Developed by WoodWorks
in collaboration with
Alex Legé, PE, SE
PCS Structural Solutions

Construction Quality Assurance on Mass Timber Projects: Inspection and Observation

Considerations for project teams developing inspection and observation plans

Quality assurance for mass timber projects involves many considerations, which can create a learning curve for teams new to these materials. For example, in addition to code-required inspections that apply to almost any project, mass timber projects benefit from other types of inspections—but it can be challenging to find information on what they entail. While inspection standards and methods have long been codified for other structural materials (including other types of wood construction), mass timber is relatively new to the United States. And although mass timber projects are subject to many of the existing inspection requirements, the 2021 International Building Code (IBC) was the first version to include requirements specific to these materials.

The Beam on Farmer / RSP Architects / PK Associates

This paper explores inspection considerations for mass timber projects, including special inspections and structural observations, and how to effectively communicate the requirements and review the results. It is intended to provide a basis for conversation that helps teams comply with the building code and develop Construction Documents (CDs) specific to the project by finetuning their approaches to construction quality assurance.

This publication references the 2024 IBC, but most references are identical in the 2021 code.

Inspections Performed by the Building Official

The building official, or Authority Having Jurisdiction (AHJ), performs a set of inspections focused on the administration and enforcement of the building code. These are not the same as special inspections and undertaking one type does not preclude the other. Provisions for building official inspections are included in IBC Section 110 and apply to most projects, regardless of structural material. Section 110.1 notes:

> *Construction or work for which a permit is required shall be subject to inspection by the building official and such construction or work shall remain visible and able to be accessed for inspection purposes until approved.*

This section also notes the importance of leaving the work in a condition that allows easy inspection until approved:

> *It shall be the duty of the owner or the owner's authorized agent to cause the work to remain visible and able to be accessed for inspection purposes. Neither the building official nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.*

Section 110.2 notes that the building official is authorized to inspect the site or existing building (in the case of a renovation or addition) before issuing the building permit. This allows them to inspect the existing conditions as deemed necessary.

It is up to the jurisdiction to determine who from their department (or approved inspection agency) will serve as the inspector(s). IBC Section 110 uses the term building official (vs. AHJ), which is defined in Section 202 as *"the officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative."*

IBC Sections 110.3.1 through 110.3.12 list the construction elements and areas to be inspected by the building official. They include:

- Footings and foundations
- Slabs and under-floor services
- Lowest floor elevation
- Framing members
- Chimneys, vents, rough electrical, plumbing, pipes, ductwork, and similar services that will eventually be concealed
- Wood cover for the purpose of providing a fire-resistance rating (FRR) for connections in Types IV-A, IV-B, and IV-C construction (the mass timber construction types introduced in the 2021 IBC)
- Gypsum board that is part of a fire resistance-rated and/or shear assembly
- Impervious moisture barrier systems that protect the framing of balconies and walking surfaces
  - In lieu of performing these inspections, the building official may request that they be included in the statement of special inspections (SSI) along with manufacturer instructions for installation and material use beyond those required in the IBC.
- Joints and penetrations in fire resistance-rated assemblies, smoke barriers, and smoke partitions
- Energy efficiency measures such as envelope insulation values and HVAC equipment efficiency (to verify compliance with the International Energy Conservation Code)
- Other inspections deemed necessary by the building official

The contractor is required to notify the building official when the various elements are ready for inspection. As noted, it is the responsibility of the contractor and owner to provide access to these areas and items, and any cost incurred to facilitate this access is not the responsibility of the building official.

When all work specified in the building permit is complete, the building official performs a final inspection and issues a certificate of occupancy if no violations are found.

Special Inspections

Special inspections focus mainly on structural items such as member framing, concrete strength, fasteners and fastener patterns, connections, welds, details, etc. The 2024 IBC provides requirements for inspections and related tasks in Section 1704, Structural Inspections and Tests, Contractor Responsibility:

> *Where application is made to the building official for construction as specified in Section 105, the owner or the owner's authorized agent, other than the contractor, shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work specified in Section 1705 and identify the approved agencies to the building official. These special inspections and tests are in addition to the inspections by the building official that are identified in Section 110.*

IBC Section 202 defines a special inspection as the *"Inspection of construction requiring the expertise of an approved special inspector in order to ensure compliance with this code and the approved construction documents."* These inspections are either periodic or continuous as defined in Section 202. Periodic inspections are performed when the inspector is intermittently present where the work is being done. They can occur at an agreed upon cadence, such as every Tuesday, or at specific stages of construction, such as when the framing is 10% complete, 30% complete, etc. Continuous inspections are when the inspector is present and visually observing the work throughout the entire time it is being done. Of the two types, periodic inspections are more common, with continuous inspections reserved for critical elements, highly-loaded members, and other unique conditions such as items that rely heavily on proper installation to achieve the design capacity (e.g., adhesive-set anchor rods).

Code commentary on the definition of special inspection provides further narrative on their purpose and timing:

> *This category of inspection is intended to apply to those material installations that require a special level of knowledge and attention. For example, special inspections are required for the installation of high strength bolts, welded connections, concrete reinforcement, prestressed concrete, fabrication of laminated wood structural elements and pile installations to comply with the contract documents and the standards under which they are assembled.*

See Appendix A for examples of special inspections on a mass timber project.

Photo WoodWorks

T3 Minneapolis / MGA | Michael Green Architecture / DLR Group / Magnusson Klemencic Associates / StructureCraft

Qualification of Special Inspectors

The IBC requires both the special inspector and special inspection agency to be approved by the building official. IBC Section 202 defines an approved agency as *"an established and recognized organization that is regularly engaged in conducting tests, furnishing inspection services or furnishing product evaluation or certification where such organization has been approved by the building official."*

IBC Section 1703.1 outlines the requirement for an approved agency to provide the necessary information to the building official for approval. Additionally, per IBC Section 1704.2.1, the agency is responsible for providing the qualifications of its special inspectors to the building official for review. Some jurisdictions maintain lists of qualified special inspectors and their certifications, and there are services available to confirm the validity of an inspector's qualifications. For example, the International Accreditation Service (IAS) provides document AC291, *Accreditation Criteria for Special Inspection Agencies*.

Specific to tall timber buildings, the International Code Council (ICC) offers the Tall Mass Timber Special Inspector Certification and the Washington Association of Building Officials (WABO) has a similar program. At this time, locating available special inspectors with certification specific to mass timber may be more challenging in some areas.

In addition to being qualified and approved, the special inspector must be independent from the contractor. Although coordination is needed between the contractor and inspector or observer, there needs to be a separation of responsibility between those performing the work and those reviewing the work. IBC Section 1703.1.1 notes that the inspector must *"be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall disclose to the building official and the registered design professional in responsible charge possible conflicts of interest so that objectivity can be confirmed."*

IBC Section 1704.2.3 requires CDs to include a statement of special inspections and an observation statement, and inspection requirements from the owner or design professional should also be included.

To avoid conflicts of interest between those performing the work (contractor) and reviewing the work for quality assurance (inspector or site observer), the inspection agency is required to be employed directly by the owner. However, in situations where the contractor is also the owner, they are permitted to directly hire the special inspector. Special inspections may be undertaken by the Structural Engineer of Record (SEOR) if they have the required training and there is no conflict of interest.

Structural Observations

Structural observations assess whether a project is in general conformance with the structural CDs and specifications. An example might be to check that installed glue-laminated timber (glulam) beams are in the locations noted in the CDs, are the required size and grade, and match the previously reviewed shop drawings.

IBC Section 202 defines a structural observation as *"the visual observation of the structural system by a registered design professional for general conformance to the approved construction documents."* These observations will often be part of the SEOR's construction administration scope. However, the owner, engineer, or architect may agree that a third-party licensed design professional will undertake them as a delegated task. It is important to note the distinction between special inspections and structural observations. Code commentary on the definition of a structural observation specifically notes that they cannot be substituted for special inspections—they are separate tasks performed by separate individuals and both are required.

Photo Hacker

District Office / Hacker / KPFF

IBC Section 1704.6 requires the registered design professional to perform structural observations under certain project circumstances, including:

- Risk Category III or IV structures
- High-rise structures
- Structures greater than two stories and assigned to Seismic Design Category E
- As required by the registered design professional or building official

Registered design professionals who seek to offer structural observation services, either on their own projects or on projects designed by other registered design professionals, should verify that their standard professional liability insurance policies cover those practices.

Communicating Special Inspection and Structural Observation Requirements

The statement of special inspections is the most common method of conveying inspection requirements from the design team to the building official, owner, and contractor. An SSI is required to apply for a building permit per IBC Section 107.1:

> *Submittal documents consisting of construction documents, statement of special inspections, geotechnical report and other data shall be submitted in two or more sets, or in a digital format where allowed by the building official, with each permit application.*

Note that IBC Section 1704.2.3 exempts light-frame wood and cold-formed steel projects designed in accordance with the provisions of Sections 2308 or 2206.1.2, respectively, from providing an SSI.

While the SSI is developed by the SEOR, other members of the design team may contribute to its requirements. IBC Section 1704.3 requires that *"the registered design professional in responsible charge shall prepare a statement of special inspections"* to be submitted with the building permit application. For structural elements such as framing members, connections, etc., the registered design professional is the SEOR. The SSI may also include non-structural items such as sprayed fire-resistant materials and smoke control systems, in which case the registered design professional may have been the project architect and/or fire protection engineer. These parties should work with the SEOR to compile one project-specific SSI that includes all structural and non-structural inspection requirements.

IBC Chapter 17 lists the code-required items that are subject to special inspections. They include:

- Material type (structural steel, concrete, masonry, wood)
- Lateral resistance (wind and seismic-resisting elements and systems)
- Fire performance (sprayed fire-resistant materials, intumescent coatings, smoke control, fire resistance of joints and penetrations)
- Other (soils, foundations, exterior insultation and finish systems, fabricators)

As noted, the IBC did not include special inspection requirements specific to mass timber until the 2021 edition. However, this should not be interpreted to mean that special inspections are not required under previous codes. A “special cases” provision in IBC Section 1705.1.1 could apply to mass timber at the discretion of the building official. Special inspections can help ensure that mass timber elements are properly installed for structural and/or fire-resistance purposes. As a result, many SEORs and Architects of Record (AORs) have developed their own set of special inspection requirements.

Some engineering firms, jurisdictions, and structural engineering associations provide templates for creating SSIs. However, they may not include mass timber-specific inspections. If this is the case, it is the responsibility of the SEOR to ensure that additional requirements are added. The SEOR should check with the jurisdiction to determine whether a certain template is required.

Scheduling Special Inspections

Special inspections typically require multiple site visits at different stages of construction. Some framing and connection inspections can occur once all the framing is erected, as long as those elements are visible. However, it can be useful (and might be required by the SEOR) to perform an initial framing inspection after a small portion of the work is complete. This can also be a good time to review materials, details, connections, and installation procedures—to catch issues needing correction before they’re repeated. It helps the SEOR, inspector, and contractor set expectations for the rest of the project and make adjustments if necessary.

Continuous inspections must be carefully coordinated so they don’t slow progress on site. This is especially relevant to mass timber since the materials are prefabricated and can be installed quickly, offering potential cost savings. The contractor should provide adequate advance notice so the inspector is available when needed, and is responsible for providing a safe and accessible site for the inspection. The site safety rules and procedures should be communicated to the inspector prior to their first visit, and many contractors begin the process with a mandatory safety meeting.

Photo WoodWorks

340+ Dixwell / GOA / ODEH Engineers – WSP

Communicating Findings

The timely communication of inspection findings to the contractor is important to the successful integration of inspections into the flow of a construction schedule. This is especially true when corrective action is necessary. For example, a special inspector performs a 25% framing completion inspection and finds that the connection detail being used to attach the mass timber floor panels to the beams does not match the CDs. The inspector should communicate this deficiency quickly so the contractor can avoid further inadequate connections. IBC Section 1704.2.4 states that *“discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work.”*

On some projects, the inspector and SEOR may have initial discussions to determine which types of deficiencies the inspector can direct the contractor to correct on site, and which should be discussed with the SEOR prior to corrective action. To clarify, there is a difference between noting areas of nonconformance with the contractor on a jobsite (i.e., what needs to be addressed) and providing specific instructions on how to correct those items to bring them to compliance (i.e., how to address them). While the simplistic answer might be “correct noted areas of deficiency by adding additional fasteners to meet the screw pattern noted in the CDs,” there are often nuances. It is the contractor’s responsibility to provide structural members and connections that conform to the CDs and specifications. If they propose alternatives, the new approach should be discussed with the SEOR prior to any work taking place.

Inspection Reports

An inspection report is required to communicate the findings from each inspection to all stakeholders. While IBC Section 1704.2.4 requires that the report be distributed to the building official and SEOR, it is typical to include the owner or owner's representative, architect, and contractor. The report should note items associated with the inspection and site, including but not limited to:

- Date and time of inspection
- Inspector
- Contractor's representative on site who received information regarding areas of nonconformance
- Active areas of work and those inspected during the visit
  - It can be helpful for the inspector to note inspected areas on a key plan drawing of the site or building.
- Areas of conformance and deficiencies
- Photos of areas inspected and deficiencies (with captions indicating the issues and locations)
- Stage of project completion and/or anticipated date of next inspection

After completing the special inspection visits and reports, the inspector will issue a final report noting the required corrective action.

Required Inspections for Timber Buildings

The 2021 and 2024 IBC require special inspections for projects classified as Type IV-A, IV-B, and IV-C construction (tall wood buildings up to 18, 12 and nine stories respectively). IBC Table 1705.5.3 requires special inspections as shown in Table 1, and IBC Section 110.3.5 requires connection fire protection inspection under certain circumstances.

IBC Section 1705.20 also requires periodic inspection of sealants or adhesives that are applied to mass timber elements per Section 703.7. This section requires that adhesives or sealants conform to ASTM D3498 (ASTM, 2019) or ASTM C920 (ASTM, 2024), respectively. It also applies to adhesives or sealants installed at abutting edges and intersections of mass timber building elements, or mass timber and other building elements, where the elements require a fire-resistance rating. This requirement does not apply unless the adhesives or sealants are part of the fire resistance-rated assembly.

TABLE 1: Required special inspections for Types IV-A, IV-B, and IV-C construction

Table 1705.5.3 Required Special Instructions of Mass Timber Construction				
Type			**Continuous Special Inspection**	**Periodic Special Inspection**
1.	Inspection of anchorage and connections of mass timber construction to timber deep foundation systems		—	X
2.	Inspect erection of mass timber construction		—	X
3.	Inspection of connections where installation methods are required to meet design loads			
	Threaded fasteners	Verify use of proper installation equipment	—	X
		Verify use of pre-drilled holes where required	—	X
		Inspect screws, including diameter, length, head type, spacing, installation angle and depth	—	X
	Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads		X	—
	Adhesive anchors not defined in preceding cell		—	X
	Bolted connections		—	X
	Concealed connections		—	X

Source: International Code Council

While IBC Section 1704.2.5 requires special inspection of fabricated items, glulam beams or cross-laminated timber (CLT) floor panels are not fabricated items. As noted in the definition of fabricated items in IBC Section 202:

> *Materials produced in accordance with standards referenced by this code, such as rolled structural steel shapes, steel reinforcing bars, masonry units and wood structural panels, or in accordance with a referenced standard that provides requirements for quality control done under the supervision of a third-party quality control agency, are not "fabricated items."*

Mass timber members fall into this category. For example, CLT is produced in accordance with ANSI/APA PRG 320 (ANSI/APA, 2019), Section 9 of which lists the requirements for quality assurance. Similarly, glulam is produced in accordance with ANSI A190.1 (ANSI, 2022), which lists requirements for quality control systems in Section 12. However, nail-laminated timber (NLT) and dowel-laminated timber (DLT) may require special inspection as fabricated items.

Other wood-related special inspection requirements that may be applicable to mass timber include:

- High wind resistance (Exposure Category B, C, or D), per IBC Section 1705.12.1:
  - Continuous inspection during field gluing operations of elements of the main wind force-resisting system (e.g., field gluing threaded rods in a timber braced-frame system)
  - Periodic special inspection for nailing, bolting, anchoring, and other fastening of elements of the main wind force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, and holdowns, except wood-sheathed shear walls and diaphragms where the fastener spacing at panel edges is more than 4 inches on center.
- High seismic resistance (Seismic Design Category C, D, E, or F), per IBC Section 1705.13.2:
  - Continuous special inspection during field gluing operations of elements of the seismic force-resisting system
  - Periodic special inspection for nailing, bolting, anchoring, and other fastening of elements of the main seismic force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and holdowns, except wood-sheathed shear walls and diaphragms where the fastener spacing at panel edges is more than 4 inches on center.

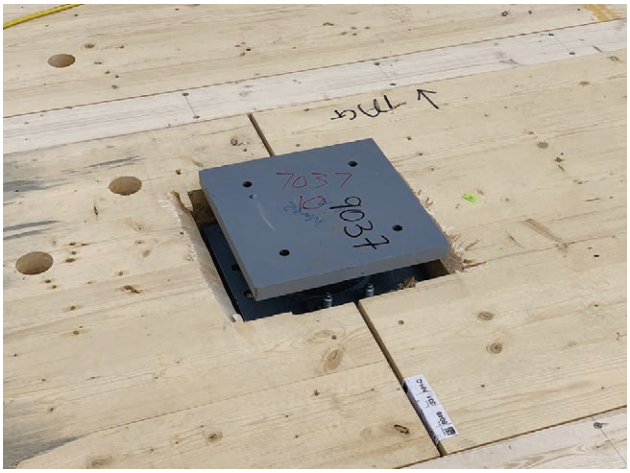

Photo WoodWorks

In this photo, the column connection and diaphragm splines would not have code-required special inspections. However, if additional fasteners were applied to the spline at spacings closer than 4 inches on center, special inspection would be required.

- Periodic special inspections of architectural components, including some non-load-bearing interior walls (Section 1705.13.5)
- Special inspection of access floor anchorage in Seismic Design Category D, E, or F structures (Section 1705.13.5.1)
- Special inspection of fire-resistant penetrations and joints in high-rise buildings, buildings with risk categories of III or IV, or fire areas containing Group R occupancies with an occupant load greater than 250 (Section 1705.18)

Additional inspections are discussed in the section, *Other Common Mass Timber Site Observations and Inspections*.

Preconstruction Meetings

Preconstruction meetings are a helpful tool for onboarding the entire team to the necessary quality control processes and expectations. Meetings should include representatives of the owner, general contractor, mass timber supplier, mass timber installer, mass timber fabricator, AOR, SEOR, special inspection agency, building official, and fire code official. These meetings are always recommended but especially important for complex projects, and it may be necessary to meet several times.

A preconstruction meeting should be held as soon as each participant has contractually joined the project and can commit to their responsibilities. Depending on the delivery method, this can be months in advance or a few weeks before quality assurance is required. It is useful to include the requirement for a preconstruction meeting in the project specifications to clearly communicate the need to everyone involved. However, this is not a substitution for more general communication. For example, the project owner needs to be aware that the special inspector must be contractually required to attend these meetings, and that the outcome may adjust the scope of work for the special inspector.

Consider the following topics for the meeting agenda:

- Stakeholders and their scope of work
  - Are there multiple mass timber suppliers? How is the erection and installation scope delineated? (E.g., Is one installer responsible for the entire installation, or will one company erect the mass timber and another install the fasteners and clips?) Is there a specialty mass timber engineer serving as the SEOR for the mass timber components?
- Documentation
  - Identify the timeline and availability of CDs and specifications, which will be the basis of the inspector and contractor's work. Who is producing and maintaining this documentation? Where will the official documents be located and how can they be accessed?
- Schedule
  - When will shop drawings be produced? When will review of the shop drawings be complete? What is the fabrication timeline? When will materials be delivered to the site? What is the installation schedule? At what key points of the installation sequence will the inspector be on site? At what key points of the installation sequence will the structural observer be on site?
- Moisture mitigation plan
  - Moisture mitigation during construction is an important topic for the preconstruction meeting. For considerations and resources, see WoodWorks' *U.S. Mass Timber Construction Manual.*
- Roles and responsibilities
  - Inevitably, there will be questions about the intent of the design and installation. The registered design professional—which could be the AOR or SEOR—is ultimately responsible for the life and safety of the building occupants. However, a specialty mass timber engineer may have the design responsibility for some or all of the mass timber components.
- Questions and potential issues
  - The preconstruction meeting should allow time and space for questions or concerns from any team member. Examples might include fit-up concerns for a particular connection, or potential sequencing issues.

For more information on preconstruction meetings and other preconstruction aspects of mass timber projects, see WoodWorks' *U.S. Mass Timber Construction Manual.*

Other Mass Timber Site Observations and Inspections

It is beneficial to undertake quality assurance items beyond those required in the IBC. Consider issues that might arise on a mass timber construction site and collaborate with others on the project team to create a quality assurance plan that addresses those items. It can be useful to incorporate some of the special inspections required for Type IV construction into mass timber projects of other building types.

One advantage of working with mass timber is the emphasis on assembling prefabricated components into a composite whole. Not only does the actual installation take less time, but conflicts and compliance issues are resolved in virtual design prior to physical construction. Even so, across large construction areas, issues arise that need to be addressed. These can often be grouped into three categories: fit-up, fabrication, and installation.

Photo: PCS Structural Solutions

The fit-up of this glulam beam against the masonry wall created a gap where the CLT panel bears on the beam. Long bearing seats and field-drilled holes for the pins allowed for field adjustability of the beam-to-wall connection.

Fit-up issues – Structural elements that don't fit together as intended can directly impact the aesthetics, safety, and constructability of a mass timber system. Mass timber elements are prefabricated with more precision than other materials, and careful design and fabrication can be utilized as a proactive approach to limiting these issues on site. The special inspector should review connections for fit-up issues between materials (e.g., timber to steel, masonry, or concrete).

Fabrication issues – These issues typically involve a mass timber element (panel, beam, column, etc.) that was mislabeled or fabricated incorrectly. The piece will likely be discovered by the installer and set aside. Minor fabrication issues can be field corrected, but many will require a replacement component. It is not uncommon for a CLT panel or glulam beam/column to be replaced on a large project, and the replacement cycle should be considered in the selection of supplier(s). Review mass timber assemblies for general conformance to the CDs as part of the structural observation plan, and engage the manufacturer immediately if issues are found.

The hammer setting on rotary drill equipment is not recommended for installing threaded fasteners in mass timber. Not all fasteners are the same and the fastener manufacturer should be consulted for installation instructions.

Photo: PCS Structural Solutions

The concealed hanger in this glulam beam-to-column connection is not fully seated.

Installation issues – It is important to confirm that the physical installation of mass timber components complies with the building code and/or CDs. Inspections typically cover:

- Screws – type, length, spacing, location, penetration
- Diaphragm splines – overdriven fasteners, fastener type and spacing, applied sealants, grade/thickness/width of spline
- Concealed connectors – whether they are fully seated, proper installation of fire protection

A common inspection requirement is to check the identification labels on mass timber members, including:

Structural grade mark stamp – For CLT and glulam, the structural grade mark stamp is the label indicating ANSI standard compliance, engineering grade, and layup. The labels should be applied to each component and are frequently located on the non-visible side (such as the edge of CLT panels or top of glulam beams). Missing labels are uncommon, but this is a final opportunity to confirm that the correct component is placed in the correct orientation.

QR code or similar – Another increasingly common label is a bar code or other designator of the individual piece. This unique identifier may be on the member wrap or printed on the member itself and shows where in the building the piece should be installed.

Protection of the mass timber elements from moisture, staining, and UV rays is typically included in the architectural scope of review vs. the special inspection or structural observation scope. However, envelope consultants may require special inspections of these items. Observations should be made regularly to assure that the elements of the moisture mitigation plan are being followed. As site conditions change frequently, adjustments to the plan should be expected.

Off-Site Inspections

In some cases, portions of the mass timber structure will be prefabricated in the manufacturer's facility, or another secondary fabrication facility, and require inspections at that location. An example might be a preassembled hybrid or composite system, such as rib panels where CLT panels are attached to parallel glulam beams to create long-span floor assemblies. Another is a timber-concrete composite assembly where shear connections (screws, plates, headed studs, etc.) are attached to the surface of the mass timber panels and concrete is cast on top, forming a composite system. Since these systems often rely on critical installation procedures (e.g., screws installed at a specific incline with a specified penetration, or epoxy rods with specified temperatures and cure times) to achieve the calculated capacity, it is important to perform inspections of the installation.

For prefabrication steps that take place off-site, the special inspector for the project may not be able to perform these inspections (depending on proximity of the facility to the jobsite). In these cases, a separate approved inspector may be contracted to visit the facility and perform the inspections at the time of prefabrication and assembly.

Note that off-site inspection requirements can vary based on the jurisdiction.

Conclusion

Since mass timber is relatively new to the U.S. market, quality assurance requirements are not as standardized or entrenched in building codes and standards as they are for other materials. They can also vary across the country. However, they are based on common sense and relatively simple. Unlike other materials that require physical testing as part of the inspection process, mass timber inspections are mainly visual.

The intent of this paper is to present considerations that help project teams develop quality assurance plans that meet their unique requirements

Collaboration between the designers of record and construction team, and design team awareness of construction activities, is useful for managing a project's risk. A thorough approach to inspections and observations will help to ensure that the constructed building complies with the structural, fire, life safety, and other requirements of the building code, and conforms to the CDs.

Photo Marshall Andrews

DPR Office / SmithGroup / Buehler Engineering

References

American National Standards Institute (ANSI). (2022). ANSI A190.1: Standard for Structural Glued Laminated Timber.

American National Standards Institute (ANSI), APA – The Engineered Wood Association (APA). (2019). ANSI/APA PRG 320: Standard for Performance-Rated Cross-Laminated Timber.

ASTM International. (2019). ASTM D3498-19a. Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor Framing System.

ASTM International. (2024). ASTM 920-18. Standard Specification for Elastomeric Joint Sealants.

International Code Council (ICC). (2023.) 2024 International Building Code.

WoodWorks – Wood Products Council. (2021). *U.S. Mass Timber Construction Manual.*

Appendix A
Example Special Inspections for a Mass Timber Project

Item/Area to Inspect	Continuous	Periodic	Notes to Inspector
Anchorage and connections of mass timber construction to timber deep foundation systems		X	
Mass timber installation		X	Review fit-up, component placement, limitations on cuts, component labels
Threaded fasteners:			
Verify use of proper installation equipment		X	
Verify use of pre-drilled holes where required		X	
Inspect screws, including diameter, length, head type, spacing, installation angle and depth		X	
Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads	X		
Adhesive anchors not defined above		X	
Bolted connections		X	
Concealed connections		X	
Factory or shop fabricated items			Does not apply to glulam, CLT, or other components produced in accordance with a code-referenced standard, or where fabrication is done by a fabricator approved to perform such work without special inspection; frequency to be determined by inspection categories as noted elsewhere
Wind resistance:			Applies to Exposure Category B, C, and D
Field-gluing operations of elements of the main wind force-resisting system	X		
Nailing, bolting, anchoring, and other fastening of elements of the main wind force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, and holdowns		X	See exception in IBC 1705.12.1
Seismic resistance:			Applies to Seismic Design Category C, D, E, and F
Field gluing operations of elements of the main seismic force-resisting system	X		
Nailing, bolting, anchoring and other fastening of elements of the main seismic force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, and holdowns		X	See exception in IBC 1705.13.2
Pin connections		X	
Composite slab system connected with adhesive	X		
CLT shear walls:			
Panel connectors		X	Review spacing, configuration, material thickness and fasteners
Holddowns		X	
Diaphragm splines:			
Nailing, bolting, anchoring and other fastening		X	Review fastener type, diameter, head type, spacing, and installation
Spline material		X	Review grade, thickness, and width of spline material, and placement of spline centered on panel joints
Sealant		X	As required for fire resistance-rated assembly
Cladding anchorage at CLT edge		X	Review fastener type, diameter, head type, spacing, and installation

Funded in part by the USDA Forest Service Forest Products Laboratory and the Softwood Lumber Board