Concrete mix by class

Materials for 1 cubic metre (m^3) of concrete, using 40 kg cement bags. Multiply by your volume, then add an allowance for waste.

Class	Mix (cement : sand : gravel)	Cement (bags)	Sand (m^3)	Gravel (m^3)	Common use
AA	1 : 1.5 : 3	12.0	0.50	1.00	High-strength members, as specified
A	1 : 2 : 4	9.0	0.50	1.00	Footings, columns, beams, suspended slabs
B	1 : 2.5 : 5	7.5	0.50	1.00	Slab on fill, non-load-bearing work
C	1 : 3 : 6	6.0	0.50	1.00	Lean concrete, fill, plant boxes

Always follow the class your plans and specifications call for.

Example: slab 4.00 m × 3.00 m × 0.10 m = 1.20 m^3, Class A.
Cement 1.20 × 9.0 = 10.8 → **11 bags** · Sand 1.20 × 0.50 = **0.60 m^3** · Gravel 1.20 × 1.00 = **1.20 m^3** (before allowance).

Volume formulas

Element	Volume (m^3)
Slab, footing, wall footing	length × width × thickness
Rectangular column or beam	width × depth × length (or height) × number of pieces
Round column	0.7854 × diameter^2 × height
Stairs (waist slab)	sloped length × width × waist thickness + steps (½ × riser × tread × width × number of steps)

Mortar by class (per m^3 of mortar)

Class	Mix (cement : sand)	Cement (bags)	Sand (m^3)
A	1 : 2	18.0	1.00
B	1 : 3	12.0	1.00
C	1 : 4	9.0	1.00
D	1 : 5	7.5	1.00

Reinforcing bars: weight and lengths

Weight per metre = $d^2 \div 162$, where d is the bar diameter in millimetres. The table gives the weight of one whole bar in each stock length.

Bar	Area (mm^2)	kg / m	6.0 m bar (kg)	7.5 m bar (kg)	9.0 m bar (kg)	10.5 m bar (kg)	12.0 m bar (kg)
10 mm	78.5	0.617	3.70	4.63	5.56	6.48	7.41
12 mm	113.1	0.889	5.33	6.67	8.00	9.33	10.67
16 mm	201.1	1.580	9.48	11.85	14.22	16.59	18.96
20 mm	314.2	2.469	14.81	18.52	22.22	25.93	29.63
25 mm	490.9	3.858	23.15	28.94	34.72	40.51	46.30
28 mm	615.8	4.840	29.04	36.30	43.56	50.81	58.07
32 mm	804.2	6.321	37.93	47.41	56.89	66.37	75.85
36 mm	1,017.9	8.000	48.00	60.00	72.00	84.00	96.00

Example: 40 pieces of 12 mm bar, each cut 3.00 m long.
Weight: 0.889 kg/m × 3.00 m × 40 = **106.7 kg**. From 6.0 m stock bars, 2 cuts per bar → 40 ÷ 2 = **20 bars**.

Counting pieces from stock bars

Step	How
1. Cuts per bar	stock length ÷ cut length, rounded **down**
2. Bars to buy	number of cuts ÷ cuts per bar, rounded **up**
3. Cuts longer than the stock bar	add the lap splice length your plans specify, then count by total length
4. Tie wire	count from your tying pattern, or use the allowance your office uses; buy by the kg

Hooks, bends, laps and cover follow the structural plans and the National Structural Code of the Philippines (NSCP). Add their lengths to each cut before counting bars.

CHB walls: per square metre

For standard 8" × 16" (200 × 400 mm) hollow blocks with about 10 mm joints. Use the net wall area: wall length × height, minus doors and windows.

Item	Per m² of wall
Hollow blocks (any thickness)	**12.5 pcs**

Laying mortar (Class B, 1 : 3) per m² of wall

CHB size	Cement (bags)	Sand (m³)
4" (100 mm)	0.522	0.0435
6" (150 mm)	1.018	0.0844
8" (200 mm)	1.502	0.1250

Plaster per m² per face

Plaster thickness	Mortar (m³)	Cement, Class B (bags)	Sand (m³)
12 mm	0.012	0.144	0.012
16 mm	0.016	0.192	0.016
20 mm	0.020	0.240	0.020
25 mm	0.025	0.300	0.025

Example: wall 10.00 m × 3.00 m, minus 2.40 m² of openings = 27.60 m², 4" CHB, plastered both faces at 16 mm.
CHB 27.60 × 12.5 = **345 pcs** · Laying cement 27.60 × 0.522 = 14.4 bags · Plaster cement 27.60 × 2 × 0.192 = 10.6 bags → **25 bags** total (before allowance).

Don't forget

- Wall reinforcement (vertical and horizontal bars) and tie wire, as shown on the plans.
- Extra cement for filling cores where the plans call for grouted cells.
- An allowance for broken blocks and mortar waste, usually set by your own experience.

Conversions for site and office

The conversions you reach for most when reading plans, supplier quotes and specs.

Length

From	Equals
1 inch	25.4 mm
1 foot	0.3048 m
1 metre	3.2808 ft
1 metre	39.37 inches

Area

From	Equals
1 m^2	10.764 ft^2
1 ft^2	0.0929 m^2
1 hectare	10,000 m^2

Volume

From	Equals
1 m^3	35.315 ft^3
1 ft^3	0.02832 m^3
1 m^3	1,000 litres
1 US gallon	3.785 litres

Lumber

From	Equals
1 board foot	1 in × 12 in × 12 in
board feet	thickness (in) × width (in) × length (ft) ÷ 12
1 m^3	423.8 board feet
2" × 2" × 10'	3.33 board feet

Weight

From	Equals
1 kg	2.2046 lb
1 metric ton	1,000 kg
1 bag cement	40 kg

Strength

From	Equals
1 MPa	145.04 psi
1,000 psi	6.895 MPa
3,000 psi	20.7 MPa
4,000 psi	27.6 MPa

Handy areas

Shape	Area
Rectangle	length × width
Triangle (gable end)	½ × base × height
Circle	0.7854 × $diameter^2$
Roof slope area	plan area ÷ cos(roof angle)