CASE STUDY

Julia West House

Small footprint, big impact: 12 stories of mass timber affordable housing

Supply of affordable housing has been a long-standing challenge in the U.S., and construction costs are cited as one of the biggest obstacles to building more units. But Julia West House, a 12-story mass timber building in downtown Portland, Oregon, demonstrated that, under the right circumstances, affordable housing can be cost-effectively built using quality materials.

Community Development Partners (CDP) and the Julia West House project team did early analyses comparing five structural options and found that a hybrid structural solution of mass timber with a steel lateral system would be the most economical and quickest way to build. “We did pay a small premium for the mass timber material itself,” said Mai Huynh-Carnes, CDP’s Senior Development Manager. “But overall, from both scheduling and financing perspectives—not just hard costs but overall costs—it was a wash because we projected a faster construction schedule. Plus, mass timber met our sustainability and carbon goals.”

Designed and built to meet the National Green Building Standard (NGBS) and Energy Star certification requirements, Julia West House contains 90 units: 60 studios and 30 one-bedroom apartments. The high-rise mass timber building makes the most of its compact downtown location; at 5,000 square feet, the site is only about one-eighth the size of a typical Portland block.

PROJECT DETAILS

Julia West House

LOCATION:	Portland, OR
STORIES:	12
SIZE:	56,000 square feet
CONSTRUCTION TYPE:	IV-B (mass timber with steel braced frames)
COMPLETED:	2025

PROJECT TEAM

OWNER/DEVELOPER:	Community Development Partners
ARCHITECT:	Holst Architecture, Inc.
STRUCTURAL ENGINEER:	KPFF
GENERAL CONTRACTOR:	Walsh Construction Co.
CLT MANUFACTURER:	Kalesnikoff
MASS TIMBER INSTALLATION:	Carpentry Plus Inc.
CONNECTORS:	Simpson Strong-Tie
ACOUSTICAL ENGINEERING CONSULTANT:	Veneklasen Associates
ACOUSTICAL FLOOR ASSEMBLY:	USG

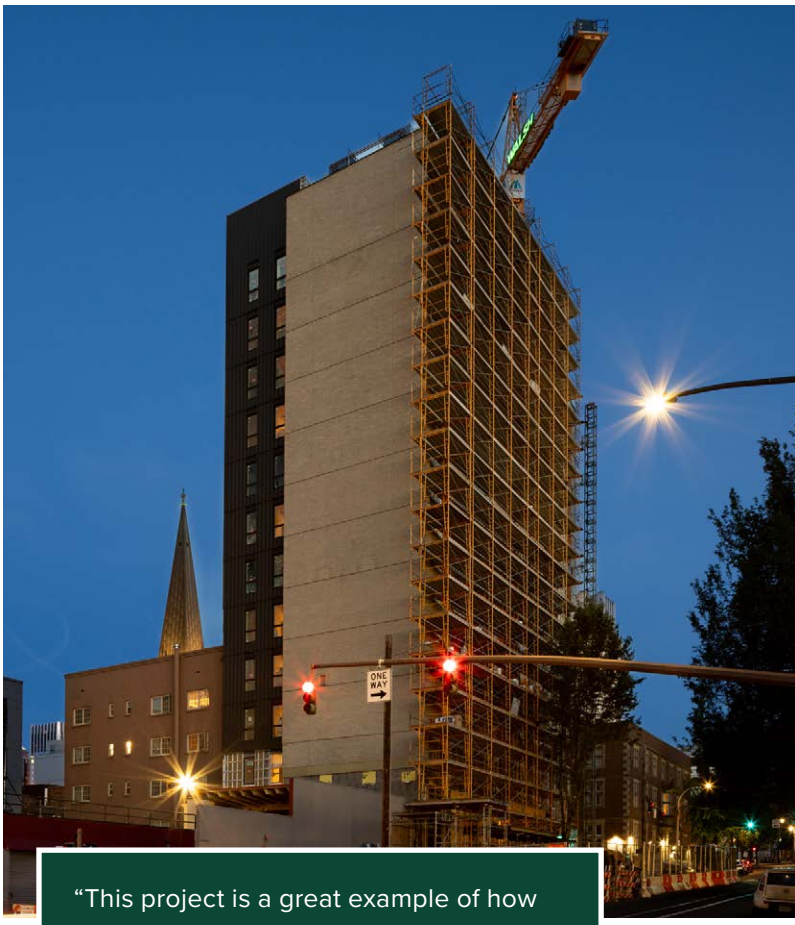
Connect with the Julia West House project team at *www.woodworksinnovationnetwork.org/en-ca/projects/julia-west-housing*

WOODWORKS INNOVATION NETWORK.ORG

Affordable Housing Design Considerations

More developers are considering mass timber to build affordable multi-family projects, and new provisions for taller timber buildings introduced in the 2021 International Building Code (IBC) are helping enable that growth.

1. **Cost effectiveness**, achieved through design efficiency, material optimization, reduced cost of interior finishes, lower material weight that can reduce foundation costs, and more, is one of the most important design considerations for an affordable housing project. Budget was one of the key reasons CDP chose mass timber for Julia West House.
2. **Quick installation** eases onsite construction challenges—important since many affordable housing projects are in tight urban locations. Faster construction also helps reduce financing costs and minimizes disruption to the neighborhood.
3. **Sustainable design and materials** may be required by sponsor organizations, funders, or municipalities. As a renewable resource, wood also helped Julia West House meet the requirements for NGBS certification.
4. **Biophilic design** is increasingly recognized as a strategy to improve occupant well-being. Because this project is in a dense urban area, architects worked to incorporate natural elements into the building, including exposed timber.
5. **Acoustic performance** impacts quality of life for residents and is an important consideration. While mass timber can pose challenges, the Holst design team overcame the hurdles by following best practices.
6. **Inherent fire-resistance**. When exposed to fire, large wood elements char on the outside while retaining their structural strength. Encapsulation with a noncombustible material such as gypsum can provide additional protection and contribute to the fire-resistance rating (FRR).
7. **Design optimization** may be key to achieving a project's design and budget goals. Stacked units with repetitive room configurations that improve framing and mechanical, electrical, and plumbing (MEP) efficiency were critically important for Julia West's compact volume. At 12 stories, the benefits were exponential.
8. **Energy efficiency** is essential since most affordable living facilities either cover the cost of utilities themselves or want to minimize utility costs for residents. CDP received about $2 million in funding from the Portland Clean Energy Fund, in part because of the project's energy efficient design and lower carbon impact.
9. **Neighborhood fit** can be particularly important if the project is integrated with market rate housing. Julia West House is in a design review area of downtown Portland, which requires higher quality materials on the exterior.
10. **Project team collaboration** is critical for optimizing mass timber's efficiencies and key to meeting design goals. CDP knew they would benefit from the value an experienced team would bring.



"This project is a great example of how to economically build high-performing, desirable housing for people who desperately need it," said Christopher Pitt, Associate Engineer at KPFF. "It shows we can build taller with timber by leveraging the benefits of schedule savings, biophilic design, and a reduced carbon footprint while addressing fire resistance and budget considerations."

Looking to utilize mass timber in an affordable housing project?

The WoodWorks paper, *Mass Timber in Affordable Multi-Family Housing: A Blueprint for Design*, covers design steps, code compliance options, material optimization strategies, and other key considerations—with examples of mass timber and hybrid projects across the U.S.

Stacked Efficiency

With such a small footprint, structural efficiency was key to the success of Julia West House. The design team used a glue-laminated timber (glulam) post-and-beam frame with cross-laminated timber (CLT) panels to optimize the unit layouts in terms of spans and grids, stacking the units to improve efficiency and reduce costs.

Unit layout is repeated from floor to floor, so partition walls stack. “Everything is straight up and down in the building,” said Nici Stauffer, Project Architect with Holst Architecture. “The elimination of corridor beams allowed us to route MEP systems easily into units without having to run them underneath the beams, which would have impacted ceiling heights.”

Pitt added, “We could do this because of the proven two-way spanning capabilities of CLT panels. In the units themselves, we aligned our framing with the demising walls, so the exposed CLT ceilings and lack of overhead ductwork help the rooms feel spacious.”

Fire-Resistant Design

Julia West House was built using Type IV-B construction, which allows some exposed mass timber surfaces, but the primary structural frame must have at least a 2-hour FRR throughout. To achieve the two hours, the exposed CLT panels were analyzed for structural fire performance, and much of the glulam frame was wrapped in gypsum wall board; glulam columns had three layers and beams had two.

“Two layers of gypsum provide 80 minutes of protection,” said Pitt. “The remaining 40 minutes were provided by the wood itself and demonstrated through char calculations. We evaluated the cost of using gypsum to wrap the glulam against the cost of larger sized members needed for 2-hour protection, but found the larger sizes would have created space challenges within this compact building. In select community spaces where we wanted to leave the glulam exposed, the members were sized to meet the full two hours of protection through charring.”

To speed construction and minimize cost, most of the glulam connections were either simple wood-to-wood bearing or readily available concealed metal hangers, designed to meet structural and fire requirements, regardless of whether they were exposed or wrapped.

Sound Design

CDP was committed to creating a quality living experience for residents, which means managing noise. Because they wanted to leave the CLT ceiling panels exposed, the team sought the advice of acoustical consultant Veneklasen Associates and followed best practices for acoustic detailing.

“We talked early about concerns with the CLT and flanking noise, especially since the panels span multiple units,” said Stauffer. “We were limited in terms of space, but believe we employed some effective strategies.”

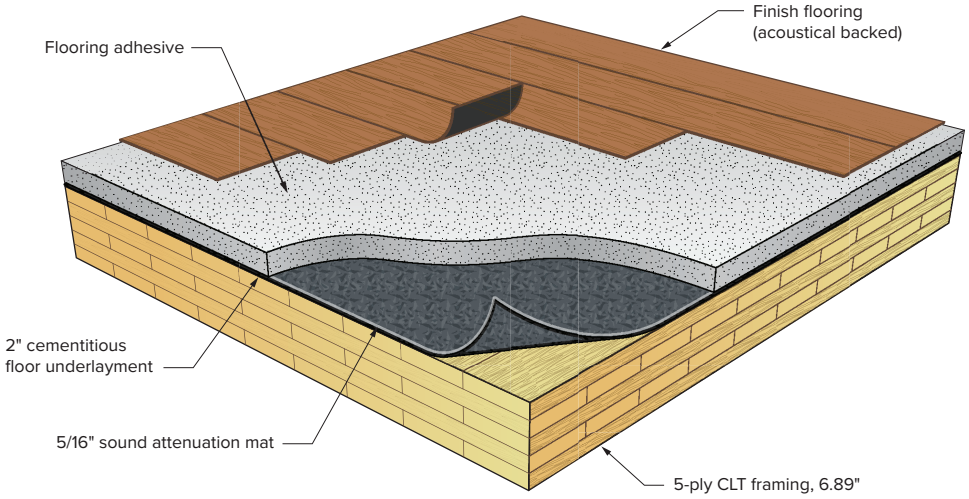
They added resilient gaskets at the top of the wall framing at unit demising walls to dampen noise transfer between units. Soffits helped in places where units had back-to-back kitchens and double-stud demising walls house plumbing and other building systems while providing acoustic separation.

The team also used a proprietary floor assembly that met or exceeded the required STC and ICC ratings. The assembly includes a sound attenuation mat, floor underlayment, flooring adhesive and acoustical-backed finish flooring on top of the 5-ply CLT floor panels. Resulting STC and IIC levels were competitive with those typically achieved with market rate assemblies.

Class Designation	Sound Transmission Class (STC)	Impact Isolation Class (IIC)
Entry level	50	50
Market rate	55	55
Julia West House	**56**	**53**
Luxury	60	60

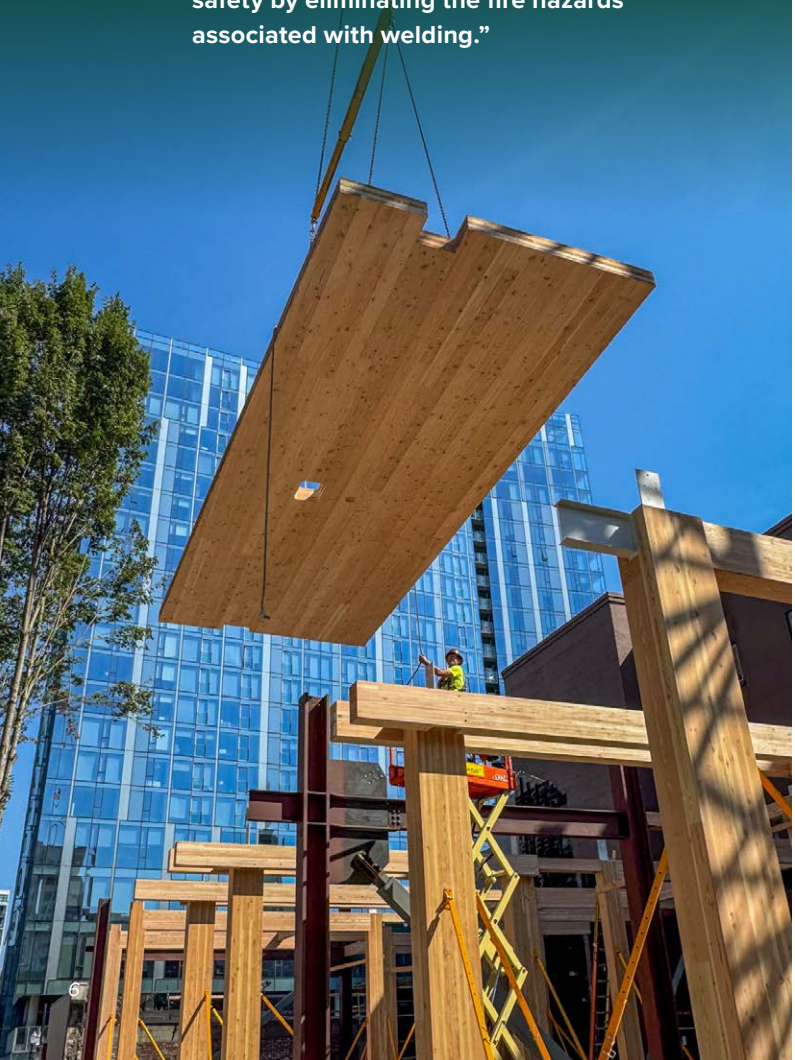
Sources: WoodWorks, Hoist Architecture

Proprietary floor assembly
Source: USG



Forward Thinking Design

- **Built using post-and-beam construction, Julia West House is one of the first 12-story Type IV-projects on the West Coast. This construction type was introduced in the 2021 IBC and allows buildings up to 12 stories and 180 feet tall.**
- **CDP and the design team prioritized energy efficiency, designing the project to achieve Energy Star certification and working with NW Energy Collaborative to meet the requirements for NGBS Gold certification. Both helped the developer access needed funding.**
- **The building's structural steel lateral system was engineered entirely with bolted connections. "We knew this would speed construction" said Ed Sloop, Senior Project Manager, Director of Innovation, and Chief Estimator at Walsh Construction. "It also improved safety by eliminating the fire hazards associated with welding."**



A Perfect Fit

The tight urban site was a perfect fit for mass timber, allowing the team to demonstrate some of the unique benefits of these materials. To save construction time and reduce neighborhood disruption, wood elements were prefabricated off site and lifted into place directly from the delivery truck. The emphasis on simple connections coupled with an experienced installation crew also sped construction.

"Because a 12-story mass timber building had not been done in Oregon, we knew there would be a lot of eyes on this job," said Jon Potter, Project Development Manager for Carpentry Plus. "We wanted to set an example of how mass timber could be effective on a project like this. It's an impressive use of a very limited amount of space."

Adding Value with Biophilic Design

Affordable housing used to be associated with cold, utilitarian structures, but the aesthetics of Julia West House are anything but. Mass timber was left exposed wherever possible, creating a warm, comforting, natural palette. CLT forms the ceilings in the main living spaces of the studio units, as well as in the bedrooms of the others. Soffits were used in entries and bathrooms to hide utilities, and hallway ceilings were covered to hide MEP.

"From an architectural perspective, there's a huge benefit to using wood on the interior to provide a connection with nature that's visible and beautiful, especially for affordable housing," said Stauffer. "We feel strongly about that, in terms of providing beauty, quality, and a better experience for the residents."

Josiah Henley, Senior Associate and Project Designer with Holst Architecture agreed, adding, "I think that's important for this population because it helped us achieve what's called trauma-informed design. We believe a natural palette helps alleviate any stress triggers for the residents that might be in the environment, and our use of wood helped us create a safe place for Julia West House residents to live."

Functional Sustainability

As an organization, one of CDP's main goals is to be sustainable with their buildings, and mass timber meets the criteria on several levels.

"Sustainability is important, not just from a built environment perspective, but also because Julia West is designed to provide permanent supportive housing for senior BIPOC (Black, Indigenous, and people of color) individuals earning less than 30 percent of the area's median income," said Huynh-Carnes. "We're paying for all utilities, so we needed an energy efficient structure—we received $2,000,000 in funding from the Portland Clean Energy Fund—and we wanted to be socially responsible as well."

Who pays the energy bill made a difference in design, added Sloop. “This is a tall building with a tiny footprint, which lent itself well to a centralized HVAC and plumbing system. The centralized system freed up space inside the units and was better for the building envelope, but it did present some challenges. Everything is tightly packed, but that would have been the case for a concrete building as well; it’s just a challenge of a dense urban development.”

Quality for the Community

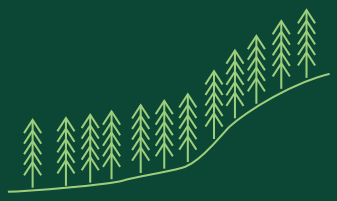
The tight location challenged the Julia West House project team, not only in terms of structure, but community fit.

Henley said, “Although it’s a pretty quiet design, we wanted to express the communal nature of the building. All the mass timber beams and CLT panels are exposed in the community spaces on the ground floor, making them visible to everyone walking by. We wanted these parts of the building to shine, to show that we’d prioritized high quality design and materials, and that nothing was sacrificed just because it was an affordable housing project.”

Huynh-Carnes emphasized Henley’s point, adding, “This building is for people coming directly from homelessness, and they deserve a high quality place to live. Julia West House is exactly that.”

Supporting Sustainable Forests

Julia West House includes 33,019 cubic feet of wood products. It takes North American forests 3 minutes to grow this volume of wood.



Estimated by the Wood Carbon Calculator for Buildings, based on research by Sarthre, R. and J. O'Connor, 2010, A Synthesis of Research on Wood Products and Greenhouse Gas Impacts, FPInnovations.

Considering wood? Ask us anything.
FREE PROJECT SUPPORT / EDUCATION / RESOURCES
woodworks.org

Disclaimer: The information in this publication, including, without limitation, references to information contained in other publications or made available by other sources (collectively "information") should not be used or relied upon for any application without competent professional examination and verification of its accuracy, suitability, code compliance and applicability by a licensed engineer, architect or other professional. Neither the Wood Products Council nor its employees, consultants, nor any other individuals or entities who contributed to the information make any warranty, representative or guarantee, expressed or implied, that the information is suitable for any general or particular use, that it is compliant with applicable law, codes or ordinances, or that it is free from infringement of any patent(s), nor do they assume any legal liability or responsibility for the use, application of and/or reference to the information. Anyone making use of the information in any manner assumes all liability arising from such use.

Funding provided in part by the Softwood Lumber Board
WoodWorks is an equal opportunity provider.

Images: Marcus Kauffman Photography (cover, p.3, p.7 bottom; Carpentry Plus (p.2, p.4, p.6, p.7 top), back cover; Holst (p.5 rendering)
WW-CS-43 • Julia West House – Case Study © 2025 WoodWorks Wood Products Council