

COST PLANNING AND ESTIMATION FOR A RESIDENTIAL BUILDING

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INTRODUCTION

This study deals with the cost estimation of a residential structure. As nowadays rise in population can be seen, with a rise in population there is need of rising in buildings, So proper planning of that structure is needed to be done. Proper planning includes a proper structural design, material estimation, cost estimation, etc. The estimation of a residential structure is the basic point of departure because of the not-so-perfect building structural design data. The cost estimation data required is structural design, labor cost, material cost, etc. these all are essential when it comes to cost estimation of a product. The study has been accomplished based on:

1. Basic survey
2. Structure Design and Data collection
3. By hand calculation
4. Project budget benefit analysis

A. *Description of project*

The building design which is used to calculate the cost estimation is a residential building. This building will have all the amenities that a house buyer will look for. This building is supposed to be constructed in a suburban area and is needed to be connected to nearby areas by wide transportroads. Residents should haveeasy access to all the basic facilities required such as Schools, Colleges, Hospitals, Markets, etc. This structure is a domestic complex have a unit area of 59*35ft

B. *The objective of the paper*

The main objective of this paper is to determine the following:However, the estimation of a residential building is the main point of departure because of the imperfect structural design data. For cost estimation data required is structural design, labor cost, material cost, etc. these all are essential when it comes to cost estimation of a product.

The study has been accomplished based on:

1. General survey
2. Design and drawing collection
3. Manual calculation
4. Cost-benefit analysis

A. Description of project

The building design which is used to calculate the cost estimation is a residential building. This building will have all the amenities that a house buyer will look for. This building is supposed to be constructed in a suburban area and is needed to connect to nearby localities by wide roads. Residents should have easy access to all the basic facilities required such as Schools, Colleges, Hospitals, Markets, etc. This structure is a domestic complex have a unit area of 59*35ft

B. Objective of the paper

The main objectives of this paper are to determine the following things:

1. To collect the detailed data of architectural drawings
2. To collect the cost data of building construction materials.
3. To process the data of cost/budget into the value of the cost of construction.
4. To calculate the overall estimated cost of construction
5. To collect the detail of the market price of material

(it may vary from place to place)

B. SCOPES OF THE STUDY

The main scopes of the study are as follows:

1. Information Collection
2. Information about the availability/cost of the required construction material
3. Material cost/price difference study
4. Labor/enforce fair study
5. Workmanship availability in a place

C. SPECIFICATION OF MATERIAL

The full specifications of the materials for the construction of the building are given below:

Cement

The cement which is to be used is going to be Ordinary Portland Cement (OPC) conforming to the requirements of the Standard Specifications for Portland cement. Cement will be delivered in bags by the manufacturer with the brand name, type of cement its weight of each bag marked on the bottom of the bag. Sample test of cement is also needed to take care of. Bulk cement which usually sets or which contains lumps of caked cement will be rejected. The use of the cement reclaimed from discarded or used bags is prohibited

Water

The water which is to be used in mixing and curing concrete will be tested by methods which are described in AASHTO test Method T-26. Water is supposed to be clean and free from NaCl (salt), oil, acid, vegetable, or other substance that could be injurious to the finished product. Water to be used in construction is required to be profitable.

Fine Aggregate: Sand

Fine Aggregate which is to be used is basic natural sand, the mixture of clean, hard, durable particles (should not be coated) resulting from the integrated siliceous. It is needed to check that the fine aggregate to be used is free from any injurious amounts of organic impurity

Deleterious substances are not supposed to exceed the following percentages by weight:

1. Clay lumps and their friable particles: 3%
2. The Coal and The Lignite: 0.25%
3. Material which is passing the 0.075 mm (No 200) sieve: 2%
4. The Shale, The coal, soft or flaky fragments: 11%
5. Other organic material content: 5%

Coarse Aggregate Used: Stone Chips

For all types of concrete except blinding concrete will contain hard durable crushed stone boulder. Coarse aggregate should be clean, free from dust. The amount of deleterious substances is not supposed to exceed the following limits:

1. Soft fragments should not exceed by 2% by mass
2. Clay lump may not exceed 0.25% by mass
3. Material passing by the 0.075 mm sieve: 0.5% by mass if clayis. 1.5% by mass if fracture dust.

Coarse Aggregate Used: Brick Chips

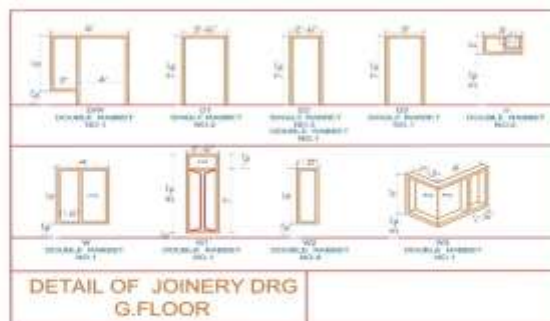
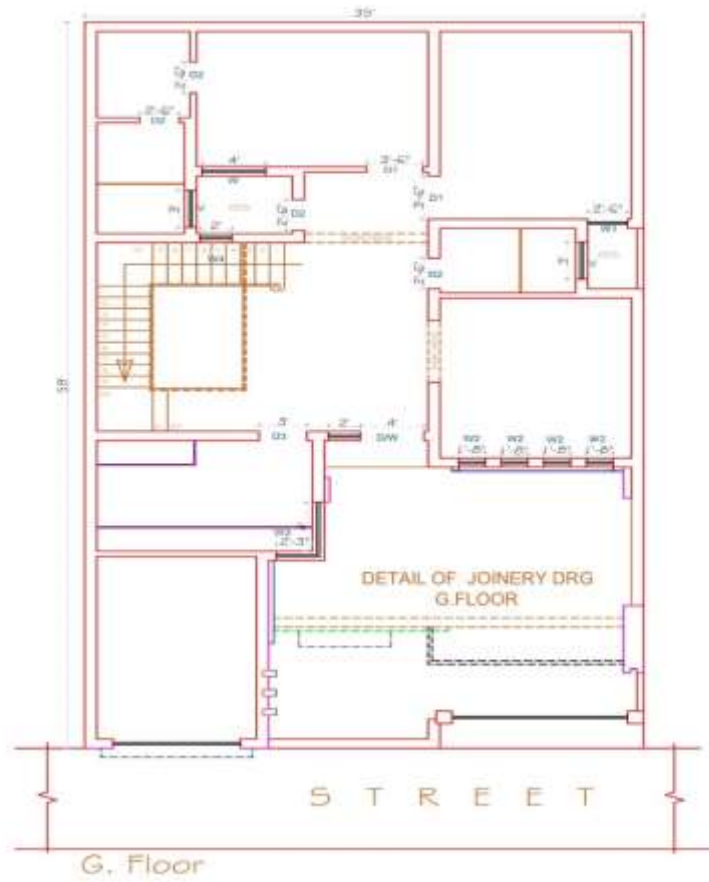
It is usually made from brick and confirmed to the following requirements:

1. It is to be made up of first-class
2. Nominal size is to be kept as same as that of stone aggregate...

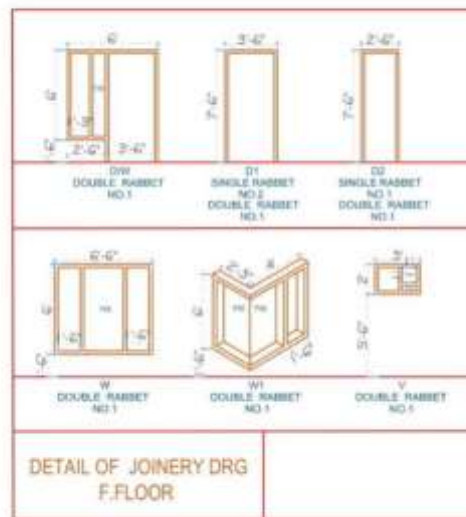
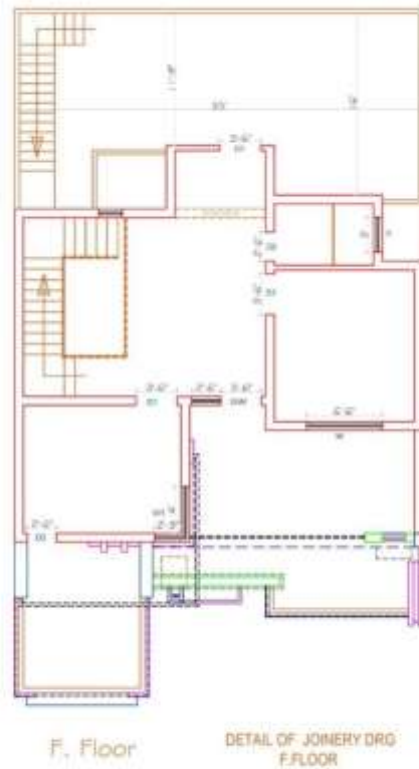


D. Structure Design

Ground Floor design:



First-floor design:



LITERATURE REVIEW

A. Terminologies of cost planning

Cost planning is the method to find the estimated cost of the project which means to know how much is going to be the cost of the project. In cost planning, the main focus is on the budget and schedule of the work. To get the undertaking of finance and to find the possible undertaking income cost The cost planning is always very important for a successful project and design planning, design and construction of a given structure and it is very helpful in getting a clear image of construction cost/budget of a project.

Cost planning consists of three steps:

- PreApproximate Estimate.
- Cost Planning of structure
- Cost rechecking at the finishing if the structure

Planning helps to prevent any type of confusion as well as maintaining the budget and avoiding any delays in the project. With help of proper planning of structure, we can avoid the wastage of any kind of resources. In the cost management process the cost planning plays a very important role in finding the budget, the budget is found out by estimating using various methods. Because of the proper planning, we can avoid wastage and other mistakes by analyzing the same kind of any projects which are ever done in past, so in short, we can term that planning is used for the reducing of wastage of period of a project as well as control the overall budget/cost of a project.

B. Cost Management

Cost management means the process of planning, estimating, budgeting, and controlling the cost. The project has to be completed within the budget estimated and given time duration.

- Elements of the cost management
 1. Estimating cost
 2. Budgeting cost
 3. Checking of cost

C. Cost Estimation

Cost estimation means finding the cost/budget of the project and developing the estimates as well as measurement for cost is useful for the resources to complete the project work and activities.

Cost estimation is mainly calculated by using various methods which are given below:

- . Approximate method
- . Cubic content method
- . Unit method (elemental method)
- . Centerline method

D. Accuracy of Cost Estimation

The precision of assessment depends on the subtleties of design just as data of market pace of the material. The area of the construction site likewise impacts the precision. On the off chance that the drawings of the design are more precise in such case possibility of exactness increment.

E. Background for cost assessment

As per the recorded foundation model of the expense assessment, it is separated for the most part into the three gatherings. The main model is advanced from the useful component of the structures. The expense plan approach was utilized in England from the late finish of the 1950s up to the 1960s. The subsequent model was begun from the relapse examination and it was utilized since the mid-1970s [Mc Caffery, 1975], The model began to create at the start of 1980'also it is mostly founded on the Monte Carlo recreation technique[Touran,1992]. The expense of undertaking is should have been assessed inside the exactness range, yet there is a colossal issue remaining before cost assessment which is especially in the underlying stage and it happens because of the absence of fundamental information and greater vulnerabilities as a consequence of arrangement. [Verlinden et al 2007]. Chan and park additionally concentrated on the expense assessment model in which they recognized components that add to the expense of the venture, for estimation of the pre-development cost of undertaking model they utilized the rule component method and evaluate relative significance for assurance of variables [Chan and park, 2005]. Oberlender and Torts both were built up the scoring arrangement of estimation for estimating the effect of four determinants of precision on gauges who associated with the readiness of assessment for example what was the information we think about the project, a factor considered at the hour of planning of assessment and how was assessment arranged. [Oberlender and Torts, 2001]. after that Torst and Oberlender concentrated to build up the model which empowers assessors to assess the precision of the early gauges [Torts and Oberlender, 2003]

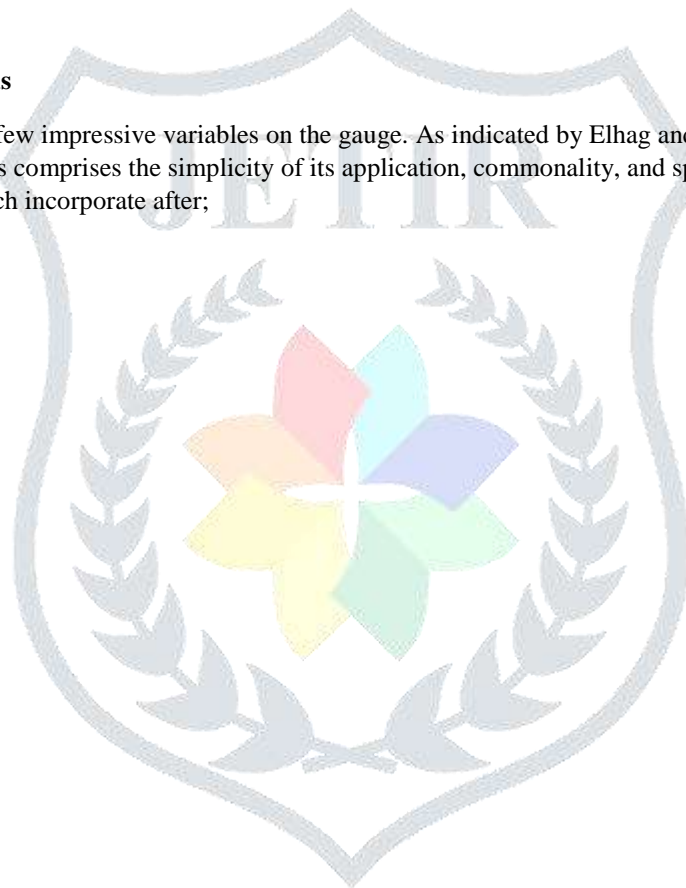
F.Types of Cost assessing Methods

Cost assessing differs because of a few impressive variables on the gauge. As indicated by Elhag and Boussabaine (1998), the engaging quality of every one of the strategies comprises the simplicity of its application, commonality, and speed along with an average degree of exactness and dependability which incorporate after;

- Functional Unit
- Cube Method
- Superficial Area
- Superficial Parameter
- Story Enclosure
- Approximate Quantities
- Elemental Analysis
- Interpolation
- Resource Analysis
- Cost Engineering

These strategies above, as per Elhag and Boussabaine (1998) are very little productive because of their detriment in the field of the absence of exactness and vulnerability. Their shortcoming additionally lies in their powerlessness to consider customer, specialist, and plan attributes, a worker for hire's qualities, contract techniques and acquirement methods, external factors, and advertising qualities. Ashworth, (2004), recognized the accompanying sorts of assessing as;

- Preliminary
- Feasibility
- Viability
- Authorization
- Final Budget
- Control



Another expense assessing strategy comprises; straight/powerful programming, relapse examination, recreation/hazard investigation, and master frameworks, Elhag and Boussabaine (1998). Be that as it may, these strategies do not have the capacities to manage numerous issues, for example,

1. Imprecision and vulnerability of information and factors influencing the cost of development projects.
2. Obscure consolidated impacts and interrelationships of cost affecting variables.
3. Complex and ambiguity of information yield relationship which can't fit in pleasantly and effectively into a quantitative depiction.

Essentially, cost assessment according to Butcher and Dermmer (2003), falls into two gatherings in particularly reasonable gauges and definite appraisals.

G. Conceptual Estimates

Some of the time called parametric or primer appraisals, it is the way toward setting up a task's expense typically before any graphical portrayal of the office created. As indicated by Clough, (1986), it is generally the primary type of assessing that includes anticipating the future expenses of a task. It is once in a while additionally called as "topdown", significant degree, ballpark, plausibility, fast in and out, closely resembling and pre-plan gauge. Clough, (1986), further told that this sort of appraisal is generally done as a piece of practicality learn at the initiation of an undertaking. Now, the gauge is set up with the least information concerning the task's extension with little plan and particular subtleties. In basic words, the applied gauge gives the customer a clue on how much financial plan is anticipated from the task before additional choices could be made to continue with the venture

H. Detailed gauge

This is otherwise called, bid or amount take-off gauges. The itemized gauge is the amount of a cycle where the expense of a given development project is anticipated. The gauge is set up by separating the work bundles in a deliberate and legitimate structure by deciding the expense of each work bundle as a matter of fact and getting the aggregate. Butcher and Dermmer (2003). Hendrickson, (2000), referenced that an intricate gauge is generally framed at whatever point the whole extent of work is unmistakably spelled out and an itemized structure depicting the whole interaction is noticeable. Hegazy, (2002), expressed that the fundamental contrast between the theoretical gauge and nitty-gritty gauge is that the itemized gauge can be done just when individual work bundles are distinguished and remove from their amounts are made conceivable. Hegazy, (2002), further expressed that the nitty-gritty gauge requires an investigation of the strategy for development to be utilized, the amounts of work, assets paces of creation, and whatever other factor that influences everyone of the sub-things.

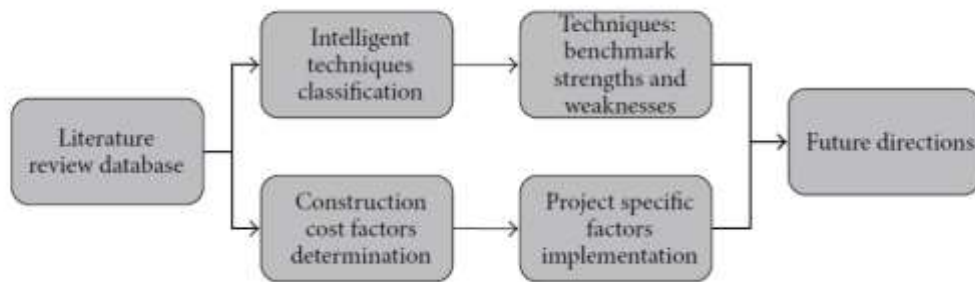
I. Factors Influencing Cost assessment Accuracy

One most significant factor for an effective acknowledgment of a development project is the arrangement of an exact quote that is fit for affecting task attainability to productivity. Enhassi, et al. (2007). The degree of precision of a gauge consistently differs contingent on the measure of data that is accessible of the task. Enhassi, et al. (2007). Elhag, et al. (2005), expressed that the most efficient factors influencing cost assessment are subjective, and they incorporate; strategies for obtainment, economic situations, and the degree of development exercises, and the customer's need concerning development time. While Odusami and Onukwube, (2008) recognized the subtleties of configuration, work, and material accessibility, mastery of the assessor, economic situations, nature of plan intricacy, the time of delicate and task group insight. While, Akintoye, (2000), distinguished intricacy of a venture, the extent of development, economic situations, the strategy utilized in development, imperatives on location, customer's monetary standing, and buildability and area of undertaking as variables affecting task quote.

Exploration Methodology

The significance of cost assessment in the development business has been talked about in the above segment. Nonetheless, there is no uncertainty that some fundamental arrangements may address the predicament of cost invades, considering all components influencing cost assessment. Indeed, there are countless successful strategies accessible to manage issues in the development of the executives. This rouses the analysts to complete and dissect astute and viable strategies concerning handle the development cost assessment issue. The scientific interaction will feature the examination hole around here. Besides, it will open an entryway for characterizing the accessible chances for future exploration. This examination has been isolated into three sections, as demonstrated in

Figure 1. First and foremost, we have made a writing survey information base on the savvy methods which have been utilized in cost assessments for quite a while. In this progression, explicit diaries have been picked dependent on their specialization both in developing the board just as data innovation. At that point furthermore, we present an examination and conversation of each compelling procedure to explain its qualities just as shortcomings. The qualities and shortcomings of particular smart strategies will be acquired by the expense assessment strategy dependent on that procedure. Furthermore, cost influencing factors have been set up to do a particular benchmarking measure



Centerline method

in this method, known as the centerline method total length of the centerline of walls, long and short has to be found out. Find the total length of center lines of walls of the same type of foundation and footings and then find the quantities by multiplying the total center lengthly the respective breadth and height. In this method, the length will remain the same for excavation in the foundation for concrete in foundation, for all footing, and for a superstructure

This method is quick but requires special attention and consideration at the junction, meeting parts of the portion or cross walls, etc.

DESCRIPTION	VALUE
Sum of horizontal main wall 1 st floor	37.72m
Horizontal secondary wall 1 st floor	18.43m
Vertical main wall 1 st floor	49.5672m
Vertical secondary wall 1 st floor	26.072m
Horizontal main wall 2 nd floor	68.316m
Horizontal Secondary wall 2 nd floor	34.196m
Vertical main wall 2 nd floor	25.4692m
Vertical secondary wall 2 nd floor	24.1502m
Total wall area 1 st floor+2 nd floor	299.393m
1 st -floor brick masonry work before plinth level	22.605m
1 st -floor brick masonry work after plinth level	65.4048m
Plastering 1 st floor	3.29m ³
2 nd -floor brick masonry work	86.722m
Plastering 2 nd floor	3.29m ³

Data analysis and Calculation

Data analysis and all other calculations are done manually chance of error are very less as all the calculations are done very carefully and are rechecked all the units used are in meter and the values are taken from the structure design. The below-given table is the data collected after solving the structure by center line method

Cost estimation calculation

For the first floor

1. Cost for excavation in foundation=218982rs
2. Pcc layer=20361.597rs
3. Brick masonry work below plinth level=192956.28rs
4. Brick masonry work above plinth level=557571.5rs
5. Rcc layer= 5777.24
6. Stair case=27000rs

7. Doors and windows=111000rs

8. Washrooms=15000rs

9. Plastering=100000rs

10. Kitchen=100000rs

Total for the first floor=138648.28

For the second floor

1. Overall brick masonry work=740258rs

2. Plastering=100000rs

3. Rcc layer=5777.24rs

4. Stair case= 27000rs

5. Doors and windows= 67000

Total for the second floor=940035rs

Overall cost

For both first and second floor, i.e whole structure construction cost will be approx

2323683.52rs

This estimated value can vary from place to place because of the price of the material to be used in construction. Location plays a major role in cost estimation it also depends upon the availability of material at a particular place. Transportation charges can also vary on different location availability of labor also plays a major role in the deflection of the derived cost

Conclusion

This research project of a residential building is concluded as per planning, estimation. The total cost of the project can be estimated in feasibility, even in case knowing the construction area that time it's easy to estimate. This study concludes that :

The total cost of the project estimated=2323683.52rs

Estimated project duration=244days

The above derive cost and duration can vary and this must be kept in mind

The above-given project is approved by a client and is going to be constructed in Punjab, nawasher