ESTIMATING & COSTING

UNIT 01

GENERAL

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Introduction

- A probable(estimated) cost of project to plan project (cost – labour - material) management
- If estimated cost is grater than money available than
  - Change in project designs or
  - Change in materials specifications
- One must have knowledge of reading a drawing as well as good understanding of specifications

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What is Estimation

" it is defined as the process of calculating the quantities and costs of the various item of works required in connection to the project."

Data required for Estimation

1. Plans, elevations and Sections – Detail drawings
2. Specifications
3. Item rates

Types of Estimate

1. Approximate or Preliminary Estimate
2. Detailed Estimate
3. Quantity Estimate
4. Revised Estimate
5. Supplementary Estimate
6. Supplementary and revised Estimate
7. Annual repair and Maintenance Estimate

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Qualities of Good Estimator

1. Read and interpret drawings
2. Sound experience
3. Knowledge of construction rules and regulations
4. Good knowledge of mensuration and simple trigonometry
5. Knowledge of Construction methods and procedures
6. Knowledge of measurements of different items
7. Accuracy in calculations
8. Good general knowledge

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Basics of SI Unit system

- Six basic units of SI system
  1. Metre (M)– Length
  2. Kilogram (KG) - Mass
  3. Second (S)– Time
  4. Ampere (A)– Electric current
  5. Degree Kelvin (K) – Thermodynamic temp
  6. Candela (Cd)– Luminous intensity

- To have uniformity
- Accuracy
- Avoid ambiguities (Quality of being open for more than one interpretation)
- Easy conversion (Meter – Centimeter – Millimeter) always in terms of 10

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Units in civil engineering works

PARTICULAR	UNIT	ILLUSTRATION
Length	Meter	m
Area	Square Meter	m^2
Volume	Cubic Meter	m^3
Mass	Kilograms	kg
Capacity	Liters	lit.

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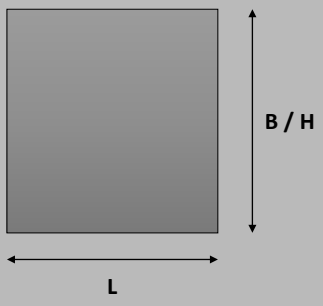
AREA

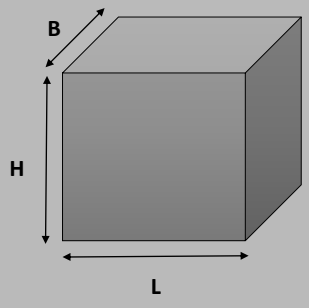
SQUARE METER
No Thickness is considered
L x B or H



UNIT SQUARE METER
L /B /H = 1.0 m

VOLUME

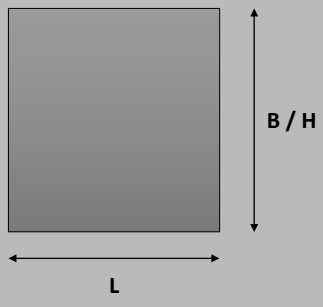
CUBIC METER
L x B x H



UNIT CUBIC METER
L /B /H = 1.0 m

UNIT LENGTH

RUNNING METER
L or B or H



UNIT RUNING METER
L /B /H = 1.0 m

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Unit Conversions

Imperial	Metric	Metric	Imperial
1.0 ft	0.3048 mt	1.0 mt	3.281 ft
1.0 sq.ft.	0.0929 sq.mt.	1.0 sq.mt.	10.76 sq.ft.

Imperial	Metric
1.0 yard	0.9144 mt
1.0 sq.yard	0.836127 sq.mt.

Imperial	Imperial
1.0 sq.yard	9.0 sq.ft.

Length conversion		
1.0 mt	100.0 cm	1000.0 mm
1.0 inch	2.54 mm	25.40 mm

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Methods of Estimating

- **Estimation : Probable cost before work starts**
  - it is derived with some theoretical concepts with the help of mathematical calculations based on data from plans, drawings and present rates.
- **Actual cost: cost at the completion of work**
  - Account of all expenditures are maintained
  - It should be near to the estimated cost
- **Detailed estimate**

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Format of sheets

Detail Estimate Sheet

SR NO	DESCRIPATION OF ITEM	NOS.	L	B	H	Q	REMARKS / CALCULATIONS

Abstract Estimate Sheet

SR NO	DESCRIPATION OF ITEM	UNIT	QUANTITY	RATE	AMOUNT

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Main Items of Work

	PARTICULAR	Description	UNIT
1	Earthwork	Excavation and Filling in Trenches and Plinth	m^3
2	Concrete in Foundation	Thickness varies from 20-45 cm (Usually 30 cm) (1:4:8/1:5:10)	m^3
3	Soiling	Below foundation bed if soil is week	m^2
4	Damp Proof Course (DPC)	Water proofing material below walls of 2.5 cm thick (1:1.5:3 or 2 cm – rich cement mortar 1:2) It is not provided under sills openings	m^2
5	Masonry	In Foundation, Plinth and Superstructure Partition walls (100-115 mm) are measured in m^2 deduction of openings and lintels are made	m^3

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Main Items of Work

	PARTICULAR	Description	UNIT
6	Lintels over openings	Bearings are added in the length of openings Bearings may be equal to the width of lintel if not specifically provided (100 cm bearing can be neglected)	m^3
7	RCC and RB work	RCC : Reinforced Cement Concrete RB : Reinforced Brickwork	m^3
8	Flooring and Roofing	On Ground floor Base and finishing layers may be calculated combined On other floors RCC slab is calculated separately	m^2

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Main Items of Work

	PARTICULAR	Description	UNIT
9	Plastering and Pointing	12mm thick No deduction of opening up to 0.5 sq.mt. For opening 0.5 – 3.0 sq.mt. only for one face For openings more than 3.0 sq.mt - both the faces	m^2
10	Cornice	Mostly it is an ornamental work	ru.mt.
11	Pillars (Circular)	$\pi /4 \times d^2$	m^3
12	Doors and Windows	Frames : Three sides (Doors), Four sides (Window) Vertical members to be inserted into the floor : 2.5-4.0 cm Shutters : 6mm clearance	m^3 m^2

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Main Items of Work

	PARTICULAR	Description	UNIT
13	Wood work	For Beams, Posts etc.	m^3
14	Iron work	For windows bearings can be taken as 20-30 cm in the wall Doors : 6 Hold fasts, Windows: 4 Hold fasts	Kg
15	White washing or Color washing or Distempering	It is usually same as of plastering quantities	m^2
16	Paintings	For doors and windows	m^2
17	Electrification, Sanitary and Water supply works	8% for each of total estimated cost	

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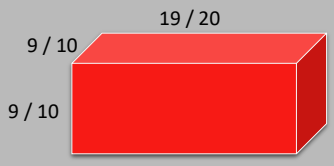
Degree of Accuracy in Estimating

- It is dependent on rate of item and a unit of payment.
- Higher the rate more accuracy is needed to carry out quantities
- Though dimensions to be measured may be allowed near to 0.5-1.0 cm for practical purpose, quantities to be worked out at least two decimal places
- For example,
  - **For example wall of 4.25 m x 3.25 m x 0.30 m = 4.14375 m^3 <u>say 4.14 m^3</u>**
  - **For example wall of 4.30 m x 3.30 m x 0.30 m = 4.257 m^3 <u>say 4.28 m^3</u>**

Degree of Accuracy in Estimating

- In general
  - Dimension : nearest to 1cm (0.01 m)
  - Area : nearest to 0.01 m^2
  - Area in cubic content : nearest to 0.01 m^3
- Thickness of slabs, partitions, etc and sectional dimensions of columns, pillars, beams etc should be taken nearest to half centimeter (0.005 m)

Bricks Comparison



dimensions are in cm

BRICK	SIZE (METRIC)	SIZE (FPS)
Standard	Actual : 19 x 19 x 9	-
Modular Brick	Nominal : 20 x 10 x 10	-

THICKNESS OF WALL						
Wall (Brick)	0.5	1	1.5	2.0	2.5	3.0
Thickness (cm)	10	20	30	40	50	60

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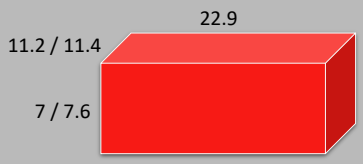
Bricks Comparison



dimensions are in cm

BRICK	SIZE (METRIC)	SIZE (FPS)
Traditional Brick	Actual : 22.9 x 11.2 x 7	Actual : 9" x 4⅜ x 2¾
	Nominal : 22.9 x 11.4 x 7.6	Nominal : 9" x 4½ x 3"

THICKNESS OF WALL						
Wall (Brick)	0.5	1.0	1.5	2.0	2.5	3.0
	4½"	9"	13½"	18"	22½"	27"
Thickness (cm)	11.4	22.9	34.3	45.7	57.1	68.6

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UNIT 01 - BUILDING ESTIMATE

METHODS OF BUILDING ESTIMATE

NUMERICAL 01

- Estimate the quantities of brick work and plastering required in a wall 4.0mt long, 3.0mt high and 30cm thick. Calculate also the total cost of wall, consider a rate of brickwork is Rs. 320.00 per cu.m and of plastering is Rs. 8.50 per sq.mt.

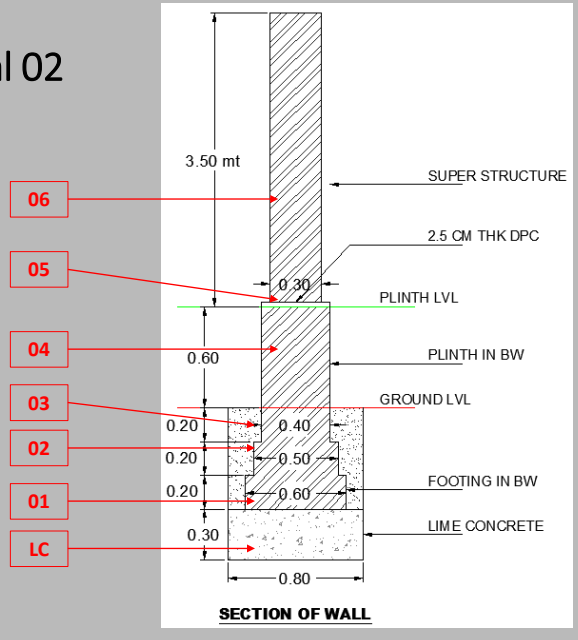
Quantities calculation			
Quantity of brick work	L x B x H	4 x 0.3 x 3 = 3.6	Cu. mt
Quantity of plaster	2(L x H)	2(4x 3) = 24	Sq. mt
Cost calculations			
Quantity of brick work	320 Rs	3.6 x 320 = 1152.00	Cu. mt
Quantity of plaster	8.50 Rs	24 x 8.50 = 204.00	Sq. mt
	Total	1356.00 Rs	

NUMERICAL 02

- Prepare a detail estimate of part of wall of a building from the given plan and section and general specifications, (Ht. of wall above plinth is 3.50 mt)
  1. Foundation concrete shall be of lime concrete
  2. Foundation and plinth shall be of first class brick work in lime mortar
  3. Damp Proof Course-2.5 cm thick 1:1.5:3 with water proofing compound
  4. Super structure – 1st class brick work in lime mortar
  5. Wall finishing –inside wall 12mm cement plastered 1:6 and white wash of 3 coats
  6. Out side wall 12mm cement plastered 1:6 including 10 cm below ground lvl and finished with two coats of colour wash over one coat of white washing.

Reference figure for Numerical 02

- Excavation height : 0.30 + 3(0.20) = 0.90 mt
- Lime concrete : 0.80 x 0.30
- 1st footing : 0.60 x 0.20
- 2nd footing : 0.50 x 0.20
- 3rd footing : 0.40 x 0.20
- 4th or Brick work in plinth : 0.40 x 0.60
- DPC : 0.40 wide and 2.50cm Thick
- Super Structure Brick work : 0.30 x 3.50



Detail Estimate

SR NO	DESCRIPATION OF ITEM	NOS.	L	B	H	Q	REMARKS
1	Earthwork in excavation in foundation	1	6	0.8	0.9	4.32	Cu.mt.
2	Lime Concrete in Foundation	1	6	0.8	0.3	1.44	Cu.mt.
3	1st class brick work in lime mortar in foundation and plinth						
	1st footing	1	6	0.6	0.2	0.72	Cu.mt.
	2nd footing	1	6	0.5	0.2	0.60	Cu.mt.
	3rd footing (wall up to GL)	1	6	0.4	0.2	0.48	Cu.mt.
	Above GL	1	6	0.4	0.6	1.44	Cu.mt.
				Total		3.24	Cu.mt.

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Detail Estimate

SR NO	DESCRIPATION OF ITEM	NOS.	L	B	H	Q	REMARKS
4	2.5 cm DPC	1	6	0.4	-	2.40	Sq.mt.
5	1st class BW in Super Stru.	1	6	0.3	3.50	6.30	Sq.mt.
6	12 mm plaster						
	Inside face	1	6	-	3.50	21.0	
	Outside	1	6	-	4.20	25.20	(H=3.5+0.6+0.1 below GL)
7	White washing inside	1	6	-	3.50	21.0	Sq.mt.
8	Colour washing over one coat of white washing (out side face)	1	6	-	4.10	24.6	Sq.mt.

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Abstract Estimate

SR NO	DESCRIPATION OF ITEM	UNIT	QUANTITY	RATE (Rs)	AMOUNT (Rs)
1	Earthwork in Excavation	m^3	4.32	350.0	1512.0
2	Lime Concrete in Foundation	m^3	1.44	220.0	316.80
3	1st class brick work in lime mortar in foundation and plinth	m^3	3.24	300.0	972.00
4	2.5 cm DPC	m^2	2.40	20.0	48.00
5	1st class BW in Super Stru.	m^3	6.30	320.0	2016.00
6	12 mm plaster	m^2	46.20	8.50	392.70
7	White washing inside	m^2	21.0	0.75	15.75
8	Colour washing	m^2	24.6	0.82	20.17
				Total	5293.42
				Add 3% for contingencies	158.80
				Add 2% for Work charge Establishments	105.87
				Grand total	5558.09

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