CERTIFIED MAILED

TO:	All Vendors Tywanna Scott, Interim, Procurement Assurance Analyst Wes Byne, Augusta Utilities Department
FROM:	Geri A. Sams Director of Procurement
DATE:	April 25, 2022
SUBJ:	**Responses to Vendor's Questions**
BID ITEM:	**Bid Item #22-193 Augusta Canal-Bulkhead Gate Repair - for Augusta, GA – Utilities Department**

BID OPENING DATE: Monday, May 9, 2022 @ 3:00 p.m.

ADDENDUM NO. 3

This Addendum shall form a part of the referenced Bid Item #22-193 Augusta Canal-Bulkhead Gate Repair- for Augusta, GA – Utilities Department and any agreement entered into in connection therewith equally as if bound into the original document. Acknowledge receipt of all Addendums on Attachment "B" within the Specifications package.

Responses to Vendor's Questions:

1. Question: Is it required to have a Georgia State Business License or an Augusta, Georgia business license at the time of proposal submission?
   Answer: Proponent must be licensed in the Governmental entity for where they do the majority of their business. Your company's business license number must be provided on Page 1 of Attachment B. If your Governmental entity (State or Local) does not require a business license, your company will be required to obtain a Richmond County business license if awarded a contract.
2. Question: Is it required to have a Georgia Contractor's License?
   Answer: Yes.
3. Question: According to the Agreement in the Specs. (p. 26/245) there are only 180 calendar days to complete the project. Is that correct?
   Answer: The Base Bid schedule stipulates 180 calendar days to substantial completion, whereas the Bid Alternate #1 stipulates and additional 150 calendar days. AUD is willing to negotiate with the selected Bidder the date to commence the Notice to Proceed to account for mobilization and supply chain concerns.
4. Question: We respectfully request a 2-week extension to the proposal deadline.
   Answer: The new proposal deadline has been changed to Monday, May 9, 2022 by 3:00 pm as stated in Addendum #2.
5. Question: Can the question date be extended till after Masters and the bid date at least one possibly two weeks?
   Answer: The date for question has expired. Please refer to Question #4 for bid date extension.
6. Question: Can we receive meeting minutes and/or the recorded zoom video for the pre-bid conference that was held this morning?

Answer: No. There is no minutes or recorded zoom meeting.

7. Question: In reference to the replacement gates, the material of construction is not specified. We respectfully request that the gates be constructed of 304 stainless steels for long-term corrosion resistance and eliminating the requirement to paint the gates. We request the 304 stainless steel material of construction requirement be added by Addendum.
   Answer: Steel material specifications are included in Technical Specification 051200, PART 2, Section 2.1 Structural Steel Materials. It is acknowledged that 304 stainless steel components would provide more long-term corrosion resistance than conventional carbon steel; however, the potential additional cost versus the operational life of the bulkhead structure did not warrant inclusion in the design and bid documents. Secondly, the "yolk" is intended to be cut from the existing gates and welded to the new gates as a value-engineered design. Using stainless steel would require welding dissimilar metals together or casting new "yolks" in stainless steel which has not been evaluated for this project. Due to the Bulkhead Gate structure being within the Augusta Canal Heritage Area, there is a requirement to comply with National Historic Preservation Act of 1966 that the metal components be painted in an approved color to maintain the character of the surrounding area. The Bidder may submit in writing an alternate price proposal for stainless steel for consideration, as long as, they also submit values for items specified in the Bid Schedule.

8. Question: Substantial completion of the BASE BID work is specified as 180 days. We would request an increase of time as shipment of the specified replacement gates (including shop drawings and approval of the drawings by Augusta) is typically 180 days after receipt of an order.
   Answer: Please refer to Question #3 listed above.

9. Question: Via a thorough underwater examination, using a state of the art camera system, of all the civil structures below the normal water line down to the bottom concrete horizontal gate seals, due to the fact no diver had made such an inspection, revealed excessive needed repairs that were grossly under estimated in subject bid proposal and in fairness to all, need to be addressed in order to give full validity to the rehabilitation quotation It is requested that such a procedure be incorporated in the bid specifications.
   Answer: The scope of repairs is predicated on the findings of the Structural Condition Assessment and Stability Analysis Report, Bulkhead Gates 12/29/2020 provided in the bid documentation. It is acknowledged the assessment did not include a dive inspection for the lower 4-feet or so of the structure due to safety and visibility concerns; however, the deterioration observed on the lower portion of the structure is expected to be similar in nature to that which is submerged except for the gate base angles as shown in Detail 5/S403. The quantity for Bid Item M13 has been revised to reflect additional potential anchor repairs and Bid Item M17 has been added to address potential gate base anchor repairs. Please see the revised Bid Schedule and Measurement Payment specification provided with Addendum #3.

10. Question: Pursuant to the excessive under water needed civil work, the use of stop logs both upstream and downstream of each gate, is not practical nor cost effective. Civil repairs both upstream and downstream of each of the 17 proposed, replaced (new) gates, the simultaneous replacement of the vertical gate guides and the removal of all accumulated logs and debris from below each gate, will be impossible without completely de-watering the canal for at least 3 to 4 working days per every two gates. It is requested that such a procedure be incorporated in the bid specifications.
    Answer: There will be a planned period of approximately 4-weeks for a single canal dewatering to coincide with the repair work for the Long Gate Spillway Repair project. This will provide an opportunity for some work to be performed on the Bulkhead Gates such as concrete spall repairs and gate base angles; however, this will not likely be enough time to do extensive gate repairs. The proposed design is intended for the Bidder to perform needed repair works by dewatering individual bays as necessary to isolate repairs to 2 gates at a time while maintaining near-normal canal operations. The method of dewatering is to be determined by the Bidder and submitted to AUD for approval prior to commencement.

11. Question: Please confirm the Corps of Engineers drawings mentioned during the virtual per-bid will be made available to the Contractors.
Answer: Higher resolution PDF format versions of the 1939 USACE drawings for the Bulkhead Gates (called "Canal Head Gates" on the plans) are provided with Addendum #3.

12. Question: Does the US Army Corps of Engineers have any right of review on the replacement gates? They have design and Fabricator Standards above anything that has been specified.
Answer: Per discussions with the Augusta Engineering Department, no pre-construction review is necessary with the USACE. The USACE was provided and has reviewed the Structural Condition Assessment and Stability Analysis Report, Bulkhead Gates 12/29/2020. Due to the Bulkhead Gates being a major component of the Augusta Canal System, it is under review by the Federal Energy Regulatory Commission for Hydropower projects. The existing Bulkhead Gate design was originally a USACE design, and the scope of this maintenance project is to replace components like-for-like.

13. Question: We request that the amount of debris removal (bid item LS-13) be quantified. That way all bidders are using the same basis for their bids.
Answer: Former Pay Item L-13 Debris Removal has been revised to Pay Item M-18 as unit cost in cubic yards. The revised Bid Schedule and Measurement Payment specification are provided in Addendum #3 attached.

14. Question: I am the Minority Coordinator for Haren Construction Company. We are looking at bidding the Augusta Canal – Long Gate Spillway Repair project bidding in April as a General Contractor. I having been reviewing the LSBE program goals/requirements for this project and have the below question. Are we able to use the Georgia DOT directory to meet the 2% LSBE Goal as well as the Augusta LSBOP Directory?
Answer: No, you can only use Augusta's LSBOP directory to meet the 2%. The DBE directory does not apply to this project.

Please acknowledge addendum in your submittal
END OF ADDENDUM

Attachments: **Revised Bid Schedule**
Measurement and Payment
Revised Drawings

AUGUSTA UTILITIES DEPARTMENT

MEASUREMENT AND PAYMENT

MISCELLANEOUS

ITEM M-9 – Replace Gates with New shall include all costs necessary for removal and disposal of existing gate and all labor, equipment, and materials to fabricate, deliver and install each new, operational gate. This shall also include all incidental labor, equipment, and materials to prepare and apply galvanization and painted finish, cutting and welding to remove and affix the lifting yoke and any and all other costs to complete the installation of the new gates including replacing column guide components included in Details 3/S403 and 4/S403. This item shall also include all costs for the fabrication and installation of a temporary gate (not affixed to the lifting mechanism) to sit in place of the removed gate until the new one is reinstalled. Gates to be replaced shall be as specified on approved plans according to category specified in the bid schedule. No separate or additional payment shall be made for these items.

ITEM M-10 – Water Control for Repair of Underwater Concrete, Features, Fixtures, Gates, Rails, et cetera shall include all costs for preparation, labor, equipment, materials, et cetera to dewater the work area to perform all necessary repair work until satisfactory completion of project tasks (M-9), (M-11), (M-12), (M-13) and (M-14).

ITEM M-11 – Concrete Crack Repairs shall include all "concrete crack repairs" identified in construction documents, and/or as identified throughout the construction project. Repairs shall include crack injection repairs as identified. Item shall include all costs associated for preparation, labor, equipment, formwork, concrete materials and all labor, equipment, and waste disposal. Partial payments shall be made based on the percentage complete of this task on the current pay application. Base bid quantity shall be included in base bid and will be modified (per Add / Deduct pricing) based on final quantity completed throughout the course of the project.

ITEM M-12 – Concrete Spall Repairs shall include all "concrete spall repairs" identified in construction documents, and/or as identified throughout the construction project. Repairs shall include concrete spall repairs as identified. Item shall include all costs associated for preparation, labor, equipment, formwork, concrete materials and all labor, equipment, and waste disposal. Where concrete spall includes deteriorated and/or damaged reinforcing cost of reinforcing coating and replacement shall be included. Partial payments shall be made based on the percentage complete of this task on the current pay application. Base bid

quantity shall be included in base bid and will be modified (per Add / Deduct pricing) based on final quantity completed throughout the course of the project.

ITEM M-13 – Gate Guide Anchor Repairs shall include all "gate guide anchor repairs" identified in construction documents, and/or as identified throughout the construction project. Repairs shall include concrete spall repairs as identified. Item shall include all costs associated with Detail 6/S403 and for preparation, labor, equipment, formwork, concrete materials and all labor, equipment, and waste disposal. Where concrete spall includes deteriorated and/or damaged reinforcing cost of reinforcing coating and replacement shall be included. Partial payments shall be made based on the percentage complete of this task on the current pay application. Base bid quantity shall be included in base bid and will be modified (per Add / Deduct pricing) based on final quantity completed throughout the course of the project.

ITEM M-14 – Clean, Prepare, and Paint Gates shall include all costs for materials, labor and equipment for existing paint removal, surface preparation and application of new paint to all ferrous parts of the existing gates. This shall include testing for lead paint and proper disposal of removed paint in accordance with government regulations. Gates to be replaced shall be as specified on approved plans according to category specified in the bid schedule. This item expects the gates to be serviced in-place knowing some portions of the gate will be inaccessible due to existing gate guides and edges facing the Bulkhead Structure on the downstream face. Due to this, this item only expects the accessible surfaces to be serviced. If the contractor elects to remove the gate for this service, it will be the contractors' responsibility to bear all costs associated with this selection and make repairs to the gate guides, gate guide anchors to return the gate to operating condition.

ITEM M-15A –Repair Bronze Lifting Stem shall include all costs for preparation, labor, equipment, materials, and waste disposal to provide and install a repaired bronze lifting stem to operational condition.

ITEM M-15B –Replace Bronze Lifting Stem shall include all costs for preparation, labor, equipment, materials, and waste disposal to provide and install a new bronze lifting stem to operational condition.

ITEM M-16 – Add Hot-Dipped Galvanizing treatment per Gate prior to painting.

ITEM M-17 – Gate Base Angle and Attachments shall include all costs for materials, labor and equipment to replace a damaged and/or deteriorated "Angle at Gate Base" as shown on Detail 5/403 for one (1) gate.

ITEM M-18 – Debris Removal shall include all costs for labor, equipment, materials, and waste disposal to remove and properly dispose of accumulated waterborne debris and floating vegetation in the vicinity of the Bulkhead Gate structure at the commencement of project activities until project completion on a per cubic-yard basis.

LUMP SUM CONSTRUCTION

ITEM LS- 1- Mobilization, Demobilization includes, but is not limited to, performance of preparatory work and operations for the assembling and setting up necessary for work on the Project, such as shops, plants, storage areas, sanitary facilities, moving in of personnel and equipment, incidentals to the Project, and any other facilities, as required by the Specifications and special requirements of the Contract Documents, as well as by Laws and Regulations in effect at the Site. Partial payments will be made with 50 percent payable with the first pay application and the remaining 50 percent payable with the final pay application. No separate or additional payment shall be made for these items.

ITEM LS- 2- Bonds, Insurance includes all costs associated with obtaining any bonds or insurance required to perform the work in accordance with the plans and specifications and as required by local and state law. Partial Payments shall be made base on the percentage complete on the current pay application.

ITEM LS-9 – Paint Handrails and Miscellaneous Fixtures shall include all costs for materials, labor and equipment for existing paint removal, surface preparation and application of new paint to all ferrous items and fixtures affixed to the Bulkhead Gate Structure, with the exception of the existing and/or newly fabricated gates. This shall include testing for lead paint and proper disposal of removed paint in accordance with government regulations. Partial Payments shall be made base on the percentage complete on the current pay application.

ITEM LS-10 – Project Safety Signage and Security Fencing shall include all costs for materials, labor and equipment to provide any and all project related and safety signage, security fencing of the project work site and any material or equipment staging/storage area.

ITEM LS-11 – Property Restoration includes, but is not limited to, all labor, materials, equipment, removal and disposal of all materials, or other items necessary to restore any and all property (e.g., bridge, parking area, disturbed ground, et cetera) affected by construction activities to original condition at time of Notice to Proceed or better.

ITEM LS-12 – Repair Damaged Lift Hoist Anchor shall include all costs for preparation, labor, equipment, materials, and waste disposal to complete the structural repair of the hoist anchoring system.

ITEM LS-13 – REMOVED

ITEM LS-14 – Allowance to be used only at the approval of the Owner.

BID SCHEDULE REVISED: 04/14/2022

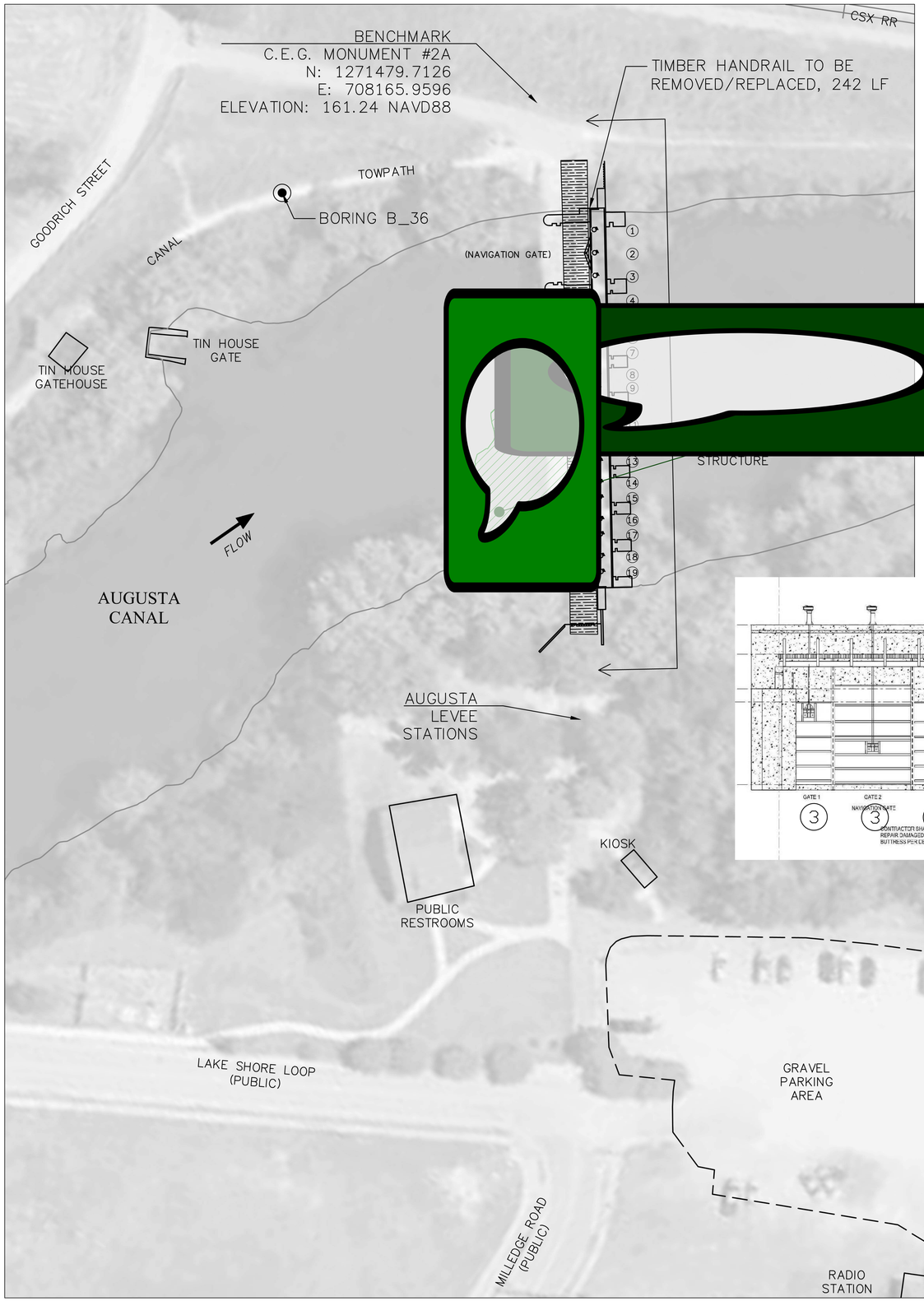
AUGUSTA CANAL BULKHEAD GATE REPAIRS **Bid Schedule (BASE BID)**					
PAY ITEM	**DESCRIPTION**	**QUANTITY**	**UNIT MEASURE**	**UNIT COST ($)**	**BASE BID**
M-9	REPLACE GATES WITH NEW (CATEGORY 1 RATED GATES)	8	EA		
M-10	WATER CONTROL FOR REPAIR OF UNDERWATER CONCRETE, FEATURES, FIXTURES, ETC. (6 MONTHS)	6	MO		
M-11	CONCRETE CRACK REPAIRS/INJECTION	200	LF		
M-12	CONCRETE SPALL REPAIRS	100	SF		
M-13	GATE GUIDE ANCHOR REPAIRS	60	EA		
M-14	CLEAN, PREPARE, AND PAINT GATES (CATEGORY 2 & 3, NOT REPLACED IN PROJECT)	11	EA		
M-15A	REPAIR BRONZE LIFTING STEM	2	EA		
M-17	GATE BASE ANGLE & ATTACHMENTS	8	EA		
M-18	DEBRIS REMOVAL	800	CY		
LS-1	MOBILIZATION AND DEMOBILIZATION, AS LISTED IN THE SPECIFICATIONS	1	LS		
LS-2	BONDS AND INSURANCE	1	LS		
LS-9	PAINT HANDRAILS, OPERATORS AND MISC. FIXTURES, EXCLUDING GATES	1	LS		
LS-10	SAFETY SIGNAGE AND SECURITY FENCING	1	LS		
LS-11	PROPERTY RESTORATION	1	LS		
LS-12	REPAIR DAMAGED LIFT HOIST ANCHOR (GATE 13)	1	LS		
LS-14	OWNER ALLOWANCE WITH APPROVAL	1	LS	$240,000	$240,000
				TOTAL (BASE BID)	

BID SCHEDULE REVISED: 04/14/2022

AUGUSTA CANAL BULKHEAD GATE REPAIRS **Bid Schedule (BID ALTERNATE #1)**					
PAY ITEM	**DESCRIPTION**	**QUANTITY**	**UNIT MEASURE**	**UNIT COST ($)**	**BASE BID**
M-9	REPLACE GATES WITH NEW (CATEGORY 2 RATED GATES)	9	EA		
M-10	WATER CONTROL FOR REPAIR OF UNDERWATER CONCRETE, FEATURES, FIXTURES, ETC. (5 MONTHS)	5	MO		
M-14	CLEAN, PREPARE, AND PAINT GATES (DEDUCT CATEGORY 2, GATES REPLACED IN BID ALT#1)	(-) 9	EA		
				TOTAL (BID ALT#1)	

AUGUSTA CANAL BULKHEAD GATE REPAIRS **Bid Schedule (ADD ITEMS)**					
PAY ITEM	**DESCRIPTION**	**QUANTITY**	**UNIT MEASURE**	**UNIT COST ($)**	**ADD BID**
M-15A	DEDUCT REPAIR BRONZE LIFTING STEM	(-) 2	EA		
M-15B	REPLACE BRONZE LIFTING STEM	2	EA		
M-16	ADD HOT-DIPPED GALVANIZING PER GATE	19	EA		
				TOTAL (ADD ITEMS)	

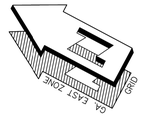
GRAND TOTAL (BASE BID + BID ALT#1)	



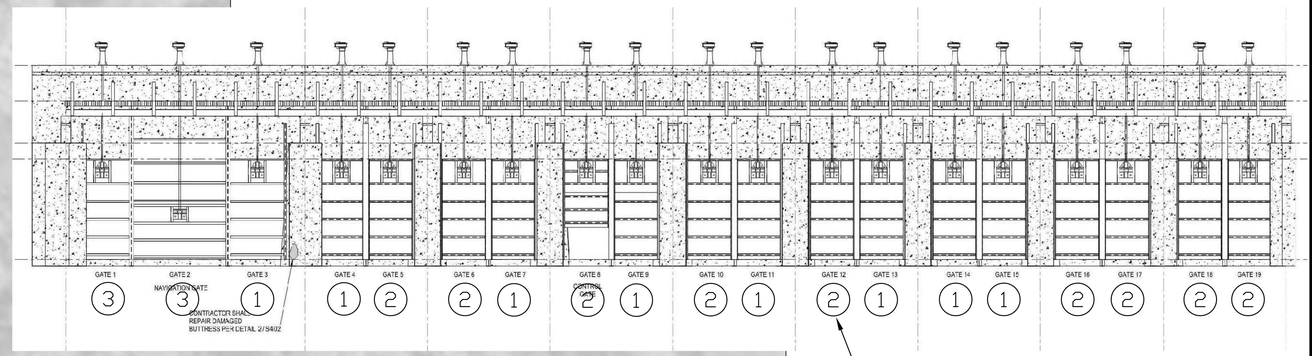
PROJECT SCOPE:

BASE BID:
1. REPLACE GATES 3, 4, 7, 9, 11, 13, 14 & 15.
2. CLEAN & PAINT ALL GATES & FERROUS METAL COMPONENTS.

ALTERNATE BID:
1. REPLACE GATES 3 THROUGH 19.
2. HOT DIP GALVANIZE NEW GATES 3 THROUGH 19.
3. CLEAN & PAINT ALL GATES & FERROUS METAL COMPONENTS.
4. GATE BLANKS TO BE USED DURING GATE REPLACEMENT OPERATIONS.
5. PAINT SHALL CONFORM TO STEEL COATING REQUIREMENTS PROVIDED IN PERFORMANCE SPECIFICATIONS. COLOR SHALL BE PANTONE @ 342U "GREEN".
6. CONTRACTOR TO DOCUMENT CONDITION OF EXISTING BRIDGE PRIOR TO AND AFTER CONSTRUCTION ACTIVITIES.
7. CONTRACTOR TO REMOVE AND REPLACE EXISTING TIMBER HANDRAIL FOR GATE REPLACEMENT ACCESS. HANDRAIL SHALL BE RESET/REPAIRED OR REPLACED IN KIND.



PROXIMATE AREA OF FLOATING AND
BMERGED DEBRIS
PROX AREA: 7,200 SQFT
PROX VOLUME: 800 CYD
SUMPTION: OBSERVED AREA INCLUDES A
BRIS DEPTH OF 3-FEET



GATE CONDITIONAL REPAIR CATEGORIES

1. LESS THAN 23 MONTHS TO REPAIR OR REPLACE GATE
2. 24 TO 60 MONTHS TO REPAIR OR REPLACE GATE
3. NO IDENTIFIED REPAIRS REQUIRED, REGULAR MAINTENANCE RECOMMENDED

PLAN
HORIZONTAL SCALE 1"=30'

30 15 0 30 60
SCALE IN FEET

GEORGIA 811
Utilities Protection Center, Inc.
Know what's below.
Call before you dig.

CRANSTON
ENGINEERING
ENGINEERS - PLANNERS - SURVEYORS
452 Ellis Street, Augusta, Georgia 30901
Telephone 706-722-1588
CranstonEngineering.com

REV. #	DATE	DESCRIPTION
1	10/22/2021	PER AUG COMMENTS

Augusta Canal Bulkhead Gate Repairs

Debris Exhibit

DRAWN BY:	MAB
CHECKED BY:	MKO
APPROVED BY:	CMN
DATE:	9-24-2021
SCALE:	1" = 30'
JOB No.	2019-0578
DRAWING No.	C101

G:\AAA-ACTIVE JOBS\2019\2019-0578_AUGUSTA CANAL ANNUAL F.E.R.C. UPDATES 2020-2021\AA - DRAWINGS\X-REFS\AUGUSTA CANAL BULKHEAD GATE REPAIRS.DWG 10/20/2021 3:28 PM

DP 1130-2-21
APP C
15 DEC 84

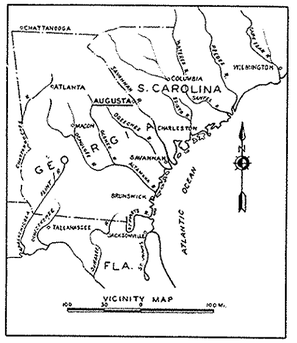
INDEX

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL—GATE STRUCTURES

1

SOUTH CAROLINA

AIKEN COUNTY



DP 1130-2-21
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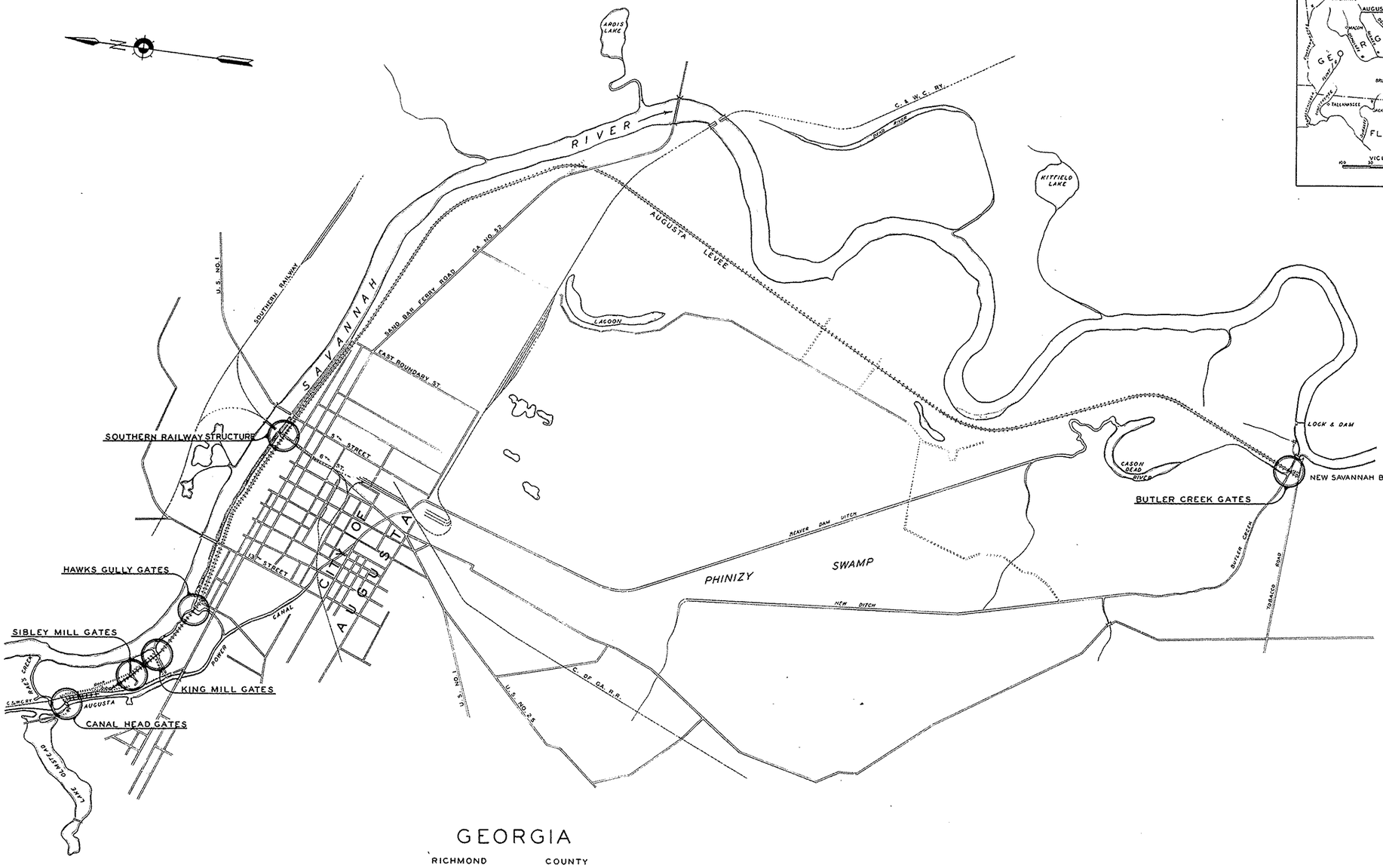
15 DEC 84



GEORGIA

RICHMOND COUNTY

BY	DATE	CHARACTER
		REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
GATE STRUCTURES
PROJECT LOCATION

1000' 0 1000' 2000' 3000' 4000' 5000' 6000'
SCALE: 1: 20,000

U.S. ENGINEER OFFICE, SAVANNAH, GA.,

SUBMITTED: M. T. Haas, SENIOR ENGINEER

APPROVED: R. H. Kreuzberg, LT. COL. CORPS OF ENGRS.

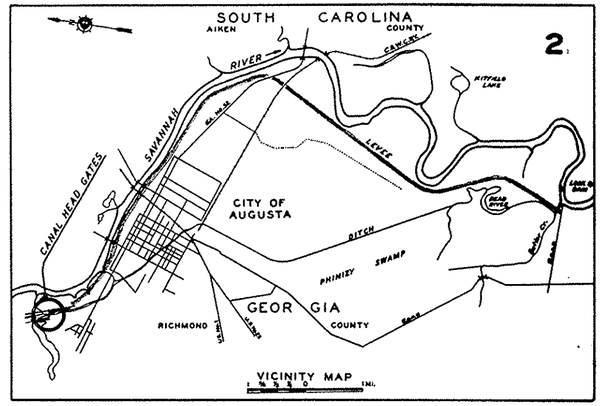
DRAWN BY W.DE V. TRACED BY W.DE V. CHECKED BY J. C.B.
FILE NO. D.S.R. 149-10/2
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1935.

D.S.R. 149-10/2

PLATE C-1

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



DP 1130-2-21
APP C
15 DEC 84

Boundary of Contract Area

WATER SURFACE ELEVATION 152.3 M.S.L. NOV. 1937

Road and Dike to High Ground For Details See D.S.R. 149-20/1

CANAL HEAD GATES

CANAL HEAD

CANAL

Proposed Bridge

Top of Levee After Grading, (to be done by City of Augusta, Ga.)

ROAD

LEVEE

SHOP

Note: For Details of Grading See D.S.R. 149-20/2

Join Grading to Existing Levee Section at this Point.

C. & W. C. RY.

Current

Boundary of Contract Area

BENCH MARK:
CROSS(X) CUT IN BOLT OF EXTREME EASTERN STANDARD OF BRIDGE OVER CANAL GATES EL. 160.85 M.S.L.

NOTE:-
ENTIRE AREA SHOWN IS PROPERTY OF CITY COUNCIL OF AUGUSTA, GA.

BY	DATE	CHARACTER REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
SITE MAP

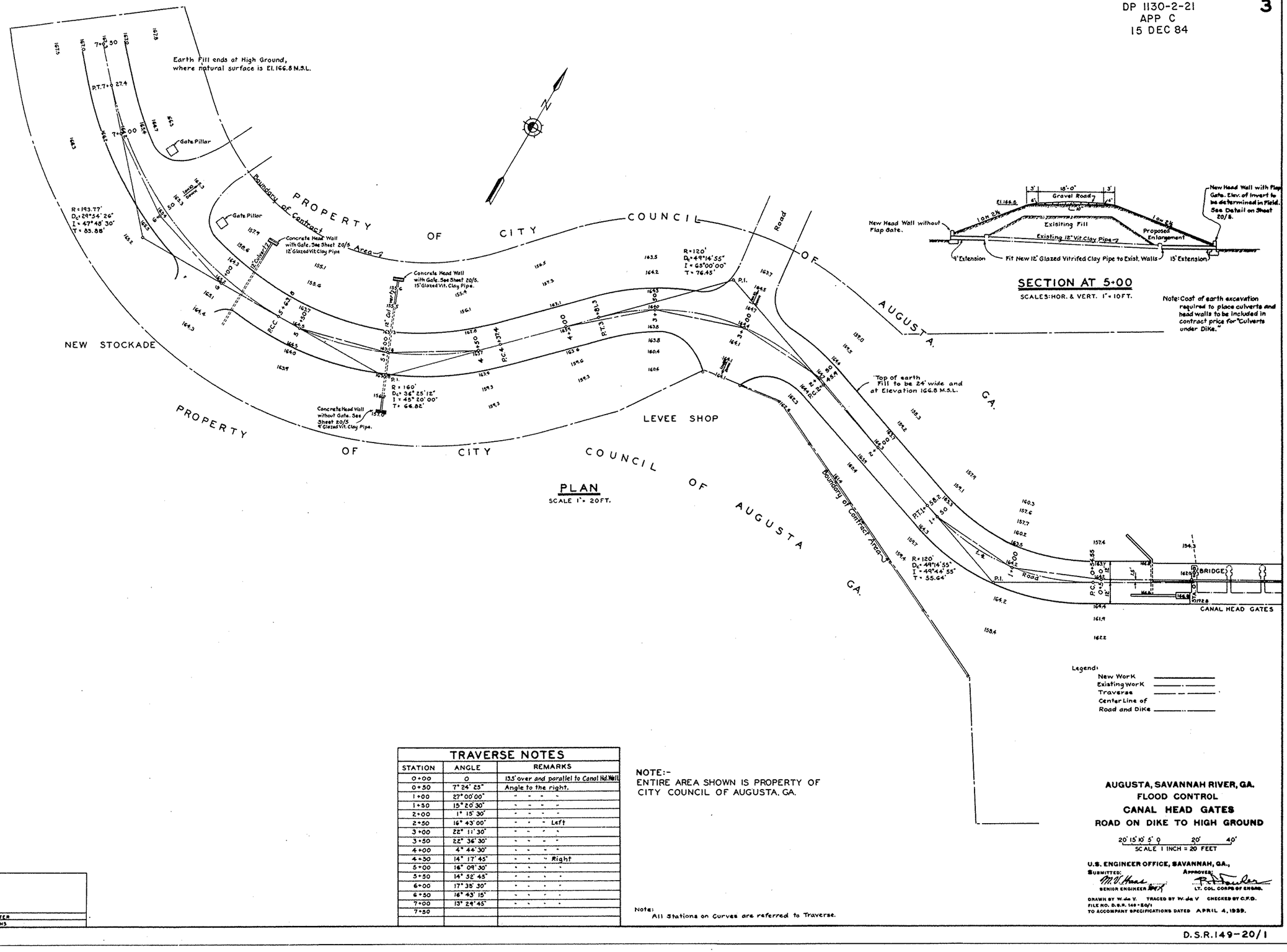
20' 8 10' 5 0 20' 40'
SCALE: 1 INCH = 20 FEET

U.S. ENGINEER OFFICE, SAVANNAH, GA.,
SUBMITTED: M. V. Haas, SENIOR ENGINEER
APPROVED: R. A. Fowler, LT. COL. CORPS OF ENGRS.

DRAWN BY W. de V. TRACED BY W. de V. CHECKED BY C.P.B.
FILE NO. D.S.R. 149-19/6
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

D.S.R. 149-10/3

PLATE C-2



PLAN
SCALE 1" = 20FT.

SECTION AT 5+00
SCALES: HOR. & VERT. 1" = 10FT.

Note: Cost of earth excavation required to place culverts and head walls to be included in contract price for "Culverts under Dike."

TRAVERSE NOTES		
STATION	ANGLE	REMARKS
0+00	0	13.5' over and parallel to Canal Hd. Wall
0+50	7° 24' 25"	Angle to the right.
1+00	27° 00' 00"	" " " "
1+50	15° 20' 30"	" " " "
2+00	1° 15' 30"	" " " "
2+50	16° 43' 00"	" " " Left
3+00	22° 11' 30"	" " " "
3+50	22° 36' 30"	" " " "
4+00	4° 44' 30"	" " " "
4+50	14° 17' 45"	" " " Right
5+00	16° 09' 30"	" " " "
5+50	14° 32' 45"	" " " "
6+00	17° 35' 30"	" " " "
6+50	16° 43' 15"	" " " "
7+00	13° 29' 45"	" " " "
7+50		

NOTE:-
ENTIRE AREA SHOWN IS PROPERTY OF CITY COUNCIL OF AUGUSTA, GA.

Note:
All Stations on Curves are referred to Traverse.

Legend:
New Work
Existing Work
Traverse
Center Line of Road and Dike

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
ROAD ON DIKE TO HIGH GROUND

20' 15' 10' 5' 0 20' 40'
SCALE 1 INCH = 20 FEET

U.S. ENGINEER OFFICE, SAVANNAH, GA.,
SUBMITTED: M. V. Haas, SENIOR ENGINEER
APPROVED: R. P. Fowler, LT. COL. CORPS OF ENGRS.

DRAWN BY W. de V. TRACED BY W. de V. CHECKED BY C.F.D.
FILE NO. D.S.R. 149-20/1
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

BY	DATE	CHARACTER OF REVISIONS

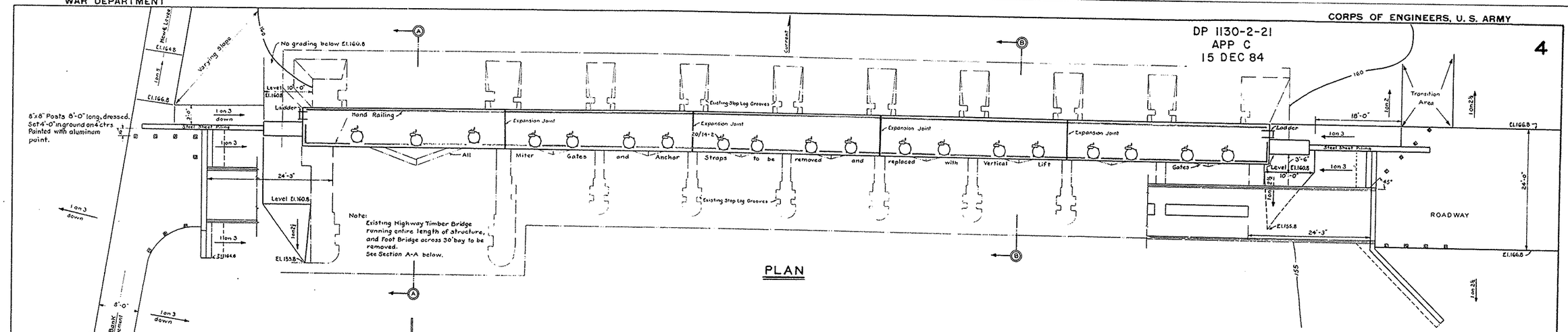
D.S.R. 149-20/1

WAR DEPARTMENT

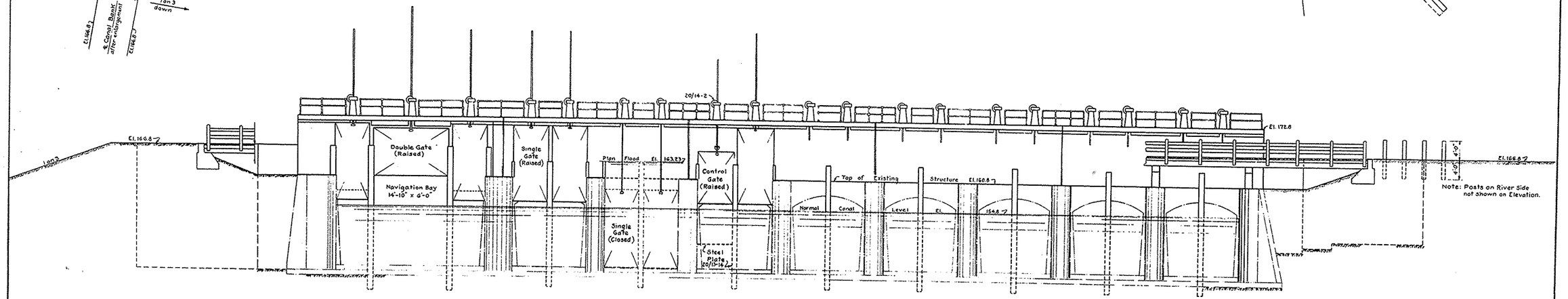
CORPS OF ENGINEERS, U. S. ARMY

DP 1130-2-21
APP C
15 DEC 84

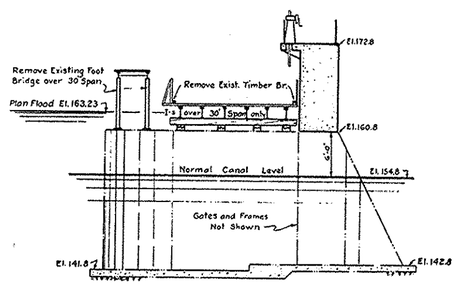
4



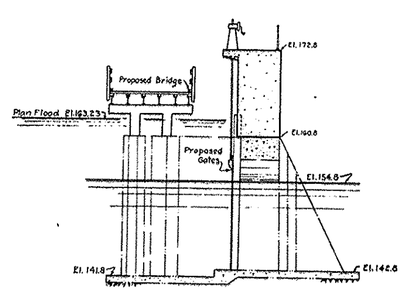
PLAN



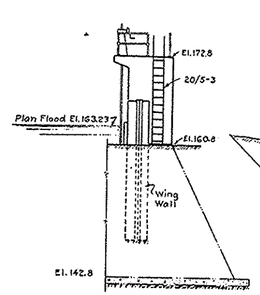
UPSTREAM ELEVATION



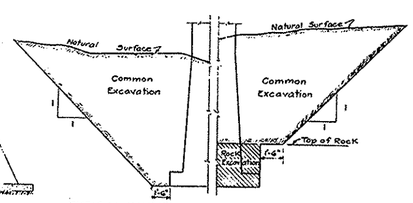
SECTION A-A



SECTION B-B



END ELEVATION
LOOKING RIVERWARD



TYPICAL PAYMENT LINES FOR EXCAVATION
NO SCALE

GENERAL NOTES

All Elevations refer to Mean Sea Level.
Existing Structures shown in phantom, thus: _____
All Gate Stands are 20/14-1 except one; marked 20/14-2.
New Work shown thus ▬▬

Order of work:
Concrete monolith across thirty-foot bay to be placed before other concrete monoliths.

BY	DATE	CHARACTER REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
GENERAL PLAN ELEVATION AND SECTION

120 5' 10' 15' 20'
SCALE: 1/8 INCH = 1 FOOT

U.S. ENGINEER OFFICE, SAVANNAH, GA.,

SUBMITTED: M. V. Haas, SENIOR ENGINEER
APPROVED: R. P. Fowler, LT. COL. CORPS OF ENGRS.

DRAWN BY W deV. TRACED BY W deV. CHECKED BY C.P.D.
FILE NO. D.S.R. 149-20/2.
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

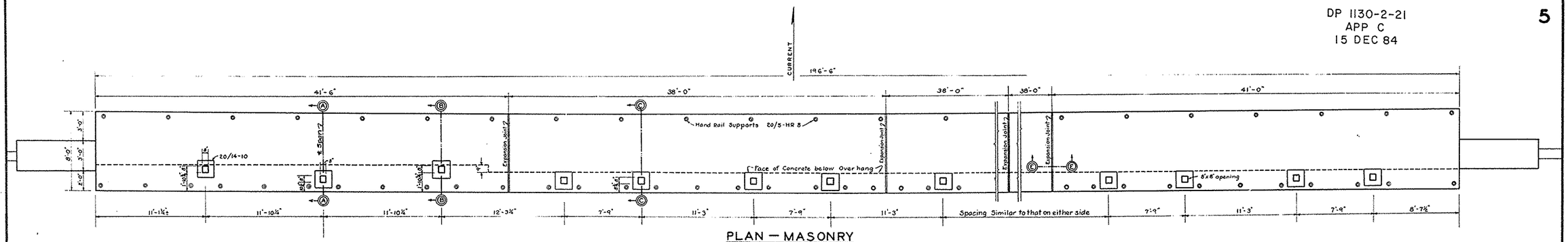
D.S.R. 149-20/2

WAR DEPARTMENT

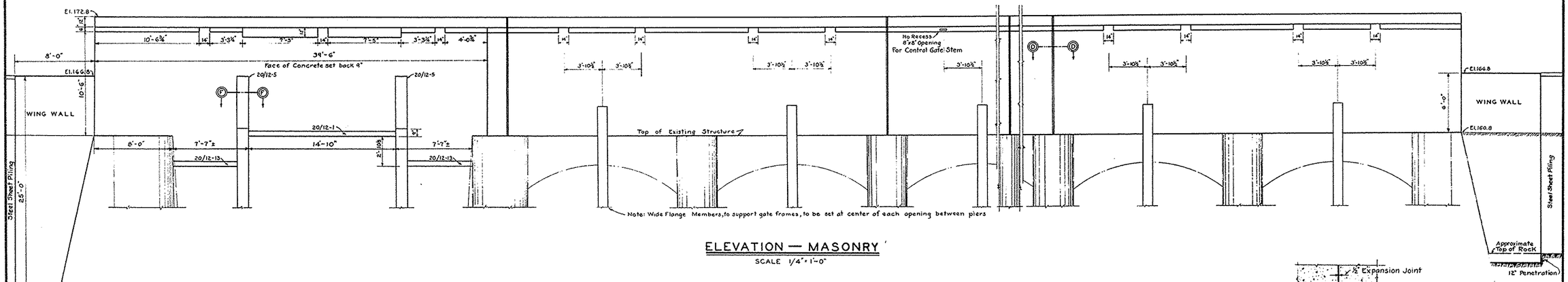
CORPS OF ENGINEERS, U. S. ARMY

DP 1130-2-21
APP C
15 DEC 84

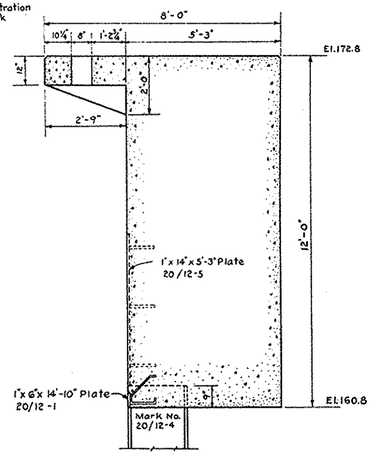
5



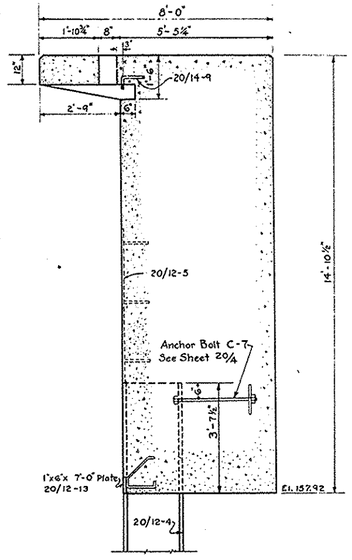
PLAN — MASONRY
SCALE 1/4" = 1'-0"



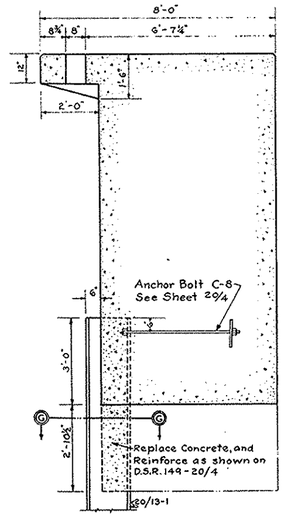
ELEVATION — MASONRY
SCALE 1/4" = 1'-0"



SECTION A—A
SCALE 1/2" = 1'-0"

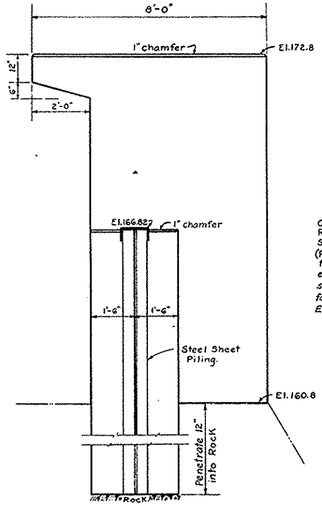


SECTION B—B
SCALE 1/2" = 1'-0"

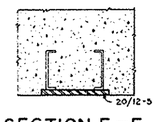


SECTION C—C
SCALE 1/2" = 1'-0"

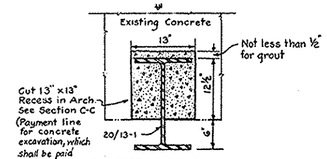
TYPICAL FOR ALL 15' EXISTING GATE OPENINGS, EXCEPT THAT FOR CONTROL GATE, RECESS UNDER OVERHANG IS OMITTED.



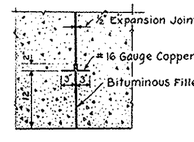
END ELEVATION
LOOKING RIVERWARD
SCALE 1/2" = 1'-0"



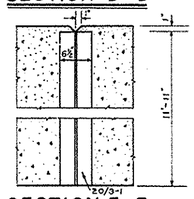
SECTION F—F
SCALE 1" = 1'-0"



SECTION G—G
SCALE 1" = 1'-0"



SECTION D—D



SECTION E—E
DETAIL OF
EXPANSION JOINT
SCALE 1" = 1'-0"

WATER STOP
MAKE 4 COPPER

MARK 20/3-1
WT. EACH 31.3 LBS.

General Note:
Omit chamfer in recesses for stem guide plates.
All concrete on this sheet to be Class 'A'.
Rock line shown is believed to be approximately correct but is not guaranteed.

BY	DATE	CHARACTER REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
CAP
MASONRY

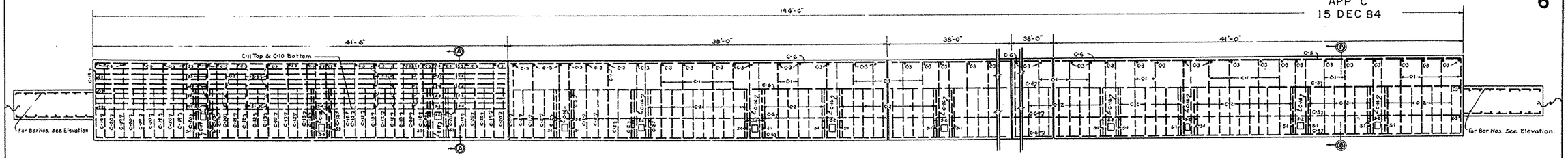
SCALES AS SHOWN

U.S. ENGINEER OFFICE, SAVANNAH, GA.,
SUBMITTED: M. J. Haas, SENIOR ENGINEER Asst
APPROVED: R. H. Fowler, LT. COL. CORPS OF ENGRS.

DRAWN BY W. deV. TRACED BY W. deV. CHECKED BY C. F. D.
FILE NO. D.S.R. 149-20/3.
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

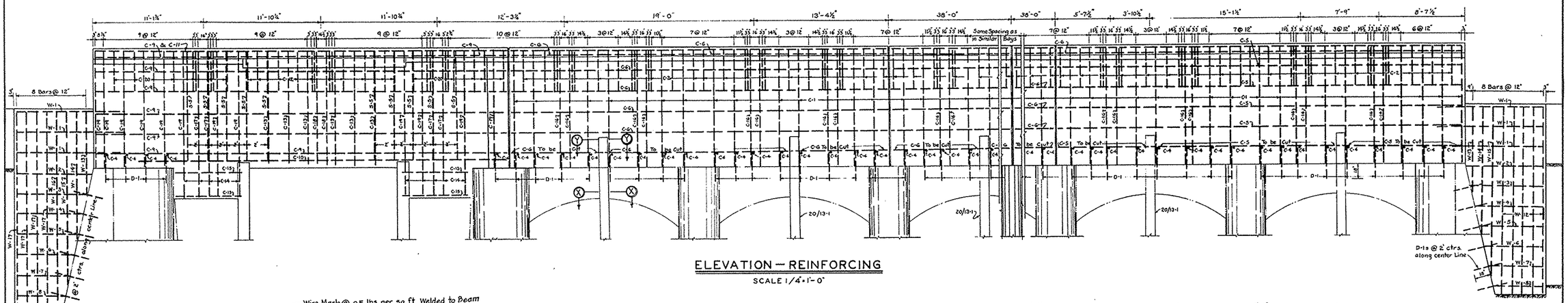
D.S.R. 149-20/3

PLATE C-5



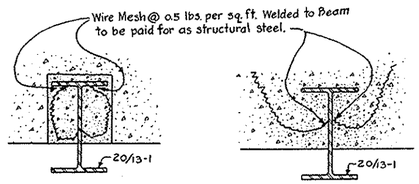
PLAN—REINFORCING

SCALE 1/4"=1'-0"



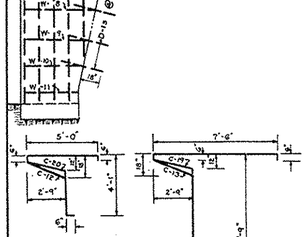
ELEVATION—REINFORCING

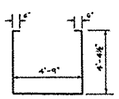
SCALE 1/4"=1'-0"

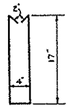


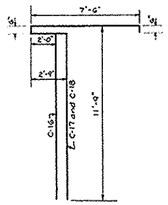
SECTION X-X

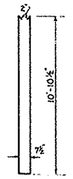
SECTION Y-Y

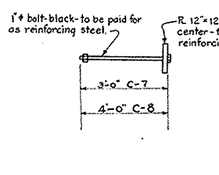


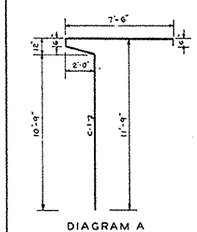


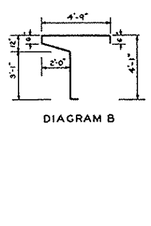










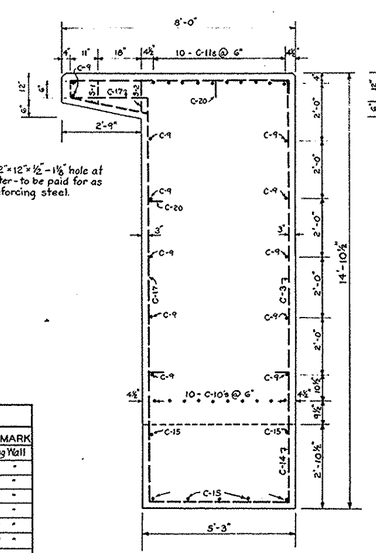


REINFORCEMENT SCHEDULE

BAR	NO. REQ'D.	SIZE	LENGTH	BENDING DIAGRAM	WEIGHT EACH	TOTAL WEIGHT	REMARK
C-1	47	⅝" ϕ	20'-11"	See Diagram "A"	21.82	1026	Cantilever
C-2	113	⅝" ϕ	10'-6"	See Diagram "B"	10.95	1237	"
C-3	96	½" ϕ	12'-2"	10'-6" / 3'-8"	8.12	780	In Back Face
C-4	70	½" ϕ	6'-10"		4.56	319	Tie Rod
* C-5	15	½" ϕ	40'-6"	Straight	27.05	406	End Span
* C-6	45	½" ϕ	37'-6"	"	25.05	1127	Typical Term.
C-7	2	1" ϕ	3'-0"	See Diagram "L"	29.13	58	Anchor Bolt
C-8	8	1" ϕ	4'-0"	" " "	31.74	254	" "
C-9	12	⅝" ϕ	41'-0"	Straight	27.39	329	Temp. Rod
C-10	10	1" ϕ	36'-6"	"	124.10	1241	Bot. of Beam
C-11	10	1" ϕ	41'-0"	"	139.40	1394	Top " "
C-12	12	⅝" ϕ	11'-7"	See Diagram C	12.08	145	Face " "
C-13	6	⅝" ϕ	21'-3"	See Diagram D	22.16	133	" " "
C-14	10	⅝" ϕ	14'-5"	See Diagram E	9.63	96	Bot. " "
C-15	14	⅝" ϕ	6'-6"	Straight	4.34	61	" " "
C-16	32	⅜" ϕ	21'-3"	See Diagram J	31.92	1021	Cantilever
C-17	4	⅜" ϕ	22'-0"	See Diagram J	33.04	132	"
C-18	2	1" ϕ	21'-10"	See Diagram J	58.29	117	Cantilever
C-19	12	⅝" ϕ	21'-8"	See Diagram D	22.60	271	"
C-20	18	⅝" ϕ	11'-11"	See Diagram C	12.43	224	"
D-1	154	½" ϕ	3'-0"	Straight	2.00	308	Dowels

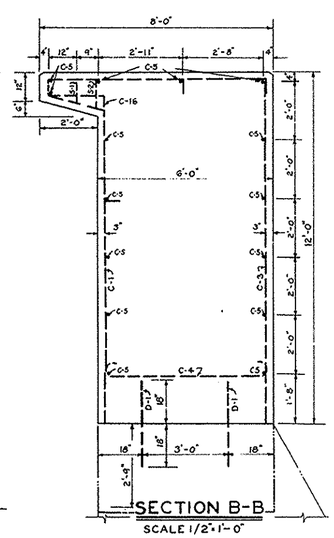
REINFORCEMENT SCHEDULE

BAR	NO. REQ'D.	SIZE	LENGTH	BENDING DIAGRAM	WEIGHT EACH	TOTAL WEIGHT	REMARK
W-1	12	½" ϕ	10'-9"	Straight	7.18	86	Wing Wall
W-2	4	½" ϕ	7'-6"	"	5.01	20	" "
W-3	4	½" ϕ	7'-0"	"	4.68	19	" "
W-4	4	½" ϕ	6'-9"	"	4.51	18	" "
W-5	4	½" ϕ	6'-3"	"	4.18	17	" "
W-6	4	½" ϕ	5'-9"	"	3.84	15	" "
W-7	4	½" ϕ	5'-4"	"	3.56	14	" "
W-8	4	½" ϕ	5'-0"	"	3.34	13	" "
W-9	2	½" ϕ	4'-6"	"	3.01	6	" "
W-10	2	½" ϕ	4'-0"	"	2.67	5	" "
W-11	2	½" ϕ	3'-9"	"	2.51	5	" "
W-12	10	½" ϕ	18'-9"	"	12.53	125	" "
W-13	4	½" ϕ	9'-0"	"	6.01	24	" "
W-14	4	½" ϕ	13'-4"	"	8.90	36	" "
W-15	4	½" ϕ	17'-6"	"	11.69	47	" "
W-16	2	½" ϕ	22'-0"	"	14.70	29	" "
W-17	8	½" ϕ	24'-9"	"	16.53	132	" "
S-1	36	½" ϕ	2'-0"	See Diagram F	1.34	48	Stirrup
S-2	36	½" ϕ	2'-2"	See Diagram G	1.44	52	"
S-3	2	½" ϕ	2'-5"	See Diagram H	1.62	3	"
S-4	2	½" ϕ	3'-2"	See Diagram I	2.18	4	"
S-5	50	½" ϕ	22'-4½"	See Diagram K	15.00	750	"



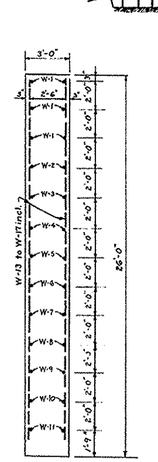
SECTION A-A

SCALE 1/2"=1'-0"



SECTION B-B

SCALE 1/2"=1'-0"



END VIEW
WING WALL-RIVERSIDE

SCALE 1/4"=1'-0"

*Cut 1-C-5 and 3-C-6s to permit placing 20/13-1.

TOTAL WEIGHT BARS
12,149 LBS.

BY	DATE	CHARACTER DESCRIPTION

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
CAP
REINFORCING

SCALES AS SHOWN

U.S. ENGINEER OFFICE, SAVANNAH, GA.,

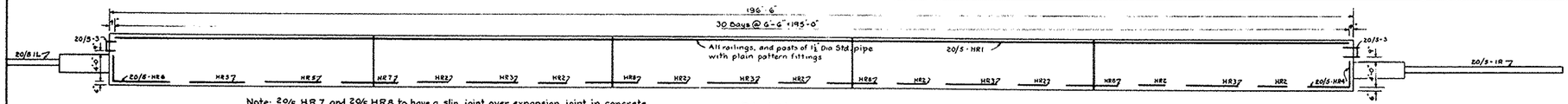
SUBMITTED: M. T. Hines, SENIOR ENGINEER

APPROVED: R. A. Fuehrer, LT. COL. CORPS OF ENGRS.

DRAWN BY W. deV. TRACED BY W. deV. CHECKED BY C.F.D.
FILE NO. D.S.R. 149 - 20/4
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

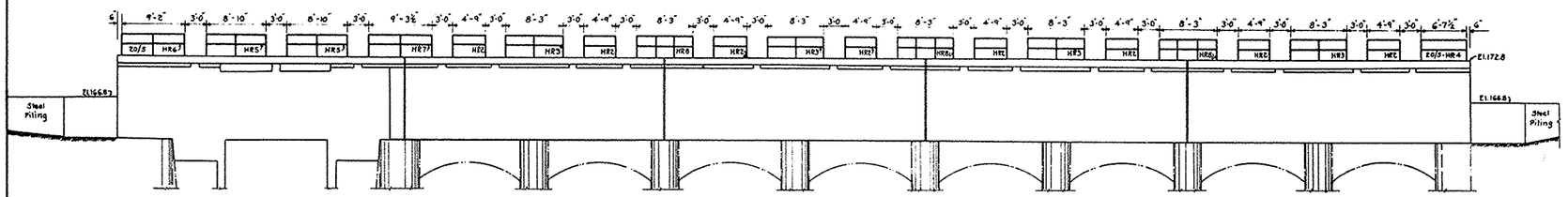
D.S.R. 149 — 20/4

PLATE C-6



Note: 20/5 HR 7 and 20/5 HR8 to have a slip joint over expansion joint in concrete. 20/5 HR1 to have a slip joint over each of the 4 expansion joints in concrete that it crosses

PLAN

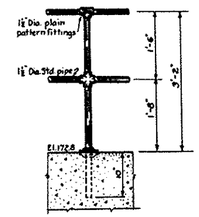


HANDRAILING

MARK 20/5 HR1	MAKE 1
MARK 20/5 HR2	MAKE 8
MARK 20/5 HR3	MAKE 4
MARK 20/5 HR4	MAKE 1
MARK 20/5 HR5	MAKE 2
MARK 20/5 HR6	MAKE 1
MARK 20/5 HR7	MAKE 1
MARK 20/5 HR8	MAKE 3

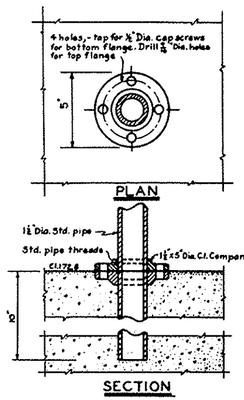
SCALE 1/8"=1'-0"

Note: Bridge and Gates not shown.



ASSEMBLY DETAIL OF POST
SCALE 3/4"=1'-0"

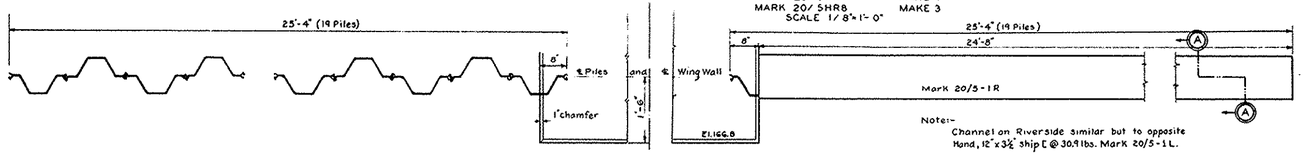
Note: Provide for slip joints in handrailing over expansion joints in masonry.



HANDRAILING SUPPORT

MARK 20/5 HR 8 MAKE 84

SCALE 3"=1'-0"

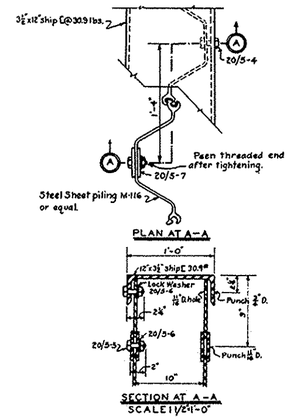


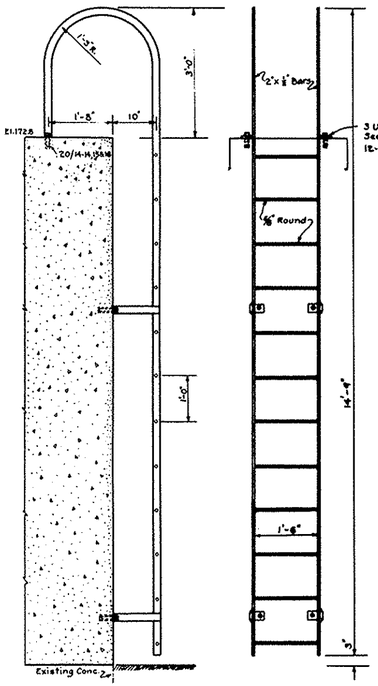
Note:- Channel on Riverside similar but to opposite Hand, 12"x3½" ship [@ 30.9 lbs. Mark 20/5-1 L.

PART PLAN BELOW CHANNEL CAP

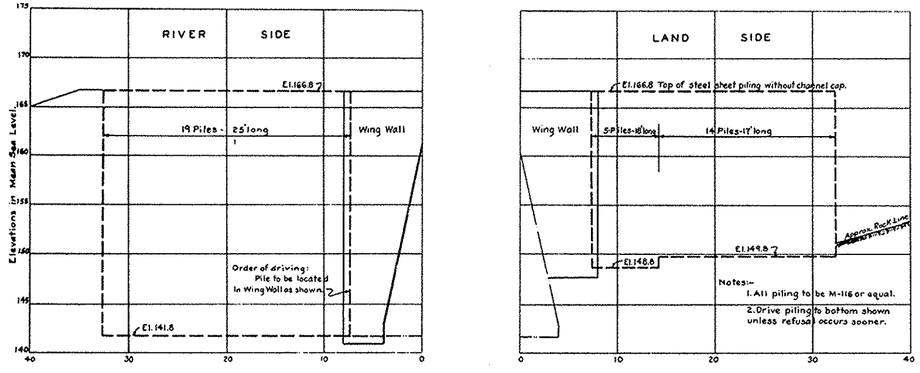
STEEL SHEET PILE WING WALL
SCALE 3/4"=1'-0"

PART PLAN ABOVE CHANNEL CAP

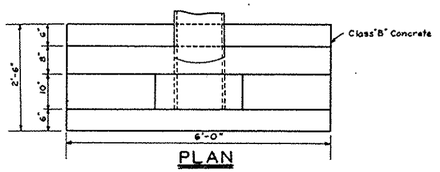




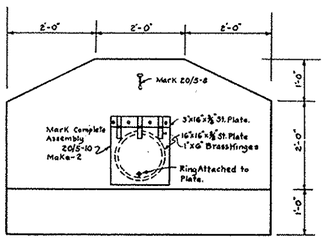
LADDER DETAIL
MARK 20/5-3 MAKE 2
SCALE 3/4"=1'-0"



PROFILE
SCALE - HOR & VERT 1"=6'-0"

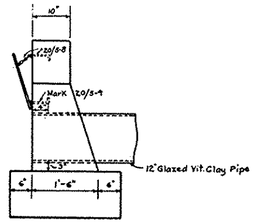


PLAN



FRONT ELEVATION
CULVERT HEAD WALL
SCALE 3/4"=1'-0"

Note: All parts shown in this detail, except concrete, to be part of payment item, "Culverts under Dike."



SIDE ELEVATION

LIST OF PARTS NOT DETAILED

BOLTS AND NUTS U.S. STANDARD

MARK	DESCRIPTION	MATERIAL	SIZE	USED WITH	QUAN.	UNIT WT.	TOTAL WT.
20/5-4	Bolt-Hex. hd. and nut	Steel	⅞" x 2½"	20/5-1R and 1L	38	.462	18
20/5-5	" " " "	Steel	⅞" x 2"	20/5-7	38	.440	17
20/5-6	Lock Washer	Spring Steel	⅞"	20/5-4, 20/5-5	76	.021	2
20/5-7	Plate Washer	Str. Steel	⅞" x 4" Dia.	20/5-5	76	1.296	99
20/5-8	⅝" Shoulder Eye bolt with Chain and Boot Snap.	Brass & Steel.	⅝" Dia.	Use to Keep Plate Up.	2		
20/5-9	Anchor Bolts with nuts	Steel	¾" x 6" (bent)	20/5-10	8	.378	3

BY	DATE	CHARACTER REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
MISCELLANEOUS DETAILS

SCALES AS SHOWN

U.S. ENGINEER OFFICE, SAVANNAH, GA.

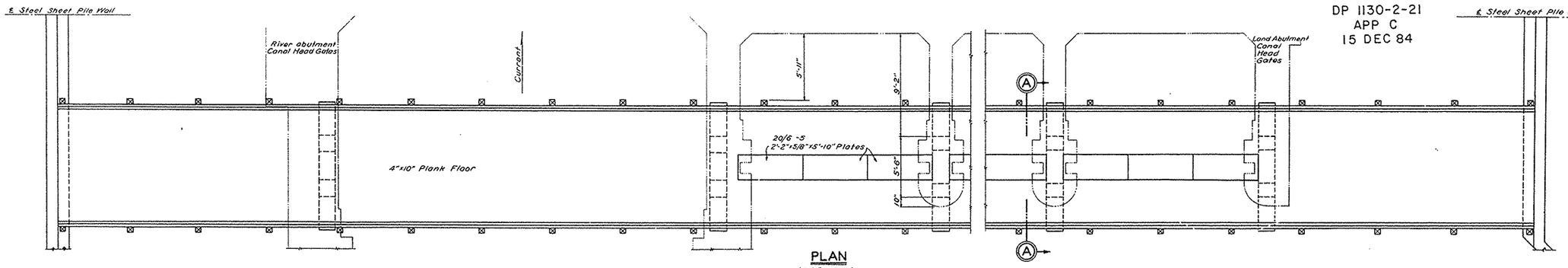
SUBMITTED: M. V. Hare, SENIOR ENGINEER

APPROVED: R. P. Howard, LT. COL. CORPS OF ENGRS.

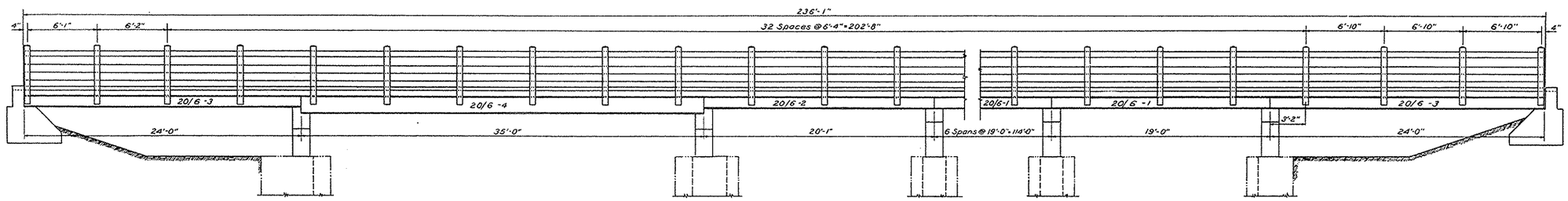
DRAWN BY W. deV. TRACED BY W. deV. CHECKED BY C. P. D.
FILE NO. D.S.R. 149-20/5
TO ACCOMPANY SPECIFICATIONS DATED APRIL 6, 1939.

D.S.R. 149-20/5

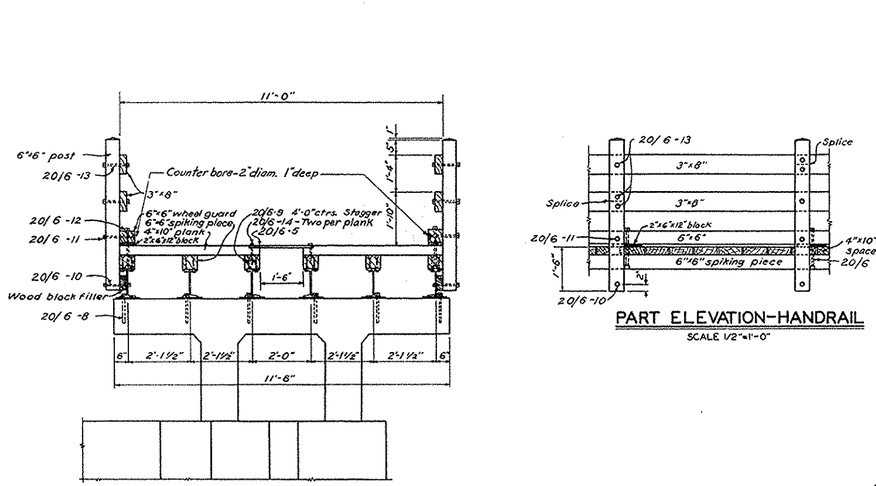
PLATE C-7



PLAN
SCALE 1/4"=1'-0"

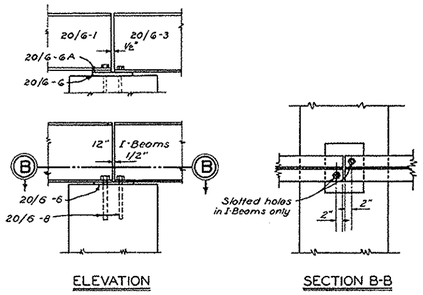


UPSTREAM ELEVATION
SCALE 1/4"=1'-0"



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

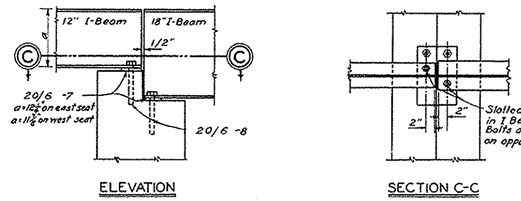
PART ELEVATION-HANDRAIL
SCALE 1/2"=1'-0"



ELEVATION

SECTION B-B

DETAIL OF STRINGER SEAT
19 FT. SPAN
SCALE 1"=1'-0"



ELEVATION

SECTION C-C

DETAIL OF STRINGER SEAT
35 FT. SPAN
SCALE 1"=1'-0"

General Notes :-

No overrun on stringers allowable.

All timber work to be creosoted, except handrail which is to be painted with aluminum paint. In portion of bridge floor where cover plates (20/6-5) are not required, floor planks shall be fastened to spiking pieces of the two center stringers by one lag screw per plank, and to outside stringer by one lag screw per plank. Swedge bolts shall be embedded at time of placing concrete. In portion of bridge floor where cover plates (20/6-5) are used, floor planks shall be fastened with two lag screws. One to center and one to outside stringer. Hand rail, posts, wheel guard, and spiking pieces to be dressed lumber. All other to be rough.

LIST OF PARTS NOT DETAILED

MARK	DESCIPTION	MATERIAL	SIZE	USED WITH	QUAN	UNIT WT.	TOTAL WT.
20/6 -1	12"W-Beam @ 25#	Struct. Stl.	18'-11½"	19 Ft. Span	42	474	19,908
20/6 -2	" " " "	" "	20'-0½"	20 Ft. "	6	501	3,006
20/6 -3	12"W-Beam @ 36"	" "	23'-11½"	Abutment Span	12	862.5	10,350
20/6 -4	18" I-Beam :: 54.7#	" "	35'-0"	35 Ft. Span	6	*	*
20/6 -5	Cover Plate	" "	2'-2"x5/8"x5'-10"	Stoplog Opening	24	322.3	7,735
20/6 -6	Seat Plate	" "	8"x½"x10"	20/6-1	48	11.3	544
20/6 -7	Seat Plate	" "	4"x½"x12"	20/6-3 & 20/6-4	36	6.8	245
20/6 -8	Swedge Bolt with nut	" "	1"x12"	20/6-6 & 20/6-7	168	3.1	521
20/6 -9	Bolt-hex.hd, Nut & 2Washer	" "	½"x7"	20/6-1, 2, 3, & 4	714	.5	357
20/6 -10	Bolt-" " " "	" "	5/8"x10"	20/6-1, 2, 3, & 4	76	1.2	91
20/6 -11	Bolt-" " " "	" "	5/8"x12"	Handrail	76	1.3	99
20/6 -12	Bolt-" " " "	" "	5/8"x18"	Wheel Guard	76	1.8	137
20/6 -13	Carriage Bolt, Nut & 2 Wash.	" "	½"x10"	Handrail	228	.7	160
20/6 -14	Lag Screws	" "	½"x8"	20/6 -5	1140	.41	467
20/7 -1	4-UnitCinchAnchor, threaded	Iron & Lead	1"	Trestle Bent	80	2.2	176
20/7 -2	Lock Washer	Spring Stl.	1"	20/7 -1	80	.087	7
20/6-6A	Seat Plate (Weld to 20/6-6	Struct. Stl.	3½"x 7/8"x 7"	20/6 -1	6	2.8	17

Note: Beams 20/6-4 to be salvaged from existing bridge and used in proposed bridge.

Week	8-25-39	Seat Plate 20/6-6A added. Elevation of Seat Detail added.
BY	DATE	CHARACTER
		REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
BRIDGE
GENERAL ARRANGEMENT

SCALES AS SHOWN

U.S. ENGINEER OFFICE, SAVANNAH, GA.,

SUBMITTED: M. U. Haas, SENIOR ENGINEER

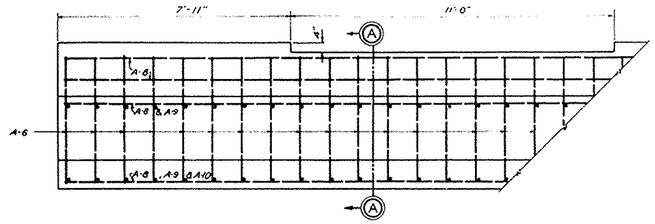
APPROVED: R. A. Lowndes, LT. COL. CORPS OF ENGRS.

DRAWN BY W.J.W. TRACED BY W.J.W. CHECKED BY C.R.D.
FILE NO. D.S.R. 149-20/6
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

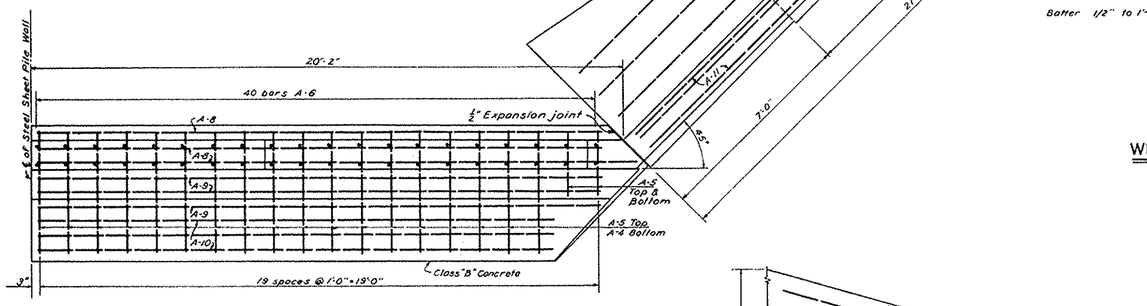
D.S.R. 149-20/6

PLATE C-8

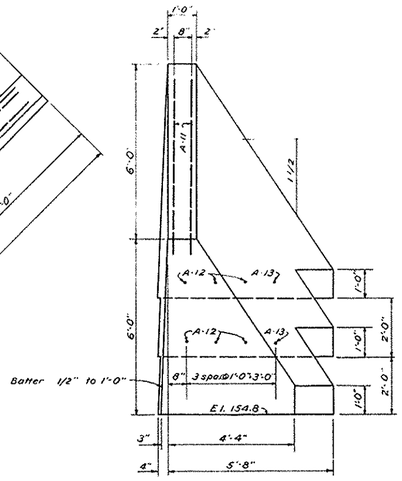
DP 1130-2-21
APP C
15 DEC 84



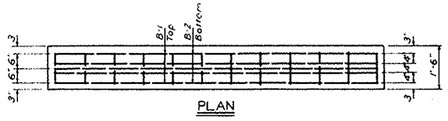
PART FRONT ELEVATION
WEST ABUTMENT



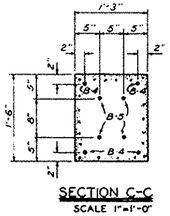
PLAN—WEST ABUTMENT



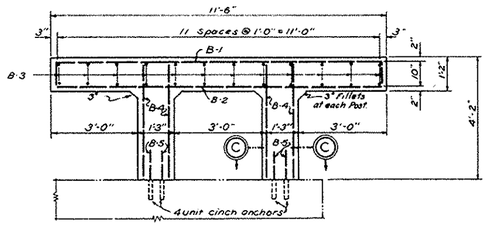
END ELEVATION
WING WALL—WEST ABUTMENT



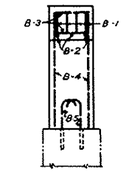
PLAN



SECTION C-C
SCALE 1"=1'-0"

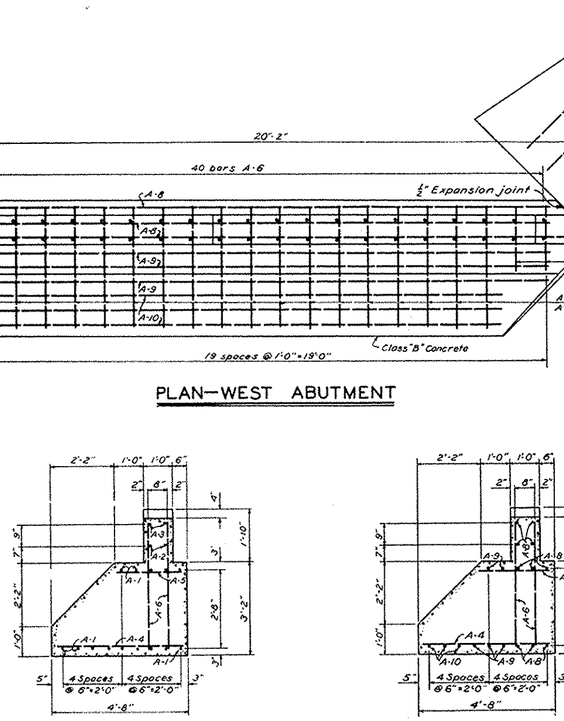


FRONT ELEVATION



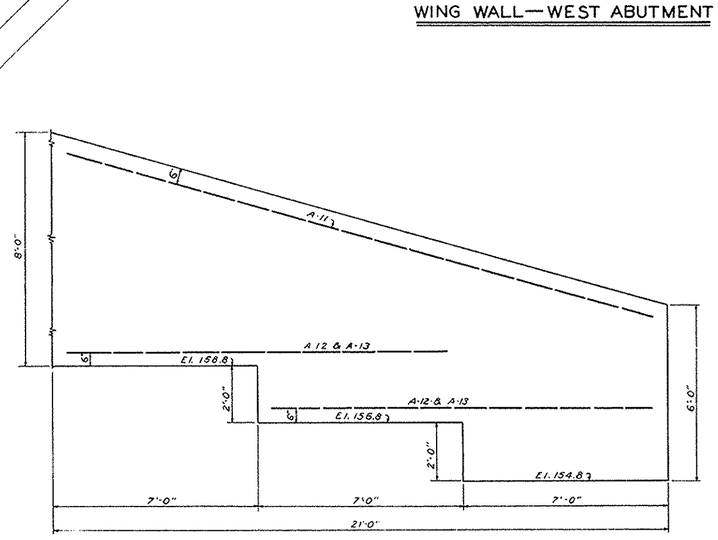
END ELEVATION

TRESTLE BENT — 19 FT. SPAN

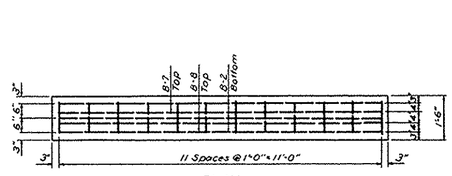


SECTION B-B

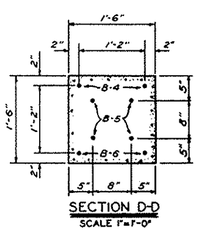
SECTION A-A



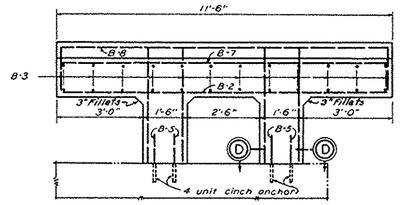
ELEVATION—WING WALL
WEST ABUTMENT



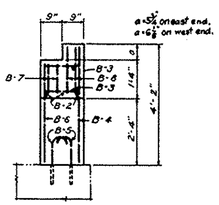
PLAN



SECTION D-D
SCALE 1"=1'-0"

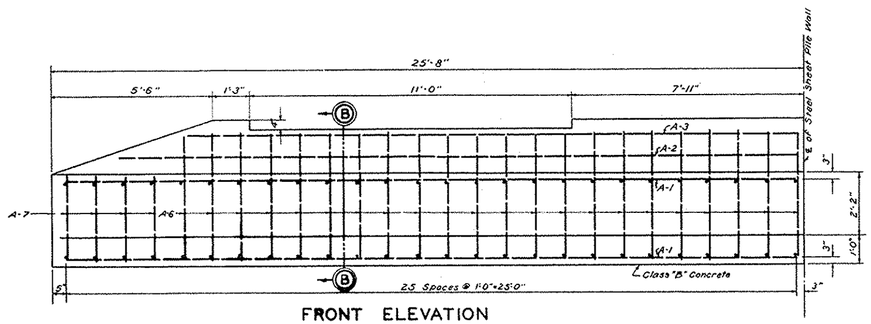


FRONT ELEVATION



END ELEVATION

TRESTLE BENT — 35 FT. SPAN



FRONT ELEVATION
EAST ABUTMENT

REINFORCEMENT SCHEDULE							
BAR	NO. REQ'D.	SIZE	LENGTH	BENDING DIAGRAM	WT. EACH	TOTAL WT.	REMARK
A-1	14	5/8" ϕ	25'-0"	Straight	26.10	366	L. Abut.
A-2	2	5/8" ϕ	23'-0"	"	24.01	48	" "
A-3	2	5/8" ϕ	21'-0"	"	21.92	44	" "
A-4	44	5/8" ϕ	4'-2"	"	4.34	191	Both Abut.
A-5	48	5/8" ϕ	2'-3"	"	2.35	113	" "
A-6	84	5/8" ϕ	4'-3"	"	4.43	372	" "
A-7	8	5/8" ϕ	2'-10"	"	2.96	24	L. Abut.
A-8	10	5/8" ϕ	20'-6"	"	21.38	214	W. "
A-9	5	5/8" ϕ	19'-0"	"	19.82	99	" "
A-10	3	5/8" ϕ	17'-6"	"	18.25	55	" "
A-11	2	3/4" ϕ	21'-0"	"	31.50	63	" "
A-12	6	3/4" ϕ	13'-0"	"	19.50	117	" "

REINFORCEMENT SCHEDULE							
BAR	NO. REQ'D.	SIZE	LENGTH	BENDING DIAGRAM	WT. EACH	TOTAL WT.	REMARK
A-13	2	3/4" ϕ	10'-0"	Straight	15.00	30	W. Abut.
				"			
B-1	32	7/8" ϕ	12'-10"	11'-2"	26.23	839	Bent
B-2	30	3/4" ϕ	11'-2"	Straight	16.82	505	"
B-3	240	1/4" ϕ	1'-2"	"	0.19	46	"
B-4	72	3/8" ϕ	4'-0"	"	6.01	433	"
B-5	80	1" ϕ	2'-7"	Hot 10" threaded	6.90	552	"
B-6	8	3/4" ϕ	3'-6"	Straight	5.26	42	"
B-7	4	7/8" ϕ	13'-2"	11'-2"	26.91	108	"
B-8	4	7/8" ϕ	14'-2"	11'-2"	28.95	116	"
				Total In Structure		4,377	

General Note:
Unless otherwise noted all concrete to be Class "A"

No.	DATE	CHARACTER REVISIONS
Rock	8-25-39	Dimensions on End Elevation of 35' Span Trestle Bent changed.

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
BRIDGE
CONCRETE DETAILS

SCALE 1/2 INCH = 1 FOOT

U.S. ENGINEER OFFICE, SAVANNAH, GA.,

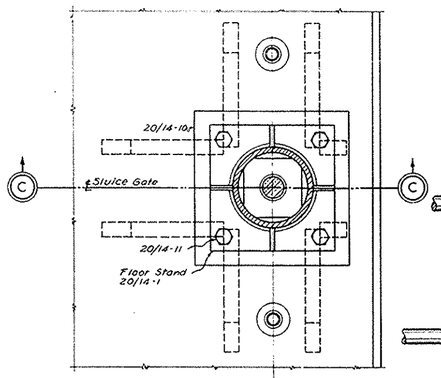
SUBMITTED: M. V. Hoag, SENIOR ENGINEER

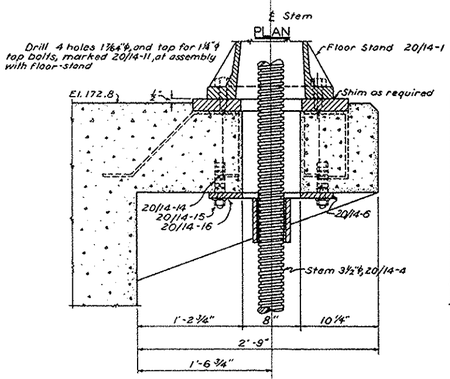
APPROVED: [signature], LT. COL. CORPS OF ENGRS.

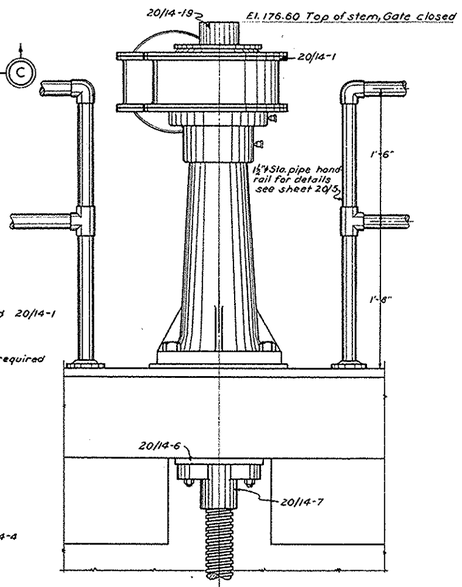
DRAWN BY W. J. W. TRACED BY W. J. W. CHECKED BY C.F.D.
FILE NO. D.S.R. 149-20/7
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

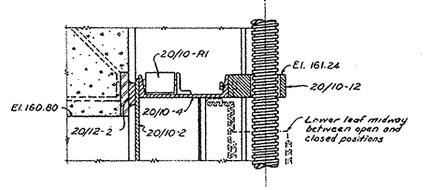
D.S.R. 149-20/7

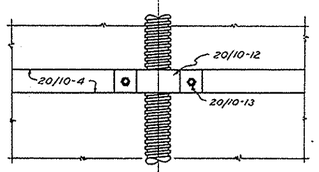
PLATE: C-9

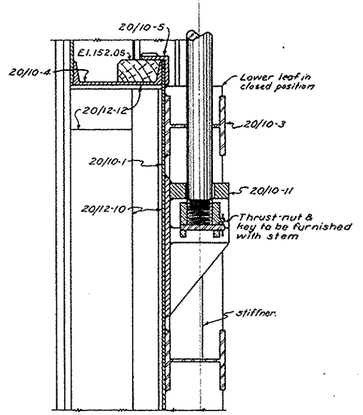


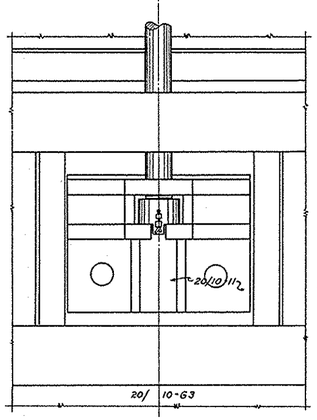










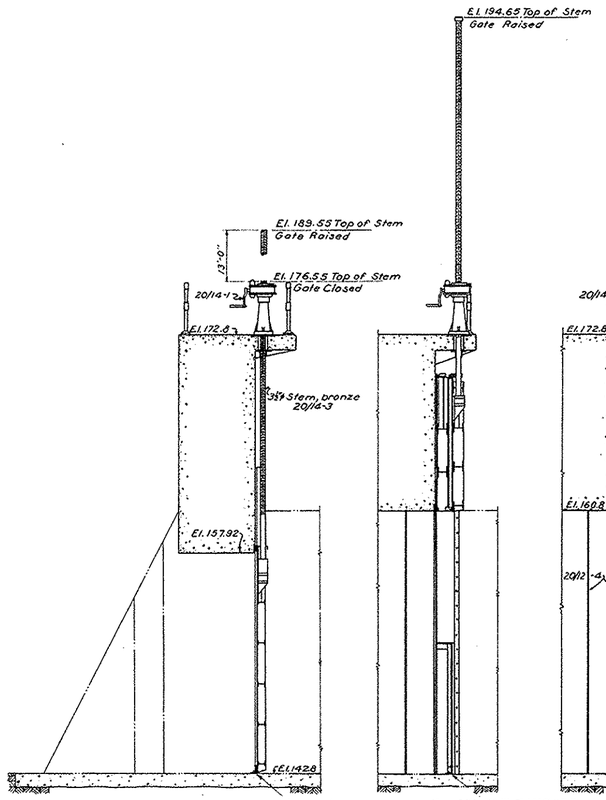


SECTION C-C

ELEVATION

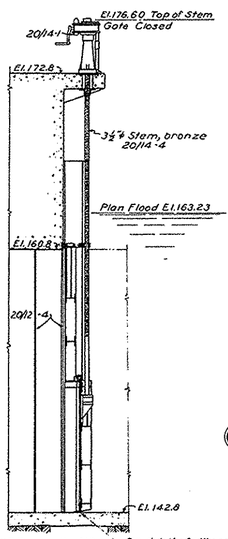
DOUBLE GATE
ASSEMBLY DETAILS
SCALE 1 1/2"=1'-0"

BY	DATE	CHARACTER OF REVISIONS



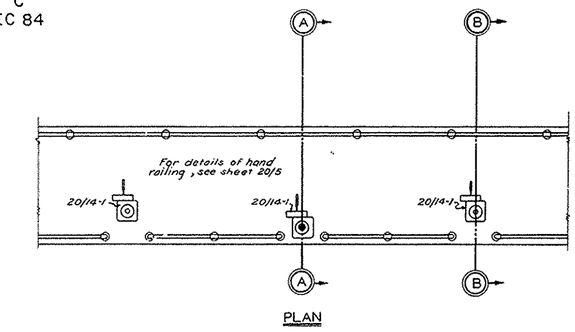
SECTION B-B

SECTION A-A
GATE RAISED

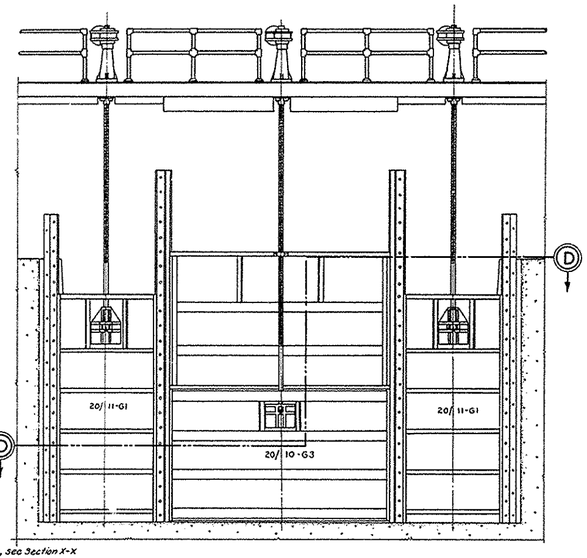


SECTION A-A
GATE CLOSED

For detail of sill angle, see Section X-X Sheet D.S.R. 149-20/12.

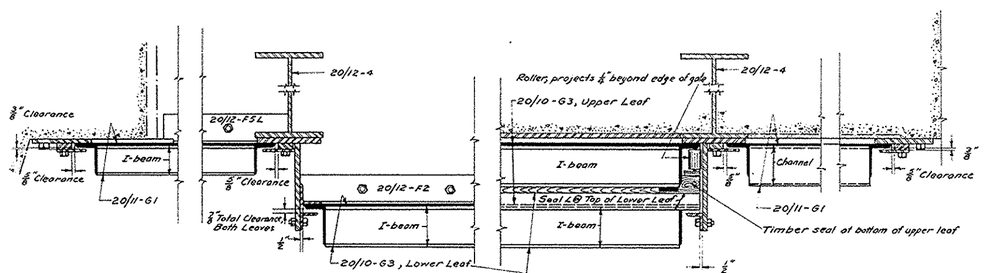


PLAN



ELEVATION

GENERAL ARRANGEMENT
SCALE 1/4"=1'-0"



Note:
In this view, fixed parts, (gate frames & guides) shown in section thus.....
Moving parts (gates) shown in section thus .....

SECTION D-D
SCALE 1"=1'-0"

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
GATES FOR 30 FT. BAY
GENERAL ARRANGEMENT

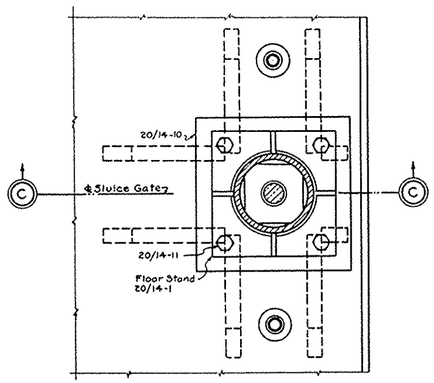
SCALES AS SHOWN

U.S. ENGINEER OFFICE, SAVANNAH, GA.,
SUBMITTED: M. V. Haas, SENIOR ENGINEER
APPROVED: R. D. Fowler, LT. COL. CORPS OF ENGRS.

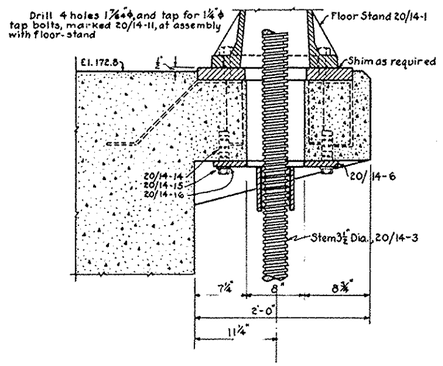
DRAWN BY W.J.W. TRACED BY W.J.W. CHECKED BY C.F.D
FILE NO. D.S.R. 149-20/8
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

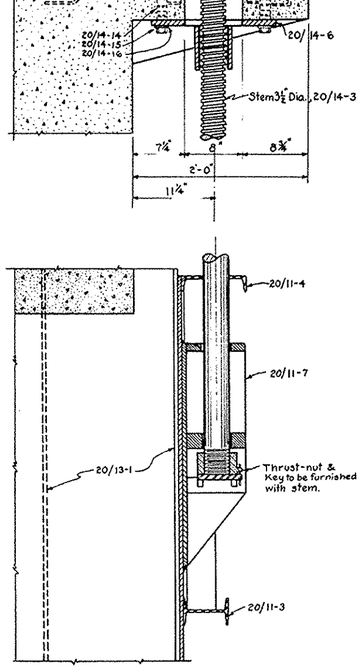
D.S.R. 149-20/8

PLATE C-10

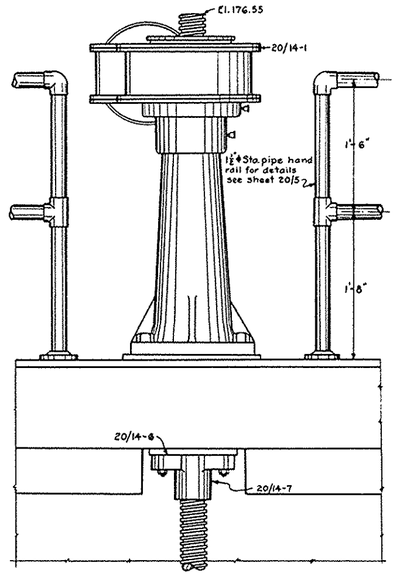


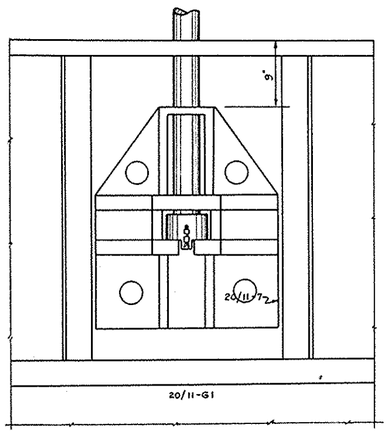
PLAN





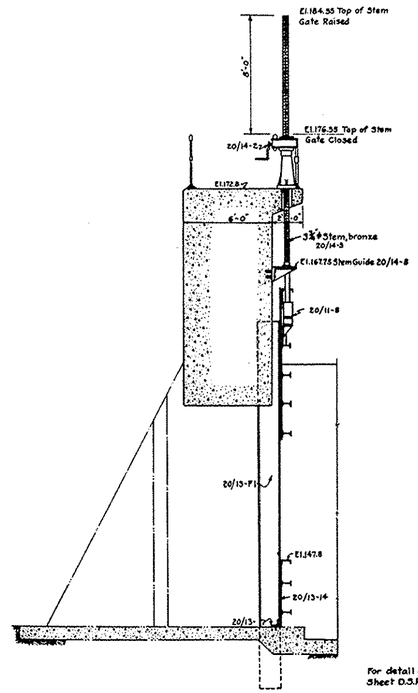
SECTION C-C



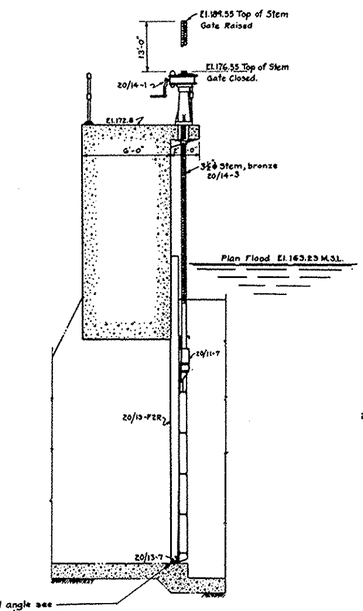


ELEVATION

TYPICAL SMALL GATE
ASSEMBLY DETAILS
SCALE 1 1/2"=1'-0"

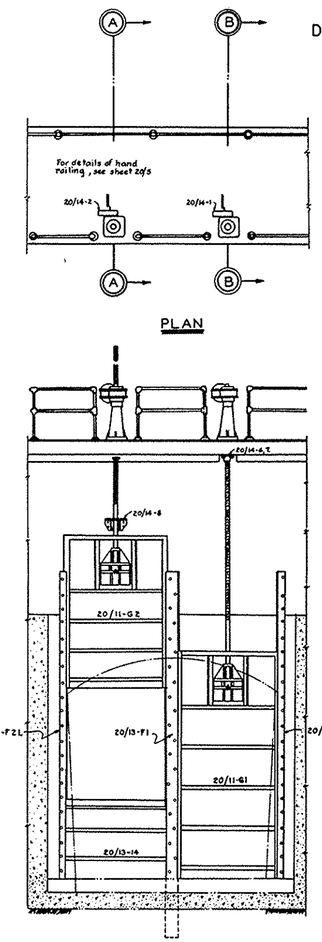


SECTION A-A



For detail of sill angle see Sheet D.S.R. 149-20/12

SECTION B-B



PLAN

ELEVATION

GENERAL ARRANGEMENT
SCALE 1/4"=1'-0"

GENERAL NOTES:
All 17 foot bays except one shown on this sheet to have two gates 20/11-G1.
Only one gate 20/11-G2 required for entire structure, namely the one shown on this sheet.

BY	DATE	CHARACTER REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
GATES FOR 17 FT. BAYS
GENERAL ARRANGEMENT

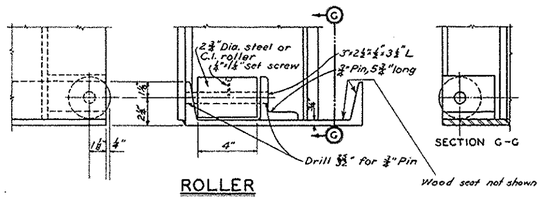
SCALES AS SHOWN

U.S. ENGINEER OFFICE, SAVANNAH, GA.,

SUBMITTED: M. W. Head, SENIOR ENGINEER
APPROVED: R. [illegible], LT. COL. CORPS OF ENGRS.

DRAWN BY W. de V. TRACED BY W. de V. CHECKED BY C.F.D
FILE NO. D.S.R. 149-20/9
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

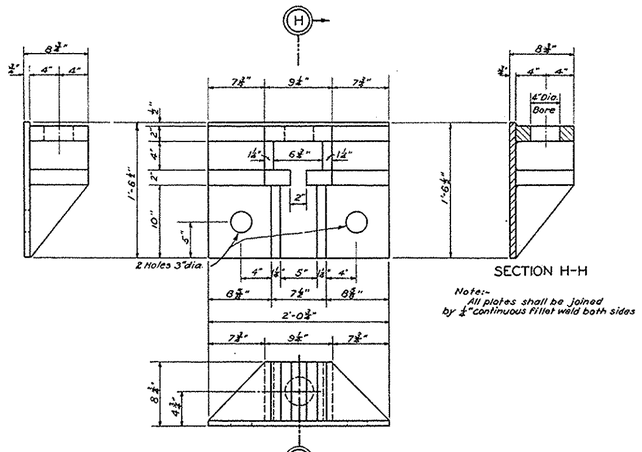
D.S.R. 149-20/9



ROLLER

MARK 20/10-R1	MAKE 4
STEEL OR C.I. ROLLER	7 LBS. EACH
PIN - 3/4" BRONZE	5 3/4" EACH
SET SCREW	.02 LBS. EACH
ANGLE 3"x2½"x⅝"x3⅜"	2.48 LBS. EACH

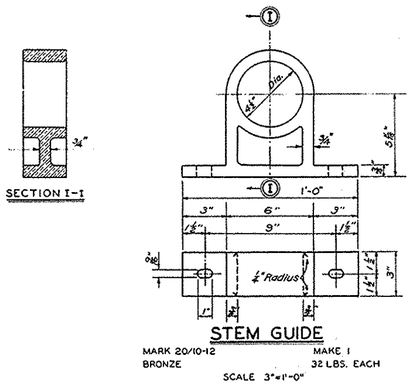
SCALE 3"=1'-0"



Note:- All plates shall be joined by ¼" continuous fillet weld both sides

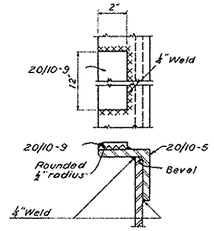
YOKE

MARK 20/10-11 MAKE 1
STRUCT. STEEL 294 LBS EACH
SCALE 1 1/2"=1'-0"



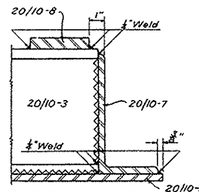
STEM GUIDE

MARK 20/10-12 MAKE 1
BRONZE 32 LBS. EACH
SCALE 3"=1'-0"



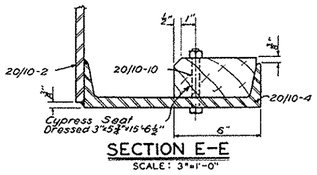
SECTION C-C

SCALE: 3"=1'-0"



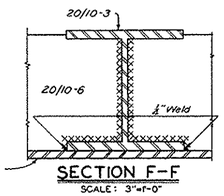
SECTION D-D

SCALE: 3"=1'-0"



SECTION E-E

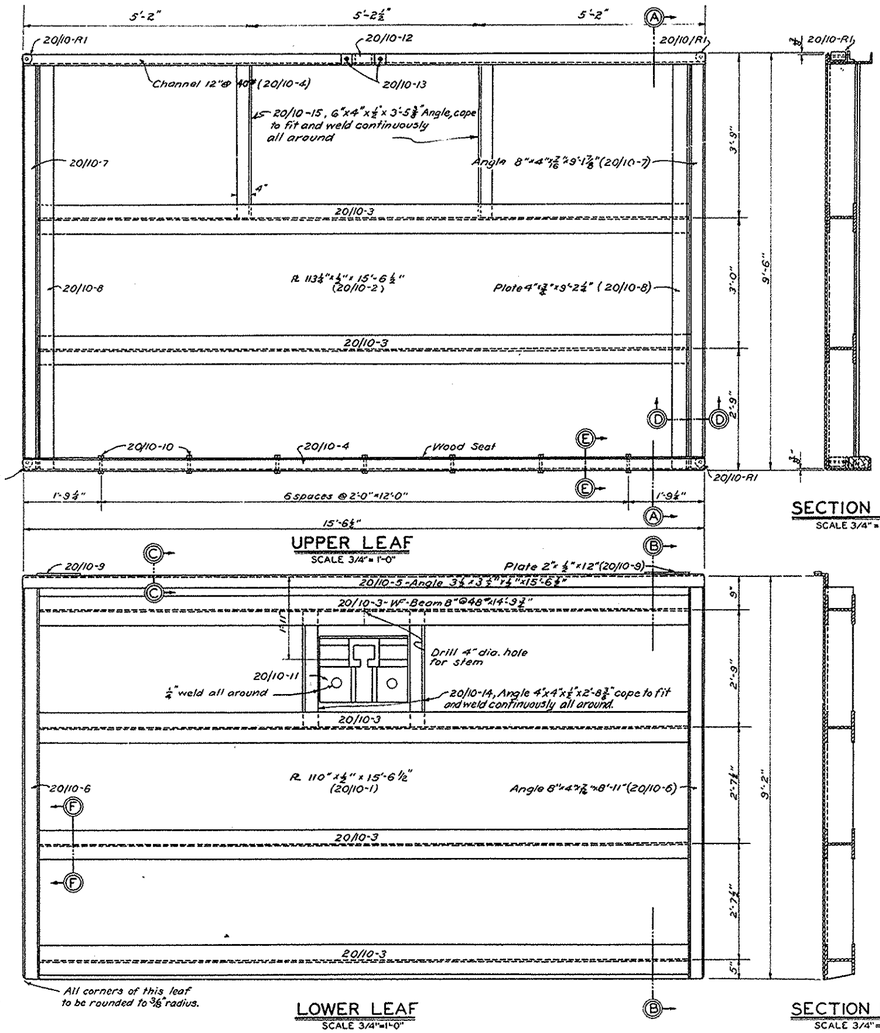
SCALE: 3"=1'-0"



SECTION F-F

SCALE: 3"=1'-0"

General Notes:-
T-Beams, channels, and angles to be joined to skin plates by fillet weld ¼"x6"@12". All other weld to be continuous.
Weights given are exclusive of electrode metal added in welding.
Skin plate for each leaf to be from a single steel plate.



UPPER LEAF

SCALE 3/4"=1'-0"

LOWER LEAF

SCALE 3/4"=1'-0"

SECTION A-A

SCALE 3/4"=1'-0"

SECTION B-B

SCALE 3/4"=1'-0"

DOUBLE GATE

MARK 20/10-G3 MAKE 1
WT. UPPER LEAF 6358 LBS.
WT. LOWER LEAF 6601 LBS. (INCLUDES YOKE)

LIST OF PARTS NOT DETAILED

MARK	DESCRIPTION	MATERIAL	SIZE	USED WITH	QUAN	UNIT WT.	TOTAL WT.
20/10-10	Bolt-hex.head & nut	Bolt Steel	¾"x4"	20/10-4	7	.3	2
20/10-13	Bolt-hex.head & nut	" "	¾"x2"	20/10-4 & 12	2	.2	1

WELD SYMBOLS

Fillet weld, near side
Fillet " , far side
Fillet " , both sides
Butt " , near side
Size, length and center to center spacing of increments in intermittent fillet welds shown thus 4"x4"@12"
Fillet welds to large scale in section shown thus 4"
Butt welds to large scale in section shown thus ½"x6"

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
DOUBLE GATE
DETAILS
SCALES AS SHOWN

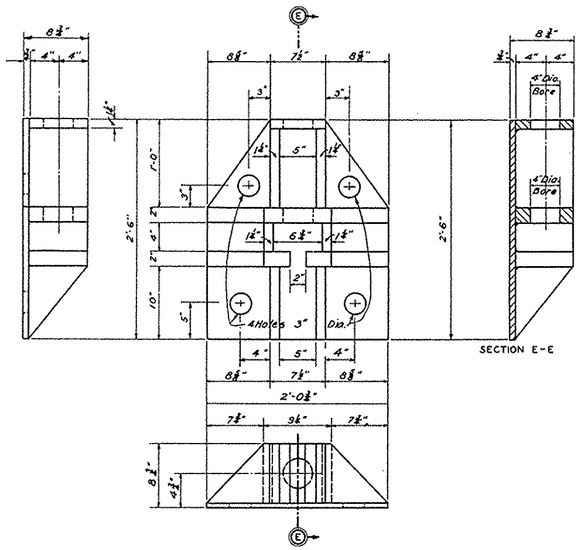
U.S. ENGINEER OFFICE, SAVANNAH, GA.,
SUBMITTED: M. T. Haas, SENIOR ENGINEER
APPROVED: R. H. Fuerler, LT. COL. CORPS OF ENGRS.

DRAWN BY W.J.W. TRACED BY W.J.W. CHECKED BY C.R.D.
FILE NO. D.S.R. 149-20/10
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1930

BY	DATE	CHARACTER REVISIONS

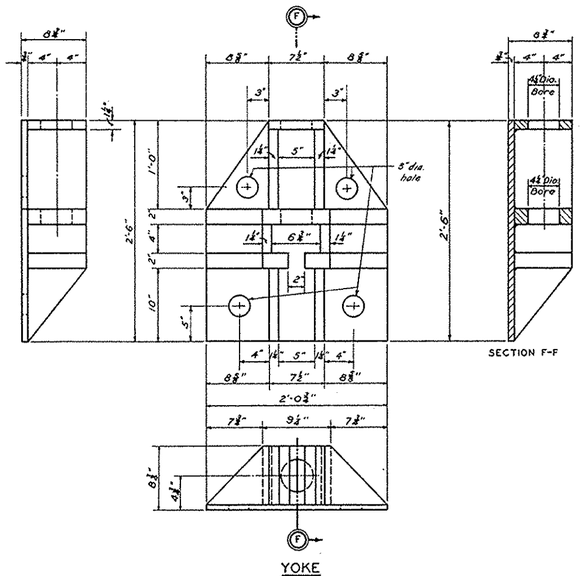
D.S.R. 149—20/10

PLATE C-12



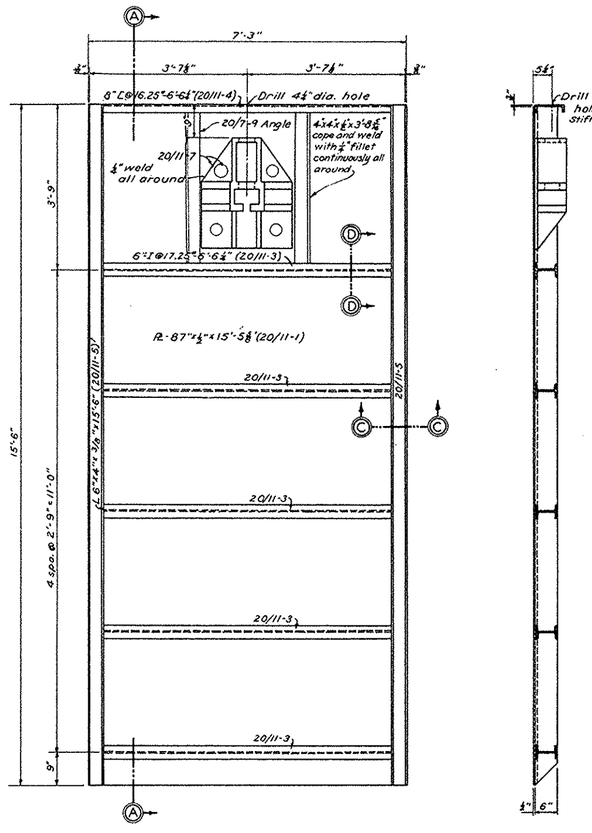
YOKE

MARK 20/11-7 MAKE 17
STUCTURAL STEEL 375 LBS. EACH
SCALE 1 1/2"=1'-0"



YOKE

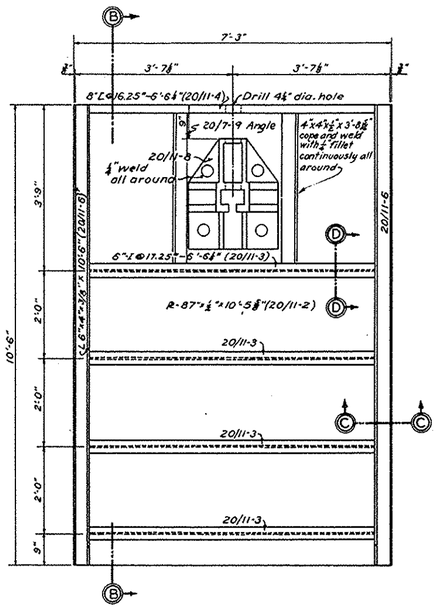
MARK 20/11-8 MAKE 1
STRUCTURAL STEEL 375 LBS. EACH
SCALE 1 1/2"=1'-0"



ELEVATION SECTION A-A

TYPICAL SMALL GATE

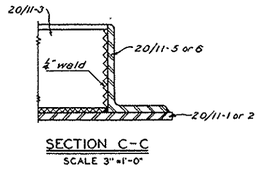
MARK 20/11-G1 MAKE 17
STRUCTURAL STEEL 3806 LBS. EACH(INCLUDING YOKE)
SCALE 3/4"=1'-0"



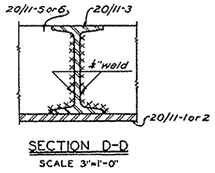
ELEVATION SECTION B-B

CONTROL GATE

MARK 20/11-G2 MAKE 1
STRUCTURAL STEEL 2832 LBS. EACH (INCLUDING YOKE)
SCALE 3/4"=1'-0"



SECTION C-C
SCALE 3"=1'-0"



SECTION D-D
SCALE 3"=1'-0"

General Note:-
I-Beams, channels, and angles to be joined to skin plates by fillet weld ¼"x6"@12". All other weld to be continuous.
For yokes, all plates shall be joined by ¼" continuous fillet weld, both sides.
Weights given are exclusive of electrode metal added in welding.
For weld symbols see sheet D.S.R. 149-20/10.
Skin plate for each gate to be from a single steel plate.

BY	DATE	CHARACTER
		REVISIONS

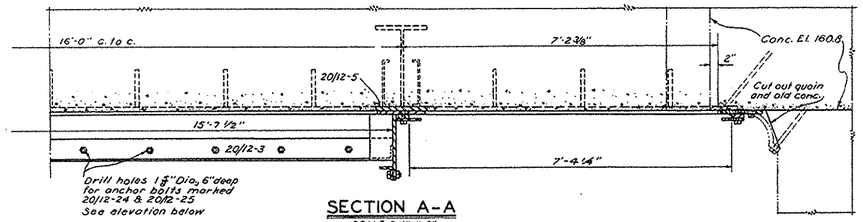
AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
SMALL GATES
DETAILS

SCALES AS SHOWN

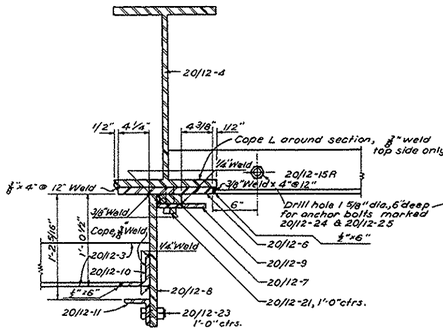
U.S. ENGINEER OFFICE, SAVANNAH, GA.,
SUBMITTED: M. T. Hass, SENIOR ENGINEER
APPROVED: LT. COL. CORPS OF ENGRS.

DRAWN BY W. J. W. TRACED BY W. J. W. CHECKED BY C. E. D
FILE NO. D.S.R. 149-20/11
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

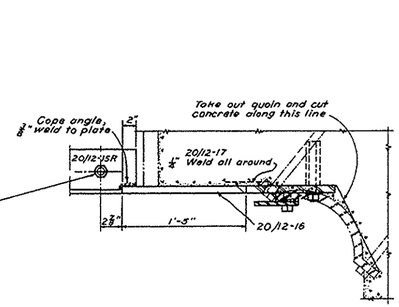
D.S.R. 149-20/11



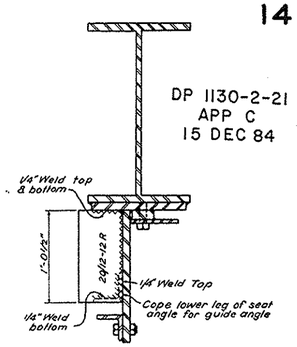
SECTION A-A
SCALE 3/4"=1'-0"



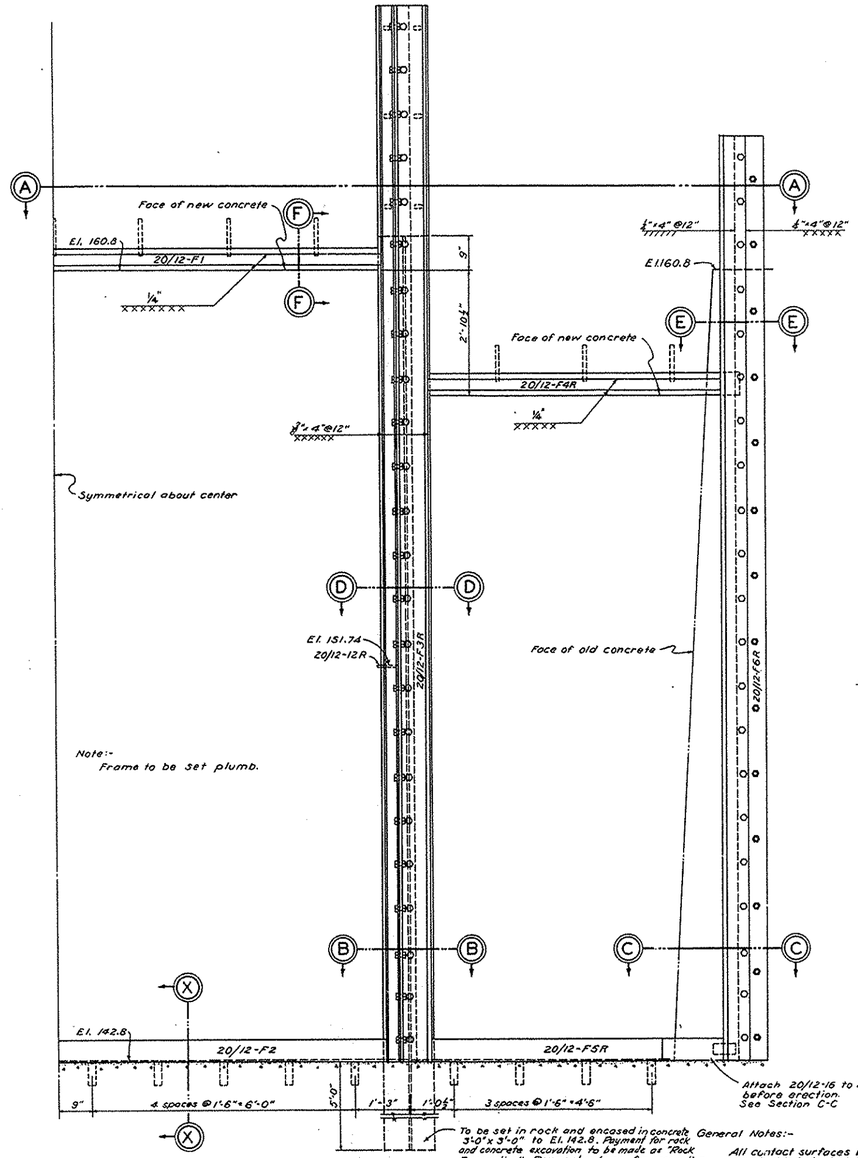
SECTION B-B
SCALE 1 1/2"=1'-0"



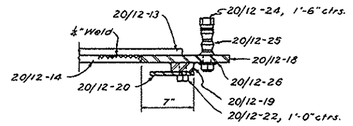
SECTION C-C
SCALE 1 1/2" =1'-0"



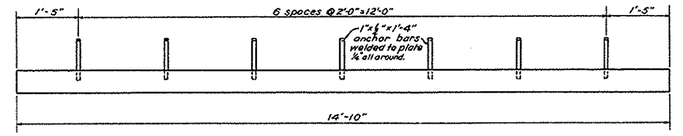
SECTION D-D
SCALE 1 1/2" =1'-0"



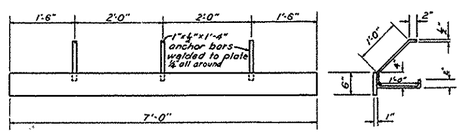
ASSEMBLY
HALF ELEVATION
SCALE 3/4"=1'-0"



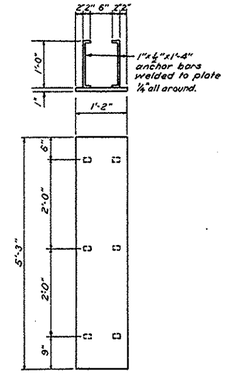
SECTION E-E
SCALE 1 1/2"=1'-0"



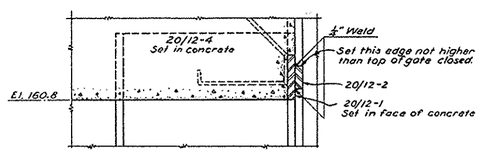
ANCHOR PLATE—DOUBLE GATE SPAN
MARK 20/12-1 USED WITH 20/12-F1 MAKE 1 334.3 LB. EACH
SCALE 3/4"=1'-0"



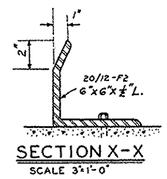
ANCHOR PLATE—SINGLE GATE SPAN
MARK 20/12-13 USED WITH 20/12-F4R&L MAKE 2 156.4 LBS. EACH
SCALE 3/4"=1'-0"



ANCHOR PLATE
OF 20/12-F3R&L
MARK 20/12-5 USED WITH 20/12-F3R&L
MAKE 2 263.5 LBS. EACH
SCALE 3/4"=1'-0"



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



SECTION X-X
SCALE 3"=1'-0"

LIST OF PARTS NOT DETAILED

MARK	DESCRIPTION	MATERIAL	SIZE	USED WITH	QUAN.	UNIT WT.	TOTAL WT.
20/12-2	Plate-3"x1"	Struct.Steel	14'-11"	20/12-F1	1	152.15	152
20/12-3	Angle-6"x6"x1/2"	" "	13'-7 1/2"	20/12-F2	1	306.2	306
20/12-4	WF-Beam-24"@140"	" "	23'-9"	20/12-F3 R&L	2	3325.0	6650
20/12-6	Plate-13"x1"	" "	24'-0"	" " " "	2	1060.8	2122
20/12-7	Plate-3"x1 1/4"	" "	24'-0"	" " " "	2	306.0	612
20/12-8	Plate-18"x1"	" "	24'-0"	" " " "	2	1468.8	2938
20/12-9	Plate-6 1/2"x 1/2"	" "	24'-0"	" " " "	2	265.2	530
20/12-10	Angle-4"x4"x 1/2"	" "	8'-10 3/4"	" " " "	2	113.9	228
20/12-11	Angle-3 1/2"x3 1/2"x 1/2"	" "	24'-0"	" " " "	2	266.4	533
20/12-12R&L	Angle-6"x6"x 1/2"	" "	1'-0 1/2"	" " " "	2	20.4	41
20/12-14	Plate-3"x1"	" "	6'-7 3/8"	20/12-F4 R&L	2	70.0	140
20/12-15R&L	Angle-6"x6"x 1/2"	" "	5'-11"	20/12-F5R&L	2	116.0	232
20/12-16	Plate-6"x1"	" "	1'-5"	20/12-F6 R&L	2	28.9	58
20/12-17	Plate-3"x 1/2"	" "	0'-6"	" " " "	2	2.5	5
20/12-18	Plate-12"x1"	" "	21'-0"	" " " "	2	856.8	1714
20/12-19	Plate-3"x1 1/8"	" "	21'-0"	" " " "	2	267.8	536
20/12-20	Plate-6"x 1/2"	" "	21'-0"	" " " "	2	214.2	428
20/12-21	Cap Screw-hex.head	Bolt Steel	1"x2 3/4"	20/12-F3 R&L	48	.85	41
20/12-22	Cap Screw-hex.head	" "	1"x1 3/4"	20/12-F6 R&L	42	.66	28
20/12-23	Bolt-hex.hd. & nut	" "	1"x3"	20/12-F3 R&L	48	1.47	71
20/12-24	Bolt-hex.hd. & nut	" "	1"x8"	20/12-F2,F5&F6R&L	46	2.51	116
20/12-25	3-Unit anchors	Iron & Lead	1"	20/12-24	46	1.50	69
20/12-26	Lock Washer	Spring Steel	1"	20/12-24	46	.0875	4

General Notes:-

All contact surfaces between concrete and unembedded steel plates to be calked with lead wool

All elevations refer to "Mean Sea Level"

Unless otherwise indicated all weld shall be continuous for full length of pieces in contact

No overrun permitted on 20/12-1, 20/12-2, 20/12-3, 20/12-14, & 20/12-15

For weld symbols see sheet D.S.R. 149-20/10

BY	DATE	CHARACTER REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
GATE FRAME FOR 30 FT. BAY
DETAILS

SCALES AS SHOWN

U.S. ENGINEER OFFICE, SAVANNAH, GA.,

SUBMITTED: M. V. Haas, SENIOR ENGINEER

APPROVED: [illegible], LT. COL. CORPS OF ENGRS.

DRAWN BY W. J.W. TRACED BY W.J.W. CHECKED BY C.F.D.
FILE NO. D.S.R. 149-20/12
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

D.S.R. 149-20/12

PLATE C-14

General Notes:-

All frames to be set plumb.

Locations of frames with reference to existing quoins vary.

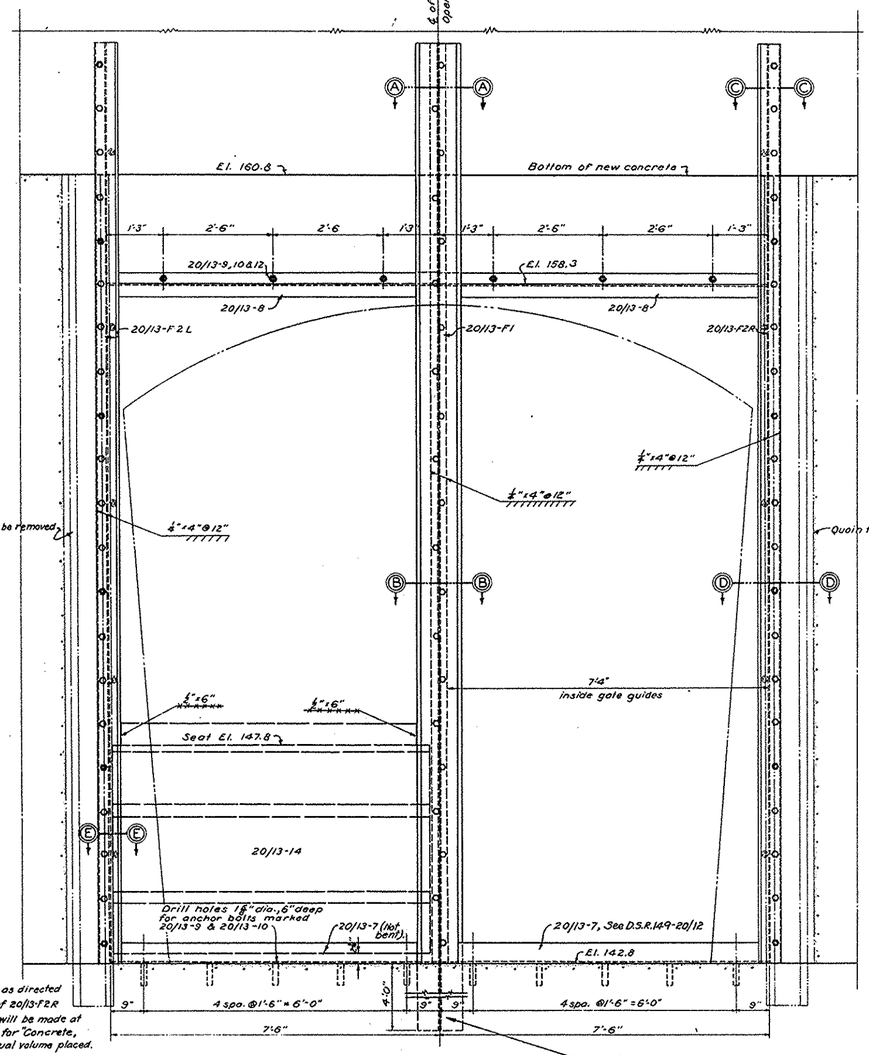
All contacting surfaces of steel and existing concrete, where water tightness is necessary, shall be caulked with lead wool.

For weld symbols see sheet D.S.R. 149-20/10.

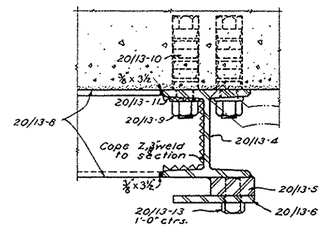
Unless otherwise indicated all weld shall be continuous for full length of pieces in contact.

Weights given are exclusive of electrode metal added in welding.

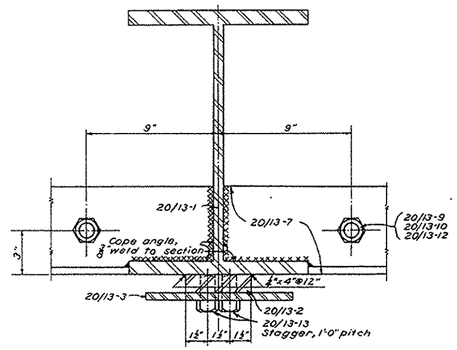
Frames for all 17 foot bays to be similar to one shown on this sheet, except one frame that requires insertion of 20/13-14



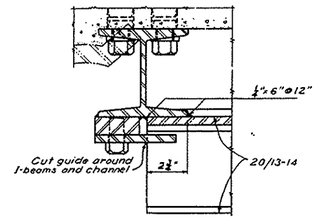
ASSEMBLY—ELEVATION
SCALE 3/4" = 1'-0"



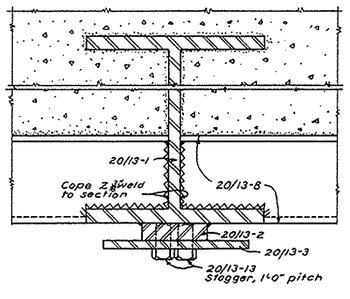
SECTION C-C
SCALE 3"=1'-0"



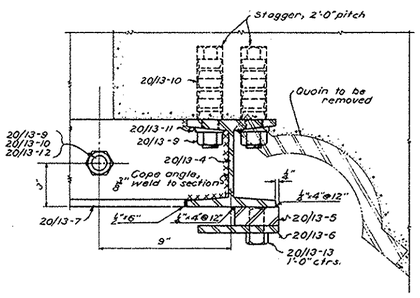
SECTION B-B
SCALE 3"=1'-0"



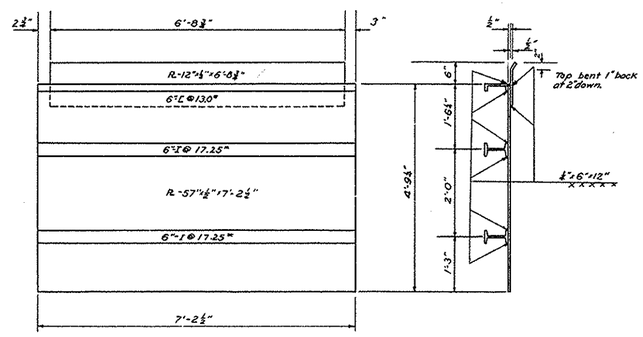
SECTION E-E
SHOWING WEIR FOR CONTROL GATE IN PLACE
SCALE 3"=1'-0"



SECTION A-A
SCALE 3" = 1'-0"



SECTION D-D
SCALE 3"=1'-0"



WEIR FOR CONTROL GATE

MARK 20/13-14 — MAKE 1
STRUCTURAL STEEL — 1179 LBS. EACH

SCALE 3/4" = 1'-0"

LIST OF PARTS NOT DETAILED

MARK	DESCRIPTION	MATERIAL	SIZE	USED WITH	QUAN	UNIT WT.	TOTAL WT.
20/13-1	W-Beam, 18"@114"	Struct Steel	25'-0"	20/13-F1	8	2850	22800
20/13-2	Plate, 4½"-1¼"	" "	21'-0"	" "	8	402	3216
20/13-3	Plate, 10"-¾"	" "	21'-0"	" "	8	357	2856
20/13-4	H-Beam, 6"@27.5"	" "	21'-0"	20/13-F2R&L	16	578	9240
20/13-5	Plate -3"-1¼"	" "	21'-0"	" " "	16	268	4288
20/13-6	Plate -5¾"-⅜"	" "	21'-0"	" " "	16	196.4	3142
20/13-7	Angle-6"-6"-¾"	" "	7'-5½"	S111	16	146.2	2339
20/13-8	Zee -6"@15.7"	" "	7'-5½"	Seal	16	117.1	1874
20/13-9	Bolt-hex.head & nut	Bolt Steel	1"x8"	20/13-4,7&8	304	2.52	766
20/13-10	3 Unit Anchor	Iron+Lead	1"	20/13-9	304	1.50	456
20/13-11	Bevel Washer	Struct. St.	1"	20/13-4&9	176	.3	53
20/13-12	Lock Washer	Spring St.	1"	20/13-7,8&9	128	.06	8
20/13-13	Cap Screw -hex. head	Bolt Steel	1"x1¾"	20/13-3&6	504	.7	353

BY	DATE	CHARACTER
		REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
GATE FRAME FOR 17 FT. BAYS
DETAILS

SCALES AS SHOWN

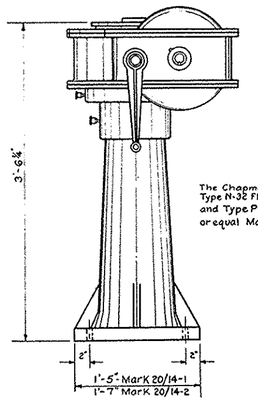
U.S. ENGINEER OFFICE, SAVANNAH, GA.,

SUBMITTED: M. V. Hass, SENIOR ENGINEER — APPROVED: R. Traweek, LT. COL. CORPS OF ENGRS.

DRAWN BY W.J.W. TRACED BY W.J.W. CHECKED BY C.P.D.
FILE NO. D.S.R. 149-20/13
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1938.

D.S.R. 149-20/13

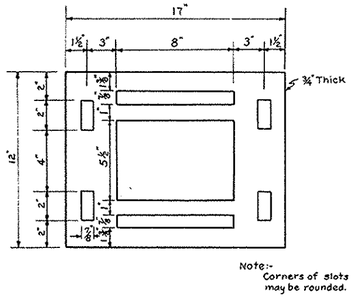
DP 1130-2-21
APP C
15 DEC 84



The Chapman Valve Mfg. Co. Type N-32 Floor-stand or equal Mark 20/14-1 and Type P-54 Floor-stand or equal Mark 20/14-2.

FLOOR STANDS

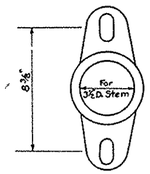
MARK 20/14-1 18 REQUIRED WT. 500 LBS. EACH
MARK 20/14-2 1 REQUIRED WT. 600 LBS. EST.
SCALE 1½" = 1'-0"



Note:- Corners of slots may be rounded.

STEM GUIDE PLATE

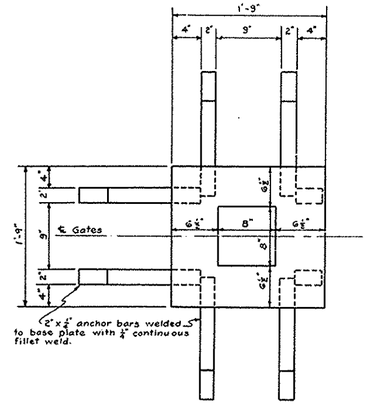
MARK 20/14-6 18 REQUIRED WT. 30 LBS. EACH
SCALE 3" = 1'-0"



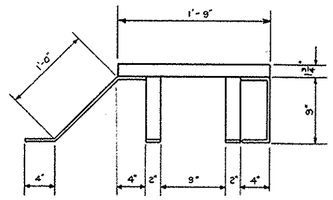
The Chapman Valve Mfg. Co. No. P-208 stem bearing or equal.

STEM BEARING

MARK 20/14-7 18 REQUIRED WITH BOLTS
WT. 2.3 LBS. EACH EST.
SCALE 3" = 1'-0"

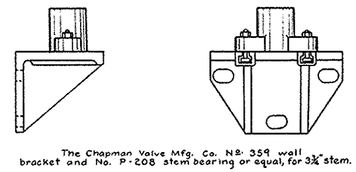


2" x ¼" anchor bars welded to base plate with ¼" continuous fillet weld.



BASE PLATE

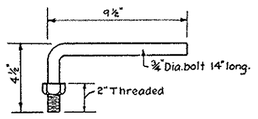
MARK 20/14-10 MAKE 19
STRUCTURAL STEEL WT. 2.12 LBS. EACH
SCALE 1 1/2" = 1'-0"



The Chapman Valve Mfg. Co. N8: 359 wall bracket and No. P-208 stem bearing or equal, for 3⅜" stem.

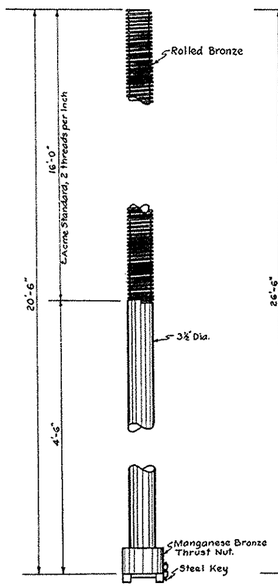
STEM GUIDE

MARK 20/14-8 1-REQUIRED WT. 165 LBS.
SCALE 1 1/2" = 1'-0"



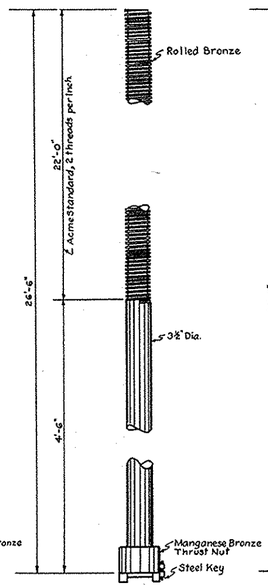
ANCHOR BOLT

MARK 20/14-9 4 REQUIRED WT. 1.87 LBS. EACH
SCALE 3" = 1'-0"



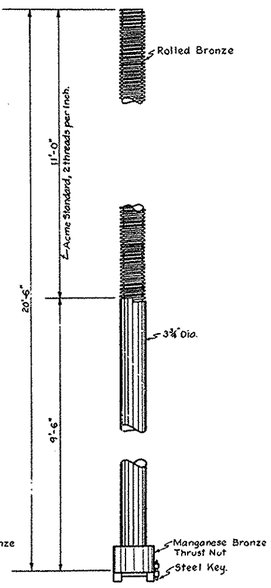
STEM

MARK 20/14-3 17 REQUIRED WT. 780 LBS. EA.
SCALE 1 1/2" = 1'-0"



STEM

MARK 20/14-4 1-REQUIRED WT. 990 LBS.
SCALE 1 1/2" = 1'-0"



STEM

MARK 20/14-5 1-REQUIRED WT. 890 LBS.
SCALE 1 1/2" = 1'-0"

LIST OF PARTS NOT DETAILED

BOLTS AND NUTS U. S. STANDARD

MARK	DESCRIPTION	MATERIAL	SIZE	THD.	FIN.	USED WITH	QUAN	UNIT WT.	TOTAL WT.
20/14-12	Hex. Hd. Mach. bolt & nut	Steel	1" x 6⅜"	2"	R.	20/14-8	3	2.18	7
20/14-13	Three-unit anchor	Iron & lead	1"			20/14-8	3	1.50	5
20/14-14	" " "	" "	⅜"			20/14-6 & 5-3	84	.90	76
20/14-15	Hex. Hd. Mach. bolt & nut		⅜" x 4"			20/14-6 & 5-3	84	.89	75
20/14-11	Tap bolt	Bolt Steel	1¼" x 3½"			20/14-1	72	2.00	144
20/14-16	Lock Washer	Spr. Steel	⅜"			20/14-6 & 5-3	84	.06	5
20/14-17	" "	" "	1"			20/14-8	3	.087	1
20/14-18	Tap bolt	Bolt Steel	1½" x 3½"			20/14-2	4	3.06	12
20/14-19	Stop Collar	Bronze	3½" dia.			20/14-4	1		

Note: All parts shown on this sheet to be furnished as part of feature "Floor Stands, Stems, Stem Guides and Ladders", except bolts, nuts and lead anchors.

BY	DATE	CHARACTER
		REVISIONS

AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
GATE OPERATING MACHINERY
DETAILS
SCALES AS SHOWN

U.S. ENGINEER OFFICE, SAVANNAH, GA.,
SUBMITTED: M. W. Haas, SENIOR ENGINEER
APPROVED: R. A. Fowler, LT. COL. CORPS OF ENGRS.

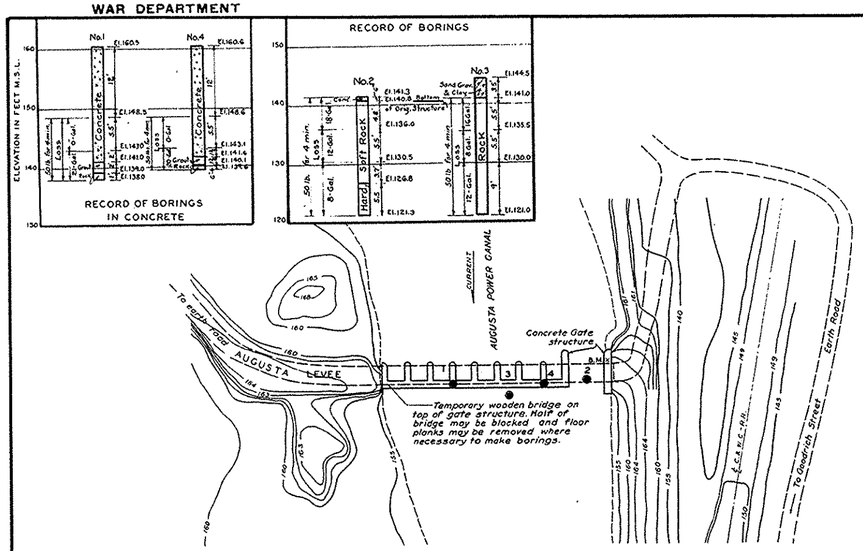
DRAWN BY W. deV. TRACED BY W. deV. CHECKED BY C. F. D.
FILE NO. D.S.R. 149-20/1-A
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

D.S.R. 149-20/14

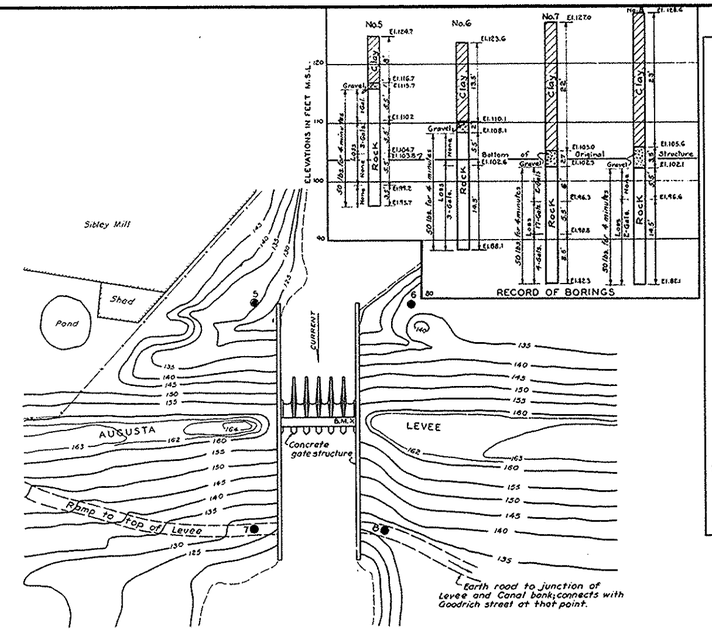
PLATE C-16

WAR DEPARTMENT

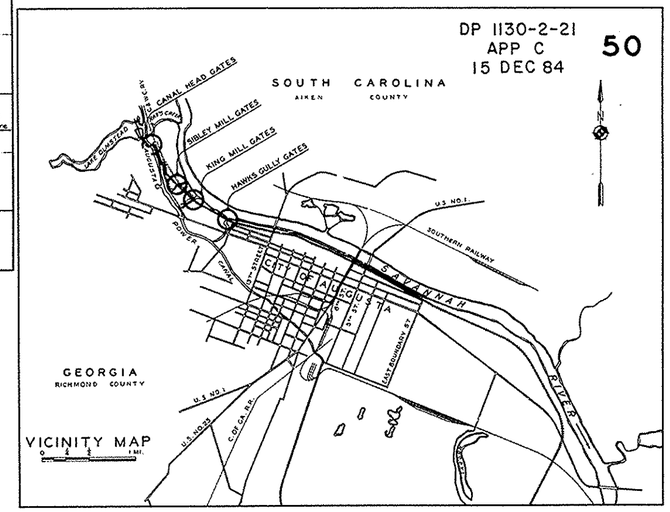
CORPS OF ENGINEERS, U. S. ARMY

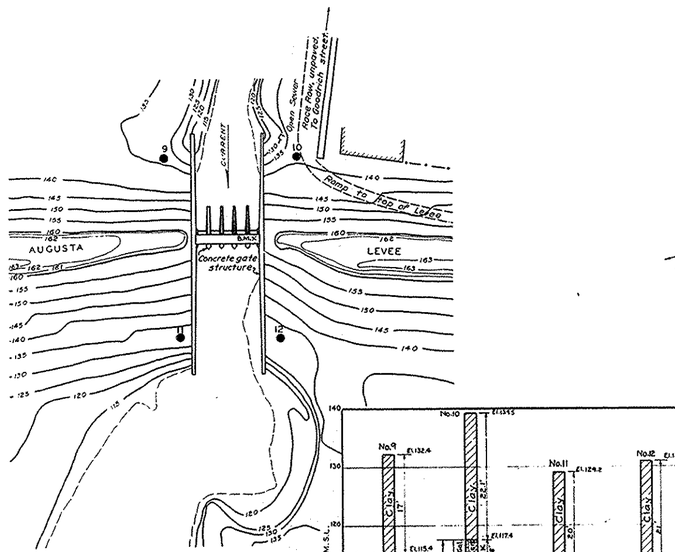


CANAL HEAD GATES

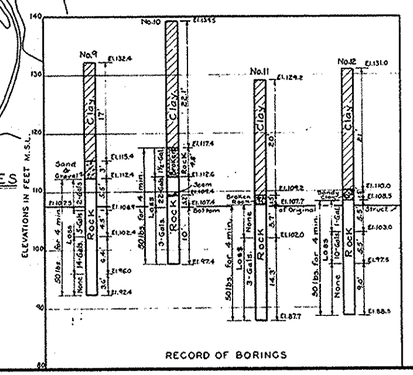


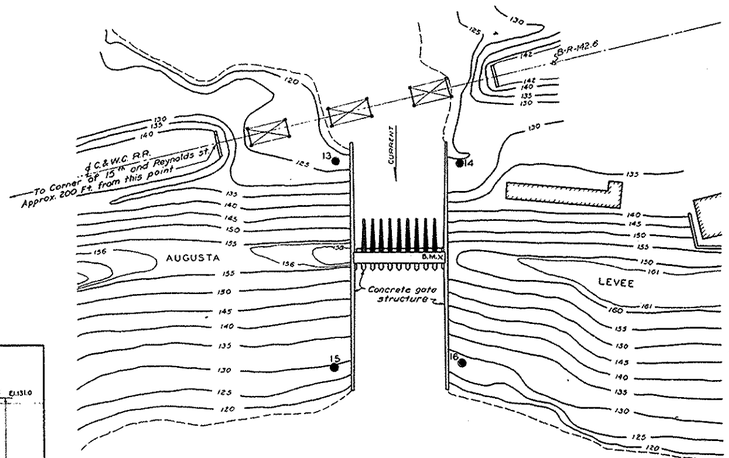
SIBLEY MILL GATES





KING MILL GATES





HAWK'S GULLY GATES

NOTE:
THE BORINGS SHOWN HEREON WERE MADE IN MAY AND JUNE 1938. THEY ARE REPRODUCED FOR BIDDER'S INFORMATION AND INDICATE CONDITIONS AT THE INDIVIDUAL LOCATIONS BORED BUT ARE NOT GUARANTEED TO BE REPRESENTATIVE OF CONDITIONS OBTAINING GENERALLY AT THE SITES.

GENERAL NOTES:

Locations of borings shown are approximate. Minor changes in location may be made as directed by the Contracting Officer in order to take advantage of locations most favorable for drilling equipment.

Points at which borings are actually made shall be accurately located by dimensions referenced to suitable points on existing concrete gate structures.

All elevations refer to Mean Sea Level.

Locations of proposed boring shown thus: ⊕

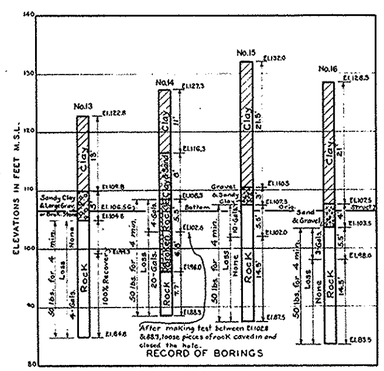
BENCH MARK DATA:

Canal Head Gates: Cross(×) cut in bolt of extreme eastern standard of bridge over canal gates El. 160.85 M.S.L.

Sibley Mill Gates: Top of extreme southern base bolt nut of southern Gate Hoist. Nut marked with (x) Cross. El. 159.04 M.S.L.

King Mill Gates: Top of extreme southern base bolt nut of southern Gate Hoist. Nut marked with(x) Cross. El. 158.51 M.S.L.

Hawks Gully Gates: Fine cross cuts(⊕) on top of extreme southern base bolt nut of southern Gate Hoist. El. 157.64 M.S.L.



1-21-39	C.F.D.	Note added re borings not guaranteed representative.
6-30-38	W.d.K.	Record of borings added.
5-7-38	J.C.B.	Relocated borings T&B. Removed temporary bridge-Sibley Mill.
DATE	BY	CHARACTER OF REVISIONS

SAVANNAH RIVER AT AUGUSTA, GA.
FLOOD CONTROL
GATE STRUCTURES
PROPOSED BORING LOCATIONS

50' 25' 0' 50' 100'
SCALE: 1 INCH = 50 FEET

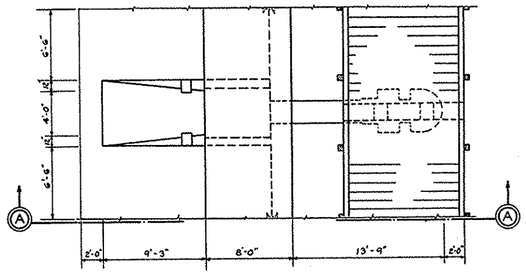
U.S. ENGINEER OFFICE, SAVANNAH, GA., MAY 1938

SUBMITTED: W. V. Howe, SENIOR ENGINEER
APPROVED: R. A. Fowler, LT. COL. CORPS OF ENGRS

DRAWN BY: W.C.V. TRACED BY: W.C.V. CHECKED BY: C.F.D.
FILE NO. D.S.R. 149-10/0
TO ACCOMPANY SPECIFICATIONS DATED MAY 3 1938 AND APRIL 4, 1939

D.S.R. 149-10/0

PLATE C-50



PART PLAN

STABILITY

Elevation of Plan Flood: In Savannah River opposite Canal Head Gates the Plan Flood Elevation is 161.23'. However the Canal Bank, in reality a continuation of the levee, extends upstream about 3 miles to the beginning of the canal. This Canal Bank is now being raised. At the Canal Head Gates, the Canal Bank will be raised to the levee grade at that point, 3.5 feet above the Plan Flood. Further upstream, the Canal Bank, after it is raised, will be lower than the Plan Flood.

Therefore, with the Plan Flood in Savannah River, water will be impounded against the Canal Head Gates to an elevation higher than that in the river opposite the Head Gates. Computations show this increase in head to be 2 feet. Therefore, the Plan Flood at Canal Head Gates is taken to be Elevation 161.23 plus 2.0' = Elevation 163.23 M.S.L.

FORCES

Computed for 1 bay of structure = 19'-0"

W_c = Weight of structure (massive portion only)	425.0	Kips
W = Weight of water over heel of pier	9.6	Kips
Total Downward Force	434.6	Kips
U = Hydrostatic Uplift	79.3	Kips
W_R = Resultant Downward Force	355.3	Kips
P = Hydrostatic Pressure, Plan Flood	274.0	Kips
P_1 = Hydrostatic Pressure, Backwater downstream	71.9	Kips
P_R = Resultant of P and P_1	202.1	Kips
R = Resultant of W_R and P_R	408.3	Kips

Resultant strikes Base Line at

$\left(\frac{202.1}{355.3} \times 8.36\right) + 5.57 = 10.33'$ from Ref. Line $\therefore$ 12.17 - 10.33 = 1.84' inside middle third.

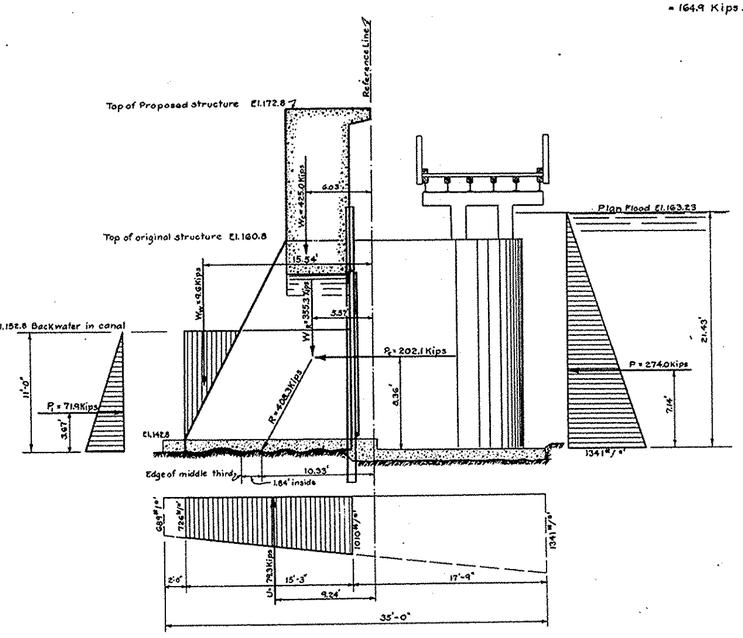
SLIDING

FORCES

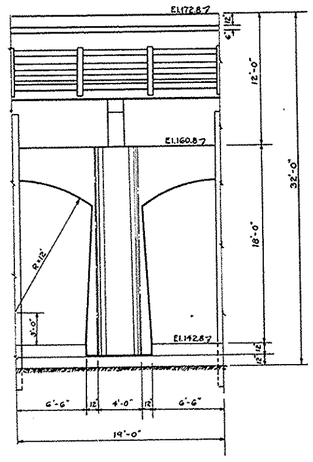
Computed for 1 bay of structure = 19'-0"

W_c =	425.0	Kips
Weight of Pier & Bridge	125.3	Kips
Weight of Foundation Slab	88.2	Kips
Weight of Water	525.1	Kips
Total Downward Force	1163.6	Kips
Hydrostatic Uplift (over entire foundation slab)	675.0	Kips
Resultant Downward Force	488.6	Kips
f = coefficient of friction, masonry on rock = 0.7		
Frictional Resistance = f x Resultant Downward Force	342.0	Kips

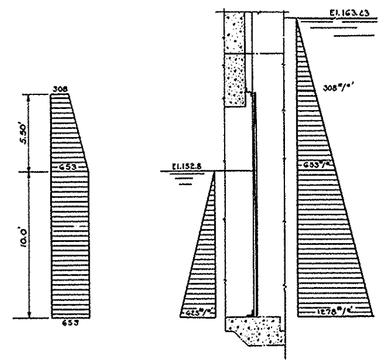
The steel H column at ¢ of the present gate openings will be embedded in the rock sufficiently to carry the reaction at the bottom of the H section due to the load there on from the proposed vertical lift gates. Therefore the total sliding force, on the concrete structure = 202.1 - reaction = 202.1 - 37.2 = 164.9 Kips. Factor of Safety against Sliding $\frac{342.0}{164.9} = 2.08$



SECTION A-A

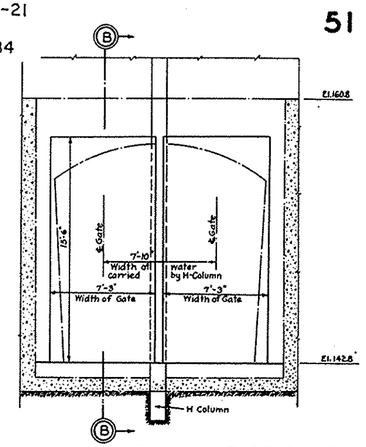


PART UPSTREAM ELEVATION



NET LOADING
(ONE FOOT WIDTH)

SECTION B-B
SCALE 1/4"=1'-0"



UPSTREAM ELEVATION-PAIR OF GATES

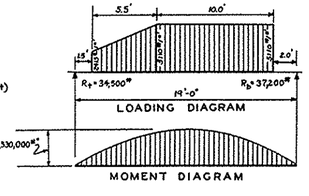
SIZE OF H COLUMN

Column acting as a beam carries a 7'-10" width of water load.
Assume beam to be freely supported at points shown on Loading Diagram at right.
Reaction at top = 34,500 # Reaction at bottom = 37,200 #
Maximum Moment = 211,000 # = 2,530,000 #" (See diagram at right)
Section Modulus Required = $\frac{\text{Moment}}{\text{f}} = \frac{2,530,000}{12,000} = 211.0$ inches^3

Use 18" x 11$\frac{3}{4}$" H @ 114 #/', Section Modulus = 220.1 inches^3

Penetration of Beam into Rock: Assume no support given by concrete foundation slab. Allowable bearing on Rock = 20,000 #/s.f.

Necessary Penetration in feet = $\frac{37,200}{(11.83+12)\,20,000} = 1.89'$ Use 2.0' penetration.



DESIGN OF GATE

For durability despite corrosion, it is considered that the skin plate of the gate should have a minimum thickness of ½" inch. Therefore assuming a ½" plate, solve for maximum permissible spacing of horizontal Beams.

Considering a section of plate 12" wide, Section Modulus = $\frac{bd^2}{6} = \frac{12 \times (0.5)^2}{6} = 0.50$ inches^3

Allowable Moment = 12,000 x .50 = 6,000 #". Unit loading = 653 #/', uniformly distributed, below El.152.8.

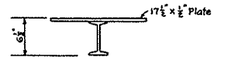
Max. Moment = .10 w ℓ^2 $\ell = \sqrt{\frac{M}{.10w}} = \sqrt{\frac{6000}{.10 \times 653}} = 2.766' = 2'-9\frac{1}{4}"$. Use a spacing of 2'-9".

Size of I-Beams required: Max. Moment in I-Beam = $\frac{w\ell^2}{8}$, where w = 653 x 2.75' = 1800 #/'

and ℓ = width of Gate between supports = 7'-0" $\therefore$ M = $\frac{1800 \times (7)^2}{8} = 11,050$ #' = 132,500 #"

Section Modulus required = $\frac{132,500}{12000} = 11.05$ inches^3. A portion of the skin-plate which is welded to the I-Beam will act with it, making in effect, a Tee-Beam. The width of skin-plate so acting is found, for beams 2'-9" on centers, to be 17½". (See Proceedings of Am. Soc. C.E. Jan. 1938 p. 118)

Try a 6" Am. Std. I @ 17.25 #/ft.



TEE BEAM SECTION

MOMENT OF INTERTIA OF BUILT UP SECTION

SECTION	AREA A	ARM	MOMENT	d	d^2	Ad^2	I_g
6" I @ 17.25 #'	5.02	3.50	17.59	2.06	4.25	21.33	26.00
17½" x ½" Skin-Plate	8.75	0.25	2.18	1.19	1.42	12.42	.18
Totals	13.77		19.77			33.77	26.18

C.G. = $\frac{19.77}{13.77} = 1.436$" $\frac{26.18}{59.95} = I$

c = 6.50 - 1.436 = 5.064 Section Modulus = $\frac{I}{c} = \frac{59.95}{5.064} = 11.82'$

The chosen beam is the lightest that will provide built up section modulus of not less than 11.05 inches^3.

DESIGN OF TYPICAL GATE

GENERAL NOTES

Base of structure rests on rock.
All elevations refer to Mean Sea Level.
For detail drawings, see Sheets D.S.R. 149-20/1 to 20/14 inclusive.
Weight of gates and operating mechanism is neglected.

DESIGN ASSUMPTIONS

Upstream Side: Plan Flood Elev. 163.23 h = 21.43'
Downstream Side: Backwater 2.0 below normal canal operating level, El. 152.8 h = 11.00'
Gates: Closed.

Portion of structure considered Effective against Overturning: Due to fact that foundation slab has a nominal thickness of only 1 foot with no reinforcing steel, and the gate piers have a controlling thickness of only 2.0', with only 6 horizontal 1" ¢ reinforcing rods, these portions are not considered effective against overturning. Thus, the only parts of the structure considered effective are the massive portions, shown bounded by heavy lines on the design diagrams, which would unquestionably act as a monolith to prevent overturning.

Portion of structure Considered Effective Against Sliding: If there is sufficient weight in the massive portions of the structure to prevent overturning, manifestly the entire structure will hold together. Therefore the entire weight of the structure will be counted against sliding.

Hydrostatic Uplift
(a). Overturning: 100 % of hydrostatic pressure at each extreme edge of foundation slab. Lineal distribution between edges of slab. Uplift assumed to be effective only on the area of the base of the monolith considered effective against overturning.
(b). Sliding: Same assumptions as for overturning except that uplift is considered effective over the entire area of the foundation slab.

Weight of water = 62.5 lbs. per cu. ft.

Weight of concrete = 150 lbs. per cu. ft.

Allowable Unit Stress in steel in gates = 12,000 lbs. per sq. in.

MASONRY STABILITY - TYPICAL BAY

SCALE 3/16" = 1'-0"

BY	DATE	CHARACTER REVISIONS

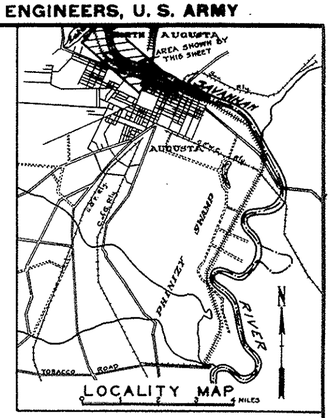
AUGUSTA, SAVANNAH RIVER, GA.
FLOOD CONTROL
CANAL HEAD GATES
DESIGN DATA
SCALES AS SHOWN

U.S. ENGINEER OFFICE, SAVANNAH, GA.,
SUBMITTED: M. T. Haas, SENIOR ENGINEER
APPROVED: R. H. Fowler, LT. COL. CORPS OF ENGRS.

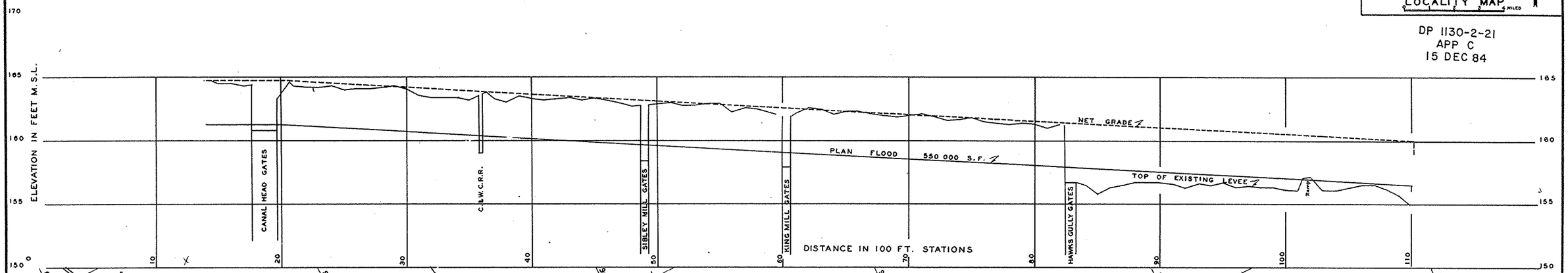
DRAWN BY C. F. O. TRACED BY W. deV. CHECKED BY C. F. O.
FILE NO. D.S.R. 149-20/A
TO ACCOMPANY SPECIFICATIONS DATED APRIL 4, 1939.

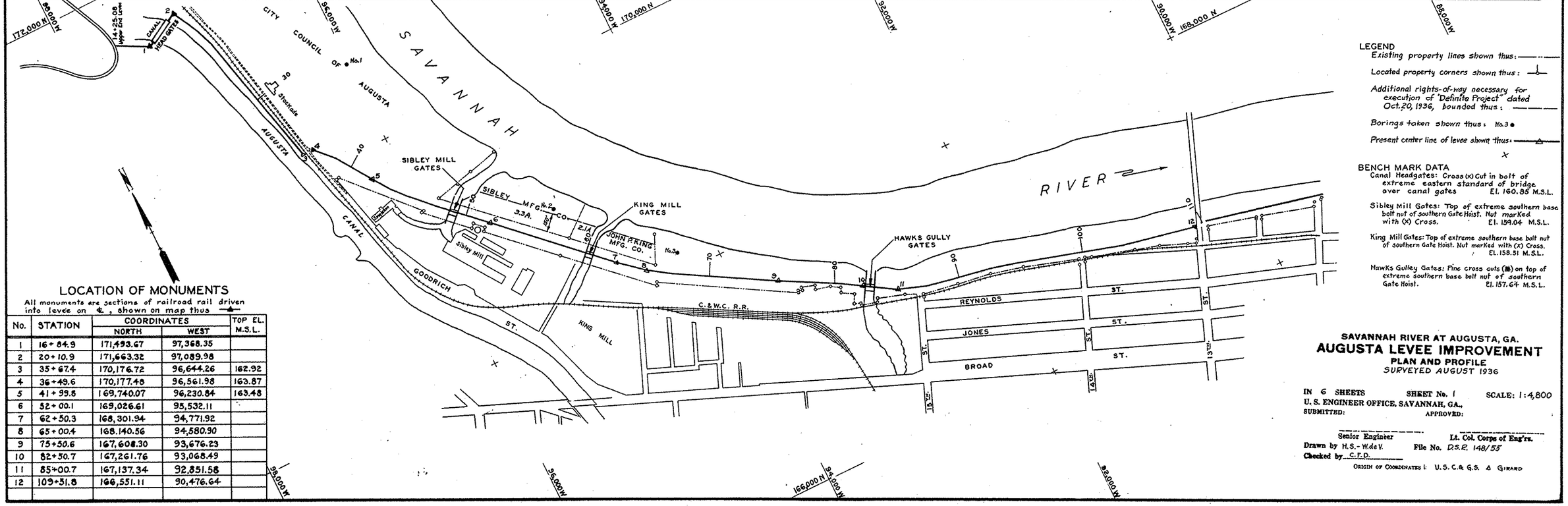
D.S.R. 149-20/A

PLATE C-51



DP 1130-2-21
APP C
15 DEC 84





LOCATION OF MONUMENTS

All monuments are sections of railroad rail driven into levee on ℄, shown on map thus —▲—

No.	STATION	COORDINATES NORTH	COORDINATES WEST	TOP EL. M.S.L.
1	16+84.9	171,493.67	97,368.35	
2	20+10.9	171,663.32	97,089.98	
3	35+67.4	170,176.72	96,644.26	162.92
4	36+49.6	170,177.48	96,561.98	163.87
5	41+99.8	169,740.07	96,230.84	163.48
6	52+00.1	169,026.61	95,532.11	
7	62+50.3	168,301.94	94,771.92	
8	65+00.4	168,140.56	94,580.90	
9	75+50.6	167,608.30	93,676.23	
10	82+50.7	167,261.76	93,068.49	
11	85+00.7	167,137.34	92,851.58	
12	109+31.8	166,551.11	90,476.64	

LEGEND

Existing property lines shown thus: ——·——

Located property corners shown thus: —⊥—

Additional rights-of-way necessary for execution of "Definite Project" dated Oct. 20, 1936, bounded thus: ————

Borings taken shown thus: No.3 ●

Present center line of levee shown thus: —△—

BENCH MARK DATA

Canal Headgates: Cross (x) Cut in bolt of extreme eastern standard of bridge over canal gates El. 160.85 M.S.L.

Sibley Mill Gates: Top of extreme southern base bolt nut of southern Gate Hoist. Nut marked with (X) Cross. El. 159.04 M.S.L.

King Mill Gates: Top of extreme southern base bolt nut of southern Gate Hoist. Nut marked with (X) Cross. El. 158.51 M.S.L.

Hawks Gulley Gates: Fine cross cuts (⊞) on top of extreme southern base bolt nut of southern Gate Hoist. El. 157.64 M.S.L.

SAVANNAH RIVER AT AUGUSTA, GA.
AUGUSTA LEVEE IMPROVEMENT
PLAN AND PROFILE
SURVEYED AUGUST 1936

IN 6 SHEETS SHEET No. 1 SCALE: 1:4,800

U. S. ENGINEER OFFICE, SAVANNAH, GA.,

SUBMITTED: APPROVED:

Senior Engineer Lt. Col. Corps of Eng'rs.

Drawn by H.S.-W.de V. File No. D.S.R. 148/55

Checked by C.F.D.

ORIGIN OF COORDINATES: U.S.C.&G.S. Δ GIRARD

D.S.R. 148/55