

GOVERNMENT OF MAHARASHTRA
PUBLIC WORKS DEPARTMENT



SUPPLEMENT
TO THE
P. W. D. HANDBOOK
PART II (Plates Nos. 1 to 37)

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1963

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P. W. D. HANDBOOK
(PART II—PLATES Nos. 1 to 37)



NAGPUR
GOVERNMENT PRESS
1963

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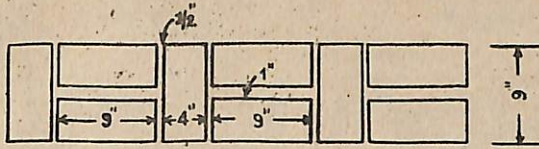


FIG. 1
FLEMISH BOND

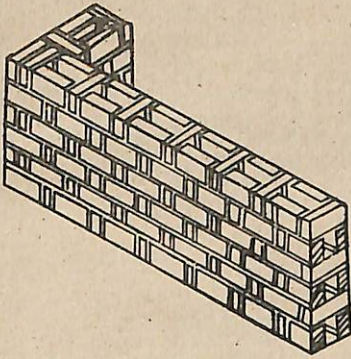


FIG. 2
ROLOK BOND

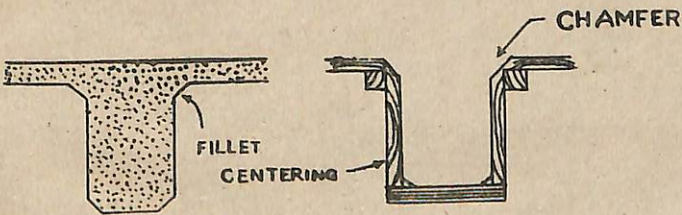


FIG. 3

FIG. 4

PLATE NO.2

THICK LINES SHOW /
DEFECTIVE JOINTS

DEFECTIVE

FOUR 3/4 SAICK

DEFECTIVA

34" DRUMS

TUBULAR

BETTER

PERFECT

PERFECT

Diagram showing a cross-section of a wall. The width is labeled as 1'-10 1/2". A horizontal crack is shown across the middle. Vertical reinforcement bars are shown on both sides of the crack.

DEFECTIVE

PERFECT

DEFECTIVE

SLIGHTLY
DEFECTIVE

DEFECTIVE
(TUBULAR)

PERFECT

DEFECTIVE

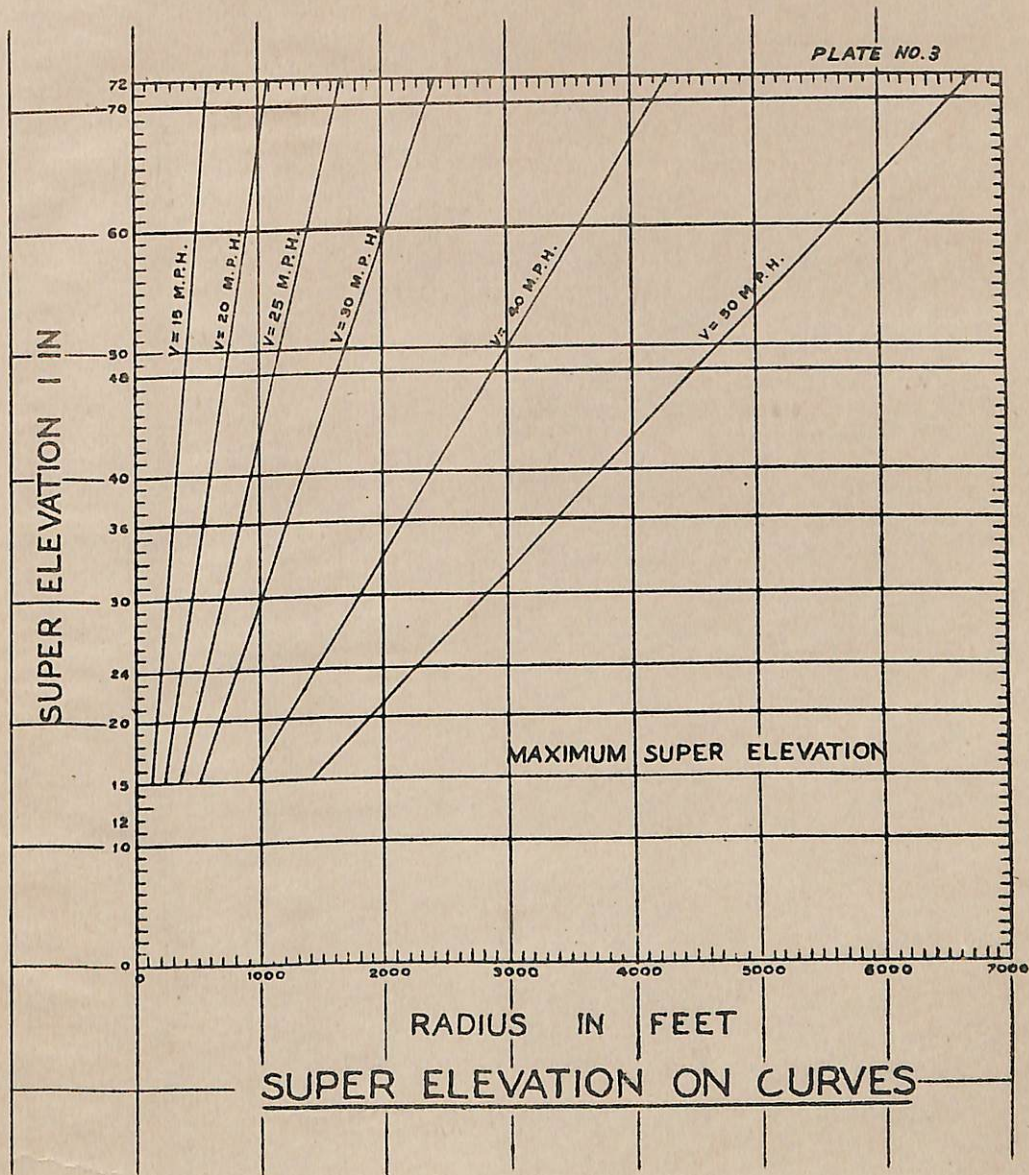
DEFECTIVE

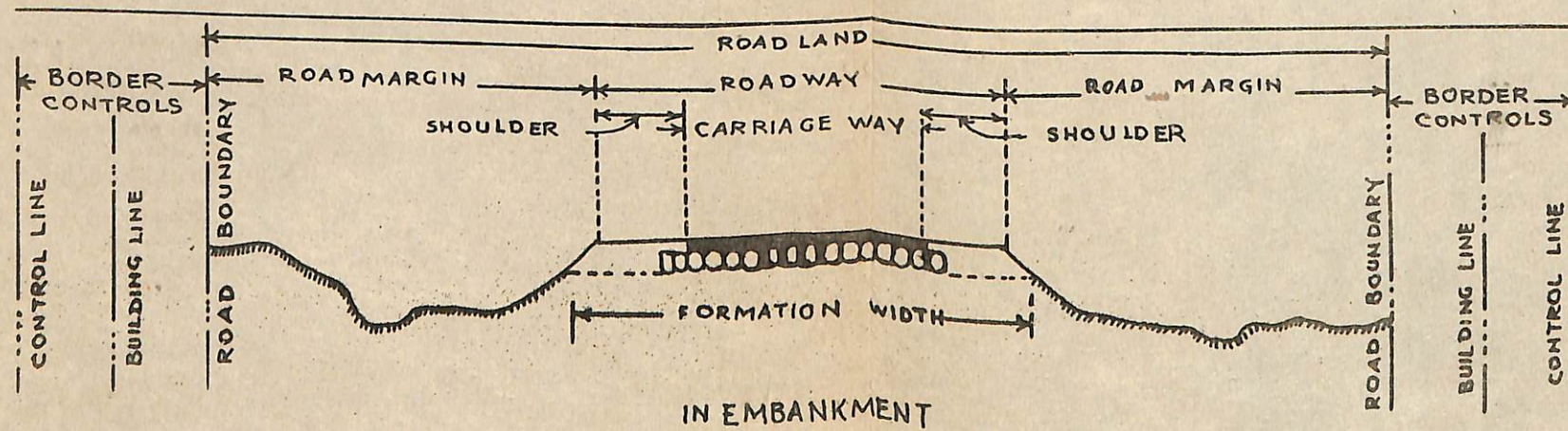
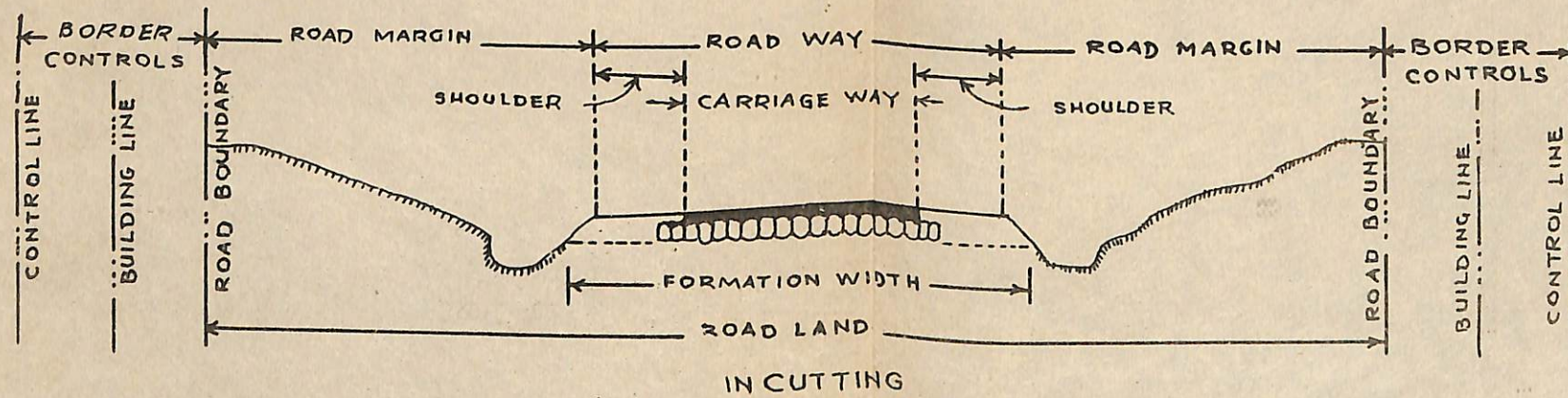
PERFECT

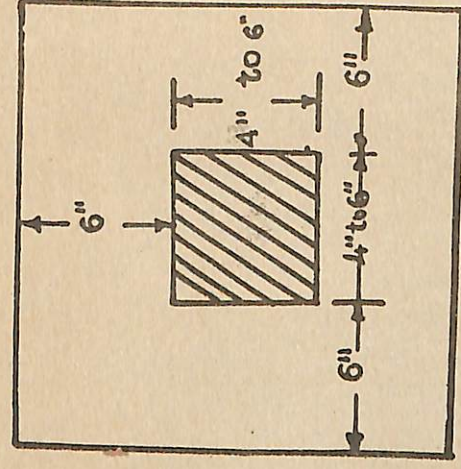
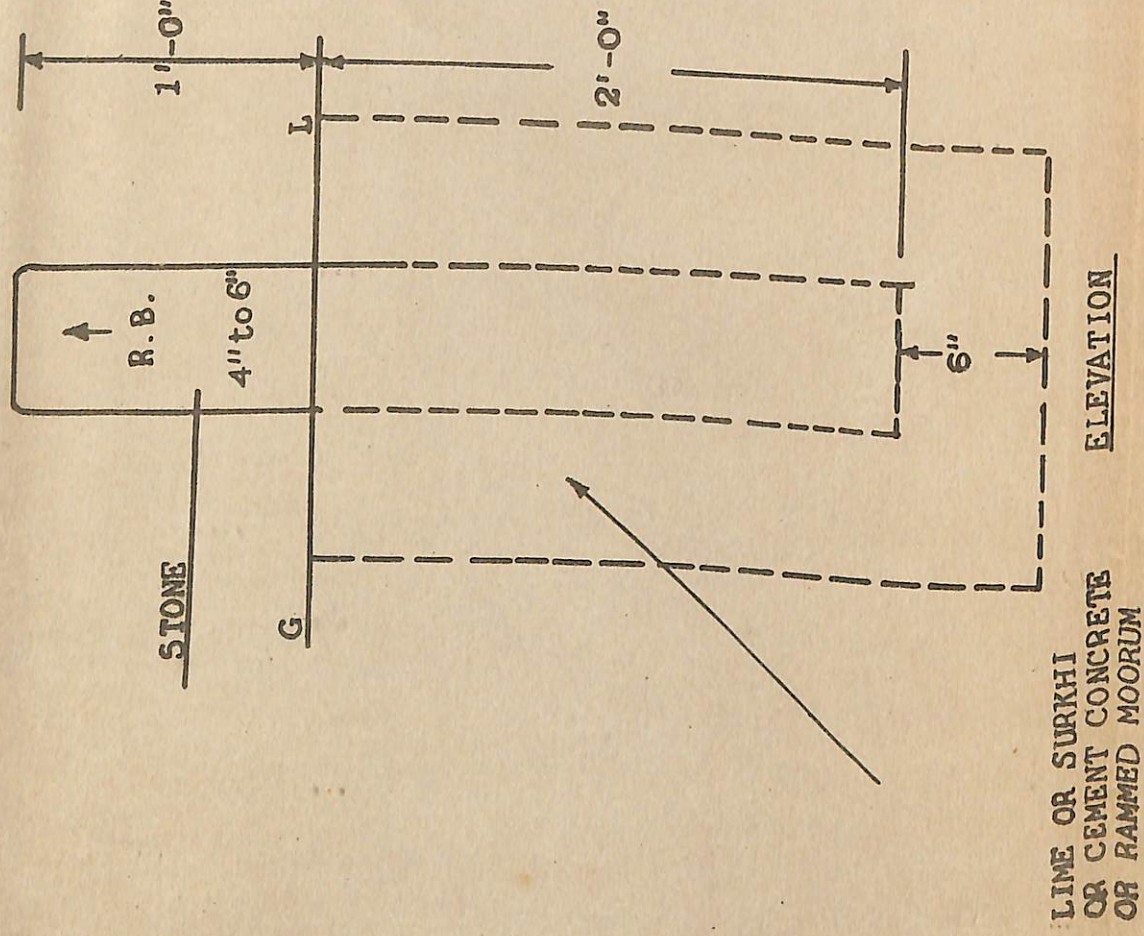
3/4 BRICKS
CLOSERS.

PERFECT

TEN 3/4 BRICKS







PLAN

ALTERNATIVELY THE BOUNDARY STONE MAY BE OF LIGHTLY REINFORCED CEMENT CONCRETE



Type Design for BOUNDARY STONE

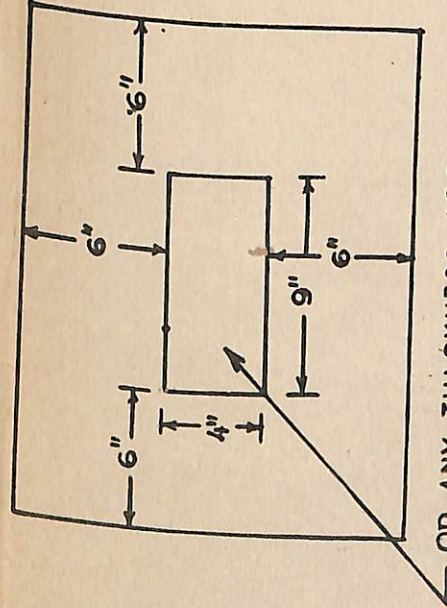
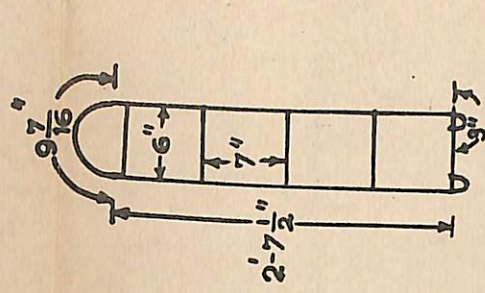
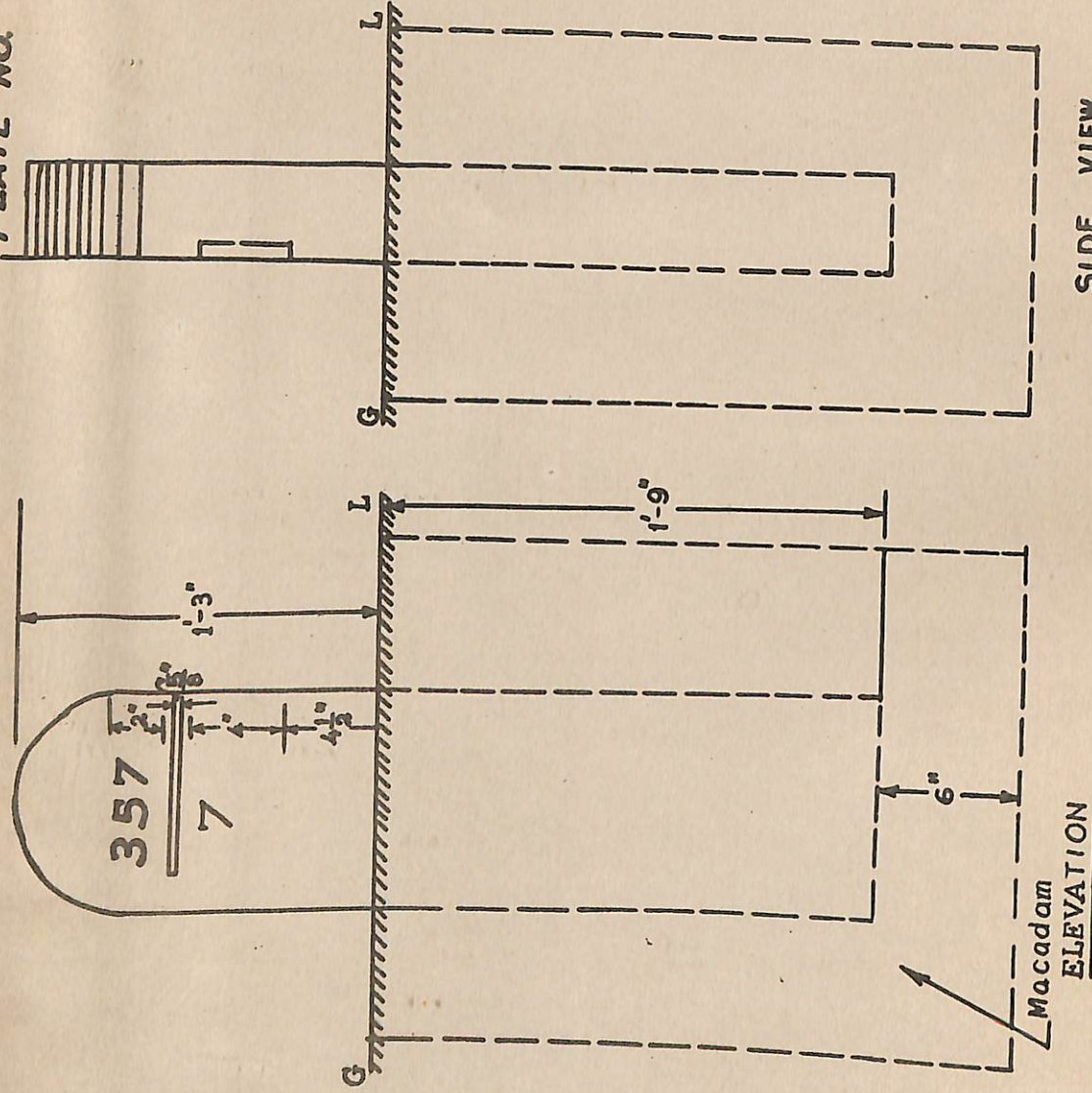


M.S. BARS $\frac{1}{4}$ " DIA:-

Length	No.	Part
6' - 1 $\frac{1}{4}$ "	2	Main Bars.
1' - 7 $\frac{1}{2}$ "	1	Bottom stirrup
1' - 6 $\frac{1}{2}$ "	1	-----
1' - 5 $\frac{1}{2}$ "	1	Central Stirrup
1' - 5"	1	-----
1' - 4 $\frac{1}{4}$ "	1	Top Stirrup

TYPE DESIGN
FOR
R.C.C. BOUNDARY STONE





OR ANY THICKNESS LOCALLY AVAILABLE
SUBJECT TO A MINIMUM OF 2 INCH.
WHEN STONE SLABS ARE USED.

PLAN

2 NOS. $\frac{1}{4}$ IN. DIA. 6 FT. $6\frac{7}{16}$ IN. LONG
5 NOS. $\frac{1}{4}$ IN. DIA. 1 FT. 9 IN. LONG

MATERIAL :-

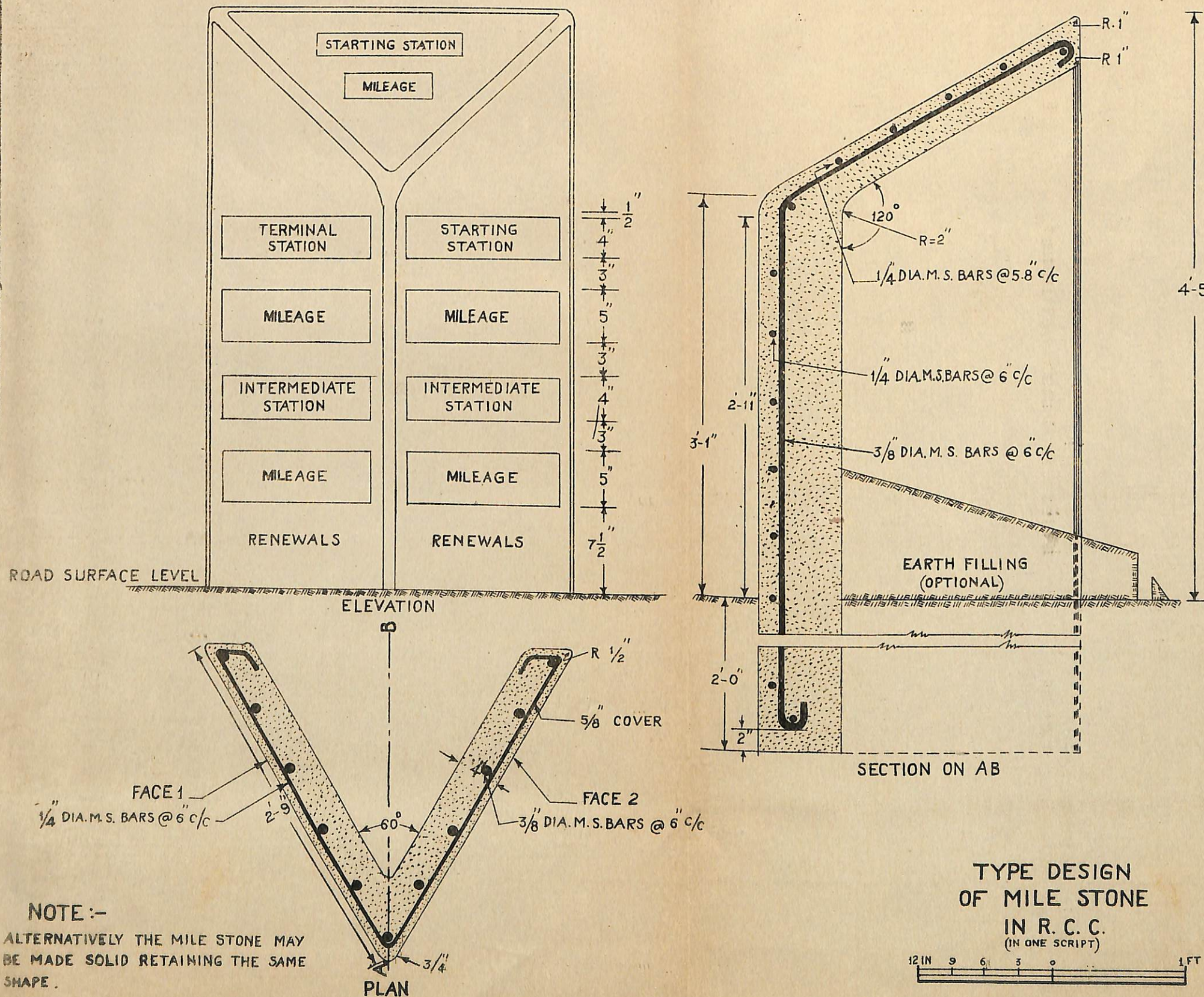
LOCAL STONE SLAB

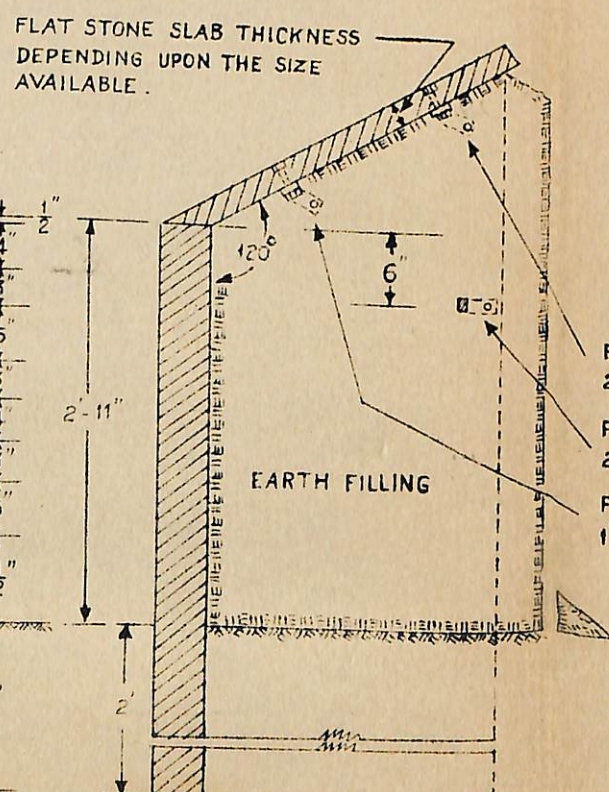
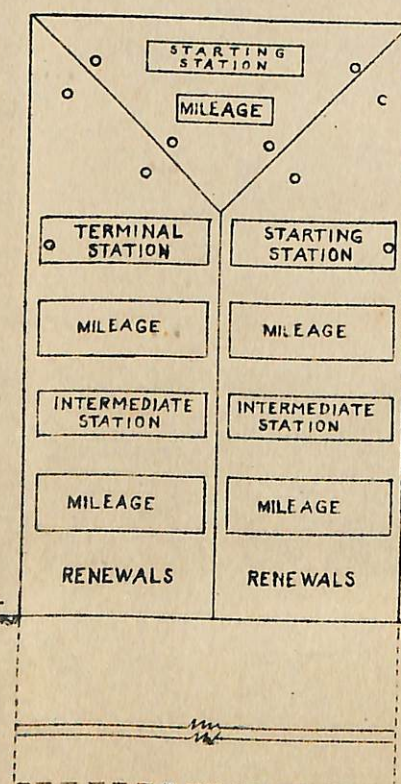
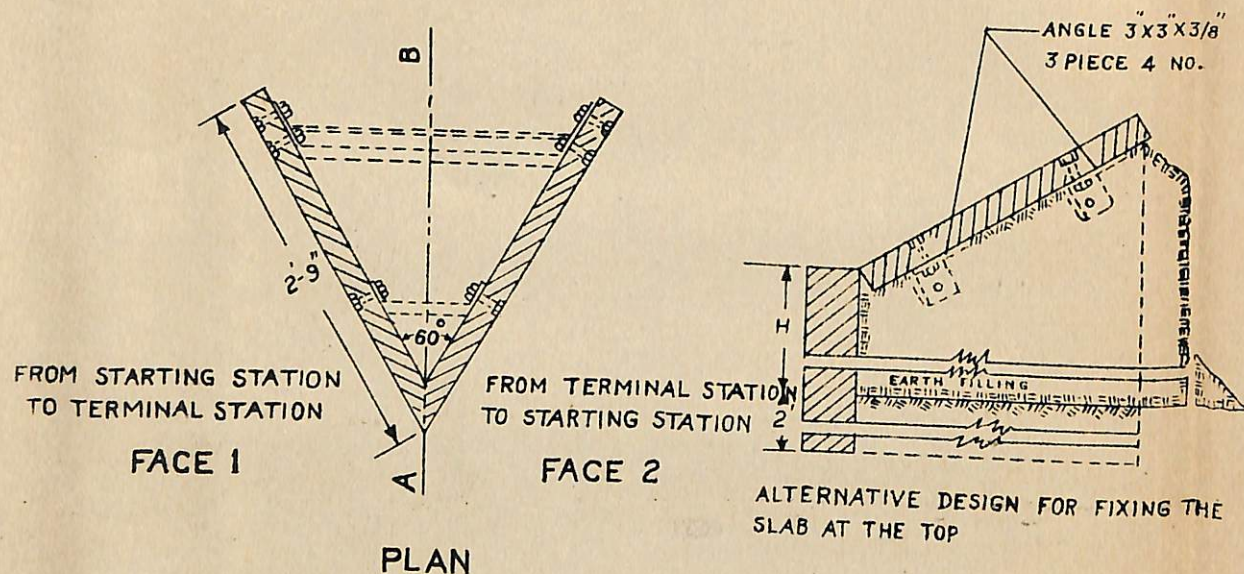
OR

REINFORCED CONCRETE.

SCHEDULE OF REINFORCEMENT
WHEN R.C. IS USED

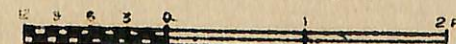
TYPE	DESIGN
FOR	
FURLONG STONE	
IN	12 9 6 3 0
SCALE	
307/JAN.52.	DRG. NO.

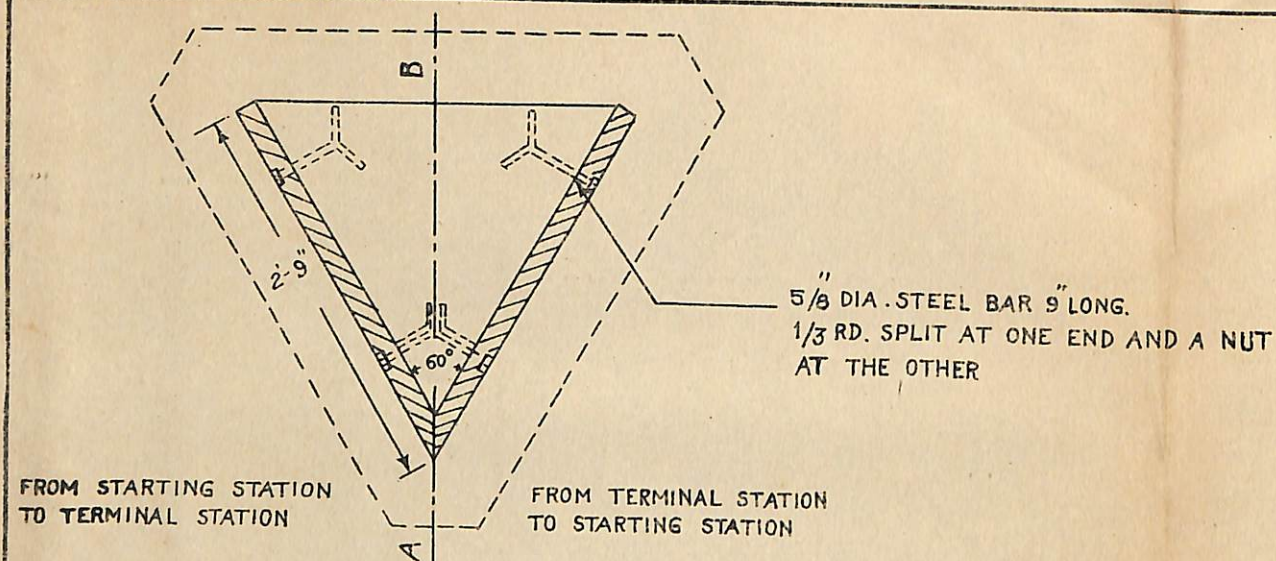




QUANTITIES PER MILE STONE	
N.H.S.H. & M. D. R.	
S. NO.	
1	STONE SLABS:- 6'-2" X 2'-9"..... 2 NO. 2'-9" X 2'-5"..... 1 NO.
2	FLATS:- (i) 2'-7" X 1" X 1/4"..... 1 NO. (ii) 2'-4" X 1" X 1/4"..... 1 NO. (iii) 1'-2" X 1" X 1/4"..... 1 NO.
3	3/8" DIA M. S. BOLTS..... 10 NO.
4	ALTERNATIVE DESIGN FOR TOP ANGLE IRON 3" LONG 3"x3"x3/8" IN PLACE OF 2 (ii) & (iii)..... 4 NO.

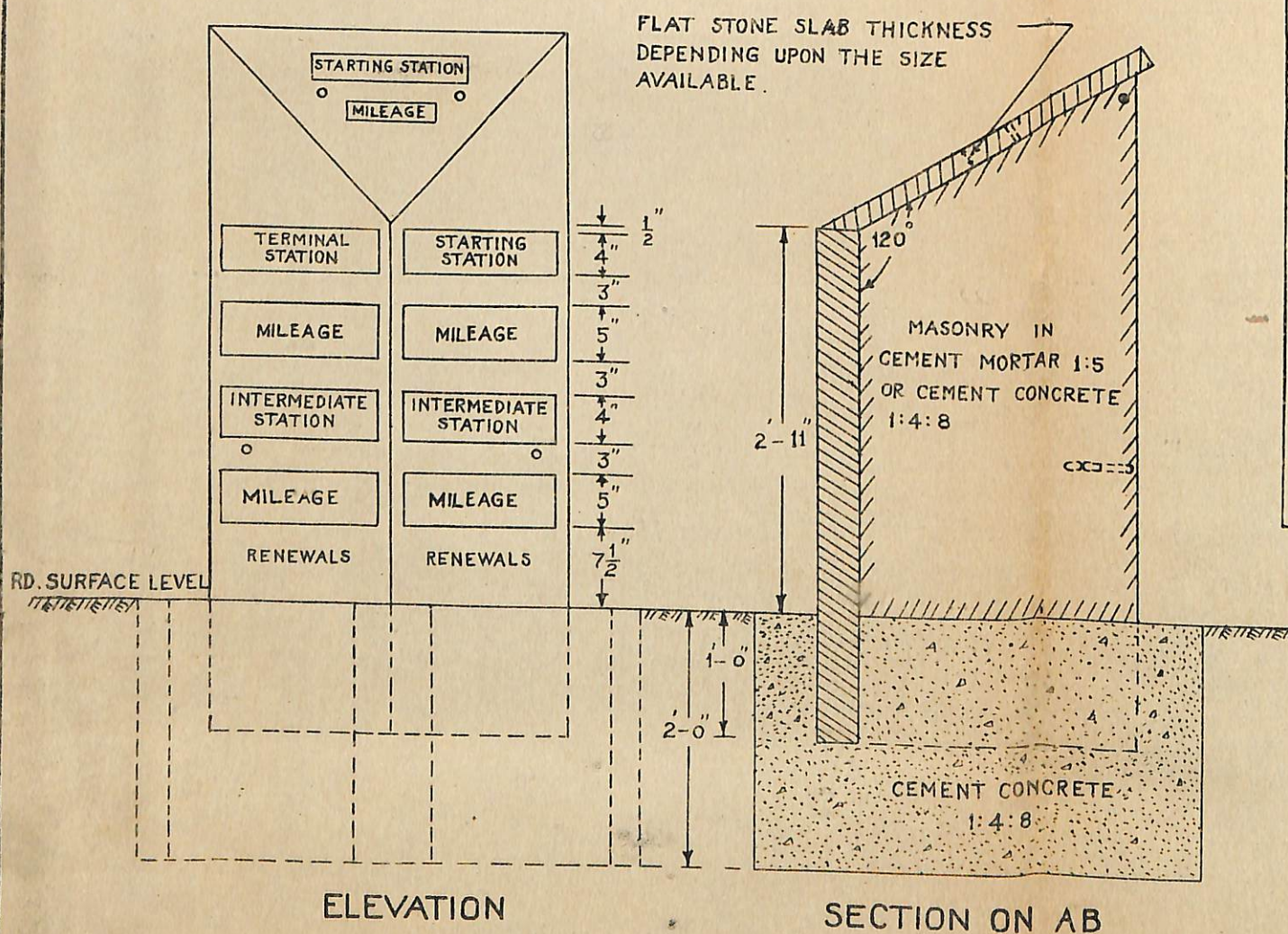
TYPE DESIGN
OF MILE STONE IN
STONE SLABS



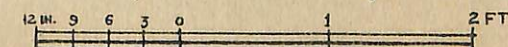


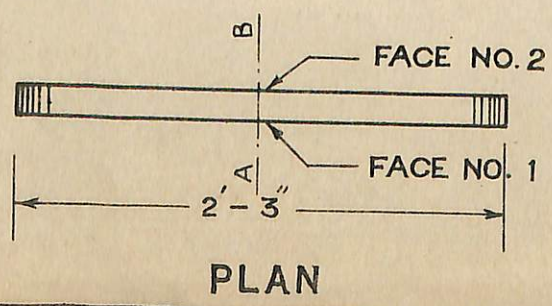
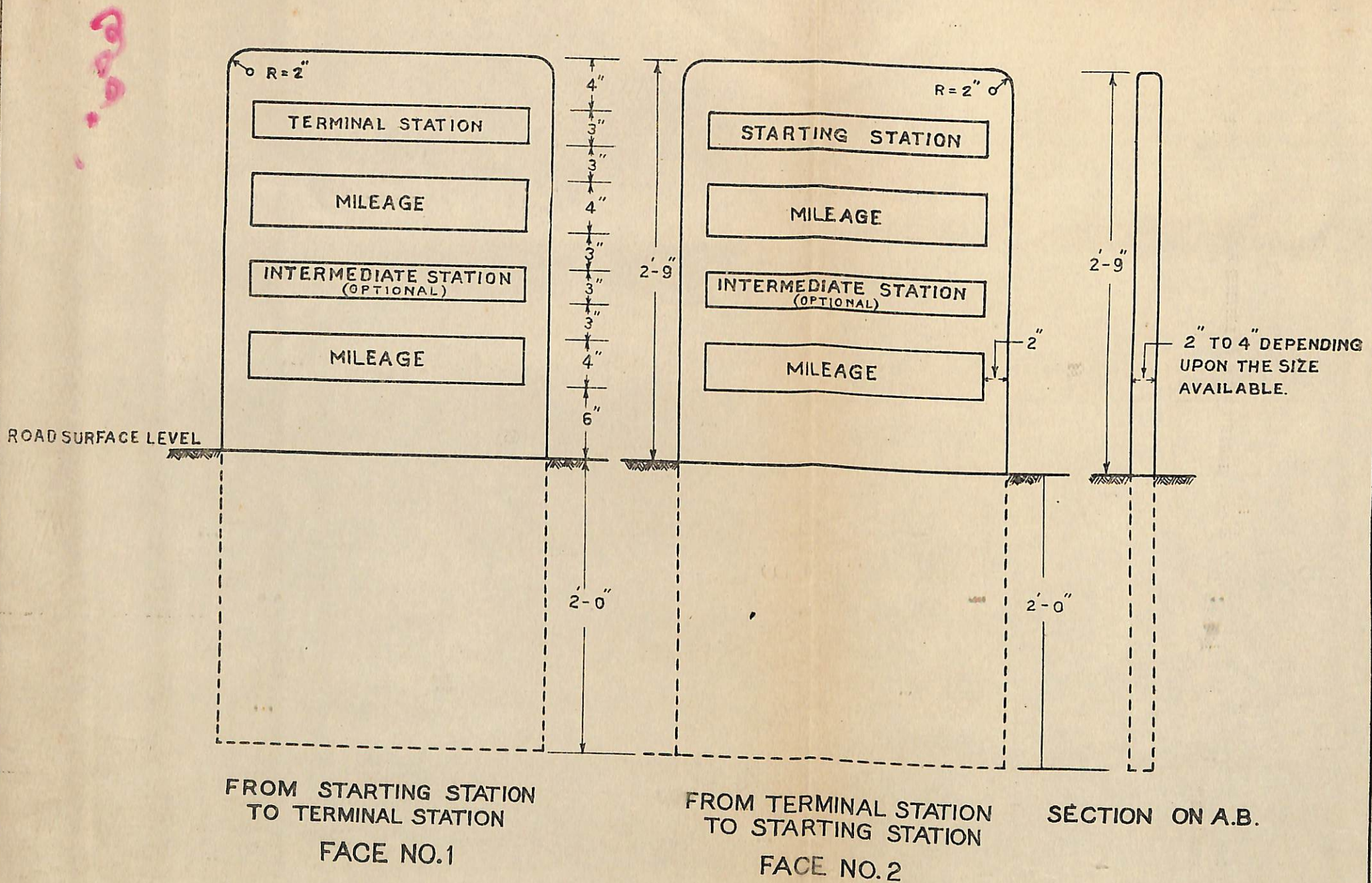
SCHEDULE OF QUANTITIES

S.NO	ITEM	QUANTITIES PER MILE STONE
		FOR N.H.S.H. AND M.D.R.
1.	CEMENT CONCRETE 1:4:8 FOR FOUNDATION	16.4 C.F.T.
2.	MASONRY IN CEMENT-MORTAR 1:5 OR CEMENT-CONCRETE 1:4:8	9.5 C.F.T.
3.	STONE SLABS :- 2 NOS. 1 NO.	5'-2" x 2'-9" 2'-9" x 2'-5"
4.	5/8" DIA. STEEL BAR 9" LONG 1/3 RD. SPLIT AT ONE END AND A NUT AT THE OTHER.	6 NOS.



TYPE DESIGN OF MILE STONE IN STONE SLABS (2ND ALTERNATIVE)





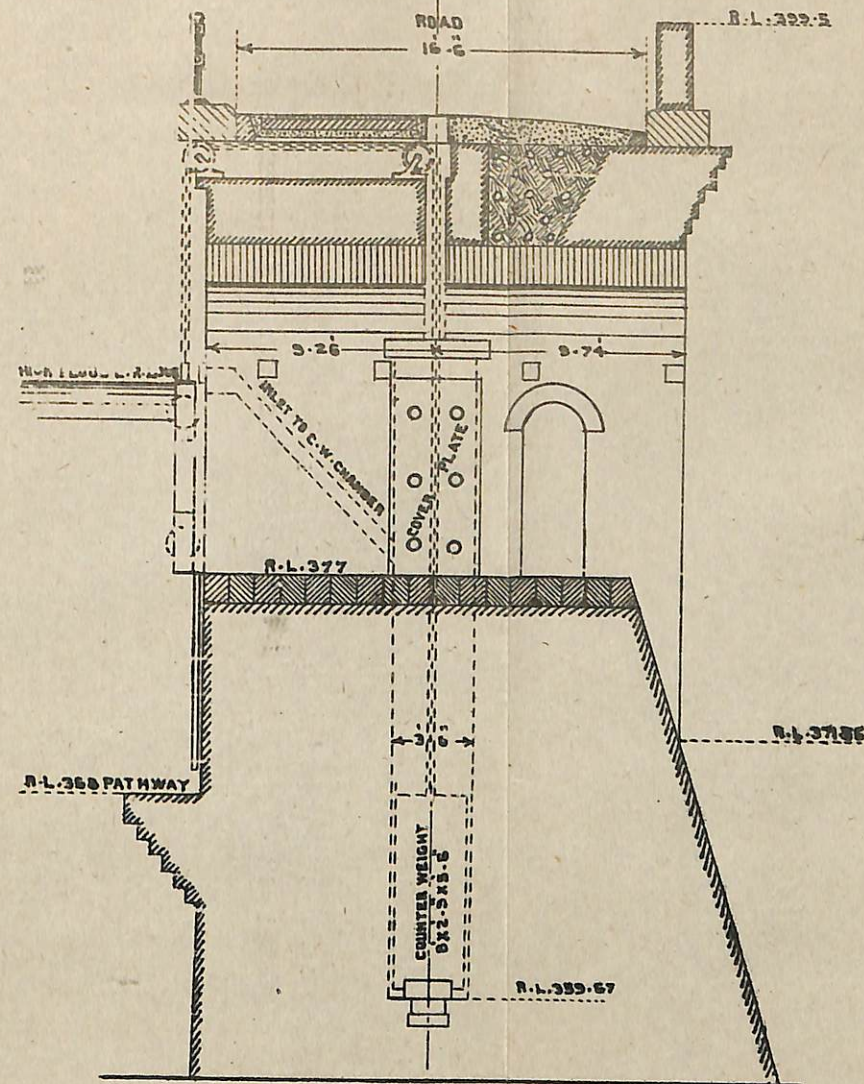
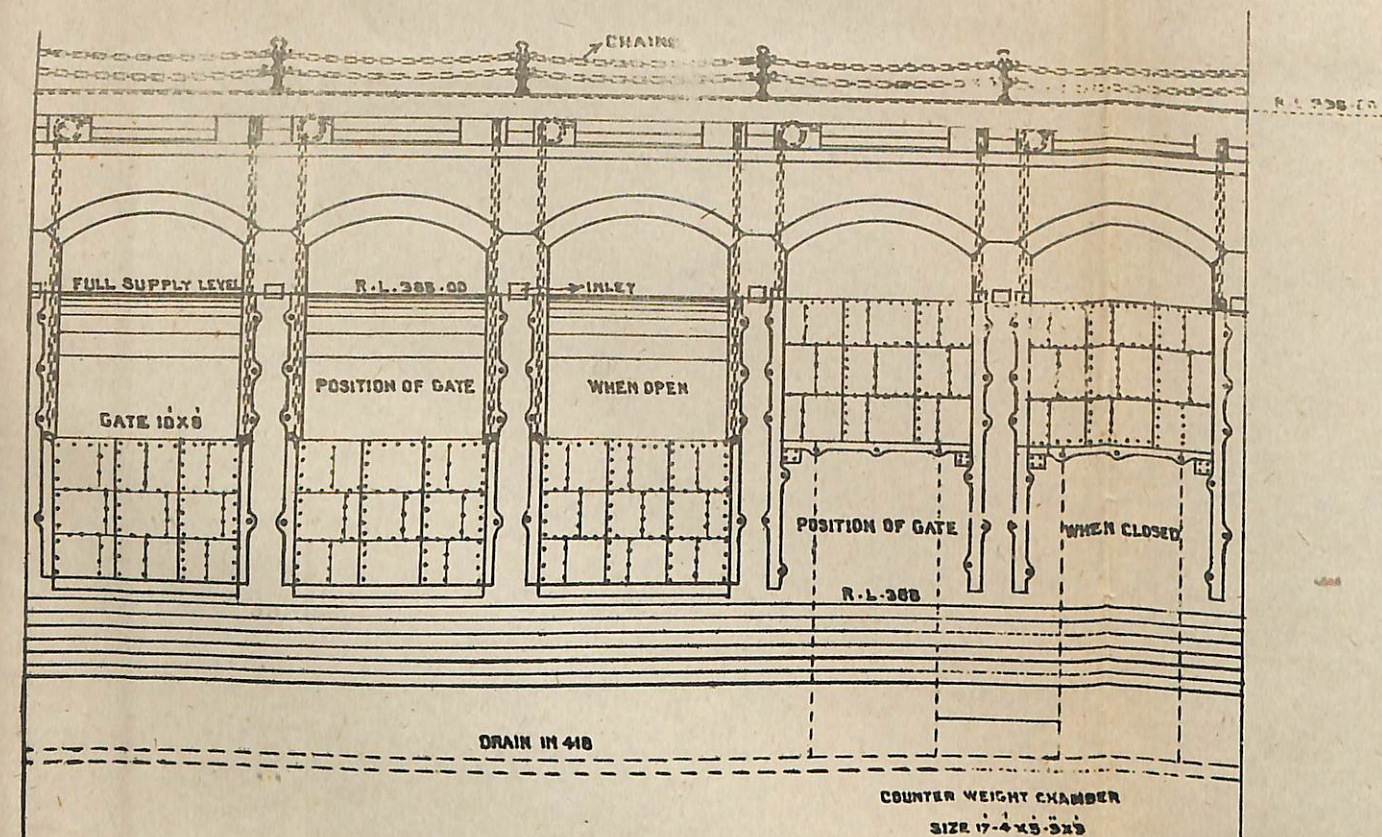
TYPE DESIGN
OF MILE STONE
FOR VILLAGE ROADS

IN 12 9 6 3 0 FT.

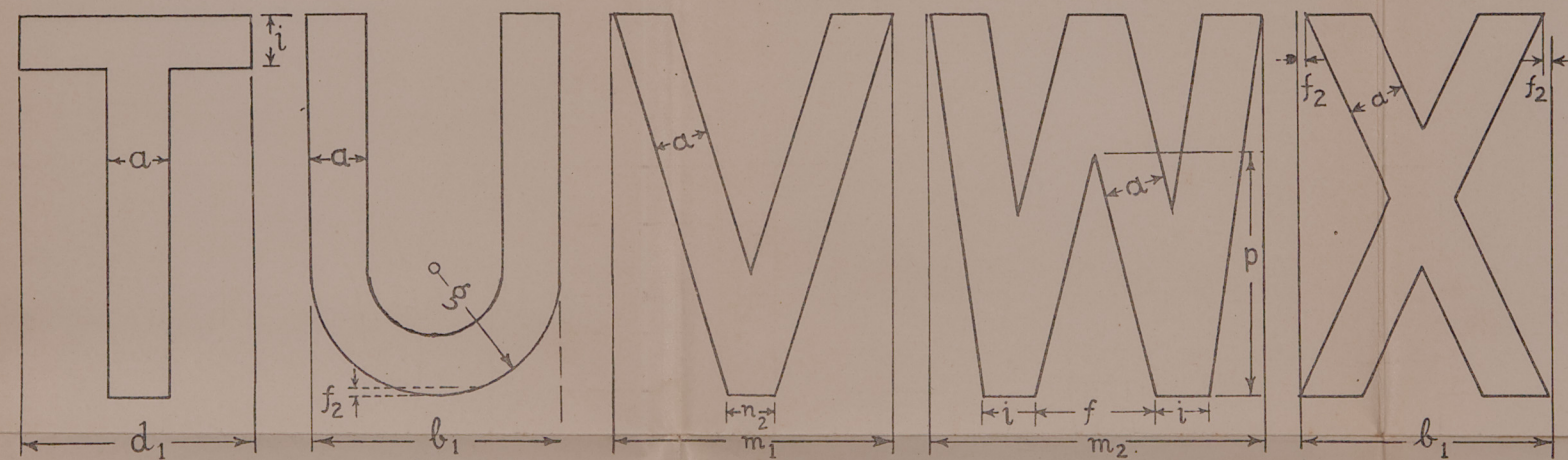
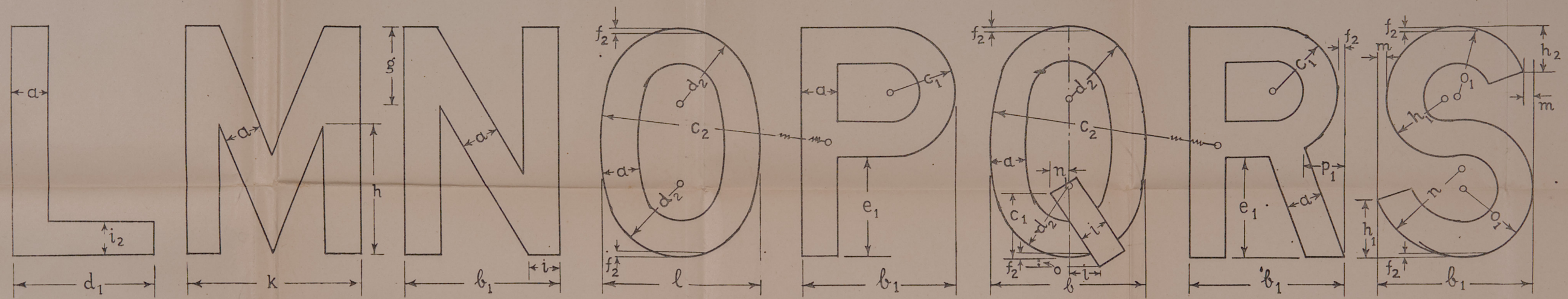
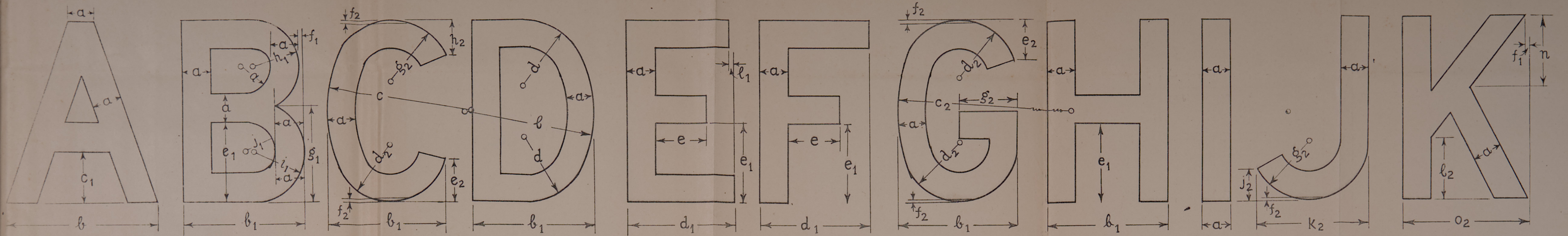
- THE LLOYD DAM -
 -- SKETCH OF AUTOMATIC WASTE WEIR GATES --

Plate No 12

- SECTION -



W. H. H. H.
 EXECUTIVE ENGINEER
 NIRA CANALS DIVISION.
W. H. H. H.



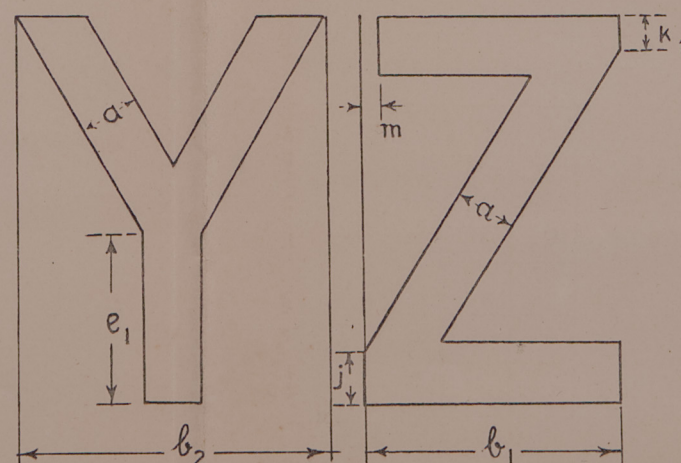
KEY

SPACING FOR LETTERS

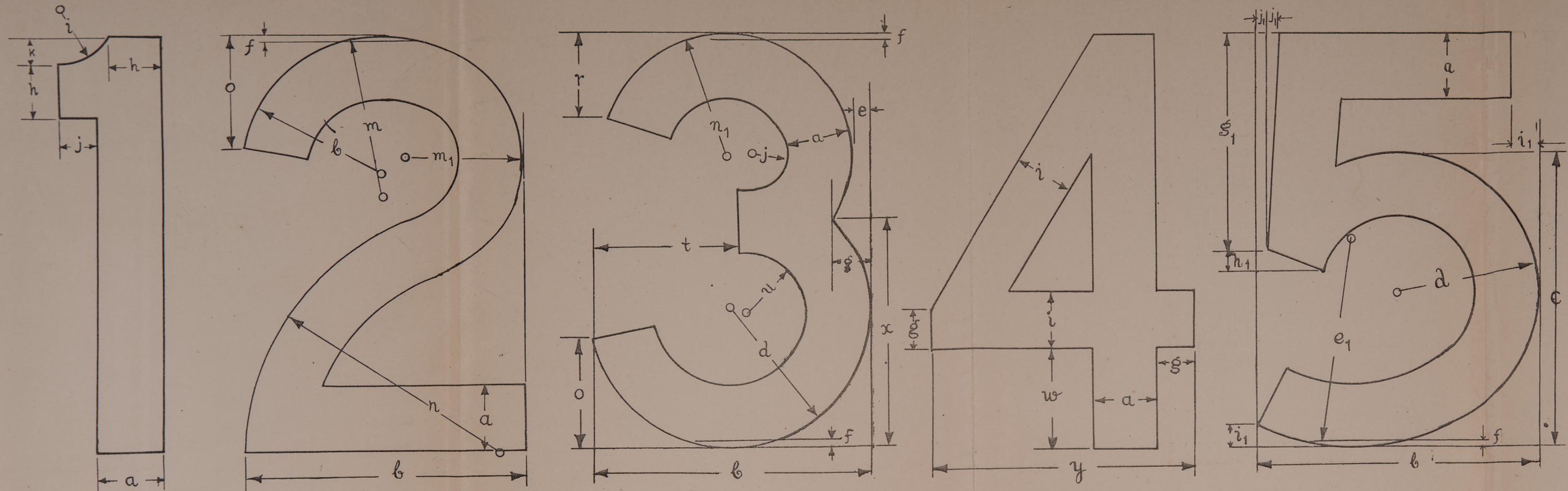
LETTER	LEFT	RIGHT	LETTER	LEFT	RIGHT	RIGHT ← LEFT	SPACING BETWEEN LETTERS
A	III	III	N	I	I		
B	I	II	O	II	II	I ↔ I	
C	II	IV	P	I	II	I ↔ II	0.56
D	I	II	Q	II	II	II ↔ I	
E	I	IV	R	I	II		
F	I	IV	S	II	II	I II ↔ III IV	0.42
G	II	II	T	IV	IV	III IV ↔ I II	
H	I	I	U	I	I	II ↔ II	
I	I	I	V	III	III		
J	IV	I	W	III	III	III IV ↔ III IV	0.28
K	I	IV	X	IV	IV	OPPOSITE	
L	I	IV	Y	IV	IV	III IV ↔ III IV	0.00
M	I	I	Z	IV	IV	PARALLEL	

STANDARD LETTERS
OF
3 INCH HEIGHT

SCALE - 1 3/4 1/2 1/4 0



DIMENSIONS (INCHES) FOR 3 INCH HEIGHT OF LETTERS														
a	b	b ₁	b ₂	c	c ₁	c ₂	d	d ₁	d ₂	e	e ₁	e ₂	f	f ₁
$\frac{15}{32}$	$2\frac{1}{2}$	$2\frac{1}{64}$	$2\frac{17}{32}$	$2\frac{3}{8}$	$\frac{27}{32}$	3	$1\frac{5}{64}$	$1\frac{53}{64}$	$\frac{61}{64}$	$\frac{55}{64}$	$1\frac{5}{16}$	$\frac{21}{32}$	$\frac{15}{16}$	$\frac{1}{16}$
f ₂	g	g ₁	g ₂	h	h ₁	h ₂	i	i ₁	i ₂	j	j ₁	j ₂	k	k ₁
$\frac{3}{64}$	1	$1\frac{9}{16}$	$\frac{63}{64}$	$1\frac{47}{64}$	$\frac{3}{4}$	$\frac{39}{64}$	$\frac{27}{64}$	$\frac{13}{16}$	$\frac{7}{16}$	$\frac{25}{64}$	$\frac{31}{64}$	$\frac{17}{32}$	$2\frac{5}{16}$	$\frac{9}{32}$
k ₂	l	l ₁	l ₂	m	m ₁	m ₂	n	n ₁	n ₂	o	o ₁	o ₂	p	p ₁
$1\frac{7}{8}$	$2\frac{7}{64}$	$\frac{3}{32}$	$1\frac{1}{32}$	$\frac{7}{64}$	$2\frac{1}{4}$	$2\frac{5}{8}$	$1\frac{11}{64}$	$\frac{15}{64}$	$\frac{3}{8}$	$\frac{9}{64}$	$\frac{29}{32}$	$2\frac{1}{16}$	$1\frac{59}{64}$	$\frac{33}{64}$

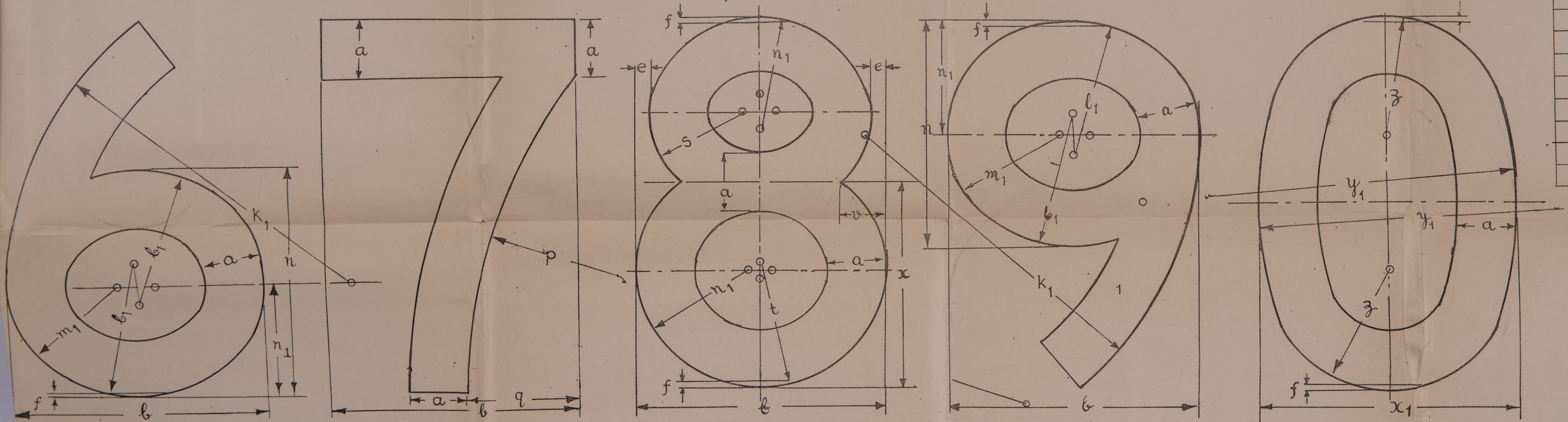


DIMENSIONS (INCHES) FOR 5 INCH HEIGHT OF NUMERALS

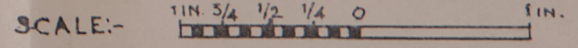
a	b	c	d	e	e ₁	f	g	g ₁	h	h ₁
$\frac{25}{32}$	$3\frac{23}{64}$	$3\frac{19}{32}$	$1\frac{43}{64}$	$\frac{3}{16}$	$2\frac{17}{32}$	$\frac{5}{64}$	$\frac{15}{32}$	$2\frac{37}{64}$	$\frac{5}{8}$	$\frac{15}{64}$
i	i ₁	j	j ₁	k	k ₁	l	l ₁	m	m ₁	n
$\frac{45}{64}$	$\frac{17}{64}$	$\frac{27}{64}$	$\frac{7}{64}$	$\frac{5}{16}$	$4\frac{29}{64}$	$\frac{41}{64}$	$\frac{51}{64}$	$\frac{61}{64}$	$\frac{7}{16}$	$3\frac{3}{64}$
n ₁	o	p	q	r	s	t	u	v	w	x
$1\frac{33}{64}$	$1\frac{21}{64}$	$7\frac{1}{2}$	$1\frac{31}{64}$	$\frac{1}{64}$	$\frac{1}{32}$	$\frac{23}{32}$	$\frac{47}{64}$	$\frac{37}{64}$	$1\frac{1}{4}$	$2\frac{13}{16}$
			x ₁	y	y ₁	z				
			$3\frac{1}{2}$	$3\frac{13}{64}$	5	$1\frac{19}{32}$				

KEY SPACING FOR NUMERALS

NUMERALS	LEFT	RIGHT	RIGHT	LEFT	SPACING BETWEEN NUMERALS
1	I	I	I	↔ I	
2	II	II	I	↔ II	0.93
3	IV	III	II	↔ I	
4	IV	IV	II	↔ III	
5	I	II	III	↔ III	0.70
6	II	II	II	↔ II	
7	IV	III	III	↔ III	0.47
8	II	II	OPPOSITE		
9	II	II	III	↔ III	0.00
0	II	II	PARALLEL		



STANDARD NUMERALS
OF
5 INCH HEIGHT



FOR HEIGHTS OF NUMERALS OTHER THAN 4 IN. THE DIMENSIONS GIVEN IN THE TABLE ARE TO BE PROPORTIONATELY INCREASED AND DECREASED.

DIMENSIONS (INCHES) FOR 4 INCH HEIGHT OF NUMERALS

a	b	c	d	e	f	f ₁	g	g ₁	h	h ₁	i
$\frac{5}{8}$	$2\frac{11}{16}$	$2\frac{7}{8}$	$1\frac{11}{32}$	$\frac{5}{32}$	$2\frac{1}{32}$	$\frac{1}{16}$	$\frac{3}{8}$	$2\frac{1}{16}$	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{9}{16}$
i ₁	j	j ₁	k	k ₁	l	l ₁	m	m ₁	n	n ₁	o
$\frac{7}{32}$	$\frac{11}{32}$	$\frac{3}{32}$	$\frac{1}{4}$	$3\frac{9}{16}$	$1\frac{5}{16}$	$1\frac{7}{16}$	$1\frac{9}{16}$	$1\frac{5}{32}$	$2\frac{7}{16}$	$1\frac{7}{32}$	$1\frac{1}{16}$
p	q	r	s	t	u	v	v ₁	w	x	y	y ₁
6	$1\frac{3}{16}$	$\frac{13}{16}$	$1\frac{1}{32}$	$1\frac{3}{8}$	$2\frac{1}{4}$	$\frac{19}{32}$	$\frac{15}{32}$	1	$2\frac{13}{16}$	$2\frac{9}{16}$	4

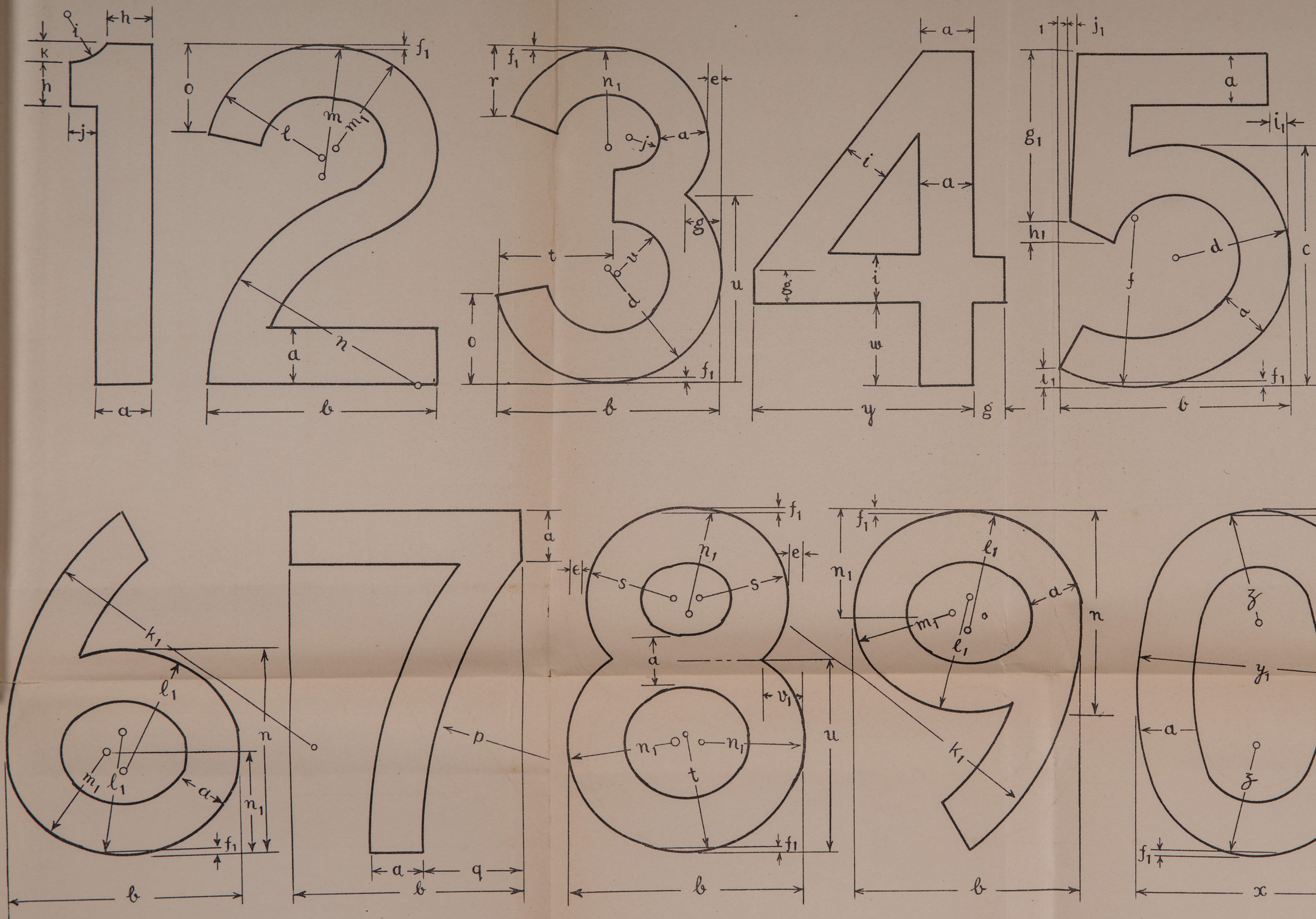
$\frac{3}{8}$
 $1\frac{9}{32}$

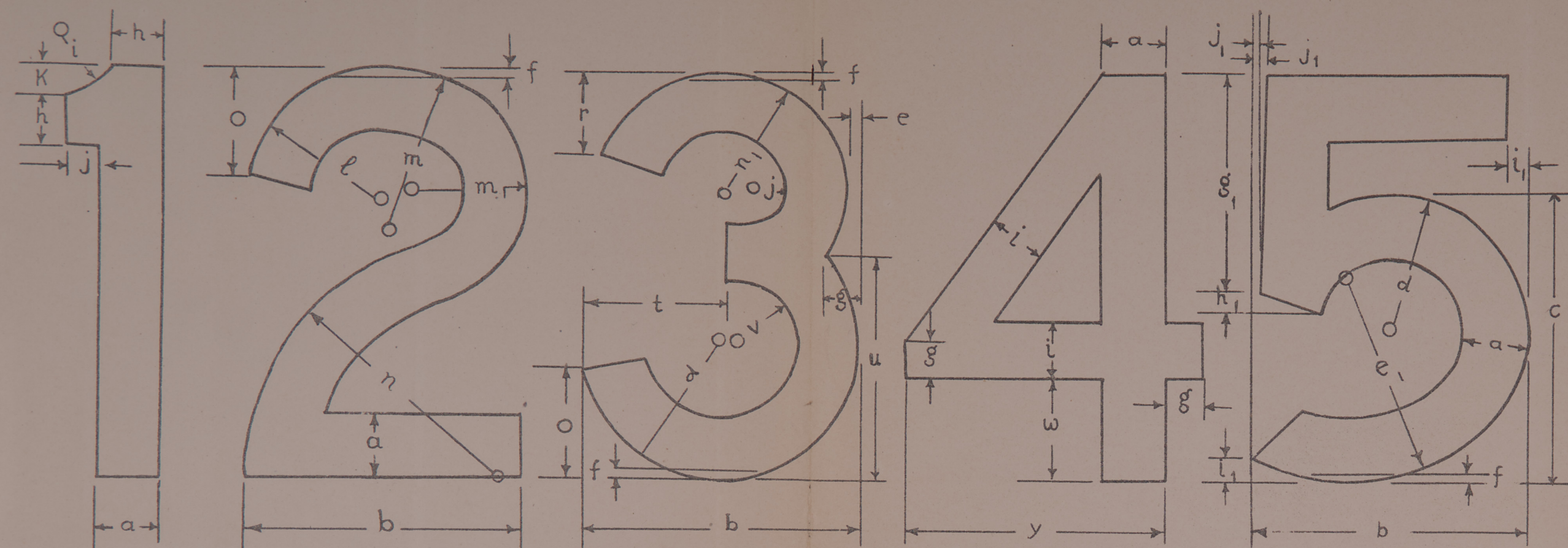
KEY
SPACING FOR NUMERALS

NUMBER	LEFT	RIGHT	RIGHT ↔ LEFT	SPACING BETWEEN NUMERALS.
1	I	I	I ↔ I	0.74
2	II	II	I ↔ II	
3	IV	II	II ↔ I	
4	IV	IV	II ↔ II	0.56
5	I	II	I ↔ II	
6	II	II	II ↔ II	
7	IV	III	III ↔ III	0.38
8	II	II	OPPOSITE	
9	II	II	III ↔ III	0.00
0	II	II	PARALLEL	

STANDARD NUMERALS
OF
4 INCH HEIGHT

SCALE 1 $\frac{3}{4}$ $\frac{1}{2}$ $\frac{1}{4}$ 0 1 IN.



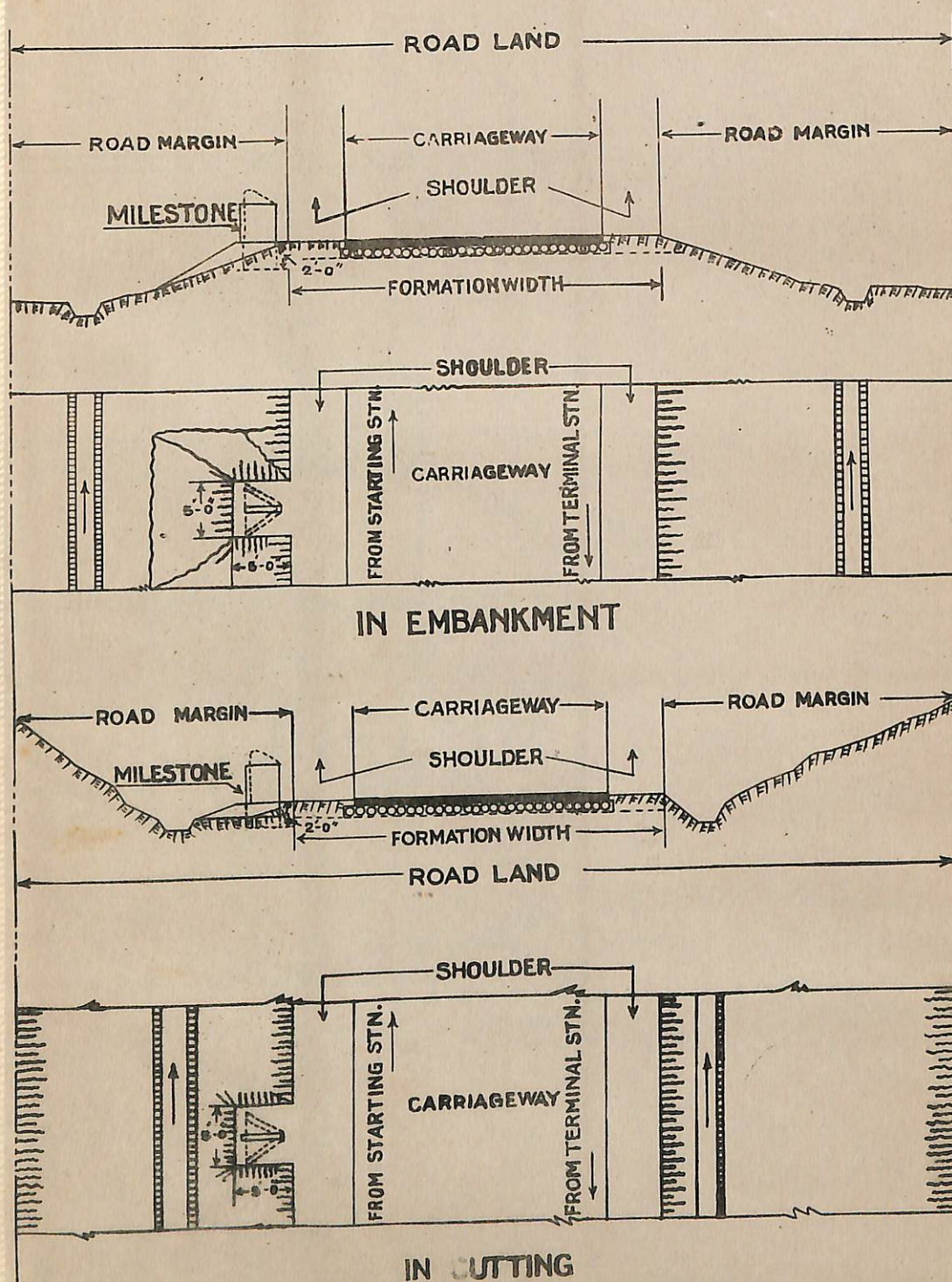


DIMENSIONS (INCHES) FOR 3 INCH HEIGHT OF NUMERALS													
a	b	c	d	e	e ₁	f	g	g ₁	h	h ₁	i	i ₁	j
$\frac{15}{32}$	$2\frac{1}{64}$	$2\frac{5}{32}$	1	$\frac{7}{64}$	$1\frac{33}{64}$	$\frac{3}{64}$	$\frac{9}{32}$	$1\frac{35}{64}$	$\frac{3}{8}$	$\frac{9}{64}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
k	l	l ₁	m	m ₁	n	o	o ₁	p	p ₁	q	q ₁	r	r ₁
$\frac{27}{64}$	$\frac{5}{32}$	$\frac{1}{4}$	$\frac{1}{16}$	$\frac{3}{16}$	$2\frac{43}{64}$	$\frac{63}{64}$	$1\frac{5}{64}$	$1\frac{11}{64}$	$\frac{55}{64}$	$1\frac{53}{64}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
s	s ₁	t	t ₁	u	v	v ₁	w	w ₁	x	x ₁	y	y ₁	z
$\frac{29}{32}$	$\frac{51}{64}$	$4\frac{1}{2}$	$\frac{57}{64}$	$\frac{39}{64}$	$\frac{49}{64}$	$1\frac{1}{32}$	$1\frac{11}{16}$	$\frac{7}{16}$	$\frac{11}{32}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{27}{64}$	$\frac{51}{64}$	$4\frac{1}{2}$	$\frac{57}{64}$	$\frac{39}{64}$	$\frac{49}{64}$	$1\frac{1}{32}$	$1\frac{11}{16}$	$\frac{7}{16}$	$\frac{11}{32}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

KEY SPACING FOR NUMERALS				
NUMERALS	LEFT	RIGHT	RIGHT ← LEFT	SPACING BETWEEN NUMERALS
1	I	I	I ↔ I	0.56
2	II	II	I ↔ II	
3	IV	II	II ↔ I	
4	IV	IV	I II ↔ III IV	0.42
5	I	II	III IV ↔ I II	
6	II	II	II ↔ II	
7	IV	III	III IV ↔ III IV	0.28
8	II	II	OPPOSITE	
9	II	II	III IV ↔ III IV	0.00
0	II	II	PARALLEL	

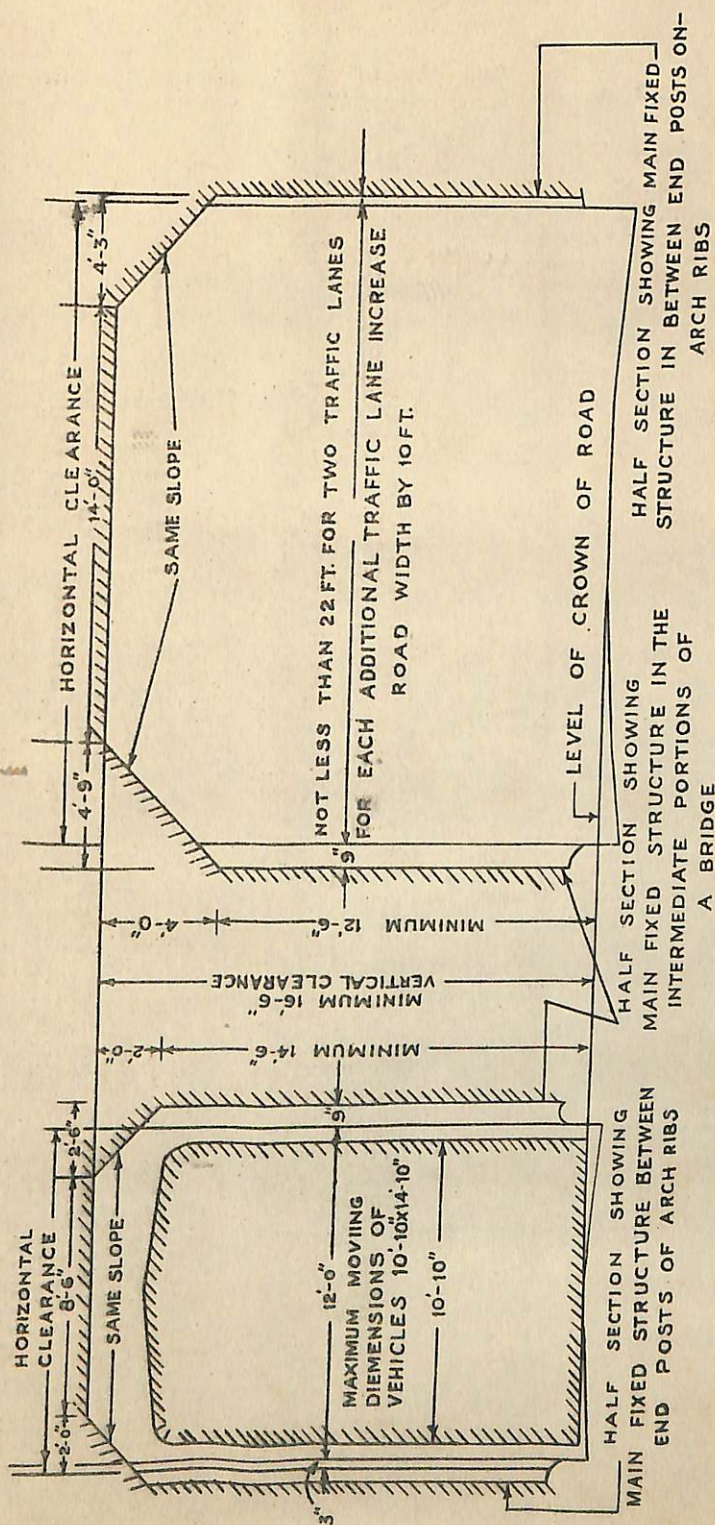
STANDARD NUMERALS OF 3 INCH HEIGHT

SCALE: - 1 IN. 3/4 1/2 1/4 0 1 IN.



LOCATION
OF
MILE STONES

SCALE: - 1" = 10 FT.

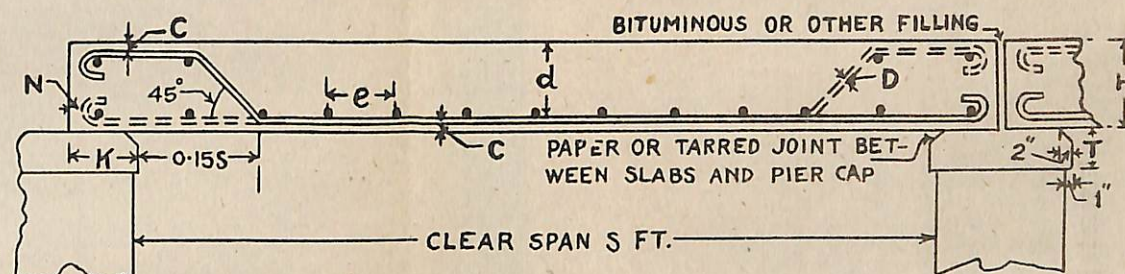


— TABLES OF FREELY SUPPORTED R.C. SLABS FOR ROAD BRIDGES & CULVERTS —

— CLEAR SPANS 3 FT. TO 25 FT. —

PLATE NO. 20.

C = CLEAR COVER MINIMUM 1"
 N = END COVER OR CLEARANCE 1½"
 OR 2D WHICHEVER IS MORE.
 D = DIAMETER OF MAIN REINFORCEMENT
 BAR (FROM TABLES)
 e = SPACING OF DISTRIBUTION REINFORCE-
 MENT (FROM TABLES)
 L = EFFECTIVE SPAN S+d



NOTE:— FOR CLEAR SPANS OVER 10 FT. A LONGITUDINAL
 CAMBER OF ABOUT ½ INCH PER 10 FT. SPAN IS RECOMMENDED.

K = LENGTH OF BEARING
 = 0.5 + 0.04S FEET OR 14"
 WHICHEVER IS LESS.
 T = DEPTH OF BEARING SLAB
 OR PIER CAP.
 = 0.25 + 0.02S FEET.
 H = OVERALL DEPTH (FROM TABLES)
 d = EFFECTIVE DEPTH (FROM TABLES)

TABLE A—DEAD LOAD COVER UP TO 3 INCHES THICK

CLEAR SPAN	MAXIMUM BENDING MOMENT PER FOOT WIDTH	MAXIMUM SHEAR PER FOOT WIDTH	OVERALL DEPTH OF SLAB EXCLUDING WEARING COAT	EFFECTIVE DEPTH OF SLAB EXCLUDING WEARING COAT	MAIN REINFORCEMENT				DISTRIBUTION REINFORCEMENT		
					DIAMETER OF RODS	SPACING CENTRES	AREA PER FOOT WIDTH AT CENTRE OF SPAN	NO. OF MAIN BARS CRANKED UP AT EACH END	DIAMETER	SPACING CENTRES IN THE CENTRAL PORTION OF SPAN	AREA PER FOOT WIDTH
FEET	INCH-LBS.	POUNDS	INCHES	INCHES	INCHES	INCHES	SQ. INCHES	NOS.	INCHES	INCHES	SQ. INCHES
S	M	V	H	d	D		AS			e	
3	34,000	3,970	7.00	5.75	3/8	3 1/2	0.408	NIL	3/8	7	0.189
4	46,000	4,440	7.00	5.75	1/2	4 1/4	0.554	NIL	1/2	9 3/4	0.241
5	56,000	4,520	8.00	6.75	1/2	4	0.586	1 IN EVERY 4	1/2	9 1/2	0.250
6	93,000	5,670	9.25	8.00	1/2	3	0.785	1 " " 4	1/2	8 1/4	0.285
7	113,000	6,050	10.00	8.69	5/8	4 1/4	0.868	1 " " 4	1/2	7 3/4	0.304
8	138,000	6,250	11.00	9.69	5/8	4	0.920	1 " " 4	1/2	7 1/2	0.314
9	159,000	6,590	11.75	10.37	3/4	5 1/4	1.010	1 " " 4	1/2	7 1/2	0.314
10	190,000	6,660	12.75	11.37	3/4	4 3/4	1.120	1 " " 4	5/8	11	0.335
12	250,000	7,210	14.25	12.87	3/4	4 1/4	1.248	1 " " 2	5/8	10 1/2	0.351
14	320,000	7,630	16.00	14.50	1	3 3/4	1.413	1 " " 2	5/8	10	0.368
15	357,000	7,860	17.00	15.50	1	6 1/4	1.510	1 " " 2	5/8	10	0.368
16	394,000	8,160	17.75	16.25	1	6	1.571	1 " " 2	5/8	9 3/4	0.378
18	474,000	8,630	19.25	17.75	1	5 1/2	1.714	1 " " 2	5/8	9 1/2	0.388
20	567,000	9,260	21.00	19.50	1	5	1.885	1 " " 2	5/8	9	0.409
22	662,000	9,760	22.50	21.00	1	4 1/2	2.090	1 " " 2	5/8	8 3/4	0.421
24	755,000	10,380	24.00	22.50	1	4 1/4	2.216	1 " " 2	3/4	12	0.442
25	830,000	10,750	25.00	23.50	1	4	2.356	1 " " 2	3/4	12	0.442

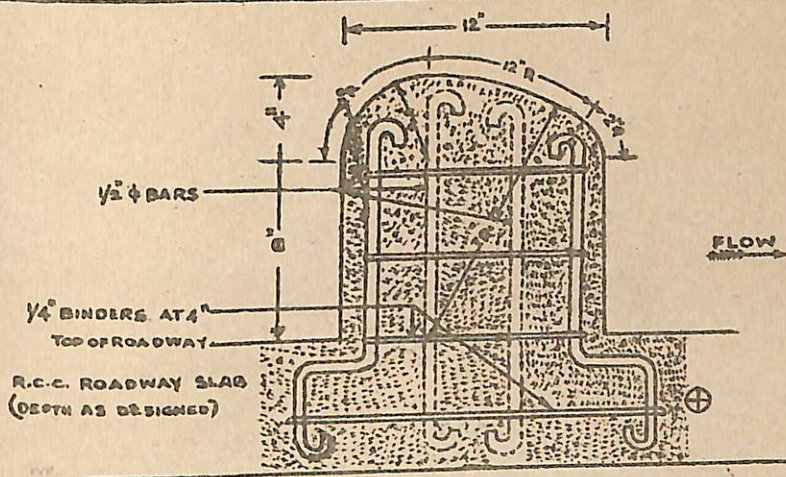
TABLE B—DEAD LOAD COVER UP TO 9 INCHES THICK

CLEAR SPAN	MAXIMUM BENDING MOMENT PER FOOT WIDTH	MAXIMUM SHEAR PER FOOT WIDTH	OVERALL DEPTH OF SLAB EXCLUDING WEARING COAT	EFFECTIVE DEPTH OF SLAB EXCLUDING WEARING COAT	MAIN REINFORCEMENT				DISTRIBUTION REINFORCEMENT		
					DIAMETER OF RODS	SPACING CENTRES	AREA PER FOOT WIDTH AT CENTRE OF SPAN	NO. OF MAIN BARS CRANKED UP AT EACH END	DIAMETER	SPACING CENTRES IN THE CENTRAL PORTION OF SPAN	AREA PER FOOT WIDTH
FEET	INCH-LBS.	POUNDS	INCHES	INCHES	INCHES	INCHES	SQ. INCHES	NOS.	INCHES	INCHES	SQ. INCHES
S	M	V	H	d	D		AS			e	
3	34,000	3,970	7.00	5.75	3/8	3 1/2	0.408	NIL	3/8	7	0.189
4	46,000	4,440	7.00	5.75	1/2	4 1/4	0.554	NIL	1/2	9 3/4	0.241
5	56,000	4,520	8.00	6.75	1/2	4	0.586	1 IN EVERY 4	1/2	9 1/2	0.250
6	102,000	5,670	9.50	8.19	5/8	4 1/2	0.818	1 " " 4	1/2	7 1/2	0.314
7	121,000	6,050	10.25	8.94	5/8	4 1/4	0.868	1 " " 4	1/2	7 1/2	0.314
8	147,000	6,250	11.25	9.94	5/8	3 3/4	0.982	1 " " 4	1/2	7 1/2	0.314
9	170,000	6,590	12.00	10.62	3/4	5	1.060	1 " " 4	1/2	7 1/4	0.325
10	204,000	6,660	13.00	11.62	3/4	4 3/4	1.120	1 " " 4	1/2	7 1/4	0.325
12	273,000	7,210	15.00	13.62	3/4	4	1.325	1 " " 2	5/8	10 1/2	0.351
14	351,000	7,660	16.75	15.37	3/4	3 1/2	1.510	1 " " 2	5/8	9 3/4	0.378
15	391,000	7,980	17.75	16.25	1	6	1.570	1 " " 2	5/8	9 1/2	0.388
16	437,000	8,310	18.50	17.00	1	5 3/4	1.640	1 " " 2	5/8	9 1/4	0.398
18	526,000	8,930	20.25	18.75	1	5 1/4	1.795	1 " " 2	5/8	9	0.409
20	628,000	9,550	22.00	20.50	1	4 3/4	1.983	1 " " 2	5/8	8 3/4	0.421
22	742,000	10,330	23.75	22.25	1	4 1/4	2.216	1 " " 2	5/8	8 1/2	0.433
24	866,000	11,170	25.50	24.00	1	4	2.356	1 " " 2	3/4	11 1/2	0.462
25	935,000	11,310	26.50	25.00	1	3 3/4	2.510	1 " " 2	3/4	11 1/2	0.462

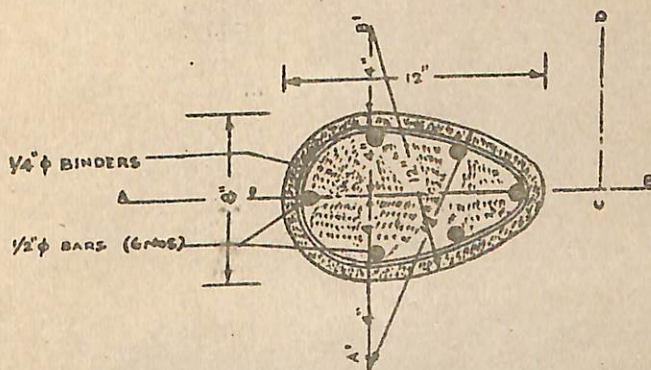
DESIGN LOADING — I. R. C. STANDARD — CLASS 'A' (REVISED 1947) WHEEL LOAD TRAIN.
 DESIGN STRESSES — CONCRETE — 750 LBS. PER SQ. INCH; STEEL 18,000 LBS. PER SQ. INCH.
 MODULAR RATIO — FIXED 15

- NOTES:— 1. THE DESIGN TABLES APPLY TO SLABS OF BRIDGES AND CULVERTS WITH A CLEAR ROAD WIDTH OF NOT LESS THAN 2 TRAFFIC LANES.
 2. MAIN REINFORCEMENT GOVERNED BY BOND AND SHEAR CONSIDERATIONS UP TO SPANS OF 4 FT.
 3. IN TABLE B, THE VALUES OF BENDING MOMENT FOR SPANS UP TO 5 FT. AND VALUES OF SHEAR FOR SPANS UP TO 12 FT. HAVE BEEN KEPT FOR CONVENIENCE THE SAME AS IN TABLE 'A' ALTHOUGH FOR A 9" WEARING COAT, ACTUAL REQUIREMENTS WOULD BE SOMEWHAT LESS OWING TO DISPERSION EFFECT.
 4. THE NUMBER OF MAIN BARS TO BE BENT UP TOWARDS THE SUPPORTS SHOULD NOT EXCEED THAT INDICATED IN THE TABLES. THE NUMBER HAS BEEN SO FIXED AS TO KEEP BOND AND TENSILE STRESSES ON THE RESIDUAL BOTTOM BARS WITHIN THE PERMISSIBLE LIMITS.
 5. THE AREA OF DISTRIBUTION REINFORCEMENT SHOULD BE 100/π PERCENT OF THE AREA OF THE MAIN REINFORCEMENT DISTRIBUTION BARS SHOULD BE SECURELY WELDED OR WIRED TO THE MAIN BARS AT EVERY ALTERNATE JOINT.
 6. IF FULL LENGTH BARS ARE NOT AVAILABLE AND JOINTS HAVE TO BE PROVIDED, LAP JOINTS OF LENGTH 40 D ARE PERMISSIBLE PROVIDED NO JOINT COMES OF MID SPAN AND ALL JOINTS ARE WELL STAGGERED.

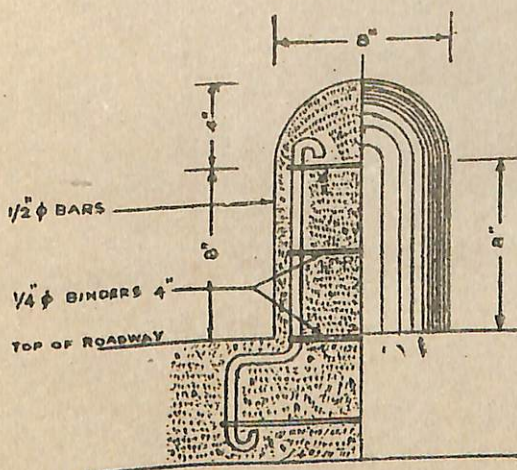
TABLES
 FOR FREELY SUPPORTED
 R. C. SLABS
 FOR
 BRIDGES AND CULVERTS
 CLEAR SPANS 3 FT. TO 25 FT.



SECTIONAL ELEVATION
SECTION ON A-B



SECTIONAL PLAN



SECTION ON A-B-C-D

NOTE:-

IF SEPARATE GUARD STONES
ARE REQUIRED (NOT CAST MONO-
LYTHIC WITH THE ROADWAY SLAB)
MAKE BASE MARKED
⊕ 18" x 14" x 6" DEEP.

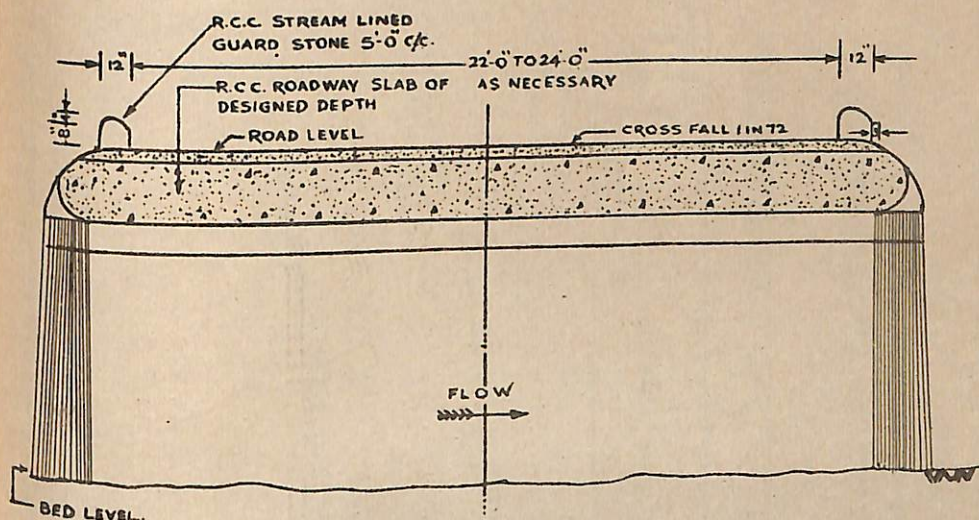
DETAILS OF R.C.C. STREAM LINED GUARD STONE

SCALE 0 6 INCHES

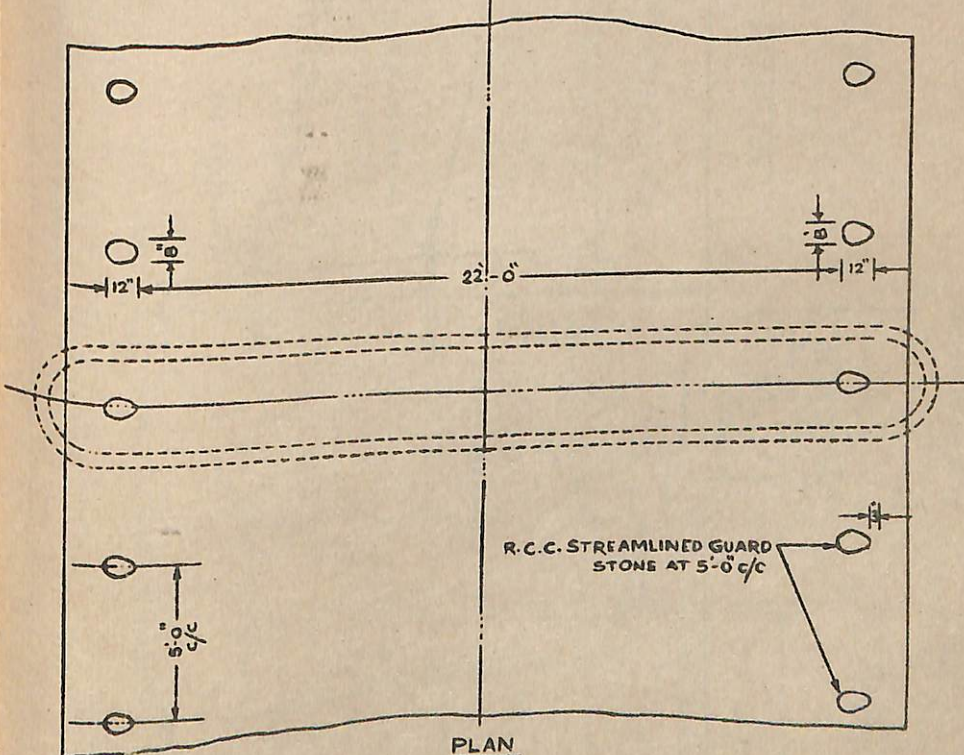
4/2 GHS
BY ENGR.

RAILINGS-(1) FOR LOW LEVEL CAUSEWAY.

PLATE NO. 22



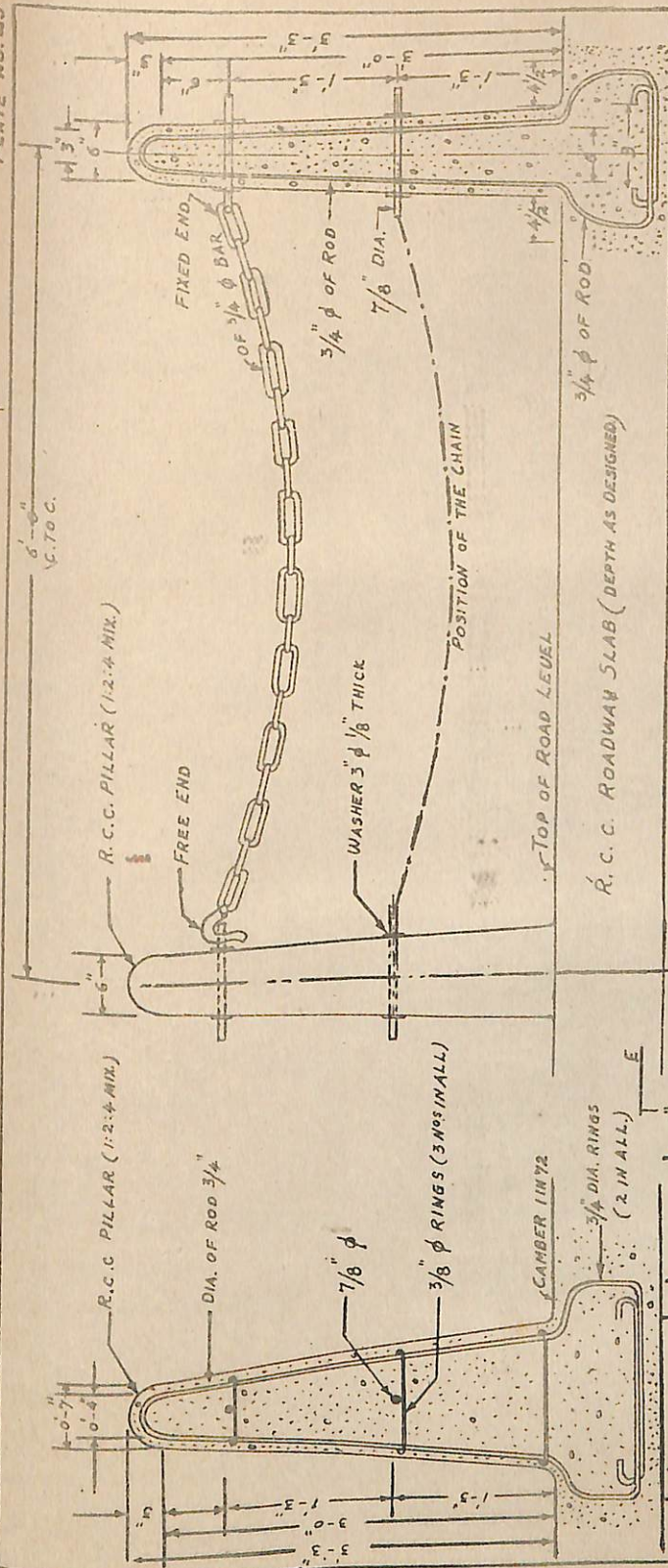
CROSS-SECTION.



PLAN

R.C.C. STREAM LINED GUARD STONES

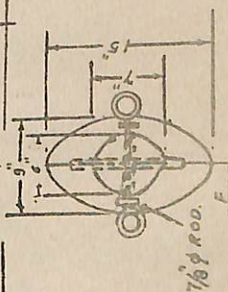
SCALE:- 1" = 4'-0"



PART ELEVATION PART SECTIONAL ELEVATION

DETAILS OF R.C.C. POST & CHAIN

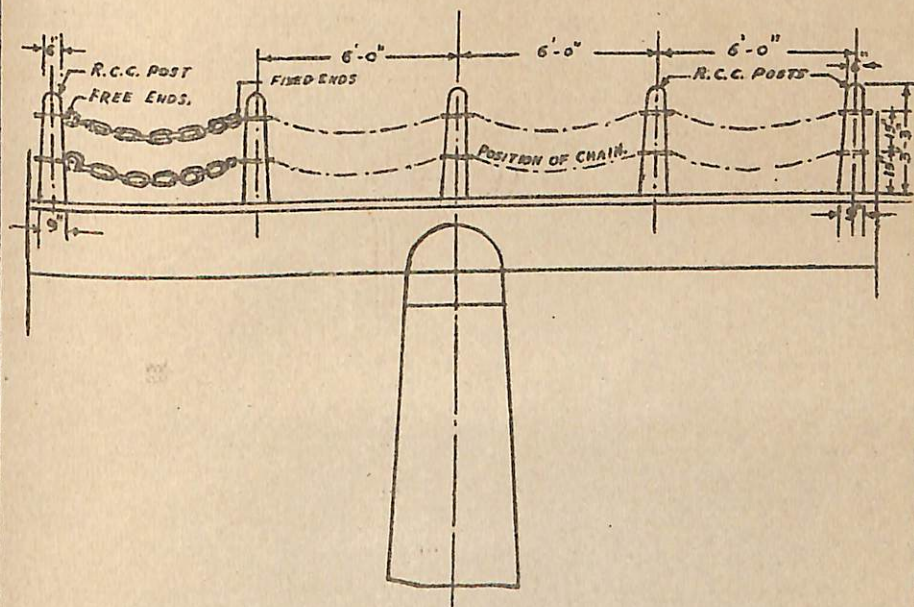
SCALE 0 1 FOOT



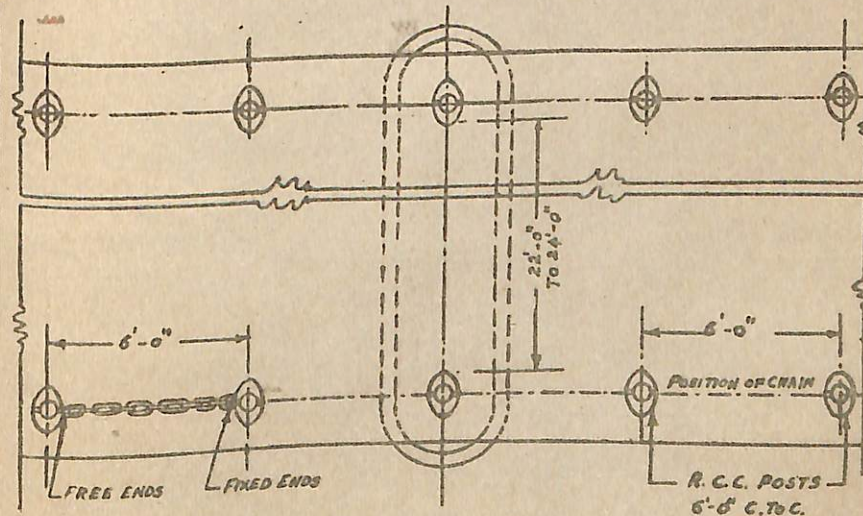
PART PLAN AT TOP

SECTION ON E F

RAILINGS:- (2) For SUBMERSIBLE BRIDGES



ELEVATION

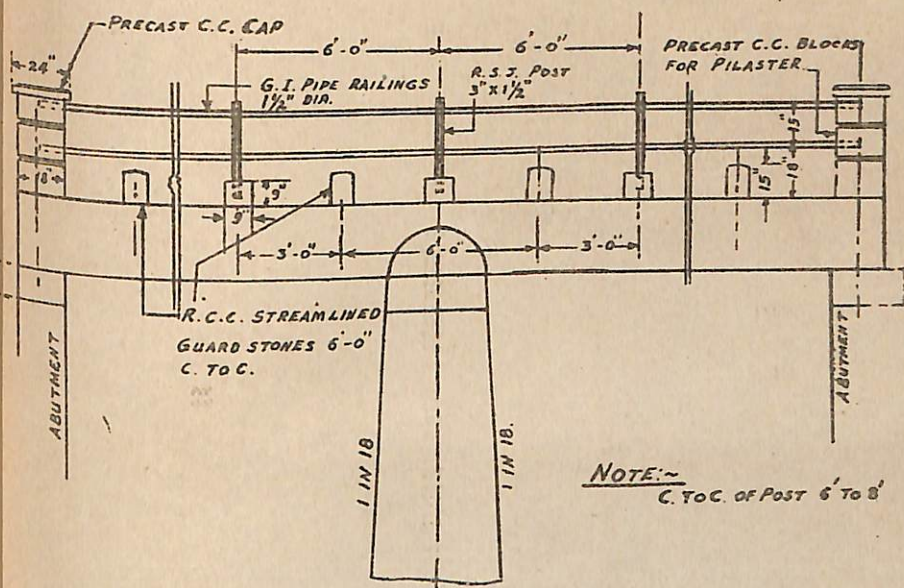


PLAN

R.C.C. POST & CHAIN TYPE RAILING

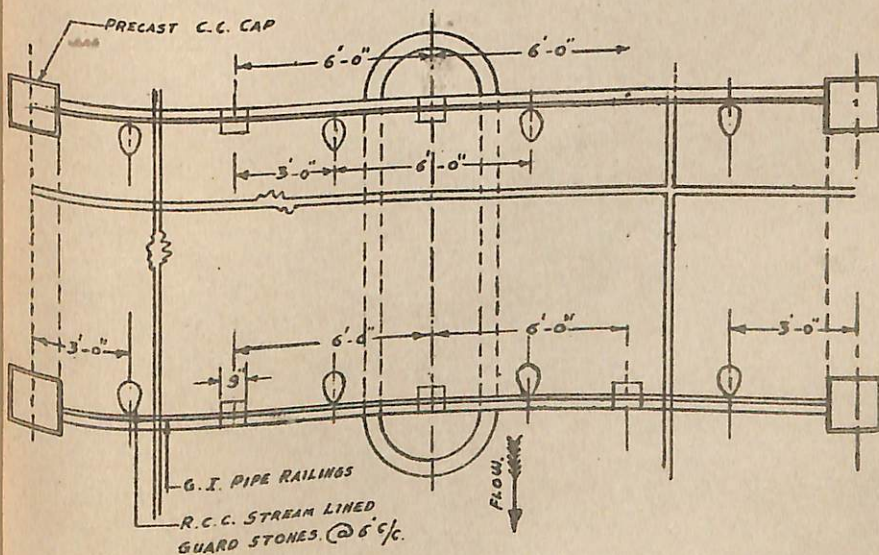
SCALE 0 4 FEET

RAILINGS:~ 3(a) SUBMERSIBLE BRIDGES.



NOTE:~
C.T.O.C. OF POST 6' TO 8'

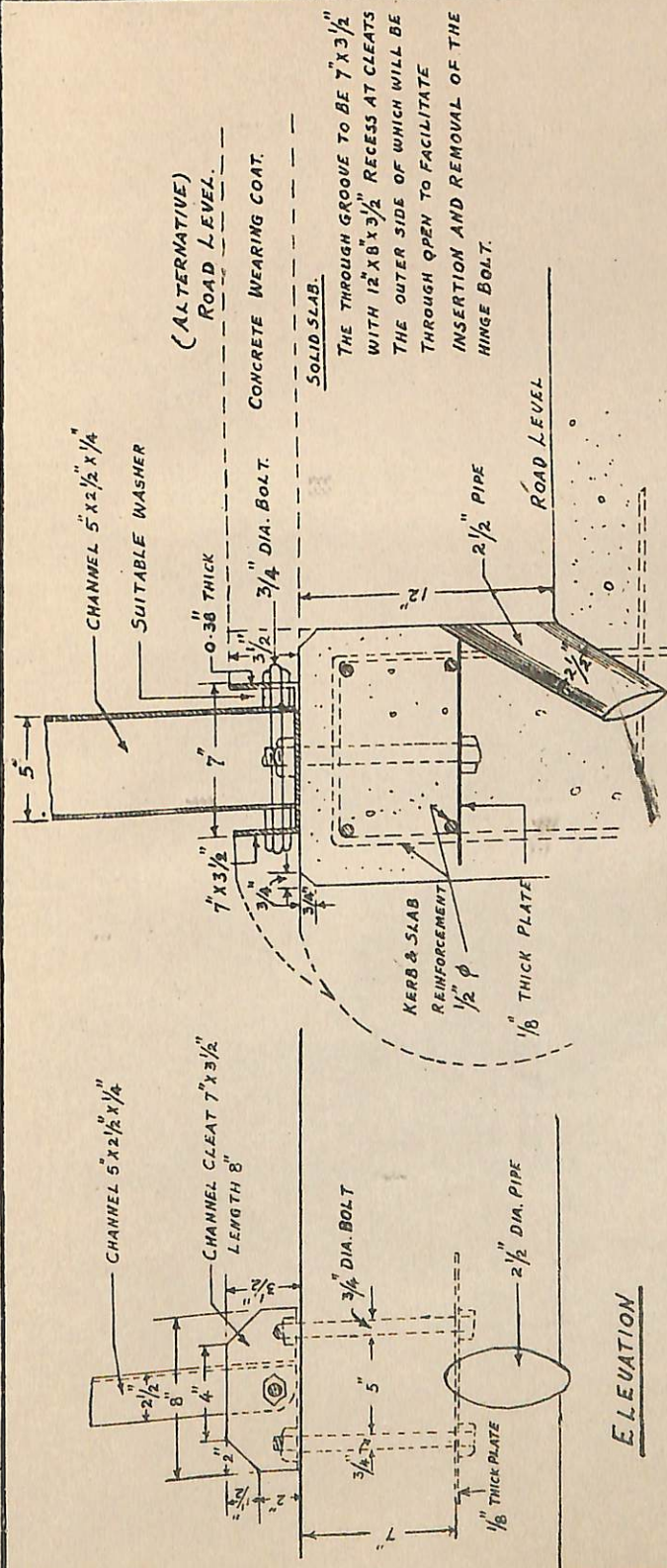
PART ELEVATION



PART PLAN

POST & PIPE TYPE OF RAILING WITH FIXED
STREAM LINED GUARD STONES

SCALE 0 4 FEET



NOTE: ~

THE TOP OF CHANNEL STANDARD WHEN COLLAPSED, WILL REST ON A STEEL PLATE 8"x7" FIXED ON TOP OF PARAPET IN THE SAME MANNER AS THE CHANNEL CLEAT 7"x3 1/2" IS SHOWN FIXED IN THIS DRAWING.

CROSS SECTION

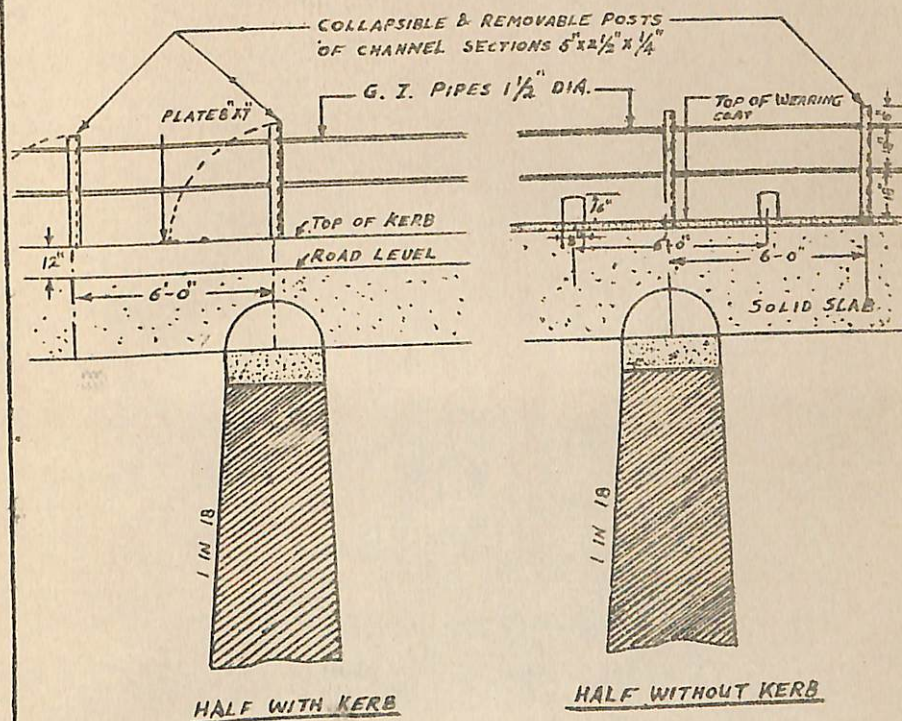
DETAILS SHOWING FIXING OF

COLLAPSIBLE POST.

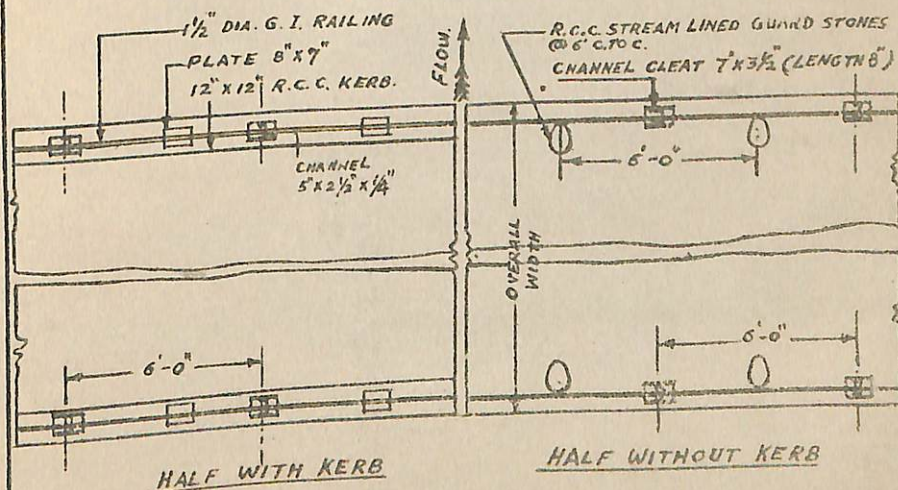
SCALE 6 INCHES

IV

RAILINGS: ~ 3 (b) SUBMERSIBLE BRIDGES.



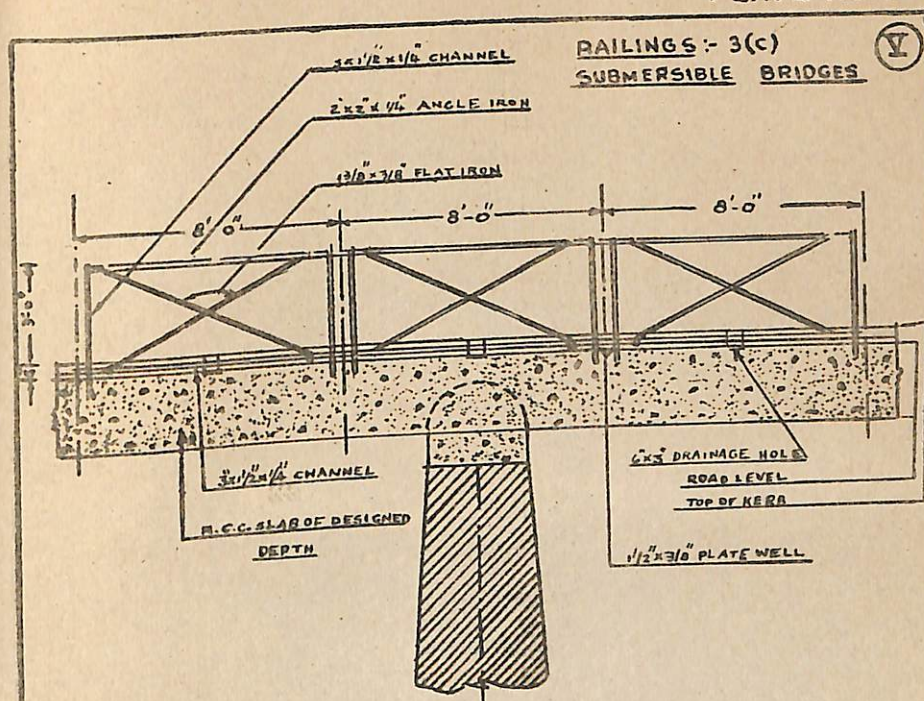
PART ELEVATION



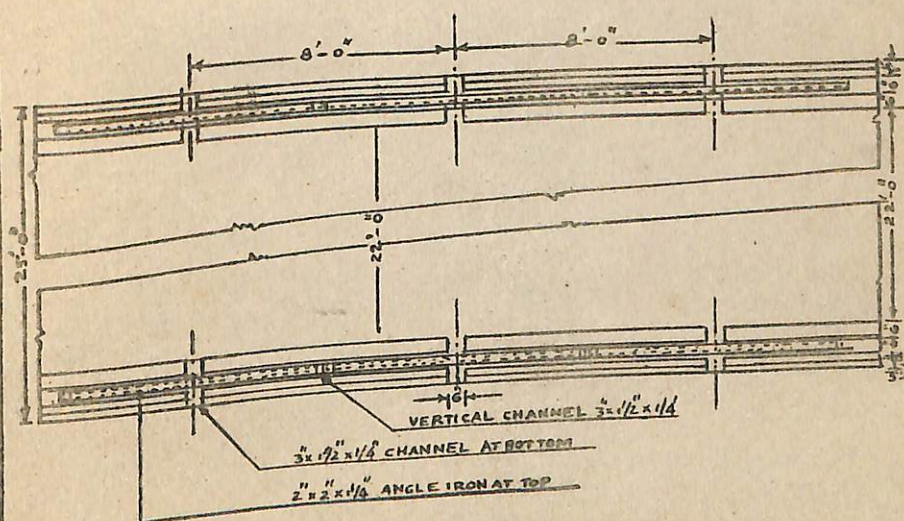
PART PLAN

COLLAPSIBLE & REMOVABLE POST & PIPE RAILING
FOR DECK WITH OR WITHOUT A KERB

SCALE 0 FEET



SECTIONAL ELEVATION

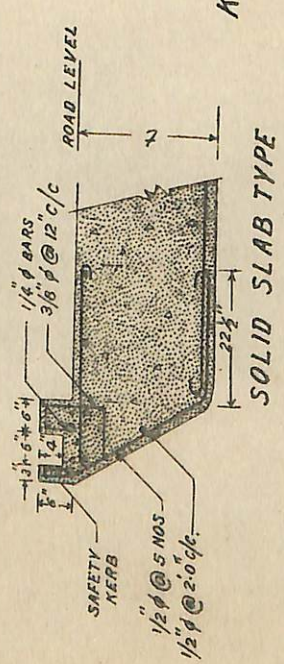
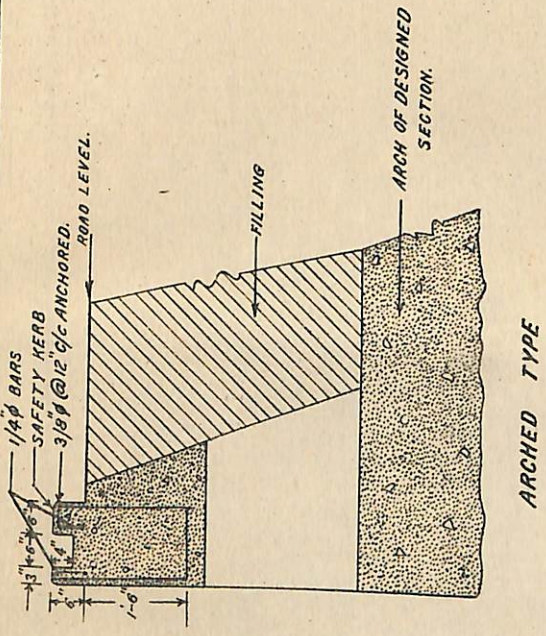
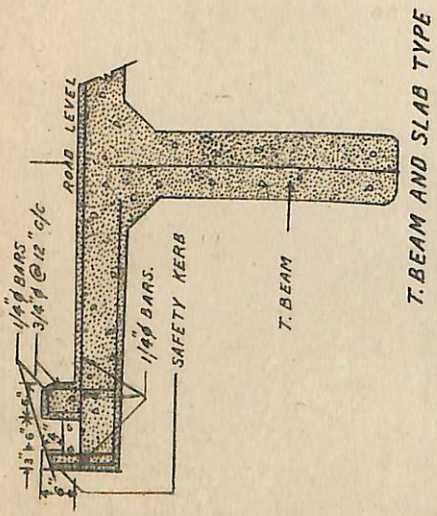


PLAN

COLLAPSIBLE RAILINGS WITH SAFETY KERB

SCALE 0 FEET





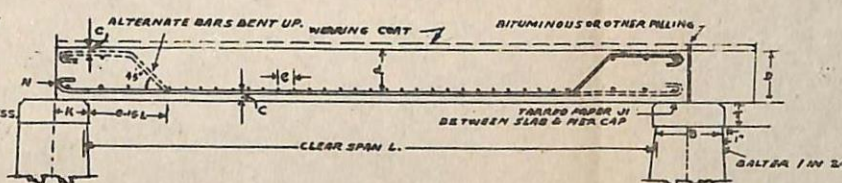
REINFORCEMENT DETAILS FOR SAFETY
KERBS FOR DIFFERENT TYPES OF BRIDGES.

SCALE:-1"=8'

TRACED BY:- S.S. GOLATKAR.
CHECKED BY:-

SYMBOLS:-

- C- CLEAR COVER 1" OR DIA. OF MAIN BAR WHICHEVER IS MORE
 N- END COVER OR CLEARANCE $1\frac{1}{2}$ " OR 2" DIA. OF MAIN BAR
 WHICHEVER IS MORE
 S- SPACING OF DISTRIBUTION BARS (FROM TABLES)
 L- EFFECTIVE SPAN $L+d$ OR c/c OF BEARING WHICHEVER IS LESS
 K- LENGTH OF BEARING
 T- DEPTH OF BEARING
 D- OVERALL DEPTH (FROM TABLES)
 d- EFFECTIVE DEPTH (FROM TABLES)
 DESIGN LOADING I.R.C. CLASS 'A.A.' (1 LANE)
 I.R.C. CLASS 'A' (2 LANES)

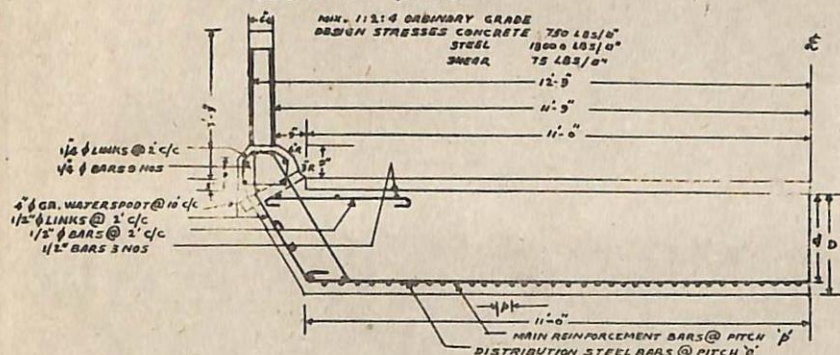


SEC. ELEVATION

NOTES:-

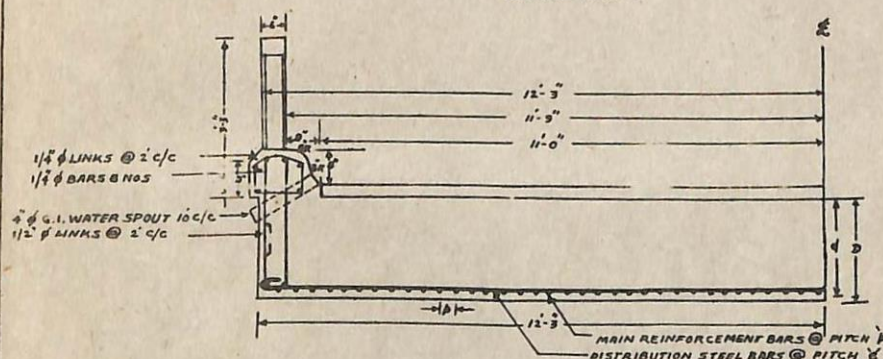
1) REINFORCEMENT:-

- (i) DISTRIBUTION BARS TO BE PLACED PARALLEL TO THE SUPPORT
 - (ii) THEY SHOULD BE SECURELY WELDED OR WIRED TO MAIN BARS AT EVERY ALTERNATE JOINT
 - (iii) IF FULL LENGTH OF BARS ARE NOT AVAILABLE AND JOINTS HAVE TO BE PROVIDED, LAP JOINTS OF LENGTH 48 TIMES THE DIAMETER PLUS USUAL HOOKS ARE PERMISSIBLE PROVIDED NO JOINT COMES AT OR NEAR MID SPAN AND ALL JOINTS ARE WELL STAGGERED
- 2)
- (i) SKEW ANGLE (IS ANGLE MADE BY FLOW LINE OF STREAM WITH THE PERPENDICULAR TO THE CENTRE LINE ALONG THE BRIDGE) NOT TO EXCEED 30 DEGREES.
 - (ii) B AND K ARE FOR PIERS UP TO A MAXIMUM HEIGHT OF 20 FT. FROM FOUNDATION TO PIER CAP PIERS:-
- 3)
- (i) FOR BRICK MASONRY PIERS, THE TOP WIDTH MAY IN MULTIPLES OF HALF BRICK LENGTH BE INCREASED TO NEXT HIGHER SIZE WHERE REQUIRED
 - (ii) PISRS TO HAVE SEMI-CIRCULAR COT AND EASE WATERS



WITH SPLAYED SIDES

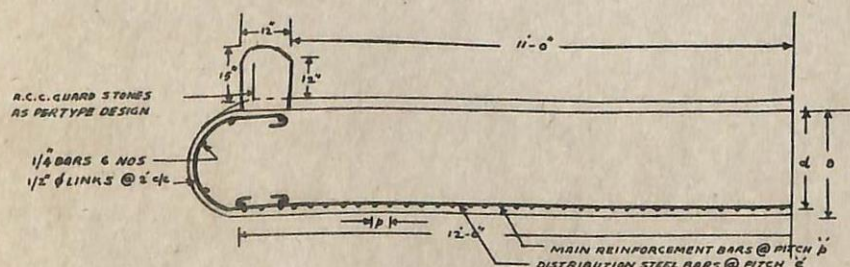
SCALE 1" = 2'-0"



WITHOUT SPLAY

FOR HIGH LEVEL BRIDGE

SCALE 1" = 2'-2"



WITHOUT SPLAY

FOR SUBMERSIBLE BRIDGE

SCALE 1" = 2'-2"

CROSS SECTIONS

SCALE 1" = 2'-2"

TABLE 'A' FOR HIGH LEVEL BRIDGE WITH SPLAYED SIDES

CLEAR SPAN IN FT.	OVERALL DEPTH OF SLAB INCL. WEARING COAT IN FEET	EFFECTIVE DEPTH OF SLAB EXCL. WEARING COAT IN INCHES	CLEAR COVER IN IN.	MAIN REINFORCEMENT				DISTRIBUTION				TOTAL STRENGTH FOR SPAN OF L+D TONS	TOTAL CONCRETE FOR SPAN OF L+D CFT.	WEAR & SPLAYED REINFORCEMENT LBS/FT OF KEYS	TOP WIDTH OF PIER	LENGTH OF BEARING		
				DIA.	PITCH	LENGTH INCLUDING HOOKS FOR SPAN L+D	TOTAL NOS.	WEIGHT INCL. IN L+D % WAS REINFORC	DIA.	PITCH	LENGTH INCLUDING HOOKS IN FT.						TOTAL NOS.	
L	B	C	C	D	E	F	G	H	I	J	K	L	M	N	O	P		
20	22	20.5	1"	1"	4 1/2"	24'-0"	53	1.78	5/8"	6"	22'-5"	45	0.50	2.28	960	7'-5"	2'-3"	1 1/2" - 1/2"
25	27	25.5	1"	1"	3 3/4"	29'-6"	71	2.61	3/4"	7"	25'-0"	40	0.77	0.80	1050	7'-6"	2'-6"	1" - 3/2"
30	31	29.375	1 1/4"	1 1/4"	5"	34'-6"	53	3.55	3/4"	6 1/2"	23'-0"	61	0.90	4.53	1970	8'-2"	2'-6"	1" - 3/2"

TABLE 'B' FOR HIGH LEVEL BRIDGE WITHOUT SPLAY

20	22	20.5	1"	1"	5"	24'-0"	60	1.00	5/8"	6 1/2"	25'-3"	42	0.62	2.32	1000		3'-6"	2'-3"	1'-2 1/2"
25	27	25.5	1"	1"	4"	29'-6"	75	2.75	3/4"	8"	25'-6"	42	0.75	3.50	1810		3'-6.5"	2'-6"	1'-3 1/2"
30	31	29.375	1 1/4"	1 1/4"	5 3/4"	34'-6"	52	3.50	3/4"	7"	25'-6"	57	1.14	4.64	2050		3'-8"	2'-6"	1'-2 1/2"

TABLE 'C' FOR SUBMERSIBLE BRIDGE

20	22	20.6	1"	1"	5"	24'-9"	58	1.00	5/8	6 1/2	25'-3"	42	0.62	2.32	1070		3'-7 1/2"	3'-0"	1'-6"
25	27	25.5	1"	1"	4"	30'-0"	73	2.73	3/4	8"	26'-6"	42	0.75	3.08	1620		3'-9"	3'-0"	1'-6"
30	31	29.375	1 1/4"	1 1/4"	5 3/4"	35'-0"	51	3.48	3/4	7"	25'-6"	57	1.14	4.62	2120		4'-0"	3'-0"	1'-6"

* THESE LENGTHS ARE FOR RIGHT ANGLED CROSSING
 IN CASE OF SKEW BRIDGES THESE LENGTHS
 SHOULD BE INCREASED TO THE EXTENT OF THE SKEW ANGLE

NOTE:-

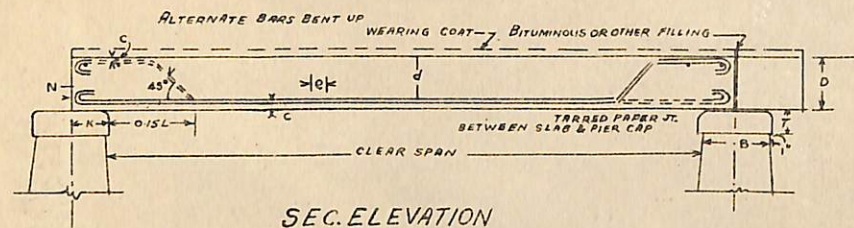
- 1 IN CASE OF SKEW BRIDGES MAIN REINFORCEMENT SHALL BE LAID PARALLEL TO THE CENTRE LINE OF ROAD WAY AND DISTRIBUTION REINFORCEMENT PARALLEL TO SUPPORTS
- 2 ONLY "TESTED MILD STEEL BARS" SHALL BE USED IN REINFORCEMENT
- 3 IN CASE UNTESTED STEEL BARS HAVE TO BE USED, SUCH BARS SHALL HAVE TO PASS THE COLD BEND TEST AS SPECIFIED IN THE ACCOMPANYING APPENDIX AND SUBJECT TO PASSING THE TEST, THE NUMBER OF BARS MENTIONED IN TABLES 'A', 'B', AND 'C' ABOVE SHALL BE INCREASED BY 20% AND THE PITCH OF REINFORCEMENT SUITABLY ADJUSTED. THE STRESS IN CONCRETE SHALL NOT REQUIRE ANY CHANGE IN NO CASE SHOULD REBOLLED BARS BE USED IN THESE DESIGNS EVEN IF THEY PASS THE COLD BEND TEST.

DESIGNS DIVISION P.W.D.

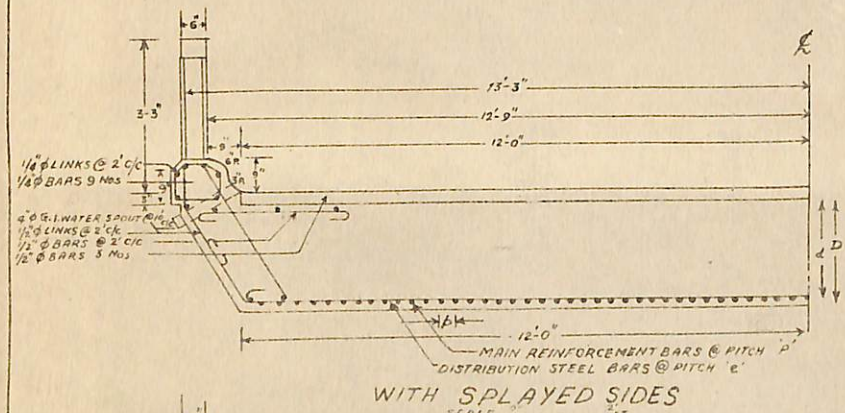
 TABLES FOR FREELY
 SUPPORTED
 R.C.C. SLABS (S.H. & M.D.R.)

 CLEAR SPAN
 20' 25' & 30'

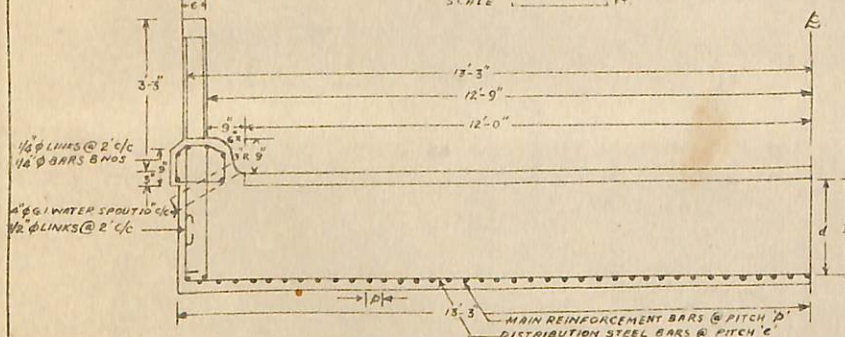
SCALE 1" = 2'-2"



SEC. ELEVATION



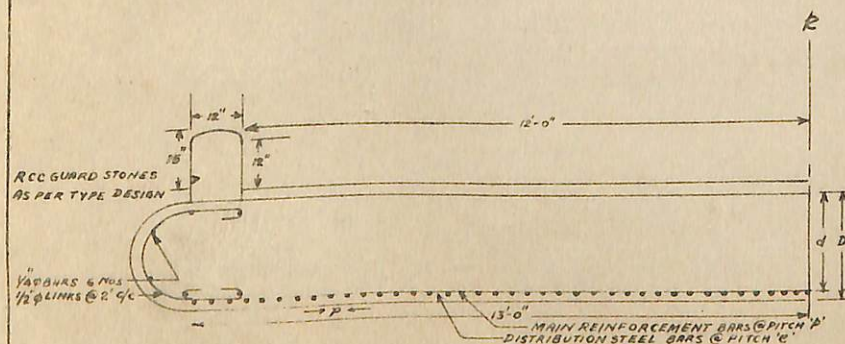
WITH SPLAYED SIDES



WITHOUT SPLAY

FOR HIGH LEVEL BRIDGE

SCALE 1" = 1 FT.



WITHOUT SPLAY

FOR SUBMERSIBLE BRIDGE

SCALE 1" = 1 FT.

CROSS SECTIONS

SCALE 1" = 1 FT.

SYMBOLS

C - CLEAR COVER / OR DIA OF MAIN BAR WHICHEVER IS MORE
N - END COVER OR CLEARANCE 1/2" OR 2x DIA. OF MAIN BARS
WHICHEVER IS MORE.

E - SPACING OF DISTRIBUTION BARS (FROM TABLES)

L - EFFECTIVE SPAN L + D OR C/C OF BEARING

WHICHEVER IS LESS.

R - LENGTH OF BEARING

T - DEPTH OF BEARING

D - OVERALL DEPTH (FROM TABLES)

d - EFFECTING DEPTH (FROM TABLES)

DESIGN LOADING I.R.C. CLASS 'AA' (1 LANE)

" " I.R.C. CLASS 'A' (2 LANES)

MIX 1:2:4 ORDINARY GRADE

DESIGN STRESSES CONCRETE 750 LBS/SQ.

STEEL 18000 LBS/SQ.

SHEAR 75 LBS/SQ.

NOTE

1 REINFORCEMENT:

(i) DISTRIBUTION BARS TO BE PLACED PARALLEL TO THE SUPPORT.
(ii) THEY SHOULD BE SECURELY WELDED OR WIRED TO MAIN BARS
AT EVERY ALTERNATE JOINT.

(iii) IF FULL LENGTH OF BARS ARE NOT AVAILABLE AND JOINTS
HAVE TO BE PROVIDED, LAP JOINTS OF LENGTH 45 TIMES
THE DIAMETER PLUS USUAL HOOKS ARE PERMISSIBLE
PROVIDED NO JOINT COMES AT OR NEAR MID SPAN AND
ALL JOINTS ARE WELL STAGGERED.

2 (i) SKEW ANGLE (i.e. ANGLE MADE BY FLOW LINE OF STREAM
WITH THE PERPENDICULAR TO THE CENTRE LINE ALONG
THE BRIDGE) NOT TO EXCEED 30 DEGREES.

(ii) B AND K ARE FOR PIERS UP TO A MAXIMUM HEIGHT OF 20 FT.
FROM FOUNDATION TO PIER CAP

3 PIERS:-

(i) FOR BRICK MASONRY PIERS, THE TOP WIDTH MAY IN MULTIPLES OF
HALF BRICK LENGTH BE INCREASED TO NEXT HIGHER SIZE

(ii) PIERS TO HAVE SEMI-CIRCULAR CUT AND EASE WATERS

TABLE 'A' FOR HIGH LEVEL BRIDGE WITH SPLAYED SIDES

TABLE A FOR HIGH LEVEL BRIDGE PIER REINFORCEMENT																		
CLEAR SPAN IN FT.	OVERALL DEPTH OF SLAB EXCL WEARING COAT INCHES	EFFECTIVE DEPTH OF SLAB EXCL WEARING COAT INCHES	CLEAR COVER IN	MAIN REINFORCEMENT				DISTRIBUTION				TOTAL STEEL REQD. PER SPAN OF L+B TONS	TOTAL CONCRETE FOR SPAN OF L+B CU. FT.	WEIR AND SPLAYED REINFORCEMENT LBS/FT. OF WEIR	TOP WIDTH OF PIER	LENGTH OF BEARIN		
				DIA	PITCH	LENGTH INCLUDING HOOKS FOR SPAN L+B	TOTAL WEIGHT INCL SHEAR TONS	DIA	PITCH	LENGTH INCLUDING HOOKS	TOTAL WEIGHT INCL SHEAR TONS							
L	D	d	C	P	P	L	W	D	P	L	W	A+B	C	B	B	K		
20	22	20.5	1"	1"	5"	24'-0"	58	1-75	5/8"	6 1/2"	24'-9"	43	0.52	2-27	1030	7-5	2'-3"	1-2 1/2"
25	27	25.5	1"	1"	4"	29'-6"	73	2-68	3/4"	7 1/2"	25'-0"	45	0.79	3-47	1580	7-6	2'-6"	1'-3 1/2"
30	31	29.575	1 1/4"	1 1/4"	5 1/2"	34'-6"	53	3-60	3/4"	6 1/2"	25'-0"	61	1.07	4-67	2140	8-2	2'-6"	1'-3 1/2"

TABLE 'B' FOR HIGH LEVEL BRIDGE WITHOUT SPLAY

20	22	20.5	1"	1"	5"	24'-0"	65	1-84	5/8"	6 1/2"	27'-3"	42	0-56	2-40	1080	3-6	2'-3"	1'-2 1/2"
25	27	25.5	1"	1"	4"	29'-6"	80	2-95	3/4"	8"	21'-5"	42	0-81	3-76	1640	3-65	2'-6"	1'-3 1/2"
30	31	29-375	1 1/4"	1 1/4"	6"	34'-6"	54	3-65	3/4"	7 1/2"	27'-6"	53	1-02	4-67	2220	3-8	2'-6"	1'-3 1/2"

TABLE 'C' FOR SUBMERSIBLE BRIDGE

20	22	20.5	1"	1"	5"	24'-0"	64	1.92	5/8"	6 1/2"	27'-3"	44	0.59	2.51	1160	3.75	3'-0"	1'-6"
25	27	25.5	1"	1"	4"	29'-6"	79	2.94	3/4"	8"	27'-6"	43	0.84	3.78	1740	3.9	3'-0"	1'-6"
30	31	29.375	1 1/4"	1 1/4"	6"	34'-6"	53	3.60	3/4"	7 1/2"	27'-6"	54	1.05	4.65	2390	4.0	3'-0"	1'-6"

X THESE LENGTHS ARE FOR RIGHT ANGLED CROSSING
IN CASE OF SKEW BRIDGES THESE LENGTHS
SHOULD BE INCREASED TO THE EXTENT OF THE SKEW ANGLE

NOTE:-

1. IN CASE OF SKEW BRIDGES MAIN REINFORCEMENT SHALL
BE LAID PARALLEL TO THE CENTRE LINE OF ROAD WAY AND
DISTRIBUTION REINFORCEMENT PARALLEL TO SUPPORTS.

2. ONLY "TESTED MILD STEEL BARS" SHALL BE USED IN
REINFORCEMENT.

3. IN CASE UNTESTED STEEL BARS HAVE TO BE USED, SUCH
BARS SHALL HAVE TO PASS THE COLD BEND TEST AS
SPECIFIED IN THE ACCOMPANYING APPENDIX AND SUBJECT
TO PASSING THE TEST, THE NUMBER OF BARS MENTIONED
IN TABLES 'A', 'B' AND 'C' ABOVE SHALL BE INCREASED
BY 20% AND THE PITCH OF REINFORCEMENT SUITABLY
ADJUSTED. THE STRESS IN CONCRETE SHALL NOT REQUIRE
ANY CHANGE, IN NO CASE SHOULD REROLLED BARS BE
USED IN THESE DESIGNS EVEN IF THEY PASS THE
COLD BEND TEST.

DESIGN'S DIVISION P.W.D.

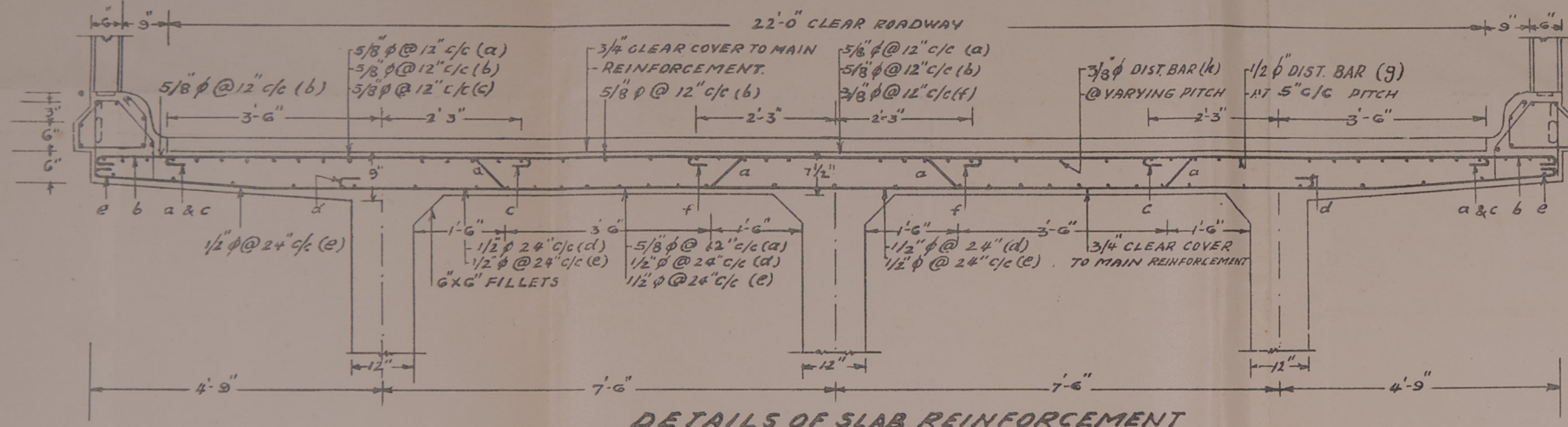
 TABLES FOR FREELY
SUPPORTED

R.C.C. SLABS (N.H.)

 CLEAR SPAN
20 FT 25 FT & 30 FT.

SCALE 1" = 1 FT.

S.No 275 OF 55



NO	MARK	SHAPE
1	a	5/8" dia
2	b	5/8" dia
3	c	5/8" dia
4	d	5/8" dia
5	e	5/8" dia
6	f	5/8" dia
7	g	5/8" dia
8	h	5/8" dia

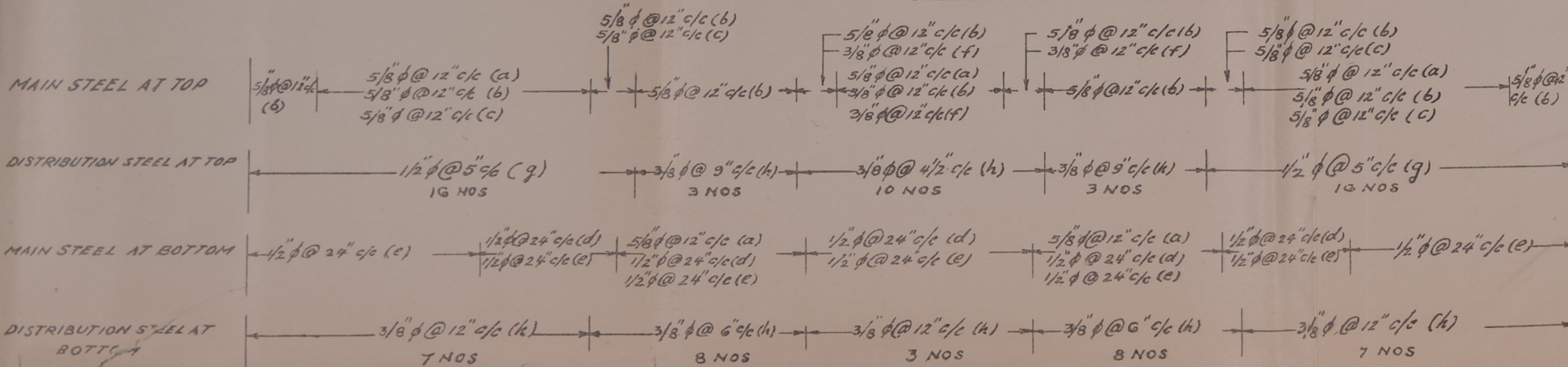
SCHEDULE OF REINFORCEMENT
(FOR 12 FT LENGTH OF SLAB)

MARK (NOT TO SCALE)	LENGTH INCL HOOKS	NOS REQD	TOTAL LENGTH	DIA.	WT/ RFT LBS	TOTAL WEIGHT LBS
1	23'-9"	12	285'-0"	5/8"	1.043	297
2	25'-3"	12	303'-0"	5/8"	"	315
3	7'-0"	12X2	168'-0"	5/8"	"	175
4	17'-0"	6	102'-0"	1/2"	0.668	68
5	25'-6"	6	153'-0"	1/2"	"	102
6	5'-3"	12	63'-0"	3/8"	0.376	24
7	12'	32	384'-0"	1/2"	0.668	256
8	12'	49	588'-0"	3/8"	0.376	221

TOTAL 1458 LBS
ADD 10% WASTAGE 146 LBS
1604 LBS
STEEL PER RFT = 1604
OF SLAB 12X22X40
= 0.0597 TONS
SAY = 0.06 TON/15

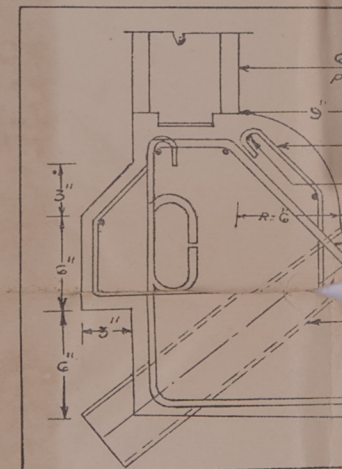
- NOTE:-**
- LOADINGS:- i) I.R.C CLASS A' DOUBLE LANE
ii) I.R.C CLASS AA' SINGLE LANE
 - STRESSES:- i) CONCRETE 950 LBS/SQ IN (COMP)
ii) STEEL:- 18000 LBS/SQ IN (TENS)
 - MIX:- 1:2:4 HIGH GRADE
 - CLEAR COVER 3/4" FOR TOP AND BOTTOM
 - THICKNESS OF SLAB:- i) CANTILEVER END - 6"
ii) SUPPORT - 9"
iii) INNER PANELS 7 1/2"
- FOR DETAILS OF PARAPET SEE TYPE DESIGN

NOTE:-
THE DIMENSIONS OF BARS AS APPEARING IN THE SCHEDULE THOUGH EXACT FOR THE PURPOSE OF ESTIMATING STEEL QUANTITIES ARE TO BE TAKEN AS APPROXIMATE ONLY FOR BENDING OF BARS. FULL SCALE ELEVATIONS FOR THE BARS SHOULD FIRST BE LINED OUT ON A PLANE PLASTERED FLOOR TO EXACT DIMENSIONS SO AS TO GET THE EXACT CLEARANCES BETWEEN DIFFERENT BARS AND THEN BARS BENT EXACTLY TO THESE EXACT SHAPES AND SIZES.



QUANTITIES PER RUNNING FOOT OF DECK.

- | | |
|---|-----------|
| 1) C.C (1:2:4) HIGH GRADE WITHOUT FILLETS | 15.32 CFT |
| 2) M.S. REINFORCEMENT (TESTED) FOR SLAB | 0.06 TON. |
| 3) M.S. REINFORCEMENT (TESTED) FOR KERB | 10 LBS. |



SCHEDULE OF REINFORCEMENT FOR KERB (10 FT LENG OF BRIDGE)

MARK	SHAPE (NOT TO SCALE)	LENGTH INCL HOOKS	NOS REQD	TOTAL LENGTH	DIA.	WT/ RFT LBS	TOTAL WT.
X	1/4" LINKS 'X' @ 2'0" c/c	3'-3"	5X2	32'-6"	1/4"	0.167 LBS	542 LBS
Y	3/8" STIRRUPS 'Y' @ 2'0" c/c	5'-3"	5X2	52'-6"	1/2"	0.668 LBS	35.06
Z	3" C.C (1:2:4) WEARING COAT	10'-0"	8X2	160'-0"	3/8"	0.376 LBS	60.16

STEEL PER RFT OF BRIDGE = 10.0 LBS

DETAILS OF KERB.
SCALE: 1/2" = 1'-0"

CHIEF ENGINEER TO GOVT. (R. & B) A.W.D. BOMBAY

EXECUTIVE ENGINEER DESIGNS DN. No 2

REVISIONS	FILE NO.	DESIGN DIVISION
DRN.	10/11/55	
TRD.	10/11/55	
CHD.	10/11/55	
D.E.	10/11/55	

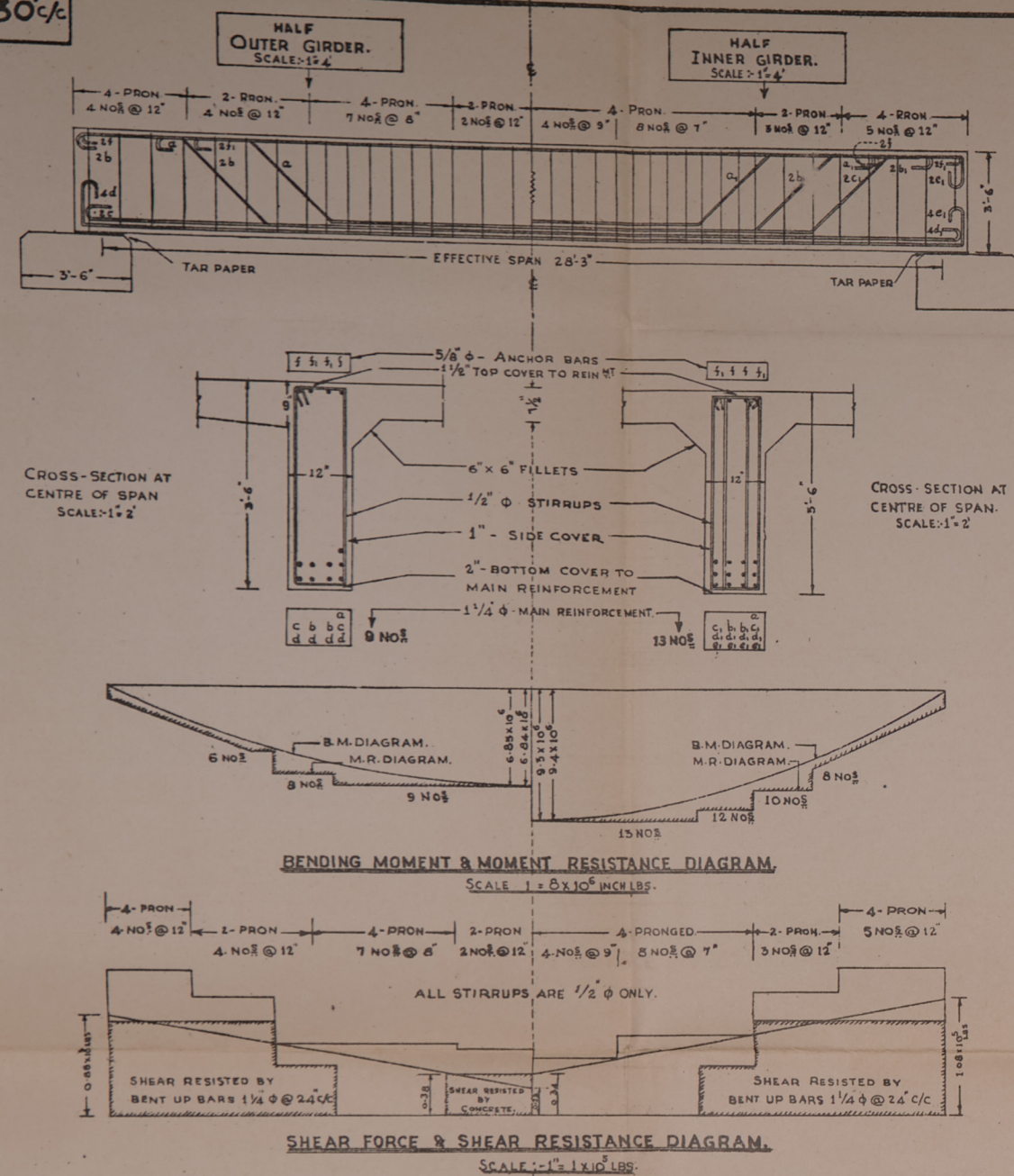
TYPE PLAN
FOR
R.C.C. DECK SLAB
(22' FT CLEAR ROADWAY)

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

DRG No T-45/55

G.P.Z.F. POONA, 1950

SPAN 30'C/C



FOR 30' C
SPAN.

STEEL — SCHEDULE.

OUTER-GIRDER.

NO. OF BARS	SHAPE OF BAR (NOT TO SCALE)	LENGTH IN FEET	NO.	TOTAL LENGTH	DIA.	WT./FT.	TOTAL WEIGHT.
a		30'-0"	1	30'	1 1/2"		
b		35'-0"	2	70'	1 1/2"		
c		30'-0"	3	63'	1 1/2"	4.172	
d		30'-0"	4	120'	1 1/2"	4.172	
e		30'-0"	5	150'	1 1/2"	4.172	
f		30'-0"	6	180'	1 1/2"	4.172	
g		30'-0"	7	210'	1 1/2"	4.172	
h		30'-0"	8	240'	1 1/2"	4.172	
i		30'-0"	9	270'	1 1/2"	4.172	
j		30'-0"	10	300'	1 1/2"	4.172	
k		30'-0"	11	330'	1 1/2"	4.172	
l		30'-0"	12	360'	1 1/2"	4.172	
m		30'-0"	13	390'	1 1/2"	4.172	
n		30'-0"	14	420'	1 1/2"	4.172	
o		30'-0"	15	450'	1 1/2"	4.172	
p		30'-0"	16	480'	1 1/2"	4.172	

TOTAL = 1684.01BS

+ 8% FOR WASTAGE ETC. 84.2"

GRAND TOTAL 1768.21BS

OR 0.789 TONS/GIRDER/SPAN.

OUTER-GIRDER.

NO. OF BARS	SHAPE OF BAR (NOT TO SCALE)	LENGTH IN FEET	NO.	TOTAL LENGTH	DIA.	WT./FT.	TOTAL WEIGHT
a		30'-0"	1	30'	1 1/2"	4.172	
b		35'-0"	2	70'	1 1/2"	"	
c		30'-0"	3	93'	1 1/2"	"	
d		30'-0"	4	120'	1 1/2"	"	
e		30'-0"	5	143'	1 1/2"	"	
f		30'-0"	6	165'	1 1/2"	"	
g		30'-0"	7	187'	1 1/2"	"	
h		30'-0"	8	209'	1 1/2"	"	
i		30'-0"	9	231'	1 1/2"	"	
j		30'-0"	10	253'	1 1/2"	"	
k		30'-0"	11	275'	1 1/2"	"	
l		30'-0"	12	297'	1 1/2"	"	
m		30'-0"	13	319'	1 1/2"	"	
n		30'-0"	14	341'	1 1/2"	"	
o		30'-0"	15	363'	1 1/2"	"	
p		30'-0"	16	385'	1 1/2"	"	

TOTAL = 2657.91BS

+ 8% FOR WASTAGE ETC. 132.81BS

GRAND TOTAL = 2790.71BS

OR 1.245 TONS/GIRDER/SPAN.

INNER-GIRDER.

NO. OF BARS	SHAPE OF BAR (NOT TO SCALE)	LENGTH IN FEET	NO.	TOTAL LENGTH	DIA.	WT./FT.	TOTAL WEIGHT
a		28'-5"	1	28'-5"	1 1/2"	4.172	
b		33'-0"	2	66'-0"	1 1/2"	"	
c		37'-0"	2	74'-0"	1 1/2"	"	
d		37'-0"	4	128'-0"	1 1/2"	"	
e		37'-0"	4	137'-0"	1 1/2"	"	
f		37'-0"	4	146'-0"	1 1/2"	"	
g		37'-0"	6	222'-0"	1 1/2"	"	
h		37'-0"	4	124'-0"	5/8"	1.043	
i		37'-0"	6	222'-0"	5/8"	1.043	
j		37'-0"	31	825'-0"	5/8"	1.043	
k		37'-0"	31	825'-0"	5/8"	1.043	
l		37'-0"	31	825'-0"	5/8"	1.043	
m		37'-0"	31	825'-0"	5/8"	1.043	
n		37'-0"	31	825'-0"	5/8"	1.043	
o		37'-0"	31	825'-0"	5/8"	1.043	
p		37'-0"	31	825'-0"	5/8"	1.043	

TOTAL = 2324.5 LBS.

+ 8% FOR WASTAGE ETC. = 116.2 LBS.

GRAND TOTAL = 2440.7 LBS.

OR 1.09 TONS/GIRDER/SPAN.

INNER-GIRDER.

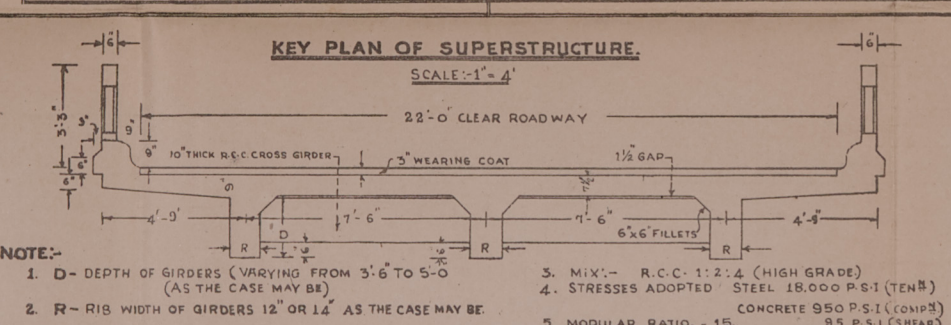
NO. OF BARS	SHAPE OF BAR (NOT TO SCALE)	LENGTH IN FEET	NO.	TOTAL LENGTH	DIA.	WT./FT.	TOTAL WEIGHT
a		38'-5"	1	38'-5"	1 1/2"	4.172	
b		42'-0"	2	84'-0"	1 1/2"	"	
c		44'-0"	2	88'-0"	1 1/2"	"	
d		48'-0"	2	96'-0"	1 1/2"	"	
e		48'-0"	3	120'-0"	1 1/2"	"	
f		48'-0"	5	240'-0"	1 1/2"	"	
g		48'-0"	5	240'-0"	1 1/2"	"	
h		48'-0"	5	240'-0"	1 1/2"	"	
i		48'-0"	5	240'-0"	1 1/2"	"	
j		48'-0"	5	240'-0"	1 1/2"	"	
k		48'-0"	5	240'-0"	1 1/2"	"	
l		48'-0"	5	240'-0"	1 1/2"	"	
m		48'-0"	5	240'-0"	1 1/2"	"	
n		48'-0"	5	240'-0"	1 1/2"	"	
o		48'-0"	5	240'-0"	1 1/2"	"	
p		48'-0"	5	240'-0"	1 1/2"	"	

TOTAL = 3237.4 LBS.

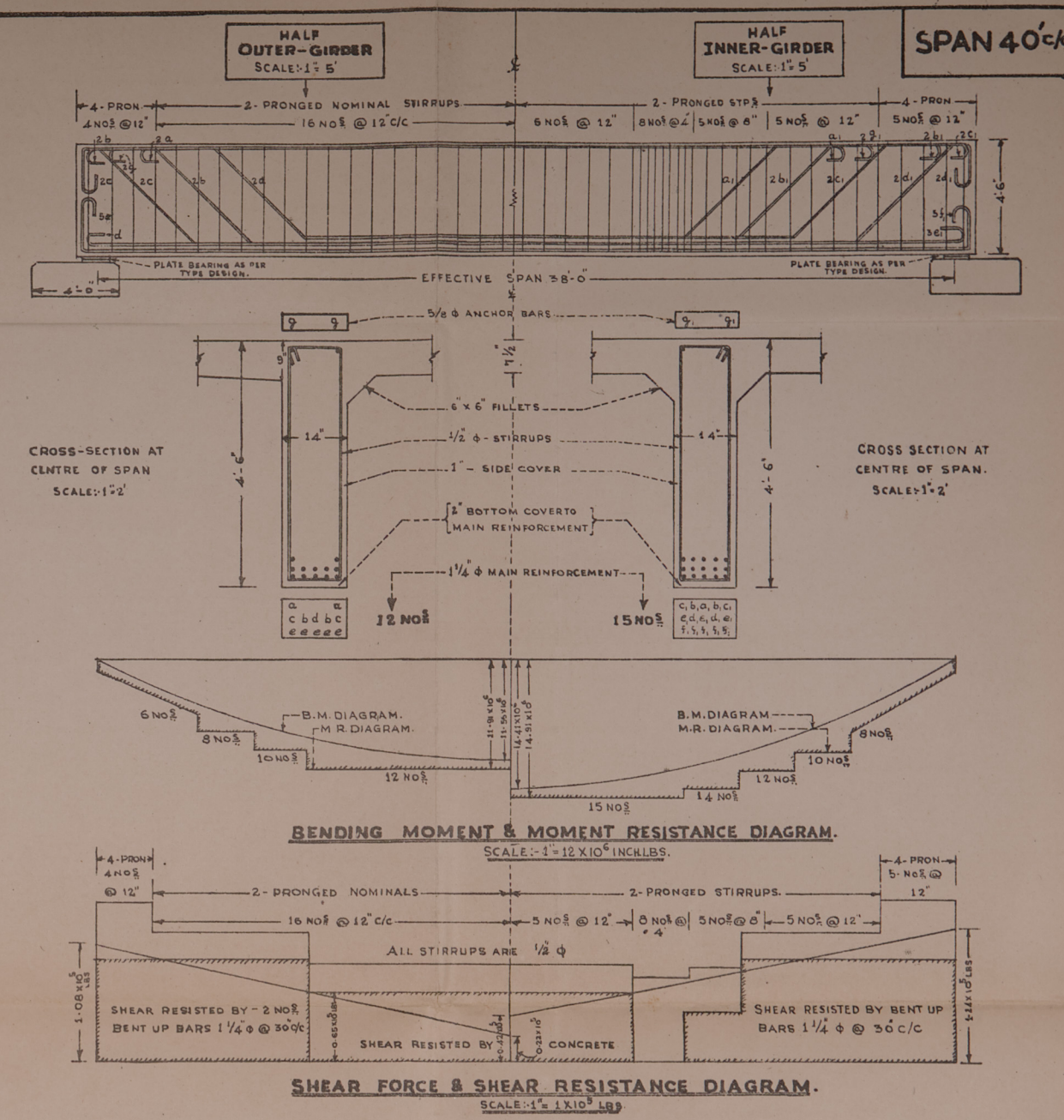
+ 8% FOR WASTAGE ETC. = 161.8 "

GRAND TOTAL = 3399.2 "

OR 1.515 TONS/GIRDER/SPAN.

[illegible]

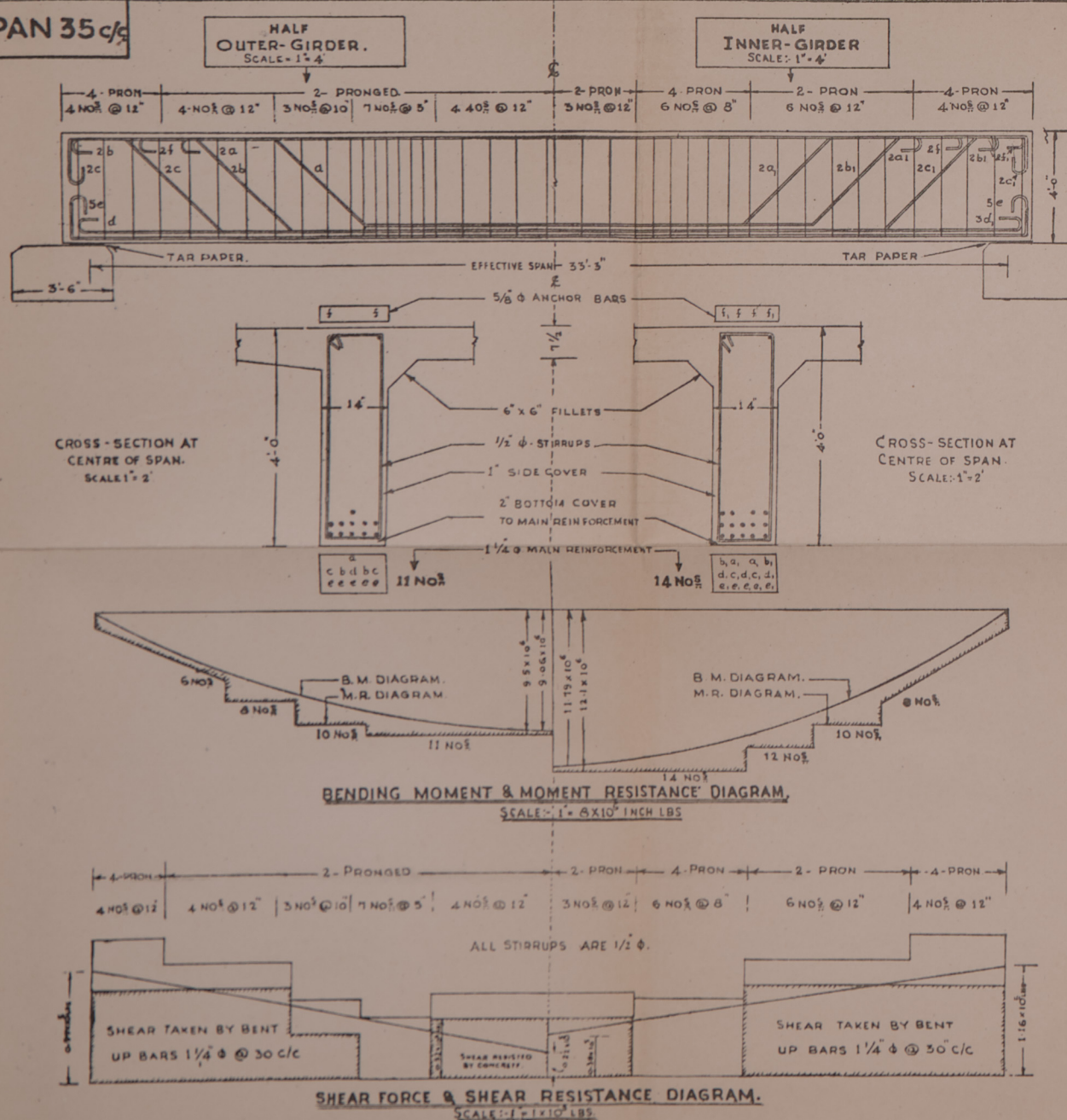
FOR 40' C/
SPAN.



NOTE.

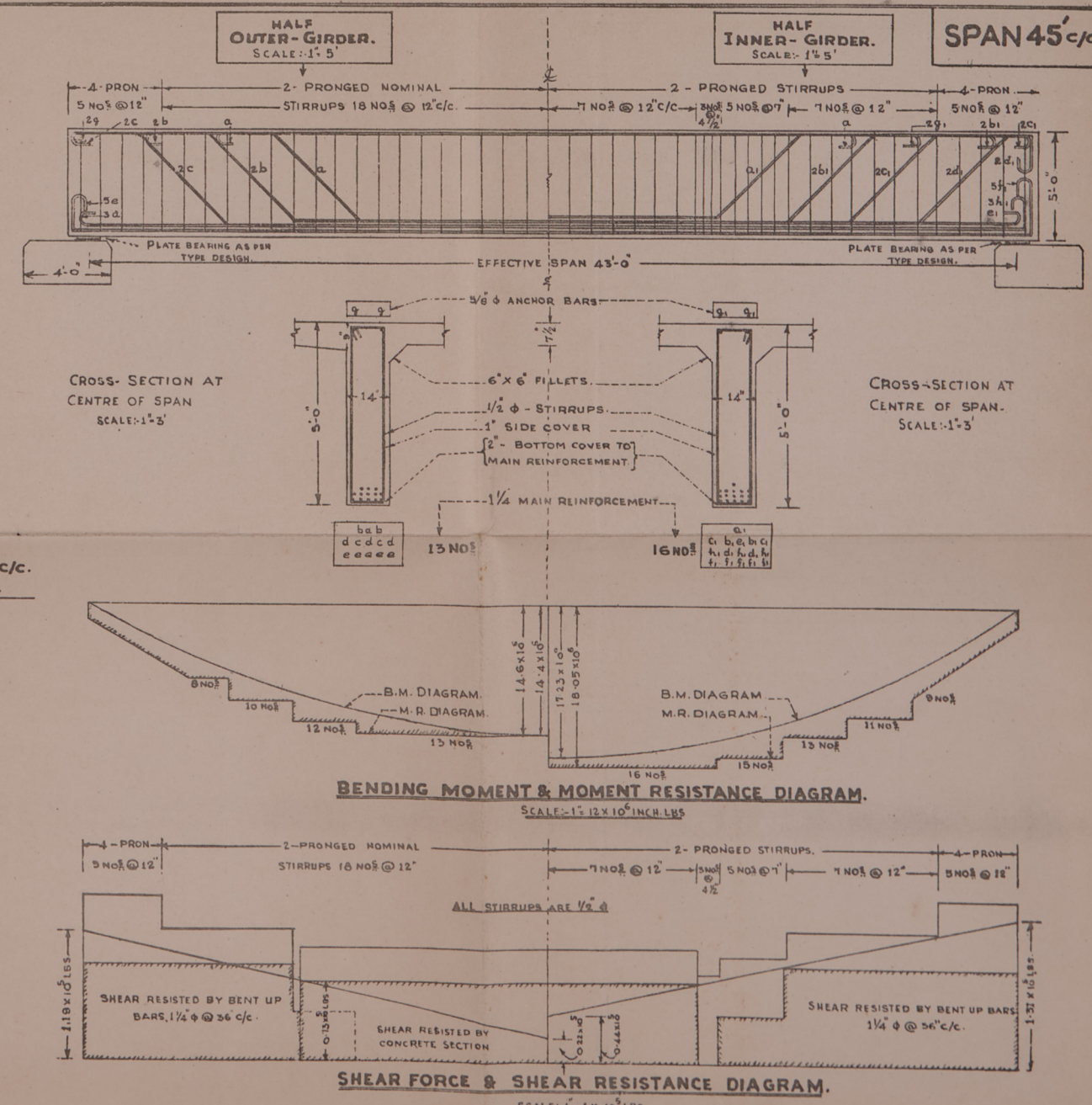
1. THE DIMENSIONS OF BARS AS APPEARING IN THE SCHEDULE THOUGH EXACT FOR THE PURPOSE OF ESTIMATING STEEL QUANTITIES ARE TO BE TAKEN AS APPROXIMATE ONLY FOR BENDING OF BARS. FULL SCALE ELONGATIONS FOR THE BARS SHOULD FIRST BE LINED OUT ON A PLAIN FLATTERED FLOOR TO EXACT DIMENSIONS SO AS TO GET THE EXACT CLEARANCES BETWEEN DIFFERENT BARS AND THEN BARS BENT EXACTLY TO THESE EXACT SHAPES AND SIZES.
2. ONLY TESTED MILD STEEL BARS SHALL BE USED IN REINFORCEMENT.
3. IF FULL LENGTH BARS ARE NOT AVAILABLE AND JOINTS HAVE TO BE PROVIDED, LAP JOINTS OF LENGTH 45 TIMES DIAMETER PLUS USUAL HOOKS ARE, PERMISSIBLE PROVIDED NO JOINT COMES AT OR NEAR THE MID-SPAN AS FAR AS PRACTICABLE. AND ALL JOINTS ARE WELL STAGGERED.
4. FOR DETAILS OF CROSS-GIRDERS AND BEARINGS PLEASE REFER TO DRG NO T-6/56 AND NO T-5/56 RESPECTIVELY

SPAN 35 c/g



FOR 35' C
SPAN

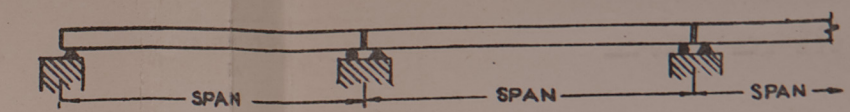
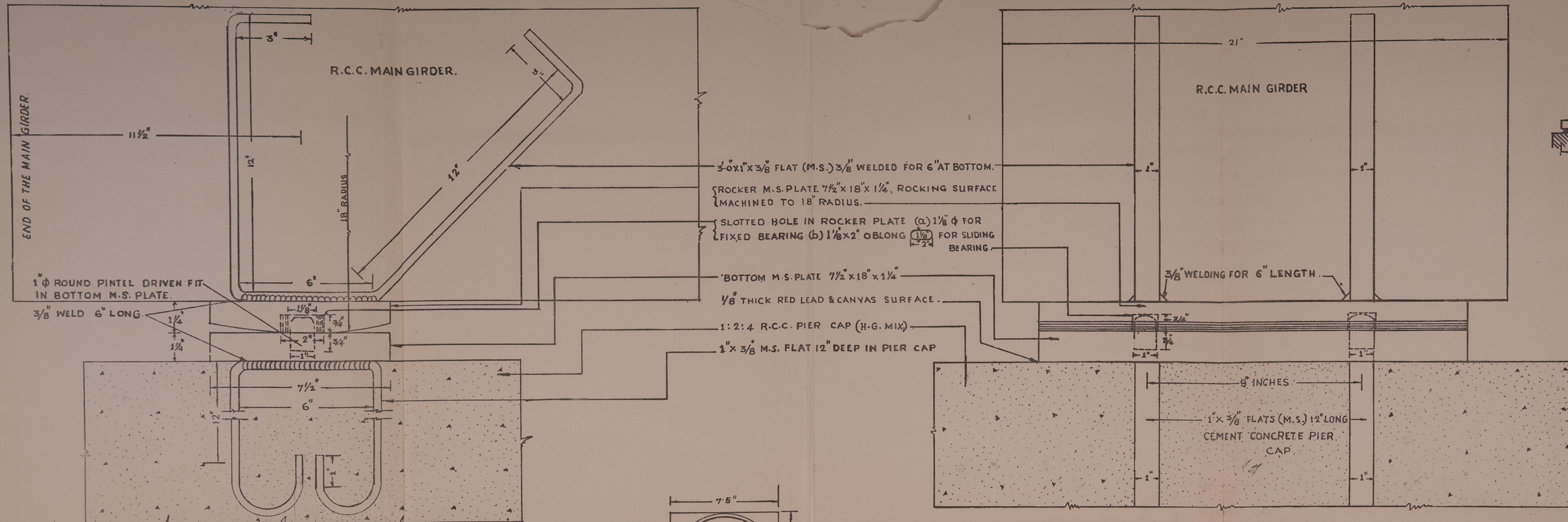
FOR 45'
SPAN.



CHIEF ENGINEER TO GOVT. (R&B) P.W.D. BOMBAY-NQ-1	
<i>C. Patel</i> 12/1/56. (C.C. PATEL) EXECUTIVE ENGINEER DESIGNS DIVISION, P.W.D. BOMBAY-1	
FILE NO	DESIGNS DIVISION P.W.D. BOMBAY.
DATED INITIAL.	TYPE DESIGN FOR R.C.C. DECKS.
DRN. <i>B.K. PPA</i>	T-BEAMS (3-GIRDERS) & SLAB TYPE -
TRD. <i>Mh</i>	SIMPLY SUPPORTED SPANS - 30, 35, 40 AND 45 FT.
CHKD. <i>B.K. PPA</i>	FOR STATE HIGHWAYS.
	CLEAR ROADWAY - 22'-0"
	GIRDER SPACING - 7'-6"
	DETAILS OF MAIN GIRDERS
DY. ENGR. <i>R. K. Ambekar</i>	SCALE: - AS MENTIONED.
	DRG NO. T-2 / 1956

G. P. Z. P. Poona, 1959.

S No 8 OF 1956



KEY ELEVATION.

SYMBOLS:-

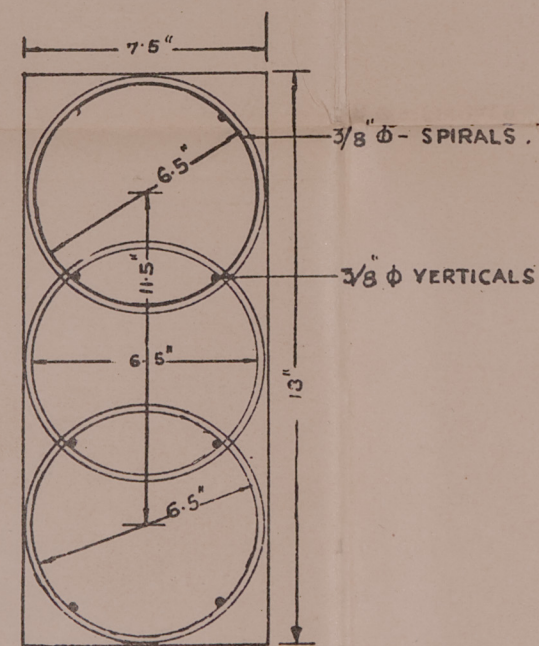
- ▲ = FIXED M.S. PL. BEARING.
- = SLIDING M.S. PL. BEARING.

END ELEVATION
SCALE:-1"=3"

FRONT ELEVATION
SCALE:-1"=3"

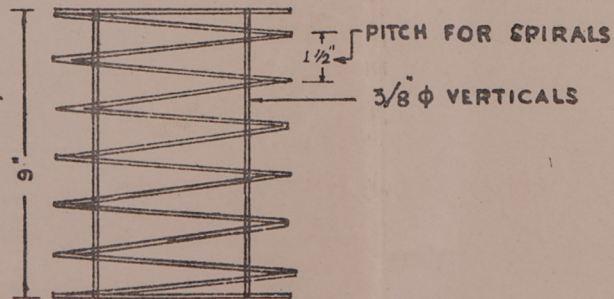
SLOTTED HOLE IN ROCKER PLATE
a) 1 1/2" φ FOR FIXED BEARING
b) 1 1/2" x 2" OBLONG (1/8" FOR SLIDING BEARING)

HALF PLAN AT TOP
SCALE:-1"=3"



PLAN OF SPIRALS
SCALE:-1"=5"

1 STEEL SPIRAL REINFORCEMENTS ARE TO BE PROVIDED IN THE CONCRETE ABOVE & BELOW THE BEARING.
2 AT TOP THE SPIRALS MAY BE PROVIDED AS SPACE PERMITS.



SECTIONAL VIEW
SCALE:-1"=5"

HALF PLAN WITH ROCKER PLATE REMOVED.
SCALE:-1"=3"

NOTES

PARTICULARS

SPECIFICATIONS.

1. **MATERIAL** ----- MILD STEEL OF I.S. STANDARD No 226/1950

2. TOLERANCES

- (a) BETWEEN DIA. OF PINTEL AND DIA. OF KNUCKLE 0.02 INCH.
- (b) HEIGHT OF COMPONENTS ----- ±0.02 INCH.
- (c) THICKNESS OF PLATES ----- NO MINUS TOLERANCES.

ADDITIONAL SPECIFICATIONS.

- 3. THE SURFACES SHOWN IN RED ARE TO BE MACHINED TRUE TO CORRECT SHAPE & CURVATURE.
- 4. CONCRETE OF RICHER MIX: 1:1 1/2:3 SHALL BE PROVIDED IN A BLOCK PROJECTING ABOUT 3" AROUND THE BEARING TO A DEPTH OF 9" IN FLANGE & PIER CAP IMMEDIATELY ABOVE AND BELOW THE BEARING PLATES, WHERE 3/8" φ STEEL SPIRALS ARE TO BE PROVIDED AS SHOWN.

CHIEF ENGINEER (R&B) TO GOVT. P.W.D. BOMBAY

C. C. Patel
24/8/56 (C.C. PATEL)

EXECUTIVE ENGINEER DESIGNS DIVISION No 2

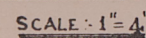
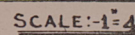
DESIGNS DIVISION No 2. P.W.D.

REFERENCE TO PREVIOUS PLAN	NAME & DESIGNATION	DATED INITIAL
	DRN BY. B. KRISHNAPPA	23/8/56
	TRD BY. M. RAMANAND	23/8/56
REVISIONS.	CHKD BY. B. KRISHNAPPA	23/8/56
	DY. ENGR. N. S. KHAMBAT	23/8/56

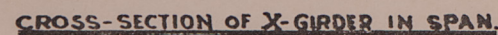
TYPE PLAN
FOR
M. S. PLATE.

ROCKER & SLIDING BEARINGS
CAPACITY UP TO 60 TONS
SCALE:-1"=5"

DRG NO-T-5 /1956



- SCALE:-1"=5'



		SPANS.				
		30'	35'	40'	45'	
DEPTH IN FT.	d'	DEPTH OF MAIN GIRDERS IN SPAN	3'-6"	4'-0"	4'-6"	5'-0"
	d'	DEPTH OF CROSS GIRDERS IN SPAN	2'-3"	2'-9"	3'-5"	3'-9"
	d'	CROSS GIRDERS AT SUPPORT.	2'-9"	3'-3"	3'-9"	4'-5"

CHIEF ENGINEER TO GOVERNMENT (R&B) PWD BOMBAY													
<i>C. Patel</i> 7/2/56 (C.C. PATEL)													
EXECUTIVE ENGINEER DESIGNS DIVISION No 2 BOMBAY													
REVISIONS.	<table border="1"> <tr> <th>FILE NO</th> <th>DESIGNS DIVISION P.W.D. B' BAY</th> </tr> <tr> <td>DATED INITIAL</td> <td rowspan="5"> TYPE-PLAN SHOWING THE DETAILS OF <u>CROSS-GIRDERS</u> </td> </tr> <tr> <td>DRN</td> <td>B. KRISHNA - P.D.</td> </tr> <tr> <td>TRD.</td> <td>M. Ramiah 2/5/56</td> </tr> <tr> <td>CHKD</td> <td>B. K. PPA 2/5/56</td> </tr> <tr> <td>DY. ENGR.</td> <td>K. Chaudhary 6/2</td> </tr> </table>	FILE NO	DESIGNS DIVISION P.W.D. B' BAY	DATED INITIAL	TYPE-PLAN SHOWING THE DETAILS OF <u>CROSS-GIRDERS</u>	DRN	B. KRISHNA - P.D.	TRD.	M. Ramiah 2/5/56	CHKD	B. K. PPA 2/5/56	DY. ENGR.	K. Chaudhary 6/2
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SCALE: - 1" = 4' DRG NO T-6/1956 G. P. Z. P. DOONA, 1956													

