# VARIABLE DIMENSIONS AND QUANTITIES FOR BARREL SECTIONS

BAR LIST

| FILL | a1 SIZE | a1 SP | a1 LENGTH | a2 SIZE | a2 SP | a2 LENGTH | b1 SIZE | b1 SP | b1 NO. | b2 SIZE | b2 SP | b2 NO. | e1 SIZE | e1 SP | e1 NO. | e2 SIZE | e2 SP | e2 NO. | f1 SIZE | f1 SP | f1 NO. | f2 SIZE | f2 SP | f2 NO. | k1 SIZE | k1 SP | k1 LENGTH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4 | 9 | 9'-8 | 5 | 4.5 | 9'-8 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 4 | 9 | 26'-2 |
| 1 | 4 | 9 | 9'-10 | 6 | 7.5 | 9'-10 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 4 | 9 | 26'-2 |
| 2 | 4 | 9 | 9'-6 | 5 | 4.5 | 9'-6 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 5 | 9 | 26'-2 |
| 3 | 4 | 9 | 9'-5 | 5 | 6 | 9'-5 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 5 | 12 | 26'-2 |
| 4 | 4 | 9 | 9'-5 | 5 | 6 | 9'-5 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 4 | 9 | 26'-2 |
| 5-7 | 4 | 9 | 9'-6 | 5 | 6 | 9'-6 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 4 | 9 | 26'-2 |
| 8-10 | 4 | 9 | 9'-9 | 5 | 6 | 9'-9 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 6 | 15 | 26'-2 |
| 11-13 | 6 | 9 | 10'-0 | 5 | 6 | 10'-0 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 5 | 12 | 26'-2 |
| 14-16 | 4 | 9 | 10'-3 | 5 | 6 | 10'-3 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 5 | 12 | 26'-2 |
| 17-19 | 4 | 9 | 10'-6 | 5 | 6 | 10'-6 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 7 | 18 | 26'-2 |
| 20-22 | 4 | 9 | 10'-9 | 5 | 6 | 10'-9 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 7 | 18 | 26'-2 |
| 23-25 | 4 | 9 | 11'-0 | 6 | 7.5 | 11'-0 | 4 | 9 | 22 | 4 | 9 | 12 | 5 | 12 | 22 | 4 | 17 | 20 | 4 | 12 | 26 | 4 | 17 | 20 | 7 | 18 | 26'-2 |

| FILL | k2 SIZE | k2 SP | k2 LENGTH | k4 SIZE | k4 SP | k4 LENGTH | k4 h | k4 v | k5 SIZE | k5 SP | k5 LENGTH | k5 h | k5 v | k6 SIZE | k6 SP | k6 LENGTH | k7 SIZE | k7 SP | k7 LENGTH | k9 SIZE | k9 SP * | k9 LENGTH | m1 SIZE | m1 SP | m1 LENGTH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 5 | 9 | 10'-8 | 5 | 12 | 5'-2 | 1'-9 | 3'-5 | 5 | 12 | 5'-2 | 1'-9 | 3'-5 | 5 | 12 | 26'-2 | 5 | 12 | 5'-2 | 5 | 4.5 | 26'-2 | 5 | 12 | 26'-8 |
| 1 | 5 | 9 | 10'-4 | 5 | 12 | 5'-5 | 1'-11 | 3'-6 | 5 | 12 | 5'-2 | 1'-8 | 3'-6 | 5 | 15 | 20'-4 | 6 | 15 | 6'-4 | 5 | 7.5 | 26'-2 | 5 | 12 | 26'-8 |
| 2 | 6 | 9 | 9'-2 | 5 | 9 | 5'-7 | 2'-4 | 3'-3 | 5 | 9 | 5'-4 | 2'-1 | 3'-3 | 5 | 9 | 19'-1 | 6 | 9 | 6'-1 | 5 | 4.5 | 26'-2 | 6 | 12 | 26'-8 |
| 3 | 6 | 12 | 8'-8 | 5 | 12 | 5'-7 | 2'-5 | 3'-2 | 6 | 12 | 5'-2 | 2'-0 | 3'-2 | 5 | 9 | 17'-10 | 6 | 9 | 5'-7 | 5 | 4.5 | 26'-2 | 4 | 9 | 26'-8 |
| 4 | 5 | 9 | 8'-2 | 4 | 9 | 5'-4 | 2'-2 | 3'-2 | 5 | 9 | 5'-3 | 2'-1 | 3'-2 | 6 | 12 | 17'-7 | 6 | 12 | 5'-3 | 6 | 4.5 | 26'-2 | 4 | 9 | 26'-8 |
| 5-7 | 5 | 9 | 8'-0 | 5 | 12 | 5'-5 | 2'-2 | 3'-3 | 6 | 12 | 5'-3 | 2'-0 | 3'-3 | 6 | 12 | 17'-5 | 7 | 12 | 5'-8 | 6 | 4.5 | 26'-2 | 5 | 12 | 26'-8 |
| 8-10 | 6 | 15 | 7'-10 | 5 | 12 | 5'-1 | 1'-10 | 3'-3 | 6 | 12 | 5'-2 | 1'-11 | 3'-3 | 7 | 15 | 17'-6 | 8 | 15 | 5'-11 | 7 | 7.5 | 26'-2 | 5 | 9 | 26'-8 |
| 11-13 | 6 | 12 | 8'-4 | 4 | 9 | 5'-0 | 1'-9 | 3'-3 | 4 | 9 | 4'-11 | 1'-8 | 3'-3 | 6 | 9 | 17'-2 | 6 | 9 | 4'-11 | 6 | 4.5 | 26'-2 | 5 | 12 | 26'-8 |
| 14-16 | 6 | 12 | 8'-7 | 5 | 12 | 5'-6 | 1'-11 | 3'-7 | 6 | 12 | 5'-5 | 1'-10 | 3'-7 | 8 | 18 | 17'-8 | 9 | 18 | 6'-3 | 8 | 4.5 | 26'-2 | 7 | 18 | 26'-8 |
| 17-19 | 7 | 18 | 8'-3 | 5 | 12 | 5'-9 | 2'-0 | 3'-9 | 6 | 12 | 5'-7 | 1'-10 | 3'-9 | 8 | 15 | 17'-6 | 8 | 15 | 5'-7 | 8 | 7.5 | 26'-2 | 7 | 18 | 26'-8 |
| 20-22 | 7 | 18 | 8'-6 | 5 | 12 | 6'-3 | 2'-6 | 3'-9 | 6 | 12 | 6'-1 | 2'-4 | 3'-9 | 8 | 15 | 17'-6 | 8 | 15 | 6'-10 | 8 | 7.5 | 26'-2 | 7 | 18 | 26'-8 |
| 23-25 | 7 | 18 | 8'-9 | 5 | 12 | 6'-7 | 2'-8 | 3'-11 | 6 | 12 | 6'-3 | 2'-4 | 3'-11 | 8 | 15 | 17'-6 | 8 | 15 | 6'-10 | 8 | 7.5 | 26'-2 | 7 | 18 | 26'-8 |

| FILL | m2 SIZE | m2 SP | m2 LENGTH | m4 SIZE | m4 SP | m4 LENGTH | m4 h | m4 v | m5 SIZE | m5 SP | m5 LENGTH | m5 h | m5 v | m6 SIZE | m6 SP | m6 LENGTH | m7 SIZE | m7 SP | m7 LENGTH | m9 SIZE | m9 SP * | m9 LENGTH | FILL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 5 | 12 | 6'-11 | 5 | 12 | 9'-11 | 1'-8 | 8'-3 | 6 | 12 | 10'-1 | 1'-10 | 8'-3 | 4 | 9 | 26'-8 | 5 | 9 | 4'-11 | 4 | 4.5 | 26'-8 | 0 |
| 1 | 5 | 12 | 7'-1 | 5 | 12 | 10'-6 | 2'-2 | 8'-4 | 6 | 12 | 10'-2 | 1'-10 | 8'-4 | 4 | 9 | 18'-9 | 5 | 9 | 5'-1 | 4 | 4.5 | 26'-8 | 1 |
| 2 | 6 | 12 | 7'-3 | 5 | 9 | 10'-6 | 2'-2 | 8'-4 | 5 | 9 | 10'-3 | 1'-11 | 8'-4 | 6 | 9 | 18'-0 | 6 | 9 | 4'-5 | 6 | 4.5 | 26'-8 | 2 |
| 3 | 5 | 9 | 7'-9 | 5 | 12 | 10'-5 | 2'-3 | 8'-2 | 6 | 12 | 10'-0 | 1'-10 | 8'-2 | 6 | 12 | 17'-8 | 6 | 12 | 4'-9 | 6 | 4.5 | 26'-8 | 3 |
| 4 | 5 | 9 | 7'-9 | 4 | 9 | 10'-5 | 2'-1 | 8'-4 | 5 | 9 | 10'-3 | 1'-11 | 8'-4 | 5 | 9 | 17'-6 | 6 | 9 | 5'-0 | 5 | 4.5 | 26'-8 | 4 |
| 5-7 | 6 | 12 | 8'-1 | 5 | 12 | 10'-3 | 2'-0 | 8'-3 | 6 | 12 | 10'-1 | 1'-10 | 8'-3 | 6 | 9 | 17'-5 | 6 | 9 | 4'-7 | 6 | 4.5 | 26'-8 | 5-7 |
| 8-10 | 5 | 9 | 7'-2 | 5 | 12 | 10'-4 | 1'-11 | 8'-5 | 6 | 12 | 10'-3 | 1'-10 | 8'-5 | 7 | 15 | 17'-9 | 8 | 15 | 5'-11 | 7 | 7.5 | 26'-8 | 8-10 |
| 11-13 | 6 | 12 | 8'-6 | 4 | 9 | 10'-1 | 1'-8 | 8'-5 | 4 | 9 | 10'-1 | 1'-8 | 8'-5 | 7 | 15 | 17'-9 | 8 | 15 | 6'-0 | 7 | 7.5 | 26'-8 | 11-13 |
| 14-16 | 7 | 18 | 8'-3 | 5 | 12 | 10'-5 | 1'-9 | 8'-8 | 6 | 12 | 10'-6 | 1'-10 | 8'-8 | 6 | 9 | 17'-6 | 6 | 9 | 5'-0 | 6 | 4.5 | 26'-8 | 14-16 |
| 17-19 | 7 | 18 | 8'-5 | 5 | 12 | 10'-7 | 1'-10 | 8'-9 | 6 | 12 | 10'-7 | 1'-10 | 8'-9 | 6 | 9 | 17'-7 | 6 | 9 | 5'-4 | 6 | 4.5 | 26'-8 | 17-19 |
| 20-22 | 7 | 18 | 8'-7 | 5 | 12 | 11'-0 | 2'-0 | 9'-0 | 6 | 12 | 10'-10 | 1'-10 | 9'-0 | 7 | 12 | 17'-9 | 7 | 12 | 5'-8 | 7 | 4.5 | 26'-8 | 20-22 |
| 23-25 | 7 | 18 | 8'-11 | 5 | 12 | 11'-2 | 2'-1 | 9'-1 | 6 | 12 | 10'-11 | 1'-10 | 9'-1 | 8 | 15 | 17'-10 | 8 | 15 | 5'-9 | 8 | 7.5 | 26'-8 | 23-25 |

| FILL | DIMENSIONS S | H | A | B | C | D * | E * | F * | G * | J * | U | V | W | X | Y | Z | QUANTITIES: CONCRETE YD ³/FT SLAB | FLOOR | WALLS | TOTAL | STEEL LBS/FT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 12 | 8 | 10.5 | 11 | 10 | 9 | 4.5 | 9 | 12 | 12 | 1'-8 | 13'-1 | 2'-7 | 3'-6 | 13'-4 | 2'-6 | .920 | .977 | .703 | 2.600 | 366.05 |
| 1 | 12 | 8 | 11.5 | 12 | 10 | 9 | 4.5 | 9 | 18 | 12 | 1'-11 | 7'-3 | 3'-2 | 3'-7 | 5'-5 | 2'-6 | 1.002 | 1.060 | .703 | 2.765 | 349.66 |
| 2 | 12 | 8 | 9 | 10 | 10 | 9 | 4.5 | 4.5 | 12 | 12 | 2'-5 | 6'-0 | 3'-1 | 3'-4 | 4'-8 | 2'-3 | .798 | .893 | .703 | 2.394 | 444.13 |
| 3 | 12 | 8 | 8 | 10 | 10 | 9 | 4.5 | 9 | 12 | 12 | 2'-7 | 4'-9 | 2'-9 | 3'-1 | 4'-4 | 2'-5 | .716 | .893 | .703 | 2.312 | 376.26 |
| 4 | 12 | 8 | 8 | 10 | 10 | 9 | 4.5 | 4.5 | 12 | 12 | 2'-10 | 4'-6 | 2'-7 | 3'-1 | 4'-2 | 2'-6 | .716 | .893 | .703 | 2.312 | 360.13 |
| 5-7 | 12 | 8 | 8.5 | 10.5 | 10 | 9 | 4.5 | 9 | 12 | 12 | 3'-0 | 4'-4 | 2'-10 | 3'-0 | 4'-1 | 2'-3 | .757 | .935 | .703 | 2.395 | 388.42 |
| 8-10 | 12 | 8 | 10 | 12 | 10 | 9 | 7.5 | 9 | 18 | 18 | 3'-4 | 4'-5 | 3'-0 | 3'-8 | 4'-5 | 2'-11 | .880 | 1.060 | .703 | 2.643 | 402.16 |
| 11-13 | 12 | 8 | 11.5 | 14 | 10 | 9 | 4.5 | 4.5 | 12 | 18 | 3'-3 | 4'-1 | 2'-6 | 3'-2 | 4'-5 | 3'-0 | 1.002 | 1.227 | .703 | 2.932 | 402.63 |
| 14-16 | 12 | 8 | 13 | 15.5 | 10 | 9 | 4.5 | 9 | 12 | 12 | 3'-2 | 4'-7 | 3'-2 | 3'-5 | 4'-2 | 2'-6 | 1.125 | 1.352 | .703 | 3.180 | 423.97 |
| 17-19 | 12 | 8 | 14.5 | 17 | 10 | 9 | 4.5 | 9 | 18 | 12 | 3'-6 | 4'-5 | 2'-9 | 3'-5 | 4'-3 | 2'-8 | 1.248 | 1.477 | .703 | 3.428 | 438.24 |
| 20-22 | 12 | 8 | 16 | 18.5 | 10 | 9 | 4.5 | 9 | 18 | 12 | 3'-5 | 4'-5 | 3'-5 | 3'-5 | 4'-5 | 2'-10 | 1.370 | 1.602 | .703 | 3.675 | 450.47 |
| 23-25 | 12 | 8 | 17.5 | 20 | 10 | 9 | 4.5 | 9 | 18 | 18 | 3'-4 | 4'-5 | 3'-5 | 3'-3 | 4'-6 | 2'-11 | 1.493 | 1.727 | .703 | 3.923 | 461.37 |

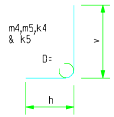
* THESE DIMENSIONS ARE CORRECT FOR 38' LONG STANDARD SECTIONS ONLY. DIMENSIONS MUST BE RECALCULATED FOR ALL OTHER SECTION LENGTHS.

NOTES:

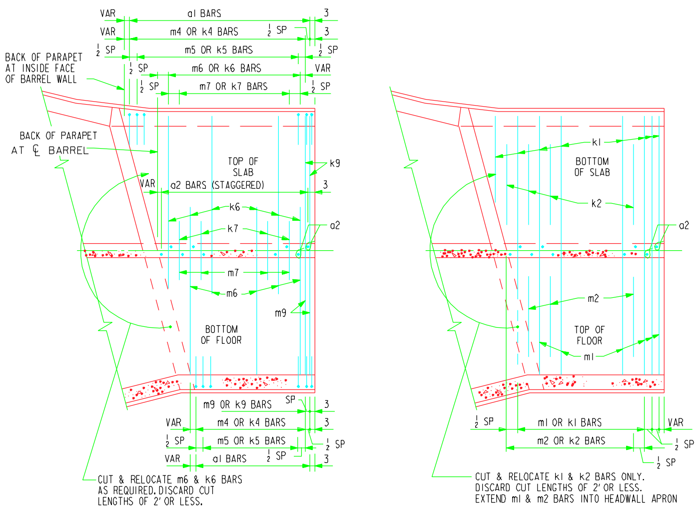
1. SEE DRAWING TWRCB-GI-87 FOR GENERAL INFORMATION, SPECIFICATIONS, AND DESIGN STRESSES.

## BENT BAR DETAIL

| BARS | D |
|---|---|
| 4 | 3 |
| 5 | 3¾ |
| 6 | 4½ |
| 7 | 5¼ |



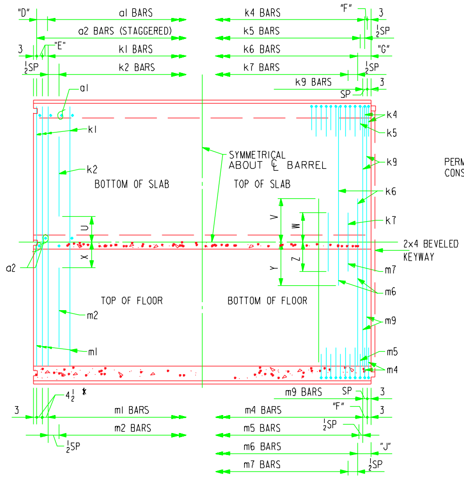

NOTE:
ALL DIMENSIONS ARE OUT TO OUT.
D = PIN DIAMETER.




## END SECTION - PLAN VIEW (KEYWAY NOT SHOWN)

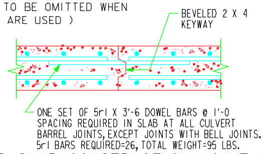
NOTE: END SECTION DETAILS SHOWN ARE FOR A 15° SKEW BARREL. USE FOR SKEWS OF 30° & 45° BY INCREASING THE NUMBER OF TRANSVERSE REINFORCING BARS REQUIRED TO BE CUT & RELOCATED.

NOTE: ALL LONGITUDINAL BARREL STEEL SHALL EXTEND AT LEAST TO THE BACKFACE OF PARAPET.

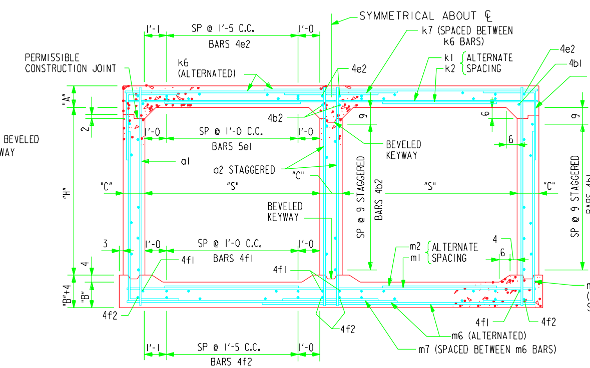



## STANDARD SECTION PLAN VIEW

NOTE: TYPICAL FOR LENGTHS OF 38'.
( KEYWAY IS TO BE OMITTED WHEN BELL JOINTS ARE USED )




## TOP SLAB CONSTRUCTION JOINT DETAIL




## BARREL SECTION

STANDARD DESIGN

# CULVERT BARREL DETAILS

FOR

TWIN REINFORCED CONCRETE BOX CULVERTS

HIGHWAY DIVISION

IOWA DEPARTMENT OF TRANSPORTATION

JULY, 1987

TWRCB 12-8-87

LATEST REVISION DATE: 12-5-96

APPROVED BY: [signature]

REVISED: 8/89; KEYWAY NOTE & DETAIL ADDED, LONGITUDINAL BARREL STEEL NOTE ADDED.
REVISED: 12/96 ; KEYWAY NOTATION CHANGED, DOWEL BAR LENGTH CHANGED.
TWB128.SOI

XXXXXXXXXXSYSTEMTIME XXXXXXXUSERNAME XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXDGNSPEC