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Estimating and Costing of Building using Revit

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Abstract: *This project, "Estimation and Costing of an RCC Building Using Revit Software," explains how to calculate the cost of building a G+4 residential structure using modern technology. Revit software helps in making the process faster and more accurate by automatically measuring materials and costs. The project covers different estimation methods, such as rate analysis and quantity surveying, to determine the required amounts of bricks, cement, sand, doors, and windows. It also includes cost calculations for important parts of the building, like the foundation, walls, and roof, to ensure proper budgeting. By using Revit, the project helps to avoid extra costs, plan materials properly, and complete construction within budget. It also teaches students how to use digital tools for cost estimation and project planning, making construction work more efficient and organized.*

Keywords: Estimation, Costing, RCC Building, Revit Software, Budgeting, Construction Planning, Quantity Surveying

I. INTRODUCTION

Before starting any building project, it is important to know how much money will be needed. Estimation helps to find out the number of materials, workers, and costs required, while costing helps in planning the budget. If the cost is too high, changes can be made to fit the budget.

A good estimate helps to use materials properly, avoid waste, and prevent extra expenses. It is also needed for project approvals, contracts, and keeping costs under control.

Today, Revit software makes estimation easier and more accurate. It creates 3D building models and calculates material quantities and costs automatically. This saves time and reduces mistakes.

This project focuses on estimating and costing a G+4 RCC building using Revit software, showing how technology helps in better planning and budgeting.

II. LITERATURE REVIEW

Estimating the cost of a building is very important to plan the budget, manage resources, and avoid extra expenses. Studies show that old methods of estimation often lead to mistakes, delays, and higher costs. One study explains that having the right techniques and skilled professionals can make cost estimation more accurate. Another study on a seven-story building in Dhaka found that manual methods are slow and can have errors, while modern tools like Revit and BIM software make the process easier and more reliable. Research comparing different cost estimation methods shows that software like Revit and AutoCAD helps by automatically calculating materials and reducing human mistakes. A case study on multi-story buildings also shows that using quantity surveying and volumetric analysis makes estimation faster and more precise. These studies prove that modern software improves cost planning and project success. This project follows these ideas by using Revit software to estimate and cost an RCC G+4 building, showing how technology helps in better construction planning.

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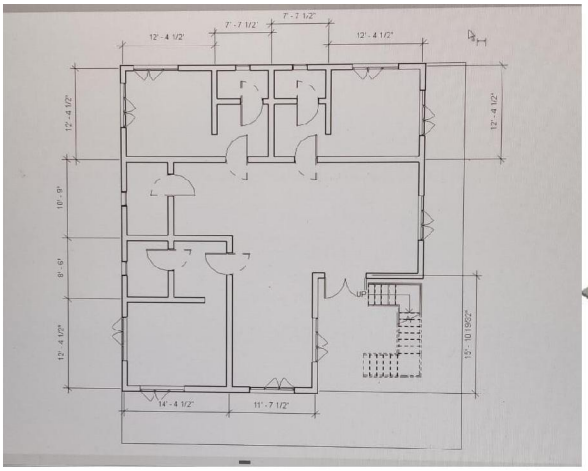
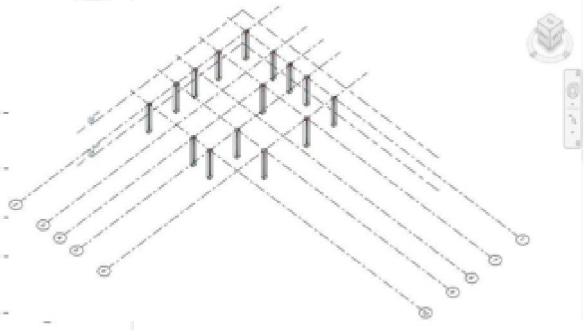
III. PLANNING OF BUILDING

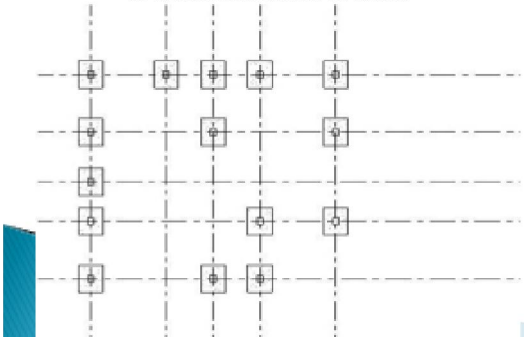


Grid plan of foundation

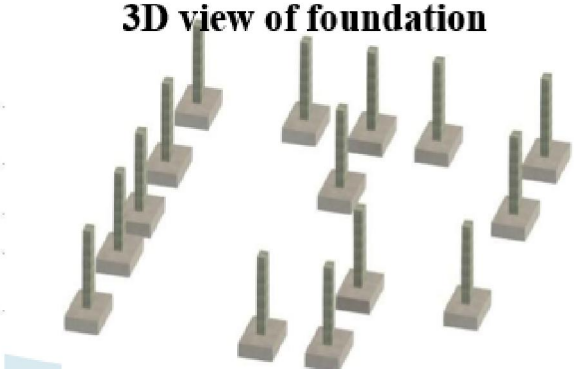
3D view of columns



Foundation Plan



3D view of foundation



IV. ESTIMATION OF BUILDING

Calculation of no. Of bricks & cost of bricks

IN MILIMETER (MM)

Size of brick = 190mm x 90mm x 90mm (WITHOUT MORTAR) Volume = L x W x H

=190 x 90 x90

=1539000mm2

PLASTER OF MORTAR USED =10MM

Size of brick = 200mm x 100mm x100mm (WITH MORTAR) Volume = L x W x H

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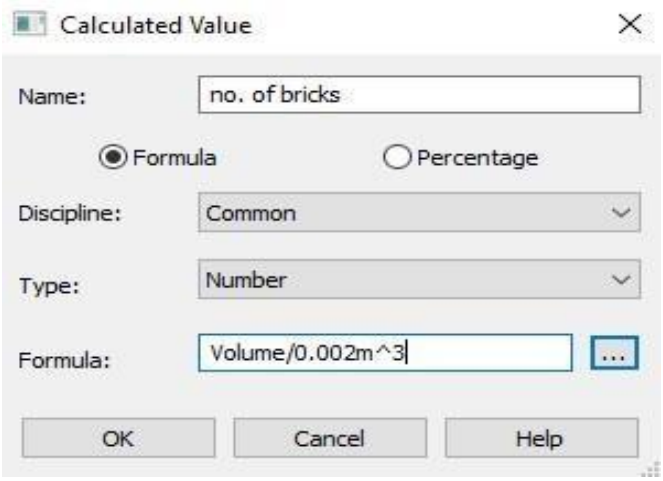
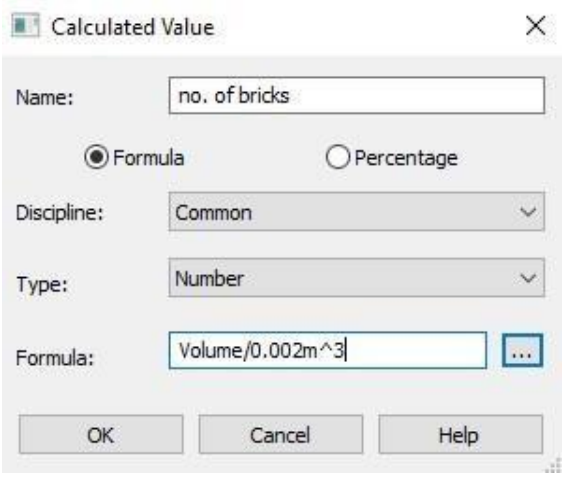
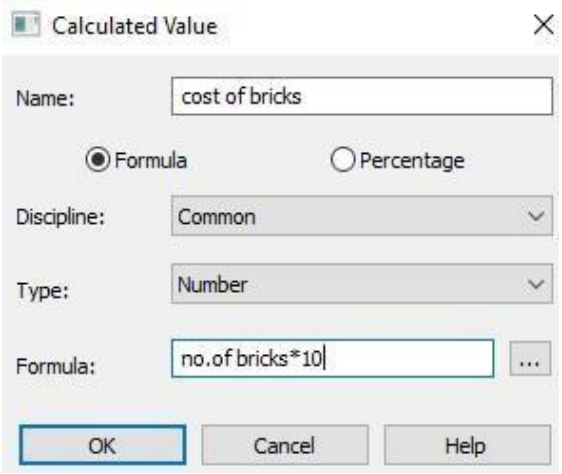
= 200 x 100 x 100
=200000
10MM = 1CM
Size of brick =19cm x 9cm x9cm (WITHOUT MORTAR)
Volume = length x width x height
= 19 x 9 x 9
= 1539cm2 PLASTER USED = 1 cm
Brick size = 20cm x 10cm x 10cm Volume = 2000cm3
1 METER = 100CM
Brick size = 0.19 x 0.09 x 0.09
= 0.001539m2 PLASTER USED = 0.1 M
Brick size = 0.20m x 0.10m x 0.10m (WITH MORTAR)
Volume = 20 x 10 x 10
= 0.002m3
NumberOf bricksin1$m^{3=}$Volumeof1m^3/volumeof1brickwithmortar
= 1/0.002
= 500 Bricks







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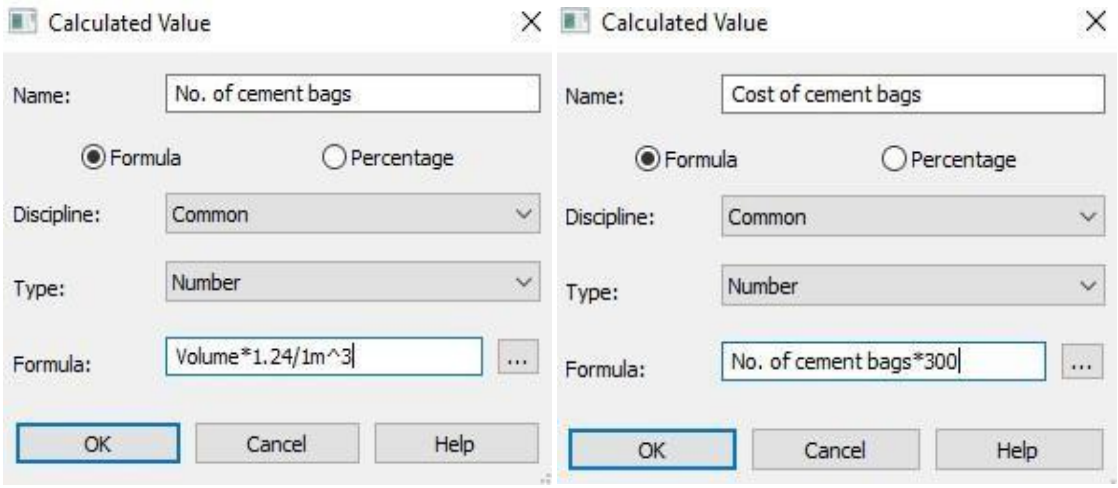
Calculation of No. cement bags & cost of Cement Bags

Volume of 1 m3 covering 500 no. of bricks
= Bricks in 1m3× 1 brick volume without mortar
= 0.001539 x 500
=0.7695m3
Volume of mortar (in 1 m3) =1-0.07695
=0.2305m3(wet volume)
For dry volume, 33% is increased as per IS code,
Dry volume = (0.2305×33%) +0.2305
=0.2305+0.076065
=0.06m3
Mortar Ratio = (1:6) = (Cement: Sand)
Quantity of cement in (1m3) = (dry volume of mortar × ratio of cement)/Ratio of (cement+ sand)
= (0.306×1)/ (1+6)
=0.043m3
Density of cement = 1440kg/m3
Quantity of cement in kg =quantity of cement × density of cement
= 0.043 ×1440
=62 kg
1 cement bag=50 kg
Total no. Of cement bag in m3=62/50
=1.24 bags
Cost of 1.24 bags = 300 ×1.24=372rs



Calculation of sand & cost of Sand

Quantity of sand in $1m^3$=(dry volume of mortar × sand ratio)/Ratio of(cement and sand)
=(0.306×6)/(1+6) =1.836/ 7
=0.262m^3
Density of sand=1450to1500kg/m^3
We are taking=1450kg/m^3
Quantity of sand in kg=0.262×densityofsand
=0.262×1450
=379.9kg
1 Trucks and=6660kg

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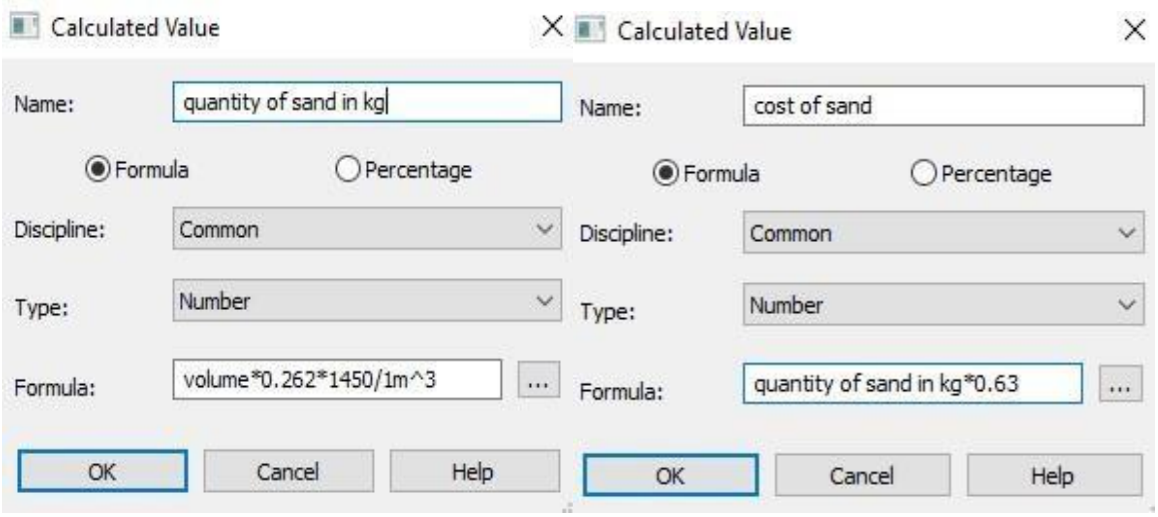
379.9kg=(379.9/6660)truck
=0.0570 truck
1trucks and cost=10500rs
379.9kgs and cost=0.0570×10500
=598.50rs
1 kg s and=379.9/598.5
=0.63rs



Calculation of Cost of Aggraegate

- Aggregate Required for 1m³ of Concrete (1:2:4 Mix):

$$\frac{1 \times 4}{1+2+4} = 0.57 \text{ m}^3$$

- Weight of Aggregate (Density = 1500 kg/m³):

$$0.57 \times 1500 = 855 \text{ kg}$$

- Cost Estimation:
  - Cost per Ton (1000 kg): ₹1,200
  - Total Cost for 855 kg:

$$\frac{855}{1000} \times 1200 = ₹1,026$$

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Steel Estimation & Cost Calculation

- Steel Required per m³ of RCC (1% of Volume):

$$1 \div 100 \times 1 = 0.01 \text{ m}^3$$

- Weight of Steel (Density = 7850 kg/m³):

$$0.01 \times 7850 = 78.5 \text{ kg}$$

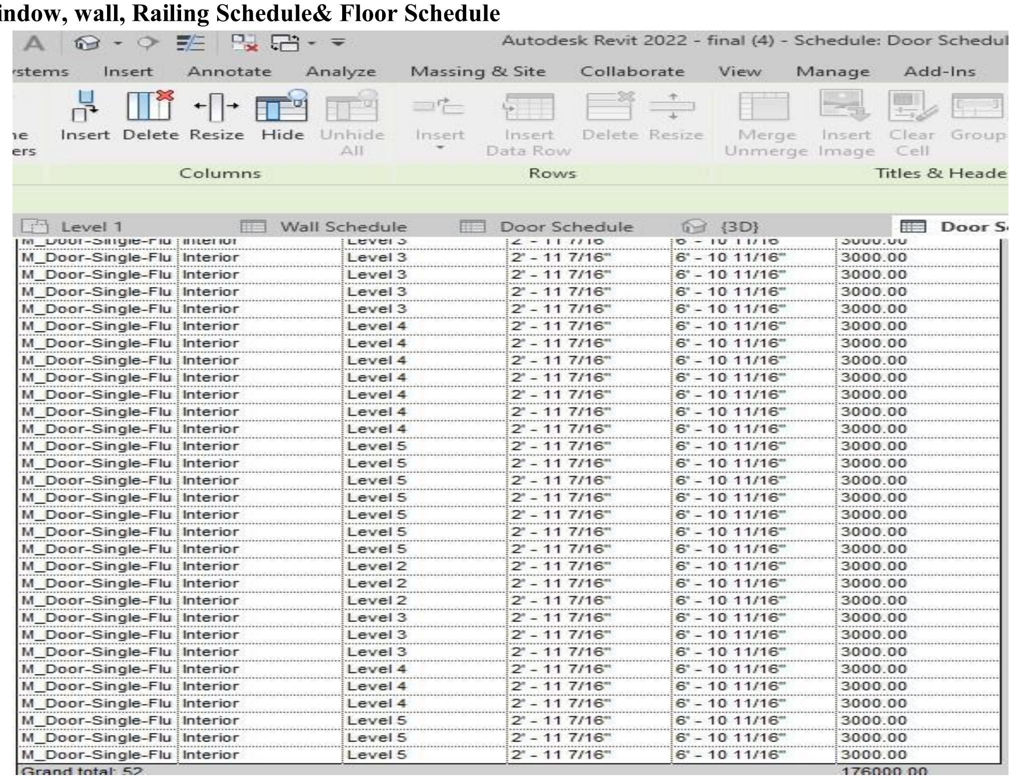
- Cost Estimation:
  - Cost per kg: ₹75
  - Total Cost:

$$78.5 \times 75 = ₹5,887.50$$

Reinforcement Concrete Cost Estimation per Meter cube

Material	Quantity/m³	Unit Rate (₹)	Total Cost (₹)
Cement	6.5 bags	350	2,275
Sand	0.42 m³	598.50	251.37
Aggregate	0.84 m³	1,026	861.84
Steel	78.5 kg	75	5,887.50
Total RCC Cost per m³			₹9,275.71

Door, Window, wall, Railing Schedule& Floor Schedule



M_Door-Single-Flu	Interior	Level 3	2' - 11 7/16"	6' - 10 11/16"	3000.00
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M_Door-Single-Flu	Interior	Level 3	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 3	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 4	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 4	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 4	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 4	2' - 11 7/16"	6' - 10 11/16"	3000.00
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M_Door-Single-Flu	Interior	Level 5	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 5	2' - 11 7/16"	6' - 10 11/16"	3000.00
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M_Door-Single-Flu	Interior	Level 5	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 5	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 2	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 2	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 2	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 3	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 3	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 3	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 4	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 4	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 4	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 5	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 5	2' - 11 7/16"	6' - 10 11/16"	3000.00
M_Door-Single-Flu	Interior	Level 5	2' - 11 7/16"	6' - 10 11/16"	3000.00
Grand total: 52					176000.00

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<Floor Schedule>

A	B	C	D
Area	Family and Type	Volume	Cost
2392 SF	Floor: Generic - 12	996.67 CF	1500.00
1795 SF	Floor: Generic - 12	747.82 CF	1500.00
1795 SF	Floor: Generic - 12	747.82 CF	1500.00
1795 SF	Floor: Generic - 12	747.82 CF	1500.00
1795 SF	Floor: Generic - 12	747.82 CF	1500.00
1795 SF	Floor: Generic - 12	747.82 CF	1500.00
11366 SF		4735.76 CF	9000.00

<Railing Schedule>

A	B	C	D
Railing Height	Family and Type	Length	Cost
3' - 0"	Railing: Handrail - Rectangular	18' - 1 13/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	29' - 7 3/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	18' - 1 13/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	29' - 7 3/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	18' - 1 13/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	29' - 7 3/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	18' - 1 13/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	29' - 7 3/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	18' - 1 13/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	29' - 7 3/32"	600.00
3' - 0"	Railing: Handrail - Rectangular	15' - 0 13/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	14' - 3 5/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	12' - 0 1/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	15' - 0 13/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	14' - 3 5/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	12' - 0 1/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	15' - 0 13/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	14' - 3 5/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	12' - 0 1/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	15' - 0 13/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	14' - 3 5/16"	600.00
3' - 0"	Railing: Handrail - Rectangular	12' - 0 1/16"	600.00
Grand total: 22			13200.00

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V. CONCLUSION

This project demonstrates how Revit software can make the estimation and costing of an RCC G+4 building more efficient and accurate. By using modern technology, construction planning becomes faster, reduces errors, and helps manage the budget better. The software automatically calculates material quantities, avoiding wastage and extra costs. This approach improves construction efficiency and ensures better resource utilization.

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