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QUANTITY SURVEY (ESTIMATION, BILLING & CONTRACTS)

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Abstract

Now a day's population is increases and land Required for living is decreases so need to construct the Multistoried building, for the multistoried building it is Necessary to planning and find out the preconstruction cost by using various methods, because of big scale budget. During construction project planning and Implementation, we need to know the quantities and costs of Various items required to meet the objective of the project. That is, construction project manager has to anticipate the Cost of project. The process of calculation of quantities and Costs of various items in connection with the construction Project is called an "estimate". In this research We will study about the various methods used in find out the quantity of materials.

Keywords: *Survey, Bar, Bending, Footing, Ring.*

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1. INTRODUCTION

An estimate is the Anticipated or probable cost of a work and Is usually Prepared before the construction Is taken up. Before undertaking any work Or project it is Necessary to know its Probable cost which is obtained or derived By estimating. The Estimating is prepared By computing or calculating the quantities Required and then Calculating the cost at Suitable rates, to go get the expenditure Likely to be incurred in the Construction of The work or structure.

Objectives

- To justify the investment from benefit cost ratio.
- An estimate for an existing is needed to valuation..

2. LITERATURE REVIEW

Bhumeshwar Dongarwar and et al, 2020 have discuss the estimation of building, Bill of quantities (BOQ), and Overall Tendering process of any Building. They have used to Centre line method to calculate the quantities of different items of work. The Rate Analysis is carried out as per CSR 2018-19 for Nagpur division excluding

GST. The effect of GST has been applied to the total cost Calculated for whole structure as 18%. The Estimate of total of fifty-five quantities has Been carried out that are being used in the Structure by the centreline method.

The layout was then prepared using AutoCAD. The various layouts were prepared and then later discussed with the architect for error correction. The cost estimate for the project has been calculated using Centre Line Method in Microsoft Excel. For the cost estimation they have used Microsoft excel. Excel is a typical spreadsheet which is nowadays widely used in cost estimation and also sometimes for planning purposes.

Punam Bhimrao Kokate and et al, 2018 have discuss the various Calculation methods used in any Buildings to be finding out the Project cost before the Construction. They have used Elemental method of estimating in These research.

For the estimation they have used following steps:

- Project Introduction: It is the description of Overall parameter of project as well as site Location.
- Scope of project: The purpose of the project, details of work, work breakdown structure and provide the overview on design basis.
- Collection of architectural drawings: In this step we were gathering the architectural drawings for calculating the cost of project according to the functional elements.
- Pre-estimation planning: From this step we were reduces the future effort at the time of construction of project i.e. from previous similar project we can reduces the same accident.
- Elements description and quantity take-offs: Estimates elements of building and calculate the quantity required details of work on sheet.
- Summary: The purpose of summary is to state the total estimated cost of the project, duration as well.
- Checking and documentation:
- Estimate filing and issues:

The building is used for this study is residential building name as Pride Aashiyana, it is Located in pune. Pride Aashiyana is a domestic complex situated in lohegaon, pune. It offers 548 apartments, covering a total area of 10 acres and unit area of 1050 to1400sq.ft. And they had completed his work on a time and finding out the Total estimated Construction cost.

3. III. METHODOLOGY & CALCULATIONS

3.1 Bar Bending schedules and Estimation Calculations

BBS is helpful in determining the cutting Length as well as the bending length Of Reinforcement. This contributes to an improvement in construction quality and a reduction In the amount of steel that is wasted, which makes construction more cost-effective.

1. Bar Bending Schedules of Footing

Size of Footing = 2000 × 2000 mm(According to Drawing)

Cover = 50 mm (According to Drawing)

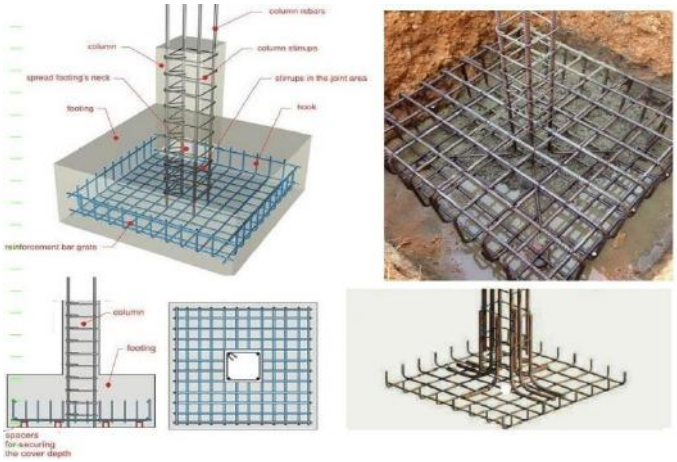

Fig.1 – Plan & sectional view of the Footing

Total length of steel = 1900 + 150 +150 = 2200 mm

Bend deduction = 2×2d (d = Dia of bar)

∴ Cutting Length = 2200 – 2×2×12 = 2200 –48 = 2152 mm = 2.152 m

No. Of Bar = Length / Spacing = 1900 / 150 +1 = 12.7 = 13 Nos.

Total Cutting Length = 1 Bar Cutting Length × No. Of Mesh × No. Of Bar

= 2.152×2×13

Total Cutting Length = 55.952 m

Weight of Bar = $D^2/162$ in 1 m Length

= $12^2/162$

Weight of Bar = 0.88 Kg/m

Total Weight = 0.88 × 55.952 = 49.735 Kg.

2. Bar Bending Schedules of Columns

Size of Column=9"×12" = 230mm× 300mm

Clear cover = 35mm, No. Of bar = 6pc.

Length of Bar = 0.45+1.2+0.6+3.3+0.15

= 5.7m = 5700mm

Bend Deduction = 5700 – (2No. Of 90°Bend)

= 5700 – 2×2d = 5700-(2×2×12) = 5652mm

Cutting Length of Bar = 5.652m

Total Cutting Length = 6×5.652 = 33.912m

Weight of bar = 33.912@$D^2/162$, $12^2/162$ = 0.889

= 0.889×33.912 = 30.14kg

Ring Stirrups:-

Ring size = a×b = [230-(2×35) × 300-(2×35)]

= 160mm × 230mm

Cutting Length of Ring = 2(a+b) + Hook Length – 3×90°bend – 2×135°bend

= 2(160+230) + 2×10d – 3(2d) – 2(3d)

= 2(260+230) + 2×10×8 – 3×2×8 – 2×3×8

= 844mm

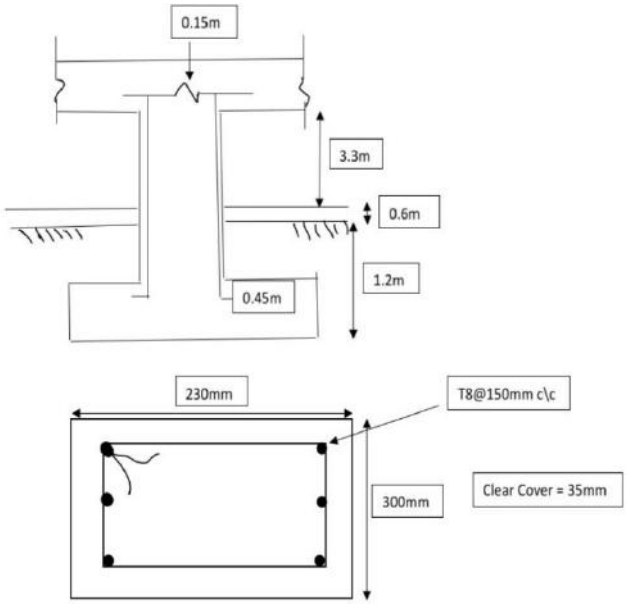

Fig.2 – Sectional view of the Column

3. Bar Bending Schedules of Plinth Beam

Column Size = 230mm×230mm

Beam Size = 230mm×230mm

Cutting Length of B1 = Total Length – Bend Deduction (90°)

= (150+195+4000+115) – 2d

= 4460-2×12 = 4436mm

Total No. Of Bar = 4 pc.

∴ Total Length = 4436 × 4 = 17744mm

Total No. Of Bar = 4 pc.

∴ Total Length = 4436 × 4 = 17744mm

Ring Cutting Length = 2(a+b) + Hook – 90°bend-135°bend

= 2(160+160) + 2×10d – 3×2d-2×3d

= 640 + 2×10×8 – 3×2×8-2×3×8 = 704mm

Total Ring = (4000÷150) + 1 = 26.6 + 1

= 27.1 = 28Nos.

Total Length = 19712mm

∴ Weight of Bar = 17744mm

= 17.74m@0.889Kg/m

Weight = 17.744×0.889 = 15.774Kg

& Weight of Ring = 19712mm = 19.712m @

0.39Kg/m

Weight = 19.712×0.39 = 7.68Kg

∴ Total Weight of Bar in B1 = 15.774 + 7.68

= 23.454Kg = 0.0233Tone

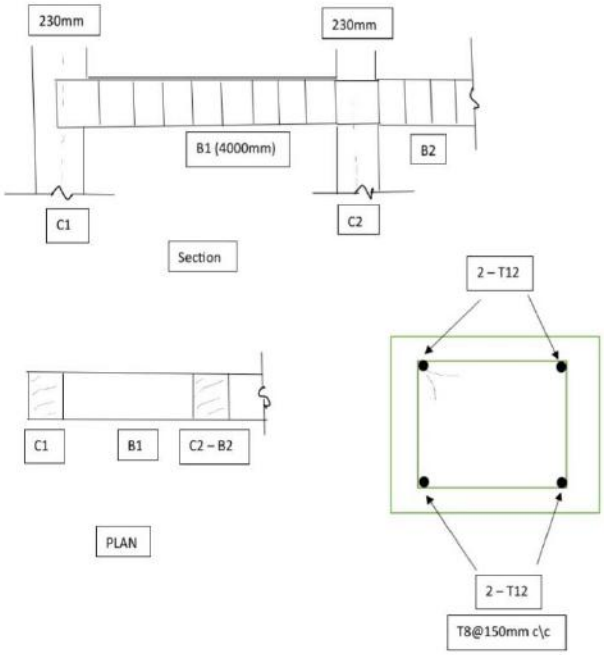

Fig.3 – Sectional view of the Plinth beam

4. Calculate Numbers and Weight of the Stirrups

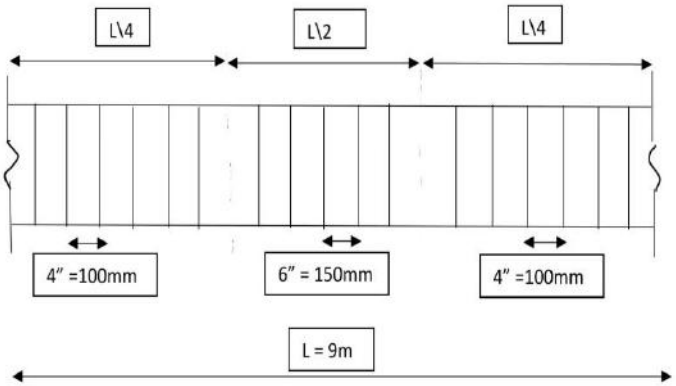

Fig.4 – Bent up Bars Slab Reinforcement

Here in L/4 = 9/4 = 2.25 m = 2250 mm

= 2250 / Spacing = 2250 / 100 = 22.5 Nos.

Here both sides are including , Then

= 22.5 + 22.5 = 45 Nos. Bar

Here in L/2 Length = 9/2 = 4.5 m = 4500 mm

= 4500 / 150 = 30 Nos. Bar

Total Number of Stirrups = 45 + 30 = 75Nos. Bar

Calculate Weight of the Stirrups

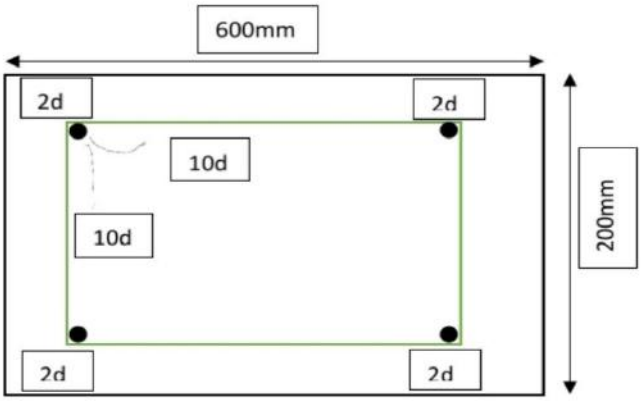

Fig.5 – Stirrups (Plan)

So, Cover = 40 mm

Then 1 side of Length is 600 – 80 = 520 mm

And 200 – 80 = 120 mm

Stirrups Cutting Length = 120 + 120 + 520 +

520 – 10d + 20d

(Assuming Dia of Bar is 8 mm)

= 120 + 120 + 520 + 520 – 10×8 + 20×8

Stirrups Cutting Length = 1360 mm

= 1.36 × 75 = 102 m

Weight of the 8 mm Bar in 1 m Length = 0.39 Kg.

Then, Total Weight of the Stirrups

= 102 × 0.39 = 39.78 Kg.

5. Calculation of Cement, Sand, Aggregate and water in Concrete For M-20

Density:-

Cement = 1440 Kg/m

Sand = 1450 – 1600 Kg/m^3

Aggregate = 1450 – 1500 Kg/m^3

Water = 1000 Lit/m^3

Wet volume of Concrete = 1m^3

Wet Volume (54% Increase) = Dry Volume

Dry Volume = 54% of Wet Volume

= 1 + 54/100 = 1.54m^3

Grade of Concrete (M-20) = 1:1.5:3

Total Ratio = 1+1.5+3 = 5.5

Cement = Dry Volume × Cement Ratio/Total Ratio

Cement = 1.54 × 1/5.5 = 0.28m^3

= 0.28m^3 × 1440 Kg/m^3 = 403.2 Kg

∵ 50 Kg = 1 Bag Cement

403.2 / 50 = 8.064 = 8 Bag Cement

Sand = 1.54 × 1.5/5.5 = 0.42m^3

= 0.42 × 1500 Kg/m^3 = 630 Kg

Aggregate = 1.54 × 3/5.5 = 0.84m^3

= 0.84 × 1500 Kg/m^3 = 1260 Kg

Water = 0.45 × Quantity of Cement

= 0.45 × 403.2 Kg = 181.44 = 182 Lit.

6. Calculation of Quantity of Cement & Sand in plaster

Of Area wall = 6m × 3m

Thickness of Plaster = 0.012m

Volume of Plaster = L×B×H

= 6m × 3m × 0.012m = 0.216m^3

Wet Volume = 0.216m^3

Dry Volume = Wet Volume × 1.33

= 0.216 × 1.33 = 0.287m^3

Cement Sand Ratio for Plaster = 1:6

Cement = Ratio of Cement / Sum of Cement Sand Ratio × Dry Volume

Cement = 1/7 × 0.287

Cement = 0.041m^3

We Know,

Density of Cement = 1440 Kg/m^3

= 1440 × 0.041 = 59.04 Kg = 1.18 Bag of Cement

Sand =

Ratio of Sand / Sum of Cement Sand Ratio

= Dry Volume

= 6/7 × 0.287

Sand = 0.246m^3

We Know,

Density of Sand = 1450 – 1600 Kg/m^3

= 1500 Kg/m^3 × 0.246 = 369 Kg

7. Calculate Number of Bricks in a Wall

We Know that Size of the Brick is (190mm×90mm×90mm) And With including mortar is (200mm×100mm×100mm)

Volume of 1 Brick = (0.2m × 0.1m × 0.1) = 0.002 m^3

To Find out Numbers of Brick We identify Size of the wall,

Assume The Length of the wall

= (280×153×90) cm.

= (2.8 × 1.53 × 0.9) = 0.86m^3

We Know that Number of Bricks in 1m^3 = 500 Nos

∵ 1m^3 = 1000 × 1000 × 1000

So, Number of Bricks in 1m^3

= 1000×1000×1000 / 100×100×200

= 500 Nos.

Then in 0.86m^3 = 0.86 × 500 = 430 Nos.

Bill of Quantities (BOQ)

- Bill of quantity shall be used in every Phase (pre contract and post contract) of The project but need of BOQ different Based contract agreement to project.
- Measurement work is the actual estimate Work will be carried out to complete the Project. The work have been measured in Different unit value of measured work will Be calculated by multiplication of quantity And rates.
- Billing of quantities (BoQ) is nothing but Just awell formatted excel document used For all types of tender works in all types of Construction in which material, parts, Labours and their costs are organised in a Tabular form (in rows and columns) .
- It also details the work and conditions of Working for the project and itemizes all the Work to enable a contractor to consider the Risk and bid accordingly.
- Also after the work is completed, the Material, and the labour charges due of the Contractor are paid to him accordingly Which is also referred to as billing.

- In case of civil engineering it deals with The cost and quantity of materials, the R.C.C work, excavation, masonry work, etc. Everything is billed at each completion Stage Bills are cross checked and Respective bills are sanctioned.

4. CONCLUSION

In this research we studied about various Bar-Bending Schedule methods like BBS of Footing, Columns, Plinth Beam etc. We Learned the various estimation Mathematical calculations like Calculation of Cement, Sand, Mortar and bricks used in Beam and wall etc. And We also learned About the Centre line Method and Elemental methods for estimation. Mostly centre line method is used for Estimation of any building. Bill of Quantities is a formatted excel document Used in all types of tender works. This is Calculated by multiplication of quantity And rates. Bar Bending Schedules is used For calculation of reinforcement bar (It's Length & weight). Quantities of Materials(cement, sand & aggregate are Finding out by its density.

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