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

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White Arkitekter

By 2030, all our architecture is carbon neutral through design excellence.
PROJECT BASED RESEARCH
FOCUS AREAS AND KNOWLEDGE SHARING
TRANSITION INTO CARBON NEUTRAL CONSTRUCTION
SKELLEFTEÅ CULTURE CENTRE

International competition 2015
30 000 m²
Locally coursèd timber
75m tall, 20 floors
HYBRID TRUSSES

ENABLE FLEXIBLE SPACES
HOTEL TOWER

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

13 STOREYS HOTEL ROOMS
ROOF TOP SPA

PANORAMA RESTAURANT

SAUNAS/ WELLNES

TURKISH BATHS

INFINITY POOL, STAINLESS STEEL
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
ELEMENTS GLT

3000m³

BEAMS
COLUMNS
THRUSSES
234 ton (excluding screws)

PILES TO BED ROCK
TRUSSES
CONNECTORS
BRACKETS
HYBRID FLOOR SLABS
WOOD HOTEL

18 PREMANUFACTURED HOTEL PODS
2 ELEVATOR CORES

3.6m
HOTEL ROOM MODULES

PREMANUFACTURED 40KM FROM SITE. DEROME

CLT SLABS
STEEL CONNECTOR
GL PILLAR CORNERS
STEEL BRACKETS

CLT SLAB
STEEL BRACKETS
PREFAB MODULARITY
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%
Section

No weather protection
OTHER USE OF STEEL

Hybrid steel timber floors

Steel brackets. 550 000p screwes.

2000p WR 13x 600-800
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.
LIFE CYCLE ANALYSIS

Balancing [kg CO₂e / m²]  Emissions [kg CO₂e / m²]

Materials (A1-3)  128
Transportations (A4)  1
Construction process (A5)  19
Operational energy (B6)  55

-326  Carbon sequestration
-39  Local renewable energy
Carbon Sequestration = 9000 tons of CO2-e*

*CO2 LCA over 50 years

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