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Cross Laminated Timber (CLT) in the Context of Wood Building Systems

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One vision.
Global competitiveness.

**NEW VALUE FOR A
CHANGING MARKETPLACE**

Wood-Based Building Systems

- Light Wood-Frame
- Heavy Timber
- CLT

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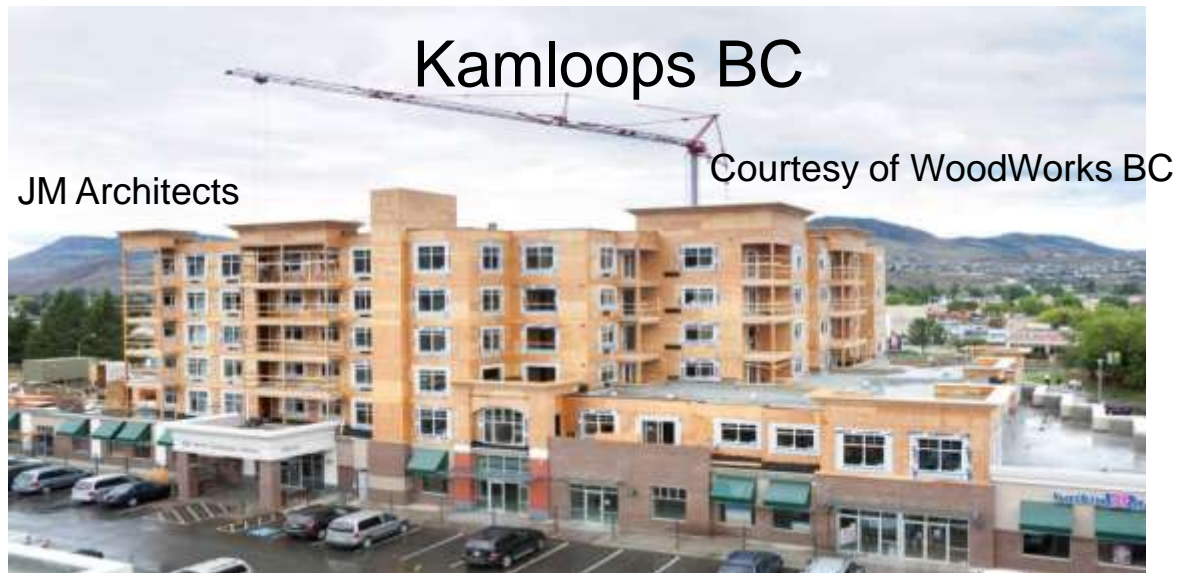
Light Wood-Frame Construction (up to 6 Storey)

- Wood First Act in BC
- New heights for wood-frame buildings in BC
 - Over sixty 5-6 storey projects are underway
 - Ontario and Quebec may be next!

Vancouver BC



Kamloops BC

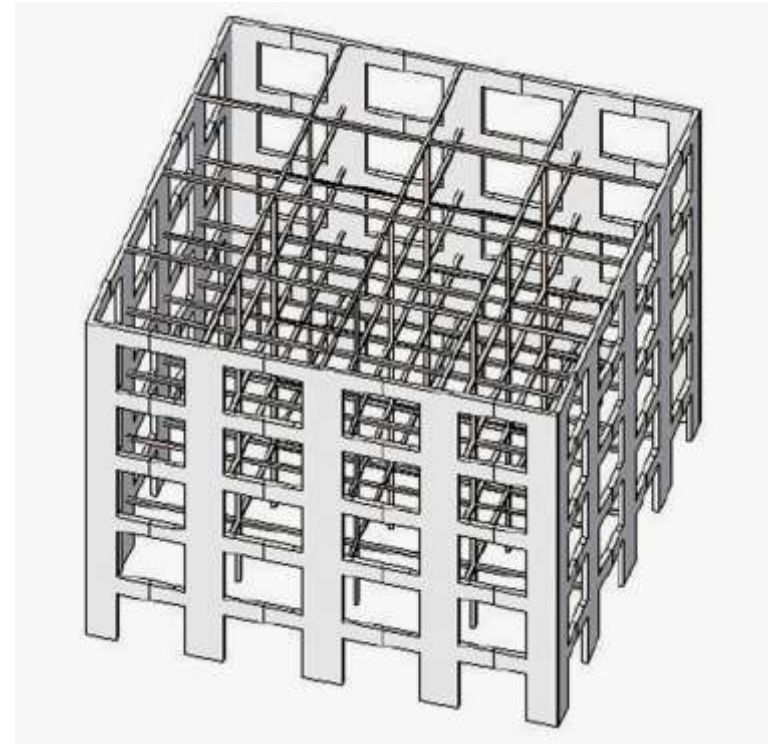


Wood-Based Building Systems

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Brick-and-Heavy Timber Mid-rise Buildings, 1905

- Gastown, Vancouver, BC
- Kelly, Douglas and Co. Warehouse



- 18,000 m²
- Height: 30m

Six-Storey Hybrid Wood-Concrete Office Building, 2010

Post & beam mid-rise building in Québec City:

- Québec's use of wood in the non-residential and multi-residential sectors policy
- Approved by Régie du bâtiment
- LEED GOLD



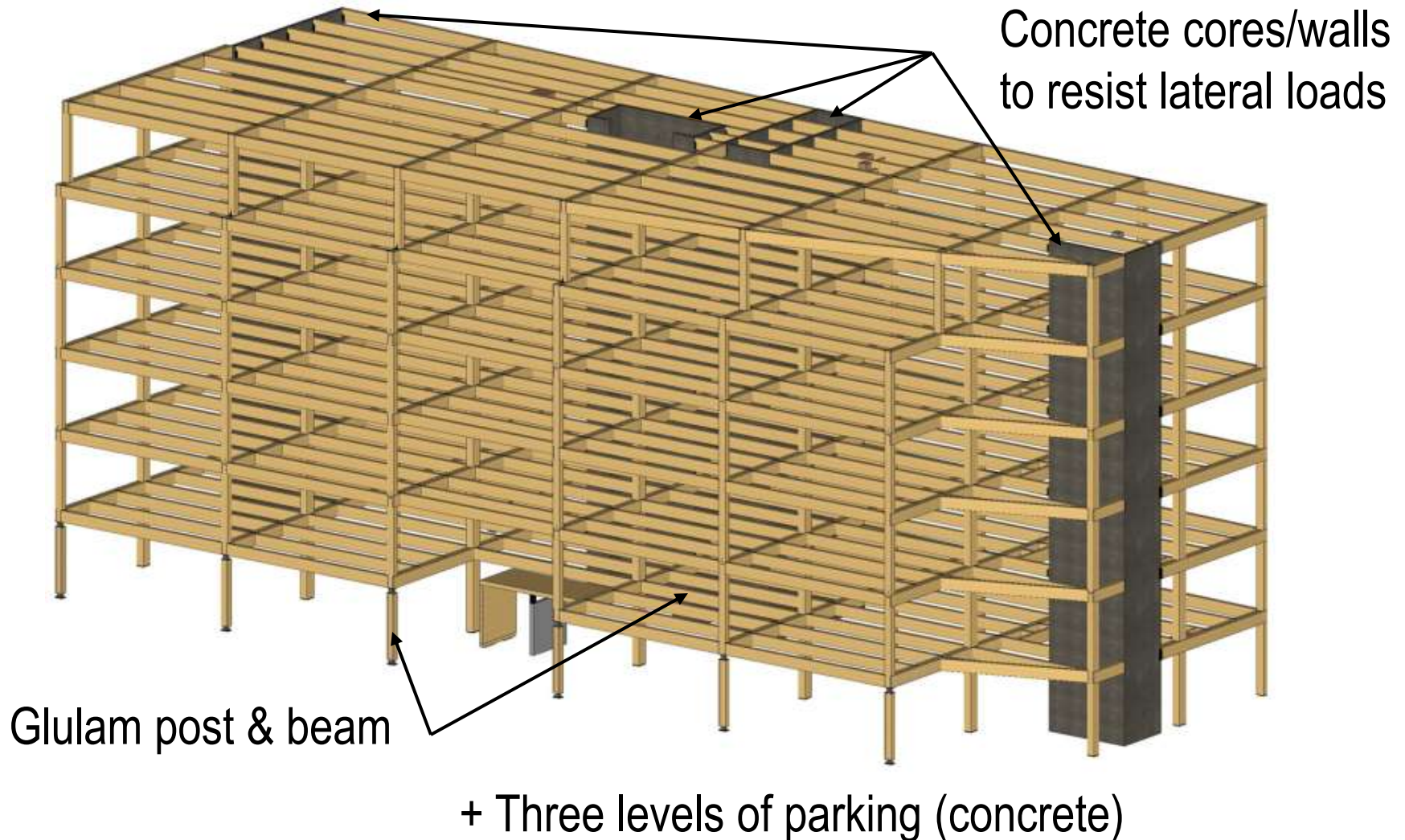
Client: **CSN-FONDACTION**

Architect: Gilles Huot, GHA Atelier d'architecture

Structure: Bureau d'Études Spécialisées inc. (BES)

Glulam Producer: Nordic Engineered Wood

CSN-FONDACTION Building Glulam Post & Beam with Concrete Cores

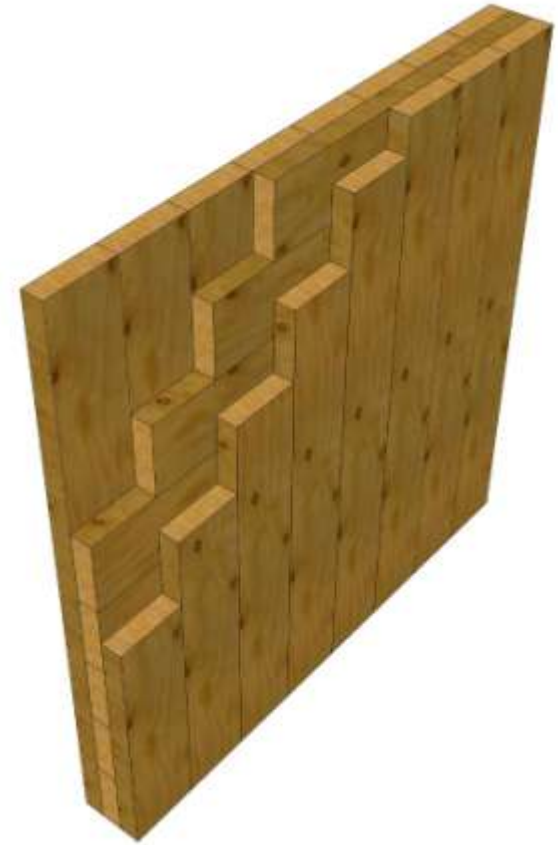


Wood-Based Building Systems

- Light Wood-Frame
- Heavy Timber
- CLT

CLT (Cross Laminated Timber) a great addition to Wood's tool box

- Pre-fabricated structural wall, roof, floor panels



Benefits of using CLT

- Short Construction Time
- Minimal waste and noise during construction
- Cost competitive
- Renewable material from sustainable forests
- Good seismic and fire performance
- Sturdiness

Current Practices - Europe



Murray Grove Building, London, 9-storey

Courtesy: Andrew Waugh



CLT can be used in elevator shafts and stairwells



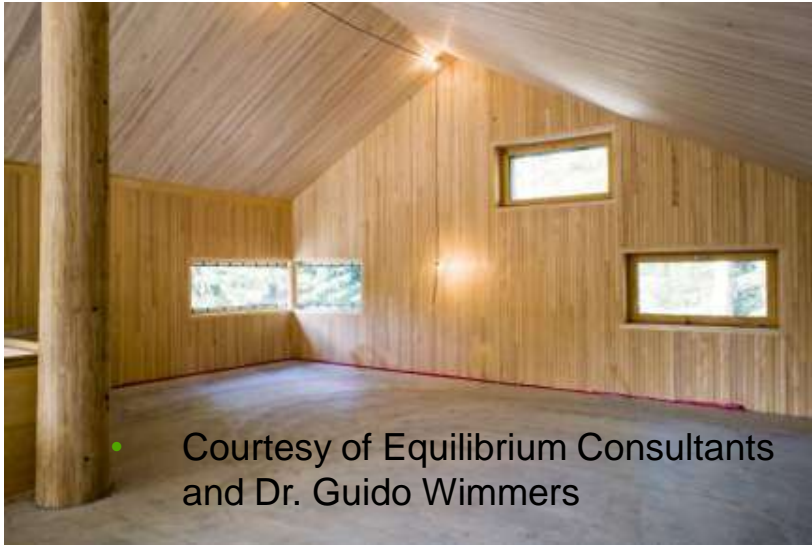
CSN-FONDACTION Building, Québec City



Murray Grove Building, London, UK

Early CLT Projects in Canada and US

AUSTRIA HOUSE; Whistler, British Columbia



- CLT panels in roofs & floors
- Diagonally dowelled panels in walls

Dowling Residence, Vancouver British Columbia

CLT structure
on concrete base



Architecture: Greg Dowling
Structural: Equilibrium

Dowling Residence

West Vancouver



L41 Modular Unit



Courtesy of Michael Katz

CLT in Hybrid Construction



Beach House in Hilton Head
Island, SC
(Mixed CLT, Steel & Concrete)



<http://www.binderholz-bausysteme.com>

Myers Memorial UMC, Bell Tower, N. Carolina, USA



Myers Memorial UMC, Bell Tower, N. Carolina, USA

Courtesy of SCLT



UBC Bio-energy Research & Demonstration Project



Courtesy of McFarland Marceau
architects ltd

Compliance of CLT system with Building Codes

- Two paths
 - **Acceptable solutions** (Light Wood-Frame, Heavy Timber)
 - **Alternate solutions** requires credible technical information to satisfy building code objectives (CLT currently is in this category)

FPIinnovations CLT Handbook; credible technical source for designers



CLT North American Advisory Committee

- To move CLT forward in North America
- Research and Standards Sub-Committee
 - Product standards underway
 - European, North American, ISO
 - Design Standards; parallel approach envisioned
 - CWC initiated the process in CSA O86
 - AWC will be initiating a Supplement to NDS
 - Building Codes
 - National Building Code Canada (2015)
 - International Building Code in US (2015)

Conclusion

- CLT is a valuable addition to wood-based building systems
- CLT is welcomed by the design and construction community
- Notable progress made on CLT research and standards
- CLT Handbook facilitates code compliance as “alternate solution”
- Commercial production is commencing in 2011



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Codes and Standards

	Current State	Short-Term (1 Year)	Medium-Term (4 years)
Product Standard Level	Proprietary route European Draft FPInnovations Drafts APA/ANSI Draft ISO Work Item	Proprietary acceptance European Standard APA/ANSI Standard ISO Draft	Proprietary CLT CLT strength classes European Standard APA/ANSI Standard ISO Standard
Material Std			
Building Code			

Codes and Standards

	Current State	Short-Term (1 Year)	Medium-Term (4 years)
Product			
Material Design Standard Level	FPInnovations Handbook & other peer reviewed information	CWC & AWC initiates the process based on FPInnovations Handbook & other peer reviewed information	Acceptance in CSA O86 2014 in Canada NDS in US
Building Code			