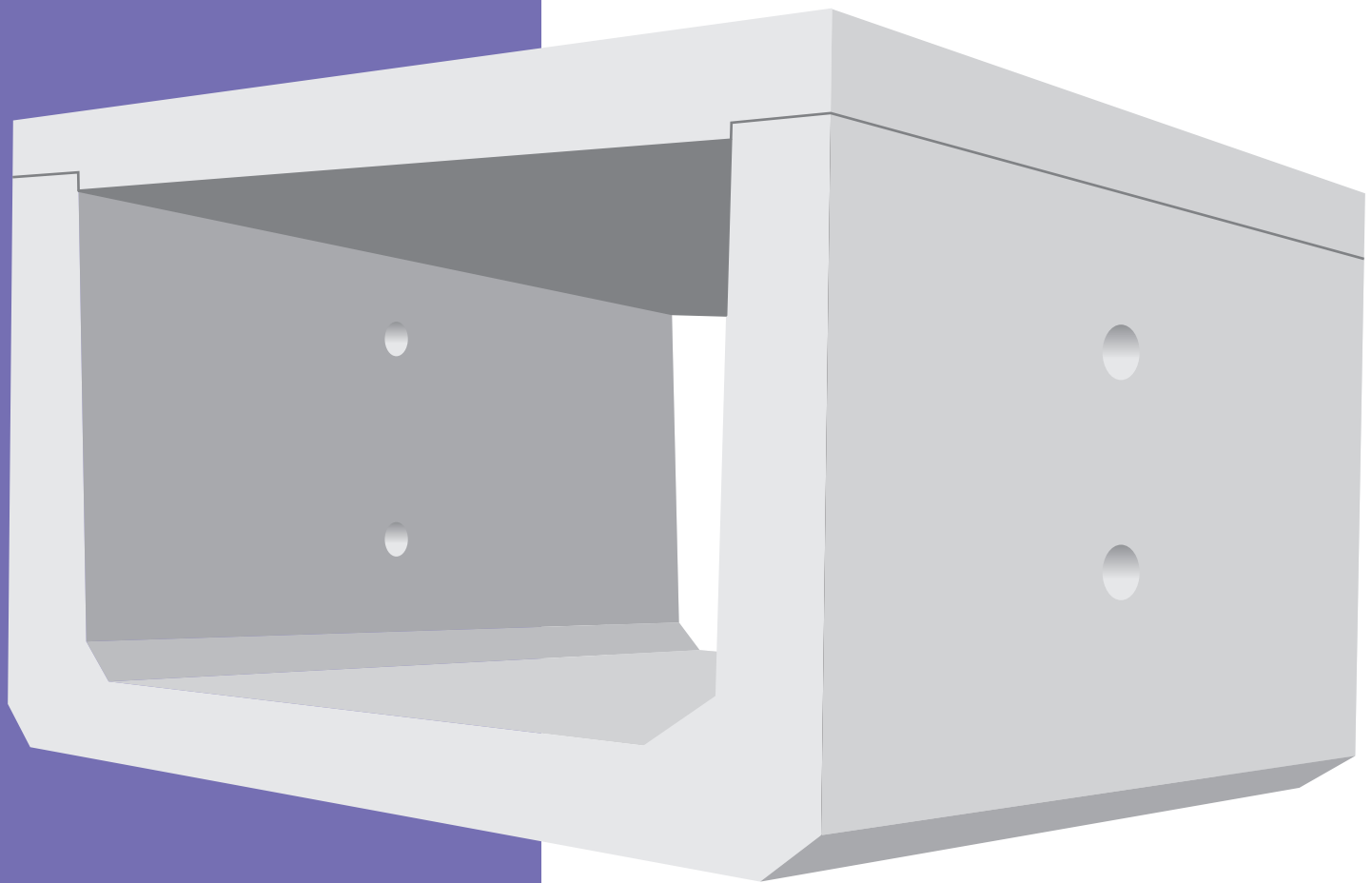




Box Culvert



MS ISO 9001 : 2015 REG NO AR 2824

SEDSCO Precast Sdn. Bhd. (328669-K)

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PRECAST CONCRETE BOX CULVERT

This brochure covers the invert and lid type of Precast Box Culverts, categorized into 3 ranges namely:-

- ▶ Standard Box Culverts - Not exceeding 1800mm width and 1800mm height.
- ▶ Supersize Box Culverts - Exceeding 1800mm width and 1800mm height up to 3600mm width and 3000mm height.
- ▶ Giant Size Box Culverts - Exceeding 3600mm width.



An extensive range of nominal sizes is available with widths ranging from 600mm to 4800mm and varying proportions of height. Each precast unit is supplied with a standard length of 1000mm.

Precast Box Culverts (except GSBC) are available with or without a dry weather flow section (DWF).

Box culverts are generally used where a drain crosses a road and usually for a shallow fill of less than 600mm and shall include a single of multicell construction.

SPECIFICATION AND DESIGN

1. SPSB Precast Concrete Box Culverts complete with lid shall comply with the following:-

- ▶ Standard Box Culverts not exceeding 1800mm width and 1800mm height shall comply with MS1293:Pt1:1992. They are reinforced to withstand a single wheel load of 112.5KN over an area of 320mm square anywhere on the cover slab (lid) when supported on the box culvert as in installed condition.
 - ▶ Supersize Box Culverts exceeding 1800mm width and 1800mm height shall comply with design loading to BS5400:Pt2:1978 (BS EN 1991-1-7:2006A:2014) modified by BD 31/87 (BD31/01), Buried Concrete Box Type structures published by Department of Transport (UK) and reinforcement design to BS8110, Structural Use of Concrete. The box culverts also comply when subjected to a two wheel load of 112.5KN over an area of 320mm square spaced at 1.8 metres apart anywhere on the cover slab (lid) when supported on the box culvert as in installed condition. (method for the load testing in accordance with MS 1293:Pt1:1992)
- a) Dispersal of wheel loads to the top of buried structure shall be assumed to occur from a contact area of 320mm square at a spread to depth ratio of 1 horizontally to 2 vertically.
 - b) Compressible support is assumed to the underside of the box culvert giving a uniform distribution of support pressure.
 - c) Density of compacted fill material shall be taken as 19KN/m³.
 - d) Each precast unit is individually designed.
 - e) Fill depth refers to superimposed material which shall include generally road construction material and the soil cover only.
 - f) For small box culverts of nominal width and depth not exceeding 1800mm and installed on non-compressible ground top, height of fill shall not exceed 2 metres inclusive of pavement, if any.
 - g) Nominal cover shall be 25mm.
 - h) Hydrostatic pressure is ignored and is eliminated by the provision of weepholes of 50mm diameter provided along the vertical wall.
 - i) Characteristic strength of concrete shall be 40N/mm².
3. SPSB can also design and manufacture to meet any other specification.

APPLICATION

- ▶ Diversion of water courses, a common use
- ▶ Road crossing
- ▶ Bridge over minor roads
- ▶ Service tunnels for underground services
- ▶ Other civil engineering and construction application

LIFTING AND STORAGE ARRANGEMENTS

Units shall be lifted through the weepholes provided along the vertical walls and preferably by means of a spreader beam to avoid any undue stresses. All units shall be stored on an unyielding ground and lids stacked with timber bearers at lifting positions.

GUIDE TO SITE PRACTICE

Following guidelines provides a reliable checklist for anyone engaged in the installation of box culverts.

A. Taking Delivery

1. Provide a hard access which can be used safely by standard delivery vehicles.
2. Lower them carefully on to a firm level base away from the edge of the trench.
3. Move them by lifting and never by dragging.

B. Preparing The Trench

1. Keeping to the specified line and gradient, the trench should be excavated to a width equal to the box culvert width plus about 600mm for most conditions.
2. Keep the width to a minimum to avoid unnecessary excavation, bedding material and backfill.
3. Carefully trim the foundation to the required depth and gradient making allowance for the thickness of bedding.
4. Excavate local hard or soft areas of the trench bottom and replace with well-compacted backfill.
5. Maintain a dry formation as far as possible.

C. Bedding

1. Lay well-compacted selected granular material over the full width of the trench to a minimum depth of 200mm.
2. Blind the surface with fine material to assist levelling.
3. As an alternative to granular bedding, a concrete blinding layer is sometimes preferred to protect the formation or to allow rapid laying of box culverts.
4. Lay a thin non-reinforced lean-mixed concrete about 75mm thick on a trench bottom which has been well prepared to a uniform firmness.

D. Laying The Culverts

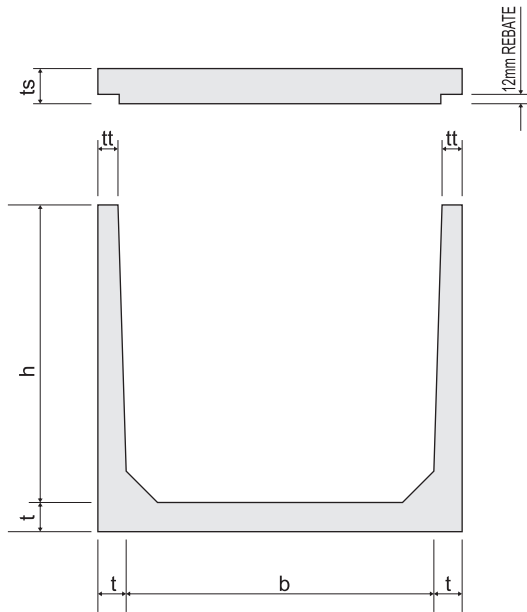
1. Box culverts are usually laid from the downstream end.
2. Inspect the box culvert before laying to ensure that the jointing surfaces are clean and that no damage has occurred.
3. Lower the box culvert carefully on to the prepared base aligning with the unit already laid.
4. If any adjustment to level is necessary, remove the box culvert and adjust the surface layer of the bedding.

E. Backfilling

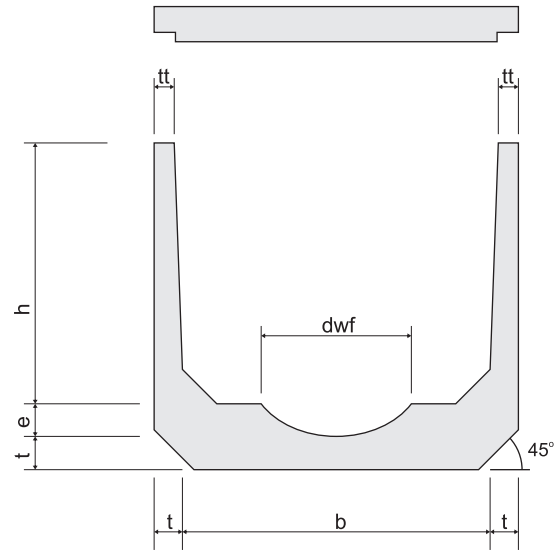
1. Backfilling should commence as soon as possible after the box culverts have been laid.
2. Fill the trench to the level of the box culvert working evenly on each side.
3. Use selected backfill material well compacted in layers not exceeding 200mm.
4. **DO NOT** use heavy vibratory equipment.
5. Continue filling over the box culvert and compact in layers.
6. **DO NOT** run heavy rollers or construction plant over the box culvert without protection.
7. The box culverts are designed to cater for superimposed backfill deadload **NOT EXCEEDING** 4m in depth (inclusive of pavement) plus 45 units of HB vehicle primary live load.



STANDARD BOX CULVERTS



Box Culvert w/o DWF

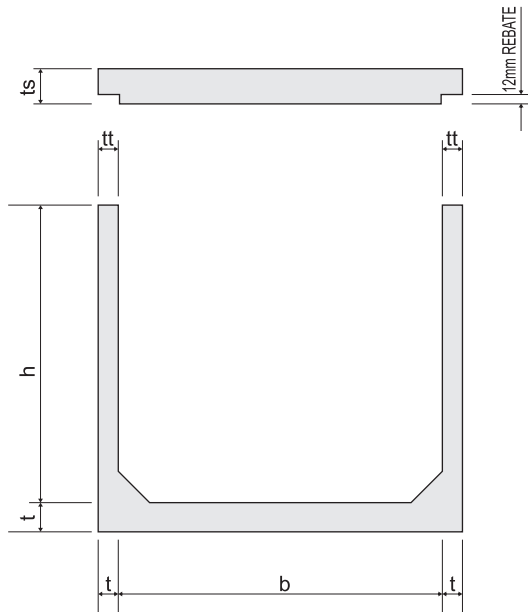


Box Culvert c/w DWF

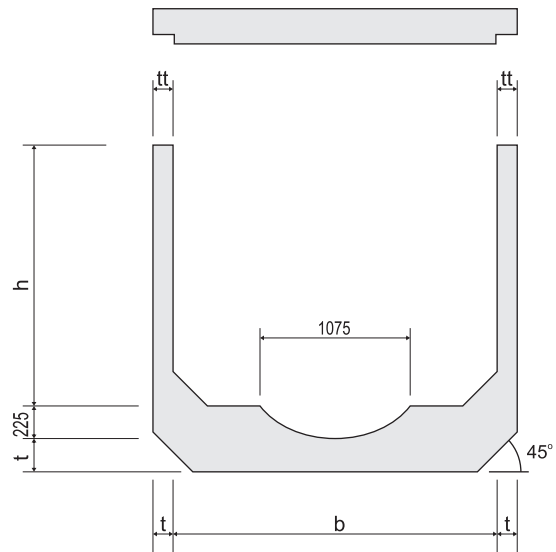
$dwf = b/2$ for size 900mm and below
 $dwf = 1075$ for size 1200 and above
 $e = 70\text{mm}$ for size 600mm series
 $e = 75\text{mm}$ for size 750mm series
 $e = 80\text{mm}$ for size 900mm series
 $e = 225\text{mm}$ for size 1200mm series and above

NOMINAL SIZE	LENGTH	DIMENSION					APPROX WEIGHT		
		b	h	t	tt	ts	LID	INVERT w/o DWF	INVERT c/w DWF
mm x mm	mm	mm	mm	mm	mm	mm	tonne	tonne	tonne
600 x 300	1000	600	300	70	64	135	0.258	0.240	0.300
x 450	1000	600	450	70	59	135	0.258	0.280	0.340
x 600	1000	600	600	70	55	135	0.258	0.342	0.600
750 x 450	1000	750	450	75	64	135	0.300	0.330	0.420
x 600	1000	750	600	75	59	135	0.300	0.380	0.460
x 750	1000	750	750	75	55	135	0.300	0.442	0.742
900 x 450	1000	900	450	80	71	140	0.385	0.390	0.500
x 600	1000	900	600	80	67	140	0.385	0.440	0.550
x 750	1000	900	750	80	64	140	0.385	0.490	0.590
x 900	1000	900	900	80	60	140	0.385	0.563	0.948
1200 x 600	1000	1200	600	95	79	150	0.540	0.610	0.760
x 750	1000	1200	750	95	75	150	0.540	0.660	0.820
x 900	1000	1200	900	95	70	150	0.540	0.753	1.293
x 1050	1000	1200	1050	95	65	150	0.540	0.740	0.930
x 1200	1000	1200	1200	95	60	150	0.540	0.852	1.392
1500 x 750	1000	1500	750	100	84	175	0.766	0.790	1.120
x 900	1000	1500	900	100	80	175	0.766	0.850	1.180
x 1050	1000	1500	1050	100	77	175	0.766	0.951	1.717
x 1200	1000	1500	1200	100	73	175	0.766	1.009	1.775
x 1350	1000	1500	1350	100	69	175	0.766	1.010	1.330
x 1500	1000	1500	1500	100	65	175	0.766	1.114	1.880
1800 x 900	1000	1800	900	120	120	200	1.035	1.070	1.580
x 1050	1000	1800	1050	120	120	200	1.035	1.140	1.650
x 1200	1000	1800	1200	120	120	200	1.035	1.200	1.710
x 1350	1000	1800	1350	120	120	200	1.035	1.720	1.770
x 1500	1000	1800	1500	120	120	200	1.035	1.320	1.830
x 1650	1000	1800	1650	120	120	200	1.035	1.380	1.880
x 1800	1000	1800	1800	120	120	200	1.035	1.503	2.538

SUPERSIZE BOX CULVERTS



Box Culvert w/o DWF

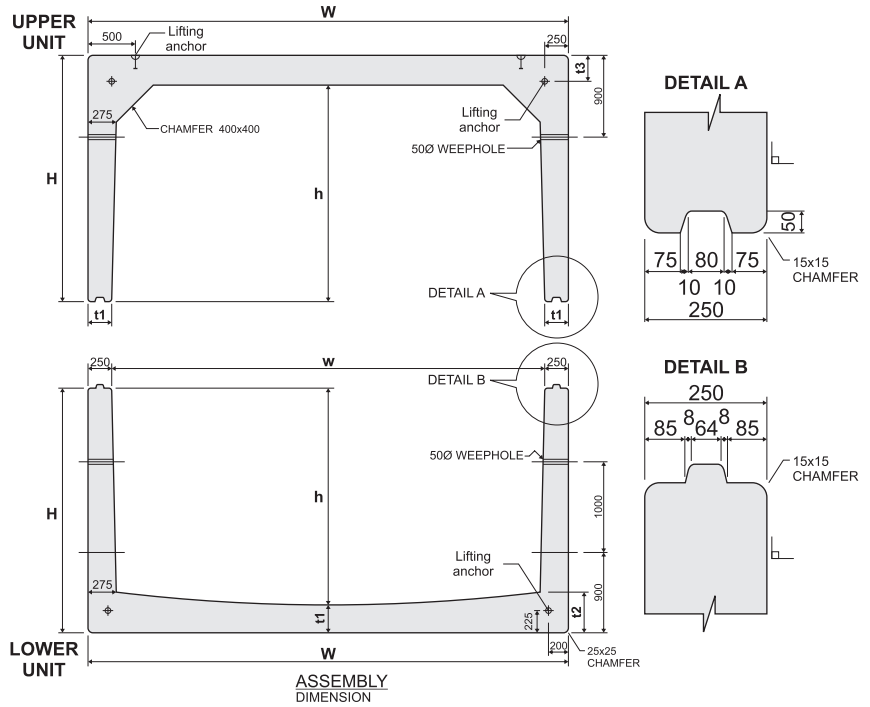
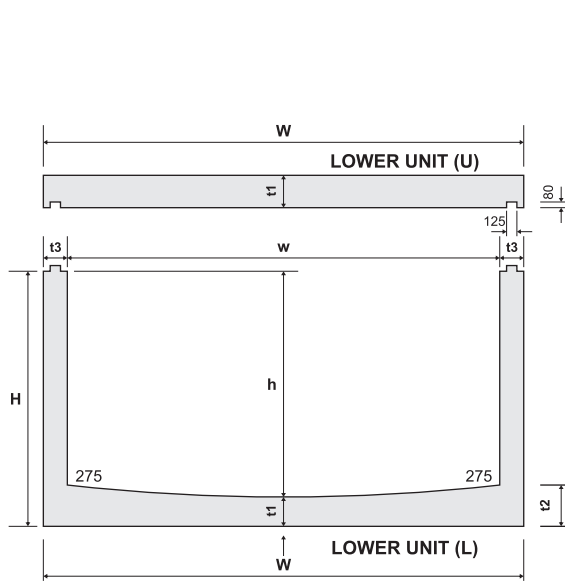


Box Culvert c/w DWF

NOMINAL SIZE	LENGTH	DIMENSION					APPROX WEIGHT		
		b	h	t	tt	ts	LID	INVERT w/o DWF	INVERT c/w DWF
mm	mm	mm	mm	mm	mm	mm	tonne	tonne	tonne
2100 x 1200	1000	2100	1200	200	200	255	1.462	2.531	3.813
x 1500	1000	2100	1500	200	200	255	1.462	2.679	4.141
x 1800	1000	2100	1800	200	200	255	1.462	2.530	3.280
x 2100	1000	2100	2100	200	200	255	1.462	3.185	4.647
2400 x 1200	1000	2400	1200	200	200	255	1.764	1.968	3.732
x 1500	1000	2400	1500	200	200	255	1.764	2.500	3.400
x 1800	1000	2400	1800	200	200	255	1.764	3.250	5.014
x 2100	1000	2400	2100	200	200	255	1.764	3.629	5.393
x 2400	1000	2400	2400	200	200	255	1.764	3.936	5.700
2700 x 1500	1000	2700	1500	200	200	255	1.808	2.690	3.750
x 1800	1000	2700	1800	200	200	255	1.808	2.900	3.960
x 2100	1000	2700	2100	200	200	255	1.808	3.090	4.150
x 2400	1000	2700	2400	200	200	255	1.808	3.270	4.330
x 2700	1000	2700	2700	200	200	255	1.808	4.020	5.828
3000 x 1500	1000	3000	1500	200	200	255	2.218	2.860	4.070
x 1800	1000	3000	1800	200	200	255	2.218	3.060	4.280
x 2100	1000	3000	2100	200	200	255	2.218	3.780	5.998
x 2400	1000	3000	2400	200	200	255	2.218	3.829	6.047
x 2700	1000	3000	2700	200	200	255	2.218	3.610	4.830
x 3000	1000	3000	3000	200	200	255	2.218	4.900	6.525
3300 x 1800	1000	3300	1800	200	200	255	1.990	3.400	4.790
x 2100	1000	3300	2100	200	200	255	1.990	3.610	5.000
x 2400	1000	3300	2400	200	200	255	1.990	3.800	5.200
x 2700	1000	3300	2700	200	200	255	1.990	3.990	5.380
x 3000	1000	3300	3000	200	200	255	1.990	5.080	6.859
3600 x 1500	1000	3600	1500	200	200	275	2.742	3.570	5.170
x 1800	1000	3600	1800	200	200	275	2.742	3.800	5.390
x 2100	1000	3600	2100	200	200	275	2.742	4.030	5.610
x 2400	1000	3600	2400	200	200	275	2.742	4.260	5.830
x 2700	1000	3600	2700	200	200	275	2.742	4.440	6.030
x 3000	1000	3600	3050	200	200	275	2.742	4.660	6.260

To allow for product improvement, information contained in this brochure may change without notice

GIANT SIZE BOX CULVERTS



GSBC with Flat Lid

GSBC with Inverted-U Lid

GSBC with flat lid

TYPE	LABEL	w	h	W	H	t1	t2	t3	WEIGHT (ton)	
									Unit	Total
4200 x 2400	U4200	4200	N.A.	4700	N.A.	300	N.A.	N.A.	3.4	10.07
	L4224	4200	2400	4700	2675	275	400	250	6.67	
4800 x 2400	U4800	4800	N.A.	5300	N.A.	325	N.A.	N.A.	4.16	11.72
	L4824	4800	2400	5300	2700	300	450	250	7.56	



GSBC with inverted U-lid

TYPE	LABEL	w	h	W	H	t1	t2	t3	WEIGHT (ton)	
									Unit	Total
4200 x 3000	U4206	4200	600	4700	900	300	N.A.	273	4.48	11.15
	L4224	4200	2400	4700	2675	275	400	250	6.67	
4200 x 3600	U4212	4200	1200	4700	1500	300	N.A.	265	5.14	11.81
	L4224	4200	2400	4700	2675	275	400	250	6.67	
4200 x 4200	U4218	4200	1800	4700	2100	300	N.A.	250	5.87	12.54
	L4224	4200	2400	4700	2675	275	400	250	6.67	
4800 x 3000	U4806	4800	600	5300	925	325	N.A.	273	5.42	13.04
	L4824	4800	2400	5300	2700	300	450	250	7.62	
4800 x 3600	U4812	4800	1200	5300	1525	325	N.A.	265	6.24	13.86
	L4824	4800	2400	5300	2700	300	450	250	7.62	
4800 x 4200	U4818	4800	1800	5300	2125	325	N.A.	258	7.00	14.62
	L4824	4800	2400	5300	2700	300	450	250	7.62	
4800 x 4800	U4824	4800	2400	5300	2725	325	N.A.	250	7.80	15.40
	L4824	4800	2400	5300	2700	300	450	250	7.60	

