Tall Wood Feasibility Study

Mass Timber and Concrete

April 2026

WoodWorks

Fathom

Introduction

The purpose of this study is to explore the financial performance of mass timber compared to concrete for a proposed 12-storey residential building in Dartmouth, Nova Scotia. To do this, we developed two optimized designs, one in concrete and one in mass timber, tailored to the strengths of each material. Our evaluation for the timber option focuses on key drivers such as cost and construction efficiency, while also taking into consideration – architectural, mechanical, and other building system requirements. The study provides quantitative data and qualitative insights to help developers and investors assess its economic viability.

Table of Contents

This study was funded by:

FETF FORESTRY ECONOMIC TASK FORCE

Wood Works

Study Assumptions

- Designed to NBC 2020 which allows for Encapsulated Mass Timber Construction (EMTC), up to 12 storeys.
- Encapsulation: Mass timber elements must be protected by non-combustible materials (e.g., gypsum board or concrete topping) to achieve an encapsulation rating.
- 2 hour fire rating required for structure.
- Alternative Solution for 13th Storey amenity/service penthouse (NBC 2020 allows 12 Storeys)
- Alternative Solution for 100% ceiling exposed in suites (Prescriptive in NBC 2025).

Project Information

Project City	Dartmouth, NS
Project Address	Prince Street
Total Units	199
Site Size (Sq.Ft)	24,896
Gross Floor Area Proposed (Sq.Ft)	162,186
Residential Area (Sq.Ft)	127,827
Commercial Area (Sq.Ft)	6,052
Total Storeys	12 (13 including amenity/service penthouse)
Total Storeys (Mass Timber)	11
Total Storeys (Concrete Podium)	1
Total Levels Below Grade	2
Parking Stalls	76

Project Team

SIDEWALK

Fathom

ASPECT STRUCTURAL ENGINEERS

PILOT BUILD CO.

Design Strategy

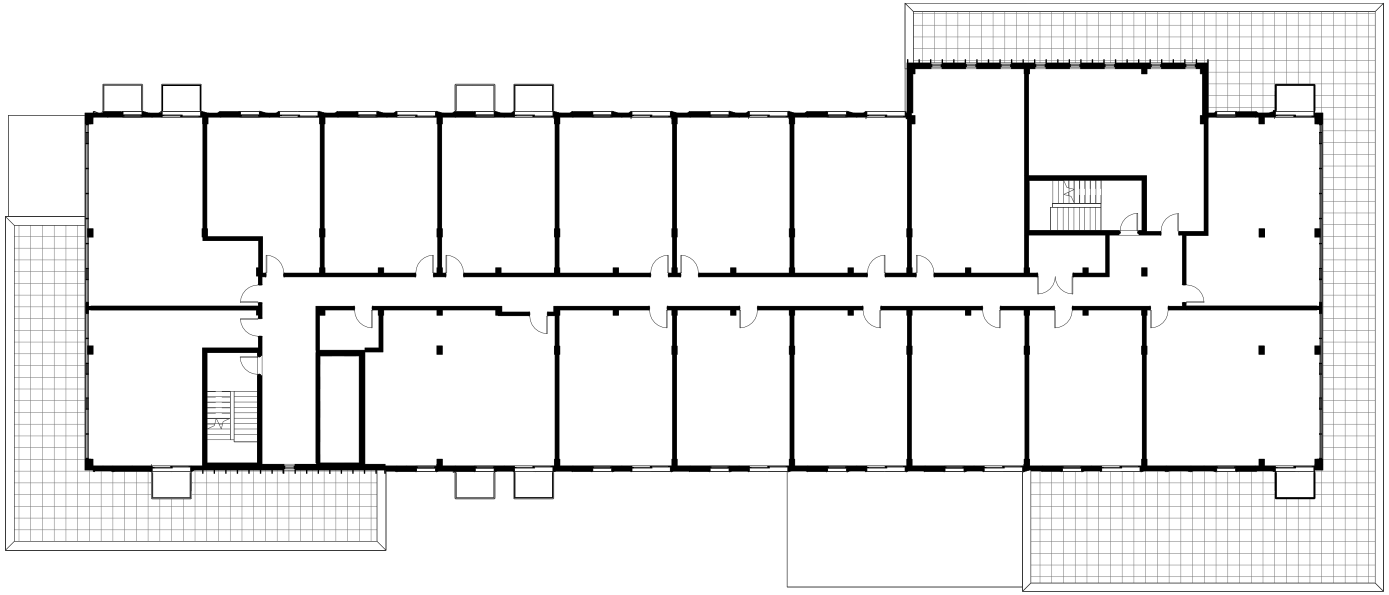
The design emerged through an integrated and iterative process that balanced architectural intent, structural efficiency, and development performance. From the outset, the project was approached not as a comparison of isolated systems, but as an exploration of how material choice influences building form, construction methodology, and long-term value.

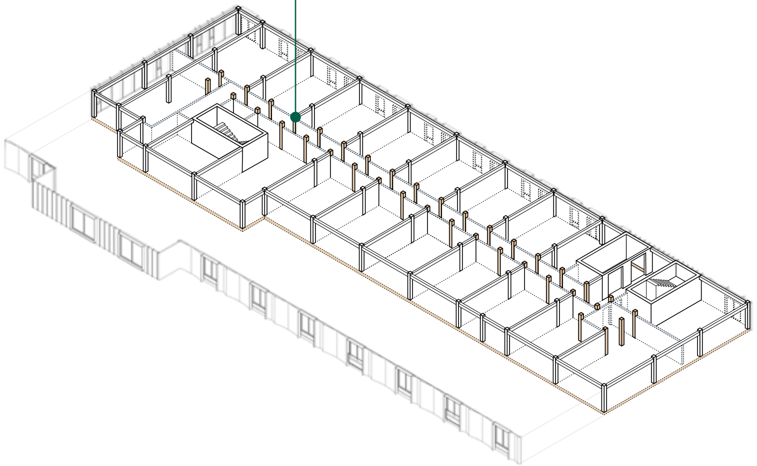
The site, a through-lot connecting King Street and Prince Street within Dartmouth's evolving downtown, established the parameters for the building massing and organization. Site and planning constraints informed a bar-shaped form bridging the two streets, enabling efficient residential layouts, strong street presence, and access to views and daylight.

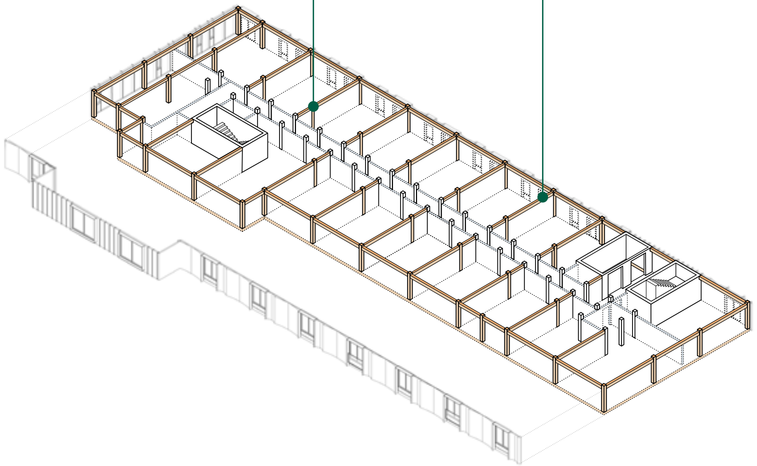
A coordinated design process with Sidewalk and Pilot established a shared framework for both structural approaches. This included a consistent grid, rationalized unit planning, and an efficient structural relationship between below-grade parking and the residential floors above. The building is organized around two central cores extending from parking to the upper amenity level, consolidating circulation and supporting efficient servicing.

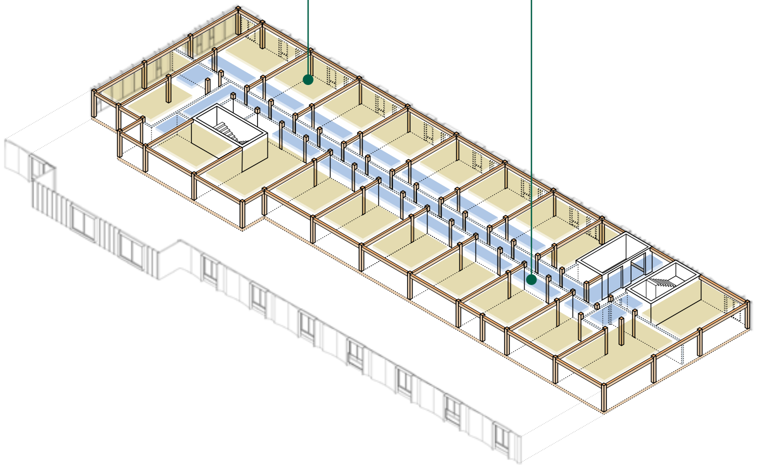
Project Drivers:

- Exposed wood
- Allowance for balconies
- MEP flexibility
- Envelope flexibility









Within this framework, the design evolution focused on how mass timber could act as both a structural system and an architectural driver. A primary objective was to expose timber within residential units, leading to a clear spatial strategy that distinguishes between exposed living areas and more highly serviced, encapsulated zones.

This required close coordination between disciplines. Structural elements were aligned with suite layouts to minimize visual impact while supporting fire and acoustic performance, and building systems were integrated early to maintain clarity within both residential and service spaces. Construction methodology further informed the design, with prefabrication and panelization supporting efficient sequencing, earlier enclosure, and a façade expression tied to the structural rhythm.

At the street level, the building is grounded by a masonry podium that responds to the surrounding context, while the tower above reflects the lighter and more articulated character enabled by the structural system. Heavily glazed exteriors facing the street reinforce the relationship between interior space and structural expression.

The resulting scheme reflects a synthesis of planning, architectural, and technical considerations. Rather than a direct substitution of materials, the project demonstrates how mass timber can inform a more integrated approach to building design, delivery, and long-term performance.

Building Comparison – Concrete Model

The concrete scheme represents a conventional cast-in-place approach, developed within the shared building framework established through the design process. It provides a direct benchmark for evaluating cost, constructability, and performance.

The structure is based on a two-way flat slab system with regularly spaced columns and a localized transfer slab at Level 2 to accommodate the transition from parking to residential layouts. Concrete cores provide lateral stability and define vertical circulation. To allow for an occupiable roof terrace, the slab steps in localized areas. Balconies included in the design are thermally broken to control heat transfer through the structure, offering a more accurate one to one comparison between the concrete and wood schemes.

This system prioritizes simplicity, trade familiarity, and established construction sequencing. The structure operates largely independently from the architectural expression, with structural elements typically concealed within finishes.

As a result, interior spaces are more uniform, and architectural differentiation is achieved primarily through applied materials rather than through the expression of the structure itself.

Building Comparison – Wood Model

The mass timber scheme builds on the same underlying building framework, developing it into a more integrated structural and architectural system.

A hybrid approach is used, with concrete cores, podium, and below-grade structure transitioning to a mass timber superstructure above. The design includes CLT floor panels supported by point-supported and post-and-beam glulam systems, coordinated with the residential layout.

The design enables selective exposure of timber within residential units, contributing to spatial quality and building identity. Structural elements are coordinated with suite planning to maintain clear living spaces, while service areas are consolidated centrally to simplify construction and performance requirements.

Prefabrication of the mass timber and a unitized envelope system supports a more predictable erection sequence and earlier building enclosure, contributing to construction efficiency and a façade expression that reflects the structural logic.

The structural grid is maintained at 6.1 meters to optimize panel sizing and minimize structural transfers. This span works efficiently with common CLT production lengths of approximately 12.2 meters, allowing panels to span two bays and reduce the number of pieces.

An architectural priority was to express timber elements wherever practical. Living areas are designed to celebrate exposed wood, while service spaces – such as bathrooms, laundry rooms, and corridors – are enclosed to support fire protection requirements. Beams within demising walls are similarly encapsulated, supporting an efficient fire design.

Overall, the mass timber scheme demonstrates an integrated relationship between structure, architecture, and construction, where material selection informs both the building experience and delivery approach.

Development Strategy

The decision to pursue mass timber was driven by a combination of market, design, and long-term ownership considerations that align closely with Sidewalk's development philosophy:

Meaningful Product Differentiation in a Rental Market

Sidewalk focuses on delivering rental buildings that are clearly differentiated from conventional concrete construction. Mass timber enables exposed structure, warmth, and material authenticity that cannot be replicated through finishes alone, creating a distinct living experience for residents.

Design Quality as a Driver of Long-Term Value

As a long-term rental owner, Sidewalk prioritizes durability, adaptability, and tenant appeal over lowest first cost. Exposed mass timber ceilings, columns, and beams become defining architectural elements that support tenant retention and long-term asset performance.

Alignment with Climate and Carbon Objectives

Mass timber reduces embodied carbon compared to conventional concrete construction. For Sidewalk, this is not a branding exercise, but a practical way to align project delivery with emerging regulatory, financing, and policy frameworks tied to carbon performance.

Construction Efficiency and Predictability

Prefabricated mass timber components allow for faster erection, earlier enclosure, and more predictable schedules. These efficiencies are particularly valuable for urban infill sites and help reduce construction risk over the life of the project.

Scalability Across Future Projects

This project is viewed as a platform, not a one-off. The lessons learned from delivering mass timber at this scale are intended to inform future Sidewalk developments, enabling repeatability and cost efficiency over time.

Local Economic and Industry Development

Mass timber supports Canadian forestry, fabrication, and construction innovation. Sidewalk views this as an opportunity to contribute to a broader domestic supply chain while advancing high-quality housing delivery.

Development Risk and Mitigation

The project team identified and proactively addressed several key risks associated with delivering a design-forward mass timber building at this scale.

	Material Procurement & Supply Chain Coordination	Construction Complexity & Execution Risk	Trade Familiarity & Coordination	Schedule & Site Logistics
Risk	Limited supplier competition, long lead times for mass timber components, or coordination challenges between fabrication, delivery, and installation could impact schedule and cost certainty.	Mass timber construction requires tight tolerances and coordination across structure, fire protection, and building systems. Inexperience or poor sequencing could lead to inefficiencies or delays.	Local trades may have limited experience working with exposed mass timber systems, increasing the risk of coordination challenges or conservative pricing.	Urban infill construction can be constrained by limited staging areas, restricted deliveries, and conflicts with surrounding infrastructure.
Mitigation	Early engagement with multiple supply partners, advance procurement planning, and close coordination between the structural engineer, fabricator, and construction manager. The site's excellent access to transportation routes and availability of on-site laydown and staging space further reduces logistics risk and supports efficient sequencing.	Hands-on, boots-on-the-ground oversight by Sidewalk, combined with a construction management partner (Pilot Build Co.) experienced in delivering complex, innovative buildings. Pilot's vested interest in the project ("skin in the game") aligns incentives and supports disciplined execution, quality control, and schedule management.	Early trade engagement, clear detailing, mock-ups where appropriate, and leveraging existing relationships with key subcontractors and suppliers. Strong buy-in from trade partners, supported by Pilot Build Co.'s experience and Sidewalk's active involvement, reduces uncertainty and improves constructability outcomes.	The site benefits from unusually strong logistical conditions for a downtown location, including direct access to shipping and transportation routes, robust utility servicing, and ample laydown and staging space. These attributes materially reduce schedule and coordination risk and support efficient mass timber installation.

Cost Comparison

This summary provides a cost comparison between concrete construction and mass timber. In both designs, the structural elements are mainly exposed, with some parts of the building being encapsulated with Type X GWB for fire protection.

The mass timber design has a cast-in-place concrete podium and elevator/stair shafts.

Key findings:

- The mass timber model was an 8.39% premium over concrete for construction costs.
- Savings for the mass timber are found in the construction scheduling and foundation costs (lighter superstructure).
- Envelope (window wall), Mechanical, and Electrical were equal for both designs.
- Insurance premiums (builder's risk only) ranged from $250,000 – $475,000 while mass timber insurance ranged from $475,000 – $750,000.
- BIM Modelling could be incorporated to add efficiencies among the various disciplines. Assume ~$300,000.
- Concrete is typically not left exposed. Added labour and material costs for at least 1 layer of Type X GWB could be added.

Cost Information

	Mass Timber		Concrete	
Construction Cost				
Gross Buildable Area (P2 to Penthouse)	214,823 ft^2		214,823 ft^2	
Direct Construction – Cost Breakdown P2 to Penthouse)				
Sitework	$ 3,891,000	5.90%	$ 3,891,000	6.36%
STRU: Concrete Foundations / Core Walls & Shear Walls	$ 4,909,437	7.44%	$ 5,190,094	8.49%
STRU: Concrete Structure – Supply & Install			$ 5,992,440	9.80%
STRU: Mass Timber Components – Supply	$ 8,226,020	12.47%	$ –	0.00%
STRU: Mass Timber Components – Install	$ 1,209,768		$ –	0.00%
Ext. Envelope – Cladding / Windows	$ 8,053,145	12.21%	$ 8,053,145	13.17%
Ext. Envelope – Roofing	$ 562,754	0.85%	$ 492,868	0.81%
Int. Finishes – Doors / Floor / Wall / Ceiling	$ 10,565,744	16.02%	$ 9,880,694	16.16%
Int. Finishes – Metals / Specialties / Millworks / Equipment	$ 3,822,160	5.79%	$ 3,822,160	6.25%
Elevator System	$ 600,000	0.91%	$ 600,000	0.98%
Mechanical System	$ 10,604,000	16.08%	$ 10,604,000	17.34%
Electrical System	$ 5,939,927	9.01%	$ 5,939,927	9.71%
Indirect Construction Cost Breakdown				
General Expenses includes CM Staff	$ 2,956,730	4.48%	$ 2,504,530	4.10%
Total Construction Cost	$ 61,340,685	93.00%	$ 56,970,858	93.16%
Construction Cost on GBA	$ 285.54/ft^2		$ 265.20/ft^2	
Consultant Fees				
Architectural	$ 600,000	0.91%	$ 600,000	0.98%
Structural	$ 125,000	0.19%	$ 125,000	0.20%
Code	$ 50,000	0.08%	$ 50,000	0.08%
Mechanical + Electrical	$ 120,000	0.18%	$ 120,000	0.20%
Other Consultants	$ 180,000	0.27%	$ 180,000	0.29%
Total Consultant Fees	$ 1,075,000	1.63%	$ 1,075,000	1.76%
Insurance Fees				
Property Insurance	$ –	0.00%	$ –	0.00%
Construction Insurance	$ 475,000	0.72%	$ 260,000	0.43%
Other	$ –	0.00%	$ –	0.00%
Total Warranty Costs	$ 475,000	0.72%	$ 260,000	0.43%
Other Fees				
Project Contingency (5%)	$ 3,067,034	4.65%	$ 2,848,543	4.66%
Total Cost (Including Sitework)	$ 65,957,719	100.00%	$ 61,154,401	100.00%
Total Cost (excluding Sitework – Building Only)	$ 62,066,719	100.00%	$ 57,263,401	100.00%
Cost per sqft	$ 288.92		$ 266.56	
Premium to Concrete per sqft	$ 22.36	8.39%	$ –	0.00%
Construction Finance Fees				
Total Construction Loan	$ 49,072,550		$ 45,576,690	
Construction Duration	24 month(s)		26 month(s)	
Construction Interest Cost per Month	$ 181,980		$ 169,010	
Total Construction Loan Interest	$ 4,367,520		$ 4,394,260	

Financial Performance Comparison

Summary

	Mass Timber	Concrete
Gross Income – Resi (Stabilized Year 6)	$ 5,417,779	$ 5,296,052
Gross Income – CRU + U/P (Stabilized Year 6)	$ 340,601	$ 340,601
Vacancy Allowance (Residential)	2.00%	2.00%
Vacancy Allowance (Commercial)	5.00%	5.00%
Operating Expenses		
General Expenses	$ 1,382,808	$ 1,375,054
Insurance	$ 104,000	$ 104,000
Net Operating Income	$ 4,155,194	$ 4,043,656
NOI	$ 4,155,194	$ 4,043,656
Property Value	$ 93,242,017	$ 87,939,902
Cap Rate	4.46%	4.60%
Exit Cap Rate	4.5%	4.60%
Assumed Market Value	$ 89,168,336	$ 83,975,573
Land Cost	$ 7,215,000	$ 7,215,000
Construction Cost	$ 65,815,965	$ 61,368,958
Consultant Fees	$ 1,075,000	$ 1,075,000
Municpal Fees	$ 500,000	$ 500,000
Insurance Cost	$ 475,000	$ 260,000
Finance Cost	$ 190,000	$ 190,000
Project Contingency	$ 3,067,034	$ 2,848,543
Total Cost	$ 78,337,999	$ 73,457,501
Net Profit	$ 10,830,337	$ 10,518,072
Margin as % of Cost	13.83%	14.32%
IRR (Levered)	17.20%	18.00%

Apartment Revenue

Apartments	Size	Mass Timber Rent	Concrete Rent	Delta	
Bachelor	507	$ 1,850	$ 1,800	2.70%	*Higher*
1-Bed	523	$ 2,000	$ 1,950	2.50%	*Higher*
2-Bed	799	$ 2,650	$ 2,600	1.89%	*Higher*
3-Bed	1,110	$ 3,200	$ 3,200	0.00%	*Equal*

The selected mass timber approach was evaluated not only on cost, but on its ability to improve overall financial performance and long-term asset quality.

Earlier Revenue Through Schedule Certainty

Faster superstructure erection and earlier enclosure enable downstream trades to mobilize sooner and reduce exposure to weather-related delays. Even modest schedule compression can allow earlier occupancy, accelerating revenue generation and improving project cash flow during stabilization.

Pre-Leasing & Market Visibility

The distinct character of exposed mass timber creates a compelling marketing narrative. This differentiation supports earlier leasing activity, stronger pre-leasing momentum, and reduced lease-up risk compared to more conventional concrete rental product.

Rental Positioning & Tenant Appeal

While underwritten conservatively, mass timber supports improved rental positioning through higher perceived quality, warmth, and uniqueness. These attributes contribute to stronger tenant demand, reduced concessions, and long-term retention rather than relying solely on headline rent premiums.

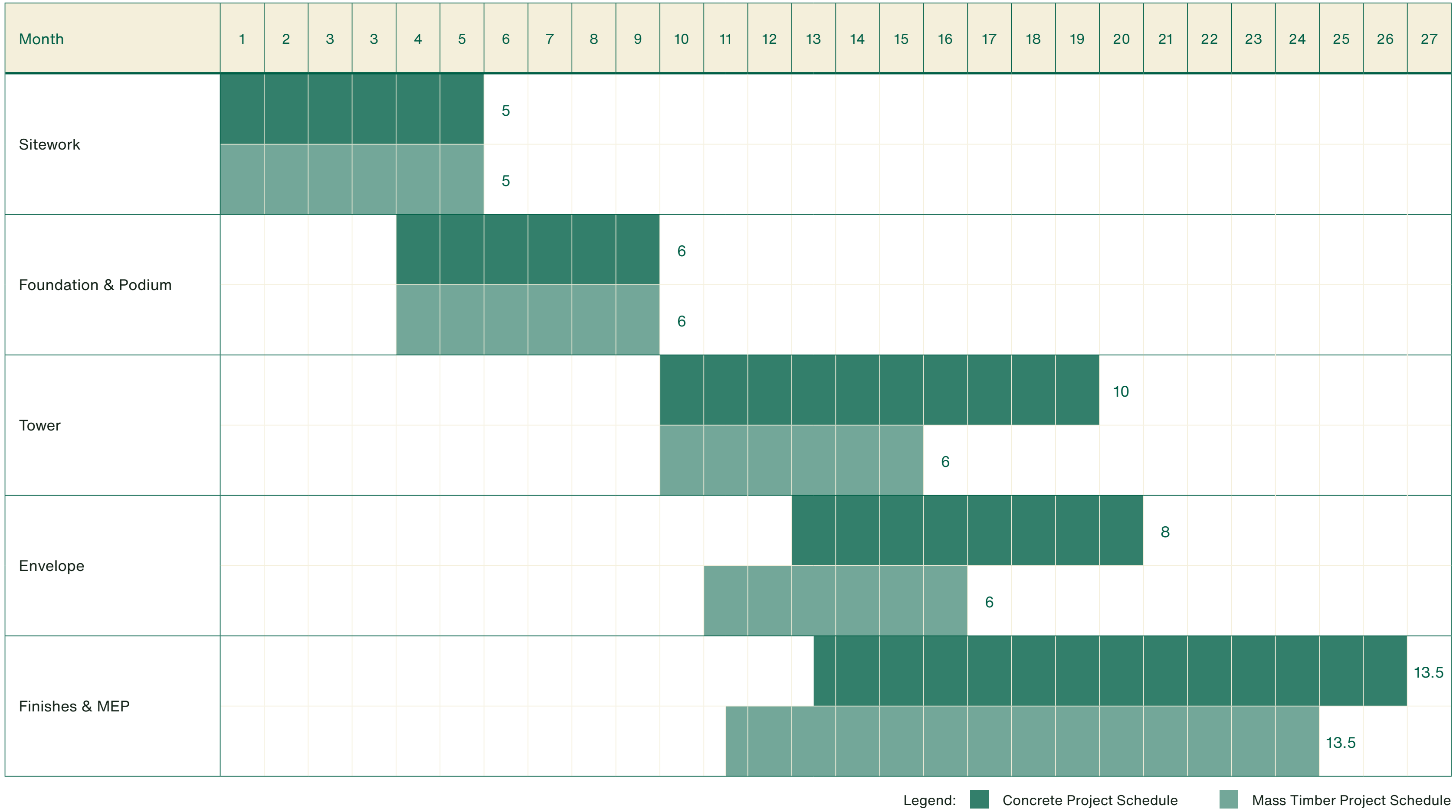
Stabilization Quality Over First Cost

For long-term rental ownership, the value of mass timber is captured over time through absorption, retention, and operating stability. The selected approach prioritizes a finished building that competes at the top of its market segment without requiring luxury-level finishes.

Repeatability for Future Developments

Beyond this project, the experience gained through delivering a design-forward mass timber building reduces execution risk on future projects, improving cost certainty, schedule reliability, and overall development performance across a broader portfolio.

Scheduling Comparison



Key Findings:

- The mass timber superstructure is completed in 6 months compared to 10 months for the concrete representing a 40% faster installation.
- The timber superstructure could be erected in 13 weeks. Approximately 1 floor per week.
- A quicker superstructure erection provides lower general expenses and labour costs.
- The envelope system (window wall) begins soon after the tower starts being erected to keep the interior out of the elements as much as possible.
- Using mass timber can provide greater scheduling certainty and eliminate delays associated with typical concrete construction.
- The Mass Timber building is expected to be completed 2 months quicker than the concrete building (7.7% scheduling reduction) Allowing earlier occupancy and accelerating revenue generation.

Carbon Comparison (Structure Only)

Life Cycle Assessment A1-A3

The Mass Timber structure had an embodied carbon impact of 138 kg CO_2/m^2 compared to 205 kg CO_2/m^2 for the Concrete structure.

Key Findings:

- Mass timber reduces the total embodied carbon by 1,226,038 kg CO_2 (39 %)
- The floor system accounts for the majority of GHG emissions
- 2629 metric tons of CO_2 is stored in the wood as biogenic carbon

These values are estimates generated by the GESTIMAT carbon calculation tool, which estimates A1–A3 embodied carbon using emission factors representative of Quebec and Ontario. Regional differences in material production and energy supply in Nova Scotia may not be explicitly reflected.

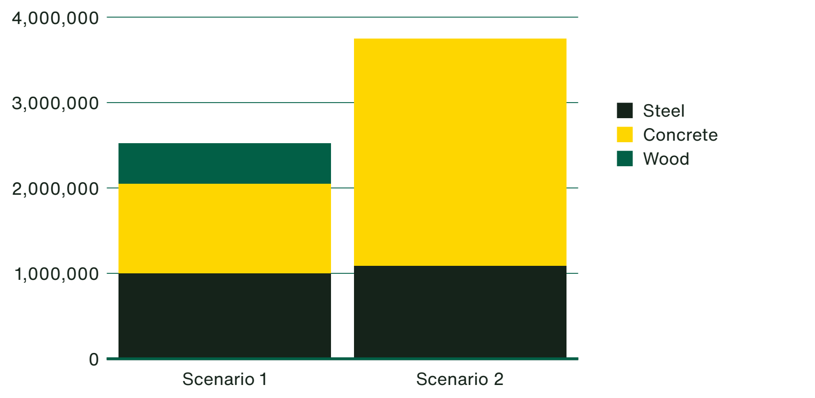
Scenarios Comparison

GHG emissions (kg CO_2 eq.)

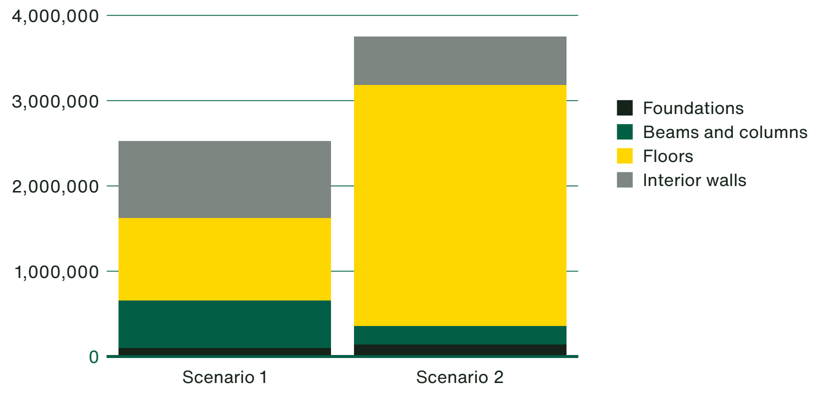
	Scenario 1	Scenario 2
Name	Wood Scenario	Concrete Scenario
Structure type	Timber and glulam	Concrete
Input includes typical (s) building (s)	No	No
Per material		
Steel	1,001,569	1,084,999
Concrete	1,047,212	2,665,394
Wood	475,575	0
Others	0	0
Per constructive system		
Foundations	97,244	135,482
Beams and columns	558,915	218,372
Floors	964,589	2,827,894
Interior walls	903,607	568,645
Exterior walls	0	0
Roofs	0	0
GHG totals		
Total	2,524,355	3,750,393
GHG per m²	138	205

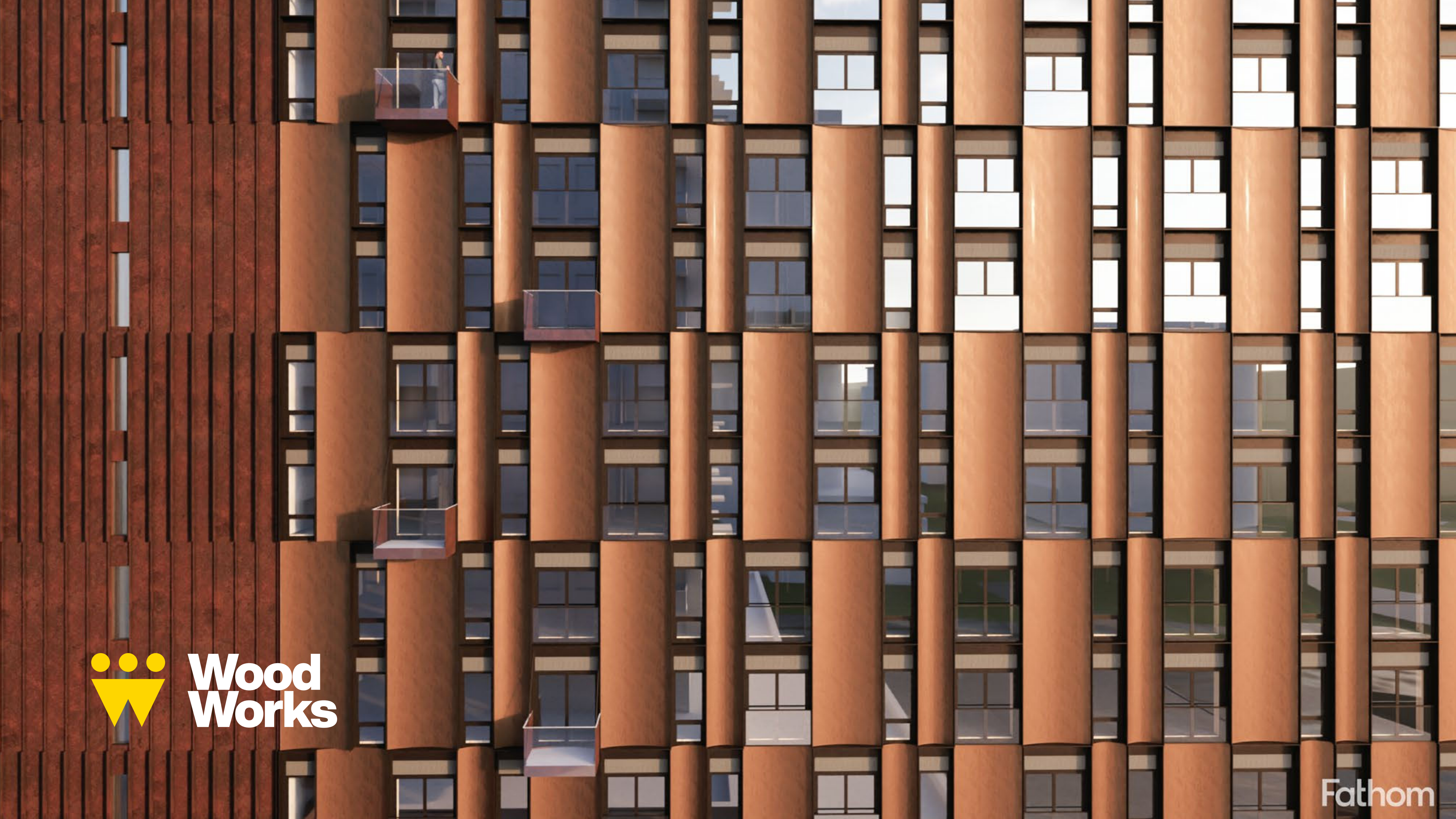
Total floor area: 18,261 m²

GHG emissions per material (kg CO_2 eq.)



GHG emissions per constructive system (kg CO_2 eq.)

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