

TYPICAL SET OUT DIMENSIONS & QUANTITY TABLES FOR REINFORCED CONCRETE PIPES BETWEEN 36° & 45° SKEW - UP TO 1800mm DIAMETER

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TABLE 10: CULVERT SKEW ANGLE 36° TO 40°
(WINGWALL ANGLES α = 8° AND β = 57°) (BATTER SLOPE OF 1V:2H)

SETOUT DIMENSIONS						QUANTITIES	
D	H	A	B	E	C	Q (TOTAL)	AQ (TOTAL)
450	735	1070	160	1650	W+1810	1.37	0.53
600	900	1400	200	2160	W+2360	2.09	0.79
750	1065	1730	250	2670	W+2920	2.98	1.37
900	1230	2060	290	3180	W+3470	4.01	1.77
1050	1395	2390	340	3690	W+4030	7.59	2.71
1200	1560	2720	390	4190	W+4580	9.51	3.32
1350	1725	3050	430	4700	W+5130	11.66	3.98
1500	1880	3360	480	5180	W+5660	13.86	4.65
1650	2045	3690	520	5690	W+6210	16.43	5.44
1800	2210	4020	570	6200	W+6770	19.2	6.28

TABLE 13: CULVERT SKEW ANGLE 41° TO 45°
(WINGWALL ANGLES α = 0° AND β = 60°) (BATTER SLOPE OF 1V:2H)

SETOUT DIMENSIONS						QUANTITIES	
D	H	A	B	E	C	Q (TOTAL)	AQ (TOTAL)
450	735	1070	0	1860	W+1860	1.4	0.53
600	900	1400	0	2430	W+2430	2.15	0.79
750	1065	1730	0	3000	W+3000	3.06	1.37
900	1230	2060	0	3570	W+3570	4.11	1.77
1050	1395	2390	0	4140	W+4140	7.83	2.71
1200	1560	2720	0	4720	W+4720	9.82	3.32
1350	1725	3050	0	5290	W+5290	12.04	3.98
1500	1880	3360	0	5820	W+5820	14.31	4.65
1650	2045	3690	0	6400	W+6400	16.97	5.44
1800	2210	4020	0	6970	W+6970	19.83	6.28

TABLE 11: CULVERT SKEW ANGLE 36° TO 40°
(WINGWALL ANGLES α = 8° AND β = 57°) (BATTER SLOPE OF 1V:4H)

SETOUT DIMENSIONS						QUANTITIES	
D	H	A	B	E	C	Q (TOTAL)	AQ (TOTAL)
450	735	2140	310	3300	W+3610	3.08	0.8
600	900	2800	400	4320	W+4720	4.85	1.2
750	1065	3460	490	5330	W+5820	7.02	2.13
900	1230	4120	580	6350	W+6930	9.57	2.77
1050	1395	4780	680	7370	W+8050	16.94	4
1200	1560	5440	770	8380	W+9150	21.37	4.92
1350	1725	6100	860	9400	W+10260	26.34	5.93
1500	1880	6720	950	10350	W+11300	31.45	6.95
1650	2045	7380	1040	11370	W+12410	37.43	8.14
1800	2210	8040	1130	12390	W+13520	43.88	9.42

TABLE 14: CULVERT SKEW ANGLE 41° TO 45°
(WINGWALL ANGLES α = 0° AND β = 60°) (BATTER SLOPE OF 1V:4H)

SETOUT DIMENSIONS						QUANTITIES	
D	H	A	B	E	C	Q (TOTAL)	AQ (TOTAL)
450	735	2140	0	3710	W+3710	3.16	0.8
600	900	2800	0	4850	W+4850	4.98	1.2
750	1065	3460	0	6000	W+6000	7.23	2.13
900	1230	4120	0	7140	W+7140	9.85	2.77
1050	1395	4780	0	8280	W+8280	17.51	4
1200	1560	5440	0	9430	W+9430	22.11	4.92
1350	1725	6100	0	10570	W+10570	27.25	5.93
1500	1880	6720	0	11640	W+11640	32.54	6.95
1650	2045	7380	0	12790	W+12790	38.73	8.14
1800	2210	8040	0	13930	W+13930	45.4	9.42

TABLE 12: CULVERT SKEW ANGLE 36° TO 40°
(WINGWALL ANGLES α = 8° AND β = 57°) (BATTER SLOPE OF 1V:6H)

SETOUT DIMENSIONS						QUANTITIES	
D	H	A	B	E	C	Q (TOTAL)	AQ (TOTAL)
450	735	3210	460	4950	W+5410	5.36	1.07
600	900	4200	600	6470	W+7070	8.58	1.62
750	1065	5190	730	8000	W+8730	12.56	2.89
900	1230	6180	870	9520	W+10390	17.27	3.78
1050	1395	7170	1010	11050	W+12060	29.16	5.28
1200	1560	8160	1150	12570	W+13720	36.96	6.51
1350	1725	9150	1290	14090	W+15380	45.71	7.87
1500	1880	10080	1420	15530	W+16950	54.74	9.24
1650	2045	11070	1560	17050	W+18610	65.28	10.84
1800	2210	12060	1700	18580	W+20280	76.72	12.56

TABLE 12: CULVERT SKEW ANGLE 41° TO 45°
(WINGWALL ANGLES α = 0° AND β = 60°) (BATTER SLOPE OF 1V:6H)

SETOUT DIMENSIONS						QUANTITIES	
D	H	A	B	E	C	Q (TOTAL)	AQ (TOTAL)
450	735	3210	0	5560	W+5560	5.52	1.07
600	900	4200	0	7280	W+7280	8.84	1.62
750	1065	5190	0	8990	W+8990	12.94	2.89
900	1230	6180	0	10710	W+10710	17.8	3.78
1050	1395	7170	0	12420	W+12420	30.17	5.28
1200	1560	8160	0	14140	W+14140	38.24	6.51
1350	1725	9150	0	15850	W+15850	47.29	7.87
1500	1880	10080	0	17460	W+17460	56.63	9.24
1650	2045	11070	0	19180	W+19180	67.55	10.84
1800	2210	12060	0	20890	W+20890	79.36	12.56

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED ELSEWHERE
- ALL QUANTITIES ARE IN CUBIC METRES
- STANDARD DRAWING REFERENCES:
 - CS3101 - INSTALLATION, BEDDING AND FILLING / BACKFILLING AGAINST / OVER CULVERTS
 - CS3104 - RCP UP TO 900 DIA & BETWEEN 20 & 45° SKEW
 - CS3106 - RCP UP TO 1800 DIA & BETWEEN 20 & 45° SKEW
- QUANTITY CALCULATIONS & TYPICAL VALUES BEEN PROVIDED TO ASSIST PROJECT DESIGN, TENDERING & CONSTRUCTION PURPOSES OF RCP CULVERTS. IT IS THE RESPONSIBILITY OF THE DESIGNER / CONSULTANT / CONTRACTOR TO VERIFY THE BELOW FORMULAS AND CALCULATIONS PRIOR TO ADOPTING FOR DESIGN. WHERE A DISCREPANCY IS IDENTIFIED, INFORM THE DEPARTMENT AS SOON AS PRACTICAL.
- FOR SETOUT DIMENSIONS & QUANTITY CALCULATION REFERENCES AND VALUES, REFER TO BELOW STANDARD DRAWINGS:
 - CS3101 - SPACING [S*] FOR MULTIPLE RCP CELLS
 - CS3104 & CS3106 - SETOUT FOR [H], [A], [B], [E], [T], [α], [β] AND HEADWALL DEPTH
 - CS3105 & CS3106 - SETOUT FOR FOOTING
 - [AQ] REPRESENTS THE CONCRETE QUANTITIES FOR EACH ADDITIONAL CELL BEYOND THE FIRST
 - CS3128 - VALUES FOR [α] & [β]

QUANTITY CALCULATIONS FOR RCP CULVERTS	
CULVERT COMPONENT	FORMULA
HEADWALL	$Q_{HEADWALL} = (([W] \times [H]) - (\pi \times (ED/2)^2) \times \text{NUMBER OF CELLS}) \times [T]$
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	$Q_{APRON} = 150\text{mm} \times (([A] \times [W]) + (0.5 \times [B] \times [A]) + (0.5 \times [E] \times [A]))$
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}	$Q_{F2} = ([A_{W2}] \times 300\text{mm} \times 100\text{mm}) + ((0.75[H] - 300\text{mm}) \times [A_{W2}] \times 0.5) \times 0.1$
TOTAL PER CULVERT	$Q_T = 2 \times (Q_{HEADWALL} + Q_{AW1} + Q_{AW2} + Q_{APRON} + Q_{F1} + Q_{F2}) + Q_{CUT-IN} + Q_{CUT-OUT}$

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			
RCP - 450DIA TO 1800DIA & 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
-	-	2 OF 6	CS3128 0 A1