticonderoga, Essex County.			7-28-66	*2.43
Halfway Creek	Wood Creek	Lat 43°26'45", long 73°29'58", at bridge on county road at Essex Falls, Washington County.			7-13-66	*25.7

* Base flow.

Discharge measurements made at low-flow partial-record stations during water years 1961-65--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Streams tributary to St. Lawrence River--Continued				
* 4-2701	West Branch Deer Creek at Fort Covington Center, N.Y.	Lat 44°56'48", long 74°28'49", at bridge on county highway, 0.6 mile west of Fort Covington Center, Franklin County, 2.1 miles upstream from East Branch, and 3.1 miles south of Fort Covington.	31.4	1961-64	7-24-61	7.29
					8-15-61	4.19
					8-31-61	16.1
					9-13-61	7.88
					9-30-61	7.61
					6- 1-62	44.1
					8- 1-62	42.9
					8- 4-62	4.11
					7- 1-63	2.22
					10- 1-63	5.43
					6- 9-63	68.5
					8- 8-63	4.26
					7- 1-63	3.80
					8- 8-63	5.16
					10- 7-63	9.09
					8- 6-64	9.05
4-2718	Little Chazy River near Chazy, N.Y.	Lat 44°59'46", long 73°27'24", at bridge on Sisson Road 1.5 miles west of U.S. Highway 9 and 3.2 miles southwest of Chazy, Clinton County.	38.4	1956-61, 1963	7- 6-61	11.3
					7-25-63	4.83
4-2728	Sumner Brook at Bloomingdale, N.Y.	Lat 44°26'30", long 74°08'05", at bridge on State Highway 3, 0.3 mile east of center of Bloomingdale, Essex County, and 1.5 miles upstream from mouth.	-	1963-65	7-26-63	31.4
					8-22-63	40.3
					8-26-63	36.4
					10-24-63	37.3
					6-24-64	38.2
					8-29-64	37.5
					9- 1-64	33.4
					7-28-65	26.6
b 4-2727	North Branch Saranac River near Clayburg, N.Y.	Lat 44°38'33", long 73°52'36", at bridge on State Highways 3 and 38B, 2.0 miles west of Clayburg, Clinton County.	b 125	1956-61	7- 6-61	140
4-2738	Little Ausable River near Valcour, N.Y.	Lat 44°35'39", long 73°29'48", at bridge on town road at Lapham Mills, 2.8 miles southwest of Valcour, Clinton County.	67.8	1956-61	7- 6-61	16.6
4-2748	East Branch Ausable River at Keene Valley, N.Y.	Lat 44°11'31", long 73°47'08", at bridge on village park road at Keene Valley, Essex County.	49.2	1957-61	7- 6-61	66.1
* 4-2782	Bouquet River at New Russia, N.Y.	Lat 44°09'53", long 73°36'30", at bridge on county road, 0.2 mile east of U.S. Highway 9 at New Russia, Essex County.	37.6	1949, 1951, 1953-54, 1957-61	9- 7-61	18.4
4-2788	English Brook at Lake George, N.Y.	Lat 43°26'23", long 73°43'28", at bridge on Big Hollow Road, 300 ft southwest of U.S. Highway 9, about 500 ft upstream from Big Hollow Branch at Lake George, and 1 mile upstream from mouth, Saratoga County.	5.03	1961-65	6-29-61	4.01
					8-16-61	.81
					9- 7-61	2.04
					9-20-61	1.12
					6- 8-62	3.12
					8-16-62	1.16
					6-25-63	1.55
					7-16-63	.74
					9-18-63	.30
					5- 5-64	6.01
					7-14-65	.57
4-2790.1	Trout Brook at Ticonderoga, N.Y.	Lat 43°50'46", long 73°26'28", at bridge on State Highway 9N, 0.2 mile west of village line of Ticonderoga and 0.9 mile upstream from mouth, Essex County.	24.6	1962-65	6- 6-62	8.28
					7- 6-62	1.01
					8-16-62	3.31
					7-16-63	3.25
					8- 7-63	1.83
					9-18-63	1.12
					4-28-64	35.6
					8-12-64	.78
					7-21-65	1.23
→ 4-2791	Big Creek at Smiths Basin, N.Y.	Lat 43°21'23", long 73°29'16", at highway bridge 0.35 mile upstream from mouth, 0.5 mile east of Smiths Basin, Washington County, and 4.8 miles west of Hartford.	33.5	1961-64	6-28-61	4.07
					7-27-61	3.53
					8-14-61	.28
					9-17-61	5.42
					7- 6-62	.61
					8-16-62	7.15
					6-28-63	4.82
					7-18-63	.82
					9-19-63	.34
					5- 5-64	18.8
					8-11-64	(e)
→ 4-2804	Mettawee River at Granville, N.Y.	Lat 43°24'23", long 73°15'45", at bridge on State Highway 22 at Granville, Washington County.	115	1960-64	6-28-61	90.7
					7-27-61	40.1
					8-14-61	17.8
					7- 6-62	22.8
					8-16-62	30.4
					6-28-63	9.69
					7-18-63	18.7
					9-19-63	10.8
					8-11-64	3.89

* Also a crest-stage partial-record station.
c Operated as a continuous-record gaging station.
a For other measurements see low-flow investigations in North Branch Clinton River basin.
b Revised.
c Furnished by Indiana Flood Control and Water Resources.
d Flow largely from limestone springs.
e No appreciable flow.
f Estimated.

Annual maximum discharge at crest-stage partial-record stations during water years 1961-65--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		Streams tributary to St. Lawrence River--Continued					
* 4-2683	Little River near Canton, N.Y.	Lat 44°33'24", long 75°06'56", at old dam 50 ft downstream from highway bridge at Brick Chapel, 4.0 miles southeast of Canton, St. Lawrence County, and 7.4 miles upstream from mouth.	42.4	1959-60, 1961-65	2-27-61	5.53	655
					4- 4-62	6.48	1,200
					4- 4-63	6.96	1,590
					3- 4-64	b 6.13	-
					4-13-64	5.83	529
					2-13-65	b 5.48	-
					4-13-65	5.32	560
* 4-2684	Grenadier Brook at Crary Mills, N.Y.	Lat 44°34'55", long 75°04'43", at highway bridge half a mile northwest of Crary Mills, St. Lawrence County, and 0.8 mile upstream from Bayou Brook.	20.6	1959-60, 1961-65	2-27-61	b 4.16	-
					4- 4-62	3.76	675
					4- 4-63	4.30	960
					3- 4-64	b 4.16	-
					2-13-65	b 4.48	-
* 4-2689	Trout Brook at Stockholm Center, N.Y.	Lat 44°46'18", long 74°48'47", at highway bridge 0.7 mile upstream from mouth and 1 mile northeast of Stockholm Center, St. Lawrence County.	44.9	1959-60, 1961-65	3-30-61	3.92	1,040
					4- 4-62	3.53	825
					3-30-63	b 4.38	-
					3- 4-64	3.47	795
					2- 4-65	b 3.80	-
					4-13-65	3.46	790
* 4-2691	Lawrence Brook near Hails, N.Y.	Lat 44°50'22", long 74°38'46", at highway bridge 2.6 miles northwest of Hails, Franklin County, and 5.6 miles upstream from mouth.	28.0	1959-60, 1961-65	3-30-61	6.08	975
					4- 4-62	5.65	615
					3-30-63	6.76	-
					3- 4-64	4.84	399
					2- 4-65	b 5.86	-
* 4-2701	West Branch Deer Creek at Fort Covington Center, N.Y.	Lat 44°58'49", long 74°29'48", at bridge on county highway, 0.8 mile west of Fort Covington Center, Franklin County, 2.1 miles upstream from East Branch, and 3.1 miles south of Fort Covington.	31.4	1962-65	4- 4-62	5.96	875
					3-27-63	b 6.19	-
					3- 4-64	b 5.97	-
					4-13-64	5.04	560
					2- 4-65	b 4.91	-
* 4-2762	Bouquet River at New Russia, N.Y.	Lat 44°09'31", long 73°36'30", at bridge on county road, 0.2 mile east of U.S. Highway 9 at New Russia, Essex County.	37.6	1949, 1951, 1953, 1956-65	1961	4.37	512
					4- 4-62	10.20	1,780
					4- 4-63	8.37	1,180
					3- 4-64	b 10.57	-
					4-22-65	6.65	740
4-2794	Poultney River tributary at East Poultney, Vt.	Lat 43°32'17", long 73°12'38", at culvert 1.0 mile north of East Poultney.	1.13	1964-65	4-14-64	12.38	98
					2-12-65	9.91	28
→ 4-2802	Mettawee River tributary No. 2 at East Rupert, Vt.	Lat 43°16'16", long 73°07'23", at culvert on State Highway 30 at East Rupert.	1.88	1963-65	3-27-63	14.99	130
					4-14-64	14.90	124
					4-13-65	12.72	82
4-2809	Moon Brook at Rutland, Vt.	Lat 43°38'15", long 72°57'25", at culvert on macadam road, 1.0 mile east of Rutland.	2.17	1964-65	4-14-64	10.75	63
					2- 4-65	10.56	44
4-2823	Brandy Brook at Brookleaf, Vt.	Lat 43°37'19", long 72°59'49", at culvert on State Highway 125 at Brookleaf, 2 miles east of Bingham.	2.26	1963-65	8-14-63	13.63	236
					3- 4-64	12.29	141
					2- 4-65	10.84	57
4-2826.5	Beaver Brook at Cornwall, Vt.	Lat 43°57'29", long 73°13'51", at culvert on State Highway 74 at Cornwall.	1.13	1964-65	4-14-64	10.57	57
					2- 4-65	10.38	51
4-2828	Little Otter Creek tributary near Bristol, Vt.	Lat 44°09'44", long 73°07'08", at culvert on dirt road, 2 miles northwest of Bristol.	1.48	1964-65	3- 4-64	12.10	45
					2- 4-65	11.19	32
4-2827.5	Lewis Creek tributary No. 2 near Hinesville, Vt.	Lat 44°18'34", long 73°04'02", at culvert on State Highway 116, 1.3 miles north of Hinesville.	1.07	1964-65	3- 4-64	12.38	50
					3- 4-65	11.69	29
4-2830.5	Winooski River tributary No. 2 near Cabot, Vt.	Lat 44°23'33", long 72°18'09", at culvert on macadam road, 2 miles north of Cabot.	1.10	1964-65	3- 4-64	10.83	16
					10-21-64	10.34	4
4-2843	Stevens Branch tributary at South Barre, Vt.	Lat 44°10'31", long 72°31'11", at culvert on dirt road, 0.7 mile west of South Barre.	.39	1964-65	3- 4-64	12.71	38
					3- 7-65	11.18	21
4-2864	Bryant Brook at Waterbury Center, Vt.	Lat 44°22'41", long 72°43'29", at culvert on State Highway 100 at Waterbury Center.	2.64	1964-65	3- 4-64	12.08	136
					3- 7-65	10.74	68
4-2868	Vincent River tributary near Richmond, Vt.	Lat 44°29'00", long 72°58'46", at culvert on macadam road, 2 miles north of Richmond.	.71	1964-65	3- 4-64	12.06	32
					4-22-65	10.72	16
4-2907	Bailey Brook at East Barnet, Vt.	Lat 44°31'41", long 72°18'16", at culvert on macadam road, 0.8 mile northeast of East Barnet.	2.52	1964-65	3-30-64	10.87	57
					-	(h)	<24
4-2921.5	Gihon River tributary near Johnson, Vt.	Lat 44°39'36", long 72°57'44", at culvert on State Highway 100B, 3 miles northeast of Johnson.	.31	1964-65	3- 4-64	10.77	30
					6-13-65	10.78	42
4-2922	Lamoille River tributary at Jeffersonville, Vt.	Lat 44°39'13", long 72°48'42", at culvert on State Highway 108 at Jeffersonville.	.58	1964-65	4-14-64	11.32	47
					6-25-65	11.01	28
4-2934	Whittaker Brook at Richford, Vt.	Lat 44°59'14", long 72°39'13", at culvert on State Highway 100, 1 mile east of Richford.	.64	1963-65	4- 3-63	8.57	28
					4-14-64	12.48	120
					3- 9-65	9.56	49
4-2938	Missisquoi River tributary at Sheldon Junction, Vt.	Lat 44°54'01", long 72°57'38", at culvert on State Highway 105 at Sheldon Junction.	1.09	1963-65	4- 3-63	12.44	65
					4-14-64	11.71	39
					6-30-65	13.28	65

Discharge measurements made at low-flow partial-record stations during water year 1958--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Streams tributary to Lake Ontario--Continued				
2337	Virgil Creek at Freeville, N. Y.	Lat 42°30'18", long 76°21'01", at bridge on Johnson St., 0.8 mile southwest of Freeville.	40.4	1955-59	10- 6-58 7-29-59 9-10-59	17.8 8.08 5.42
.2338	Salmon River at Hyers, N. Y.	Lat 42°32'18", long 76°32'34", at Timber Bridge, Hyers, 0.3 mile above mouth.	89.3	1956-59	10- 6-58 7-29-59 9- 9-59	19.2 1.31 .53
2362	Flint Creek at Seneca Castle, N. Y.	Lat 42°53'25", long 77°06'05", at bridge on Castle Rd., 0.4 mile northeast of Seneca Castle.	82.3	1957-59	10-10-58 7-31-59	3.40 .14
2383	Owasco Inlet at Moravia, N. Y.	Lat 42°43'01", long 76°26'16", at bridge on West Cayuga St., extension, about 0.8 mile northwest of Moravia.	108	1949-50, 1956-59	10- 6-58 7-29-59 9-10-59	43.9 13.7 7.96
2412	West Branch Fish Creek near Bloosvale, N. Y.	Lat 43°18'26", long 75°36'56", at bridge, 0.4 mile southwest of Bloosvale.	203	1957, 1959	10- 9-58 10-21-58	243 388
2417	East Branch Fish Creek at Smeaton Mills, N. Y.	Lat 43°27'44", long 75°38'51", at bridge on Osceola-West Leyden road, 0.3 mile east of Smeaton Mills.	98.7	1957-59	9-23-59	31.0
2422	North Branch Salmon River at Redfield, N. Y.	Lat 43°32'32", long 75°48'51", at highway bridge on Harvester Mill Rd., 0.7 mile northeast of Redfield.	82.3	1957, 1959	10- 9-58 10-21-58	112 130
2806	South Sandy Creek near Wardwell, N. Y.	Lat 43°45'22", long 76°05'16", at highway bridge, 1.2 miles southwest of Wardwell.	80.6	1957, 1959	10-22-58 9-12-59	90.0 9.85
2830	Sugar River at Talcottville, N. Y.	Lat 43°32'06", long 75°22'03", at bridge on State Highway 12D, 0.3 mile north of Talcottville.	41.5	1928-329, 1957-58	9-23-59	6.61
2842	Roaring Brook at Martinsburg, N. Y.	Lat 43°44'00", long 75°28'13", at bridge on State Highways 12D and 28, at Martinsburg.	21.8	1957-58	9-21-59	3.26
2872	Sunday Creek near Number Four, N.Y.	Lat 43°32'19", long 75°07'03", at bridge on Mosher powerplant road, 3.1 miles east of Number Four.	9.07	1954-55, 1957-59	5-18-55 7- 7-55 9-14-55 9- 3-59	16.2 7.74 2.87 10.4
		Streams tributary to St. Lawrence River				
*2807	Chaumont River near Depauiville, N. Y.	Lat 44°10'30", long 76°00'57", at highway bridge, 3.6 miles northeast of Depauiville.	18.3	1956-57, 1959	10-22-58 4-23-59 7-16-59 9-21-59	2.81 4.42 .98 .63
2718	Little Chazy River near Chazy, N. Y.	Lat 44°50'46", long 73°27'26", at bridge on Sisseon Rd., 1.5 miles west of U. S. Highway 9, 3.2 miles southwest of Chazy.	38.4	1956-59	10-22-58 7-22-59 9-17-59	6.76 3.53 1.86
2722	North Branch Saranac River near Clayburg, N. Y.	Lat 44°55'33", long 73°32'34", at bridge on State Highways 3 and 385, 2.0 miles west of Clayburg.	124	1956-59	10-22-58 7-23-59 9-18-59	115 69.0 78.9
2736	Little Ausable River near Valcour, N. Y.	Lat 44°35'39", long 73°29'46", at bridge on town road, at Lapham Mills, 2.8 miles southwest of Valcour.	67.8	1956-59	10-21-58 7-23-59 9-17-59	16.0 4.14 3.44
2748	East Branch Ausable River at Keene Valley, N. Y.	Lat 44°11'31", long 73°47'08", at bridge on village park road, at Keene Valley.	49.2	1957-59	10- 9-58 10-22-58 7-22-59	36.1 49.4 39.0
*2762	Bouquet River at New Russia, N. Y.	Lat 44°09'51", long 73°36'30", at bridge on county road, 0.2 mile east of U. S. Highway 9, at New Russia.	37.6	1954, 1957-59	10-22-58 7-23-59 9-19-59	15.1 7.86 5.16
2792	Hadlock Pond Outlet at West Port Ann, N. Y.	Lat 43°24'19", long 73°34'42", at bridge on State Highway 149, 0.6 mile southwest of West Port Ann.	16.5	1953-54, 1957-59	9- 8-59	1.34

* Also a crest-stage partial-record station.
0 Operated as a continuous-record gaging station.

METTAWEE RIVER NEAR WHITEHALL, N. Y.

This temporary station was located on the farm of Fred Foote, near the second highway bridge above the confluence of Mattawee River and Wood Creek, and about 2 miles from Whitehall. It was established August 25, 1908, to obtain data regarding the low-water flow of Mettawee River, and was discontinued December 5, 1908.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Mettawee River near Whitehall, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 25	G. M. Brett	22	13.5	1.15	18.8
September 19	C. H. Adams	19	9.6	1.00	10.6

Daily gage height, in feet, of Mettawee River near Whitehall, N. Y., for 1908.

[Observer, B. M. Moore.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.05	1.00	1.20	1.08	16	.....	1.00	1.10	1.08	.....
2	.....	1.12	1.15	1.12	1.05	17	.....	1.02	1.10	1.12	.....
3	.....	1.05	1.08	1.18	1.10	18	.....	1.00	1.10	1.10	.....
4	.....	1.02	1.18	1.05	1.08	19	.....	1.00	1.00	1.12	.....
5	.....	1.22	1.05	1.15	1.05	20	.....	1.00	1.02	1.12	.....
6	.....	1.15	1.08	1.15	.....	21	.....	1.00	1.10	1.12	.....
7	.....	1.02	1.15	1.10	.....	22	.....	.98	1.02	1.10	.....
8	.....	1.10	1.10	1.08	.....	23	.....	1.00	1.08	1.08	.....
9	.....	1.00	1.08	1.05	.....	24	.....	1.00	1.08	1.08	.....
10	.....	1.02	1.05	1.08	.....	25	1.15	1.00	1.05	1.08	.....
11	.....	1.00	1.15	1.10	.....	26	1.12	1.00	1.02	1.08	.....
12	.....	1.02	1.05	1.12	.....	27	1.10	1.00	1.05	1.08	.....
13	.....	1.00	1.20	1.12	.....	28	1.18	1.00	1.10	1.08	.....
14	.....	1.00	1.18	1.10	.....	29	1.20	1.00	1.20	1.05	.....
15	.....	1.00	1.10	1.10	.....	30	1.02	1.00	1.25	1.08	.....
						31	1.00	.....	1.22	.....	.....

NOTE. Ice conditions December 6 to 31.

Rating table for Mettawee River near Whitehall, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	7	1.20	23
1.00	11	1.30	33
1.10	16		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on two discharge measurements made during 1908 and is fairly well defined.

Monthly discharge of Mettawee River near Whitehall, N. Y., for 1908.

[Drainage area, 200 square miles.]

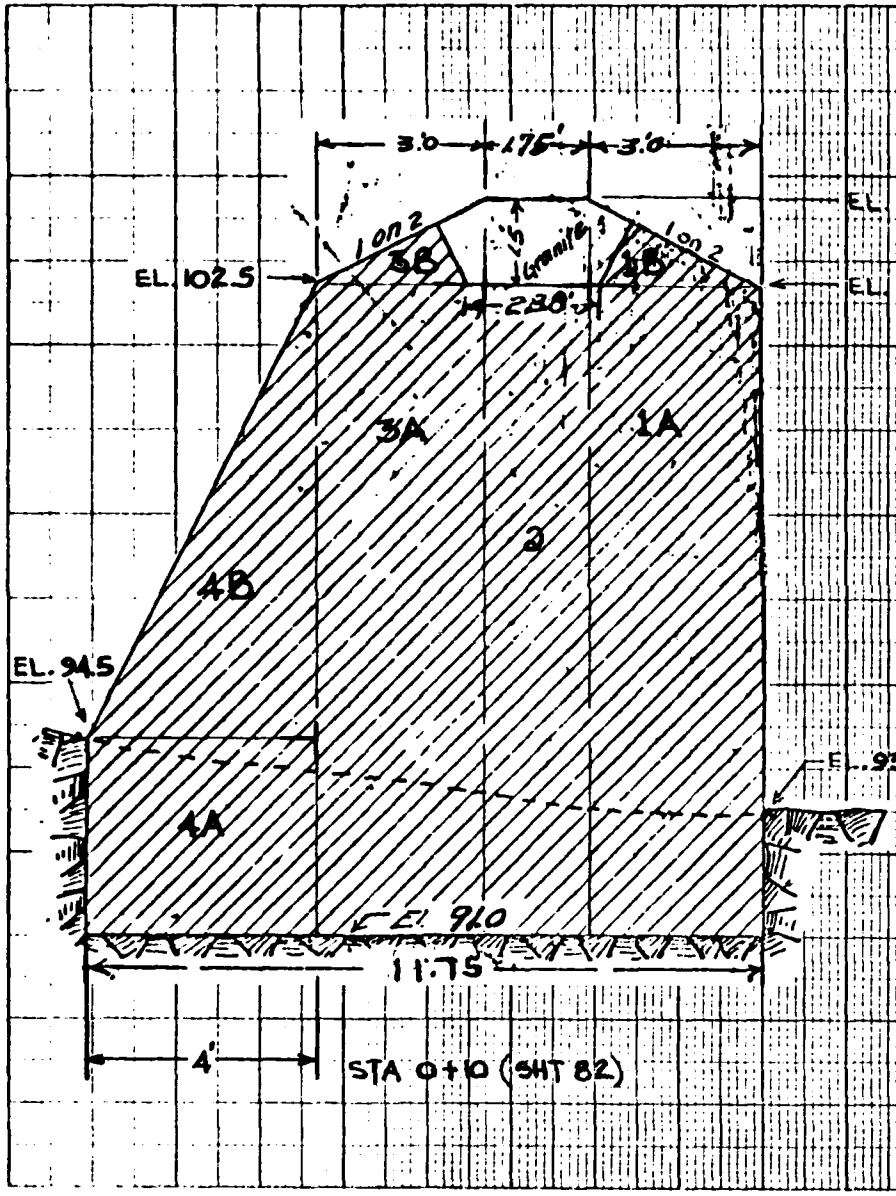
Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 25-31	23	11	17.3	0.084	0.02	B.
September	25	10	12.5	.061	.07	B.
October	28	11	16.9	.082	.09	B.
November	23	14	16.4	.080	.09	B.
December 1-5	16	14	14.8	.072	.01	B.

APPENDIX D
STABILITY COMPUTATIONS

1/

LOCK C-12 DAM NY-796

SPILLWAY CREST



SECTION	WIDTH W	HT H	AREA A	DIST. TO TOE D	(D x A)
1A	3	11.5	34.50	10.25	353.625
1B	3	1.5	2.25	9.75	21.938
EQUIV. 1			36.75	10.2194	
3A	3	11.5	34.50	5.5	189.75
3B	3	1.5	2.25	6	13.50
EQUIV. 3			36.75	5.5306	
4A	4	3.5	14	2	28
4B	4	8	16	2.6666	42.6666
EQUIV. 4			30	2.3555	
2	1.75	13	22.75	7.875	

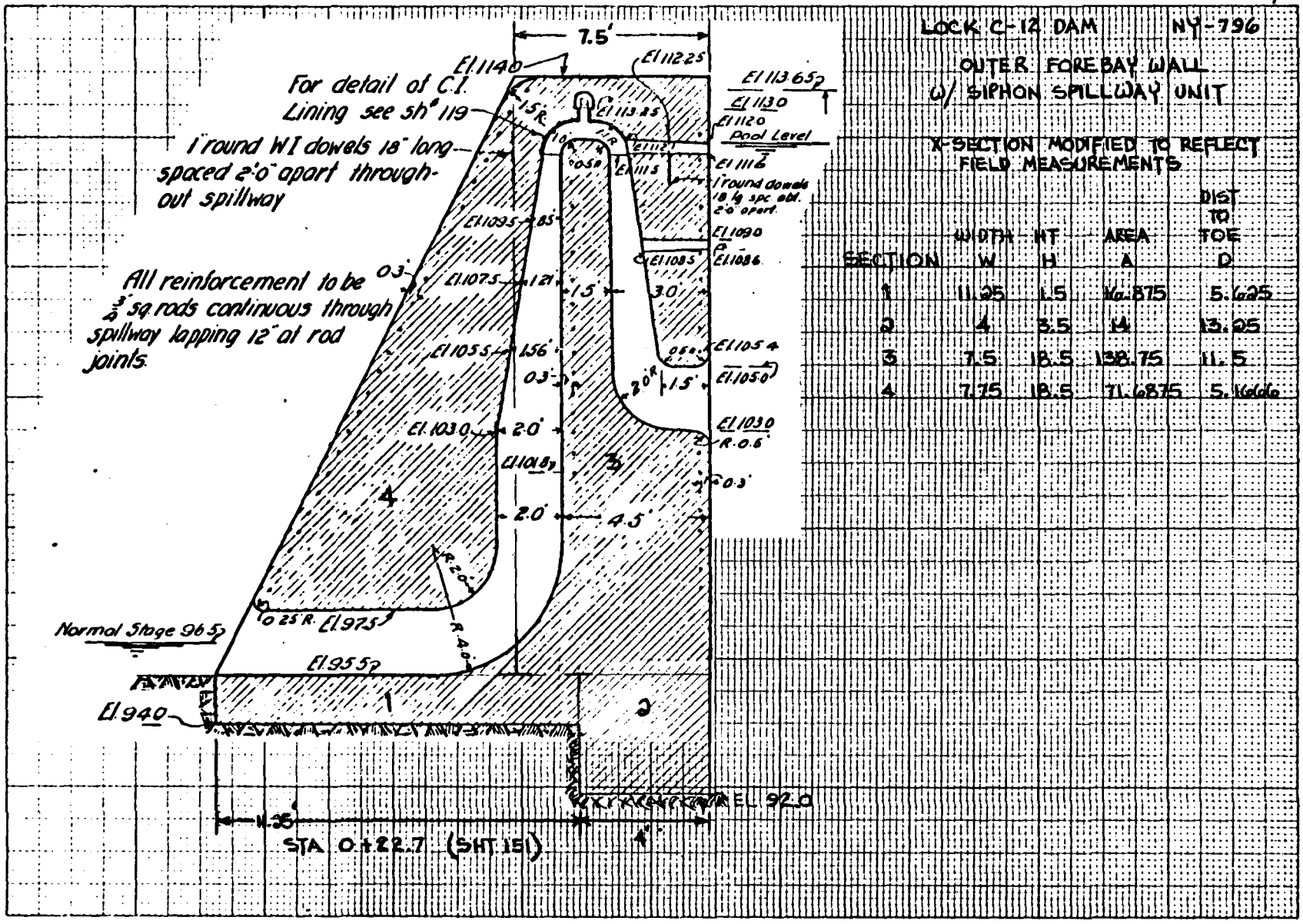
2/

LOCK C-12 DAM NY-796

OUTER FOREBAY WALL W/ SIPHON SPILLWAY UNIT

X-SECTION MODIFIED TO REFLECT FIELD MEASUREMENTS

SECTION	WIDTH W	HT H	AREA A	DIST TO TOE D
1	11.25	1.5	16.875	5.625
2	4	3.5	14	13.25
3	7.5	18.5	138.75	11.5
4	7.75	18.5	71.6875	5.1666



LOCK C-12 DAM

STABILITY ANALYSIS PROGRAM - LOOK SHEET

SECTION @ SPILLWAY CREST

INPUT ENTRY		ANALYSIS CONDITION				
		1	2	3	4	5
Unit Weight of Dam (K/ft^3)	0	0.15				
Area of Segment No. 1 (ft^2)	1	36.75				
Distance from Center of Gravity of Segment No. 1 to Downstream Toe (ft)	2	10.2194				
Area of Segment No. 2 (ft^2)	3	22.75				
Distance from Center of Gravity of Segment No. 2 to Downstream Toe (ft)	4	7.875				
Area of Segment No. 3 (ft^2)	5	36.75				
Distance from Center of Gravity of Segment No. 3 to Downstream Toe (ft)	6	5.5306				
Base Width of Dam (Total) (ft)	7	11.75				
Height of Dam (ft)	8	13				
Ice Loading (K/ ft.)	9	—	—	—		
Coefficient of Sliding	10	0.7				
Unit Weight of Soil (K/ft^3) (deduct 18)	11	0.1026				
Active Soil Coefficient - Ka	12	—				
Passive Soil Coefficient - Kp	13	3.69				
Height of Water over Top of Dam or Spillway (ft)	14	8	16.5	8		
Height of Soil for Active Pressure (ft)	15	2.5				
Height of Soil for Passive Pressure (ft)	16	3.5				
Height of Water in Tailrace Channel (ft)	17	5.5	14.2	5.5		
Weight of Water (K/ft^3)	18	0.0624				
Area of Segment No. 4 (ft^2)	19	30				
Distance from Center of Gravity of Segment No. 4 to Downstream Toe (ft)	20	2.3555				
Height of Ice Load or Active Water (ft) (does not include 14)	46	13	13	13		
Seismic Coefficient (g)	50	—	—	0.10		

LOCK C-10 DAM

STABILITY ANALYSIS PROGRAM - DATA SHEET

SECTION @ OUTER FOREBAY WALL

INPUT ENTRY		ANALYSIS CONDITION 4	5	6	7	8
Unit Weight of Dam (K/ft3)	0	0.15				
Area of Segment No. 1 (ft^2)	1	16.875				
Distance from Center of Gravity of Segment No. 1 to Downstream Toe (ft)	2	5.625				
Area of Segment No. 2 (ft^2)	3	14				
Distance from Center of Gravity of Segment No. 2 to Downstream Toe (ft)	4	13.25				
Area of Segment No. 3 (ft^2)	5	138.75				
Distance from Center of Gravity of Segment No. 3 to Downstream Toe (ft)	6	11.5				
Base Width of Dam (Total) (ft)	7	15.25				
Height of Dam (ft)	8	20				
Ice Loading (K/L ft.)	9	—	5	—	—	—
Coefficient of Sliding	10	0.7				
Unit Weight of Soil (K/ft3) (deduct 18)	11	0.1026				
Active Soil Coefficient - Ka	12	—				
Passive Soil Coefficient - Kp	13	3.69				
Height of Water over Top of Dam or Spillway (ft)	14	—	—	6.5	8	—
Height of Soil for Active Pressure (ft)	15	—				
Height of Soil for Passive Pressure (ft)	16	3.5				
Height of Water in Tailrace Channel (ft)	17	2.5	2.5	11.2	11.2	2.5
Weight of Water (K/ft3)	18	0.0624				
Area of Segment No. 4 (ft^2)	19	71.6875				
Distance from Center of Gravity of Segment No. 4 to Downstream Toe (ft)	20	5.1666				
Height of Ice Load or Active Water (ft) (does not include 14)	46	20	20	22	22	20
Seismic Coefficient (g)	50	—	—	—	—	0.10

LOCK C-12 DAM

SECTION @
SPILLWAY CREST

NORMAL
CONDITIONS

```
   0.        RCL
               0
   0.15
   0.15      RCL
               1
  36.75
  36.75      RCL
               2
  10.2194
  10.2194    RCL
               3
  22.75
  22.75      RCL
               4
   7.875
   7.875     RCL
               5
  36.75
  36.75      RCL
               6
   5.5306
   5.5306    RCL
               7
  11.75
  11.75      RCL
               8
  13.
  13.        RCL
               9
   0.
   0.        RCL
              10
   0.7
   0.7       RCL
              11
   0.1026
   0.1026    RCL
              12
   0.
   0.        RCL
              13
   3.69
   3.69      RCL
              14
   8.
   8.        RCL
              15
   2.5
   2.5       RCL
              16
   3.5
   3.5       RCL
              17
   5.5
   5.5       RCL
              18
   0.0624
   0.0624    RCL
              19
  30.
  30.        RCL
              20
   2.3555
   2.3555    RCL
              46
  13.
  13.        RCL
              50
   0.
```

1.167514761 F.S.(OVT)

1.519510434

1.000770952 F.S.(SLD)

MAXIMUM
KNOWN
FLOOD

```
   0.        RCL
              14
  16.5
  16.5       RCL
              17
  14.3
```

.9355942751 F.S.(OVT)

-1.203721476

.7978647977 F.S.(SLD)

NORMAL
W/SEISMIC

```
   0.        RCL
              50
   0.1
```

1.167514761

1.519510434

1.000770952

1.023861357 F.S.(OVT)

.2468123529

0.8265963869 F.S.(SLD)

LOCK C-12 DAM

SECTION @
OUTER FOREBAY WALL

NORMAL CONDITIONS

0.	RCL 0
0.15	
0.15	RCL 1
16.875	
16.875	RCL 2
5.625	
5.625	RCL 3
14.	
14.	RCL 4
13.25	
13.25	RCL 5
138.75	
138.75	RCL 6
11.5	
11.5	RCL 7
15.25	
15.25	RCL 8
20.	
20.	RCL 9
0.	
0.	RCL 10
0.7	
0.7	RCL 11
0.1026	
0.1026	RCL 12
0.	
0.	RCL 13
3.69	
3.69	RCL 14
0.	
0.	RCL 15
0.	
0.	RCL 16
3.5	
3.5	RCL 17
2.5	
2.5	RCL 18
0.0624	
0.0624	RCL 19
71.6875	
71.6875	RCL 20
5.1666	
5.1666	RCL 46
20.	
20.	RCL 50
0.	

1.807126191 F.S.(OVT)

6.034957765

1.631238041 F.S.(SLD)

NORMAL W/ICE

0.	RCL 9
5.	
5.	RCL 17
2.5	

1.138254405 F.S.(OVT)

2.112062276

1.164636771 F.S.(SLD)

MAXIMUM KNOWN FLOOD

0.	RCL 9
0.	
0.	RCL 14
6.5	
6.5	RCL 17
11.2	
11.2	RCL 46
22.	

1.159198968 F.S.(OVT)

2.278665295

.9120826803 F.S.(SLD)

LOCK C-12 DAM

SECTION @
OUTER FOREBAY WALL

UPSTREAM CANAL WALL LIMIT

0.	RCL 14
8.	
1.092289674	F.S.(OVT)
1.401928946	
.8442944233	F.S.(SLD)

0.	RCL 14
0.	
0.	RCL 17
2.5	
2.5	RCL 46
20.	
20.	RCL 50
0.1	
1.827126191	
6.034957765	
1.631238041	

NORMAL
W/SEISMIC

1.472657602	F.S.(OVT)
4.278739723	
1.164391136	F.S.(SLD)

APPENDIX E

REFERENCES

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4) US Department of Commerce; Weather Bureau;
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Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24, and 48 Hours, April 1956.

5) US Department of Interior; BUREC;
Design of Small Dams, 2nd edition (rev. reprint), 1977

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6) Water Supply Paper 244; (1907-08); Part IV; St. Lawrence River Basin.

7) Water Supply Paper 1627; (1959); Part 4; St. Lawrence River Basin.

8) Water Supply Paper 1912; (1961-65); Part 4; St. Lawrence River Basin.

9) Water Supply Paper 2005; (1972); Model Hydrographs; W.D. Mitchell.

10) Water Resources Data for New York - 1966;
Part 1; Surface Water Records.

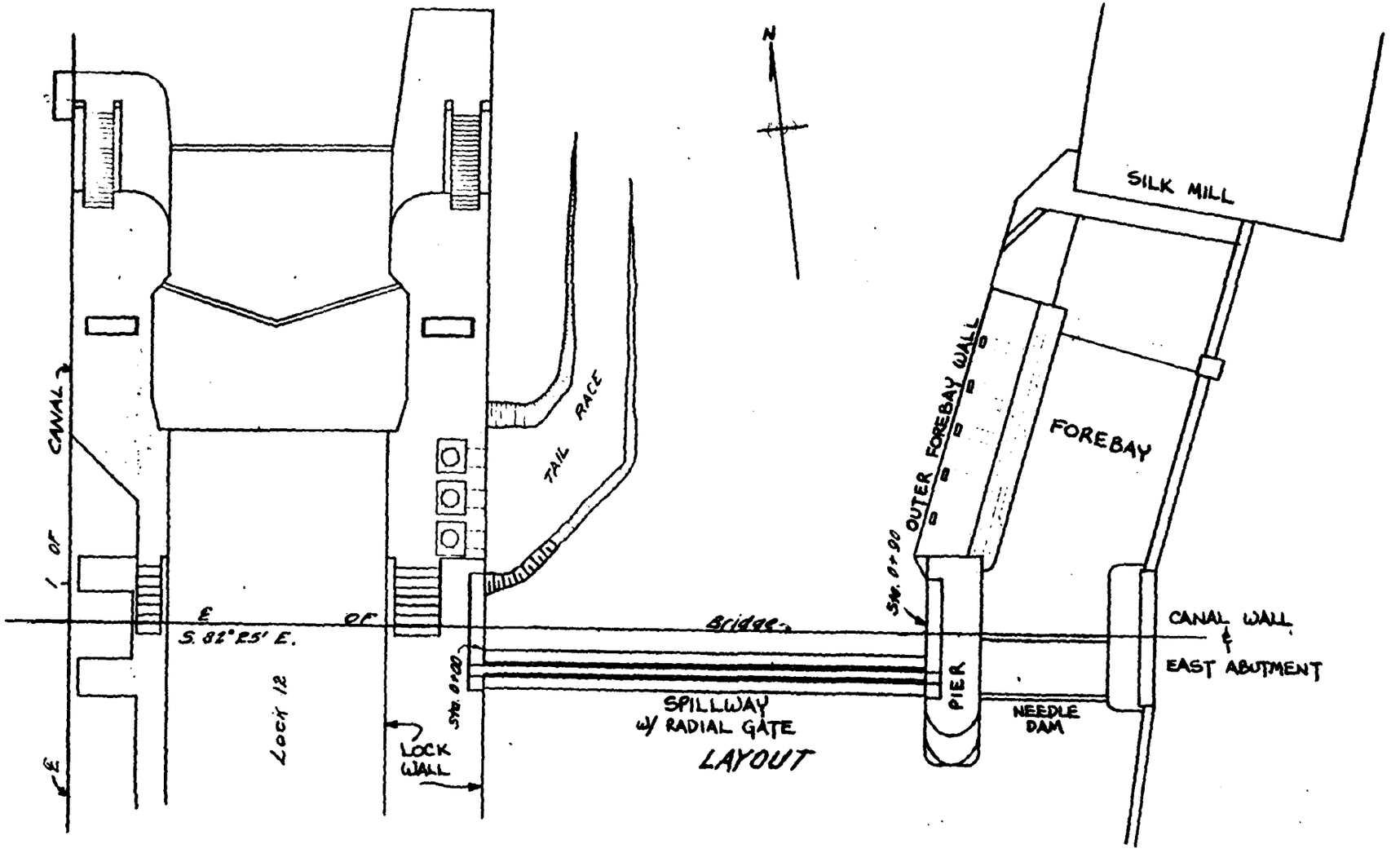
11) US Naval Facilities Engineering Command;
Design Manual DM-7; March 1971.

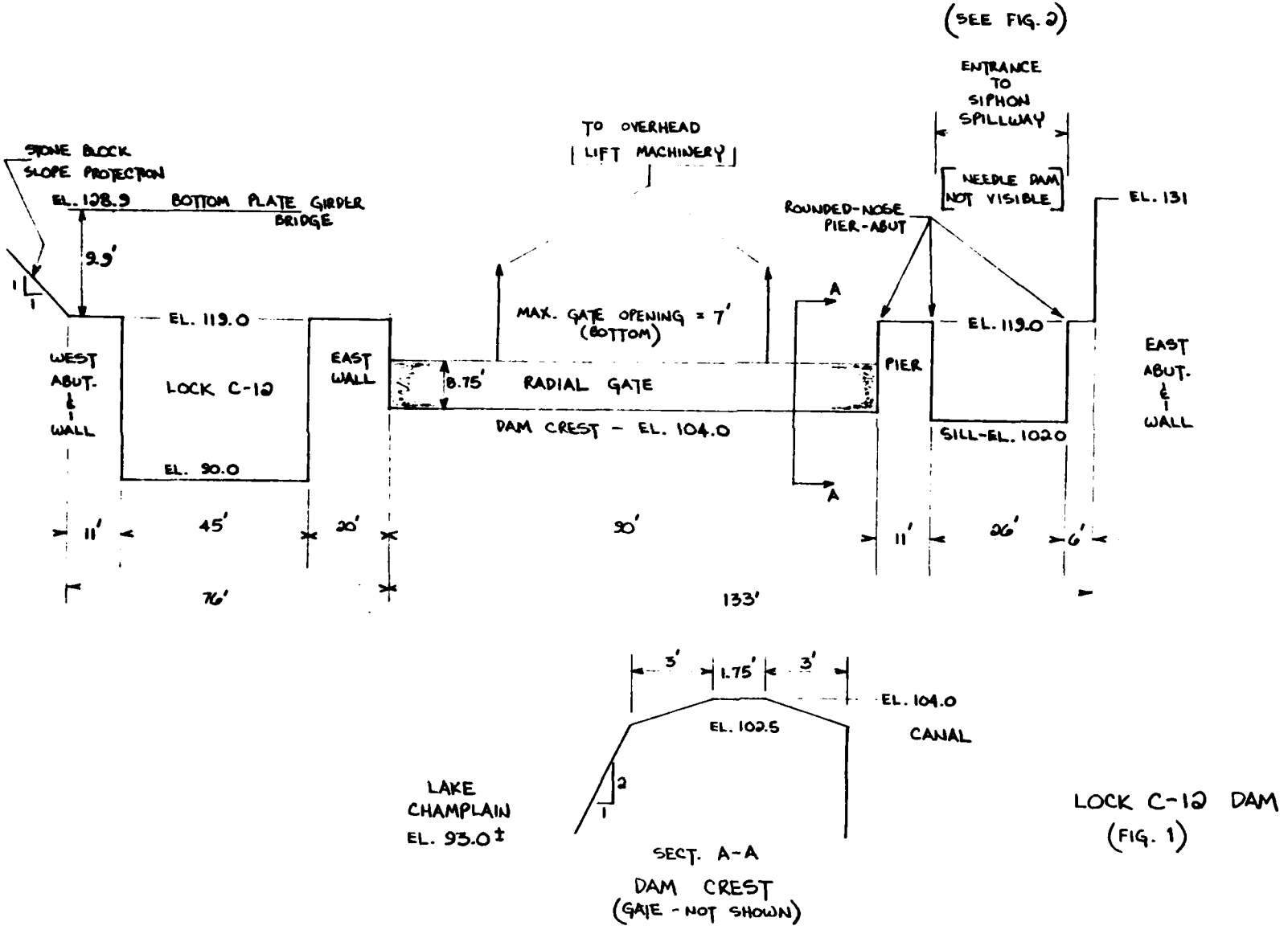
12) US Steel; Steel Sheet Piling Design Manual;
July, 1975.

APPENDIX F
DRAWINGS

VICINITY MAP
LOCK C-12 DAM
DAM SITE
Whitehall
WARREN
WASHINGTON
VERMONT
Fort Ann
Granville
Hudson Falls
South Hudson Falls
Fort Edward
Argyle
Salem
Thomson
Greenwich
LAKE LAUDERDALE STATE PARK (Undeveloped)
DELAWARE AND HUDSON
GREENWICH AND JOHNSONVILLE
NEW YORK STATE DEPARTMENT OF TRANSPORTATION
WASHINGTON COUNTY
SCALE 1:250,000

LOCK C-12 DAM

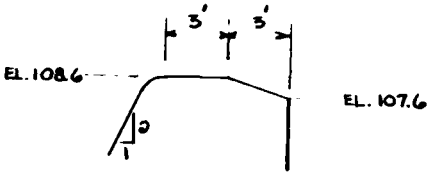

N
SILK MILL
CANAL
℄ of
TAIL RACE
OUTER FOREBAY WALL
FOREBAY
℄ OF
S. 82° 25' E.
Bridge
Sta. 0+90
CANAL WALL
℄
EAST ABUTMENT
Lock 12
Sta. 0+20
LOCK WALL
SPILLWAY
w/ RADIAL GATE
PIER
NEEDLE DAM
LAYOUT



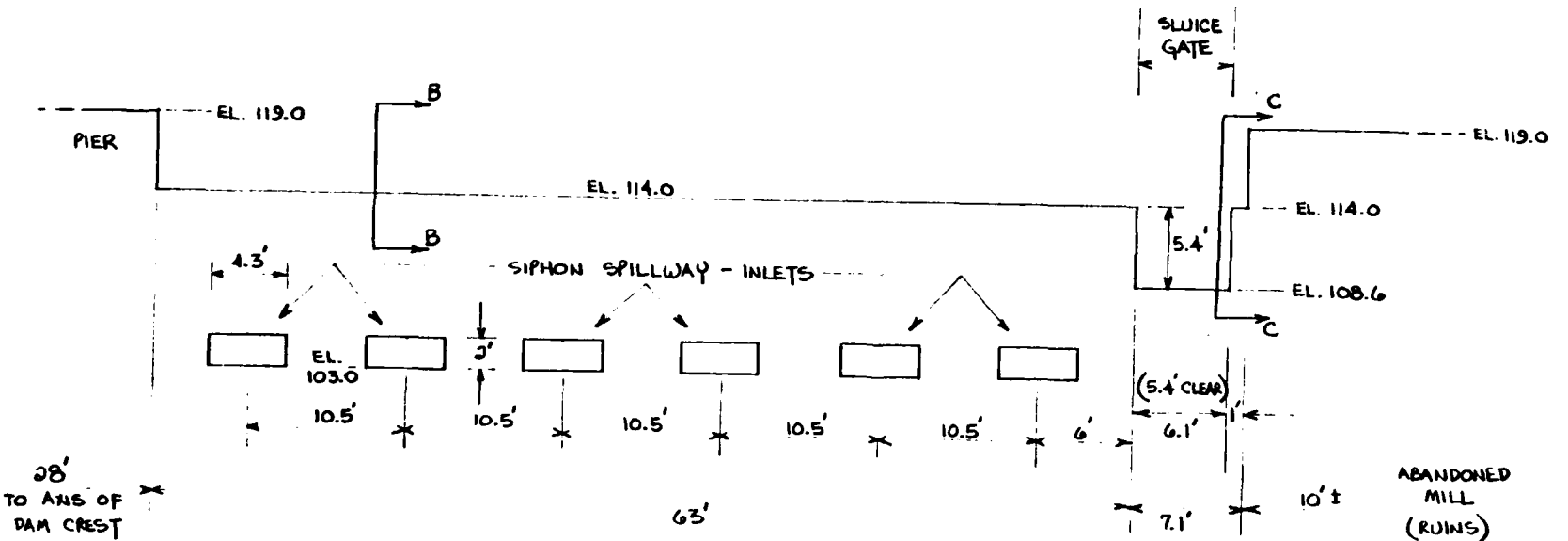
LOCK C-12 DAM
(FIG. 1)

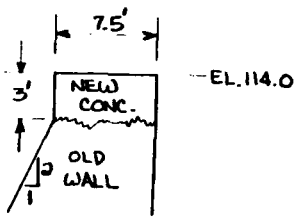
SIPHON SPILLWAY - CLEAR OPENING 2' x 4.3' INLETS
ENTR. RADIUS (ALL SIDES) 0.5'

CLEAR OPENING 2' x 2.2' OUTLETS
ELEV. @ INNERT 95.5



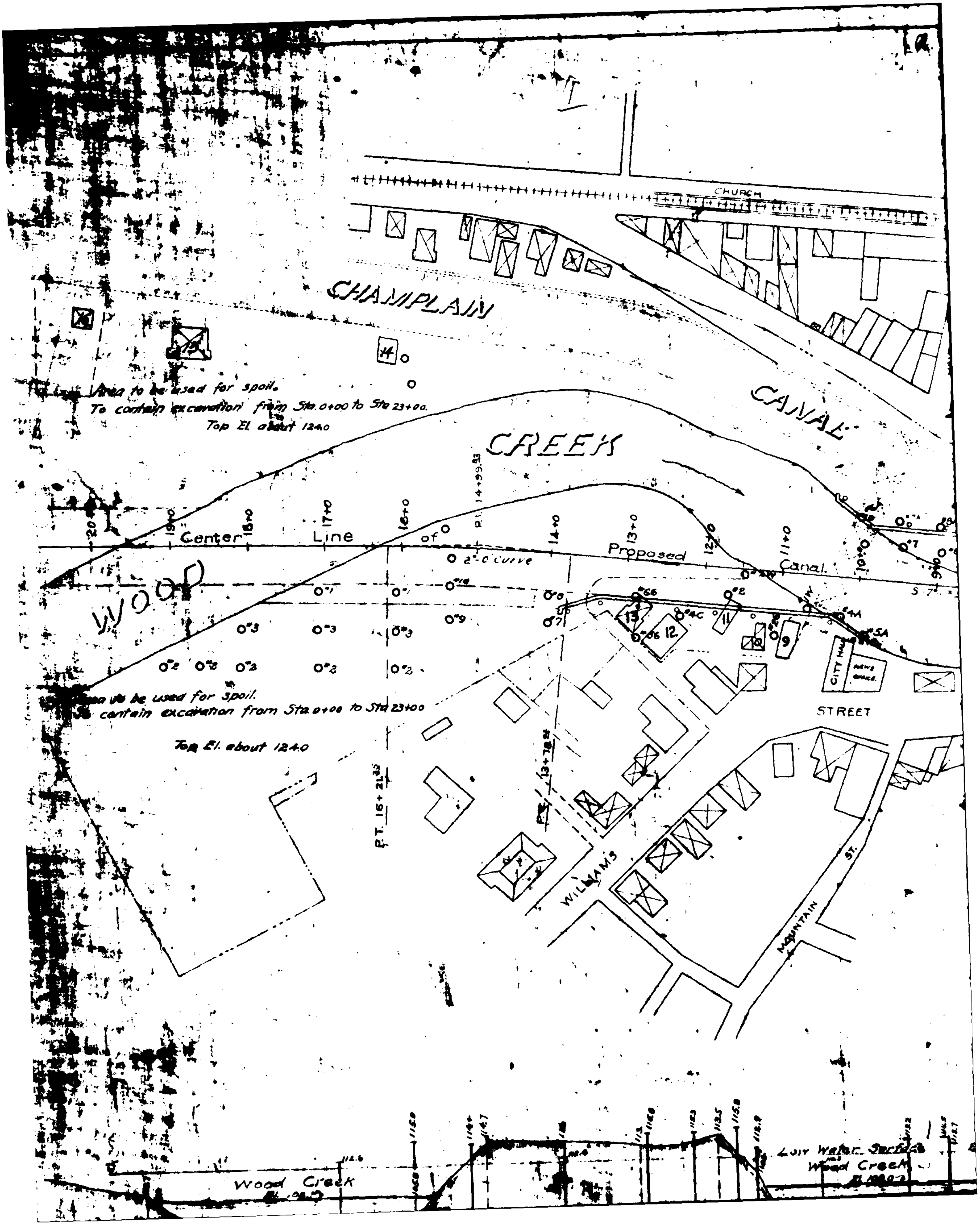
SECT. C-C
SLUICE GATE - CREST

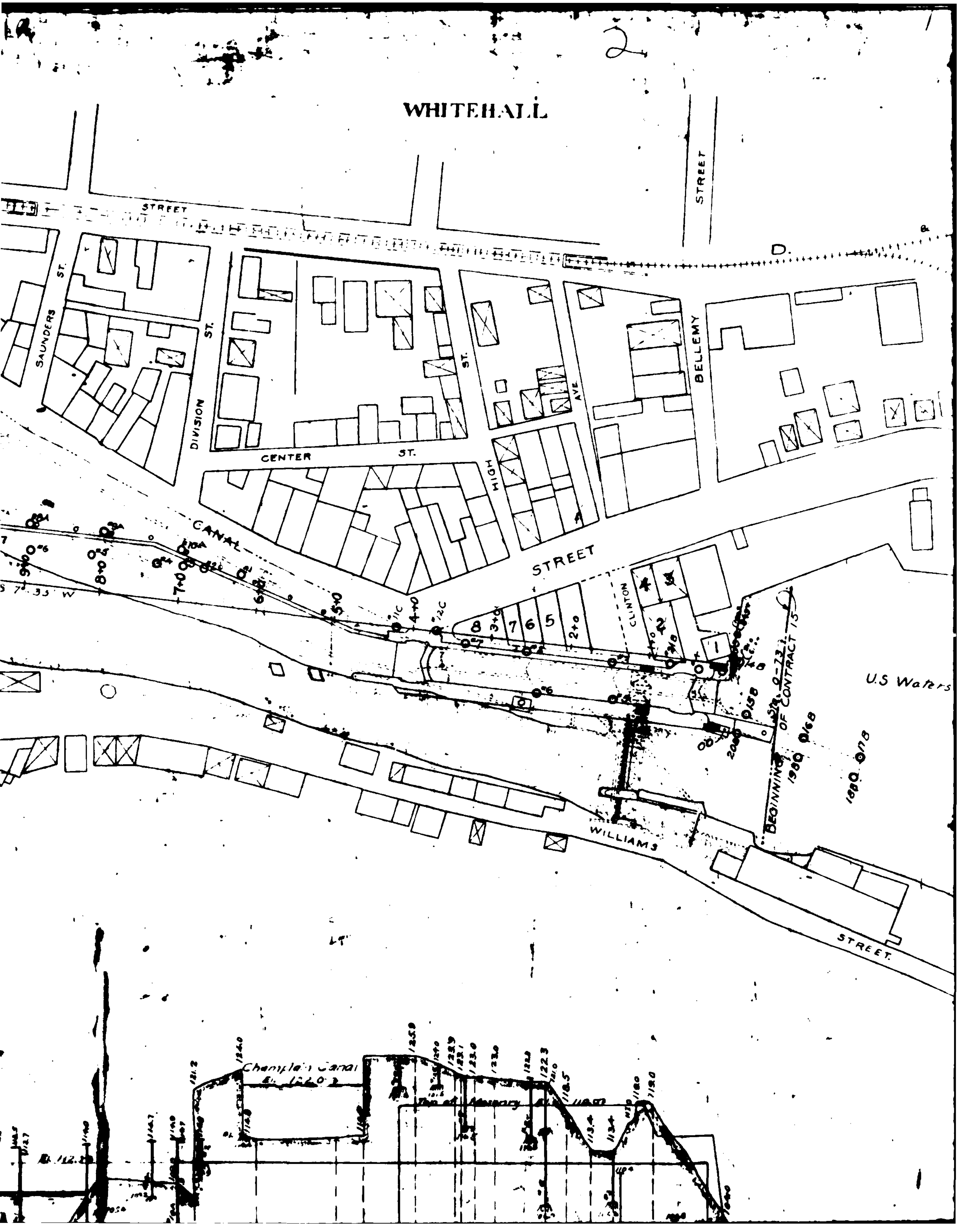




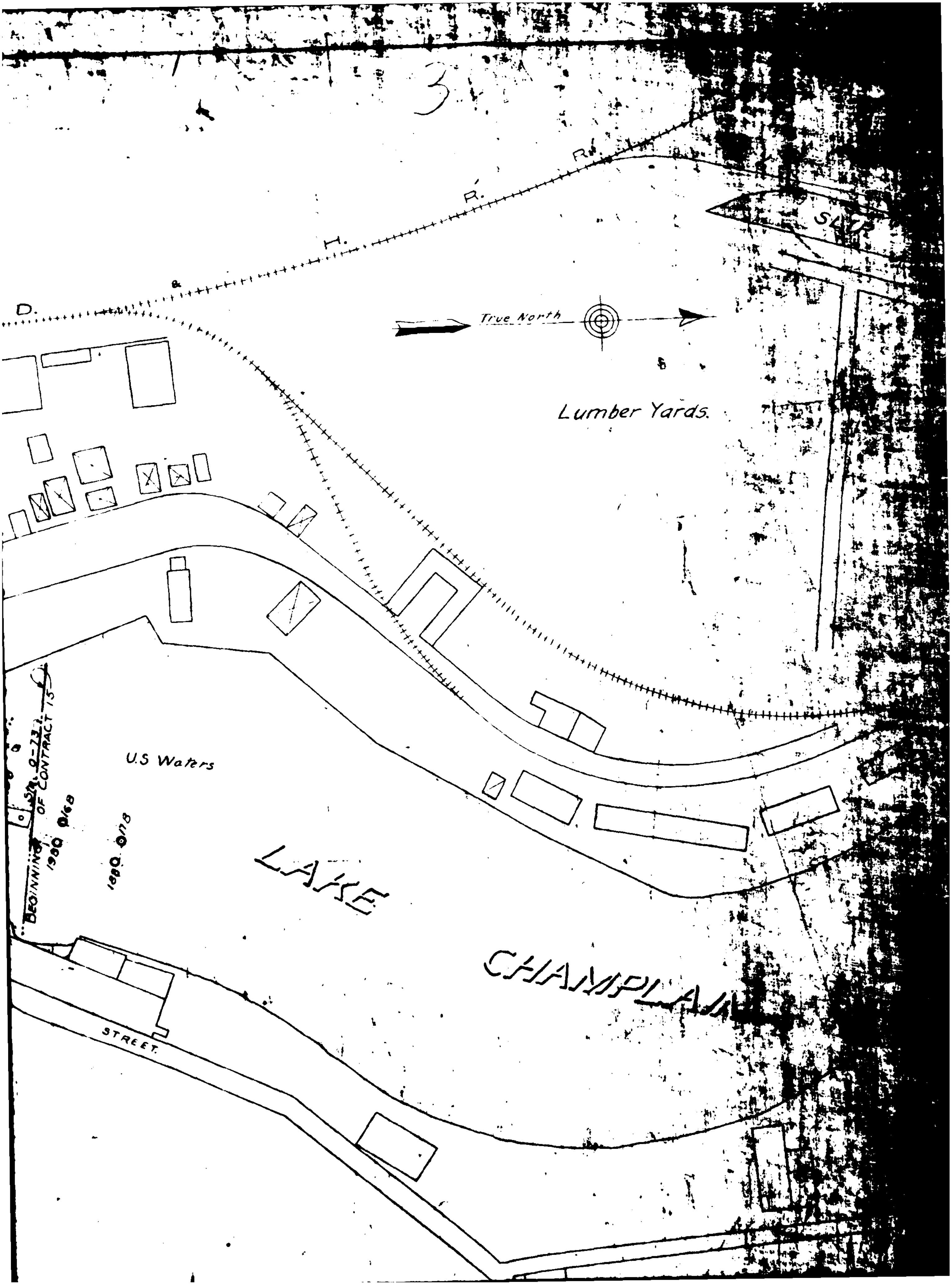
SECT. B-B

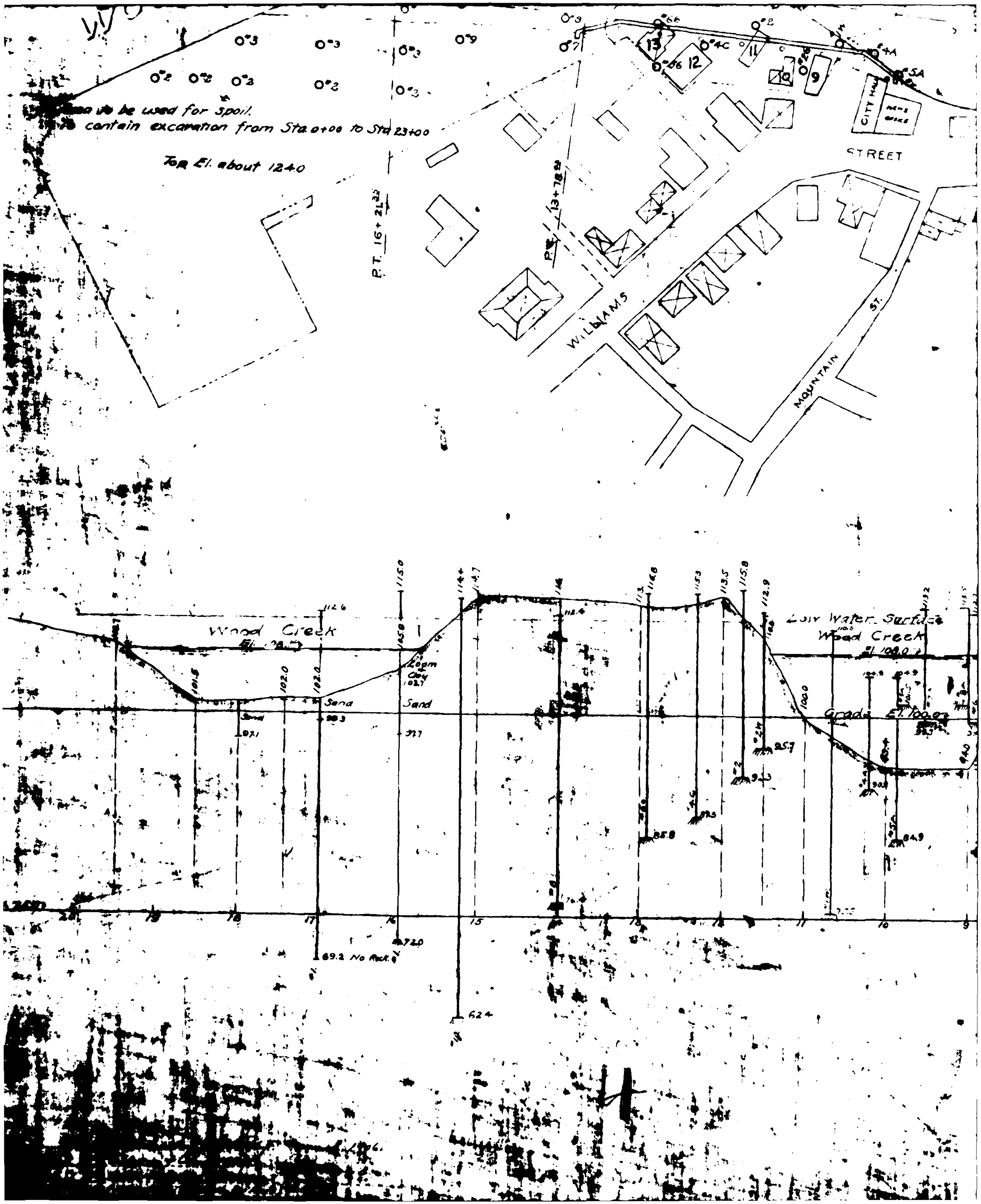
LOCK C-12
EAST - OUTER FOREBAY WALL
(FIG. 2)

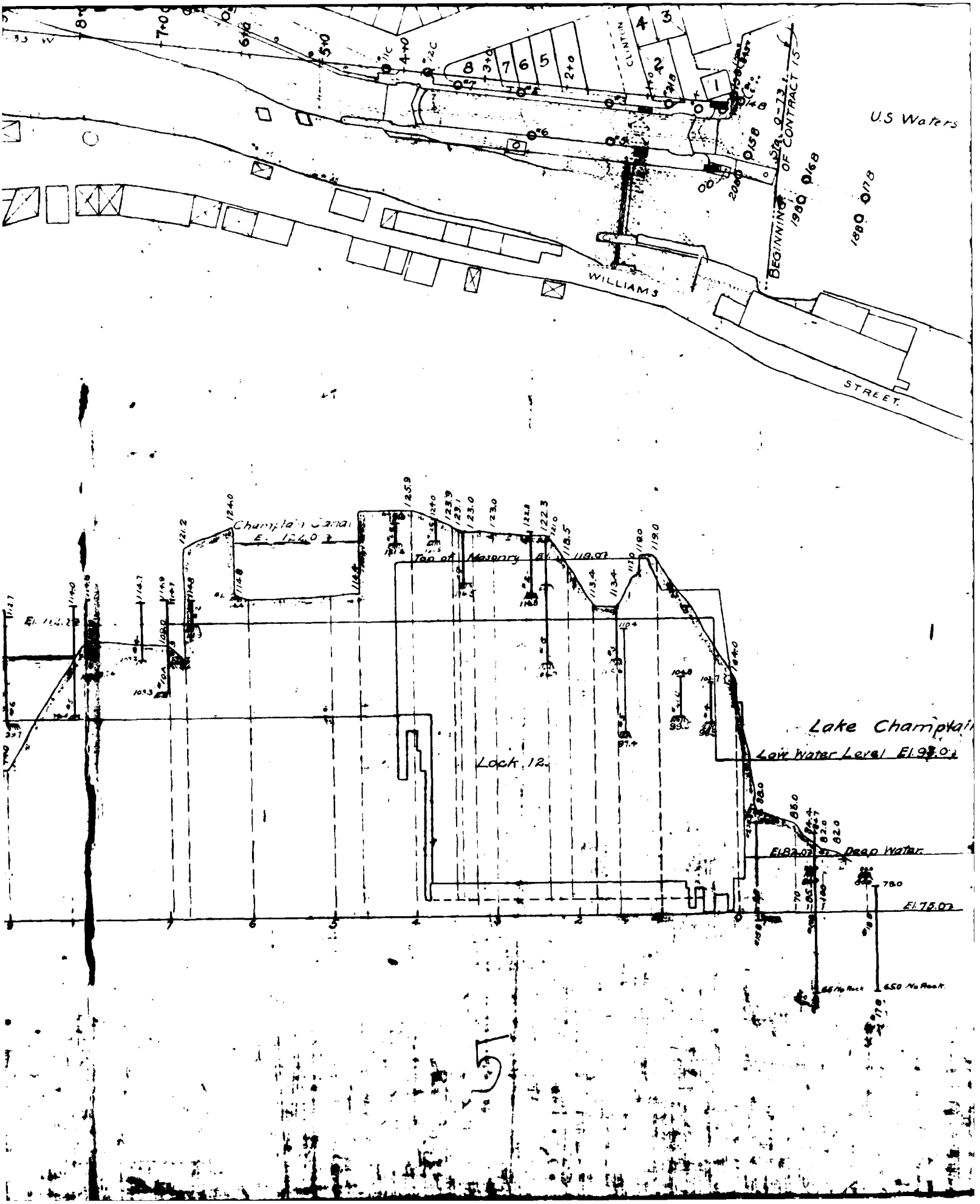

CHURCH
CHAMPLAIN
CANAL
CREEK
WOOD
Area to be used for spoil.
To contain excavation from Sta. 0+00 to Sta 23+00.
Top El. about 124.0
Center Line of Proposed Canal.
2° 0' curve
PI 14+99.33
PT. 16+21.33
PC 13+78.8
CITY HALL
NEWS OFFICE
STREET
WILLIAMS
MOUNTAIN ST.
Area to be used for spoil.
To contain excavation from Sta. 0+00 to Sta 23+00
Top El. about 124.0
Wood Creek
Low Water Surface Wood Creek

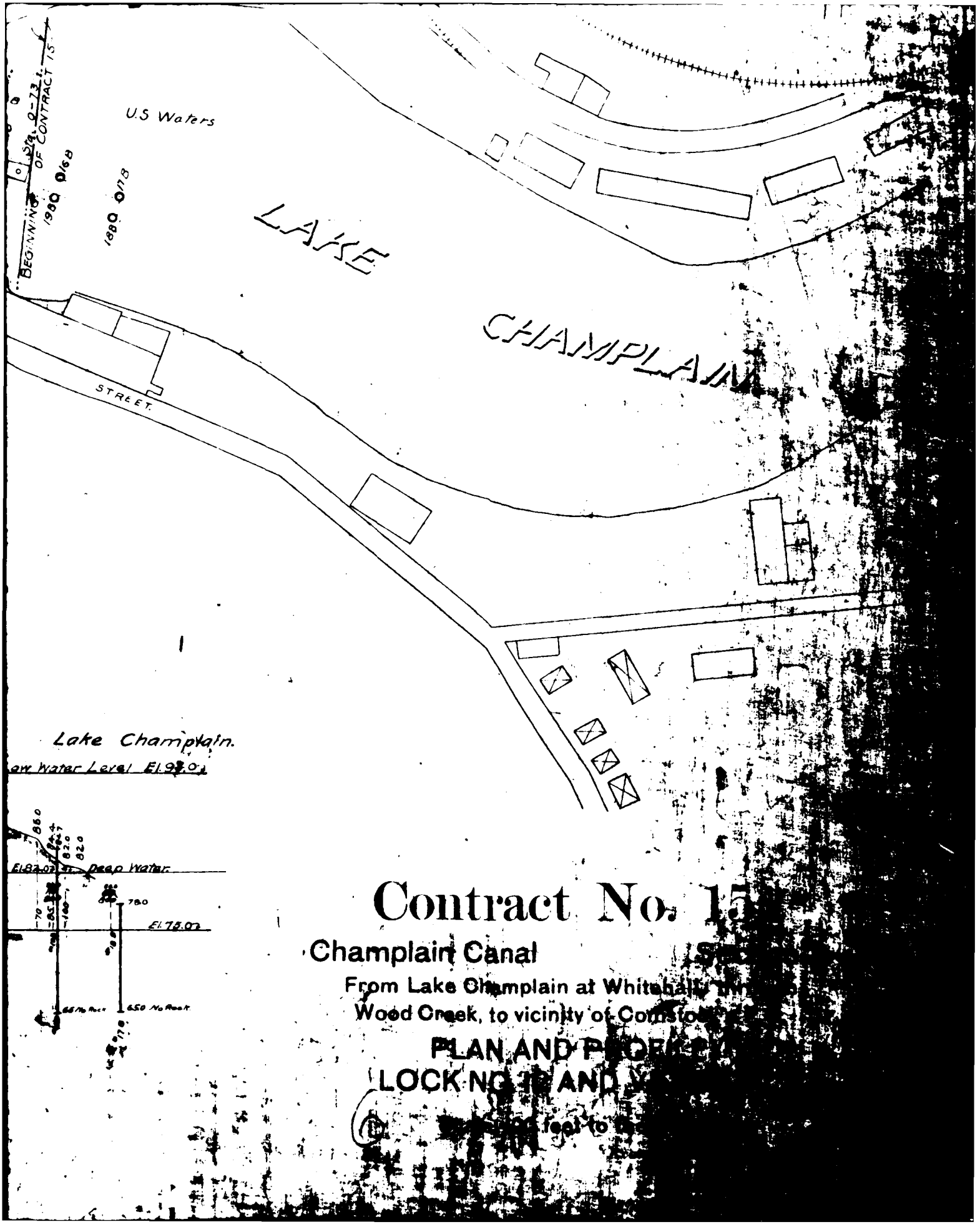


WHITEHALL
STREET
STREET
SAUNDERS ST.
DIVISION ST.
CENTER ST.
HIGH ST.
AVE.
BELLEMY
CANAL
STREET
CLINTON
WILLIAMS
STREET.
U.S Waters
BEGINNING OF CONTRACT 15
Champlain Canal


3
D. & H. R. R.
True North
Lumber Yards.
U.S Waters
LAKE
CHAMPLAIN
BEGINNING OF CONTRACT 15
STREET.


to be used for spoil.
contain excavation from Sta 0+00 to Sta 23+00
Top El. about 124.0
P.T. 16+21
STREET
CITY HALL
WILLIAMS
MOUNTAIN
ST.
Wood Creek
Low Water Surface
Wood Creek
Grade El. 100.0
Sand
Sand
Loam
Clay
69.2 No Rock
62.4
72.0
85.8
84.9
19
18
17
16
15
13
12
11
10
9


U.S Waters
WILLIAMS
STREET
CLINTON
BEGINNING OF CONTRACT 15
Sta. 2-73.1
Champlain Canal
E. 124.0 ±
Top of Masonry El. 119.97
Lock 12
Lake Champlain
Low Water Level El. 98.0 ±
Deep Water
El. 82.07
El. 75.07
650 No Rock



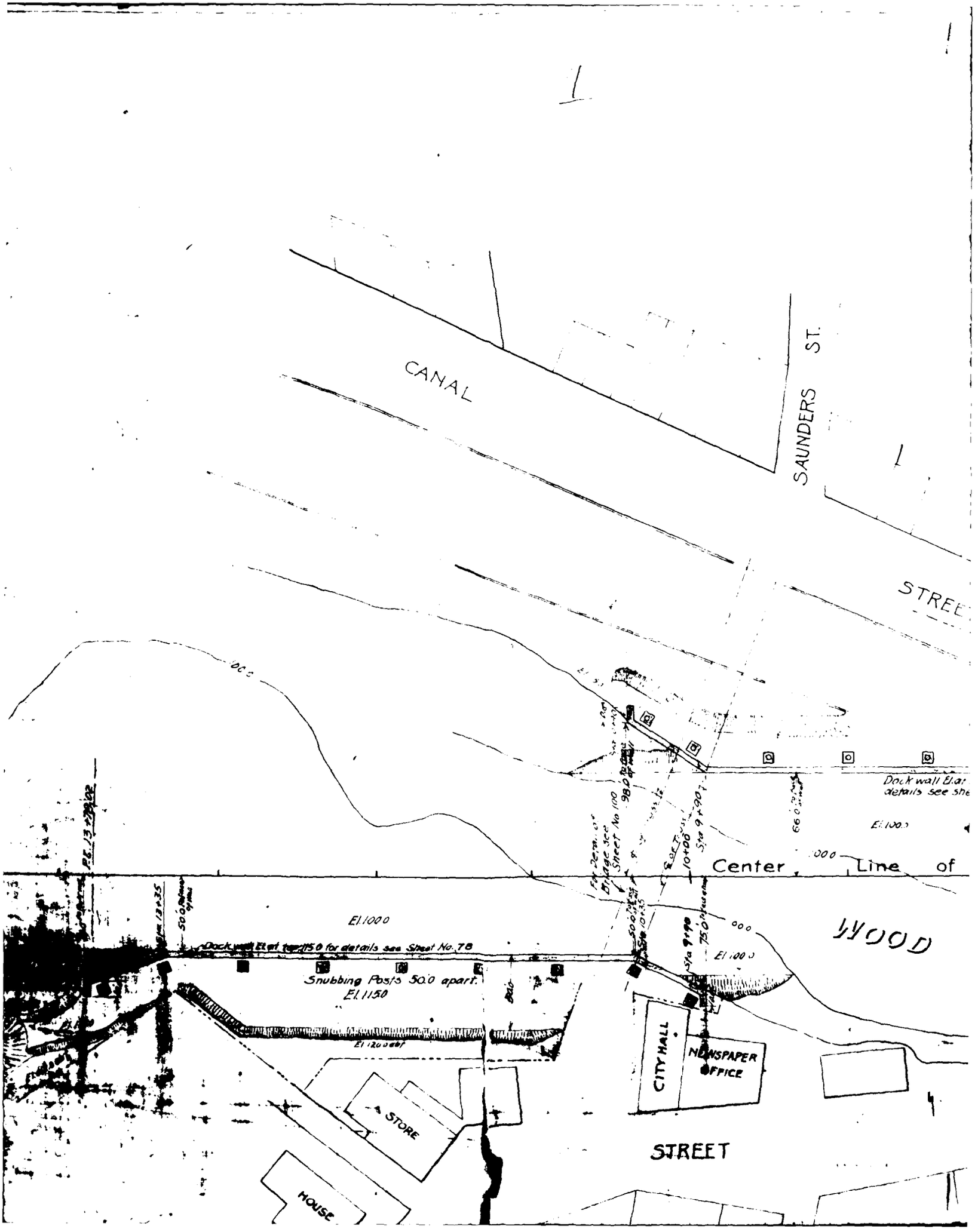
Contract No. 15

Champlain Canal

From Lake Champlain at Whitehall
Wood Creek, to vicinity of Comstock

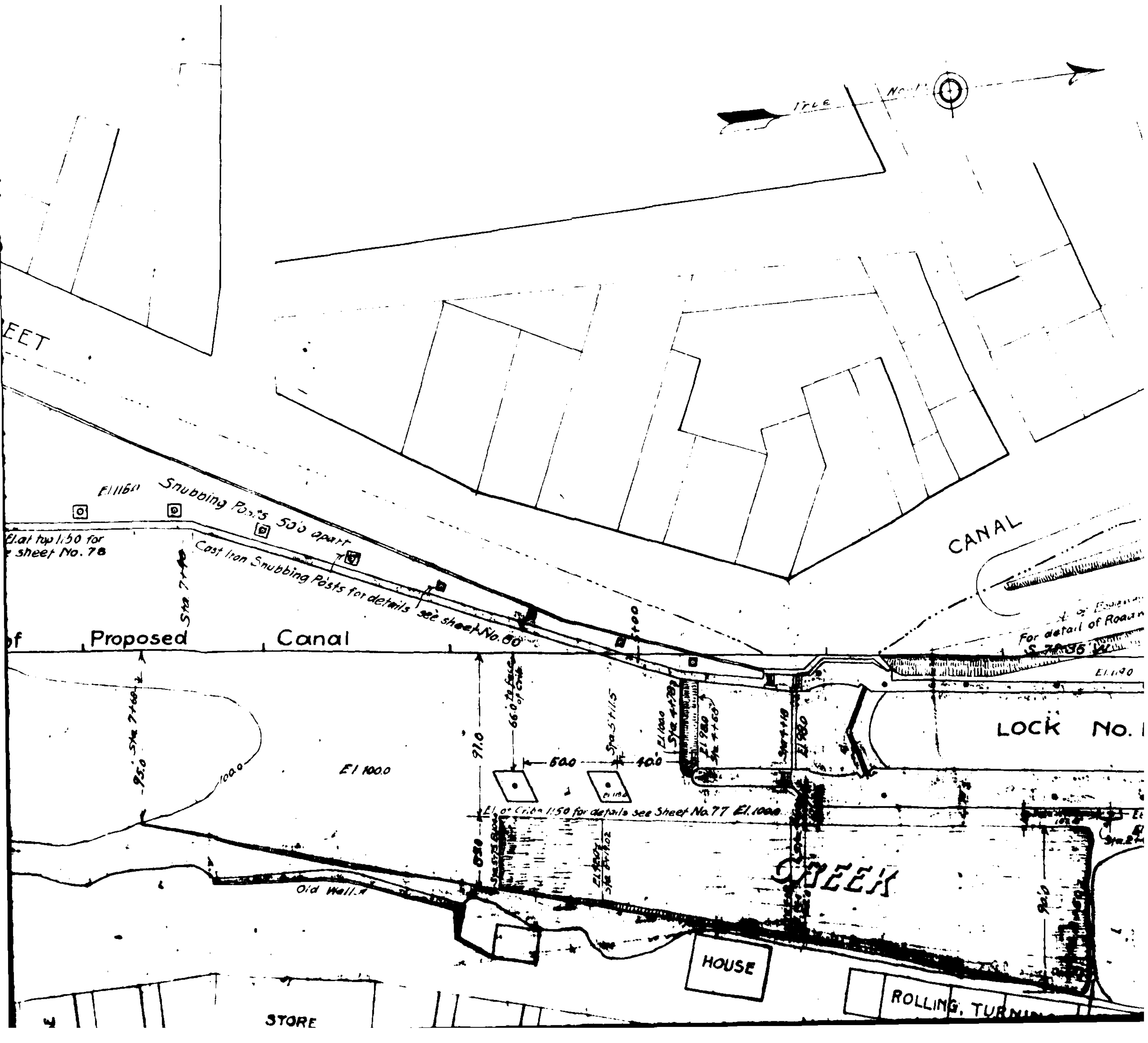
PLAN AND PROFILE

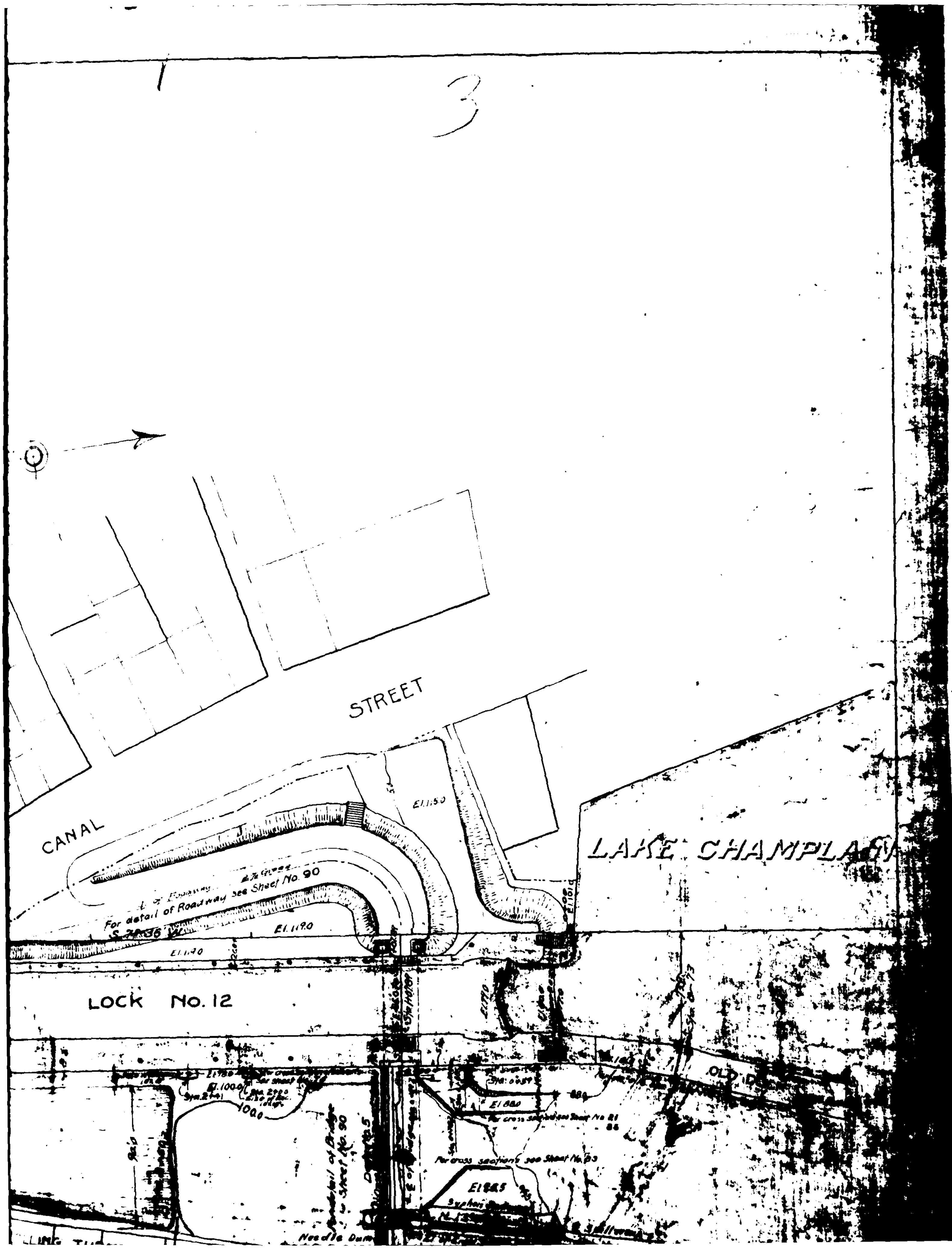
LOCK NO. 12 AND


CANAL
SAUNDERS ST.
STREET
Center Line of
WOOD
STREET
El. 100.0
Dock wall El. at top 115.0 for details see Sheet No. 78
Snubbing Posts 50.0 apart.
El. 115.0
El. 120.0 ±
CITY HALL
NEWSPAPER OFFICE
STORE
HOUSE

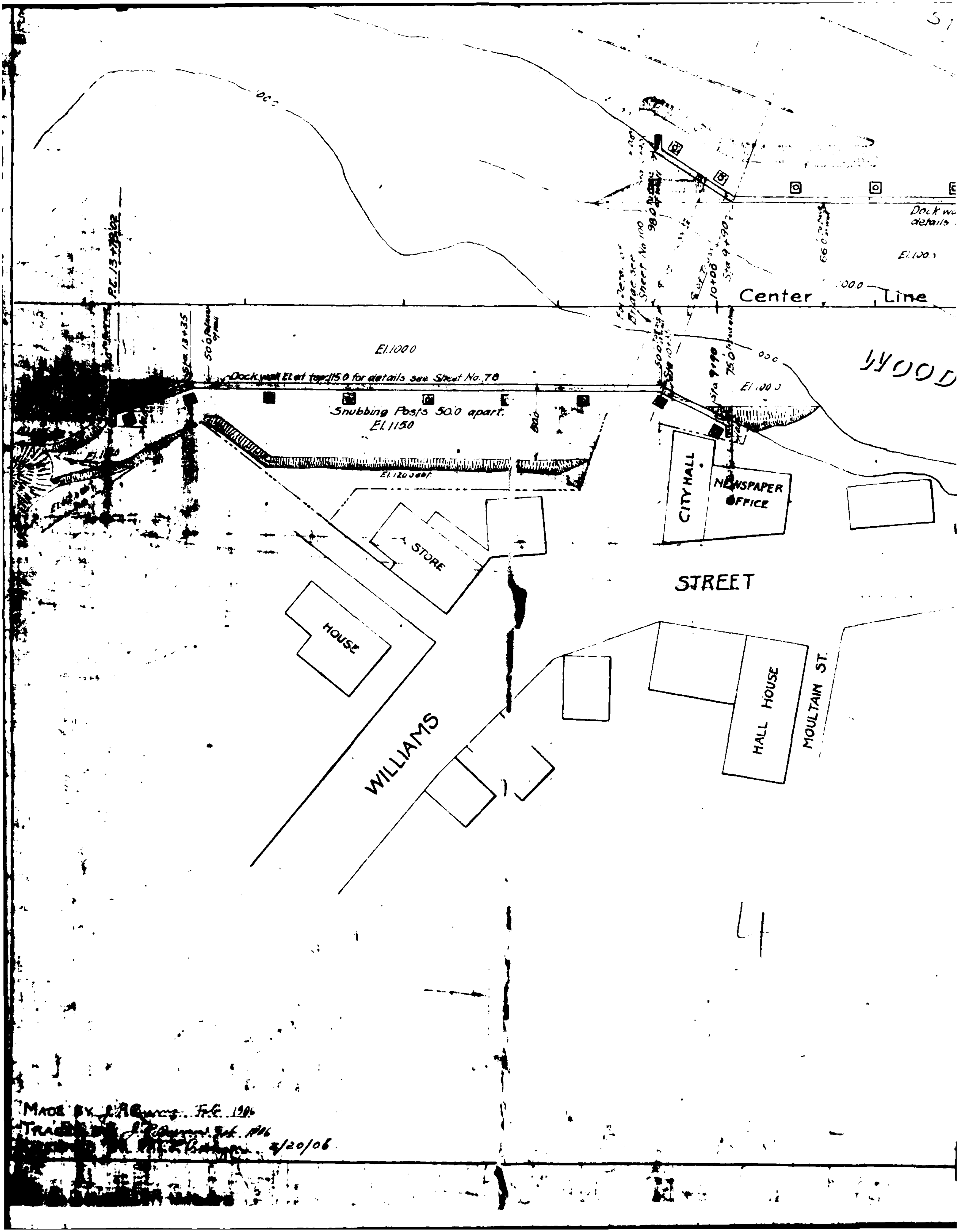
2

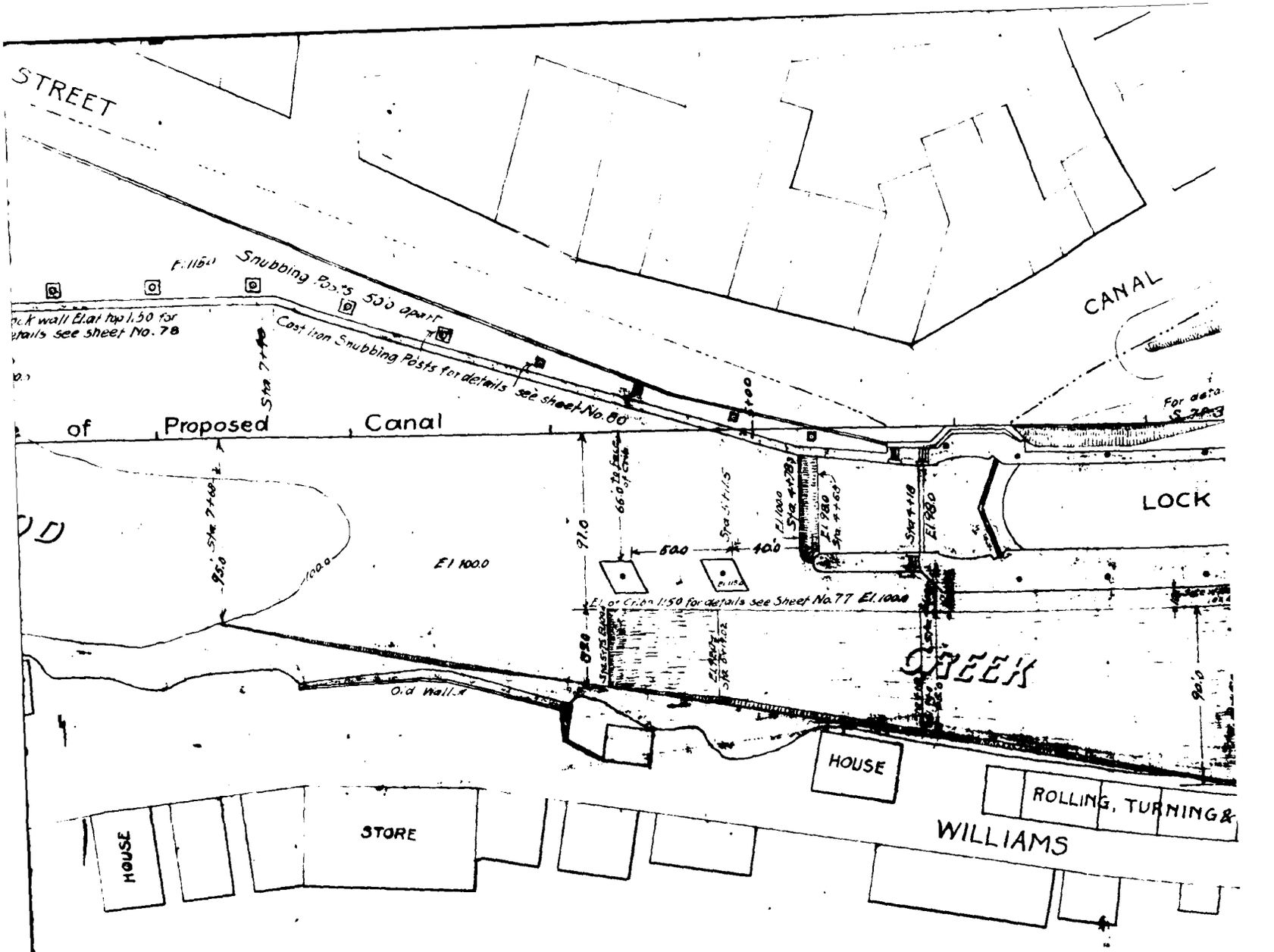
1


Snubbing Posts 50.0 apart
Cast Iron Snubbing Posts for details see sheet No. 80
Proposed
Canal
CANAL
LOCK No.
El 100.0
95.0
91.0
66.0 to face of Crib
50.0
40.0
El. of Crib 115.0 for details see Sheet No. 77 El. 100.0
Old Well
CREEK
HOUSE
STORE
ROLLING, TURN

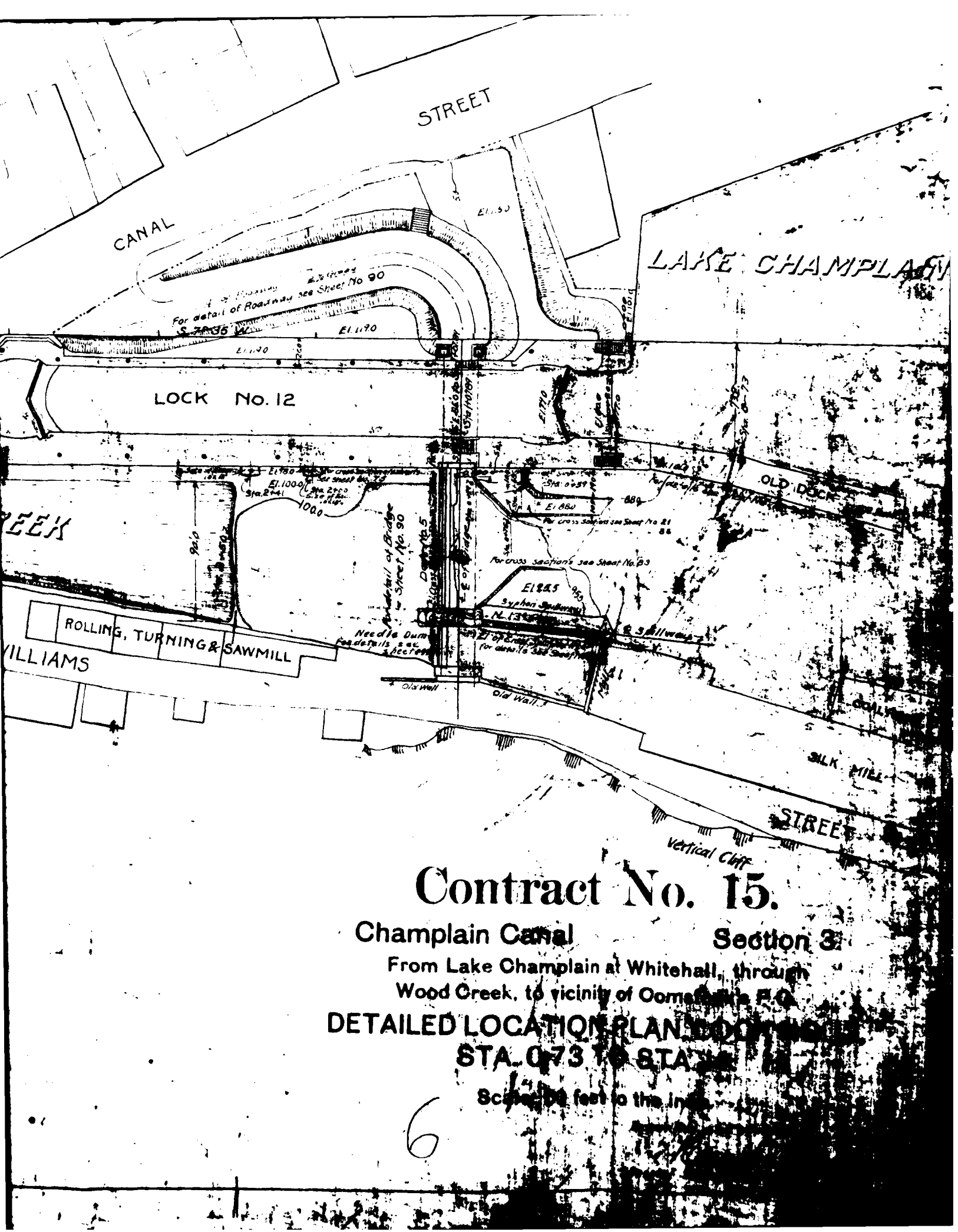


3
CANAL
STREET
LAKE CHAMPLA
For detail of Roadway see Sheet No. 90
El. 119.0
El. 115.0
LOCK No. 12
El. 88.0
For cross sections see Sheet No. 23
Needle Dam


P.C. 13+79.02
Sta. 13+35
El. 100.0
Center Line
Dock wall El. at top 115.0 for details see Sheet No. 78
Snubbing Posts 50.0 apart.
El. 115.0
El. 120.0 abt.
Sta. 9+90
WOOD
CITY HALL
NEWSPAPER OFFICE
STORE
STREET
HOUSE
WILLIAMS
HALL HOUSE
MOULTAIN ST.
4
MADE BY ... Feb. 1906
TRACED BY ... Feb. 1906
2/20/06


STREET
Snubbing Posts 50'0 apart
Cast Iron Snubbing Posts for details see sheet No. 80
CANAL
of Proposed Canal
LOCK
El 100.0
Old Wall
HOUSE
STORE
ROLLING, TURNING &
WILLIAMS

5



Contract No. 15.

Champlain Canal — Section 3.

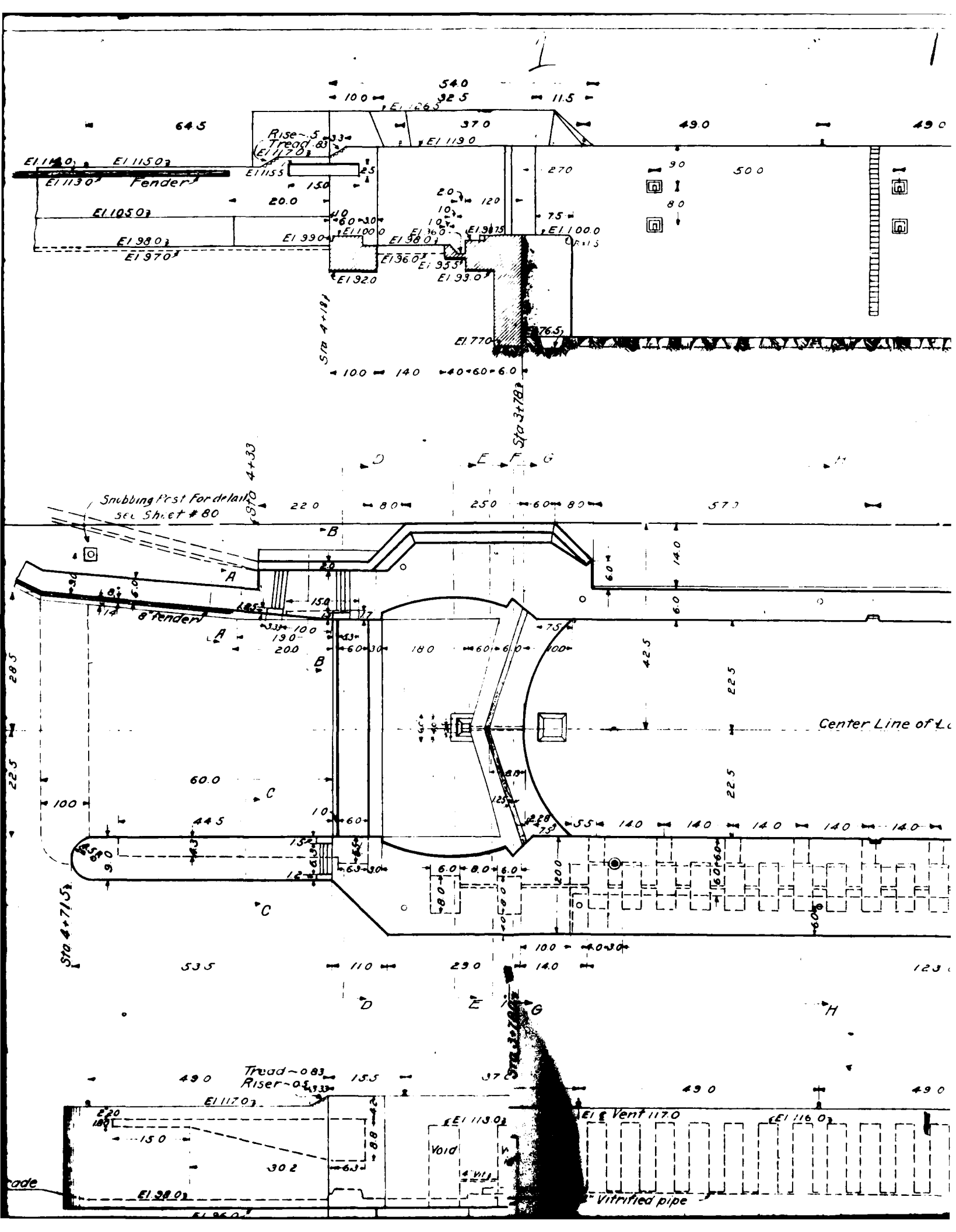
From Lake Champlain at Whitehall, through Wood Creek, to vicinity of Comstock's F.C.

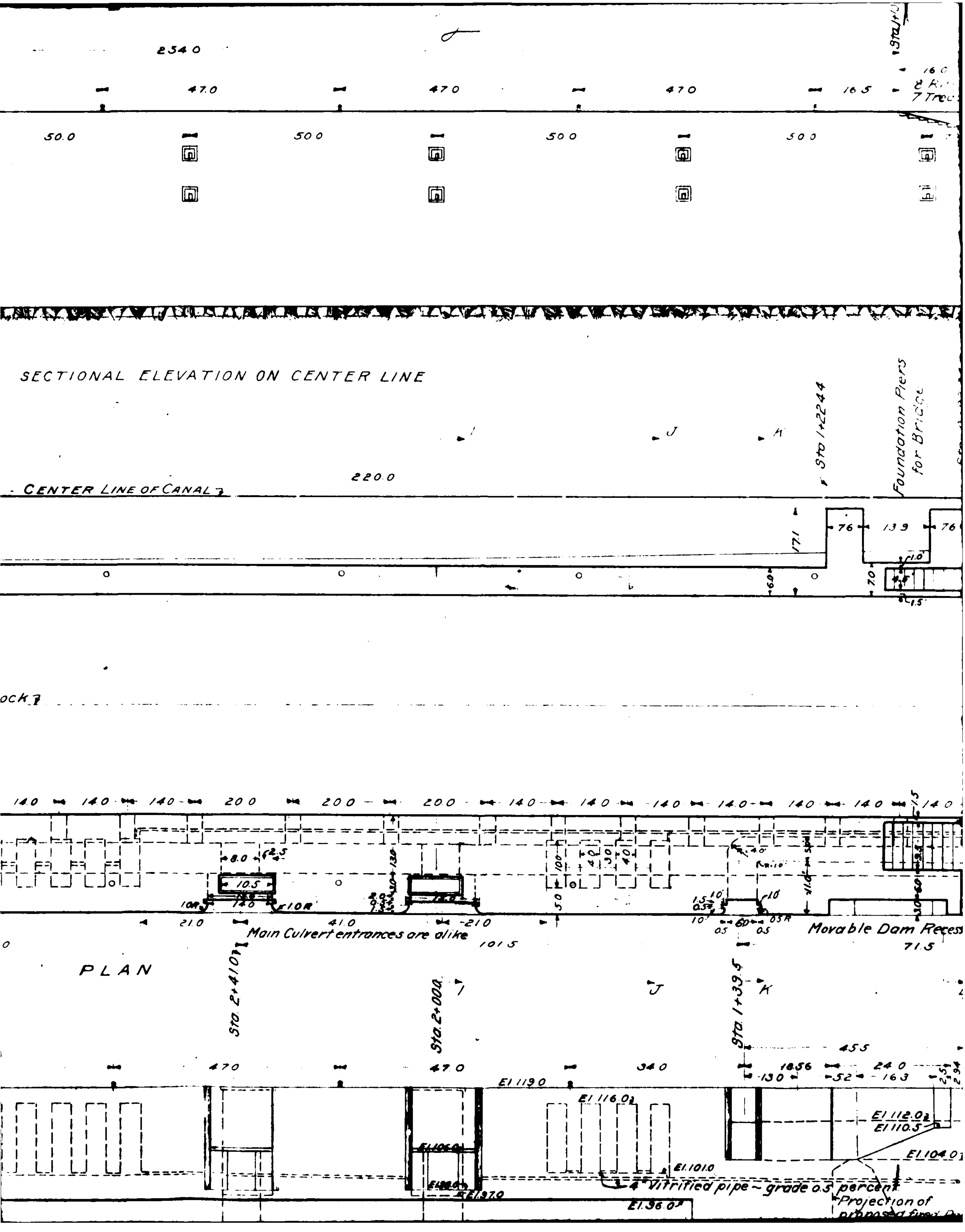
DETAILED LOCATION PLAN [illegible]

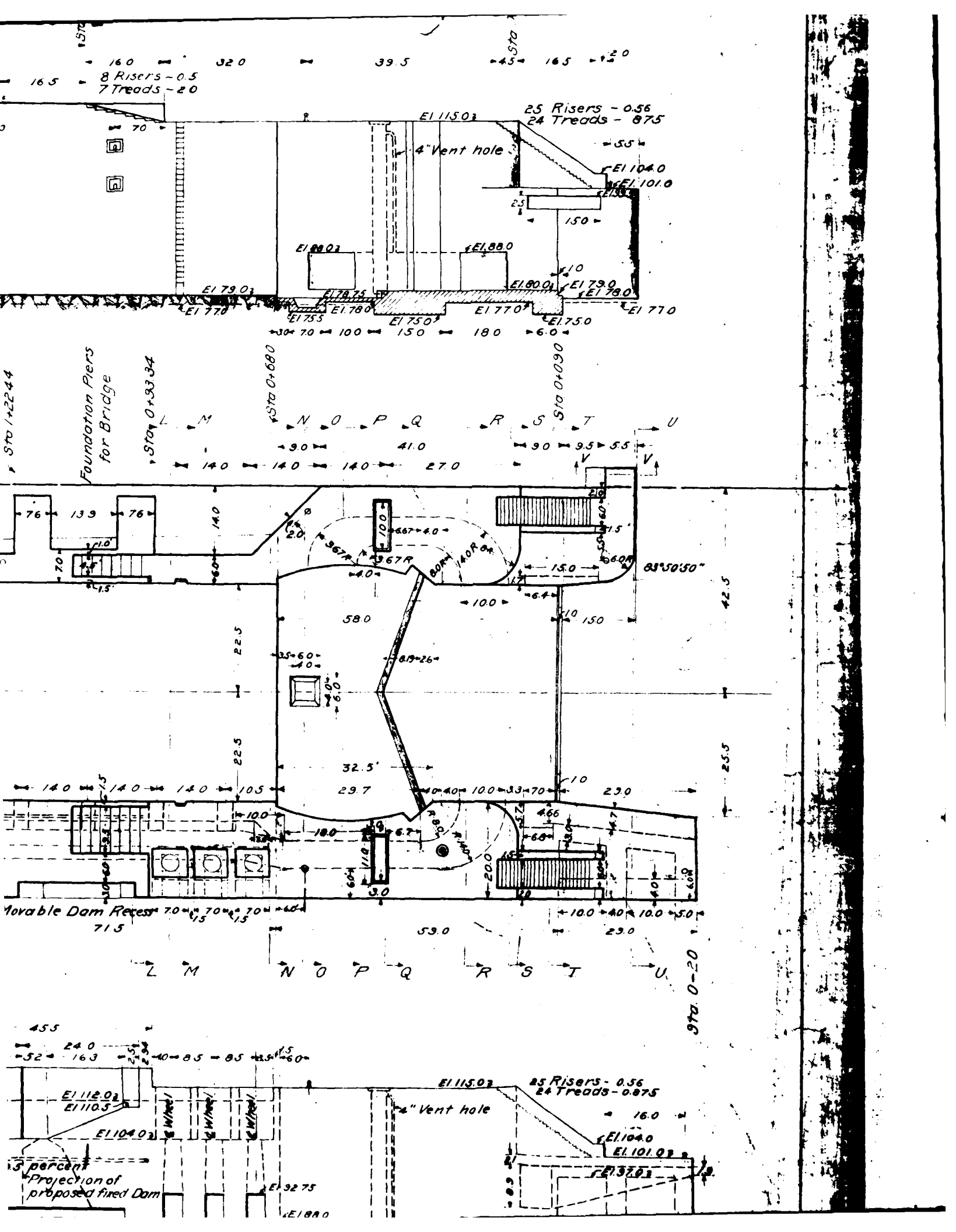
STA. 0+73 TO STA. [illegible]

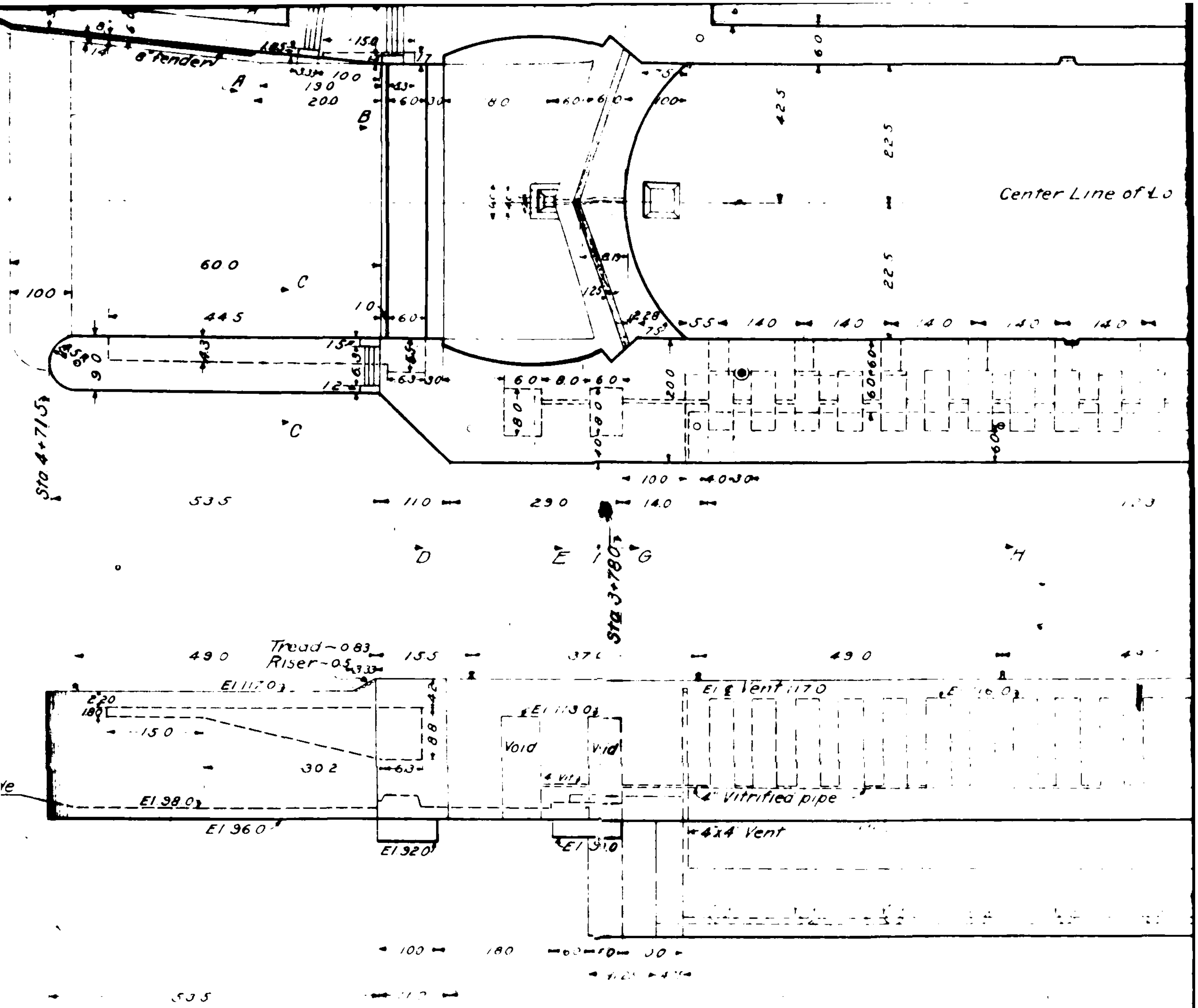
Scale 100 feet to the inch

6


Fender
Rise-.5
Tread .83
Sta 4+18
Sta 3+78
Sta 4+33
Sta 4+71.5
Snubbing Post For details see Sheet #80
8" Fender
Center Line of
Tread-.083
Riser-.0
Void
Vitrified pipe
Vent 117.0


SECTIONAL ELEVATION ON CENTER LINE
CENTER LINE OF CANAL
Sta 1+22.44
Foundation Piers for Bridge
PLAN
Main Culvert entrances are alike
Movable Dam Recess
Sta 2+41.07
Sta 2+00.0
Sta 1+39.5
El 119.0
El 116.0
El 112.0
El 110.5
El 104.0
El 101.0
El 97.0
El 96.0
4" Vitrified pipe ~ grade 0.5 percent
Projection of


8 Risers - 0.5
7 Treads - 2.0
25 Risers - 0.56
24 Treads - 0.875
4" Vent hole
Foundation Piers for Bridge
Sta 1+22.44
Sta 0+93.34
Sta 0+68.0
Sta 0+09.0
Sta 0-20
L M N O P Q R S T U V
Movable Dam Recess
3 percent
Projection of proposed fixed Dam
83°50'50"



NOTES

Al exposed edges to be rounded to a radius of one inch exc

Ladder and lock line hooks to be in both walls

No vertical joints allowed between Sta 0+24 and Sta 0+60 or Sta 0+68 and Sta 0+98 or Sta 3+64 and Sta 4+00

For details of anchorages for lock gates and needle dam see

For details of lock see sheet Nº 79-80-81

For details of culvert linings and valve shafts see sheet Nº

For foundation plan see sheet Nº 76.

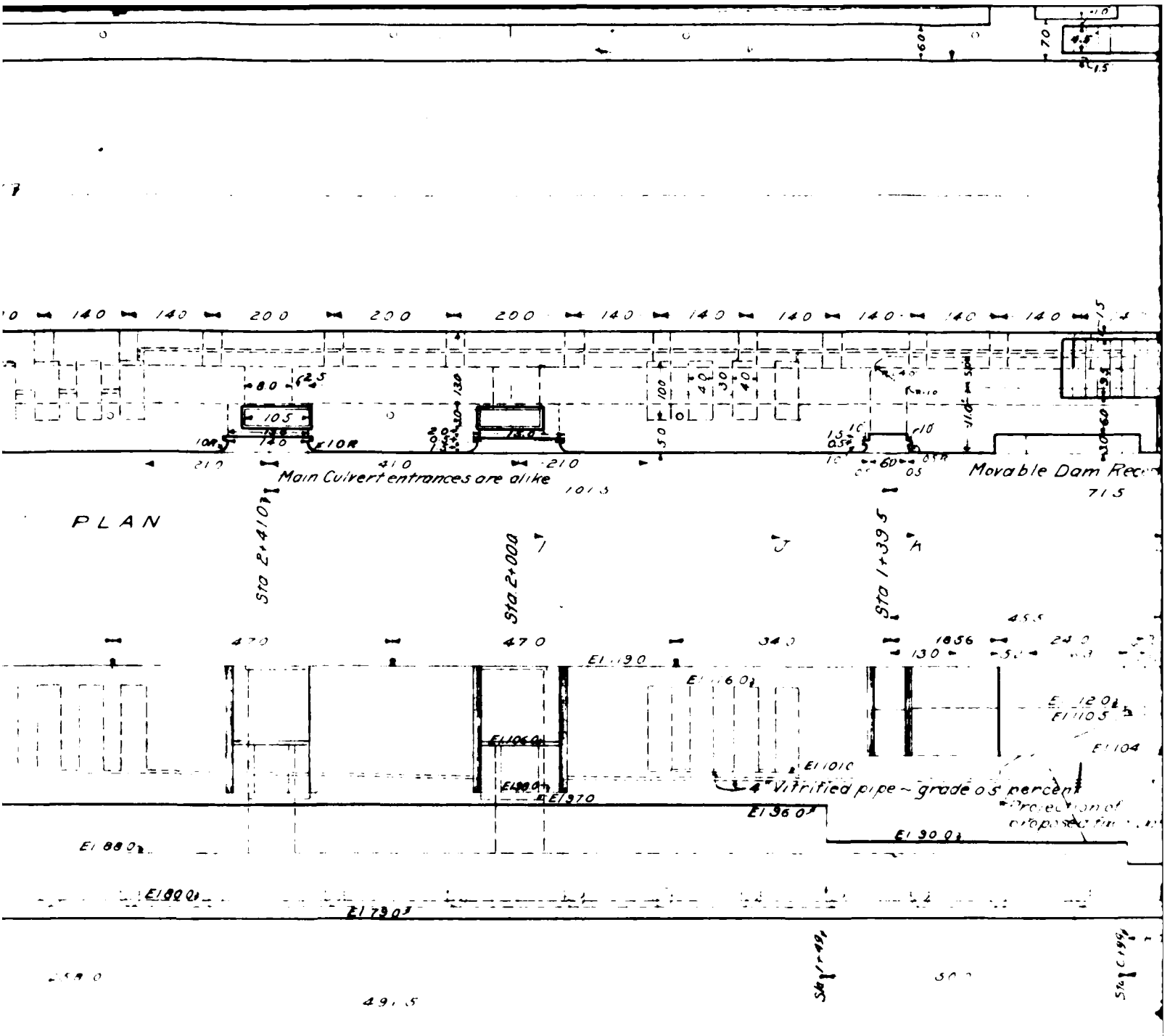
For sections see sheet Nº 75.

For bridge foundation details see sheet Nº 91-92

For movable dam details see sheet Nº 97-98

MADE BY T.W. Ripley ... Creager
TRACED BY Louis Garbi Jr
CHECKED BY T.H. Ripley

4



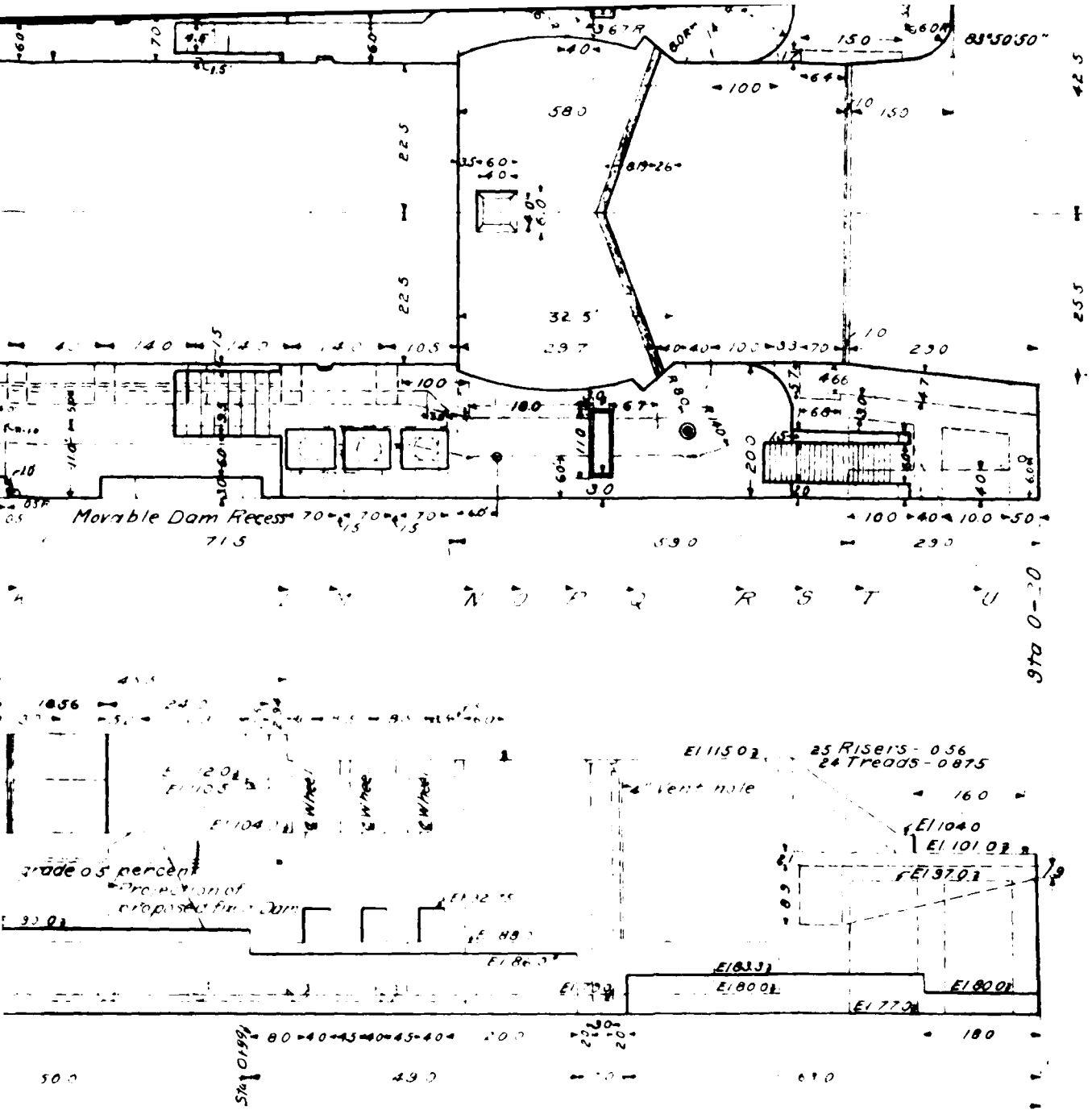
Second Class Concrete

o Snubbing Post

● Capstan (not in Contract)

sheet N° 79 - 124 - 125 - 126 - 127 - 129 - 130 - 131

20 - 121 - 122 - 123



Contract No. 15.

Champlain Canal — Section 3.

From Lake Champlain at Whitehall, through Wood Creek, to vicinity of Comstock's P.O.

PLAN AND ELEVATION

LOCK NO. 12.

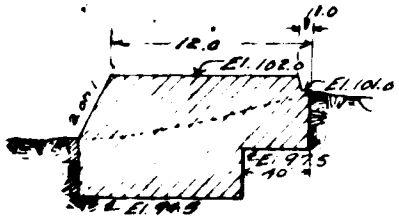
Scale: 1 inch = 16 feet

na Class Concrete

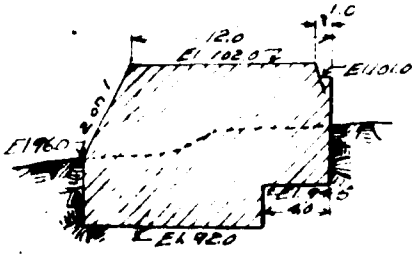
bing Post

stan (not in Contract)

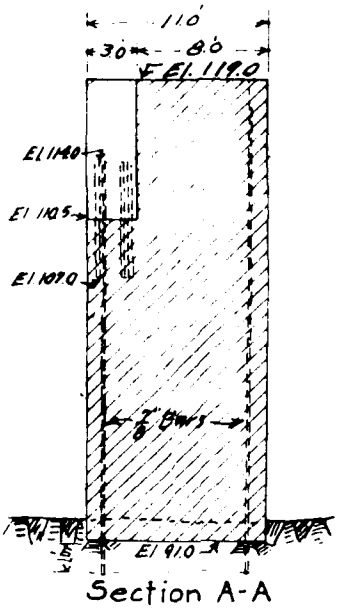
6



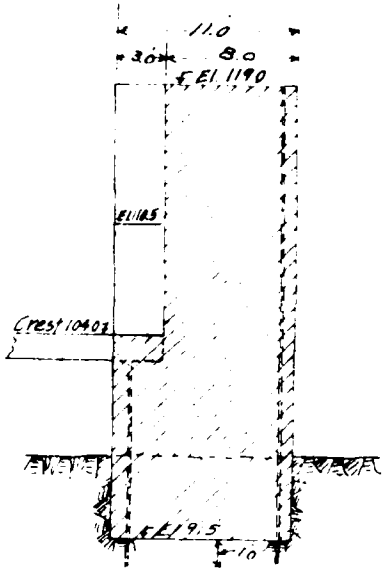
Section C-C.



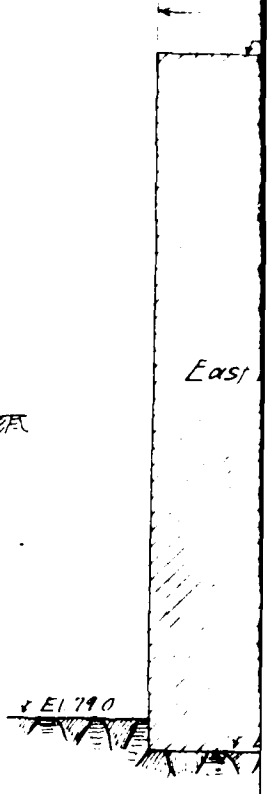
Section at Sta. 1+13

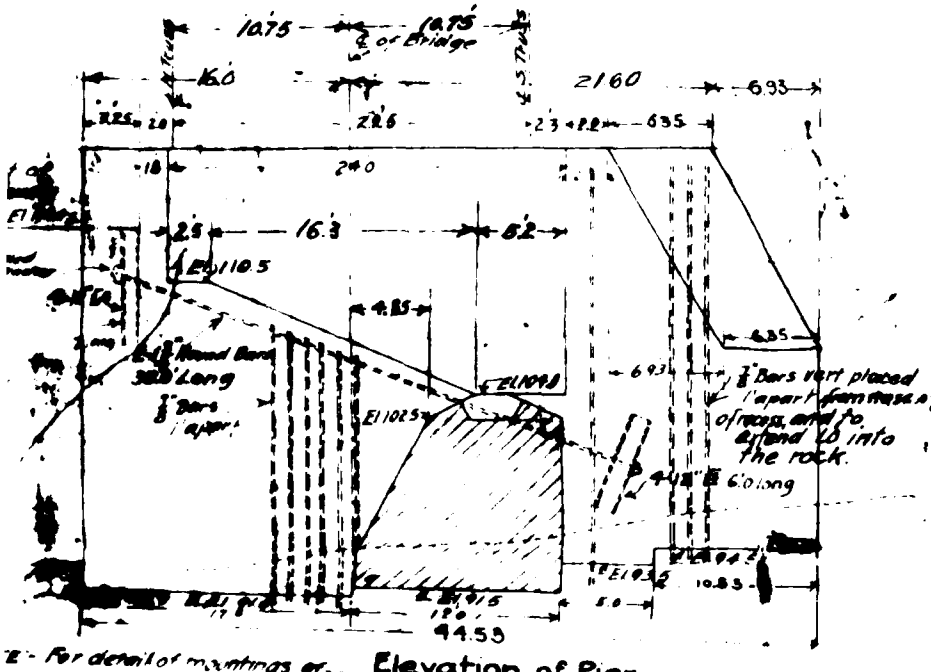


Section A-A



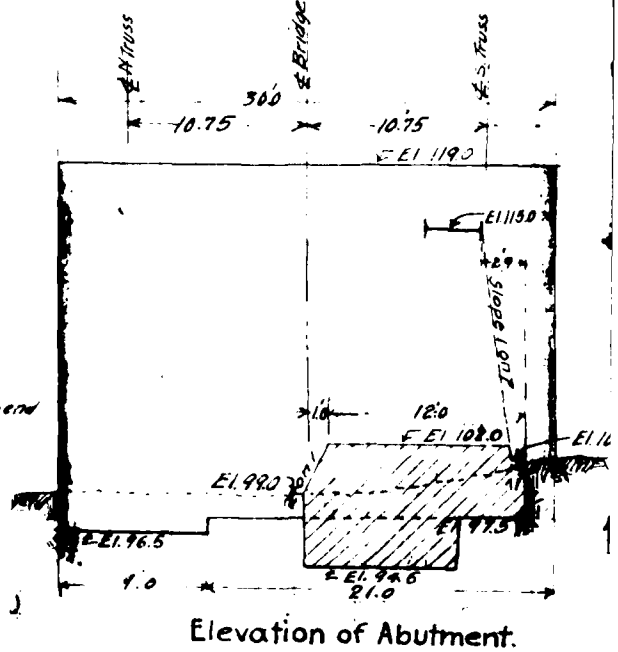
Section B-B





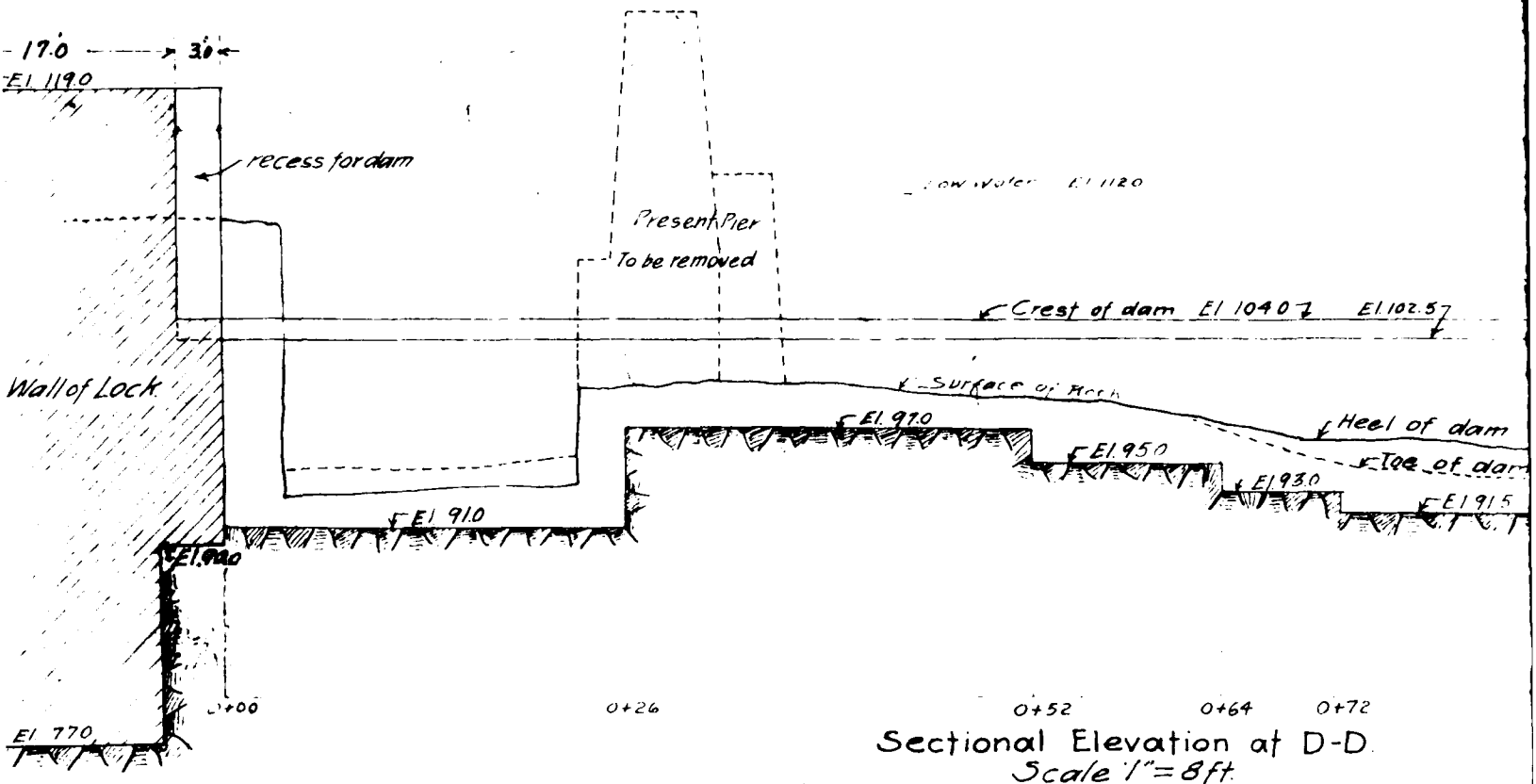
℄ - For details of mountings of ... ings, see Sheet Nos 87-90.

Elevation of Pier

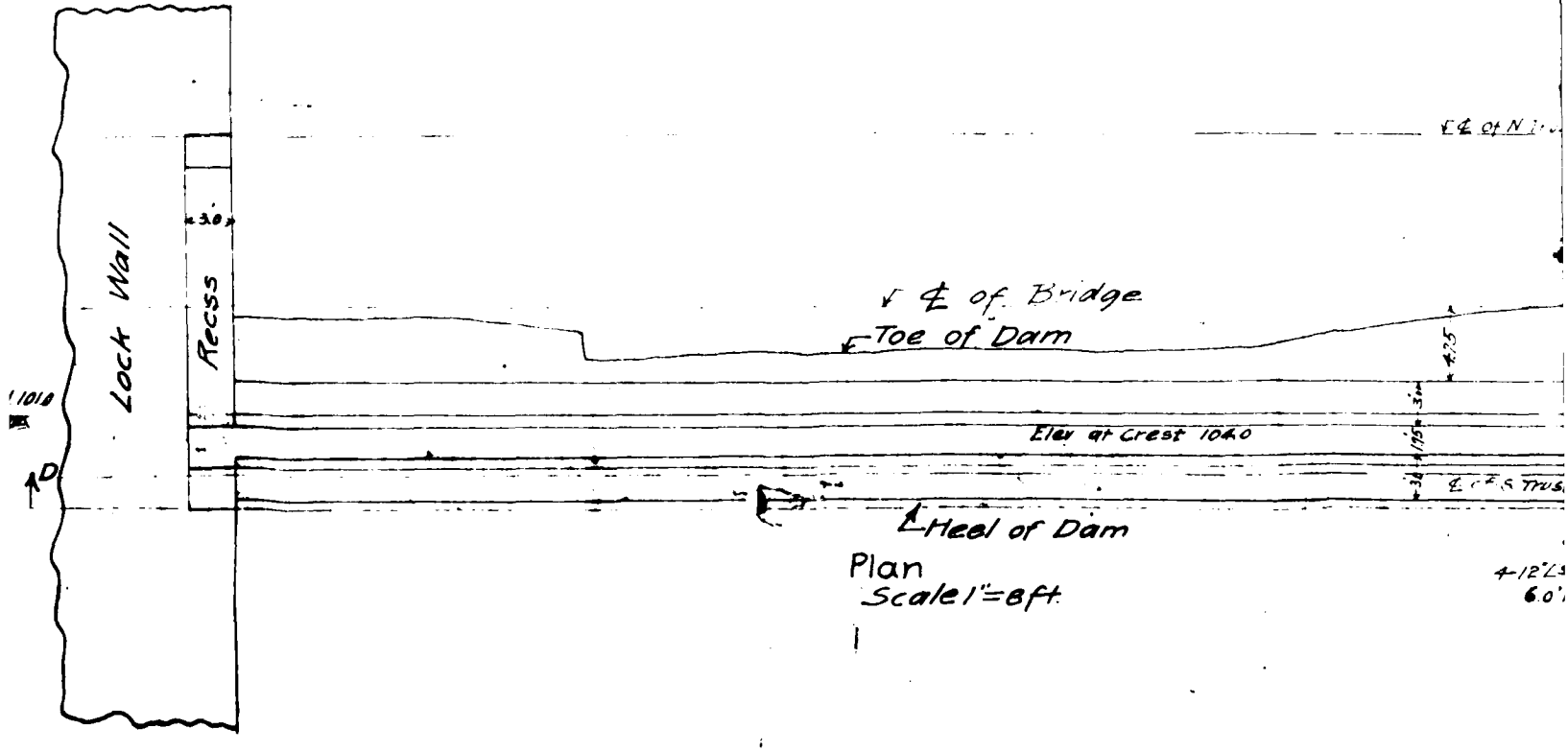


Elevation of Abutment.

2



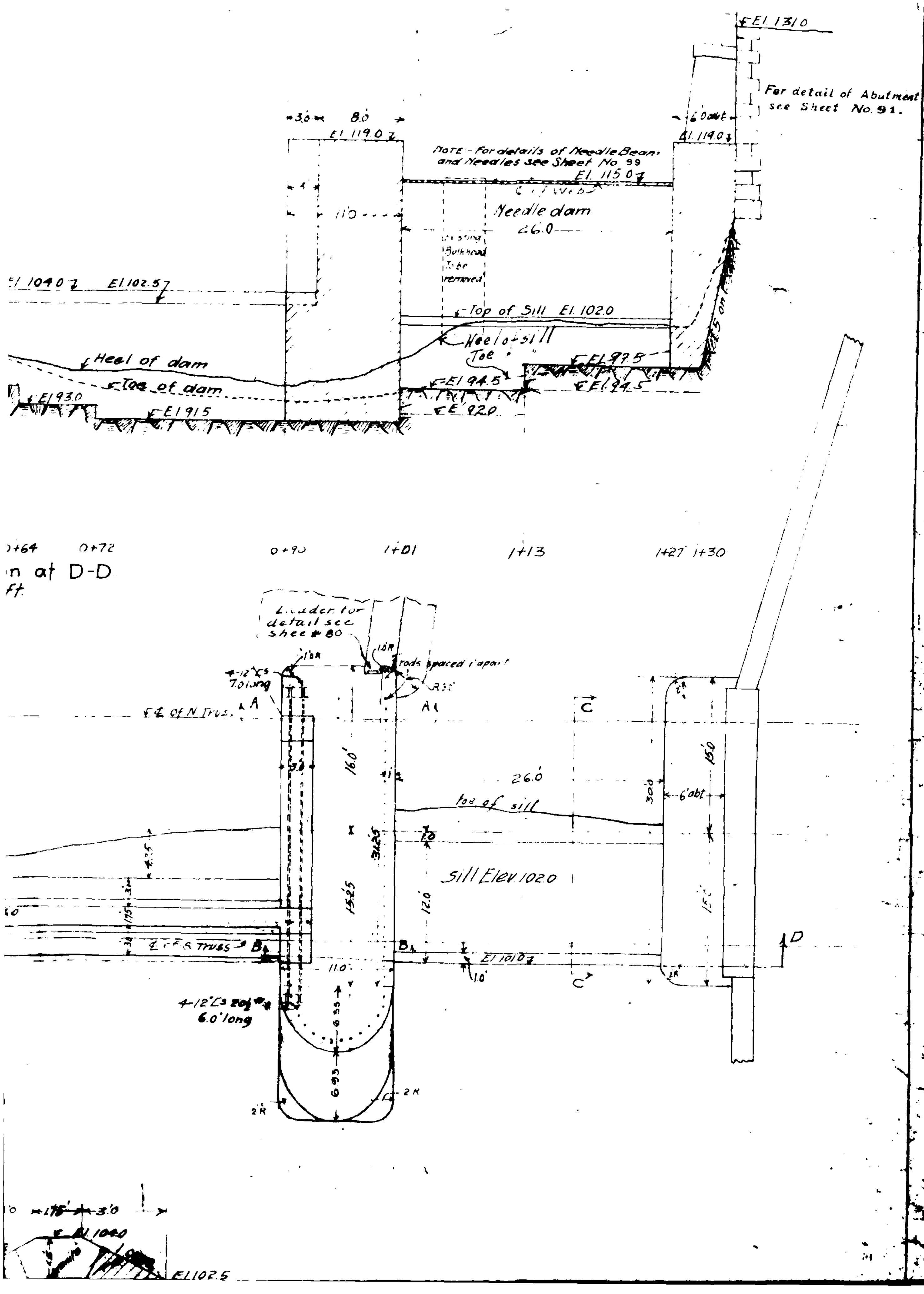
Sectional Elevation at D-D
Scale 1" = 8ft



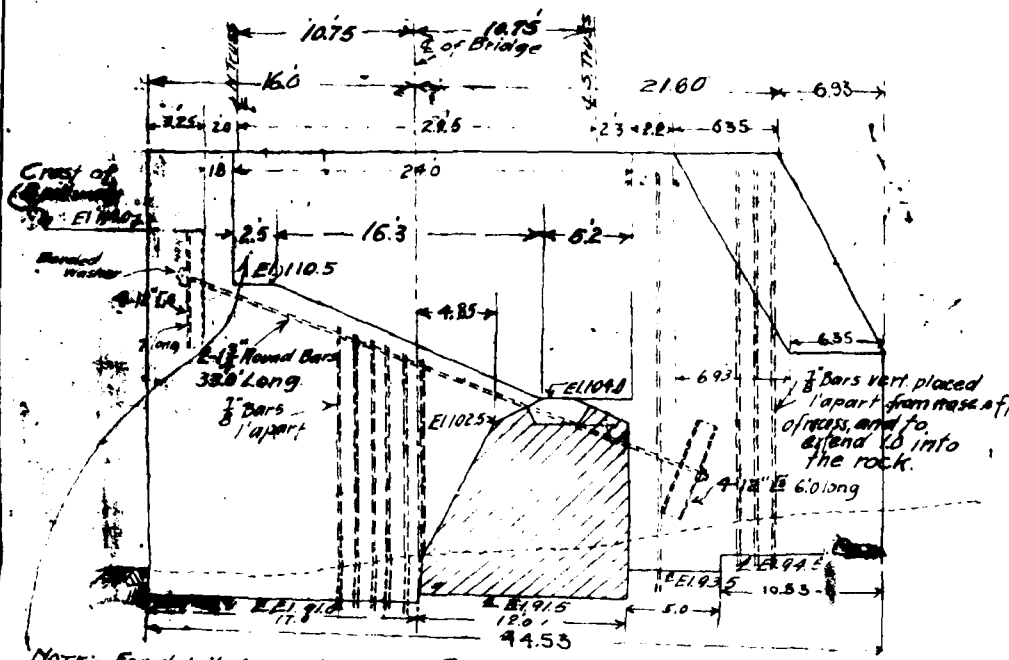
Plan
Scale 1" = 8ft

3.0 1.75 3.0

3.0 1.75 3.0

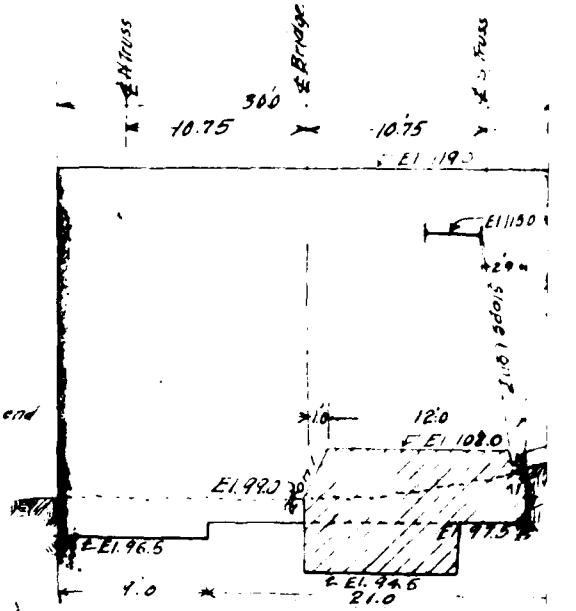


El. 131.0
For detail of Abutment see Sheet No. 91.
3.0
8.0
El. 119.0
6.0 abt.
El. 119.0
NOTE — For details of Needle Beam and Needles see Sheet No. 99
El. 115.0
Needle dam
26.0
11.0
Existing Bulkhead to be removed
El. 104.0
El. 102.5
Top of Sill El. 102.0
Heel of sill
Toe
El. 97.5
Heel of dam
Toe of dam
El. 94.5
El. 94.5
El. 93.0
El. 91.5
El. 92.0
0+64
0+72
0+90
1+01
1+13
1+27
1+30
n at D-D
ft.
Leader for detail see sheet #80
rods spaced 1' apart
4-12" [s 7.0' long
R 30
A
A
C
C
℄ of N. Truss
16.0
26.0
toe of sill
30.0
6' abt.
15.0
1.0
Sill Elev. 102.0
12.0
15.25
15.0
℄ of S. Truss
B
B
El. 101.0
11.0
1.0
D
4-12" [s 20 lb. 6.0' long
6.55
6.95
2R
2R
2R
2R
1.75
3.0
El. 104.0
El. 102.5

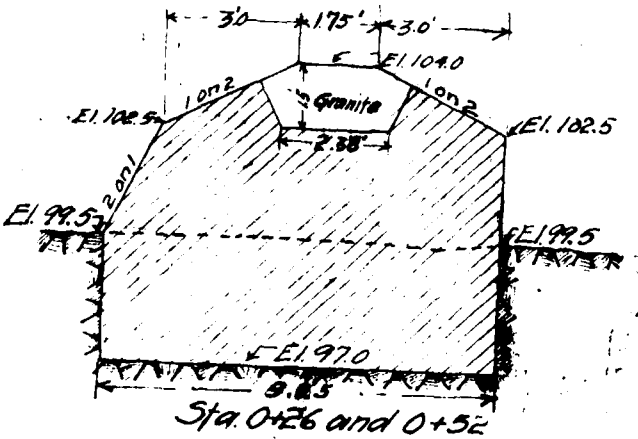


NOTE:- For detail of mountings of Hinge Pins, see Sheet Nos 97-98.

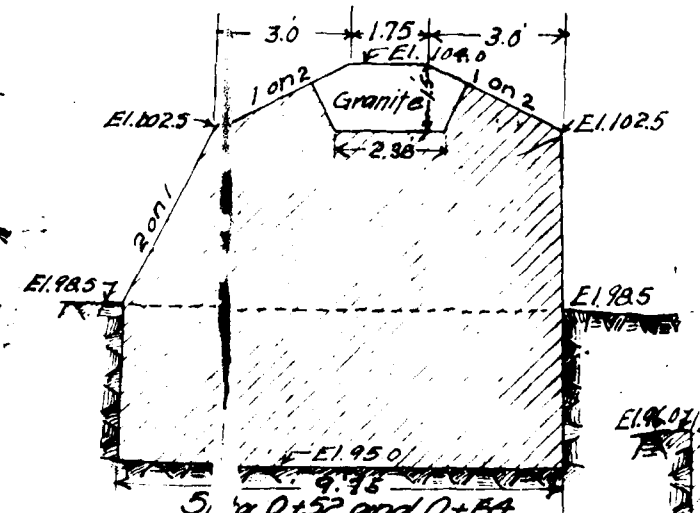
Elevation of Pier.



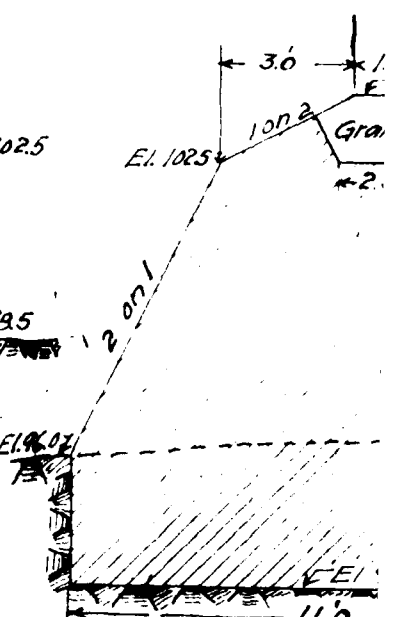
Elevation of Abutment.



Sta. 0+26 and 0+52



Sta. 0+52 and 0+64



Sta. 0+64 and

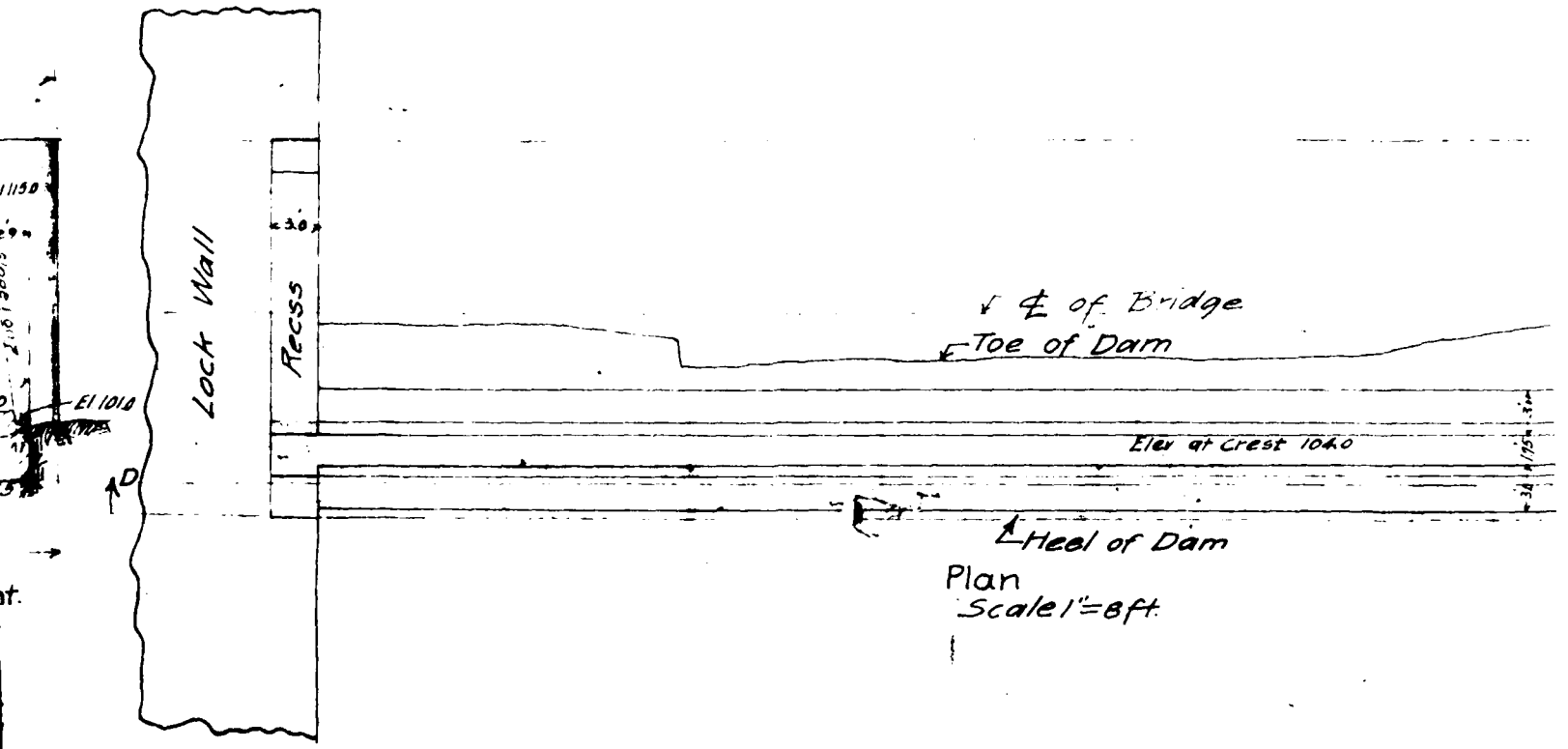
NOTE:- Granite cap stones to be bushhammered on top and slopes, joints to lay ½ inch.

Sca

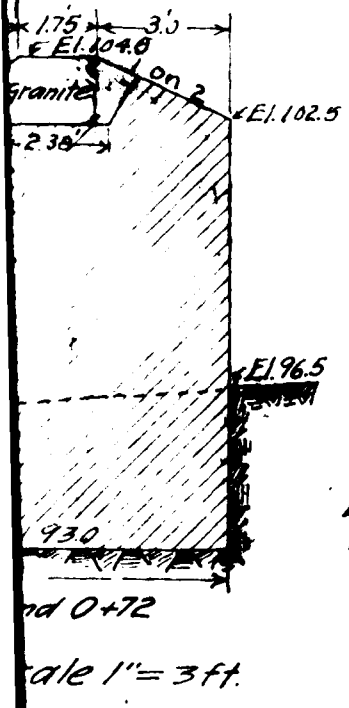
MADE BY N. Spencer
TRACED BY J. P. Burns
CHECKED BY Geo. M. Reid 8/12, 06

0+52 0+64 0+7

Sectional Elevation at D-D
Scale 1"=8ft

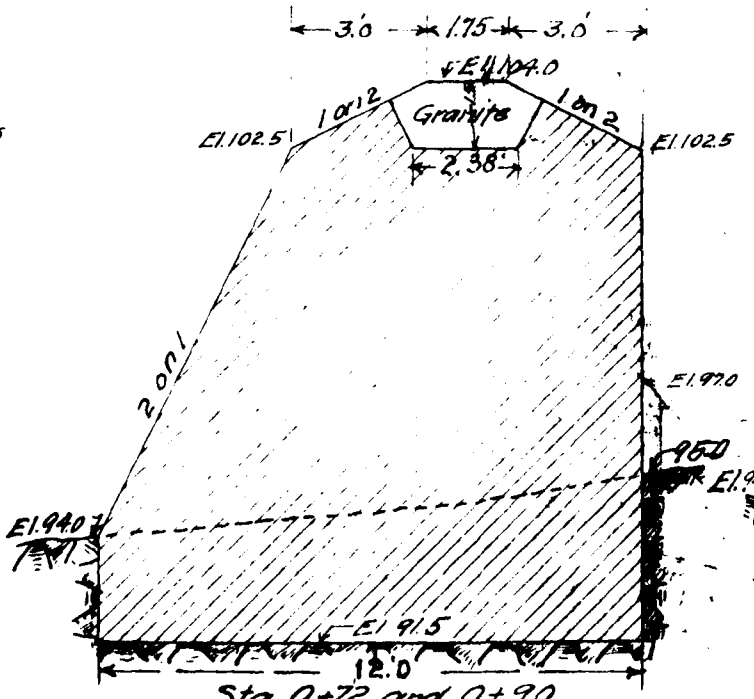


Plan
Scale 1"=8ft

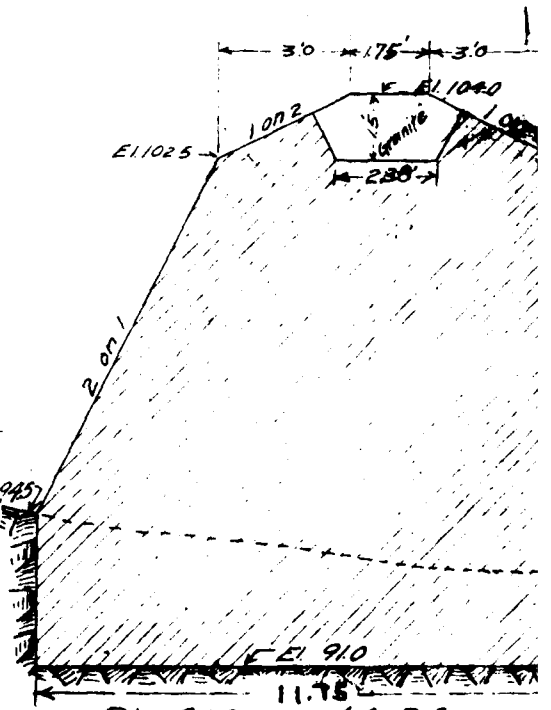


nd 0+72

ale 1"= 3ft.



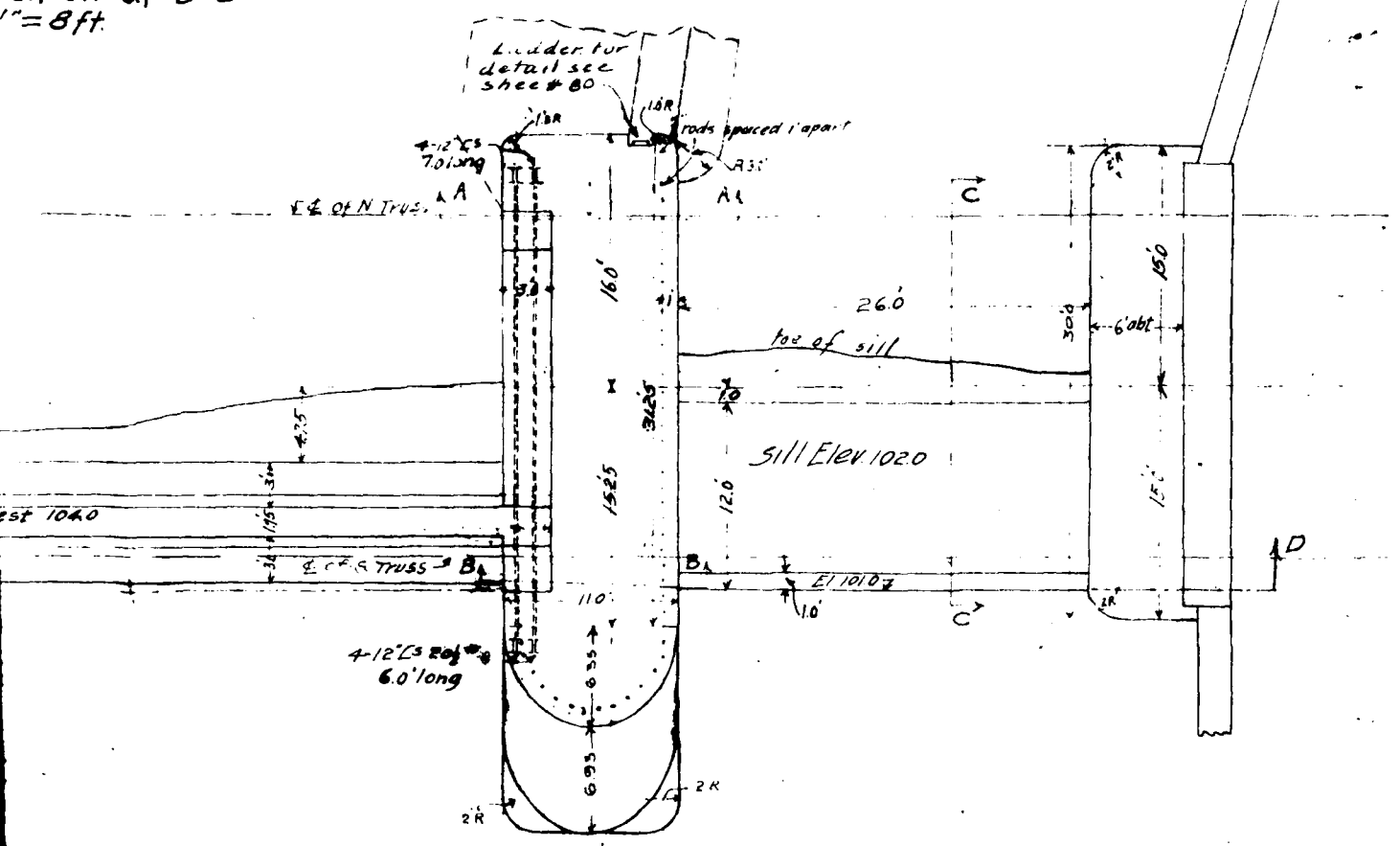
Sta. 0+72 and 0+90

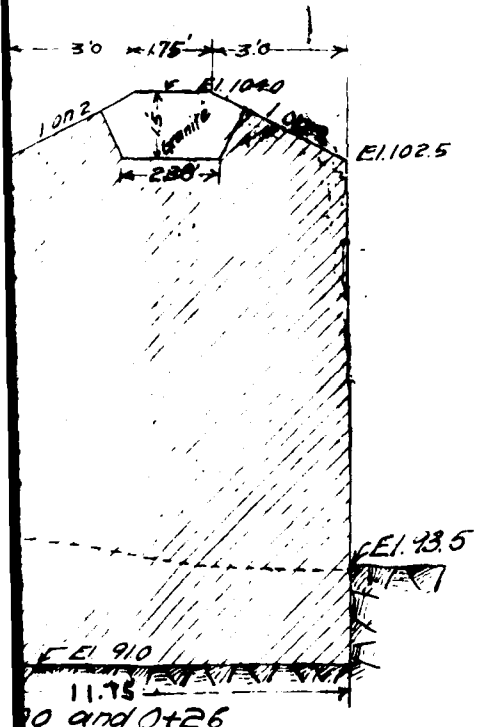


Sta 0+00 and 0+26

5

vation at D-D
1"=8ft.





Contract No. 15.

Champlain Canal Section 3.

From Lake Champlain at Whitehall, through Wood Creek, to vicinity of Comstock's P.O.

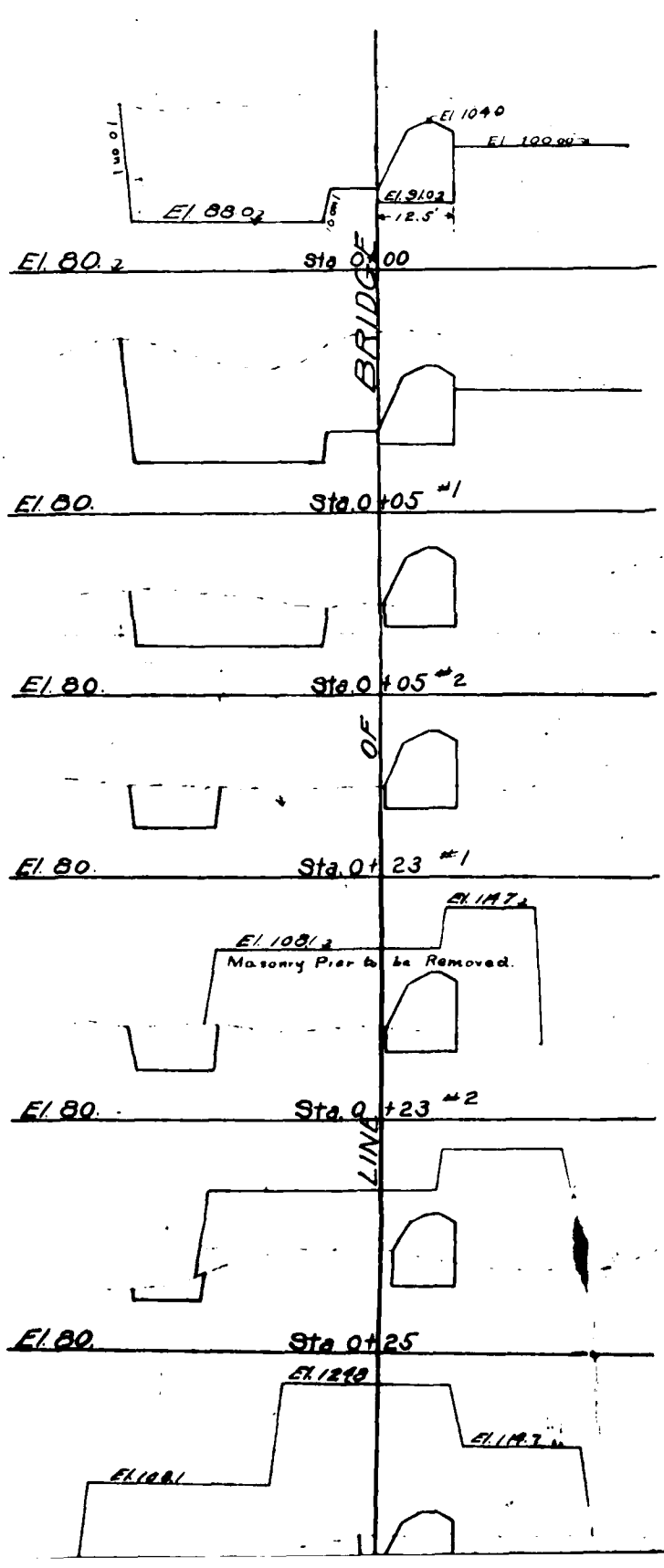
DETAIL PLANS OF DAM 5, BRIDGE PIER, ABUTMENT ETC.

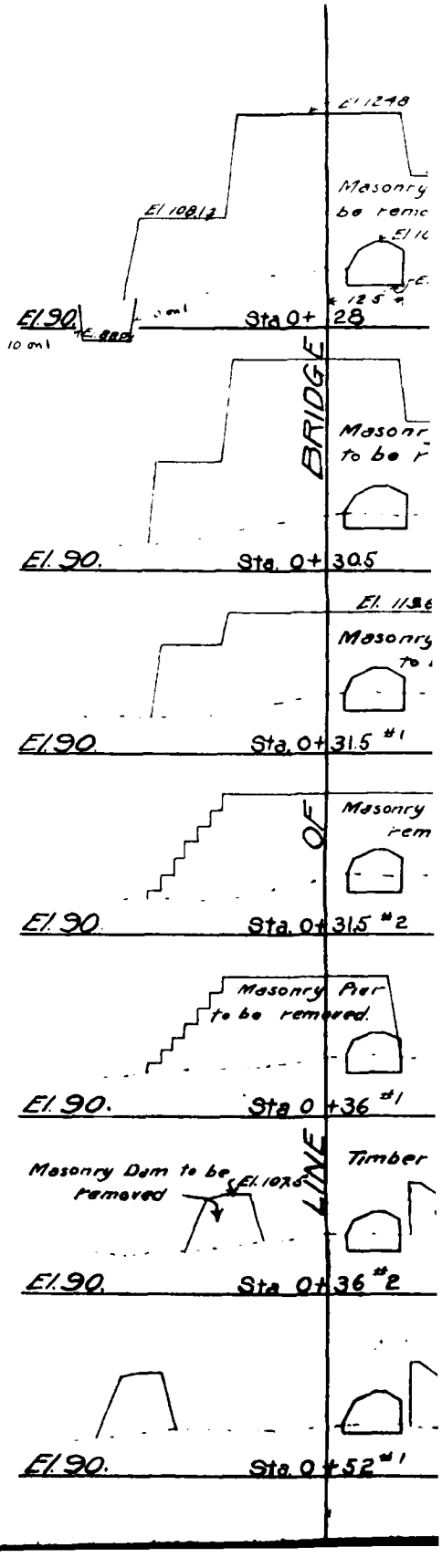
Scales: as indicated.

Examined and approved

Special Deputy State Engineer.

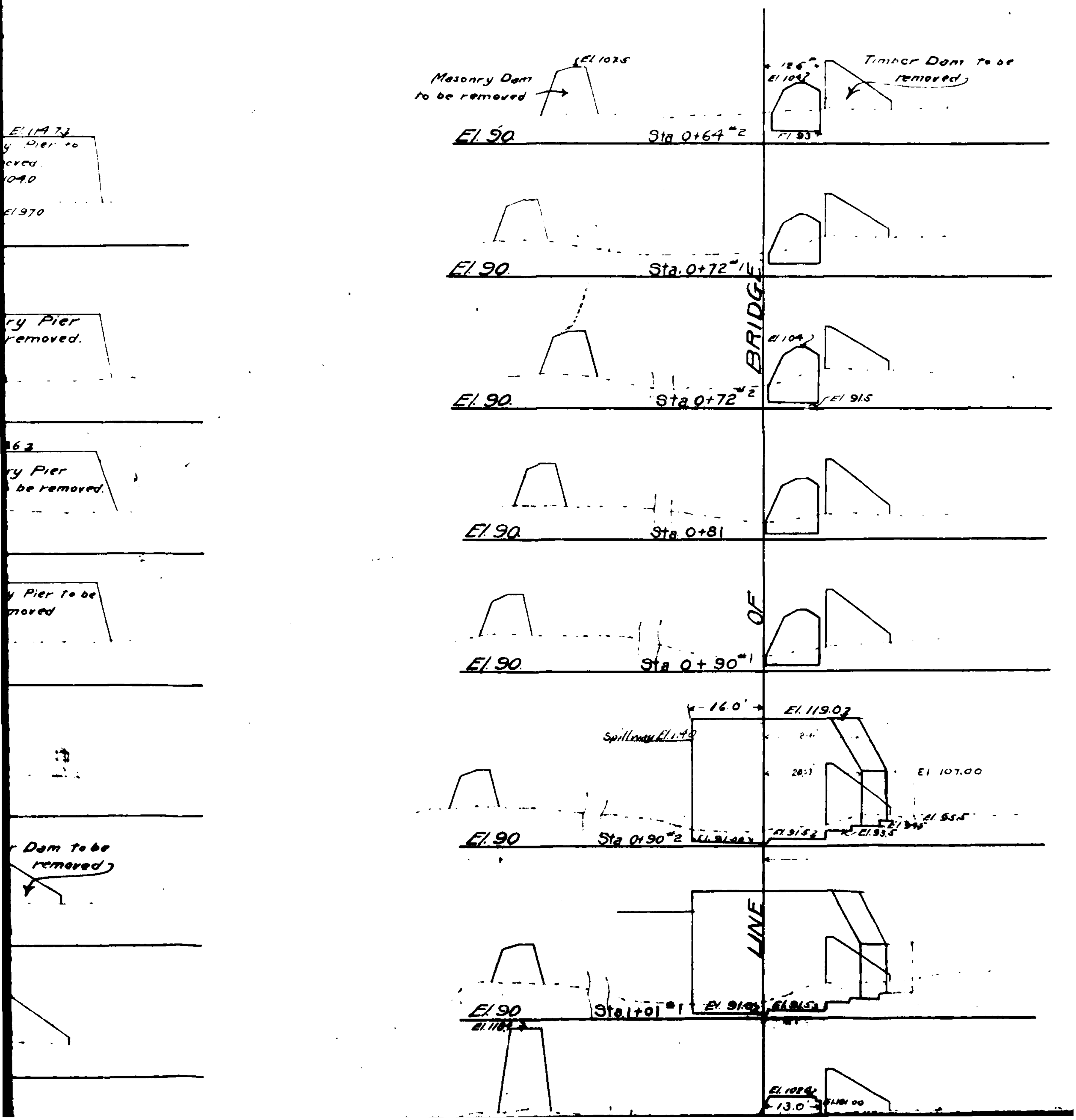
6


El 1040
El 100.00
El 88.0
El 91.0
12.5'
El. 80.2
Sta 0+00
BRIDGE
El. 80.
Sta. 0+05 #1
El. 80.
Sta. 0+05 #2
El. 80.
Sta. 0+23 #1
El. 108.2
Masonry Pier to be Removed.
El. 80.
Sta. 0+23 #2
LINE
El. 80.
Sta 0+25
El. 124.8
El. 108.1

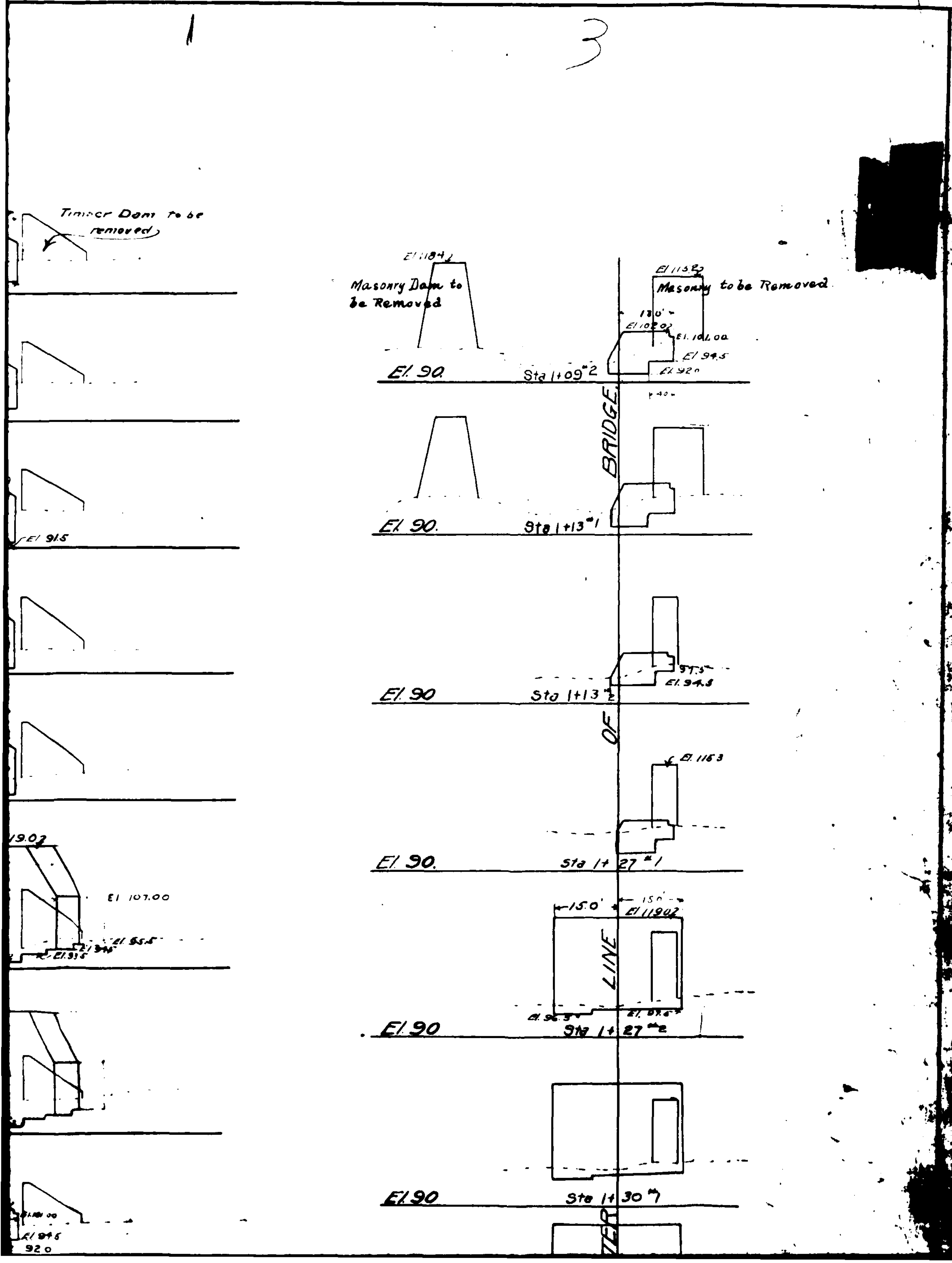

El. 124.8
El. 108.2
Masonry
El. 90.
Sta 0+28
BRIDGE
El. 90.
Sta. 0+30.5
El. 90.
Sta. 0+31.5 #1
OF
El. 90.
Sta. 0+31.5 #2
Masonry Pier
to be removed.
El. 90.
Sta 0+36 #1
Masonry Dam to be
removed
El. 107.5
LINE
Timber
El. 90.
Sta 0+36 #2
El. 90.
Sta 0+52 #1

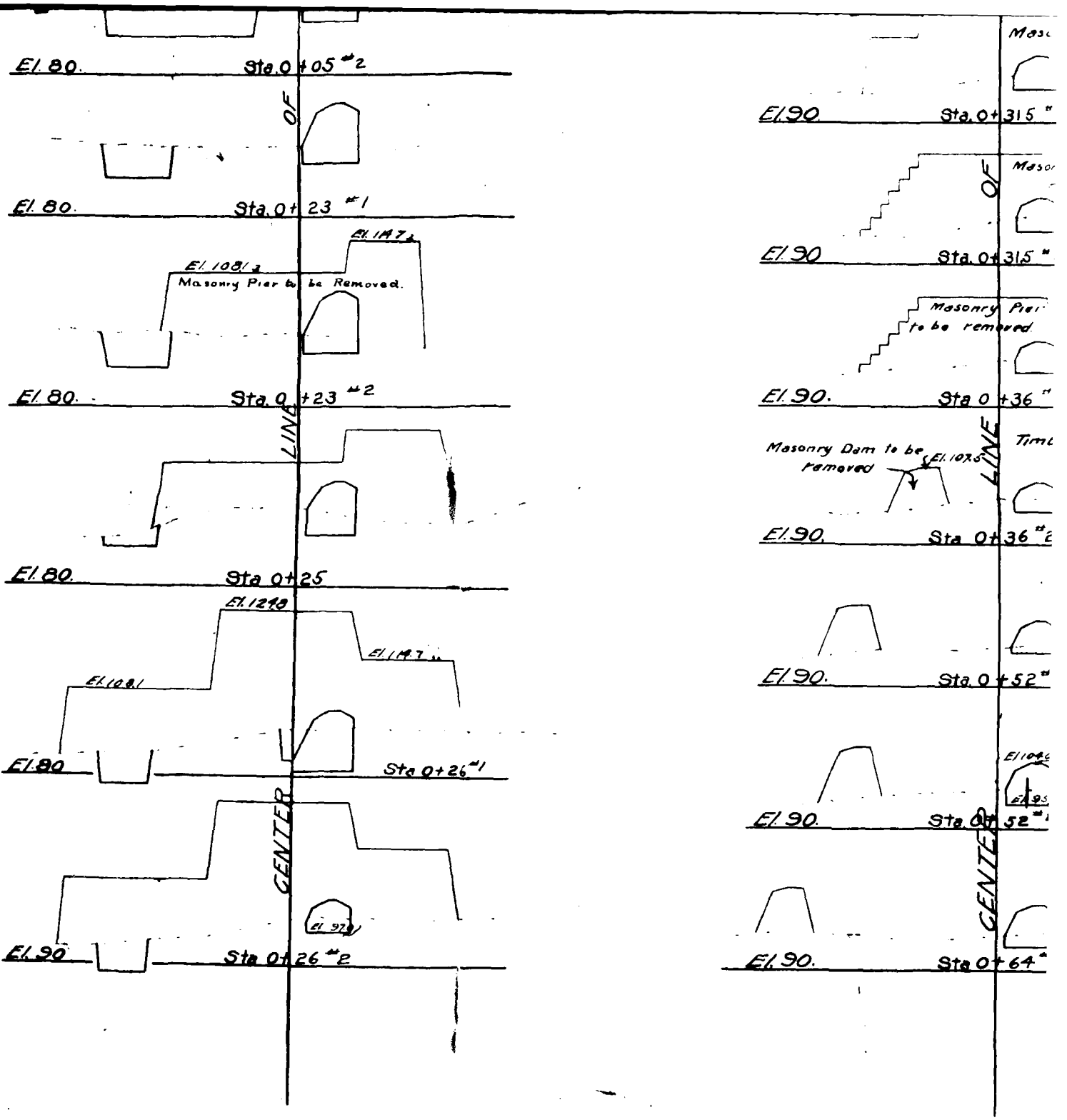
2

1

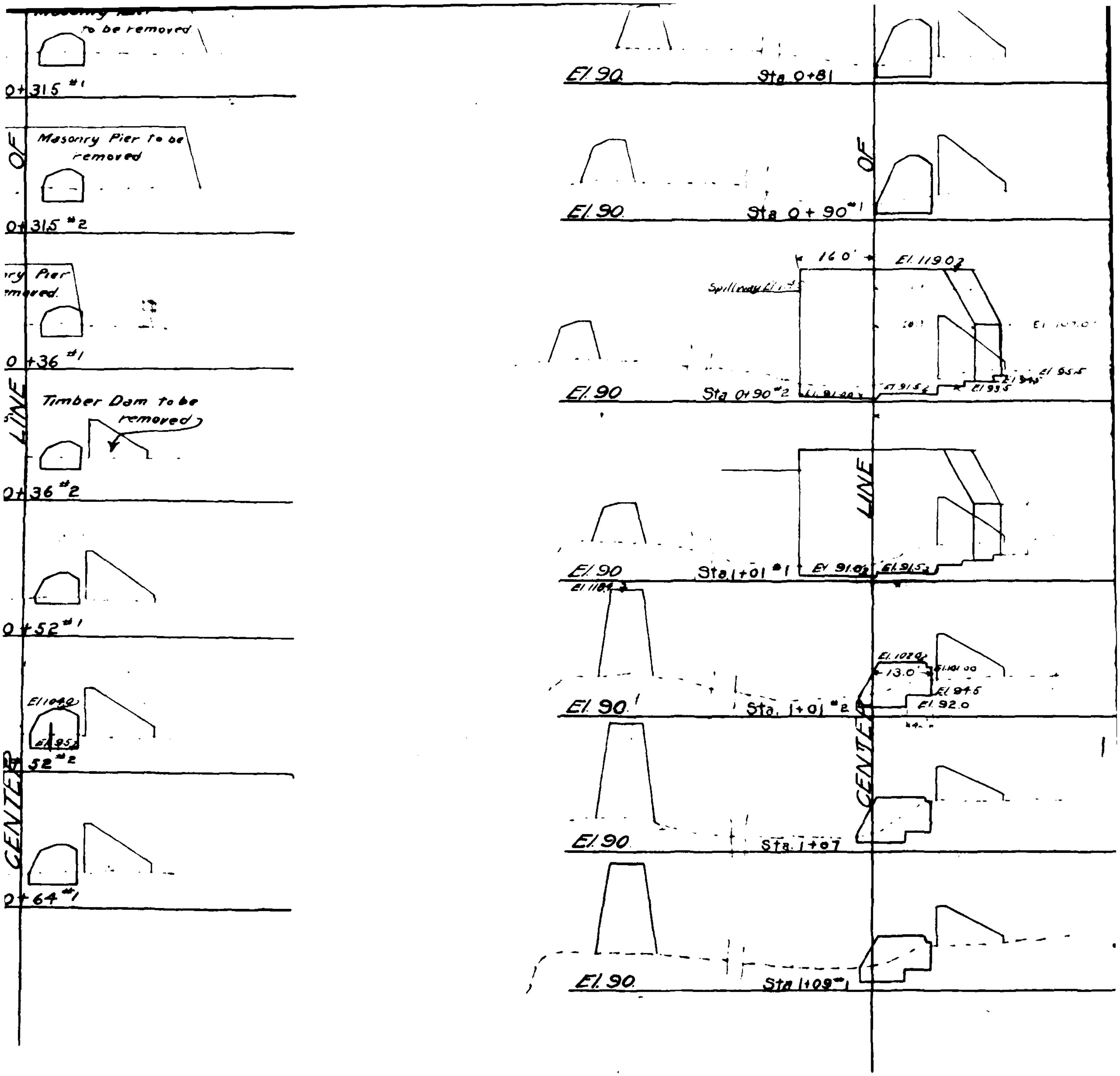


Masonry Dam to be removed
El 107.5
Timber Dam to be removed
El 90
Sta 0+64
El 90
Sta. 0+72
El 90
Sta 0+72
El 91.5
El 90
Sta 0+81
El 90
Sta 0+90
16.0'
El. 119.02
Spillway El. 114.0
El 107.00
El 90
Sta 0+90
El 90
Sta 1+01
BRIDGE
OF
LINE
ry Pier removed.
ry Pier be removed.
Pier to be moved
Dam to be removed
13.0'

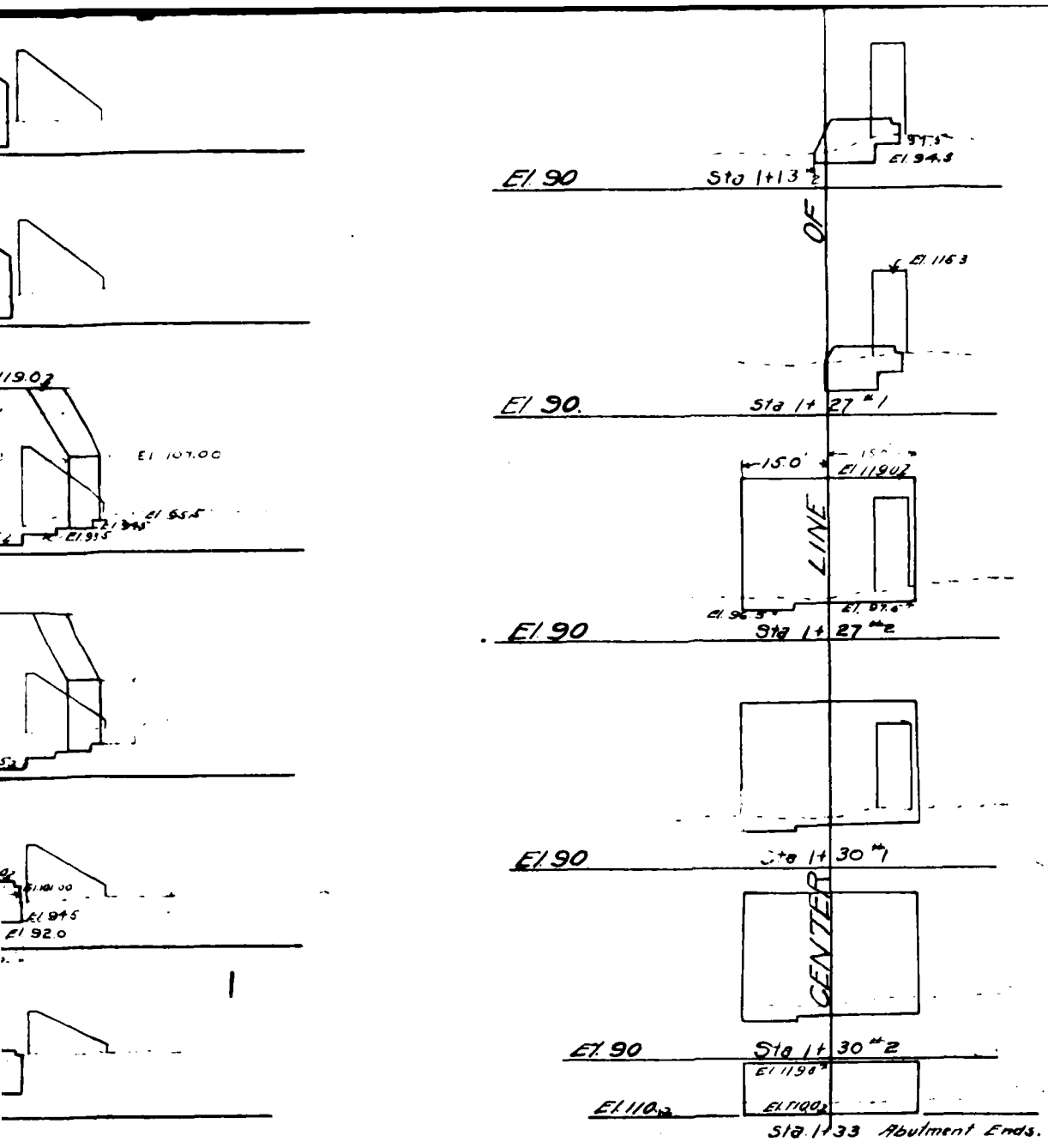
 Timber Dam to be removed
Masonry Dam to be Removed
Masonry to be Removed
El. 90
Sta 1+09 #2
BRIDGE
El 91.5
El. 90.
Sta 1+13 #1
El. 94.3
El. 90
Sta 1+13 #2
OF
El. 116.3
El. 90.
Sta 1+27 #1
El 107.00
15.0'
LINE
El 90
Sta 1+27 #2
El 90
Sta 1+30 #7



MADE BY [illegible] DATE 2-06.
TRACED BY A.E. Stone DATE 3-12-06.
CHECKED T. W. [illegible] DATE 3-16-06



to be removed
0+31.5 #1
Masonry Pier to be removed
0+31.5 #2
Pier
removed
0+36 #1
Timber Dam to be removed
0+36 #2
0+52 #1
El 104.0
El 95.5
52 #2
0+64 #1
CENTER LINE OF
El. 90
Sta 0+81
El. 90
Sta 0+90 #1
16.0'
El. 119.0
Spillway
El. 95.5
El. 93.5
El. 91.5
El. 90
Sta 0+90 #2
El. 90
Sta 1+01 #1
El 91.0
El 91.5
El 118.5
El. 102.0
13.0'
El. 101.00
El 94.5
El 92.0
El. 90
Sta. 1+01 #2
El. 90
Sta 1+07
El. 90
Sta 1+09 #1



Contract No. 15.

Champlain Canal — Section 3.

From Lake Champlain at Whitehall, through Wood Creek, to vicinity of Comstock's P.O.

CROSS SECTIONS OF DAM ACROSS WOOD CREEK AT LOCK NO. 12, SHOWING SECTIONS OF OLD STRUCTURES TO BE REMOVED.

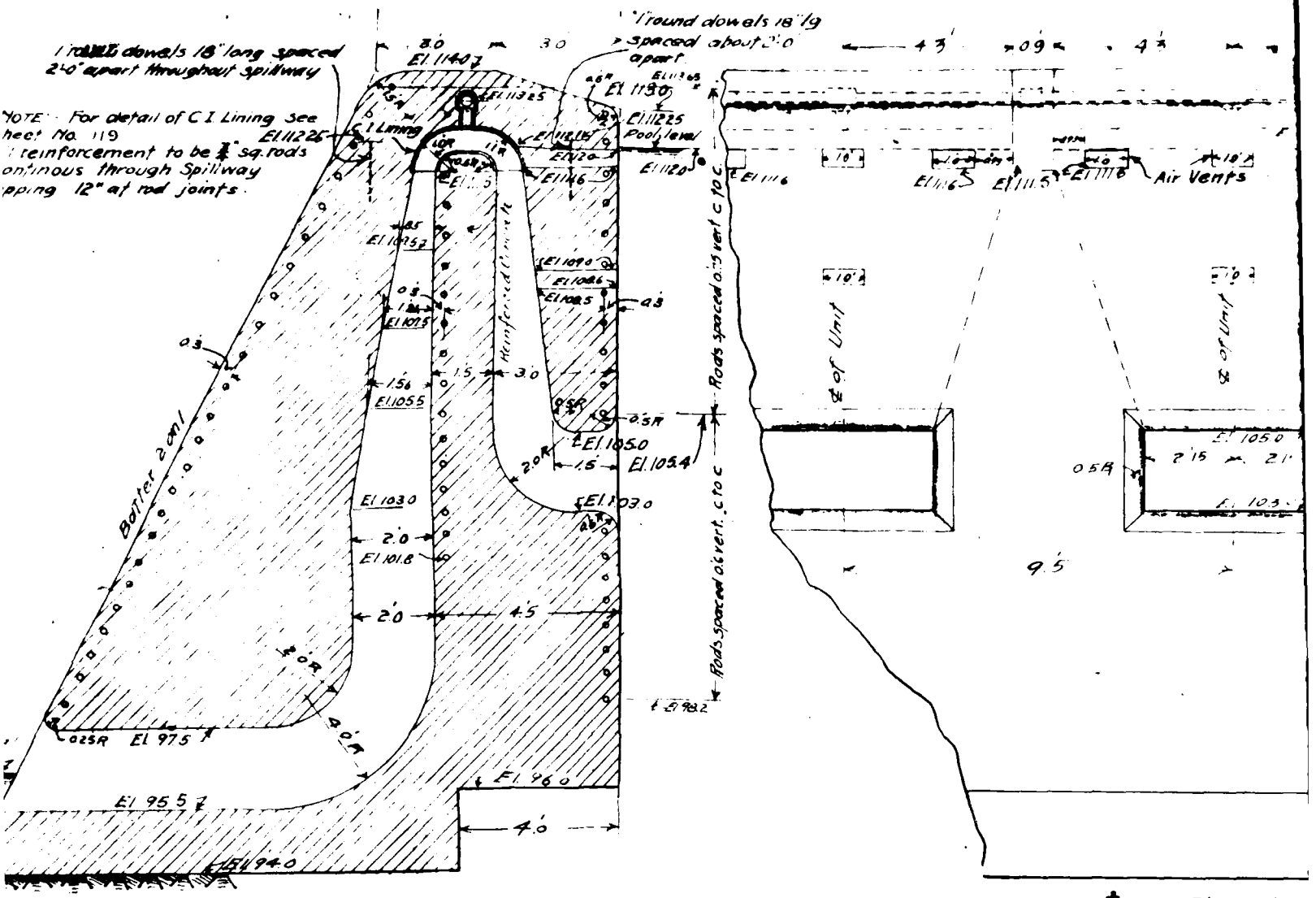
Scale: 20 feet to the inch

Examined and approved

Chief Engineer

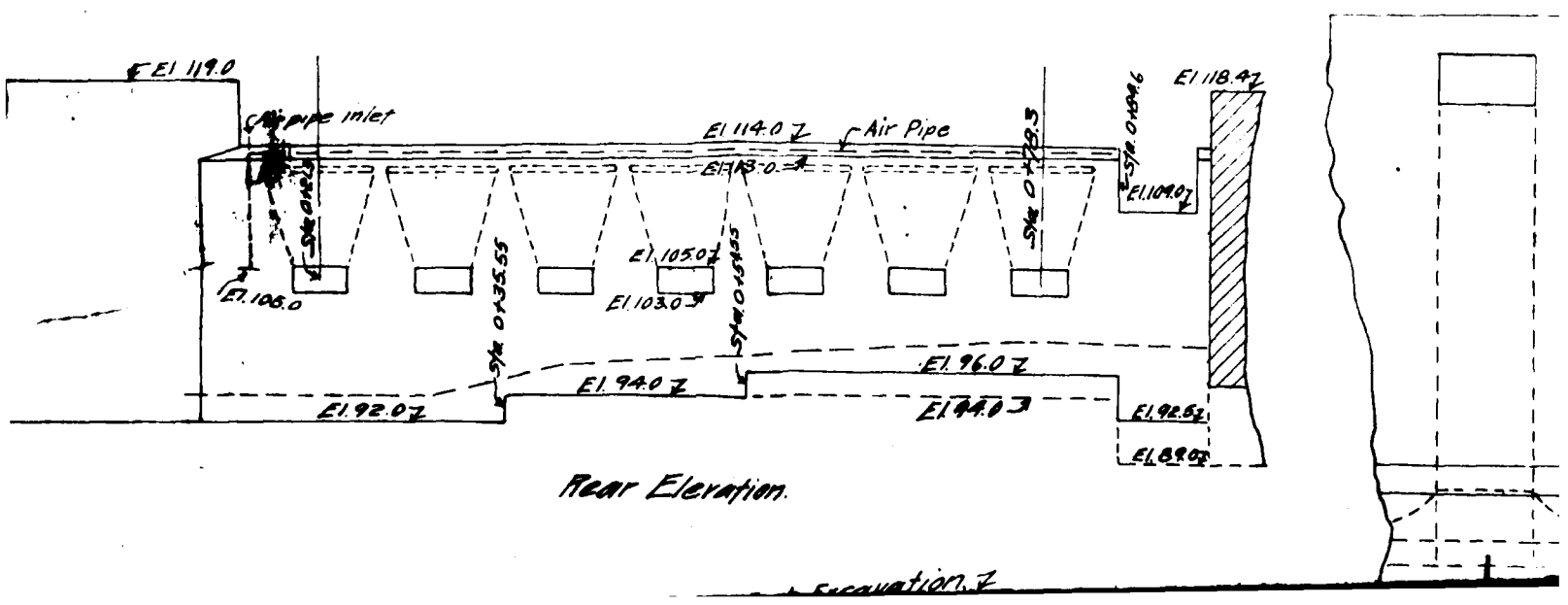
Assistant Engineer

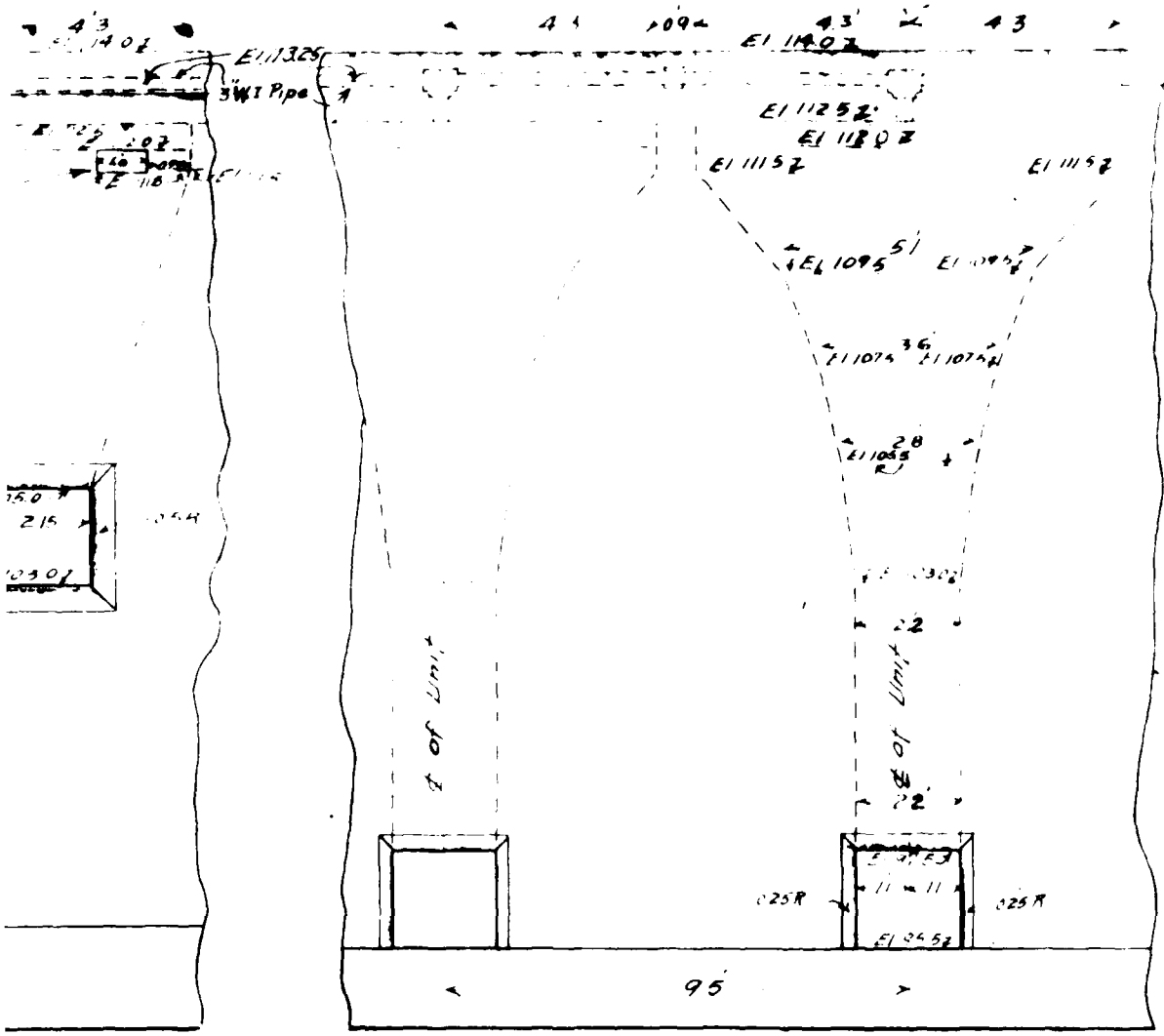
6.



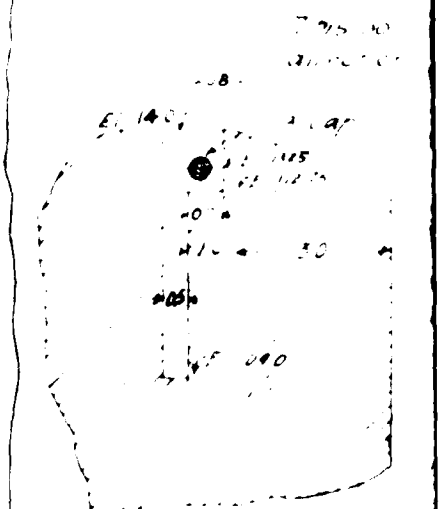
DETAIL OF SPILLWAY

Scale $\frac{3}{8}$" = 1 ft.

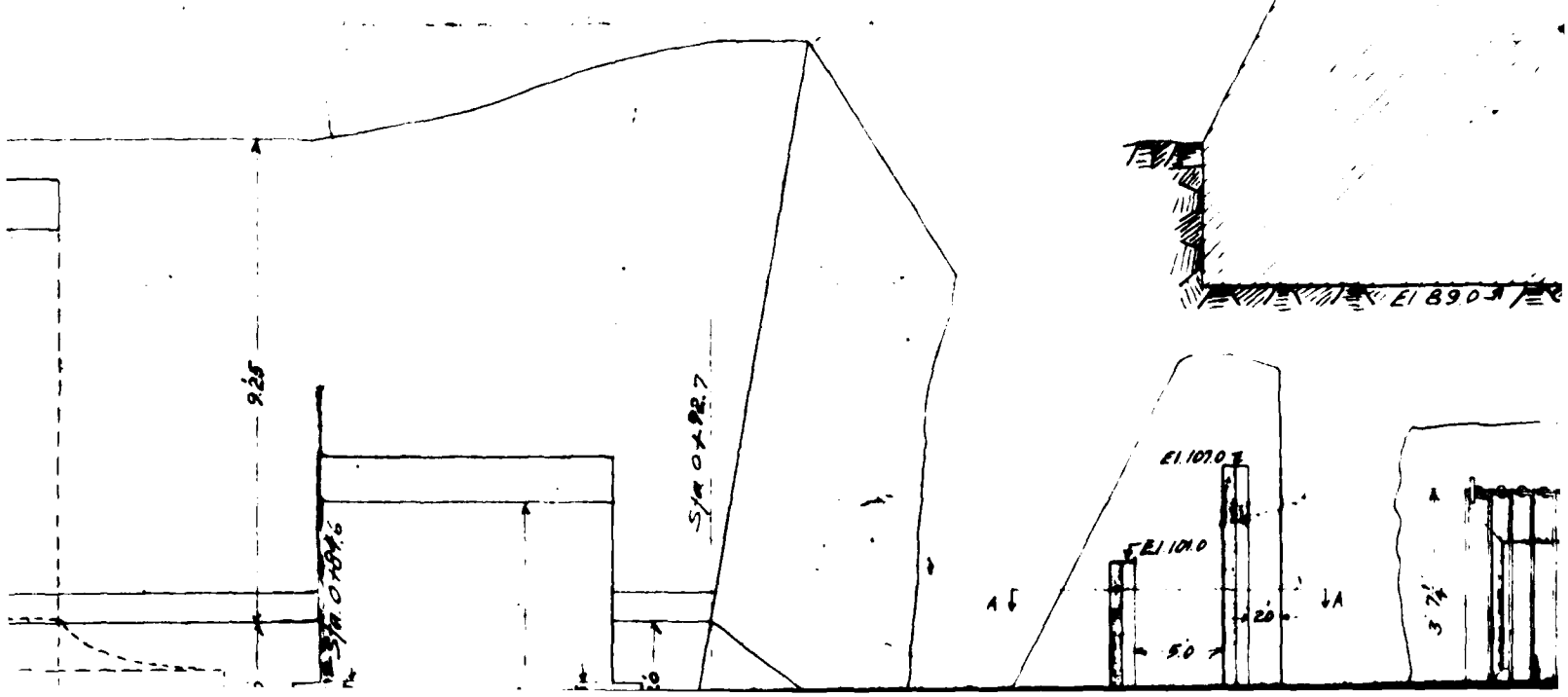


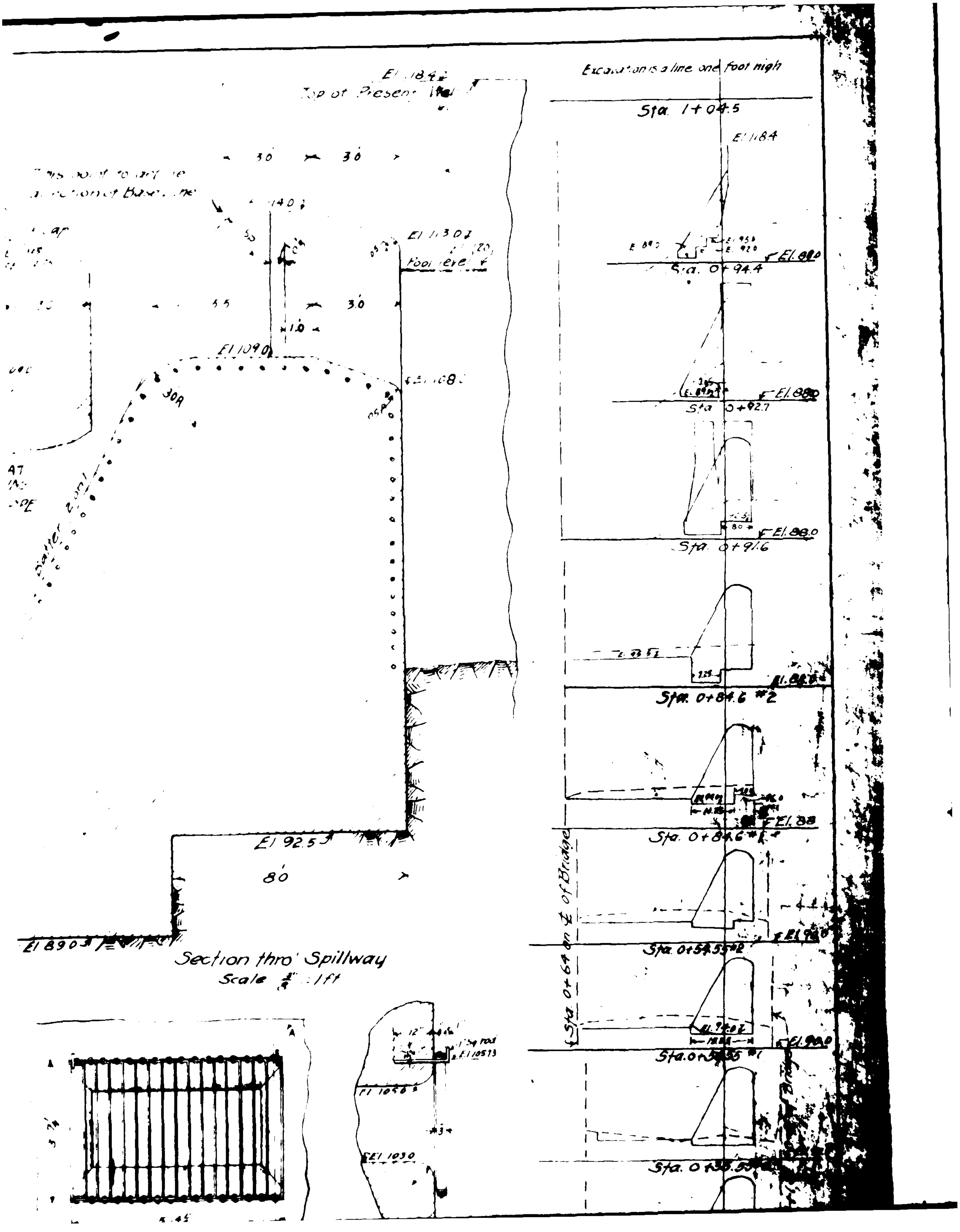


Front Elevation

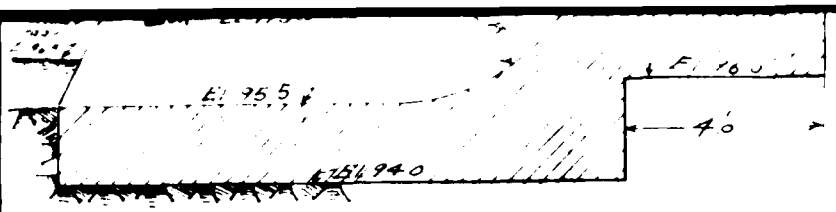


SECTION AT STA 0+89.2 SHOWING LOCATION OF AIR PIPE





Excavation is a line one foot high
El 184
Top of Present
Sta. 1+04.5
El 118.4
30
30
El 113.0
Pool level
El 88.0
Sta. 0+94.4
30
1.0
El 109.0
30R
Sta. 0+92.7
El 88.0
Sta. 0+91.6
El 88.0
Sta. 0+84.6 #2
El 88
Sta. 0+84.6 #1
El 92.5
80
El 89.0
Sta. 0+64 on ℄ of Bridge
El 90.0
Sta. 0+54.55 #2
El 90.0
Sta. 0+
El 105.0
El 103.0
Sta. 0+
Section thro' Spillway
Scale 3/8":1ft

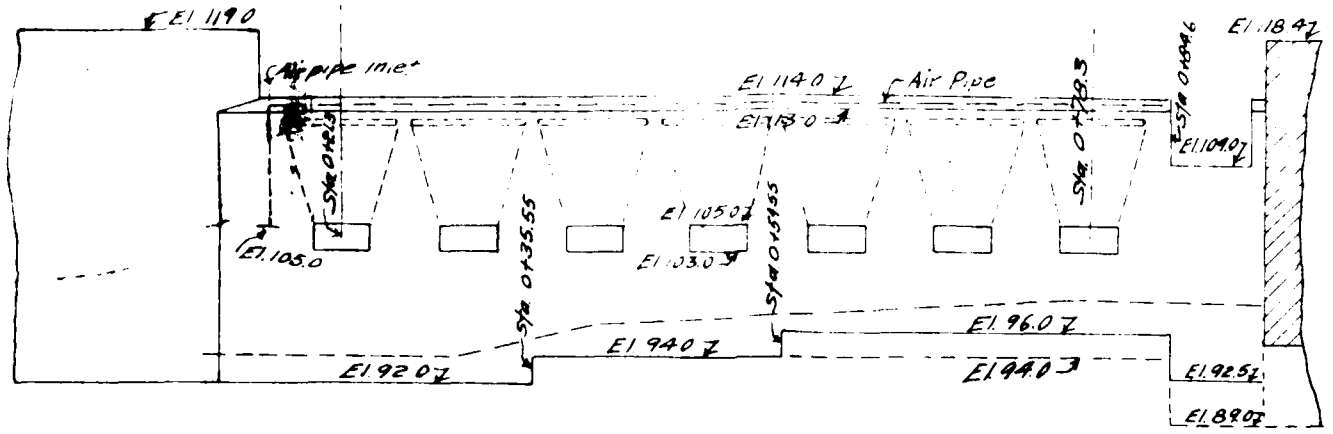


Section on ℄ of Unit at Sta 0+60

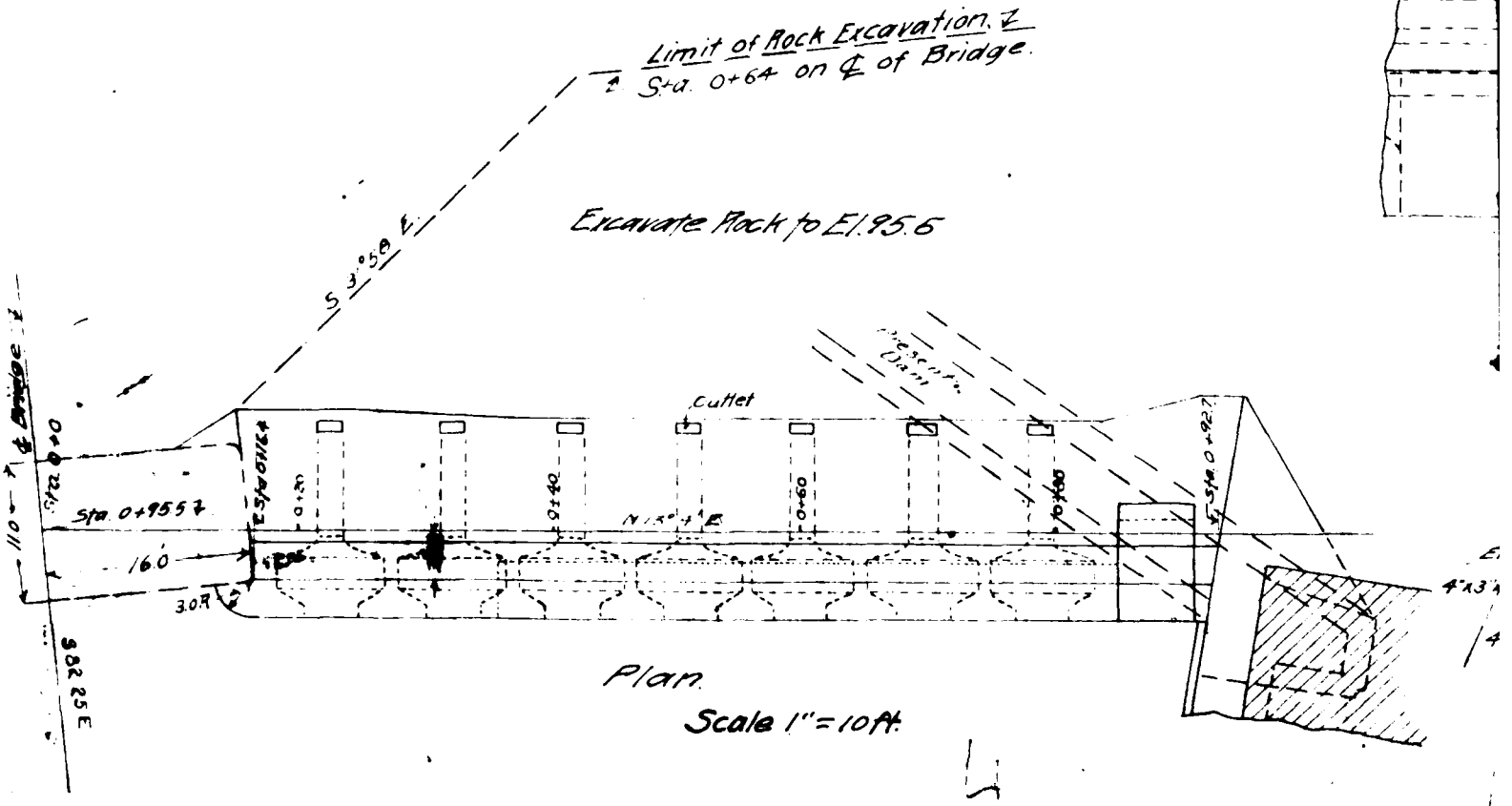
Rear Ele.

DETAIL OF SPILLWA

Scale $\frac{3}{8}$" = 1 ft



Rear Elevation



Plan

Scale 1" = 10 ft.

MADE BY W P Creager

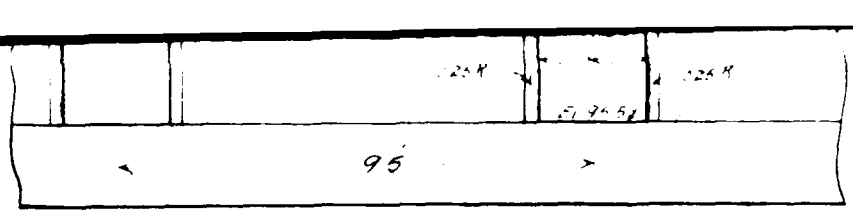
TRACED BY J. P Burns Mar 1, 1906

CHECKED BY [illegible] 3/19/06

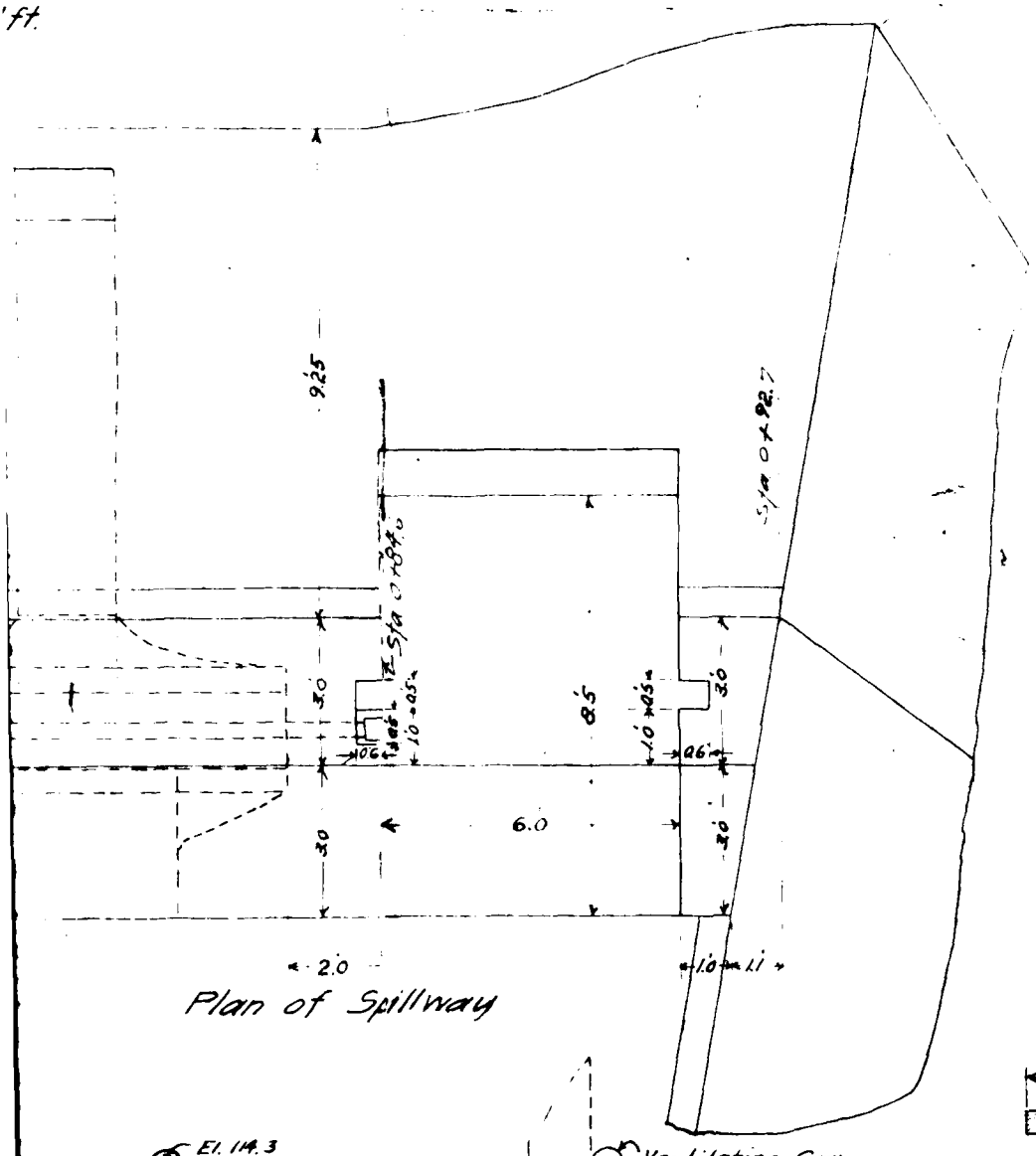
levation

AY

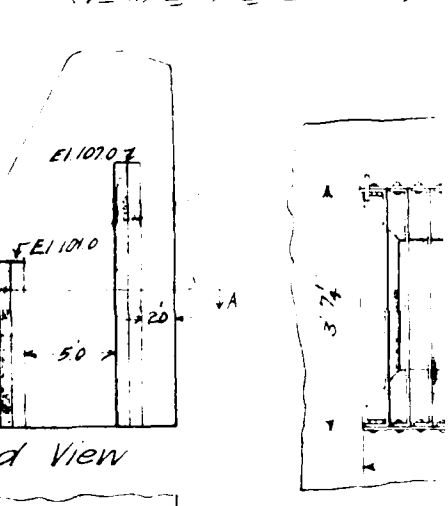
'ft.



Front Elevation



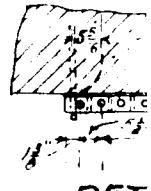
Plan of Spillway



End View

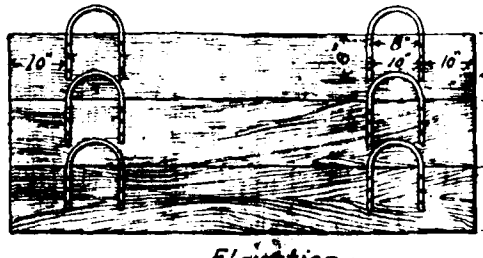
Section A-A.
DETAIL OF KEYWAY.

Ele



DETA

Plan.



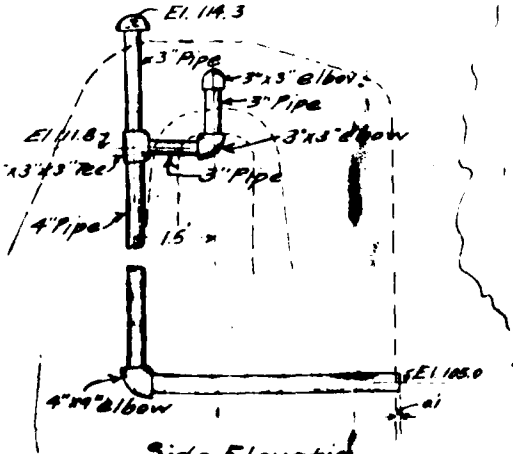
Elevation.

Side

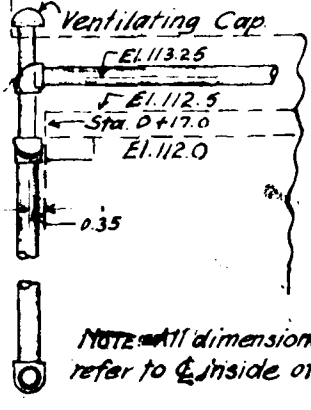
Material Required.
5 Pcs. Spruce 4"x12" x 7'-0"
10. Bars 1"x½" x 2'-6"
60 Lag Screws 4" long

Scale 1"=

DETAIL OF STOP LOGS FOR POWER C



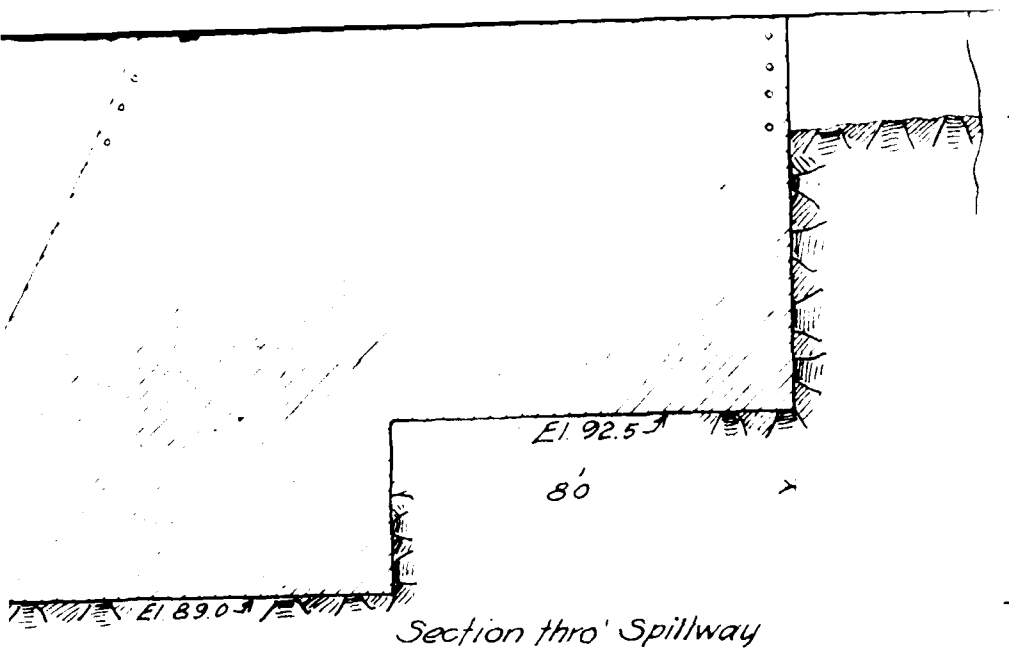
Side Elevation



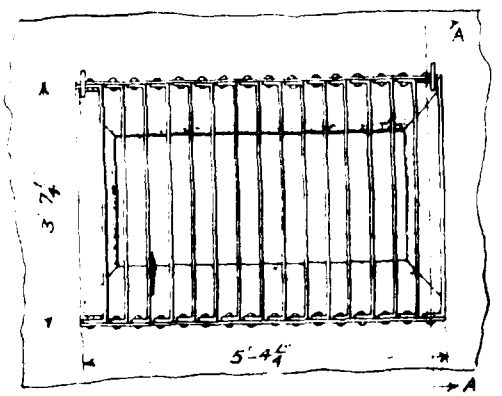
Front Elevation

Note: All dimensions refer to ℄ inside of pipe.

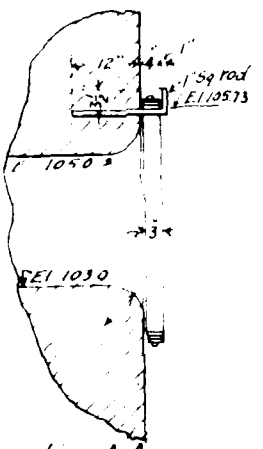
DETAIL OF AIR PIPE INLET.
STA. 0+16.65



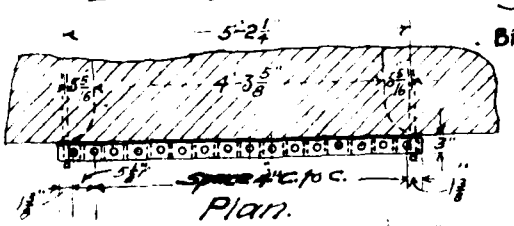
Section thro' Spillway
Scale $\frac{3}{8}$" = 1ft.



Elevation.



Section A-A

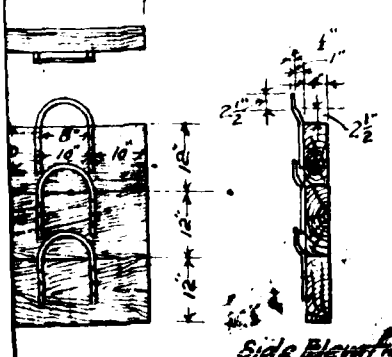


Plan.

DETAIL OF GRATINGS
Scale $\frac{1}{2}$" = 1ft.

Bill of Material for 7 Gratings

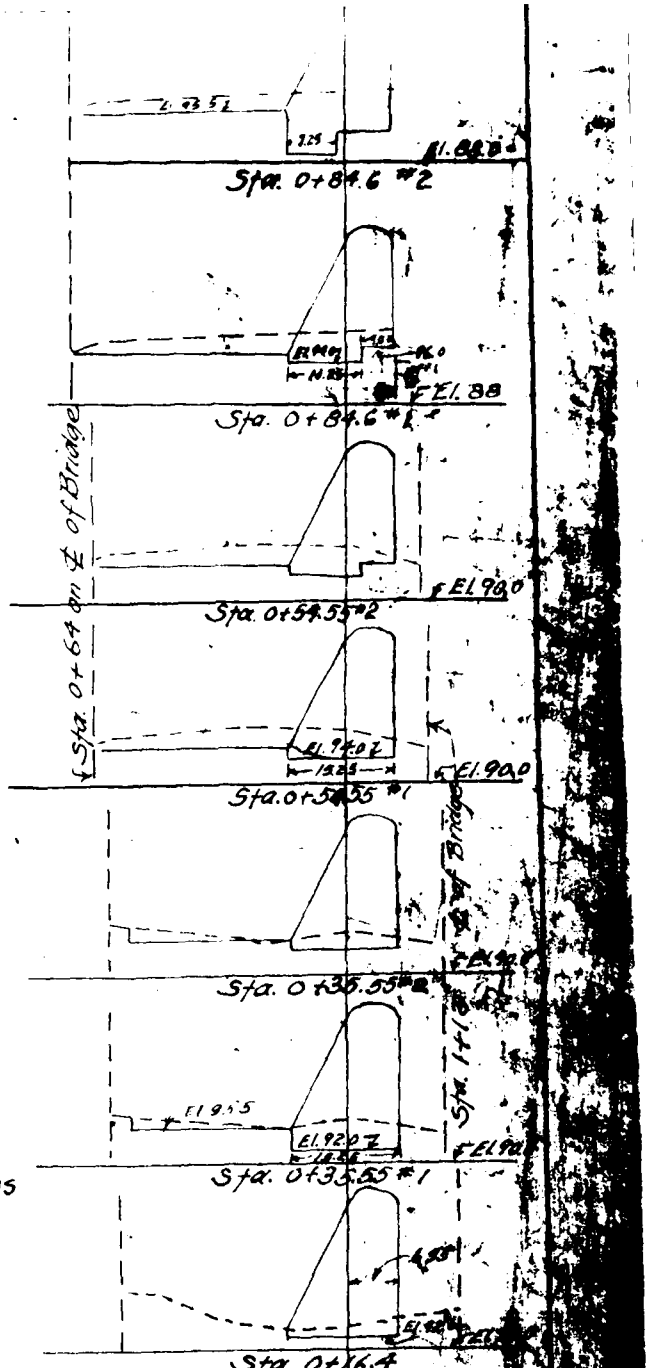
105 Bars ½" x 3" x 3'-9½"
7- Bars ½" x 3" x 3'-10¾"
7- Bars ½" x 3" x 3'-9"
14 Bars ⅜" x 3" x 5'-4¼"
224 - ½" rivets
14 - 1" sq. bars 2½" long.



Side Elevation.

Scale 1" = 2ft.

OGS FOR POWER CULVERT.



NOTE:- Excavation of old Dam is shown on sections of Dam No. 5. Sheet

Contract No. 15.

Champlain Canal — Section 3.

From Lake Champlain at Whitehall, through Wood Creek, to vicinity of Comstock's P.O.

DETAIL PLANS OF SIPHON SPILLWAY AT LOCK NO. 12

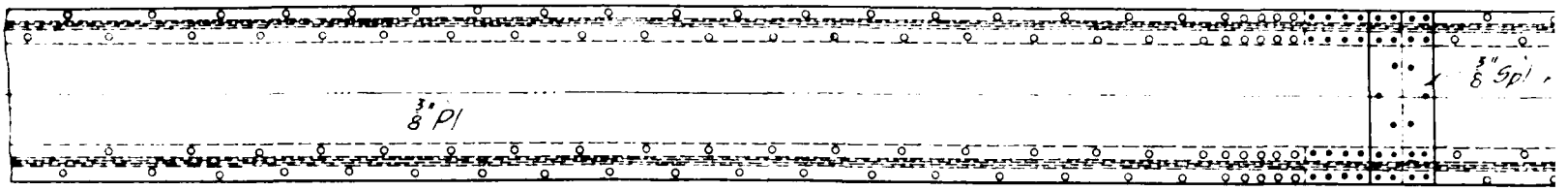
Scales as indicated.

Examined and approved

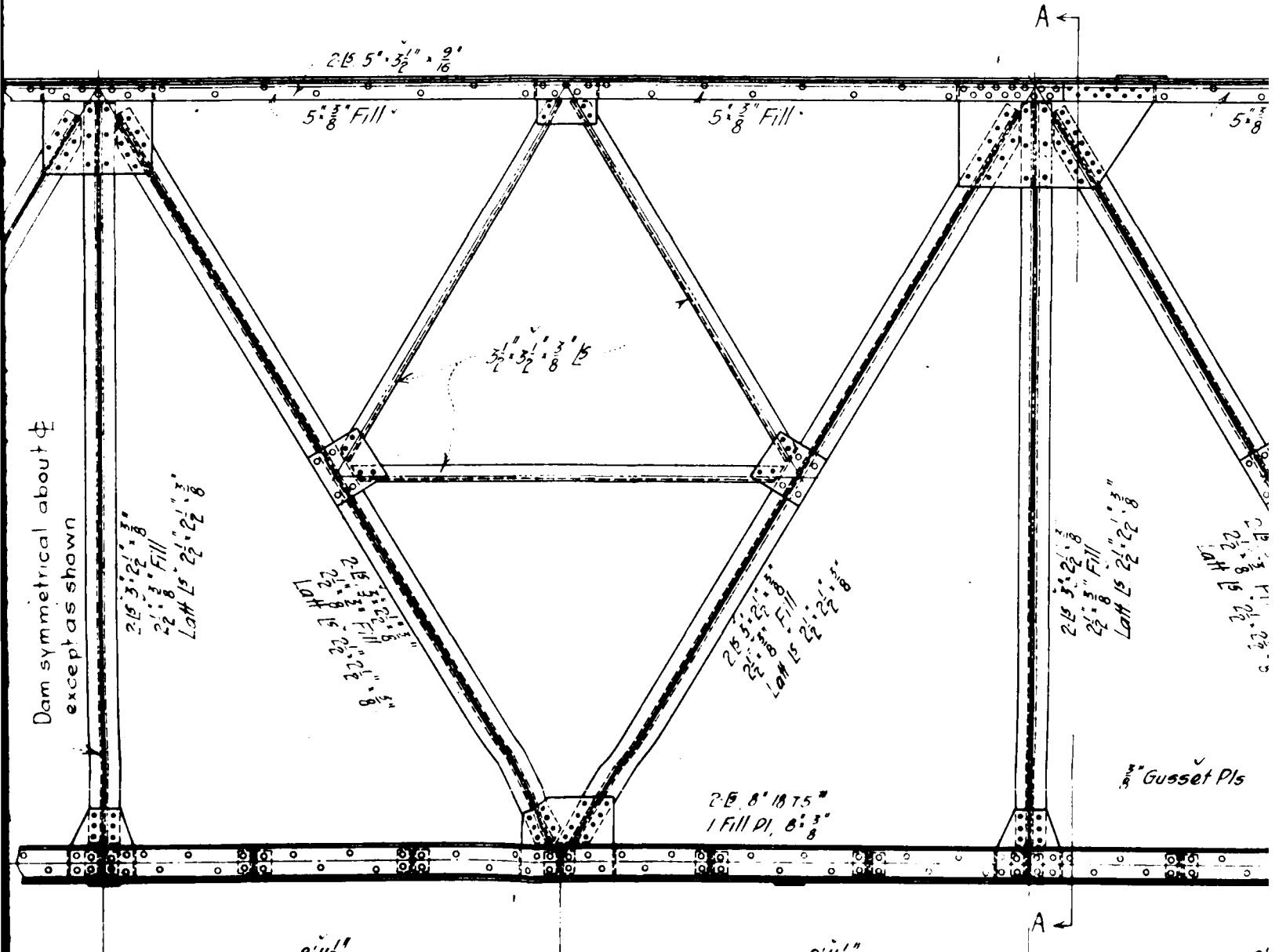
Special Deputy State Engineer

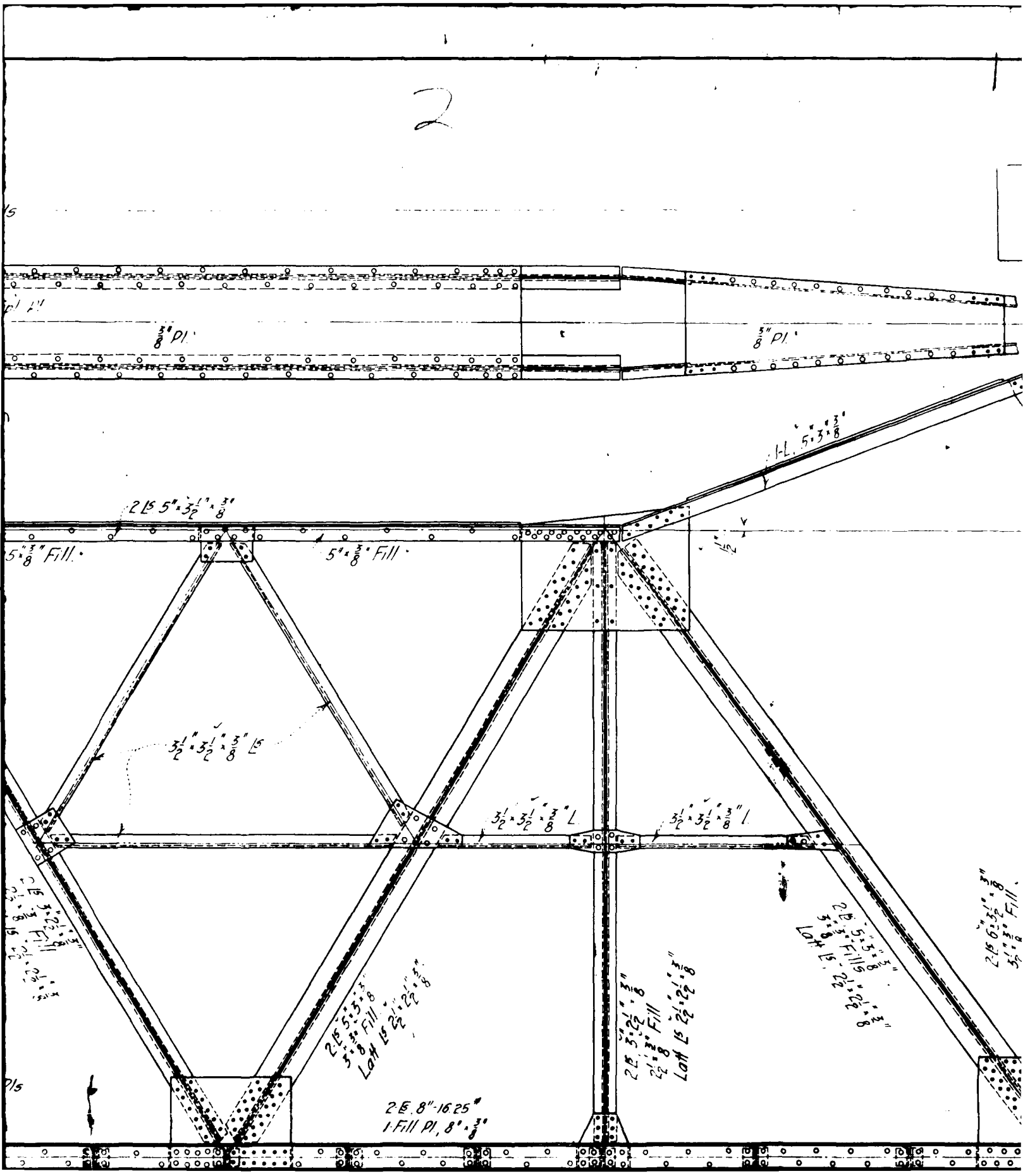
6

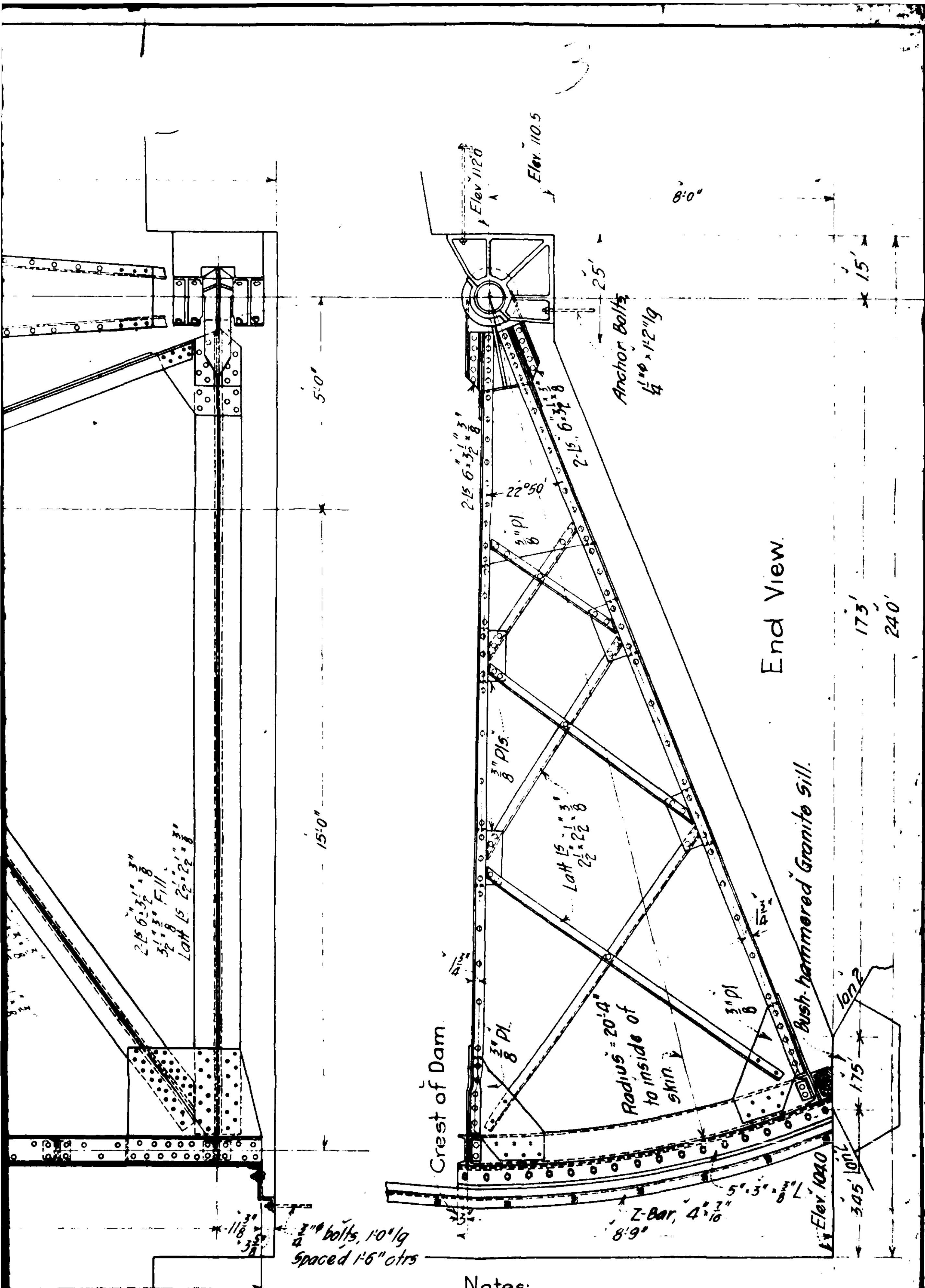
96 0" between Walls



Back Elevation



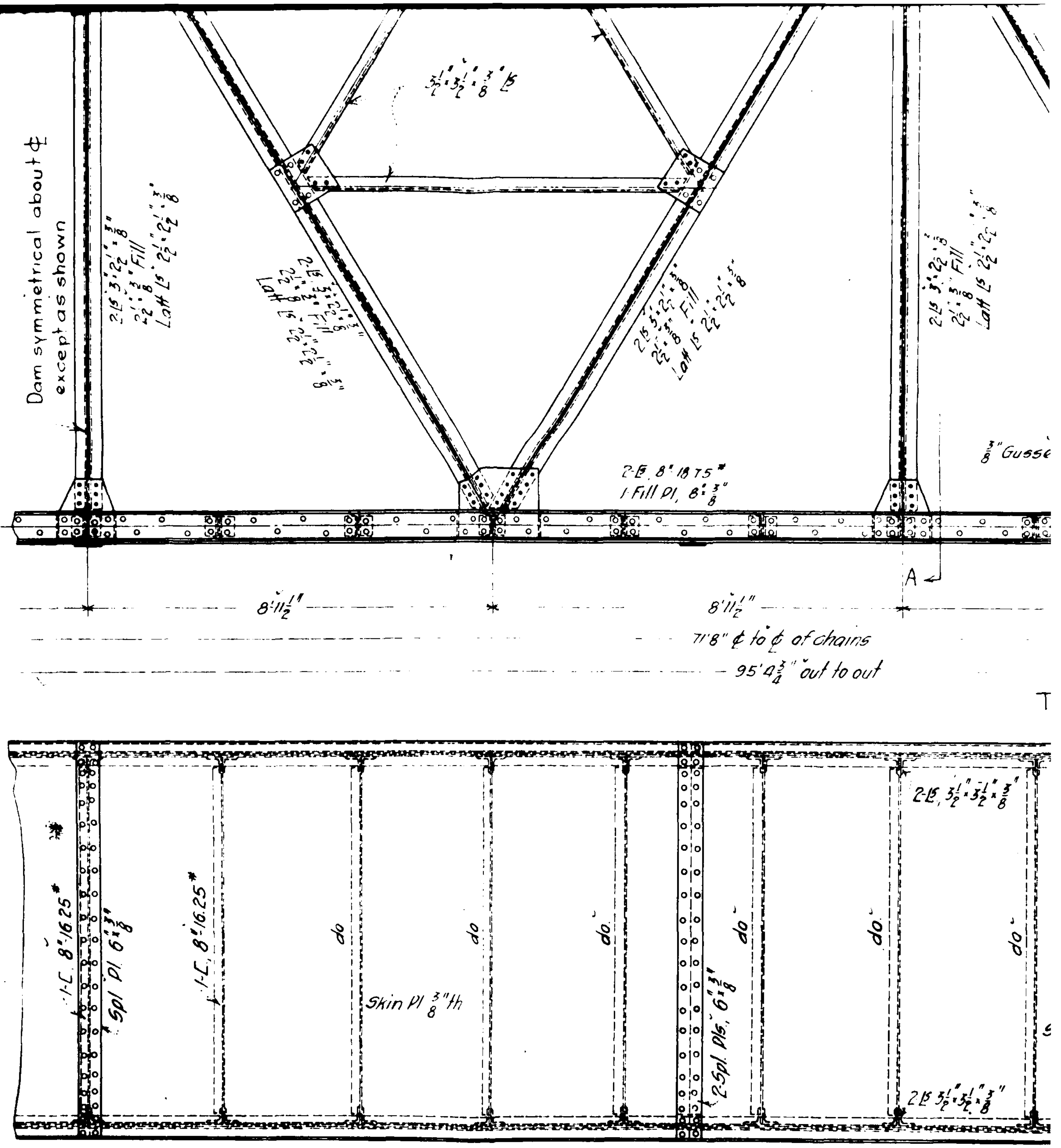

2
⅜" Pl.
⅜" Pl.
1-L, 5" x 3" x ⅜"
2 Ls 5" x 3½" x ⅜"
5" x ⅜" Fill.
5" x ⅜" Fill.
3½" x 3½" x ⅜" Ls
3½" x 3½" x ⅜" L
3½" x 3½" x ⅜" L
2 Ls 5" x 3½" x ⅜"
Lath Ls 2½" x 2½" x ⅜"
2 Ls 5" x 3½" x ⅜"
2½" x ⅜" Fill
Lath Ls 2½" x 2½" x ⅜"
2 Ls 5" x 3½" x ⅜"
3" x ⅜" Fill
Lath Ls 2½" x 2½" x ⅜"
2 Ls 5" x 3½" x ⅜"
3" x ⅜" Fill
2 Ls 8" - 16.25#
1 Fill Pl, 8" x ⅜"



Notes:

Material medium O.H. Steel, except as noted.

Rivets ⅞" diam.



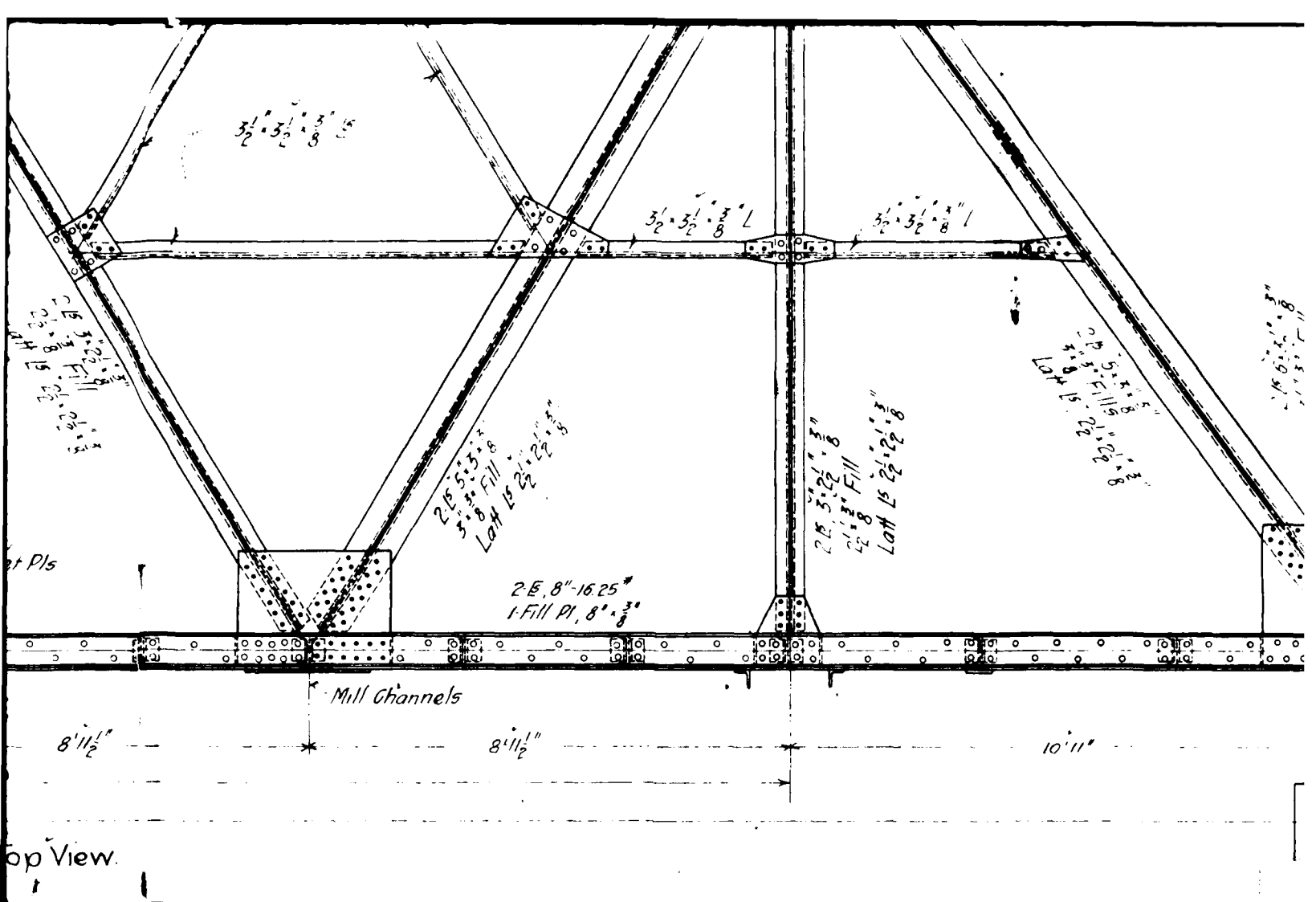
Quantities.

Structural Steel	60600#
Machined Cast Steel	3600#
" Forged "	1,055#
Babbit Metal & Bronze	500#
W. O. Timber	286 ft b.m
Leather	12 Sq. ft.

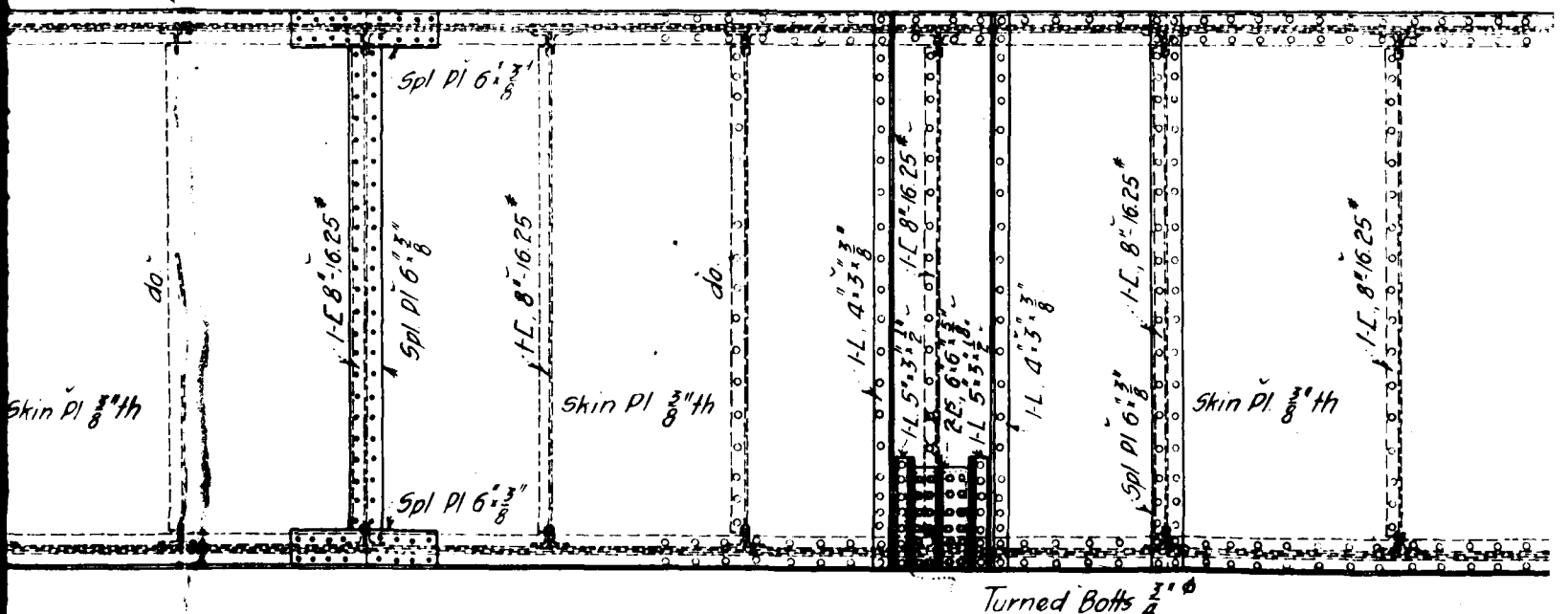
Quantities given include allowance for overrun.

MADE BY H. F. Kellogg
TRACED BY [signature]
CHECKED BY [signature]

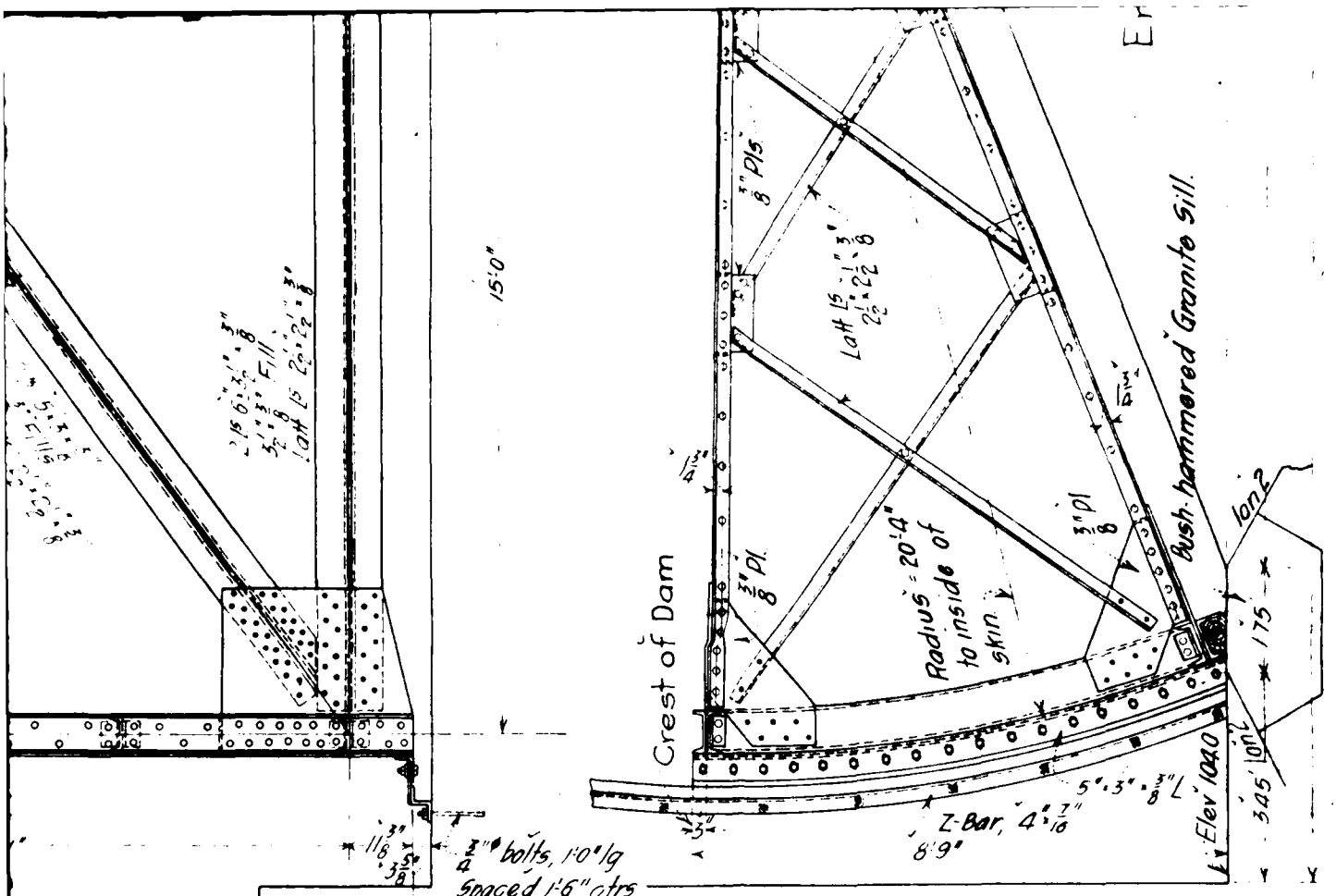
L1



Top View.



Front Elevation.



Notes:

Material medium O.H. Steel, except as noted.
Rivets $\frac{3}{4}$" diam
Open holes $\frac{13}{16}$" diam
Scale $\frac{1}{2}$" = 1'0"

Contract No. 15.

Champlain Canal — Section 3.

From Lake Champlain at Whitehall, through Wood Creek, to vicinity of Comstock's P.O.

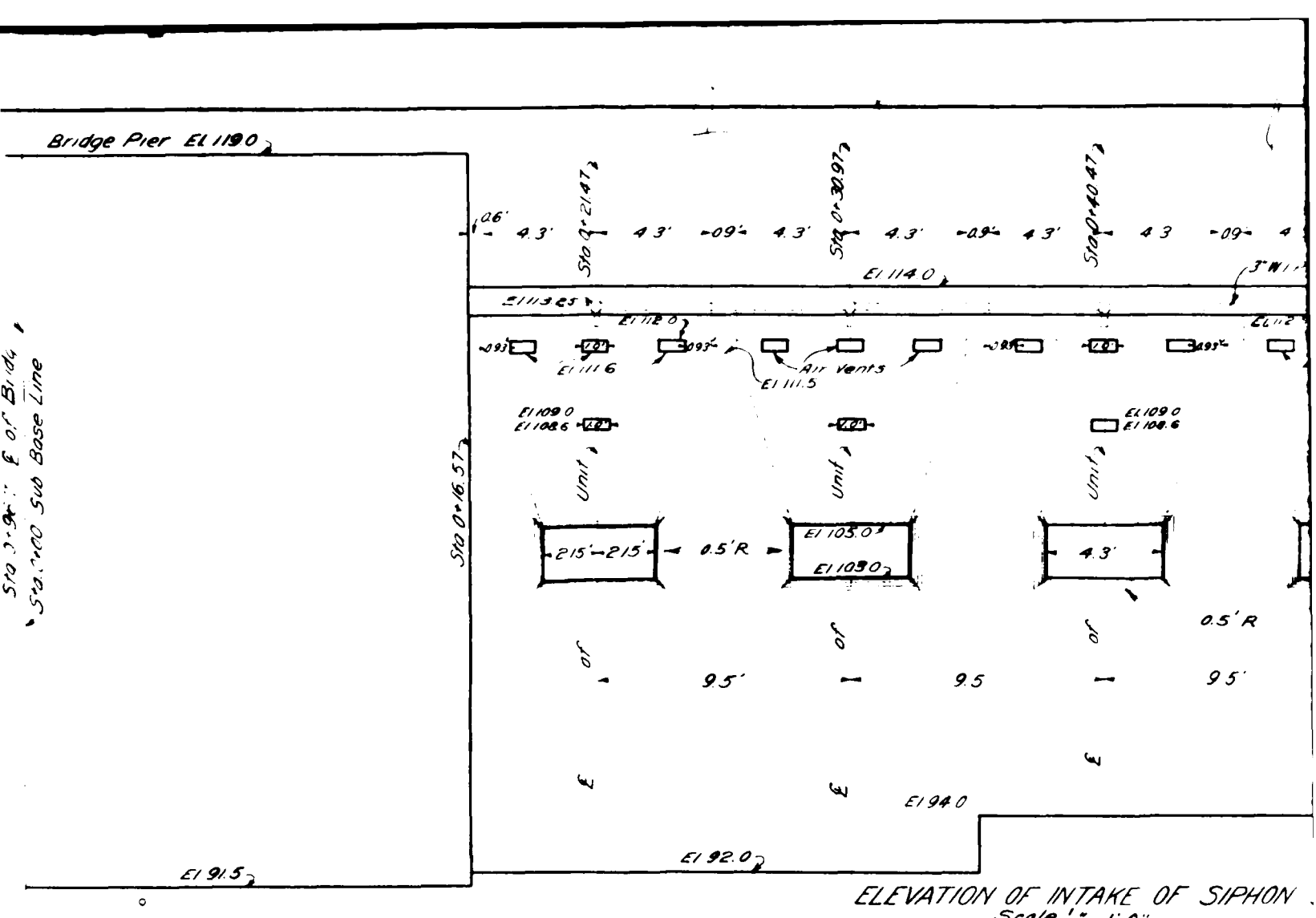
DETAILS OF MOVABLE CREST OF DAM 5, AT LOCK 12.

FOR OTHER DETAILS SEE FOLLOWING SHEET.

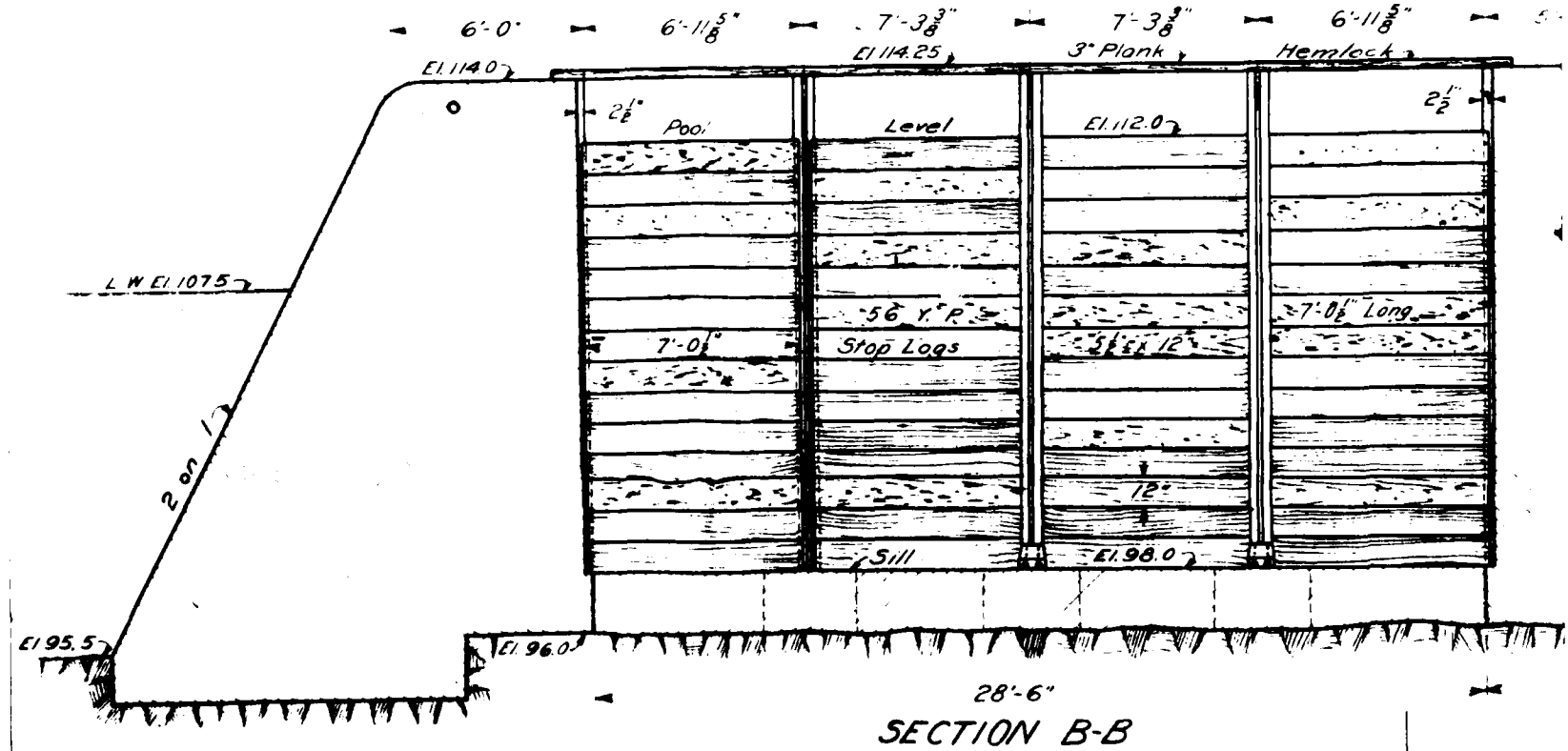
Scales as indicated.

Examined and approved,
W. K. Davis
Chief Bridge Designer and Inspector.

Examined and approved,
Special Deputy State Engr.

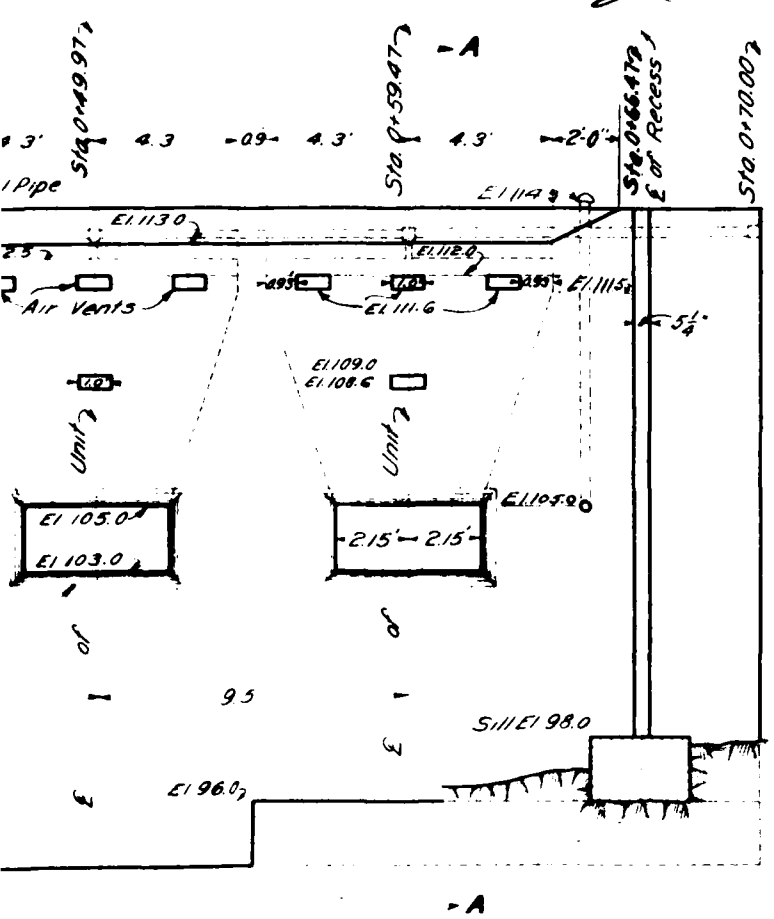


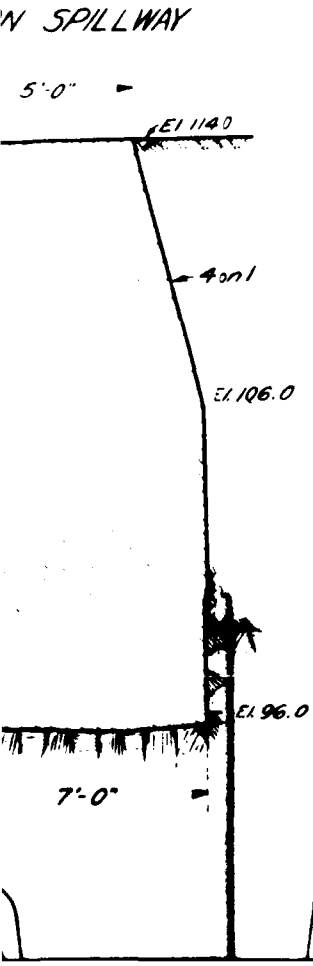
ELEVATION OF INTAKE OF SIPHON
Scale $\frac{1}{4}$" = 1'-0"

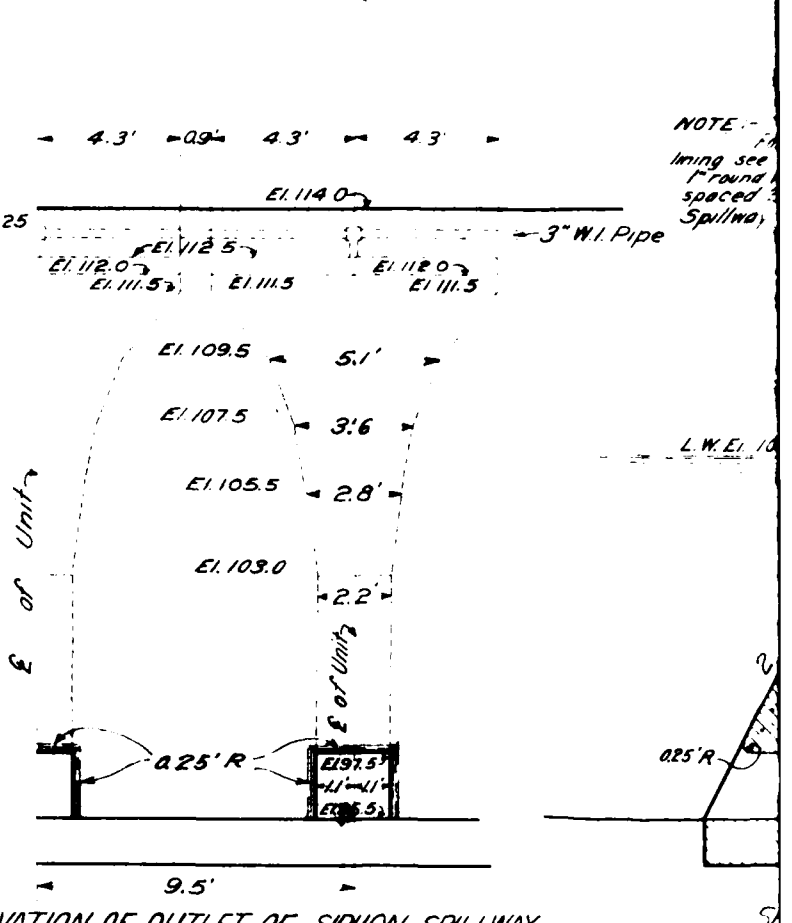


SECTION B-B
Scale $\frac{1}{4}$" = 1'-0"

Floor El 116.5



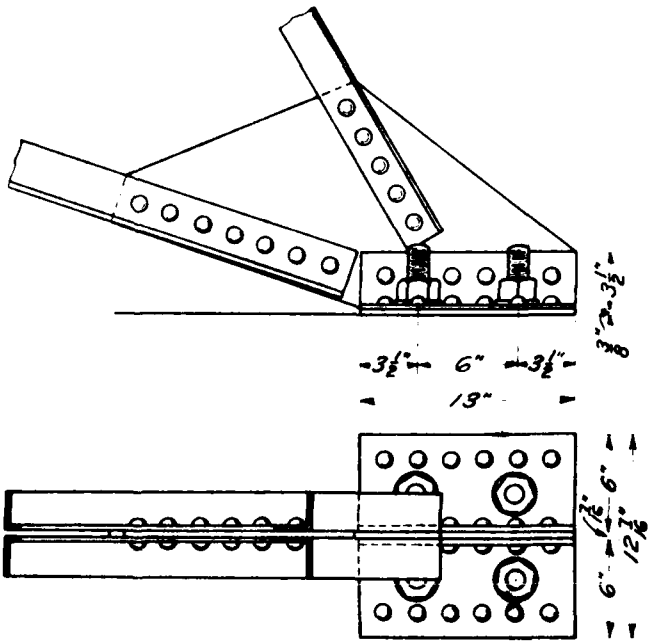




ELEVATION OF OUTLET OF SIPHON SPILLWAY

Scale ¼" = 1'-0"

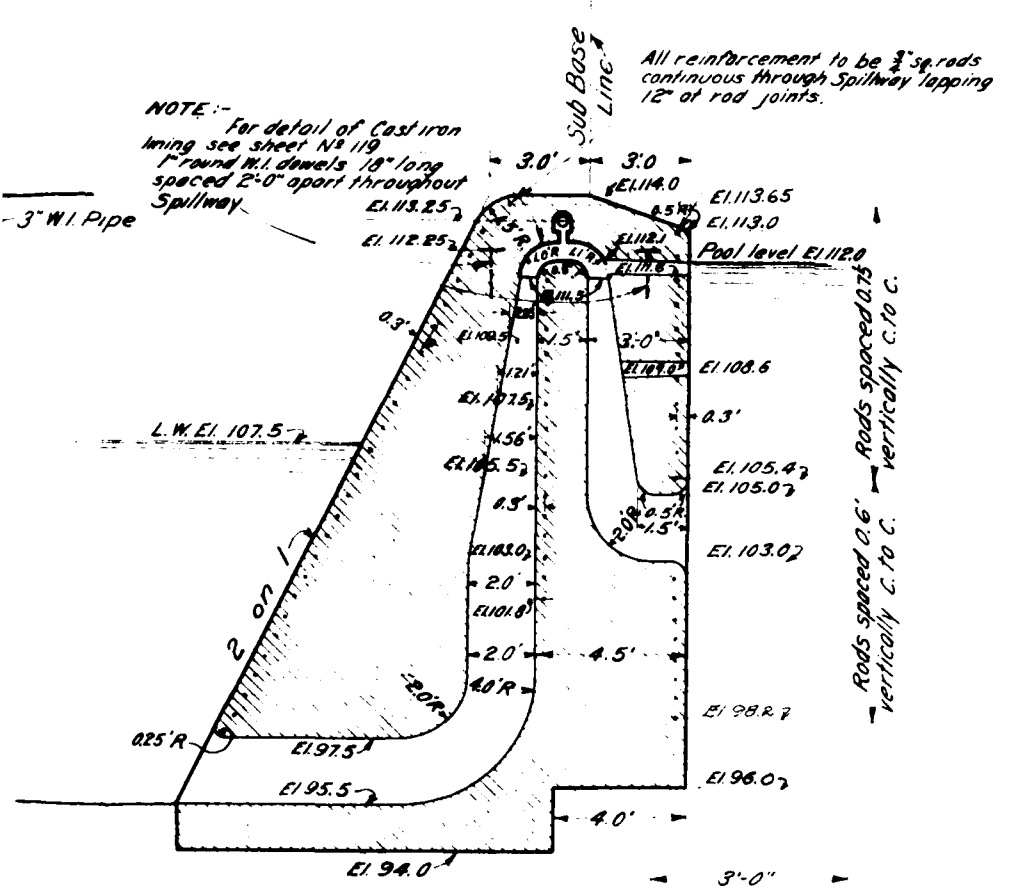
For details of Keyways, Gratings & Air Pipe inlets see sheet #84



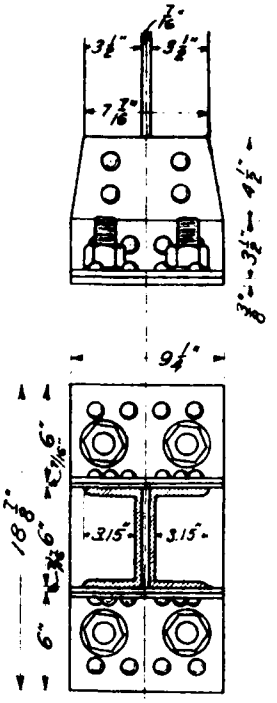
TOE

SCALE 1½" = 1'-0"

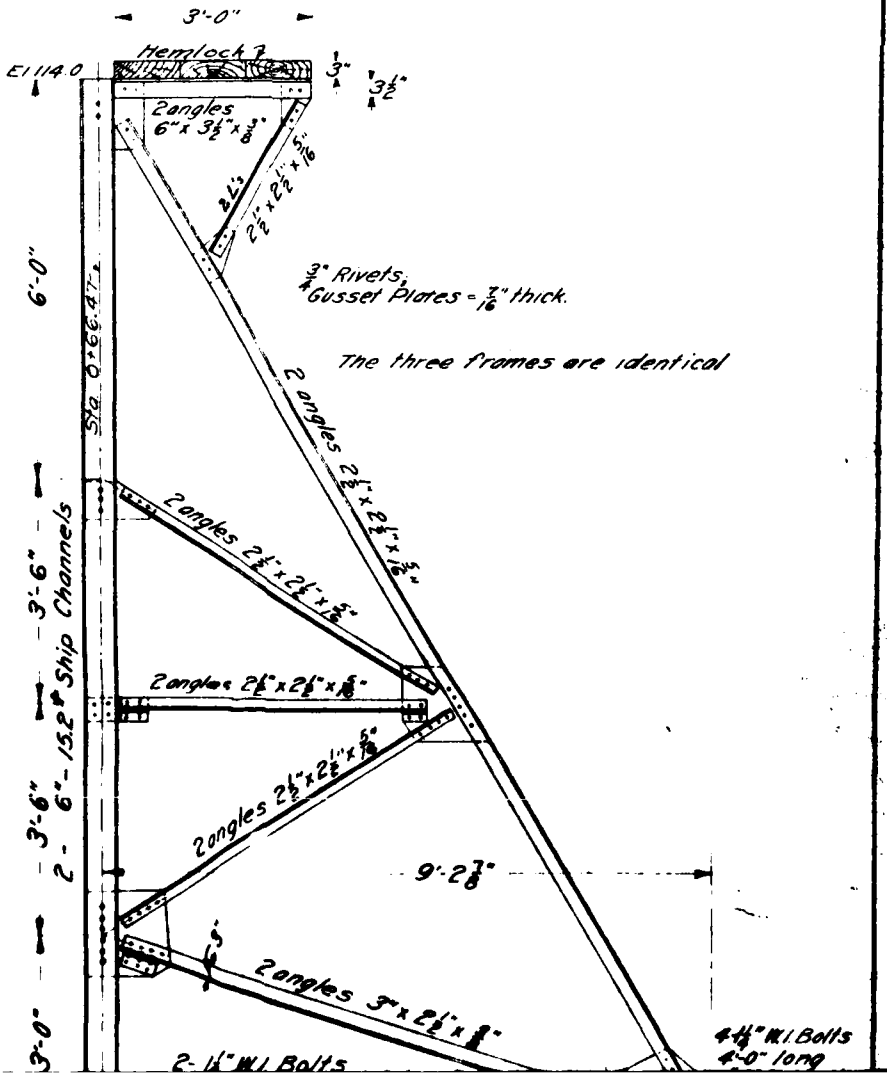
CHAMPLAIN SILK MILLS



SECTION A-A
Scale ¼"= 1'-0"



HEEL
SCALE 1½"= 1'-0"



inlets

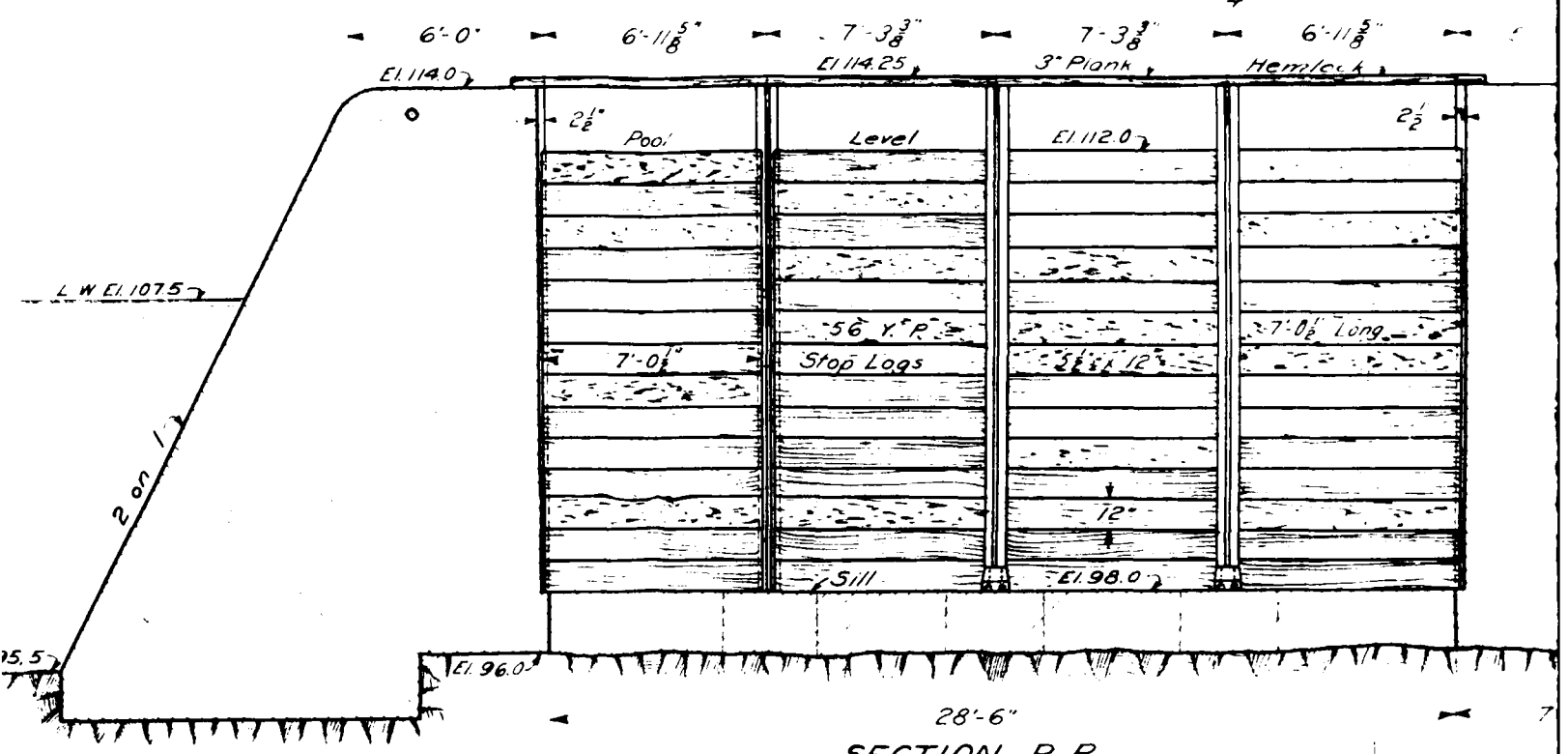
CHAMPLAIN SILK MILLS

El 91.5

El 92.0

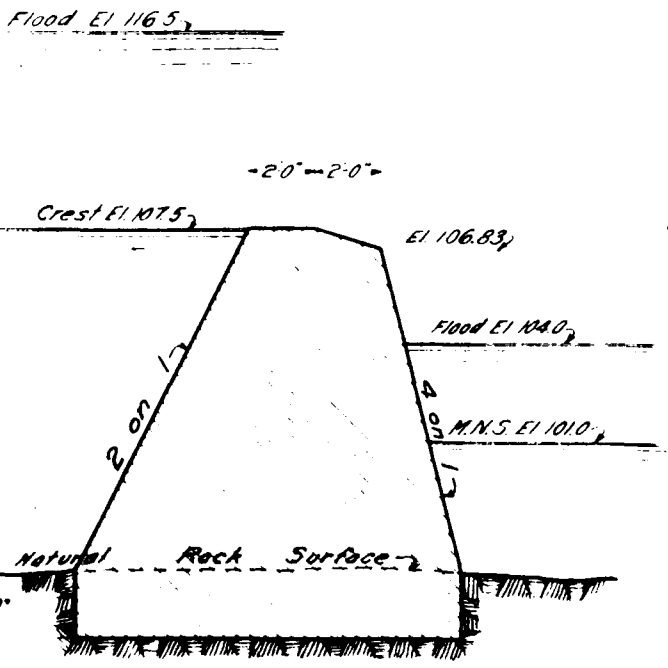
ELEVATION OF INTAKE OF SIPHON

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



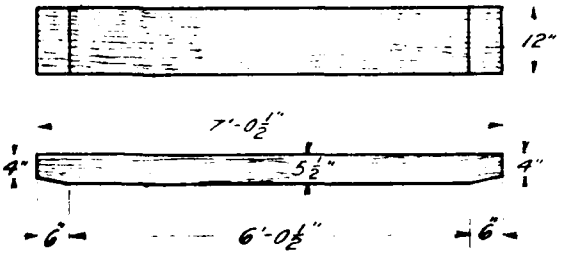
SECTION B-B

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



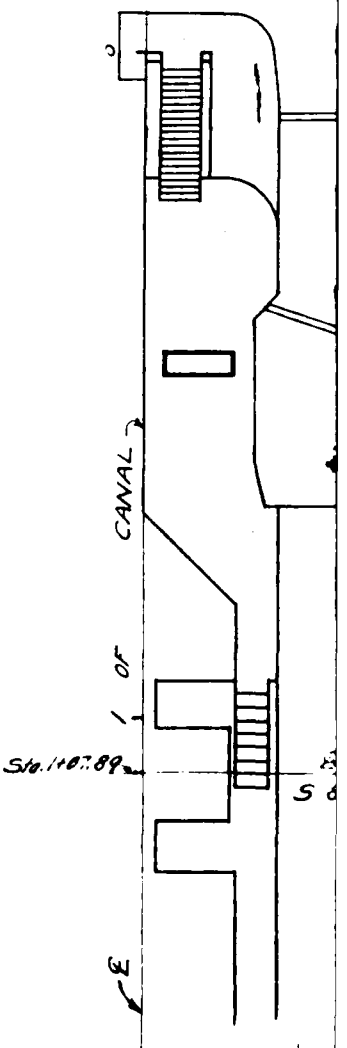
SECTION OF CONCRETE EXTENSION TO PRESENT RUBBLE DAM.

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



DETAIL OF STOP LOG.

SCALE $\frac{1}{2}$" - 1'-0"



Made by P. Pate Dixon

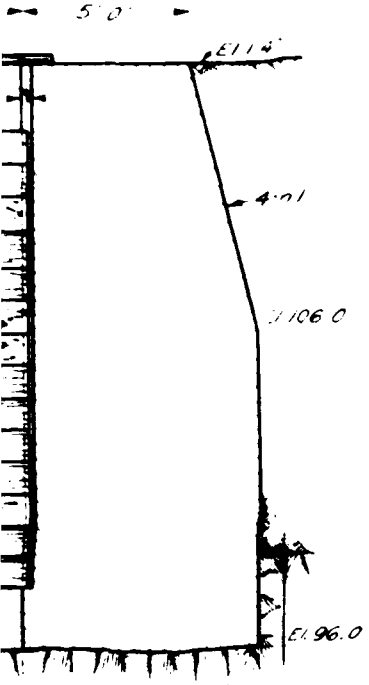
Traced by Kirkham 5/13/09

Corrected by H. G. Welch

2nd Check by Charles Kirkham

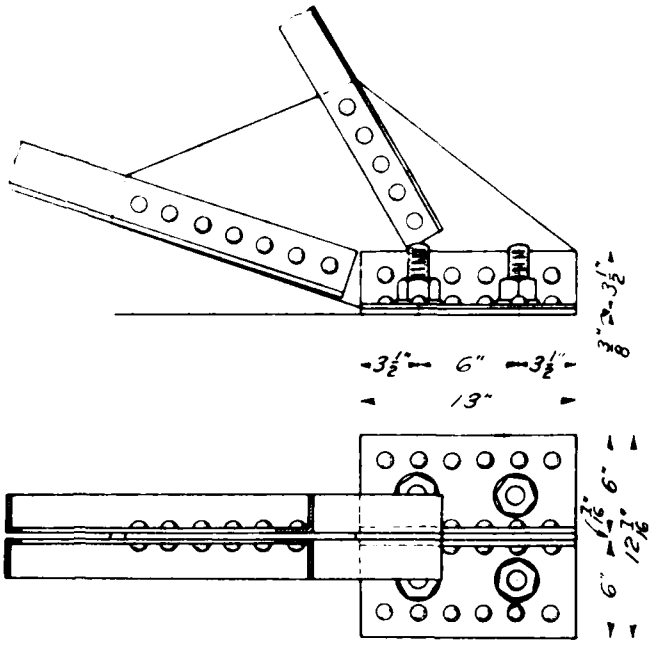
A

PHON SPILLWAY

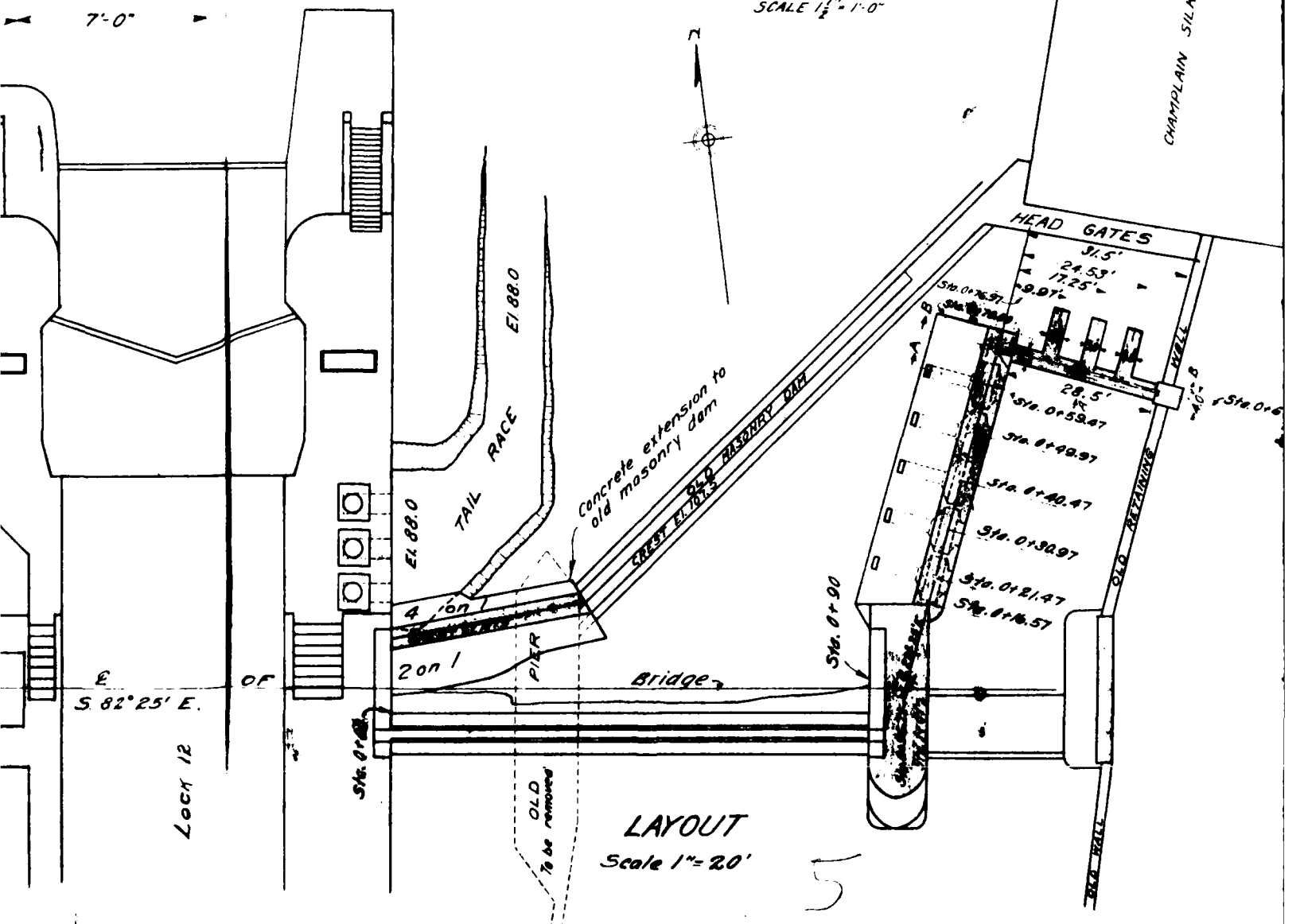


ELEVATION OF OUTLET OF SIPHON SPILLWAY
Scale 1/4" = 1'-0"

For details of Keyways, Gratings & Air Pipe inlets see sheet #84



TOE
SCALE 1½" = 1'-0"



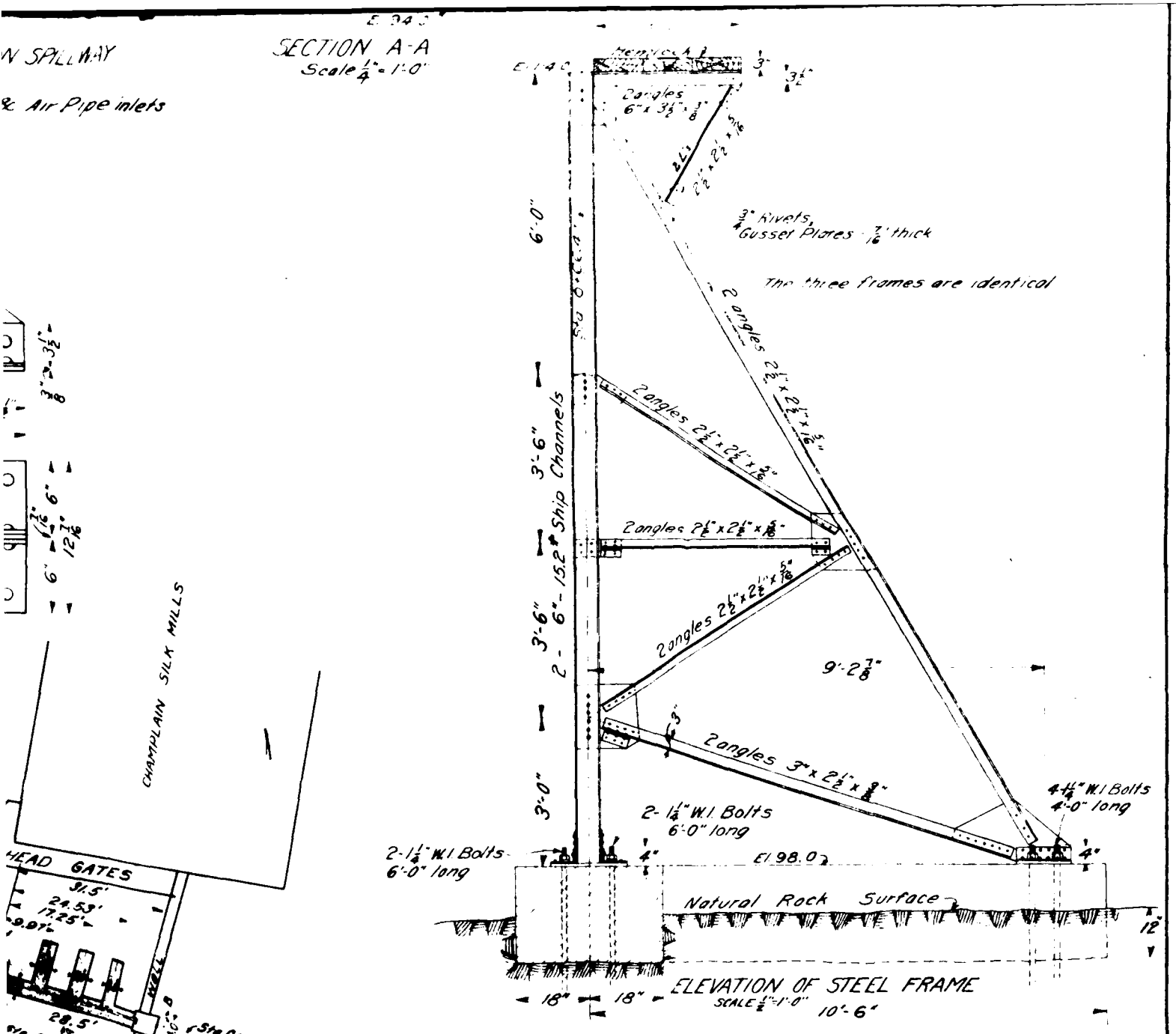
LAYOUT
Scale 1"=20'

5

N SPILLWAY

& Air Pipe inlets

SECTION A-A
Scale 1/4" = 1'-0"



Contract No. 15.

ALTERATION NO. 6 SHEET 148

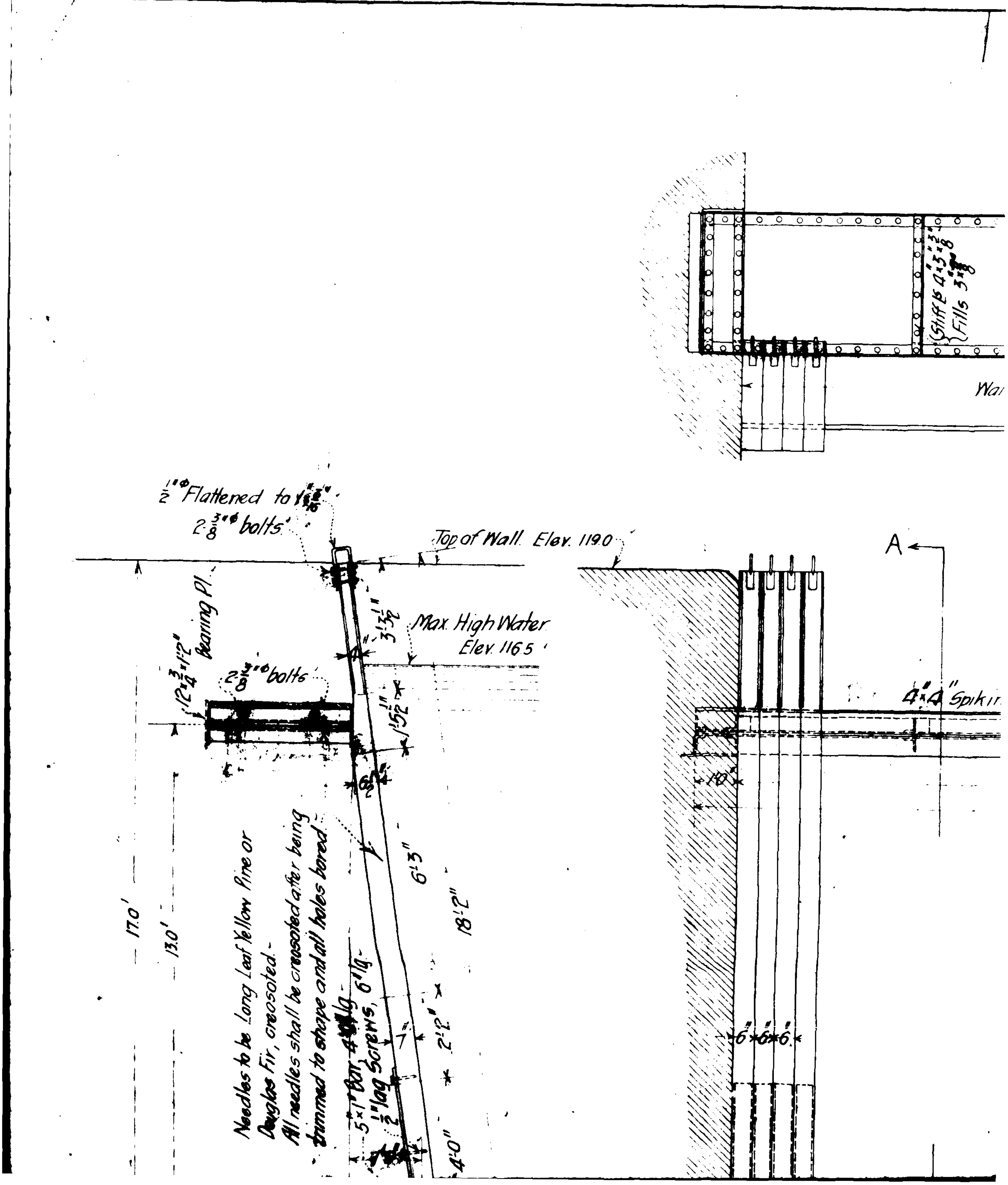
DETAILS OF DAM & BULKHEAD LOCK NO. 12

Scales as indicated

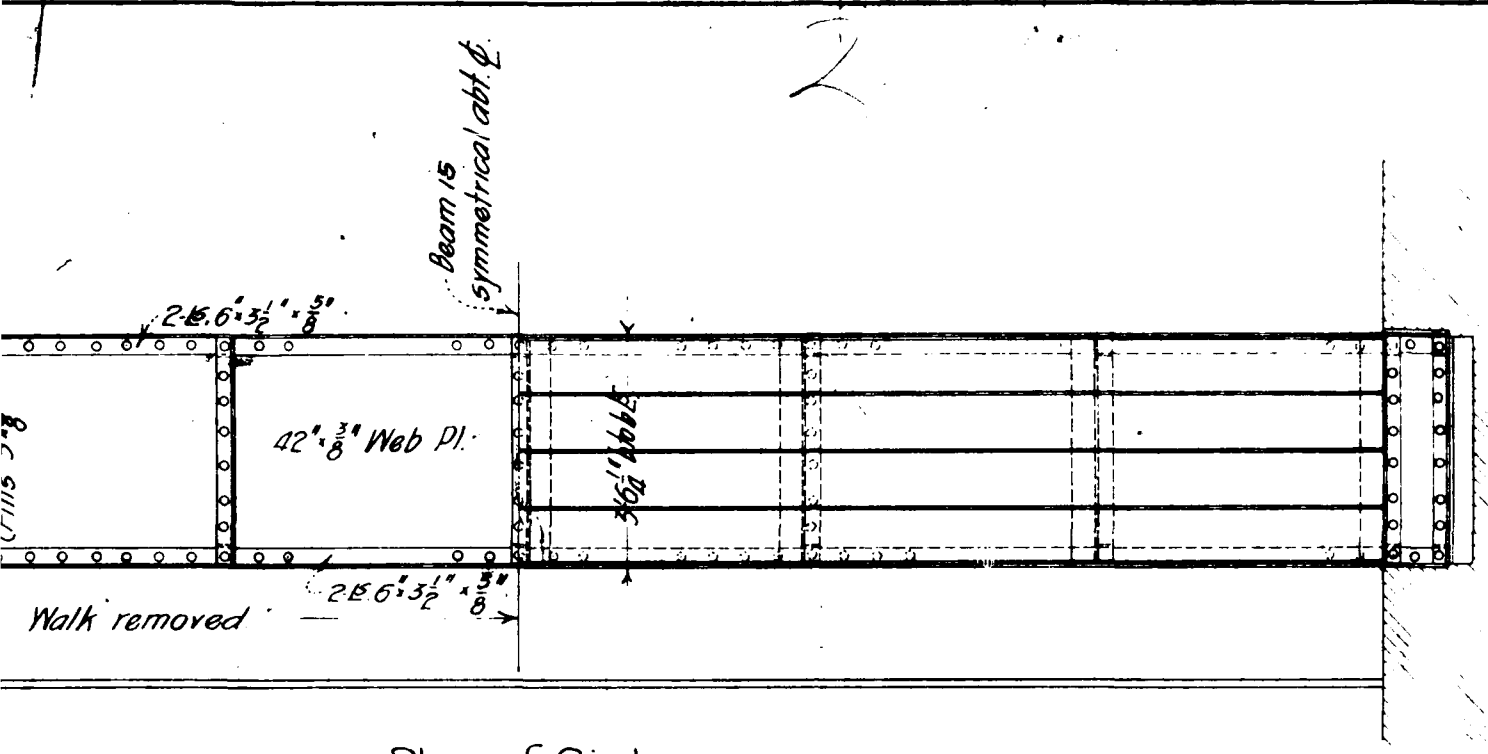
Examined and approved
G. F. Stickney
Supervising Engineer
June 2 1909

Examined and approved
Wm. Barclay Parsons
Special Deputy Chief Engineer.
June 2 1909

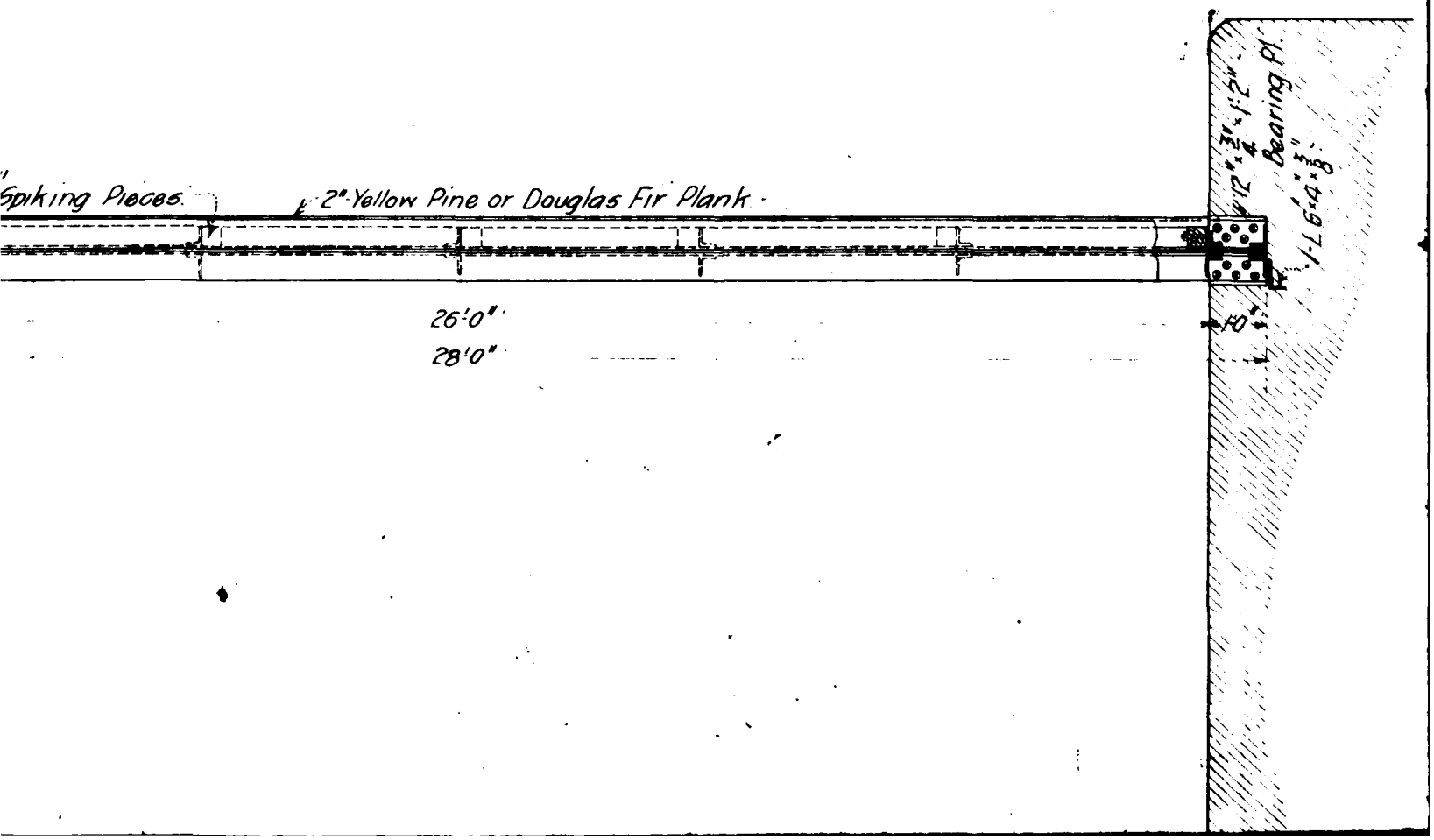
14

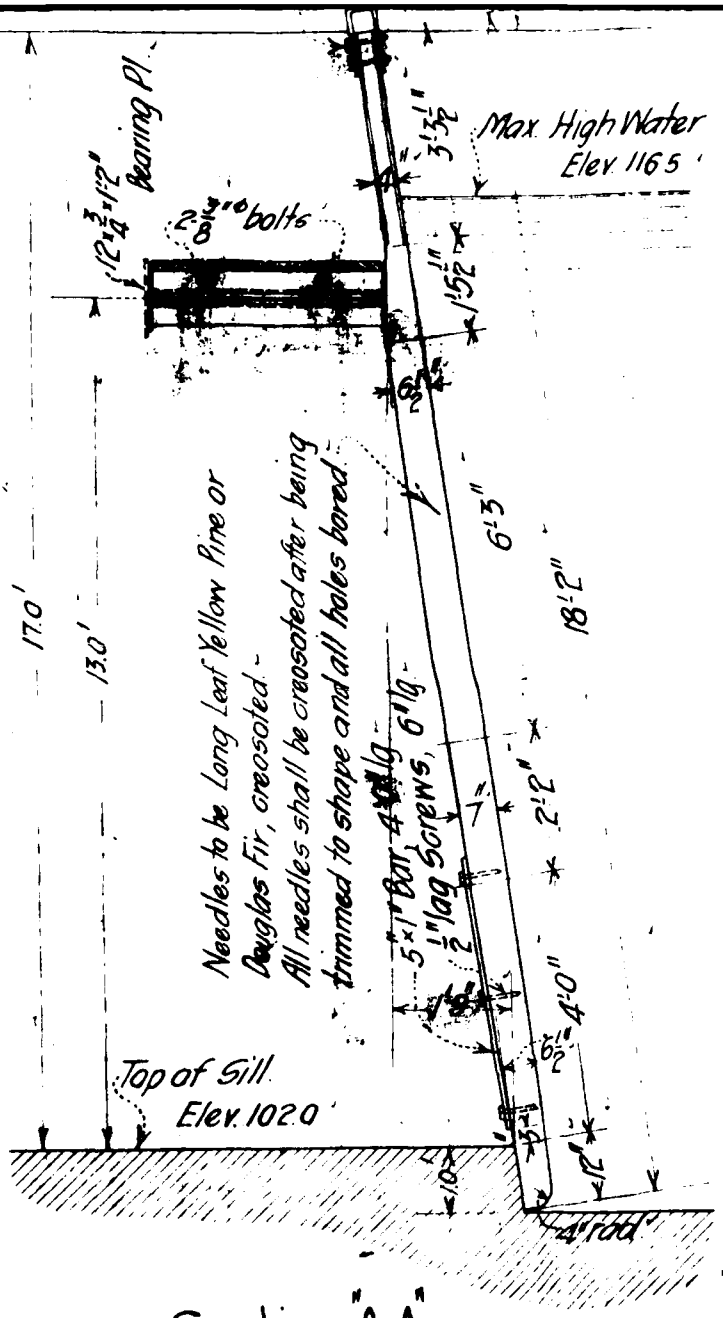


Stiff ⦣s 4"×3"×⅜"
Fills 3"×⅜"
Wa
½"ϕ Flattened to
2-⅜"ϕ bolts
Top of Wall Elev. 119.0
A
Max. High Water
Elev. 116.5
3'-3½"
Bearing Pl.
12"×¾"×1'-2"
2-⅜"ϕ bolts
1'-5½"
4"×4" Spikin
1'-0"
6'-3"
18'-2"
17.0'
13.0'
Needles to be Long Leaf Yellow Pine or
Douglas Fir, creosoted.
All needles shall be creosoted after being
trimmed to shape and all holes bored.
2'-1½"
6"×6"×6"
5×1" Bolt
½" lag Screws, 6" lg.
4'-0"

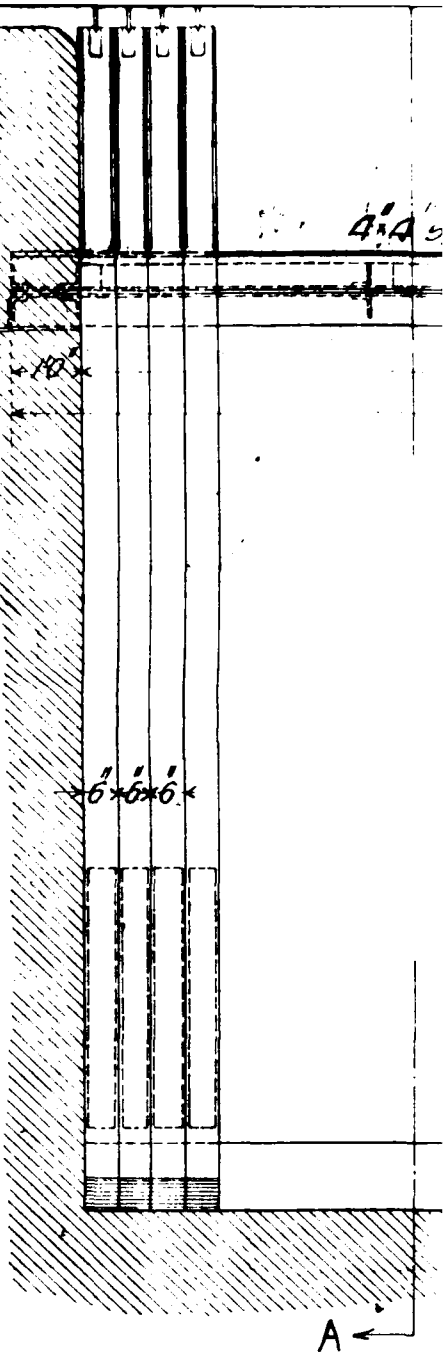


Plan of Girder.





Section "A-A".

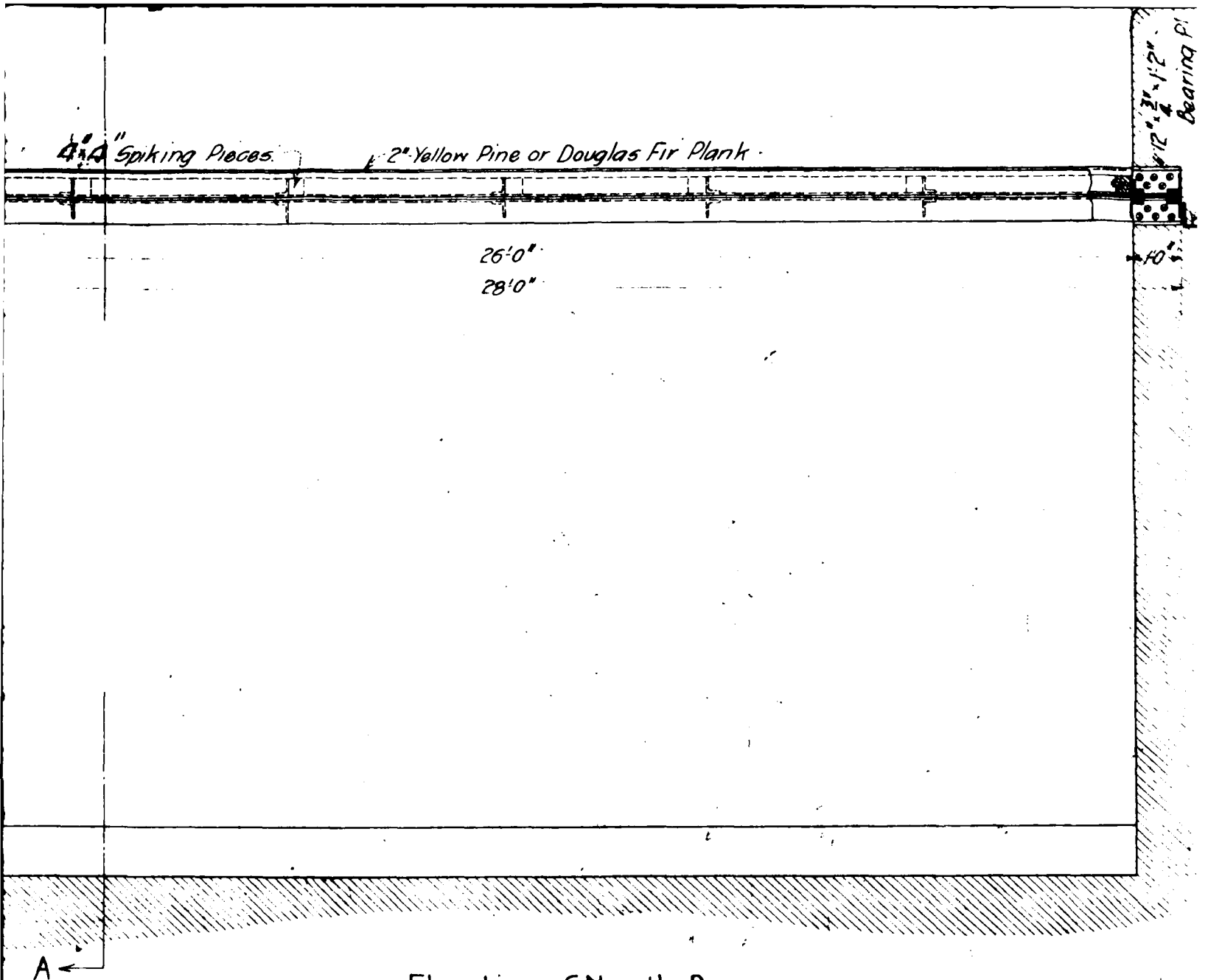


Note:-

All material medium O.H. Steel.
All holes 15/16" diameter.
All rivets 3/4" "

} Unle
other
note

Edw. G. Semon
Edw. G. Semon



Elevation of Needle Dam.

Quantities for 1 Needle Dam	
1 Steel Girder	4800#
Timber on Girder	204 ft. b.m.

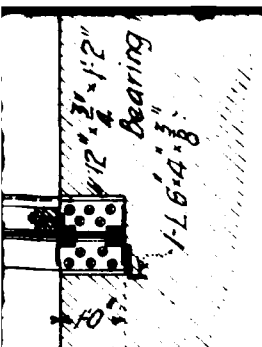
Quantities for 1 Needle	
Bars and Bolts.	[illegible]
Timber (Gross)	63 ft. b.m.

Steel:- Unless otherwise noted.

ted:

1-Girder, complete as shown

5-Needles as shown



Contract No. 15.

Champlain Canal Section 3.

From Lake Champlain at Whitehall, through Wood Creek, to vicinity of Comstock's P.O.

DETAILS OF NEEDLE DAM ACROSS HEADRACE TO SILK MILL AT LOCK 12.

5"

Scales as indicated.

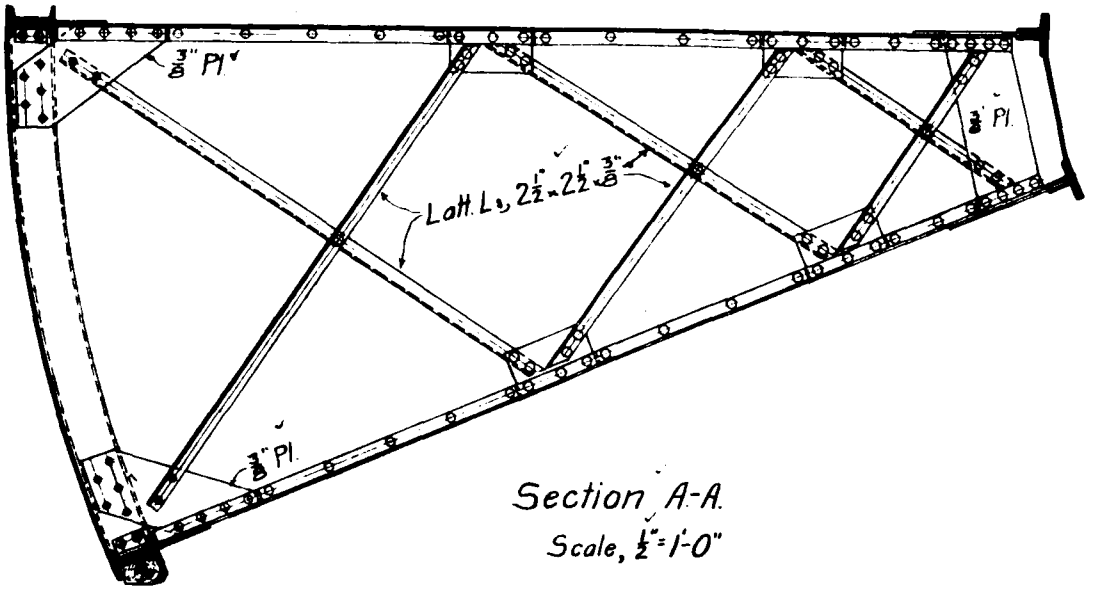
Examined and approved

Wm R. Davis

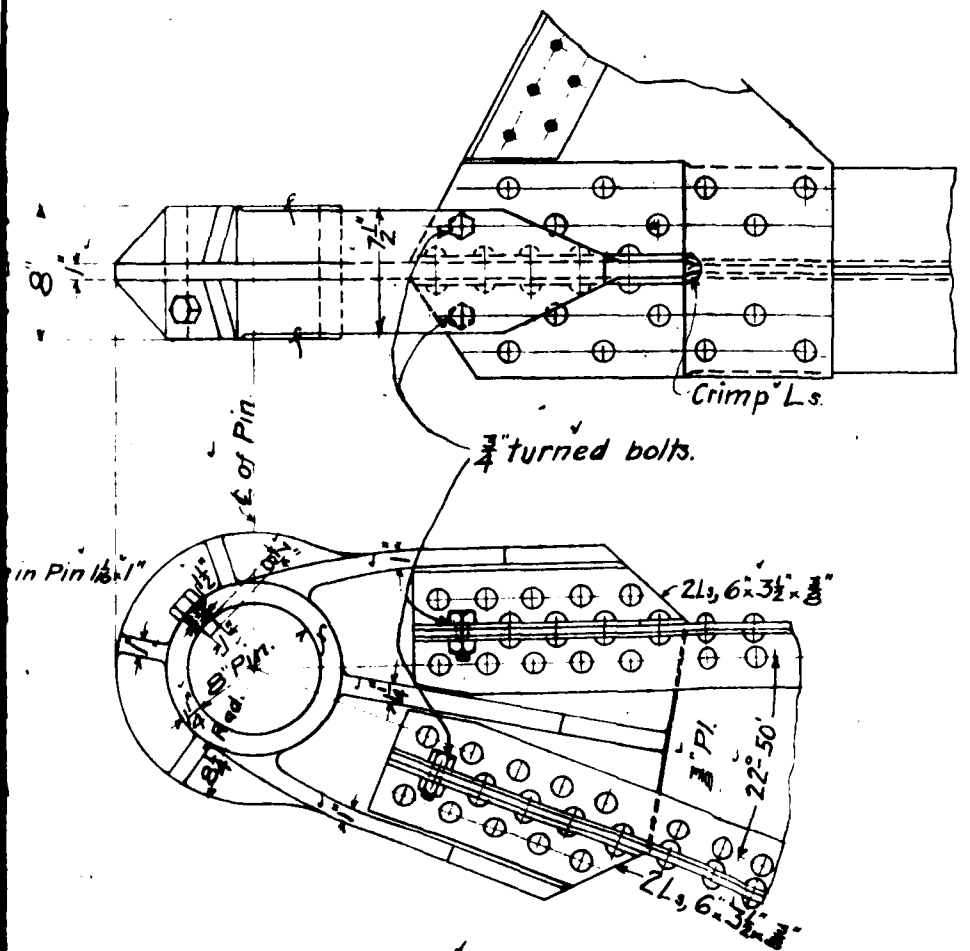
Chief Bridge Designer and Inspector

Examined and approved

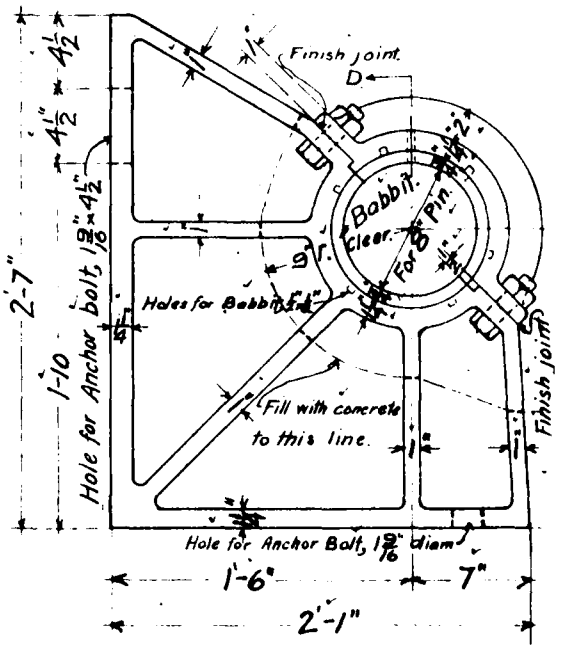
Special Inspector



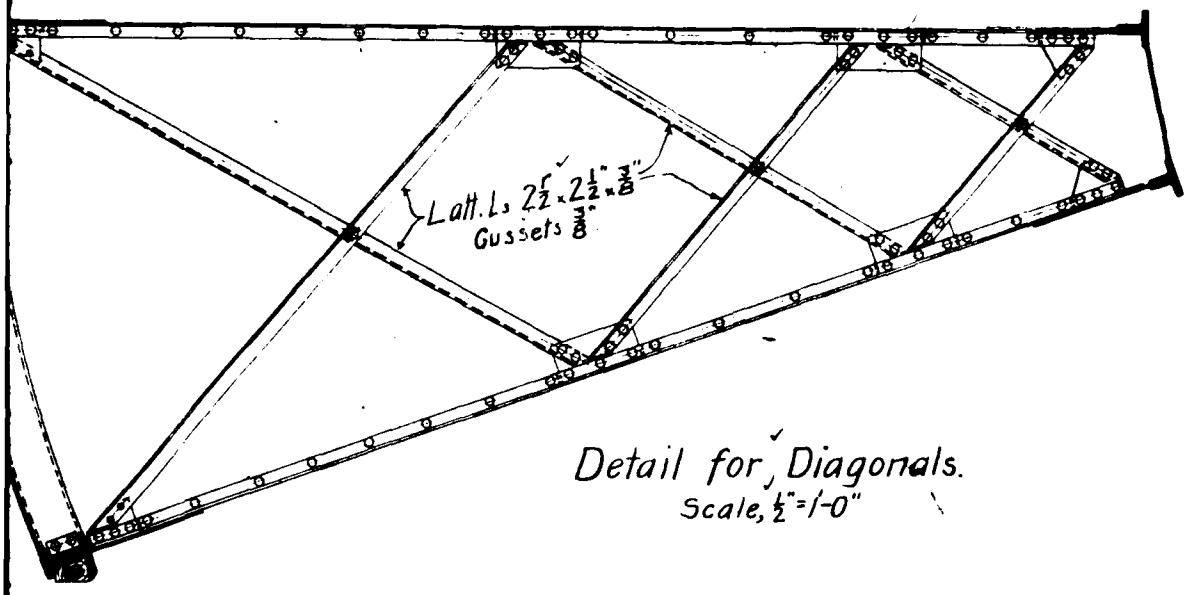
Section A-A.
Scale, ½"=1'-0"



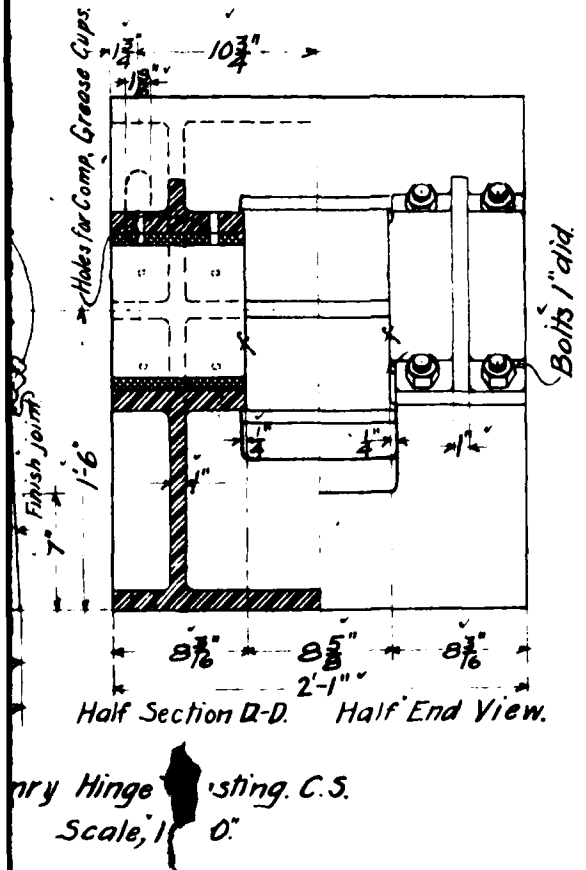
C.S. Male Hinge Casting and Connection.
Scale, 1½"=1'-0"



Masonry



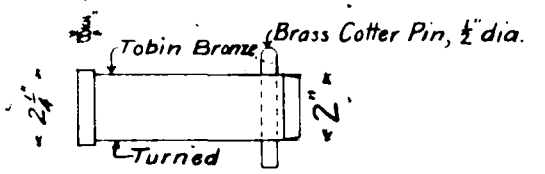
Detail for Diagonals.
Scale, ½"=1-0"



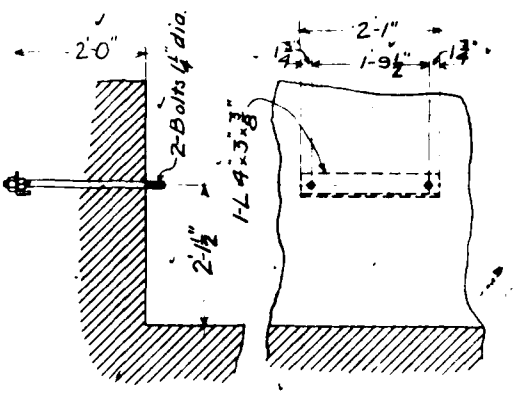
Half Section Q-D. Half End View.

nry Hinge sting. C.S.
Scale, 1 0"

Tobi
Tur
Detail
Sc
Top of Lock W

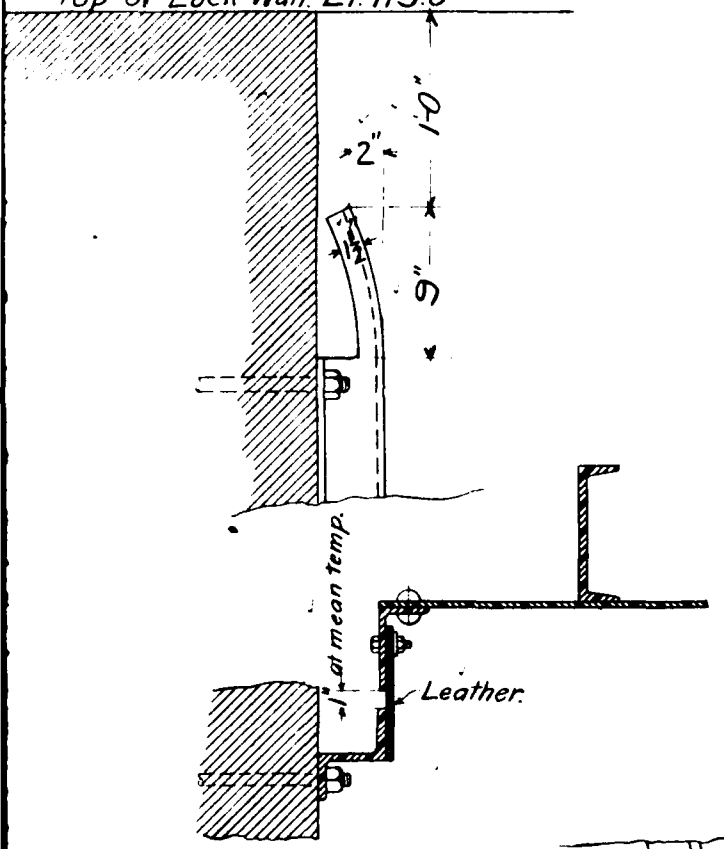


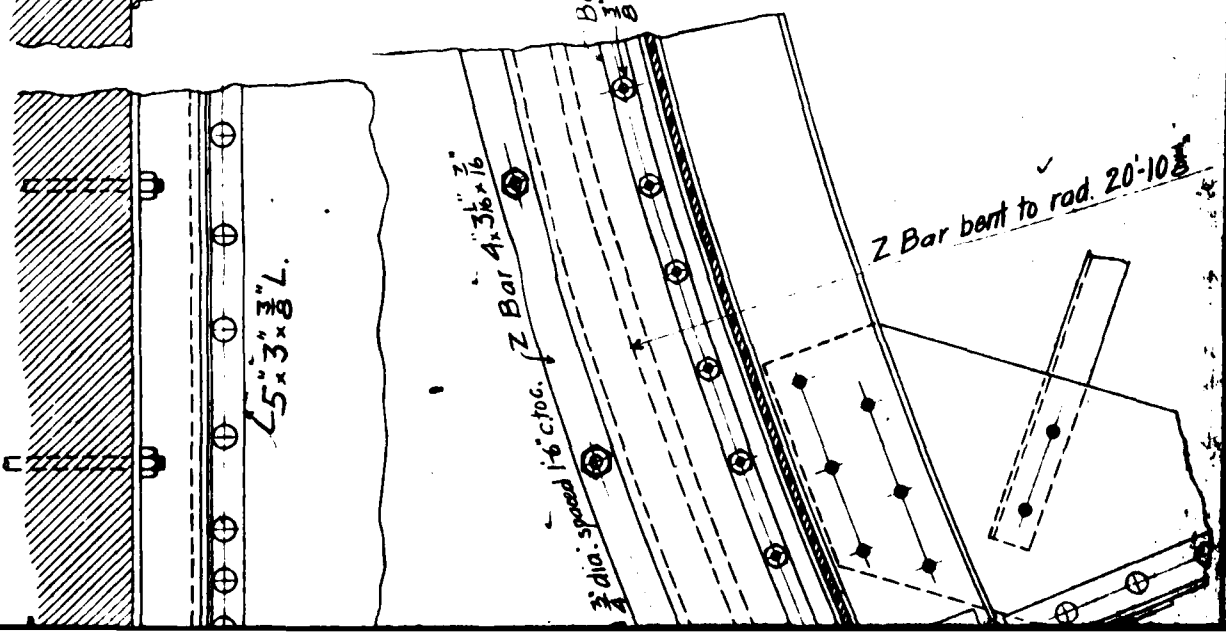
Detail of Pin.
Scale, 3" = 1'-0"

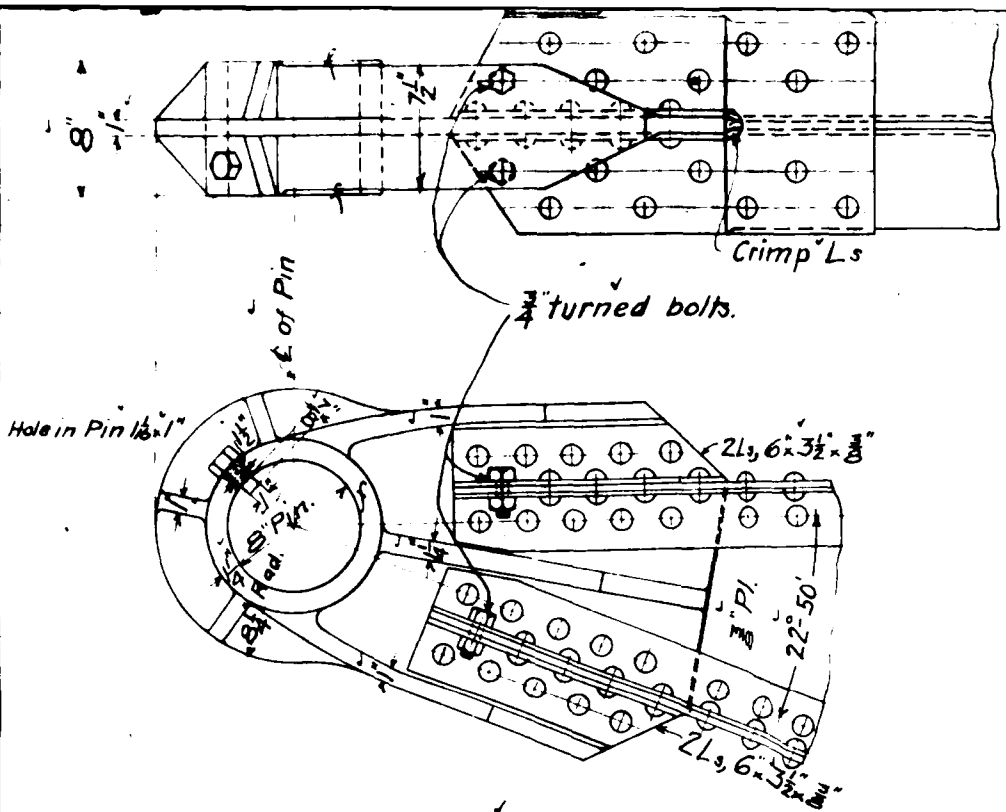


Detail of Anchorage.
Scale, ½" = 1'-0"

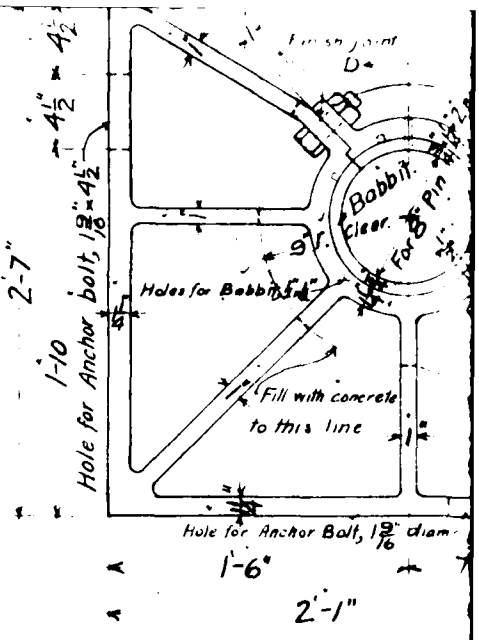
Top of Lock Wall El. 119.0

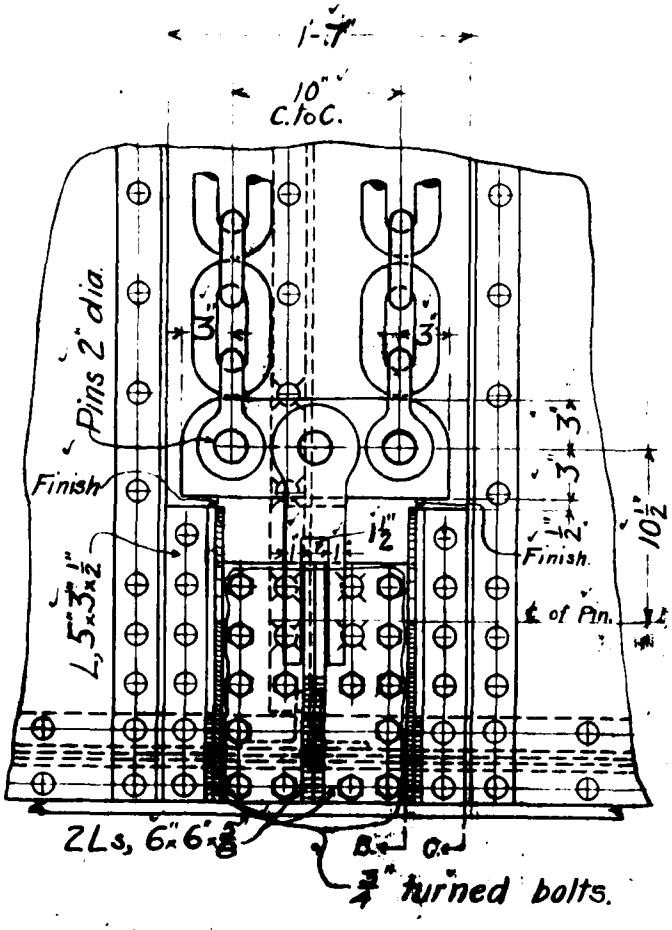


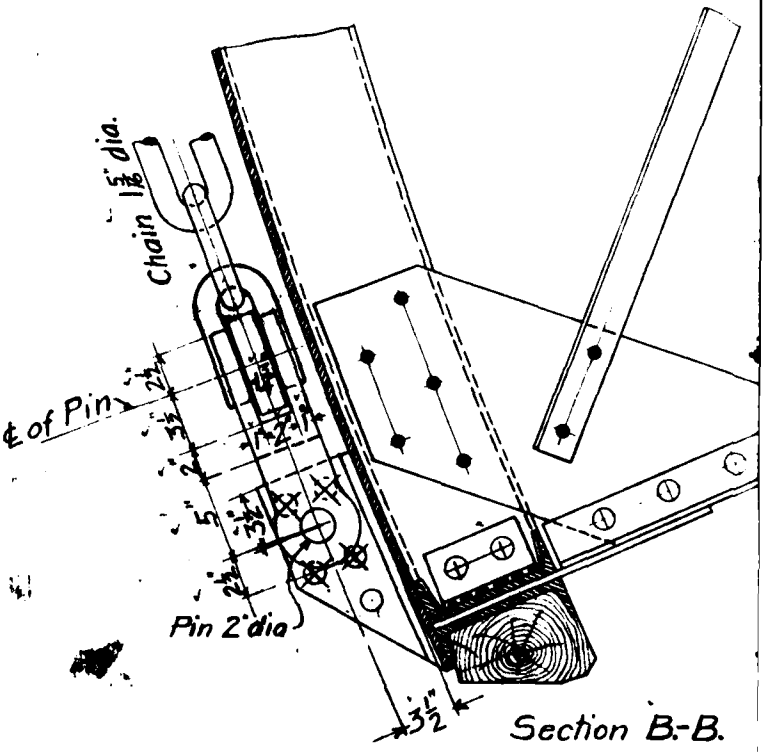




C.S. Male Hinge Casting and Connection.
Scale, 1½"=1'-0"



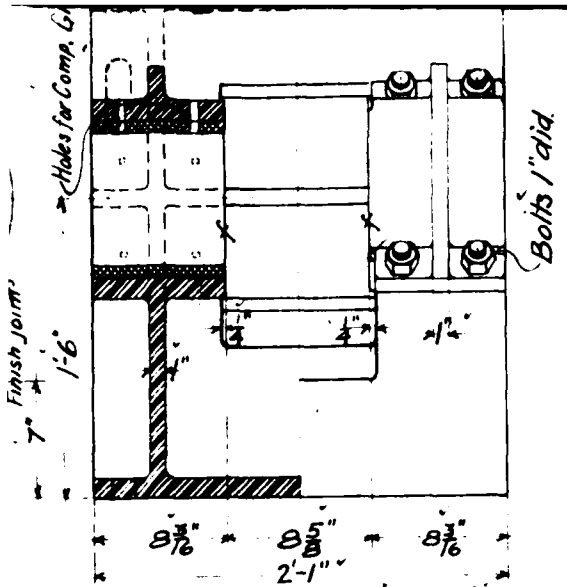




Section B.-B.

Detail of Chain Con
Scale, 1½"=1'-0"

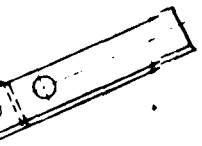
MADE BY Kellogg
TRACED BY A.E. Frost
CHECKED BY

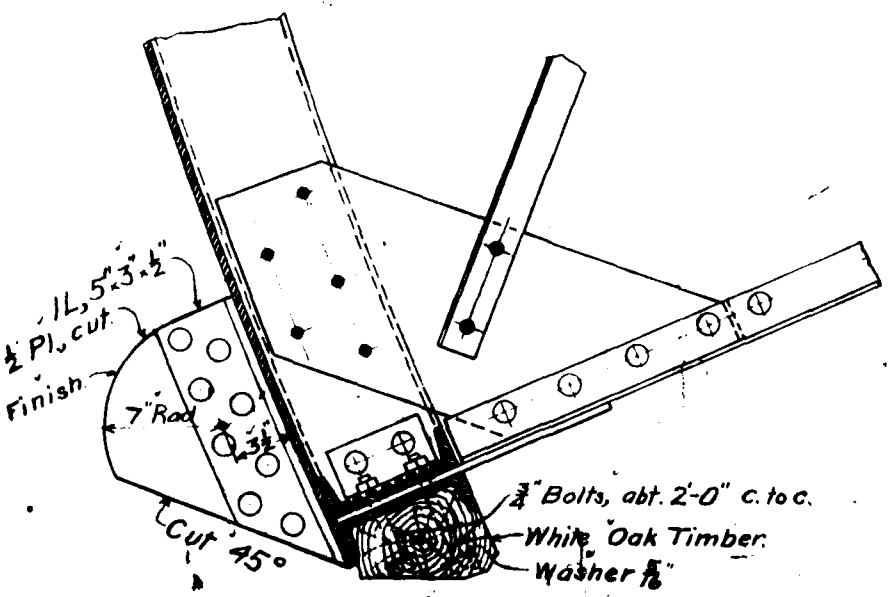


Half Section D-D. Half End View.

ry Hinge sting. C.S.
Scale, 1 0"

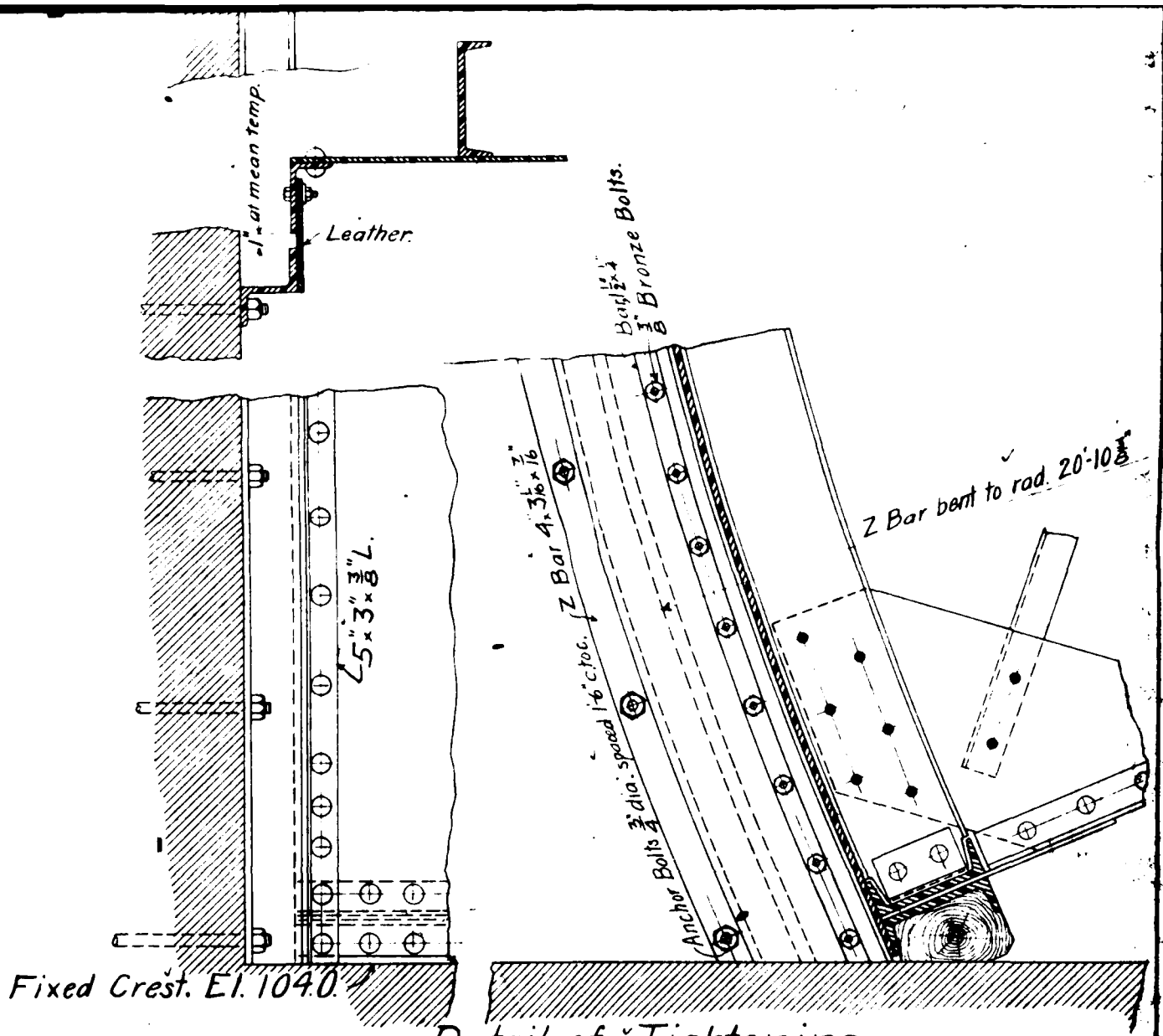
Fixed Crest. E





Section C-C.

ction.



Detail of "Tightening."
Scale, 1½"=1'-0"

Contract No. 15.

Champlain Canal Section 3.

From Lake Champlain at Whitehall, through Wood Creek, to vicinity of Comstock's P.O.

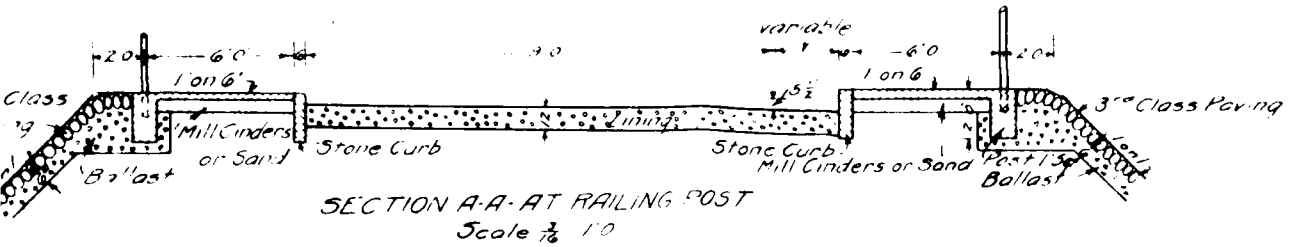
DETAILS OF MOVABLE CREST OF DAM 5, AT LOCK 12.

FOR OTHER DETAILS SEE PRECEDING SHEET.

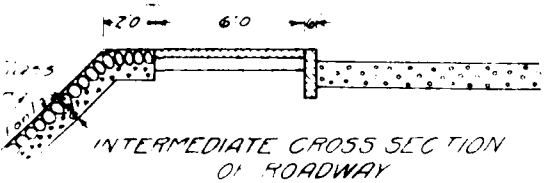
Scales as indicated.

Examined and approved
Wm. K. Davis
Chief Bridge Designer and Inspector

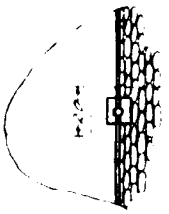
Examined and approved



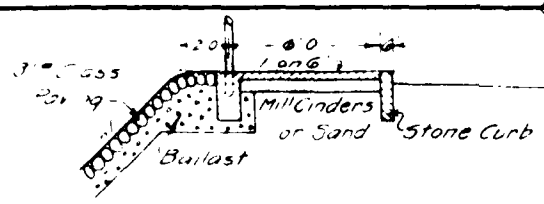
SECTION A-A- AT RAILING POST
Scale 3/16 1'0



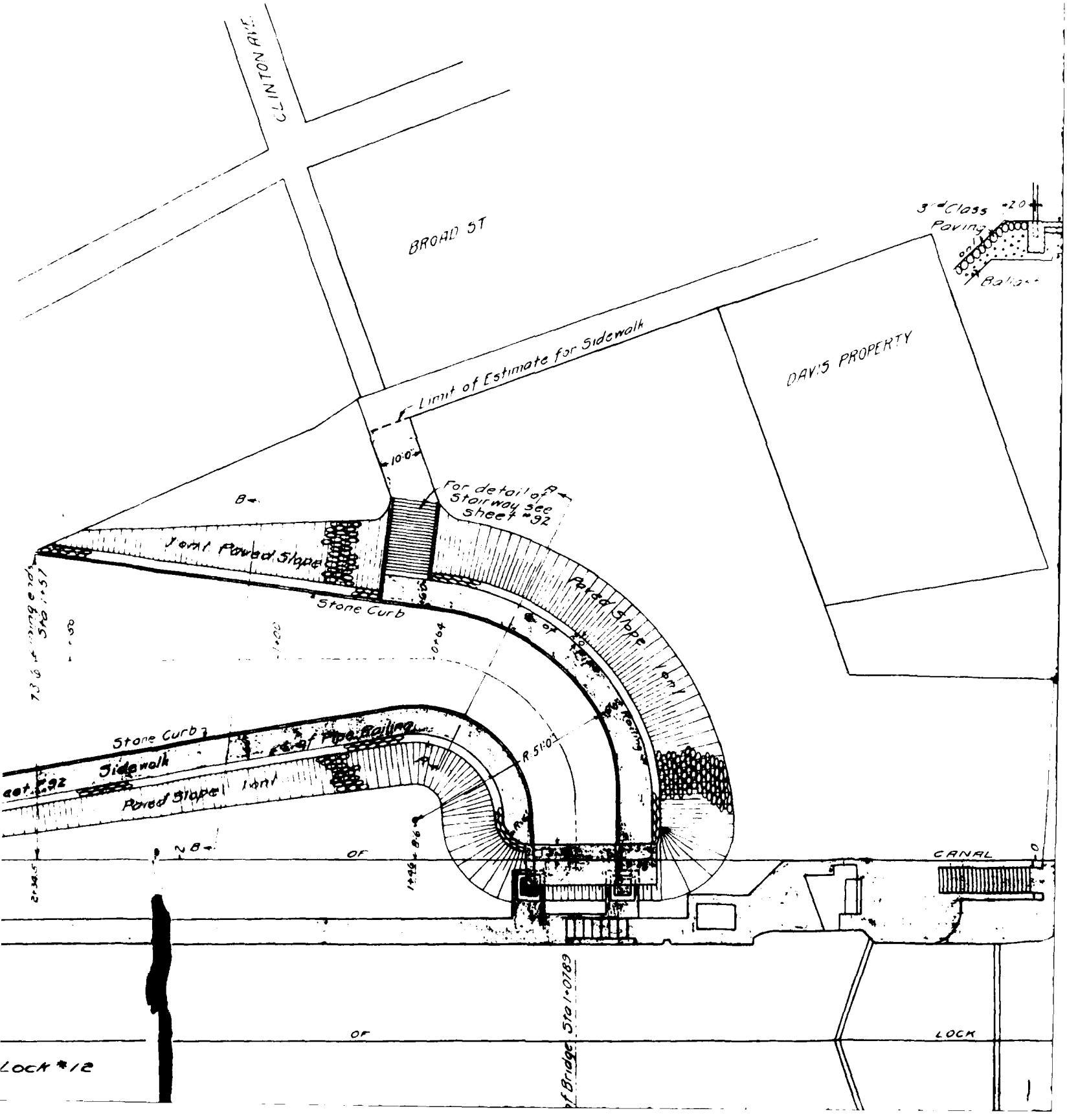
INTERMEDIATE CROSS SECTION OF ROADWAY
Scale 3/16 1'0"



PLAN OF SIDEWALK POST
Scale 3/4 1'0



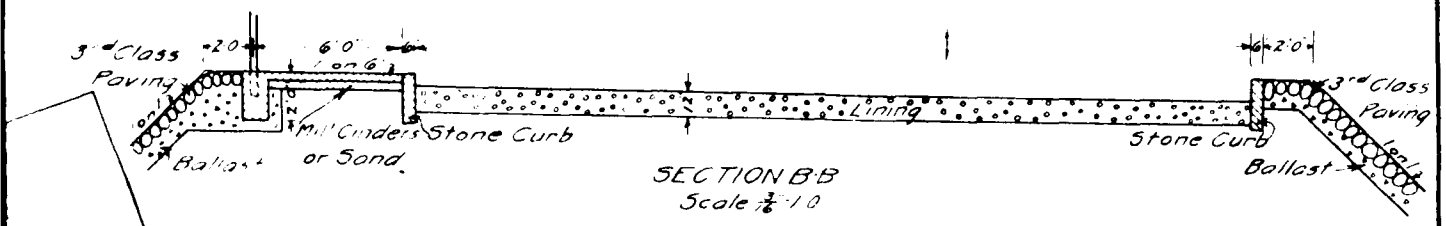
SECTION
Scale 1/2



7% Grade

Grade of Broad Street

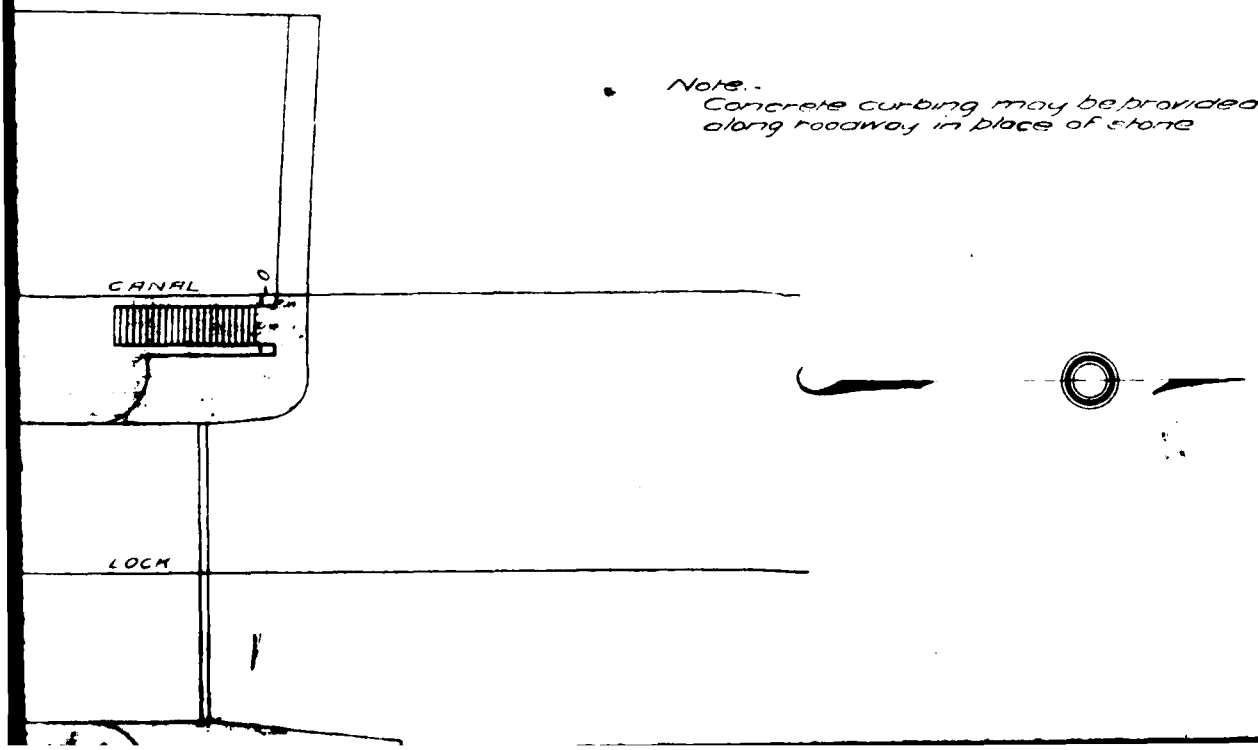
SECTION C C
Scale 1/8 1'0

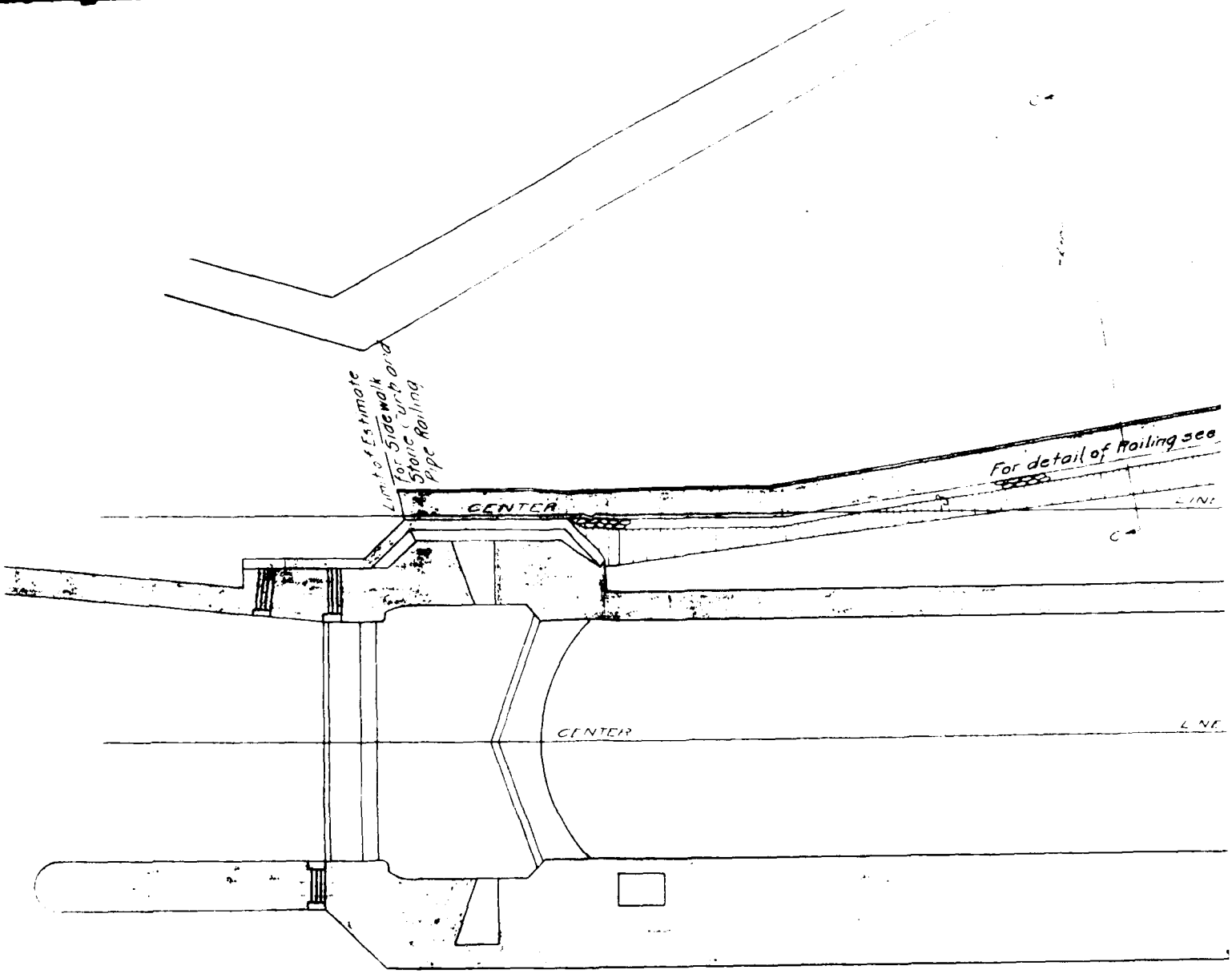


SECTION B B
Scale 1/8 1'0

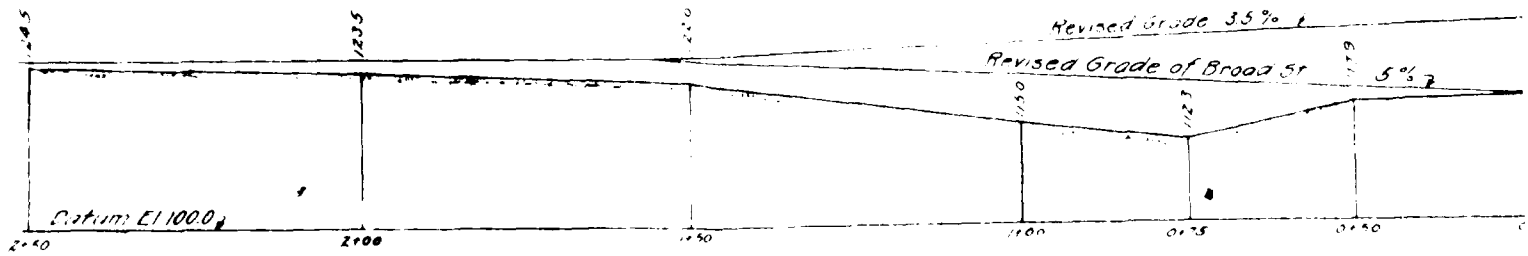
ERTY

Note.-
Concrete curbing may be provided along roadway in place of stone



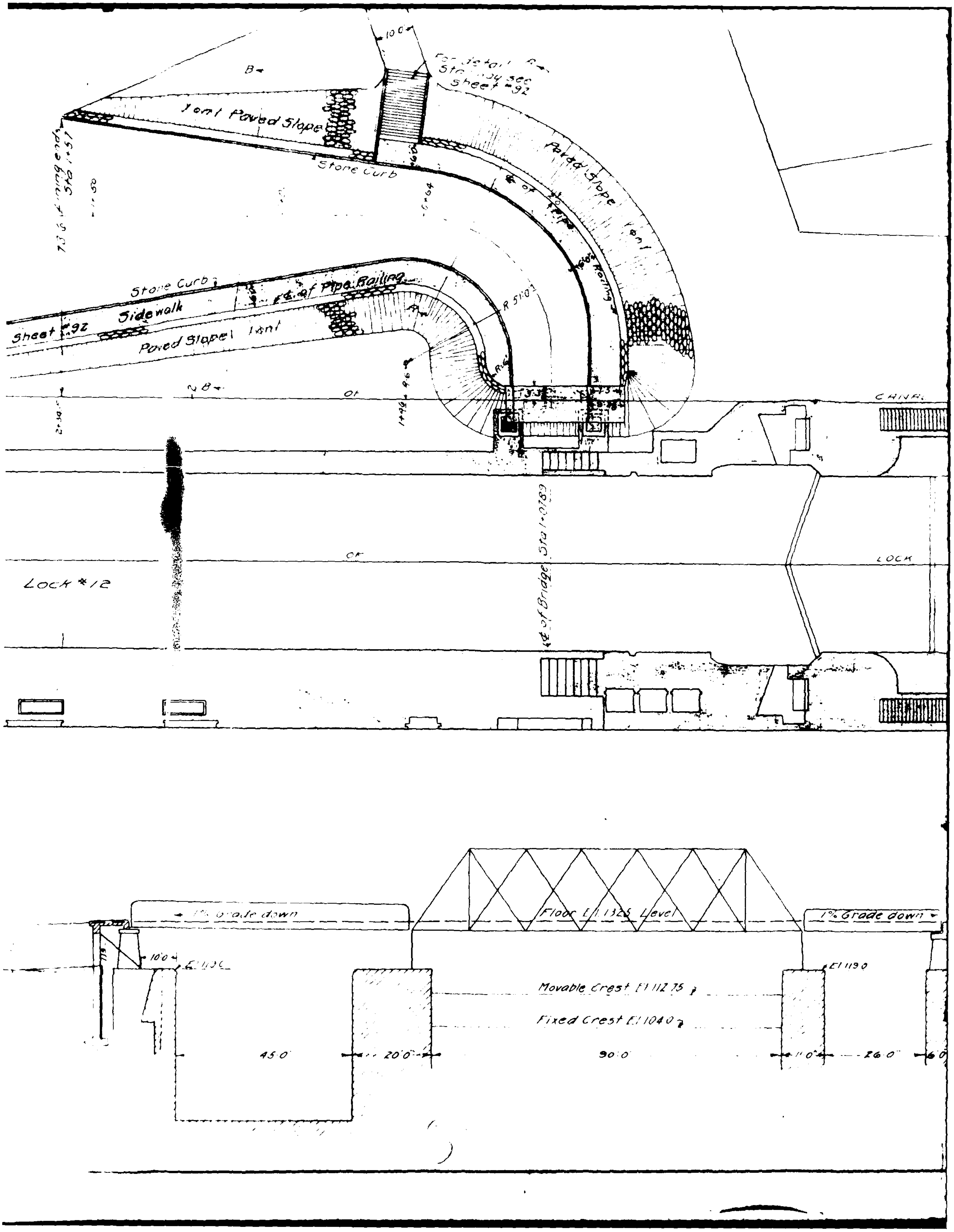


PLAN
Scale 1" = 20'



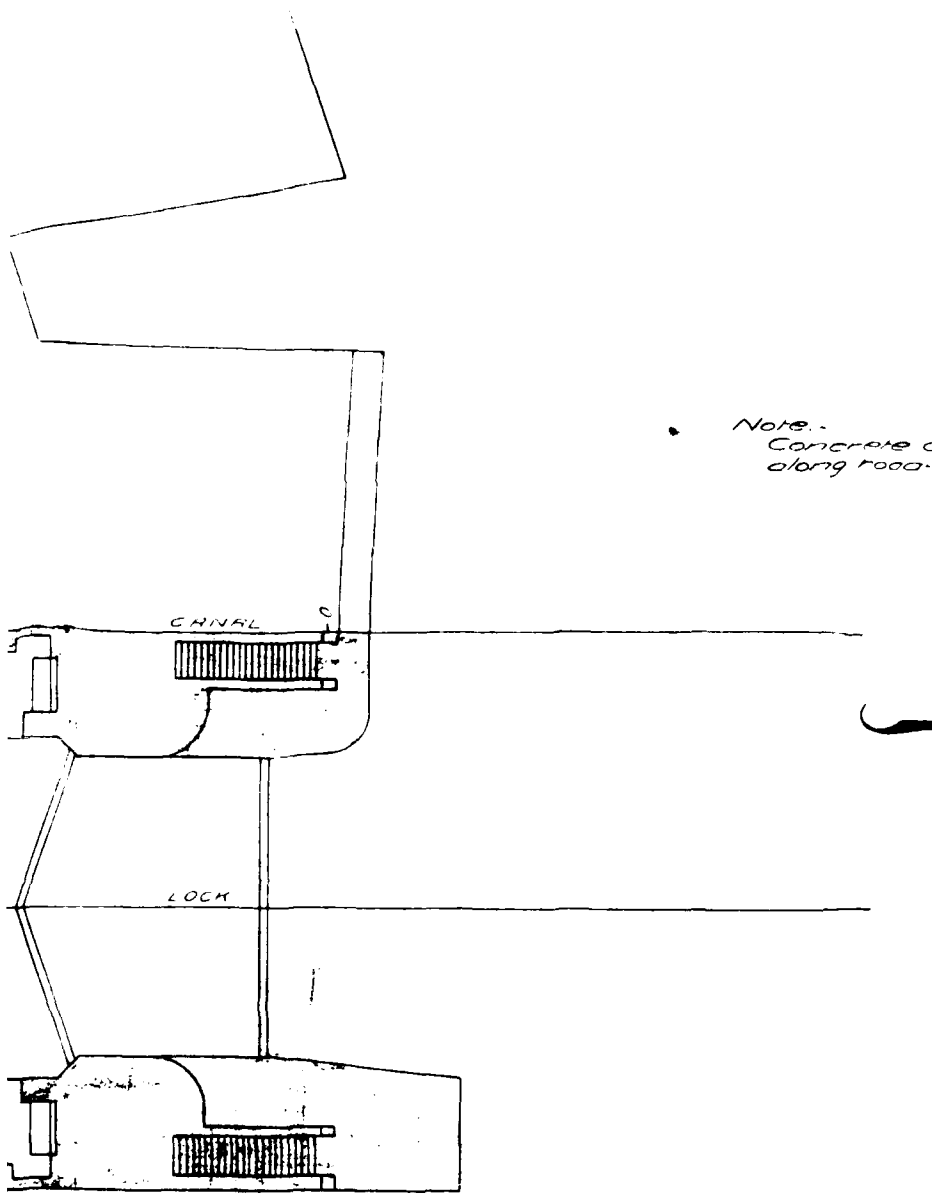
PROFILE ON CENTER LINE OF ROADWAY
Scale 1" = 20'

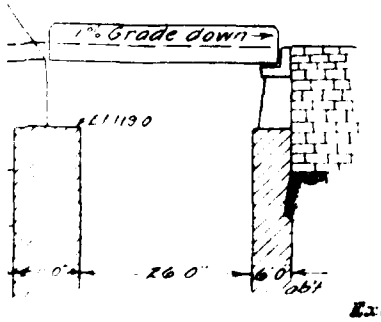
Made by [illegible] 7-10.
Traced by Stevens
1st Check by
2nd Check by Chas. Nichols



Stone Curb
1on1 Paved Slope
Paved Slope 1on1
Stone Curb
Sidewalk
of Pipe Railing
Sheet #92
Paved Slope 1 on 1
Lock #12
of Bridge Sta 1+07.89
LOCK
1% grade down
Floor El 132.5 Level
1% Grade down
Movable Crest El 112.75
Fixed Crest El 104.0
El 119.0
45.0
20.0
90.0
11.0
26.0

Note.-
Concrete curbing may be provided along roadway in place of stone





Contract No. 15.

ALTERATION NO. 12 SHEETS 156 & 157

Champlain Canal Section 3

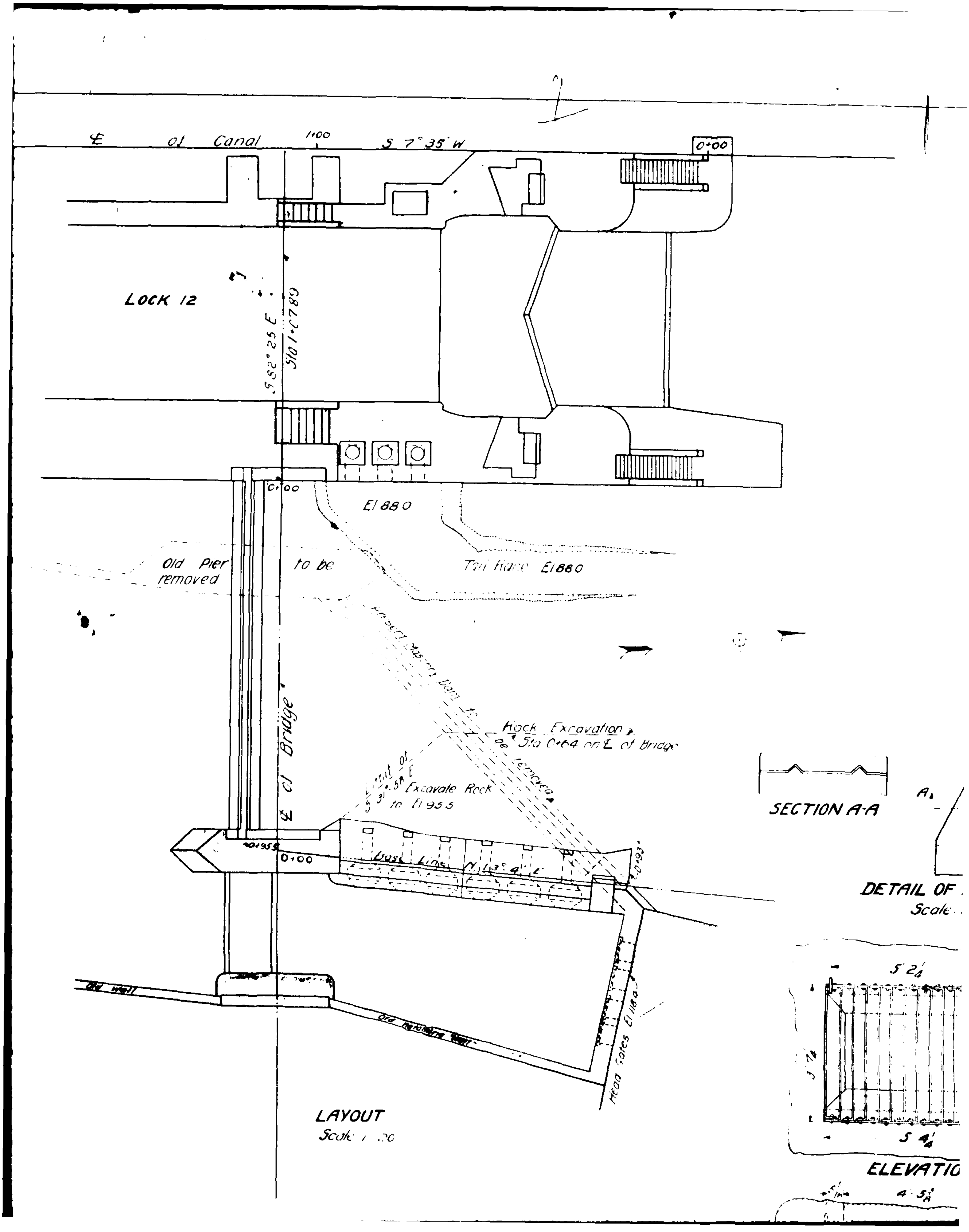
DETAILS OF APPROACH FOR HIGHWAY BRIDGE AT CLINTON AVE., WHITEHALL

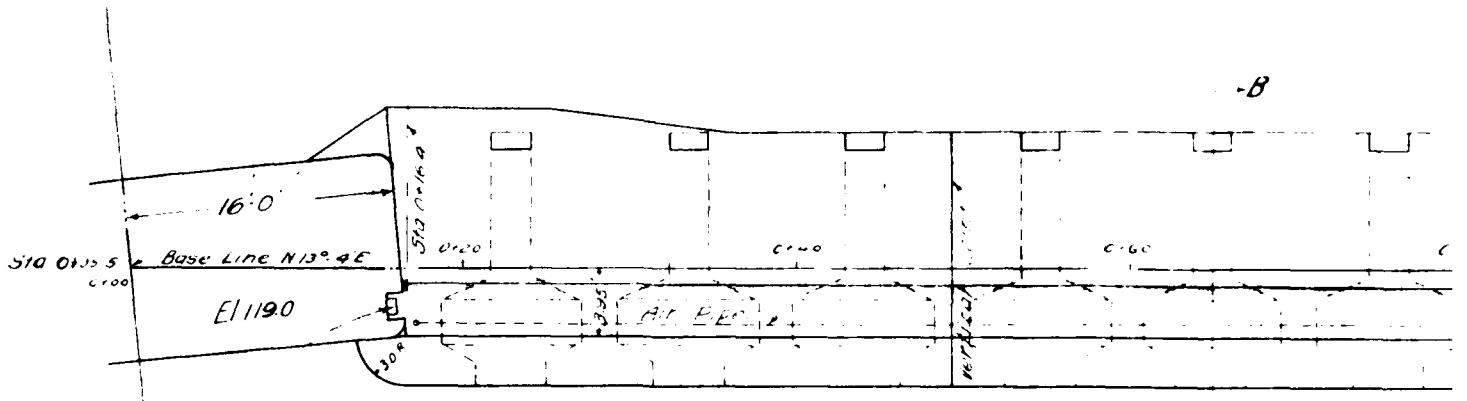
Scales as indicated

Examined and approved
Aug 17 1910
G. F. Lackey
Superintending Engineer

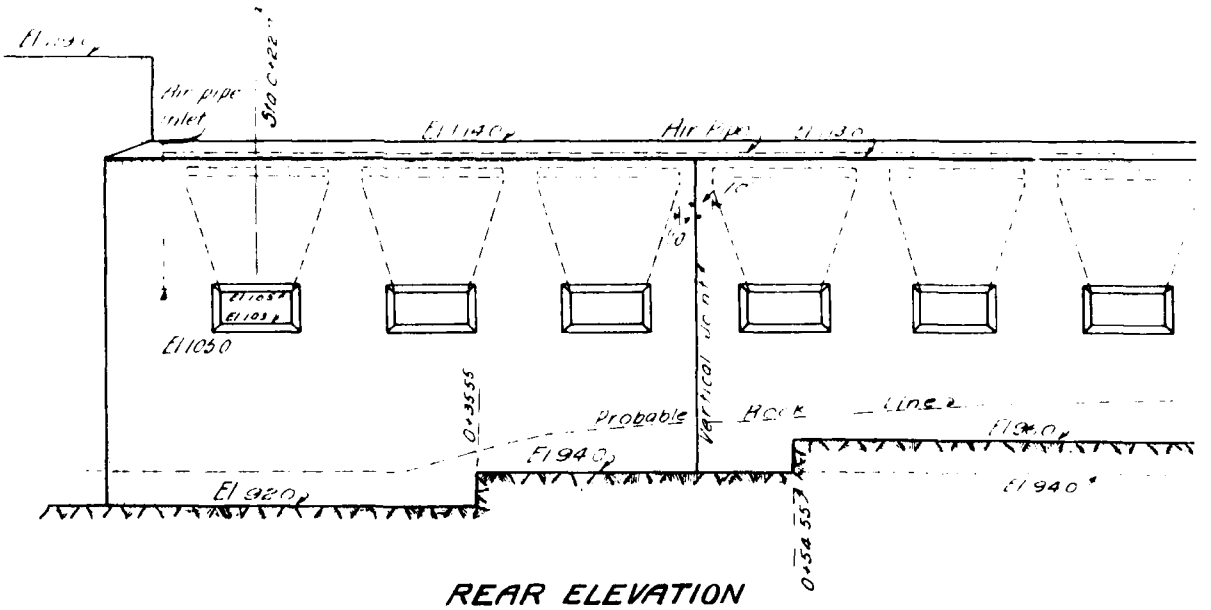
Examined and approved
Aug 17 1910
Wm B Landretto
Special Deputy State Engineer

156

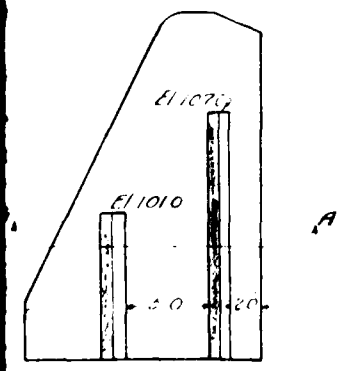

℄ of Canal
1+00
S 7° 35' W
0+00
LOCK 12
S 82° 25' E
Sta 1+07.89
0+00
El 88.0
Old Pier to be removed
Tail Race El 88.0
Present Masonry Dam to be removed
Rock Excavation Sta 0+64 on ℄ of Bridge
Limit of Excavate Rock to El 95.5
S 31° 38' E
℄ of Bridge
0+95.5
0+00
Base Line N 13° 4' E
0+93
Old wall
Old retaining wall
Head Gates El 118.4
LAYOUT
SECTION A-A
A
DETAIL OF
5' 2¼
3' 7¼
5' 4¼
ELEVATIO
4' 5⅝



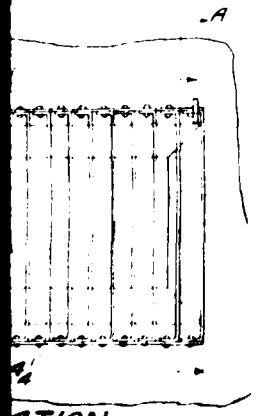
PLAN
Scale 1"-8'

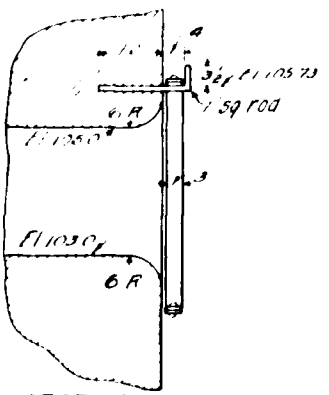


REAR ELEVATION
Scale 1"-8'



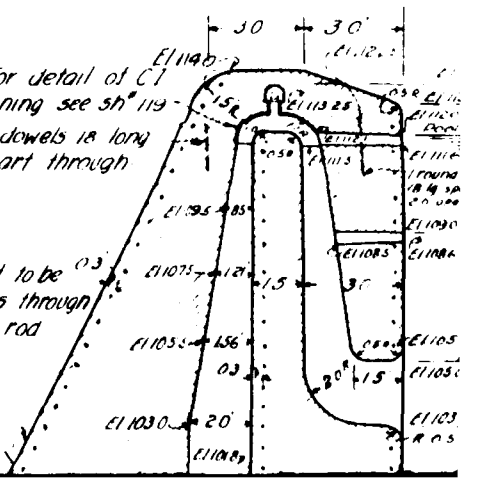
OF KEYWAY
Scale 1"-8'

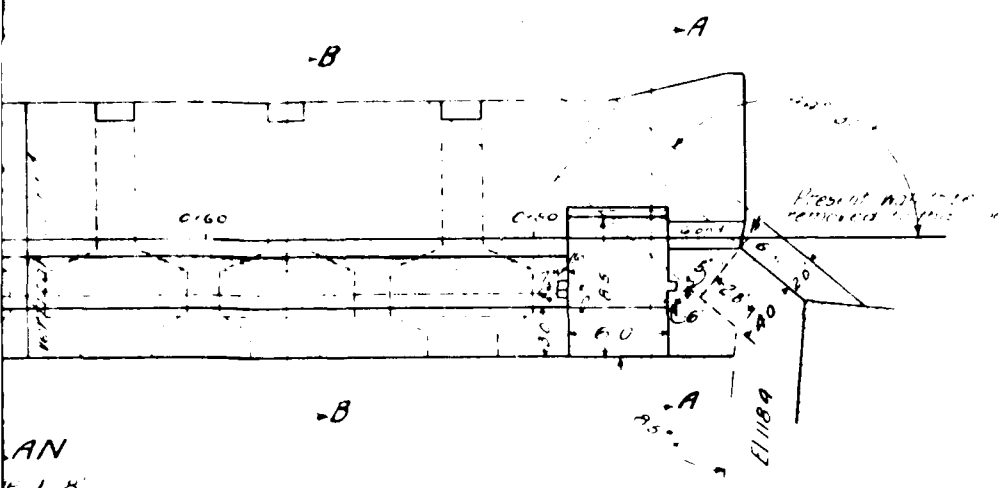


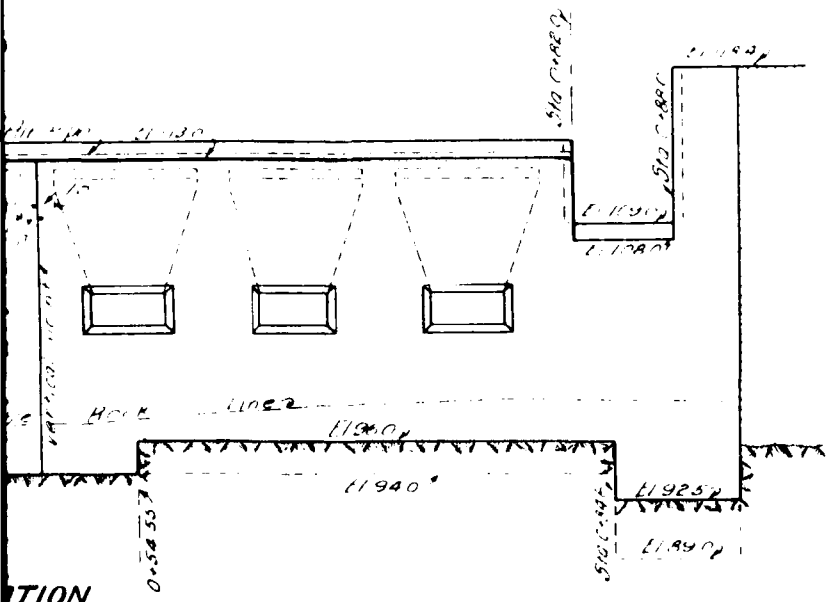


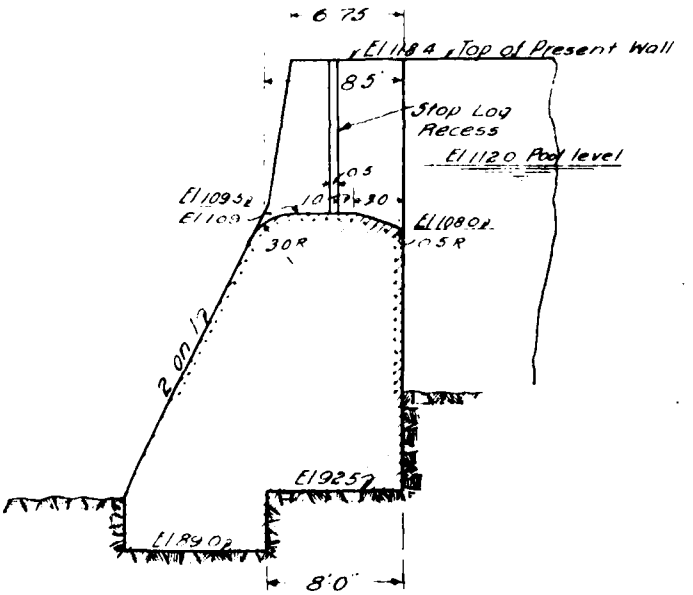
SECTION A-A

Bill of Material for 6 Gratings
90 bars ¾" sq x 3'9½"

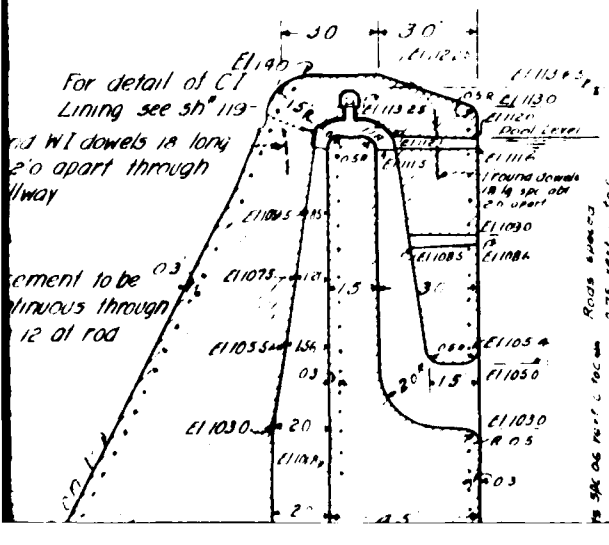


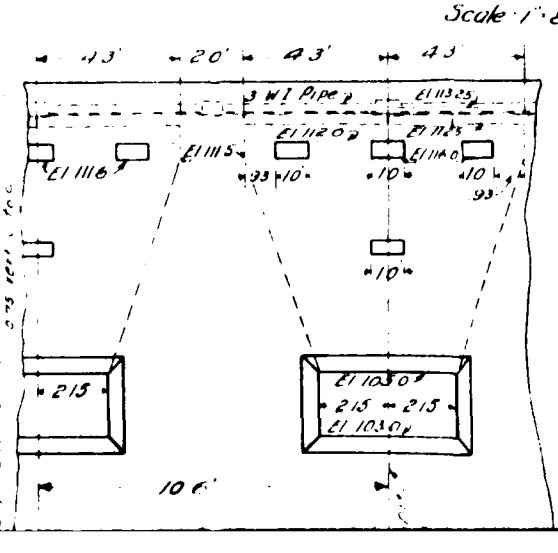


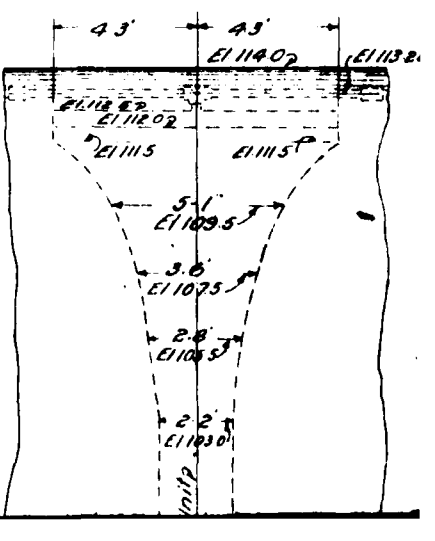


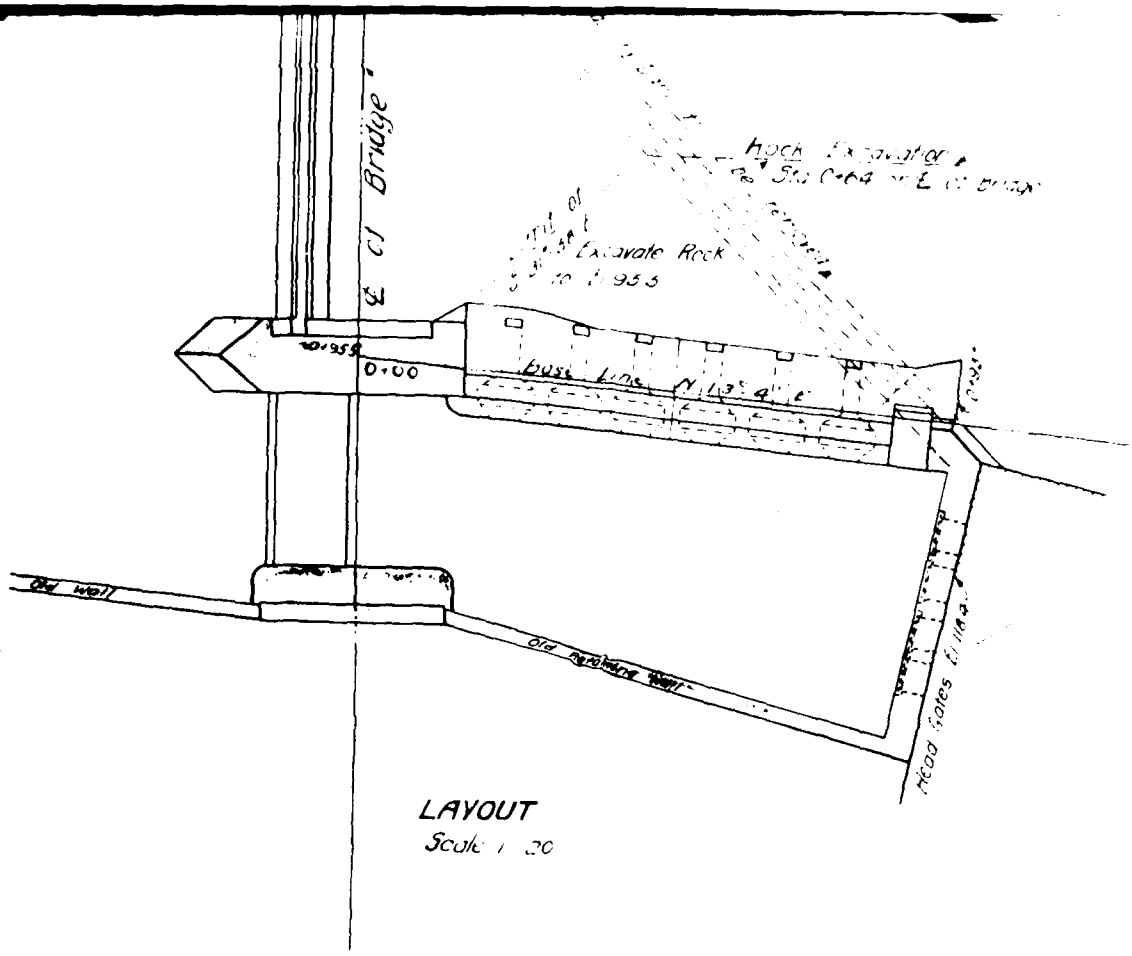


SECTION A-A
Scale 1"=8'-0"









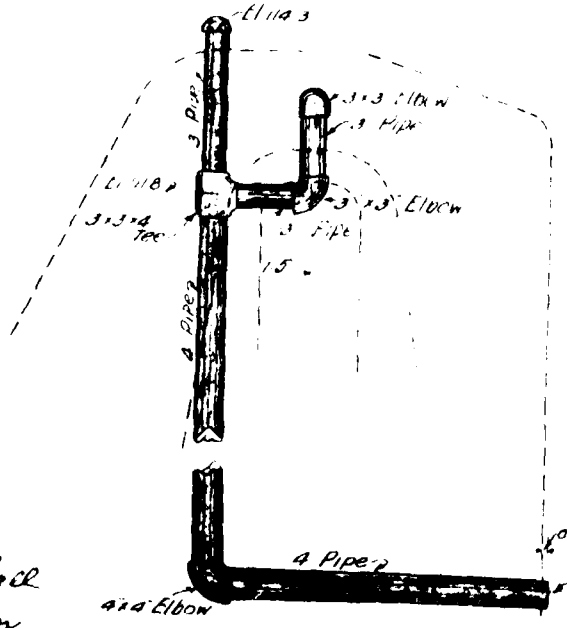
LAYOUT
Scale 1" = 20'

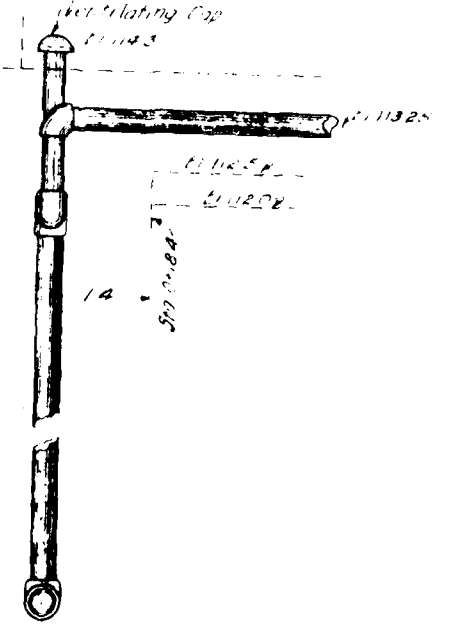
SECTION A-A

DET

ELE

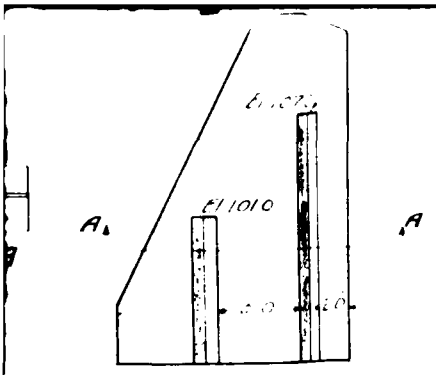
DETAIL O
Sca



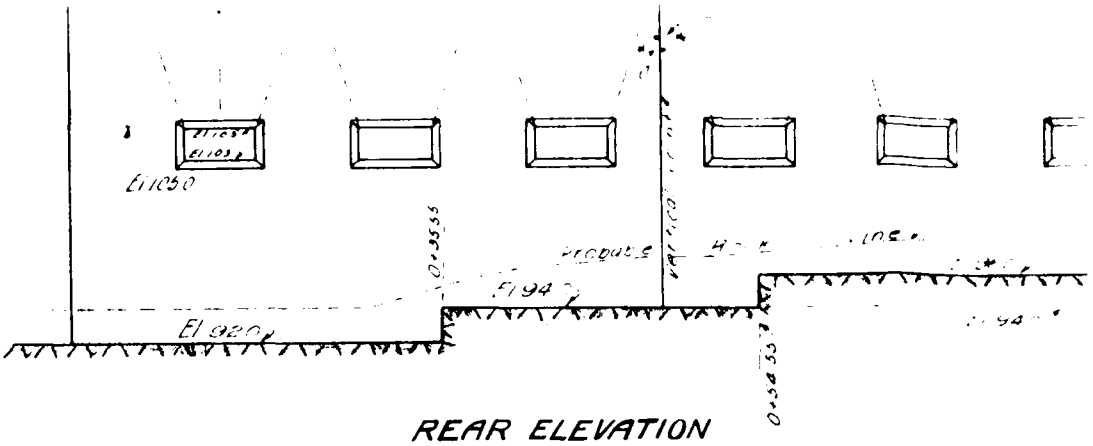


DETAIL OF AIR PIPE INLET STA 0-170
Scale 1" = 2'

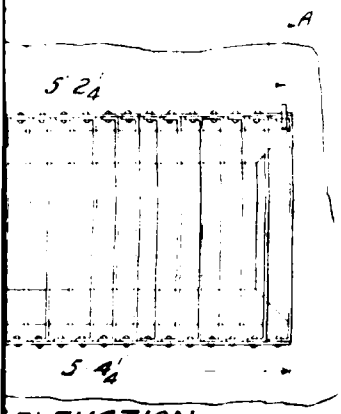
Made By: Umstead
Checked By: Dixon
Traced By: Murray
2nd Check By: F.O. Crumpf



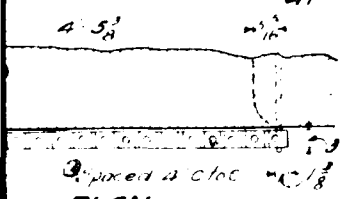
DETAIL OF KEYWAY
Scale 1"=8'



REAR ELEVATION
Scale 1"=8'

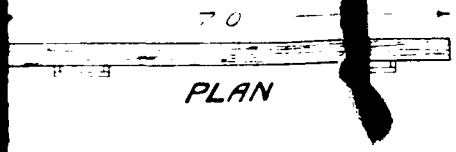


ELEVATION

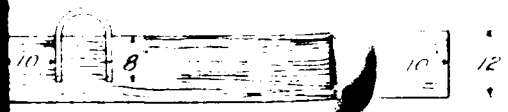


PLAN

L OF GRATINGS
Scale 1"=2'



PLAN

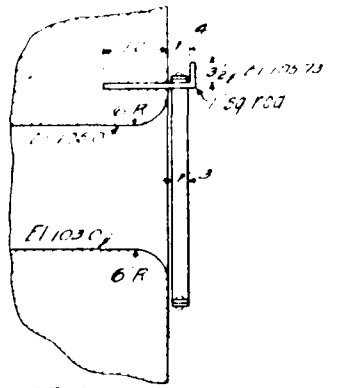


ELEVATION

DETAIL OF STOP-LOGS
Scale 1"=2'

Bill of Material
5 pcs Spruce 4" x
10 bars 1½" x 26"
60 Lag screws 4"

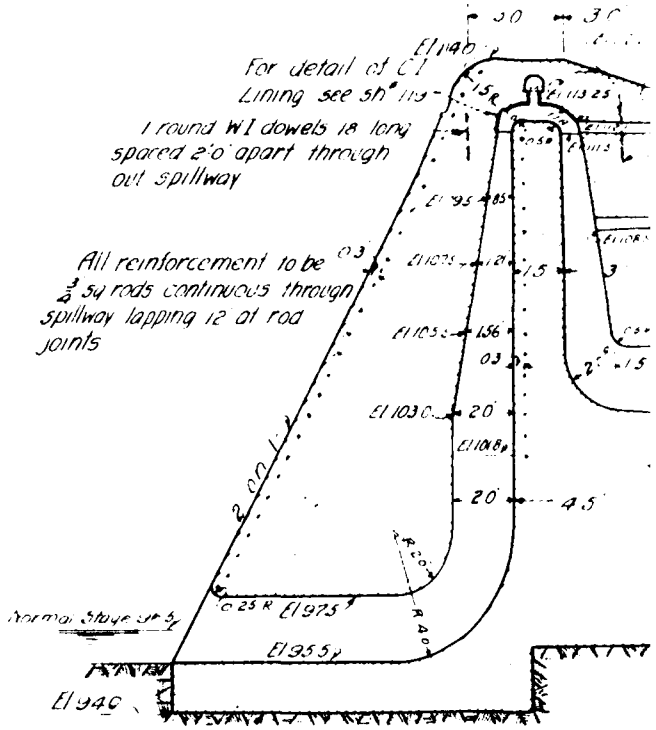
END ELEVATION



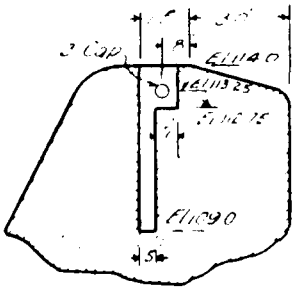
SECTION A-A

Bill of Material for 6 Gratings

90 bars	¼" x 3" x 3' 9½"	
6	¼" x 3" x 3' 10¾"	
6	¼" x 3" x 3' 9"	
12	⅜" x 3" x 5' 4¼"	
192 rivets	½"	
12 1" sq bars	2' 1½" lg	

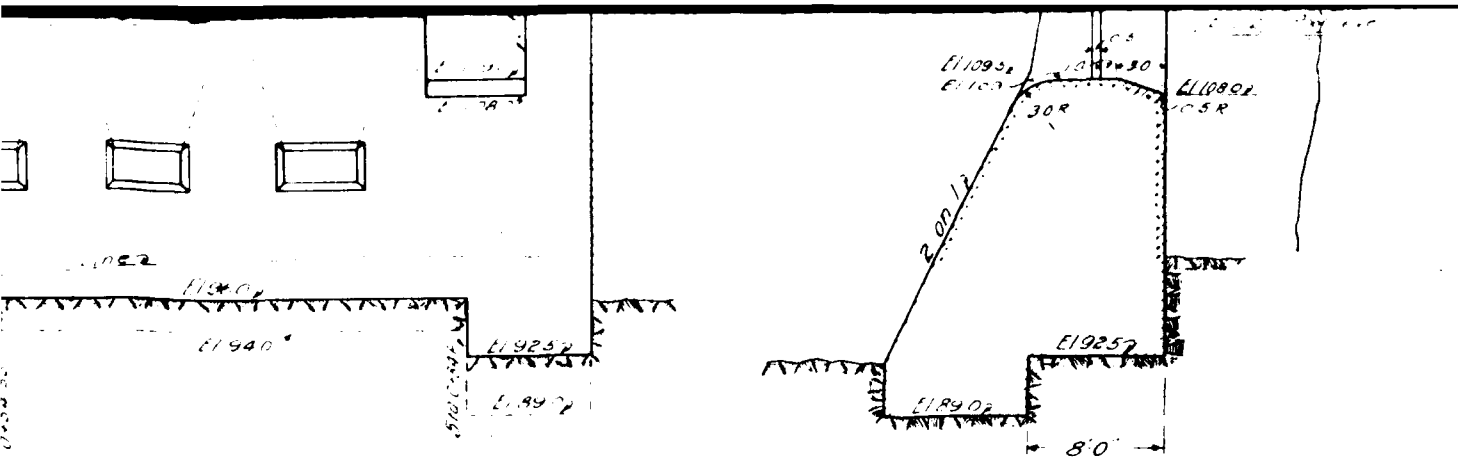


SECTION B-B
Scale 1"=4'

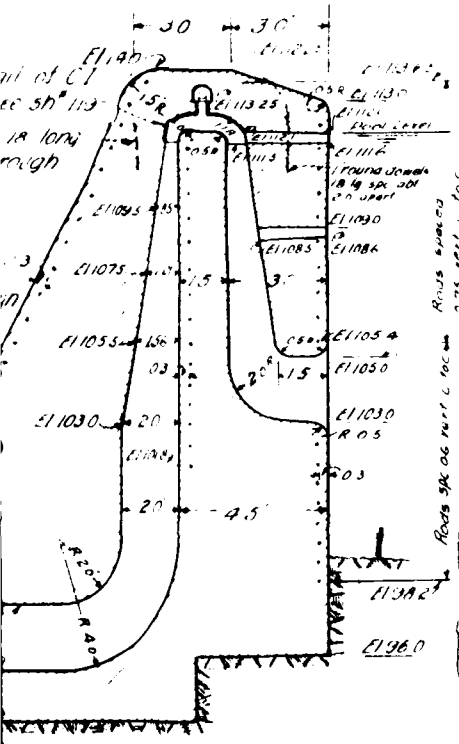


SECTION AT STA 0+816
SHOWING LOCATION OF AIR PIPE
Scale 1"=4'

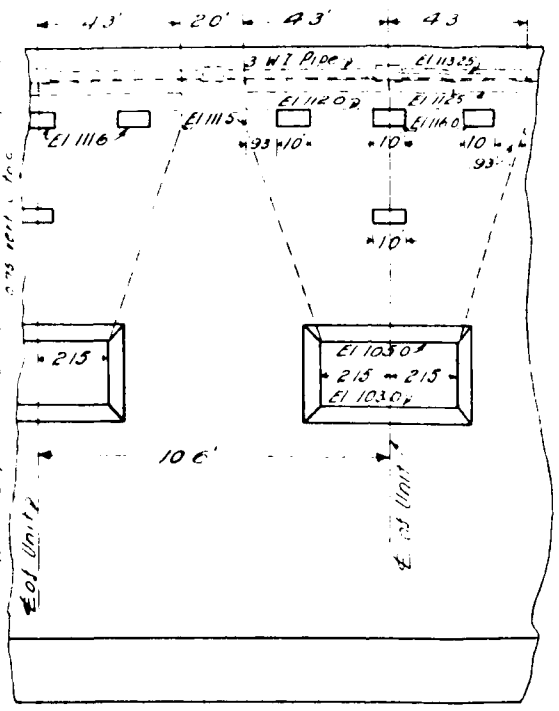
5



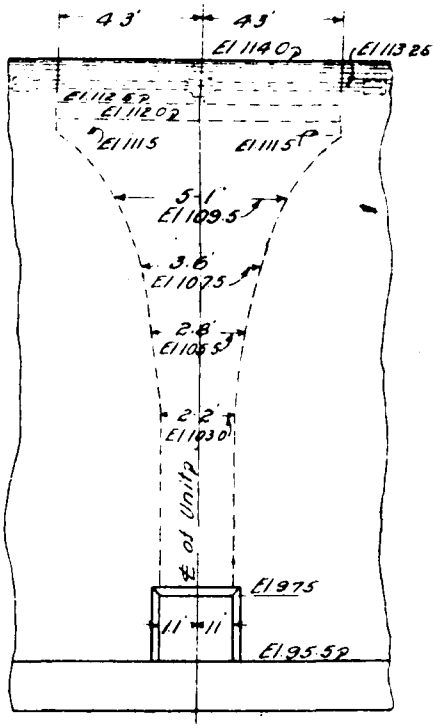
SECTION A-A
Scale 1" = 8'0"



SECTION B-B
Scale 1" = 4'



REAR ELEVATION
Scale 1" = 4'



FRONT ELEVATION
Scale 1" = 4'

Contract No. 15.

ALTERATION NO. 8. SHEET NO. 151 & 152.

DETAILS OF SYPHON SPILLWAY AT LOCK 12

Scales as indicated

R PIPE

Examined and approved
G F Stickney
Supervising Engineer
Oct 5th 1922

Examined and approved
Wm J Wardwell
Special Deputy State Engineer.
Oct 5 1922

151

END

DATE
FILMED
9-80

DTIC