Concrete works

Note: This process of computation uses the VOLUME METHOD. Just compute for the AREA and multiply with **thickness.**

General Formula for Volume: V= AREA x THICKNESS

1. **Footings:**

F-1

L: 1000m = 1m

W= 1m

T = 0.3

QTY: 6 SETS

V= 1 x 1 x 0.3 = 0.3 m3

V total = 0.3 x 6 = 1.8 m3

User input: CONCRETE GRADE: CLASS AA

GRAVEL: G-1

TABLE 1-2 CONCRETE PROPORTION

Class	Mixture	Cement		Sand	Gravel
		40 kg. / Bag	NEVER MIND THIS SECTION, IT'S FOR 50KG CEMENT	cu.m.	cu.m.
AA	1 : 11/2 : 3	12.0		.50	1.0
A	1 : 2 : 4	9.0		.50	1.0
B	1 : 21/2 : 5	7.5		.50	1.0
C	1 : 3 : 6	6.0		.50	1.0

Bags of **cement** = 0.3 X 12 x 6 sets = 21.6 say **22 BAGS** OF 40KG CEMENT (22 x 165 **/cement bag = P 3630**)

V of **sand** = 0.3 x 0.5 x 6 sets = **0.9m3 (0.9 x 1400/m3 of sand = P 1260)**

V of **Gravel** = 0.3 x 1.0 x 6 sets = **1.8 m3 (1.8 x 530/ m3 of G-1 Gravel = P 954)**

ALWAYS ROUND UP (1 DECIMAL PLACES FOR SAND AND GRAVEL, CEMENT IS THE NEAREST WHOLE NUMBER)

Gravel G-1 or the type of Gravel is only affected with the PRICING

SAME PROCESS FOR F-2 AND F-3

L: 53.25 m

L f-f: 32.7 m

B: 0.4m

T: 0.2m

V= L x W x T

Total V = 53.25 x 0.4 x 0.2 = **4.26 m3**

Note: Use the Length (L) of the WF or TB, not the "L f-f"

40 KG CEMENT BAGS: 4.26 x 12 = 51.12 or **52 bags (52 Bags x P165 = P 8,580.00)**

Sand: 4.26 x 0.5 =2.13 or **2.2 m3 (2.2 m3 x P1400/m3 of sand = P 3080.00)**

Gravel: 4.26 x 1 = 4.26 or **4.3 m3 (4.3 m3 x 530/ m3 of G-1 Gravel = P 2279.00)**

Footing material cost = 3630+ 1260+954+8580 + 3080 +2279 = P 19,783.00

Footing labor cost= (4.26+1.8[vol from footings] x 400 / m3 vol labor rate for Footing = P 2424.00

FOR TRAPEZOIDAL FOOTING

$$V = \left[\left(\frac{B_U + B_T}{2} \times T\right) \times L\right] \times no.\ of\ sets$$

L: 53.25 m

L f-f: 32.7 m

BT: 0.4m

BU: 0.2m

T: 0.2m

$$V = \left[\left(\frac{0.4+0.2}{2} \times 0.2\right) \times 53.25\right] \times 1 = 3.195\ \ or\ 3.2m3$$

Note: Use the Length (L) of the WF or TB, not the "L f-f"

40 KG CEMENT BAGS: x 12 = 38.4 or **39 bags**

Sand: 3.2 x 0.5 = **1.6 m3**

Gravel: 3.2 x 1 = **3.2 m3**

2.) Column

B: 300mm

D: 300 mm

H: 1200 mm

QTY: 11sets

V= B x D x H x no. of Sets

V= 0.3 x 0.3 x 1.2 x 11 =1.188 or **1.19 m3**

CONCRETE GRADE CLASS: B

Cement: 1.19 m3 x 7.5 = 8.925 or **9 bags (9 x 165/cement bag = p 1485.00)**

Sand: 1.19 x 0.5 = 0.594 or **0.6 m3** (0.6 x 1400**/m3 of sand** = **P840.00**)

Gravel: 1.19 = 1.19 or **1.2 m3 (1.2 x 530/ m3 of G-1 Gravel = P 636.00)**

Material cost = P 2961.00

Labor cost = (1.19 x 450 / m3 vol labor rate for column= P 535.5)

3.) BEAM (For simplicity, assume same given with column. Columns and beams are same in concreting)

B: 300mm

D: 300 mm

H: 1200 mm

QTY: 11sets

V= B x D x H x no. of Sets

V= 0.3 x 0.3 x 1.2 x 11 =1.188 or **1.19 m3**

CONCRETE GRADE CLASS: B

Cement: 1.19 m3 x 7.5 = 8.925 or **9 bags (9 x 165/cement bag = p 1485.00)**

Sand: 1.19 x 0.5 = 0.594 or **0.6 m3** (0.6 x 1400**/m3 of sand**= P840.00)

Gravel: 1.19 = 1.19 or **1.2 m3 (1.2 x 530/ m3 of G-1 Gravel = P 636.00)**

total cost = 1485 + 840 + 636 = P 2,961.00

Labor cost = 1.19 x 500/ m3 vol labor rate for beam = P 595.00

5.) Slab

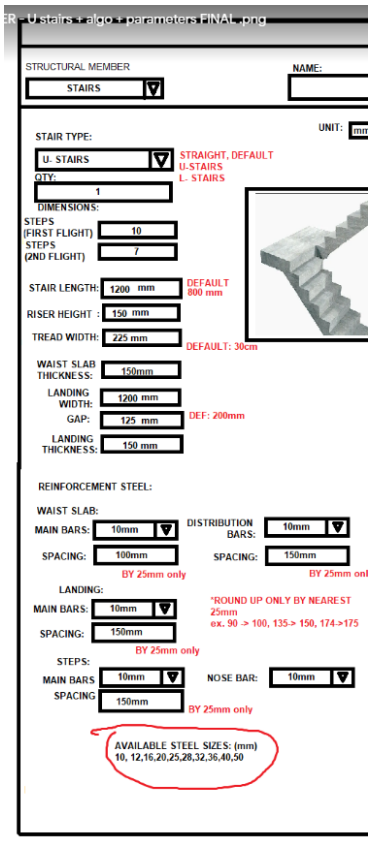
V= L x W x T x no. of quantity

L: 8m

W: 10m

T: 0.1 m

Qty: 1 set



Volume = 8 x10 x 0.1 x 1 = **8 m^3**

READY MIX CONCRETE: 3000PSI (20.7 Mpa) @ 28 days

RMC 3000 psi @ 28days = (8 x 4540/ m3 of 3000 PSI @28days = P 36320.00)

Material cost = php 36,320.00

Labor cost = P(8 x 350/ m3 Slab concrete labor rate = P2800.00)

4.) STAIRS

U - STAIRS

CLASS AA – 12 BAGS OF 40K CEMENT, 0.5 m3 sand, and 1 m3 Gravel

Volume:

$$Waist\ Slab\ Flight\ 1 = SW\ x\ WSL\ x\ WAIST\ SLAB\ Thc = 1.2\ x\ 2.725\ x\ 0.15 = 0.4905\ m^3 t$$

$$CONCRETE\ VOLUME\ FOR\ STEPS:\ V = \frac{RISER \times TREAD}{2} \times SW \times NO.\ OF\ STEPS$$

$$V = \frac{0.15 \times 0.225}{2} \times 1.2 \times 17 = 0.34425\ m^3$$

$$Waist\ Slab\ Flight\ 2 = SL\ x\ WSL\ x\ Thc = 1.2\ x\ 1.9\ x\ 0.15 = 0.342\ m^3$$

$$Landing = ((SW \times 2) + Gap) \times (LANDING\ WIDTH) \times landing\ thc = (1.2(2) + 0.125) \times (1.2) \times 0.15 = 0.4545\ r$$

$$Total\ Volume = 0.4905 + 0.34425 + 0.342 + 0.4545 = 1.63125\ m^3$$ (1.63 x 450 = P733.50)

Concrete needed:

Cement = 1. 63125 x 12 = 19.57 **OR 20 Bags (20 x 165/cement bag = P 3300.00)**

Sand = 1. 63125 x 0.5 = 0.81 m3 or **0.9 m3 (0.9 x 1400/m3 of sand= P1260.00)**

Gravel =1. 63125 x 1 = 1.63 **OR 1.7 m3 (1.7 x 530/ m3 of G-1 Gravel = P901.00)**

Material cost = 3300+1260 + 901 = P 5,461.00

Labor cost = vol x labor rate = 1.63 x 450 / m3 stairs labor rate = P 733.50

STRAIGHT STAIRS (SAMPLE COMPUTATION ONLY, BUT USE U STAIRS FOR SAMPLE COMPU IN TOTALITY)

CLASS AA – 12 BAGS OF 40K CEMENT, 0.5 m3 sand, and 1 m3 Gravel

Volume:

$$Waist\ Slab\ Flight\ 1 = SW\ x\ WSL\ x\ WAIST\ \ SLAB\ Thc = 1.2\ x\ 2.725\ x\ 0.15 = 0.4905\ m^3 t$$

$$CONCRETE\ VOLUME\ FOR\ STEPS:\ \ V = \frac{RISER \times TREAD}{2} \times SW \times\ NO.\ OF\ STEPS$$

$$V = \frac{0.15 \times 0.225}{2}\ *\ 1.2 \times 10 = 0.2025\ m^3$$

$$Total\ Volume = 0.4905 + 0.2025 = 0.693\ m^3$$

$$Concrete\ needed:$$

Cement = 0.693 x 12 = 8.316 say **9 Bags**

Sand = 0.693x 0.5 = 0.34 m3 or **0.4 m3**

Gravel = 0.693 x 1 **=** 0.693 or **0.7 m3**

L- STAIRS

CLASS AA – 12 BAGS OF 40K CEMENT, 0.5 m3 sand, and 1 m3 Gravel

Volume:

$$Waist\ Slab\ Flight\ 1 = SW\ x\ WSL\ x\ \ WASIT\ SLAB\ Thc = 1.2\ x\ 2.725\ x\ 0.15 = 0.4905\ m^3 t$$

$$CONCRETE\ VOLUME\ FOR\ STEPS:\ \ V = \frac{RISER \times TREAD}{2} \times SW \times\ NO.\ OF\ STEPS$$

$$V = \frac{0.15 \times 0.225}{2} \times 1.2\ \times 17 = \ \ 0.34425\ m^3$$

$$Waist\ Slab\ Flight\ 2 = SL\ x\ WSL\ x\ Thc = 1.2\ x\ 1.9\ x\ 0.15 = 0.342\ m^3$$

$$Landing = \left(\left(SL^2\right)\right) x\ LANDING\ thc = \left(1.2^2\right) x\ 0.15 = 0.216\ m^3$$

$$Total\ Volume = 0.4905 + 0.34425 + 0.342 + 0.216 = 1.39275\ m^3$$

$$Concrete\ needed:$$

Cement = 1.39275 x 12 = 16.71 say **17 Bags**

Sand = 1.39275 x 0.5 = 0.6966375 m3 or **0.7 m3**

Gravel = 1.39275 x 1 = 1.39275 or **1.4 m3**

NOTE: FACTOR OF SAFETY IS 5% BY DEFAULT. ADD THAT 5% TO THE TOTAL COMPUTED MATERIALS

FACTOR OF SAFETY:

CEMENT = 22 + 52 + 9+9+ 20 = 112 BAGS x 0.05 = 5.6 or 6 Bags; 6 BAGS x 165/cement bag

=P 990.00

CEMENT BAGS ALWAYS ROUND UP IN WHOLE NUMBER (9.001 = 9 but if 9.01 = 10)

SAND = 0.9 + 2.2 + 0.6 + 0.6 + 0.9 = 5.2 m3 x 0.05 = 0.26 or 0.3 ; 0.3 x 1400/m3 of sand = P420.00

Gravel = 1.8 + 4.3 + 1.2+1.2 + 1.7 = 10.2 m3 x 0.05 = 0.51 or 0.6 ; 0.6 x 530/ m3 of G-1 Gravel = P 318.00

***SAND AND GRAVEL ALWAYS ROUND UP TO NEAREST TENTH (1 DECIMAL PLACE) ***

FOR READY MIX CONCRETE:

Vol = 8 m3 x 0.05 = 0.4 m3 ; 0.**4 m3 X 4540 = P 1816.00**

total cost of factor of safety= 990+420+318+1816 = P 3544.00

Total Material cost = P 71,030.00

Total Labor cost = P 7088.00

over all total cost = 71030+ 7088 = PHP 78118.00