MASS TIMBER TRAINING NETWORK

Advancing Trades for a Sustainable Future

FINAL REPORT

2025-26

MODERN METHODS OF CONSTRUCTION EDUCATION

MASS TIMBER TRAINING NETWORK

Advancing Trades for a Sustainable Future

PROJECT FINAL REPORT 2026

Breena Jackson, Alyxces Igot, Jen Kim, Nathan Bergen, Nanda Dimitrov, Devon Franklin - British Columbia Institute of Technology

Project Sponsors
Natural Resources Canada — Green Construction Through Wood (GCWood) Program
British Columbia Institute of Technology | School of Construction & Environment
Fiscal Year 2025–26 | March 2026

Executive Summary

Canada's construction sector is experiencing a historic shift toward off-site construction, mass timber and modern methods of construction (MMC). The Mass Timber Training Network: Advancing Trades for a Sustainable Future (MTAT) was launched to ensure that Canada's skilled trades workforce—particularly carpenters and carpentry educators—is equipped with the knowledge, competencies, and resources to lead this transformation.

Led by the British Columbia Institute of Technology (BCIT) and funded through Natural Resources Canada's Green Construction Through Wood (GCWood) Program, the MTAT project brought together a national network of post-secondary institutions, unions, industry builders, government agencies, Indigenous partners, and professional associations with a shared mission: to build an inclusive mass timber trades education framework for use across Canada. Over the course of the 2025–26 fiscal year, the project successfully: established a national network of industry and educational stakeholders; developed and validated over 80 mass timber learning outcomes; created three curriculum frameworks; conducted a national faculty needs assessment and identified competencies for carpentry faculty development; launched the Modern Methods of Construction Education website with a collection of teaching resources, including three mass timber project drawing sets; mapped a list of commonly used software to use cases at each phase in the design, manufacture and construction of a mass timber project; and conducted knowledge-gathering missions to Sweden, Denmark, Germany, and Austria. The project has delivered lasting infrastructure—curricula, networks, training resources, and tools—that will continue to support Canada's mass timber workforce for years to come. Project deliverables are available online on the Modern Methods of Construction Education Website: **www.mmceducation.ca**

Table of Contents

Project by the Numbers 4

Background and Context 8

Project Goals and Approach 9

Training Framework 9

Mass Timber Trades Curriculum Learning Outcomes 11

Framework 1: Mass Timber Learning Outcomes mapped to the Harmonized RSOS for Carpenters 15

Framework 2: Mass Timber Learning Outcomes with Learning Activities 25

Faculty Development for Mass Timber and Offsite Construction Education 32

Carpentry Faculty Development Matrix 33

Barriers to Implementing Mass Timber Training for Trades & Proposed Solutions 37

Teaching and Training Resources - MMC Educators Hub 43

Sample Teaching Resource: Mass Timber Benchtop Project 44

Knowledge Mobilization 49

Modern Methods of Construction Education Website 49

National and International Knowledge Exchange 49

Equity, Diversity, and Inclusion 51

Pre-fab and Off-site Construction Education 60

Legacy and Looking Forward 69

Acknowledgements 70

References 71

PROJECT PROFILE: MASS TIMBER TRAINING NETWORK (MTAT)

Visual summary of highlights, key engagement activities, stakeholder composition, outreach efforts, and digital performance for the project period (April 2025 – March 2026)

Project Snapshot

A high-level overview of partnership milestones and engagement metrics achieved to date.

MOUs Signed

Formal partnership agreements established with institutions and organizations across Canada.

15

Stakeholders Engaged

Direct engagement through outreach conversations, email, and phone.

100+

1:1 Meetings

In-person and virtual meetings with educators, industry, and partners.

50+

Working Group Meetings

Nation-wide sessions to guide project priorities and validate competencies.

3

Network Engagement and Collaboration

These figures reflect structured collaboration with stakeholders to advance mass timber education.

Mass Timber Learning Outcomes Identified

80+

Competencies gathered and validated through national collaboration and industry review.

Curriculum Revision Rounds

4

Iterative refinement cycles to align learning outcomes with industry-validated competencies.

Partners Participated in 3 Day Faculty Workshop

13

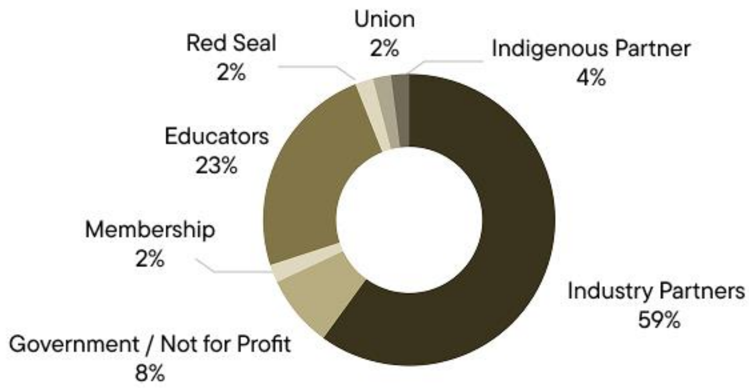
Competencies gathered and validated through national collaboration and industry review in Nov 2025.

Network Composition and Representation

The MTAT network reflects the perspectives of diverse stakeholders across the section and across the country.

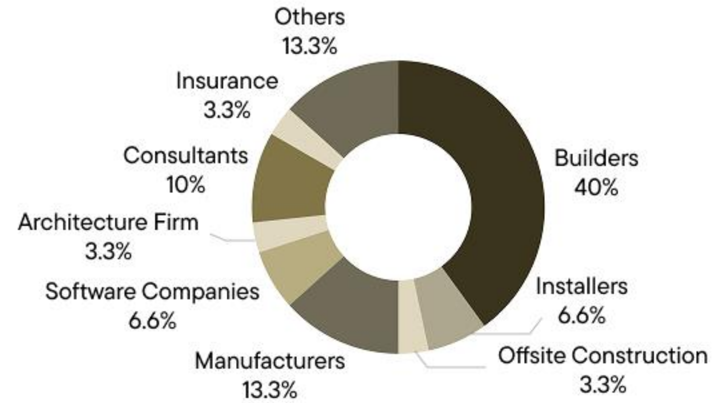
Stakeholder Representation by Sector

Industry Partners	30	Red Seal	1
Government / Not for Profit	4	Union	1
Membership	1	Indigenous Partner	2
Education	12		
Total			**51**

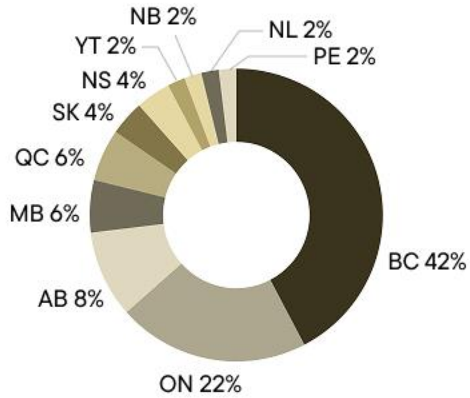


Industry Partners Breakdown by Subsector

Builders	12	Architecture Firm	1
Installers	2	Consultants	3
Offsite Construction	1	Insurance	1
Manufacturers	4	Others	4
Software Companies	2		
Total			**30**



Geographic Representation by Province



Awareness & Outreach Activities

These efforts expanded national visibility and stakeholder engagement, and enabled the team to research best practices in training.

National & International Conferences and Industry Tours

Canada

Conference / Industry Tour Name	Location	Date
2025 Supporting Equity in Trades Conference	Toronto, ON	May, 2025
Skills National Competition	Regina, SK	May, 2025
42nd International Symposium on Automation and Robotics in Construction	Montreal, QC	July, 2025
WoodRise 5th International Congress	Vancouver, BC	Sep, 2025
BCIB's Respectful Onsite Initiative	Vancouver, BC	Oct, 2025
Total		**5**

International

Conference / Industry Tour Name	Location	Date
International Mass Timber Conference	Portland, US	Mar, 2025
Canadian Wood Council Technical Tour	Sweden	Oct, 2025
29th International Wood Construction Conference	Austria	Dec, 2025
Rosenheim Technical University Tour	Germany	Dec, 2025
Salzburg University of Applied Sciences Tour	Austria	Dec, 2025
Total		**5**

International Manufacturing Facilities Toured

Number of visit team viewed to learn manufacturing facilities.

13

Knowledge Mobilization & Digital Performance

These metrics demonstrate measurable interest and engagement.

Website Performance

Email Sign-ups for Training Framework Updates — **120+**

Individuals requesting updates on the national Mass Timber Training Framework.

Website Active Users — **8.3K+**

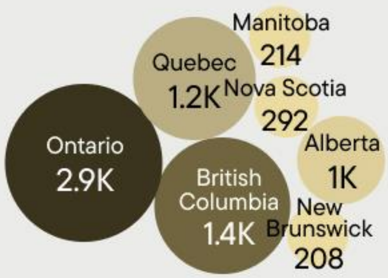
Total unique users who visited the website since launch.

Website Engaged Sessions — **4.3K+**

Sessions where users actively interacted with content, views, or key actions.

Website Active Users by Region

Competencies gathered and validated through national collaboration and industry review in Nov 2025.



Social Media Performance

Social Media Total Followers — **1024+**

Combined followers across LinkedIn, Instagram, and Facebook.

LinkedIn	421+
Instagram	518+
Facebook	85+

Social Media Content Reach — **277K+**

Total impressions across platforms, reflecting overall visibility and awareness.

LinkedIn	33K+
Instagram	106.2K+
Facebook	138.2K+

Social Media Content Interactions — **2.8K+**

Reactions, likes, and engagement actions across all platforms.

LinkedIn	767+
Instagram	1.6K+
Facebook	408+

Background and Context

The Mass Timber Opportunity in Canada

Mass timber—encompassing products such as cross-laminated timber (CLT), glulam, and nail-laminated timber (NLT)—is rapidly gaining prominence as a sustainable, low-carbon alternative to conventional steel and concrete construction (Brind'Amour & Bertrand, 2023). Canadian wood is internationally recognized for its quality, and Canada's forests provide an abundant and renewable supply chain to support a thriving mass timber industry (OMTI BC, 2024).

The construction sector accounts for a significant share of Canada's greenhouse gas emissions. Transitioning to wood-based, prefabricated, and off-site construction methods is a recognized pathway to reducing embodied carbon, increasing building speed and efficiency, and generating high-quality employment in communities across the country (Hwang, et.al, 2025)

The Training Gap

Despite the rapid growth of mass timber construction in Canada, the skilled trades education system has not kept pace. Carpentry programs—the trades most directly involved in mass timber assembly and installation—rarely include mass timber-specific content. Most curricula were designed for conventional wood-frame or light-wood construction and do not address the distinct materials, tools, connections, planning processes, and safety considerations that mass timber demands.

Carpentry instructors across Canada similarly lack access to professional development, teaching resources, or peer networks focused on mass timber, making it challenging to incorporate mass timber content into existing training programs. Without investment in faculty capacity, new curriculum content cannot be delivered effectively. This skills gap represents both a risk to the growth of the mass timber sector and an opportunity for targeted public investment.

GCWood Program and MTAT Project

The GCWood Program, administered by Natural Resources Canada, supports projects that accelerate the use of wood in construction through innovation, demonstration, capacity building, and knowledge transfer. The MTAT project was selected under GCWood (2025-2026) to address the identified gap in trades education for mass timber construction.

BCIT's School of Construction & Environment, home to one of Canada's most advanced mass timber training facilities—including the Mass Timber Connections and Constructability Hub and a High Performance Building Lab—was uniquely positioned to lead this national effort.

Project Goals and Approach

The MTAT project was organized around four interconnected strategic areas:

1. Network Building	Recruit and engage a national network of post-secondary institutions, unions, industry partners, government agencies, Indigenous organizations, and professional associations through formal MOUs and sustained collaboration.
2. Curriculum Development	Develop a validated national framework of mass timber learning outcomes and competencies that can be adopted and adapted by carpentry programs across Canada, mapped to the Red Seal occupational standard.
3. Capacity Building	Identify knowledge and skill gaps among carpentry faculty and provide direct upskilling opportunities; develop teaching resources and an instructor guide for the Mass Timber Benchtop Project.
4. Knowledge Mobilization	Share findings, tools, and resources nationally through a dedicated online platform, conferences, and network events, ensuring broad reach and lasting impact (mmcedcation.ca)

Throughout all activities, the project embedded commitments to equity, diversity, and inclusion—with particular attention to Indigenous representation, gender equity in the trades, and cultural safety in mass timber work environments.

Training Framework

Developing the Mass Timber Learning Outcomes

At the heart of the project's curriculum work is a comprehensive set of over 80 mass timber learning outcomes, developed through an iterative, nationally validated process over four rounds of revision. The framework captures the skills and knowledge that participants in mass timber training need to demonstrate upon completion of training to contribute effectively to a mass timber construction project.

The outcomes are organized into nine core curriculum areas and structured across four expanding levels of mastery—from foundational awareness through to advanced application—making them adaptable for short courses, module inserts, or full program integration. They serve as the starting point for the 2 teaching frameworks outlined below and future curriculum development.

Participants

Over 100 MTAT Network members representing 51 organizations contributed to the development of the Learning Outcomes framework, including representatives of 30 Industry partners, 12 post-secondary institutions, 4 government/non-profit organizations, Red Seal Canada, a Carpentry Union, and two Indigenous partner organizations. Participants represented unique perspectives from across Canada, and shared training needs from 11 provinces and territories. The largest group of participants represented the industry in British Columbia, with 42% of contributors, then Ontario (22%), followed by Alberta (8%), Quebec (6%) and Manitoba (6%). The only two areas not represented were the Northwest Territories and Nunavut. Please see the project by the numbers page above for a more detailed list of contributors.

Methodology

The learning outcomes were developed collaboratively with network members using a modified Delphi methodology (Hesson, Kenney, McKenna, 2025) through network meetings and one-on-one consultations, then validated through an anonymous prioritization survey, additional rounds of individual consultation, and small-group validation sessions. Outcomes were also cross-referenced against the current (2022) Red Seal Canada Carpentry occupational standard (RSOS) to identify gaps and avoid duplication.

Numbering system:
The whole numbers indicate the mass timber learning outcome parent category:

1 Wood Science & Joinery Techniques
2 Mass Timber Materials
3 Pre-Construction Planning, Coordination & Collaboration
4 CAD & Digital Project Delivery
5 Tools for Mass Timber Installation
6 Hardware / Connections for Mass Timber
7 Moisture Management
8 Working on Site (mass timber jobsite readiness)
9 Rigging

The first decimal place notes the level at which the learning outcome appears (1-4) The progression follows Red Seal Occupational Standard (RSOS) logic:

Level 1 = foundational knowledge & basic skills
Level 2 = application & interpretation
Level 3 = analysis & coordination
Level 4 = integration, evaluation, leadership

The second decimal place is an item number. Learning outcomes highlighted in orange are covered in the current Carpentry Red Seal program and can be omitted in training where carpentry training is a prerequisite.

Mass Timber Trades Curriculum Learning Outcomes

This list of learning outcomes captures the skills and knowledge that trades students in mass timber (MT) training need to demonstrate upon completion of training in order to contribute to a mass timber construction project.

Wood Science & Joinery Techniques - 1	
1.11 Describe the cultural significance and history of wood. **1.12 Explain wood as a living material and its basic anatomical structure (earlywood/latewood, cell composition, moisture states).** **1.13 Identify grain direction, wood species, and cuts (flat/vertical).** **1.14 Explain how grain orientation affects cutting, fastening, and finishing.** **1.21 Explain dimensional changes in wood from humidity/temperature.** **1.22 Describe load transfer implications of grain orientation.** 1.23 Compare sustainability properties of MT species and products. **1.31 Analyze how environmental conditions (moisture, UV, fire) affect wood performance & MT performance** 1.32 Explain char layer 1.41 Evaluate life-cycle performance, long-term durability risks, and maintenance strategies for MT structural elements.	**1.15 Read grain orientation in solid wood and align cutting/fastening accordingly.** **1.16 Identify and fit patches using basic joinery techniques.** **1.17 Identify cut of wood (e.g. flat vs. vertical grain)** **1.24 Repair surface damage in MT using steaming, sanding, and basic refinish techniques.** **1.25 Assess grain + machining direction to perform precise joinery operations.** 1.33 Conduct field assessments of engineered members (CLT, glulam, LVL, MPP) for deterioration, delamination, char exposure, checking, and moisture-related issues. 1.42. Develop remediation plans for damaged MT components, including patching, refinishing, and moisture correction steps.
Mass Timber Materials - 2	

2.11 Identify CLT, GLT, DLT, NLT, MPP, SCL products and their uses. 2.12 Describe benefits of MT in sustainability and construction performance. 2.21 Evaluate the sustainability, span capacity, and manufacturing processes of MT products. 2.22 Describe science of MT manufacturing (including moisture fundamentals). 2.31 Investigate emerging MT products and hybrid systems. 2.41 Assess how MT product selection affects constructability, sequencing, tolerances, and long-term performance. 2.42 Evaluate tolerance differences between materials used on a MT build	2.13 Identify MT products in shop drawings. 2.23 Apply safe handling, temporary protection, and storage procedures for MT materials. 2.32 Coordinate MT material handling logistics within a multi-trade environment. 2.43 Recommend MT material solutions for project-specific needs. 2.44 Calculate tolerance differences between materials used on a MT build.
Pre-Construction Planning, Coordination & Collaboration - 3	
3.11 Identify stages of a MT project (pre-planning, fabrication, mobilization, installation). 3.12 Identify benefits of an off-site construction model for MT. **3.13 Identify practices contributing to psychological and cultural safety on a highly collaborative, interdisciplinary site. / MT project.** 3.21 Explain preconstruction sequencing, supply-chain coordination, and BIM roles on a MT project. 3.22 Describe differences between MT roles and traditional construction roles. 3.31 Analyze expectations for collaboration (design-phase input, clash-detection, timeline impacts) on MT projects. 3.41 Evaluate how design-phase decisions affect cost, sequencing, and downstream dependencies on MT projects	**3.14 Use respectful, inclusive language in team communication and trades collaboration.** 3.23 Participate in collaborative processes (early coordination, design intent communication). 3.32 Coordinate delivery, staging, and on-site movement of MT components. **3.33 Apply strategies from respectful-workplace training to real project scenarios.** 3.42 Create a MT construction project timeline showing impacts of deviations and required cross-trade mitigation measures.
CAD & Digital Project Delivery - 4	

4.11 Identify BIM principles and coordination workflows for MT/ offsite projects. 4.12 Explain value of pre-site planning and 3D model trust. 4.21 Explain use of 3D models for sequencing and constructability in offsite construction **4.22 Interpret engineered bracing plans for MT.** 4.31 Analyze digital model elements for staging and structural feasibility. 4.41 Evaluate coordination workflows to identify potential conflicts in prefabricated assemblies.	4.13 Navigate the 3D model of a structure. 4.23 Create basic CAD elements. **4.24 Extract layout info from 3D models.** **4.32 Use digital layout tools for bracing and panel alignment.** 4.33 Read/interpret MT shop drawings and assembly diagrams. 4.42 Create model-based strategies for installation sequencing or field verification of MT.
Tools for Mass Timber Installation - 5	
5.11 Identify specialized MT tools and hazards. **5.12 Describe saw blades, drill bits, and machining properties.** 5.21 Explain how machining methods relate to tolerances and surface finish for MT. 5.31 Assess tool selection needs for complex MT connections or repairs. 5.41 Evaluate quality of tool-based fabrication work.	5.13 Operate basic MT power and hand tools. **5.14 Chisel recess corners accurately.** **5.22 Shape, profile, and finish surfaces to tolerances.** **5.23 Fabricate jigs and demonstrate tool proficiency.** **5.32 Fabricate and fit advanced patch repairs for MT** 5.42 Develop tool-use protocols for advanced MT tasks (specialty cutting, recessing, shaping).
Hardware / Connections for Mass Timber - 6	
6.11 Identify MT building components, hardware, and fasteners. 6.21 Explain torque effects, ductility, and connection behaviour. 6.22 Interpret shop-drawing connection details. 6.31 Analyze connection tolerances vs. conventional carpentry tolerances. 6.32 Explain shear/tension forces and their effect on MT installation. 6.41 Evaluate connection strategies for MT assemblies, including fire, seismic, and long-term considerations.	**6.12 Install standard MT fasteners to specification.** 6.23 Install MT connectors (knife plates, hangers, drag straps). 6.24 Install MT screws at angles correctly. 6.33 Troubleshoot and repair MT connection issues. 6.42 Create connection execution plans for complex MT assemblies.
Moisture Management - 7	

7.11 Describe mold conditions, moisture challenges, and protective wraps for MT. **7.12 Understand climate zones.** 7.21 Explain impacts of saturation and moisture penetration on MT assemblies. 7.31 Analyze causes and consequences of on-site moisture exposure of MT materials. 7.41 Develop moisture management strategies for the full construction cycle.	**7.13 Install moisture protection materials.** **7.14 Calibrate moisture meters.** **7.22 Monitor moisture during concrete topping or slab installation.** 7.32 Implement moisture mitigation and tracking protocols. 7.42 Assign moisture-management responsibilities to stakeholders and coordinate onsite processes.
Working on Site (mass timber jobsite readiness) - 8	
8.11 Identify scope of work and MT-specific risks. 8.12 Describe unique considerations for site organization and sequencing of MT projects 8.21 Explain logistics, tolerances, and coordination with other trades. 8.31 Analyze site workflows and trade interactions. 8.32 Explain the importance of confirming elevation measurements, with a focus on measurements unique to MT builds 8.41 Identify sequencing optimizations and risk mitigations at system level.	**8.13 Use PPE appropriate for a MT site** **8.14 Conduct Field Level Risk Assessments.** **8.15 Survey control points.** **8.22 Use total station for layout.** **8.23 Install membranes / fire protection.** 8.33 Develop task-specific work plans for MT projects. 8.34 Confirm as built measurements with architectural drawings. 8.42 Execute multi-trade coordination based on site constraints.
Rigging - 9	
9.11 Identify rigging equipment, hand signals, knots, fall-protection basics for MT. **9.21 Describe considerations for vertical member tipping and CG balance.** **9.22 Identify different rigging slings, hardware, and below-the-hook lifting devices.** 9.31 Analyze rigging configurations for MT load scenarios. 9.32 Describe methods and considerations for handling and control of MT loads 9.33 Describe methods for identifying centers of gravity and load balance in large wood components 9.41 Calculate loads and select appropriate rigging configurations for engineered assemblies.	**9.12 Perform hand signals, tie knots, prepare and secure loads, use tag lines, locate lifting points.** **9.13 Apply lifting practices for cranes** 9.23 Land/position MT elements precisely. 9.24 Create a lift plan for a MT beam **9.25 Calculate load weights for MT** **9.26 Apply lifting practices for multiple-crane sites** 9.34 Operate rigging tools (clutches, slings) and implement safe lift plans. 9.35 Find center of gravity on a rectilinear panel 9.36 Accurately install lifting points on a rectilinear panel **9.41 Create a fall protection plan for a medium sized crew** 9.42 Create a lifting plan for a just in time delivery of various panels and beams

Framework 1: Mass Timber Integration into Harmonized Carpentry Apprenticeship Training Red Seal Occupational Standards

The below table is a combination of 2 tables from the Red Seal Occupational Standards: Carpenter Task Matrix (*page 19 RSOS*) and Harmonization of Apprenticeship Training (*page 24 RSOS*). These sequenced topics have then been mapped onto the Mass Timber (MT) Learning outcomes table. The column "Mass Timber learning outcomes mapped onto existing RSOS tasks" lists Mass timber learning outcomes that could naturally fit into existing RSOS learning outcome and task categories. The column "Mass Timber learning outcomes that don't map onto existing RSOS tasks" includes learning outcomes that are currently outside the scope of trade as defined by the existing RSOS for Carpenters and would require additional training. A program review and addition of these learning outcomes to the trade is recommended.

Numbering system:
The numbers in orange indicate a MT learning outcome. Whole numbers indicate learning outcome parent category (*see learning outcomes table*).
First decimal place notes level following RSOS logic:

Level 1 = foundational knowledge & basic skills
Level 2 = application & interpretation
Level 3 = analysis & coordination
Level 4 = integration, evaluation, leadership

The second decimal place is an item number.
The letter – numbering system not highlighted in orange is part of the RSOS task matrix.

For example:* *B-5.01 *Interprets project drawings* ***4.11, 4.12***

- *RSOS Task B5: Interprets documentation - Level 1- foundational knowledge)*
- *Corresponding items:* ***4.11*** *Identify BIM principles and coordination workflows.* ***4.12*** *Explain value of pre-site planning and 3D model trust.*

A – Performs common occupational skills - 12%						
Task	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Mass Timber (MT) learning outcomes mapped across existing RSOS tasks**	**Mass Timber (MT) learning outcomes that don't map across existing RSOS tasks**
Task A-1 Uses and maintains tools and equipment 32%	A-1.01 Uses hand, power and pneumatic tools – **1.14, 1.15, 1.16, 5.11, 5.12, 5.13, 5.14** A-1.02 Uses stationary tools A-1.03 Uses powder-actuated tools A-1.04 Uses lifting, rigging and hoisting equipment - **9.11, 9.12, 9.13, 9.22** A-1.05 Uses layout instruments and equipment – **8.13, 8.14, 8.15, 8.22** A-1.06 Uses tack welding equipment (Not Common Core) A-1.07 Uses torch cutting equipment (Not Common Core)	A-1.05 Uses layout instruments and equipment - **8.22**			1.14 Explain how grain orientation affects cutting, fastening, and finishing 1.15 Read grain orientation in solid wood and align cutting/fastening accordingly. 1.16 Identify and fit patches using basic joinery techniques. 5.11 Identify specialized MT tools and hazards. 5.12 Describe saw blades, drill bits, and machining properties. 5.13 Operate basic MT power and hand tools. 5.14 Chisel recess corners accurately. 8.14 Conduct Field Level Risk Assessments. 8.15Survey control points. 8.22 Use total station for layout 9.11 Identify rigging equipment, hand signals, knots, fall-protection basics. 9.12 Perform hand signals, tie knots, prepare and secure loads, use tag lines, locate lifting points. 9.13 Apply lifting practices for cranes 9.22 Identify different rigging slings, hardware, and below-the-hook lifting devices.	9.23 Land/position MT elements precisely. 9.24 Create a lift plan for a mass timber beam 9.25 Calculate load weights 9.26 Apply lifting practices for multiple crane sites 9.31 Analyze rigging configurations for load scenarios. 9.32 Describe methods and considerations for handling and control of mass timber loads 9.33 Describe methods for identifying centers of gravity and load balance in large wood components 9.34 Operate rigging tools (clutches, slings) and implement safe lift plans. 9.35 Find center of gravity on a rectilinear panel 9.36 Accurately instal lifting points on a rectilinear panel 9.41 Calculate loads and select appropriate rigging configurations for engineered assemblies. 9.42 Create a fall protection plan for a medium sized crew 9.43 Create a lifting plan for a just in time delivery of various panel and beams
Task A-2 Performs safety-related activities 26%	A-2.01 Uses personal protective equipment (PPE) and safety equipment – **8.11, 8.13**				8.11 Identify scope of work and MT-specific risks 8.13 Use PPE	

	A-2.02 Maintains safe work environment					
Task A-3 Builds and uses temporary access structures 26%	A-3.01 Uses stationary access equipment A-3.02 Uses mobile access equipment A-3.03 Erects/dismantles scaffolding A-3.04 Modifies scaffolding					
Task A-4 Uses communication and mentoring techniques 16%	A-4.01 Uses communication techniques - 3.13, 3.14			A-4.02 Uses mentoring techniques - 3.33	3.13 Identify practices contributing to psychological and cultural safety required for the high level of interprofessional collaboration on a MT project 3.14 Demonstrate professionalism through use of respectful, inclusive language in team communication. 3.33 Apply strategies from respectful-workplace training to real project scenarios.	
B – Performs planning and layout - 14%						
Task	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Mass Timber learning outcomes mapped across existing RSOS**	**Mass Timber learning outcomes that don't map across existing RSOS**
Task B-5 Interprets documentation 35%	B-5.01 Interprets project drawings 2.13, 4.11, 4.12, 4.13 B-5.02 Interprets specifications 4.33 B-5.03 Interprets safety documentation 8.14				2.13 Identify mass timber products in shop drawings. 4.11 Identify BIM principles and coordination workflows. 4.12 Explain value of pre-site planning and 3D model trust. 4.13 Navigate a 3D model. 4.33 Read/interpret MT shop drawings and assembly diagrams. 8.14 Conduct Field Level Risk Assessments.	3.11 Identify stages of a MT project (pre-planning, fabrication, mobilization, installation). 3.12 Identify benefits of an off-site construction model.

	B-5.04 Interprets workplace documentation					
Task B-6 Organizes work 24%				B-6.01 Schedules work sequence 4.41, 4.42, 8.32 B-6.02 Performs site preparation 8.41 B-6.03 Performs quantity takeoff B-6.04 Organizes material 4.41	4.41 Evaluate coordination workflows to identify potential conflicts in prefabricated assemblies. 4.42 Create model-based strategies for installation sequencing or field verification. 8.21 Explain logistics, tolerances, and coordination with other trades. 8.32 Explain the importance unique to mass timber builds of confirming elevation measurements 8.41 Identify sequencing optimizations and risk mitigations at system level.	3.41 Evaluate how design-phase decisions affect cost, sequencing, and downstream dependencies. 3.42 Create a construction timeline showing impacts of deviations and required cross-trade mitigation measures. 8.42 Execute multi-trade coordination based on site constraints.
Task B-7 Performs layout 41%	B-7.01 Performs site layout 8.11, 8.12 B-7.02 Lays out concrete formwork B-7.03 Lays out floors B-7.04 Lays out decks B-7.05 Lays out walls B-7.06 Lays out ceilings B-7.07 Lays out roofs	B-7.01 Performs site layout 4.22, 4.24 B-7.03 Lays out floors B-7.05 Lays out walls B-7.06 Lays out ceilings B-7.07 Lays out roofs B-7.08 Lays out stairs	B-7.02 Lays out concrete formwork B-7.03 Lays out floors B-7.06 Lays out ceilings B-7.07 Lays out roofs B-7.08 Lays out stairs B-7.09 Lays out balustrades	B-7.03 Lays out floors B-7.07 Lays out roofs B-7.08 Lays out stairs B-7.09 Lays out balustrades	4.22 Interpret engineered bracing plans. 4.24 Extract layout info from models. 8.11 Identify scope of work and MT-specific risks. 8.12 Describe site organization and sequencing.	3.21 Explain preconstruction sequencing, supply-chain coordination, and BIM roles. 3.22 Describe differences between MT roles and traditional construction roles. 3.23 Participate in collaborative processes (early coordination, design intent communication). 3.31 Analyze expectations for collaboration (design-phase input, clash-detection, timeline impacts). 3.32 Coordinate delivery, staging, and on-site movement of MT components. 3.41 Evaluate how design-phase decisions affect cost, sequencing, and downstream dependencies. 3.42 Create a construction timeline showing impacts of deviations and required cross-trade mitigation measures.

						4.21 Explain use of 3D models for sequencing and constructability. 4.23 Create basic CAD elements. 4.31 Analyze digital model elements for staging and structural feasibility. 4.32 Use digital layout tools for bracing and panel alignment. 8.31 Analyze site workflows and trade interactions. 8.33 Develop task-specific work plans. 8.42 Execute multi-trade coordination based on site constraints.
C – Performs concrete work - 16%						
Task	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Mass Timber learning outcomes mapped across existing RSOS**	**Mass Timber learning outcomes that don't map across existing RSOS**
Task C-8 Constructs formwork 72%	C-8.03 Constructs footing forms C-8.04 Constructs wall form systems and grade beam formwork C-8.05 Constructs slab formwork C-8.08 Installs embedded reinforcements C-8.09 Dismantles formwork		C-8.01 Erects excavation shoring and underpinning C-8.02 Erects concrete falsework C-8.06 Constructs column formwork C-8.07 Constructs stair formwork C-8.08 Installs embedded reinforcements			

Task C-9 Installs concrete, cement-based and epoxy products 28%	C-9.01 Places concrete C-9.02 Facilitates curing of concrete C-9.03 Performs basic concrete finishing		C-9.04 Installs pre-cast components C-9.05 Installs grout			
D – Performs framing - 20%						
Task	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Mass Timber learning outcomes mapped across existing RSOS**	**Mass Timber learning outcomes that don't map across existing RSOS**
Task D-10 Constructs floor systems 29%	10.01 Installs engineered floor systems. **2.11, 2.12** D-10.02 Constructs dimensional lumber floor framing	D-10.02 Constructs dimensional lumber floor framing			**2.11** Identify CLT, GLT, DLT, NLT, MPP, SCL products and their uses. **2.12** Describe benefits of MT in sustainability and construction performance.	**2.13** Identify mass timber products in shop drawings. **2.14** Identify cut of wood (e.g. flat vs. vertical grain) **6.11** Identify MT building components, hardware, and fasteners. **6.12** Install standard fasteners to specification.
Task D-11 Constructs deck systems 16%	D-11.01 Constructs decks D-11.02 Installs deck components					
Task D-12 Constructs wall systems 27%	D-12.01 Installs engineered wall systems D-12.02 Constructs dimensional lumber wall framing	D-12.01 Installs engineered wall systems **2.21, 2.31, 8.23** D-12.02 Constructs dimensional lumber wall framing			**2.21** Evaluate sustainability, span capacity, and manufacturing processes of MT products. **2.31** Investigate emerging MT products and hybrid systems. **8.23** Install membranes / fire protection.	**2.22** Describe the science of MT manufacturing (including moisture fundamentals). **2.23** Apply safe handling, temporary protection, and storage procedures for MT **6.21** Explain torque effects, ductility, and connection behaviour. **6.22** Interpret shop-drawing connection details. **6.23** Install connectors (knife plates, hangers, drag straps). **6.24** Install MT screws at angles correctly.

Task D-13 Constructs roof and ceiling systems 28%		D-13.01 Installs engineered trusses 6.11 D-13.02 Constructs roof and ceiling framing	D-13.01 Installs engineered trusses D-13.02 Constructs roof and ceiling framing	D-13.01 Installs engineered trusses 2.41, 2.42 D-13.02 Constructs roof and ceiling framing	2.41 Assess how product selection affects constructability, sequencing, tolerances, and long-term performance. 2.42 Evaluate tolerance differences between materials used on a mass timber build 6.11 Identify MT building components, hardware, and fasteners.	2.31 Investigate emerging MT products and hybrid systems. 2.32 Explain char layer in MT 2.33 Coordinate MT material handling logistics within a multi-trade environment. 2.43 Recommend MT material solutions for project-specific needs. 2.44 Calculate tolerance differences between materials used on a mass timber build 6.31 Analyze connection tolerances vs. conventional carpentry tolerances. 6.32 Explain shear/tension forces and their effect on installation. 6.33 Troubleshoot and repair connection issues. 6.41 Evaluate connection strategies for MT assemblies, including fire, seismic, and long-term considerations. 6.42 Create connection execution plans for complex assemblies. 8.34 Confirm as built measurements with architectural drawings
E – Performs exterior finishing - 14%						
Task	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Mass Timber learning outcomes mapped across existing RSOS**	**Mass Timber learning outcomes that don't map across existing RSOS**
Task E-14 Installs exterior doors and windows 41%		E-14.01 Installs exterior jambs/frames E-14.02 Installs exterior doors E-14.03 Installs exterior windows E-14.04 Installs exterior door and window hardware				
Task E-15 Installs roofing		E-15.01 Installs roofing			7.11 Describe mold conditions, moisture challenges, and protective wraps	7.31 Analyze causes and consequences of on-site moisture exposure.

24%		components **7.11, 7.21** E-15.02 Installs roof coverings **7.41**			**7.21** Explain impacts of saturation and moisture penetration on assemblies. **7.41** Develop moisture management strategies for the full construction cycle.	**7.32** Implement moisture mitigation and tracking protocols.
Task E-16 Installs exterior finishes 35%		E-16.01 Installs exterior wall components – **7.22** E-16.02 Installs exterior wall coverings **7.13**			**7.13** Install moisture protection materials. **7.22** Monitor moisture during concrete topping or slab installation.	**7.42** Assign moisture-management responsibilities to stakeholders and coordinate onsite processes.
F –Performs interior finishing - 14%						
Task	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Mass Timber learning outcomes mapped across existing RSOS**	**Mass Timber learning outcomes that don't map across existing RSOS**
Task F-17 Applies wall and ceiling finishes 17%			F-17.01 Installs wallboard F-17.02 Applies compound to walls and ceilings F-17.03 Installs panels, tiles and solid wood finishes F-17.04 Installs suspended ceilings F-17.05 Installs demountable wall systems – **7.31**		**7.31** Analyze causes and consequences of on-site moisture exposure.	**1.13** Identify grain direction, wood species, and cuts (flat/vertical). **1.14** Explain how grain orientation affects cutting, fastening, and finishing. **1.15** Read grain orientation in solid wood and align cutting/fastening accordingly. **1.16** Identify and fit patches using basic joinery techniques. **1.31** Analyze how environmental conditions (moisture, UV, fire) affect wood performance. **1.32** Evaluate suitability of wood species for specific MT applications. **1.33** Conduct field assessments of engineered members (CLT, glulam, LVL, MPP) for deterioration, delamination, char exposure, checking, and moisture-related issues. **1.34** Document findings using trade-specific terminology.
Task F-18 Installs flooring 17%				F-18.01 Installs underlayment F-18.02 Installs floor coverings		**5.41** Evaluate quality of tool-based fabrication work.

				F-18.03 Installs access flooring		5.42 Develop tool-use protocols for advanced MT tasks (specialty cutting, recessing, shaping).
Task F-19 Installs interior doors and windows 31%			F-19.01 Installs interior jambs/frames F-19.02 Installs interior doors F-19.03 Installs interior windows F-19.04 Installs interior door and window hardware			5.31 Assess tool selection needs for complex connections or repairs. 5.32 Fabricate and fit advanced patch repairs.
Task F-20 Constructs and installs finish components and stairs 35%		F-20.03 Constructs stairs	F-20.01 Fabricates finish components 5.22, 5.23 F-20.02 Installs finish components and accessories F-20.03 Constructs stairs	F-20.03 Constructs stairs	5.22 Shape, profile, and finish surfaces to tolerances. 5.23 Fabricate jigs and demonstrate tool proficiency.	1.21 Explain dimensional changes in wood from humidity/temperature. 1.22 Describe load transfer implications of grain orientation. 1.24 Repair surface damage in mass timber using steaming, sanding, and basic refinish techniques. 1.25 Assess grain + machining direction to perform precise joinery operations. 5.21 Explain how machining methods relate to tolerances and surface finish.
G – Performs renovations - 10%						
Task	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Mass Timber learning outcomes mapped across existing RSOS**	**Mass Timber learning outcomes that don't map across existing RSOS**
Task G-21 Performs renovation-specific support activities 48%				G-21.01 Removes existing material 1.42 G-21.02 Protects structure during renovations	1.41 Evaluate life-cycle performance, long-term durability risks, and maintenance strategies for mass timber structural elements.	1.11 Describe the cultural significance and history of wood. 1.12 Explain wood as a living material and its basic anatomical structure (earlywood/latewood, cell composition, moisture states). 1.23 Compare sustainability properties of mass timber species and products.

Task G-22 Performs renovation-specific construction activities 52%				G-22.01 Joins new to existing construction G-22.02 Changes existing structure during renovations 1.41	1.42 Develop remediation plans for damaged mass timber components, including patching, refinishing, and moisture correction steps.	

Framework 2: Mass Timber for Carpentry Trades Modular Standalone

Framework 2 was designed to be modular and adaptable while capturing the full breadth of identified mass timber learning outcomes not able to fit into framework 1 because of RSOS constraints. Modular framework 2 is built to mirror the nature of mass timber construction: it is an iterative process where each step both informs and is informed by the previous step. Delivery of interlocking learning outcomes within framework 2 relies heavily on project work and case studies. To keep in alignment with RSOS training, a 30% theory 70% practical ratio to learning modality was adopted. The logic is that trades competency is fundamentally experiential. 30% time in the classroom gives apprentices the conceptual framework however, the 70% shop time is where learning becomes skill.

Numbering system:

The numbers in orange indicate a MT learning outcome. Whole numbers indicate learning outcome parent category (*see learning outcomes table*). First decimal place notes level following RSOS logic:

Level 1 = foundational knowledge & basic skills
Level 2 = application & interpretation
Level 3 = analysis & coordination
Level 4 = integration, evaluation, leadership

The second decimal place is an item number.

<table>
<tr><th colspan="3">Level 1</th></tr>
<tr><th colspan="2">Wood Science & Joinery Techniques</th><th>Modality & Learning Activities</th></tr>
<tr><td>Theory - 30%</td><td>Practical - 70%</td><td rowspan="6">Level 1:
foundational knowledge & basic skills

Core Anchor: Introductory MT Benchtop Project
MMC small-scale benchtop project gives learners a tangible reference point that connects wood science, materials, tools, hardware, moisture, drawing sets, site safety, and rigging.</td></tr>
<tr><td>1.11 Describe the cultural significance and history of wood.
1.12 Explain wood as a living material and its basic anatomical structure (earlywood/latewood, cell composition, moisture states).
1.13 Identify grain direction, wood species, and cuts (flat/vertical).
1.14 Explain how grain orientation affects cutting, fastening, and finishing.</td><td>1.15 Read grain orientation in solid wood and align cutting/fastening accordingly.
1.16 Identify and fit patches using basic joinery techniques.
1.17 Identify cut of wood (e.g. flat vs. vertical grain)</td></tr>
<tr><th colspan="2">Mass Timber Materials</th></tr>
<tr><td>Theory - 30%</td><td>Practical - 70%</td></tr>
<tr><td>2.14 Identify CLT, GLT, DLT, NLT, MPP, SCL products and their uses.</td><td>2.16 Identify MT products in shop drawings.</td></tr>
</table>

2.15 Describe benefits of MT in sustainability and construction performance.	
Pre-Construction Planning, Coordination & Collaboration	
Theory - 30%	**Practical** - 70%
3.11 Identify stages of a MT project (pre-planning, fabrication, mobilization, installation). 3.12 Identify benefits of an off-site construction model for MT. **3.13 Identify practices contributing to psychological and cultural safety on a highly collaborative, interdisciplinary site. / MT project.**	**3.14 Use respectful, inclusive language in team communication and trades collaboration.**
CAD & Digital Project Delivery	
Theory - 30%	**Practical** - 70%
4.11 Identify BIM principles and coordination workflows for MT/ offsite projects. 4.12 Explain value of pre-site planning and 3D model trust.	4.13 Navigate the 3D model of a structure.
Tools for Mass Timber Installation	
Theory - 30%	**Practical** - 70%
5.11 Identify specialized MT tools and hazards. **5.12 Describe saw blades, drill bits, and machining properties.**	5.13 Operate basic MT power and hand tools. **5.14 Chisel recess corners accurately.**
Hardware / Connections for Mass Timber	
Theory - 30%	**Practical** - 70%
6.11 Identify MT building components, hardware, and fasteners.	**6.12 Install standard MT fasteners to specification.**
Moisture Management	
Theory - 30%	**Practical** - 70%
7.11 Describe mold conditions, moisture challenges, and protective wraps for MT. **7.12 Understand climate zones.**	**7.13 Install moisture protection materials.** **7.14 Calibrate moisture meters.**
Working on Site (mass timber jobsite readiness)	
Theory - 30%	**Practical** - 70%

Suggested Modalities

- Illustrated case study introduction: instructor-led walkthrough of a real MT project (e.g. Brock Commons or Vienna House) highlighting how each Level 1 topic appears on a real build.
- Direct instruction + demonstration for foundational wood science and material identification (grain, species, MT product types).
- Hands-on shop practice: identify and handle actual MT samples, operate basic MT tools, install fasteners, and apply moisture protection to project mock-up.
- 3D model navigation exercise: learners recreate elements of the benchtop project as a 3D model. Lecture on how digital tools support pre-construction planning.
- Role-play/simulation: brief scenario-based activity on respectful trades communication and safe rigging hand signals, connecting site-readiness and collaboration outcomes.

8.11 Identify scope of work and MT-specific risks. 8.12 Describe unique considerations for site organization and sequencing of MT projects	**8.13 Use PPE appropriate for a MT site** **8.14 Conduct Field Level Risk Assessments.** **8.15 Survey control points.**	
Rigging		
Theory - 30%	**Practical** - 70%	
9.11 Identify rigging equipment, hand signals, knots, fall-protection basics for MT.	**9.12 Perform hand signals, tie knots, prepare and secure loads, use tag lines, locate lifting points.** **9.13 Apply lifting practices for cranes**	
Level 2		
Wood Science & Joinery Techniques		**Modality & Learning Activities**
Theory - 30%	**Practical** - 70%	**Level 2:** application & interpretation **Core Anchor: Connections Project** MMC MT connections project serves as the through-line. Learners apply skills from multiple modules to a single interconnected build sequence, seeing how decisions in one area (moisture, connections, layout) affect all others. **Suggested Modalities** • Case study analysis: learners examine a real MT project with documented errors, delays, and corrections (e.g. moisture event, connection revision) and trace the downstream impacts across trades and timeline. • Shop project with shop-drawing interpretation:
1.21 Explain dimensional changes in wood from humidity/temperature. **1.22 Describe load transfer implications of grain orientation.** 1.23 Compare sustainability properties of MT species and products.	**1.24 Repair surface damage in MT using steaming, sanding, and basic refinish techniques.** **1.25 Assess grain + machining direction to perform precise joinery operations.**	
Mass Timber Materials		
Theory - 30%	**Practical** - 70%	
2.21 Evaluate the sustainability, span capacity, and manufacturing processes of MT products. 2.22 Describe science of MT manufacturing (including moisture fundamentals).	2.23 Apply safe handling, temporary protection, and storage procedures for MT materials.	
Pre-Construction Planning, Coordination & Collaboration		
Theory - 30%	**Practical** - 70%	
3.21 Explain preconstruction sequencing, supply-chain coordination, and BIM roles on a MT project. 3.22 Describe differences between MT roles and traditional construction roles.	3.23 Participate in collaborative processes (early coordination, design intent communication).	
CAD & Digital Project Delivery		
Theory - 30%	**Practical** - 70%	
4.21 Explain use of 3D models for sequencing and constructability in offsite construction	4.23 Create basic CAD elements. **4.24 Extract layout info from 3D models.**	

4.22 Interpret engineered bracing plans for MT.		learners extract layout information from a 3D model or 2D shop drawing to set up and assemble project, linking CAD/digital delivery • Collaborative simulation: small teams perform pre-construction coordination roles (designer intent, carpenter, moisture monitor) during assembly, reinforcing the interdisciplinary nature of MT projects. • Guided discovery/problem-solving: instructor introduces a tolerance or connection challenge mid-project; learners must diagnose and resolve it, mirroring real just-in-time decision-making on site. • Guest speaker / video: industry practitioner shares experience from a real MT site, with emphasis on sequencing, supply-chain coordination, and trade collaboration.
Tools for Mass Timber Installation		
Theory - 30%	**Practical** - 70%	
5.21 Explain how machining methods relate to tolerances and surface finish for MT.	**5.22 Shape, profile, and finish surfaces to tolerances.** **5.23 Fabricate jigs and demonstrate tool proficiency.**	
Hardware / Connections for Mass Timber		
Theory - 30%	**Practical** - 70%	
6.21 Explain torque effects, ductility, and connection behaviour. 6.22 Interpret shop-drawing connection details.	6.23 Install MT connectors (knife plates, hangers, drag straps). 6.24 Install MT screws at angles correctly.	
Moisture Management		
Theory - 30%	**Practical - 70%**	
7.21 Explain impacts of saturation and moisture penetration on MT assemblies.	**7.22 Monitor moisture during concrete topping or slab installation.**	
Working on Site (mass timber jobsite readiness)		
Theory - 30%	**Practical** - 70%	
8.21 Explain logistics, tolerances, and coordination with other trades.	**8.22 Use total station for layout.** **8.23 Install membranes / fire protection.**	
Rigging		
Theory - 30%	**Practical** - 70%	
9.21 Describe considerations for vertical member tipping and CG balance. **9.22 Identify different rigging slings, hardware, and below-the-hook lifting devices.**	9.23 Land/position MT elements precisely. 9.24 Create a lift plan for a MT beam **9.25 Calculate load weights for MT** **9.26 Apply lifting practices for multiple-crane sites**	

Level 3

Wood Science & Joinery Techniques		**Modality & Learning Activities**
Theory - 30%	**Practical** - 70%	**Level 3:** analysis & coordination
3.11 Analyze how environmental conditions (moisture, UV, fire) affect wood performance & MT performance 3.12 Explain char layer	3.13 Conduct field assessments of engineered members (CLT, glulam, LVL, MPP) for deterioration, delamination, char exposure, checking, and moisture-related issues.	

Mass Timber Materials		**Core Anchor: MMC Connections Project or MMC Full Scale Project** **Suggested Modalities** • Field trip or site visit: where possible, visit an active MT construction site to observe just-in-time delivery, crane operations, multi-trade coordination, and sequencing in action. • Case study with digital model: learners analyse staging and structural feasibility using a 3D model, read MT shop drawings, and develop a task-specific work plan, connecting CAD, site-readiness, and pre-construction outcomes. • Project-based assessment: learners complete a field-style assessment of engineered members (deterioration, delamination, moisture) on the shop project and produce a written finding, mirroring professional site documentation. • Scenario-based rigging exercise: learners calculate load weights, locate centre of gravity, and develop a lift plan for a rectilinear panel using the constructability hub or shop mock-up, integrating rigging with site planning outcomes. • Respectful workplace applied scenario: learners
Theory - 30%	**Practical** - 70%	
2.31 Investigate emerging MT products and hybrid systems.	2.32 Coordinate MT material handling logistics within a multi-trade environment.	
Pre-Construction Planning, Coordination & Collaboration		
Theory - 30%	**Practical** - 70%	
3.31 Analyze expectations for collaboration (design-phase input, clash-detection, timeline impacts) on MT projects.	3.32 Coordinate delivery, staging, and on-site movement of MT components. **3.33 Apply strategies from respectful-workplace training to real project scenarios.**	
CAD & Digital Project Delivery		
Theory - 30%	**Practical** - 70%	
4.31 Analyze digital model elements for staging and structural feasibility.	**4.32 Use digital layout tools for bracing and panel alignment.** 4.33 Read/interpret MT shop drawings and assembly diagrams.	
Tools for Mass Timber Installation		
Theory - 30%	**Practical** - 70%	
5.31 Assess tool selection needs for complex MT connections or repairs.	**5.32 Fabricate and fit advanced patch repairs for MT**	
Hardware / Connections for Mass Timber		
Theory - 30%	**Practical** - 70%	
6.31 Analyze connection tolerances vs. conventional carpentry tolerances. 6.32 Explain shear/tension forces and their effect on MT installation.	6.33 Troubleshoot and repair MT connection issues.	
Moisture Management		
Theory - 30%	**Practical** - 70%	
7.31 Analyze causes and consequences of on-site moisture exposure of MT materials.	7.32 Implement moisture mitigation and tracking protocols.	
Working on Site (mass timber jobsite readiness)		

Theory - 30%	**Practical** - 70%	reflect on a project scenario involving trade conflict or communication breakdown and apply strategies from respectful-workplace training to propose resolution.
8.31 Analyze site workflows and trade interactions. 8.32 Explain the importance of confirming elevation measurements, with a focus on measurements unique to MT builds	8.33 Develop task-specific work plans for MT projects. 8.34 Confirm as built measurements with architectural drawings.	
Rigging		
Theory - 30%	**Practical** - 70%	
9.31 Analyze rigging configurations for MT load scenarios. 9.32 Describe methods and considerations for handling and control of MT loads 9.33 Describe methods for identifying centers of gravity and load balance in large wood components	9.34 Operate rigging tools (clutches, slings) and implement safe lift plans. 9.35 Find center of gravity on a rectilinear panel 9.36 Accurately install lifting points on a rectilinear panel	

Level 4

Wood Science & Joinery Techniques		**Modality & Learning Activities**
Theory - 30%	**Practical** - 70%	**Level 4:** integration, evaluation, leadership **Core Anchor: MMC Full Scale MT Project & Integrated Capstone** **Suggested Modalities** • Capstone project leadership: learners create a MT construction project timeline (with deviation impacts and cross-trade mitigations), a connection execution plan, and a moisture management strategy, then present and defend their decisions to
1.41 Evaluate life-cycle performance, long-term durability risks, and maintenance strategies for MT structural elements.	1.42 Develop remediation plans for damaged MT components, including patching, refinishing, and moisture correction steps.	
Mass Timber Materials		
Theory - 30%	**Practical** - 70%	
2.41 Assess how MT product selection affects constructability, sequencing, tolerances, and long-term performance. 2.42 Evaluate tolerance differences between materials used on a MT build	2.43 Recommend MT material solutions for project-specific needs. 2.44 Calculate tolerance differences between materials used on a MT build.	
Pre-Construction Planning, Coordination & Collaboration		
Theory - 30%	**Practical** - 70%	
3.41 Evaluate how design-phase decisions affect cost, sequencing, and downstream dependencies on MT projects	3.42 Create a MT construction project timeline showing impacts of deviations and required cross-trade mitigation measures.	

<table>
<tr><td colspan="2">CAD & Digital Project Delivery</td><td rowspan="18">peers and an industry reviewer.
• Industry panel or expert review: learners receive feedback from a practicing MT contractor or engineer on their capstone plans, reinforcing real-world standards and multi-stakeholder expectations.
• Model-based sequencing exercise: learners use a digital model to identify coordination conflicts in a prefabricated assembly and develop installation sequencing or field verification strategies, directly applying CAD and pre-construction outcomes at a leadership level.
• Rigging and safety plan creation: learners develop a full fall-protection plan and a just-in-time lifting plan for a mixed delivery of MT panels and beams, integrating load calculations, rigging configuration, and multi-trade site coordination.
• Peer teaching or mentorship activity: learners demonstrate a tool protocol, repair technique, or connection strategy to peers, building the communication and leadership skills needed to guide junior workers on a MT site.</td></tr>
<tr><td>Theory - 30%</td><td>Practical - 70%</td></tr>
<tr><td>4.41 Evaluate coordination workflows to identify potential conflicts in prefabricated assemblies.</td><td>4.42 Create model-based strategies for installation sequencing or field verification of MT.</td></tr>
<tr><td colspan="2">Tools for Mass Timber Installation</td></tr>
<tr><td>Theory - 30%</td><td>Practical - 70%</td></tr>
<tr><td>5.41 Evaluate quality of tool-based fabrication work.</td><td>5.42 Develop tool-use protocols for advanced MT tasks (specialty cutting, recessing, shaping).</td></tr>
<tr><td colspan="2">Hardware / Connections for Mass Timber</td></tr>
<tr><td>Theory - 30%</td><td>Practical - 70%</td></tr>
<tr><td>6.41 Evaluate connection strategies for MT assemblies, including fire, seismic, and long-term considerations.</td><td>6.42 Create connection execution plans for complex MT assemblies.</td></tr>
<tr><td colspan="2">Moisture Management</td></tr>
<tr><td>Theory - 30%</td><td>Practical - 70%</td></tr>
<tr><td>7.41 Develop moisture management strategies for the full construction cycle.</td><td>7.42 Assign moisture-management responsibilities to stakeholders and coordinate onsite processes.</td></tr>
<tr><td colspan="2">Working on Site (mass timber jobsite readiness)</td></tr>
<tr><td>Theory - 30%</td><td>Practical - 70%</td></tr>
<tr><td>8.41 Identify sequencing optimizations and risk mitigations at system level.</td><td>8.42 Execute multi-trade coordination based on site constraints.</td></tr>
<tr><td colspan="2">Rigging</td></tr>
<tr><td>Theory - 30%</td><td>Practical - 70%</td></tr>
<tr><td>9.41 Calculate loads and select appropriate rigging configurations for engineered assemblies.</td><td>9.42 Create a fall protection plan for a medium sized crew
9.43 Create a lifting plan for a just in time delivery of various panels and beams</td></tr>
</table>

Faculty Development for Mass Timber and Offsite Construction Education

After identifying mass timber focused learning outcomes for future carpenters, the project team conducted an assessment of carpentry faculty development needs. The needs assessment focused on how carpentry faculty can build on their existing expertise to expand their familiarity with mass timber materials, tools, processes and digital construction tools as they prepare to teach about mass timber in carpentry training programs at all levels. The guiding questions of the needs assessment process were:

1. What areas of mass timber knowledge and hands-on experience will help carpentry faculty feel prepared to teach about mass timber?
2. What professional development opportunities could carpentry faculty participate in/engage with to enhance their ability to teach about mass timber?
3. What resources do carpentry faculty/departments need to provide mass timber training effectively? (physical & digital resources, learning resources, space)
4. What are potential barriers to carpentry faculty development and curriculum integration of mass timber into the carpentry training?

Data collection – National carpentry faculty workshop

Eighteen experienced carpentry faculty from six postsecondary institutions and training organizations in four provinces worked together to identify an initial list of faculty competencies need for high self-efficacy in mass timber instruction during a 3-day intensive workshop held at BCIT in November 2025. Faculty participants' prior experience with mass timber varied widely, ranging from no direct site experience with mass timber experience, to instructors who are highly skilled mass timber installers with robust industry experience. This variety of experience represents a typical cross section of Carpentry faculty in Canada: all faculty are highly skilled in the field, but not all have had exposure to mass timber due to the novelty of mass timber as a common building material, faculty members' scope of trade or their location and proximity to active mass timber sites. For example, mass timber construction on postsecondary institutes' campuses has contributed access to and education about mass timber among instructors (e.g. UBC Brock commons, British Columbia Institute of Technology Tall Timber Housing, University of the Fraser Valley Student Residence, University of Toronto Academic Tower, University of New Brunswick Engineering Commons, Simon Fraser University Tall Timber Residence).

Data collection - Individual interviews and network feedback

Throughout the project, individual interviews/consultations were conducted with over 50 members of the MTAT network to expand and confirm the initial list. Faculty competencies were also shared with all members of the MTAT network for further validation.

Findings - Faculty Development Competencies

Key faculty competencies and activities were identified and grouped to align with the 9 major learning outcome categories: Wood Science & Joinery Techniques, Mass Timber Materials, Pre-Construction Planning, Coordination & Collaboration, CAD & Digital Project Delivery, Tools for Mass Timber Installation, Hardware/Connections for Mass Timber, Moisture Management, Working on Site (mass timber jobsite readiness) and Rigging. The detailed list of competencies is summarized in the table below.

The competencies identified can serve as a framework for designing professional development activities for carpentry faculty. The goal of faculty development activities is to widen instructor experience so that instructors can model effective construction practices for students. In addition to knowledge of relevant theory related to mass timber, instructors in the project participants emphasized the need for hands on practice with mass timber materials and recommended creating an instructor "bootcamp" where carpentry faculty can experience the process of mass timber installation and witness challenges and solutions firsthand. This learning experience would provide instructors with a wide range of examples that they can use in their teaching and share with students.

Findings - Barriers to Implementing the Mass Timber Training Framework

As part of the consultation process, faculty and training provides from across Canada spoke extensively about the challenges of implementing mass timber training as part of carpentry, joinery and other trades curricula. The list of barriers identified by network participants, along with potential strategies to overcome these barriers is listed in the section below, after the faculty competency table.

How to use the framework

The faculty development competency framework can be used in multiple different ways. First, individual instructors may use it as a tool for reflection on their own mass timber teaching competencies. Second, departments may use it as a starting point as they plan professional development activities for their faculty group. Third, it can be used during program or curriculum reviews as a tool to identify gaps in current curricula and faculty expertise and support integration of mass timber construction into existing trades curricula.

Carpentry Faculty Development Matrix

Wood Science & Joinery Techniques		
Theory	**Activities to Enhance Faculty Learning**	**Teaching Resources needed for Classroom Implementation**
• Basic facts about mass timber • Sustainability of mass timber • Benefits of carbon capture	• Attend an intro to mass timber program	• Sample mass timber materials • Glossary of mass timber terms (with images)

<table>
<tr><td>Fire/char behavior compared with stick framing</td><td>Attend info sessions & read case studies (hosted by CWC & WoodWorks and other organizations)</td><td>Data about sustainability of mass timber (e.g. comparison of emission reduction
Infographics with
Myths vs. Facts about mass timber
Sustainability of mass timber
Benefits of mass timber</td></tr>
<tr><td colspan="3">Mass Timber Materials</td></tr>
<tr><td>Theory</td><td>Activities to Enhance Faculty Learning</td><td>Teaching Resources needed for Classroom Implementation</td></tr>
<tr><td>Explain benefits of mass timber construction (direction of industry, employability skills, future jobs, net zero ready skills)
Explain unique characteristics and benefits of offsite construction approaches
Effectively dispel myths about mass timber (fire, moisture, earthquake, sustainability, structural integrity)
History of mass timber
R value
Acoustics
How mass timber interacts with/ other materials (building envelope etc.)
Costs of mass timber materials
Production timelines and availability of mass timber materials</td><td>Tour mass timber manufacturing plants (Element5, Nordic, Kalesniskoff, Passive House BC, etc.)
Visit demonstration buildings
Attend major conferences (Forum Holzbau - Austria, International Mass Timber Conference -Portland, Mass Timber+ Philadelphia, Woodrise – various locations)
Invite industry experts in the region for conferences to facilitate workshops/speak on panels on campus</td><td>Sample materials (CLT, Glulam, DLT, NLT,)
Sample kits and mock-ups
Mobile labs for community delivery
Teaching site for mass timber learning activities: a space to set up mock-ups or small mass timber structure
Ideas for collaborative hands-on projects like the BCIT Constructability Hub (with facilitation guidelines and strategies for assessment/ rubrics)</td></tr>
<tr><td colspan="3">Pre-Construction Planning, Coordination & Collaboration</td></tr>
<tr><td>Theory</td><td>Activities to Enhance Faculty Learning</td><td>Teaching Resources needed for Classroom Implementation</td></tr>
<tr><td>Articulating the critical role of Building Information Modelling in Pre-construction planning
Collaborating on fire protection w/ all subtrades
Communicating timelines to subtrades
Understanding the team effort around air barriers
Sequencing of a job – what is pre-installed, and what is installed on site</td><td>Participate in BIM-based collaboration simulation (both pre-construction planning and clash detection)
Industry guest speakers who share details of mass timber construction process, share successes, errors, lessons learned</td><td>Case studies with realistic details of the construction process, showcasing data on the impact of errors and delays, adjustments, successes and timing. (Materials needed: case description, supporting materials, facilitation plan)
Sequencing activities. For example: instructor asks learners create a timeline for the project, then address a challenge or unexpected development - 1 truck is stopped at the</td></tr>
</table>

• Compare mass timber with other construction approaches (concrete, steel, stick framing)		border / container doesn't arrive. (Resources needed: slides with project description, drawings, project component cards, slides with curveball, debriefing questions, key takeaways) • Partnerships with industry to secure guest speakers (virtual or recorded) • Timelapse erection videos of mass timber buildings

CAD & Digital Project Delivery

Theory	Activities to Enhance Faculty Learning	Teaching Resources needed for Classroom Implementation
• Understand pros and cons of software platforms commonly used by trades people in the mass timber industry • Explain the role of digital modelling in mass timber construction (BIM) → Describing clash detection in BIM →Importance of trusting the model/plan and relying on BIM	• Open, read & navigate 3D drawings, models & digital platforms • Take BIM, CAD courses • Collaborate w/ Civil Engineering & Architecture departments to create learning opportunities related to BIM	• Sample digital drawing sets/ digital twin of buildings on campus or near campus • Strategies and solutions to accommodate remote students with accessibility challenges (internet speed, equipment, digital literacy) • List of software platforms commonly used by trades people in the mass timber industry • Access to software to gain experience with navigating multiple platforms (no single industry standard)

Tools for Mass Timber Installation

Theory	Activities to Enhance Faculty Learning	Teaching Resources needed for Classroom Implementation
	Hands-on experience with mass timber specific tools & hardware: • Timber screws • High torque drills • Chain mortiser • Chainsaw w/ attachments • Jig fabrication • Templates (3D printing) •. Beam Saw •. Auger •. Panel pullers	• Access to equipment listed on the left (on campus, on loan, or on site)

Hardware / Connections for Mass Timber

Theory	Activities to Enhance Faculty Learning	Teaching Resources needed for Classroom Implementation

• Understanding tolerances • Firestopping • Cost and availability of mass timber hardware and connections • Quality control: Precision / QC → only use the screws specified, cannot just substitute		• Sample connections and mass timber screws • Sample connections, fasteners and screws) • Glossary of mass timber connections, fasteners – with images (in colour)
Moisture Management		
Theory	**Activities to Enhance Faculty Learning**	**Teaching Resources needed for Classroom Implementation**
• How MT "interacts" w/ other materials (building envelope, platform course) • How to create a moisture management plan • Storage & protection of mass timber materials • Climate zones • How environmental conditions affect MT • Strategies/timing for wrapping/unwrapping • Finishing & variation in impact & moisture	• Calibrate and use moisture meter • Attend info sessions & read case studies (hosted by CWC & WoodWorks ect.)	• Case studies • Manufacturer guidelines • Videos, contracts, fact sheets, cost reports, drawings • Sample moisture management plans • Checklists for Moisture Management → what to do if something gets wet → how to dry out properly → what to look for/measure → what to report to supervisor
Working on Site (mass timber jobsite readiness)		
Theory	**Activities to Enhance Faculty Learning**	**Teaching Resources needed for Classroom Implementation**
• Sequencing, accuracy, tolerances, speed of installation. • Mass Timber / Offsite Mindset • Sequencing of a job – what is pre-installed, and what is installed on site • Layout – accuracy (what level & why?) • Tolerances – difference in tolerances btw concrete, steel and mass timber • Speed of work / sequence (Ex: 8 mins epoxy to install) • Speed of build (floor/day) → safety implications • Panel size, pinch points / heat points	• Mass timber install practicum or similar hands-on learning experience • Industry work exchange: arrange site experience by partnering with contractors open to hosting instructors • Field trip to site – to see "just in time delivery" when materials go from the truck to the crane and up	• Safety case studies and exposure to just-in-time workflows • Full case studies highlighting the reality of the construction process – errors, delays, adjustments, successes, timing • Infographics, data sheets and public-facing educational material explaining mass timber benefits (cost, speed, reduced noise, cleaner site, less waste, sustainability, etc) • Case studies focusing on safety → Working at heights → Ergonomics for MT hardware → differences in weight of drills/screws → small tricks of the trade for MT
Rigging		

Theory	Activities to Enhance Faculty Learning	Teaching Resources needed for Classroom Implementation
• Identify mass timber-specific rigging practices, radio communication, inspection and safety. • Understanding the impact of crane use and hook time on project progress and sequencing; understanding that hook time is costly and previous • Safety considerations for MT rigging	Hands on experience with: • Common MT rigging accessories (radio-remote-release) • Common mass timber rigging hardware (Combi Clutch, synthetic slings, anchors • Inspection of pick points • Combined centers of gravity • Adjusting to different cranes → impact on productivity • How to protect the material during rigging • Rigging as inspection stage → verify fit before lifting • Blind rigging & radio communication	• On campus crane (spider crane, mobile, gantry jib ect.) • Full suite of lifting equipment, hardware, slings & hooks • Videos of mass timber elements being lifted and landed

Barriers to Implementing Mass Timber Training for Trades & Proposed Solutions

Carpentry faculty identified barriers to integrating mass timber into the carpentry curriculum at 3 levels: at the Individual/Institutional; Provincial and National levels. Solutions to these challenges vary greatly by location and will be different in urban centres and in regions located further from manufacturing facilities or active mass timber sites. This is one of the reasons why participants recommended creating a mass timber instructor training bootcamp that can be offered on both the East and West coast, to provide access to training to instructors who do not have the funds or opportunity to access to mass timber training through their union (such as the United Brotherhood of Carpenters training centre in Las Vegas) or other organizations.

Individual/Institutional Level Barriers & Solutions

Time for faculty development

- One of the greatest barriers identified was finding time to developing knowledge of mass timber and self-efficacy in teaching about mass timber. Possible solutions include offering buyout time for course development, and short leaves for learning, as well as encouraging faculty to learn alongside students by organizing tours of active mass timber sites or mass timber fabrication facilities.
- Collaborative course development and resource sharing between institutions in the same region or between departments at the same institution have also been identified as possible solutions to address this challenge (e.g. collaboration between Carpentry and Civil engineering on BIM or digital design courses and faculty upskilling).

Motivation and Incentives for faculty development

- Department chairs and PSI leaders identified finding motivated faculty as a potential barrier. Possible solutions can include supporting mass timber integration as a teaching innovation and connecting faculty with institutional grants or offering funding for participating in a mass timber related conference or factory tour and asking faculty members to integrate what they learned into their teaching. Leaders emphasized supporting enthusiastic faculty champions in the initial steps of curriculum integration, rather than requiring all faculty to include mass timber in their teaching.
- Support from institutional leaders: Faculty identified the need for champions at the leadership level – school leaders and chairs who understand future directions of industry and can advocate for facilities and funding. Carpentry union leaders also emphasized the need to educate union leaders from an automotive background who are less familiar with the context of carpentry, as they and may not be familiar with the unique needs of carpentry training – in terms of facilities and needs for space.

Finding "time & space" in the curriculum for mass timber

- As faculty in all disciplines, carpentry instructors feel that the curriculum is "very full" and that they do not have much flexibility to add new modules to an already busy program schedule. MTAT resources and the curriculum framework shared as part of this project may help address this barrier by identifying key points in carpentry training where courses can be enhanced with mass timber case studies, tool use, sample materials and short hands-on experiences to promote exposure to mass timber early on in foundational carpentry training.
- Faculty noted that it is also challenging to bring in expert industry speakers who work in a fast-paced industry. Potential solutions that PSIs have used successfully include inviting industry experts to present virtually, recording and re-using expert presentations; arranging for virtual visits to construction sites/manufacturing facilities, and to invite guest speakers already visiting the region for mass timber related conferences and trades shows such as Woodrise or Buildex to reduce travel costs and time commitment required.

Lack of equipment

- Faculty noted that their campuses and facilities cannot always support larger size equipment required for experiential learning with mass timber (e.g. large enough crane, availability of space to set up a mock-up structure indoors or outdoors; transportation for existing mock-ups).
- Possible solutions can include collaborating with industry to use equipment on loan for shorter periods of time; sharing equipment between neighboring institutions/multiple departments.
- Collaboration can include sharing software licenses (such as cadwork) between departments (e.g.collaboration between Carpentry, Joinery, Civil Engineering, and Architectural Technology programs)
- New equipment suitable for mass timber also requires faculty training on the equipment (e.g. instructor qualified to operate a larger crane), requiring both funds and time.

Difficult to access training in remote geographic locations

- Possible solutions to promote greater student & faculty access can include mobile mass timber labs that can bring experiential learning to communities outside large urban areas.

Barriers for students (individual level)

Currently, mass timber training is offered as continuing education, through part time studies programs in the evenings/weekends and online, and complemented by some practical, hands-on intensive courses such as the 2-week practicum offered at the end of BCIT's Associate Certificate in Mass Timber Construction. While these programs are designed to accommodate participants already working in industry, barriers remain for many students, including:

- Transportation from community/remote areas to the campuses where practical training is offered
- Limitations for students with childcare and eldercare responsibilities who are not able to attend intensive full day training
- Limited time available outside of full-time employment and family responsibilities, especially during peak construction season
- Limited funding is available for tuition, and no wage subsidies are offered in any programs – many potential participants are not able to stop working to participate in upskilling.
- Limited apprenticeship opportunities: need to encourage contractors and suppliers to accept and invest in training lower level apprentices – not just level 4 apprenticeships.

Potential solutions to support students may include: more practical training offered on weekends, mobile training labs available in smaller communities outside urban areas to reduce the commute to training.

Provincial Barriers & Advocacy

Barriers and potential solutions at the provincial level focused primarily on the need for coordination and collaboration between government, industry and postsecondary institutions, particularly around well-coordinated advocacy and resource sharing between organizations working to foster mass timber adoption and offsite construction at multiple levels.

Lack of coordinated governance/ industry transformation framework

- Participants from across the country expressed the need for a greater alignment of provincial (and national) initiatives is needed to support construction transformation
- Participants noted an inconsistency in government initiatives and advocacy at the provincial and federal level and noted that initiatives and advocacy invested during one government is often lost when there is a shift in leadership or ministry structure. They noted that greater alignment between initiatives, funding and incentives offered by ministries focusing on forestry, natural resources, construction would facilitate industry transformation.

Economic and Trade Barriers

- Lack of Incentives: Participants noted the lack of economic incentives for industry transformation and as well as for training (both incentives for developers that promote mass timber adoption and incentives for trades people to participate in upskilling and specialized mass timber training (such as tuition subsidies, student loans, childcare support during training).

- Trade barriers, and limited availability of materials in some provinces (e.g. Manitoba), including cost of access to materials (including MT, as well as connections and fasteners); long back-order timelines when components have to be shipped from Europe
- Possible solutions can include rebates for sustainable material use, net zero designs, (for contractors or developers?)

More industry- education and PSI x PSI collaboration needed

- Participants from across the country emphasize the need more collaboration between industry and educational institutions, and among educational institutions to showcase innovative approaches to building, highlight solutions, offer site visits, and share training resources.
- They observed with concern that there is less collaboration among post-secondary institutions (PSI's) today than a decade ago, due to significant recent budget cuts across higher education. Barriers to collaboration include inflexible policies around transfer credit, jointly offered programs, residency requirements for collaborative programs, PSI procurement processes that limit industry collaboration or make it difficult to pay industry experts for contributions to courses.
- Trades students tend to pursue their education locally. And as a result, sometimes collaboration within an institution's own province is more challenging, while collaborating between PSI's across provinces and regions is easier, because institutions are not competing for the same students.

Collaborative interdisciplinary training initiatives - carpenters x engineers x architects in the same learning space

- More collaboration is needed with provincial organizations for architects and engineers to offer inter-professional mass timber training that emphasizes the pre-construction planning and inter-professional collaboration during offsite construction projects.
- One program that addresses this barrier is BCIT's Applied Mass Timber Engineering Microcredential. It is a program designed for structural engineers, that is infused with experiential learning in carpentry and mass timber installation. Participants learn about the principles of designing mass timber buildings and then get hands on practice installing a mass timber structure that models a large number of structural components, diverse connections and fasteners and allows them to gain an appreciation of tolerances unique to mass timber. The practical learning component utilizes BCIT's Mass Timber Connections and Constructability Hub.

Building Inspection: Mass timber/ offsite training for building inspectors

- Industry partners emphasized that the high cost of inspections increases the cost of mass timber projects significantly. We heard that companies need to hire code consultants just to prepare for inspections incurring over $10,000 dollars of additional cost. Contractors and engineers find that they are spending hundreds of hours to explain every nuance of a mass timber building to inspectors who do not have the knowledge and background to assess the appropriateness of materials, connections and installation approaches. Because of uninformed inspectors, installers have had to photograph every connection to be able to show and document each step of installation. Manufacturers adapted by filming each stage of production, and creating an archive that allows inspectors to look up the manufacturing of each building component on video without having to take apart pre-fabricated components (item code matches code on video recording). While this technology provides a stop-gap measure, it is also expensive and time consuming.

- Industry partners emphasized that cities and provinces need to require their inspectors to upskill and better understand construction innovation, so they do not use traditional construction standards for offsite and mass timber projects.
- Required mass timber training/upskilling offered by PSI's for building inspectors would help reduce this barrier significantly. Initial training can be offered online, but ideally, training would include a hands-on component (such as experience with the BCIT Connections and Constructability Hub or UBC mass timber mockups).
- In BC, the Building Officials Association (BOABC) has shown great interest in collaboration and invited members of BCIT's mass timber training team to present at their regional meetings.

National Barriers & Potential Solutions

Harmonized Red Seal Carpentry Curriculum

- The national harmonized carpentry curriculum is both a success in interprovincial collaboration, and a barrier to training for construction innovation. It allows mobility across provinces, while at the same time it is a less nimble framework, which makes implementing changes (such as integrating mass timber related competencies) very slow. Currently, harmonized red seal carpentry curriculum has been adopted in all provinces except Ontario. It is expected to be adopted in Ontario within the near future as well.
- The long-term goal of the MTAT Network is to advocate for change in the red seal standards to include mass timber competencies. This process is expected to take several years.

National Occupational Standard is needed for Mass Timber Construction/ Installation

- Participants emphasized the need for a national standard that situates mass timber at the intersection of existing standards – as it draws on competencies from carpentry as well as steelwork, with an emphasis on joinery and carpentry skills, enhanced by and understanding of rigging and pre-construction planning and innovative offsite approaches to construction.

Greater collaboration between federal agencies is needed

- Both industry partners and post-secondary institutions emphasized the need for collaboration between federal agencies, to provide cohesive support,, align funding sources and share the outcomes of resources an initiatives developed through these programs (For example, Natural Resources Canada and UTIP both fund programs for mass timber training, the former to PSIs. The latter to unions to support MT training)
- Industry partners also noted the need for nationwide coordination on support for mass timber manufacturing and offsite construction
- They noted that mass timber provides an important alternative material at a time when tariffs on steel are increasing, but strategic federal messaging has not highlighted this alternative.

Support for Offsite Construction

- Network members noted that they are reluctant to make changes without extensive industry consultation, needs assessment and market research

- Canada's building codes are a provincial/territorial patchwork. A manufacturer operating from a single factory but serving customers across Canada must navigate differing provincial, territorial, and municipal code interpretations — a fragmented regulatory landscape that creates uncertainty, slows production, drives up costs, and restricts the availability of modular products. This is the fundamental enemy of offsite construction, which only achieves its cost and efficiency advantages through *repetition and scale* — building the same product for many markets.
- Skillsets overlap – mass timber is offsite construction – but carpenters are not offsite workers. Simply training more trades people will not solve the offsite construction labour shortage (interconnected skills of different professions, interprofessional collaboration between different stakeholders in the construction project – see Mc Kinsey report

Opportunities For Action/ Advocacy – National

- Host an annual mass timber/off site construction education summit to bring together educational institutions, trainers from partners organizations, industry partners, regulators and funders to identify training collaboration, work to remove barriers and promote mass timber training and adoption
- Establish partnerships with Indigenous Communities "Tree to key on own land:" Mass timber construction and manufacturing located in indigenous communities, by Indigenous owned companies can provide opportunities economic development, self-determination, education, social development, and sustainable housing.

Promote wide ecosystem change and awareness through education:

- Public education focusing on mass timber: Collaborate with industry partners, government and postsecondary institutions to create share data and examples that help reduce the uncertainty around Mass Timber and offsite construction and articulate the benefits of MT construction among the general public, contractors, investors, engineers, insurance representatives etc.
- Develop case studies, data sheets that help reduce the perception of heightened risk involved in mass timber projects and working with wood in general
- Educate professionals in the construction sector about the benefits and sustainability of mass timber and offsite approaches (economic and environmental sustainability), including insurance, fire-safety etc.

Teaching and Training Resources - MMC Educators Hub

The educators' hub is designed to provide trades instructors with resources they can use in their own professional development, as well as to support course and curriculum development for mass timber and offsite construction. Alongside resources produced specifically for the MTAT project, teaching resources published by organizations supporting construction transformation (such as the Canadian Wood Council, Naturally Wood, Woodworks and others) have been identified and linked through the MMC website's Educators Hub page to avoid duplication. Resources are organized and tagged to match the mass timber learning outcomes categories, to enable educators designing a module on moisture management or rigging to find relevant resources more easily. Teaching resources include:

- Case studies of mass timber projects, connection detail examples, technical guides, and links to training materials gathered through knowledge-exchange visits.
- Video demonstrations, lessons and site visits produced by both BCIT and by industry stakeholders.
- A catalogue of educational programs for wood-related prefabrication and off-site construction available in Canada was also compiled and organized by province, making it searchable and publicly accessible through the MMC Education platform. Internally produced resources include training videos from industry partners as well as a teaching guide for one of the mass timber project drawings.
- A list of software applications commonly used in mass timber construction was compiled in collaboration with software companies. The list includes software capabilities and use cases mapped to each phase in the design, manufacture and design of a mass timber project. This resource is available on the MMC Education website, and includes applications of Dietrich's, Revit, Autocad, HSBCAD, CMBuilder and cadwork.
- A sample learning activity (Mass Timber Benchtop Project) is included in the next section below.

Sample Teaching Resource: Mass Timber Benchtop Project

PART	QUANTITY	WEIGHT	SPECIES
GC01	2	7.900 KG	DOUGLAS FIR
GB01	1	8.511 KG	DOUGLAS FIR
PART	QUANTITY	SOURCE	MATERIAL
SC01	1	CUSTOM	STEEL
SC02	1	CUSTOM	STEEL
SC03	1	CUSTOM	STEEL
HARDWARE	QUANTITY	SOURCE	MATERIAL
RICON-S VS 140x60	4	MTC	STEEL
MTW45-8	4	SIMPSON	STEEL
SDCF22700	8	SIMPSON	STEEL
IMBED GRI 0104	4	F3	COMPOSITE
5/8" THREADED ROD	4		STEEL
5/8" NUT	4		STEEL
3/4" x 6" BOLT	4		STEEL
3/4" WASHER	8		STEEL
3/4" NUT	4		STEEL

MODERN METHODS OF CONSTRUCTION EDUCATION

PROJECT: MASS TIMBER BENCHTOP PROJECT

INSTRUCTOR SET

SHEET TITLE: EXPLODED VIEW

PROJECT NO.: 2601.01

DATE: 2026-02-27

SCALE: NTS

DRAWN BY: AJ

SHEET NO.: MT101

Mass Timber Benchtop Project - Instructor Guide

This project is designed to give students experience with material, fabrication techniques, tools, installation practices and hardware used in a mass timber build. The focus of the learning throughout is on **wood science**; understanding how moisture affects wood, grain direction & composition and how tooling will affect the material, **mass timber materials**; identifying various materials and use cases, **drawings**; read and interpret, **tools for mass timber**; selecting the correct tool and order of operation and tolerances, **hardware/connections**; installation techniques, layout & accuracy.

Learning Outcomes

1.12 Explain wood as a living material and its basic anatomical structure (earlywood/latewood, cell composition, moisture states).
1.13 Identify grain direction, wood species, and cuts (flat/vertical).
1.14 Explain how grain orientation affects cutting, fastening, and finishing.
1.21 Explain dimensional changes in wood from humidity/temperature.
1.15 Read grain orientation in solid wood and align cutting/fastening accordingly.
1.16 Identify and fit patches using basic joinery techniques.
1.17 Identify cut of wood (e.g. flat vs. vertical grain)
1.24 Repair surface damage in MT using steaming, sanding, and basic refinish techniques.
1.25 Assess grain + machining direction to perform precise joinery operations.
2.13 Identify MT products in shop drawings.
4.33 Read/interpret MT shop drawings and assembly diagrams.
5.11 Identify specialized MT tools and hazards.
5.12 Describe saw blades, drill bits, and machining properties.
5.13 Operate basic MT power and hand tools.
5.14 Chisel recess corners accurately.
5.22 Shape, profile, and finish surfaces to tolerances.
5.23 Fabricate jigs and demonstrate tool proficiency.
5.32 Fabricate and fit advanced patch repairs for MT
5.21 Explain how machining methods relate
to tolerances and surface finish for MT.
5.31 Assess tool selection needs for complex MT connections or repairs.
5.41 Evaluate quality of tool-based fabrication work.
6.11 Identify MT building components, hardware, and fasteners.
6.21 Explain torque effects, ductility, and connection behavior.
6.22 Interpret shop-drawing connection details.
6.31 Analyze connection tolerances vs. conventional carpentry tolerances.
6.12 Install standard MT fasteners to specification.
6.23 Install MT connectors (knife plates, hangers, drag straps).
6.24 Install MT screws at angles correctly.
6.33 Troubleshoot and repair MT connection issues.
8.13 Use PPE appropriate for a MT site

Mass Timber Benchtop Project - Setup

This project is estimated to take 12 hours to complete depending on level of pervious woodworking experience. All tools should be demonstrated for best safety practice regardless of student's proficiency.

Students will be provided with 1 glulam beam @ 175 x 190 x 1200, MMC Mass Timber Benchtop Project drawing set, all hardware listed within drawing set pages LS101, LS102 &LS201, hand tools, marking gauges and tape measures. Power tools, bits and jigs may be communal use – fabrication of hand-made jigs can be added to project to extend learning.

Each student will fabricate a stub column and beam and install all hardware included in the drawing provided. Instructor will fabricate 1 stub column for use in demos and marking. To mark the project, the instructor column will be mounted to the steel bracket (page LS203) on the right-hand side. Students will install their column to the left and the beam will span the 2 columns. ****NOT INCLUDED IN THE DRAWING**** Instructor will hit each glulam beam with a hammer - students will steam out dent with an iron.

Sample Rubric

Task	Conditions	12 - 8 Meets Industry Standard	8 - 4 Approaching Industry Standard	4-0 Below Industry Standard
Install Timber screws	Accuracy of layout Correct hardware used Heads are not stripped Fasteners are not over/under driven			
Fabrication of Column	Hardware and patch are all within 1/32" Length is within 1/32" Knife plate fits with no rocking & through bolts install with ease			
Fabrication of beam	Hardware is within 1/32" Length is within 1/32" Recess is within 1/32"& corners are squared			
Install of Beam	Beam installed without binding Gaps are accurate to drawing within 1/32"			
Overall Fit & Finish	No damage, dents, scratches, glue or graphite visible			

Sample Day plan

Time	Location	Day 1	Demo
7:30 – 9:00	Classroom	Understanding wood fiber, Intro to mass timber materials, Walk through of project drawing	
9:00 – 9:15	**Coffee**		
9:15 – 11:00	Shop	Layout project components	Layout: using combination square, marking accuracy
11:00 – 11:30	**Lunch**		
11:30 – 12:00	Shop	Prep for cutting	Grain: steaming out a dent, how cutting tools affect grain
12:00 – 1:00	Shop	Cut material to length	Timber saw: safe use, deflection, blade types
1:00 – 1:45	Shop	Drilling	Drills & jigs: safe use, order of operation, spurs & grain
1:45 – 2:00	Shop	Clean up & debrief	
Time	**Location**	**Day 2**	**Demo**
7:30 – 9:00	Classroom	Mass timber install considerations, Timber screws; torque effects, ductility, and connection behavior.	
9:00 – 9:15	**Coffee**		
9:15 – 10:00	Shop	Mortise slot for knife plate	Chain mortiser: safe use, grain, tool path
10:00 – 11:00	Shop	Route recesses	Routers: safe use, direction of feed, depth of pass, use of jigs/bearings
11:00 – 11:30	**Lunch**		
11:30 – 12:00	Shop	Fit patch	Chisel: safe use, breaking grain
12:00 – 1:00	Shop	Finish sand	Sanders: safe use, grit
1:00 – 1:45	Shop	Install hardware	Accuracy, order of operation, tack screws
1:45 – 2:00	Shop	Clean up & debrief	

Tool List

Power Tools	Bits
16 5/16" Timber saw https://www.makita.ca/index2new.php?event=tool&id=73	1/4" Radius Round Over Router Bit https://www.kmstools.com/dimar-1-4-quot-radius-round-over-router-bit.html?srsltid=AfmBOooH9H1nDecOIijPijZKa3eJkW8bbCXhx8CYLkAuRrTE0KPTtTty
1 ¼" Chain Mortiser https://www.makita.ca/index2new.php?event=tool&id=134	1/2" x 2-1/2" Straight Bit https://www.kmstools.com/freud-12-130-two-flutes-1-2-in-shank-1-2-2-1-2-straight-bit.html
Small Router https://www.makita.ca/index2new.php?event=tool&id=3831&catid=2	3mm 4" twist drill bits
Plunge Router https://www.festoolcanada.com/products/routing/routers/576213---of-1400-eq-f-plus-us	1-5/8" x 5/8" Chamfer Bit https://www.kmstools.com/freud-40-114-1-2-in-shank-1-5-8-5-8-chamfer-bit.html
Corded Drill https://www.dewalt.ca/product/dw246/12-13mm-vsr-drill-keyless-chuck?tid=576976	60mm diameter Forstner bit https://www.fisch-tools.com/en/produkte/0317-wave-cutter-forstner-bit
Hole Hawg ½" right angle drill https://www.milwaukeetool.ca/products/details/m18-fuel-hole-hawg-1-2-right-angle-drill-high-demand-kit/2707-22hd	3/4" diameter 17" Auger bit
Belt sander https://www.makita.ca/index2new.php?event=tool&id=111	7/8" diameter 17" Auger bit
Random Orbital Sander https://www.makita.ca/index2new.php?event=tool&id=1751&catid=2	ASSY RW driver bits https://mtcsolutions.com/products/assy-rw-bits/
Hand Tools	**Jigs/ Sundries**
Iron https://www.blackanddecker.ca/product/ir0820c/1200w-iron?tid=588371	Drilling station https://produkte.mafell.de/usa/drilling-and-driving/drilling-station/drilling-station-bst-460-s
Dead blow mallet	Jig for chain mortiser blowout/length – Hand made
Combination square	Jig for routing patch – Hand made
F-Clamps	Wood glue https://www.titebond.com/product/glues/e8d40b45-0ab3-49f7-8a9c-b53970f736af

Knowledge Mobilization

Modern Methods of Construction Education Website

A key knowledge mobilization deliverable of the project is the Modern Methods of Construction Education website, launched in September 2025 at **www.mmceducation.ca.** The platform was built around three core pillars: stakeholder engagement, workforce upskilling, and the integration of mass timber education.

1.2K	685	217K+
Active Users Since Launch	Social Media Followers	Total Social Media Views

Phase 1 of the website provided an overview of the project, links to existing educational programs, and a hub for network updates. Phase 2, completed in Q3, added enhanced educational resources, components of the training framework, and a searchable catalogue of Canadian programs. The final iteration of the website, including all project deliverables, will be completed by March 31, 2026.

The website has attracted early engagement from industries, educators, and institutions across Canada, with traffic originating from major cities including Toronto, Vancouver, Calgary, Montreal, Edmonton, and Ottawa. Social media channels on LinkedIn, Instagram, and Facebook have generated strong engagement rates (1.7% on Instagram; 2.3% on LinkedIn), indicating early relevance and traction among target audiences. The platform serves as the long-term home for MTAT project outputs, ensuring continued accessibility for educators, industry professionals, students, post-secondary institutions, training authorities, government agencies, unions, regulators, and industry associations long after the project concludes.

National and International Knowledge Exchange

To benchmark Canadian mass timber trades education against leading international models, the project team undertook several knowledge-gathering activities to identify industry training needs, gaps in current training, and innovative approaches to addressing these gaps:

Canadian Wood Council Technical Tour, October 2025	Sweden & Denmark. Toured 13 mass timber manufacturing facilities, networked with 35 participants from the Canadian prefab sector (manufacturers, government officials, CWC members and suppliers). Generated a partnership with Les Industries Bonneville (Québec), who shared industry best practices for addressing the upskilling gap in prefab education.

2025 Supporting Equity in Trades Conference	Toronto, Ontario. Gained insight into equity issues within the trades industry and explored potential opportunities for collaboration and partnership.
Skills National Competition	Regina, Saskatchewan. Collaborated with leaders in trades skills development and identified further collaboration opportunities.
5th WoodRise International Congress	Vancouver, BC (September 2025) Connected with international leaders in mass timber construction, strengthening involvement in a progressive and inclusive training network dedicated to advancing skilled trades in the timber industry.
42nd International Symposium on Automation and Robotics in Construction	Montreal, Quebec. Attended this global conference to explore advances in construction automation, robotics, and sustainability that will inform future curriculum in construction trades. Engaged with keynotes, workshops, and technical tours, connected with researchers and industry professionals worldwide.
Postsecondary Training Institution Visits (Germany, Austria) December 2025	Toured training facilities at the Technical University of Rosenheim (Germany) and the University of Applied Science (FH Salzburg, Austria). Consulted on diverse approaches to incorporating mass timber and offsite construction into trades curriculum.
29th International Wood Construction Conference Forum Holzbau, December 2025	Collected resources for curriculum development, including learning activities, case studies, and examples of innovation in wood construction globally. (Innsbruck, Austria)
BCIB's Respectful Onsite Initiative	Completed training on diversity and inclusion in the workplace, enhancing knowledge of practices that promote respectful worksites and support the development of a more diverse and inclusive skilled trades workforce.
CICC Modern Methods of Construction Session	Engaged with Canadian and international participants on emerging MMC education approaches.

Equity, Diversity, and Inclusion

Equity, diversity, and inclusion (EDI) were foundational commitments woven throughout all aspects of the MTAT project. The project team recognized that mass timber and modern methods of construction present an opportunity to build a more inclusive construction workforce—one that actively recruits, supports, and retains women, Indigenous peoples, newcomers, and other underrepresented groups.

Gender Equity

The trades remain a male-dominated sector. The MTAT project incorporated gender equity considerations at every stage, from stakeholder engagement strategies to the framing of learning outcomes. The "Respectful Onsite Initiative" training delivered by BC Infrastructure Benefits (BCIB) was integrated into the faculty workshop and informed the development of curriculum content around creating psychologically safe and inclusive work environments. The project also engaged with the TWIG network (Trades, Women, and Gender Inclusive), which focuses specifically on increasing women's participation in the trades, as a network partner.

Regional Equity

The national network was deliberately designed to represent Canada's geographic diversity. Network members and MOU partners span British Columbia, Alberta, Manitoba, Ontario, Quebec, New Brunswick, and Nova Scotia. Working group meetings were held virtually to remove geographic barriers to participation, and the MMC Education website is accessible to educators and learners anywhere in Canada

Indigenous Partnerships

Indigenous engagement was prioritized throughout the project. Squamish Nation was represented at the national faculty workshop, and the project team-initiated exploration of a partnership with the Indigenous Women's Justice Centre to identify best practices for embedding cultural safety into carpentry curriculum. Participation from two Indigenous women faculty members at the faculty workshop helped ground the curriculum development process in lived experience and community perspectives.

The learning outcomes framework explicitly includes competencies related to cultural safety, respectful and inclusive language on mass timber sites, and recognition of the cultural significance of wood across Indigenous traditions.

Why are cultural safety and Indigenous cultural competency training included in the framework?

Mass Timber Construction is an emerging field within the construction sector that is expected to grow significantly in the next decade (cite OMTI MT report), opening new jobs for trades people, Indigenous trades people, women, girls, Two-Spirited, LGBTQ+ individuals. As this new sector emerges, there is an opportunity to create more inclusive, welcoming workspaces for diverse trades people by promoting a culture of safety, respect and inclusion on site through trades training, including mass timber education.

To ensure that the learning outcomes proposed in the Mass Timber education framework for carpenters (1) reflect principles of inclusion and respect, and (2) that they promote cultural and psychological safety for Indigenous people and Indigenous communities, we sought input from the BC First Nations Justice Council.

The BC First Nations Justice Council is a provincial advocacy organization, whose work is “developed with Indigenous leadership and grounded in respect for Indigenous rights and diversity.” The council’s justice strategy seeks a “transformative overhaul to improve justice outcomes and uphold human rights.” (Justice Strategy - BC First Nations Justice Council).
Four members of the council, all Indigenous women, contributed to the recommendations, including Kory Wilson, who also serves as Executive Director of Indigenous Initiatives and Partnerships at the British Columbia Institute of Technology. The report was compiled by Vaughn Banlieu-Mercredi, policy student at the BC First Nations Justice Council.

Council members shared a list of recommendations and existing training resources based on prior research they have done on the experiences of Indigenous people in and around work camps where groups of trades people work in close proximity to Indigenous communities. While mass timber projects are not identical to work camps, the lessons learned from the experiences of Indigenous people, women and other diverse groups during encounters with large groups of trades people around these work camps can help us identify strategies for incorporating cultural safety training in trades education going forward.

Please see below for the briefing note from the BC Indigenous Justice Council.

BC FIRST NATIONS
JUSTICE COUNCIL

BRIEFING NOTE

To: Breena Jackson
From: Vaughn Beaulieu-Mercredi, Policy Student
Date: 2026-02-12
Subject: Information on the Need for Indigenous Cultural Competency Training in the Trades to Create Safer Environments for Indigenous Peoples and Indigenous Women and Subsequent Recommendations

For Information

Purpose:
This briefing note is intended to provide information regarding recommendations for Indigenous cultural competency training within in the trades as a means of creating safer environments for Indigenous peoples, specifically women, girls, and Two-Spirited, lesbian, gay, trans, queer plus (2SLGBTQ+) individuals. Specifically, this briefing note will:

1. Detail a list of a recommendations with references to where the recommendations came from.
2. Include an information and background section explaining why recommendations are needed; and
3. Provide a list of existing cultural competency training that fills this need.

To achieve these objectives, multiple documents ranging from a wide range of publishers were reviewed. Reviewed documents include reports from parliamentary committees, and Indigenous Nations, academic articles, studies undertaken by the Union of BC Indian Chiefs, and submissions by various organizations such as the Ontario Native Women's Association and the Centre to End All Sexual Exploitation.

Background:
Indigenous peoples, specifically women, girls, and 2SLGBTQ+ individuals are subject to a "risk pile up", related to many socioeconomic and historical factors. One of these factors is the location of the Indigenous communities themselves which is intertwined with the geographic reality of natural resources in Canada. It is common for resource project proponents and Indigenous communities to consider economic factors when determining the siting of resource camps. Indigenous leadership typically try to secure the closest possible location to the communities for the resource project to develop to try and engage as many economic benefits as possible. However, the siting of a resource development project typically comes with an increase in violence towards Indigenous women, girls, and 2SLGBTQ+ members of the community.

This increase in violence has multiple factors, but one of the most commonly identified relates to the culture of the resource development project itself. A study completed by the Union of BC Indian Chiefs identifies the violence towards Indigenous peoples as a result of hyper-masculine, misogynistic, and white supremacist cultures that have been observed in the 'trades.' Trade workers often hold prejudices and racist beliefs towards Indigenous people, and Indigenous women, girls, and 2SLGBTQ+ people are at a heightened risk of violence because of this. Another aspect that can help explain the violence is the fact that (outside) workers are not invested in the community, and do not have relationships with people in the area. These workers are disconnected from the region, and this lack of connection creates an opportunity for misconduct and violence to occur. This lack of connectivity and the beliefs they have towards Indigenous peoples compounded with the access to drugs and alcohol, results in a variety of violent and inequitable outcomes for Indigenous women, girls and 2SLGBTQ+ people.

Research conducted by Emma Barnes of the Royal Roads University demonstrated that the nature of sexual violence in work camps is systemic. Participants in Barnes' research identified a wide range of issues that contribute to sexual violence towards Indigenous peoples; these issues include ineffective regulation of training programs in the trades, insufficient reporting mechanisms of sexual violence, and inadequate training provided to workers. Many participants described the training on harassment and sexualized violence as "insufficient and superficial". For example, initial training on workplace harassment included a module on 'respect' but failed to provide workers with additional training since the initial hiring. Another example of insufficient training is demonstrated by none of Barnes' research participants indicated receiving training covering the historical relationship between man/work camps and sexualized violence or the Missing and Murdered Indigenous Women and Girls (MMIWG) crisis. This lack of sufficient or meaningful training creates an environment where workers are unequipped to recognize and understand how sexual harassment can manifest and evolve into sexual violence.

Many organizations recognize that some degree of education can begin to dismantle this hostile environment and give Indigenous peoples, women, girls, and 2SLGBTQ+ individuals more degrees of safety. This education must necessarily be targeted at the perpetrators of violence. This means targeting trades workers.

As detailed in the next section, organizations—Indigenous and non-Indigenous—recognize the need for education and have called for the development of programming in various forms. In-depth education combined with regular training on these issues within man camps (and the trades profession in general), can help trades workers develop a comprehensive understanding of how these issues manifest and perpetuate violence towards Indigenous women, girls, and 2SLGBTQ+ individuals, and more importantly, help them put a stop to the violence.

BC FIRST NATIONS JUSTICE COUNCIL

List of Recommendations:

This section of the briefing note will detail recommendations that various organizations and bodies have published to address the sexual violence against Indigenous peoples, women, girls, and 2SLGBTQ+ people.

The Union of BC Indian Chiefs

- **Accountability and Safety of 'Man Camps':** Canada must work with the provinces and territories and private industry and stipulate as a condition of project approvals, that any employers that accommodate large camps of workers, have staff training, safety checks, and an accountability framework within the company's policies to respect and uphold the rights and safety of Indigenous women, girls, and Two-Spirit+ people and of the neighbouring Indigenous communities. Worker accommodation camp regulations should limit the length of time temporary work camps can run and implement practices that increase safety for Indigenous women. Work camps must develop safe, responsible, and accountable relationships with Indigenous communities in close proximity.
- **Education and Training:** Provide mandatory education and training to government, private sector, and extractive industries on gender-based violence prevention and cultural training, including mandatory ongoing cultural awareness, anti-racism, anti-violence, and gender-equality training, along with services to address addiction and mental health wellbeing among workers.

The Firelight Group, Lake Babine Nation, and Nak'azdli Whut'en

- **Community-led cultural competency training for all industry and agency personnel involved, working with, or working in camps and communities.** This training is necessary for developing an understanding of impacts of colonization and intersectional systemic oppression and supporting the use of culturally appropriate justice processes. Understanding the contemporary implications of these is vital if this collaborative/co-managed approach is going to be effective and sustainable.
- **Implement strategies to address hyper-masculine culture in industrial work camps.** This can include diversity training seminars to teach workers about mechanisms of privilege and exclusion based on gender, class, and ethnicity. This will help cultivate an understanding of privilege, while addressing white male domination in these settings. This training can also address impacts of anonymity and shadow populations on co-located communities, how to exercise employment rights, and how to be respectful in co-located communities.
- **Implement companywide cultural sensitivity training for all workers, all management, and all sub-contractors to understand the regional and community context that company is working in, including history and impacts of colonization** (and moving toward decolonization).
- **Ensure cultural sensitivity training is built into general workplace culture** (i.e., not only policy).

BC FIRST NATIONS JUSTICE COUNCIL

Standing Committee on the Status of Women, Parliament of Canada

- **Recommendation 7 – Workplace Policies:** That the Government of Canada, with the goal of preventing and addressing incidences of violence and harassment against Indigenous women, girls, and Two-Spirit individuals by individuals employed for resource development projects, respecting the jurisdictions of and in consultation with provinces, territories, municipalities, Indigenous peoples, and Indigenous communities, require companies conducting these projects to develop corporate social responsibility policies that include addressing and preventing violence and harassment.
- **Recommendation 10 – Training for Workers:** That the Government of Canada, with the goal of preventing and addressing incidences of violence and harassment against Indigenous women, girls, and Two-Spirit individuals by individuals employed for resource development projects, respecting the jurisdictions of and in consultation with provinces, territories, municipalities, Indigenous peoples, and Indigenous communities, require companies conducting these projects to implement mandatory training for all employees on gender-based and sexual violence, anti-racism, cultural safety, diversity and inclusion, as well as the effects of colonization on Indigenous peoples.

Centre to End All Sexual Exploitation

- **Resource Industries must:** expand their codes of conduct for workers and contractors to include training on sexual violence, commercial sexual exploitation and human trafficking.
- **Resource Industries must:** fund community safety initiatives, employment training bursaries and financial literacy programs, both on Nations and Metis Communities and in towns and cities.
- **Resource Industries must:** develop wellness programs for the male workforce and focus on positive masculinity, healthy relationships and healthy coping strategies to deal with the unusual workplace stressors required in the Resource Industry.

Indigenous Caucus of the Indigenous Advisory and Monitoring Committee for the Trans Mountain Expansion Project and Existing Pipeline

- **Cultural Safety:** Governments and regulators can help to ensure cultural safety by making the necessary changes to laws, policies, regulations, and practices, including the creation of an Anti-Racism Act. Such changes would make cultural, diversity, and unconscious bias awareness training, informed or led by Indigenous peoples, mandatory for all contractors, staff and management prior to arrival at the work site. This training could address etiquette, cultural awareness, customs, respect for Indigenous cultures and peoples, LGBTQIA2S+ awareness, and training regarding policies for traditional use and heritage resources finds.
- **Workplace Conditions and Culture:** Regulators and industry can set conditions that require workplaces to normalize a culture of respect for women by mandating sexual exploitation awareness training for all workers, and by ensuring that formal workplace discussions regarding consent and sexual exploitation occur with greater frequency, and that there is clear communication about gender-based violence from leadership.

Existing Cultural Competency Training:

BC FIRST NATIONS JUSTICE COUNCIL

1. **San'yas Indigenous Cultural Safety Training Program:** San'yas offers online training courses for people working in any sector across Canada. San'yas divides their courses into several categories, with each category being further divided into subcategories. The main and subcategories are:
    a. BRITISH COLUMBIA: topics covered include colonization in Canada, Racism, discrimination, stereotyping, and their impacts on Indigenous peoples, and taking action to strengthen Indigenous Cultural Safety in relationships, practices, and services.
        i. Core ICS Foundations: includes topics on colonization in Canada, racism, discrimination, and stereotyping, and their impacts on Indigenous peoples in different contexts, and taking action to strengthen Indigenous Cultural Safety in relationships, practices, and services.
        ii. Core ICS Health: in addition to the training on the Core ICS Foundations, this module includes training on the social and structural determinants of health in relation to Indigenous people, gaps in health equity for Indigenous peoples, and taking action to enhance Indigenous Cultural Safety in health care. This training is targeted at individuals who work in healthcare.
        iii. Core ICS Mental Health: in addition to the training on the Core ICS Foundations, this module includes training on the historical and ongoing impacts of colonization on mental health and substance use, perspectives on mental health and healing, reducing health inequities and enhancing mental health, and taking action to enhance Indigenous Cultural Safety in mental health and substance use services. This training is aimed at people who work, study, or volunteer with the mental health sector.
        iv. Core ICS Child Welfare: topics covered include racism, discrimination, and stereotyping, and their impacts on Indigenous peoples in the context of child welfare, health and social inequities for Indigenous peoples and how these are reflected in child welfare, protecting cultural connections and supporting positive identity development, supporting Indigenous children and youth to counter the impacts of racism, and taking action to enhance Indigenous Cultural Safety in the child welfare system. This training is aimed at people who work with the child welfare sector.
        v. Core ICS Justice: topics covered in this course include racism, discrimination, and stereotyping, and their impacts on Indigenous peoples in the context of the justice system, the inequities experienced by Indigenous people across the justice continuum, ways that Indigenous peoples experience marginalization and violence, and how to take action to enhance Indigenous Cultural Safety in the justice system. This course is designed for people who work in the justice system.
        vi. Core ICS Foster Care: In addition to the training provided in the *Child Welfare* course, this course on foster care includes training on protecting cultural connections and supporting positive identity development as a foster parent, understanding and identifying anti-Indigenous racism and how to address it, advocating for Indigenous children and youth in your care by countering the impacts of racism, and how to take action in enhancing Indigenous Cultural Safety in foster care and the child welfare system. This course is designed for foster parents (current and future) who have Indigenous children and youth in their care.
        vii. Advanced Learning: San'yas offers 'Advanced Training' to people who have completed a Core Training and want to learn more about Indigenous cultural safety and anti-Indigenous racism. This Advanced Training is focused on healthcare.

BC FIRST NATIONS
JUSTICE COUNCIL

b. MANITOBA: the Manitoba Indigenous Cultural Safety Training offers Core Training that has been specifically designed for people working in any sector in Manitoba.

   i. Manitoba Core ICS Health: topics covered include racism, discrimination, and stereotyping, and their impacts on Indigenous peoples in health care contexts, the social and structural determinants of health in relation to Indigenous peoples, gaps in health equity for Indigenous peoples, and how to act in uprooting anti-Indigenous racism and enhancing Indigenous Cultural Safety. This training is designed for anyone who works, studies or volunteers in any aspect of health care services or supports within and around the Manitoba region. Although this training focuses on health care, San'yas states that the overall teachings are relevant to anyone.

   ii. Advanced Training: San'yas offers 'Advanced Training' to people who have completed a Core Training and want to learn more about Indigenous cultural safety and anti-Indigenous racism. This Advanced Training is focused on healthcare and is accredited in by the College of Family Physicians of Canada and the University of British Columbia's Faculty of Medicine Continuing Professional Development program.

c. ONTARIO: through collaboration with Indigenous health leaders and educators San'yas developed the Ontario curriculum. These courses are available in both English and French.

   i. Core Foundations: this course is designed for anyone who intends to enhance Indigenous Cultural Safety in their work and workplace. Topics include colonization in Canada; racism, discrimination, and stereotyping, and their impacts on Indigenous peoples in different contexts; and how to take action to strengthen Indigenous Cultural Safety in relationships, practices, and services.

   ii. Core Health: this course is a baseline in education and meant to complement Nation- and region-specific training provided by Indigenous organizations and/or communities. It covers the same topics as other Health courses discussed above.

   iii. Core Mental Health: This course covers the same topics as other Mental Health courses discussed above.

   iv. Core Enhanced Health: This course provides an additional two hours of education in addition to the Core Health course. It includes additional topics such as 'recognizing areas for organizational change' and 'speaking up and advocating for social justice for Indigenous peoples'.

   v. Advanced Training: This is the same training as the 'Advanced Training' discussed above.

d. INDIGENOUS-ONLY GROUPS: with Indigenous-only groups, all participants and facilitators are Indigenous. The same content is covered as in other courses, but the group discussions and journal questions are framed from an Indigenous perspective.

e. POST-CORE TRAINING (ADVANCED): This is the same training as the 'Advanced Training' discussed above.

f. TRAINING IN FRENCH: currently, San'yas' bilingual/French course is offered based in the Ontario Foundations course discussed above.

BC FIRST NATIONS JUSTICE COUNCIL

2. **Indigenous Corporate Training Inc.:** This company offers training for non-Indigenous people and organizations in Canada working with or wanting to do business with Indigenous peoples. Indigenous Corporate Training offers both foundational courses and advanced courses.
   a. FOUNDATIONAL:
      i. Indigenous Awareness: this course focuses on Indigenous history in Canada and present-day issues. It is designed to give participants the essential foundation to learn, understand, and engage respectfully with Indigenous peoples.
      ii. Indigenous Relations: this training provides helpful insights, strategies, practical tips, and a structured framework to approach and develop effective Indigenous relations. Key topics include cultivating relationships with Indigenous peoples, beginning consultation, and overcoming fear and uncertainty.
      iii. Working Effectively with Indigenous Peoples: this course is a combination of the above two courses that aims to provide participants an understanding of Indigenous history and contemporary issues, in addition to practical strategies and tips that they can apply in their work.
   b. ADVANCED:
      i. Indigenous Consultation & Engagement.
      ii. Indigenous Employment, Recruitment & Retention.
      iii. Indigenous Procurement; and
      iv. How to Negotiate with Indigenous Peoples.

Documents Reviewed

Beyond violence: Building equity and safety in Canada's industrial energy resource work camps, Emma Barnes, https://www.sciencedirect.com/science/article/pii/S2214629625002749.

INDIGENOUS COMMUNITIES AND INDUSTRIAL CAMPS: Promoting Healthy Communities in Settings of Industrial Change, The Firelight Group with Lake Babine Nation and Nak'azdli Whut'en, https://quakerservice.ca/wp-content/uploads/2017/02/Firelight-work-camps-Feb-8-2017_FINAL.pdf.

Responding to the Calls for Justice: Addressing Violence Against Indigenous Women and Girls in the Context of Resource Development Projects Report of the Standing Committee on the Status of Women, https://www.ourcommons.ca/Content/Committee/441/FEWO/Reports/RP12157710/feworp05/feworp05-e.pdf.

The Deadly Intersections of Resource Extraction and Gender-Based Violence in Canada, The Union of B.C. Indians Chiefs, https://www.ourcommons.ca/Content/Committee/441/FEWO/Brief/BR11772889/br-external/UnionOfBritishColumbiaIndianChiefs-e.pdf.

Websites Reviewed

Indigenous Corporate Training Inc., https://www.ictinc.ca/training.

San'yas Anti-Racism Indigenous Cultural Safety Training Program, https://sanyas.ca/courses.

Pre-fab and Off-site Construction Education

To build a foundational understanding of Canadian prefabricated wood construction educational infrastructure, outside consultants were brought in to conduct a landscape scan of the sector. The aim was to identify existing prefabricated wood construction educational programs, gaps in programing, common misconceptions about workforce needs and pre-existing industry best practices for upskilling.

Prefabrication Training & Education

Roles, Curriculum Gaps & Recommendations for BCIT

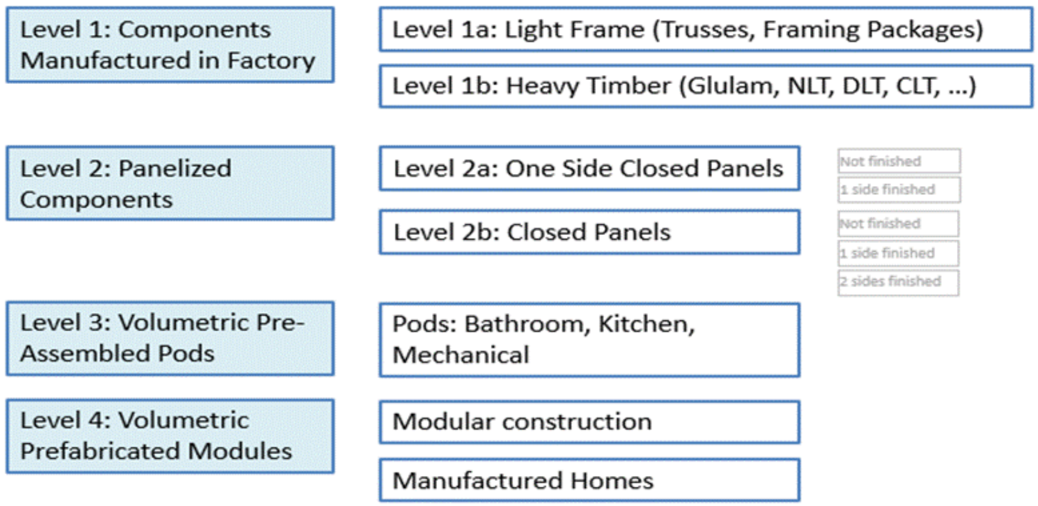
By Lenny Wimmers | Report for BCIT

Methodology

This review employed a mixed-methods approach to assess the current landscape of prefabrication and wood construction in Canada, integrating both quantitative and qualitative data. The majority of information was sourced through publicly accessible online materials, including institutional program descriptions, micro credential platforms, government databases, and policy reports. Quantitative data includes structured inventories of programs, course offerings, and credential types, while qualitative analysis focuses on interpreting trends, institutional strategies, and policy framing that underpin the growth of off-site and wood-based construction education. The methodology prioritizes breadth over depth, aiming to map the ecosystem of prefabrication education rather than evaluate individual program outcomes. Given the rapidly evolving nature of this field and the reliance on non-peer-reviewed sources, findings are presented with an understanding of their provisional and exploratory character.

This brief first provides an overview of what prefab/offsite construction is, highlights its advantages, and describes the mindset shift and conditions required for a successful transition to prefab approaches. Then, it provides a brief overview of the training needs and limited education opportunities currently available for prefab construction.

Different levels of prefab construction



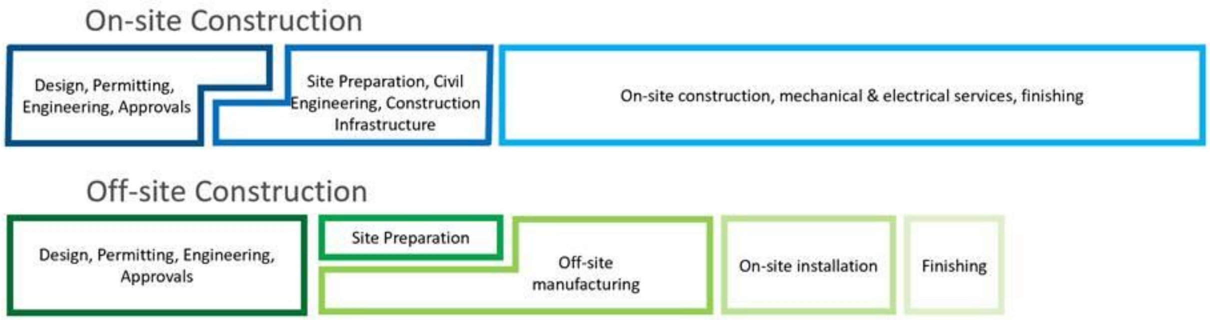
For the purpose of this report, we will focus on level 2 and higher, as these require multiple trades and subgroups to work together off-site. Level one involves multiple mandatory steps for prefab to be successful, but it stops short of having to optimize the process with multiple trades present. It is the optimization of a single element, not the entire construction process (Goodier & Gibb, 2007; Goodland et al., 2019; Wimmers, 2020).

Advantages of Prefabrication

Prefabrication includes the optimization of as many as possible processes in a controlled environment. This approach has important advantages for both the construction process and for the people involved in the construction process, including:

- Prefabrication enables accelerated and more efficient scheduling, accelerated building time, reduced building cost and overall reduced lifetime cost of the building (Bertram et al., 2019).
- Prefabrication can lead to improved, consistent quality, better energy efficiency or seismic performance, and contribute to sustainability, as material optimization creates less waste (Richard, 2005).
- Optimized prefabrication processes have a balanced work-flow, eliminating bottle necks.
- For workers, factory- based construction can help optimize ergonomics and productivity. Pre-fab construction facilities provide a safer work environment by reducing high noise levels, dust, heavy lifting and other health and efficiency reducing factors (Pons & Wadel, 2011; Jaillon et al. 2009; Li, Shen & Alshawi, 2014; Lu, Huang & Li, 2011; Pan, Gibb & Dainty, 2012).
- As a result, optimized workplaces may attract a larger, previously untapped workforce (Nadim & Goulding, 2010; BuildForce Canada, 2025).

Off-site vs On-site Construction



Off-site construction pulls the process further forward: project teams spend more of the schedule early on design coordination, approvals, procurement, and shop-level detailing (so parts can be manufactured), but once the factory is producing, building work runs in parallel with site prep and foundations (Goodland et al., 2019). That overlap, plus weather-shielded production, cuts variability and turns weeks of on-site rough-in into a short, crane-set phase followed by fast enclosure, MEP hook-ups (mechanical, electrical and plumbing), and commissioning (Pan et al., 2012).

By contrast, conventional on-site builds are mostly sequential and weather-exposed following excavate, pour, frame, rough-in, and enclose. Trades queue up, changes ripple late, and inspections stretch across months. Net effect: off-site shifts the critical path to preconstruction and logistics (design freeze, factory slots, transport/crane windows) and typically compresses the on-site duration dramatically, if those early decisions are locked and the supply chain is tight.

Educating the Workforce for Prefab Construction

The shift to prefab construction requires training focusing on key elements of modern construction that make the prefab/offsite approach unique, including an understanding of the prefab mindset, Building Information Modelling (BIM) and familiarity with regulatory frameworks governing prefab construction (Hwang, et.al 2025). Training is needed at multiple levels: for architects, engineers, tradespeople involved in the construction process, for developers, inspectors, regulators, and those involved in financing and insurance for offsite construction projects.

Prefab Mindset

Moving from general contracting to a manufacturing-centric model of construction flips core business assumptions. In homebuilding, overhead stays lean, and labour is variable so slower schedules can be tolerated to maximize margin per unit. Add a factory and these assumptions are reversed: assets depreciate, overhead is fixed, and direct labour becomes a fixed hourly cost whether or not product ships. In this context, time isn't just money, it's a compounding expense. Every lost hour erodes value through idle wages, overhead burn, and faster depreciation (Schmidt, 2025).

This new reality demands a cultural shift toward a true manufacturing mindset: prioritize labour efficiency, throughput per hour, and waste elimination (and if you're leveraged on equipment, uptime too). Practically, that means adopting lean practices and building a feedback culture that solves problems at the line and locks in improvements. This culture is very different than the current standard, but without it, a prefab company won't survive.

BIM

A Building Information Model (BIM) is a "shared digital representation of physical and functional characteristics of any built objects (including buildings) which forms a reliable basis for decisions." BIM is not an absolute necessity for successful prefabrication, but it is very beneficial and saves costs (Wimmers, 2020).

Prefabrication relies on the creation of a detailed 3D model, often referred to as a digital twin, that captures not only the architectural layout but also all structural and service elements, including mechanical, plumbing, and electrical systems. This model is typically developed using Building Information Modeling (BIM) software such as Revit or Cadwork and serves as the foundation for downstream processes. It enables the generation of production-ready files, including CNC machine code for mass timber elements or cut lists for panelized light-frame construction.

The model is shaped by Design for Manufacture and Assembly principles, ensuring that it reflects both architectural intent and factory production logic. Decisions within the production process, such as the dimensions of prefabricated panels, the degree of pre-installation (e.g., windows, insulation, Mechanical, Electrical and Plumbing rough-ins), and the sequencing of on-site assembly are all derived from this digital foundation. These decisions are also influenced by logistical constraints, including site specific limitations, transportation limits and crane capacities. As noted earlier, the specific level of prefabrication (e.g., open-frame, closed-frame, volumetric) defines the extent to which these components are completed off-site.

CSA A277 standard

The CSA A277 standard governs the certification of the production process in off-site construction facilities. It requires that each segment of the quality program be managed by "qualified personnel", defined by their personal qualifications and assigned responsibilities. While not explicitly requiring Red Seal or other certification for trades like carpentry, having certified personnel in these roles can support compliance and streamline certification.

The CSA A277 standard, originally developed for manufactured homes, focuses on factory-level quality assurance of their process. Certified plants require quarterly inspections. Compliance demands include:

- Annual calibration of all testing equipment—even new devices
- A detailed material list outlining every component's origin, standards, and test results
- Full documentation of any non-conformities

While these rules support consistency, they create a high administrative burden that discourages innovation and limits project flexibility. The framework favours larger firms with the resources to manage compliance, while small companies struggle to enter or scale, facing steep startup costs and staffing demands.

Training for inspectors and permitting staff

At the municipal level, a knowledge gap often exists among building inspectors and related permitting staff regarding prefabricated and factory-built construction systems. Many approval processes are structured around conventional site-built sequencing, which can create uncertainty when reviewing modular, panelized, or mass-timber assemblies that arrive substantially complete. Inspectors may have limited familiarity with factory-based quality assurance systems, digital fabrication workflows, or certification frameworks such as CSA A277, leading to duplicated inspections, inconsistent interpretation of code compliance, or requests for documentation not aligned with off-site production realities. As prefabrication adoption increases, targeted education will be necessary to help equip the municipal review processes for contemporary manufacturing-based construction methods.

Education for finance and insurance professionals

Financing is one of the largest obstacles to prefabricated construction in B.C. and Canada. Lenders often classify factory-built homes and components as movable property rather than real property, meaning offsite work is unsecured until installed. Lenders typically finance only about 50 percent of factory-stage work due to this perceived risk, while manufacturers require up to 90 percent of costs before delivery to manage material and labour risk. This creates a funding gap of up to 40 percent, usually covered through cash or high interest unsecured lending.

The upcoming prompt payment legislation and changes to the Builders Lien Act, currently being finalized by the Ministry of Attorney General, will extend lien protection to offsite components by updating the definition of “material” (Fasken, 2025). This gives manufacturers legal recourse to enforce payment for factory-stage work before delivery, linking these components to the building site. By reducing nonpayment risk, this measure may increase lender confidence in factory-stage work.

Canadian Prefab Education

In my scan of Canadian post-secondary institutions for prefabrication-specific education, I identified 44 relevant programs, micro-credentials, and courses, plus 75 offerings in closely adjacent areas. The direct set spans mass-timber design, modular/panelized construction methods, and model-to-fabrication workflows; the adjacent set covers BIM, building-envelope and Passive House training, construction management, and carpentry/apprenticeship pipelines. Together they represent a coast-to-coast mix across universities, polytechnics, and colleges, with notable clusters in B.C. and Ontario and meaningful activity in Alberta, Quebec, and the Atlantic provinces.

While the footprint is encouraging, the current landscape has gaps that will slow industry adoption. Offerings are unevenly distributed (heavy in B.C./ON, thin elsewhere) and skew toward design-side and timber electives, with far fewer courses on factory methods, and BIM-to-fabrication. Mechanical, Electrical and Plumbing in prefabrication and logistics are particularly underrepresented. Many micro-credentials don’t stack into diplomas or degrees leaving a rather undeveloped path for employees. Delivery is often classroom or online with limited hands-on training on jigs, fixtures and modern equipment. Finally, curricula rarely cover data and operations skills that supervisors and planners need to run a factory—leaving companies to backfill critical training in-house.

The CWC (Canadian Wood Council) has a wood construction education map which identified 71 programs and 235 courses. Their scanning criteria was different, focusing on wood construction in general and not just on prefabrication. However, it is showcasing similar takeaways. There are clear clusters in BC and in Ontario and Quebec. 90% of courses are in undergraduate and graduate level with only 10% at the college level.

Recommendations

BCIT is well positioned to help accelerate the adoption of wood-based prefabrication in Canada and in British Columbia by expanding training beyond a narrow focus and toward a broader manufacturing-based model. A foundational micro-credential in prefabrication could provide a holistic introduction to the sector, helping learners across design, trades, supervision, and production understand the full off-site process and the role each position plays within it. Building on this, BCIT could expand applied curriculum to better reflect factory realities, including Design for Manufacture and Assembly, line-balancing principles, BIM-to-fabrication workflows, CNC file generation, and Mechanical, Electrical and Plumbing integration in prefab systems. In addition to technical skills, training should emphasize the importance of company culture and mindset, including continuous improvement, problem-solving at the line, and feedback systems that help lock in learning and operational gains. Targeted education for building inspectors and permitting staff on prefabricated systems and CSA A277, would further strengthen regulatory readiness. Wherever possible, these offerings should be stackable into larger credentials to support long-term workforce development.

References

Bertram, N., Fuchs, S., Mischke, J., Palter, R., Strube, G., & Woetzel, J. (2019). *Modular construction: From projects to products*. McKinsey Global Institute.

Borden Ladner Gervais LLP. (2025, October 10). *B.C. introduces new Construction Prompt Payment Act*. https://www.blg.com/en/insights/2025/10/bc-introduces-new-construction-prompt-payment-act

British Columbia. Office of Housing and Construction Standards. (2015, June). *Understanding B.C.'s building regulatory system* (Building Act guide series: Section A1). https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/guides/buildingactguide_sectiona1_june2015_web.pdf

BuildForce Canada. (2025). *British Columbia construction and maintenance looking forward: Highlights 2025-2034*.

Fasken. (2025, December 11). *BC Construction Prompt Payment Act receives Royal Assent*. https://www.fasken.com/en/knowledge/2025/12/bc-construction-prompt-payment-act-receives-royal-assent

Goodier, C. I., & Gibb, A. G. F. (2007). Future opportunities for offsite in the UK. *Construction Management and Economics, 25*(6), 585-595. https://doi.org/10.1080/01446190601071821

Goodland, H., Lam, A., Taylor, M., & Zadeh, P. (2019). *Cost implications of accelerated construction schedules*. FPInnovations.

Hwang, J. H., Rankin, J., Searle, B., Odo, N., Montazeri, S., Al-Hussein, M., Zelele, T., Tomalty, J., Farmer, M., & Endean, J. (2025, October). *Roadmap to transform the Canadian construction industry through industrialized construction, research and innovation*. National Research Council of Canada. https://www.unb.ca/ocrc/_assets/documents/roadmap-transform-the-canadian-construction-industry-full-report2.pdf [unb.ca]

Jaillon, L., Poon, C. S., & Chiang, Y. H. (2009). Quantifying the waste reduction potential of using prefabrication in building construction in Hong Kong. *Waste Management, 29*(1), 309-320. https://doi.org/10.1016/j.wasman.2008.02.015

Li, Z., Shen, G. Q., & Alshawi, M. (2014). Measuring the impact of prefabrication on construction waste reduction: An empirical study in China. *Resources, Conservation and Recycling, 91*, 27-39. https://doi.org/10.1016/j.resconrec.2014.07.013

Lu, W., Huang, G. Q., & Li, H. (2011). Scenarios for applying RFID technology in construction project management. *Automation in Construction, 20*(2), 101-106. https://doi.org/10.1016/j.autcon.2010.09.007

Nadim, W., & Goulding, J. S. (2010). Offsite production in the UK: The way forward? A UK construction industry perspective. *Construction Innovation, 10*(2), 181-202. https://doi.org/10.1108/14714171011037183

Pan, W., Gibb, A. G. F., & Dainty, A. R. J. (2012). Strategies for integrating the use of off-site production technologies in house building. *Journal of Construction Engineering and Management, 138*(11), 1331-1340. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000544

Pons, O., & Wadel, G. (2011). Environmental impacts of prefabricated school buildings in Catalonia. *Habitat International, 35*(4), 553-563. https://doi.org/10.1016/j.habitatint.2011.03.005

Richard, R.-B. (2005). Industrialized building systems: Reproduction before automation and robotics. *Automation in Construction, 14*(4), 442-451. https://doi.org/10.1016/j.autcon.2004.09.009

Schmidt, M. (2025). *A practical path forward for offsite manufacturing: Strategies to scale capacity and succeed with industrialized wood-based construction*. Canadian Wood Council / WoodWorks Ontario. https://cwc.ca/wp-content/uploads/2025/05/A-Practical-Path-Forward-for-Offsite-Manufacturing.pdf

Wimmers, G. (2020, March). *Wood technology solutions: Report for Quesnel*. City of Quesnel. https://www.quesnel.ca/sites/default/files/docs/our-community/1._wood_technology_solutions_-_quesnel_report_march_2020.pdf

Industry Needs Assessment — Prefab Training Gaps and Opportunities

In early 2026 Gruner Consulting Inc. conducted an off-site construction work force needs assessment for Assembly Corp, a Toronto-based company that specializes in prefab and mass-timber construction. The assessment, generously shared with the MTAT project establishes that the prefab sector operates more like an advanced manufacturing environment than traditional site-built construction. This difference requires a new category of hybrid worker that blends foundational trade knowledge with industrial production competencies. The assessment identified four distinct workforce categories: Hybrid Skilled Operators capable of running CNC and automated fabrication equipment with foundational carpentry literacy; Quality Control Technicians trained in production-line inspection, defect identification, and lean production practices; Modernized Millwrights with skills in automated equipment maintenance, robotic systems, and digital calibration; and Prefabricated Installation Specialists with expertise in module alignment, crane sequencing, connection detailing, and onsite troubleshooting. The most fundamental shift from traditional on-site work to prefab works is a systems think approach. Prefab construction is not simply moving traditional construction indoors but understanding workflow, DFMA, interdisciplinary collaboration, optimization of material and trade coordination. This shift requires a new kind of workforce, with the following competencies:

Hybrid Skilled Operators

There's a clear gap for workers who bridge CNC/automated equipment operation with foundational carpentry knowledge. Prefab factories use automated panel framing, digital fabrication tables, and robotic-assisted systems, but output still has to conform to building code standards. No existing apprenticeship pathway produces this hybrid worker, making it one of the most actionable program development opportunities nationally.

Quality Control as a Standalone Competency

Unlike site-built construction where errors are corrected as you go, factory production demands early defect detection and lean continuous improvement practices. This is identified as a significant skills gap — workers need to recognize quality deviations at each production checkpoint, not just at the end. This is largely absent from current trades curricula.

Millwright Modernization

Automated prefab facilities are reviving demand for millwrights, but in a modernized form. Robotic arm maintenance, sensor-based diagnostics, and automated fabrication bridge systems require a millwright pathway updated well beyond its traditional scope.

Prefab Installation as a Distinct Specialization

Even after factory production, onsite installation of panelized and volumetric systems requires skills beyond general carpentry — crane sequencing, module alignment, connection detailing between prefab components, and rapid troubleshooting. This is currently an underserved area, and Assembly Corp draws a direct parallel to BCIT's Mass Timber Certificate as a model for what a focused installation extension program could look like.

Proposed Program Pathways with National Applicability

The needs assessment identified four specific training program types that could be developed and scaled nationally. Each addresses a distinct gap and could be offered as stackable credentials rather than standalone courses.

(i) **Prefabrication Machine Operator Certificate**;

(ii) **Prefab Production Quality Technician** micro-credential;

(iii) **Advanced Millwright stream for automated construction facilities;**

(iv) **Prefabricated Housing Installation Extension Program**.

Industry Best Practice Example

Bonneville Homes' Worker Upskilling System

In response to a significant gap in the labour market around off-site and prefabricated construction training, Bonneville Homes (Belleville, ON) has developed its own internal system for upskilling workers. Their approach is grounded in the philosophy that employees should be *pulled up, not pushed*, and that clear pathways for advancement create stronger, more capable teams.

At the facility, each employee carries two sets of badges that indicate the skills they bring to the production line:

1. Construction Skill Badges – representing hands-on technical abilities such as electrical work, plumbing, painting, drywall, roofing, millwork, and other construction-related competencies.
2. Lean Production Skill Badges – capturing workplace performance attributes such as completing tasks on time, leadership capacity, communication skills, problem-solving, and overall contribution to production efficiency.

To support ongoing development, Bonneville offers free weekend bootcamp-style training that allows employees to learn new competencies and earn additional badges. Each new badge comes with a guaranteed pay increase, reinforcing the company's commitment to helping workers advance.

Employees also participate in self-assessments, rating their own skill level and confidence for each badge they hold. These self-ratings are tracked alongside internal company assessments, which measure takt time, number of deficiencies, output quality, and reliability. As employees gain new skills and demonstrate improved performance, they accumulate points within Bonneville's system—and the employee with the most points is recognized and rewarded, further encouraging continuous improvement.

Application of This Best Practice to Education and the MTAT Project

Given the absence of a harmonized curriculum or Red Seal program for mass timber at this time, a badge-based system such as Bonneville's presents a strong interim model that can be adapted for educational purposes.

By aligning badges with the learning outcomes defined through the MTAT project, education and training providers can:

- Clearly define the skills required for safe and effective mass timber installation
- Establish a consistent method for tracking when learning outcomes have been met
- Provide instructors with a transparent, easy-to-use tool for monitoring student progress
- Offer industry a straightforward way to understand the specific competencies a graduate brings
- Build greater trust with insurers and regulators by demonstrating cohesion and standardization across skill levels in the mass timber workforce

These badges can act as a critical stop-gap measure between the current state of training and the future incorporation of mass timber into the Red Seal framework. By adopting a model similar to Bonneville's, the training ecosystem can begin building structured, verifiable competency pathways even before official national standards are established.

"The greatest benefit of the program is the self-motivation that will arise with in the worker. As we all know, the most efficient motivation is the one that comes from inside, since it is 100% oriented with the need." - *Eric Bonneville principal and owner of Bonneville Homes*

Legacy and Looking Forward

The MTAT project has built lasting infrastructure for mass timber trades education in Canada. The curriculum framework, faculty resources, national network, and digital platform created through this project provide a foundation that will endure well beyond the project's funded period.

Legacy and Sustainability

The MTAT project has positioned BCIT and its national partners as leaders in mass timber trades education. The network of partner organizations—spanning post-secondary institutions, unions, industry, government, and Indigenous organizations—represents a durable ecosystem of stakeholders committed to this work. The MMC Education website will continue to serve as a national hub, and the curriculum framework provides a ready-to-adopt resource for any Canadian carpentry program seeking to integrate mass timber content.

The project has also sparked international connections—with European manufacturers, universities, and industry associations—that can inform the continued evolution of Canadian mass timber trades education. As the sector grows and building codes continue to expand mass timber's permitted applications, the foundation built by MTAT ensures that Canada's skilled trades workforce will be ready to meet the demand.

> *"BCIT has connected with a technically advanced and socially impactful training network advancing the mass timber revolution—one that includes and uplifts skilled trades. Through international engagement, hands-on curriculum development, and a coast-to-coast network of educators and industry leaders, the MTAT project has laid the groundwork for a more sustainable, inclusive, and skilled Canadian construction workforce."*

Acknowledgements

The MTAT project team gratefully acknowledges the support of Natural Resources Canada's Green Construction Through Wood (GCWood) Program, whose investment made this work possible. We thank all network partners, working group members, faculty workshop participants, Indigenous partners, union representatives, industry contributors, and international collaborators who generously shared their time, knowledge, and expertise.

This project was led by the British Columbia Institute of Technology, School of Construction & Environment, and reflects the collective effort of educators, tradespeople, researchers, and industry leaders committed to building a skilled, sustainable, and inclusive mass timber construction workforce for Canada.

Project Lead Institution	British Columbia Institute of Technology (BCIT), School of Construction & Environment
Project Title	Mass Timber Training Network: Advancing Trades for a Sustainable Future (MTAT)
Funder	Natural Resources Canada – Green Construction Through Wood (GCWood) Program
Fiscal Year	2025–26
Website	www.mmceducation.ca
Social Media	LinkedIn: linkedin.com/company/mmc-edu/ | Instagram: @bcitmmceducation | Facebook: MMCEducationCanada

References

Brind'Amour, M., Bertrand, S. (2023). Building Sustainably – Mass Timber. Environmental and Energy Study Institute Fact Sheet. September 2023. Downloaded from Fact Sheet | Building Sustainably: Mass Timber (September 2023) | White Papers | EESI

BC Office of Mass Timber Implementation (OMTI) (2024) Mass Timber Action Plan Progress Update. Available online

Hasson, F., Keeney, S., McKenna, H. (2025). Revisiting the Delphi technique - Research thinking and practice: A discussion paper. International Journal of Nursing Studies, 168 (August 2025) 105119, https://doi.org/10.1016/j.ijnurstu.2025.105119.

Hwang, J. H., Rankin, J., Searle, B., Odo, N., Montazeri, S., Al-Hussein, M., Zelele, T., Tomalty, J., Farmer, M., & Endean, J. (2025, October). *Roadmap to transform the Canadian construction industry through industrialized construction, research and innovation*. National Research Council of Canada. https://www.unb.ca/ocrc/_assets/documents/roadmap-transform-the-canadian-construction-industry-full-report2.pdf [unb.ca]

Red Seal Canada (2022). Interprovincial Occupational Standard: Carpenter https://red-seal.ca/eng/trades/carpenters/overview.shtml Employment and Social Development Canada.