DATE: December 6, 2023
TO: Committee on Agriculture, Conversation & Forestry
Committee on Education & Cultural Affairs
Committee on Housing
Committee on Innovation, Development, Economic Advancement & Business
FROM: Samantha Warren, UMS Director of Government & Community Relations
samantha.warren@maine.edu / (207) 632-0389
RE: **Resolves 2023, Chapter 27 (LD 881, *Directing the University of Maine System to Study the Barriers to Use of Cross-laminated Timber*)**

In recognition of the R1 University of Maine's leadership in forest products research and innovation and the economic and environmental opportunity of mass timber in the state and beyond, the 131st Legislature directed the University of Maine System (UMS) to study the barriers to use of cross-laminated timber. No appropriation was provided.

Based on his expertise and connections to industry and community partners, UMS selected UMaine's Forest Industry Business Development Manager, Shane O'Neill, to conduct the study. O'Neill undertook dozens of personal interviews with relevant stakeholders, and additionally solicited through surveys input from architecture, engineering and construction professionals, and separately municipal code and fire enforcement officials.

The findings of this comprehensive study show that while there is increasing utilization of mass timber in Maine construction, there is agreement across all respondent groups that significant barriers to more widespread use remain and should be addressed. Chief among them include:

- Availability of adequately skilled and trained workforce across the mass timber construction, manufacturing and enforcement processes.
- Challenges in sourcing mass timber, availability of optimized dimensional products, lack of regional availability, logistics and lead times.
- Need to improve the design and engineering of mass timber structures to optimize performance attributes of various mass timber products to the applications in the structure. (This ultimately applies back to education and experience in the optimized performance characteristics of mass timber for code, fire, structural, acoustics, thermal and occupant comfort purposes.)
- Challenges with the lack of a consistent and sustained market demand for mass timber products, fluctuations in product demand, underutilized production capacity from potential competitors across North America and the associated risks with establishing a mass timber facility based on the current market environment.
- Cost competitiveness compared against traditional commercial building materials.

The attached report details these barriers and the following recommendations Maine may benefit from seriously considering:

- Understand the policies and initiatives of other states (like Oregon, Washington and Michigan) to develop a mass timber policy strategy for the state.
- Explore possible funding of a mass timber demonstration initiative.

- Revise and refine Maine's mass timber manufacturing attraction strategy.
- Develop a comprehensive mass timber workforce development strategy for Maine.
- Establish and staff a state mass timber advocacy group.

UMS/UMaine welcomes the opportunity to review this study and discuss next steps with your Committees or interested parties. We also invite you to visit UMaine — as the Housing Committee did this fall — to tour relevant laboratories and see first-hand mass timber research and innovation underway at our university in close partnership with industry.

Barriers to Use of Cross-Laminated Timber in Maine

Prepared for the 131st Maine Legislature

Submitted by

The University of Maine
Office of Strategic Partnerships, Innovation, Resources and Engagement
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December 06, 2023

Contents

List of Figures

List of Acronyms

AEC	Architecture, Engineering and Construction
AIA	American Institute of Architects
AWC	American Wood Council
BIM	Building Information Modelling
BOCA	Building Officials and Code Administrators International, Inc.
CET	Construction Engineering Technology
CLF	Carbon Leadership Forum
CLT	Cross-Laminated Timber
CNC	Computer Numerical Control
CTE	Career and Technical Education
DLT	Dowel-Laminated Timber
ESG	Environment, Social, and Governance
GCBI	Green Business Certification Inc.
GLT	Glue-Laminated Timber
IBC	International Building Code
ICBO	International Conference of Building Officials
ICC	International Code Council
IPD	Integrated Project Delivery
IRC	International Residential Code
LCA	Life-cycle assessment
MEP	Mechanical, Electrical and Plumbing Engineering
NCSEA	National Council on Structural Engineers Associations
NLT	Nail-Laminated Timber
SBCCI	Southern Building Code Congress International, Inc.
SMT	Sustainable Materials and Technology
UMA	University of Maine at Augusta
UMS	University of Maine System

Executive Summary

To increase understanding of both the adoption rate and in-state manufacturing of mass timber In Maine, the 131st Legislature and Governor Mills passed LD 881, a resolve directing a study of the barriers facing cross-laminated timber In Maine and provide recommendations to promote their use in construction. This study was developed in response to the resolve. The study engaged 108 unique participants to define available training, education, and experiences across the stakeholders throughout the building lifecycle process in the state.

From this information, the following five recommendations are proposed:

1. Understand the policies and initiatives of other states to develop a policy strategy for the state.
2. Explore the funding of a mass timber demonstration initiative to serve as an "in practice" training and experience mechanism across the building construction lifecycle.
3. Revise and refine Maine's mass timber manufacturing attraction strategy.
4. Develop a comprehensive workforce development strategy for Maine.
5. Establish and staff a state mass timber advocacy group.

Introduction

1.1 Study Purpose

In June 2023, the Maine Legislature and Governor Janet Mills signed passed LD 881, a resolve directing the University of Maine System to "study the barriers to more widespread use of cross-laminated timber and make recommendations for any professional training or other measures that would promote its use in construction."

1.2 Background

Mass timber is a broad category encompassing several engineered wood products. While LD 881 references cross-laminated timber (CLT), this study uses the term "mass timber" to refer to types of construction that includes CLT but is a more representative term for the family of products and construction methods needed to

utilize CLT. However, the study is limited to products that use dimensional lumber components (i.e. nominal 2" thick material). While the term "mass timber" is a relatively new categorization, many of the products within this designation have been used in North America for decades.

Cross-Laminated Timber (CLT) is a wood panel system rapidly gaining popularity in North America after widespread use in Europe for the last two decades. CLT is manufactured by laminating dimensional lumber elements in a bi-directional orientation using structural adhesives (Figure 1), to develop performance properties allowing their use in commercial construction providing two-way spanning performance.

Glue-Laminated Timber (GLT) is a wood panel or beam (glulam) & column system which has been used in North America (primarily in beam and columns applications) since the 1930's. GLT is manufactured by laminating dimensional lumber elements in a uni-directional orientation using structural adhesives (Figure 2), to develop performance properties allowing their use in commercial construction applications requiring spanning characteristics in one direction (often as columns or beams). GLT panels can also be designed to provide structural performance in floor or roof applications that are more structurally efficient than CLT in one-way span applications[1].

Nail-Laminated Timber (NLT) is a wood panel system which has been used in North America for over 150 years. NLT is manufactured by laminating dimensional lumber elements in a uni-directional orientation using nail or screw fastening (Figure 3), to develop performance properties allowing their use in commercial construction applications requiring spanning characteristics in one direction. NLT panels are more challenging to designs requiring openings and penetrations (when ferrous-based

[1] Li, Hao et al. 2022. Bending and shear performance of cross-laminated timber and glued-laminated timber beams: A comparative investigation." *Journal of Building Engineering*. 45: 103447. https://doi.org/10.1016/j.jobe.2021.103477.

fasteners are used) and like GLT, can be designed to be more structurally efficient than CLT in one-way span applications[2].

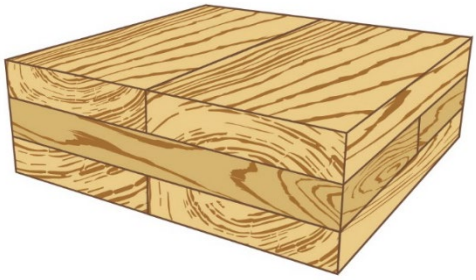

Figure 1: Cross-Laminated Timber (CLT)

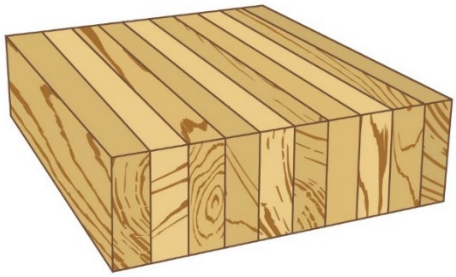

Figure 2: Glue Laminated Timber (GLT)

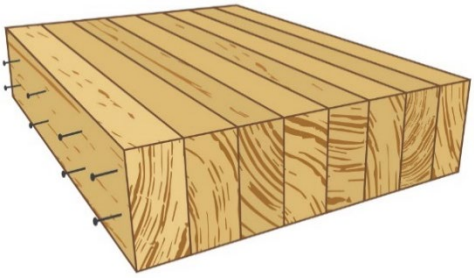

Figure 3: Nail-Laminated Timber (NLT)

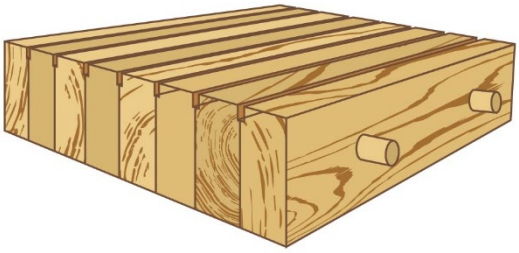

Figure 4: Dowel-Laminated Timber (DLT)

Images Source: www.naturallywood.com

Dowel-Laminated Timber (DLT) is a wood panel system relatively new to North America (similar to CLT) after development in Europe in the 1990's. DLT is manufactured by laminating dimensional lumber elements in a uni-directional orientation using hardwood dowels (Figure 4), to develop performance properties allowing their use in commercial construction requiring one-way or two-way spanning performance (depending on assembly method). DLT is the only mass

[2] Gong, Meng. 'Lumber-Based Mass Timber Products in Construction'. *Timber Buildings and Sustainability*, edited by Giovanna Concu. IntechOpen, 4 Dec. 2019. https://doi.org/doi:10.5772/intechopen.85808.

timber product which uses neither metal fasteners or adhesives, consisting only of wood.

1.3 Objectives

The objectives for this study (as outlined by LD 881) are:

1. Study the barriers to more widespread use of cross-laminated timber (CLT), and
2. Provide recommendations for any professional training or other measures that would promote its use in construction.

These objectives were maintained throughout the study, with the only variance being the collection of trainings, experiences, and barriers across all dimensional lumber-based mass timber products.

Methodology

1.4 Study Development

The university engaged stakeholders across the building project lifecycle using a mixed mode approach including an assessment of the workforce training landscape, direct interviews with individual organizations, and directed surveys. All participants were ensured their anonymity in providing information to encourage open discussions. Data was collected across the various stakeholders from Oct. 1st until Nov. 15th, 2023.

Results

1.5 Mass Timber Training

This section outlines the various state programs and national training opportunities available to practitioners for advancing their understanding of the design, installation, and fabrication of mass timber.

1.5.1 Within the University of Maine System

Currently there are four degree-granting programs and one proposed micro-credential within the University of Maine System (UMS) which incorporate mass timber as part of their curriculum.

University of Maine

Department of Civil and Environmental Engineering

As part of the Civil Engineering undergraduate program, students are introduced to mass timber and other engineered wood materials in *CIE 110: Materials*. This first-year course introduces students to the manufacturing and uses of various mass timber and engineered wood products employed across residential and commercial construction and outlines their areas of advantages in engineering design. Graduate students have access to *CIE 544: Timber and Masonry Design*, with a significant focus on the design, fabrication, and structural performance of mass timber elements (GLT and CLT).

School of Engineering Technology

As part of the Construction Engineering Technology (CET) program, students are trained across a blend of civil engineering technology and construction business management. A pilot course incorporating mass timber products is being offered this year under *CET 498: Selected Topics in Construction Engineering Technology*. The outcome of the course performance and student feedback will be used in evaluating the potential of refining and incorporating the curriculum into the standard coursework for the program.

School of Forest Resources

As part of the Sustainable Materials and Technology (SMT) undergraduate program, students are exposed to mass timber curricula across five courses during their degree studies. These include:

1. *SFR 215*: *Introduction to Sustainable Materials and Technology* (introduces the range of mass timber products in general terms suitable for students across multiple colleges and departments).
2. *SFR 450*: *Processing of Sustainable Materials* (provides training on the manufacturing of multiple forms of mass timber [CLT, DLT, NLT], their testing and determination of mechanical and physical properties)
3. *SFR 453*: *Biocomposite Materials* (provides laboratory training on the use of bonding resins used in mass timber assembly)
4. *SFR 456*: *Physical and Mechanical Properties of Sustainable Materials* (studies the design of mass timber structural systems on building performance)
5. *SFR 530*: *Wood Physics* (studies the hygrothermal, energy, and occupant comfort performance of mass timber assemblies as part of a building envelope)

University of Maine at Augusta

As part of the University of Maine at Augusta (UMA) architecture undergraduate program, students are exposed to mass timber curricula across three courses during their degree studies. These include:

1. *ARC 231*: *Architectural Materials and Methods* (introduces students to the design, integration, properties, sustainable use, and structural limitations of a variety of building materials, including mass timber and engineered wood products).
2. *ARC 332*: *Construction Techniques* (provides training on construction practices and techniques to develop accurate representation models and technical drawings for use across the building professional trades and evaluating design assemblies of building materials learned in *ARC 231* for performance objectives).
3. *ARC 407*: *Architectural Design*: *Integration Studio* (students apply their academic experience across all prior coursework with an emphasis on the ability to produce an integrated architectural project demonstrating a student's capacity to make design decisions while integrating design thinking skills within a regulatory and tectonic context).

University of Maine System

In Fall 2023, a micro-credential was proposed on "Sustainable Building Science", proposing a holistic approach to building design and operations across the topic

areas of indoor environmental quality, envelope system performance, and building sustainability. This micro-credential program was approved for development In December, and will train individual participants on gaining an understanding on the science and technologies employed to provide a better-built environment through lower embodied carbon construction with sustainable building products (including mass timber and engineered wood products and other forest-based replacement materials), increase energy efficiency, and improve occupant comfort and health.

1.5.2 Within the Maine Community College System

Currently there are three associate degree programs in Building Construction Technology through the Maine Community College System (MCCS): Eastern Maine Community College in Bangor, Central Maine Community College in Auburn, and Southern Maine Community College in South Portland and Brunswick. Each of these colleges offer a certificate program in Building Construction, along with Northern Maine Community College. In discussion with the various programs throughout MCCS, it was noted that while there is currently no presentation of mass timber products to the students, the programs were very receptive to including mass timber curriculum within their instruction.

1.5.3 National Mass Timber Training

Building professionals have a variety of national-level training and education opportunities related to mass timber available. During this study, six different national organizations were identified for providing online and in-person training modules (many of which offer professional continuing education credits). The list of organizations (in alphabetical order) is outlined in Appendix A.

1.6 Commercial Construction Supply Chain Stakeholders

A total of 86 distinct respondents were assessed across the direct interviews and survey process throughout the architecture, engineering, and construction (AEC) community, manufacturers, and municipal enforcement agencies. A total of 271 open ended responses were supplied from the respondent pool, aggregated into categories based on the nature of the response, and tallied to determine a

distribution (Figure 5). This figure represents a ranking of respondent's opinions on the largest barriers to more wide-spread adoption and use of mass timber in Maine.

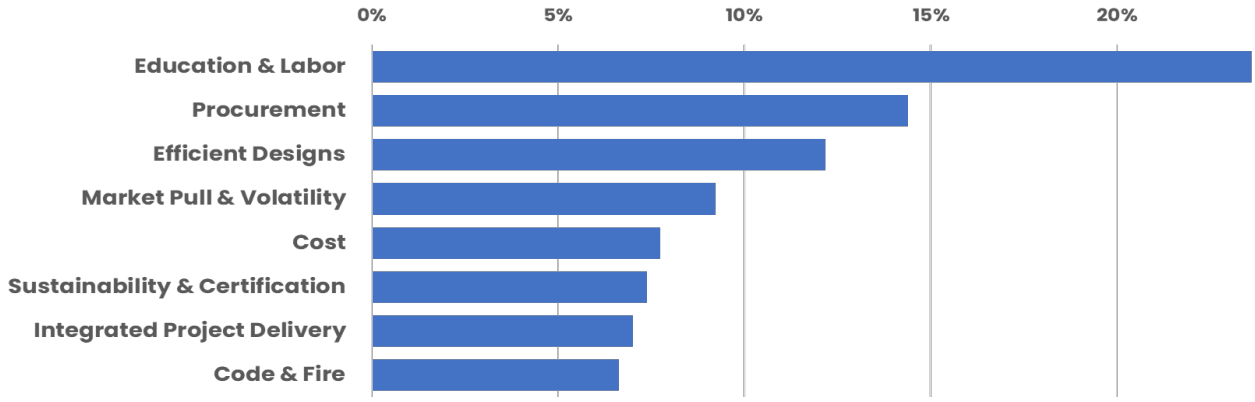

Figure 5: Top Weighted Barrier Categories Identified from Respondent Pool

The contents of each category outlined in Figure 5 include the following:

1. Education & Labor: Availability of adequately skilled and trained workforce across the mass timber construction, manufacturing, and enforcement processes.
2. Procurement: Challenges in sourcing mass timber, availability of optimized dimensional products, lack of regional availability, logistics, and lead times.
3. Efficient Designs: Improving the design and engineering of mass timber structures to optimize performance attributes of various mass timber products to the applications in the structure. This category ultimately applies back to education and experience in the optimized performance characteristics of mass timber for code, fire, structural, acoustics, thermal and occupant comfort purposes.
4. Market Pull & Variability: Challenges with the lack of a consistent and sustained market demand for mass timber products, fluctuations in product demand, underutilized production capacity from potential competitors across North America, and the associated risks with establishing a mass timber facility based on the current market environment.
5. Costs: Minimizing cost increases throughout the AEC, manufacturers, installers, the mechanical, electrical, and plumbing engineering (MEP) trades, and enforcement processes to increase total delivered project cost competitiveness compared against traditional commercial building materials.

6. Sustainability & Certification: Includes challenges in procuring sustainable and performance certifications for mass timber products and their subsequent raw materials, completed structure environmental impact (embodied carbon, operational energy, and lifecycle analysis), and perceptions of long-term sustainability of forest resources for building systems.
7. Integrated Project Delivery (IPD): Challenges of traditional design, bidding, subcontractor, and enforcement processes resulting in increased total project costs. By increasing the adoption of an IPD approach to project development, the AEC, MEP, installers, manufacturers, and enforcement stakeholders are engaged early in the development process to identify and resolve challenges early in the process, decreasing delays and modification costs during the onsite construction process (thus reducing net project cost).
8. Code & Fire: Challenges on the understanding and application of code and fire performance standards to specific building installations. These challenges increase project timelines, overdesigned structures, misapplications of fire abatement treatments, and overall increases in project costs and timelines.

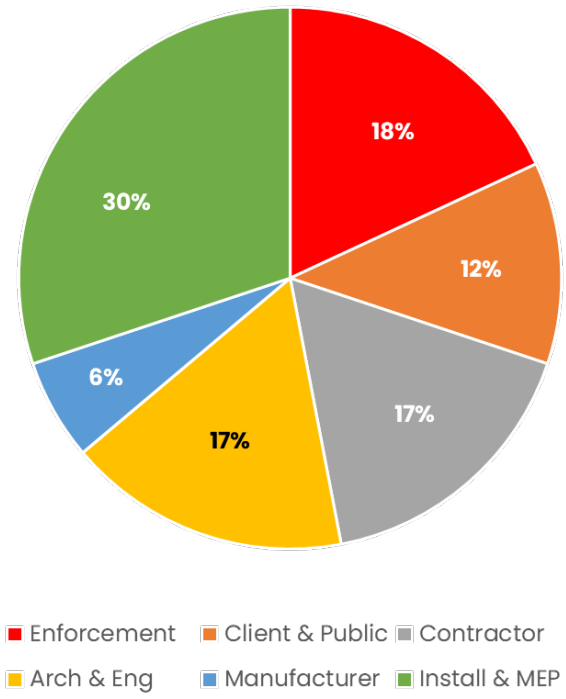

Figure 6: Identified Areas of Additional Mass Timber Training Needs

Regarding the overall education and labor challenge, the groups identified in need of training were aggregated and are found in Figure 6. Among the AEC respondents, 49% considered a mass timber building, 36% have completed a mass timber building, with 79% of those completing a building in Maine. Of those completed, 57% stated the project experienced delays due to (or possibly due to) the use of mass timber in the building. There were two additional unprompted topic areas expressed across all interviewed stakeholder groups worth noting:

1. The perception of a lack of "buy-in" and prioritization from the state's economic, sustainability and carbon reduction goals as opposed to other states with a more notable level of mass timber activity (e.g Oregon).
2. Concerns on mass timber's perception with the general public and environmental advocacy groups regarding the use of forest resources, deforestation, and environmental impact.

1.6.1 Developers and Institutions

For the developers and institutions engaged, the following results were obtained:

1. 31% of the respondents have completed a mass timber project with 38% in Maine.
2. 63% of the respondents considered mass timber for projects in Maine, with 67% of those projects not moving forward to completion due to (or possibly due to) mass timber in the design.
3. 75% of the respondents indicated projects delays due to (or possibly due to) the use of mass timber in their completed projects.

Figure 7 outlines the top obstacles identified by developers and institutions for mass timber building projects. The top categories identified being finance and insurance of projects (overall and operational costs), project delays, understanding mass timber product performance and benefits versus inherent expectations (in comparison with traditional materials, sustainability, and societal benefits), and project priorities, including the value-add of mass timber to total project cost towards environment, social, and governance (ESG) mandates of the company, institution, and/or building end users.

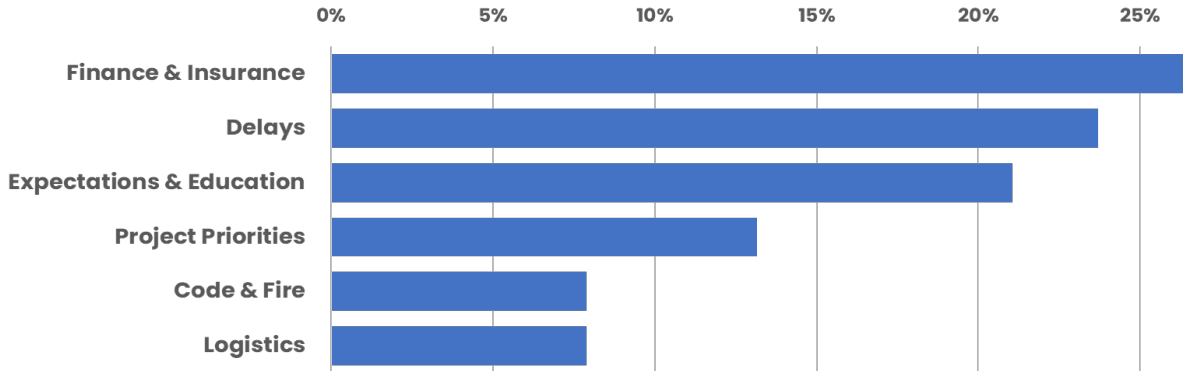

Figure 7: Top Challenge Areas Identified for Developers & Institutions

1.6.2 Architects and Design Engineers

For the architects and design engineers engaged, the following results were obtained:

1. 69% of the respondents have completed a mass timber project with 56% in Maine.
2. 63% of the respondents considered mass timber for projects in Maine, with 60% of those projects not moving forward to completion due to (or possibly due to) mass timber in the design.
3. 63% of the respondents indicated projects delays due to (or possibly due to) the use of mass timber in their completed projects.

Figure 8 outlines the top challenge areas identified by architects and design engineers for mass timber building projects. The top categories being efficient mass timber designs (optimized for performance, cost, and installation), education (33% in design & engineering, 30% in code and fire; 30% in contractors, installers and MEPs; 7% in developers & institutions), procurement & delay challenges, IPD, and costs.

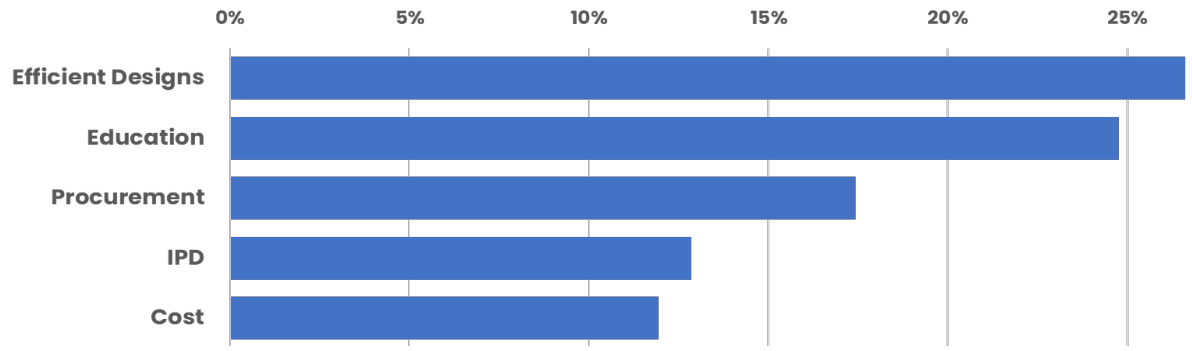

Figure 8: Top Challenge Areas Identified for Architects & Design Engineers

1.6.3 Commercial Contractors

For the commercial contractors engaged, the following results were obtained:

1. 47% of the respondents have completed a mass timber project with 71% in Maine.
2. 64% of the respondents considered mass timber for projects in Maine, with 71% of those projects not moving forward to completion due to (or possibly due to) mass timber in the design.

3. 100% of the respondents indicated projects delays due to (or possibly due to) the use of mass timber in their completed projects.

Figure 9 outlines the top challenge areas identified by commercial contractors for mass timber building projects. The top categories identified being education (51% in installers and MEPs; 19% in contractors; 11% in code and fire enforcement; 11% in developers and institutions; 8% in architects and design engineers), procurement and delay challenges, cost, efficient designs and IPD.

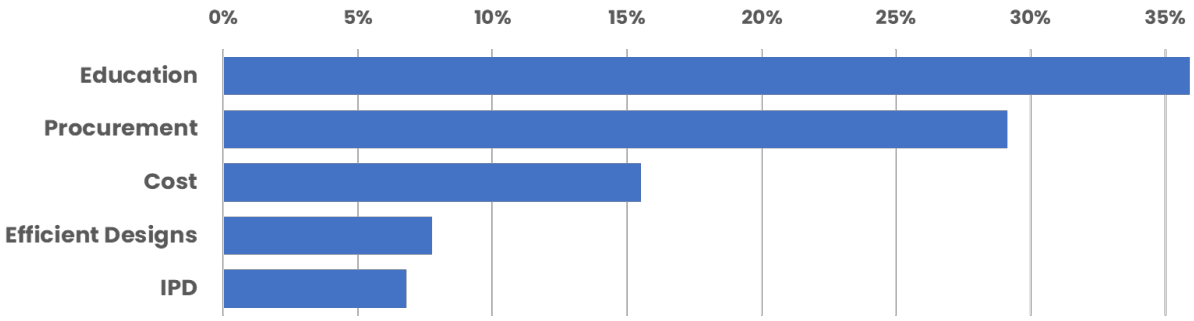

Figure 9: Top Challenge Areas Identified for Commercial Contractors

1.6.4 Manufacturers

Figure 10 outlines the top challenge areas identified by mass timber manufacturers who have considered Maine for a facility. The top categories include:

1. Education: Actual or perceived lack of adequately trained and knowledgeable mass timber workforce across the AEC community (44%), technical manufacturing, building information modelling (BIM), and computer numerical control (CNC) panel conversion (31%), and education within the general public and state agencies on mass timber benefits (26%).
2. Fiber Supply and Sustainability: Lack of clarity on the sustainably available and accessible species mix of sawlog and dimensional products meeting manufacturer needs in the state, fiber procurement process in the state, and the excess capacity of the logging workforce to harvest the sawlogs to properly size manufacturing operations for supply without disruption of established sawmill operations.

3. Market Pull & Volatility: Concerns on the volume and consistency of mass timber market demand, and competition from underutilized capacity in other North American mass timber mills.
4. Investment Risk: Concerns on investment cost, facility scale estimation and mass timber product categories manufactured for future capacity, competitor ramp-up, and market segmentation within the mass timber product types.
5. Operational Costs in Maine: Actual or perceived higher costs of doing business in Maine (including labor, utilities, fiber, and taxes).

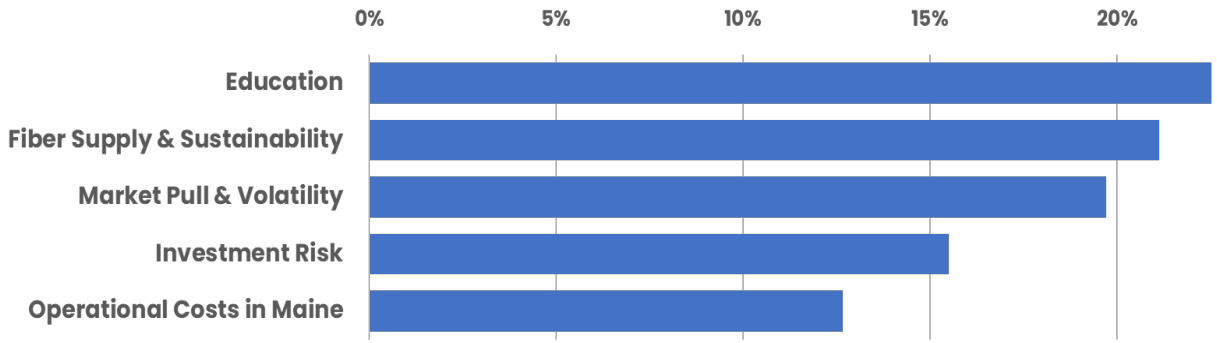

Figure 10: Top Challenge Areas Identified for Mass Timber Manufacturers

An additional trend was observed within the established sawmills in the state who have considered mass timber. There was the indication of a strong willingness to collaborate or supply a standalone mass timber facility by adjusting their production processes and offsetting a portion of their current production from their traditional distribution channels. The sawmills see this as an opportunity to diversify their market segments, buffer the pricing swings of selling into a commodity market, and institute marginal increases in production.

1.6.5 Code and Fire Enforcement

For the code and fire enforcement officials engaged, the following results were obtained:

1. 23% of the respondents have had a mass timber project proposed in their jurisdiction, with 63% of those projects advancing to construction.

2. 35% of respondents were offered some level of training on mass timber codes, with 92% of those offered completing those training opportunities.
    - 36% believed the training received was sufficient, while 64% believed it was somewhat sufficient.
3. 91% of the respondents were interested in additional mass timber code training.

Figure 11 outlines the top types of training requested by the code and fire official respondents. The overall sentiment expressed by the code and fire officials in this study was best summarized by one respondent's comment:

> *"Mass timber requires a much larger scale of knowledge and understanding over traditional materials. Many code officers have no mass timber or even post and beam exposure".*

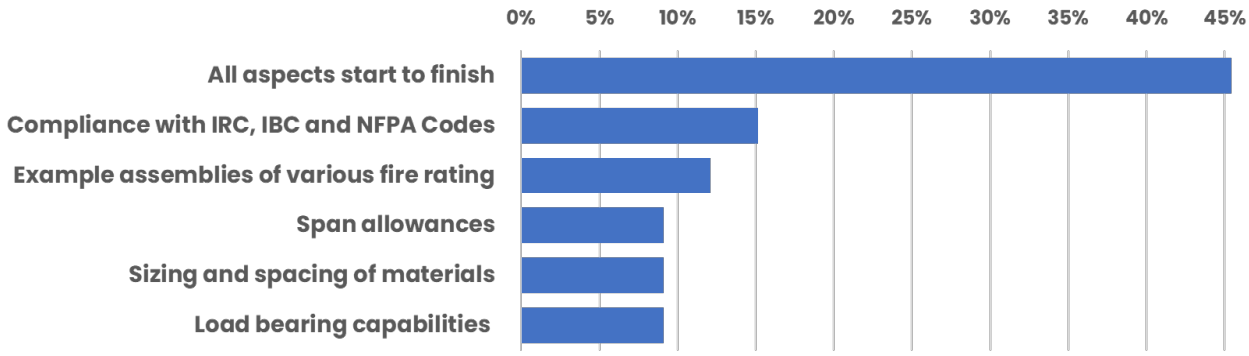

Figure 11: Prioritization of code and fire enforcement respondent training areas

Recommendations

The following five recommendations were developed and refined through the evaluation of the survey data and input across various stakeholder groups engaged in the development of this study:

1. Understand the policies and initiatives of other states to develop a policy strategy for the state. Using other state models for mass timber acceleration strategies and sustainable building initiatives (Oregon, Washington, Michigan, South Carolina and Minnesota for example), to implement, advance, and monitor mass timber activities in Maine aligned with, and in synergy with, the state's economic,

environmental, and housing strategies to ensure adoption across Maine's current recommendations and goals.

2. Explore the funding of a mass timber demonstration initiative to serve as an "in practice" training and experience mechanism across the AEC, MEP, and code. The Boston Mass Timber Accelerator program is a potential example framework. These demonstration facilities would be used as in-field teaching and training "living laboratories" across the building project process, including optimized and hybrid structural design and engineering, integrated project delivery, installation, fire design, subcontractor installations, sound and acoustics systems, embodied carbon and building system life-cycle assessment.
3. Revise and refine Maine's mass timber manufacturing attraction strategy. This strategy should include improved metrics on infrastructure, workforce readiness, supply chain partnerships, and applicable timber resources into a clear, concise engagement package. This should include a systems analysis of the viability of various mass timber products, scale of operations, optimized supply chains and processes, and anticipated capital investment for various facilities at the targeted scales. This should include a strategy from the state to de-risk investment for establishing operations in Maine.
4. Develop a comprehensive workforce development strategy for Maine. This should include training courses, programs, and curriculum which leverage current programs within the state and across national support organizations for deployment to:
    - UMS, MCCS, career and Maine's technical education (CTE) sites to develop the future workforce and advancements in mass timber technologies, design, installation, and in-service performance.
    - AEC and MEP professionals in the state on the efficient design of structures incorporating mass timber, the importance of integrated project delivery (IPD) on project timelines and costs to increase near-term workforce readiness.
    - Maine's municipal code and fire enforcement officials to increase understanding and familiarity with the application of updated codes in the state to streamline mass timber installations while ensuring public safety.
5. Establish and staff a state mass timber advocacy group. This group should be solely focused on the development, implementation, and execution of the four prior recommendations to effectively administer and coordinate the programmatic activities and strategic development under a unified and

responsive framework which operates under cooperative MOUs across the various stakeholders. Keeping abreast of market dynamics, global manufacturers, advancements in processing technologies, and in-service best practices, this group should be used to both aggregate and disseminate the most current and relevant information across the stakeholder landscape to serve as the forward-facing agents for mass timber in the state. UMaine previously operated the Maine Mass Timber Commercialization Center (MMTCC) which served in a similar role for the state until federal grant funding ceased in 2021.

Appendix A: Identified National Mass Timber Training Organizations

American Wood Council

The American Wood Council (AWC) is a trade association that represents North American wood products manufacturers. AWC provides a variety of mass timber wood framing resource guides and trainings for design, construction, code compliance, and performance standards to building professionals. AWC trainings are available as continuing education credits for members of the ICC, AIA, and NCSEA. More information on AWC's guides and training opportunities are found through their website https://learn.awc.org/.

Carbon Leadership Forum

The Carbon Leadership Forum (CLF) is a non-profit organization hosted at the University of Washington's College of Built Environments. CLF is focused on accelerating the reduction of embodied carbon in buildings and infrastructure through research programs, promotion of building life cycle assessments, and educational outreach to a variety of stakeholders (policy makers, building professionals and researchers). CLF provides a variety of toolkits and resources relating to embodied carbon measurement practices, material guides, life cycle assessments and policy education. More information on CLF's guides and toolkits are found through their website https://carbonleadershipforum.org/.

International Code Council

The International Code Council (ICC) is the largest international association of building safety professionals. ICC's mission is "To provide the information, tools, and resources that members rely on, building safety professionals turn to, and the public trusts." ICC provides codes, standards, and solutions through the 1994 merger of three separate sets of model codes throughout the U.S.: Building Officials and Code Administrators International, Inc. (BOCA), International Conference of Building Officials (ICBO) and Southern Building Code Congress International, Inc. (SBCCI). Part of ICC's activities is supporting code official professional development and providing

training opportunities. Specifically, the ICC Special Inspector certification program offers a Tall Mass Timber Buildings certification to support building officials in understanding and evaluating mass timber code practices to increase efficiency in the code evaluation process. More information on the ICC Special Inspector certification program is found through their website https://www.iccsafe.org/professional-development/certifications-and-testing/special-inspector-exams/.

The Wood Institute

The Wood Institute is a national compilation providing training and education resources related to both mass timber and light framing construction to building professionals. The Wood Institute combines training opportunities available from the American Wood Council, Think Wood, WoodWorks, and the Carbon Leadership Forum into one searchable location. More information on the individual training opportunities at The Wood Institute are found through their website https://www.woodinstitute.org/local/catalogue/index.php.

Think Wood

Think Wood is a national-level communications campaign to provide commercial, multi-family and single-family home design and build resources to architects, developers and contractors. Think Wood offers a series of continuing education AIA and GCBI courses regarding mass timber. More information on the individual training opportunities with Think Wood are found through their website https://www.thinkwood.com/continuing-education.

WoodWorks

WoodWorks is a non-profit organization directly assisting developers, designers, and construction professionals, providing free project support for commercial and multi-family wood buildings. Additionally, WoodWorks provides several guides and training presentations supporting building professionals in wood and mass timber project design, development, and implementation. More information on WoodWork's guides and training opportunities are found through their website https://www.woodworks.org/.