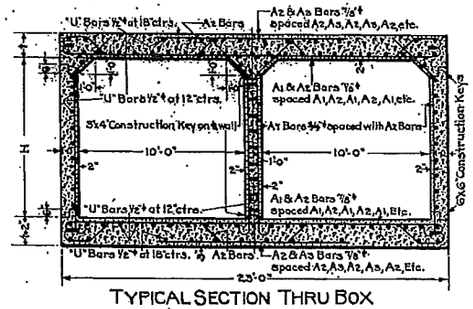
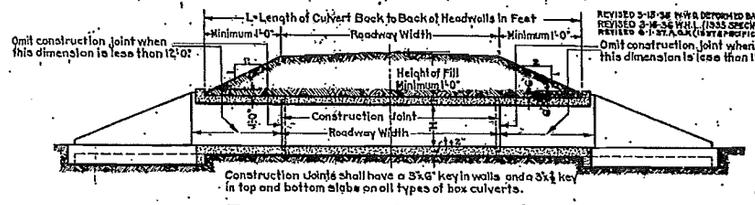
STANDARD M-110-B

FED. ROAD DIST. No.	STATE	F.A.P. PROJECT	SHEET	TOTAL SHEETS
3	COLO.	212-A(1)	16	

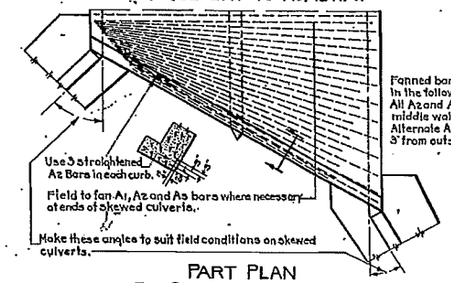
REVISED 3-13-34 N.W.A. DEFORMED BARS.
REVISED 2-14-34 W.H.L. (1933 SPECIFICATION)
REVISED 6-1-37 A.G.K. (1937 SPECIFICATION) [redacted]



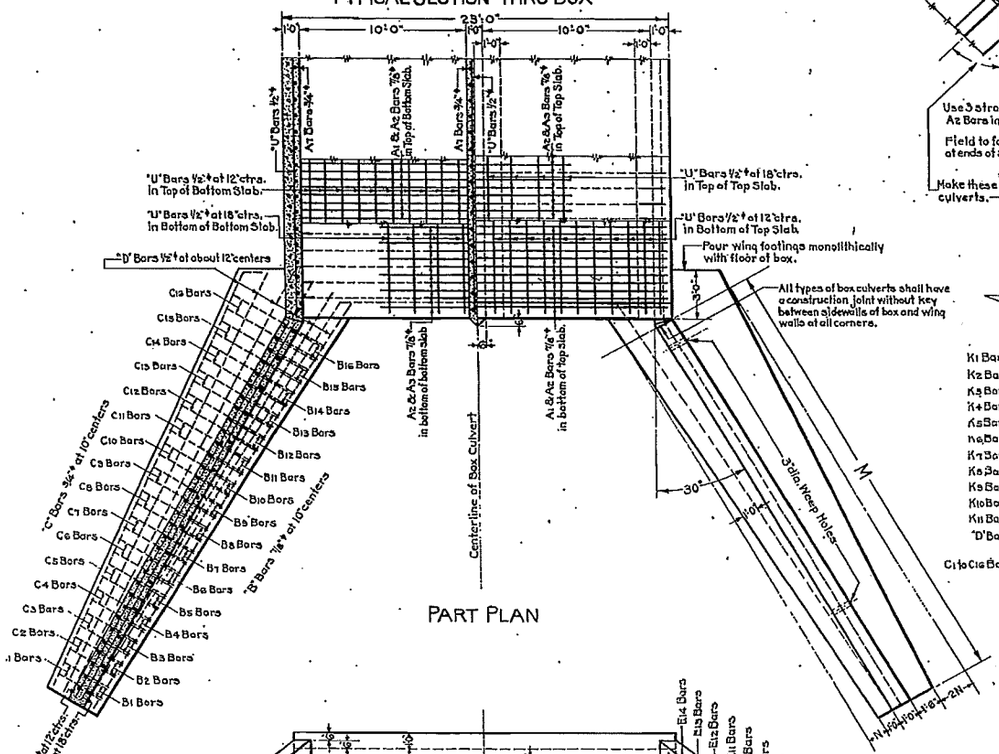
TYPICAL SECTION THRU BOX



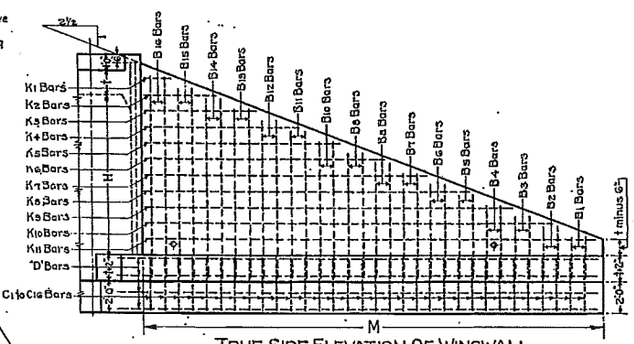
TYPICAL SECTION SHOWING RELATION OF CULVERT TO ROADWAY



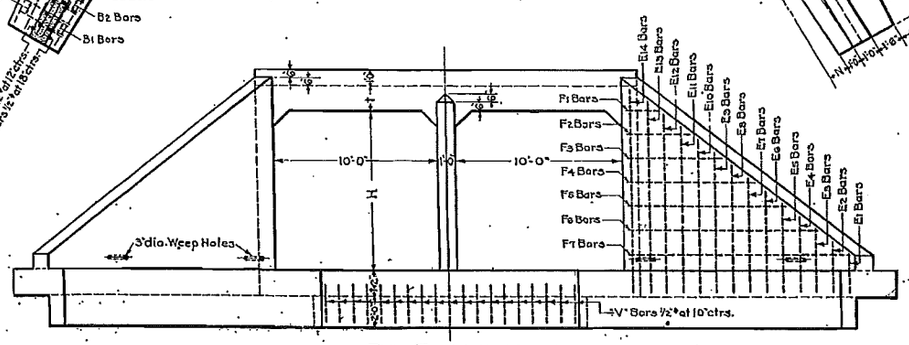
PART PLAN FOR SKEWED HEADWALLS



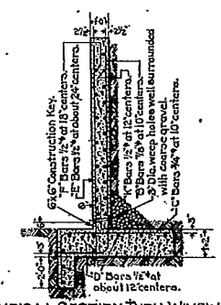
PART PLAN



TRUE SIDE ELEVATION OF WINGWALL



END ELEVATION



TYPICAL SECTION THRU WINGWALL

REINFORCEMENT BAR LIST

USE BARS FOR	MARK	SIZE	NUMBER	DIMENSION P	TOTAL LENGTH	BENDING DIAGRAM (ALL DIMENSIONS ARE TO ℄ OF BARS)
All Sizes	A1	⅞"ϕ			24'-4"	
All Sizes	A2	⅞"ϕ	12(L+2) SPACING	t minus 4"	24'-4" (1.64P)	
All Sizes	A3	⅞"ϕ			11'-6"	
All Sizes	A7	¾"ϕ	24(L+2) SPACING	H minus 4"	H+3'-0"	
All Sizes	U	½"ϕ	36		1'-9"	
All Sizes	D	½"ϕ	36		10'-0"	
All Sizes	E1	½"ϕ	4		1'-10"	
All Sizes	E2	½"ϕ	4		2'-8"	
All Sizes	E3	½"ϕ	4		3'-6"	
All Sizes	E4	½"ϕ	4		4'-5"	
All Sizes	E5	½"ϕ	4		5'-1"	
All Sizes	E6	½"ϕ	4		5'-10"	
All Sizes	E7	½"ϕ	4		6'-8"	
H=5'-0" and over	E8	½"ϕ	4		7'-5"	
H=6'-0" and over	E9	½"ϕ	4		8'-3"	
H=8'-0" and over	E10	½"ϕ	4		9'-1"	
H=9'-0" and over	E11	½"ϕ	4		9'-10"	
H=9'-0" and over	E12	½"ϕ	4		10'-8"	
H=10'-0"	E13	½"ϕ	4		11'-6"	
H=10'-0"	E14	½"ϕ	4		12'-3"	
All Sizes	F1	½"ϕ	4		4'-6"	
All Sizes	F2	½"ϕ	4		6'-3"	
All Sizes	F3	½"ϕ	4		12'-0"	
H=5'-0" and over	F4	½"ϕ	4		15'-3"	
H=6'-0" and over	F5	½"ϕ	4		18'-6"	
H=8'-0" and over	F6	½"ϕ	4		23'-3"	
H=10'-0"	F7	½"ϕ	4		27'-0"	
All Sizes	K1	½"ϕ	4		2'-0"	
All Sizes	K2	½"ϕ	4		4'-6"	
All Sizes	K3	½"ϕ	4		7'-0"	
All Sizes	K4	½"ϕ	4		9'-6"	
All Sizes	K5	½"ϕ	4		12'-0"	
H=5'-0" and over	K6	½"ϕ	4		14'-6"	
H=6'-0" and over	K7	½"ϕ	4		17'-0"	
H=6'-0" and over	K8	½"ϕ	4		19'-6"	
H=8'-0" and over	K9	½"ϕ	4		22'-0"	
H=10'-0"	K10	½"ϕ	4		24'-6"	
H=10'-0"	K11	½"ϕ	4		27'-0"	
All Sizes	B1	⅝"ϕ	8	P= 1'-0" Q= 1'-2"	2'-11"	
All Sizes	B2	⅝"ϕ	8	P= 1'-0" Q= 1'-10"	3'-7"	
All Sizes	B3	⅝"ϕ	8	P= 1'-1" Q= 2'-6"	4'-4"	
All Sizes	B4	⅝"ϕ	8	P= 1'-2" Q= 3'-2"	5'-1"	
All Sizes	B5	⅝"ϕ	8	P= 1'-2" Q= 3'-10"	5'-10"	
All Sizes	B6	⅝"ϕ	8	P= 1'-4" Q= 4'-6"	6'-7"	
All Sizes	B7	⅝"ϕ	8	P= 1'-5" Q= 5'-2"	7'-4"	
H= 5'-0" and over	B8	⅝"ϕ	8	P= 1'-5" Q= 5'-10"	8'-0"	
H= 5'-0" and over	B9	⅝"ϕ	8 (6'-0" Q)	P= 1'-6" Q= 6'-6"	8'-9"	
H= 6'-0" and over	B10	⅝"ϕ	8	P= 1'-7" Q= 7'-2"	9'-6"	
H= 6'-0" and over	B11	⅝"ϕ	8	P= 1'-8" Q= 7'-10"	10'-3"	
H= 8'-0" and over	B12	⅝"ϕ	8	P= 1'-9" Q= 8'-6"	11'-0"	
H= 8'-0" and over	B13	⅝"ϕ	8	P= 1'-10" Q= 9'-2"	11'-9"	
H=10'-0"	B14	⅝"ϕ	8	P= 1'-11" Q= 9'-10"	12'-6"	
H=10'-0"	B15	⅝"ϕ	8	P= 1'-11" Q= 10'-6"	13'-2"	
H=10'-0"	B16	⅝"ϕ	8	P= 2'-0" Q= 11'-2"	13'-11"	
All Sizes	C1	¾"ϕ	8	P= 2'-8" Q= 2'-3"	5'-3"	
All Sizes	C2	¾"ϕ	8	P= 2'-11" Q= 2'-3"	6'-0"	
All Sizes	C3	¾"ϕ	8	P= 3'-1" Q= 2'-3"	6'-2"	
All Sizes	C4	¾"ϕ	8	P= 3'-4" Q= 2'-3"	6'-5"	
All Sizes	C5	¾"ϕ	8	P= 3'-7" Q= 2'-3"	6'-8"	
All Sizes	C6	¾"ϕ	8	P= 3'-9" Q= 2'-3"	6'-10"	
All Sizes	C7	¾"ϕ	8	P= 4'-0" Q= 2'-3"	7'-1"	
H= 5'-0" and over	C8	¾"ϕ	8	P= 4'-6" Q= 2'-3"	7'-3"	
H= 5'-0" and over	C9	¾"ϕ	8 (6'-0" Q)	P= 4'-8" Q= 2'-3"	7'-6"	
H= 6'-0" and over	C10	¾"ϕ	8	P= 4'-8" Q= 2'-3"	7'-8"	
H= 8'-0" and over	C11	¾"ϕ	8	P= 4'-10" Q= 2'-3"	7'-11"	
H= 8'-0" and over	C12	¾"ϕ	8	P= 5'-1" Q= 2'-3"	8'-2"	
H= 8'-0" and over	C13	¾"ϕ	8	P= 5'-4" Q= 2'-3"	8'-5"	
H= 8'-0" and over	C14	¾"ϕ	8	P= 5'-6" Q= 2'-3"	8'-7"	
H=10'-0"	C15	¾"ϕ	8	P= 5'-9" Q= 2'-3"	8'-10"	
H=10'-0"	C16	¾"ϕ	8	P= 6'-0" Q= 2'-3"	9'-1"	
All Sizes	V	½"ϕ	38	P= 2'-0" Q= 2'-3"	5'-1"	

★ See Table of Dimensions and Quantities

NOTE FOR "E" BARS ONLY
Where t+2'-11" use Q lengths & total lengths as shown.
" t+2'-11" add 4" to Q " " " " " "
" t+2'-10" add 10" to Q " " " " " "

NOTE FOR "B" BARS
Where t+2'-15" use Q lengths & total lengths as shown
" t+2'-11" add 4" to Q " " " " " "
" t+2'-10" add 10" to Q " " " " " "

NOTE FOR "C & V" BARS
Where t+2'-15" use Q lengths & total lengths as shown
" t+2'-11" add 2" to Q " " " " " "
" t+2'-10" add 5" to Q " " " " " "

TABLE OF DIMENSIONS AND QUANTITIES

STEEL QUANTITIES GIVEN BELOW INCLUDE ALLOWANCE OF 1½% FOR OVERRUN
TOTAL QUANTITIES FOR ONE BOX EQUALS THE QUANTITY FOR TWO HEADWALLS PLUS (L) QUANTITY FOR ONE LIN. FT. BOX

HEIGHT OF FILL ALLOWED	TYPE	INSIDE SPAN EACH BOX	HEIGHT H	THICKNESS OF SLAB t	SPACING OF BARS A	NUMBER OF U-BARS PER BOX	LENGTH OF WINGWALL M	DIMENSION N	QUANTITIES FOR ONE LIN. FT. OF BOX: CONCRETE CU.YDS.	STEEL LBS.	QUANTITIES FOR TWO HEADWALLS: CONCRETE CU.YDS.	STEEL LBS.
4'-0"	10-A	10'-0"	4'-0"	15"	8"	86	12'-6"	7"	2.503	280	30.5	2400
			5'-0"	13"	8"	90	15'-0"	8"	2.614	287	36.5	2510
			6'-0"	13"	8"	94	17'-6"	9"	2.725	294	43.0	3680
			8'-0"	13"	8"	102	22'-6"	1'-0"	2.945	308	57.0	4825
			10'-0"	13"	8"	110	27'-6"	1'-2"	3.170	323	73.0	6120
10'-0"	10-B	10'-0"	4'-0"	15"	6"	86	12'-6"	7"	2.793	364	33.0	2610
			5'-0"	15"	6"	90	15'-0"	8"	2.904	364	39.5	3140
			6'-0"	15"	6"	94	17'-6"	9"	3.015	313	46.0	3720
			8'-0"	15"	6"	102	22'-6"	1'-0"	3.237	351	61.5	5100
			10'-0"	15"	6"	110	27'-6"	1'-2"	3.460	401	78.0	6425
15'-0"	10-C	10'-0"	4'-0"	18"	5"	86	12'-6"	7"	3.213	416	39.5	2830
			5'-0"	18"	5"	90	15'-0"	8"	3.330	426	43.0	3350
			6'-0"	18"	5"	94	17'-6"	9"	3.441	436	50.5	3950
			8'-0"	18"	5"	102	22'-6"	1'-0"	3.663	456	67.5	5400
			10'-0"	18"	5"	110	27'-6"	1'-2"	3.885	476	88.5	6770

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE COLORADO STATE HIGHWAY DEPARTMENT, ADOPTED JUNE 1, 1937.
ALL CONCRETE SHALL BE CLASS "A".
ALL WALLS SHALL HAVE FORMS ON BOTH SIDES.
ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.
ALL BARS SHALL BE DEFORMED.
MINIMUM DISTANCE FROM CENTERLINE OF BARS TO EDGE OF CONCRETE TO BE 2½".
LONG BARS WHEN SPLICED SHALL BE LAPPED TWO FEET.
FOR CULVERTS REQUIRED AND GOVERNING DIMENSIONS SEE SHEET H-2.
ALL REINFORCING BARS SHALL BE TAGGED WITH THE STATION NUMBER AND LETTER DESIGNATION.
THIS DESIGN NOT TO BE USED WHEN HEIGHT OF FILL OVER BOX EXCEEDS THAT TABULATED AS ALLOWABLE.
POUR WING FOOTINGS MONOLITHICALLY WITH FLOOR OF BOX.
POUR WINGS INDEPENDENT OF SIDES OF BOX.
THE USE OF ADDITIONAL CONSTRUCTION JOINTS UNDESIRABLE, SHOULD FIELD CONDITIONS REQUIRE, CONSTRUCTION JOINTS MAY BE MADE ON A VERTICAL PLANE PERPENDICULAR TO CENTERLINE OF CULVERT, AND SHALL HAVE KEYS AS SHOWN.
SUPPORTING SOILS FOR ALL CULVERTS MUST BE COMPACTED TO A FIRM AND UNIFORM MATERIAL THROUGHOUT.
ALL BACKFILLING TO AND OVER CULVERTS SHALL BE LAID IN LAYERS NOT EXCEEDING SIX INCHES IN DEPTH AND EACH LAYER SHALL BE ROLLED OR HAND TAMPED WHERE INACCESSIBLE TO ROLLER. ALSO MOISTENED WHEN NECESSARY.

LOADING DATA.
LIVE LOAD = A. A. S. H. O. AUG. 1935, CLASS A. (H-15)

COLORADO
STATE HIGHWAY DEPARTMENT
STANDARD DOUBLE CONCRETE BOX CULVERT
10 FT. x 4 FT. 10 FT. x 6 FT. 10 FT. x 8 FT.
10 FT. x 5 FT. [redacted] 10 FT. x 10 FT.

Designed by A.G.K. Approved by [signature]
Made by A.G.K. Bridge Engineer
Checked by O.W.C. Date: July 25th, 1933

STRUCTURE NO.