2010 STANDARD PLAN D81

173

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 20, 2011
PLANS APPROVAL DATE
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.
REGISTERED PROFESSIONAL ENGINEER · No. C37765 · Exp. 12-31-12 · CIVIL · STATE OF CALIFORNIA

SPAN, S = 4'

HEIGHT, H	2'	2'	3'	3'	4'	4'
MAXIMUM EARTH COVER	10'	20'	10'	20'	10'	20'
Conc ROOF T_1	7"	7½"	7"	7½"	7"	7½"
Conc WALLS T_2	6"	6½"	6½"	7"	7"	8"
Conc INVERT T_3	7"	7½"	7"	7½"	7"	7½"
Reinf SPACING	12"	12"	12"	12"	12"	12"
Reinf "g" SIZE BAR	#4	#7	#4	#7	#4	#7
Reinf "f" SIZE BAR	#5	#5	#5	#5	#5	#5
Reinf "a" SIZE BAR	#6	#4	#6	#4	#6	#4
Reinf "e" SIZE BAR	#4	#4	#4	#5	#5	#6
QUANTITIES CONCRETE CF/LF	14.1	15.1	15.9	17.1	17.9	19.6
QUANTITIES REINFORCEMENT LB/LF	109	109	115	122	130	141
** SOIL PRESSURE (ksf)	2.1	4.1	2.2	4.1	2.2	4.1

SPAN, S = 5'

HEIGHT, H	2'	2'	3'	3'	4'	4'	5'	5'
MAXIMUM EARTH COVER	10'	20'	10'	20'	10'	20'	10'	20'
Conc ROOF T_1	7"	9"	7"	9"	7"	9"	7"	9"
Conc WALLS T_2	6"	6½"	6½"	7½"	7½"	8"	8"	9½"
Conc INVERT T_3	7½"	9"	7½"	9"	8"	9"	8"	9"
Reinf SPACING	11½"	12"	11½"	12"	11½"	12"	11½"	12"
Reinf "g" SIZE BAR	#4	#7	#4	#7	#4	#7	#4	#7
Reinf "f" SIZE BAR	#5	#5	#5	#5	#5	#5	#5	#5
Reinf "a" SIZE BAR	#6	#4	#6	#4	#6	#4	#6	#4
Reinf "e" SIZE BAR	#4	#4	#4	#5	#5	#6	#5	#7
QUANTITIES CONCRETE CF/LF	16.9	20.5	18.8	22.9	21.7	25.1	24.0	28.5
QUANTITIES REINFORCEMENT LB/LF	133	130	139	145	156	164	163	192
** SOIL PRESSURE (ksf)	3.2	4.1	3.2	4.1	3.2	4.1	3.3	4.2

SPAN, S = 6'

HEIGHT, H	3'	3'	4'	4'	5'	5'	6'	6'
MAXIMUM EARTH COVER	10'	20'	10'	20'	10'	20'	10'	20'
Conc ROOF T_1	7"	10½"	7"	10½"	7"	10½"	7"	10½"
Conc WALLS T_2	6½"	7½"	7"	8½"	7½"	10"	8½"	11"
Conc INVERT T_3	8½"	10½"	8½"	10½"	8½"	10½"	8½"	10½"
Reinf SPACING	11½"	12"	11½"	12"	11½"	12"	11½"	12"
Reinf "g" SIZE BAR	#6	#7	#6	#7	#6	#7	#6	#7
Reinf "f" SIZE BAR	#5	#5	#5	#5	#5	#6	#5	#6
Reinf "a" SIZE BAR	#7	#4	#7	#4	#7	#4	#7	#4
Reinf "e" SIZE BAR	#4	#5	#5	#6	#6	#6	#6	#7
QUANTITIES CONCRETE CF/LF	22.3	29.3	24.3	32.0	26.5	35.6	29.5	38.5
QUANTITIES REINFORCEMENT LB/LF	202	167	218	188	239	213	250	243
** SOIL PRESSURE (ksf)	3.1	4.1	3.1	4.2	3.1	4.2	3.1	4.2

SPAN, S = 7'

HEIGHT, H	3'	3'	4'	4'	5'	5'	6'	6'	7'	7'
MAXIMUM EARTH COVER	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'
Conc ROOF T_1	7½"	11½"	7½"	11½"	7½"	11½"	7½"	11½"	8"	11½"
Conc WALLS T_2	6½"	7½"	7½"	8"	7½"	9½"	8½"	11"	9½"	13"
Conc INVERT T_3	9½"	12"	9½"	12"	9½"	12"	9½"	12"	9½"	12"
Reinf SPACING	11"	10½"	11"	10½"	11"	10½"	11"	10½"	11"	10½"
Reinf "g" SIZE BAR	#6	#7	#6	#7	#6	#7	#6	#7	#6	#7
Reinf "f" SIZE BAR	#6	#5	#6	#5	#6	#6	#6	#6	#6	#6
Reinf "a" SIZE BAR	#6	#4	#6	#4	#6	#4	#6	#4	#6	#4
Reinf "e" SIZE BAR	#4	#5	#5	#6	#6	#6	#6	#7	#6	#7
QUANTITIES CONCRETE CF/LF	26.8	36.1	29.3	38.3	31.1	41.9	34.0	46.0	38.0	51.3
QUANTITIES REINFORCEMENT LB/LF	237	209	254	232	275	262	287	298	299	317
** SOIL PRESSURE (ksf)	3.0	4.1	3.0	4.2	3.0	4.2	3.0	4.2	3.1	4.3

SPAN, S = 8'

HEIGHT, H	4'	4'	5'	5'	6'	6'	7'	7'	8'	8'
MAXIMUM EARTH COVER	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'
Conc ROOF T_1	8½"	13"	8½"	13"	8½"	13"	8½"	13"	8½"	13"
Conc WALLS T_2	6½"	8"	7½"	9½"	8½"	11½"	9½"	13"	11"	15"
Conc INVERT T_3	10½"	13½"	10½"	13½"	10½"	13½"	10½"	13½"	10½"	13½"
Reinf SPACING	9"	10"	9"	10"	9"	10"	9"	10"	9"	10"
Reinf "g" SIZE BAR	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7
Reinf "f" SIZE BAR	#5	#6	#5	#6	#5	#6	#5	#6	#5	#6
Reinf "a" SIZE BAR	#6	#4	#6	#4	#6	#4	#6	#4	#6	#4
Reinf "e" SIZE BAR	#5	#6	#5	#6	#6	#6	#6	#7	#6	#7
QUANTITIES CONCRETE CF/LF	34.2	46.7	36.9	50.4	39.9	55.2	43.2	59.9	47.7	66.0
QUANTITIES REINFORCEMENT LB/LF	334	287	345	301	376	317	390	359	406	378
** SOIL PRESSURE (ksf)	2.9	4.2	2.9	4.2	3.0	4.3	3.0	4.3	3.0	4.4

SPAN, S = 10'

HEIGHT, H	5'	5'	6'	6'	7'	7'	8'	8'	9'	9'	10'	10'
MAXIMUM EARTH COVER	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'
Conc ROOF T_1	10½"	15½"	10½"	15½"	10½"	15½"	10½"	15½"	10½"	15½"	10½"	15½"
Conc WALLS T_2	8½"	8½"	8½"	9½"	8½"	10½"	9"	12"	10"	13½"	11"	15"
Conc INVERT T_3	10½"	16"	10½"	16"	10½"	16"	10½"	16"	10½"	16"	10½"	16"
Reinf SPACING	11"	7½"	10½"	7½"	10"	8"	10"	8"	10½"	8"	10½"	8½"
Reinf "g" SIZE BAR	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7
Reinf "f" SIZE BAR	#7	#6	#7	#6	#7	#6	#7	#6	#7	#6	#7	#6
Reinf "a" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#5
Reinf "b" SIZE BAR	#5	#5	#4	#5	#5	#5	#6	#5	#6	#6	#6	#6
Reinf "b" Dim "B" ft-inch	1-9	2-7	2-0	2-9	2-3	2-9	2-7	3-1	2-7	3-1	2-7	3-1
Reinf "b" Dim "Bw" ft-inch	4-0	4-11	4-0	4-11	4-0	4-11	4-0	4-11	4-0	4-11	4-0	4-11
Reinf "c" SIZE BAR	#5	#6	#6	#6	#6	#6	#6	#6	#7	#6	#7	#6
Reinf "c" Dim "C" ft-inch	3-1	2-9	3-9	3-3	4-6	4-3	5-6	4-6	6-0	4-9	6-0	4-9
Reinf * "e" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#5	#5
QUANTITIES CONCRETE CF/LF	49.1	68.4	51.1	71.9	53.2	75.8	56.1	80.8	60.1	86.4	64.4	92.5
QUANTITIES REINFORCEMENT LB/LF	393	520	427	542	473	538	509	559	534	599	568	636
** SOIL PRESSURE (ksf)	2.8	4.8	2.8	4.9	2.9	4.9	2.9	4.9	2.9	4.9	2.9	5.0

SPAN, S = 12'

HEIGHT, H	6'	6'	7'	7'	8'	8'	9'	9'	10'	10'	11'	11'	12'	12'
MAXIMUM EARTH COVER	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'
Conc ROOF T_1	11½"	18"	11½"	18"	11½"	18"	11½"	18"	11½"	18"	11½"	18"	11½"	18"
Conc WALLS T_2	8½"	9½"	8½"	10½"	9"	12"	10"	13½"	11"	15"	12½"	16½"	13½"	18½"
Conc INVERT T_3	12"	19"	12"	19"	12"	19"	12"	19"	12"	19"	12"	19"	12"	19"
Reinf SPACING	9"	8"	9"	8"	8"	7½"	8"	7½"	8½"	7½"	8½"	8"	8½"	8"
Reinf "g" SIZE BAR	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7
Reinf "f" SIZE BAR	#7	#8	#7	#8	#7	#7	#7	#7	#7	#7	#7	#8	#7	#8
Reinf "a" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
Reinf "b" SIZE BAR	#5	#6	#5	#6	#6	#6	#6	#6	#6	#6	#5	#6	#6	#6
Reinf "b" Dim "B" ft-inch	2-7	3-1	3-0	3-2	3-6	3-2	3-8	3-4	3-9	3-4	3-9	3-4	3-9	3-4
Reinf "b" Dim "Bw" ft-inch	4-1	3-2	4-1	3-4	4-1	3-4	4-1	3-7	3-9	3-7	3-9	3-7	3-7	3-7
Reinf "c" SIZE BAR	#6	#6	#6	#6	#6	#6	#6	#6	#6	#6	#7	#7	#7	#7
Reinf "c" Dim "C" ft-inch	3-10	3-7	4-6	4-4	5-7	5-0	6-6	5-2	7-2	5-4	7-5	5-7	7-5	5-7
Reinf * "e" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5
QUANTITIES CONCRETE CF/LF	63.6	94.4	65.7	98.4	68.6	104	72.6	109	76.9	115	82.6	122	87.7	131
QUANTITIES REINFORCEMENT LB/LF	563	686	584	711	691	721	715	745	700	764	767	867	804	890
** SOIL PRESSURE (ksf)	2.8	4.8	2.8	4.9	2.8	4.9	2.8	4.9	2.8	4.9	2.9	5.0	2.9	5.0

SPAN, S = 14'

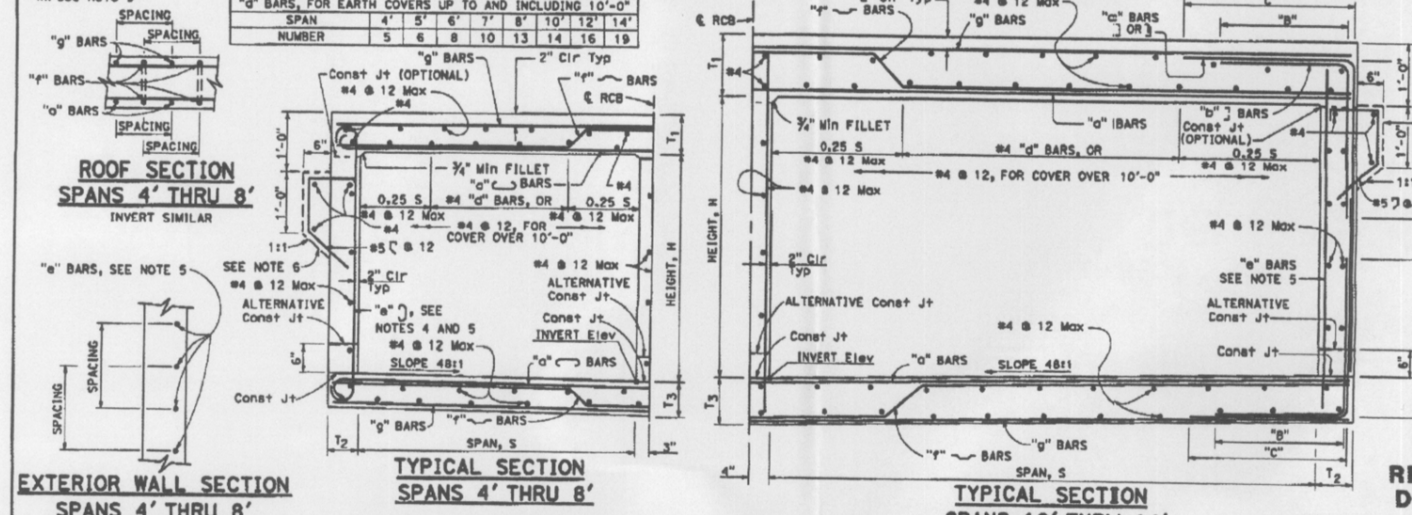
HEIGHT, H	7'	7'	8'	8'	9'	9'	10'	10'	11'	11'	12'	12'	13'	13'	14'	14'
MAXIMUM EARTH COVER	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'
Conc ROOF T_1	13"	20½"	13"	20½"	13"	20½"	13"	20½"	13"	20½"	13"	20½"	13"	20½"	13"	20½"
Conc WALLS T_2	9"	11"	9"	12"	10"	13½"	11½"	15"	12½"	17"	13½"	18½"	15"	20"	16½"	22"
Conc INVERT T_3	13½"	21½"	13½"	21½"	13½"	21½"	13½"	21½"	13½"	21½"	13½"	21½"	13½"	21½"	13½"	21½"
Reinf SPACING	8½"	8"	8½"	8"	8½"	8"	8½"	8"	8½"	8"	8½"	8"	9"	8"	9"	8"
Reinf "g" SIZE BAR	#8	#8	#8	#8	#8	#8	#8	#8	#8	#8	#8	#8	#8	#8	#8	#8
Reinf "f" SIZE BAR	#7	#8	#7	#8	#7	#8	#7	#8	#7	#8	#7	#8	#7	#8	#7	#8
Reinf "a" SIZE BAR	#4	#5	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
Reinf "b" SIZE BAR	#5	#6	#6	#6	#5	#6	#6	#6	#6	#6	#6	#7	#7	#7	#7	#7
Reinf "b" Dim "B" ft-inch	2-7	2-7	3-3	3-3	4-0	4-0	4-0	4-0	4-7	4-4	4-7	4-11	5-3	4-11	5-3	4-11
Reinf "b" Dim "Bw" ft-inch	5-0	3-9	5-0	4-6	5-0	5-0	5-0	5-0	4-9	5-6	4-9	6-2	5-2	6-2	5-2	6-2
Reinf "c" SIZE BAR	#6	#6	#6	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#8	#8
Reinf "c" Dim "C" ft-inch	4-3	3-11	5-6	5-2	7-9	5-8	8-6	6-5	8-10	6-6	9-0	6-10	9-3	6-10	9-3	6-10
Reinf * "e" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#6	#6
QUANTITIES CONCRETE CF/LF	88.8	124	84.0	129	88.0	134	93.4	141	98	149	103	156	110	164	117	174
QUANTITIES REINFORCEMENT LB/LF	734	878	785	919	842	956	882	985	916	1015	964	1120	980	1141	1095	1269
** SOIL PRESSURE (ksf)	2.8	4.8	2.8	4.9	2.8	4.9	2.8	4.9	2.8	5.0	2.9	5.0	2.9	5.0	2.9	5.1

* See Note 5
** See Note 9

"d" BARS, FOR EARTH COVERS UP TO AND INCLUDING 10'-0"								
SPAN	4'	5'	6'	7'	8'	10'	12'	14'
NUMBER	5	6	8	10	13	14	16	19

NOTES:

1. For boxes with span or height less than any of those shown in table, use next greater size box concrete dimensions and reinforcement. Make necessary changes in bar lengths and quantities.
2. For boxes with span or height or cover greater than those shown in tables, a special design is required.
3. Quantities are approximate and for design purposes only.
4. It is permissible to eliminate the 180° hooks on every other "e" bar.
5. "e" bars are at half spacing.
6. Provide paving notch when top is exposed and when pavement is concrete, and adjust quantities.
7. For design and details not shown, see Standard Plan D82.
8. This plan sheet may be used for multiple cell culverts by making necessary adjustments.
9. Soil pressures shown are factored per AASHTO LRFD and include soil weight of fill over box, self weight of box and live load where applicable.

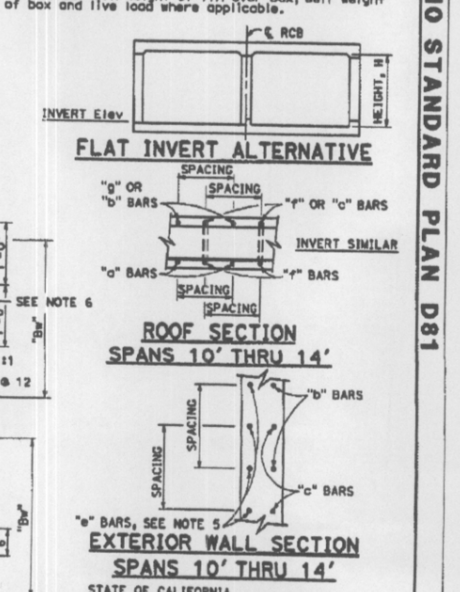


ROOF SECTION
SPANS 4' THRU 8'
INVERT SIMILAR

EXTERIOR WALL SECTION
SPANS 4' THRU 8'

TYPICAL SECTION
SPANS 4' THRU 8'

TYPICAL SECTION
SPANS 10' THRU 14'



FLAT INVERT ALTERNATIVE

ROOF SECTION
SPANS 10' THRU 14'

EXTERIOR WALL SECTION
SPANS 10' THRU 14'

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CAST-IN-PLACE REINFORCED CONCRETE DOUBLE BOX CULVERT

NO SCALE

D81

2010 STANDARD PLAN D85

178

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 20, 2011
PLANS APPROVAL DATE
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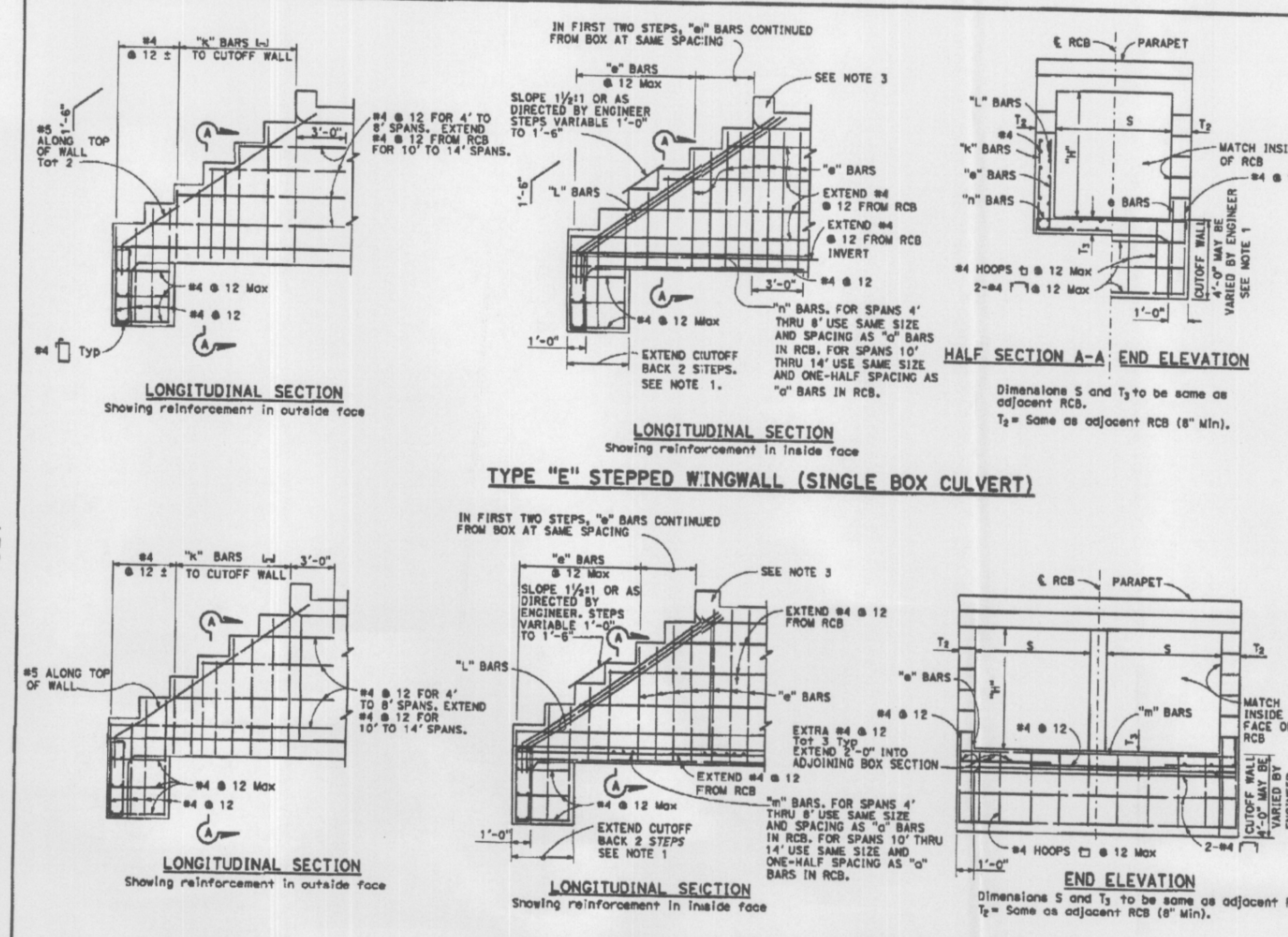


LONGITUDINAL SECTION
Showing reinforcement in outside face

LONGITUDINAL SECTION
Showing reinforcement in inside face

HALF SECTION A-A | END ELEVATION

Dimensions S and T_3 to be same as adjacent RCB.
T_2 = Same as adjacent RCB (8" Min).

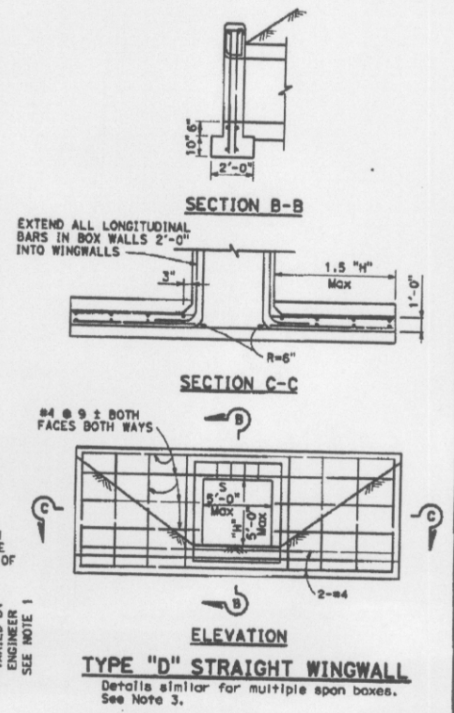
TYPE "E" STEPPED WINGWALL (SINGLE BOX CULVERT)

LONGITUDINAL SECTION
Showing reinforcement in outside face

LONGITUDINAL SECTION
Showing reinforcement in inside face

END ELEVATION
Dimensions S and T_3 to be same as adjacent RCB.
T_2 = Same as adjacent RCB (8" Min).

TYPE "E" STEPPED WINGWALL (MULTIPLE BOX CULVERT)



SECTION B-B

SECTION C-C

ELEVATION

TYPE "D" STRAIGHT WINGWALL
Details similar for multiple span boxes. See Note 3.

NOTES:

1. Eliminate cutoff walls if adjacent channel is paved.
2. For "H" not shown use reinforcement for next greater height.
3. For parapet details not shown see Standard Plan D82.

TABLE OF REINFORCEMENT FOR TYPE "E" WINGWALLS										
"H"	(SEE NOTE 2)	3'	4'	5'	6'	7'	8'	10'	12'	14'
"k" BARS	BAR No.	#4	#4	#5	#5	#5	#5	#5	#5	#5
"k" BARS	SPACING	@ 12	@ 12	@ 12	@ 10	@ 9	@ 8	@ 7	@ 5	@ 4
"L" BARS	BAR No.	#5	#5	#6	#6	#7	#7	#7	#7	#7
"L" BARS	NUMBER EACH WALL	2	2	3	3	3	3	3	3	3

DETAIL OF DESIGN LOADING CASES - TYPE "D" STRAIGHT WINGWALL
Case I Level + 240 psf surcharge
Case II 2:1 sloping ground with no surcharge
Case III 1½:1 limited slope (5'-0" Max height) + 240 psf surcharge

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BOX CULVERT WINGWALLS TYPES D AND E

NO SCALE

D85

REGISTERED PROFESSIONAL ENGINEER · JOE MURPHY · No. 41277 · EXP. 9-30-14 · CIVIL · STATE OF CALIFORNIA · 2-13-13

DILLON & MURPHY
CONSULTING CIVIL ENGINEERS
ENGINEERING · PLANNING · SURVEYING
847 N. CLUFF AVENUE, SUITE A2, LODI, CALIFORNIA 95240 (209) 334-6613

RMC DONDERO PTP
PROPOSED BRIDGE

CALTRANS STANDARD DRAWINGS

LINDEN, CALIFORNIA
JULY, 2013

REV. NO.	DESCRIPTION	DATE

SCALE: AS NOTED
DRAWN BY: SM
DESIGNED BY:
CHECKED BY: JM
AS BUILT BY:

BENCH MARK: *V959 EL: 88.553
DESCRIPTION:
BRASS CAP ON CONC. POST ON HWY 4, 0.2 MILES WEST OF VAN ALLEN ROAD, 29' NORTH OF CENTERLINE.
(DATUM: NGVD 29)

SHEET 3 OF 3 SHEET
JOB NO. 1363

S:\2013\1363\TOPO.dwg Aug 12, 2013