This is a comparison of unreinforced solid concrete walls vs. hollow core concrete block walls (information provided by Concrete Foundations Association)

Unreinforced solid concrete foundation wall

Concrete compressive strength @ 28 days $F_c' = 3000$ psi
Height = 8'-0"

Vertical Load on Wall:

Load from roof	= 15 x 6 = 90 plf
Load from wall above	= 15 x 8 = 120 plf
Load from floor	= 10 x 6 = 60 plf
Total load from above	= 270 plf

Tensile Strength of concrete = $5 \times \ell \times \sqrt{f_c'} = 178$ psi

8" wall

Weight of concrete wall to point of Max. Moment = 100 x 4.78 = 478 plf

Total load	= 478+ 270 = 748 plf
Factored load (Pu)	= 1.7 x 748 = 1271.6 plf

Calculation of Max. Moment:

Max Moment	= 1131.98 lb-ft
Factored Moment (Mu)	= 1924.37 lb-ft
Section Modulus	= b x $h^2/6$ = 128 in^3/ft

A = 12 x 8 = 96 in^2

At the tension face,

$-P_u/A_g + M_u/S \le 5 \times \ell \times \sqrt{f_c'}$ (ACI–318, 22.5.3 eqn. 22-6)
$-P_u/A_g + M_u/S$ = 167.16 psi
< 178 psi **(O.K.)**

At the compression face,

$P_u/\ell P_n + M_u/\ell M_n \le 1$ (ACI–318, 22.5.3 eqn. 22-5)
P_n = 148500 lb
$M_n = 0.85 \times f_c' \times S$ = 0.122
< 1.0 **(O.K.)**

10" wall

Weight of concrete wall to point of Max. Moment = 125 x 4.78 = 597.5 plf

Total load	= 597.5 + 270 = 867.5 plf
Factored load (Pu)	= 1.7 x 867.5 = 1474.8 plf

Calculation of Max. Moment:

Max Moment	= 1131.98 lb-ft
Factored Moment (Mu)	= 1924.37 lb-ft
Section Modulus	= b x $h^2/6$ = 200 in^3/ft

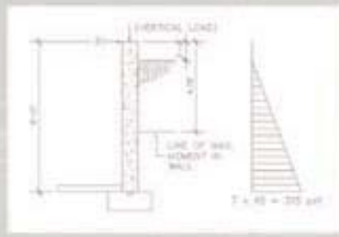
A = 12 x 10 = 120 in2

At the tension face,

$-P_u/A_g + M_u/S \le 5 \times \ell \times \sqrt{f_c'}$ (ACI–318, 22.5.3 eqn. 22-6)
$-P_u/A_g + M_u/S$ = 103.17 psi
< 178 psi **(O.K.)**

At the compression face,

$P_u/\ell P_n + M_u/\ell M_n \le 1$ (ACI–318, 22.5.3 eqn. 22-5)
P_n = 196560 lb
$M_n = 0.85 \times f_c' \times S$ = 0.08
< 1.0 **(O.K.)**



Unreinforced hollow core concrete block foundation wall

Height= 8'-0"

Vertical Load on Wall:
Total load from above = 270 plf

10" wall

Weight of concrete wall to point of Max. Moment = 72 x 4.78 = 344.16 plf
Total load = 344.16 + 614.16 plf

Calculation of Max. Moment:

Max. Moment	= 1131.98 lb-ft
Section Modulus	= 125 in^3/ft
A	= 61 in^2/ft
r	= radius of gyration = 3.14 in
h/r	= 30.57 < 99

Check for Combined Flexure & Axial Load in Compression:
As per "Building Code Requirement for Masonry Structures (ACI 530-95/ASCE 5-95/TMS 402-95-6.3.1)"
At the compression face,

$$f_a/F_a + f_b/F_b \le 1$$

where,

f_a = calculated compressive stress in masonry due to axial load only (psi)
= 614.16/61 = 10.07 psi
f_b = calculated compressive stress in masonry due to flexure only (psi)
= 1131.98/125 = 108.67 psi
F_a = allowable compressive stress in masonry due to axial load only (psi)
= 380.93 psi
F_b = allowable compressive stress in masonry due to flexure only (psi)
= (1/3) x f_m' = 533.33 psi

Therefore,
$f_a/F_a + f_b/F_b$ = .023 < 1.0 **(O.K.)**
Assuming Type M mortar is being used,
Allowable stress in tension,
F_t = 25 psi (normal to bed joints) (ACI 530-95/ASCE 5-95/TMS 402-95- Table 6.3.1.1)
$- P_a/A + \_M/S$ = 98.60 psi
> 25 psi **(NOT O.K.)**

12" wall

Weight of concrete wall to point of Max. Moment = 82 x 4.78 = 392 plf
Total load = 392 + 270 = 662 plf

Calculation of Max. Moment:

Max. Moment	= 1131.98 lb-ft
Section Modulus	= 190 in^3/ft
A	= 70 in^2/ft
r	= radius of gyration = 3.972 in
h/r	= 24.17 < 99

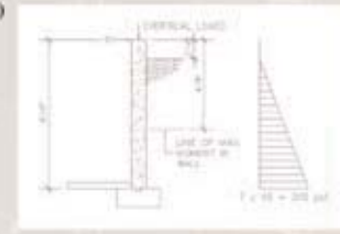
Check for Combined Flexure & Axial Load in Compression:
At the compression face,

$$f_a/F_a + f_b/F_b \le 1$$

where,

f_a = 662/70 = 9.457 psi
f_b = 1131.98/190 = 71.39 psi
F_a = (1/4) x f_m' x (1 - (h/(140 x r))^2)
= (1/4) x 1600 x (1 - (24.17/140)^2)
= 388.08 psi
F_b = (1/3) x f_m'
= 533.33 psi

Therefore,
$f_a/F_a + f_b/F_b$ = 0.158
< 1.0 **(O.K.)**
Ft = 25 psi (normal to bed joints)
$- P_a/A + \_M/S$ = 62.033 psi
> 25 psi **(NOT O.K.)**



Flexural Strength Test Results

Nominal Size	Type	Load (lbs.)	Gross Strength (PSJ)
8" x 16" x 24"	Poured concrete walls	21,750	765
8" x 16" x 24"	Concrete block	690	25
10" x 16" x 24"	Poured concrete walls	34,600	770
10" x 16" x 24"	Concrete block	2,060	45
12" x 16" x 24"	Poured concrete walls	50,600	775
12" x 16" x 24"	Concrete block	1,150	20

Compressive Strength Test Results

Nominal Size	Type	Load (lbs.)	Gross Strength (PSJ)
8" x 16" x 24"	Poured concrete walls	593,000	4900
8" x 16" x 24"	Concrete block	143,070	1210
10" x 16" x 24"	Poured concrete walls	711,000	4670
10" x 16" x 24"	Concrete block	164,500	1580
12" x 16" x 24"	Poured concrete walls	877,000	4780
12" x 16" x 24"	Concrete block	243,000	1330

This comparison shows that poured concrete walls provide builders and owners with stronger, drier, better concrete basements. They offer performance that block walls simply can't match. Poured walls have a compressive and flexural strength several times that of block and far beyond the required safety factor

When it comes to below grade construction, hollow core block just doens't stack up to poured concrete. The results of this study prove unreinforced hollow core concrete block basement walls for residential construction fail to meet standards of accepted engineering practices even in 10'' and 12'' wall thicknesses.