

Wood Design Seminar

Opportunities in Mid-rise Construction

May 8th & 9th 2014.

Steven Street
Wood-Works!



Presentation :

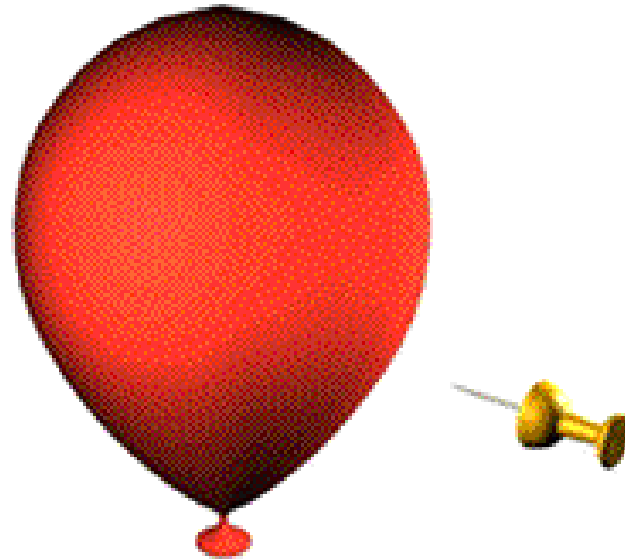
Background on the mid-rise file

Mid-Rise Construction

“Wood re-loaded”

Exploring design trends utilising wood in mid-rise developments

- *products and applications*
- *Code considerations*



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Timber is the New Concrete University Lecture Series

Timber is the New Concrete

the work of dRMM Architects



an international guest lecture by
Alex de Rijke, BA, MA (RCA), Dip Arch, RIBA,
Director, dRMM Architects, London, UK

01 November 2011 - 6:30 to 7:30 p.m.

University of Toronto, John H. Daniels
Faculty of Architecture, Landscape, & Design
230 College Street, Lecture Room 103

hosted by



A highly abbreviated synopsis of technology as the key driver of architecture is as follows:

The 17-18C was the era of brick, the 19C was the era of the steel frame, the 20C was the era of concrete. As the politically charged global energy crisis develops, and CO₂ emissions become legal issues, the 21C will be the era of renewable timber.

dRMM regards engineered timber as one of the most interesting and sustainable high-performance materials of the future. Alex de Rijke will present dRMM's design work not only as dynamic architecture, but also as "pioneer projects of a 21C industrial ecology revolution."

- AdR

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Murray Grove project – London, UK

- Tallest modern solid timber building in the world
- No sprinkler system – party walls are rated for 1.5 hours – compartmentalize fire.
- 9 weeks construction time



Bridport House

1090

41 new residential units for Hackney Homes in East London. The existing housing block is being replaced by the eight- and five- storey building, accommodating 1 - 4 bed residential units. The housing is built to Code Level 4 and complies with Lifetime Homes. When completed, this will be the largest solid timber building in the UK.

SERVICES
structural design of timber superstructure
supply and installation of timber superstructure

MATERIALS
crosslam. glulam

INSTALLATION
10 weeks

GIFA
4,154m²

STORED CARBON
1198 tonnes CO₂



CLIENT
Hackney Borough Council
ARCHITECT
Karakusevic Carson Architects
TIMBER ENGINEER
CarbonEng

MAIN CONTRACTOR
Willmott Dixon Housing

PROJECT VALUE
£5.9 million

COMPLETION
2011

ENVIRONMENTAL RATING
CSH Level 4




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THE BRIEF Open Academy, Norwich

- 3500m³ timber
- 2700t CO₂ stored
- Equivalent to 30% renewables for 20 years or carbon neutral for 10 years?

Courtesy of Ramboll

Forté, Docklands, Melbourne



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Overview

Forté is the tallest timber apartment building in the world - at 32.17 metres tall. By using Cross Laminated Timber (CLT), Forté, reduces CO2 equivalent emissions by more than 1,400 tonnes when compared to concrete and steel - the equivalent of removing 345 cars from the roads.

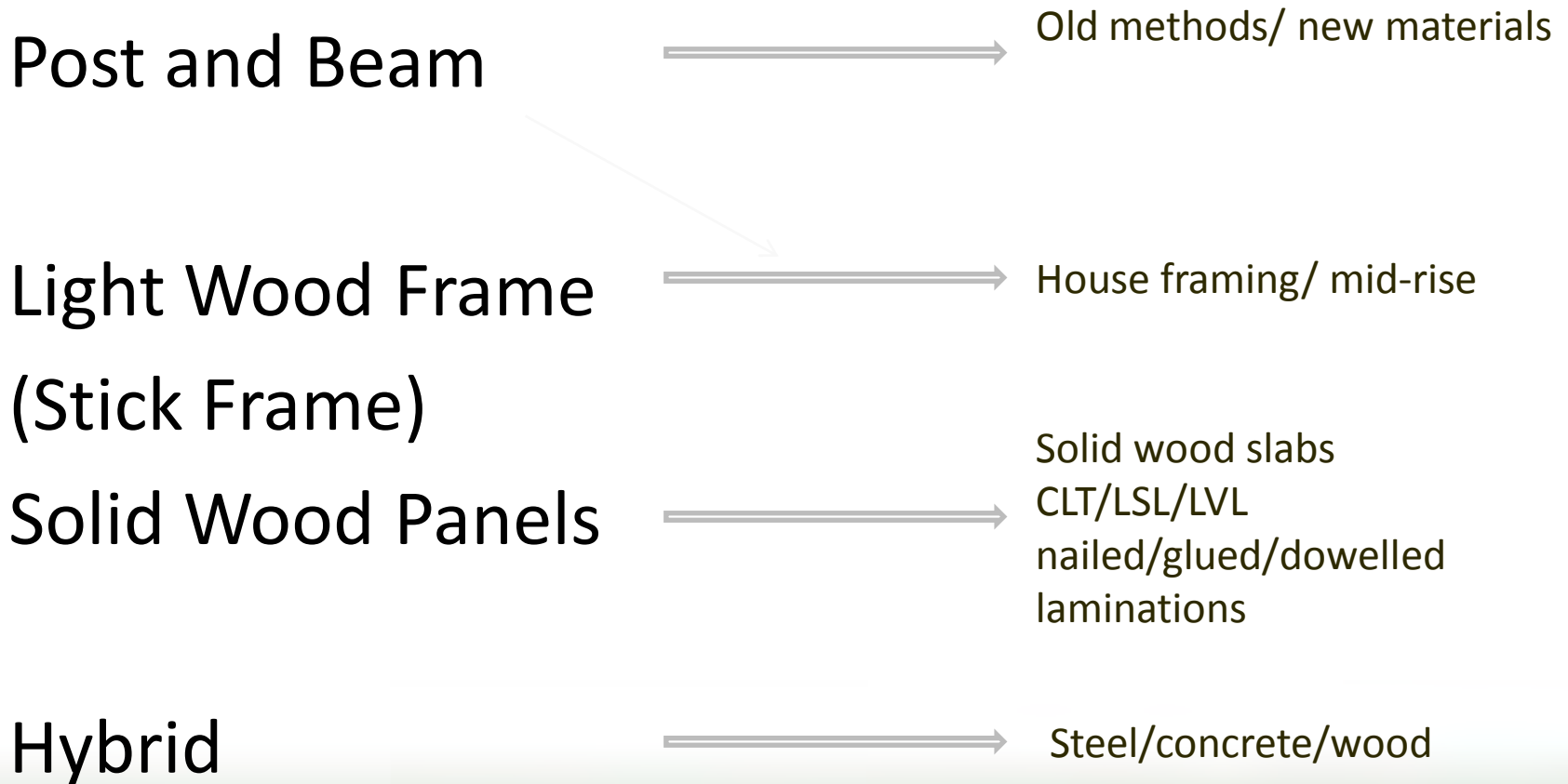
Detail

Aspiring to be the first 5 Star Green-Star As Built certified residential building in Australia, Forté towers over 10 storeys offering 23 residential apartments with ground floor retail.

Neighbouring the tower will be 4 luxury townhouses. The tower is designed and constructed by Lend Lease and will reflect the contemporary inner-city lifestyle of Victoria Harbour.



Evolution





A Study on Historical Tall-Wood Buildings in Toronto and Vancouver

First edition

Project No. 301006152 Canadian Forest Service Final Report 2012/13

May 2013

Author

Kenneth Koo, P. Eng, P.E., Industry Advisor, Advanced Building Systems

This project was financially supported by the Canadian Forest Service under the Contribution Agreement existing between the Government of Canada and FPInnovations.

Appendix B-1: Photos of Historical Tall Wood Buildings, Toronto

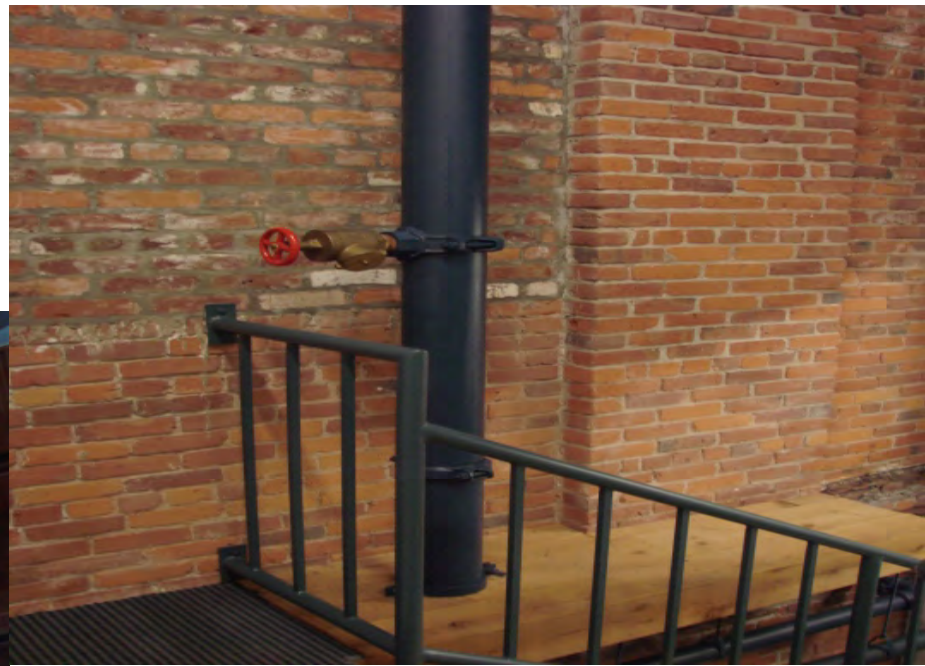


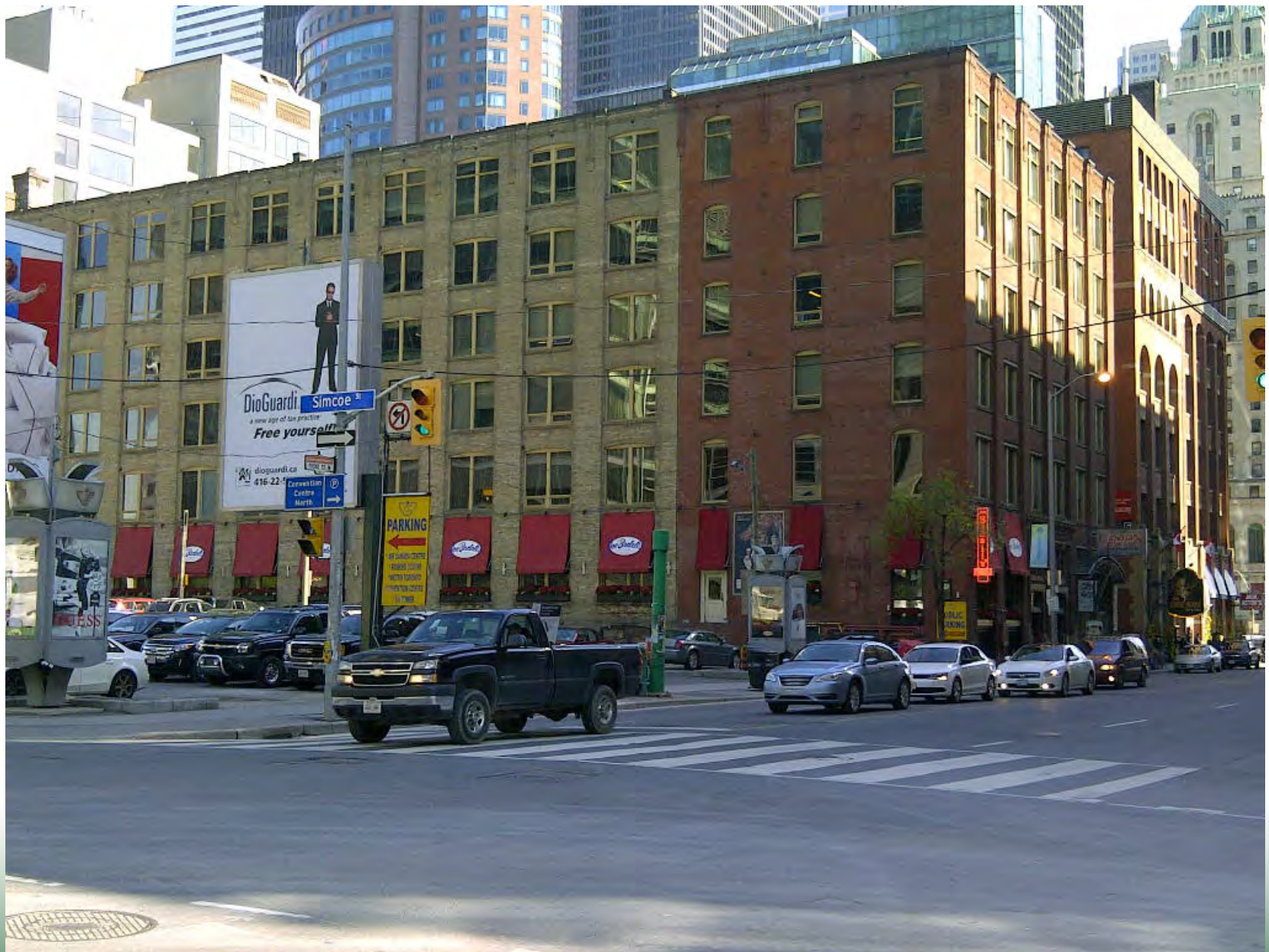
- the internal structure of the building is built of massive timber elements.



Buildings are 100 years +

Durability!





156 Front Street, Toronto, Ontario

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Light Wood Frame

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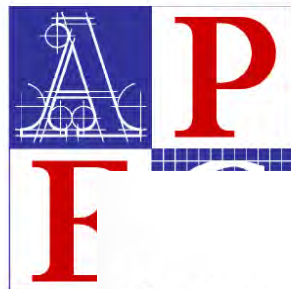
BC Mid-rise data: 156 projects, 258 bldgs. (contemplated, design, under construction)

Building Types:

All six in wood	45%
Five wood on one concrete	13%
All five in wood	26%
Four wood on two concrete	2%
Four wood on one concrete	10%
Three wood on two concrete	1%

- over \$2.6 billion (potential) of new construction in BC!

APEGBC Technical and Practice Bulletin



Professional
and General
www.apegbc.ca

Structural, Fire Protection
Professional Engineer
Wood Frame Residential

Building Enclosure Design Guide

WOOD-FRAME MULTI-UNIT RESIDENTIAL BUILDINGS



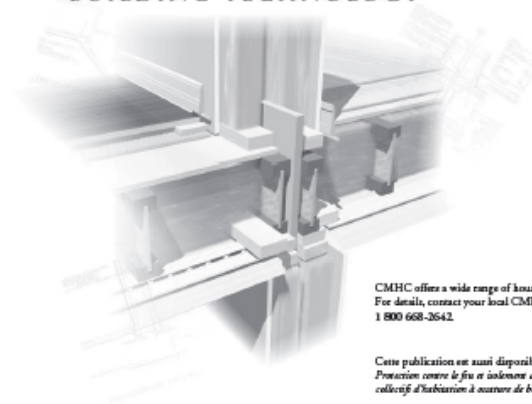
RDH | Building Engineering Ltd.

FPInnovations



FIRE AND SOUND CONTROL IN WOOD-FRAME MULTI-FAMILY BUILDINGS

BEST PRACTICE GUIDE
BUILDING TECHNOLOGY



CMHC offers a wide range of housing-related information. For details, contact your local CMHC office or call 1 800 668-3642.

Cette publication est aussi disponible en français sous le titre : Protection contre le feu et isolement acoustique des collectifs d'habitation à ossature de bois—62943

28-06-06

Canada



National Research
Council Canada
Institute for
Research in
Construction

Conseil national
de recherches du Canada
Institut de
recherche en
construction



ALBERTA INSTITUTE OF BRITISH COLUMBIA



Homeowner
Protection Office
Branch of BC Housing

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Skyline Residences - Esquimalt





Sandman Hotel,
Kamloops





Mosaic, Vancouver, BC



Vancouver-UBC







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technical challenges of Six storey wood structures

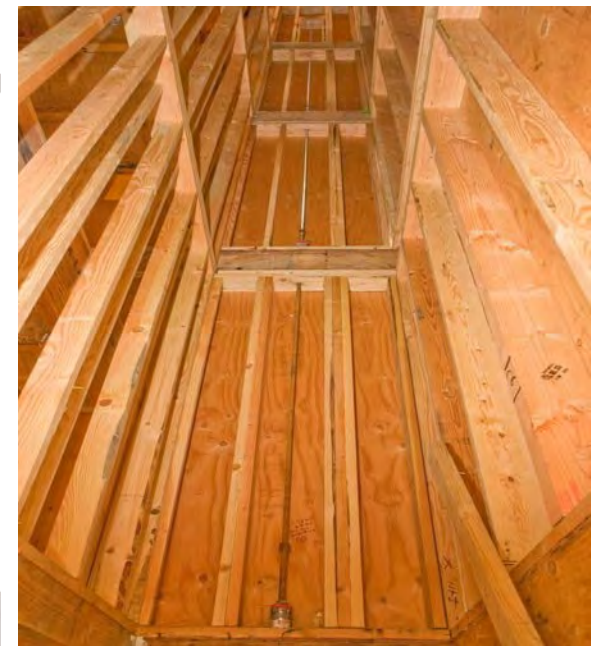
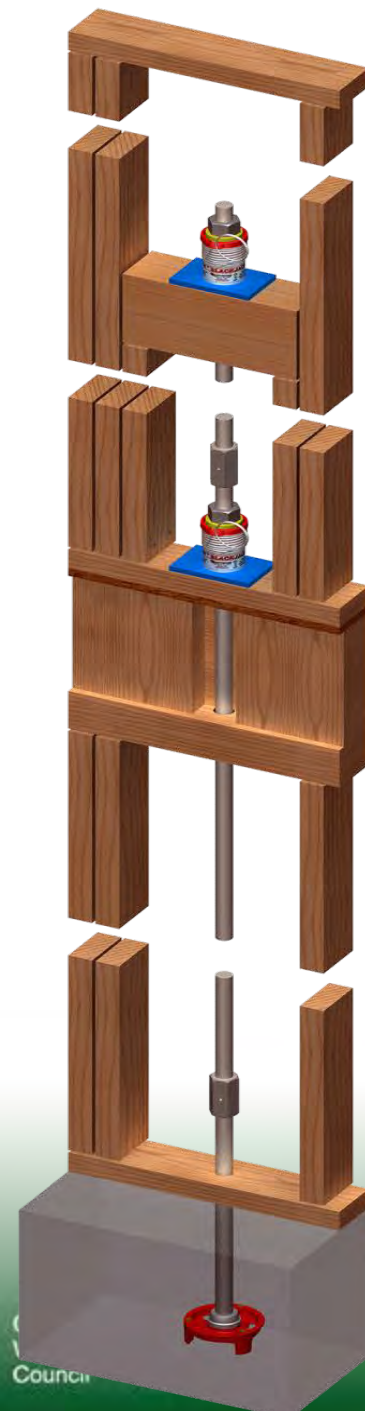
All of these:

Architectural, Structural, Fire, Plumbing, Sprinklers, Mechanical

Need to take into account.....

- Effects of Shrinkage
- Effects of Differential Settlement
- Effects of Shear and Lateral Movement
- Fire Walls and Area Separation Walls
- NFPA 13 Sprinkler requirements
- Non-combustible exterior cladding

- Successful shake table test 7 storey wood frame- (Japan 2009)
- Technical documents produced
- Systems were developed or brought in





Kingston, ON

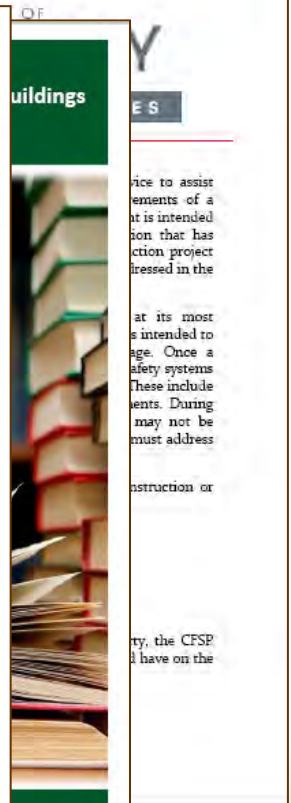
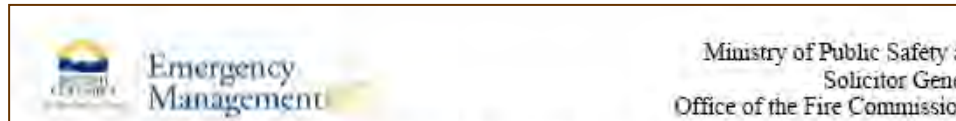




Remy fire,
Richmond BC



Fire Issues/Studies



The purpose
with an emphasis
Columbia
construction

This bulletin

- Br
- Br
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- BC
- co

Fire Safety and Security

A TECHNICAL NOTE ON FIRE SAFETY AND SECURITY ON CONSTRUCTION SITES IN BRITISH COLUMBIA

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Canadian Wood Council / Conseil canadien du bois



Building Envelope
for 5 and 6 Storey
Projects (Mid-Rise)



Creating a Fire-safe Construction Site

- Steven Craft, PhD, P.Eng,
Ineke Van Zeeland, M.Eng., ASFPE,
Steven Street



Photo credits: Sukh Johal, Wood**WORKS!** BC




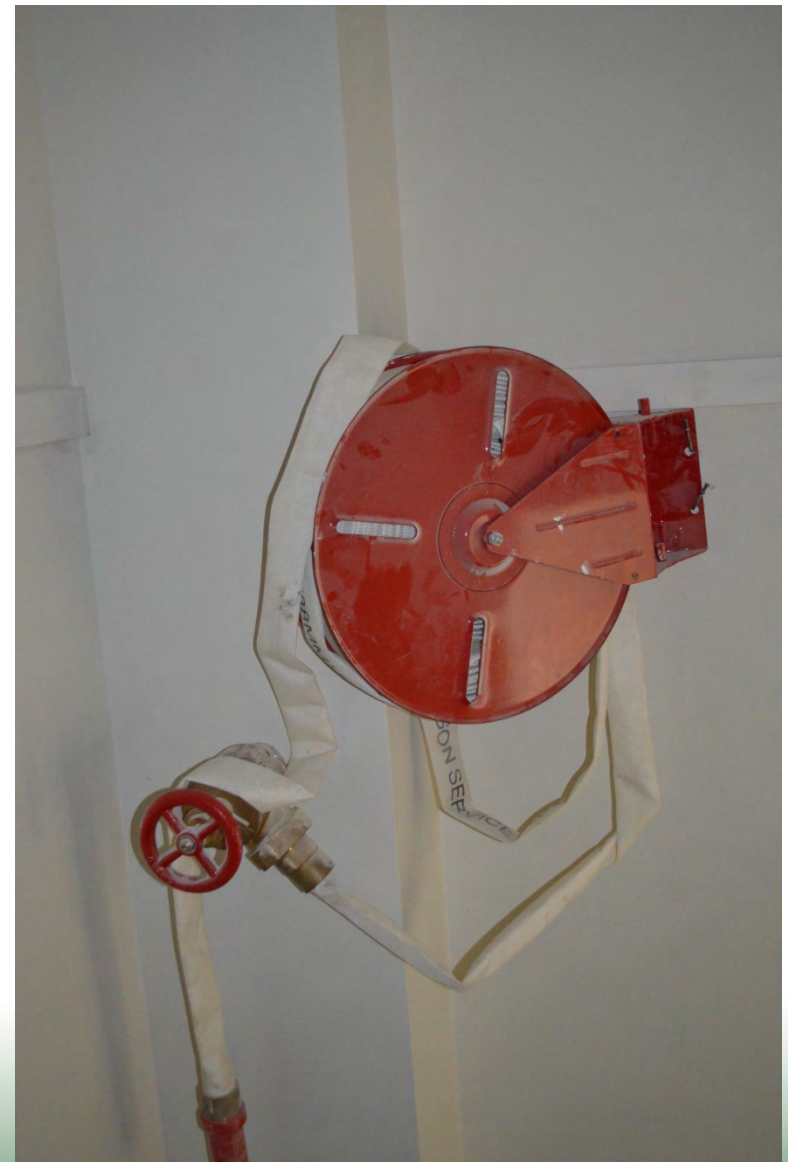


Photo credits: Sukh Johal, Wood**WORKS!** BC

Discussion needed on new construction procedures

- Floor by floor construction to include installed Firedoors (with fuseable links) + Charges standpipes installed as you build your way up.
- Hotworks or not?
- Smoking policy



Fire Protection

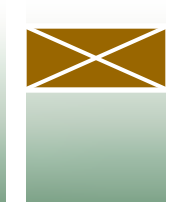
Building codes require all building systems to perform to the same level of safety, regardless of material used.

1h Fire Rated Wall Assemblies

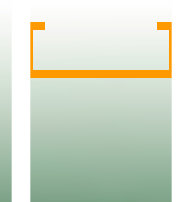
All 3 wall assemblies may be designed to pass CAN/ULC-S101 for 1h FRR.



Wood Stud



Steel Stud



Concrete / Masonry



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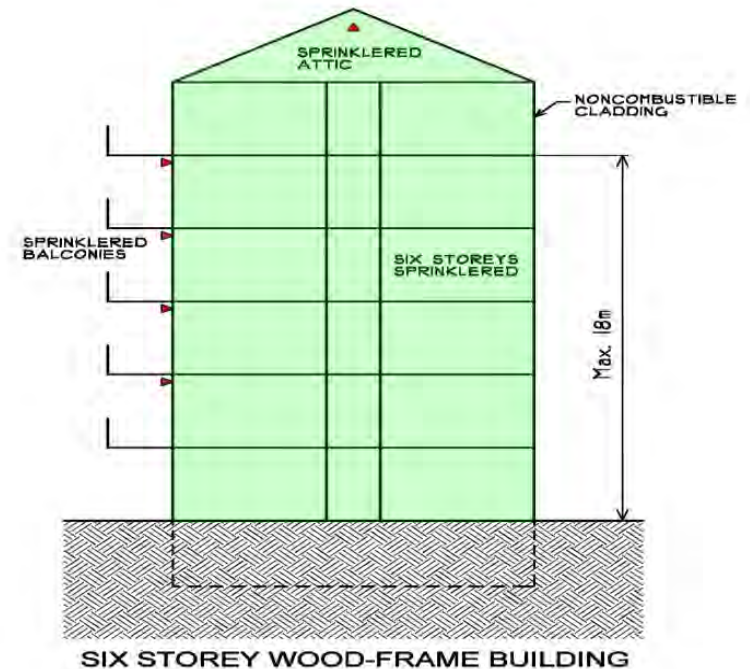
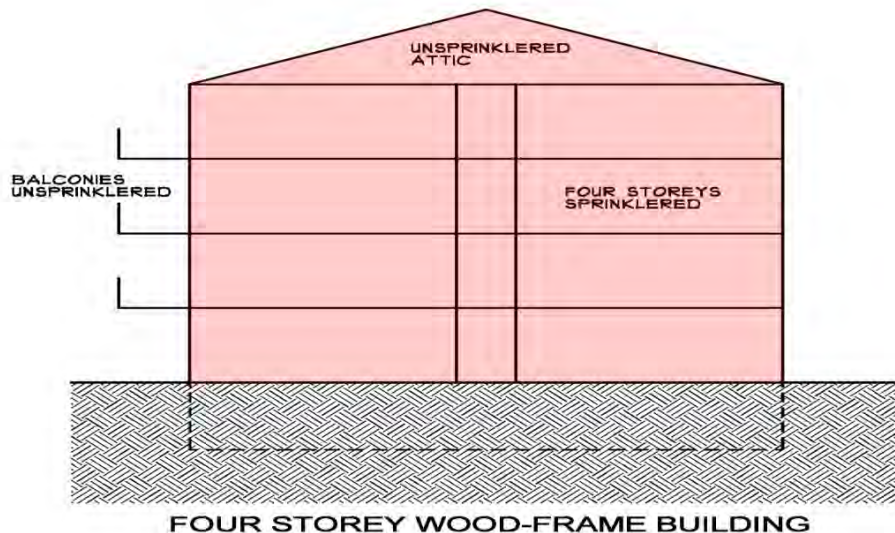
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Fire Protection

- NFPA 13 Sprinkler System
- small rooms, closets, balconies
- Attics, roof void spaces
- Combustible concealed spaces
- A larger sprinkler design area may be used





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North Kamloops Library, Kamloops, BC



Library Square, Kamloops, BC



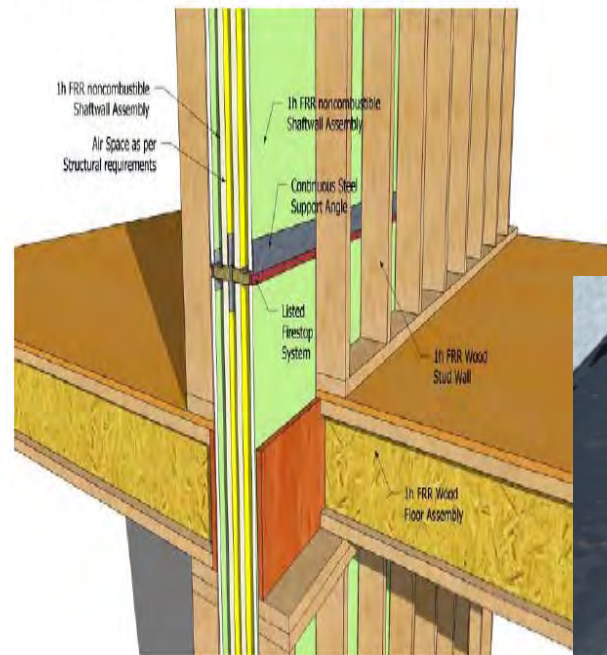
I joist floors, I joist roof
2hr wood party walls
Wood elevator shaft

Uplift forces:
84 locations 18,840 lbs
On the first floor





APPENDIX F: NON-COMBUSTIBLE WALL ASSEMBLIES



Firewall Using Two Shaftwall Assemblies
Perspective View



Library Square, Kamloops, BC





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Avenues and Mid-Rise Building Study

- The City of Toronto predicts population growth of over 3 Million people by 2031 (growth of 500,000 people)
- City's official plan encourages growth be directed to intensification areas, including the "Avenues"



Ontario's Mid-Rise Interest

- Mid-Rise buildings plan a vital role in the Avenues solution to cope with the population growth
- Avenues amount to about 324km of property frontage
- Approx. 200km of this can be redeveloped accommodating a mid-rise form



Ontario's Mid-Rise Interest

- Combustible construction design flexibility and affordability
- Supports sustainable design
- Supports growth model on the “Avenues” and the Golden Horseshoe Growth Plan objectives
- Mixed occupancy
- Supports the forestry sector





wood solutions in mid-rise construction



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Courtesy Quadrangle Architects Ltd.

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UNLOCKING THE POTENTIAL FOR MID-RISE BUILDINGS

SIX STOREY WOOD STRUCTURES

Prepared for the Building Industry and Land Development Association

The professional advice of Paul J. Bedford FCIP, RPP
Adjunct Professor, Urban & Regional Planning
University of Toronto and Ryerson University

February 2013

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TORONTO, May 15, 2013 /CNW/ - Representatives from the building and development industry are releasing an extensive report calling for a change to the Ontario Building Code.

The changes, endorsed by City of Toronto's Chief Building Official and Chief Planner and similar to those made in British Columbia, will allow woodframe construction of buildings up to six storeys, resulting in the creation of more safe and affordable homes for residents across the GTA.

Brief remarks by industry leaders will be followed by interview and photo opportunities.

When:

Wednesday, May 22, 2013

10:30 a.m.

Where:

589 King Street East, Toronto

Outside Toronto Community Housing's Waterfront Toronto development

Who:

Bryan Tuckey, President and CEO, Building Industry and Land Development Association (BILD)

Leith Moore, President, Ontario Home Builders' Association (OHBA) and Vice President, Development, Sorbara Development Corporation

Marianne Berube, Executive Director, Ontario Wood Works, Canadian Wood Council

Jennifer Keesmaat, Chief Planner, City of Toronto

Ann Borooah, Chief Building Official, City of Toronto

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BC's Building Code-Prior to change



Kelowna 4 storey

Kelowna 4 storey+ mezzanine



Photo Credit: Sukh Johal, WoodWORKS!BC



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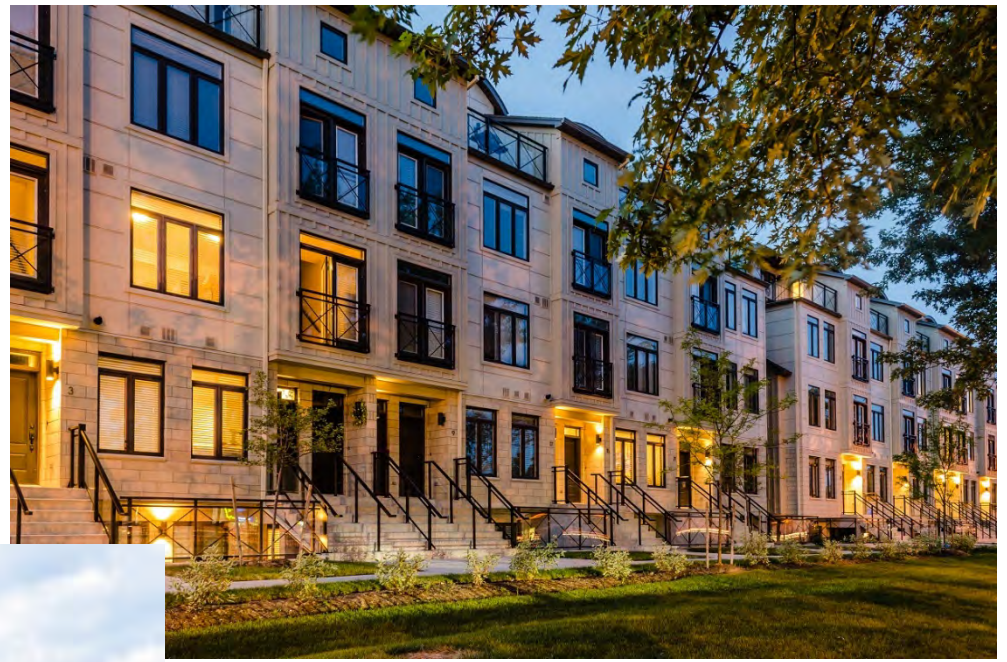
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WAVE

Three Buildings in One Incredible
Lakeside Community

BRANTHAVEN
HOMES

CATCH
THE WAVE!

If you love the style and the view the lake, you'll love Wave Condos. The first release in the successful Brant Haven Lakeside neighborhood, Wave Condos is a stunning blend of rustic design and modernity. Wave Condos are an intimate collection of just 55 units in a four-story building with a modern design. Brant Haven Lakeside is a beautiful and convenient location. Wave is located in the heart of the Brant Haven Lakeside community. Only 10 minutes from the lake.

Coastal & Classic

Wave's first floor features a mix of rustic and modern design. The rustic design includes stone, wood, and metal accents. The modern design includes large windows, glass doors, and a clean, minimalist aesthetic. The combination of these elements creates a unique and inviting atmosphere. The building is designed to be a part of the Brant Haven Lakeside community, offering a lifestyle that is both relaxing and active. The location is perfect for those who want to be close to the lake and enjoy the beautiful views. The building is a great investment for those who want to live in a high-quality, modern community. The design is a perfect blend of rustic and modern, creating a unique and inviting atmosphere. The building is a great investment for those who want to live in a high-quality, modern community. The design is a perfect blend of rustic and modern, creating a unique and inviting atmosphere.

© 2014 Brant Haven Lakeside Homes

WAVE CONDO UNIT 101 (2014)

WAVE CONDO UNIT 101 (2014)



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In-plant machinery is computer-controlled, allowing for a seamless flow of information to the assembly floor.



Floor and wall panels are fabricated and assembled ensuring the final product meets the highest standards.









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CLT & Heavy slab use.....











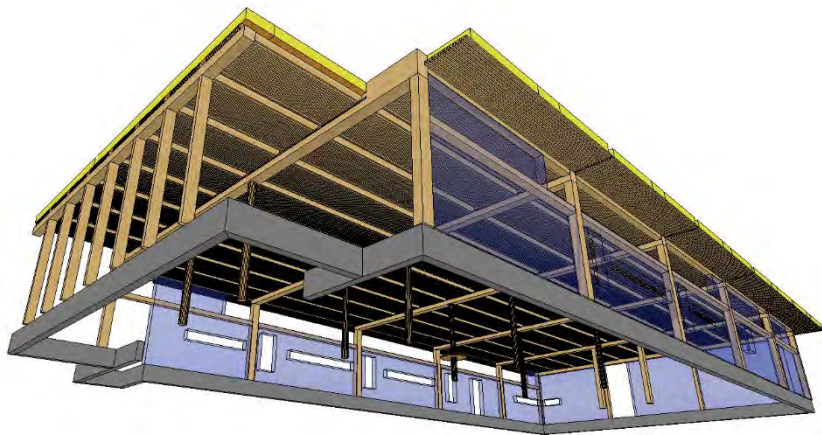


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Cross-Laminated Timber (CLT) Panels



- Product developed in Europe
- Lightweight & prefabricated systems
- Wood strips stacked crosswise on top of each other (glued or nailed)
- Creates thick and large panels
- Thicknesses of the panels vary from 50 to 600 mm
- Cross lamination minimizes swelling and shrinkage in the board plane
- Increases considerably the load-bearing capacity
- Two way action such as concrete slab – *ability to span width and lengthwise.*

Structurlam Cross Laminated Timber Elkford Lake Recreation Centre, BC



ESSB

UBC Campus, BC



ESSB

UBC Campus, BC



CIRS

UBC Campus, BC





OVERVIEW

“One building off by itself has zero impact on the world’s climate, but a building that is influential and begins to change the way that architects, engineers, contractors, developers and financial institutions shape the built environment, that’s a building that was worth building.”

- Denis Hayes, CEO, Bullitt Foundation

Buildings account for an estimated 39% of carbon dioxide emissions, 65% of waste and 70% of electrical use in the United States. In the Pacific Northwest, a changing climate is already shifting our use of water, energy and other natural resources. To address this reality, the Bullitt Center in Seattle, WA is demonstrating what is possible today and inspiring tomorrow’s leaders to go even farther.

Why is the Bullitt Foundation building the Bullitt Center?

The era of cheap abundant energy, plentiful fresh water, and localized impacts of human activities is over. Humans now affect every corner of the planet. Yet virtually no new buildings – even “green buildings” – are being built to function harmoniously in the conditions we know will prevail. The Bullitt Center is designed to still make sense 250 years from now. And it was built to ease barriers for projects yet to come. The first Prius cost more than the 10,000th. But before you can build the 10,000th of anything, you need to build the first.

Bullitt Center Seattle WA



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Thank You.

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