

# Research and Comparative Analysis of Precast Concrete House

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## ABSTRACT

Now a day construction of house become very expensive these days. There are various options for need to explore for that. Construction start with planning, design, and financing and continuous until the structure is ready for occupancy. Precast construction of house structure with minimum use of cost, time, and environment. So that's why we prefer as solution precast concrete construction. It is most economical solution present in the construction industry and it is also economical and environmental friendly.

**KEYWORDS:** column post, panels, ecofriendly, precast

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## INTRODUCTION

Our work is to be comparative analysis of precast concrete and brickwork construction. Brickwork construction is very time consuming, since bricks absorb water easily, it causes fluorescence. Brickwork has very less tensile strength. Precast concrete is best technique comparably others, and economically better and compressive strength high than others which we take lab test on it. Specially we use panel type precast concrete.

That's why we represent precast concrete construction technique, here we decided to be which technique is better compare in time, strength, quality, economical etc.

### Literature review-

Building house has become very expensive thing in today's life. So we will analyze the competition between both precast concrete and brickwork construction to see the cheaper options. So we are going to understand the process by doing research papers on precast concrete.

**1. A Review on precast concrete (P.Karthigai priya, M.Neamitha)-** The precast is been adopted

worldwide and it has many properties such as it can withstand under seismic loads, cyclic loads etc. It has good quality control. The speed of construction can be increased with precast construction

**2. A case-study on use of precast technology for construction of high rise buildings-** (Sandeep jain) From the above case study, it can be concluded that precast construction, if designed and executed with thorough planning, has a great potential to respond to new market demands. Adopting mix of CIS & factory made precast units wherever required, instead of usually considered 'all precast or no precast' approach offers more benefits in terms of time, cost, and quality. Repetition of precast components is essential in order to meet quantity for cost effectiveness. The adoption of precast compared with traditional construction demonstrated significant advantages, such as improved quality control, reduction of construction time, construction waste, dust & noise on site, and labour requirement on site. In addition, it results in higher useful gross floor area

which contributed to significant cost benefits. A considerable reduction in steel factor can be achieved even for seismic zones IV & V. It becomes easy to perform non-destructive testing (NDT) if the need arises and becomes easy to mitigate. Precast has evolved towards the use of non-standard design approach with modular elements optimising site opportunities & constraints. For commercial construction and other standard products like boundary wall etc. precast has unprecedented benefits. Precast technology allowed for flexible design and longer clear spans in the non-tower areas like parking. Precast is smart way to achieve the sustainability objectives of Green Building.

**3. An introduction to precast RCC wall panels-(Anitha Jayraman)** - The study done on the construction done using RCC wall panels gave an excellent outcome on major construction worries like reduction of time in construction, paved an idea towards the reusable concrete structures, the replacement of natural sand by M sand, extensive reduction in labor which is a major concern these days. The following study notably established the following; The replacement of natural sand by M sand made the reduction in the sand cost by 70% which makes the wall panels more economical in the present scenario of sand shortage. The time analysis conducted showed that construction using wall panels is faster than conventional construction by 56% which is remarkable as the productivity becomes twice. The panels are more

stable than the usual brick walls as the joint are reduced enormously. The joints between the walls are made by mortar strips so which can be removed and the wall panels can be reused. This shows that the concrete structures can be reused as steel structures. The cost analysis on a simple factory construction project showed that wall panel construction reduces the cost almost by 30 to 35%.

**Basic Material Testing**

**1. Test on cement**

Properties	Cement
Specific gravity	3.1
Normal consistency	29%
Initial setting time	110min

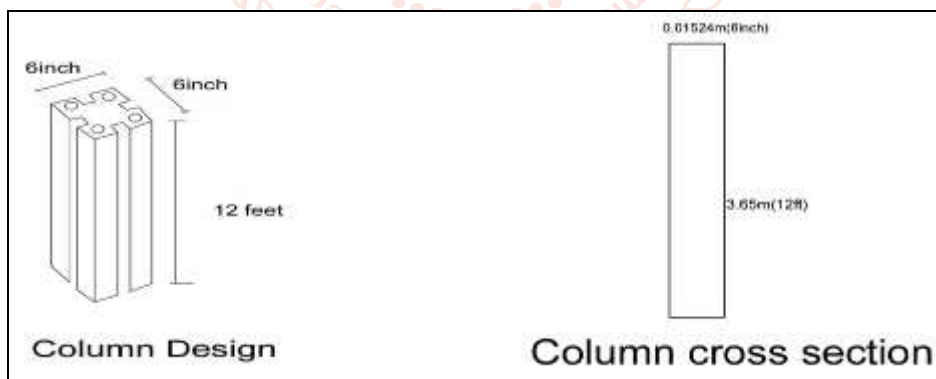
**2. Test on m-sand and coarse aggregate**

Properties	M-sand	Coarse aggregate
Specific Gravity	2.63	2.61
Absorption	2.61	1.95
Bulk density(loose)	1.32	1.37
Bulk Density (compacted)	1.70	1.50

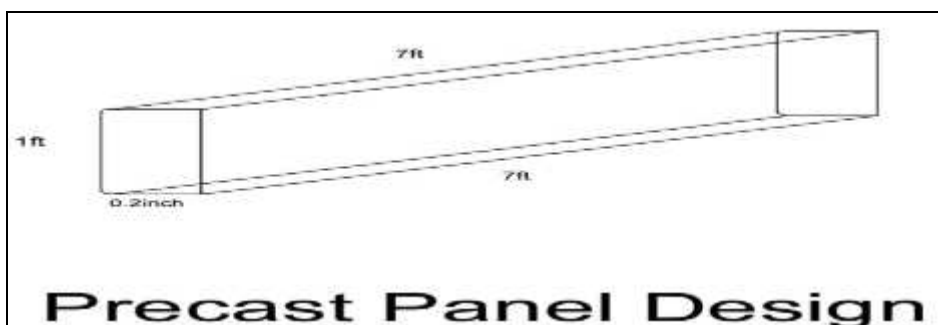
**Design of precast construction-**

The overall situation of a precast is dependant on connections-

- Resistance to all design forces
- Ductility in case of excessive deformation
- Resistance to volume changes and related forces
- Adequate durability
- Required fire resistance



We have column design dimension 0.6x0.6 inch square and ht of column customized it has 12 feet. This is reinforced precast concrete. we have gap between column for fixing concrete panel.



Here we have 1ft height and 7ft length thickness 2inch (1x7 feet). This panel is fixed in column gap and filled with concrete mix.

## Methodology-

### 1. Concrete mix-

Here we small precast work fence post, slab, RCC concrete. We use concrete mix ratio 1:2.5:3.5. Maximum size of aggregate 20mm. water for best consistency soft mixing of 300ml of admixture is used for 50kg bag of cement.

### 2. Moulding-

Mould details and connections ISMB 200, ISMC200. Different sections of the mould are fixed by bolt connection and bolts are properly checked and joints and edges also. Dimensions of mould are within the specified tolerance. For properly and smoothly getting material using old engine oil.

### 3. Curing-

After get material from its go fo curing process. Adequate curing time desired environment is most important. Wall panels are covered with wet mats and cured for 3 days. After 3 days of curing, wall panel will be shifted to storage place.

### 4. TRANSPORT-

This panel system is considered for single storey houses. So our material is not too big to handle. It is easy to handle and easy to transport we can transport through mini truck, tractor etc.

### 5. Foundation-

- In this system we use 12,15,18 ft customized column poles.
- We can build foundation 2 or 3 feet below ground level in the foundation in such way that we can build and lower the foundation.
- Once we have determined the height of column make hole in the ground for that height and then rubble soling.
- After rubble soling process then concreting done with finishing.



**Foundation work in precast construction**

### 6. Installation-

- First complete the column and complete the foundation work.
- Fill the gap between two columns as build beam.
- Once beam is built the strength of your construction will increase and the foundation will be strong.
- After the foundation work completed then 1x7 feet concrete panel in two columns should be arranged one after the other properly.
- After that put on the window and doors were you want and fixed it.



**Construction of precast home**



**Construction of precast home**



**Window fitting between two column**

**7. Finishing-**

In this system of precast construction finishing means two concrete panel between this filling the concrete paste. both side of panel need to fill the concrete.



**Finishing work in precast construction**

**Result-**

Sr. No.	Material	Cost of one room(10x10ft)	Time	Labour	Compressive strength(N/mm <sup>2</sup> )
1	Precast concrete	20,000/- Rs.(100Rs per running sq.ft rate in market with labour and material)	Required less time	Skilled labour required	20KN
2	Brickwork Construction (RED BRICK)	29500/-Rs.(No of brick-281 lno,Cement-12bag,sand-74cu.ft.and labour charges)	Required more time	Skilled labour required	12KN

**Conclusion-**

- It is economical and cheap for construction of house.
- It is environmental friendly and high durability, fire resistance.
- Easy to transport and handling.
- This process only best for single storey building houses.

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