



Build Back Better with Mass Timber BBBRC Phase I Grant Request: Concept Proposal Narrative

OREGON'S MASS TIMBER VISION AND ECONOMIC OPPORTUNITY.

Mass timber is a new and transformative category of wood products. The Oregon Mass Timber Coalition's (Coalition) **vision** is to enhance and expand Oregon's established mass timber industry ecosystem, growing it into a significant regional cluster. Our region is facing interrelated challenges - climate change impacts (especially wildfires), social inequalities and homelessness, caring for an aging population, unaffordable housing, and the economic disruption caused by the global pandemic – all of which are affecting the health of individuals and our communities. This effort will scale up innovative economic development projects, helping economic recovery, and addressing issues such as low wages, inequality, sustainability, and disparities of benefit.

In response to these pressing challenges, the Coalition sees an **economic opportunity** unique to our region to expand Oregon's traded-sector mass timber cluster through the innovative use of a new product category – prefabricated housing systems using mass timber. By optimizing mass timber made from low-value logs for residential applications, the Coalition will demonstrate that these housing solutions can be more resilient and as affordable as light-wood-frame housing assemblies. Research and prototyping will demonstrate that a system of prefabricated mass timber can be aesthetically pleasing and potentially outperform light-wood-frame for energy efficiency, speed of construction, and fire resistance.

A key goal of our initiative is to link equitable housing production and job growth to reduction of forest fire risk. Housing can be made affordable via optimization of high-volume automated manufacturing processes and the utilization of low-value wood species from salvage and restoration forest projects as input materials in mass timber products. Expanding mass timber's application can provide permanent affordable replacement housing for low income and wildfire-impacted populations, inclusive of BIPOC communities, and has further application as multi-story affordable housing in high-density urban neighborhoods. These units sequester carbon, replace energy-intensive materials such as steel and concrete, and contribute to wildfire risk reduction and rural job creation. Through the production, development, and use of new kit-of-parts mass timber housing systems we can **revolutionize how America builds affordable, high performance, and resilient homes**, while at the same time make our communities more resilient through meeting **housing needs**, improving **forest management**, and creating **well-paying skilled jobs** in both rural and urban communities.

THE COALITION. The Coalition is a group of eligible entities from state government and state universities, led by a special purpose district, the Port of Portland. The Coalition's purpose is to expand a regional growth cluster from the assets of an established mass timber manufacturing ecosystem. The partnership was originally convened by Business Oregon and received designation from the EDA as an Investing in Manufacturing Communities Partnership (IMCP) Manufacturing Community in 2015.

Forestry and related industries have lost more than 14,000 jobs in Oregon since 2006 and additional impacts from wildfires are increasing.

4,000 dwelling units destroyed by the 2020 Labor Day wildfires housed low- to moderate-income households.

The Manufactured/Plywood Industry has lost 47 percent of employment since 2001 (from 12,352 to 8,383 jobs).

In terms of employment since the start of the pandemic, Oregon lags the national average by 0.6 percentage points as of July 2021 (-4.4% in Oregon compared to -3.7% nationwide).



Port of Portland (Port, Lead). The Port has expertise in transportation logistics and access to business parks that currently serve 27,000 local jobs and generate 1.8 billion in wages. As the lead institution, the Port will house a new Oregon Mass Timber Center that includes facilities for prefabricated housing manufacturing and training on an approximately 50-acre site at Terminal 2. The marine location is ideal for shipping mass timber from across the region to the manufacturing facility and increasing future export capacity.

TallWood Design Institute (TDI). Oregon State University and the University of Oregon joined forces to launch TDI in 2015. TDI unites researchers from top US forestry, wood science, engineering, and sustainable design programs as the nation's first interdisciplinary research collaboration focusing on the advancement of mass timber and structural wood products building solutions. TDI's primary activities are state-of-the-art applied timber research and education workforce training, testing, and product development. These are reinforced by diverse faculty expertise, cutting-edge facilities, and extensive partnerships with manufacturers, designers, and other stakeholders.

The Oregon Department of Forestry (ODF). ODF is responsible for regulating, protecting, and managing the state's forests. ODF is committed to growing Oregon's vibrant and innovative forestry and wood products sector, which is responsible for more 18.1 billion in economic output and provides over 71,000 jobs to Oregonians across many parts of the state. The forestry and wood products sector is particularly important to the economies of Oregon's rural communities. ODF's role includes bringing expertise to increasing fiber supply through forest restoration projects.

Business Oregon. Business Oregon, the state's economic development agency, supports investment in the innovation of the mass timber industry and facilitates development of the industry's ecosystem. Oregon is an internationally recognized leader in wood product manufacturing and mass timber research and is a first mover in the mass timber opportunity. More than any other of Business Oregon's target industry groups, forestry and wood products employment is concentrated in rural Oregon. Business Oregon brings together Coalition partners in the support and development of this industry group, one that is vital to the economic prosperity of many rural Oregonians.

Oregon Department of Land Conservation and Development (DLCD). DLCD works in partnership with local governments and state and federal agencies to address the land use needs of local communities, regions, and the state, including assessing local housing need and increasing housing supply and choice. DLCD will assist the project in identifying barriers to implementation, building community participation, and support regional planning efforts to develop resilience to natural hazards, including those exacerbated by fire and climate change.

COMPONENT PROJECTS. The Coalition's eight (8) key projects are described below. Phase 1 funding will answer questions related to mass timber housing design and prefabrication, workforce development, testing and prototyping, forest resource supply chain, and implementation. See the Project and Budget Narratives for more details on how the Phase 1 technical assistance award will be allocated and used.

1. Modular Housing Manufacturing Facility The new Mass Timber Center will host a facility for manufacturing modular housing using mass timber. This will be a new product category that the Port will be creating. In addition, the Port will provide space for mass timber product fabrication and other associated advanced wood product manufacturing products. The manufacturing facility will serve as a small business incubator, inclusive of women and BIPOC communities. It will also serve as a hub



for market research and business modeling to support the growth and vitality of mass timber manufacturing activity at Terminal 2 and throughout the region.

The Mass Timber Center will host a **2. Workforce Training Center** that focuses on skills training in mass timber manufacturing and fabrication and modular mass timber assembly and construction, with opportunities for participants to gain experience in assembly and fabrication, manufacturing practices, and entrepreneurial skills.

3. University of Oregon Acoustic Testing Facility UO has developed plans for a state-of-art facility for conducting acoustics tests of mass timber assemblies. The lack of such a facility is a widely recognized barrier to development of affordable mass timber solutions for multi-family housing. Certified acoustics tests need to be conducted for a large variety of mass timber assemblies in order to further the adoption of mass timber panels in the residential construction market. The timber industry needs easy and rapid access to the proposed facility, its equipment, and UO's research expertise to measure airborne sound and impact transmission of the building materials and construction assemblies. Further, design teams and other industry professionals require access to research expertise to develop improved building materials and construction assemblies.

4. Oregon State University Fire Testing Facility. Fire performance is a critical aspect of mass timber construction and a key area for ongoing research and development. OSU has significant research expertise in both structural and wildland fires, and results of mass timber fire tests have demonstrated that wood can be used safely in multi-family housing. However, Oregon currently lacks its own fire-testing capabilities, and fire tests must be carried out as far away as Texas and Ottawa, Canada. This has proven a barrier to further critical research on optimizing the performance and cost-efficiency of mass timber housing. A fire testing chamber, proposed to be sited adjacent to TDI's Emmerson Advanced Wood Products Lab on the Corvallis campus, would allow rapid and cost-effective fire testing within the US western region, benefitting both mass timber construction growth and reduction of wildfires.

5. TDI Research and Development. The universities are collaborating with industry experts to develop panelized workforce housing prototypes using MPP construction that leverages the cost efficiencies of computer-controlled prefabrication. The designs will be optimized for aesthetics, affordability, energy efficiency, resilience, and biophilic benefits of wood. The panels can be made from logs with diameters as small as 5", thus creating a market for otherwise low-value trees harvested from restoration forestry, which have climate, wildfire and rural economic co-benefits. This collaboration will also develop, prototype, and test designs for factory-built volumetric mass timber modular housing. A third research and prototyping project addresses digital prefabrication of mass timber panels to retrofit affordable, light-wood-frame multi-family housing stock, extending its useful life and increasing energy efficiency and seismic resiliency.

Testing is also needed to determine viable pathways to commercial acceptance of lesser-utilized wood species in cross-laminated timber (CLT). Ponderosa Pine is a highly prevalent species throughout Oregon and the western US that currently lacks viable markets and contributes to wildfire risk. OSU researchers have tested the structural properties of CLT produced from this species, with promising preliminary results. A detailed testing plan and further work to define a custom grade specification is needed before this material can be manufactured and used commercially.

6. Fiber Supply Mapping and Supply Chain Efficiency. To determine raw material supply, OSU forest resources management researchers will carry out an economic analysis of Oregon's timber



supply available for mass timber products, with an emphasis on restoration thinning and proximity to transportation and processing facilities. This includes statewide fiber mapping, matching forest resources to available processing capacity, and analyzing the economics of the transportation and distribution supply chain. A pilot technology implementation project will be developed to assess efficiency gains and training needs related to state-of-the-art harvesting technologies in restoration harvesting operations. Findings from these activities will inform recommendations on future processing facility siting. Workforce development is a crosscutting theme that spans woodlands harvesting activities, mass timber manufacturing, housing manufacturing, and site assembly. OSU will develop training programs in all of these areas, including in the use of modern harvesting equipment and forestry technology and leveraging existing curriculum that has been created using its own state funds and internal OSU grants.

7. Fiber Supply Increases/Forest Restoration. ODF will identify and permit a sizeable forest restoration project within the Willamette National Forest. Affordable mass timber housing development will spur additional demand for wood fiber from Oregon’s forests. This demand can support the restoration of federal forests. Efforts to make forests more fire resilient focus on removing small trees and brush while leaving larger trees behind; CLT and MPP manufacturing creates a ready-made market for the materials resulting from federal forest restoration. USDA Forest Service is highly supportive of a state and federal partnership to increase fire resiliency while providing wood fiber to Oregon’s growing mass timber industry.

8. Local Code Analysis. DLCD will identify statutory and local regulatory barriers impeding the rapid deployment of mass timber modular homes to communities in wildfire-impacted jurisdictions. This work will assess local code barriers to the construction of mass timber modular homes in five wildfire-impacted communities, with an emphasis on identifying obstacles to replacement of affordable housing for vulnerable residents. Funds will also be used to update state model codes as a resource for capacity-constrained communities and to produce educational products and conduct outreach to and with local jurisdictions, the Homebuilders Association, community development corporations, building officials, and developers.

METRICS OF SUCCESS. Phase 1 planning work will develop metrics directly related the project goals of enhancing economic equity by reducing property loss or disruption due to wildfires; reducing housing production costs; and creating jobs, training, and entrepreneurial opportunities. We will be evaluating and refining our metrics in Phase I planning, but metrics will address:

Forest Management - Regionally, wildfires are increasing in size and scope west of the Cascade mountains in Oregon and Washington. The 2020 Labor Day fires burned over 1 million acres and destroyed 4,000 homes and 1,000 businesses. Fuels reduction and forest health treatments to moderate fire behavior are needed on more than 10 million acres in Oregon alone.

Affordable Housing - Many of the 4,000 dwelling units destroyed by Labor Day wildfires housed low- to moderate-income households. Replacing workforce housing for underserved community members is an economic priority for jurisdictions affected by wildfire and mass timber products can help meet housing needs. Metrics will address housing supply for underserved populations in urban, suburban and rural locations, including fire-

Target Number of Units Per Workday*		Total Units	Target Unit Cost in 2021 dollars
Year 1	19	5,000	\$126/sf, kitchen/bath module
Year 2	77	20,000	\$78/sf, no plumbing module
Year 5	383	100,000	
*Aspirational factory-produced module numbers			



affected communities and targeted project outcomes are to reduce housing costs and increase housing accessibility in fire-impacted areas.

Manufacturing Training, Jobs and Regional GDP Growth - The Oregon Mass Timber Center and related demand increases for mass timber will increase manufacturing jobs, grow regional GDP in the mass timber cluster, and expand career pathways and workforce equity for the region's underserved communities.

Implement training programs that build a stronger and equitable mass timber workforce and build partnerships with organizations that represent underserved communities.	Create a pathway to commercial use of Ponderosa Pine, a highly prevalent but lesser-utilized western wood species, in CLT.
Capacity building and technology transfer to existing Oregon modular builders (construction and fabrication know-how, skills upgrading).	Produce development cost models and plans for panelized housing that will be made publicly available and designed to scale broadly into the single-family residential housing market.
Increase the mass timber wood fiber supply, and reduce fuels and lower fire risk, through restoration forestry projects.	

ACCESSIBILITY OF MATCHING FUNDS. Phase 2 funding will be requested for the buildout of the Mass Timber Center and lab facilities and for supporting research activities. The Port's funding match will come out of general fund dollars. Business Oregon will be providing an FTE position to support Coalition activities. The acoustic lab's design-build process has a verbal commitment of \$2 million in matching funds by a private-sector stakeholder and potential facility user; additional investment commitments from manufacturers will be sought during 2022. Matching funds for the fire testing lab facility will be provided from OSU's College of Engineering, supporting the project's lead faculty member. Refining mass timber housing designs, building prototypes, and testing will be supported through cost-share for the use of TDI facilities UO and OSU faculty time, TDI staff time, and TDI state funding for student research assistants and external consultants (including for energy modeling through an Energy Trust of Oregon grant). The effort to increase fiber supply and forest restoration will go through Oregon's innovative Federal Forest Restoration Program, using Good Neighbor Authority; this program uses state resources to increase the pace and scale of restoration.

BARRIERS TO PROJECT IMPLEMENTATION AND MITIGATION. No significant barriers are anticipated to implementing the projects described in this grant request. Phase 1 funding will determine the specific requirements and details to bringing the Mass Timber Center to fruition, the suitability of the acoustic testing site, and the design specifications for the fire testing facility. Research and development planning completed in Phase 1 will answer further questions related to panelized and volumetric mass timber housing and fiber supply. The Coalition has identified siting and design requirements in local development and building codes, specifically as applied to innovative building techniques, as potential barriers to mass timber housing implementation.

TIMELINE FOR IMPLEMENTATION. Planning phase work will determine specific timelines, but all projects can be completed by September 30, 2027. Generally, Phase 1 projects are anticipated to be complete by the end of 2022. Studies and planning related to the Terminal 2 facilities are anticipated to be complete Q1 2022. Other work will continue throughout 2022, including DLCD's model code work, which is anticipated to continue through Q3 of 2022. Additional detail on the timing of project activities to be undertaken can be found in the Budget Narrative, submitted as part of the complete grant application.