

TYPICAL SET OUT TABLES & QUANTITY CALCULATIONS FOR REINFORCED CONCRETE BOX CULVERTS (UP TO 1800mm CULVERT CELL HEIGHT) AND BETWEEN 35° AND 45° SKEW

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TABLE 10: CULVERT SKEW ANGLE 35° TO 40°
(WINGWALL ANGLES $\alpha = 8^\circ$ & $\beta = 57^\circ$) (BATTER SLOPE OF 1V:2H)

SETOUT DIMENSIONS					
D	H	A	B	E	C
450	830	1260	180	1950	W+2130
600	980	1560	220	2410	W+2630
750	1130	1860	270	2870	W+3140
900	1280	2160	310	3330	W+3640
1050	1430	2460	350	3790	W+4140
1200	1580	2760	390	4260	W+4650
1350	1730	3060	440	4720	W+5160
1500	1880	3360	480	5180	W+5660
1650	2030	3660	520	5640	W+6160
1800	2180	3960	560	6100	W+6660

TABLE 13: CULVERT SKEW ANGLE 40° TO 45°
(WINGWALL ANGLES $\alpha = 0^\circ$ & $\beta = 60^\circ$) (BATTER SLOPE OF 1V:2H)

SETOUT DIMENSIONS					
D	H	A	B	E	C
450	830	1260	0	2190	W+2190
600	980	1560	0	2710	W+2710
750	1130	1860	0	3230	W+3230
900	1280	2160	0	3750	W+3750
1050	1430	2460	0	4270	W+4270
1200	1580	2760	0	4790	W+4790
1350	1730	3060	0	5310	W+5310
1500	1880	3360	0	5820	W+5820
1650	2030	3660	0	6340	W+6340
1800	2180	3960	0	6860	W+6860

TABLE 11: CULVERT SKEW ANGLE 35° TO 40°
(WINGWALL ANGLES $\alpha = 8^\circ$ & $\beta = 57^\circ$) (BATTER SLOPE OF 1V:4H)

SETOUT DIMENSIONS					
D	H	A	B	E	C
450	830	2520	360	3890	W+4250
600	980	3120	440	4810	W+5250
750	1130	3720	530	5730	W+6260
900	1280	4320	610	6660	W+7270
1050	1430	4920	700	7580	W+8280
1200	1580	5520	780	8510	W+9290
1350	1730	6120	870	9430	W+10300
1500	1880	6720	950	10350	W+11300
1650	2030	7320	1030	11280	W+12310
1800	2180	7920	1120	12200	W+13320

TABLE 14: CULVERT SKEW ANGLE 41° TO 45°
(WINGWALL ANGLES $\alpha = 0^\circ$ & $\beta = 60^\circ$) (BATTER SLOPE OF 1V:4H)

SETOUT DIMENSIONS					
D	H	A	B	E	C
450	830	2520	0	4370	W+4370
600	980	3120	0	5410	W+5410
750	1130	3720	0	6450	W+6450
900	1280	4320	0	7490	W+7490
1050	1430	4920	0	8530	W+8530
1200	1580	5520	0	9570	W+9570
1350	1730	6120	0	10610	W+10610
1500	1880	6720	0	11640	W+11640
1650	2030	7320	0	12680	W+12680
1800	2180	7920	0	13720	W+13720

TABLE 12: CULVERT SKEW ANGLE 35° TO 40°
(WINGWALL ANGLES $\alpha = 8^\circ$ & $\beta = 57^\circ$) (BATTER SLOPE OF 1V:6H)

SETOUT DIMENSIONS					
D	H	A	B	E	C
450	830	3780	540	5830	W+6370
600	980	4680	660	710	W+7870
750	1130	5580	790	8600	W+9390
900	1280	6480	920	9980	W+10900
1050	1430	7380	1040	11370	W+12410
1200	1580	8280	1170	12760	W+13930
1350	1730	9180	1300	14140	W+15440
1500	1880	10080	1420	15530	W+16950
1650	2030	10980	1550	16910	W+18460
1800	2180	11880	1670	18300	W+19970

TABLE 15: CULVERT SKEW ANGLE 41° TO 45°
(WINGWALL ANGLES $\alpha = 0^\circ$ & $\beta = 60^\circ$) (BATTER SLOPE OF 1V:6H)

SETOUT DIMENSIONS					
D	H	A	B	E	C
450	830	3780	0	6550	W+6500
600	980	4680	0	8110	W+8110
750	1130	5580	0	9670	W+9670
900	1280	6480	0	11230	W+11230
1050	1430	7380	0	12790	W+12790
1200	1580	8280	0	14350	W+14350
1350	1730	9180	0	15910	W+15910
1500	1880	10080	0	17460	W+17460
1650	2030	10980	0	19020	W+19020
1800	2180	11880	0	20580	W+20580

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED ELSEWHERE
- STANDARD DRAWING REFERENCES:
 - CS3107 - RCBC SETOUT DETAILS
 - CS3108 - RCBC CROWN UNIT & LINK SLAB INSTALLATION DETAIL
 - CS3109 - RCBC WINGWALL AND HEADWALL DETAIL FOR D < 900mm
 - CS3110 - RCBC WINGWALL AND HEADWALL DETAIL FOR D > 900mm
 - CS3111 - RCBC CONSTRUCTION OF BASES WITH NIBS & APRONS
 - CS3112 - RCBC CONSTRUCTION OF BASES WITH RECESSES & APRONS
- TO ASSIST PROJECT DEVELOPMENT, TENDERING AND CONSTRUCTION, FORMULAS ARE PROVIDED TO DEVELOP QUANTITIES FOR RCBC BOX CULVERTS. IT IS THE RESPONSIBILITY OF THE DESIGNER / CONSULTANT / CONTRACTOR TO VERIFY THE BELOW FORMULAS, AND WHERE A DISCREPANCY EXISTS, INFORM THE DEPARTMENT AS SOON AS PRACTICAL.
- THE SETOUT DIMENSIONS & QUANTITY CALCULATIONS PROVIDED REFERENCE THE BELOW STANDARD DRAWINGS:
 - CS3107 - REFERENCE FOR [H], [A], [B], [E], [T], [α], [β] AND HEADWALL DEPTH
 - CS3110 - REFERENCE FOR RCBC FOOTING
 - CS3111 & CS3112 - VALUES FOR [Bt]
 - CS3130 - VALUES FOR [α] & [β]

QUANTITY CALCULATIONS FOR RCBC CULVERTS	
CULVERT COMPONENT	FORMULA
HEADWALL	$Q_{HEADWALL} = [T] \times \text{HEADWALL DEPTH} \times [W]$
WINGWALL 1 LENGTH - A_{W1}	$A_{W1} = [A] / \cos(\alpha)$
WINGWALL LENGTH 2 - A_{W2}	$A_{W2} = [A] / \cos(\beta)$
WINGWALL - Q DUE TO A_{W1}	$Q_{AW1} = ([A_{W1}] \times 200\text{mm} \times [T]) + ([A_{W1}] \times (H - 200\text{mm}) \times 0.5 \times [T])$
WINGWALL - Q DUE TO A_{W2}	$Q_{AW2} = ([A_{W2}] \times 200\text{mm} \times [T]) + ([A_{W2}] \times (H - 200\text{mm}) \times 0.5 \times [T])$
APRON	$Q_{APRON} = ([A] \times [W]) + (0.5 \times [B] \times [A]) + (0.5 \times [E] \times [A])$
CUT OFF WALL - INLET	$Q_{CUT-IN} = ([W] + [B] + [E]) \times 200\text{mm} \times 150\text{mm}$
CUT OFF WALL - OUTLET	$Q_{CUT-OUT} = ([W] + [B] + [E]) \times 450\text{mm} \times 150\text{mm}$
FOOTING DUE TO A_{W1}	$Q_{F1} = ([A_{W1}] \times 300\text{mm} \times 100\text{mm}) + ((0.75[H] - 300\text{mm}) \times [A_{W1}] \times 0.5) \times 0.1$
FOOTING DUE TO A_{W2}	$Q_{F2} = ([A_{W2}] \times 300\text{mm} \times 100\text{mm}) + ((0.75[H] - 300\text{mm}) \times [A_{W2}] \times 0.5) \times 0.1$
IN-SITU BASE SLAB	$Q_{BASE} = [Bt] \times [W] \times \text{LENGTH OF CULVERT FROM INVERT TO INVERT}$
TOTAL PER CULVERT	$Q_T = 2 \times (Q_{HEADWALL} + Q_{AW1} + Q_{AW2} + Q_{APRON} + Q_{F1} + Q_{F2}) + Q_{CUT-IN} + Q_{CUT-OUT} + Q_{BASE}$

NOTES:
1. QUANTITY CALCULATIONS ARE PROVIDED AND INCLUDE THE FOLLOWING: HEADWALL, WINGWALLS, APRON, CUT OFF WALL & FOOTINGS

0	ISSUED AS A STANDARD DRAWING	APR 2023	J. COOK	TCS / DIPL
No.	AMENDMENT DESCRIPTION	DATE	INIT.	DEPT/COMPANY

Drawn	J. COOK Date: MAR 2023	Checked	S. HATZI Date: APR 2023
Designed	J. COOK Date: MAR 2023	Checked	S. HATZI Date: APR 2023
	Design Project Leader DIPL Date: APR 2023		NTG Project Manager DIPL Date: APR 2023



STANDARD DRAWINGS DRAINAGE			
RCBC - 450mm - 1800mm HEIGHT & 1V:2H TO 1V:6H BATTER SETOUT DIMENSIONS & QUANTITIES - 36° TO 45° SKEW			
NTG Project No.	NTG Asset No.	Sheet Reference	NTG Drawing No. Amendment
-	-	4 OF 6	CS3130 0 A1