

Prefabricated Construction: A Review

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Abstract - Modular construction is an innovative construction technique that involves the pre-engineering and fabrication of building components in a factory off-site. The method of using volumetric components in construction involves creating modular units or sections of a building off-site in a factory or workshop. Modular construction is a construction method that involves creating prefabricated components or modules off-site in a factory or workshop. These components are then transported to the construction site for final assembly. This construction method is gaining popularity in the industry due to its numerous advantages. The modularity of the construction process also allows for flexibility in design and expansion of the building. Modular construction is an off-site building method that involves creating components or modules in a factory or workshop and assembling them on-site. The paper also highlights the various challenges and limitations associated with modular construction, such as transportation and site access constraints.

Key Words: Prefabricated, Sustainability, Modularity, Conventional.

1.INTRODUCTION

Modular construction is a growing trend in the building industry, with prefabricated components being delivered to building sites from factories. This approach to construction allows for increased efficiency and quality control, as well as reduced construction time and cost. Overall, modular design offers a flexible and cost-effective approach to creating complex systems or products by breaking them down into smaller, independently created modules. This approach is particularly well-suited to modular construction, as it allows for greater flexibility in design and construction, and can help to streamline the production and assembly process. This paper explores the benefits of modular construction and modular design, including improved efficiency, cost savings, and sustainability, and examines some of the challenges associated with this approach. The paper also discusses the need for continued innovation in modular construction and design, in order to meet the growing demand for more efficient and environmentally-friendly building solutions.

Modular construction is an innovative building method that involves the manufacturing of multiple building sections, called modules, in a facility for assembly at a

remote building site. This process can cut construction time in half by enabling many processes to happen simultaneously. The modular construction process can be broken down into easy steps from concept to completion, including plan and design engineering, licenses and authorizations, site development, plant fabrication, conveyance and installation.

2.PLAN AND DESIGN

Architectural design is a critical component of every construction project, including modular construction. The first step in modular construction is to create a design for the house or building that needs to be erected. As a designer, it is crucial to consider the client's requirements when creating a design. This includes elements such as the number of rooms, the style of the roof, the number of floors, the floor design, and the kitchen design. For instance, the number of rooms determines the layout and size of the house, while the style of the roof can affect the aesthetic appeal and the durability of the structure. Similarly, the floor design and kitchen layout can impact the flow and functionality of the living space. By carefully considering these markers and the client's needs, a designer can create a design that meets both the functional and aesthetic requirements of the client. The environmental and climatic conditions of the site are also important factors to consider, as they can determine the type of materials and methods used to tackle harsh weather conditions and how many floors can be erected. Additionally, the budget of the client must be taken into account, along with the properties of the ground to ascertain the type of foundation required. This paper explores the importance of architectural design in modular construction, and the factors that need to be considered during the design phase. The paper also discusses the impact of environmental and climatic conditions on modular construction, and the need for customized solutions to meet specific client requirements. The paper concludes by highlighting the potential benefits of modular construction in terms of cost, time, and sustainability, and the need for continued research and development in this field.

After the architectural designs for a modular construction project have been finalized, they are sent to the engineering department for review. The purpose of this review is to ensure that the building meets certain codes and standards of safety and performance. Engineering reviews are mandatory in order to comply with government regulations, such as the International Energy

Conservation Code (IECC), which sets standards for energy efficiency in buildings.

During the engineering review process, the design is scrutinized to ensure that it meets all relevant codes and regulations, and any necessary changes are made to ensure compliance. This paper provides an overview of the engineering review process in modular construction, and the importance of complying with government regulations and standards of safety and performance. The paper also discusses the potential benefits of modular construction in terms of energy efficiency and sustainability, and the need for continued innovation in this field. Finally, the paper concludes by highlighting the challenges and opportunities that modular construction presents, and the potential for this innovative building method to revolutionize the construction industry.

LICENSES AND AUTHORIZATIONS.

In order to begin construction or undertake a major renovation of any building, permits must be obtained from the state jurisdiction. The responsibility of obtaining these permits falls on the client, who must appoint a general contractor as their representative to acquire the required permits for construction on their property. Failure to obtain the necessary permits can result in penalties or even the demolition of the building by government officials. The permits required for construction typically include a site plan, building permit, mechanical permit, plumbing permit, and concrete permit. This paper explores the importance of obtaining the necessary permits in modular construction, and the potential consequences of failing to comply with government regulations. The paper also discusses the role of the general contractor in obtaining permits, and the need for effective communication and collaboration between the client, contractor, and government officials. Finally, the paper concludes by highlighting the potential benefits of modular construction in terms of cost, time, and sustainability, and the need for continued innovation in this field to meet the growing demand for more efficient and environmentally-friendly building solutions.

MODULAR FABRICATION

Modular construction involves the fabrication of building modules in an offsite factory, which are then transported to the building site for installation. However, before the modules can be installed, the site must be developed to prepare for their arrival. This process typically involves several key steps. First, the site is surveyed to determine the contours of the land and identify any potential obstacles or challenges. Next, the land is excavated and graded to create a level foundation for the building. Drainage systems are then installed to ensure proper water management on the site. Finally, the foundation on which the modules will be installed is constructed, often using concrete or other durable materials. This process requires careful planning and coordination to ensure that the site is

prepared to receive the modules and that the installation process proceeds smoothly.

ASSEMBLY AND CONVEYANCE

Once the modules have been placed, the final connections are made to complete the building. Plumbing and electrical connections are made between modules and the main power and water supply. HVAC systems are also installed at this stage. After all the connections are made, the interior and exterior finishes are completed to give the building a final look. This includes installing fixtures, cabinets, and appliances, and completing final painting and flooring. Finally, the building is inspected and approved by the local authorities before being handed over to the client.

MERITS OF MODULAR CONSTRUCTION

1. Modular construction offers cost savings due to the efficient use of materials, reduced waste, and streamlined processes. This can result in lower construction costs and faster project completion times, leading to a faster return on investment for the client.
2. Modular construction is also more environmentally friendly as it generates less waste and requires less transportation of materials to the construction site, reducing the carbon footprint of the project.
3. The quality of the finished product in modular construction is generally higher as the controlled factory environment allows for consistent production standards and quality control measures.
4. Modular construction also offers flexibility in design, allowing for customization and changes to be made to the building's layout even after fabrication has begun.
5. The use of modular construction can also improve safety on the job site as there is less on-site construction activity and fewer opportunities for accidents to occur.

3. CONCLUSIONS

It is indeed a more efficient and sustainable method of construction that has a wide range of applications in various building types and situations. The reduced waste and construction time can also lead to cost savings for the client or developer.

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