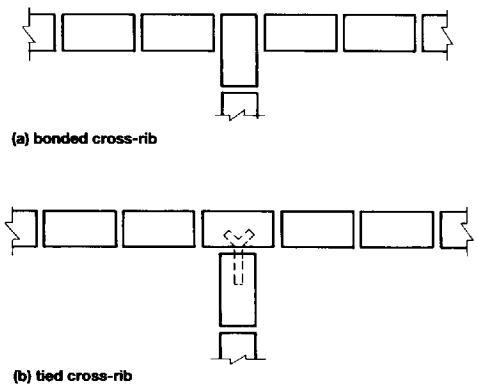

Figure 17: Structural connection between flanges and cross-ribs

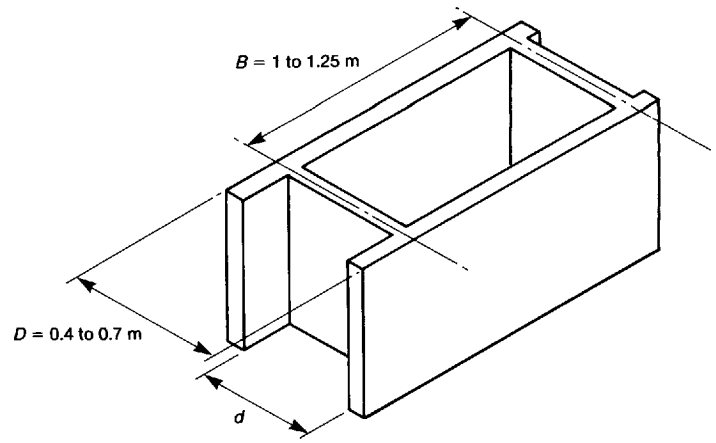

Figure 18: Typical leading dimensions

which only solid blocks with the most commonly used work size, 440 x 215 x 100 mm, are considered. Table 2 deals with concrete brickwork diaphragms.

Note: Other standard sizes of concrete masonry unit including voided units, e.g. hollow or cellular units, may be used.

2.3.1 Concrete blockwork

Figure 19 shows three typical arrangements for achieving bonded cross-ribs from which the various bonding profiles and their respective section properties can be developed. For unbonded cross-ribs the centres are less restricted but for convenience they are often placed on the centre of a block or at a perpend joint. Figure 20 shows the combinations of wall depths and cross-rib spacings upon which Table 1 is based. In this figure and in the table, three depths of tied walls and two depths of bonded wall are considered. The calculations of the section properties of wall reference A are set out below:

Wall reference A (440 x 215 x 100 mm work size of blocks):

D $= 215 + (2 \times 10) + (2 \times 100) = 435$ mm

d $= 435 - (2 \times 100) = 235$ mm

B_d $= (2 \times 440) + (2 \times 10) = 900$ mm

b_v $= 900 - 100 = 800$ mm

I $= B_d \times d^3/12 - b_v \times d^3/12$

$= 0.9 \times 0.435^3/12 - 0.8 \times 0.235^3/12$

$= 0.0053$ m^4 per diaphragm

I per metre $= I/B_d = 0.0053/0.9 = 0.0059$ m^4 per metre

Z $= I/0.5D = 0.0053/0.5 \times 0.435$

$= 0.0244$ m^3 per diaphragm

Z per metre $= I/B_d = 0.0244/0.9 = 0.0271$ m^3 per metre

A $= (B_d \times D) - (b_v \times d)$

$= (0.9 \times 0.435) - (0.8 \times 0.235)$

$= 0.2035$ m^2 per diaphragm

A per metre $= A/B_d = 0.2035/0.9 = 0.2261$ m^2 per metre

(K_1 and K_2 values for this wall section will be calculated later under the respective headings, Sections 2.4.4 and 2.4.5).

If voided concrete blocks are used, the calculation of the section properties must take account of the voids. In addition, the designer must give full consideration to the resistance of any metal shear ties embedded into these blocks as the tie may bear onto only the narrow wall of the hollow unit. It may be considered appropriate to align the cross-ribs with the solid regions of these blocks or perhaps to use only solid blocks for tied diaphragm walls.

Table 1. Section properties – solid concrete blocks of work size 440 x 215 x 100 mm.

Section	Dimensions (m)				Section properties per diaphragm			Section properties per metre			Shear stress coefficient	Stability moment K_2 (kN/m)	
	D	d	B_d	b_v	$I \times 10^{-3}$ (m^4)	$Z \times 10^{-3}$ (m^3)	A (m^2)	$I \times 10^{-3}$ (m^4)	$Z \times 10^{-3}$ (m^3)	A (m^2)	K_1 (m^{-2})	K_2 (15)	K_2 (20)
A	0.435	0.235	0.90	0.80	5.31	24.40	0.2035	5.40	27.10	0.2261	28.39	0.63	0.84
B	0.435	0.235	1.125	1.025	6.60	30.30	0.2485	5.86	26.90	0.2208	28.55	0.616	0.821
C	0.435	0.235	1.350	1.250	7.90	36.00	0.2935	5.80	26.60	0.217	28.623	0.605	0.807
D	0.550	0.350	0.730	0.630	7.87	28.62	0.181	10.78	39.20	0.248	20.87	0.875	1.166
E	0.550	0.350	1.180	1.080	12.50	45.46	0.271	10.60	38.52	0.230	21.24	0.807	1.08
F	0.660	0.460	0.900	0.800	15.00	45.67	0.226	16.74	50.74	0.251	16.80	1.06	1.416
G	0.660	0.460	1.125	1.025	18.00	56.30	0.271	16.50	50.10	0.240	16.93	1.015	1.35
H	0.660	0.460	1.350	1.250	22.20	67.70	0.316	16.40	49.00	0.234	17.02	0.9903	1.320
J	0.775	0.575	0.730	0.630	18.30	47.32	0.204	25.07	64.79	0.239	13.46	1.387	1.849
K	0.775	0.575	1.180	1.080	28.60	73.80	0.2935	24.20	62.50	0.248	13.92	1.2327	1.643
L	0.885	0.685	0.900	0.800	30.50	68.90	0.2485	33.80	76.50	0.2761	11.58	1.566	2.08
M	0.885	0.685	1.125	1.025	37.50	84.70	0.2935	33.30	75.30	0.2608	11.775	1.480	1.970
N	0.885	0.685	1.350	1.250	44.40	99.40	0.3385	32.00	73.60	0.2507	12.04	1.42	1.89

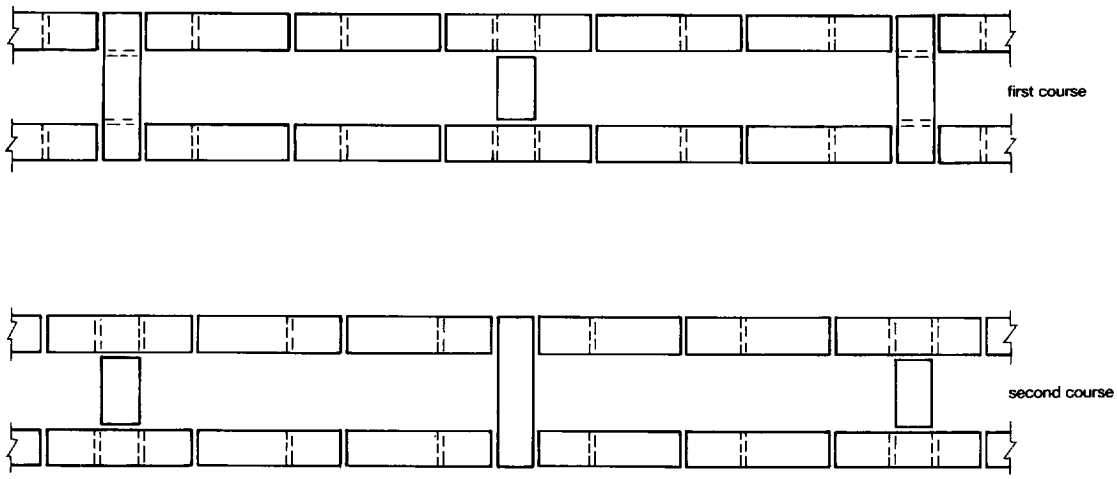

Figure 19: Typical arrangements when cross-ribs are bonded into flanges