Quantity Survey & Estimation

Lecture 01

Introduction to Quantity surveying & Estimation, Quantities of concrete and mortar

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What is meant by the term '' Quantity survey & Estimation ?

Quantity Surveying means calculating the **quantity** of materials such as total volume of concrete, total weight of reinforcement bars, total area to be finished.

&

Estimating deals with predicting the amount required for constructing such as cost of materials, labor costs etc.

What is the purpose of '' Quantity survey & Estimation ?

To know the amount money required to complete the work.

To know quantities of material required to complete the work.

To justify the investment (benefit cost ratio).

To fix up the completion period from volume of work involved in the estimate.

Asses to the requirement tools, plants and equipment to complete the work accordingly.

What are the types of ''Quantity survey & Estimation'' ?

Two main types

1. Approximate Estimate

It gives the approximate cost of the work and prepared on the basis of similar work carried out in the past.

2. Detail Estimate

Detailed estimate is an accurate and consists of working out the quantities of each item of work. It is prepared after the complete set of drawings.

IMPORTANT TERMINOLOGIES

IN

QUANTITIES OF CONCRETE & MORTAR

Difference B/W Concrete & Mortar?

CONCRETE
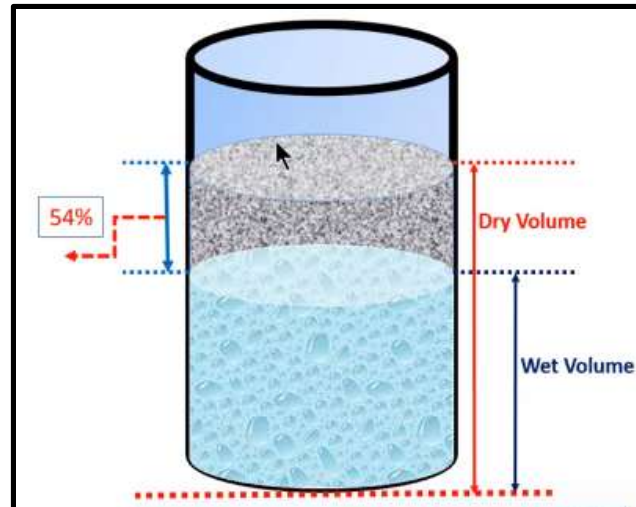
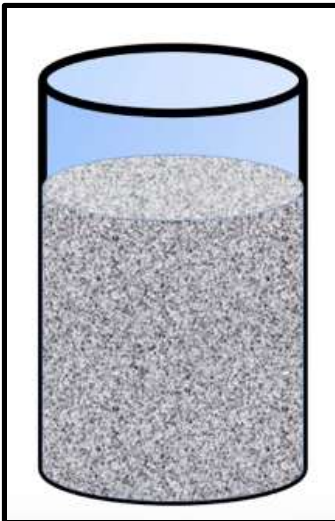CEMENT,   SAND,   AGGREGATE

MORTAR

CEMENT,   SAND

DRY & WET VOLUME OF CONCRETE

Dry volume of concrete is the combined volume of cement, fine aggregates and coarse aggregate in dry condition.

After mixing, the resultant wet volume turns out to be approximately 60–70% of the dry volume. For estimation purposes, dry volume of concrete can be taken as 1.54 times of its wet volume.

For Concrete 1m³   = 54 %

Dry Volume   = Wet Volume + 54% Of Wet Volume

$$= 1 + (\frac{54}{100} \times 1)$$

$$= 1 + 0.54$$

Dry Volume   = 1.54

DRY & WET VOLUME OF MORTAR

When water is added to the dry mix of cement-sand, the volume of dry mix is reduced. It happens due to the presence of air voids in sand particles.

When we calculate the mortar quantity for any masonry work, we get the wet volume of mortar. If we want to calculate the required volume of sand and cement, we need to convert that wet volume into the dry volume.

For estimation purposes, dry volume of mortar can be taken as 1.27 or 1.30 times of its wet volume.
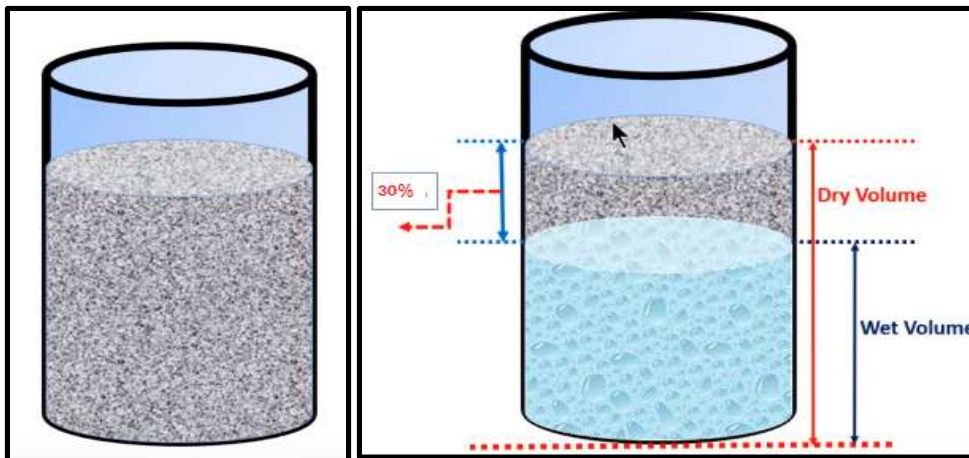
For Cement Mortar 1m³ = 27 % Or 33 %

Dry Volume = Wet Volume + 27% Of Wet Volume

$$= 1 + \left(\frac{27}{100} \times 1 \right)$$

$$= 1 + 0.27$$

Dry Volume = 1.27

EXAMPLE: CALCULATE DRY VOLUME OF MORTAR

Let's assume we require **10** cubic feet wet mortar and the ratio of cement and sand in the mortar is **1:4**.

As we discussed previously, the dry volume of mortar is,

= **Wet volume of mortar x 1.30**

- =10 x 1.30
- =**13.00 cubic feet.**

1 CUBIC FEET = 13.5Nos of bricks

Bricks In 1 Cubic Cuft:

Size Of Brick	$= 9'' \times 4.5'' \times 3''$
Size Of Brick With Mortar	$= 9.08'' \times 4.58'' \times 3.08''$
Volume Of Brick With Mortar	$= L \times B \times H$
	$= 9.08 \times 4.58 \times 3.08$
	$= 128 \text{ inch}^3$
Volume Of 1 Cuft	$= 1ft \times 1ft \times 1ft$
	$= 12 \text{ inch} \times 12 \text{ inch} \times 12 \text{ inch}$
	$= 1728 \text{ inch}^3$
No Of Bricks	$= \dfrac{\text{Volume Of 1 Cubic Inch}}{\text{Volume Of 1 Brick}}$
	$= \dfrac{1728}{128}$
Nos Of Bricks	$= 13.5 \text{ Nos}$

ABC

Brick

3 inch

9 inch

4.5 inch

ABC

Brick

3.08 inch

9.08 inch

4.58 inch
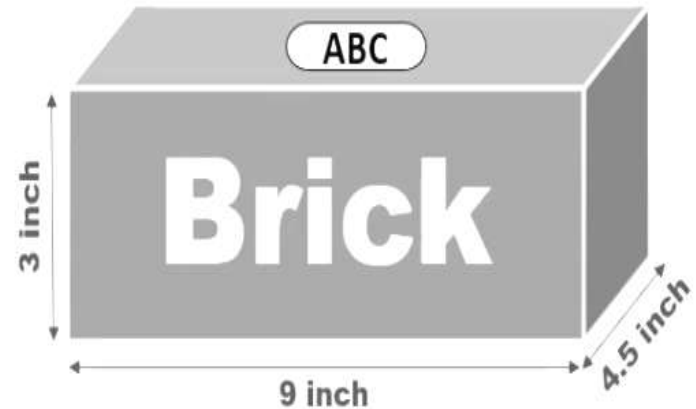
HOW TO CALCULATE CEMENT MORTAR IN BRICK WORKS

- Let suppose we have a brick work of 75cft, and ratio for that is given 1:4. calculate the Dry volume and quantities of mortar.
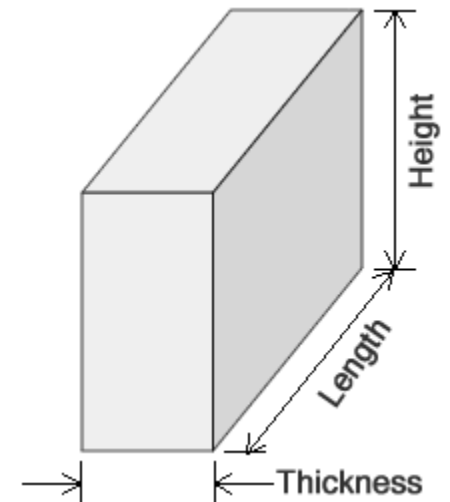
Volume of bricks work = 75cft

- ## To find volume of mortar;

Note: (We consider 20% to 30% mortar in brick work.)

Taking 25% of brick work for mortar

$25/100 * 75 = $ **18.75cft (wet volume)**

Thickness X length X height = Cft

- For Dry volume we have to multiply factor 1.27 with wet volume of mortar

Dry volume = wet volume * 1.27

$$= 18.75 * 1.27 = \mathbf{23.81\,cft}$$

Now

Cement = ?

Sand =?

For cement we have;

Quantity of Cement =Ratio of Cement/Sum of ratio × Dry Material

Ratio= 1:4 (1 cement & 4 sand)

Sum of ratio is 1+4 = 5

Dry volume = 23.81 CFT

$$= 1/5*23.81 = 4.76 \text{ CFT}$$

Note : (1 bag = 1.25cft)

4.76/1.25 = 3.8 bags say 4 bags

<u>For sand we have;</u>

Quantity of sand =Ratio of sand/Sum of ratio × Dry Material

$$= 4/5 * 23.81 = 19 \text{ CFT}$$

HOW TO CALCULATE QUANTITIES OF CONCRETE

Determine the Quantities of various materials to prepare 100CFT concrete (1:4:8)?

<u>Solution</u>

- Quantity of Wet material =100cft

- Dry density of Concrete =1.54

- **<u>Quantity of dry material =100 × 1.54 =154cft</u>**

- Ratio of Concrete =1:4:8

- **<u>Sum of ratio =1+4+8 =13</u>**

- Quantity of Cement =Ratio of Cement/Sum of ratio × Dry Material

$$= 1/13 \times 154 = 11.78 \text{cft}$$

And $= 11.78/1.25 = 9.42$ **bags**

- Quantity of sand =Ratio of sand/Sum of ratio × Dry Material

$$= 4/13 \times 154 = 47.12 \text{cft}$$

- Quantity of course agg =Ratio of Course agg/Sum of ratio × Dry Material

$$= 8/13 \times 154 = 94.24 \text{cft}$$

ASSIGNMENT NO #01

Determine the Quantities of cement , sand and coarse aggregates to prepare 150 cubic feet concrete (1:2:4).

THE END