W O O D

IN CONSTRUCTION

A N O P T I O N O R A N E C E S S I T Y

image source: https://www.fastepp.com/concept-lab/material/parallel-strand-lumber-psl-5/

JON GARMENDIA

RIBA

Royal Institute of
British Architects

COAVN

GOUDIE

OBJECTIVES

WOOD AS A MAIN CONSTRUCTION ELEMENT

source: https://wtop.com/garden-plot/2018/01/gardeners-delight-looking-seeds-browse-new-listings-catalogs/

source: http://www.kndlandscaping.com

WOOD SINCE THE ORIGINS

FIRST USES OF WOOD

WOOD SINCE THE ORIGINS

FIRST USES OF WOOD

FIRST USES OF WOOD

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FIRST USES OF WOOD

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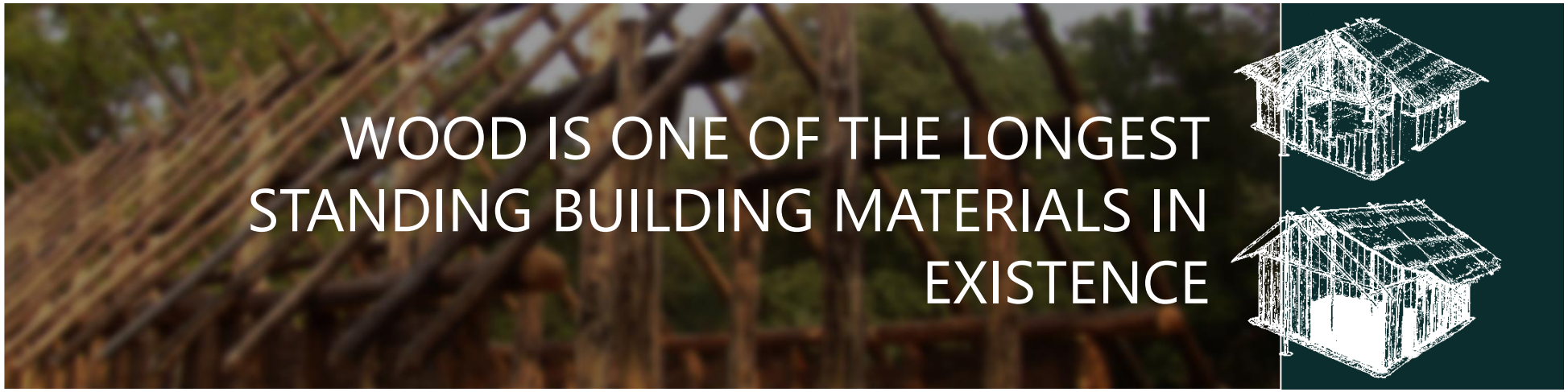
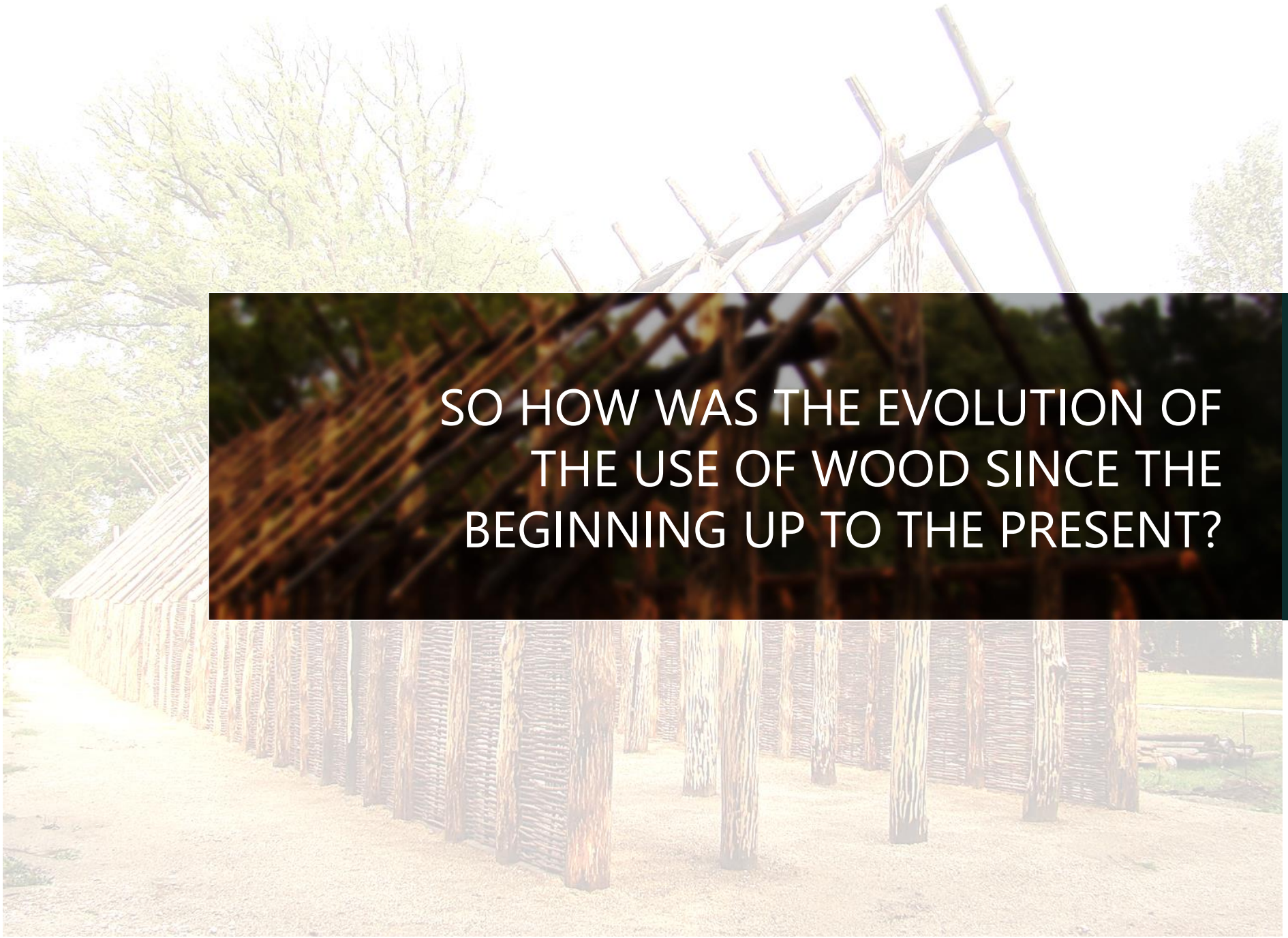


NEOLITHIC LONGHOUSE MODEL

MUSEUM OF PREHISTORY
URGESCHICHTEMUSEUM
MAMUZ, AUSTRIA

NEOLITHIC LONGHOUSE MODEL

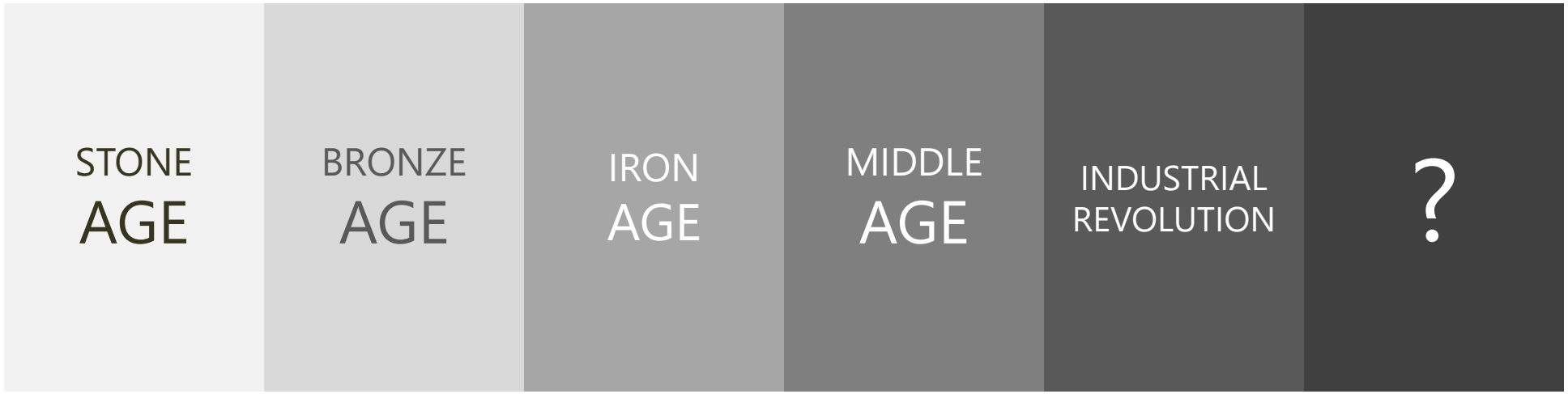
MUSEUM OF PREHISTORY
URGESCHICHTEMUSEUM
MAMUZ, AUSTRIA



SO HOW WAS THE EVOLUTION OF THE USE OF WOOD SINCE THE BEGINNING UP TO THE PRESENT?

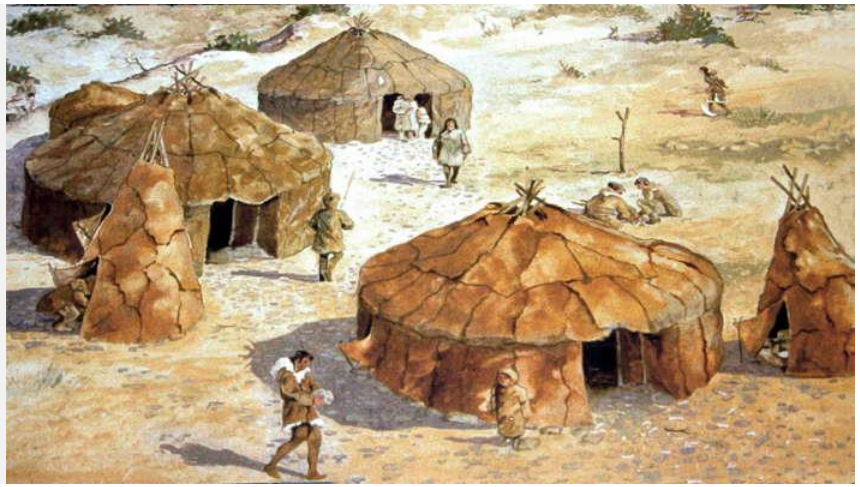
WOOD THROUGH THE AGES

WOOD THROUGH THE AGES



WOOD THROUGH THE AGES

STONE AGE



source: landschaftsmuseum westerwald, hachenburg, germany

Image of the Magdalenian settlement in Gönnersdorf, 12 500 BP, RGZM special exhibition in Mainz 1975.

Traces of two small round tents, and three large, fur-covered dwellings, with a broad oval shape, similar to a yurt, were revealed with a diameter of 6 to 10 metres. They were coloured red on the inside and outside, and the floors were paved with slate.

The settlement was systematically excavated over an area of 650 square metres, and bones were found of mammoth, horse, bison, aurochs, reindeer, deer and arctic fox, as well as birds.

WOOD THROUGH THE AGES

In 2560 BC Egypt had to strip every bit of forest and wood they could to build the pyramids of Giza, for levers and sledges.

BRONZE AGE

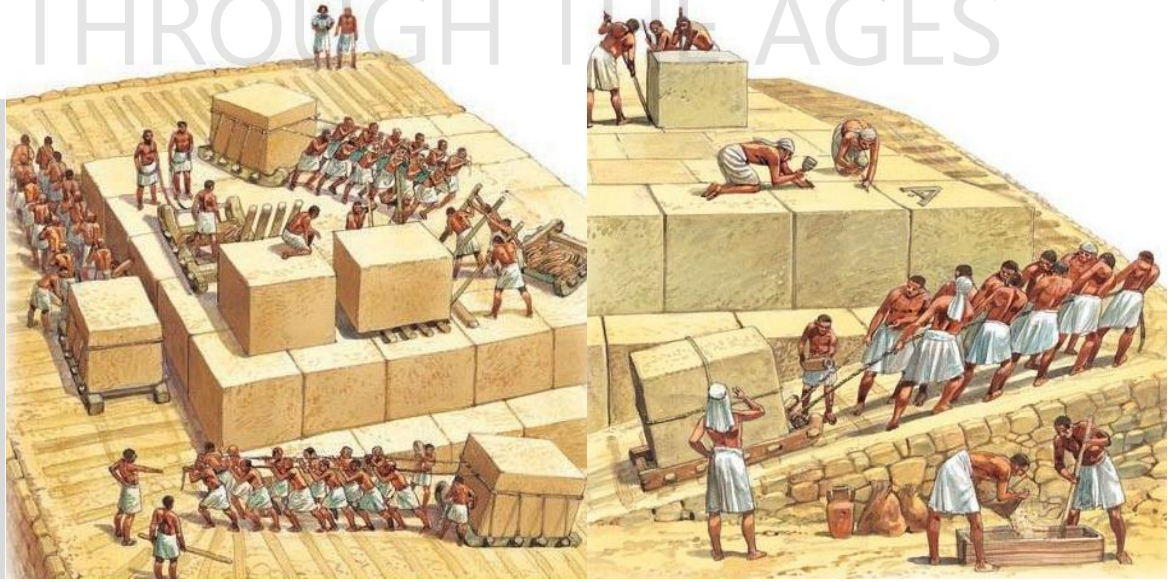


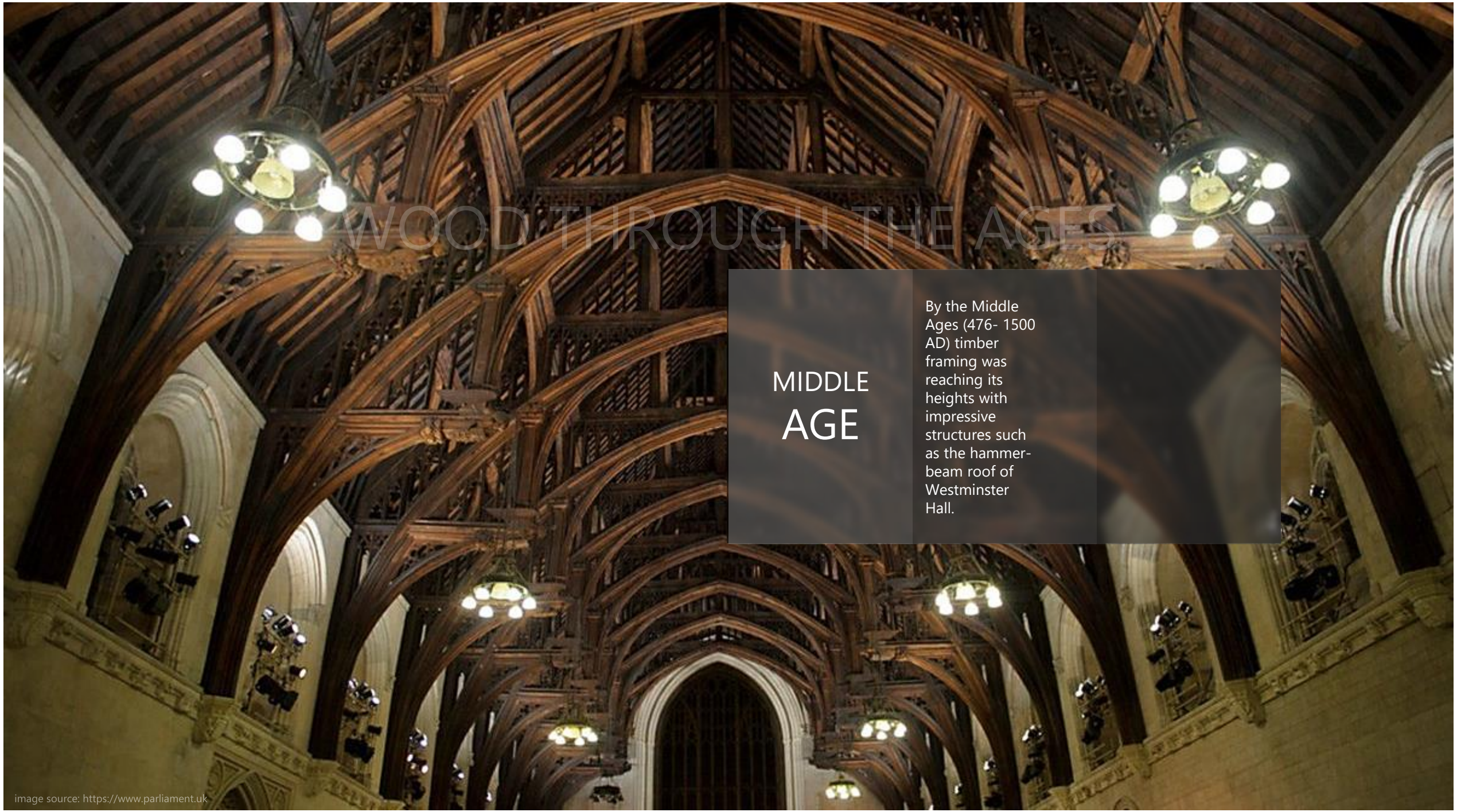
image source: https://www.q-files.com/history/ancient-egypt/pyramids-how-they-were-built/

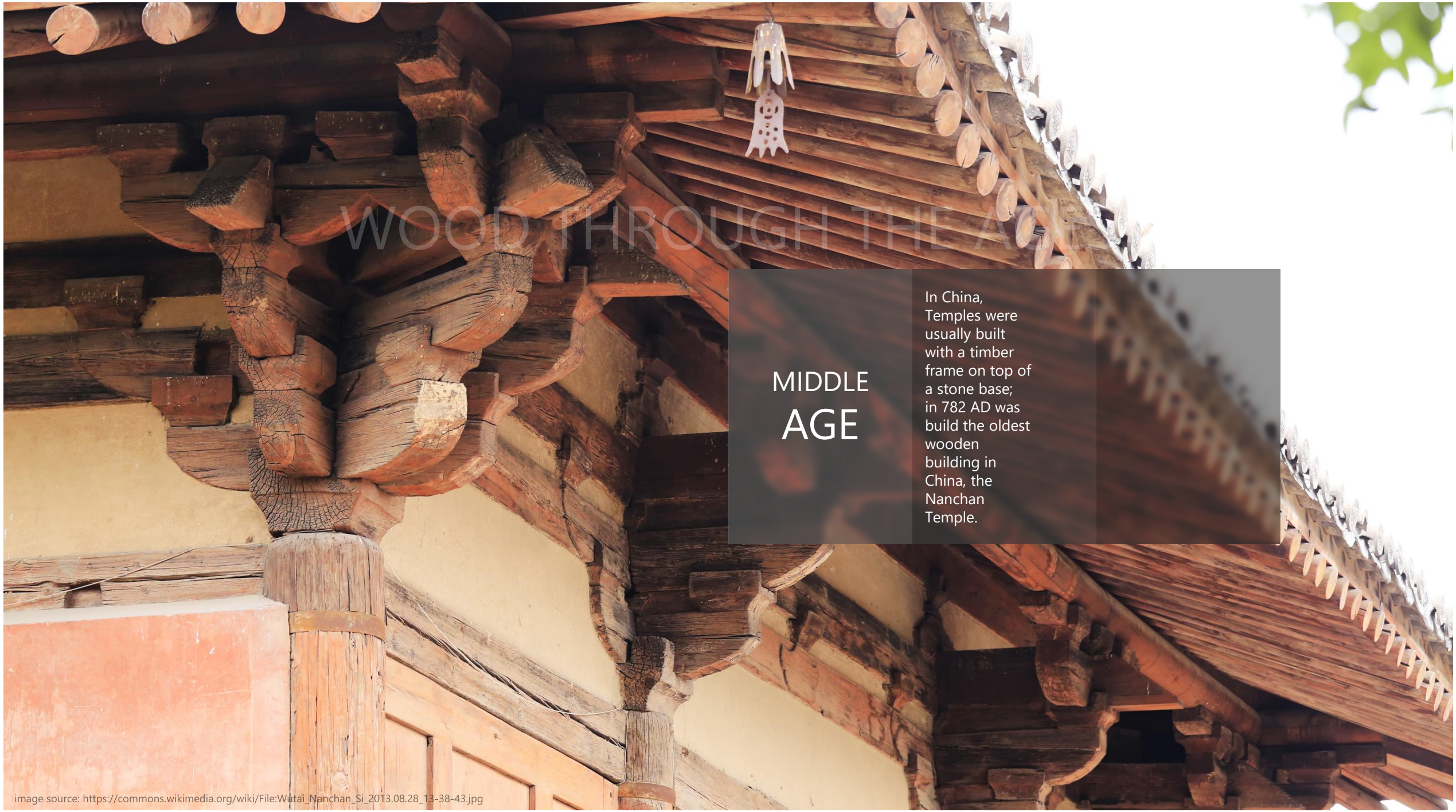
WOOD THROUGH THE AGES

During the Iron age the main building material was the mud-brick which still required the use of wood – the bricks were formed in wooden molds.

IRON AGE

image source: https://www.britisgmuseum.org


WOOD THROUGH THE AGES
MIDDLE AGE
By the Middle Ages (476- 1500 AD) timber framing was reaching its heights with impressive structures such as the hammer-beam roof of Westminster Hall.
image source: https://www.parliament.uk



MIDDLE AGE

In China, Temples were usually built with a timber frame on top of a stone base; in 782 AD was build the oldest wooden building in China, the Nanchan Temple.

image source: https://commons.wikimedia.org/wiki/File:Wutai_Nanchan_Si_2013.08.28_13-38-43.jpg

WOOD THROUGH THE AGES

INDUSTRIAL REVOLUTION

Image: The Iron Rolling Mill by Adolph Friedrich Erdmann Von Menzel, 1875 Oil on Canvas

PRESENT AND FUTURE AGES

FOREST ECONOMY

FOREST ECONOMY

WOOD CONSTRUCTION INCREASE CLIMATE CHANGE BECAUSE IT DESTROYS FORESTS?

Image source: Ales Krivec

image source: https://parenting.firstcry.com/articles/tomatoes-for-babies-health-benefits-and-soup-recipe/

image source: https://ec.europa.eu/europeaid/news-and-events/ethiopia-breaks-world-tree-planting-record-eus-helping-hands_en


THE BEST GUARANTEE FOR FORESTS' CONSERVATION & RENOVATION IS THE ORDERLY MANAGEMENT AND THE USE OF THEIR RESOURCES.

AT THE SAME TIME, IT GENERATES AN OPPURTUNITY TO CREATE SUSTAINABLE EMPLOYMENT IN RURAL AREAS FACING THE PROBLEM OF DEPOPULATION.

FOREST ECONOMY

WOOD AGAINST CLIMATE CHANGE


image source: http://environmentsinteriordesign.com/tooth-acres/
CEMENT PRODUCTION ACCOUNTS FOR 6% OF
CO2 EMISSIONS IN THE WORLD


image source: https://www.industryweek.com/economy/china-s-steel-production-hits-new-highs
WHILE STEEL PRODUCTION
(HALF DESTINED FOR CONSTRUCTION)
IS RESPONSIBLE FOR 8%

Photo by Mary Whitney from Pexels

Photo by Lukasz Szmigiel on Unsplash

ONE CUBIC METER OF WOOD STORES ONE TON OF CARBON DIOXIDE

Illustration by Sephiroth-Art at DeviantArt

for the fight against climate change, wood provides two great solutions:

1 REDUCES CO2 EMISSIONS

2 STORES & RETAINS CO2

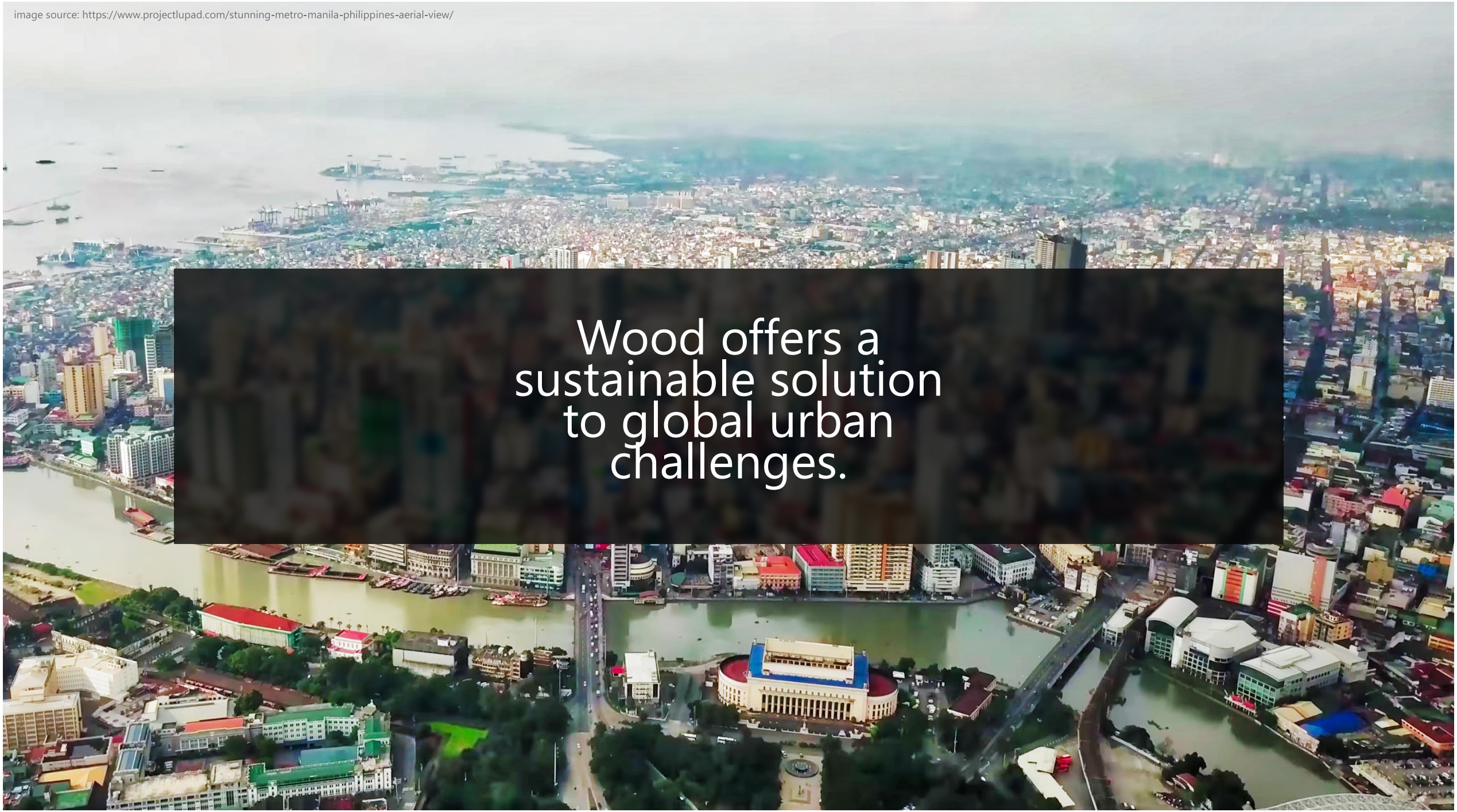


image source: https://www.projectlupad.com/stunning-metro-manila-philippines-aerial-view/
Wood offers a sustainable solution to global urban challenges.

World’s Tallest Wooden Structure

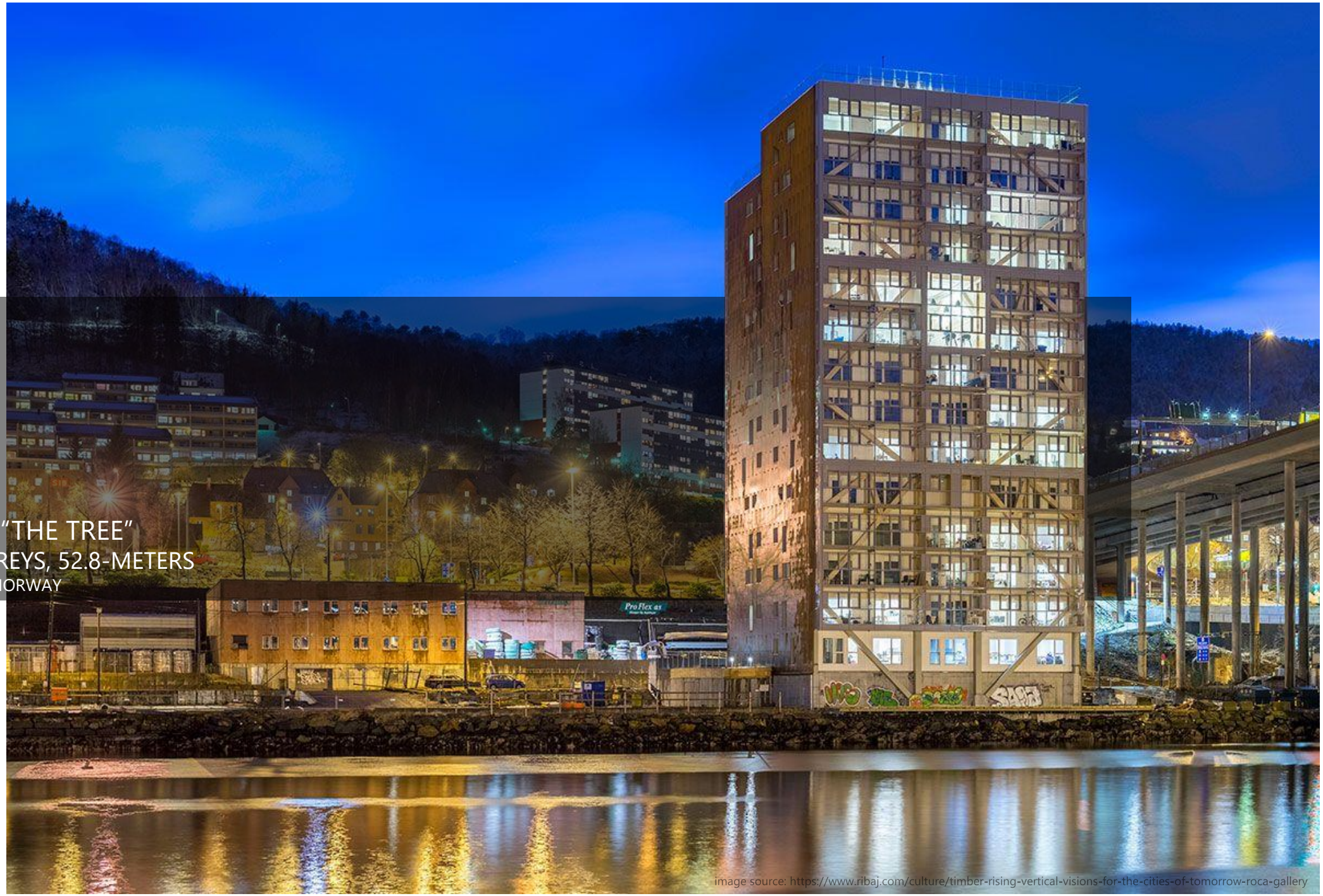
18 STOREYS, 85.4-METERS

MJØSA TOWER

BRUMUNDDAL, NORWAY

image source: https://www.metsawood.com/global/news-media/news/Pages/News.aspx?EncryptedId=9EFB639671E46670&Title=MetsaWood:At18storeys,Mj%C3%B8saTowerinBrumunddaltotaketitleofworldstallestwoodenbuilding


image source: https://www.cadcr.com/18-storey-mass-timber-hybrid-ubc-brock-commons-tops-out/
BROCK COMMONS
17 STOREYS, 53-METERS
VANCOUVER, CANADA



TREET “THE TREE”
14 STOREYS, 52.8-METERS
BERGEN, NORWAY

image source: https://www.ribaj.com/culture/timber-rising-vertical-visions-for-the-cities-of-tomorrow-roca-gallery

THESE EXAMPLES SHOW THAT IT IS POSSIBLE TO BUILD LARGE STRUCTURES WITH WOOD & RESPOND TO THE MASSIVE POPULATION GROWTH

“THE EIGTH POINTS

EIGHT SOLID ARGUMENTS SUPPORT THE IDEA OF WHY WOOD IS A GREAT MATERIAL TO CONSIDER IN CONSTRUCTION.

it is estimated that the use of structural solutions for beams and partitions based on laminated and cross-laminated wood (CLT) grows at a rate of 15% annually.

1

FIRE RESISTANT

1

Structural wood is extraordinarily resistant to fire, even more than steel or concrete.

WOOD STRUCTURES BURN, AT ABOUT 0.7MM PER MINUTE WHILE IN A FIRE, A METAL STRUCTURE BEGINS TO DEFORM AFTER 750 DEGREES CELCIUS, THE WOOD CONTINUES TO WORK WITHOUT DEFORMING OR MOVING.

2

QUICK & EASY INSTALLATION

2

Use of modular components make it easier and quicker to construct. Also, much healthier and more efficient construction process.

3

LOWER CARBON FOOTPRINT

3

Many materials leave a carbon footprint in the environment that contributes to climate warming. But with wood, the footprint is negative.

4 RESPECTING THE ENVIRONMENT

icon by monkik at flaticon

4

The manufacturing, transportation and use of concrete consume about 15% more energy than an identical process using wood.

icon by monkik at flaticon

5

Wood insulates 15 times more than concrete, 400 times more than steel, and 1,770 times more than aluminum.

ACOUSTICAL MATERIAL

6

The porosity and elasticity of this material give it incredible acoustic properties.

6

STRUCTURALLY STRONG

7

Studies confirm that the relationship between the strength & weight of structural wood is higher by 20% compared to other materials such as steel & cement.

7

DURABLE RENEWABLE & A HEALTHY MATERIAL

8

Even in the final phase of its life cycle, it can be used as fuel in substitution of other fossil materias. And the CO it will emit is the CO it absorbed from the atmosphere.

8

NEW AGE, NEW TECHNIQUES, NEW WOOD

LAMINATED VENEER LUMBER

image source: https://ultralam.com/products/laminated-veneer-lumber-lvl/

image source: http://www.eurban.co.uk/material-component/clt/

Popularized in Europe and gradually gaining attention in the rest of the world, Cross
Laminated Timber (CLT) stands out for its strength, appearance, versatility, and sustainability.

image source: http://www.eurban.co.uk/material-component/clt/

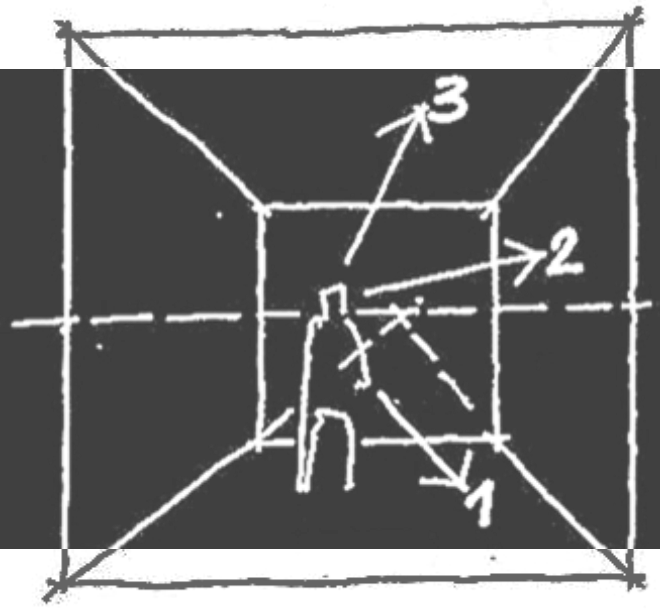
The material consists of planks (or lamellas) of sawn, glued, and layered wood, where each layer is oriented perpendicular to the previous.

image source: http://www.iaacblog.com/programs/clt-cross-laminated-timber/

Most panels are between
8 to 10 feet (2.4 to 3 meters) wide, although some are 4 feet (1.2 meters), and they generally come in lengths of around 40 feet (12 meters).

image source: http://www.iaacblog.com/programs/clt-cross-laminated-timber/

The panels can function as walls, floors, furniture, ceilings, and roofs,



While the project stage can take a little longer, the assembly is of an amazing speed: in the case of a house of 200 m2, the assembly can take 5 days and occupy a minimum workforce (around 4 instructed people).

image source: https://images.adsttc.com/media/images/59b9/8d94/b22e/38f3/4700/0000/large_jpg/28098979911_a3270ae7e2_o.jpg?1505332605

Perhaps in some years, the cities will be transformed based on the warmth and texture of the wood, also changing the way in which the design and construction are conceived.

image source: http://pluspng.com/black-and-white-city-png-8202.html

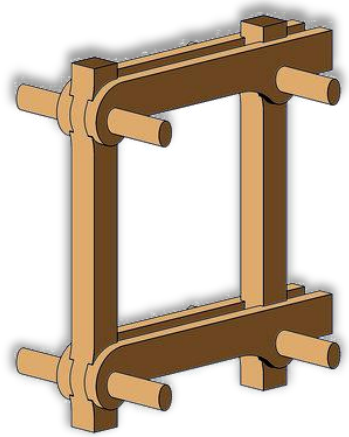

USES OF
WOOD

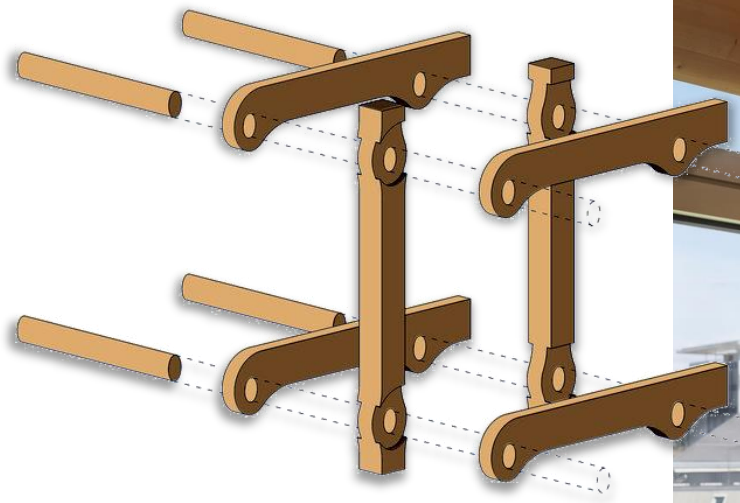

STRUCTURE

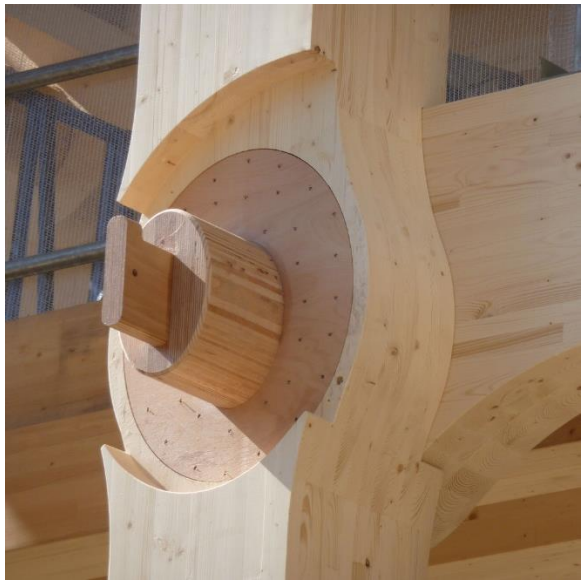
TAMEDIA OFFICE BUILDING

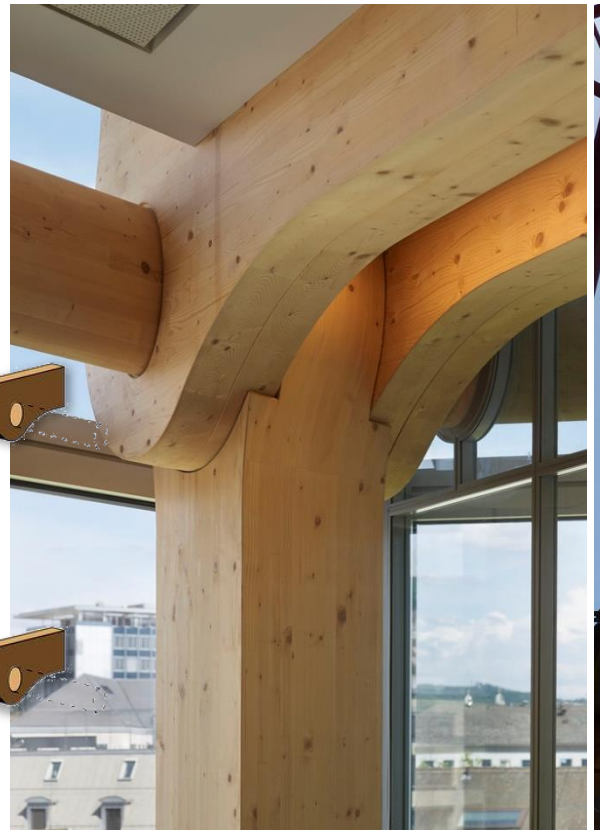
SHIGERU BAN ARCHITECTS


Tages-Anzeiger



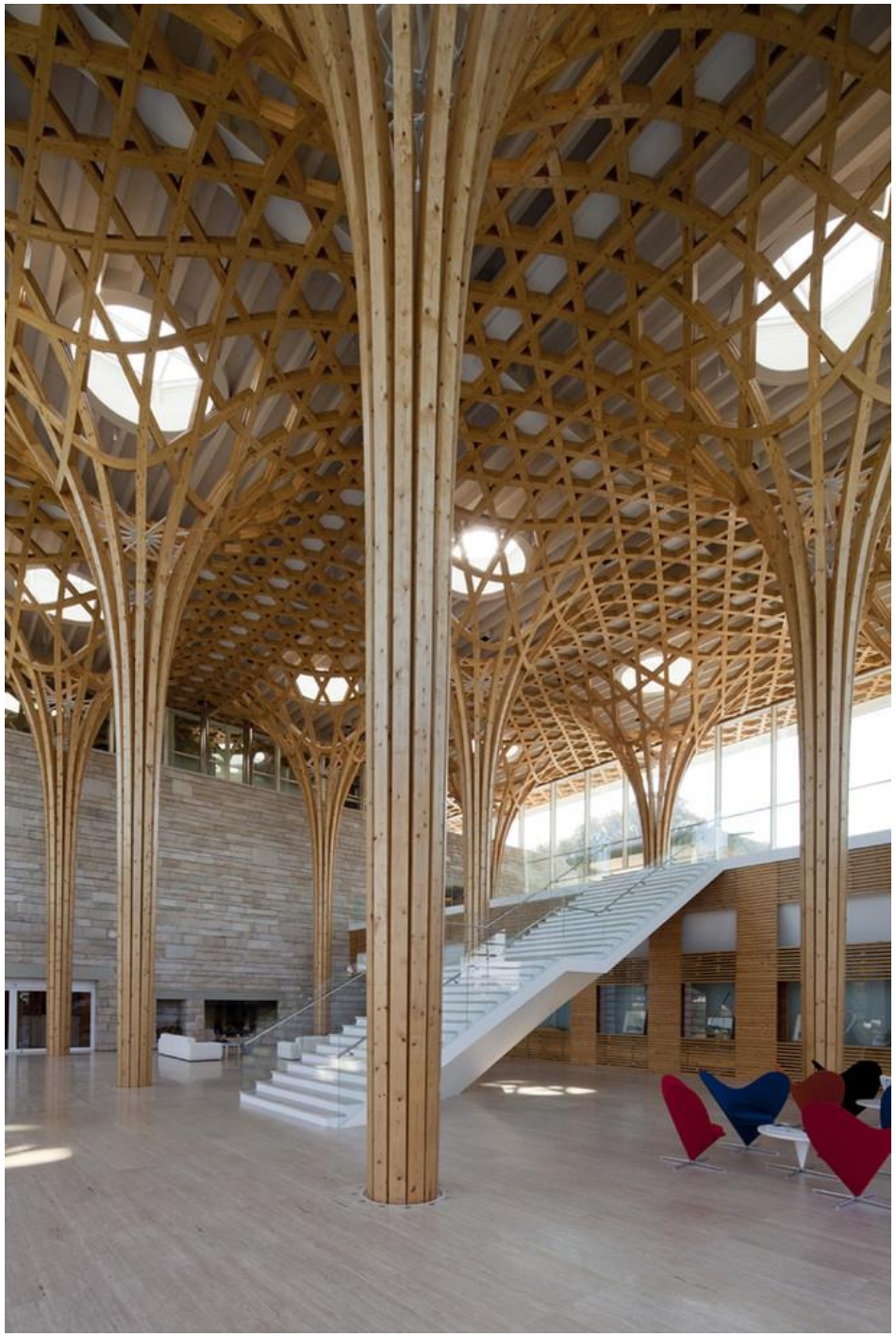


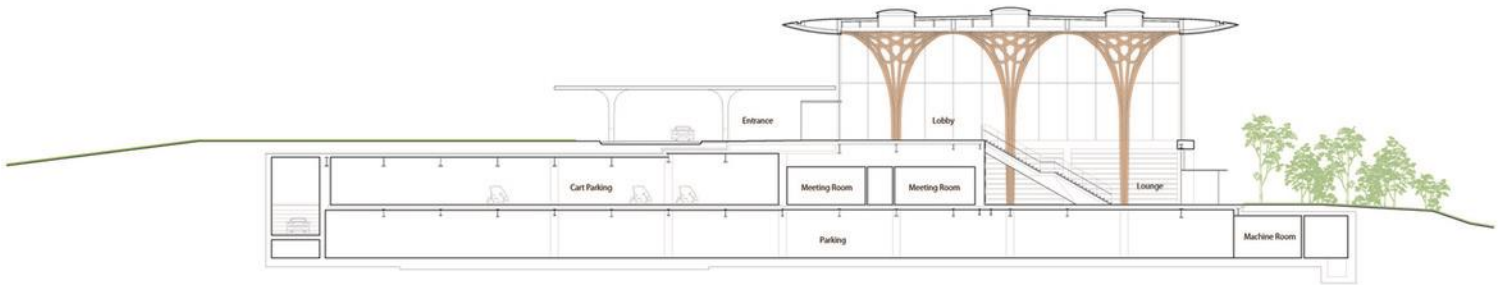


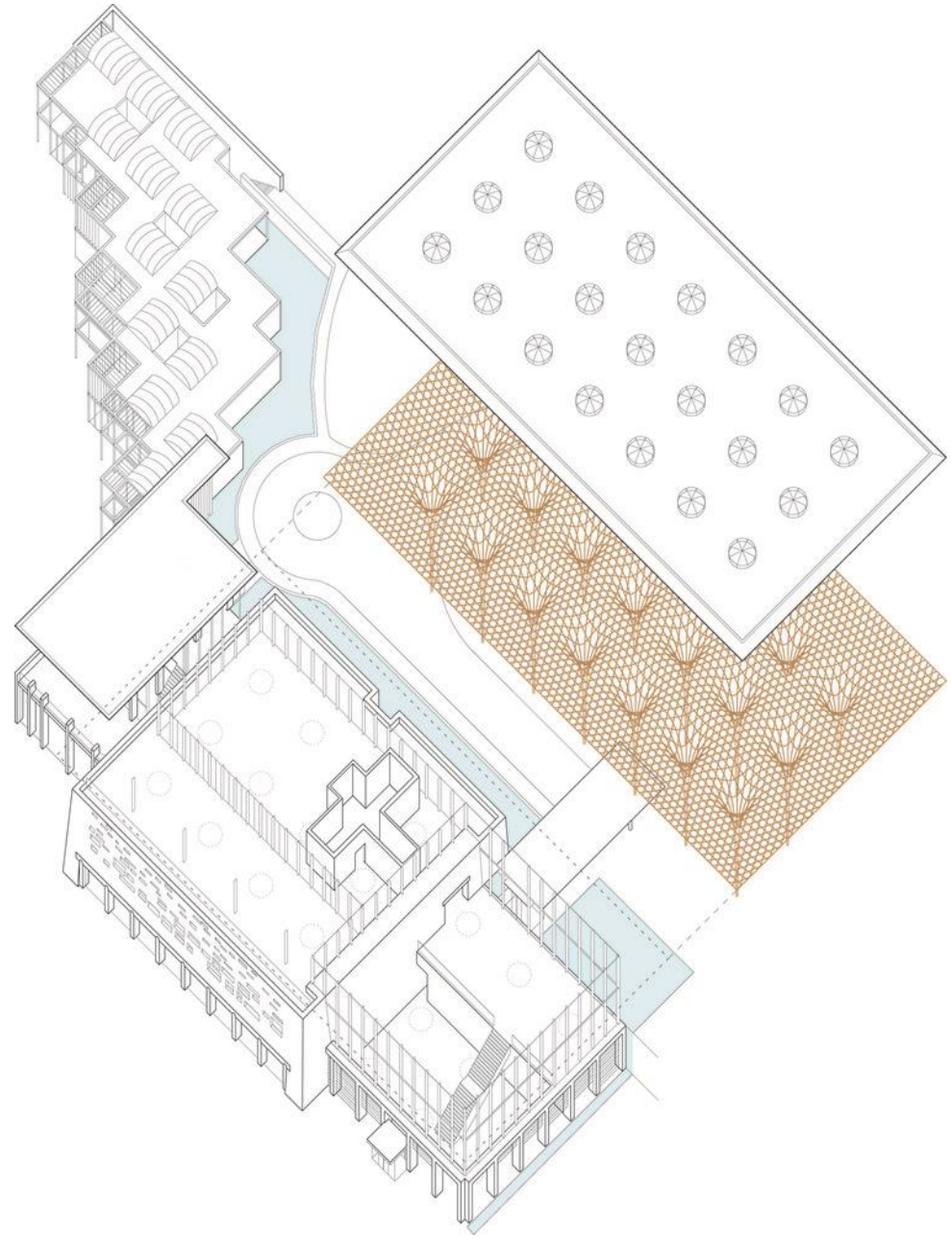


NINE BRIDGES COUNTRY CLUB

SHIGERU BAN ARCHITECTS

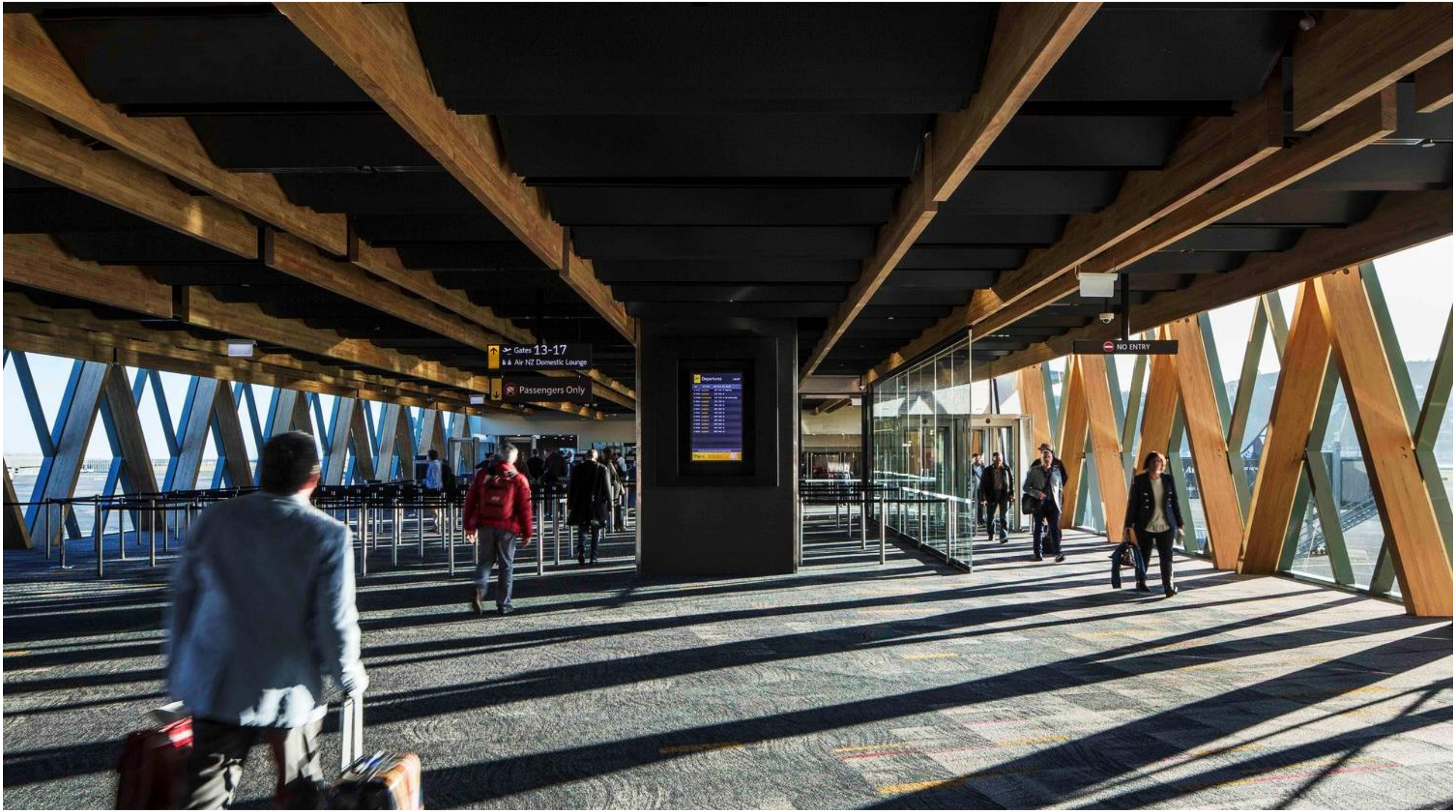


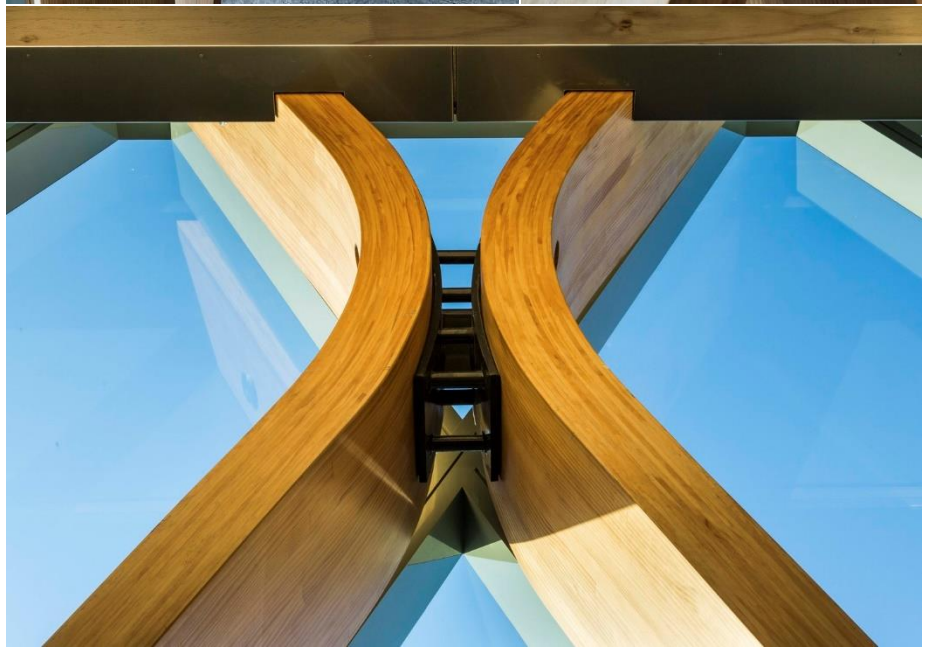

Entrance
Lobby
Cart Parking
Meeting Room
Meeting Room
Lounge
Parking
Machine Room

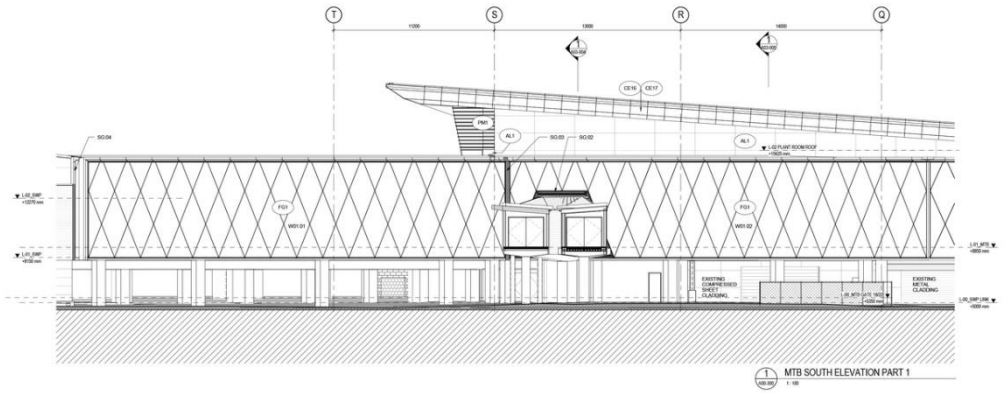


EXTENSION OF WELLINGTON AIRPORT

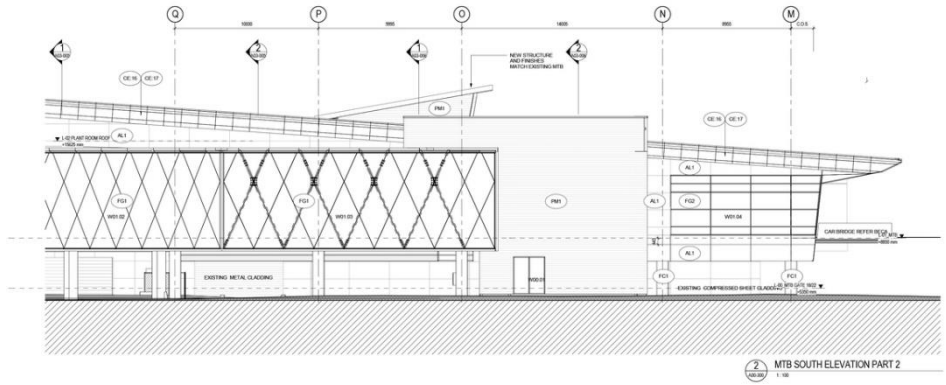
WARREN AND MAHONEY ARCHITECTS


Gates 13-17
Air NZ Domestic Lounge
Passengers Only
NO ENTRY





1 MTB SOUTH ELEVATION PART 1
1 : 100

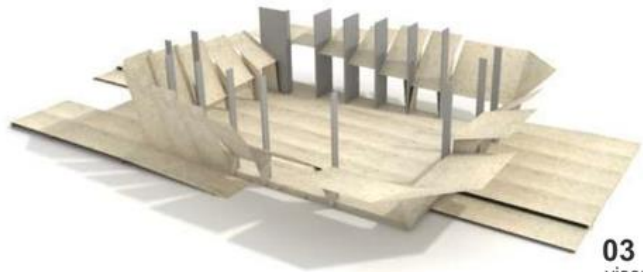


2 MTB SOUTH ELEVATION PART 2
1 : 100

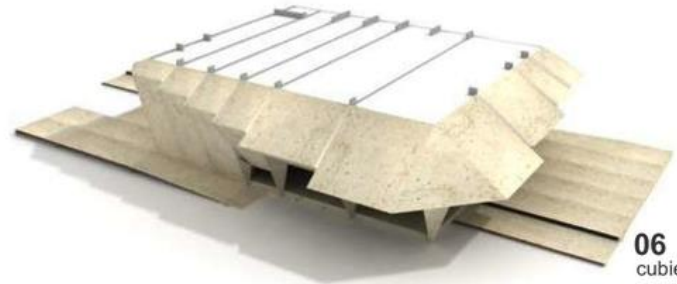
EXTERIORS

ENDESA PAVILION

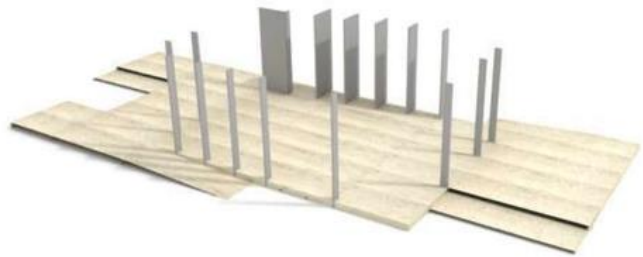
INSTITUTE FOR ADVANCED ARCHITECTURE OF CATALONIA



03
viseras



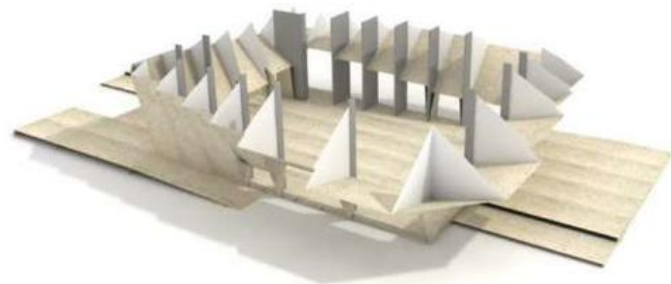
06
cubierta



02
pilares

05
viseras

01
base



04
laterales

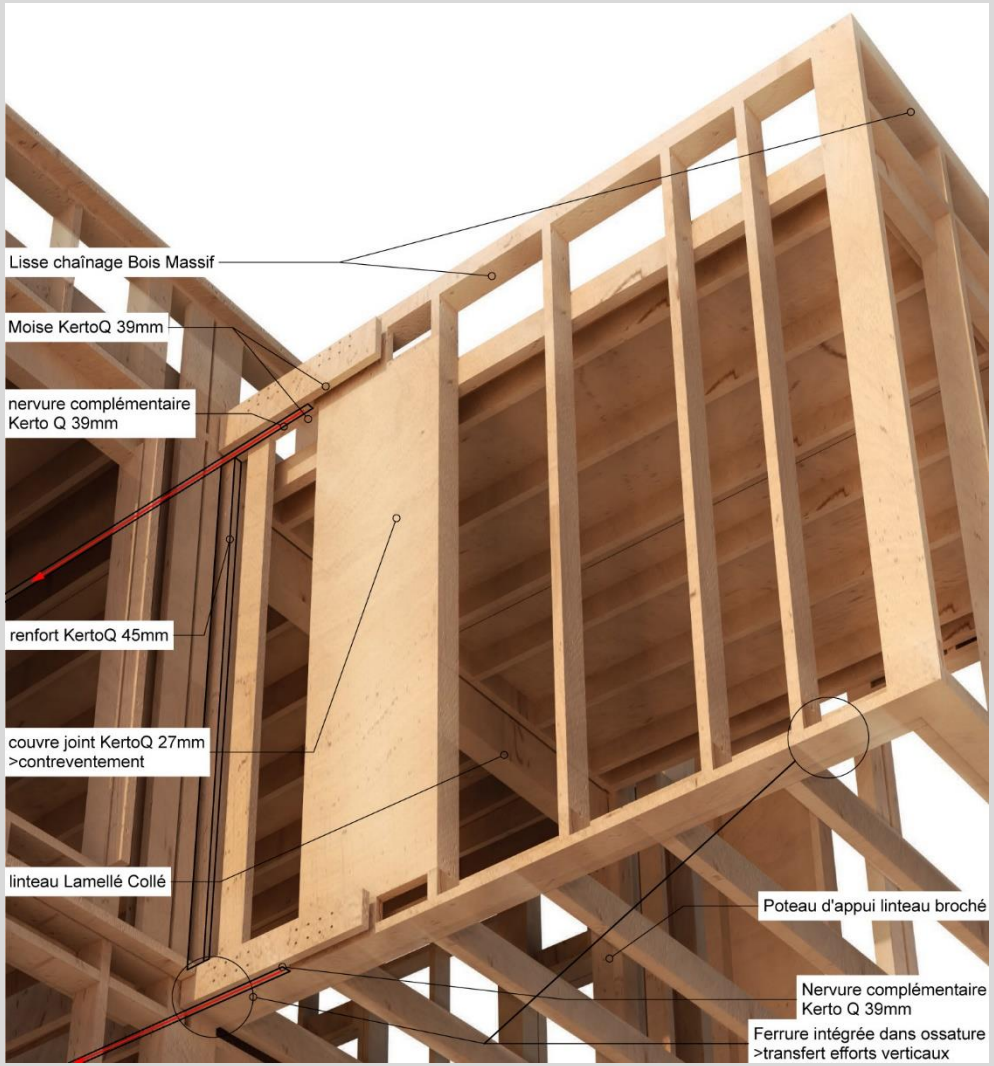
pavello **ENDESA**
smart city BCN

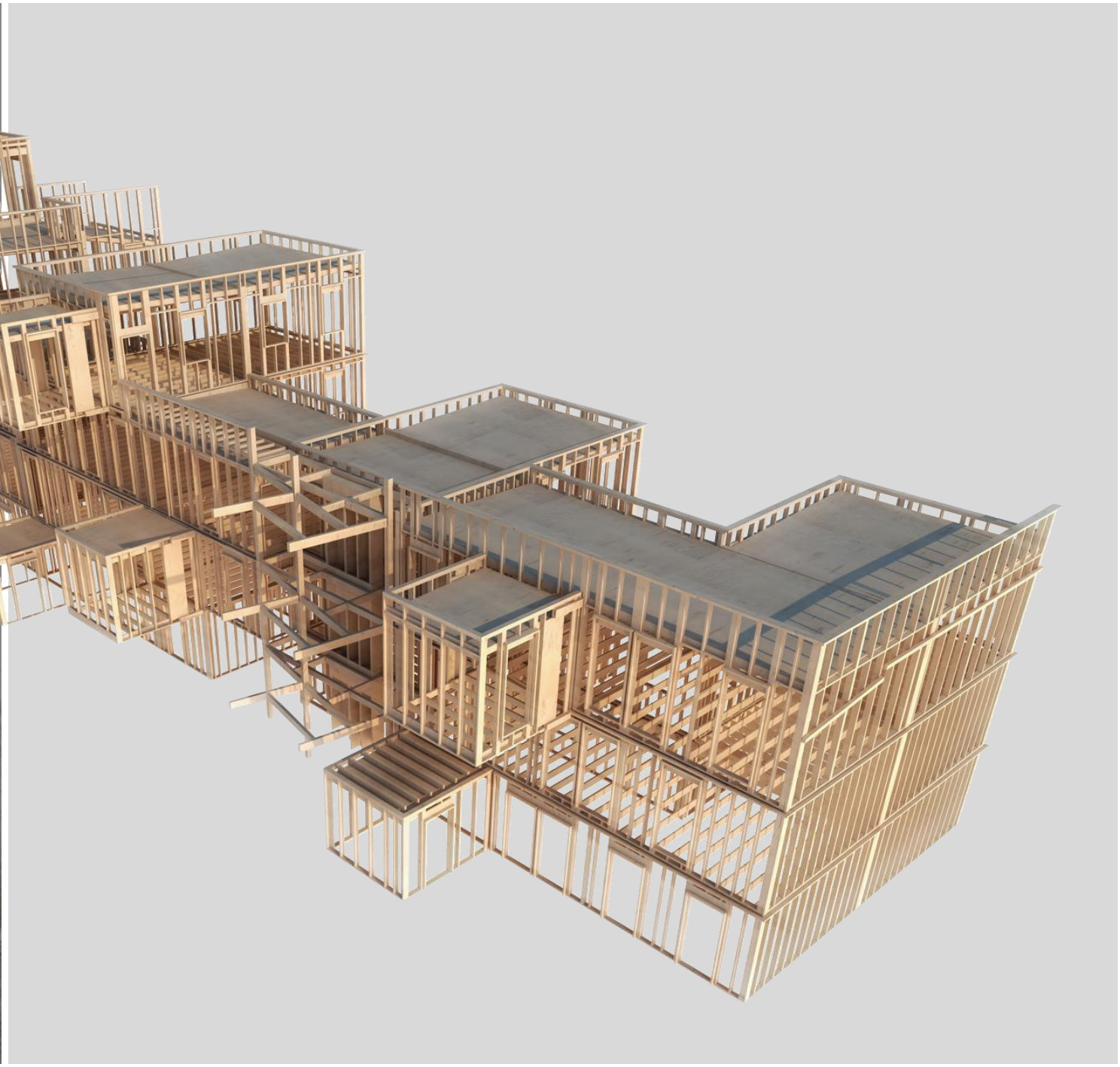
fases de muntatge
document: C 02
data: 06.10.2011

un projecte de: endesa
disseny de: Iaac
propietat de: VISOREN

TETE IN L'AIR

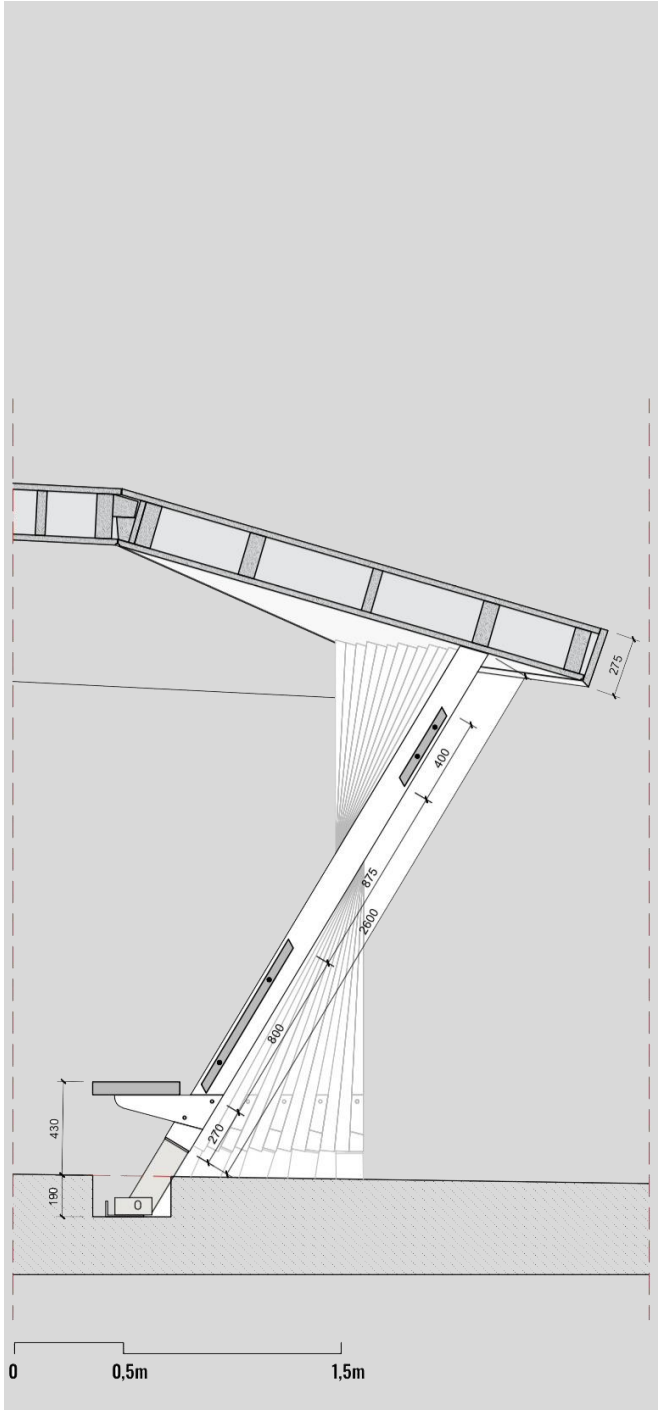
KOZ ARCHITECTES


Lisse chaînage Bois Massif
Moise KertoQ 39mm
nervure complémentaire
Kerto Q 39mm
renfort KertoQ 45mm
couvre joint KertoQ 27mm
>contreventement
linteau Lamellé Collé
Poteau d'appui linteau broché
Nervure complémentaire
Kerto Q 39mm
Ferrure intégrée dans ossature
>transfert efforts verticaux

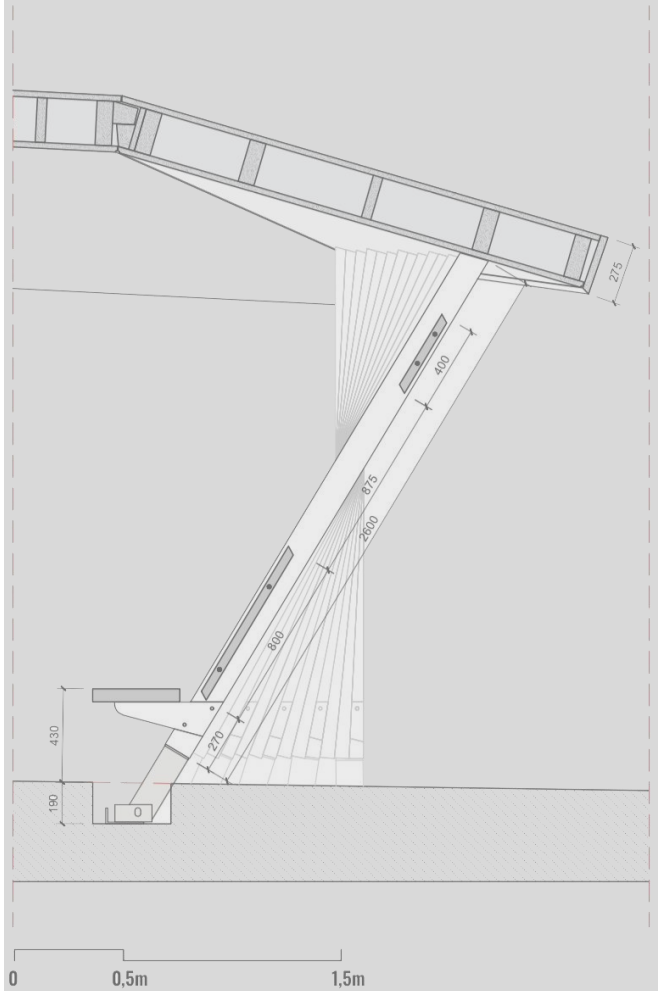


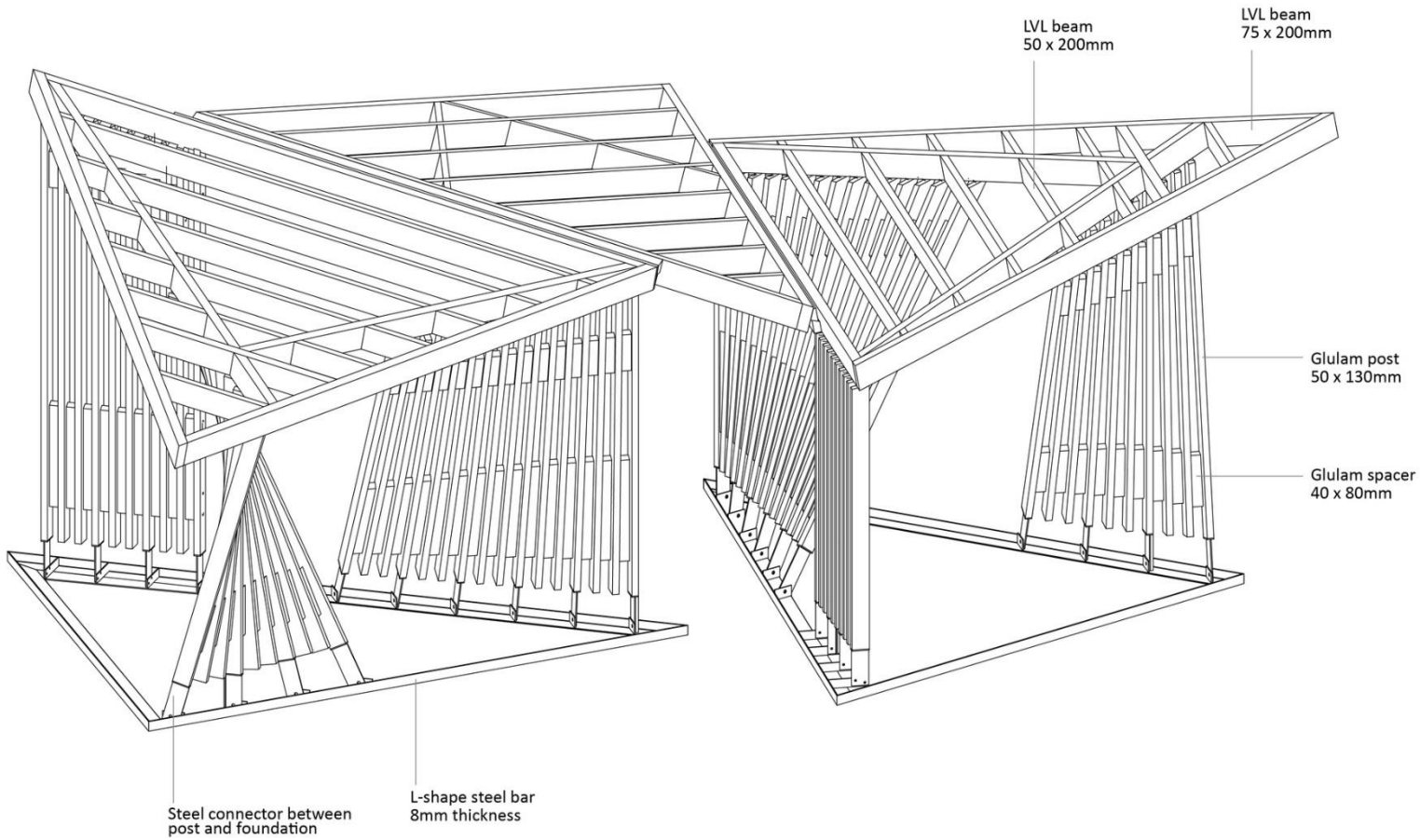
KOHTA TRAIN STATION

AALTO UNIVERSITY WOOD PROGRAM


275
400
875
2600
800
430
270
190
0
0
0,5m
1,5m


Koria


275
400
875
2600
800
430
270
190
0
0
0,5m
1,5m


LVL beam
50 x 200mm
LVL beam
75 x 200mm
Glulam post
50 x 130mm
Glulam spacer
40 x 80mm
Steel connector between
post and foundation
L-shape steel bar
8mm thickness


INTERIORS

HOUSE ZILVAR

ASGK DESIGN


HOME

Designed as a low energy house. The large timber-framed structure (2x4) is designed using KVH construction timber profiles while the outside wood cladding uses a **burn and stain** technique, for longer lasting life

(Credit: Daniel Shearing)

PUDASJÄRVI WOOD

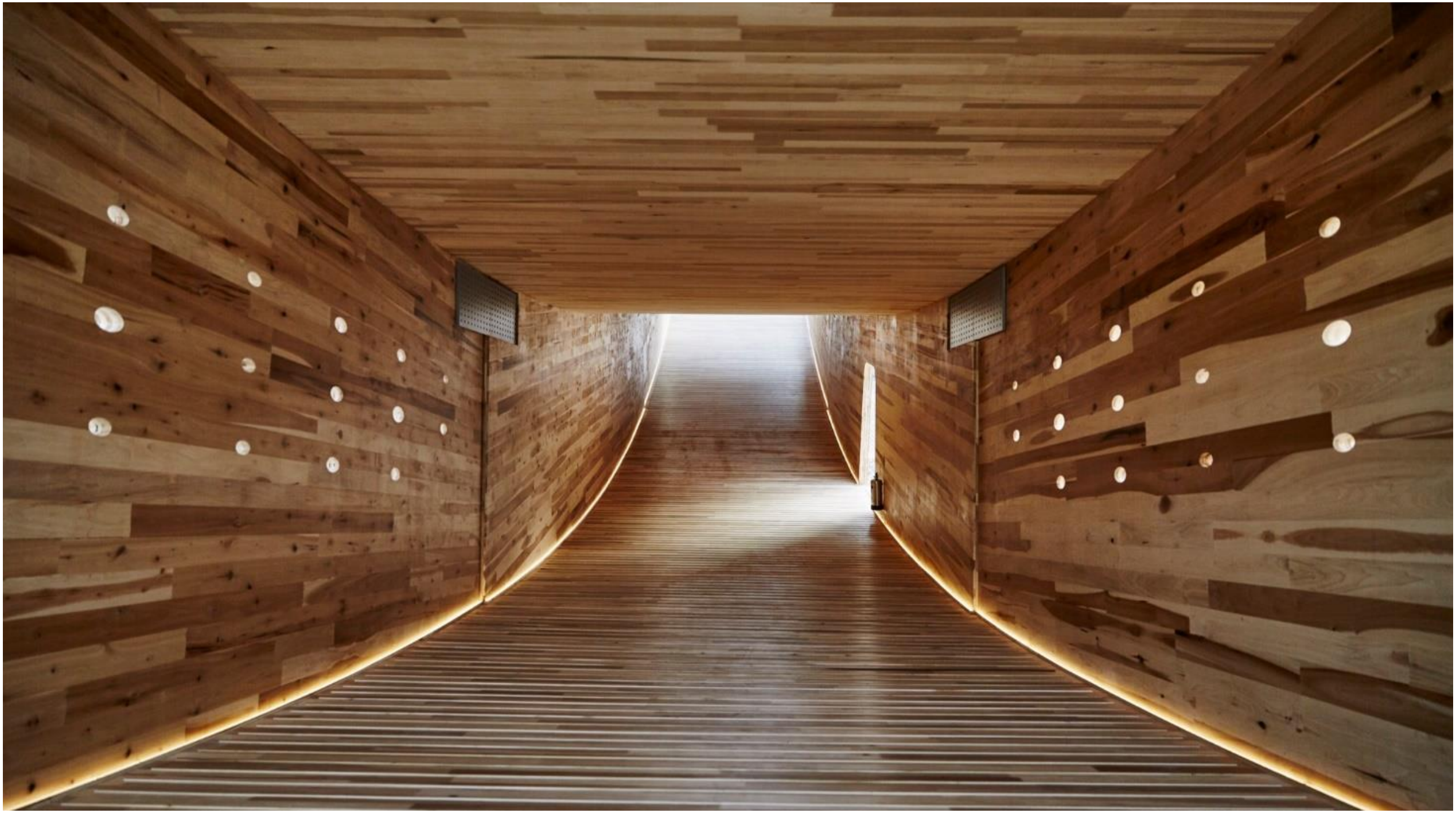
LUKKAROINEN ARCHITECTS

The structural walls are made of laminated log. Glulam is a stress-rated engineered wood beams of various shapes

(Credit: Daniel Shearing)

THE SMILE

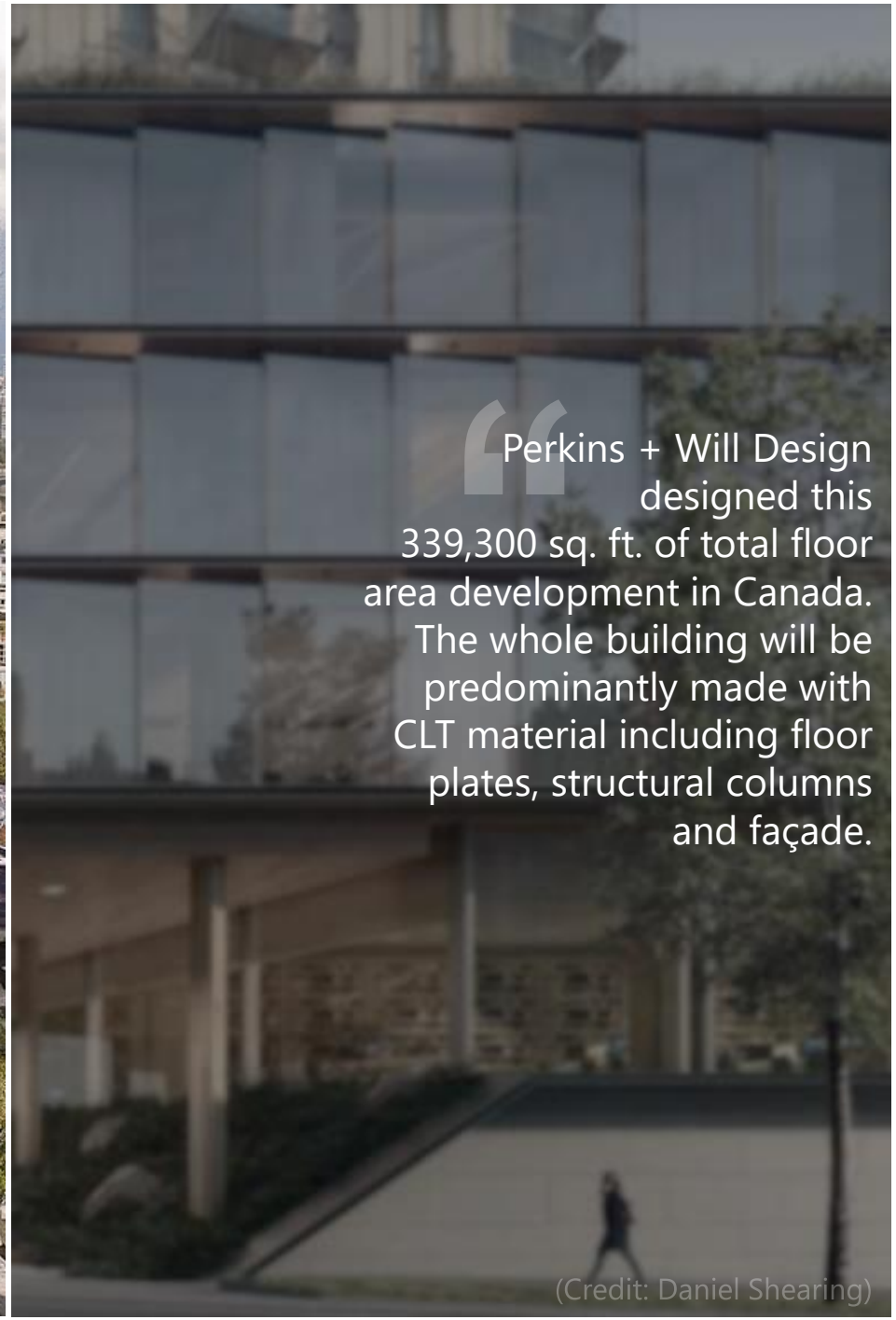
ALISON BROOKS ARCHITECTS



CONDOMINIUMS

SKYSCRAPER FOR VANCOUVER

PERKINS + WILL DESIGN

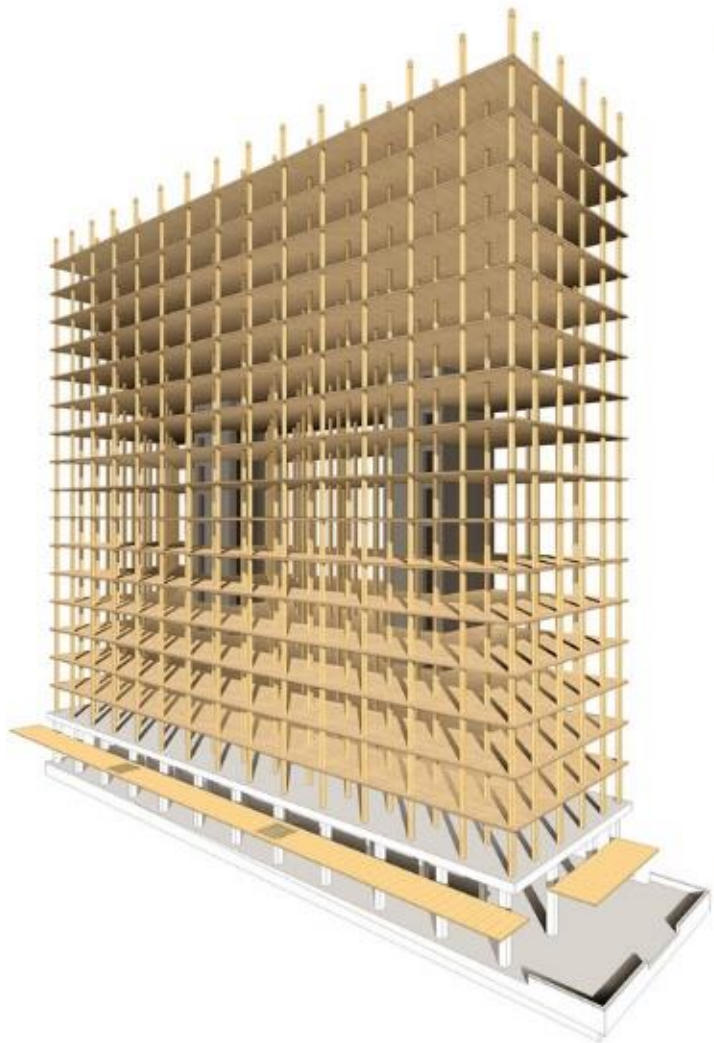


Perkins + Will Design designed this 339,300 sq. ft. of total floor area development in Canada. The whole building will be predominantly made with CLT material including floor plates, structural columns and façade.

(Credit: Daniel Shearing)

VANCOUVER'S BROCK COMMONS

ACTON OSTRY ARCHITECTS INC

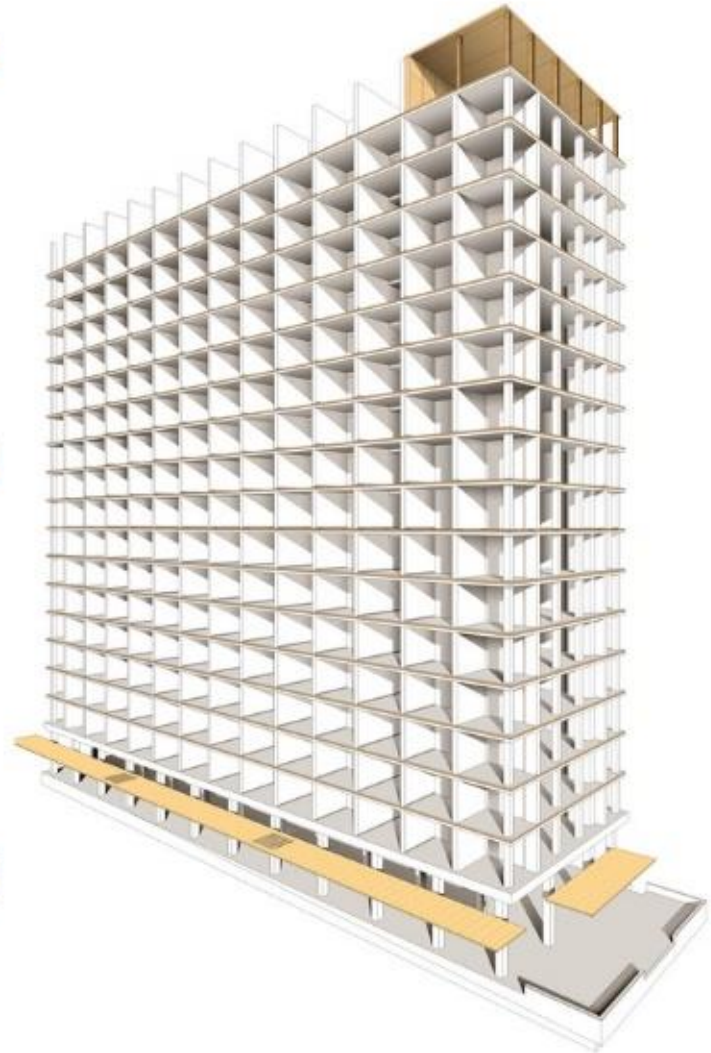


hybrid mass timber and concrete core structure

CLT floor slabs with glulam
columns and steel connectors

partial encapsulation
during construction

completed construction



encapsulated structure

hybrid structure and encapsulation

W O O D

IN CONSTRUCTION

A N O P T I O N O R A N E C E S S I T Y

image source: Lukasz Szmigiel on Unsplash
image source: https://www.fastepp.com/concept-lab/material/parallel-strand-lumber-psl-5/

W O O D

IN CONSTRUCTION

A N O P T I O N O R A N E C E S S I T Y

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