

Cost analysis of precast wall panel and burnt brick masonry wall.

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Abstract - As the Indian construction industry is adapting modern techniques and materials for its growth day by day, but the factor which is still stationary is, budget. For carrying any project the most important factor is the cost of the project which basically is the summation of all the different elements which are involved in the project. When we deal in building construction walls are one of the most delicate element which has its own importance in any structure. For erection of conventional burnt brick masonry walls it requires a lot of skilled labor and more over a large amount of time. By the time of finishing it again requires a capital for plaster and smoothing the surface. This paper deals with the cost analysis of precast wall panel and a conventional burnt brick masonry wall, so that there should be a concluded result regarding the cost estimation of the two walls mentioned above. The precast panel used for this project is a self-designed insulated wall panel with details described in the paper below.

This paper contributes in the modern day construction techniques and material. As the precast industry is holding the market and extending its work in every possible elements of the construction viz. precast column, precast beams, precast slabs, precast rigid pavements, and off-course precast walls. The benefits of the precast element systems has shown a lot of interest in today's market for the designers. So, it is necessary that these precast wall panels must be in the range of optimum cost so that they can be utilized for the maximum purposes they can be used for.

Key Words: Precast panel, cost analysis, burnt brick masonry, insulated, conventional.

1. INTRODUCTION

This paper includes an overview of the cost analysis between a particular designed precast insulated wall panel and conventional burnt brick masonry wall. The reason for this paper is to justify whether the precast constructions are worth or not as compared to conventional burnt brick masonry for erecting walls. The panels which are used to this project were self-designed precast insulated wall panels. For the purpose of insulation the material which is used is expanded polystyrene sheets sandwiched in between the two outer concrete wythe layer. All the three layers i.e. the two outer concrete layers and the insulated sheet layer were held with the help of connectors. These connectors were inserted during the time of casting the panels.

One of the objective of these precast wall panels are they leads in reduction of thermal energy requirement in a building due to which a large amount of energy and money is saved during the useful life of these panels. The expanded polystyrene is one of the material which is responsible resisting the flow of heat through it. So, the cost analysis of these precast insulated wall panels is very much important.

1.1 Design of Panel

This particular design panel is a typical sandwich wall panel and the 2 main component of the panel are-

1. Concrete wythe.
2. Insulation.
3. Connector.

The dimensions of the panel is 30.5 cm* 30.5 cm*7cm.

Classification of thickness- (20-30-20) mm where 30mm & 40 mm are thickness of concrete wythe and thickness of insulation respectively.

1. Concrete wythe-

The strength of the panel is totally depended on the 2 outer layer of the concrete. These layer are to resist all the compressive forces which are created in between the structural element in the framed structure.

Characteristic of concrete-

- Design mix- M20 i.e. (1:1.5:3) cement: sand: aggregate.
- Water cement ratio- 0.5.
- Size of aggregates – 10-15mm.
- Sand – locally available.

2. Insulation-

The main properties of the precast panel was achieved with the help of insulation provided in between 2 layer of concrete. The insulation used for this was 'sheets of polystyrene'.

Characteristics of insulation-

- Thickness of material- 30mm
- Length & width – (28*28) cm respectively.

1.2 Strength of panels- compressive strength (Mpa)

The panels were tested in compression testing machine in the college campus. The panels were tested in compression testing machine.

Sr.no	Size of panel (cm)	Load(N)	Strength(Mpa)
1	30.5*30.5*7	205	17
2	30.5*30.5*7	210	17

2. COST ANALYSIS-

2.1- Self designed panel-

The cost of manufacturing of these designed precast wall panels was done on raw material i.e. cement, sand, aggregate purchased at retail rates.

The purchased rates of the quantities are as follows-

Sr.no	Material	Per unit	Cost
1	Cement	Bag	300
2	Sand	M ³	6000
3	Aggregate	M ³	8000
4	polystyrene	sheet	35

The quantity of raw materials required for making 1 panel was first calculated on the basis of volumetric batching and later was converted into weight batching.

As the dimension of 1 panel was 30.5cm*30.5cm*7cm, the quantity of raw material required for making 1 panel was about 2:3:6 kg for the ratio of cement:sand:aggregate.

So, as per the above rates for 1 panel the cost is given by-

Cement	Sand	Aggregate	polystyrene
12Rs.	10Rs.	13Rs.	5Rs.

Above rate chart shows that the cost of making of 1 panel with self-designed ratio of concrete and insulation cost up to Rs. 30 for size of 1ft. * 1ft. This cost of 1 panel is slightly high as compared to that of conventional burnt brick masonry.

2.2- Burnt Brick Masonry-

For making of brick wall of the size of 30.5cm*30.5cm*7cm the raw material required consist of cement, sand, aggregate, and brick. The mortar required for joining these bricks together was in the ratio of (1:6) i.e. 1 part of cement and 6 parts of sand. The rate chart of burnt brick is as follows-

Cement	Sand	Brick
10 Rs.	5 Rs.	15 Rs.

From the above analysis it reflects that the self-designed precast insulated wall panels cost comparatively high as compared to that of conventional burnt brick panel.

3. CONCLUSIONS

Final rate

- Precast panel- 40Rs.
- Brick masonry – 30Rs.

From the above rates, which are accounted it shows that the precast insulated wall panels are quite expensive as compared to that of conventional burnt brick panel for an particular area of size.

But, when we consider brick masonry it include additional cost for plastering and labor for their installation. Since these precast panels are ready for installation at the site it does need any other cost for finishing and does not require a large amount of money for their installation. So these precast panels has a bright future in the domestic market.



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REFERENCES

- [1] Abhijeet Kamble, S. Bhosale, M. M. Wagh, Experimental analysis and performance evaluation of cavity walls with burnt brick for building envelope, IRJET, volume 2, issue 3, June- 2015.
- [2] Dr. H. W. Pang, Lightweight precast systems inn buildings- the way ahead. Materials science and technology in engineering and technology 2005.
- [3] David C. Salmon, Amin Einea, Maher K. Tadros, and Todd D. Culp, Full scale testing of precast concrete sandwich panels, ACI Structural journal, title no- 94-S32.
- [4] Sugeng WIJANTO, Takim ANDRIONO, Research and application of precast/ prestressed concrete systems in indonesia, the 14th world conference on earthquake engineering, october12-17, 2008, Beiging, China.

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