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SPECIAL FEATURE

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A New Life

Hamilton's Ken Soble Tower rebirth a Passive House first

DAN O'REILLY
CORRESPONDENT

Overlooking Hamilton Harbour, the 18-storey Ken Soble Tower is a building with a long list of problems including a deteriorating envelope, lack of insulation, inadequate ventilation, and end of life systems.

During the next two years, however, the 50-year-plus concrete rental apartment tower will be given new life.

Its rebirth may set the stage for the conversion of similar apartment housing stock of the same vintage and era.

The transformation of the CityHousing Hamilton-owned building at 500 MacNab Street North is considered to be the first Passive House retrofit of an existing residential tower in North America.

The building which is currently unoccupied, will be converted into a sustainable, energy-efficient and comfortable structure with new amenities.

Project highlights will include the installation of a R38 overcladding consisting of a high-performance rain screen system and rock wool insulation, plus Passive House windows, a centralized HVAC system, and a modernized ventilation system with new air handling units and direct ducting into the suites.

Other work includes the building of a new community room and solarium, plus accessibility and interior upgrades.

Project lead is ERA Architects Inc. Its consulting partners include CityHousing Hamilton, mechanical consultant Reinbold Engineering Group, structural and building science consultant Entuitive Engineering, and Passive House consultant Trans Solar which is based in Germany where the energy standard was pioneered.

Other partners are Canadian Passive House consultant JMV Consulting and electrical consultant Nemetz (S/A) & Associates Ltd.

> "Those building are structurally solid, but their mechanical systems are on the brink of failure or are severely distressed,"
>
> Ya'el Santopinto
> ERA Architects Inc.

PCL is the construction manager. The project will begin with a selective, highly coordinated (and just-tendered) removal of the outdated mechanical, plumbing, ventilation, and other systems and installing modernized ones in both the tower and a three-storey adjacent annex.

"It will be total upgrade," says ERA associate Ya'el Santopinto.

Improving accessibility in the 146 units is one of the project's key social goals.

Where that converges with energy performance targets is a plan to chop off the tower's concrete slab balconies and replace them with Juliette ones.

An interior step limited accessibility to the old balconies. Removing them will also help eliminate thermal bridging, says Santopinto.

Although there are more than a few project hurdles, the building will consume 70 per cent less energy and reduce greenhouse gas emissions by more than 90 per cent when construction is completed in 2020, she says.

ERA ARCHITECTS

The transformation of the over 50-year-old Ken Soble Tower in Hamilton, Ont. is considered to be the first Passive House retrofit of an existing residential tower in North America. A revamp of its mechanical systems is a critical project goal.

Designed to the specific Passive House category known as EnerPHit, the Ken Soble Tower project could be the standard-bearer for refurbishing thousands of post-World World II apartment buildings across the country, adds Santopinto.

"Those building are structurally solid, but their mechanical systems are on the brink of failure or are severely distressed, their envelopes are failing, and they are poorly insulated."

ERA became involved in the project about two years ago when it conducted a feasibility study for CityHousing Hamilton. It then started design in the fall of 2018 after the agency gave the project the green light, says Santopinto.

As the tower has been designed to attain Passive House accreditation, the design had to be approved by a third-party certifier. A similar audit process will be conducted at the end of construction, she says.

The architect credits Reinbold Engineering for its "nimble, creative approach" in addressing the numerous design and mechanical issues.

Passive House is intended to reduce the total load within each space of a building to the point heating and cooling can be delivered using only ventilation supply air conditioning.

Reinbold's focus was on the development of "a semi-centralized energy recovery strategy", says associate Cara Sloat.

"We are reusing the existing supply and return shafts for refurbished or new ductwork."

And within each unit will be variable air volume boxes which enable tenants to control the temperature, she says.

One of the issues Reinbold had to grapple with the fact that Passive House doesn't take into account Ontario's high humidity levels.

The active cooling solution was the design of a variable refrigerant system connected to the semi-centralized heat recovery system, says Sloat.

Passive House is a very airtight and highly thermally insulated standard and, as such, achieving balanced ventilation and ensuring there are no uncontrolled wall penetrations will be critical during construction.

Other challenges for the construction manager and subtrades will be ensuring the wall assemblies are seamlessly reassembled when the new mechanical and other systems are inserted, Sloat says.

The history of the project goes back to 2016 when CityHousing Hamilton began assessing whether it should retrofit or sell the tower which is the oldest highrise in its 7,000-unit housing inventory, says its senior development project manager, Sean Botham.

Rather than embark on a series of piecemeal repairs, staff recommended the non-profit agency's board of directors "take a step back and take a holistic look," and that eventually led to the decision to approve a Passive House conversion, says Botham.

New accommodation was found for the occupants.

The tower, which had been occupied by single people under 60, will be repurposed for seniors' housing. But none of the previous tenants will be denied reentry if they qualify, he says.

At this time project costs are not being revealed as some value engineering is underway. However, it will be approximately half the cost of new construction.

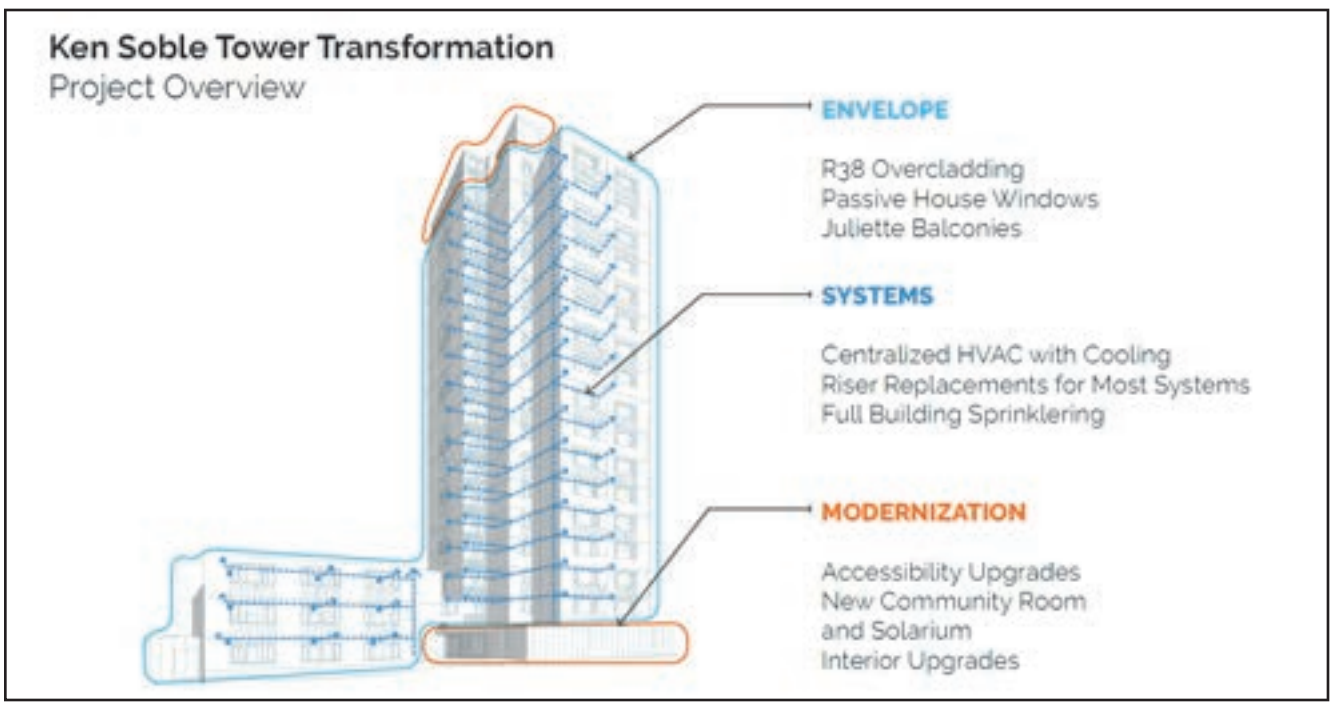
The agency was able to secure a Federation of Canadian Municipalities Green Municipal Fund grant and loan, Botham says.

The Ken Soble Tower project will not be a one-off. CityHousing Hamilton has embraced Passive House for the redevelopment of two 91-unit townhouse complexes and five new buildings, all of which are in different stages of planning, he says.

Passive House is being used extensively by the European Union and cities such as Vancouver and New York and "the thought was why not Hamilton?"

PHOTO ABOVE AND RENDERING AT RIGHT: ERA ARCHITECTS

A semi-centralized energy recovery strategy for the Ken Soble Tower was created. Also, its concrete slab balconies will be removed and replaced with Juliette ones.



Risk Management

How subcontractors can mitigate risk in their contracts

NATHAN MEDCALF
CORRESPONDENT

At a risk management seminar in Ottawa in late February, Dan Leduc, a partner at the law firm Norton Rose Fulbright LLP outlined several different ways in which trade contractors might simply use the contracts imposed on them as potential "push backs" or claims for change orders as provided for by the CCA 1 2008 form of subcontract.

The seminar took place at the Ottawa Construction Association's inaugural construction symposium and trade show.

> "Use the contract you bid on to fight for what you need. Intelligence is the ability to adopt to change,"
>
> Dan Leduc
> Norton Rose Fulbright LLP

In his presentation, Leduc was able to demonstrate how the wording in that standard form of subcontract can be grounds for a request for a change when there are schedule adjustments, given that the typical wording for a change order speaks to an adjustment in Contract Time, how there is often no express provision for a deficiency holdback to be taken and that the process of certifying progress draws does not lend itself to such a holdback over and above the statutory lien holdback, and how Issued for Construction (IFC) Drawings cannot form part of the definition of Subcontract Documents without a change order.

"I'm not giving you legal advice," said Leduc, a member of the association's board of directors who has been practising construction law for 27 years. "I want to talk to you about these issues from my perspective if I were an electrical contractor, working at the fictional company, Leduc Electric."

Leduc continued: "A general contractor (GC) compiles bids from the subcontractor (sub) and the sub bids the work based on an estimate for labour and material. The GC will do 10-20 per cent of the work while the subcontractor will do 80-90 per cent of the work. A GC operates on margins and change order mark up and the subcontractor operates in the profitability of its own estimate.

"GCs are taking a bundle of risk and contractually driving it down on the subcontractor. So, the subcontractor, an entity with the least amount of control on the project over something like scheduling — because they can't schedule the other trades — will be exposed on liquidated damages in a disproportionate measure.

"These are some of the dynamics in terms of risk I see day to day when I deal with my subcontractor clients."

"Typically, when I start a job at Leduc Electric, we get a tender schedule from the GC at the outset and it is usually useless. It has no critical path; it hasn't been thought through. It certainly isn't resource-loaded. It's just a little schematic for me to think about when things are about to happen."

Sometimes, Leduc said, general contractors decide to change the schedule.

If that schedule doesn't match a subcontractor's contract completion date, then there is an adjustment to the contract time, which means subcontractors are entitled to a document that has power to change the contract; this is called a change order.

According to the CCDC 2 -2008 Stipulated Price Contract, which is the standard prime contract between the owner and the prime contractor: "A change order is a written amendment to the contract prepared by the consultant and signed by the owner and the contractor stating their agreement on:

A change in the work

The method of adjustment or the amount of the adjustment in the contract price, if any

The extent of the adjustment in the contract time, if any"

"A change order can deal with an adjustment in the contract time, so when there is a schedule revision, that would be an adjustment to the schedule. It is the only way I can adjust my contract time as per the contract.

"The wording lends itself that any adjustment requires a change order. I wouldn't demand a change order for every adjustment. If the GC changes how I do my work, I am going to ask for a change order. If it is going to affect my critical path, my peak labour, my material delivery, I'm asking for a change order."

Leduc pointed out that an IFC is a drawing or document complementary to the contract. Sometimes, an IFC will conflict with a subcontractor's prime contract.

"IFCs are not a contract document," Leduc said. "As a subcontractor, they are not part of my scope. At Leduc Electric, when we get IFCs, I ask for a change order. I need a change order. The only way you can amend my contract is with a change order."

"I'm not saying I would get a change order every time; I'm just reading you the contract."

The Ontario Association of Architects (OAA) states that the IFC is not part of the contract. "In many cases, the changes will only have negligible effects, but if something does go wrong on a project, it can be used in a claim against the architect," Leduc said.

Not every construction document is a contract.

Leduc also reduces risk at Leduc Electric in the following way. "I don't accept the terms of an unqualified bid, but rather, I submit a qualified bid," he said.

"Typically, you are stuck with the contract you bid on. Use the contract you bid on to fight for what you need. Intelligence is the ability to adopt to change. Stephen Hawking said that. You have to change the way you do things."

Education

Trade school reps talk skilled trades as a career option

PETER CAULFIELD
CORRESPONDENT

Getting young people to consider a career in the skilled trades is often a hard sell in Canada. Unlike such countries as Germany, a shirt with a blue collar is looked down on by many people here.

Under the influence of the media, their parents and their peers, many millennials prefer university over trade school.

How realistic is young Canadians' aversion to a career in the trades?

To get another opinion on the subject, the DCN and JOC talked to representatives of four different Canadian post-secondary trades training institutions.

We asked them if young people should consider a career in the mechanical or electrical trades and what they can expect to find once they're out the door with their certification and into the world of work.

Derek Kochenash, dean of skilled trades and technologies at Red River College (RRC) in Winnipeg, says the mechanical and electrical trades offer "great opportunities for exciting and fulfilling careers."

"Skilled trades workers are reportedly the happiest workers in Canada," said Kochenash. "So all Canadian youth should consider careers in skilled trades and technologies."

The college promotes its programs in a variety of ways, including the TEC (Technology Exploration Camps) and GETT (Girls Exploring Trades and Technology) summer youth camps.

TEC offers hands-on technology activities and demonstrations for girls and boys entering Grade 6 or 7.

The camps are designed to give middle school students a taste of various engineering technology-related disciplines.

NORTHERN ALBERTA INSTITUTE OF TECHNOLOGY

Students at the Northern Alberta Institute of Technology studying the mechanical and electrical trades need to have the ability to put theoretical concepts into practice, says its dean.

TEC has two, one-week camp modules. Each week explores civil, electrical and mechanical engineering.

The young TEC campers do a lot of building: A working model of a medieval catapult; a hydraulic lifter; a bridge; and a model of a town.

Students also experiment with electricity and learn how to read schematics, build circuits and how to make and program a robot.

GETT introduces girls ages 12-14 to applied skills and technology careers. It promotes the importance of taking science, advanced math subjects and industrial arts in high school by stressing the impact those subjects have on career decisions.

Pam Stoneham

Pam Stoneham, associate dean in the School of Skilled Trades, Apprenticeship and Renewable Technology at Durham College (DC), in Oshawa, Ont., says career opportunities are expected to increase, because the current skilled trades workforce is aging and preparing to retire in the coming years.

"Parents need to know that skilled trades work is for creative, problem-solving and motivated individuals," said Stoneham. "There are advancement opportunities in the field for people who can troubleshoot and lead teams. The work is rewarding, both financially and personally."

Stoneham says DC is the only college with a post-secondary program for crane operation, rigging and construction techniques, and mechanical technician — elevating devices.

"Motive power technician students in our automotive technician — service and management program build a kit car, and assemble it piece-by-piece through four semesters," said Stoneham. "Our industry partners provide us with access to state-of-the-art technology so students can gain real-world, job-ready skills."

Hossam Kishawy, associate dean in the department of automotive, mechanical and manufacturing engineering at the University of Ontario Institute of Technology (UOIT) in Oshawa, says electrical and mechanical engineering provides the base education and skills required for many jobs in the different engineering industries.

"All areas of engineering are built upon these two disciplines in some form or another, and there are a lot of different career paths for someone with these degrees," said Kishawy.

In addition to the basic electrical and mechanical degrees, UOIT has courses in energy engineering (mechanical), and smart grids (electrical).

"If you decide to pursue the design side of engineering, you can end up working in an office, so engineering offers the opportunity to blend office and field work," said Kishawy.

Malcolm Haines, dean of the school of skilled trades at the Northern Alberta Institute of Technology (NAIT) in Edmonton, says the skilled trades today, including mechanical and electrical, require math and problem-solving abilities.

Malcolm Haines

"You need a good grounding in high school math — trigonometry, geometry and algebra — and the ability to put theoretical concepts into practice, so you can calculate such things as flow rates and pipe diameters," said Haines.

Although some parents think trades are dead-end jobs, they can in fact be stepping-stones to other careers in such disciplines as management and education.

"There are many career pathways opening up," said Haines. "At NAIT, for example, once someone has become a certified journeyperson, they can enter NAIT's business administration program."

Alberta is seeing the start of an economic recovery now, with more apprentices registering for programs.

"Now is the time for young people to find a company that will take them on as an apprentice," Haines said. "Get in on the ground floor of the recovery now."

Taking Action

Improving envelope and mechanical design key for super-efficiency

SHEENA SHARP

An overreliance on building code regulations to combat climate change is not enough, says Sheena Sharp of Coolearth Architecture Inc. The use of better technology and equipment is important too.

DAN O'REILLY
CORRESPONDENT

Addressing the critical issue of climate change requires taking action on a number of different fronts including full-scale adoption of technologies which don't provide an immediate payback, says the principal and founder of an architectural firm which specializes in low-carbon design.

Unfortunately, not enough action is being taken, says Sheena Sharp of Coolearth Architecture Inc., the co-designer of the Mount Dennis Childcare Centre, the City of Toronto's first Net Zero facility.

"We seem to be put in two camps, continue life as-is based on fossil fuels and destabilize the planet or change our economy to stabilize it."

A strict overreliance on building code regulations to drive change and not installing or even considering equipment, components, or technologies with cost recoveries longer than a "five year payback" define the first option which is basically the status quo, she says.

The second path, and one which is needed if Canada is to honour its commitments under the 2015 Paris Agreement on Climate Change, is to embrace technologies and measures which would help reduce or even eliminate a dependency on fossil fuels.

Many of those measures are uneconomic — which means the savings will not pay for the costs, or at least not right away.

"If they did, we would not be having this conversation. People would just be doing what needs to be done."

Some of the targets developers and the construction industry, including mechanical and electrical engineering professions, should be aiming for is ensuring that new buildings are designed and constructed to be super energy-efficient and that every existing building in Ontario be renovated within the 35 years —"most in the next 11 years"— to meet that same level.

Still other strategies include striving for much smaller energy loads, higher insulations, and increased air tightness, says Sharp, adding that the mechanical consultants "must work hand-in-hand," with architects on envelope design.

In the United States, the Army Corps of Engineers requires air tightness testing on federally owned buildings ranging from office buildings to aircraft hangars. Sharp predicts it's only a matter of time before that becomes mandatory in Canada for both public and private sector buildings.

"We test every batch of concrete on a construction site. Why can't we do it for air tightness?"

Another environmental approach is offsetting loads and being reimbursed for it — which is not really a new concept and is already being implemented by some property owners and managers in co-operation with local utility companies.

For example, businesses with critical refrigeration requirements such as warehouses, grocery stores and food storage depots can decrease temperatures at night when overall energy demand in a city or region is slack. During the day they can ease on their energy use because their products will remain safe even as temperatures rise within the premises.

"Buildings and the (electrical) grid can work together. We have the technology," says Sharp, citing, as examples, geothermal, heat pump, and pre-warming/precooling systems such as ThermoDeck, which incorporates ductwork in hollow core slabs.

Not to be overlooked, however, is the impact that smaller units such as desk computers and refrigerators can have on building performance.

"Occupant equipment is the last frontier," says Sharp, who is the owners' representative for the Ontario Association of Architects' Net Zero carbon renovation of its Toronto headquarters.

Included in the soon-to-be-completed project has been the replacement of desktop computers with more energy-efficient laptops. But there was one item which wasn't immediately considered.

"We were missing our energy targets," says Sharp, pointing out the cause was determined to be a 20-year-old commercial refrigerator.

Powering Green

Conestogo Mechanical helped power evolv1 to life

DAN O'REILLY
CORRESPONDENT

For more than a decade the family-operated Cora Group has been developing and managing environmentally sustainable commercial buildings and when it began the planning for its most recent venture one of the partnering firms it "cherry-picked" was Kitchener-based Conestogo Mechanical Inc.

"We have worked with them before and knew they had the resources," says Cora chief operating officer Adrian Conrad on the selection process for delivering the evolv1.

Located in the David Johnston Research + Technology Park, in Waterloo, Ont., the evolv1 is no ordinary office building.

Designed and engineered by Stantec and built by construction manager Melloul-Blamey Construction Inc., the three-storey, 9,290-square-metre (100,000-square foot) building has the distinction of being the first-ever project to receive a Zero Carbon Building — Design certification under the Canada Green Building Council's Zero Carbon Building Standard. It's also net positive and LEED Platinum certified.

Its extensive catalogue of green features includes a 160-metre-deep (524-foot) geothermal heating and cooling system, a solar wall and a 12-metre-high (40-foot-high) living wall with approximately 4,500 plants.

Installing the mechanical system was fairly straight forward, but Conestogo president Wes Quickfall admits he and his colleagues had to adjust their thinking and attitudes in the company's role as the design-assist mechanical contractor.

"Evolv1 was significant for many reasons over and above a traditional project/office building."

All the various pieces of mechanical equipment and components — such as a heat pump chiller imported from Italy — had to be electric rather than fueled by fossil fuels as is usually the case with many office buildings, says Quickfall.

"When designing a system conventionally you rely on fossil fuels, such as natural gas, rather than electrification for capital cost savings and ongoing energy savings.

"Natural gas is less expensive than electricity, but it emits more carbons and with this project electrical costs weren't a concern for the owner. The building generates more than it consumes," says Quickfall, citing a 72-cell rooftop solar panel and a second 1,440-panel in the parking lot.

Conestogo was among a select group of construction industry stakeholders who were invited to participate in reviews and consultations in the early stages of the project. It officially came on board in December 2016 with a mandate to review the mechanical budget and provide value engineering, he says.

It was full partner in the design discussions with the architect, the structural engineer and the other consultants, although Quickfall notes that process wasn't much different than a conventional project.

"From a design-assist perspective, the challenge we faced was trying to catch ourselves from reverting back to conventional design when providing that budget and practical assistance."

Construction of the building commenced shortly after the completion of the design in June 2017, with the installation of the mechanical systems beginning in July of that year.

One of the installation challenges, and which made this project different from many others, was blending the base building and tenant fit-ups into one package rather than separating the work into separate phases.

"Rather than installing all of the base building systems which may have interfered with tenants, we postponed installation (of those systems) where possible, made some early tenant assumptions and in most cases were able to accommodate tenant designs more cost effectively."

Asked to highlight some of the specific work his firm undertook, Quickfall points to the installation of a variable refrigerant flow system consisting of three units per floor with up to 18 ports in each.

"It's among the largest VRF systems we've ever done."

Other work included the installation of hydronic piping for chilled and heating water, BAS controls, plumbing of a rain water harvesting system, the installation of a reverse water system, and all sheet metal work including supply, return, exhaust and energy recovery duct work.

Conestogo was on site until the fall of 2018 and its workforce varied from approximately four to between 16 to 18 at the project's peak in the spring and summer of that year, Quickfall says.

Occupied by a mix of high-tech and professional service firms, evolv1 is about 95 per cent leased out, says Cora's Adrian Conrad.

Despite the high emphasis on environmental features and its status as Canada's first zero-carbon building, leasing rates are comparable to other Class A building in the area, he says.

In explaining the rationale and thinking behind the creation of evolv1, Conrad says the company wanted to "push the envelope" and see what more can be accomplished on the sustainability front in Canada.

Plans are already underway for evolv2 across the road from the present building, he says.

LIVESCAPE

The evolv1 building located in the David Johnson Research + Technology Park in Waterloo, Ont. has various features which make it a zero carbon building, including this living wall.

CONESTOGO MECHANICAL

A behind the scenes view of the solar wall ductwork installed by Conestogo Mechanical.

CONESTOGO MECHANICAL

A rainwater harvesting system is one of the innovative mechanical features at evolv1.