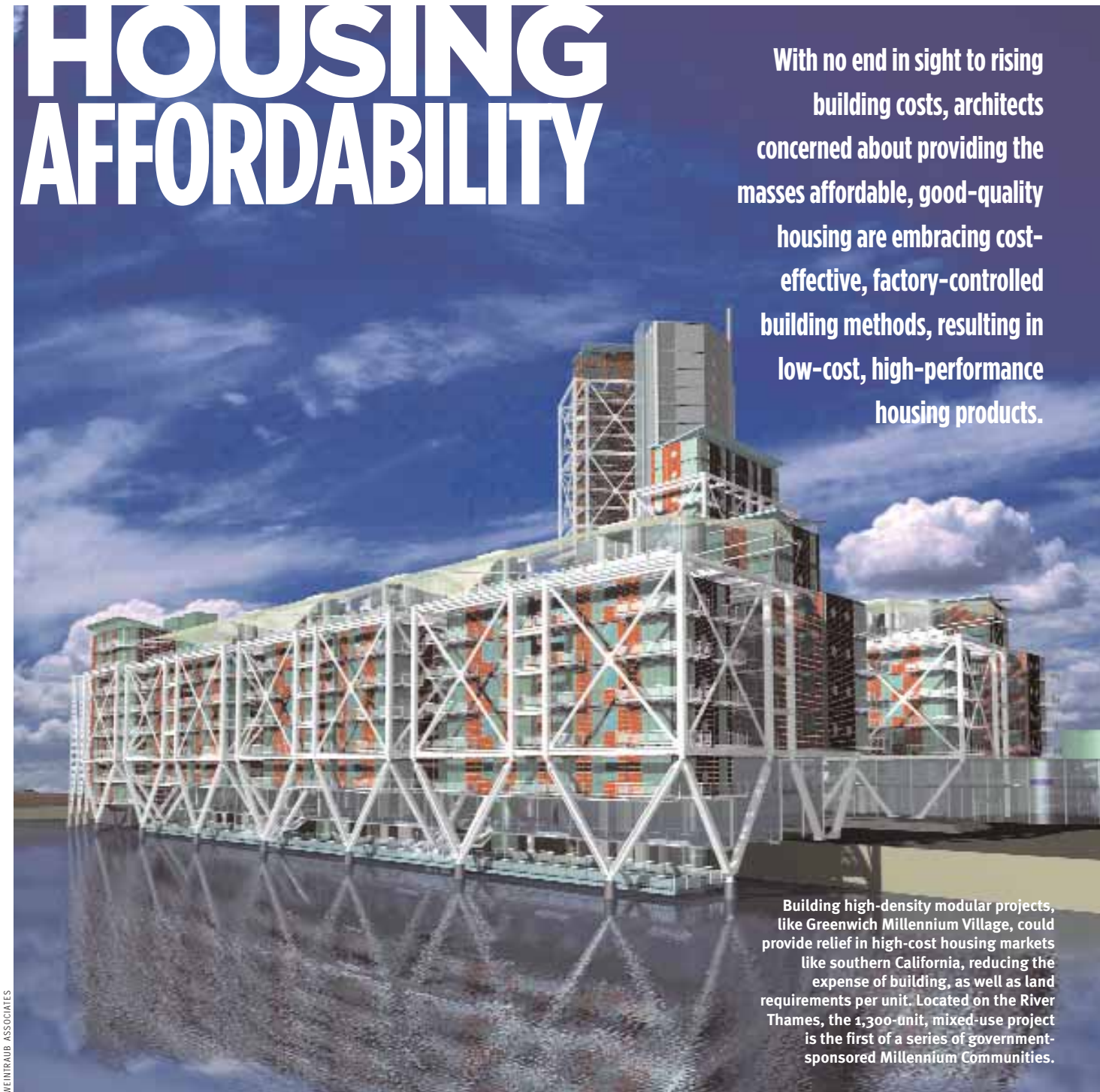


BUILDING BLOCKS OF HOUSING AFFORDABILITY

PATRICIA L. KIRK

With no end in sight to rising building costs, architects concerned about providing the masses affordable, good-quality housing are embracing cost-effective, factory-controlled building methods, resulting in low-cost, high-performance housing products.



Building high-density modular projects, like Greenwich Millennium Village, could provide relief in high-cost housing markets like southern California, reducing the expense of building, as well as land requirements per unit. Located on the River Thames, the 1,300-unit, mixed-use project is the first of a series of government-sponsored Millennium Communities.

WEINTRAUB ASSOCIATES

LOOKING FOR WAYS TO DELIVER high-quality homes at prices low-income and working-class families can afford, affordable housing interests are increasingly shifting from site-built to factory-built production methods.

Because of rising building costs, public housing organizations across Europe are requiring a percentage of government-

modular products that can be built quickly and withstand future storms.

The factory environment provides an opportunity to build a higher-quality product at a lower cost than ground-up construction because there can be greater quality control in a factory, less waste, economies of scale in buying large quantities of materials and prod-

a modular product has to be built well to withstand the rigors of shipping.

Not all modular products are created equal, however. New York City-based architect James Dart, who is designing modular home prototypes for affordable homebuilder ACORN Housing Corporation, notes that modular housing companies flocked to the New Orleans region following Katrina and built a lot of homes. "The big issue has been quality," he says. "Workmanship has been shoddy across the board, and many of these homes are destined to be maintenance nightmares." Dart notes that some companies are pandering to housing-challenged consumers with stylistic illustrations of products, but "if you kick the tires, you'd walk away," he adds.

"It [the hype] has been a challenge for the consumer to sift through," concurs New Orleans native Leonard Kotowski, who formerly served as a lobbyist for the modular housing industry and a consultant to the city. "It's been like the Gold Rush—companies coming to the Gulf Coast wanting to build 100,000 homes and sell them for whatever. "Pricing is out of hand for the quality of product offered," he adds, contending that the majority of newcomers in town have no experience in the building process or construction industry.

Now heading a newly formed modular housing company, Lodgic Homes, which builds customized market-priced products and state-sponsored affordable housing, Kotowski notes, for example, that his company can design and build a totally customized, upscale home for \$120 per square foot, while some modular companies operating in New Orleans are pricing tract-quality housing at \$90 to \$130 per square foot. Dart anticipates that the 150 sustainable homes he is designing for ACORN can be built at a cost ranging from \$75,000 to \$130,000, depending on size and location.

Meanwhile, the Alternative Housing Pilot Program created by Congress in 2006 is providing \$400 million to replace FEMA trailers with modular Katrina and Carpet cottages. Katrina Cottages are one- and two-bedroom, single-family units, while Carpet Cottages are one-story, multiunit structures built in Creole Cottage style.

The temporary cottage concept grew out of an American Institute of Architects (AIA) recommendation to replace FEMA trailers with safer

The Paragon Project, an inner-city modular residential complex, incorporates a mix of student, key worker, and affordable one- and two-bedroom apartments in West London.



CARTWRIGHT PICKARD ARCHITECTS

sponsored homes to be constructed using "modern methods," according to Richard Ashdown, director of Affordable Housing for the Jones Lang LaSalle Residential Group in the United Kingdom (U.K.) and former head of Sappling Housing Partnership, a consortium of five housing associations in southern England.

"The government is pressing this, challenging housing associations to produce homes for £60,000 (\$120,000), or £20,000 (\$40,000) under market," he says, noting that the government wants to drive down home prices by reducing labor costs and is requiring one-half of the 30,000 government-sponsored homes built each year to be factory built.

In the United States, the housing deficiency in Gulf Coast states resulting from hurricanes is helping to mainstream modular housing, as local, state, and federal recovery agencies look to the architectural and engineering communities for expertise in creating affordable, high-performance, well-designed

ucts, and the construction itself takes a fraction of the time required for a site-built home.

New York City-based architect Frederic Schwartz, who is designing sustainable four- and five-story modular multifamily projects to replace Katrina-ravaged housing in New Orleans, points out that a controlled factory environment not only provides greater quality assurance, but also eliminates exposure to moisture and related construction defects and liability issues. As a result, well-built modular housing can provide greater customer satisfaction and less risk of lawsuits against building defects.

A study done in 1992, following Hurricane Andrew, by Federal Emergency Management Agency (FEMA) demonstrated that modular housing product performs better than any other type of home in high winds, according to Steve Snyder, executive director of the Modular Building Systems Association in Harrisburg, Pennsylvania, who points out that



LOWE'S

The Katrina Cottage, designed by a team of architects headed by Marianne Cusato, can be expanded up to 1,200 square feet and sustain winds of up to 140 miles per hour. Lowe's is offering the designs along with packages of materials needed to construct them for \$45 to \$50 per square foot at four Gulf Coast store locations.

and more comfortable interim housing, since temporary housing can end up lasting longer than originally anticipated. The AIA lobbied for the project to buy time for careful long-term planning and creation of new codes and standards to protect against future disasters.

New York City-based architect Marianne Cusato, in conjunction with a team of architects from around the nation including architect Andrés Duany, designed Katrina Cottages, ranging in size from 544 to 936 square feet (51 to 87 sq m), that can withstand heavy rainfall and winds up to 140 miles (225 k) per hour. Lowe's has signed an agreement with Cusato to market these designs along with the materials needed to build them. The package comes with everything needed to

would be better spent on permanent housing, since people will still be living in temporary quarters.

NOLA produces high-quality, energy-efficient Creole Cottages of 1,000 to 1,500 square feet (93 to 139 sq m) for \$110,000 to \$160,000. But the need for cottages like these is great, and reputable companies like NOLA have a limited production capacity, in this case, only 45 to 50 homes a year.

LRA, however, hopes to convert Katrina Cottages to permanent housing and has established a \$2 million fund to provide occupants downpayment assistance to purchase and expand units into permanent dwellings, according to Jeff Hebert, director of community planning for LRA. But, he notes that with about 53,000 people in the Gulf Coast area in need of housing, the FEMA cottage program represents an "eye-dropper in an ocean" of need.

The cottage concept also is helping New Orleans bring home its schoolteachers. The LRA providing 250 fully furnished, rent-free, two-bedroom units to teachers willing to return. The modular units will be located on school district property.

Local governments in the U.K. are using a similar concept to recruit and retain key workers—teachers, police officers, nurses, and firemen. LiveIn Quarters is working with housing associations and developers across the country to build modular Mini Suites in blocks of 50 or more units. The program is aimed at helping key workers stretch their wages, which have not kept pace with the rising cost of housing. Key workers in London, for example, are being offered these stylish, fully furnished efficiency-size apartment units for as little as £70 (\$140) a week, a fraction of the cost of renting from a private landlord.

North Wales-based Corus Living Solutions, a division of Corus Group, a manufacturer of steel and aluminum products, also offers a high-performance, steel-frame modular housing system that is being used to create worker, student, and military housing, as well as hotels, hostels, and family-size homes. The flexible FutureHome system consists of modular room units in various sizes that can be assembled in a variety of configurations and added to or subtracted from as a family grows or downsizes.



DUANY PLATER-ZYBERK

The Louisiana Recovery Agency has contracted with a team headed by Washington, D.C.-based developer the Cypress Group to build 450 temporary units, including multiunit Carpet Cottages designed by Miami-based architect Andrés Duany.

complete the cottage, except the foundation, piers, HVAC system, and labor needed to build it. Some of the designs can be expanded up to 1,200 square feet (111 sq m) to create a permanent dwelling.

The Louisiana Recovery Agency (LRA) has contracted with Cypress Cottage Partners—a team headed by Washington, D.C.-based developer the Cypress Group that includes Louisiana contractor the Shaw Group, Miami-based architects Duany Plater-Zyberk & Company, Cusato, and Lowe's—to build 450 to 500 cottages to provide relief to people currently living in FEMA trailers in four areas affected by hurricanes or housing refugees.

Pointing out that a permanent modular home costs little more than a Katrina Cottage, Nurhan Gokturk, president of NOLA, an established New Orleans-based modular housing manufacturer, contends that the \$75,000 to \$80,000 per unit being spent on cottages



NURHAN GOKTURK

The Creole Cottage, one of the energy-efficient homes that reflect the traditional architecture of New Orleans, is being built by New Orleans modular manufacturer/builder NOLA.

In designing ACORN homes, Dart says the primary focus will be on the structure's performance, although designs will reflect the character of New Orleans neighborhoods. "We're shifting the paradigm from how it looks to how it performs," he explains, noting that performance is as big an issue for returning homeowners as banks and insurance companies. Focus groups conducted by ACORN revealed that potential buyers are hesitant about rebuilding and staying on unless they can be assured of the safety of the area and its ability to withstand hurricanes and other natural disasters.

To improve performance, ACORN plans to build 150 homes in the Ninth Ward and New Orleans East to higher than the minimum standards required. For example, modular

housing off site, because under factory conditions, workers can work day and night."

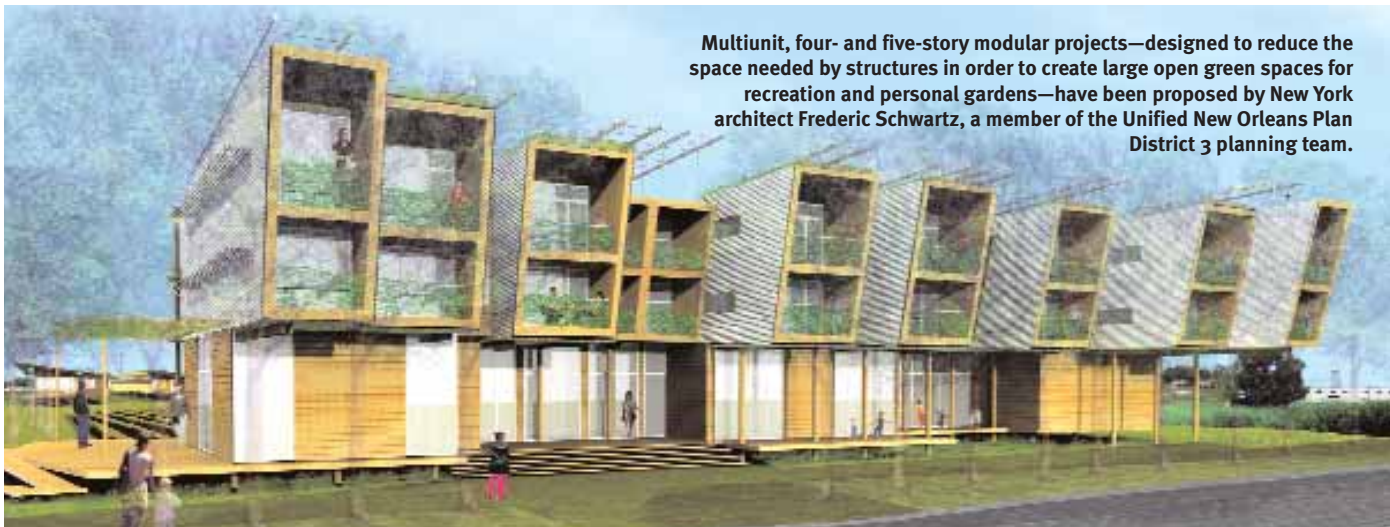
"A modular housing manufacturer can build a lot of homes in a short amount of time," concurs Snyder, noting that 70,000 homes are needed in Mississippi alone. Local builders are needed to do site work and build foundations, he says, so using the workforce in other states to build structures maximizes the effectiveness of the region's limited workforce.

Schwartz suggests that Katrina is accelerating interest in modular technologies and building systems in the architectural community and among other industry professionals. With architects now involved, modular housing is becoming more flexible and sustainable and is gaining acceptance among consumers.

Another goal for this project is to create modular designs adaptable to various site shapes and situations, he continues, "We're trying to make modular urban infill friendly. Our newest design is the most flexible, allowing us to develop a stand-alone or one- or two-story multifamily projects using modular components."

The ecoMOD team just completed a local two-story condominium project with two units and has underway a project that involves preserving a pre-Civil War wood-frame structure, adding a modular area to increase the living space, and constructing a separate studio cottage to provide the family with an ongoing rental income.

Meanwhile, the Southeast Wisconsin AIA is underway on a community service program



SCHWARTZ ARCHITECTURE

boxes will be elevated higher than the base flood elevation mandated by FEMA, and units will be flexible enough to shift in relationship to each other, while landscaping will be able to maintain a consistent elevation.

The company also plans to build homes in clusters because "no one wants to be the first and only one back in the neighborhood," Dart says, suggesting that barriers to the "road home" is as much psychological as financial and physical.

Schwartz, a member of the Unified New Orleans Plan (UNOP) District 3 planning team, also is concerned about the quality of modular housing rising in the city, but points out: "The only way to attack the immediate need for thousands upon thousands of homes in New Orleans is to construct prefabricated

John Quale, project director for ecoMOD, an architecture education project at the University of Virginia in Charlottesville, is designing and manufacturing modular housing prototypes for Habitat for Humanity in Gautier, Mississippi, which has been asked to increase home production from three or four homes to 200 homes annually because of hurricane damage.

The ecoMOD project's primary goal, however, is to develop environmentally responsible strategies for prefab homes within the affordable housing context. "Our larger agenda is to work with regional housing organizations," Quale says, explaining that home prices in the Charlottesville market are inflated by the university's presence and the ongoing press about the town's quality of life.

aimed at demonstrating how modular housing can be used to reweave the fabric of deteriorating neighborhoods and create dignified inner-city housing, explains Milwaukee-based architect John Holz, AIA Southwest Wisconsin vice president, who heads the program. Part of the national AIA Blueprint for America 150th anniversary observance, the regional program encompasses three projects—in Milwaukee, Racine, and Waukesha, Wisconsin—which are south and west of Milwaukee respectively.

The University of Wisconsin-Milwaukee School of Architecture agreed to design home prototypes, and a \$7,500 grant from AIA150 and \$21,500 in donations launched the effort. The initiative will provide each community one dwelling intended to serve as a catalyst for

building a neighborhood of secure and sustainable housing in existing communities suffering from financial disinvestment.

Homes are designed to fit on 30- to 35-foot- (9.1- to 11-m-) wide, odd-shaped lots, says Holtz, noting that the two-story structures are about 22 feet (6.7 m) wide and are thoughtfully designed to “live bigger” than

their actual size of 1,500 square feet (139 sq m) and encourage social interaction and revival of community, with large front porches and welcoming facades.

Architects and inventors are also experimenting with alternative open building systems, including structural insulated panels (SIPs), which are composed of rigid foam

insulation sandwiched between oriented strand board and can be used as wall, floor, and roof components. Unlike prefab housing components that are delivered 80 to 90 percent completed and quickly installed on site in two to three weeks, the SIP system, sometimes referred to as a “flatpack” home, consists of panel components that are assembled

Modular Homes Move Upscale

MODULAR HOUSING is not what it used to be—which is a good thing. It is undergoing an image makeover, with a focus on quality and design providing the impetus for mainstream acceptance.

Until fairly recently, modular housing conjured up an image of mass-produced homes of questionable quality with look-alike, cookie-cutter designs. Today, modular housing can be anything the buyer wants, from a custom million-dollar mansion to a simple vacation cottage. The overall quality is regarded as good or better than a site-built stick home because the factory environment provides an opportunity for quality control and eliminates exposure to moisture associated with building defects.

“It’s high time for a change,” comments New York City–based architect James Dart, who is designing modular housing for a sustainable housing project in New Orleans being developed by affordable builder ACORN Housing Corporation. “The U.S. construction industry is still in the 19th century when it comes to producing product,” he adds, suggesting that modular offers a more efficient and predictable way to get homes to market than relying on the ebb and flow of the stick-built environment.

“Five years ago the industry was driven by cost, so we built basic, uninteresting-looking homes,” says Kevin Flaherty, vice president of sales and marketing for Genesis Homes, a division of modular home giant Michigan-based Champion Homes. Lower price is no longer the primary motivation for rising modular sales. “Now, the more serious challenge is to look

for new ways to build,” he adds, pointing out that various forces are converging to increase the industry’s acceptance of modular housing, but most notable is the shortage of skilled labor.

A 2004 study from the Construction Industry Institute indicated that 75 percent of contractors are experiencing a labor shortage. Furthermore, the report noted that skilled trades are in decline because the industry is failing to attract younger workers when older workers retire. The average age of a skilled construction worker today is 47 years, according to the U.S. Bureau of Labor Statistics.

Meanwhile, an estimated 40 percent of current U.S. construction workers are illegal immigrants, points out Flaherty, suggesting, “If we stem the flow of illegal workers, it will put a real cramp on traditional builders.”

Modular building technology includes both prefabricated and packaged home kits, or “flatpack,” products. Prefab buildings are delivered in sections that are 70 to 90 percent finished. Components are assembled on site, systems hooked up, and the home is ready for occupancy, usually in just a few weeks. Home kits consist of precut, predrilled parts needed to build a specific home design. The flatpack product includes timber-frame structural insulated panels (SIPs), bathroom- and kitchen-pod technology, and preinstalled mechanical systems used to build the

structure on site, which generally takes two to four months.

Both modular housing systems require less time to complete than the eight to 12 months needed for ground-up construction. Although modular construction techniques do not guarantee lower home prices, time saved cuts the cost of carrying construction financing and reduces construction-related disruption in a neighborhood. The cost of dirt and labor in a market influences price most. However, modular building processes do provide efficiencies, such as reduced waste and economies of scale in purchasing large quantities, that often provide homebuyers greater value, or “bang for the buck” in the way of higher-end products and upscale features.

Architect Leo Marmol, a principal at Los Angeles–based Marmol Radziner, which is designing and manufacturing modern-style, sustainable, steel-frame modular products, says the quality of home his firm is producing for \$250 to \$300 per square foot would fetch \$500 to \$600 per square foot if site built. “The fact that it’s made in a factory is irrelevant,” he stresses. “It’s how it feels, the high quality of life it provides,” Marmol adds, pointing out that the factory-built home provides more advantages in terms of cost and the environment than ground-up construction.

Architects are the primary catalyst in the shift to modular housing. “Architects are endorsing



CHAMPION ENTERPRISES/GENESIS HOMES

A modular housing product allowed 38 single-family homes to go up quickly in the nine-square-block district surrounding Detroit, Michigan’s Oakman Elementary/Orthopedic School for disabled children.

on site, which usually takes about two months. Among the advantages of SIPs, however, are that they are energy-efficient, fire resistant, and prewired, and they reduce exterior noise. SIPs also are lightweight, but have the strength of a steel I-beam; flexible so that elements can be added or upper-level space developed as a family grows;

and because they eliminate load-bearing walls, they can accommodate open floor plans and double-sided access to cabinetry and bookcases.

Los Angeles-based inventor Barry Rosengrant has created an improved SIP product that can be attached to a modular space frame, thereby producing a completely

enclosed structure within two weeks using unskilled labor. The E-Space Component Building System, which includes exposed wood interiors that evoke a traditional Japanese aesthetic, provides open timber-frame spaces without the shrinking, cracking wood or expensive mortise and tendon joinery that is inherent to timber framing.



BARVISTA HOMES

Modular home manufacturers are including architectural details that enable modular homes to fit into the character of neighborhoods like those of Winter Park, Colorado.

modular because they can get their projects completed quicker and with higher quality,” Flaherty says, noting that as a result, the industry has become more architecturally focused than in the past, applying

elevations and details similar to site-built homes.

Modular manufacturers today can build to any codes, standards, or client specifications, including green-built and Leadership in

Energy and Environmental Design (LEED) criteria, as well as high-performance building standards in hurricane-prone zones.

“We’ve gotten better at what we do and a lot more creative than in the past,” points out industry veteran Glen Alessandri, president of Colorado-based Barvista Homes. “The industry is building better and more customized products. The key is that products don’t look any different than stick built products.” he adds, pointing out that his firm does everything from urban infill housing to green-built upscale million-dollar homes in resort areas to condominiums and apartments.

The only limitation would involve site location, says Alessandri, referring to the Department of Transportation regulations regarding the width of units that can be transported on various types of highways. Therefore, the quality or type of highway infrastructure available to move components to a specific location dictates the size of modular units, he adds, suggesting that architects work with modular manufacturers upfront to design structures with modular constraints in mind, rather than bringing them a completed design to adapt.

Although modular housing currently represents only about 5 percent of total market share, demand for modular housing is expected to grow dramatically along with awareness of its benefits among both

industry professionals and consumers. Natural disasters, however, are turning up interest in high-quality, mass-produced housing, notes New Orleans architect Steven Binger, who is designing homes for a new custom modular builder based in Texas, Lodgic Homes.

“New Orleans was behind in embracing modular or manufactured housing of any kind,” Binger says. “It goes back to the city’s architectural heritage and tradition of craftsmanship and high-quality construction,” he adds, noting that New Orleans natives are conservative and not apt to accept anything new until they fully understand it. “Katrina kicked everything up a notch, because people are realizing we have a lot of houses to build in a short period of time.” he points out. “There’s a shortage of people in the trades and now that people are looking for other options and learning about modular, they’re pleased with what they see.”

In the design of Lodgic Homes, the idea is to take the modular system and “make New Orleans out of it,” Binger notes, explaining that this will involve meshing traditional New Orleans architectural designs, including the Camelback, Shotgun, Shotgun Camelback, Creole Cottage, and Townhouse—a classic Greek Revival style that includes galleries, or porches, on the first and second floors—into a modular perspective.—P.K.



CONCORDIA ARCHITECTURE AND PLANNING

New Orleans architect Steven Binger is designing homes for Houston, Texas-based modular homebuilder Lodgic Homes to fit into New Orleans’s neighborhoods. Rather than replicas of original home styles, they are contemporary spinoffs, such as the modern Craftsman-style design.

Rosengrant's product consists of moderately priced, off-the-shelf, sustainable building components and new patented metal connector technology that allows balconies and upper floors to be incorporated into the structure when it is initially constructed or at a later date.

"Our ecologically sound wood, which is engineered from quick-growing waste trees, arrives cut and drilled to size, and the metal connector system eliminates all the handwork required by timber framing," he says. "By having materials preengineered and presized, cheap, unskilled labor can bolt them together, eliminating the high cost of skilled tradesmen."

Pliny Fisk, associate professor of architecture at A&M University and codirector of the Center for Maximum Potential Building Systems in Austin, has developed a concept that

mail-order home kit in 1940. Now with growing consumer acceptance of the modular home concept, two major do-it-yourself home retailers—IKEA in Europe and Home Depot in North America—are offering new moderate-priced modular housing products.

The IKEA BoKlok [Swedish for "live smart"] product is a sophisticated, sustainable timber SIP product that provides a full-range of housing options, from single-family to multistory rental and condominium products.

Well-tested in the Scandinavian countries, where 2,000 homeowners live in BoKlok homes, the BoKlok brand, which was developed by IKEA and Swedish homebuilder Skanska, is expanding to the U.K. IKEA has partnered with U.K.-based affordable housing developer Live Smart @ Home to deliver

to launch a pilot homebuilding program in the greater New Orleans area. Homes will be manufactured in a factory, delivered, installed on site, and finished using Home Depot interior products. Homestar Builders is providing complete construction services, including foundations and site work. Nine designs, ranging in size from 620 to more than 2,000 square feet (58 to 186 sq m), and in price from \$75 to \$125 per square foot installed, excluding the lot.

Pickard's firm is also designing high-rise buildings up to 20 stories tall, constructed by lifting preengineered modular concrete and steel components with a crane up to 12 stories, then building the top eight stories using traditional building methods.

Schwartz says that ultimately U.S. architects also would like to take modular to loftier heights, "but," he adds, "I don't see the industry doing that right now. The taller building unions get involved in work done because it cuts out labor, but there's also the practicality of lifting modules 20 stories. We're proposing four and five stories in New Orleans, but there's the potential to go higher given the right circumstances."

Christian Redfeam, assistant professor at the University of Southern California School of Policy, Planning, and Development, agrees that factory-built modular housing can lower the cost of construction. He stresses, however, that this strategy will not have much impact on housing prices in high-cost areas like southern California, unless modular construction involves high-density vertical housing.

"No matter what the industry comes up with as far as a structure, it won't be affordable, because of the cost of land underneath," Redfeam explains, noting that land under the typical \$800,000 southern California home is \$550,000 of the cost. "The only way to make land less expensive is to make it undesirable or increase density," Redfeam continues, suggesting there is no real cure for housing the region's working class without reducing the share of land that everyone occupies. **U**

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Home Depot has partnered with Homestar Builders, a Texas-based modular homebuilder, to launch a pilot homebuilding program in the greater New Orleans area. Homes will be manufactured in a factory, delivered, and installed on site.

goes beyond building systems to the core of affordability. Pliny's design consists of a full range of modular house parts that fit together and can be assembled in various configurations. The groHome house, which can grow along with the size of a family, operates on a plug-and-play idea in which the starter or basic structure is predesigned to receive additional components. Fisk's concept is to produce home-starter kits and add-on components distributed by a national do-it-yourself home improvement retailer, so consumers can buy and build only the amount of living space needed initially and add space over time as the family grows.

This concept offers real home affordability by eliminating the 30-year mortgage, Fisk explains, "If you break down where the money goes for housing and land, it actually goes to the bank. If you think incrementally, it's pay-as-you-grow. This house responds to occupants, and they don't have to pay a mortgage to the bank. Do-it-yourself is a fast-growing industry in this country," adds Fisk. "If people could buy parts that go together . . . we're talking about a house system that responds to people's needs."

No major retailer has marketed a flatpack house since Sears Roebuck eliminated its

BoKlok projects to public housing associations, as well as offer a flatpack timber home product to consumers at 13 U.K. IKEA stores.

BoKlok U.K., a joint venture of Live Smart and the nation's largest housing association, the London-based Hyde Group, has selected Optima Homes, an off-site timber SIP building system launched by Pace Timber Systems and Cartwright Pickard Architects, both of which are based in the U.K. BoKlok U.K. plans to build about 500 homes, targeted at young families and working people earning £12,500 to £30,000 [\$25,000 to \$60,000] over three years in four developments in southern England.

The Optima Home system is a kit of standard, flexible, sustainable parts, incorporating timber-frame SIP panels with bathroom and kitchen pod technology and preinstalled mechanical and electrical duct systems that can be used to construct various home designs. James Pickard, principal at Cartwright Pickard Architects and Optima Home designer/creator, reports the system is easy to install. One team can put up a three-story structure in one day and can complete the interior work in eight weeks, rather than the eight months it typically takes to build a stick house.

Home Depot has partnered with Homestar Builders, a Texas-based modular homebuilder,