## QUANTITIES SHOWN ARE FOR TWO HEADWALLS

| CMP SIZE DIA | CORR CMAP SXR | CMP AREA SQ. FT. | L | SINGLE CMP | | | | | | | | DOUBLE CMP | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0° SKEW | | 15° SKEW | | 30° SKEW | | 45° SKEW | | 0° SKEW | | 15° SKEW | | 30° SKEW | | 45° SKEW | |
| | | | | CONC CU. YD. | STEEL LBS | CONC CU. YD. | STEEL LBS | CONC CU. YD. | STEEL LBS | CONC CU. YD. | STEEL LBS | CONC CU. YD. | STEEL LBS | CONC CU. YD. | STEEL LBS | CONC CU. YD. | STEEL LBS | CONC CU. YD. | STEEL LBS |
| 12" | | 0.79 | 3'-6" | 0.85 | 35 | 0.93 | 37 | 0.94 | 37 | 0.99 | 39 | 1.21 | 46 | 1.30 | 49 | 1.35 | 50 | 1.49 | 53 |
| 15" | 18" x 11" | 1.23 | 4'-3" | 1.09 | 48 | 1.19 | 50 | 1.21 | 51 | 1.27 | 52 | 1.51 | 61 | 1.62 | 64 | 1.68 | 65 | 1.85 | 69 |
| 18" | 22" x 13" | 1.77 | 5' | 1.36 | 55 | 1.48 | 59 | 1.51 | 59 | 1.57 | 61 | 1.83 | 70 | 1.96 | 73 | 2.05 | 75 | 2.24 | 80 |
| 24" | 29" x 18" | 3.14 | 6'-6" | 1.95 | 78 | 2.12 | 83 | 2.16 | 84 | 2.25 | 86 | 2.53 | 95 | 2.73 | 100 | 2.84 | 103 | 3.08 | 108 |
| 30" | 36" x 22" | 4.91 | 8' | 2.61 | 105 | 2.85 | 111 | 2.90 | 112 | 3.01 | 115 | 3.39 | 126 | 3.65 | 132 | 3.79 | 135 | 4.11 | 142 |
| 36" | 43" x 27" | 7.07 | 9'-6" | 3.36 | 122 | 3.66 | 129 | 3.72 | 131 | 3.86 | 134 | 4.34 | 147 | 4.68 | 155 | 4.85 | 158 | 5.25 | 167 |
| 42" | 50" x 31" | 9.62 | 11' | 4.18 | 167 | 4.56 | 177 | 4.64 | 179 | 4.81 | 182 | 5.39 | 196 | 5.81 | 206 | 6.03 | 210 | 6.52 | 220 |

## QUANTITIES SHOWN ARE FOR ONE HEADWALL

| LENGTH OF REINFORCING BARS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMP SIZE | SINGLE CMP | | | | | SINGLE OR DOUBLE CMP | | | | | | | DOUBLE CMP | | | | |
| | 0°-45° | 0° | 15° | 30° | 45° | 0° | 15° | | 30° | | 45° | | 0°-45° | 0° | 15° | 30° | 45° |
| | NO. 4 | NO. 5 | NO. 5 | NO. 5 | NO. 5 | NO. 4 | NO. 4 | NO. 4 | NO. 4 | NO. 4 | NO. 4 | NO. 4 | NO. 4 | NO. 5 | NO. 5 | NO. 5 | NO. 5 |
| | K | N | N | N | N | M | M | M1 | M | M1 | M | M1 | K | N | N | N | N |
| 12" | 4@ 2'-5" | 2@4'-3" | 2@4'-8" | 2@4'-9" | 2@5' | 2@1'-6" | 1@1'-4" | 1@2' | 1@1'-3" | 1@2'-1" | 1@1' | 1@2'-4" | 5@2'-5" | 2@6'-3" | 2@6'-9" | 2@7'-1" | 2@7'-10" |
| 15" | 6@ 2'-8" | 2@5'-3" | 2@5'-9" | 2@5'-11" | 2@6'-2" | 2@1'-8" | 1@1'-6" | 1@2'-2" | 1@1'-5" | 1@2'-3" | 1@1'-2" | 1@2'-6" | 7@2'-8" | 2@7'-6" | 2@8'-1" | 2@8'-6" | 2@9'-5" |
| 18" | 6@ 2'-11" | 2@6'-3" | 2@6'-10" | 2@7' | 2@7'-4" | 2@2'-3" | 1@2'-1" | 1@2'-11" | 1@2' | 1@3' | 1@1'-9" | 1@3'-3" | 7@2'-11" | 2@8'-9" | 2@9'-5" | 2@9'-10" | 2@10'-11" |
| 24" | 6@ 3'-5" | 2@8'-3" | 2@9' | 2@9'-3" | 2@9'-9" | 4@3' | 2@2'-10" | 2@3'-9" | 2@2'-9" | 2@3'-10" | 2@2'-6" | 2@4'-1" | 7@3'-5" | 2@11'-3" | 2@12'-1" | 2@12'-8" | 2@14' |
| 30" | 8@ 3'-11" | 2@10'-3" | 2@11'-2" | 2@11'-5" | 2@12'-1" | 4@3'-9" | 2@3'-7" | 2@4'-8" | 2@3'-6" | 2@4'-9" | 2@3'-3" | 2@5' | 9@3'-11" | 2@14' | 2@15' | 2@15'-9" | 2@17'-5" |
| 36" | 8@ 4'-5" | 2@12'-3" | 2@13'-4" | 2@13'-8" | 2@14'-5" | 4@4'-6" | 2@4'-4" | 2@5'-7" | 2@4'-3" | 2@5'-8" | 2@4' | 2@5'-11" | 9@4'-5" | 2@16'-9" | 2@18' | 2@18'-10" | 2@20'-10" |
| 42" | 10@ 4'-11" | 2@14'-3" | 2@15'-6" | 2@15'-11" | 2@16'-10" | 6@5'-3" | 3@5'-1" | 3@6'-6" | 3@5' | 3@6'-7" | 3@4'-9" | 3@6'-10" | 11@4'-11" | 2@19'-6" | 2@20'-11" | 2@21'-11" | 2@24'-3" |

## NOTES:

1. CONCRETE SHALL BE CLASS A OR AA.
2. REINFORCING STEEL SHALL BE DEFORMED BARS WITH MAXIMUM SPACING OF 18" SET 2½" CLEAR OF SURFACE OF CONCRETE EXCEPT AS NOTED. BAR ENDS SHALL BE KEPT 1½" CLEAR OF SURFACE OF CONCRETE. REINFORCING BARS MAY BE CUT AND BENT IN FIELD.
3. FOOTINGS SHOWN ARE OF MINIMUM DEPTH AND SHALL BE EXTENDED IF SOIL IS UNSUITABLE OR LIABLE TO SCOUR.
4. CULVERT PIPES TO BE SET ON A SKEW SHALL BE MITERED WHEN HEADWALLS ARE CONSTRUCTED. WHEN HEADWALLS ARE NOT CONSTRUCTED THE PIPES SHALL NOT BE MITERED EXCEPT IN OVERFLOW SECTION.
5. FOR ESTIMATING HEADWALL QUANTITIES ON SKEWED CULVERTS:
   0° to 10° - USE QUANTITIES FOR 0° SKEW.
   11° to 25° - USE QUANTITIES FOR 15° SKEW.
   26° to 40° - USE QUANTITIES FOR 30° SKEW.
   41° to 55° - USE QUANTITIES FOR 45° SKEW.
   OVER 55° - CALCULATE QUANTITIES REQUIRED.
   CULVERTS SHOULD BE INSTALLED ON 5° INCREMENTS WHERE IT IS FEASIBLE.





NEVADA DEPARTMENT OF TRANSPORTATION

CULVERT HEADWALLS
12" TO 42" CMP

| | | |
|---|---|---|
| Signed Original On File | R-2.4.1.1 | (502) |
| CHIEF HYDRAULICS ENGINEER | ADOPTED 8/69 | REVISION 5/09 |