

TALLWOOD

DESIGN INSTITUTE

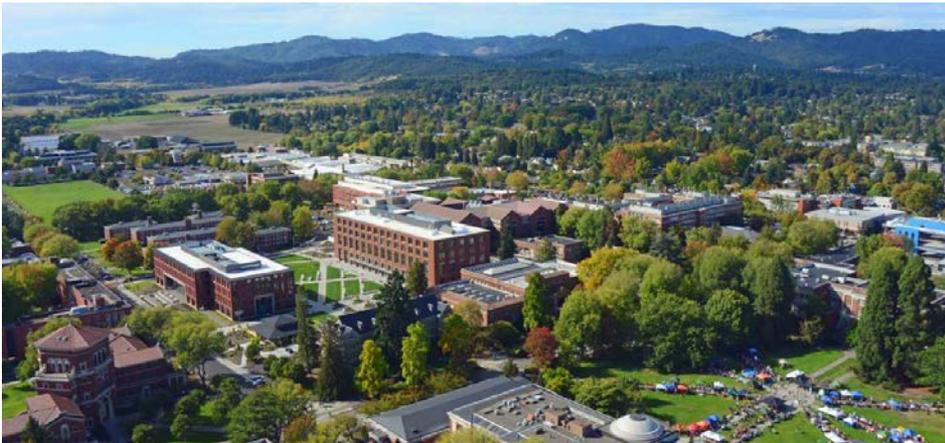
Advancing solutions for designers, manufacturers
and engineers of our built environment.

Mass Timber Construction in the USA: Lessons from Recent Research

TallWood Design Institute

An industry-driven partnership between:

- College of Forestry, Oregon State University
- College of Design, University of Oregon
- College of Engineering, Oregon State University

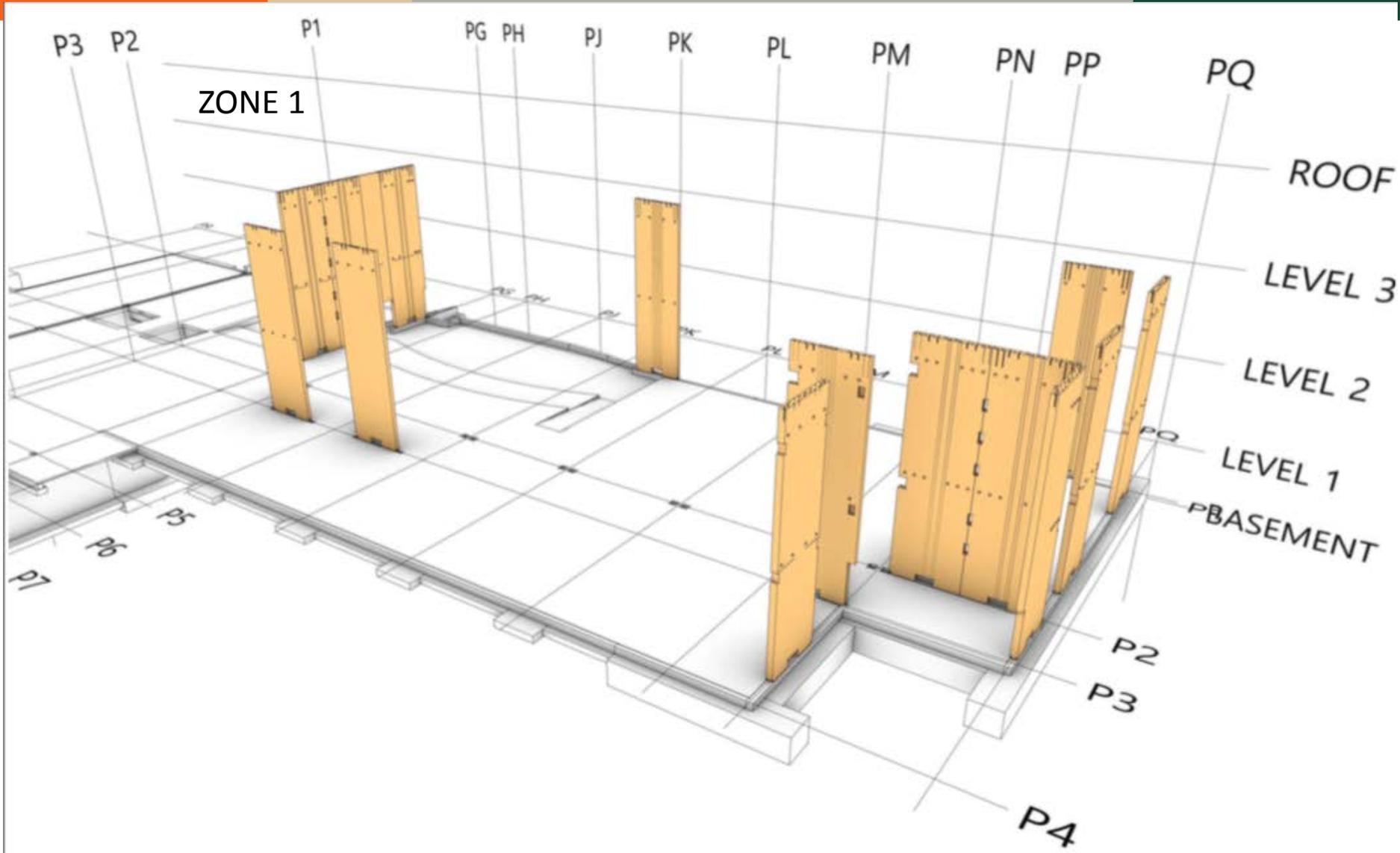


Oregon Forest Science Complex



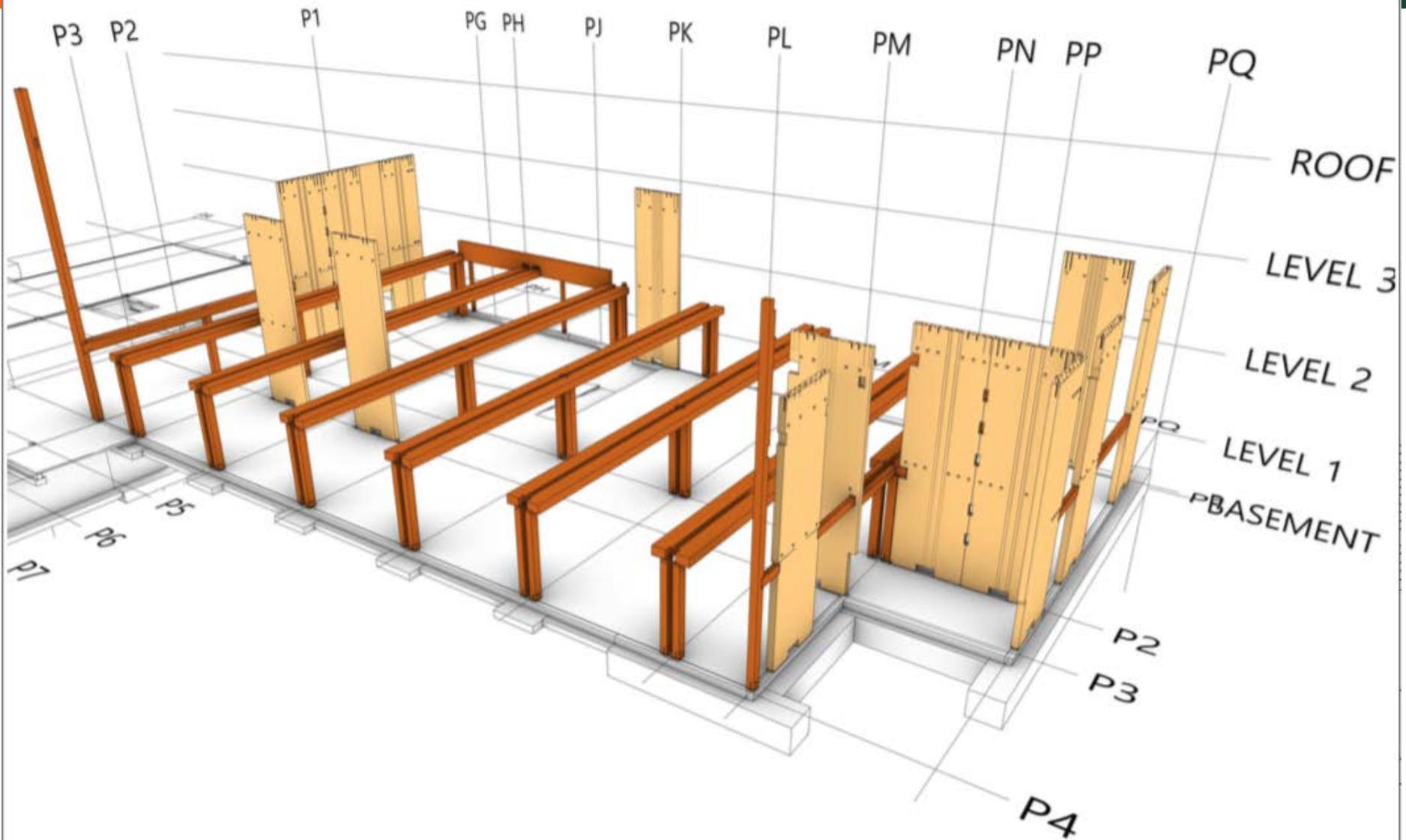
Peavy Hall – OSU College of Forestry



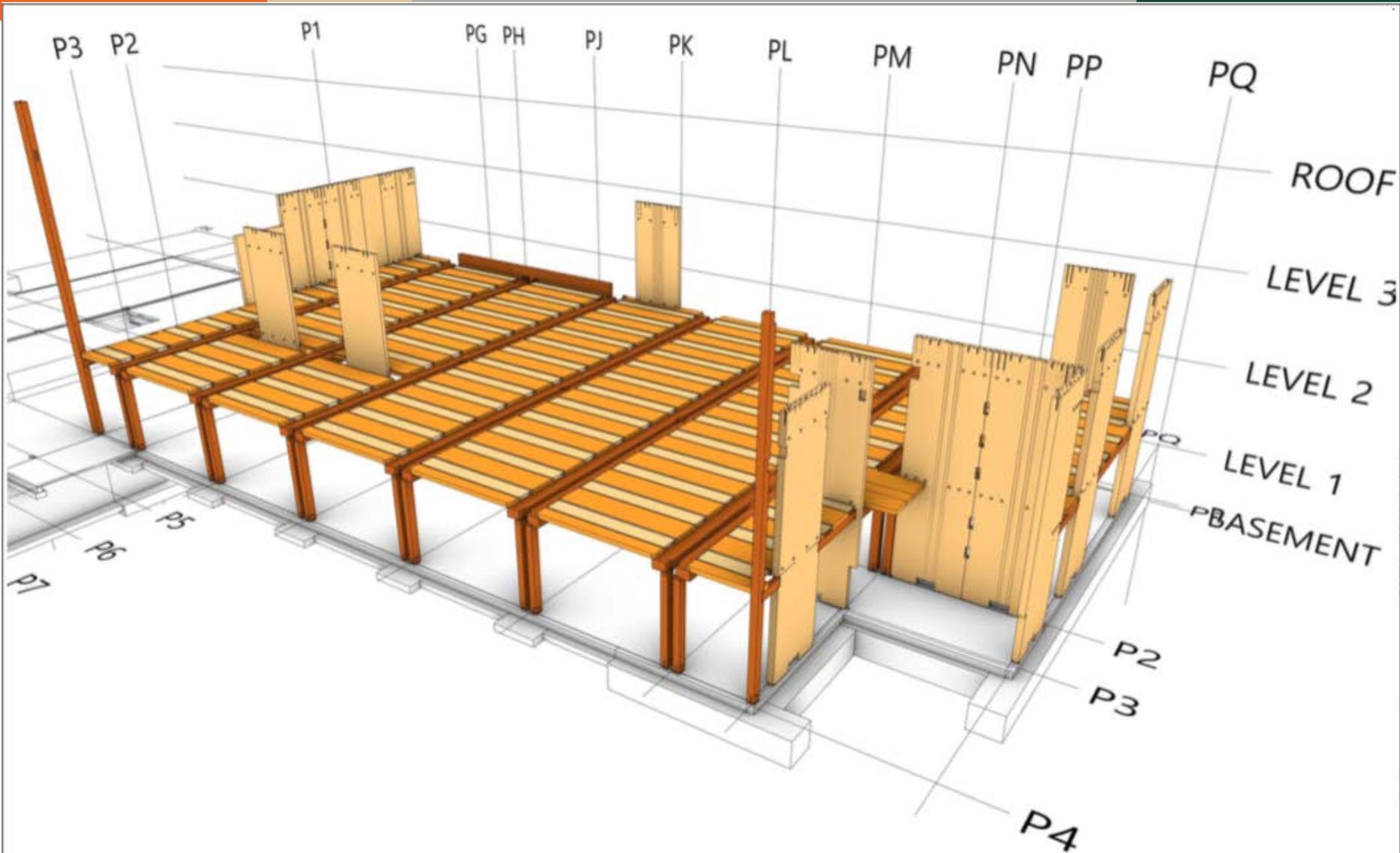


Source photo:
Courtesy of Structurecraft

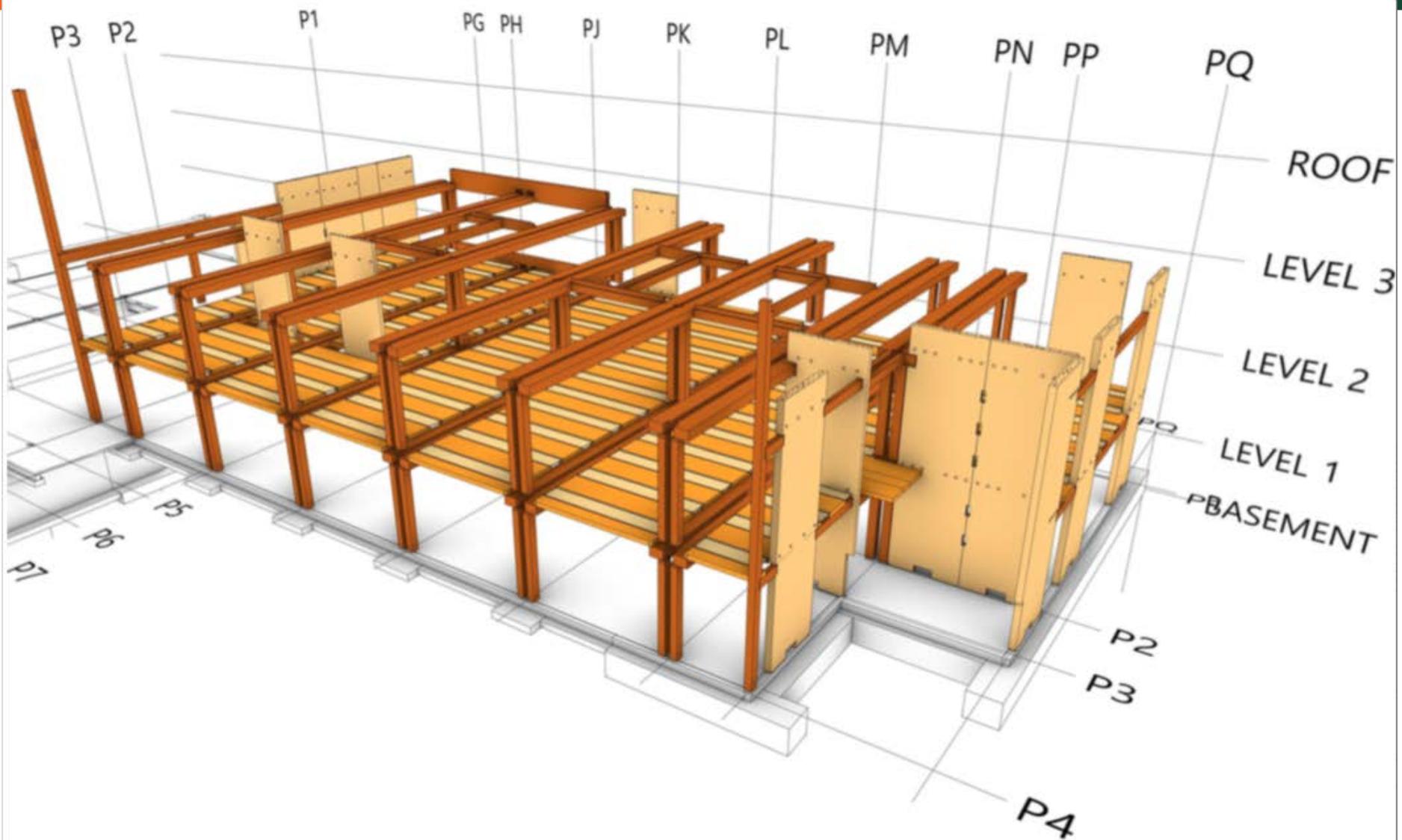
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SCALE: NA



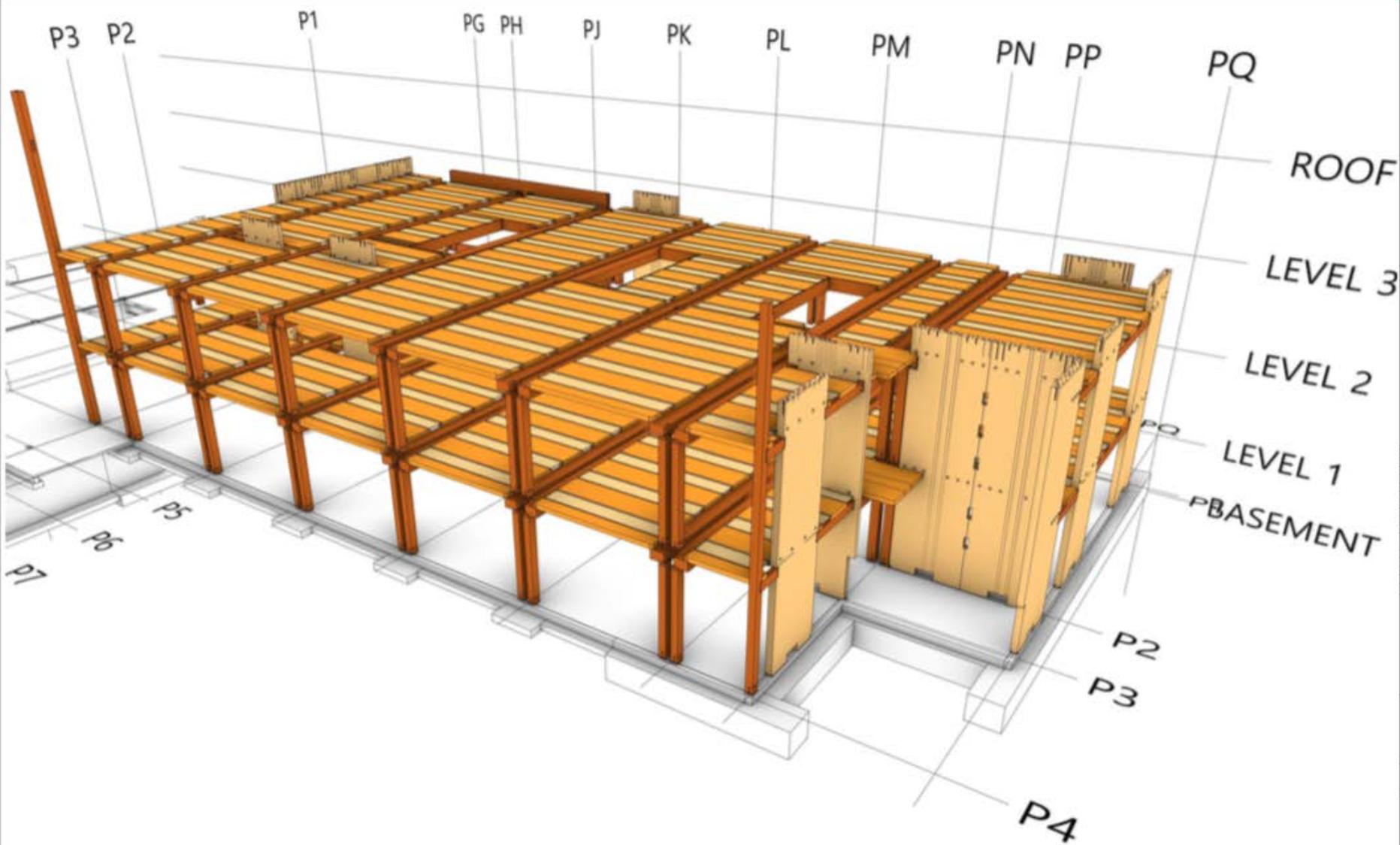
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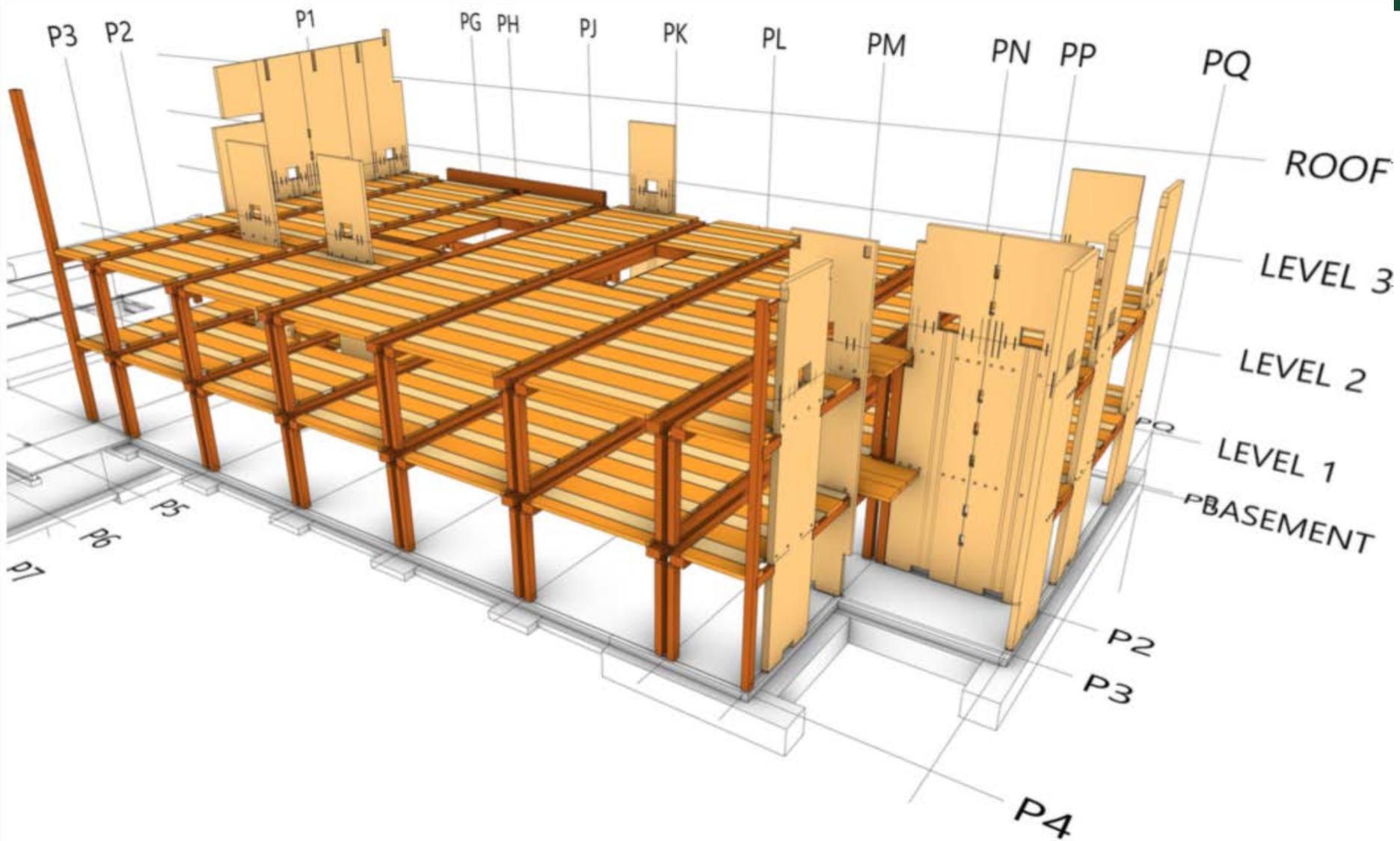


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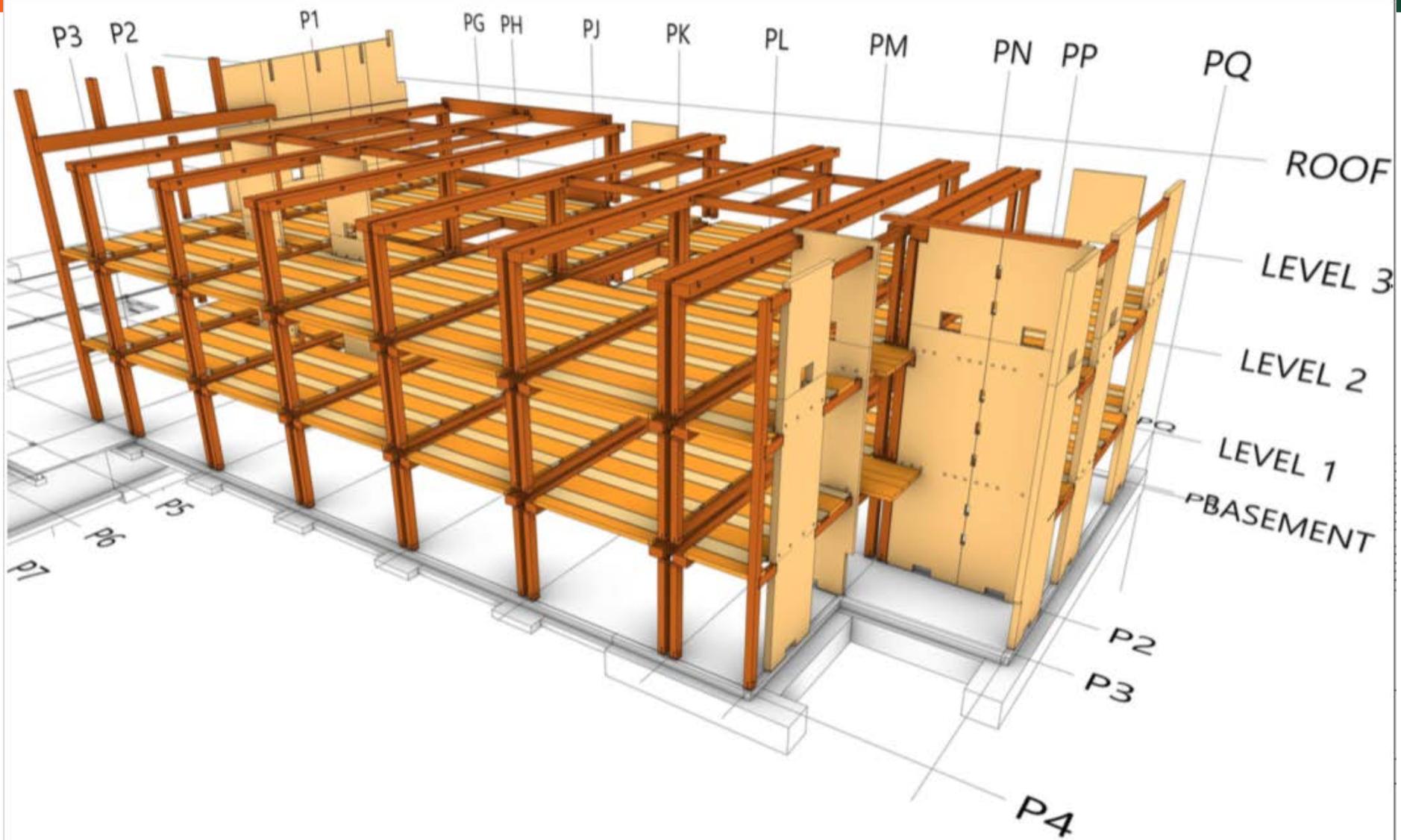


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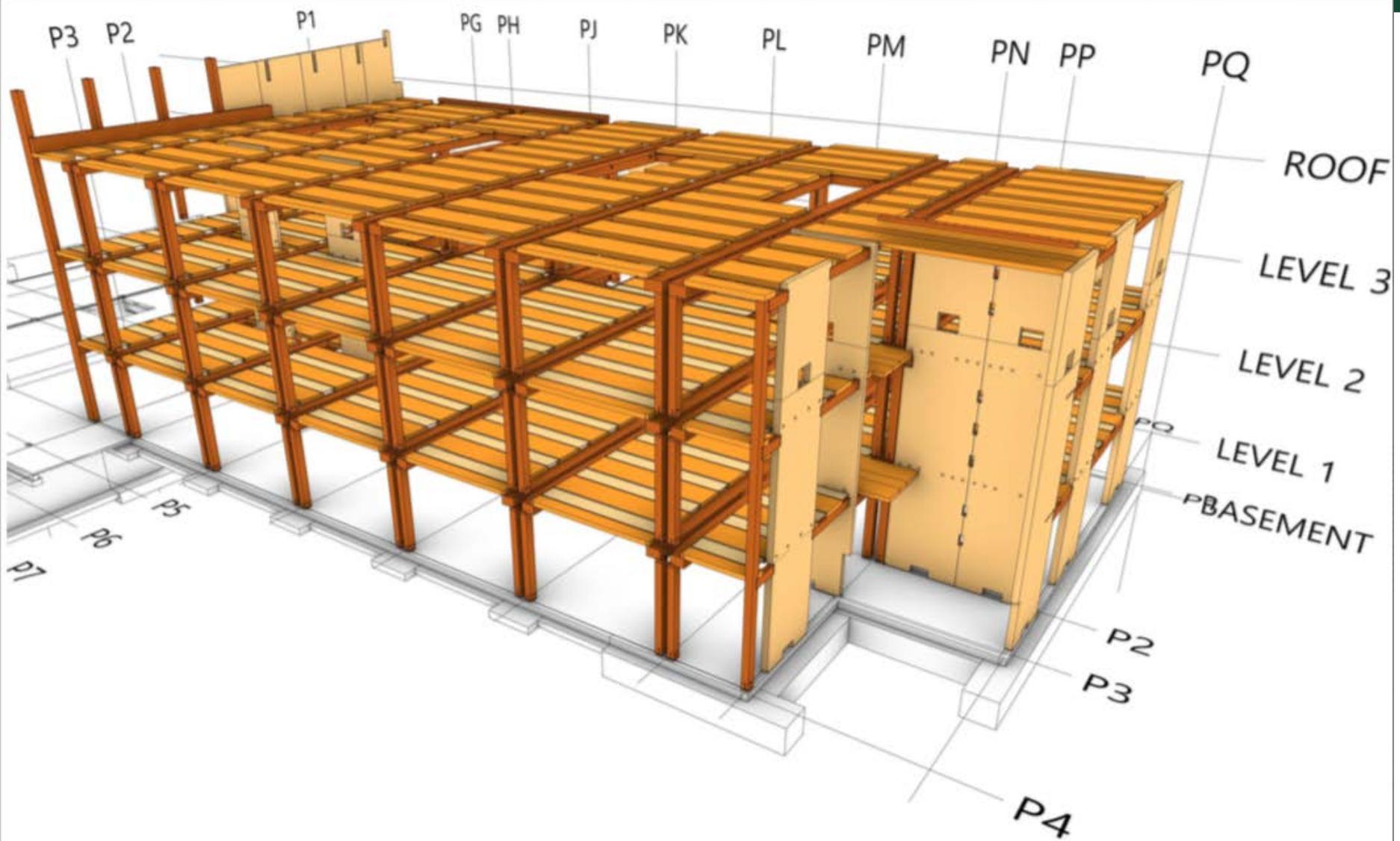
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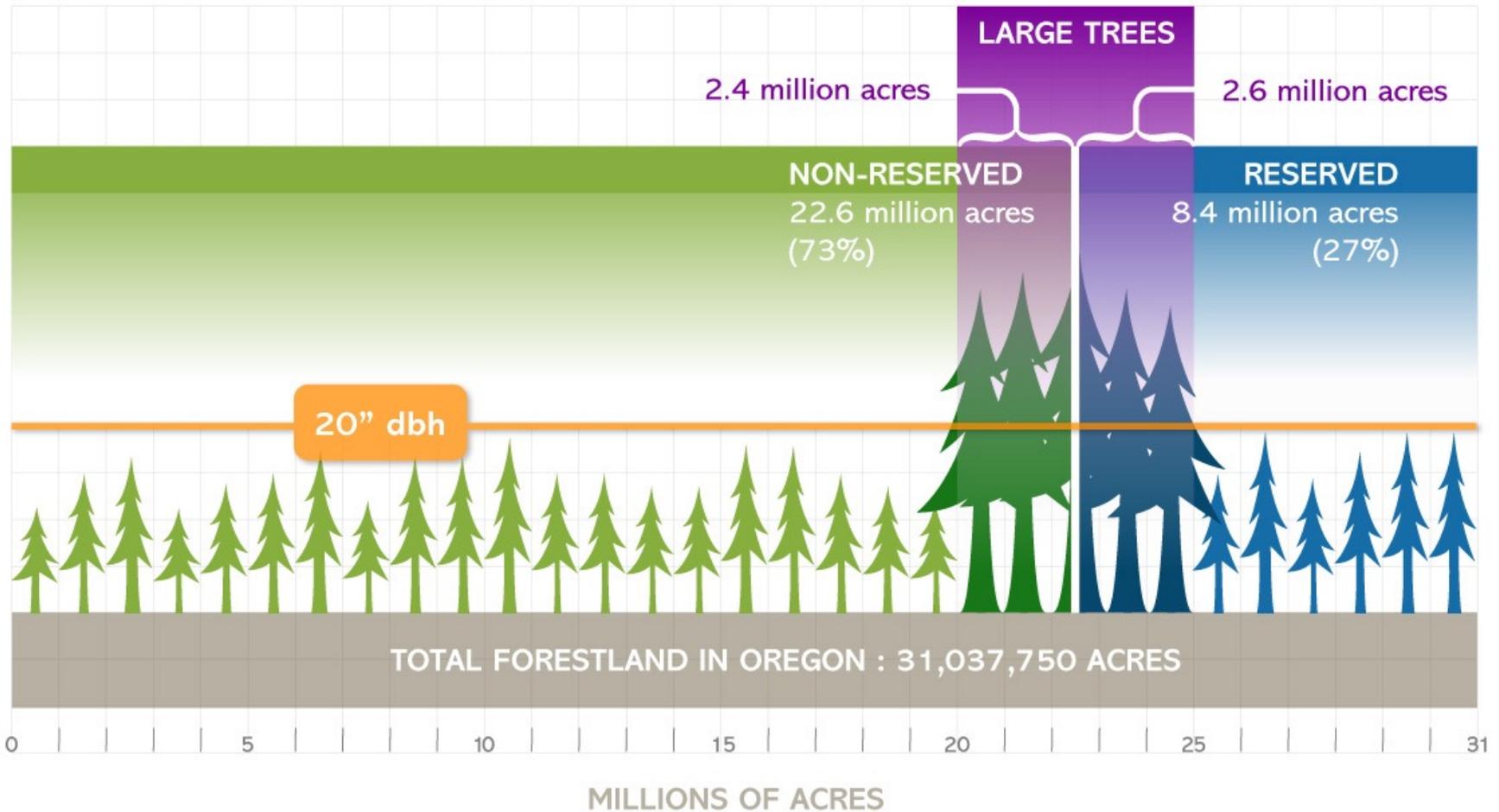
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Peavy Hall – OSU College of Forestry



Oregon has become a focal point for mass timber in the US for several reasons...

OREGON FORESTED AREA - RESERVED LANDS & LARGE TREES



LEADING
LUMBER PRODUCER
IN USA

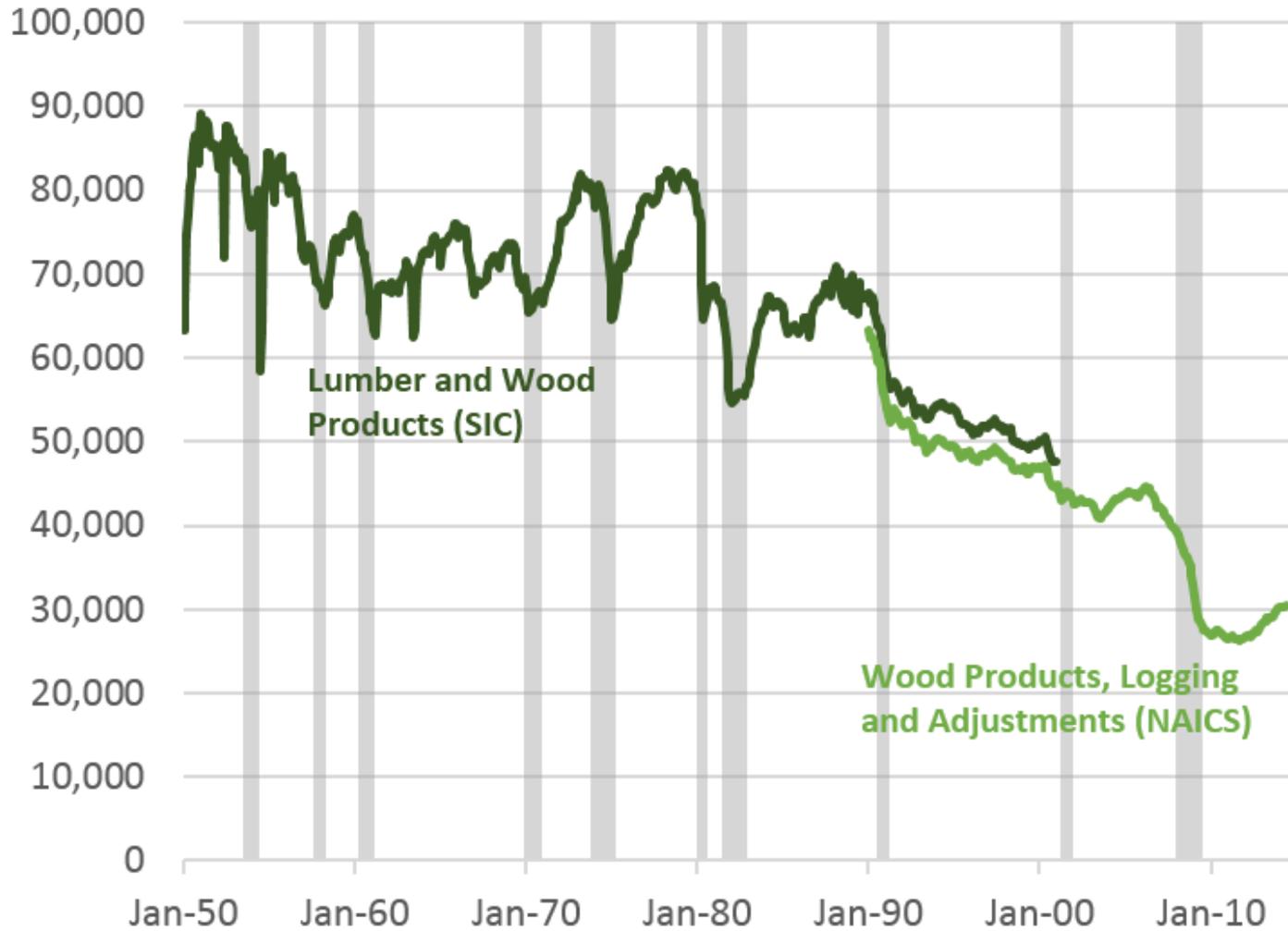
+76,000 JOBS

\$12.7 BILLION
IN OREGON'S ECONOMY
IN 2011

IN 2011 **NEARLY 16%**
OF TOTAL U.S.
PRODUCTION

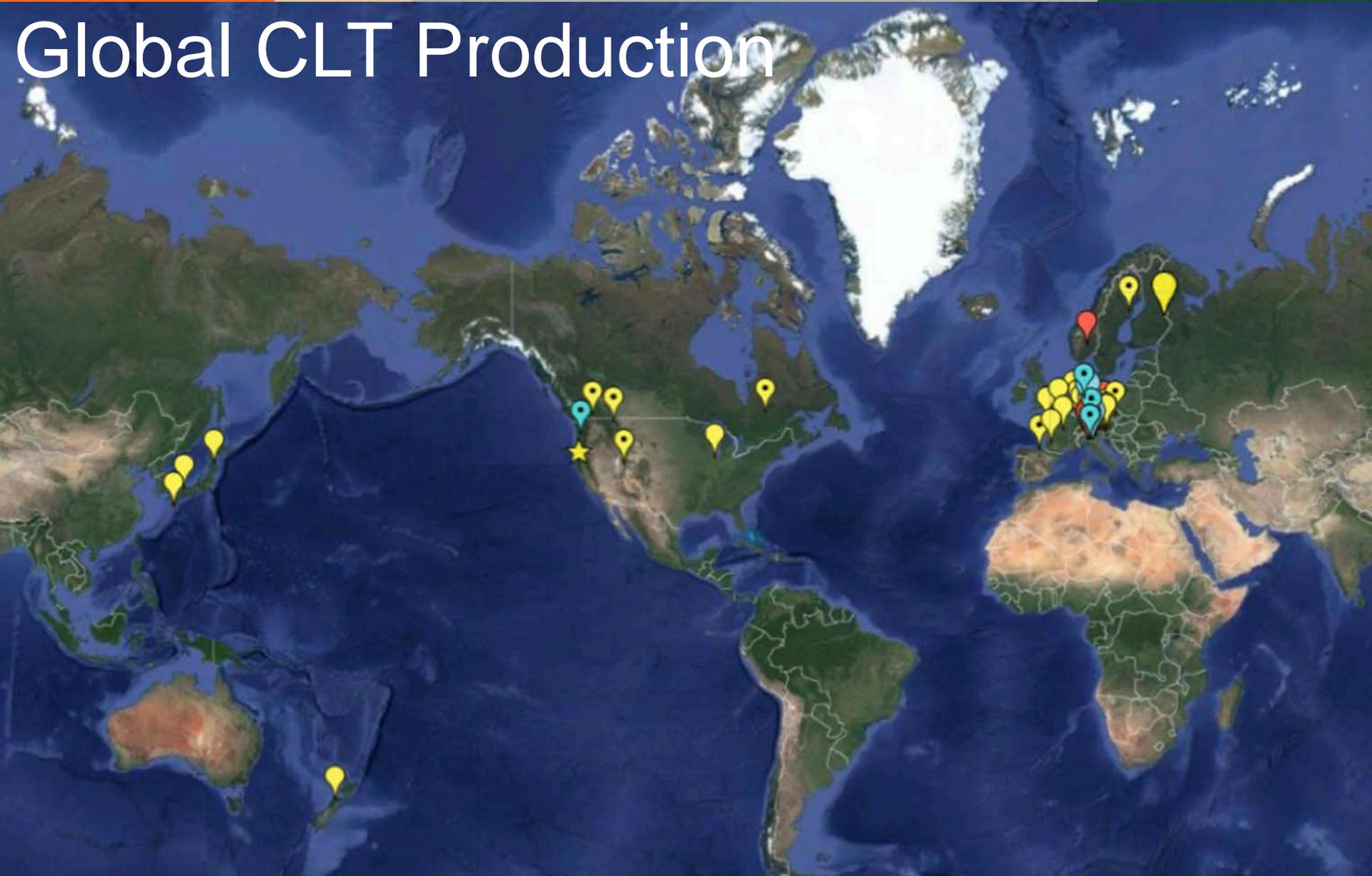


Oregon Wood Products Employment, 1950-2014

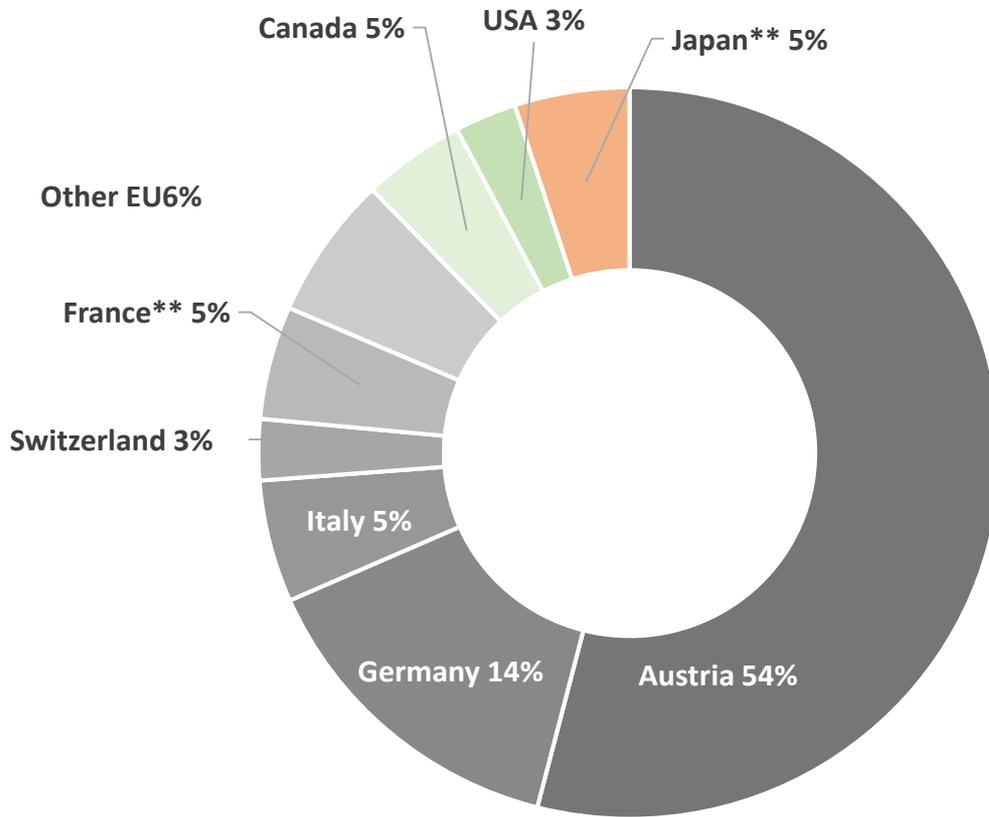


Mass Timber around the World

Global CLT Production

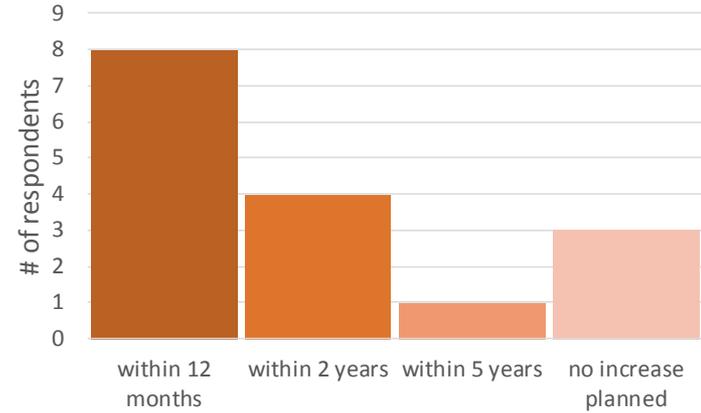
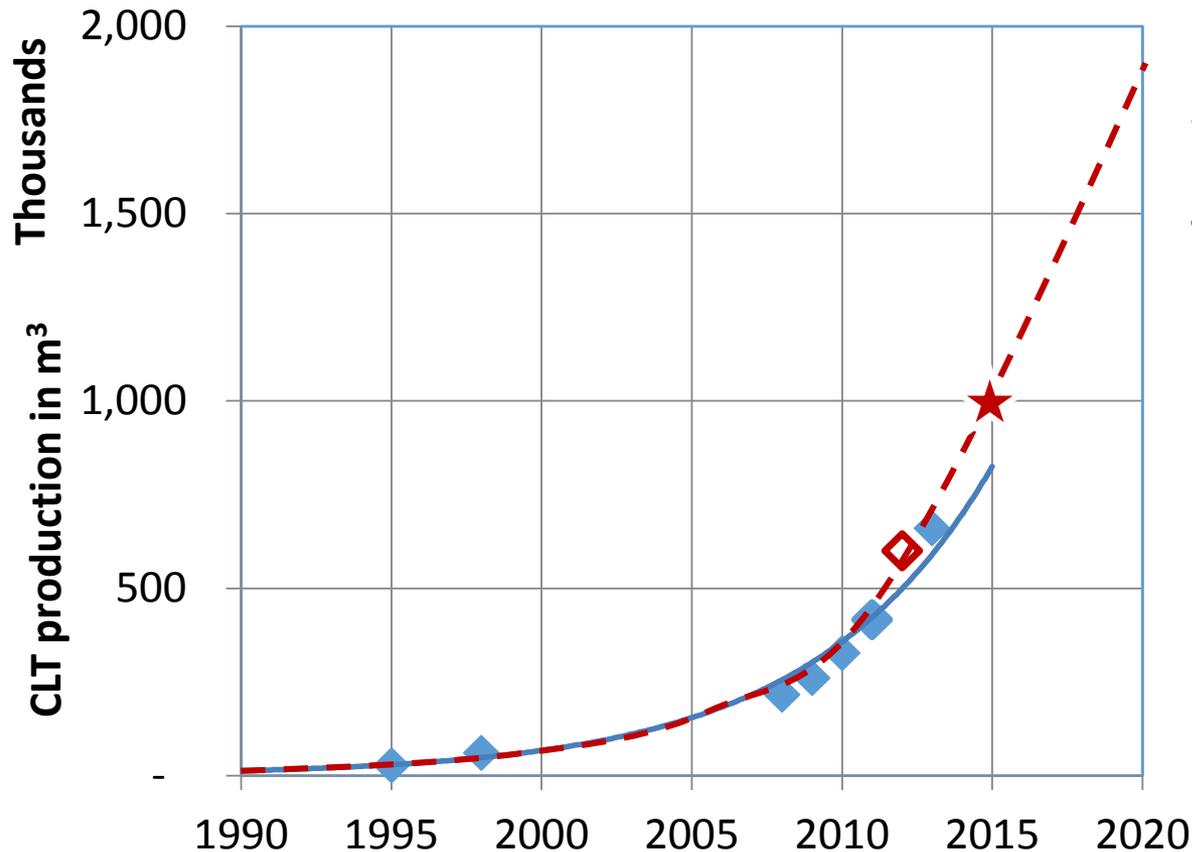


Estimated Global Output



Muszynski 2017

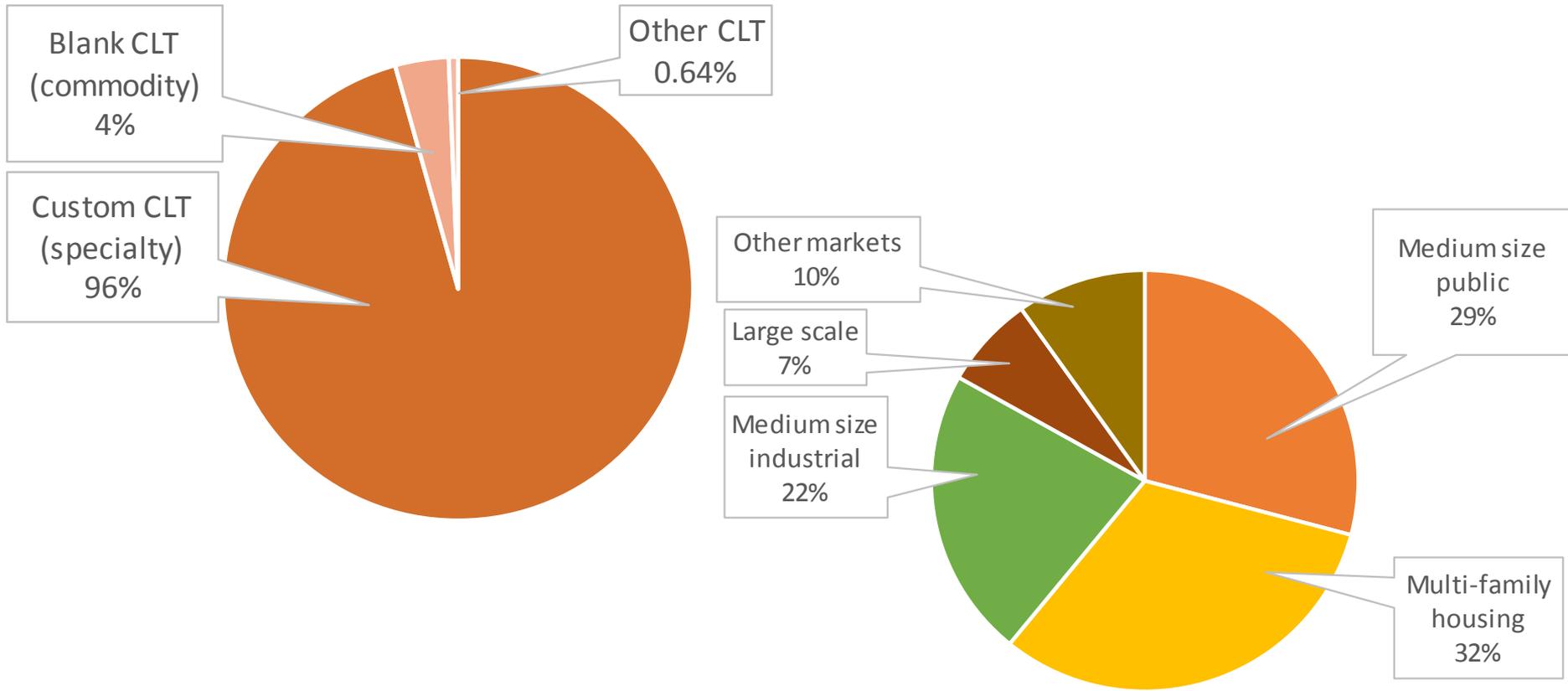
Market Growth

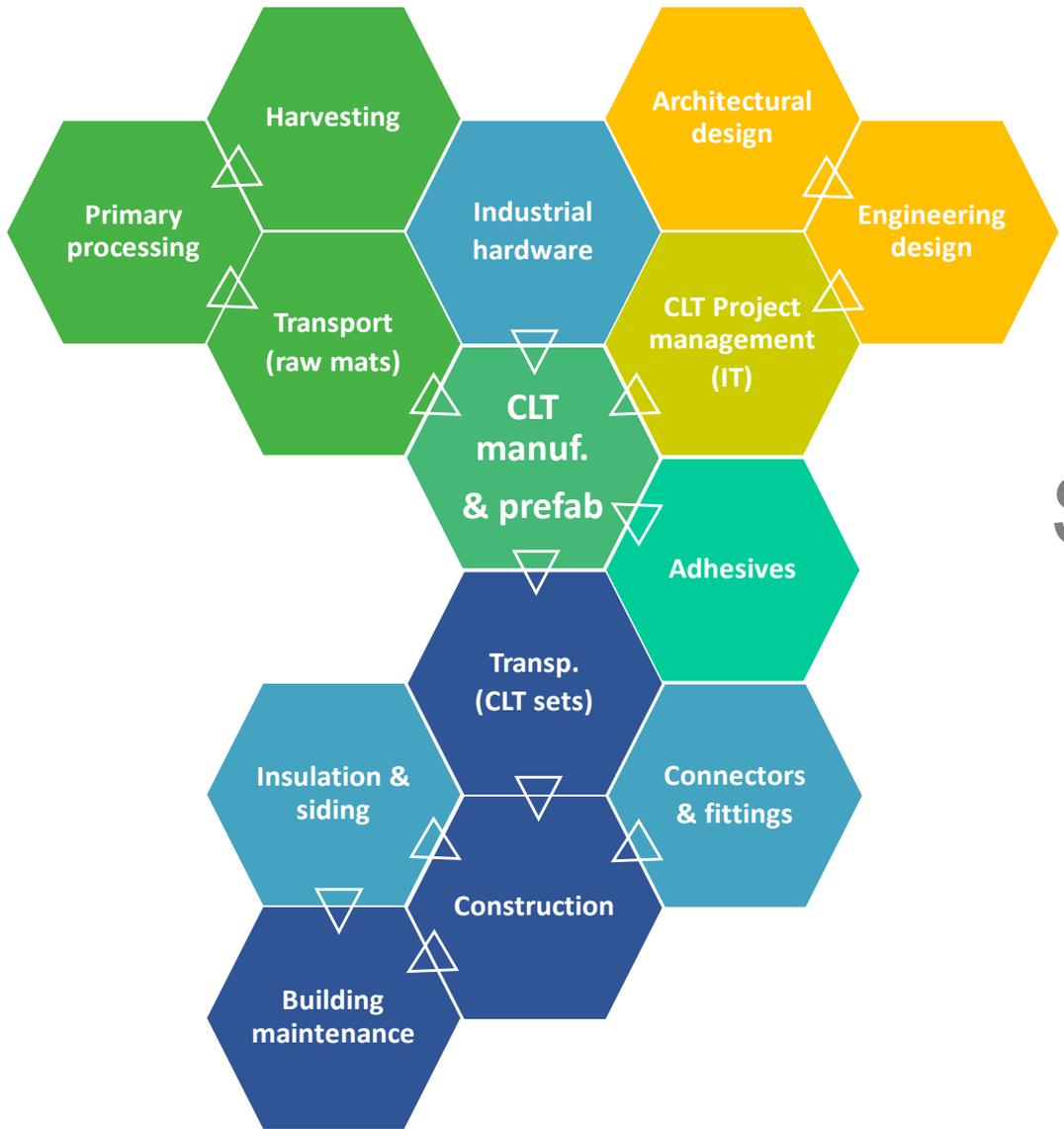


35.3 M CFT
OR
424 M BF

Muszynski 2016, based on Schickhofer 2010, Holzkurier 2011, 2015 & OSU Global Industry Survey 2016

Over 80% of world production is used in structures allowed in current codes





Supply Chains

DR Johnson Lumber, OR



SmartLam, Whitefish, MT



Mass Timber in the USA: the Future?

- 
- Freres Lumber Company – plant opens December 2017
 - SmartLam (Montana) – planning two more CLT plants in next two years
 - Katerra (WA) – planning two more CLT plants in next 2 years
 - Vaagen Timber (WA) – CLT plant announced for 2018
 - International Beams (Alabama)
 - Oregon – Columbia Pacific, American Laminators next?

TallWood Design Institute: Mandate

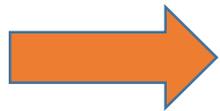
1. Grow the manufacturing base for structural wood products – especially mass timber - in Oregon and the Northwest US
2. Eliminate barriers and stimulate demand for structural wood products and building systems throughout the US

What are the barriers?

- Cost uncertainties and lack of familiarity among contractors
- Design: seismic, fire, durability (moisture), lack of standardized connector systems, etc.
- Manufacturing: computer aided design skills, computer numerical control fabrication machinery skills, digital integration from screen to machine and jobsite; aversion to capital investment risk; drying capacity
- Construction: different installation skills required than typical general contractors possess

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These span across disciplines and must be addressed through a coordinated approach

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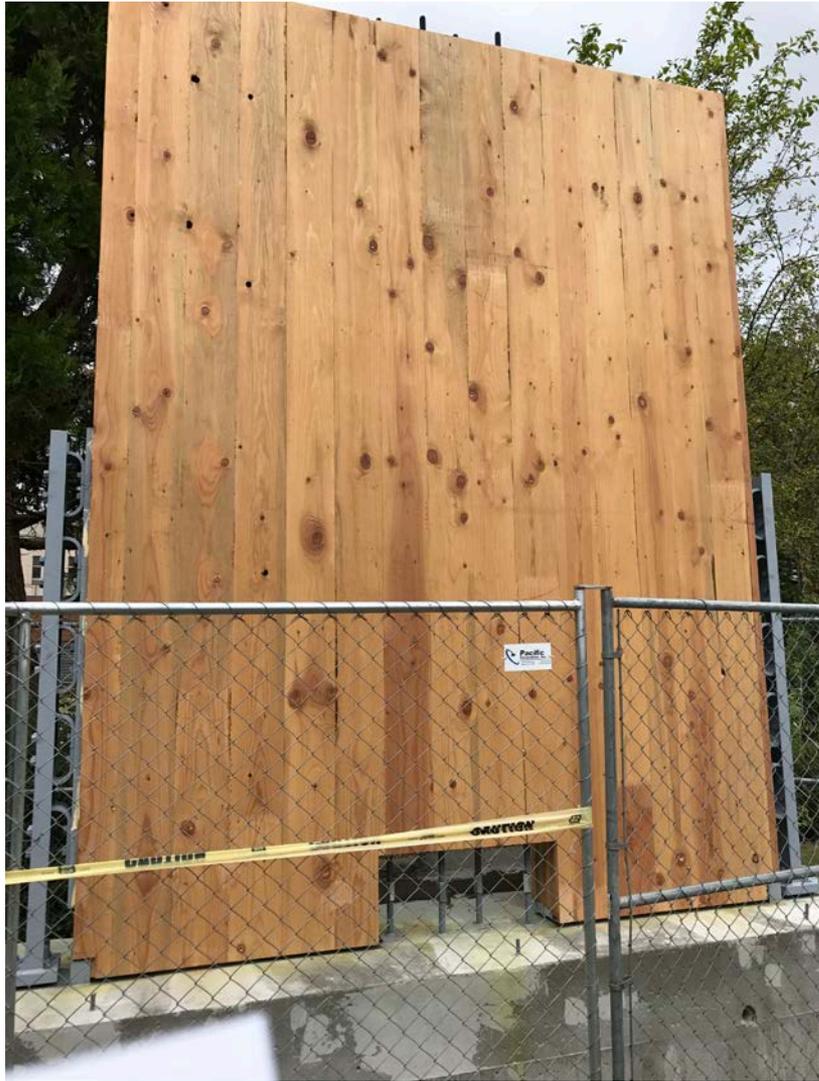
- Industry-focused applied research
- Product development and testing
- Training and education

Research

Seismic Testing of CLT Structures



CLT Rocking Wall System





OSU
Oregon State
UNIVERSITY

NEW PEAVY HALL BUILDING

- ARCHITECT: MICHAEL GREEN ARCHITECTURE INC. PORTLAND, OR
- STRUCTURAL ENGINEER: EQUILIBRIUM CONSULTING PORTLAND, OR
- MECHANICAL/PLUMBING: PAE CONSULTING ENGINEERS SEATTLE, WA
- ELECTRICAL ENGINEER: AEI AFFILIATED ENGINEERS SEATTLE, WA
- CIVIL ENGINEER: KPFF SEATTLE, WA
- LANDSCAPE ARCHITECT: SWIFT COMPANY SEATTLE, WA
- GENERAL CONTRACTOR: ANDERSEN CONSTRUCTION COMPANY PORTLAND, OR
- PROJECT MANAGEMENT: OREGON STATE UNIVERSITY CAMPUS OPERATIONS



Fire Testing





Post Occupancy Monitoring



Image Credit: Evan Schmidt

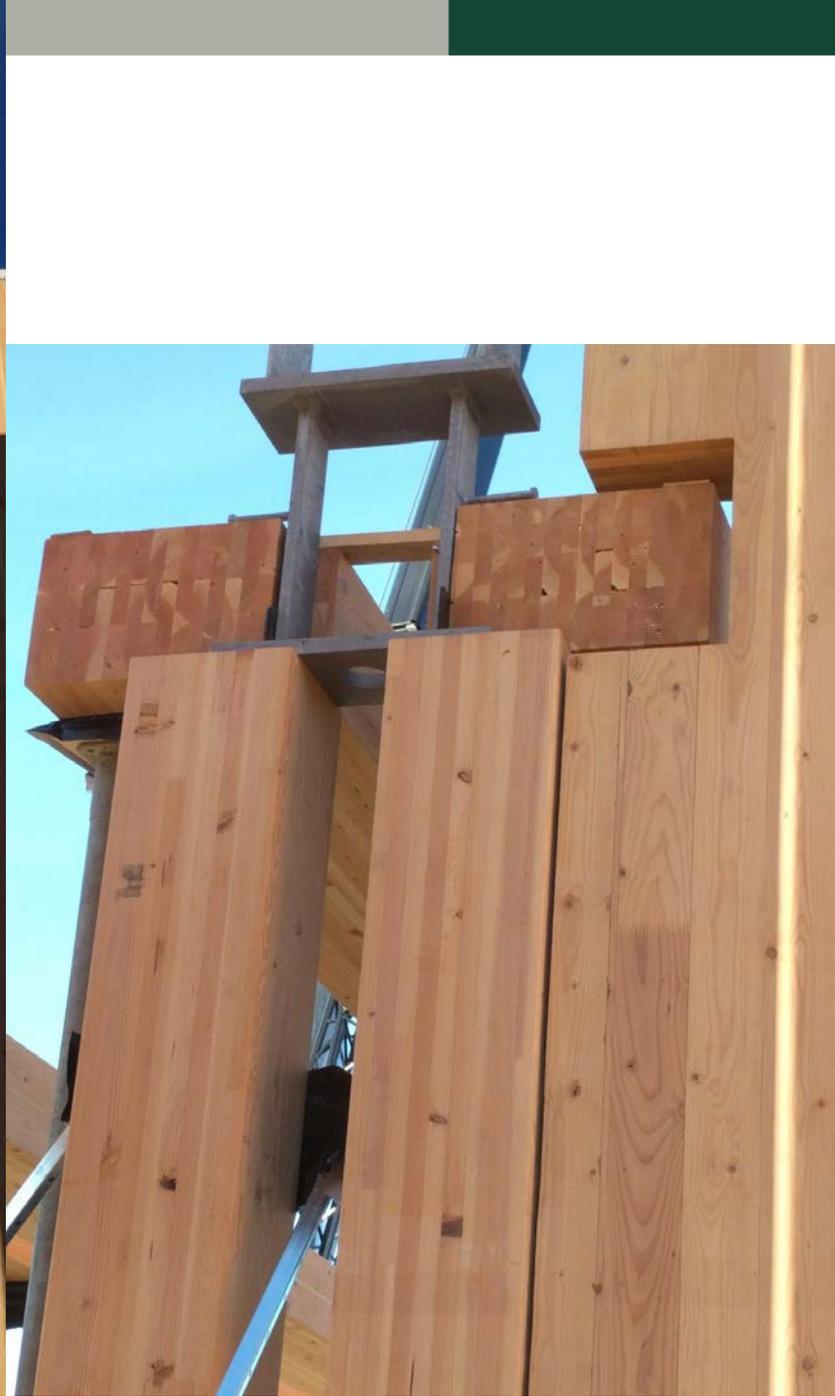


Image Credit: Evan Schmidt

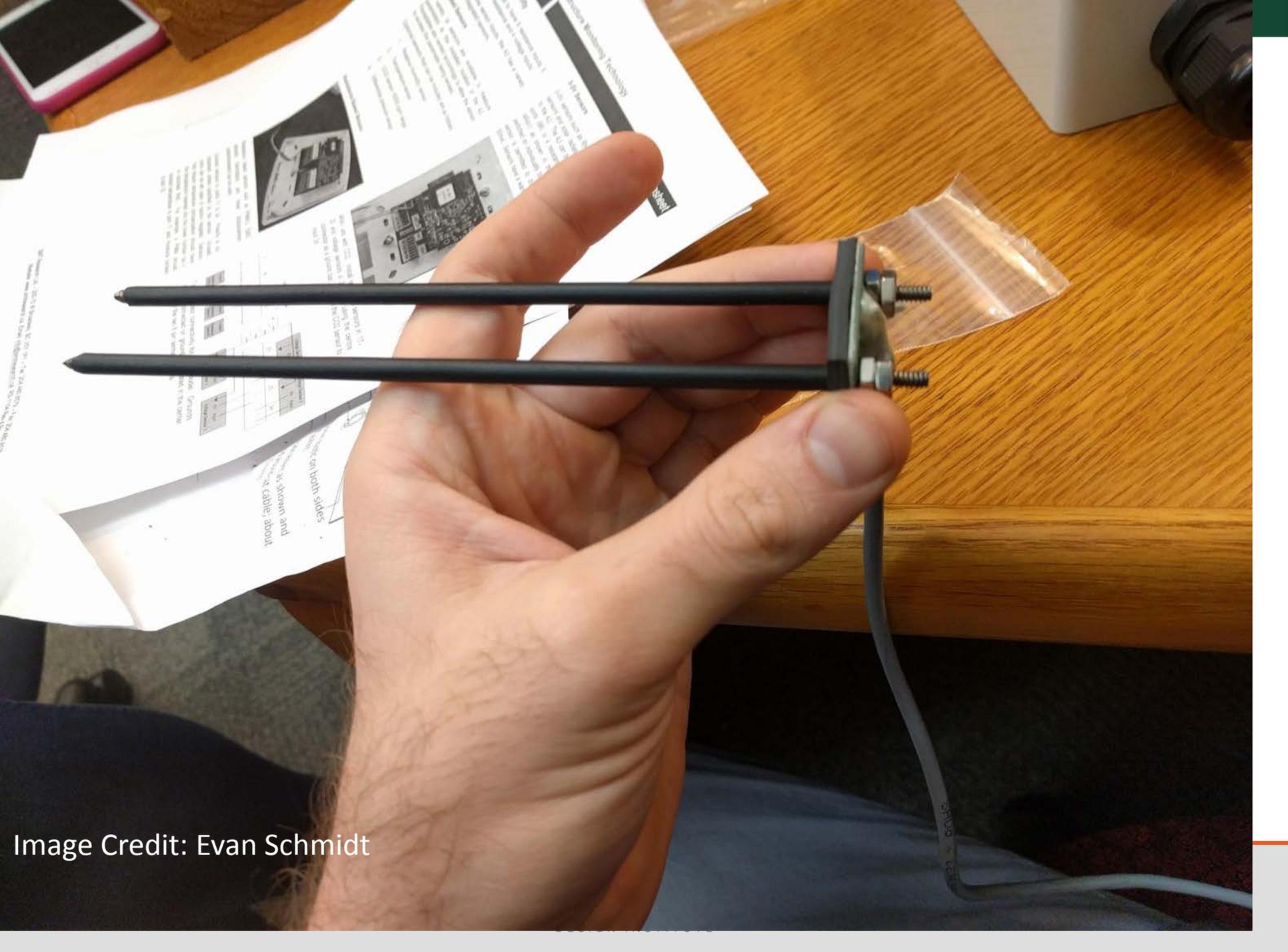


Image Credit: Evan Schmidt



2 TON

3

2

Image Credit: Evan Schmidt



Image Credit: Evan Schmidt



Image Credit: Evan Schmidt

Costing Research



Image Credit: Structurlam

Other Current/Forthcoming Research

- Modular hybrid buildings utilizing mass timber (military, disaster-relief, affordable housing)
- Improving adhesives (eco-friendliness, fire resistance, cure times)
- Coatings performance research
- Indoor air quality in mass timber structures
- Achieving net zero standards in mass timber buildings

Education



Education & Training

- Certificate program in mass timber manufacturing and construction:
 - Modular program for workplace learners
 - Joint delivery with community colleges
 - Online elements
 - Partnerships with software and machinery vendors
 - Design-fabricate build experiences at TDI's A.A. "Red" Emerson Advanced Wood Products Lab



Training

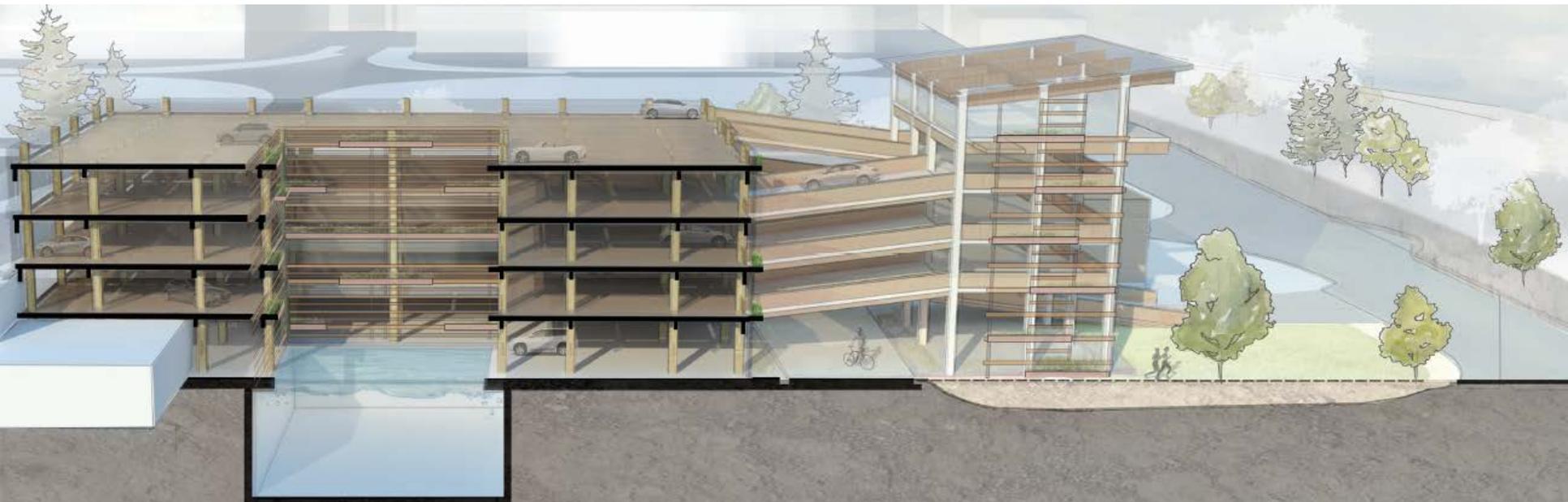
Translating research findings into plain language summaries for code officials, designers and other relevant audiences





TRANSPARENCE-V

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MOMENTUM

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KAITO [box-kite]

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HISTORIC HAYWARD FIELD

MASS TIMBER WEST GRANDSTANDS



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University of Oregon

Mikhail Gershfeld
Dept. of Civil Engineering
California State Polytechnic
University, Pomona



Hayward Field
SHELL

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Judith Sheine, Mikhail Gershfeld, Faculty Advisors



Hayward Field
WAVY CANTILEVER

David Moreno | Russell Regulinski | Tim Sieroslowski
Judith Sheine, Mikhail Gershfeld, Faculty Advisors



Hayward Field
ARCH

Nicole Giustino | August Lehnert | Max Moore
Judith Sheine, Mikhail Gershfeld, Faculty Advisors

Product Development & Testing

- Testing and product development for manufacturers (DR Johnson, Freres Lumber)
- Peer review service
- Testing for proposed projects
- Glenwood parking structure – durability technical support and testing







TALLWOOD

DESIGN INSTITUTE

Advancing solutions for designers, manufacturers
and engineers of our built environment.

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