

Analysis of Prefabricational Construction And Conventional Construction

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Abstract - Prefabricated buildings and structures are mounted from uniform prefabricated three dimensional units, providing strength, preset thermal properties of structures, dynamic stability, and immutability of geometric dimensions of the prefabricated elements during their manufacture, transportation, and installation in special and difficult conditions. Prefabrication has been widely regarded as a sustainable construction method in terms of its impact on environmental protection. One important aspect of this perspective is the influence of prefabrication on construction waste reduction and the subsequent waste handling activities, including waste sorting, reuse, recycle, and disposal. There are a couple of different popular forms of prefab with different benefits to offer. Depending on your specific construction project, you may want to consider implementing some of the options. We've pulled together information about the different kinds of prefab as well as the benefits of using this strategy in order to help you decide. In this project the replacement of non-structural component with prefabrication element is proposed. The cost benefit analysis will be studied including prefabrication element in conventional building.

Key Words: Prefabrication, Pre-Cast, Members Of The Building, Microsoft Project

1. INTRODUCTION

It is really the process of constructing building integrity at a manufacturing or other production facility before moving entire assemblies or inter - and intra here to construction sites where the tower will be built. The word is intended to differentiate this technique from a more traditional building practise of bringing basic components here to construction project where all assemblage is completed. A home construction example exemplifies the prefab process. The traditional technique of making a home involves transporting bricks, lumber, cement, sand, steel, metal construction aggregate, among other resources, here to site then constructing the structure on-site from some of these components. Only the cornerstones are built in this manner in prefabricated building. While portions of walls, floors, the top are prefab constructions with windows & door frames incorporated, they are carried to that same site, raised into position by just a crane, & boiled down.

1.1 Prefabrication

Prefabricated construction, sometimes known as "prefab," is a prominent building style. This technique employs off-site components manufactured in such a factory, which could then be transferred and assembled on-site to form a building. There are many prominent types of prefab that each have its own set of advantages. I may wish to explore using any of these choices depend on your unique building project. To assist you with making your decision, we've statistics demonstrate on the many types of prefab or the advantages of employing this technique.

1.2 Principles of Prefabrication

- Helps reduce costs
- Performance will increase since elements may well be created beneath regulated circumstances.
- Helps expedite building although no cure is required.
- Use the substances with inherent properties such as low gravity, ease of achievability, barrier properties, & flammability.
- Use the substances with inherent properties such as low mass, ease of achievability, insulation, & miscibility.

1.3 Fundamentals of Prefabrication

- Modularization

Long - term process is described as building of an entire component off-site before transporting that to the jobsite. With simplicity of shipping, the units might have to be split food onto lesser parts. Typically, prefabrication requires upwards of single transaction.

- Prefabrication

Often this includes a particular profession of profession & is commonly characterised as a manufacturing process in a specialised facility when diverse substances are mixed to make a constituent of a terminal. As much as this item is

created in a workshop & is not part of an entire unit, it is considered pre-made.

- Preassembly

Prefabrication seems to be the merging diverse resources & pre-made elements at a separate place beforehand installing them as a station console. Such setup is related to the constructability method in that the produced elements being constructed near toward the site before being installed on-site. Prefabricated components, which is often considered as a mix of reusability and blueprinting, typically includes operations from several trades & pieces of scientific disciplines.

- Industrialization

That word encompasses all 3 of the aforesaid outside development groups. Economy is centered upon that manufacture idea & is described as the implementation of systems, machinery, & premises to drive growth, minimize physical labor, & boost output quality.

1.4 Prefabricational elements

- Flooring / Roofing system.
- Precast Beams
- Precast Columns
- Precast wall panels
- Precast Slabs

1.5 Software To Be Used

It's indeed essentially a gantt chart that has increased the capacity of internal stakeholders to share complicated concepts. It is now simple to produce & utilize material for buildings. It is indeed a CIEPM (Programmable Logic controller Industrial Project) idea that enables for such significant harvesting of project management data, material, & understanding for partners in ways that participation could never have imagined.

1.6 Microsoft Project

Microsoft Word is fundamentally a computer system that keeps a record of you assignment using two major databases of info. Project data is stored concerning your development's tasks in one database & relevant data the other. You may show your project details from all of these fields in a variety of ways by utilising the numerous views offered in Venture. The Project interface may change based on the chosen view, table, & filter. Yet, you must first get acquainted the with display's critical parts, as seen below. Mastering the interface structure, as well as its features & vocabulary, can assist anyone in utilising Microsoft Teams.

2. Case Study

Shiv Sai Developers (Shown in fig. no.1)



Fig. No. 1 Elevation plan

- Name of site: Shiv Sai developers
- Name of builder : Kiran Vitthal Nagawade
- Location of site : Plot no. 25&26 at Nhawaretal. Shirur, Dist. Pune
- Area of site : 6000 sq ft
- Cost of project : 1.8 cr
- Name of consultant : Mahesh Kadam
- Details of site :
 - 2 bhk -- 3 flats per floor
 - 1 bhk – 2 flats per floor
- Present condition : excavation and prep for centre lining for foundation
- Total built up area : 4800 per floor slab area (P+4)
- Owner and developer : Kiran Nagawade
- Architect : Sidhshesh Sonawane
- Structural engineer ; Sachin Sharma
- Total flats : 20 flats
 - 12 flats : 2bhk
 - 8 flats : 1bhk

This structure is conventional residential building. This case study having 20 flats and it is having (P+4) structure.

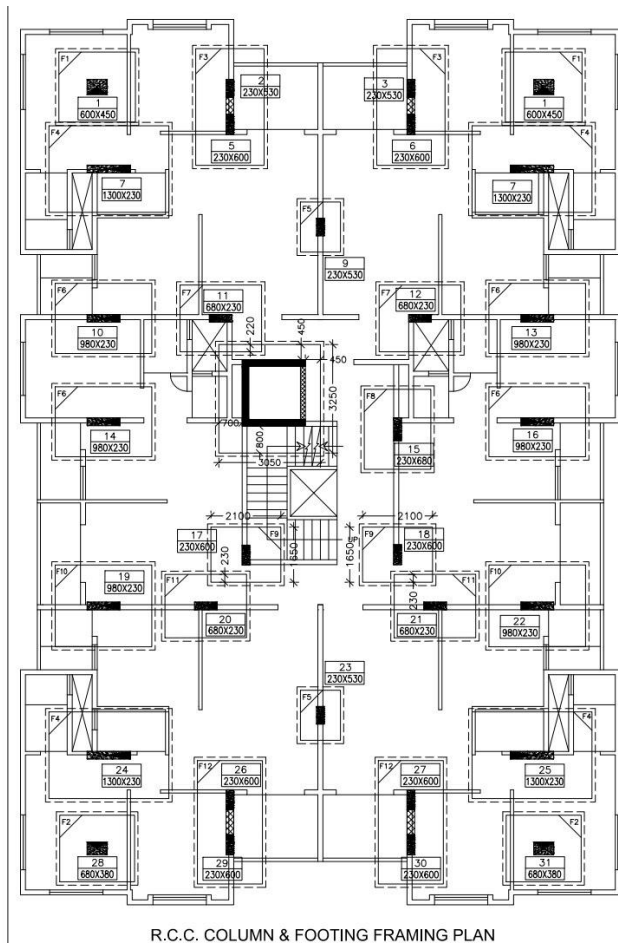


Fig. No. 2 RCC Plan

In the above case study we are going to replace the conventional building elements by prefabricated doors-windows frame, Walls, Wc. Bath.

1. Work breakdown structure of conventional construction

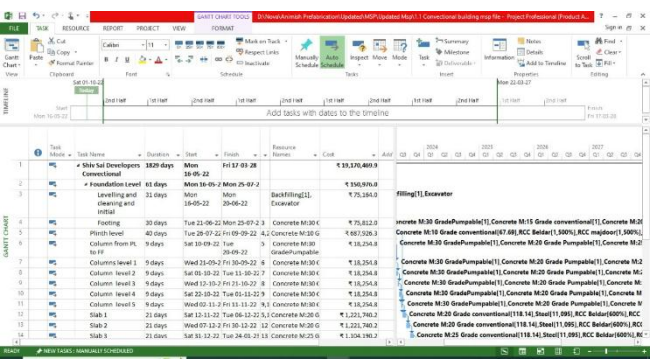


Fig. No. 3 WBS of Conventional Construction

The fig. no.3 is Convectional Shiv Sai Work breakdown structure, it shows detail of all conventional construction task which are been done on the site and also shows the material which are been required at different stages of the activities.

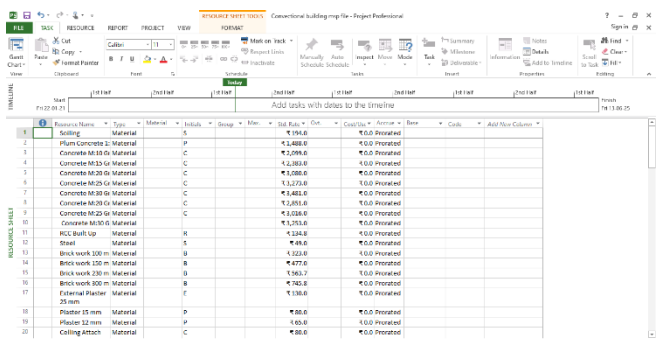


Fig. No. 4 Costing of conventional construction

The fig. no. 4 is a screenshot of the resource sheet, this sheet shows us all the resources that are been allotted in construction site. It also shows us the standard rate of the material and labour per hour and per day.

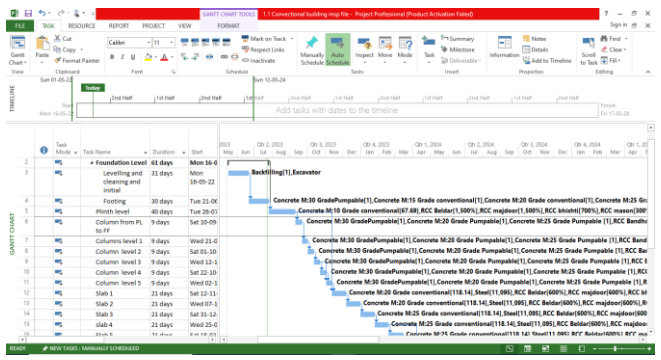


Fig. No. 5 Work flow of conventional construction

The fig. no. 5 shows the detailed Foundation level, Plinth level, slabs etc of a convectional building and the materials which are allotted on the site.

2. Results from WBS of conventional construction from MSP is:

- No. of days – 1829 days
- Cost with material+labour and Machinery- ₹ 19,170,983.1

Table No. 1

No. of days	1829
Cost	19,170,983.1

3. Work breakdown structure of prefabricated structure



Fig. No. 6 Prefabricated walls

Prefabricated Walls ₹ 90/ Square Feet



Fig. No. 7 Prefabricated window

Cost per window is Rs 8000/-

Cost per door frame is Rs 12000/-



Fig. No. 8 Prefabricated windows and door frames

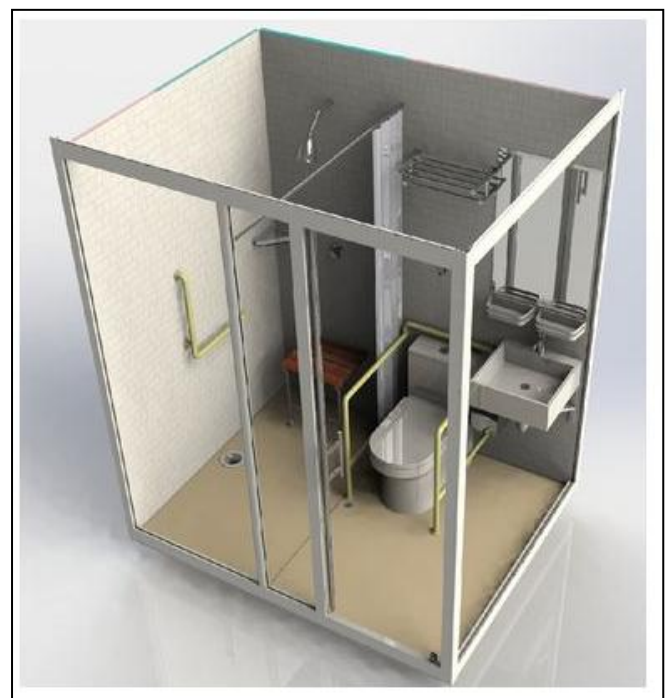


Fig. No. 9 W.C. Unit

Task ID	Task Name	Duration	Start	Finish	Resources	Cost
1	Site clearing and leveling and initial development	25 days	16-05-22	20-06-22	Excavator	1,75,24.0
2	Excavate	30 days	Tue 21-06-22	Mon 20-07-22	Machinery	1,75,24.0
3	Reinforce	40 days	Tue 26-07-22	Fri 09-09-22	4.5 Concrete	1,687,236.3
4	Columns from P1 to T1	7 days	Sat 09-09-22	Tue 20-09-22	Concre	1,18,254.8
5	Columns level 1	7 days	Wed 22-09-22	Fri 30-09-22	6 Concrete	1,18,254.8
6	Columns level 2	7 days	Sat 05-10-22	Tue 13-10-22	7 Concrete	1,18,254.8
7	Columns level 3	7 days	Wed 22-10-22	Fri 29-10-22	8 Concrete	1,18,254.8
8	Columns level 4	7 days	Sat 05-11-22	Tue 13-11-22	9 Concrete	1,18,254.8
9	Columns level 5	7 days	Wed 22-11-22	Fri 30-11-22	10 Concrete	1,18,254.8
10	Slab 1	23 days	Sat 03-12-22	Tue 06-12-22	11 Concrete	5,122,190.2
11	Slab 2	23 days	Wed 09-12-22	Fri 18-12-22	12 Concrete	5,122,190.2
12	Slab 3	23 days	Sat 25-12-22	Tue 28-12-22	13 Concrete	5,134,130.2
13	Slab 4	23 days	Wed 29-12-22	Fri 14-01-23	14 Concrete	5,202,350.2
14	Slab 5	23 days	Sat 19-01-23	Tue 28-01-23	15 Concrete	5,122,350.2
15	Slab 6	23 days	Wed 12-02-23	Fri 01-02-23	16 Concrete	5,122,350.2
16	Installing Prefabricated Walls	30 days	Sat 08-04-23	Fri 12-05-23	Machinery	4,200,180.0

Fig.No. 10 Work breakdown structure of prefabricated structure

Fig.No. 11 Costing of Prefabricated construction

The Fig. No. 11 shows us the Resources and standard rate that is been allotted in the prefabrication building. The elements with various material type of prefabricated wall, door and windows are been included in the convectonal sheet with cost.

Fig. No. 12 Costing of Prefabricated Construction

The fig.no.12 shows detail in MSB of all construction of different building work and element. The green highlighted cost type shows of prefabricated wall and without highlighted cost type are of Conventional building materials, such as slab wall, wc and bath.

4. Result from WBS of Prefabricated Construction from MSP is:

- No. of days – 1516 days
- Cost with material+labour and Machinery- ₹ 18,843,555.2

Table No. 2

No. of days	1516
Cost (Rs.)	18,843,555.2

Comparison of conventional construction to prefabrication construction :

Table No. 3

Type	Duration (Days)	Cost (Rs.)
Conventional Construction	1829	19,170,983.1
Prefabrication Construction	1516	18,843,555.2

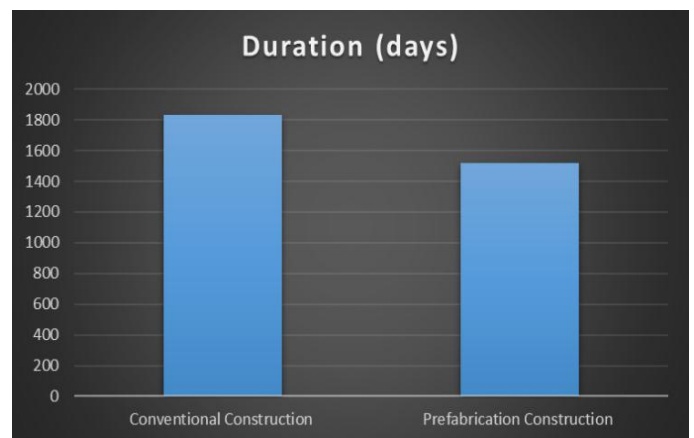


Chart No. 1 Comparison of Duration for Conventional Construction To Prefabrication Construction

The chart no. 1 shows the comparison between conventional construction and prefabrication construction for duration respectively as 1829 and 1516.

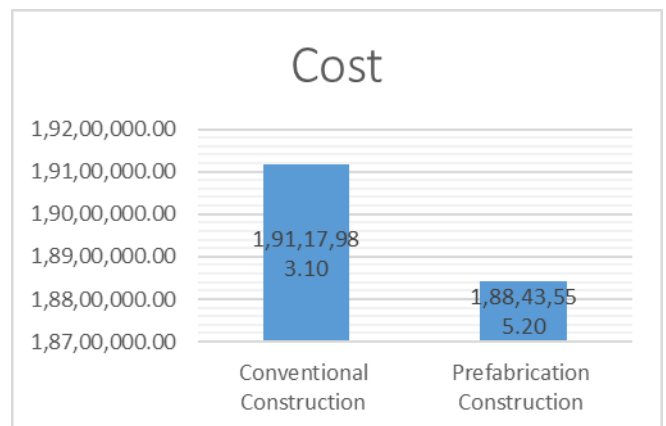


Chart No. 2 Comparison of Cost for Conventional Construction To Prefabrication Construction

The chart no. 2 shows the comparison for cost in between conventional construction and prefabrication construction respectively as Rs. 19,117,983.1/- and Rs. 18,843,555.2/- Which means we are saving Rs. 2,74,427.90/- from the convectonal structure by making it a prefabricated one.

The cost of Prefabrication construction is reduced as the duration of days is reduced and it reduces the activities on site and cost of the labors and the material cost is also saved on site , though the prefabricated structures are ready to install it reduces material on site for the particular items. Also the transportation and fitting charges are included.

CONCLUSION

The process is concerned with the scientific machinery that defines a categorization of buildability in building.

1.It discusses the parameters which it impacts the choice to install readymade pieces to a building.

2.It also includes the findings of a study focusing on the utilisation of precast systems.

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