

FPInnovations 

OUR NAME IS INNOVATION

Inspiring 100 Year Old Tall Wood Buildings in Canada

 Wood Solutions Fair

Toronto Wood Solutions Fair
November 12, 2013

Kenneth Koo, P. Eng, P.E.
M. Mohammad, P. Eng, PhD
Advanced Building Systems

Copyright Materials

This presentation is protected by US and International Copyright laws. Reproduction, distribution, display and use of the presentation without written permission of the speaker is prohibited.

© FPInnovations 2013



Program Education Credit Information

The Canadian Wood Council is a Registered Provider with the American Institute of Architects. This course meets Continuing Education System requirements for one Learning Unit. Credit earned on completion of this program will be reported to CES Records for AIA members who provided their member number during the online registration. This course also qualifies as Structured Learning with OAA. Certificates of Completion for OAA members, and anyone else who indicated they wanted a certificate, will be emailed after the event to those who requested them during the registration process. We will also report participation to the Engineering Institute of Canada on behalf of any engineers who requested their participation be recorded.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. The same is true for the OAA and EIC. Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



Issues with Wood Construction



Courtesy: Forest Products Laboratory

Fire:

After fire scene, wood beam supporting twisted steel I-beams
(Against common misconception!)



Courtesy: Wikimedia Commons

Durability:

- Horyuji Temple, five-storey Pagoda
(*Temple of the Flourishing Law*)
- Ikaruga, Nara Prefecture, Japan
- UNESCO World Heritage Site
- Built in **607AD**

- The **Wood** culture in NA is quite rich
- Industrial, commercial and res. **Wood** buildings have been serving occupants for a over a century (i.e., code compliant)

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.



Brick & Beam Buildings

- Adaptive Re-use of the industrial old brick & timber buildings from early 1900's into unique work or living environments
- Up to 8 storeys (≈100 ft or 31 m high)
- Up to 326,759 ft² (≈ 32,500 m²)
- Built from 1859 to 1940
- Factories, warehouses and manufacturing plants - during the industrial era
- All across Canada



6

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.



Features of Brick & Beam Buildings

- ❑ B & B buildings offer unique interiors
 - high ceiling
 - exposed wood structural frames
 - exposed metal connectors
 - exposed mechanical systems
 - central & core location in city
- ❑ Today:
 - Telecommunication & IT
 - Business & Professional Services
 - Retail & Offices
 - Restaurant & Condominiums



7

© 2013 FPinnovations. All rights reserved. Copying and redistribution prohibited. © FPinnovations, its marks and logos are trademarks of FPinnovations.

FPinnovations 

Brick & Beam Buildings

- ❑ Toronto - 129 buildings
 - 43 buildings = 5 storeys +
 - 19 buildings = 7 to 8 storeys
 - Floor space = 190,000 ft² (single building)
- ❑ Vancouver – 50 buildings
 - Historical Buildings
 - The Landing
 - The Leckie
- ❑ New apartments additions
 - Meets current code requirements
 - Massey Harris HO (1905) => Loft condo (2003)



8

© 2013 FPinnovations. All rights reserved. Copying and redistribution prohibited. © FPinnovations, its marks and logos are trademarks of FPinnovations.

FPinnovations 

Toronto B & B office buildings



204 King East,
127,388 ft², Monster & AutoDesk



468 King West
65,027 ft², Indigo head office



30 Duncan St
64,000 ft²,
Professional offices such as
Architects & Energy Management
Consultants



185 Spadina Ave
55,814 ft²,
IBM Algorithmics software

9

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.



Vancouver B & B buildings:



55 Water Street, **Gastown**
1912 Malkin & Co. Grocery warehouse



321 Water Street, **Gastown**



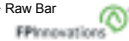
1111 Mainland St, **Yaletown**
Yaletown Brewing Company



1095 Hamilton St, **Yaletown**
Blue Water Blue Water Cafe + Raw Bar

10

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.



B & B – Office



11

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations. Its marks and logos are trademarks of FPInnovations.



B & B - Retail & Restaurant

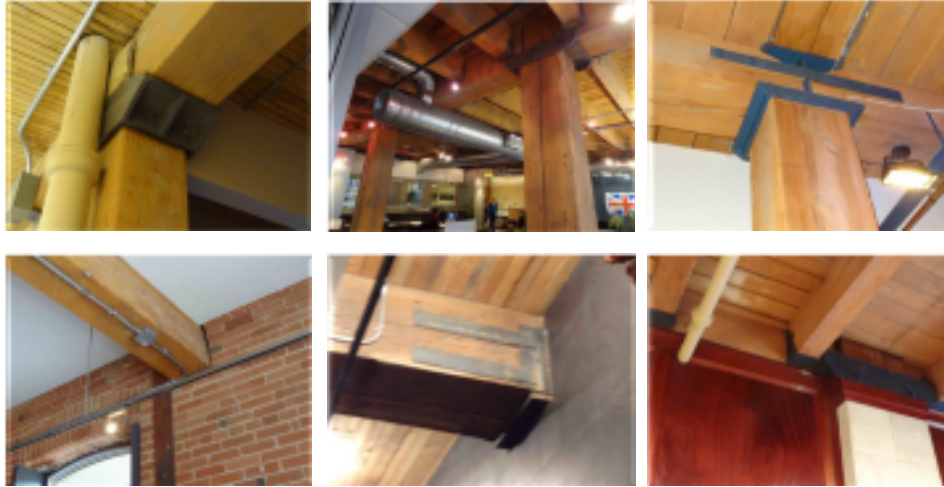


12

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations. Its marks and logos are trademarks of FPInnovations.



Typical Interior Posts and Beams



13

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.

FPInnovations 

OLDEST Brick & Beam Buildings

- ❑ “Distillery District” is a historic site with 60 buildings
- ❑ The 5 storey Stone Distillery was built in 1859
- ❑ It (and more than 40 buildings) is now a pedestrians village for arts, culture and entertainment.
 - It is the 2nd largest film location outside Hollywood with over 1700 films



Courtesy: www.distilleryheritage.com



14

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.

FPInnovations 


LARGEST Brick & Beam Building

- ❑ Toronto Carpet Factory was built between 1899 and the 1920s in “Liberty Village”
- ❑ 312,000 ft² complex of eight buildings on a four-acre block site
- ❑ Main building = 190,000 ft²
Ceiling height = 12' to 22'
6 storey building



15

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.

FPInnovations 

TALLEST Brick & Beam Building

- ❑ The Landing, Gastown, Vancouver
 - Storeys: 7 / 9
(two below Water Street level)
 - Height: 30m (≈10 storeys)
 - Total building area = 174,713 ft²
 - Renovated & restored in 1987 and conforms to current BC Building Code for seismic requirements
 - 3 buildings with 2 new concrete cores with floor reinforcement



16

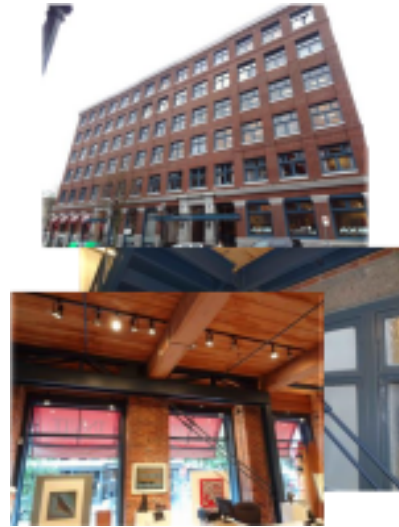
© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.

FPInnovations 

INNOVATIVE RENOVATION Brick & Beam Building

□ The Leckie, Gastown, Vancouver

- 7-storey warehouse / factory building built in 1908/1913 with brick and granite facade
- Renovated in 1991
 - City of Vancouver Heritage Award for structural upgrading
 - *Diagonal steel rods* are part of the seismic upgrading system and tied to anchors 90 feet below ground



17

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.

FPInnovations 

Recent Trends

- Recently, strong interest to re-specify wood in non-res. & mid and high rise buildings
- Several factors have contributed to this:
 - Availability of new generation of innovative EWP, connection systems & design tools
 - Recent changes to building codes
 - Development of CLT in Europe (i.e., ease of prefabrication & assembly, use in infill projects)
 - Environmental concerns (i.e., climatic changes)

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.

FPInnovations 

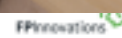
Innovative Connection Systems for Timber Constructions (European Systems)



Concealed and easy to assemble

Source: Rothoblaas

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.



Modern Mid-rise Wood Frame Construction in B.C. (Residential - C)



20

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.



Mid-rise Wood Frame Construction with concrete podium (mixed occupancy – Group C & E)



21

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.



CLT in Hybrid Construction – Vancouver, BC



UBC New Earth Sciences Building
Hybrid CLT/Steel/Concrete



FPInnovations, its marks and logos

Photo: KK Law Photography

6 Storeys CLT Building in Quebec City



Under construction

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.



Renaissance of Tall Wood Buildings

□ The Case for Tall Wood Buildings

- How mass timber offers a Safe, Economical and Environmentally friendly alternatives for tall building structures
- Architect: Michael Green (2012)

□ CWC/NRCan (10+)

- Canadian Tall Wood Demonstration Project - Expression of Interest (2013)
- CWC is in the process of evaluating submissions & announce the proponent and project in 2014

□ FPInnovations

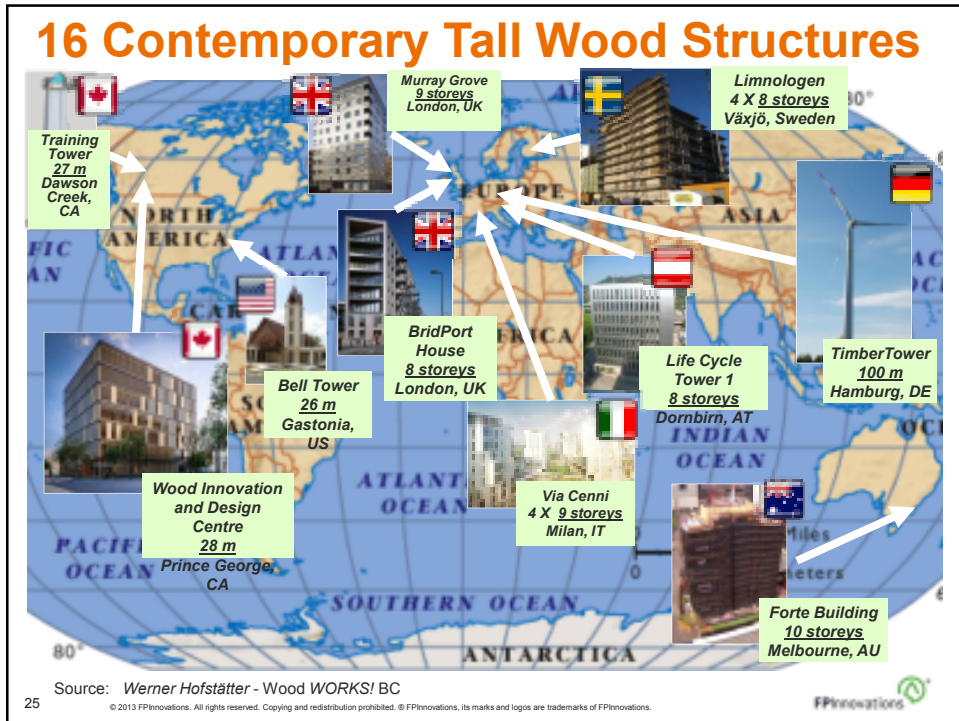
“TECHNICAL GUIDE FOR THE DESIGN AND CONSTRUCTION OF TALL WOOD BUILDINGS IN CANADA
90% draft” - Aug 2013



24

© 2013 FPInnovations. All rights reserved. Copying and redistribution prohibited. © FPInnovations, its marks and logos are trademarks of FPInnovations.





Conclusions

- Historical brick & beam (post & beam) buildings are treasured and loved buildings in Canada – quite inspiring.
- Wood buildings are durable and capable of serving its intended use.
- Wood building should be designed based on performance without arbitrary limits placed on height, area and usage.
- Wood buildings can be upgraded for seismic & fire resistance.
- EWP including Mass Timber and Glulam are good alternative to solid timber used in the historical tall buildings.