

Section-A

Estimate

* Estimate :-

An estimate for any construction work may be defined as the process of calculating the quantities and costs of the various items required in connection with the work.

It is prepared by calculating the quantities, from the dimensions on the drawings for the various items required to complete the project and multiplied by unit cost of the item concerned.

* Purpose of Estimating :-

- 1) To ascertain the necessary amount of money required by the owner to complete the proposed work.
- 2) To ascertain quantities of materials required in order to programme their timely procurement.
- 3) To calculate the number of different categories of workers that are to be employed to complete the work within the limited time.
- 4) To assess the requirements of Tools, Plants and equipment required to complete the

work according to the programme.

- 5) To fix up the completion period from the volume of works involved in the estimate.
- 6) To draw up a construction schedule and programme and also to arrange the funds required according to the programming.
- 7) To justify the investment from benefit cost ratio. (ratio should be ≥ 1)
- 8) To invite tenders and prepare bills for payment.
- 9) An estimate for an existing property is required for valuation.

Note:- An estimate is the probable cost of construction for a work, worked out from the dimensions on the drawings and standing rates at the time of preparation of the estimate.

☒ Different Types Of Estimates :-

1) A detailed Estimate :-

- Quantities of all items of work are calculated from their respective dimensions on the drawings on a

drawing measurement sheet.

- Multiplying these quantities by their respective rates in a separate sheet, the cost of all items of work are worked out individually and then summarised.
- All other expenses required for satisfactory completion of the project are added to the above cost to frame the total of a detailed estimate.
- This is the best and most accurate estimate that can be prepared.

2) A Preliminary or approximate or rough Estimate :-

- This is an approximate estimate to find out an approximate cost in a short time and thus enables the authority concerned to consider the financial aspect of the scheme, for according sanction to the same.

3) A Quantity Estimate or Quantity Survey :-

- This is a complete estimate or list of quantities for all items of work required to complete the concerned project.
- To find the cost of an item its quantity

is multiplied by the rate per unit for that item.

4) Revised Estimate:-

It is a detailed estimate for the revised quantities and rates of items of works originally provided in the estimate without material deviations of a structural nature from the design originally approved for quantity.

5) A Supplementary Estimate:-

While a work is in progress, some changes or additional works due to material deviation of a structural nature from the design originally approved may be thought necessary for the development of a project.

An estimate is then prepared to include all such works. This is known as a supplementary estimate. And is same as detailed estimate.

6) Revised Estimate and Supplementary Estimates due to reduction of cost (following P.W.D manual)

7) A Complete Estimate

8) Annual maintenance or Repair Estimate

* Methods of Estimation :-

1) Unit-Quantity Method to prepare a detailed estimate

2) Approximate Methods :- (for Building)

- (i) Plinth area or square - metre method
- (ii) Cubic rate or cubic - metre method
- (iii) Approximate quantities with bill method
- (iv) Service Unit or Unit rate method
- (v) Bay Method
- (vi) Cost comparison method
- (vii) Cost from materials and labour

* General Items of work for building estimates :-

- 1) Earthwork in excavation for foundation trenches
- 2) Earthwork in filling
 - (a) Foundation filling
 - (b) Plinth filling
- 3) Brick flat soiling
- 4) Cement or Lime Concrete in foundation
- 5) Masonry work in foundation and plinth
- 6) Damp-proof Course (D.P.C.)
- 7) Masonry work in superstructure walls
- 8) 10 cm thick brickwork
- 9) R.C.C. or R.B. work

- 10) Centering and shuttering (Form work)
- 11) Steel work
- 12) Lime terracing
- 13) Woodworks for doors and windows
- 14) Mild Steel clamp or hold fast
- 15) Flooring
- 16) Plastering and Painting
- 17) White washing or Colour washing
- 18) Painting or woodwork

Units of dimensions for materials and works:-

Materials & works	Size
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- | | |
|---|-------------------------------------|
| 1) Bricks, stones blocks etc. | cm |
| 2) Agg., ballast, grit, sand etc. | mm |
| 3) A.C. sheets, tiles, slates, glass panes etc. | L & B in cm or m
Thickness in mm |
| 4) Timber | L in m, cross-section in cm or mm |
| 5) Mild Steel section | L in m & dia. in mm |
| 6) Masonry | L & Ht. in m & Thickness or B in cm |
| 7) Concrete work | L in m, B in m, Thickness in cm |
| 8) Door, windows etc. | Ht. & B in m or cm |
| 9) Rolled steel sections | L in m, section in mm |
| 10) White painting, washing, painting etc. | L & B or Ht. in m |
| 11) Hardware articles | Size in cm or mm |

Section-A (Remaining--)

✱ A Single Roomed Building :-

General Specifications:

Brickwork shall be 1st class with cement mortar (1:4). Foundation concrete shall be of cement with brick chips (1:3:6). Wood work for frames shall be of salwood and shutters of Indian teak. Frame for wooden door shall be of salwood 10 cm x 8 cm and shutter of 1st class Indian teak 25 mm thick. Steel door shall be with integrated grills with 1.25 mm thick M.S. sheet. All walls shall be three coats white washed. Doors shall be painted with two coats. R.C. works are 1% reinforced TOR steel. 2 nos. 75 mm dia. rain water spouts shall be provided. Other specifications shall be followed as mentioned in the drawing.

✱ A Two Roomed Building :-

General Specifications:-

- (a) Foundation and plinth :- First class brickwork in cement mortar (1:4) over lime concrete (18:36:100)

- (b) Superstructure Walls:- First class brickwork in cement mortar (1:6) over 2.5 cm thick D.P.C. (1:2:4) and parapet walls shall be cement mortar (1:4). In superstructure 15 cm thick R.C.C. (1:2:4) band lintel shall be provided.
- (c) Roofing:- The roof shall be 10 cm thick R.C.C. slab with stone chips (1:2:4) and 10 cm (av.) lime terracing (2:2:7). The R.C. slabs and beam shall be 1% reinforced.
- (d) All R.C.C. works except roofing shall be 0.8% reinforced.
- (e) Flooring:- Shall be 25 mm thick artificial stone chips finished with neat cement finishing at top. Under flooring shall be 7.5 cm thick lime concrete (1:2:7) terracing over a brick flat sating.
- (f) Finishing:- Outside walls up to plinth including plinth offset shall be 20 mm thick cement plaster smooth with neat cement. Inside and outside walls shall be 12 mm cement plastered (1:6). R.C. slab and ceiling 6 mm cement plastered (1:4). Inside walls three coats white washed.

and outside two coats colour washed over a coat of white wash.

- (g) Doors and Windows:- Frames shall be of salwood, shutters of Indian teak wood 35mm thick Indian teak wood panelled type design and shall be painted with two coats over priming coat. Back of door and window frames shall be painted with two coats of coal tar. Window grating shall be 16 mm dia. M.S. bar with 40 mm x 16 mm intermediate stiffener M.S. plate and M.S. clamps for frames 50 mm x 60 mm flat 40 cm long. Iron works shall be painted two coats.

✶ Detailed Estimate of a Two-Storeyed Residential Building having a foundation for future future extension up to three stories along with cost per storey:-
General Specification:-

- (a) Foundation and Plinth:- Brickwork in foundation and plinth shall be of first class brick in cement mortar (1:4) over cement concrete M10 (i.e. 1:3:6)
- (b) Filling:- Foundation trenches shall be filled up with excavated earth and the plinth shall filled up with local sand.
- (c) Damp-Proof-Course:- Shall be of cement

Concrete M15 (equivalent 1:2:4) with water proofing compound.

(d) Superstructure:- Shall be of first class brickwork in cement mortar (1:16). 10 cm thick brick partition wall shall be of first class in cement mortar (1:4) with H.B. netting in every third layer.

(e) Roofing and R.C.C. Work:- The roof shall be of 10 cm R.C.C. slab with 7.5 cm (av.) lime terracing over it. All R.C.C. work shall be of grade M15 concrete and reinforced with an average of 0.8% Tors Steel.

(f) Flooring:- The under bed of ground floor shall be of 7.5 cm thick lime terraced ($1\frac{1}{2}$:2:7) laid over a layer of brick flat sasing. The floor shall be 25 mm thick, skirting for walls and staircase railing shall be 20 mm thick terrazzo works, with necessary underlay of cement concrete (1:2:4) with stone chips and 12 mm thick terrazzo topping laid and finished to 9 mm light green colour. The height of the skirting shall be 20 cm.

(g) Doors and Windows:- The frame of

Window sills shall be mosaic. The door shutters shall be 35 mm thick solid flush type commercial quality.

(h) Plastering:- Inside and outside walls shall be with 12 mm thick cement plaster (1:6). Ceiling sunshade and soffit of staircase etc. shall be with 6 mm thick cement plaster (1:4).

(i) Painting:- All wood work for door and window frames and window shutters shall be painted two coats super glass over a coat of primer.

(j) Outside Walls:- Shall be painted two coats with decorative cement based paint.

(k) Rain Water Pipes:- 4 nos. A.C. down of 100 mm dia. shall be provided with two coats of paint as that of cement work.

☒ Canals:-

The canals are generally categorised in the following three cases:

Case I: When natural surface level is above full supply level i.e. fully in cutting

Case II: When natural surface level is between F.S.L and Bed level i.e. partly in cutting and partly in filling.

Case III:- When natural surface level is below bed level i.e. fully in embankment.

Calculations of Quantities:-

Case I: fully in cutting.

The principle used for calculating earthwork in canals is the same as that of in Road estimate i.e. $(Bd + Sd^2) \times \text{Length}$

where, B = Formation of width

d = depth of embankment

S = Side slope

Case II: Partly in cutting and partly in filling:

The earthwork of the cutting portion is calculated using formula $Bd + Sd^2$ and earthwork for banks is calculated also using formula $Bd + Sd^2$ which is equal to $(\text{Top width of left bank} + \text{Top width of right bank} \times \text{height of bank} + 2 \times \text{Slope of the bank} \times \text{height}^2)$.

If the extra earth is required for banks, the earth is taken from borrow pits, which are measured separately. If the excavated quantity

is sufficient for the completion of banks, then the depth of excavation is known as Economical depth of digging.

Case III: Fully in Embankment:

In this case, the calculation of quantities is simple. As the canal is fully in embankment, total embankment is considered for calculation of earth work and from it, portion of canal is deducted.

If the section of canal is such that the earth obtained from cutting is sufficient in forming the banks, then the section is known as economical section.

Balancing depth:-

When cutting is sufficient to make banks. The condition is called balancing depth. No extra earth is required from borrow pits.

The discharge will be maximum with minimum cross-section area.