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DEPARTMENT OF THE INTERIOR

HUBERT WORK, Secretary

BUREAU OF RECLAMATION

DAVID W. DAVIS, Commissioner

HIGH-PRESSURE RESERVOIR OUTLETS

A REPORT ON
BUREAU OF RECLAMATION INSTALLATIONS

By

J. M. GAYLORD, Electrical Engineer

AND

J. L. SAVAGE, Designing Engineer

PART 2 DETAIL DRAWINGS



WASHINGTON
GOVERNMENT PRINTING OFFICE
1923

NOTICE

This volume is published primarily for official use of the engineers of the Bureau of Reclamation. Copies may be obtained by the public for \$10 each. Address the Commissioner, Bureau of Reclamation, Washington, D. C.

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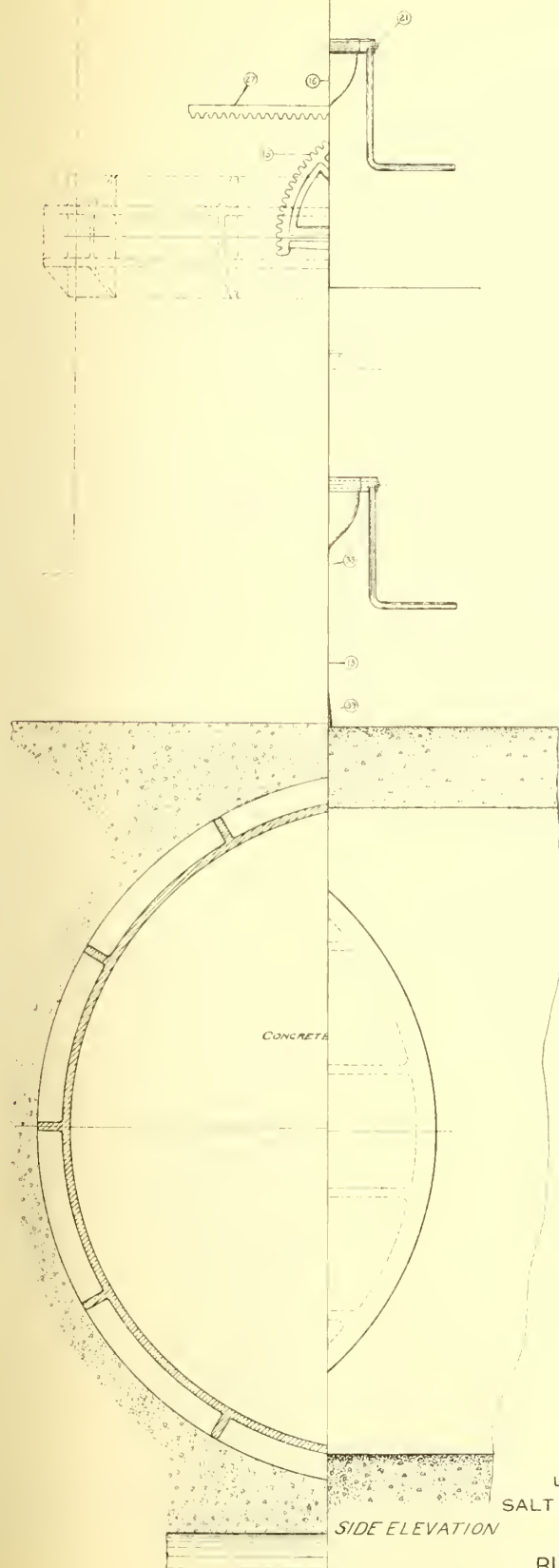
GENERAL.

88. Typical balanced needle valve installation.









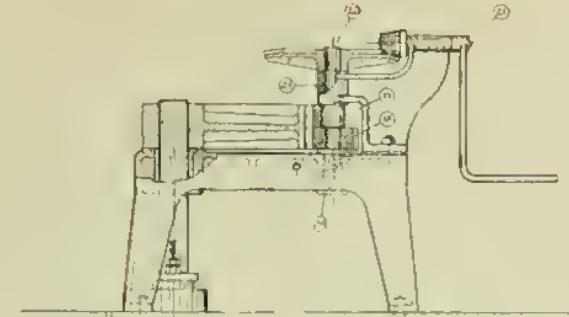
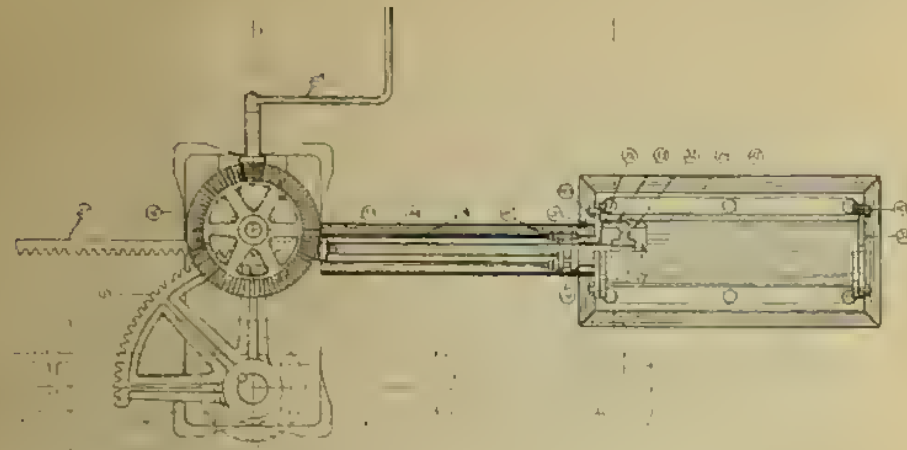
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA

CROSS CUT POWER PLANT
BUTTERFLY GATES, 8 FT. DIAMETER

20342 PLATE 2 OF 88

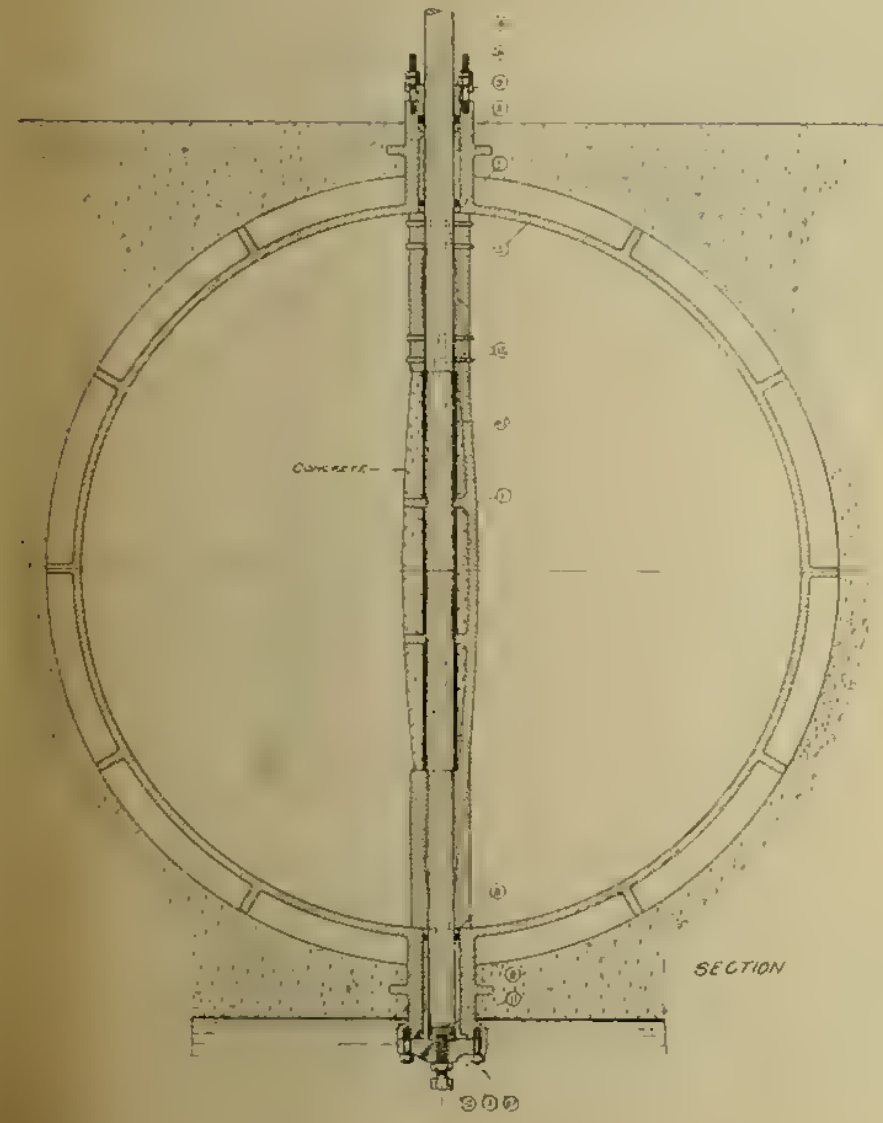
1923

25-E-72

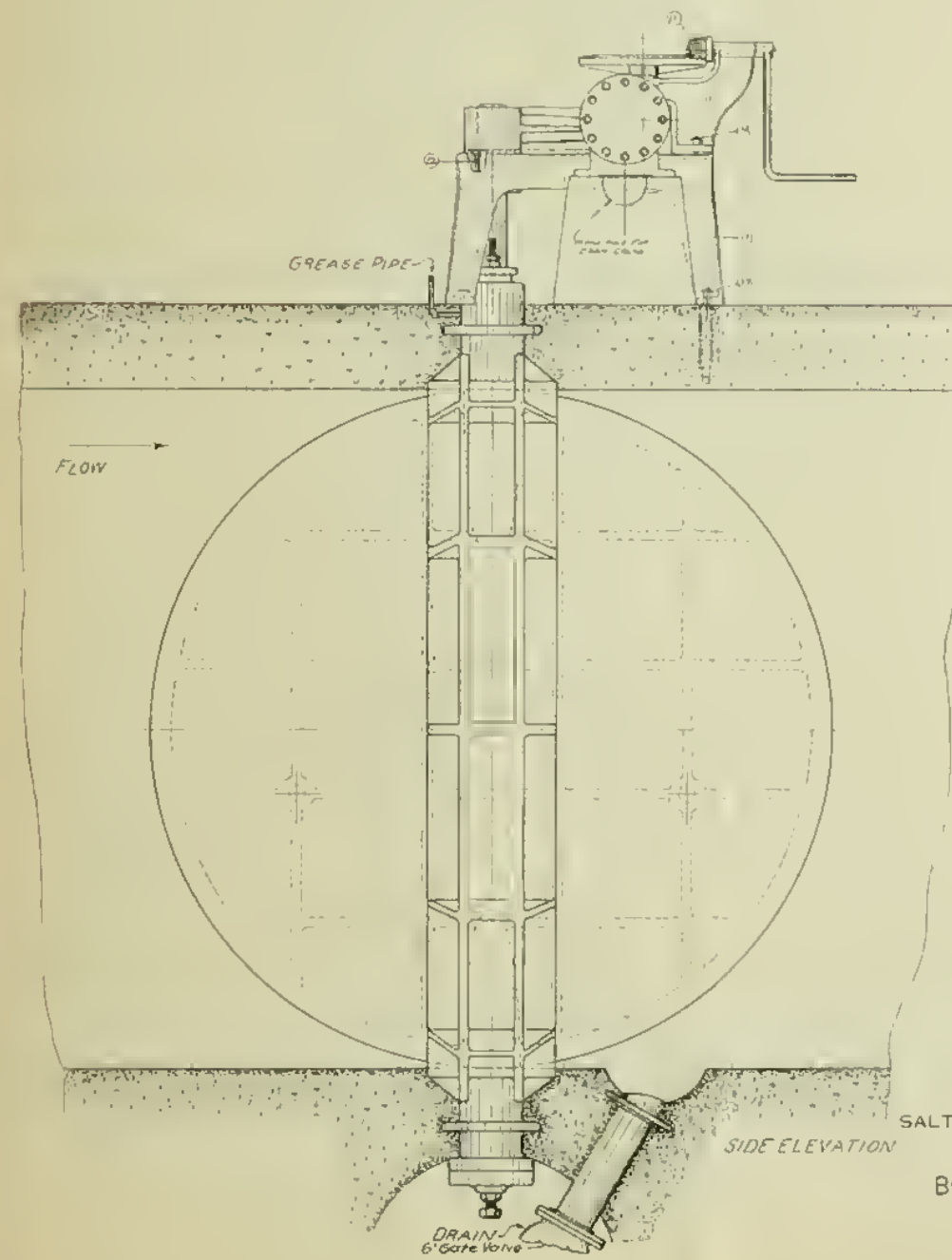


SECTION

PLAN VIEW

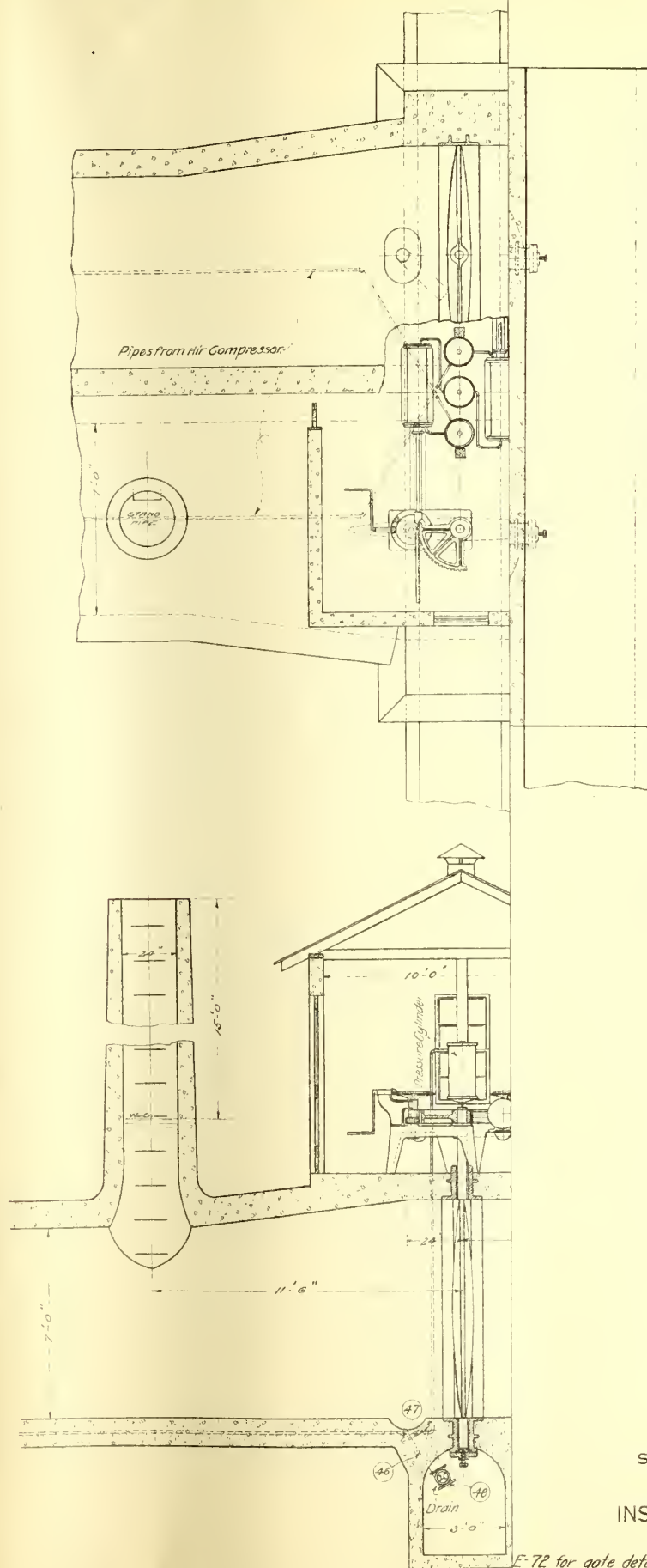


SECTION



SIDE ELEVATION

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SALT RIVER IRRIGATION PROJECT, ARIZONA
CROSS CUT POWER PLANT
BUTTERFLY GATES, 8 FT. DIAMETER
20342 PLATE 2 OF 88
1923



LIST OF MATERIAL FOR ONE GATE

NO.	SYMBOL	MATERIAL	NAME OF PART
1	(1)	CAST IRON	GATE LEAF
1	(2)	"	GATE FRAME
1	(3)	"	THRUST BEARING CAP
1	(4)	BRONZE	GATE SHAFT
1	(5)	"	TOP BUSHING
1	(6)	"	BOTTOM BUSHING (+ 1 AW)
1	(7)	"	TOP RING
1	(8)	"	BOTTOM RING
1	(9)	"	STUFFING BOX GLAND
1	(10)	"	ADJUSTING SCREW
3	(11)	MACH STEEL	THRUST BEARING DISCS
4	(12)	BRONZE	TAPER PINS
1	(13)	CAST IRON	GEAR STAND
1	(14)	"	GEAR STAND BRACKET
1	(15)	"	GEAR QUADRANT (+ GIB HEAD KEY)
1	(16)	"	BEVEL GEAR (+ GIB HEAD KEY)
1	(17)	BRONZE	BEVEL PINION (LEATHY SET SCREW)
1	(18)	"	SPUR PINION (+ LEATHY KEY)
1	(19)	MACH STEEL	ROLLER
1	(20)	"	BEVEL GEAR SHAFT
1	(21)	"	BEVEL PINION SHAFT
1	(22)	BRONZE	GATE SHAFT BUSHING
1	(23)	"	BEVEL GEAR SHAFT BUSHING (UPPER)
1	(24)	"	" (LOWER)
1	(25)	STEEL FORGING	CRANK
1	(27)	MACH STEEL	RACK
1	(28)	"	PISTON ROD
1	(29)	CAST IRON	CYLINDER
1	(30)	"	CYLINDER HEAD & STUFFING BOX
1	(31)	"	CYLINDER HEAD
1	(32)	"	PISTON
4	(33)	"	PISTON RINGS
1	(34)	BRONZE	STUFFING BOX GLAND
1	(35)	"	STUFFING BOX SEAT
2	(36)	MACH STEEL	STUFFING BOX STUDS
8	(37)	"	THRUST BEARING CAP STUDS
2	(38)	"	GEAR STAND BRACKET STUDS
4	(39)	MILD STEEL	GEAR STAND ANCHOR BOLTS
24	(40)	MACH STEEL	CYLINDER HEAD STUDS
2	(41)	"	STUFFING BOX STUDS
6	(42)	MILD STEEL	CYLINDER ANCHOR BOLTS
2	(43)	"	STAY BOLTS
2	(44)	"	PIPE SEPARATOR
3	(45)	"	PIPE SLEEVE
1	(46)	CAST IRON	6' DRAIN PIPE 1/8" LONG
1	(47)	"	6'X10" FLOOR FLANGE
1	(48)	"	6" GATE VALVE
2	(49)	BRASS	1/4" DRAIN COCKS

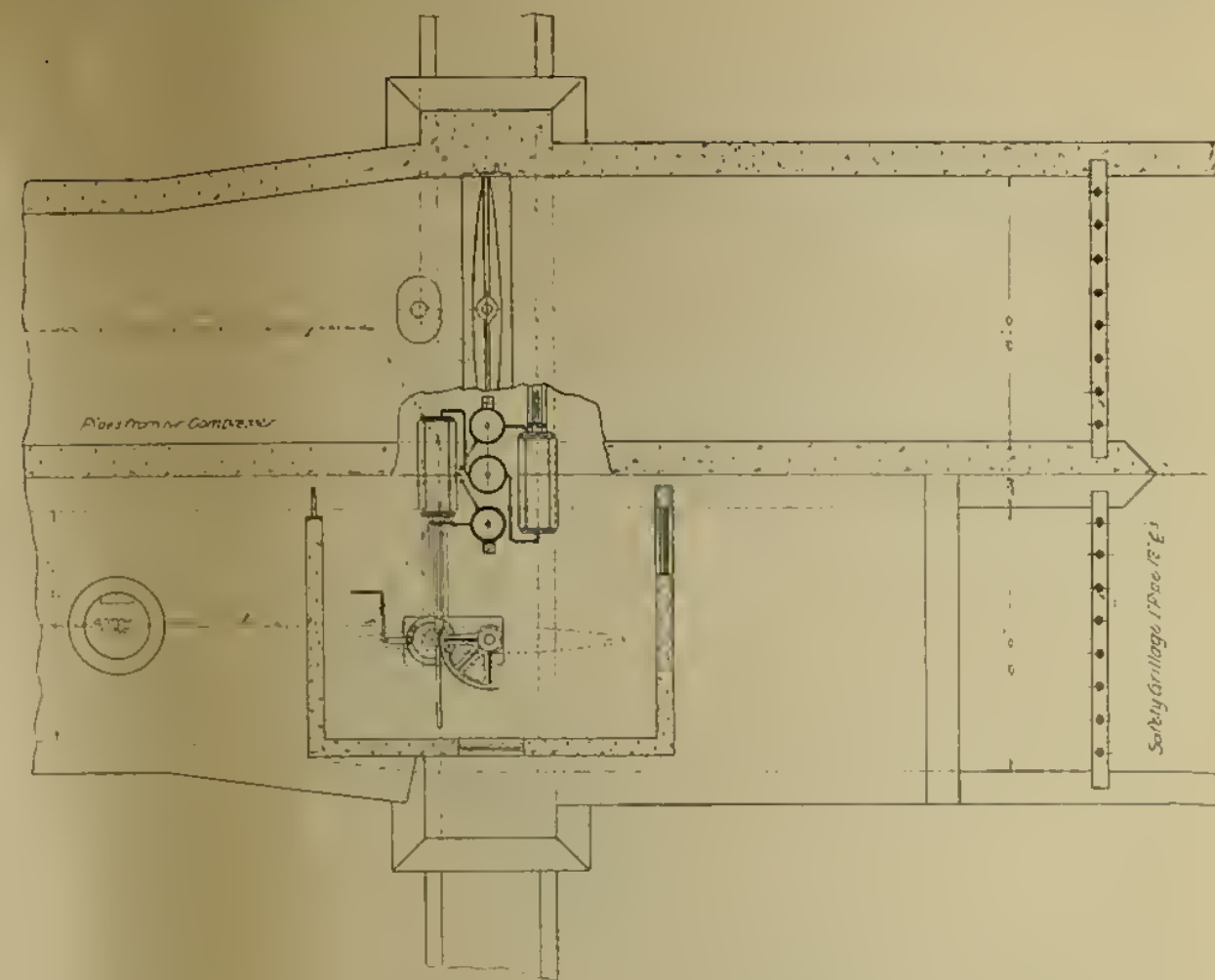
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA
CROSS CUT POWER PLANT
INSTALLATION 8 FT. BUTTERFLY HEAD GATE

NO. 20343 PLATE 3 OF 88

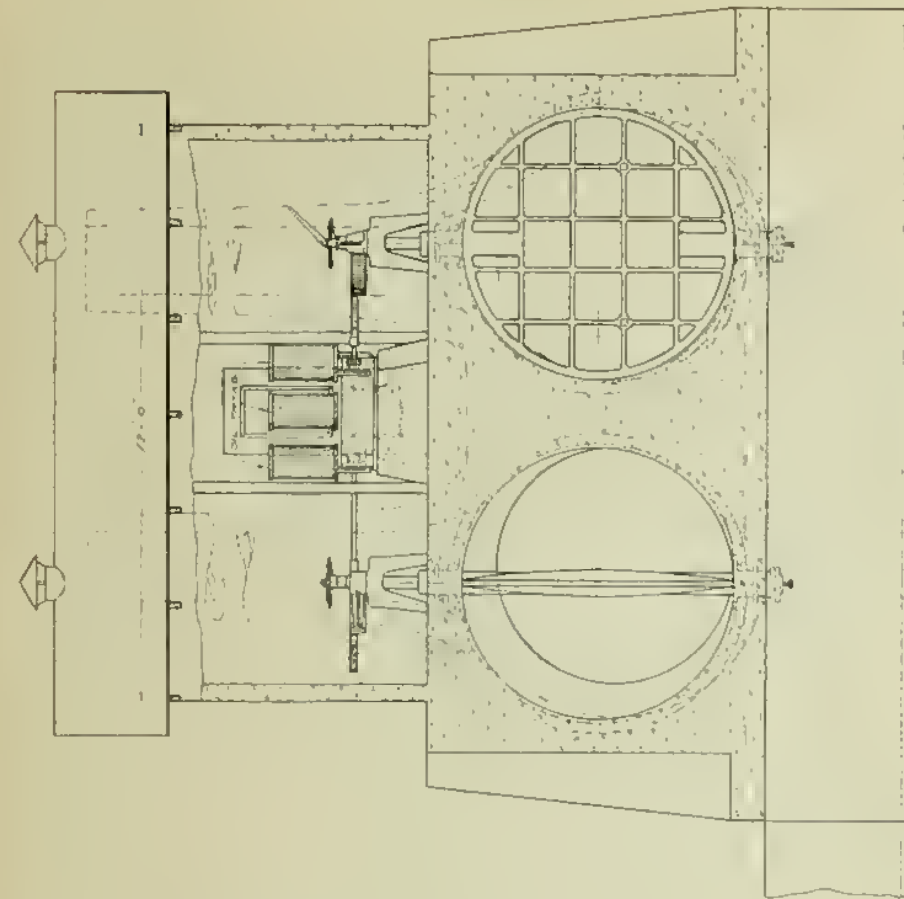
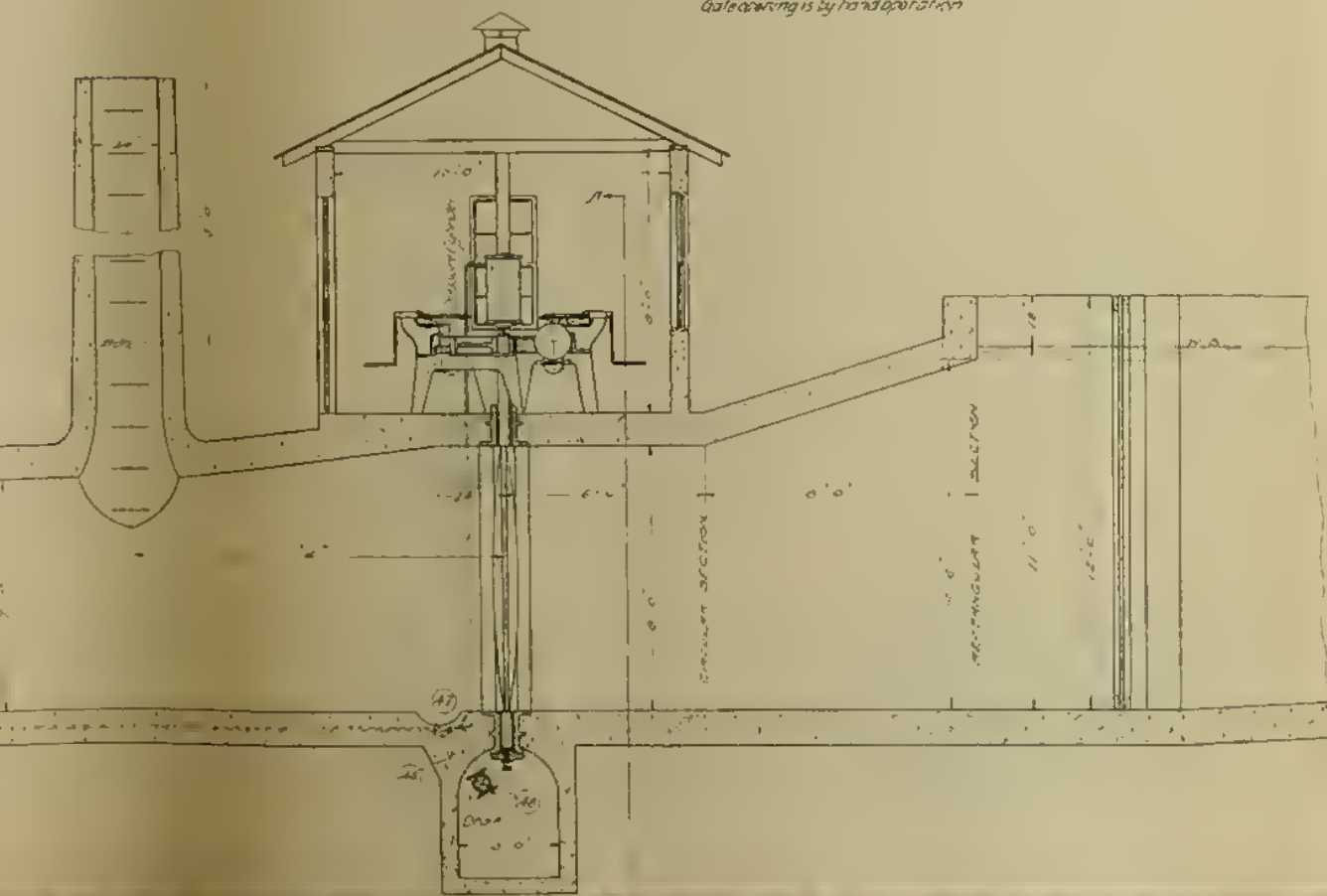
1923

F-72 for gate details

25-E-68



Gate operation by compressed air arranged re-closure only
Gate opening is by hand operation



SECTION A-A

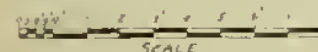
LIST OF MATERIAL FOR ONE GATE

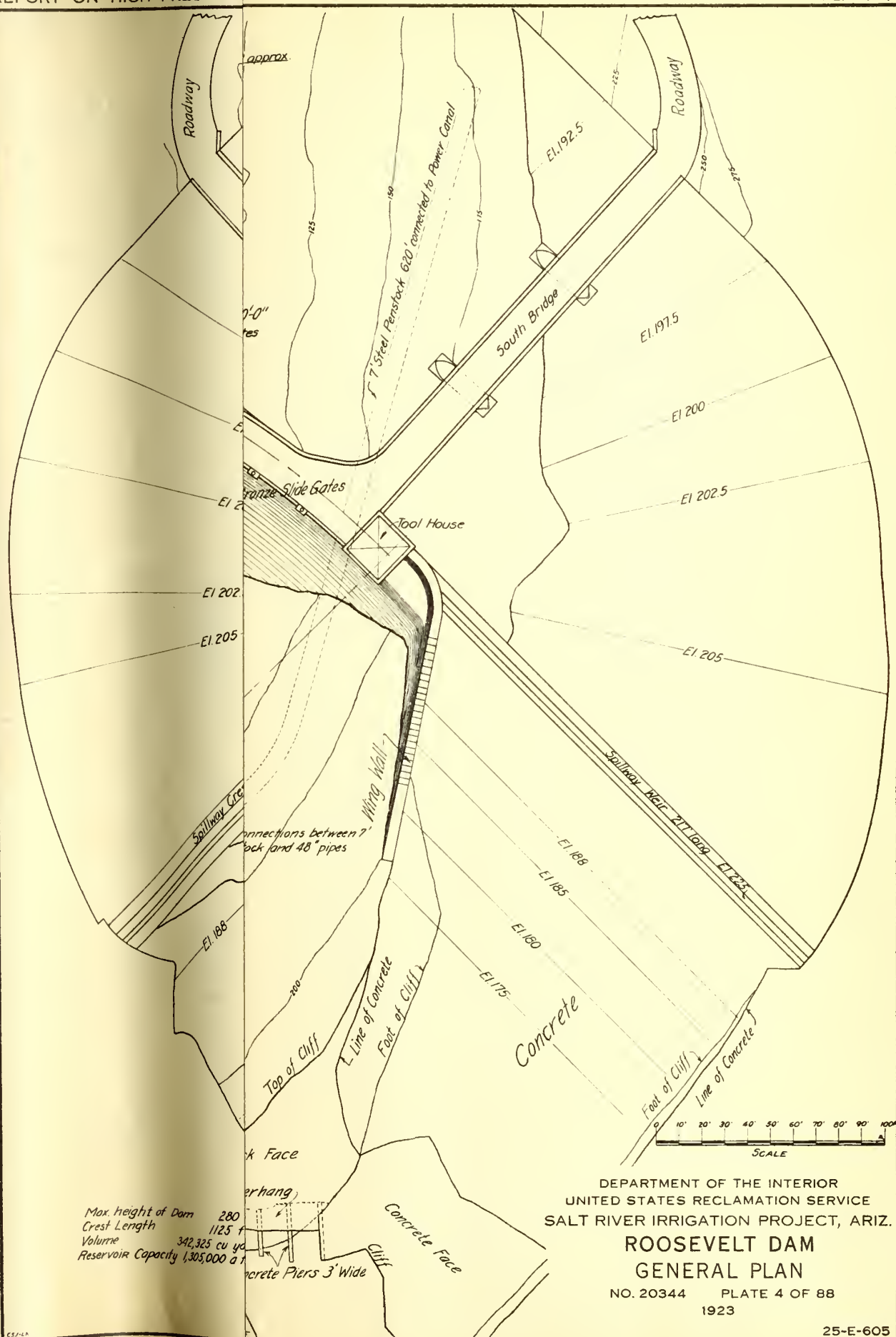
NO	QTY	MATERIAL	NAME OF PART
1	1	CAST IRON	GATE LEAF
1	2	-	GATE FRAME
1	3	-	THRUST BEARING CAP
1	4	BRONZE	GATE SHAFT
1	5	-	TOP BUSHING
1	6	-	BOTTOM BUSHING (1/2" DIA)
1	7	-	TOP RING
1	8	-	BOTTOM RING
1	9	-	STUFFING BOX GLAND
1	10	-	ADJUSTING SCREW
3	11	MACH STEEL	THRUST BEARING DISCS
4	12	BRONZE	TAPER PINS
1	13	CAST IRON	GEAR STAND
1	14	-	GEAR STAND BRACKET
1	15	-	GEAR QUADRANT (1/2" DIA KEY)
1	16	-	BEVEL GEAR 1 (1/2" DIA KEY)
1	17	BRONZE	BEVEL PINION (1/2" DIA KEY)
1	18	-	SPUR PINION (1/2" DIA KEY)
1	19	MACH STEEL	ROLLER
1	20	-	BEVEL GEAR SHAFT
1	21	-	BEVEL PINION SHAFT
1	22	BRONZE	GATE SHAFT BUSHING
1	23	-	BEVEL GEAR SHAFT BUSHING (UPPER)
1	24	-	(LOWER)
1	25	STEEL FORGE	CRANK
1	26	MACH STEEL	CRANK
1	27	-	PISTON ROD
1	28	CAST IRON	CYLINDER
1	29	-	CYLINDER HEAD + STUFFING BOX
1	30	-	CYLINDER HEAD
1	31	-	PISTON
4	32	-	PISTON RINGS
1	33	BRONZE	STUFFING BOX GLAND
1	34	-	STUFFING BOX SEAT
2	35	MACH STEEL	STUFFING BOX STUDS
8	36	-	THRUST BEARING CAP STUDS
2	37	-	GEAR STAND BRACKET STUDS
1	38	MILD STEEL	GEAR STAND ANCHOR BOLTS
24	39	MACH STEEL	CYLINDER HEAD STUDS
2	40	-	STUFFING BOX STUDS
6	41	MILD STEEL	CYLINDER ANCHOR BOLTS
2	42	-	STAY BOLTS
2	43	-	PIPE SEPARATOR
3	44	-	PIPE SLEEVE
1	45	CAST IRON	6" DRAIN PIPE 18" LONG
1	46	-	6" X 10" FLOOR FLANGE
1	47	-	6" GATE VALVE
2	48	BRASS	3/4" DRAIN COCKS

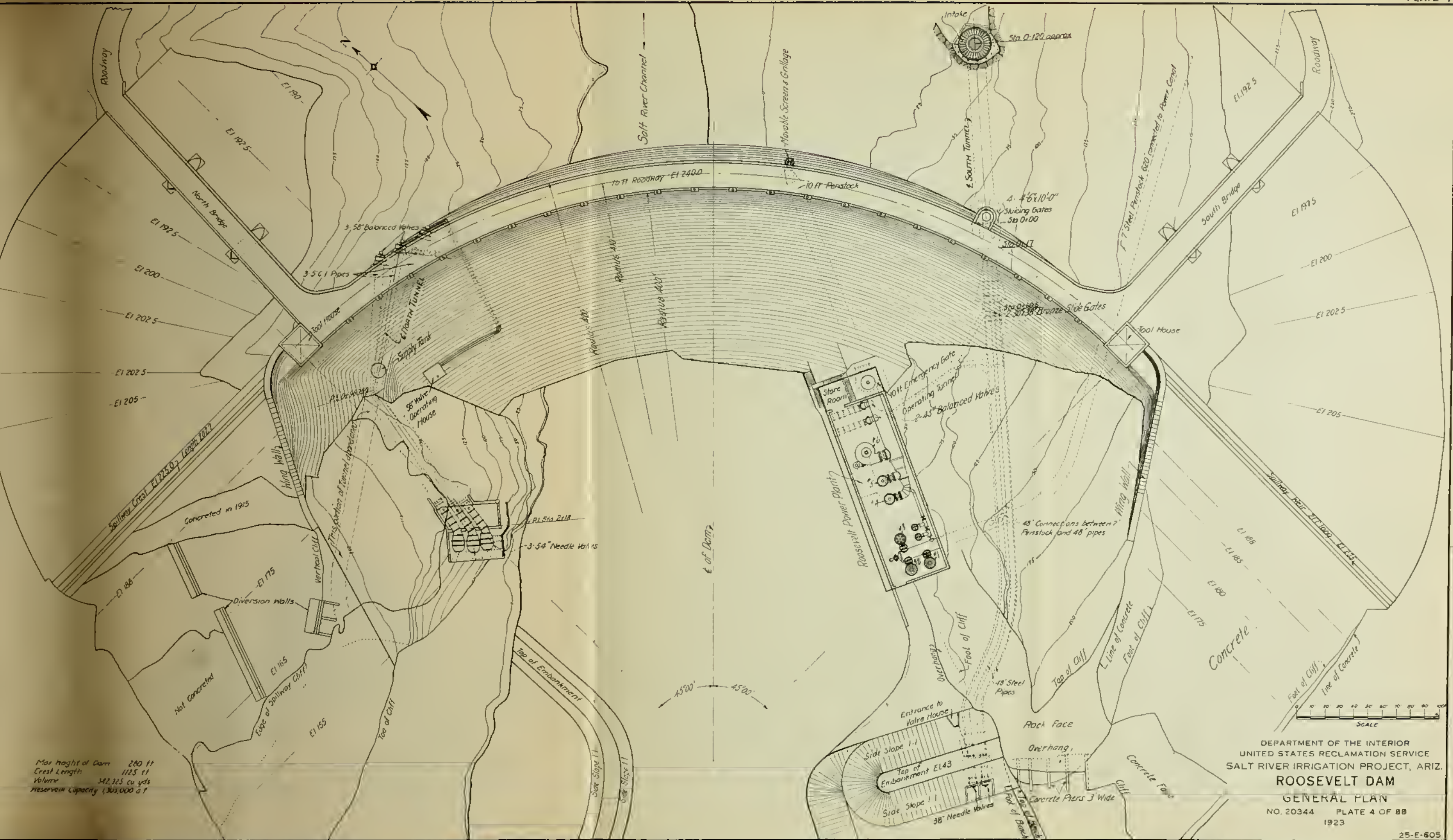
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA
CROSS CUT POWER PLANT
INSTALLATION 8 FT. BUTTERFLY HEAD GATE

NO 20343 PLATE 3 OF 88
1923

See Dring 25-E-72 for gate details

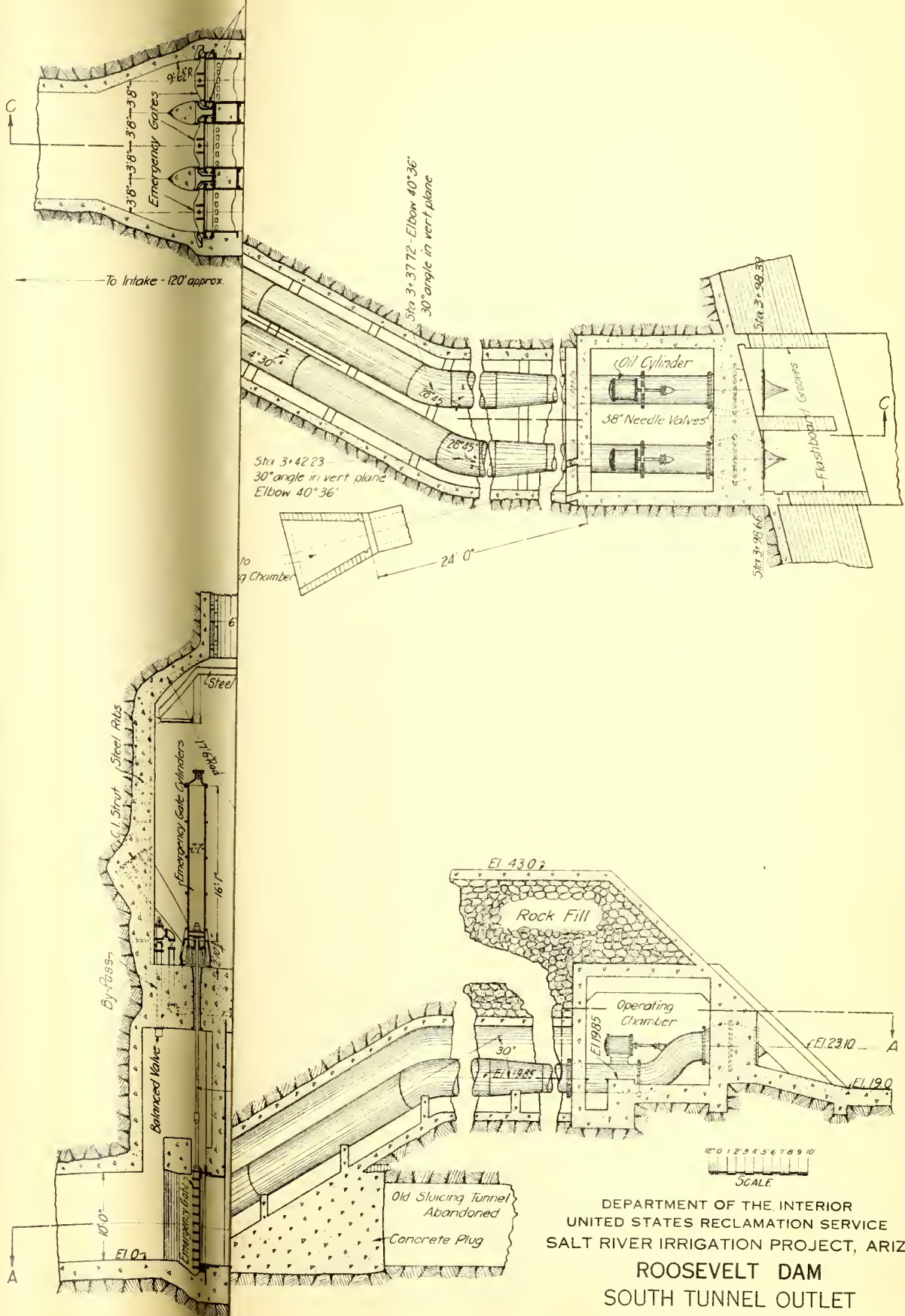






Max height of Dam 280 ft
Crest Length 1125 ft
Volume 342,325 cu yds
Reservoir Capacity 130,000 a.f.

DEPARTMENT OF THE INTERIOR
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SALT RIVER IRRIGATION PROJECT, ARIZ.
ROOSEVELT DAM
GENERAL PLAN
NO. 20344 PLATE 4 OF 88
1923



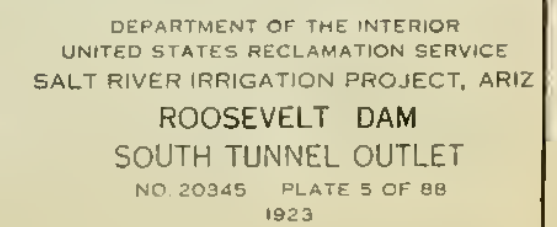
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZ.

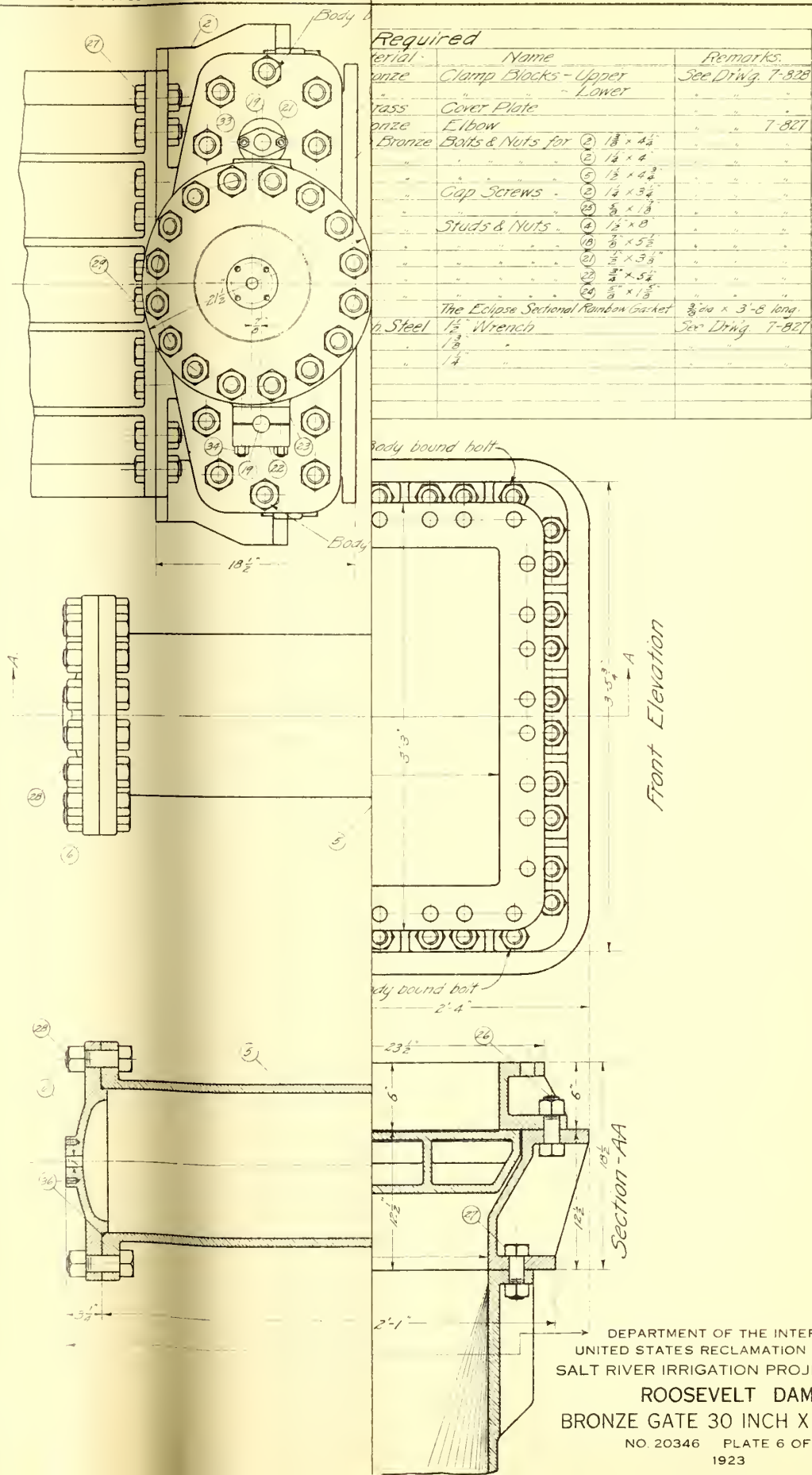
ROOSEVELT DAM
SOUTH TUNNEL OUTLET

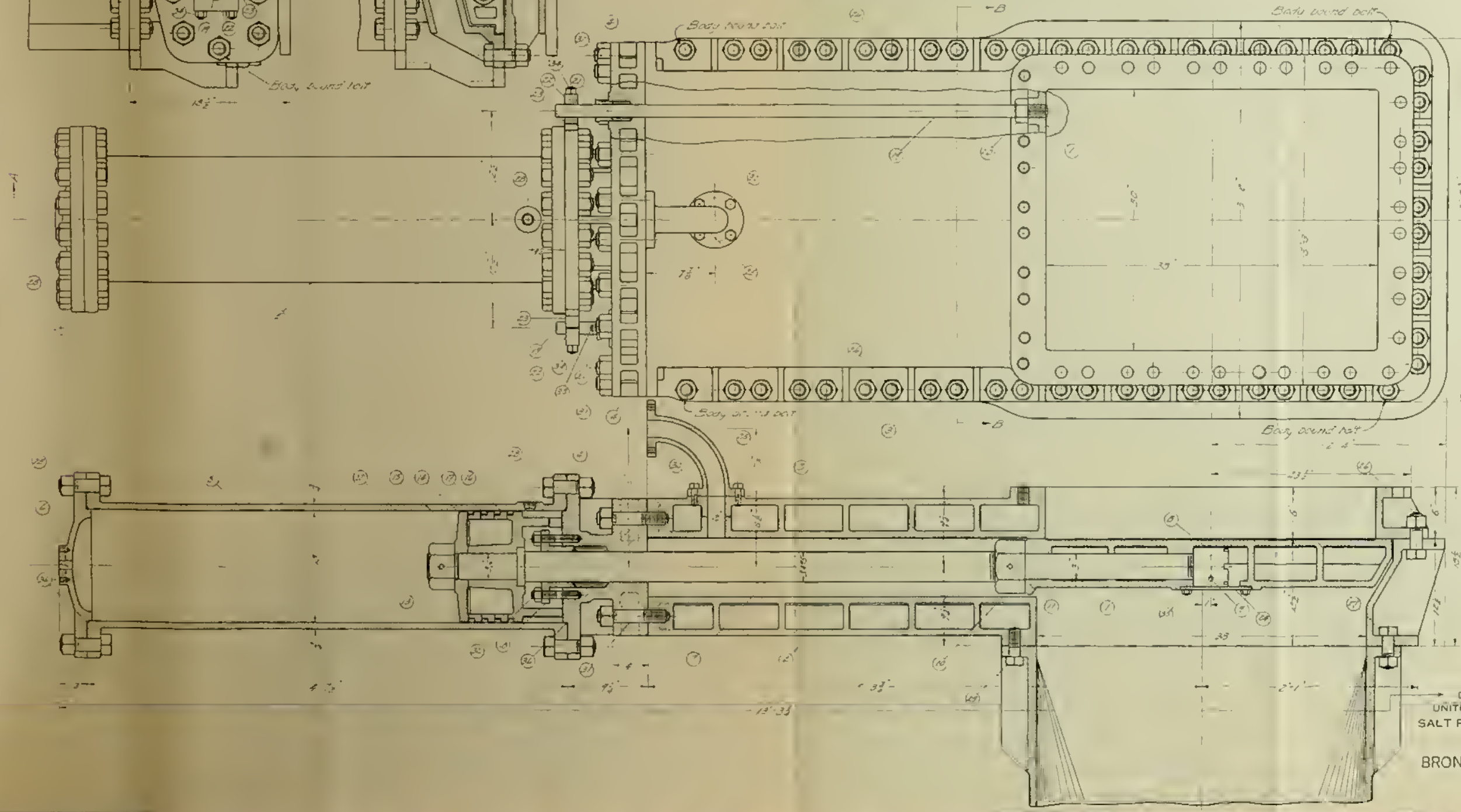
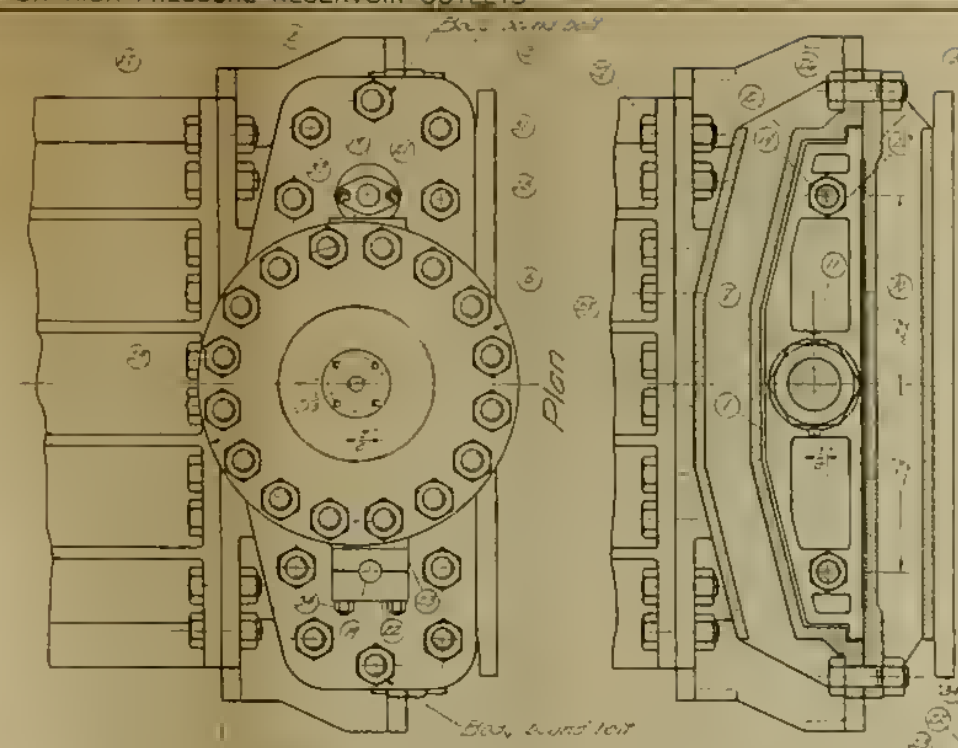
NO. 20345 PLATE 5 OF 88

1923

25-E-606

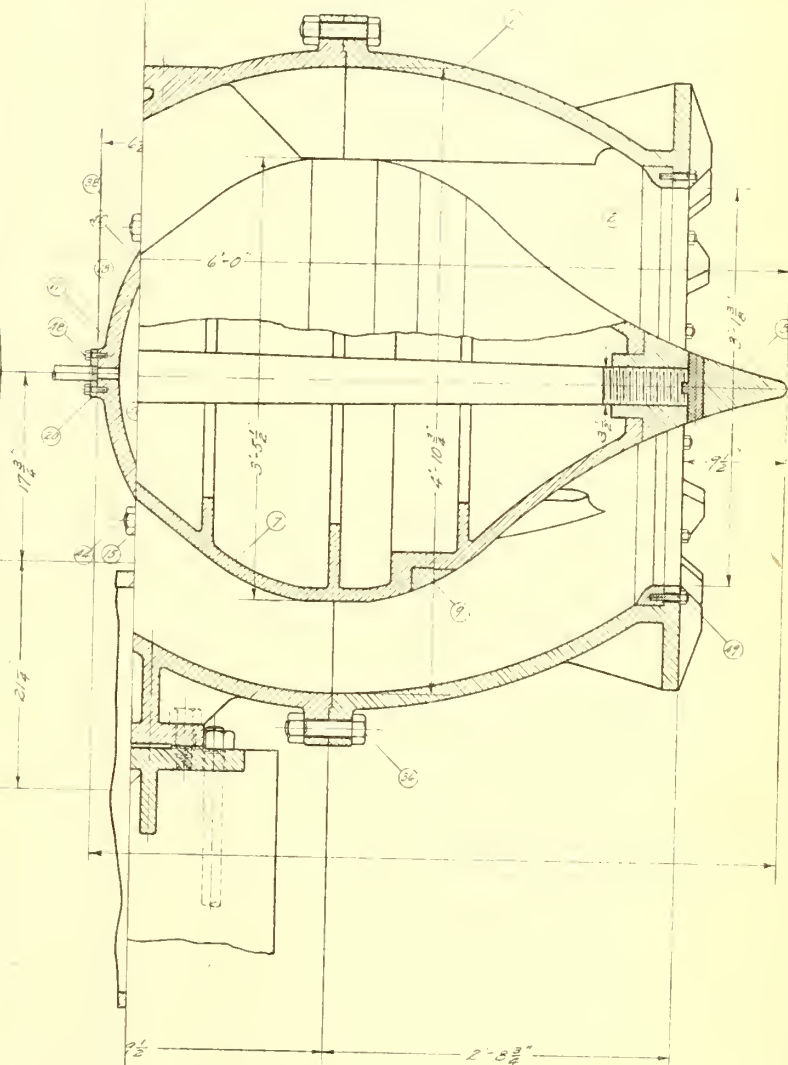
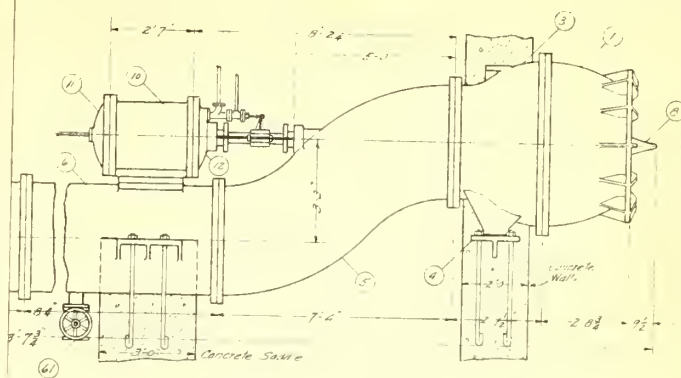
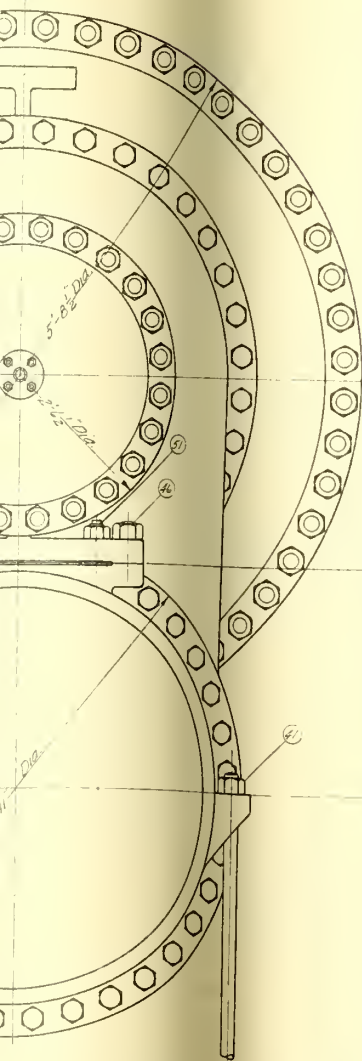






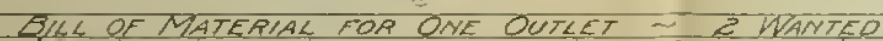
Bill of Material for One Gate - 2 Required									
Qty	Req	Material	Name	Remarks	Symbol	Qty	Req	Material	Name
1	1	Bronze	Gate Leaf	See Ding 7-826		2	2	Bronze	Clamp Blocks - Upper
1	1		Housing			1	1	Brass	Clamp Blocks - Lower
1	1		Frame	7-827		1	1	Brass	Core Plate
1	1		Housing Core	7-828		1	1	Bronze	Elbow
1	1		Cylinder			54	54	Thin Bronze	Bolts & Nuts for 18" x 48"
1	1		Head			34	34		18" x 48"
1	1	Thin Bronze	Gate Stem	7-827		36	36		18" x 48"
1	1		Gate Leaf Lock Nut			6	6		Cap Screws 18" x 3/4"
2	2		Set Screw for 3/4" x 1 1/2"			16	16		Studs & Nuts 18" x 8"
2	2		Bearing Nut			2	2		8" x 5/8"
1	1		Set Screw for 1/2" x 1 1/2"			4	4		8" x 3/4"
1	1		Piston Lock Nut			4	4		8" x 5/8"
1	1		Set Screw for 1/2" x 1 1/2"			4	4		8" x 1 1/8"
1	1	Bronze	Piston Body	7-828		1	1	Plate Steel	The Eclipse Special/Reamer Guard 3/4" x 3'-8" long
1	1		Head			1	1		14" Wrench
1	1		Bull Ring			1	1		12"
4	4		Piston Ring						
1	1		Stuffing Box Gland for 1 1/2"						
2	2	Thin Bronze	Indicator Rod	7-827					
2	2		Lock Nut for						
2	2	Bronze	Stuffing Box Gland for 1 1/2"	7-828					

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZ
ROOSEVELT DAM
BRONZE GATE 30 INCH X 38 INCH
NO 20346 PLATE 6 OF 80
1923

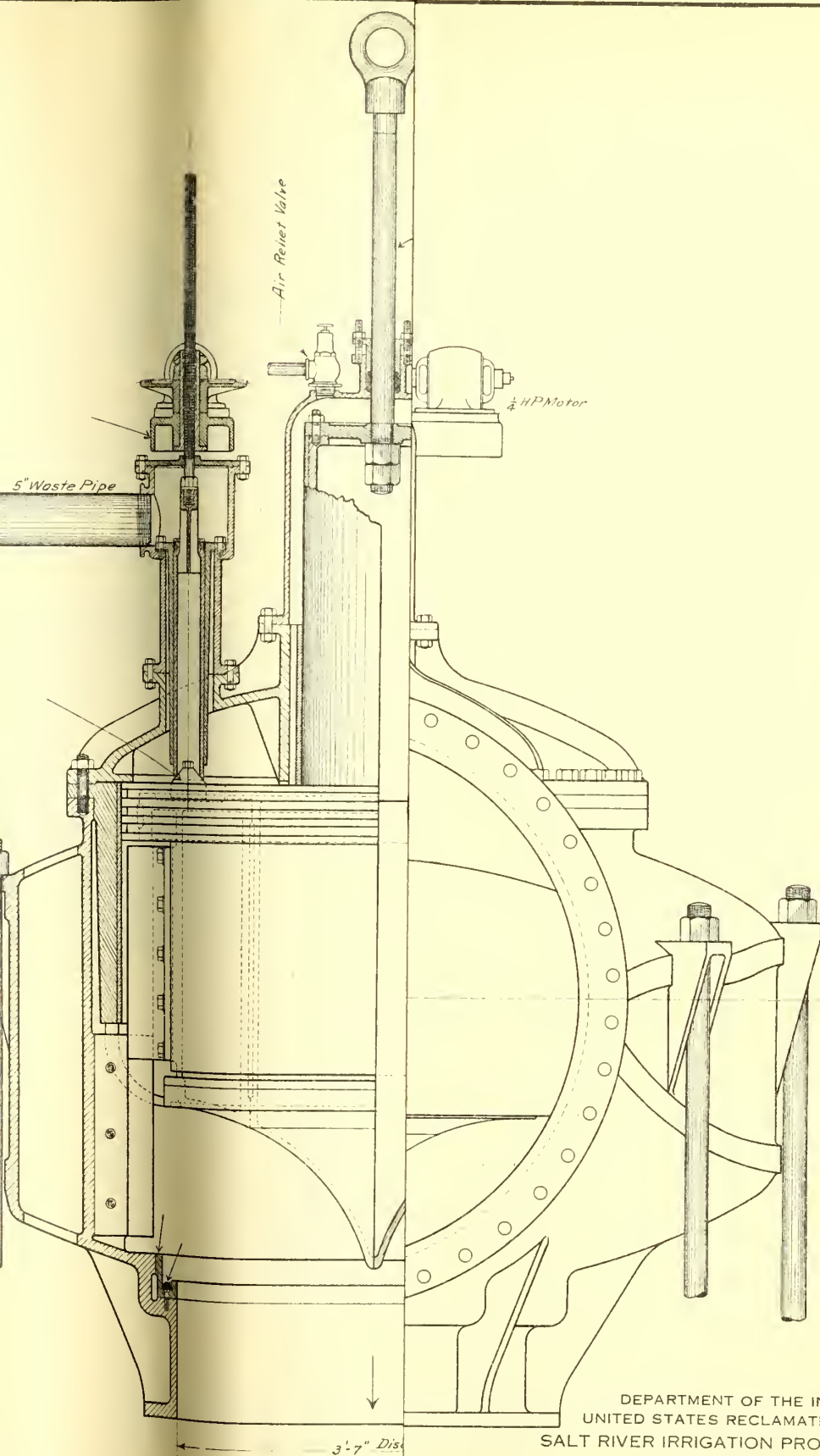


Qty Req	Material	Name	QTY
1	Seam Steel	Nozzle Tip	18 x 4 1/2
1	Heavy Bronze	Seat Ring for (1)	18 x 6
1	Seam Steel	Nozzle Body	7'-0 1/2 x 4 1/2
1	"	Seat Plate for (3)	18 x 6
1	"	Offset Pipe	14 x 7
1	"	Cutter Pipe	2 x 2 1/2
1	"	Needle	7'-0 1/2 x 3 1/2
1	Bronze	Needle Point	2 x 1 1/2
1	Heavy Bronze	Seat Ring for (7)	7'-0 1/2 x 2 1/2
1	Seam Steel	Cylinder	7'-0 1/2 x 2 1/2
1	"	Cylinder Cover	7'-0 1/2 x 2 1/2
1	Polished Bronze	Cylinder Head	8'-0 x 5'-0 x 8'-0
1	Bronze	Cylinder Liner	"
1	"	Piston	"
1	"	Bull Ring	"
1	Tobin Bronze	Stuffing Box Gland	12 x 4 1/2
1	"	Shaft	14 x 5
1	Cast Iron	Shaft Nut	14 x 6
1	"	1 Extra Heavy Tee with sweep	"
1	Bronze	1 Extra Heavy Companion Flange	5'-0 x 3'-0
1	"	Heavy Valve Body	7'-0

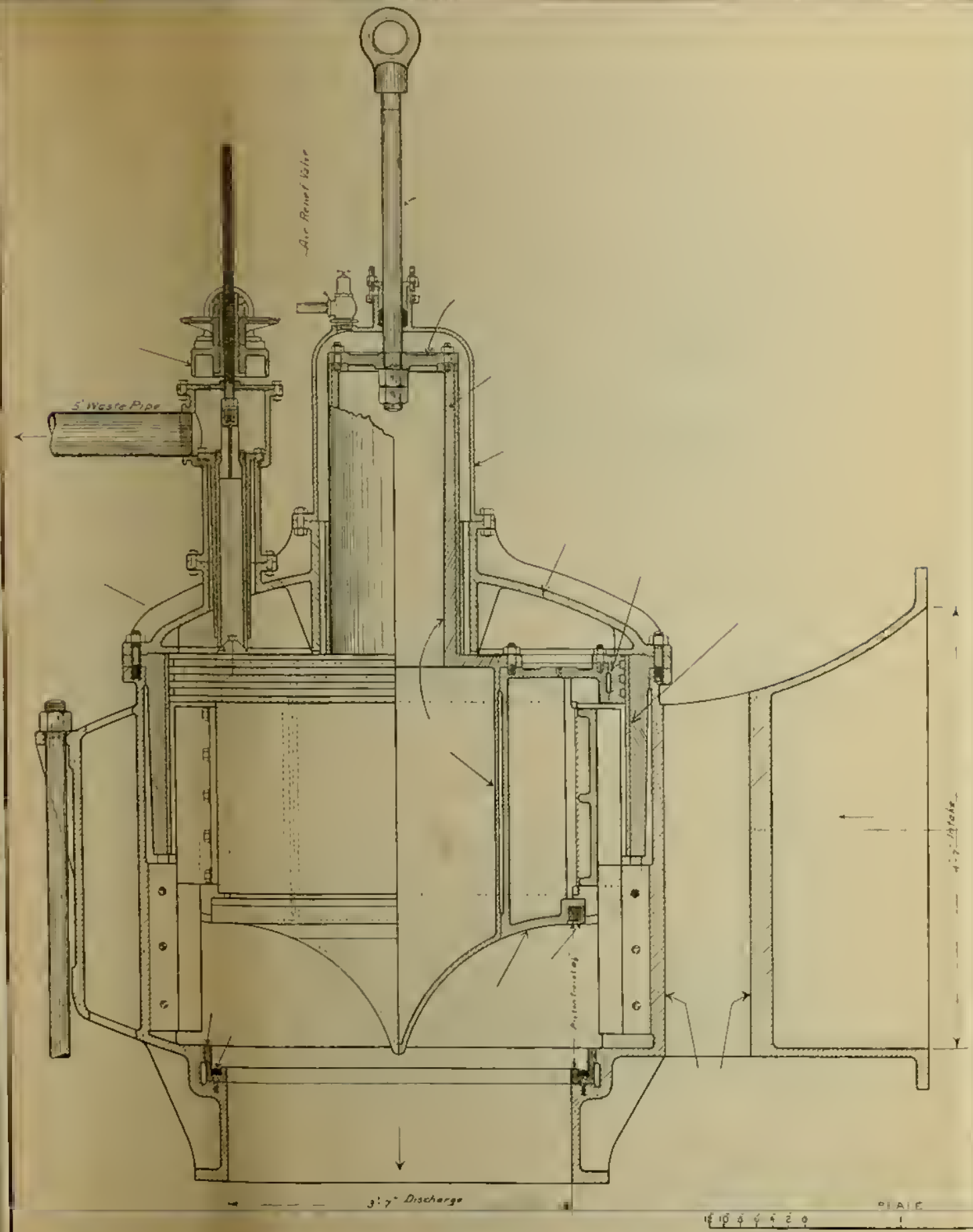
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UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA
ROOSEVELT DAM
NEEDLE VALVE 38 INCH DIAMETER
NO. 20347 PLATE 7 OF 88
1923



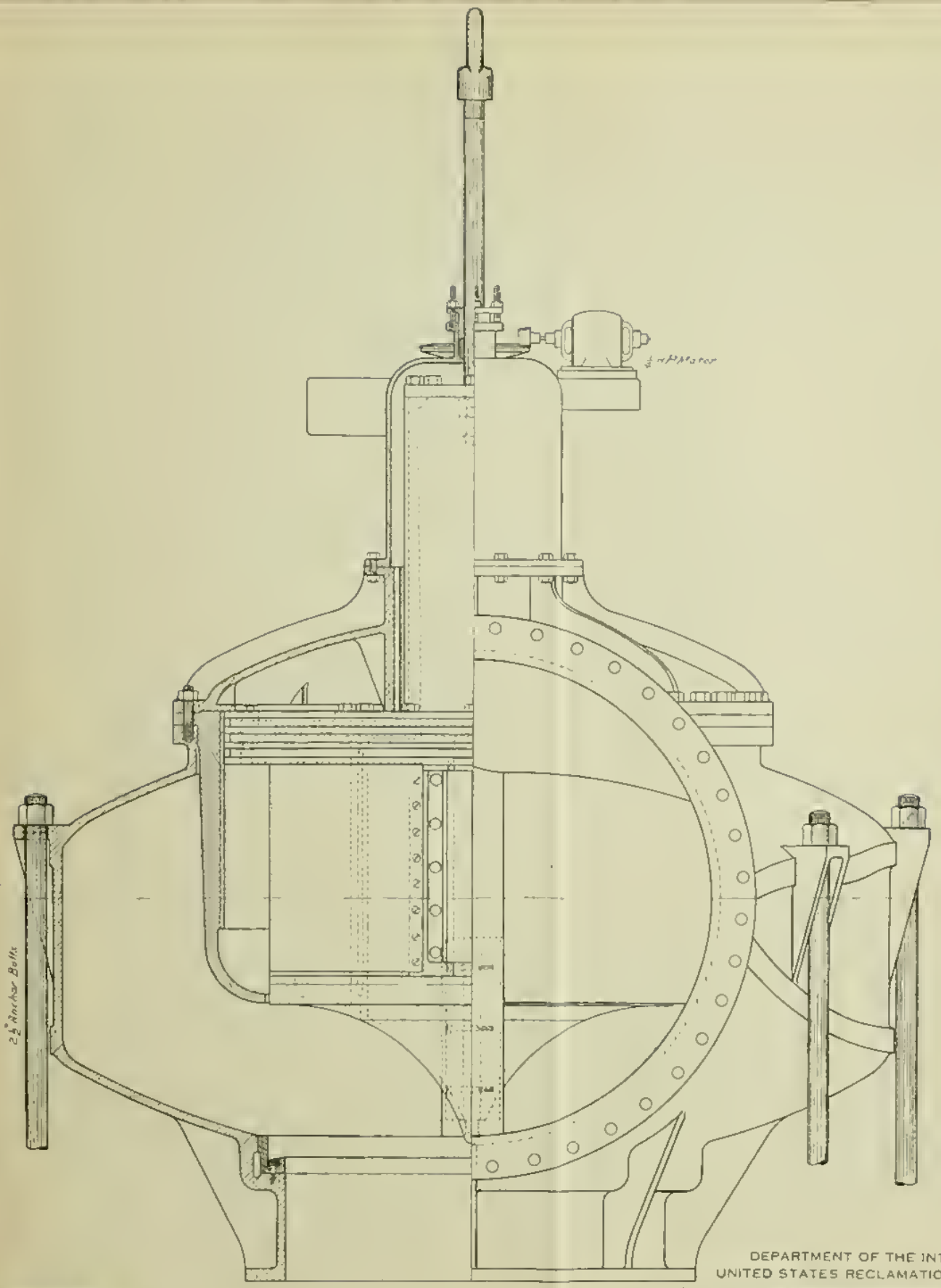
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA
ROOSEVELT DAM
NEEDLE VALVE 38 INCH DIAMETER
NO 20347 PLATE 7 OF 88
1923



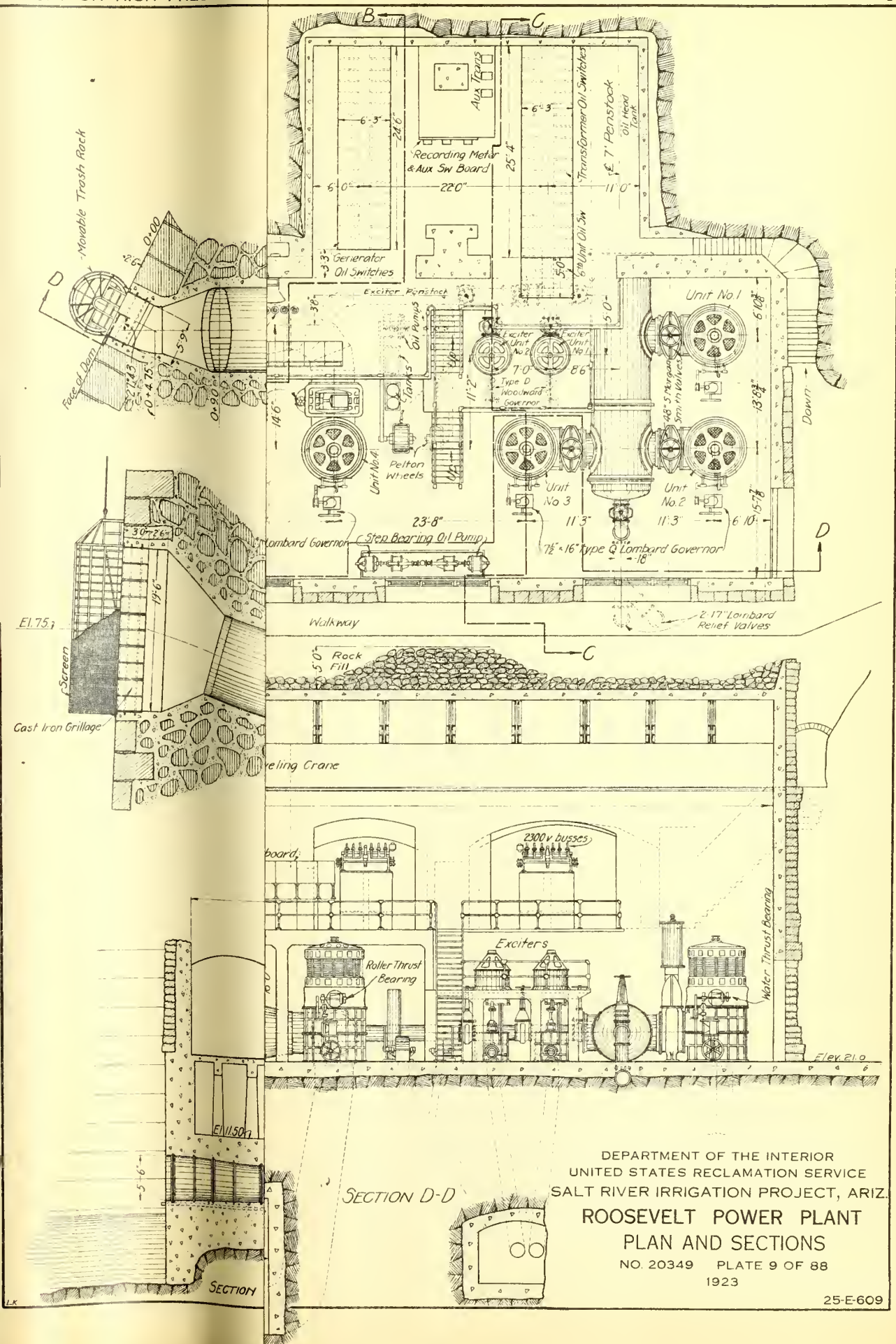
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SALT RIVER IRRIGATION PROJECT, ARIZONA
ROOSEVELT DAM
BALANCED VALVE 43 INCH DIAMETER
NO. 20348 PLATE 8 OF 88
1923



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



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SALT RIVER IRRIGATION PROJECT, ARIZONA
ROOSEVELT DAM
BALANCED VALVE 43 INCH DIAMETER
NO 20348 PLATE 8 OF 88
1923

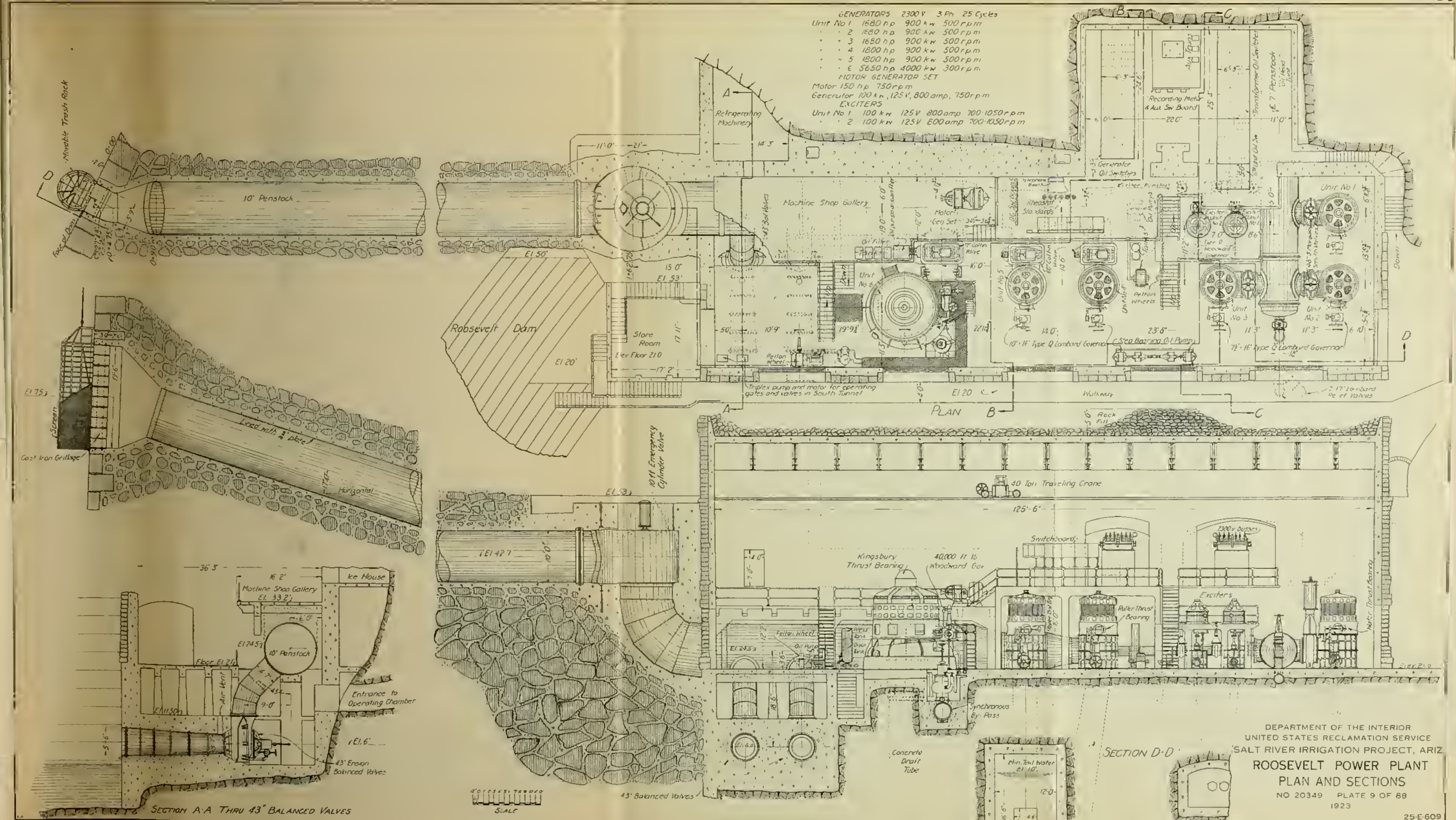


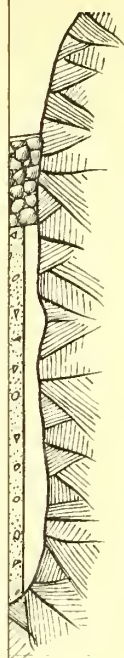
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZ.

**ROOSEVELT POWER PLANT
PLAN AND SECTIONS**

NO. 20349 PLATE 9 OF 88
1923

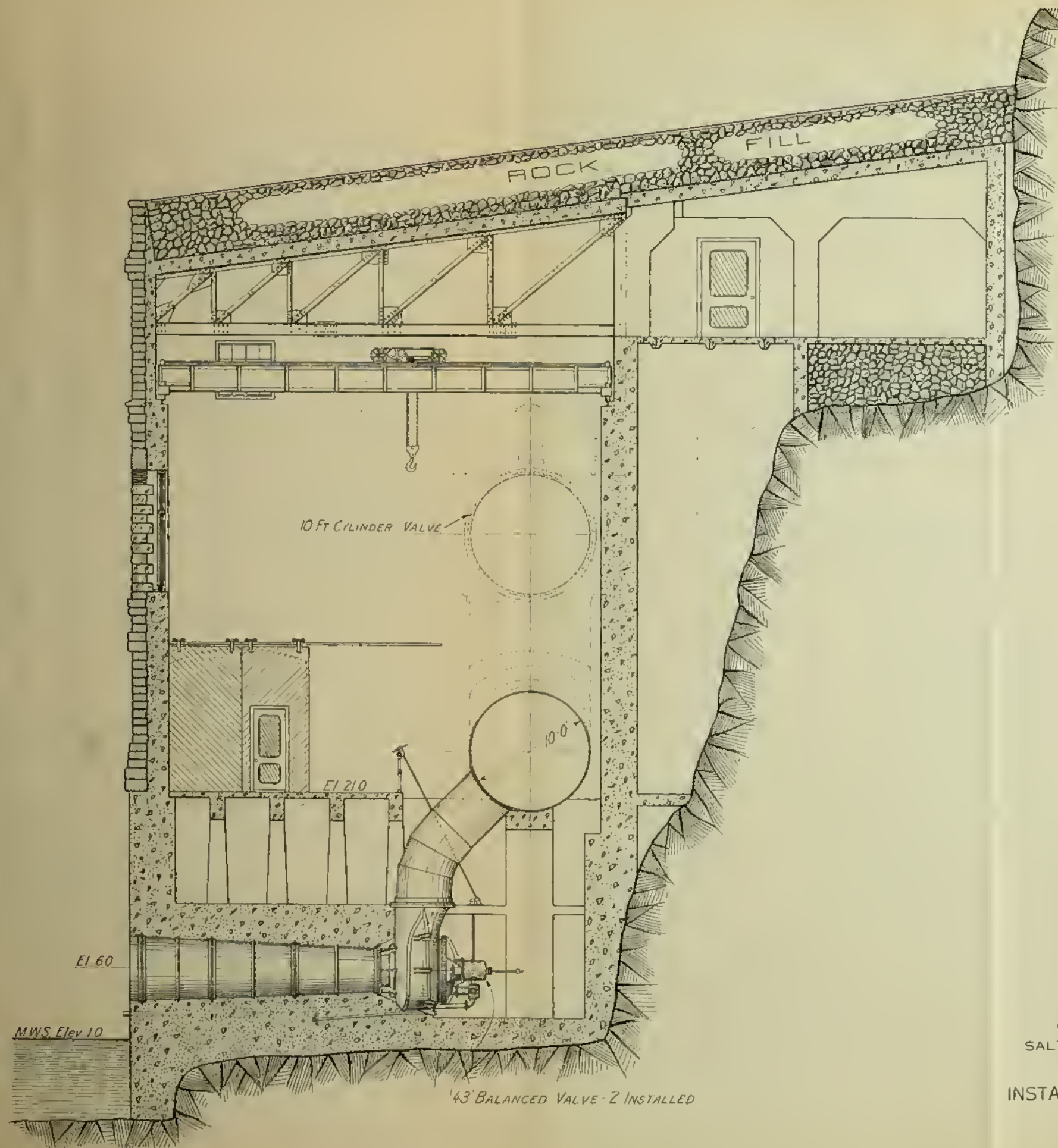
25-E-609



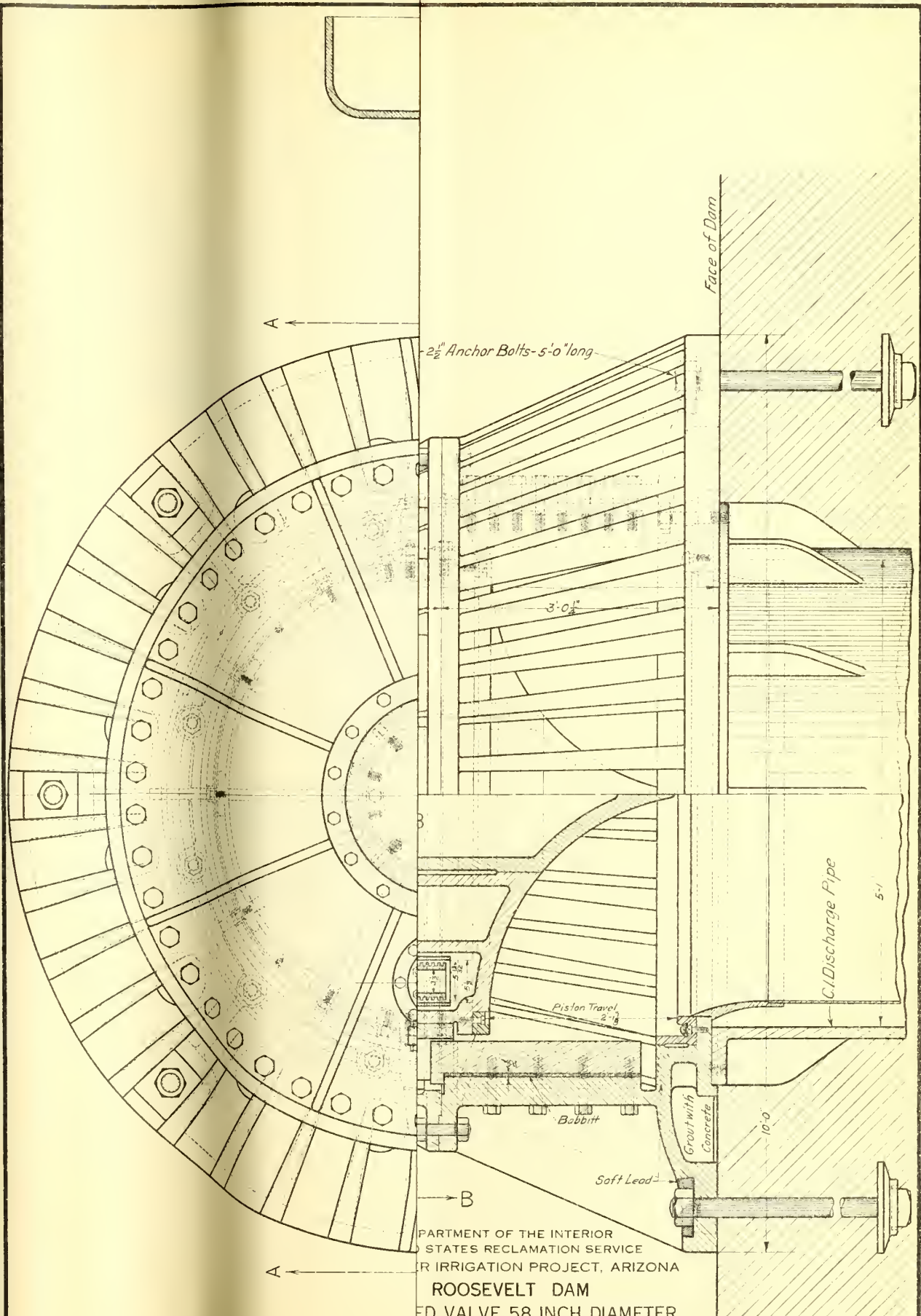


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA
ROOSEVELT DAM
INSTALLATION, 43 INCH BALANCED VALVE

NO. 20350 PLATE 10 OF 88
1923

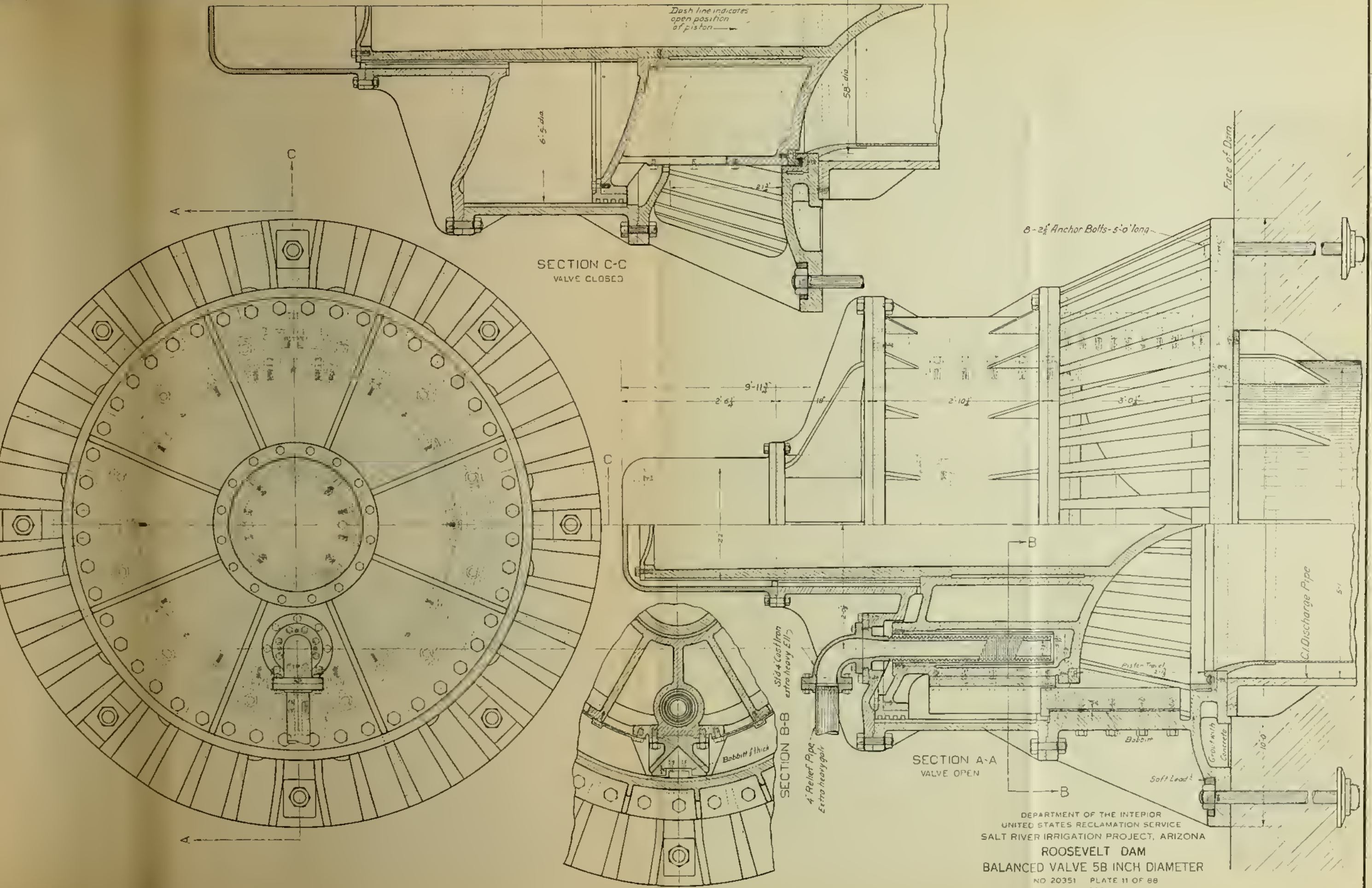


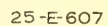
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA
ROOSEVELT DAM
INSTALLATION, 43 INCH BALANCED VALVE
NO 20350 PLATE 10 OF 88
1923

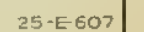


DEPARTMENT OF THE INTERIOR
 STATES RECLAMATION SERVICE
 FOR IRRIGATION PROJECT, ARIZONA
ROOSEVELT DAM
 ED VALVE 58 INCH DIAMETER

NO. 20351 PLATE 11 OF 88
 1923



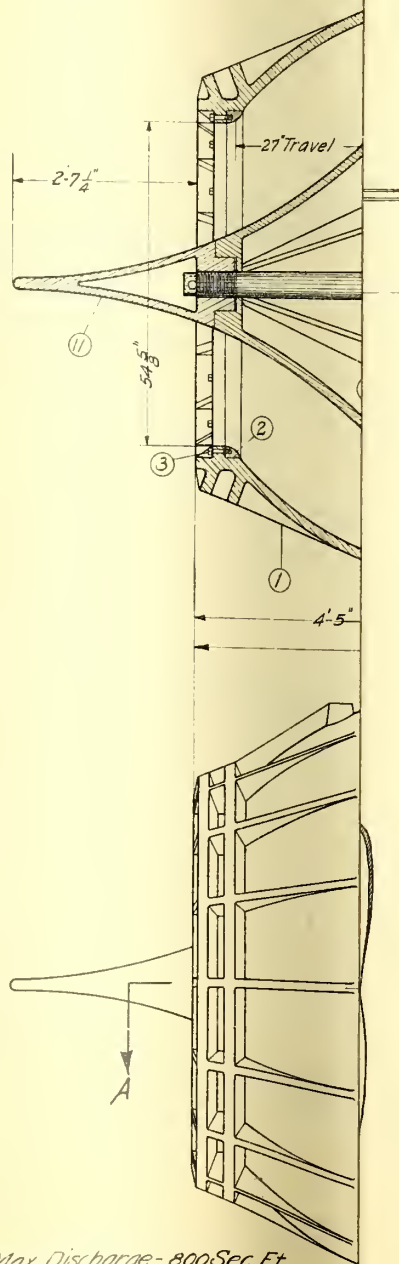




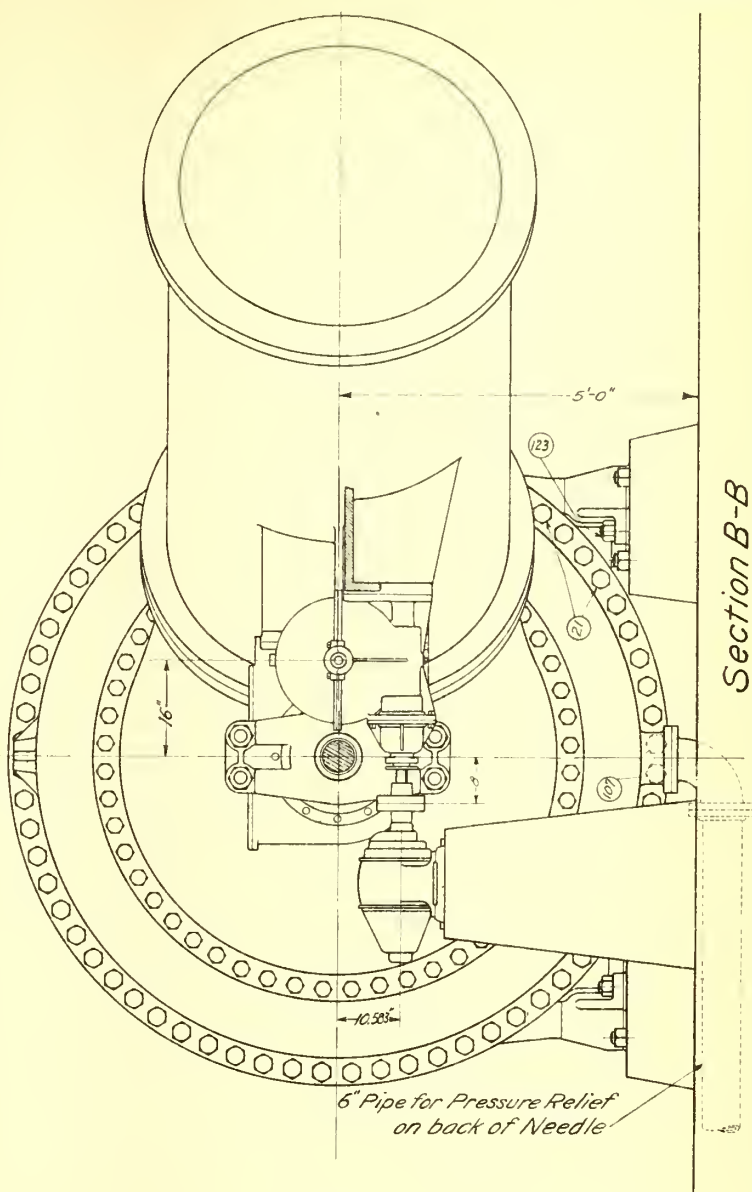
BILL OF MATERIALS

Symbol	No	Req	Material	Notes
(1)	1		Semi Steel	Nozzle
(2)	1		Phosphor Bronze	Nozzle Seat
(3)	16		Tobin	Cap Screws
(4)	1		Semi Steel	Needle
(5)	1		Phosphor Bronze	Needle Seat
(6)	16		Tobin	Cap Screws
(7)	4		Class C	Guide
(8)	1		Semi Steel	Needle Case
(9)	126		2 1/2" Steel bolts w/	
(10)	1		Class D Bronze	Sleeve
(11)	1		Phosphor	Needle Tip
(12)	1		Special Steel	Stem-Needle
(13)	1		Cast Steel	Stem Coupling
(14)	2		Steel	Ring Key/Washer
(15)	1		Semi Steel	Needle Case

See drg 25 E-304 for balance of Bill of Materials

Max Discharge - 800 Sec. Ft.
Max Head - 156 Ft.

2" An



Section B-B

LIST OF DRAWINGS

- NO. 16 30° ELBOW DETAIL
- " 2 30° ELBOW SPLITTER SECTIONS
- " 3 RADIAL SECTIONS 30° ELBOW
- " 4 NEEDLE CASE DETAIL
- " 5 NOZZLE AND SOLE PLATE DETAILS
- " 6 NEEDLE DETAILS
- " 7 GEAR AND THRUST CASE DETAILS
- " 8 SQUARE BEARING AND INDICATOR DETAILS
- " 9 THRUST BEARING, STRUT, GEAR AND NUT
- " 10 WORM AND CASE DETAILS
- " 11 54" PIPE WITH BRACKETS
- " 12 OPERATING MECHANISM
- " 13 GENERAL ARRANGEMENT
- " 14 NEEDLE CASE CONE
- " 15 COUPLING AND GUIDE BEARING DETAILS

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONAROOSEVELT DAM
NEEDLE VALVE 54 INCH DIAMETER

NO. 20353 PLATE 13 OF 88

1923

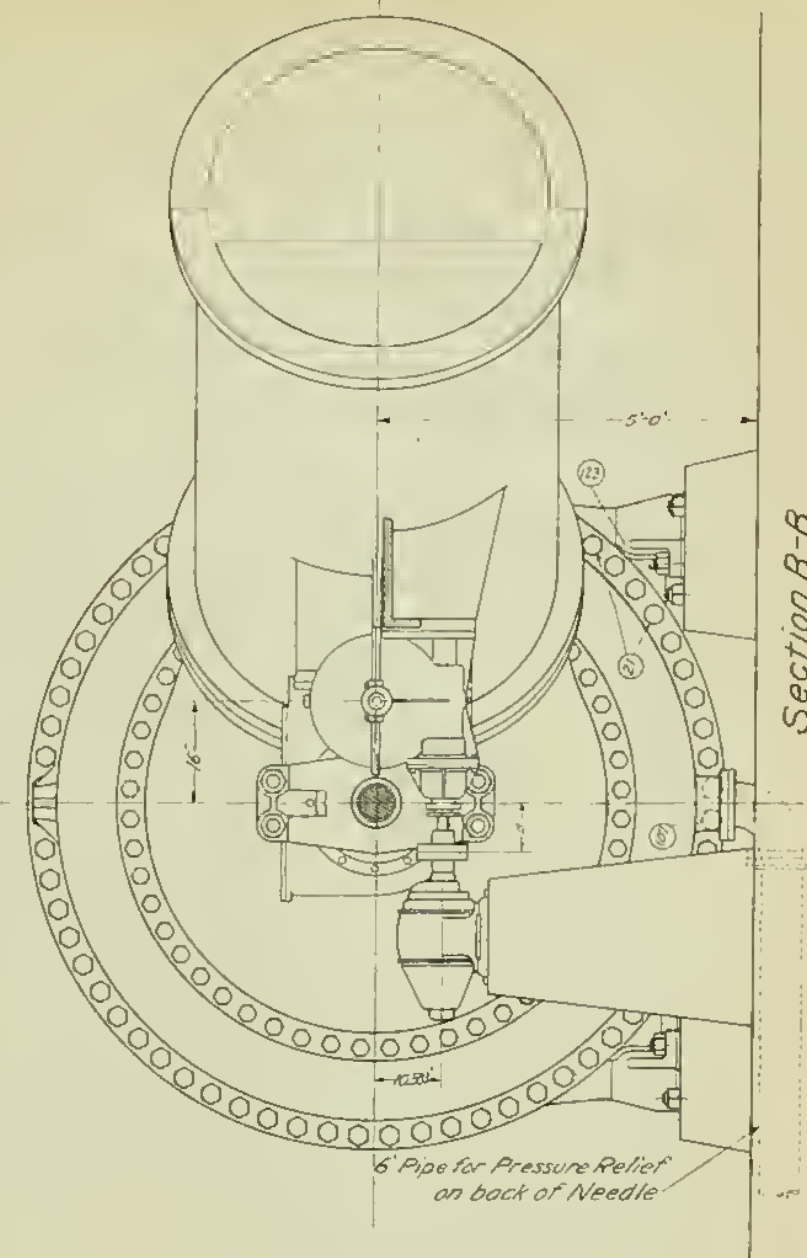
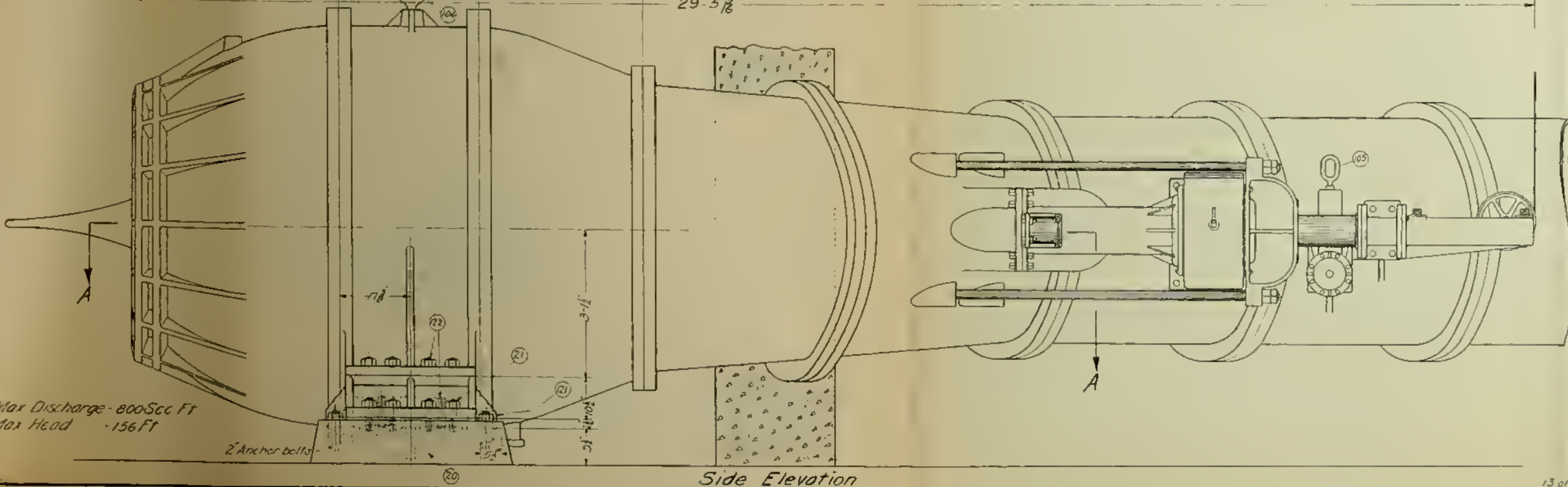
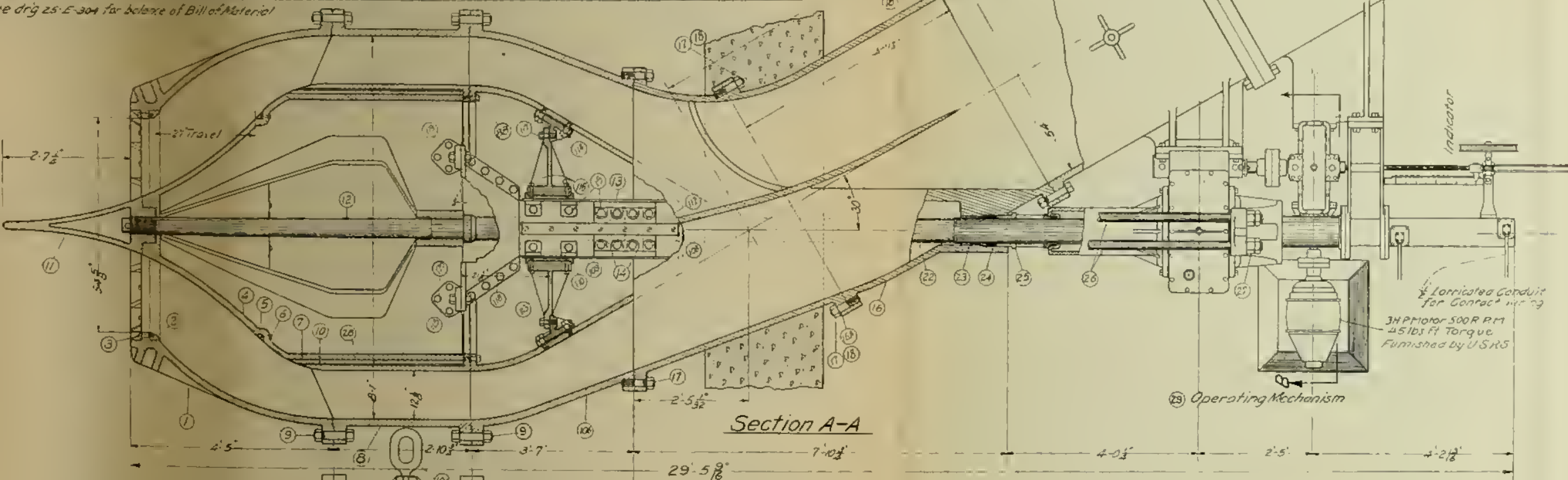
0 1 2 3 4
Scale in Feet

25-E-305

BILL OF MATERIAL FOR ONE OUTLET — THREE WANTED

Item No.	Qty.	Material	Size	Spec.	Notes	Item No.	Qty.	Material	Size	Spec.	Notes
1	1	Semi Steel	Needle	7E874	15	2	1	Semi Steel	30° Elbow	7E875	
2	1	Phosphor Bronze	Needle Seal	7E874	16	1	1	Semi Steel	30° Elbow	7E875	
3	16	Tabin	Cap Screws	7E875	17	24	1	Semi Steel	30° Elbow	7E875	
4	1	Semi Steel	Needle	7E875	18	148	1	Semi Steel	30° Elbow	7E875	
5	1	Phosphor Bronze	Needle Seal	7E875	19	15	1	Semi Steel	30° Elbow	7E875	
6	10	Tabin	Cap Screws	7E875	20	2	1	Semi Steel	30° Elbow	7E875	
7	4	Glass C	Guide	7E875	21	16	1	Semi Steel	30° Elbow	7E875	
8	1	Semi Steel	Needle Case	7E875	22	1	1	Special Steel	Stem-Operating Section	7E880	
9	126	1/2" Steel Rods with Tabin Bronze Nuts	7E874	23	1	1	1	Class D Bronze	Main Stem & Winding	7E876	
10	1	Class D Bronze	Stem	7E874	24	60	1	Class D Bronze	Stem-Operating Section	7E880	
11	1	Phosphor	Needle Tip	7E875	25	1	1	Class C Bronze	61 Main Stem Elbow	7E876	
12	1	Special Steel	Stem-Needle Section	7E875	26	4	1	Special Steel	24 Tension Rods	7E876	
13	1	Cast Steel	Stem Coupling	25-E-538	27	8	1	Tabin Bronze	Tension Rod Nuts	7E875	
14	2	Steel	Ring Keyways and Pins	7E875	28	56	1	3/16" F.H. Bolts and Nuts	7E875		
15	1	Semi Steel	Needle Case Cone	7E880	29	1	1	OPERATING MECHANISM	7E881		

e drg 25-E-304 for balance of Bill of Material



- LIST OF DRAWINGS
- NO 16 30° ELBOW DETAIL
 - " 2 30° ELBOW SPLITTER SECTIONS
 - " 3 RADIAL SECTIONS 30° ELBOW
 - " 4 NEEDLE CASE DETAIL
 - " 5 NOZZLE AND SOLE PLATE DETAILS
 - " 6 NEEDLE DETAILS
 - " 7 GEAR AND THRUST CASE DETAILS
 - " 8 SQUARE BEARING AND INDICATOR DETAILS
 - " 9 THRUST BEARING, STRUT, GEAR AND NUT
 - " 10 WORM AND CASE DETAILS
 - " 11 54" PIPE WITH BRACKETS
 - " 12 OPERATING MECHANISM
 - " 13 GENERAL ARRANGEMENT
 - " 14 NEEDLE CASE CONE
 - " 15 COUPLING AND GUIDE BEARING DETAILS

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA

ROOSEVELT DAM
NEEDLE VALVE 54 INCH DIAMETER

NO 20353 PLATE 13 OF 88
1923

Scale in Feet

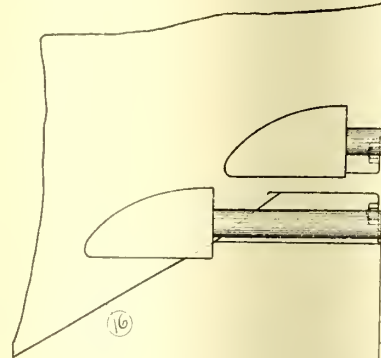
25-E-305

PLATE 14

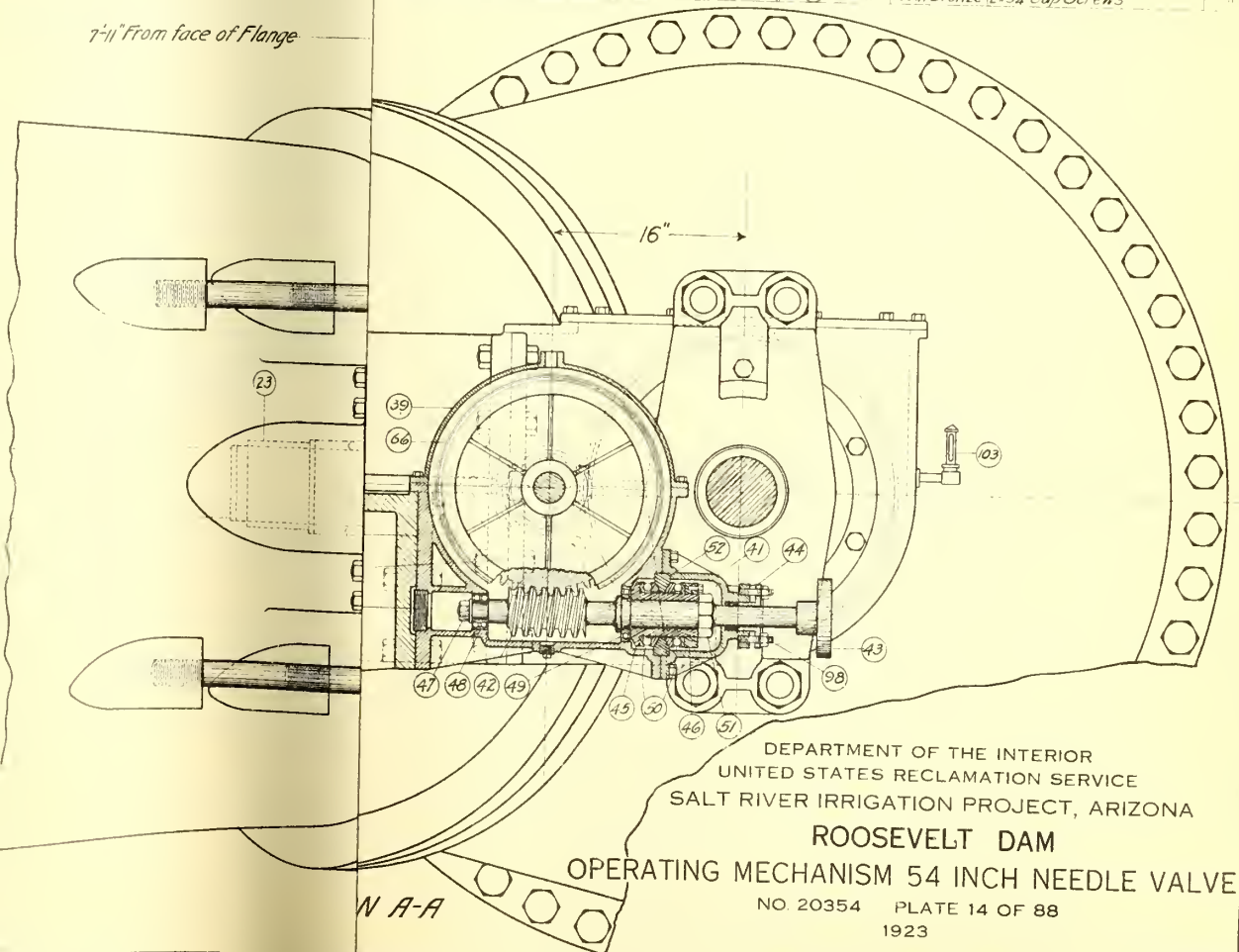
BILL OF MATERIAL CONTINUED

BILL OF MATERIAL FOR ONE OUTLET ~ THREE WANTED

Symbol	No Req'd	Material	Name	Qty	Symbol	No Req'd	Material	Name	Qty	
108	2	Class C Bronze	Coupling Guides	1	7E876	68	1	Semi Steel	Square Bearing	7E877
109	2	" " "	" " "	1		69	1	"	End Stem Case	
110	2	" " D "	Bearing Liners	1		70	2	"	Contact Box	
111	2	" " "	" " "	1		71	2	Red Wd Fibre	Contact Insulation	
112	28	Tobin Bronze	$\frac{3}{4} \times \frac{1}{2}$ FH Screws	1		72	2	Copper	Contact	
113	1	Semi Steel	Guide Bearing	1		73	2	Brass	Cover	
114	4	" " "	Bearing Brackets	1		74	2	Copper	Brushes	
115	16	" " "	Coupling	1		75	2	Brass	Terminal Posts	
116	8	Tobin Bronze	$\frac{3}{4} \times \frac{1}{2}$ Cap Screws	1	7E879	76	1	Semi Steel	Indicator Bearing	
117	36	" " "	$\frac{1}{4} \times \frac{3}{8}$ " " "	1		77	1	"	Bracket	
118	8	Steel	$\frac{1}{4} \times \frac{1}{4}$ Bolts-Tobin Bra	1		78	2	Brass	Guide Plates	
119	16	" " "	$\frac{1}{4} \times \frac{1}{4}$ " " "	1		79	1	Phos Bronze	Indicator Rack	
120	24	" " "	$1 \times \frac{1}{2}$ " " "	1		80	1	"	Pinion	
121	2	Semi Steel	Needle Case Base	1		81	1	"	Nut	
122	12	Steel	2×7 Studs with Tob	1		82	1	Brass	Stem Sheath	7E880
123	4	" " "	$1 \frac{1}{4} \times \frac{1}{2}$ " " "	1		83	4	Steel	$\frac{1}{4} \times \frac{1}{4}$ Bolts-Tobin Bronze Nuts	7E874
						84	13	"	1×4	
						85	8	"	$\frac{3}{4} \times \frac{1}{2}$	
						86	16	"	$\frac{3}{4} \times \frac{1}{2}$	
						87	6	"	$\frac{1}{2} \times \frac{1}{4}$	
						88	26	Tobin Bronze	$1 \times \frac{1}{2}$ Cap Screws	
						89	24	"	$\frac{1}{2} \times \frac{1}{2}$	
						90	2	"	$\frac{1}{2} \times \frac{1}{2}$	
						91	3	"	$\frac{3}{4} \times \frac{1}{2}$	
						92	8	"	$\frac{3}{4} \times \frac{1}{2}$	
						93	8	"	$\frac{3}{4} \times \frac{1}{2}$	
						94	8	"	$\frac{3}{4} \times \frac{1}{2}$	
						95	8	"	$\frac{3}{4} \times \frac{1}{2}$	
						96	8	"	$\frac{3}{4} \times \frac{1}{2}$	
						97	4	Steel	$\frac{3}{4} \times \frac{1}{2}$ Studs-Tobin Bronze Nuts	
						98	3	"	$\frac{3}{4} \times \frac{1}{2}$	
						99	8	"	$\frac{3}{4} \times \frac{1}{2}$ Bolts	
						100	4	Brass	$\frac{1}{4} \times \frac{1}{4}$ Oil Cups	
						101	2	"	$\frac{1}{4} \times \frac{1}{4}$ Grease Cups	7E877
						102	60	Flax	$\frac{3}{4}$ Sg Hydraulic Packing	7E876 79
						103	2	Brass	$\frac{3}{4}$ Oil Gauges-See Note with 30	7E876 79
						104	2	Mild Steel	2 Eye Bolt	7E874
						105	1	"	"	
						106	2	Tobin Bronze	$1 \times \frac{1}{2}$ Cap Screws	



7-11" From face of Flange



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA

ROOSEVELT DAM OPERATING MECHANISM 54 INCH NEEDLE VALVE

NO 20354 PLATE 14 OF 88
1923

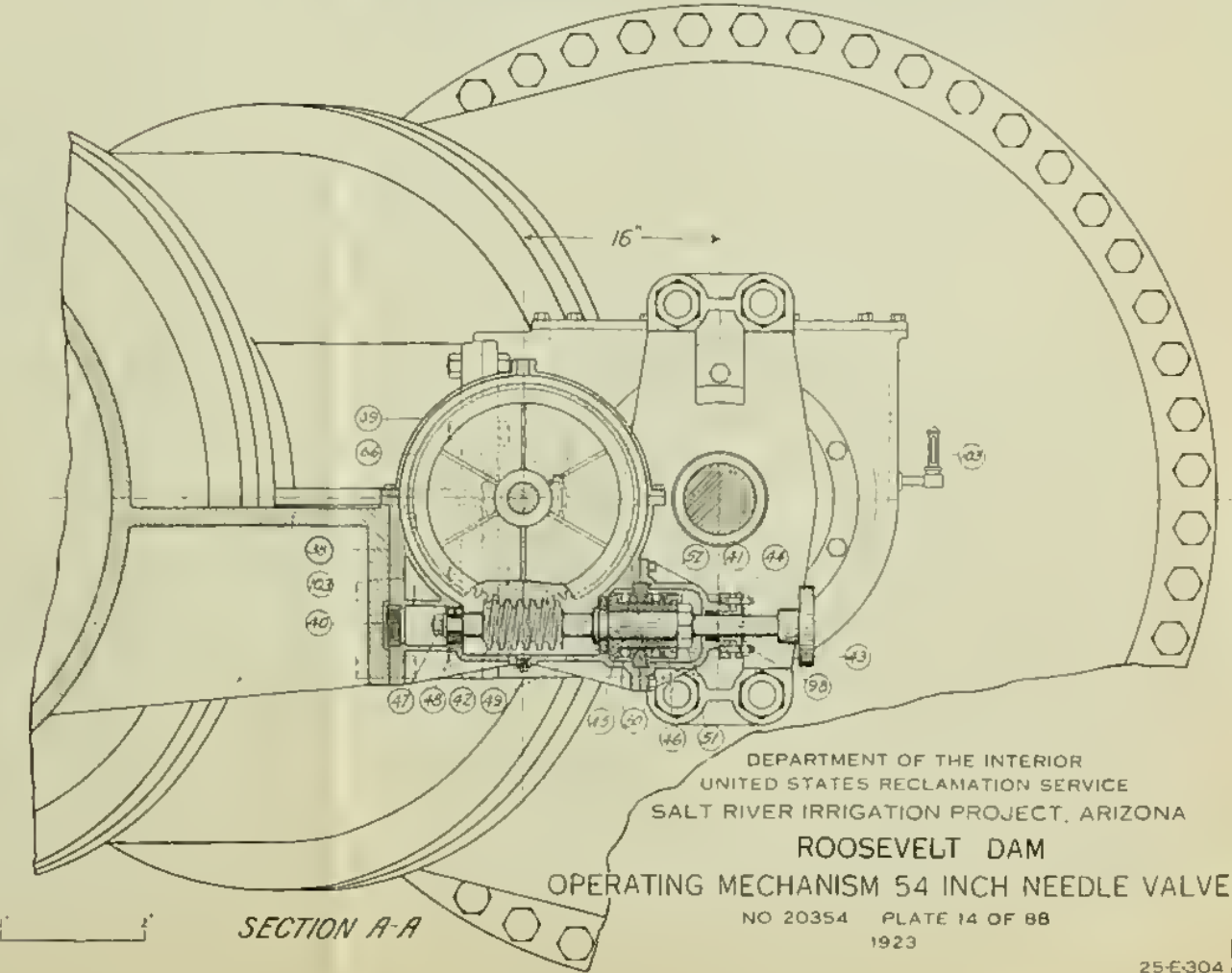
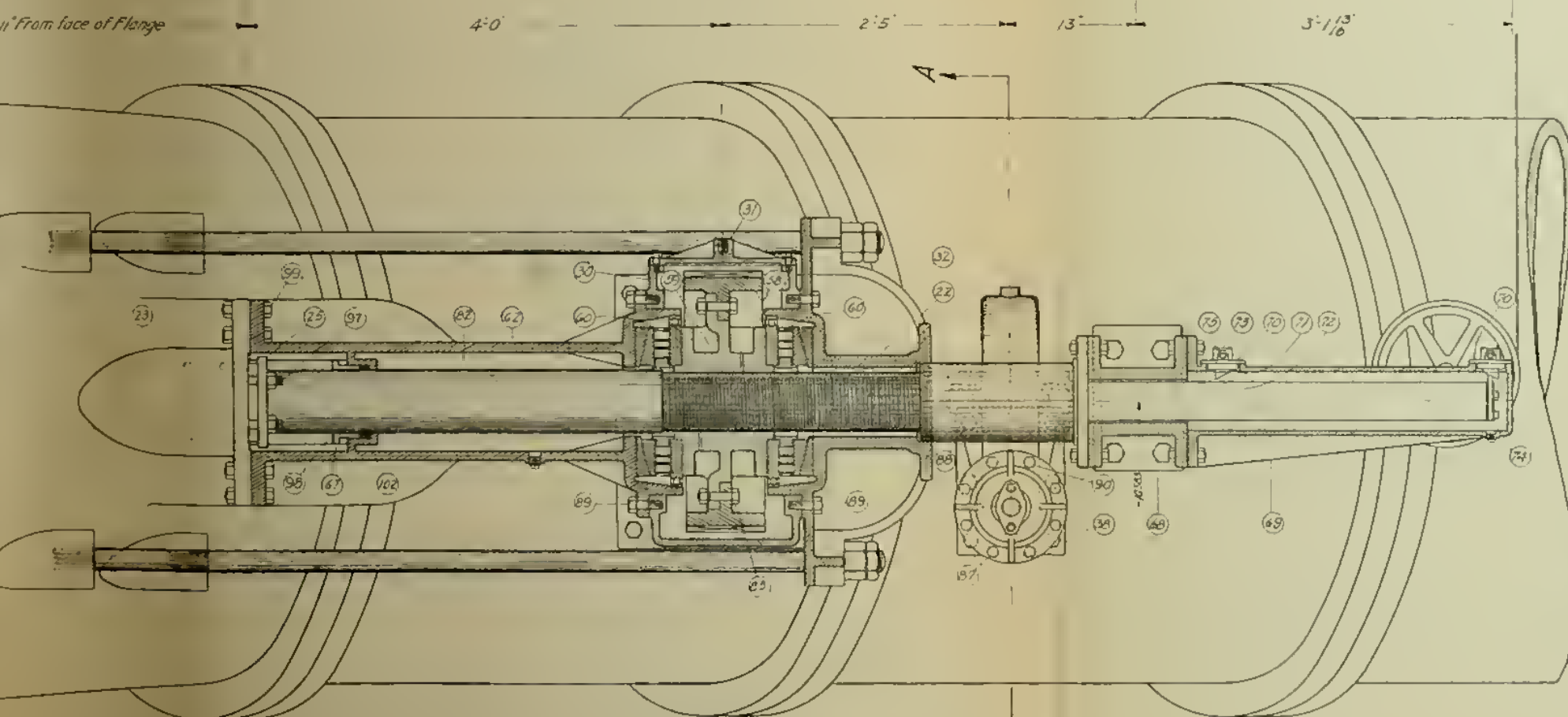
OF MATERIAL CONTINUED

Material	Name	Qty.	Org. No.
Cast Bronze	Coupling Bush	25 E-298	
D	Bearing Liners		
Cast Bronze	1/2" F.H. Screws		
Cast Steel	Guide Bearing		
	Bearing Brackets		
	Coupling		
Cast Bronze	1/2" F.H. Cap Screws	25 E-297	
	1/2" F.H.		
Steel	1/2" Bolts with Cast Bronze Nuts		
	1/2" F.H.		
Semi Steel	Needle Case Base Plate	25 E-296	
Steel	2" x 7" Studs with Cast Bronze Nuts	25 E-297	
	1/2" F.H.		

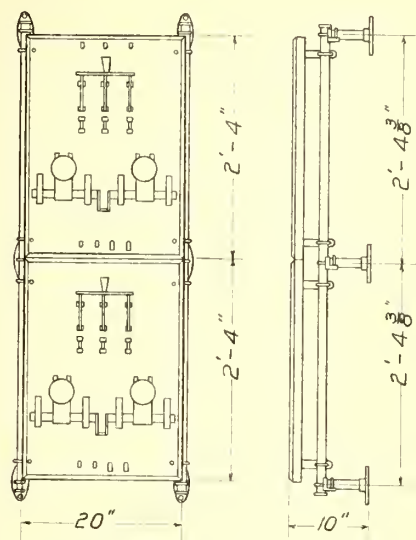
- LIST OF DRAWINGS
- NO 10 30° ELBOW DETAIL
 - 2 30° ELBOW SPLITTER SECTIONS
 - 3 RADIAL SECTIONS 30° ELBOW
 - 4 NEEDLE CASE DETAIL
 - 5 NOZZLE AND SOLE PLATE DETAILS
 - 6 NEEDLE DETAILS
 - 7 GEAR AND THRUST CASE DETAILS
 - 8 SQUARE BEARING AND INDICATOR DETAILS
 - 9 THRUST BEARING STRUT, GEAR AND NUT
 - 10 WORM AND GEAR DETAILS
 - 11 54 PIPE WITH BRACKETS
 - 12 OPERATING MECHANISM
 - 13 GENERAL ARRANGEMENT
 - 14 NEEDLE CASE CONE
 - 15 COUPLING AND GUIDE BEARING DETAILS

29 BILL OF MATERIAL FOR ONE OUTLET — THREE WANTED

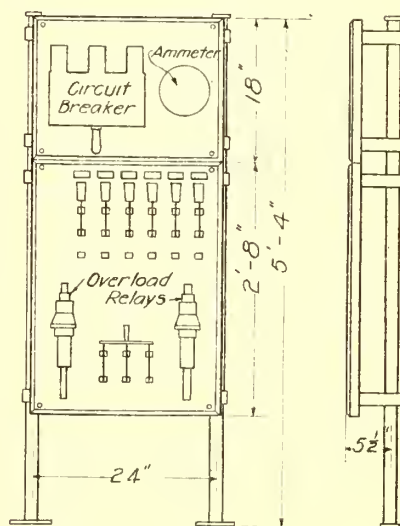
Symbol	Qty.	Material	Name	Qty.	Symbol	Qty.	Material	Name	Qty.
30	1	Semi Steel	1/2" F.H. Case	1	48	1	Semi Steel	Square Bearing	1
31	1		Gear Case Cover	1	49	1		End Stem Case	1
32	1	Cast Steel	Thrust Case	1	50	2	Radial Fibre	Contact Box	1
33	1	Phos Bronze	2 1/2" Bushing	1	51	2	Cooper	Contact Insulation	1
34	1		3/4"	1	52	2	Cooper	Contact	1
35	1		1/2"	1	53	2	Cooper	Cover	1
36	1	Steel	1/2" O.D. Casing	1	54	2	Cooper	Brushes	1
37	1	Cast Iron	6 1/2" x 5 1/2" Flange	1	55	2	Brass	Terminal Pins	1
38	1	Semi Steel	Horn Drive Case	1	56	1	Semi Steel	Indicator Bearing	1
39	1		Cover	1	57	1		Bracket	1
40	1	Cast Iron	3/4" Std. Pipe Plug	1	58	2	Brass	Guide Plates	1
41	1	Semi Steel	Horn Bearing Housing	1	59	1	Phos Bronze	Indicator Rock	1
42	1	Steel	Horn	1	60	1		Pinion	1
43	1	Cast Iron	3/4" Std. Flexible Coupling	1	61	1		Nut	1
44	1	C. Bronze	1 1/2" Gland	1	62	1	Brass	Stem Sheath	1
45	1	Steel	Horn Thrust Sleeve	1	63	4	Steel	1 1/2" Bolt's Cast Bronze Nuts	1
46	1		Sleeve Nut	1	64	1		1/4"	1
47	1		1" Lock Nut	1	65	8		1/4"	1
48	1		3/4" Horn Shaft Bearing	1	66	6		1/4"	1
49	1		1/2"	1	67	6		1/4"	1
50	2		1/2" Thrust	1	68	26	John Brown	1 1/2" Cap Screws	1
51	1		2 1/2" Lock Nut	1	69	24		1 1/2"	1
52	1		Thrust Ring	1	70	2		1 1/2"	1
53	1	Brass	Indicator Drum Shaft	1	71	2		1 1/2"	1
54	1	Phos Bronze	Indicator	1	72	8		1 1/2"	1
55	1		Stem	1	73	8		1 1/2"	1
56	1	Semi Steel	Drum	1	74	8		1 1/2"	1
57	2	Brass	Straps	1	75	8		1 1/2"	1
58	1	Cast Steel	Gear	1	76	8		1 1/2"	1
59	1	Cast Steel	Nut	1	77	8		1 1/2"	1
60	2	See Detail	Roller Thrust Bearing	1	78	8		1 1/2"	1
61	1	Steel	Pinion	1	79	8		1 1/2"	1
62	1	Cast Steel	Thrust Bearing Strut	1	80	8		1 1/2"	1
63	1	Steel	Pinion Shaft	1	81	4	Brass	1 1/2" Oil Cups	1
64	1		Horn Wheel Shaft	1	82	2		1 1/2" Grease Cups	1
65	1	Cast Iron	Std. Flanged Coupling	1	83	60	Flint	1 1/2" Hydraulic Packing	1
66	1	Cast Bronze	Horn Wheel	1	84	2	Brass	1 1/2" Oil Gauges See Detail	1
67	1	C. Bronze	1 1/2" Gland	1	85	2	Mild Steel	5 Eye Bolt	1
					86	1			
					87	2	John Brown	1 1/2" Cap Screws	1



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA
ROOSEVELT DAM
OPERATING MECHANISM 54 INCH NEEDLE VALVE
NO 20354 PLATE 14 OF 88
1923



MOTOR CONTACTOR PANEL
IN VALVE HOUSE
(One for each Needle Valve)



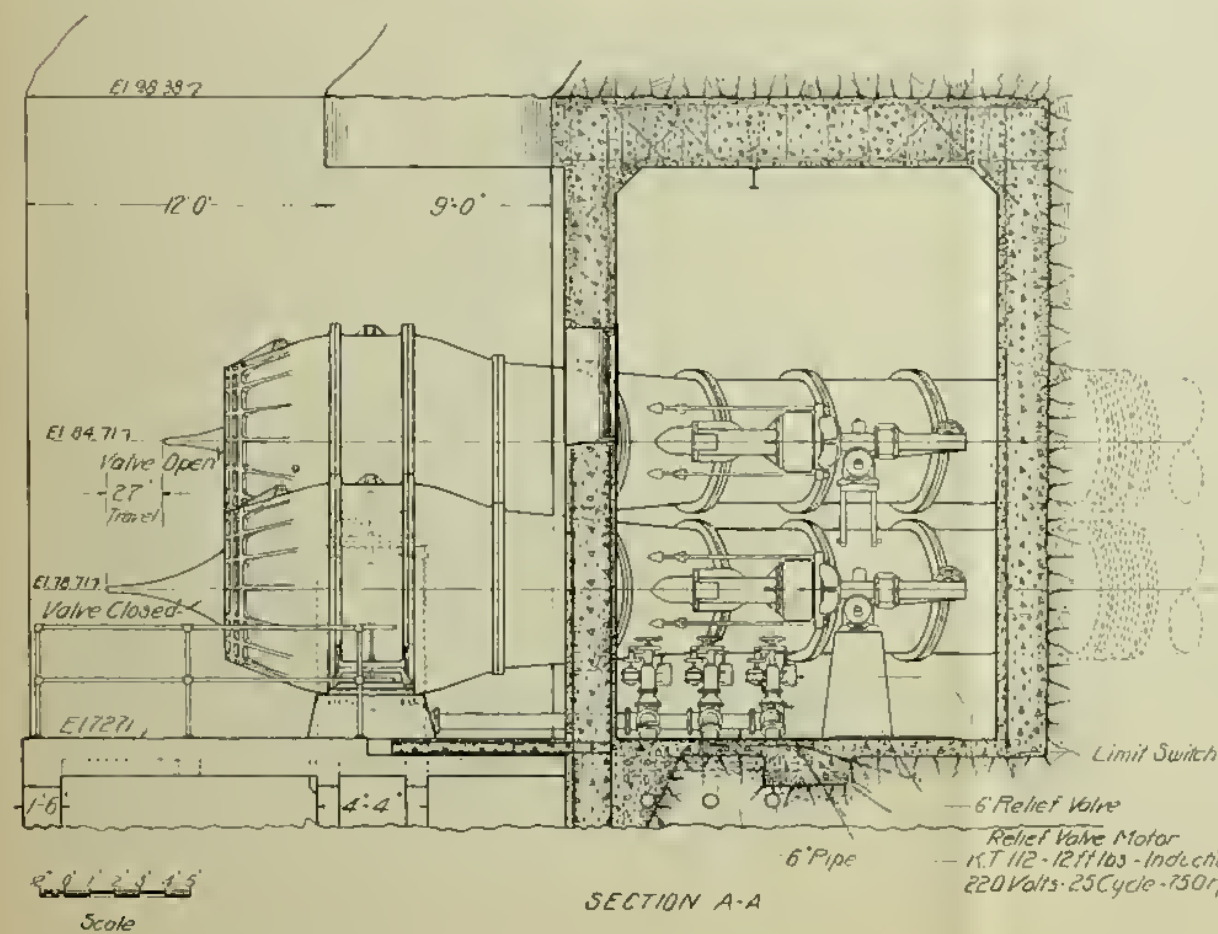
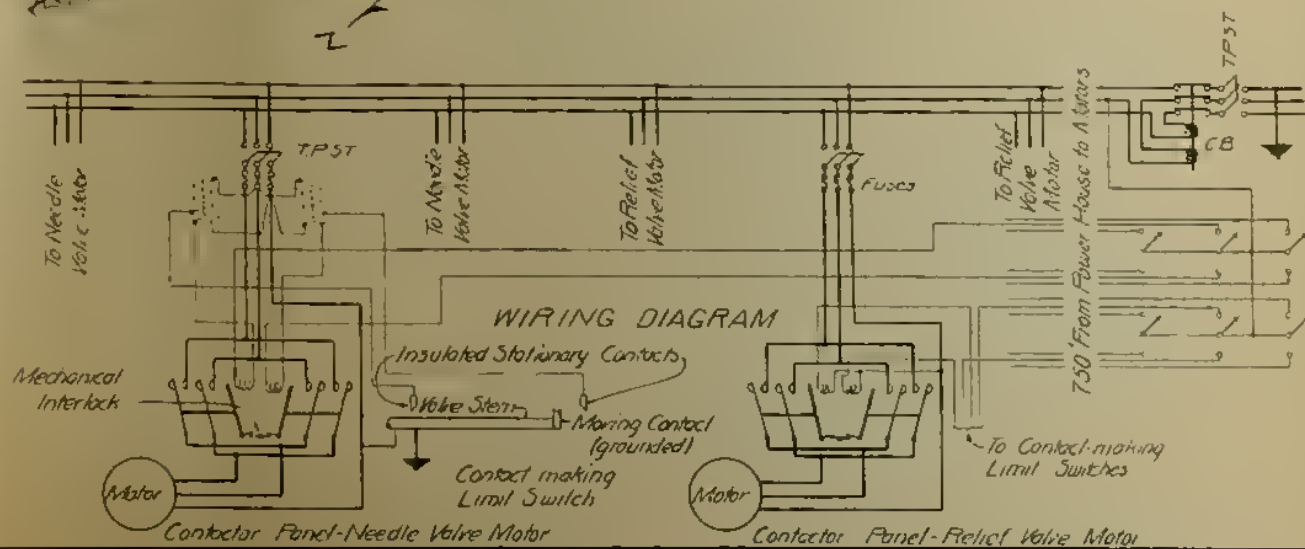
MASTER CONTROL PANEL
IN POWER HOUSE



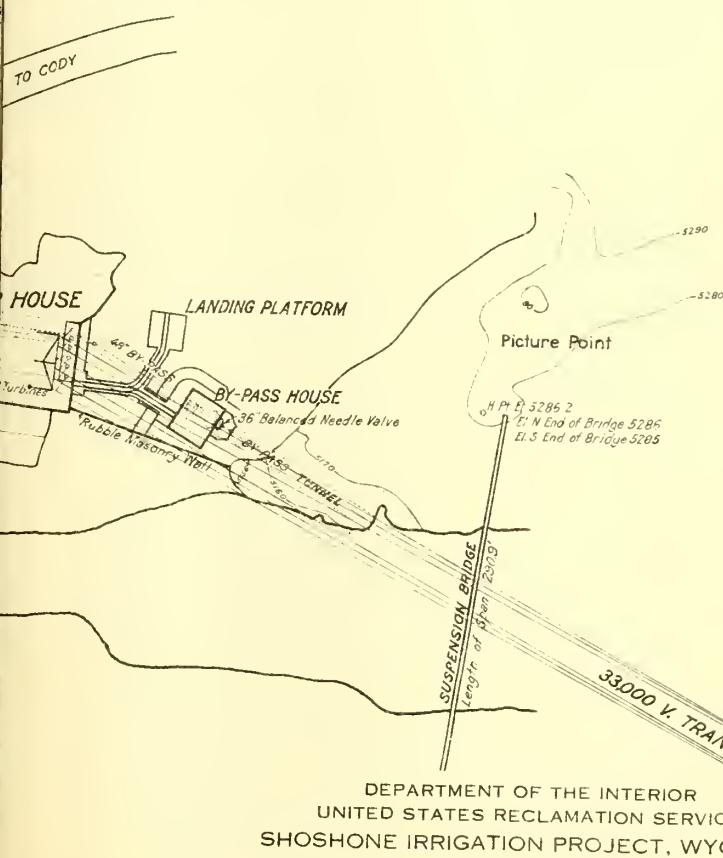
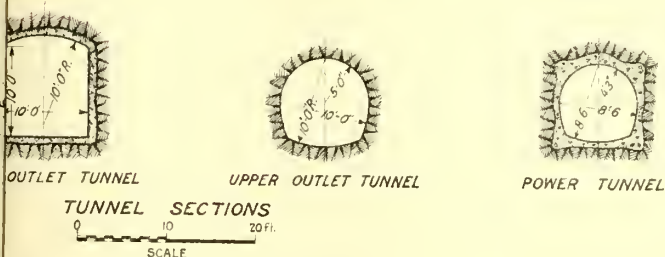
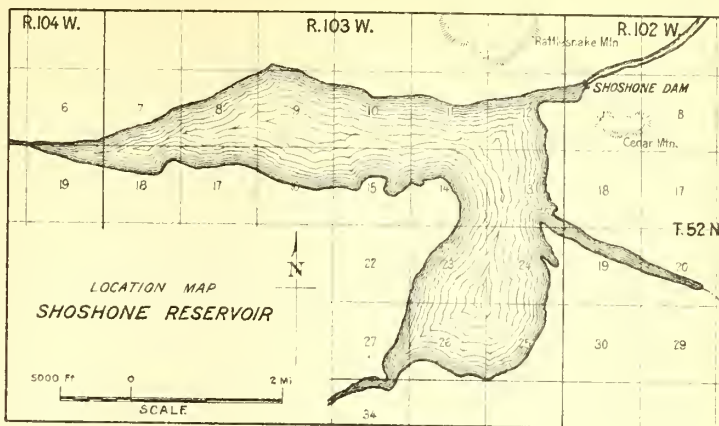
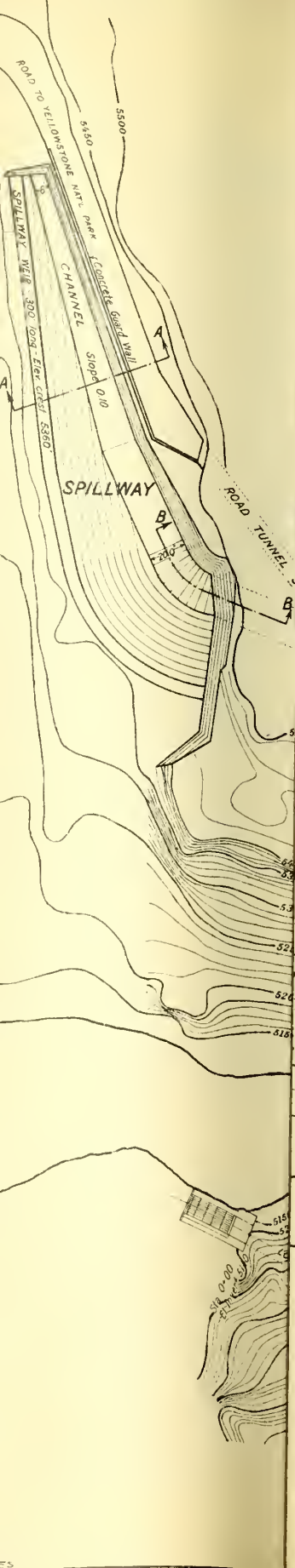
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA

ROOSEVELT DAM INSTALLATION 54 INCH NEEDLE VALVE

NO. 20355 PLATE 15 OF 88
1923



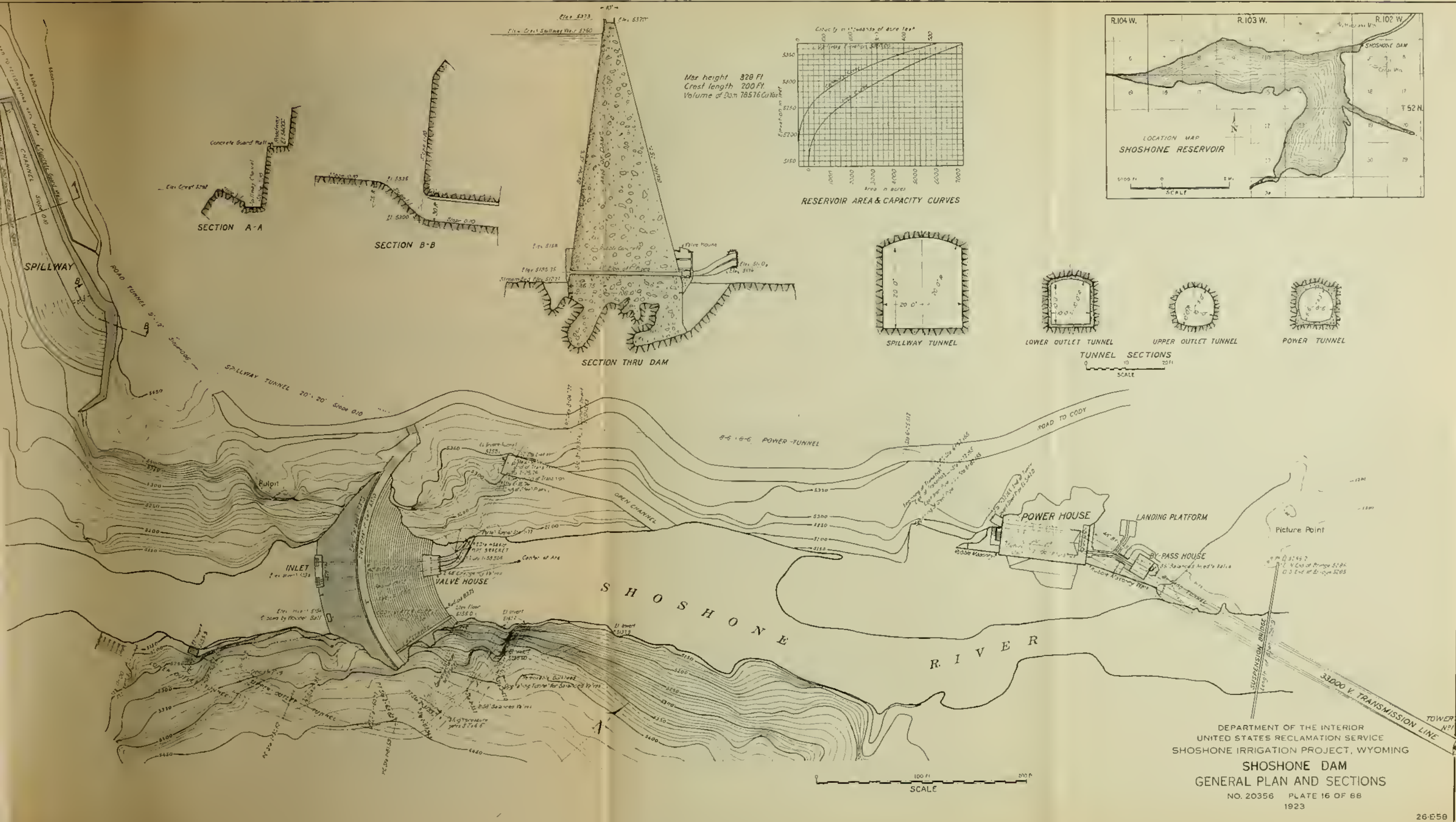
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SALT RIVER IRRIGATION PROJECT, ARIZONA
ROOSEVELT DAM
INSTALLATION 54 INCH NEEDLE VALVE
NO 20355 PLATE 15 OF 88
1923



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SHOSHONE IRRIGATION PROJECT, WYOMING

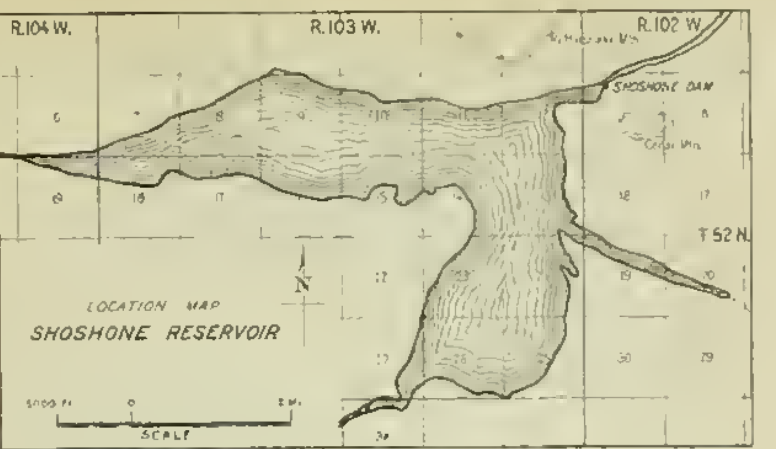
SHOSHONE DAM GENERAL PLAN AND SECTIONS

NO. 20356 PLATE 16 OF 88
1923



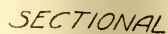
Max height 329 Ft
Crest length 200 Ft
Volume of Dam 78576 Cu Yds

RESERVOIR AREA & CAPACITY CURVES

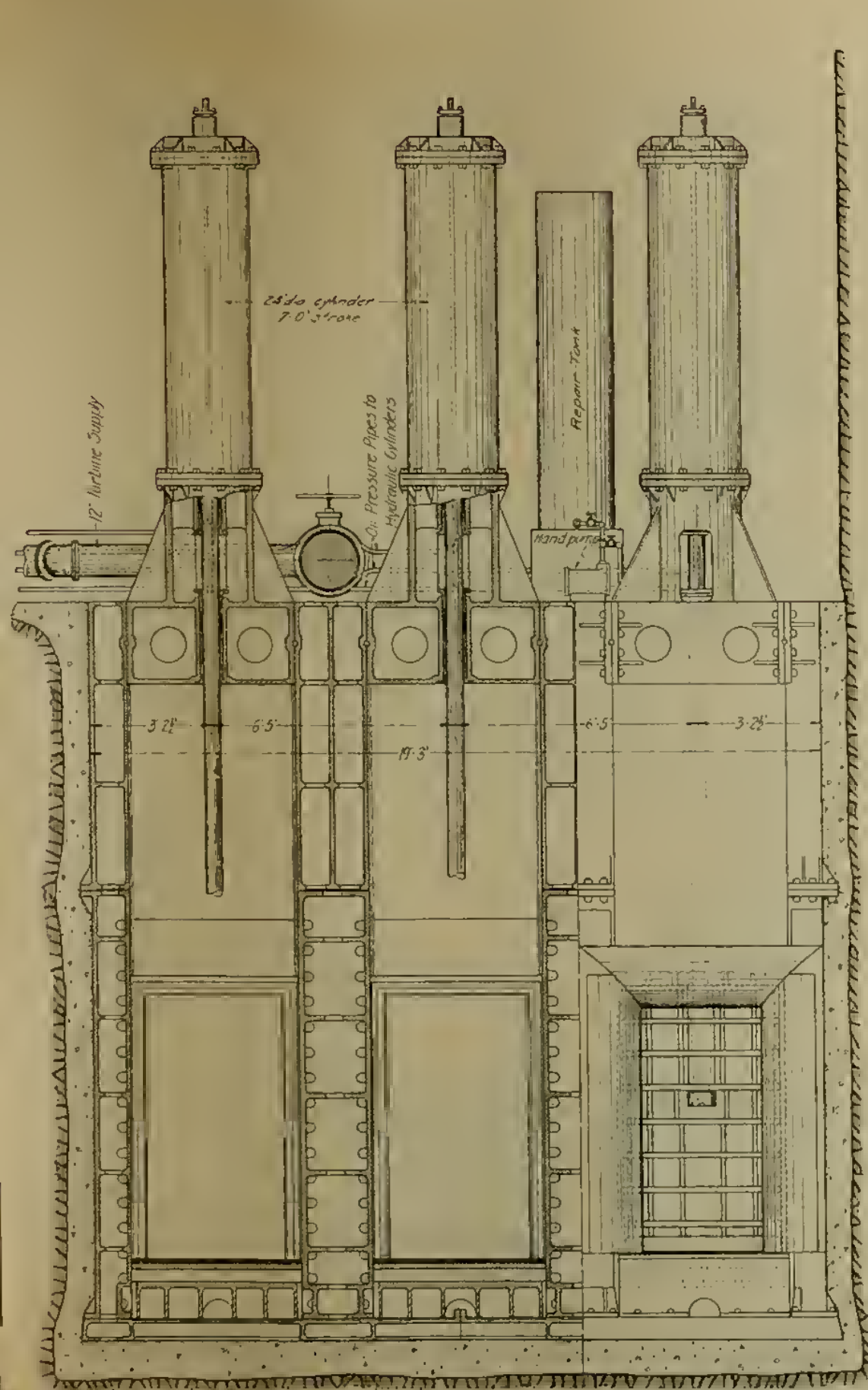


TUNNEL SECTIONS

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SHOSHONE IRRIGATION PROJECT, WYOMING
SHOSHONE DAM
GENERAL PLAN AND SECTIONS
NO. 20356 PLATE 16 OF 68
1923

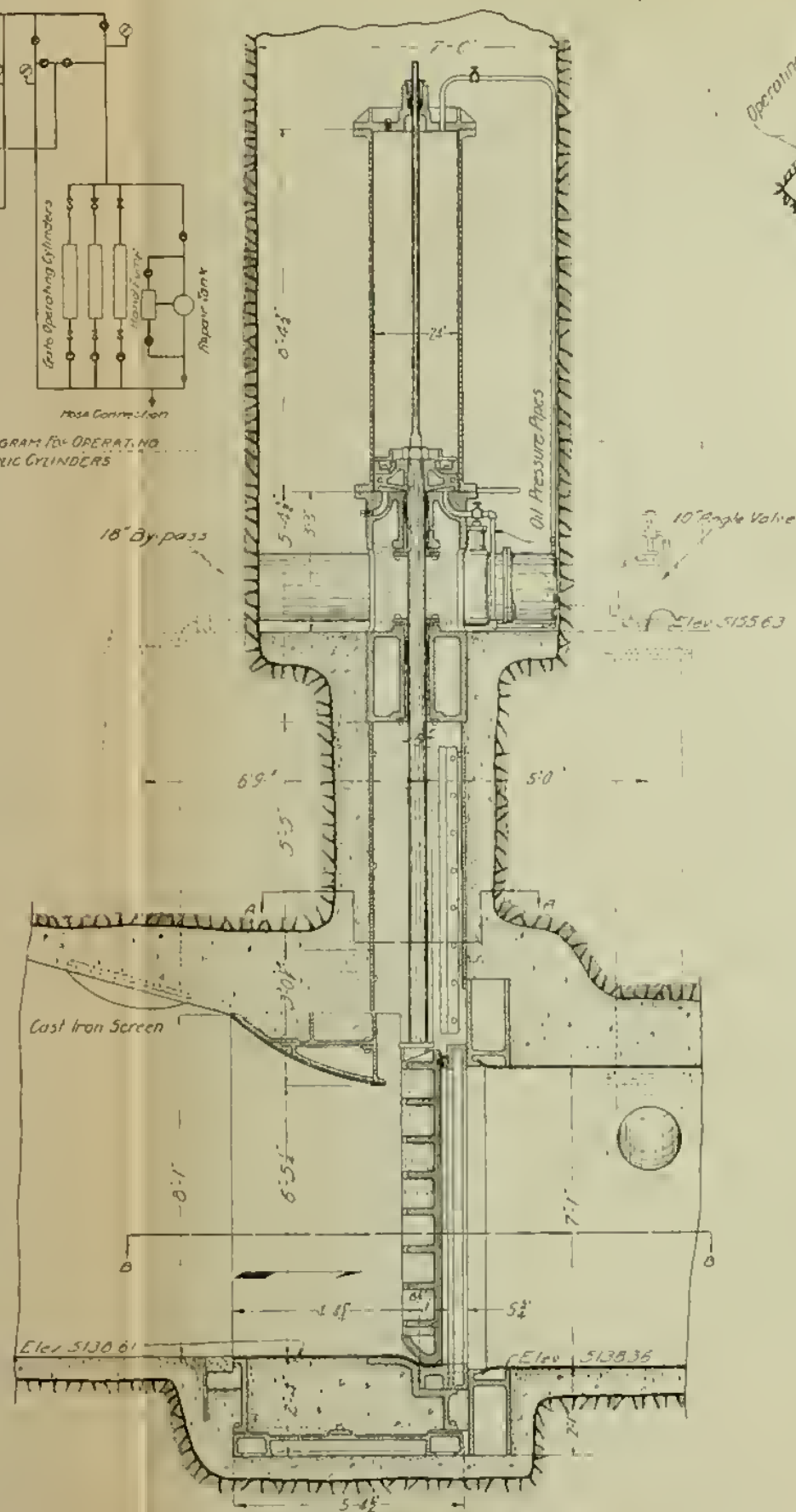
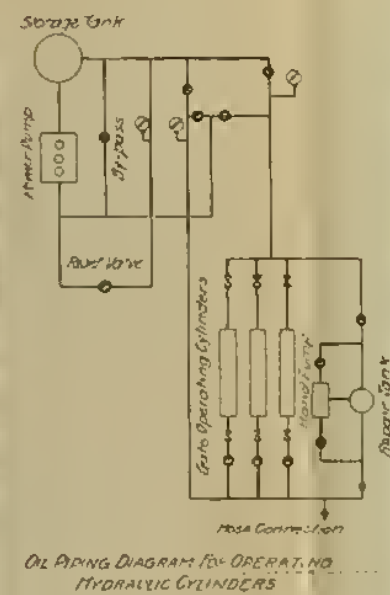


NO. 20357 PLATE 17 OF 88
1923

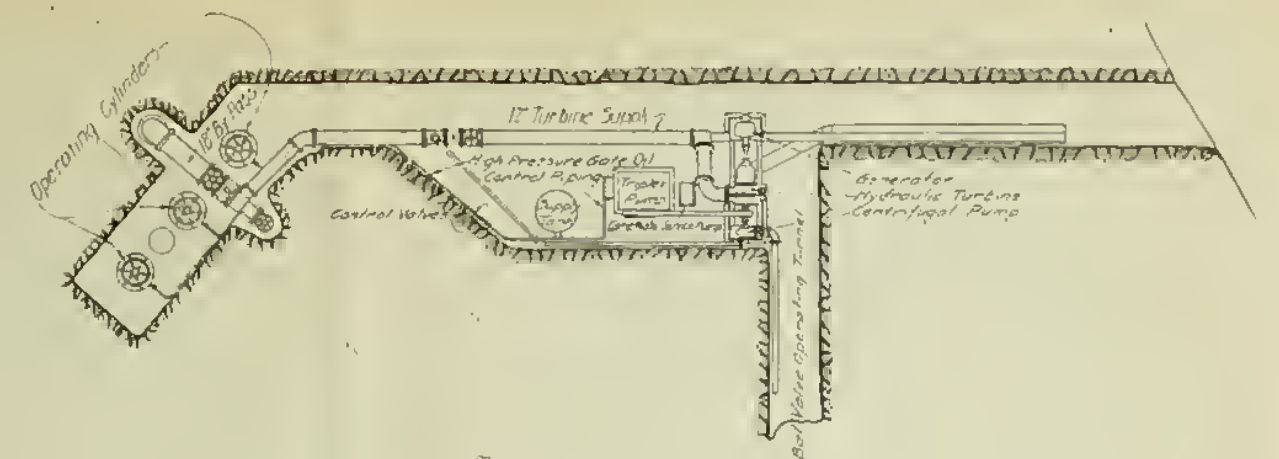


SECTIONAL ELEVATION CC

FRONT ELEVATION

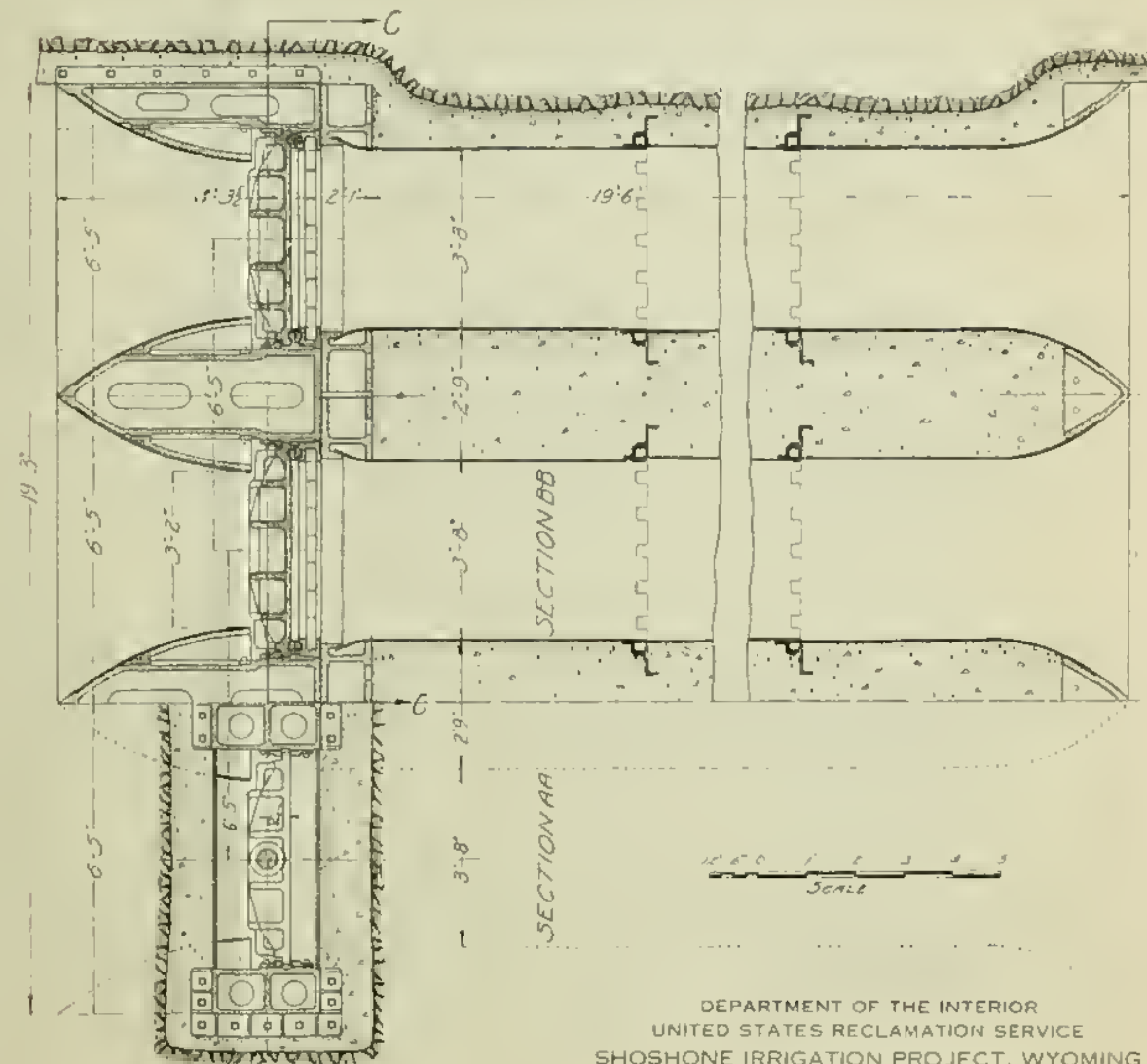


SECTIONAL ELEVATION

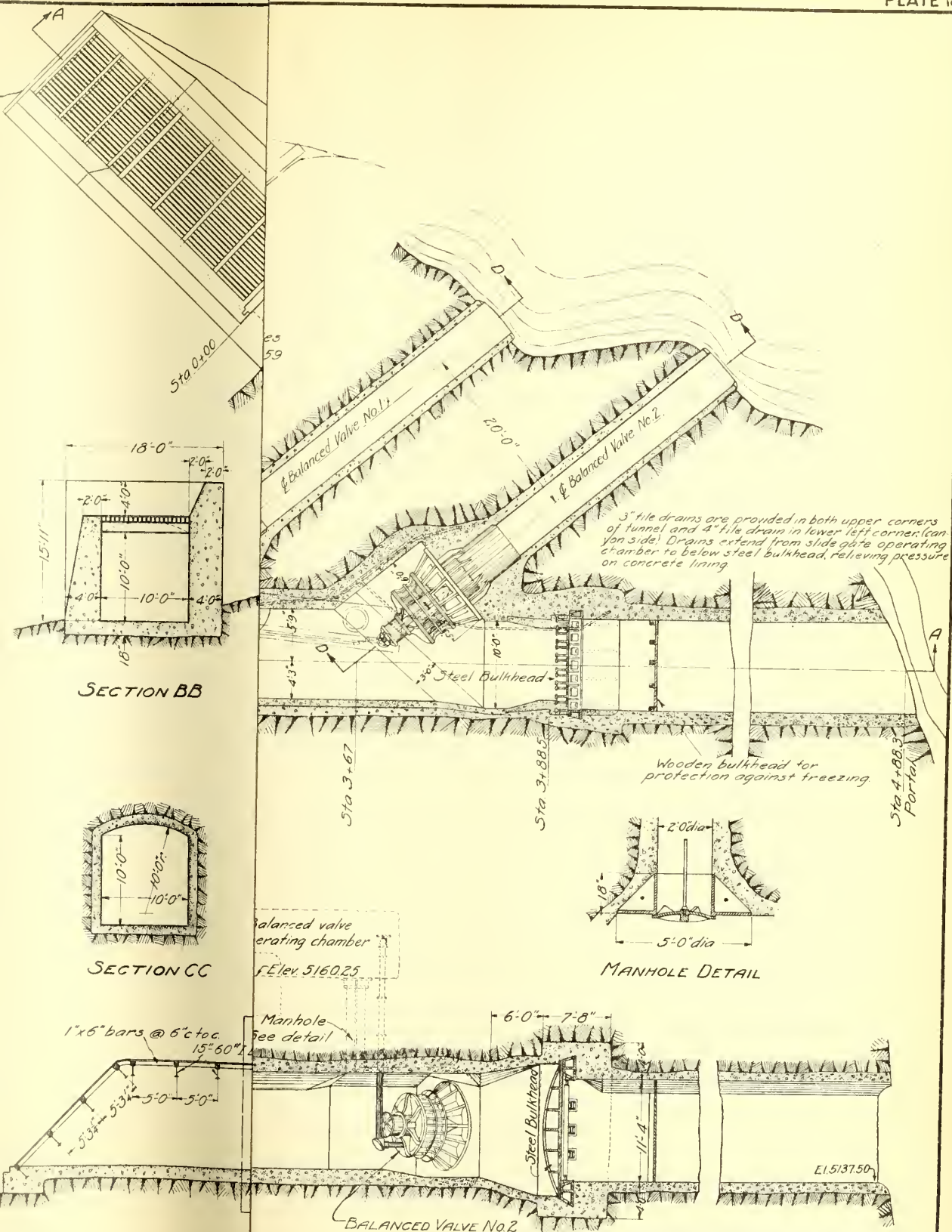


PLAN OF OPERATING TUNNEL

0 5 10 15 20
SCALE



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SHOSHONE IRRIGATION PROJECT, WYOMING
SHOSHONE DAM
HIGH PRESSURE GATES
NO 20357 PLATE 17 OF 88
1923

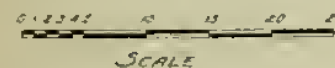


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SHOSHONE IRRIGATION PROJECT, WYOMING

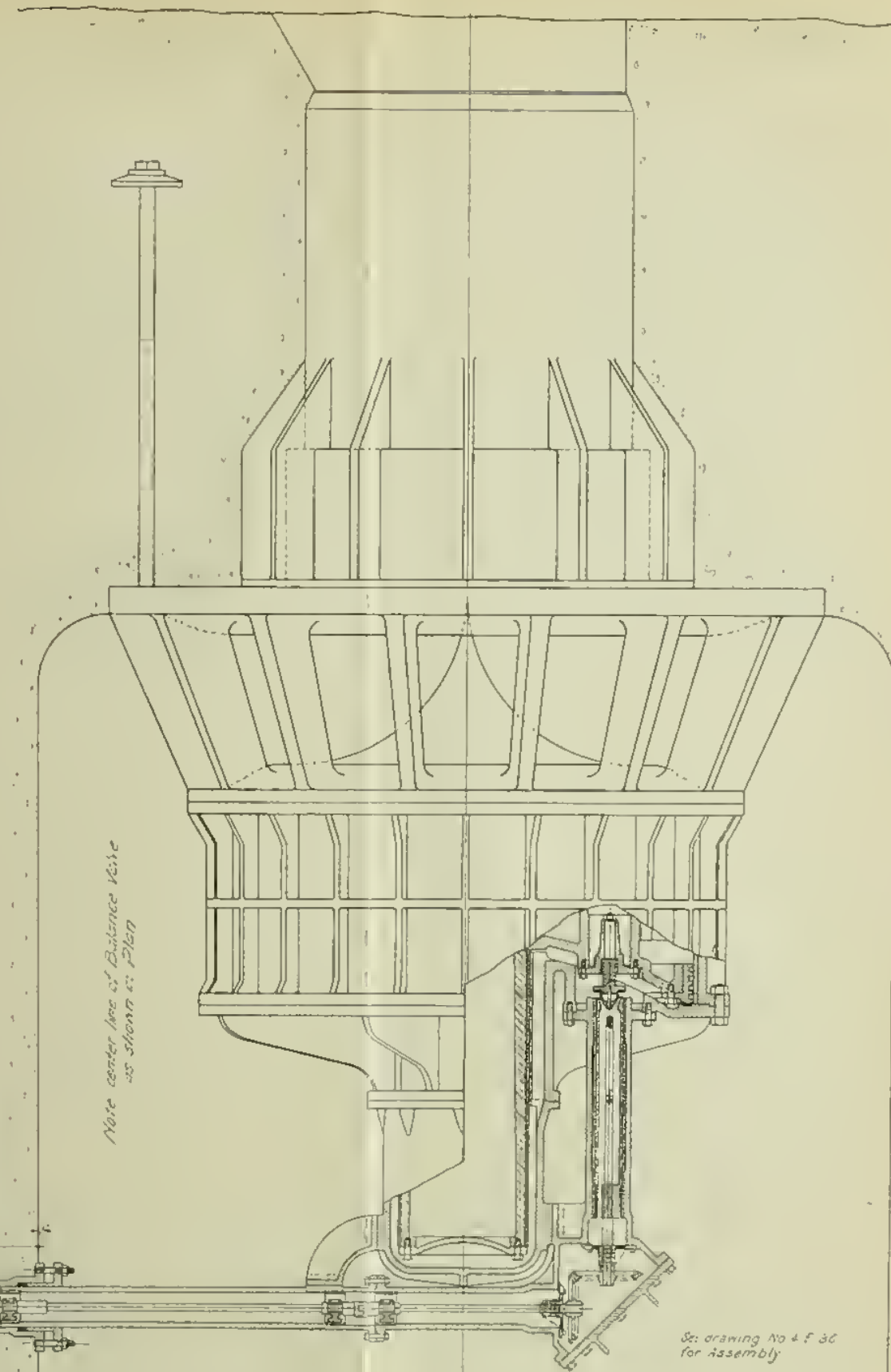
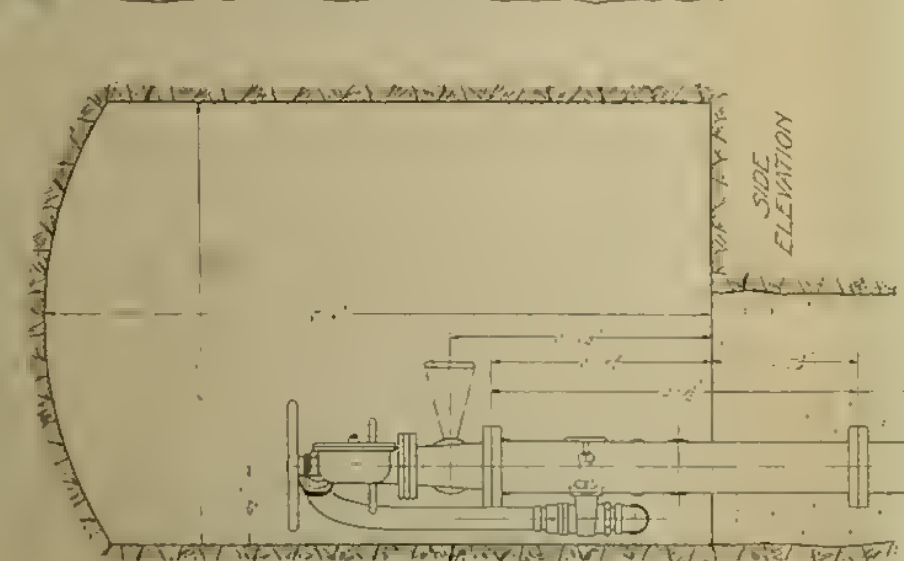
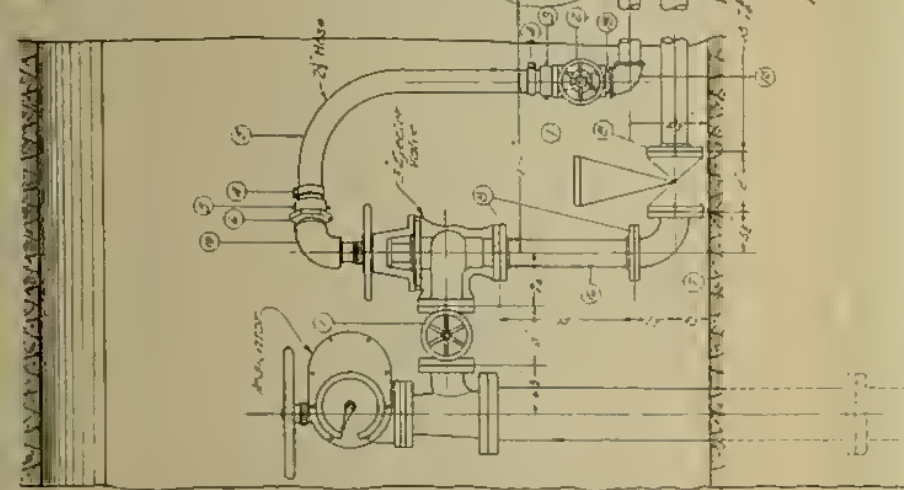
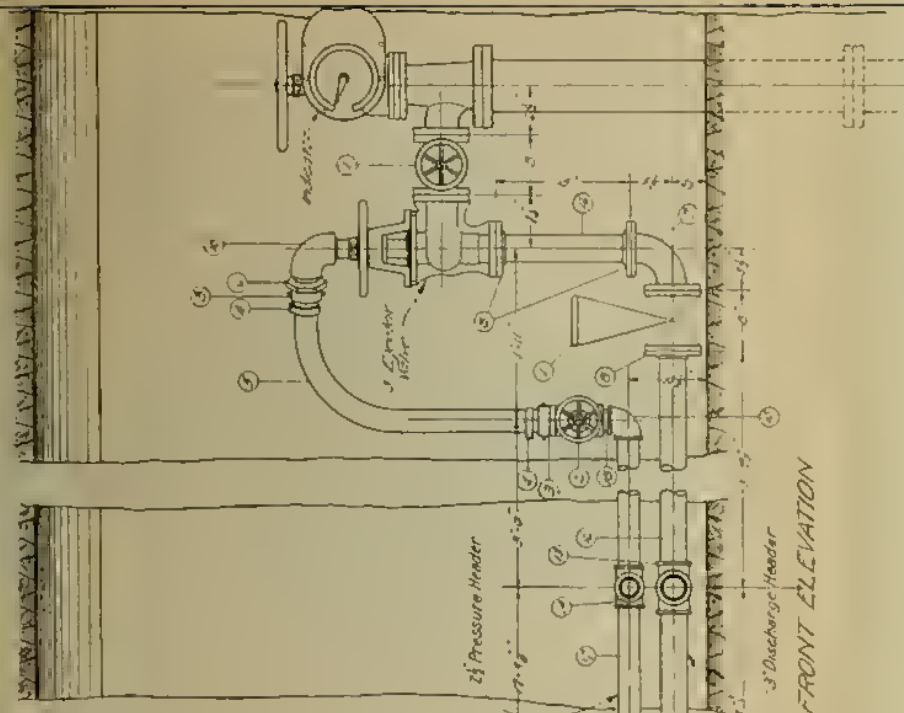
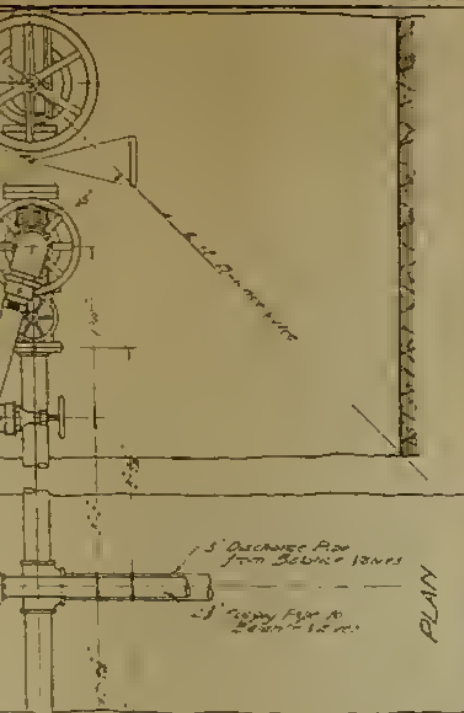
SHOSHONE DAM LOWER OUTLET TUNNEL

NO. 20358 PLATE 18 OF 88
1923

General arrangement of dam and
see drg. 26-E-58.

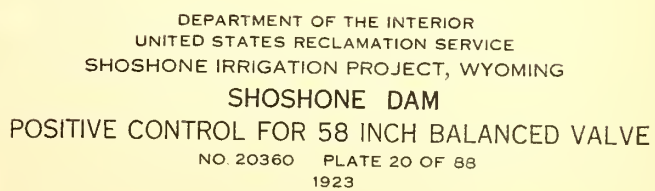


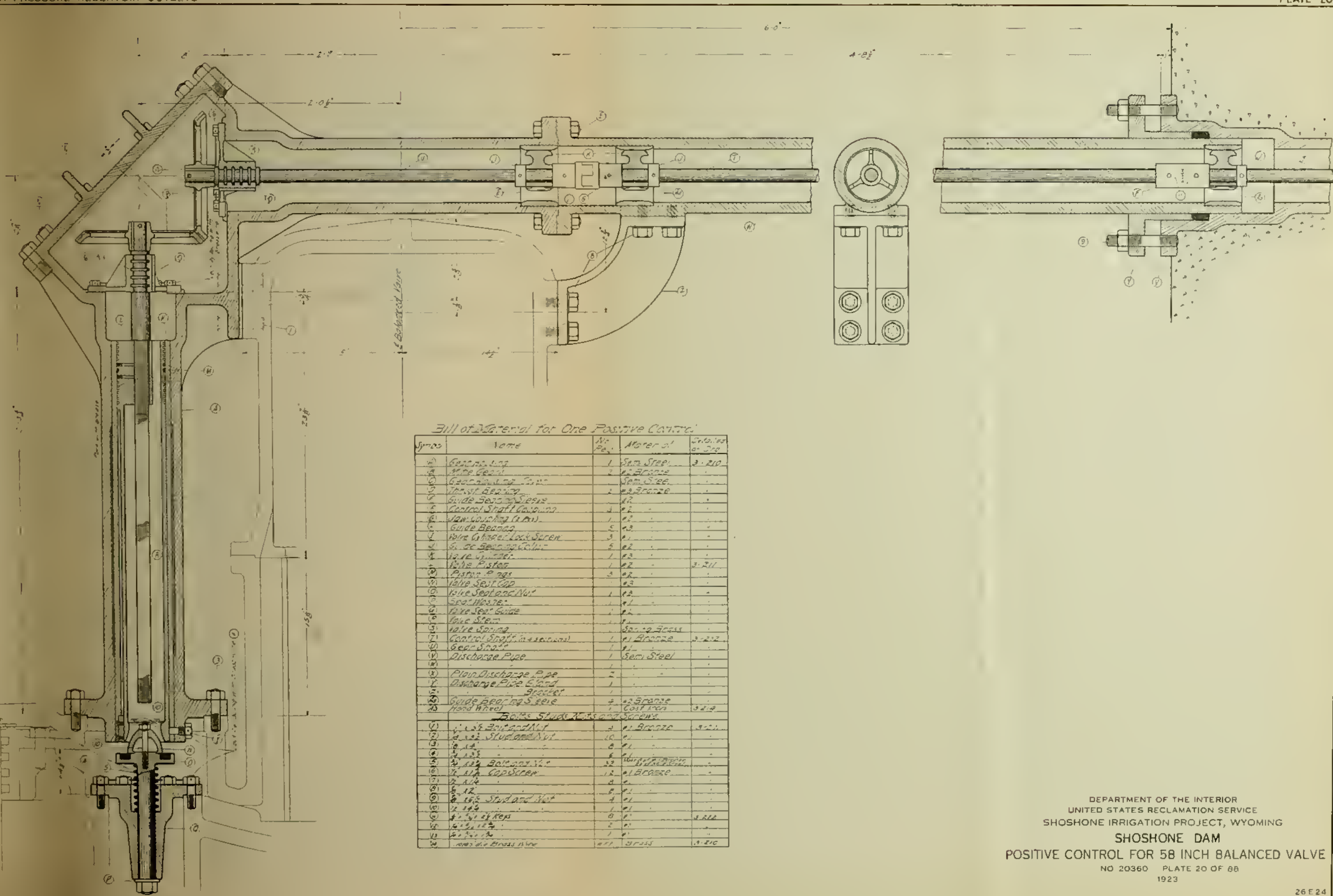
For general arrangement of dam and outlets see drg 26-E-58



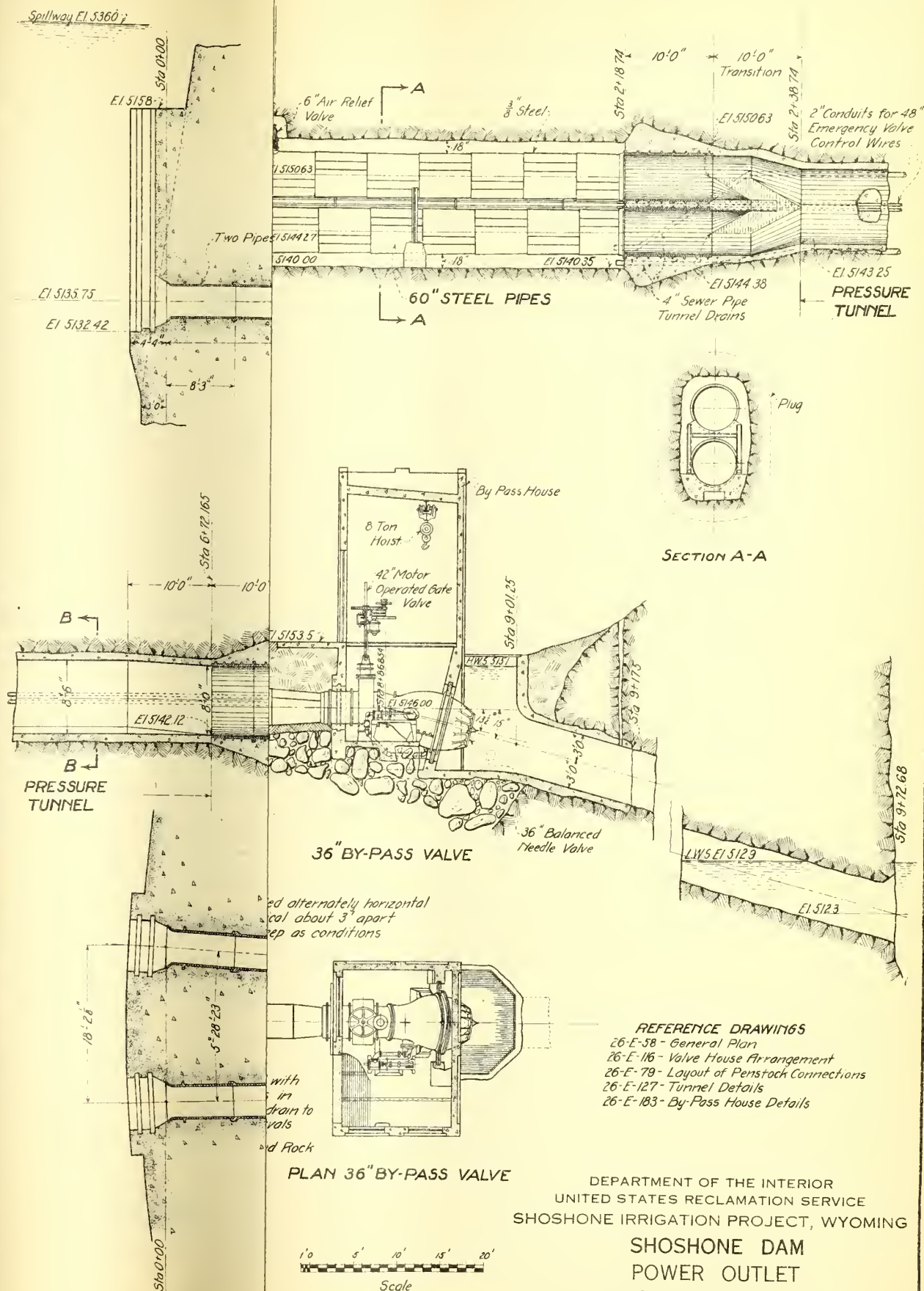
SCALE

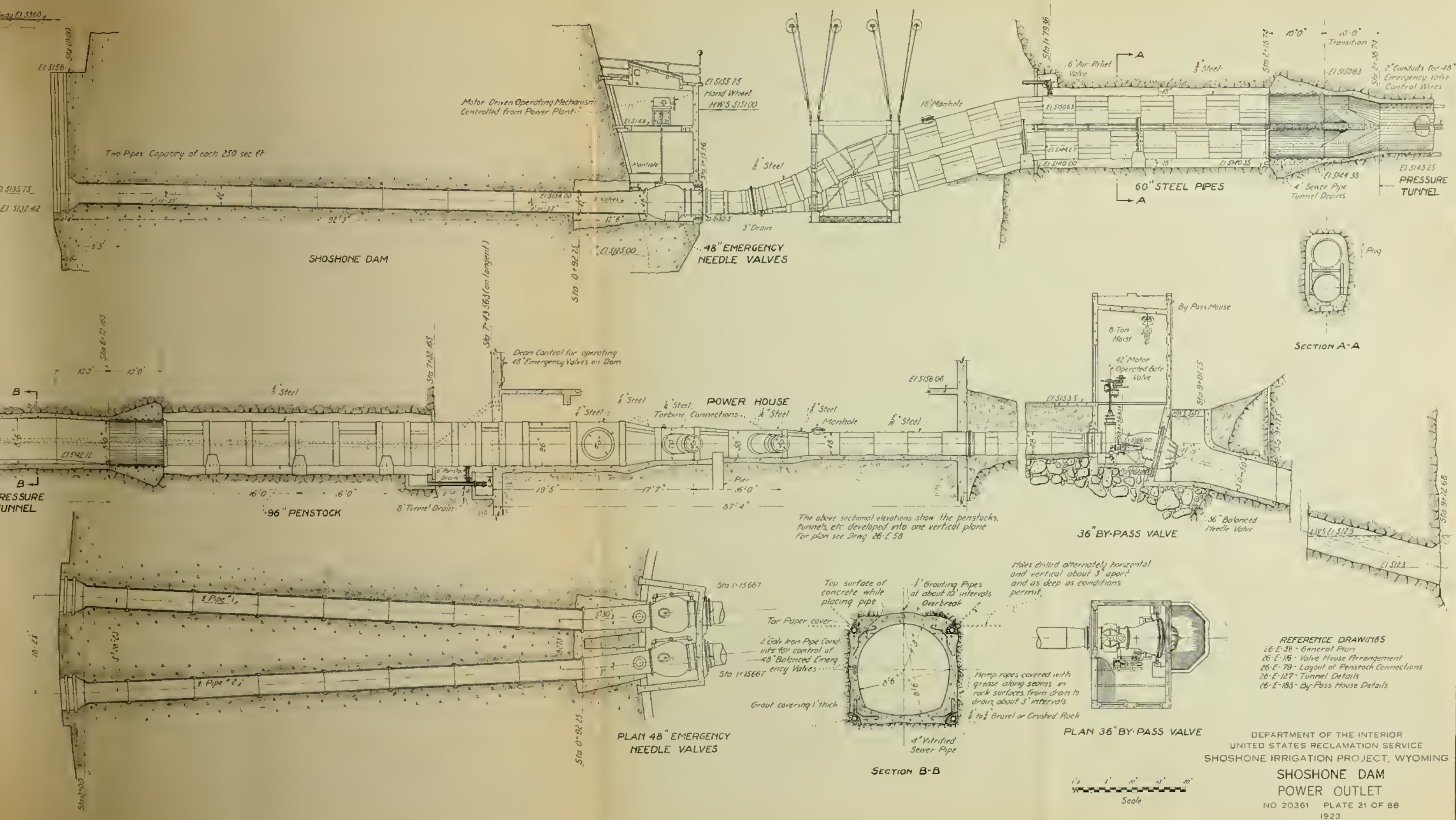
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SHOSHONE IRRIGATION PROJECT WYOMING
SHOSHONE DAM
INSTALLATION, 58 INCH BALANCED VALVE
NO 20359 PLATE 19 OF 88
1923

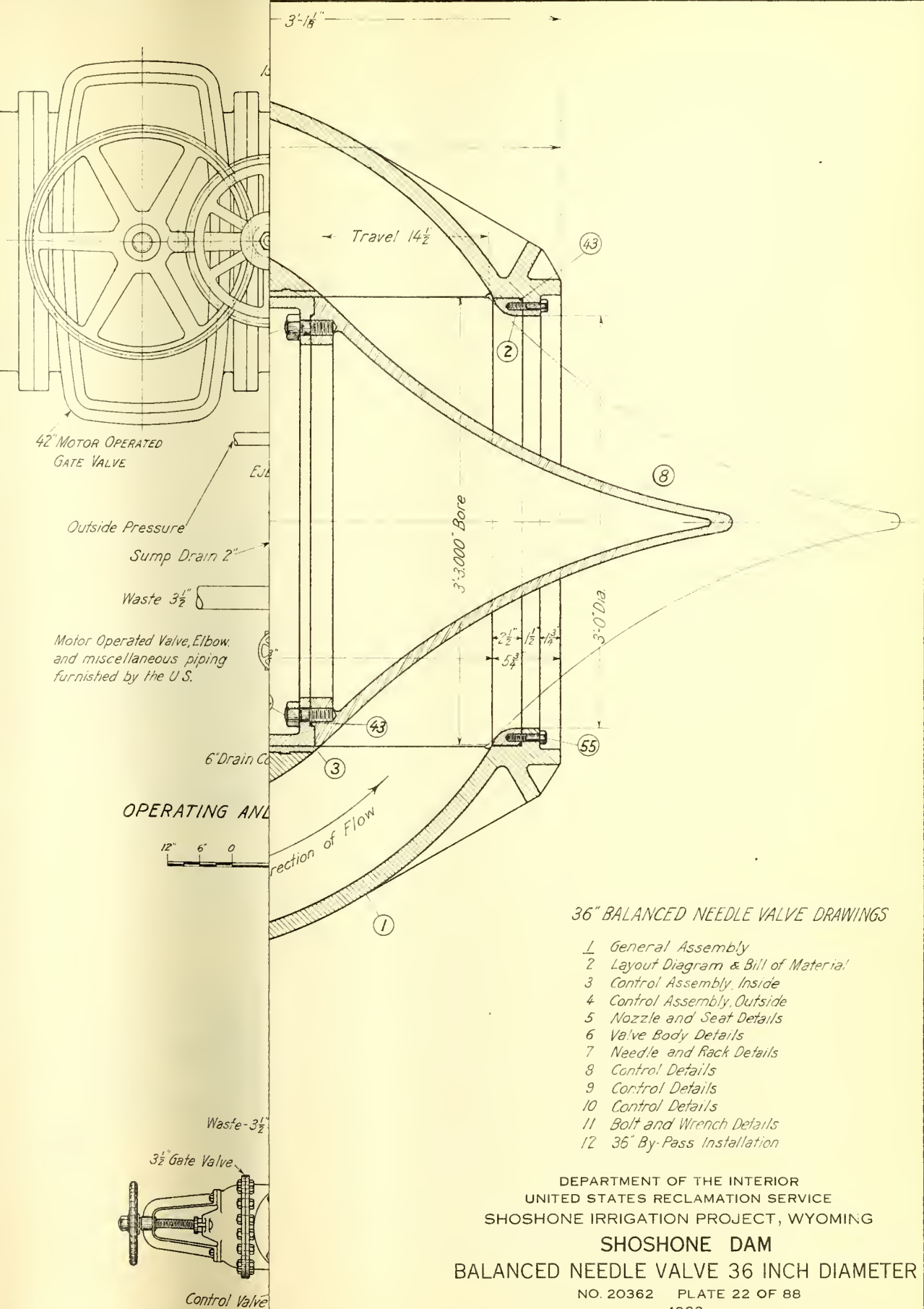


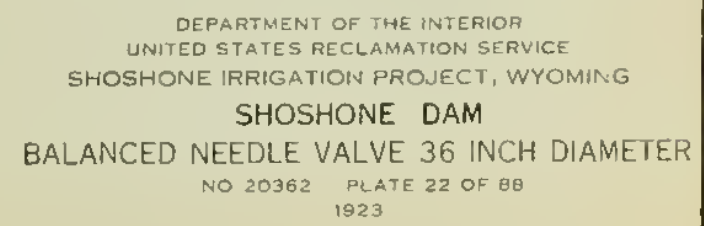


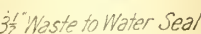
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SHOSHONE IRRIGATION PROJECT, WYOMING
SHOSHONE DAM
POSITIVE CONTROL FOR 58 INCH BALANCED VALVE
NO 20360 PLATE 20 OF 88
1923

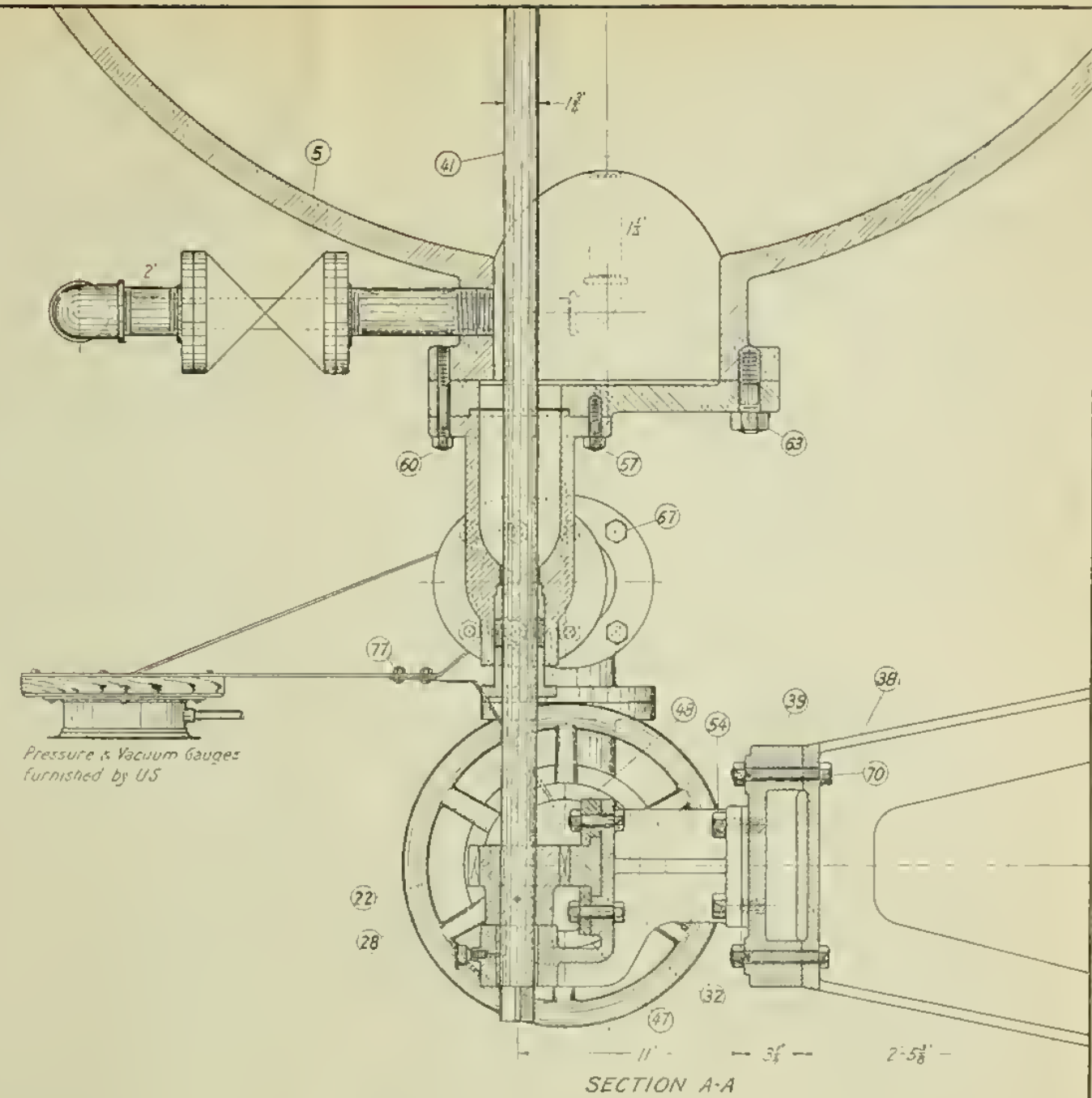
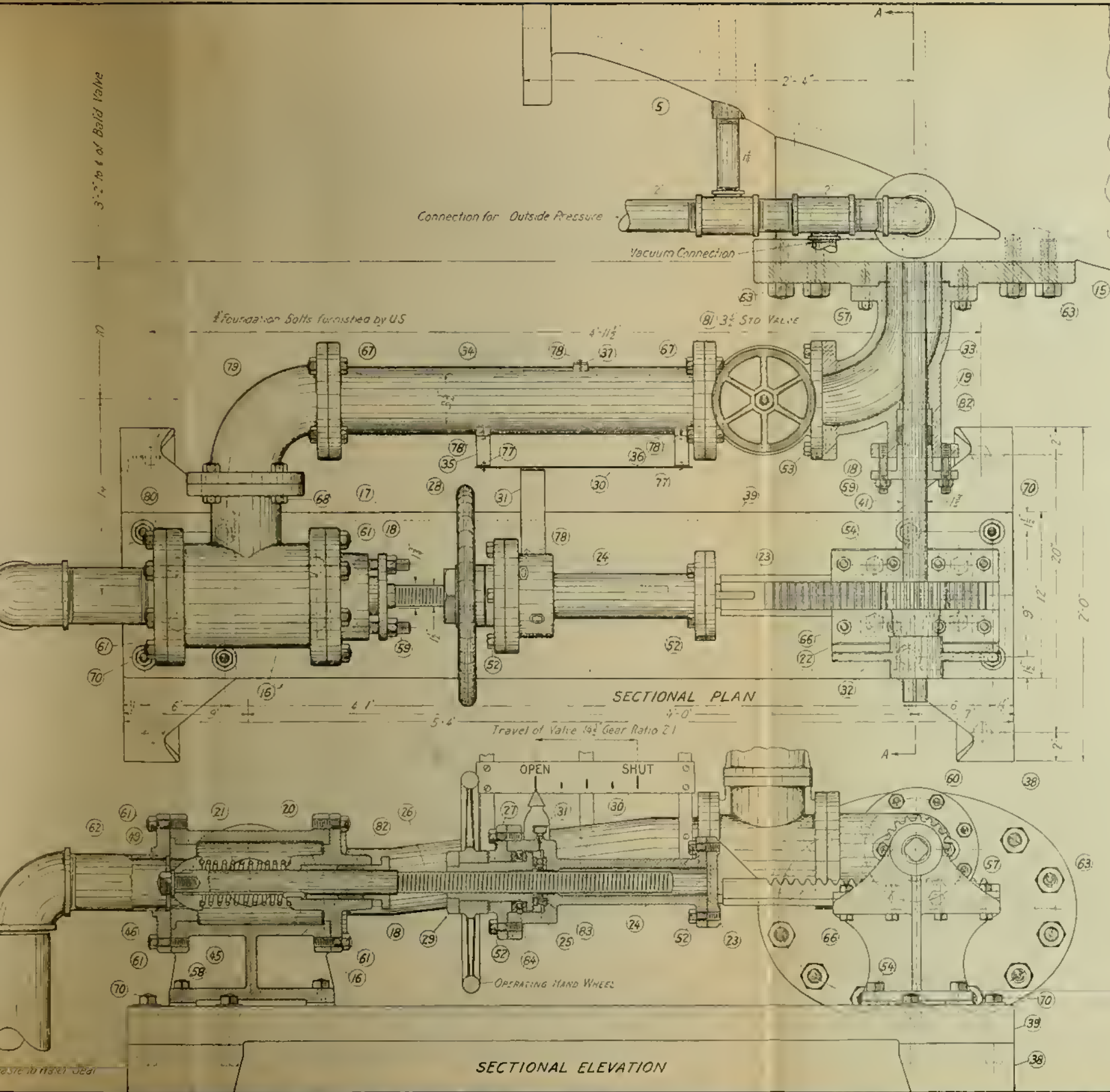












36" BALANCED NEEDLE VALVE DRAWINGS

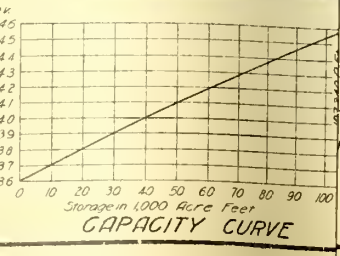
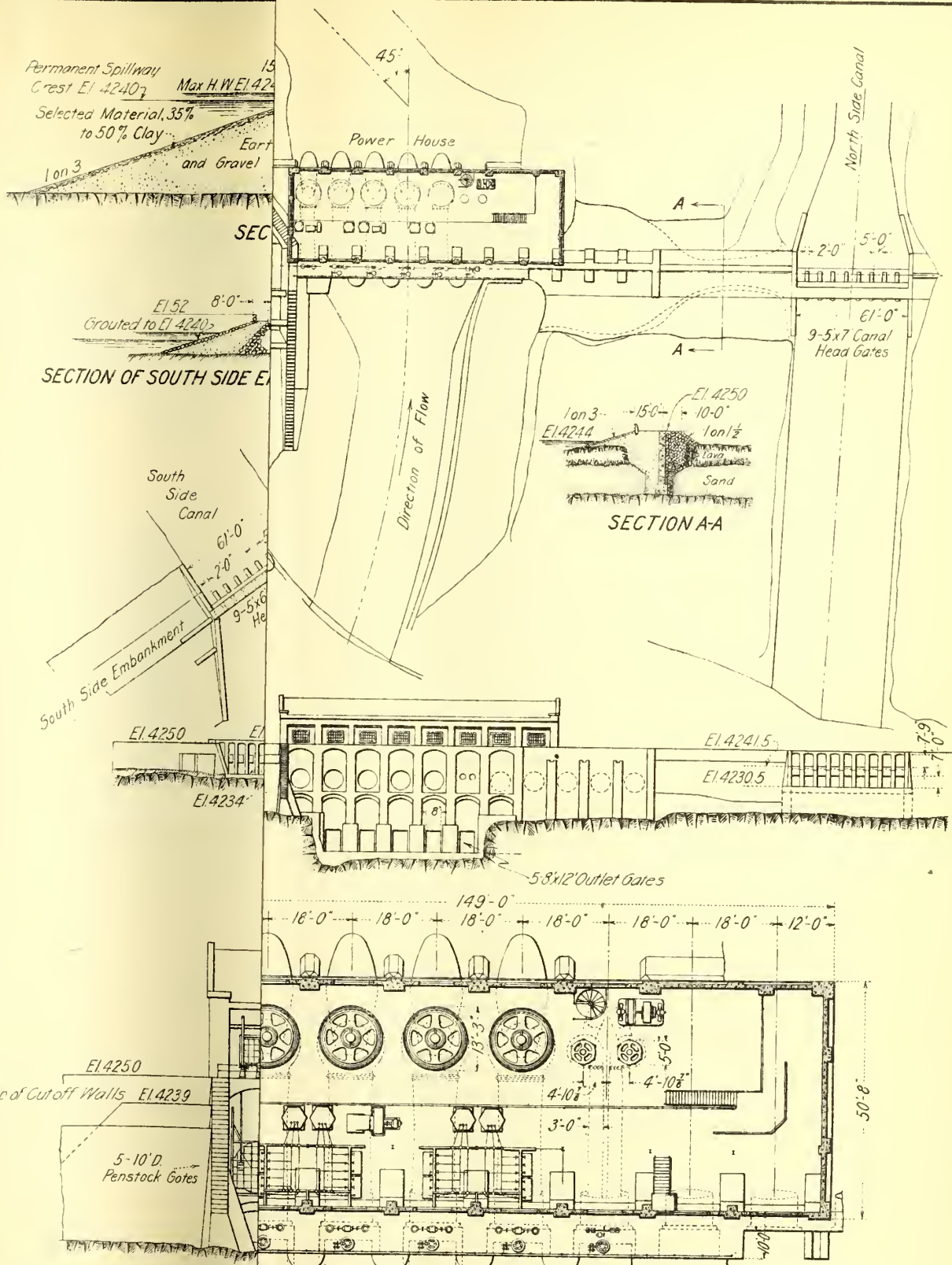
1. General Assembly
2. Layout Diagram & Bill of Material
3. Control Assembly, Inside
4. Control Assembly Outside
5. Needle and Seat Details
6. Valve Body Details
7. Needle & Rack Details
8. Control Details
9. Control Details
10. Control Details
11. Bolt and Wrench Details
12. 36" by Pass Installation

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
SHOSHONE IRRIGATION PROJECT, WYOMING

SHOSHONE DAM

CONTROL FOR 36 INCH BALANCED NEEDLE VALVE

NO 20363 PLATE 23 OF 88
1923

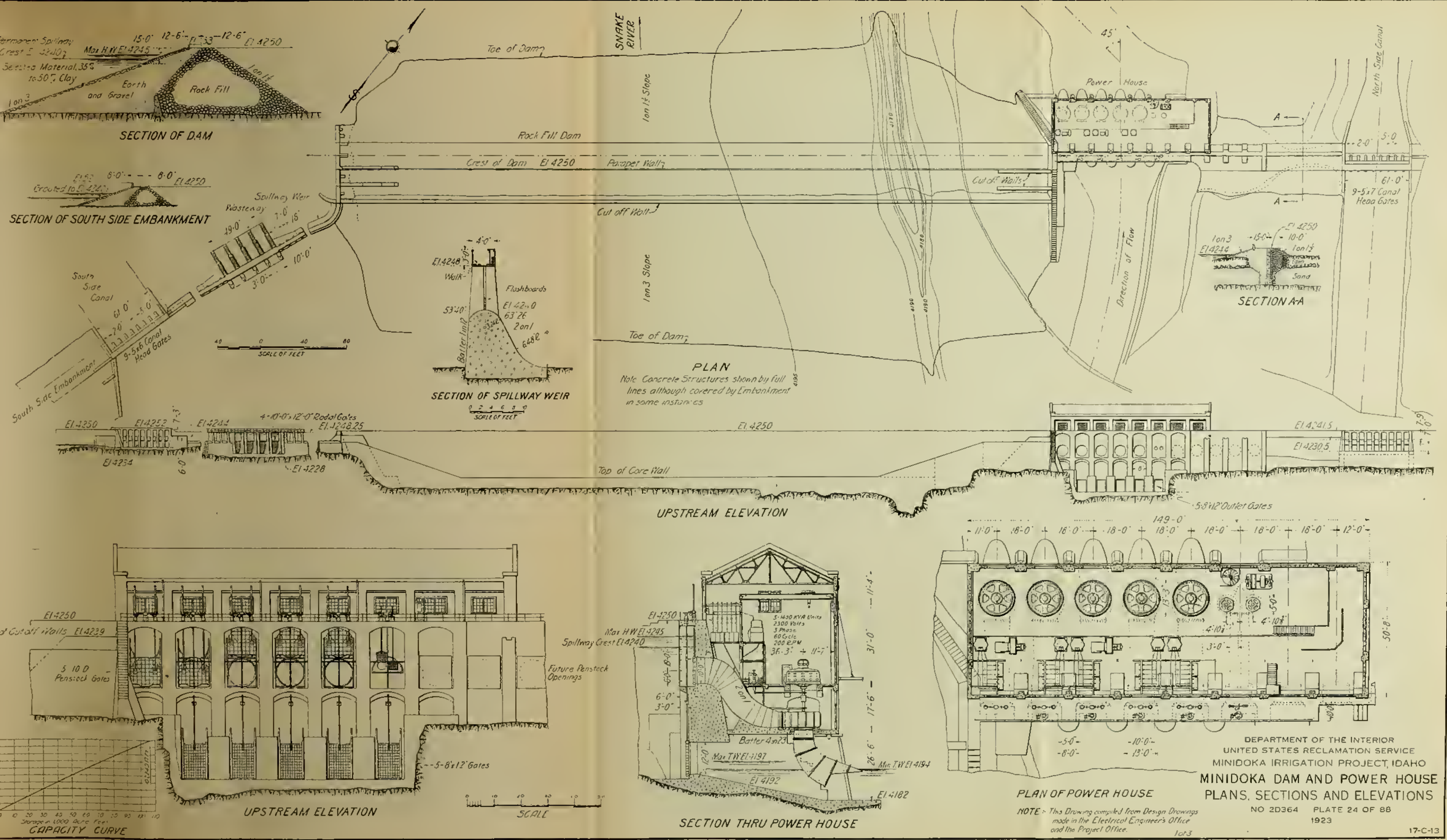


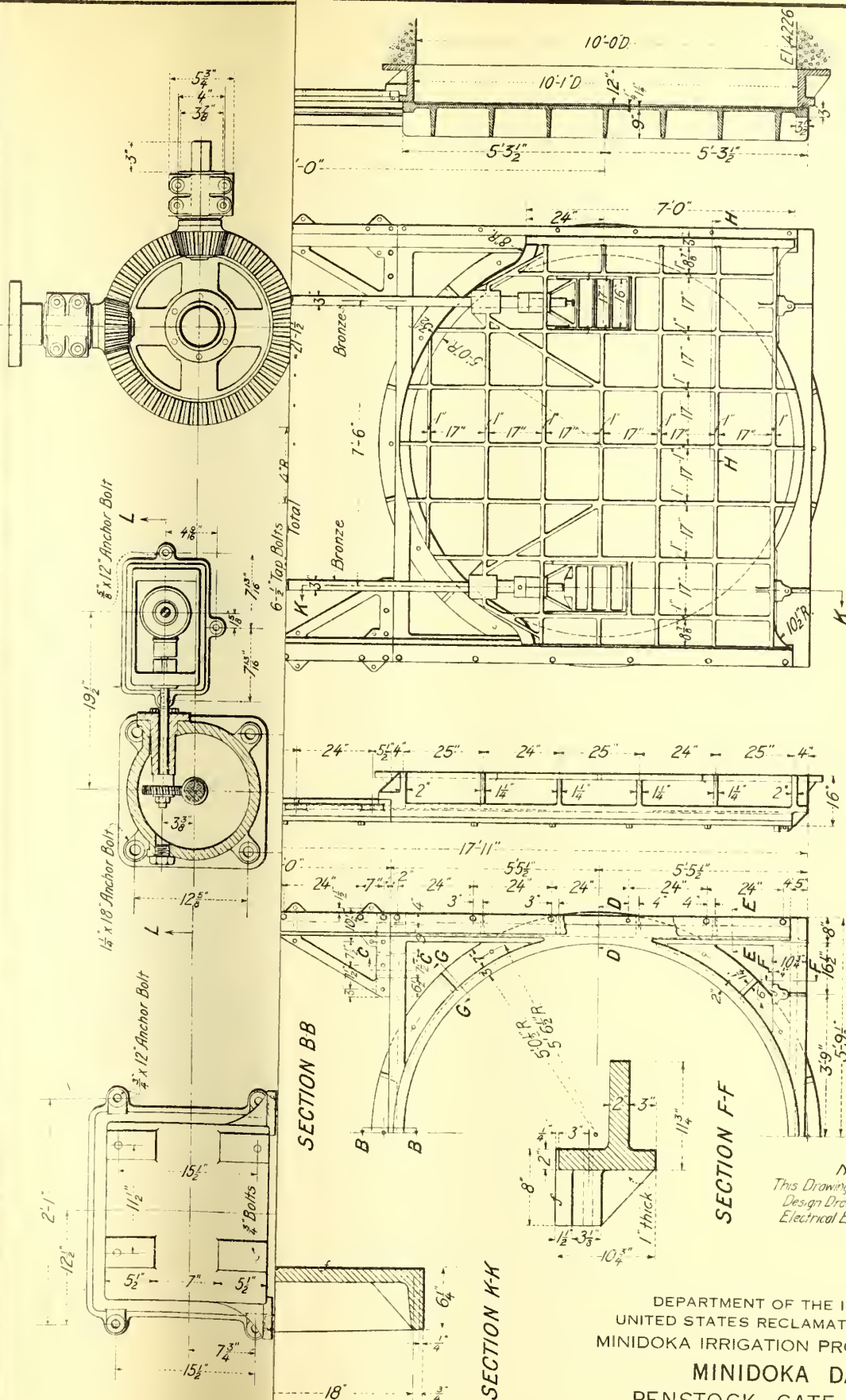
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MINIDOKA IRRIGATION PROJECT, IDAHO
**MINIDOKA DAM AND POWER HOUSE
PLANS, SECTIONS AND ELEVATIONS**
NO. 20364 PLATE 24 OF 88
1923

PLAN OF POWER HOUSE

This Drawing compiled from Design Drawings made in the Electrical Engineer's Office and the Project Office.

1 of 3



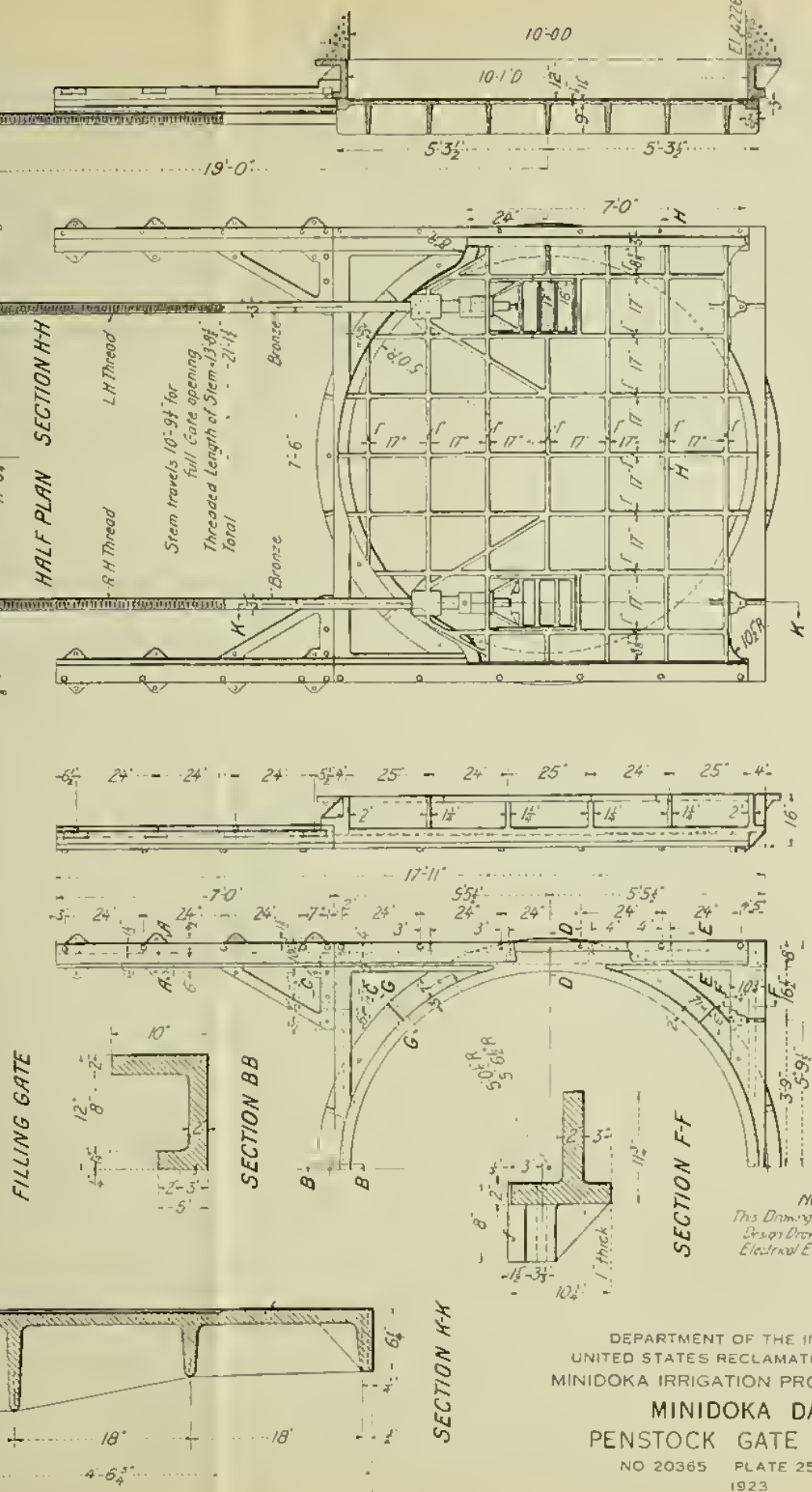


SECTION
FRONT ELEVATION
ASSEMBLY

FRAME DETAILS

NOTE
This Drawing compiled from
Design Drawings made in the
Electrical Engineer's Office.

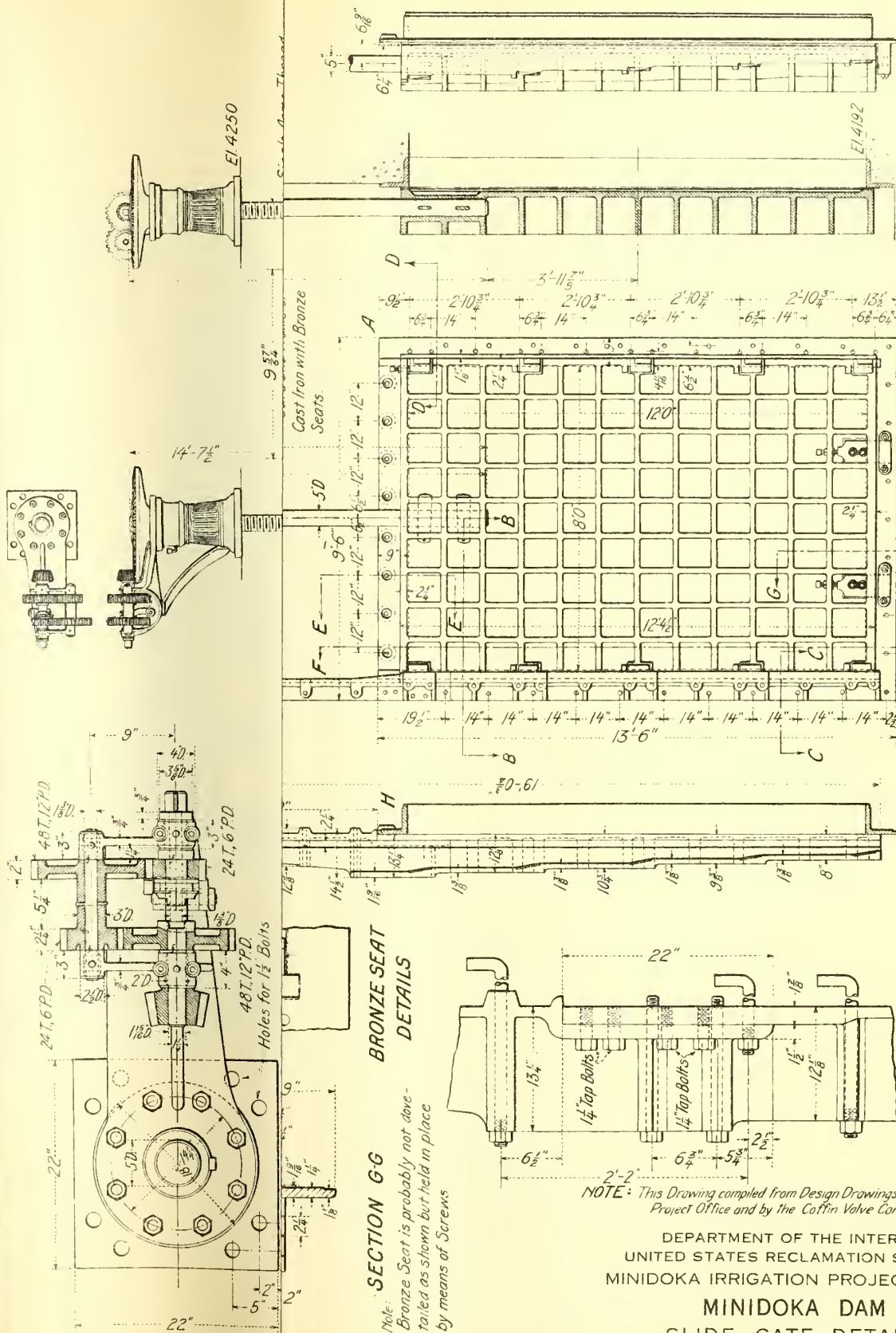
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MINIDOKA IRRIGATION PROJECT, IDAHO
MINIDOKA DAM
PENSTOCK GATE DETAILS
NO. 20365 PLATE 25 OF 88
1923



FRONT ELEVATION SECTION
ASSEMBLY

FRAME DETAILS

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MINIDOKA IRRIGATION PROJECT, IDAHO
MINIDOKA DAM
PENSTOCK GATE DETAILS
NO 20365 PLATE 25 OF 88
1923



SECTION SIDE ELEVATION
FRONT ELEVATION ASSEMBLY

SECTION F-F
(Gate removed)

DETAILS AT H
(Spigot removed)

BRONZE SEAT
DETAILS

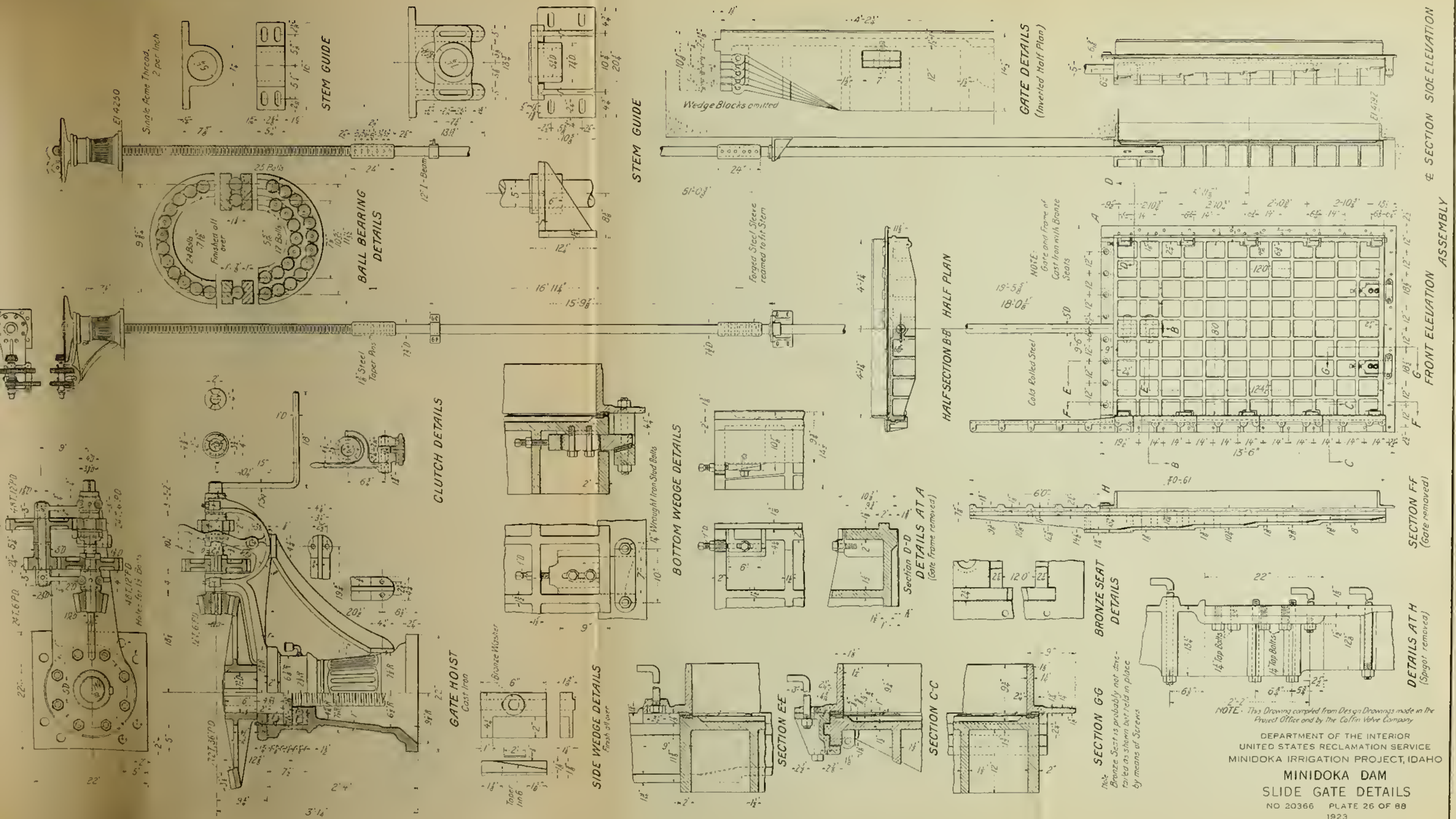
SECTION G-G
Note: Bronze Seat is probably not dove-tailed as shown but held in place by means of Screws

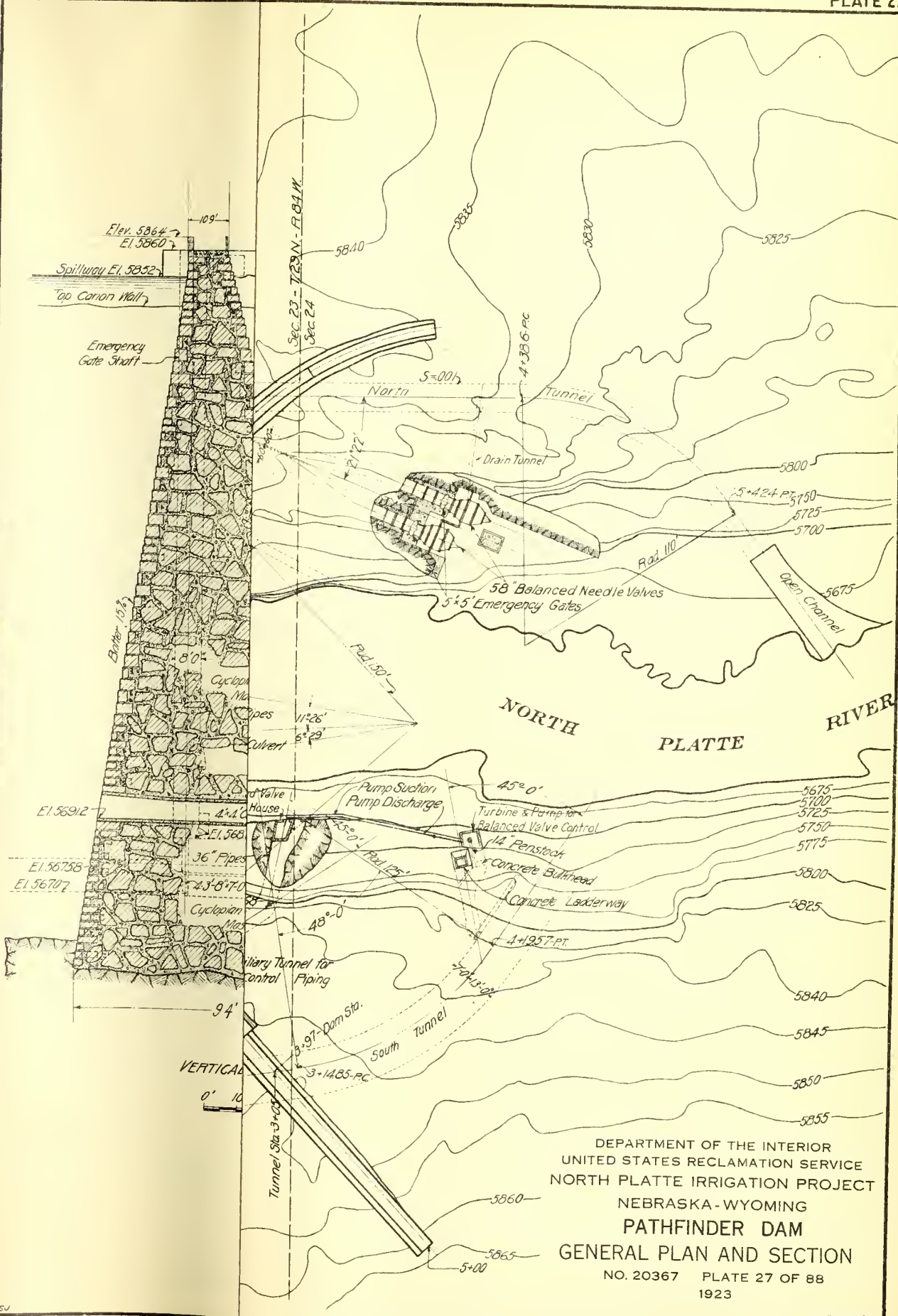
NOTE: This Drawing compiled from Design Drawings made in the Project Office and by the Coffin Valve Company

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MINIDOKA IRRIGATION PROJECT, IDAHO

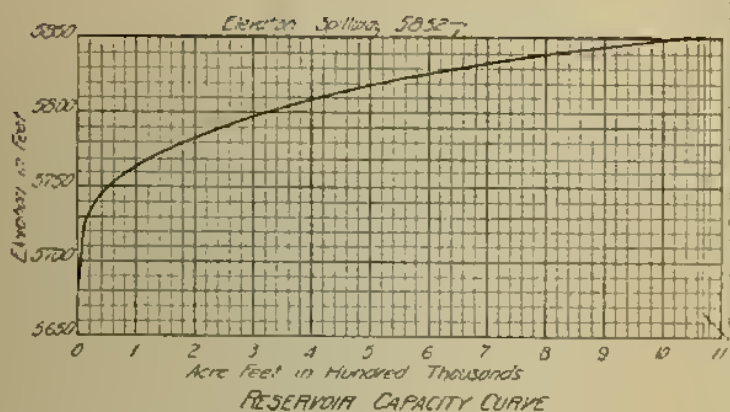
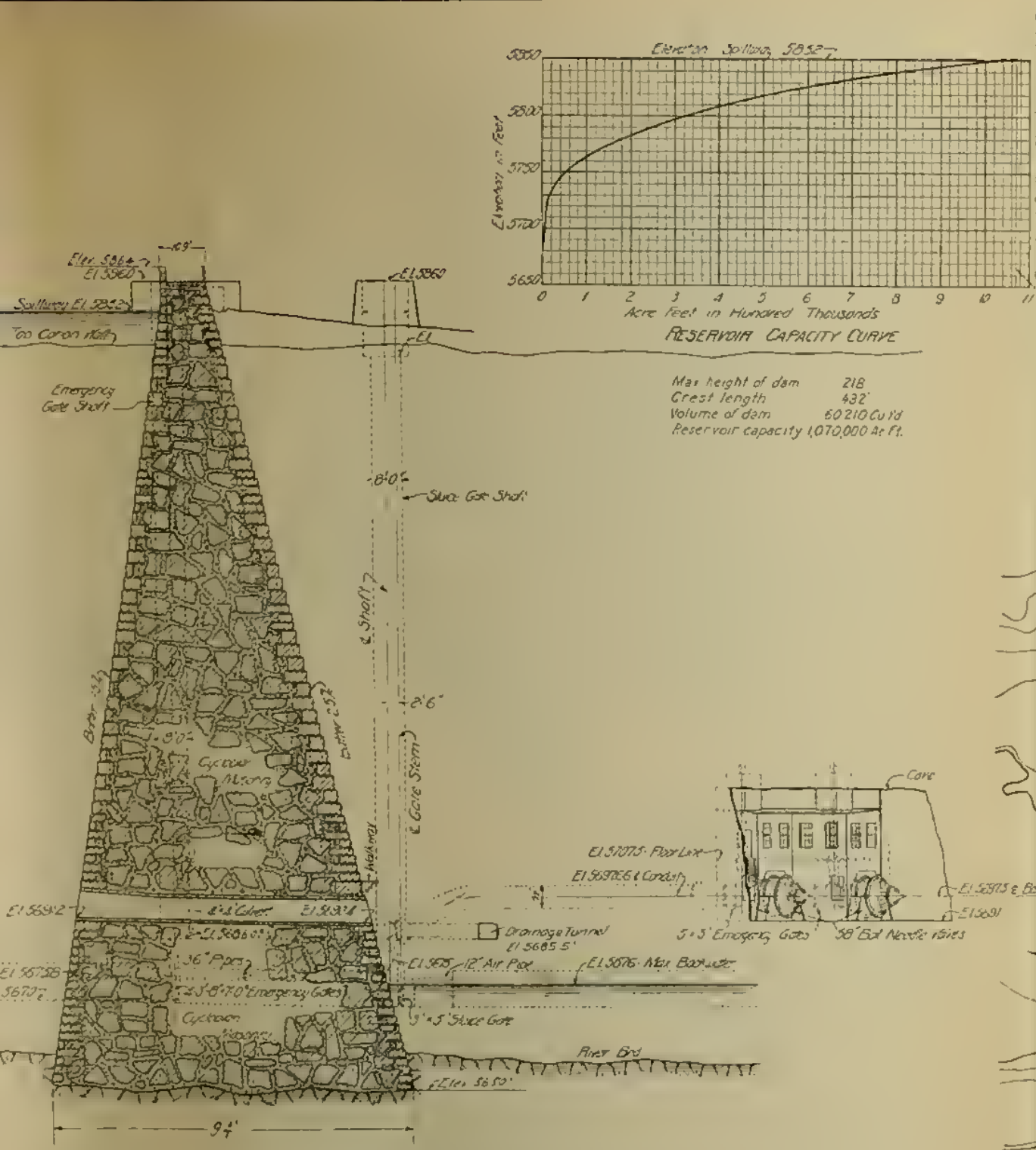
MINIDOKA DAM
SLIDE GATE DETAILS

NO. 20366 PLATE 26 OF 88
1923

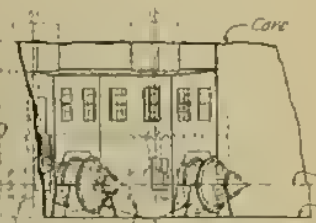




DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT
NEBRASKA-WYOMING
PATHFINDER DAM
GENERAL PLAN AND SECTION
NO. 20367 PLATE 27 OF 88
1923



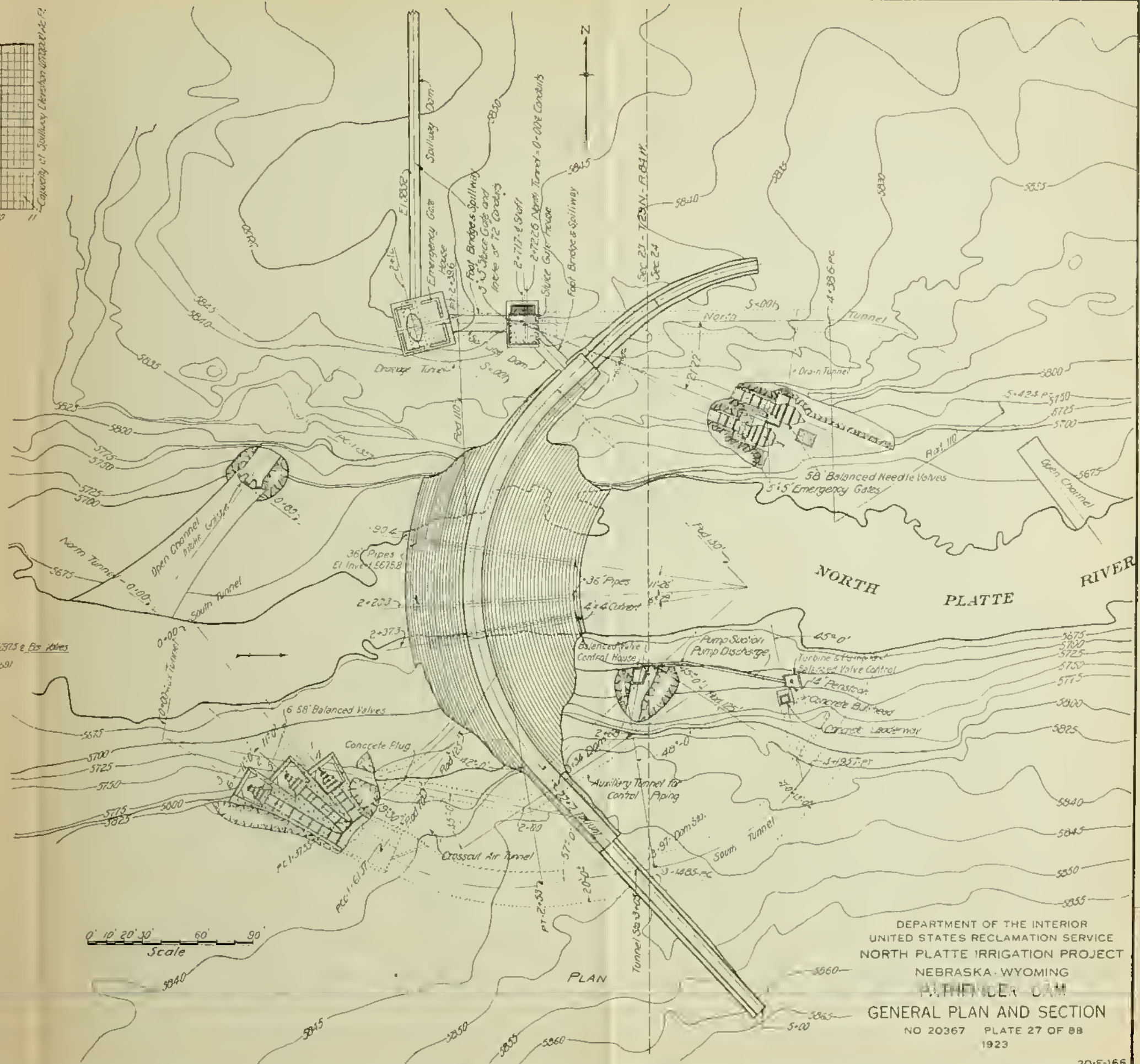
Max height of dam 218
Crest length 432
Volume of dam 60210 Cu Yd
Reservoir capacity 1,070,000 Ac Ft.



VERTICAL SECTION THROUGH CULVERT

0' 10' 20' 40' 60' 80'

Scale

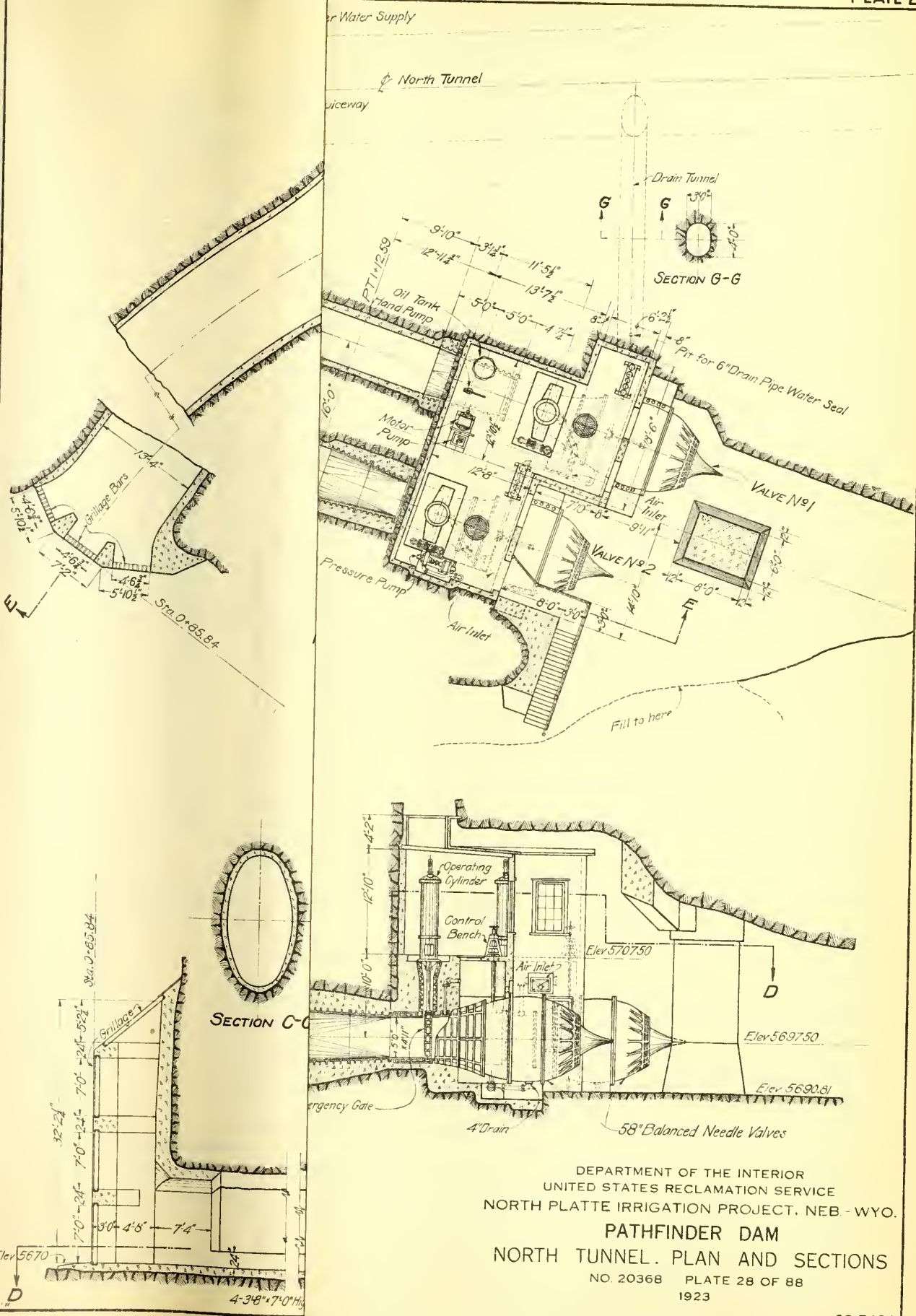


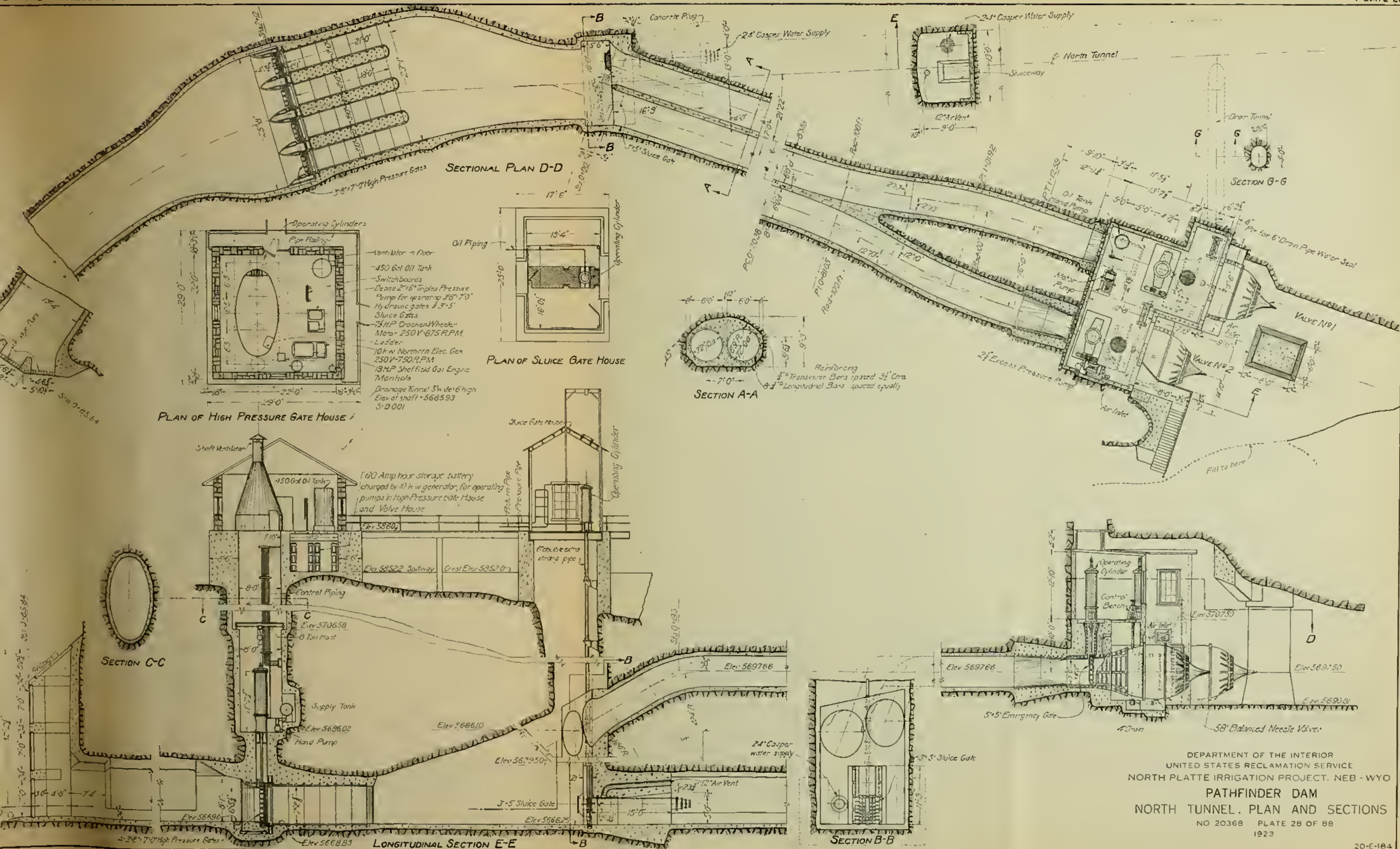
0' 10' 20' 30' 60' 90'

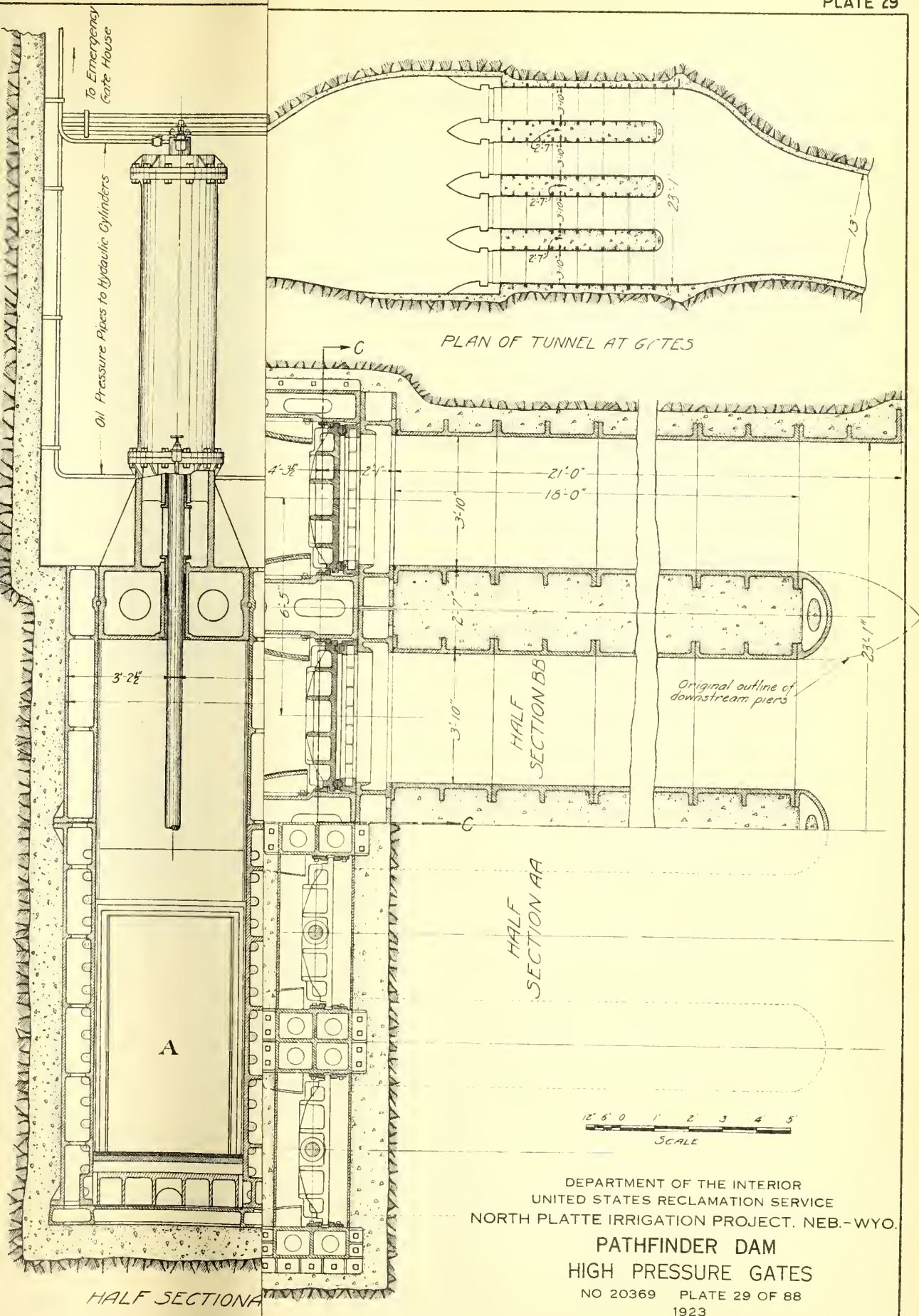
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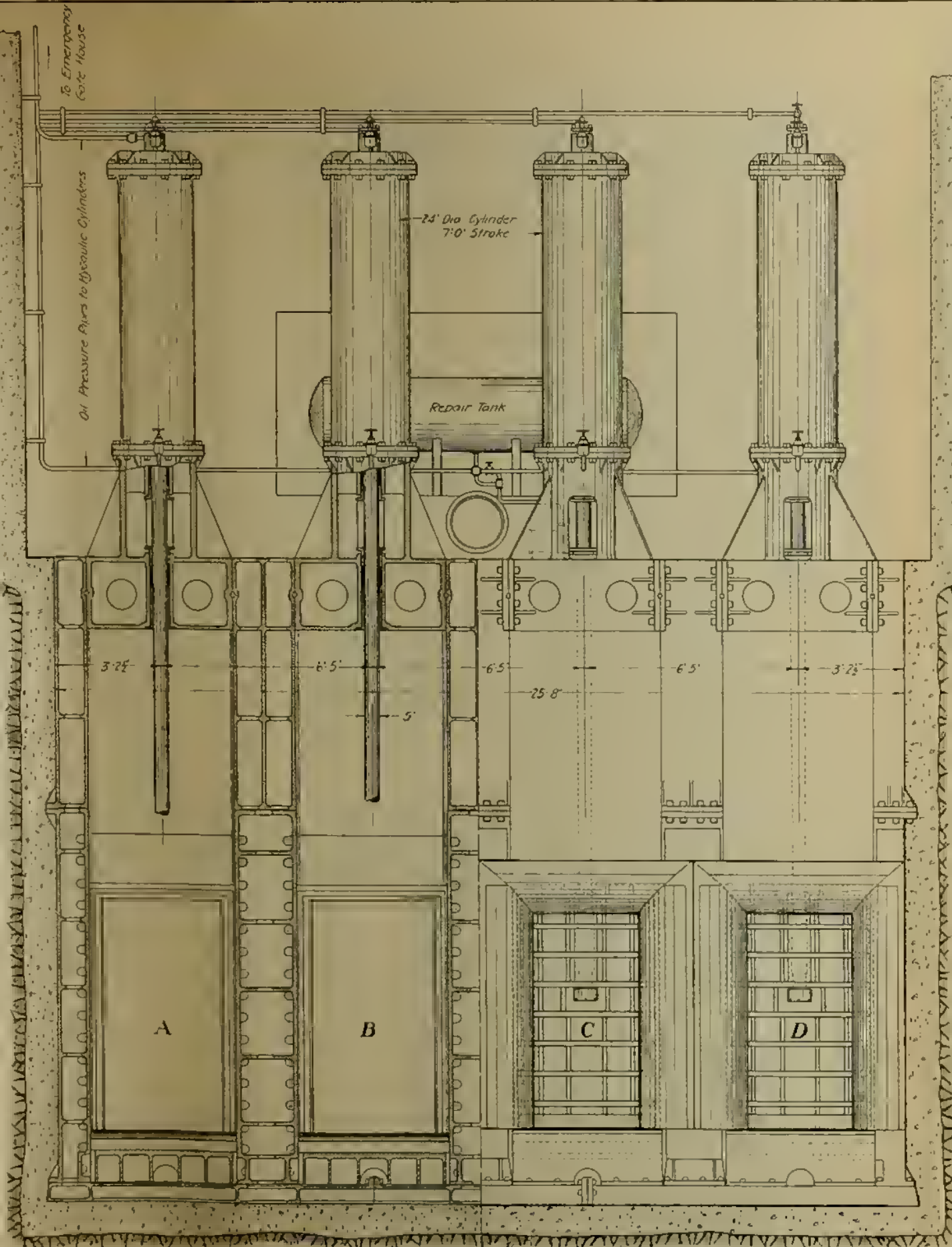
PLAN

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT
NEBRASKA-WYOMING
ALTHUNDER DAM
GENERAL PLAN AND SECTION
NO 20367 PLATE 27 OF 88
1923



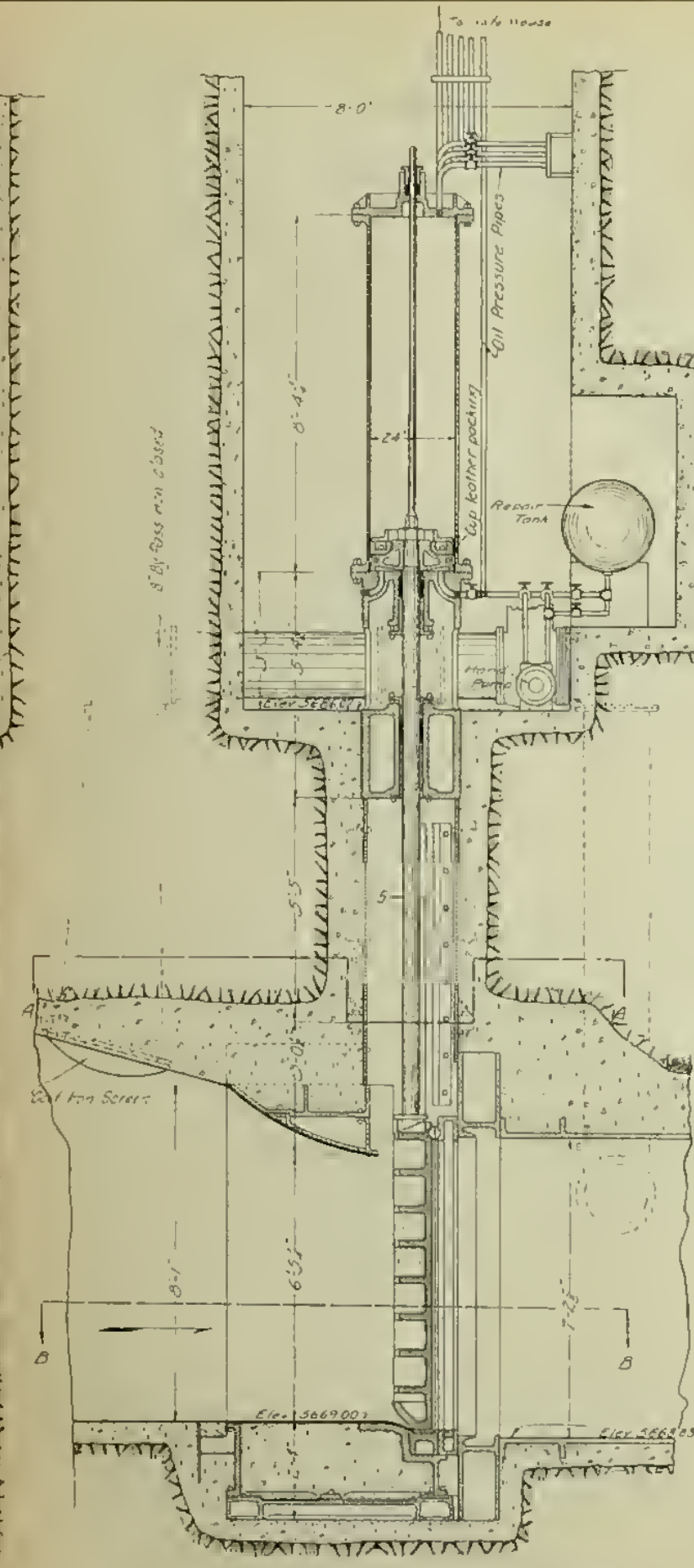




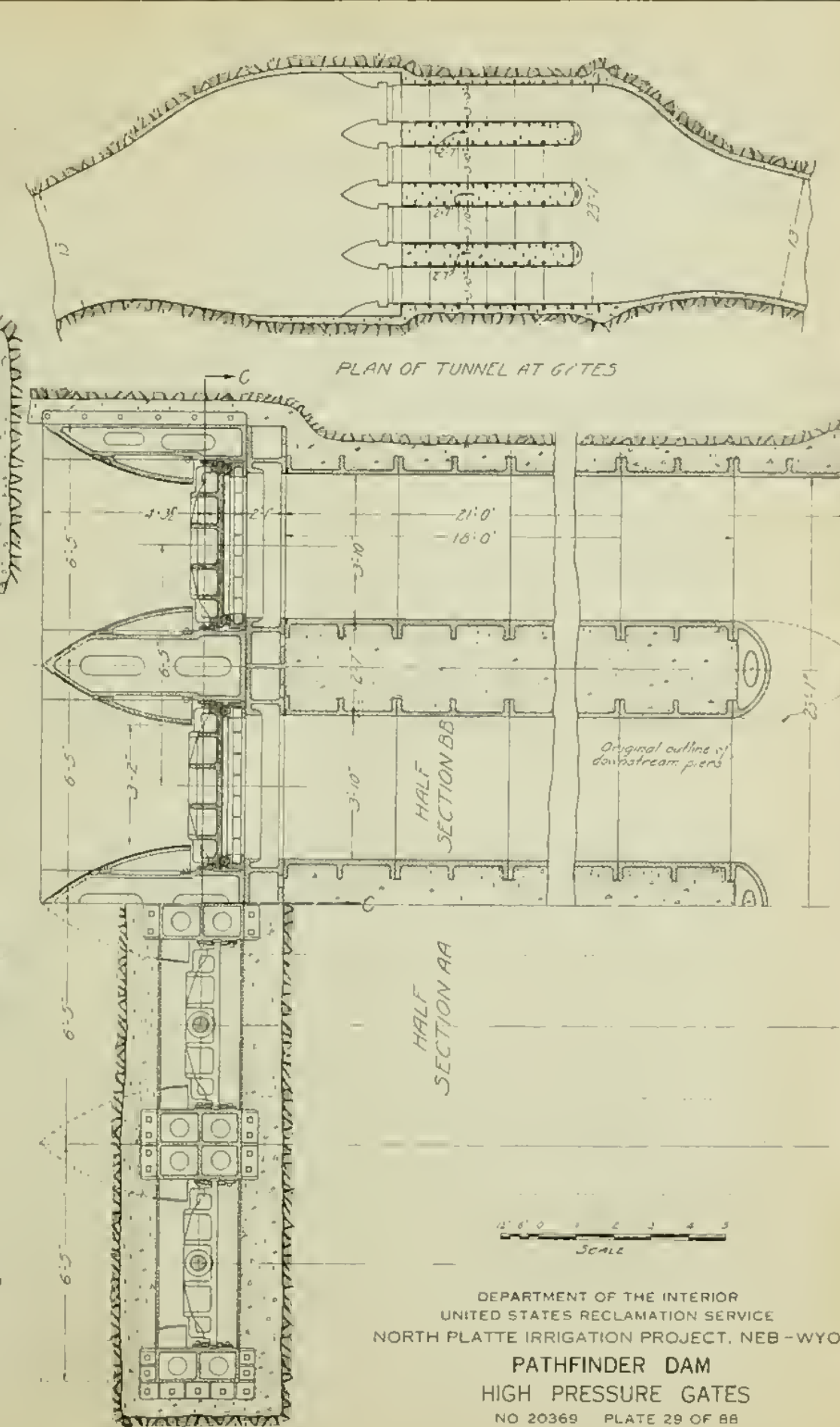


HALF SECTIONAL ELEVATION CC

HALF FRONT ELEVATION



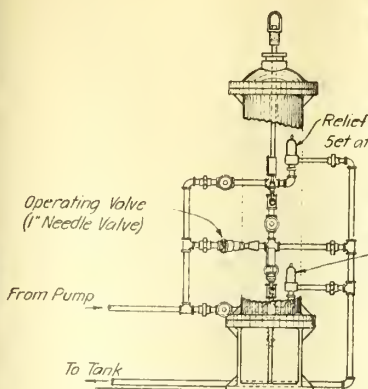
SECTIONAL ELEVATION



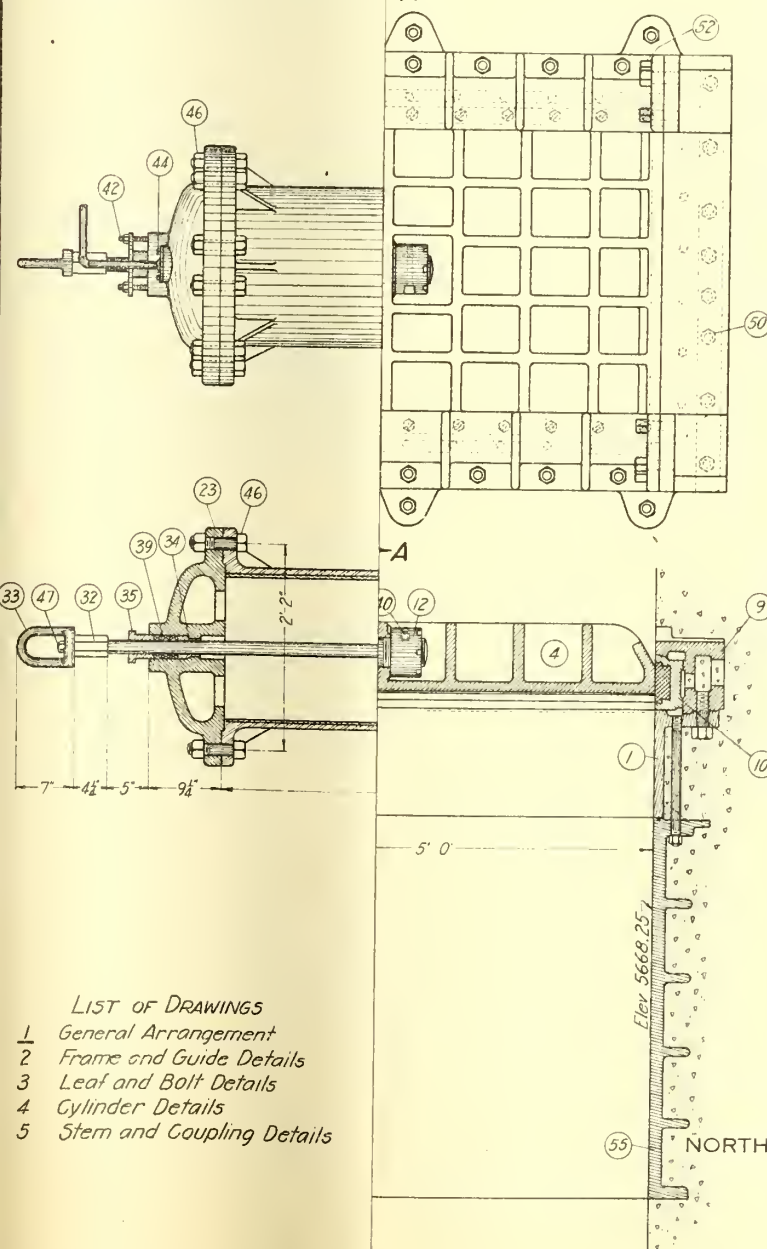
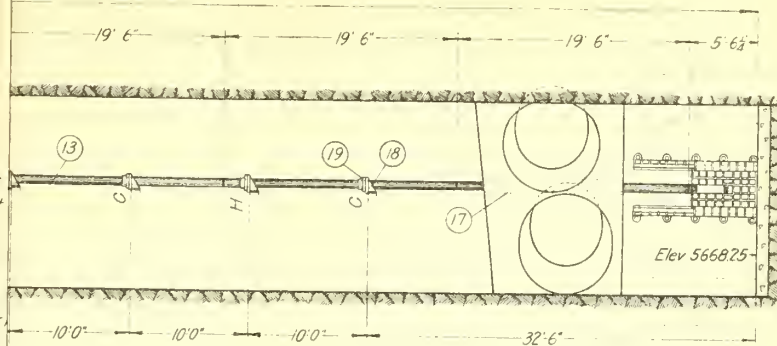
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT, NEB-WYO.

PATHFINDER DAM
HIGH PRESSURE GATES

NO 20369 PLATE 29 OF 88
1923



CONTROL PIPING ARRANGEMENT



LIST OF DRAWINGS

- 1 General Arrangement
- 2 Frame and Guide Details
- 3 Leaf and Bolt Details
- 4 Cylinder Details
- 5 Stem and Coupling Details

BILL OF MATERIAL

QTY BOL	MATERIAL	No Kto	DESCRIPTION	DRWG No
1	Semi Steel	1	Gate Frame	20-E-149
2	"	1	Leaf Guide Left	"
3	"	1	" Right	"
4	"	1	Gate Leaf	20-E-150
5	Glass "C" Bronze	2	Seat Vertical	"
6	" " "	2	Guide " "	"
7	" " "	1	" Horizontal	"
8	" " "	1	Seat	"
9	Semi Steel	1	" Frame	20-E-149
10	"	1	"	"
11	Special Steel	1	Stem	20-E-152
12	Cast Mang Bronze	1	" Lock Nut	"
13	Mild Steel	10	" Extension	"
14	Cast Mang Bronze	9	" Coupling	"
15	"	1	Piston Rod Coupling	"
16	Special Steel	1	" and Sleeve	"
17	Cast Iron	1	Stem Guide	"
18	"	16	" Bracket	"
19	"	16	" Bearing	"
20	Steel	1	Lock Nut Wrench	"
21	Semi Steel	1	Cylinder Base	20-E-151
22	Cast Steel	1	"	"
23	Semi Steel	1	" Head	"
24	Cast Mang Bronze	1	Piston Body	"
25	"	1	" Head	"
26	Glass "C" Bronze	3	Bull Ring	"
27	Cast Mang Bronze	4	Piston Ring	"
28	Gull Bronze	1	4 1/2" Stuffing Box Seat	"
29	"	1	4 1/2" Gland	"
30	Cast Mang Bronze	1	Piston Lock Nut	"
31	Roller " "	1	Indicator Rod	20-E-152
32	Cast Steel	1	Safety Link Nut	"
33	"	1	"	20-E-151
34	Gun Bronze	1	1 1/2" Stuffing Box Seat	"
35	"	1	1 1/2" Gland	"
36	Cast Mang Bronze	1	Stem Eyebolt	20-E-152
37	Sheet Brass	24	Lock Washer	20-E-150
38	4 1/2" Ring Packing	6 in	Garlock No. 99 or equal	20-E-152
39	1 1/2" "	3 in	"	"
40	Mild Steel	1	Fillister Head Cap Screw	20-E-150
41	Special Steel	8	Stud 1" x 4"	"
42	Mild Steel	2	" 3/4" x 5"	"
43	"	2	" 3/4" x 6 1/2"	"
44	"	8	" 3/4" x 2"	"
45	Special Steel	4	" 1 1/2" x 5 1/2"	"
46	"	28	Bolt 1 1/2" x 5 1/2"	"
47	Mild Steel	4	" 3/4" x 3 1/2"	"
48	"	64	Rough Machine Bolt 3/4" x 3"	"
49	"	48	" " 3/4" x 2 1/2"	"
50	Special Steel	8	Cap Screw 1 1/2" x 4 1/2"	"
51	"	28	" " 1 1/2" x 3 1/2"	"
52	"	6	" " 1 1/2" x 3 1/2"	"
53	Roller Tobin Bronze	24	Flathead Bolt 3/4" x 3 1/2"	"
54	"	49	" Screw 3/4" x 2 1/2"	"
55	Cast Iron	7	Gate Frame Extension	20-E-201
56	Mild Steel	32	Stud 1 1/2" x 16 1/2"	"
57	"	111	Fuse Wire 226 mils diam	"
58	Mild Steel	12	Stud 3/4" x 3 1/2"	"
59	Cast Iron	1	Air Pipe Flange	"
60	*20 Ga 11.5 Std Sheet Steel	1	Tunnel Plug Air Pipe	20-E-164

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT, NEB. WYO.

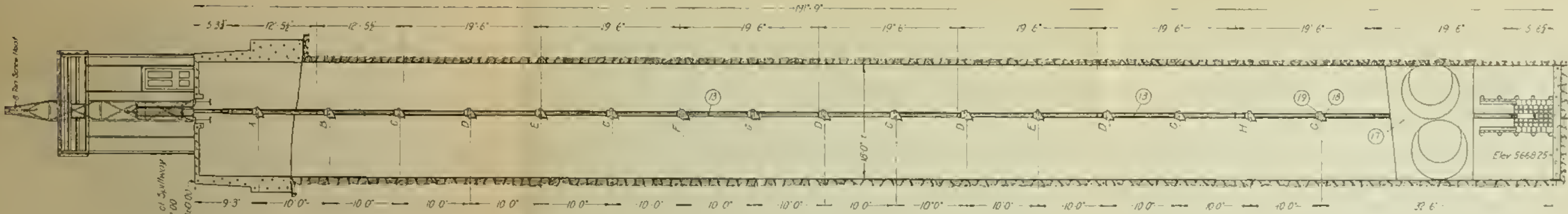
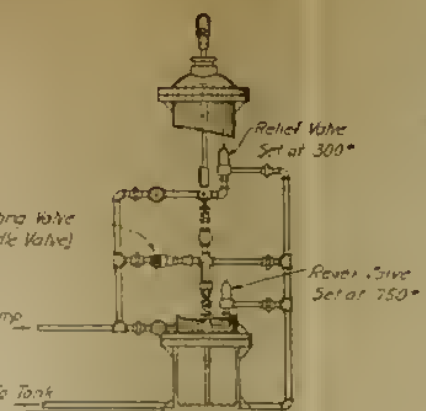
PATHFINDER DAM
SLUICE GATE 5 X 5 FEET

NO. 20370 PLATE 30 OF 88

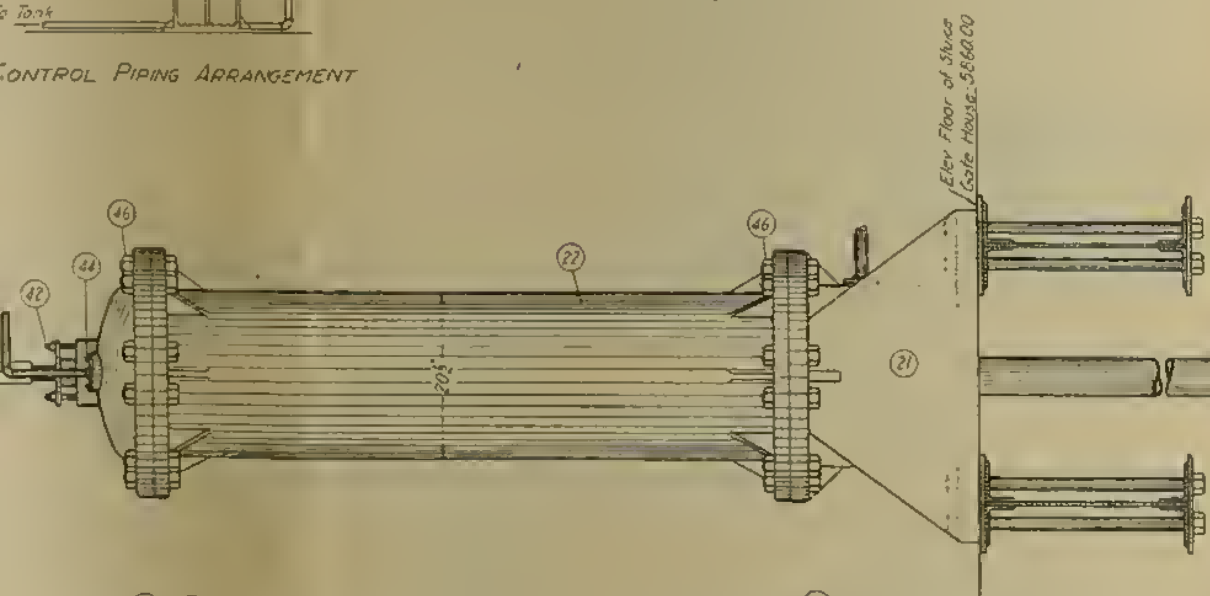
1923

This drawing supersedes Dwg No. 20-E-148

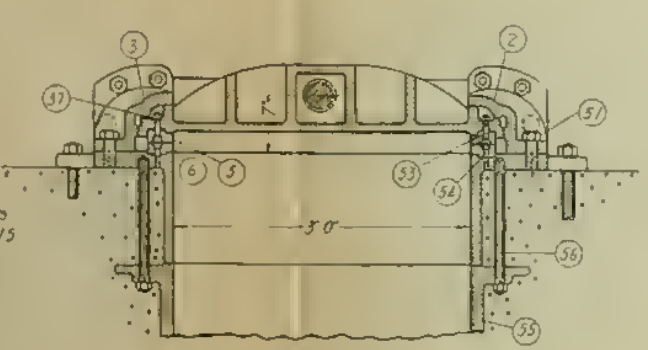
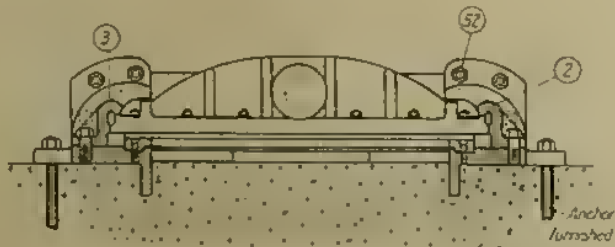
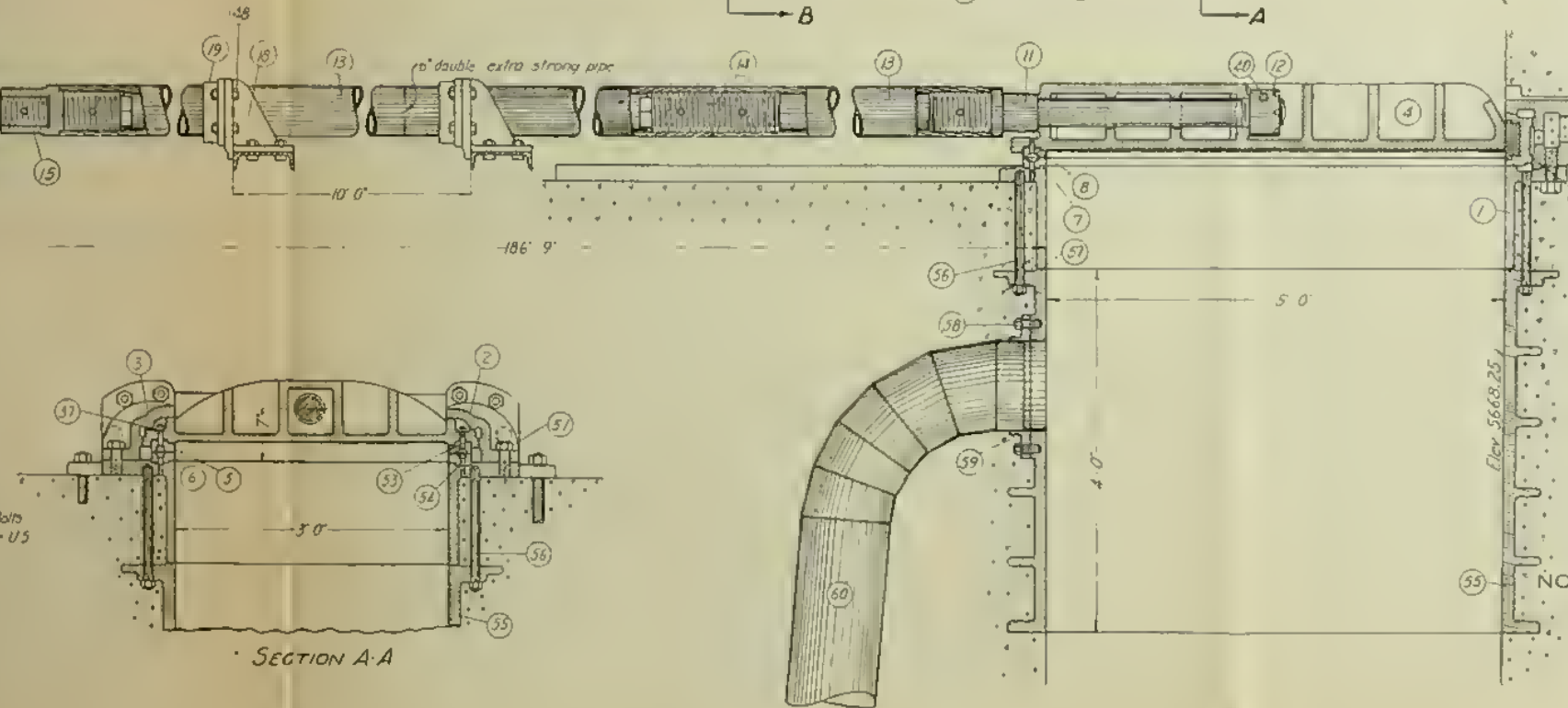
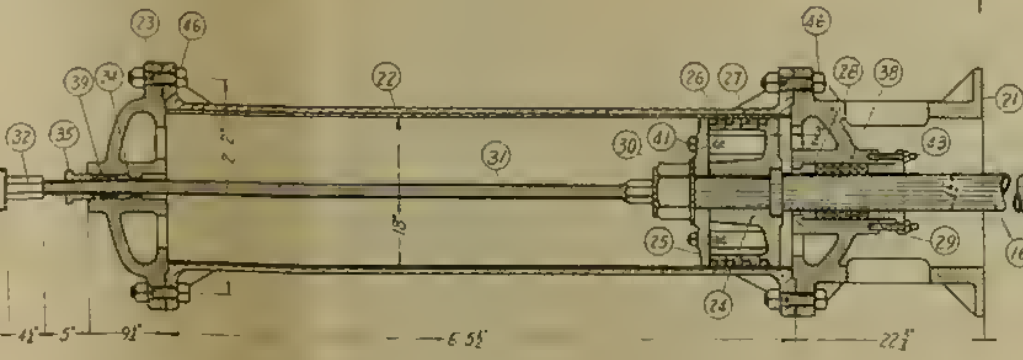
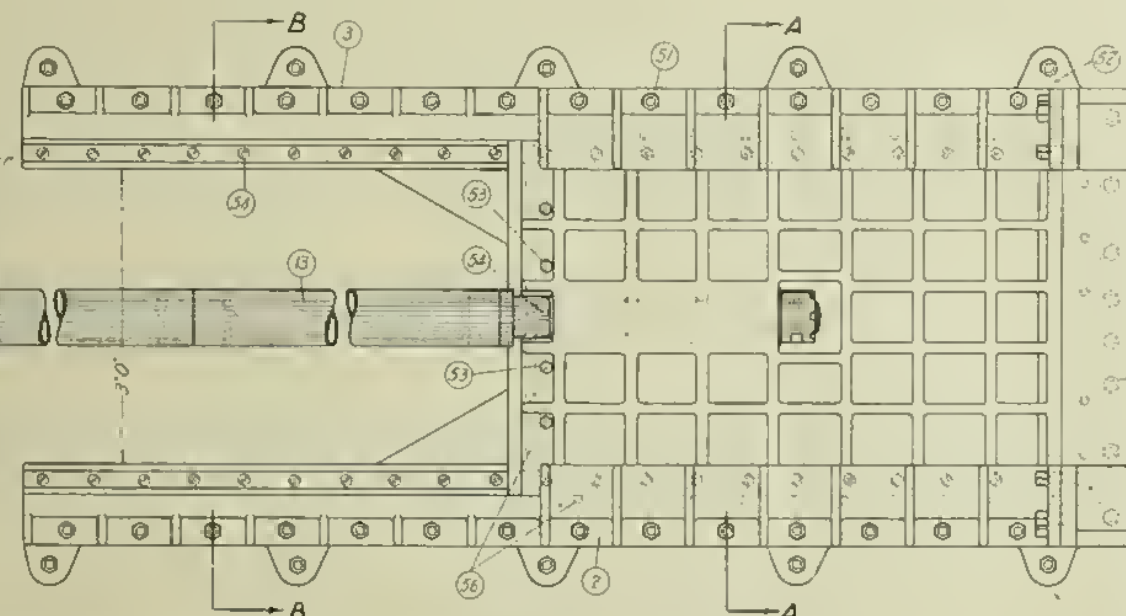
20-E-202



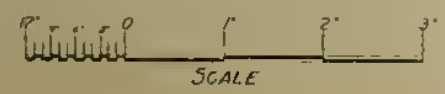
CONTROL PIPING ARRANGEMENT



Coefficient of Friction - Starting = 0.70
Closing = 0.35
Maximum Operating Pressure in Cylinder
750 pounds per square inch.



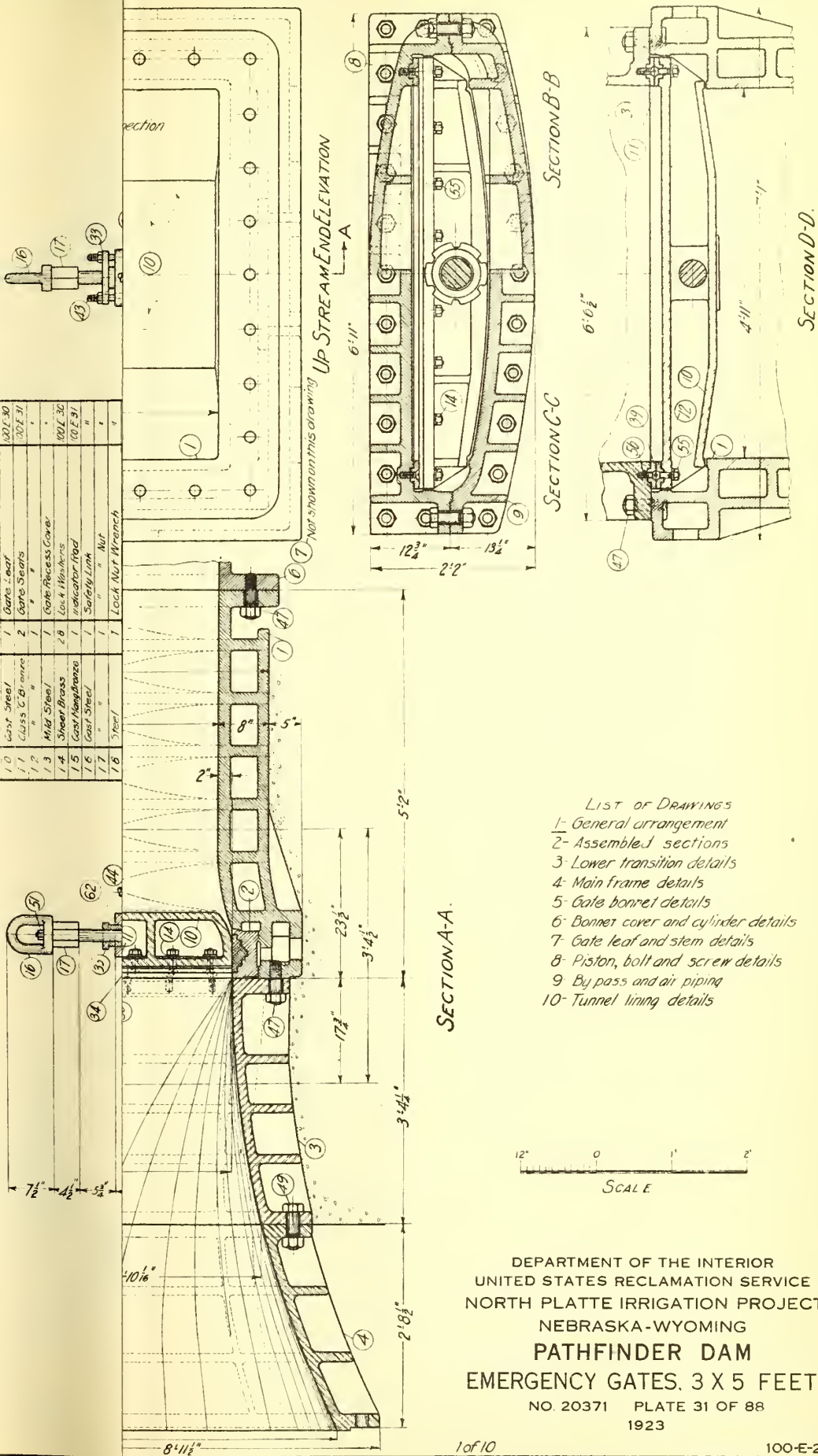
- LIST OF DRAWINGS
General Arrangement
Frame and Guide Details
Leaf and Bolt Details
Cylinder Details
Stem and Coupling Details



BILL OF MATERIAL				
SYM	MATERIAL	NO	DESCRIPTION	DWG NO
1	Semi Steel	1	Gate Frame	20-E-150
2	"	1	Leaf Guide Left	"
3	"	1	" Right	"
4	"	1	Gate Leaf	20-E-150
5	Class C Bronze	2	Seat Vertical	"
6	"	2	Guide	"
7	"	2	Horizontal	"
8	"	1	Seat	"
9	Semi Steel	1	Frame	20-E-149
10	"	1	"	"
11	Special Steel	1	Stem	20-E-150
12	Cast Mang Bronze	1	Lock Nut	"
13	Mild Steel	10	Extension	"
14	Cast Mang Bronze	9	Coupling	"
15	"	1	Piston Rod Coupling	"
16	Special Steel	1	and Sleeve	"
17	Cast Iron	1	Stem Guide	"
18	"	16	Bracket	"
19	"	16	Bearing	"
20	Steel	1	Lock Nut Wrench	"
21	Semi Steel	1	Cylinder Base	20-E-151
22	Cast Steel	1	"	"
23	Semi Steel	1	Head	"
24	Cast Mang Bronze	1	Piston Body	"
25	"	1	Head	"
26	Class C Bronze	3	Bull Ring	"
27	Cast Mang Bronze	4	Piston Ring	"
28	Gun Bronze	1	4" Stiffing Box Seat	"
29	"	1	4" Gland	"
30	Cast Mang Bronze	1	Piston Lock Nut	"
31	Hollow	1	Indicator Rod	20-E-152
32	Cast Steel	1	Safety Link Nut	"
33	"	1	"	20-E-151
34	Gun Bronze	1	1/4" Stiffing Box Seat	"
35	"	1	1/4" Gland	"
36	Cast Mang Bronze	1	Stem Eyebolt	20-E-152
37	Sheet Brass	24	Lock Washer	20-E-150
38	4" Ring Packing	1	in Corick No 99 or equal	20-E-152
39	"	1	"	"
40	Mild Steel	1	Fillister Head Cap Screw	20-E-150
41	Special Steel	8	Stud 1" x 4"	"
42	Mild Steel	2	" 2" x 5"	"
43	"	2	" 2" x 6"	"
44	"	8	" 1/2" x 2"	"
45	Special Steel	4	" 1/2" x 5/8"	"
46	"	28	Bolt 1/2" x 5/8"	"
47	Mild Steel	4	" 3/4" x 3/4"	"
48	"	64	Heavy Hexing Bolt 1/2" x 3/4"	"
49	"	48	" 1/2" x 3/4"	"
50	Special Steel	8	Cap Screw 1/2" x 4"	"
51	"	28	" 1/2" x 3/4"	"
52	"	6	" 1/2" x 3/4"	"
53	Roller Tabin Bronze	24	Flathead Bolt 1/2" x 3/4"	"
54	"	48	Screw 1/2" x 2"	"
55	Cast Iron	1	Gate Frame Extension	20-E-201
56	Mild Steel	32	Stud 1/2" x 1/2"	"
57	"	111	Use wire 22mils diam	"
58	Mild Steel	12	Stud 1/2" x 3/4"	"
59	Cast Iron	1	Air Pipe Flange	"
60	206 (11.534) Steel Steel	1	Tunnel Plug Air Pipe	20-E-164

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT, NEB. WYO
PATHFINDER DAM
SLUICE GATE 5 X 5 FEET
NO 20370 PLATE 30 OF 88
1923

Symbol	Material	Method	Description	Dwg No.
1	Steel	1	Main Frame	1001-27
2	Cast Iron	1	Gate Leaf	1001-28
3	Cast Steel	1	Transition - Frame Section	1001-29
4	"	"	Transition - Gate Section	"
5	"	"	Transition - Lower Section	"
6	Steel	1	Gate Bonnet	1001-30
7	"	1	Gate Leaf and Stem	1001-31
8	"	1	Gate Leaf and Stem	1001-32
9	Cast Steel	1	Gate Leaf and Stem	1001-33
10	Cast Steel	1	Gate Leaf and Stem	1001-34
11	Cast Steel	1	Gate Leaf and Stem	1001-35
12	Cast Steel	1	Gate Leaf and Stem	1001-36
13	Cast Steel	1	Gate Leaf and Stem	1001-37
14	Cast Steel	1	Gate Leaf and Stem	1001-38
15	Cast Steel	1	Gate Leaf and Stem	1001-39
16	Cast Steel	1	Gate Leaf and Stem	1001-40
17	Cast Steel	1	Gate Leaf and Stem	1001-41
18	Cast Steel	1	Gate Leaf and Stem	1001-42
19	Cast Steel	1	Gate Leaf and Stem	1001-43
20	Cast Steel	1	Gate Leaf and Stem	1001-44
21	Cast Steel	1	Gate Leaf and Stem	1001-45
22	Cast Steel	1	Gate Leaf and Stem	1001-46
23	Cast Steel	1	Gate Leaf and Stem	1001-47
24	Cast Steel	1	Gate Leaf and Stem	1001-48
25	Cast Steel	1	Gate Leaf and Stem	1001-49
26	Cast Steel	1	Gate Leaf and Stem	1001-50
27	Cast Steel	1	Gate Leaf and Stem	1001-51
28	Cast Steel	1	Gate Leaf and Stem	1001-52
29	Cast Steel	1	Gate Leaf and Stem	1001-53
30	Cast Steel	1	Gate Leaf and Stem	1001-54
31	Cast Steel	1	Gate Leaf and Stem	1001-55
32	Cast Steel	1	Gate Leaf and Stem	1001-56
33	Cast Steel	1	Gate Leaf and Stem	1001-57
34	Cast Steel	1	Gate Leaf and Stem	1001-58
35	Cast Steel	1	Gate Leaf and Stem	1001-59
36	Cast Steel	1	Gate Leaf and Stem	1001-60
37	Cast Steel	1	Gate Leaf and Stem	1001-61
38	Cast Steel	1	Gate Leaf and Stem	1001-62
39	Cast Steel	1	Gate Leaf and Stem	1001-63
40	Cast Steel	1	Gate Leaf and Stem	1001-64
41	Cast Steel	1	Gate Leaf and Stem	1001-65
42	Cast Steel	1	Gate Leaf and Stem	1001-66
43	Cast Steel	1	Gate Leaf and Stem	1001-67
44	Cast Steel	1	Gate Leaf and Stem	1001-68
45	Cast Steel	1	Gate Leaf and Stem	1001-69
46	Cast Steel	1	Gate Leaf and Stem	1001-70
47	Cast Steel	1	Gate Leaf and Stem	1001-71
48	Cast Steel	1	Gate Leaf and Stem	1001-72
49	Cast Steel	1	Gate Leaf and Stem	1001-73
50	Cast Steel	1	Gate Leaf and Stem	1001-74
51	Cast Steel	1	Gate Leaf and Stem	1001-75
52	Cast Steel	1	Gate Leaf and Stem	1001-76
53	Cast Steel	1	Gate Leaf and Stem	1001-77
54	Cast Steel	1	Gate Leaf and Stem	1001-78
55	Cast Steel	1	Gate Leaf and Stem	1001-79
56	Cast Steel	1	Gate Leaf and Stem	1001-80
57	Cast Steel	1	Gate Leaf and Stem	1001-81
58	Cast Steel	1	Gate Leaf and Stem	1001-82
59	Cast Steel	1	Gate Leaf and Stem	1001-83
60	Cast Steel	1	Gate Leaf and Stem	1001-84
61	Cast Steel	1	Gate Leaf and Stem	1001-85
62	Cast Steel	1	Gate Leaf and Stem	1001-86
63	Cast Steel	1	Gate Leaf and Stem	1001-87
64	Cast Steel	1	Gate Leaf and Stem	1001-88
65	Cast Steel	1	Gate Leaf and Stem	1001-89
66	Cast Steel	1	Gate Leaf and Stem	1001-90
67	Cast Steel	1	Gate Leaf and Stem	1001-91
68	Cast Steel	1	Gate Leaf and Stem	1001-92
69	Cast Steel	1	Gate Leaf and Stem	1001-93
70	Cast Steel	1	Gate Leaf and Stem	1001-94
71	Cast Steel	1	Gate Leaf and Stem	1001-95
72	Cast Steel	1	Gate Leaf and Stem	1001-96
73	Cast Steel	1	Gate Leaf and Stem	1001-97
74	Cast Steel	1	Gate Leaf and Stem	1001-98
75	Cast Steel	1	Gate Leaf and Stem	1001-99
76	Cast Steel	1	Gate Leaf and Stem	1001-100



- LIST OF DRAWINGS
- 1- General arrangement
 - 2- Assembled sections
 - 3- Lower transition details
 - 4- Main frame details
 - 5- Gate bonnet details
 - 6- Bonnet cover and cylinder details
 - 7- Gate leaf and stem details
 - 8- Piston, bolt and screw details
 - 9- By pass and air piping
 - 10- Tunnel lining details

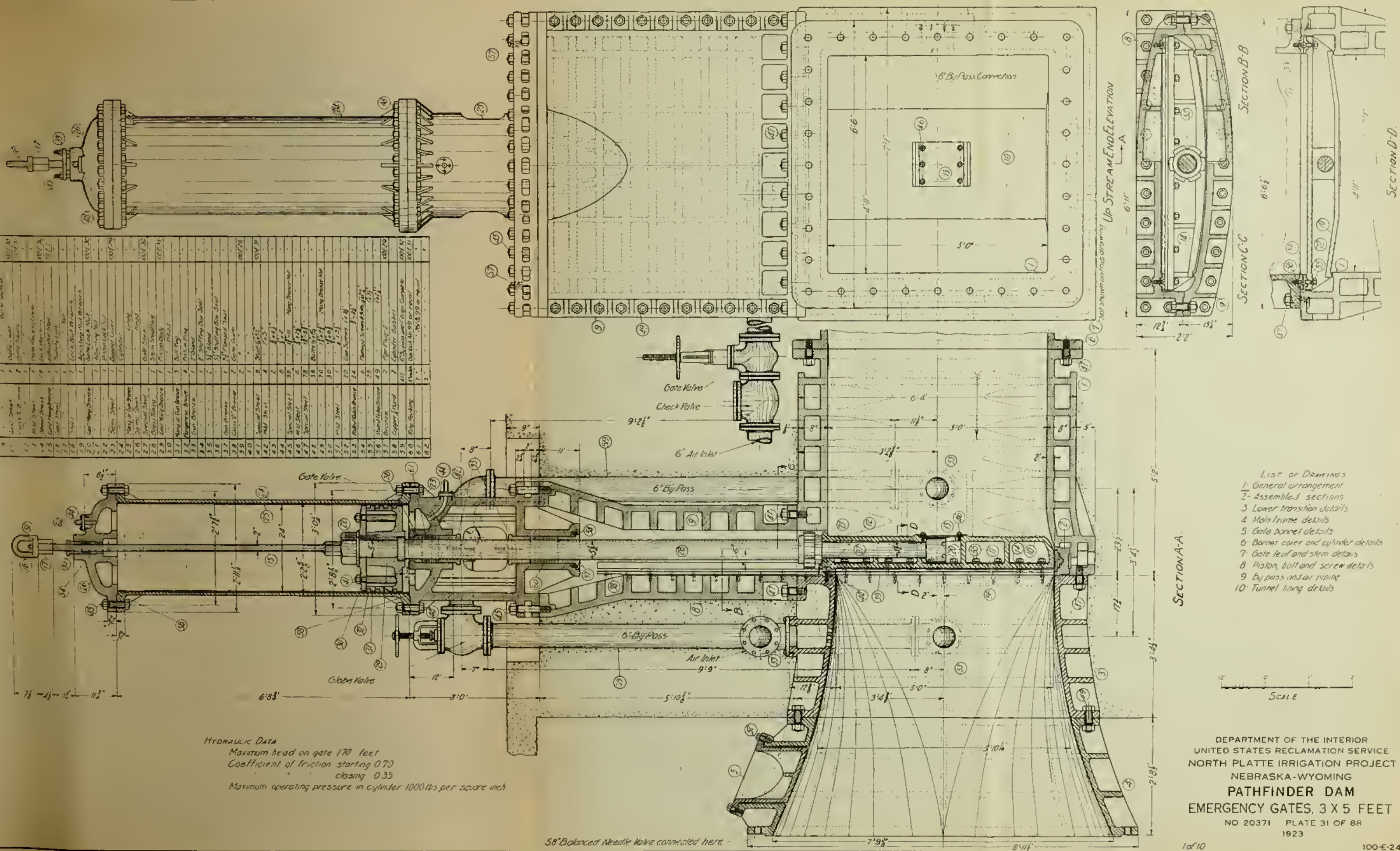
SCALE

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT
NEBRASKA-WYOMING
PATHFINDER DAM
EMERGENCY GATES. 3 X 5 FEET
NO. 20371 PLATE 31 OF 88
1923

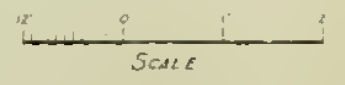
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1001.2.99	Gate Valve	1	1001.2.99	Gate Valve	1
1001.2.100	Gate Valve	1	1001.2.100	Gate Valve	1

HYDRAULIC DATA
 Maximum head on gate 170 feet
 Coefficient of friction starting 0.70
 closing 0.35
 Maximum operating pressure in cylinder 1000 lbs per square inch

58" Balanced Needle Valve connected here



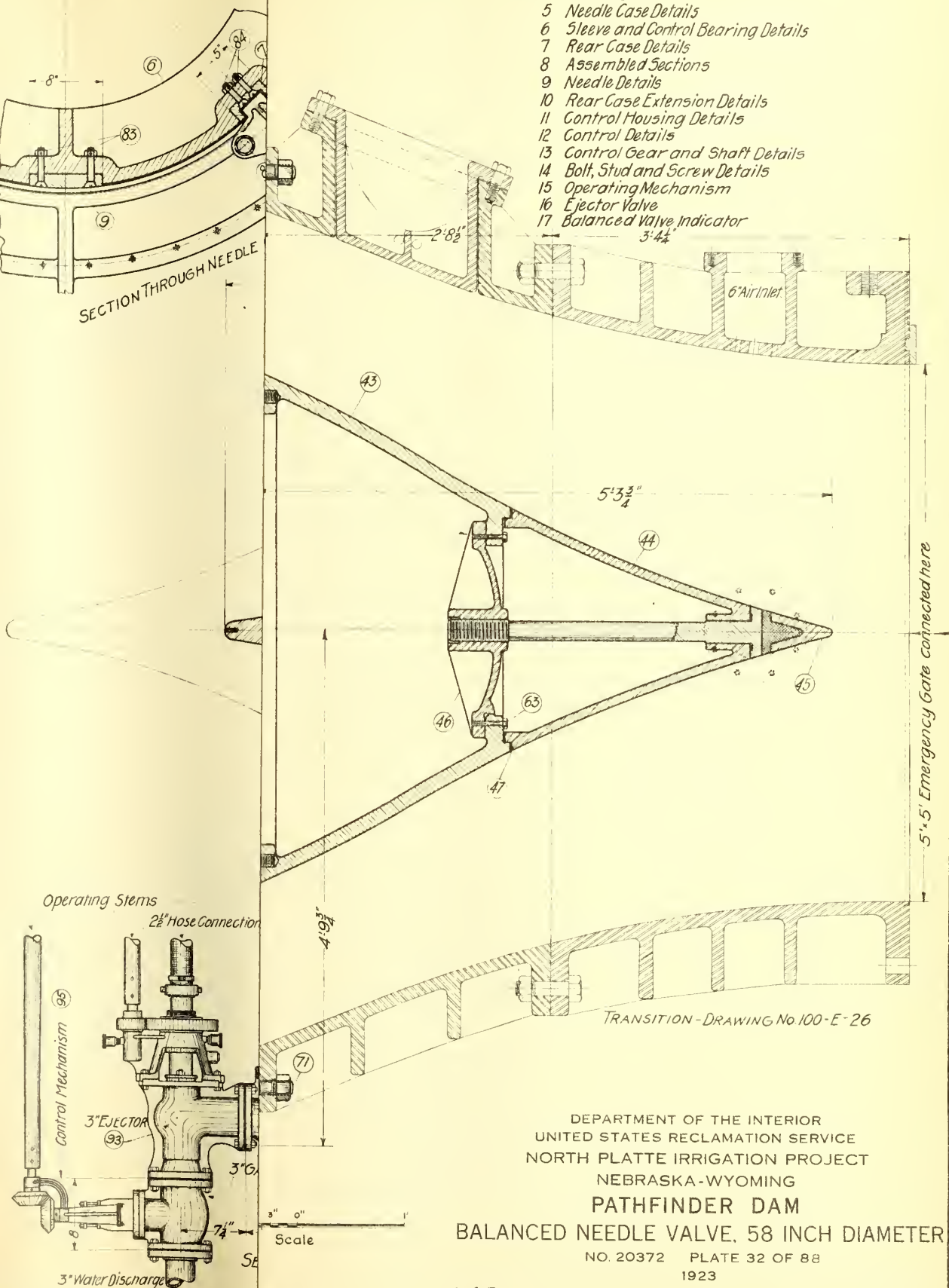
- LIST OF DRAWINGS
1. General arrangement
 2. Assembled sections
 3. Lower transition details
 4. Main frame details
 5. Gate barrel details
 6. Barrel cover and cylinder details
 7. Gate leaf and stem details
 8. Piston, bolt and screw details
 9. Bypass and air piping
 10. Tunnel lining details



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 NORTH PLATTE IRRIGATION PROJECT
 NEBRASKA-WYOMING
PATHFINDER DAM
 EMERGENCY GATES, 3 X 5 FEET
 NO 20371 PLATE 31 OF 88
 1923

LIST OF DRAWINGS:

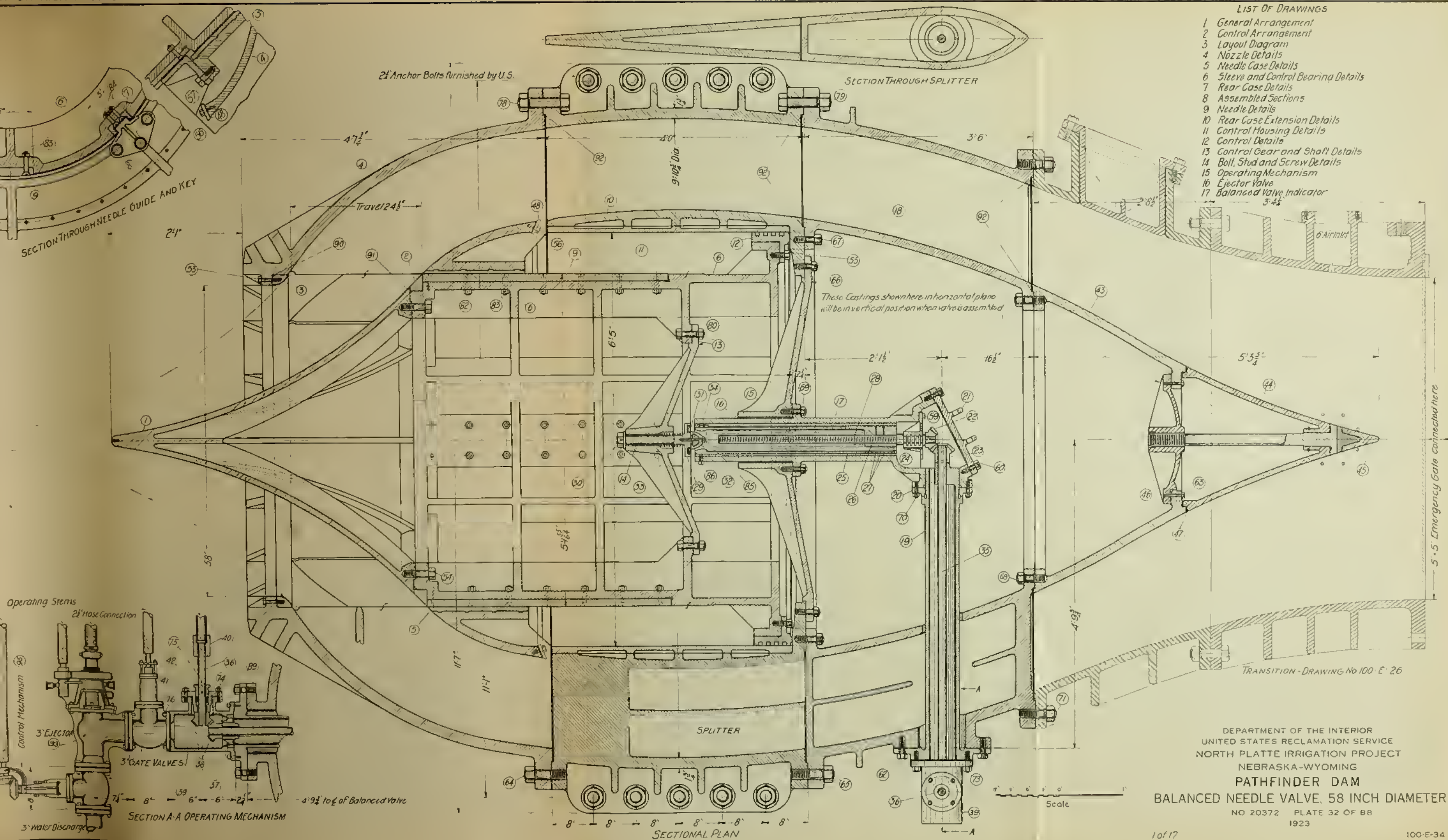
- 1 General Arrangement
- 2 Control Arrangement
- 3 Layout Diagram
- 4 Nozzle Details
- 5 Needle Case Details
- 6 Sleeve and Control Bearing Details
- 7 Rear Case Details
- 8 Assembled Sections
- 9 Needle Details
- 10 Rear Case Extension Details
- 11 Control Housing Details
- 12 Control Details
- 13 Control Gear and Shaft Details
- 14 Bolt, Stud and Screw Details
- 15 Operating Mechanism
- 16 Ejector Valve
- 17 Balanced Valve Indicator



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NEBRASKA-WYOMING

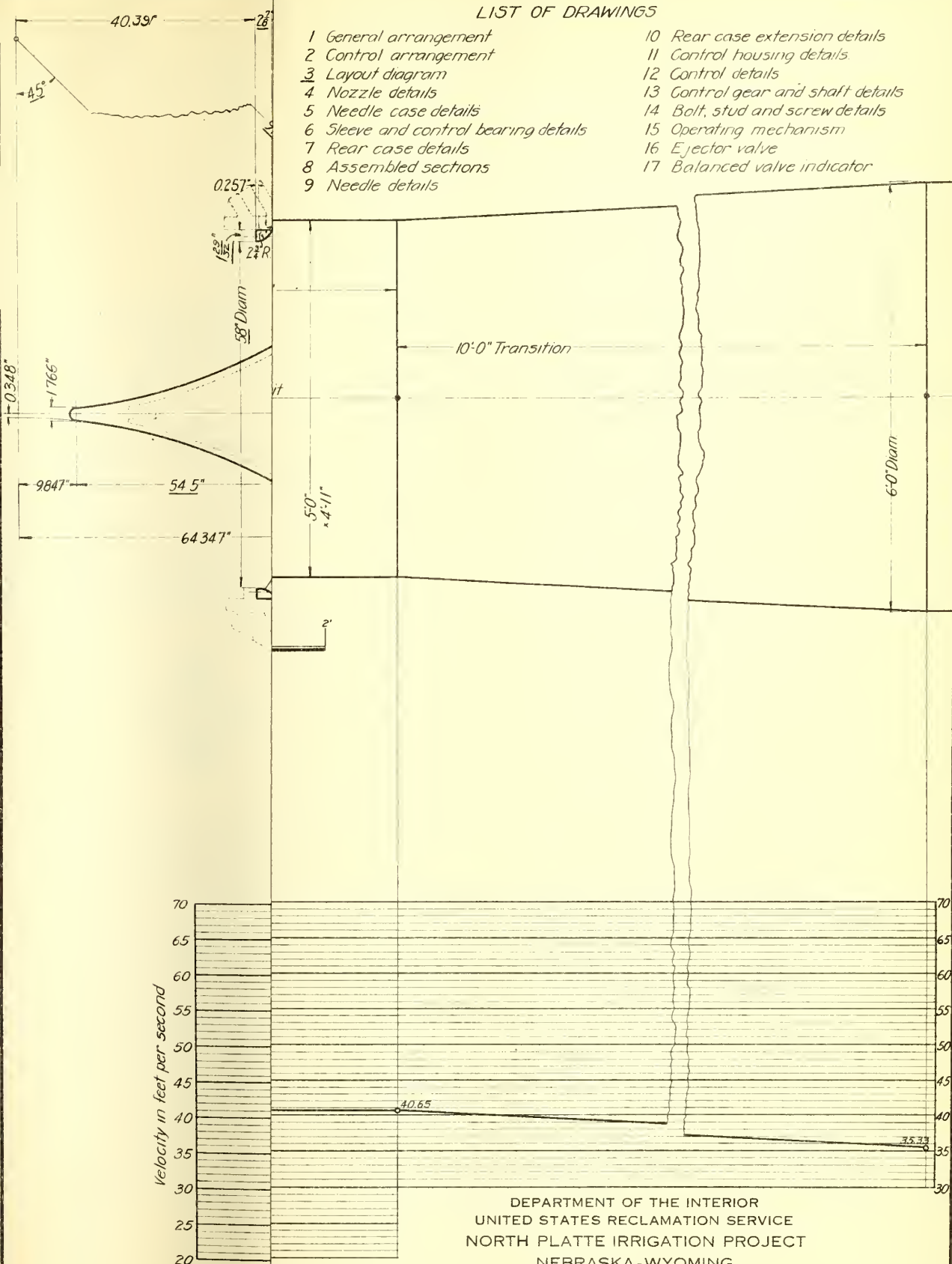
PATHFINDER DAM BALANCED NEEDLE VALVE, 58 INCH DIAMETER

NO. 20372 PLATE 32 OF 88
1923



LIST OF DRAWINGS

- | | |
|--------------------------------------|-----------------------------------|
| 1 General arrangement | 10 Rear case extension details |
| 2 Control arrangement | 11 Control housing details |
| 3 Layout diagram | 12 Control details |
| 4 Nozzle details | 13 Control gear and shaft details |
| 5 Needle case details | 14 Bolt, stud and screw details |
| 6 Sleeve and control bearing details | 15 Operating mechanism |
| 7 Rear case details | 16 Ejector valve |
| 8 Assembled sections | 17 Balanced valve indicator |
| 9 Needle details | |

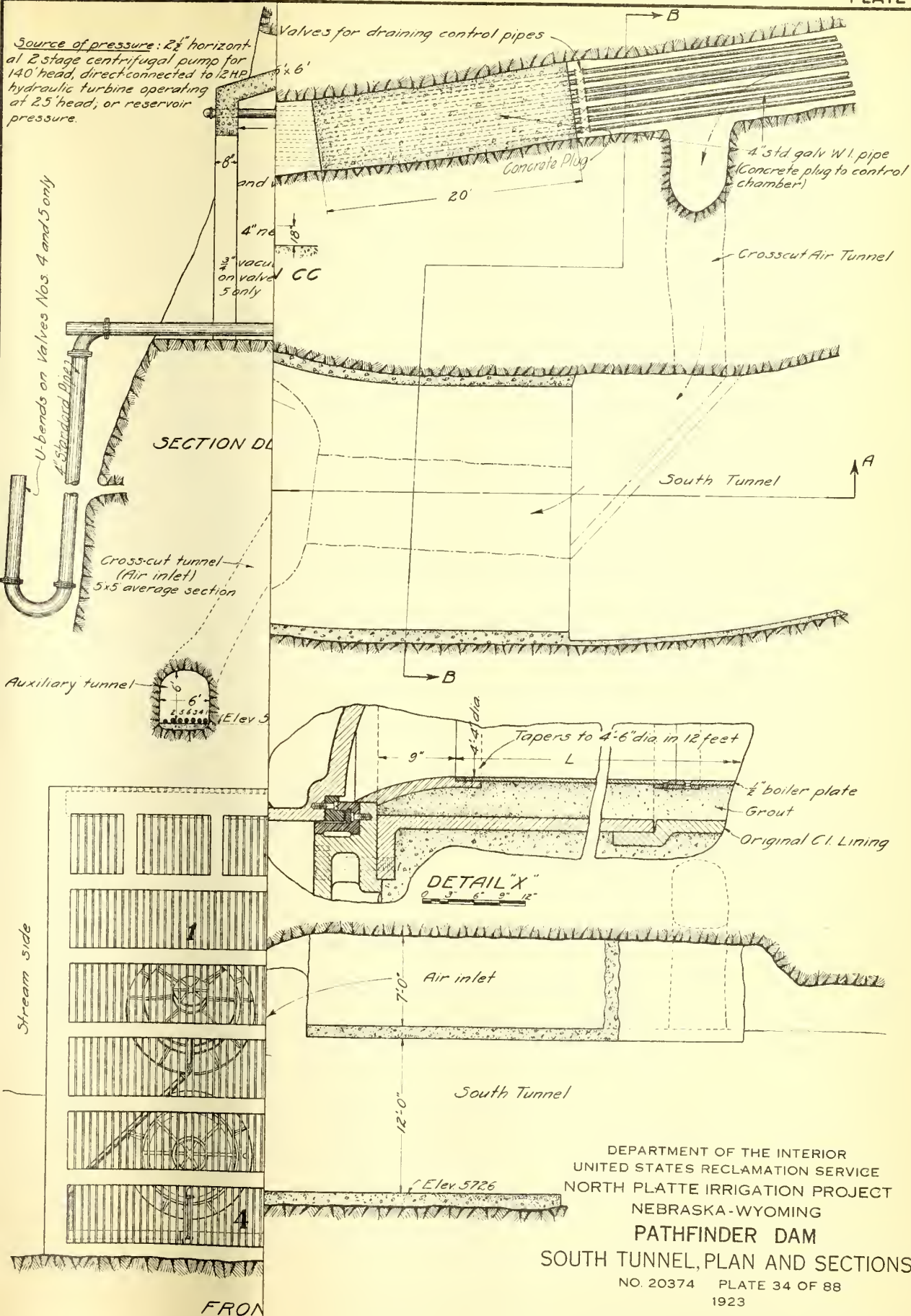


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UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT
NEBRASKA-WYOMING
PATHFINDER DAM

LAYOUT DIAGRAM FOR 58 INCH BALANCED NEEDLE VALVE

NO. 20373 PLATE 33 OF 88
1923

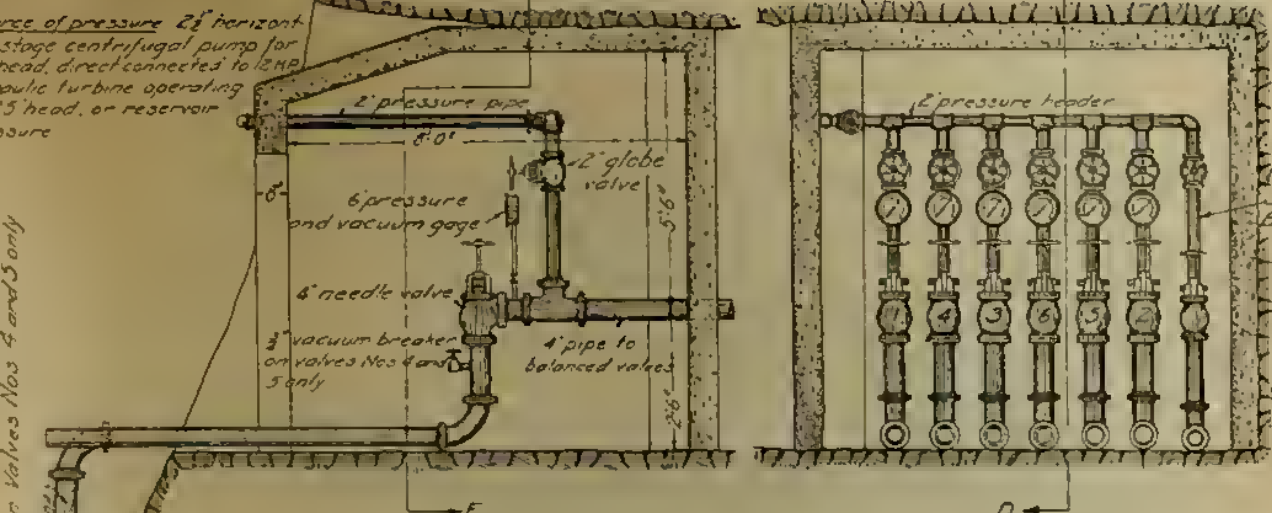




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NEBRASKA-WYOMING
PATHFINDER DAM
SOUTH TUNNEL, PLAN AND SECTIONS

NO. 20374 PLATE 34 OF 88
1923

U-bends on Valves Nos 4 and 5 only

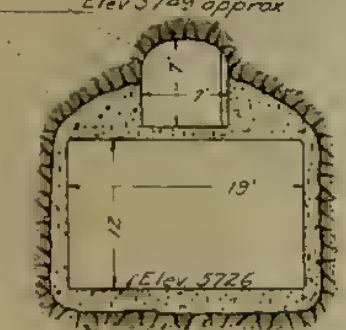


SECTION DD

CONTROL CHAMBER

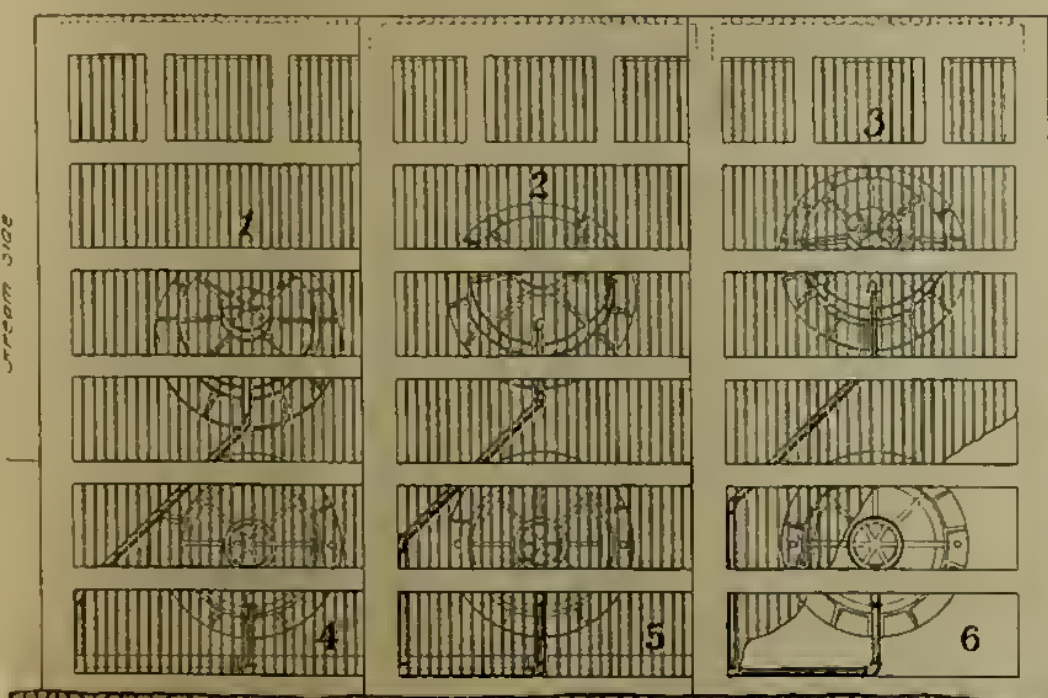
SECTION EE

Elev 5749 approx



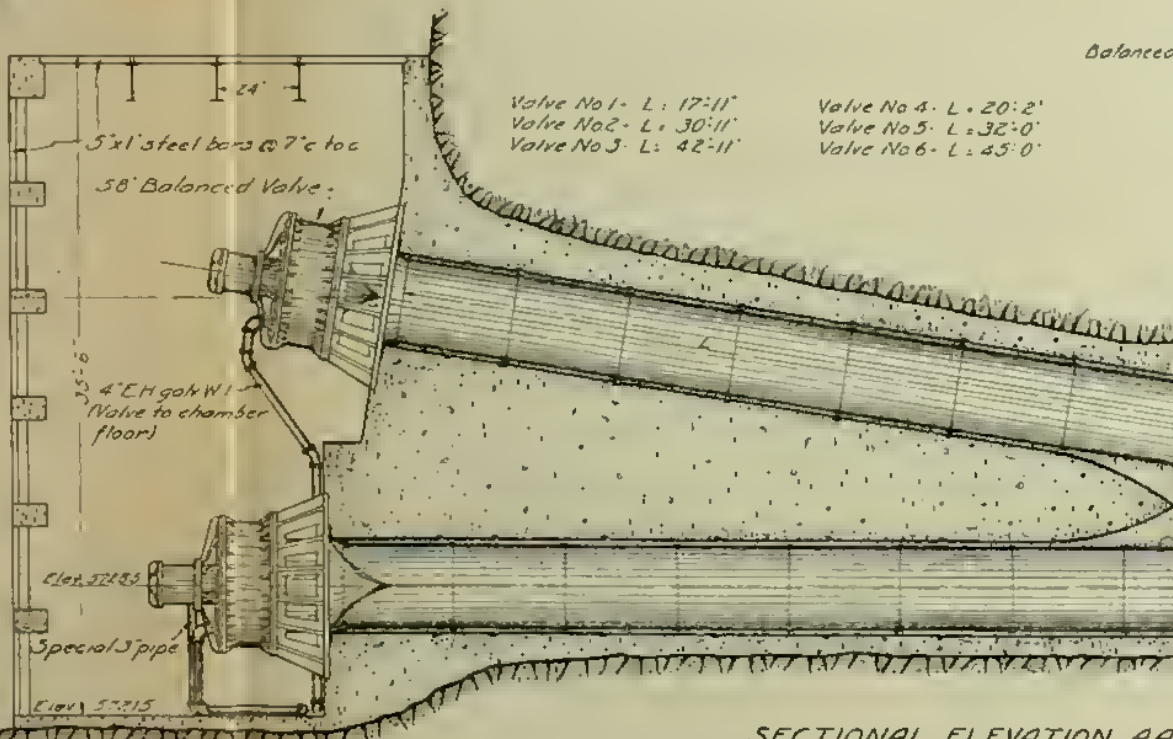
SECTION BB

0 12 3 4 10 15



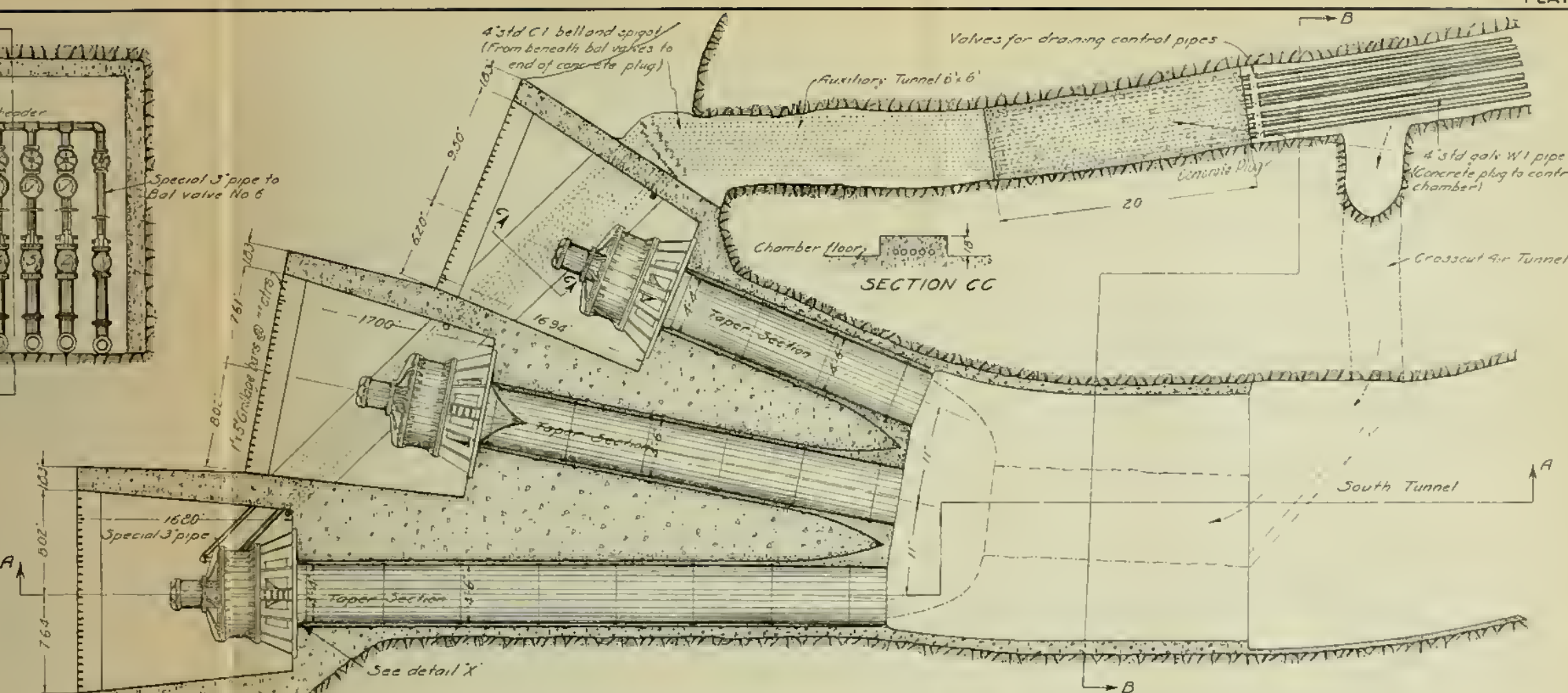
FRONT ELEVATION (DEVELOPED)

Valve No 1 - Elev 57399
Valve No 2 - Elev 57430
Valve No 3 - Elev 57461



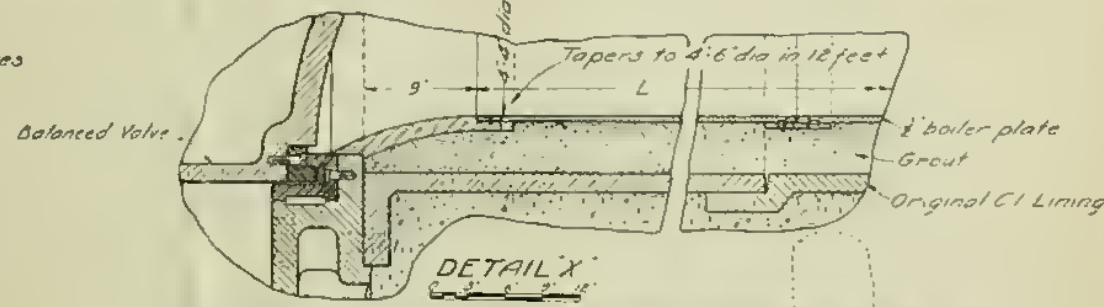
SECTIONAL ELEVATION AA

0 15 30 45 60

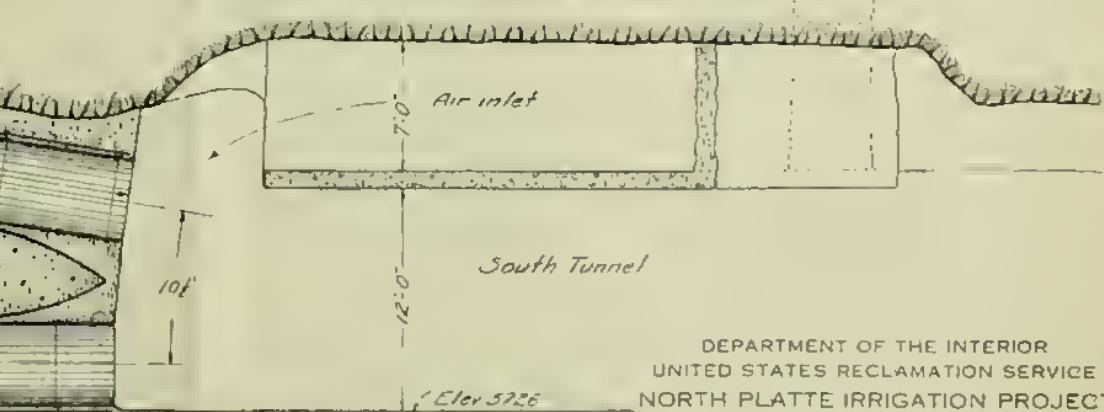


SECTION CC

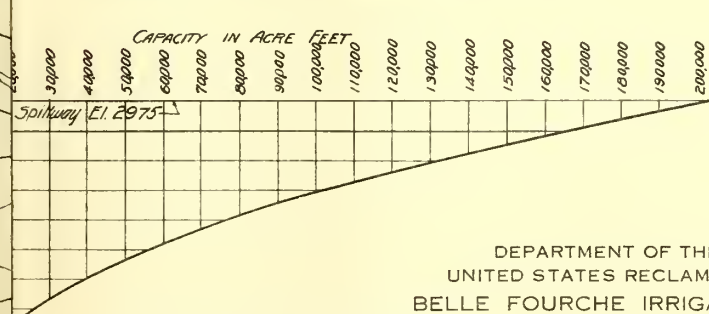
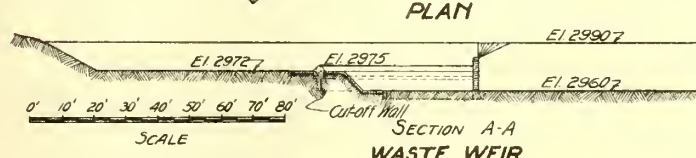
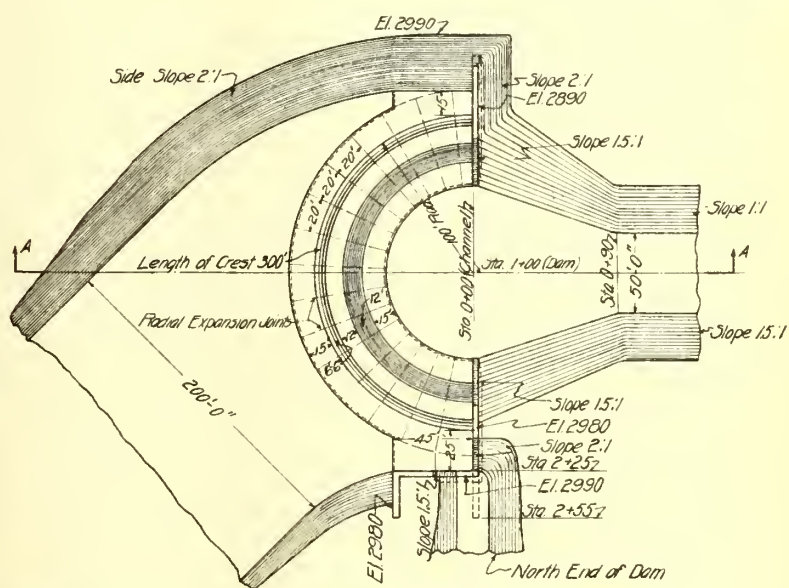
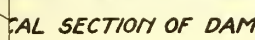
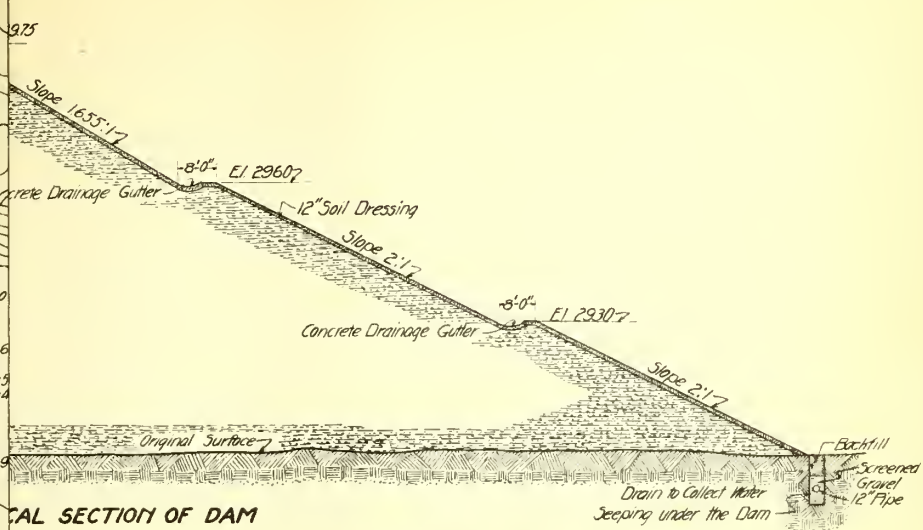
SECTIONAL PLAN through lower tier of balanced valves



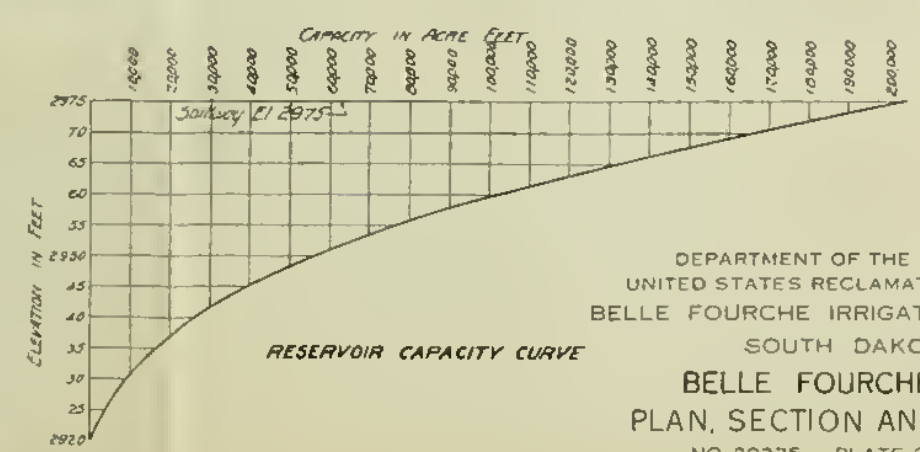
DETAIL X



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT
NEBRASKA-WYOMING
PATHFINDER DAM
SOUTH TUNNEL, PLAN AND SECTIONS
NO 20374 PLATE 34 OF 88
1923

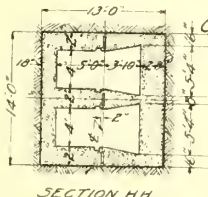
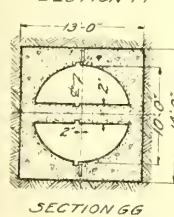
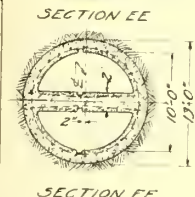
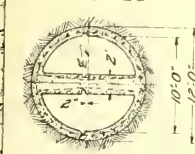
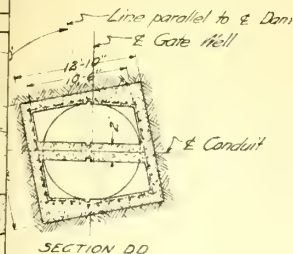
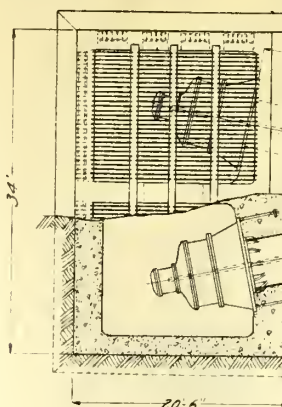


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BELLE FOURCHE IRRIGATION PROJECT
SOUTH DAKOTA
BELLE FOURCHE DAM
PLAN, SECTION AND DETAILS
NO. 20375 PLATE 35 OF 88
1923

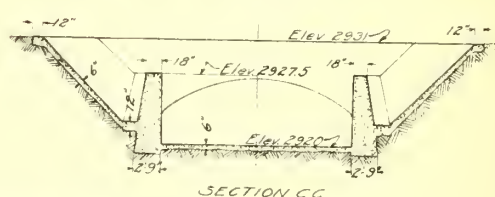
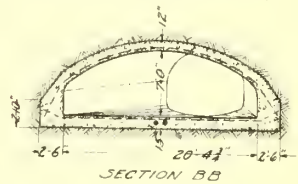
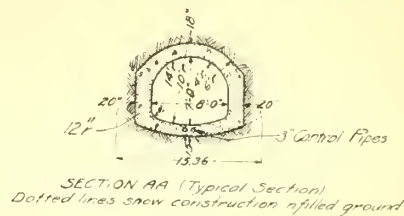


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BELLE FOURCHE IRRIGATION PROJECT
SOUTH DAKOTA
BELLE FOURCHE DAM
PLAN, SECTION AND DETAILS
NO 20375 PLATE 35 OF 88
1923

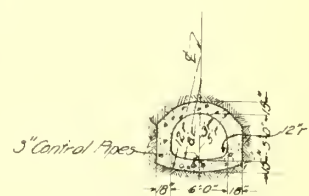
2-58" Balanced Valves



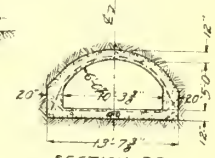
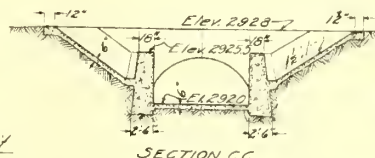
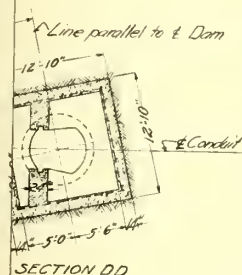
NORTH CONDUIT WELL SECTIONS



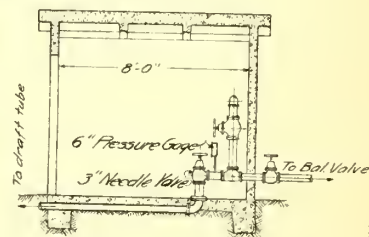
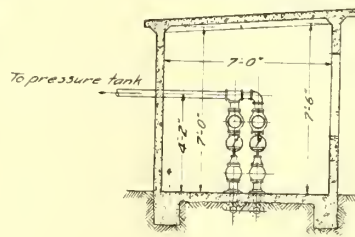
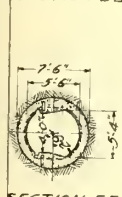
CONDUIT SECTIONS-NORTH CONDUIT



SECTION AA (Typical Section)
Dotted lines show construction in filled ground

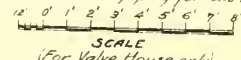


CONDUIT SECTIONS-SOUTH CONDUIT

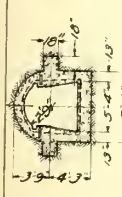


VALVE HOUSE-NORTH AND SOUTH CONDUITS

South Conduit Valve House contains piping for one balanced valve only



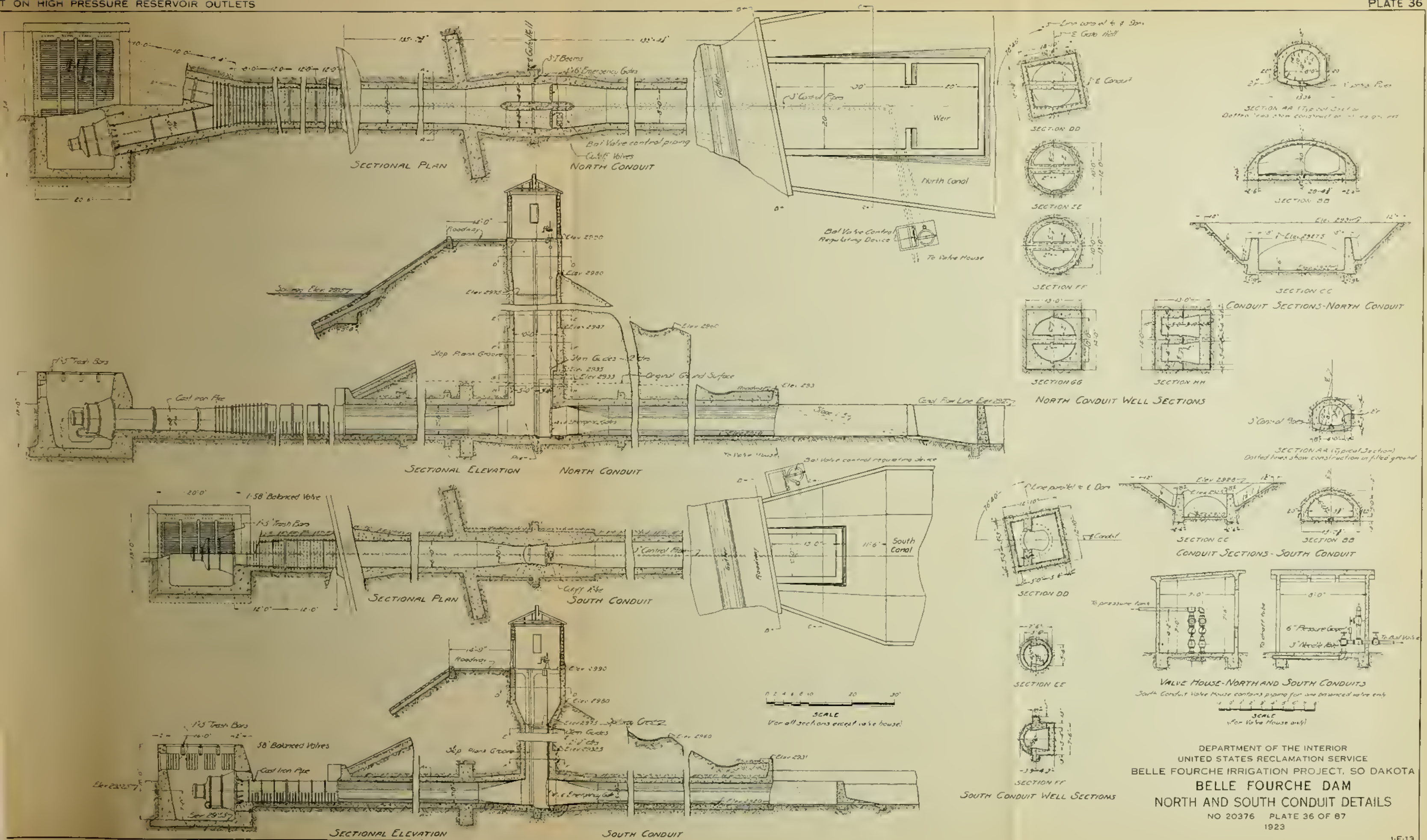
SCALE
(For Valve House only)

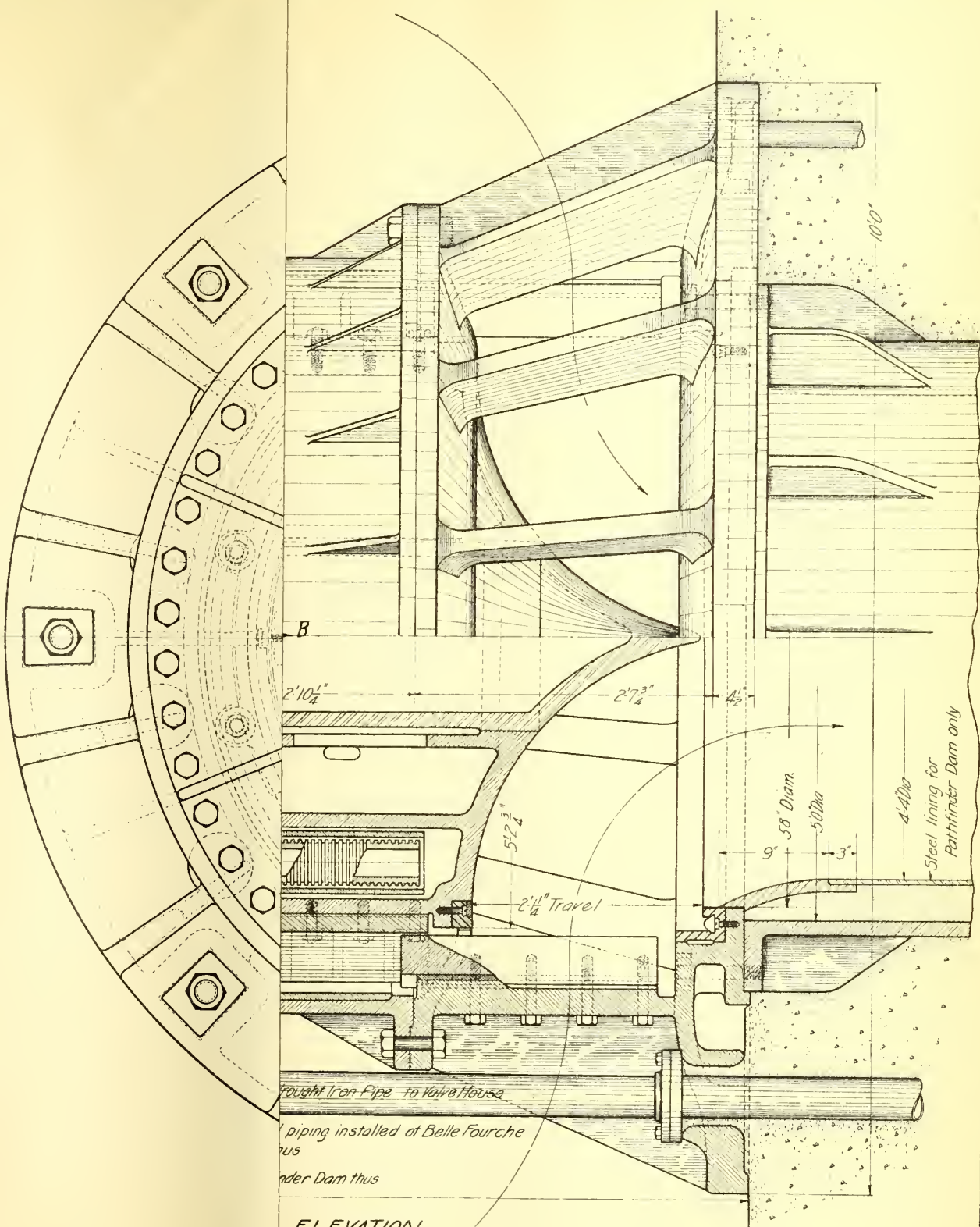


CONDUIT WELL SECTIONS

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BELLE FOURCHE IRRIGATION PROJECT, S.D. DAKOTA
BELLE FOURCHE DAM
NORTH AND SOUTH CONDUIT DETAILS

NO. 20376 PLATE 36 OF 87
1923





ELEVATION

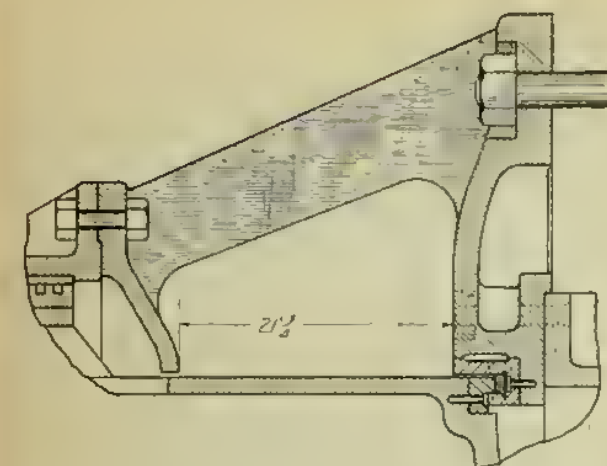
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BELLE FOURCHE IRRIGATION PROJECT, SO. DAKOTA
BELLE FOURCHE DAM
BALANCED VALVE, 58 INCH DIAMETER

from Los Angeles drawing No 2-138

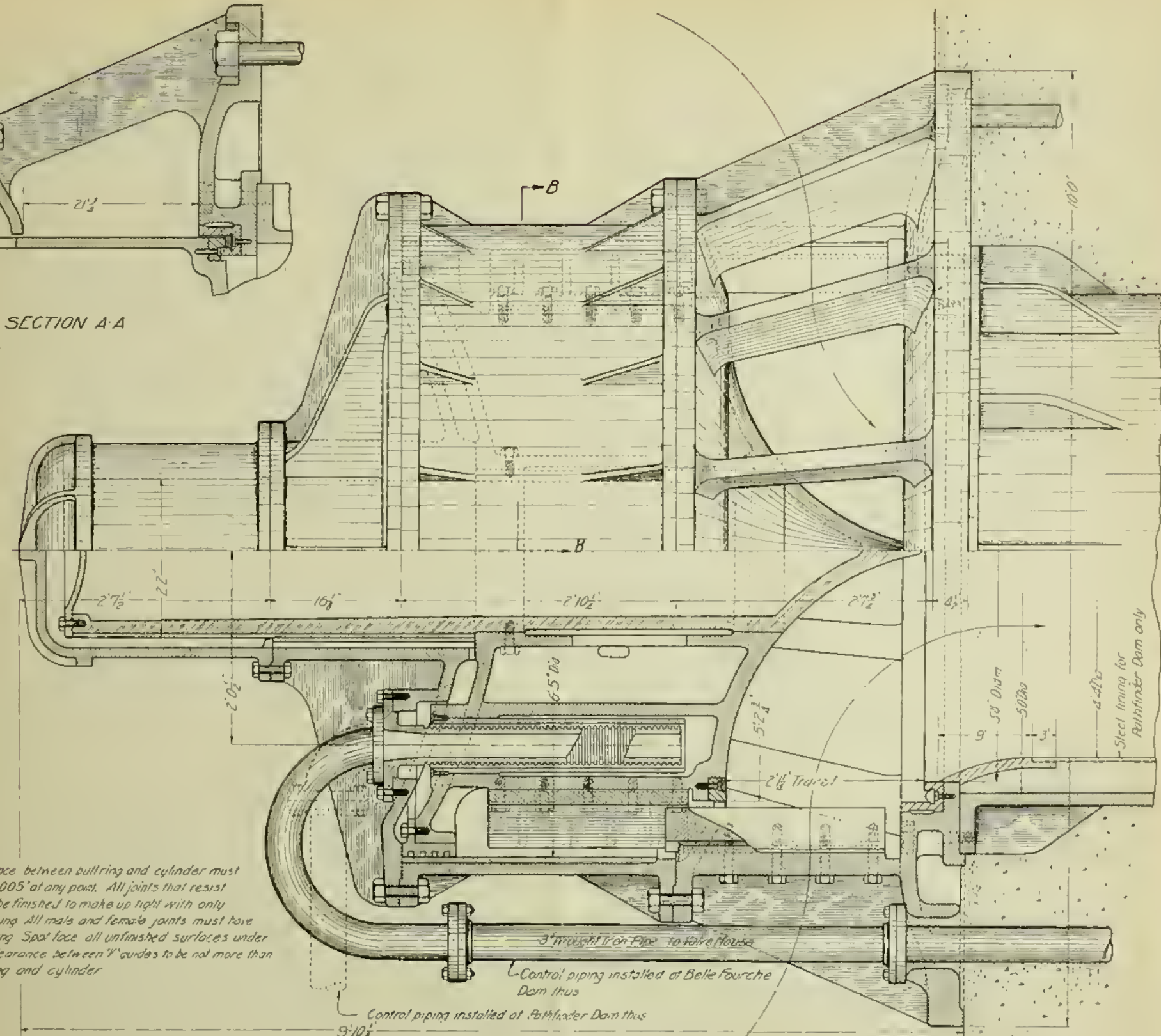
NO. 20377 PLATE 37 OF 88

1923

20-E-20



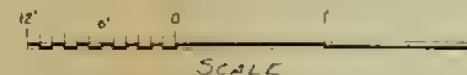
SECTION A-A



SECTIONAL ELEVATION

NOTE: Clearance between bullring and cylinder must not be more than 0.005" at any point. All joints that resist water pressure to be finished to make up tight with only white lead for packing. All male and female joints must have perfect side bearing. Spot face all unfinished surfaces under bolts and nuts. Clearance between "g" guides to be not more than half that of bullring and cylinder.

PLAN AND SECTION B-B



NOTE SAME DESIGN USED FOR
PATHFINDER DAM

NOTE: Retroced from Los Angeles drawing No 2-138

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BELLE FOURCHE IRRIGATION PROJECT, S.D. DAKOTA
BELLE FOURCHE DAM
BALANCED VALVE, 58 INCH DIAMETER
NO 20377 PLATE 37 OF 88
1923

BILL	
N ^o	REQ'D.
3	
2	
2	
3	
6	
2	
24	
24	
1	
1	

10 x 12
WALL, ON
FACT A



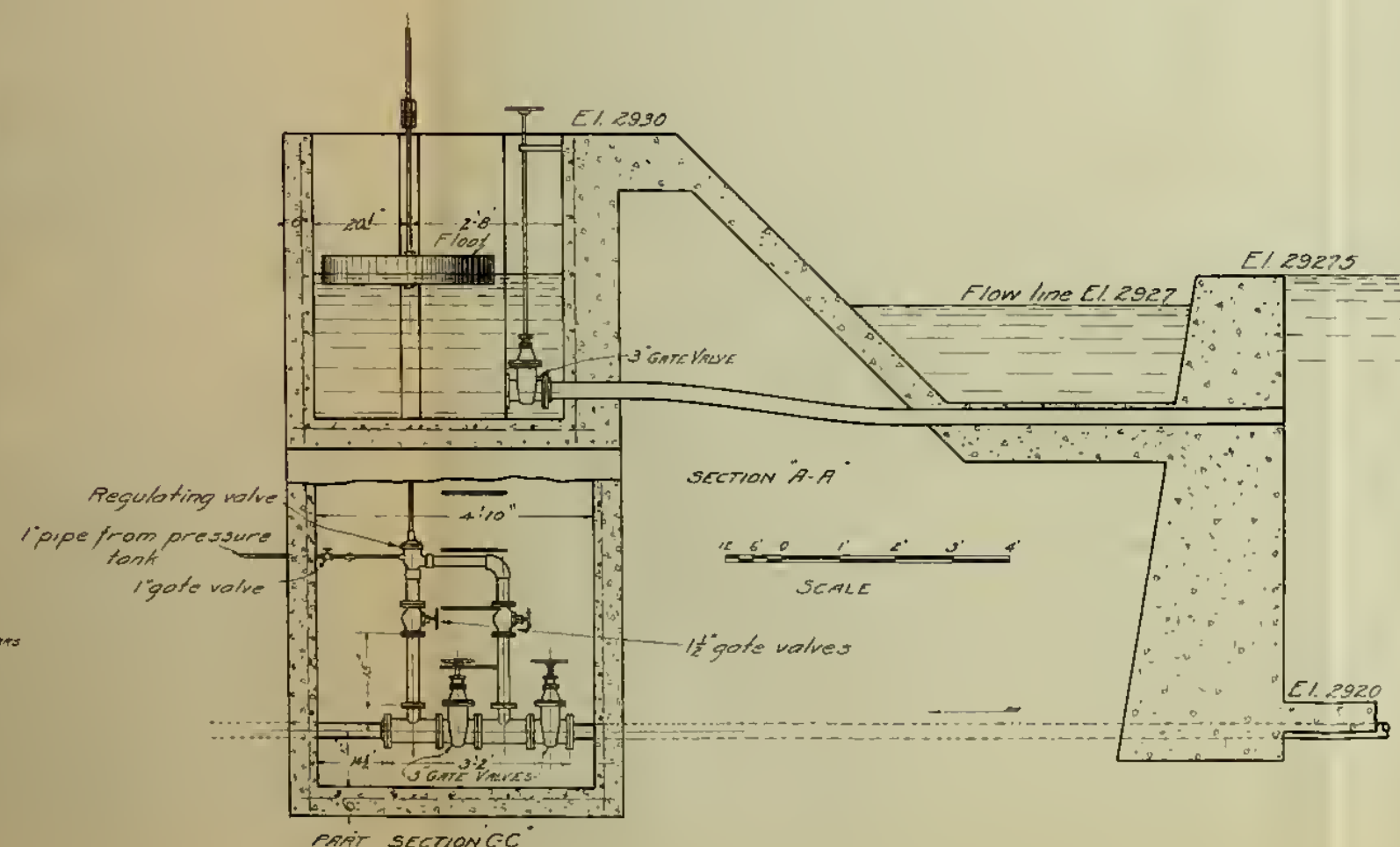
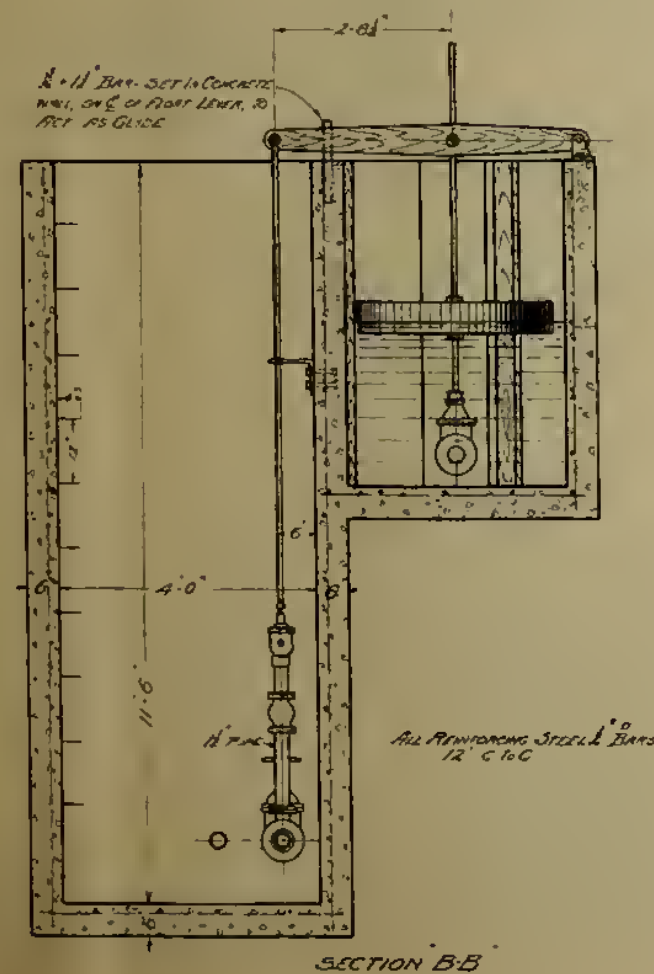
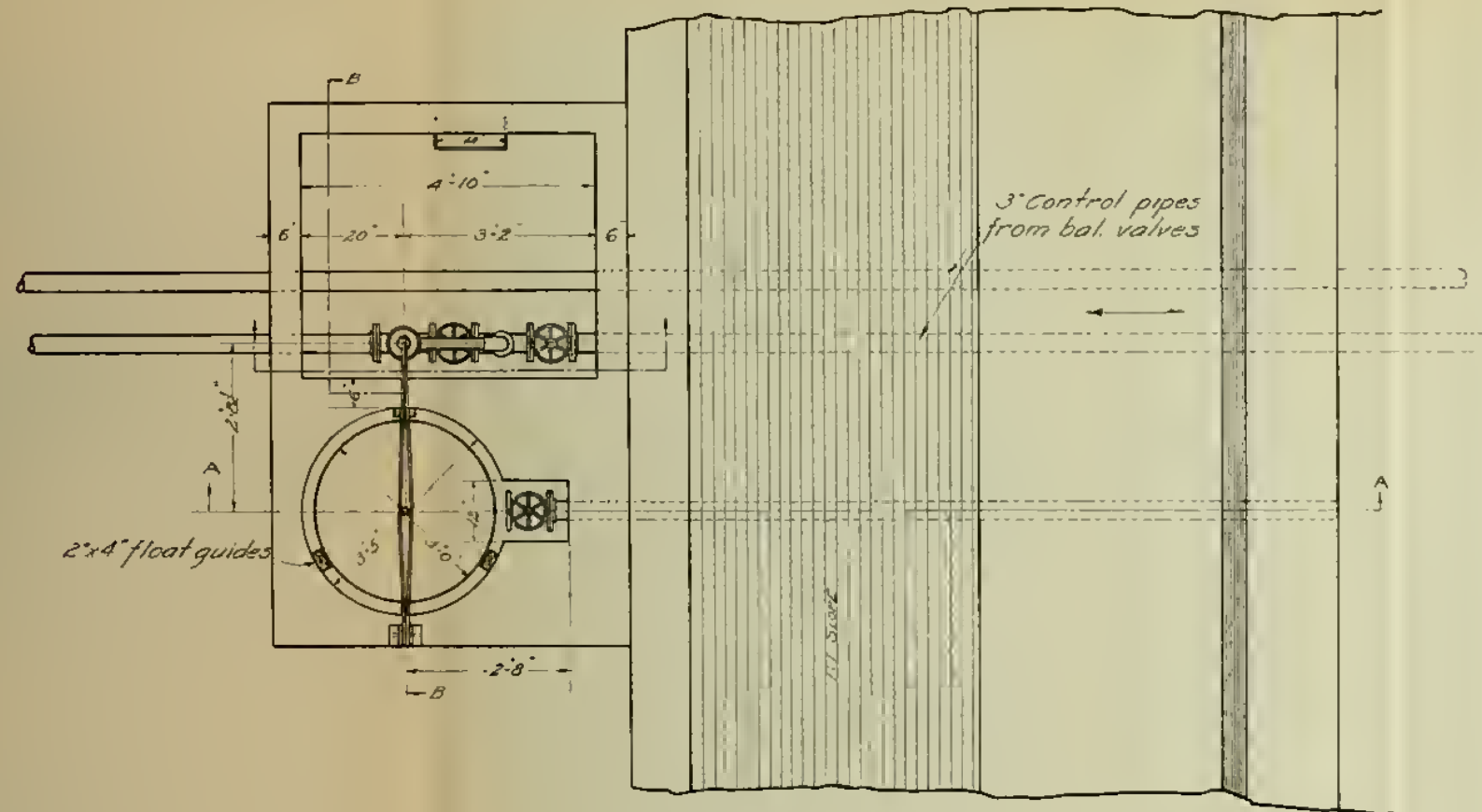
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BELLE FOURCHE IRRIGATION PROJECT
SOUTH DAKOTA

BELLE FOURCHE DAM
BALANCED VALVE DISCHARGE REGULATOR

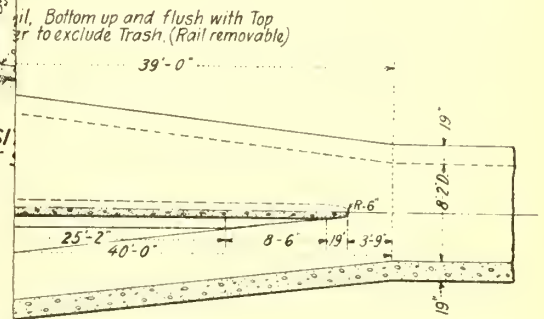
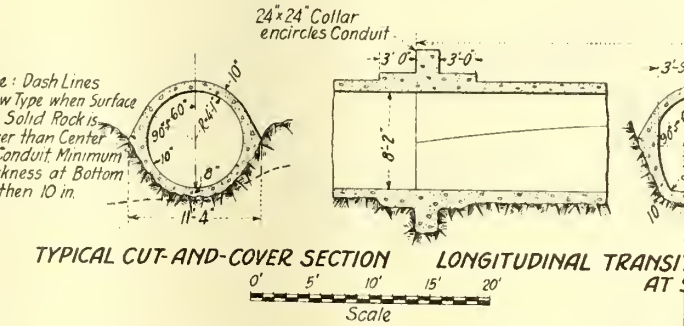
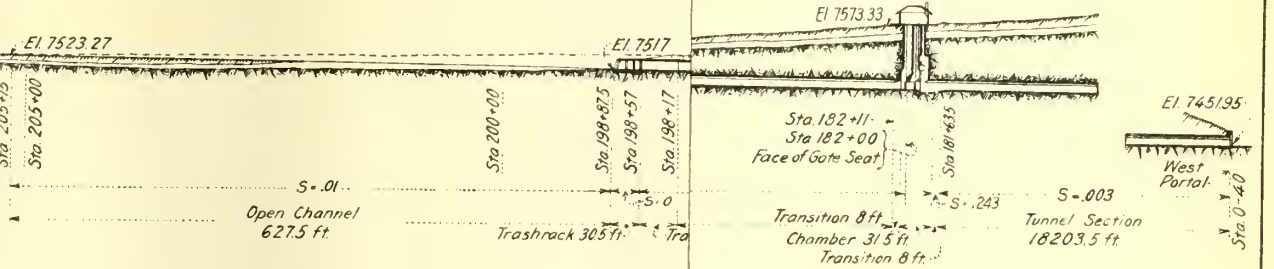
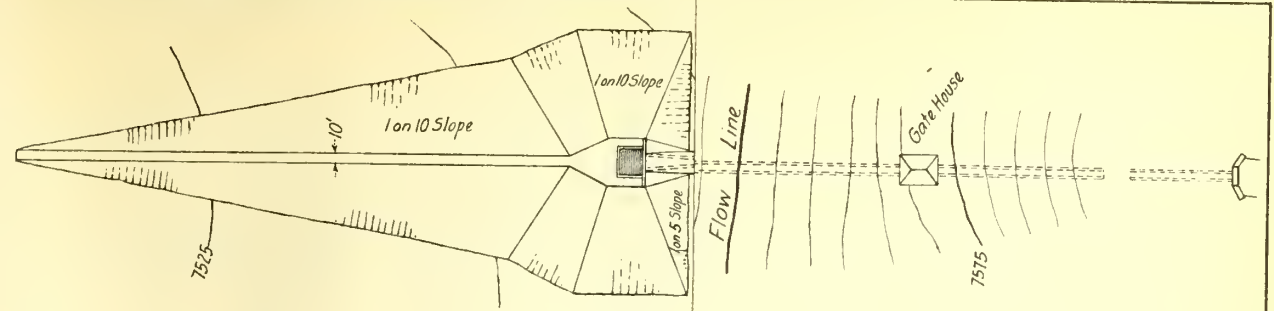
NO. 20378 PLATE 38 OF 88

1923

BILL OF MATERIAL FOR ONE REGULATOR			
NO. REQ'D.	SIZE	MATERIAL	DESCRIPTION
3	3"	C.I.	FLANGED GATE VALVES
2	1 1/2"	"	"
2	3' 3" x 1 1/2"	"	FLANGED REDUCING TEES
3	3"	"	COMPARISON FLANGES
6	1 1/2"	"	"
2	1 1/2"	STD W.I.	PIPE 15' LONG JAW 20' 2000
24	3/8" x 2 1/2"	50 HD	MATCH BOLTS
24	3/8" x 1 1/2"	"	"
1	1"	BRASS	GATE VALVE
1	1"	"	UNION

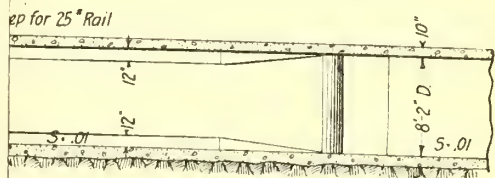


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BELLE FOURCHE IRRIGATION PROJECT
SOUTH DAKOTA
BELLE FOURCHE DAM
BALANCED VALVE DISCHARGE REGULATOR
NO 20378 PLATE 38 OF 88
1923



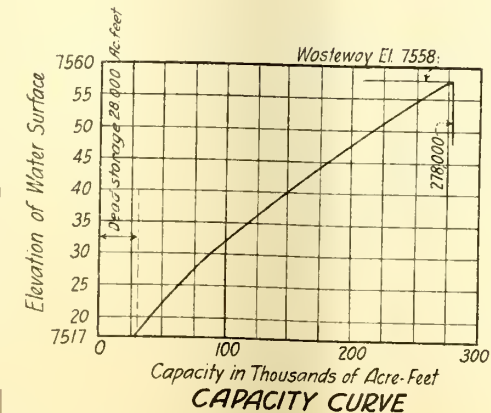
Note Reinforcement not shown

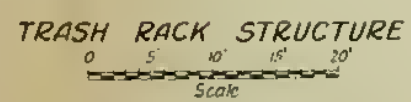
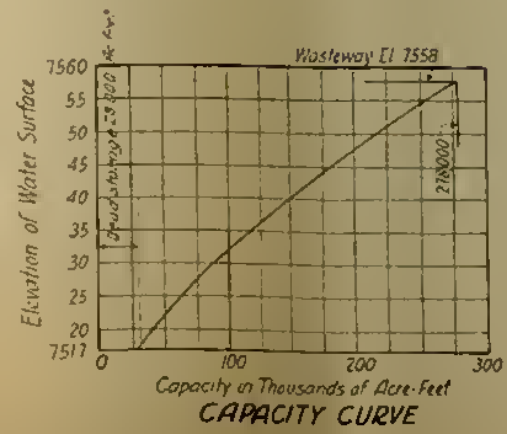
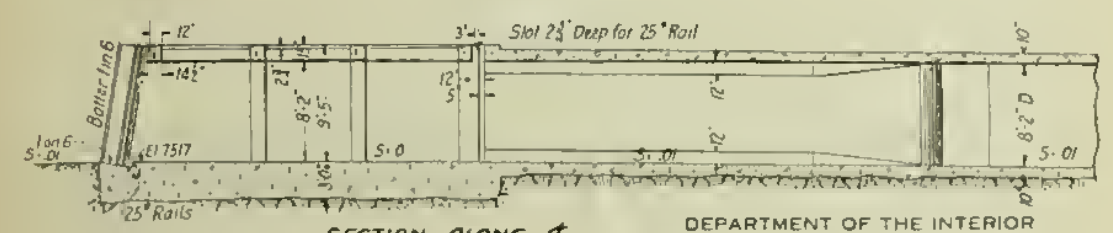
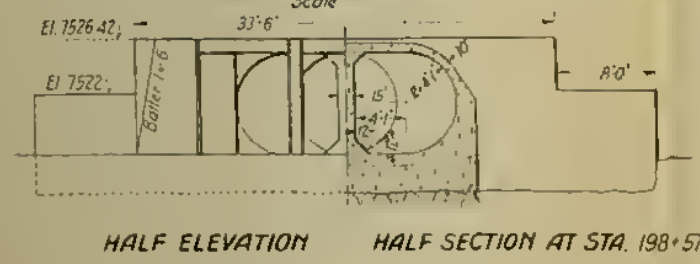
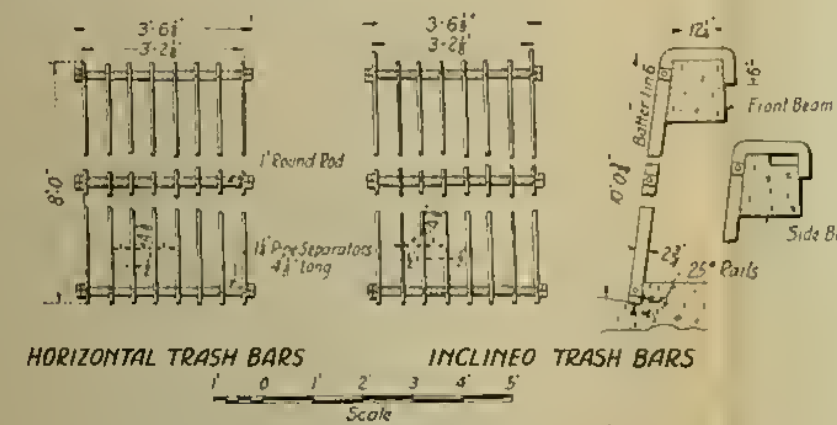
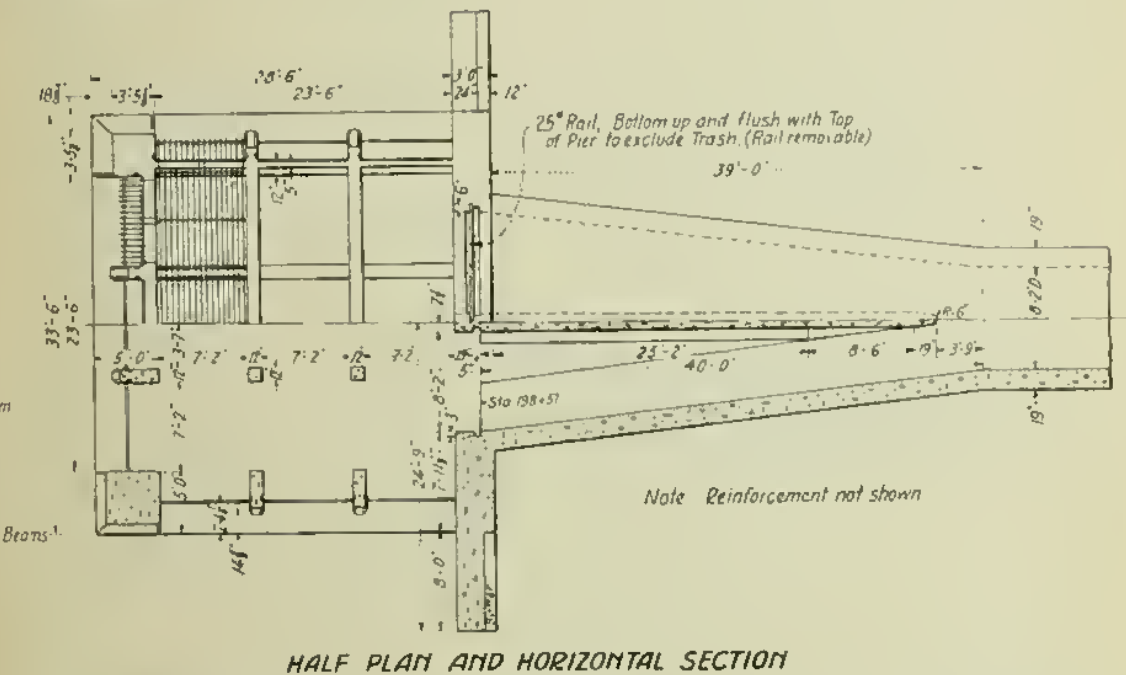
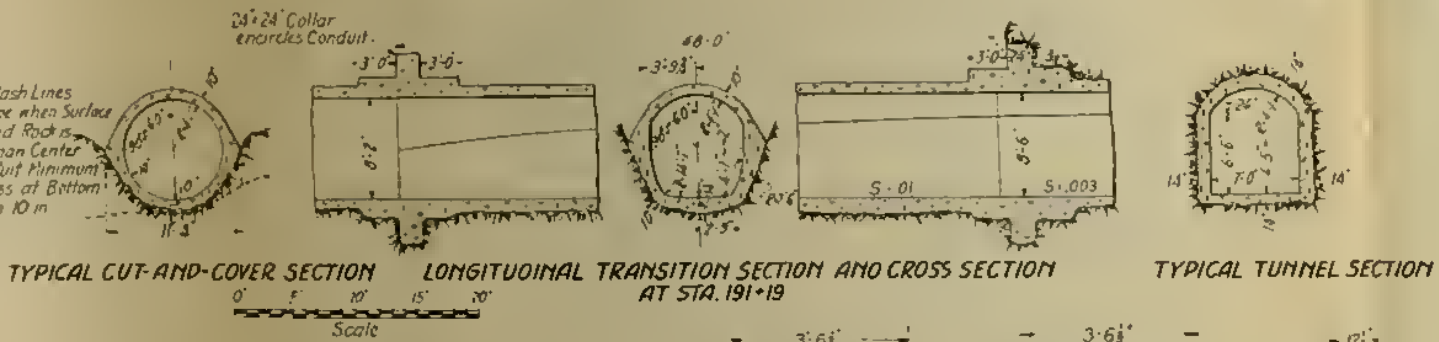
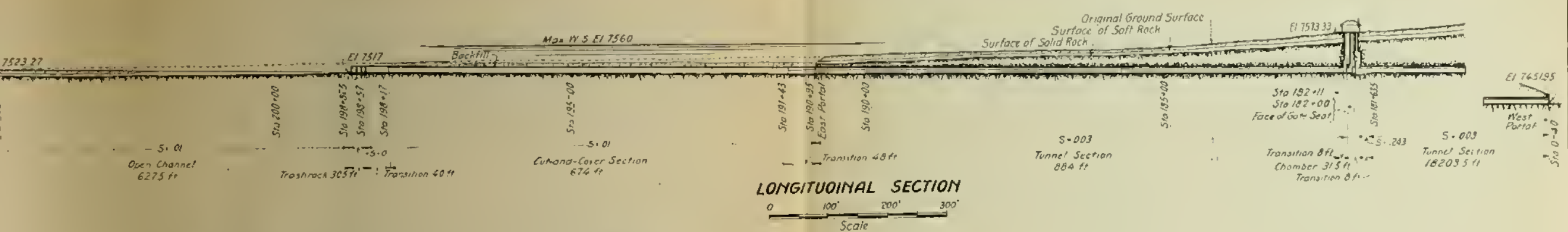
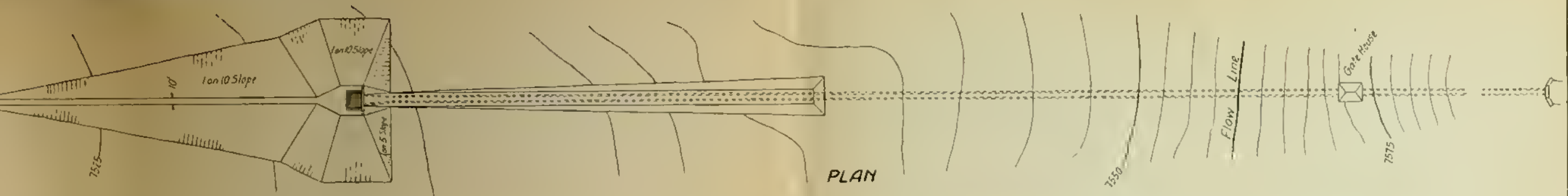
HORIZONTAL SECTION



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
STRAWBERRY VALLEY IRRIGATION PROJECT
UTAH
STRAWBERRY TUNNEL CONTROL WORKS
GENERAL PLAN AND TRASH RACK DETAILS

NO. 20379 PLATE 39 OF 88
1923





DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
STRAWBERRY VALLEY IRRIGATION PROJECT
UTAH
STRAWBERRY TUNNEL CONTROL WORKS
GENERAL PLAN AND TRASH RACK DETAILS

NO 20379 PLATE 39 OF 88
1923

NOTE This Drawing compiled from Design Drawings made in the Project Office 1 of 5

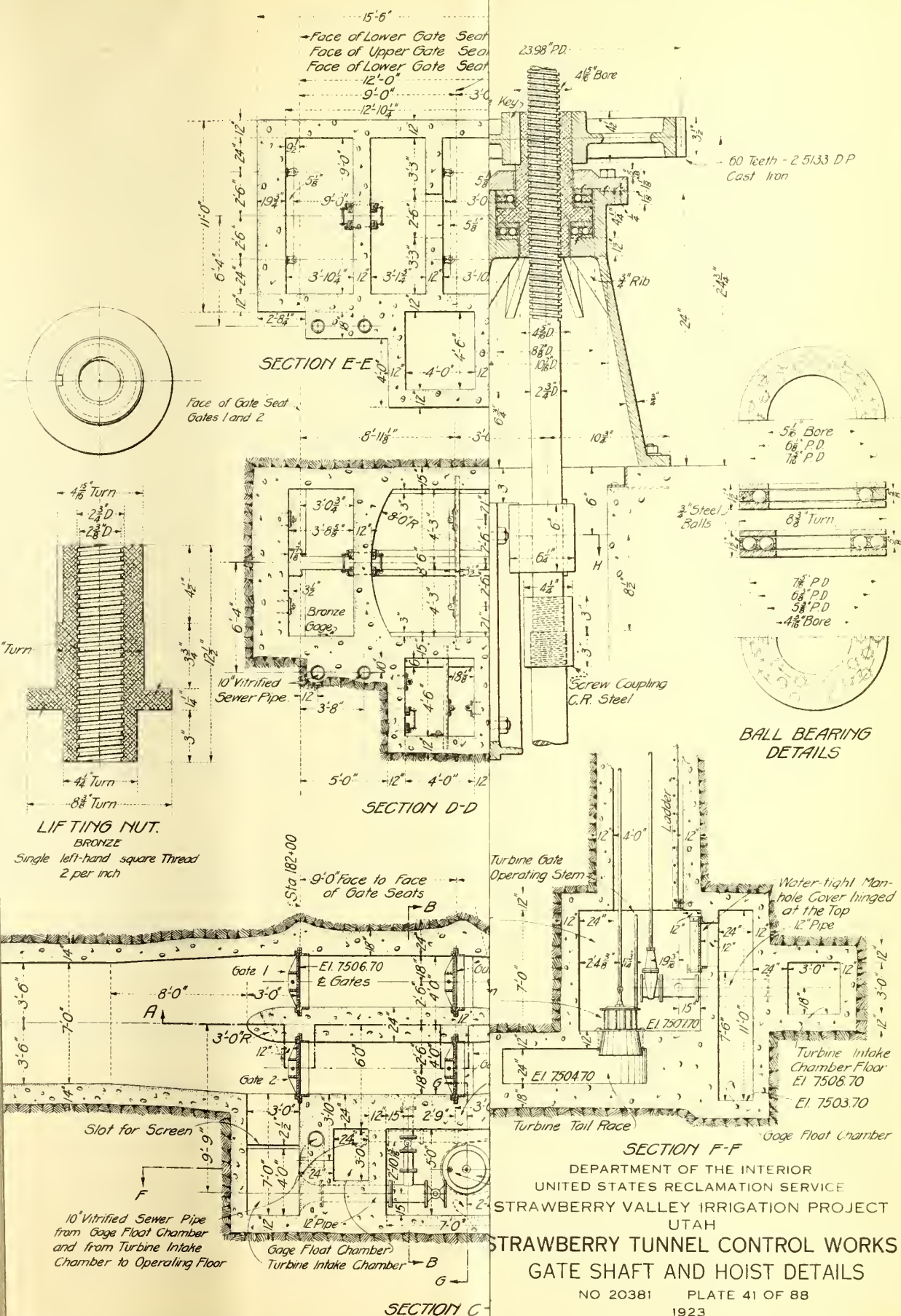


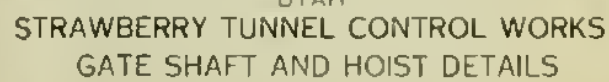
NO. 20380 PLATE 40 OF 88

PLATE 40 OF 88
1923

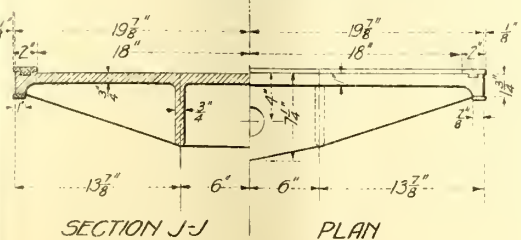
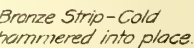
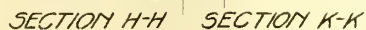
27-C-25



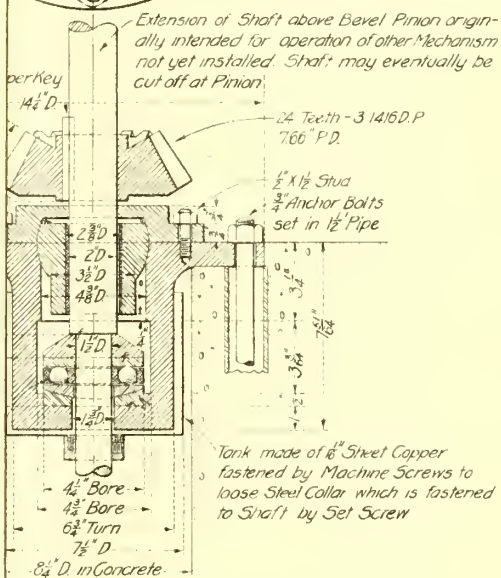
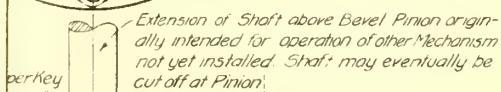




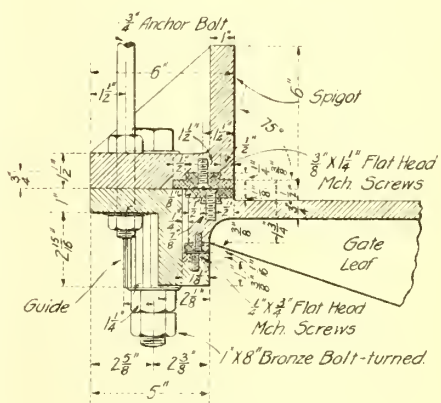
27-C-26



GATE LEAF DETAILS

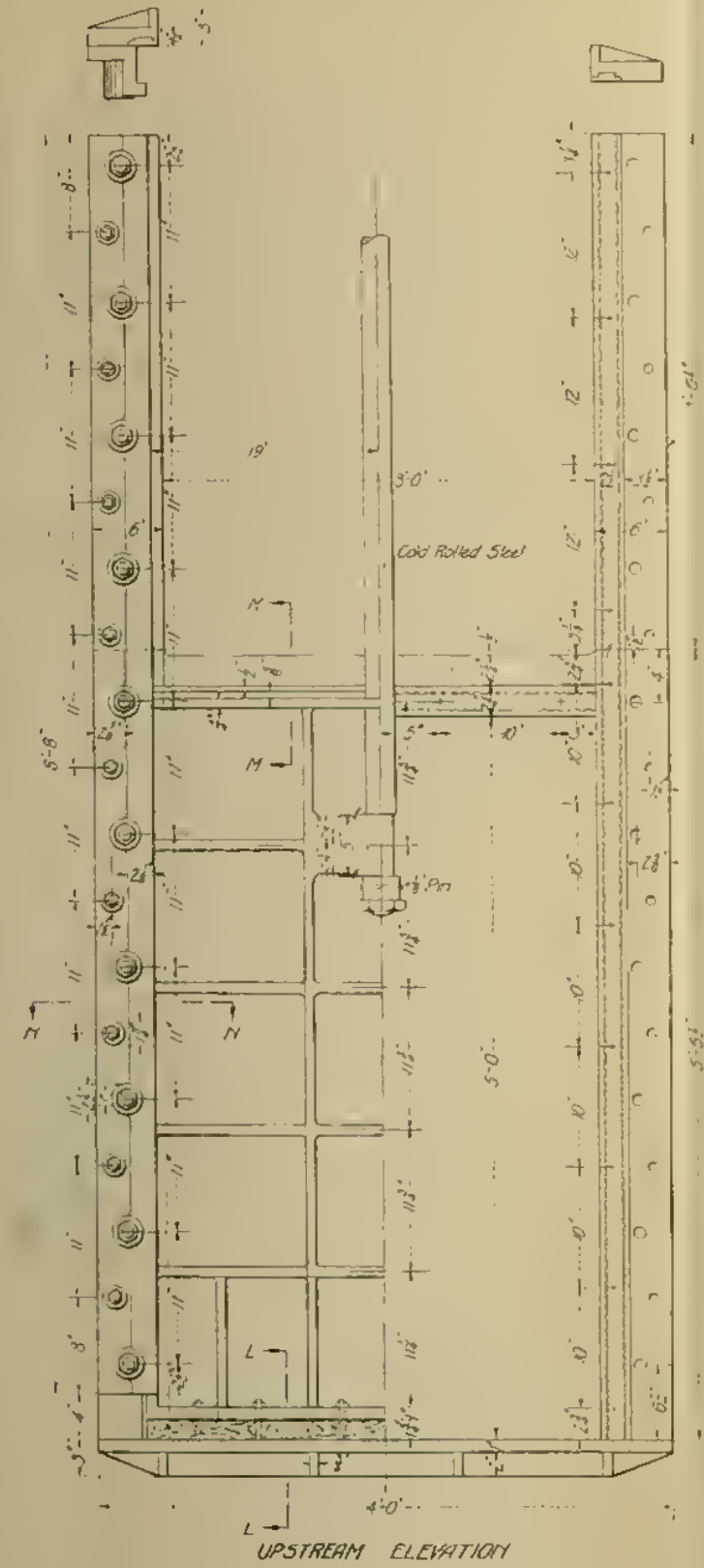
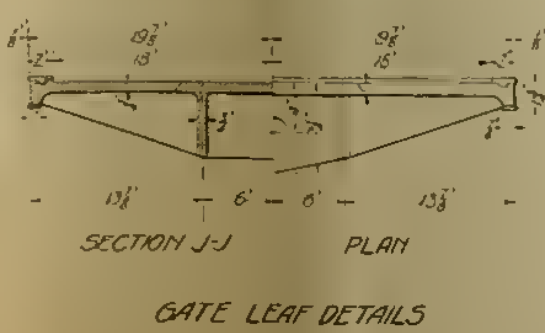
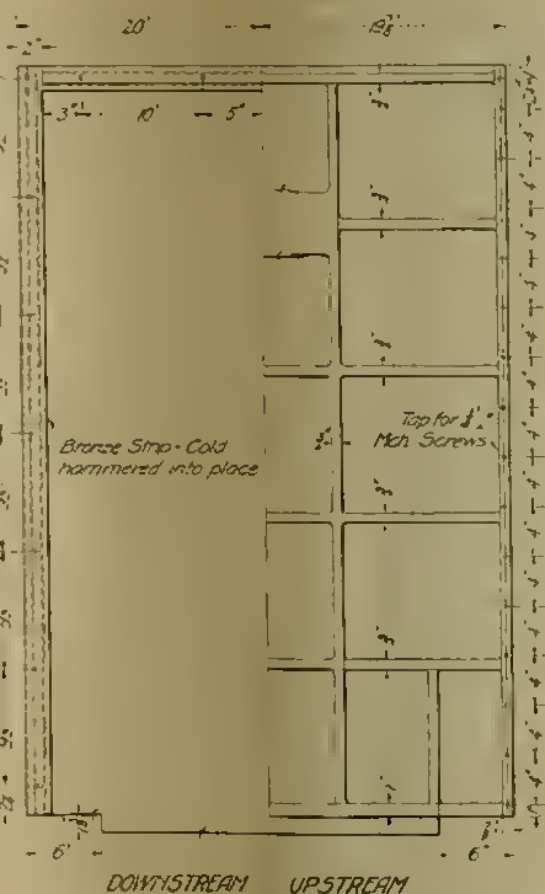
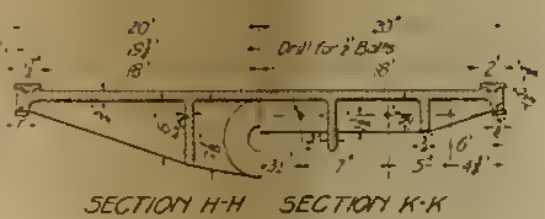


SHAFT THRUST BEARING.
CAST IRON

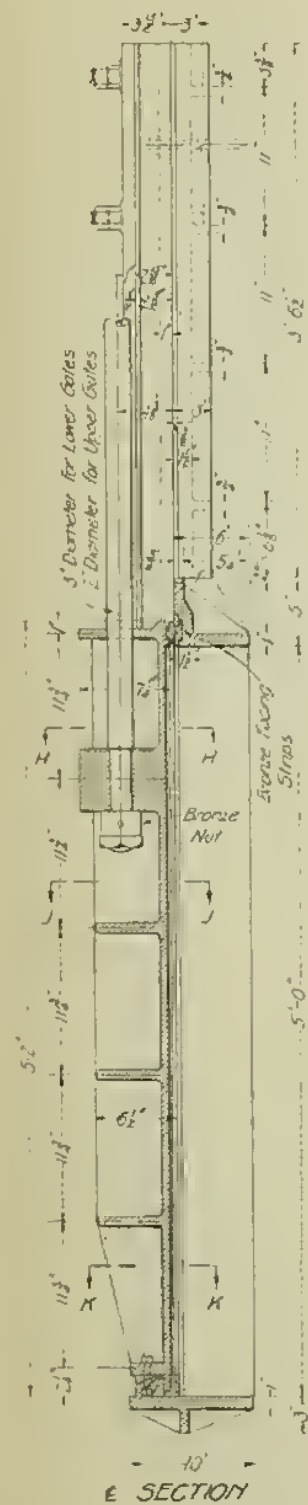


SECTION N-N

NO. 20382 PLATE 42 OF 88
1923



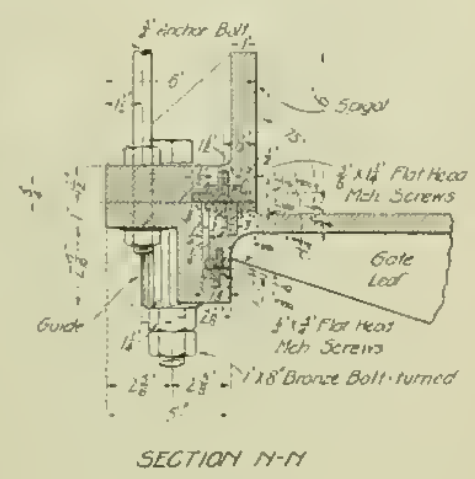
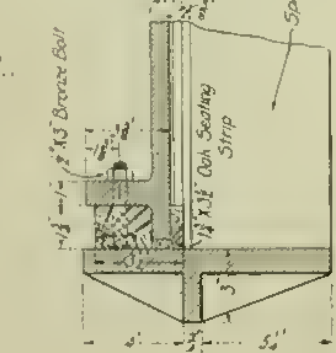
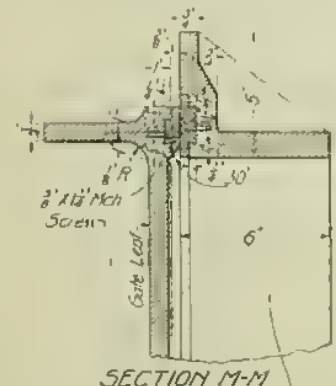
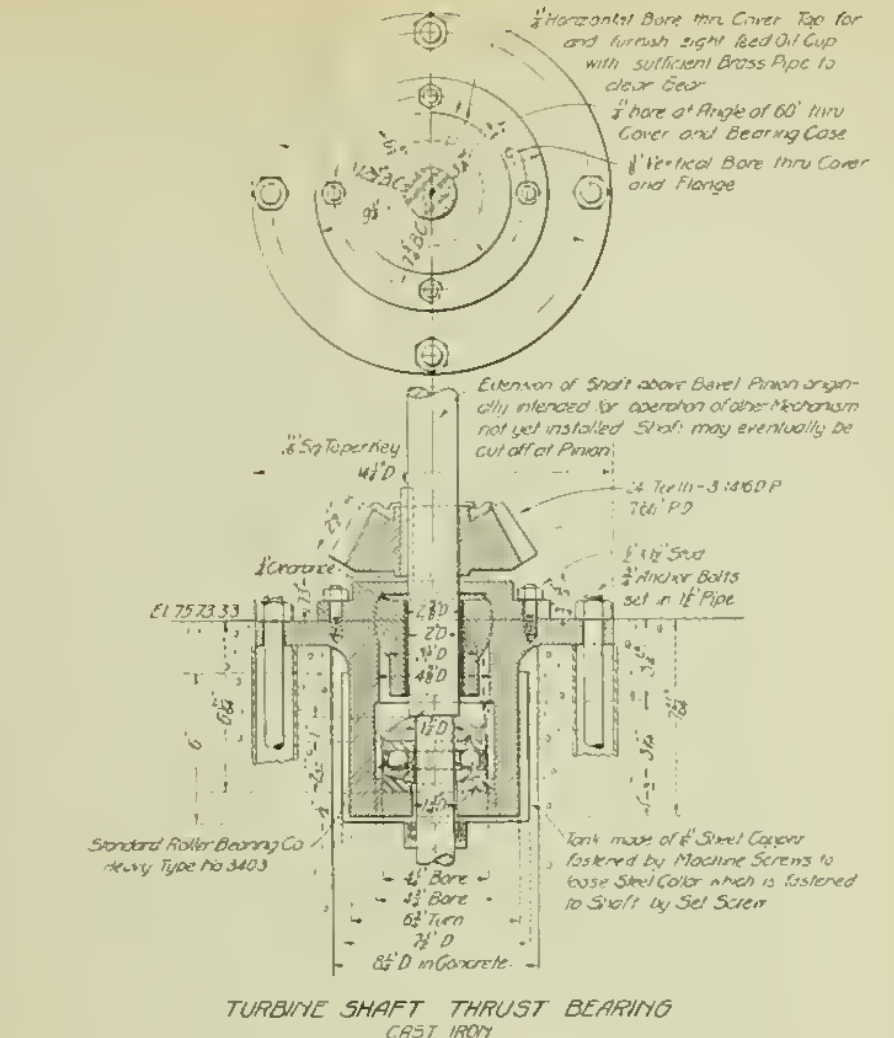
Gate Frame Extension



GATE ASSEMBLY

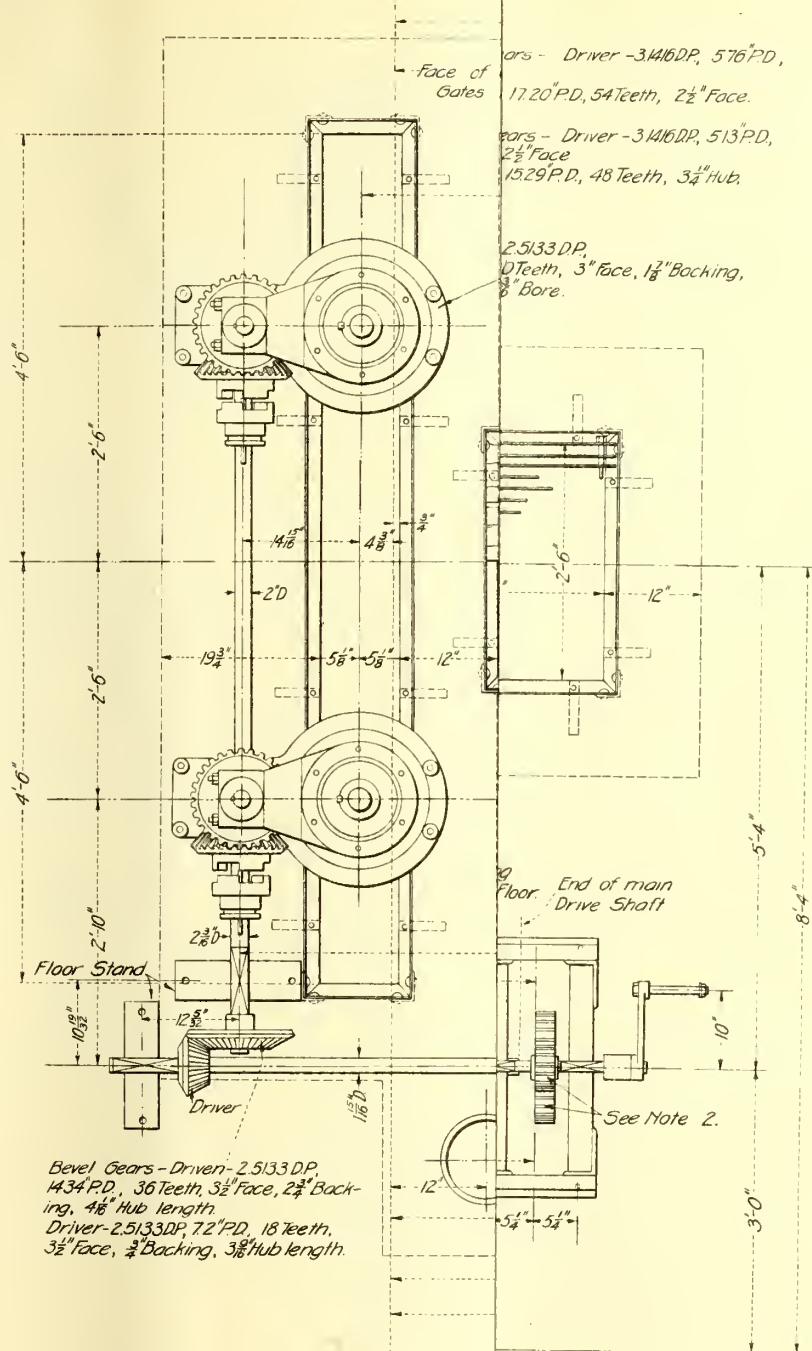
NOTE Gate and Frame of Cast Iron with Bronze Seal

Note This Drawing Compiled from Design Drawings made in the Project Office

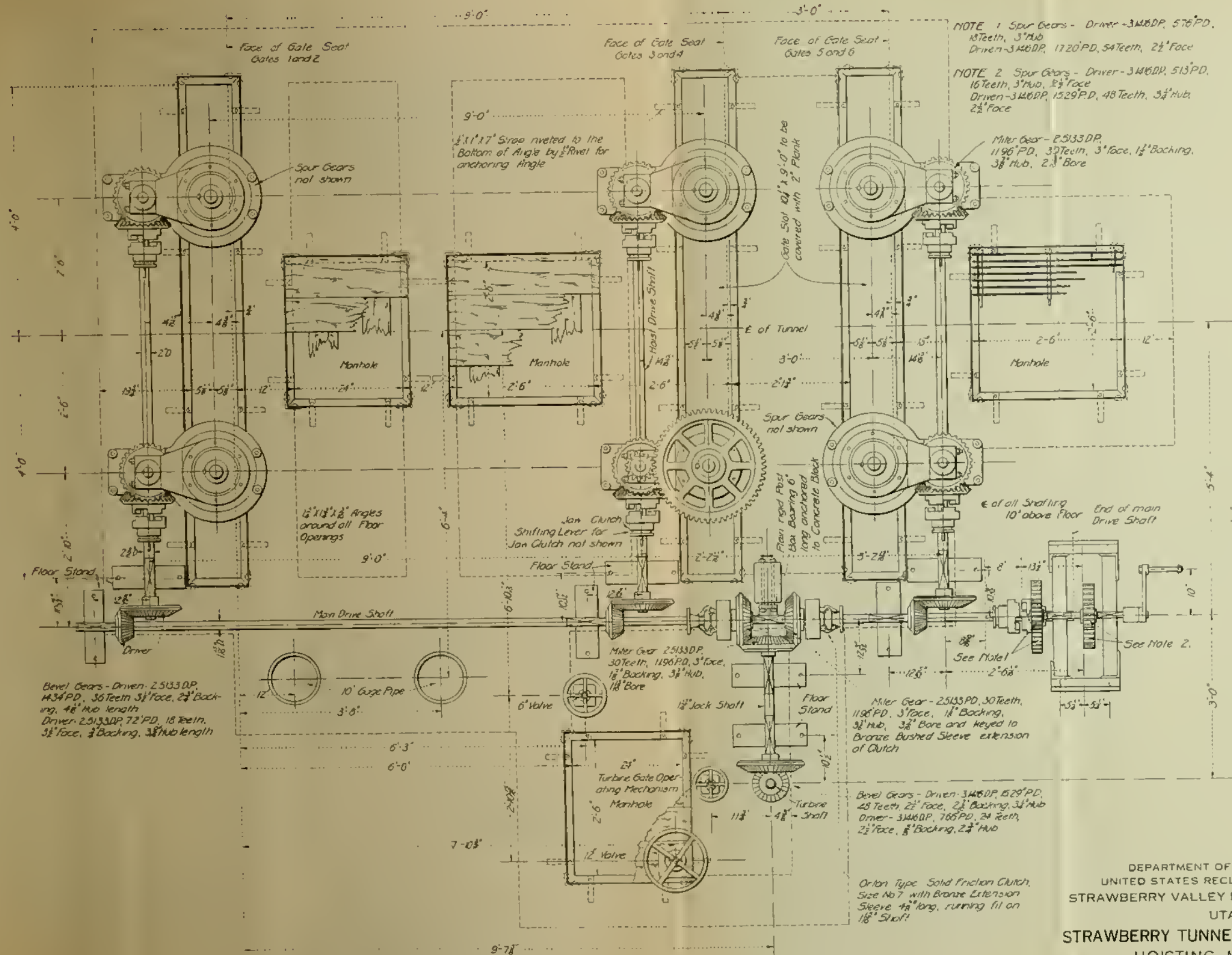


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
STRAWBERRY VALLEY IRRIGATION PROJECT
UTAH
STRAWBERRY TUNNEL CONTROL WORKS
GATE AND THRUST BEARING DETAILS

NO 20382 PLATE 42 OF 88
1923



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
STRAWBERRY VALLEY IRRIGATION PROJECT
UTAH
STRAWBERRY TUNNEL CONTROL WORKS
HOISTING MACHINERY
NO. 20383 PLATE 43 OF 87
1923



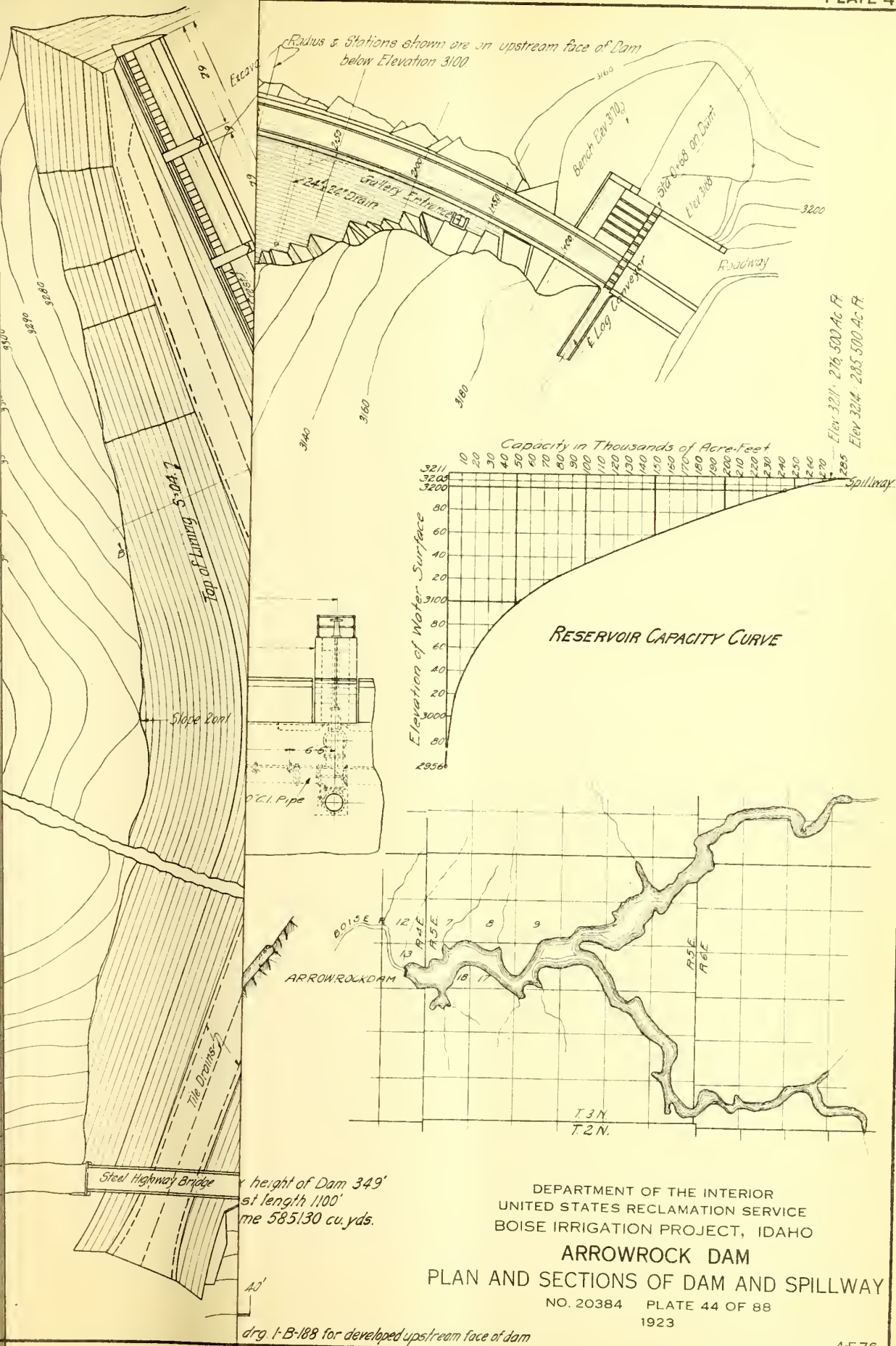
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
STRAWBERRY VALLEY IRRIGATION PROJECT
UTAH
STRAWBERRY TUNNEL CONTROL WORKS
HOISTING MACHINERY

NO 20383 PLATE 43 OF 87
1923

Notes This Drawing compiled from Design Drawings made in the Project Office

Set 5

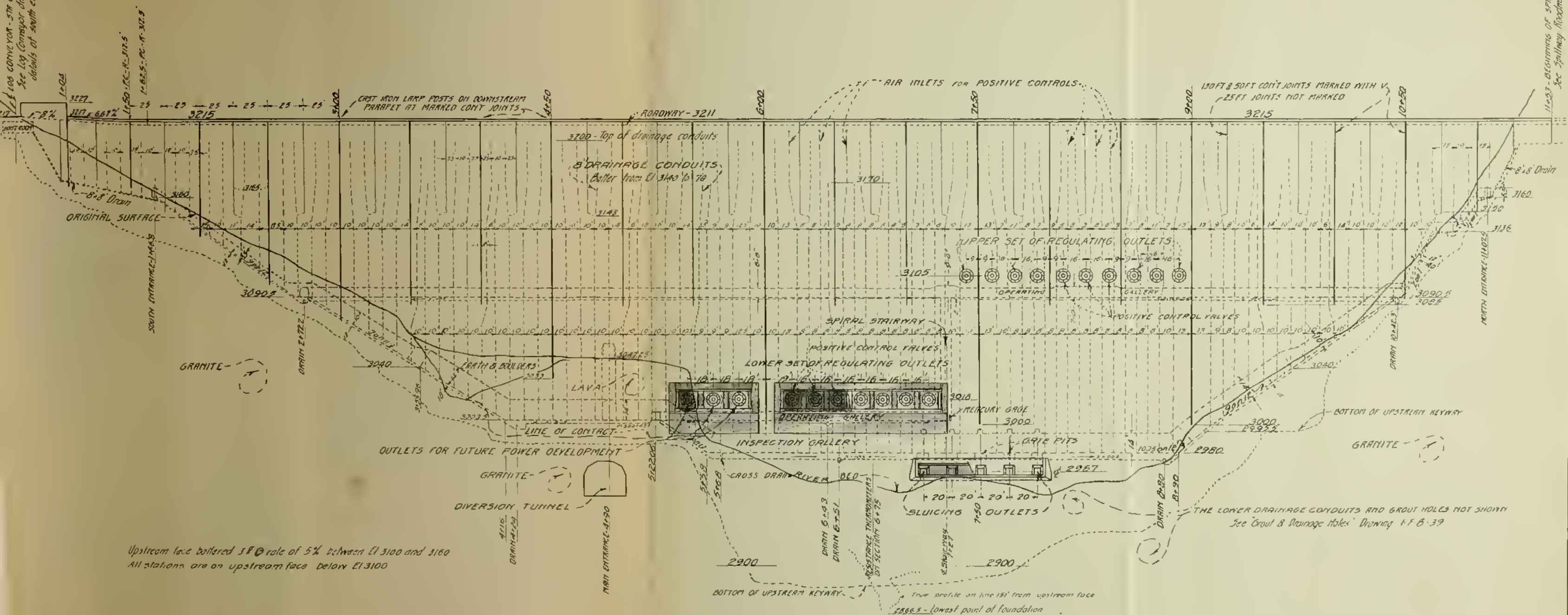
27-C-28



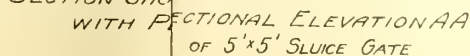
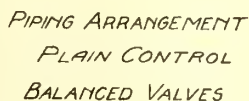
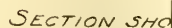
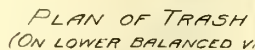


See Log Conveyer drawings for details of south end of Dam

See Spillway drawings for details of north end of Dam



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BOISE IRRIGATION PROJECT IDAHO
ARROWROCK DAM
UPSTREAM FACE OF DAM
NO 20385 PLATE 45 OF 88
1923



- Notes:
- 10 - 58" Balanced Valves at Elev 3018 - Max head 100 ft
 - 3 Positive control for regulation.
 - 7 Plain control - operated at full capacity.
 - 10 - 58" Balanced Valves at Elev 3018 - Max head 187 ft
 - 3 Positive control for regulation.
 - 4 Plain control - operated at full capacity.
 - 3 Plain control for future power conduits.
 - Fill balanced valves to be operated at not over 100 ft head.
 - 5'-5'x5' Hydraulic Sluice Gates at Elev 2967 Max head on gates 238 ft. to be operated at not over 60 ft head

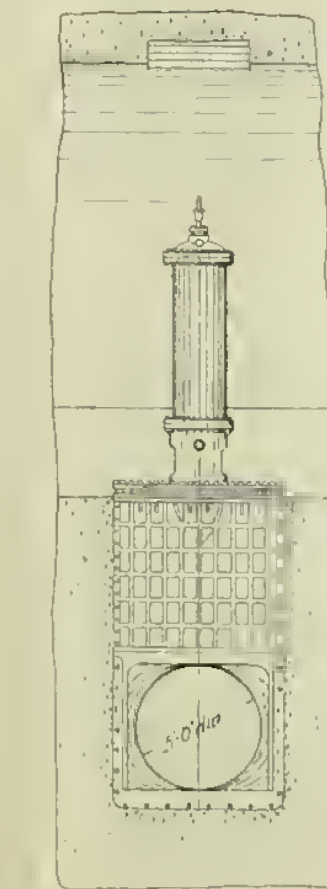
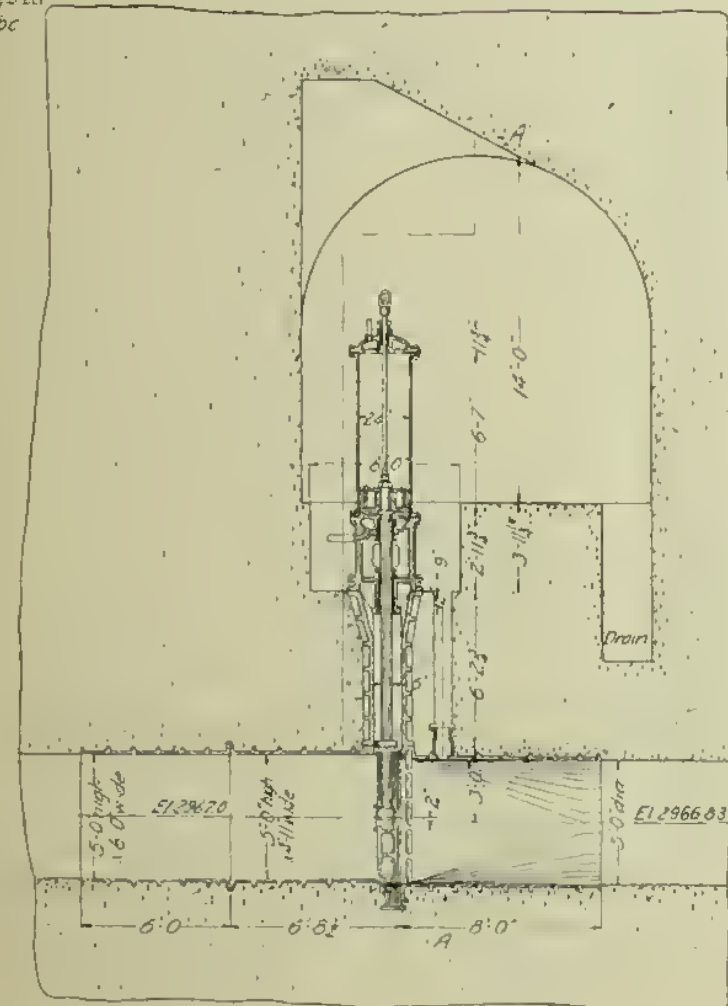
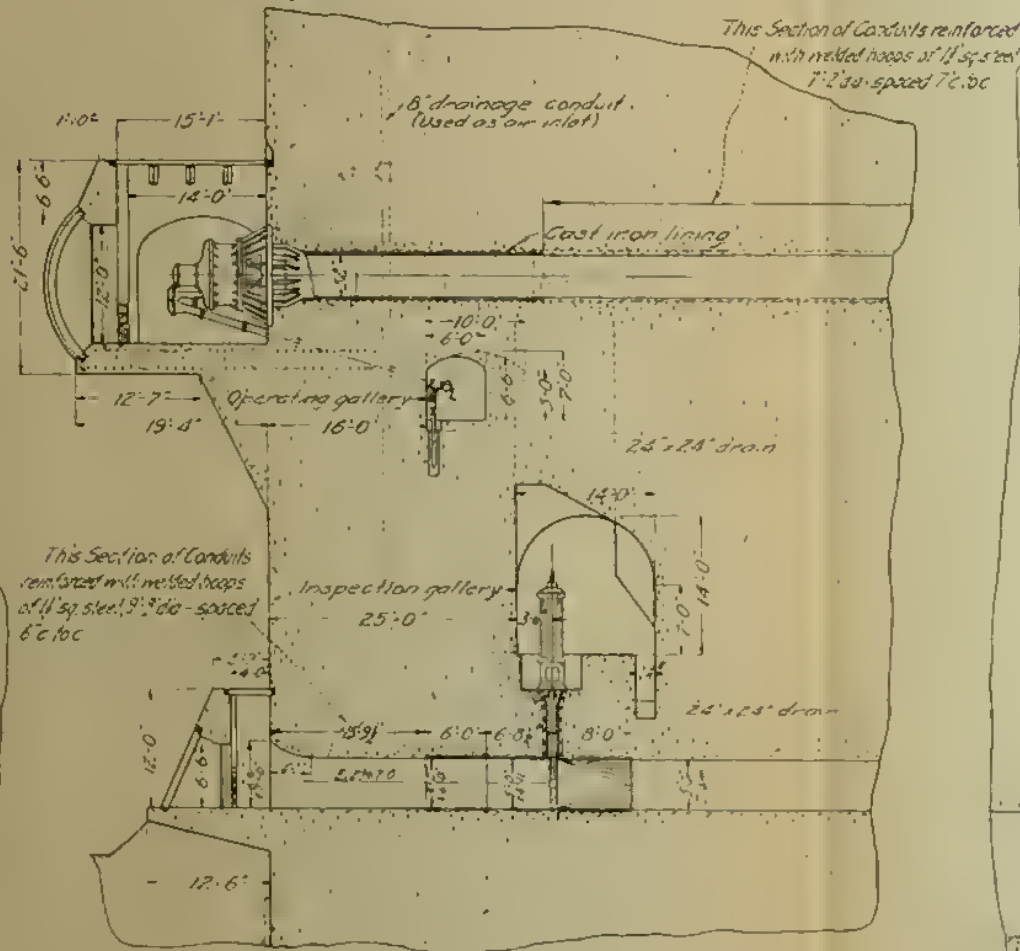
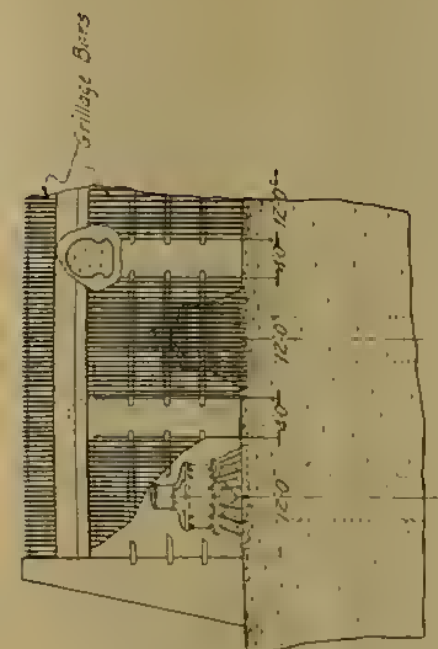
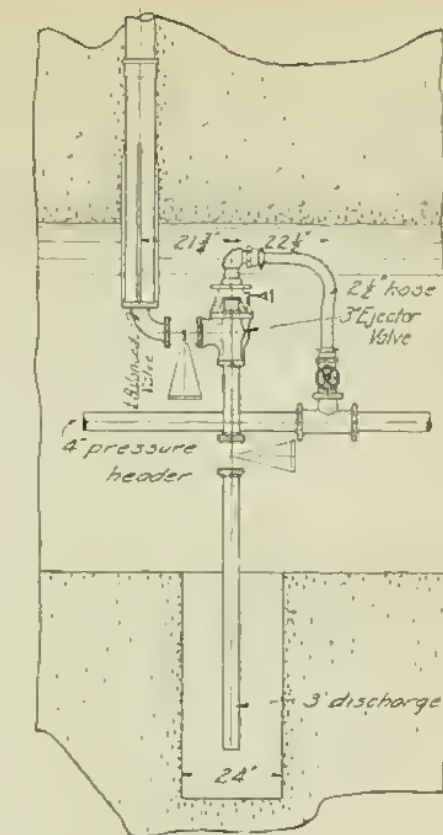
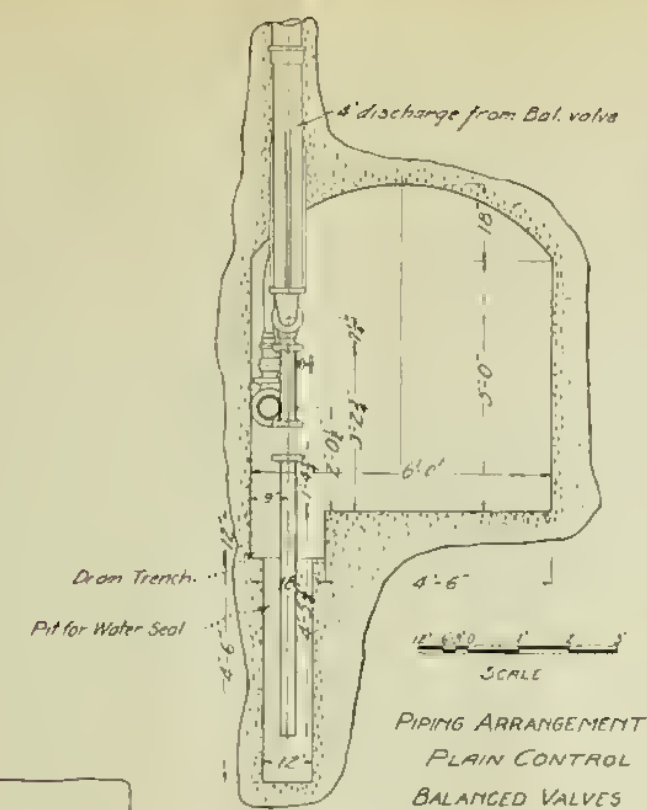
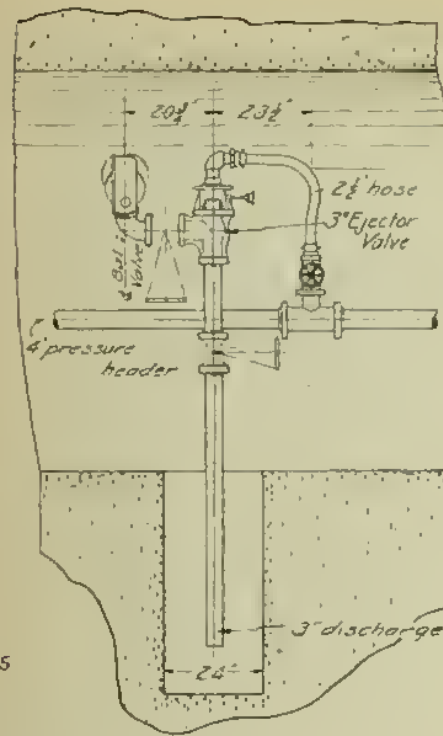
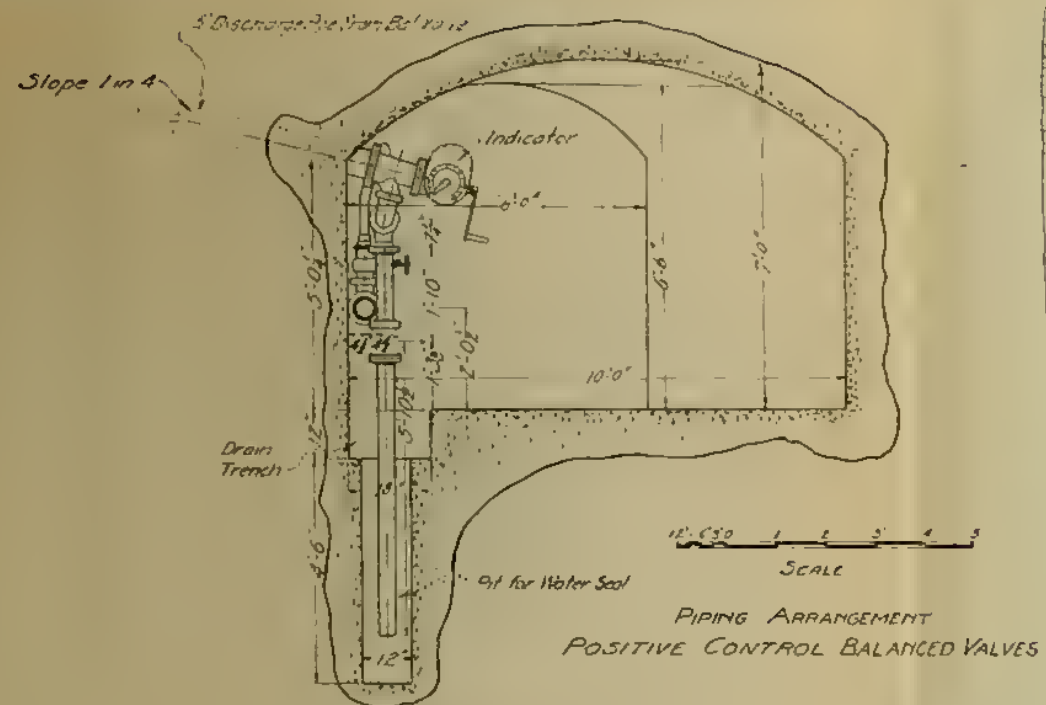
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BOISE IRRIGATION PROJECT, IDAHO

ARROWROCK DAM BALANCED VALVE AND SLUICE GATE INSTALLATION

NO. 20386

PLATE 46 OF 88

1923



Notes:

- 10' 58" Balanced Valves at Elev 3018 - Max head 100 ft
- 3 Positive control for regulation
- 7 Plain control - operated at full capacity
- 10' 58" Balanced Valves at Elev 3018 - Max head 187 ft
- 3 Positive control for regulation
- 4 Plain control - operated at full capacity
- 3 Plain control for future power conduits
- All balanced valves to be operated at not over 100 ft head
- 5' 5" x 5' Hydraulic Sluice Gates at Elev 2967 Max head on gates 238 ft to be operated at not over 60 ft head

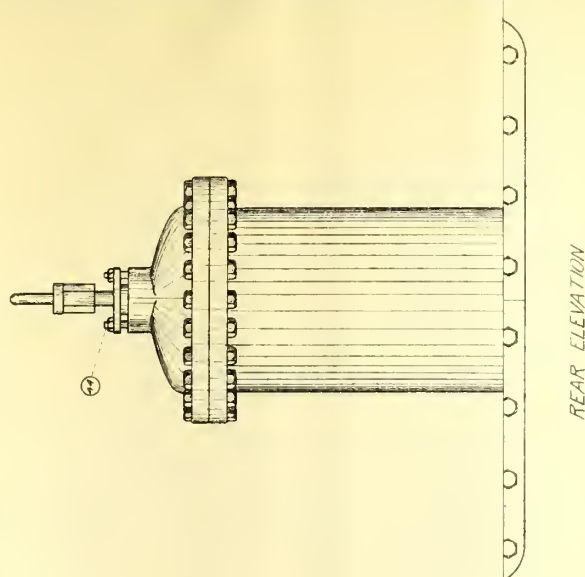
SECTION SHOWING UPPER BALANCED VALVE WITH PLAIN CONTROL

SCALE

SECTION THRU 5' x 5' SLUICE GATE
5 Gates installed - Max head 238 ft

SCALE

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BOISE IRRIGATION PROJECT, IDAHO
**ARROWROCK DAM
BALANCED VALVE
AND SLUICE GATE INSTALLATION**
NO 20386 PLATE 46 OF 88
1923

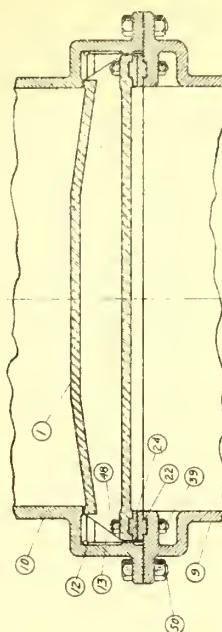
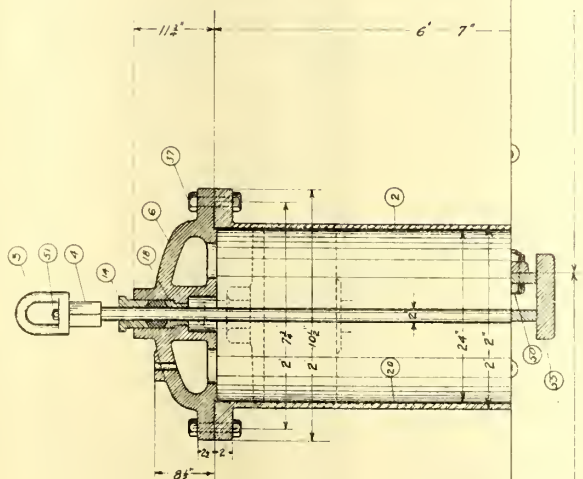


REAR ELEVATION

8' 0"

LONGITUDINAL SECTION

6' 0"

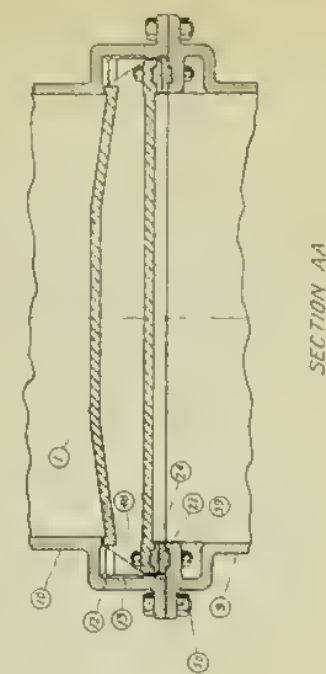
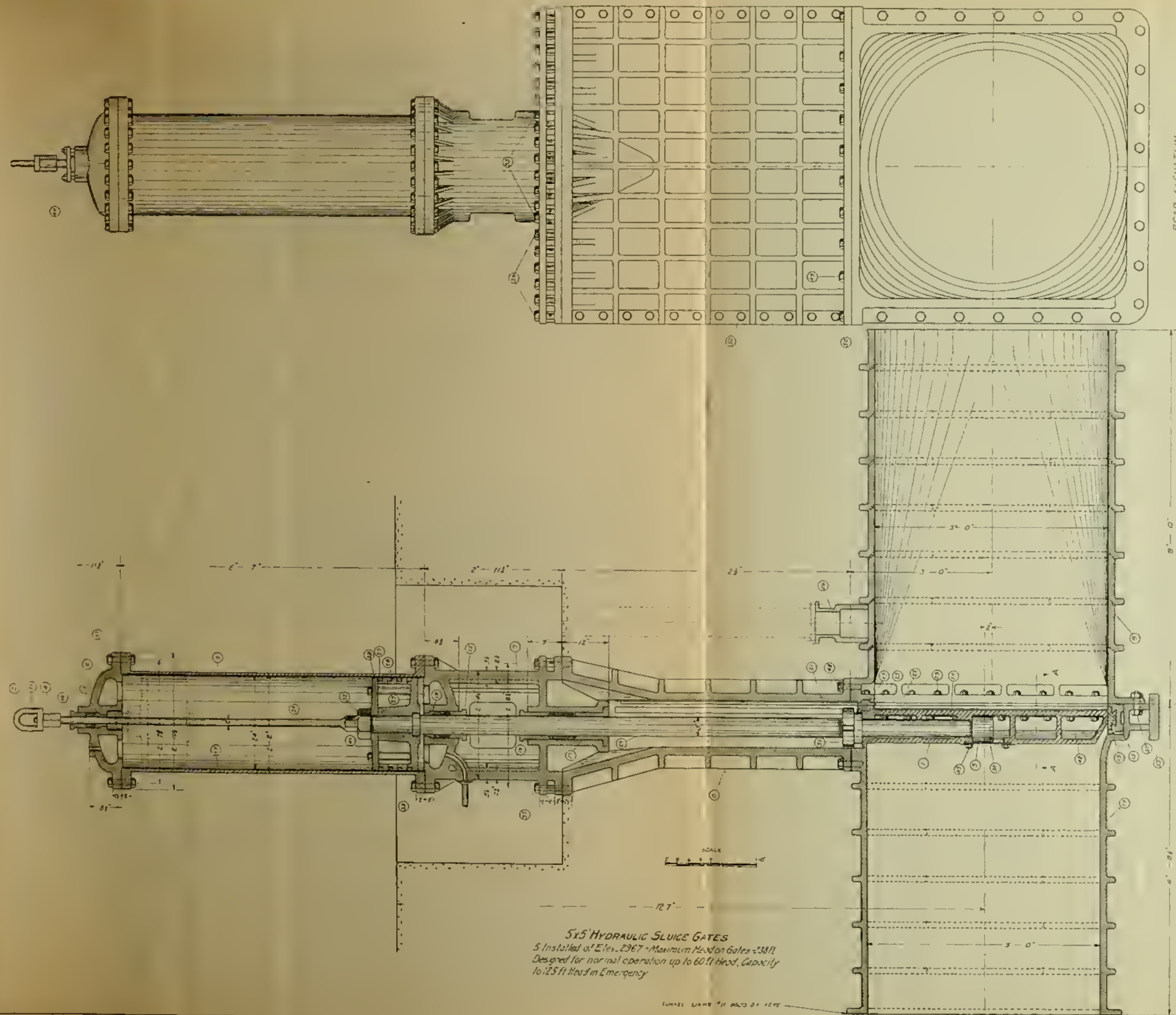


SECTION AA

BILL OF MATERIAL FOR ONE GATE				
NO.	QTY.	MATERIAL	NAME OF PART	REMARKS
1	1	CAST IRON	GATE LEAF	SEE BING 13-300
2	1	CAST IRON	CYLINDER	" 13-300
3	1	"	SAFETY LOCK EYE	" 13-300
4	1	"	NUT	" 13-300
5	1	"	PISTON COVER	" 13-300
6	1	CAST IRON	CYLINDER HEAD	" 13-300
7	1	"	GATE PISTON COVER	" 13-300
8	1	"	GATE PISTON (TWO PIECES)	" 13-300
9	1	"	DISCHARGE PIPE	" 13-300
10	1	"	INLET PIPE	" 13-300
11	1	"	TUNNEL LINING	" 13-300
12	1	"	GATE SEAL	" 13-300
13	1	BRASS	GATE SEAL FILLS	" 13-300
14	1	ON BRASS	STUFFING BOX GLAND	" 13-300
15	1	"	"	" 13-300
16	1	"	"	" 13-300
17	1	"	"	" 13-300
18	1	"	SEAL	" 13-300
19	1	"	"	" 13-300
20	1	"	CYLINDER LINING	" 13-300
21	2 (EACH)	"	GATE GUIDE	" 13-300
22	2 (EACH)	"	"	" 13-300
23	1	"	SEAL	" 13-300
24	2 (EACH)	"	"	" 13-300
25	1	"	"	" 13-300
26	3	"	BULL RING	" 13-300
27	4	"	PISTON RINGS	" 13-300
28	1	"	PISTON HEAD	" 13-300
29	1	"	GATE STEM	" 13-300
30	1	"	GATE STEM LOCK NUT	" 13-300
31	1	"	ADJUSTING NUT	" 13-300
32	1	"	PISTON LOCK NUT	" 13-300
33	1	"	PISTON BUSH	" 13-300
34	1	"	INDICATOR ROD	" 13-300
35	1	"	SCREW NUTS FOR PISTON SETS	" 13-300
36	2	"	"	" 13-300
37	2	"	BOLTS & NUTS - CYLINDER HEAD	" 13-300
38	2	"	"	" 13-300
39	2	"	"	" 13-300
40	2	"	"	" 13-300
41	2	"	"	" 13-300
42	2	"	"	" 13-300
43	2	"	"	" 13-300
44	2	"	"	" 13-300
45	2	"	"	" 13-300
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47	2	"	"	" 13-300
48	2	"	"	" 13-300
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57	2	"	"	" 13-300
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98	2	"	"	" 13-300
99	2	"	"	" 13-300
100	2	"	"	" 13-300

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BOISE IRRIGATION PROJECT, IDAHO
ARROWROCK DAM
HIGH PRESSURE GATES, 5 X 5 FEET

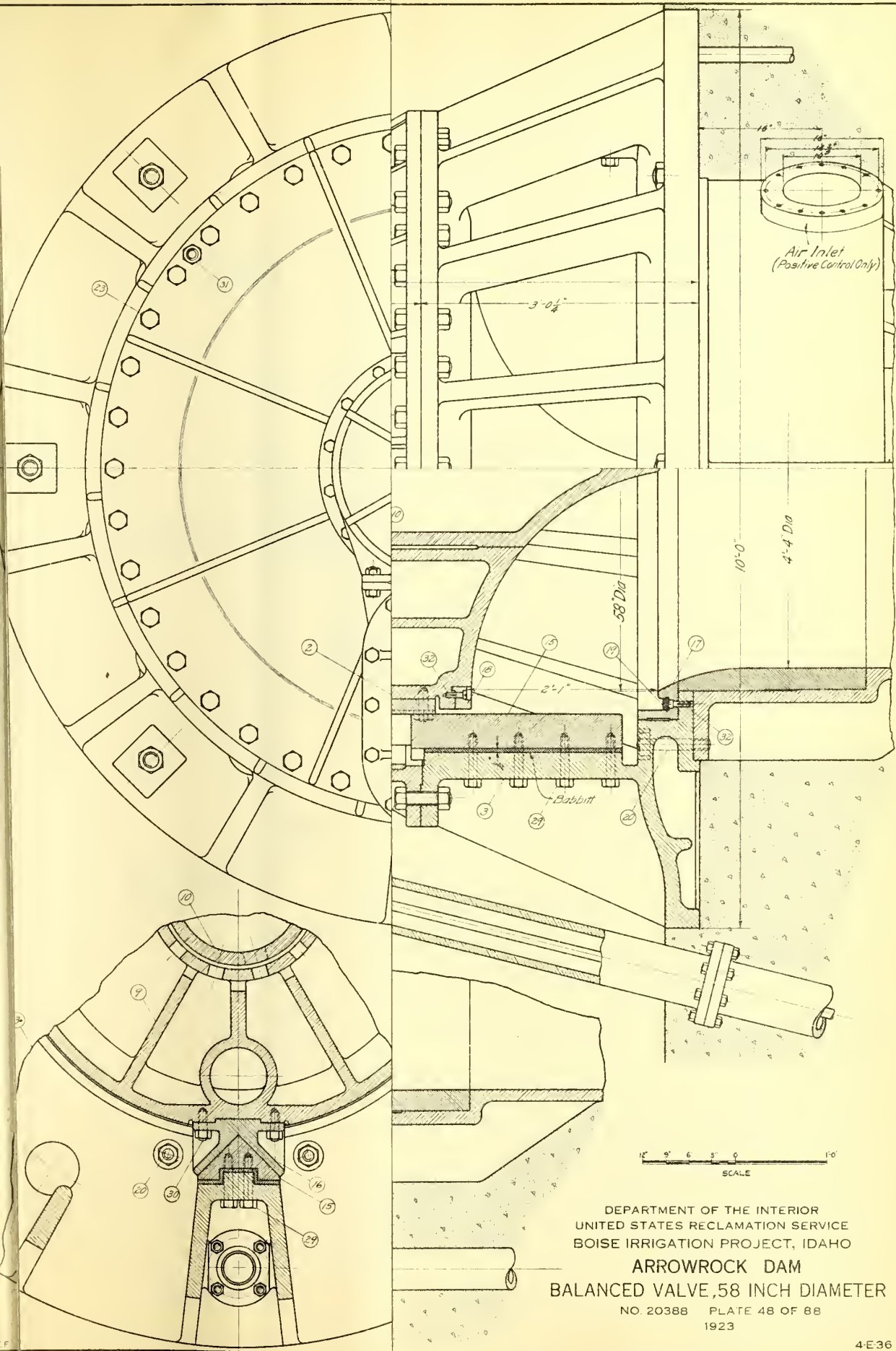
NO. 20387 PLATE 47 OF 88
1923



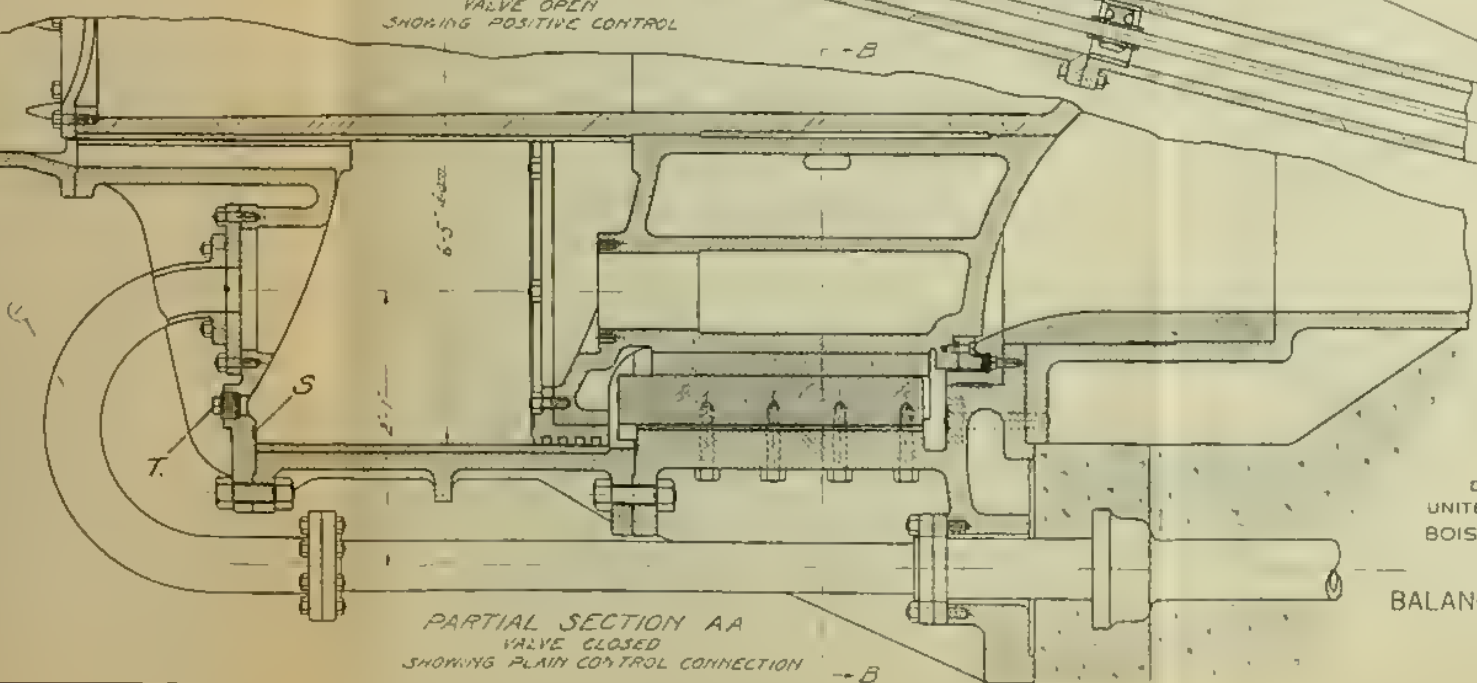
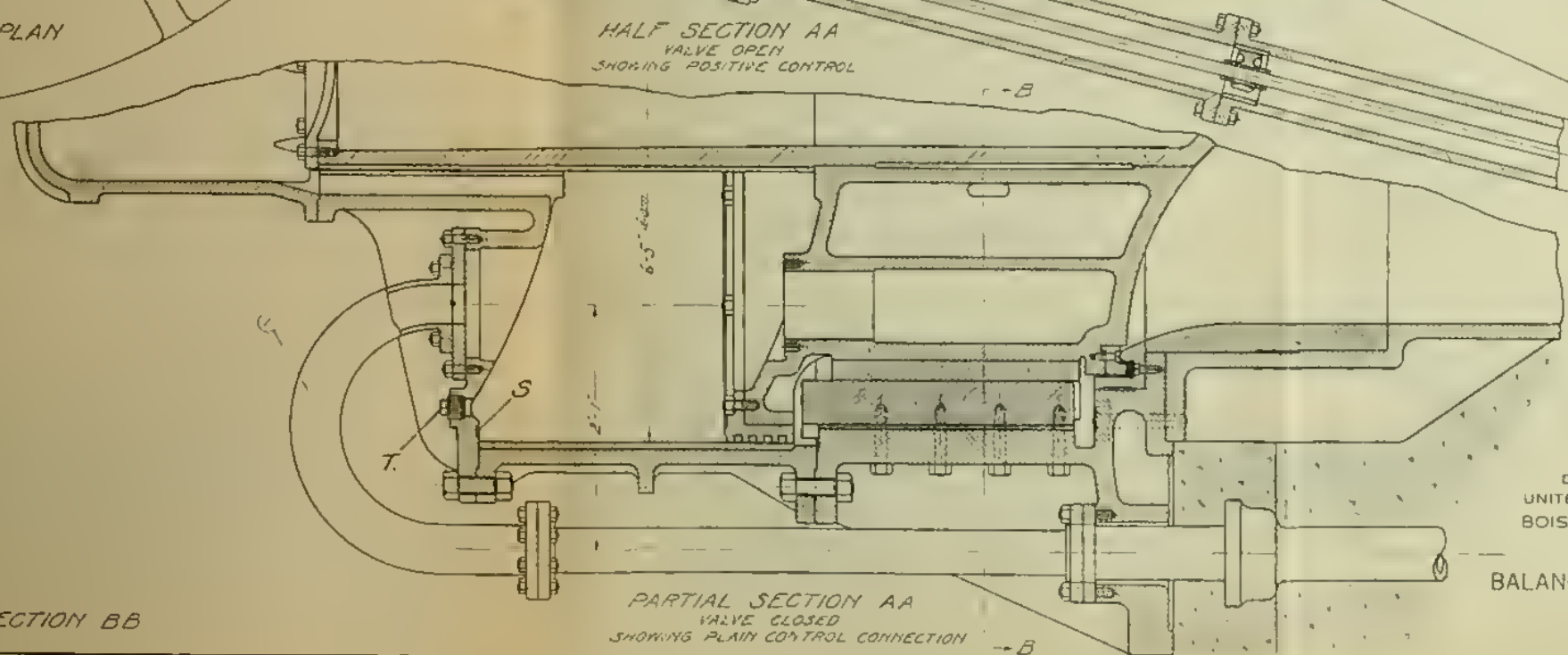
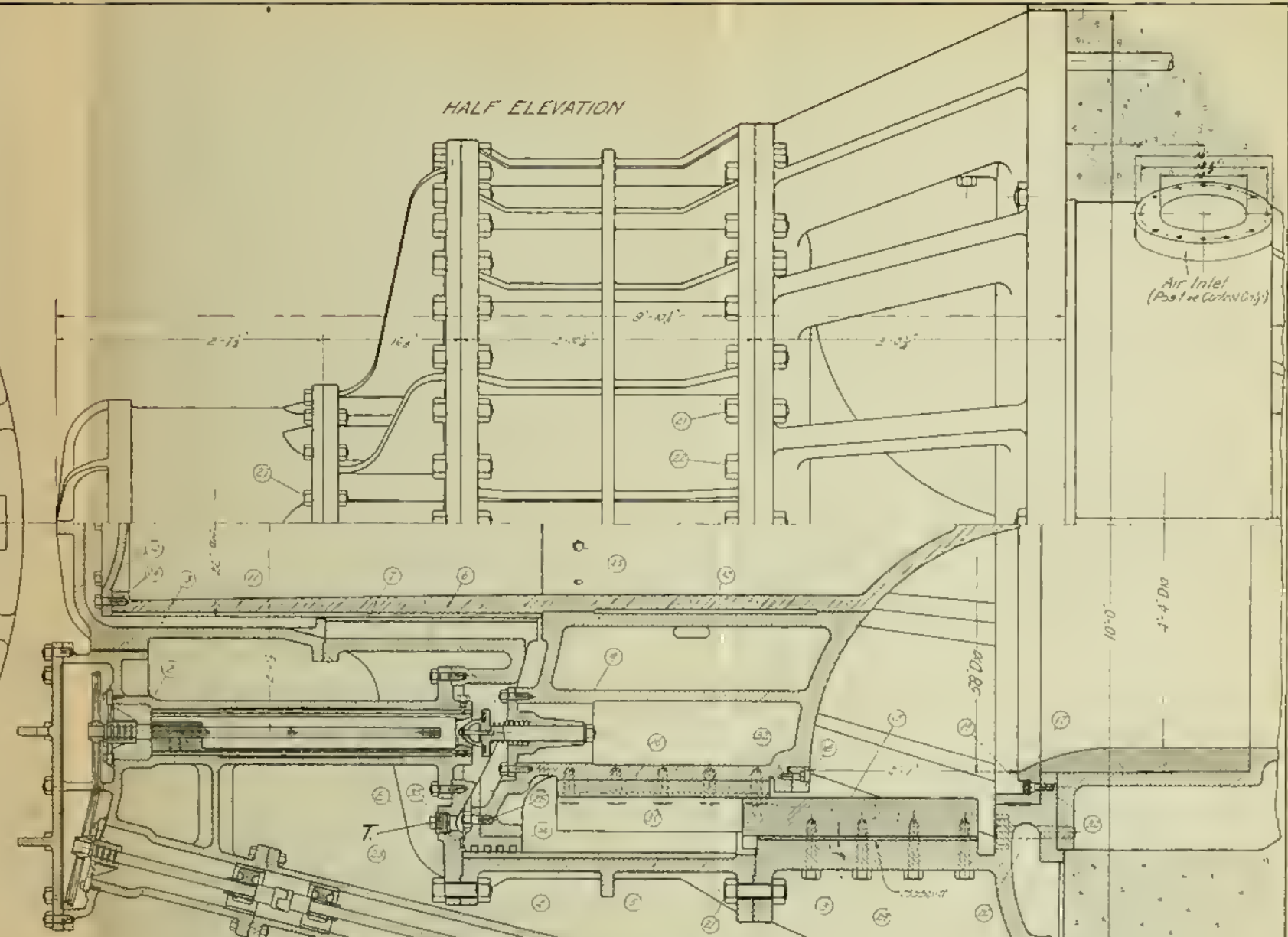
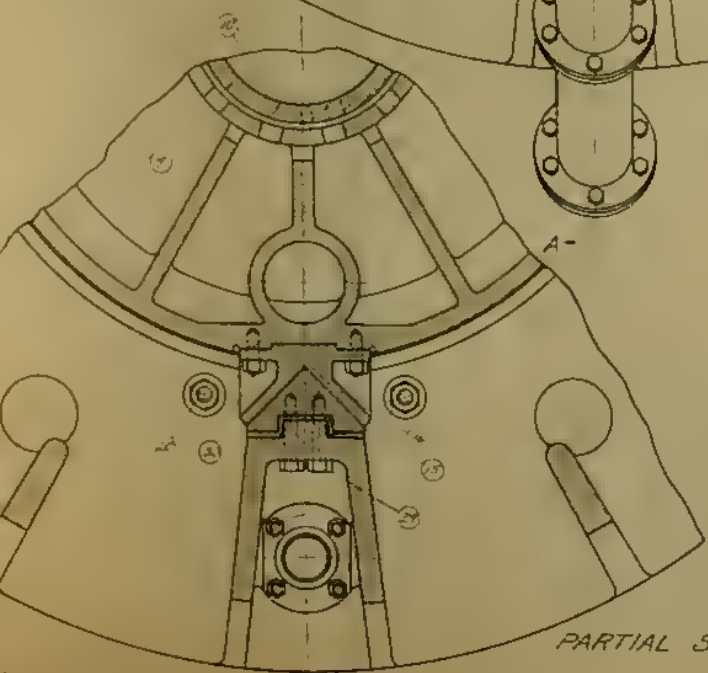
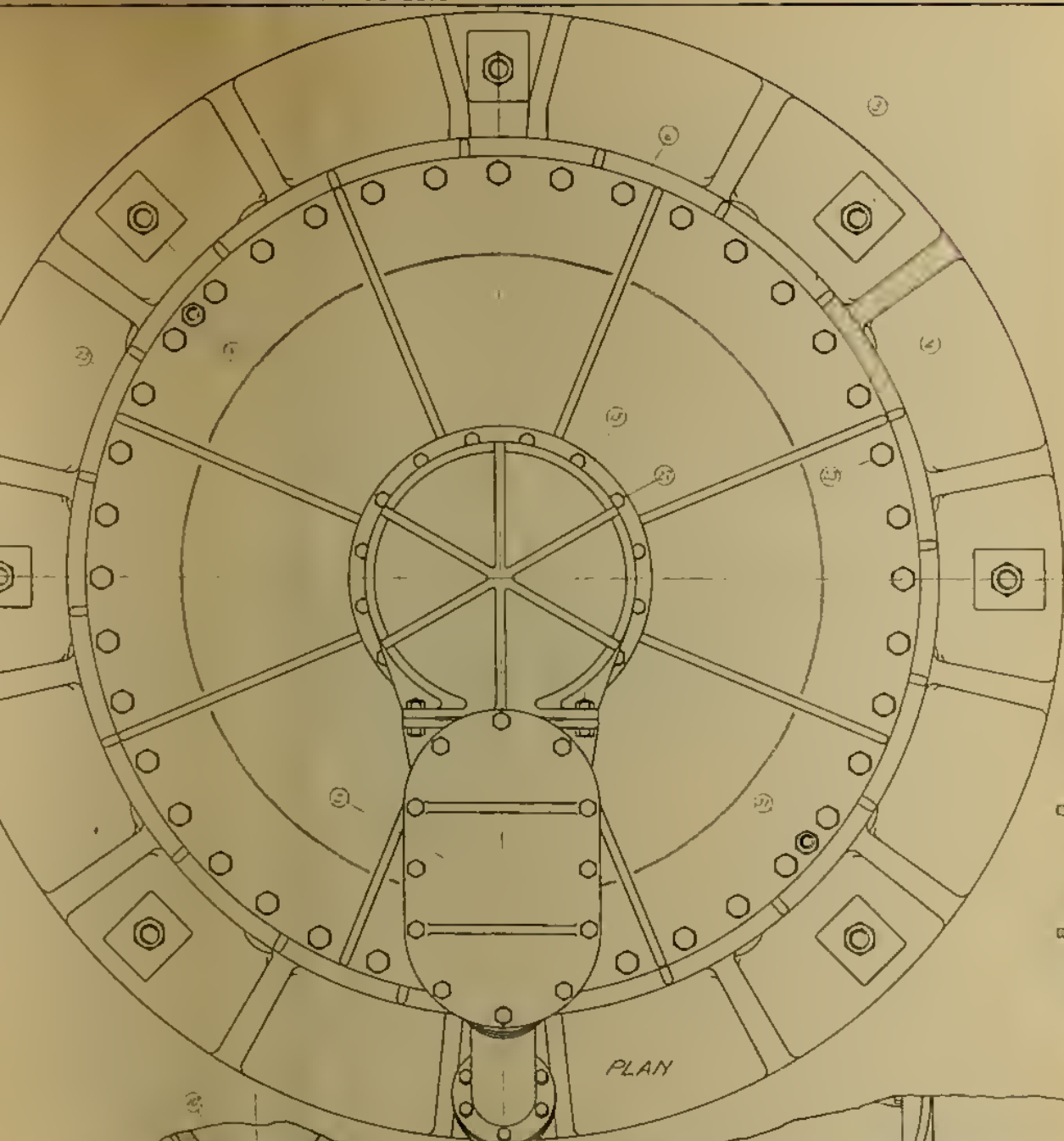
BILL OF MATERIAL FOR ONE GATE			
No.	QTY.	DESCRIPTION	REMARKS
1	1	Gate Body	SLUICE GATE
2	1	Gate Frame	SLUICE GATE
3	1	Gate Support	SLUICE GATE
4	1	Gate Seal	SLUICE GATE
5	1	Gate Lock	SLUICE GATE
6	1	Gate Hinge	SLUICE GATE
7	1	Gate Pin	SLUICE GATE
8	1	Gate Bolt	SLUICE GATE
9	1	Gate Nut	SLUICE GATE
10	1	Gate Washer	SLUICE GATE
11	1	Gate Gasket	SLUICE GATE
12	1	Gate Seal	SLUICE GATE
13	1	Gate Lock	SLUICE GATE
14	1	Gate Hinge	SLUICE GATE
15	1	Gate Pin	SLUICE GATE
16	1	Gate Bolt	SLUICE GATE
17	1	Gate Nut	SLUICE GATE
18	1	Gate Washer	SLUICE GATE
19	1	Gate Gasket	SLUICE GATE
20	1	Gate Seal	SLUICE GATE

5x5 HYDRAULIC SLUICE GATES
5 Installed at Elev. 2967 - Maximum Head on Gates 238 ft
Designed for normal operation up to 60 ft Head, Capacity
to 125 ft Head in Emergency

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BOISE IRRIGATION PROJECT, IDAHO
ARROWROCK DAM
HIGH PRESSURE GATES, 5 X 5 FEET
NO 20367 PLATE 47 OF 88
1923

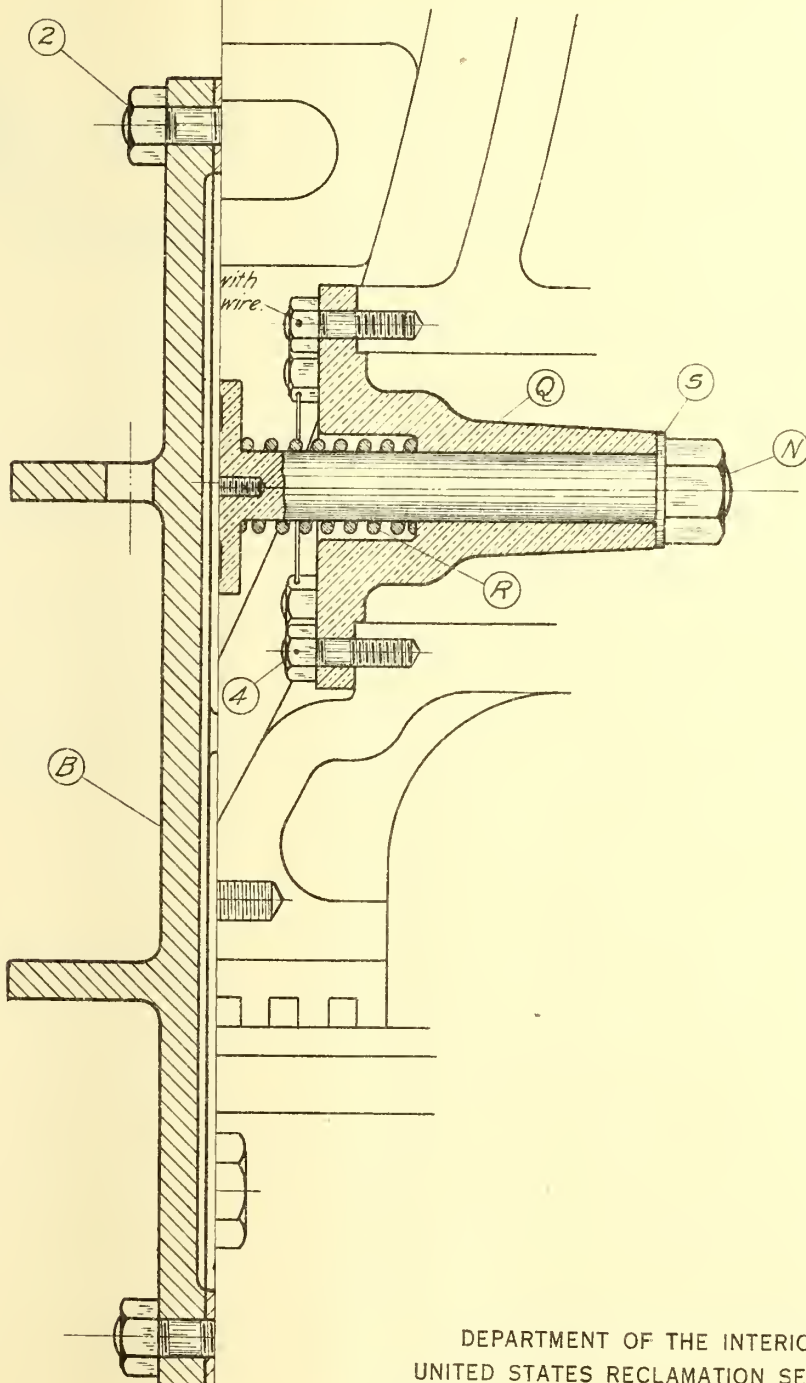


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BOISE IRRIGATION PROJECT, IDAHO
ARROWROCK DAM
BALANCED VALVE, 58 INCH DIAMETER
NO. 20388 PLATE 48 OF 88
1923



SCALE

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BOISE IRRIGATION PROJECT, IDAHO
ARROWROCK DAM
BALANCED VALVE, 58 INCH DIAMETER
NO 20388 PLATE 48 OF 88
1923



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BOISE IRRIGATION PROJECT IDAHO

ARROWROCK DAM

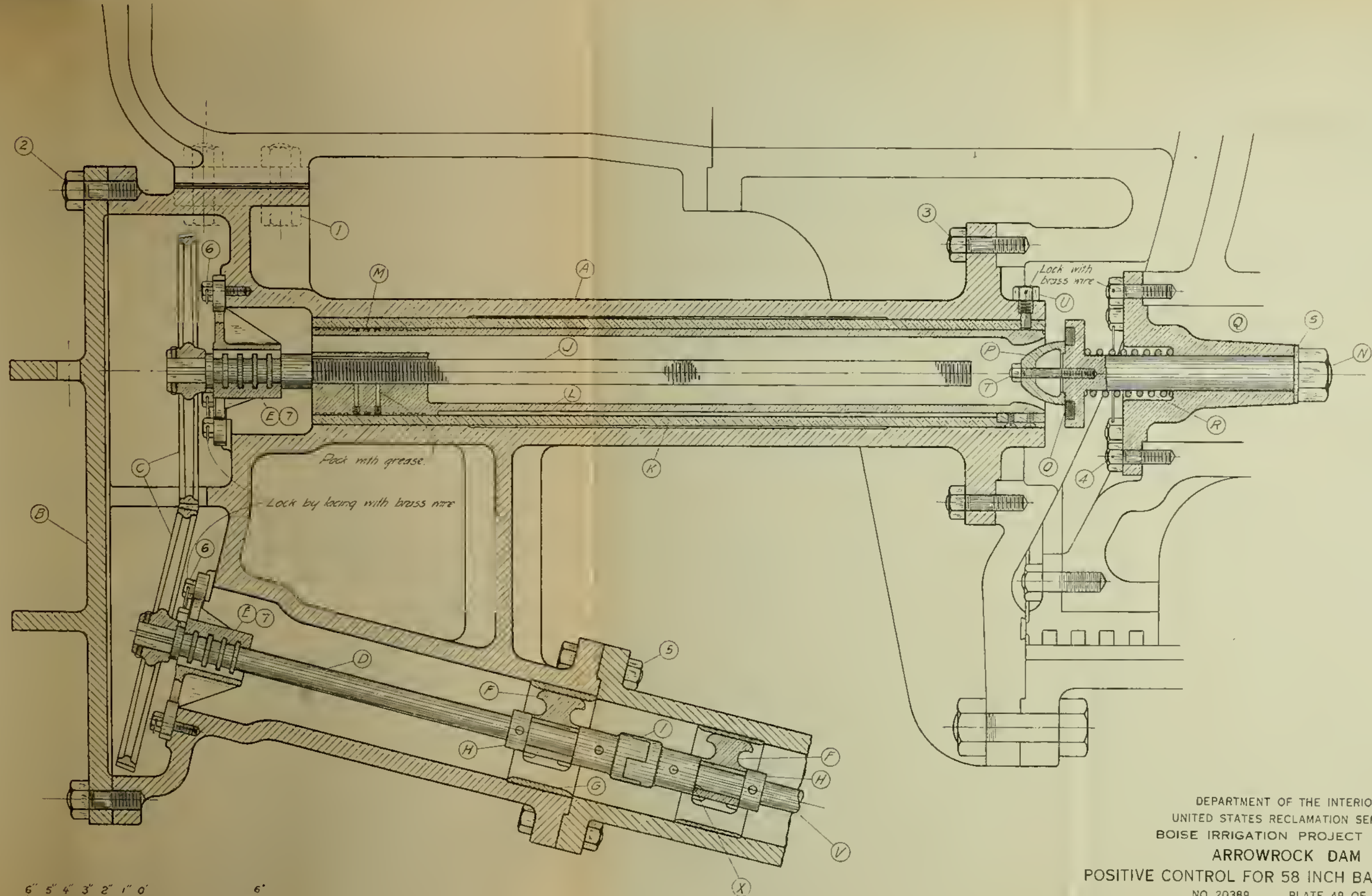
POSITIVE CONTROL FOR 58 INCH BALANCED VALVE

NO. 20389

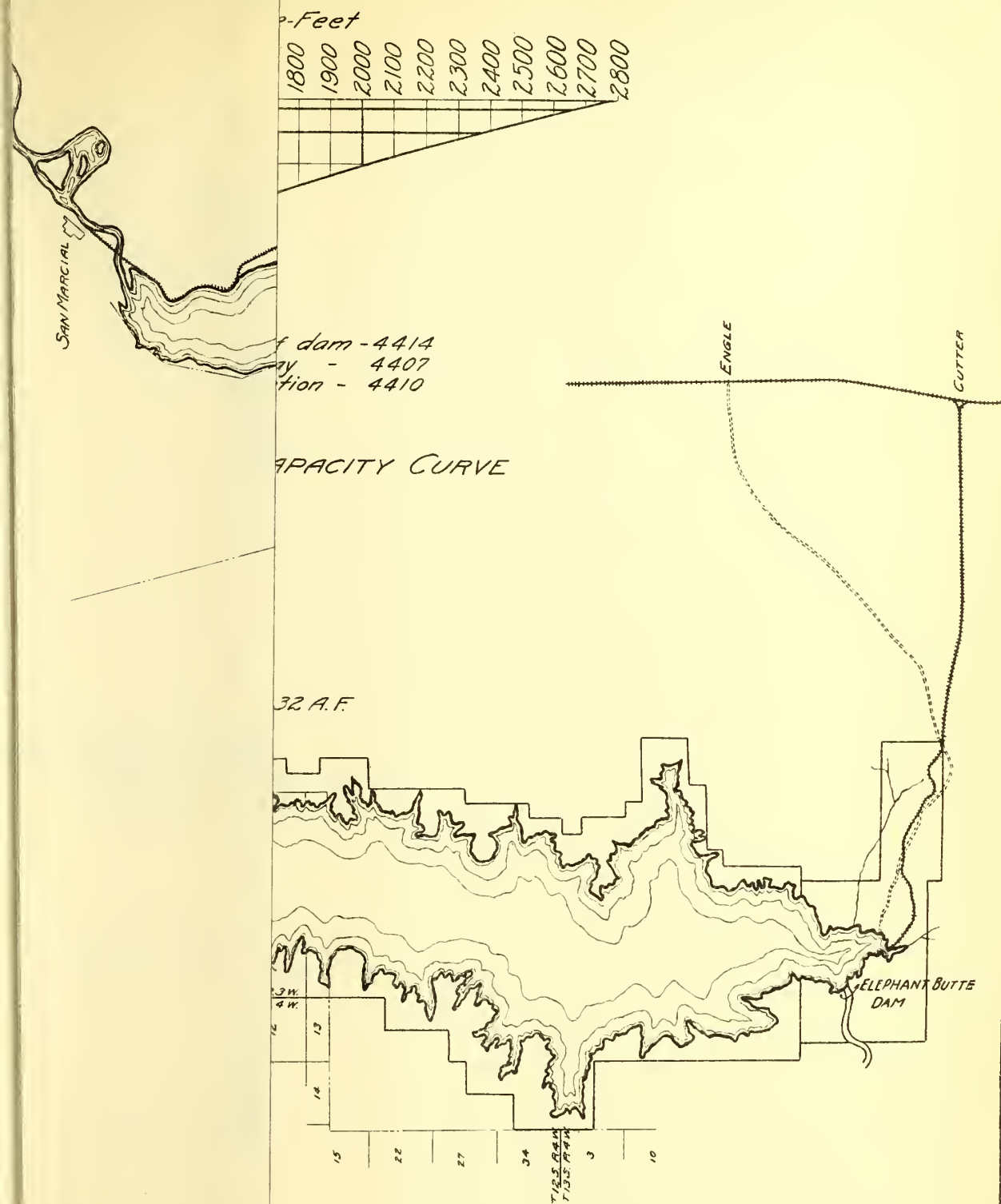
PLATE 49 OF 88

1923

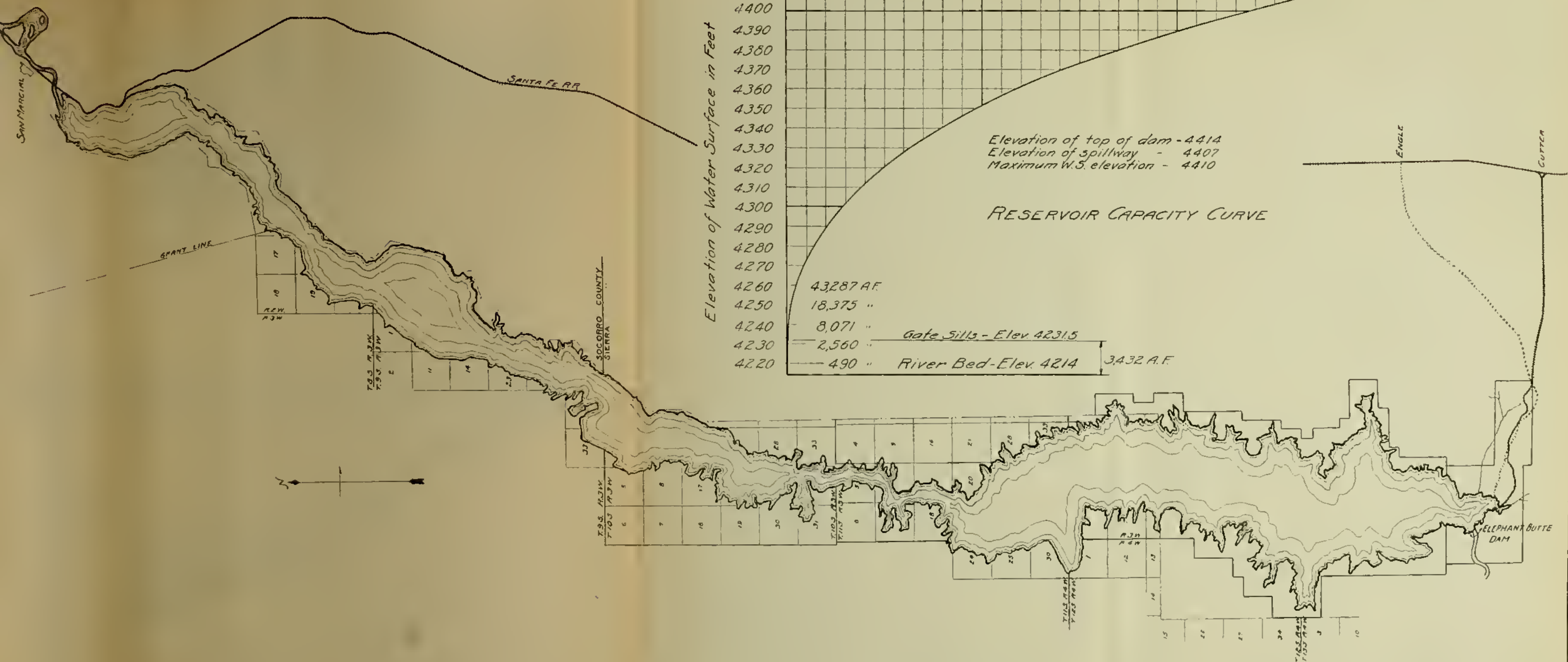
4-E-30



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
BOISE IRRIGATION PROJECT IDAHO
ARROWROCK DAM
POSITIVE CONTROL FOR 58 INCH BALANCED VALVE
NO. 20389 PLATE 49 OF 88
1923



DEPARTMENT OF THE INTERIOR
 UNITED STATES RECLAMATION SERVICE
 RIO GRANDE IRRIGATION PROJECT, NEW MEXICO-Texas
ELEPHANT BUTTE RESERVOIR
MAP AND CAPACITY CURVE
 NO. 20390 PLATE 50 OF 88
 1923



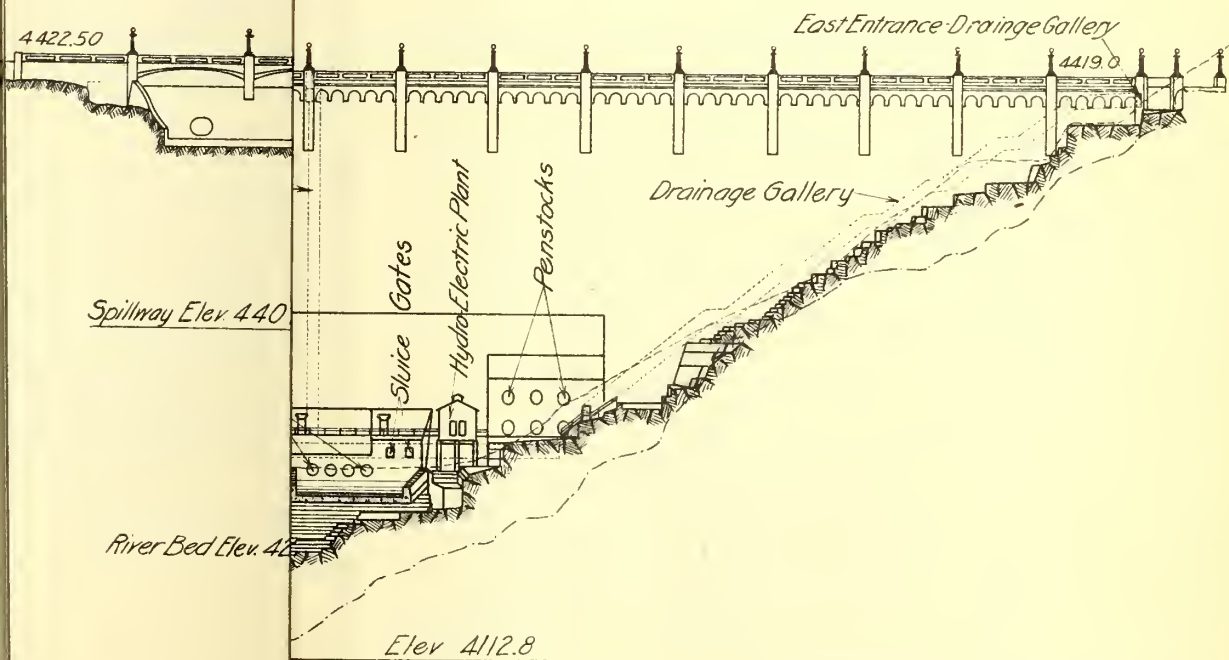
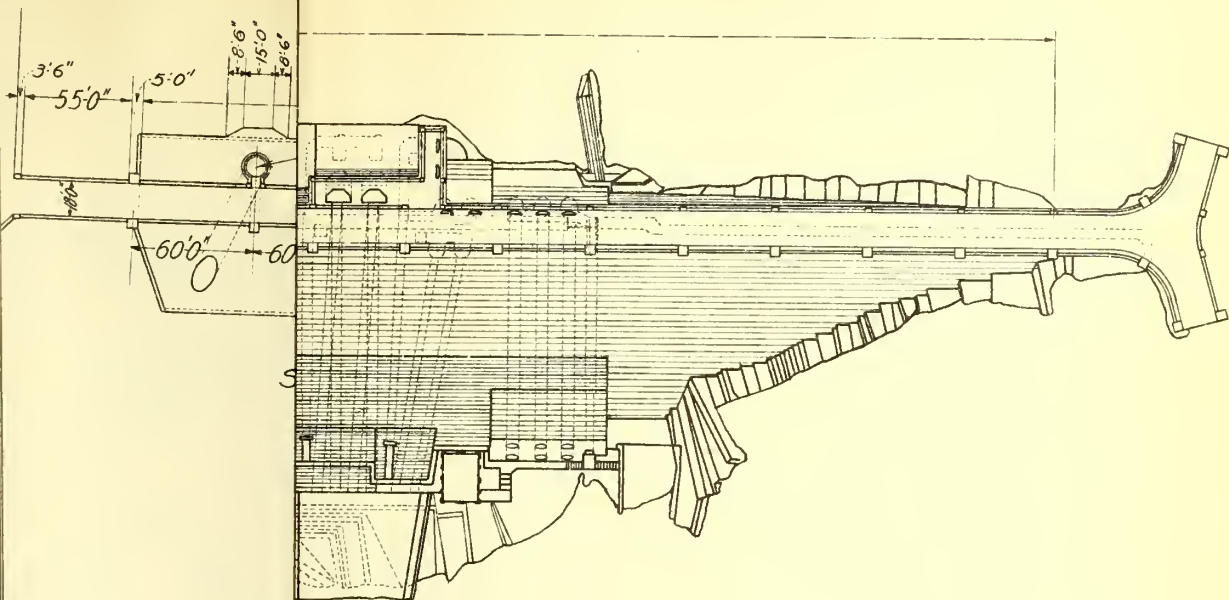
DEPARTMENT OF THE INTERIOR
 UNITED STATES RECLAMATION SERVICE
 RIO GRANDE IRRIGATION PROJECT, NEW MEXICO-TEXAS

ELEPHANT BUTTE RESERVOIR
 MAP AND CAPACITY CURVE

NO 20390 PLATE 50 OF 88

1923

24-E-62



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO - TEXAS

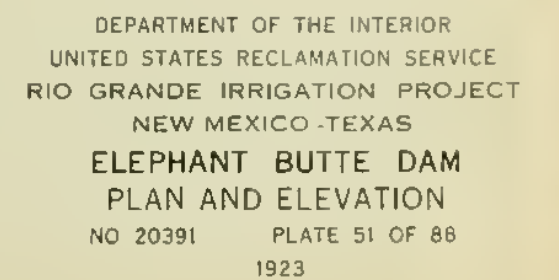
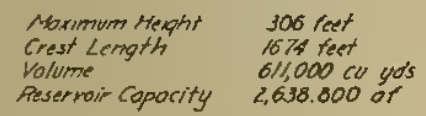
**ELEPHANT BUTTE DAM
PLAN AND ELEVATION**

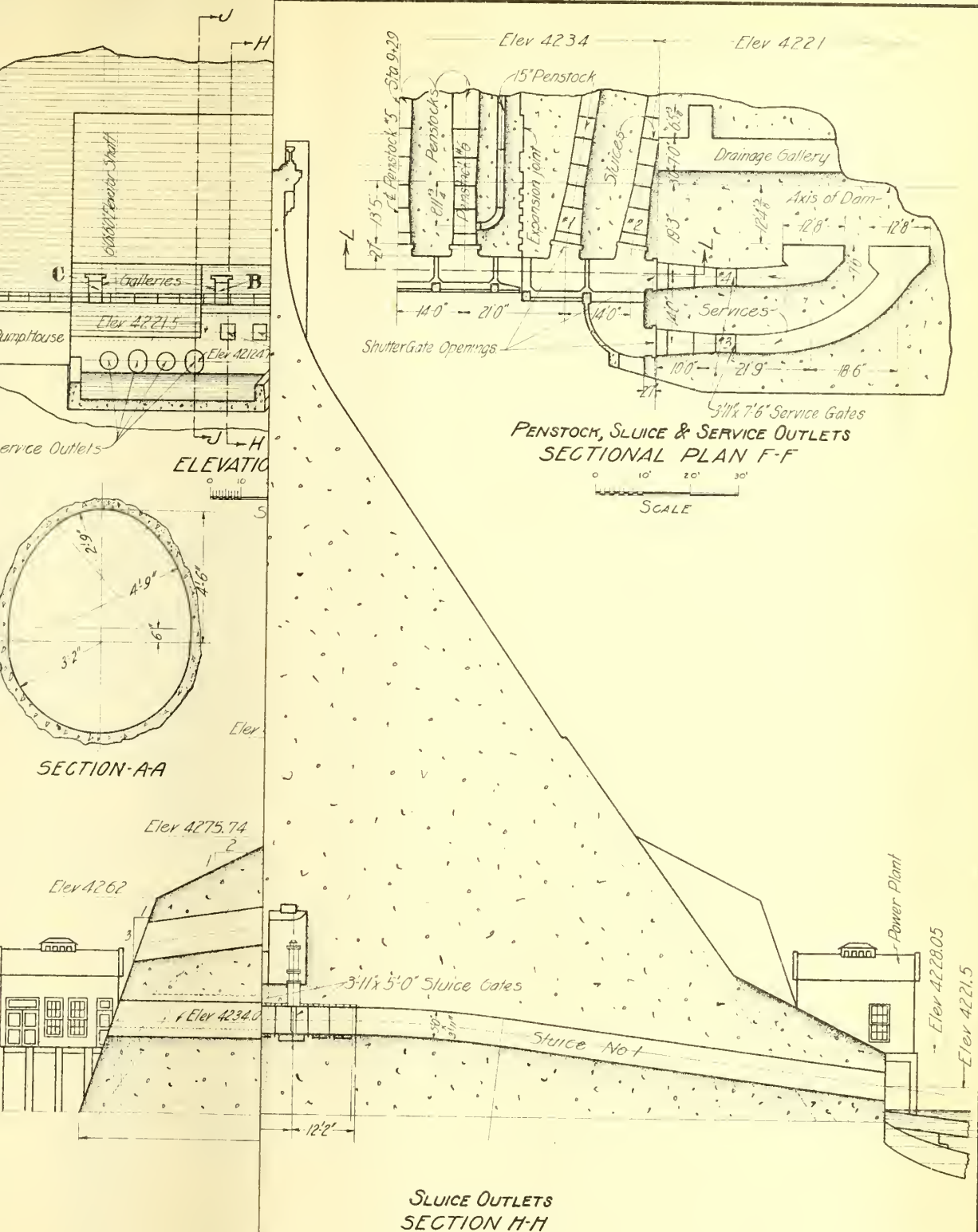
NO. 20391

PLATE 51 OF 88

1923

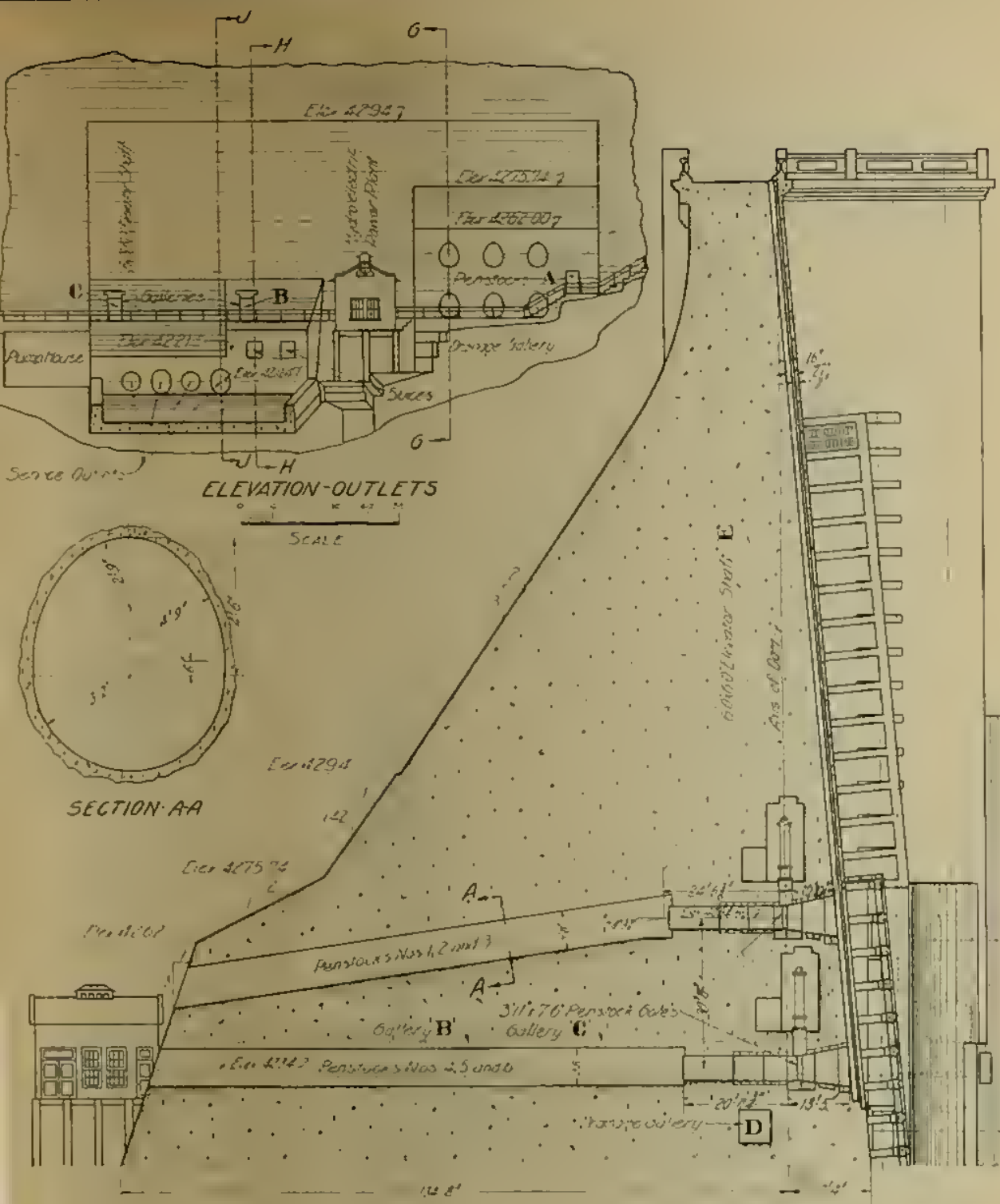
24-E-55



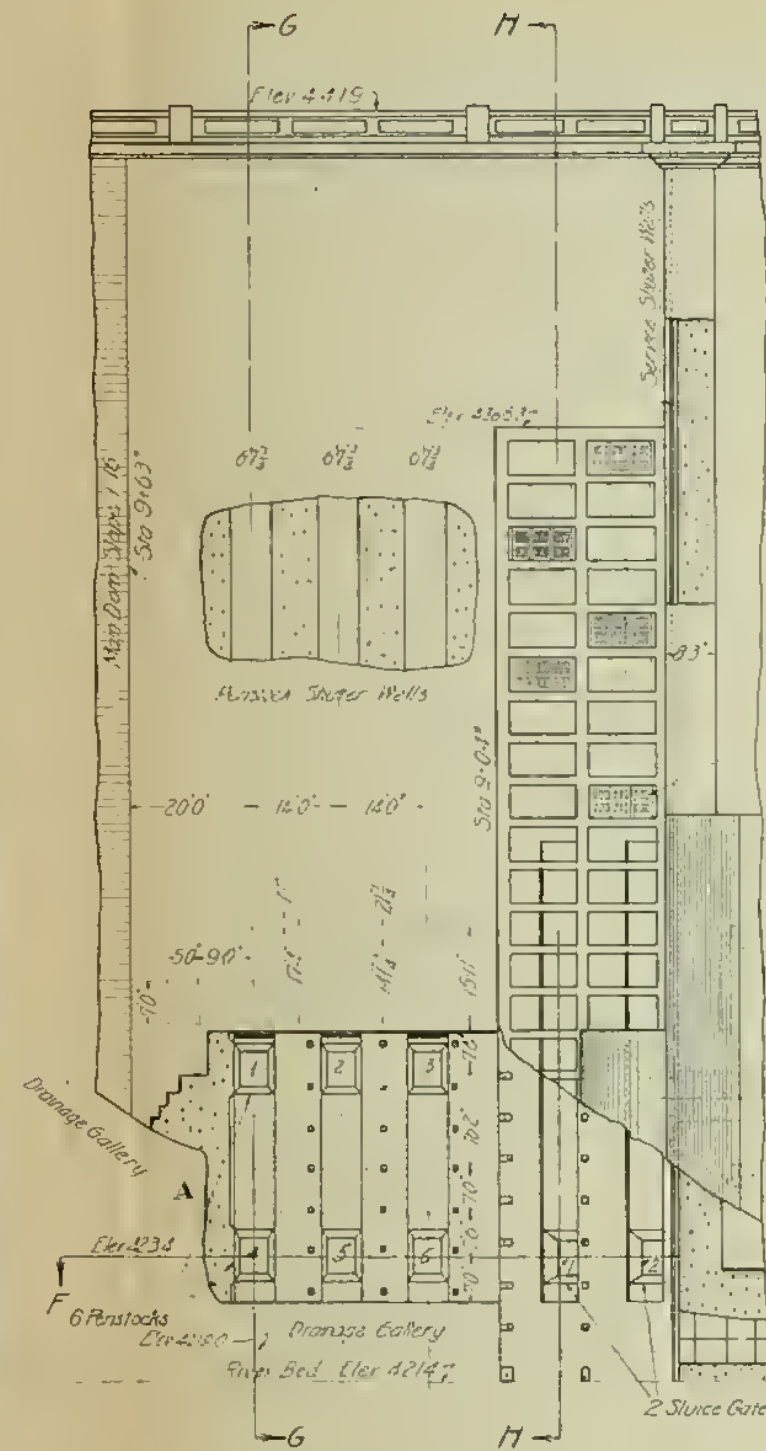


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS
ELEPHANT BUTTE DAM
SLUICE AND PENSTOCK GATES

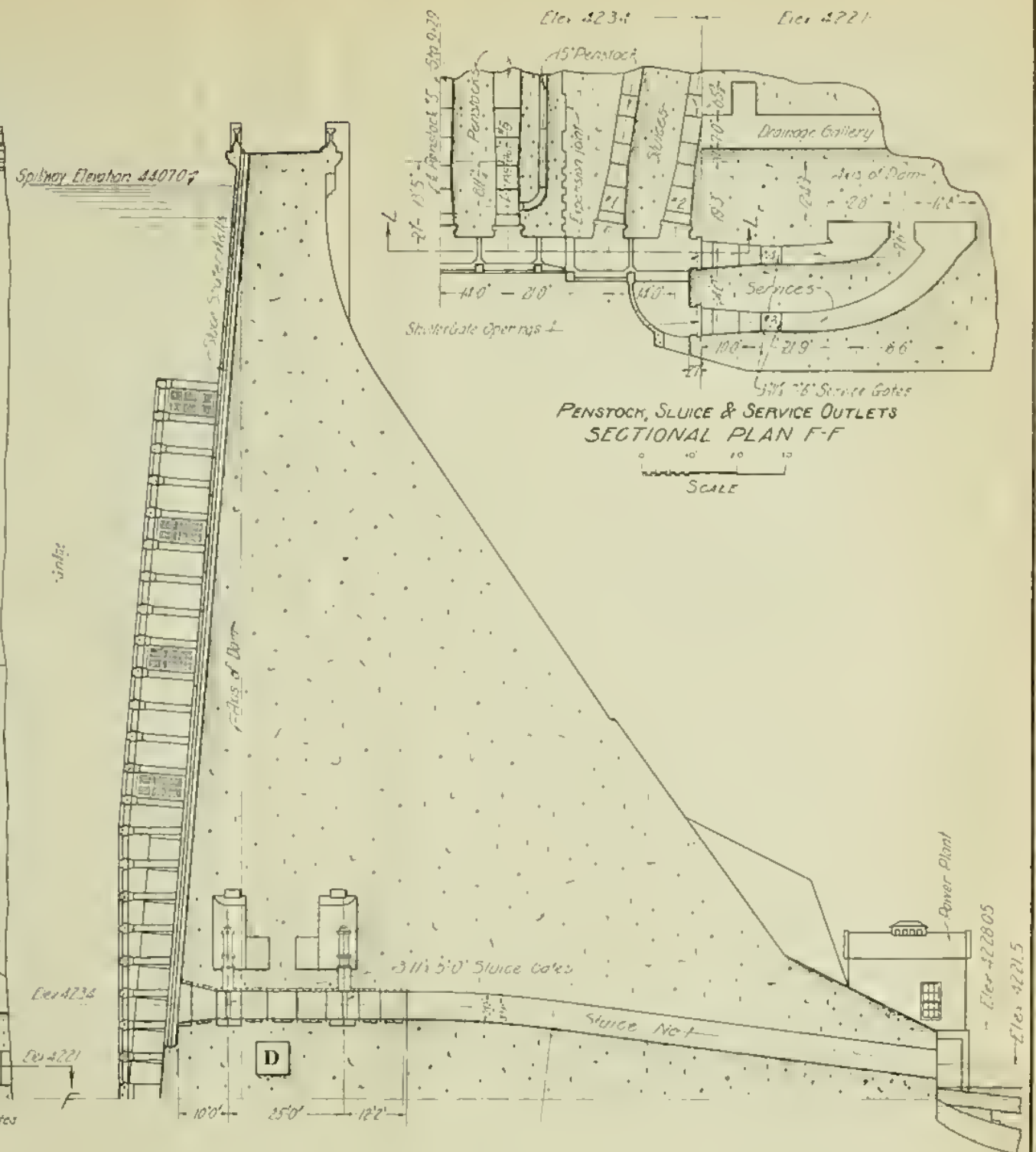
NO. 20392 PLATE 52 OF 88
1923



PENSTOCK OUTLETS
SECTION G-G



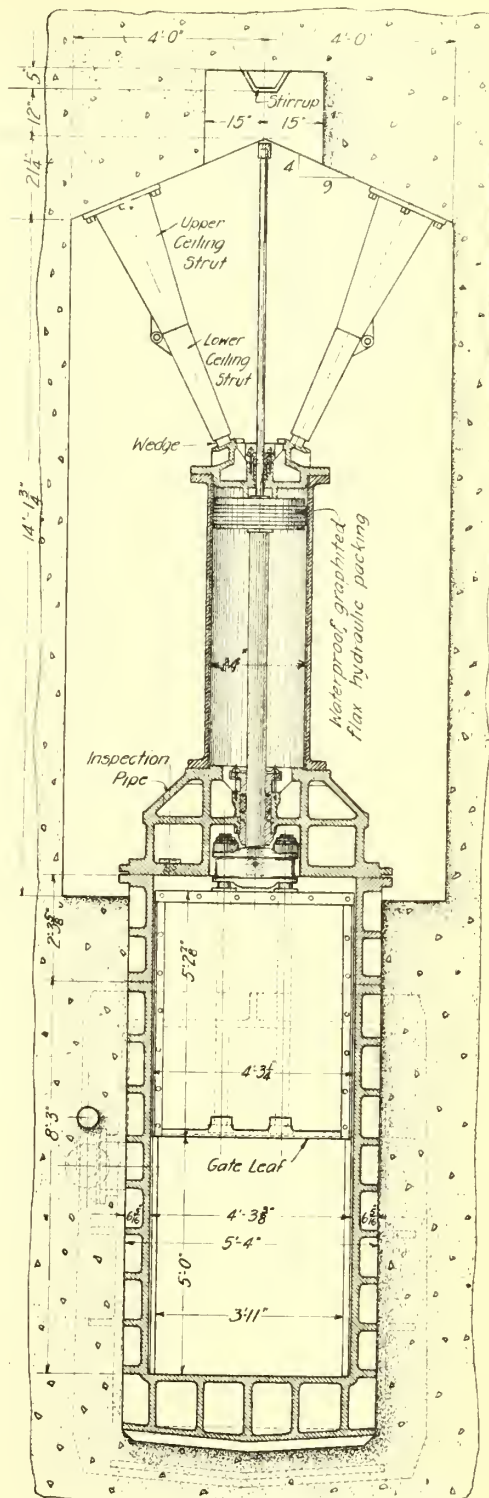
SECTIONAL ELEVATION LL UP STREAM FACE



SLUICE OUTLETS
SECTION H-H

Maximum height of Dam 306'
Crest length incl spillway 1574'
Volume incl spillway 611,000 cy
Reservoir capacity 2,638,800 AF

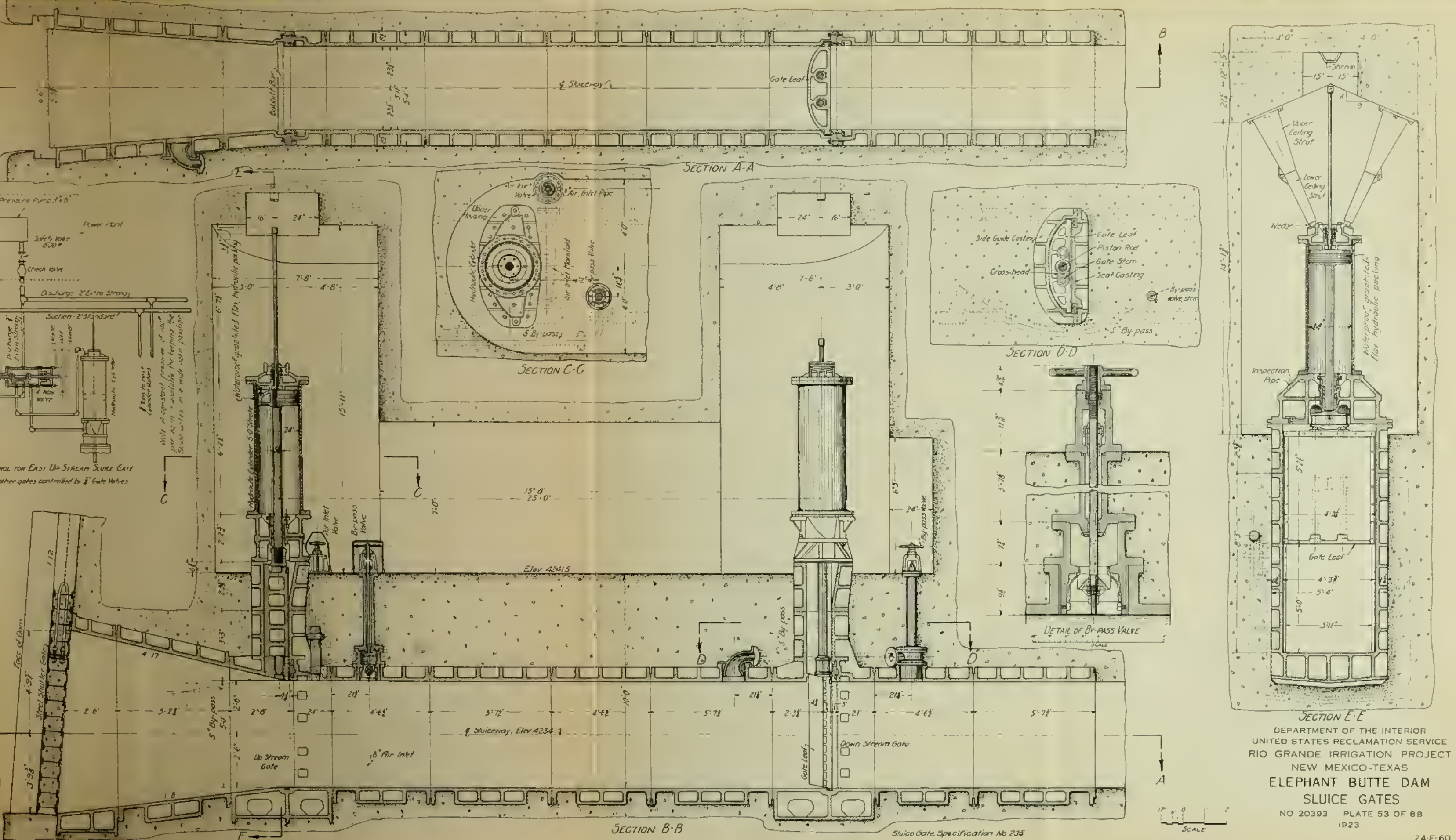
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS
ELEPHANT BUTTE DAM
SLUICE AND PENSTOCK GATES
NO. 20392 PLATE 52 OF 88
1923

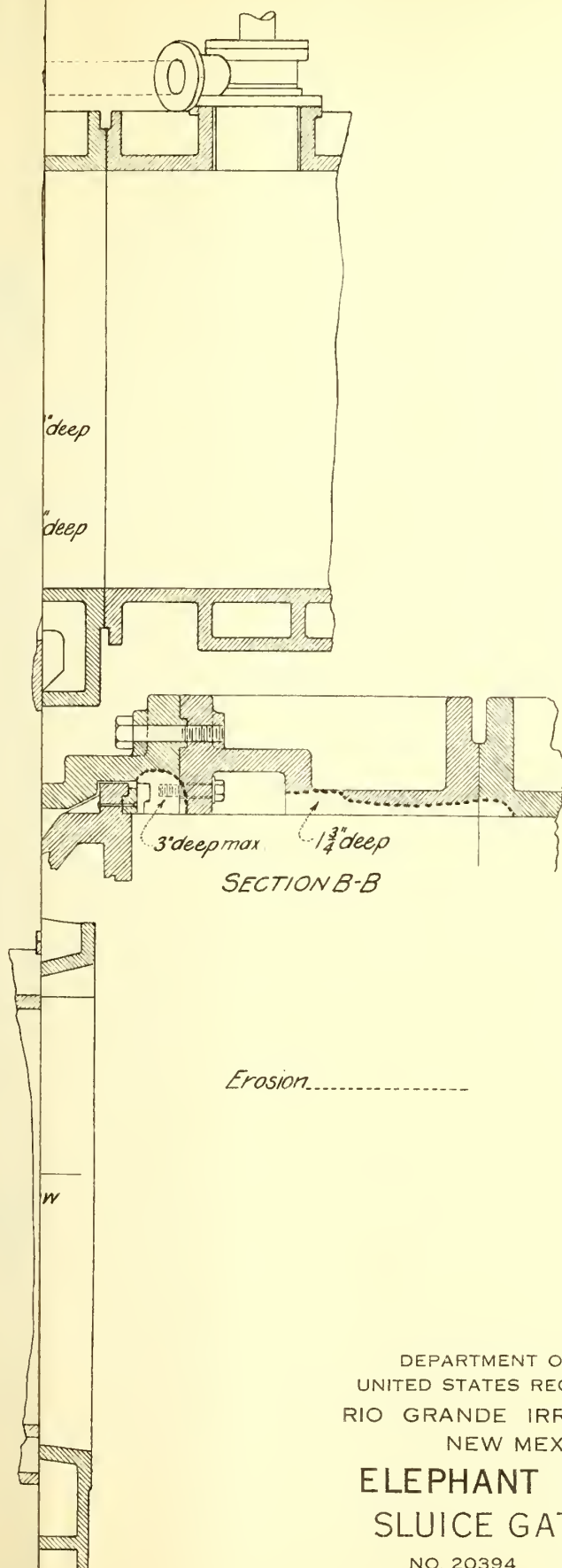


SECTION E-E

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS
ELEPHANT BUTTE DAM
SLUICE GATES

NO. 20393 PLATE 53 OF 88
1923

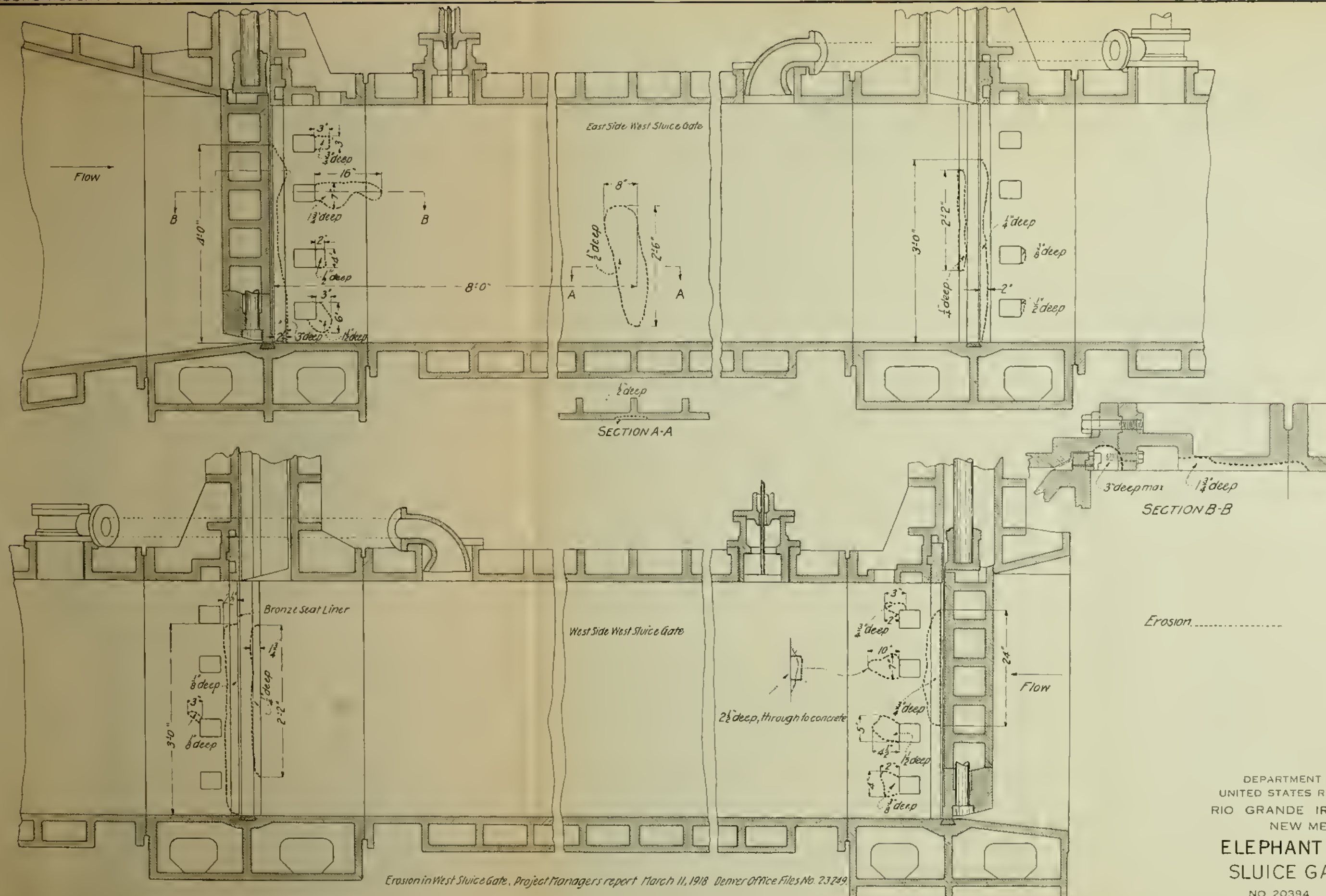




DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS

ELEPHANT BUTTE DAM SLUICE GATE EROSION

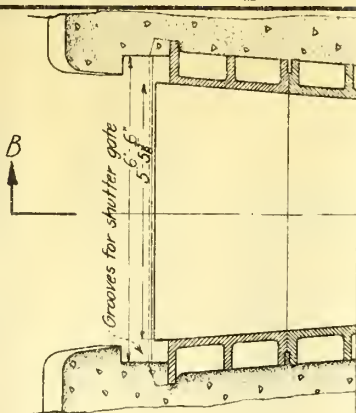
NO. 20394 PLATE 54 OF 88
1923



Note. Erosion occurred in East Sluice Gate very similar to that shown on this drawing for West Sluice Gate

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS
**ELEPHANT BUTTE DAM
SLUICE GATE EROSION**

NO 20394 PLATE 54 OF 88
1923



To raise gate, close valves B & C,
and open valves A & D
To lower gate, close valves A & D
and open valves B & C.

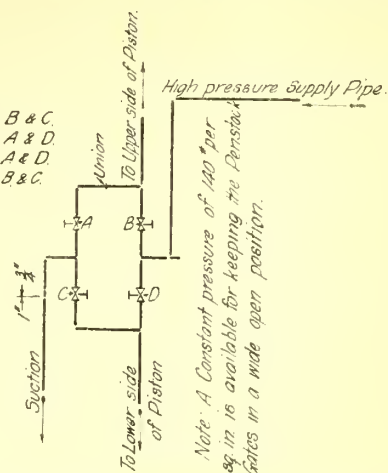
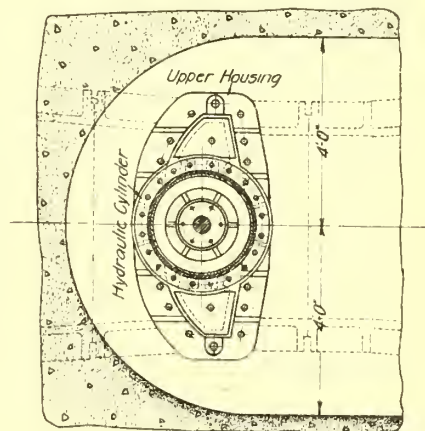
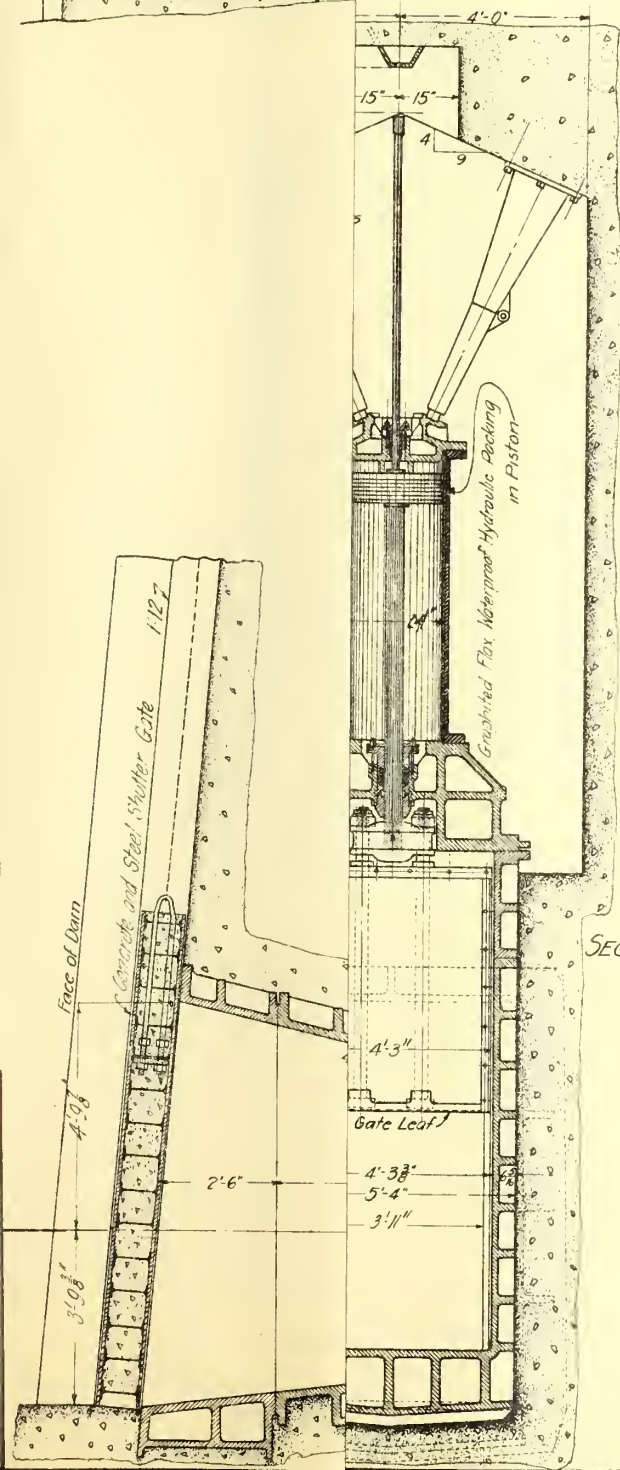


DIAGRAM OF PIPES FOR OPERATING CYLINDER

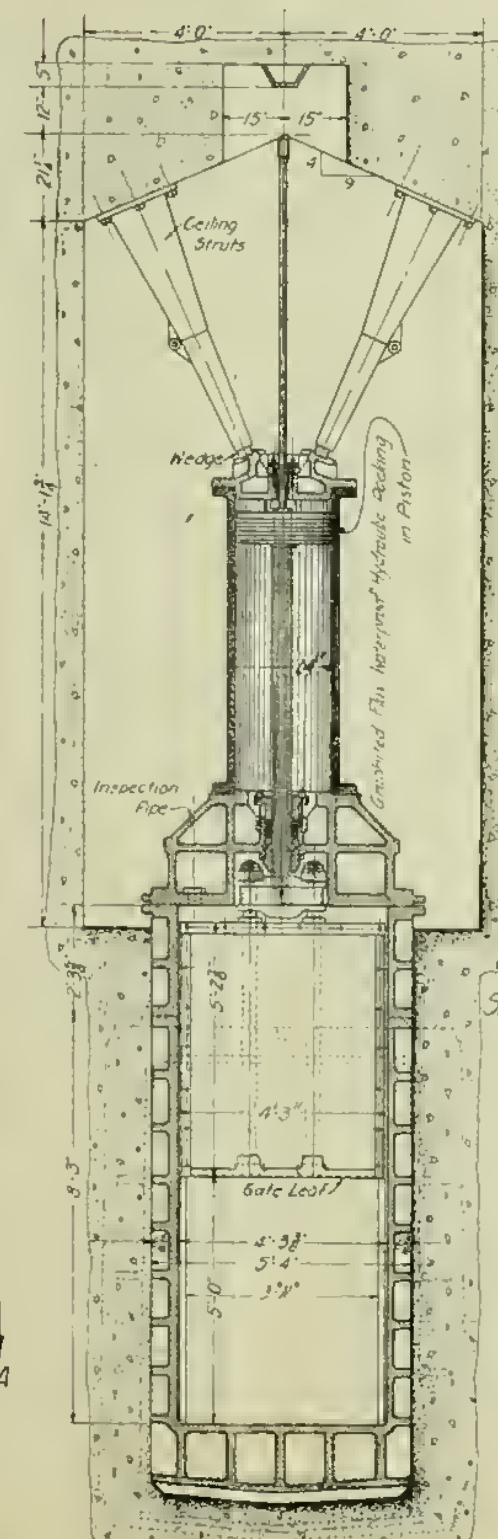
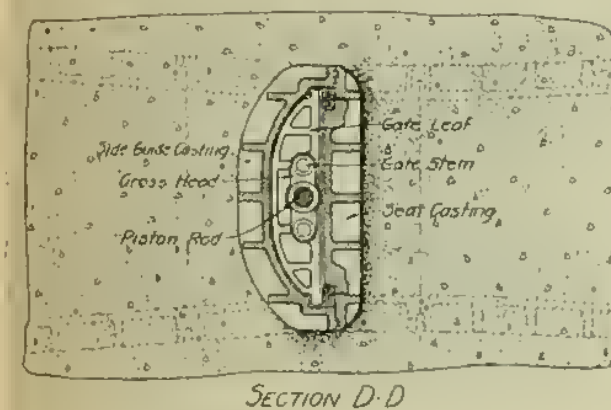
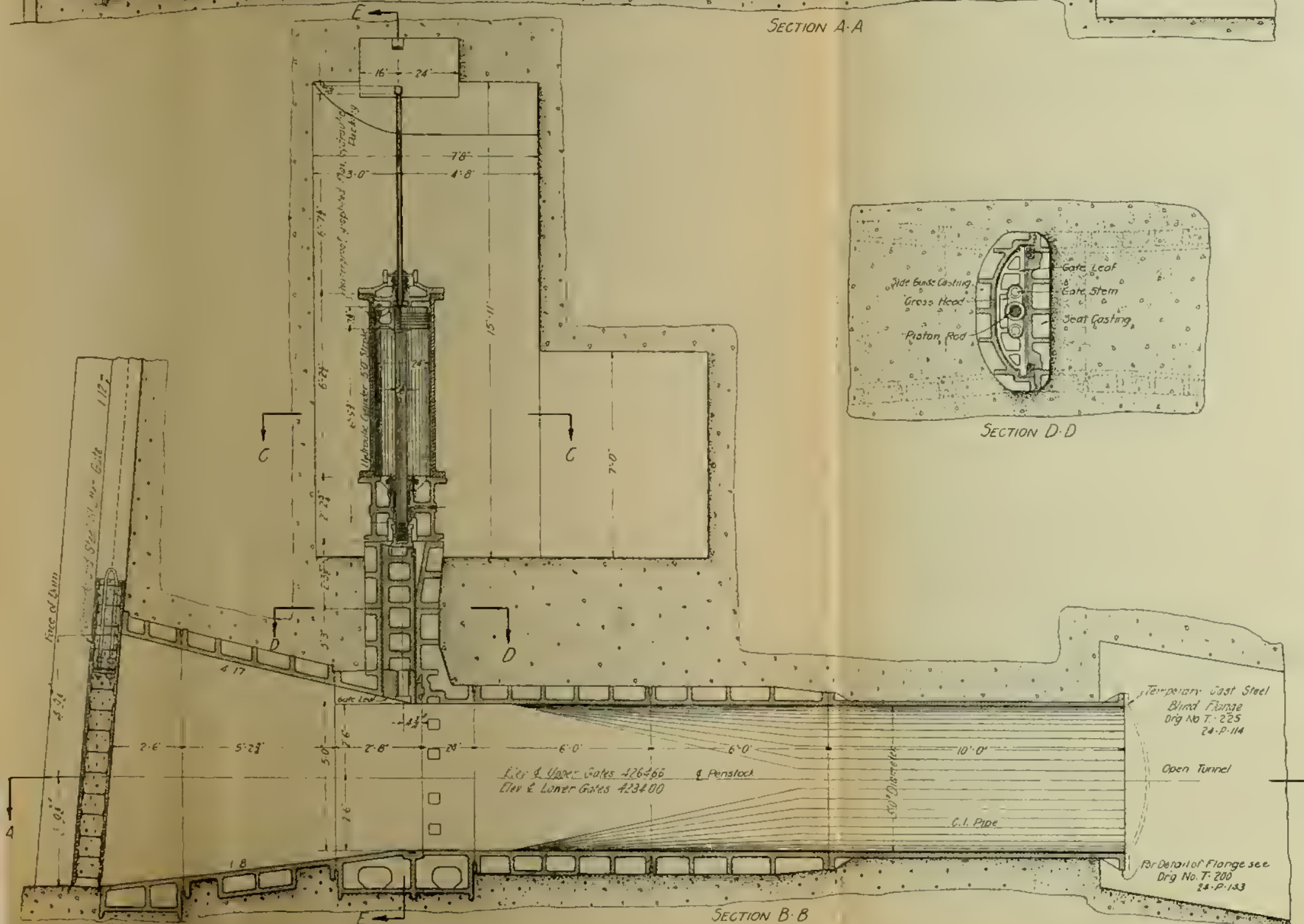
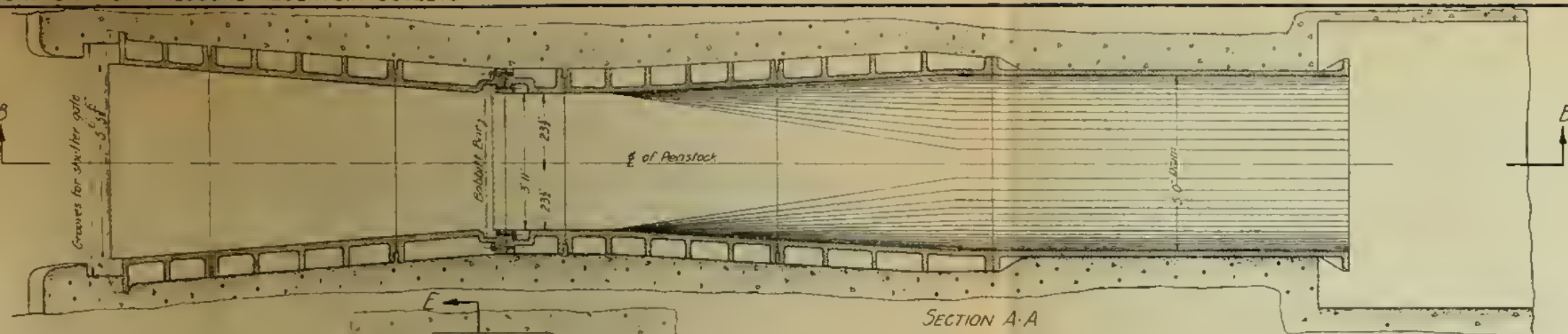


SECTION C-C



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS
ELEPHANT BUTTE DAM
PENSTOCK GATES

NO. 20395 PLATE 55 OF 88
1923



To raise gate, close valves B & C
and open valves A & D
To lower gate, close valves A & D
and open valves B & C

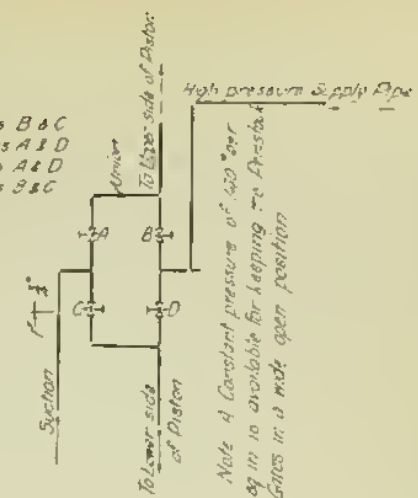
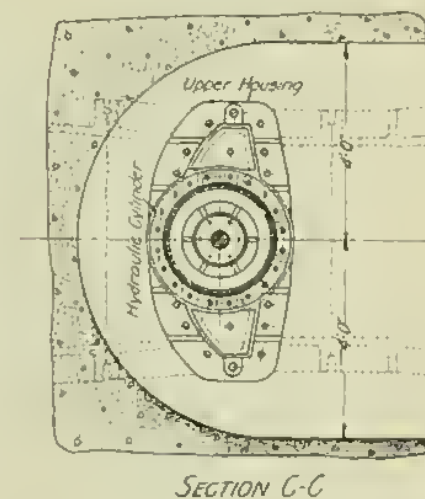
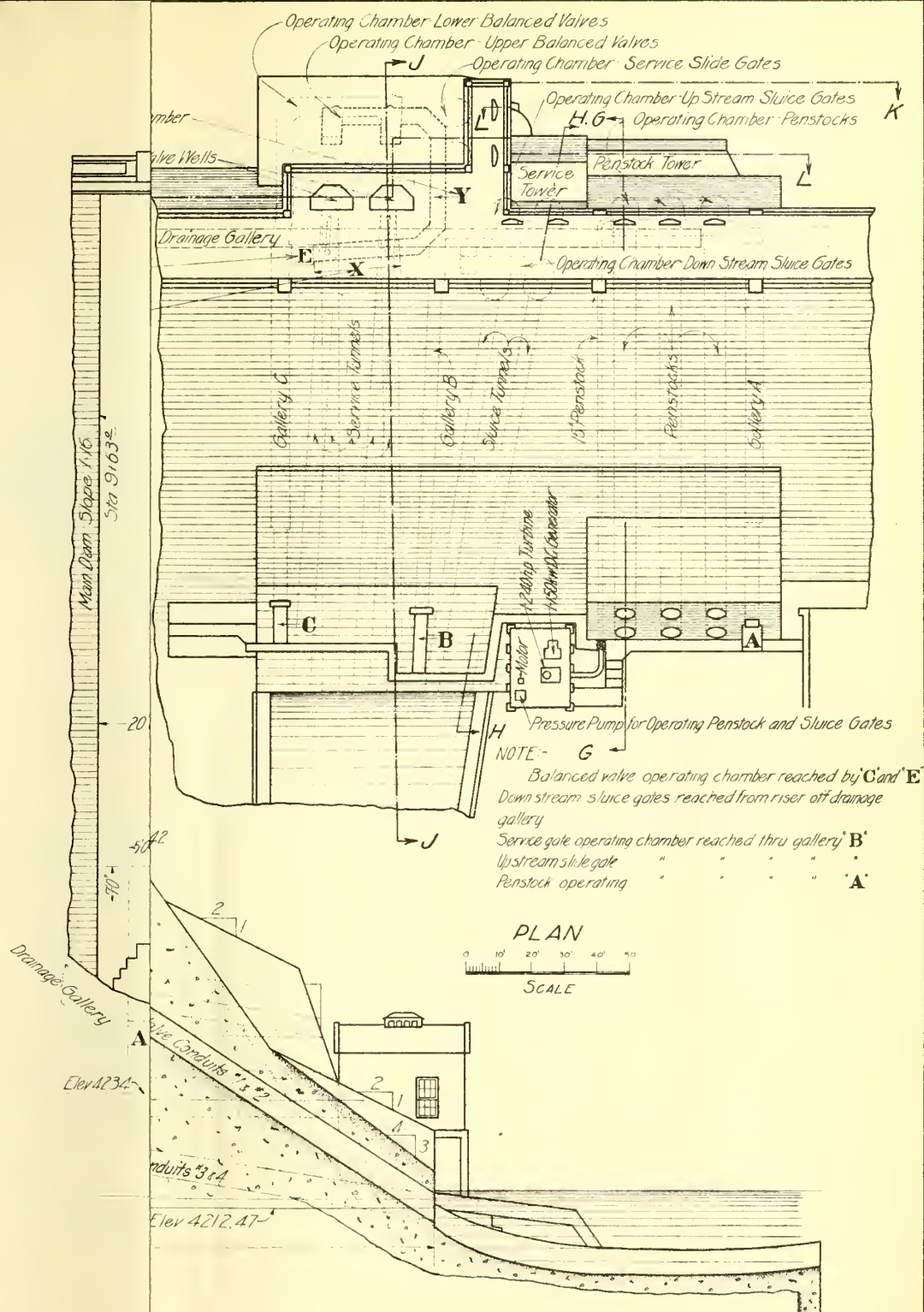


DIAGRAM OF PIPES FOR OPERATING CYLINDER



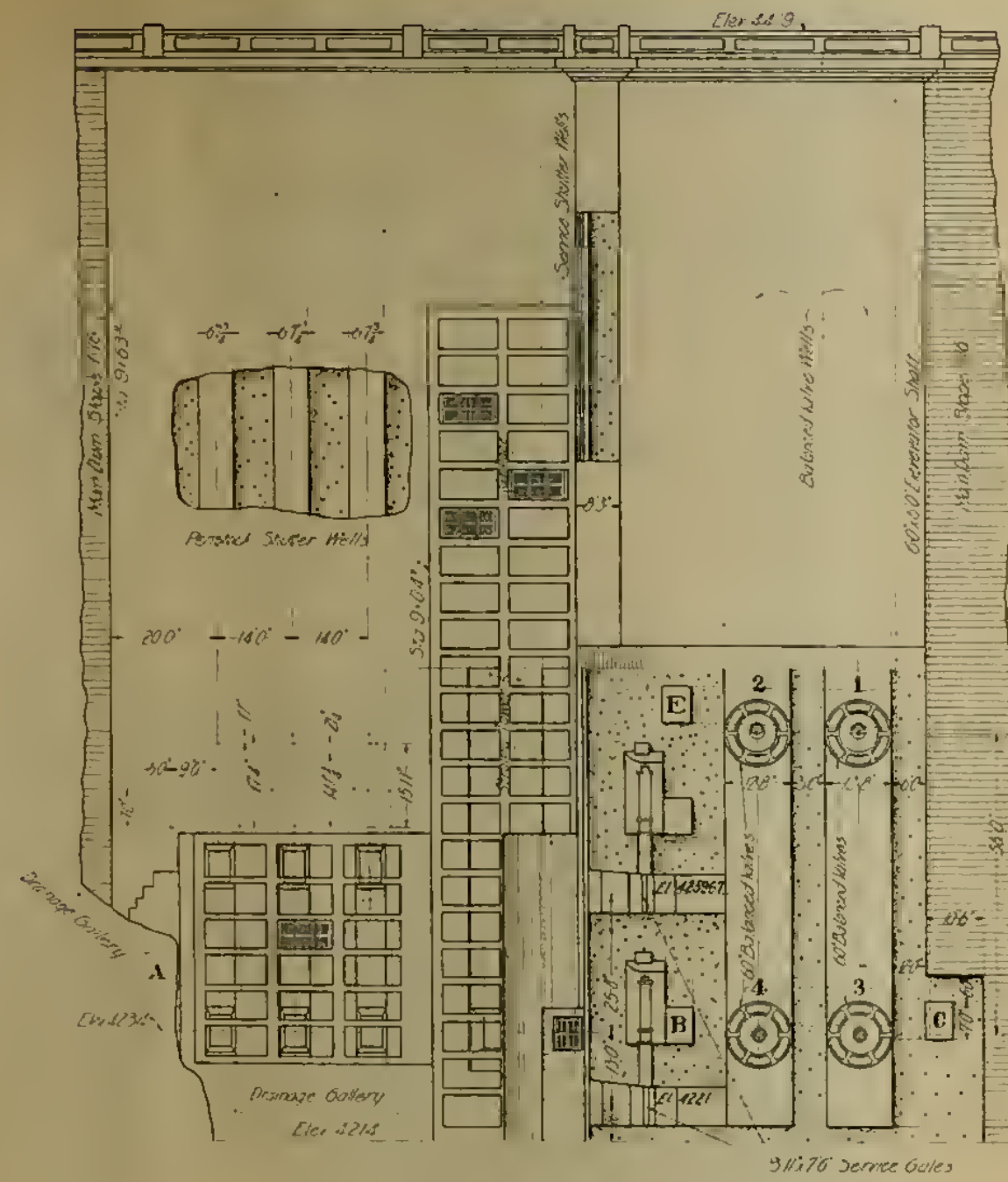
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-Texas
ELEPHANT BUTTE DAM
PENSTOCK GATES
NO. 20395 PLATE 55 OF 68
1923



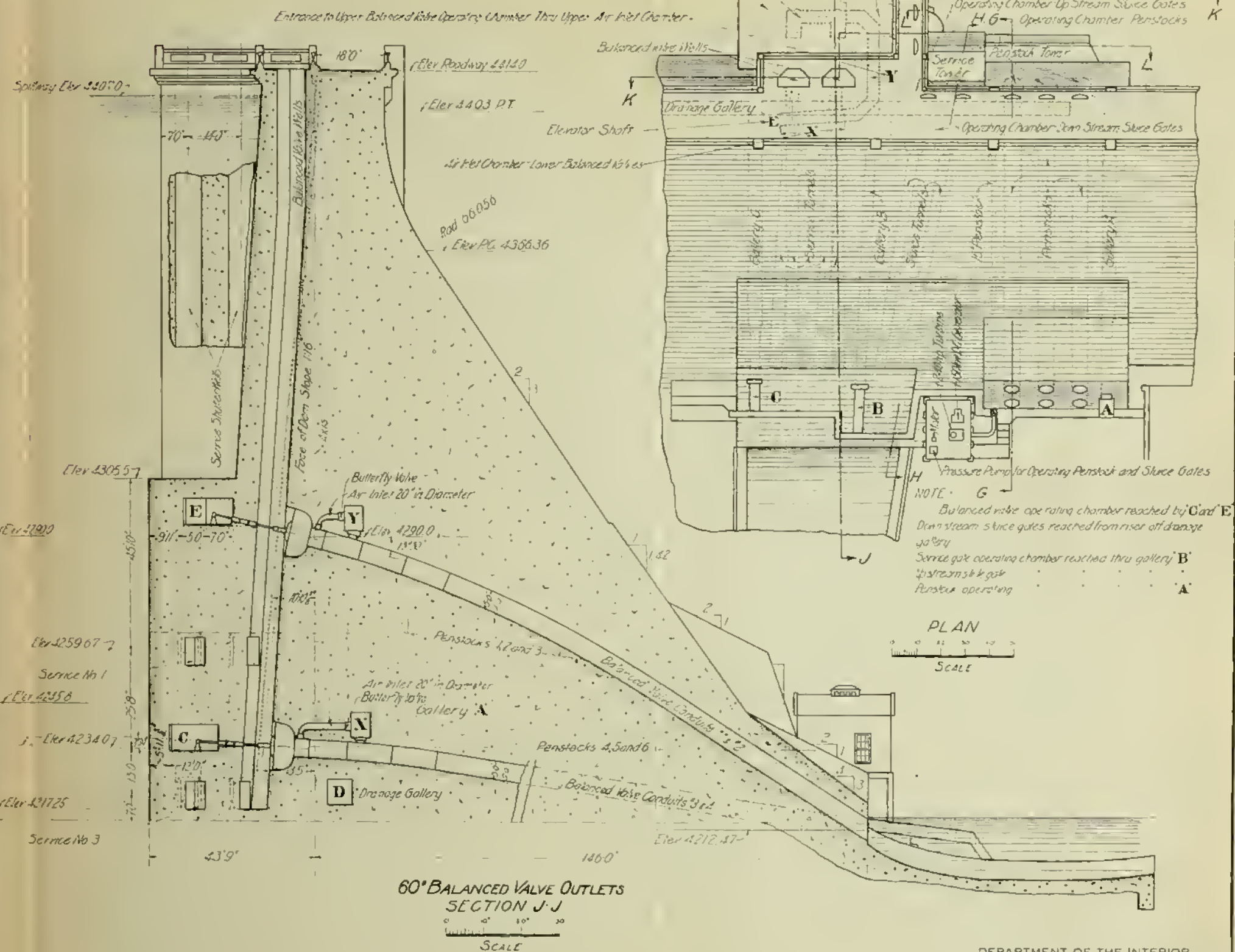
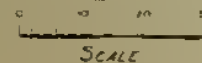
DEPARTMENT OF THE INTERIOR
 UNITED STATES RECLAMATION SERVICE
 RIO GRANDE IRRIGATION PROJECT
 NEW MEXICO-TEXAS
ELEPHANT BUTTE DAM
SERVICE OUTLETS

NO 20396 PLATE 56 OF 88
 1923

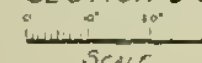
24-E-56



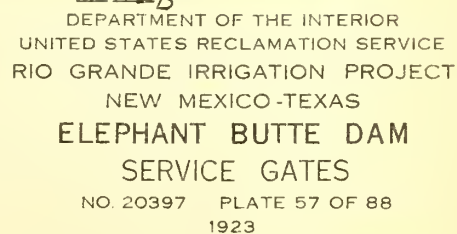
SECTIONAL ELEVATION K-K

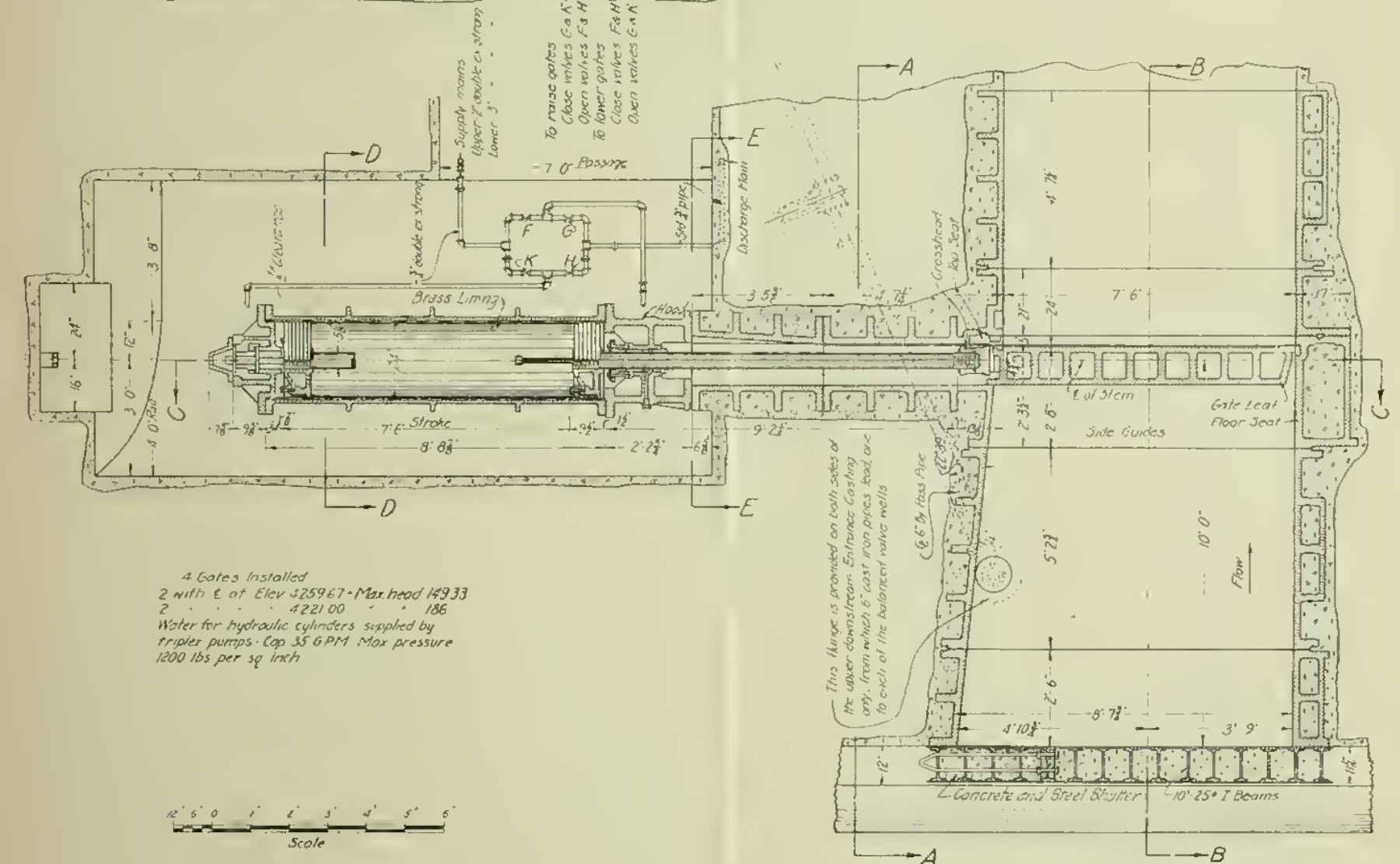
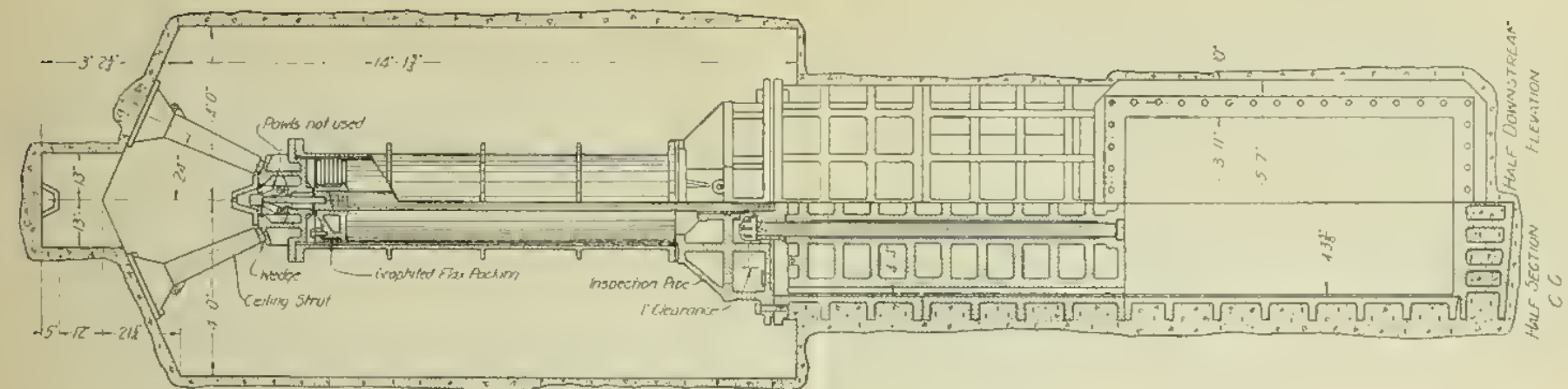
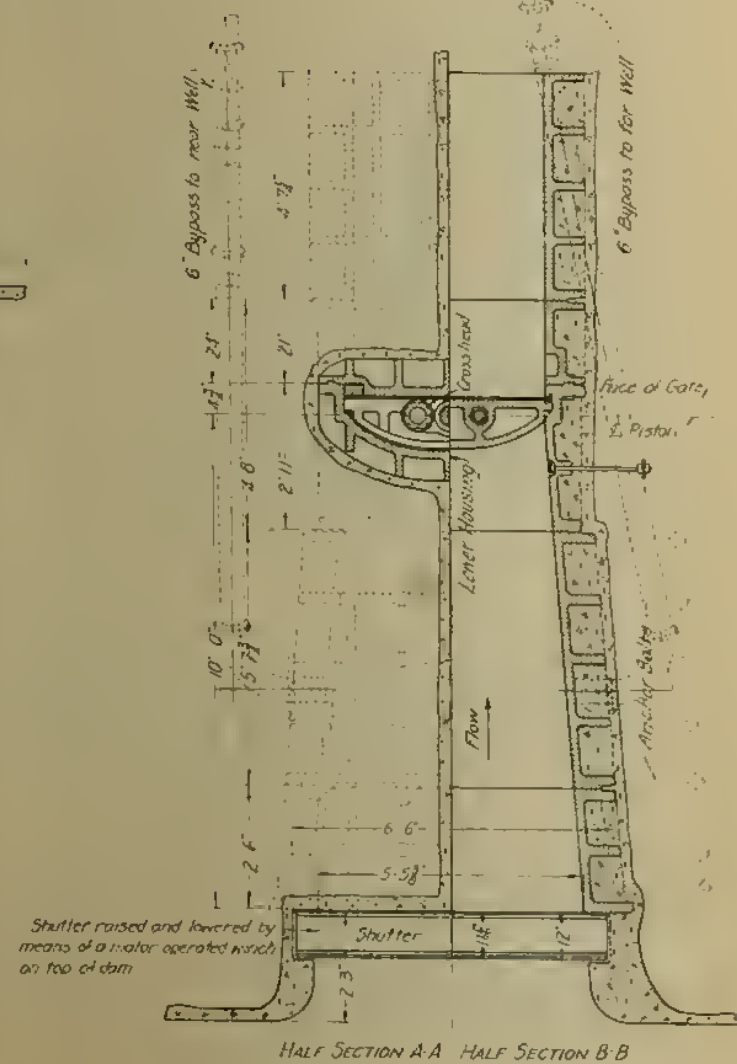
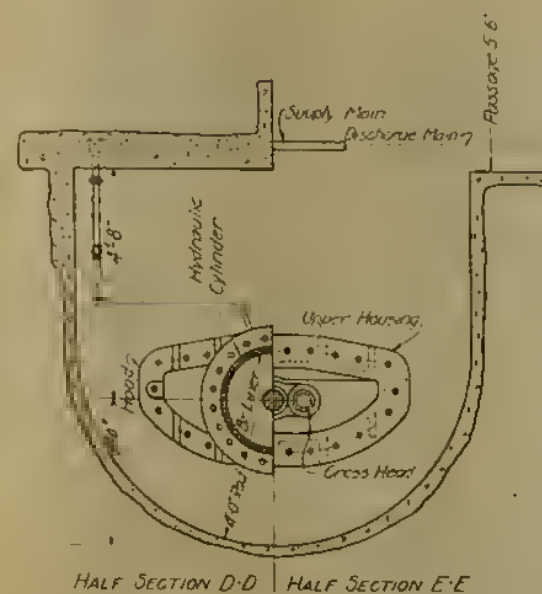
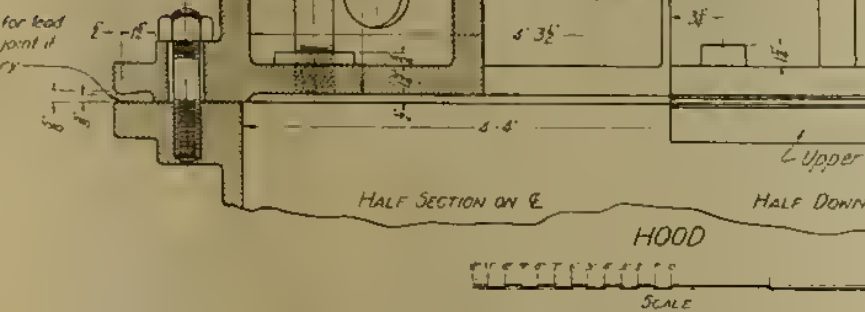


60° BALANCED VALVE OUTLETS SECTION J-J



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS
ELEPHANT BUTTE DAM
SERVICE OUTLETS
NO 20396 PLATE 56 OF 88
1923





4 Gates installed
2 with E. of Elev. 225967 - Max head 14933
2 " " " " 422100 " " 186
Water for hydraulic cylinders supplied by
triplex pumps - Cap 35 GPM Max pressure
1200 lbs per sq inch

OPERATION OF BALANCED VALVES connected to Reservoir

Balanced Valve: Assume all valves closed valves A and Y

valve X, applying reservoir pressure under valve Flap, closing it.

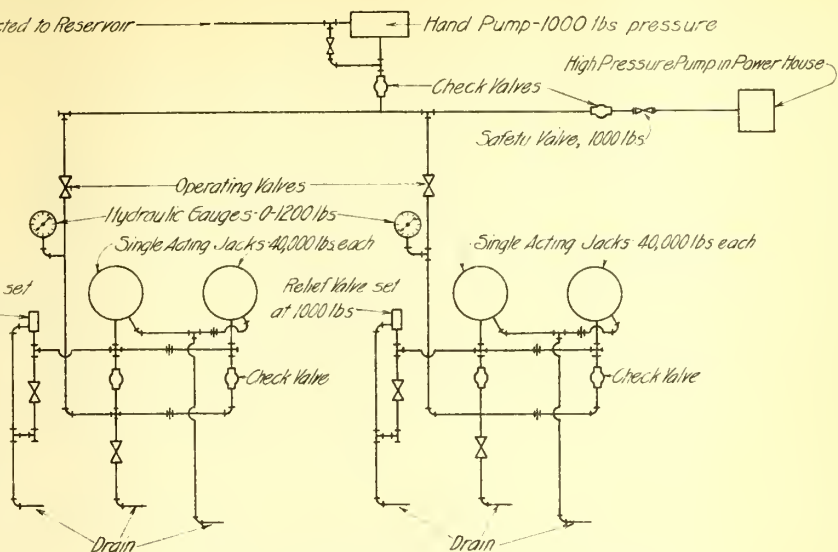
valve S. Fill draft header, air vent on air-venter being open. When draft header is full, close air vent.

Valves S, R, X, and A. Draft tube action becomes effective, producing vacuum back of piston. If piston does not move under the above conditions proceed as follows, using the 2 cylinder hydraulic jack, close all valves but valve Z. Tighten clamp.

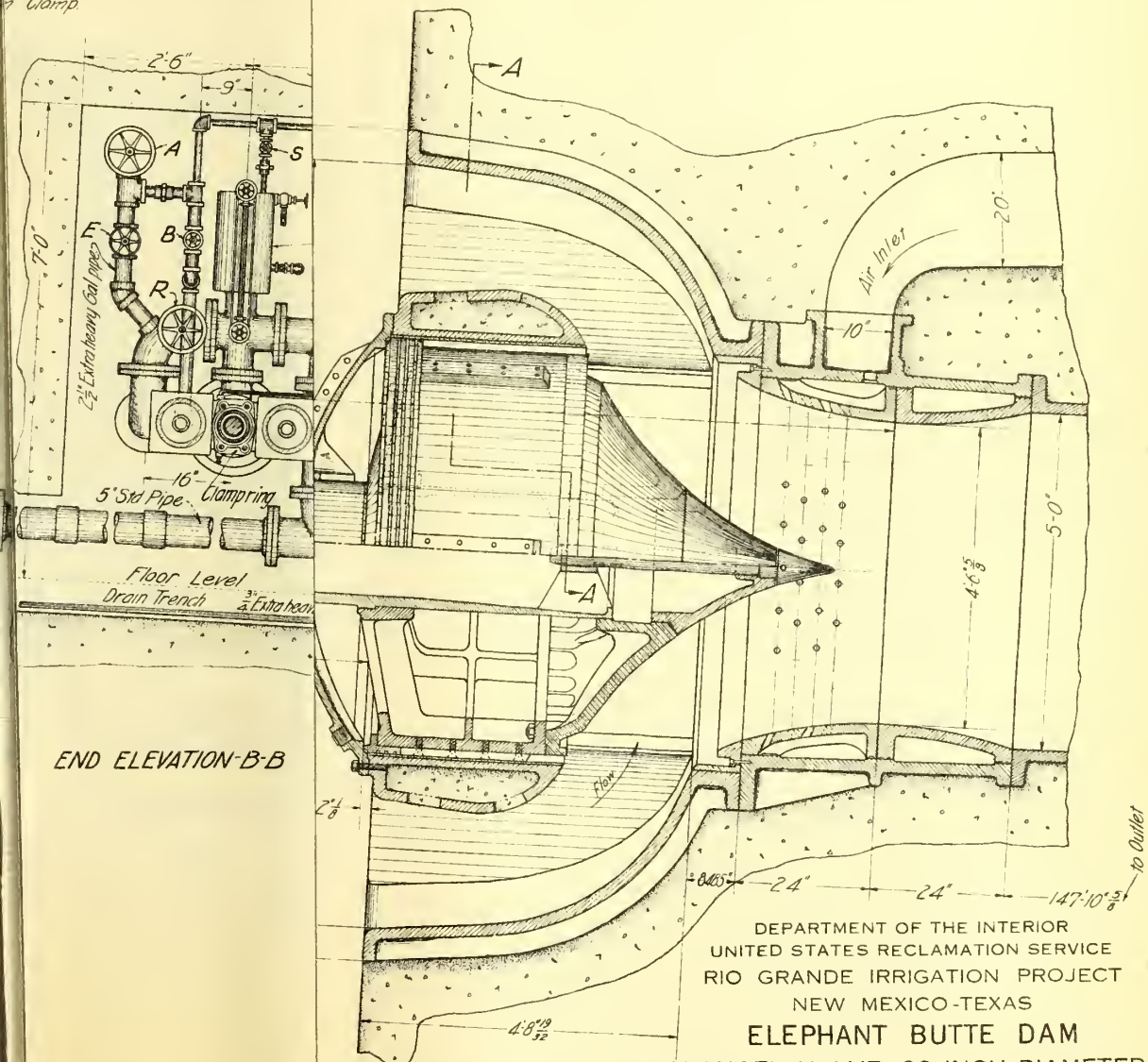
valve Z. Open valve A. Close valve R. valve E slowly, applying reservoir pressure back of the piston until the balanced valve is closed.

Valve E. Close Valve A.

valve Z. Tighten clamp.



PIPING DIAGRAM-AUXILIARY CONTROL



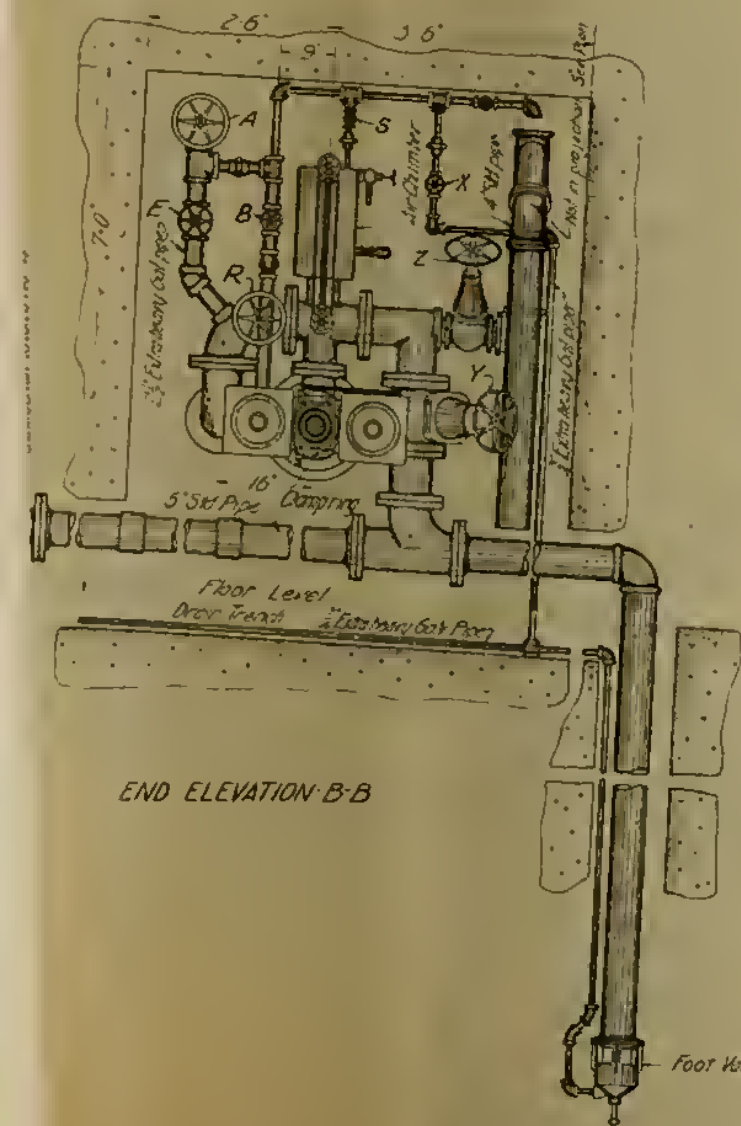
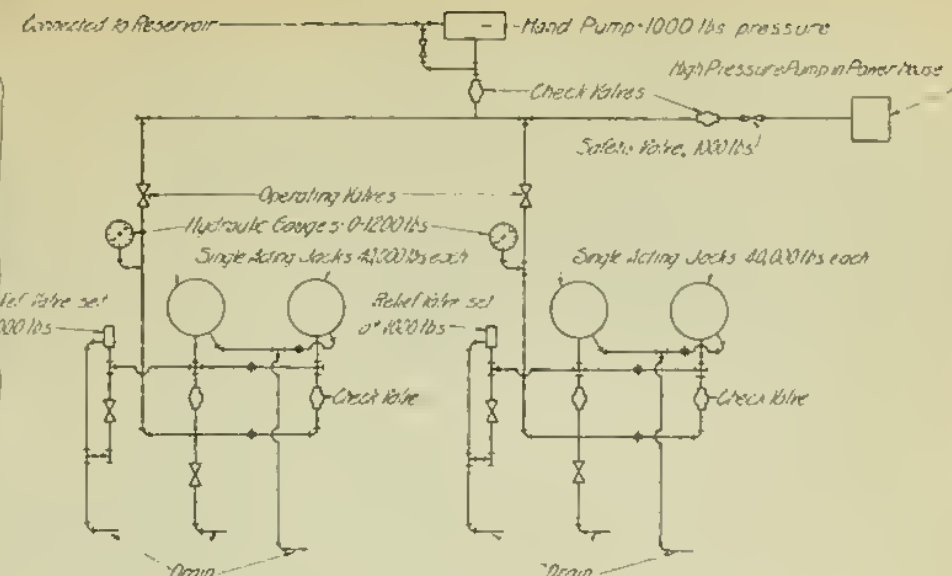
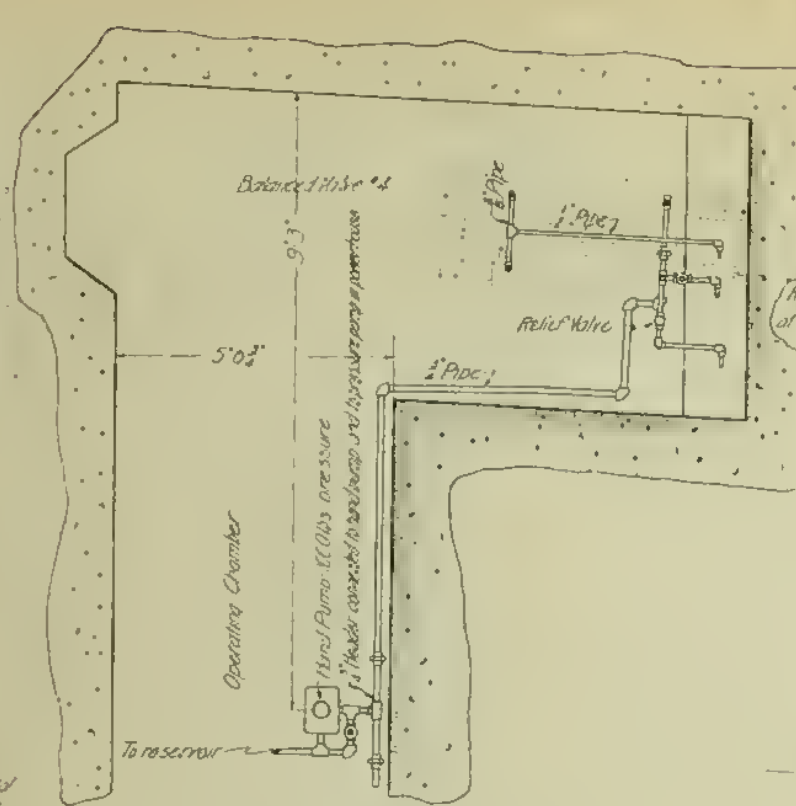
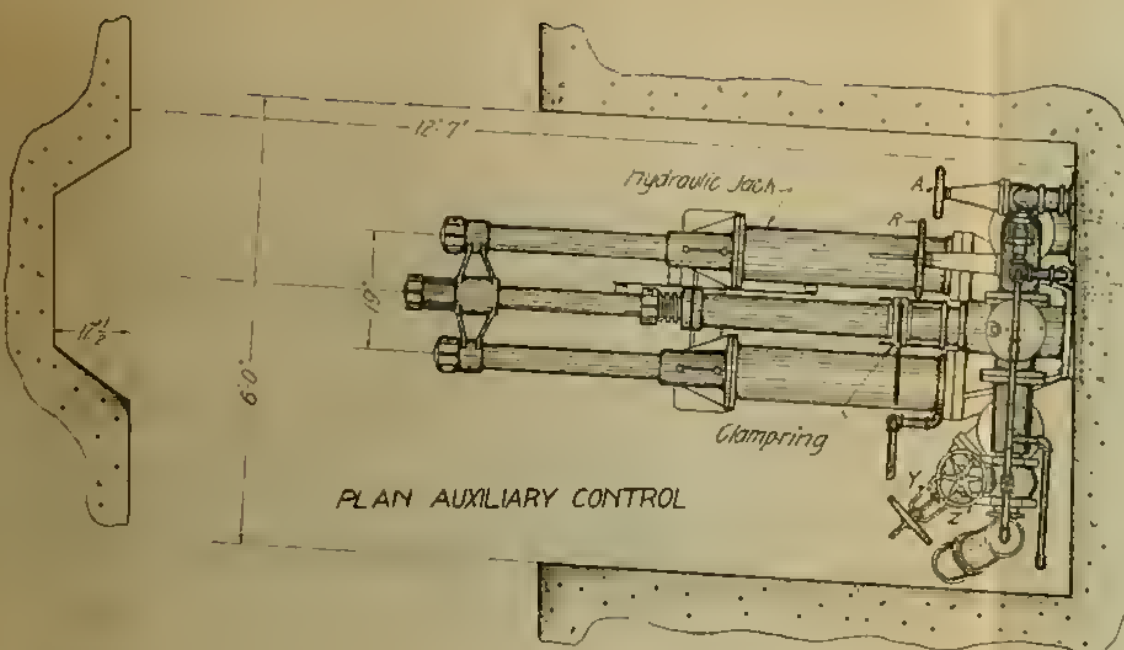
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS
ELEPHANT BUTTE DAM
BALANCED VALVE, 60 INCH DIAMETER

tion No 242
178-D
rawing No 24-E-56

NO. 20398 PLATE 58 OF 88
1923

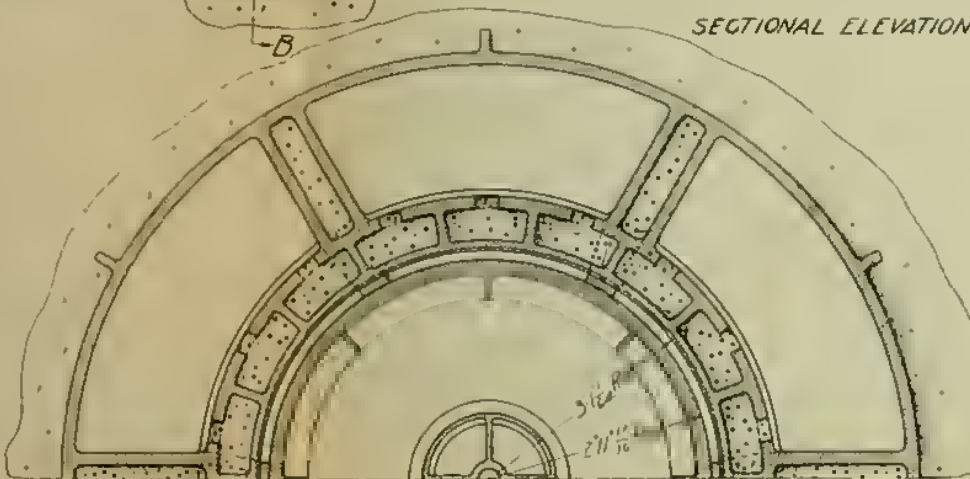
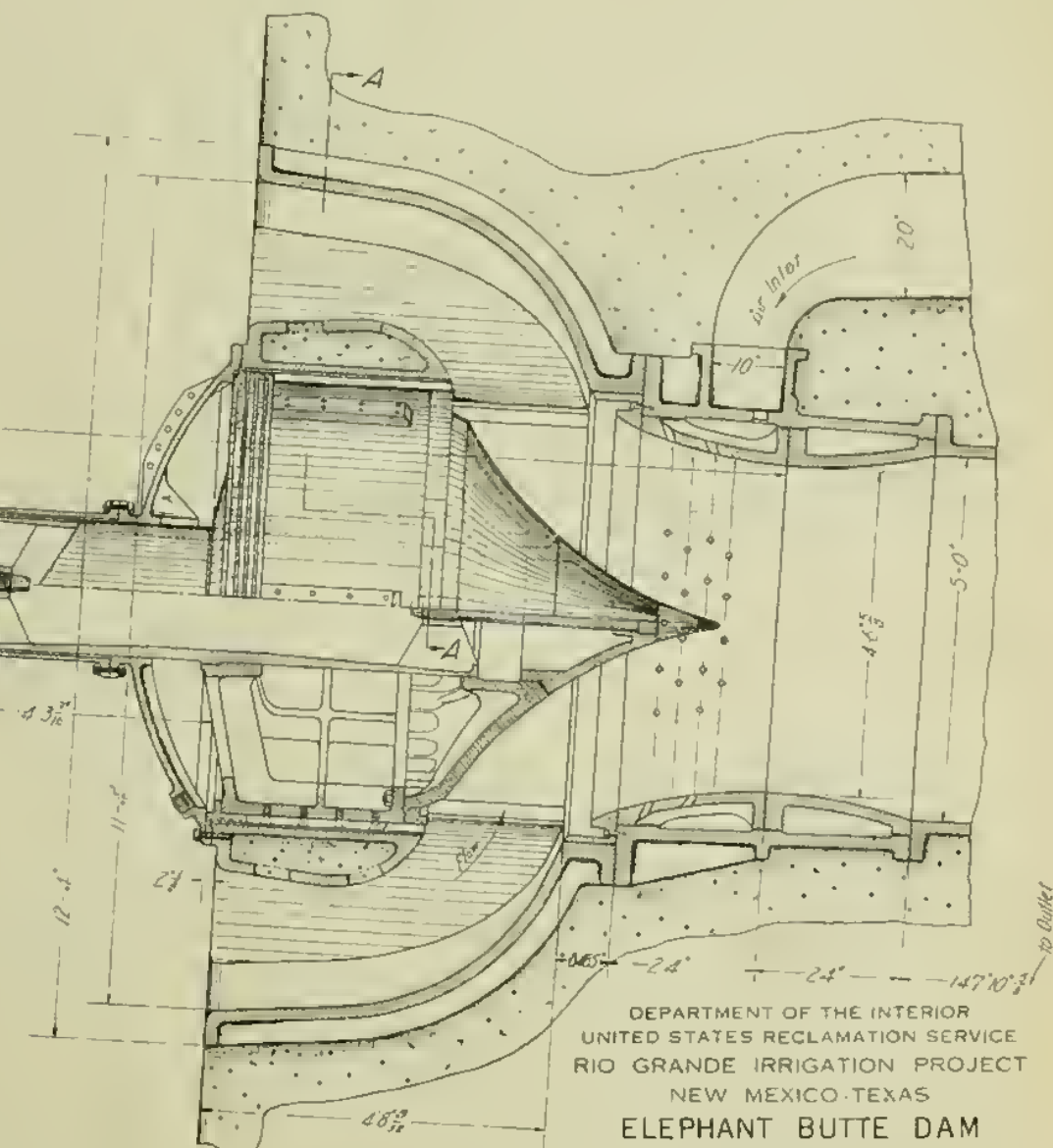
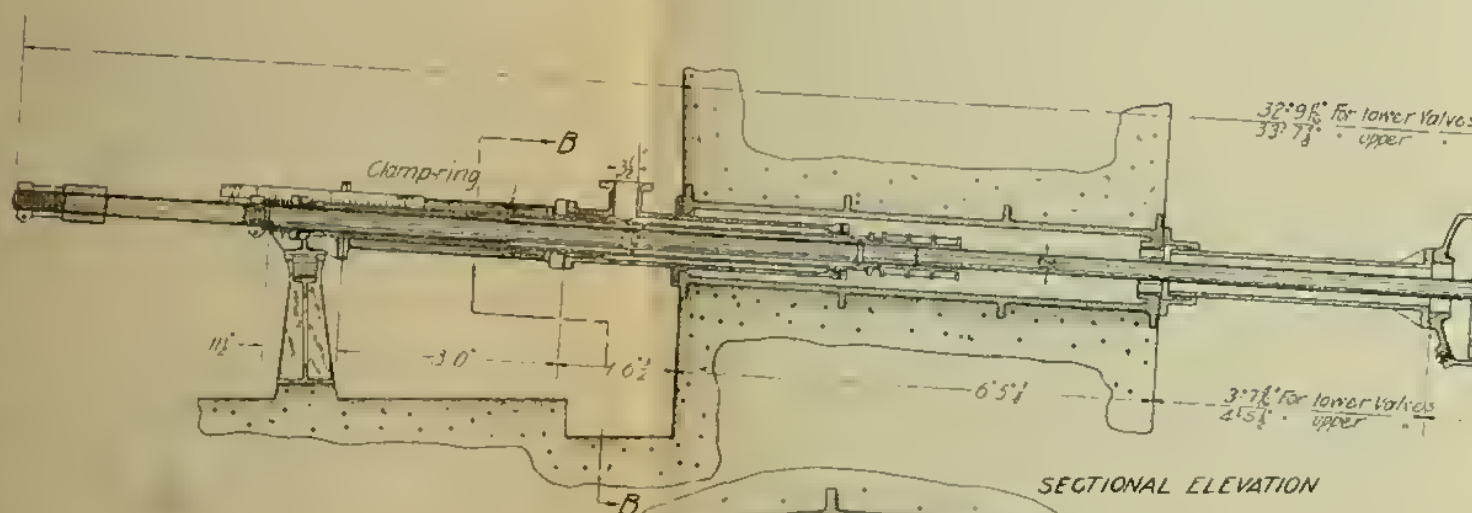
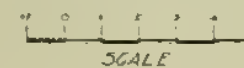
24-E-58

OPERATION OF BALANCED VALVES
 Open Balanced Valve. Assume all valves closed.
 Open valves A and Y.
 Open valve S, applying reservoir pressure under foot valve S, closing it.
 Open valve S, lift draft header, as vent on air reservoir being open when draft header is lifted, close air vent.
 Close valves S, R, and A. Draft tube action then becomes effective producing vacuum in space of piston. If piston does not move under the above conditions proceed as follows, using the 2 cylinder hydraulic jack. See that drain valves are closed.
 Open control valve slowly, until the piston has reached the desired position then release hydraulic jack, close all valves but valve Z, and tighten clamp.
 Close Balanced Valve.
 Loosen clamp.
 Close valve Z. Open valve A. Close valve R.
 Open valve E slowly, applying reservoir pressure to the back of the piston until the balanced valve is closed.
 Close Valve E. Close Valve A.
 Move piston part way.
 Close Valve E.
 Close Valve A.
 Open Valve Z.
 Tighten Clamp.



NOTE
 Balanced valves Nos 1 and 2 (upper) have a horizontal angle of 90° with axis of down and vertical angle of 13° 30'.
 Balanced valves Nos 3 and 4 (lower) have a horizontal angle of 86° 38' with axis of down and vertical angle of 3° 30'.

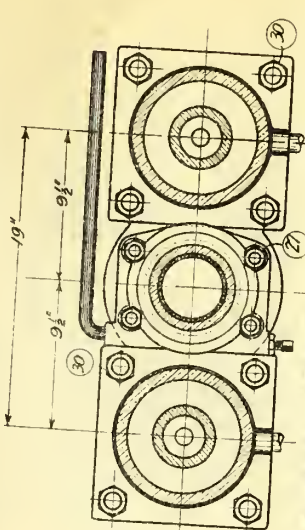
AUXILIARY CONTROL PIPING PLAN



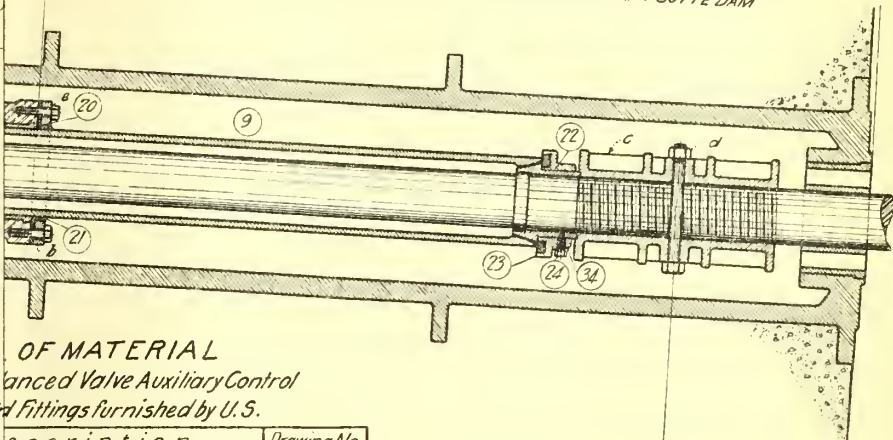
SECTION A-A

Balanced Valve Specification No 242
 Auxiliary Control 178-D
 For location in dam see drawing No 24-E-56

DEPARTMENT OF THE INTERIOR
 UNITED STATES RECLAMATION SERVICE
 RIO GRANDE IRRIGATION PROJECT
 NEW MEXICO, TEXAS
ELEPHANT BUTTE DAM
BALANCED VALVE, 60 INCH DIAMETER
 NO 20398 PLATE 58 OF 68
 1923



NOTE: Parts marked a-g are reused from present construction, shown on drawing No. 4. Specification No. 242 "BALANCED VALVES FOR SERVICE CONDUITS ELEPHANT BUTTE DAM"

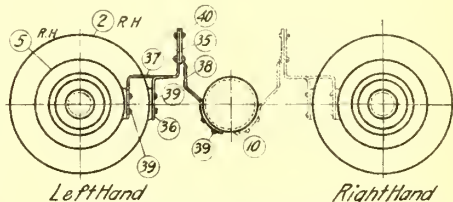


OF MATERIAL

Balanced Valve Auxiliary Control

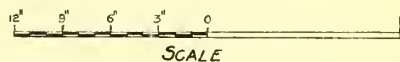
High Pressure Operating Valve
Drawing No 24-E-54

Description	Drawing No.
ing Tube Guide	24-E-50
der, see note on detail drawing	24-E-52
n	"
n Ring	"
der Head, see note on detail drawing	24-E-50
der Cover Stand	"
head	24-E-52
n Rod Clamp Nut	"
ing Tube	24-E-51
od	24-E-52
od Clamp Nut	"
od Nut	"
g Clamp Nut	"
	24-E-51
ing Tube Packing Ring	"
ing Tube Packing	"
Strap Housing	24-E-52
ing Tube Guide Stuffing Box Gland	24-E-50
ing Tube Guide Stuffing Box	"
" " " "	"
" " " " Packing	"
ing Tube Seat	24-E-51
" " " " Ring	"
" " " " Bolt	"
rews $\frac{1}{2}$ " x 23"	"
Head Screws	24-E-52
, Bronze Nuts $\frac{3}{4}$ " x 13"	24-E-50
" " $\frac{1}{2}$ " x 33"	"
ine Bolts $\frac{3}{8}$ " x 24"	24-E-52
" $\frac{1}{2}$ " x 4"	"
$\frac{1}{4}$ " x 24"	"
ard Grease Cups $\frac{1}{2}$ " pipe shank	24-E-49
ut Wrench	24-E-52
Washers	24-E-51
on Indicator Gage, see note on detail drawing	"
" " Bracket Cylinder	"
" " " " Cylinder Cover	"
" " " " Hand	"
illister Head Screws	24-E-49
ttion Head Screws, hex nuts	"
High Pressure Hydraulic Packing	"



ARRANGEMENT OF POSITION INDICATOR
Similar for Upper and Lower Valves

REFERENCES:	Drawing No
Guide Stand and Bearing Details	24-E-50
Cylinder, Piston and Tail Rod	24-E-52
Locking Tube and Seat	24-E-51
Operating Pipe System	24-E-53
High Pressure Operating Valve	24-E-54
Balanced Valve Details	Spec. No. 242

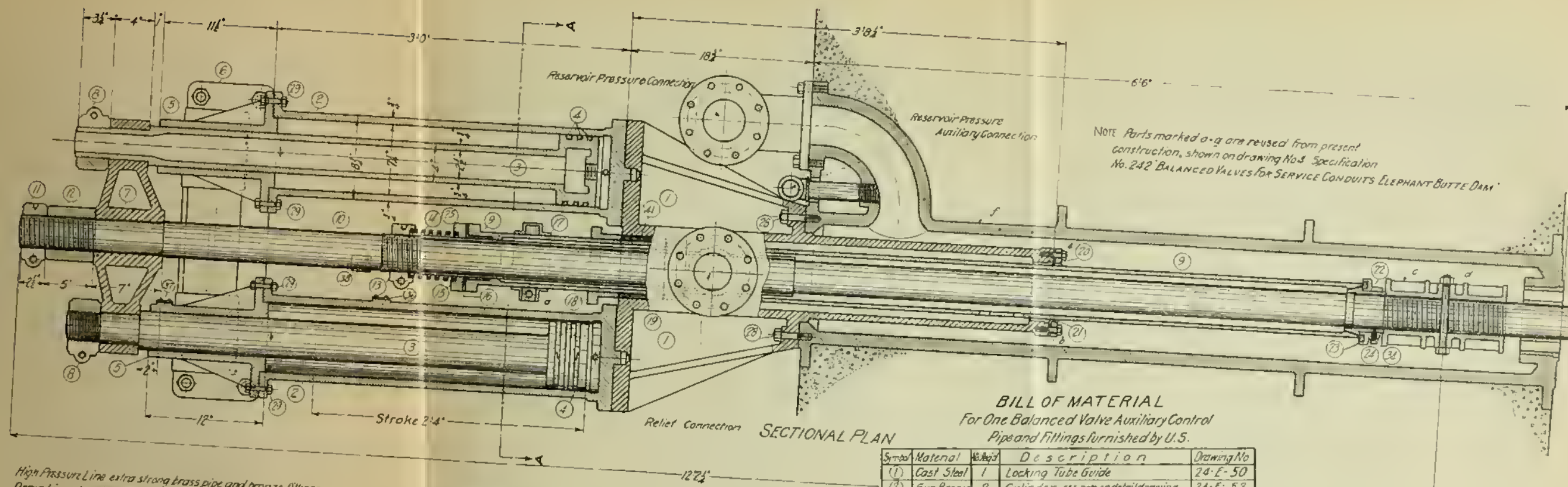
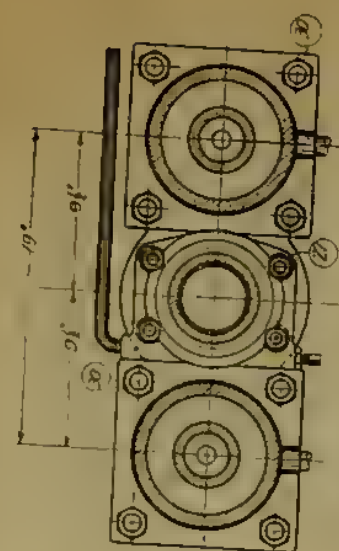


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS

ELEPHANT BUTTE DAM BALANCED VALVE AUXILIARY CONTROL

NO. 20399 PLATE 59 OF 88
1923

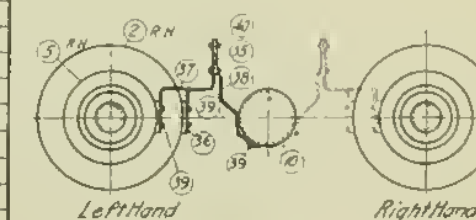
SECTION A-A



NOTE Parts marked a-g are reused from present construction, shown on drawing No. 3 Specification No. 242 BALANCED VALVES FOR SERVICE CONDUITS ELEPHANT BUTTE DAM

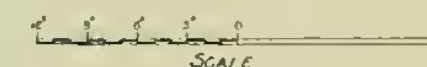
BILL OF MATERIAL
For One Balanced Valve Auxiliary Control
Pipe and Fittings furnished by U.S.

Symbol	Material	Quantity	Description	Drawing No.
(1)	Cast Steel	1	Locking Tube Guide	24-E-50
(2)	Gun Bronze	2	Cylinder, see note on detail drawing	24-E-52
(3)	"	2	Piston	"
(4)	"	6	Piston Ring	"
(5)	"	2	Cylinder Head, see note on detail drawing	24-E-50
(6)	Semi Steel	1	Cylinder Cover Stand	"
(7)	Cast Steel	1	Crosshead	24-E-52
(8)	Gun Bronze	2	Piston Rod Clamp Nut	"
(9)	"	1	Locking Tube	24-E-51
(10)	Forged Steel	1	Tail Rod	24-E-52
(11)	Gun Bronze	1	Tail Rod Clamp Nut	"
(12)	"	1	Tail Rod Nut	"
(13)	"	1	Spring Clamp Nut	"
(14)	Spring Steel	1	Spring	24-E-51
(15)	Gun Bronze	1	Locking Tube Packing Ring	"
(16)	Leather	1	Locking Tube Packing	"
(17)	Gun Bronze	1	Brake Strap Housing	24-E-52
(18)	"	1	Locking Tube Guide Stuffing Box Gland	24-E-50
(19)	"	1	Locking Tube Guide Stuffing Box	"
(20)	"	1	"	"
(21)	Leather	1	"	"
(22)	Gun Bronze	1	Locking Tube Seal	24-E-51
(23)	"	1	"	"
(24)	"	2	"	"
(25)	Mild Steel	4	Cap Screws 1/2" x 2 1/2"	"
(26)	"	4	Collar Head Screws	24-E-52
(27)	"	4	Studs, Bronze Nuts 1/2" x 3/8"	24-E-50
(28)	"	4	"	"
(29)	"	16	Machine Bolts 1/2" x 2 1/2"	24-E-52
(30)	"	8	"	"
(31)	"	8	"	"
(32)	Brass	4	Standard Grease Cups & pipe shank	24-E-49
(33)	Mild Steel	1	Clamp Nut Wrench	24-E-52
(34)	Annealed Brass	2	Lock Washers	24-E-51
(35)	Unannealed Iron	1	Position Indicator Gage, see note on detail drawing	"
(36)	Brass	1	"	"
(37)	"	1	"	"
(38)	"	1	"	"
(39)	"	6	1/2" x 1/2" Fillister Head Screws	24-E-49
(40)	"	4	3/4" x 1/2" Button Head Screws, hex nuts	"
(41)	"	9 feet	Spiral High Pressure Hydraulic Packing	"



ARRANGEMENT OF POSITION INDICATOR
Similar for Upper and Lower Valves

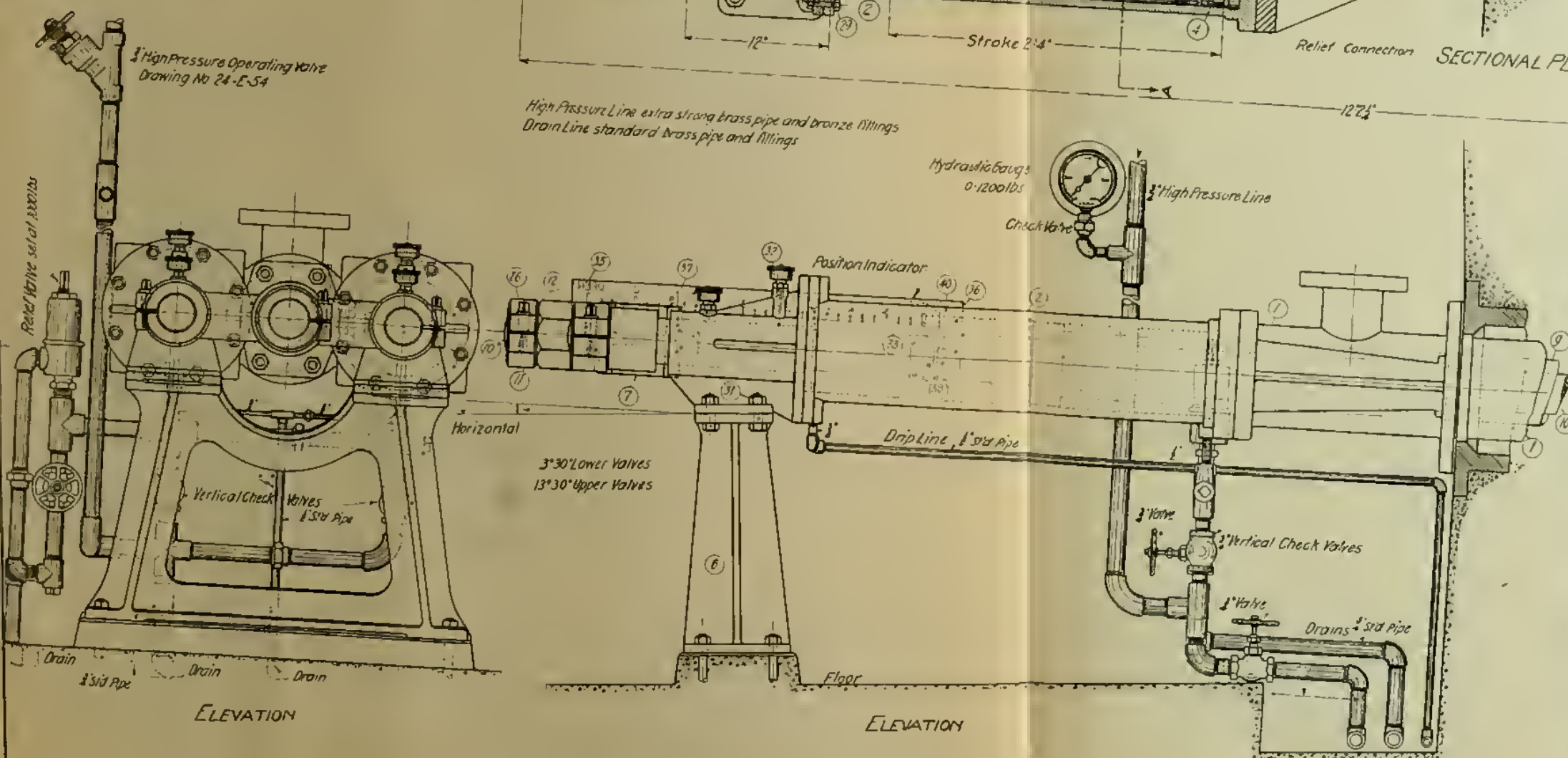
REFERENCES
Guide Stand and Bearing Details 24-E-50
Cylinder, Piston and Tail Rod " 24-E-52
Locking Tube and Seal " 24-E-51
Operating Pipe System " 24-E-53
High Pressure Operating Valve 24-E-54
Balanced Valve Details Spec. No. 242

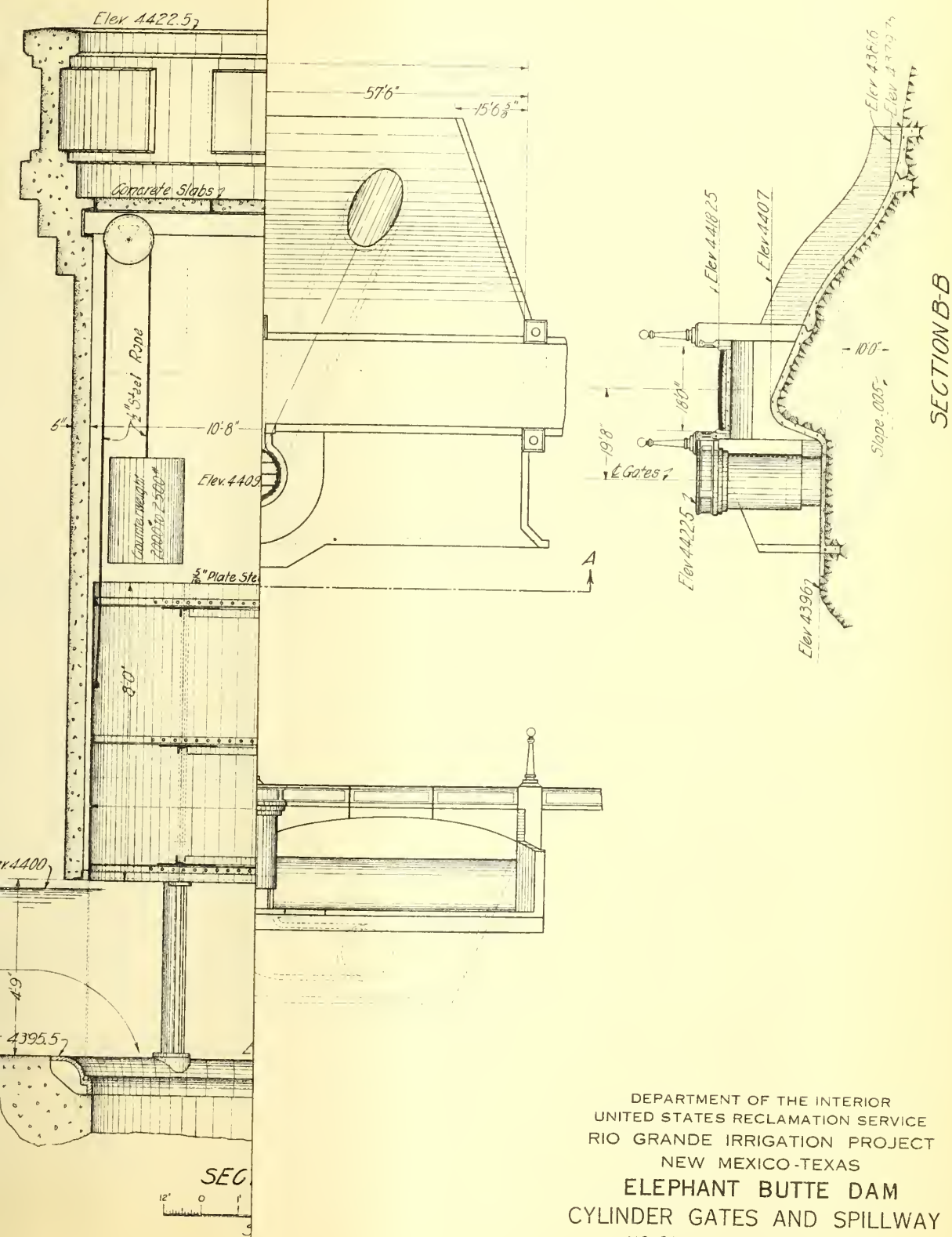


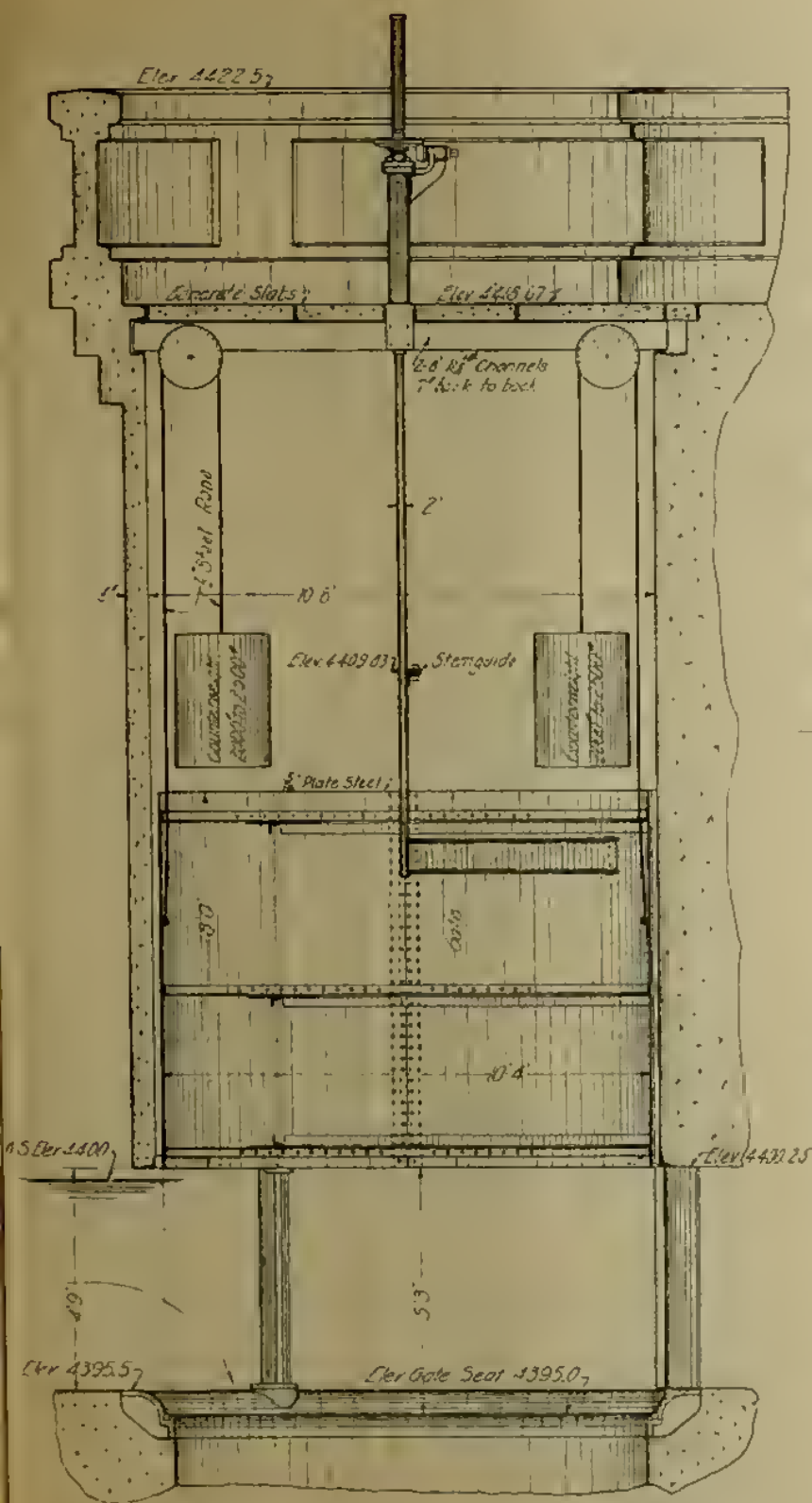
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS
ELEPHANT BUTTE DAM
BALANCED VALVE AUXILIARY CONTROL

NO 20399 PLATE 59 OF 88
1923

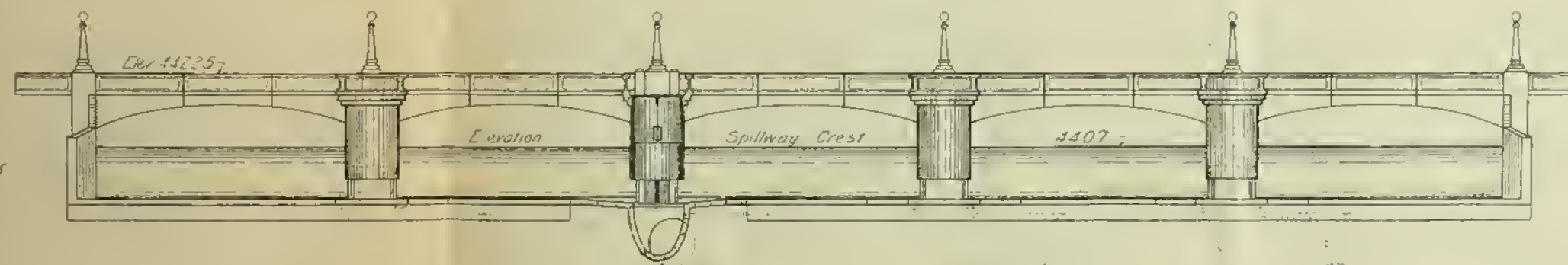
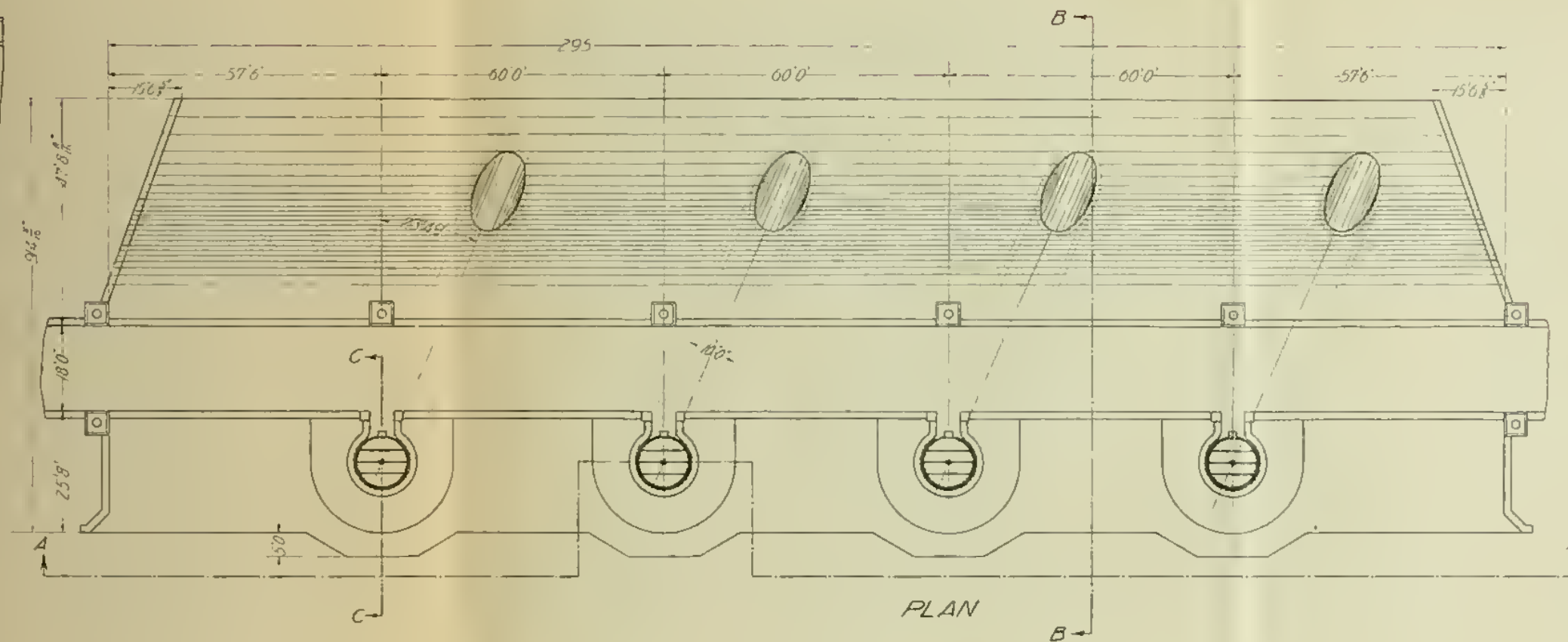
24-E-49



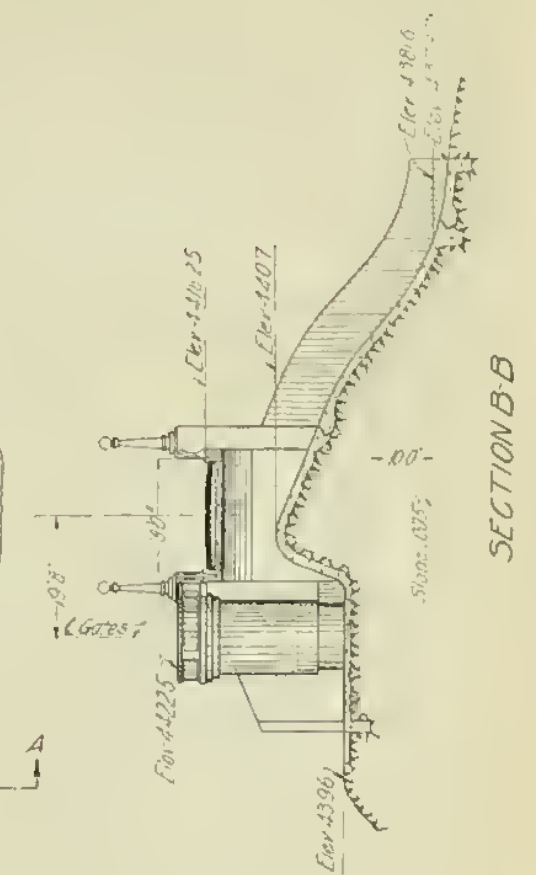
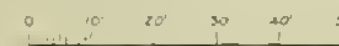




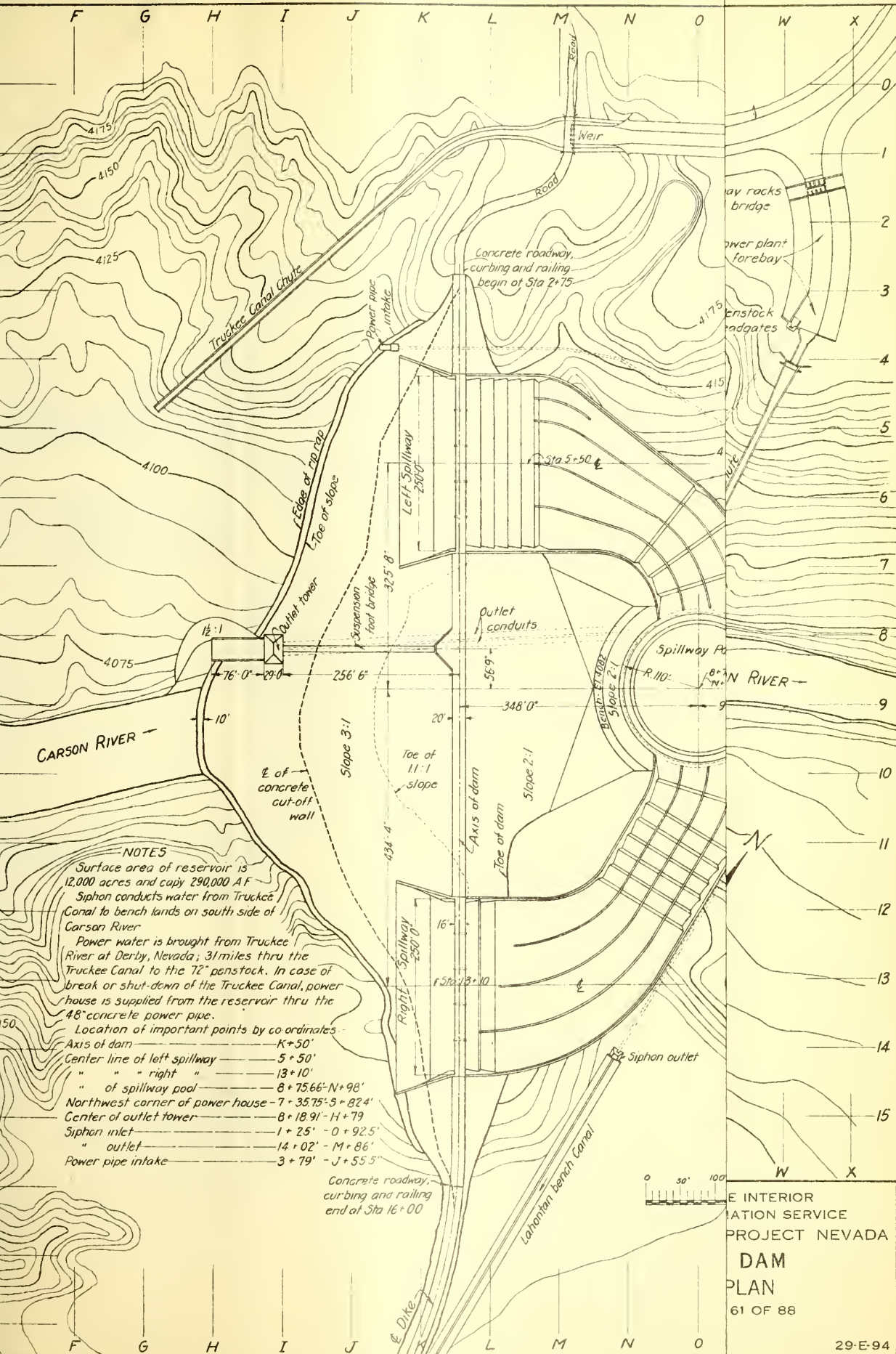
SECTION C-C
SCALE



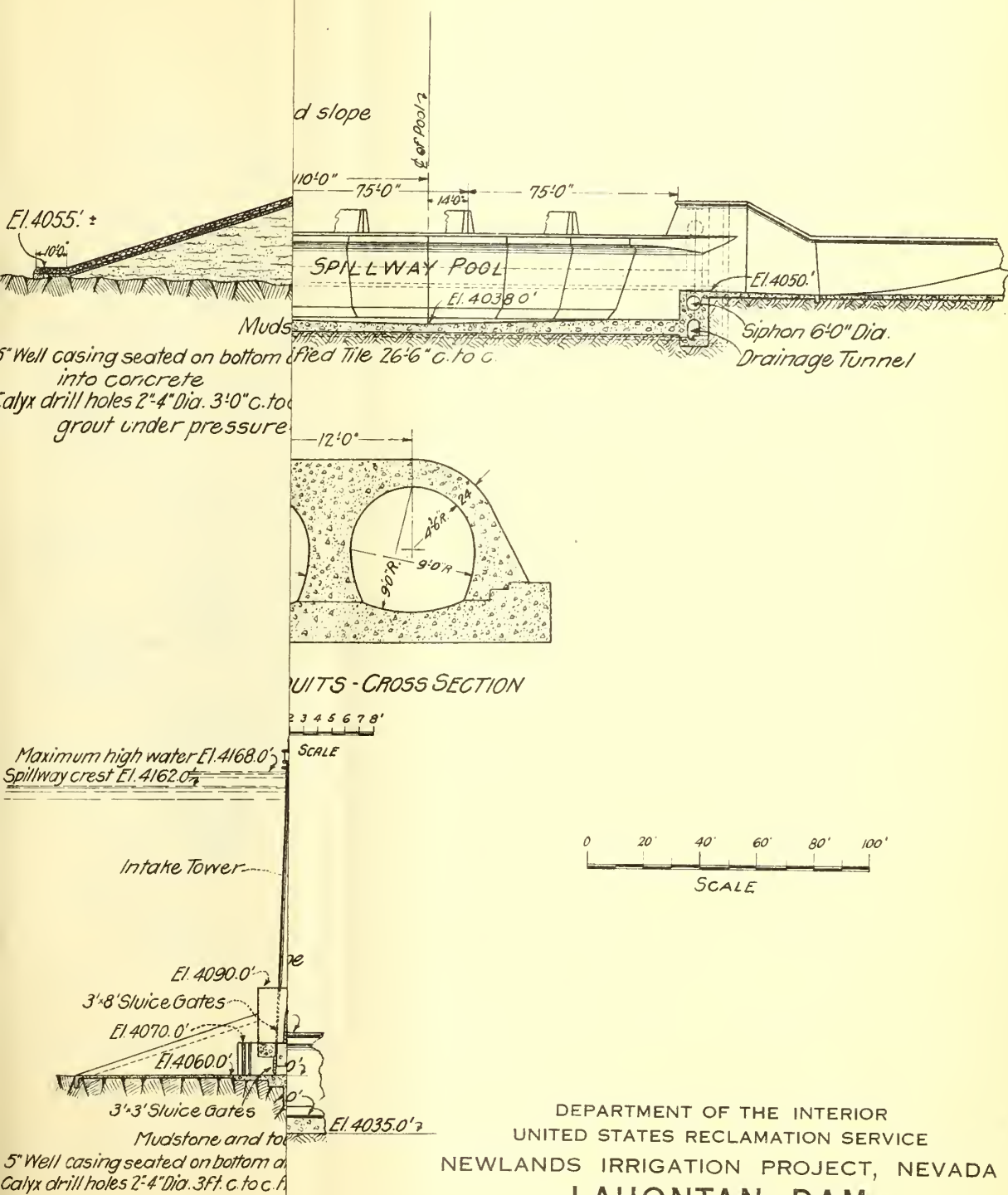
SECTIONAL ELEVATION A-A



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
RIO GRANDE IRRIGATION PROJECT
NEW MEXICO-TEXAS
ELEPHANT BUTTE DAM
CYLINDER GATES AND SPILLWAY
NO 20400 PLATE 60 OF 88
1923







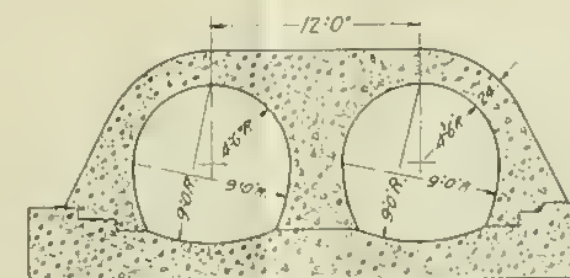
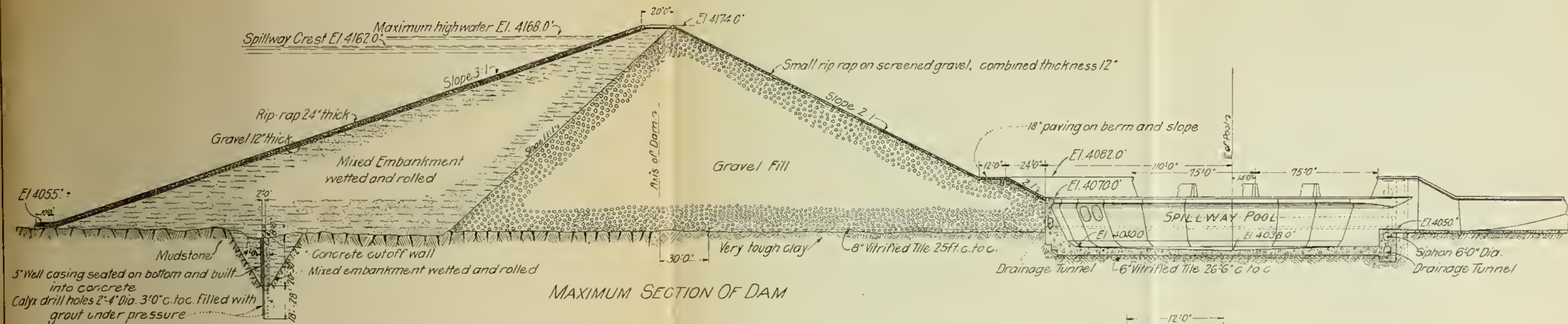
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA

LAHONTAN DAM

SECTIONS OF DAM AND OUTLET

NO. 20402 PLATE 62 OF 88

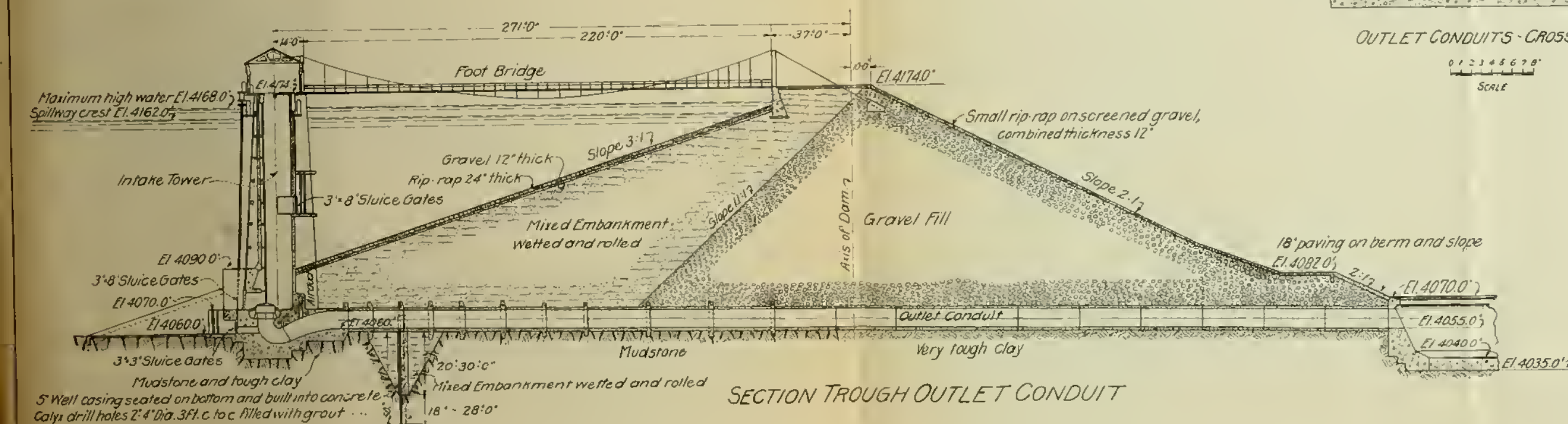
1923



OUTLET CONDUITS - CROSS SECTION

0 1 2 3 4 5 6 7 8
SCALE

0 20 40 60 80 100
SCALE



DEPARTMENT OF THE INTERIOR
 UNITED STATES RECLAMATION SERVICE
 NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
 SECTIONS OF DAM AND OUTLET

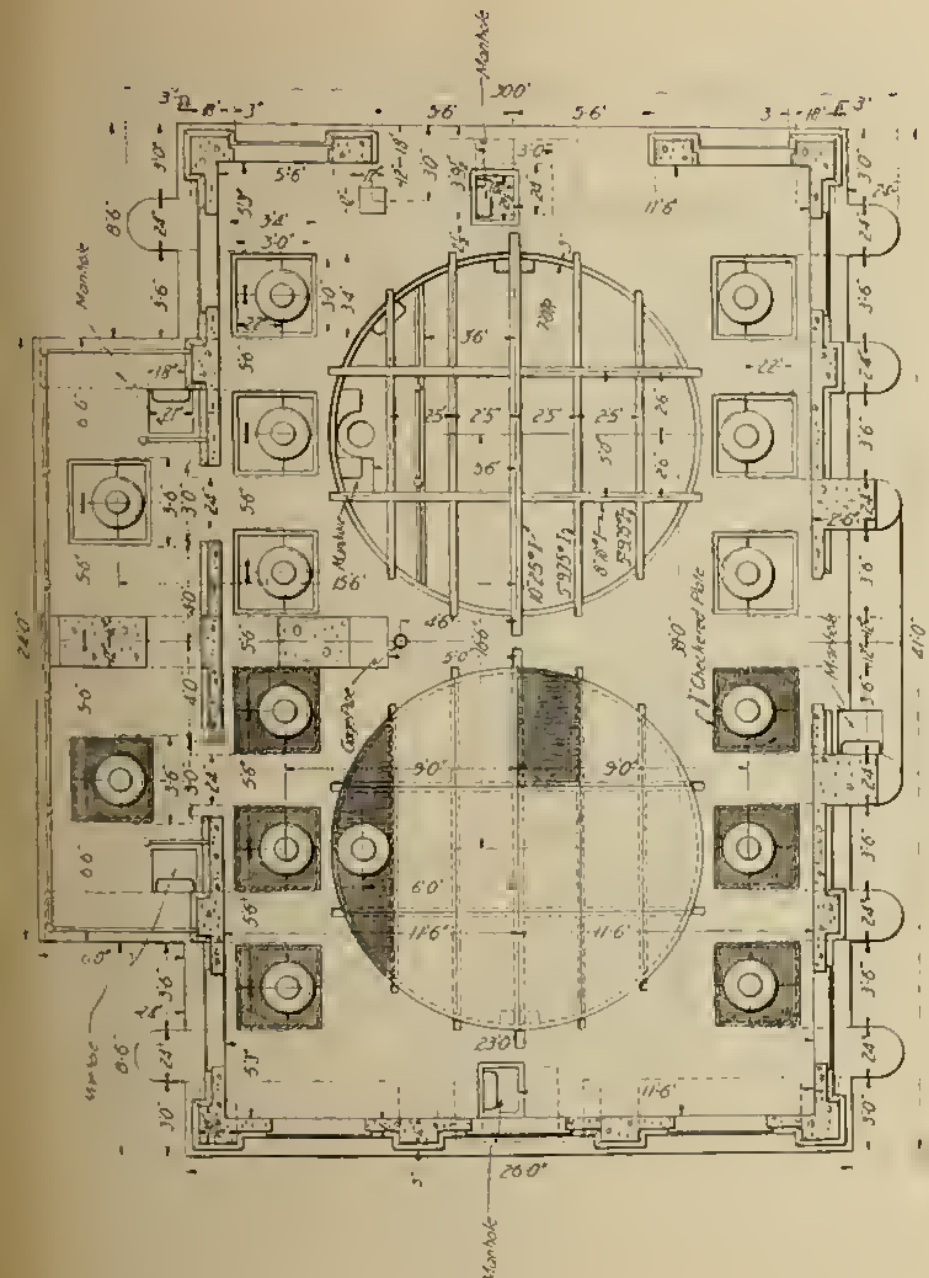
NO. 20402 PLATE 62 OF 88
 1923



NOTE- This Drawing compiled from Design Drawings
made in the Project Office

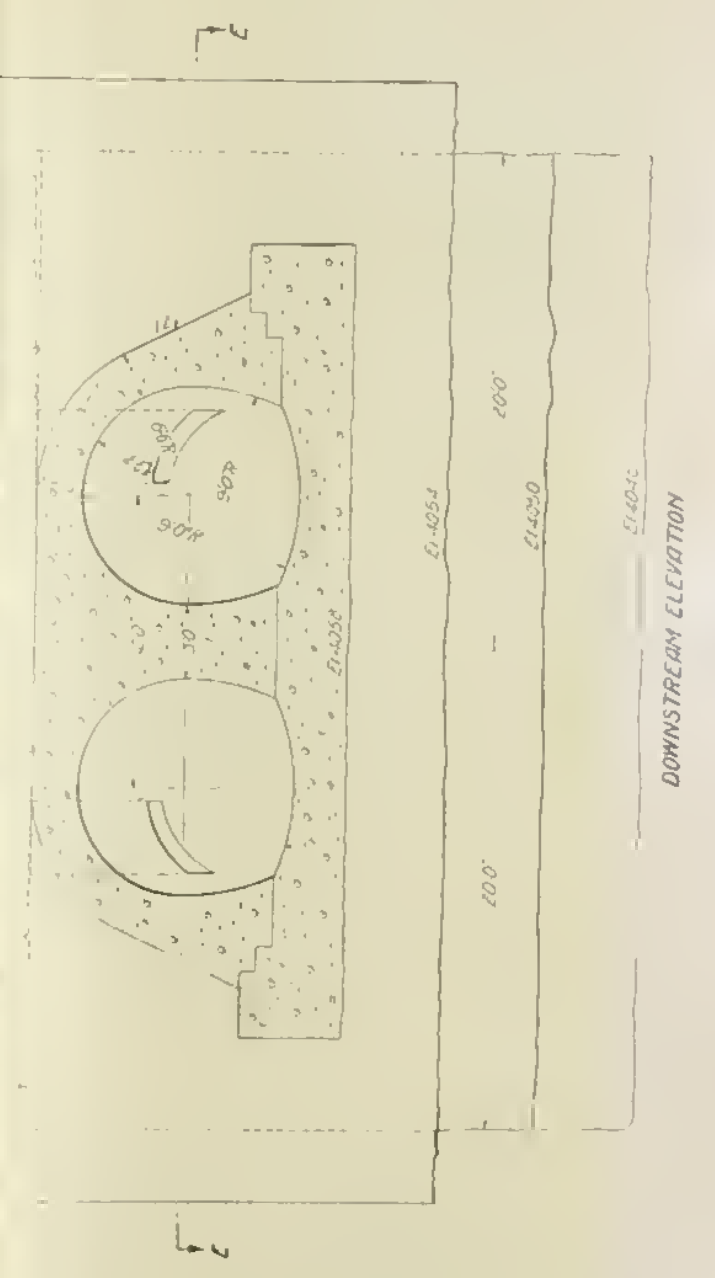
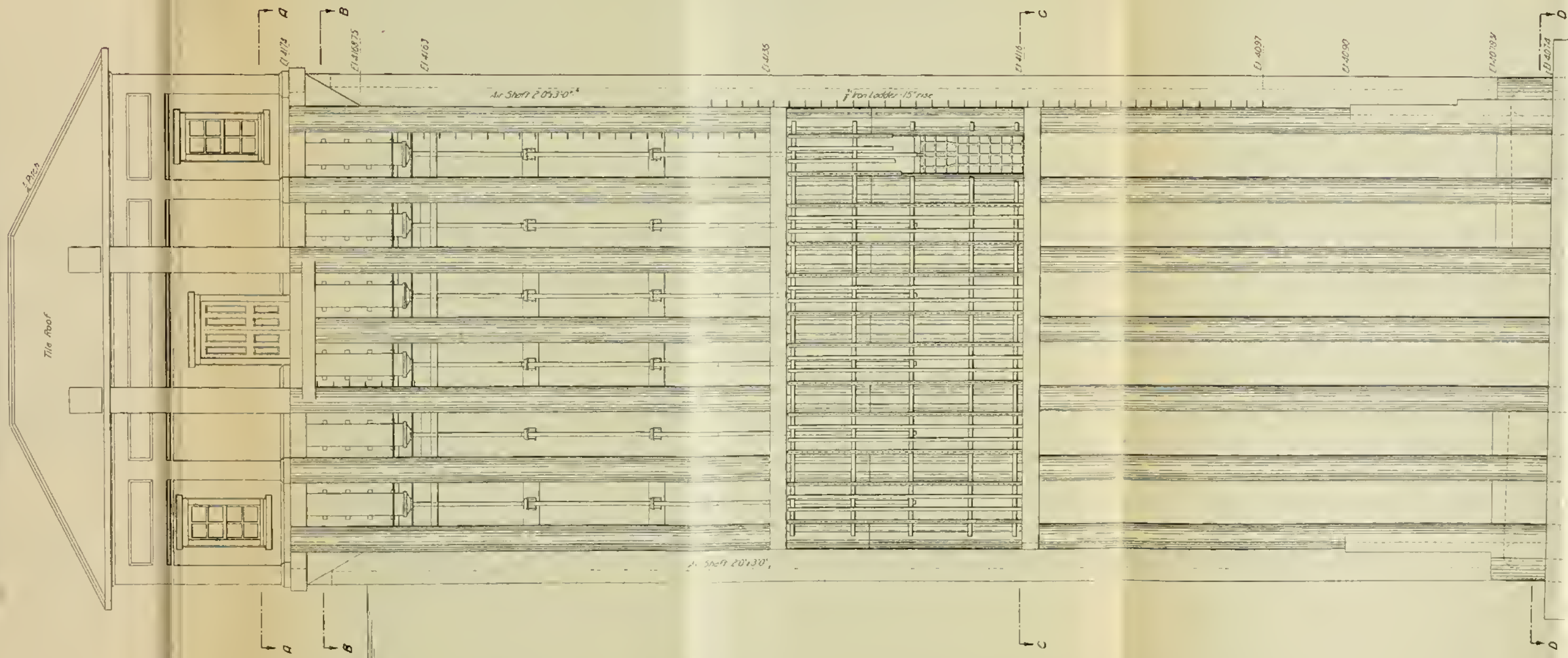
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
GATE TOWER, DOWNSTREAM ELEVATION

NO. 20403 PLATE 63 OF 88
1923



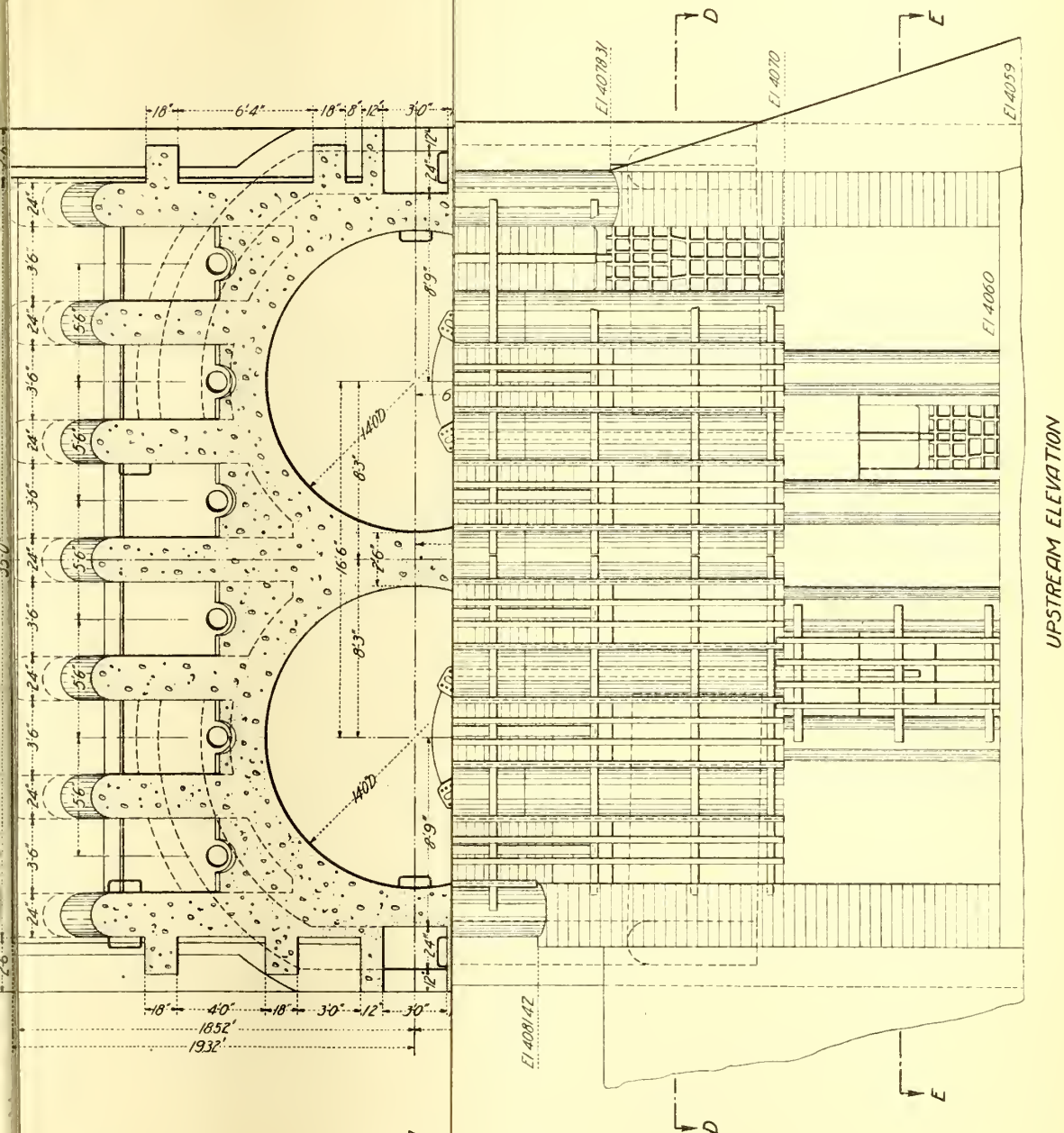
SECTION A-A
Floor Plan

Note: Reinforcement not shown



NOTE: This drawing compiled from design from up made in the Project Office

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
GATE TOWER, DOWNSTREAM ELEVATION
NO 20403 PLATE 63 OF 88
1923

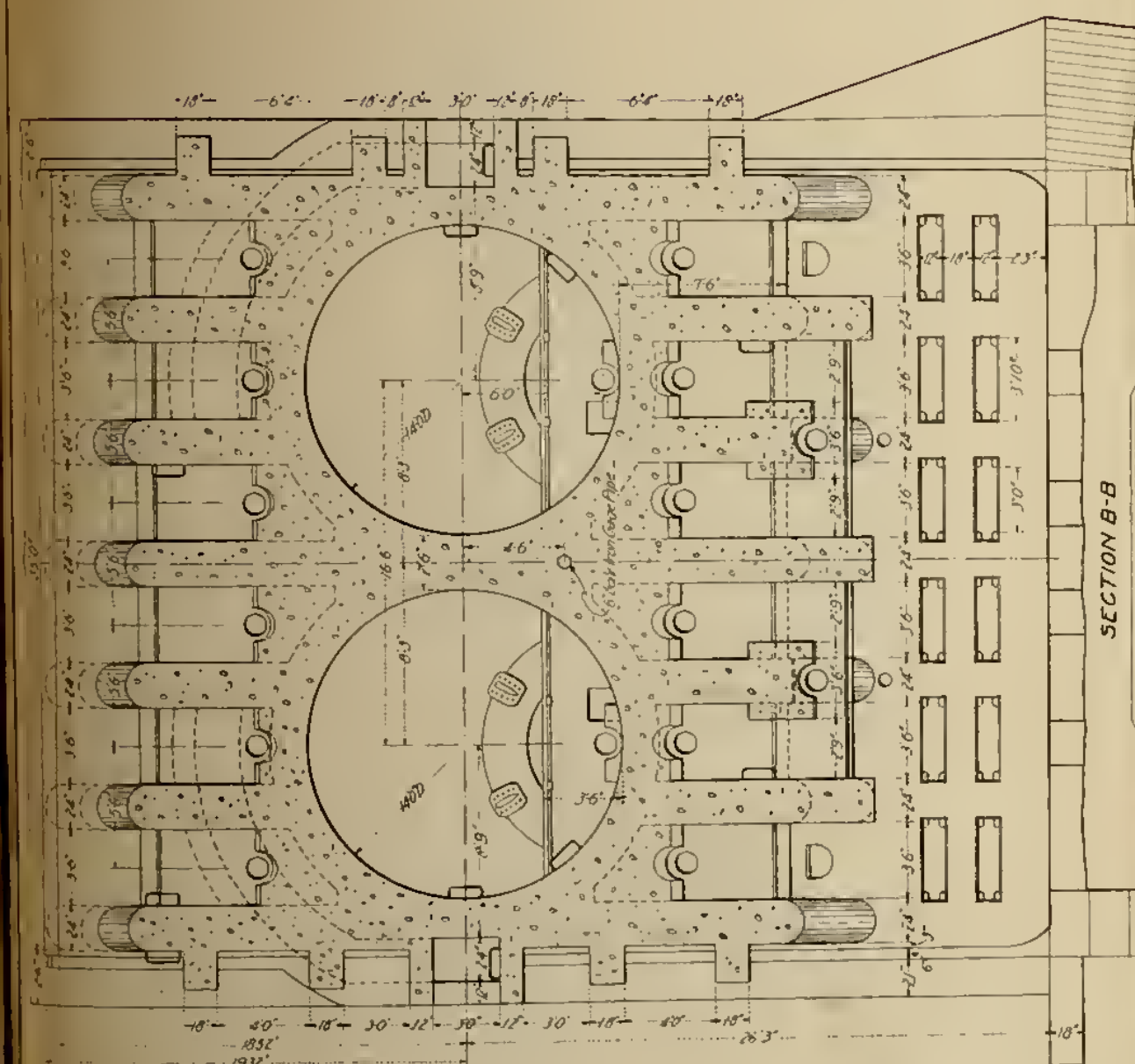


Note:- Reinforcement not shown

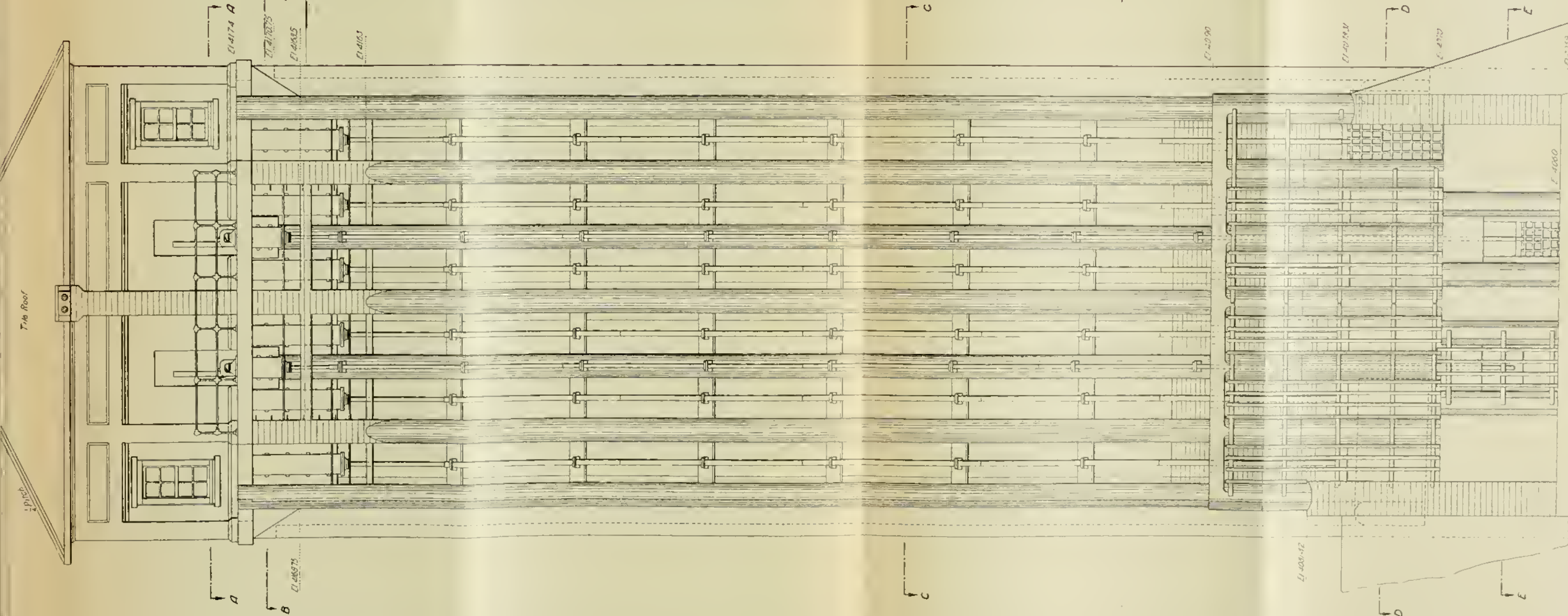
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
GATE TOWER, UPSTREAM ELEVATION

NO. 20404 PLATE 64 OF 88
1923

ing compiled from Design
in the Project Office



Note: Reinforcement not shown



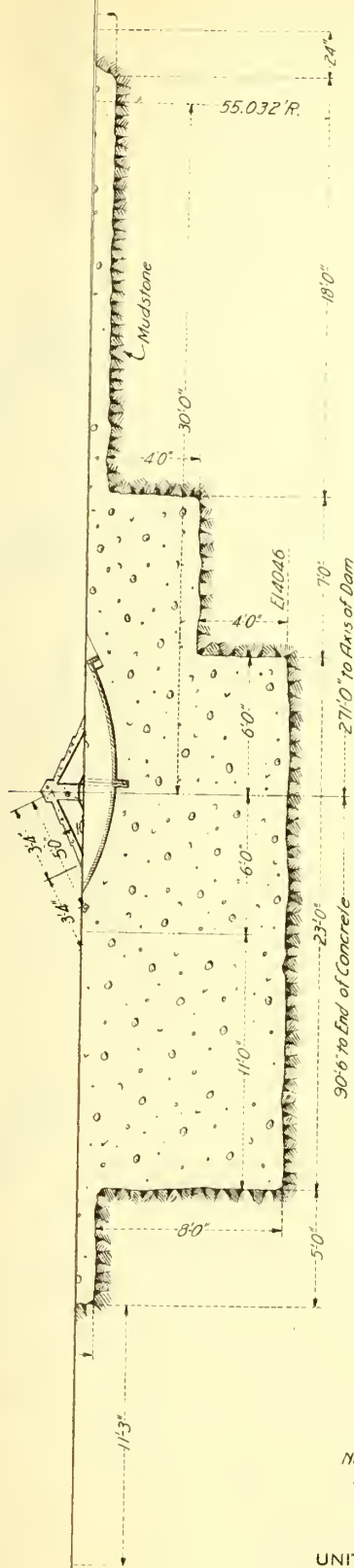
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
GATE TOWER, UPSTREAM ELEVATION

NOTE: This drawing compiled from Design
Drawings made in the Project Office

NO 20404 PLATE 64 OF 88
1923

2 of 5

29 C-24



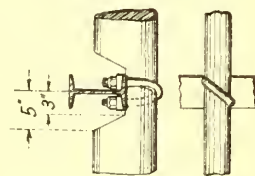
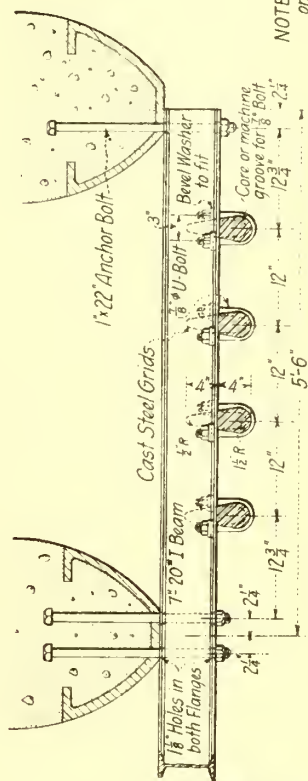
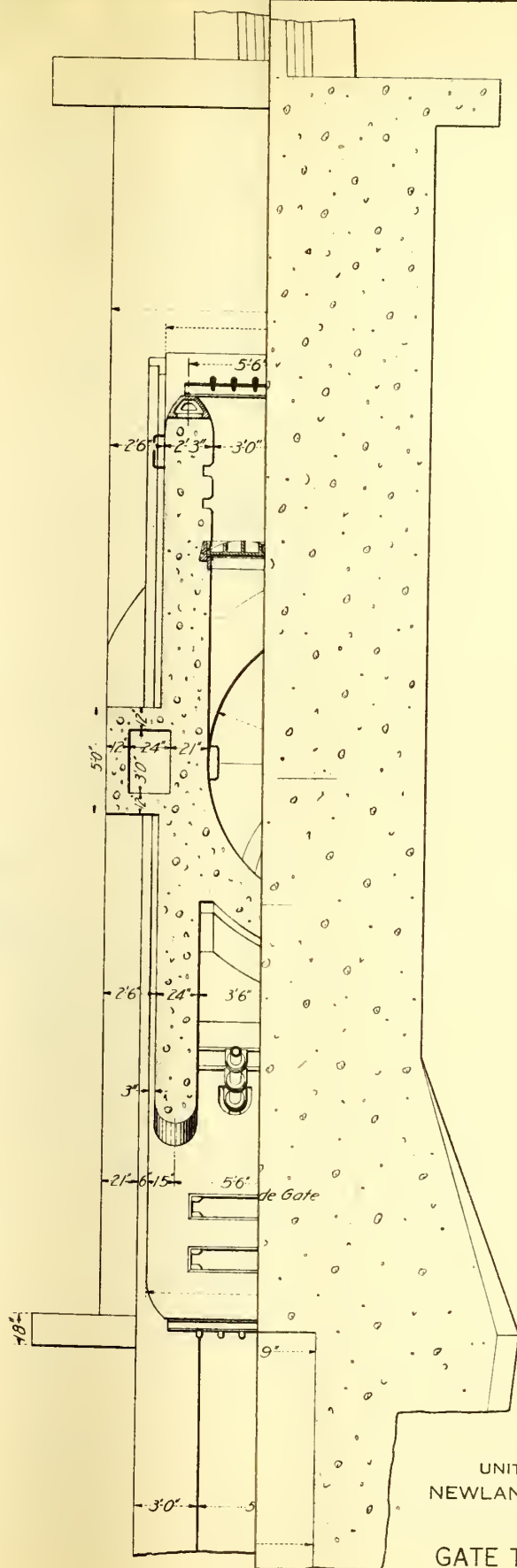
SECTIONAL ELEVATION

Note - Not a true Section. Section is taken to show Water Passages to best advantage and is not that cut by one Plane.

NOTE - This Drawing compiled from Design Drawings made in the Project Office

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
GATE TOWER, VERTICAL SECTION

NO. 20405 PLATE 65 OF 88
1923



NOTE: Details for 3'x3' Gates differ only in Distance between Piers

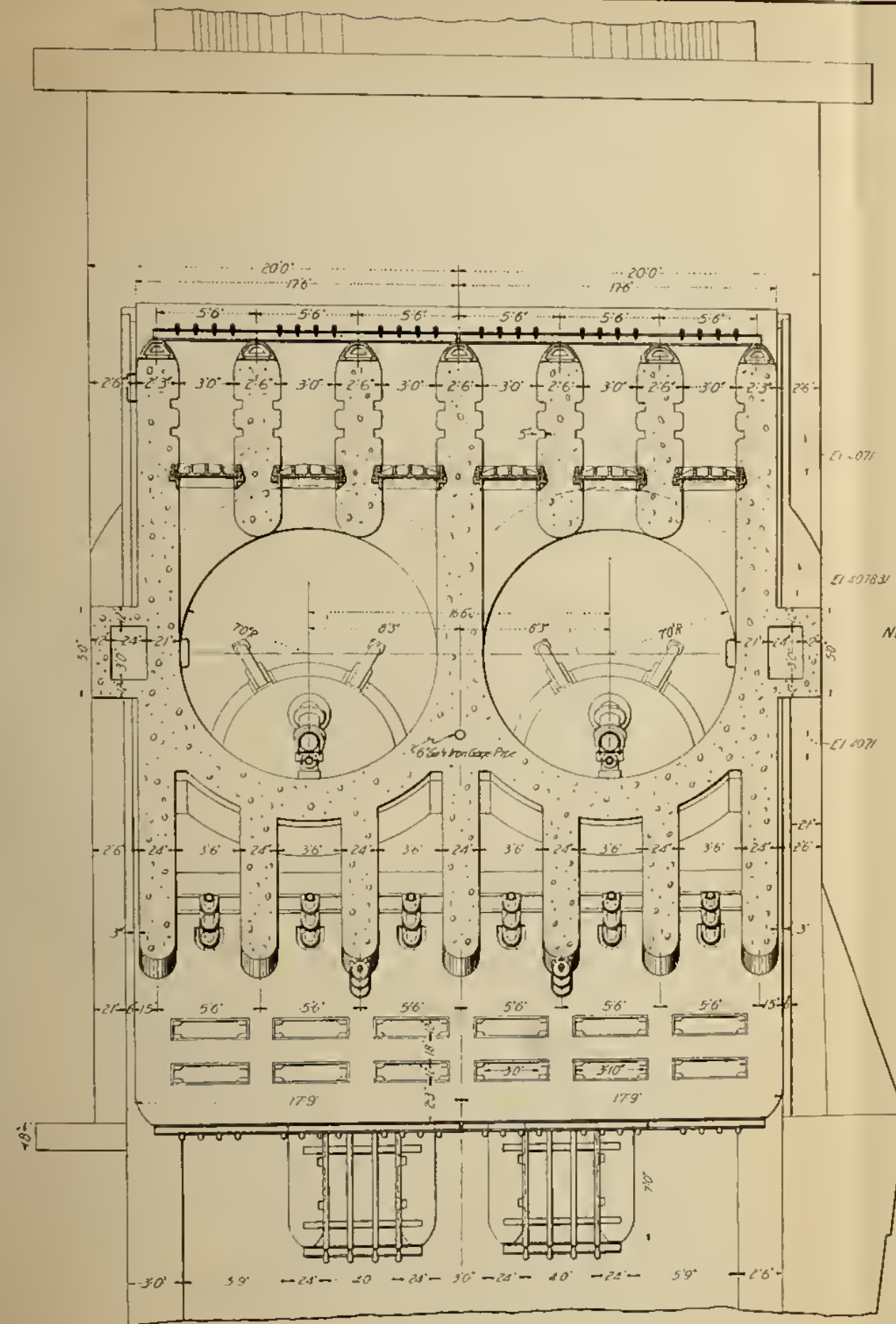
CONNECTION DETAIL FOR HORIZONTAL BEAMS
FOR 3'x8 GATES

TRASH RACK DETAILS

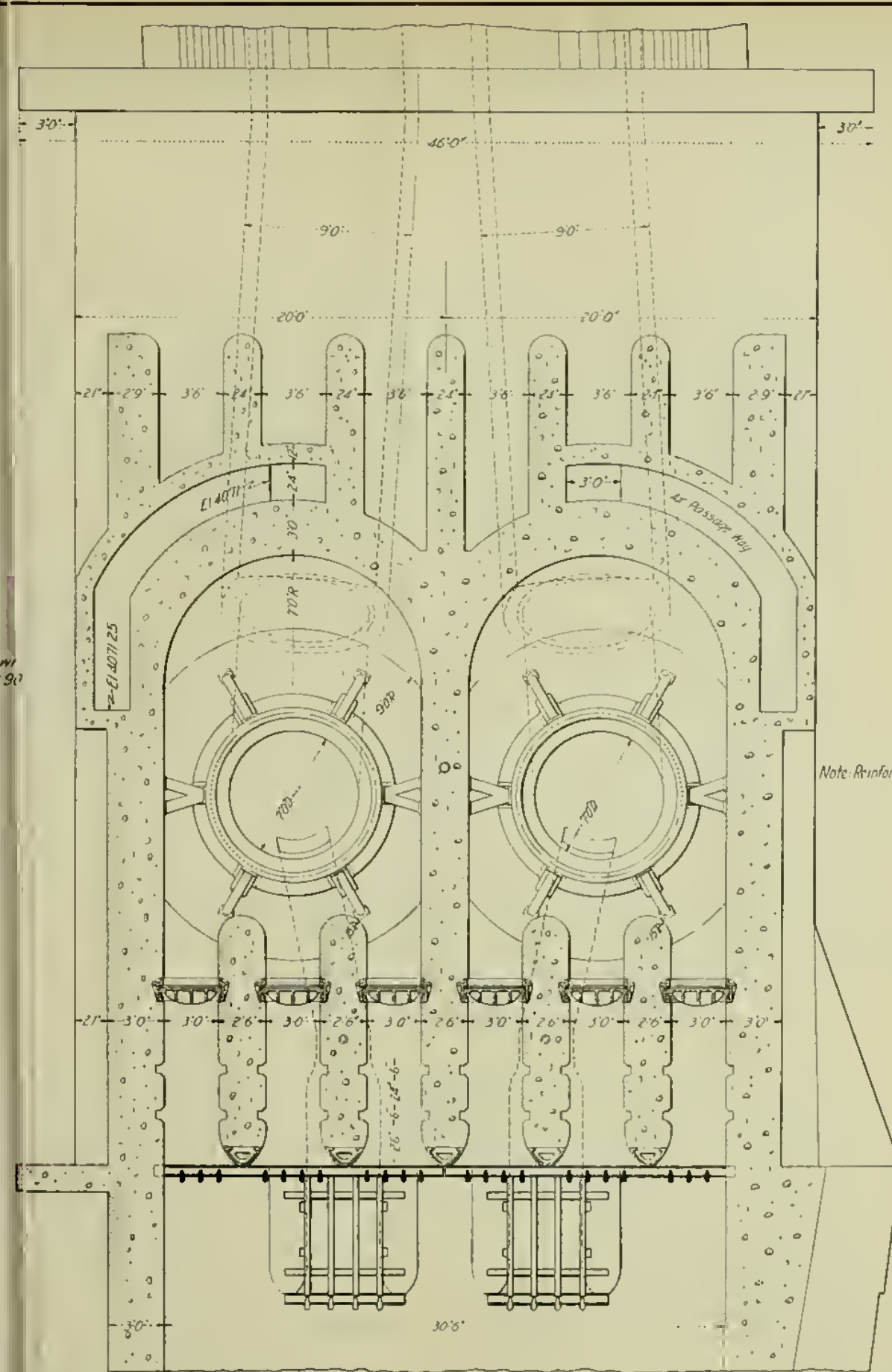
NOTE: This Drawing compiled from Design Drawings made in the Project Office.

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
GATE TOWER, HORIZONTAL SECTIONS

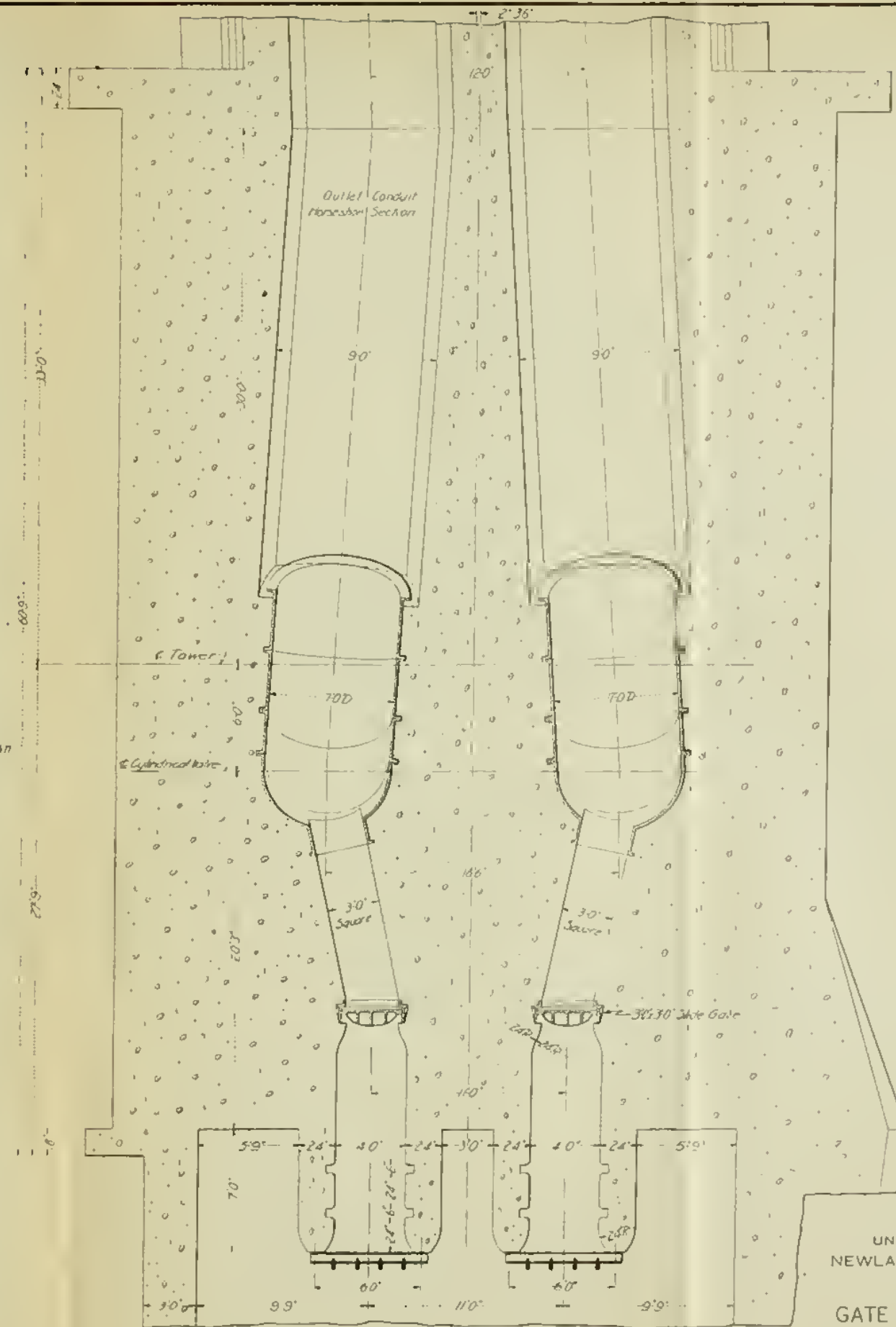
NO. 20406 PLATE 66 OF 88
1923



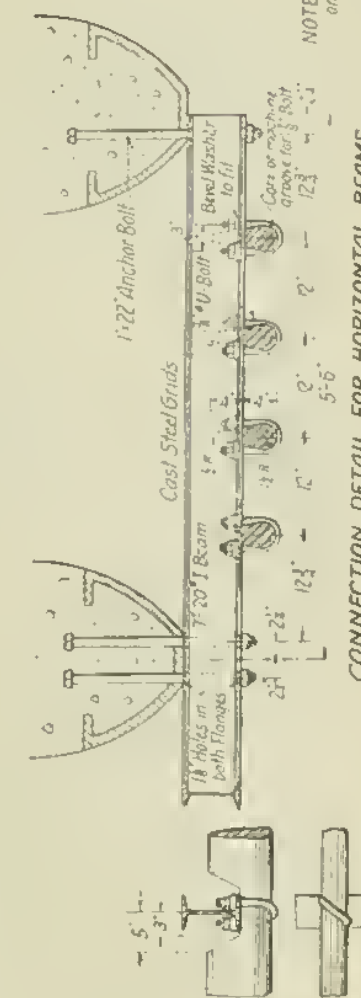
SECTION C-C



SECTION D-D



SECTION E-E



NOTE: Details for 3.3 Gates differ only in Distance between Girders.

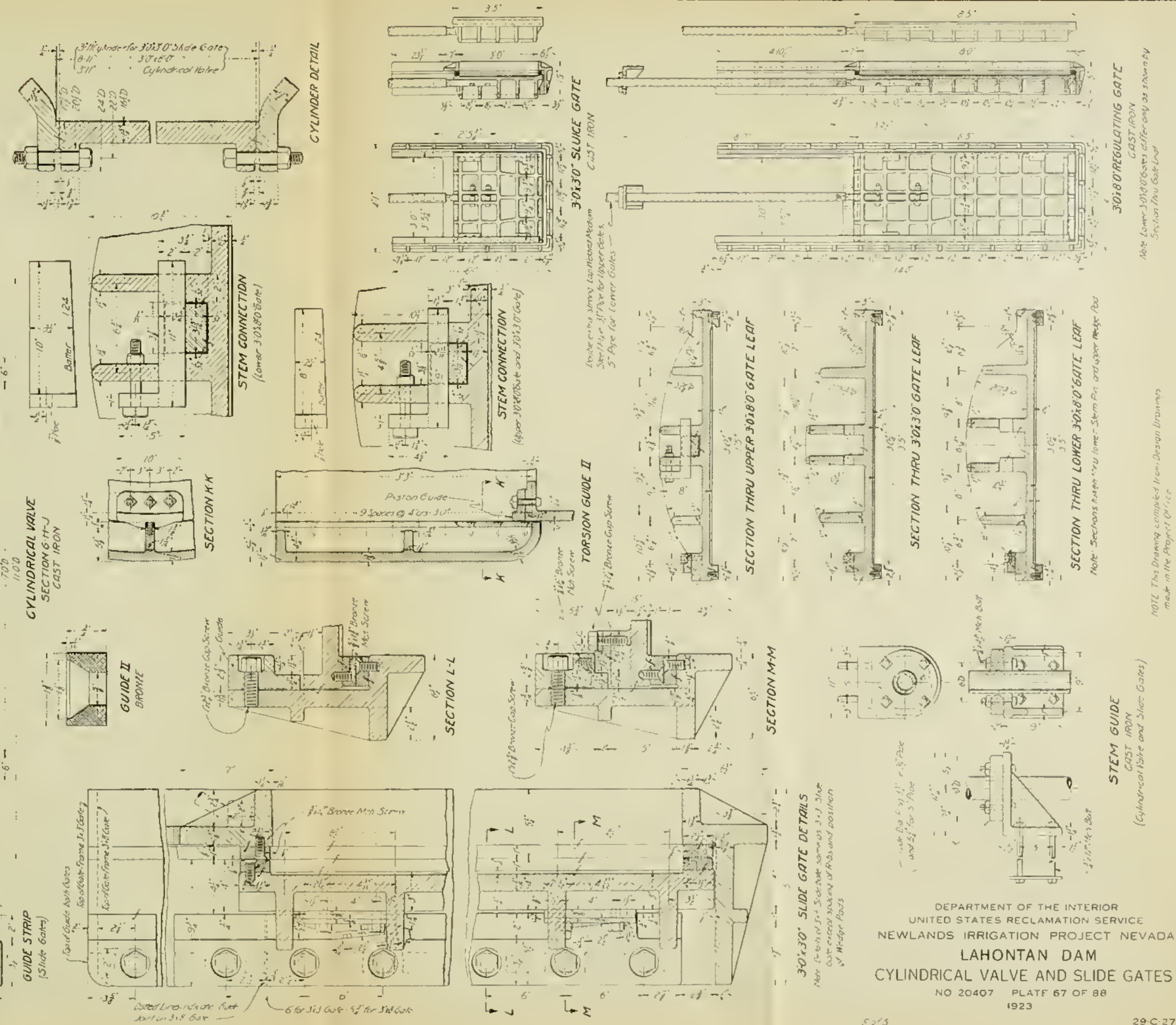
5'-6"
CONNECTION DETAIL FOR HORIZONTAL BEAMS
FOR 3'-8" GATES

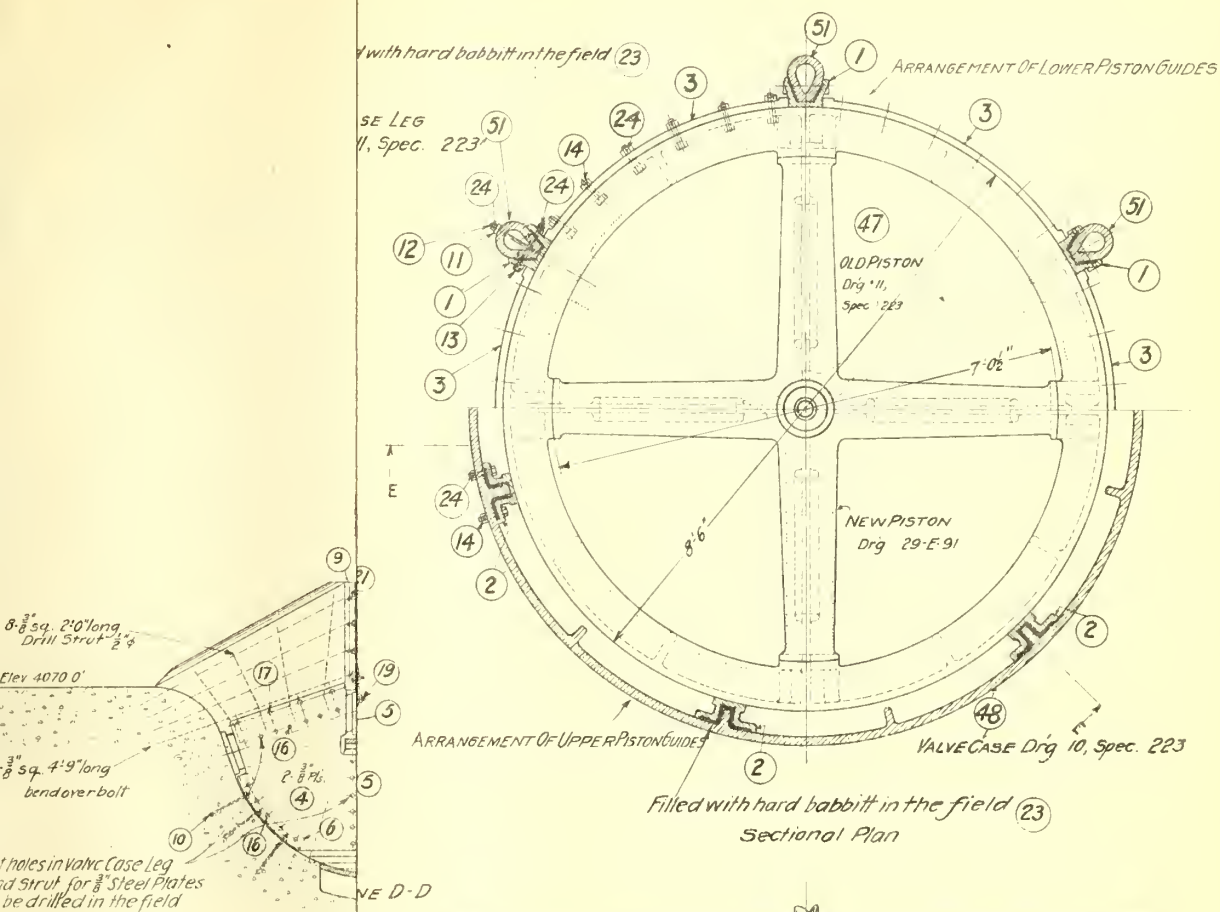
TRASH RACK DETAILS

NOTE This Drawing compiled from Design Drawing
made in the Project Office

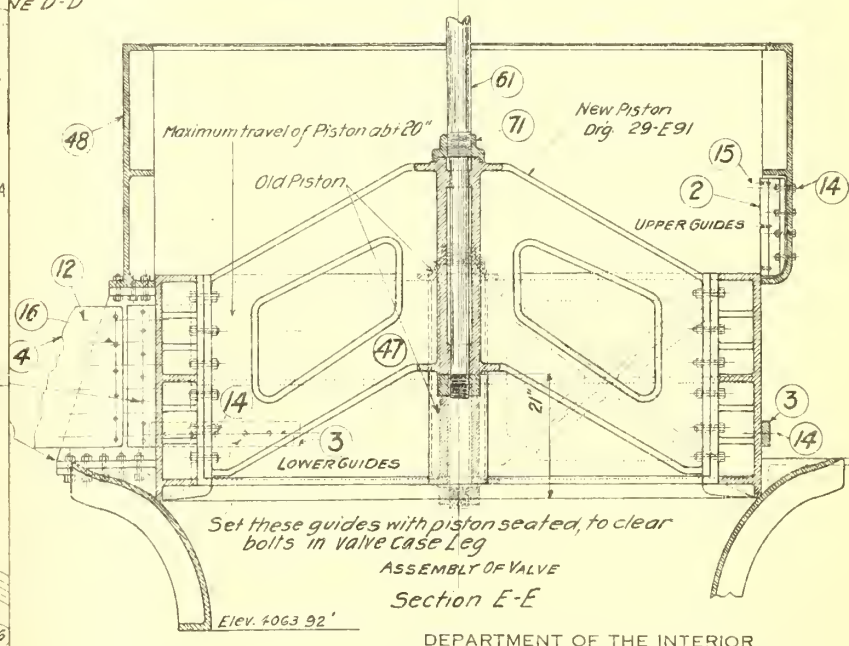
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
GATE TOWER, HORIZONTAL SECTIONS

NO 20406 PLATE 66 OF 88
1923





Sectional Elevation at A

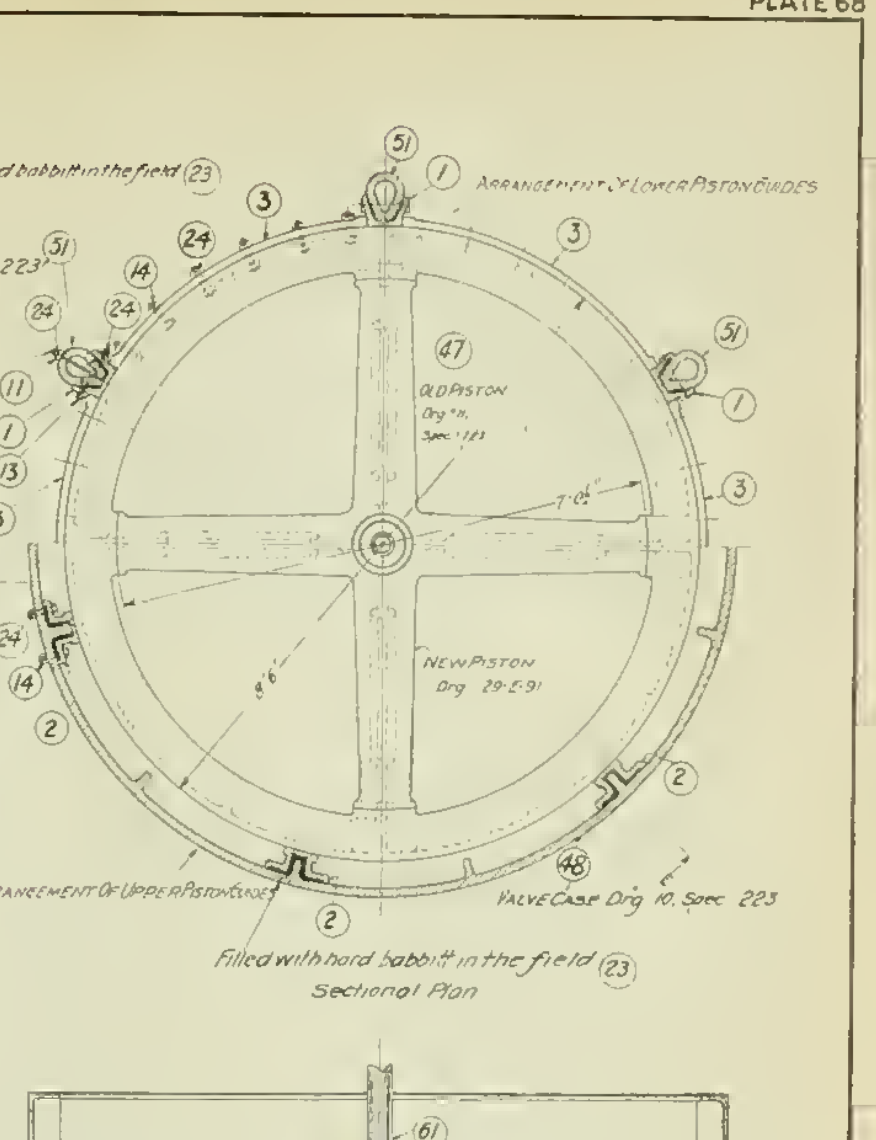


12' 9' 6' 3' 0'

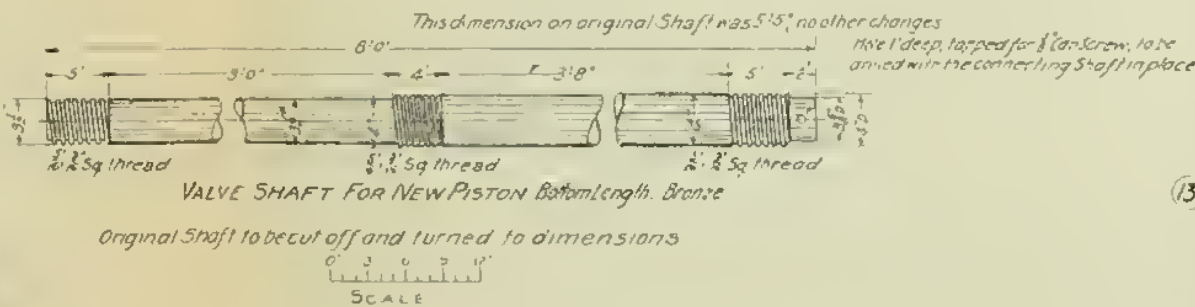
SCALE

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
GUIDE ALTERATIONS IN CYLINDRICAL VALVE

NO. 20408 PLATE 68 OF 88
1923



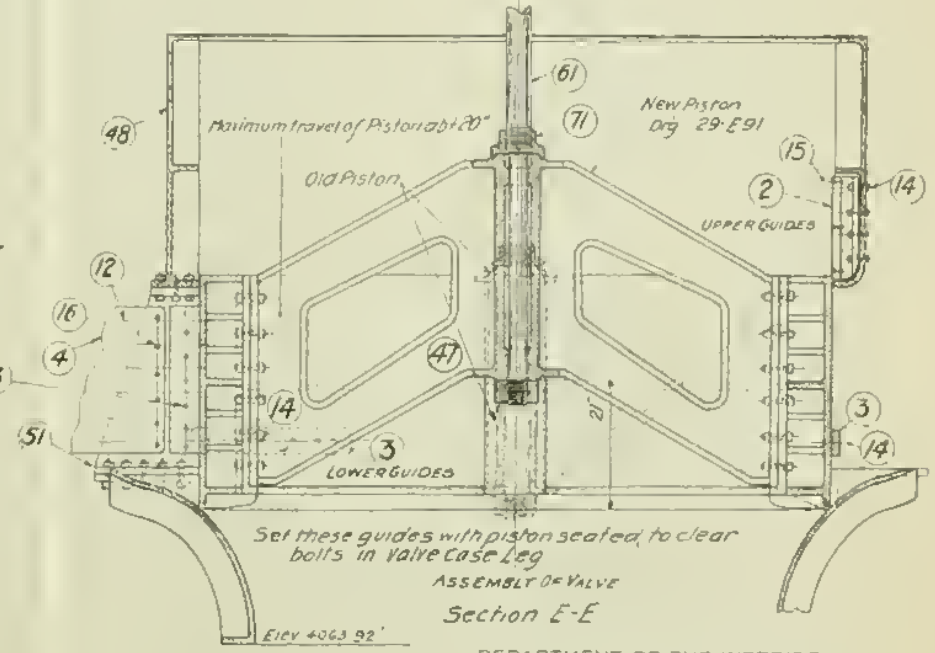
SIDE ELEVATION AT 'B'



VALVE SHAFT FOR NEW PISTON Bottom Length. Bronze

Original Shaft to be cut off and turned to dimensions

SCALE

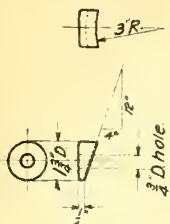


ASSEMBLY OF VALVE

Section E-E

62 92

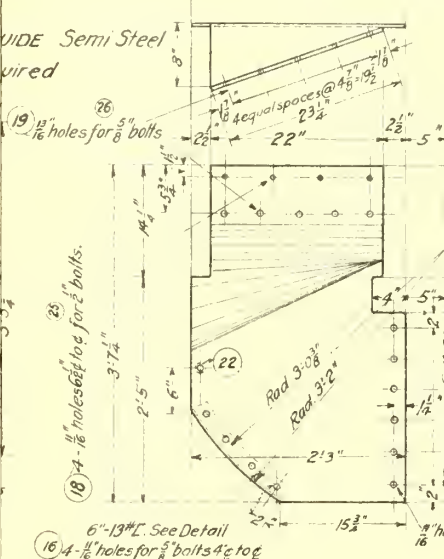
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
GUIDE ALTERATIONS IN CYLINDRICAL VALVE
NO 20406 PLATE 68 OF 88
1923



11) 1) dimension given to be finished and fitted in the field
2) for $\frac{7}{8}$ turned bolts, drill, ream and spot face

Section vi ired

For notes and dimensions not given



Sto Cut Washer
Sto. $\frac{5}{8}$ Hex. Nut

10 ANCHOR BOLT
Mild Steel
18 Required

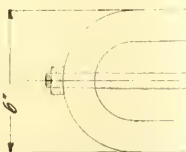
Scale of inches

(5) $\frac{3}{8}$ " STEEL PLATE 4 Required. Bend 2 as shown 2 opposite

MATERIAL FOR ONE VALVE:		
DESCRIPTION	SIZE	MAT'L.
Five Case Leg Guide	As shown	Soft Steel
Five Case Guide	" "	" "
Division Guide	" "	" "
Plates	¾"	Steel
"	"	"
Channels	6' - 13"	"
"	"	"
Angle	4½" x ¾"	"
Rings	3' x ¼"	"
Anchor bolts with hex nut, cut washer	¾" x 12"	Mild Steel
Level Washers	As shown	Cast Iron
Countersunk head bolts with Standard Hex. Nuts	¾" x 11"	Mild St.
"	¾" x 12"	"
"	¾" x 10 ½"	"
"	¾" x 10 ½"	"
"	¾" x 10 ½"	"
"	¾" x 10 ½"	"
Bolts, Hex. Heads and Nuts	¾" x 8 ½"	"
"	¾" x 3 ½"	"
Head Screws	¾" x 2"	Bronze
Each Bolt Sq. Heads, Hex. Nuts	¾" x 7 ½"	Mild St.
"	¾" x 7 ½"	"
"	¾" x 2 ½"	"
"	¾" x 19"	"
"	¾" x 14 ½"	"
"	¾" x 12"	"
"	¾" x 22 ½"	"
"	¾" x 19 ½"	"
"	¾" x 16 ½"	"
"	¾" x 12 ½"	"
"	¾" x 10 ½"	"
"	¾" x 2 ½"	"
"	¾" x 6"	"
"	¾" x 6"	"
Machine Bolts, Sq. Heads, Hex Nuts	¾" x 2 ½"	"
"	¾" x 6"	"
Lipe Spacer	"	"
Lord Babbitt	"	"
Grass Spring Wire	⅞ Pound	"
Level Washers For 6" Rods, Cast Iron	As shown	"
"	3 ½"	"

VALVE CASE LEG (SI) Dr'g II Specification 223

Drill and spot face for $\frac{5}{8}$ " turned b



Cast to dimension given, to be finished
and fitted in field

Section B-B

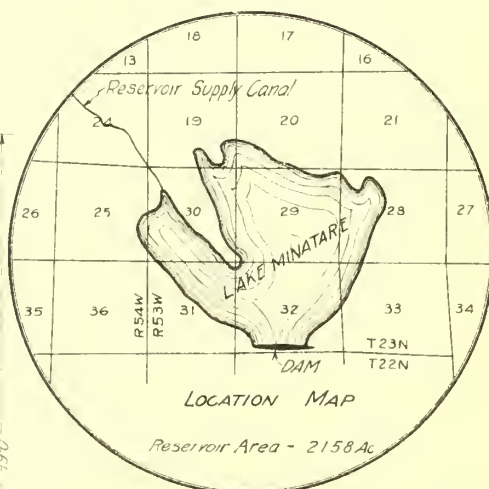
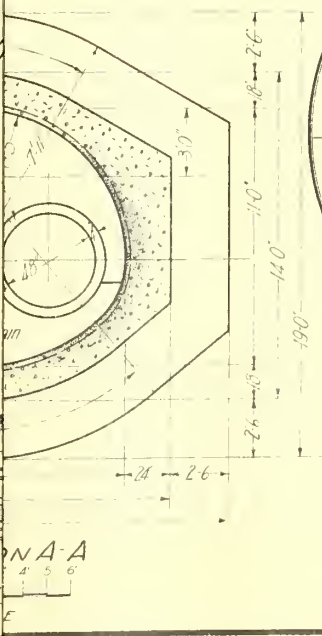
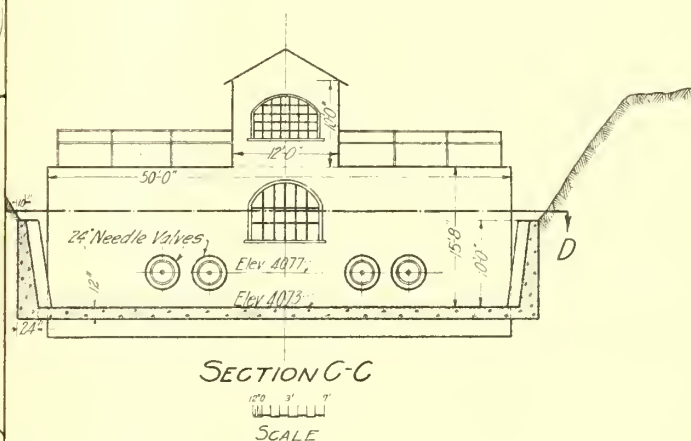
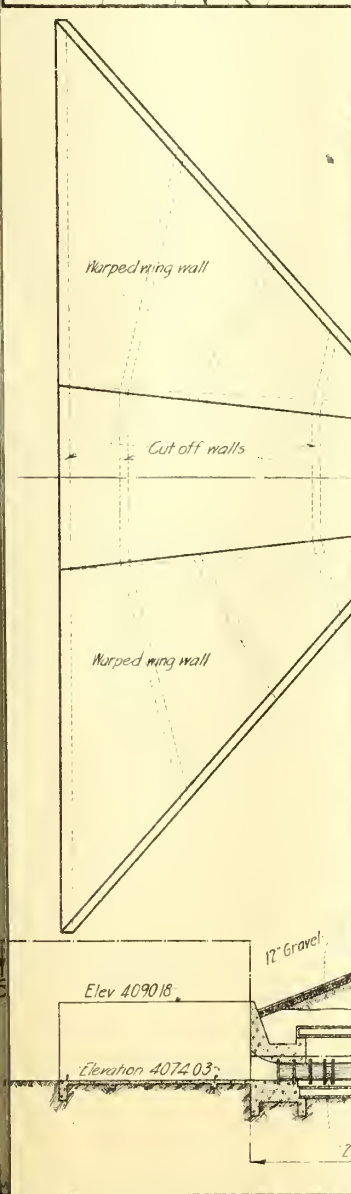
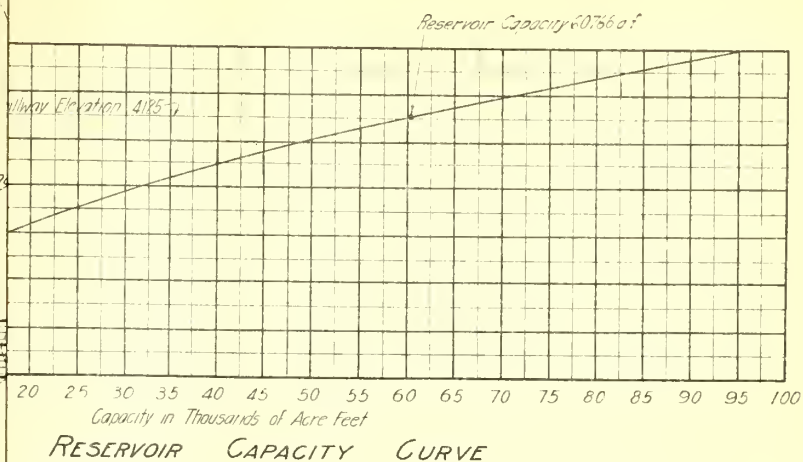
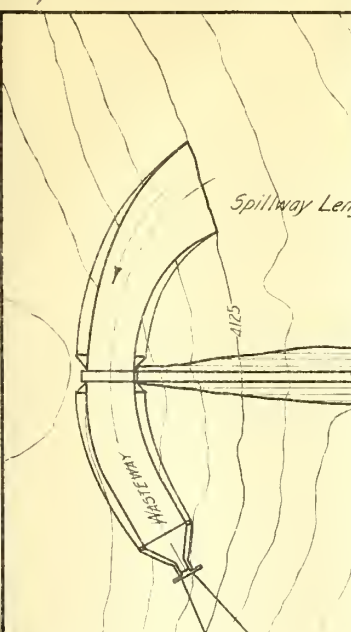


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NEWLANDS IRRIGATION PROJECT, NEVADA
LAHONTAN DAM
DETAILS OF GUIDE ALTERATIONS

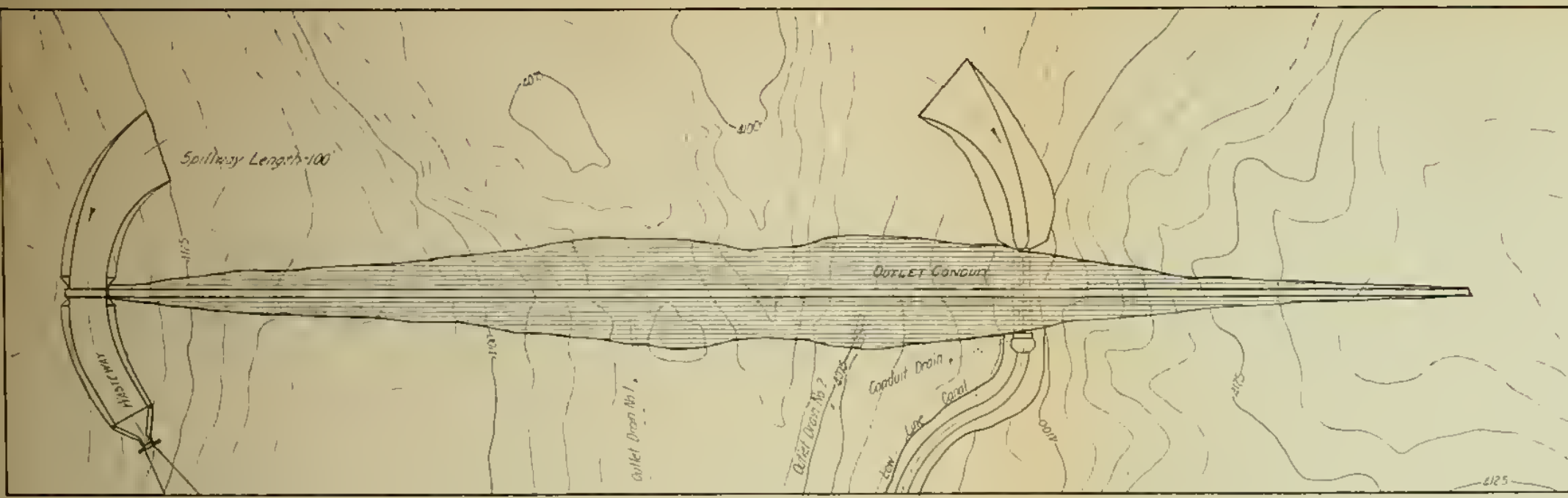
DETAILS OF GUIDE ALTERATIONS

NO 20409 PLATE 69 OF 88
1923





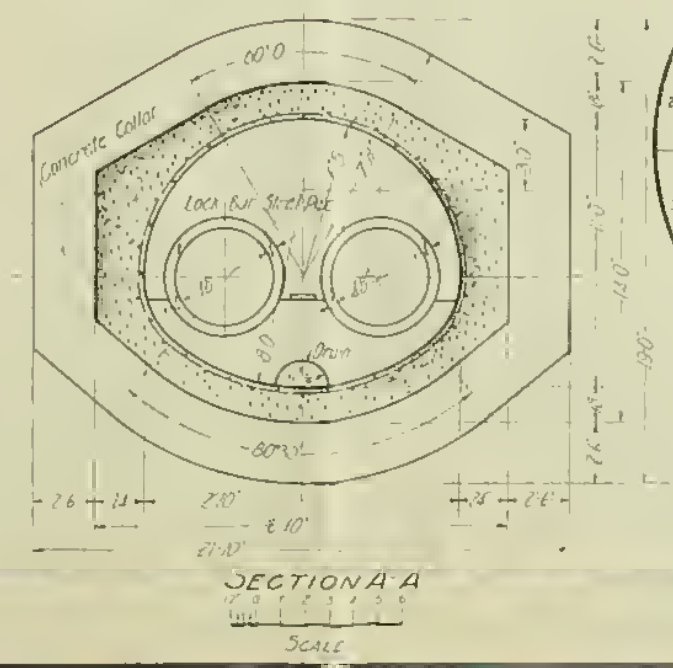
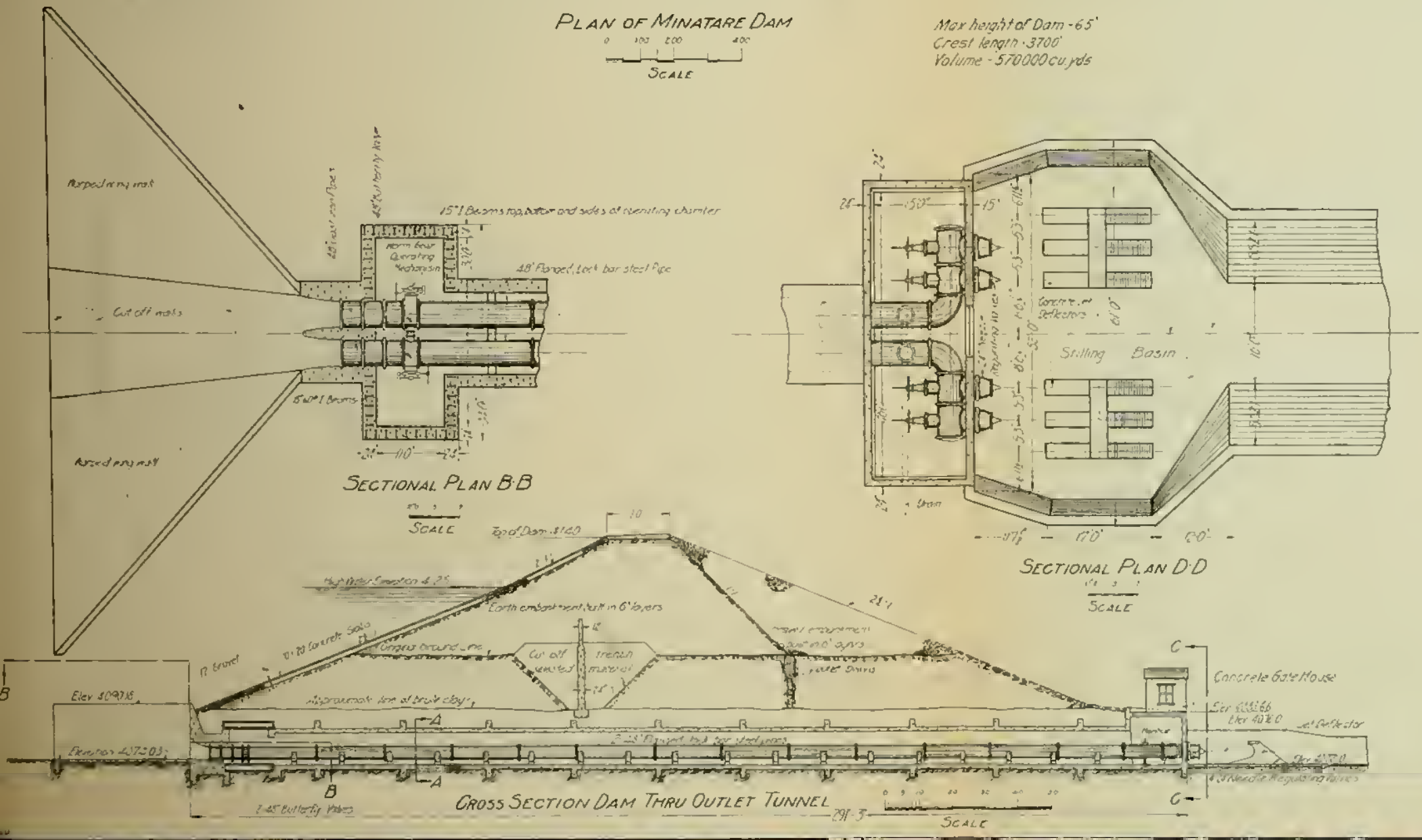
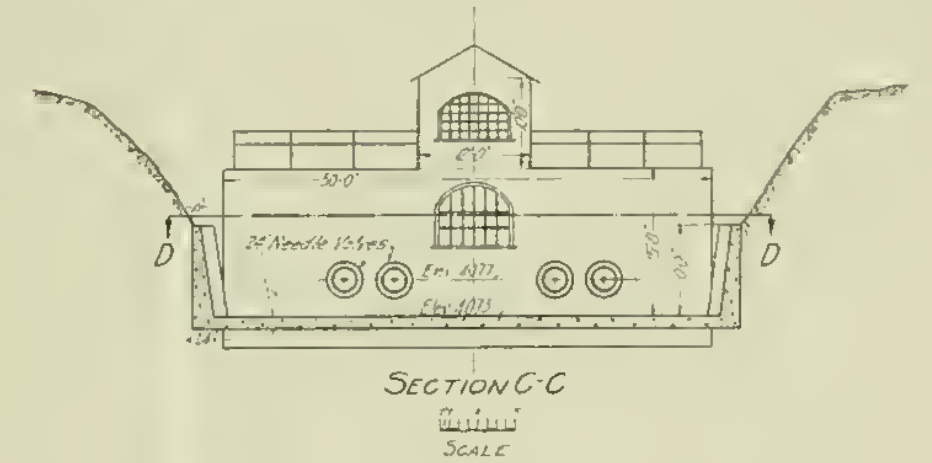
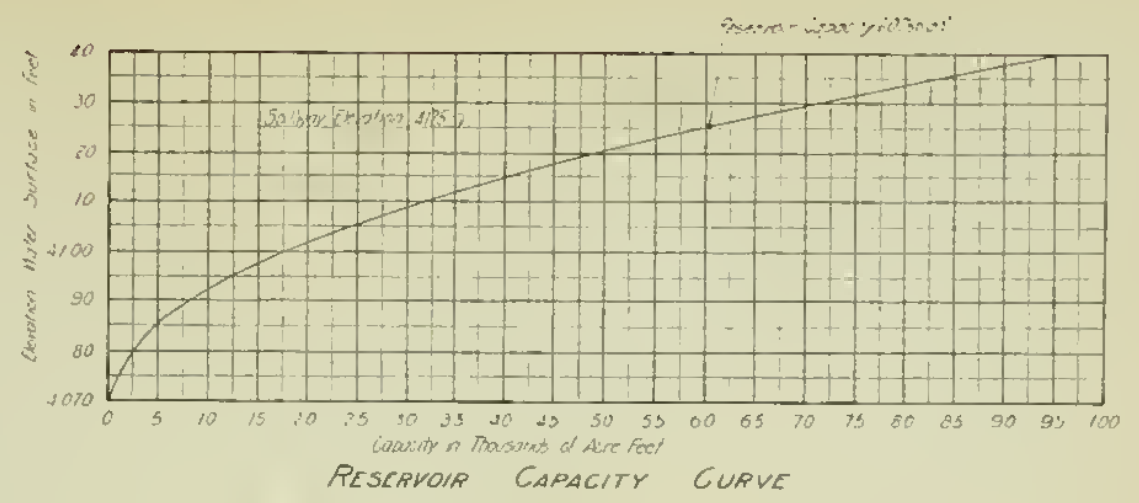
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT
NEBRASKA-WYOMING
MINATARE DAM
PLAN AND SECTIONS
NO. 20410 PLATE 70 OF 88
1923



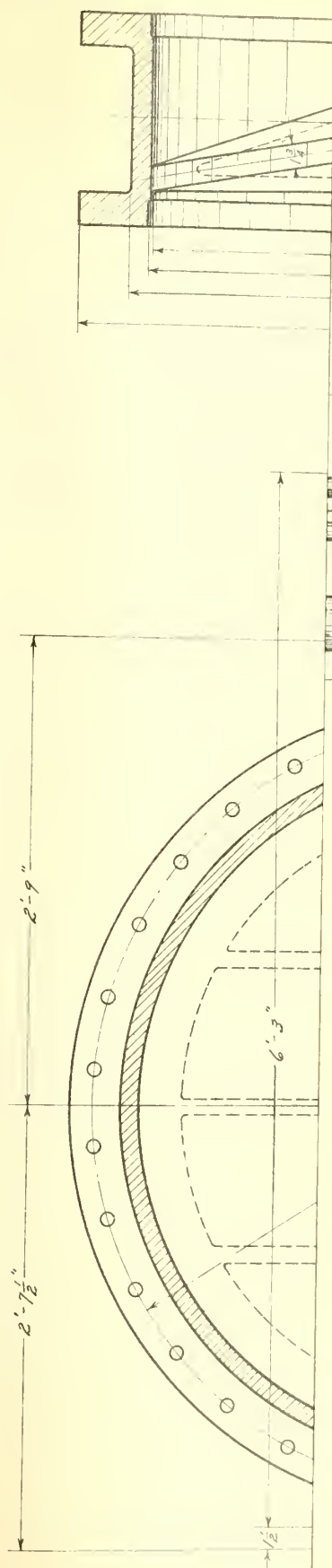
PLAN OF MINATARE DAM

SCALE

Max height of Dam - 65'
Crest length - 3700'
Volume - 570000 cu. yds



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT
NEBRASKA-WYOMING
MINATARE DAM
PLAN AND SECTIONS
NO 20410 PLATE 70 OF 88
1923



Spur Gear 32 c. 1 1/4" P. 3 F.

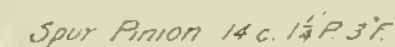
Spur Pinion 14 c. 1 1/4" P. 3 F.

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT
NEBRASKA-WYOMING
MINATARE DAM
BUTTERFLY GATE, 48 INCH DIAMETER

NO. 20411 PLATE 71 OF 88

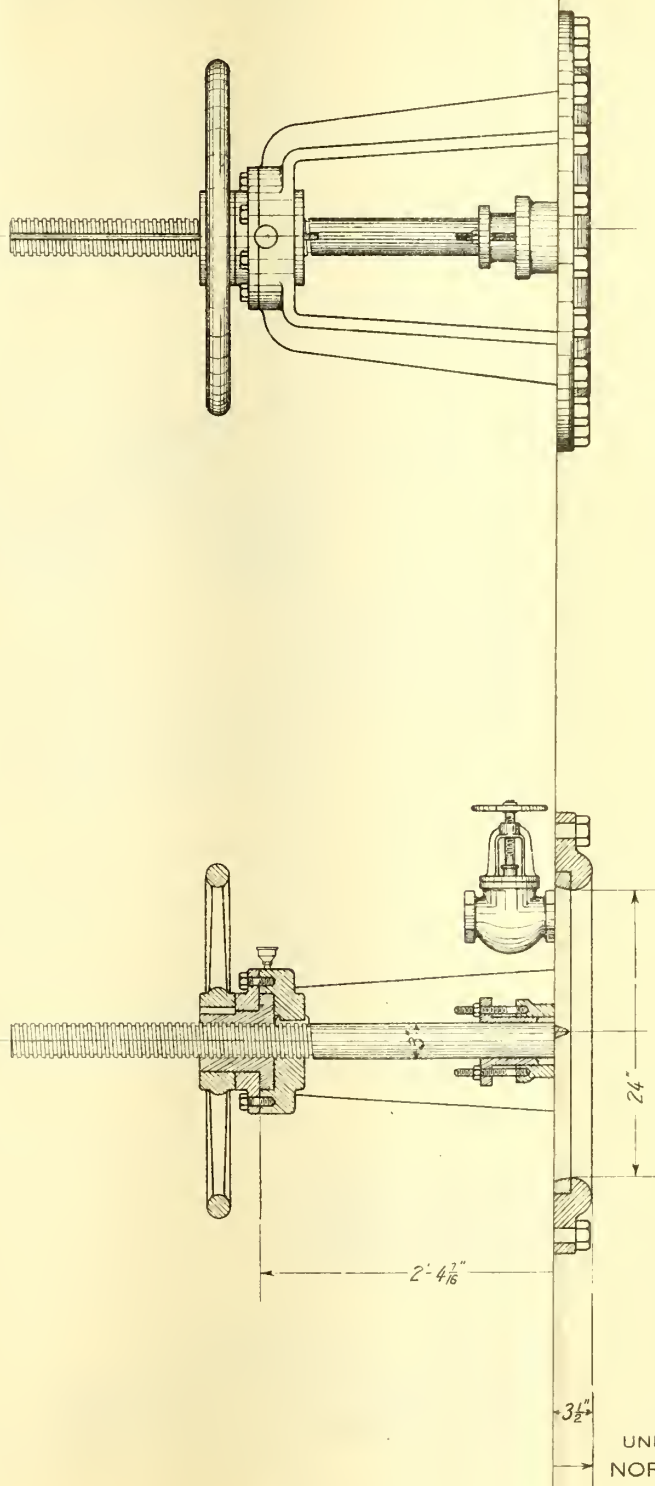
1923

20-M-28



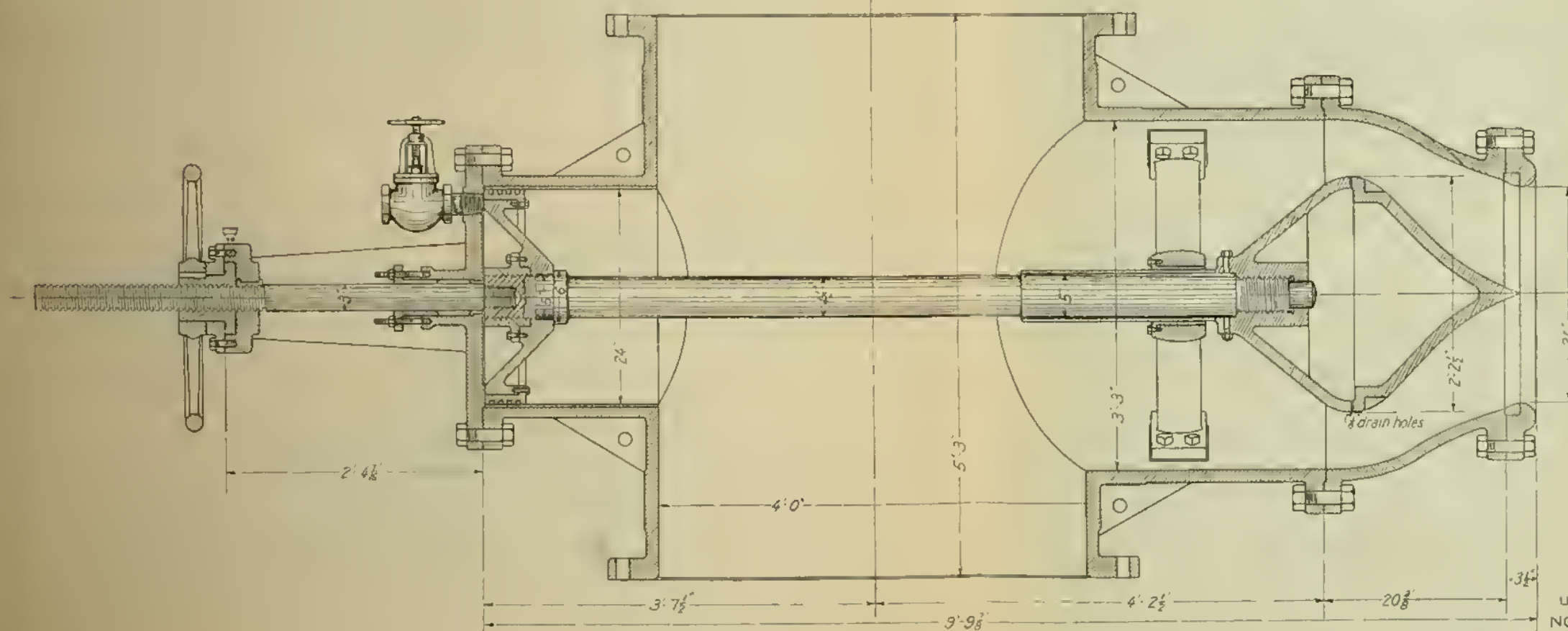
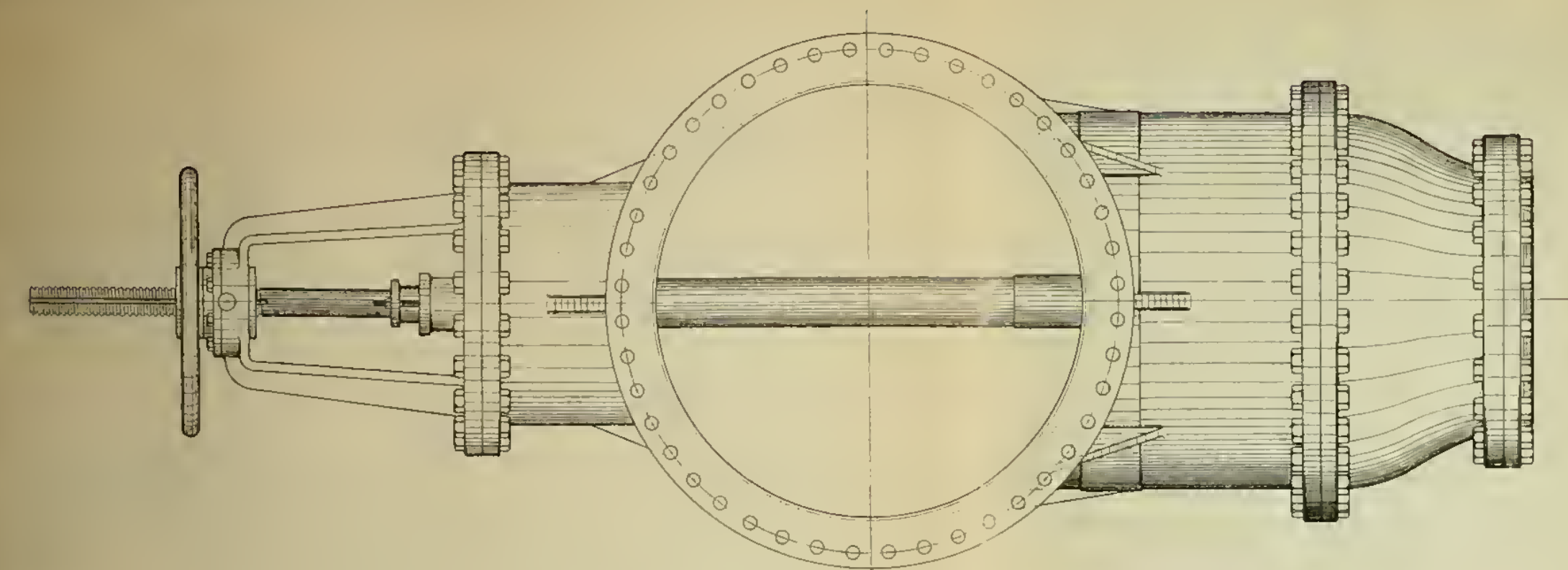
Compression Grease Cups

20-M-28



DEPARTMENT OF THE INTERIOR
 UNITED STATES RECLAMATION SERVICE
 NORTH PLATTE IRRIGATION PROJECT
 NEBRASKA-WYOMING
MINATARE DAM
 GATE REGULATING VALVE 24 INCH DIAMETER

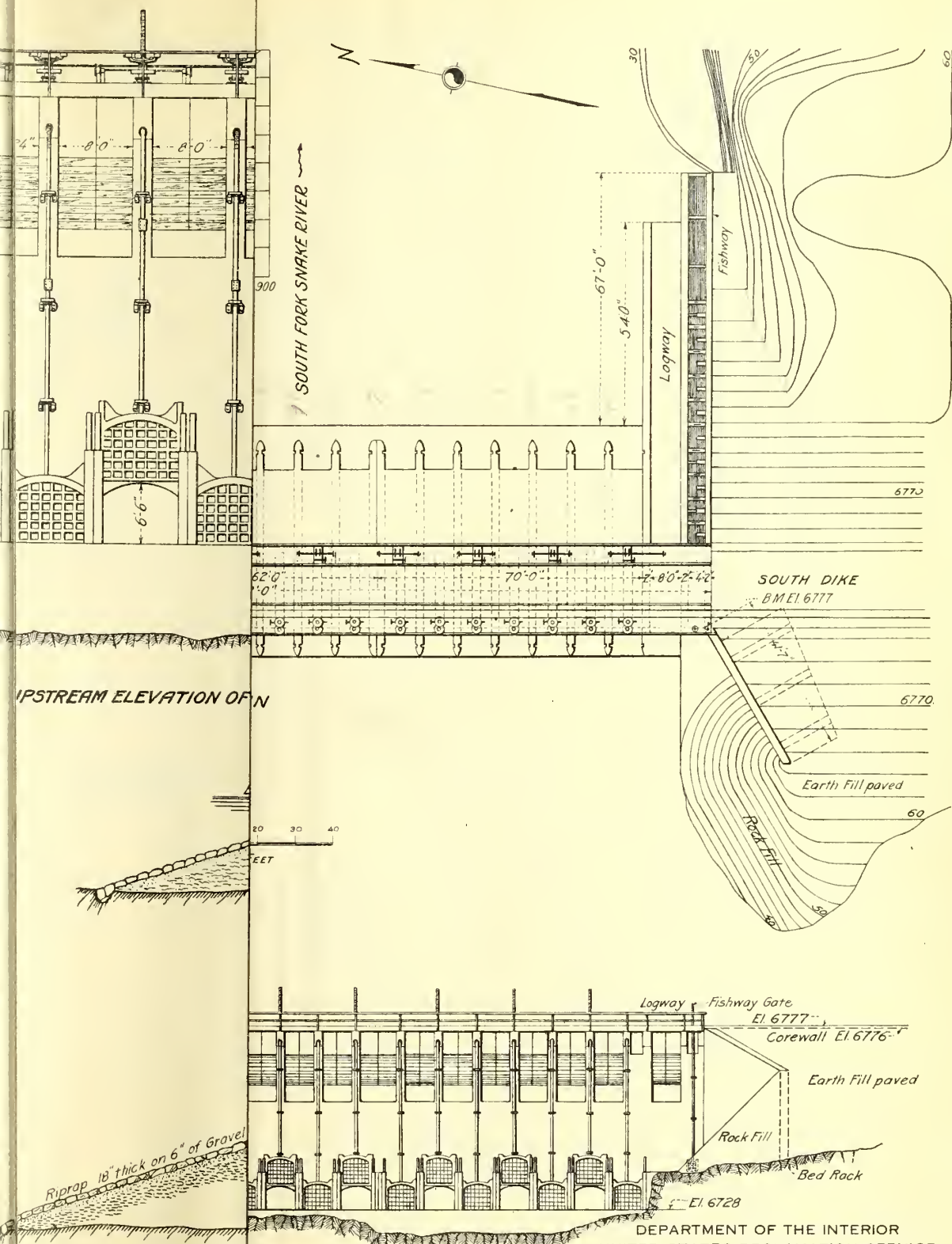
NO. 20412 PLATE 72 OF 87
 1923



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
NORTH PLATTE IRRIGATION PROJECT
NEBRASKA · WYOMING

MINATARE DAM
NEEDLE REGULATING VALVE 24 INCH DIAMETER

NO 20412 PLATE 72 OF 87
1923



PLAN ELEVATION

NOTE

This Drawing compiled from Design
Drawings made in the Project Office

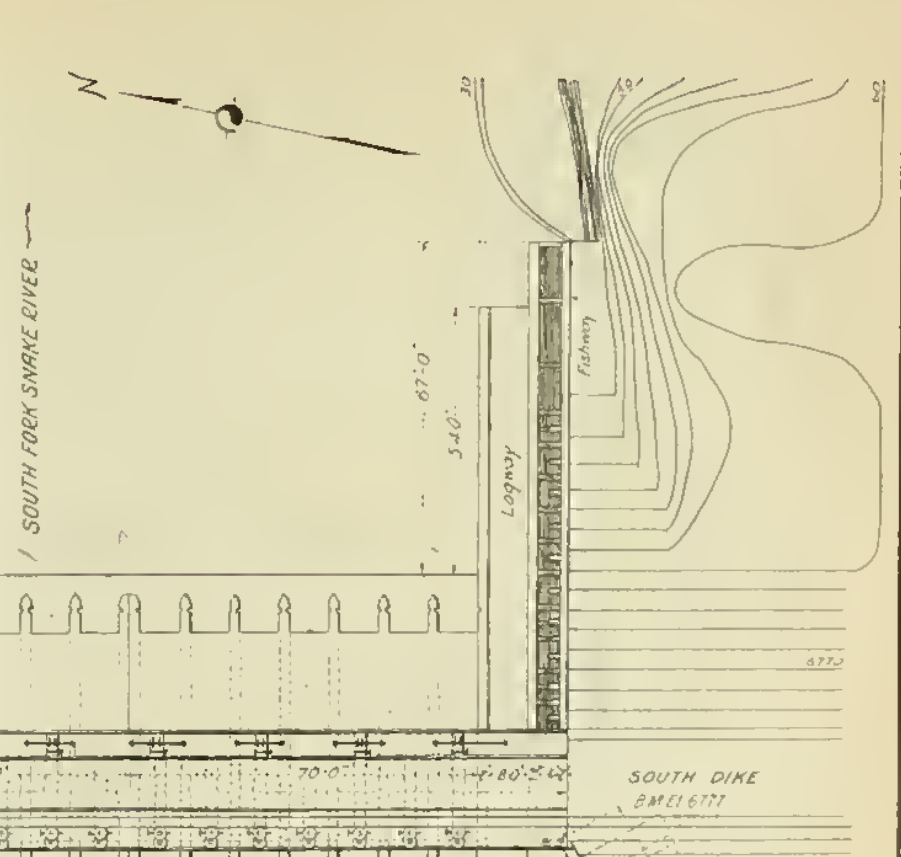
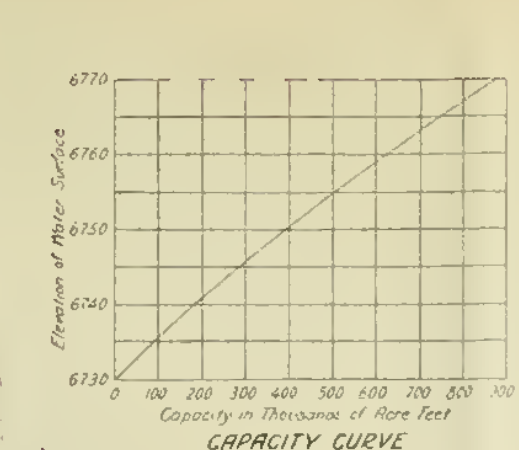
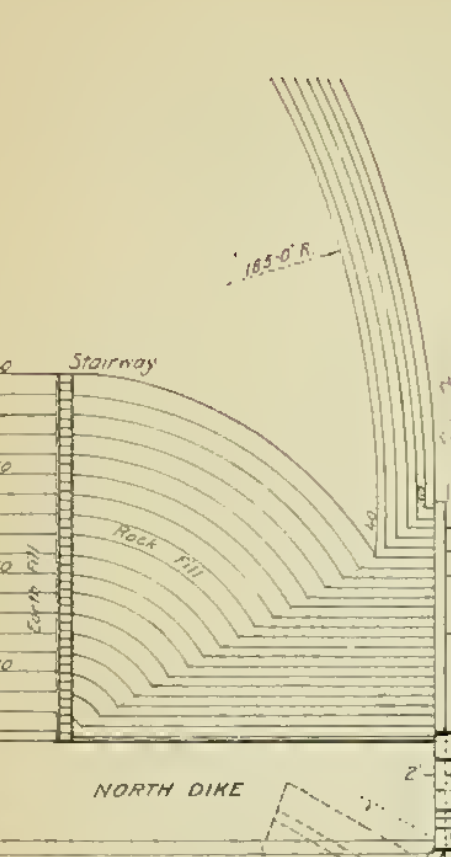
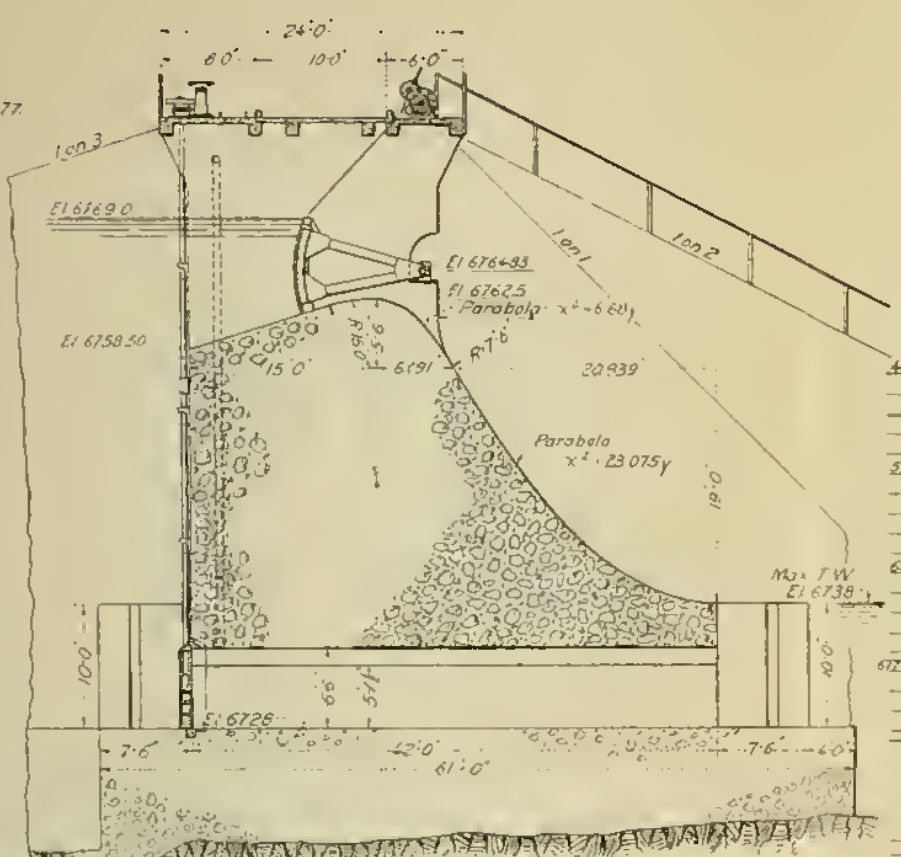
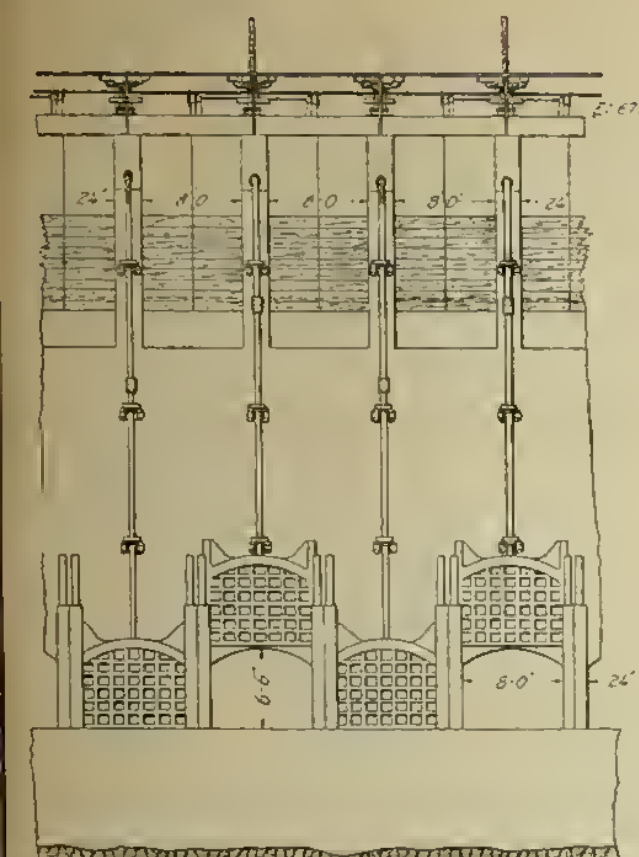
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MINIDOKA IRRIGATION PROJECT

IDAHO - WYOMING

JACKSON LAKE DAM
PLAN, ELEVATION AND SECTIONS

NO. 20413 PLATE 73 OF 88

1923



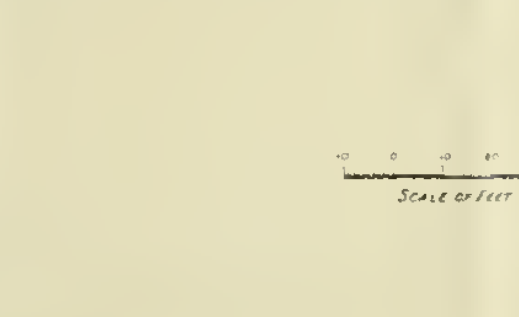
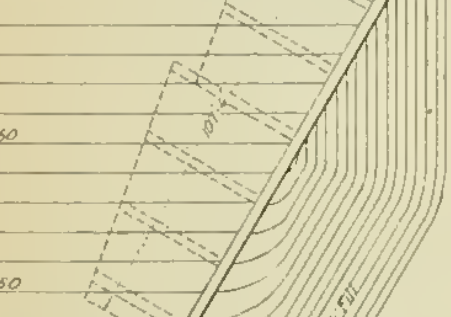
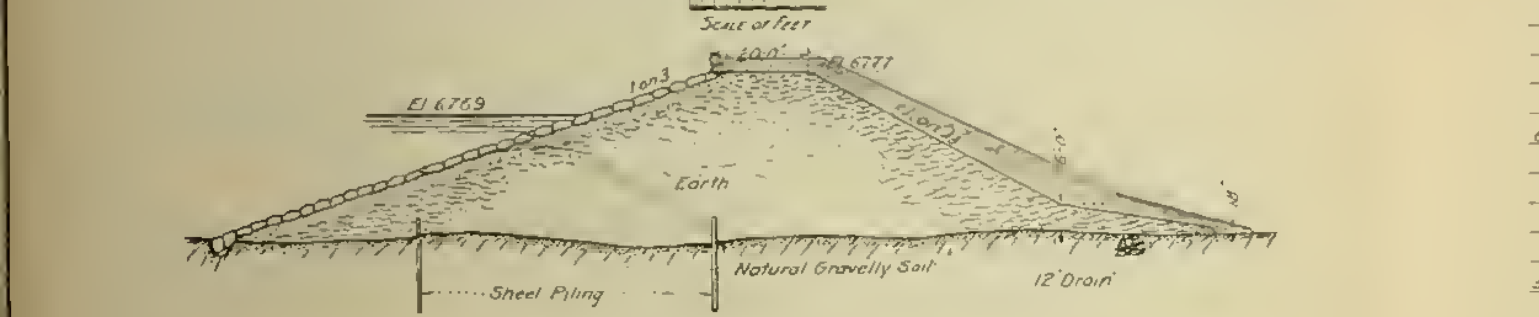
UPSTREAM ELEVATION OF MASONRY DAM

SECTION THRU MASONRY DAM

Stairway

CAPACITY CURVE

PLAN

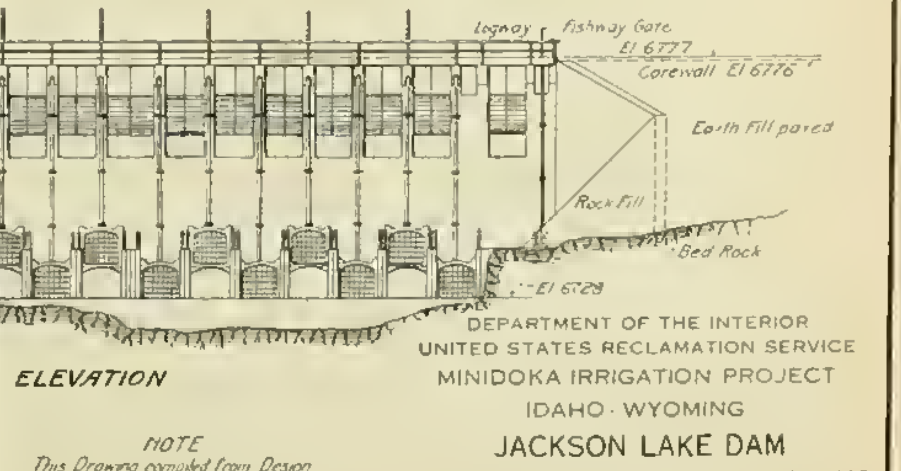
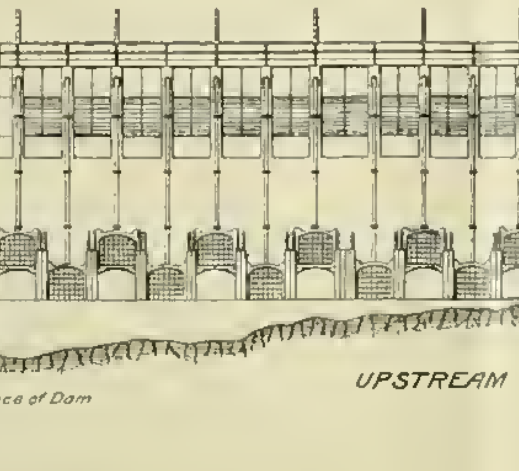
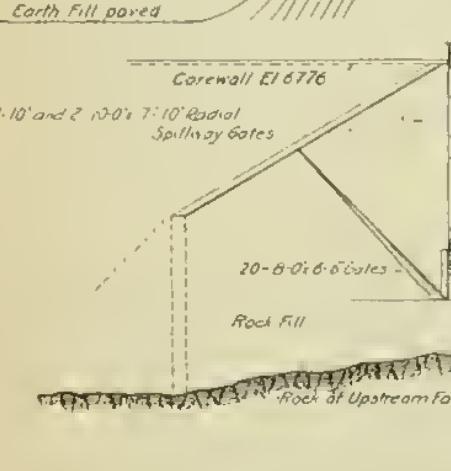
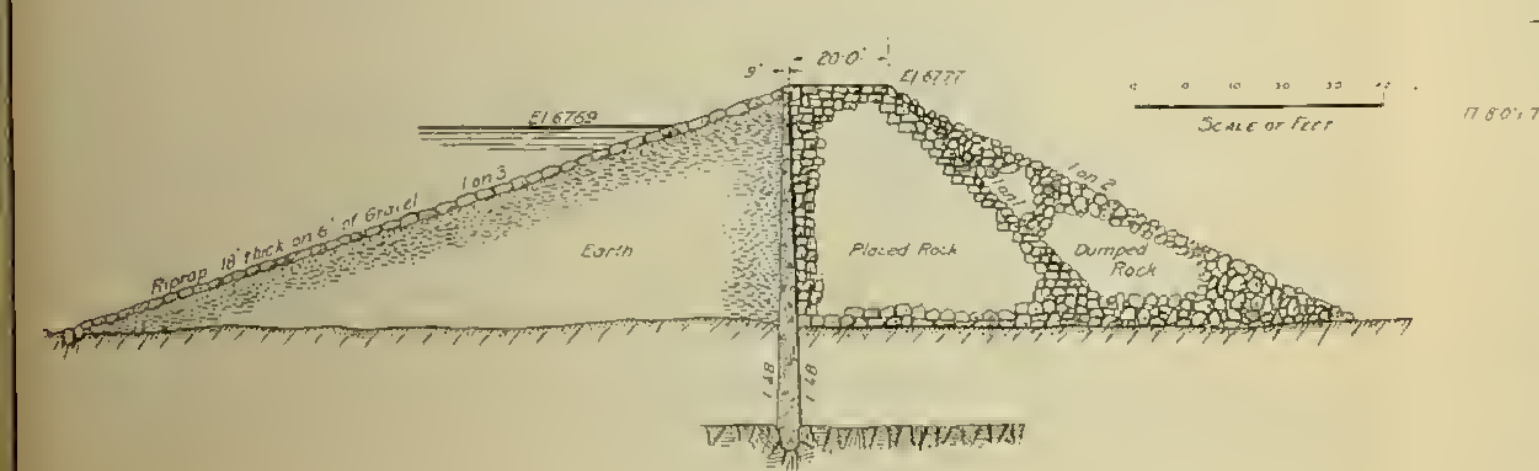


TYPICAL DIKE SECTION

NORTH DIKE

SOUTH DIKE

Logway



DIKE SECTION AT NORTH END OF DAM

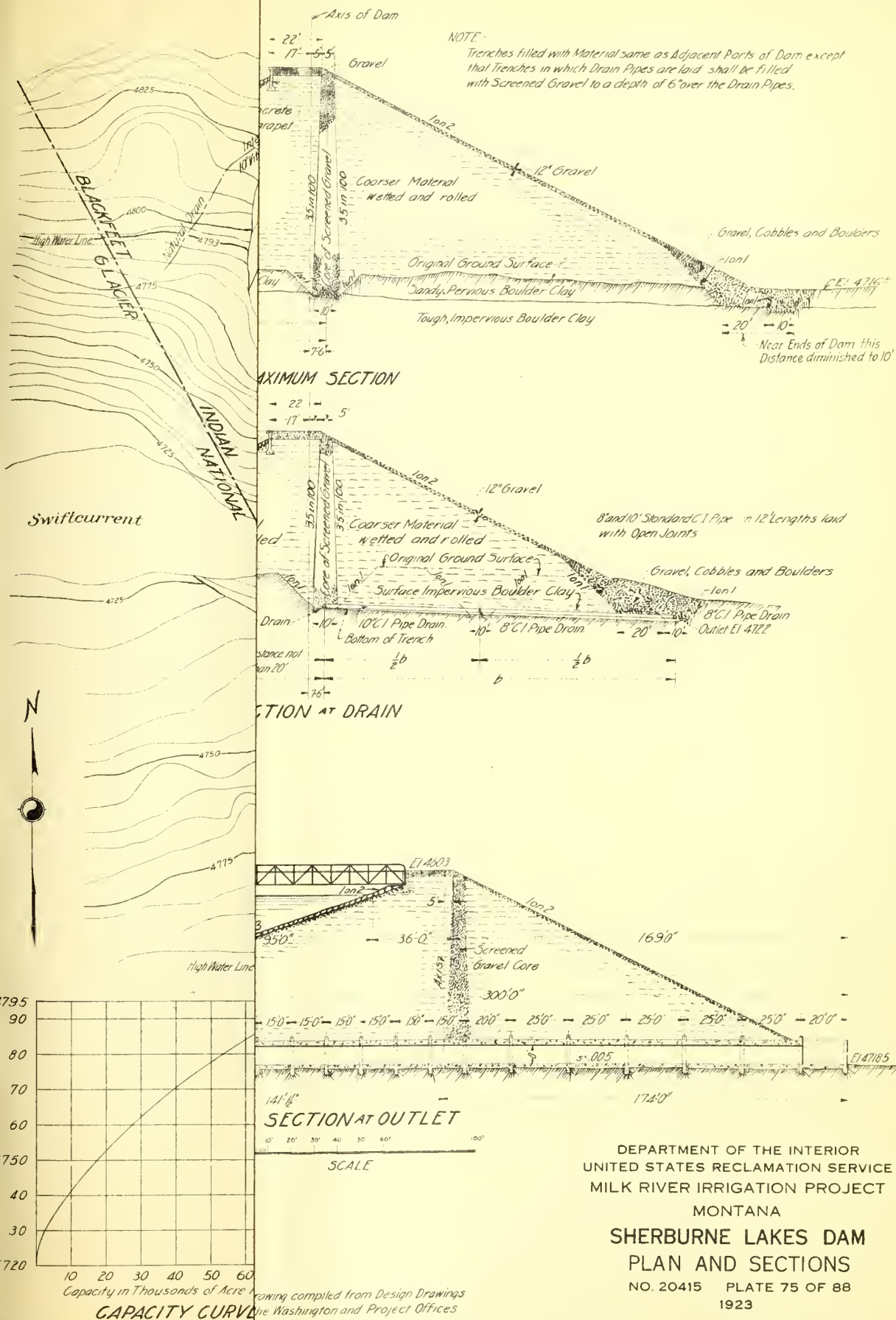
Corewall El. 6776

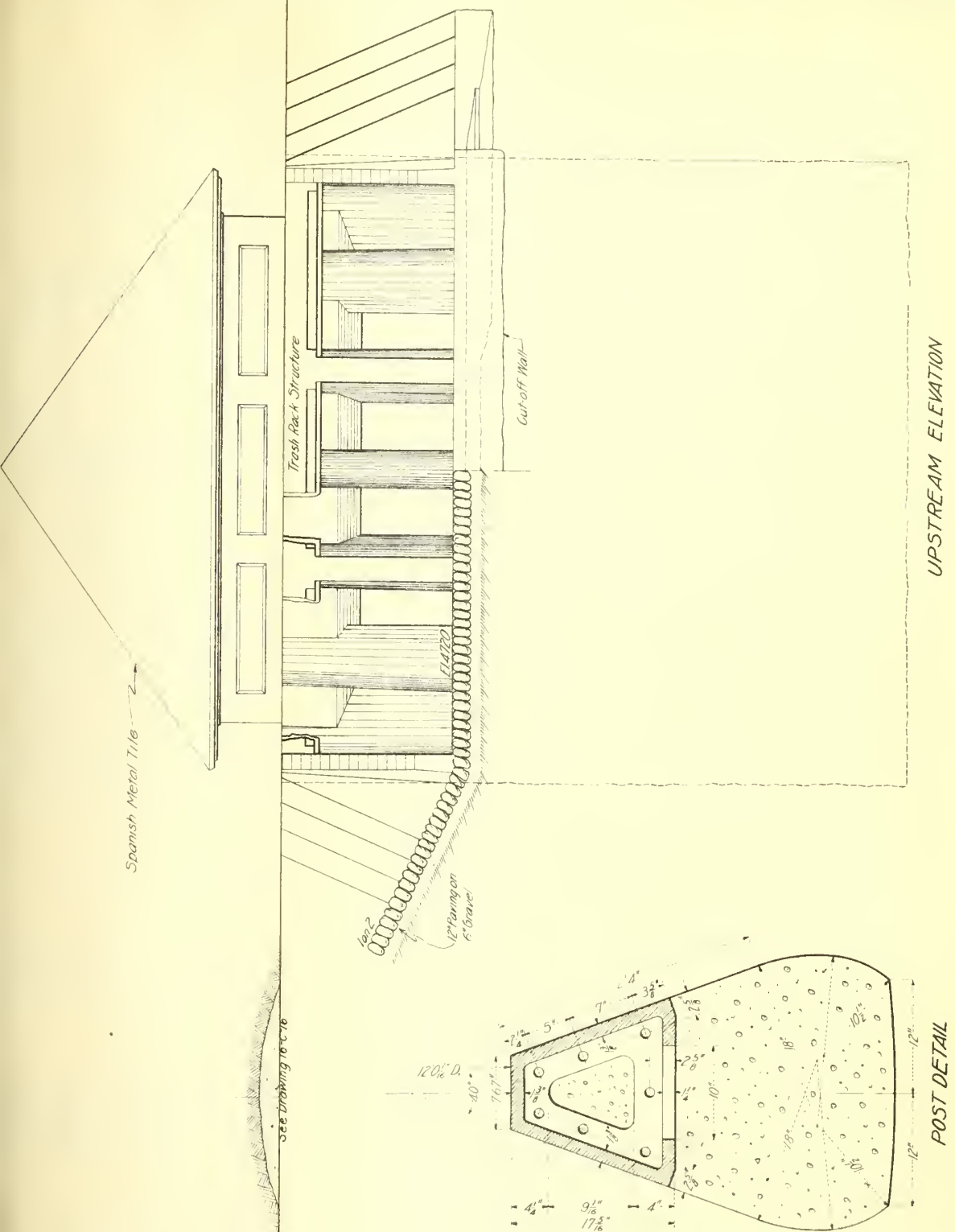
20-8-0's 6-6's Gates

UPSTREAM ELEVATION

NOTE
This Drawing compiled from Design
Drawings made in the Project Office

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MINIDOKA IRRIGATION PROJECT
IDAHO - WYOMING
JACKSON LAKE DAM
PLAN, ELEVATION AND SECTIONS
NO 20413 PLATE 73 OF 88
1923



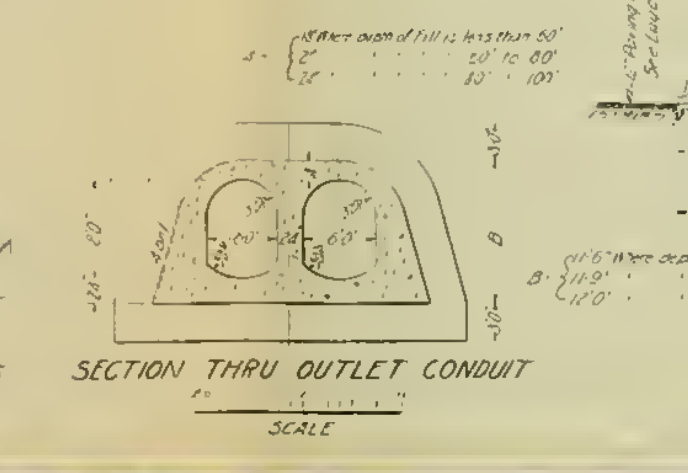
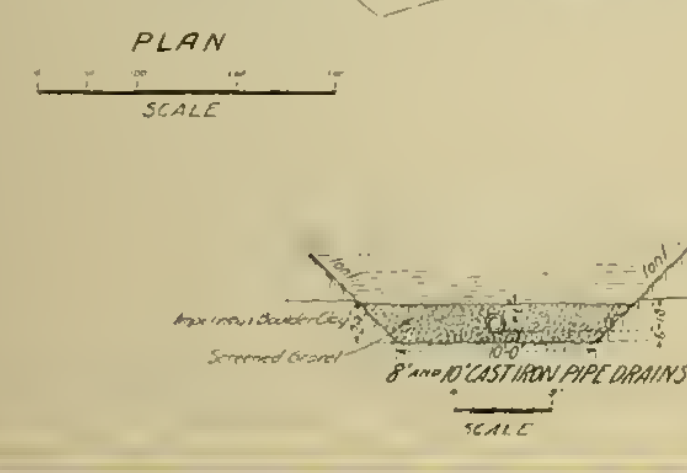
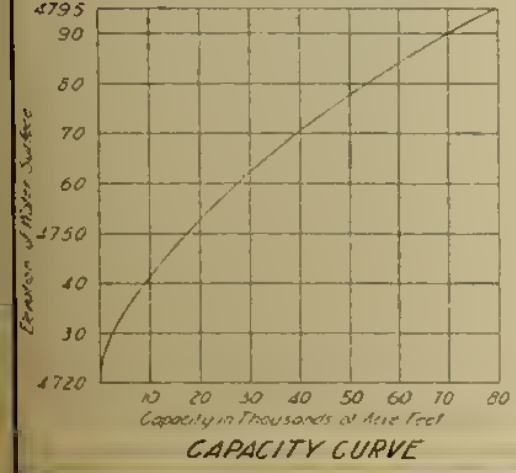
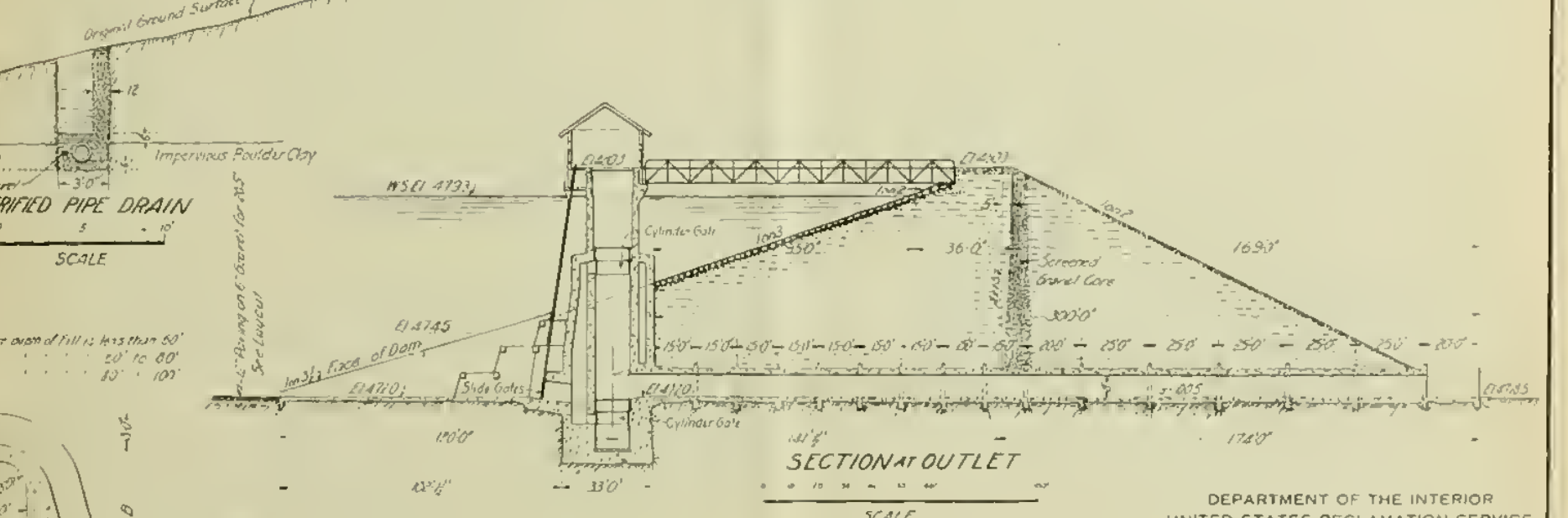
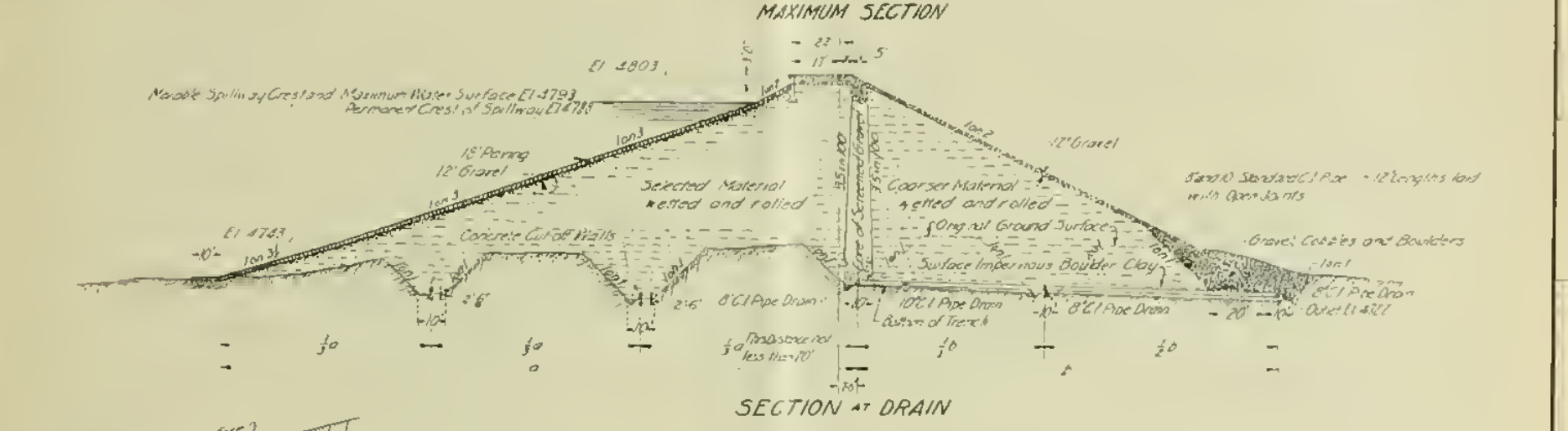
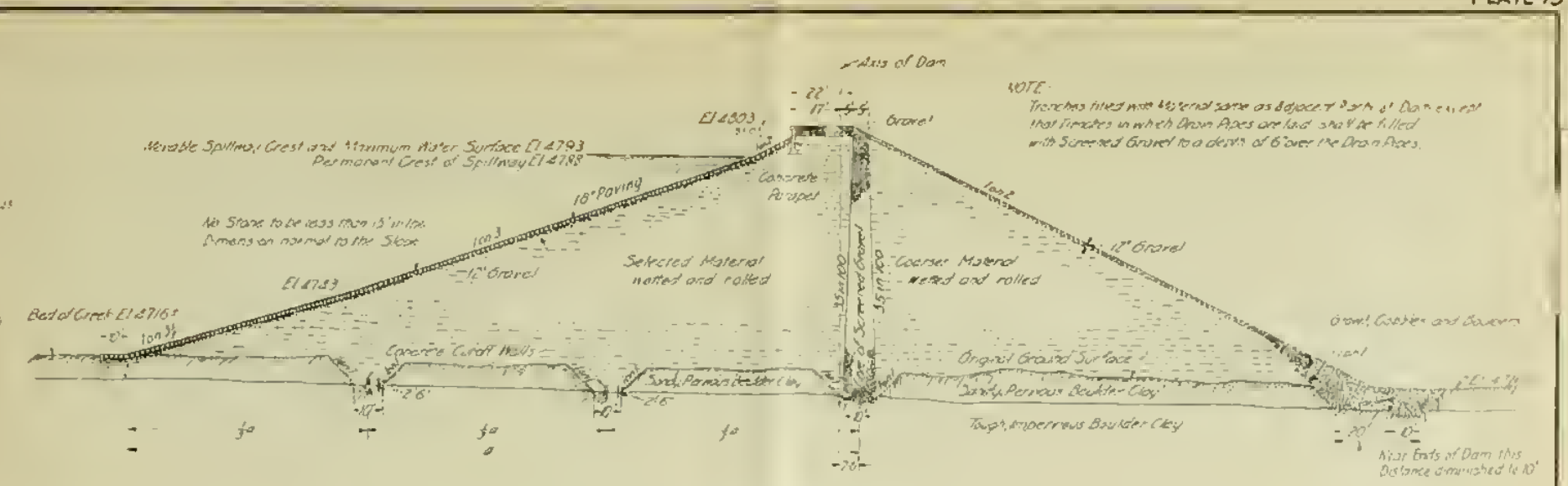
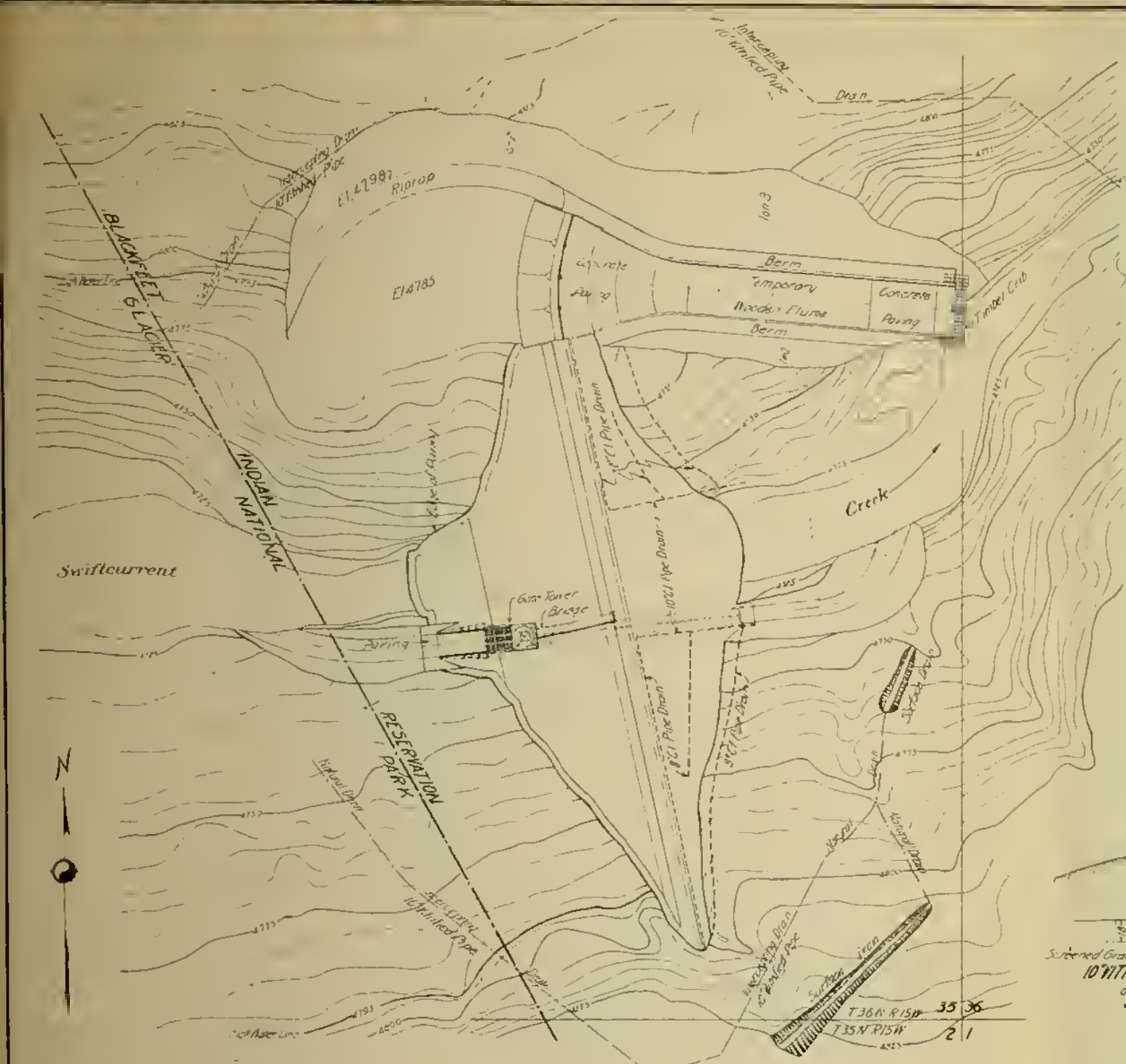


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT
MONTANA

SHERBURNE LAKES DAM
GATE TOWER, ELEVATION AND SECTIONS

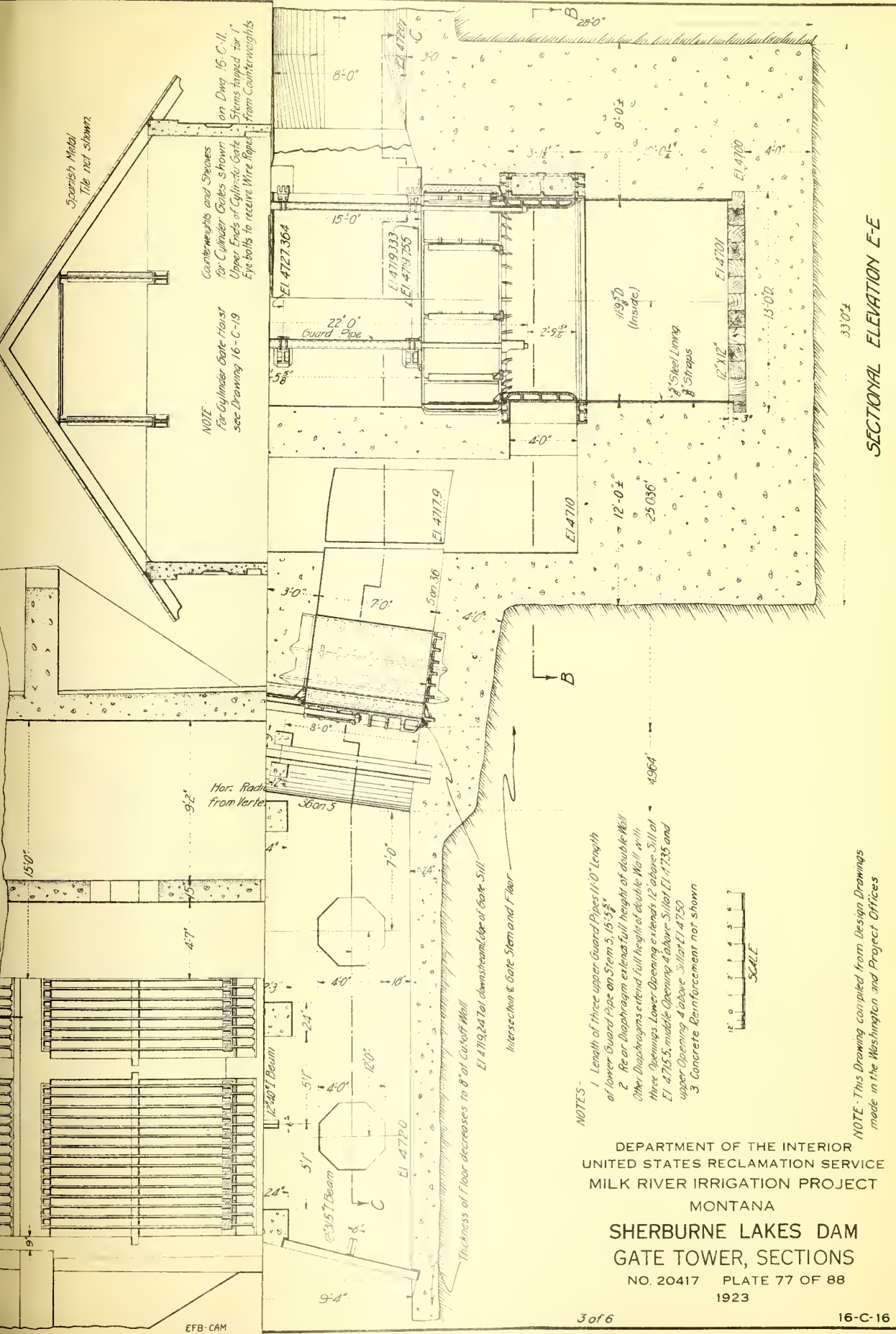
This Drawing compiled from Design Drawings
made in the Washington and Project Offices

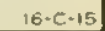
NO. 20416 PLATE 76 OF 88
1923

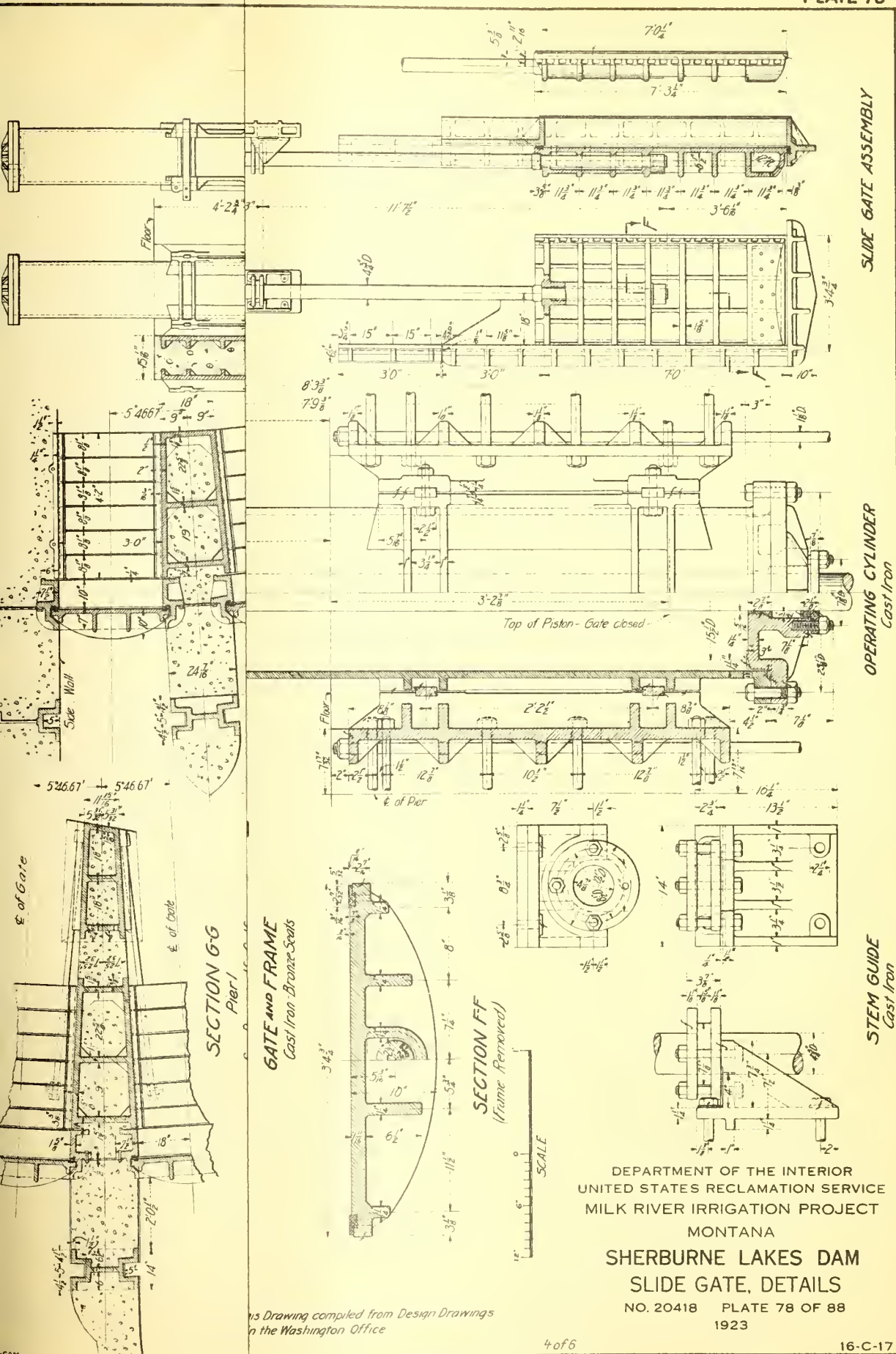


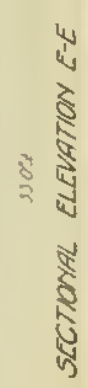
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT
MONTANA
SHERBURNE LAKES DAM
PLAN AND SECTIONS
NO 20415 PLATE 75 OF 88
1923

NOTE: This Drawing compiled from Design Drawings made in the Washington and Project Offices



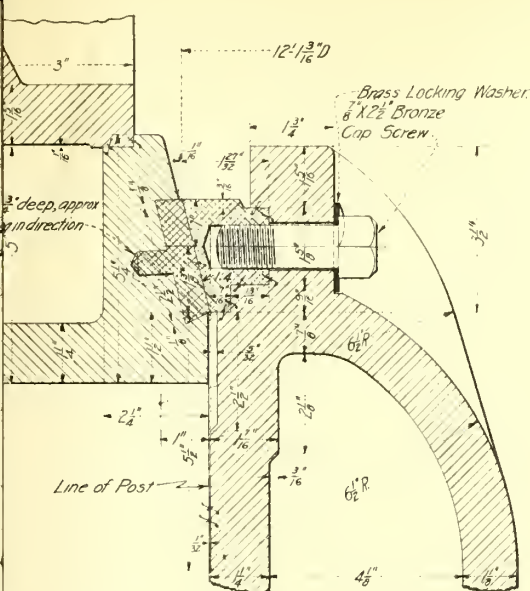
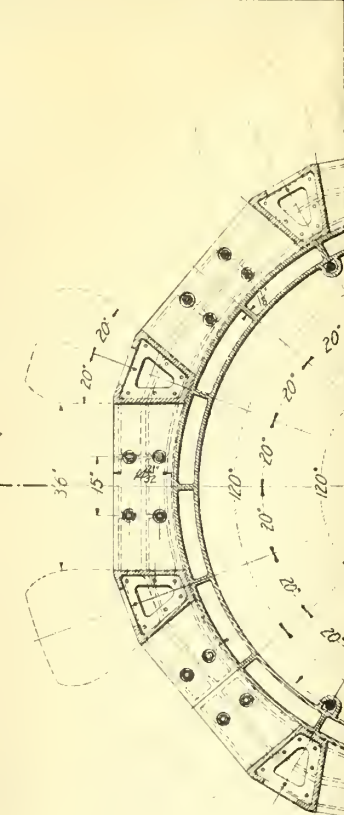




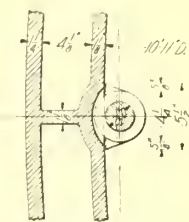


NOTE: This Drawing compiled from Design Drawings made in the Washington and Project Offices

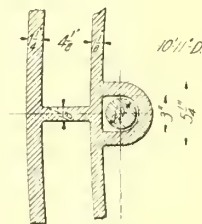
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT
MONTANA
SHERBURNE LAKES DAM
GATE TOWER, SECTIONS
NO 20417 PLATE 77 OF 88
1923



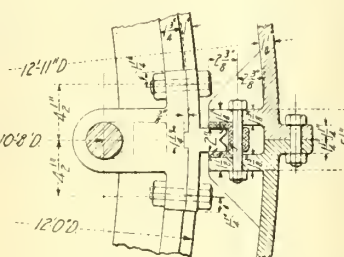
SECTION THRU TOP GATE SEAT
Bronze Seat



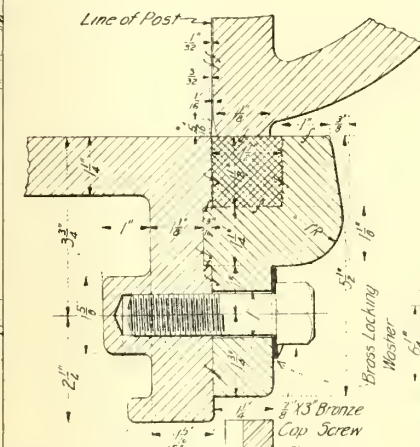
SECTION Q-Q



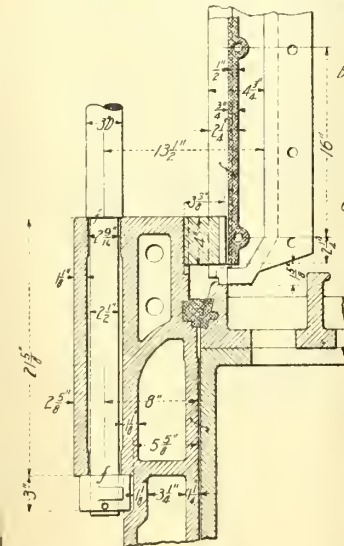
SECTION R-R



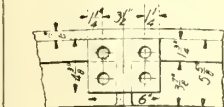
SECTION THRU TORSION GUIDE



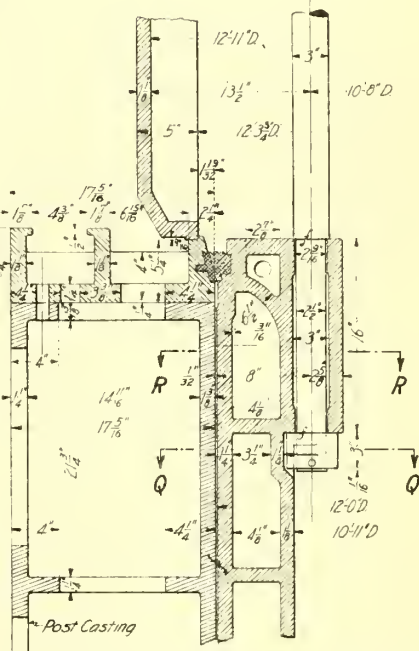
SECTION THRU BOTTOM GATE SEAT
Babbitt Seat



SECTION THRU STEMS 1 AND 4
Torsion Guides on Stems 1 and 4 only



GUIDE SHOE
Cast Iron



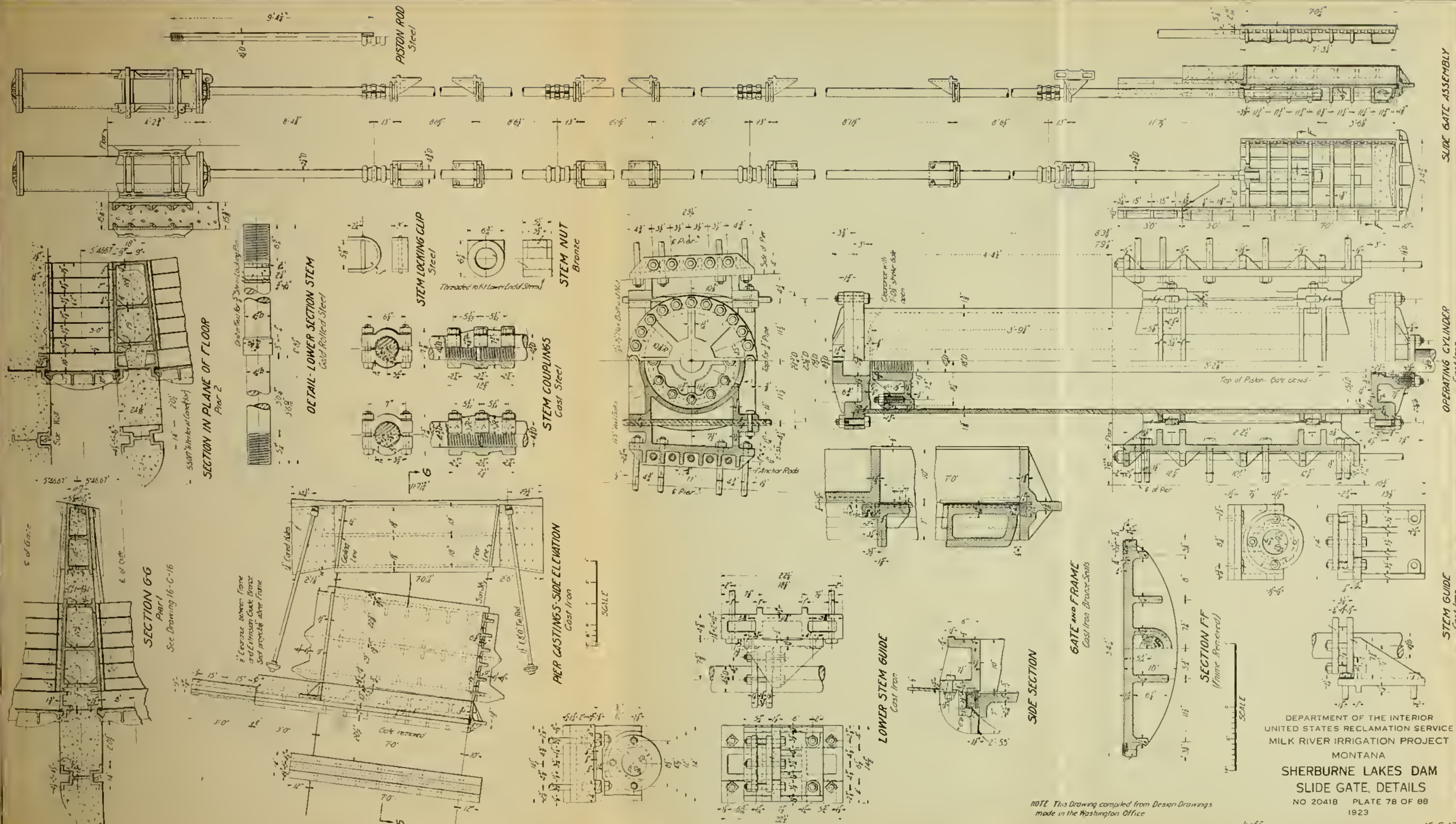
SECTION THRU STEMS 2, 3, 5 AND 6

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT
MONTANA

SHERBURNE LAKES DAM CYLINDER GATE DETAILS

NO. 20419 PLATE 79 OF 88
1923

Drawing compiled from Design Drawings
the Washington Office



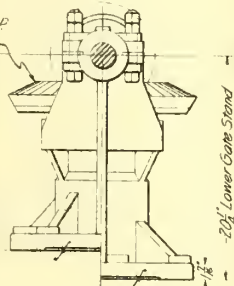
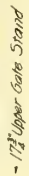
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT
MONTANA
SHERBURNE LAKES DAM
SLIDE GATE, DETAILS
NO 20418 PLATE 78 OF 88
1923

SLIDE GATE ASSEMBLY

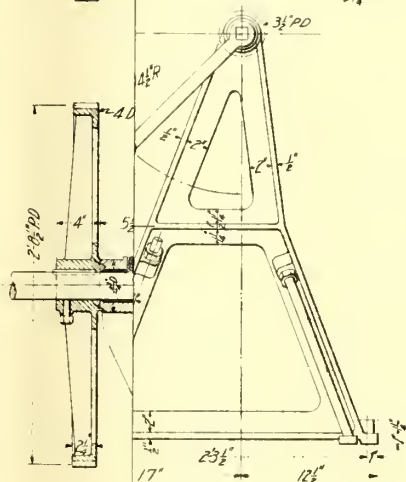
OPERATING CYLINDER

STEM GUIDE

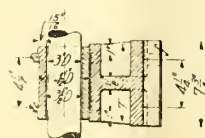
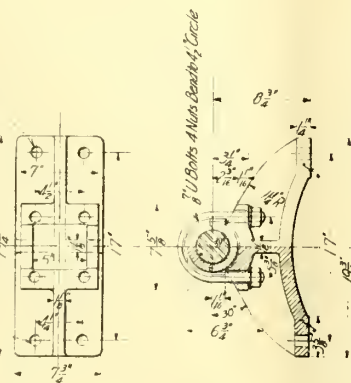
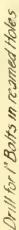
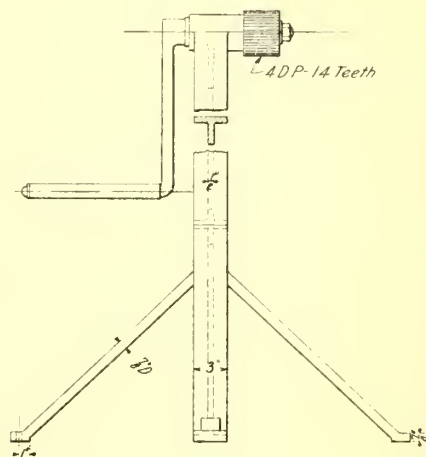
Standard Set Collars on Shafting at Hoists for Stems 3 and 6
Bevel Gears on Shafting at Hoists for Stems 2 and 5 are 4 D.P. 76 Teeth
Threaded Length 5'6" on Stems 1 and 4,
5'0" on Stems 2, 3, 5 and 6
Thread in Lifting Nut, Double Acme, $\frac{3}{4}$ " Lead,
2" Pitch



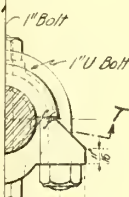
CYLINDER GATE HOIST
Cast Iron



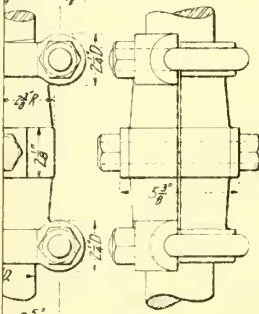
CRANK STAND
Cast Iron



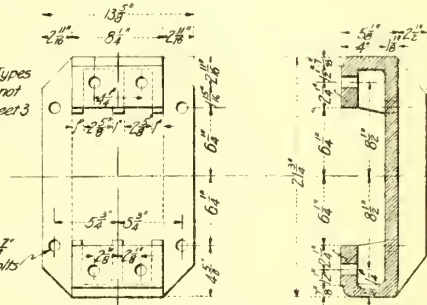
STEM GUIDE AND BRACKETS



NOTE Four other Types
of Bases used but not
shown except on Sheet 3



HALFELEVATION
TEM GUIDE COUPLING
Cast Steel



BASE FOR STEM GUIDE BRACKET
Cast Iron

NOTE: All Details shown on this Sheet are for
Cylinder Gates.

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT
MONTANA

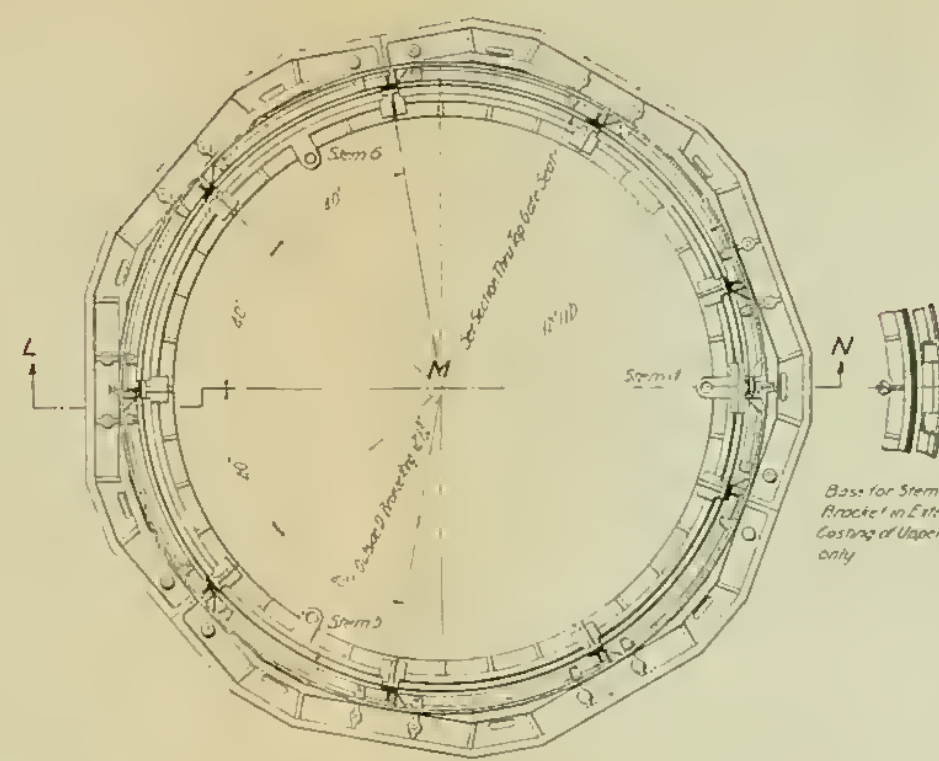
SHERBURNE LAKES DAM

NO. 20420 PLATE 80 OF 88
1923

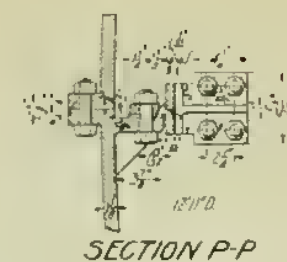
Drawing compiled from Design Drawings
of Washington Office.

6 of 6

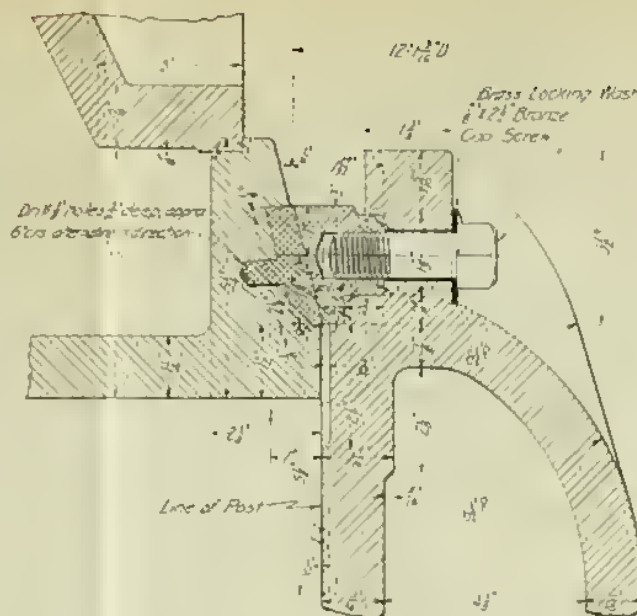
16-C-19



Base for Stern Guide
Project in Extension
Casting of Upper Gate
only



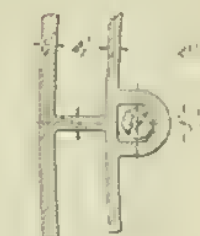
SECTION P-P



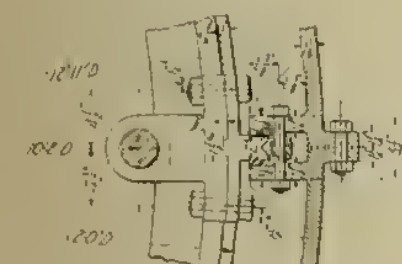
SECTION THRU TOP GATE SEAT
Bronze Seal



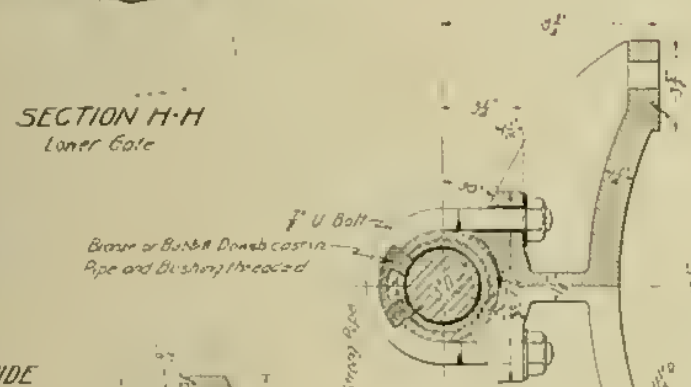
SECTION 0-0



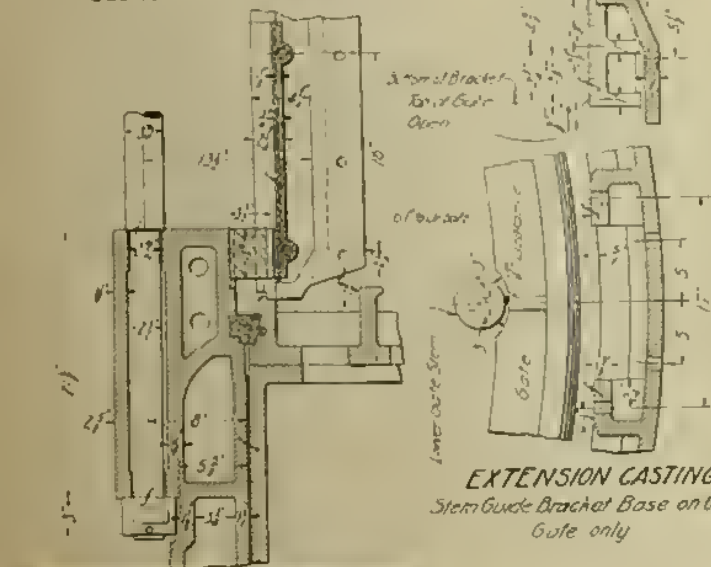
SECTION R·R



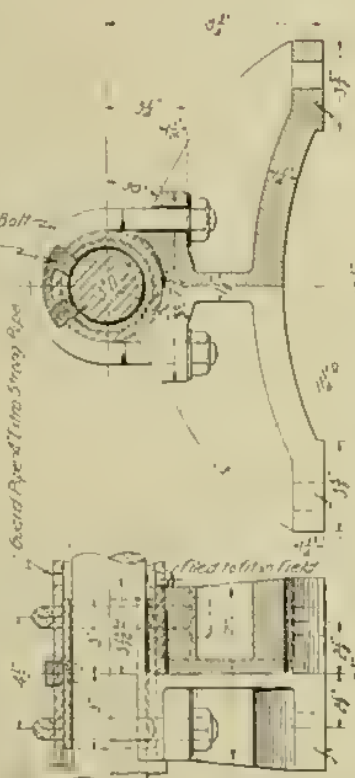
SECTION THRU TORSION GUIDE



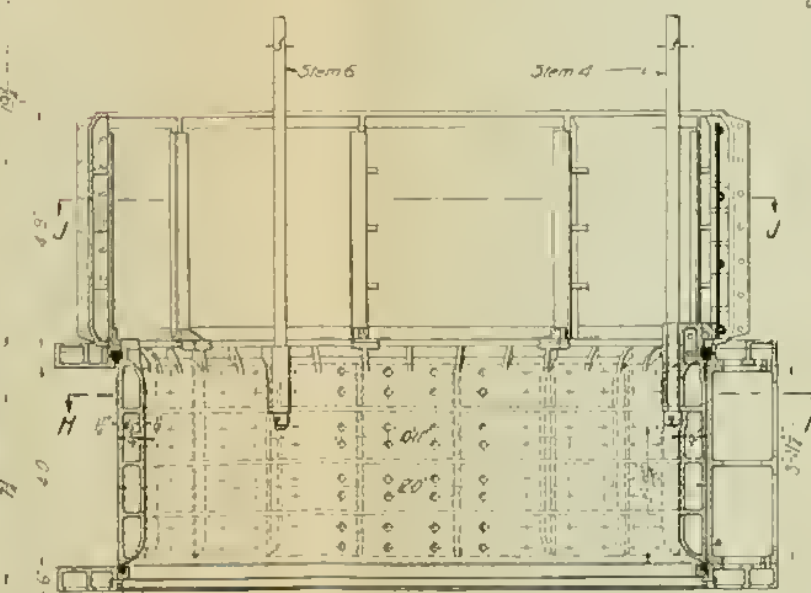
SECTION H-H
Lower Epile



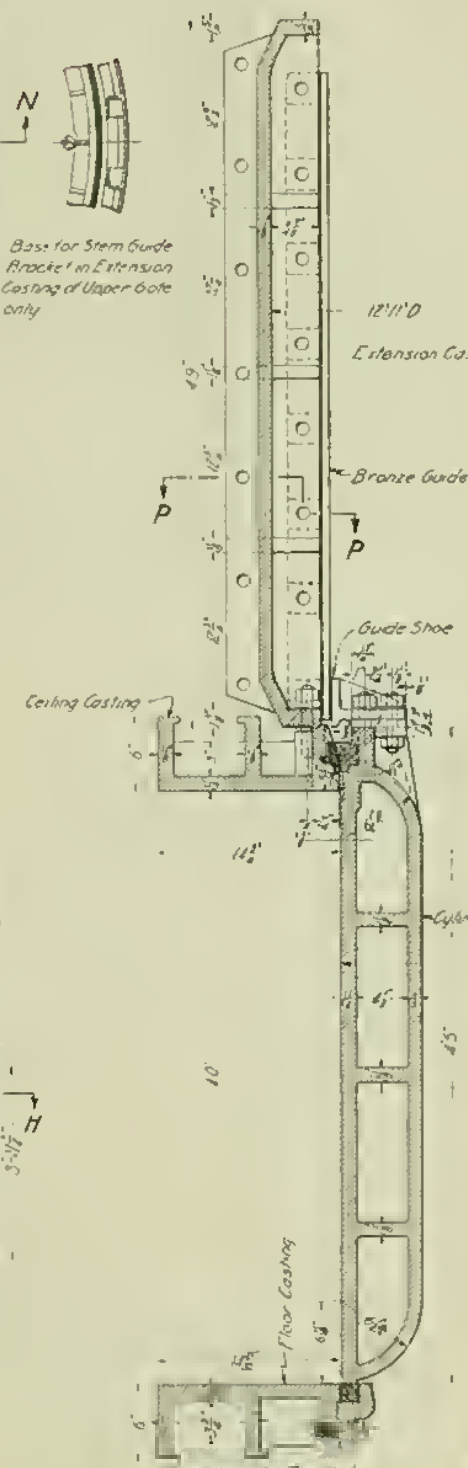
EXTENSION CASTING



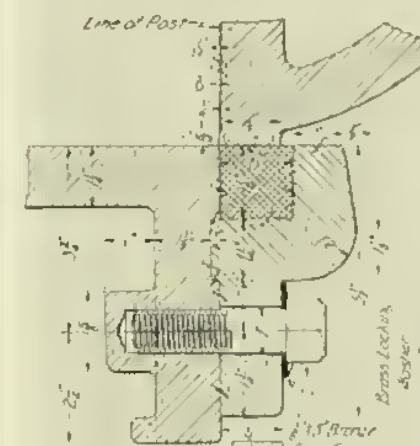
STEM GUARD PIPE AND BRACKET
Steel and Cast Iron



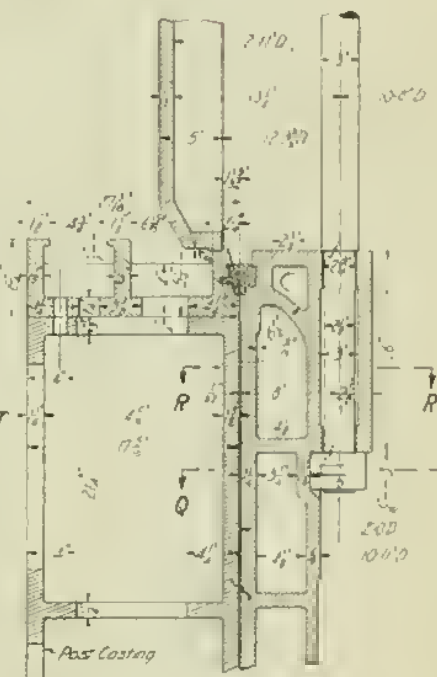
SECTION K-K AND L-M-N
Lower Gole



SECTION L-M



SECTION THRU BOTTOM GATE SEAT
Babbitt Seal

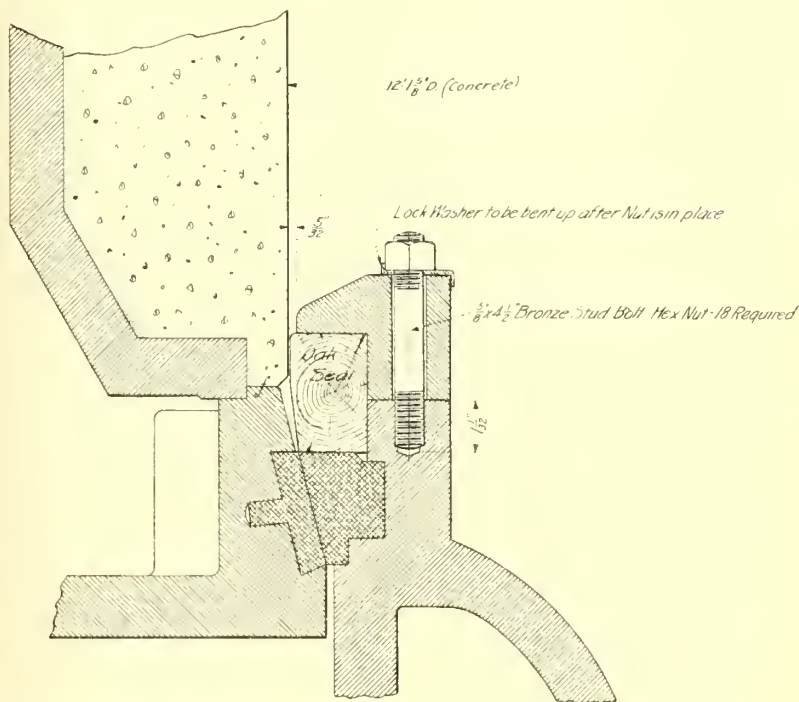
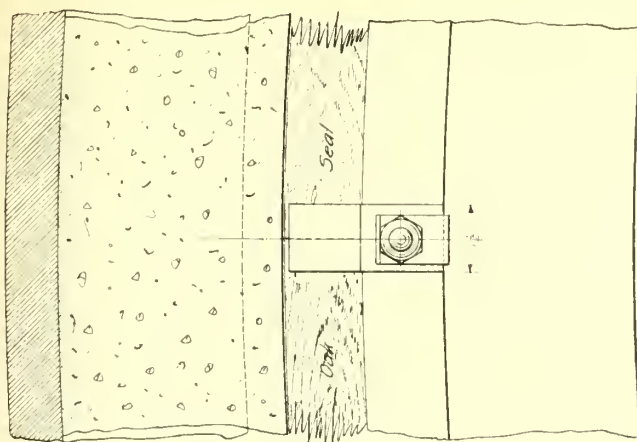
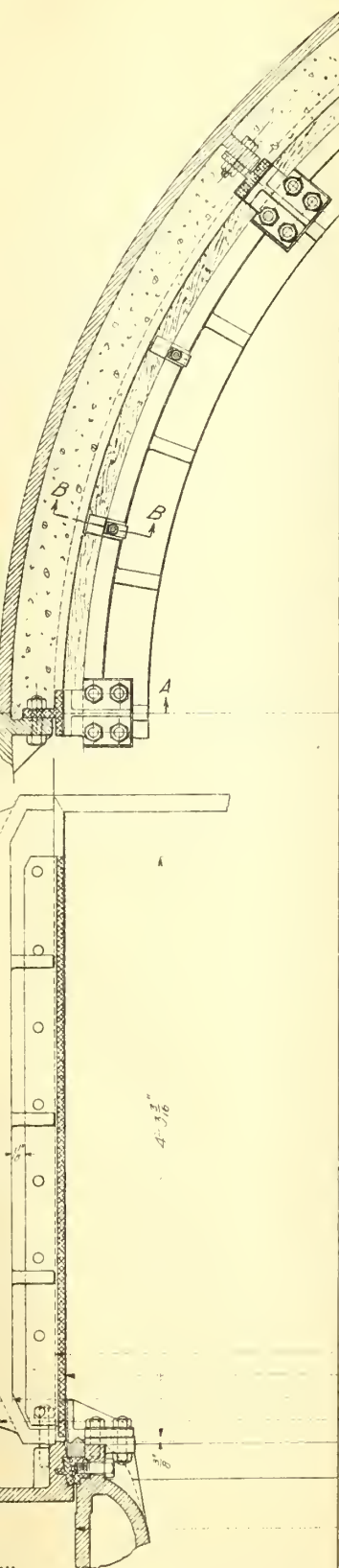


SECTION THRU STEMS 23.5 AND 6

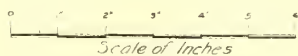


GUIDE SHOE
Cast Iron

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT
MONTANA
SHERBURNE LAKES DAM
CYLINDER GATE DETAILS
NO 20419 PLATE 79 OF 88
1923



SECTION BB

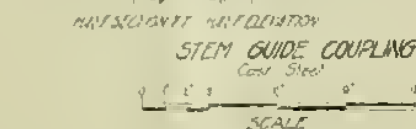
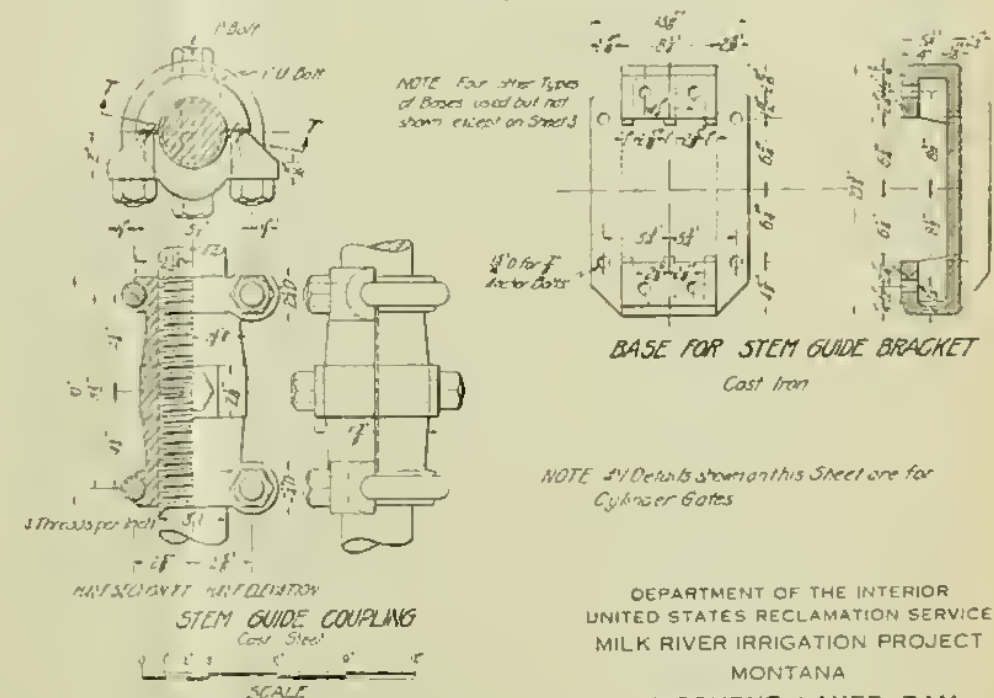
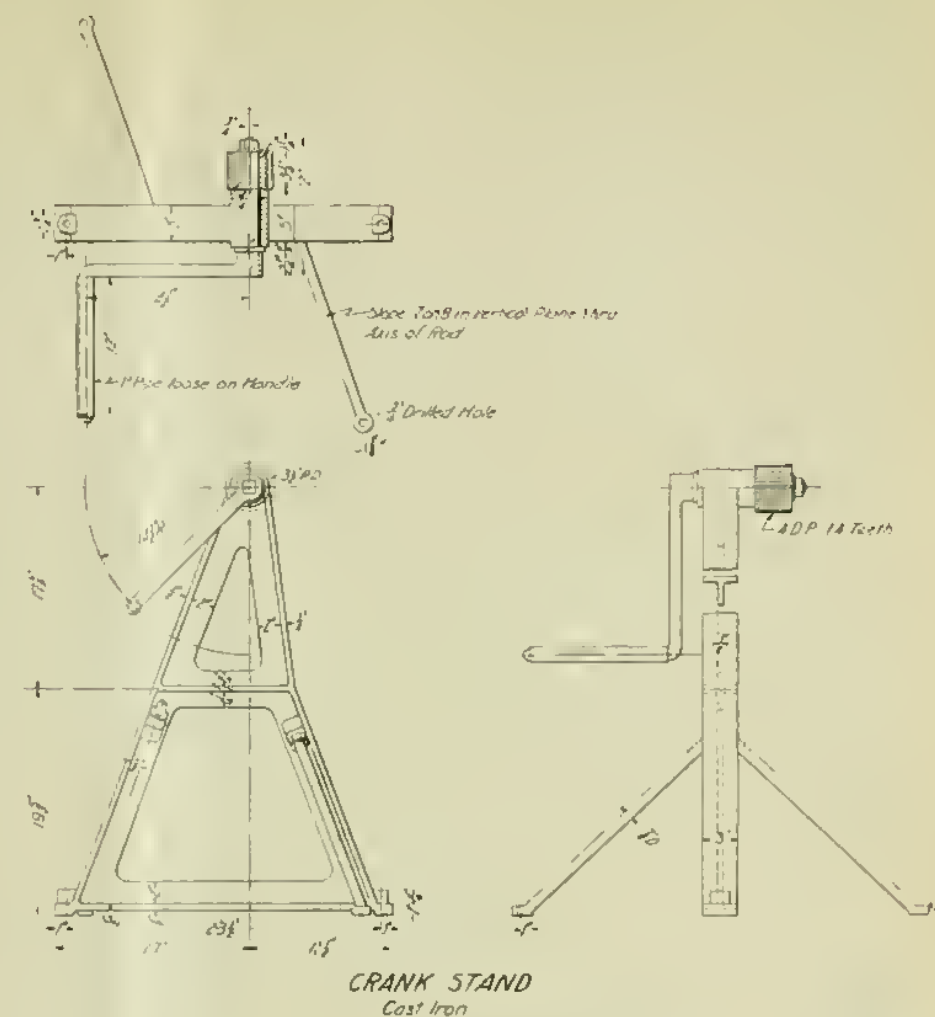
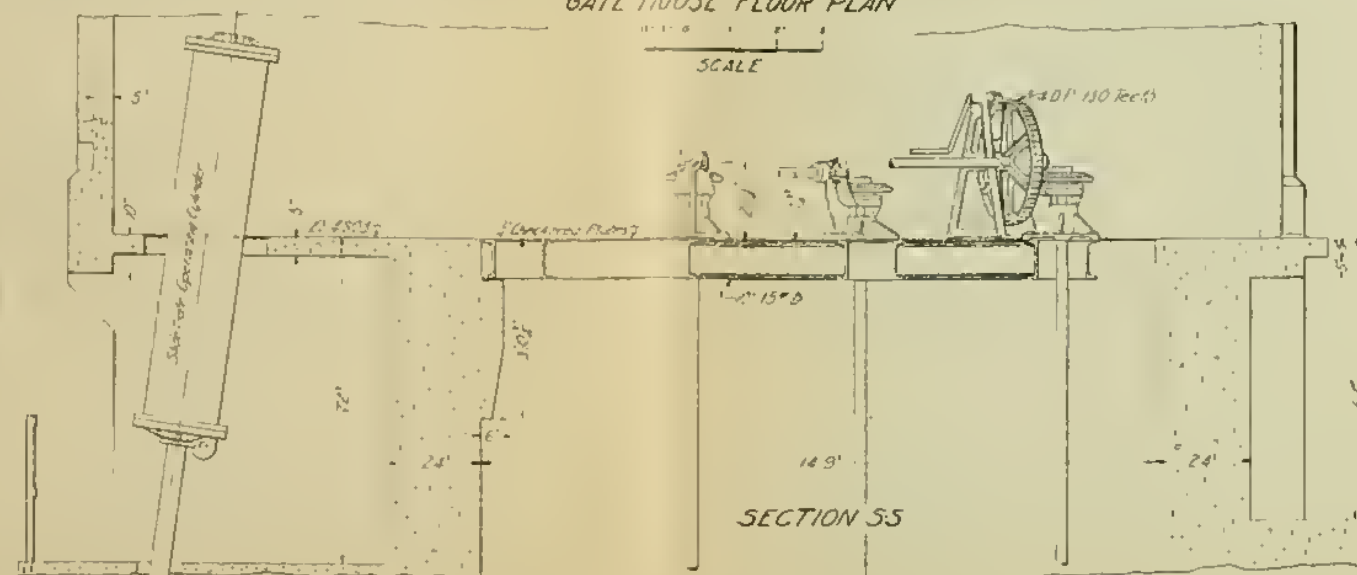
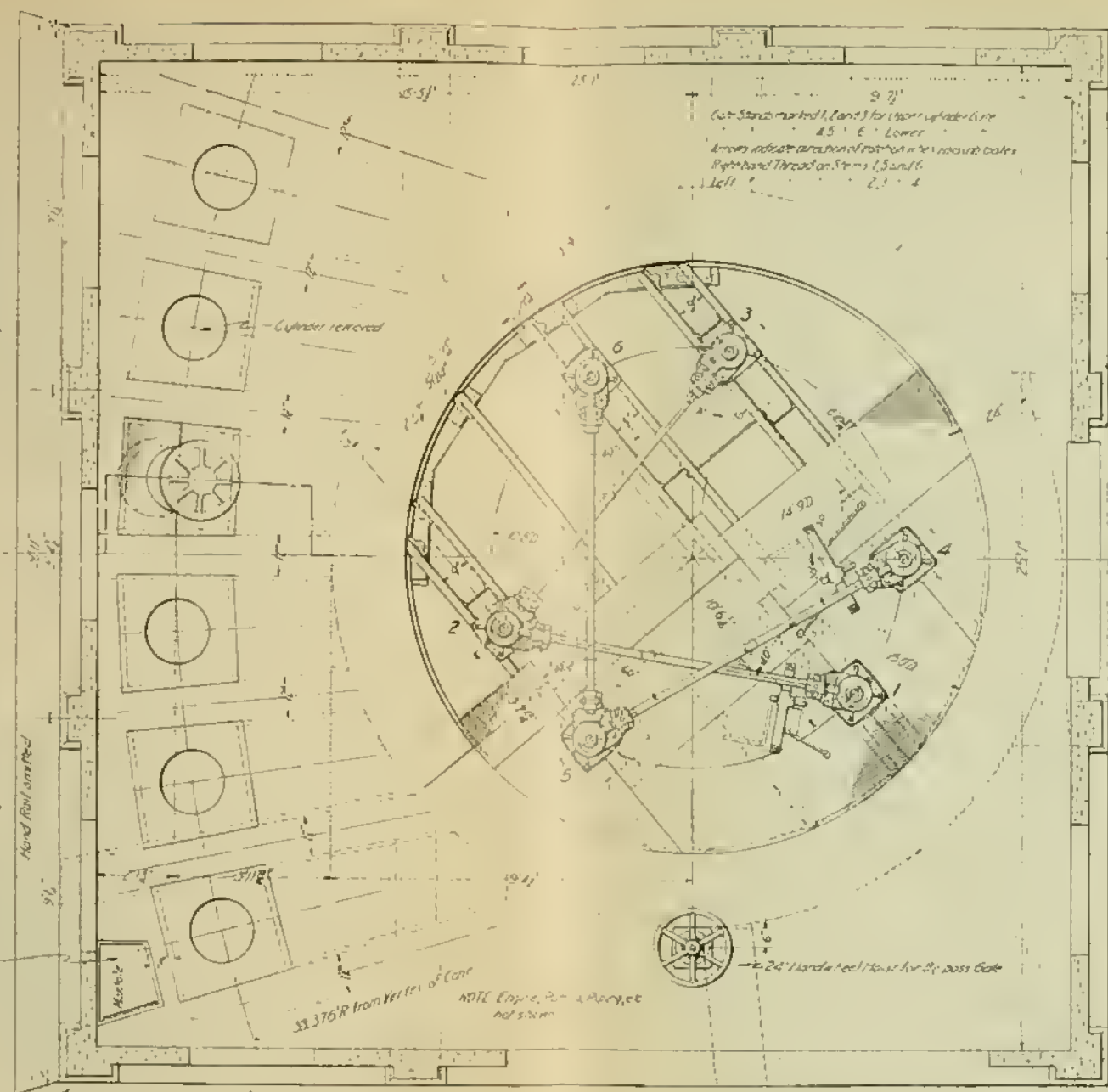
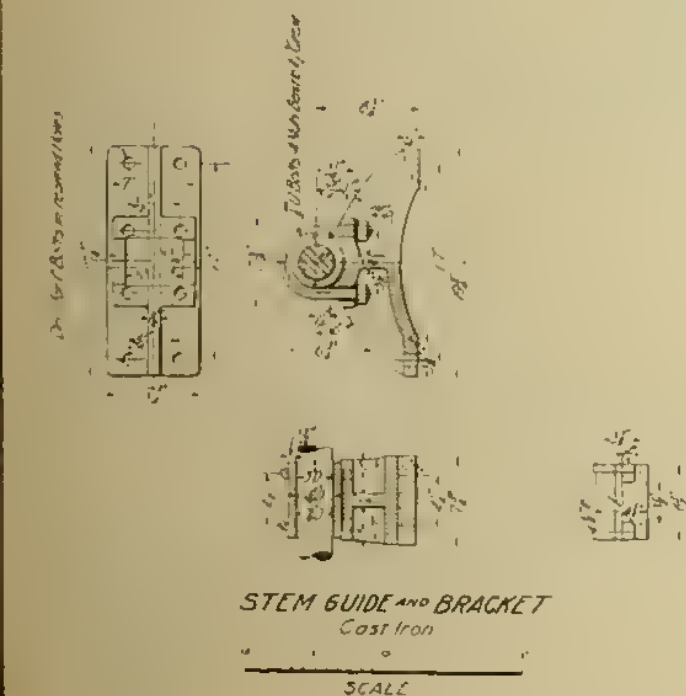
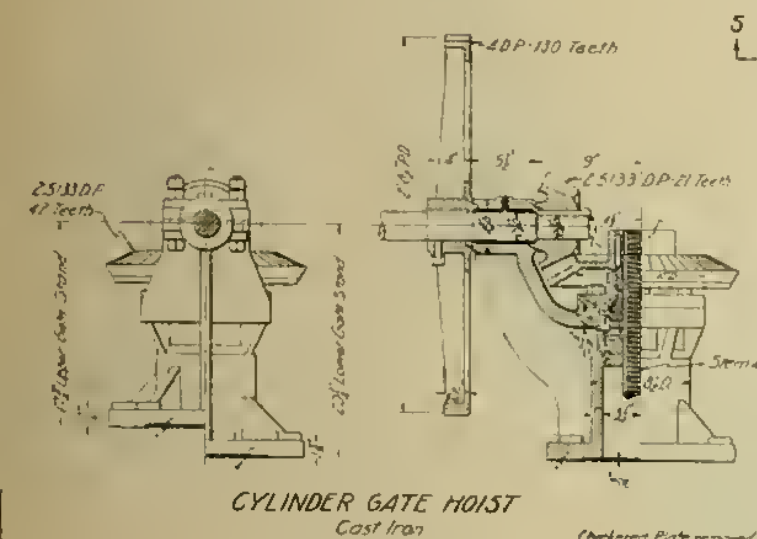


NOTE: Repairs consist of filling the frame with concrete and adding an Oak Sealing Strip to keep gravel off the gate seat which in the past has prevented closing of gate. Additions to be made to the lower Gate only.

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT, MONTANA
SHERBURNE LAKES DAM
CYLINDER GATE REPAIRS
NO. 20421 PLATE 81 OF 88
1923

NOTES:

Standard Set Collars on Shafting at
Hubs for Stems 3 and 6
Bowl Bearings on Shafting at Hubs for
Stems 2 and 5 are 40 P. 76 Teeth
Threaded Length 5'6" on Stems 1 and 4
5'0" on Stems 2, 3, 5 and 6
Thread in Lifting Nut Double Thread 2'0" x 1/2"

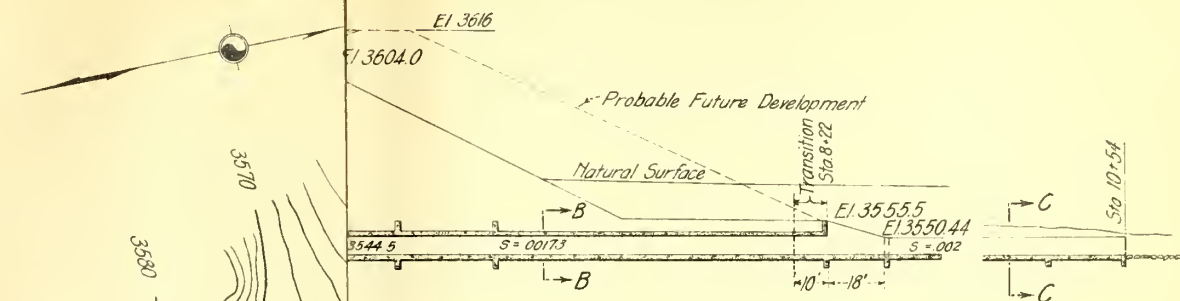


NOTE: This Drawing compiled from Design Drawings
made in the Washington Office

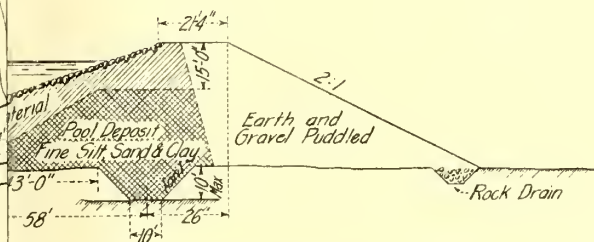
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT
MONTANA

**SHERBURNE LAKES DAM
GATE HOISTS**

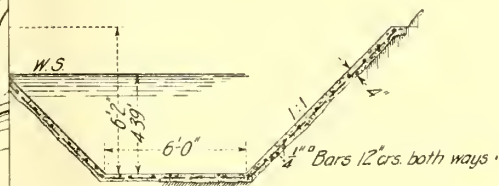
NO 20420 PLATE 80 OF 88
1923



OUTLET WORKS

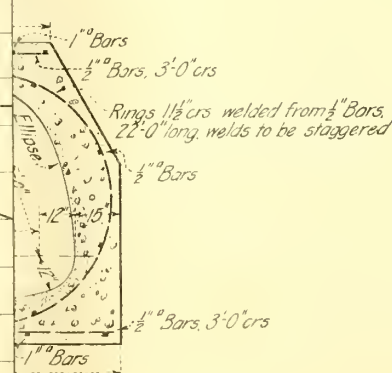
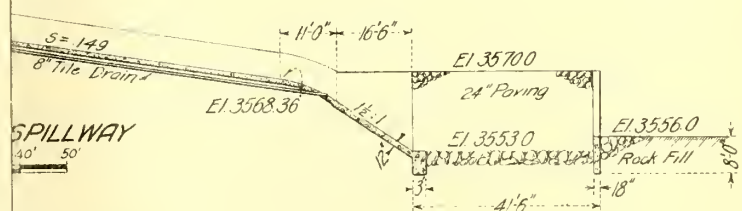
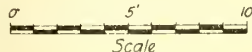


SECTION THROUGH DAM

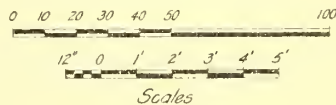
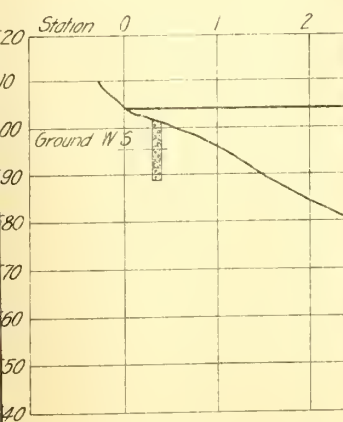


Hydraulic Properties
 $n = 0.014$ $S = 0.002$
 $d = 4.39$ $V = 8.78$
 $Q = 4.00$

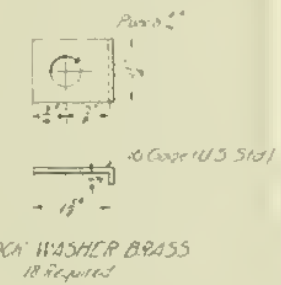
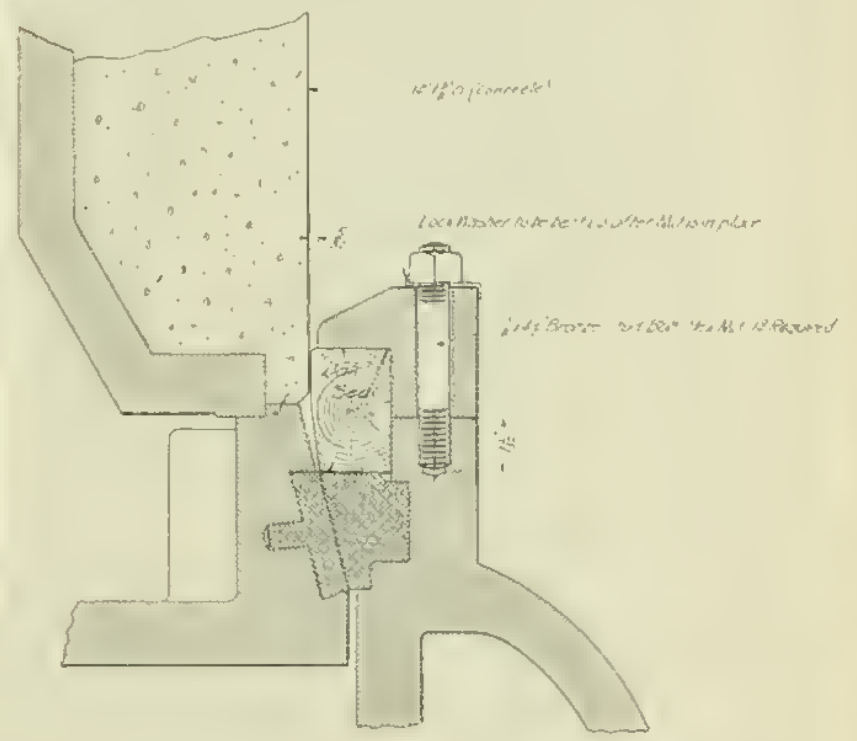
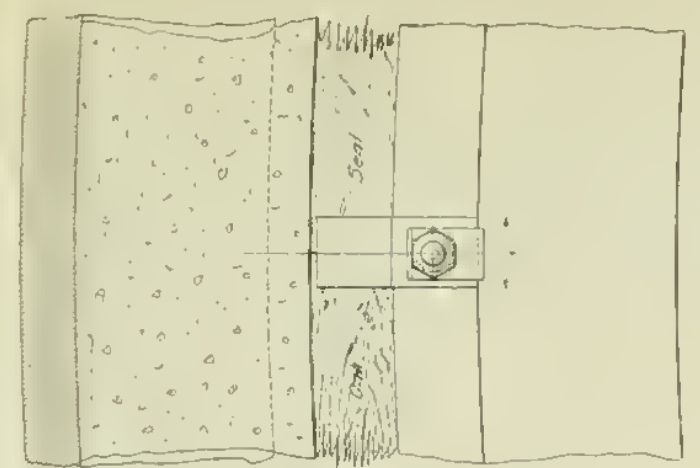
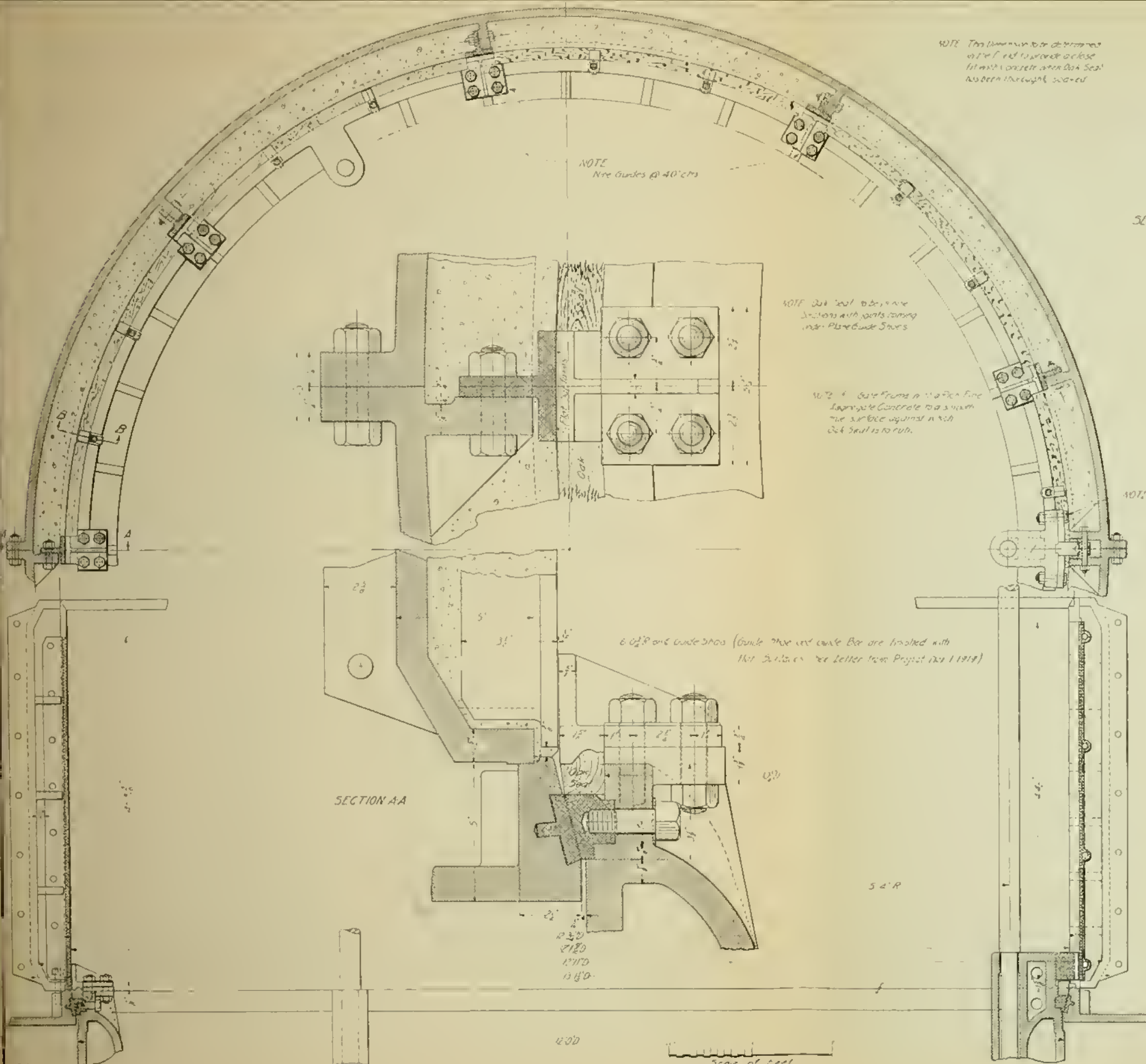
SECTION C-C



SECTION A-A



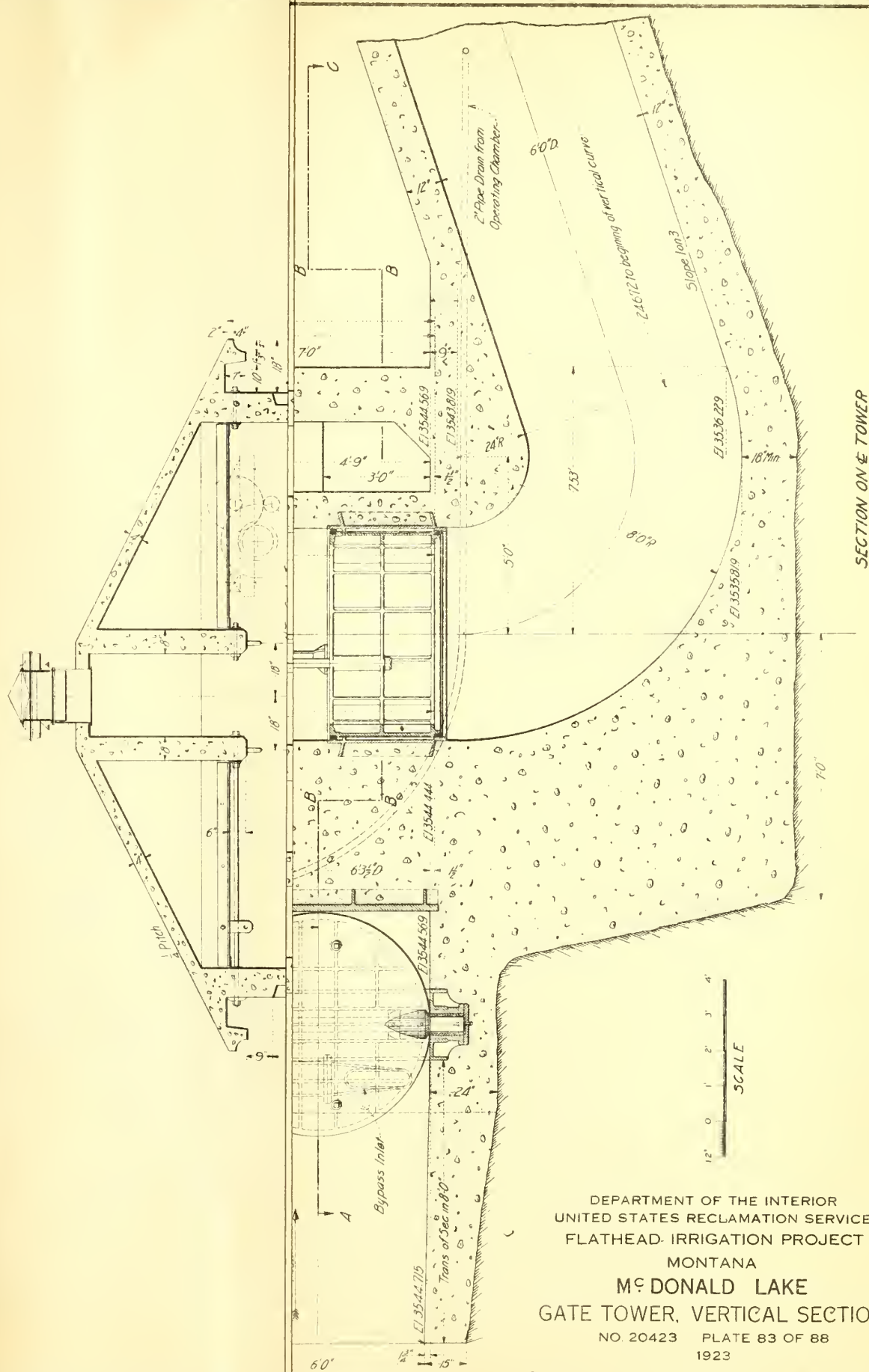
DEPARTMENT OF THE INTERIOR
 UNITED STATES RECLAMATION SERVICE
 FLATHEAD IRRIGATION PROJECT
 MONTANA
Mc DONALD LAKES DAM
 PLAN AND SECTIONS
 NO. 20422 PLATE 82 OF 88
 1923



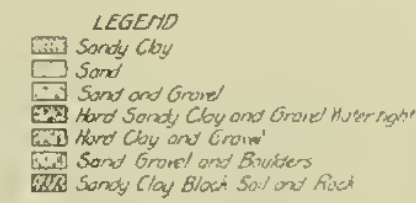
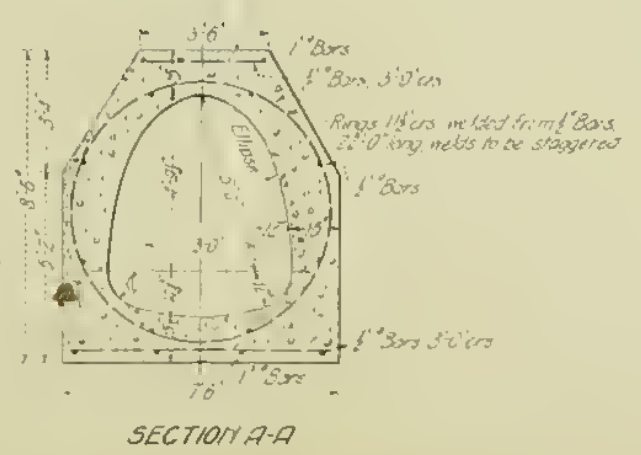
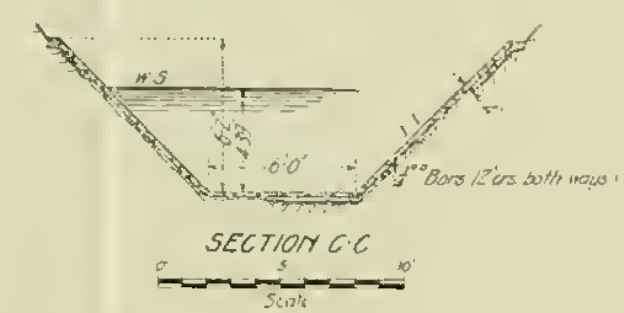
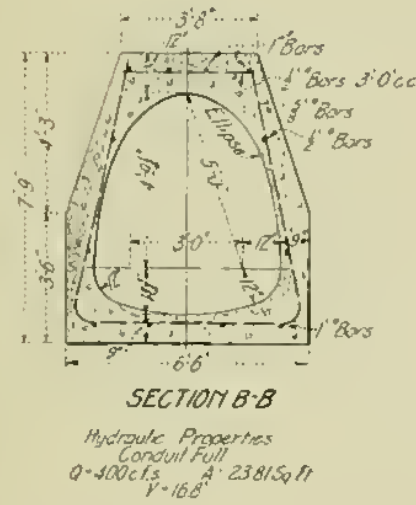
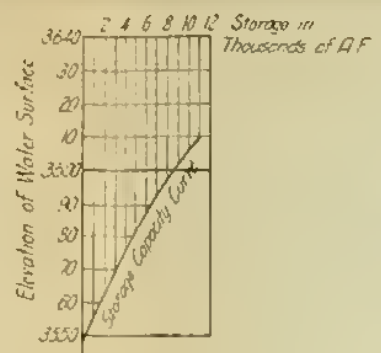
SECTION BB

Scale of inches

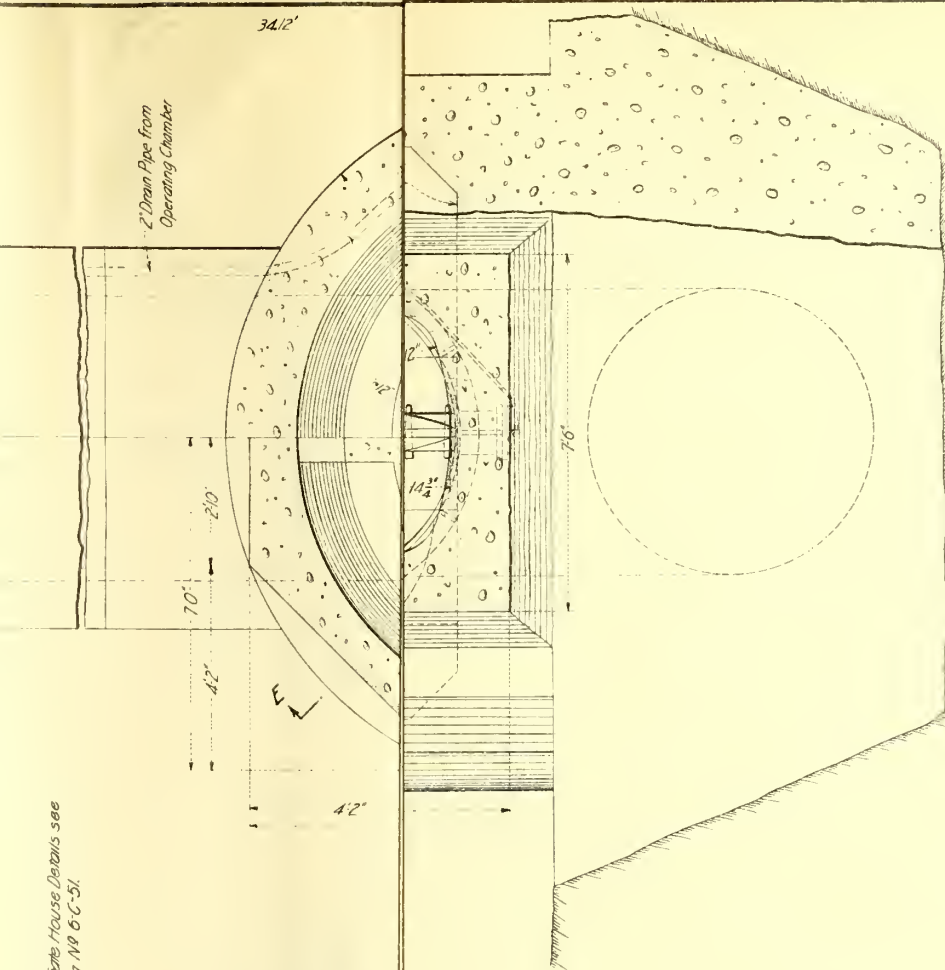
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
MILK RIVER IRRIGATION PROJECT, MONTANA
SHERBURNE LAKES DAM
CYLINDER GATE REPAIRS
NO 20421 PLATE 81 OF 88
1923



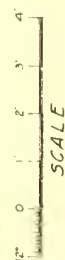
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT
MONTANA
MCDONALD LAKE
GATE TOWER, VERTICAL SECTION
NO 20423 PLATE 83 OF 88
1923



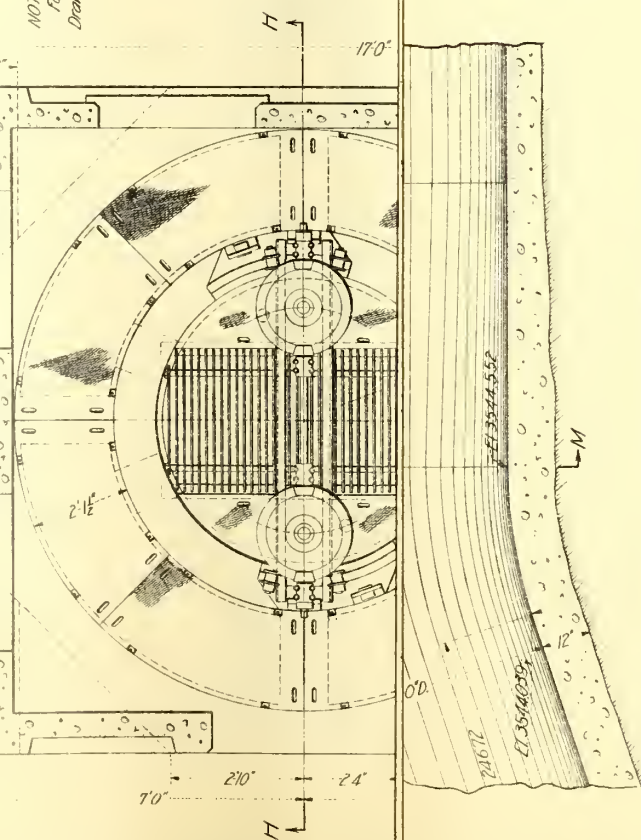
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT
MONTANA
MC DONALD LAKES DAM
PLAN AND SECTIONS
NO 20422 PLATE 82 OF 88
1923



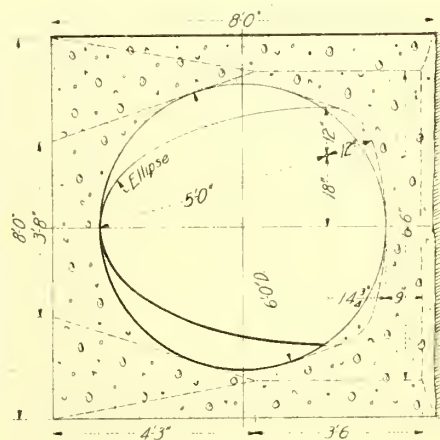
UPSTREAM ELEVATION



NOTE:
For Gate House Details see
Drawing NO 6-C-51.



TRANSITION-TOWER TO CONDUIT



SECTION M-M

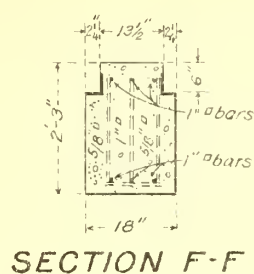
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT, MONTANA

MCDONALD LAKE DAM
GATE TOWER, SECTIONS

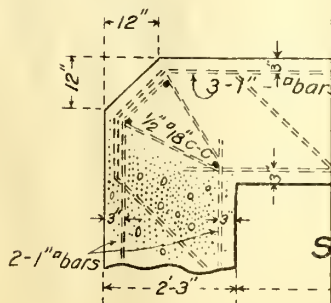
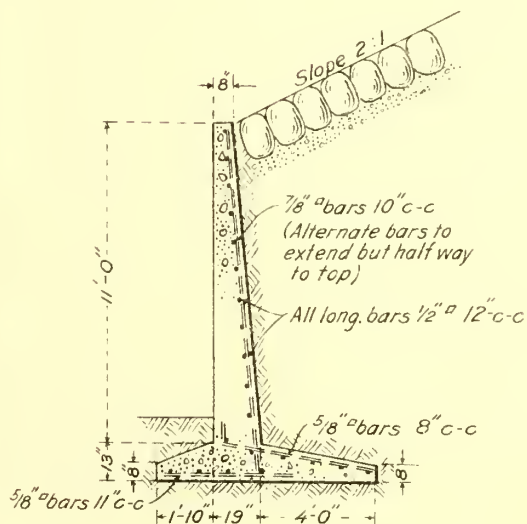
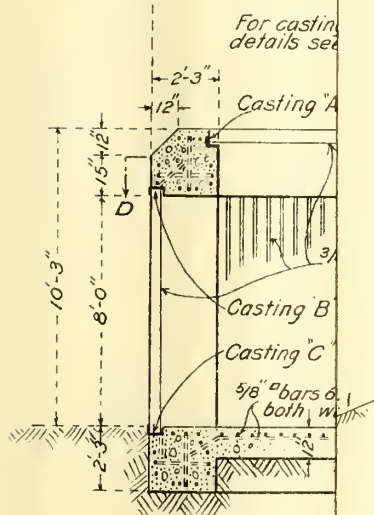
NO. 20424 PLATE 84 OF 88
1923



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT
MONTANA
MC DONALD LAKE
GATE TOWER, VERTICAL SECTION
NO 20423 PLATE 83 OF 88
1923



Quantities	
Concrete	55 c.y.
1" [#] bars	5000 lbs.
7/8" "	600 "
5/8" "	2300 "
1/2" "	800 "

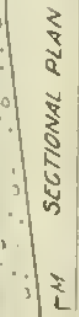
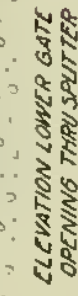
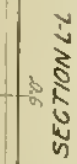
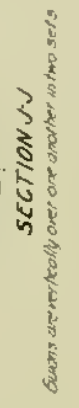
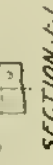
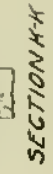
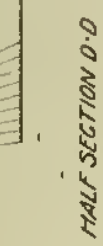
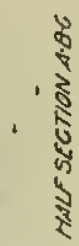
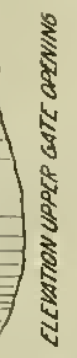
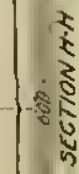
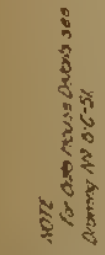


DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT, MONTANA
MC DONALD LAKE DAM
TRASH RACK STRUCTURE

NO. 20425 PLATE 85 OF 88

1923

6-C-40



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT, MONTANA
MCDONALD LAKE DAM
GATE TOWER, SECTIONS
NO 20424 PLATE 84 OF 88
1923

Name	Dring No	Symbol	No Reg	Material	Name	Dring No
ase	14-E-215	27	28 in. ft	---	3/4 square Graphited Flax Packing	not detailed
of	"	28	1	Steel & Brass	Ball Bearing No 1 complete	14-E-216
Cover Plate	"	29	2	" " "	No 2 "	"
rand	14-E-216	30	6	Mild Steel	3/4 x 2 1/4" Cop Screw - Hex head	"
"	"	31	4	" "	3/8 x 2 3/8 "	"
Wheel Sector	14-E-217	32	8	" "	3/4 x 2 3/8 "	"
"	14-E-215	33	12	" "	1/2 x 1 1/4 "	"
Sector-Complete with ball & nut	14-E-217	34	2	" "	3/4 x 2 3/4 Machine Bolts " " 8 nut	"
"	14-E-216	35	6	" "	3/4 x 2 3/4 " " " " "	"
or Ball Bearing No 2	"	36	4	" "	3/4 x 2 "	"
ar with set screw	"	37	4	John Bronges	3/4 x 6" Stuffing Box Stud - Hex nut	"
with set screw	14-E-217	38	1	Along "	3" Gate Shaft Nut - Hex bossed	14-E-215
rank	"	39	1	" "	3" Lock Nut - Hex bossed one side	"
Gate Leaf with Phos Br Sleeves	14-E-215	40	6	Strid	3/8" Expansion Bolts - Hex head	not detailed
Shaft	14-E-217	41	1	1 1/2" S & Br	Compression Grouse Cup - complete	13-296
Shaft	"	42	1	Strid	3/4 x 2" Plain Grouse Cup - Crane "672 equal	not detailed
Collar with Set Screw - 1 1/2"	"	43	4	" "	1/2 x 1 1/2 " " " " "	"
Gate Shaft 7/8" x 1" x 7"	"	44	22 in. ft	Brass	1/2" Seamless Drawn Pipe - Iron pipe size	"
Norm "	"	45	1	Rough Brass	1/2" Y Bend	"
Pinion " 1/2" x 3/4" x 3 1/4"	"	46	2	" "	1/2" Strid Steam Cock - Crane "298 equal	"
Pin	14-E-215	47	2	" "	1/2" Elbow Iron pipe size	"
Box Gland	14-E-217	48	1	" "	1/2" Street Elbow "	"
Shing	"	49	2	" "	1/2" Strid Ground Union - Crane "521 1/2 equal	"
ft - 1 1/2"	"	50	4	" "	1/2" Couplings Iron pipe size	"
Pass Complete	14-E-223	51	2	" "	1/2" Elbow 45°	"
Bushing	14-E-217	52	2	Cast Iron	3" Countersunk Pipe Plug	"
"	"	53	4	Brass	1/2" Short Nipples	"

Operating Chamber 7'-0"

Gate = Chamber

2'-6 1/4"

Outside dia 18 1/2"

Operating Chamber 5'-0"

2'-3"

12"

3 1/2"

19 1/2"

19 1/2"

Seal 6'-3" dia

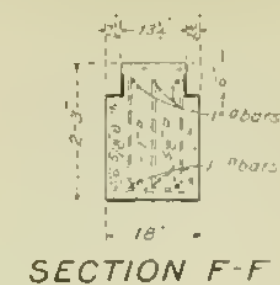
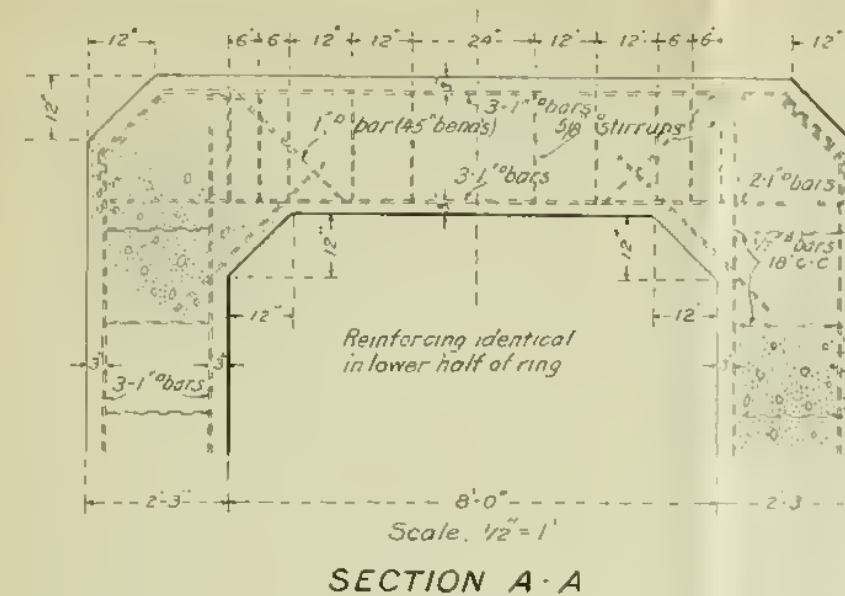
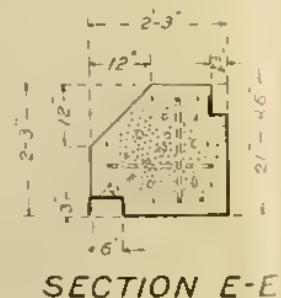
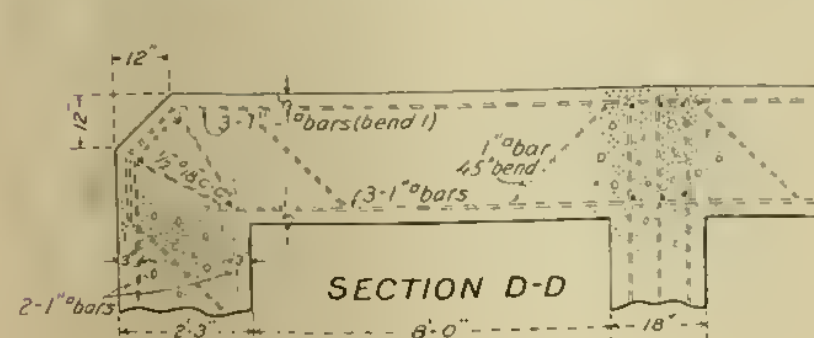
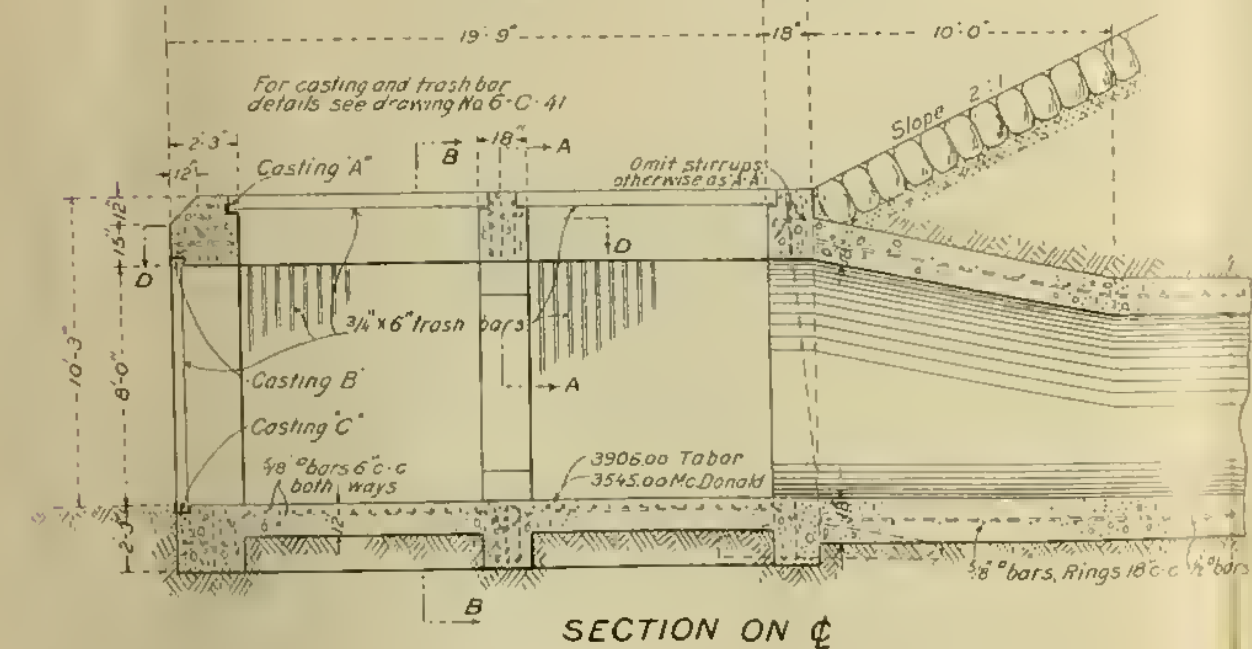
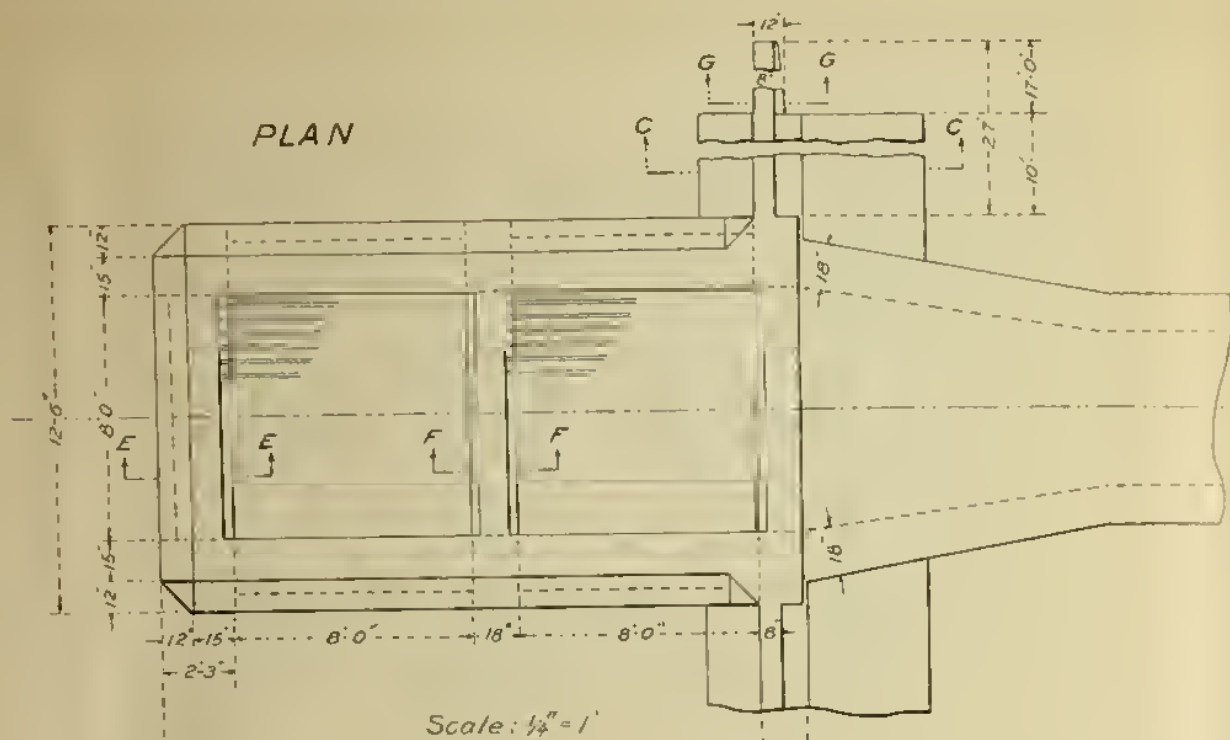
Direction of Flow

TOP PLAN of OPERATING MECHANISM

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT MONTANA
MC DONALD LAKE DAM
BUTTERFLY GATE ASSEMBLY

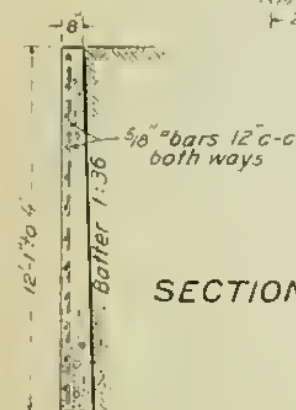
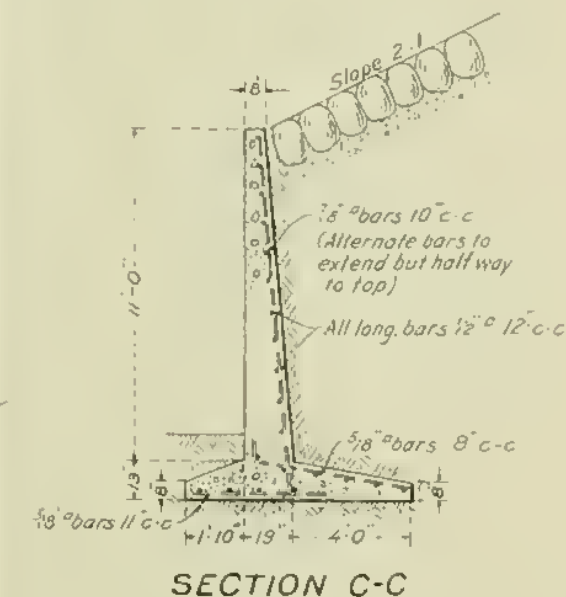
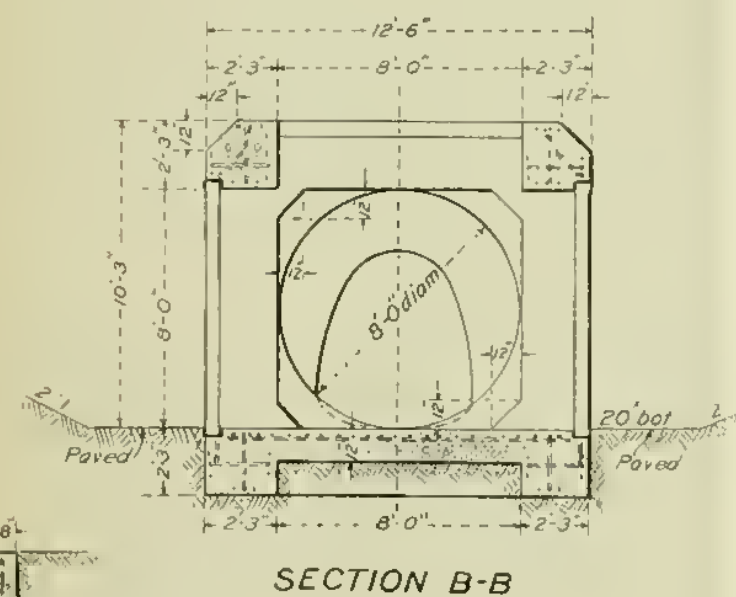
HORIZONTAL SECTION on ϕ

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT MONTANA
MC DONALD LAKE DAM
BUTTERFLY GATE ASSEMBLY
NO 20426 PLATE 86 OF 88
1923



Quantities

Concrete	55 cy.
1" bars	5000 lbs
5/8"	600
3/8"	2300
1/2"	800

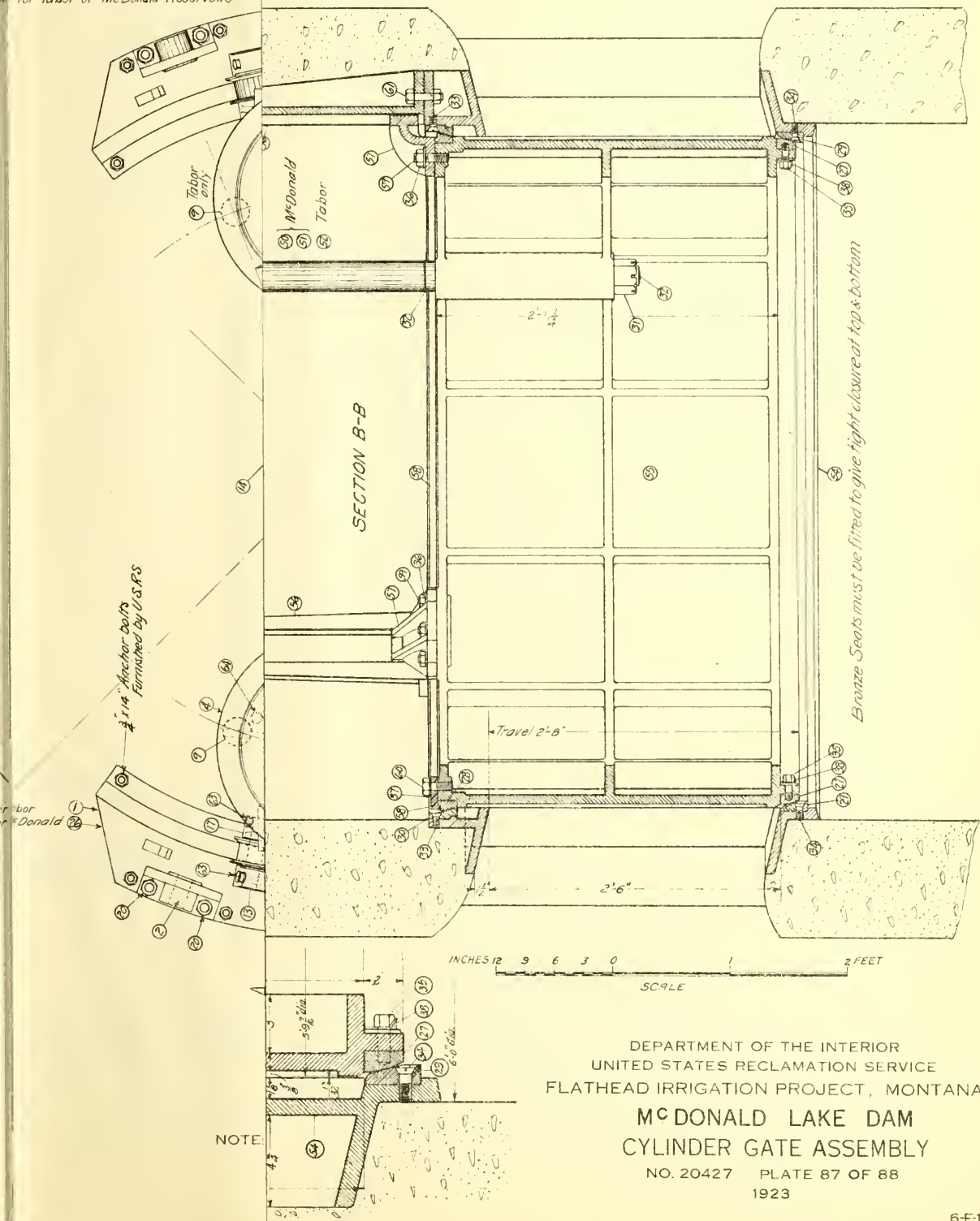


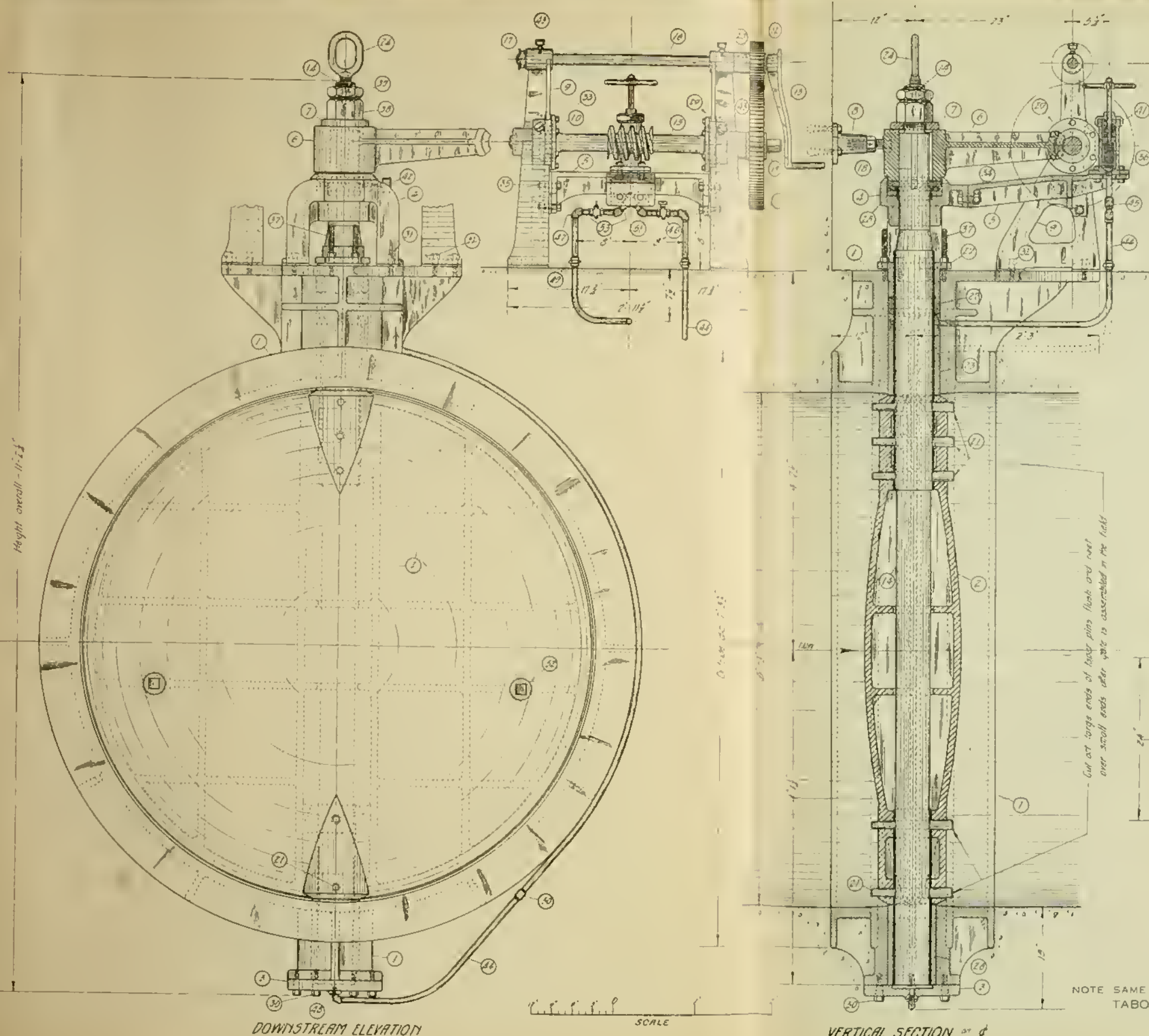
NOTE: SAME DESIGN USED FOR
TABOR DAM

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT, MONTANA
Mc DONALD LAKE DAM
TRASH RACK STRUCTURE
NO 20425 PLATE 85 OF 88
1923

BILL OF MATERIAL REQUIRED FOR TABOR RESERVOIR				MATERIAL REQUIRED FOR McDONALD RESERVOIR					
Mark	No. Req.	Material	Name	Remarks	Mark	No. Req.	Material	Name	Remarks
1	2 or 2	Cast Iron	Bed Plate	Hoisting Mechanism With Bed Plate (1) and 6 Taper Pin Bearings (2)	1	1		Hoisting Mechanism	With Bed Plate (1) and 4 Taper Pin Bearings (2)
2	6 or 4	"	Taper Pin Bearings	"	2	2		Gate	"
3	2	Phosphor Bronze	Lifting Nuts	"	4	4	Cast Iron	Single Stem Guide Base	Drwg 14-E-221
4	2	Cast Iron	Bevel Gears	"	8	20	"	Double	"
5	4	"	Pinions	"	20	20	"	Stem Guide	"
6	1	C.R. Shafting	Pinion Shaft	"	20	20	"	Stem Guide Anchor	"
7	2	"	Crank Shaft	"	80	80	Steel	Cap Screws for (3)	"
8	2	Mild Steel	Clamps	"	80	80	"	Bolts and Nuts 1 1/2"	"
9	2	C.R. Shafting	Gate Stem	"	6	6	Steel Pipe	Gate Stem	"
10	2	Cast Iron	Gate Stem	"	4	4	"	"	"
11	4	"	Shaft Bearings	"	2	2	"	"	"
12	2	Hardened Steel	Ball Bearings	"	2	2	"	"	"
13	2	Cast Iron	Wheel Car	"	41 bi-	41 bi-	Cast Iron	Stem Flange	"
14	2	Steel	Top Beam	"	56	56	Steel	Bolts and Nuts 1 1/2"	"

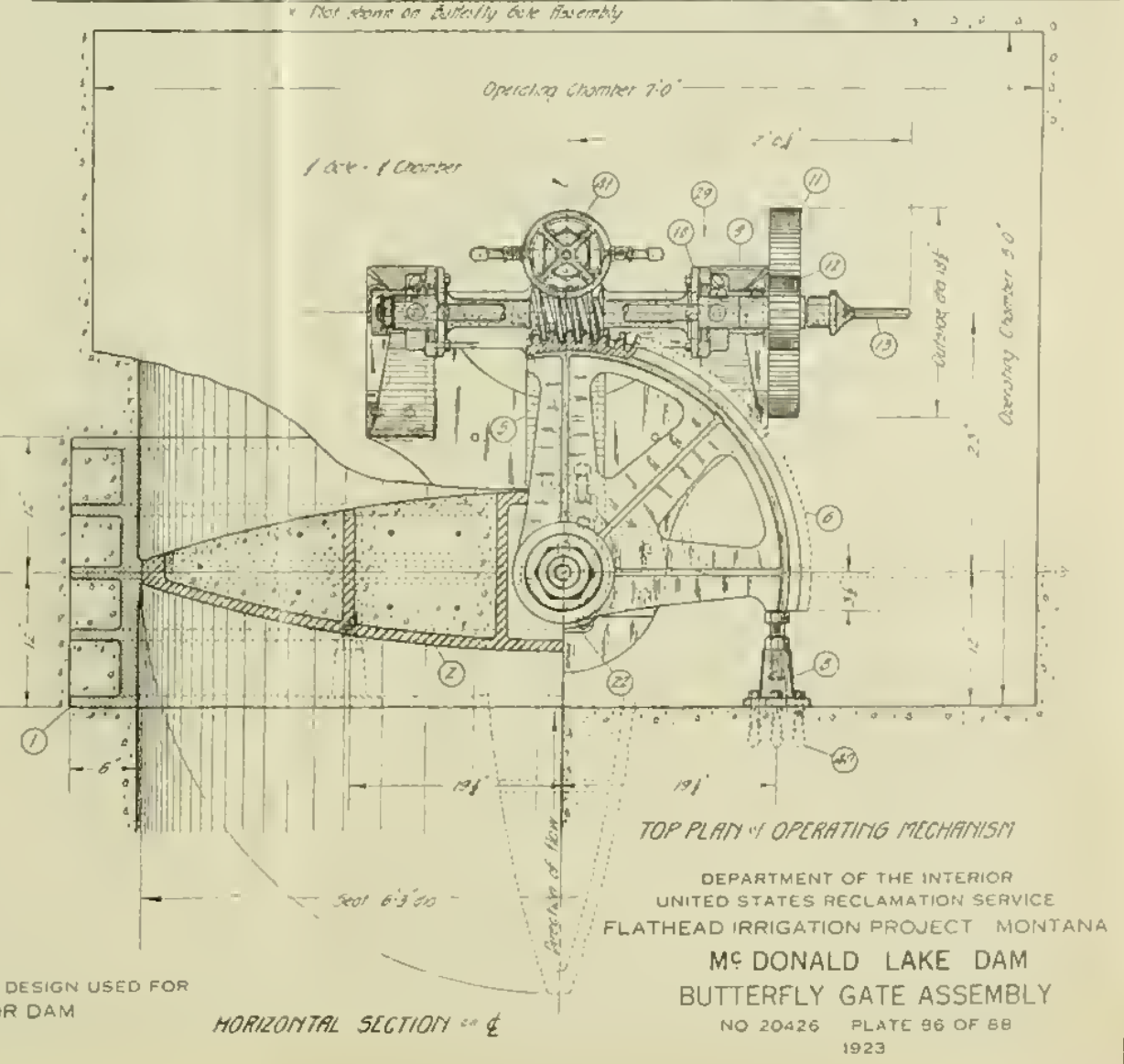
Percent quantities indicate number
for Tabor or McDonald Reservoirs

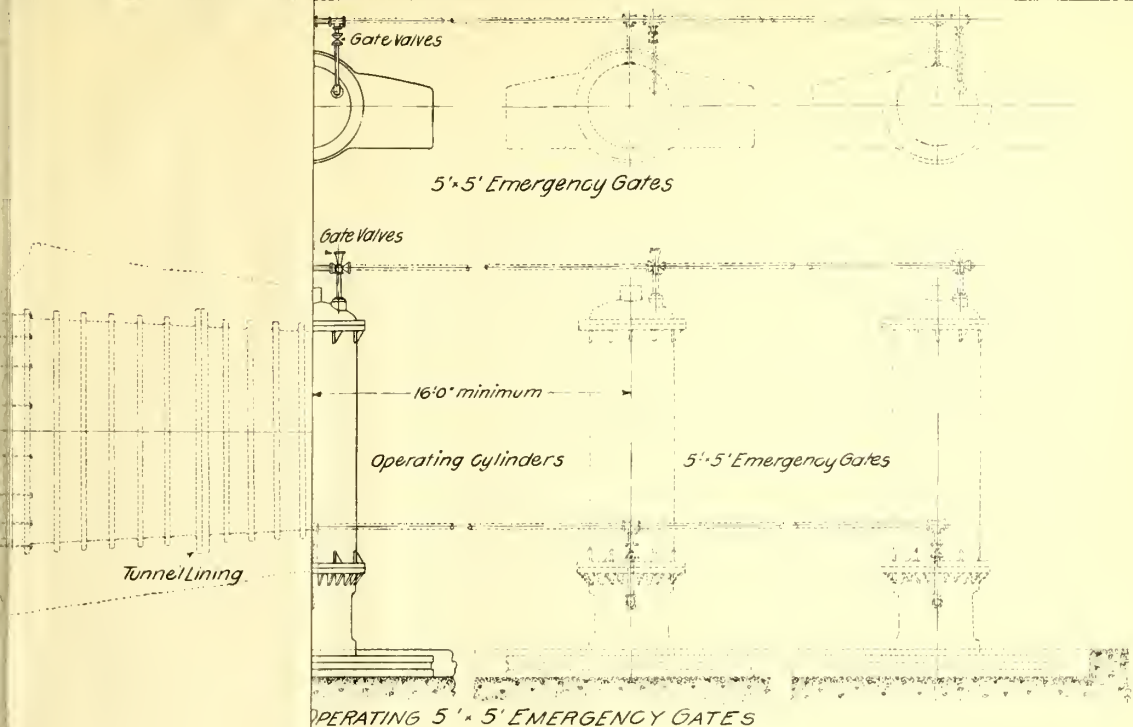




BILL OF MATERIAL FOR ONE GATE - TWO WANTED

Symbol	Qty	Req.	Material	Name	Qty	Req.	Material	Name	Qty	Req.
1	1	Cast Iron	Gate Cone	14E 215	27	1/2 in. P.	3/4" square Cast Iron Flange	14E 215	27	1/2 in. P.
2	1	Cast Steel	Gate Leaf	14E 215	28	1	Small Brass Pin	14E 215	28	1
3	1	Cast Iron	Bottom Cover Plate	14E 215	29	2	1/2 in. P. Cap Screws	14E 215	29	2
4	1	Cast Iron	Gate Shaft	14E 215	30	6	1/2 in. P. Cap Screws	14E 215	30	6
5	1	Cast Iron	Yoke	14E 215	31	2	1/2 in. P. Cap Screws	14E 215	31	2
6	1	Cast Steel	Worm Wheel Sector	14E 215	32	8	1/2 in. P. Cap Screws	14E 215	32	8
7	1	Cast Steel	Washer	14E 215	33	12	1/2 in. P. Cap Screws	14E 215	33	12
8	2	Cast Iron	Stop for Sector Complete with Bolt & Nut	14E 215	34	2	1/2 in. P. Cap Screws	14E 215	34	2
9	1/8 in. P.	Brass	Brackets	14E 215	35	6	1/2 in. P. Cap Screws	14E 215	35	6
10	2	Cast Iron	Gears & Ball Bearing 1 1/2"	14E 215	36	4	1/2 in. P. Cap Screws	14E 215	36	4
11	1	Cast Iron	Screw Cap with set screw	14E 215	37	2	1/2 in. P. Cap Screws	14E 215	37	2
12	1	Cast Iron	Pinion with set screw	14E 215	38	1	1/2 in. P. Cap Screws	14E 215	38	1
13	3	Cast Steel	Hand Latch	14E 215	39	1	1/2 in. P. Cap Screws	14E 215	39	1
14	1	Cast Steel	Shut the Gate with Pinion & Screw	14E 215	40	6	1/2 in. P. Cap Screws	14E 215	40	6
15	1	Cast Steel	Worm	14E 215	41	1	1/2 in. P. Cap Screws	14E 215	41	1
16	1	Cast Steel	Pinion	14E 215	42	1	1/2 in. P. Cap Screws	14E 215	42	1
17	1	Cast Iron	Safety Latch with Set Screw 1 1/2"	14E 215	43	2	1/2 in. P. Cap Screws	14E 215	43	2
18	2	Cast Steel	Key for Gate Shaft 3/4" x 1 1/2"	14E 215	44	2	1/2 in. P. Cap Screws	14E 215	44	2
19	1	Cast Steel	Worm 3/4" x 1 1/2"	14E 215	45	1	1/2 in. P. Cap Screws	14E 215	45	1
20	1	Cast Steel	Pinion 3/4" x 1 1/2"	14E 215	46	2	1/2 in. P. Cap Screws	14E 215	46	2
21	5	Cast Steel	Top of Gate	14E 215	47	2	1/2 in. P. Cap Screws	14E 215	47	2
22	1	Cast Steel	Shutting Gear	14E 215	48	1	1/2 in. P. Cap Screws	14E 215	48	1
23	1	Cast Steel	Top of Gate	14E 215	49	2	1/2 in. P. Cap Screws	14E 215	49	2
24	1	Cast Steel	Eye Bolt 1 1/2"	14E 215	50	4	1/2 in. P. Cap Screws	14E 215	50	4
25	1	Cast Steel	10" Bypass Complete	14E 215	51	2	1/2 in. P. Cap Screws	14E 215	51	2
26	1	Cast Steel	Shutting Gear	14E 215	52	2	1/2 in. P. Cap Screws	14E 215	52	2
					53	4	1/2 in. P. Cap Screws	14E 215	53	4

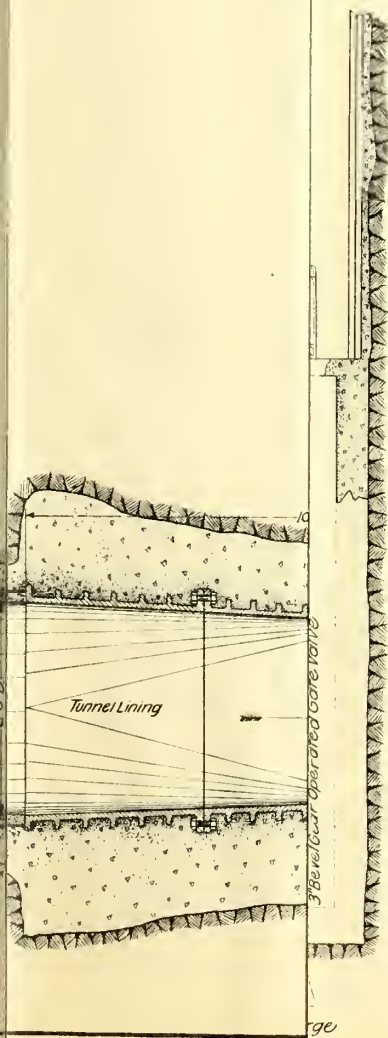




HYDRAULIC DATA

Maximum Head on Gate, 170ft.

Maximum Capacity 1000 cubic feet per second



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
TYPICAL BALANCED NEEDLE VALVE
INSTALLATION

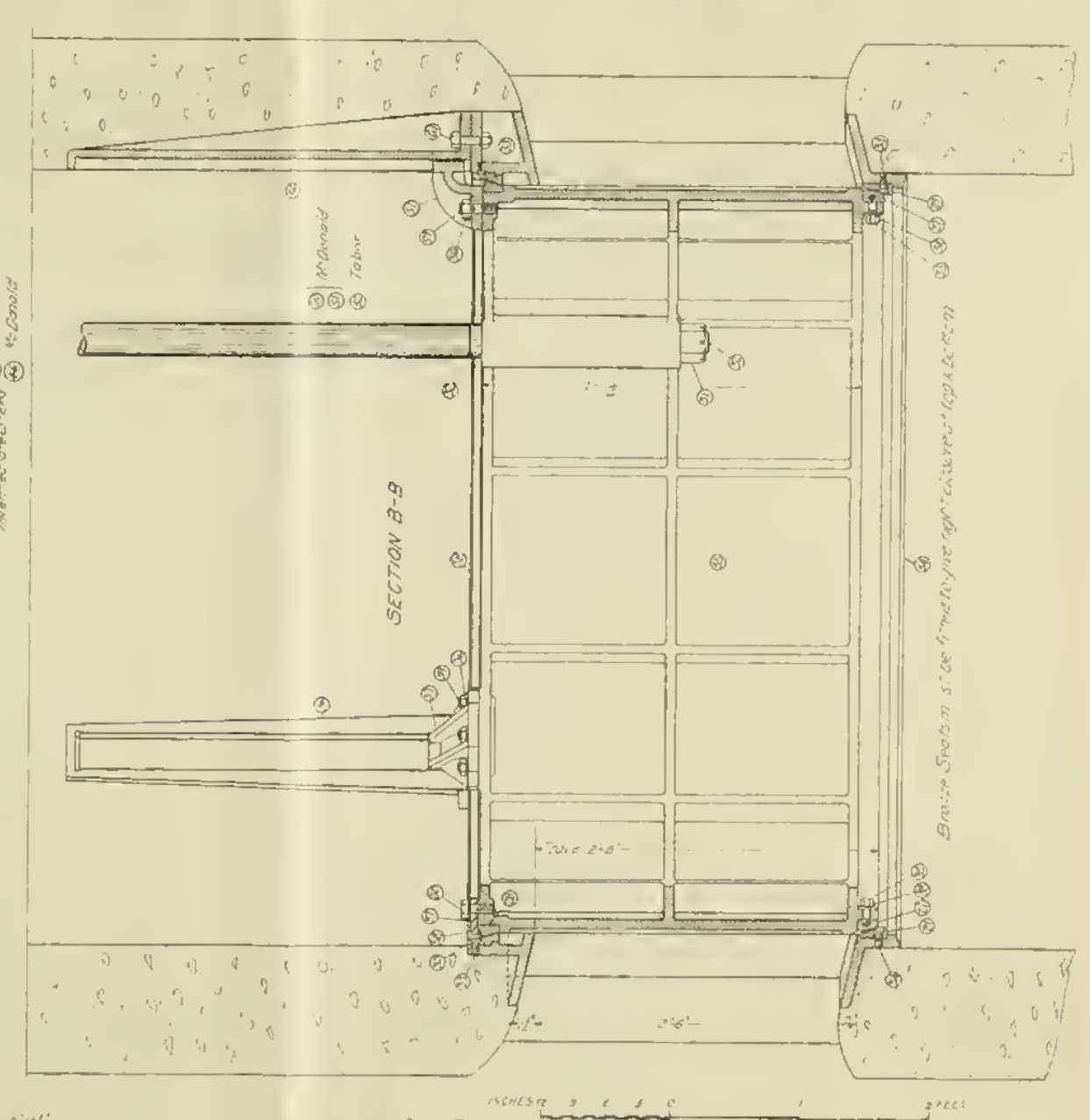
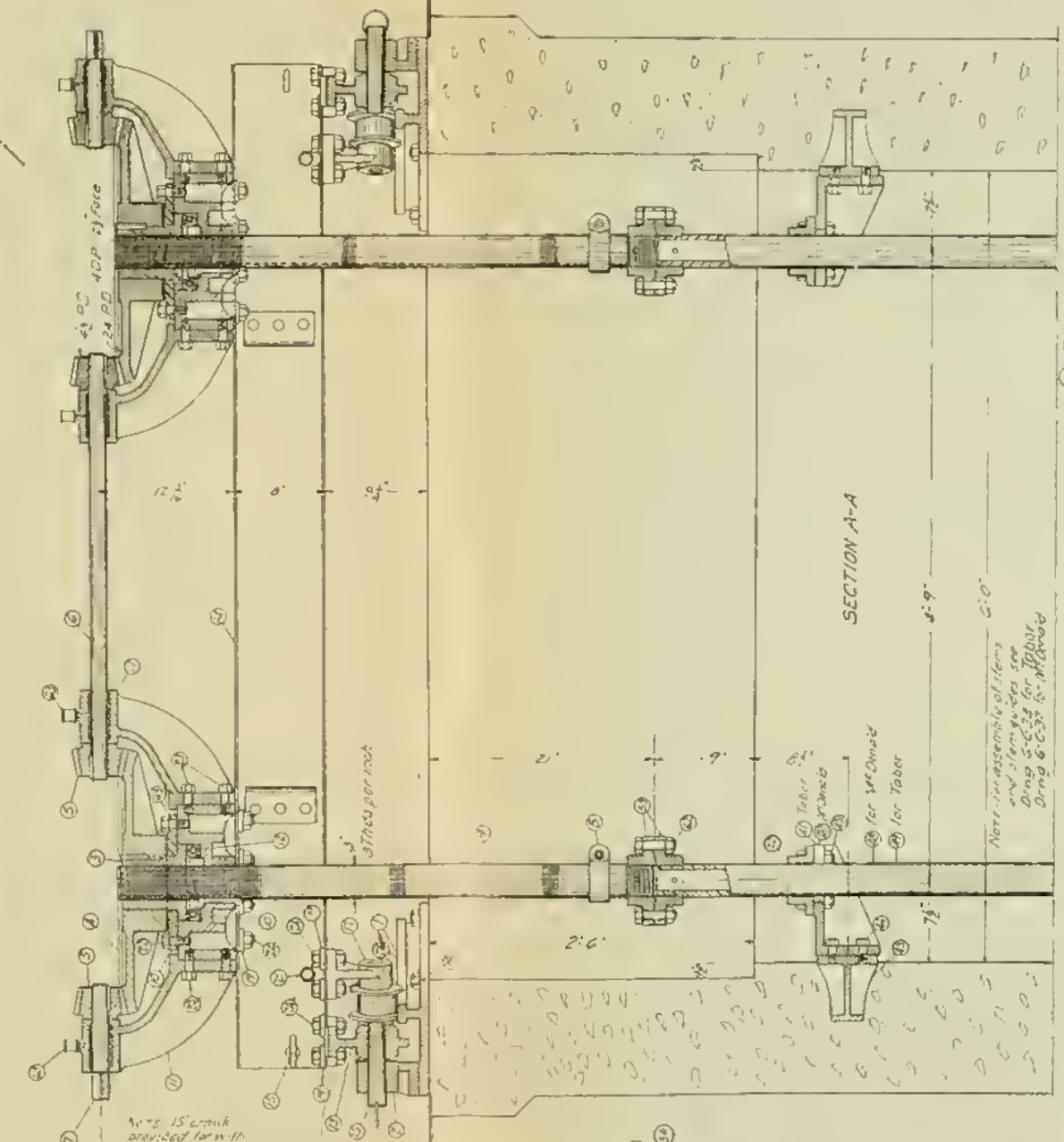
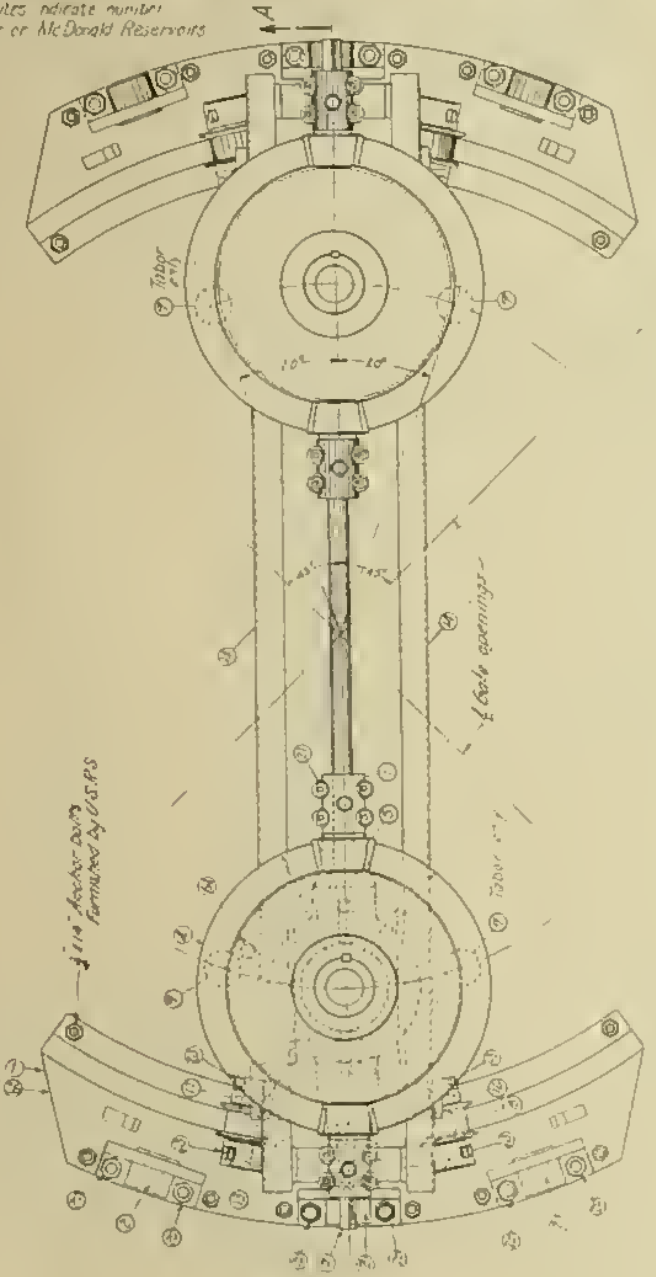
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BILL OF MATERIAL FOR ONE HOISTING MECHANISM									
Mark	No. Pcs	Material	Name	Remarks	Mark	No. Pcs	Material	Name	Remarks
1	2	Cast Iron	Bed Plate	Drwg 14-E-220	1	2	Steel	Upper Pinion Gear	
2	2	Cast Iron	Lower Pin Bearing		2	2	Cast Iron	Wheel Bearing	
3	2	Phosphor Bronze	Lifting Nuts		3	2	Steel	Wheels	
4	2	Cast Iron	Seal Gears		4	2	Steel	Barrel Washers	
5	2	CR Shafting	Pinions		5	2	Steel	Studs	
6	2	CR Shafting	Pinion Shaft		6	2	Steel	Bolt	
7	2	CR Shafting	Cranks		7	2	Steel	Cap Screws	
8	2	CR Shafting	Clamps		8	2	Steel	1/2 and Nuts	
9	2	CR Shafting	Gate Stems		9	2	Steel	Grease Cup Bolt	
10	2	Cast Iron	Gate Stands		10	2	Steel	Gate Stand Flange	
11	2	Cast Iron	Shaft Bearings		11	2	Steel		
12	2	Hardened Steel	Ball Bearings		12	2	Steel		
13	2	Cast Iron	Wheel Carriages		13	2	Steel		
14	2	Steel	Top Beams		14	2	Steel		

BILL OF MATERIAL FOR ONE GATE									
Mark	No. Pcs	Material	Name	Remarks	Mark	No. Pcs	Material	Name	Remarks
1	1	Mang. Bronze	Seat Ring	Drwg 14-E-221	1	1	Brass	Lock Washer	Drwg 14-E-222
2	1	Steel	Gate Lifting		2	1	Cast Iron	Gate Lifting	Drwg 14-E-222
3	1	Steel	Gate Cylinder		3	1	Steel	Gate Guide	
4	1	Steel	Gate Guide		4	1	Steel	Clamping Ring	
5	1	Steel	Clamping Ring		5	1	Steel	Stud	
6	1	Steel	Cap Screw		6	1	Steel	Cap Screw	
7	1	Steel	Lock Washer		7	1	Steel	Bolt and Nut	

BILL OF MATERIAL FOR ONE GATE									
Mark	No. Pcs	Material	Name	Remarks	Mark	No. Pcs	Material	Name	Remarks
1	1	Steel	Gate Lifting		1	1	Steel	Gate Lifting	
2	1	Steel	Gate Cylinder		2	1	Steel	Gate Guide	
3	1	Steel	Gate Guide		3	1	Steel	Clamping Ring	
4	1	Steel	Clamping Ring		4	1	Steel	Stud	
5	1	Steel	Cap Screw		5	1	Steel	Cap Screw	
6	1	Steel	Lock Washer		6	1	Steel	Bolt and Nut	

The different quantities indicate number required for Tabor or McDonald Reservoirs



NOTE: SAME DESIGN USED FOR TABOR DAM

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
FLATHEAD IRRIGATION PROJECT, MONTANA
MCDONALD LAKE DAM
CYLINDER GATE ASSEMBLY
NO 20427 PLATE 87 OF 88
1923



