EXPLORING THE ROLE OF MASS TIMBER

INDUSTRIAL BUILDINGS AND WAREHOUSE CONSTRUCTION

Wood Works | Canadian Wood Council Resource Program

Contents

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About Us

The Canadian Wood Council (CWC) is a leading force in advancing building codes and standards for wood construction, ensuring market access for Canadian wood products, and accelerating the adoption of sustainable, wood-based construction in the marketplace.

Founded in 1959, the Canadian Wood Council (CWC) is Canada's unifying voice for the wood products industry. As a national federation of associations, our members represent hundreds of manufacturers across the country.

Our mission is to support our members by accelerating market demand for wood products while championing responsible leadership through excellence in codes, standards, and regulations. Central to this effort is the WoodWorks program, which provides technical support and knowledge transfer to the construction sector, ensuring industry professionals have the expertise and resources needed to advance wood construction.

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EXPLORING THE ROLE OF MASS TIMBER

INDUSTRIAL BUILDINGS AND WAREHOUSE CONSTRUCTION

The emerging use of mass timber in industrial buildings presents promising opportunities that are shaping the future of construction in this sector. As a sustainable and economically competitive alternative, mass timber is redefining industrial construction, a field traditionally dominated by prefabricated steel. An analysis of two cutting-edge projects in Sudbury, Ontario, highlights key advantages, including cost competitiveness, reduced embodied carbon, and aesthetic appeal. The insights from these two projects present stakeholders with helpful considerations and valuable strategies for integrating mass timber into future developments.

Cambrian Heights

Herold Industrial Park

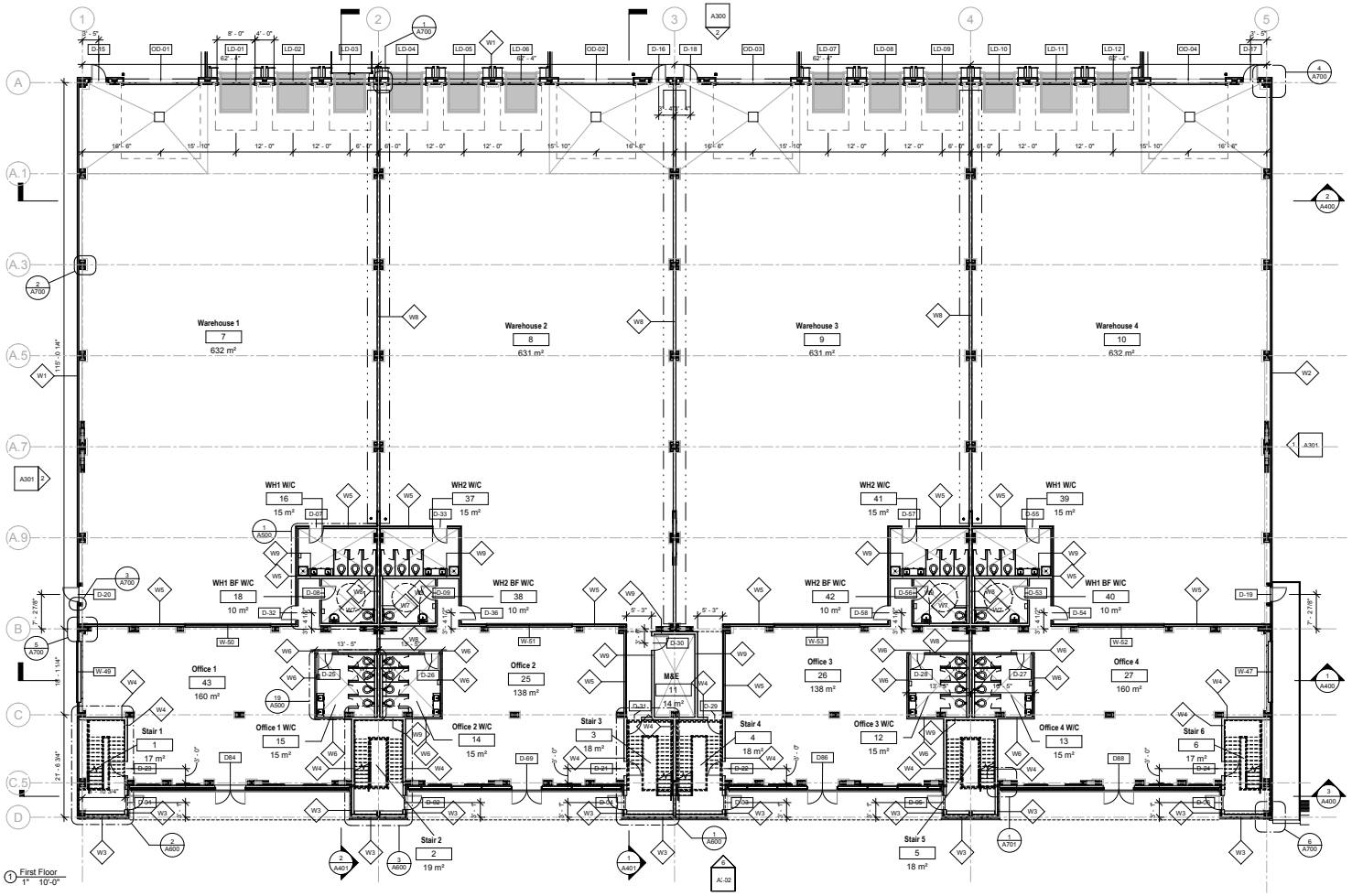
Cambrian Heights

PROPERTY INFORMATION		
Property Name	**Cambrian Heights Industrial**	
Market	Sudbury, Ontario	
Occupancy Type	Medium Hazard Industrial (F2) + Offices (D)	
	Square Meters	*Square Feet*
Industrial Space	2,528	27,211
Office Space	1,790	19,267
Gross Building Area	4,318	46,479
Site Size	17,094	183,998
Loading Docks	12	
Overhead Doors	4	
Parking Spaces	84	

The Cambrian Heights industrial warehouse, situated in the core of Greater Sudbury, Ontario, drew considerable attention during its construction due to its striking "yellow steel structure." At a glance, it appeared to be a conventional steel-framed building. However, a closer look revealed that the warehouse's superstructure was, in fact, made from mass timber—a material choice that signals a clear shift in the mindsets of builders and end users. Undertaking a mass timber project of this scale was a bold, and perhaps risky, decision for Bloomington Developments, who are known for their extensive industrial holdings across Greater Sudbury. Patrick Danielson, Principal of Danielson Architecture Office Inc (DAO), was commissioned in 2020 to design this first-of-its-kind project in Northern Ontario, as Bloomington Developments aimed to address a growing demand for industrial and mixed-use spaces in the area.

Cambrian Heights

Cambrian Heights Floor Plan, Level 1



DEVELOPMENT OVERVIEW

Project Features

- Two-storey, mass timber, mixed-use, medium-hazard industrial and office building
- Post-and-beam structural system with column grid spacing of 18m x 6m with 9m clear height
- 12 loading docks and 4 overhead doors

Product Strategy

- This building employs sustainable design strategies to reduce the embodied carbon footprint compared to traditional steel construction.
- The flexible design layout provides adaptable spaces suitable for a range of tenant uses, from logistics to manufacturing.

Cambrian Heights

Investment Highlights

- Mass Timber was cost competitive with steel, making it an economically viable option.
- Ideally positioned in Sudbury, a Northern Ontario location where industrial space is in is high demand.
- The project meets the evolving needs of tenants who are increasingly demanding sustainable design and versatile industrial spaces.
- Demand for flexible spaces in distribution centres increased since COVID-19.

Risk Mitigation

- Bloomington Developments is an experienced developer with a strong track record in commercial and industrial property development.
- The developer hired an experienced mass timber supplier who supported the project team in the early design phase.

Project Strategy

Bloomington Developments' "build it, and they will come" strategy required DAO to design a highly adaptable building capable of accommodating a variety of tenant needs, enabling both single and multi-tenant configurations. While industrial buildings often bypass intensive architectural involvement, Bloomington's vision for a multiple occupancy sustainable design necessitated an engaged architect aligned with their corporate priorities. Darian Sweeney, Project Manager for Bloomington Developments, emphasized the important role DAO's team played in creating a space that would meet the sustainability objectives sought by potential tenants.

The Shift from Steel to Mass Timber

Initially designed as a traditional steel structure, the project faced significant challenges due to the COVID-19 pandemic's impact on steel prices and availability. "Steel prices nearly tripled, and lead times became unworkable," Patrick recalls, leading him to suggest a shift to mass timber. Bloomington Developments quickly recognized mass timber's advantage.

Sweeney confirmed the change of the superstructure from structural steel to mass timber was based on several factors that included feasibility, aesthetics, and the sustainability attributes of using a renewable building material.

Jeremy Upward and Katherine Morawietz, architectural designers with DAO and graduates of Sudbury's McEwen School of Architecture (a mass timber building itself), had been exposed to this structural system throughout the school's construction, thereby providing a familiar point of departure for this project. Patrick's background in mass timber design, gained from his studies at the University of British Columbia and expanded upon through projects in Vancouver and Sudbury, further supported Bloomington's shift from steel to timber.

Collaboration with Mass Timber Suppliers

Cambrian Heights Project Team (from left to right): Sébastien Gaudreault of Tergos Construction, Darian Sweeney of Bloomington Developments, and Eric Forget of Nordic Structures, along with Katherine Morawietz, Jeremy Upward, and Patrick Danielson of Danielson Architecture Office.

Early in the design phase, the project team partnered with Nordic Structures, whose expertise in timber engineering, supply, and installation helped streamline the transition from steel to wood. The project's original steel grid spacing translated well to a mass timber structure, greatly simplifying the switch. Eric Forget, Team Lead at Nordic Structures, remarked, "These are the types of buildings we love—high-volume, with simple grid spacing and repetitive connections, ideal for mass timber."

Nordic Structures supplied glulam posts and beams, fasteners, and cross-laminated timber (CLT) panels for the roof and second floor. The roof utilized 89mm 3-ply CLT panels, while the fire-rated second floor required 105mm 3-ply CLT panels.

Penetrations through the wood panels were kept to a minimum, which streamlined coordination between structural, mechanical, and electrical elements. This also reduced CNC machine work in the factory, cutting both costs and production time. Danielson was able to coordinate space to run electrical and mechanical services between the purlin and girder structural roof elements.

"Having a mass timber supplier complete the engineering and supply of these structures eliminated coordination complexity," Eric remarked. It also reduced the number of design checks needed after the permit was issued. "This made the process very smooth," Danielson agreed.

At time of publication, the mass timber structure has been fully installed and exterior envelope installation is in progress. The building is slated for completion Fall 2025.

> "Having a mass timber supplier complete the engineering and supply of these structures eliminated coordination complexity and reduced the number of design checks needed after the permit was issued."
>
> **ERIC FORGET,** TEAM LEAD, NORDIC STRUCTURES

Herold Industrial Park

PROPERTY INFORMATION		
Property Name	**Herold Industrial Park**	
Market	Sudbury, Ontario	
Occupancy Type	Medium Hazard Industrial (F2) + Offices (D)	
	Square Meters	*Square Feet*
Industrial Space	870	9,365
Office Space	1,408	15,156
Gross Building Area	2,278	24,520
Site Size	21,498	231,402
Loading Docks	2	
Overhead Doors	3	
Parking Spaces	67	

Project & Team Introduction

Following the successful launch of the Cambrian Heights project, Bloomington scoured its portfolio of land holdings to find a home for its next mass timber building. The developer identified its south end property on Herold Drive, with one existing building and plenty of unused land, as an ideal fit and approached the teams at DAO and Nordic once again to help bring the project to life. The new building and extensive planned landscaping will transform the once semi-barren site into the clean, green, multi-business "Herold Industrial Park": impossible to miss for drivers on the two major highways – 17 and 69 – that intersect nearby. Whether travelling north-south or east-west through Northern Ontario, passersby will catch a glimpse of a landmark project in Greater Sudbury's pivot towards more sustainable industrial development.

Herold Industrial Park

DEVELOPMENT OVERVIEW

Project Features

- Two-storey, mass timber, mixed-use, medium-hazard industrial and office building
- Post-and-beam structural system with column grid spacing of 15m x 8m and 9m clear height
- 2 loading docks and 3 overhead doors

Product Strategy

- This building employs sustainable design strategies to reduce the embodied carbon footprint compared to traditional steel construction.
- The flexible design layout provides adaptable spaces suitable for a range of tenant uses, from logistics to manufacturing.

Investment Highlights

- Ideally positioned in a high-demand area for industrial space in Sudbury/Northern Ontario.
- The project meets increasing demand for sustainable design and versatile industrial spaces.
- An experienced mass timber supplier was on board from the beginning to support the project team in the early design phase.

Risk Mitigation

- The site's location within a flood plain and proximity to a highway necessitated precise building placement, additional waterproofing measures, and a specially tailored stormwater plan to meet requirements set by the city's Conservation Authority.
- Bloomington Developments' experience in the Sudbury market informed their insistence that the building design would allow for tenant flexibility. In this case a tenant was proactively secured during the construction process, which allowed for the incorporation of additional design elements to suit their needs.

"Tenants are increasingly prioritizing sustainable features, and the importance of biophilic design cannot be overstated. Creating beautiful, natural spaces not only enhances employee well-being and productivity, but also fosters a positive company culture."

DARIAN SWEENEY,
PROJECT MANAGER, BLOOMINGTON DEVELOPMENTS

Herold Industrial Park

FINDING THE RIGHT TENANT FOR HEROLD INDUSTRIAL PARK

Bloomington Developments secured a tenant who was eager to adapt the space to their needs and whose corporate initiatives aligned with the building's sustainability features. The builder was able to highlight the renewable construction materials and the embodied carbon benefits of using mass timber, which, in conjunction with the beautiful aesthetics of the exposed timber structure throughout, spurred the tenant to pursue a 10-year lease (double the length of a typical lease of this kind).

Although some adjustments to the base building were needed to meet the tenant's requirements, the established flexible design allowed for swift modification. To satisfy the tenant's request for additional office space, Bloomington added 4,500 square feet of rentable area to to the existing second floor and installed a full height glass façade at the building's new main entrance, among other minor changes.

Sustainability Goals

With these projects, Bloomington Developments has targeted a new generation of tenants who prioritize sustainability, noting that they have had more frequent discussions with potential tenants who value high performance, low carbon construction. Danielson affirmed that building with wood is an effective way to reduce the embodied carbon in construction, and he uses the CWC Carbon Calculator to quickly calculate the carbon stored in wood products used in a building's construction.

CAMBRIAN HEIGHTS INDUSTRIAL	
Volume of wood products used:	925 cubic meters
U.S. and Canadian forests grow this much wood in:	3 minutes
Carbon stored in wood:	1135 metric tons of carbon dioxide
Equivalent to:	
240 cars off the road for a year	
Energy to operate 120 homes for a year	

HEROLD INDUSTRIAL PARK	
Volume of wood products used:	359 cubic meters
U.S. and Canadian forests grow this much wood in:	1 minutes
Carbon stored in wood:	317 metric tons of carbon dioxide
Equivalent to:	
93 cars off the road for a year	
Energy to operate 46 homes for a year	

Embodied Carbon

Comparing a Mass Timber vs Steel Superstructure

GHGMAT, an estimating tool for greenhouse gas (GHG) emissions of building materials, was used to evaluate and compare the embodied carbon of the mass timber structure against that of the steel alternative originally considered (note that only the superstructure was assessed in this analysis). The tool estimates the GHG emissions associated with material manufacturing, also known as the Product Stage or cradle-to-gate emissions, covering the life cycle stages from raw material extraction to manufacturing (life cycle modules A1-A3).

Overall, using a low-carbon, renewable building material is a great way to reduce embodied GHG emissions on a project. The apparent savings serve as a key selling point to tenants who are motivated to foster a better company culture, especially for employees conscious of their GHG emissions.

CAMBRIAN HEIGHTS GHGMAT RESULTS

GHG Emissions by Element	Mass Timber	Steel
Beams and Columns	18,924 kg CO2e	132,481 kg CO2e
Floors	32,807 kg CO2e	133,571 kg CO2e
Roofs	81,837 kg CO2e	428,081 kg CO2e
GHG Totals	**133,568 kg CO2e**	**694,133 kg CO2e**
Avoided GHG Emissions	**560,565 kg CO2e**	

Figure 5: GHGMAT results comparing embodied carbon emissions (cradle-to-gate) of the mass timber and steel superstructure options for the Cambrian Heights Industrial Warehouse.

This chart omits the foundations, interior partitions, and exterior walls in its calculations, as these elements remain consistent between the two structure types. However, it is worth noting that by utilizing mass timber, the size of the building foundations may be reduced due to the lighter weight of the material.

"The GHGMAT tool makes it easier than ever to perform early-stage GHG assessments and compare material choices. It's a practical, user-friendly way to help project teams and owners make informed, low-carbon design decisions right from the start."

BROCK O'DONNELL, TECHNICAL ADVISOR FOR WOODWORKS ONTARIO

The Business Case for Industrial Mass Timber Buildings

INDUSTRIAL MASS TIMBER: Costs, Speed, and Market Return		
Project Information	**Cambrian Heights**	**Herold Industrial Park**
Structure	**Mass Timber**	**Mass Timber**
Structure Install	8 Weeks	5 Weeks
Super Structure Cost	$2,414,100	$1,275,040
Lease Terms (Years)	TBD	10 Years
Gross Area (SF)	46,478 SF	24,520 SF
Course of Construction Insurance (monthly)	1035	1004
Market Rental Rates (SF)	$ 18.00/SF	$ 18.00/SF
Realized Market Rates (SF)	$ 22.00/SF *	$ 20.00/SF
Premium Rent Realized	**$ 185,912/ year (+22%)**	**$ 49,040/ year (+ 11%)**

**Provided by Bloomington Developments*

In Bloomington's portfolio, current rental rates average between $15 and $17 per square foot (SF) triple-net and expected new industrial building rates in the Greater Sudbury market begin at $18.00-$19.00 per SF. Cambrian Heights is projected to achieve $22 per SF triple-net, with higher lease rates driven by the new facility's timber aesthetics. This premium—up to $4.00 per SF for mass timber—represents a 22% rent increase.

Conclusion

These in-demand industrial warehouse buildings demonstrate the viability of alternative materials over traditional steel systems, and Bloomington Developments has proven that mass timber is a competitive alternative in both cost and embodied carbon. On the Cambrian Heights project, the use of mass timber saved approximately 560,565 kg CO_2e and stores approximately 1,135,000 kg CO_2. This sequestered carbon dioxide was removed from the atmosphere as the trees grew and will remain within the building structure for the life of the building. Tenants are increasingly prioritizing sustainable features, and the importance of biophilic design cannot be overstated. Creating beautiful, natural spaces not only enhances employee well-being and productivity, but also fosters a positive company culture.

The success of Cambrian Heights and Herold Industrial Park was borne out of close collaboration with the mass timber supplier and efficient material coordination, culminating in spaces that disrupt the status quo of Greater Sudbury's industrial market while still addressing its needs. With the beautiful simplicity and easily replicable nature of warehouse structures, Danielson envisions pre-designed parametric wood systems as the next frontier. These adaptable building models can be instantly modified to meet diverse project needs, enhancing both speed and scalability in sustainable design. Danielson explained, "Our pre-designed systems will work the same way a seed grows into a unique tree, a responsive system where architecture delivers tailored sustainable, innovative designs on a larger scale through accelerated repetition."

Sweeney acknowledged the risks of venturing into new territory on their first mass timber project, particularly the uncertainty regarding how future tenants would perceive a timber-built industrial space. However, mass timber exceeded their expectations as a viable and strategic option. Emboldened by the heavy interest in its first two mass timber projects, Bloomington Developments has once again engaged DAO and Nordic to design a third industrial building of this type, further strengthening Bloomington's position as a local leader in mass timber construction and, more broadly, forward-thinking sustainable development. Sweeney emphasized that mass timber is now a foundational element of their strategy.

Project Team

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Ontario

Federal Economic Development Agency for Northern Ontario
Agence fédérale de développement économique pour le Nord de l'Ontario

Natural Resources Canada
Ressources naturelles Canada

WoodWorks Partners

Premier Level:

Boise Cascade
Western Archrib Structural Wood Systems
KALESNIKOFF TIMBER INSPIRES
Weyerhaeuser
SIMPSON Strong-Tie
Woodsure

Champion Level:

certainteed SAINT-GOBAIN
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ELEMENT5
HASSLACHER NORICA TIMBER From wood to wonders.

Supporter Level:

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