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Constructing a Greener Future, MODULE BY MODULE

In the residential construction business the variables of quality, cost and time are often at odds, with one or another almost inevitably sacrificed. But according to Arthur Klipfel, founder, president and CEO of Oaktree Development it doesn't have to be that way and there is, in fact, a better way...

Written by Margaret Patricia Eaton

Based on his years of research and development, Klipfel maintains that well-designed, off-site modular construction is the solution to the inherent issues faced by developers, such as the lengthy time period required for conventional construction, expensive cost overruns that occur when design flaws are discovered, and time-consuming requests for information that are standard operating procedure.

As an alternative, this Cambridge, Massachusetts-based company's patented Greenstaxx modular building-design system, marketed as a digital library of units, is revolutionizing the multi-family residence construction industry, introducing significant cost and time savings for developers while increasing quality. By using the GreenStaxx US patented module system, the developer could complete a project five to six months sooner than if he'd opted for conventional construction, and with a cost savings of 13 percent.

The patent protects the process of marketing a design/build system based on stacked units in a computer interface to multifamily residence developers. Stacked units are pre-designed and pre-engineered and independent of a specific project. When a project is identified, a grid is created to fit local conditions and sized to fit the unit stacks. When the units are placed into the grid, the result is a completely integrated set of contract documents that are connected to supply chains, including module manufacturers.

The benefit of using the Greenstaxx system is that quality is not sacrificed because corners have not been cut to save time and money. Instead, the savings are a result of expert, meticulous architectural design and planning by Oaktree Development and standardization of the manufacturing process and supply chain which can take advantage of unit repetition.

It may seem revolutionary but the modular concept is one Klipfel has researched and developed during his long and distinguished career and which has garnered him national recognition. Cambridge Cohousing, for example, a modular 41-unit condominium project completed in 1997, was named the following year by the American Institute of Architects as one of the 10 best examples of sustainable residential design in the United States.

After graduating from Yale with a master's degree in architecture and completing post-graduate studies at Harvard, Klipfel went to New York to work with Paul Rudolph, former dean of the architectural school at Yale who'd opened a practice there. "He brought in a bunch of us young guys just starting out and we had an incredible project given to us by the mayor to build housing and space for a printer's union over the Westside Highway toward the Hudson River, so we did the housing portion. I was in charge of 27,000 housing units and we did them as modules," he recalls, "but the project was never built, which was too bad. But it ended up in the Metropolitan Museum of Visionary Architecture and it was in the process of manufacturing that project for Paul Rudolph that I got the bug for off-site production."

Two years later in 1973, he founded Unihab with architect Gwendolen Noyes, his wife and business partner, with the mission

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of designing and developing efficient and affordable housing, using factory-built technology where possible. It was based on ideas that evolved out of the experience in New York with modules. In those early years Unihab completed about 100 units in the ski areas of Vermont.

"Then my wife and I came to Boston and started doing building rehabs in Cambridge and conventionally built multi-family projects," he says. "It wasn't until the '90s that we got back to the modular mode and built a 40-unit project in New Hampshire."

Klipfel shares that, "What changed for me was that I recognized what we'd been doing in Vermont as a system was rigid and didn't fit into an urban setting. So I redesigned the system (over a period of five years) and applied for new patents, (another three or four years) while continuing with our commitment to develop housing inside the urban fabric next to transportation links and where zoning permitted, up to four or five storeys," he explains.

"When we did the 175 units next to the Green Line Station in East Cambridge we didn't have the Greenstaxx system together, but that experience led me to realize we could use the same kind of units over and over again in multiple projects with slight variations and so I

came up with the idea of creating a digital library of every kind of unit conceivable."

Within the Greenstaxx digital library, which exists in REVIT, an Autodesk program, there are 20 standardized units including outside corner units, inside corner units, one- and two-bedroom units, handicapped-accessible units, elevator shafts and stairwells, designed to be stacked one on top of the other, just like building blocks. These can then be dropped into a grid which could be designed in the form of an L, a T or any other configuration to suit the site. The key advantage for the developer is the amount of time saved, as over half of the drawings for the building are already done. As well, the time between the initial design and the construction project is further reduced as the wood-framed units are being manufactured at the same time the site is being prepared, so they're ready to be stacked and locked into place as soon as the site is ready. Then all the general contractor has to do is button them up and put on the external skin and roof.

"So what we're doing is providing all of our drawings, designed and engineered by us to the developer, but the local architect (AOR) has to put them into a set of plans that describes the entire building, including the exterior elevation, and that is the set of plans he will stamp for the building permit," Klipfel explains. Even though he's convinced that using modules constructed off-site is the better option, the Greenstaxx system can also accommodate conventional construction methods.

While the units are standardized, there are opportunities for customization in terms of finishes. For example, the developer can choose between hardwood flooring or carpet, granite countertops or a less expensive material. There are also opportunities to choose between what Klipfell calls "a green building or the greenest building" by increasing the amount of insulation or upgrading to triple-glazed windows which cost more but increase energy efficiency. "There are options for the developer when he's making decisions. We've also done a lot of work when it comes to researching materials and issues such as rebates for using Energy Star equipment, so we're saving everyone a lot of time and cost as well as giving a higher quality product."

A prime example of Oaktree Development's Greenstaxx construction is its 53 one- and two-bedroom unit project with 22,000 square feet of retail space on the ground level at 30 Haven, Redding, MA, a finalist for the 2014 Jack Kemp Excellence in Affordable and Workforce Housing Award. There, the simultaneous site preparation and modular fabrication greatly compressed the construction time, with the units set and stacked on the steel podium base in only three and a half weeks. Built to the highest standards of energy efficiency, the apartments feature high ceilings, stainless steel EnergyStar appliances, wood cabinetry, and granite counters. Residents enjoy assigned garage parking, a fitness room, a guest room for visitors, and a community room with fireplace and kitchen.

Then there's Brookside Square in Concord, MA, built to LEED standards with 74 one- and two-bedroom units above 38,000 square feet of commercial space, featuring rooftop solar panels. In 2016, this project won the Multifamily Executive Project of the Year Award in the low-rise category.

The Greenstaxx system will also be used in an ambitious redesign of Newtonville Square in Newtonville, MA, in response to a request for a proposal from the city to contribute to its vision of a vibrant, sustainable and transit-oriented commu-

nity. When completed by an independent developer it will be offered as proof of concept.

"We're projecting big savings with modules, but given the modular industry right now, you can't always count on their pricing and delivery schedule," Klipfel says, which is why he's going to the modular housing expo in Tucson, AZ in March to identify module manufacturers he can work with, before rolling the system out across the country in the next year or so. "We intend to go into every market in the US where there's a high demand for multifamily housing."

Research and development have gone into every aspect of Greenstaxx, including financial considerations above and beyond the drawing and construction time. "So we'll set up with our recommended suppliers, buying directly from the factory and not going through dealers, so there is savings with the repetition of units from project to project. Our goal is to use the system all over the US, so the supply chains will be connected to that volume of production."

Oaktree has also worked out a system developers can use for tax savings and actual rebates, "as it drives developers and architects crazy trying to keep up with all the latest regulations. I think in the last project we did we got back $200,000 in rebates."

Next on Klipfel's 'to do' list is to develop 3D imaging, so a developer can show a prospective tenant images of furnished units.

Last but not least, he's looking at a post-construction program, a system of online performance monitoring for the key equipment – the heating elements or the appliances – making it all about saving time and money while improving quality.

"In fact it's really all about increasing quality," he says of the years of research and development that have gone into the Greenstaxx system in order to produce smarter, greener buildings, from which developers and residents alike can benefit. ■

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