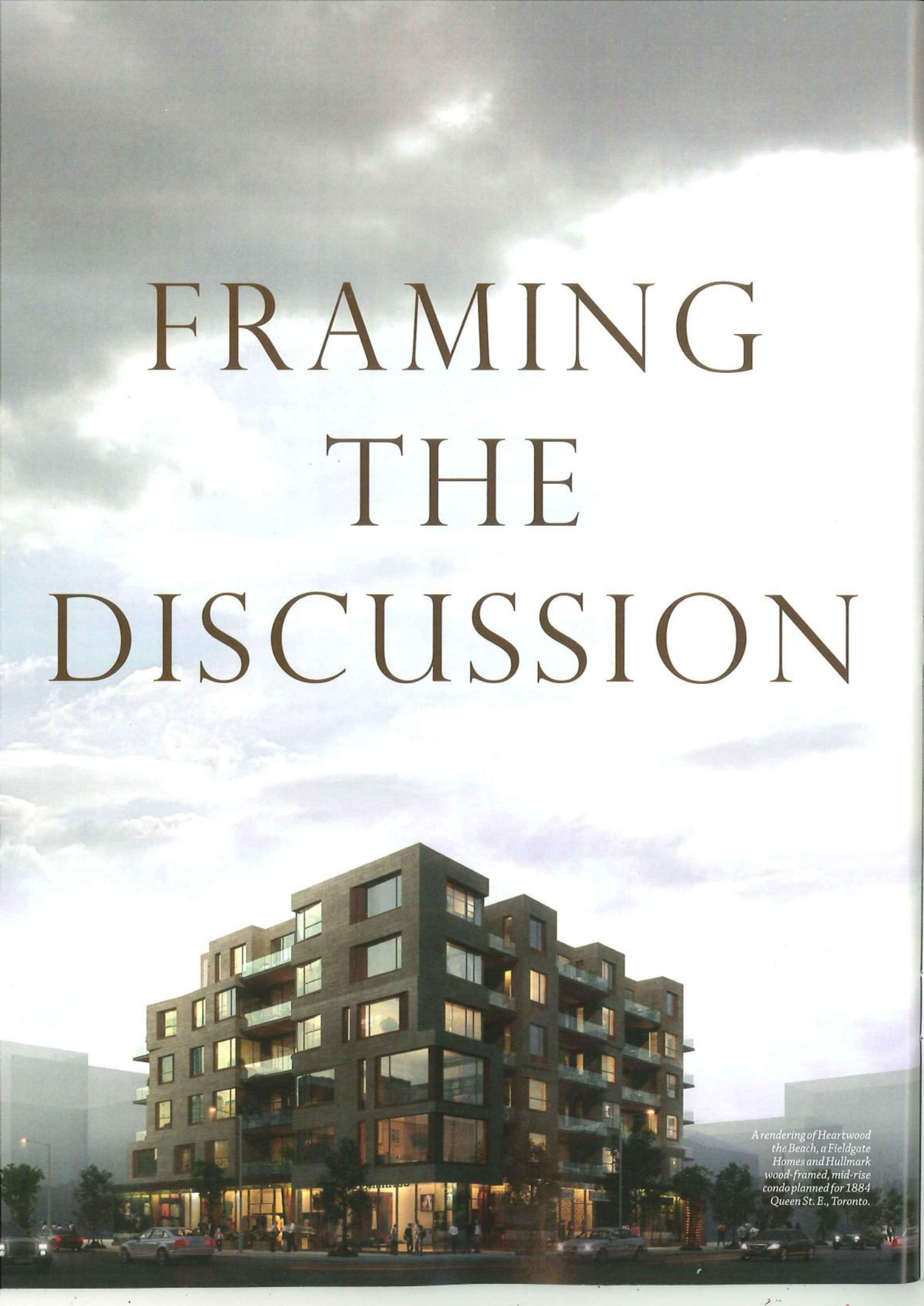
FRAMING THE DISCUSSION



A rendering of Heartwood the Beach, a Fieldgate Homes and Hullmark wood-framed, mid-rise condo planned for 1884 Queen St. E., Toronto.

RESEARCH AND NEW TECHNOLOGY ARE HELPING TO ADVANCE MID-RISE WOOD CONSTRUCTION

BY MARC HUMINILOWYCZ

On January 1, 2015, after years of advocacy efforts by Ontario's building industry, the Canadian Wood Council and numerous Ontario municipalities, the Ontario Building Code amendment to permit six-storey wood-frame construction was finally put in place.

The new code change was great news for Ontario on multiple fronts: Builders benefit from new construction opportunities and increased employment; municipalities are able to intensify neighbourhoods with under-utilized land on major avenues and corridors; residents are the beneficiaries of more affordable housing; and Canada's forestry industry is discovering an expanded market for its sustainably produced resource.

While the new regulations will be similar to those employed in British Columbia—which in 2009 became Canada's first province to adopt mid-rise wood-frame buildings—Ontario's code features more stringent safety requirements, including the use of non-combustible materials in areas such as stairwells and balcony sprinklers.

However, six-storey wood construction has been embraced in B.C. and in several countries around the world, where buildings of 10 storeys or higher are commonplace—that despite six-storey wood construction encountering its fair share of opposition, mainly from the perspective of fire safety. Last September at OHBA's annual conference, Len Garis, Adjunct Professor and Fire Chief for the City of Surrey, B.C., helped quell those fears with a comprehensive presentation on fire safety of mid-rise wood-frame residential buildings.

Quoting statistics from the *Sprinkler Systems and Fire Outcomes in Multi-Level Residential Buildings* report that Garis co-authored with Dr. Joseph Clare in 2012, Garis' detailed seminar covered a massive amount of research on building fire safety, including a simulation modelling study from the National Research Council, a retrospective analysis of residential building fires in British Columbia and case studies from other jurisdictions with wood-frame buildings. Topics included fire simulations, fire incidents, sprinklers, injuries and loss of life (firefighter and public), retrospective analyses, balcony fires, fires in buildings under construction, comparisons of fire incidence by construction type and other information extracted from 1,942 fire incidents that occurred in B.C. between October 2006 and October 2011.

"An overwhelmingly consistent theme emerges," Garis observed. "Although fire services have typically responded with concerns to changes in the building code (that allowed) this type of construction, the available information suggests that these structures will perform at least as well from a fire safety perspective as those already permitted."

Does construction type make a difference? Garis cited statistics that your likelihood of dying in a fire in a steel-frame building is the same as in a wood-frame building, assuming both have sprinklers and smoke alarms that are operational and compliant with the NFPA 13 standard.

Garis also noted that Ontario's code

Developed by Core Urban and engineered by Strik Baldinelli Moniz, Templar Flats in Hamilton is among Ontario's current six-storey, wood-frame projects.

changes make provisions to address the challenges of wood-frame buildings under construction—including fire safety planning, training, best practices, firewall construction and site security—as well as fires that originate from their exteriors, such as balconies, which would be required to also have sprinklers according to the new code.

"Industry stakeholders have the right to ask questions about wood-frame construction. We have lots of data," said Garis, adding that the Canadian Association of Fire Chiefs received a $1.1 million grant from the federal government to collect fire safety data on the subject "so that decisions can be made based on the quantitative evidence." He encourages anyone interested in investigating the research further to download a complete report from the University of the Fraser Valley titled, "Taller Wood Buildings and Fire Safety," at cjr.ufv.ca.

Fire concerns aside, almost a year after the code change, six-storey wood is quickly gaining acceptance among builders and municipalities across Ontario, who are realizing its many advantages in both economics and planning. This is welcome news for the Canadian Wood Council and its Wood *WORKS* campaign (see wood-works.ca) to promote the use of wood in building construction.

"We've been selling the concept for four years," says Ontario Wood *WORKS* Technical Director Steven Street. "The code change was the first step. Now we need to make sure that the technical details of this type of construction and the principles of wood—its design capabilities, behaviours and limitations—are understood by builders, engineers and architects."

According to Street, wood used in construction comes from Ontario, Quebec and different parts of Canada, giving builders a choice of product according to their projects' performance requirements and design efficiencies. Originating mostly from managed forests on crown lands, it is a versatile, healthy and sustainable product.

> "THE FACT THAT SO MANY PROJECTS ARE ON THE GO IS AMAZING."

Street applauds the "pioneers" who have already embraced six-storey wood. "There's a massive amount of momentum," he says. "Governments are quickly adopting the new code regulations and working with designers and builders to make things happen. The fact that so many projects are on the go within one year of the code change is amazing. The next five years will be really exciting!"

In a construction field lacking in wood-frame blueprints, several forward-thinking builders and designers in Ontario are leading the way. Structural engineer Mike Baldinelli of Strik Baldinelli Moniz has already been involved in the design of three mid-rise wood-frame

BRANCHING OUT

Six-storey wood-frame construction is gaining momentum in Ontario. Here's a sampling of projects that fall under the new code amendment, each in various stages of design or construction.

THE SANDMAN HOTEL, HAMILTON
Six-storey, 208-unit hotel in the city's east end. Hamilton was Ontario's first city to issue a permit for mid-rise wood-frame buildings in excess of four storeys.

TEMPLAR FLATS, HAMILTON
Six-storey infill residential rental project in downtown Hamilton combining the adaptive reuse of two existing buildings. Builder: Core Urban Inc. Engineers: Strik Baldinelli Moniz

356 DUNDAS ST., LONDON
Six storeys, 69 affordable housing rental apartments. Engineers: Strik Baldinelli Moniz

AQUABLU LUXURY LAKESHORE CONDOS, GRIMSBY
Five-storey, 124 units, including four attached townhomes. Builder: Homes by DeSantis. Design/Project Management Consultants: Capital Build

OAK PARK PHASE II, OAKVILLE
Five-storey, 100-unit condo building. Builder: Ballantry Homes. Engineers: Strik Baldinelli Moniz

THE CABIN, 45 DOVERCOURT RD., TORONTO
Six-storeys, with 25 two-storey units. Builder: Curated Properties

HEARTWOOD THE BEACH, TORONTO
Six-storey, 70-unit condo is both Toronto's first wood and first cross-laminated timber mid-rise. Builder: Fieldgate Homes and Hullmark Engineers: Moses Structural Engineers Architect: Quadrangle Architects

THE GALLERY CONDOMINIUMS, BARRIE
Four- to six-storey condo development. Builder: Pratt Homes

Homes by DeSantis says wood-frame projects such as AquaBlu, a five-storey luxury condo in Grimsby, offers aesthetic flexibility on top of environmental benefits.

"FROM A DESIGN PERSPECTIVE, WOOD COMES WITH A UNIQUE SET OF BENEFITS AND CHALLENGES."

projects completed in Ontario: six-storey buildings in London and Hamilton, and a five-storey version in Oakville.

"From a design perspective, wood comes with a unique set of benefits and challenges," says Baldinelli. "Depending on where in Ontario the structure will be built, things like geology (soil type and seismic factors) and wind loads need to be accounted for. Wood moves more easily than other materials, so hold-downs and shear walls need to be designed and installed to prevent the building from moving more than prescribed by code."

While the steel and concrete industries have well-established design tools for building construction, no design software has existed for mid-rise wood. "Wood has lagged behind," says Baldinelli. "Seeing an opportunity, we spent one year developing a wood design program. We have a lot of confidence in it." His company also recently received funding from Natural Resources Canada to work with the University of Western Ontario on developing a stand-alone program that all engineers can use. "Many people don't know how to design these buildings," Baldinelli adds. "This is what the industry needs."

By next April, a total of eight five- to six-storey buildings will be designed by Strik Baldinelli Moniz, and the company plans to do modelling this winter on its first eight-storey wood-frame structure. "Work on several projects has given us the liberty of tweaking (client) designs to make them cost-efficient, optimizing costs versus benefits," says Baldinelli.

Based on experience in B.C. and elsewhere, six-storey wood-frame construction is about 10% less expensive than using steel or concrete.

Baldinelli also cites reduced builder costs, although not as dramatic. "The cost of using wood in a building versus using concrete and steel is a savings of 10% to 12% per sq. ft.," *Northern Ontario Business Magazine* noted in a November interview with Baldinelli. "The building is lighter and it's faster to erect—12 to 14 months with a concrete building compared to eight to 10 months with wood."

There are a lot of carrying costs builders can save, Baldinelli adds.

Determining actual savings depends on many factors, notes Street, including "how the building is constructed and what wood structural systems are employed. One builder may have a system to achieve a much higher STC rating than others. From historical data gathered in B.C., many projects have achieved quite significant savings not only on materials, but on foundations, as the buildings are lighter, and on prefabrication, which results in a quicker build-time."

For his part, architectural designer Keith Reycraft of Orchard Design, currently working on a six-storey-wood, 85-unit residential rental building in Cambridge, appreciates the design flexibility and visual appeal that wood offers. "Although our budget has been adjusted throughout the project, we're still creating a nice-looking building with glass railings and lots of windows," he says.

One of the main design challenges that Reycraft experienced with his project had to do with minimizing the transfer of loading from floor to floor. "We tried to stack the units as much as possible, while at the same time meeting barrier-free requirements," Reycraft says. "It's all coming together thanks to seamless conversations between the designer and the structural engineer. The mechanicals are important too. We needed to account for headroom clearances of pipes in relation to floors."

Even though Orchard Design is not yet clear on what the final costs of the Cam-

bridge project will be, Reycraft believes in the many benefits of wood-frame construction. "Wood makes buildings work, offering a high return on investment," he says. "Builders are looking for budget-conscious options to offset the high cost of materials and land these days. Wood also offers the advantage of speedy construction." Reycraft explains that, compared to other building materials, wood can be easily brought to the site by truck, then staged and craned into place on site, without the need for large storage spaces.

David Moses, principal of Moses Structural Engineers in Toronto, has over 15 years of experience in wood and heavy timber construction and coordination. His company is currently involved in 10 mid-rise wood-frame projects in various stages of design, approval and construction.

While six-storey wood offers advantages to builders and municipalities over concrete, including time and cost efficiencies, Moses admits that it also has its challenges. "The code is very specific when it comes to the re-aligning of walls, especially shear walls," he explains. "This can affect the layout of spaces in residential units. For example, Toronto has mid-rise guidelines for its avenues, specifying stepping back on upper floors and stacking them so as not to obscure views. And the spacing of the grid is different on the main floor versus the upper floors."

But these are minor challenges, Moses says, adding that each project involves a learning curve. "But it's all manageable; you just need to sit down and address issues early in the design process," says Moses, who sees a bright future for six-storey wood, despite its slow acceptance and familiarity among municipal building officials and builders.

Among Ontario builders capitalizing on the changes in the building code, Homes by DeSantis has been one of the first out of the blocks. One of the developer's current projects is AquaBlu, a five-storey, 124-unit wood-frame luxury condominium project in Grimsby. In addition to the economic and environmental benefits of wood, company president Gabriel DeSantis values its aesthetic flexibility. "Wood gives us versatility with the beauty aspects of construction," he says. "It allows us much more architectural creativity and a leap forward in interior design."

DeSantis says modern consumers are demanding smarter, more affordable spaces. "Wood allows us to meet the consumer demand by delivering a much better product at an affordable price," he says, adding that his AquaBlu project, supported with marketing materials promoting its wood-frame attributes, sold out in the first few hours of its launch.

> "IT GIVES US THE CHANCE TO DEVELOP INFILL SITES THAT HAVE NOT PREVIOUSLY MADE SENSE FINANCIALLY."

Being an early adopter, DeSantis claims that his company's experience with this type of construction led to the development of methodology that paved the way for projects of greater heights. Having their share of early scrutiny from municipal building officials didn't hurt either. "The Town of Grimsby's Director of Building and Enforcement John Schonewille has been very supportive of our current project," DeSantis says.

Another company welcoming the change with open arms is Barrie-based Pratt Homes. "Wood is what we know," says Pratt Homes owner Heljar Hansen. "It gives us the chance to develop infill sites that have not previously made sense financially. We can keep control of the projects ourselves and keep them within a framework that we're familiar with."

Not that the practice is all smooth sailing. "I guess the industry is experiencing some challenges related to wood shrinkage, but nothing that can't be solved," says Heljar, whose company is currently planning the Gallery in Barrie, a foursome of six-storey, wood-frame buildings.

"And mid-rise wood has been fought by interest groups. As such we are having some challenges due to a myth that wood will not perform good enough in a mid-rise application," Heljar concedes. "But with time and proper information to share with the public, this will change."

Almost one year after the change in Ontario's building code, the future of six-storey wood construction looks secure. Municipal building officials are getting up to speed. Engineers and builders are embracing new design techniques thanks to new software programs being developed.

Perhaps the only piece of the puzzle missing is on the marketing side with consumers who, besides being the beneficiaries of a more affordable housing option, may not be aware of the many other benefits. But it would appear that six-storey wood is just the most recent step in mid-rise construction.

How high can it go? The sky just may be the limit. **OHB**

WOOD WORKS!

Mid-rise, wood-frame construction offers many benefits to builders, municipalities, residents and the environment:

- **WOOD** *is a sustainable, renewable and recyclable resource.*
- **WOOD** *is economical—it's lighter, more easily transportable and quicker to build than steel and concrete.*
- **WOOD** *is ideal for infill installations where a large crane is not possible.*
- **WOOD** *allows for more intensive land use—the ability to intensify neighbourhoods with under-utilized land on major avenues and corridors.*
- **WOOD** *offers smarter, more affordable housing—15% to 20% less than conventional construction.*
- **WOOD** *creates jobs and stimulates the economy.*