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Hanscomb QUANTITY SURVEYORS

Hanscomb LOAN MONITORING INC.

VANCOUVER EDMONTON REGINA WINNIPEG LONDON HAMILTON TORONTO OTTAWA HALIFAX

MASS TIMBER VS CAST-IN-PLACE CONCRETE

Cost, Schedule and Regional Lessons from Calgary, Ottawa, and Moncton

Superstructure Comparative Study

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AGENDA

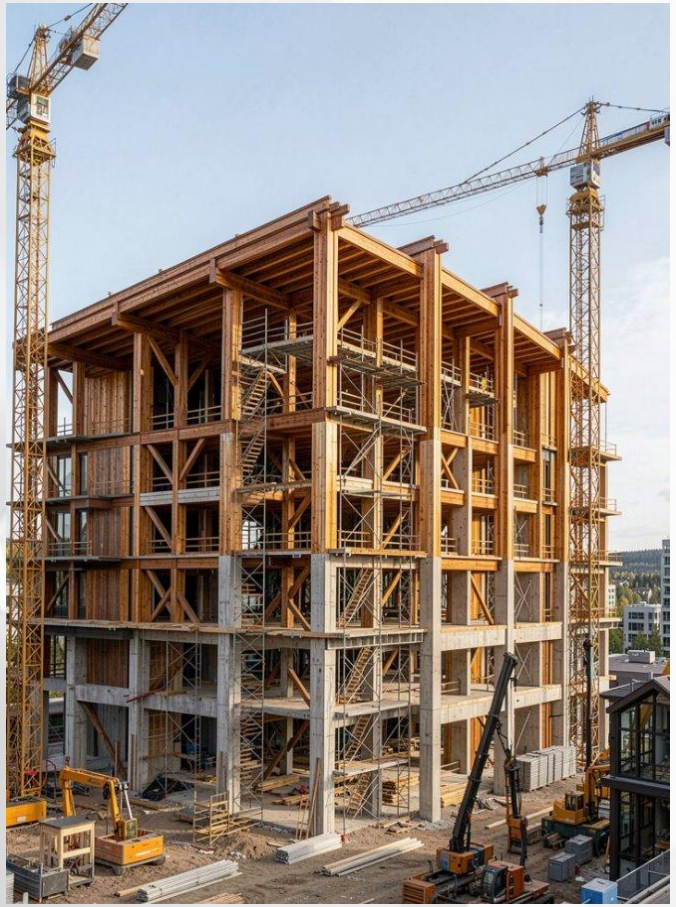
1. Introduction and scope
2. Structural systems
3. Material properties, fire performance, embodied carbon
4. Location-specific factors
5. Schedule and cost
6. Conclusion

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1. INTRODUCTION AND SCOPE

- **Study question** → When does mass timber create a credible alternative to cast-in-place concrete?
- **Common basis** → A comparable 12-storey building form, equivalent spans, design loads, and fire-resistance targets.
- **Timber scope** → CLT panels, glulam members, and structural connections, concrete cores.
- **Concrete scope** → Concrete, reinforcing steel, slabs, beams, columns, and core/shear-wall elements.
- **Lens** → Structural performance, fire strategy, schedule, cost drivers, and regional conditions—not a universal winner.

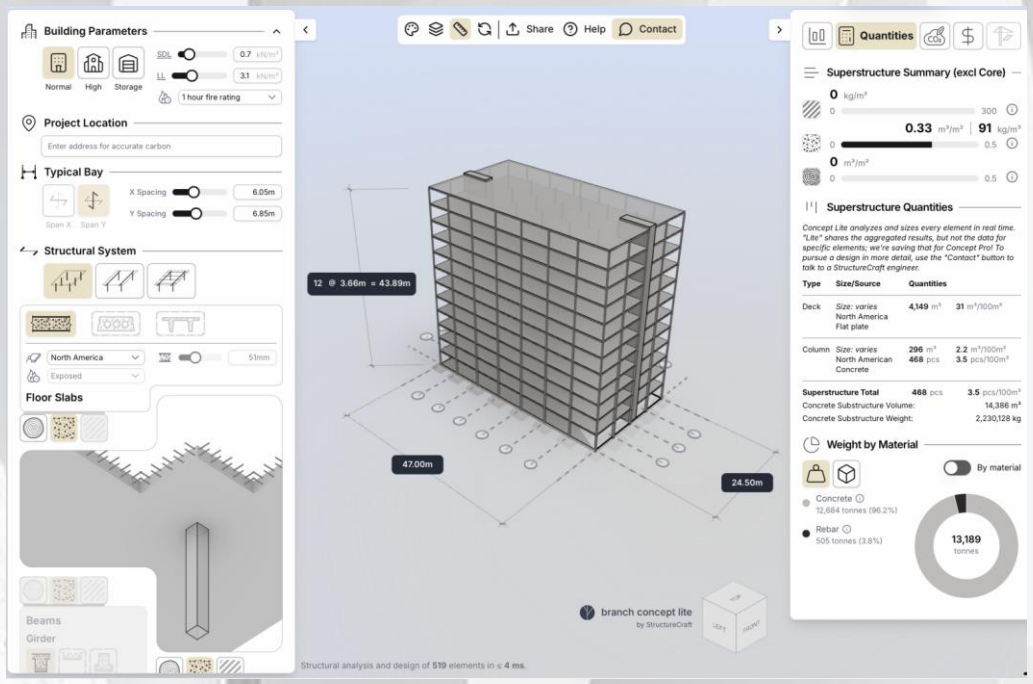


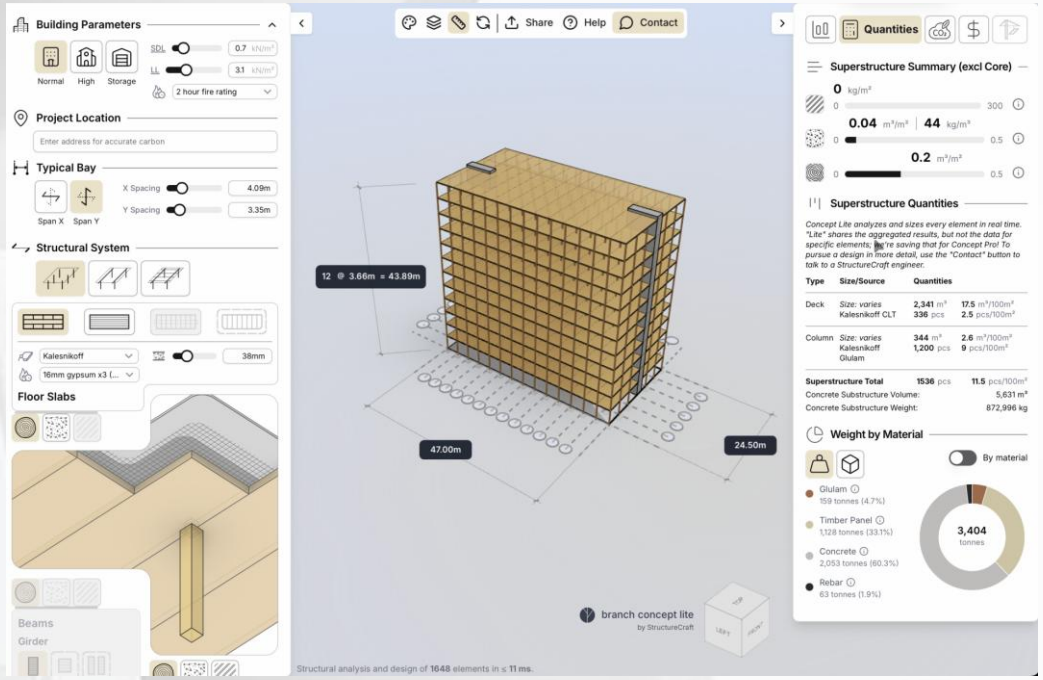
2. STRUCTURAL SYSTEMS

- **Concrete load path** → Slabs + beams + columns, with reinforcing steel and a concrete core/shear-wall system.
- **Timber load path** → CLT floor/roof panels + glulam beams/columns, tied together with steel connections and a concrete core.
- **Shared requirement** → Both systems are designed to meet the same performance targets; the difference is how they carry and assemble loads.
- **Assembly signal** → Timber arrives as prefabricated components; concrete advances through forming, reinforcing, pouring, and strength-gain stages.
- **Calgary exception** → Sandy soils require piles under both options, making foundations a location-specific cost driver.



2. STRUCTURAL SYSTEMS





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3. MATERIAL PROPERTIES, FIRE PERFORMANCE EMBODIED CARBON

- **Weight cue** → Normal-weight concrete is about 2,400 kg/m³; mass timber is roughly 500 kg/m³—directional context, not a project quantity.
- **Fire** → Concrete is non-combustible; timber can meet the rating with code-compliant encapsulation and connection detailing.
- **Embodied carbon** → Cement is a major concrete contributor; timber may reduce embodied carbon and store biogenic carbon, subject to project-specific assessment.
- **Foundation effect** → Lower timber self-weight can help where spread footings are feasible; Calgary's piles narrow that advantage.
- **Decision check** → Treat fire design, insurance, carbon accounting, and site controls as part of the system—not afterthoughts.



3. MATERIAL PROPERTIES

Foundations & Design

Lower structural mass can mean shallower foundations and reduced gravel pads — particularly advantageous on low-bearing soils. Wide spans may restrict CLT supplier selection. Exposed timber may reduce the requirement for selected finishes.

Risk & Insurance

Mass timber premiums are typically **4–6× comparable cast-in-place concrete buildings.** Early insurer engagement, technical documentation, a defined fire strategy, and a moisture management plan are essential to mitigate premiums.

Weather & Winter Work

Cast-in-place concrete winter operations may require heating, hoarding, and curing protection for **approximately five months annually**. Ancillary winter costs may be understated in baseline estimates. Concrete pricing assumes summer construction conditions.

4. LOCATION-SPECIFIC FACTORS

SD1

- **Ottawa** → Spread-footing conditions may let timber's lower self-weight reduce foundation demand.
- **Calgary** → Sandy soils require piles for both systems; the substructure advantage is narrower.
- **Moncton** → Site conditions and local supply can shift the balance; validate geotechnical and procurement assumptions early.
- **Across all cities** → Climate, code, labor, crane access, transport, and availability shape constructability.
- **Regional takeaway** → The best-fit system is location-dependent; carry local assumptions into early design and cost planning.



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5. SCHEDULE AND COST

- **Schedule** → Prefabricated timber can speed erection; concrete adds forming, reinforcing, pours, and strength-gain time.
- **Example** → Greater Toronto Area structure*: 113 days timber vs 190 days concrete.
  **refer to sources slide for details of this study*
- **Cost lens** → Compare foundations, connections, fire protection, logistics, crane time, and labor.
- **Schedule value** → Earlier enclosure or occupancy may reduce financing exposure; model separately.
- **Guardrail** → Procurement, design maturity, site logistics, and local capacity can change the result.

Structural erection schedule





Greater Toronto Area example*



*See sources slide for study details. Illustrative, not a forecast.

Cost lens: foundations, connections, fire protection, logistics, crane time and labour.

Schedule value: earlier enclosure or occupancy may reduce financing exposure; model separately.

Guardrail: procurement, design maturity, site logistics and local capacity can change the result.

5. SCHEDULE AND COST

Key Schedule Considerations

- Mass timber may accelerate the critical path by approximately 6–8 weeks within a 24-month overall schedule.
- Benefits: earlier trade access, smaller workforce, no full concrete curing cycles, and easier penetration cutting.
- A concrete core remains required for this 12-storey scheme, keeping formwork on-site and limiting parallel efficiencies.
- Continuing activities include spline work, topping slabs, sleeves, and moisture protection logistics.
- Calgary caveat: piling requirements may reduce the relative schedule advantage.

Net schedule gain is real but marginal where geometry and structural layouts are similar between systems.

5. SCHEDULE AND COST

Primary Cost Factors

Material Limitations

Mass timber structural products have different span/load limitations that steel or concrete which must be determined at the outset of design based on site planning.

Up-front Design Decisions

Significant numbers of decisions need to pushed forward in the design process, requiring increased up-front engagement of designers, consultants, contractors, and clients.

Shipping Constraints

Pre-assembled mass timber components are shipped to site by truck. Delivery is constrained by practical and logistical considerations which must be considered early in design planning.

5. SCHEDULE AND COST

Primary Cost Factors

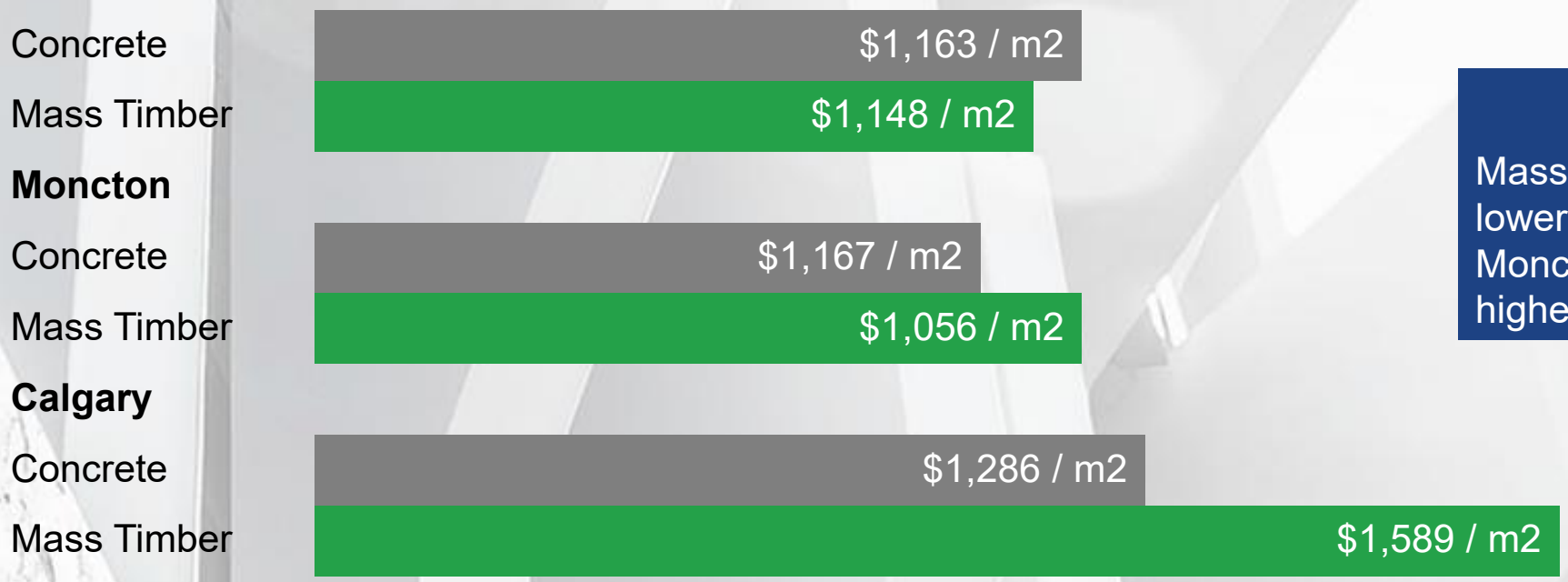
Financial & Insurance Agreements

Loan timelines, bridge financing, and construction insurance are key items that can determine the success of a mass timber project. While the overall costs may not be large, the impact of these on project viability are significant.

Construction Timelines

Mass timber construction timelines are very different from conventional structural materials. With proper planning, these timelines can significantly improve the total cost of completion.

5. SCHEDULE AND COST



Takeaway

Mass timber is slightly lower in Ottawa and Moncton, but materially higher in Calgary

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CALGARY: COST & MARKET FINDINGS

19%

Timber superstructure premium

Labor and material cost above cast-in-place concrete superstructure

4% increase

Timber material rate

Compared to comparable Ontario or New Brunswick rates

Market Context

- Cast-in-place concrete is the established, cost-effective high-rise solution in Calgary.
- Both structures in Calgary require piles; a typical depth is assumed at 100 ft / 30 m. If piles exceed typical depth, an alternative foundation type should be evaluated.
- No limitations exist in piling contractor availability in Alberta.
- Transportation costs, supply constraints, and limited local CLT manufacturing drive the timber premium.

Conclusion: Cast-in-place concrete is currently the more economical solution in Calgary.

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OTTAWA: COST & MARKET FINDINGS

6%

Timber superstructure premium

Labor and material cost above cast-in-place concrete superstructure

1%

Overall timber savings

Net overall system saving after substructure offset

Market Context

- Cast-in-place concrete remains the predominant high-rise system.
- Mass timber supply, installation, procurement, and design expertise are becoming more available.
- Reduced foundation requirements offset the superstructure premium, producing an approximately 1% overall saving.
- Local concrete delivery is concentrated among two major trades, creating capacity and competition considerations.

Conclusion: Mass timber is currently more economical in Ottawa, subject to validation of the 1% advantage at design stage.

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MONCTON: COST & MARKET FINDINGS

3%

Concrete superstructure premium

Labor and material cost above cast-in-place concrete superstructure

10%

Overall timber savings

Net overall system saving after substructure offset

Market Context

- Cast-in-place concrete remains the predominant non-combustible high-rise system locally.
- Mass timber offers a slightly shorter, more predictable erection schedule.
- Lighter structure can reduce foundation depth and extent, particularly on lower-bearing soils.

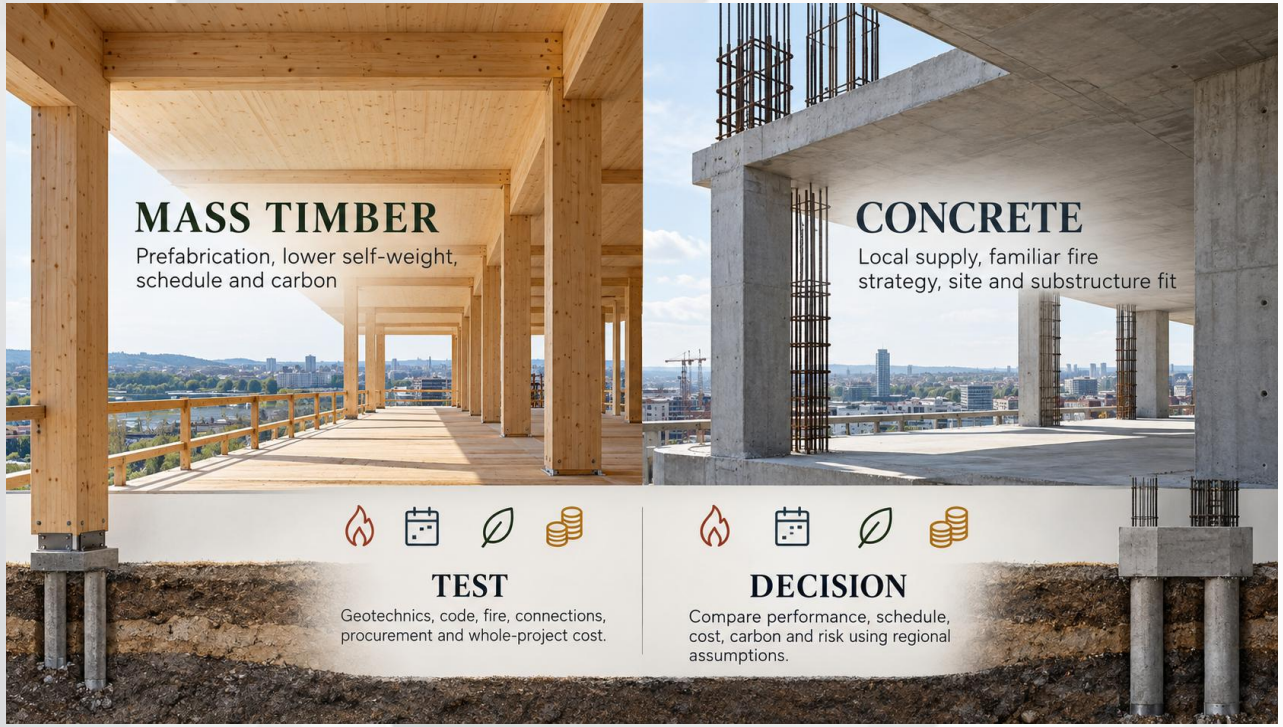
Conclusion: Mass timber is currently the more economical capital-cost solution in Moncton.

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6. CONCLUSION

- **Mass timber:** Favor prefabrication, low self-weight, schedule, and carbon goals when they fit the site and delivery model.
- **Concrete:** Favor local supply, familiar fire strategy, or site and substructure conditions that narrow timber's advantage.
- **Test:** Geotechnics, code path, fire and connection details, procurement capacity, and whole-project cost.
- **Decision:** Neither system wins everywhere; compare performance, schedule, cost, carbon, and risk using regional assumptions.



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6. CONCLUSION

Based on the cost data and trade-off analysis, the following location-specific guidance provides a structured basis for structural system selection. Recommendations are calibrated to the economic realities of each market.

Calgary
Default to Concrete
Market Evolution
Timber market maturity in Western Canada may shift Calgary's economics over time. Cost benchmarks should be revisited at each project stage as market conditions evolve.

Ottawa
Evaluate Non-Cost Factors
Cost as a Starting Point
Cost data establishes the economic baseline. In markets where cost is neutral (Ottawa), qualitative trade-offs and project strategy should drive the final recommendation.

Moncton
Prioritize Mass Timber
Key Principle
Structural system selection must be location-specific. A single national policy favoring either timber or concrete will produce suboptimal outcomes in at least one of these three markets.

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ACKNOWLEDGEMENT CREDITS:

- NRCan's Greener Construction Through Wood program
- Sustainable Buildings Canada
- Canadian Institute of Quantity Surveyors
- RDH Building Science
- Prepared for the European Council of Construction Economists (CEEC)

94th General Assembly

Natural Resources Canada | Ressources naturelles Canada

Sustainable Buildings Canada

Canadian Institute of Quantity Surveyors | Institut canadien des économistes en construction

RDH BUILDING SCIENCE

Conseil Européen des Economistes de la Construction
The European Council of Construction Economists
CEEC

Sources:

Hanscomb Study, Study shows costs and sustainability similar across steel, concrete and timber

- https://www.on-sitemag.com/construction-materials/study-shows-costs-and-sustainability-similar-across-steel-concrete-and-timber/1003986805/

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Thank you

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