

Rendering and exterior shot of finished Niche One apartment condos in Calgary, Alberta.



# Sustainable Building:

## A Win for Everyone

By Shari Held

Precast and structural steel prove to be a **winning combination** for a sustainable building in Canada.

Niche Development Corp. is breaking new ground in its quest to provide affordable, energy-efficient and low-maintenance multi-family housing. The results of the company's first venture, Niche One apartment condos in its headquarters city of Calgary, Alberta, are impressive. But the real news is how the real estate developer/builder is making it possible.

Wood-frame construction is a popular choice for Canadian multi-home residences. However, when Peter Purewal, CEO, and John Clarke, president, founded Niche Development in 2015, they bucked tradition and turned to precast and structural steel as their materials of choice.

"I've personally made precast and steel my only method of construction," Clarke said. "Using precast in harmony with structural steel makes us more energy-efficient and construction-efficient."

### THE MANY MERITS OF PRECAST

A precast structure has many benefits for builders, real estate operators and homeowners. First, concrete is a non-combustible material that doesn't support mold growth.



Recently, the Canadian Precast/Prestressed Concrete Institute commissioned a study to determine insurance companies' biggest concern during the construction process.

"We thought it would be fire," said CPCI Board Member Jason Rabasse, C.E.T, business development manager at Lafarge Precast in Edmonton, Alberta. "We were completely surprised to find out it was mold."

Fire came in second. Both issues increase insurance rates for wood-frame construction.

Cast-in-place concrete requires on-site curing, testing and cleanup, which negatively impact the construction schedule. Clarke also finds precast to be less expensive and faster to install than cast-in-place. This is critical because the Alberta climate limits building to only eight months. The precast concrete elements are manufactured off-site in an environmentally controlled facility, resulting in Lafarge Precast taking advantage of the winter months as part of the construction season.

"Time is everything," Clarke said. "The moment the product's installed, we can move on to the next portion of construction. That's where we gain speed."

"Our methodology reduces construction time by 33% or more."

Work on Niche One began mid-March 2016 with the demolition of two asbestos-filled multi-family residences dating back to 1952. The three-story, 18-unit apartment condos

"The combination of **hollowcore** and **structural steel** used in a truly **integrated design** is what made this project unique and successful."

– Jason Rabasse, *Lafarge Precast Edmonton*

were finished in mid-November – in about half the time it takes to erect a comparable wood-frame structure, according to Clarke.

Second, Niche Development feels building with precast is better for the environment, an important issue for the company.

"A design based on precast and structural steel promotes sustainability by reducing the duration of on-site construction and energy consumption of heating equipment, which is particularly important for workers," said MoDA Architect Nicholas Tam, AAA, NCARB, MRAIC, B.Arch. MoDA Architecture is currently working with Niche Development on its latest project, Belgravia Square, a 70-unit apartment condo in Edmonton.

Additionally, precast and structural steel offer far more design opportunities compared to wood-frame construction. Tam noted precast allows designers more freedom with the layout of interior walls.

"The combination of steel and precast is able to provide larger structural spans with fewer requirements for columns or structural walls," Tam said.

Niche Development achieved a free-falling effect with the balconies at Niche One by cantilevering them 8 feet off the structure – without using columns.

"Working with precast is like having an art canvas that no one's ever painted on before," Clarke said. "You can do almost anything with it."

## A DIFFERENT MINDSET

One thing Niche Development found it couldn't do was simply swap out wood and replace it with precast and structural steel in the design.

"We had to design a totally different building," Clarke said.

The biggest challenge was the significant pre-planning required. The design had to be completed down to the last detail prior to ordering the precast and steel. Most builders aren't used to operating like that. Fortunately, new design tools like 3-D Building Information Modeling software make the predesign process easier.

"The nice part is that once you've preordered your material, you know exactly what's going to show up and you know exactly how to put it together," Clarke said.

The big question is: Can this methodology compete with wood-frame construction? Clarke thinks so – especially if you look at long-term savings.

## THINNER IS BETTER

Lafarge Precast Edmonton provided the precast hollowcore slabs for Niche One's flooring system. Niche Development worked closely with Rabasse and Lafarge's team during the design phase to maximize efficiencies. As a result, every floor in Niche One is constructed of full, 4-foot-wide hollowcore slabs, eliminating waste and cutting charges.

"It's always nice when you have an owner that wants to listen to a supplier and understands what the product can do so he can design efficiently," Rabasse said. "The combination of hollowcore and structural steel used in a truly integrated design is what made this project unique and successful."

It took 320 pieces (approximately 30,000 square feet) of 8-inch-thick hollowcore for the flooring system. The weight of the largest piece was about 7,000 pounds.





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— John Clarke, Niche Development

The resulting finished floor system is only 10 inches thick, which allowed for spacious 9-foot ceilings.

"With wood framing or conventional steel framing we'd be dealing with a 2-foot floor system," Clarke said. "On six-story buildings that adds about 6 feet, so it becomes substantial."

Another big advantage is that hollowcore dissipates sound, making it a very quiet building. That's a big plus for condo residents.

#### FINISHED AND FUNCTIONAL FOUNDATION WALLS

Alberta holds the Canadian record for the most extreme temperature change – in one hour, the temperature rose from -2 F to 72 F. Winter lows can reach -22 F. Keeping heating and cooling costs under control was imperative for the Niche One project.

Niche Development used closed-loop geothermal heating and cooling in combination with insulated precast walls to maximize energy efficiency. As a result, Niche One exceeds the current energy code by 30%.

The major structural walls – foundation walls, elevator shafts and stairwells – are constructed from approximately 5,000 square feet of insulated precast sandwich panels. Lafarge Precast Calgary fabricated a total of 36 panels, each approximately 10 feet high. The weight of the largest insulated wall panel was more than 25,000 pounds.

"With the insulation embedded in the concrete, it creates a kind of thermal mass effect and you don't lose heat like you'd normally do," Clarke said.

The insulated panels were cast on a steel bed to ensure the best possible finish. First, a layer of concrete was poured over the entire bed. Next, rigid foam insulation was laid on top to meet the R-15 value required for the project. Then, the final layer of concrete was poured, creating the insulated sandwich panel with insulation extending to all edges of the panel. Several of these panels were load-bearing.

"This wall system gives you a finished building envelope," Rabasse said. "There's no need to stud it, drywall it or insulate it. It's already a finished wall."

Installation was a breeze. Cranes placed the foundation wall panels horizontally around the perimeter of the building to minimize the number of joints. The panels, which carry the weight of the entire structure, were braced in position until enough of the structural steel framing was erected to tie everything together.

This style of building creates a resilient, low maintenance structure in comparison to the

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You can do almost anything with it.”

– John Clarke,  
Niche  
Development

lighter wood-frame construction. However, wood-frame elevator shafts require continual repair and adjustments as the building shifts or settles. Precast elevator shafts are maintenance free, and that means substantial operational savings.

#### LESSONS LEARNED

What’s the biggest lesson Niche Development took away from its Niche One project? They now take advantage of the strength and versatility of precast and will use it more on future projects.

Already on the drawing board are plans to use precast to replace some of the steel cross bracing in its Belgravia Square project.

“So far it looks like it’s going to give us a quicker and better project,” Clarke said. “And it really saves money.”

#### SUSTAINABILITY MAKES SENSE FOR EVERYONE

Sustainable building – selecting resources that don’t harm the environment and using them efficiently – is an essential component of

doing business for Niche Development.

According to engineers on the Niche One project, Niche Development saved 30 metric tons of greenhouse gases per year compared to the traditional way of building.

“Minimizing the labor and throwaway waste from your job site helps to reduce the overall costs,” Clarke said. “If general contractors and everyone else in the business crunch their numbers, they’ll find it saves a lot of money compared to the way we build today.”

Condo owners also reap big benefits from investing in energy-efficient buildings that are constructed to last a lifetime and beyond.

“We build a high-quality product that requires very little maintenance and doesn’t cost anywhere near the operating costs of a comparable building,” Clarke said. “That gives people long-term cost certainty.”

In addition to energy and maintenance savings, condo owners receive other benefits. Niche One precast and structural steel apartment condos cost 25% to 30% less to insure than wood-frame buildings. And condo fees at Niche One are less than comparable developments.

Finally, there’s the intangible value of knowing you’re doing the right thing.

“Long-term, we have to stop polluting,” Clarke said. “We have to clean up the old sites. We have to leave our planet a better place.” **PI**

*Shari Held is an Indianapolis, Ind.-based freelance writer who has covered the construction industry for more than 10 years.*

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