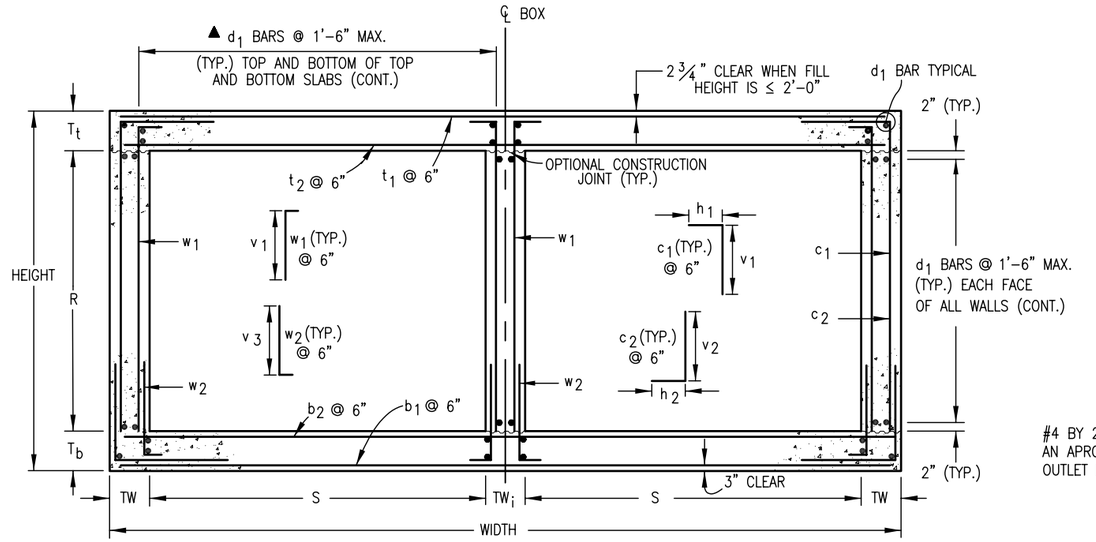
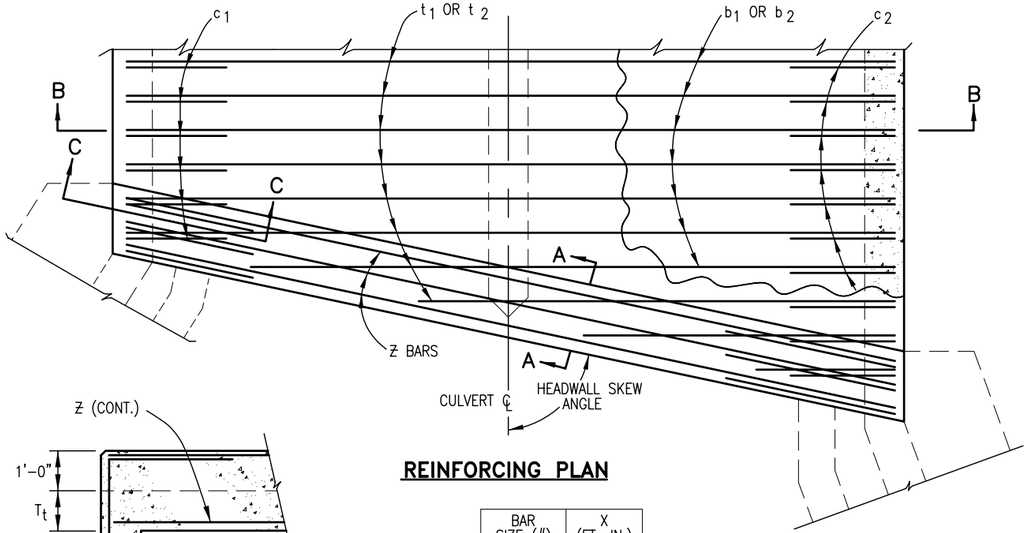
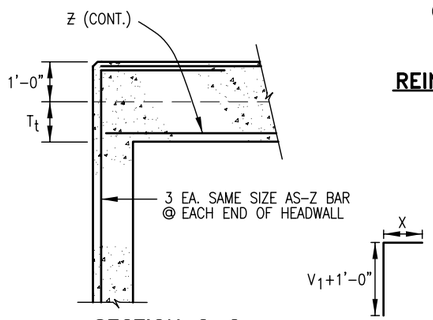



## SECTION B–B



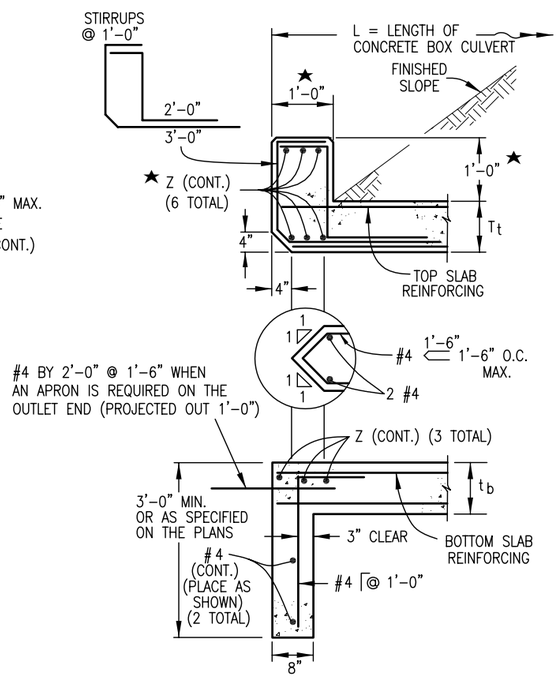

## REINFORCING PLAN



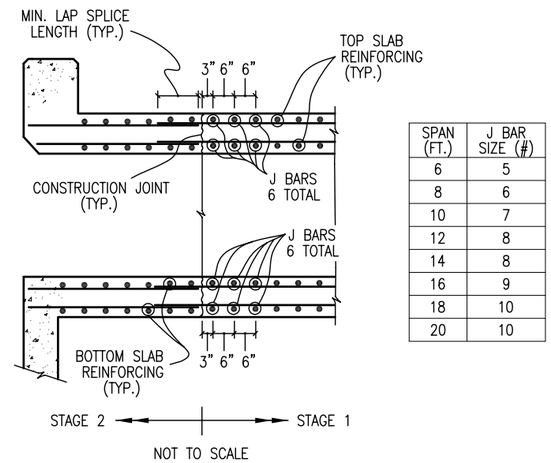

## SECTION C–C

| BAR SIZE (#) | X (FT.–IN.) |
|---|---|
| 4 | 1–9 |
| 5 | 2–2 |
| 6 | 2–7 |
| 7 | 3–1 |
| 8 | 4–0 |
| 9 | 5–1 |
| 10 | 6–5 |
| 11 | 7–11 |

## HEADWALL CORNER REINFORCING DETAIL




## SECTION A–A




| SPAN (FT.) | J BAR SIZE (#) |
|---|---|
| 6 | 5 |
| 8 | 6 |
| 10 | 7 |
| 12 | 8 |
| 14 | 8 |
| 16 | 9 |
| 18 | 10 |
| 20 | 10 |

## CONSTRUCTION JOINT DETAIL FOR STAGED CONSTRUCTION

NOTE: THIS DETAIL IS FOR CONSTRUCTION JOINTS PERPENDICULAR TO THE ℄ OF THE BOX ONLY.

## GENERAL NOTES

1. ALL CONCRETE SHALL BE CLASS D (BOX CULVERT).
2. ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS PLACED.
3. CONSTRUCTION JOINTS NOT SHOWN ON THE PLANS MAY BE CONSTRUCTED ONLY IF APPROVED BY THE ENGINEER.
4. THE CONTRACTOR SHALL MAINTAIN THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.
5. STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH STANDARD PLAN M–206–1.
6. FOR ANY CULVERT SPAN 20 FT. OR GREATER, A FOUNDATION INVESTIGATION AND REPORT ARE REQUIRED.
7. BACKFILL SHALL NOT BEGIN UNTIL TOP SLAB HAS REACHED DESIGN STRENGTH, $f'_c$.
8. SPLICE QUANTITIES FOR LONGITUDINAL AND TRANSVERSE BARS ARE NOT INCLUDED.
9. REINFORCING STEEL SHALL BE GRADE 60.
10. THE MINIMUM LAP SPLICE LENGTH FOR EPOXY COATED REINFORCING BARS SHALL BE:

| BAR SIZE: | #4 | #5 | #6 | #7 | #8 | #9 | #10 | #11 |
|---|---|---|---|---|---|---|---|---|
| SPLICE LENGTH: | 1'–3" | 1'–6" | 1'–10" | 2'–2" | 3'–8" | 4'–8" | 5'–11" | 7'–3" |

THE MINIMUM LAP SPLICE LENGTH FOR BLACK REINFORCING BARS SHALL BE:

| BAR SIZE: | #4 | #5 | #6 | #7 | #8 | #9 | #10 | #11 |
|---|---|---|---|---|---|---|---|---|
| SPLICE LENGTH: | 1'–0" | 1'–4" | 1'–7" | 1'–10" | 2'–5" | 3'–1" | 3'–11" | 4'–10" |

11. ALL DIMENSIONS ARE PERPENDICULAR TO THE CENTERLINE OF THE BOX.
12. WINGWALLS SHALL BE TIED TO CONCRETE BOX CULVERT IN ACCORDANCE WITH STANDARD PLAN M–601–20.
13. ALL TRANSVERSE REINFORCING SHALL BE NORMAL TO THE CENTERLINE OF THE BOX.
14. FILL HEIGHT IS THE DISTANCE MEASURED FROM TOP OF TOP SLAB TO TOP OF PAVEMENT.
15. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4 IN.

▲ WHEN THE FILL HEIGHT IS LESS THAN OR EQUAL TO 2 FT., THE SPACING OF THE $d_1$ BARS IN THE BOTTOM OF THE TOP SLAB SHALL BE 6 IN. OR LESS. USE THE FOLLOWING EQUATION TO CALCULATE THE ADDITIONAL REINFORCING QUANTITY. WHERE S IS IN FEET:

ADDED REINFORCING, LBS./LIN FT. = $2 \times \left(\frac{S}{0.5} - \frac{S}{1.5}\right) \times 0.668 = 1.781\ S$

DESIGN DATA: 16TH EDITION OF THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES

SERVICE LOAD DESIGN METHOD

UNIT STRESSES: $f_s$ = 24,000 psi., $f_y$ = 60,000 psi., $f_c$ = 1,800 psi., $f'_c$ = 4,500 psi., n = 8

LOADING DATA:

LIVE LOAD = AASHTO, HS 20–44 AND ALTERNATE MILITARY LOADING

DEAD LOAD CASE 1: VERTICAL EARTH LOAD = 120 LBS./CU. FT. HORIZONTAL EARTH LOAD = 30 LBS./CU.FT.

DEAD LOAD CASE 2: VERTICAL EARTH LOAD = 120 LBS./CU. FT. HORIZONTAL EARTH LOAD = 60 LBS./CU. FT.

FUTURE HMA OVERLAY = 48 LBS./SQ. FT. BASED ON 4 IN. THICKNESS

LIVE LOAD SURCHARGE ON EXTERIOR WALLS = 2 FT. OF EARTH

★ IF HEADWALL MOUNT GUARDRAIL IS USED (SEE STANDARD PLAN M–606–1, SHEET 16):

- ALL REINFORCING STEEL SHALL BE ACCORDING TO THIS BOX CULVERT PLAN.
- ANY ADDITIONAL STIRRUP LENGTH WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
- HEADWALL DIMENSION AND CONCRETE QUANTITY SHALL BE ACCORDING TO STANDARD PLAN M–606–1, SHEET 16.
- POST ANCHORS SHALL BE PROVIDED ACCORDING TO STANDARD PLAN M–606–1, SHEET 16.
- POST ANCHORS AND CONCRETE FOR HEADWALL MOUNT OF GUARDRAIL WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
- POST ANCHORS WHEN REQUIRED AND ENCASED IN HEADWALL CONCRETE, SHALL CONFORM TO ASTM A 36 OR AASHTO M 169 STEEL.

| Computer File Information | | Sheet Revisions | |
|---|---|---|---|
| Creation Date: 07/04/06 | Initials: SJR | Date: | Comments |
| Last Modification Date: 07/04/06 | Initials: LTA | | |
| Full Path: www.dot.state.co.us/DesignSupport/ | | | |
| Drawing File Name: 601020102.dwg | | | |
| CAD Ver.: MicroStation V8 Scale: Not to Scale | Units: English | | |

(R–X) (R–X) (R–X) (R–X)

Colorado Department of Transportation
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Denver, Colorado 80222
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Fax: (303) 757–9820
Project Development Branch SRJ/LTA

# DOUBLE CONCRETE BOX CULVERT

Issued By: Project Development Branch on July 04, 2006

STANDARD PLAN NO.
M-601-2
Sheet No. 1 of 2

# DOUBLE CONCRETE BOX CULVERT DIMENSIONS & QUANTITIES (EXCLUDING HEADWALLS & TOEWALLS)

| BOX SIZE | | | | FILL HEIGHT ALLOWED | SLAB & WALL THICKNESS (INCHES) | | | BAR SIZES | | | | | | | $d_1$▲ | DIMENSIONS | | | | | QUANTITIES | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | R | HT. | WIDTH | | | | | $t_1$* | $t_2$ | $b_1$ | $b_2$ | $w_1$* & $w_2$ | $c_1$* | $c_2$ | | $h_1$ | $h_2$ | $v_1$ | $v_2$ | $v_3$ | CONCRETE | REBAR STL |
| FT. | FT. | FT.–IN. | FT.–IN. | FT.–FT. | $T_t$ | $T_b$ | TW & $TW_i$ | # | # | # | # | # | # | # | NO. | FT.–IN. | FT.–IN. | FT.–IN. | FT.–IN. | FT.–IN. | CU.YDS./LIN.FT. | LBS./LIN.FT. |
| 6 | 6 | 7–5 | 14–6 | 0 TO 10 | 8 | 9 | 10 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 74 | 2–7 | 2–7 | 6–6 | 2–3 | 2–3 | 1.316 | 248 |
| | | 7–8 | 14–6 | >10 TO 15 | 9 | 11 | 10 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | | 2–7 | 2–7 | 6–7 | 2–5 | 2–5 | 1.457 | 250 |
| | | 7–11 | 14–6 | >15 TO 20 | 11 | 12 | 10 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | | 2–7 | 2–7 | 6–9 | 2–6 | 2–6 | 1.585 | 241 |
| | 8 | 9–5 | 14–6 | 0 TO 10 | 8 | 9 | 10 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 86 | 2–7 | 2–7 | 8–6 | 2–3 | 2–3 | 1.502 | 272 |
| | | 9–8 | 14–6 | >10 TO 15 | 9 | 11 | 10 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | | 2–7 | 2–7 | 8–7 | 2–5 | 2–5 | 1.636 | 264 |
| | | 9–11 | 14–6 | >15 TO 20 | 11 | 12 | 10 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | | 2–7 | 2–7 | 8–9 | 2–6 | 2–6 | 1.770 | 263 |
| | 10 | 11–6 | 14–6 | 0 TO 10 | 8 | 10 | 10 | 4 | 5 | 4 | 4 | 4 | 5 | 5 | 92 | 2–9 | 2–9 | 10–6 | 2–9 | 2–4 | 1.731 | 299 |
| | | 11–8 | 14–6 | >10 TO 15 | 9 | 11 | 10 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | | 2–9 | 2–9 | 10–7 | 2–10 | 2–11 | 1.821 | 353 |
| | | 12–0 | 14–10.5 | >15 TO 20 | 11 | 13 | 11.5 | 4 | 4 | 5 | 4 | 5 | 5 | 5 | | 2–11 | 2–11 | 10–9 | 3–0 | 3–0 | 2.167 | 360 |
| 8 | 6 | 7–9 | 18–6 | 0 TO 10 | 10 | 11 | 10 | 6 | 5 | 6 | 5 | 4 | 4 | 5 | 90 | 2–7 | 2–9 | 6–8 | 2–10 | 2–5 | 1.755 | 349 |
| | | 8–2 | 18–6 | >10 TO 15 | 12 | 14 | 10 | 6 | 5 | 6 | 5 | 4 | 4 | 4 | | 2–7 | 2–7 | 6–10 | 2–8 | 2–8 | 2.040 | 342 |
| | | 8–6 | 18–6 | >15 TO 20 | 14 | 16 | 10 | 6 | 5 | 6 | 5 | 4 | 4 | 4 | | 2–7 | 2–7 | 7–0 | 2–11 | 2–11 | 2.269 | 344 |
| | 8 | 9–9 | 18–6 | 0 TO 10 | 10 | 11 | 10 | 6 | 5 | 6 | 4 | 4 | 4 | 5 | 102 | 2–7 | 2–9 | 8–8 | 2–10 | 2–5 | 1.940 | 357 |
| | | 10–2 | 18–6 | >10 TO 15 | 12 | 14 | 10 | 6 | 5 | 5 | 5 | 4 | 4 | 4 | | 2–7 | 2–7 | 8–10 | 2–8 | 2–8 | 2.225 | 348 |
| | | 10–6 | 18–6 | >15 TO 20 | 14 | 16 | 10 | 6 | 5 | 6 | 5 | 4 | 4 | 4 | | 2–7 | 2–7 | 9–0 | 2–11 | 2–11 | 2.454 | 368 |
| 10 | 6 | 7–7 | 22–6 | 0 TO 5 | 9 | 10 | 10 | 7 | 6 | 7 | 5 | 4 | 5 | 6 | 98 | 2–9 | 3–4 | 6–7 | 3–2 | 2–4 | 1.875 | 490 |
| | | 8–1 | 22–6 | >5 TO 10 | 12 | 13 | 10 | 7 | 5 | 7 | 5 | 4 | 4 | 5 | | 2–7 | 2–9 | 6–10 | 3–0 | 2–7 | 2.292 | 435 |
| | | 8–7 | 22–6 | >10 TO 15 | 15 | 16 | 10 | 7 | 5 | 7 | 5 | 4 | 4 | 4 | | 3–1 | 2–7 | 7–1 | 2–10 | 2–10 | 2.708 | 439 |
| | | 9–1 | 22–6 | >15 TO 20 | 18 | 19 | 10 | 7 | 6 | 7 | 6 | 4 | 5 | 5 | | 3–6 | 2–9 | 7–4 | 3–6 | 3–1 | 3.125 | 512 |
| | 8 | 9–7 | 22–6 | 0 TO 5 | 9 | 10 | 10 | 7 | 6 | 7 | 5 | 4 | 5 | 6 | 110 | 2–9 | 3–4 | 8–7 | 3–2 | 2–4 | 2.060 | 519 |
| | | 10–1 | 22–6 | >5 TO 10 | 12 | 13 | 10 | 7 | 5 | 7 | 5 | 4 | 4 | 5 | | 2–7 | 2–9 | 8–10 | 3–0 | 2–7 | 2.477 | 470 |
| | | 10–7 | 22–6 | >10 TO 15 | 15 | 16 | 10 | 7 | 5 | 7 | 5 | 4 | 4 | 4 | | 3–1 | 2–7 | 9–1 | 2–10 | 2–10 | 2.894 | 465 |
| | | 11–0 | 22–6 | >15 TO 20 | 17 | 19 | 10 | 7 | 6 | 7 | 5 | 4 | 5 | 5 | | 3–6 | 2–9 | 9–3 | 3–6 | 3–1 | 3.241 | 520 |
| | 10 | 11–8 | 22–6 | 0 TO 5 | 9 | 11 | 10 | 7 | 6 | 6 | 5 | 4 | 5 | 6 | 116 | 2–9 | 3–4 | 10–7 | 3–3 | 2–5 | 2.315 | 519 |
| | | 12–1 | 22–6 | >5 TO 10 | 12 | 13 | 10 | 6 | 5 | 7 | 5 | 4 | 5 | 5 | | 2–9 | 2–9 | 10–10 | 3–0 | 2–7 | 2.662 | 487 |
| | | 12–6 | 22–6 | >10 TO 15 | 14 | 16 | 10 | 7 | 5 | 6 | 5 | 4 | 5 | 5 | | 2–9 | 2–9 | 11–0 | 3–3 | 2–10 | 3.009 | 491 |
| | | 13–0 | 22–10.5 | >15 TO 20 | 17 | 19 | 11.5 | 7 | 5 | 7 | 5 | 5 | 5 | 5 | | 3–8 | 2–11 | 11–3 | 3–6 | 3–6 | 3.606 | 582 |
| 12 | 6 | 7–9 | 26–6 | 0 TO 5 | 10 | 11 | 10 | 8 | 6 | 8 | 5 | 4 | 6 | 6 | 106 | 2–9 | 3–4 | 6–8 | 3–3 | 2–5 | 2.273 | 634 |
| | | 8–5 | 26–6 | >5 TO 10 | 14 | 15 | 10 | 7 | 6 | 8 | 6 | 4 | 4 | 5 | | 2–7 | 2–9 | 7–0 | 3–2 | 2–9 | 2.927 | 583 |
| | | 9–0 | 26–6 | >10 TO 15 | 17 | 19 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 5 | | 3–6 | 2–9 | 7–3 | 3–6 | 3–2 | 3.500 | 640 |
| | 8 | 9–10 | 26–6 | 0 TO 5 | 10 | 12 | 10 | 8 | 6 | 7 | 5 | 4 | 6 | 6 | 118 | 2–9 | 3–4 | 8–8 | 3–4 | 2–6 | 2.540 | 633 |
| | | 10–5 | 26–6 | >5 TO 10 | 14 | 15 | 10 | 7 | 6 | 8 | 6 | 4 | 4 | 5 | | 2–7 | 2–9 | 9–0 | 3–2 | 2–9 | 3.113 | 607 |
| | | 11–0 | 26–6 | >10 TO 15 | 17 | 19 | 10 | 8 | 6 | 7 | 6 | 4 | 5 | 5 | | 3–6 | 2–9 | 9–3 | 3–6 | 3–1 | 3.685 | 633 |
| | 10 | 11–11 | 26–6 | 0 TO 5 | 11 | 12 | 10 | 8 | 6 | 7 | 5 | 4 | 5 | 6 | 124 | 2–9 | 3–4 | 10–9 | 3–4 | 2–6 | 2.807 | 635 |
| | | 12–5 | 26–6 | >5 TO 10 | 14 | 15 | 10 | 7 | 6 | 7 | 6 | 4 | 5 | 6 | | 2–9 | 3–4 | 11–0 | 3–7 | 2–9 | 3.298 | 632 |
| | | 13–0 | 26–6 | >10 TO 15 | 17 | 19 | 10 | 8 | 6 | 7 | 6 | 4 | 5 | 5 | | 3–6 | 2–9 | 11–3 | 3–6 | 3–1 | 3.870 | 656 |
| 14 | 6 | 8–2 | 30–6 | 0 TO 5 | 13 | 13 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 6 | 122 | 2–9 | 3–4 | 6–11 | 3–5 | 2–7 | 3.003 | 722 |
| | | 9–0 | 30–6 | >5 TO 10 | 17 | 19 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 5 | | 3–6 | 2–9 | 7–3 | 3–6 | 3–1 | 3.944 | 717 |
| | | 9–2 | 30–6 | >10 TO 12 | 19 | 19 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 5 | | 3–6 | 2–9 | 7–5 | 3–6 | 3–1 | 4.133 | 718 |
| | 8 | 10–1 | 30–6 | 0 TO 5 | 12 | 13 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 6 | 134 | 2–9 | 3–4 | 8–10 | 3–5 | 2–7 | 3.094 | 753 |
| | | 10–11 | 30–6 | >5 TO 10 | 17 | 18 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 5 | | 3–6 | 2–9 | 9–3 | 3–5 | 3–0 | 4.035 | 743 |
| | | 11–2 | 30–6 | >10 TO 12 | 19 | 19 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 5 | | 3–6 | 2–9 | 9–5 | 3–6 | 3–1 | 4.318 | 746 |
| | 10 | 12–0 | 30–6 | 0 TO 5 | 12 | 13 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 6 | 140 | 2–9 | 3–4 | 10–10 | 3–5 | 2–7 | 3.279 | 772 |
| | | 12–4 | 30–6 | >5 TO 7 | 13 | 15 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 6 | | 2–9 | 3–4 | 10–11 | 3–7 | 2–9 | 3.562 | 774 |
| | | 13–1 | 30–6 | >7 TO 12 | 18 | 19 | 10 | 8 | 6 | 8 | 6 | 4 | 5 | 5 | | 3–6 | 2–9 | 11–4 | 3–6 | 3–1 | 4.409 | 768 |
| 16 | 6 | 8–5 | 34–6 | 0 TO 5 | 14 | 15 | 10 | 9 | 7 | 9 | 6 | 4 | 6 | 6 | 130 | 3–4 | 3–4 | 7–0 | 3–7 | 2–9 | 3.644 | 955 |
| | | 8–9 | 34–6 | >5 TO 7 | 16 | 17 | 10 | 9 | 7 | 9 | 7 | 4 | 5 | 5 | | 3–6 | 2–9 | 7–2 | 3–4 | 2–11 | 4.069 | 960 |
| | | 9–5 | 34–6 | >7 TO 10 | 19 | 22 | 10 | 9 | 7 | 8 | 7 | 4 | 5 | 5 | | 3–6 | 2–9 | 7–5 | 3–9 | 3–4 | 4.921 | 917 |
| | 8 | 10–5 | 34–6 | 0 TO 5 | 14 | 15 | 10 | 9 | 7 | 9 | 6 | 4 | 5 | 6 | 142 | 2–9 | 3–4 | 9–0 | 3–7 | 2–9 | 3.829 | 961 |
| | | 10–9 | 34–6 | >5 TO 7 | 16 | 17 | 10 | 9 | 7 | 9 | 7 | 4 | 5 | 5 | | 3–6 | 2–9 | 9–2 | 3–4 | 3–0 | 4.255 | 987 |
| | | 11–4 | 34–6 | >7 TO 10 | 19 | 21 | 10 | 9 | 7 | 9 | 7 | 4 | 5 | 5 | | 3–6 | 2–9 | 9–5 | 3–8 | 3–3 | 5.000 | 993 |
| | 10 | 12–1 | 34–6 | 0 TO 2 | 12 | 13 | 10 | 8 | 7 | 8 | 6 | 4 | 6 | 7 | 148 | 3–4 | 3–8 | 10–10 | 3–11 | 2–7 | 3.588 | 930 |
| | | 12–5 | 34–6 | >2 TO 5 | 14 | 15 | 10 | 9 | 7 | 9 | 6 | 4 | 6 | 6 | | 3–4 | 3–4 | 11–0 | 3–7 | 2–9 | 4.014 | 1013 |
| | | 12–10 | 34–6 | >5 TO 7 | 16 | 18 | 10 | 9 | 7 | 8 | 6 | 4 | 6 | 5 | | 4–3 | 2–9 | 11–2 | 3–10 | 3–0 | 4.546 | 957 |
| 18 | 6 | 8–5 | 38–6 | 0 TO 2 | 14 | 15 | 10 | 9 | 8 | 9 | 6 | 5 | 7 | 7 | 138 | 3–8 | 3–8 | 7–0 | 4–1 | 3–2 | 4.002 | 1179 |
| | | 8–7 | 38–6 | >2 TO 5 | 15 | 16 | 10 | 10 | 7 | 10 | 7 | 4 | 6 | 6 | | 4–3 | 3–4 | 7–1 | 3–8 | 2–10 | 4.239 | 1229 |
| | | 9–2 | 38–6 | >5 TO 7 | 19 | 19 | 10 | 9 | 7 | 10 | 7 | 4 | 5 | 5 | | 3–6 | 2–9 | 7–5 | 3–6 | 3–1 | 5.071 | 1125 |
| | 8 | 10–5 | 38–6 | 0 TO 2 | 14 | 15 | 10 | 9 | 8 | 9 | 7 | 4 | 7 | 7 | 150 | 3–8 | 3–8 | 9–0 | 4–1 | 2–11 | 4.187 | 1209 |
| | | 10–9 | 38–6 | >2 TO 5 | 15 | 18 | 10 | 10 | 7 | 9 | 7 | 4 | 6 | 6 | | 4–3 | 3–4 | 9–1 | 3–10 | 3–0 | 4.662 | 1193 |
| | | 11–2 | 38–6 | >5 TO 7 | 19 | 19 | 10 | 9 | 7 | 10 | 7 | 4 | 5 | 5 | | 3–6 | 2–9 | 9–5 | 3–6 | 3–2 | 5.256 | 1152 |
| | 10 | 12–7 | 38–6 | 0 TO 2 | 14 | 17 | 10 | 9 | 8 | 8 | 6 | 4 | 7 | 7 | 156 | 3–8 | 3–8 | 11–0 | 4–3 | 2–9 | 4.610 | 1151 |
| | | 12–9 | 38–6 | >2 TO 5 | 15 | 18 | 10 | 10 | 7 | 9 | 7 | 4 | 6 | 6 | | 4–3 | 3–4 | 11–1 | 3–10 | 3–0 | 4.847 | 1222 |
| | | 13–4 | 38–6 | >5 TO 7 | 19 | 21 | 10 | 9 | 7 | 9 | 9 | 4 | 5 | 5 | | 3–6 | 2–9 | 11–5 | 3–8 | 3–3 | 5.679 | 1214 |
| 20 | 6 | 8–7 | 42–6 | 0 TO 2 | 15 | 16 | 10 | 10 | 8 | 10 | 7 | 5 | 7 | 7 | 154 | 4–9 | 3–8 | 7–1 | 4–2 | 3–3 | 4.622 | 1487 |
| | | 9–1 | 42–6 | >2 TO 5 | 19 | 18 | 10 | 9 | 8 | 10 | 7 | 4 | 5 | 6 | | 3–6 | 3–4 | 7–5 | 3–10 | 3–0 | 5.409 | 1300 |
| | 8 | 10–9 | 42–6 | 0 TO 2 | 15 | 18 | 10 | 10 | 8 | 9 | 7 | 4 | 7 | 6 | 166 | 4–9 | 3–4 | 9–1 | 4–4 | 3–0 | 5.069 | 1387 |
| | | 11–0 | 42–6 | >2 TO 5 | 18 | 18 | 10 | 10 | 8 | 10 | 7 | 4 | 5 | 6 | | 3–6 | 3–4 | 9–4 | 3–10 | 3–0 | 5.463 | 1402 |
| | 10 | 12–8 | 42–6 | 0 TO 2 | 15 | 17 | 10 | 10 | 8 | 9 | 7 | 4 | 7 | 7 | 172 | 4–9 | 3–8 | 11–1 | 4–3 | 2–11 | 5.123 | 1437 |
| | | 12–11 | 42–6 | >2 TO 5 | 17 | 18 | 10 | 10 | 8 | 10 | 7 | 4 | 6 | 6 | | 4–3 | 3–4 | 11–3 | 3–10 | 3–0 | 5.517 | 1456 |

## HEADWALL AND TOEWALL QUANTITIES

| HEADWALL SKEW ANGLE | 90° TO 75° | | | 74° TO 60° | | | 59° TO 45° | | |
|---|---|---|---|---|---|---|---|---|---|
| SPAN – S | Ƶ | STIRRUPS | REBAR QUANT. | Ƶ | STIRRUPS | REBAR QUANT. | Ƶ | STIRRUPS | REBAR QUANT. |
| FT. | # | # | LBS./LIN.FT. | # | # | LBS./LIN.FT. | # | # | LBS./LIN.FT. |
| 6 | 4 | 4 | 22.8 | 4 | 4 | 22.5 | 4 | 4 | 21.9 |
| 8 | 4 | 4 | 21.4 | 4 | 4 | 21.2 | 5 | 4 | 25.5 |
| 10 | 5 | 4 | 26.4 | 5 | 4 | 25.3 | 7 | 4 | 38.3 |
| 12 | 5 | 4 | 25.4 | 6 | 4 | 30.9 | 8 | 5 | 44.9 |
| 14 | 6 | 4 | 30.6 | 7 | 4 | 37.0 | 10 | 5 | 68.9 |
| 16 | 6 | 4 | 29.9 | 8 | 5 | 47.8 | ✯ | ✯ | ✯ |
| 18 | 7 | 4 | 35.8 | 9 | 5 | 56.1 | ✯ | ✯ | ✯ |
| 20 | 7 | 4 | 34.0 | 11 | 6 | 83.8 | ✯ | ✯ | ✯ |
| CONCRETE QUANTITY = 0.085 CU.YDS./LIN.FT. | | | | | | | | | |

## NOTES

1. QUANTITIES ARE PER LINEAR FOOT (OF HEADWALL) FOR ONE HEADWALL AND TOEWALL AND INCLUDE ALL HEADWALL AND TOEWALL REINFORCING STEEL. QUANTITY INCLUDED WAS CALCULATED PER 1 FT. STRIP. SKEW ANGLE MAY VARY. QUANTITIES SHALL BE PAID FOR AS SHOWN ON THE PLANS.

✯ 2. A SKEWED HEADWALL IS NOT RECOMMENDED FOR THESE SPANS. A SPECIAL DESIGN IS REQUIRED.

3. FOR HEADWALL AND TOEWALL DETAILS SEE SHEET 1.

4. WHEN THE FILL HEIGHT IS LESS THAN OR EQUAL TO 2 FT.–0 IN., ALL REINFORCING BARS IN THE HEADWALL, ALL REINFORCING BARS DESIGNATED BY AN ASTERISK (✱), AND THE $d_1$ IN THE BARS IN THE TOP MAT OF THE TOP SLAB SHALL BE EPOXY COATED.

5. REINFORCING QUANTITIES INCLUDE BOTH EPOXY–COATED AND UNCOATED BARS.

6. WHEN AN R (RISE) OF LESS THAN 6 FT. IS REQUIRED, USE THE BAR SIZES AND THE SLAB AND WALL THICKNESSES FOR THE 6 FT. RISE (IF AVAILABLE ON THE TABLE).

▲ 7. THE SIZE OF $d_1$ BARS IS #4. THE NUMBER OF BARS REQUIRED IS LISTED.

| Computer File Information | |
|---|---|
| Creation Date: 07/04/06 | Initials: SJR |
| Last Modification Date: 07/04/06 | Initials: LTA |
| Full Path: www.dot.state.co.us/DesignSupport/ | |
| Drawing File Name: 601020202.dwg | |
| CAD Ver.: MicroStation V8 | Scale: Not to Scale Units: English |

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# DOUBLE CONCRETE BOX CULVERT


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M-601-2