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The Glass Condo Conundrum

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"*They call them CONDOMiniums because the developer gets to screw the buyer without incurring risk*."
1980s Toronto joke, source unknown.

Falling glass from Toronto's condominium tower buildings has attracted a great deal of public attention starting in the late summer of 2011. The consequences of such failures could prove tragic and there has been a widespread response to how this problem can be avoided in the future. Some developers have voluntarily pursued mitigation measures including the wholesale replacement of tempered glass units on balcony guards with laminated, tempered glass units, entirely at their own expense.

Much less sensational, but potentially far more damaging, is another problem with the hundreds of condominium tower buildings recently built across the GTA. It also has to do with glass - not falling glass, but glass used as the primary building envelope that separates the indoors from the outdoors. Virtually all of the glass condominium towers feature window wall systems that enclose the entire facade of these buildings. Window walls are thermally inefficient compared to curtain walls or punched windows, and they also exhibit questionable performance in terms of durability, air and water leakage. Industry experts forecast that many of these window wall systems will require extensive retrofit or replacement within 15 to 20 years after they have been constructed in order to remediate these performance problems. Owners of these buildings, and purchasers of buildings that are now under construction, are often not aware of the potential liabilities associated with their real estate investments. When they come to understand the risk they have incurred, it is only natural for them to want an explanation for how this situation came about.

But first, let's begin by looking at the typical situation being forecast for glass condo towers, beginning at the point where a new condominium is handed over to the condominium board comprised of unit owners. At this point the Tarion condominium coverage has come into effect as follows: One Year, Two Year and Major Structural Defect warranties are in effect, where the aggregate maximum warranty coverage for new homes and condominium units is $300,000. The maximum coverage for condominium common elements is $50,000 times the number of units, to a maximum of $2.5 million. All minor deficiencies are covered under the One Year and Two Year warranties and between years 3 and 7, the Major Structural Defect warranty applies. The latter is rarely invoked since the reinforced concrete structures of condo towers are well engineered and constructed. Normally, by the end of the total warranty coverage period, isolated performance problems begin to occur within the window wall assemblies, mostly visible as water leakage. These are remediated on an as-required basis until such time as the problems become chronic and extensive.

At this time, the least expensive repair is to seal the exterior face of the window wall assemblies over the entire building.[1] This expenditure is not usually forecast in the *reserve fund study*, and hence it requires a *special assessment* be levied against all the condominium unit owners, prorated on a floor area basis. This form of remediation only lasts for 10 to 15 years and then it must be either repeated or the entire window wall facade replaced. If the former option is elected, then the repair work becomes quite visible and these special assessments must be disclosed to prospective buyers. Not only does the building begin to look shabby, but it also has relatively higher *maintenance fees* than more durable condo towers. Alternatively, a much more expensive special assessment for replacing the entire building envelope can be levied and then a proper allocation for future maintenance and replacement be included within the reserve fund. What is important to appreciate is that either way, the market value of the condo tower is affected, and its marketability can also be compromised by concerns over appearances and/or durability and performance problems.

[1] A significant proportion of the repair cost is associated with staging that allows technicians to go up and down the exterior of the building facade to work safely and efficiently. For this reason, performing numerous, intermittent spot repairs is often more costly than sealing the entire building, or as a minimum, one side of a building at a time.

Another aspect of the window wall replacement scenario that is critical to appreciate is it will require occupants to move out of their units while the work is taking place. As the existing building envelope is removed and replaced, likely on a floor-by-floor basis for each building face, the occupants will have to relocate while the work is carried out for anywhere from several weeks to a month. This will cause added expenses and disruption that will ripple through the building as the work proceeds. During the many months this replacement program is being executed, it is reasonable to assume it is not advantageous to put up a condo unit for sale, given the timing and cost uncertainties associated with a major retrofit.

By the time the facade replacement situation is encountered, condo owners will be quite demanding of an explanation. Unfortunately, the explanation is quite complex and it is often difficult to comprehend all aspects, even by trained building professionals such as architects and engineers. The first and most important thing to appreciate is there is no villain in this story. The present situation with glass condo towers is the result of numerous factors, each of which have shaped a collective, societal response to the development of modern high-rise housing. Everyone involved, developers, codes and standards, building authorities, design professionals, contractors and trades, manufacturers, real estate agents and consumers, have collectively contributed to the present situation.

Development Industry

Developers are risk-averse investors who stand to lose a lot of money if their business plans develop unexpected wrinkles, like cost overruns or delays. Innovation is greatly resisted because it increases the risk of wrinkles. In a city like Toronto, where recent infrastructure projects, the condo boom and upcoming Pan Am Games have consumed all available skilled construction trades, innovation translates into higher prices from contractors to developers who are having a difficult time coping with conventional construction practices, let alone new materials and methods. The window wall system is a popular choice because its time of delivery, installation and cost are highly predictable - exactly what risk-averse developers prefer.

But the argument that condo development projects in Toronto are risky is highly suspect. Sales statistics indicate they are gobbled up and their prices continue to increase steadily at a rate higher than the escalation rate for new construction. Moreover, virtually none of the developers of condominiums are publicly held corporations. This means they do not need to obtain funding through the sale of shares deploying financial instruments such as initial public offerings - put simply, they must be flush with cash if they can bank roll their own projects and/or their projects entail so little risk they can obtain favourable financing terms.

In 2008, development industry leaders participated in a cost-benefit study prior to implementation of the Toronto Green Standard. They carefully scrutinized the cost premiums and projected savings for consumers, and acknowledged the findings for condos were entirely valid:

Looking at energy conservation measures from the perspective of the owner of a typical 700 square foot suite, for an additional cost of $2,541 for a unit with an average sale price of $259,700 (700 ft^2 @ $371/ft^2), the owner can save $368 per year for a payback of 6 years and an internal rate of return of 22.3% assuming the current scenario; 5.7 years and 24.6% respectively, assuming the high energy price escalation rate scenario. The difference in 25-year net present values between a conventional baseline condo and an energy efficient model is $24,740 for the current scenario and $33,638 for the high scenario. This would easily pay for an even higher performing building envelope and HVAC system, both in terms of energy efficiency and durability, than the one assumed in the upgraded combos. An important factor emerging from life cycle analysis is the need to reconcile justifiably higher initial costs with mortgage eligibility. Clearly, the energy savings can finance the higher initial costs however, this economic relationship must be acknowledged by financial institutions and mortgage insurance agencies through their policies and practices.[2]

If better performing buildings are cost effective to consumers and not financially burdensome to developers, why has the condo market adhered to the bare bones minimum requirements of codes and standards?

[2] *Toronto Green Development Cost-Benefit Study*. Ted Kesik and Anne Miller, 2008. pp.54. http://www.toronto.ca/planning/environment/pdf/cost_benefit_Oct2008.pdf

Codes and Standards

Starting in January 2012, the Ontario Building Code will embark on higher standards of energy efficiency that will require the energy modeling of performance using computer software for most large buildings. Energy modeling is only now becoming a widespread practice after a decade or so of promoting green buildings through programs such as LEED®. Before this, building codes and energy standards were mostly prescriptive, requiring minimum levels of efficiency for various components of a building, and in some cases, allowing trade-offs that would allow a below-minimum component to be used if an above-minimum component of equipment compensated. The inefficient window wall systems were combined with highly efficient heating, ventilating and air-conditioning systems to satisfy then existing code requirements. Energy modeling requires graduate level training, typically in mechanical engineering, and building officials who enforce the code often do not have the appropriate background or training needed to ensure compliance. Where they do, there is great pressure to have building permits turned around quickly, as the carrying costs on money borrowed to assemble land for development are extremely high. Codes cannot lead an industry, they can only serve as a ratchet to prevent downward slippage toward substandard practices.

On the other hand, consumers can compare the energy efficiency among appliances that cost only a few hundred dollars, but there is no energy efficiency labeling of condominiums or new homes costing hundreds of thousands of dollars. The federal government has been developing the *EnerGuide for Houses* rating system for over a decade and provinces like Ontario do not appear open to mandating it for the benefit of consumers. Energy labeling that indicates how a dwelling performs in comparison to the minimum code requirements is essential to informed decision making by prospective condo and new home buyers.

Building Authorities

Unlike single, detached houses and do-it-yourself building additions, condo towers are designed by licensed professionals. Building authorities rely on these trained individuals to have exercised due diligence with respect to compliance with minimum codes and standards. They cannot enforce better design and construction practices and are left to administer the lowest common denominator. In some cases, as with the Toronto Green Standard, the planning department can intervene at the early stages of a building project to negotiate a "greener" than typical building, but ultimately there are limits to this advocacy role. New buildings seldom exceed minimum code requirements, and even if they do, this is not reflected in any official building rating system. If new buildings were students, most would come home with reports indicating they passed with barely more than 50% in each course. There are no "A"-condos in Toronto on the basis of how they compare with the minimum code requirements.

Design Professionals

For over a decade, progressive design professionals have questioned the durability and life cycle performance of glass condo towers. There is no definitive requirement for durability in the building code, certainly not one that prescribes the useful service life of various components, such as window walls. The energy efficiency requirements in the building code have not been optimized on the basis of life cycle operating cost, and in some cases have not been sufficient to avoid condensation problems in building envelope assemblies. While there are some sustainability advocates who are critical of the design professions not taking a stronger environmental advocacy role, the realities of professional practice are that developers are among architects' and engineers' biggest clients. Pushing for higher standards, and hence higher initial costs, would tend to lead developers towards more conventional practitioners. It remains difficult to innovate building technologies that cost less while delivering superior performance. The electronics and computer industries may have succeeded in doing so (the laptop computer you buy today is cheaper in real dollar terms than its counterpart from 3 years ago, and it delivers superior features and performance), but only because of automated mass production. Buildings are once off, even if all the glass condo towers look very similar.

Contractors and Trades

"Go to university or college, don't work with your hands," children have been told since the 1960s. When European immigrants flocked to Canada in the 1950s and 60s, there was not a shortage of skilled trades and in the GTA, tower apartment building construction rivaled today's condo boom. But it is getting harder to find the next generation of construction trades and there is a fear quality and productivity will go down while the cost of buildings continues to spiral. Building the better condo tower is not on the radar of the construction industry.

Manufacturers
The situation with glass condominium towers is not unlike what once faced the automobile industry. Less than half a century ago, automobiles were relatively unsafe, inefficient and lacked sufficient durability. Activists like Ralph Nader, in combination with the 1970s Oil Crisis and the arrival of Japanese automobiles in the North American market, caused a major re-design of the automobile and the introduction of safety and fuel economy ratings. Glass condo towers, once their facades start failing, will do the same for Ontario's building technology industry. Standards will rise to satisfy consumer expectations their real estate investment will perform adequately for at least as long as the mortgage. Most current premiums for high performance construction products reflect their low market penetration simply because inferior technology is permitted by our codes and standards. Ontario manufacturers need higher sales volumes of superior products to justify retiring old product lines and transitioning to the manufacturing of materials, components and equipment. In turn, these can also be exported to jurisdictions that embraced high performance buildings long ago, when Canada stubbornly adhered to obsolete and inefficient building technology.

Real Estate Industry
Consumer education is not a hallmark of Canada's real estate industry. Purchasers are commonly warned that insisting on a home inspection may jeopardize their offer, and there is little, if any, formal training in building technology required to become a real estate agent. Explaining the potential pitfalls of a glass condo tower building may be in the best interest of the buyer, but not the agent. How much should real estate agents know about buildings, and how much of this should they divulge to prospective buyers? One way to approach an answer to this question is to compare what real estate agents charge for their services compared to the architects who design the buildings. Typically, real estate agents receive a 5% commission on their sales, whereas architects receive on average approximately 8% of the value of the building as their total fee, which is shared with their engineering consultants. Architects are obliged to know everything about the buildings they design and are professionally liable for errors and omissions. They must also provide expert opinions to their clients for all aspects of the buildings they design. Why should real estate agents not be required to possess a competent knowledge about the buildings they are selling? Buyer beware would not be considered an ethical position for architects and engineers serving the public. Compared to all of the work involved in designing and specifying the various components, assemblies and systems that make for a modern building, it is not unreasonable to expect real estate agents to be forthcoming with vital information about the durability and operating costs of the buildings they are selling. Explaining the potential problems associated with glass condo towers that have been identified by technical experts to their prospective buyers, would be no different than a general practitioner explaining the risks associated with certain medications and procedures to their patients. The real estate industry has not taken a proactive approach to such issues yet it is usually the first point of contact for consumers of real estate.

Consumer Education
The average person does not know how a modern building works, let alone how to assess the quality of a building. The building science that underpins an understanding of building behaviour is not taught in elementary or secondary schools even though it is far less arcane than astronomy. The average consumer knows a great deal about the things to look for when buying a smart phone, a laptop computer, or a big screen TV, thanks largely due to the educational advertising campaigns launched by manufacturers, who must explain why last year's model has been superseded in performance, and is therefore no longer cool to own. Unfortunately, when it comes to housing, granite countertops, master bedroom ensuites, interior finishes and special features dominate the marketing mantra, with all considerations obeying the gods of location and affordability. Are consumers ever told that a $10,000 premium for more insulation and better windows would yield some $20,000 in savings over the 25-year mortgage? The sophistication of financial analyses supporting the developer's investment plan stands in stark contrast to the complete absence of consumer awareness about issues like life cycle cost or durability, both of which significantly impact the consumer's real estate investment. If the average person was educated about housing to the same extent as they are about diet, exercise, health and well being from grades K-12, buyer and seller would be evenly matched in terms of financial know-how. As it stands, all homebuyers, including condo dwellers, are being sold on the sizzle, and not the nutritional content, of the steak. Ultimately, consumer demands drive the market and the average condo buyer does not understand what features constitute a superior quality building. Developers do not volunteer information if they are not asked, and consumers have not been educated to ask the right questions.

What's Next?
These are uncertain economic times and yet the sales of condos in the GTA continue unabated. How many buildings are exposed to the risk of failing to perform according to consumer expectations? Why are glass condo towers designed by architects and engineers performing worse than single family homes constructed by homebuilders? Is it true that for a fistful of dollars (large denomination bills) much of this could have been avoided? The answers to these questions will all come out in the wash, meantime single family homeowners should not get too smug when they hear about the condo conundrum.

Inferior quality building envelopes and deferred maintenance will eventually deflate the prices of resale condo units. A generation of new condo buyers that is planning to build equity and eventually move up to single family detached housing as they form families will be stranded with devalued assets. And so will the empty nesters who cannot sell their homes and get on with retirement. If anyone other than new condo buyers should be concerned about the glass tower condo conundrum, it is the baby boomers who are expecting the appreciation in their real estate investments will be realized along with their retirement plans. When it comes to the real estate market, we are all in it together and the attitude that "I'm okay" among one market sector is a false security that can quickly become unraveled.

Will history in the GTA repeat itself? High-rise apartment buildings of the 60s and 70s were once 'chic' cribs with underground parking and indoor pools. Now many of them are home to Toronto's priority neighbourhoods. Is this the fate of today's glass condo towers, to become depreciated investments that are unloaded as low-income rental housing awaiting renewal? If we know anything for certain, it is never too early to begin the process of rehabilitating inferior building stock and investing in preventive measures.[3]

Looking at the things that can and should be done, the situation is not as dire as it first appears.

1. Change the codes and standards so that the durability and energy performance of condominiums is comparable to that of single family detached homes.
2. Mandate third party field testing of the building envelope to ensure air and water tightness.[4]
3. Make disclosure of condo building envelope construction and condition mandatory, along with the energy labeling of all buildings, new and existing.
4. Have condominium boards begin planning for the eventual replacement of their window wall systems, and adjust reserve funds accordingly.
5. Initiate a program of research and development into high performance, replacement facade systems for high-rise buildings so that the technology is reliable, cost effective and made locally.
6. Educate and qualify the real estate industry so that along with the building industry, these major players can lead consumer education programs about how buildings work, and what to look for when buying real estate.
7. Revise the condo legislation in Ontario so that condo owners are able to negotiate improvements with the developer they deem critical and cost effective before construction begins. By the time the condo boards are formed, they are stuck with whatever was built, instead of being able to assess the costs and benefits of various measures that improve durability and performance.

What can be done for all the owners and recent purchasers of glass condo towers? It's not possible to go back and change things, and no one party is to blame. This is a case where a collective consciousness created a self-fulfilling prophecy (CONDOMinium). But the buildings can be rehabilitated and the energy and maintenance savings will help pay for the special assessment over time. And based on when they were constructed, most of these buildings still occupy the best locations in a market where location trumps all.

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[3] Kesik, Ted and Ivan Saleff. *Tower Renewal Guidelines*, University of Toronto Press, October 2009. (http://www.daniels.utoronto.ca/trg)

[4] Effective January 1, 2010, the Pro-Demnity Insurance Company, which operates a mandatory insurance program on behalf of the Ontario Association of Architects, issued a bulletin requiring a thorough review and testing of window walls and the provision of a minimum 5-year warranty against air and water leakage.

Food for Thought

Developers, architects, engineers and manufacturers should seriously also reflect on the condo conundrum. Not just cheap window walls plague many of the glass condo towers - there are also issues such as inadequate ventilation that need to be resolved. There is no other sector that ranks as poorly as the building industry when it comes to innovation and delivering value to its customers. Today's glass condo towers are not as energy efficient and far less durable than their 1960s counterparts. Is there any other industry where 50 years later, the products it produces cost more and perform worse than their predecessors? Buildings are not televisions, automobiles or computers - they are real estate, and unlike the aforementioned consumer goods, expected to appreciate in value over time. Indeed, average Canadians bank on the appreciation of their real estate investments. Housing is a necessity and while consumers can forego expenditures on a new computer, they must live somewhere. There may be no need for innovation in a market dominated by location, but that does not mean innovation will not be highly rewarded. The Apple iPod is a recent and notable example of how a personal digital music system could transform an entire industry overnight. Developers who can deliver exceptional performance and value will be likewise rewarded once consumers become aware of the current state-of-the-art in condominium buildings. This happened in the automobile industry, then it happened with the iPod and condominium towers are next. It's not a matter of if, but when, and consumers will ultimately decide, if they so choose.

Doing It Right - Rare example of a condominium project where masonry block back-up is used behind the exterior insulation and brick facade. Note the use of punched windows instead of window wall assemblies from floor to ceiling. This type of construction provides superior durability and energy performance for a marginal premium.

Terminology and Additional Information

Maintenance Fees
Also referred to as common area expenses. Maintenance fees are a monthly charge (your share) for the utilities, regular upkeep, management, administration and insurance for the common element areas. The fees vary according to project and home size. Each homeowner's portion of these expenses is set out in the budget statement, which lists the percentage for which each unit is responsible.

Reserve Fund
A fund required to be set aside by the Condominium Corporation to cover the major repair and replacement of the common elements and assets of the condominium.

Special Assessment
A special assessment is an additional payment or a levy that a condo board has to impose when unexpected shortfalls or unexpected expenditures occur in the budget, or when an expensive system has to be replaced (i.e., a boiler) and there is not enough money in the reserve fund to cover for it. Special assessments are like a fee and are proportional to the % of common expenses each unit has, as per the declaration. Therefore, a smaller suite's special assessment will be lower than one paid by a larger suite.

For more information, visit the **Condo Information Centre**:
http://www.condoinformation.ca/

Energy Labeling
http://homeenergylabelling.blogspot.com/

Condominium Statistics
http://www.cmhc-schl.gc.ca/en/hoficlincl/homain/foan/index.cfm
http://www.urbanation.ca

Ontario Condominiums

A Guide to Condominiums - Ontario Ministry of Consumer Services
http://www.sse.gov.on.ca/mcs/en/Pages/Condos.aspx

Top Ten Tips for New Home Buyers - Tarion Warranty Corporation
http://www.tarion.com/New-Home-Buyers/Pages/Top-Ten-Tips-For-New-Home-Buyers.aspx

Warranty Protection - Tarion Warranty Corporation
http://www.tarion.com/Warranty-Protection/Warranty-Coverage/Pages/default.aspx

Condominium Performance Issues

Energy Performance in Condominiums - Toronto Atmospheric Fund
http://torontoatmosphericfund.wordpress.com/2011/07/06/energy-performance-in-condominiums/

Curtainwalls best suited for highrise condos.
http://dcnonl.com/article/id35754

Why Architects Shouldn't Build Condos Out of Glass And People Shouldn't Buy Them.
http://www.treehugger.com/files/2011/08/why-architects-shouldnt-build-condos-out-of-glass.php