International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 05 | May - 2023 Impact Factor: 8.176 ISSN: 2582-3930

RAPID CONSTRUCTION TECHNIQUES AND MATERIALS USED

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INTRODUCTION

Construction industries face an on going challenge of maintaining, rehabilitating, expanding and constructing using innovative way of construction method (KTC, 2005). The new approach to construct a building or infrastructure has been to perform faster construction to save money and increase the quality of work. In order toaccomplish this, the rapid construction method has to be introduced that allow the policy of get in, get out and stayout. This approach relies on the use of innovative rapid construction methods to complete the work in a quality manner and in a timeframe that will have a minimal impact on the public. There are many advantages to using innovative rapid construction methods. By reducing construction time, these methods can minimize delays, mitigate congestion, save money and improve the safety aspect without sacrificing quality (Goodrum et. al., 2005).Rapid construction provides a significant opportunity to reduce congestion associated in the construction flow.

These methods will lesson project durations while retaining quality. Opportunities for innovative methods inrapid construction are numerous. For example, pre- cast/modularization.

METHODOLOGY

Rapid construction can be achieved through the basic principle of focusing on eliminating waste. The criteria of stabilizing the work flow can be achieved by injecting lean manufacturing principles into the construction process flow. Lean construction is a new way to manage construction. The objective, principles and techniques of lean construction taken together form the basis for a rapid project delivery process. Unlike current approaches to managing construction (including design-build) and programmatic improvement efforts (partnering), lean construction provides the foundation for an operation based rapid construction project delivery system. While the transformation-flow-value theory broadens the understanding of project management, the perception of construction as a complex phenomenon opens up for the introduction of completely new approaches to project management. The ordered approach which gave rise to what can be called management-as-planning and management-as organizing should be reinterpreted and supplemented in future project management. Management as co-operation and as learning comes into focus. The consultant and contractor's familiarity with the system led to significant reductions in construction time and improvements in overall economy. The use of material and workflow in this technology is to provide rapid construction, decrease environmental impacts, increase durability, and reduce on-site labor, resulting in better work zone safety.

WHY WE NEED RAPID CONSTRUCTION PRACTICE ?

Construction industries faces lots of ongoing challenges of maintaining, rehabilitating, expenditures and many more. All thesethings are directly connected to the time, as the time increases it may lead to increases in challenges or problems which will lead usto rework and as we all have budget constraints that's why the main target is to MINIMIZE THE CONSTRUCTION TIME.

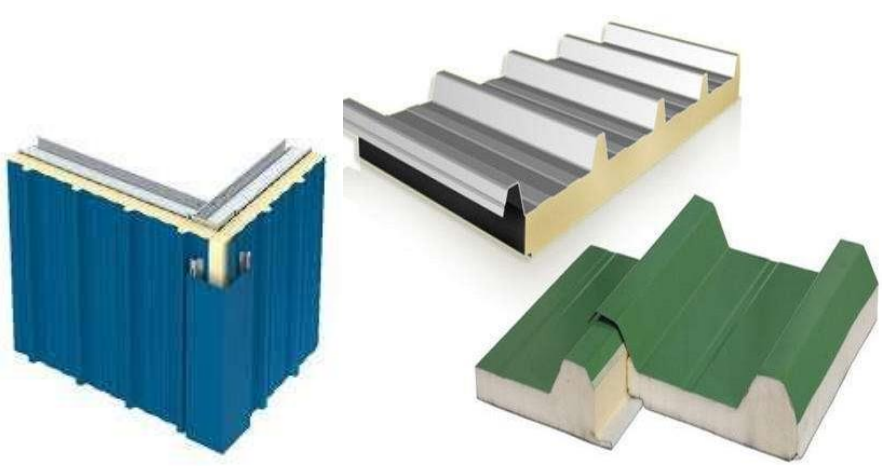
To complete the work without compromising the quality and in atime frame with minimal impact on public. Also there are many advances of using rapid constructions. reduce congestion associated in the construction flow. The rapid construction

of libraries of bioactive analogs based on natural products to access to potential therapeutics constitutes one of the paradigms inchemical sciences. Construction technology refers to the collection of innovative tools, machinery, modifications, software, etc. used during the construction phase of a project that enables advancement in field construction methods, including semi- automated and automated construction equipment.

PRE – FABRICATED SANDWICH PANEL SYSTEM

• PUF Sandwich panels is a composite structures which are commonly used in the construction industry for providing excellentthermal and acoustic insulation properties. PUF insulated sandwichpanels consisting of an insulating layer of rigid core sandwiched between two layers of structural board, used as a building material. The board can be pre-coated GI sheet [PPGI], stainless steel [SS], Cement fiber board, ACP and the insulation core will either be Polyurethane foam [PUF], Rock wool or EPS. In this technology, Factory made prefabricated sandwich panel system is made out ofcement orcalcium silicate boards and cement mortar with EPS(Expanded Polystyrene) granules balls and act as wall panel. Prefabricated channel system can be divided according their uses is materials, methods and structural configuration. In structural configuration have also sub part which is frame, panel and cells system. In this paper discussed about how it works. In thistechnique firstly steel column may be hoisted. Hoisting sequence should be reasonably arranged to prevent structural tilt. After secondary beam and column bracing need to be assembled by floor steel stair case installation firstly column and beam installation.

Secondly platform will be placed at last pound rail and stair step installation, laying rebar trust deck. Welding stud bind rebar and other pipeline before pouring concrete. When concrete reaches thedesign strength remove the bottom templates of the truss deck. Wallinstallation: (i) Interior wall installation. Cement EPS sandwich panel fixing U-type clips into pre-determined position. Bonding Adjacent seams with polymer mortar. Light steel keel partition firstly installing vertical and then horizontal. Fixing calcium silicate board on one side, filling rock wool and other pipe line at last. Fixing the calcium silicate board onthe other side.



MONOLITHIC CONCRETE CONSTRUCTION
(MIVAN FORMWORK SYSTEM)

- This innovative form of work is actually suitable for construction houses in large quantities at a faster speed. Thespeed of construction needs to be given greater importance, especially for large housing projects or township project.

- To minimize the unusual challenges in terms of time, cost and quality, the real estate industry has come up with a smartmethod of construction known as the "MIVAN formwork system"
- There are a number of buildings in India (Mumbai, Bangalore,etc.) that are being constructed with the help of economical aswell as satisfying for the overall Indian real estate market.
- Concrete walls and slabs are cast in one go at site giving monolithic structure using high-precisions, re-usable, room-sized, Steel forms or moulds.
- This system intends to replace the conventional RCC Beam- Column structure which uses steel/plywood shuttering. 'MIVAN formwork' system uses customized engineered steel/aluminium formwork consisting of two half shells whichare placed together and then concreting is done to form a room size module. Several such modules make an apartment.

PRECAST CONCRETE CONSTRUCTION SYSTEM (2D PRECAST)

• Precast construction Technology is a system of castingconcrete in a reusable moulds or “form” which is thentreated in a controlled environment, conveyed to the construction site and lifted to the place.

• Precast Construction Technology consists of various precastelements such as walls, beam, slabs, columns, staircase, landing and some customized elements that are standardized and designed for stability, durability and structural integrity of the building.

• This technology is suitable for construction of high rise buildings resisting seismic and wind induced lateral loads along with gravity loads. The building framing is planned insuch a way that maximum number of repetitions of molds isobtained.

• Precast concrete is a construction product produced by casting concrete in a reusable mold or "form" which is thencured in a controlled environment, transported to the construction site and maneuvered into place; examples include precast beams, and wall panels for tilt up construction. In contrast, cast-in-place concrete is pouredinto site-specific forms and cured on site.

• Recently lightweight expanded polystyrene foam is being used as the cores of precast wall panels, saving weight andincreasing thermal insulation.

• Precast stone is distinguished from precast concrete by the finer aggregate used in the mixture, so the result approachesthe natural product.

Floor Slab

Staircase

PRECAST CONCRETE CONSTRUCTION SYSTEM (3D VOLUMETRIC)

• This 3D Volumetric concrete construction is the modern method of building by which solid precast concrete structural modules like room, toilet, kitchen, bathroom, stairs etc. and any combination of these are cast monolithically in plant or Casting yard in a controlledcondition. These Moduls are transported, erected and installed using cranes and push-pull jacks and are integrated together in the form of complete building unit. Subject to the hosting capacity, building of any height can be constructed using the technology.

• This is cast complete with window and door frames, electrical and plumbing conduits already inlaid and are designed into the moulds.

• The modules casts five sides in a single pour.

• Building all the features into the moulds design reduces projectturnaround time and costs.

• The openings for windows, doors are so precise that they can be ordered straight from the drawings.

• This method is replicated and the modules are fitted together side-by-side or at top of each other. This allows the roof of the first module to become the floor of the second module as they are vertically stacked, similar to Lego blocks or bricks. This ability tofit the modules together reduces construction time.

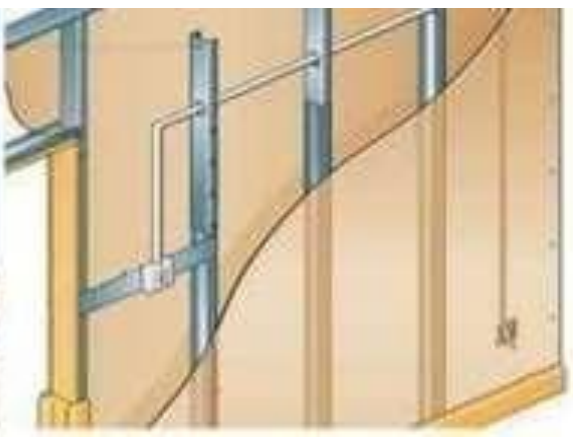
LIGHT GAUGE STEEL STRUCTURAL SYSTEM & PRE-ENGEENIERED STEEL STRUCTURAL SYSTEM (LGSF)

• Light Gauge Steel Frame (LGSF) System uses factory madegalvanized light gauge steel components. The components/sections are produced by cold forming method and assembled as panels at site forming structural steel framework upto G+3 building. LGSF is used is combinationwith pre-engineered steel structural system for buildings above G+3 for longevity, speedier construction, strength andresource efficiency.

Construction Process:

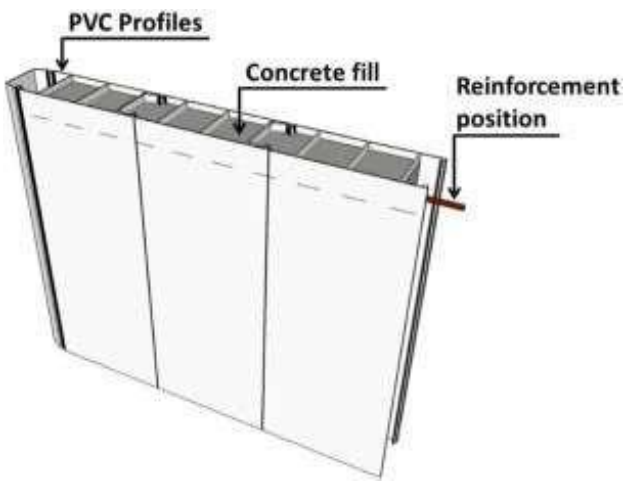
• The sequence of construction comprises of foundation laying, fixing of Pre-Engineered Steel Structural System, fixing of tracks, fixing of tracks, fixing of wall panels with bracing as required, fixing of tracks, fixing of floor panels, decking sheet, fixing of electrical and plumbing services andfinally of concrete walling panels with light weight concreteas infill.

• The other options of dry walling components such as sandwich panels with insultation material in between can also be used sandwich panes with insultation material in between can also be used. Similarly, the floors can either bycomposite slab/deck slabs/precast hollow core slabs as per the need and requirements.



PVC STAY IN PLACE FORMWORK SYSTEM

• The plant manufactured rigid poly-vinyl chloride (PVC) based polymer components serve as a permanent In the work presented, the effect of a patented polyvinyl chloride (PVC) stay-in-place forming system on the mechanical performance of concrete that it encases is examined. The compressive and flexural performance of the system are investigated. The results indicate that the PVC encasement enhances both compressive and flexural performance. Compressive strength is increased by the confining action ofthe PVC and flexural performance is improved due to the increased tensile capacity of the sections under flexural loading. designs PVC stay-in-place formwork for use in concrete walls. The PVC components are manufactured through an extrusion process and consist of several differentinterlocking parts. The Octa form system can be used for any type of concrete wall structure. The most common applications of this system are barns and holding tanks, but it can also be used in residential construction and retaining walls. The biggest distinction between Octa form's wall system and a traditional concrete wall is the role of formwork. Standard formwork must be constructed and thentaken down after the concrete has been poured; whereas, PVC stay-in-place formwork is assembled and left in place for the entire lifetime of the concrete wall. In addition, a minimal amount of stability bracing is required during construction.



CONCLUSION

Based on the analysis, the rapid construction can be achieved through the basic principle which focusing on eliminating waste. The criteria of stabilizing the work flow can be achieved by injecting the lean manufacturingprinciples into the construction process flow. Lean construction is a new way to manage construction. The objective, principles and techniques of lean construction taken together form the basis for a rapid project delivery process. Unlike current approaches to managing construction (including design-build) and programmatic improvement efforts (partnering), lean construction provides the foundation for an operations based rapid construction project delivery system. While the transformation-flow-value theory broadens the understanding of project management, the perception of construction as a complex phenomenon opens up for the introduction of completely new approaches to project management. The ordered approach which gave rise to what can be called management-as-planning and management-as organizing should be reinterpreted and supplemented in future project management.