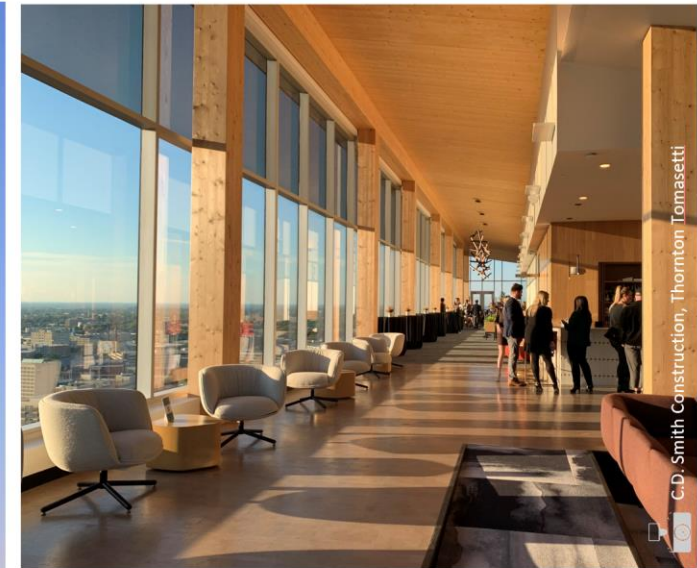


ASCENT_Milwaukee



ASCENT | MILWAUKEE, USA

Architektur & Planung: Korb + Associates Architects

höchstes Massivholzgebäude der Welt

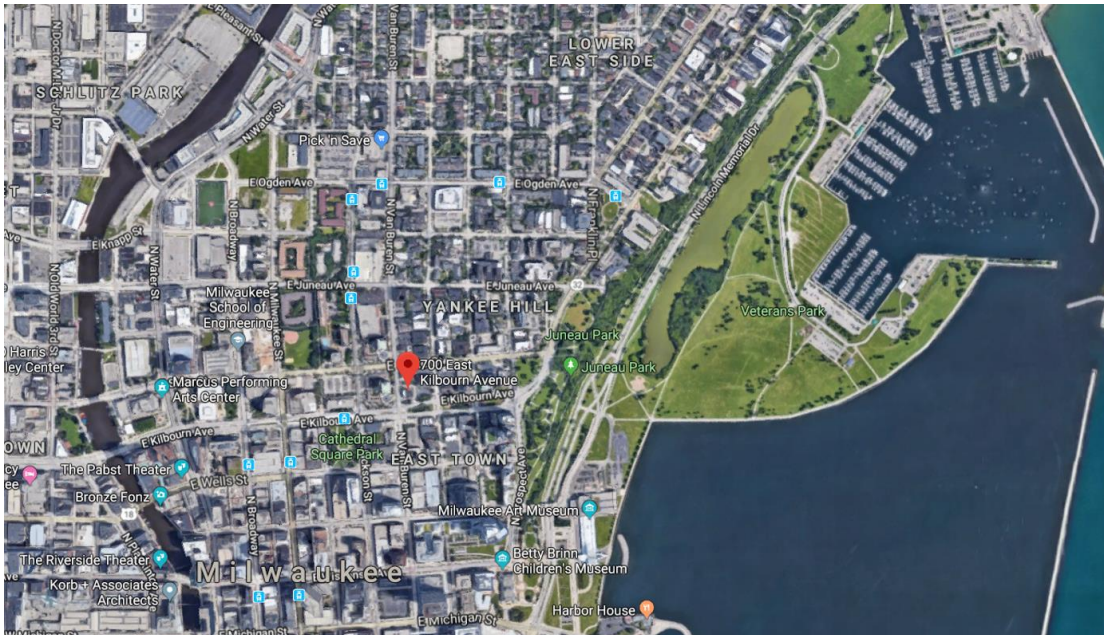
25 Etagen | 86,5 Meter | 19 Etagen mit KLH® - CLT

Anzahl Apartments: 259

KLH® – CLT Volumen: 32.000 m²



Milwaukee, WI



Ablauf

Erste Kontaktaufnahme
Erstes Angebot
Beginn Planung
Baubeginn
Beginn Holzbau
Ende Holzbau
Fertigstellung

März 2019
Mai 2020
Oktober 2020
Januar 2021
Juni 2021
Dezember 2021
Juli 2022



PIONEER IN THE
PRODUCTION OF CLT

International Tall Timber Precedents



Mjøstårne, Brumunddal, Norway

Completed: March 2019
18 stories
279 feet tall



Tall Wood Residence, Vancouver,
Canada

Completed: 2017
18 stories
174 feet tall



The Tree, Bergen, Norway

Completed: 2015
14 stories
160 feet tall

Projektbeteiligte

New Land Enterprises

Owner/Developer



NEW LAND
ENTERPRISES

C.D. Smith Construction
Catalyst Construction

General Contractors



KORB Associates
Thornton Tomasetti
ARUP

Architect
Engineer
Fire Engineer



Thornton
Tomasetti

ARUP

KLH CLT Supplier
Wiehag Glulam

CLT Supplier and Fabricator
Glulam Supplier Fabricator
Steel Connector Fabricator

Austria



WIEHAG
TIMBER CONSTRUCTION



TIMBERLAB

Mass Timber Specialist



TECHNISCHE ZULASSUNGEN | ZERTIFIKATE | ECO LABELS

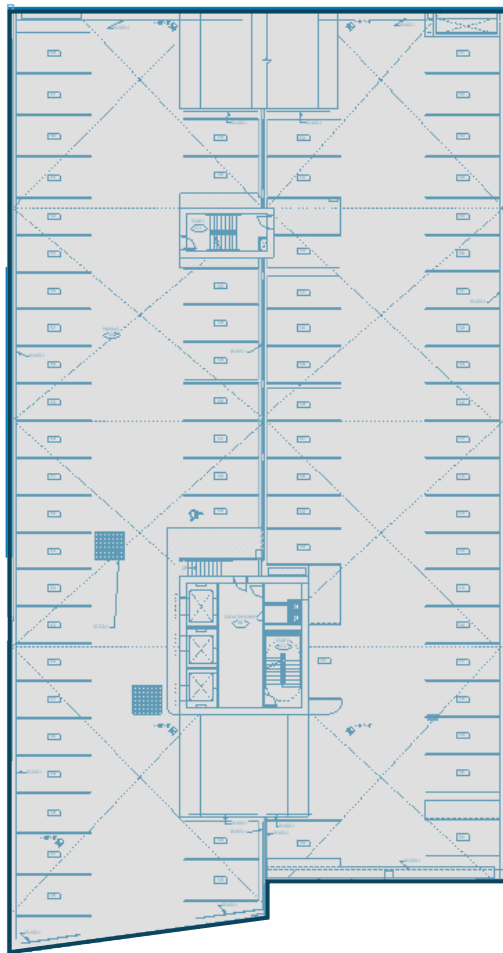


Europäische Technische Bewertung ETA – 06/0138 | CE Zertifikat |
Produktzulassung für USA & Kanada ANSI/APA PRG 320

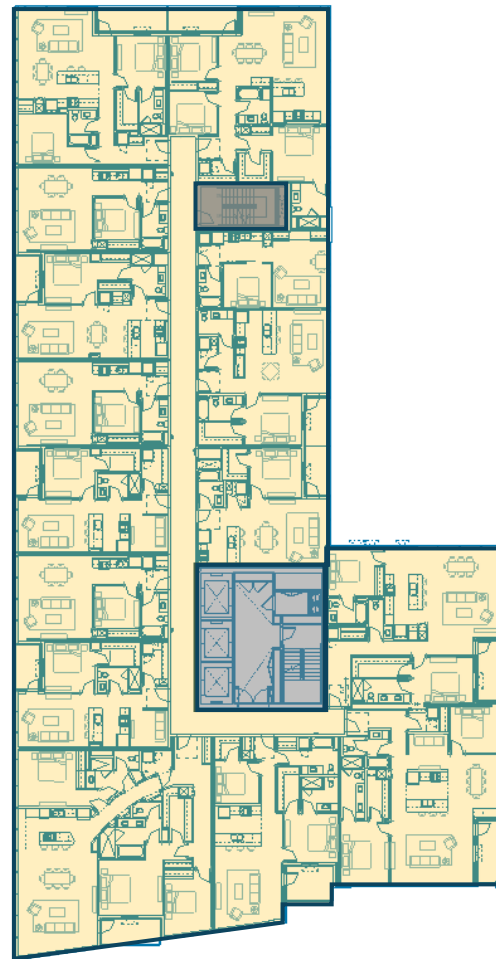
Japanische Zulassung NTI-301 | Zulassung für Frankreich DTA 3.3/20-
1016_V1 | Zulassung für Spanien AITIM 31-01

Qualitätsmanagement ISO EN 9001:2015 | Umweltmanagement ISO EN
14001:2015 | Swan Eco – Label | Declare

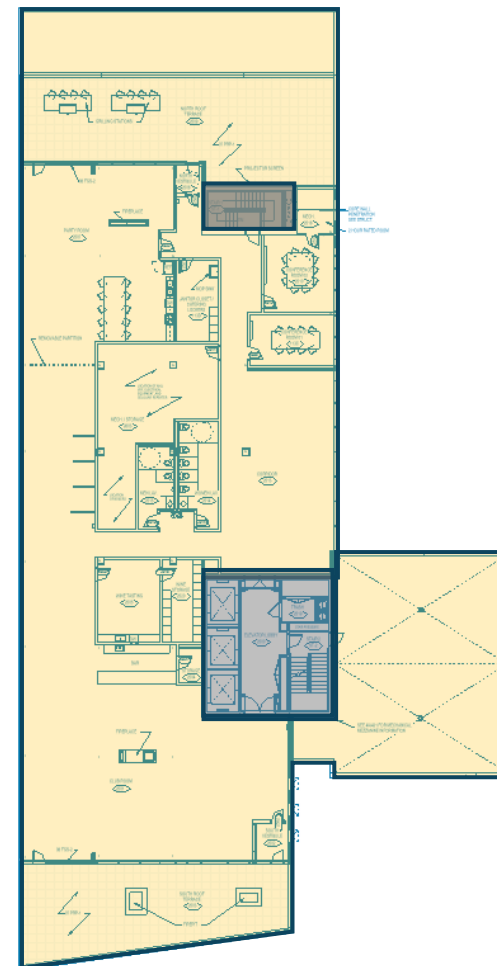
PEFC Zertifizierung | FSC® C119602 Zertifizierung |
Umweltproduktdeklaration



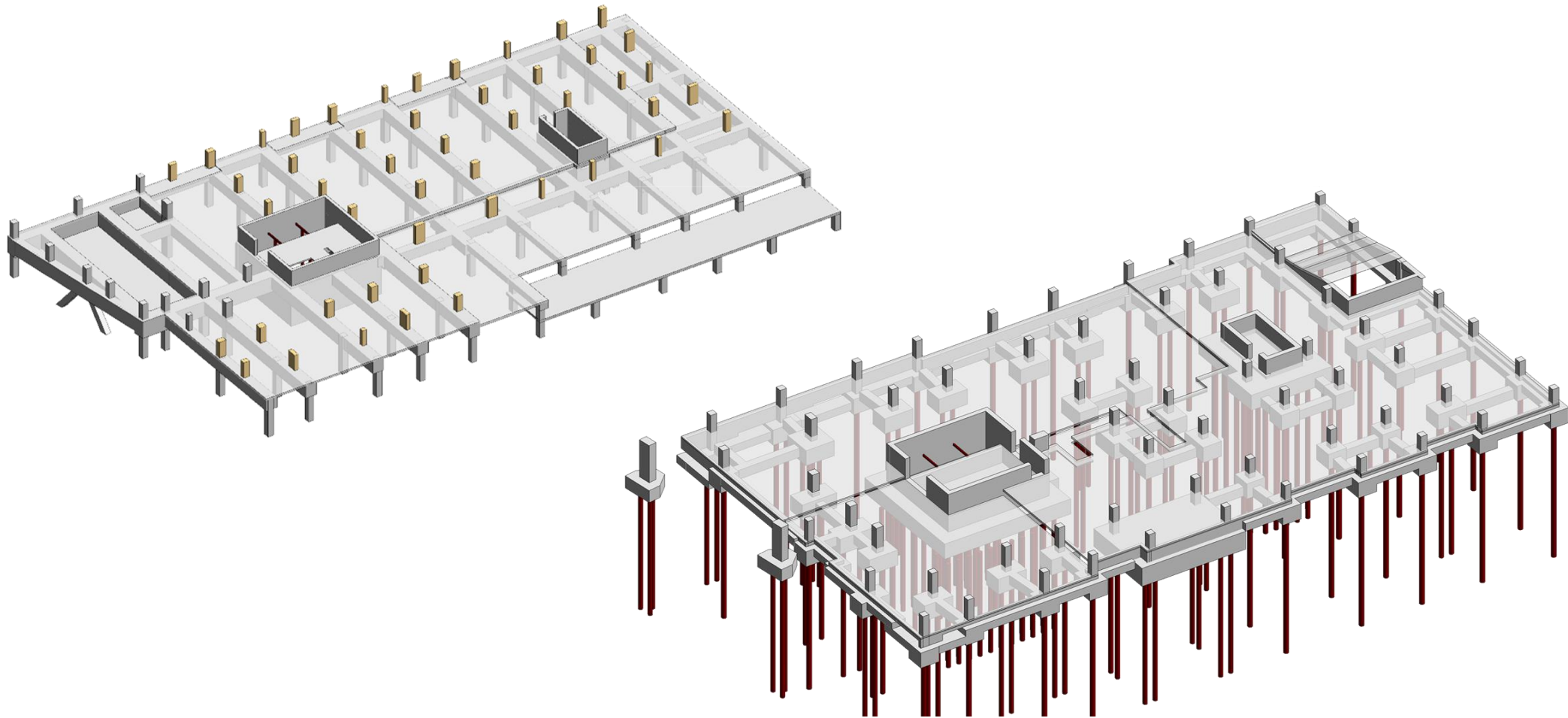
TYPICAL PARKING
LEVEL

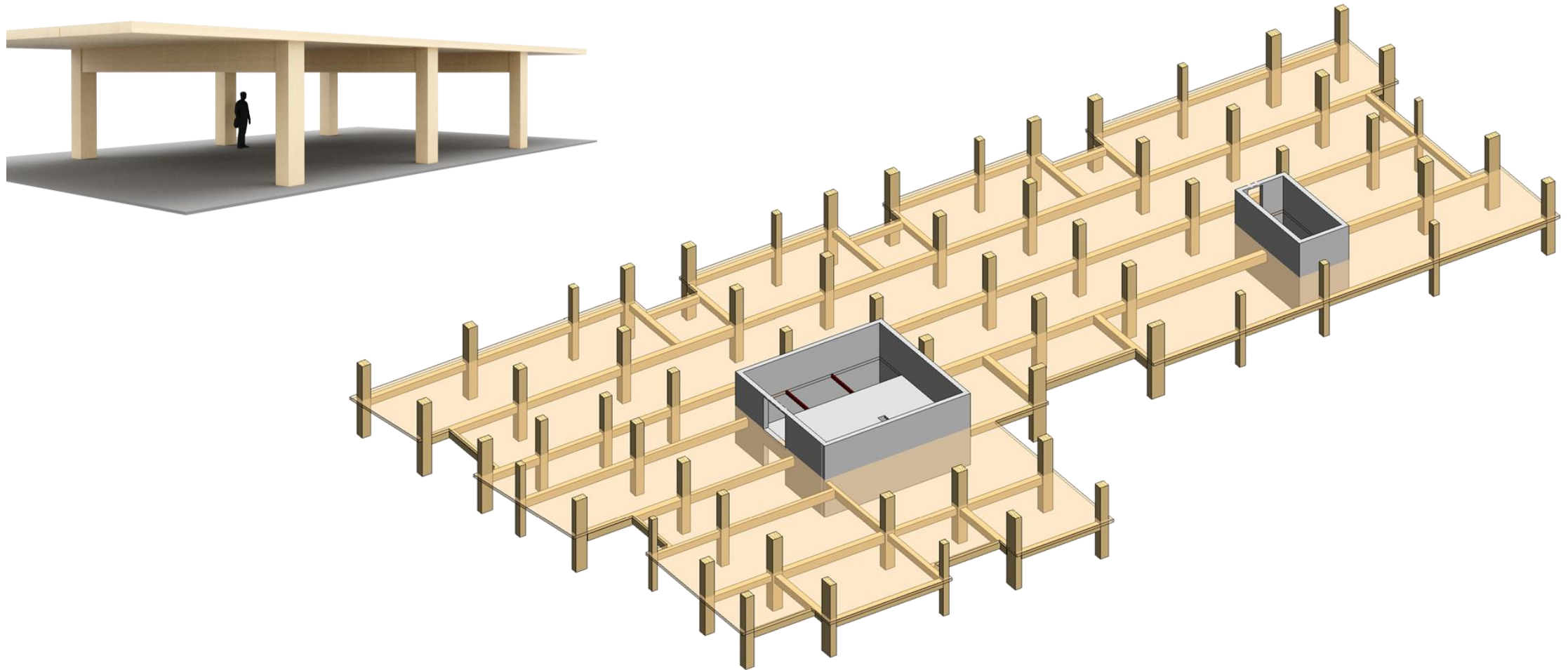


TYPICAL RESIDENTIAL
LEVEL



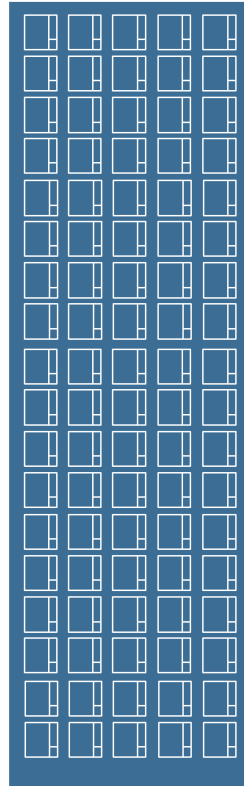
AMENITIES LEVEL
(L25)





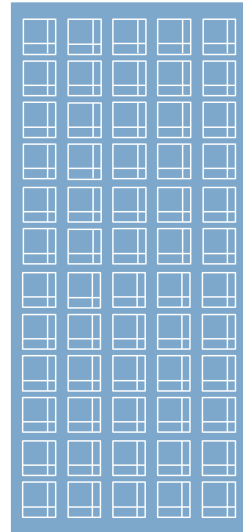
TALL WOOD BUILDING CODE- IBC 2021

TYPE IV-A



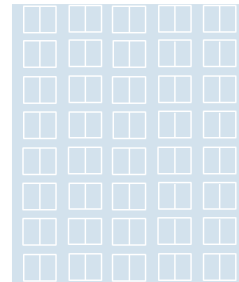
270 ft
18 stories
Fully encapsulated

TYPE IV-B



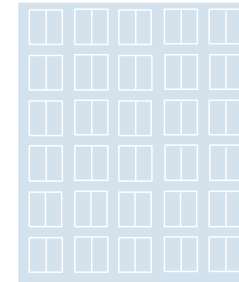
180 FT
12 stories
Partially encapsulated

TYPE IV-C



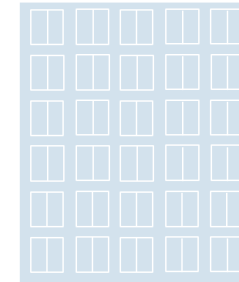
85 FT
8 stories
Fully exposed
2 hour FRR

TYPE III-A,B



85 FT
6 stories
Fully exposed
1 hour (0 hour) FRR

TYPE IV-HT



85 FT
6 stories
Fully exposed
1 hour (0 hour) FRR

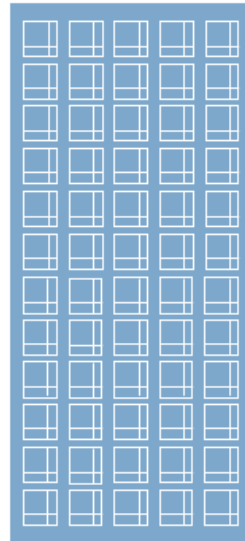
TALL WOOD BUILDING CODE- IBC 2024

TYPE IV-A



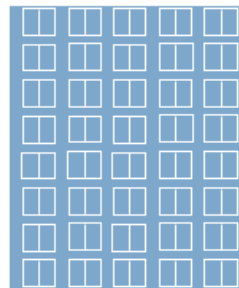
270 ft
18 stories
Fully encapsulated

TYPE IV-B



180 FT
12 stories
Fully Exposed
2 hour FRR

TYPE IV-C



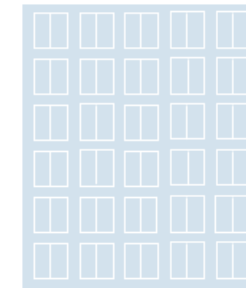
85 FT
8 stories
Fully exposed
2 hour FRR

TYPE III-A,B



85 FT
6 stories
Fully exposed
1 hour (0 hour) FRR

TYPE IV-HT



85 FT
6 stories
Fully exposed
1 hour (0 hour) FRR

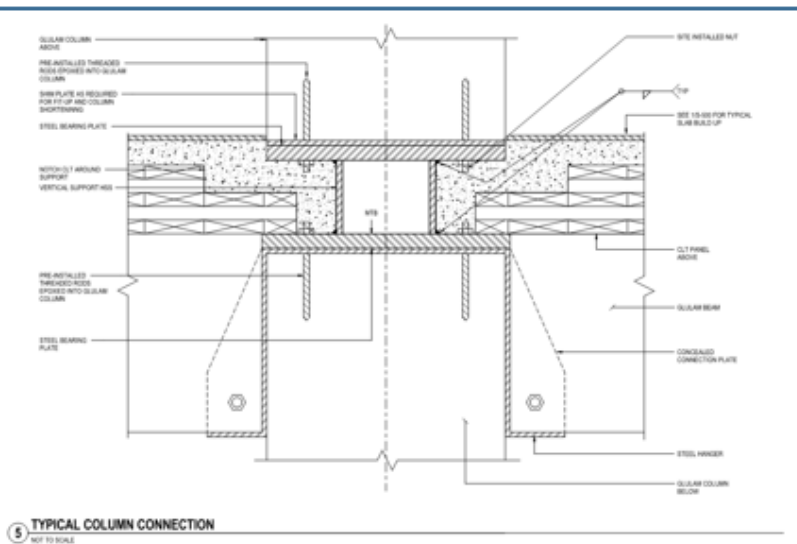


CONFIRMING FIRE PERFORMANCE

Methods for Determining Fire Resistance:

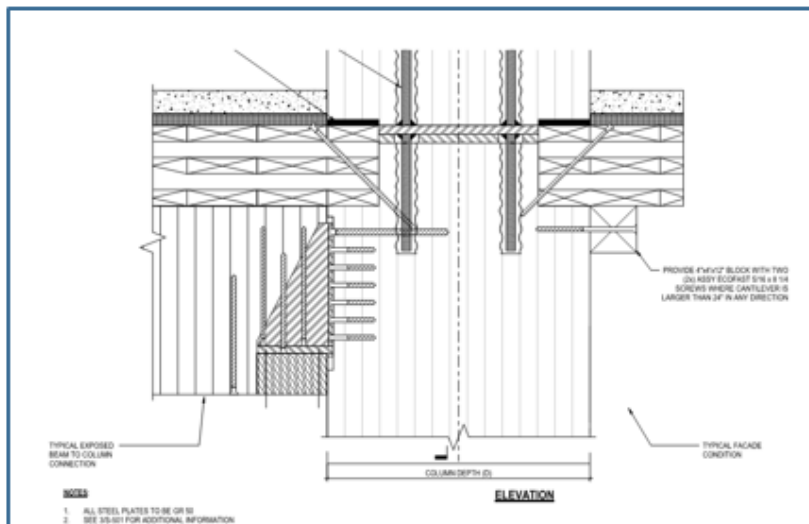
1. Prescriptive design per IBC 721.
 - only for 1hr FRR
 - Min timber sizes for Type IV-HT per IBC 602.4
2. Calculations in accordance with Chapter 16 of National Design Specification for Wood Construction
 - limited to calculating up to 2hr FRR
3. Alternate Means and Methods Request (AMMR) per IBC 104.11, based on Fire Testing or Research Reports.
 - No testing for 3hr glulam

Timberlab helped secure the testing for the first ever 3 HR FRR for glulam columns



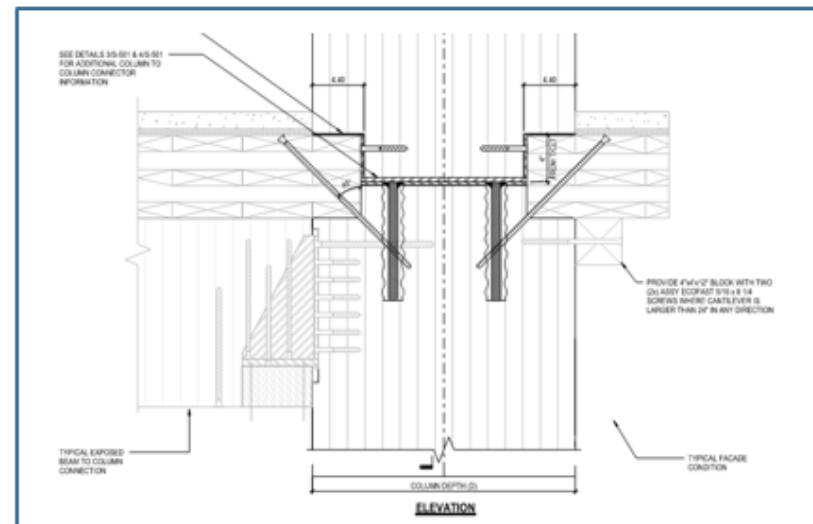
Initial Column to Column Connector with beam knife plates. Design included lots of steel, multiple welds, CNC fabrication to the CLT which would have been extremely costly. This connection would have required fire testing to be used.

Original Connection



Removed most of the steel from the connection. Reduced need for CNCing to the CLT panels, separated the beam connectors and utilized existing approved and tested framework connection.

Timberlab Design



Reduced the amount of steel further, reduced the quantity of epoxy, encapsulated the steel in the connection to avoid any fireproofing.

Final Design

FIRE TESTING FOR ACCEPTANCE

2 HR Panel

A test of the 175mm panel was utilized to prove that a 180mm panel would be sufficient on Ascent.



Panel Joint Test

The panel joint between the panel utilized a standard spline joint detail without any fire sealant allowing for future efficient panel install.



3 HRR Glulam Column

The char layer is removed to show remaining structurally intact column.

This gave the project the oversizing requirements to design without encapsulation

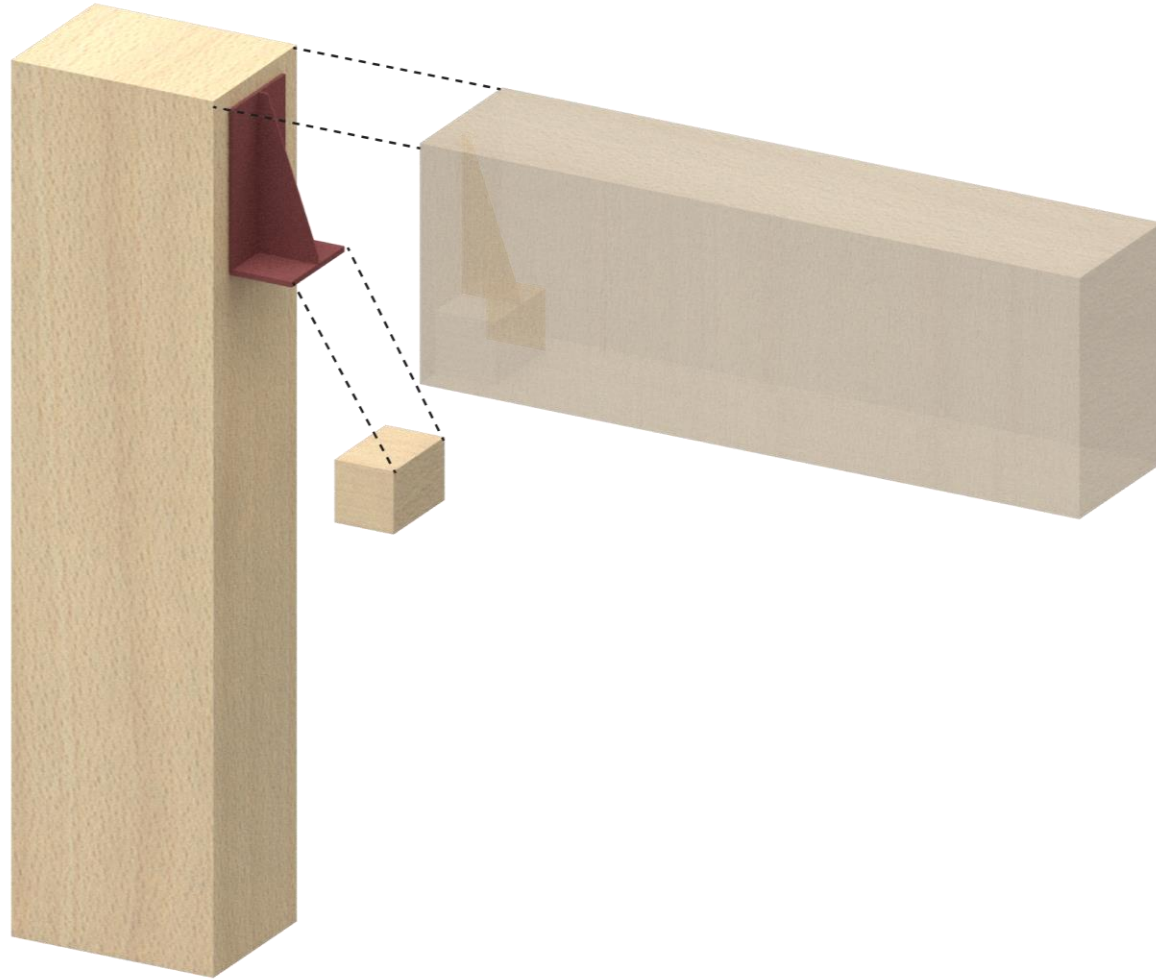


3 Tests

European Spruce
NA Spruce
NA Douglas Fir

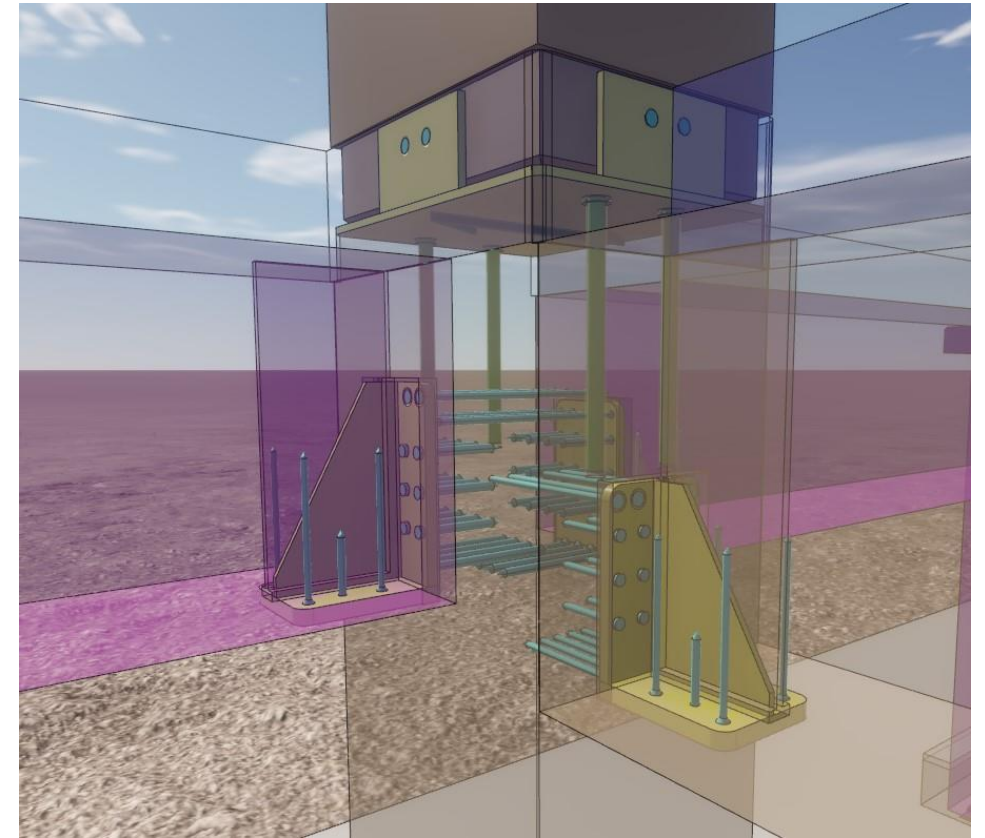
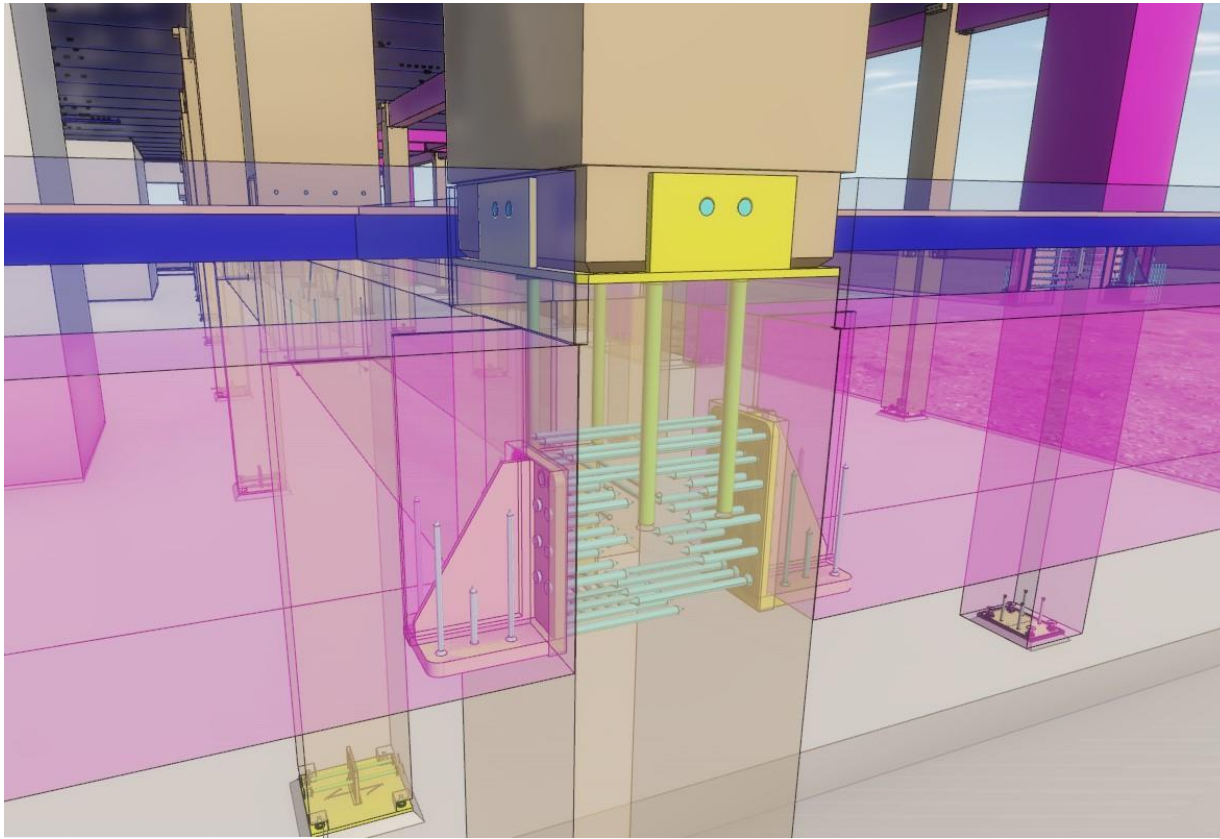
Were all tested to confirm their different char rates and enable the project to have more opening sourcing

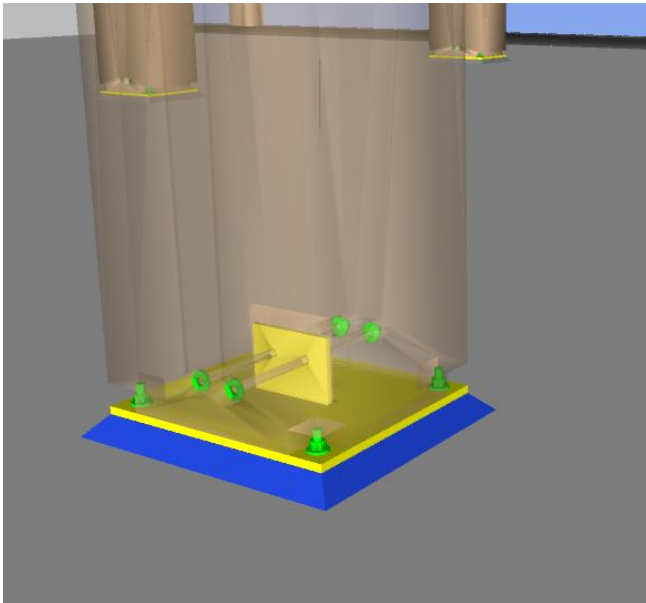
Column	Depth [in]	Avg time [hr]	best fit rate [in/hr]	min. rate [in/hr]	max rate [in/hr]
Hesslacher Spruce	1	0.67	1.59	1.40	1.60
	2	1.44	1.39	1.18	1.60
	3	2.38	1.32	1.23	1.48
	3.5	2.89	1.31	1.22	1.45
	4				1.38
measured from residual		3.00	1.29	1.21	1.35
Column	Depth [in]	Avg time [hr]	best fit rate [in/hr]	min. rate [in/hr]	max rate [in/hr]
Western Archib D. Fir	1	0.66	1.58	1.29	1.71
	2	1.41	1.44	1.26	1.59
	3	2.22	1.34	1.18	1.58
	3.5	2.63	1.33	1.21	1.52
	4				1.46
measured from residual		3.1	1.31	1.19	1.45
Column	Depth [in]	Avg time [hr]	best fit rate [in/hr]	min. rate [in/hr]	max rate [in/hr]
Western Archib Spruce	1	0.70	1.49	1.30	1.57
	2	1.49	1.34	1.20	1.60
	3	2.31	1.29	1.16	1.60
	3.5	2.75	1.27	1.18	1.45
	4				1.42
measured from residual		3.1	1.28	1.15	1.39





Koordination





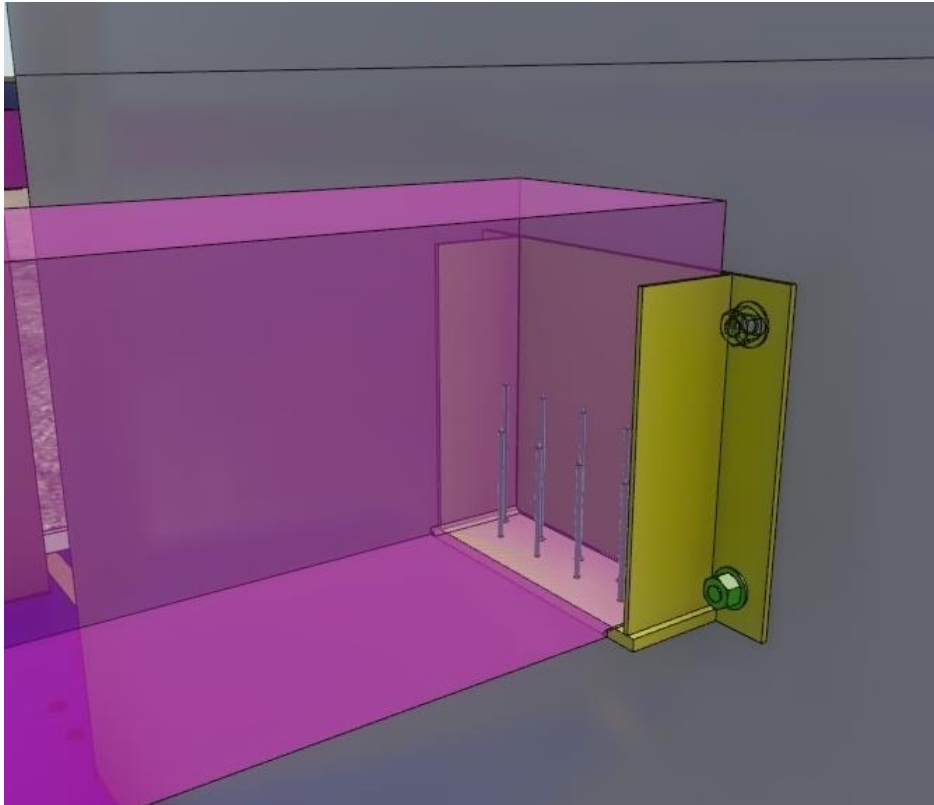
3d Modell



Grundplatte



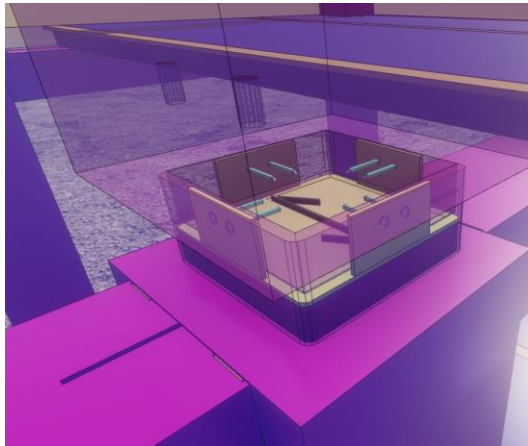
Finale Ausführung



3d Modell



Anschluss Treppenhaus



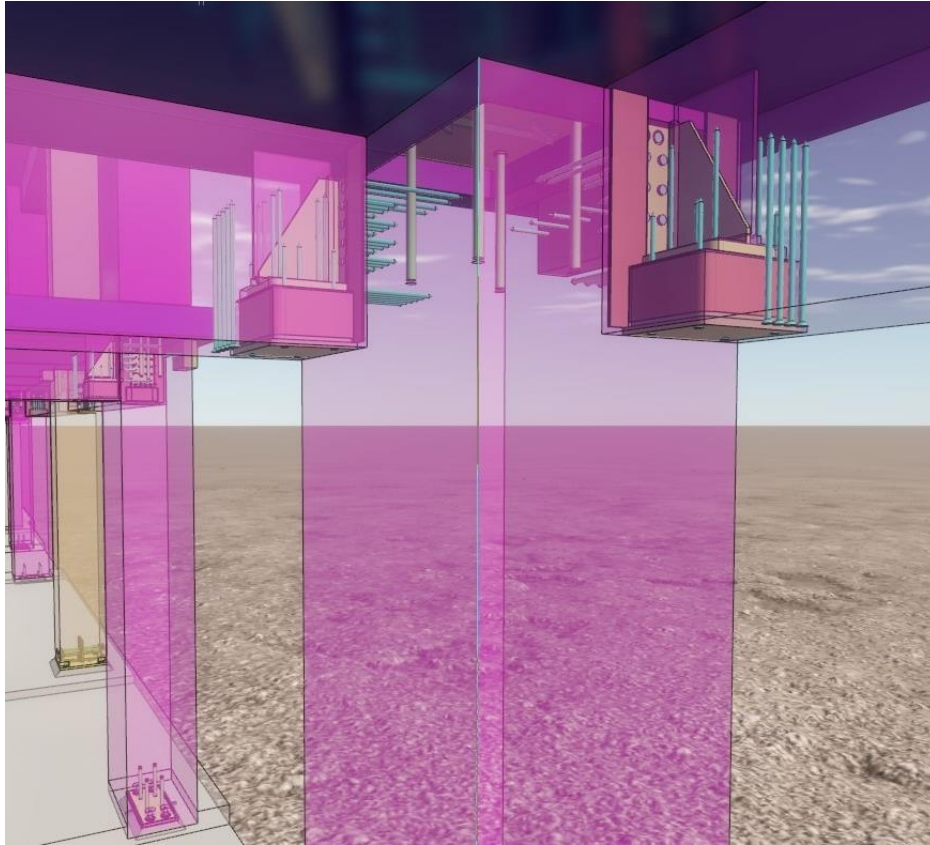
3d Modell



Stützenverbindung oben



Stützenverbindung unten



3d Modell



2hr Brandschutzausführung

Logistik

193	Container
127	Container CLT
66	Container BSH
1	Pandemie





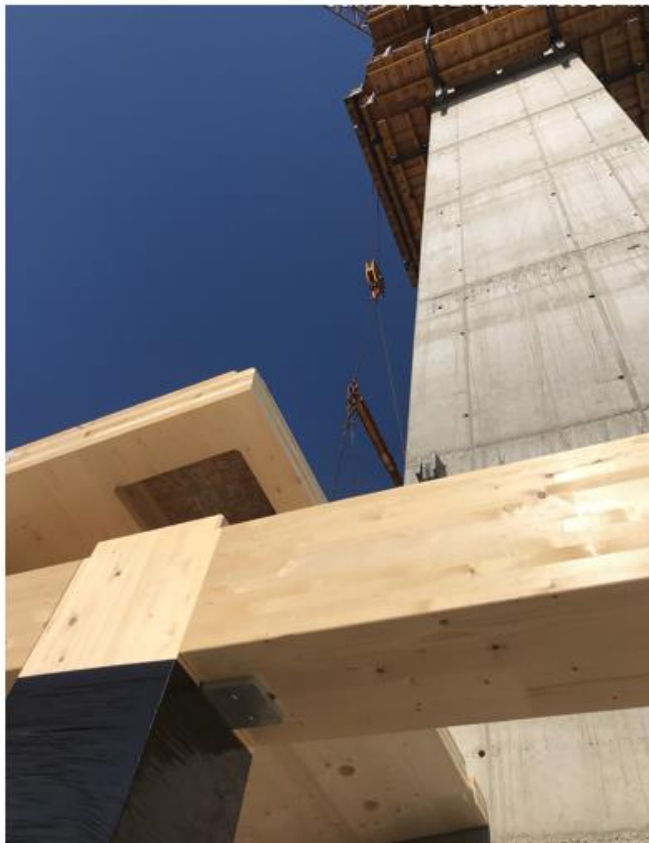
Start of Timber Construction
(June 2021)



Level 17 Complete
(September 2021)



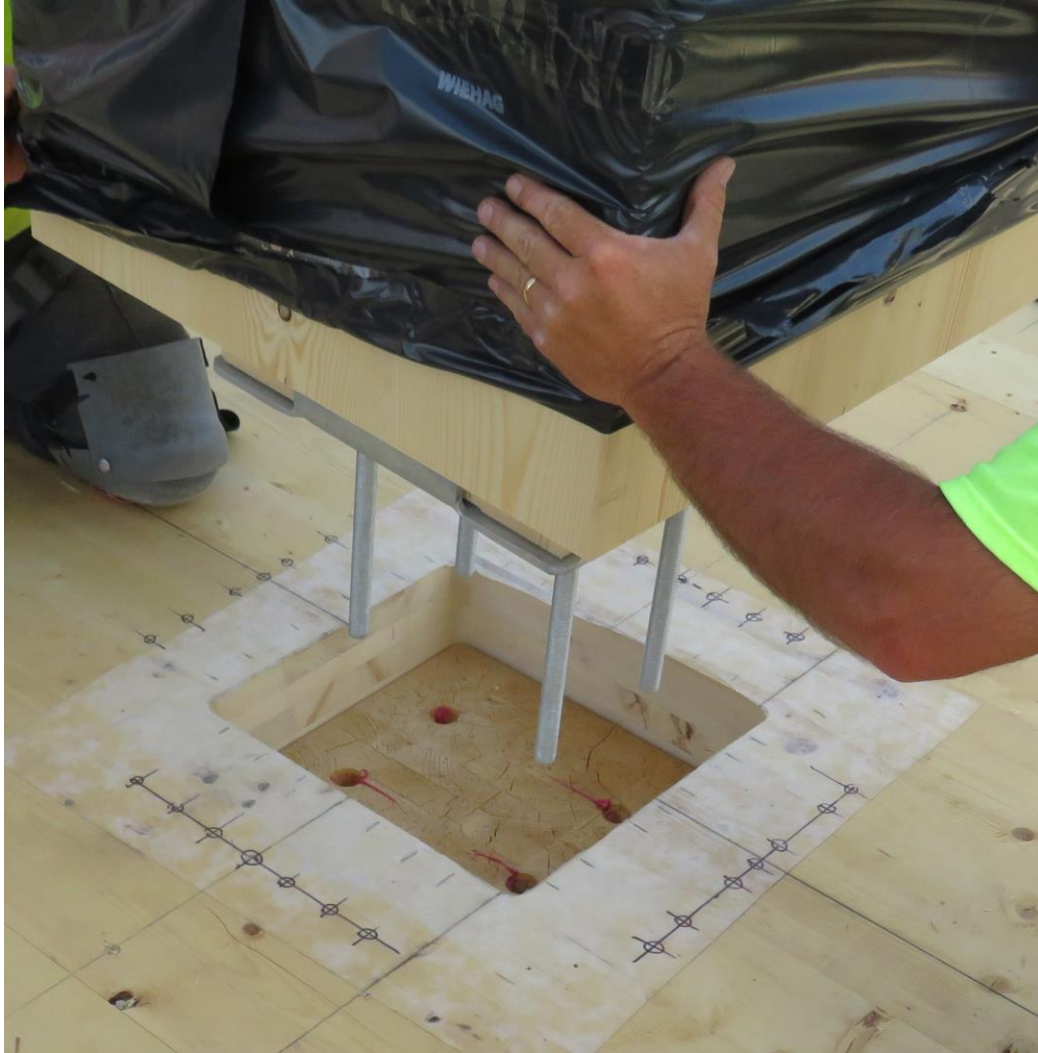
Level 26 (Roof) Topped Out
(December 2021)



CLT was pre-cut for column penetrations

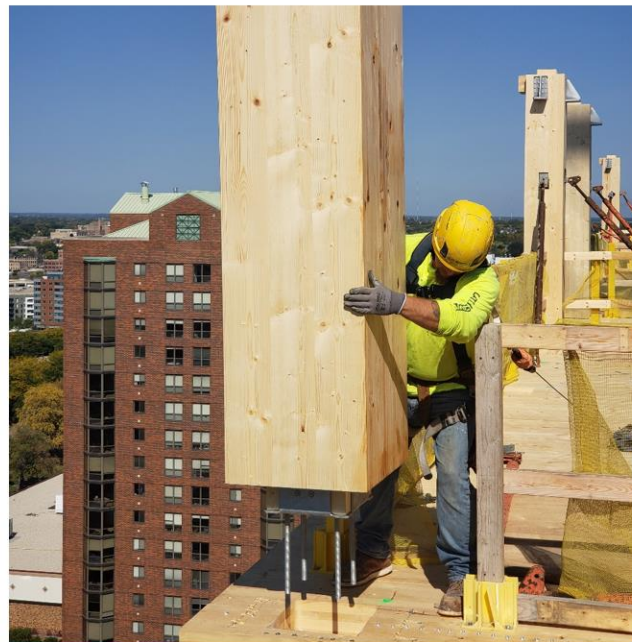


CLT installation at concrete core









**GLULAM
COLUMNS**



**GLULAM
BEAMS**



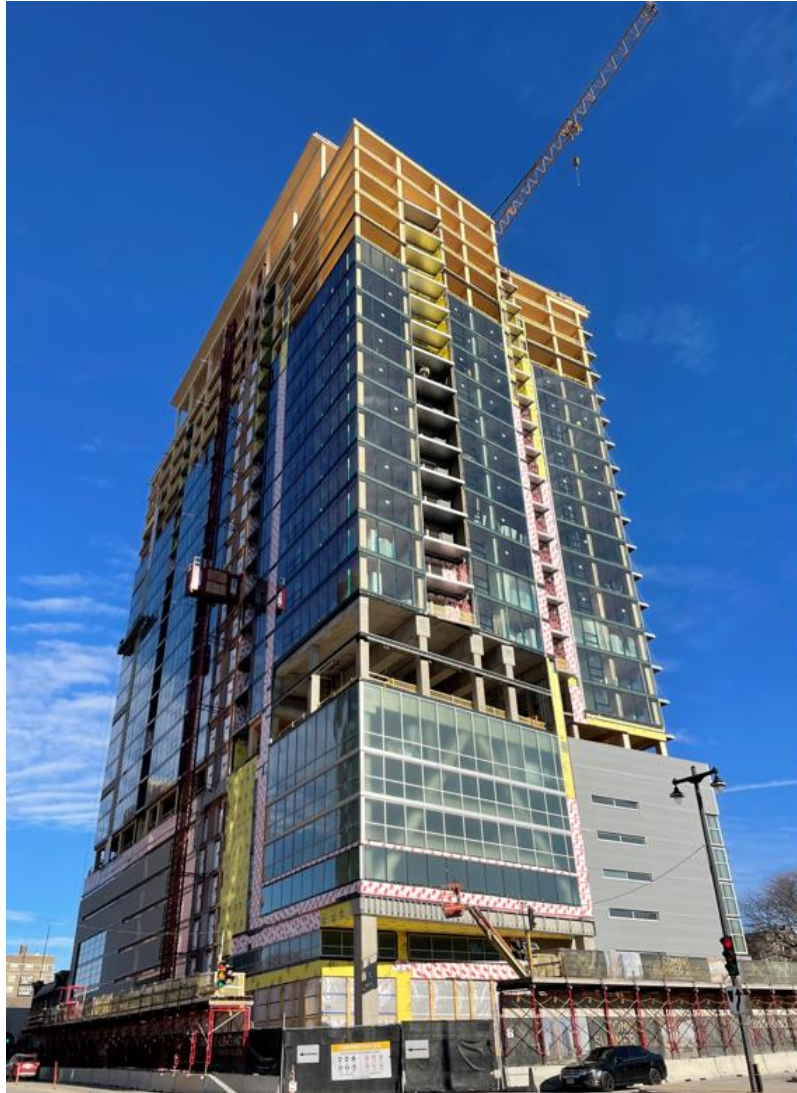
CLT PANELS

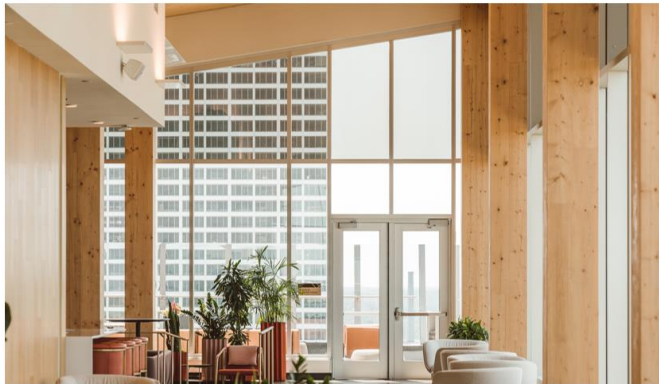


**TIMBER
SCREWS**









Sebastian Popp

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www.klhusa.com

