THEORY + PRACTICE

MASS TIMBER
Agenda

INTRODUCTION
WHAT WAS
WHAT'S NOW
WHAT'S NEXT
LESSONS LEARNED
Alexandra Durkee

DEVELOPMENT ASSOCIATE

Hines T3 Project Manager

6 Years Experience
Jessie Johnson
ARCHITECT
AIA, LEED AP
T3 RiNo Project Leader
15 Years Experience
Hines

63 YEARS

$124.3 BILLION OF ASSETS

PRESENCE IN 219 CITIES + 23 COUNTRIES

514 PROPERTIES = 222 M SF IN PORTFOLIO
Experimenting, diversifying, sharing innovations

Data as a change catalyst, for the benefit of people.
What WAS
Building with wood dates to the Stone Age

Timber framing dates to 50 AD

Heavy commercial use in U.S. until Industrial Revolution

Code restrictions following Great Chicago Fire of 1871
Pros & Cons

Pros

+ Character
+ Low Embodied Energy

Cons

× Tech Integration
× Energy Efficiency
What’s NOW
The modern timber building landscape
TIMBER101

PRODUCTS

GLUED

GLT | SCL | CLT

NON-GLUED

DLT | NLT | CNLT | ICLT

Edinburgh Napier University
TIMBER101
EVOLVING CODES

**TYPE IV-HT**
IBC 2015

**TYPE IV-C**
IBC 2021
limited state and municipal adoptions include: Oregon, Washington

**TYPE IV-B**

**TYPE IV-A**

* Occupancy Classification B max heights and levels; variances may exist for A, M and R-2 Occupancy Classification, reference IBC 2021.

Fire protection requirements limit interior exposed timber; redundant water supply for fire suppression over 120' h.

Full interior and exterior fire protection requirements restrict exposed timber; redundant water supply for fire suppression over 120' h.
Timber members develop a predictable outer char layer that insulates and protects structural integrity during a fire. Independent fire endurance tests inform code-based fire protection requirements.

Less weight = better resistance to lateral forces. With code-based sizing and connection / fastening requirements, timber assemblies – with bracing for shear walls – can resist lateral distortion. Limits vary by IBC Seismic Risk Category, with guidance available from the ASCE.

Typical spans are 20-30’. Achievable spans (up to 60’) are a three-way balance between:
1. Size of timber member (esp. depth)
2. Cost of timber member
3. Span of timber member & impact on modular efficiencies
## TIMBER101

### OWNER VALUE

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>SPEED TO MARKET</strong></td>
<td>Off-site component construction simultaneous with on-site foundation work, on-site assembly. <strong>Can see up to 20% faster construction.</strong></td>
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<tr>
<td><strong>LABOR</strong></td>
<td>Prefabrication requires less on-site labor. <strong>Less vulnerable to labor shortages.</strong></td>
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<td><strong>MATERIAL WASTE</strong></td>
<td>Controlled fabrication = less waste from virgin material and at construction site.</td>
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<tr>
<td><strong>WEIGHT</strong></td>
<td>Can reduce substructure, shear wall, and foundation costs. <strong>Mitigating variable: Height &amp; Seismic</strong></td>
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<tr>
<td><strong>MATERIAL REUSE</strong></td>
<td>Potential for direct reuse following deconstruction. <strong>Mitigating variable: Retesting</strong></td>
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HEALTH & WELLBEING
Natural wood indoors can lower pulse rate, blood pressure & autonomic nervous activity. 
**Calming effect from biophilia.**

PURPOSE DRIVEN
Market position as positive contributor to environment attracts tenants, who increasingly care about carbon footprint.

INSTAGRAMMABLE
Unique aesthetic appeals to younger generations, who value authenticity and a “shareable” visual experience.

CONNECTION TO PLACE
US production facilities are growing, catering to consumer demand for localism.
PERFORMANCE
State-of-the art mechanical system
High-performance envelope & glass
Efficient planning grid
Acoustic control
Consistent access to daylight & views

TECHNOLOGY
Robust & redundant data backbone
WiredScore rated
Modern elevators

AMENITIES
Transit proximity
Active lifestyle: Bike storage, showers, fitness + wellness
Social lounges at street-level and rooftop
Collaborative tenant hubs

loft office
1 MILLION SF ON THE BOARDS
in five US and Canadian cities

T3 collaborators include: Michael Green & Associates, Pickard Chilton Architects, Hartshorne Plunkard Architecture
THE EVOLUTION

RiNo

IBC Type V
85’ maximum height
Six stories
240,000 SF
Ground breaking early 2020
DEN
IBC Type V
85' maximum height
Six stories
240,000 SF
Broke ground early 2020
THE
EVOLUTION
IBC Type V
85' maximum height
Six stories
240,000 SF
Broke ground early 2020
DEN IBC Type V
85' maximum height
Six stories
240,000 SF
Broke ground early 2020

THE EVOLUTION
Environmental benefit

Of one T3

**Carbon** 3,646
Metric tons of carbon stored

**Emissions** 1,411
Metric tons of emissions avoided

**Impact** 996
Cars taken off the road (equivalent)
Built to Sustain.
Designed to Inspire.
What’s NEXT
Modeling tall timber
TALL WITH TIMBER
Rethinking the housing crisis
Timber vs. Concrete:  
- 20% construction duration
HOSPITALITY & TIMBER
Modular Design
Lessons Learned
bridging theory & practice
The timber design and construction process is more front loaded: a manufacturing-oriented delivery model with earlier systems decision timelines.

Design, engineering, and contracting teams with prior timber experience streamlines the process.
**LIFE CYCLE ASSESSMENT**

**SOURCING**

- Responsible sourcing: +/- 25%
- Carbon sequestration: 75%
SOURCING

EMBODIED ENERGY

Responsible forestry
Transportation intensity
Manufacturing offsets & waste recovery
Exposed systems require heightened architecture →
design + engineering coordination must ensure
seamless interplay between timber beams, exposed
ducts, and required clearances

Economies of column grid and standard bay sizes
are more pronounced with timber than with CIP
concrete or steel

Consider performance-based specification
Lightweight cladding lessens dead load burden on timber system

CLT, NLT, and DLT should be reevaluated with every project in response to a rapidly evolving supply chain

The core material decision is site and project specific; concrete adds cost and environmental impact
FLOOR LOADING

ALTERNATIVE

Timber doesn’t give as much built in floor loading for assembly spaces (as concrete and steel) → need to evaluate if extra floor depth is needed overall → can increase in cost

Beam structure requires a drop panel above each window → still receive high expanse of window.
CONSTRUCTION

VIDEO EMBED OF T3 CONSTRUCTION