

Analysis of Formwork in Multistory Building

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Abstract: One of the most important factors in determine the success of a construction project in terms of speed, quality cost and safety of work is the out of the total cost of project approximate 40% cost is spent on formwork when considering the importance of cost variation in contractor and client both try to finish the job early as possible and contractor wants to finish work as soon as possible because gain maximum profit due to this reason speedup the work in high-rise building construction by achieving very short floor cycle this cycle mainly depends on formwork types in this is main time factor of construction project and used of formwork is partly growth in 20 century increasing the use of concrete in construction so it is very important factor to focus on formwork in construction industry This Paper aim is to present existing formwork type and modern method affects the project duration and cost of project and quality of work for that a research has been carried out and result will present in this paper.

Keywords: Cost, Duration, Formwork, quality

I. Introduction

Formwork is defined as temporary structure whose purpose is to provide support and containment for fresh concrete until it can support itself. It moulds the concrete to desired shape and size and controls the position and alignment. The development of formwork is parallel to use of concrete in construction. The advancement of technology increase of Population and space Limitation lead the way to construct high rise building but the task is not very easy at the beginning now the man made task easy by intervening new machinery and new techniques. The important factor in terms of cost Quality and speed in a high-rise building construction project with the advancement of technology it developed gradually and people used ply wood sheets instead of timber planks and steel pipes with jacks were used to support the ply wood. The larger units were invented like formworks for slab panels, formworks for columns, beams...etc. when the same elements are repeating. Finally the whole system of formwork is made initially material used steel and steel self weight very high. Then the aim was to reduce the weight of the system and the materials for formwork have extended to aluminum, plastic, fiber glass etc.

Contractor believe this system of formwork is suitable for super tall building as the initial cost of the system formwork is a bit high, it reduces the project duration and hence the total project cost. Considering the overall of high-rise building the system of form work is much more economical than all other primary work types, it reduces the project duration. Also improve the Quality of work and speed of construction.

II. Types of Formworks

Conventional Formwork: This is the oldest type of formwork used in construction Industry. Timber, bamboo, masonry and carpentry. This type formwork suitable for small construction up to G+1 floor in India it is widely used in construction but it is not suitable for high-rise or major project due to stability and structural safety issue, it not used in big project and another side of this form work life span is min because deterioration rate very high. Some of the advantages of this type and poor finish, high labor requirement, skilled labor requirement and consume lot of time are some of the disadvantages.

Modern Formwork: This is very closer to conventional formwork and in simple words this is one step advanced than conventional formwork some modern techniques used in fixtures and fastening is used, only the difference is advanced material is used in modern formwork. Main advantage is this is used several times in project but Initial cost is high after the used in several project and the scarp value as compare to conventional formwork is also very high. The differences of both types are that steel props and various types of jacks (U jacks, T jacks) are used as supports in the formwork instead of timber supports and ply wood sheets are used instead of timber planks on slab decks, beams and columns. Low initial cost, low skilled labor requirement, can even use in small places and when there are lot of deviations in the structure are some of the advantages while poor finish of the concrete surface, high labor requirement and the higher floor cycle are the disadvantages.

This type is much more advanced than the modern conventional type. In this type there are pre-fabricated formwork items such as pre-fabricated formworks for slab panels and supports and ply wood should be used additionally for slab deck, beams and columns for the surface. There are other forms of semi system formwork such as table forms, flying forms etc. DOCA is the most famous brand for this type of formwork and some people know about this type only as “DOCA formwork”.

System Formwork: System formwork has prefabricated modular components with casting panels. Fabricated panel required proper shape the biggest advantage of this type is speedy and quality construction. But the high initial cost is the main disadvantage and hence it is not economical to use in low – rise buildings. But this economical for high-rise building having few typical stories.

III. Research Study

The aim of this study to find most economical formwork type to used in high-rise building. When considering a construction project there are many cost components contributing to the total cost of project, and the duration of the project is the governing factor for the preliminary running cost.

Total Project Cost = Materials and labor + Preliminary cost + Machinery & equipment t+ Waste material handling + Safety + Finishes + ...

Preliminary Cost = Salaries + work establishment charge + Security

When a building construction project is considered the material requirement is unique as it depends on the design. But the labour requirement and the duration of the project are directly affected by the technologies and the construction method used in project the speed of project affects this is find in high-rise building project. When using latest technologies, the labor requirement and the time duration can be minimized in the project, mainly for the super structure.

In multistory building project time is main factor and is directly affects the floor cycles and hence it will reduced time taken to construct the main structure because of that total duration of the project will go down drastically. In this research cost comparison of the total project cost has done.

IV. Result

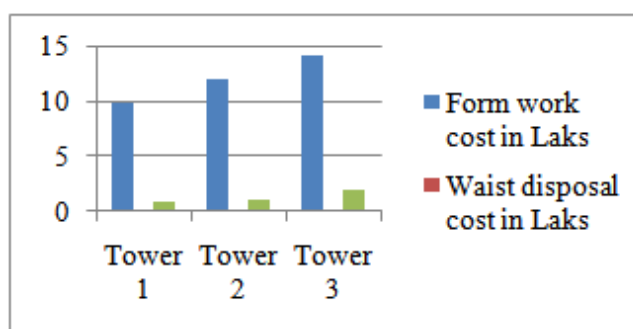
Data is collected from M/s Sai Construction Ahmednagar. Name of Construction work on Residential Building of KARAN RHEA Wing A, Wing B & Wing C at Wadegaon Sheri, Pune. Projects and calculations are done for the total project cost of the selected projects when using different types of formworks in the construction. From the observation all parameters are kept same and only the formwork type changed at the same time all factors affects due to the formwork types is considered result as shown in table.

Table No.1

Project	No.of Floor	Area of each floor (sqm)	Total cost of Project
WingA	10	418	11,24,42,000
Wing B	15	510	13,71,90,000
Wing C	20	600	16,14,40,000

Table No.2

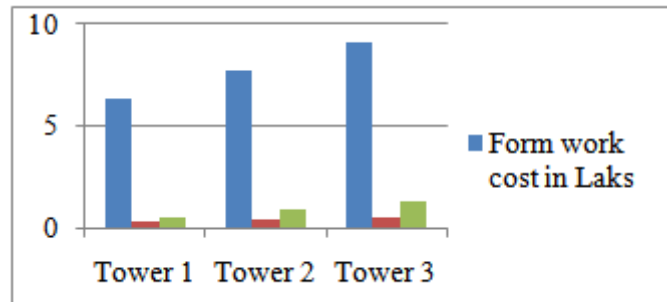
Analysis of the Aluminium formwork for Typical Floor			
	Wing A	Wing B 2	Wing C 3
Form work cost in Laks	9.82	11.98	14.1
Waist disposal cost in Laks	0	0	0
Machinary cost in Laks	0.9	1.12	1.98



For Aluminum form work

Table No.3

Analysis of the conventional formwork for Typical Floor			
	Wing A	Wing B 2	Wing C 3
Form work cost in Laks	6.27	7.65	9.0
Waist disposal cost in Laks	0.31	0.38	0.45
Machinery cost in Laks	0.5	0.85	1.25



V. Conclusion

From the results obtained we can come to a conclusion that when the system formwork is used in the construction project, the total project cost and the duration of the project is lesser than other type of formwork

The aluminum panel formwork is most expensive type formwork out of this three type formwork. At the same time the highest total project cost is obtained when modern conventional type of formwork is used in the building construction project which is the least expensive formwork type. So it is clearly seen that not a cost of formwork directly affects the cost of project.

The floor cycle will be 6-10 floor when the system is used the cost and duration will be reduced same time finishing of concrete surface obtained smoothly hence after shutter removing no need to extra finishing is required so also save the finishing cost. There will be less waste disposal and less machinery usage. Not only are the direct benefits there many indirect benefits of using aluminum formwork in high-rise building construction project.

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