

Research Report

Mid-Rise Wood Construction in the Canadian Market

A Summary of Nationwide Focus Groups

Presented to:

Canadian Wood Council

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Walker Consulting Group

BACKGROUND

It has been about ten years since the door opened to mid-rise wood structures in the Canadian market. BC was the first of Canada's provinces to embrace this type of construction in 2009, and since then, other regions of the country have come onstream, most since 2015.

Wood Works and the CWC felt there would be value in taking stock of how the market has evolved thus far across major Canadian markets. Two drivers prompted this initiative: first, a sense among Wood Works staff that the market for mid-rise wood construction had encountered some challenges in some parts of Canada; and second, a sense that the path to adoption might differ somewhat across the country, and as such, some merit might be found in learning more about how the individual markets were faring.

Between August 20 and September 6, 2019, focus groups were held in five cities across Canada (Halifax, Quebec City, Toronto, Edmonton and Vancouver) among building sector stakeholders with an interest in advancing market and regulatory adoption of mid-rise wood buildings (buildings up to 6 storeys in height) made of structural wood.

Across the country, a total of 49 participants, comprised of architects, engineers, developers, code experts and industry experts engaged in dialogue on a number of subjects, including:

- The current state of the market for mid-rise (5-6 storey) structures in each respective market;
- The headwinds and tailwinds influencing development of the mid-rise wood market in respective regions;
- Information gaps/requirements for key stakeholders connected to or within the building industry;
- Recommended key priorities for Wood Works regional teams and national team.

The ultimate goal of this project is to identify and stratify impediments to progress to mid-rise wood buildings in all markets of the country, assess their similarities/differences, and understand roles and activities that the Wood Works program team and CWC team can do to help surmount them.

OVERALL STATE OF THE BUSINESS

Across Canada, the regional markets for mid-rise wood construction are at widely different stages of development. BC is by far the most developed, while Atlantic Canada is the least developed. Although markets are at different stages today, there has been genuine progress in all markets across the country.

The acceleration curve has not been on the trajectory that some expected when codes began to change, but progress is clearly in evidence. In Ontario and Alberta, a subtle “slowing” of demand for wood mid-rise buildings across Canada over the past year or so, observed by Wood *Works!* teams, was reflected in the discussions among stakeholders in the focus groups. In Quebec and Atlantic Canada markets, there has been some market activity, but mid-rise wood has not yet gained significant footing.

In BC, this category of building has continued a strong growth trajectory. BC is a different market for mid-rise wood construction than all the other markets in Canada today. It is more mature, and mid-rise wood buildings have become much more normalized in the marketplace. After listening to the BC focus groups and considering the course of BC’s mid-rise evolution overall, it is clear that there are some parallels with trends (and challenges) observed in other Canadian markets. But BC has had some unique circumstances that have worked in wood’s favour that aren’t present in other markets. In other words, some, but not all, of the BC experience can translate to other markets, and it is essential that these elements (what can and cannot translate) are well understood. That is one of our objectives in this report – to highlight those.

The primary intent of this report is to accurately pinpoint the factors that we believe are most important to turning the acceleration curve upward, in different parts of the country. Because if there is one thing that is common to all markets across the country, is a genuine belief that mid-rise wood construction is the biggest growth opportunity we have in Canada for the wood business.

SITUATION ANALYSIS: KEY FACTORS

When considering the regional markets of the country (other than BC), unpacking the dynamics at play, the challenges faced by the wood products industry in establishing the mid-rise market have some things to do with general market forces. But many of them have to do with challenges (real and perceived) associated with this type of construction among the stakeholders in the business, and in municipal governments. Those challenges include:

1. **The economics of these mid-rise buildings is not bearing fruit the way some developers expected.** In different markets, this is the case for different reasons.
 - **In Quebec**, this is chiefly because concrete is more economical to build with, and teams know how to work with it. That reality probably trumps all other economic factors in that market, including the fact that subsidized housing in that is supposed to (by regulation) to be built out of wood.
 - **In Ontario**, concrete is not quite as economical as Quebec, but developers and builders have found themselves having to do a lot of extra work on wood projects to get them done properly, so they lose the economic benefit of “speed” of construction, meaning that costs today are close with concrete. In addition, labour shortages & untrained crews in Ontario are driving higher than expected construction costs with wood over the past year to 18 months.
 - **In Atlantic Canada**, concrete isn’t as economical as in Quebec and Ontario, but the building code changes permitting wood really only took place 2 years ago, so the dynamic is a fair bit different there than in other markets. Economic patterns from other markets are in evidence - there aren’t enough experienced crews to work with wood, and there is also not enough available quantity of access to panelized systems to take the pressure off the need for crews. An additional challenge in Atlantic Canada (Halifax) is that it is that the multi-storey market is mostly a rental market. This market is willing to pay less than vs condo owners, meaning the economic pressures are even more significant.
 - **In Alberta**, there are economic benefits and opportunities associated with building with wood as compared to concrete, but the lack of experienced engineers, builders and crews are holding things back. Moreover, the general economic malaise in Alberta is affecting the building market overall. We were told there is a risk premium built into a number of the costs the mid-rise wood market, so the industry is not gaining the cost benefits yet.
 - **In BC, most of the time, the economics work for mid-rise wood buildings.** Most developers in our Vancouver focus group described their experience for mid-rise wood as being about 15% better on cost than a similar structure in concrete. In BC today, projects will typically meet that range. In part, that is a product of concrete being expensive. It is also a product of other variables in the equation, including speed of construction, working in wood’s favour.

In other Canadian markets, the differential might only be 0-5% (excluding the first project or two for most, where typically costs are higher for wood owing to the project teams' learning curve).

In all markets, a typical developer will not make the money they expect on wood mid rise until the 3rd or 4th project they take on. And in some cases, they don't get to the 3rd or 4th project – they have been dissuaded from trying again after initial losses.

None of these economic forces was helped by the rapid rise in the cost of lumber last year. For sure, some were further dissuaded from using wood when the costs spiked. And even though prices have returned back to pre-2018 levels, there is now some sense of uncertainty about whether prices can be counted on to stay in a similar range. This notion of cost certainty is an important one, because of the often long lag times between when a property is acquired and when development breaks ground. Finding ways and means of establishing greater cost certainty for wood is a key variable for success.

- 2. Municipal building officials are slowing approval processes down, in various ways, in various jurisdictions.** This is not always a purposeful thing as a bias against wood – oftentimes there is genuine interest in wood construction among building officials. Rather, the force most often at play is just typical government risk-aversion – wanting to cross every t and dot every i.

But this is an issue that can only be truly understood (and dealt with) at the municipality-by-municipality level. Every municipality in Canada has its own dynamics at play in the building department, which makes things very complex for developers to manage when it comes to a new thing like a mid-rise wood building. Sometimes the impediment within a municipality is just a lack of knowledge among officials or inspectors, requiring much more up-front work for developers (and sometimes additional costs of engineers and other consultants) explaining the project and its elements. Other times the slowdowns are because officials are fundamentally resistant to using wood for these kinds of projects, and they put bureaucratic roadblocks in the way.

In markets where concrete is more available and cost-competitive, it is a lot easier for a developer to deal with officials to get a concrete mid-rise or high-rise building done than a wood building. As we heard in the Ontario focus group, if municipal approval takes too long, developers can propose going a few storeys higher in concrete, where the economics are better.

In general, building officials are more receptive to training around wood, while fire officials are typically not. But at this point, there are a lot of building officials who are wary of mid-rise wood as part of the natural risk aversion one finds in government generally.

- 3. Fire officials in some regions/municipalities another more difficult challenge.** In many municipalities, in virtually every region of the country, certain fire officials were noted for their continued strong resistance to wood mid-rise construction. Depending on the power structures at play within municipalities, sometimes fire officials have more influence than their position technically has, and they actively and aggressively find ways to impede allowance of wood mid-rise buildings, even when it is allowed under

the code. Most importantly, there is a strong local-regional psychology at play, where these officials are not all that interested in hearing from expertise from other jurisdictions about these issues. So a Len Garis type opinion leader will really only have influence in their own region of the country.

4. **Quality control issues.** Various challenges associated with quality control in mid-rise buildings surfaced across the country. The most prevalent issue was that too many developers and builders bring in crews that are inexperienced, or only experienced in in 3 and 4 storey buildings, who really do not understand (or want to understand) the significant differences building in a 5 or 6 storey context. We consistently heard that crews brought in from 3 storey projects to work on a 5 or 6 storey building make a lot of errors, that have to be fixed (and that cost money to fix) when they work on these buildings. This issue was probably most pronounced in Quebec and Alberta discussions, but true everywhere.

In Toronto, we heard about a Carpenters Union who has geared up for Midrise training of carpenters. This is a tactic that Wood Works probably needs to consider, & build a strategy to facilitate in other markets. Ideally, this would be with other stakeholder associations as well.

5. **Other quality control issues were raised as well.** Much was discussed about certain specific challenging aspects of building mid-rise with wood: connectors, shear walls, tie-downs, acoustics/intra floor noise, shrinkage were all mentioned as tricky parts of the building process that they and their crews often did not have technical expertise about, and become rate-limiting steps for them to get right in the construction process. There are clear knowledge gaps about some of these technical issues in the construction process.

The BC engineers association (APEG) was active in early years of midrise and came out with a Midrise guide, that was cited in several groups outside BC. It is clear from our discussions that the market has a higher standard for engineers' capabilities with wood in BC – some speculated that the leaky condo issue more than 25 years ago was the tipping point and affected the dynamic there. What we heard was that BC engineers specify everything and follow specifications, while in other regions this is much more hit and miss, where builders do more “freestyling” that gets project quality in trouble.

In Quebec specifically, a unique dimension of quality control challenge surfaced, related to building inspections. In our Quebec discussions, we heard that there is a lack of strong oversight at the building code level, where builders and crews are not as actively “corrected” by inspectors, resulting in the quality of mid-rise wood construction being less than ideal. This was felt to be most an issue throughout Quebec, with the exception of Montreal.

6. **A lack of integrated approach to the design and building process.** One of the most notable hallmarks of BC compared to other parts of Canada is the prevalence of integrated approaches to project design and development. What this means is that project teams (developer, engineer, architect, builder, code consultant) develop their plans as a group early in the project, oftentimes led by the engineer. In other markets, the traditional silo approach to building process is evident, where everyone is treated more like a sub, brought in for their specific task and skillset. The result is less coordination, and more cost in the back and forth of teams on jobsites.

- 7. A lack of code/cost consultant expertise in and around the building development community.** If there is one area where BC differs most strikingly from other markets, it is in the presence of a community of code and cost consultants who work regularly with engineers, developers and officials on mid-rise wood projects. These experts have expertise, experience, and relationships with key constituencies and end up being central to the process in BC. We did not find that other markets had nearly as many “go to” people in these spheres. We believe that their expertise helps to minimize uncertainty, for the developer (about whether or not they can make money on a project) and of the officials (because these consultants have seen everything and have often established trust-based relationships with officials in key municipalities). And this helps grease the wheels for more adoption.
- 8. The availability of panelized systems varied across the country.** In Atlantic, Quebec, and Alberta, there was demand, but not much availability of panelized systems that could be used in building these structures, and avoid some of the challenges in dealing with crews. Given the quality control and crew challenges enumerated above, and recognizing that in BC most of the structures are built from panelized systems, there is no doubt that there is a market gap. What we also heard was that we have a bit of a chicken-and-egg situation today, where companies that might want to get into the panel business don’t have enough certainty about market demand. This is an area of the business that hopefully as markets mature, more players will enter the panel business.
- 9. Environmental benefits of wood buildings sound good, but don’t tangibly mean much.** We heard the same story over and over again: municipalities talk about climate change and sustainability, but they don’t have metrics in place that would be able to give advantage to wood mid-rise projects. So no real advantage manifests to mid-rise wood projects (or against concrete projects) at the building approval level on these grounds anywhere in Canada today, other than the goodwill of some of the teams that seek to build more sustainable buildings.
- 10. Building Valuation bias against wood.** One of the realities of the construction business today is that most developers build and then sell those buildings to REITs or other financial institutions like Altus. Only about 25% of buildings are builder-owner operated structures. Because the build and sell model is so prevalent, a critical part of the financing equation has to do with building valuations that financial institutions assign to prospective structures. These valuation formulas incorporate a number of variables, and some of those variables, particularly those associated with durability, bias against wood, yielding lower valuations and therefore inadequate financing. The reason this does not manifest in BC is because building values are so high already, even if the bias is in the model, there is still enough projected value to get the necessary financing. So right up front, choosing mid-rise wood for a build and sell structure means potential challenges in getting adequate financing. This is an issue that must be further investigated, root causes identified, and studies commissioned to demonstrate the failings of the current valuation tools that real estate valuers use.

- 11. Insurance.** Course of construction insurance was raised as a concern in a few groups, where it remains a reality that insurers are charging significant dollars, and imposing expensive provisions (like full time security guards) on mid-rise wood projects.
- 12. In Ontario and Quebec, the concrete stairwell code requirement within wood buildings was seen as a significant impediment to adoption, as well as to quality structures.** In both of those groups, there was significant frustration raised about this issue and the lack of scientific evidence of its merit. This is a cost issue as well, as it adds more trades to a project, as well as creating issues with building shrinkage asymmetry (where the building shrinks but the elevator shaft or stairwell doesn't).

KEY INGREDIENTS FOR SUCCESS

Stepping back from the overall patterns and challenges, one useful way of thinking about the critical path for mid-rise wood construction is to think about the presence of “ingredients” in a given market that will have the most influence on whether this form of construction will become more deeply rooted.

Our team identified 10 ingredients that once can assess in each market. Collectively, they provide a useful picture of the headwinds, or tailwinds, that are working with or against wood today in each market. Below is a table outlining each of these, and our assessment of how each market lines up on each of them.

	BC	Alberta	Ontario	Quebec	Atlantic
Cost certainty about mid-rise wood construction in the developer community	Yes, mostly	No	No	No	No
Alternatives (concrete) cost competitive	No	No	Yes	Yes	Yes
Integrated solutions approach to projects (all stakeholders involved from the outset)	Yes	No	No	No	No
Reasonably efficient municipal approvals process	Yes, mostly	Depends on municipality	Depends on municipality	Depends on municipality	No
Experienced crews	Sometimes	No	No	No	No
Panel solutions available	Yes, mostly	Sometimes	Sometimes	Rarely	No
Fire officials onside or at least neutral	Yes, mostly	Sometimes	Sometimes	Sometimes	Yes
Active community of Code consultants	Yes	No	No	No	No
A track record of quality mid-rise wood buildings	Yes	No	Yes, mostly	No	N/A
A mix of developers entering the market (not just low cost 3-4 storey players)	Yes	No	Sometimes	No	No

PATHWAYS TO SUCCESS

The critical path of development for wood mid-rise structures varies slightly in each part of the country. There are insights to be gleaned and initiatives adopted across markets, but there are unique circumstances in each market that make it difficult to entirely “carbon copy” development plans across markets.

That said, for widespread development of mid-rise to occur, the path to success requires the following:

- A reasonable degree of cost certainty for developers to use wood.
- A reasonable timeframe for project development approvals, and transparency around those processes.
- Early stage integration among project team members (engineer, architect, developer, builder) to come together to build out plans. Active engagement at this same early stage by the engineer to help lay down clear specifications for builders/crews.
- A more properly informed building official and fire official community about key issues, including key nuances, of mid-rise wood construction.
- Availability of panel systems, and failing that, experienced crews, to build with.
- A group of mature and experienced firms in the code and cost consulting sphere, or at least within some of the big development companies.
- Engineers very active in the building process, specifying many key components (which helps minimize builders and crews “freestyling” on site and making mistakes.
- Good basic quality control measures in place, among crews and inspectors.
- More of the small but challenging “headache” building construction challenges alleviated (like connectors, tie downs, acoustics).

RECOMMENDATIONS FOR WOOD WORKS

There are, for certain, some market-based solutions that are needed in order for the mid-rise business to accelerate. The cost competitiveness of concrete in most parts of Canada is part of the reason why the market has slowed over the past year or 18 months. Moreover, the lack of available panel providers (outside BC) is a big challenge, in part because of the reality that experienced crews are hard to find.

Nonetheless, there are definite opportunities for CWC and Wood Works to play helpful enabling roles for the industry. Some of the initiatives include:

1. Develop a detailed, illustrated “building mid-rise” user guide that provides actionable ways and means of building these types of structures, with particular emphasis on a few areas that are often pain points in the process, such as:
 - a. Connectors
 - b. Tie downs
 - c. Shear walls
 - d. Mitigating Shrinkage issues
 - e. Ventilation
 - f. Listed fire assembly
 - g. Sound transmission
 - h. Fire safety
 - i. Best practices from other areas
 - j. Pre-approved solution templates for combustible stair shafts
 - k. Include OBOA/ other Building official associations to develop a template protocol (this might be separate than in a guide)

This user guide would serve dual purposes, for developers/crews as well as for building officials who we were told are in need of some best practice guides to learn themselves. The intent is not to be a marketing document showing off beautiful case studies, or an encyclopedic book that is too daunting to open. Rather it should be a very practical, user friendly guide for people working in and around the trade (including building officials) every day. The guide should be built off the Ontario

midrise 2015 guide and the CECOBOIS midrise guide from 2016, with more details and specific operating procedures for certain process elements as listed above.

There is likely merit in establishing a small group of 3-5 industry stakeholders who participated in these groups to serve as a sounding board for the development of this material.

There may be need to take this one step further, to develop complete software for wood design. This would help to alleviate some of the common problems faced by project teams as they enter the midrise space. This was suggested in the BC discussion.

2. Build out educational programmes for builder teams and crews to go along with this guide. Whether these are in-person courses or online, there is a need for education that schools and trades are not providing.
3. Develop a database of alternate solutions submissions or engineering submissions that have been provided to municipalities for different mid-rise wood buildings around the country, that could be accessed by CWC/Wood Works stakeholders and adopted/adapted for use. There should be efficiencies available in capturing collecting and disseminating these, so engineers and other experts do not have to do as much reinventing of the wheel when these types of requests are made by building officials.
4. Building a stronger network of experts that are respected within the fire and building code community, who can help broker engagement and educational efforts with officials about these types of structures. And those experts need to be identified and fostered within specific regions – “outside experts”, even in the same field, will not be seen as all that credible.

In BC, code consultants and Engineers sent a letter to the City of Burnaby to say that 6 storey wood Midrise buildings are safe. Burnaby had been one of the more notorious municipalities resisting wood Midrise but is now starting to support it. This is a good template for the kind of thing that might be emulated in other markets.

5. A fulsome strategy should be developed to tackle informing and engaging the building officials’ communities in key jurisdictions across Canada (start with the top 20 CMAs) and work to bring them onside or at least have them neutral about wood. This effort should be constructed like a lobbying campaign that an industry association would pursue.

6. Code work, specifically:

- Concrete stairwells and elevator shafts (either eliminate them or recommend specific wood systems that would be best aligned to them to minimize issues associated with shrinkage).
 - Seismic code in BC. BC officials are pressing to increase the parameters of the seismic code for buildings in the province, which were already increased in the 2015 code process. If the increases that are being discussed now (another 20-30% increase) there will be significant challenges for mid rise wood buildings to meet.
7. Perhaps more for BC than other markets, focus some energy on establishing taller 7-10 storey residential wood buildings into the code. This is worth pursuing as a priority for the code teams at CWC.
8. Commission work by a respected third party that could make recommendations to municipalities about environmental sustainability goals (in terms of emissions, waste, etc.). These recommendations should then be suggested for adoption by building departments, and necessary as part of project approval processes. Absent specific, tangible KPIs, sustainability language from political and other officials will not turn into sustainability action, and will thus not benefit wood construction in the ways that it should.
9. Further investigation into impediments associated with building valuation. Discussions with real estate valuers, as well as organizations like Altus, should help to diagnose the root causes of these issues, and mitigating measures should be pursued afterward.

CONCLUSION

Mid-rise wood construction is big business for the wood industry in Canada. It is an area that has been, and continues to be, a significant opportunity. Much more growth is possible. What the past couple of years has shown is that the gains that have been made have been uneven across the country, and they are not as yet deeply rooted to ensure long term sustainability of the sector, at least outside BC. It is essential that stakeholders like CWC and Wood *Works!* keep their eyes firmly on the ball, and pursue measures including those outlined above in order to re-invigorate the markets and make wood buildings the norm in the mid-rise category across Canada.

Finally, it is important to understand that the opportunities for mid-rise buildings is big, probably much bigger than for mass timber structures. One message we heard from several of the focus groups is that there is risk in being too focused on mass timber at this time, when mid-rise is still in its infancy, and when the economics of mass timber are unclear. We heard this point made in several of the discussions.