Fed. Road Dist. No.	State	Proj	Fiscal Year	Sheet No.	Total Sheets
6	Okla.				

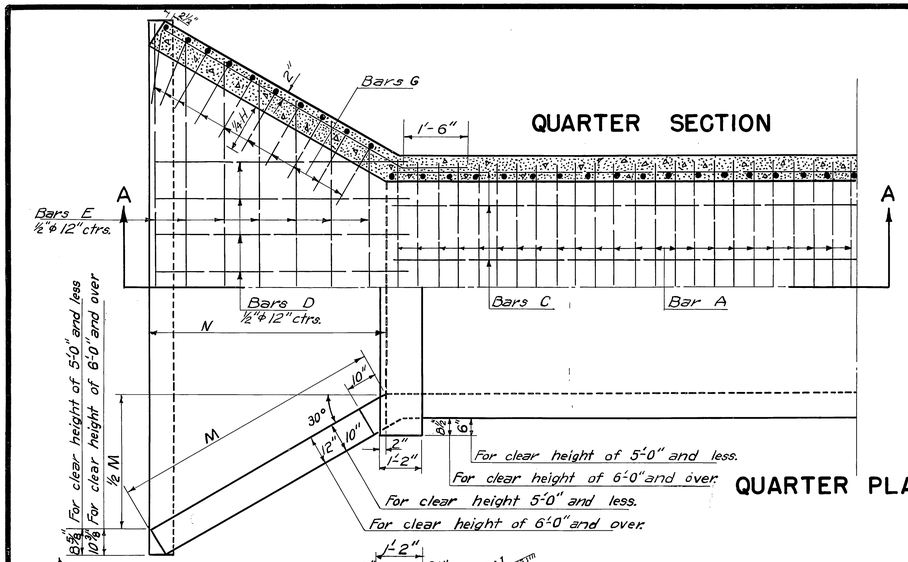
Rev. 6/25/58
Rev. 11-17-61.
Rev. Note for Reinf. W/s. 5-7-63

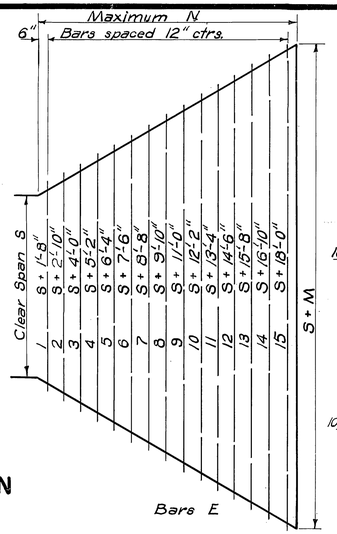
Size of Barrel	W	T
2×2 to 4×4	2'-0"	9
5×2 to 6×6	2'-6"	9
8×3 to 10×10	3'-0"	1'-0"

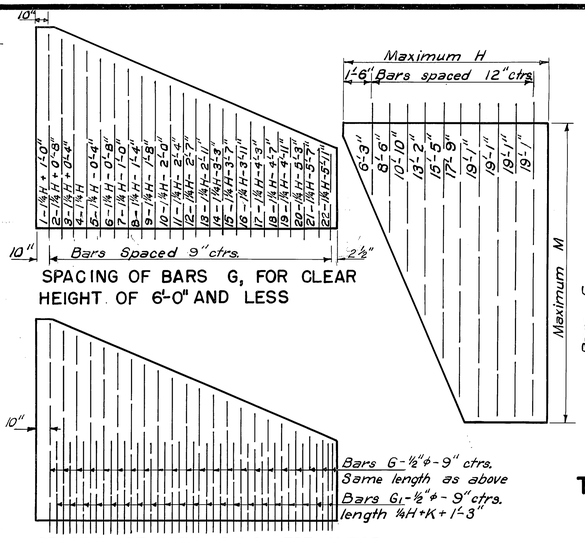
Retraced by B.R.G. July, 1952
Checked by C.P. July, 1952

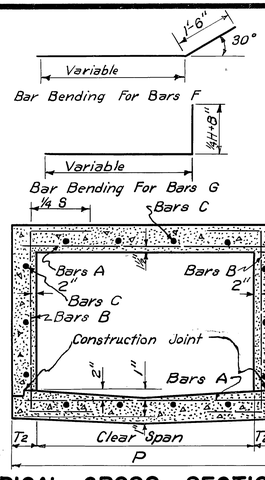
Retraced by H.H. Aug. 1941
Retraced by R.W. Jan. 1947
Checked by A.W.V. 3/26/47

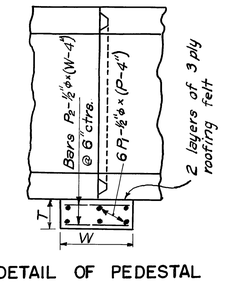
Supervised By H.X.W., D.I.M's & G.B.H.
Detailed " H.R.W. Traced By H.H.
Checked " H.E.M. & F.R.C. Dec. 1939

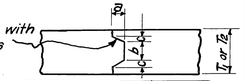




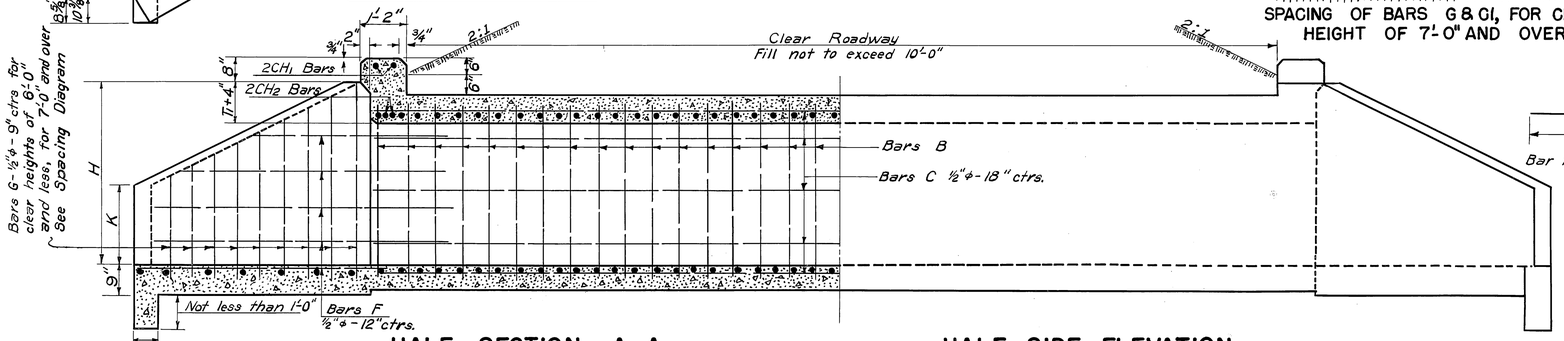


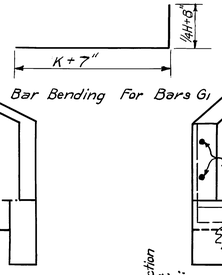


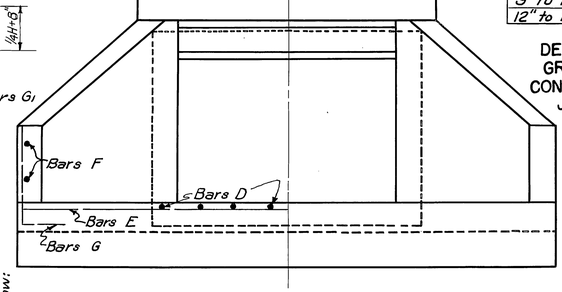




T1 or T2	a	b	c
6" to 8"	2"	2"	1"
9" to 11"	2"	3"	1"
12" to 14½"	3"	4"	2"







DETAIL OF GROOVED CONSTRUCTION JOINT

Design No.	Clear Span Ft.	Clear Height Ft.	Area of Opening Sq. Ft.	WATERWAY	BARREL OF CULVERT REINFORCING STEEL Dimensions T1	T2	V	P	Bars A Size & Spacing	Bars A length	Bars B Size & Spacing	Bars B length	Bent Bars C Size & Spacing	Bent Bars C No.	Quantities Steel Per lin. ft. lbs.	Quantities Conc. Per lin. ft. Cu. Yds.
1	2	2'-0"	4.0		6"	6"	3'-0"	3'-0"	½"ϕ-6"	2'-8"	½"ϕ-9"	3'-6"	½"ϕ-18"	8	19.34	0.185
2		2'-6"	6.0		6"	6"	3'-6"	4'-0"	½"ϕ-6"	3'-8"	½"ϕ-9"	4'-2"	½"ϕ-18"	8	22.97	0.222
3	3	2'-6"	7.5	6	6"	6"	3'-6"	4'-0"	½"ϕ-6"	3'-8"	½"ϕ-9"	4'-8"	½"ϕ-18"	8	23.86	0.241
4		3'-0"	9.0		6"	6"	4'-0"	4'-0"	½"ϕ-6"	3'-8"	½"ϕ-9"	5'-2"	½"ϕ-18"	10	26.14	0.259
5		2'-0"	8.0		7"	6"	3'-2"	5'-0"	⅜"ϕ-8"	4'-8"	½"ϕ-9"	4'-10"	½"ϕ-18"	10	30.40	0.290
6	4	2'-6"	10.0		7"	6"	3'-8"	5'-0"	⅜"ϕ-8"	4'-8"	½"ϕ-9"	5'-4"	½"ϕ-18"	10	31.31	0.308
7		3'-0"	12.0		7"	6"	4'-2"	5'-0"	⅜"ϕ-8"	4'-8"	½"ϕ-9"	5'-10"	½"ϕ-18"	12	33.58	0.327
8		4'-0"	16.0		7"	8"	5'-2"	5'-4"	⅜"ϕ-8"	5'-0"	½"ϕ-9"	6'-10"	½"ϕ-18"	12	36.45	0.428
9		2'-0"	10.0		8"	6"	3'-4"	6'-0"	⅜"ϕ-7"	5'-8"	½"ϕ-9"	5'-6"	½"ϕ-18"	12	38.72	0.370
10		3'-0"	15.0		8"	6"	4'-4"	6'-0"	⅜"ϕ-7"	5'-8"	½"ϕ-9"	6'-6"	½"ϕ-18"	14	41.90	0.407
11	5	4'-0"	20.0		8"	8"	5'-4"	6'-4"	⅜"ϕ-7"	6'-0"	½"ϕ-9"	7'-6"	½"ϕ-18"	14	44.92	0.511
12		5'-0"	25.0		8"	10"	6'-4"	6'-8"	⅜"ϕ-7"	6'-4"	½"ϕ-9"	8'-6"	½"ϕ-18"	16	49.30	0.638
13		6'-0"	30.0		8"	10"	7'-4"	6'-8"	⅜"ϕ-7"	6'-4"	½"ϕ-9"	9'-6"	½"ϕ-18"	18	52.47	0.700
14		7'-0"	35.0		8"	10"	8'-4"	6'-8"	⅜"ϕ-7"	6'-4"	½"ϕ-9"	10'-6"	½"ϕ-18"	18	54.30	0.761
15		2'-0"	12.0		9"	6"	3'-6"	7'-0"	⅜"ϕ-6"	6'-8"	½"ϕ-9"	6'-2"	½"ϕ-18"	12	47.61	0.463
16		3'-0"	18.0		9"	8"	4'-6"	7'-4"	⅜"ϕ-6"	7'-0"	½"ϕ-9"	7'-2"	½"ϕ-18"	14	52.19	0.556
17	6	4'-0"	24.0		9"	8"	5'-6"	7'-4"	⅜"ϕ-6"	7'-0"	½"ϕ-9"	8'-2"	½"ϕ-18"	14	54.01	0.605
18		5'-0"	30.0		9"	10"	6'-6"	7'-8"	⅜"ϕ-6"	7'-4"	½"ϕ-9"	9'-2"	½"ϕ-18"	16	58.59	0.734
19		6'-0"	36.0		9"	10"	7'-6"	7'-8"	⅜"ϕ-6"	7'-4"	½"ϕ-9"	10'-2"	½"ϕ-18"	18	61.76	0.796
20		3'-0"	24.0		12"	8"	5'-0"	9'-4"	⅜"ϕ-6½"	9'-0"	½"ϕ-9"	8'-8"	½"ϕ-18"	18	78.46	0.839
21		4'-0"	32.0		12"	8"	6'-0"	9'-4"	⅜"ϕ-6½"	9'-0"	½"ϕ-9"	9'-8"	½"ϕ-18"	18	80.27	0.889
22	8	5'-0"	40.0		12"	10"	7'-0"	9'-8"	⅜"ϕ-6½"	9'-4"	½"ϕ-9"	10'-8"	½"ϕ-18"	20	85.32	1.025
23		6'-0"	48.0		12"	10"	8'-0"	9'-8"	⅜"ϕ-6½"	9'-4"	½"ϕ-9"	11'-8"	½"ϕ-18"	22	88.49	1.086
24		7'-0"	56.0		12"	10"	9'-0"	9'-8"	⅜"ϕ-6½"	9'-4"	½"ϕ-9"	12'-8"	½"ϕ-18"	22	90.30	1.148
25		8'-0"	64.0		12"	11"	10'-0"	9'-10"	⅜"ϕ-6½"	9'-6"	⅜"ϕ-8"	13'-8"	½"ϕ-18"	24	113.11	1.272
26		6'-0"	60.0		14½"	10"	8'-5"	11'-8"	⅜"ϕ-5"	11'-4"	½"ϕ-9"	13'-1"	½"ϕ-18"	24	122.72	1.415
27		7'-0"	70.0		14½"	10"	9'-5"	11'-8"	⅜"ϕ-5"	11'-4"	½"ϕ-9"	14'-1"	½"ϕ-18"	24	124.54	1.477
28	10	8'-0"	80.0		14½"	11"	10'-5"	11'-10"	⅜"ϕ-5"	11'-6"	⅜"ϕ-8"	15'-1"	½"ϕ-18"	26	149.54	1.603
29		9'-0"	90.0		14½"	12"	11'-5"	12'-0"	⅜"ϕ-5"	11'-8"	⅜"ϕ-7"	16'-1"	½"ϕ-18"	28	162.62	1.741
30		10'-0"	100.0		14½"	12"	12'-5"	12'-0"	⅜"ϕ-5"	11'-8"	⅜"ϕ-8"	17'-1"	½"ϕ-18"	28	162.07	1.815

Design No.	TWO WINGS AND ONE APRON REINFORCING STEEL Dimensions H	K	M	N	Bars D No.	Bars D length	Bars E No.	Bars E length	Bars F No.	Bars F length	Bars F No.	Bars F length	Bars G No.	Bars G length	Bars G1 No.	Bars G1 length	Quantities Steel	Quantities Cl. A Conc.	Conc. in one Curtain wall Cu. Yds. Per Ft. of depth.	TWO CURBS Class A Concrete	TWO CURBS STEEL Reinf. Steel Same Size As A 4CH1	As A 4CH2	As A Bars Total for two curbs	TOTAL QUANTITIES 50' Roadway Steel	50' Roadway Cl. A Conc.	Design No.	Quantities in one Pedestal Cl. A Conc.	Quantities in one Pedestal Steel
1	2'-10"	1'-5"	4'-2"	3'-7½"	4	4'-0"	4										69	1.18	.188	.31	3'-8"	2'-8"	17	1,161	12.67	1	.167	25
2	2'-10"	1'-5"	4'-2"	3'-7½"	5	4'-0"	4			4	6'-4"	10					75	1.28	.212	.40	4'-8"	3'-8"	23	1,367	14.92	2	.222	33
3	3'-4"	1'-7"	4'-11"	4'-3"	5	4'-8"	4			4	6'-4"	10					87	1.66	.231	.40	4'-8"	3'-8"	23	1,439	16.71	3	.222	33
4	3'-10"	1'-9"	5'-7"	4'-10"	5	5'-3"	5		2	6'-3"	4	7'-9"	14				117	2.05	.247	.40	4'-8"	3'-8"	23	1,616	18.46	4	.222	33
5	4'-4"	2'-0"	5'-10"	5'-0"	6	5'-8"	4			4	6'-5"	10					81	1.43	.239	.48	5'-8"	4'-8"	44	1,787	18.90	5	.278	42
6	4'-11"	2'-2"	6'-2"	5'-3"	6	6'-1"	4		2	6'-3"	2	7'-2"	12				94	1.83	.258	.48	5'-8"	4'-8"	44	1,860	20.68	6	.278	42
7	5'-5"	2'-4"	6'-6"	5'-6"	6	6'-5"	4		2	6'-3"	4	7'-11"	14				126	2.28	.276	.48	5'-8"	4'-8"	44	2,042	22.59	7	.278	42
8	5'-11"	2'-7"	7'-2"	6'-2½"	6	6'-8"	4		4	Var.	4	9'-4"	18				179	3.23	.311	.50	6'-0"	5'-0"	47	2,300	29.84	8	.296	45
9	6'-6"	2'-9"	7'-6"	6'-8"	4	6'-7"	12										93	1.62	.268	.56	6'-8"	5'-8"	52	2,251	23.58	9	.417	59
10	7'-0"	2'-11"	7'-10"	6'-11"	4	6'-7"	12										140	2.49	.303	.56	6'-8"	5'-8"	52	2,511	27.31	10	.417	59
11	7'-6"	3'-1"	8'-2"	7'-3½"	4	6'-7"	12		2	6'-3"	4	8'-0"	16				195	3.52	.340	.58	7'-0"	6'-0"	55	2,781	34.87	11	.440	63
12	8'-0"	3'-3"	8'-6"	7'-4"	4	Var.	12		4	Var.	4	9'-6"	20				263	4.70	.375	.61	7'-4"	6'-4"	58	3,148	43.94	12	.463	64
13	8'-6"	3'-5"	8'-10"	7'-5"	4	Var.	12		6	Var.	6	12'-5"	28				337	6.85	.420	.64	7'-9"	6'-4"	60	3,462	51.58	13	.463	64
14	8'-11"	3'-7"	9'-2"	7'-6"	4	Var.	12		8	Var.	6	13'-11"	30		28	6'-6"	542	8.65	.457	.64	7'-9"	6'-4"	60	3,968	58.42	14	.463	64
15	9'-5"	3'-9"	9'-6"	7'-8"	4	6'-8"	12		2	6'-3"	2	6'-8"	12				99	1.78	.295	.64	7'-8"	6'-8"	61	2,735	28.87	15	.486	69
16	9'-11"	3'-11"	9'-10"	7'-9½"	4	6'-8"	12		2	6'-3"	4	8'-2"	16				149	2.69	.332	.67	8'-0"	7'-0"	64	3,076	35.62	16	.509	73
17	10'-4"	4'-1"	10'-2"	7'-11"	4	Var.	12		4	Var.	4	9'-7"	20				206	3.78	.367	.67	8'-0"	7'-0"	64	3,285	40.42	17	.509	73
18	10'-10"	4'-3"	10'-6"	8'-1"	4	Var.	12		6	Var.	4	11'-1"	24				264	5.05	.404	.69	8'-4"	7'-4"	66	3,681	49.77	18	.532	74
19	11'-3"	4'-5"	10'-10"	8'-3½"	4	Var.	12		6	Var.	6	12'-6"	28				359	7.23	.447	.72	8'-9"	7'-4"	68	3,998	57.46	19	.532	74
20	11'-9"	4'-7"	11'-2"	8'-5"	4	6'-8"	16		2	6'-3"	4	8'-6"	16				180	3.24	.390	.83	10'-0"	9'-0"	116	4,556	51.72	20	.037	106
21	12'-3"	4'-9"	11'-6"	8'-8"	4	Var.	16		4	Var.	4	10'-0"	20				243	4.50	.426	.83	10'-0"	9'-0"	116	4,776	56.91	21	.037	106
22	12'-8"	4'-11"	11'-10"	8'-10½"	4	Var.	16		6	Var.	4	11'-5"	24				314	5.81	.461	.85	10'-4"	9'-4"	120	5,165	66.69	22	.074	107
23	13'-2"	5'-1"	12'-2"	9'-1"	4	Var.	16		6	Var.	6	12'-11"	28				395	8.20	.507	.88	10'-9"	9'-4"	122	5,513	74.76	23	.074	107
24	13'-7"	5'-3"	12'-6"	9'-3½"	4	Var.	16		8	Var.	6	14'-4"	32		30	6'-9"	635	10.13	.542	.88	10'-9"	9'-4"	122	6,088	81.92	24	.074	107
25	13'-11"	5'-5"	12'-10"	9'-6"	4	Var.	16		10	Var.	6	15'-10"	36		34	7'-4"	764	12.26	.579	.89	10'-11"	9'-6"	124	4,534	92.71	25	.093	111
26	14'-3"	5'-7"	13'-2"	9'-9"	4	Var.	16		6	Var.	6	13'-3"	30				451	9.15	.564	1.05	12'-9"	11'-4"	146	7,429	94.06	26	.296	130
27	14'-8"	5'-9"	13'-6"	9'-11½"	4	Var.	16		8	Var.	6	14'-8"	32		36	7'-5"	809	13.44	.636	1.06	12'-9"	11'-4"	146	7,972	101.43	27	.296	130
28	15'-2"	5'-11"	13'-10"	10'-2"	4	Var.	16		10	Var.	6	16'-2"	36		38	8'-1"	965	15.85	.671	1.07	12'-11"	11'-6"	148	9,542	112.57	28	.315	134
29	15'-5"	6'-1"	14'-2"	10'-5"	4	Var.	16		10	Var.	8	17'-7"	40		38	8'-1"	965	15.85	.671	1.07	13'-1"	11'-8"	150	10,536	124.64	29	.333	135
30	15'-8"	6'-3"	14'-6"	10'-8"	4	Var.	16		12	Var.	8	19'-1"	44		42	8'-8"	1143	18.54	.708	1.07	13'-1"	11'-8"	150	11,904	133.95	30	.333	135

Note: Quantities for 50' Roadway do not include pedestal quantities. Grooved construction joints and pedestals shall be used when and where noted on Summary sheet. In general Grooved Construction Joints and Pedestals shall be placed as follow:
- 60' to 100' of Barrel use 1, construction joint and pedestals.
- 100' to 140' of Barrel use 2, construction joints and pedestals.
- 140 to 180 of Barrel use 3, construction joints and pedestals.

General Notes

All reinforcing steel shall be deformed round bars. The design and table are based upon net areas of bars as follows. ½"ϕ=0.1963 sq. in. – ⅝"ϕ=0.3068 sq. in. – ¾"ϕ=0.442 sq. in. Other sizes may be used provided they are spaced so as to give as much net sectional area per foot width of slab. Plans showing such changed sizes and spacing must be approved. All exposed surfaces to have a carborundum finish and this shall be included in the unit price bid per Cu. Yd. for concrete. All exposed edges shall have a ¾" chamfer.
Design is sufficient for H10-53 and PPM 20-4 loading

Design Data

Dead load	1000 Lbs.
Live load	None
Impact	None

Quantities shown for reinforcing steel shall be reduced by 1¼% (.015) to comply with approved C.R.S.I. weights per foot for reinforcing bars.

OKLAHOMA STATE HIGHWAY COMMISSION STANDARD CONCRETE BOX CULVERTS SPANS 2 TO 10 FEET FOR FILLS 3 TO 10 FEET WITH 2 TO 1 SLOPE

28

BC-62