Mass Timber Construction Management: Design through Project Close Out

Sustainability of North American Wood Products

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Course Description

Innovations in mass timber construction are offering new opportunities for the building industry. Products such as cross-laminated timber (CLT) and glue-laminated timber (glulam) combine multiple laminations of lumber to produce solid timber elements such as floor and wall panels, beams, and columns. These elements have high strength-toweight ratios, allowing them to replace more traditional construction materials while providing sustainable systems that can meet code criteria for acoustics, fire-resistance, seismic performance, energy efficiency, and more. However, while design and code aspects of mass timber receive a great deal of focus, it is the construction aspects that often decide whether a project goes forward. Mass timber construction has similarities to other systems, but it also has unique attributes—and a complete understanding of the differences is key to efficient project cost estimation and efficient construction. This in-depth, multi-faceted workshop will explore mass timber from design through preconstruction, fabrication, erection, and project close-out. After setting the stage with an overview of mass timber products and sustainability attributes, discussion will focus on construction topics, including risk analysis, cost case studies design team interaction, cost optimization, scheduling, site planning, and other logistics. Intended for construction industry professionals looking to gain a deep understanding of the unique attributes of mass timber construction, this workshop will leave attendees with information they need to successfully bid and construct a mass timber project.

Learning Objectives

- 1. Understand the preconstruction manager's role in material procurement and coordination of trades for code-compliant mass timber projects.
- 2. Highlight effective methods of early design-phase cost estimation and building official interaction on code compliance topics that keep mass timber options on the table.
- 3. Discuss potential construction schedule savings and construction fire safety practices realized through the use of prefabricated mass timber elements.
- Explore best practices for interaction between manufacturer, design team and preconstruction manager that can lead to cost efficiency and safety on site.

TO **SUSTAIN** PRIVATE FOREST.

WE MUST **SUSTAIN** THE PEOPLE WHO OWN THEM.





OUR UNIQUE POSITION



We are a landowner organization.

To protect the forests, you must promote the interests of those who own, manage and make a livelihood from their natural resources.

Only then will the ultimate goal of conservation of America's private forests be achieved.

The US Forest Narrative

What's being said about US forests and their owners?



MARKETS ARE NOT A CONCERN.



PRIVATE FOREST LANDOWNERS LACK MANAGEMENT PLANS.



PRIVATE LANDOWNERS DO NOT PRACTICE SUSTAINABLE FORESTRY.

FORESTS ARE DISAPPEARING.



ISSUE PAPER

Hug a tree while you still can: U.S. forests are disappearing

🛃 Share on Facebook 😏 Share on Twitter



Enviva Harvest Site - Outside Woodland, NC - May 2015. D Dogwood Alliance.



Forestry

Wildfire

Urbanization Ze

Zero or Minor Loss

Curtis et al 2018

Myth

US Forests Are Disappearing

11/6/2019

"U.S. Forest Resource Facts and Historical Trends"

United States Department of Agriculture (USDA) Brochure, August 2014 https://www.fia.fs.fed.us/library/brochures/docs/2012/ForestFacts_1952-2012_English.pdf





Who Owns the Forests

Federal and State Corporate Owners Family Forest Owners Owners Owners Owners Owners







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FOREST-TYPE GROUPS

White/red/jack pine Spruce/fir Longleaf/stash pine Lobiolly/shortleaf pine Pinyon/juniper Douglas-fir Ponderosa pine

Western white pine Fir/spruce/mountain hemlock Lodgepole pine Hemlock/Sitka spruce Western latch Redwood Other western softwoods California mixed conifer Exotic softwoods Oak/pine Oak/hickory Oak/gum/cypress Elm/ash/cottonwood Maple/beech/birch Aspen/birch Alder/maple Western oak Tanoak/laurel Other western hardwoods Tropical hardwoods Exotic hardwoods

-Not all forests supply wood markets -Tree species determine market use







Forests vs. Timber

- Forest Inventory
- Commercially available timber supply
- Age Classes
- Harvests removals



MYTH
 We do not
 practice
 sustainable
 forestry



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Sustainable Forestry in the United States



US Forests Are Sustainably Managed



Sustainable Forestry + Markets = Keeping Forests as Forests

Wood Markets Underpin Everything

TOP 5 REASONS FOR OWNING FORESTLAND

1 Timber

2 Land Investment

³ Wildlife

4 Legacy

5 Beauty

THE WALL STREET JOURNAL.

Thousands of Southerners Planted Trees for Retirement. It Didn't Work.

Too much pine and not enough saw mills spell years of depressed prices for plantations

11/6/2019

11/6/2019

All farmers need markets

The Role of Forests in the Climate Solution

AN ACRE OF FOREST

WOOD IS GOOD FOR THE ENVIRONMENT

RELEASES

ABSORBS

2 TONS

2

06/11/2019

STOCKS

565,880 TO CURRENT FOSSIL FUEL STOCKS

The US Forest Carbon Accounting Framework: Stocks and Stock change 1990-2016. Gen. Tech. Rep. NRS-154. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 49 pp. How much carbon is stored in U.S. forests?

US Forest Service

Annual CO2 emissions, 2017

Annual carbon dioxide (CO2) emissions, measured in tonnes per year.

Think Globally, Act Locally

Source: Global Carbon Project: <u>OurWorldInData.org/co2-and-</u> <u>other-greenhouse-gas-emissions/ • CC BY</u>

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Carbon and the Built Environment

Built Environment Statistics

Buildings represent 28% of global energy-related CO2 emissions Building construction represents another 11% of energy-related CO2 emissions Global building stock is expected to double before 2050

Net Zero Carbon Buildings Declaration Report

Construction a New Low Carbon Future

In September 2018, C40 cities from around the world made an ambitious commitment to ensure all new buildings are net zero carbon by 2030, and all buildings by 2050.

Net Zero Carbon Buildings Declaration Report

Figure 2. Breakdown of U.S. city investment pipeline between 2016 and 2050 (U.S.\$ Billion)

Figure 3. Historic reported action profile for U.S. cities, and the scale of action required over the next years.

Net Zero Carbon Buildings Declaration Report³⁷

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THE BENEFITS OF WOOD

Why Build With Wood?

Renewable Resource

It's a solution not a problem

- Exceeds other building materials in several areas
 - Environment
 - Cost savings (construction and energy)
 - Well beingness all the way around

BENEFITS OF BUILDING WITH WOOD

Wood and wood products need the least amount of energy to manufacture and has the lowest impact on air and water quality.

Life Cycle Assessment is potentially the most important method for assessing the overall environmental impact of products, processes or services

making these lorests beneficial for the natural and built environment.

carbon as they grow.²

Mass timber is a sustainable and resilient alternative to other building materials.

- Wood is the only major building material that grows naturally, is renewable and sequesters carbon.
- It is estimated that the use of one mass timber product, cross-laminated timber (CLT), along with other emerging wood technologies in buildings 7-15 stories, could have the same emissions control effect as taking more than 2 million cars off the road for one year.⁴
- Specifically, replacing steel with mass timber could reduce carbon dioxide (CO₂) emissions by between 15% and 20%.⁶

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Mass timber leads to less construction and production emissions.

 Wood not only stores large quantities of carbon throughout its lifetime, but its manufacture results in lower emissions of greenhouse and other gases than the production of other building materials.⁷

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90% reduction

in construction traffic and roughly 25% faster build time when mass timber was used instead of concrete.⁸

American Wood Council NFPW Infor graph

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- 15X Better than masonry
- 400x better than steel
- 1,770x better than aluminum.

As a result of this improved thermal performance, buildings produced using timber, particularly engineered timber such as Cross Laminated Timber (CLT), Glulam and Laminated Veneer Lumber (LVL) require less energy to heat and cool, resulting in reduced energy bills.

RECYCLED WOOD

Station -

1

Bringing the Benefits of Nature Indoors

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Biophilic Benefits

Wilson, E.O. 1984. Biophilia. Harvard University Press, Cambridge.

Healthcare spaces: reduced pain medication by 22%

Education spaces: increased rates of learning, improved test results, reduced impacts of ADHD

Office design: increased productivity by 8% and rates of well-being increased by 13%

Homes: 7-8 % less crime attributed to areas with natural elements and an increase of 4-5% in property price

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Mass timber offers a rare opportunity—a chance to transform the construction and logging industries so that we reduce emissions while adding millions of carbon-sequestering trees to the landscape. We'll cut them down and then grow more, gardening the earth as stewards living in a built world made more and more out of wood. America's oldest standing wooden home is still holding 400-year old carbon. Dedham, MA

YOU can be part of the carbon solution.

Build with WOOD!

Melinda Gable

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