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VIRTUAL/TELECONFERENCE
MASS TIMBER TASK FORCE
Virtual, 4822 Madison Yards Way, Madison
Contact: Brad Wojciechowski (608) 266-2112
December 9, 2025

The following agenda describes the issues that the Task Force plans to consider at the meeting. At the time of the meeting, items may be removed from the agenda. Please consult the meeting minutes for a record of the actions of the Task Force.

AGENDA

9:00 A.M.

OPEN SESSION – CALL TO ORDER – ROLL CALL

A. Adoption of Agenda (1)

B. Approval of Minutes of September 9, 2025 (2)

C. Introductions, Announcements and Recognition

D. Reminders: Scheduling Concerns

E. Administrative Matters
1. Department, Staff and Task Force Updates

F. Administrative Rules Matters – Discussion and Consideration

G. Alternative Procedures for Design of Mass Timber Tall Buildings – Discussion and Consideration (3-21)
1. Developing Content for Alternative Procedures for Mass Timber Guidebook
2. Relating Mass Timber to Other Alternative Building Procedures

H. Public Comments

ADJOURNMENT

NEXT MEETING: TBD

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MEETINGS AND HEARINGS ARE OPEN TO THE PUBLIC, AND MAY BE CANCELLED WITHOUT NOTICE.

Times listed for meeting items are approximate and depend on the length of discussion and voting. All meetings are held virtually unless otherwise indicated. In-person meetings are typically conducted at 4822 Madison Yards Way, Madison, Wisconsin, unless an alternative location is listed on the meeting notice. In order to confirm a meeting or to request a complete copy of the board's agenda, please visit the Department website at https:\\dsps.wi.gov. The board may also consider materials or items filed after the transmission of this notice. Times listed for the commencement of any agenda item may be changed by the board for the convenience of the parties. The person credentialed by the board has the right to demand that the meeting at which final action may be taken against the credential be held in open session. Requests for interpreters for the hard of hearing, or other accommodations, are considered upon request by contacting the Affirmative Action Officer or reach the Meeting Staff by calling 608-267-7213.

VIRTUAL/TELECONFERENCE
MASS TIMBER TASK FORCE
MEETING MINUTES
SEPTEMBER 9, 2025

PRESENT: Justin Gavin, Laura Hasburgh, Jordan Komp, Marco Lo Ricco *(arrived at 9:10 a.m.)*, Richard Paur, Erich Roden,

ABSENT: Jason Korb, Michael Mazmanian, Alexander Timmer

STAFF: Brad Wojciechowski, Executive Director; Joseph Ricker, Legal Counsel; Ashley Sarnosky, Board Services Supervisor; and other Department Staff

CALL TO ORDER

Richard Paur, Chairperson, called the meeting to order at 9:04 a.m. A quorum was confirmed with five (5) members present.

ADOPTION OF AGENDA

MOTION: Laura Hasburgh moved, seconded by Jordan Komp, to adopt the Agenda as published. Motion carried unanimously.

APPROVAL OF MINUTES OF JUNE 10, 2025

MOTION: Erich Roden moved, seconded by Laura Hasburgh, to approve the Minutes of June 10, 2025 as published. Motion carried unanimously.

Marko Lo Ricco arrived at 9:10 a.m.

Jordan Komp was excused at 10:01 a.m.

ADJOURNMENT

MOTION: Laura Hasburgh moved, seconded by Erich Roden, to adjourn the meeting. Motion carried unanimously.

The meeting adjourned at 10:05 a.m.

An Alternate Procedure for the Design and Permitting of (Tall) Mass Timber Buildings

2025 Edition

A consensus document developed by the Wisconsin Mass Timber Task Force

Task Force Active Members:

Richard Paur, P.E., Chairperson

Justin Gavin - Wisconsin Department of Safety and Professional Services Representative

Laura E. Hasburgh, PhD, P.E. – Materials Research Engineer, USDA, US Forest Service, Forest Products Laboratory

Jordan T. Komp, P.E., S.E. – Thornton Tomasetti

Jason P. Korb, AIA, NCARB – Korb Architecture

Marco T. Lo Ricco, PhD, P.E. — Research General Engineer, USDA, US Forest Service, Forest Products Laboratory

Michael C. Mazmanian, AIA, LEED AP – Deputy Commissioner – City of Milwaukee Department of Neighborhood Services

Erich J. Roden – Deputy Chief, Milwaukee Fire Department

Alexander R. Timmer – University of Wisconsin-Milwaukee

Table of Contents

About the Mass Timber Task Force

The Mass Timber Task Force was created under Wis. Stat. § 227.13 to advise the Department and the Commercial Building Code Council on matters relating to development of mass timber guidelines.

The agency utilized informal conferences and consultations to obtain the viewpoint and advice of interested persons and stakeholders with respect to contemplated rule making. The agency appointed a committee of experts, interested persons or representatives of the public to advise it with respect to any contemplated rule making. The committee shall have advisory powers only.

Chapter I — Intent, Scope, and Justification

1.01 Intent.

The intent of the guidebook is to provide a framework for design professionals to work with permitting officials to facilitate the approval of (tall) Mass Timber structures, utilizing a performance-based design approach. The alternative design methods and materials described in this guidebook must provide, at a minimum, an equivalent level of quality, strength, fire resistance, durability, and safety, as buildings of similar height, occupancy, and area; as they relate to the Wisconsin Commercial Building Code, with references to the International Building Code.

1.02 Scope.

The scope of this guidebook is to identify a methodology for the design, review, and approval of mass timber or composite mass timber buildings beyond the prescriptive provisions of IBC Type IV construction.

1.03 Justification.

The Wisconsin Commercial Building Code (CBC) and the International Building Code (IBC) have existing provisions for alternative building materials, as well as the use of a performance-based design approach, both in lieu of a standard prescriptive code approach.

(1) Alternate Building Materials. SPS 361.03 (6): "Nothing in chs. SPS 361 to 366 is intended to prohibit or discourage the design and utilization of new building products, systems, components, or alternate practices, provided written approval from the department is obtained first."

(a) SPS 361.50 (2): "Materials, equipment, and products that meet the intent of chs. SPS 361 to 366 and which are not approved under sub. (1) shall be permitted if approved in writing by the department.

(b) Approval of materials, equipment, and products shall be based on sufficient data, tests, and other evidence that prove the material, equipment, or product meets the intent of the standards specified in chs. SPS 361 to 366.

(c) Tests, compilation of data, and calculations shall be conducted by a qualified independent third party."

(2) Performance Based Design. The utilization of alternative building materials and design methods are contingent on approvals from the Wisconsin Department of Safety and Professional Services (DSPS). This guidebook outlines practices that have been used prior to the establishment of the Task Force, focusing on their implementation with respect to (tall) Mass Timber structures.

(a) IBC 2021 – Appendix O. "Provides an optional design, review and approval framework for use by the building official. Typical uses would include cases of alternate methods in Chapter 1, select areas of the code that require a rational analysis such as Section 909 and elsewhere. It simply extracts the relevant administrative provisions from the ICC Performance Code into a more concise, usable appendix format for a jurisdiction confronted with such a need. Currently there are multiple varying jurisdictional rules and procedures in many communities regarding procedure and none in even more. The building official is often left alone to reach decisions not just on the merits of a

design but must first also decide on the submittal and review process. As an appendix, the provisions herein are entirely optional to a jurisdiction. This appendix can be adopted, adopted with local modifications, or even used on a case-by-case basis as part of a Memorandum of Understanding or similar legal agreement between the jurisdiction and the owner/design team. It simply represents another tool for the jurisdiction to reach for in cases of need; it neither encourages nor creates any additional opportunity for performance-based design."

(b) This guide would recommend the mass timber design align with the performance objectives utilized by the International Code Council Ad Hoc Committee on Tall Wood Buildings (TWB) in providing guidance on the development of future code change proposals, primarily:

1. No collapse under reasonable scenarios of complete burnout of fuel without automatic sprinkler protection being considered.
2. No unusually high radiation exposure from the subject building to adjoining properties to present a risk of ignition under reasonably severe fire scenarios.
3. No unusual response from typical radiation exposure from adjacent properties to present a risk of ignition of the subject building under reasonably severe fire scenarios.
4. No unusual fire department access issues
5. Egress systems are designed to protect building occupants during the design escape time, plus a factor of safety.
6. Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios; the degree of reliability should be proportional to evacuation time (building height) and risk of collapse.

Chapter II — Petition for Variance and Permitting Process.

For projects utilizing the alternate design methods and materials outlined in this guide, the following permitting and variance process is recommended.

2.01 Preliminary Meeting.

(1) A preliminary meeting, likely occurring in the Concept or Schematic Design phase of the project, to introduce the project to the Authority Having Jurisdiction (AHJ) or Authorized Representative, including the following items:

(a) Project location
(b) Project Parameters (height, number of stories, material exposure, etc.)
(c) Project timeline
(d) Unique or critical project details
(e) Design team proposed variance path (e.g. An Alternate Procedure for the Design and Permitting of (Tall) Mass Timber Buildings)
(f) Preliminary Authority Having Jurisdiction or Fire Department Questions
(g) Scheduling of next steps

(2) It is recommended the following parties are in attendance

(a) Authority Having Jurisdiction
(b) Fire department representatives
(c) Ownership
(d) Architect on Record "AOR"
(e) Engineer on Record "EOR"
(f) Fire engineer (if on-boarded)
(g) Contractor (if on-boarded)
(h) Peer reviewer (if on-onboarded)

2.02 Process Approval.

(1) Based on the introductory meeting, and initial feedback from the AHJ/Fire Department, the design team should formally propose a Variance/Permitting Approval Process (e.g. the Alternate Materials provision, the use of this guide…), including what, if any, supplemental testing, reports, or documentation will be provided in the formal variance. [Include official plan review].

(2) After reviewing the proposal, the AHJ should formally approve or reject the variance process, including any required modifications or supplement documentation to the design team proposal.

2.03 Petition for Variance.

(1) Based on the previously accepted variance process, the design team/ownership should formally issue a "Petition for Variance" (or potentially multiple variances depending on the project).

(2) The petition should include the following:

(a) The code section(s) being petitioned
(b) The variance request

(c) The intent of the code section(s) being petitioned
Petitioners' comments including what supplemental documentation (e.g. letters, reports, test results, peer reviews, fire engineering) will be provided with the future issuance of the permit documents.

(3) If deemed acceptable, the AHJ should provide, "Conditional Approval" of the petition for variance, noting any specific conditions of approval (e.g. the petitioner carrying out all items noted in the original petition).

(4) If deemed unacceptable, the AHJ should clarify why the petitions were rejected, or note what modifications would be required for approval.

2.04 Issuance of Permit Documents.

(1) It is recommended the following permit documents (at a minimum) should be issued to the AHJ, as well as the previously approved Third Party Peer Reviewer, if applicable (refer to section 3.04 for additional information regarding the peer review process).

(2) Design Narrative
(a) Justification to the AHJ and Independent Third-Party Peer Reviewer for use of proposed Mass Timber design/construction. Including code references, recommended design methodology, and associated code design factors and equations.
1. If the team is proposing the use of Mass Timber elements or hardware sourced outside the United States, it is recommended the design team provide supplement documentation demonstrating design equivalency between Eurocode (or other foreign code) serviceability and strength parameters, with those documented in the applicable United States design standards (e.g. NDS and ANSI). The design team shall justify to the AHJ and Peer Reviewer, the use of the design recommendations, factors, and equations provided by these codes, in accordance with American Standards.
(b) Description of each mass timber component (structural and non-structural), delineating primary and secondary framing members.

(3) Construction Documents (e.g. drawings and specifications for all disciplines and trades)
(a) Structural: Typical mass timber framing schedules, material properties, and assumed loading (e.g. loading diagrams)
(b) Architectural and Life Safety Plans and Sections
(c) Mechanical, Electrical, Plumbing and Fire Protection (MEPFP)
(d) Other: Lighting, Energy Compliance, Elevator

(4) Structural Calculations
(a) Standard strength and serviceability calculations, both for Mass Timber and non-Mass Timber elements. These calculations should consider both standard design scenarios (load combinations) as well as the fire safety scenario(s), in the event the members are relying on encapsulation or charring of the structure to meet a prescribed endurance rating.

(b) Should the team consider sourcing material (timber/hardware) outside of the United States, it is recommended the team provide an additional equivalent Eurocode design for the controlling members/designs. The peer reviewer (where applicable) should review and comment on the conversion factors from codes outside the United States to NDS parameters/values.

(5) Additional Documentation

(a) Additional information required to supplement standard code previsions, design drawings, and structural calculations, which could include material or member certifications, such as:

1. Glulam fire test reports (e.g. char rates beyond 2 hours)
2. CLT compliance with PRG-320 (2018 or beyond) to avoid heat delamination
3. CLT un-restrained load-bearing floor/ceiling assembly fire test results, in compliance with ASTM E119-16a Standard Test Methods for Fire Tests of Building Construction and Materials
4. Connection load-bearing fire-test(s) in compliance with ASTM E119-16a, or supplemental fire engineering per IBC 2021, Section 2304.10.1
5. Proprietary component testing/ICC reports/documentation/calculations

(6) Documentation for provisions and standards associated with materials (timber/hardware) sourced outside of the United States (or not in accordance with typical US testing/standard).

Chapter III — <u>Analysis, Design, and Detailing</u>

(1) For Type IV construction, beyond the prescriptive requirements of the adopted building code, an alternate, performance-based, pathway is available for design and permitting.

(2) The goal of this chapter is to provide guidance on design parameters and third-party peer reviews to meet project performance objectives. These performance objectives should be approved among various project stakeholders, which may include ownership, insurers, the design team, AHJ, tenants, and community first responders. The level of performance (survivability, repairability, or continued operations despite extraordinary events) should be determined at the project onset so that appropriate structural design load combinations, fire performance and life safety goals, serviceability criteria, structural stability or integrity checks, and other considerations may be applied accordingly to fulfill objectives.

3.01 Structural Design Considerations.

(1) The structural design should follow, at a minimum, the prescriptive requirements of the National Design Specification referenced by the current version of the Wisconsin Commercial Building Code. Generally, code minimum requirements are established to prevent damage under routine service conditions and ensure that building occupants may evacuate buildings safely when an extraordinary event occurs. Higher performance-based design objectives, however, may be established at the discretion of project stakeholders

(e.g. owners, insurers, tenants, and first responders) to minimize damage to the structure, architectural and/or mechanical systems, and building contents.

(2) Load Combinations
(a) should cite a model building code or other rational means of risk assessment to determine load combination factors and the effects of individual hazards (wind, seismic, flood, etc.) that result in applied loading conditions.

(3) Basic, Code-required Load Combinations (e.g. ASCE/SEI 7)
(a) for strength design or allowable stress design should be addressed, at a minimum. If supplemental or enhanced requirements are being considered (similar to the performance-based design approaches developed for seismic design), those methods of load determination, applied load combination factors, and risk assessment should be indicated in the calculations.

(4) Load Combinations for Extraordinary Events
(a) are defined in the most recent edition of ASCE/SEI 7 to address low-probability events such as fires, explosions, and vehicular impacts that may cause disproportionate structural collapse by damaging columns. Among these extraordinary events, fire damage is generally applicable to performance-based design of mass timber structures that seek an alternative solution to the encapsulation requirements prescribed by building codes. Load combinations should consider the:
1. Capacity of a structure or critical structural element to withstand the effects of a fire and simultaneous gravity loads,
2. Residual capacity of damaged structures or critical structural elements affected by fire, and,
3. Stability requirements of the structure as a whole or critical elements, including the influence of second-order effects.
(b) whether to use ASCE 7, Fire Design Specification, or other rationally derived load combination equations to determine the demands of mass timber structures subjected to fire is at the discretion of the design team, AHJ, and peer reviewers. The selected load combinations should be matched to either allowable stress design (ASD) or strength design (LRFD) methods. For further guidelines to assess the capacities of fire-damaged structures or structural elements, see Section 3.3 Fire Protection Considerations.

3.02 Structural Systems and Components.

(1) The design (and documentation) should clearly define the structural load path and system, including defining primary, secondary, and main lateral force resisting members (including the role, or multiple roles, each individual member may serve). In comparison to systems made from other structural materials, building codes and design standards contain relatively few prequalified mass timber lateral systems. Additionally, innovative structural systems such as hybrid and composite mass timber are being developed; emphasizing the need for an alternate (performance-based) design approach (beyond the limited prequalified systems currently referenced in building codes).

(2) Hydrogen embrittlement of mass timber screws should also be taken into consideration by the design, construction, and manufacturing teams. The phenomenon of hydrogen

embrittlement, associated with the infiltration of hydrogen atoms in metal elements (in this case screws), can result in the metal screws becoming brittle and making them more prone to unexpected cracking, failure under load, or resulting in additional axial stress within the mass timber elements. To mitigate these risks, the task force identifies the current minimum recommendations that are provided in the reference materials at the end of the guidebook.

3.03 Structural Design References.

(1) Despite the rapid development of design standards for mass timber construction, such as the most recent editions of the NDS and Special Design Provisions for Wind and Seismic (SDPWS), design teams will likely need to reference updated editions of these design standards and state-of-the-art research to keep pace with industry developments and best practices. Refer to bibliography for recommended references/design guides associated with many of the topics discussed above.

3.04 Serviceability and Non-Structural Design.

(1) Serviceability considerations, including lateral drifts, floor deflections, vertical compensation (e.g. creep and shrinkage, differential shortening between elements/materials) and floor vibrations may often control, or at least provide significant guidance towards, the overall design of a structure (beyond standard strength designs/calculations). Additionally, due to the lightweight nature of mass timber construction, there are frequently additional non-structural design principals (e.g. acoustic design, sound mitigation, and thermal/energy performance) that need to be considered during design.

Note: The reader is once again encouraged to review bibliography for additional references associated with the topics above.

3.05 Additional Technical Reviews.

(1) For tall mass timber structures, requiring consideration beyond the prescriptive requirements of the reference building code (i.e. performance based design or alternate design methodology), it is recommended that the AHJ, ownership, and design team consider the need for, or incorporation of the following:

(a) Fire Engineering Consultant

1. If the AHJ determines a fire engineering consultant is required, it is recommended the consultant be selected by the ownership/design team and then approved by the AHJ. This selection should be made based on previous mass timber experience and the consultant's ability to provide an independent, objective, and technical review. This scope may include (among other things) review of:
    a. Exposed mass timber framing and connections
    b. Concealed mass timber framing and connections
    c. Use of sealant and detailing at abutting timber elements
    d. Concealed spaces and associated detailing
    e. Gypsum detailing
    f. Smoke evacuation plans
    g. Manufacturer or Foreign test data for compliance with relevant standards

(a) Mass Timber Peer Review Panel (MTPRP)

1. If the AHJ determines a MTPRP is appropriate, it is recommended the MTPRP, consultants, firm be selected by the ownership or design team and then approved by the AHJ. The MTPRP selection should consider previous mass timber experience and the panel's ability to provide an independent, objective, technical review to advise the AHJ as to whether the design generally conforms to the requirements set forth by the building official (potentially including the recommendations in this document). This scope may include (among other things): [Reference list below once]
   a. Exposed mass timber framing and connections,
   b. Concealed mass timber framing and connections,
   c. Use of sealant and detailing at abutting timber elements,
   d. Concealed spaces and associated detailing,
   e. Smoke evacuation plans,
   f. Manufacturer or foreign test data for compliance with relevant standards.

Chapter IV — Fire Protection Considerations.

(1) Fire protection measures including both passive (i.e., fire resistance and flame spread rating) and active (i.e., automatic fire sprinkler and smoke detection systems) features are designed to meet the goals of life safety for occupants, safe access for firefighters, and protection of property. The goals are often unique for each project and will be based on the stakeholders' needs and desires. When utilizing performance-based designs, the fire protection measures outlined by the prescriptive code(s) may be modified while still achieving the specific fire and life safety goals of the prescriptive code(s).

4.01 Structural Fire-resistance Requirements.

(1) The design team should provide clear documentation noting what structural elements are considered exposed, concealed and/or partially concealed, and the associated fire resistance rating required for each element. Structural details provided to the AHJ should identify the required minimum fire resistance rating of each element per current prescriptive requirements, including percentage of exposed elements, and clearly outline the methods used to meet or exceed the minimum prescriptive fire resistance requirements, particularly where members rely on charring of the wood structural members to achieve the fire resistance rating.

(2) For elements where the fire protection is provided by a combination of a non-combustible material and a wood charring layer, the contribution of each towards the overall fire resistance rating should be documented; with the contribution of the non-combustible materials (where applicable) providing a minimum of 2/3 of the overall required fire resistance rating.

(3) When supplement testing is desired (potentially as part of the project's variance process), the testing procedure should be confirmed as acceptable with the stakeholders, and results should be reviewed for approval by Project AOR, EOR, Fire Engineer, and AHJ.

4.02 Minimum Fire-Resistance Rating (FRR) Recommendations.

Element	Minimum Fire-Resistance Rating
Primary Structural Frame:	
Buildings up to 180'-0" or 12 stories	2 hours[1]
Buildings taller than 180'-0" or 12 stories	3 hours[1,2]
Bearing Walls	Refer to primary structural frame[3, 4]
Non-Bearing Walls and Partitions	0 hours
Floor Construction and Associated Secondary Structural Members	2 hours
Roof Construction and Associated Secondary Structural Members:	
Buildings up to 180'-0" or 12 stories	1 hour
Buildings taller than 180'-0" or 12 stories	1.5 hours
Structural Connections	FRR to match, at a minimum, the lower of the connection member(s) FRR

[1.] Roof support rating is permitted to be reduced by one hour where supporting a roof only (not including additional occupancies/loading)
[2.] For buildings not greater than 420 feet in building height, the fire-resistance rating of floor framing elements (e.g. CLT slabs and glulam beams) shall be permitted to be reduced to 2 hours.
[3.] No reduction for roof framing is permitted
[4.] Minimum fire-rating for exterior walls to be based on fire separation distance

4.03 Mass Timber Fire Resistance Rating Validation

(1) There are two main paths to establishing fire resistance ratings for the primary and secondary structure: calculation method and fire performance testing.

(a) Calculation Method

Methods outlined in either the National Design Specification (NDS) or the Fire Design Specification (FDS) may be used to calculate the fire resistance rating of mass timber members. For designs outside the scope of approved FDS, additional verification and approval by the AHJ of the char rates and fire resistance times assigned to any structural members will be needed. The design team may utilize new or existing char rate/depth data or previously established performance-based design methods, where applicable and approved by the AHJ, as the basis for designing structural sections with adequate residual capacity to resist fire.

Note: The USDA Forest Products Laboratory has 3-hour char depth data for Douglas Fir, American Spruce, or European Spruce.

(b) Fire Performance Testing

When the approved specifications or calculation method as outlined above is not applied, new fire performance tests may be required to determine fire resistance rating. The test method should be worked on by necessary stakeholders (AHJ, fire protection engineer, etc.).

4.04 Connection Details.

(1) Mass timber connections may either be previously tested and listed for intended use and fire resistance rating. This guidebook recommends achieving the desired fire resistance rating by utilizing noncombustible protection or verifying via testing under a fire event.

Connections utilizing intumescent paint for noncombustible protection should be tested (under a fire event) to confirm compatibility between materials.

(2) At the AHJ's discretion, the use of engineering analysis may be provided to validate the fire resistance rating of connections per current building code provisions.

(3) Connection test specimens should be representative of construction tolerance limits, dimensional changes, wood cover, encapsulation, and fire sealant installations.

(5) Testing results shall be provided to the AHJ for review and should meet the recommendations of 4.03 of the guidebook.

4.05 Noncombustible Protection.

(1) Gypsum detailing requirements to follow IBC 2021 section 722.7.

(2) Sealants: Sealing of adjacent mass timber elements per 703.7. Sealants shall meet the requirements of ASTM C920. Adhesives shall meet the requirements of ASTM D3498.

(3) Fire Blocking: Materials to meet the requirements of IBC 703.7

(4) Alternative noncombustible protection may be used if tested and approved by the AHJ

4.06 Additional Passive Fire Protection Considerations.

(1) Primary and Secondary Structure.

(a) The floor assembly should contain a noncombustible material no less than 1" in thickness, or a proven sufficient thickness, above the mass timber floor. No additional limits are directly required of the primary and secondary structural exposure, contingent on meeting the fire-resistance ratings specified in Section 4.03.

(2) Concealed Spaces.

(a) It is the Task Force's opinion that mass timber should not be permitted in concealed spacings with the following exceptions: (1) non-combustible protection is provided within the interior (mass timber) space or (2) significant project specific testing/data is obtained and approved by the AOR/EOR, AHJ, and independent third-party peer reviewer.

(3) Exterior Walls (Façade).

(a) The Task Force would note the following recommendations, consistent with the 2021 IBC.

1. "Exterior side of exterior walls protected by a non-combustible material—e.g., 5/8" Type X gypsum sheathing"

2. “No combustible exterior wall coverings except for certain water-resistant barriers”
3. “No exposed mass timber on the inside and outside surfaces of exit enclosures and elevator hoistways in high-rise buildings (occupied floor > 75 feet from lowest fire department access)”
4. “Noncombustible construction only for exit enclosures and elevator hoistways greater than 12 stories or 180 feet”

4.07 Prevention of Ignition and Control of Fire Development or Spread.

(1) The risk of accidental fire must be reduced. Additionally, should a fire occur, severity, duration, and spread must be controlled. The risk of ignition is accomplished by ensuring potential ignition sources are away from combustible materials and by selecting equipment with fire-safe features and design.

(2) In the case of ignition, the rate of fire development and subsequent heat and smoke production must be controlled. For mass timber structures, this can be achieved by compartment geometry to reduce radiant feedback, proper selection of construction materials including interior finishes and exterior walls designs, ventilation control including pressurization and smoke extraction systems, compartmentalization with fire walls and smoke barriers, and adequately designed suppression systems.

4.08 Fire Detection and Notification.

(1) A fire detection system that provides early detection must be installed throughout any mass timber structure. The system shall notify occupants, emergency personnel, and activate any active fire protection systems such as a smoke extraction system, door releases, or a suppression system. The system operation must be well documented and agreed upon by the location fire department.

4.09 Fire Suppression.

(1) Automatic fire suppression systems are required for all mass timber structures and properly designed in accordance with NFPA 13 for each hazard identified within the structure. When approaching design considerations outside of the prescriptive requirements, additional redundancies within the fire suppression system (sprinkler system and standpipe system) shall be considered.

(2) Water Supply:
(a) Dual water supply for buildings 120 feet and above, in accordance with 2021 IBC 403.3.2
(b) Water supply in accordance with 2021 IFC 3313 and 2021 IBC 3313

Chapter V — Construction and Post-Occupancy.

(1) Mass Timber construction to follow the general requirements of Type IV Construction, IBC 602.4 Type IV in accordance with Table 601, unless otherwise noted in this guide.

5.01 Construction.

(1) It is recommended that prior to construction the ownership, design, and construction teams meet with the AHJ to schedule a project kick-off meeting. At this time, the various stakeholders can discuss and agree to timelines/frequencies for regular meetings, site inspections, and general construction administration, including procedures for deviations/field modifications and any supplemental temporary construction requirements (e,g, standpipes, dual water supplies, non-combustible protection, connection details). It is also recommended that the stakeholders discuss and consider the need for Mass Timber Specials Inspections.

(2) Supplemental references for Mass Timber Construction and Special inspections (including among others the IFC, IBC, and Mass Timber Guidebook) are provided at the end of this document for additional information.

(3) The design and construction teams should establish a humidity protection plan for the timber structure. This plan should include considerations for avoiding rain water accumulation (e.g., assigning personnel to remove cumulated water after the rain, even during the weekends) and how the water will be slowly heated after the façade installation to prevent checks on the timber elements.

5.02 Post Occupancy.

(1) If the AHJ determines supplemental post-occupancy requirements are necessary as part of the variance process (beyond those typically documented in the IBC or IFC, e.g. ensuring passive protection remains in place), it is recommended these items are specifically documented and agreed to as part of the variance process or documentation. Supplemental references, which include information regarding post occupancy conditions (e.g. repair of damaged mass timber) are provided at the end of this document.

(a) The owner shall ensure that required passive protection remains in place over the life of the building, section 701.6 of the IFC.

Bibliography

Structures

Referenced Standards

AITC 119-96: Standard Specifications for Structural Glued Laminated Timber of Hardwood Species. Englewood, CO: American Institute for Timber Construction (AITC), 1996.

ASCE/SEI 7-22: Minimum Design Loads and Associated Criteria for Buildings and Other Structures. Reston, VA: American Society of Civil Engineers (ASCE), Structural Engineering Institute (SEI), 2022.

ANSI/APA A190.1-2022: Product Standard for Structural Glued Laminated Timber. Tacoma, WA: APA – The Engineered Wood Association, 2022.

ANSI/APA PRG 320-2018: Standard for Performance-Rated Cross-Laminated Timber. Tacoma, WA: APA – The Engineered Wood Association, 2018.

Fire Design Specification (FDS) for Wood Construction. 2024 edition. Leesburg, VA: American Wood Council, 2023.

International Building Code. 2024 edition. Country Club Hills, IL: International Code Council, 2023.

National Design Specification for Wood Construction. 2024 edition. Leesburg, VA: American Wood Council, 2024.

Special Design Provisions for Wind and Seismic with Commentary. 2021 edition. Leesburg, VA: American Wood Council, 2021.

Hydrogen embrittlement fastener reference standards and considerations

1. Compliance with ISO 2702 (or equivalent) for all screws.
2. Additionally, for screws used in steel to timber connections or in exterior conditions
3. Core hardness ≤ 360 HV
4. Development of a fabrication quality assurance plan, in accordance with ASTM F606 Clause 7 or ISO 15330.
5. Electroplated fasteners manufactured per ASTM F1941 or ISO 4042, with a zinc coating thickness of at least 8 µm or chrome passivated zinc coating of 5µm
6. Strict compliance with manufacturer's installation instructions, including recommended tools, drive-in torque limits, and pre-drilling requirements
7. For dry service conditions, the timber moisture content (MC) averaging 15% or lower throughout the year, not exceeding 19% at any time
8. Storing fasteners (prior to installation) in a dry environment, preventing exposure to moisture and/or other corrosive elements
9. Approval of all fasteners by the Structural Engineer of Record (EOR) prior to installation

Performance-Based Design

2021 International Code Council Performance Code for Buildings and Facilities. Country Club Hills, IL: International Cod Council, 2020.

The SFPE Task Group on Performance-Based Design Review. *Code Official's Guide to Performance-Based Design Review*. Bethesda, MD: Society of Fire Protection Engineers (SFPE) and International Code Council (ICC), 2004.

The SFPE Guide to Performance-Based Fire Safety Design. Bethesda, MD: Society of Fire Protection Engineers (SFPE), 2015.

Mass Timber Design Guides

American Institute of Timber Construction (AITC), Timber Construction Manual, 6th edition. Hoboken, NJ: John Willey & Sons, Inc., 2012.

Barber, David, Denis Blount, John J. Hand, Michelle Roelofs, Lauren Wingo, Jordan Woodson, and Frances Yang. *Design Guide 37: Hybrid Steel Frames with Wood Floors*. American Institute of Steel Construction, 2022.

***CLT Handbook: cross-laminated timber*. U.S. edition. Edited by Erol Karacabeyli and Brad Douglas. Madison, WI: USDA, Forest Service, Forest Products Laboratory and Binational Softwood Lumber Council, 2013.**

Woodworks Wood Products Council, *CLT Diaphragm Design Guide*. Washington DC: Woodworks Wood Products Council, 2023.

Woodworks Wood Products Council, *CLT Exterior Wall Assemblies Meet NFPA 285 Fire Test Standard: Test Summary*. Washington DC: Woodworks Wood Products Council, 2023.

Woodworks Wood Products Council, *Index of Mass Timber Connections*. Washington DC: Woodworks Wood Products Council, 2024.

Woodworks Wood Products Council, *Mass Timber Design Manual, volume 2*. Washington DC: Woodworks Wood Products Council, 2022.

Woodworks Wood Products Council, *Inventory of Acoustically-Tested Mass Timber Assemblies*. Washington DC: Woodworks Wood Products Council, 2024.

Woodworks Wood Products Council, *Inventory of Fire Resistance-Tested Mass Timber Assemblies and Penetrations*. Washington DC: Woodworks Wood Products Council, 2022.

Woodworks Wood Products Council, *U.S. Mass Timber Construction Manual, 1st edition*. Washington DC: Woodworks Wood Products Council, 2021.

Woodworks Wood Products Council, *U.S. Mass Timber Floor Vibration Design Guide*. Washington DC: Woodworks Wood Products Council, 2023.

Shephard, Annabel B., Erica C. Fischer, Andre R. Barbosa, and Arijit Sinha. "Fundamental Behavior of Timber Concrete-Composite Floors in Fire." Journal of Structural Engineering 147, no. 2 (2021): 04020340.

Liu, Julie, Erica C. Fischer, Andre R. Barbosa, and Arijit Sinha. "Experimental Testing and Numerical Simulation of Timber-Concrete Composite Floors in Fire." *Journal of Structural Engineering* 149, no. 11 (2023): 04023151.

Note

The references provided are intended for guidance and as a basis for citing information substantiating performance-based design of tall wood buildings. This reference list should not be interpreted as a comprehensive list nor a list of mandatory standards. Many of the national standards listed above have not been officially adopted by the State of Wisconsin. The design team, however, is encouraged to cite sources of information to facilitate review by the peer reviewer and AHJ.