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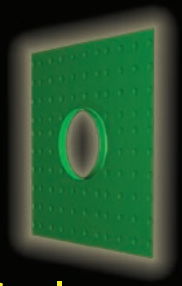

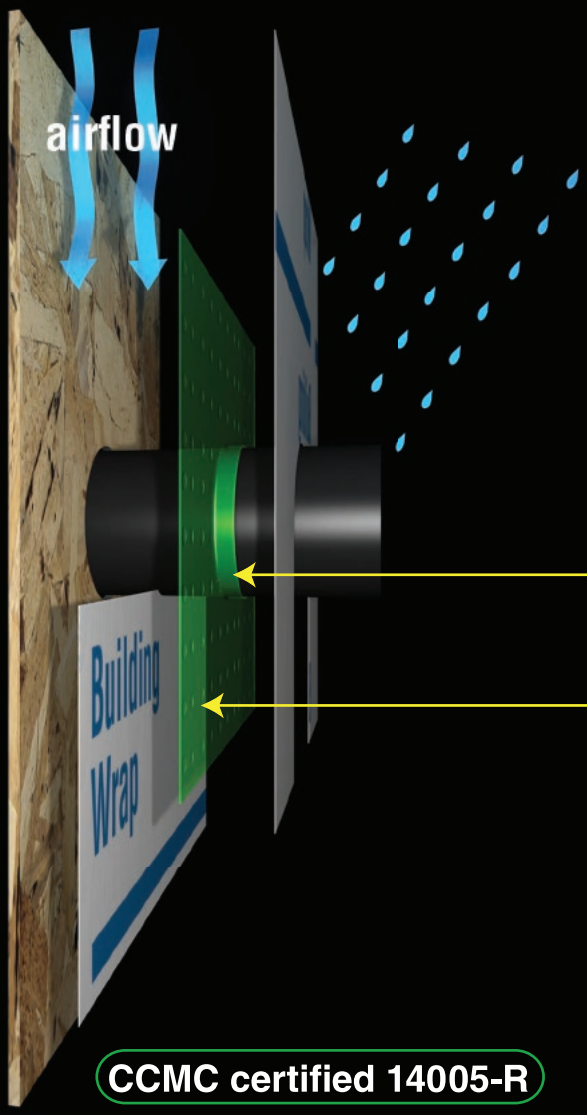

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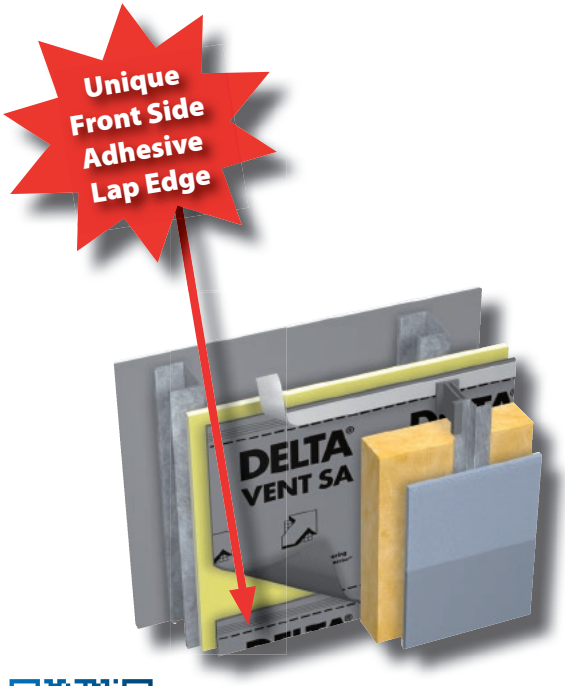

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FEATURES

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Welcome to the Inaugural Edition of *BCBEC Elements* magazine.

SEPTEMBER 23, 2015
BCBEC Full Day Conference and AGM
Fairmont Hotel Vancouver
900 West Georgia Street
Vancouver, B.C.

For the past 26 years BCBEC has brought together a diverse group of stakeholders from within British Columbia's building envelope industry. BCBEC is composed of members from all segments of the construction industry including representatives from government, product manufacturers, and construction associations, in addition to consultants in the building envelope field, contractors, and educators. We gather together in order to share ideas and encourage dialogue, to challenge our collective understanding, and to strengthen our ability to provide service to the broader construction community.

Over the years, the BCBEC Annual Conference, Luncheon Education Sessions and Building Research Committee have been structured to explore current elements and issues in building enclosure design, construction and remediation. As you read through these pages of our print or online edition of *BCBEC Elements* you will see that we continue to stress building science fundamentals, sustainable practices, and methods of optimizing building enclosure performance. In this publication, we will seek to profile not only a building's physical elements, but also the human element. In this spirit, our first edition will take a behind-the-scenes look at the leadership of a Vancouver project success story, and also profile one of the past recipients of one of the BCBEC Education Foundation Awards.

At BCBEC, our focus is to encourage learning and education related to the building envelope and building science. *BCBEC Elements* will stress learning not only from the technical content provided by the articles and contributors of the publication but through information provided by our advertisers. We would like to extend our appreciation to our funding partners and advertising sponsors for their essential financial support and endorsement of this new initiative.

Moving forward, we welcome ideas for technical content, articles of interest, upcoming events, and personal profiles specific to the building envelope industry for our biannual publication. Enjoy the Spring/Summer 2015 edition of *BCBEC Elements* magazine – the next issue will come to you in the fall of 2015. ■

BCBEC: THE FIRST 25 YEARS

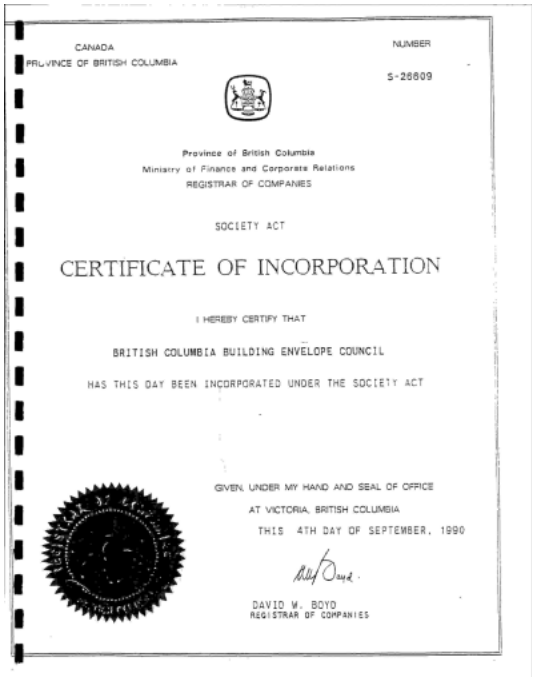
By Murray Frank

It was 1988 and I was a young Building Science consultant when I was invited to become part of the formation of BEC BC (as it was originally called). In previous years, I had occasioned a dimly lit room somewhere in Edmonton where some of the great minds of Canadian Building Science were being forced to debate a building science position that they did not personally support (poly vs. no poly was my favourite of these), and the winner (as voted on by those in attendance) got the bottle of scotch that sat as incentive on the makeshift podium. I was convinced by my ABEC experience that open dialogue within the Building Science community was a powerful learning experience and that B.C. could certainly benefit from its own Building Envelope Council.

The first meetings of BCBEC were often productive, and always fuelled by pasta from Anton's in Burnaby (to this day, the lineup down Hastings St. for a lunch table at this institution is a fixture of Burnaby Heights). It is no secret that the Building Envelope Council formed on the West Coast owes a great debt of gratitude to the Roofing Contractors Association of BC for donating their boardroom on Dawson Street, for underwriting about a ton of pasta and a tanker of coffee, and for loaning us the guidance of John Wells (the RCABC Technical Manager at the time) once a month to facilitate the genesis of BCBEC. Without RCABC, I am convinced that BCBEC would have formed too late to have served the Construction Industry of the West Coast through the massive challenges it was unknowingly about to face.

With consensus about the need for BCBEC, the task of the founding members was to define the programs and benefits that would attract membership and sustain the organization. The group boldly decided that a big event in the form of an all-day seminar would serve the purpose, and that the annual membership in BCBEC would be included in the seminar fees. The first event in March of 1989 was a great success, focusing on "How Tight is Tight Enough." Alan Toon, another instrumental founding member of BCBEC (then with the National Research Council (NRC) Institute for Research in Construction), was able to convince the IRC to provide speakers and the proceedings from the Healthy Buildings '88 Conference held in Stockholm, Sweden (remember when the NRC had money for research and information dissemination)? With the success of this conference, and a small amount of money in a bank, BCBEC was truly born.

I am drawn to the temptation of taking account of BCBEC today after more than 25 years of activity. BCBEC was formed around a clear intention that it would not provide technical services, but rather that it would facilitate open industry dialogue, research, and education by others. BCBEC began with the intention that member-



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INCORPORATION OF BCBEC IN 1990

ship provided no guarantee of qualifications of any member, but rather that it provided a discount pass to industry dialogue and a gentle monthly reminder to come out, eat some lunch, listen to a non-partisan presentation about some topic related to Building Science, and to participate in the discussion that flowed from these forums. In this regard, BCBEC has been an unqualified success. Monthly lunch meetings (with the summer off), and at least one substantial full-day session (with AGM) was the recipe scribed in the late '80s and remains the cornerstone of the activity of the Council. In recent years this has grown to include hosting national events and additional half-day sessions as well.

The early years ran with the original format to great success. The BCBEC Boards in those early years took great care in protecting the longevity of BCBEC by formally incorporating the Council in 1990, and by creating an endowment fund as a way of ensuring a perpetual legacy for future Building Science students and to provide a legitimate tool for contributing to Building Science research and education. That the focus of BCBEC remains relatively unchanged while the evolution of BCBEC has always responded to the timely needs of the industry is a testimony to those who defined the format in those early years. I am humbled to have been a part of that process, but I openly admit that my role in those days was more to agree with others who seeded so many of the great ideas that took such strong rooting. In the beginning, I was quite happy to book facilities, fax notifications, accept payments and organize many of the events. My major impact on BCBEC and our industry was yet to come.

In late 1990, I was asked to present at one of the lunch hour seminars. Alan Toon specifically wanted a discussion about some of the wood frame building failures my consulting company was investigating and detailing retrofit solutions for. Lawrie Beaton of Highland Restorations (now part of On Side Restoration) was doing much of the restoration work we were involved in and with his tremendous support, we constructed a "rainscreen wall" that we wheeled into the Plaza 500 ballroom and placed (quite fittingly) under a blue tarp.

For 90 minutes, the presentation formally explored a wide cross section of building envelope failures from throughout the lower mainland and southern Vancouver Island, and categorized the major detail failures associated with those projects. The presentation, aptly named "Water Got In and Made Things Bad," suggested that these failures appeared systemic, that they might amount to more than a half-billion dollars in required repairs throughout the south coast of B.C., and then concluded by pulling back the blue tarp to reveal a capillary broken installation of stucco as part of the possible design and construction changes required moving forward. The presentation was received in many ways by many attendees, but was a clear example of just how powerful the BCBEC format was in generating discussion and influencing the Building Science community.

Less than six years later, the City of Vancouver issued Bulletins 96-2 and 96-25, making the rainscreen mandatory under the Vancouver Building Bylaw. This was followed some years later with the requirement for capillary broken walls under the National Building Code of Canada for those structures located in high moisture index locations.

I know that when various founding directors of BCBEC cross paths today, there is great satisfaction in knowing that the value of the format of dialogue first witnessed by me, for example, in that dark room in Edmonton in the mid '80s, continues to be a relevant and well-supported format moving forward. Recent Board initiatives have sought out the reflections of past executives and are paving the path forward with great respect for what got BCBEC to where it is today. This shoulder check before moving forward will ensure the relevance of BCBEC for many years to come, and I am personally very humble to have played my small part in what BCBEC is today.

Is the work all done? Not by any stretch. Consider the following excerpt from the proceedings of that first all-day seminar in 1989:

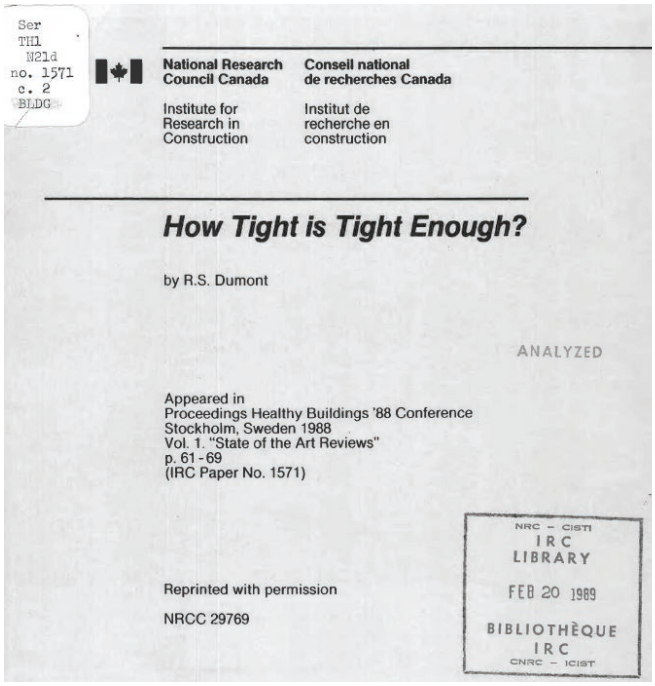
"Care must be taken with tight buildings to ensure that adequate ventilation is maintained. In well-sealed buildings, some form of mechanical ventilation is normally required. In such buildings, heat recovery and treatment of the ventilation air is possible."

On December 19, 2014 the BC Building Code, in recognition of new energy provisions that include a focus on airtightness in homes, brought into effect a requirement for a principal mechanical ventilation system for exhaust and supply, and provides five separate conformance paths for the mechanical distribution of supply air that utilize different systems, including forced-air furnaces, HRVs, ERVs, and central-recirculation ventilation systems.

For those keeping score, that is 25 years from discussion to code in B.C., and BCBEC was there for the whole journey. I hear discussions today (facilitated by BCBEC) on topics that will continue to evolve over the next quarter century. Some of these include conditioned attics, conventional attic ventilation, high energy performance walls and roofs, below grade assemblies that work, and options for vapour diffusion control. These are only a very few of the subjects that ensure the ongoing validity of BCBEC.

Twenty-five years ago I thought we knew everything about building science. I recognize now that we didn't, we don't yet, and we will likely never know it all. I practise at ease today knowing that BCBEC will continue to serve as the spotlight for important discussion within our industry. ■

Murray Frank is a premier building science specialist in British Columbia.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How Tight is Tight Enough?

by R.S. Dumont

ANALYZED

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STRATA DEPRECIATION REPORTS

A Voice for Standardization

By Jeff Renwick, PEng

BACKGROUND

The form of land and property ownership known as "Strata Title" originated in New South Wales, Australia in 1961. Since then many countries around the world have adopted the Australian land ownership system in one form or another. Those countries include Abu Dhabi (legislation pending), Dubai, Fiji, India, Indonesia, Malaysia, Philippines, Singapore, South Africa and Canada.

Other countries have adopted strategies for subdivided land ownership under common title with differing administrative mechanisms. In most parts of Canada and the U.S. the legal term is "Condominium," rather than "Strata Title." Across Canada, only the province of British Columbia uses the term "Strata Title."

DEPRECIATION REPORTS

One building asset management tool available to strata is the facility audit and life cycle analysis study, commonly known as a Depreciation Report or Reserve Fund Study.

A depreciation report, herein called the "report," is a financial and logistical planning tool that provides an opinion of timeline for common property renewals, and an estimation of the associated construction budgets. The report also provides a financial plan that identifies to the strata how much may be required to contribute to their contingency reserve funds in order to be able to pay for the expected common property renewals, when they become due.

In Canada, contingency reserve fund studies/depreciation reports are required by law to be completed in the Northwest Territories, British Columbia, Alberta,

Saskatchewan, Manitoba, Ontario, Nova Scotia, New Brunswick and Newfoundland/Labrador.

The requirement for a report in B.C. was passed by an Order in Council on December 13, 2011 bringing into force sections of the previously tabled Strata Property Amendment Act, which in part deals with *Section 94 (Depreciation Report) of the Strata Property Act,* and amends sections of the *Strata Property Regulation.*

The December 13, 2011 Order in Council brings into force a legal requirement that all strata properties greater than four units have a report completed by December 13, 2013. Strata formed after December 13, 2013 have until six months after their second AGM to have a report completed.

Unlike other provinces, the B.C. legislation allows the Strata to defer a report for 18 months by passing a resolution to that effect with a three-quarters majority vote. Strata who defer a report through the prescribed means are in compliance with the Act respecting the report. Where a Strata votes to defer a report, however, defeats the intent of the legislation and the substantial benefits to the Strata and prospective buyers for having the report in place.

In contrast, Saskatchewan legislation requires a report for Strata with 12 units or greater (excluding rental Strata and Strata with one owner) and does not allow Strata to defer the report.

In B.C. a report is required to be completed every three years. Each report includes a mandatory site visit and a 30-year planning outlook. The reports are relatively expensive and the regulatory requirement to complete a report every three years would seem to be quite onerous on the strata, especially for the smaller complexes.

Other provinces have somewhat more practical approaches and require the reports to be completed every five to 10 years, include shorter 25-year timeframes and allow lower cost economic updates (no site visit and maintains the forecast period of the reference report) to be completed more frequently.

My observations one year past the December 13, 2013 deadline for completion of a report is that many strata have had their report completed. These strata appear to be well-managed and proactive in maintaining their properties.

Although no official records are kept, a May 6, 2014 article in *Business in Vancouver* suggests that overall, fewer than 20 per cent of the estimated 30,000 strata corporations in B.C. have voted to acquire their report. Having that statistical information in place would enable the province and our industry to monitor if the legislation and policy is working or not.

The minimum requirements for the report are contained in broad terms in Section 6.2 of the Strata Property Regulation.

- Firstly, the report is to provide a 30-year life cycle analysis of:
- The property that is the direct responsibility of the Strata Corporation to maintain and repair (common property) and,
- The common property that is for the use of the individual strata lot owner (limited common property).

- Those common property maintenance or renewal items that occur less frequently than once a year or are not expected to occur.
- A site visit is mandatory and the report must include a summary of the maintenance and renewal items forecast over the 30-year period.

The life cycle analysis is to include a common property general condition assessment listing the common property inventory, current repair or replacement estimates, estimated remaining service life, and future anticipated replacement costs of each of the common property components, systems or assemblies.

The life cycle analysis is not intended to identify those common property maintenance or renewal items that occur annually or more frequently; in other words, the analysis is not intended to identify or report on the strata operating budget.

Secondly, the report is to provide a financial forecast plan to assist the strata in being able to substantially meet the financial requirements presented in the common property life cycle analysis.

The financial plan should present a reserve fund contribution schedule that is manageable for the Strata lot owners and consistent with the long-term maintenance goals of the Strata.

The escalation (inflation) factor that is used in the financial planning is subjective and cannot be accurately predicted. The escalation factor has a large impact on the overall "cost" of the common property maintenance and renewals over the 30-year report timeline. A small difference in the escalation factor will change the financial plan significantly, but one way to reduce the impact of the variability due to the escalation factor is to reduce the timeframe of the report.

In commercial facility condition assessments, the timeframe for the financial planning outlook is typically much shorter than 30 years, around 10 years. In practical terms a 10-year report outlook presents a plan that can potentially be more accurate and focuses the financial requirements to what is required in the shorter term.

The B.C. legislation requires completion of reports by a "qualified person." Strata Property Regulation Section 6.2(6) states:

(6) For the purposes of section 94 (1) of the Act, ***"qualified person"*** *means any person who has the knowledge and expertise to understand the individual components, scope and complexity of the strata corporation's common property, common assets and those parts of a strata lot or limited common property, or both, that the strata corporation is responsible to maintain or repair under the Act, the strata corporation's bylaws or an agreement with an owner and to prepare a depreciation report that complies with subsections (1) to (4).*

Compared to other provinces, the B.C. legislation presents less prescriptive requirements for the format of the report, and does not objectively identify the qualifications of the person that may prepare the report. That contrasts with comprehensive legislation respecting the required qualifications of persons preparing reports in other provinces.

It appears the B.C. legislation has taken a step towards creating a framework for the preservation of the Strata common property, and to provide comprehensive disclosure of the building condition and the Strata's financial ability to maintain the property to the homeowners and prospective buyers.

The B.C. legislation has not provided a framework for enforcement of the report preparation or its recommendations, but rather to allow the individual strata to decide how to manage their property by allowing them to select the qualifications of the report provider and the associated level of service.

Such a subjective regulatory framework invites a wide variety of report formats, methodology and basis for cost estimates, prepared by persons with varying levels of formal education and relevant industry experience.

The strata will undoubtedly encounter scenarios where initial and subsequent reports are prepared by different report providers. In cases where a similar format, methodology and basis for cost estimation is followed by the different report providers, all is well; however if the basis for subsequent reports significantly varies, the strata may well misunderstand the differences in the report approaches. The misunderstanding of the report by the strata can be compounded if latent defects or premature failure of components are discovered in subsequent site visits.

STANDARDIZED REPORTS

The Saskatchewan legislation surrounding reserve fund studies (depreciation reports) specifies that a "qualified person" shall be one of:

1. Applied Science Technologist, Applied Science Technologists and Technicians Act
2. Accredited Appraiser Canadian Institute, Appraisal Institute of Canada
3. Certificate of practice under the Architects Act
4. Certified Reserve Planner under the Real Estate Institute of Canada
5. Licensed professional engineer, under the Engineering and Geoscience Professions Act

Since the reports are now a provincial requirement, a legislated standard for the qualifications of the report provider would filter out the destabilizing effects of inconsistent and non-professional work.

Although there are five main associations that govern the practice of their members, as an engineer, I can only speak to our APEGBC practice. Certainly co-operation across the associations would benefit the industry and the public.

As professional engineers, there are ways that we can help to protect the interests of the public while carrying out our life cycle analysis of strata property.

When we present a report to the strata, we not only represent our individual firms, but we also represent engineers as a group. It is in our interest as a group and profession, to present to the strata accurate and consistent information with a high level of integrity.

As the strata council are comprised of people from all walks of life, the information needs to be provided to the strata in a way that such a diverse group can understand. One way we can maintain a consistent perception of the report information is through standardization of the reports.

Each engineering firm will have a different approach to the methodology of the report preparation and the level of service they wish to provide. However it is important that all the reports generally present similar information at the end of the day.

Our engineering world is defined by standards and specifications. Meaningful standards have come from the recognized institutions such as: *Canadian Standards Association (CSA); American Society for Testing & Materials (ASTM); Construction Specification Institute (CSI); American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)* and their European *ISO* counterparts, to name a few.

A few standards relevant to preparation of the report are:

ASTM E2018 – 08 Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process. This standard is useful to benchmark or baseline a level of due diligence and risk tolerance for a property condition assessment. This standard addresses the qualifications of both the field observer and the consultant preparing the report, specifies many aspects of the technical level of audit, and presents that the assessment is not exhaustive and uncertainty will remain after the assessment is completed.

ASTM E917-13 Standard Practice for Measuring Life-Cycle Costs of Buildings and Building Systems. This standard is useful guidance for preparing "what if" analysis when conducting a cost-benefit analysis for deferral of maintenance, phasing, or selection of design options.

The *CSI UniFormat II* method of information organization, which is based on functional assemblies rather than individual components, appears to be tailor-made for the common property inventory classification. The Uniformat II standard also defines levels of detail.

ASHRAE has completed research projects establishing a Service Life and Maintenance Cost Database for mechanical HVAC and electrical systems. That database is available online, with a subscription.

Several national construction and material cost databases exist. *RS Means, Hanscom Yardstick for Costing, Marshall & Swift, Craftsman Book, Cost Data Online (Richardson Database)* and others have developed cost databases for facility maintenance and repair, construction materials and assemblies.

Feedback from property managers over the last couple of years indicates one of the biggest issues with the reports is a large variance in the common property maintenance and renewal cost estimates presented by different report providers for similar components or assemblies and types of buildings.

Although each report provider undoubtedly has justification for their presentation of cost estimates, the wide variance of these estimates for similar components or assemblies reduces confidence in the report by the public and increases risk to the report providers across the industry.

Feedback from professional liability insurance (PLI) underwriters is that the perceived uncertainty in the reliability of the reports has led to economic forecasting exclusions in PLI policies to design professionals.

It is not possible to accurately predict what the actual market costs for a common property maintenance or renewal item will be. If, however, an objective (objective analysis of quantity and application of published cost data) standard for presentation of cost information is made policy, we reduce our risk and increase consistency across components, assemblies and properties. A tendency to conservatively overestimate costs to reduce risk to the report provider will be reduced.

Since recognized standards for most parts of the report already exist, there is no need to develop new standards in isolation. Instead, it is possible to assimilate the information that has already been established to bring together a comprehensive technical standard for the report.

No one legislative body or professional practice association can develop all the policy for the preparation and use of the reports. Legislative framework needs to work in hand with policy developed by our respective professional associations.

For that to work, a legislative framework is needed to define the purpose of the report, the requirements for what the report is to contain, the qualifications of who can do one and how the report is to be used by the strata. I also suggest that the province require strata to provide information pertaining to the basic size, type of the complex, whether a report is in place and to what extent the Strata are following the report. The province would steward and maintain that information for statistical purposes.

Other provinces have already adopted objective standards respecting required qualifications of the report provider so again we do not have to "reinvent the wheel." The Saskatchewan legislation provides a comprehensive listing of the qualifications of a report provider. Adopting the B.C. association counterparts is all that is required to move the B.C. legislation to an objective standard.

Since the individual practice of a member of a professional association is governed by policy of that association, a legislative framework that requires a report provider to be a member of a relevant professional association allows the opportunity for the association to define the practice of a report provider. Developing professional practice guidelines for a report will affect and guide the technical aspects of the report.

Adopting *ASTM E2018* as the minimum requirements for the methodology of carrying out a condition assessment for the report, and adopting the *Uniformat II* standard with a prescribed minimum level of detail for presentation of common property inventory components or assemblies, will bring standardization to the presentation of that information. Standardizing the basis and methodology for presentation of cost estimates would increase public confidence in the reports and reduce risk to the report providers.

Such a move would facilitate training and the transfer of knowledge and experience to our younger engineers, promote public trust, and bring accuracy and consistency to the strata depreciation report. ■

Jeff Renwick, PEng is a principal of LDR Engineering Group – a full service Building Science Consulting firm that also provides facility condition audits and depreciation reports across B.C – and a Strata Council chair. He may be reached at jeff@ldrgroup.ca or (604) 783-9793.

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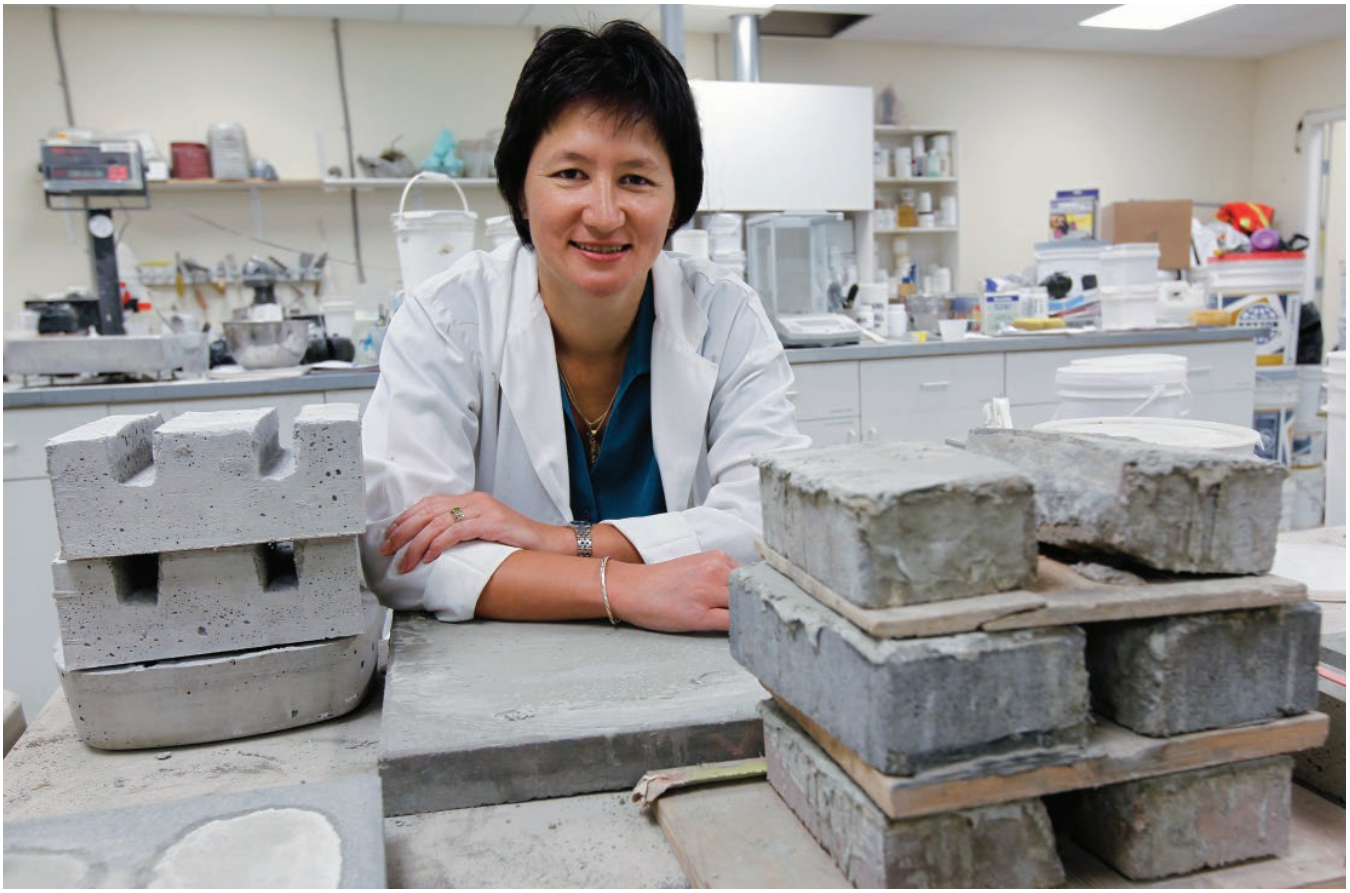


RESEARCH AND DEVELOPMENT IS A CORNERSTONE OF KRYTON INTERNATIONAL'S OPERATIONS. IT HAS AN APPLIED RESEARCH AND DEVELOPMENT CENTRE IN VANCOUVER.
PHOTO CREDIT: KRYTON INTERNATIONAL

PEOPLE POWER:

Q&A With Kari Yuers

By Richard Woodbury

Kari Yuers is the president and CEO of Kryton International, the world's leading concrete waterproofing solutions provider, with distribution in over 40 countries. Her father, R.G. (Ron) Yuers, started the company as a small, family business in 1973.

In the early days, Kari and her brother Kevin swept the factory floors and applied labels on buckets.

Kari didn't always work for the company. She spent time working as a general labourer in the construction industry and also worked for golf, smoked salmon and retail sales businesses.

A highly respected businessperson, Kari has won many awards, including the Ernst and Young Entrepreneur of the Year Award in 2003 and an Influential Woman in Business Award in 2012. She is a sought-after speaker on topics including corporate growth strategies, corporate culture, leadership, management and innovation.

BCBEC Elements caught up with Kari to discuss the development of Kryton. This interview has been edited for clarity and brevity.

BCBEC Elements: What brought you back to Kryton in 1991?

Kari Yuers: I could see Kryton had a lot going for it, but I thought there was a lot more Kryton could do or be.

BE: What did it take for the company to go from a small one to a globally successfully one?

KY: Everything starts with finding and keeping the right people. If you look at the multi-decade history of Kryton, for every really big upswing in the company, if you were to plot it on a timeline, you can almost directly draw a line to a person added at that time. I think part of it is focus. We've focused on what we're extremely strong at, what we can deliver that nobody else can. For example, in 2006, we pared down our line of products from 150 concrete protection products such as coating, sealers and crystal waterproofing to a core product line of 12 concrete waterproofing products. The product line is so unique and so superior to others. I also think going international is not for the faint of heart.

BE: Why?

KY: It's three steps forward and two steps back in a lot of cases. For example, we'd been selling in China regionally over 25 years ago. We sold into Hong Kong and it was then resold into mainland China. Once mainland China opened up, you could set up a business there, but only through joint-venture arrangements. In the mid-1990s, we found a joint-venture partner and in 1998, we built a factory north of Shanghai. All of those stories of the terrible things that happen to Western companies in China were true of our experience. We found our intellectual property was being taken and we lost the factory. However, that didn't deter from our perseverance. We set up an office in the 2000s and we've had our own full-time staff working there ever since. These are the kinds of challenges where you just have to say, 'Hey, it's part of the environment you have to deal with.' If you believe in what you're doing and your brand has growth potential in these regions, you just have to simply work through these challenges.

BE: After going through that, do other issues that come up in the business no longer seem so challenging?

KY: Yes. I think the important thing is if you can laugh at some of these failures, I think they make you stronger.

BE: What are your future goals for the company?

KY: The goal is to continue to grow worldwide. We're currently in over 40 countries.

BE: What role has being located in B.C. played in the company's growth?

KY: B.C. is quite advanced and innovative when it comes to concrete. A lot of people may not realize Vancouver specifically has been a launching ground for developing a lot of concrete technology over the years. As well, I find our concrete quality and processes are quite high compared to most places in the world.

BE: How does your company push for innovation?

KY: We have an applied research and development centre here in Vancouver. We have people doing research, looking at markets, seeing what customers are doing, what they need, what their pains are and then put it through a process of asking questions, doing the business case and being able to gather the options and opportunities. I think our process today is about taking those great ideas and then really making sure they're tested to see if the product is giving the customer an experience they cannot have with any other product or manufacturer.

My early days were spent looking at the things we can rally behind that other people don't know about or haven't seen. One example was the crystalline admixture. It was a product used at the U.S. Navy's Boeing Development Center in 1983. In 2003, we won the most innovative product award for that product. It takes that long for people to say, 'Hey, that make sense.'

BE: Would it be fair to say innovation is in part a long-term plan?

KY: It's not a lightbulb moment. It's a process, more than anything. I think innovation is about seeing the future and saying, 'Well, of course nobody is buying it now, that's why it's innovative.' You also have to learn to fail to innovate. You can't just suddenly say, 'Oh, this is a great idea, we're only going to deal with success.' Every time you do an experiment, you're going to have a lot of strikeouts before you have a home run.

BE: Why has Kryton been named one of the best companies to work for so many times?

KY: That really comes out of the culture and wanting to have engaged people that are successful. In 2006 and 2007, the world was rapidly growing, the stock market was going great, things were being built like crazy, so it was hard to hang on to people because the moment you got them trained, they were going somewhere else for more money. Our turnover numbers were too high, so I hired some human resources help to assess how are we doing in these different areas. If you face the cold hard truth of how you're doing in different areas, you have an ability to fix it. We went on to survey and understand what was good and what wasn't so great.

We have clear expectations for people. They have good direction and we have leaders that can help and support them and they're appreciated. We have a profit-sharing plan; we have a social committee and do events. Some of the things that get highlighted are our benefits. Just this morning, I had the pleasure of announcing to everybody that we hit a certain budget number. By doing this, everybody worldwide gets to go on an all-expenses paid trip to Puerto Vallarta, Mexico. The trip is April 23-26.

BE: What do you think makes for a successful CEO?

KY: I think it's a combination of things. I think you need to have vision and drive. You have to work hard and you definitely have to know where you're going and have the drive and perseverance to make it happen. My personal success is probably built on humility and being able to connect with people. I think when you really care about people and care about what they care about and their future, they care back. I think our success at Kryton is because people really care about Kryton. ■

A BEACON FOR GREEN BUILDING

By Matthew Bradford

Mountain Equipment Co-op Head Office in Vancouver

Mountain Equipment Co-op (MEC) has a new home base and it's blazing a trail for sustainable design. Located near the eastern end of Vancouver's False Creek flats, the office building was designed to provide the Canadian outdoor retailer with a larger, greener, and more employee-centric headquarters. And since opening its doors to staff in November 2014, it's clear MEC's new home is delivering on all fronts.

"From the very start, our main design challenge was: 'How can we create a space where people come first and our footprint is as light as possible?'" recalls Sandy Treagus, MEC CFO.

Part of the answer lay in drawing inspiration from MEC's portfolio, which includes three Gold LEED certified stores and three more that are targeting Gold certification.

"We have a long history building green, so it was a foregone conclusion that we would seek to push the envelope on green building design and performance," says Tim Southam, MEC's public affairs manager.

The development team was equally key to the project's success. It consisted of numerous partners who had worked with MEC on previous builds. These included architect Proscenium Architecture + Interiors Inc. and general contractor Ventana Construction Corporation, who worked in close collaboration with MEC and the project's contractors to bring the company's eco-forward vision to life.

"Sustainability was a very important factor from the start," notes Greg Piccini, architect with Proscenium. "[MEC] had a strong mandate for a green building that really works for them and all their employees, and we worked closely with them to help them achieve it."

BUILT TO INSPIRE

MEC's new head office wears its passion for the outdoors inside and out. Rising four storeys high, the steel and wood-framed building incorporates a wealth of sustainable features and systems that make it one of the greenest commercial facilities in Vancouver.

First and foremost is the building's envelope, which consists of narrow floor plating, R-70 insulated roofs and R-50 insulated walls.

The exterior walls were constructed of Structural Insulated Panels (SIPs), composed of vertical 2 x 12's with high-density foam insulation between studs and oriented strand board sandwiching the assembly.

The building's frame also incorporates triple-glazed fibreglass windows with low thermal conductivity fibreglass frames that combine with the high-efficiency exterior to create a strong thermal barrier, while optimizing natural light.

"There's nowhere in the building that you don't get natural light. So from that perspective, it cuts down on energy use," notes Piccini, adding, "It's a highly insulated space."

Energy conservation is also achieved through the building's geothermal system, comprised of a ground source heat pump and 20 wells set to depths of 550 feet. The system works by taking fresh air in through three motorized wind towers on the building's roof, forcing it to the basement for geothermic treating, and redistributing temperature-controlled air to vents set amidst the raised floors on each level.

Explains Bruce Bird, Ventana's senior project manager for this project, "The wind assistance helps push the air to the fan impellors, which drive the ventilation through huge fan coils that heat or cool the air, and then back up the wind towers through the building and into the interstitial floor spaces beneath the raised

access flooring on each floor. It then flows by pressure up through diffusers in this raised flooring and then back, by natural convention, through the ceiling space to the wind towers, where it is mixed with fresh air while on its journey back to the basement fans and then recycled again."

"This provides efficiencies from the wind assistance, which optimizes the use of energy and power, which in turn takes some of the load off the fans," he adds.

Energy conservation efforts notwithstanding, MEC's new building employs a number of water conservation features. Low-flow toilets and fixtures are used throughout the building, and its "blue roof" directs rainwater to an underground 7,700-gallon cistern where it is used for non-potable water functions.

The building's "blue roof" is also integral to the building's green design. As such, MEC brought Structure Monitoring Technology (SMT) into the fold to implement a green roof leak detection system that allows maintenance staff to pinpoint leaks when they occur and act on them effectively.

"The long-term sustainability of that structure was very important to MEC," explains Jason Teetaert, vice-president of business development with SMT Research and past president of BCBEC. "With these roofs, you're always asking yourself, 'Will it leak? Will the membrane stay intact? Will it damage the roofing insulation and the roof deck below over time? And since you can't see the membrane, and you can't go up and inspect it, this system makes up for that by taking readings every hour and tracking moisture below the roof membrane."

The green roof leak detection system works by reading moisture detection tape installed under the roof's TPO membrane. That data is then used to pinpoint the exact location and severity of a leak to building staff through SMT's dashboard.

"They can log in to our online dashboard at any time or we send notifications of where the moisture is and where it changes if it gets a leak," explains Teetaert. "From that perspective, it offers peace of mind in knowing that green roof is performing as planned and that if it requires any maintenance, the staff can locate it more easily without having to rip off a large section of the roof to find the source of the leak."

Uniting all of these features is the Building Management System (BMS) computer, which draws information from thousands of sensors to oversee nearly every aspect of the building (i.e. temperature, humidity, sunlight intensity, life safety systems) and adjust the systems accordingly.

"You can go online and can see everything right down to what lightbulb might be burnt out on the third floor," says Piccini.

All combined, MEC's new headquarters is estimated to be 70 per cent more energy-efficient than comparable office buildings. And while it is pursuing LEED Platinum designation in 2015, Tyler Pasquill, Ventana's vice-president of pre-construction, says MEC's eco-friendly goals are moreso driven by its longstanding company philosophy. "There was never a mandate to achieve LEED Platinum; the mandate was to design it our way and then do a LEED scorecard to see how we rate. This approach demonstrates that MEC truly believes in and supports their philosophy, that they believed it was better than conventional green building guidelines, and that it was possible to achieve."

SMT STAINLESS STEEL MOISTURE DETECTION TAPE INSTALLED UNDER ROOF MEMBRANE REPORTS ON STATUS OF MOISTURE CONTENT, IN THIS CASE WATER INTRUSION FROM TEMPORARY NIGHT SEAL.

PHOTO CREDIT: SMT RESEARCH, J. HERMES

A WORTHY CHALLENGE

Building MEC's new headquarters came as an interesting problem-solving opportunity for Ventana and the project's contractors. And although this was the third MEC project for Ventana, having built the MEC Vancouver store 20 years ago and the North Vancouver store in 2012, this particular build provided new challenges. The first, recalls Bird, was reclaiming the former brown field site, after which it was tasked with adhering to a tight development timeline amid Vancouver's weather conditions.

"The main challenge when building a project that has so much wood in it was weather during the winter portion of construction. In order to keep as much water as possible out of, and off of, the building in the first place, we used a large tent structure that covered the entire building. We also pre-wrapped the structural timber at the point of manufacture."

A further challenge, notes Southam, was bringing MEC's new digs online within a tight schedule. "We needed to ensure the building would be finished to coincide when the lease on the previous space was expiring, and that meant working closely with the contractor to keep everyone on the same page.

The Ventana team also had to ensure the IT infrastructure in the new building was ready to handle the new AS 400 server for MEC's retail, inventory, accounting and web sales, six weeks prior to occupancy.

Fortunately, Southam adds, MEC had the benefit of working with a familiar and knowledgeable team. "They knew what green building entails and the opportunities that lie within close collaboration and taking an iterative approach to design. That, and our own experience with green building, really made it possible to put forward a proposal that pushed the envelope."

Indeed, MEC's team was more than up to the challenge. As a result, the company's new headquarters stands at its 1077 Great Northern Way address as a beacon for green building and a blueprint for commercial projects to come.

Looking back, Piccini says, "A lot of this project was new territory for us, but we're very proud of what's been achieved." ■

MAIN MEC ENTRANCE AND RECEPTION DESK. PHOTO CREDIT: MOUNTAIN EQUIPMENT CO-OP.

EMPLOYEE-CENTRIC

Healthy lifestyles are central to the MEC brand. It's no surprise then that its new head office caters to active living through staff amenities like a bouldering room, gathering places, rich landscaping features, and a multi-purpose room that plays host to everything from corporate meetings to table tennis tournaments, impromptu gatherings to yoga, spin classes and beyond.

"The space is quite frankly just amazing to work in," says Southam. "You really sense that among employees. They're really happy to work here. I think to the extent that the building helps them to do their best work, it really does support our business and sets us up for the future."

Owner: Mountain Equipment Co-op

General Contractor: Ventana Construction Corporation

Architect: Proscenium

Landscape Architect: Sharp & Diamond Landscape Architecture

Roofing Company: Homan Roofing

Roofing consultant: Wells Klein Consulting

Green roof leak detection system: Structure Monitoring Technology (SMT)

DESIGN AND CONSTRUCTION OF TALL WOOD BUILDINGS

Building Enclosure and Long-Term Durability

By Jieying Wang

ABSTRACT

FPInnovations published the "Technical Guide for the Design and Construction of Tall Wood Buildings in Canada" in 2014 to assist early adopters in construction of tall wood buildings. This article briefly covers related considerations and recommendations on designing durable and energy-efficient enclosures.

1. INTRODUCTION

The "Technical Guide for the Design and Construction of Tall Wood Buildings in Canada" (1st edition) was published by FPInnovations in 2014 based on collaborative work with a large team of experts with funding provided by Natural Resources Canada. "Tall wood building" is defined as a wood-based or hybrid building that is significantly higher than currently permitted by the National Building Code of Canada, and what was permitted in the past using traditional sawn timber members, i.e., with a height of 10 storeys or more. This guide was intended to be used initially by the design teams participating in the "2013 Tall Wood Structure Demonstration Projects" initiative, led by the Canadian Wood Council and supported by Natural Resources Canada. The guide has nine chapters covering building systems, sustainability, structural and serviceability, fire safety and protection, building enclosure, prefabrication, costing, performance monitoring, and maintenance. Chapter 6, "Building Enclosure Design," led by RDH Building Engineering in the development, was considered an essential component of this technical guide due to the importance of building enclosure and long-term durability. The chapter covers aspects unique to design and construction of building enclosures of tall wood buildings, while heavily referencing existing best practice guides (CMHC 1999a, 1999b; HPO 2011; Finch et al. 2013; Gagnon and Pirvu 2011; Karacabeyli and Douglas 2013).

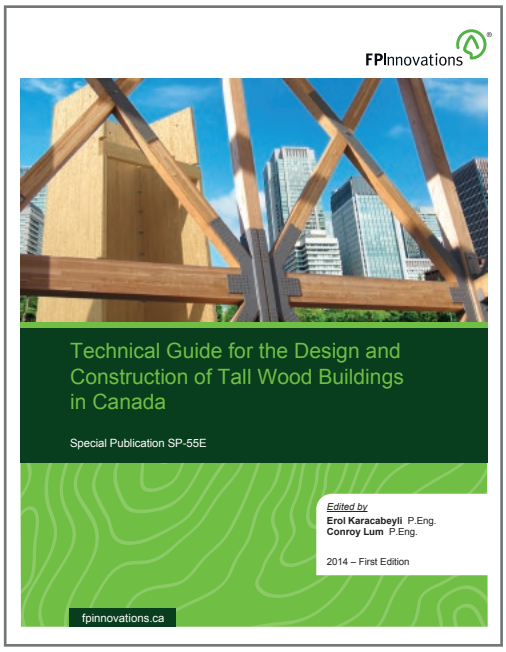


FIG. 1 COVER PAGE OF FPINNOVATIONS' TALL WOOD BUILDING GUIDE

2. INCREASED LOADS ON ENCLOSURE

Environmental and structural loads acting on building enclosures increase with building height. A tall building is generally more exposed, greatly increasing the wind and the wind-driven rain loads experienced by the roof, exterior walls, windows, balconies and various interfaces. There is also greater runoff on the exterior walls of the bottom storeys. These all require robust enclosure systems and detailing to prevent rain penetration. A tall building typically uses mass timber products, such as cross-laminated timber (CLT), glulam, build-up members, and various structural composite products. It typically needs a prolonged construction period, though this may be shortened by prefabrication. These factors usually increase moisture risk resulting from on-site wetting and reduced drying ability, particularly in the rainy coastal climates. The increased wind load, along with the increased stack effects inside a tall building, requires robust air barrier systems. In addition, the enclosures bear larger structural loads, particularly at lower levels, requiring heavier and denser structural members, increasing the thermal bridging potential. The exterior walls also bear heavier cladding, typically through exterior insulation. They also need to accommodate larger differential movement occurring between structural and enclosure components, resulting

from wood shrinkage and load-induced deformation. A tall building also incurs increased difficulty and costs associated with long-term maintenance and repair. Therefore, a tall wood building requires much more robust building enclosure systems, compared with lower-height wood-frame buildings.

3. EXTERIOR WALL SYSTEMS

The enclosure system of a tall building is determined by the structural system to a large degree. Figure 2 illustrates five types of exterior walls and structural systems that may be used in a tall wood or wood hybrid building. Light platform frame exterior walls (a) are most commonly used in low- to mid-rise wood-frame buildings in North America. This system represents a structurally adequate and cost-effective option for the top floors of a taller wood building. Prefabricated framing or assemblies are often used to speed up construction, replacing stick-built framing.

When light platform framing systems cannot effectively meet the structural requirements of a tall building, non-bearing wood-frame infill walls can be used in a mass timber structure (b); or in a concrete building (c), utilizing similar wood-frame exterior wall assemblies. For such infill wall applications, attention must be paid to the interfaces between the structural members and the infill walls to accommodate potential deflection of structural members, prevent water penetration, reduce thermal bridging, and ensure airtightness. Wood-based infill walls in mid- and high-rise concrete or steel buildings have been used in northern Europe for a few decades. They often improve thermal performance relative to the traditional steel-stud or concrete block infill walls, making it easier to meet increasingly stringent energy efficiency requirements using thin wall assemblies. Other wood-based systems and materials, such as structurally insulated panels, could also be used for non-bearing exterior walls.

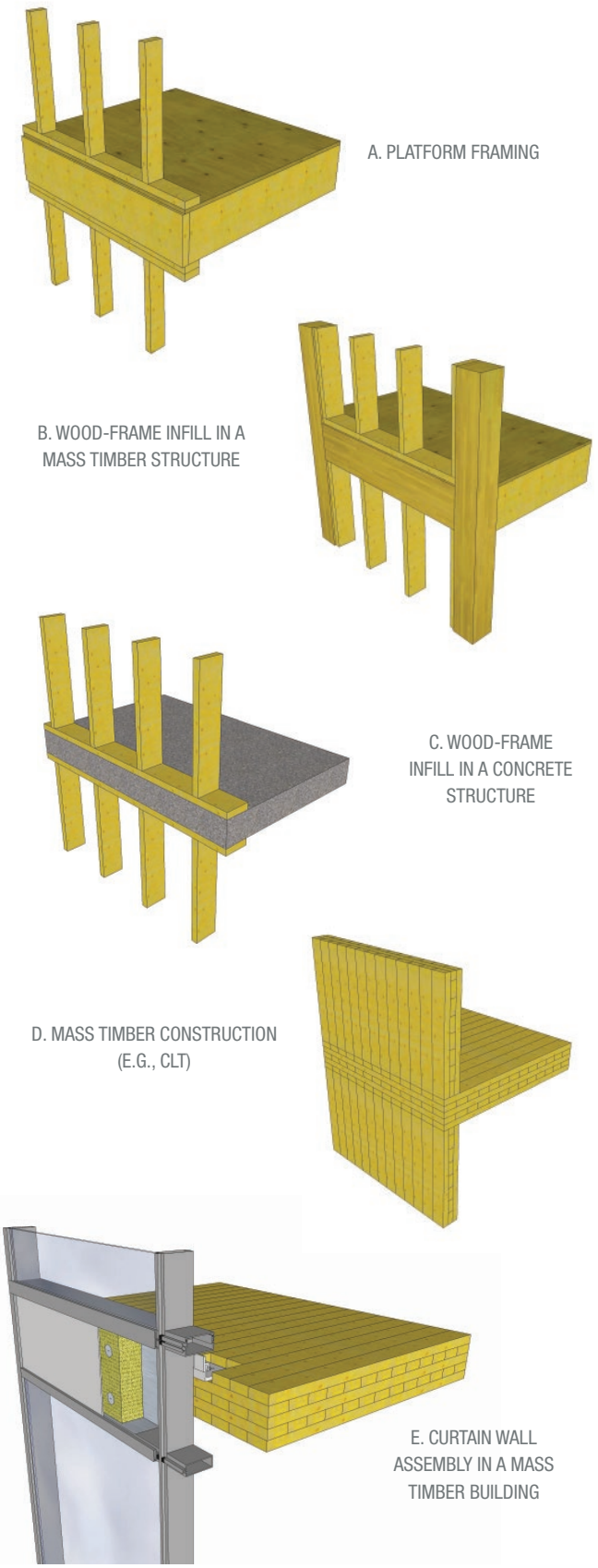
Exterior wall systems based on mass timber plates (d), such as CLT, laminated veneer lumber, laminated strand lumber, and parallel strand lumber, provide another option for exterior walls, particularly when the exterior walls are designed to be shear walls. In addition to these four approaches, a curtain wall (e) is a common option, especially for commercial and institutional buildings.

4. BUILDING ENCLOSURE DESIGN

A building enclosure is expected to control environmental loads by managing heat, air, moisture, and vapour transfer through the assemblies. The assemblies and all interfaces must be properly designed, built, and maintained to achieve long-term durability and thermal efficiency. In particular, multiple lines of defence should be provided to prevent water ingress through the building enclosure.

The most critical control layers of an exterior wall include cladding, water-resistive barrier (WRB), air barrier, thermal insulation, and vapour control layer. The opaque wall assemblies of a tall wood building should be rainscreened walls, properly designed and built to meet durability and thermal performance requirements, depending on the climate and local building codes. Rainscreen construction generally improves moisture performance by providing a capillary break between the cladding and the WRB, a continuous path for drainage, improved drying capacity and a degree of pressure moderation across the cladding. For the WRB to perform adequately, the continuity of the WRB must be maintained over the

FIG. 2 FIVE TYPES OF BUILDING ENCLOSURE SYSTEMS



service life, particularly at various interfaces, such as between roof and wall, window and wall, and balcony and wall. In most wood wall assemblies, the WRB should be vapour permeable to facilitate drying towards the exterior. The cladding of a tall wood building must be durable and made from low-maintenance materials. It is typically required by fire regulations to be non-combustible.

In terms of thermal performance, a traditional wood-frame wall, for example a wall built with 2 by 6 in. dimensional lumber with fibreglass batt insulation in the stud cavities, will likely not meet the insulation requirements in most climates based on the 2011 National Energy Code for Buildings, or the ASHRAE 90.1 standard in some jurisdictions in Canada. Exterior insulation (Fig. 3, 4) is strongly recommended to achieve continuous insulation and to keep the structural members warm. When exterior insulation is used, attention must be paid to cladding attachment to prevent excessive long-term deflection and to reduce thermal bridging. Potential impacts of exterior insulation on durability performance (e.g. vapour permeability) and fire performance should also be assessed. Closely associated with thermal performance, air flow control becomes more important due to the increased loads on the enclosure of a tall building relative to a low-rise building. Airtightness is more critically important for thermally efficient building enclosure assemblies to achieve long-term durability due to the increased vapour condensation potential and reduced drying capacity resulting from high thermal insulation levels. See detailed air barrier design in the guide.

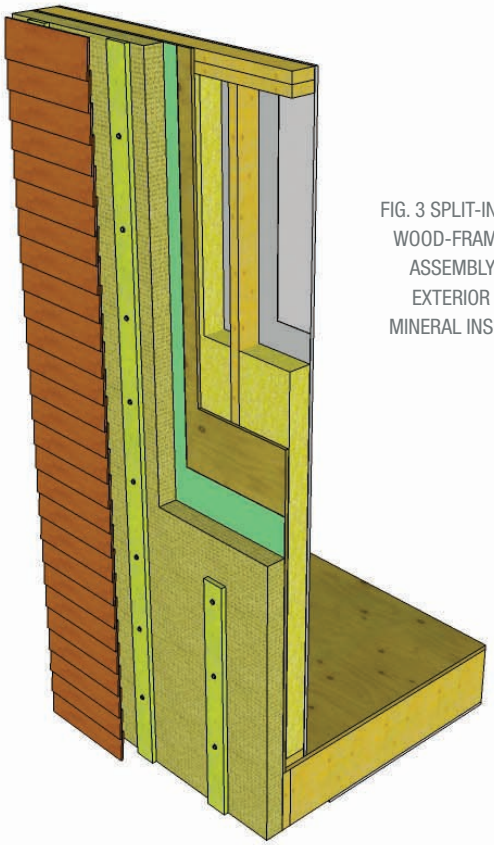


FIG. 3 SPLIT-INSULATED WOOD-FRAME WALL ASSEMBLY WITH EXTERIOR RIGID MINERAL INSULATION

Tall buildings typically use low-slope roof and roof-deck assemblies, often built with mass timber beams/columns (e.g. glulam) and mass timber plates (e.g. CLT), with built-up assemblies. Either a conventional or protected membrane roofing assembly (also called "inverted" roofing) can be used (Fig. 5, 6). Comparing these two options, the protected membrane roof provides greater protection of the roofing membrane and is recommended for a roof deck or a roof anticipated to have high foot traffic and other surface loads. A low-slope roof must provide a good slope to drains, recommended to be a minimum of two per cent, by taking into consideration factors such as material dimensional stability and settlement. The use of mass timber products for the roof structure of a tall building requires special considerations, including on-site moisture management (Wang 2015), to reduce wetting and promote drying, particularly in a rainy climate. Water leaks through a roof could lead to deterioration and compromise of the underlying structure. However, immediately finding leaks may become challenging when leakage occurs above mass timber assemblies. To mitigate these risks, the roof structure may be designed to integrate interior ventilation cavities to improve drying performance. Preservative-treated wood may be specified for vulnerable locations. When there is a desire or even requirement for installing a green roof, the costs and benefits must be carefully assessed, considering life span, long-term maintenance costs and probability of leaks.

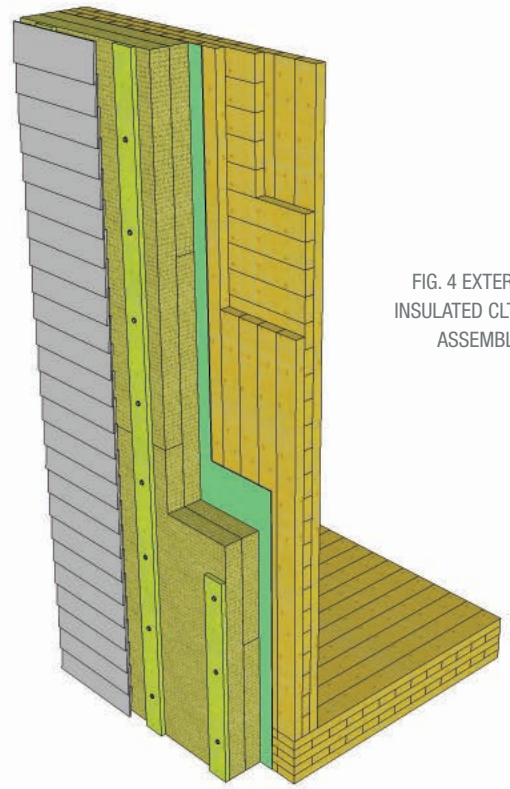


FIG. 4 EXTERIOR-INSULATED CLT WALL ASSEMBLY

5. CONCLUDING REMARKS

The "Technical Guide for the Design and Construction of Tall Wood Buildings in Canada" is a multi-discipline, peer-reviewed document. It has been well-received in the construction industry since its release, not only in Canada, but worldwide. Two trophies were awarded to FPInnovations at the 2014 Contech Building Exposition in Montreal, in the Housing-Innovative Practices category, for the development of this technical guide. This article covers only briefly

the major considerations for designing durable and energy-efficient building enclosures. More information about building enclosure design, on-site moisture management, and exterior wood application is provided in the technical guide. Other aspects related to the design and construction of a tall wood building can be found in other chapters of this guide. Note such a guide is not intended to substitute for input of professional engineers for any specific construction project.

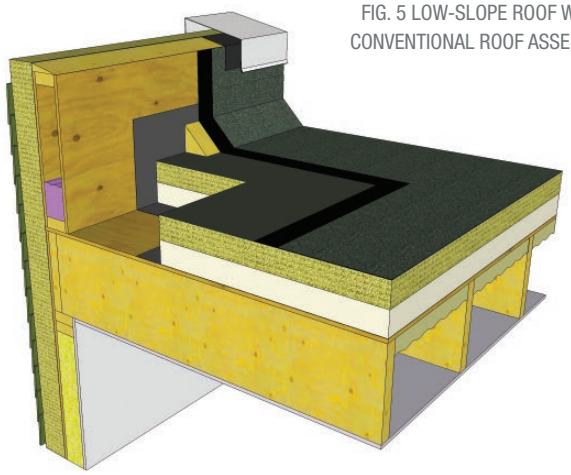


FIG. 5 LOW-SLOPE ROOF WITH CONVENTIONAL ROOF ASSEMBLY

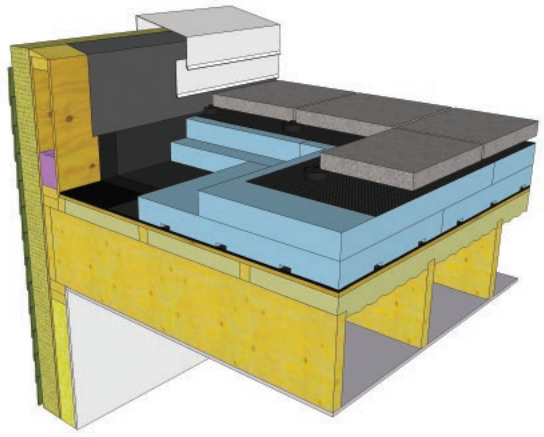


FIG. 6 LOW-SLOPE ROOF WITH INVERTED (I.E. PROTECTED MEMBRANE) ROOF ASSEMBLY

ACKNOWLEDGMENTS

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BCBEC Foundation Awards Profile:

SHAHRZAD PEDRAM

By Kelly Parker

BCBEC THEN-PRESIDENT JASON TEETAERT PRESENTS BCIT STUDENT SHAHRZAD PEDRAM WITH THE TOM MORSTEAD AWARD
PHOTO CREDIT: SCOTT MCALPINE, BCIT

If one were to crack open the constitution of BCBEC, they would come upon Article 2, which states: "The purpose of the society is to promote the pursuit of excellence by all individuals and groups having an interest or involvement in the design, construction or other technical aspects of the 'building envelope,' and includes the organization and/or sponsorship of meetings, seminars and other activities for the education and professional advancement of those individuals and groups."

Pursuant to that stated purpose, in 2006, the BCBEC Foundation was established from a surplus in the BCBEC operating budget to provide scholarships for post-secondary students and apprentices who have excelled in the study field of building envelope design, construction and technology.

Under that umbrella, in 2009, Tom Morstead's family established the Tom Morstead Award, with funds awarded in the form of scholarships or bursaries to registered educational institutions such as the British Columbia Institute of Technology. Funds are awarded to students at the foundation's direction, with awards typically granted in the spring of each year, depending on the institution. The amount awarded each year is decided by the Board of Directors based on the amount available for granting and the competitiveness of the applicants, with individual awards typically ranging from $500 to $1,000.

In 2012, Shahrzad Pedram (Building Science Engineer, EIT) became the first ever winner of the Master of Applied Science in Building Science Award for high academic standing, leadership and best all-around performance in building science.

BCBEC Elements caught up with Pedram to see where her path has led in the two years since she won.

BCBEC Elements: Bring us up to date on where you are on your career path.

Shahrzad Pedram: Things have been going well. Since I received the award, I found full-time employment and I'm working for a building engineering firm – RDH Building Engineering – here in Vancouver. I'm an engineer-in-training, so I'm just starting up doing building rehab projects, and I'm on my way toward becoming a professional engineer; that's sort of a four-year process. The award has definitely helped me jumpstart my career.

BE: No doubt the money helped, but how has BCBEC helped you along the way?

SP: The money definitely helped! In graduate school, you don't typically have a steady income, so any bit of award or scholarship really does help, and I really think that BCBEC helped me, certainly during that time, but it also helped to open up new connections.

BE: A big part of the advantage of being associated with BCBEC must be the networking opportunities.

SP: What's great about BCBEC is that it helps us to meet the community here in Vancouver that is really involved with the building science industry. They offer subsidized rates for their lunch and learns and professional development sessions for students, so I think that aspect definitely helped me and I know it helped my other classmates to make new connections and to meet professionals in the industry. In fact, I met my current employers at a BCBEC event, so it greatly helps. People who have been in the industry for a long time get connected with students and new graduates, and those who are looking for opportunities in the field.

BE: What about the support of that community…how did that help you out?

SP: The support has been fantastic. They offer students who have been doing research work an opportunity to present their projects and findings from their projects to the members at large at their AGM, and I think that's a great way to get exposure and get yourself out there, especially for people who are looking for job opportunities to get themselves out there and to let it be known what they've been working towards during your time in school. ■

BC BEC EVENTS

TUESDAY, MAY 19, 2015
Seattle Building Enclosure Council (SeaBEC) presents:
2015 SeaBEC Symposium
One-Day Symposium
Seattle Art Museum
Seattle, WA, USA

WEDNESDAY, MAY 27, 2015
APEGBC presents: Ventilation and Condensation – Part 3 Buildings
Vancouver, B.C. & Webinar

SEPTEMBER 23, 2015
BCBEC Full Day Conference and AGM
Fairmont Hotel Vancouver
900 West Georgia Street
Vancouver, B.C.

SAVE THE DATE:

UPCOMING VANCOUVER LUNCHEONS AT:

3075 SLOCAN STREET

VANCOUVER, B.C.

12:00 P.M. - 2:00 P.M.

MAY 21, 2015

JUNE 18, 2015

PROMOTING THE BUILDING ENVELOPE INDUSTRY ACROSS THE WEST

SPRING/SUMMER 2015

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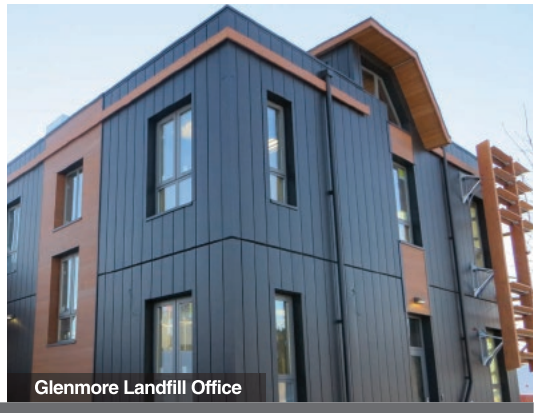

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