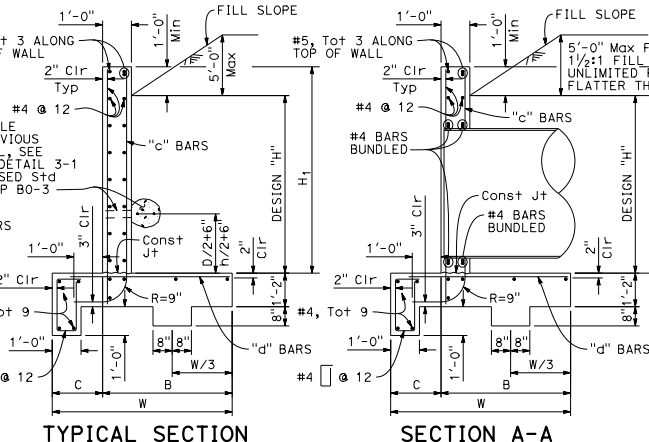
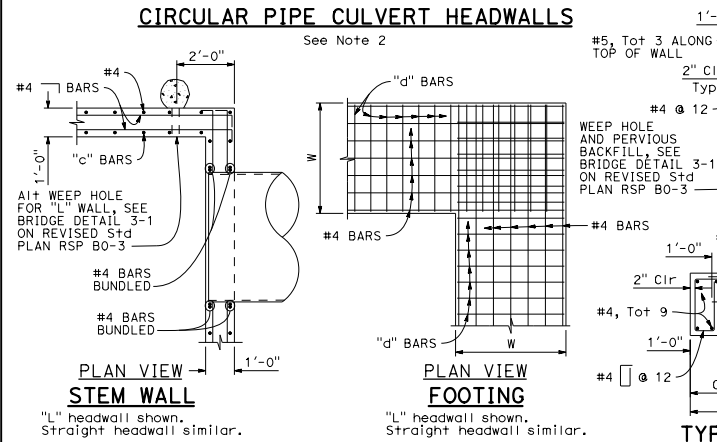


H	CIRCULAR PIPE SIZE D	CMP ARCH SIZE S x h
2'-8"	12"	-
2'-11"	15"	21" x 15"
3'-2"	18"	24" x 18"
3'-5"	21"	28" x 20"
3'-8"	24"	35" x 24"
3'-11"	27"	-
4'-2"	30"	42" x 29"
4'-5"	33"	49" x 33"
4'-8"	36"	-
4'-11"	39"	57" x 38"
5'-2"	42"	64" x 43"
5'-5"	45"	-
5'-8"	48"	71" x 47"
5'-11"	51"	-
6'-2"	54"	-



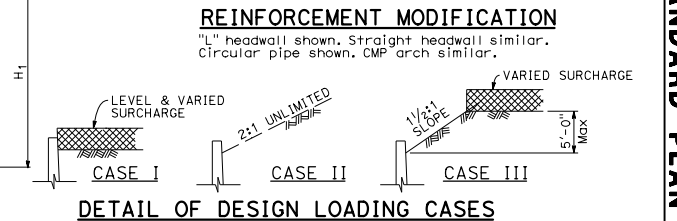
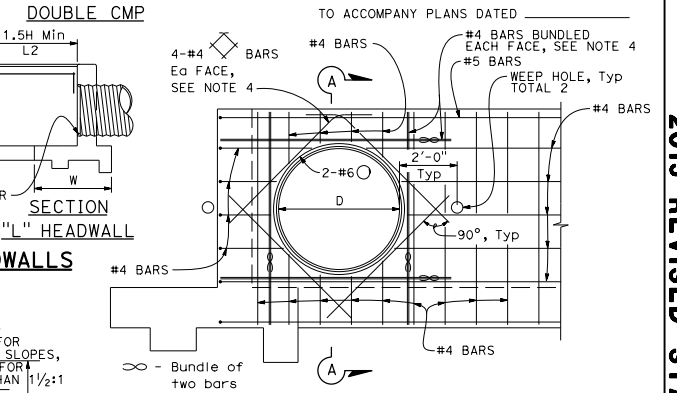
H	2'-8"	2'-11"	3'-2"	3'-5"	3'-8"	3'-11"	4'-2"	4'-5"	4'-8"	4'-11"	5'-2"	5'-5"	5'-8"	5'-11"	6'-2"
W	4'-7"	4'-9"	4'-10"	5'-0"	5'-1"	5'-2"	5'-3"	5'-5"	5'-6"	5'-7"	5'-9"	5'-9"	5'-11"	6'-0"	6'-3"
C	1'-2"	1'-2"	1'-2"	1'-3"	1'-3"	1'-3"	1'-4"	1'-4"	1'-4"	1'-4"	1'-5"	1'-5"	1'-6"	1'-6"	1'-9"
B	3'-5"	3'-7"	3'-9"	3'-9"	3'-10"	3'-11"	4'-0"	4'-1"	4'-2"	4'-3"	4'-4"	4'-4"	4'-5"	4'-6"	4'-8"
"c" BARS	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
"d" BARS	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 8
* Conc CY/LF	0.404	0.412	0.415	0.423	0.430	0.433	0.440	0.444	0.448	0.451	0.455	0.462	0.466	0.477	
* Reinf LB/LF	23	24	24	25	25	26	27	27	28	28	29	29	30	31	32
**CASE I Ser (a <sub>0</sub> , B')	0.79, 4.66	0.83, 4.57	0.88, 4.58	0.89, 4.73	0.93, 4.74	0.93, 4.75	1.02, 4.75	1.02, 4.92	1.07, 4.93	1.11, 4.94	1.12, 4.98	1.16, 4.99	1.17, 5.16	1.21, 5.18	1.15, 5.53
**CASE I Str (a <sub>0</sub> , B')	1.48, 1.75	1.53, 1.80	1.65, 1.76	1.64, 1.88	1.76, 1.85	1.89, 1.83	2.02, 1.80	1.97, 1.95	2.08, 1.94	2.20, 1.93	2.28, 1.92	2.39, 1.92	2.31, 2.08	2.41, 2.09	2.17, 2.41
**CASE I Extr (a <sub>0</sub> , B')	0.65, 4.16	0.68, 4.27	0.72, 4.29	0.74, 4.44	0.78, 4.46	0.82, 4.47	0.86, 4.47	0.87, 4.63	0.92, 4.63	0.96, 4.64	0.98, 4.69	1.03, 4.69	1.04, 4.84	1.09, 4.84	1.05, 5.18
**CASE II Ser (a <sub>0</sub> , B')	0.41, 4.52	0.44, 4.67	0.48, 4.73	0.51, 4.90	0.55, 4.95	0.59, 5.00	0.63, 5.04	0.65, 5.21	0.70, 5.26	0.74, 5.30	0.77, 5.37	0.81, 5.40	0.83, 5.58	0.88, 5.61	0.86, 5.96
**CASE II Str (a <sub>0</sub> , B')	1.05, 4.49	1.10, 4.64	1.15, 4.69	1.19, 4.86	1.24, 4.90	1.30, 4.94	1.36, 4.98	1.39, 5.15	1.46, 5.18	1.52, 5.22	1.56, 5.28	1.62, 5.31	1.62, 5.48	1.72, 5.51	1.69, 5.85
**CASE II Extr (a <sub>0</sub> , B')	0.98, 3.90	1.03, 4.00	1.10, 4.01	1.13, 4.15	1.19, 4.15	1.26, 4.15	1.33, 4.14	1.37, 4.28	1.44, 4.27	1.52, 4.26	1.57, 4.29	1.65, 4.28	1.69, 4.41	1.77, 4.42	1.71, 4.71
**CASE III Ser (a <sub>0</sub> , B')	0.61, 4.53	0.64, 4.73	0.68, 4.76	0.70, 4.91	0.74, 4.91	0.79, 4.94	0.83, 4.93	0.85, 5.08	1.17, 4.03	1.23, 4.03	1.27, 4.06	1.34, 4.02	1.36, 4.15	1.43, 4.11	1.36, 4.45
**CASE III Str (a <sub>0</sub> , B')	0.99, 4.28	1.04, 4.67	1.10, 4.69	1.13, 4.83	1.19, 4.82	1.25, 4.83	1.32, 4.82	1.35, 4.95	2.02, 2.66	2.16, 2.62	2.25, 2.59	2.44, 2.48	2.49, 2.54	2.70, 2.44	2.50, 2.72
**CASE III Extr (a <sub>0</sub> , B')	0.90, 3.88	0.95, 3.93	1.01, 3.91	1.04, 4.02	1.11, 3.97	1.18, 3.92	1.25, 3.90	1.28, 4.00	1.35, 3.94	1.43, 3.92	1.51, 3.97	1.55, 3.87	1.58, 3.97	1.67, 3.91	1.60, 4.22

\* Quantities include 1'-0" extension above the design "H" limit.  
 \*\* a<sub>0</sub> = net bearing stress (ksf), B' = effective footing width (ft)  
 Ser - ser stress  
 Str - strength limit  
 Extr - extreme event

**REINFORCED CONCRETE HEADWALL**  
 Quantities do not include added diagonals and do not consider pipe occupancy.

NOTE: Reinforced Concrete: f<sub>y</sub> = 60,000 psi  
 Earth Density: 120 pcf  
 Equivalent Fluid Pressure: 36 pcf

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
July 21, 2017 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.					



- NOTES:**
- Length of wall from @ pipe to end of wall is 1.5H Min. The ends of headwall need to be embedded into the slope by two feet.
  - Single circular pipe or single CMP shown for "L" headwall. For double pipe in "L" headwall, see "ELEVATION STRAIGHT HEADWALL DOUBLE CIRCULAR PIPE" or "ELEVATION STRAIGHT HEADWALL DOUBLE CMP" detail for additional information.
  - Cable railing to be installed on top of headwall when shown on Project Plans. See Standard Plan B11-47 for cable railing details.
  - Adjacent to each side of the opening, place additional reinforcement equivalent to half the interrupted main reinforcement. For pipes 42" diameter and greater, add 4 diagonals, 1 bar each side. Extend bars one development length past the intersection with the adjacent diagonal bar, or where bars intersect mid thickness of adjacent wall, bottom slab or at top of wall, bend ends as required into same plane.
  - Quantities are approximate and for design purposes only. No deduction is made for pipe or arch occupancy.

STATE OF CALIFORNIA  
 DEPARTMENT OF TRANSPORTATION  
**PIPE CULVERT HEADWALLS STRAIGHT AND "L"**  
 NO SCALE  
 RSP D89 DATED July 21, 2017 SUPERSEDES RSP D89 DATED July 15, 2016 AND STANDARD PLAN D89 DATED OCTOBER 30, 2015 - PAGE 205 OF THE STANDARD PLANS BOOK DATED 2015.  
**REVISED STANDARD PLAN RSP D89**

2015 REVISED STANDARD PLAN RSP D89