Span	A Bars	Additional Steel/Ft.
4		0
5	#6@15"	18.522
6	#6@13"	24.840
8	#7@14"	35.671
10	#7@12"	50.968
Use above in Interstate System		

Revisions for H-20-S16-53 & PPM 20-4 loading

Bars E $\frac{1}{2}$"ϕ @ 12"cts.

QUARTER SECTION

Bars A
Bars A1
Bars C
Bars D
Bars E
Bars F
Bars G
Bars H

QUARTER PLAN

For clear height of 5'0" and less
For clear height of 6'-0" and over

Bars G-$\frac{1}{2}$"ϕ @ 9"cts. for Clear height of 6'-0" and less, for 7'-0" and over see diagram for spacing.

Bars-E.

Bars Spaced @ 12"cts.

Max. N

Max. M

Bars F

Bars spaced @ 12"cts. Max. H

Bars spaced @ 9"cts.

Spacing of Bars G For clear Height of 6'-0" and less

Spacing of Bars G & G1 For clear Height of 7'-0" and over.

Bars G-$\frac{1}{2}$"ϕ @ 9"cts. same length as above.

Bars G1-$\frac{1}{2}$"ϕ @ 9"cts. Length $\frac{1}{4}H+K+1'-3"$

Variable

Bending For F Bars

Bending For Bars A1

Bending For Bars G1

Bending For Bars G

Detail of Construction Joints

Note to Pour Concrete to here with Walls.

NOTE

Reinforcing steel wts. shown on this std. are for estimated purposes only. Final pay wts. for reinforcing steel will be calculated using the approved AASHO or CRSI wts. for reinforcing steel.

Clear height 3'0" or less R=9"
Clear height over 3'-0" R=12"

TYPICAL CROSS SECTION

Bars A
Bars A1
Bar C1
Bars B
Bars C
Bars H
Construction Joint
Clear Height H
Clear
Span
Clear Span

All construction and materials requirements shall be in accordance with the current standard specifications.

P+1'-0" For clear height of 5'and less.
P+1'-5" For clear height of 6 feet and over

Bars F
Bars D -12"cts.
Bars G
Bars E

END ELEVATION

Clear Roadway
Fill not to exceed 3'0"
2:1
2CH1
2CH2
Bars F
Bars B
Bars C
Not less than 1'-0"

HALF SECTION

HALF SIDE ELEVATION

Variable See Diagram

Quantities shown for reinforcing steel are for one barrel and two wings complete. Weights are for top mat reinforcing bars.

All slab reinforcing steel shall be supported on approved metal supports.

General Notes

All exposed edges shall have ¾" chamfer.

All reinforcing steel shall be deformed round bars. The design and table are based upon net areas of bars as follows - $\frac{1}{2}$"ϕ - 0.1963 sq.in. $\frac{5}{8}$"ϕ - 0.3068 sq.in., $\frac{3}{4}$"ϕ - 0.442 sq.in. Other sizes may be used, provided they are spaced so as to give as much net sectional area per ft. width of slab. Plans showing such changed sizes and spacing must be approved.

Unless otherwise specified, all exposed concrete surfaces shall have a finish in accordance with the current standard specifications.

See Revisions for H-20-S16 Loading

Design - Data

Conc. slab 6"span 8½"-106 lbs. L.L.M. 909x40=36,360#
Dirt Fill 100 " I=30% L.L.= 10,910#
Paving 7" 87 " $f_s = \frac{M}{A_s jd} = \frac{293 \times 667^{\#}\text{-}12}{0.67 \times 19.550^{\text{in}^2}}$
Total D.L. 293 "
Total Mom.=66,820 in.#

L.L. 6'-8" 909 — V8/8

55 | 10.000
1,818

FED. ROAD DIST. NO.	State	FISCAL PROJ. NO.	YEAR	SHEET NO.	TOTAL SHEET
6	OKLA.				

REVISIONS

NO	DESCRIPTION	BY	DATE
	Revision of Const. Joint Req. for H-20 S16-53	J.H.S. AMD	9-24-58
15	Adjust Reinf. Steel at Note	J.L.G.	9-5-62
16	Note for Reinf. Wts.	J.D.C.	5-7-63
	Rev.-Rem. 2:1 Slopes	L.G.C.	5-7-65

OKLAHOMA DEPARTMENT OF TRANSPORTATION

RECORD

ITEM	BY	DATE
DESIGN		
DETAIL		
TRACED		
CHECKED		
APPROVED		

OKLAHOMA CITY, OKLA.

STANDARD BOX CULVERTS SPANS 4 TO 10 FT. FOR FILLS NOT OVER 3 FT.

14

BC 5A2

Designed By H.W. & A.T.M.
Drawn By L.T.D.
Checked By D.S.M. & H.B.S.
Re-traced By G.R.C. & Jones Hall
Checked By L.R.
Re-traced By R.W. Mar. 1947

* Note: The weight of the CH1 & CH2 Bars is included in the weight of the Total Quantities for 30'and 36' Rdy.

Design No.	Class	Clear Span Ft.	Clear Height Ft.	Area Opening Sq.Ft.	T1	T2	L'	P	Bars A Size & Spacing	Bars A Length	Bars A1 Size & Spacing	Bars A1 Length	Bars A1 Bending A	B	C	D	E	Bars B Bent Size & Spacing	Bars B Bent Length	Bars C Size & Spacing	Bars C No.	Bars H Size & Spacing	Bars H Length	Quantities steel per Lin. Ft. Lbs.	Quantities conc. per Lin. Ft. Cu. Yds.
1		2'-0"	16		7"	6"	3'-2"	10'-0	$\frac{5}{8}$"ϕ -16"	9'-6"	$\frac{5}{8}$"ϕ -16"	10'-1"	10"	4'-1"	0'-5"	2'-1"	3"	$\frac{1}{2}$"ϕ -9"	4'-10"	$\frac{1}{2}$"ϕ -18"	20	$\frac{1}{2}$"ϕ -9"	3'-4"	59.81	0.601
2	4	2'-6"	20		7"	6"	3'-8"	10'-0"	"	9'-8"	"	10'-1"	10½"	4'-1"	0'-5"	2'-1"	3"	"	5'-4"		20		3'-10"	61.62	0.638
3		3'-0"	24		7"	6"	4'-2"	10'-0	"	9'-8"	"	10'-1"	10½"	4'-1"	0'-5"	2'-1"	3"	"	5'-10"		22		4'-4"	64.79	0.675
4		4'-0"	32		7"	8"	5'-2"	10'-4"	"	10'-0"	"	10'-5"	10½"	4'-1"	0'-5"	2'-1"	3"	"	6'-0"		26		5'-6"	72.35	0.829
5		2'-0"	20		7¼"	6"	3'-3"	10'-3	$\frac{3}{8}$"ϕ -15"	11'-8"	$\frac{5}{8}$"ϕ -15"	12'-2"	12½"	5"	3'-0"	2'-5"	3½"	$\frac{1}{2}$"ϕ -9"	5'-1"	$\frac{5}{8}$"ϕ -18"	34	$\frac{1}{2}$"ϕ -9"	3'-5"	72.76	0.725
6		2'-6"	25	7¼"	6"	3'-9"	10'-3"	"	11'-8"	"	12'-2"	12½"	5"	3'-0"	2'-5"	3½"	"	5'-1"	34		3'-7"	74.57	0.760		
7	5	3'-0"	30	7¼"	6"	4'-3"	10'-0"	"	11'-8"	"	12'-2"	12½"	5"	3'-0"	2'-5"	3½"	"	5'-1"	34		3'-11"	76.38	0.799		
8		4'-0"	40	7¼"	8"	5'-3"	10'-4"	"	12'-0"	"	12'-6"	12½"	5"	3'-0"	2'-5"	3½"	"	5'-3"	28		5'-6"	84.01	0.954		
9		5'-0"	50	7¼"	10"	6'-3"	10'-8"	"	12'-4"	"	12'-10"	13"	5"	3'-0"	2'-5"	3½"	"	5'-5"	32		6'-6"	91.49	1.117		
10		7'-0"	70	7¼"	10"	8'-3"	12'-8"	"	12'-4"	"	12'-10"	13"	5"	3'-0"	2'-5"	3½"	"	10'-5"	36		8'-6"	101.46	1.315		
11		2'-0"	24	8½"	6"	3'-5"	14'-0"	$\frac{3}{8}$"ϕ -13"	13'-8"	"	$\frac{5}{8}$"ϕ -13"	14'-3"	10"	6¼"	3'-7"	2'-8"	4½"	$\frac{1}{2}$"ϕ -9"	6'-1"	$\frac{1}{2}$"ϕ -18"	26	$\frac{1}{2}$"ϕ -9"	3'-7"	89.83	0.903
12		2'-6"	30	8½"	6"	3'-11"	14'-0"	"	13'-8"	"	14'-3"	15"	10"	6¼"	3'-7"	2'-8"	4½"	"	6'-7"		26		4'-1"	91.64	0.940
13	6	3'-0"	36	8½"	8"	4'-5"	14'-4"	"	14'-0"	"	14'-7"	15"	10"	6¼"	3'-7"	2'-8"	4½"	"	7'-1"		30		4'-7"	97.48	1.032
14		4'-0"	48	8½"	8"	5'-5"	14'-4"	"	14'-0"	"	14'-7"	15"	10"	6¼"	3'-7"	2'-8"	4½"	"	8'-1"		30		5'-3"	101.41	1.135
15		5'-0"	60	8½"	10"	6'-5"	14'-8"	"	14'-4"	"	14'-11"	15"	10"	6¼"	3'-7"	2'-8"	4½"	"	9'-1"		34		6'-3"	109.06	1.300
16		6'-0"	72	8½"	10"	7'-5"	14'-8"	"	14'-4"	"	14'-11"	15"	10"	6¼"	3'-7"	2'-8"	4½"	"	10'-1"		38		7'-1"	115.40	1.399
17		2'-6"	30	10"	8"	4'-2"	18'-4"	$\frac{3}{4}$"ϕ -14"	19'-3"	$\frac{3}{4}$"ϕ -14"	18'-10"	19'-7"	8½"	4'-9"	3'-3½"	6"	$\frac{1}{2}$"ϕ -9"	7'-10"	$\frac{1}{2}$"ϕ -18"	32	$\frac{1}{2}$"ϕ -9"	4'-5"	139.93	1.368
18		3'-0"	38	10"	8"	4'-8"	18'-4"	"	18'-0"	"	18'-10"	19'-7"	8½"	4'-9"	3'-3½"	6"	"	8'-4"		32		4'-11"	141.74	1.411
19		4'-0"	64	10"	8"	5'-8"	18'-4"	"	18'-0"	"	18'-10"	19'-7"	8½"	4'-9"	3'-3½"	6"	"	9'-4"		36		6'-0"	148.24	1.514
20	8	5'-0"	80	10"	10"	6'-8"	18'-8"	"	18'-4"	"	19'-2"	19'-11"	8½"	4'-10"	3'-3½"	6"	"	10'-1"		40		7'-0"	156.32	1.683
21		6'-0"	96	10"	10"	7'-8"	18'-8"	"	18'-4"	"	19'-2"	19'-11"	8½"	4'-10"	3'-3½"	6"	"	11'-1"		40		8'-0"	159.95	1.781
22		7'-0"	112	10"	10"	8'-8"	18'-8"	"	18'-4"	"	19'-2"	19'-11"	8½"	4'-10"	3'-3½"	6"	"	12'-1"		44		9'-0"	166.29	1.880
23		8'-0"	128	10"	11"	9'-8"	18'-8"	"	18'-6"	"	19'-4"	20'-1"	8½"	4'-10"	3'-3½"	6"	"	13'-4"		48		10'-0"	173.51	2.039
24		2'-6"	50	11"	8"	4'-4"	22'-4"	$\frac{3}{4}$"ϕ -12"	22'-0"	$\frac{3}{4}$"ϕ -12"	23'-0"	23'-11"	10"	6'-0"	3'-10"	7"	$\frac{1}{2}$"ϕ -9"	9'-0"	$\frac{1}{2}$"ϕ -18"	38	$\frac{1}{2}$"ϕ -9"	4'-7"	187.26	1.754
25		3'-0"	60	11"	8"	4'-10"	22'-4"	"	22'-0"	"	23'-0"	23'-11"	10"	6'-0"	3'-10"	7"	"	9'-6"		38		5'-1"	189.08	1.797
26		4'-0"	80	11"	8"	5'-10"	22'-4"	"	22'-0"	"	23'-0"	23'-11"	10"	6'-0"	3'-10"	7"	"	10'-6"		42		6'-3"	195.73	1.900
27		5'-0"	100	11"	10"	6'-10"	22'-8"	"	22'-4"	"	23'-4"	24'-1"	10"	6'-0"	3'-10"	7"	"	11'-6"		42		7'-3"	201.38	2.070
28	10	6'-0"	120	11"	10"	7'-10"	22'-8"	"	22'-4"	"	23'-4"	24'-1"	10"	6'-0"	3'-10"	7"	"	12'-6"		46		8'-3"	207.72	2.169
29		7'-0"	140	11"	10"	8'-10"	22'-8"	"	22'-4"	"	23'-4"	24'-1"	10"	6'-0"	3'-10"	7"	"	13'-6"		50		9'-3"	214.07	2.268
30		8'-0"	160	11"	11"	9'-10"	22'-10"	"	22'-6"	"	23'-6"	24'-3"	10"	6'-0"	3'-10"	7"	"	14'-6"		50		10'-3"	218.71	2.428
31		9'-0"	180	11"	12	10'-10"	23'-0"	"	22'-8"	"	23'-8"	24'-5"	10"	6'-0"	3'-10"	7"	"	15'-6"		54		11'-3"	226.07	2.599
32		10'-0"	200	11"	12	11'-10"	23'-0"	"	22'-8"	"	23'-8"	24'-5"	10"	6'-0"	3'-10"	7"	"	16'-6"		58		12'-3"	232.42	2.710

TWO WINGS AND ONE APRON

Design No.	Dimensions H	K	M	N	Reinforcing Steel Bars D No.	Leng.	Bars E No.	Len.	Bars F No.	Leng.	No.	Leng.	Bars G No.	Leng.	Bars G1 No.	Leng.	Quantities Steel	CI.A Conc.	Conc. in Two Curbs cu. Yds.	Conc. in one curtain Wall cu.yds. Per. Ft. of depth
1	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-5"	10						108	1.94	0.89	0.363
2	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-5"	10						124	2.43	0.89	0.382
3	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-5"	10						162	2.97	0.89	0.400
4	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-5"	10						222	4.09	0.91	0.435
5	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-6"	12						125	2.20	1.05	0.414
6	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-6"	12						142	2.73	1.05	0.434
7	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-6"	12						183	3.31	1.05	0.482
8	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-6"	12						240	4.50	1.07	0.487
9	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-6"	12						327	5.93	1.10	0.524
10	1'-4"	1'-8"	1'-4"	3'-8"					4	6'-6"	12						424	7.34	1.13	0.602
11	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						135	2.48	1.22	0.466
12	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						164	3.06	1.22	0.484
13	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						199	3.64	1.25	0.503
14	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						266	5.00	1.25	0.540
15	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						360	6.46	1.27	0.575
16	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						447	8.93	1.30	0.619
17	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						310	3.68	1.57	0.587
18	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						231	4.38	1.57	0.605
19	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						325	5.90	1.57	0.642
20	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						429	7.51	1.59	0.677
21	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						502	10.17	1.62	0.722
22	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						635	12.40	2.14	0.794
23	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						799	14.98	2.14	0.794
24	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						540	4.35	1.90	0.690
25	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						364	5.13	1.90	0.708
26	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						365	6.74	1.90	0.743
27	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						453	8.59	1.93	0.780
28	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						556	11.32	1.96	0.823
29	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						818	13.74	1.96	0.860
30	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						970	16.31	1.97	0.897
31	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						1145	19.07	1.98	0.932
32	1'-4"	1'-8"	1'-4"	3'-10"					4	6'-6"	12						1338	22.14	1.98	0.969

TOTAL QUANTITIES

Design No.	30' Roadway Steel	30' Roadway Class A Conc.	36' Roadway Steel	36' Roadway Class A Conc.	Design No.	Two Curbs Reinf. Steel Same Size as A Bars * ACH1	* ACH2
1	2216	24.73	2574	28.34	1	10'-3"	9'-8"
2	2,306	26.93	2,676	30.76	2	10'-3"	9'-8"
3	2,483	29.23	2,872	33.28	3	10'-3"	9'-8"
4	2,848	36.49	3,282	41.46	4	11'-0"	10'-0"
5	2681	29.48	3,118	33.83	5	12'-9"	11'-8"
6	2,773	31.76	3,221	36.33	6	12'-3"	11'-8"
7	2,913	34.14	3,371	38.94	7	12'-8"	11'-8"
8	3,274	41.57	3,778	47.28	8	13'-0"	12'-0"
9	3,690	49.75	4,239	56.45	9	13'-4"	12'-4"
10	4,606	64.89	5,214	72.78	10	13'-9"	12'-4"
11	3,271	36.01	3,810	41.43	11	14'-8"	13'-8"
12	3,380	38.39	3,930	44.03	12	14'-8"	13'-8"
13	3,620	42.56	4,225	49.75	13	15'-0"	14'-0"
14	3,900	48.65	4,509	55.36	14	15'-0"	14'-0"
15	4,336	56.94	4,990	64.74	15	15'-4"	14'-4"
16	4,715	65.17	5,407	73.56	16	15'-9"	14'-4"
17	5,129	53.88	5,962	62.00	17	10'-3"	9'-0"
18	5,222	56.69	6,073	65.16	18	10'-0"	9'-0"
19	5,617	63.10	6,509	72.19	19	10'-4"	9'-0"
20	6,049	71.82	6,987	81.92	20	10'-4"	9'-4"
21	6,354	80.40	7,314	91.08	21	10'-9"	9'-4"
22	7,023	88.20	8,020	99.48	22	10'-9"	9'-4"
23	7,390	98.11	8,621	110.34	23	10'-11"	9'-6"
24	6,146	68.11	7,870	78.63	24	23'-0"	22'-0"
25	6,853	71.08	7,987	81.86	25	23'-0"	22'-0"
26	7,267	77.67	8,442	89.07	26	23'-0"	22'-0"
27	7,632	86.91	8,840	99.33	27	23'-4"	22'-8"
28	8,039	95.66	9285	108.67	28	23'-8"	22'-8"
29	8,766	103.74	10,051	117.34	29	23'-8"	22'-8"
30	9,808	125.15	11,165	140.75	30	24'-1"	22'-8"
31	10,321	136.07	11,965	151.18	31	24'-1"	22'-8"
32	10,867	134.92	11,762	151.18	32	24'-1"	22'-8"