

# AIA WASHINGTON COUNCIL

## 2018 ADVOCACY SUMMIT

### CES

#### **Learning Objective 1:**

Each attendee will learn about the process the ICC Tall Building Ad Hoc Committee undertook in investigating mass timber construction and how the ICC mass timber code amendments, on which the Washington State Building Code amendments are based, were developed.

#### **Learning Objective 2:**

Each attendee will learn how the proposed amendments were incorporated into the code amendment to the Washington State Building Code, the process for adoption and where the code change proposal currently stands.

#### **Learning Objective 3:**

Each attendee will leave with a basic understanding of the various changes to the Washington State Building Code to permit the use of mass timber in the construction of tall buildings.

#### **Learning Objective 4:**

Each attendee will learn how to apply these new code changes to projects. Discussion will involve case studies and description of different mass timber systems available to designers and how to avoid common pitfalls for mass timber projects.

# AIA WASHINGTON COUNCIL 2018 ADVOCACY SUMMIT CES

## CES ANNOUNCEMENT

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

# Why Washington and Tall Timber?

## **Legislation ESB 5450**

**Forest Health Crisis:**  
Management Practices  
Remove Fuels  
Prevent Fires  
Increase Dialogue  
Sustainable Harvest

**Establish  
Manufacturing Base:**  
Hi-tech CNC Machining  
Prefabrication/Modularization  
Modernize Construction

**Rural Jobs/  
Economic Growth**

**Local/Renewable Material**



IMAGE: INTERNET



# State-Wide Code Change Proposal

**CLT Coalition**

**Language from ICC TWB**

**Educational Outreach  
to SBCC members**

**TAG and Code  
Council Process**

**Public Hearings**

**ESB 5450 was vital**

**2015 vs. 2018**

**SBCC process...**

**WABO: In-step with  
National Process**

**Could be enacted  
as early as July 2019**

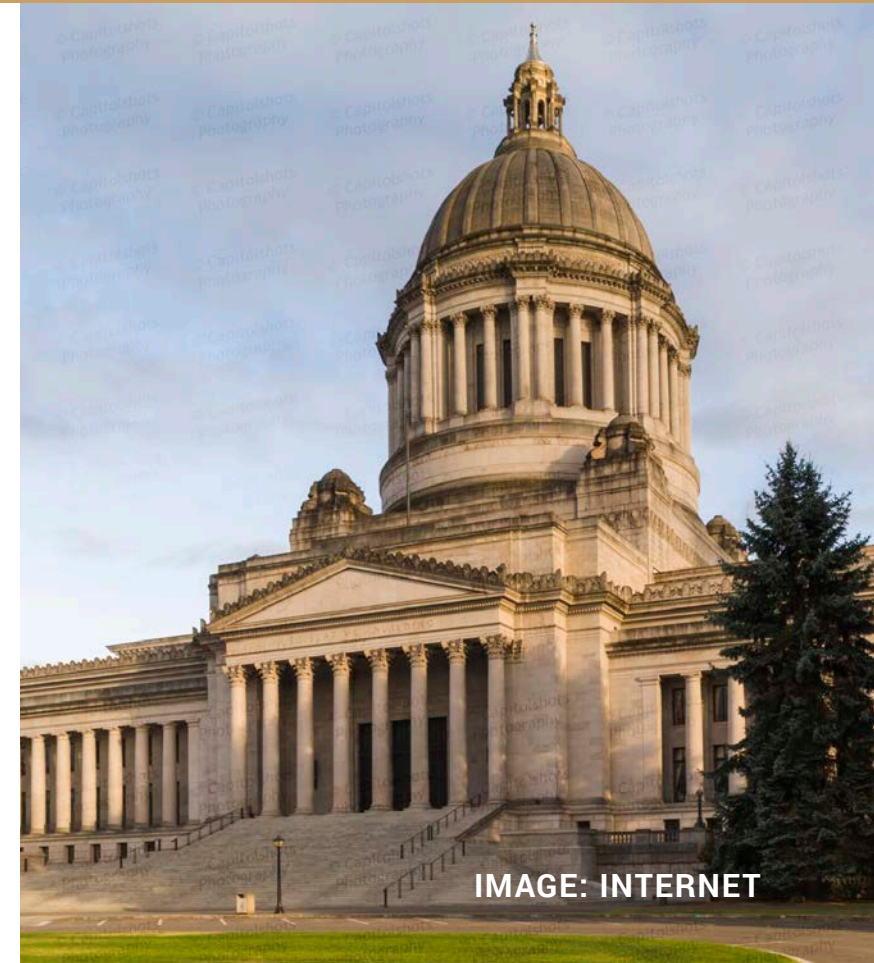


IMAGE: INTERNET



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INTERNATIONAL CODES™

**IBC**®

A Member of the International Code Family®

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**BUILDING CODE**®

# The Code Changes



# TWB Goals

**No collapse after complete burn-out of fuel without automatic sprinkler protection**

**No unusual risk (radiation/fire exposure) to adjoining properties**

**No unusual risk (radiation/fire exposure) of adjoining properties to mass timber building**

**No unusual fire department access issues**

**Egress systems designed to protect building occupants during the design escape time, plus a factor of safety**

**Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios**

**The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.**

# 2021 IBC: 11 Code Change Proposals (Group A)



**IBC**<sup>®</sup>

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INTERNATIONAL  
BUILDING CODE<sup>®</sup>

**Tables 504.3 & 504.4:**  
Allowable Height/Stories

**Table 506.2:**  
Allowable Area

**508/509:**  
Fire Barriers

**602.4:**  
Type of Construction

**703.8:**  
Performance Method

**703.9 & 1705.19:**  
Sealants at Edges

**718.2.1:**  
Fireblocking Materials

**722.7:**  
Fire-Resistance Ratings

**IFC 3308.4:**  
Fire Safety During Construction





# ICC CODE DEVELOPMENT PROCESS

## HOW IT WORKS

The International Code Council develops the International Codes, a coordinated, modern set of building codes used in all 50 U.S. states and many other countries. Changes to the I-Codes are made through a transparent and inclusive consensus-based process that complies with the OMB Circular A-119.

### CODE DEVELOPMENT COMMITTEES

Anyone can apply to serve on one of the committees that preside over the Committee Action Hearings (CAH).

The Codes and Standards Council makes recommendations based on these applications to the ICC Board, which appoints members to the committees.

Members of each committee fall into one of three interest categories:

- **General:** government regulatory agencies.
- **User:** building owners, designers, insurance companies, private inspection agencies, academics.
- **Producer:** builders, contractors, manufacturers, distributors.

### CODE CHANGE SUBMISSION AND REVIEW

Anyone can submit code change proposals via ICC's cloud-based program, cdpACCESS™.

ICC staff reviews each proposal and assigns them to the applicable Code Development Committee.

STAGE ONE



STAGE TWO



### COMMITTEE ACTION HEARINGS

At the CAH, code development committees **approve**, **approve with modifications** or **disapprove** each code change proposal.

Any participants may challenge the committee actions. ICC members vote on these challenges online. Approved challenges result in an automatic public comment to be considered at the PCH.



### PUBLIC COMMENT SUBMISSION AND REVIEW

Anyone can submit public comments via cdpACCESS™ on the results of the CAH.



### PUBLIC COMMENT HEARINGS

At the PCH, eligible voters discuss and vote on code change proposals.



Eligible voters work for government agencies protecting the public's health and safety and have no financial stake in the outcome.

STAGE THREE



### ONLINE GOVERNMENTAL CONSENSUS VOTE

Following the PCH, eligible voters vote online. **The final vote count combines the in-person PCH and online votes.** The Validation Committee reviews and the ICC Board confirms the final results.



### NEW EDITION PUBLISHED

An updated edition of the International Codes is published every three years.

The Code Council also develops a number of codes and standards, including mechanical, plumbing, structural, resilience, accessibility and green standards, and is accredited by the American National Standards Institute as a standards developer.

# Section 202: New Definition

## MASS TIMBER

Structural elements of Type IV construction primarily of solid, built-up, panelized or engineered wood products that meet minimum cross section dimensions of Type IV construction.

Light-frame wood construction not allowed!

**NOTE: Heavy Timber minimum dimensions in IBC 2018 moved to section 2301.11**



IMAGE: INTERNET



# Types of Type IV

**IBC defines minimum sectional dimensions:**

Solid Sawn

Glued-Laminated

Structural Composite

Cross-laminated Timber



IMAGE: FAST + EPP



# IBC Section 602.4 Type IV

## Defines Three New Construction Types:

Type IVA

Type IVB

Type IVC

## Type IV-HT:

Legacy Type Heavy Timber  
No Change

## Note:

PRG-320 2018:  
Heat De-lamination

**NOTE:** Protected concealed spaces and shafts permitted in new Types IV-A, B, C.  
Concealed spaces NOT permitted in Type IV-HT.

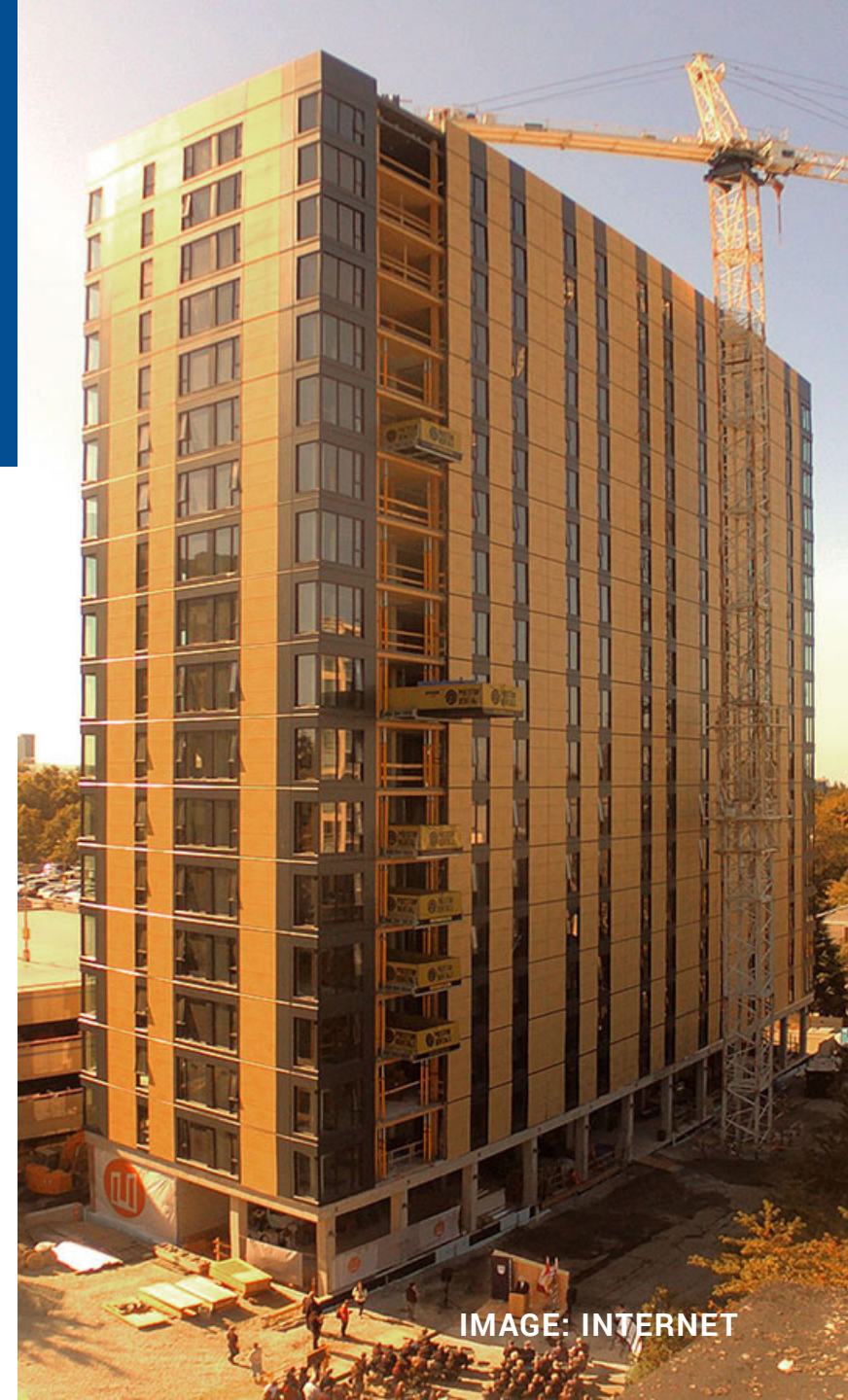


IMAGE: INTERNET

# Type IVA

## INTERIOR: FULLY PROTECTED

Fully protected:  
No exposed mass timber  
(walls, ceilings, roofs)

Not less than 80 minutes  
or 2/3 of the fire resistance  
rating from noncombustible  
protections

**NOTE:** Buildings greater than 12 stories/180 feet, interior exit and elevator hoistway enclosures shall be constructed of non-combustible materials.

## EXTERIOR

Minimum 40-minute  
noncombustible protection  
plus no combustible cladding  
or sub-framing

## FLOORS

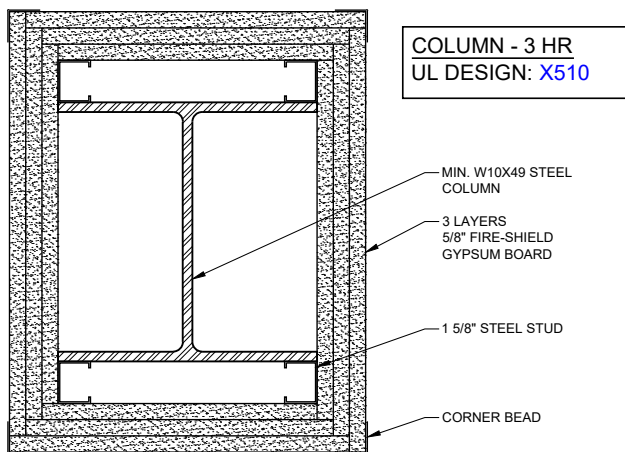
Minimum 1-inch thick  
non-combustible topping



# Type IVA - Comparison

## STEEL

Significant loss in strength above 1,000 degrees F  
(5 min. ASTM E119)



SOURCE: USG

## TIMBER

Timber chars at 572 degrees F.  
Maintains strength beyond char zone. No temperature rise on back surface with minimum thickness of residual timber.

TWB Fire Test Temperature:  
+1,800 degrees F for +3 hrs

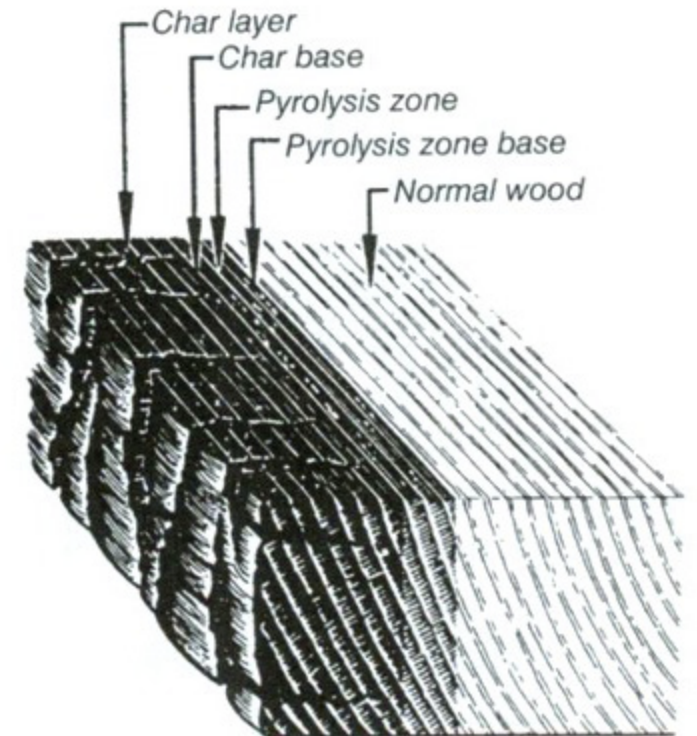


IMAGE: INTERNET



# Type IVB

## INTERIOR:

### PARTIALLY PROTECTED

Ceilings: 20% exposed in dwelling unit/fire area

Walls: 40% Exposed

Combined Ceilings and Walls: Formula Calculation + separate exposed ceilings and walls by minimum 15 feet

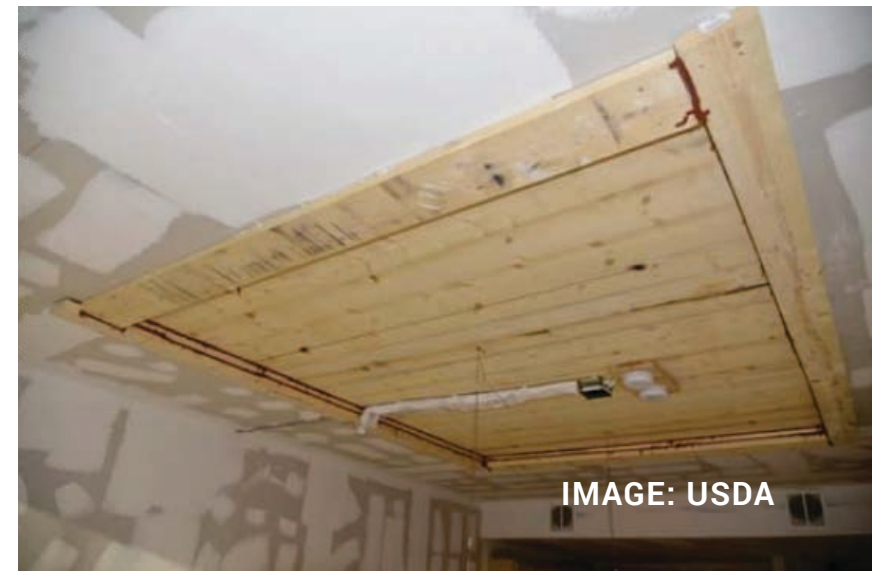
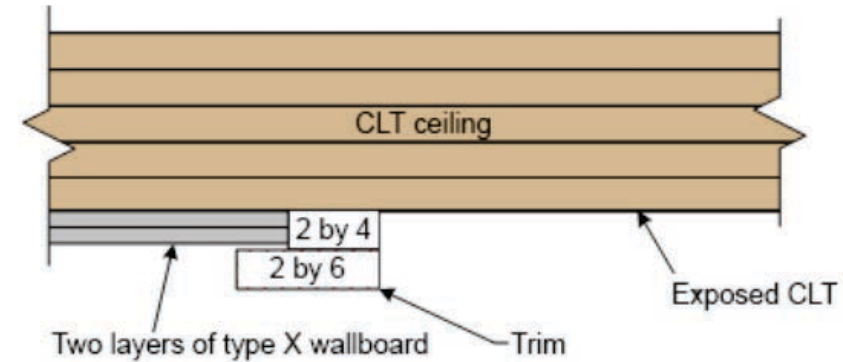
NOTE: Mass timber buildings over 120' require fire pump connections from two separate mains.

## EXTERIOR

Minimum 40-minute noncombustible protection plus no combustible cladding or sub-framing

## FLOORS

Minimum 1-inch thick non-combustible topping



# Type IVB



IMAGE: USDA

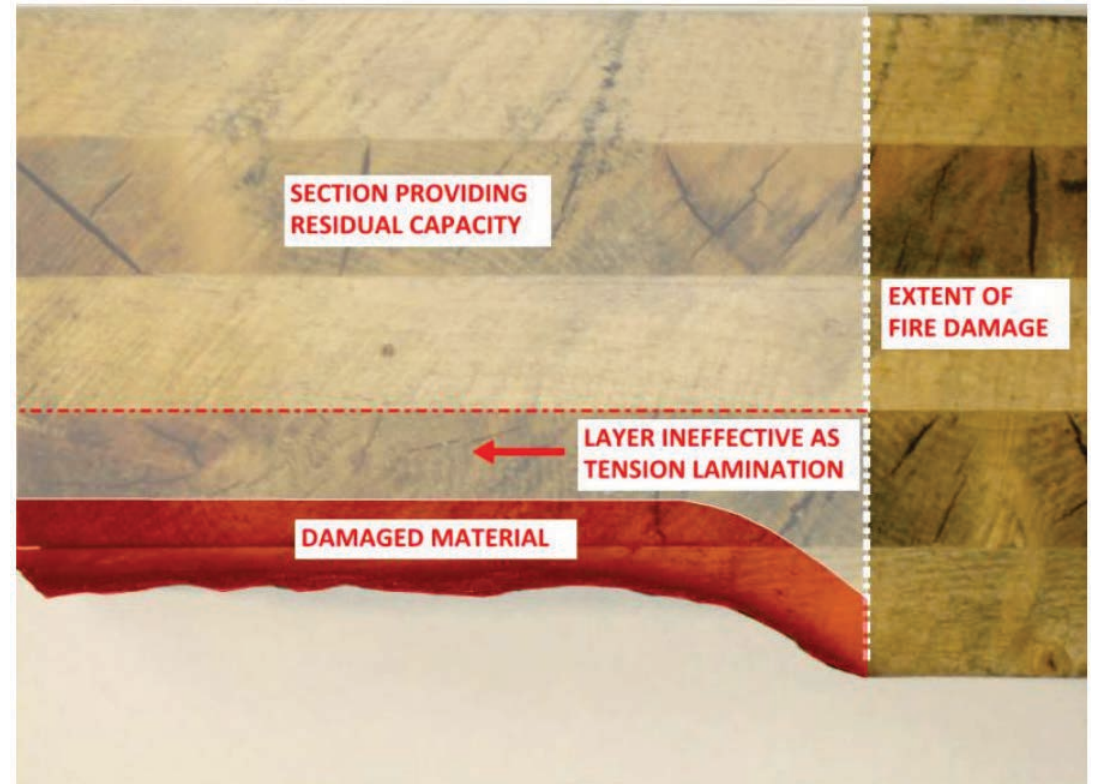


IMAGE: SMARTLAM



# Type IVC

## INTERIOR

No protection required

**Note:** Concealed spaces and shafts require min. 40 minute protection inside and outside for Type IVC. Concealed spaces not permitted in Type IV-HT

## EXTERIOR

Minimum 40-minute noncombustible protection plus no combustible cladding or sub-framing

## FLOORS

In accordance with 804

## TYPE IV-HT

No change



IMAGE: BEN GUTHRIE



# Sections 703.8 & 722.7

## SECTION 703.8

### Performance Method

Fire testing (ASTM E 119 or UL 263) can be used to determine protection time of non-combustible elements other than GWB.

Perform 2 tests: 1 with and 1 without protection and compare results.

**Note:** 2/3 of the required fire resistance rating must come from the Noncombustible Protections.

## SECTION 703.8

### Prescriptive Method

Calculate the fire resistance rating of a protected wood element:

Fire resistance rating of the unprotected wood member plus time provided by the noncombustible protection applied to the exposed wood.

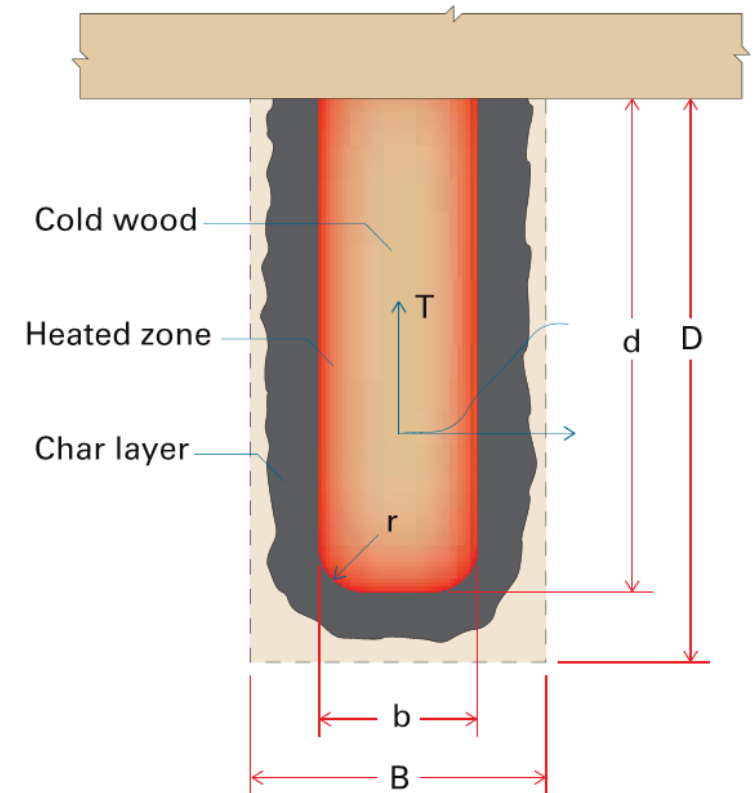


IMAGE: AWC

# Connections must be protected

## SECTION 202

Building elements, **components** and assemblies to be fire-resistance rated

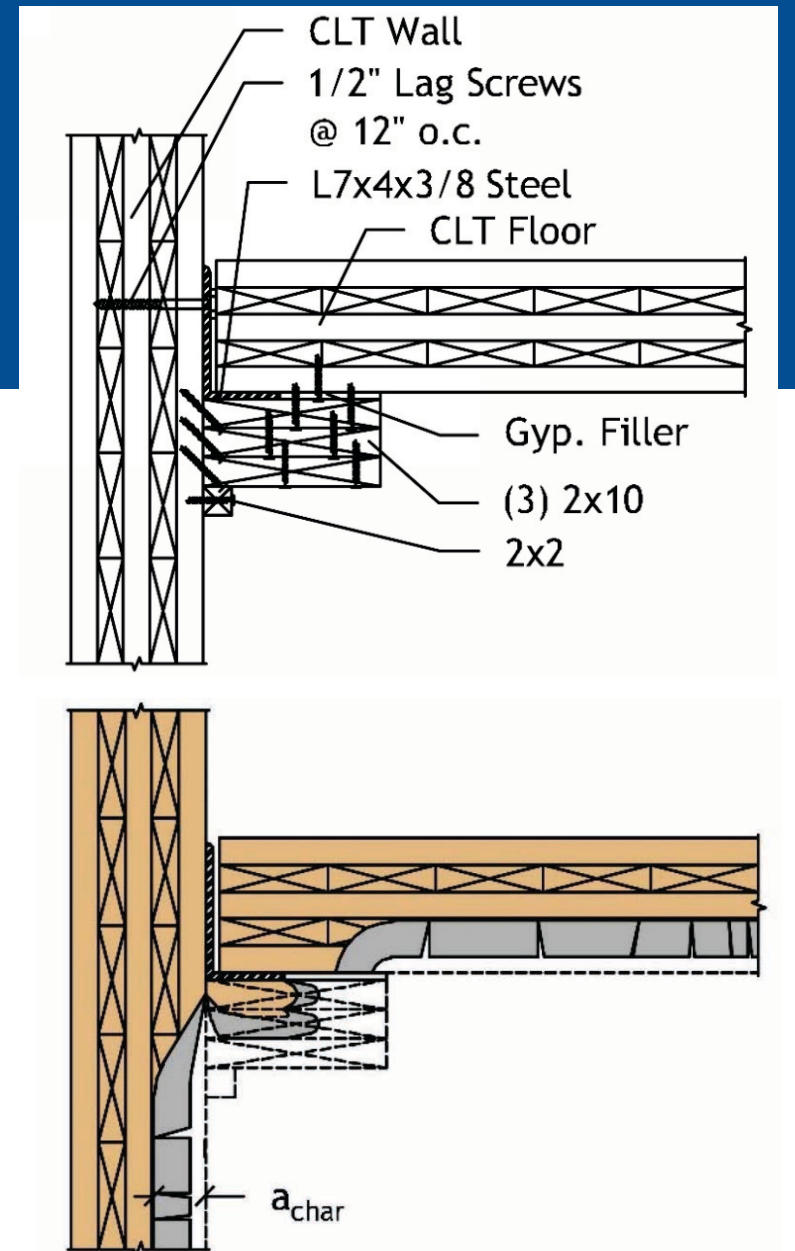
## SECTION 704.2 & 704.3

Primary frame to be protected

## SECTION 722

Fire-resistance rating can be determined in **NDS Chapter 16** and **AWC TR-10**:

Provide requirements to protect steel with wood, noncombustible protection or combination



DRAFT IMAGE: AWC

# Table 722.7.1

**TABLE 722.7.1 (1)**  
Protection Required from  
Noncombustible Covering Material

Required Fire Resistance of Building Elements per Tables 601 & 602 (HOURS)	Minimum Protection Required from Noncombustible Protection (MINUTES)
1	40
2	80
3 or more	120

**TABLE 722.7.1 (2)**  
Protection Required by  
Noncombustible Covering Material

Noncombustible Protection	Protection Contribution (MINUTES)
1/2-inch Type X Gypsum Board	25
5/8-inch Type X Gypsum Board	40



# Section 703.9

## Sealing of Adjacent Mass Timber Elements

In Type IVA, B and C construction, abutting intersections of mass timber building elements and building elements of other materials where both are required to be fire resistance rated, sealant or adhesive shall be provided to resist the passage of air

Sealants shall meet the requirements of ASTM C920  
Adhesives shall meet the requirements of ASTM D3498

**Note:** Penetrations per ASTM E814



IMAGE: USDA

# Table 601: Fire Resistance for Building Elements

Building Element	Type I		Type II		Type III		Type IV				Type V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary Structural Frame	3	2	1	0	1	0	3	2	2	HT	1	0
Bearing Walls:												
Exterior	3	2	1	0	1	2	3	2	2	2	1	0
Interior	3	2	1	0	2	0	3	2	2	1/HT	1	0
Non-Bearing Walls & Partitions: Exterior	(See Table 602)											
Non-Bearing Walls & Partitions: Interior	0	0	0	0	0	0	0	0	0	(See Section 602.4.4.6)	0	0
Floor Construction	2	2	1	0	1	0	2	2	2	HT	1	1
Roof Construction	1-1/2	1	1	0	1	0	1-1/2	1	1	HT	1	1

# Table 601: Fire Resistance for Building Elements

Building Element	Type I		Type II		Type III		Type IV				Type V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary Structural Frame	3	2	1	0	1	0	3	2	2	HT	1	0
Bearing Walls:												
Exterior	3	2	1	0	1	2	3	2	2	2	1	0
Interior	3	2	1	0	2	0	3	2	2	1/HT	1	0
Non-Bearing Walls & Partitions: Exterior	(See Table 602)											
Non-Bearing Walls & Partitions: Interior	0	0	0	0	0	0	0	0	0	(See Section 602.4.4.6)	0	0
Floor Construction	2	2	1	0	1	0	2	2	2	HT	1	1
Roof Construction	1-1/2	1	1	0	1	0	1-1/2	1	1	HT	1	1

Note: Reductions in fire resistance ratings allowed in hi-rise construction not allowed for mass timber



# Table 506.2: Allowable Area

Occupancy Classification	TYPE OF CONSTRUCTION						
	Sprinklered	Type I		Type IV			
	(S)	A	B	A	B	C	HT
A-1	S	UL	UL	135,000	90,000	56,250	45,000
A-2	S	UL	UL	135,000	90,000	56,250	45,000
A-3	S	UL	UL	135,000	90,000	56,250	45,000
B	S	UL	UL	324,000	216,000	135,000	108,000
E	S	UL	UL	229,500	153,000	95,625	76,500
M	S	UL	UL	184,500	123,000	76,875	61,500
R-2	S	UL	UL	184,500	123,000	76,875	61,500

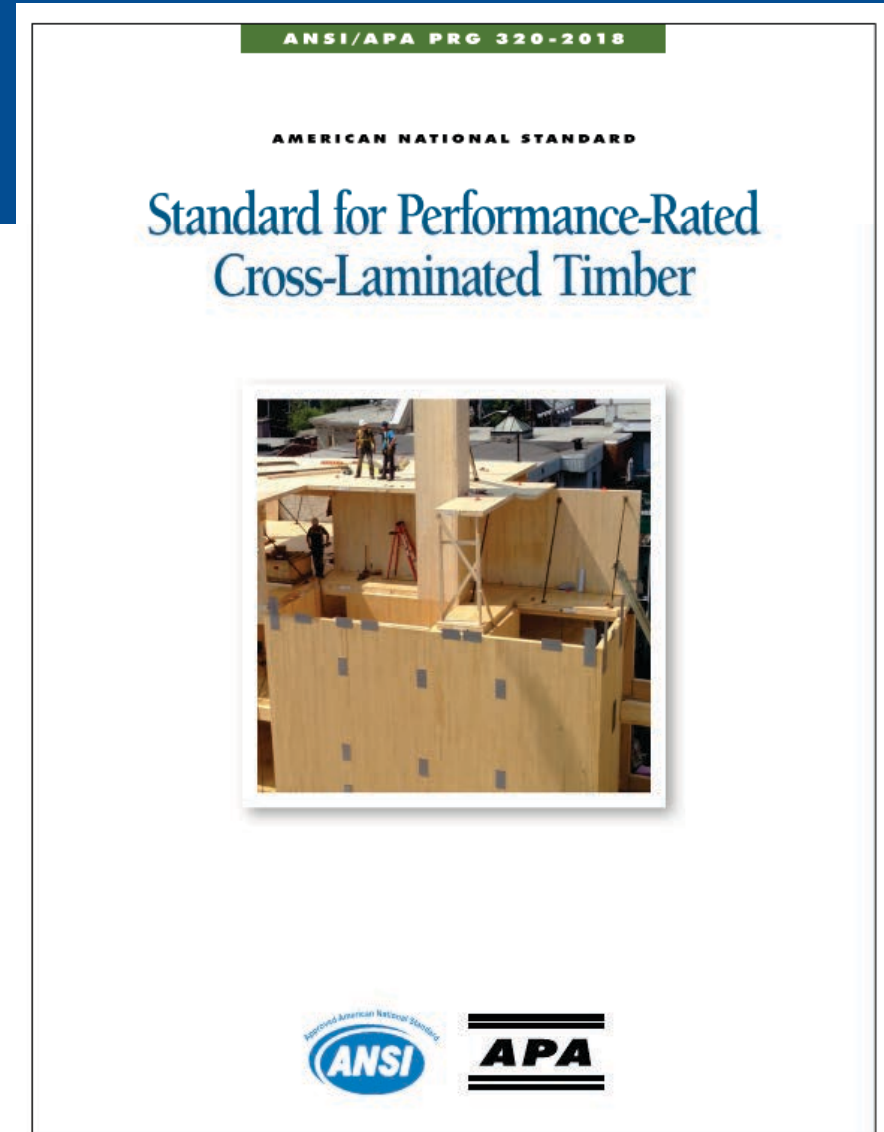
# Table 503.4 & 504.4: Allowable Stories/Height Above Grade Plane

Occupancy Classification	TYPE OF CONSTRUCTION						
	Sprinklered	Type I		Type IV			
	(S)	A	B	A	B	C	HT
A-1	S	UL/UL	6/180 FT	9/270 FT	6/180 FT	4/85 FT	4/85 FT
A-2	S	UL/UL	12/180 FT	18/270 FT	12/180 FT	6/85 FT	4/85 FT
A-3	S	UL/UL	12/180 FT	18/270 FT	12/180 FT	6/85 FT	4/85 FT
B	S	UL/UL	12/180 FT	18/270 FT	12/180 FT	9/85 FT	6/85 FT
E	S	UL/UL	6/180 FT	9/270 FT	6/180 FT	4/85 FT	4/85 FT
M	S	UL/UL	12/180 FT	12/270 FT	8/180 FT	6/85 FT	5/85 FT
R-2	S	UL/UL	12/180 FT	18/270 FT	12/180 FT	8/85 FT	5/85 FT

# PRG-320 2018

**Elevated temperature performance requirements in U.S. and Canada per Annex B (large-scale compartment test)**

Intent to exclude premature failure of adhesives that permit CLT char layer fall-off before arriving at the glue-line, resulting in exposed fresh wood and fire regrowth / re-flashover in tests.





# Adhesive Qualification Tests

## Qualification Tests Performed on Other Adhesives

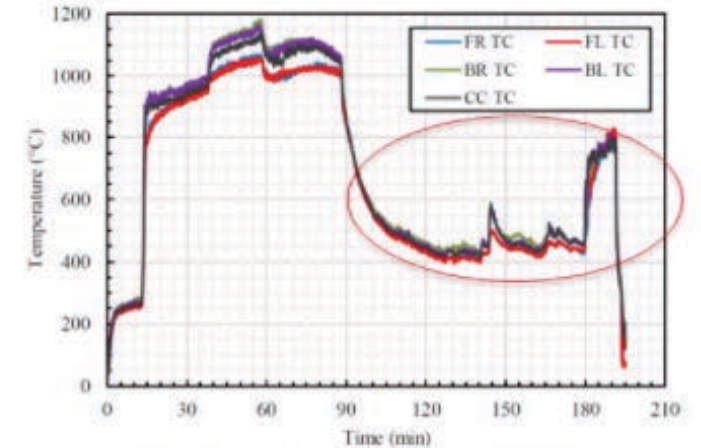
Fire regrowth observed with PLR

No fire regrowth observed with:

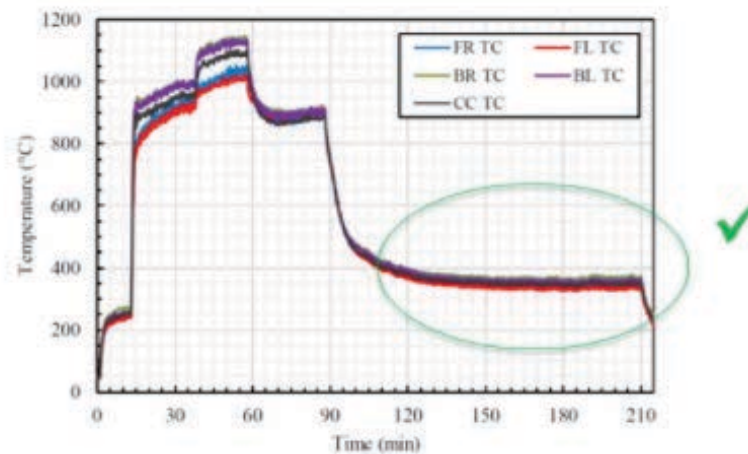
Melamine Formaldehyde Resin

Improved PUR

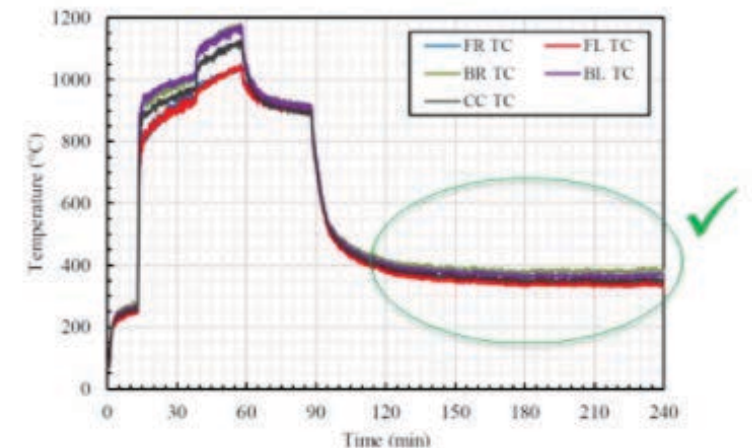
Test identifies acceptable performance



HEAT DE-LAMINATING PUR



MELAMINE FORMALDEHYDE RESIN



IMPROVED PUR

# Sections 403.2.2, 508.4.4.1, 509.4.1.1

## **SECTION 403.3.2** **Water Supply to Required** **Fire Pumps**

Type IV buildings over  
120-feet require fire pumps  
from two separate connections  
(non-combustible = 420-feet)

## **SECTIONS** **508.4.4.1 & 509.4.1.1** **Thermal Barrier**

In Type IVB and IVC –  
Thermal barrier required for  
horizontal assemblies and  
when a fire barrier between  
separated occupancies and  
incidental uses is required

# Table 1705.5.3: Required Special Inspections of Mass Timber Construction

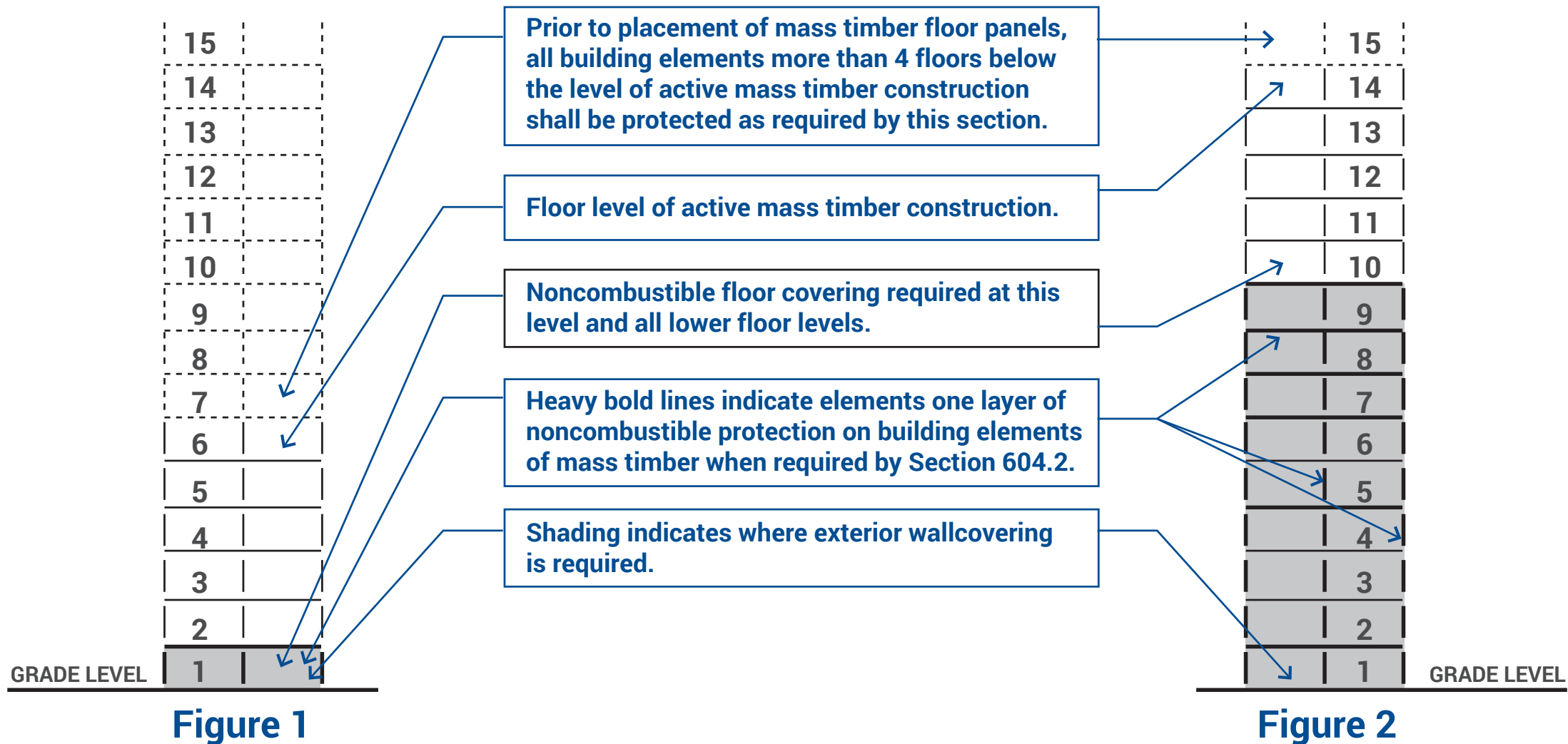
Type	Continuous Special Inspection	Periodic Special Inspection
1. Inspection of Anchorage and Connections of Mass Timber Construction to Timber Deep Foundation System		X
2. Inspect Erection and Sequence of Mass Timber Construction		X
3. Inspection of Connections Where Installation Methods are Required to Meet Design Leads		
a. Threaded Fasteners		
(1) Verify use of proper installation equipment		X
(2) Verify use of pre-drilled holes where required		X
(3) Inspect screws, including diameter, length, head type, spacing, installation angle and depth		X
b. Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads	X	
c. Bolted Connections		X
d. Other Proprietary Concealed Connection		X

# IFC

## **SECTION 3308.9** **Fire Safety During Construction** **for Types IV-A, B & C**

1. Standpipes shall be provided per Section 3313.
2. A water supply for fire department operations, as approved by the fire chief.
3. Where building construction exceeds 6 stories, at least one layer of noncombustible protection (if required by 602.4) shall be installed on all building elements more than 4 floor levels below active mass timber construction before erecting additional floor levels.
4. Where building construction exceeds 6 stories above grade plane required exterior wall coverings shall be installed on all floor levels more than 4 floor levels below active mass timber construction before erecting additional floor level.

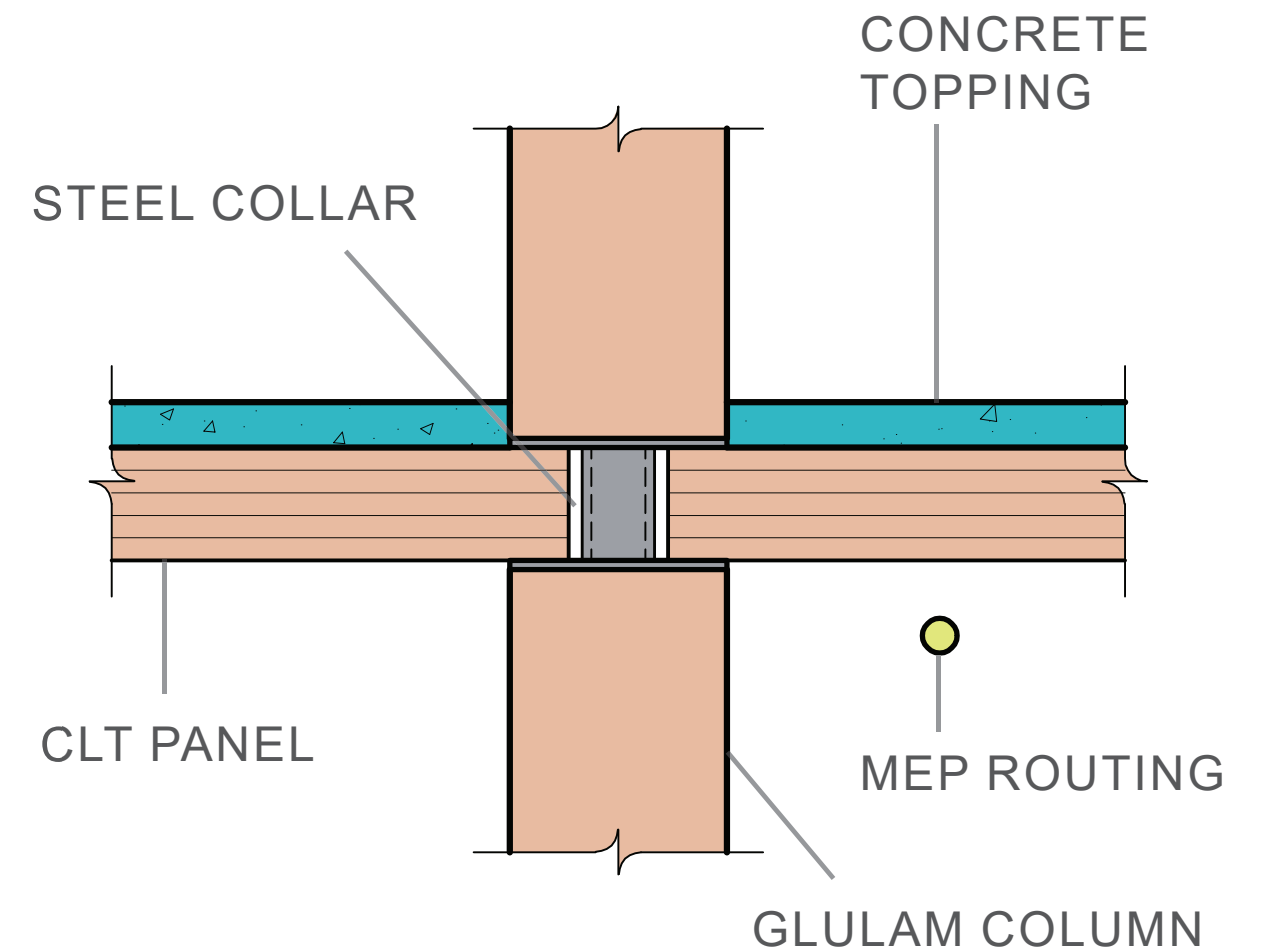
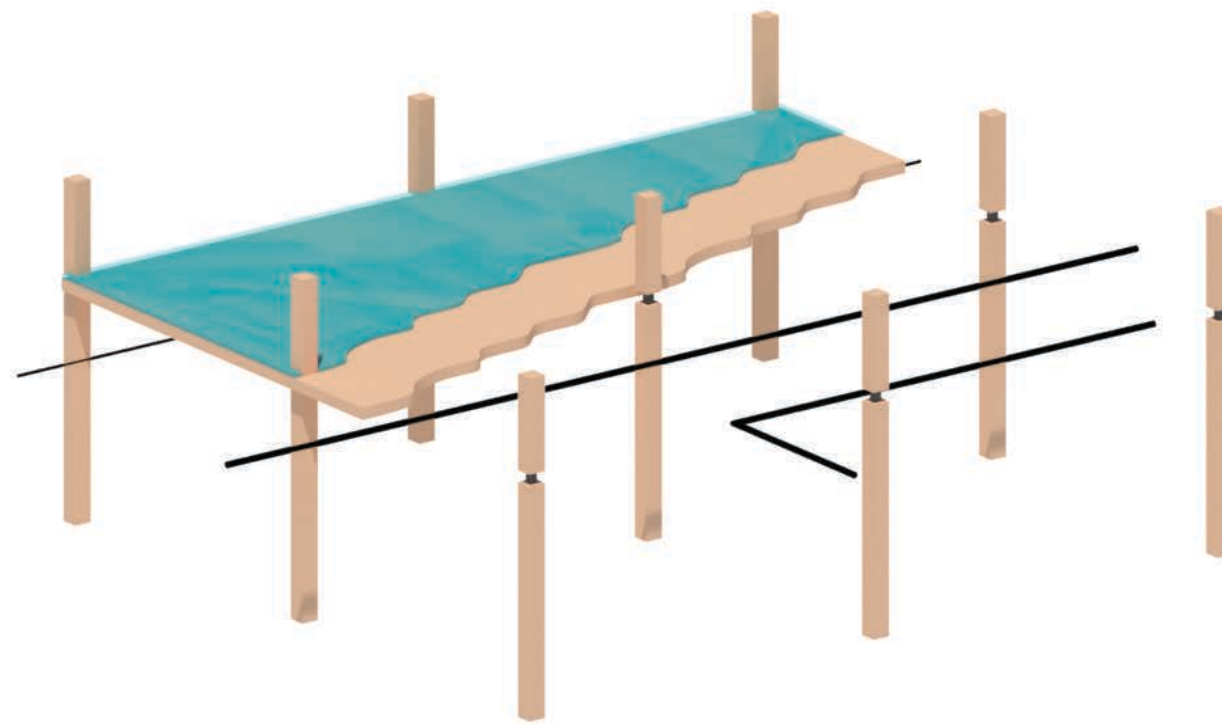




# Examples of Protection During Construction for Mass Timber Buildings Greater than Six Stories Above Grade Plane

POST AND PLATFORM FRAMING CONCEPT:

# CROSS-LAMINATED TIMBER PANELS



## SYSTEM DESCRIPTION

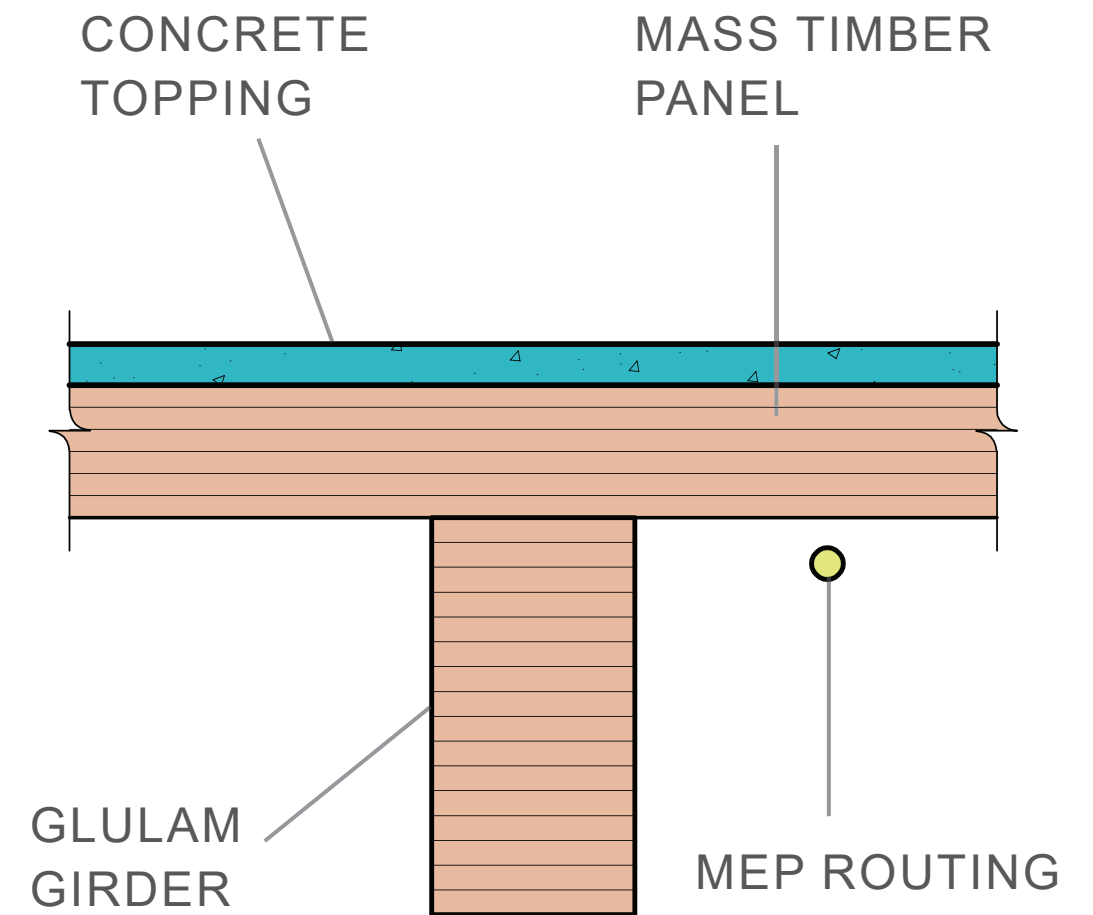
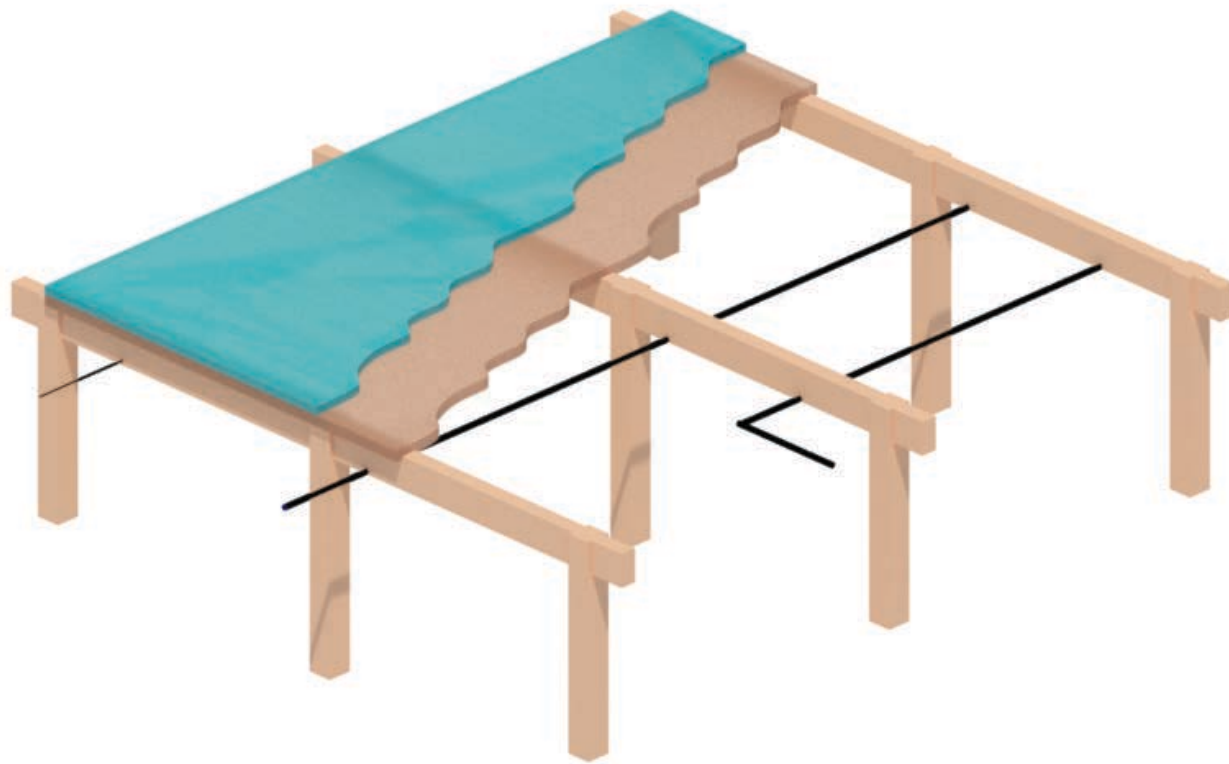
- 5-7 ply CLT panel with 2 1/2" concrete topping
- Heavy timber columns
- Concrete shear core, steel braced frames or steel moment frames (pre-approved systems)

## BEST USE

- Mid to high-rise residential/hospitality projects
- Type III-B, IV A-C construction
- Approx. 8'x13' column grid

POST AND PLATFORM FLOOR FRAMING CONCEPT:

# DOWEL-LAMINATED TIMBER (OR CLT) PANELS W/ MASS TIMBER GIRDERS



## SYSTEM DESCRIPTION

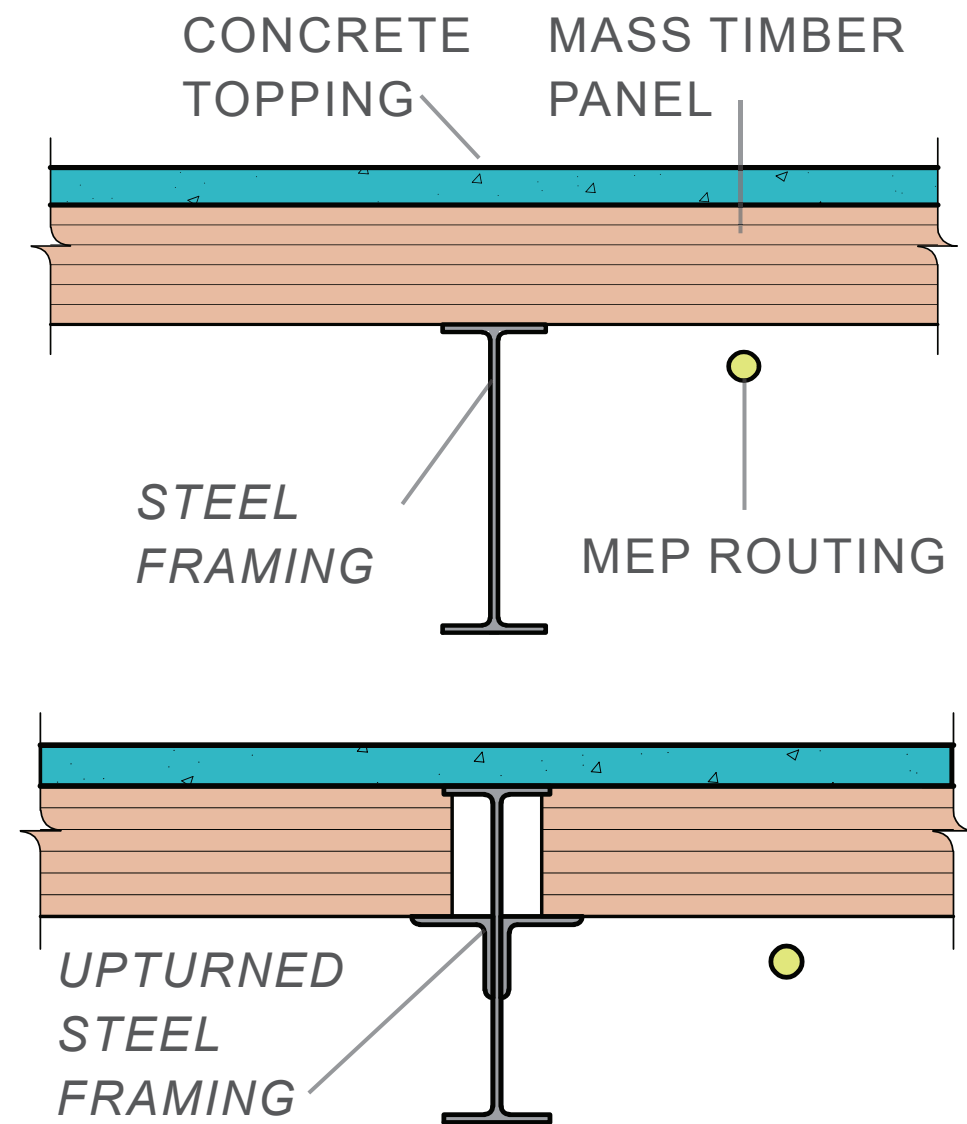
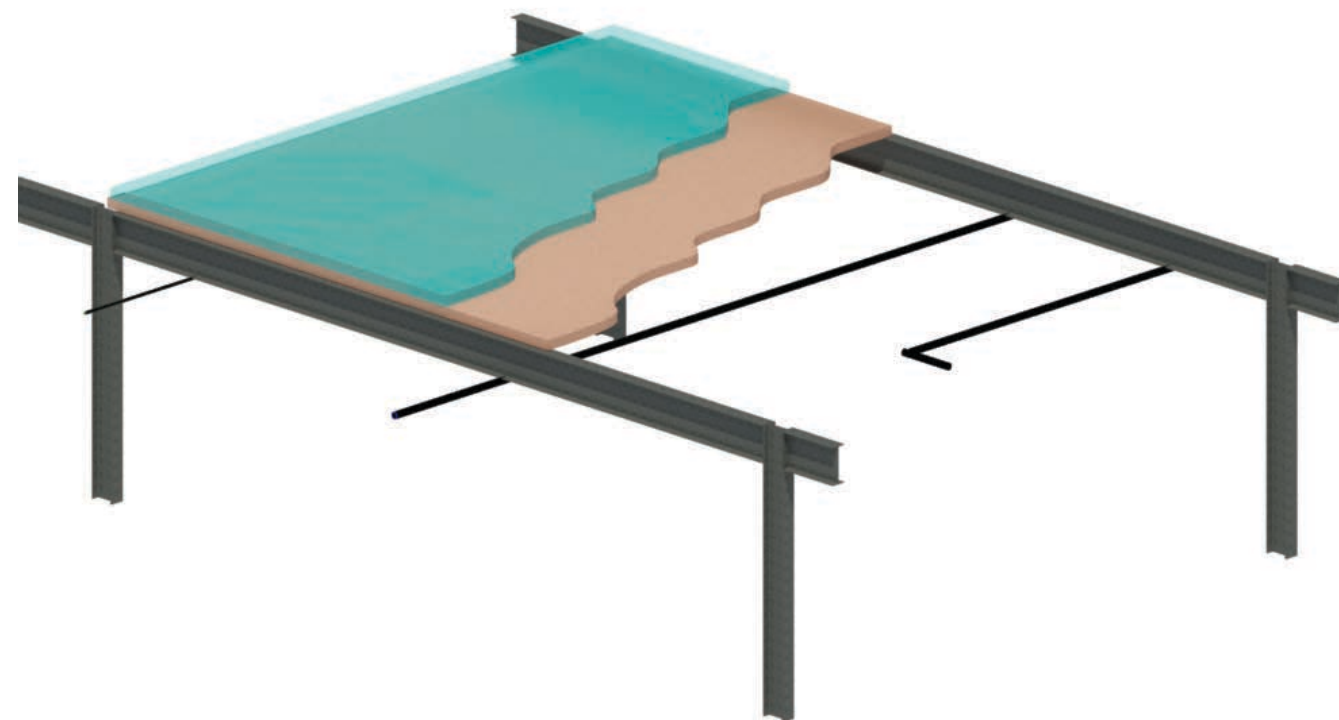
- 2x8 DLT Panels w/ 2 1/2" concrete topping
- 5 to 7-Layer CLT Panels w/ 1-2" of cementitious topping
- Glulam beams
- Heavy timber columns
- Concrete shear core, steel braced frames or steel moment frames

## BEST USE

- Mid-rise projects
- Type IV B & C construction (for reasonable column sizing)
- Approx. 25'x25' column grid
- *Approx. 20' x 25" column grid (CLT)*

HYBRID STRUCTURE FRAMING CONCEPT:

# DOWEL-LAMINATED TIMBER PANELS W/ STEEL WIDE FLANGE BEAMS



## SYSTEM DESCRIPTION

- 2x8 DLT panel with minimum 2 1/2" concrete topping
- Steel columns (with fire protection)
- 2x4 DLT panels with minimum 2 1/2" concrete topping & wide flange steel beams at 8' to 10' o.c. between girders (with fire protection)

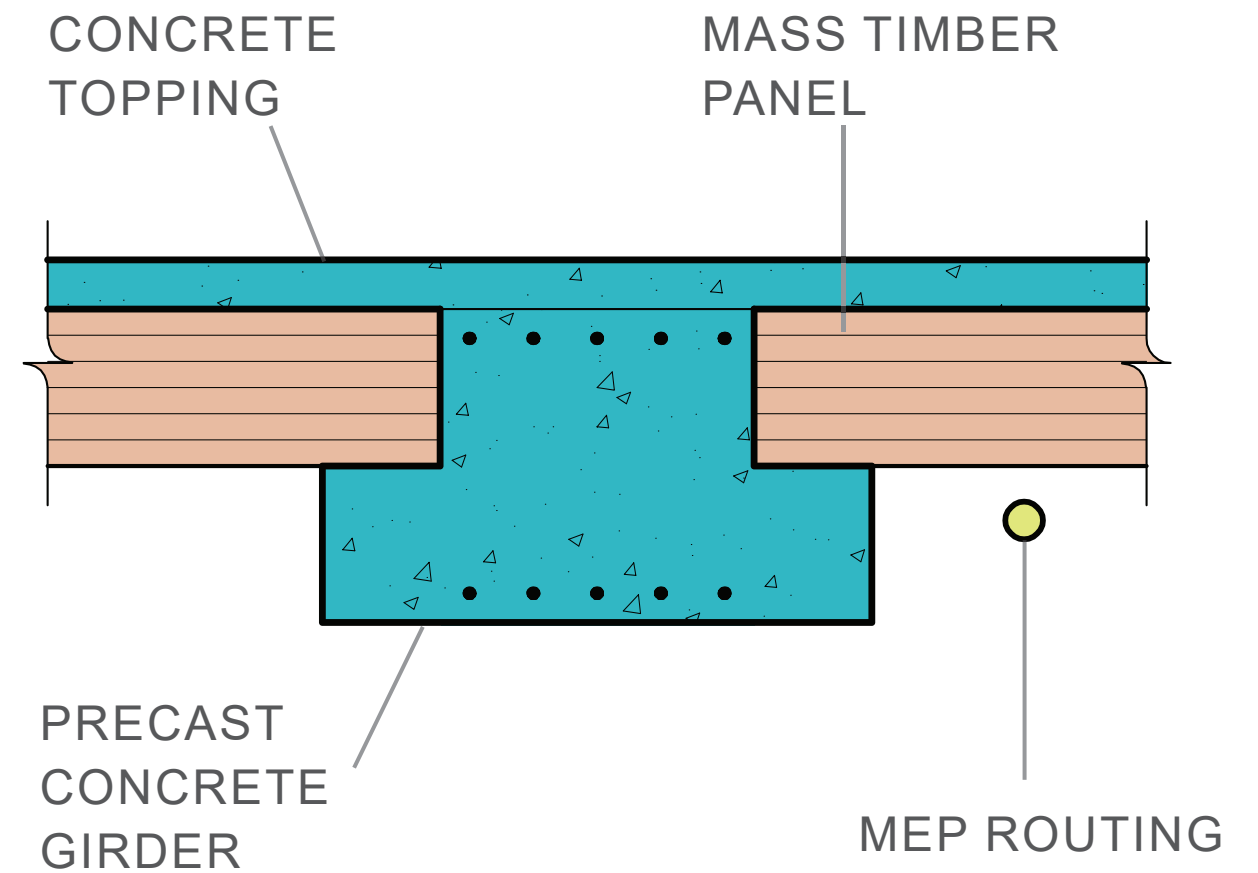
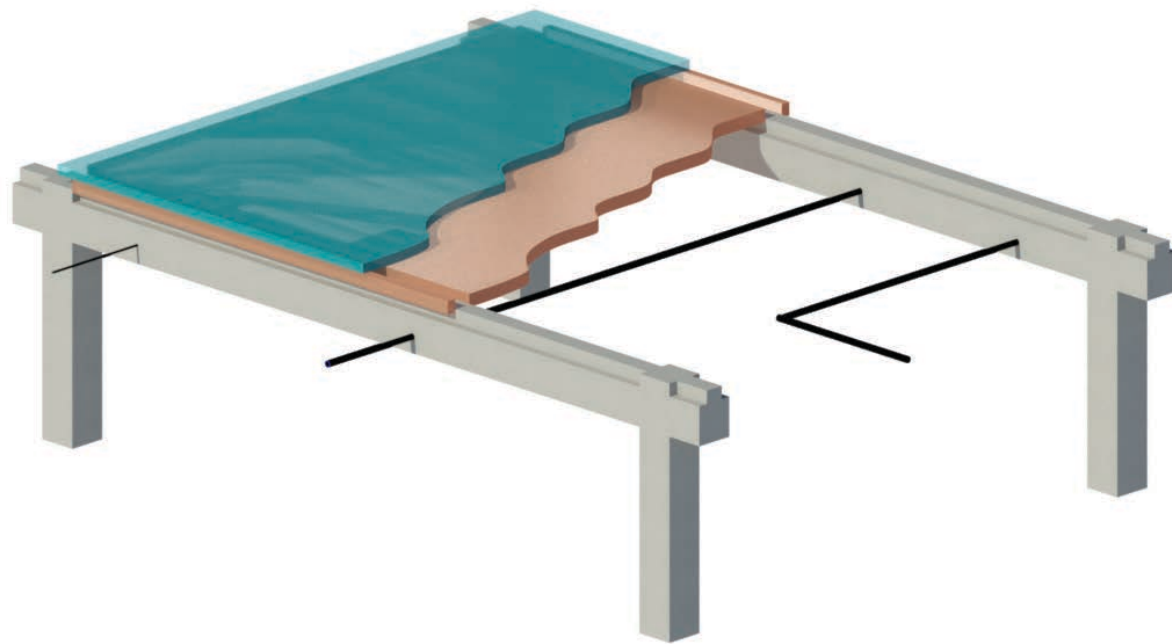
## BEST USE

- Long-span column grid projects
- Type IV-A, B, C construction



HYBRID STRUCTURE FRAMING CONCEPT:

# DOWEL-LAMINATED TIMBER PANELS W/ PRE-CAST CONCRETE GIRDERS



## SYSTEM DESCRIPTION

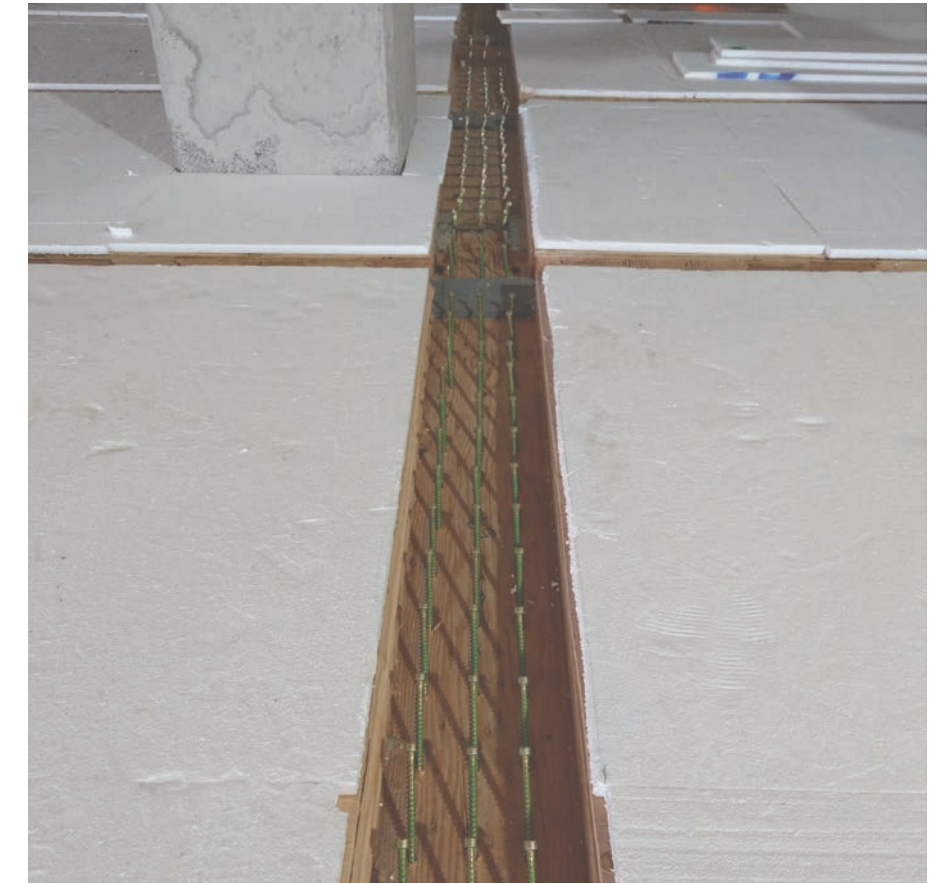
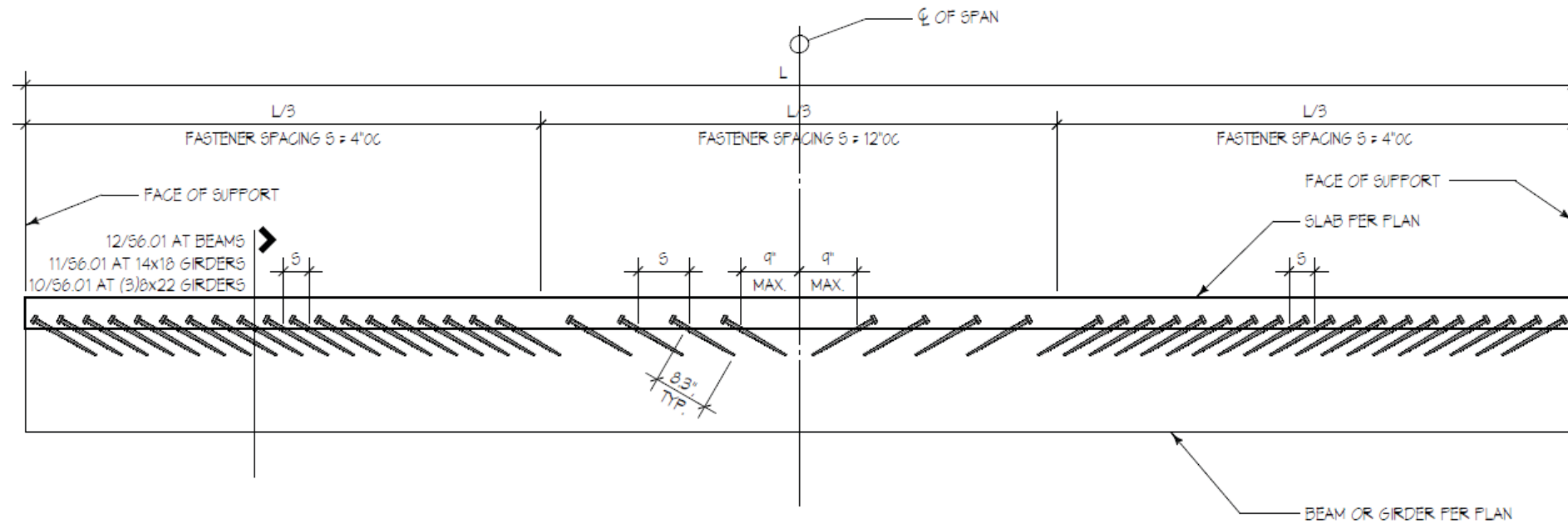
- 2x8 DLT panel with minimum 2 1/2" concrete topping
- ~24" deep concrete pre-cast girders
- Concrete columns
- Concrete shear core or moment frame

## BEST USE

- Long-span column grid projects
- Type IV-A, B, C construction
- Approx. 20'x40' column grid

WHAT'S POSSIBLE:

# MASS TIMBER INNOVATIONS: TIMBER CONCRETE COMPOSITE



## CONCEPT

Mechanically join mass timber panel or glulam beam to concrete topping via inclined screws or other means of attachment

## BENEFITS

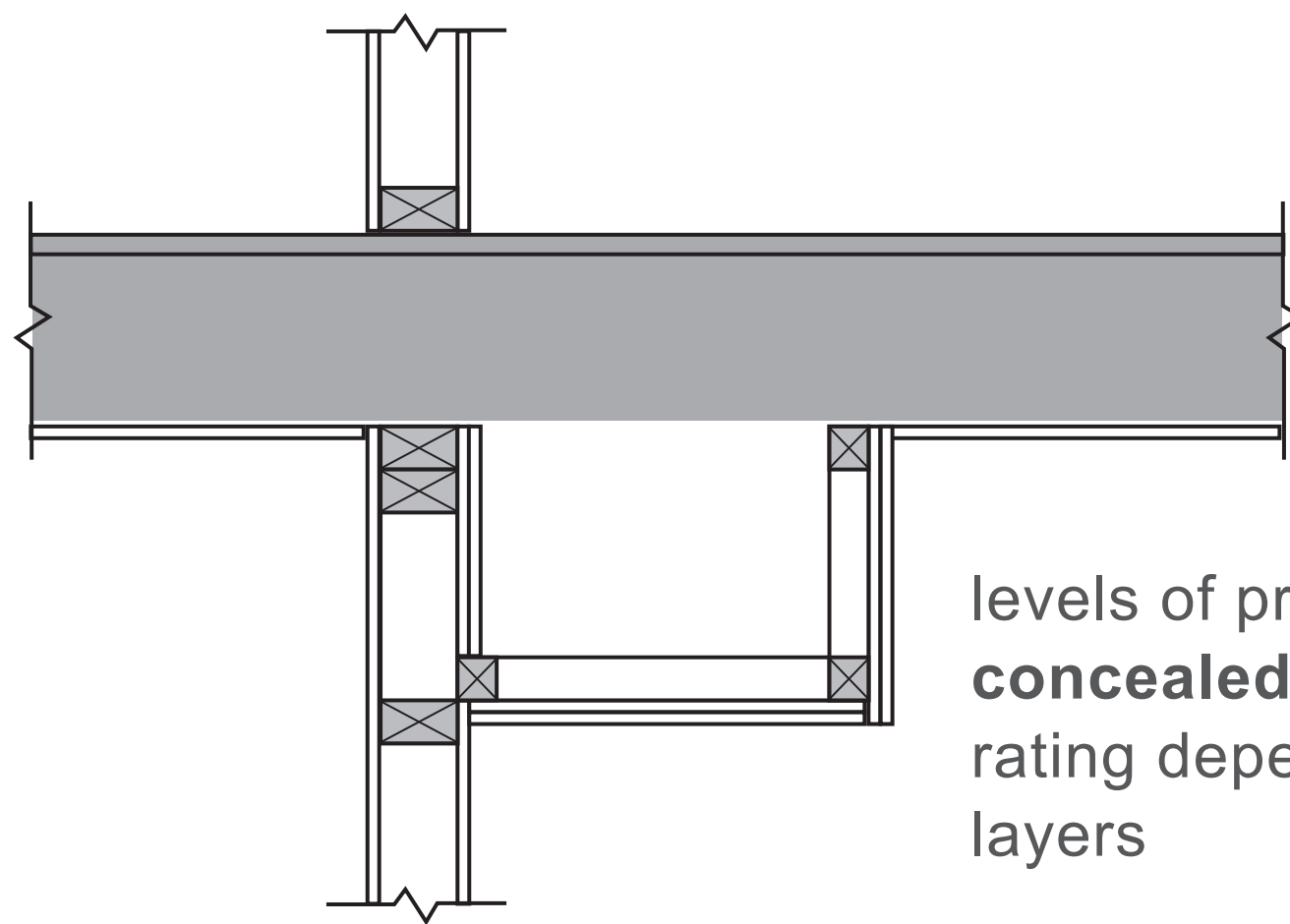
Increases strength and stiffness of gravity framing system, allowing more efficient span-to-depth ratios for beams and panels

# THE “GOTCHAS” ISSUES TO BE AWARE OF CONCEALED SPACE CONSTRUCTION

- Not allowed in Type **IV-HT** construction
- Allowed in Types **IV-A/B/C**

Limited combustibles

Mass timber lined with GWB



levels of protection in  
**concealed space:**  
rating dependent, 2-3  
layers



*Photo provided by U.S. Forest Products Laboratory, USDA*



# THE “GOTCHAS” ISSUES TO BE AWARE OF STAIR, HOISTWAY, & SHAFT CONSTRUCTION

- **Type IV-A/B/C stairs & hoistways**
  - **GWB-protected mass timber** allowed up to 12 stories and 180 feet
  - **Non-combustible construction** required > 12 stories or 180 feet
- **Mass timber shafts protected with** **GWB (Type IV-A/B/C)**

exposed **CLT** not allowed in any of these areas





# THE “GOTCHAS” ISSUES TO BE AWARE OF EXTERIOR WALL CONSTRUCTION

- **Type IV-A/B/C**

- GWB on outside face of mass timber
- No combustibles outboard of mass timber

- **Energy Code notes**

- Continuous insulation only per Prescriptive Path

Mineral wool is non-combustible

- Can use Performance Path

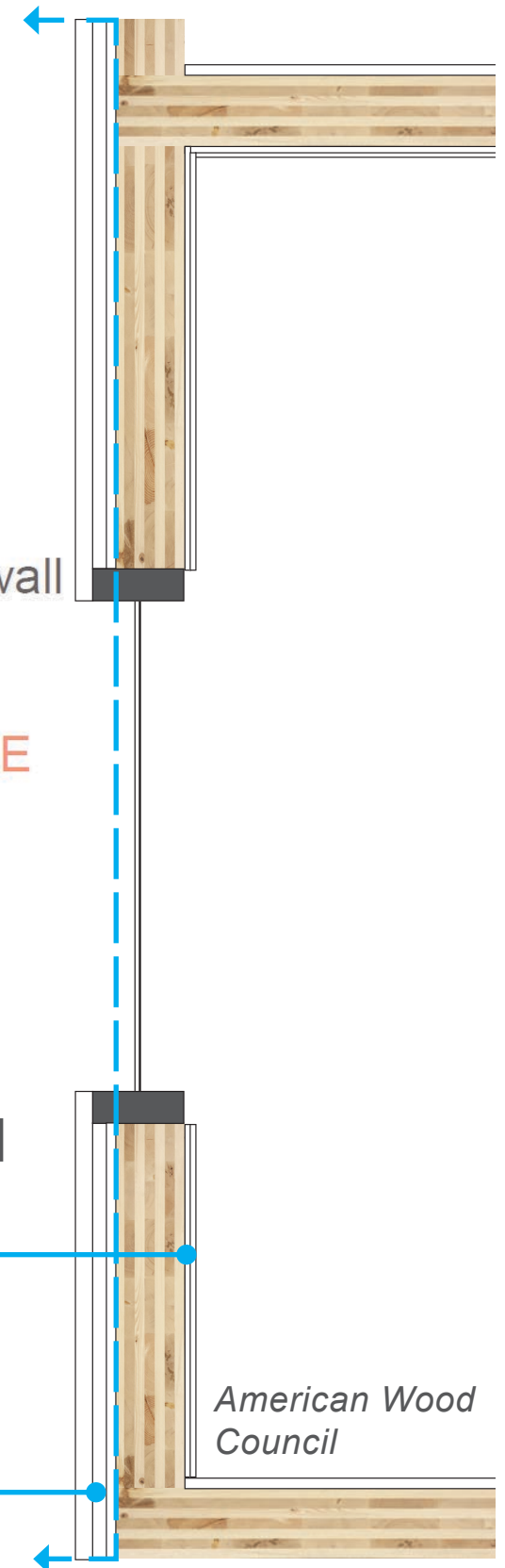
Confirm values for wood w/ local jurisdiction ahead of time

not just  
load  
bearing

Type IV-B load bearing exterior wall  
All material outboard of the  
Mass Timber  
**MUST BE NONCOMBUSTIBLE**  
Except: water resistive barrier

2 hr fire resistant rating  
required for Exterior and  
Interior bearing walls

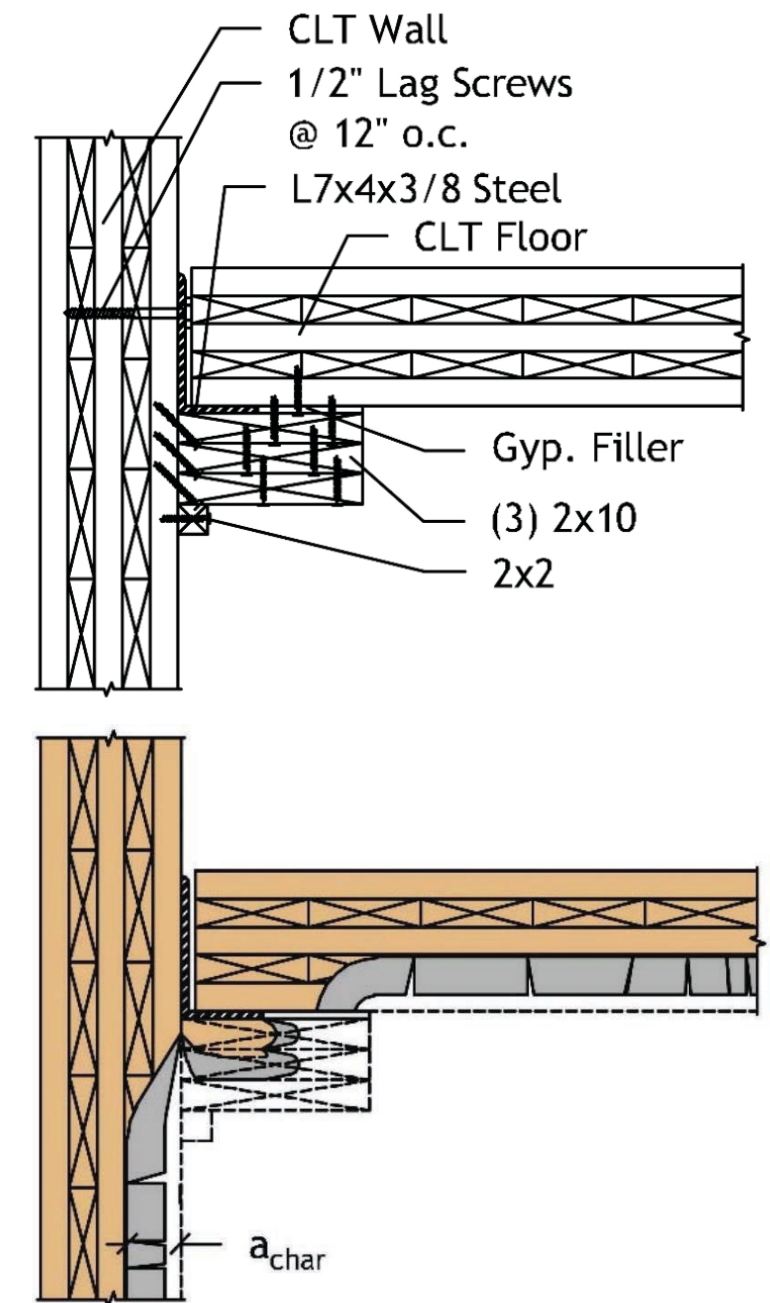
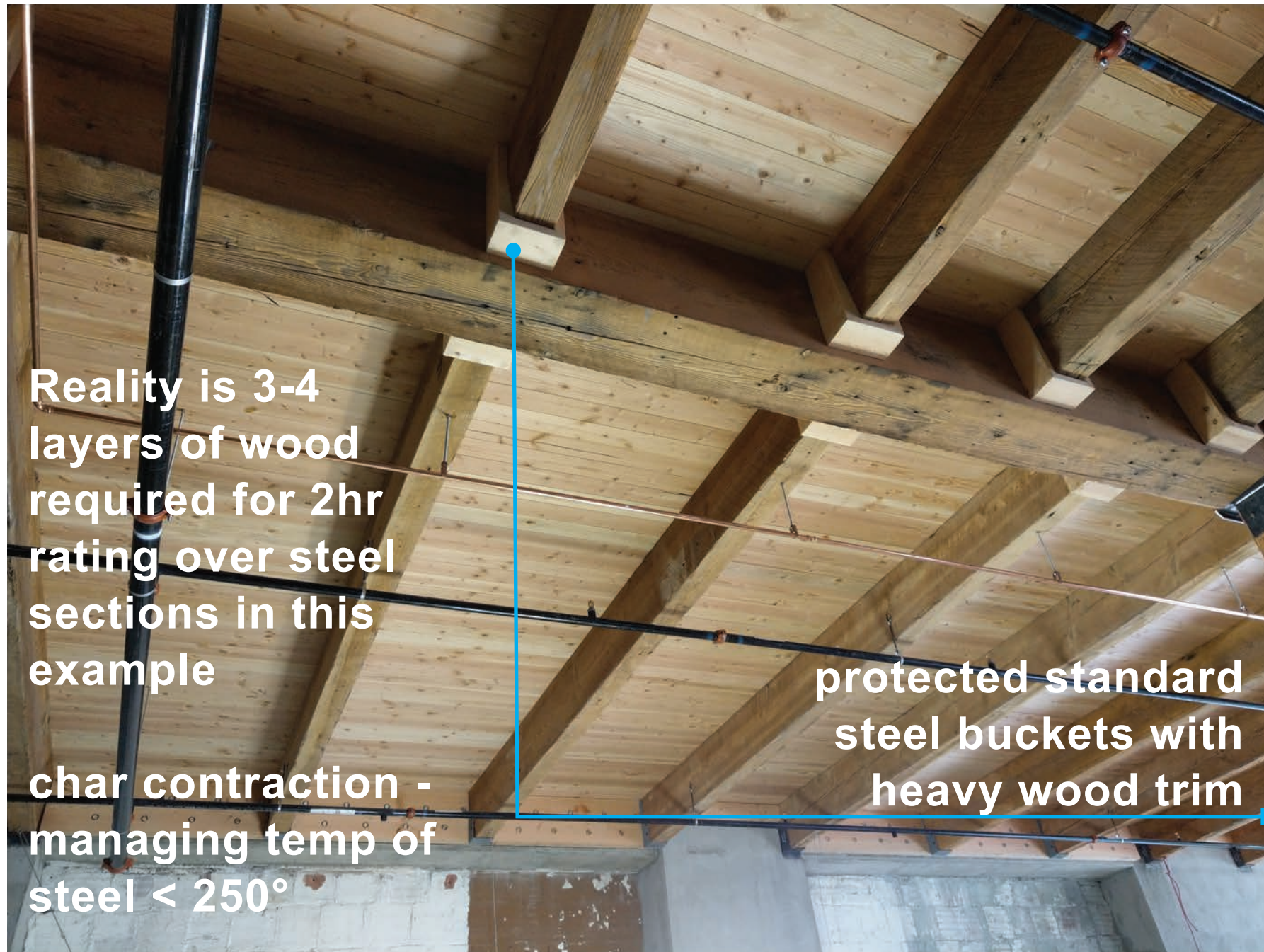
exterior noncombustible  
protection



American Wood  
Council



# THE “GOTCHAS” ISSUES TO BE AWARE OF CONNECTION PROTECTION





# OTHER CONSIDERATIONS | SEISMIC DESIGN

- Real seismic design values for CLT shear wall structures under development
  - Not likely to be available until 2024 IBC (ASCE 7-22)
- Other standard systems can be used (hybrid)
- Recommendation – **stay within pre-approved systems**





# OTHER CONSIDERATIONS SPECIAL INSPECTIONS

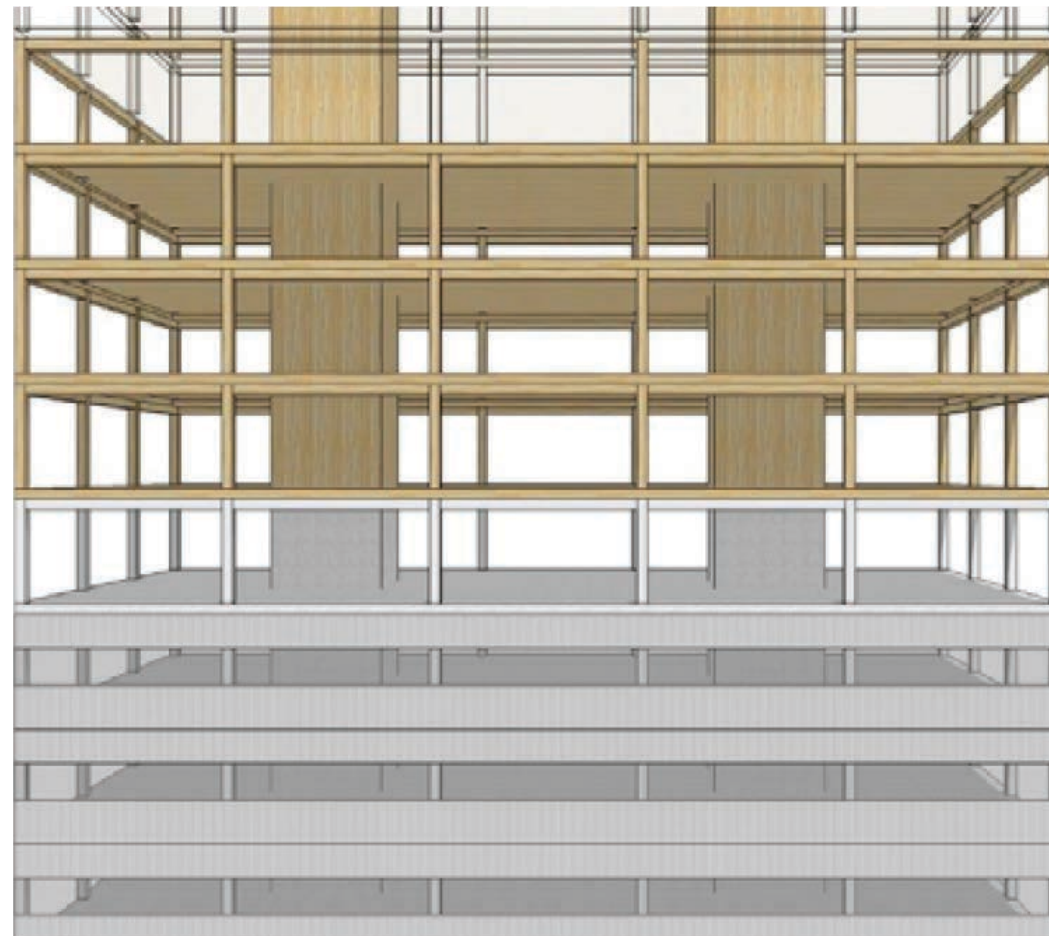
- **3rd-party agency**
  - Paid by owner, not contractor
- **Required for erection**
  - Similar to precast concrete
  - Panel labeling, placement, connections
- **Connection fire protection (maybe)**





# CONSTRUCTION SEQUENCING + COORDINATION

- **Exterior cladding, interior GWB** (if required)
  - Follow erection such that no more than 4 floors “below active floor” of exposed mass timber





# ICC AD HOC COMMITTEE ON TALL WOOD BUILDINGS

## Update

2021 IBC Group A Public Comment Hearings

October 24, 2018

Richmond, VA

# STATUS OF TALL WOOD PROPOSALS

- Package of 11 proposals for 2021 IBC
- 97/103 comments for Disapproval of new Type IV-A/B/C



**AND THE WINNER IS...???**

(And what's next?)





# STATUS OF TALL WOOD PROPOSALS

- **All TWB Committee proposals passed Public Comment vote** (closest vote 68% / 32%)
- **2-week online voting period to start – November 7**
  - Governmental member voting representatives only
- **Voting validation – mid-December**





# FIRE TESTING EXAMPLES

## “TWB” FIRE TESTS

- Compartment tests
  - **Simulated Type IV-A, IV-B** (shown)
    - Survived content burnout
  - **Type IV-C sprinklered**
    - Not full test of fully exposed
- Adhesive tests
  - Delamination failures
  - New standard => new tests => better results
  - Specify PRG 320-**18**



Ignition



Living Room /  
Kitchen Flashover



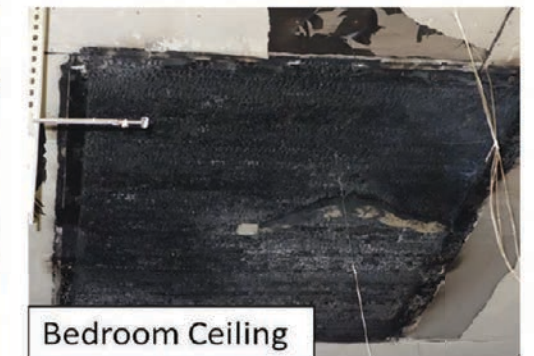
Bedroom Flashover



Decay Phase



Living Room Ceiling



Bedroom Ceiling

Photos provided by U.S. Forest Products Laboratory, USDA



American Wood Council



American Wood Council



# BROCK COMMONS Vancouver, BC

template for **TYPE IV-A**

- Building Height: **190 ft | 57.9 m**
- Use: **Residential Apartments**
- Stories: **18**
- Square Footage: **162,697 ft<sup>2</sup> | 15,115 m<sup>2</sup>**
- Owner: **University of British Columbia**
- Architects: **Acton Ostry Architects, Inc.**
- Structural: **Fast+Epp – Design**  
RJC Engineers | Merz Kley Partner



*naturallywood.com*



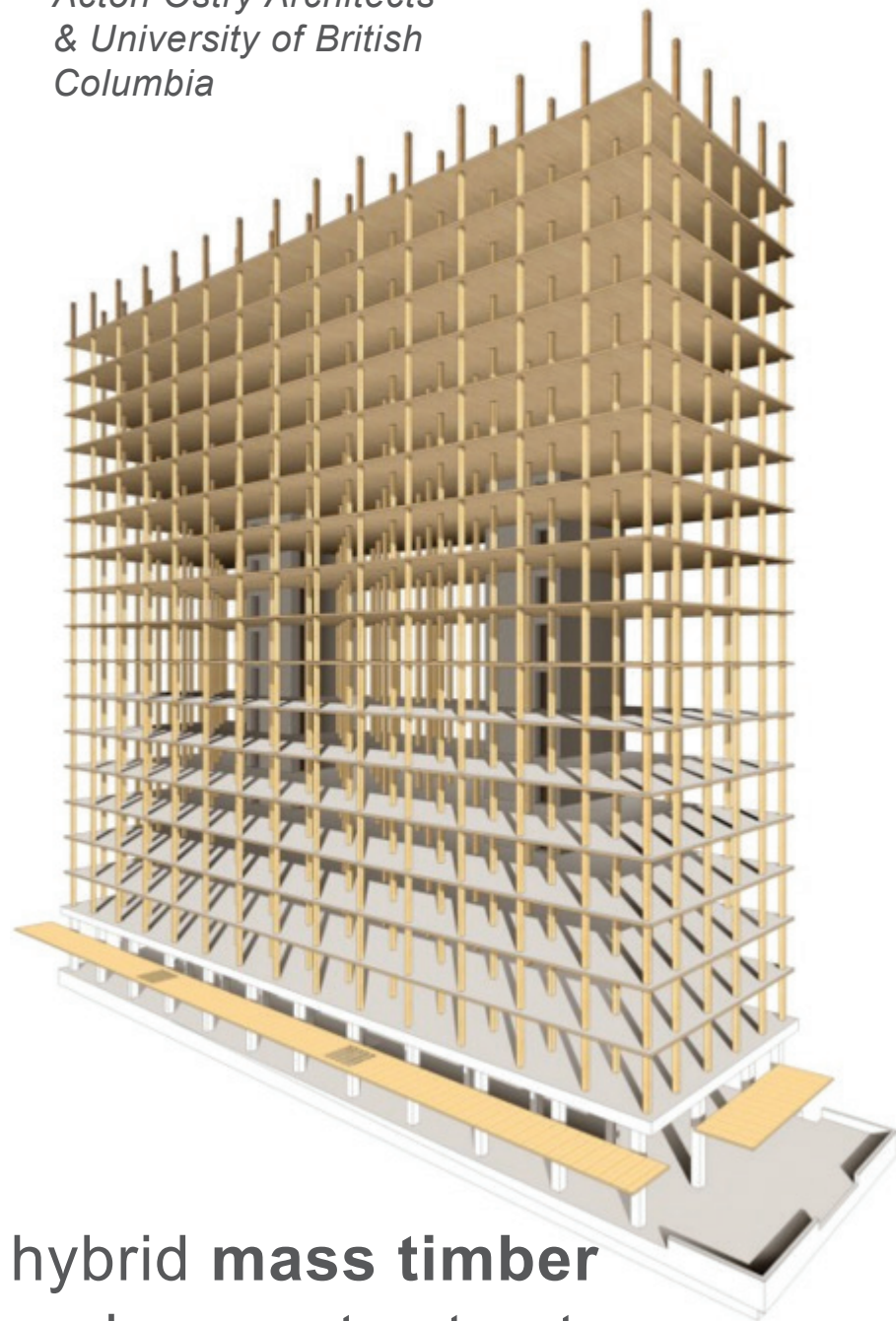
*seagatestructures.com*



# BROCK COMMONS Vancouver, BC

template for **TYPE IV-A**

*Acton Ostry Architects  
& University of British  
Columbia*



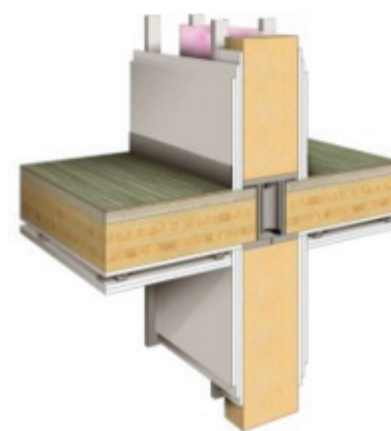
hybrid **mass timber**  
and concrete structure



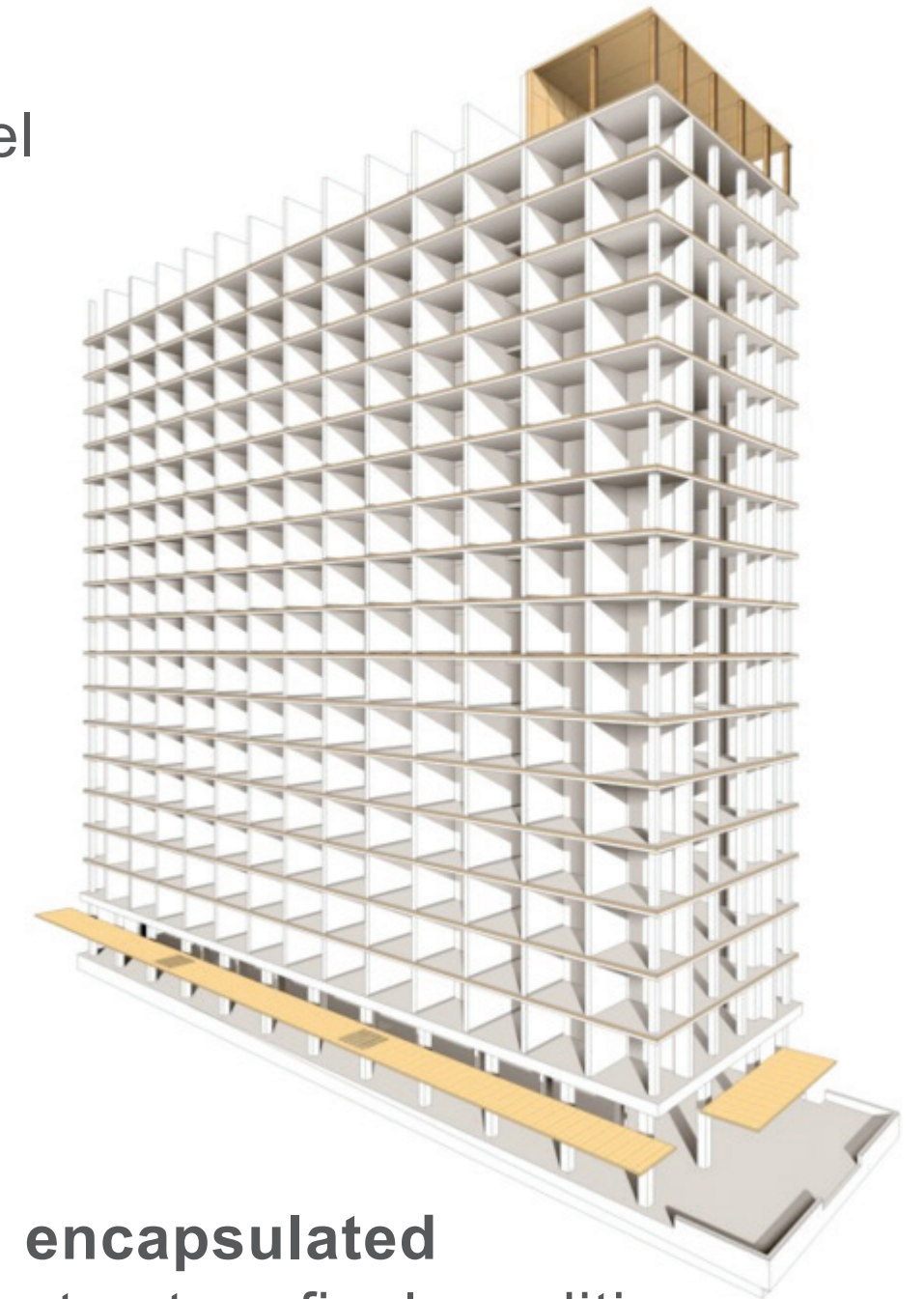
**CLT** floor slabs  
with glulam  
columns and steel  
connectors



partial  
**encapsulation**  
during  
construction



completed  
construction  
condition



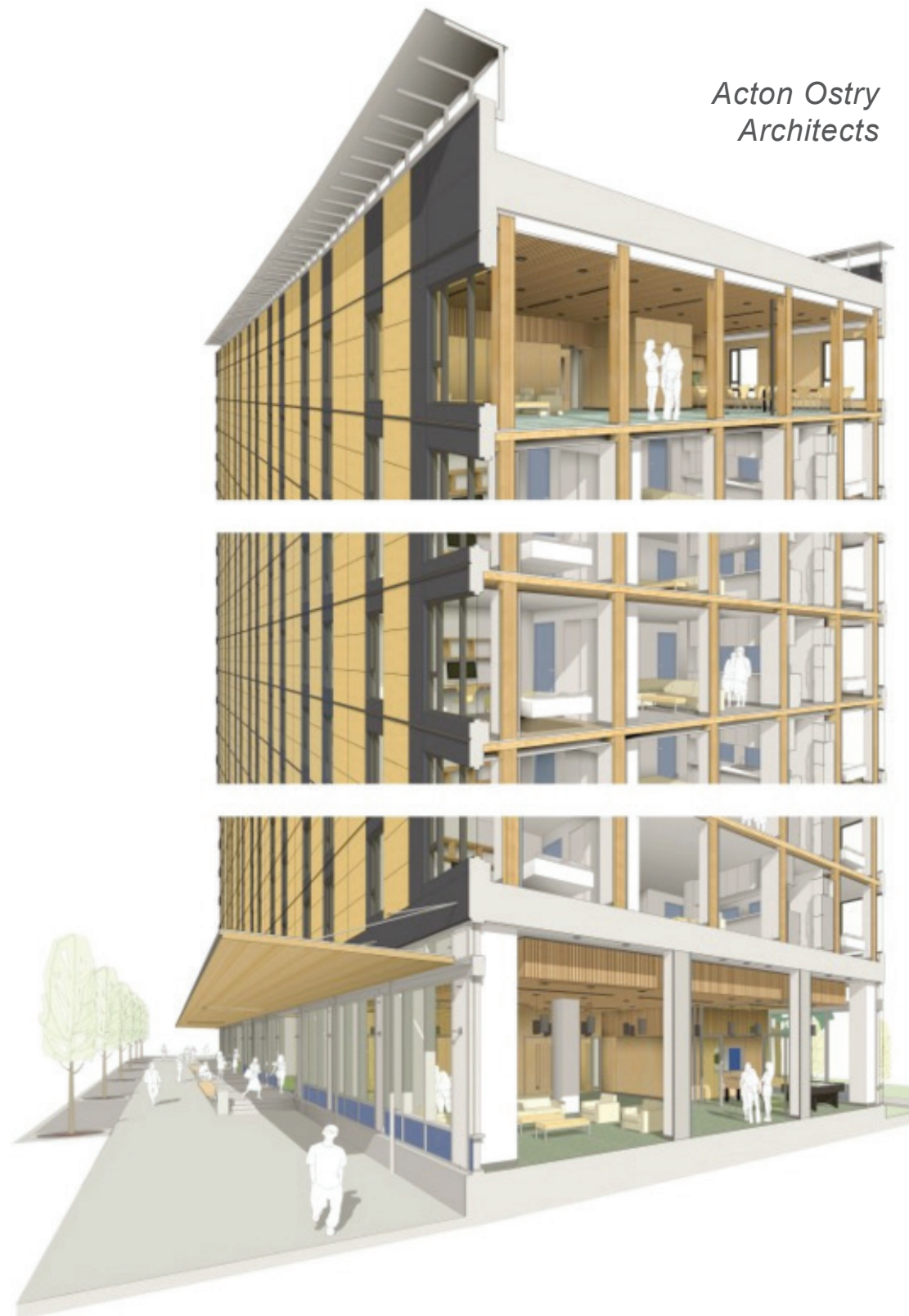
**encapsulated**  
structure final condition



# BROCK COMMONS Vancouver, BC

template for **TYPE IV-A**

Acton Ostry  
Architects



**exposed** wood structure at student amenity space

**encapsulated** wood structure at typical floor

concrete structure and **CLT** canopy at base



[naturallywood.com](http://naturallywood.com)



# BROCK COMMONS Vancouver, BC

template for **TYPE IV-A**



*Acton Ostry Architects  
& University of British  
Columbia*





# FRAMEWORK Portland, OR

planned project closest to **TYPE IV-B**

- Building Height: **148 ft**
- Use: **Office, Retail, Affordable Housing**
- Stories: **12**
- Square Footage: **90,000 ft<sup>2</sup>**
- Owner: **Home Forward + Beneficial State Bank**
- Architects: **Lever Architecture**
- Structural: **KPFF Consulting Engineers**
- More representative to Type IB
- Best planned project representing Type IV-B  
albeit the unique seismic system – *design indicates more exposed wood than would be allowed*





# FRAMEWORK Portland, OR

planned project closest to **TYPE IV-B**

CLT wall panel structural testing at Oregon State University. Structural tests were taken well beyond actual building demands to observe failure mechanisms in the CLT panels.





# CARBON 12 Portland, OR

built project closest to **TYPE IV-C**

- Building Height: **85 ft**
- Use: **Residential Condos + Commercial**
- Stories: **8**
- Square Footage: **42,000 ft<sup>2</sup>**
- Owner: **Kaiser Group**
- Architects: **Path Architecture**
- Structural: **Munzing Structural**
  - exposed CLT with exposed Post + Beams (Portland Special)
  - protected concealed spaces, stairs and shafts





# HINES T3 Minneapolis, MN

- Building Height: 85 ft
- Use: **Commercial Office**
- Stories: 7
- Square Footage: 180,000 ft<sup>2</sup>
- Owner: **Hines**
- Architects: **Michael Green Architecture + DLR Group**
- Structural: **Magnusson Klemencic Associates + Structure Craft**

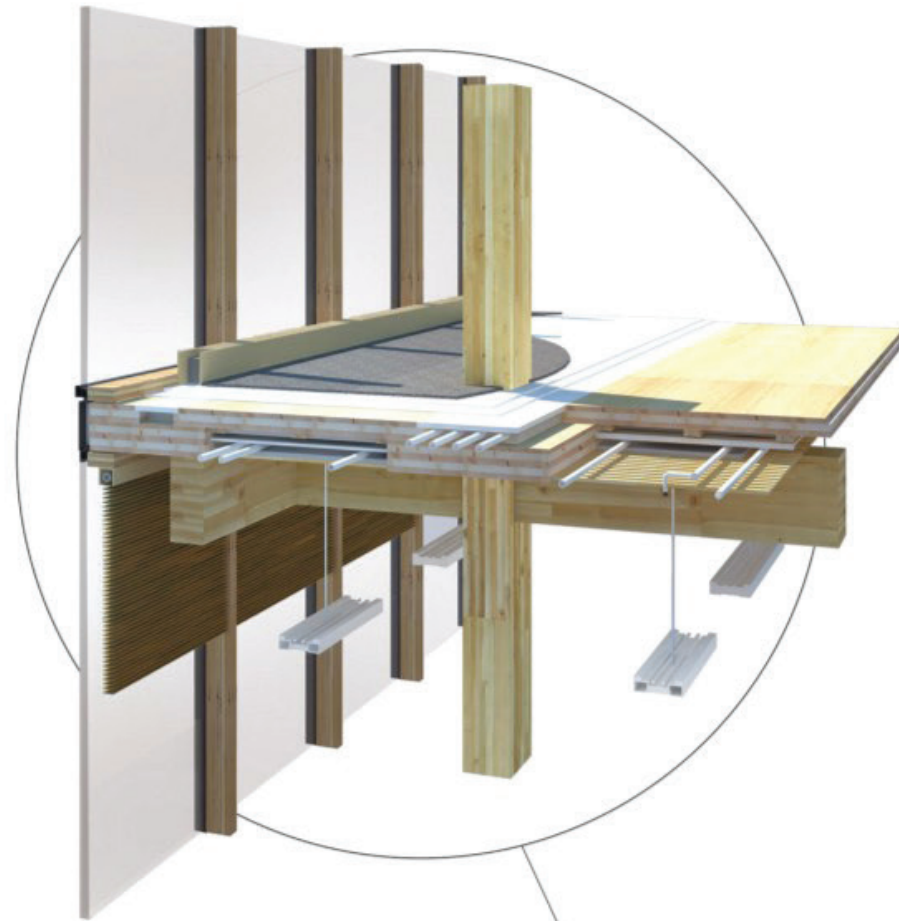
code compliant **TYPE IV - HT**





# HINES T3

code compliant **TYPE IV - HT**



tech office tenants  
seeking out **Mass  
Timber Aesthetic**



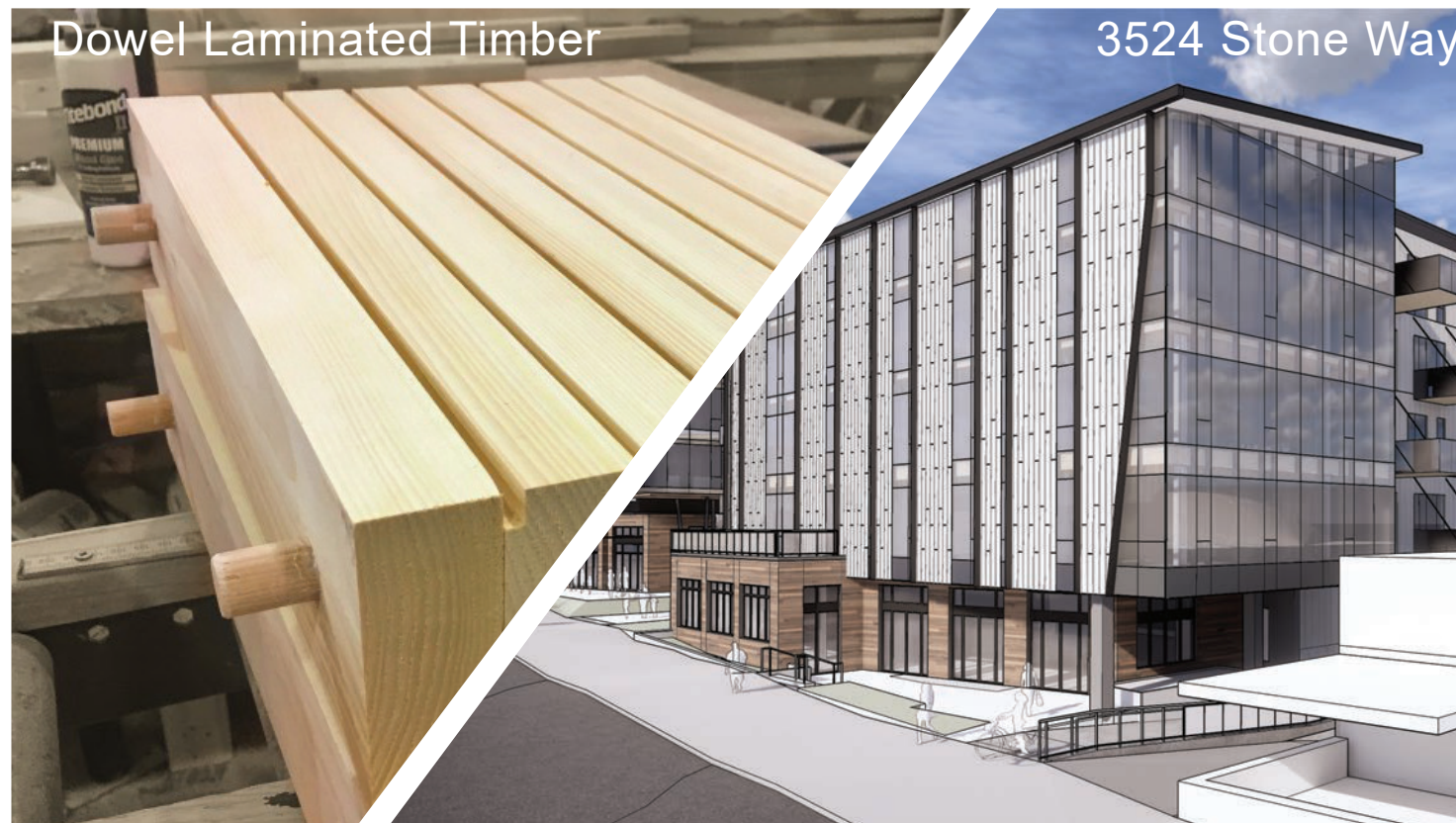
*mg-architecture.ca*



# SUPPLY CHAIN

## LOOKING AT THE BIG PICTURE

- Construction Team + suppliers
- Pricing & Cost Estimating
- 3-D Modeling + atypical consultants
- Availability of panels meeting PRG 320



- a.** Structurlam  
Penticton, B.C.
- b.** SmartLam  
Columbia Falls, MT
- c.** DR Johnson Lumber  
Riddle, OR
- d.** Katerra  
Spokane, WA  
Vaagen Bros.  
Colville, WA

