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## ARCHITECTURAL INSTITUTE OF BRITISH COLUMBIA

July 18, 2008

VIA email: [trudy.rotgans@gov.bc.ca](mailto:trudy.rotgans@gov.bc.ca)  
Original Via Mail

Ms. Trudy Rotgans, MAIBC  
Manager, Codes Development  
Building and Safety Policy Branch  
Office of Housing and Construction  
**Ministry of Housing and Social Development**  
PO Box 9844 Stn Prov Govt  
Victoria BC V8W 9T2

Dear Ms. Rotgans:

**Re: Proposed Amendments to the BC Building Code to Allow Six Storey Wood-Frame Construction**

We are writing to provide APEGBC's and AIBC's comments and suggestions regarding proposed changes to the BC Building Code (the "Code") that would permit wood-framed structures of up to six storeys.

We have considered the "scoping review" dated June 18, 2008 (revised June 30, 2008) *Multi-Level Wood-Framed Structures: Requirements for Building Beyond Four Storeys* (the "Scoping Review") and the Building Policy Advisory Committee's notes of its conference call on June 25, 2008 (the "BPAC Notes"). We also sought comments from and had a meeting of members of both professions on July 9, 2008 (at which your attendance was very helpful) to discuss the Scoping Review and BPAC Notes and any additional issues or concerns not identified in those documents.

### EXECUTIVE SUMMARY

Based on discussions with our members, we do not see any insurmountable technical issues to six storey above-ground wood-frame construction for residential occupancy. The associations are committed to addressing issues that have been identified or are identified during the review process and developing guidelines, with the assistance and support of the Provincial government, with the objective of protection of personal property and the health, safety and welfare of the public.

It is critical that both the architecture and engineering professions are consulted throughout the review process so that they can provide input to Building and Safety Policy Branch (“BSPB”) and its consultants on technical and other issues identified to date and in the future and as any particular proposed Code changes evolve. Equally important is the need for sufficient time before and after any Code changes are enacted to educate industry participants on the changes’ implications; and so that technical issues can be addressed and all industry participants can make appropriate arrangements. This includes sufficient lead-in time between publication date and enforcement date to enable timely project-design decisions. Failure to identify the technical issues to our members and other industry participants in advance of the changes could have serious consequences.

We also strongly support the idea of BSPB creating an industry advisory committee that would act as a liaison and information source to BPSB, its consultant(s), APEGBC, AIBC and other stakeholders such as the Union of BC Municipalities (UBCM) and the Fire Commissioners’ Office. Both professions welcome the opportunity to participate in industry-wide and specialist advisory committees.

### **SPECIFIC ISSUES IDENTIFIED**

Given the time constraints, our list of issues and concerns has to be considered incomplete. Typically the process for implementing such significant changes to the Code is that good practices are first developed and become accepted as an industry standard, leading to an amendment to the Code to reflect this. The consultation and education process recommended in advance of any Code change will likely identify all the technical and Code related issues. However the compressed time-frame we are operating under increases the risk that some issues or solutions to problems will not be identified prior to the changes to the Code.

In addition to the items identified in the BPAC Notes and the Scoping Review, our comments are as follows:

#### **1) Fire Safety**

There will be increased opportunity to use a combination of the more traditional wood stick-frame construction and pre-engineered wood products. Such systems will require the availability of properly fire tested and listed assemblies with load limits addressed to make 6-storey wood-frame construction feasible.

When pre-engineered wood products such as cross laminated wood panels are used in the design, care must be taken to address the significant impact the failure of such panels in a fire may have on the overall structural integrity of the building, thus minimizing the ability to fight a fire safely using current fire fighting practices.

There must be consultation and careful coordination of this initiative with regional fire services throughout BC and the Office of the Fire Commissioner to ensure such stakeholders are in agreement so that regional variances are not imposed.

Criteria for height limits should be clear, to avoid misinterpretation or abuse.

#### **2) Fire Flow and Water Supply**

Some municipalities currently have engineering criteria which trigger much higher fire flow, including the amount of water needed for fire fighting of wood-frame construction, than is otherwise required under the Code. For example, some municipalities still use the Fire Underwriter Survey (FUS) guide to calculate fire flow, even though the FUS guide is no longer referenced in the Code. There is a need for consistent use and application of an appropriate standard to assess the required fire flow for a 6-storey wood-frame construction. It is recommended that BSPB clarify the appropriate standard to be used in determining fire flow for buildings, and consult with the various municipalities through UBCM so that common ground can be found.

**3) Fire Safety During Construction**

Although the Code's fire safety provisions primarily relate to completed and occupied buildings, fires during construction have proven to be a significant risk to surrounding structures as well the buildings under construction. In the case of 6-storey wood-framed buildings, the level of exposure and fire risk to adjacent properties will be more significant because of the 50% additional fire load.

Due to increasing concerns around security during the construction phase, additional research is necessary to address the fire hazard to the building as well as to the adjacent properties. Various means should be explored to reduce this risk.

**4) Occupancy**

The issues and concerns identified in this letter are based on the assumption that the Code changes are primarily intended to address residential use. Limitations on appropriateness of this initiative to other residential occupancies such as assisted living must be appropriately explored and addressed.

The proposal must address mixed-use occupancies, at least in the form of ground floor retail, assembly, office, etc. We understand that a consideration in this Code change is to increase density, which will increase the demand for mixed-use buildings. Therefore the initiative should explore the possibility of concrete construction for other occupancies posing higher fire hazard.

**5) Code Requirements and Current Construction Practices**

Prior to moving towards a 6-storey Code change, it is crucial that the existing problems and interpretations revolving around 4-storey wood-frame buildings are addressed by BSPB. Examples of these issues include:

- Methods of protection for openings in and penetrations of fire rated membranes.
- Continuation of vertical fire separations and means to achieve this in the concealed joist or truss space. (This issue sometimes is mitigated by using the ceiling "membrane" rating approach, which also has issues).
- Continuation of horizontal ceiling membrane rating without interruption.
- Fire resistance and load bearing requirements of fire separations in currently tested and listed assemblies. (This relates to load restriction factors resulting from conversion from working stress design to limit states design.)
- The existing 4-storey residential construction is lacking Code intent and objective statements. To assist designers in assessing and interpreting the Code, it is essential that the new requirements have clear intent and objective statements.

**6) Alternative Solutions**

A Code change permitting 6-storeys of wood-frame construction should eliminate the general need for alternative solutions.

In case of need for alternative solutions on specific projects, we would support creation of a Provincial body to review alternative solutions. This was also recommended by the Provincial Modernization Strategy Task Force.

**7) Structural and Seismic Issues**

The structural portions of the current Code and the referenced CSA documents do not require changes to allow the design and construction of 6-storey wood-frame buildings. The seismic design section of the Code has a maximum 20-metre height limit for wood shear walls, which should not pose a significant constraint.

The material design codes are written based on the limitations imposed by the National Building Code of Canada (NBCC) on the specific material. For example CSA O86 contains material specific to 4-storeys in the Wood/Drywall mixed systems. There is no guidance given for higher buildings. The aspect ratios allowed for shear walls may need to be reviewed to assess their appropriateness for the proposed 6-storey buildings. It is recommended that the Province formally notify the Canadian Standards Association (CSA) of their plan to allow 6-storey wood-framed construction in order that the CSA-O86 committee can assess whether this change would trigger the need to issue an addendum covering some items specific to 5- and 6-storey buildings.

It is imperative that guidelines be developed for structural engineers to facilitate the changes in practice required when increasing the building height by 50%. The Structural Engineering Association of BC ("SEABC") has committed to assist in the development of these guidelines through APEGBC. Sufficient time is needed for development of such guidelines. Significant work and resources are necessary to research, develop and adapt a comprehensive guideline for the structural design of engineered systems. This work should be done prior to any amendments to the Code, and the support and assistance of the Province would be of great benefit in meeting this need expeditiously.

**8) Wood Shrinkage**

Designing wood structures requires accommodating how wood changes dimension with moisture content. Some of the effects of shrinkage are cumulative with building height. This could be a matter of concern from design, aesthetic, maintenance and operational perspectives (e.g. air and water infiltration and shrinkage gaps between building components). Such considerations may be addressed through the increased usage of pre-engineered wood products as opposed to traditional wood-frame stick construction. However, in case of wood-framed stick construction additional research is necessary and similarly guidelines should be developed to address this concern.

**9) Building Envelope**

Increased building height will likely result in higher environmental moisture loads due to higher wind forces and increased rain runoff collection areas. Cladding systems must be able to accommodate the higher loads. Additional research, testing and consultation is necessary in this area and similarly guidelines for practitioners should be developed.

**10) Design Coordination**

Due to the level of complexity associated with 6-storey wood-frame residential construction there will be an increased requirement for guidelines and careful coordination of the architecture and engineering design of these structures. This will be especially crucial in areas of BC having high seismic and wind loads.

**11) Peer Review Process**

It is understood that a feasibility study and research project is being sought by the Province and BSPB regarding the 6-storey wood-frame building initiative. It is recommended that the work and findings of the consultant(s) preparing this study be objectively peer-reviewed by at least two members of the National Building Code Standing Committee on Fire Safety and Occupancy who are independent of the material industries.

**12) Industry Preparedness**

The education and training of the construction industry in the application of new technology and building systems is a significant consideration that must be addressed to facilitate the successful implementation of such an initiative.

**13) Insurance & Warranty Considerations**

The Homeowner Protection Office and the Municipal Insurance Association are considered important stakeholders. They must be engaged as both groups will impact the ability for individual municipalities to be able to issue permits for these types of structures.

**14) Implementation Considerations**

Initially proceeding with some prototype projects and requiring independent third-party review during the first few years would be an appropriate way in which to proceed.

**15) Regulatory Coordination**

It is also important that any changes to the Code be carefully drafted to avoid interpretations that would create inappropriate "Code creep": what was intended to be prohibited should not be possible. (As discussed above, it is equally important that any Code changes be drafted so that what was intended to be permitted is clear and not contradicted by another portion of the Code). This can be addressed by providing clear intent and objective statements for the proposed changes to Code articles.

The Code change should also be coordinated with other pertinent regulatory standards and codes such as those relating to fire fighting and water supply.

**CONCLUSION**

Both AIBC and APEGBC have considered and are supportive of the concept of 6-storey wood-frame construction subject to design, technical and implementation issues being appropriately addressed as outlined above. The associations are prepared to work with the Province in addressing the issues.

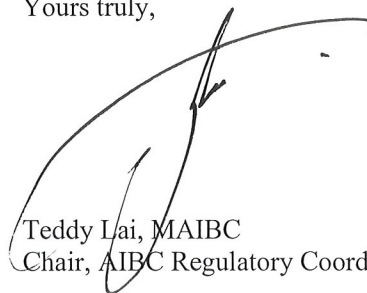
We thank you for the opportunity to comment on this initiative. We look forward to further developments, discussion, and being able to contribute to the process of implementing the changes successfully.

Yours truly,



Khash Vorell, P.Eng.  
Chair, APEGBC Building Codes Committee

Yours truly,



Teddy Lai, MAIBC  
Chair, AIBC Regulatory Coordination Committee

/gat

cc. Peter R. Mitchell, P.Eng., Director, Professional Standards & Development, APEGBC  
Michael Ernest, MAIBC, Director of Professional Practice, AIBC