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RATE AND ANALYSIS OF REINFORED OF G+3 RESIDENTIAL BUILDING ON THE PERCENTAGE BASIS OF CONCRETE

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ABSTRACT
An estimate is a computation of the quantities required and expenditure likely to be incurred the construction of a work. In any construction project, the probable cost of construction which is known beforehand is known as the estimated cost. And hence it is quite essential for the arrangement of financial resources for the completion of any construction project. In this project, the main aim was to find out the detailed estimation of reinforcing steel from the structural drawings & on the percentage basis of concrete of a residential building (G+3) with rate analysis. It also aims in finding out the probable cost, or the estimated cost of the project based on the computation of these quantities by comparing the steel from structural drawings and on the percentage basis of residential building with concrete. The computation of quantities was carried out based on the drawings of various elements, such as each floor plan, sectional views of the floors, which have also been provided in this document. These details provide an idea for requirement of quantities for a particular project and also the like expenditure which would be needed to be arranged. This documentation also provides the abstract of the estimated cost for the residential building. The planning of the educational building is based on functional requirements. The plans have been prepared by using Auto CAD and the 3-D model was created in Revit Architecture.

I. INTRODUCTION

1.1: Definition of Estimating and Costing

Estimating is the technique of calculating or computing the various Quantities and the expected Expenditure to be incurred on a particular work or Project In case the funds available are less than the estimated cost the work is done in part or by reducing it or specifications are altered, the following requirement are necessary for preparing an estimate.

a) Drawings like plan, elevation and sections of important points.

b) Detailed specifications about workmanship & properties of materials etc.

c) Standard schedule of rates of the current year.

1.2: Need for Estimation and Costing

• Estimate gives an idea of the cost of the work and hence its feasibility can be determined i.e. Whether the project could be taken up with in the funds available or not.

• Estimate gives an idea of time required for the completion of the work.

• Estimate is required to invite the tenders and Quotations and to arrange

• Contract.

• Estimate is also required to control the expenditure during the execution of work.

• Estimate decides whether the proposed plan matches the funds available or not

1.3: Procedure of Estimating or Method of Estimating

Estimating involves the following operations

• Preparing detailed Estimate.

• Calculating the rate of each unit of work

• Preparing abstract of estimate

1.4 : Data Required To Prepare an Estimate

1. Drawings i.e. Plans, elevations, sections etc.
2. Specifications.
3. Rates.

1.4.1: Drawings

If the drawings are not clear and without complete dimensions the preparation of estimation become very difficult. So, It is very essential before preparing an estimate.

1.4.2: Specifications

a) General Specifications: This gives the nature, quality, class and work and materials in general terms to be used in various parts of wok. It helps no form a general idea of building.

b) Detailed Specifications: These gives the detailed description of the various items of work laying down the Quantities and qualities of materials, their proportions, the method of preparation workmanship and execution of work.

1.4.3: Rates

For preparing the estimate the unit rates of each item of work are required.

1. For arriving at the unit rates of each item.
2. The rates of various materials to be used in the construction.

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3. The cost of transport materials.
4. The wages of labour, skilled or unskilled of masons, carpenters, Mazdoor,etc.

1.5: Objectives of Project Work

The main objectives of the research have been:
To find out the detailed estimate of steel quantity required in the residential building(G+3). It also aims in finding out the probable cost, or the estimated cost of steel required in the building.

1.6: Details of Site

PARTICULARS

Type of Structure: Multi-storied R.C.C structure
Purpose of the Structure: Residential Building
Total Plinth Area: 100 sq. yards
No. of stories: 3
Location: Bandlaguda Mohammed nagar
The Original plan of the Educational Building can be found under "Drawings" section of the "Appendix

PLAN LAYOUT:

Fig:1. Plan of a Residential Building (G+3)

Arbitrary Method of Concrete Mix Design

1. In the arbitrary method of concrete mix design is
2. supposed to do quantity voids in fresh concrete that
3. the voids of course aggregate will full fill by the fine
4. aggregate.
5. The cement quantity is used according to given
6. strength of concrete.
7. It is maintained a ratio between cement and quantity

Strength	Mix ratio
M10	1:3:6
M15	1:2:4
M20	1:1.5:3
M25	1:1:2

II. FOOTINGS:

2.1: Introduction

Footings are structural members used to support columns and walls and transmit their loads to the underlying soils. Reinforced concrete is a material admirably suited for footings and is used as such for both reinforced concrete and structural steel buildings, bridges, towers, and other structures. The permissible pressure on a soil beneath a footing is normally a few tons per square foot. The compressive stresses in the walls and columns of an ordinary structure may run as high as a few hundred tons per square foot. It is therefore necessary to spread these loads over sufficient soil areas to permit the soil to support the loads safely. Not only is it desired to transfer the superstructure loads to the soil beneath in a manner that will prevent excessive or uneven settlements and rotations, but it is also necessary to provide sufficient resistance to sliding and overturning.

Footing Layout

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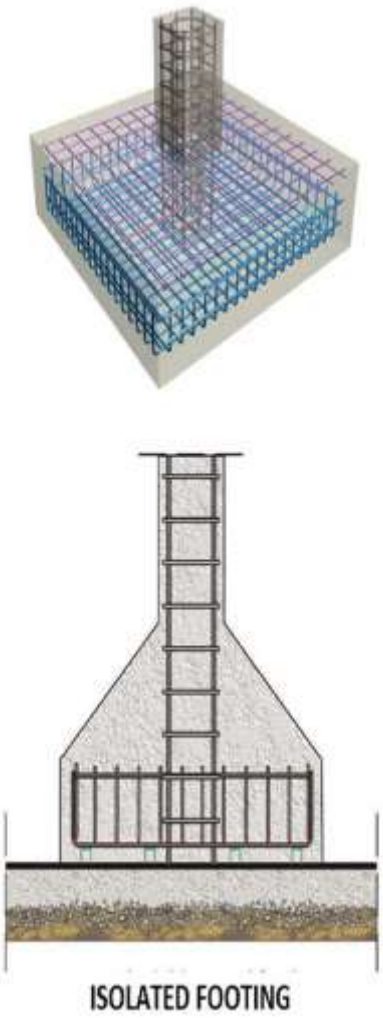

Fig:2. Layout of a Footings

Fig:3. Overview Of Islolated Footing

2.3: PROFORMA FOR STEEL CALCULATION OF FOOTINGS

S No	Description of Bar	Dia of Bar 'mm'	Length in 'mm'	No's	Total Length	Unit Weight in 'kg/m'	Total Weight in 'Kg'
1	Main Bars Footing-1	10	1.21	16	19.36	0.616	11.93
2	Main Bars Footing-2	10	1.63	22	33.86	0.616	22.08
3	Main Bars Footing-3	10	1.86	32	59.52	0.616	36.66

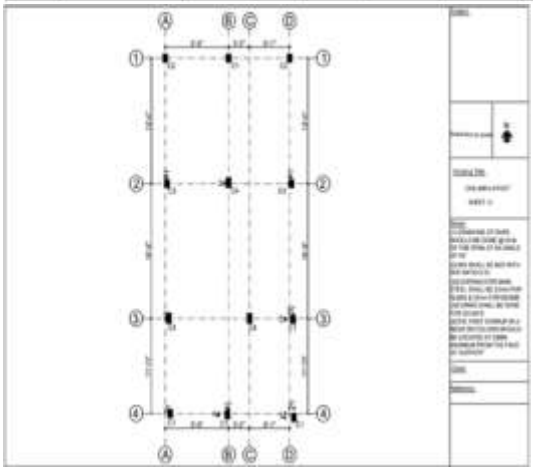

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Fig .4 Column layout

III. CHAPTER-3

Eccentricity Loaded Column (Uniaxial or Biaxia)

Based on Slenderness Ratio:

1. Short Column
2. Long Column

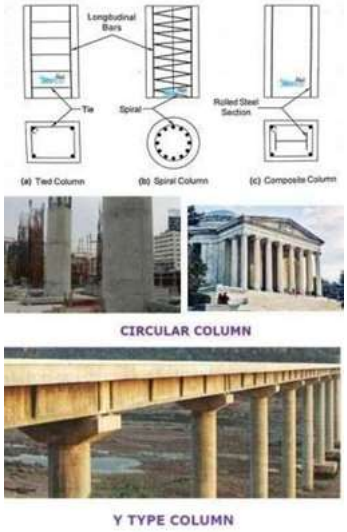

Fig:5. Types of Column

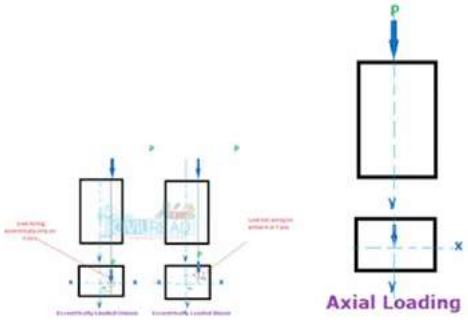

Fig:6. Types of loading in Columns

3.1: PROFORMA FOR STEEL CALCULATION OF COLUMNS

S No	Description of Bar	Diameter 'mm'	Length in 'm'	No's	Total Length	Unit Weight 'Kg/m'	Total Weight in 'Kg'
1	Main Bars Column-1	12	16.1	6	96.6	0.89	85.97
	Lateral Ties	8	1.052	109	114.66	0.39	44.72
2	Main Bars Column-2	16	16.1	4	64.4	1.58	101.75
	Lateral Ties	8	1.052	109	114.66	0.39	44.72
3	Main Bars 1 Column-3	16	16.1	4	64.4	1.58	101.75
	Main Bars 2	12	16.1	2	32.2	0.89	101.75
	Lateral Ties	8	1.052	109	114.66	0.39	28.65
4	Main Bars Column-4	16	16.1	8	128.8	1.58	203.5
	Lateral Ties	8	1.214	109	132.33	0.39	52.21

S No	Description	No's	Weight 'Kg'	Per	Total Weight 'Kg'
1	Column-1	5	130.69	1	653.45
2	Column-2	2	146.47	1	292.94
3	Column-3	2	175.12	1	350.24
4	Column-4	3	255.71	1	767.13
				Total	2063.76

IV. CHAPTER-4

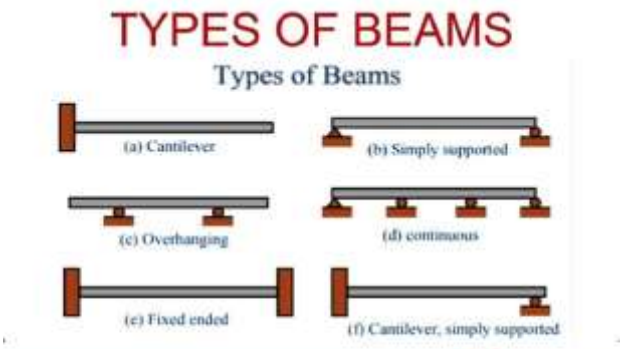

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Fig:7:Typees of Beams

V. SLABS:

5.1: Introduction

A concrete slab is a common structural element of modern buildings, consisting of a flat, horizontal surface made of cast concrete. Steel-reinforced slabs, typically between 100 and 500
mm thick, are most often used to construct floors and ceilings, while thinner mud slabs may be used for exterior paving.
In many domestic and industrial buildings, a thick concrete slab supported on foundations or directly on the subsoil, is used to construct the ground floor. These slabs are generally classified as ground bearing or suspended. A slab is ground-bearing if it rests directly on the foundation, otherwise the slab is suspended. For multi-story buildings, there are several common slab designs.

Beam and block, also referred to as rib and block, is mostly used in residential and industrial applications. This slab type is made up of pre-stressed beams and hollow blocks and are temporarily propped until set, typically after 21 days.A hollow core slab which is precast and installed on site with a crane
In high rise buildings and skyscrapers, thinner, pre-cast concrete slabs are slung between the steel frames to form the floors and ceilings on each level. Cast in-situ slabs are used in high rise buildings and large shopping complexes as well as houses. These in-situ slabs are cast on site using shutters and reinforced steel.
On technical drawings, reinforced concrete slabs are often abbreviated to "r.c.c. slab" or simply"r.c c.". Calculations and drawings are often done by structural engineers in CAD software.

5.2: Types of Slabs

Rcc Slabs are three types depending on design criteria
1. One Way Slab
2. Two Way Slab
3. Cantilever Slab

1. One-Way Slabs on Beams

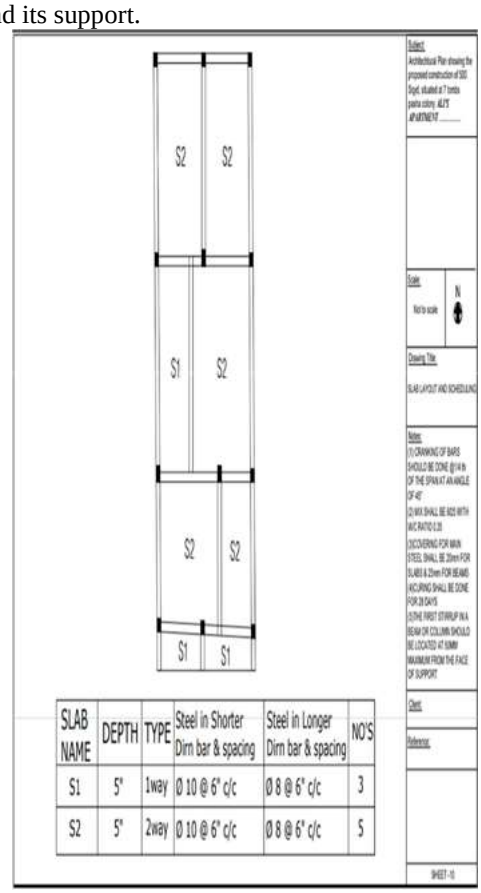
Cast in situ method is used to construct one-way slabs on beams which involves fixing of forms followed with the installation of reinforcements, and finally the pouring of fresh concrete. One-way slabs on beams are most suitable for spans of 3-6m, and a live load of 3 to 5KN/m2. They can also be used for larger spans with relatively higher cost and higher slab deflection. Additional formwork for the beams is however needed.

2. Two-way Slabs on Beams

The construct of this type of slab is similar to that of one-way slab on beams, but it may need more formworks since two-way slabs are supported on all sides. Slabs on beams are suitable for spans between 6 and 9m, and live loads of 3-6KN/m2 . The beams increase the stiffness of the slabs, producing relatively low deflection. Additional formwork for the beams is needed.

3.Cantilever slab –

Cantilever Slab has only one support at one end and other three ends are open. The main reinforcement of cantilever slab should be extended one and half times beyond its support.



SLAB NAME	DEPTH	TYPE	Steel in Shorter Dirn bar & spacing	Steel in Longer Dirn bar & spacing	NO'S
S1	5"	1way	Ø 10 @ 6" c/c	Ø 8 @ 6" c/c	3
S2	5"	2way	Ø 10 @ 6" c/c	Ø 8 @ 6" c/c	5

Fig:. 8. Layout and Detailing of Slabs

5.3: COMPARISION OF RATE ANALYSIS

S.NO	Description of Item	Manual calculation	Percentage Basis
1	footings	282.7x41= 11590.7/-	9225/-
2	Neck column		9061/-
3	Plinth beam	361.562x41= 14824.042/-	15043.269/-
4	Columns	2063.76x41= 84614.16/-	60192.387/-
5	Extra column of parapet height		3379.425/-
6	Beams	677.513x41= 27778.033/-	139811.64/-
7	Slabs	661.51x41= 27121.91/-	139811.64/-
	TOTAL RATE	RS=1,65,928/-	RS=3,71,449/-

VI. CONCLUSION

The project describes a method of estimation and costing of "RESIDENTIAL BUILDING (G+3) BY COMPARING STEEL FROM STRUCTURAL DRAWINGS AND ON THE PERCENTAGE BASIS". The scope behind presenting this project is to learn concept of estimating the quantities and rate analysis, before undertaking the construction of project.

The estimate is probable cost of work and is determined theoretically by mathematical calculations based on plans and drawings, current rates.
The cost of steel calculated by structural drawings is less compared to percentage basis.
Cost of steel by structural drawings: RS=1,65,928/- Cost of steel by percentage basis:
RS=3,71,449/-
Hence
Cost of steel calculated by structural drawings is found to be more efficient to construct a residential building (G+3). The planning and designing of the AN APARTMENT BUILDING has been completed effectively in our project. If this is constructed on the proposed site, it will be very help full to our people. We all the members of our team have learned to plan a building with referring to NATIONAL BUILDING OF INDIA 2005. This project is a very useful to learn about the design of the structural elements like beams, column and slabs by using IS 456-2000. The important thing that we have done were referring to lots of books for designing, and we are very much satisfied with exposing to field design.

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