

Ingrained Framework

All-timber high-rise load-bearing structure, Portland, OR, USA



Main authors

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Project data

Project group: Architecture, building and civil engineering
 Client: The Framework Project and Home Forward
 Project background: Private commission
 Planned start: November 2017

Summary and appraisal of the project by the jury

The design of "Ingrained Framework" proposes a 12-level building using wood as the principal construction material. Intended for realization in the city of Portland, Oregon, the design recognizes timber as an important local resource, acknowledging the region's longstanding tradition in wood construction. The project thereby intends to encourage widespread use of a carbon sequestering technology, while strengthening local economies in rural communities by increasing wood building product demand. Though similar structures have been erected in the region, it would be the first all mass timber high-rise in North America, using Cross Laminated Timber (CLT) for all load-bearing structural components, including the building's stabilizing cores.

Perceiving the project as another successful step in a long series of advances in timber technology, the jury was particularly taken by the extensive fire, structural, seismic, and acoustic testing undertaken to satisfy building code requirements – codes normally designed for steel and concrete structures and not particularly tailored to promote high-rise wood construction. Considering the project's ecological objectives, the jury questioned the proposed aluminum composite facade, which partially offsets the benefits gained by the wood. This said, the jury appreciated the efforts undertaken to promote timber as a building material, not just for small-scale buildings, but most importantly for high-rise structures as well – a forerunner that will allow the building industry to adapt to new standards.



Image 1: Framework, exterior rendering.

Statements on the sustainability of the project by the authors

Innovation and transferability – Progress

Because high-rise wood structures are not prescriptively allowed in the USA code, the Framework project undertook extensive fire, structural, seismic, and acoustic testing to demonstrate the equivalent performance of steel and concrete. The tests included the first successful two-hour fire rated Cross Laminated Timber (CLT) connection. Results from this performance-based design path will be made public to spur widespread acceptance of tall wood structures in USA building codes. The project demonstrates innovation with respect to mass timber and seismic performance. Framework will have a 40-meter post-tensioned CLT rocking wall core – the tallest in the world – that will resist damage from an earthquake and allow the building to remain occupiable even after a major seismic event.

needed wood products has the potential to boost rural job creation in the fields of sustainable forest management, timber harvesting, and wood products manufacturing. Tall wood construction has transformative implications for rural communities here in Oregon, as well as other timber-rich regions across North America.

Resource and environmental performance – Planet

Framework encourages a paradigm shift for sustainable construction in the USA. The project uses timber, sourced regionally from sustainability-managed forests, as its building-wide structural system. Wood has environmental advantages over traditional materials like concrete and steel, because it absorbs and stores carbon. Demand for wood products perpetuates a beneficial cycle where trees are transformed into carbon sequestering building materials and then replanted for future harvest. By demonstrating the feasibility of tall wood buildings in the USA, and creating a path for their regulatory acceptance, Framework promises to spur nationwide adoption of an environmentally responsible construction method. Framework is expected to offset 1,654 metric tons of carbon emissions.

Economic viability and compatibility – Prosperity

Framework is a catalyst project intended to create demand for mass timber and high-rise wood buildings throughout the USA. Greater demand for tall wood buildings in urban areas drives economic opportunity in the rural communities that produce wood building products. Widespread use of CLT and other engi-



Image 2: Framework, structural model.

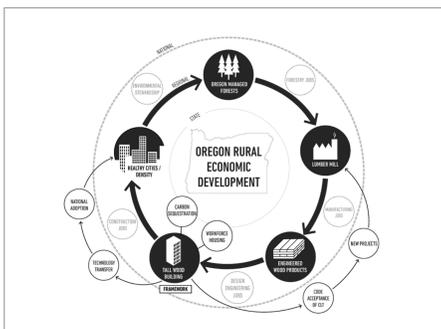


Image 3: Framework, urban and rural connection.



Image 4: Framework, expressed timber core.



Image 5: Framework, lobby with exposed wood and tall wood exhibition.



Image 6: Framework, affordable housing component.



Image 7: Framework, timber core, framing, and floor.



Image 8: Framework, fire testing.



Image 9: Framework, exposed two-hour-rated connection.



Image 10: Framework, CLT rocking wall testing.