SYNERGY SCHOOL OF ENGINEERING DHENKANAL

LECTURENOTES
ON
ESTIMATION&COSTEVALUATION-1

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CHAPTER-1

Introduction

WHATISANESTIMATE ……

- Before taking up any work for its execution, the owner or builder should have a thorough knowledge about the volume of work that can be completed with in the limits of his fund sort he probable cost that may be required to complete the proposed work.

- It is there for unnecessary are the probable cost or estimate for the proposed work from its plan and specification.

- Otherwise, it may so happen that the work has to be stopped before its completion due to the shortage of funds or of materials.

- Besides the above, an estimate for any public construction work is required to be prepared and submitted beforehand so that sanction of necessary funds may be obtained from the authority concerned .

- Thus 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.

- To prepare an estimate, drawing consisting of the plan, the elevation and the section through important points, along with a detailed specification giving specific description of all workman ship , properties and proportion of materials , are required.

PURPOSEOFESTIMATING:-

- To ascertain the necessary amount of money required by the owner to complete the proposed work .For public construction work, estimates are required in order to obtain administrative approval, allotment of funds and technical sanction.
- To ascertain quantities of materials required in order to programmed their timely procurement.
- To calculate the number of different categories of workers that is to be employed to complete the work within the scheduled time of completion.

- To assess the requirements of tool, plants and equipment required to complete the work according to the programmed.

- To fix up the completion period from the volume of works involved in the estimate.
- To draw up a construction schedule and programmed and also to arrange the funds required according to the programming.
- To justify the investment from benefit cost ratio.(for ideal investment, this ratio should be more than one)
- An estimate for an existing property is required for valuation

TYPESOFESTIMATE

- ROUGHCOSTESTIMATE
- PLINTHAREAESTIMATE
- CUBICALCONTENTESTIMATE
- AQUANTITYESTMATE
- APPROXIMATEQUANTITYMETHOD
- DETAILEDORITEMRATEESTIMATE
- REVISEDESTIMATE
- SUPPLEMENTARYESTIMATE
- REPAIRANDMAINTENANCEESTIMATE
- ACOMPLETEESTIMATE

ROUGHCOST ESTIMATE

IT is prepared to decide the financial policy matter. it is prepared on basis of practical knowledge and cost of similar works. The competent sanctioning authority "Administrative approval".

- These estimates are also referred to as room estimate and are use full for go/nokind decision making which essential refers to whether the project should or should not be pursued

- Some of the methods they can be useful for such estimates are investment per annual capacity turnover and capital ratio .

PLINTHAREAESTIMATE

- IT Is prepared on the basis of plinth area of the building multiplied by plinth area rate prevalent in the region.

- Plinth area rates are fixed from the cost of similar buildings constructed in the locality having similar finishing's and amenities

- The cost of construction is determined by multiplying plinth area with plinth area rate. The area is obtained by multiplying length and breadth (outer dimensions of building). In fixing the plinth area rate, careful observation and necessary enquiries are made in respect of quality and quantity as materials and labor, type of foundation, height of building, roof, woodwork, fixtures, number of stores etc.

CUBICALCONTENT ESTIMATE

- This estimate is worked out on the basis of the cubical contents of proposed building to be constructed and then applying to it the rate per cubic meter.
- This is more accurate than plinth area estimate.
- The cubic content rates are deduced from the cost of similar buildings constructed in the same locality
- This method is generally used for multi-storied buildings. It is more accurate that the other two methods plinth area method and unit base method.
- The cost of a structure is calculated approximately as the total cubical contents(Volume of buildings) multiplied by Local Cubic Rate.

- The volume of building is obtained by Length x breadth x depth or height. The length and

breadth are measured out to out of walls excluding the plinth off set.

AQUANTITYESTIMATEORQUANTITYSURVEY

- This is complete estimate or list of quantities for all items of work required to complete the concerned project.
- The quantity of each individual items of work is worked out form respective dimensions on the drawing of the structured of in the cost of an item in quantity is multiplied by the rate per unit from that item.
- The purpose of the bill quantity to provide a complete list of quantities necessary for the competitionofanyengineeringprojectandwhenpricegiventotheestimatedcostoftheproject.

- **APPROXIMATEQUANTITIES**
- Regarded as the most reliable and accurate method of estimating, provided that there is sufficient information to work done . Depending on thee experience of the surveyor, measurement can be carried out fairly quickly using composite rates to save time.
- The rules of measurement are simple, although it must be said they are not standardized and tend to vary slightly from one surveyor to another.
- One approach involves grouping together items corresponding to a sequence of operations and relating them to a commonun it of measurement unlike the measurement for a bill of quantities, Where items are measured separately.

- All measurements are taken as gross over all but the very large opening.

- Initially, the composite rates require time to build up, but once calculated they may be used on a variety of estimating needs
- Reasonably priced software packages are now available .An example for a composite is shown below for substructure:
- This is an approximate estimate to find out an approximate cost in the short time and thus enable the authority concerned to consider the financial aspect of the scheme for according sanctioned the same.

- Such an estimate is framed after knowing the rates of similar works and form practical knowledge in various ways for various types of work such as

- Plinth area or square meter method.
- Cubic rate or cubic meter method.
- Serve unit or unit rate method.
- Bay method.
- Approximate quantities with bill method.
- Cost comparison method
- Cost from materials and labor.

DETAILEDORITEM RATEESTIMATE

- This estimate is an accurate and is based on the plan and sanctions of the building.
- The quantity of items under each subhead of work are calculated from the dimensions taken from drawing and then total cost is worked out in a form called abstract of cost
- This include the detailed particulars for the quantities, rate and cost of all the items involved for satisfactory completion of a project
- Quantities of all items of work are calculated from their respective dimension on the drawing on a measurement sheet . multiplying these quantities by their respective rate in separate sheet, the cost of all items of work are worked out individually and then summarized
- A detail estimate is accompanied by

- Report
- Specification
- Detailed drawing showing plane Design data and calculation
- Basis of rates adopted in the estimate

REVISED ESTIMATE

- IT Is also a detailed estimate and is prepared a fresh when the original sanctioned detailed estimateexceedsby10%ormore,either due to rates being found in sufficient or due to some other reasons
- It is always possible that in spite of all precaution in the planning stages it becomes clearly during execution the actual cost of a project will exceed the original estimate, now generally in cushion of the cost is available, if the exceed is higher.
- It is prepare don the basis one estimate on which sanction was obtained showing the existing sanction and the progress made up to date
- Therevisedestimateshouldbeaccompaniedbycomparativestatementshowingtheoriginal and revised rate and quantity

SUPPLEMENTARYESTIMATE

- This is afresh detailed estimate of the additional work in additional work in addition to the original one and is prepared when additional work is required to supplement the original work.
- There is always a like hood that while executing a certain project it may be considered worthwhile

To carry out additional work, which was not fore seen in initial stage sand there fore not actual for the preliminary estimate

- Execution of such work required drawing up and approval of supplementary estimate and the exercise is essential similar to that of drawing up the estimate for the main work it is naturally expected that the cost of additional work will be much smaller than the main work
- In case where a substantial section of a project in a band one or where material deviation from the original proposals are expected to result in substantial savings the estimate is revised by the department and intimated to engineer in charge for execution of work
- But in case wherethesavingisduetoamaterialdeviationofstructuralnaturefromthedesign originally approved supplement estimate is prepared for a revised technical sanction

- The method of preparation of supplementary estimate is the same as that of detail estimate and it should be accompanied by full report of the circumstances which render it necessity.
- The abstract must show the amount of original estimate and the total of sanctioned required including the supplementary amount.

REPAIRANDMAINTENANCEESTIMATE

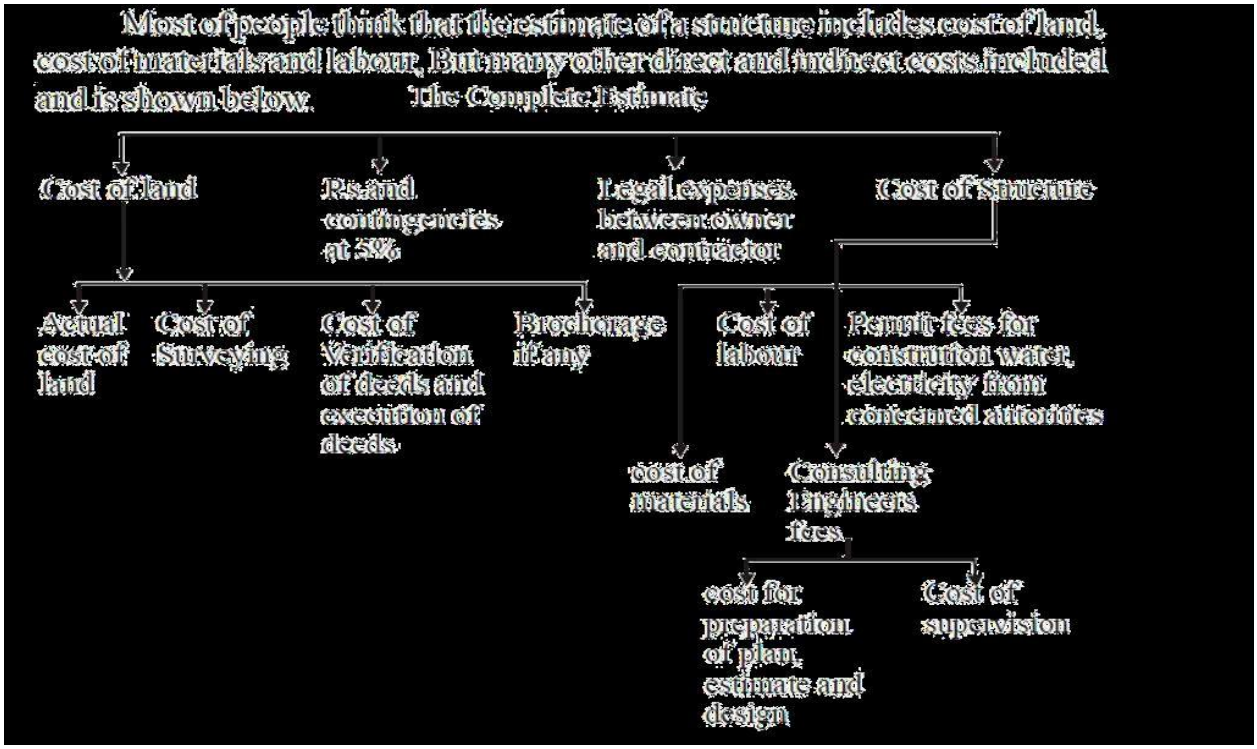
- In order to keep the structure roads etc in proper condition annual repairs and carried out annually for which an estimate is prepared. The estimated amount should not be more than 1.5% of the capital cost of work
- There are more than 10,000 maintenance, repair and preventive maintenance tasks for all types of facilities. With advance Intel communications, computers and other work place technologies ,the list is growing rapidly. In a downsized, fiscally conservative environment, facilities are seen as vital capital assets that affect employee productivity. The demands for technical expertise and cost-effective plant operations have increased dramatically.

- After completion of a work it necessary to maintain the same for the proper function and for the same an estimate is prepared for items which required renewal, placement, repairs, etc in form of detailed estimate
- For building, such items of work like white washing, color and painting of doors and windows etc.quantitiesarebasedonthepreviousmeasurementrecordedinmeasurement book as standard measurement books .for pretty works such as replacement of glass panes, repairs of floors patch repairs to cement plaster walls and changing roof tiles or similar natural works
- The total estimate coat of maintenance of structural is generally kept within the prescribe limits on percentage basis of the cost of the construction of the structure and its imp.
- The total estimated cost of maintenance of structure is generally kept within the prescribed Limits on percentage basis(Variable according to the age and importance of the structure)of the cost of the construction of the .

Structure and its importance.

COMPLETEESTIMATE

- This is an estimated cost of all items which are related to the work in addition to main contractor to the detailed estimate
- One may think that an estimate of a structure includes only the cost of land and the cost items to be included.



Basic SI Units

- Units of Length- Meter(M)-The meter is the length equal to1650673.73wave length sin v a cuum of the radiation corresponding to the transition between the levels $2p_{10}$and $5d_5$of the Kryp ton 86 atom.

- Unit of Mass-Kilogram(Kg)-The kilogram is the unit of mass and is equal to the mass of the international prototype of the Kilogram.

- Unit of Time- Second(s)- The second is the duration of 9192 631 770 periods of the radiation corresponding to the transition between the hyper fine levels of the ground state of the Cesium133 atom.

- Unit of Electric Current-Ampere(A)-The ampere is that constant current which, if maintained in two straight parallel conductors of indefinite length, of negligible circular cross-section and placed one meter apart in vacuum, would produce between these conductors of force equal to 2×10^{-7} Newton per unit length.

- Unit of The rmodynamic Temperature- Kelvin (K)-The Kelvin unit of the thermodynamic temperature of the triple point of water. Kelvin may be used for expressing atemperature interval. The degree Celsius (^{0}C) is a unit of the International

- Unit of LuminousIntensity-Candela(cd)-The candela is the luminousintensity, in the perpendicular direction of a surface of 1/600,000 squaremetre of a black body at the temperature of freezing platinum, under a pressure of 101.325 Newton's per square metre

CHAPTER-2

METHOD OF ESTIMATING

The quantities like earth work, foundation concrete, brick work in plinth and superstructure etc, can be workout by any of following two methods:
a) Long wall-short wall method
b) Centre line method.
c) Partly centre line and short wall method.

LONGWALL-SHORTWALLMETHOD:

In this method, the wall along the length of room is considered to be long wall while the wall perpendicular to long wall is said to be short wall. To get the Measurement of Materials and Works length of long wall or short wall, calculate first the centre line lengths of individual walls.Thenthelengthoflongwall,(outtoout)maybecalculatedafteraddinghalfbreadthat each end to its centre line length. Thus the length of short wall measured into in and may be found by deducting half breadth from its centre line length at each end. The length of long wall usually decreases from earth work to brick work in super structure while the short wall increases. These lengths are multiplied by breadth and depth to get quantities

CENTRELINEMETHOD:

This method is suitable for walls of similar cross-sections. Here the total centre line length is multiplied by breadth and depth of respective item to get the total quantity at a time. When cross walls or partitions or verandah walls join with main all, the centre line length gets reduced by half of breadth for each junction. such junction or joints are studied carefully while calculating total centre line length. The estimates prepared by this method are most accurate and quick.

PARTLYCENTRELINEANDPARTLYCROSSWALLMETHOD:

This method is adopted when external (all-round the building) wall is of one thickness and the internal walls having different thicknesses. In such cases, centre line method is applied to external walls and long wall-short wall method is used to internal walls. This method suits for different thicknesses walls and different level of foundations. Because of this reason, all Engineering departments are practicing this method.

HOWTOPREPAREADETAILEDESTIMAT DETAILED ESTIMATE:

The unit-quantity method is followed to prepare a details of measurement and calculation of quantities. measurement form

Item no	Description /Particular of item work	No of item	Length in meter	Breadth in meter	Depth or Height in meter	Quantity In CUM	Remark

Abstract of estimate form

Item No	Description of item	Quantity with unite	Rate /Unite	Amount in R.S

Functions of an abstract of estimate
The main functions of an abstract of estimate are
 The total estimated cost and the different items of works required to complete projectcan be known.

Basis on which% rate tenders are called after excluding the amount for contingency and work-charged establishment.
Apart of tender document and a contractor can arrive at his own rates from the schedule of work described in the description column.

This is the basis on which bills are prepared for payment. Comparative costs of different items of works can be known.

Data required for preparing detailed estimate
• DRAWING
• SPECIFICATIONS(both general and detailed)
• RATES
• UPDATEDMODEOFMEASUREMENT
• STANDINGCIRCULARS

FACTORS CONSIDERED DURING DETAILED ESTIMATION
(a) Quantity of materials

(b) Availability of materials

(c) Transportation of materials

(d) Location of site

(e) Local labour charges

Principle of Units for Various Items Of Works-
The units of different works depend on their nature, size and shape. In general, the units of different items of work are based on the following principle:-
i) Mass, voluminous and thick works shall be taken in square unit or volume. The measurement of length and breadth or height shall be taken to compute the volume or cubic contents.

ii) Shallow, thin and surface works shall be taken in square units or in area. The measurement of length and breadth or height shall be taken to compute the area.

iii) Long and thin work shall be taken in linear or running unit, and linear measurement shall be taken.

iv) Piece work, job work, etc shall be taken in number.

The units of payments and measurement of various items of work in metric system are same except for earthwork. Earthwork is measurement in cu m but payment is made per 100 cu m(per % cu m).

THE UNITS OF MEASUREMENTS AND PAYMENTS FOR VARIOUS ITEMS OF WORKS AND MATERIALS

Sl. No.	Particulars of Items	Units of measurement in MKS	Units of payment in MKS	Units of payment in FPS
	Earthwork —			
1.	Earthwork in excavation in ordinary soil, earthwork in mixed soil with kankar, bajri, etc. earthwork in hard soil ...	cu m	per % cu m	% cu ft
2.	Rock excavation ...	cu m	per % cu m	% cu ft
3.	Earthfilling in excavation in foundation ...	cu m	per % cu m	% cu ft
4.	Earthfilling in foundation trenches ... (*Usually not measured and not paid separately*)	cu m	per % cu m	% cu ft
5.	Earthfilling in plinth ...	cu m	per % cu m	% cu ft
6.	Earthwork in banking, cutting, in road and irrigation channel ...	cu m	per % cu m	% cu ft
7.	Surface dressing and levelling, cleaning, etc. ...	sq m	per sq m	% sq ft
8.	Cutting of trees (Girth specified) ...	no.	per no.	per no
9.	Puddling, Puddle clay core ...	cu m	per % cu m	% cu ft
10.	Sand filling ...	cu m	per cu m	% cu ft
11.	Quarrying of stone or boulder ...	cu m	per cu m	% cu ft
12.	Blasting of rock (Blasted stone stacked and then measured) ...	cu m	per cu m	% cu ft
	Note. — (*For earthwork, normal lead is 30 m and normal lift is 1.5 m*).			

Sl. No.	Particulars of Items	Units of measurement in MKS	Units of payment in MKS	Units of payment in FPS
	Concrete —			
1.	Lime concrete (L.C.) in foundation ...	cu m	per cu m	% cu ft
2.	Lime concrete (L.C.) in roof terracing, thickness specified ... (*May also be in volume basis as practice in U.P.*).	sq m	per sq m	% sq ft
3.	Cement concrete (C.C.) ...	cu m	per cu m	per cu ft
4.	Reinforced cement concrete (R.C.C.) ...	cu m	per cu m	per cu ft
5.	C.C. or R.C.C. Chujja, sun shade ...	cu m	per cu m	per cu ft
6.	Precast C.C. or R.C.C. ...	cu m	per cu m	per cu ft
7.	Jali work or jaffri work or C.C. tracery panels (Thickness specified) ...	sq m	per sq m	per sq ft
8.	Cement concrete bed ...	cu m	per cu m	per cu ft
	D.P.C. —			
9.	Damp proof course — Cement concrete, Rich cement mortar, Asphalt, etc. (Thickness specified) ...	sq m	per sq m	% sq ft
	Brickwork —			
1.	Brickwork in foundation and plinth, in superstructure, in arches, etc., in cement, lime or mud mortar ...	cu m	per cu m	% cu ft
2.	Sun dried brickwork ...	cu m	per cu m	% cu ft
3.	Honey-comb brickwork, thickness specified... (*May also be in volume basis as practice in U.P.)*	sq. m	per sq m	% sq ft
4.	Brickwork in jack arches, if measured separately ...	cu m	per cu m	% cu ft
5.	Jack arch roofing including top finishing ...	sq m	per sq m	% sq ft
6.	Brickwork in well steining ...	cu m	per cu m	% cu ft
7.	Half-brickwork with or without reinforcement (*May also be in cu m as practice in U.P.*) ...	sq m	per sq m	% sq ft
8.	Thin partition wall ...	sq m	per sq m	% sq ft
9.	Reinforced brickwork (R.B. work) ...	cu m	per cu m	% cu ft
10.	String course, drip course, weather course, coping etc. (Projection specified) ...	metre	per m	per r ft

Sl. No.	Particulars of Items	Units of measurement in MKS	Units of payment in MKS	Units of payment in FPS
11.	Cornice (Projection and type specified) ...	metre	per m	per r ft
12	Brickwork in Fire place, Chulla, Chimney ...	cu m	per cu m	% cu ft
13.	Pargetting Chimney, fire place flue ...	metre	per m	per r ft
14.	Brick edging (by road side) ...	metre	per m	per r ft
	Stone work —			
1.	Stone masonry, Random Rubble masonry, Coursed Rubble masonry, Ashlar masonry in walls, in arches, etc. ...	cu m	per cu m	% cu ft
2.	Cut stone work in lintel, beam, etc. ...	cu m	per cu m	per cu ft
3.	Stone slab in roof, shelve, etc., stone chujjas, stone sun shed, etc. (Thickness specified) ...	sq m	per sq m	% sq ft
4.	Stone work in wall facing or lining (Thickness specified)	sq m	per sq m	per sq ft
	Wood work —			
1.	Wood work, door and window frame or chowkhat, rafters beams, roof trusses, etc. ...	cu m	per cu m	per cu ft
2.	Door and window shutters or leaves, panelled, battened, glazed, part panelled and part glazed, wire gauged, etc. (Thickness specified) ...	sq m	per sq m	per sq ft
3.	Door and window fittings as hinges tower bolts, sliding bolts, handles, etc. ... *(May also be on the basis of area of shutters as practice in U.P.)*	no.	per no.	per no.
4.	Timbering, boarding (Thickness specified) ...	sq m	per sq m	per sq ft
5.	Timbering of trenches (Area of face supported) ...	sq m	per sq m	per sq ft
6.	Sawing of timber ...	sq m	per sq m	per sq ft
7.	Woodwork in partition, Ply wood, etc. ...	sq m.	per sq m	per sq ft
8.	Ballies (Diameter specified) ...	metre	per m	per r ft
	Steel work —			
1.	Rolled Steel joists, Channels, Angles, T-irons, Flats, Squares, Rounds, etc. ...	quintal	per q	per cwt
2.	Steel reinforcement bars, etc., in R.C.C., R. B. work ...	quintal	per q	per cwt
3.	Bending, binding of steel reinforcement ...	quintal	per q	per cwt

Sl. No.	Particulars of Items	Units of measurement in MKS	Units of payment in MKS	Units of payment in FPS
4.	Slate roofing, timber roofing ...	sq m	per sq m	% sq ft
5.	Thatch roofing including bamboo jaffri (Thickness specified) ...	sq m	per sq m	% sq ft
6.	Eave board (Thickness specified) ...	sq m	per sq m	per sq ft
7.	R.C.C., R.B. slab roof (excluding steel) ...	cu m	per cu m	per cu ft
8.	Lime concrete roof over and inclusive of tiles or brick, or stone slab, etc. (Thickness specified) ...	sq m	per sq m	% sq ft
9.	Mud roof over and inclusive of tiles, or bricks, or stone slab, etc. (Thickness and type specified) ...	sq m	per sq m	% sq ft
10.	Ridges, valleys, gutters, (Girth specified) ...	metre	per m	per r ft
11.	Tar felting, Bituminous painting ...	sq m	per sq m	% sq ft
12.	Insulating layer in roof of sand and clay, asphalt, etc. ...	sq m	per sq m	% sq ft
13.	Expansion, contraction or construction joint ...	metre	per m	per r ft
14.	Ceiling — Timber, A.C. Sheet plain, Cloth, Cement plaster on XPM, Paste board, etc. ...	sq m	per sq m	per sq ft
15.	Centering and shuttering, Form work — Surface area of R.C.C. or R.B. work supported (*May also be per cu m (cu ft) of R.C.C. or R.B. work*)	sq m	per sq m	% sq ft
	Plastering, Pointing and Finishing —			
1.	Plastering — Cement mortar, Lime mortar, mud, etc. (Thickness, proportion specified)	sq m	per sq m	% sq ft
2.	Pointing — Struck, Flush, Weather, etc. ...	sq m	per sq m	% sq ft
3.	Dado (Thickness and type specified) ...	sq m	per sq m	% sq ft
4.	Skirting (Thickness type and height specified)	metre	per m	per r ft
5.	Cement mortar or lime mortar rubbing ...	sq m	per sq m	% sq ft
6.	White washing, Colour washing, Cement washing (No. of coat specified) ...	sq m	per sq m	% sq ft
7.	Distempering (No. of coat specified) ...	sq m	per sq m	% sq ft
8.	Snow cement washing or finishing (No. of coat specified) ...	sq m	per sq m	% sq ft

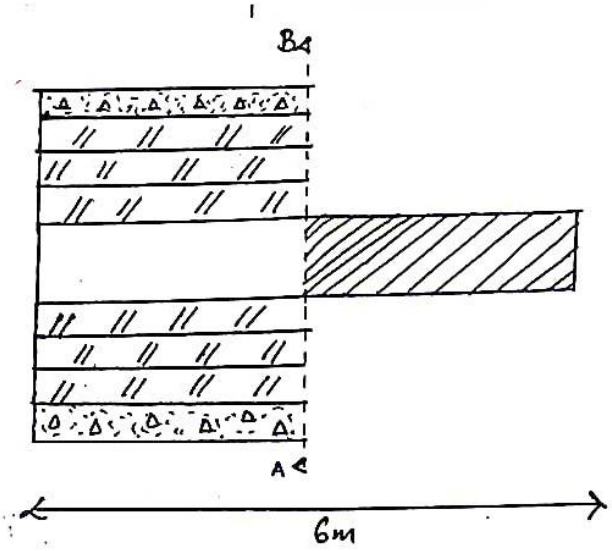
Sl. No.	Particulars of Items	Units of measurement in MKS	Units of payment in MKS	Units of payment in FPS
4.	Fabrication and hoisting of steel work ...	quintal	per q	per cwt
5.	Expended Metal (X.P.M.), size specified ...	sq m	per sq m	per sq ft
6.	Fabric reinforcement, wire netting ...	sq m	per sq m	per sq ft
7.	Iron work in struss ...	quintal	per q	per cwt
8.	Gusset plate (Minimum rectangular size from which cut) ...	quintal	per q	per cwt
9.	Cutting of Iron Joists, channels ...	cm	per cm	per inch
10.	Cutting, Angles, Tees, Plate ...	sq cm	per sq cm	per sq inch
11.	Threading in iron ...	cm	per cm	per inch
12.	Welding, solder of sheets, plates ... (*Welding of rails, steel, trusses, rods — per no.*)	cm	per cm	per inch
13.	Boring holes in iron ...	no	per no.	per no.
14.	Cast Iron (C.I.) pipe, Dia. specified ...	metre	per m	per ft
15.	Rivets, Bolts and nuts, Anchor bolts, Lewis bolts, Holding down bolts, etc. ...	quintal	per q	per cwt
16.	Barbed wire fencing ...	metre	per m	% r ft
17.	Iron gate ... (*May also be by weight, quintal*)	sq m	per sq m	per sq ft
18.	Iron hold fast ... (*May also be by no.*)	quintal	per q	per cwt
19.	Iron railing (Height and types specified) ...	metre	per m	per r ft
20.	Iron grill, collapsible gate ... (*May also be by weight, quintal*)	sq m	per sq m	per sq ft
21.	Rolling shutter ...	sq m	per sq m	per sq ft
22.	Steel doors and windows (type and fixing specified) ...	sq m	per sq m	per sq ft
	Roofing —			
1.	Tiled roof — Allahabad tile, Faizabad tile, Mangalore tile, etc. including battens ...	sq m	per sq m	% sq ft
2.	Country tile roof including bamboo jaffri ...	sq m	per sq m	% sq ft
3.	Corrugated iron (G.C.I.) roof, Asbestos cement (A.C.) sheet roof ...	sq m	per sq m	% sq ft

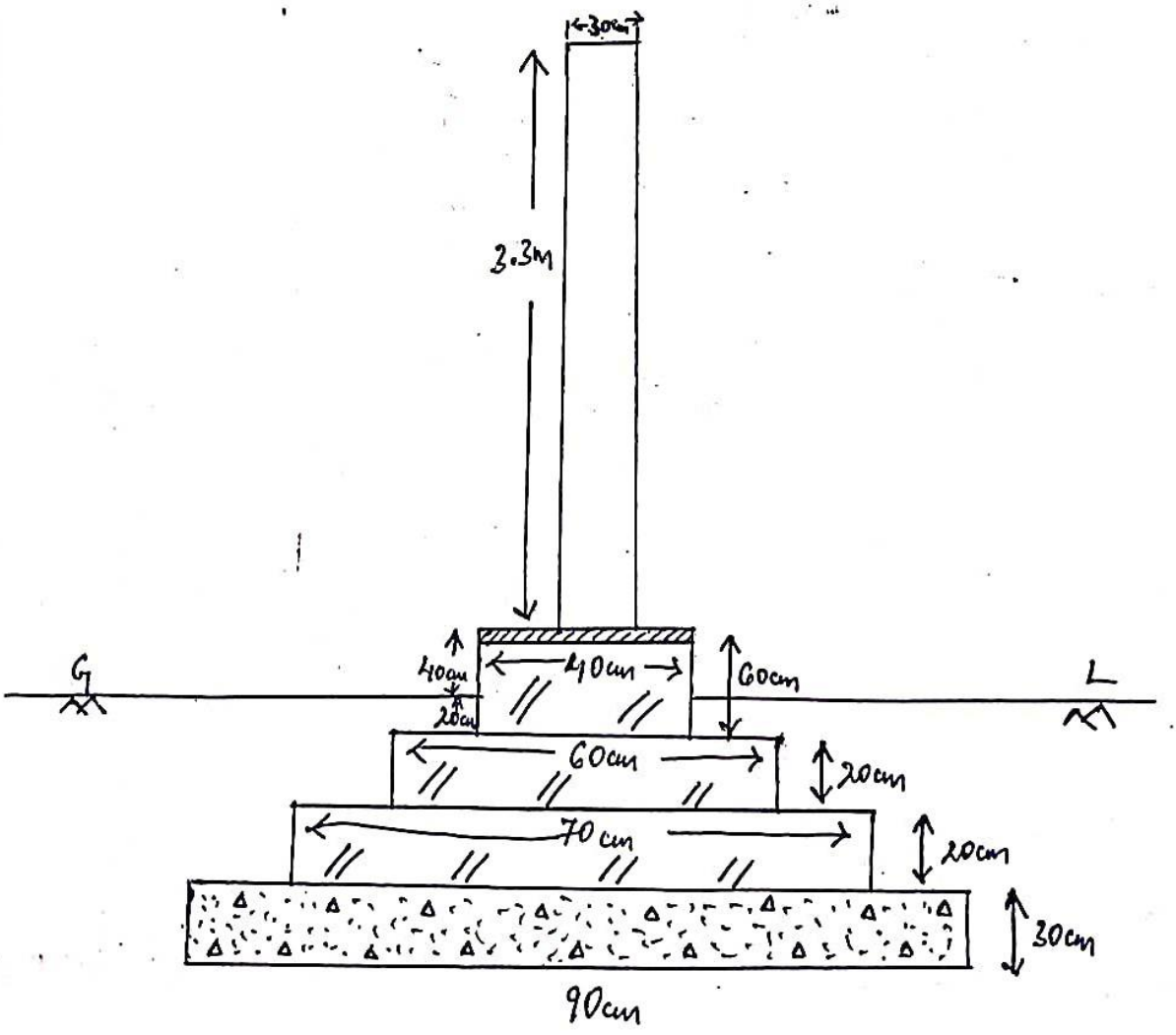
Sl. No.	Particulars of Items	Units of measurement in MKS	Units of payment in MKS	Units of payment in FPS
3.	Ornamental Pillar caps, Pillar base, Flowers, Brackets, etc. ...	no.	per no.	per no.
4.	Railing (Height and type specified) ...	metre	per m	per r ft
5.	Surface drain small (size, material, etc. specified) ...	metre	per m	per r ft
6.	Surface drain large (item wise) —			
	(*i*) Masonry ...	cu m	per cu m	% cu ft
	(*ii*) Plastering ...	sq m	per sq m	% sq ft
7.	Pipe — rainwater, sanitary, water pipe, etc. (Dia. specified) ...	metre	per m	per r ft
8.	Laying pipe line — sanitary, water pipe, etc. (Dia, depth, bedding etc. specified) ...	metre	per m	per r ft
9.	Jungle clearance ... (*May also be per km for road and irrigation channel*)	sq m or hectare	per sq m or per hectare	% sq ft or per acre
10.	Silt clearance in irrigation channels (Similar to earthwork) ... (*For thin layer upto 5 cm may be on area basis*)	cu m	per % cu m	% cu ft
11.	Trestle, Crate (size, type, etc. specified) ...	no.	per no.	per no.
12.	Cleaning flues ...	no.	per no.	per no.
13.	Cotton cords in sky light ... (*May also be by weight in kg*)	no.	per no.	per no.
14.	Easing doors and windows ...	no.	per no.	per no.
15.	Fixing doors and windows ...	no.	per no.	per no.
16.	Supply and fixing of Hinges, Tower bolts, Hasp and staples, Handles, Hardwares, etc....	no.	per no.	per no.
17.	Glazing ...	sq m	per sq m	per sq ft.
18.	Glass panes (supply) ...	sq m	per sq m	per sq ft.
19.	Fixing of glass panes or cleaning ...	no.	per no.	per no.
20.	Renewing of glass panes ...	no.	per no.	per no.
21.	Well sinking (Masonary or tube well) ...	metre	per m	per r ft.
22.	Pile driving or sinking ...	metre	per m	per r ft
23.	Furnitures — Chairs, tables, etc. (size shape specified) ...	no.	per no.	per no.

Sl. No.	Particulars of Items	Units of measurement in MKS	Units of payment in MKS	Units of payment in FPS
3.	Ornamental Pillar caps, Pillar base, Flowers, Brackets, etc. ...	no.	per no.	per no.
4.	Railing (Height and type specified) ...	metre	per m	per r ft
5.	Surface drain small (size, material, etc. specified) ...	metre	per m	per r ft
6.	Surface drain large (item wise) —			
	(*i*) Masonry ...	cu m	per cu m	% cu ft
	(*ii*) Plastering ...	sq m	per sq m	% sq ft
7.	Pipe — rainwater, sanitary, water pipe, etc. (Dia. specified) ...	metre	per m	per r ft
8.	Laying pipe line — sanitary, water pipe, etc. (Dia, depth, bedding etc. specified) ...	metre	per m	per r ft
9.	Jungle clearance ... (*May also be per km for road and irrigation channel*)	sq m or hectare	per sq m or per hectare	% sq ft or per acre
10.	Silt clearance in irrigation channels (Similar to earthwork) ... (*For thin layer upto 5 cm may be on area basis*)	cu m	per % cu m	% cu ft
11.	Trestle, Crate (size, type, etc. specified) ...	no.	per no.	per no.
12.	Cleaning flues ...	no.	per no.	per no.
13.	Cotton cords in sky light ... (*May also be by weight in kg*)	no.	per no.	per no.
14.	Easing doors and windows ...	no.	per no.	per no.
15.	Fixing doors and windows ...	no.	per no.	per no.
16.	Supply and fixing of Hinges, Tower bolts, Hasp and staples, Handles, Hardwares, etc....	no.	per no.	per no.
17.	Glazing ...	sq m	per sq m	per sq ft.
18.	Glass panes (supply) ...	sq m	per sq m	per sq ft.
19.	Fixing of glass panes or cleaning ...	no.	per no.	per no.
20.	Renewing of glass panes ...	no.	per no.	per no.
21.	Well sinking (Masonary or tube well) ...	metre	per m	per r ft.
22.	Pile driving or sinking ...	metre	per m	per r ft
23.	Furnitures — Chairs, tables, etc. (size shape specified) ...	no.	per no.	per no.

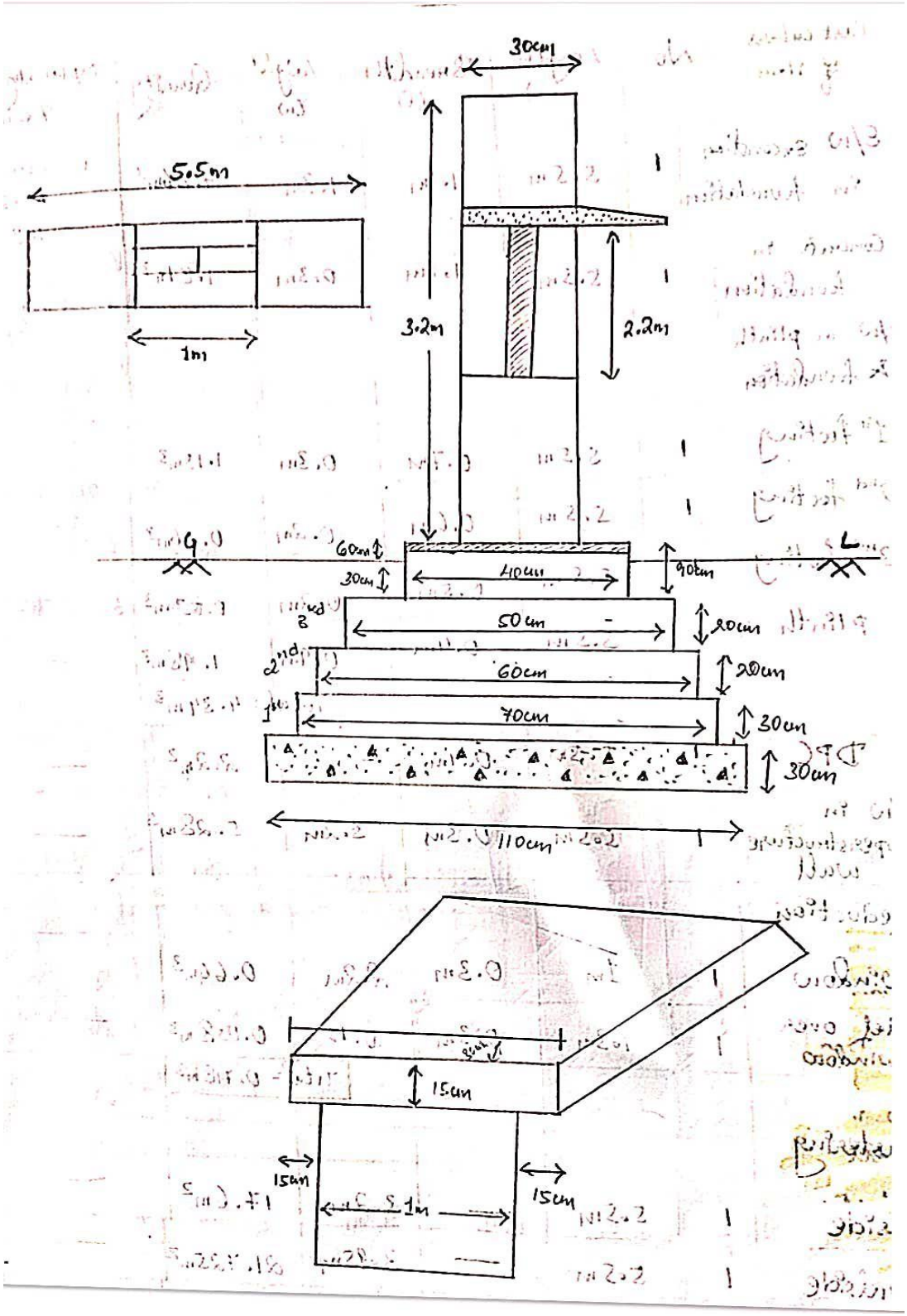
Sl. No.	Particulars of Items	Units of measurement in MKS	Units of payment in MKS	Units of payment in FPS
24.	Painting furnitures ...	no.	per no.	per no
25.	Caning chairs ...	no.	per no.	per no.
26.	Pitching of brick, stone, kankar, etc. ... *(Brick pitching may also be on area basis in sq m)*	cu m	per cu m	% cu ft
27.	Lining of Irrigation Channel, Tunnel, etc. *Materials, thickness specified* ... *(Thick lining may be in volume basis in cu m)*	sq m	per sq m	% sq ft
28.	Kankar quarrying, kankar supply ...	cu m	per cu m	% cu ft
29.	Kankar consolidation, road metal consolidation ...	cu m	per cu m	% cu ft
30.	Dag-belling ... *(May also be per km)*	metre	per m	% r ft
31.	Bituminous road surfacing ...	sq m	per sq m	% sq ft
32.	*Dismantling* —	Same as for different items	Same as for different items	Same as for different items
33.	Dismantling of brick masonry ...	cu m	per cu m	% cu ft
34.	Grouting (Bituminous grouting of road metal, cement grouting of concrete) ...	sq m	per sq m	% sq ft
35.	Grouting of cracks, joints, etc. ...	metre	per m	per r ft
36.	Electric Wiring or Electrification Light, Fan, Plug points ...	point	per point	per point
37.	Watercloset (W.C.), Wash hand basin, Manhole, etc. (size specified) ...	no	per no	per no
	Materials —			
1.	Supply of bricks ...	% nos.	per % nos.	% nos.
2.	Supply of Sand, Surkhi, Cinder, etc. ...	cu m	per cu m	% cu ft
3.	Supply of cement ...	bag of 50 kg	per bag or per quintal or per tonne	per cwt or per ton
4.	Supply of lime unslaked ...	quintal	per quintal	per maund
5.	Supply of lime slaked ... *(May also be in volume basis in cu m)*	quintal	per quintal	per maund

Sl. No.	Particulars of Items	Units of measurement in MKS	Units of payment in MKS	Units of payment in FPS
6.	Supply of Brick ballast, Stone ballast, Aggregate, etc. ...	cu m	per cu m	℅ cu ft
7.	Broken bricks, Kankar, etc. ...	cu m	per cu m	℅ cu ft
8.	Supply of Timber ...	cu m	per cu m	℅ cu ft
9.	Supply of Steel ...	quintal	per q or per tonne	per cwt
10.	Supply of Bitumen, Tar ...	tonne	per tonne	per ton
11.	Supply of Coal ...	tonne	per tonne	per ton
12.	Supply of A.C. sheets (Measured flat) ...	sq m	sq m	sq ft
13.	Supply of G.I. sheet ...	quintal	per qunital	per cwt
14.	Supply of switches, plugs, ceiling roses, bulbs, brackets, etc. ...	no.	per no.	per no.
15.	Supply of insulated electric wire (size specified) ...	quintal	per quintal	per cwt.
16.	Supply of bare electric wire (size specified) ...	quintal	per quintal	per cwt.
17.	Tents, sholdaries (size specified) ...	no.	per no.	per no.
18.	Supply of Water closet, W.C. (size specified) ...	no.	per no.	per no.
19.	Supply of Wash hand basin (size specified) ...	no.	per no.	per no.
20.	Supply of Cowl, Mica valve, Intercepting trap, etc. (size specified) ...	no.	per no.	per no.
21.	Supply of Bib cock, Stop cock, Ball cock, etc. (size specified) ...	no.	per no.	per no.
22.	Supply of Ferrule, C.I. Tank, Water meter, etc. (size specified) ...	no.	per no.	per no.
23.	Supply of pipe, C.I. pipe, S. W. pipe. Hume pipe, A.C. pipe, G.I. pipe, etc. (Dia. specified) ...	metre	per m	per r ft
24.	Supply of lead, lead wool ...	kg or quintal	per kg or per quintal	per cwt
25.	Spun yarn ...	kg	per kg	per lb
26.	Supply of varnish, oil, etc. ...	litre	per litre	per gl

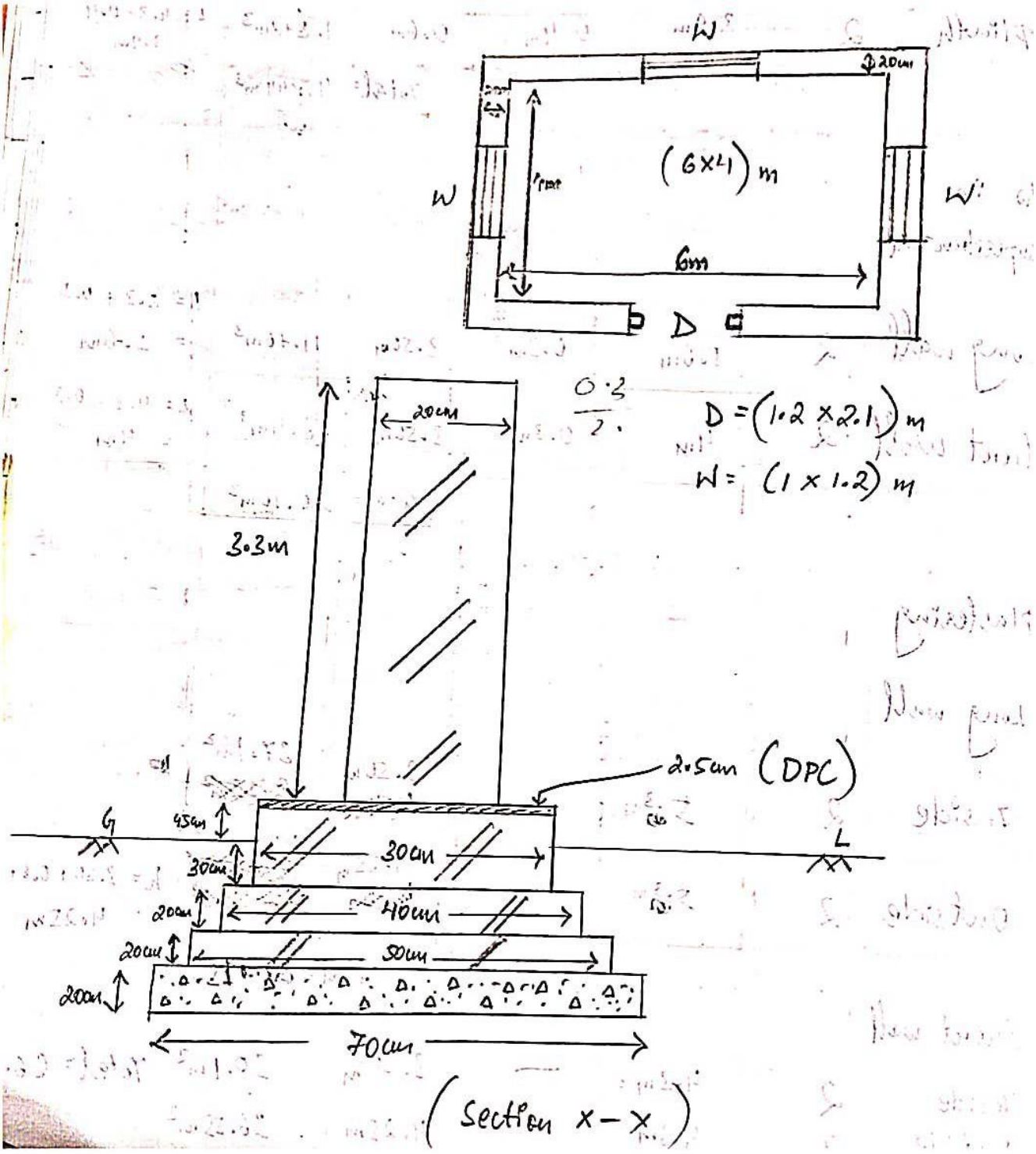

B
A
6m


30cm
3.3m
G
L
40cm
20cm
40cm
60cm
60cm
20cm
70 cm
20cm
30cm
90cm

SINGLEWALLQUANTITY ESTIMATION							
Item No	Particulars of Item	No's item	Length (M)	Breath(M)	Depth or Height(M)	Quantity	Remark
1	E/W Excavation in foundation	1	6M	0.9M	0.9M	4.86 cum	H=0.3+0.2+0.2+0.2=0.9M
2	Concrete in foundation	1	6M	0.9M	0.3M	1.62 cum	
3	B/W in foundation & footing						
	1stfooting	1	6M	0.7M	0.2M	0.84M3	----------
	2nd footing	1	6M	0.6M	0.2M	0.72M3	----------
	Plinth	1	6M	0.4M	0.6M	1.44M3	H=0.4+0.2=0.6M
				Total		3 cum	
4	DPC	1	6M	0.4M		2.4 cum	
5	B/W in Superstructure	1	6M	0.3M	3.3M	5.94 cum	
6	Plastering						
	Inside	1	6M	---	3.3M	19.8 sqm	----------
	Outside	1	6M	---	3.8M	22.8 sqm	H=3.3+0.4+0.1=3.8M
	SINGLEWALLWITHWINDOWQUANTITYESTIMATION						
Item No	Particulars of Item	No's item	Length (M)	Breath(M)	Depth or Height(M)	Quantity	Remark
1	E/W Excavation in foundation	1	5.5M	1.1M	1.3M	7.86 cum	H=0.3+0.2+0.2+0.3+0.3=1.3 M
2	Concrete in foundation	1	5.5M	1.1M	0.3M	1.81 cum	----------
3	B/W in foundation & footing						
	1stfooting	1	5.5M	0.7M	0.3M	1.15 cum	----------
	2nd footing	1	5.5M	0.6M	0.2M	0.66 cum	----------
	3rd footing	1	5.5M	0.5M	0.2M	0.55 cum	----------
	Plinth	1	5.5M	0.4M	0.9M	1.9 cum	H=0.6+0.3=0.9M
4	DPC	1	5.5M	0.4M	----	2.2 sqm	----------
5	B/W in Superstructure	1	5.5M	0.3M	3.2M	5.28 cum	----------
	Deduction						
	Window	1	1M	0.3M	2.2M	0.66 cum	


30cm
5.5m
1m
3.2m
2.2m
60cm
30cm
40cm
90cm
50cm
20cm
60cm
20cm
70cm
30cm
30cm
110cm
15cm
15cm
15cm
1m

SINGLE ROOM BUILDING QUANTITY ESTIMATE



SINGLE ROOM BUILDING QUANTITY ESTIMATION

C/C distance of L/W= 0.3/2+6+0.3/2 = 6.3M

C/C distance of S/W= 0.3/2+5+0.3/2 = 5.3M

m no.	Particular of Item	No.	Length	Breadth	Height	Quantity	Explanatory Note
1	E/W excavation in foundation						
	Long wall	2	7.1M	0.8M	1.1M	12.496M3	H=0.4+0.2+0.2+0.3=1.1M, L=6.3+0.8=7.1M
	Short wall	2	4.5M	0.8M	1.1M	7.92M3	L=5.3-0.8= 4.5M
					Total=	20.416M3	
2	Concrete in foundation						
	Long wall	2	7.1M	0.8M	0.3M	3.408M3	L= 6.3+0.8= 7.1M
	Short wall	2	4.5M	0.8M	0.3M	2.16M3	L=5.3-0.8= 4.5M
					Total=	5.568M3	
3	B/W in footing & foundation						
	Long wall						
(i)	1st footing	2	7M	0.7M	0.2M	1.96M3	L= 6.3+0.7= 7M
(ii)	2nd footing	2	6.8M	0.5M	0.2M	1.36M3	L= 6.3+0.5= 6.8M
(iii)	Plinth	2	6.7M	0.4M	1M	5.36M3	L= 6.3+0.4=6.7M & H= 0.4+0.6=1M
	Short wall						
(i)	1st footing	2	4.6M	0.7M	0.2M	1.288M3	L= 5.3-0.7= 4.6M
(ii)	2nd footing	2	4.8M	0.5M	0.2M	0.96M3	L= 5.3-0.5= 4.8M
(iii)	Plinth	2	4.9M	0.4M	1M	3.92M3	L= 5.3-0.4= 4.9M & H= 0.4+0.6= 1M
					Total=	14.848M3	
4	DPC						
	Long wall	2	6.7M	0.4M	-----	5.36M2	L= 6.3+0.4= 6.7M
	Short wall	2	4.9M	0.4M	-----	3.92M2	L= 5.3-0.4= 4.9M
					Total=	9.28M2	
5	B/W in superstructure						
	Long wall	2	6.6M	0.3M	3.2M	12.672M3	L= 6.3+0.3= 6.6M
	Short wall	2	5M	0.3M	3.2M	9.6M3	L= 5.3-0.3= 5M
					Total=	22.272M3	
6	Plastering						
	Long wall						
	Inside	2	6M	------	3.2M	38.4M2	----------
	Outside	2	6.6M	------	4M	52.8M2	L=6+0.3+0.3= 6.6M &H= 3.2+0.6+0.2= 4M
	Short wall						
	Inside	2	5M	-------	3.2M	32M2	----------
	Outside	2	5.6M	-------	4M	44.8M2	L=5+0.3+0.3=5.6M & H= 3.2+0.6+0.2= 4M

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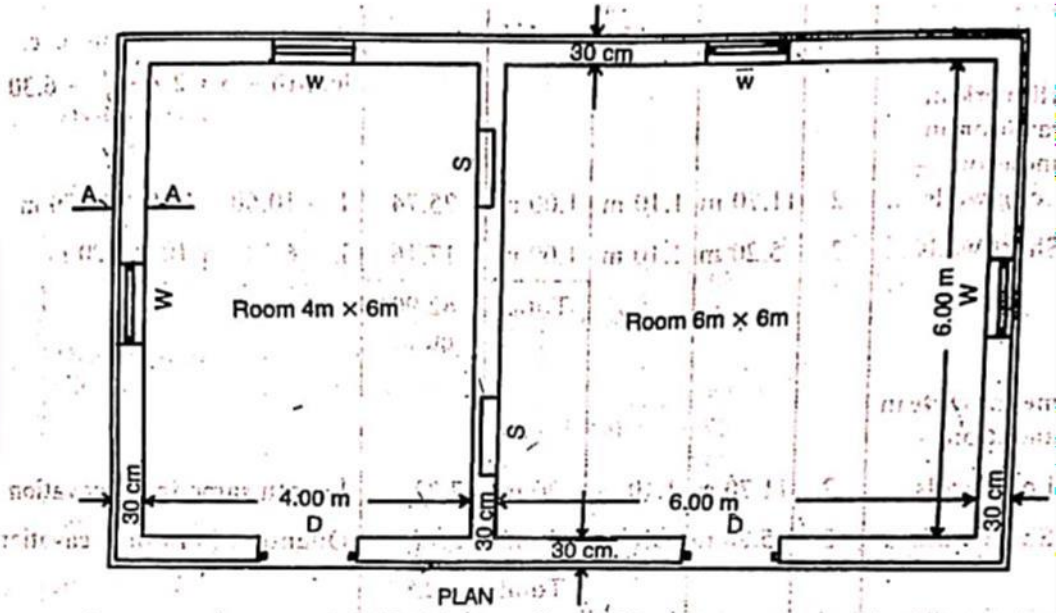

30 cm
W
W
S
A
A
W
Room 4m × 6m
Room 6m × 6m
6.00 m
W
S
30 cm
4.00 m
D
30 cm
6.00 m
D
30 cm
30 cm.
PLAN

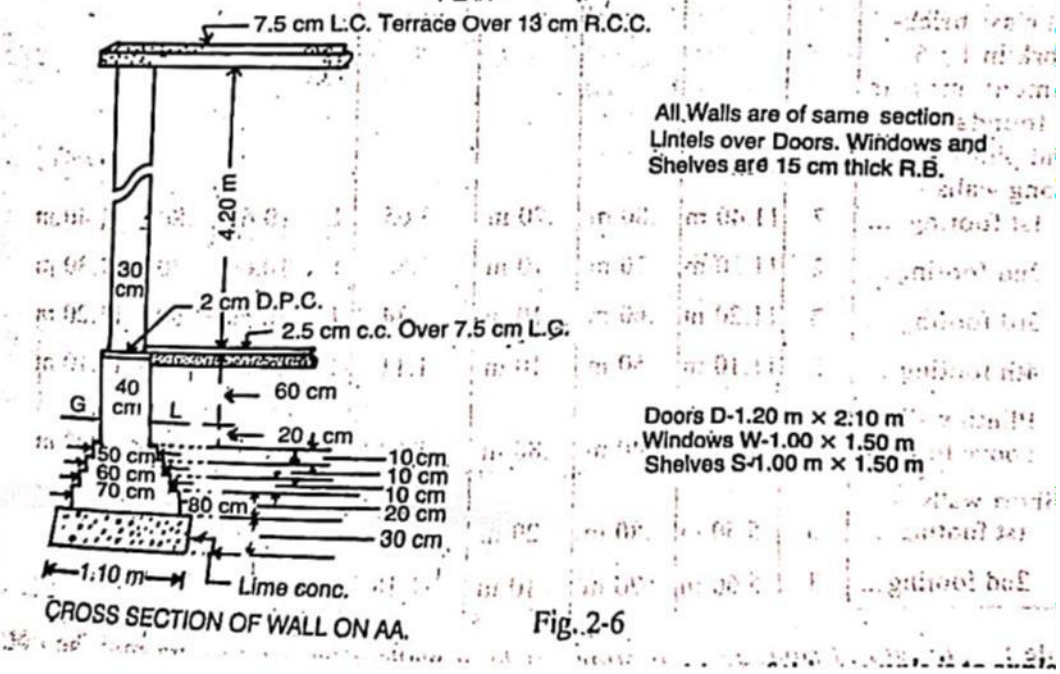

7.5 cm L.C. Terrace Over 13 cm R.C.C.
All Walls are of same section
Lintels over Doors. Windows and
Shelves are 15 cm thick R.B.
4.20 m
30 cm
2 cm D.P.C.
2.5 cm c.c. Over 7.5 cm L.C.
40 cm
G
L
60 cm
20 cm
50 cm
60 cm
70 cm
80 cm
10 cm
10 cm
10 cm
20 cm
30 cm
Doors D-1.20 m × 2.10 m
Windows W-1.00 × 1.50 m
Shelves S-1.00 m × 1.50 m
1.10 m
Lime conc.
CROSS SECTION OF WALL ON AA.

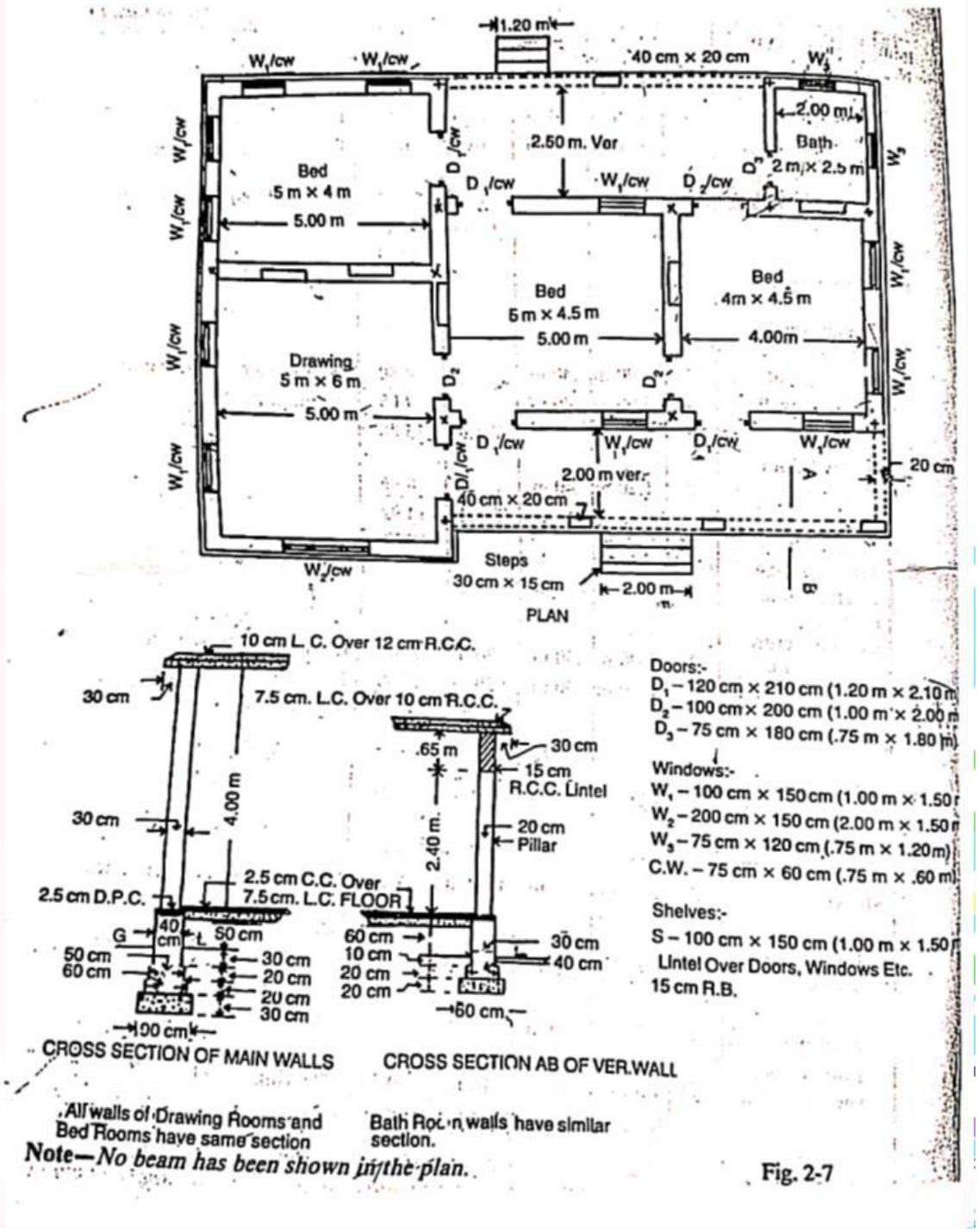
Fig. 2-6

TWO ROOM BUILDING WITH WINDOW,DOOR & SHELVES QUANTITY ESTIMATION

C/C distance of L/W= 0.3/2+4+0.3+6+0.3/2= 10.6M

C/C distance of S/W= 0.3/2+6+0.3/2= 6.3M

n no.	Particular of Item	No.	Length	Breadth	Height	Quantity	Explanatory Note
1	E/W excavation in foundation						
	Long wall	2	11.7M	1.10M	1M	25.74M3	L=10.6+1.10= 11.7M & H=0.2+0.1+0.1+0.1+0.2+0.3=1M
	Short wall	3	5.2M	1.10M	1M	17.16M3	L=6.3-1.10= 5.2M
					Total=	42.9M3	
2	Concrete in foundation						
	Long wall	2	11.7M	1.10M	0.3M	7.722M3	L=10.6+1.10= 11.7M
	Short wall	3	5.2M	1.10M	0.3M	5.148M3	L=6.3-1.10= 5.2M
					Total=	12.87M3	
3	B/W in footing & foundation						
	Long wall						
(i)	1st footing	2	11.4M	0.8M	0.2M	3.648M3	L=10.6+0.8= 11.4M
(ii)	2nd footing	2	11.3M	0.7M	0.1M	1.582M3	L=10.6+0.7= 11.3M
(iii)	3rd footing	2	11.2M	0.6M	0.1M	1.344M3	L=10.6+0.6= 11.2M
(iv)	4th footing	2	11.1M	0.5M	0.1M	1.11M3	L=10.6+0.5= 11.1M
(v)	Plinth	2	11M	0.4M	0.8M	7.04M3	L=10.6+0.4= 11M & H=0.2+0.6=0.8M
	Short wall						
(i)	1st footing	3	5.5M	0.8M	0.2M	2.64M3	L=6.3-0.8= 5.5M
(ii)	2nd footing	3	5.6M	0.7M	0.1M	1.176M3	L=6.3-0.7= 5.6M
(iii)	3rd footing	3	5.7M	0.6M	0.1M	1.026M3	L=6.3-0.6= 5.7M
(iv)	4th footing	3	5.8M	0.5M	0.1M	0.87M3	L=6.3-0.5= 5.8M
(v)	Plinth	3	5.9M	0.4M	0.8M	5.664M3	L=6.3-0.4= 5.9M & H=0.2+0.6= 0.8M
					Total=	26.1M3	
4	DPC						
	Long wall	2	11M	0.4M	----	8.8M2	L=10.6+0.4= 11M
	Short wall	3	5.9M	0.4M	----	7.08M2	L=6.3-0.4= 5.9M
					Total=	15.88M2	



All walls of Drawing Rooms and Bed Rooms have same section

Bath Room walls have similar section.

Note—No beam has been shown in the plan.

Fig. 2-7

MULTIROOM BUILDING WITH DOUBLE VERANDAH QUANTITY ESTIMATION

(i)	**Leftside Bedroom & Drawing room**						
	C/C distance of L/W= 0.3/2+6+0.3+4+0.3/2= 10.6M						
	C/C distane of S/W= 0.3/2+5+0.3/2= 5.3M						
(ii)	**Rightside two Bedroom**						
	C/C distance of L/W= 0.3/2+5+0.3+4+0.3/2= 9.6M						
	C/C distance of S/W= 0.3/2+4.5+0.3/2= 4.8M						
(iii)	**Front Verandah**						
	C/C distance of L/W= 0.3/2+5+0.3+4+0.1+0.2/2= 9.65M						
	C/C distance of S/W= 0.2/2+2+0.3/2= 2.25M						
(iv)	**Back Verandah & Bathroom**						
	C/C distance of L/W= 0.3/2+5+0.3+4+0.1+0.2/2= 9.65M						
	C/C distance of S/W= 0.3/2+2.50+0.2/2= 2.75M						
n no.	**Particular of Item**	**No.**	**Length**	**Breadth**	**Height**	**Quantity**	**Explanatory Note**
1	**E/W excavation in foundation**						
(i)	Leftside Bedroom & Drawing room						
	Long wall	2	11.5M	0.9M	1M	20.7M3	L=10.6+0.9= 11.5M & H=0.3+0.2+0.2+0.3=1M
	Short wall	3	4.4M	0.9M	1M	11.88M3	L=5.3-0.9= 4.4M
(ii)	Rightside two Bedroom						
	Long wall	2	10.5M	0.9M	1M	18.9M3	L=9.6+0.9= 10.5M & H=0.3+0.2+0.2+0.3= 1M
	Short wall	2	3.9M	0.9M	1M	7.02M3	L=4.8-0.9= 3.9M
(iii)	Front Verandah						
	Long wall	1	9.5M	0.6M	0.5M	2.85M3	L=9.65+0.6/2-0.9/2= 9.5M & H=0.1+0.2+0.2= 0.5M
	Short wall	1	1.5M	0.6M	0.5M	0.45M3	L=2.25-0.6/2-0.9/2= 1.5M
(iv)	Back Verandah & Bathroom						
	Long wall	1	9.5M	0.6M	0.5M	2.85M3	L=9.65+0.6/2-0.9/2= 9.5M & H=0.1+0.2+0.2= 0.5M
	Short wall	2	2M	0.6M	0.5M	1.2M3	L=2.75-0.6/2-0.9/2= 2M
					Total=	65.85M3	
2	**Concrete in foundation**						

(i)	Leftside Bedroom & Drawing room						
	Long wall	2	11.5M	0.9M	0.3M	6.21M3	L=10.6+0.9= 11.5M
	Short wall	3	4.4M	0.9M	0.3M	3.564M3	L=5.3-0.9= 4.4M
(ii)	Rightside two Bedroom						
	Long wall	2	9.6M	0.9M	0.3M	5.184M3	L=9.6+0.9/2-0.9/2= 9.6M
	Short wall	2	3.9M	0.9M	0.3M	2.106M3	L=4.8-0.9/2-0.9/2= 3.9M
(iii)	Front Verandah						
	Long wall	1	9.7M	0.6M	0.2M	1.164M3	L=9.65+0.6/2-0.5/2= 9.7M
	Short wall	1	1.7M	0.6M	0.2M	0.204M3	L=2.25-0.6/2-0.5/2= 1.7M
(iv)	Back Verandah & Bathroom						
	Long wall	1	9.7M	0.6M	0.2M	1.164M3	L=9.65+0.6/2-0.5/2= 9.7M
	Short wall	2	2.2M	0.6M	0.2M	0.528M3	L=2.75-0.6/2-0.5/2= 2.2M
					Total=	18.756M3	
3	**B/W in footing & foundation**						
(i)	Leftside Bedroom & Drawing room						
	Long wall						
*	1st footing	2	11.2M	0.6M	0.2M	2.688M3	L=10.6+0.6= 11.2M
*	2nd footing	2	11.1M	0.5M	0.2M	2.22M3	L=10.6+0.5= 11.1M
*	Plinth	2	11M	0.4M	0.9M	7.92M3	L=10.6+0.4= 11M & H=0.6+0.3= 0.9M
	Short wall						
*	1st footing	3	4.7M	0.6M	0.2M	1.692M3	L=5.3-0.6= 4.7M
*	2nd footing	3	4.8M	0.5M	0.2M	1.44M3	L=5.3-0.5= 4.8M
*	Plinth	3	4.9M	0.4M	0.9M	5.292M3	L=5.3-0.4= 4.9M & H=0.6+0.3= 0.9M
(ii)	Rightside two Bedroom						
	Long wall						
*	1st footing	2	9.6M	0.6M	0.2M	2.304M3	L=9.6+0.6/2-0.6/2= 9.6M
*	2nd footing	2	9.6M	0.5M	0.2M	1.92M3	L=9.6+0.5/2-0.5/2= 9.6M
*	Plinth	2	9.6M	0.4M	0.9M	6.912M3	L=9.6+0.4/2-0.4/2= 9.6M & H=0.6+0.3= 0.9M
	Short wall						
*	1st footing	2	4.2M	0.6M	0.2M	1.008M3	L=4.8-0.6/2-0.6/2= 4.2M
*	2nd footing	2	4.3M	0.5M	0.2M	0.86M3	L=4.8-0.5/2-0.5/2= 4.3M

*	Plinth	3	4.9M	0.4M	0.9M	5.292M3	L=5.3-0.4= 4.9M & H=0.6+0.3= 0.9M
(ii)	Rightside two Bedroom						
	Long wall						
*	1st footing	2	9.6M	0.6M	0.2M	2.304M3	L=9.6+0.6/2-0.6/2= 9.6M
*	2nd footing	2	9.6M	0.5M	0.2M	1.92M3	L=9.6+0.5/2-0.5/2= 9.6M
*	Plinth	2	9.6M	0.4M	0.9M	6.912M3	L=9.6+0.4/2-0.4/2= 9.6M & H=0.6+0.3= 0.9M
	Short wall						
*	1st footing	2	4.2M	0.6M	0.2M	1.008M3	L=4.8-0.6/2-0.6/2= 4.2M
*	2nd footing	2	4.3M	0.5M	0.2M	0.86M3	L=4.8-0.5/2-0.5/2= 4.3M
*	Plinth	2	4.4M	0.4M	0.9M	3.168M3	L=4.8-0.4/2-0.4/2= 4.4M & H=0.6+0.3= 0.9M
(iii)	Front Verandah						
	Long wall						
*	1st footing	1	9.65M	0.4M	0.2M	0.772M3	L=9.65-0.4/2+0.4/2= 9.65M
*	Plinth	1	9.6M	0.3M	0.7M	2.016M3	L=9.65-0.4/2+0.3/2= 9.6M & H=0.6+0.1= 0.7M
	Short wall						
*	1st footing	1	1.85M	0.4M	0.2M	0.148M3	L=2.25-0.4/2-0.4/2= 1.85M
*	Plinth	1	1.9M	0.3M	0.7M	0.399M3	L=2.25-0.4/2-0.3/2= 1.9M & H=0.6+0.1= 0.7M
(iv)	Back Verandah & Bathroom						
	Long wall						
*	1st footing	1	9.65M	0.4M	0.2M	0.772M3	L=9.65-0.4/2+0.4/2= 9.65M
*	Plinth	1	9.6M	0.3M	0.7M	2.016M3	L=9.65-0.4/2+0.3/2= 9.6M & H=0.6+0.1= 0.7M
	Short wall						
*	1st footing	2	2.35M	0.4M	0.2M	0.376M3	L=2.75-0.4/2-0.4/2= 2.35M
*	Plinth	2	2.4M	0.3M	0.7M	1.008M3	L=2.75-0.4/2-0.3/2= 2.4M
					Total=	41.596M3	
4	**DPC**						
(i)	Leftside Bedroom & Drawing room						
	Long wall	2	11M	0.4M	-----	8.8M2	L=10.6+0.4= 11M
	Short wall	3	4.9M	0.4M	-----	5.88M2	L=5.3-0.4= 4.9M
(ii)	Rightside two Bedroom						
	Long wall	2	9.6M	0.4M	------	7.68M2	L=9.6+0.4/2-0.4/2= 9.6M

(iii)	Front & Back Verandah(Pillars)	4	8M	0.3M	------	9.6M2	
(iv)	Bathroom						
	Long wall	2	3.05M	0.3M	-------	1.83M2	L=2.75+0.3= 3.05M
	Short wall	1	1.9M	0.3M	-------	0.57M2	L=2.2-0.3= 1.9M
					Total=	37.88M2	
5	**B/W in superstructure**						
(i)	Leftside Bedroom & Drawing room						
	Long wall	2	10.9M	0.3M	4M	26.16M3	L=10.6+0.3= 10.9M
	Short wall	3	5M	0.3M	4M	18M3	L=5.3-0.3= 5M
(ii)	Rightside two Bedroom						
	Long wall	2	9.6M	0.3M	4M	23.04M3	L=9.6+0.3/2-0.3/2= 9.6M
	Short wall	2	4.5M	0.3M	4M	10.8M3	L=4.8-0.3/2-0.3/2= 4.5M
(iii)	Front Verandah (Wall above Pillar)						
	Long wall	1	9.6M	0.2M	0.50M	0.96M3	L=9.65-0.3/2+0.2/2= 9.6M & H=0.65-0.15= 0.50M
	Short wall	1	2M	0.2M	0.50M	0.2M3	L=2.25-0.2/2-0.3/2= 2M & H=0.65-0.15= 0.50M
(iv)	Back Verandah (Wall above Pillar)						
	Long wall	1	9.6M	0.2M	0.50M	0.96M3	L=9.65-0.3/2+0.2/2= 9.6M & H=0.65-0.15= 0.50M
	Short wall	2	2.5M	0.2M	0.50M	0.5M3	L=2.75-0.3/2-0.2/2= 2.5M & H=0.65-0.15= 0.50M
(v)	Pillars	4	8M	0.2M	2.40M	15.36M3	----------
(vi)	Bathroom						
	Long wall	2	2.7M	0.2M	2.40M	2.592M3	L=2.75+0.2/2-0.3/2= 2.7M
	Short wall	1	1.95M	0.2M	2.40M	0.936M3	L=2.2-0.3/2-0.2/2= 1.95M
					Total=	100.668M3	
	Deduction						
	Window(1)	11	1M	0.3M	1.50M	4.95M3	----------
	Lintel over Window	11	1.3M	0.3M	0.15M	0.643M3	L=1+0.15+0.15= 1.3M
	Window(2)	1	2M	0.3M	1.50M	0.9M3	----------
	Lintel over Window	1	2.3M	0.3M	0.15M	0.103M3	L=2+0.15+0.15= 2.3M
	Window(3)	2	0.75M	0.2M	1.20M	0.36M3	----------
	Lintel over Window	2	1.05M	0.2M	0.15M	0.063M3	L=0.75+0.15+0.15= 1.05M

	Door(1)	5	1.20M	0.3M	2.10M	3.78M3	----------
	Lintel over Door	5	1.5M	0.3M	0.15M	0.337M3	L=1.20+0.15+0.15= 1.5M
	Door(2)	3	1M	0.3M	2M	1.8M3	----------
	Lintel over Door	3	1.3M	0.3M	0.15M	0.175M3	L=1+0.15+0.15= 1.3M
	Door(3)	1	0.75M	0.2M	1.80M	0.27M3	----------
	Lintel over Door	1	1.05M	0.2M	0.15M	0.031M3	L=0.75+0.15+0.15= 1.05M
	Shelves	5	1M	0.3M	1.50M	2.25M3	----------
	Lintel over Shelves	5	1.3M	0.3M	0.15M	0.292M3	L=1+0.15+0.15= 1.3M
					Total=	15.954M3	
6	**Plastering**						
(i)	Leftside Bedroom & Drawing room						
	Inside	1	40M	----	4M	160M2	L=[{2(5+6)+2(5+4)}]= 40M
	Outside	1	31.8M	----	4.7M	149.46M2	L=2(10.9+5)= 31.8M & H=4+0.6+0.1= 4.7M
(ii)	Rightside two Bedroom						
	Inside	1	36M	----	4M	144M2	L=[{2(5+4.5)+2(4+4.5)}]= 36M
	Outside	1	28.2M	----	4.7M	132.54M2	L=2(9.6+4.5)= 28.2M H=4+0.6+0.1= 4.7M
iii)	Front Verandah (Wall above Pillar)						
	Inside	1	11.3M	----	0.50M	5.65M2	L=5+0.3+4+2= 11.3M & H=0.65-0.15= 0.50M
	Outside	1	11.8M	----	0.50M	5.9M2	L=5+0.3+4+0.2+0.1+2+0.2= 11.8M & H=0.65-0.15= 0.50M
iv)	Back Verandah (Wall above Pillar)						
	Inside	1	16.3M	----	0.50M	8.15M2	L=7.3+2(2+2.5)= 16.3M & H=0.65-0.15= 0.50M
	Outside	2	12.3M	----	0.50M	12.3M2	L=9.6+2.7= 12.3M & H=0.65-0.15= 0.50M
(v)	Pillars	4	8M	----	2.40M	76.8M2	----------
iv)	Bathroom						
	Inside	1	9M	----	2.40M	21.6M2	L=2(2+2.5)= 9M
	Outside	1	9.8M	----	3.1M	30.38M2	L=2(2.4+2.5)= 9.8M & H=2.40+0.6+0.1= 3.1M
					Total=	746.78M2	

CHAPTER-3

Rate analysis

Definition: In order to determine the rate of particular item, the factors affecting the rate of that item are studied carefully and then finally a rate is decided for that item. This process of determining the rates of an item is termed as analysis of rates or rate analysis. The rate of particular item of work depends on the following.

1. Specifications of works and material about their quality, proportion and constructional Operation method.
2. Quantity of material sand their costs.
3. Cost of labours and their wages.
4. Location of site of work and the distances from source and conveyance charges.
5. Over head and establishment charges
6. Profit

Dry material calculation

Let us assume the mix proportion is1 :2:4(Cement :Sand :Stone=a:b:c) Volume of wet concrete = 1 m3

Volume of dry concrete=1×1.54=1.54 m3

Calculation For Cement

Formula, Cement=(Volume of dry concrete/a+b+c)×a

- =(1.54/a+b+c)×a=[(1.54/1+2+4)]×1=0.22 cum

Now density of cement=1440kg/cu.m

∴ Volume of cement=0.22×1440 =316.8kg.

As we know,1bag of cement contains 50kg of cement.

∴ Cement bags required=316.8/50=6.33bags.

Calculation For Sand

Formula, Sand=(Volume of dry concrete/a+b+c)×b

- =(1.54/a+b+c)×b=(1.54/1+2+4)×2=0.44cu.m.

Calculation For Aggregates

Formula , Aggregates = (Volume of dry concrete/a+b+c)×c

- =(1.54/a+b+c)×c=(1.54/1+2+4)×4=0.88cu.m.

Calculation For Water Content

Let us assume the water cement ratio of concrete is 0.45.

- w/c= 0.45
- Required water for1bag cement=0.45×0.0353=0.0159cu.m.

Where volume of 50 kg cement = 0.0353 cu.m

- 1m3 water=1000 Liter

Required water for1bagcement = 0.0159×1000=15.9Litre.

∴ Required water for 6.33 bags cement = 6.33×15.9=101Litre. Summary

- Cement=6.33bags.
- Sand=0.44cum

- Aggregates=0.88cum
- Water=101litre.

DRYMATERIALCALCULATIONOFBRICKWORK

Assuming,
1. Volume of brick work=1 m3
2. Grade of mortar=1:6(cement : sand)
3. First class brick(190 mm x 90 mm x 90 mm)
4. Thickness of mortar=10mm=0.01m

No. Of Bricks:
No. of bricks=(Volume of brick work/Volume of one brick with mortar)
Volume of one brick without mortar = 0.19×0.09×0.09 = 0.001539 m3
Volume of brick with mortar = (0.19+0.01) x (0.09+0.1)x (0.09+0.1)
=0.2×0.1×0.1=0.002m3
No. of bricks = 1.0/ (0.002) = 500
Consider10%to15%bricksaswastage.
∴ Total no. of bricks=500+(10x500)/100 =550
Quantity Of Mortar:
Volume occupied by bricks= No. of bricks x Volume of one brick
Volume of bricks = 500 x 0.001539 = 0.7695 m3
Volume of mortar=Volume of brickwork–Volume of bricks
∴ Volume of Mortar=1.0–0.7695=0.2305m3
Quantity Of Cement:
Cement=(Dry volume of mortar x Cement ratio)/Sum of the ratio
Dry volume of Mortar=1.54x0.2305=0.35497m3(54% increment due to volume shrink after adding water)
Cement=(0.35497x1)/(1+6)=0.35497/7=0.05071m3
Cement=0.043795x1440=73.0224kg
∴ No.of cement bags=73.0224/50=1.45 bags(1bagcementcontains50 kg cement) Quantity of Sand:
Sand=(Dry volume of mortar x Sand ratio)/Sum of the ratio
Sand = (0.35497 x 6)/7 = 2.12982/7 = 0.30426 m3
∴ Sand=0.30426x35.3147=10.7448cft.
Summery:

Number of Bricks = 550
Cement=1.45bagsof50Kg
Sand=0.30426m3or10.7448cft.

CHAPTER-4

DUTIESANDRESPONSIBILITIESOFJUNIORENGINEER

1. To assisting checking of all type of estimates, DPR in accordance of Designs and drawings and submit them to the higher authority for sanction/ process.
2. Carrying out of survey work of areas for development and preparation of Survey plans.
3. Mathematical and survey instruments, tools and plant including their receipt and issue and maintenance of their account.
4. Carrying out Laboratory test on material issue has cement, steel, timber, metal, soil, aggregates or any other material as directed by higher authorities.
5. Carrying out field tests on soils etc. as directed by higher authorities.
6. To prepare estimates as directed by higher authority and submit them to the higher authority for sanction.
7. To assisting checking of Schedule of Rates, Analysis of rates and specification of schedule of works.
8. To assisting preparation and checking of Specifications of work.
9. To assisting checking of theoretical consumption of materials.
10. To assisting checking of supplementary, substituted and deviation item statements.

DUTIESANDRESPONSIBILITIESOFASSISTANTENGINEER

1. Assisting designing, developing and executing construction projects.
Work with Project Manager in reviewing project specification and in preparing project plan and design sheet.
2. Visit sites , prepare construction drawing sand develop samples. Work with engineering team in developing construction plan.
3. Determine budget, schedule, manpower and material and equipment requirements to execute construction project.
4. Report all expenses to Project Manager on timely basis.
5. Maintain quality assurance standards for projects.
6. Provide technical assistance to field staff when needed.
7. Analyze construction problems and recommend corrective actions.
8. Order and stock construction materials to avoid shortage

REFERENCES

ESTIMATING & COSTING IN CIVIL ENGINEERING (B.N DUTTA)

ESTIMATING,COSTING, SPECIFICATION & VALUATIONINCIVIL

ENGINEERING (M.CHAKRABORTY)