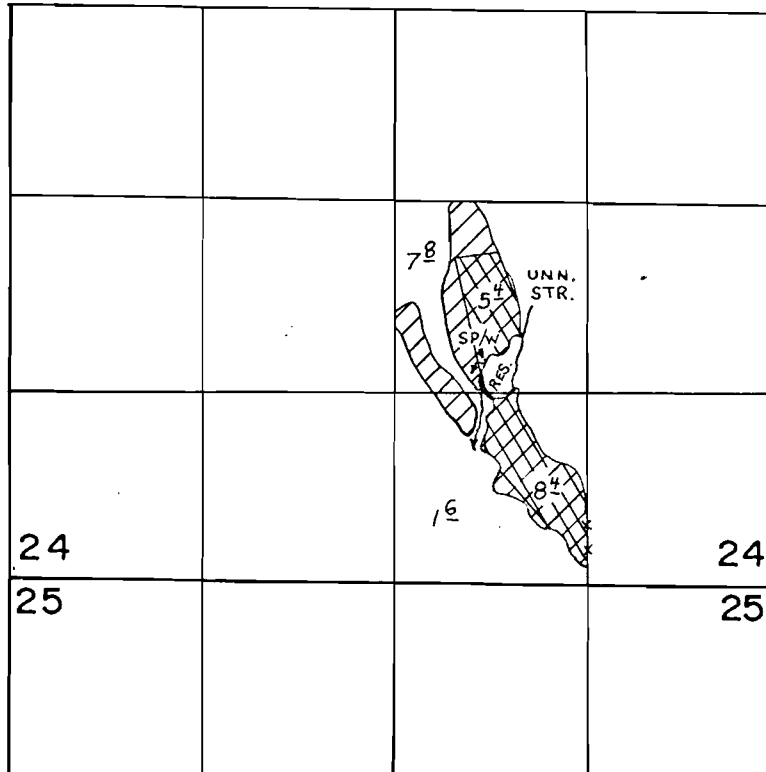


T.2N.R.5W.W.M.



DIV. LOC. - 1330' N. & 2000' W. FROM S.E. COR. SEC. 24

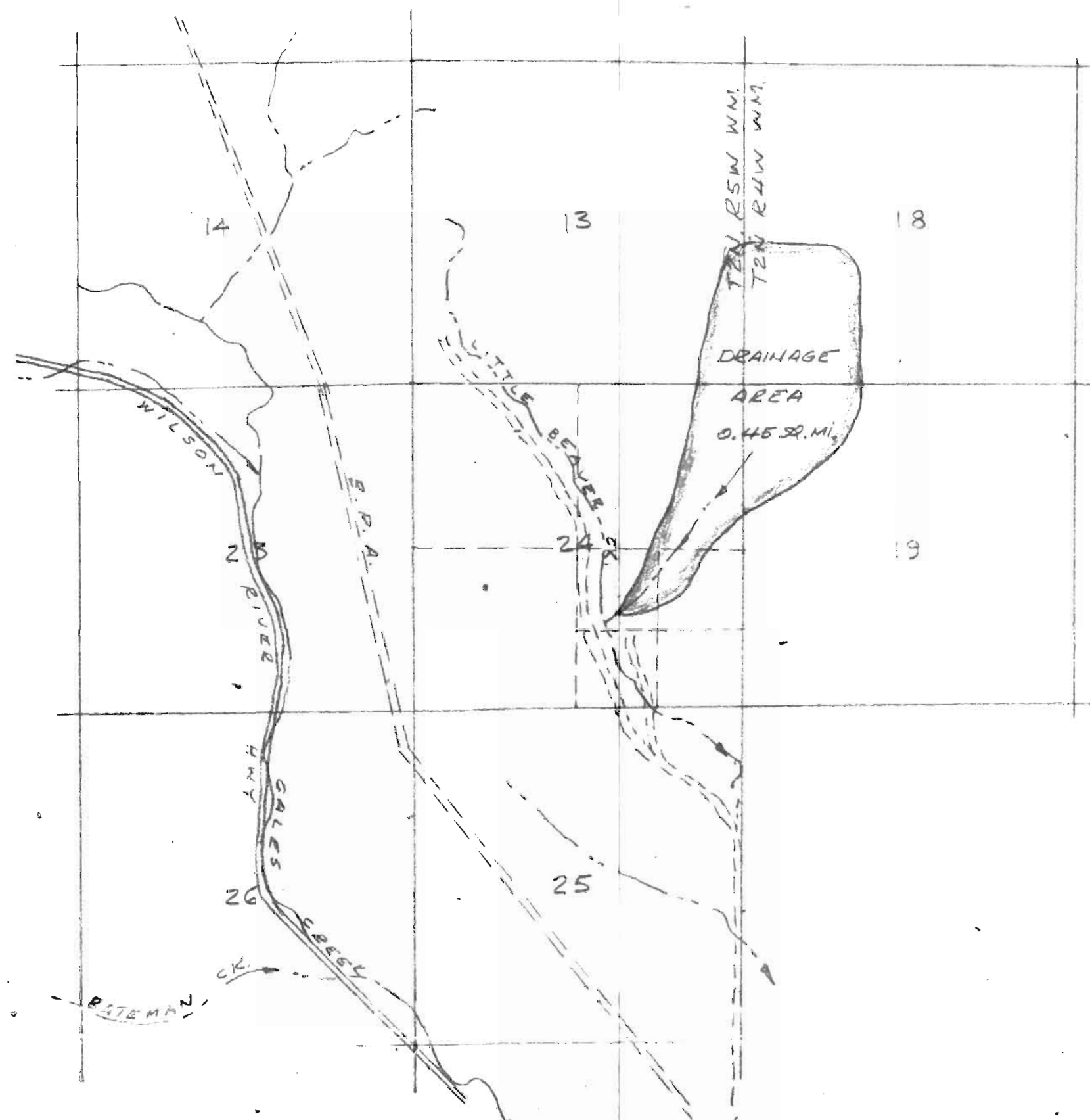
-  - PRIMARY
-  - SUPPLEMENTAL TO CERT. 29219

FINAL PROOF SURVEY UNDER

R-49516 R-5831
 Application No. 49517 Permit No. 36050

IN NAME OF
MELVIN B. HOWELL

Surveyed May 20 1976, by R. G. Mucken

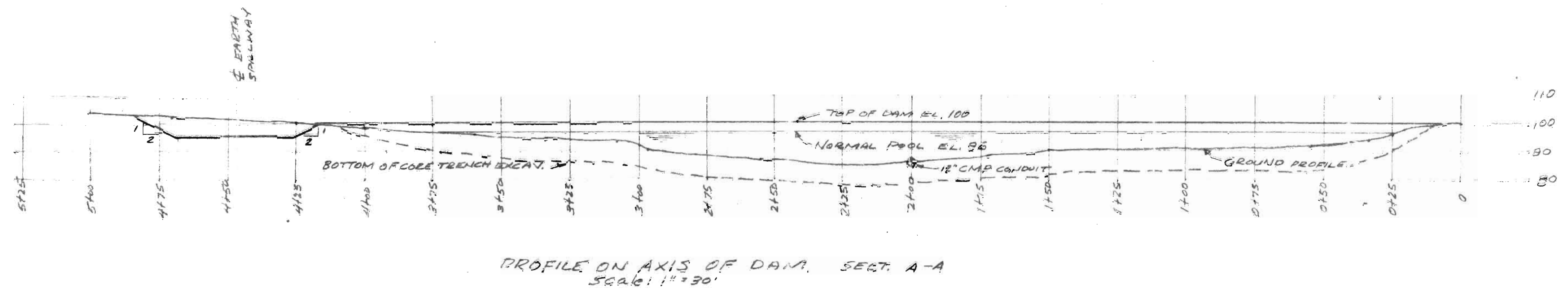


DRAINAGE AREA = 0.45 SQ. MI.
 PEAK FLOW (100 YR) = 202 CFS.
 SPILLWAY:
 $S_0 = 0.007$ ft./ft.
 $V_p = 7.0$ ft./sec.
 $L = 80$ ft.
 $d_c = 0.97$ ft.
 $b = 43$ ft.
 $V_c = 5.2$ ft./sec.
 $S_c = 0.025$ ft./ft.
 $4p = 1.65$ ft.
 $d_o = 0.63$ ft.

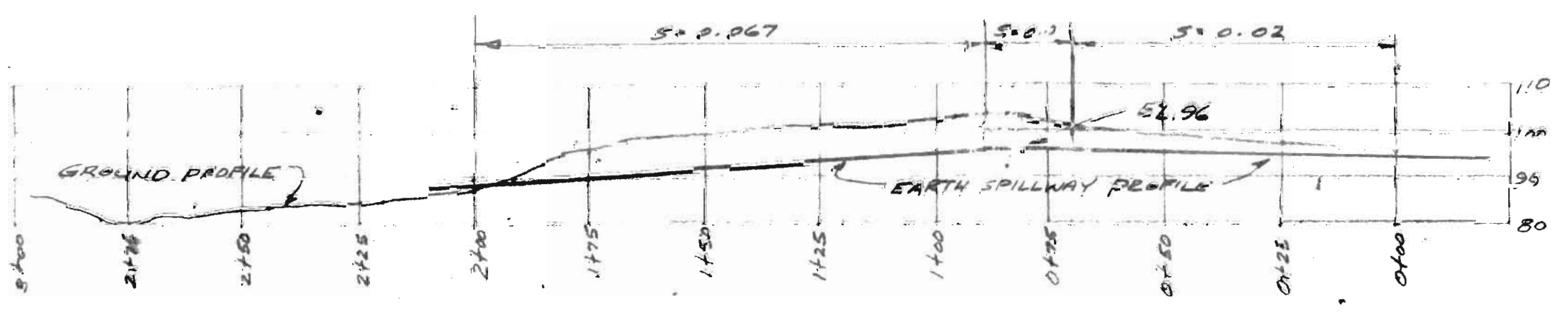
RESERVOIR AREA-CAPACITY

ELEV.	AREA (AC.)	STORAGE (AC.-FT.)
90	0.06	0
92	0.20	0.51
94	0.49	1.20
96	1.04	2.73

DRAINAGE AREA & VICINITY MAP
T2N R5W, W.M. WASHINGTON CO.
1" = 2000'

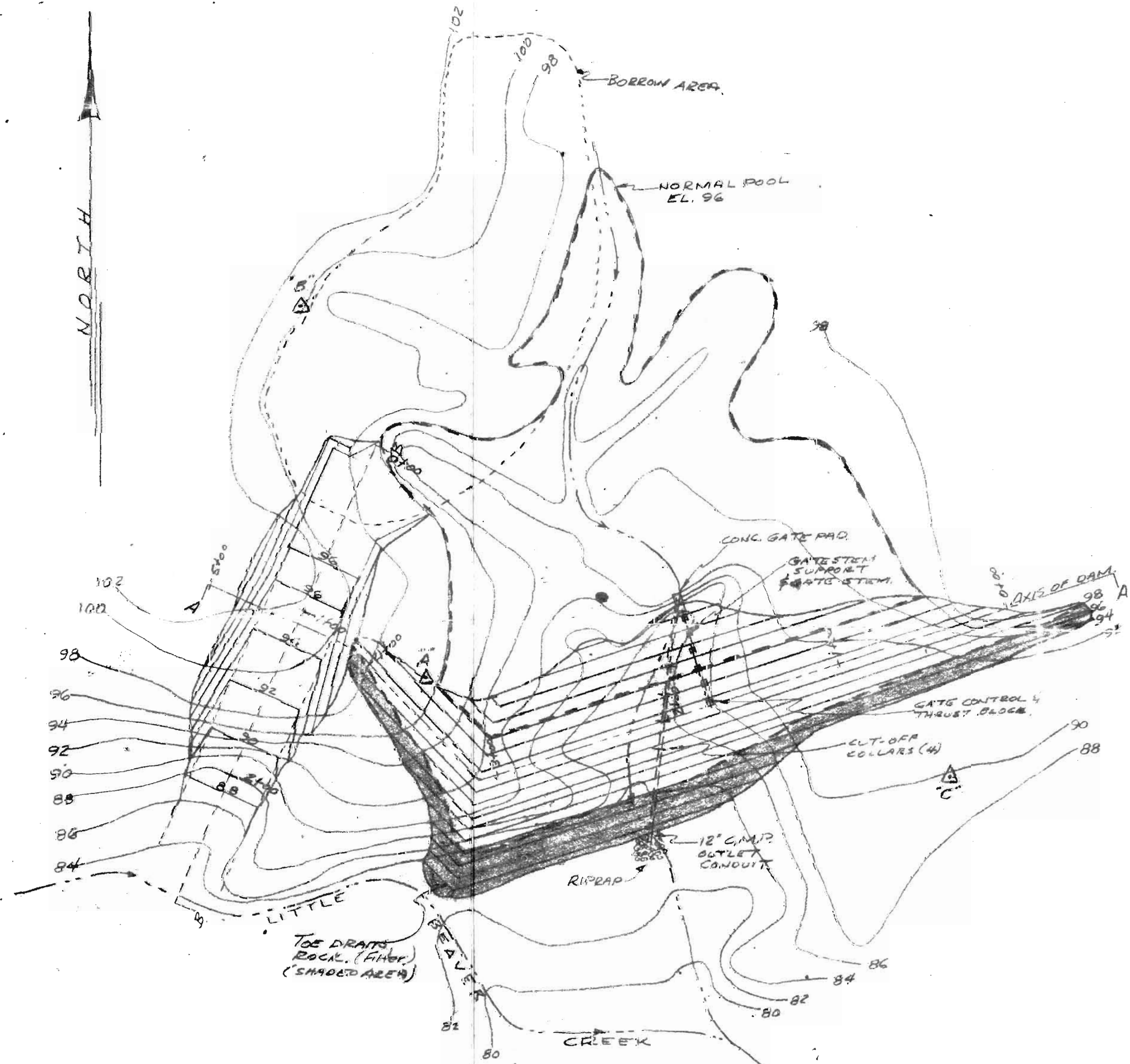


PROFILE ON AXIS OF DAM, SECT. A-A
SCALE: 1" = 30'

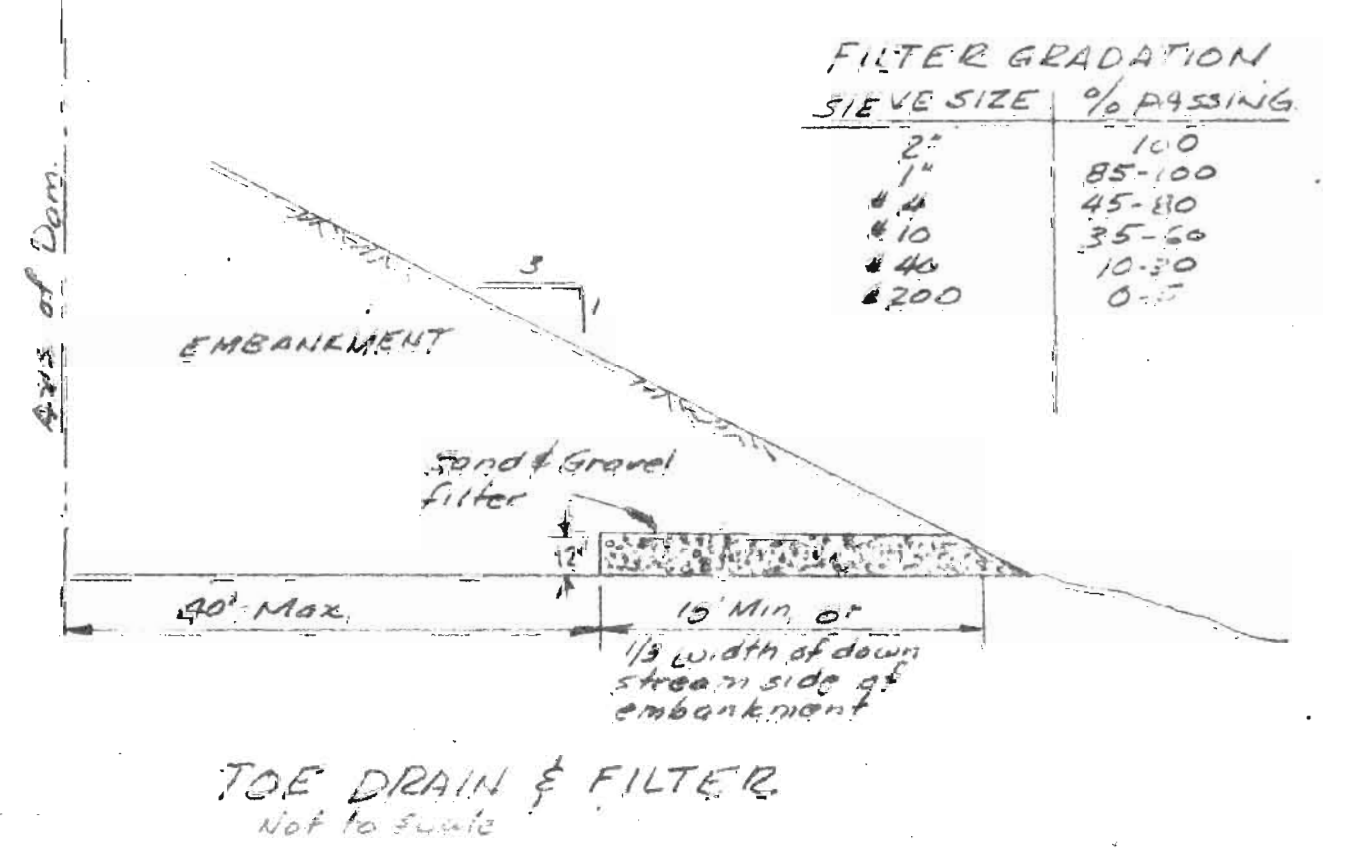


SPILLWAY PROFILE
Scale: 1" = 30'

RECEIVED
 STATE ENGINEER
 SALEM OREGON



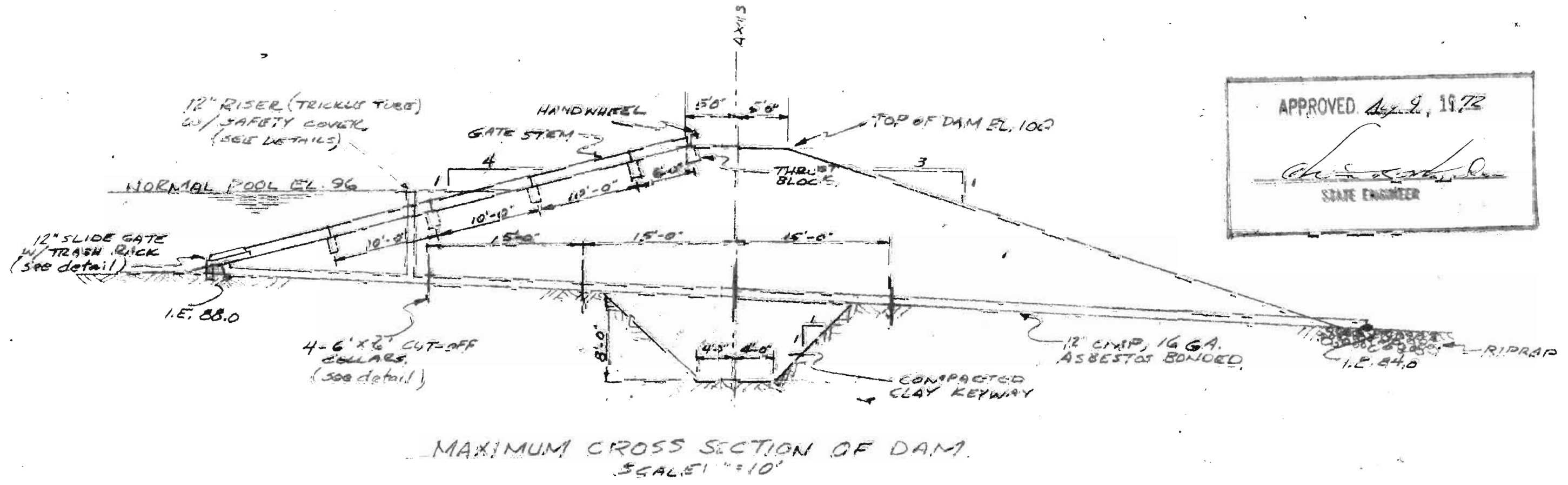
RESERVOIR & DAM SITE
IN SE 1/4 SECTION 24, T2N, R5W, W.M.
SCALE: 1" = 50' ASSUMED DATUM.



FILTER GRADATION

SIEVE SIZE	% PASSING
2"	100
1"	85-100
3/4"	45-110
4/10"	35-50
4/40"	10-30
4/200"	0-5

TOE DRAIN & FILTER
Not to scale



MAXIMUM CROSS SECTION OF DAM
SCALE: 1" = 10'

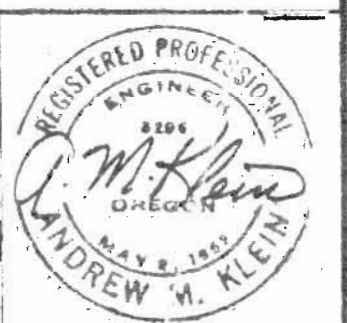
APPROVED *[Signature]* 2, 1972
 STATE ENGINEER

STATE ENGINEER
 DO NOT LEND OUT

Application No. R-49514, 49517
 Permit No.

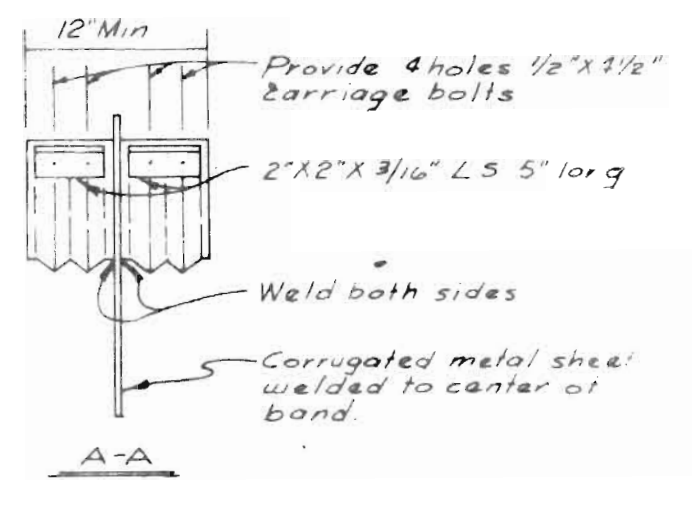
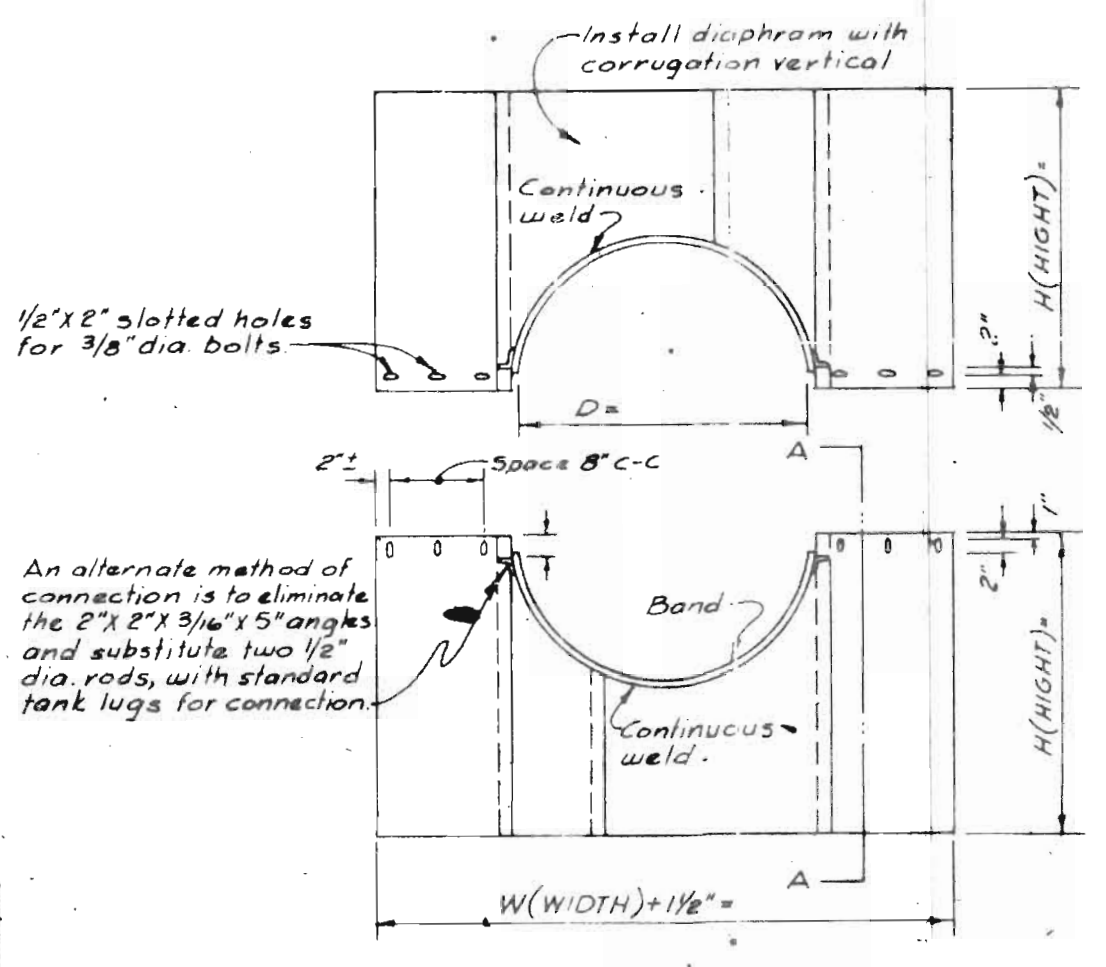
HOWELL DAM & RESERVOIR
 LAYOUT & DETAILS

h. a. mohr & ASSOCIATES
 CIVIL ENGINEERS
 140 N. THIRD AVENUE
 HILLSBORO, ORE. 97123



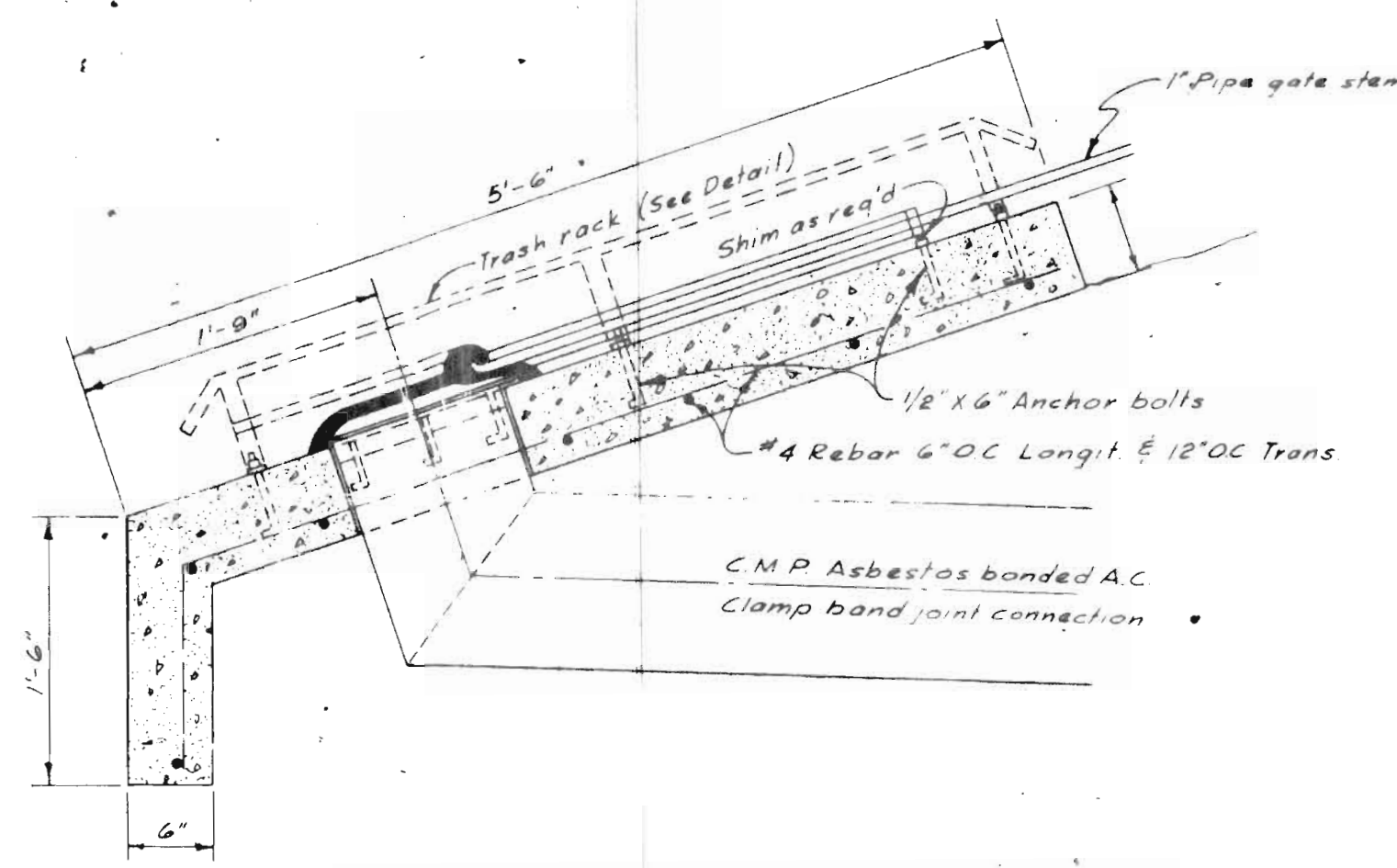
DSGN: AMK
 # 1664-72 July 1972

- NOTES:
1. All materials to be in accordance with construction material specifications.
 2. Unassembled diaphragms shall be marked by painting or tagging to identify matching pairs.
 3. The top between the two half sections and between the pipe and connecting band shall be caulked with asphalt mastic at time of installation.
 4. Welding may be substituted for rivets in fastening 2"x2"x3/16" L to pipe. Welds must be on each side of angles and on each corrugation ridge in contact with angles.
 5. D = outside diameter of W.S. pipe or nominal diameter of C.V. pipe.
 6. All corrugated metal pipe diaphragms shall be asphalt coated after shop fabrication has been performed.

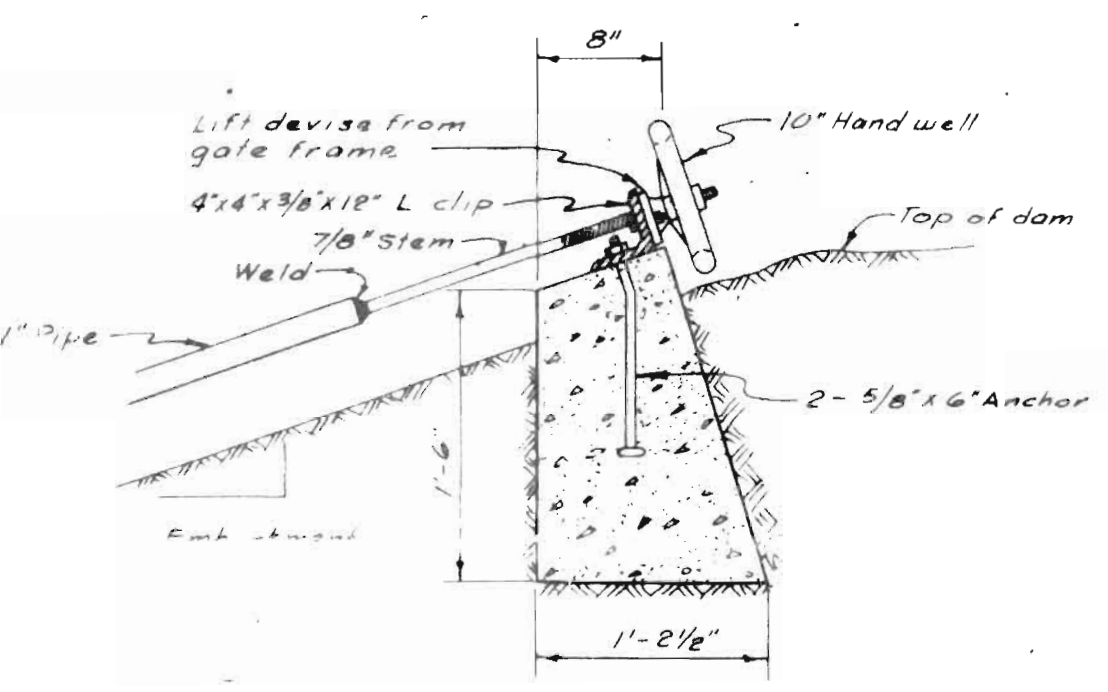


PIPE DIA	GAGE	GAGE	NOMINAL DIAPHRAGM SIZE	FABRICATION DIMENSIONS	
				W(WIDTH)	H(HEIGHT)
8	16	-	58 X 58	58 1/2	30 1/2
10	16	-	58 X 58	58 1/2	30 1/2
12	16	14	60 X 60	64	32 1/2
15	16	18	63 X 63	68	34
18	16	14	64 X 64	69 1/2	35 1/2
21	16	14	69 X 69	72	37
24	14	14	72 X 72	72	38 1/2
30	14	14	78 X 78	82 1/2	41 1/2
36	-	14	84 X 84	88	44 1/2
42	-	14	90 X 90	93	47 1/2
48	-	14	96 X 96	96	50 1/2
54	-	14	102 X 102	101 1/4	53 1/2

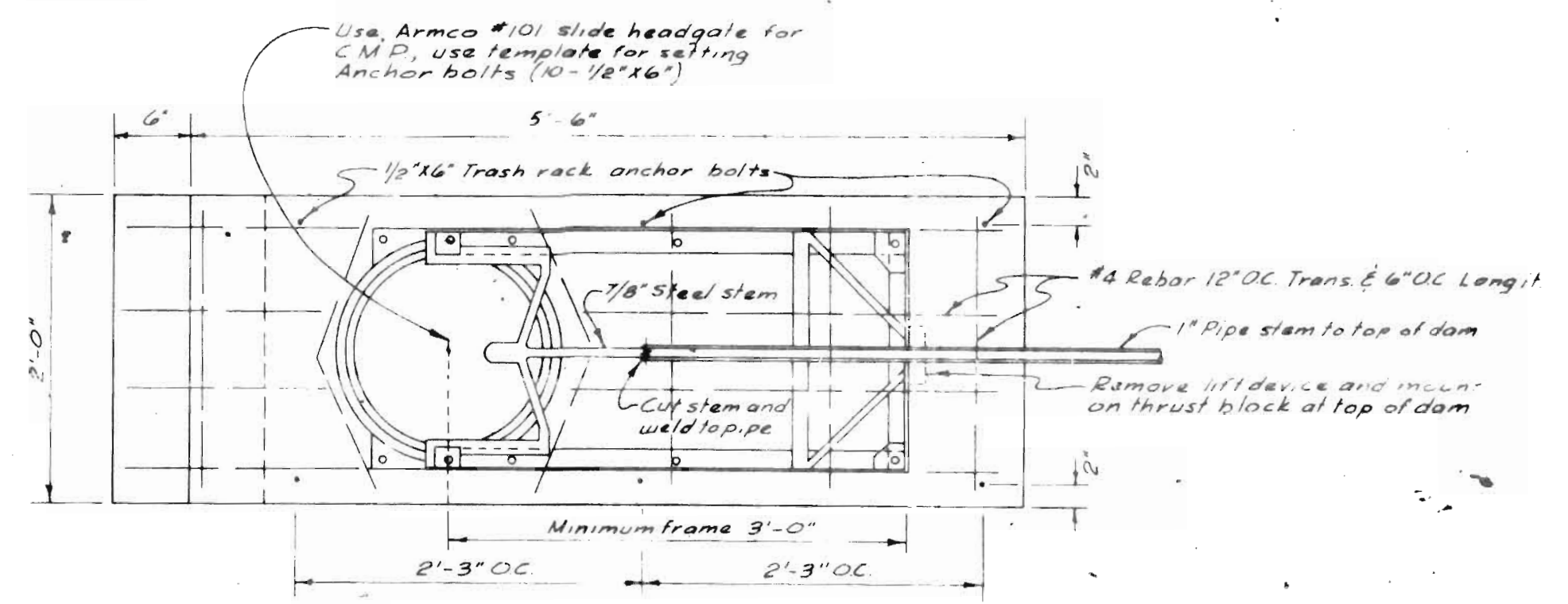
CORRUGATED METAL DIAPHRAGM ANTI-SEEP COLLAR



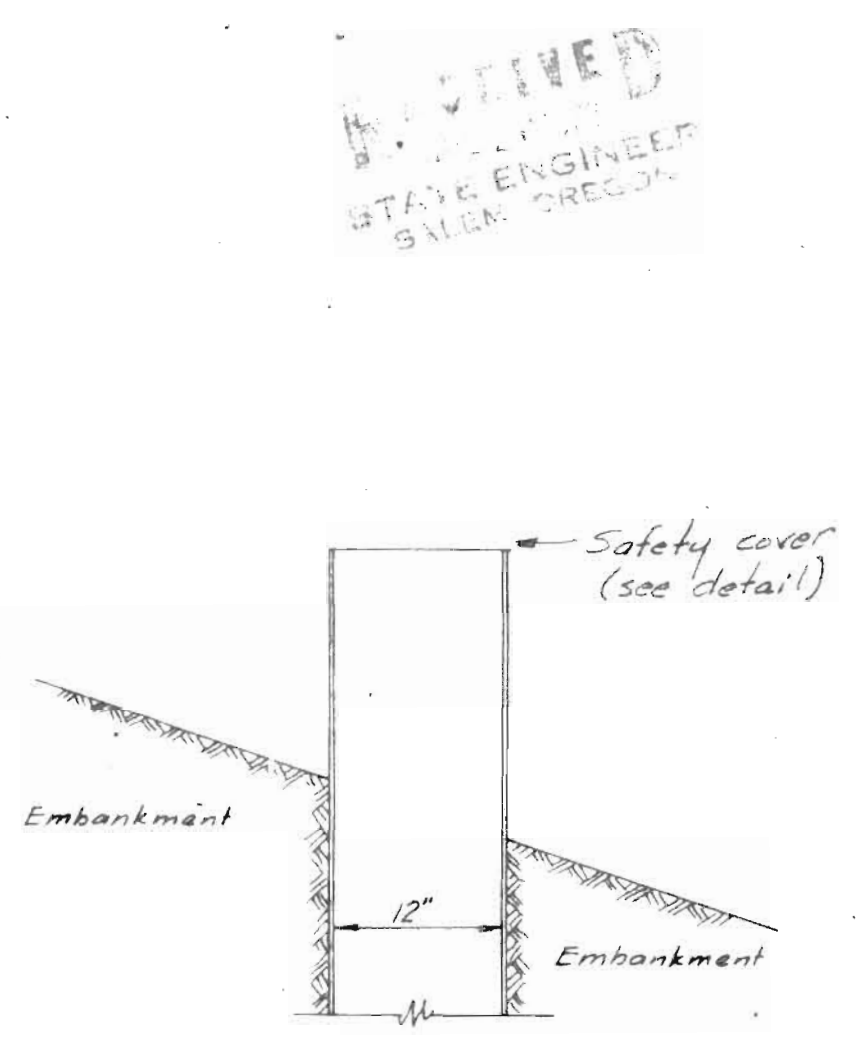
CONCRETE GATE PAD-SECTION VIEW



GATE CONTROL & THRUST BLOCK



CONCRETE GATE PAD-TOP VIEW

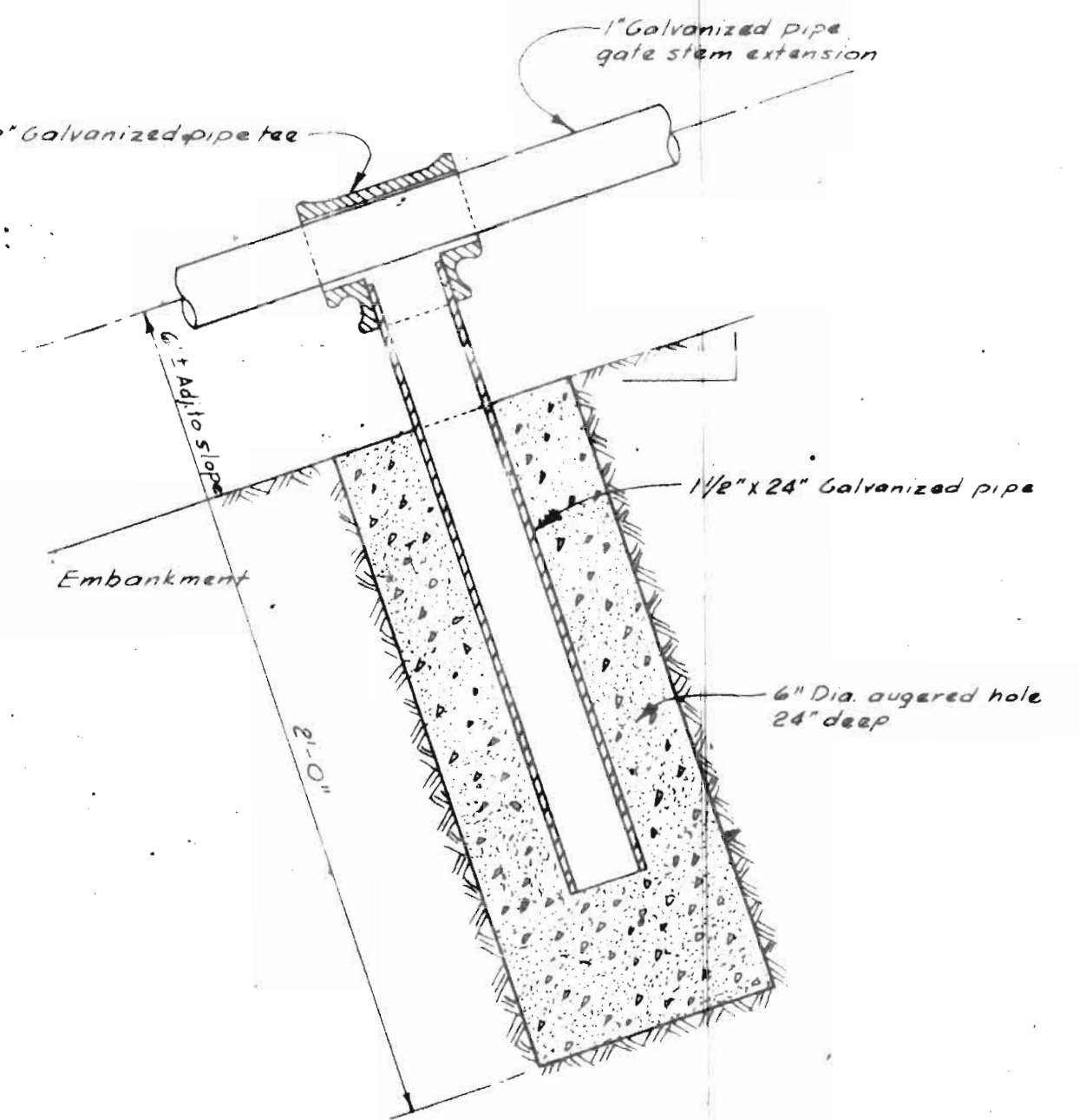


RISER DETAIL

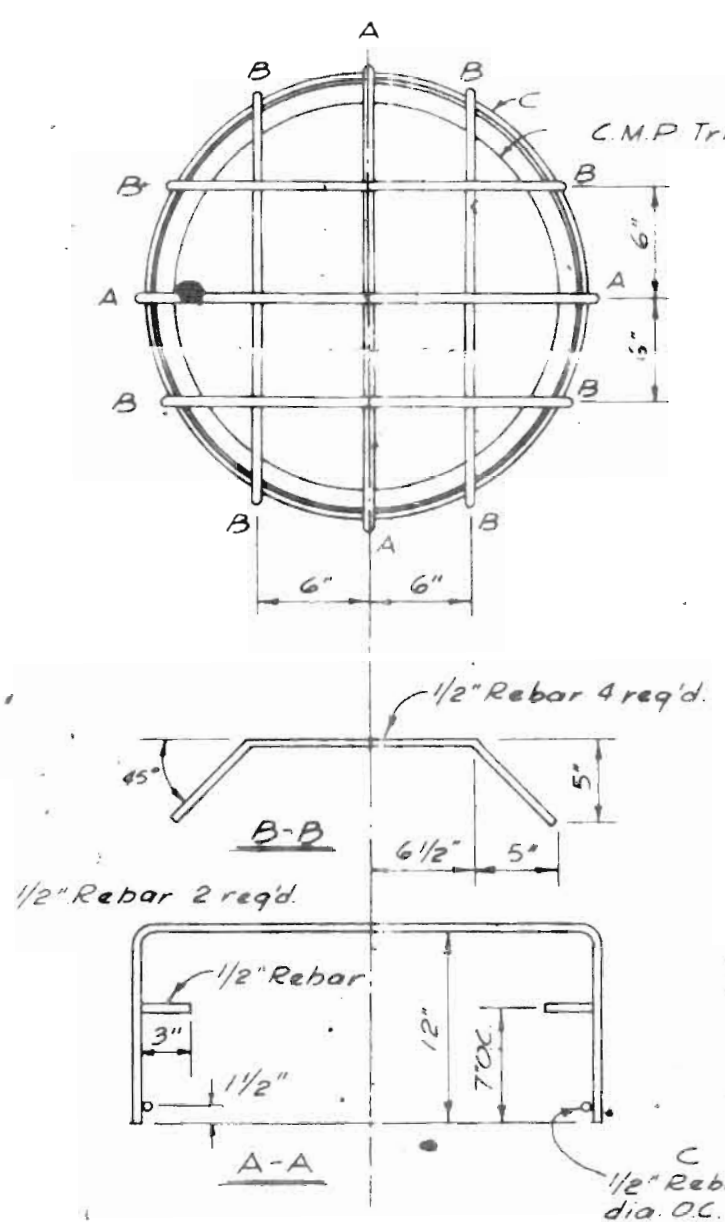
APPROVED, Aug. 9, 1922
Andrew M. Klein
 STATE ENGINEER

DO NOT SCALE UP

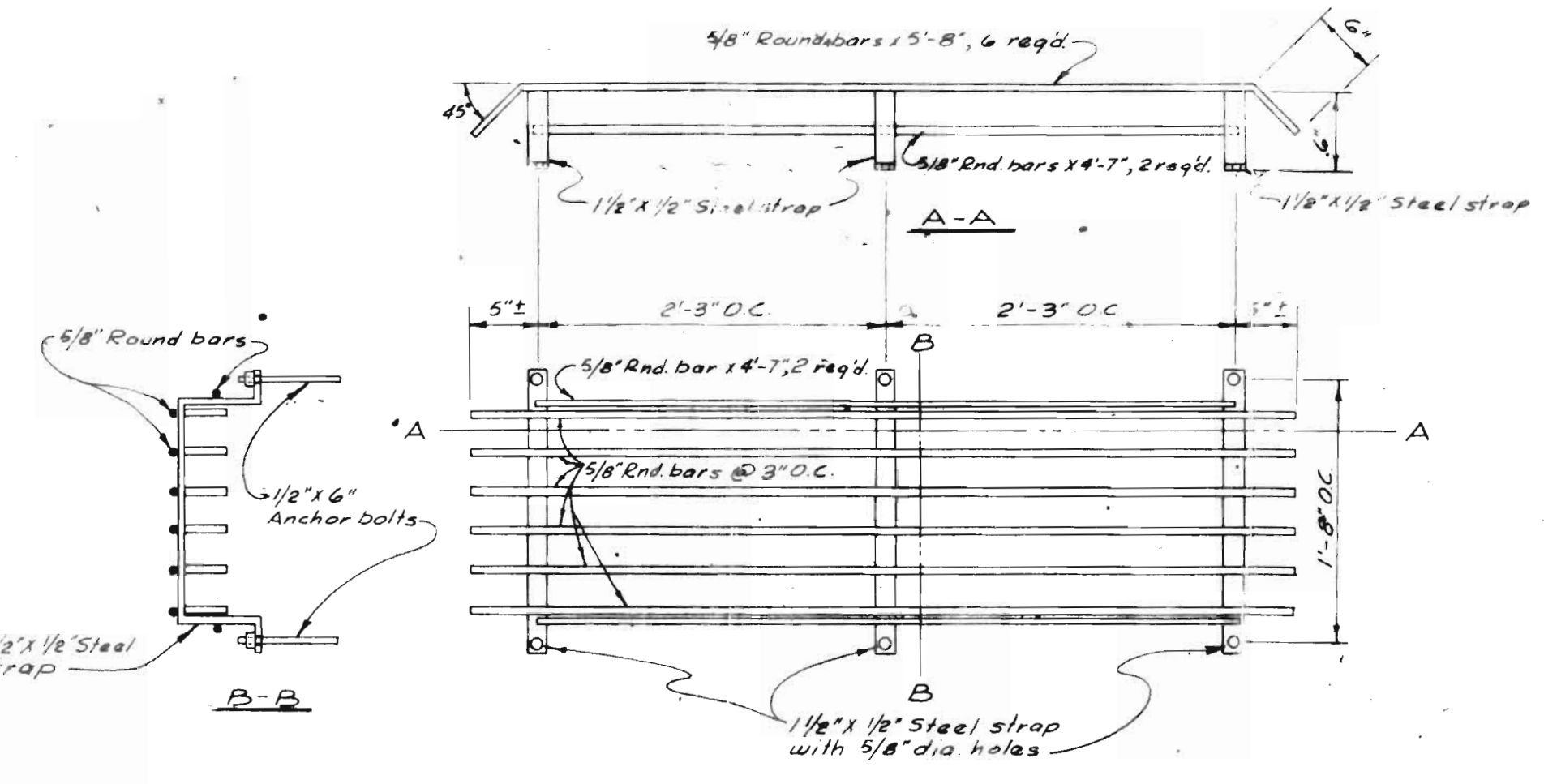
Note: Concrete cut off collar poured in place over C.M.P. conduit form in excavation trench. Tamp backfill after removal.



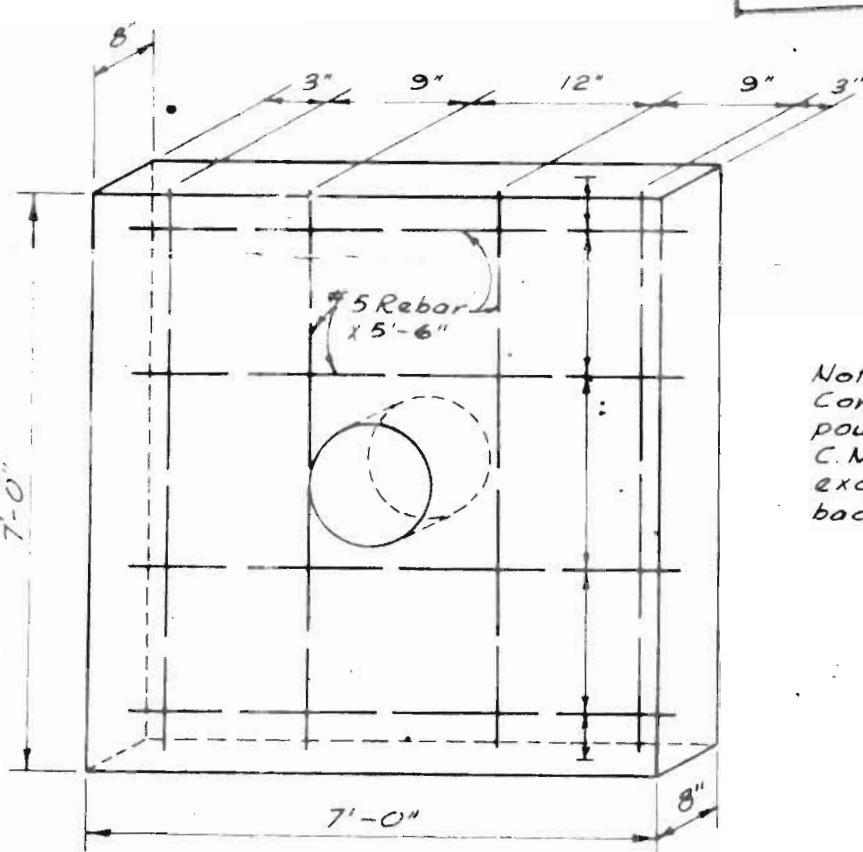
GATE STEM SUPPORT



SAFETY COVER



TRASH RACK



CONCRETE CUT-OFF COLLAR

Application No. R-49516, 49517
 Permit No.

DAM & RESERVOIR DETAILS
 HOWELL DAM & RESERVOIR

h. a. mahr & Associates
 Civil Engineers

REGISTERED PROFESSIONAL ENGINEER
 3399
Andrew M. Klein
 OREGON
 MAY 1, 1922
 ANDREW M. KLEIN

SCALE: NONE BY S.R.S. 2
 JOB NO. 166472 DSG: AMK 2