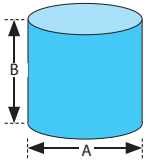
Multiply the height of your column by the number that corresponds to the diameter to determine the cubic yards needed.

Column

$$CY = \frac{0.7854 \times A^2 \times B}{27}$$



Diameter	CY	Diameter	CY	Diameter	CY
8"	.013	20"	.081	32"	.207
9"	.016	21"	.089	33"	.220
10"	.020	22"	.097	34"	.232
11"	.024	23"	.107	35"	.248
12"	.029	24"	.116	36"	.262
13"	.034	25"	.126	37"	.276
14"	.040	26"	.137	38"	.292
15"	.045	27"	.147	39"	.307
16"	.051	28"	.158	40"	.322
17"	.058	29"	.170	41"	.340
18"	.065	30"	.181	42"	.356
19"	.073	31"	.193	43"	.373

Table for Estimating Concrete—This table shows the amount of concrete required, in cubic yards, for 1 foot of height of cylinders of various diameters.

Concrete for Footing

Depth of Footing (inches)	CY's per Linear Foot — Width of Footing (in.) 12"	15"	18"	24"
6″	.019	.023	.028	.037
8″	.025	.031	.037	.049
9″	.028	.035	.042	.056
10″	.031	.039	.046	.062
12″	.037	.046	.056	.074
18″	.056	.069	.083	.111
24″	.074	.093	.111	.148
30″	.093	.116	.139	.185
36″	.111	.139	.167	.222
42″	.13	.162	.194	.259
48″	.148	.185	.222	.296
54″	.167	.208	.25	.333
60″	.185	.231	.278	.37
66″	.204	.255	.306	.407
72″	.222	.278	.333	.444
78″	.241	.301	.361	.481
84″	.259	.324	.389	.519
90″	.278	.347	.417	.556

Using the Formula

$$CY = \frac{L \times W \times D}{27}$$

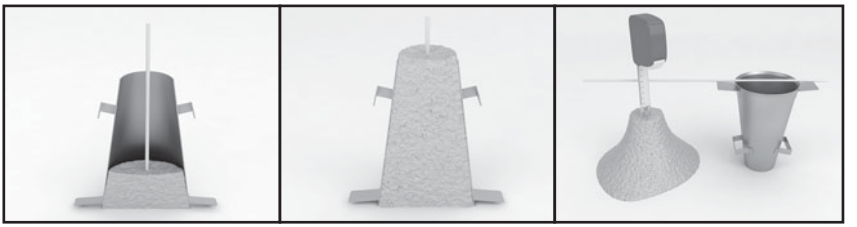
1. Add the total linear feet (LF) of footings.
2. Multiply the LF by the width of the footings.
3. Multiply area by depth of the footings.
4. Divide the cubic feet by 27 to find the cubic yards.

Using the Table

1. Identify the factor in the table based on the depth and width of your footing.
2. Multiply the LF by the factor to determine how many cubic yards of concrete you need.

CONCRETE SLUMP

Determine the Slump of Concrete



1. **Take a sampling of concrete and place it into the cone intended for this purpose.**
2. **Place the concrete into the cone in three equal layers and rod each layer 25 times to consolidate the concrete. Ten lbs. of water per cubic yard of concrete will increase the slump by approximately 1". A gallon of water weighs 8.33 lbs.**
3. **Empty the concrete from the cone.**
4. **Place the cone to the side of the concrete.**
5. **After the concrete has settled, place a level across the top of the cone.**
6. **Measure from the bottom of the level to the top of the concrete—the measurement is the "Slump of the Concrete."**

Increase the Slump of Concrete
Total Cubic Yards x Increase (inches)

ex. *How many gallons of water should be added to 12 cubic yards of concrete if the slump needs to be increased by 1.5"?*

1. **Multiply the total cubic yards of concrete by the number of inches the slump is increased.**
   12 x 1.5 = 18
2. **Multiply the product of Step 1 by 10.**
   18 x 10 = 180 lbs. of water
3. **Divide the total pounds of water (product from Step 2) needed by 8.33.**
   180 ÷ 8.33 = 21.60 gallons of water

Rebar Weight

Weight = LF of Bar x Weight per LF

ex. *Calculate the total weight of rebar if you are installing 21 pieces of #5 rebar that are 14' in length.*

Weight of #5 bar is 1.043 lbs. per LF
Calculate total LF: 21 x 14 = 294
294 x 1.043 lbs. = 306.642 lbs.

Rebar Weight

Rod Size (Diameter)	Rod Number	Weight (Pounds per LF)
¼″	2	.167
3/8″	3	.376
½″	4	.668
5/8″	5	1.043
¾″	6	1.502
7/8″	7	2.044
1	8	2.67

Water to Cement Ratio

$$\text{Ratio} = \frac{\text{Water (lbs.)}}{\text{Cement in mix (lbs.)}}$$

ex. *Calculate the water to cement ratio in a batch of concrete if 1 cubic yard has 22 gallons of water and 455 pounds of cement.*

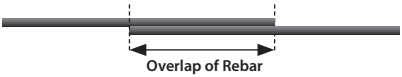
1. **Convert gal. of water into lbs.**
   22 x 8.33 = 183.26 lbs.
2. **Divide water by the pounds of cement.**
   183.26 ÷ 455 = 0.40
   Note: A gallon of water weighs 8.33 lbs.

Rebar Lap

Lap = Bar Diameter x Specified Lap

ex. *Calculate the overlap for #5 bar with a specified bar lap of 25d.*

Diameter is 5/8 or .625
Determine bar lap = 25
25 x .625 = 15.625″
Note: Specified to be overlapped 15-5/8″



Convert Gallons of Water into Pounds

Pounds = Gallons of Water x 8.33

ex. *Calculate the pounds of water in 45 gallons of water.*

1. **Gallons of water x 8.33.**
   45 x 8.33 = 374.85 pounds
   Note: A gallon of water weighs 8.33 lbs.

Convert Pounds of Water into Gallons

Gallons = Pounds of Water ÷ 8.33

ex. *Calculate the number of gallons in 233 pounds of water.*

1. **Pounds of water ÷ 8.33.**
   233 divided by 8.33 = 27.97 gallons
   Note: A gallon of water weighs 8.33 lbs.

ESTIMATING BRICK

Brick Multiplier: $\frac{144}{\text{H x L of brick*}}$

**Must add mortar to one side and joint first*

Brick Quantity: Area* x Multiplier

**Deduct for openings*

Calculating Quantity of Brick

1. **Add mortar to one side and one joint to face dimensions of the brick.**
2. **Multiply the Height of the brick by the Length of the brick to determine face area in square inches (or use the table).**
3. **Divide 144 square inches by the face area of the brick. (This is the multiplier—how many brick you will need per square foot.)**
4. **Calculate the area of the space for installing brick. Deduct the square feet of the openings.**
5. **Multiply the area by the brick multiplier (can be found on the next page).**
6. **Add 5% to 10% for waste.**

Using the Table to Calculate Brick Quantity

	Brick Size			Mortar Joint				
Type	Height	Length	Width	1/4"	3/8"	1/2"	5/8"	3/4"
Common	2 ¼"	8"	3 ¾"	7	6.6	6.2	5.8	5.5
Large St	1 5/8"	15 ¾"	3 ¾"	4.8	4.5	4.2	3.9	3.3
Small St	1 ¼"	8"	3 ¾"	5.3	5.1	4.8	4.5	4.3
Jumbo	2 1/8"	11 ½"	5 ½"	1.16	1.05	9.7	4.1	3.9
Norman	2 ¾"	8 ¾"	4"	5.2	4.9	4.6	4.3	4.1
Roman	2 ¼"	11 ½"	3 ¾"	4.9	4.6	4.4	4.1	3.9

ex. *Calculate the quantity of brick to be installed on 4000 square feet. You are installing a Common Brick with a ¼" mortar joint.*

1. **Find the number that corresponds to your mortar joint and brick type.**
   The number is 7. This is the number of bricks needed to cover one square foot.
2. **Multiply this number by the area for which you will be installing brick.**
   7 x 4000 = 28,000

NOTE: Don't forget to deduct for openings and factor in waste.

ESTIMATING MORTAR, CEMENT & SAND

Quantity(CF) of mortar required to lay 1000 Bricks						
Joint Thickness (inches)	Thickness of the Wall in Inches					
	4"	8"	12"	16"	20"	24"
1/8"	2.9	5.6	6.5	7.1	7.3	7.5
1/4"	5.7	8.7	9.7	10.2	10.5	10.7
3/8"	8.7	11.8	12.9	13.4	13.7	14
1/2"	11.7	15	16.2	16.8	17.1	17.3
5/8"	14.8	18.3	19.5	20.1	20.5	20.7
3/4"	17.9	21.7	23	23.6	24	24.2
7/8"	21.1	25.1	26.5	27.1	27.5	27.8
1"	24.4	28.6	30.1	30.8	31.2	31.5

ex. *What CF of mortar is needed to install 7600 bricks? Wall thickness is 4" and the mortar joint is 1/8".*

1. **Identify the joint thickness.**
   Go to 1/8"
2. **Identify the thickness of your wall.**
   Follow across to 4" thickness
3. **Identify the multiplier that corresponds with Step 1 & Step 2.**
   Multiplier is 2.9
4. **Divide the total number of bricks you are installing by 1000.**
   7600 ÷ 1000 = 7.6
5. **Use the multiplier from Step 3 to multiply by the number from Step 4. This is the CF of mortar.**
   2.9 x 7.6 = 22.04 CF of mortar

Calculate Masonry Cement

Cement = CF of Mortar x 0.5

ex. *Calculate the number of bags of cement needed to install 23,000 bricks if the wall thickness is 4" with 3/8" mortar joint.*

1. **Determine the Cubic Feet of mortar needed based on the table.**
   23,000 ÷ 1000 x 8.7 = 200
2. **Multiply the CF of mortar needed by 0.5.**
   200 x 0.5 = 100 bags

Calculate Pounds of Sand

Sand = CF of Mortar x 100

ex. *Calculate the pounds of sand needed to install 23,000 bricks if the wall thickness is 4" with 3/8" mortar joint.*

1. **Determine the Cubic Feet of mortar needed based on the table.**
   23,000 ÷ 1000 x 8.7 = 200
2. **Multiply the CF of mortar needed by 100.**
   200 x 100 = 20,000 pounds