



Utilizing Modular Construction as a Strategy

To be competitive in an environment where the playing field has been leveled will take a unique application of construction means and methods. Modular construction has the ability to provide this opportunity.

By Mike Kanaby

The construction market will remain competitive for the next several years, and owners will continue to take advantage of the market dynamics when funding is available. To differentiate in the sea of competition will take creative strategic thinking.

The strategy of an organization sets the short-term (three- to five-year) direction and aligns this direction with the vision and values of the organization. Companies that are successful at creating, executing and adjusting strategies to adapt to unforeseen changes typically remain profitable, even in down markets. Successful strategic planning involves a thorough analysis of the context in which the execution of the plan will take place. As context changes, so do the plans. A contextual evaluation includes analyzing internal strengths, weaknesses, external opportunities and threats; the competitive landscape; market forecasts; and the voice of the customer. With this data, the organization's needs identify where it can gain competitive advantages. Finding the area where your organization can gain competitive advantage is not always easy, but as the saying goes, "You cannot keep doing the same thing and expect different results."

What owners want today is the highest-quality product, in the fastest amount of time, for the lowest price. This is not much different from what owners have always wanted. Time is money and the quicker owners can occupy a space, the

quicker they start to realize a return on their investment. The differences between then and now are the tools available to the construction market. BIM, project management software, field management software and state-of-the-art equipment allow companies to make decisions much faster and with a higher expectation of the project delivery. Contractor strategy should center on these expectations and seek to gain a competitive advantage in meeting them. One such strategy often overlooked is modular construction.

When most people think of modular construction, they envision the double-wide trailer. When most contractors think of modular construction, they think of a jobsite trailer. While these are in fact modular construction, modular has evolved into a much more comprehensive building solution.

Modular construction can be segregated into two categories, permanent and temporary. Examples of temporary modular construction are jobsite trailers, portable classrooms and temporary living facilities. These fill a very important role in the construction industry, yet offer little to a traditional contractor in the sense of a strategic advantage. Permanent modular construction, however, can offer a tremendous strategic advantage.

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Permanent modular construction is an evolution from prefabrication that has been enabled greatly by the integration of three- and four-dimensional building design software. Permanent modular structures include hotels, college dormitories, hospitals, assisted living facilities, office buildings and military structures. Just about any type of building can be built utilizing permanent modular construction.

These structures are fabricated in an off-site location, shipped to the project site and assembled. Field crews then tie the structures together and complete the project. Due to the strict controls in the factory setting, materials are used more efficiently, higher safety standards can be achieved,

and the schedule can be accelerated, all while providing a greener project. In a recent example, 178 patient bathrooms were built off-site, and many other large areas were prefabricated in the construction of Miami Valley Hospital in Dayton, Ohio. Other examples of permanent modular construction include the 60,000-square-foot Xstrata Nickel plant in Ontario; the 2010 Winter Olympics athletes' village in Whistler, British Columbia; 48,000 square feet at The Gables assisted living facility in Rutland, Vt.; 58,000 square feet at the Millennium Community School in Columbus, Ohio; and a 24-story high-rise in Wolverhampton, England.

It would seem that modular construction makes sense for a variety of practical reasons; however, according to the Modular Building Institute (MBI), modular

buildings only make up 1% of the construction market. With so much upside, why are more contractors not embracing modular as a strategy? The MBI recently put together a panel discussion to discuss the hurdles of bridging the gap between traditional contractors and modular manufacturers. In the discussion, Tom Hardiman, executive director of the MBI, talked about the stigma that projects either had to be built completely modular or completely site-built. “This is not the case,” said Mr. Hardiman and, “That’s not the answer going forward. There are projects or parts of projects that make sense to use a modular approach.” During the panel, Mr. Hardiman asked Eric Mucklow of the U.S. Army Corps of Engineers about the hurdles in transitioning to modular, and his response was, “Most of the A/E community is not familiar with modular construction.” From the contractor’s perspective, John Scott, president of Scott Long Construction, said he has been exploring modular as a strategic advantage but has had difficulty getting the modular manufacturer involved early enough and not having the right modular partners. “One of the biggest hurdles is that we just don’t know what capabilities modular construction has.”

With a variety of current projects available to prove the viability of modular, coupled with the demand by customers for tighter schedules, higher quality and greener construction, contractors should be looking at the utilization of modular construction as a strategic advantage. The National Institute of Standards and Technology (NIST) and the National Research Council (NRC) were commissioned to perform a study on construction productivity. The team released the report “Advancing the Competitiveness and Efficiency of the U.S. Construction Industry.” One of the five breakthrough initiatives proposed was “greater use of prefabrication, preassembly, modularization and off-site fabrication techniques and processes.” In FMI’s 4Q Nonresidential Construction Index (NRCI), an index based on the insight and experience of industry executives, panelists felt there would be an increase in the use of prefabrication and modular construction, driven by the use of BIM and the need for lower costs, higher quality and improved schedules.

To investigate a modular construction strategy in action, FMI looked at the Fort Sam Houston Medical Education Training Campus (METC). The METC project began in 2005 under the Base Realignment and Closure Act (BRAC), with the intention of relocating all military field medical training to Fort Sam Houston in San Antonio, Texas. Total construction spend for the METC program is approximately \$2 billion to create a campus-like atmosphere consisting of approximately 1.6 million square feet of education, training, recreation facilities and laboratories, and just more than 1 million square feet of dormitory space. The program is being administered by the Joint Program Management Office (JPMO) and is a collaboration among the U.S. Army Corps of Engineers, Air Force Center for Engineering and the Environment, and the U.S. Naval Facilities Engineering Command.

The METC project is the largest modular project in North America. The JPMO was tasked with building this project under a tight schedule and with a shortage of labor in the marketplace. Dr. Scott Griffin, facilities lead for the METC Transformation and Integration Office, said the strategy for construction was out-of-the box thinking. One opportunity to accelerate construction was with modular construction for more than 1 million square feet of dormitory space, and

this required the selection of a project team with expertise. Hensel Phelps, a general contractor and construction management firm based in Greeley, Colo., and Warrior Group, a permanent modular manufacturer and construction management firm, were just the team. This team had successfully used modular construction for dormitory projects at Fort Bliss, Texas, and Fort Carson, Colo., and was selected to provide the dormitories for the METC project. The METC dormitory project utilized a hybrid approach, where portions of the project were site-built and the individual units, or modules, were constructed off-site simultaneously. These modules were shipped to the site 80% to 90% complete, including windows, ceramic tile, oak vanities, solid surface countertops and hung doors. At the site, the modules are put in place and the site trade contractors perform all tie-ins. This hybrid modular approach allowed the team to begin the site work and foundation work at the same time as the units, greatly accelerating the schedule. The METC project has been a success and is scheduled to be completed in the summer of 2011.



Ed Zdon is the senior project manager for Pre-Construction/Special Projects at Warrior Group and has been working on the Fort Sam Houston project. FMI was able to talk with Mr. Zdon about the experience and gain some insight into utilizing modular construction as a strategy.

Kanaby: Tell us about the Fort Sam Houston project.

Zdon: The Fort Sam Houston project is part of the Base Realignment and Closure (BRAC) program. Fort Sam Houston has typically served as the U.S. Army's medical training facility and under BRAC will now serve as a medical training facility for all branches. The dormitories we are building are part of the Medical Education Training Campus (METC) facility, which will also include classrooms, a fitness center, HQ buildings, etc. The four buildings we are working on total 350,000 square feet per building. Each building contains 220,000 square feet of modular construction, with the remaining being site-built. When complete, we will have just more than 1 million square feet of construction built off-site.

Kanaby: Why was modular chosen for this project?

Zdon: Modular construction was chosen by the Army Corps of Engineers due to the schedule constraints. The base had soldiers coming in, and the Corps needed the facility ready for occupation. The units could be built simultaneously as the site work was being done, which greatly accelerated the schedule. In addition to the tight timeline, the buildings still had to meet all of the code requirements,

including the stringent Anti-Terrorism Force Protection Requirements (ATFPR), all while obtaining a minimum LEED Silver Certification.

Kanaby: What has contributed to the Fort Sam Houston METC dormitory project's success?

Zdon: There are a number of things. One is the experience of the teams involved. We have done similar projects at several other bases, such as Fort Bliss and Fort Carson. Another is that modular has to be a collaborative effort. For instance, the foundation is extremely critical to the process. Hensel Phelps realized this and ensured the highest quality on the foundations. The boxes sit on the foundation and set the stage for the whole building. If the foundation is off, it is much more difficult to fix it with finished modules. There was a lot of collaboration with the subcontractors on the project as well. The trade contractors performing the traditional portion of the project and making all of the tie-ins came to our plant where the units were being built. They worked with our trade contractors on ensuring the transitions were smooth and the locations and space were conducive for the on-site portion. The owner (U.S. Army Corps of Engineers) was able to come to the plant and see a finished module before all of them were created. This, in essence, gives the owner a full-scale mock-up. The entire project team collaborated on scheduling. We typically set eight boxes per day and roof them. A box consists of 6,500 square feet of 80%–90% complete structure. We were able to be flexible in setting the boxes, so if the trades ahead of us had a weather delay, we could slow down, and then when they were caught up, we could accelerate to 12 boxes a day to get back on schedule. This project had close to 100 rain days, and we still finished on schedule. There was a high level of collaboration with the design team. Overall, the project was successful because of the collaboration of all parties involved.

Kanaby: What are some of the lessons learned about the Warrior/Hensel Phelps relationship that might help other contractors who are looking at utilizing modular as a strategy?

Zdon: One key consideration that gets lost in the shuffle is the location of the trades. We build modules in a factory. Our framers, electricians and finishers are all in the plant. We have a set crew that is specialized in setting and rigging that sets the boxes on-site. They are not electricians or drywallers. Contractors are used to having the trades on-site and ours are not. This was a bit of a learning curve at first.

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loose, it is difficult to change the design. You cannot move a door to the other side. The manufacturers order in bulk, so it is difficult to change fixtures or colors. Once production starts, the owners and designers need to put their pencils down. This was a bit of a struggle to change the mind-set and behaviors that traditional contractors and designers are used to.

Kanaby: Why would modularization be a good strategy for a traditional contractor?

Zdon: The modular process is immune from weather, at least the factory-built modules. The site-built portions of our projects are constantly under pressure of weather delays. Our portion [at Sam Houston] was not affected. The module construction ran ahead of the site-built portion and we wound up stockpiling the modules because we were so far ahead.

If your project has many little unique parts, modular is probably not a good strategy. If you have a lot of repeatability, like dorms or offices, modular makes sense. Although it may not reduce costs dramatically, it reduces time. An owner who utilizes a modular approach saves general conditions dramatically.



There is also the green aspect. Modular generates less waste and is more energy-efficient due to the construction methods.

Kanaby: Why do you think that the more traditional contractors do not pursue modular as a strategy?

Zdon: There is a feeling of losing control for the contractor. So much of the work is done off-site in an environment that is outside of the contractor's area of expertise. There is also a fear of change, and a fear of the unknown. To approach a project with modular for the first time, traditional

site-built contractors would have to be able to step outside of their comfort zones and take an approach that they may not be the experts on yet.

Education is another hurdle. Most contractors and design teams do not know what the capabilities of modular construction are. Many modular construction manufacturers have the capabilities to assist in the design process, but the contractors and designers are not always aware that this help is available.

Kanaby: Most contractors are familiar with the concept of modular and traditional stick-built, but maybe not about the concept of hybrid construction.

Zdon: Most multistory buildings using modular construction are a hybrid of both modular and site-built. The idea is that the repetitive part of the project is built in a factory and the one-off work is done on-site. An example is at the Fort Sam Houston METC. Some of the classrooms and other buildings were site-built, but the dormitories, where there was a lot of repetition, utilized modular construction.

Kanaby: What are some suggestions for a traditional contractor thinking about a modular strategy?

Zdon: Work with an architect that is creative and open to new ideas — a progressive design firm. Most architects feel modular construction is boxy and lacks artistic flair, but that is not the case at all. There are many examples of very creative modular buildings.

Partner with an experienced modular manufacturer, particularly one that has experience working with traditional contractors.

Start the process early. It becomes much more difficult to utilize modular once plans are completely finished.

The conversation about modular should happen at the conceptual or early-design phase. Things can be adjusted slightly to accommodate modular after design, but is much easier if it is incorporated initially.

Kanaby: Currently, modular only makes up 1% of the construction market. What do you think will need to happen for modular construction to gain in market share?

Zdon: There needs to be more education for contractors about the possibilities, particularly in hospitality, education and health care. There needs to be more awareness by owners on the financial benefits of occupying a building faster.

There needs to be more collaboration. The design-build process dictates a more collaborative atmosphere and is helping to change the environment of construction to a more collaborative effort. As construction becomes more collaborative, the transition to a modular strategy will be much easier.

To be competitive in an environment where the playing field has been leveled will take a unique application of construction means and methods. Modular construction has the ability to provide this opportunity in many applications. It will take a new level of strategic thinking and collaboration than most firms have had to employ for a contractor to access this capability. This will take an open mind and a willingness to diverge from the way things have always been done. The construction companies that have already tackled this challenge are separating themselves from their counterparts and offering clients real value. ■

Links to MBI and METC

Link to MBI's podcast on modular construction:

www.modular.org/htmlPage.aspx?name=modular_podcasts

Link to MBI:

www.modular.org/

Link to the METC website:

www.metc.mil/news/metc.php