

Sara Cultural Center, Skellefteå, Sweden – Steel Box Trusses and Tension Rods Allow Long Spans and a Timber Core

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Architect, Partner, White Arkitekter



CTBUH 2022
Steel-Timber Conference

SARA

kulturhus

CTBUH STEEL & TIMBER HYBRID BUILDINGS
CHICAGO.IL 2022 05 24

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white

White Arkitekter

By 2030, all our architecture
is carbon neutral through
design excellence.



WHITE RESEARCH LAB

WHITE RESEARCH LAB

**PROJECT BASED RESEARCH
FOCUS AREAS AND KNOWLEDGE SHARING
TRANSITION INTO CARBON NEUTRAL CONSTRUCTION**

white

SKELLEFTEÅ CULTURE CENTRE

International competition 2015

30 000 m²

Locally coursed timber

75m tall, 20 floors



SKELLEFTEÅ, SWEDEN

Gulf stream

65 degrees north
Dawson City - Yukon

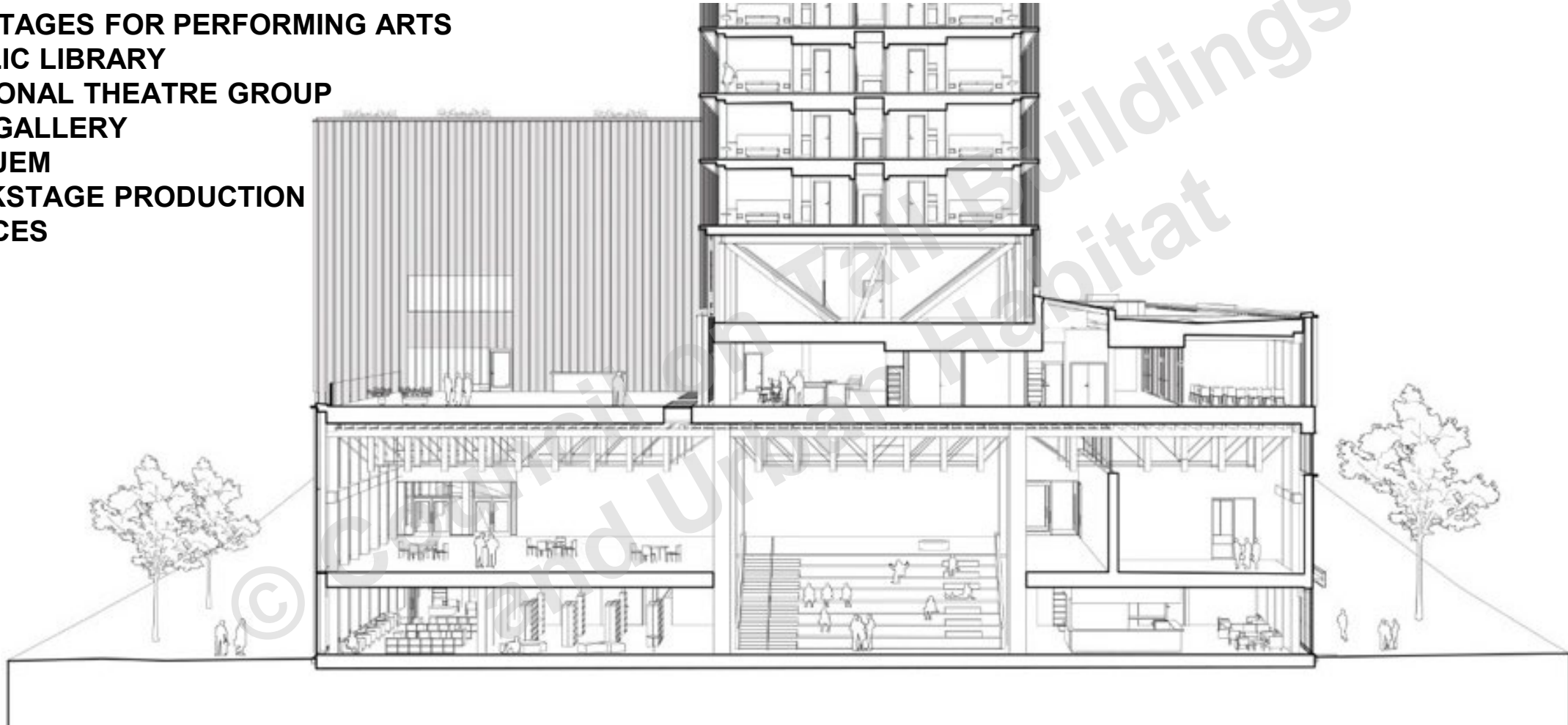
SKELLEFTEÅ

STOCKHOLM

LONDON

CULTURE CENTER

- SIX STAGES FOR PERFORMING ARTS
- PUBLIC LIBRARY
- REGIONAL THEATRE GROUP
- ART GALLERY
- MUSEUM
- BACKSTAGE PRODUCTION
- OFFICES



HYBRID TRUSSES

ENABLE FLEXIBLE SPACES



white

HOTEL TOWER

- 205 HOTEL ROOMS**
- CONFERENCE CENTER**
- GYM**
- ROOFTOP SPA**
- 3 THEME RESTAURANTS**



© Courthouse Buildings Habitat

HOTEL ROOMS

13 STOREYS HOTEL ROOMS

© Colliers and Uptown Tall Buildings Habitat



ROOF TOP SPA

PANORAMA RESTAURANT

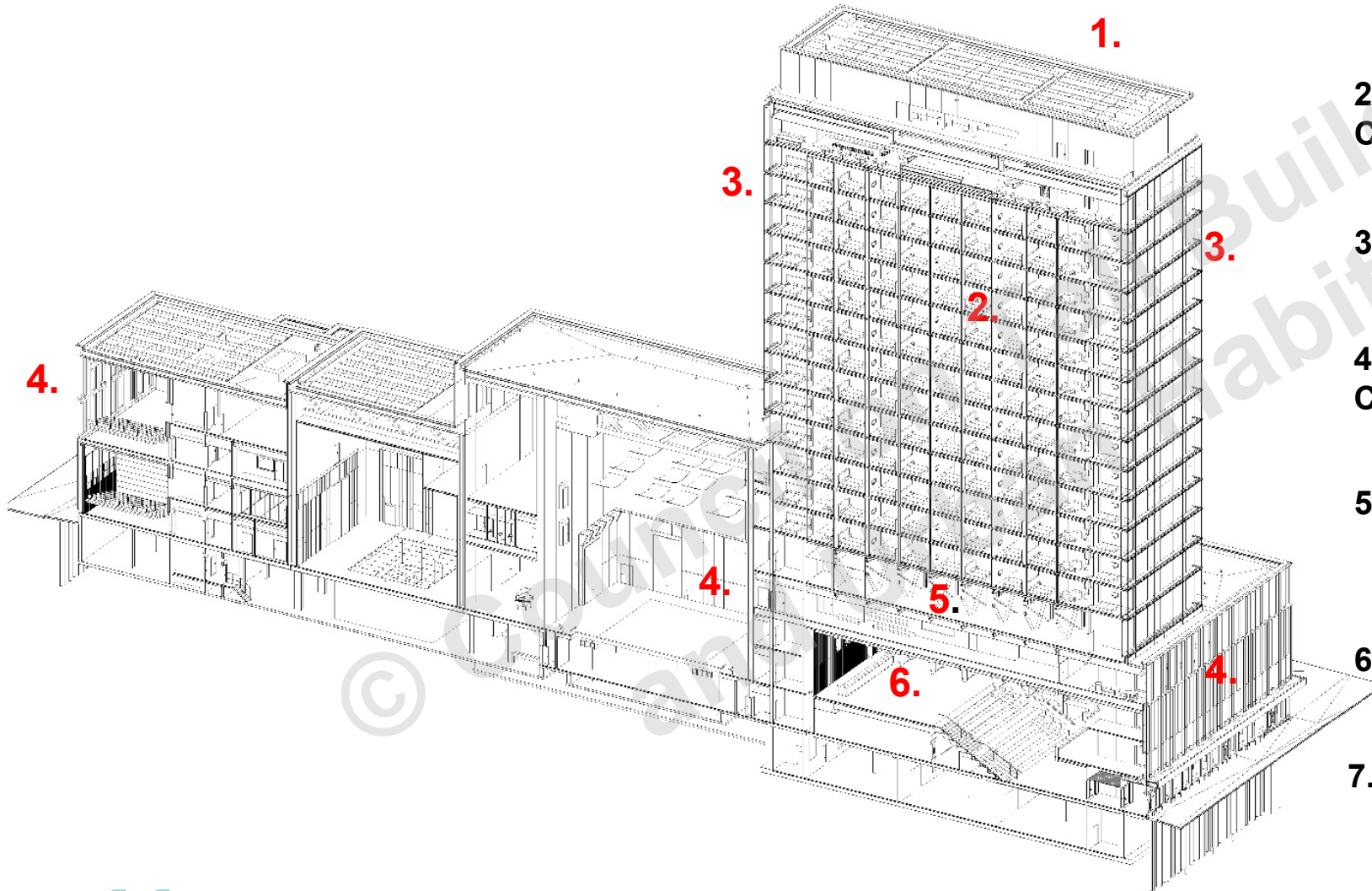
SAUNAS/ WELLNES

TURKISH BATHS

INFINITY POOL, STAINLESS STEEL



CONSTRUCTION



1. Dead weight concrete slabs

2. Prefabricated
CLT Hotelroom modules (13 storeys)

3. CLT cores stability (proposed concrete)

4. Combination of Glulam frame and
CLT walls and floors

5. Transfer structure, Steel trusses
Plant floor

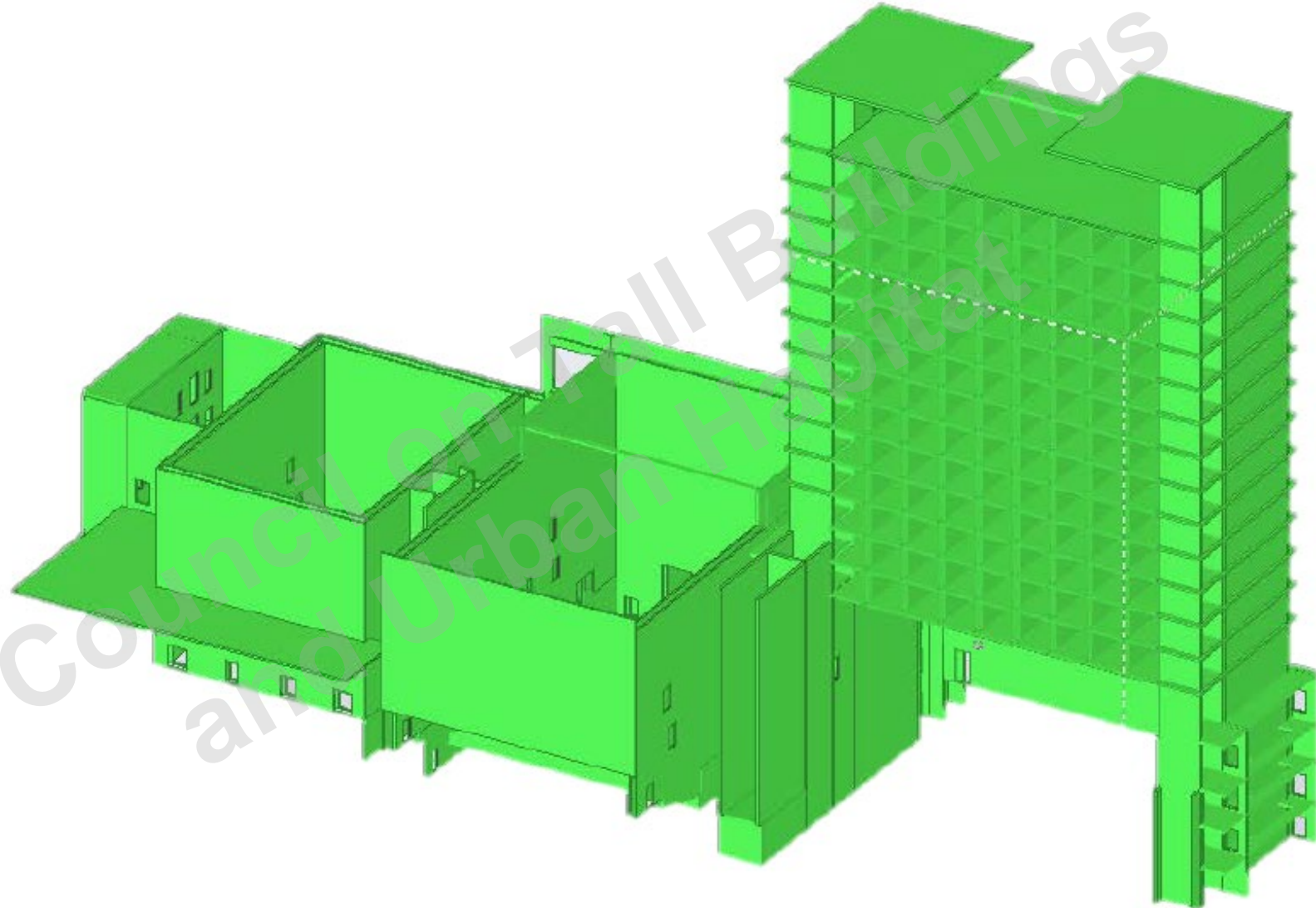
6. Hybrid GL and Steel trusses

7. Concrete Foundations

ELEMENTS CLT

9000m³

- ELEVATOR CORES
- 3D VOLUMETRICS
- SHEAR WALLS
- FLOOR SLABS

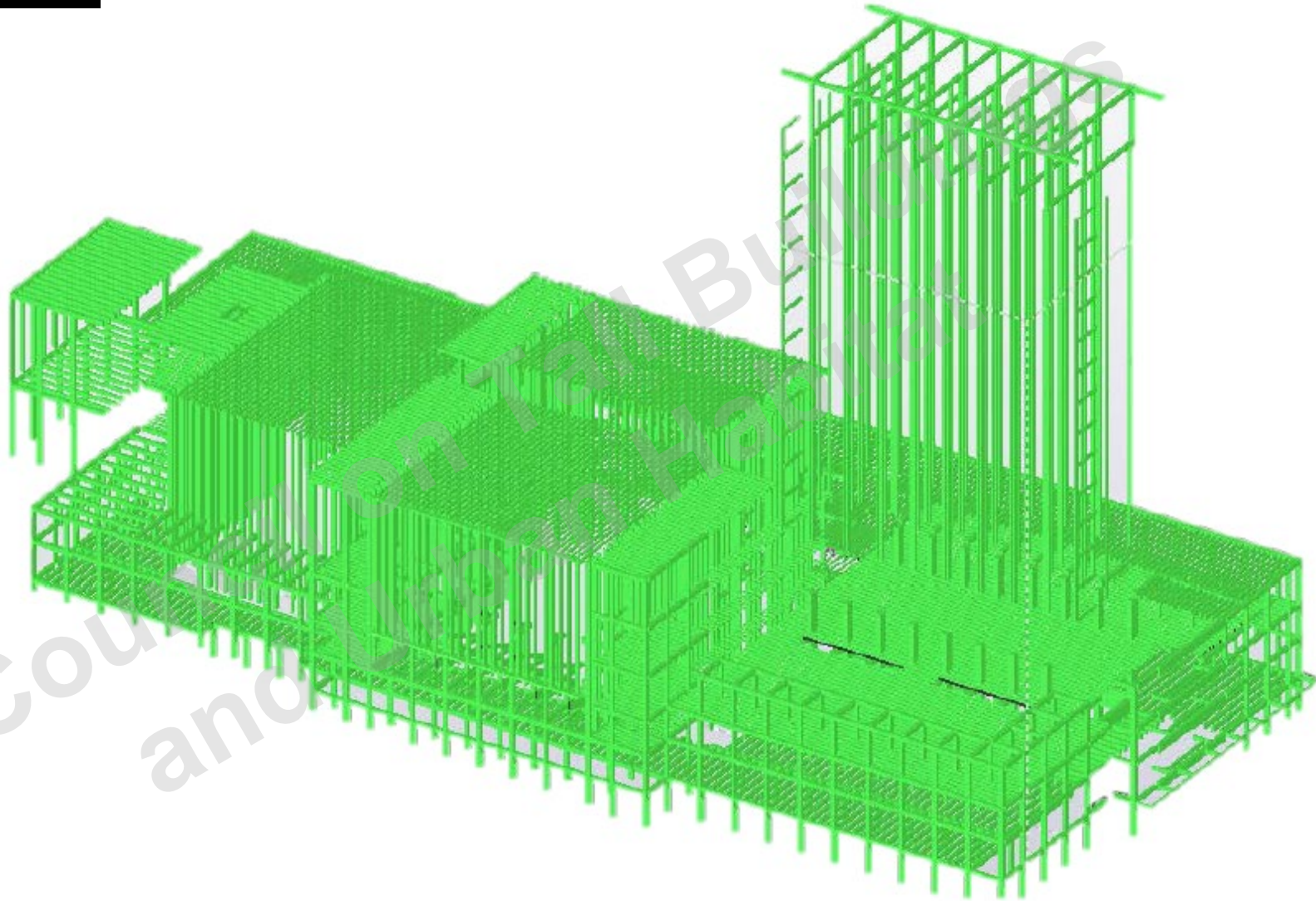


© Council of Tall Buildings

ELEMENTS GLT

3000m³

BEAMS
COLUMNS
THRUSSES



STEEL

234 ton (excluding screws)

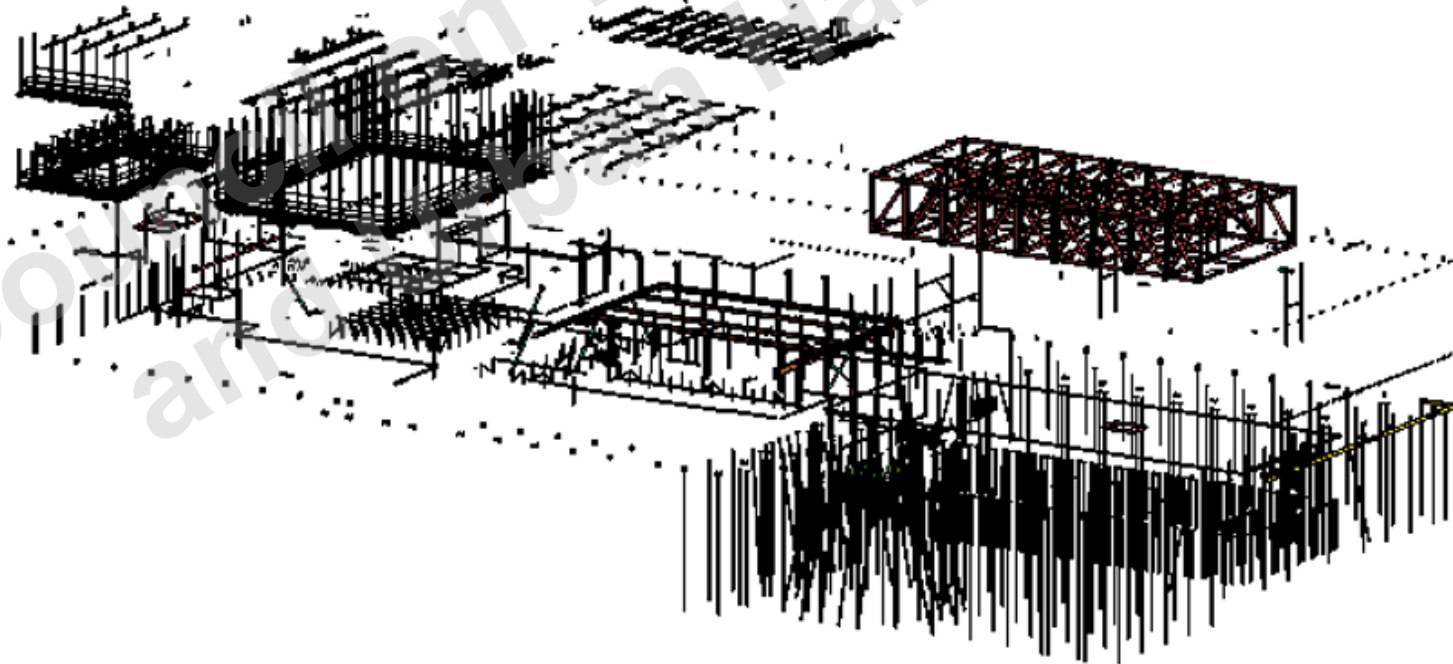
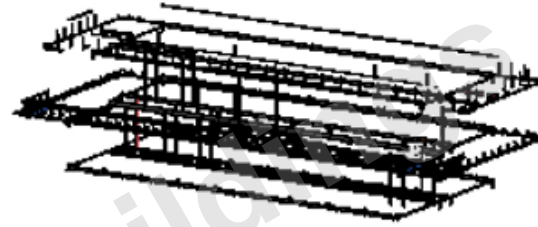
PILES TO BED ROCK

TRUSSES

CONNECTORS

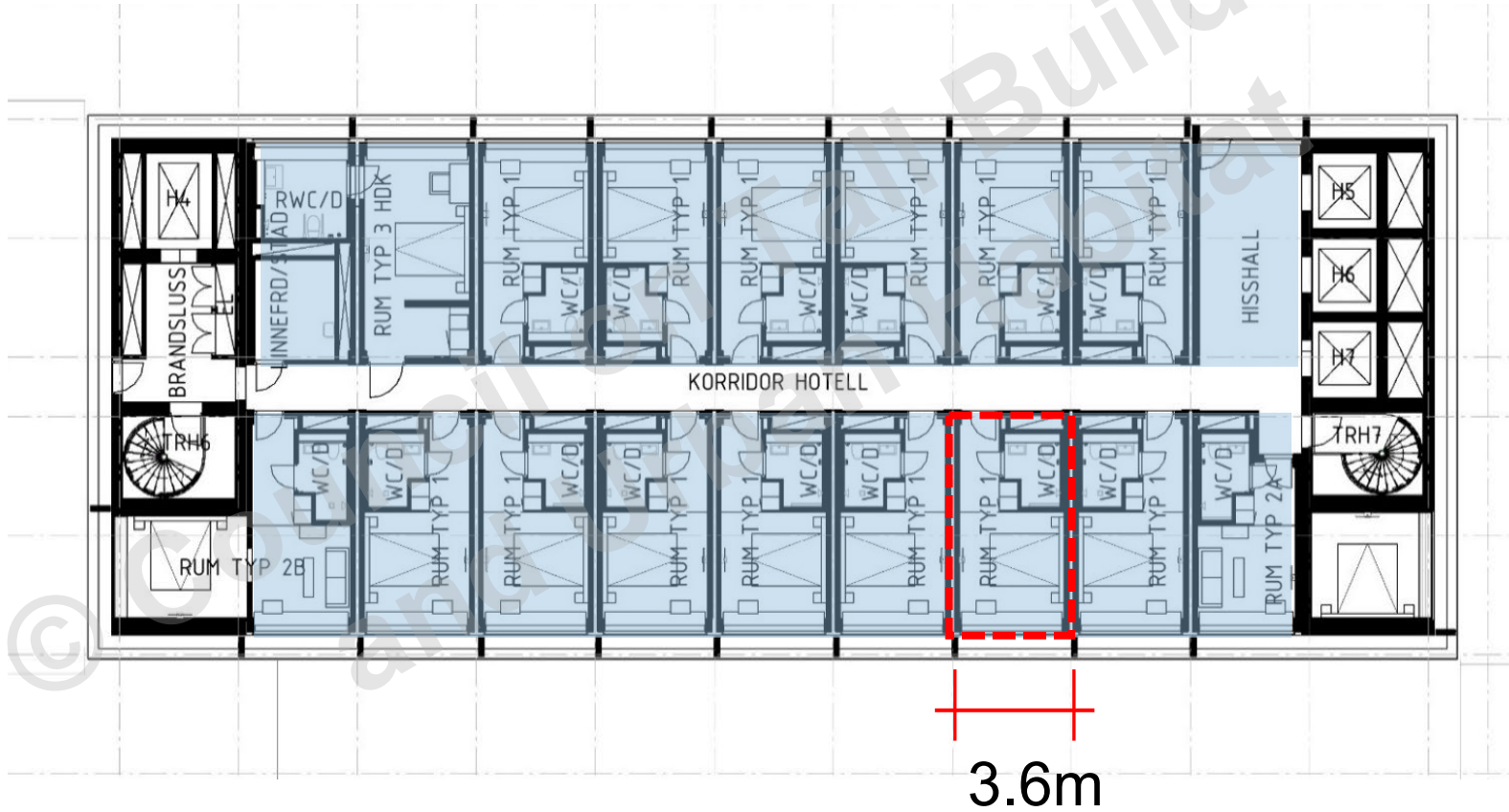
BRACKETS

HYBRID FLOOR SLABS



WOOD HOTEL

18 PREMANUFACTURED HOTEL PODS
2 ELEVATOR CORES

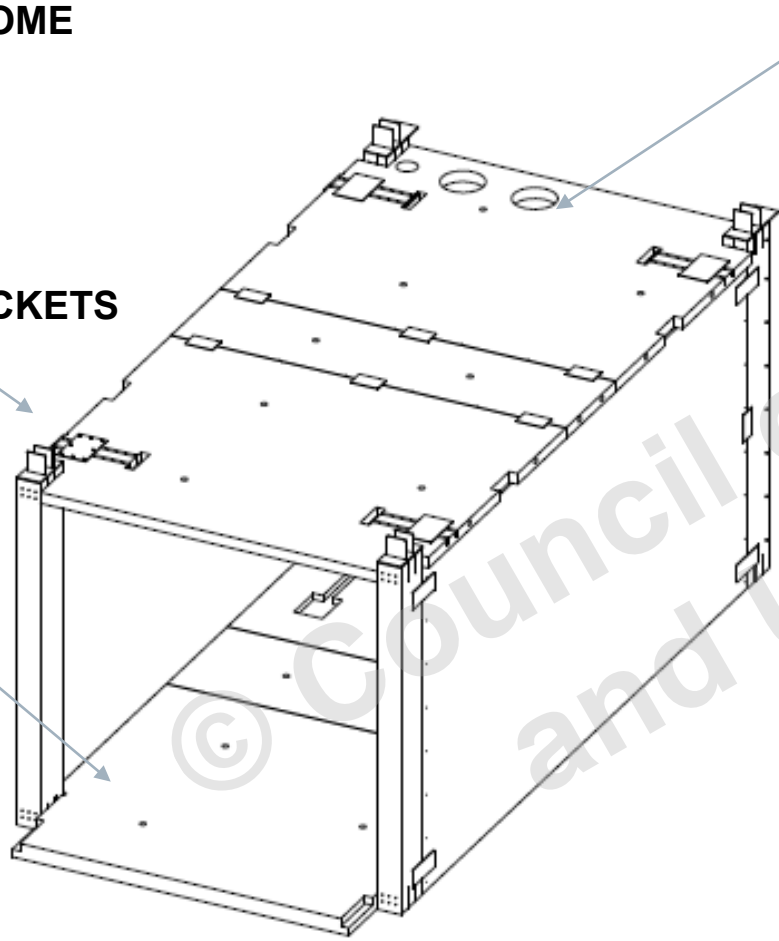


HOTEL ROOM MODULES

PREMANUFACTURED 40KM FROM
SITE. DEROME

STEEL BRACKETS

CLT SLAB



3D - VY
1:30

CLT SLABS
STEEL
CONNECTOR
GL PILLAR
CORNERS

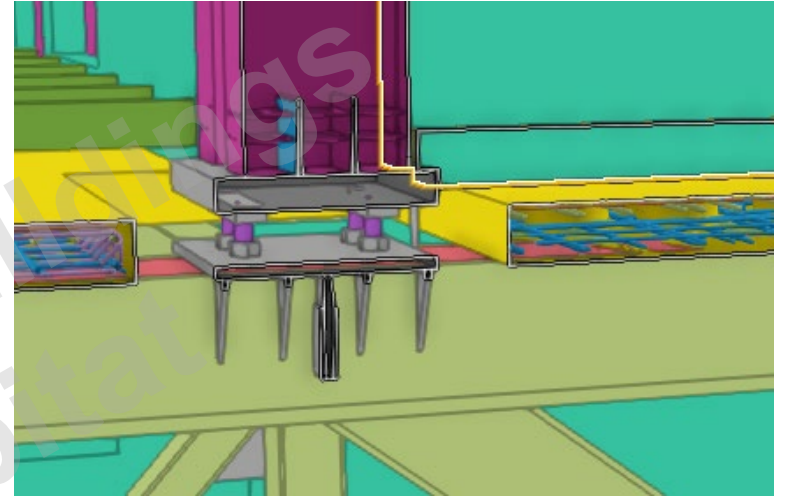
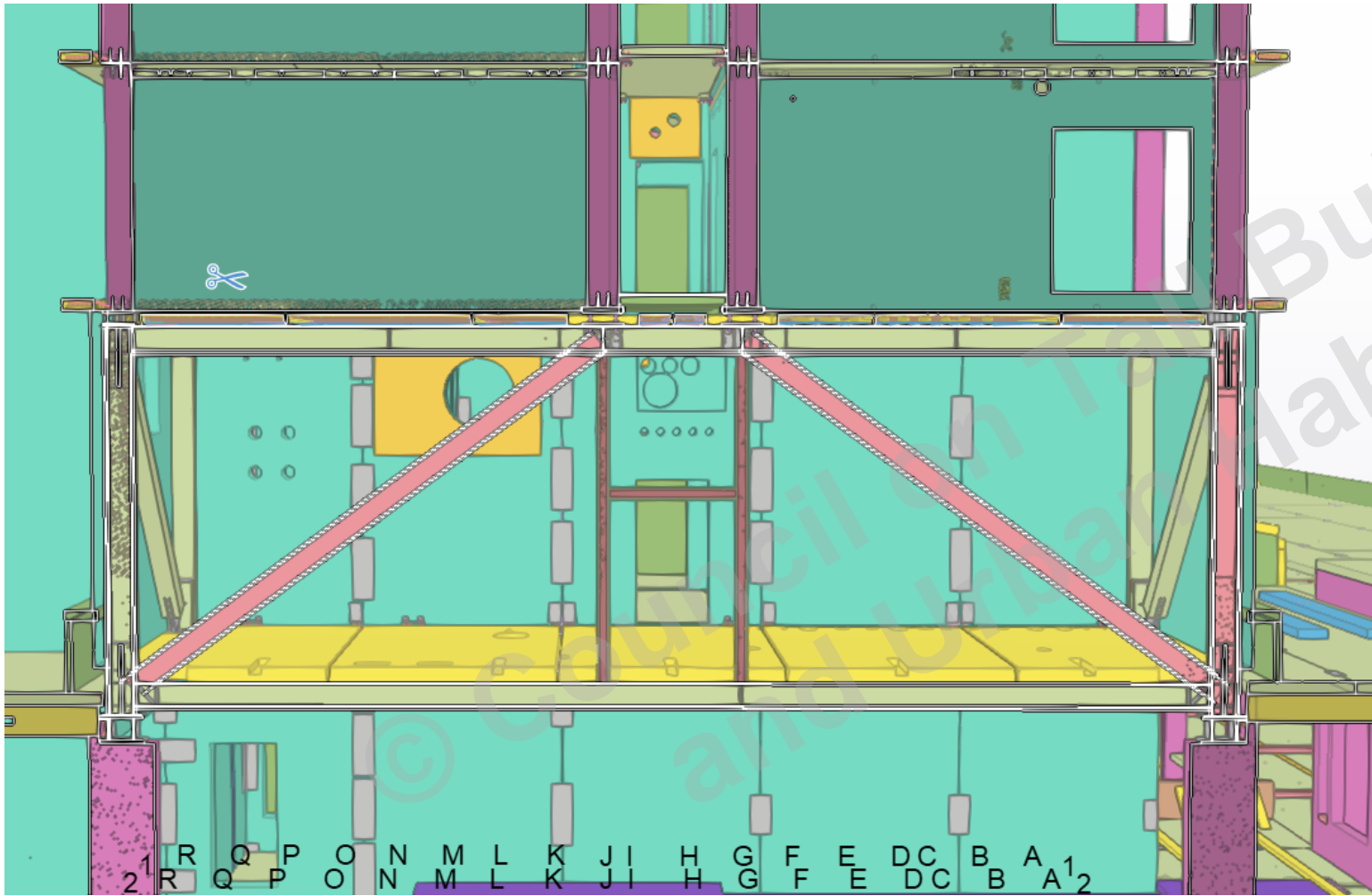
STEEL BRACKETS



PREFAB MODULARITY



STEEL TRUSSES



PRE-FABRICATION, STORAGE.

Martinsons (Holmen)

CLT Factory 50 km from Skellefteå
Bygdsiljum

Knowledge of properties of wood, made to measure
FSC certification, Safe working environment.

Large elements, Fewer connectors
Largest element 27x3M 12 ton



ON SITE CONSTRUCTION

73 weeks of montage

Build up vertically, 13 segments

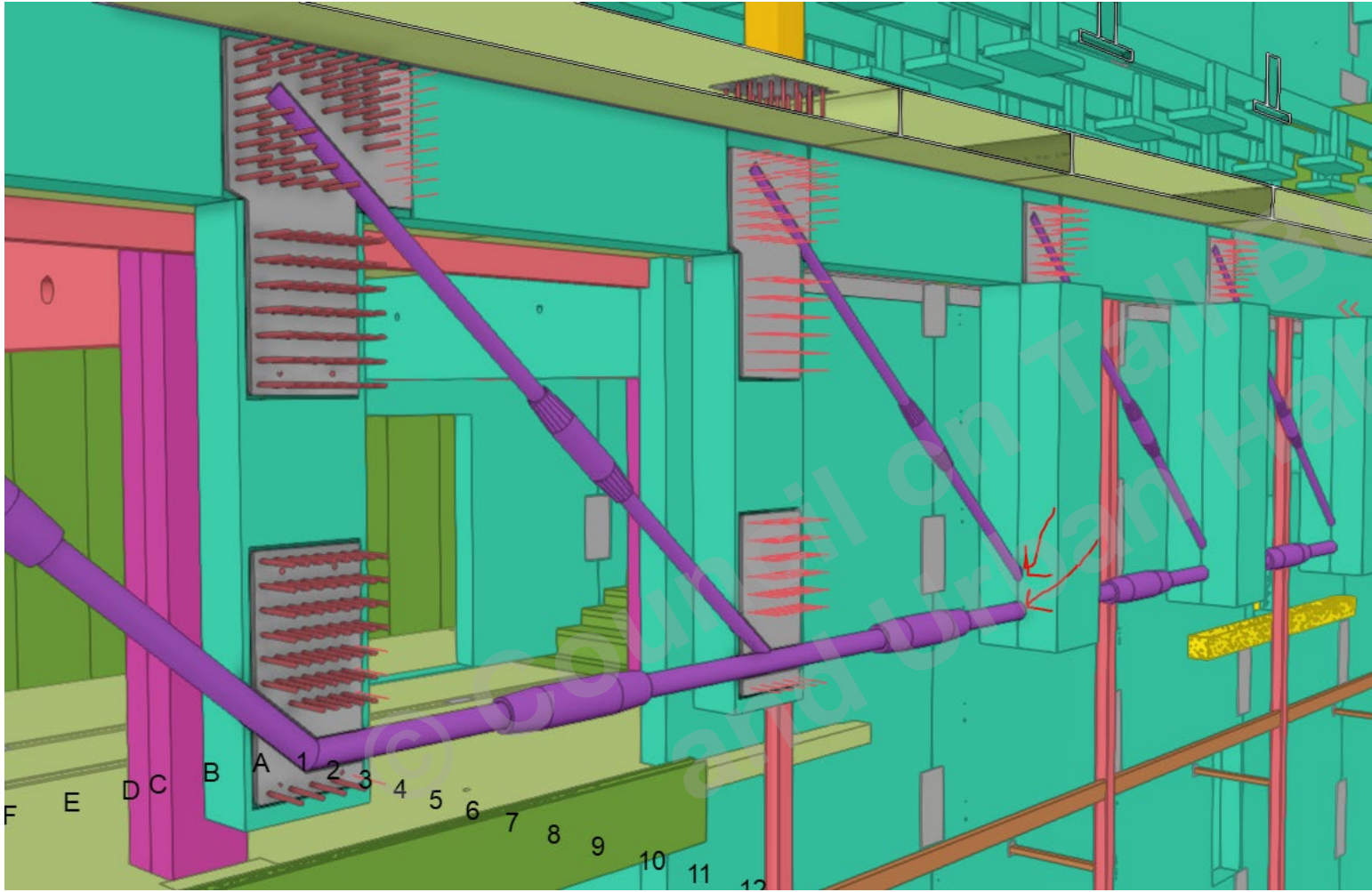
Time saving 1 year of construction.

No weather protection

Reducing transportation with 80%



HYBRID TRUSSES



Section



No weather protection

OTHER USE OF STEEL



Hybrid steel timber floors



**Steel brackets.
550 000p screws.**



2000p WR 13x 600-800



FIRE SAFETY

RATED "BR0" SWEDISH SYSTEM

FULLY SPRINKLERED

**HOTEL TOWER WITH TR1+TR2
EVACUATION STAIRS + EVACUATION LIFT.**

HOTEL R90/R60 CULTURE CENTRE: R60/R30

**OVERDIMENSIONED WOOD BASED ON STANDARD
CHARRING RATE**

**INTERNAL WOOD SURFACES FIRE COATED TO B-s1,d0
FACADE PANEL FIRE TREATED 2M ABOVE GROUND.**

ENERGY PERFORMANCE

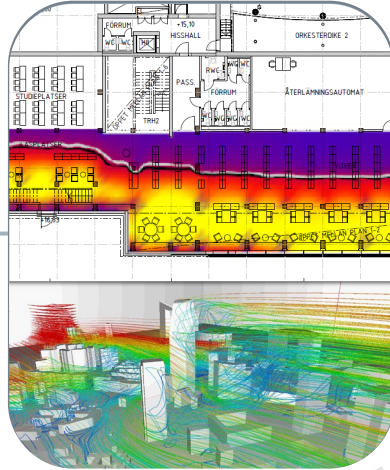
- **EFFICIENT FACADE ENVELOPE**
- **ELIMINATION OF THERMAL BRIDGES**
- **FIXED AND MOBILE SUN PROTECTION**
- **HYBRID VENTILATION OF LARGE VOLUMES**
- **PHOTOVOLTAIC PANELS ON ROOFS AND FACADES**
- **100% RENEWABLE HEATING AND COOLING GRID**
- **CONNECTED TO SMART GRID,**
- **OPTIMIZATION BY ARTIFICIAL INTELLIGENCE**
- **CERTIFICATION "GOLD" SWEDEN GREEN BUILDING COUNCIL MILJÖBYGGNAD.**

BIM INTEGRATED DESIGN

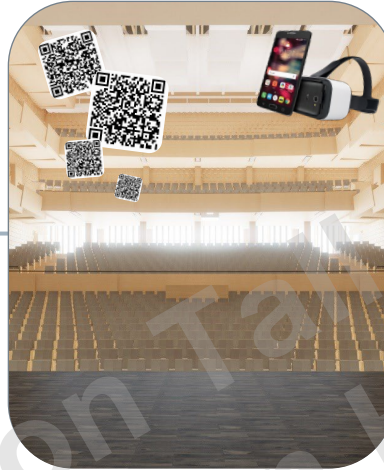
DESIGN TECHNICAL



SUSTAINABILITY



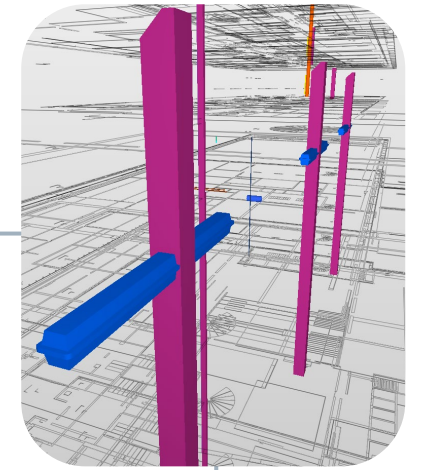
AR & VR



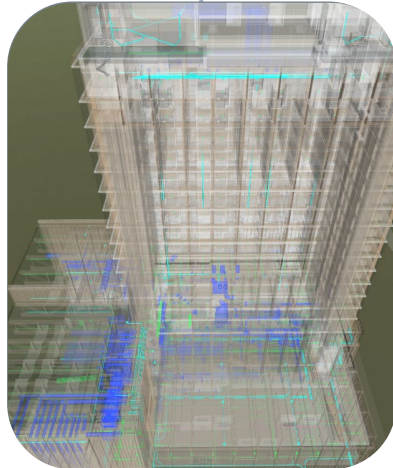
VIZUALISATION



REVIEW COLLISIONS



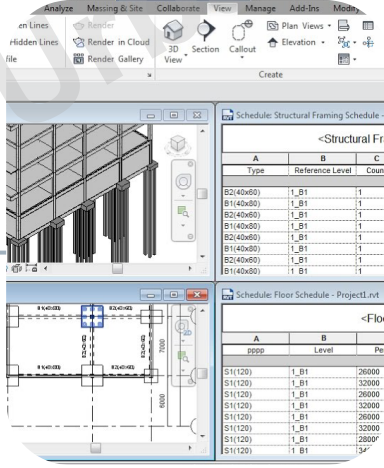
COORDINATION



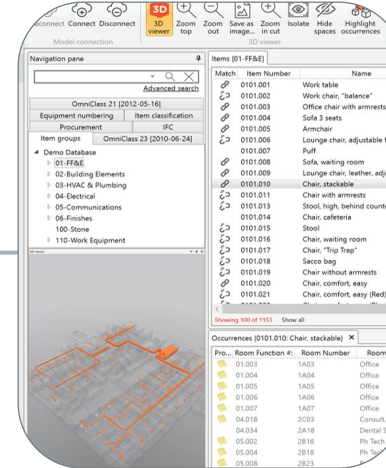
DIALOGE



QUANTITY TAKE-OF



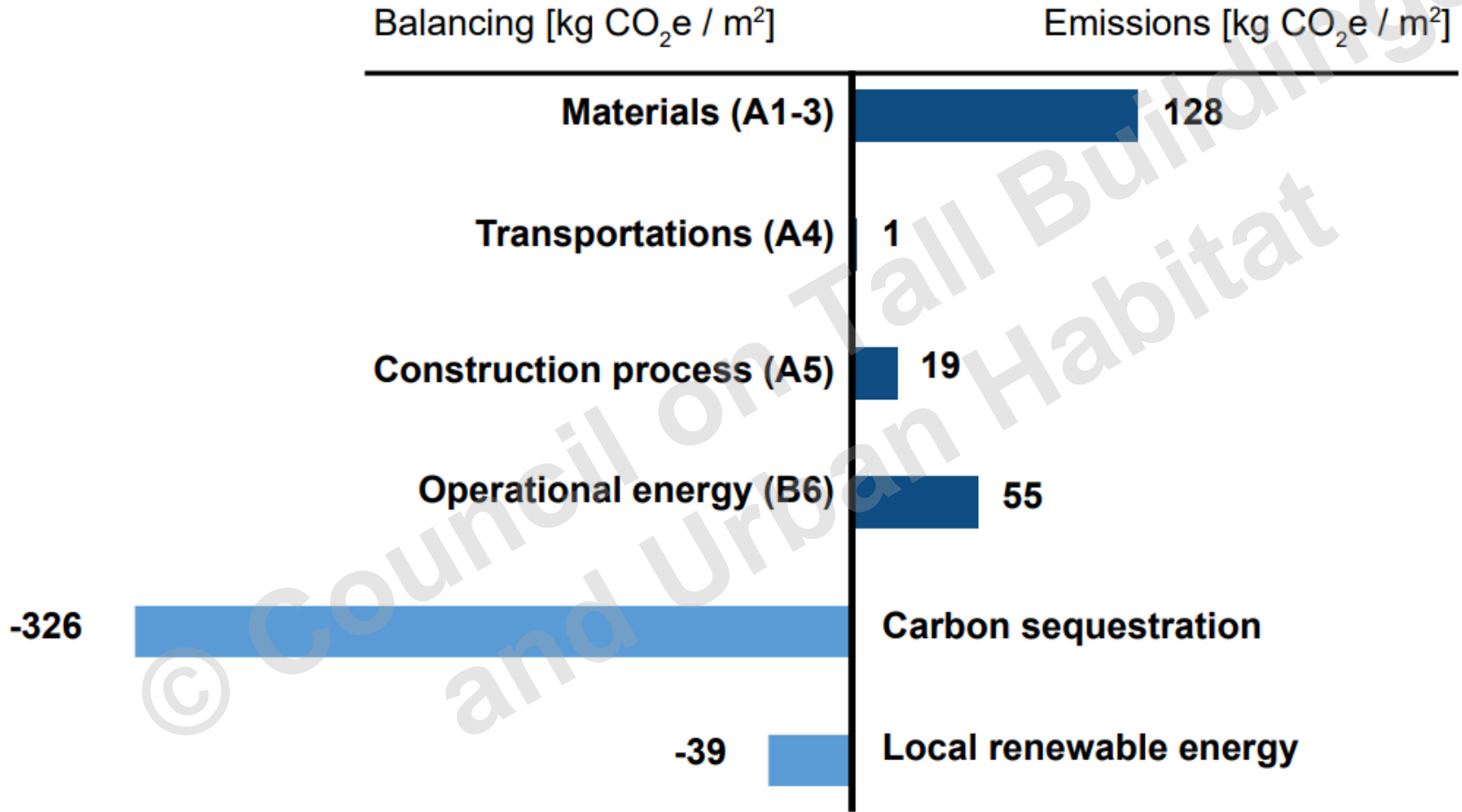
DATABASE



ON-SITE



LIFE CYCLE ANALYSIS



CLIMATE POSITIVE BUILDING

Carbon Sequestration = 9000 tons of CO₂-e*

*CO₂ LCA over 50 years

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