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Precast construction as a Sustainable Building Method in the United Arab Emirates

Shahid Hassan Gardezi, Senior Procurement and Contracts Engineer, Tech Construction, UAE

Summary

Ajmal Makan, Sharjah Waterfront City is spread over 60 million square feet and consists of eight beautifully designed islands which creates a new city on the coast of the Arabian Gulf. Once developed, Sharjah waterfront City will host a community of 60,000 people, 1,500 villas and 95 high rise residential and commercial towers. The development is a combination of open and verdant beaches (40% of the project area), and 60% of the area is landscaped with green beaches, green gardens and service areas, ensuring the building of a healthy and respectful society. Ajmal Makan has adopted international standards for green buildings, reducing energy use and the overall carbon footprint of the project. The development consists of 321 villas which are designed to offer maximum comfort to the residents. From a structural point, cost reduction has been considered and from an environment perspective, the villas are green buildings and consume less energy helping reduce carbon footprint. While from a technological point of view, they are fully equipped with sensors, building management systems and security equipment.

Tech Group PJSC, established in 2003, is a multi-discipline construction and industrial company with a leading position in its markets. Tech Group adheres to the highest quality, health, safety and environmental standards with most of its businesses achieving ISO 9001, ISO 14001 and OHAS 18001 certifications. Design and construction of villas in the prestigious development of Ajmal Makan has been awarded to Tech Group. Meeting the time and cost constrains, Tech Group has successfully achieved sustainable design which complied with the client requirements along with environmentally friendly construction. Precast construction was proposed and approved by client.

Context

While providing a luxurious living space for style conscious people, the developer had the vision to work with environmentally friendly and sustainable activities during the whole development. One of the aims is to develop a pollution-free city, where the community will be blessed with facilities for a high standard of living. 60% of the area of the city will be landscaped with gardens, parks, and surrounded by natural green plants, plains and flower beds. The target is to achieve and comply with maximum standards to remain environmentally friendly and apply best practice in the development and construction of green buildings that reduce energy consumption and reduce the total carbon footprint of the project. The villas on the island have been designed as a fascinating architectural art gallery combining dazzling design and smart technologies with an objective to offer maximum comfort and happiness to the residents.

Aims

- ➜ To provide a luxurious living designation
- ➜ To provide more green space than built up areas to experience pollution free, natural environments
- ➜ To exercise maximumt environmentally friendly and sustainable built environment methods and materials

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- ➜ To exercise green building guidelines
- ➜ To use a construction type which reduces life cycle cost of the buildings and villas

The Project

Working on this prestigious project as a procurement manager, I provided a proposal which met client requirements, project needs, and the standards required to be in compliance with sustainability and green building guidelines, within an agreed time frame.

The first step, selection of a construction method, was a critical decision which was going to impact significantly on project timeframe, quality and sustainability. To achieve all these targets to maximum extent, precast construction methods were proposed to the client, which was accepted, with the client reiterating their interest and support towards sustainability. Precast construction method has enabled us to reduce our construction period, maintain the same quality standards and follow sustainability guidelines. It has reduced activities on site and all production of elements are being done in factory in a controlled environment providing controlled quality products. Only the foundations are being casted in situ and before the erection of precast element. This method has saved a lot of time on construction as foundation work and casting of elements is in progress simultaneously. This has reduced wastage of material significantly. Transportation of raw material to site has been reduced, along with the number of trips to transport raw material to site. In the precast construction method, wastage of material is controlled and furthermore, use of hollow core slabs have been used to reduce the quantity of concrete in the project as a whole. While this is putting an impact on economic sustainability, it is playing a vital role in carbon reduction during concrete production.

The UAE has very hot weather most of the year and it is very difficult for workers to work outside during the day, impacting badly on worker's health and progress of construction. By adopting a precast construction method, the impact on workers due to the weather is reduced as most work is done in factories where work timing can be easily managed, making construction more sustainable and energy efficient. During construction, external panels, insulated windows and curtain walls are being utilized as a thermal break and polyurethane waterproofing is utilized in the roofing. During material selection care has been taken, keeping in view the life cycle and maintenance cost and the weather environment of the UAE. While these steps from client and contractor will play a vital role towards sustainability, this will attract buyers as they will have less maintenance and life cycle cost with good energy efficient housing.

Personal Impact

Working as a procurement manager my role is to procure the services, materials and resources for projects which increases the company value in terms of revenue and client satisfaction at the same time. Compliance with client needs, project requirements, best value for money and adherence with rules and regulations is of utmost importance. While working in this prestigious project I have always tried to provide value of money but also respected and followed the client's desire to achieve a sustainable and

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environmentally friendly project. The selection of the construction method and materials has been done considering life span, energy consumption during manufacturing and the role it plays in saving energy during the life cycle.

Results

The construction period and project duration were reduced significantly by using the precast construction method. This method has maintained quality through the project as elements are being made in the controlled environment of the factory. The use of precast construction method has a positive economic impact in many ways. Wastage of material, which is significantly higher when cast in situ, is controlled within a factory setting and any waste material is reused.

The weather in the UAE does not allow work to be conducted outside during the day because it is very hot for most of the year. Labour productivity remains much less, risk of sickness is higher, and arrangements are required to do the work in night causing more expenditures. Production of building elements in factory, with only foundation work being done onsite, has combatted this problem. The quantity of concrete has been reduced by using hollow core slabs. Also, transportation of material has been reduced and therefore fuel consumption. All these have a positive impact on the environment by reducing the carbon footprint. Furthermore, the carefully considered materials will reduce the energy consumption throughout the life of building and impact positively on environment and cost.

Results

The transportation of raw materials, before the production and manufacturing onsite increases the number of delivery trips, however, this is reduced by having only the final product being transported to site. This allows a saving both in fuel cost and other wear and tear.