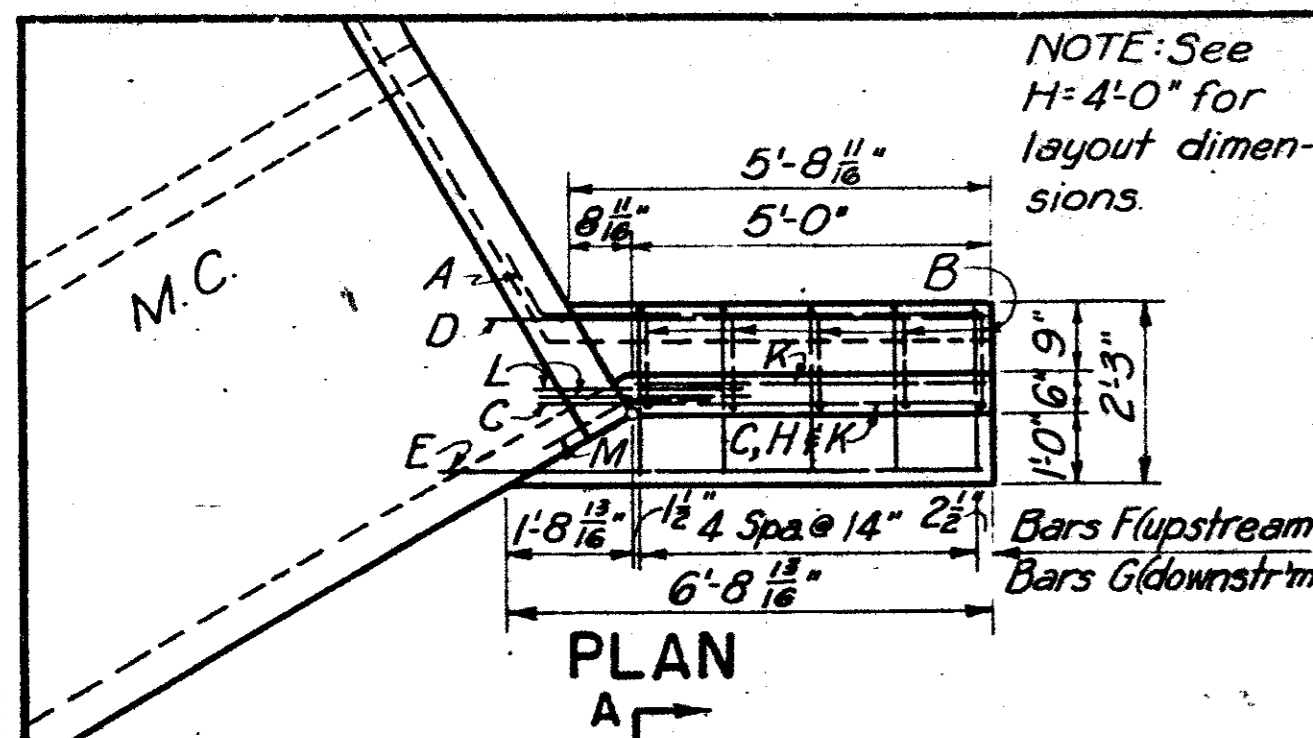


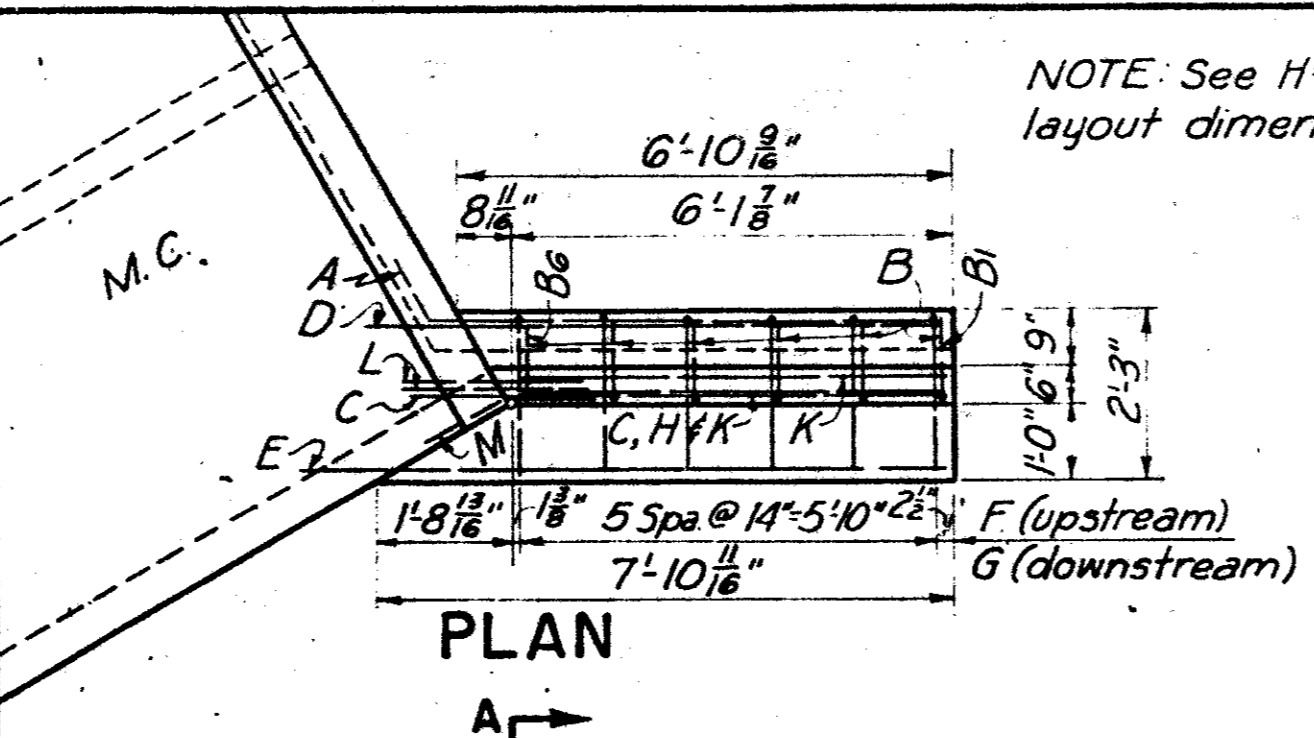
DATE: \_\_\_\_\_ BY: \_\_\_\_\_  
 SURVEYED \_\_\_\_\_  
 CHECKED \_\_\_\_\_  
 NOTE BOOK \_\_\_\_\_  
 NO. \_\_\_\_\_

DATE: \_\_\_\_\_ BY: \_\_\_\_\_  
 SURVEYED \_\_\_\_\_  
 CHECKED \_\_\_\_\_  
 NOTE BOOK \_\_\_\_\_  
 NO. \_\_\_\_\_



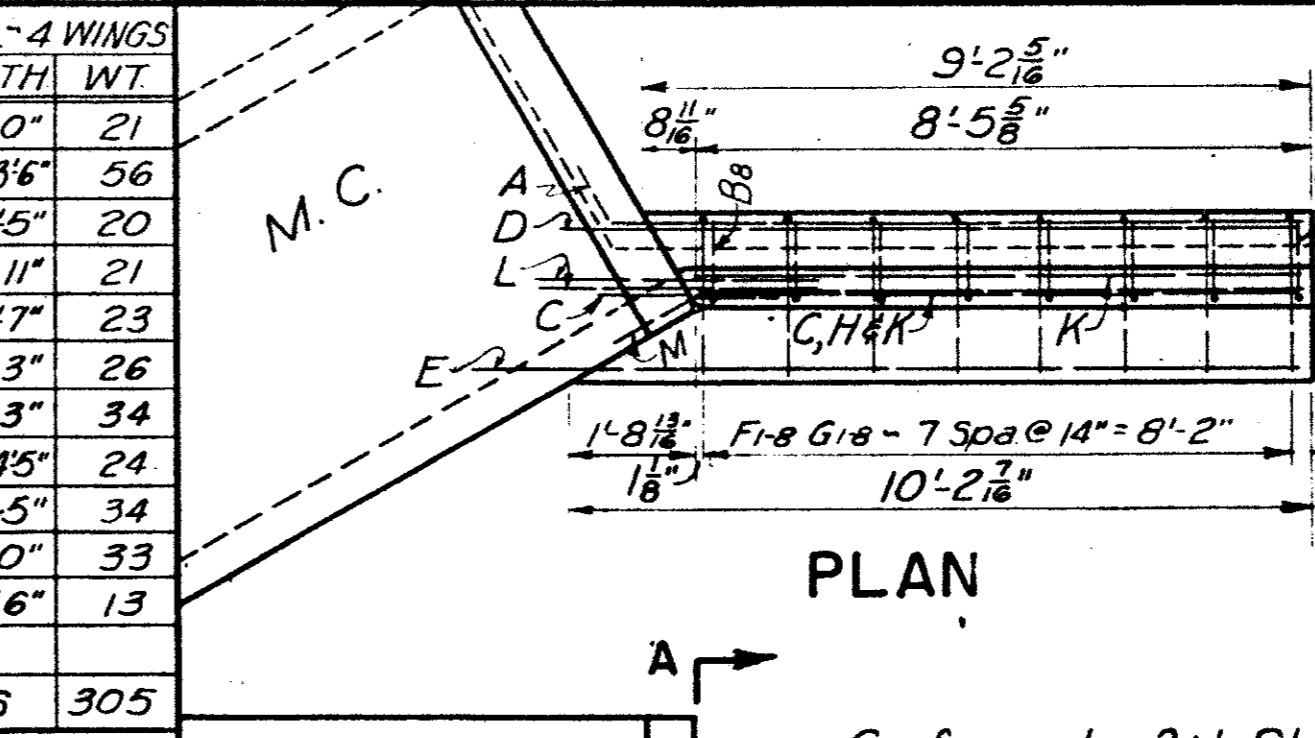
**BILL OF REINF STEEL-4 WINGS**

BAR NO.	SIZE	SPA	LGTH	WT.
A	4 #4	-	6'-9"	18
Brs	20 #4	14"	Av 2'9"	37
C	4 #4	-	6'-3"	17
D	4 #4	-	6'-9"	18
E	4 #4	-	7'-5"	20
F	10 #4	14"	3'-3"	22
G	10 #4	14"	4'-3"	28
H	4 #4	-	3'-1"	8
K	8 #4	-	5'-2"	28
L	8 #5	-	4'-0"	33
M	4 #4	-	2'-6"	7
<b>TOTAL FOR 4 WINGS</b>				<b>236</b>



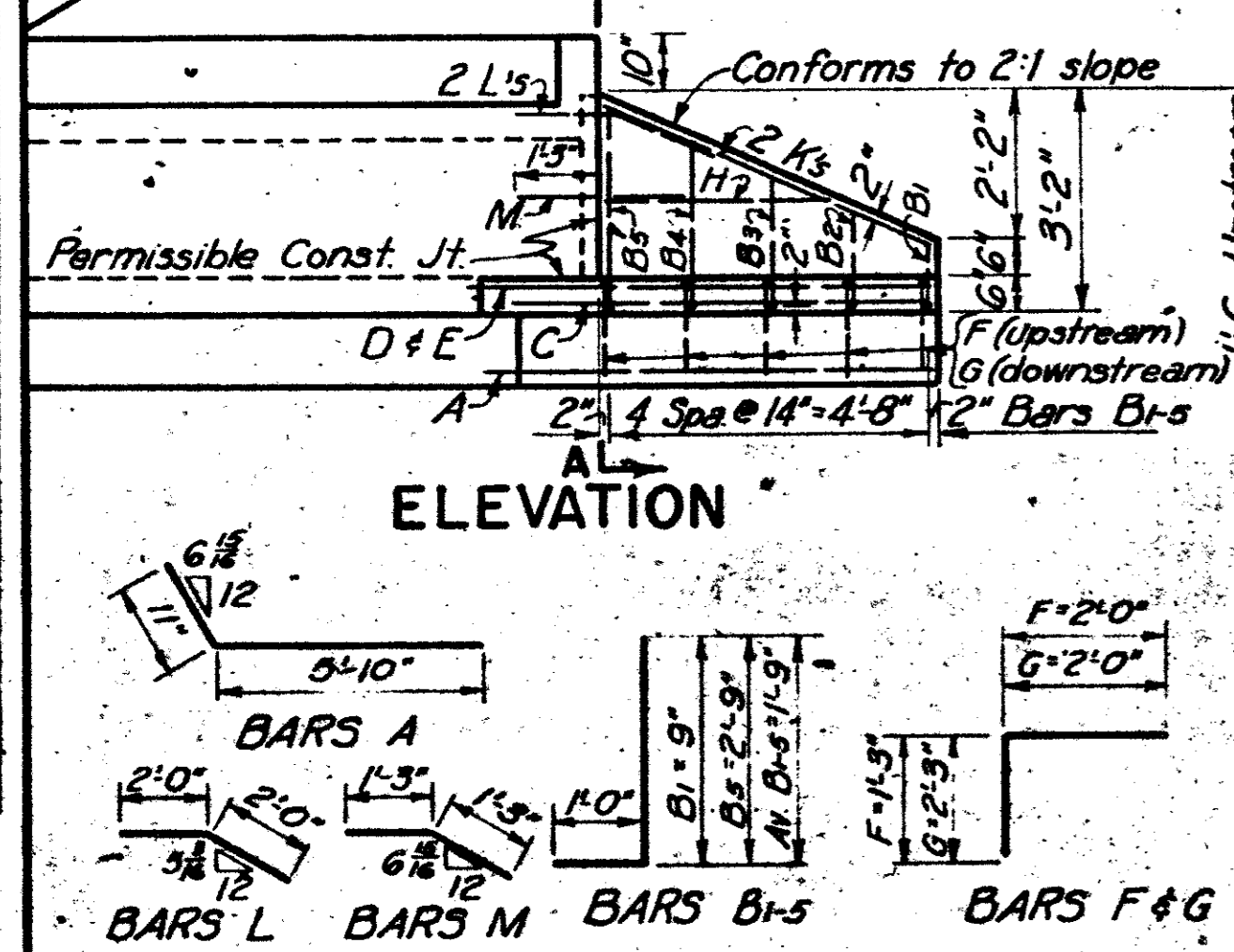
**BILL OF REINF STEEL-4 WINGS**

BAR NO.	SIZE	SPA	LGTH	WT.
A	4 #4	-	8'-0"	21
Brs	24 #4	14"	Av 3'6"	56
C	4 #4	-	7'-5"	20
D	4 #4	-	7'-11"	21
E	4 #4	-	8'-7"	23
F	12 #4	14"	3'-3"	26
G	12 #4	14"	4'-3"	34
Hrs	8 #4	15"	Av 4'5"	24
K	8 #4	-	6'-5"	34
L	8 #5	-	4'-0"	33
M	8 #4	-	2'-6"	13
<b>TOTAL FOR 4 WINGS</b>				<b>305</b>



**BILL OF REINF STEEL-4 WINGS**

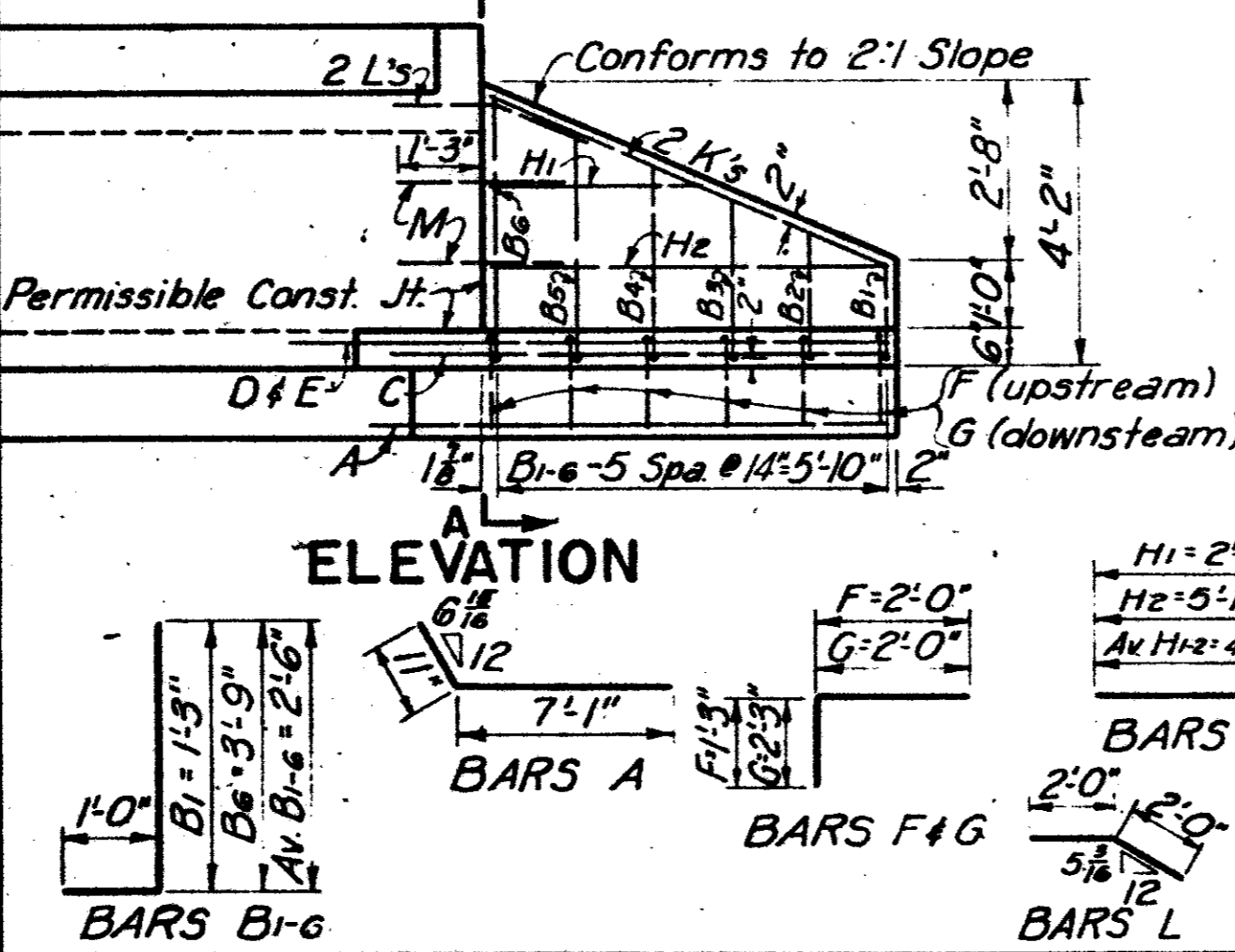
BAR NO.	SIZE	SPA	LGTH	WT.
A	4 #4	-	10'-3"	27
Brs	32 #4	14"	Av 4'0"	86
C	4 #4	-	9'-8"	26
D	4 #4	-	10'-2"	27
E	4 #5	-	11'-5"	48
F	16 #4	14"	3'-3"	35
G	16 #4	14"	4'-3"	45
Hrs	12 #4	15"	Av 5'4"	43
K	8 #5	-	9'-0"	75
L	8 #5	-	4'-0"	33
M	12 #4	-	2'-6"	20
<b>TOTAL FOR 4 WINGS</b>				<b>465</b>



**ESTIMATED QUANT-4 WINGS**

ITEM	UNIT	QUANT.
CONCRETE	C.Y.	2.16
REINF STEEL	LB.	236

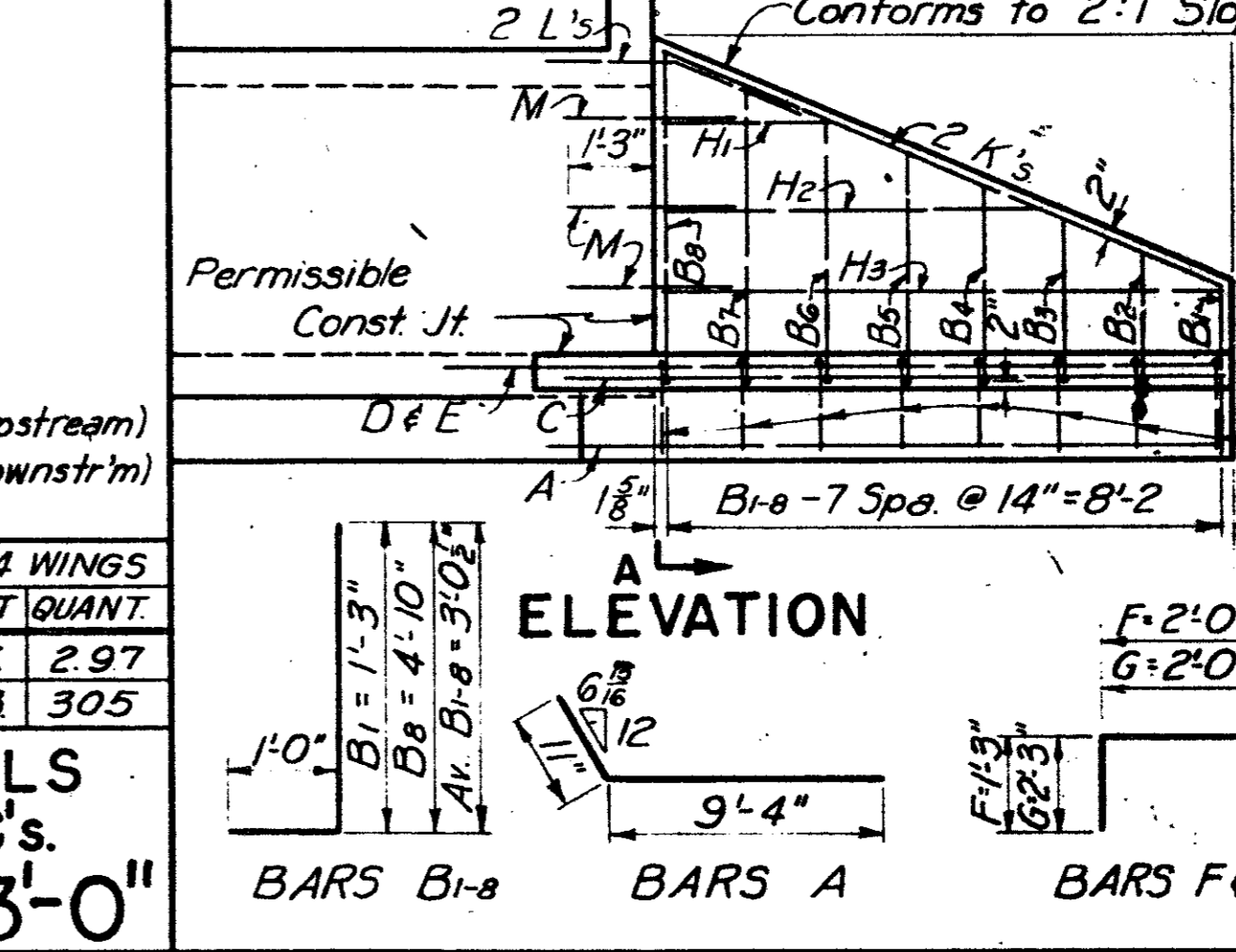
**WINGWALLS FOR M.C.'s**  
H=2'-0"



**ESTIMATED QUANT-4 WINGS**

ITEM	UNIT	QUANT.
CONCRETE	C.Y.	2.97
REINF STEEL	LB.	305

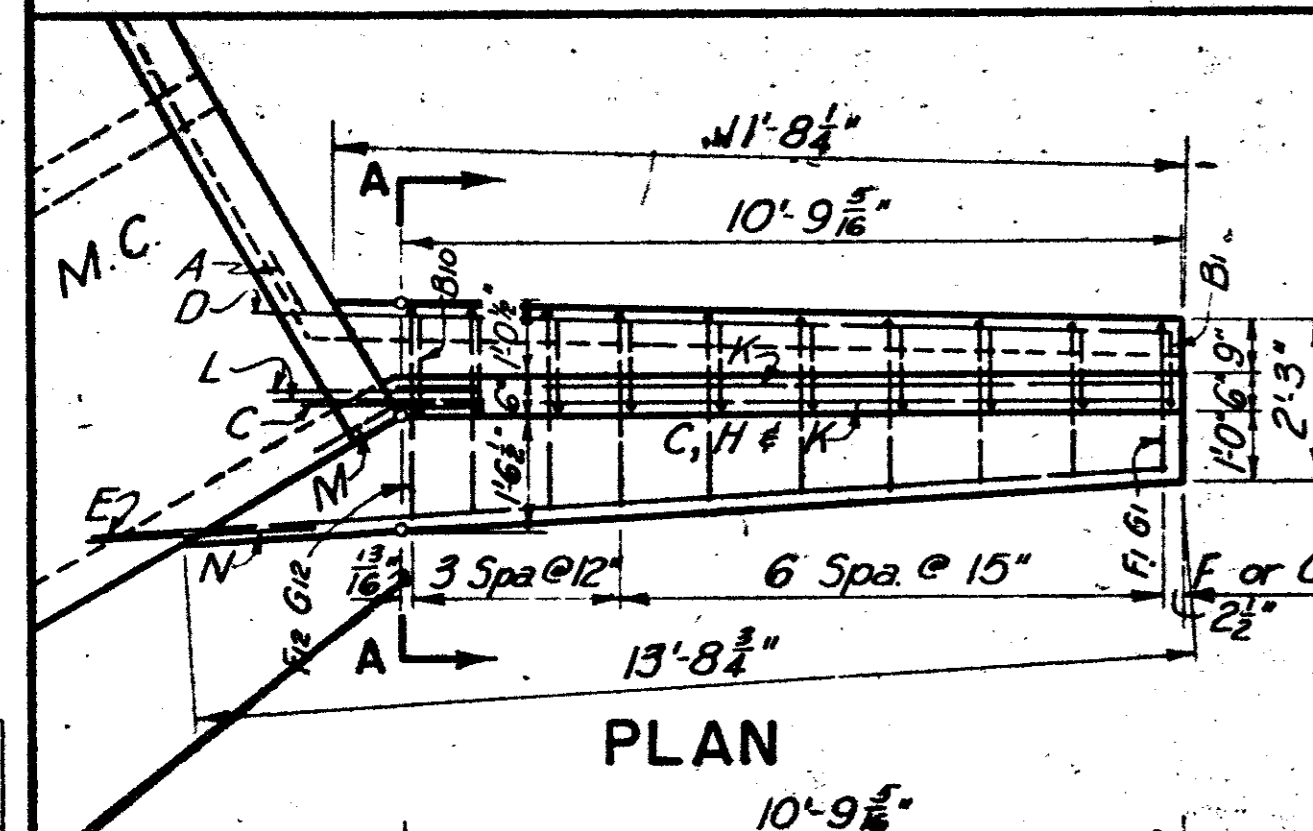
**WINGWALLS FOR M.C.'s**  
H=3'-0"



**ESTIMATED QUANT-4 WINGS**

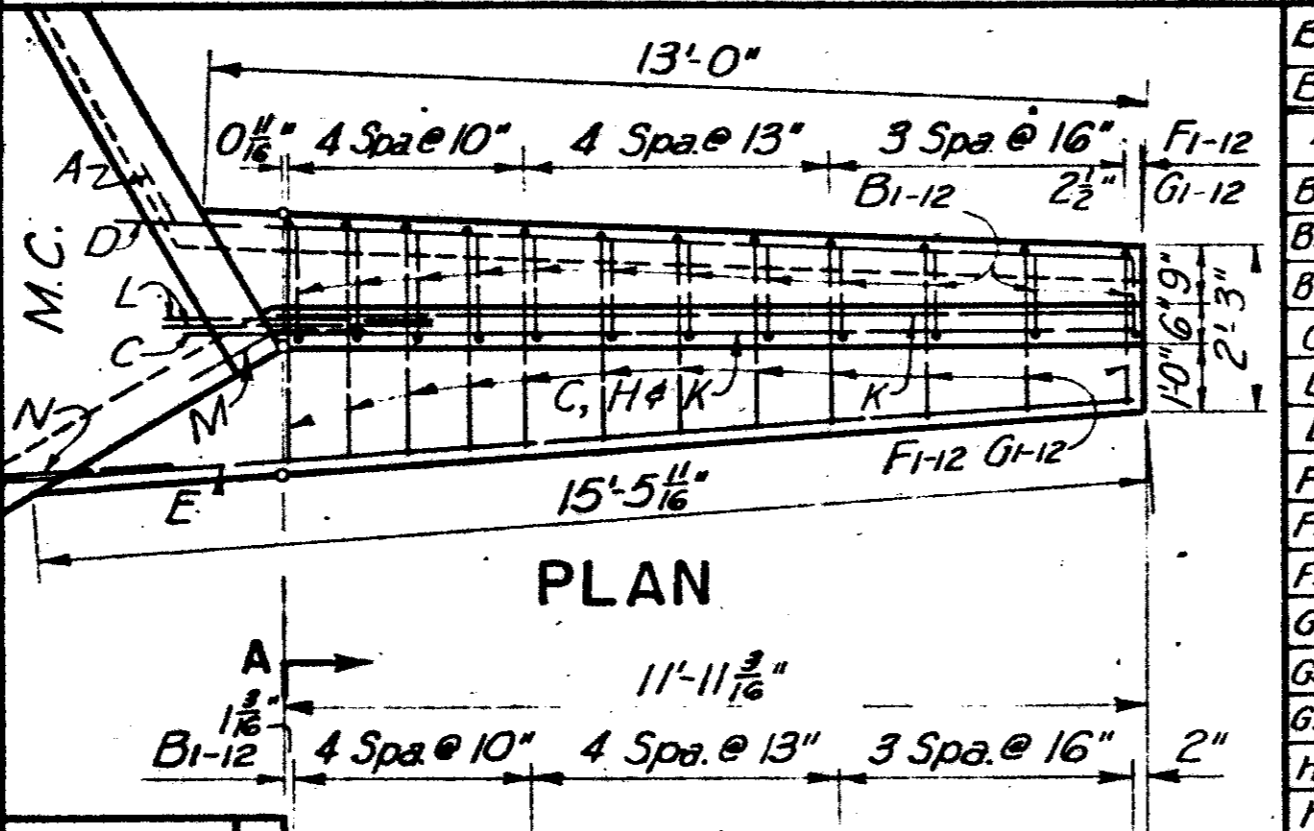
ITEM	UNIT	QUANT.
CONCRETE	C.Y.	4.34
REINF STEEL	LB.	465

**WINGWALLS FOR M.C.'s**  
H=4'-0"



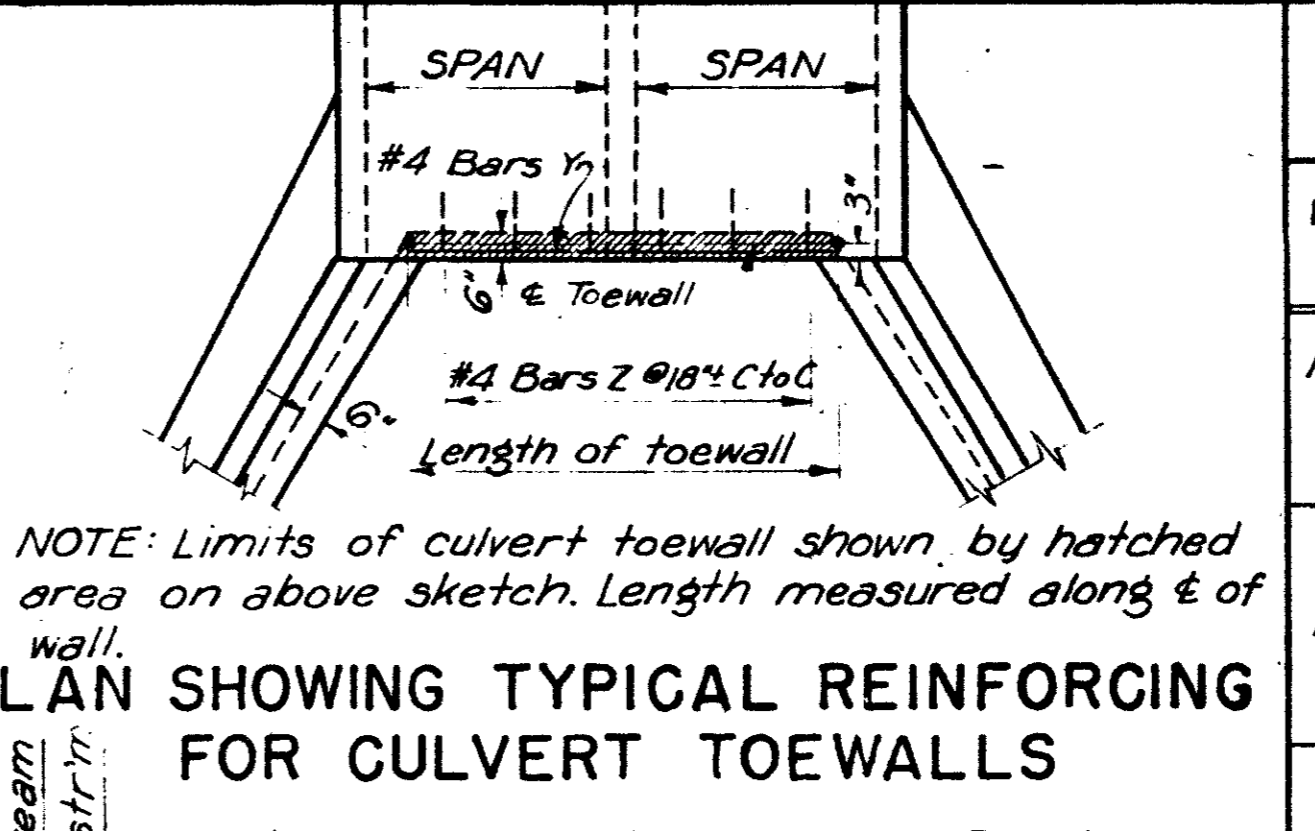
**BILL OF REINF STEEL-4 WINGS**

BAR NO.	SIZE	SPA	LGTH	WT.
A	4 #4	-	12'-9"	34
Brs	28 #4	15"	Av 3'11"	73
C	4 #4	-	12'-0"	32
D	4 #4	-	12'-8"	34
E	4 #5	-	14'-0"	62
Frs	14 #4	15"	Av 3'6"	33
Grs	6 #4	12"	Av 4'0"	16
Hrs	14 #4	15"	Av 4'6"	42
Irs	6 #4	12"	Av 5'0"	20
Jrs	12 #4	18"	Av 6'5"	51
K	8 #5	-	11'-6"	36
L	8 #6	-	4'-6"	51
M	12 #4	-	2'-6"	20
N	4 #5	-	3'-2"	13
<b>TOTAL FOR 4 WINGS</b>				<b>633</b>



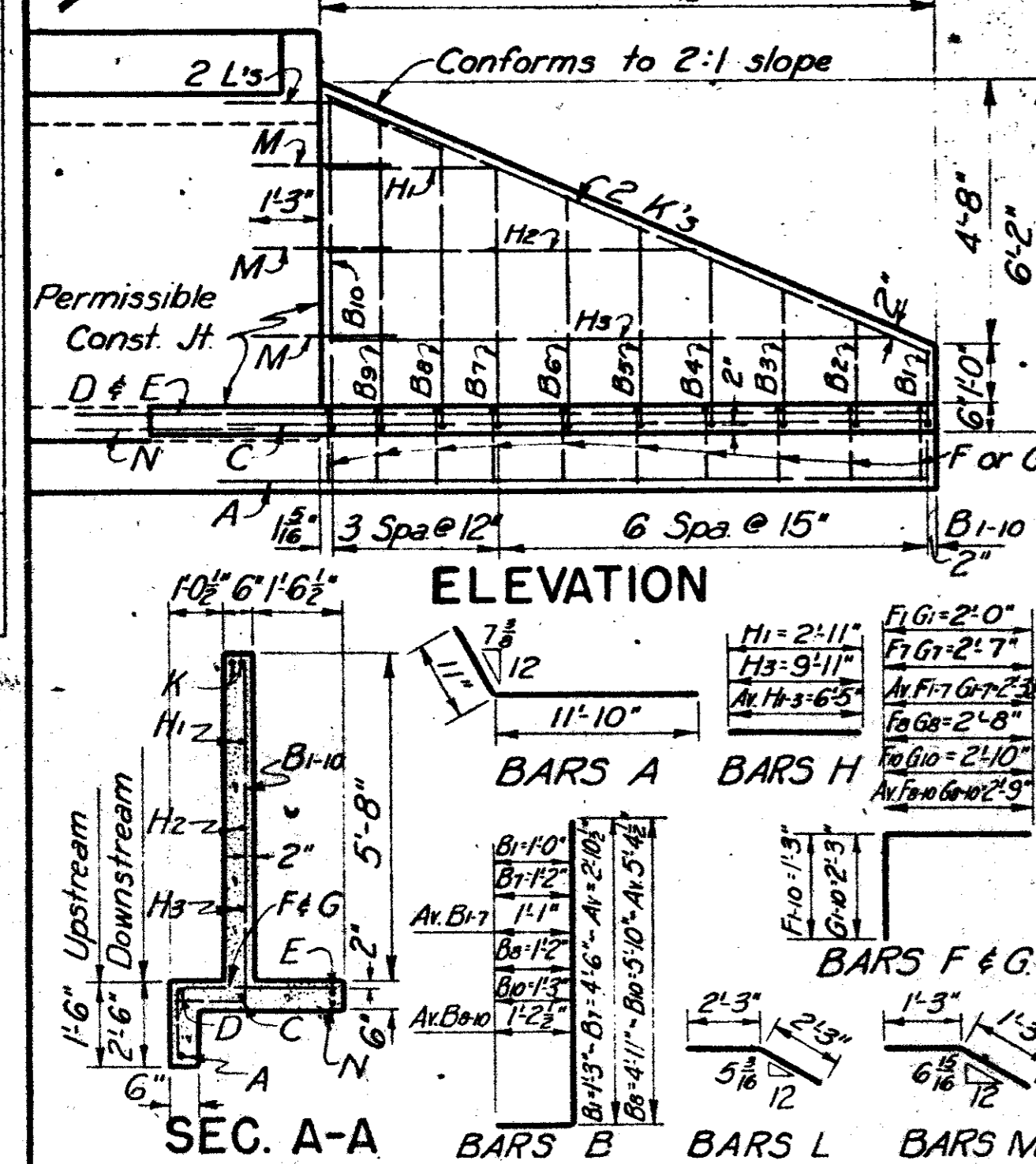
**BILL OF REINF STEEL-4 WINGS**

BAR NO.	SIZE	SPA	LGTH	WT.
A	4 #4	-	14'-1"	38
Brs	16 #4	16"	Av 3'8"	39
C	4 #4	-	13'-2"	35
D	4 #4	-	14'-0"	37
E	4 #5	-	16'-9"	70
Frs	8 #4	16"	Av 3'5"	18
Grs	8 #4	13"	Av 4'0"	21
Hrs	8 #4	10"	Av 4'5"	24
Irs	8 #4	16"	Av 4'5"	24
Jrs	8 #4	13"	Av 5'0"	27
Krs	8 #4	10"	Av 5'5"	29
Lrs	8 #4	16"	Av 4'5"	24
Mrs	8 #4	13"	Av 5'0"	27
Nrs	8 #4	10"	Av 5'5"	29
O	4 #5	-	3'-2"	13
<b>TOTAL FOR 4 WINGS</b>				<b>791</b>



**ESTIMATED QUANTITIES FOR TWO CULVERT TOEWALLS**

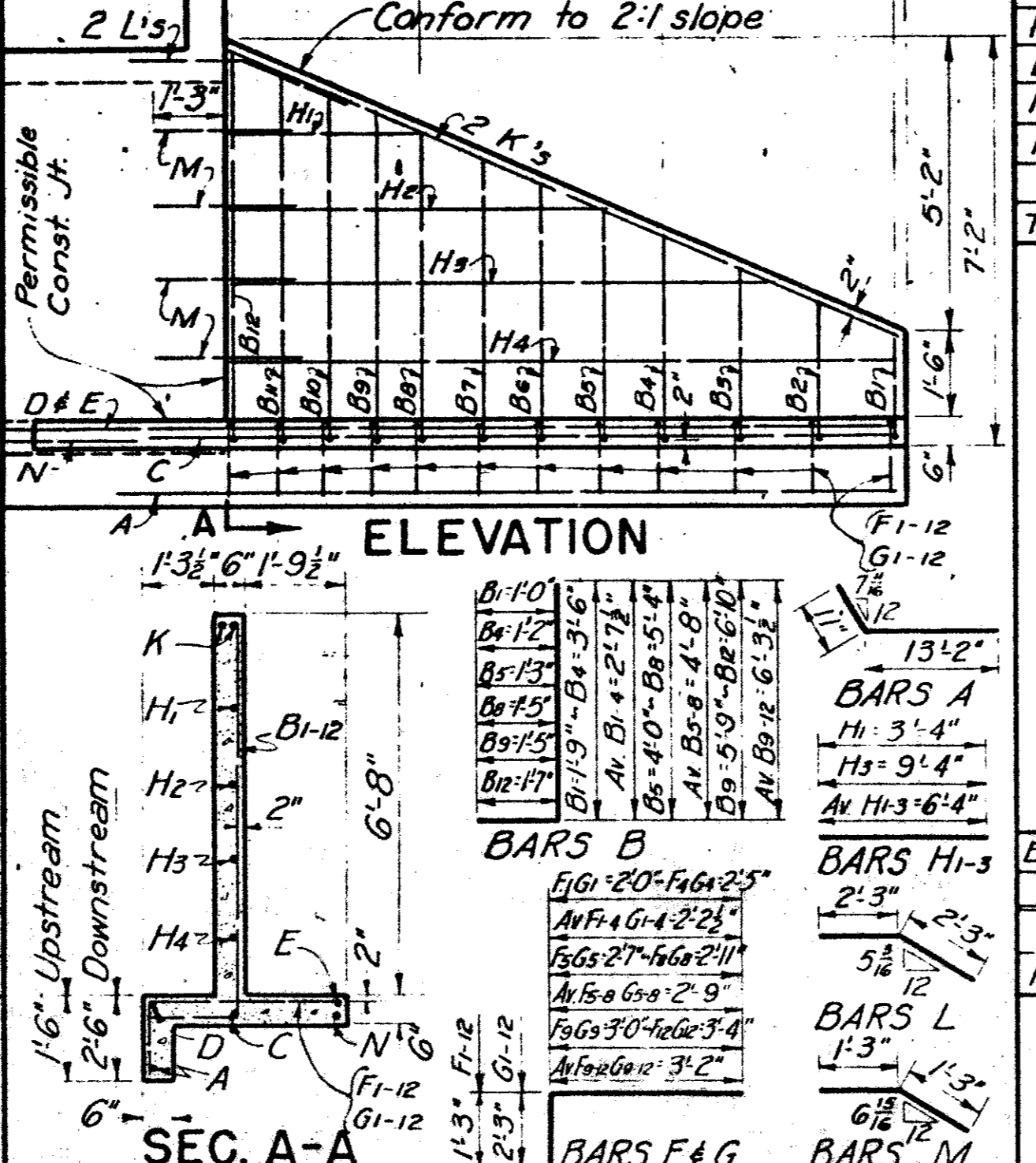
WING WALL	SPAN LENGTH	2 SPANS		3 SPANS		4 SPANS		5 SPANS		6 SPANS	
		CONC. C.Y.	REINF. LB.	CONC. C.Y.	REINF. LB.	CONC. C.Y.	REINF. LB.	CONC. C.Y.	REINF. LB.	CONC. C.Y.	REINF. LB.
H=2'-0" TO H=4'-0" INCL.	5'-0"	0.53	41	0.83	64	1.14	83	1.44	105	1.75	130
	6'-0"	0.64	51	1.00	76	1.36	101	1.72	129	2.08	154
	7'-0"	0.75	58	1.17	88	1.59	118	2.00	148	2.42	178
H=5'-0"	8'-0"	0.86	65	1.33	100	1.80	135	2.26	168	2.75	202
	5'-0"	0.50	40	0.81	63	1.12	83	1.43	106	1.74	130
	6'-0"	0.61	47	0.98	75	1.34	100	1.71	125	2.07	154
H=6'-0"	7'-0"	0.72	57	1.14	88	1.56	118	1.99	148	2.41	178
	8'-0"	0.85	64	1.31	100	1.79	131	2.26	164	2.74	202
	9'-0"	0.94	71	1.48	112	2.01	148	2.54	185	3.07	226
H=6'-0"	6'-0"	0.58	46	0.94	71	1.31	99	1.67	124	2.04	149
	7'-0"	0.69	52	1.11	83	1.53	113	1.95	143	2.37	173
	8'-0"	0.80	63	1.28	95	1.75	130	2.23	163	2.71	197
H=6'-0"	9'-0"	0.91	70	1.44	107	1.97	147	2.51	184	3.04	222
	10'-0"	1.02	76	1.61	119	2.20	161	2.78	203	3.37	248



**ESTIMATED QUANT-4 WINGS**

ITEM	UNIT	QUANT.
CONCRETE	C.Y.	6.34
REINF STEEL	LB.	633

**WINGWALLS FOR M.C.'s**  
H=5'-0"



**ESTIMATED QUANT-4 WINGS**

ITEM	UNIT	QUANT.
CONCRETE	C.Y.	7.95
REINF STEEL	LB.	791

**WINGWALLS FOR M.C.'s**  
H=6'-0"

**TABLE OF TOEWALL LENGTHS FOR M.C.'s**

WING WALL	SPAN	LENGTH					
		2 SPANS	3 SPANS	4 SPANS	5 SPANS	6 SPANS	
H=2'-0"	5'-0"	9'-5 3/4"	14'-11 3/4"	20'-5 3/4"	25'-11 3/4"	31'-5 3/4"	
	5'-0"	9'-5 3/4"	14'-11 3/4"	20'-5 3/4"	25'-11 3/4"	31'-5 3/4"	
	6'-0"	11'-5 3/4"	17'-11 3/4"	24'-5 3/4"	30'-11 3/4"	37'-5 3/4"	
H=3'-0"	7'-0"	13'-5 3/4"	20'-11 3/4"	28'-5 3/4"	35'-11 3/4"	43'-5 3/4"	
	5'-0"	9'-5 3/4"	14'-11 3/4"	20'-5 3/4"	25'-11 3/4"	31'-5 3/4"	
	6'-0"	11'-5 3/4"	17'-11 3/4"	24'-5 3/4"	30'-11 3/4"	37'-5 3/4"	
H=4'-0"	7'-0"	13'-5 3/4"	20'-11 3/4"	28'-5 3/4"	35'-11 3/4"	43'-5 3/4"	
	8'-0"	15'-5 3/4"	23'-11 3/4"	32'-5 3/4"	40'-11 3/4"	49'-5 3/4"	
	5'-0"	8'-11 3/8"	14'-6 3/8"	20'-1 1/8"	25'-8 3/8"	31'-3 3/8"	
H=5'-0"	6'-0"	10'-11 7/8"	17'-6 3/8"	24'-1 1/8"	30'-8 3/8"	37'-3 3/8"	
	7'-0"	12'-11 7/8"	20'-6 3/8"	28'-1 1/8"	35'-8 3/8"	43'-3 3/8"	
	8'-0"	14'-11 7/8"	23'-6 3/8"	32'-1 1/8"	40'-8 3/8"	49'-3 3/8"	
H=6'-0"	9'-0"	16'-11 7/8"	26'-6 3/8"	36'-1 1/8"	45'-8 3/8"	55'-3 3/8"	
	6'-0"	10'-4 1/4"	16'-11 3/8"	23'-6 3/8"	30'-1 1/8"	36'-8 3/8"	
	7'-0"	12'-4 1/4"	19'-11 3/8"	27'-6 3/8"	35'-1 1/8"	42'-8 3/8"	
H=6'-0"	8'-0"	14'-4 1/4"	22'-11 3/8"	31'-6 3/8"	40'-1 1/8"	48'-8 3/8"	
	9'-0"	16'-4 1/4"	25'-11 3/8"	35'-6 3/8"	45'-1 1/8"	54'-8 3/8"	
	10'-0"	18'-4 1/4"	28'-11 3/8"	39'-6 3/8"	50'-1 1/8"	60'-8 3/8"	

**GENERAL NOTES:**  
 DESIGN: Wing Walls designed in accordance with Rankine's theory of retaining wall design. Elements of design are shown on sketch at right. All concrete shall be Class A. Chamfer all exposed corners 1/4" unless specified otherwise. All dimensions relating to reinforcing steel are to centers of bars. Toe walls for culvert and wing walls shall be omitted when structure is founded on solid rock, as approved by Engineer.

**TEXAS HIGHWAY DEPARTMENT**  
**FLARED WINGWALLS**  
 FOR MULTIPLE CULVERTS  
 H=2'-0" TO 6'-0" INCL.  
**MCW-FI**

DRAWING ORIGINAL DATE  
 DW: ABL  
 C.D.W.: KNI  
 TR: CTVV  
 CR: TR MDA

REVISIONS  
 Rev. Jan. 1959  
 Rev. Nov. 1964  
 Rev. Nov. 1967

DEPARTMENT OF PUBLIC WORKS  
 COUNTY OF DALLAS, TEXAS