

SOM was founded as an **interdisciplinary practice**

SOM



we are a collaborative of **over 1,200 designers** across the world





↑ Population Growth

1.9 billion

24% increase in the next 27 years

Information Source:
(<https://www.un.org/en/sections/issues-depth/population/>)
The World Population Prospects 2019

An aerial night view of the New York City skyline, showing numerous skyscrapers illuminated with lights. The Empire State Building is prominent on the right side. The sky is dark blue with some clouds.

↑ Building Growth

2060: 2.5 trillion ft²

**Constructing an entire New York City
every month**

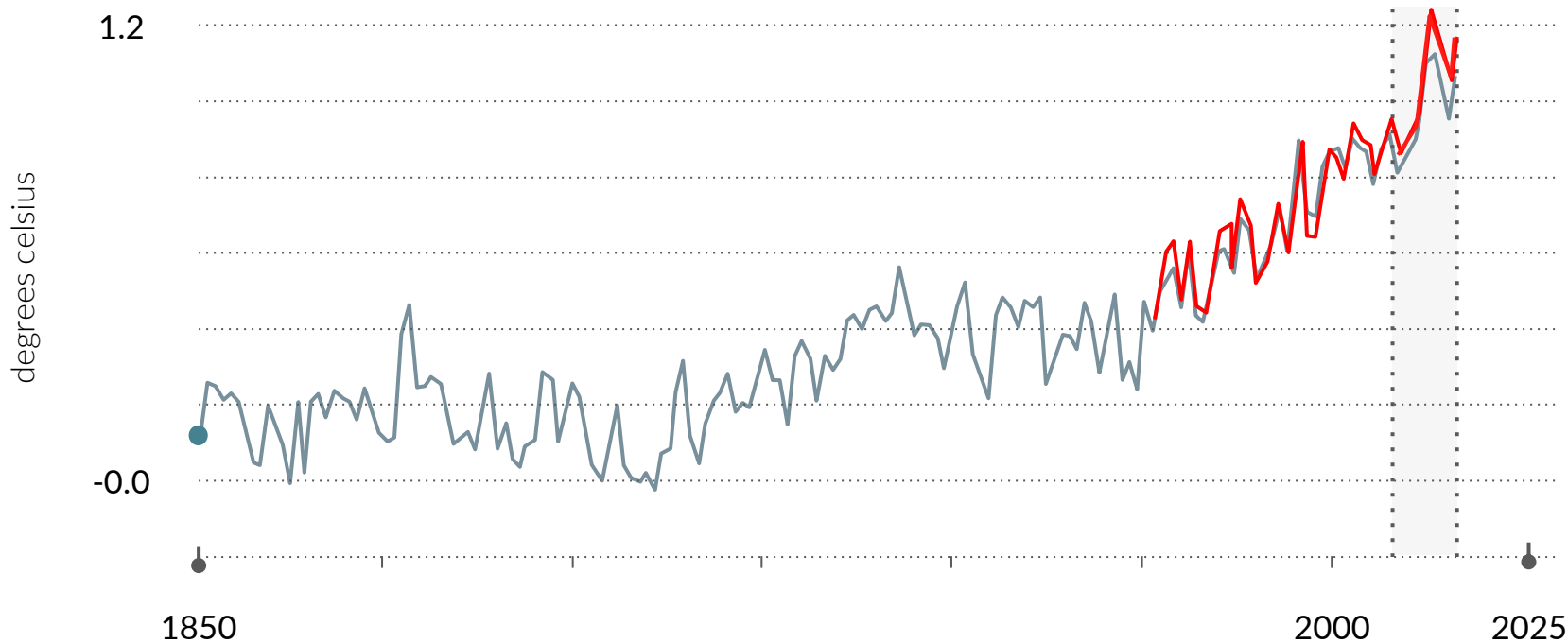
Information Source: <https://architecture2030.org/new-buildings-operations/>

By 2060, the world is projected to add 230 billion m² (2.5 trillion ft²) of buildings, or an area equal to the entire current global building stock*. This is the equivalent of adding an entire New York City to the planet every 34 days for the next 40 years.

*UN Environment, Global Status Report 2017

8 warmest years on record

Since records started in 1850



Climate is Rapidly Changing

2015 UN Paris Agreement

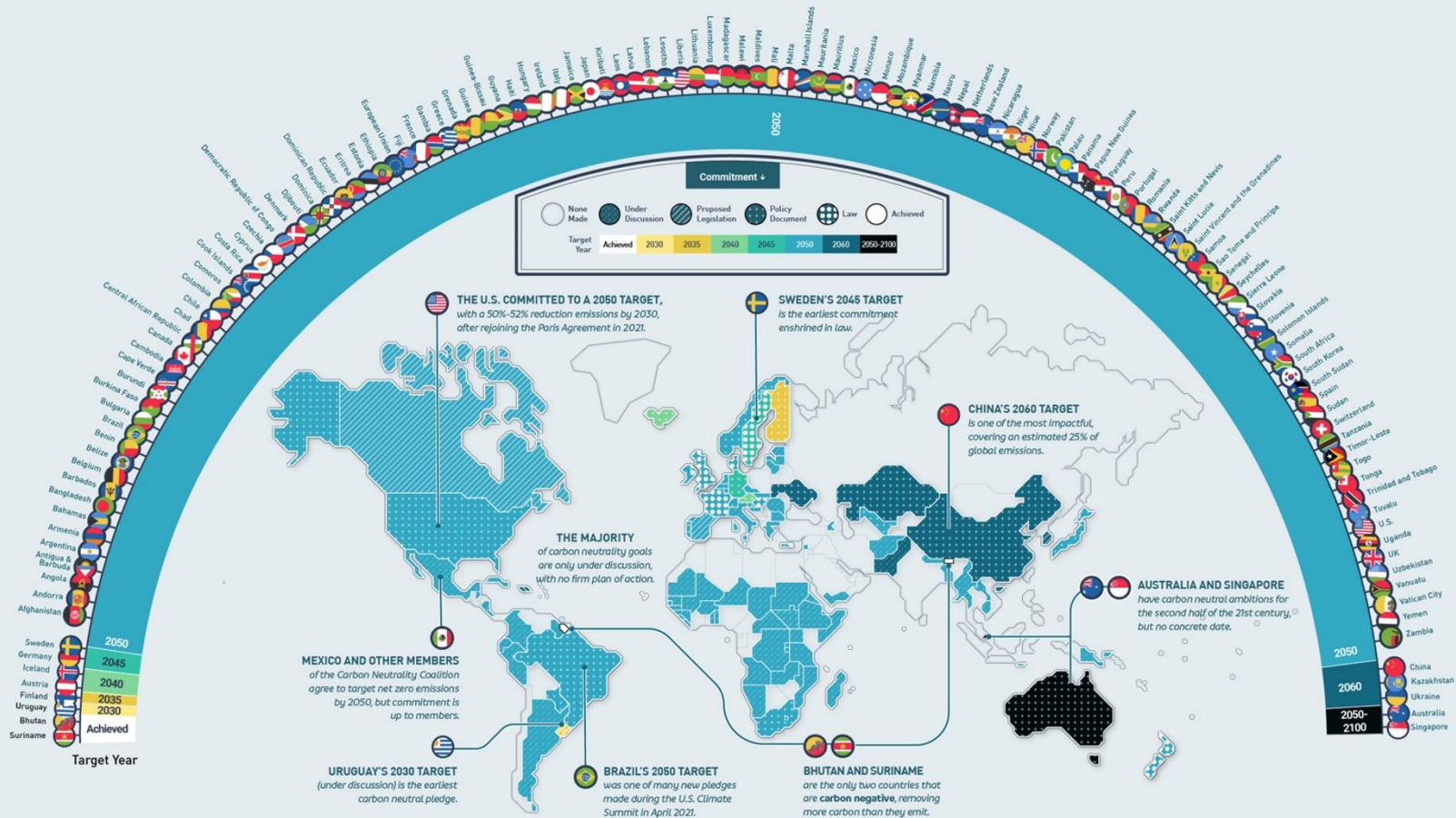
2°C to 1.5°C

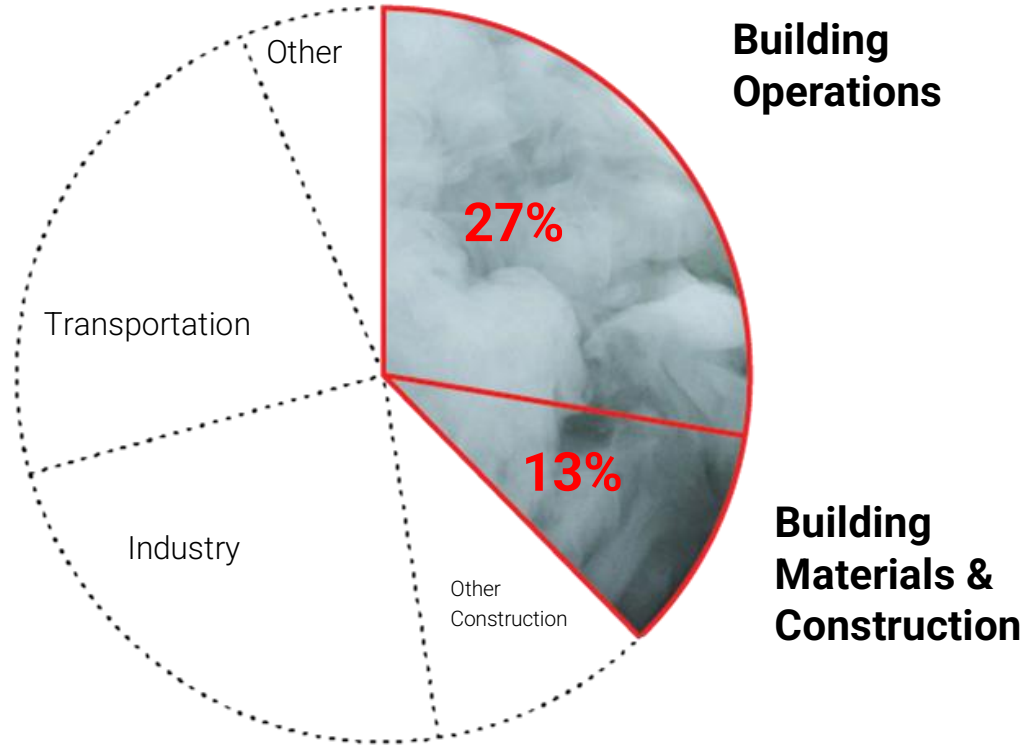
2018 UN IPCC Recommendation

1.5°C



In 2015, the Paris Agreement was adopted to limit the global temperature rise maximum at 2°C with a strong recommendation to retain it at 1.5°C



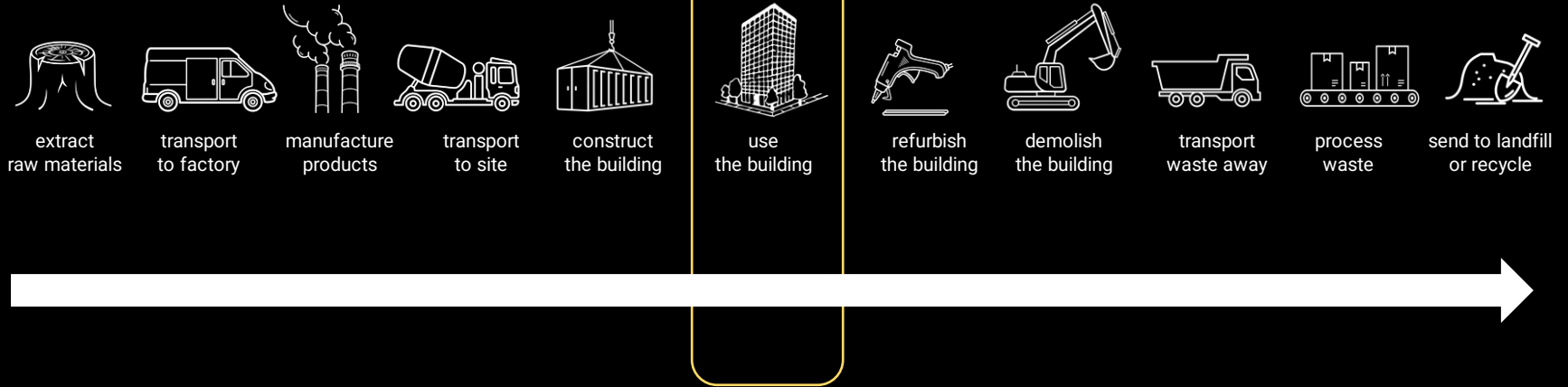


How do **WE** design a
better future?

building life cycle



operational carbon



upfront (embodied) carbon



extract
raw materials



transport
to factory



manufacture
products



transport
to site



construct
the building



use
the building

end-of-life (embodied) carbon



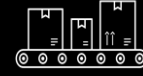
refurbish
the building



demolish
the building



transport
waste away



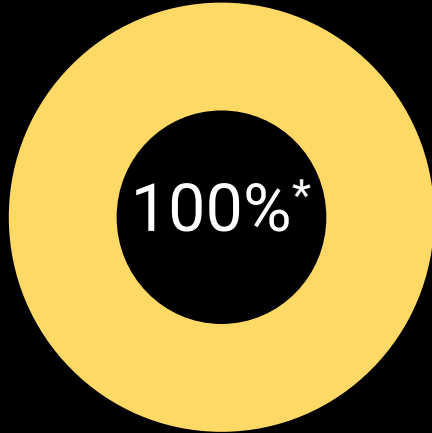
process
waste



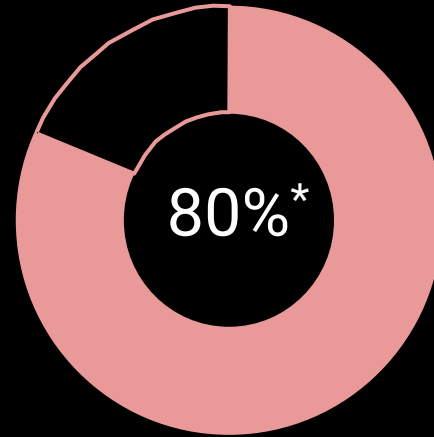
send to landfill
or recycle



continuously **measuring** performance



operational energy



embodied carbon

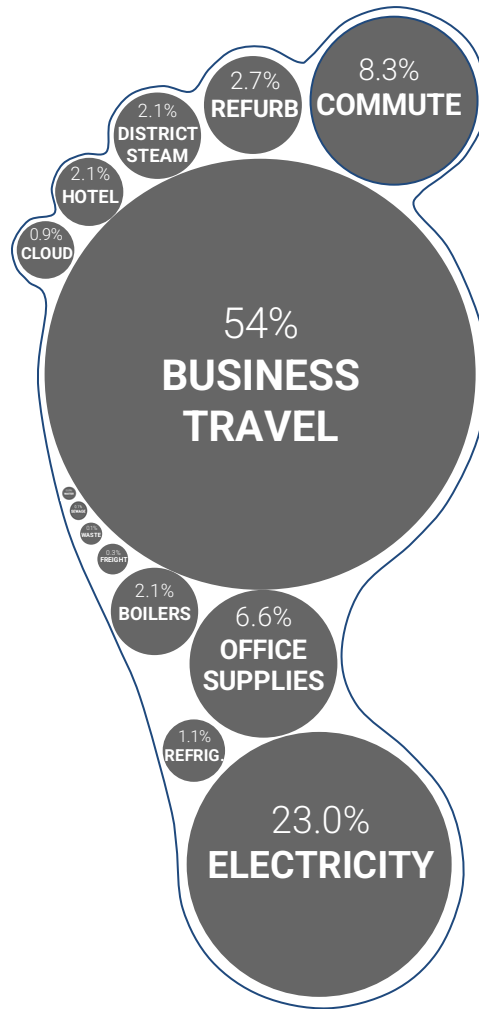
*percentage of the assessed SOM portfolio

2030

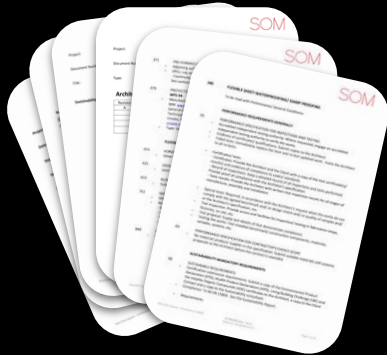
We are targeting **net zero operational carbon** for 100% of our active work.

2040

We are targeting **net zero whole life carbon** for 100% of our active work.



de-carbonising our specifications



from **specifications**

to **projects**

de-carbonising our specifications

Setting embodied carbon limits

Target materials with lower Global warming potentials

Continue to encourage industry to innovate

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2.3 METAL MATERIALS

A. Aluminum

NTS: Verify all embodied carbon content availability from Industry-verified information. Some manufacturers have product-specific EPDs. Confirm actual minimum values that are achievable.

1. *General: Utilize aluminum members used for entrances and storefront frames meeting parameters documented in industry-wide environmental product declaration (EPD) published by the Aluminum Association.*

- a. *Global Warming Potential (ISO 14025), Stages A1-A3 (Cradle to Gate):*

1) *Powdercoated aluminum extrusion [4.0] kg/CO2e / kg*

- b. *Estimated Mean Service Life: [100-years].*

NTS: Verify recycled content.

- c. *Recycled Content: [75%]*

SOM



An aerial photograph of a dense urban area in Manhattan, New York, featuring several prominent skyscrapers with glass facades. The buildings are tightly packed, and the surrounding area includes lower-rise structures and rooftop gardens.

The Pendry Hotel

Manhattan West New York, NY

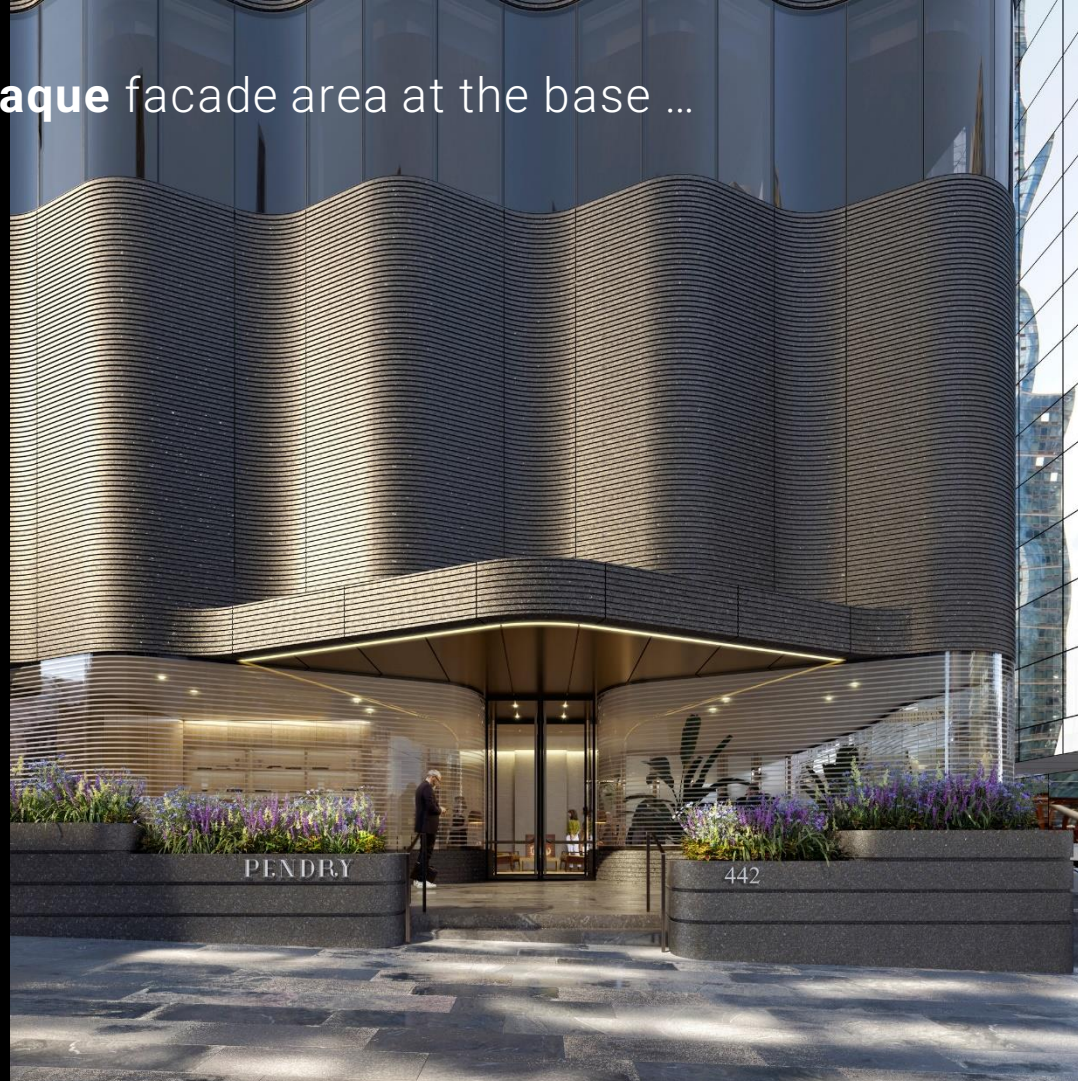
Google Earth



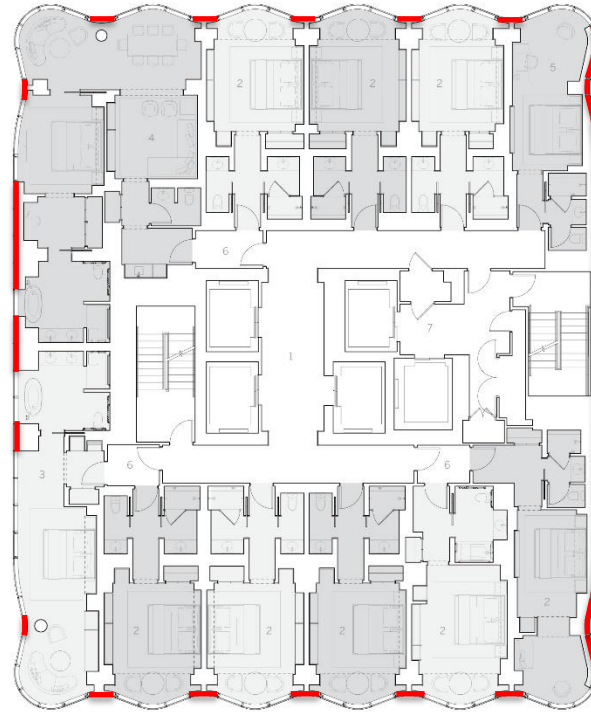
A Series of **Bay Windows**



with a lot of **opaque** facade area at the base ...



... and **throughout** the building

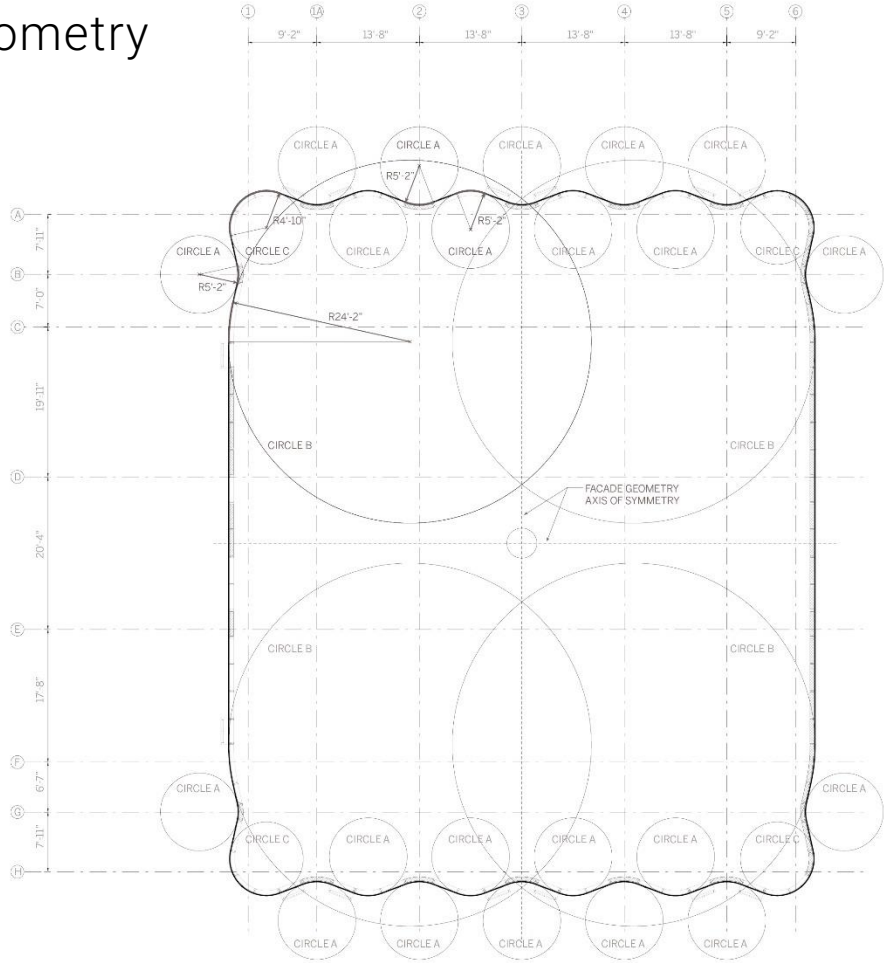


- 1 ELEVATOR LOBBY
- 2 KING GUESTROOM
- 3 JUNIOR SUITE
- 4 SUITE
- 5 JUNIOR KING
- 6 FLEXIBLE LOCK-OFFS
- 7 SERVICE AREA

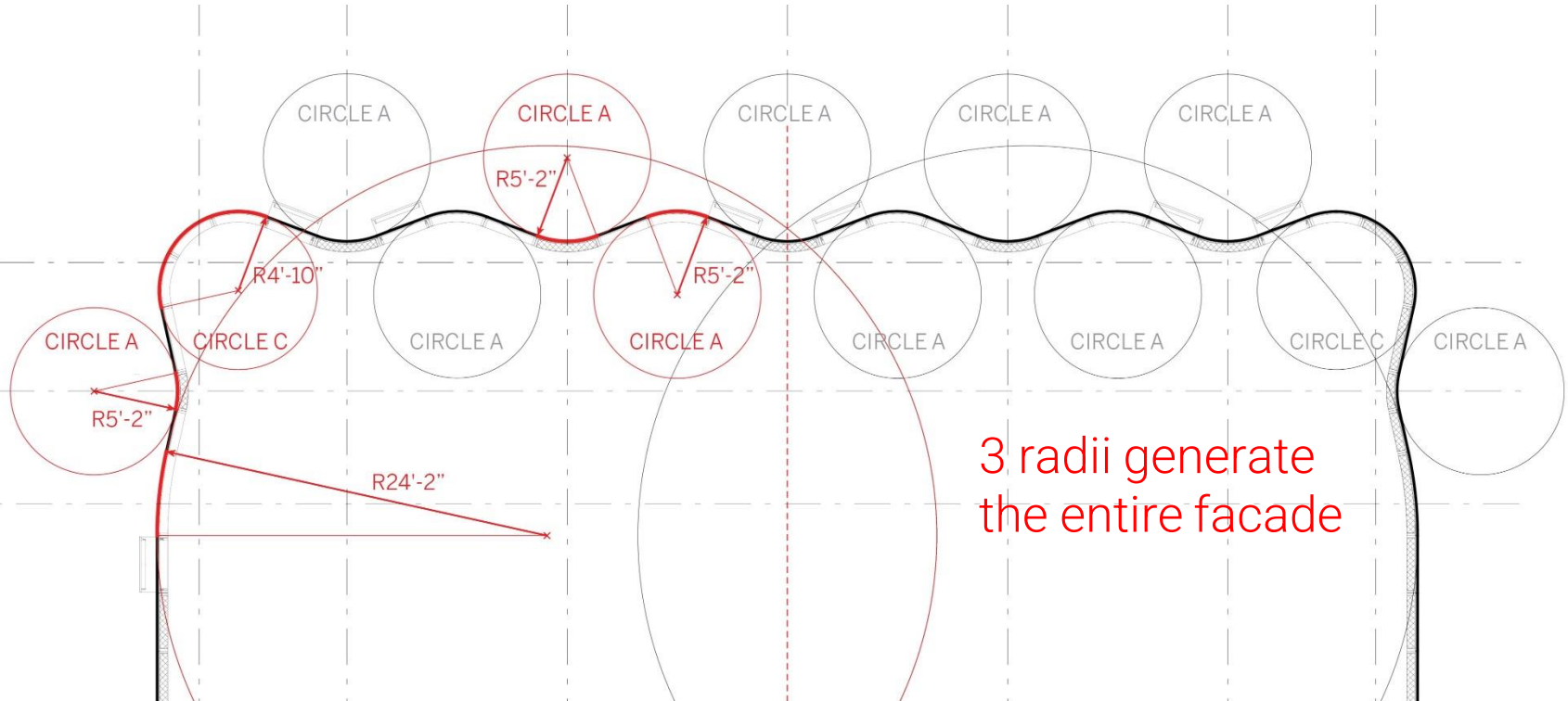


0 5 10 20 40 FT

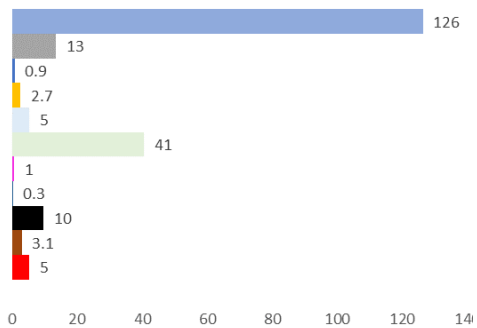
Rationalized geometry



Rationalized geometry





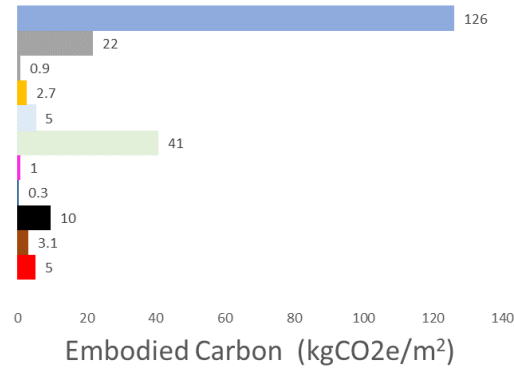


Embodied Carbon (kgCO₂e/m²)

Pendry Hotel - Stone

249 kgCO₂e/m²

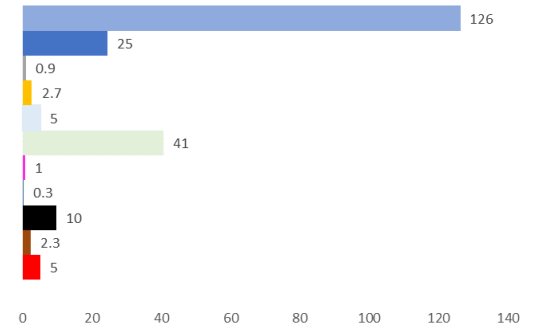
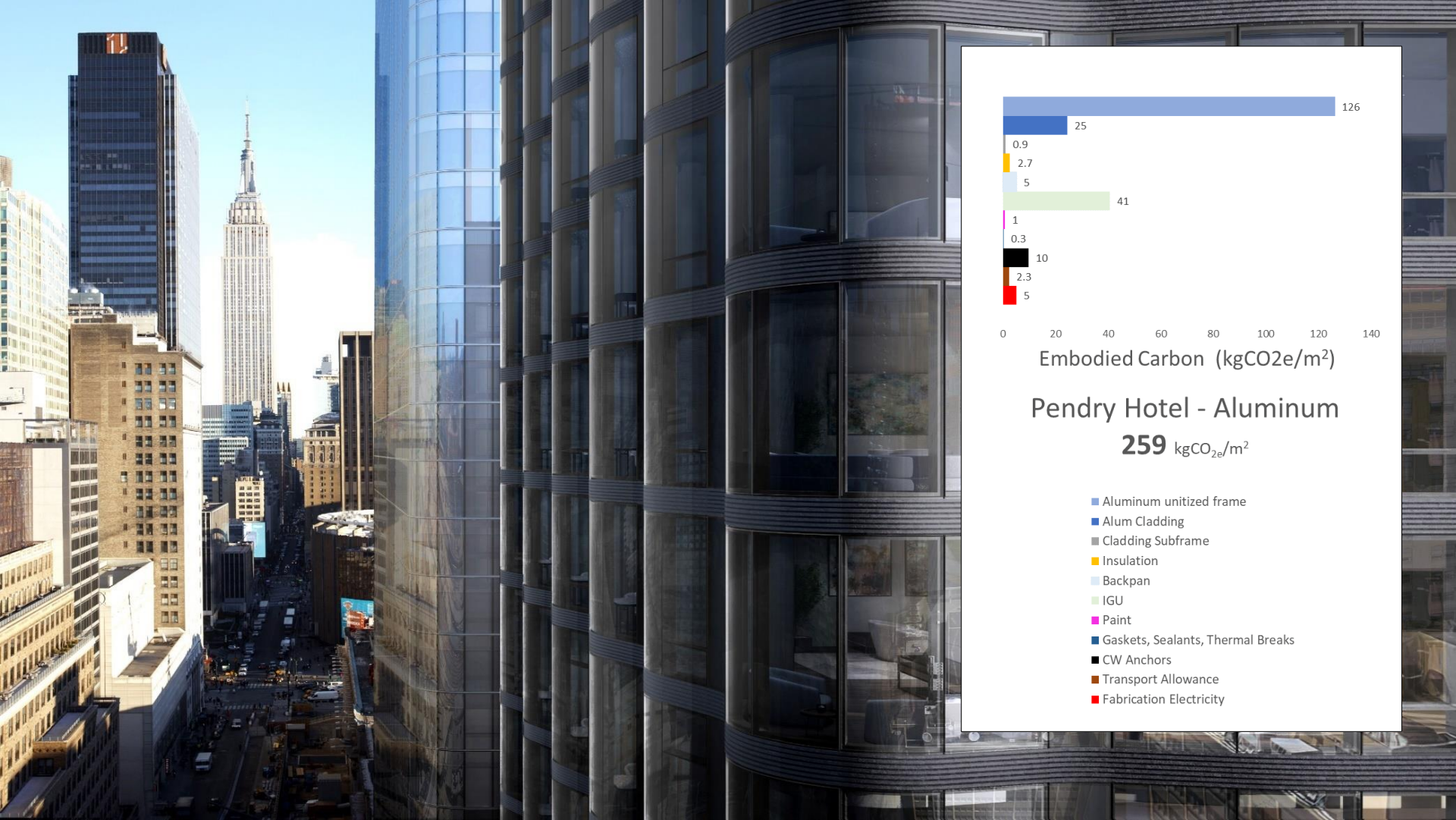
- Aluminum Unitized Frame
- Stone Cladding
- Cladding Subframe
- Insulation
- Backpan
- IGU
- Paint
- Gaskets, Sealants, Thermal Breaks
- CW Anchors
- Transport Allowance
- Fabrication Electricity



Pendry Hotel - UHPC

257 kgCO₂e/m²

- Aluminum unitized frame
- UHPC Cladding
- Cladding Subframe
- Insulation
- Backpan
- IGU
- Paint
- Gaskets, Sealants, Thermal Breaks
- CW Anchors
- Transport Allowance
- Fabrication Electricity

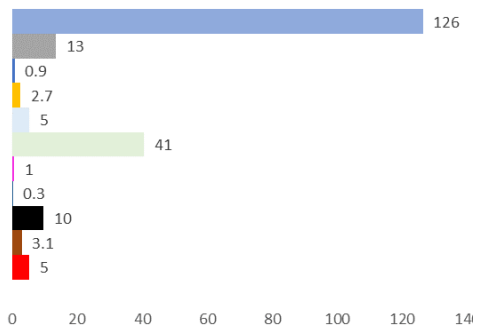


Embodied Carbon (kgCO₂e/m²)

Pendry Hotel - Aluminum

259 kgCO₂e/m²

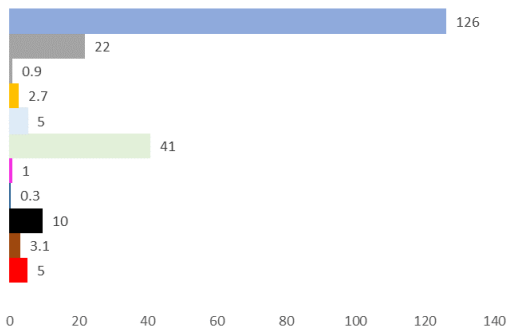
- Aluminum unitized frame
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Embodied Carbon (kgCO_{2e}/m²)

Pendry Hotel - Stone

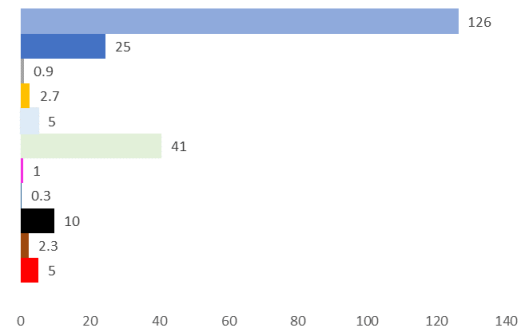
249 kgCO_{2e}/m²



Embodied Carbon (kgCO_{2e}/m²)

Pendry Hotel - UHPC

257 kgCO_{2e}/m²



Embodied Carbon (kgCO_{2e}/m²)

Pendry Hotel - Aluminum

259 kgCO_{2e}/m²

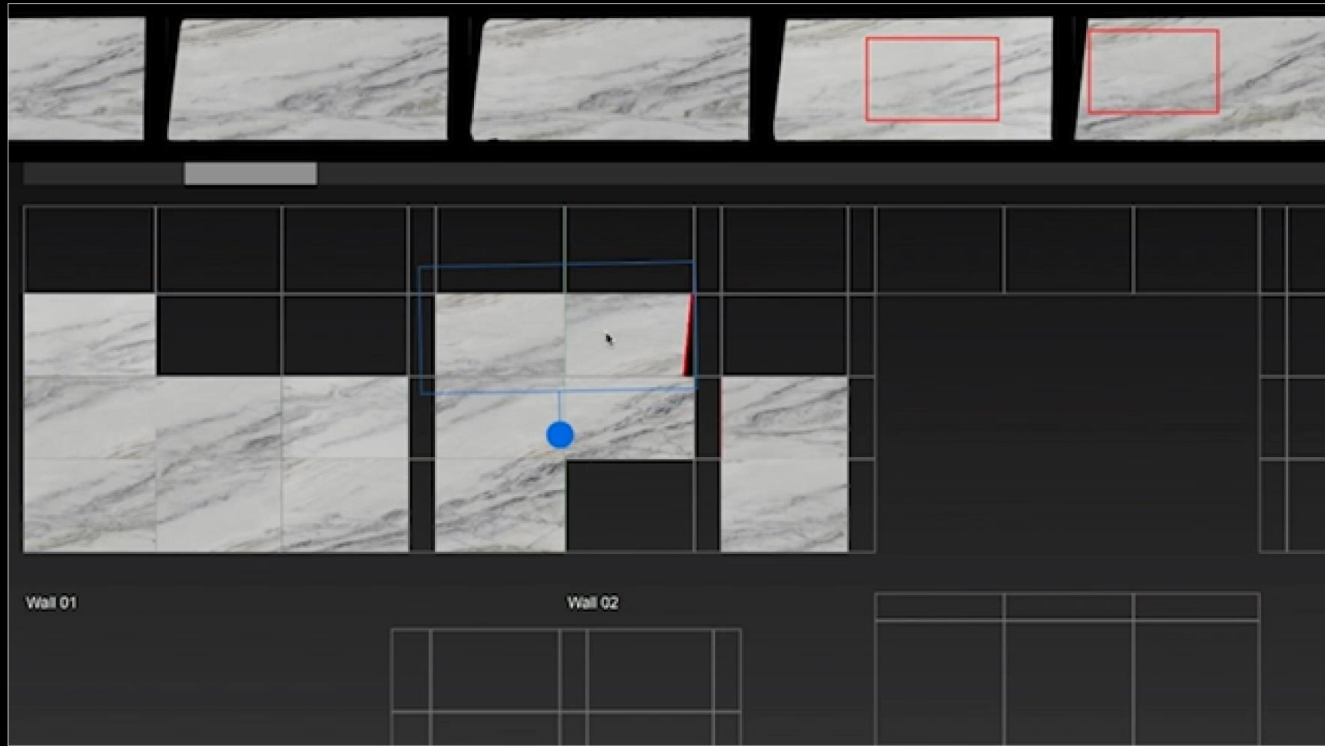
- Aluminum unitized frame
- Alum Cladding
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- CW Anchors
- Transport Allowance
- Fabrication Electricity



conventional
dry lay



digital dry lay



courtesy www.drylayout.com











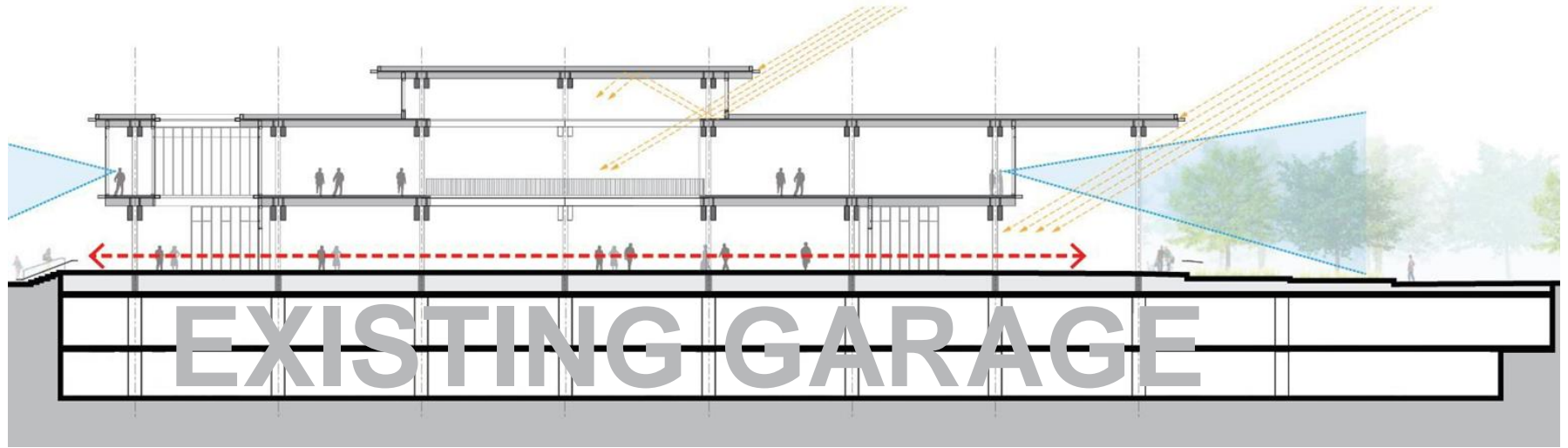
The Billie Jean King Main Library

Longbeach, CA

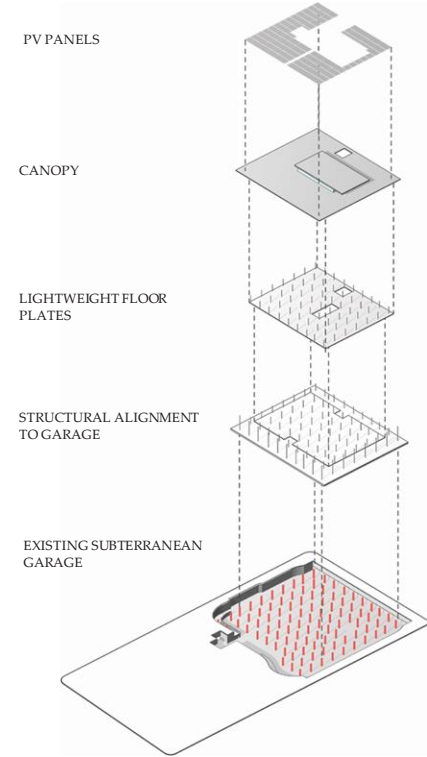
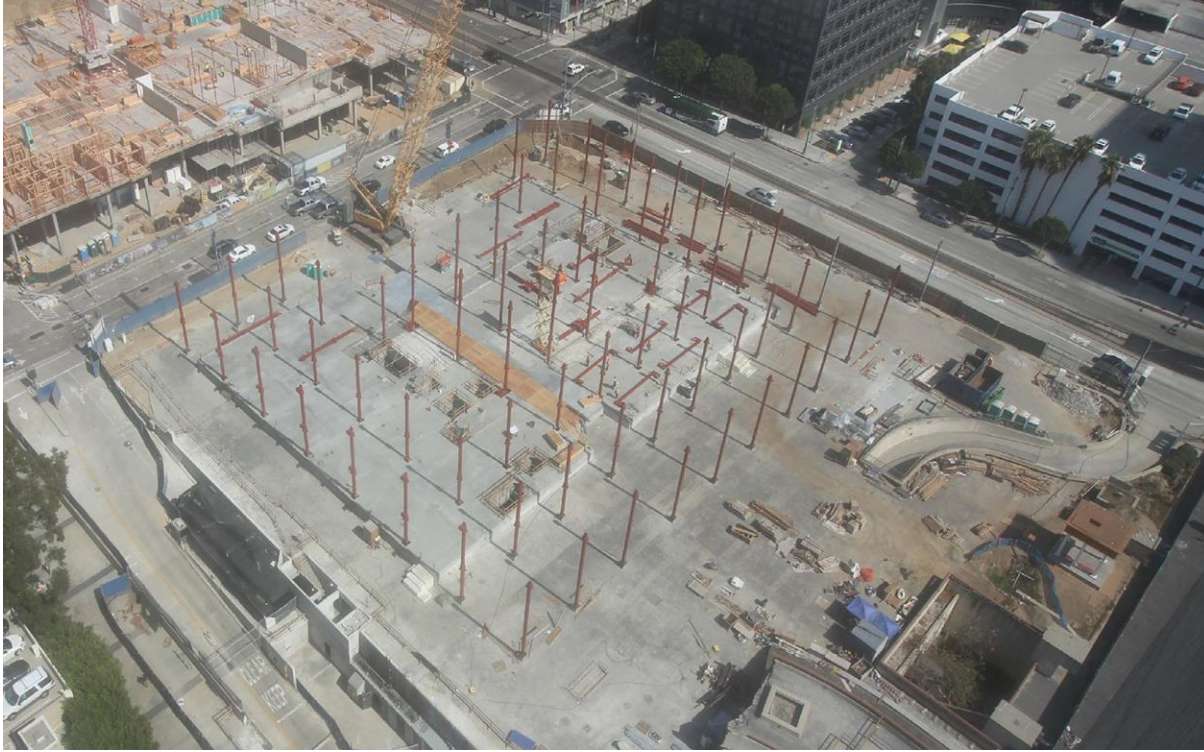
Google Earth
Landsat / Copernicus



reuse the existing garage



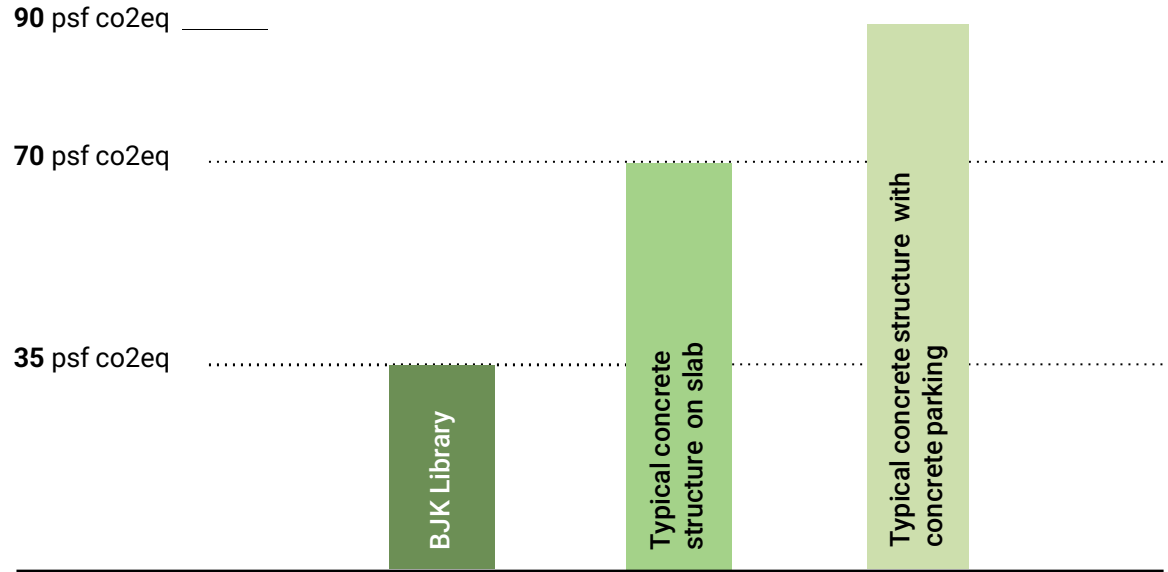
reuse the existing garage





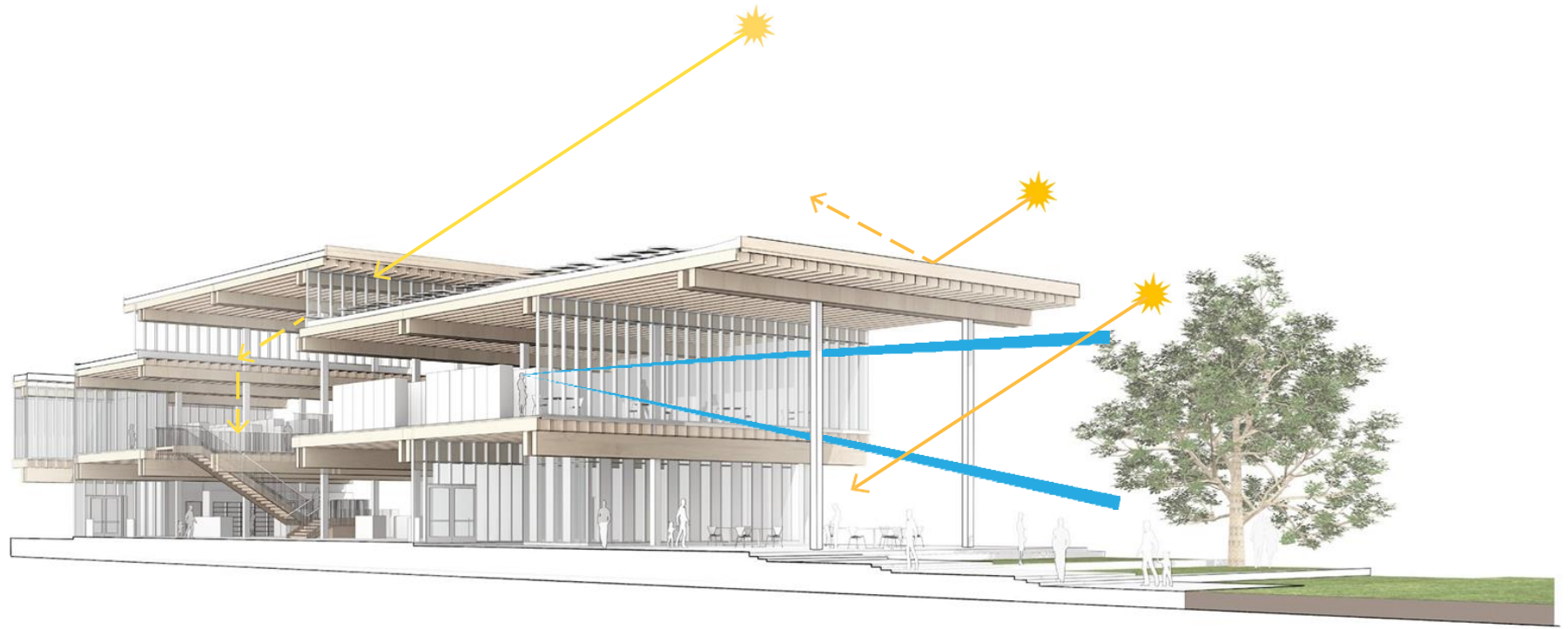
do **more** with Less

LEED Platinum certified, the building utilizes timber construction and features rooftop photovoltaic cells, daylighting strategies, controlled air ventilation systems, and extensive glazing with architectural overhangs for solar protection. Existing substructure was reused.



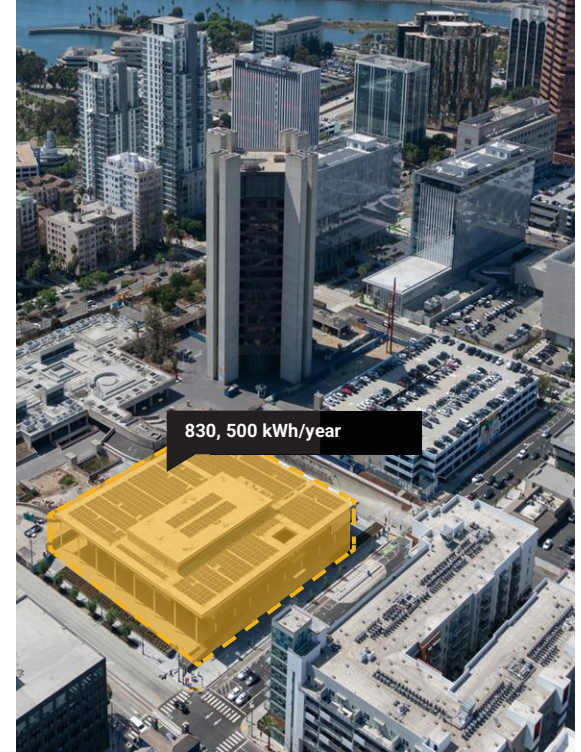
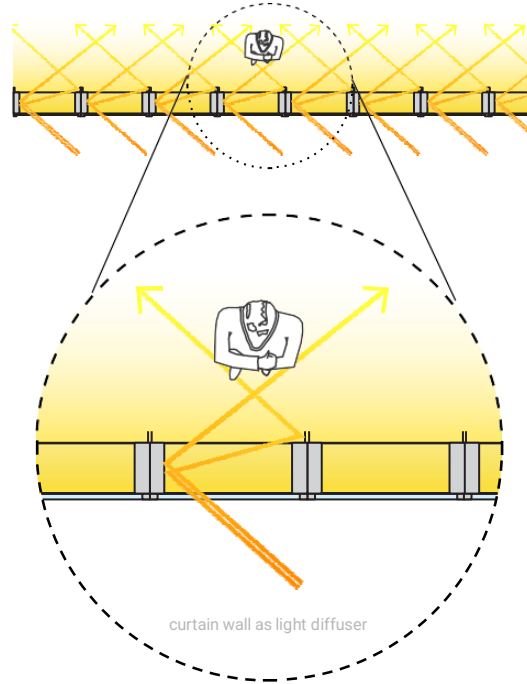


do **more** with Less



systems efficiency

daylight and glare

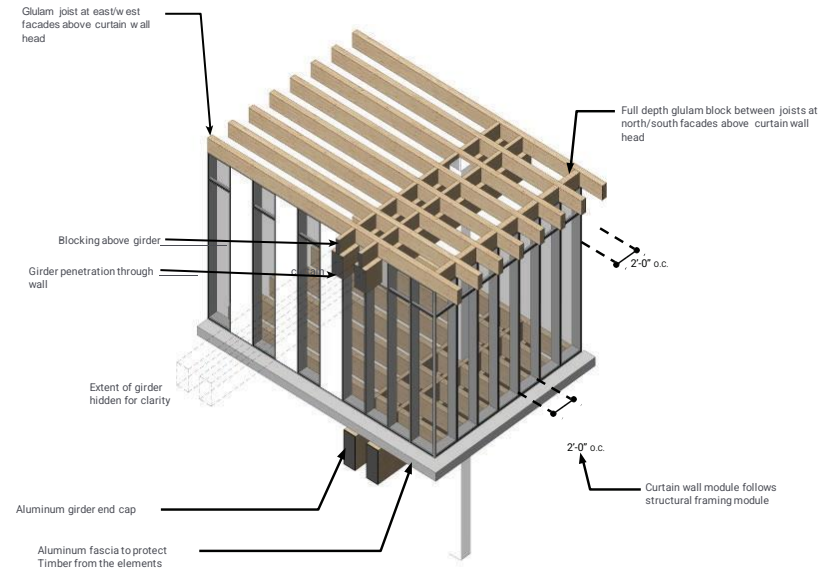
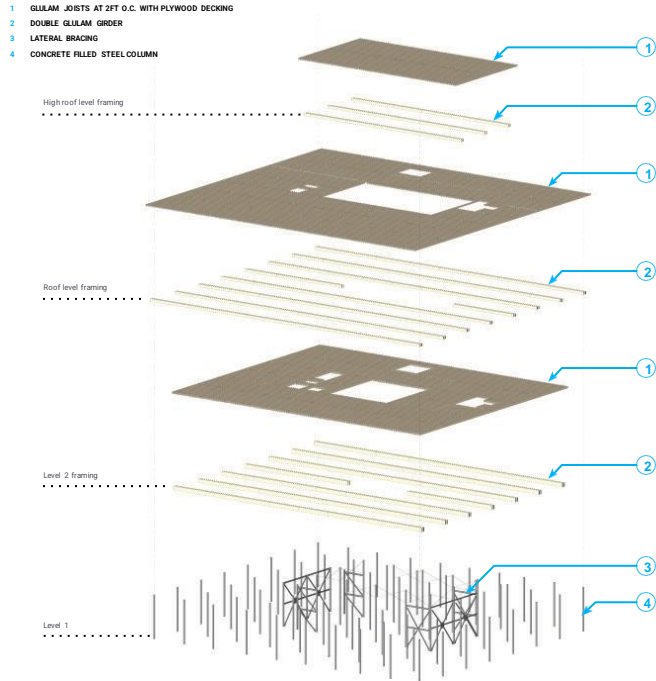


integration of structure and architecture

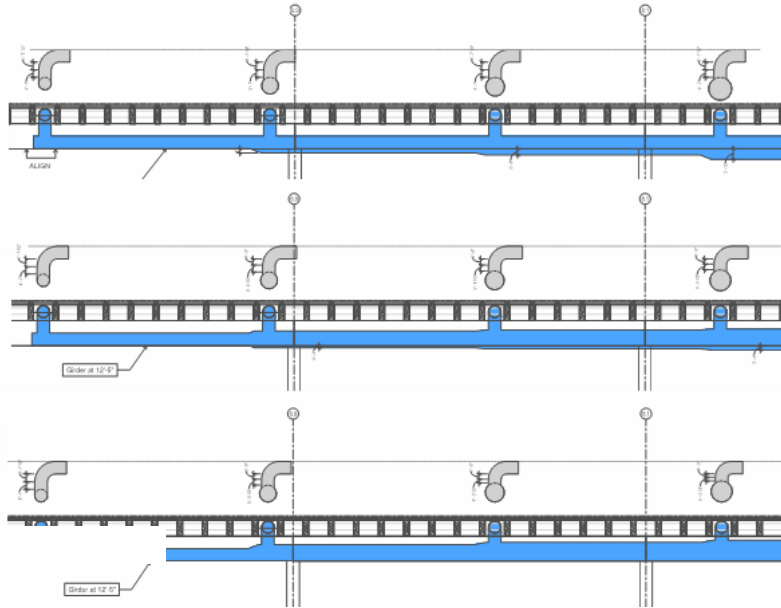
“what It Is” is “what It looks like”



integration of structure and architecture economy and repetition

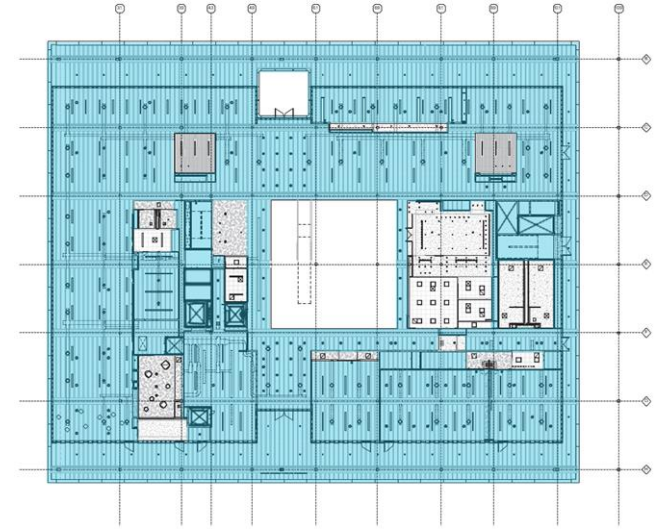


integration of systems and architecture



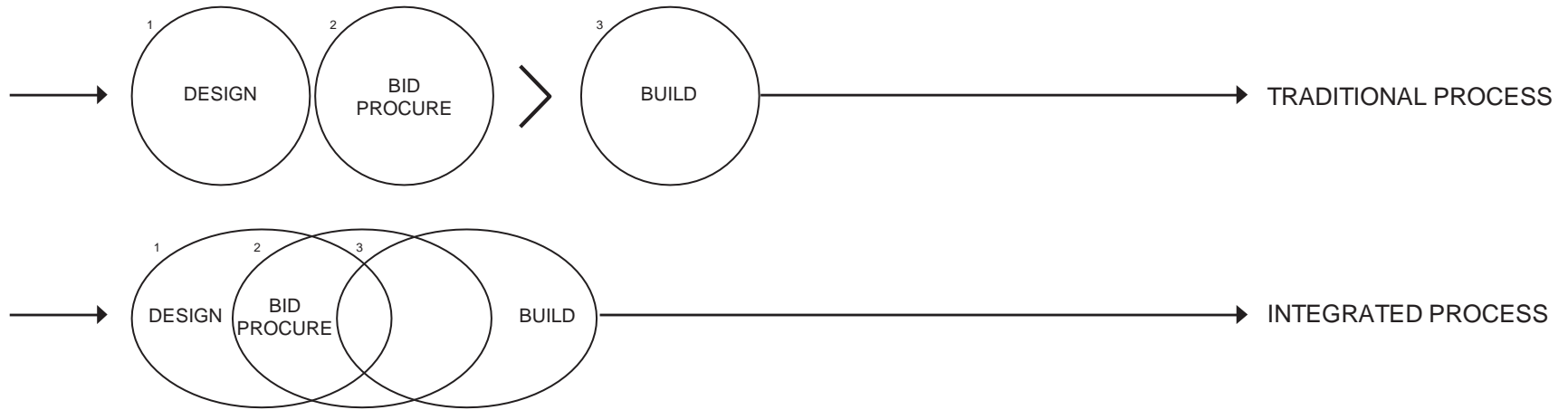


integration of structure and architecture



SAVINGS:
CEILING MATERIAL = 58, 990 SQ FT = 13,300 LBS CO2EQ

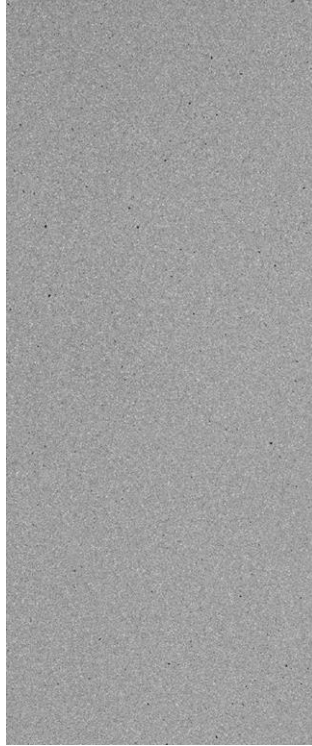
integration of design and construction



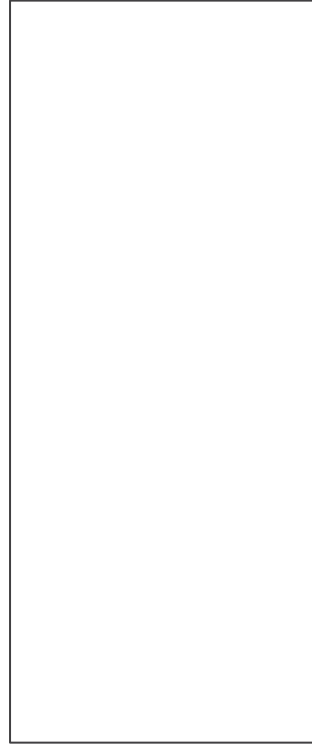
integration of design and construction



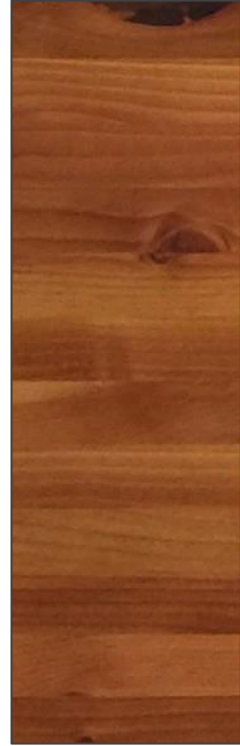
LIBRARY - WORKING MOCKUP



CONCRETE



WHITE

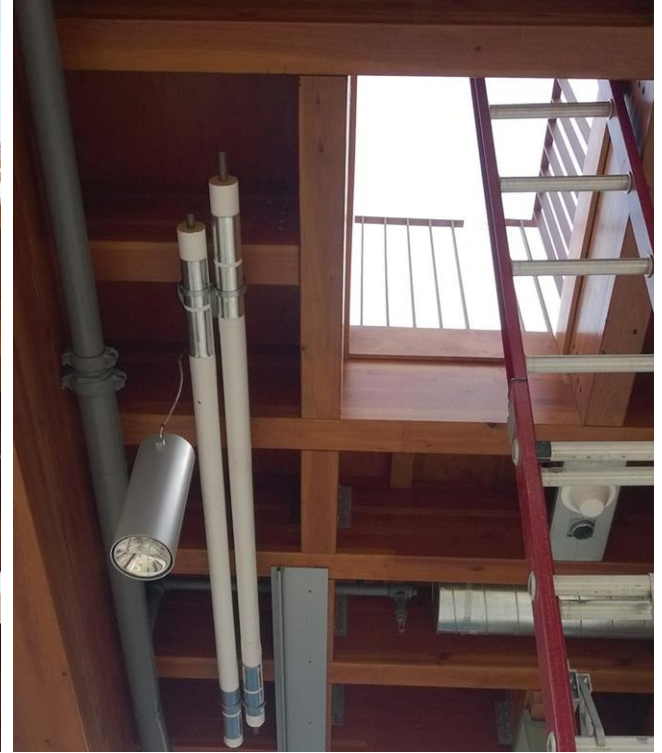


WOOD

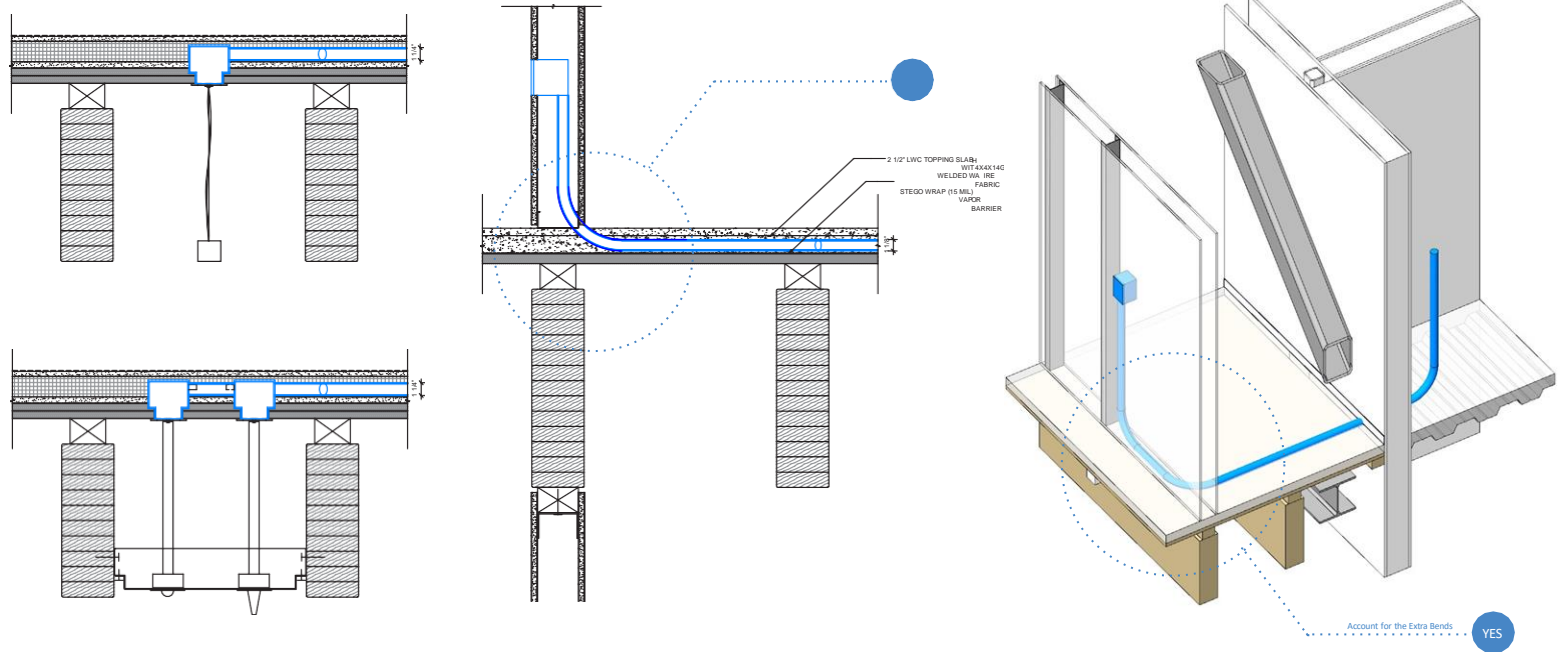


METALS

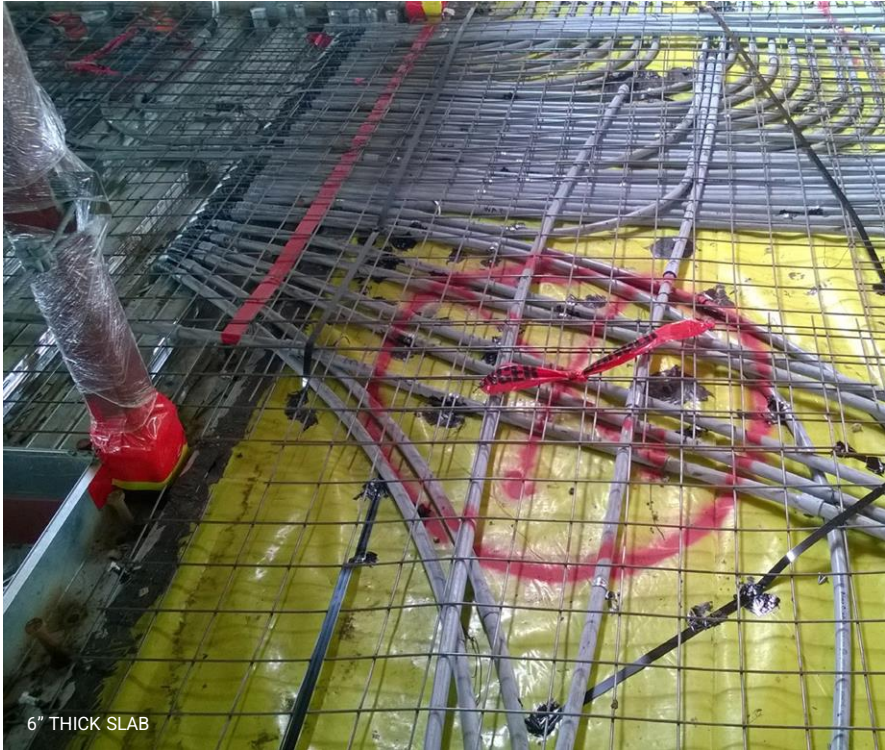
integration of design and construction



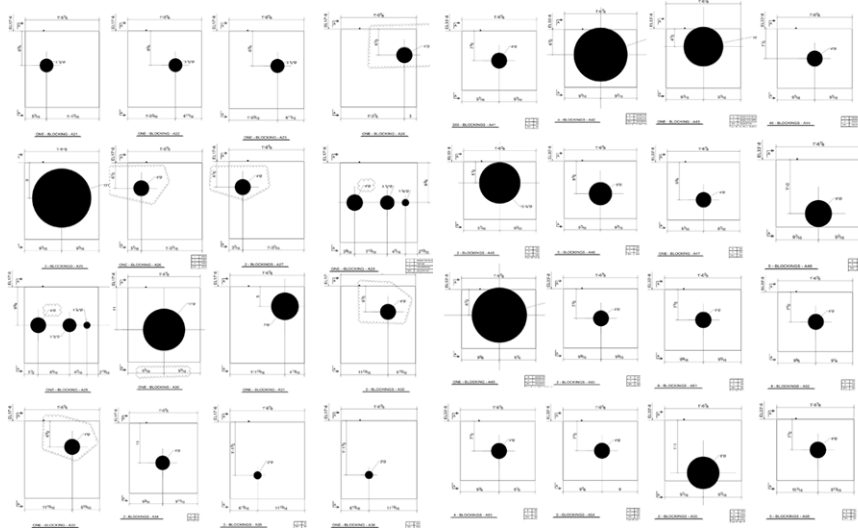
integration of design and construction



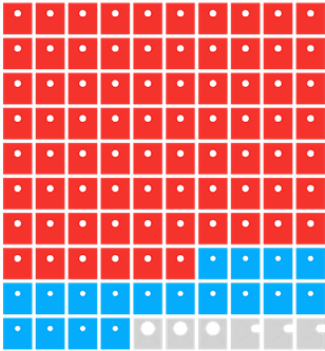
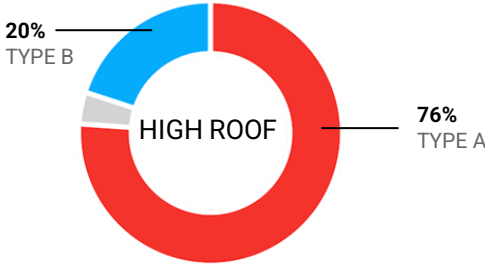
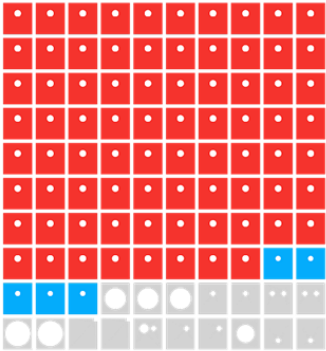
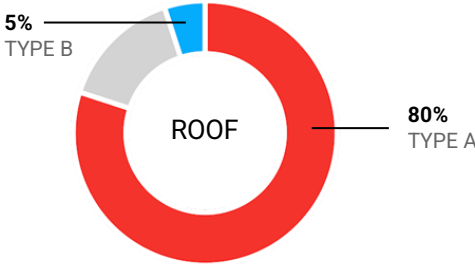
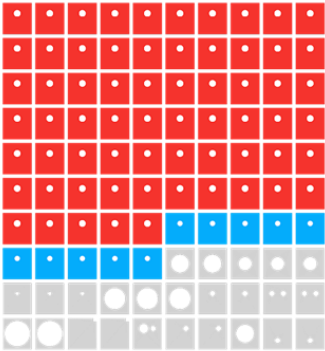
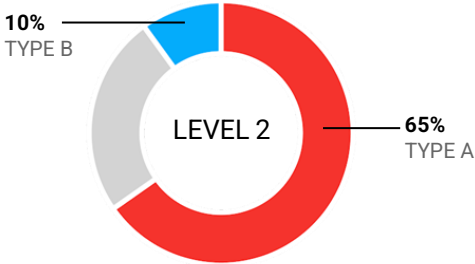
integration of design and construction



integration of design and construction



optimization of timber penetration

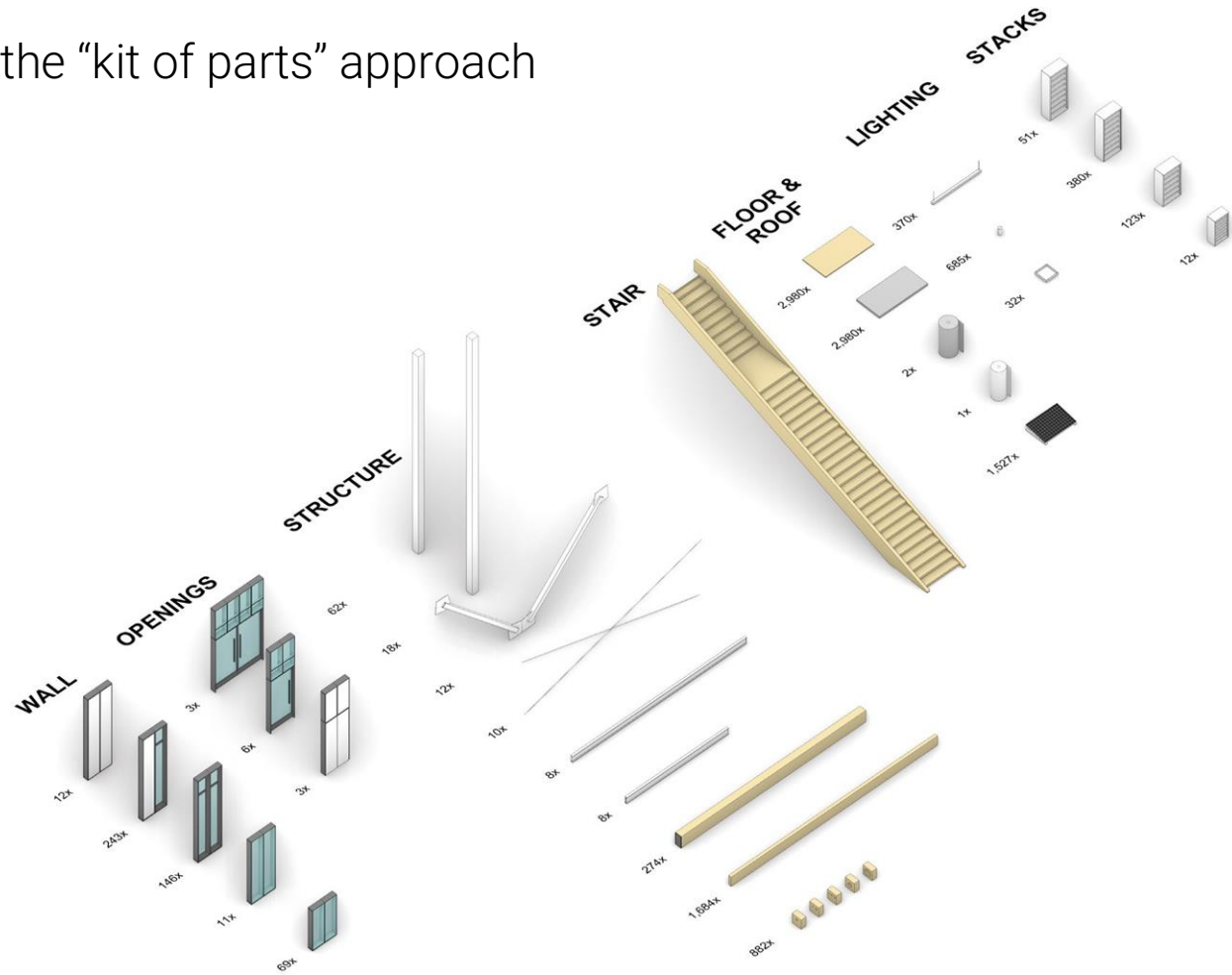


waste **reduction**: the “kit of parts” approach

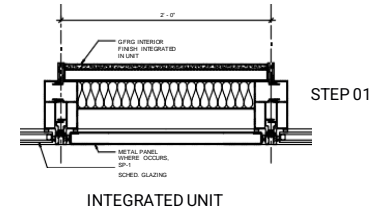
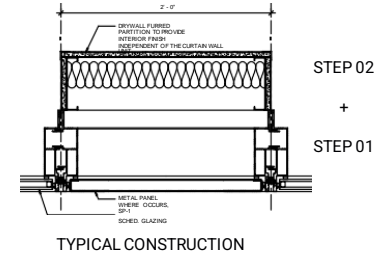
Less Waste

Higher Quality

Higher Value



waste **reduction**: the “kit of parts” approach



SAVINGS:
DRYWALL = 6,272 SQ FT
LIGHT GAUGE METAL = 8,291 FT



An aerial view of the London skyline, showing a dense cluster of skyscrapers in the City of London. The Gherkin (30 St Mary Axe) is prominent in the center. To its right is the Shard, and further right is the London Bridge. The River Thames flows through the city. The image is a high-resolution satellite or aerial photograph.

99 Bishopsgate

London, UK

Google Earth

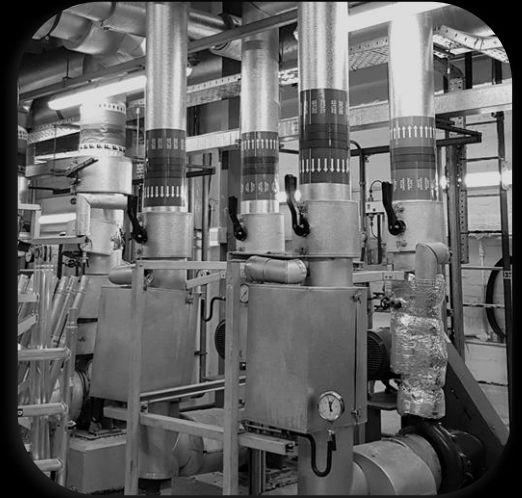




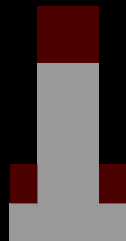
90s GLASS BOX



TIRED FLOORPLATE

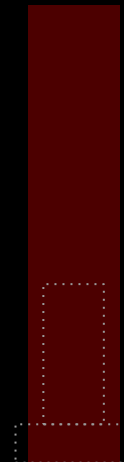


OUTDATED SYSTEMS



RETROFIT

?



NEW BUILD

RETROFIT

How can we **extend the lifespan**
of an existing building with minimal intervention?

RETROFIT

Design Strategy

MINIMIZE
DEMOLITION

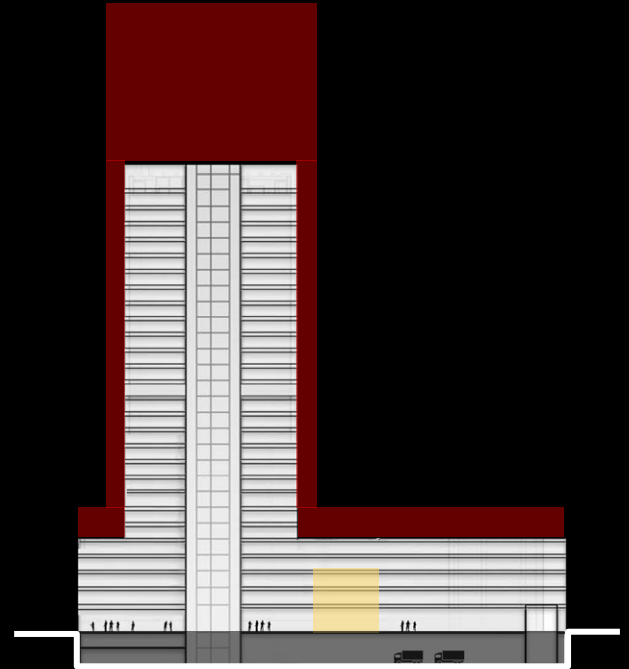
Demolish as less as possible

IMPROVE
EXISTING

Create amenity spaces and
improve the comfort

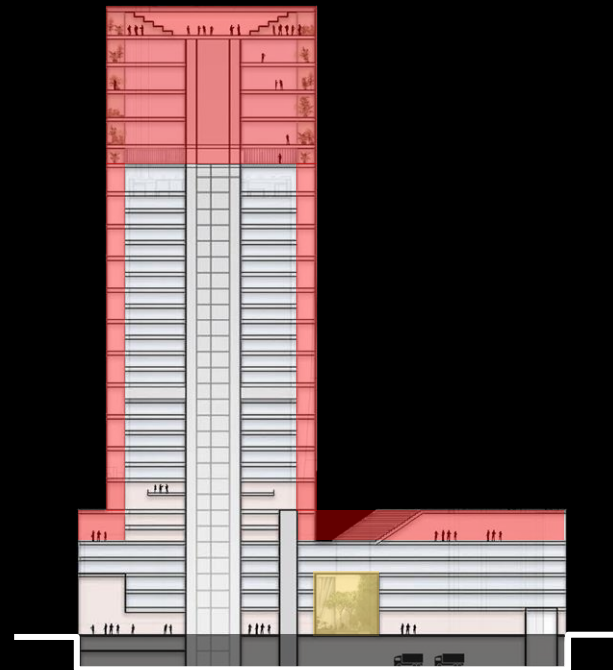
MAXIMIZE
POTENTIAL

Improve the area without
touching the existing structure
and foundations



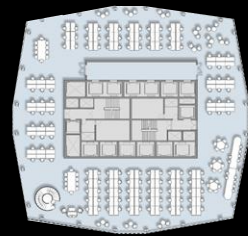
RETROFIT

Inclusive and diverse workplace



RETROFIT

Inclusive and diverse workplace



ORIGINAL PLAN



ENLARGED PLAN

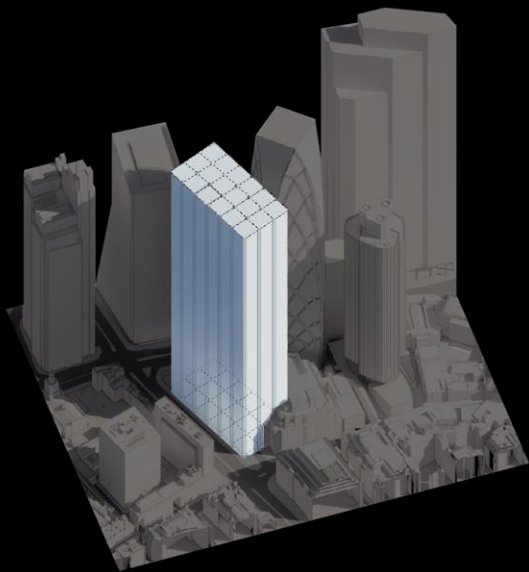


NEW ADDITION



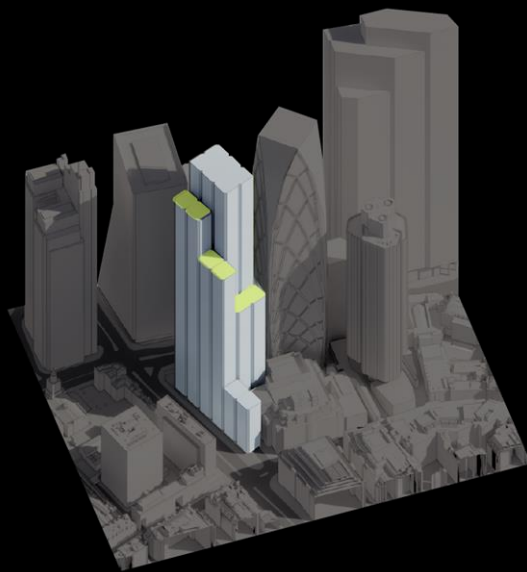
NEW BUILD

How far can we **maximise the lifespan**
of a new building?



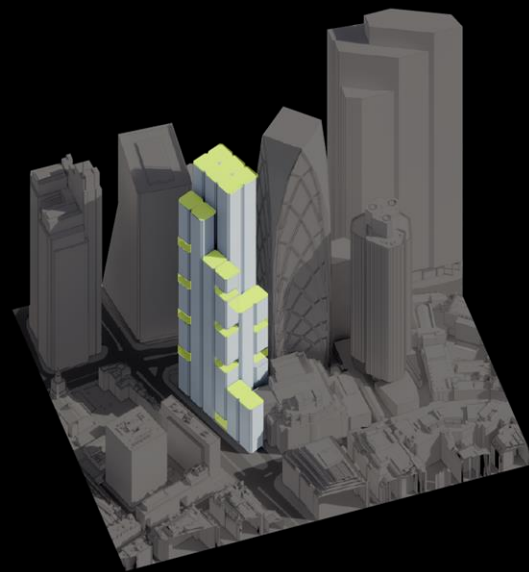
SITE INFILL

Maximising Site Opportunities



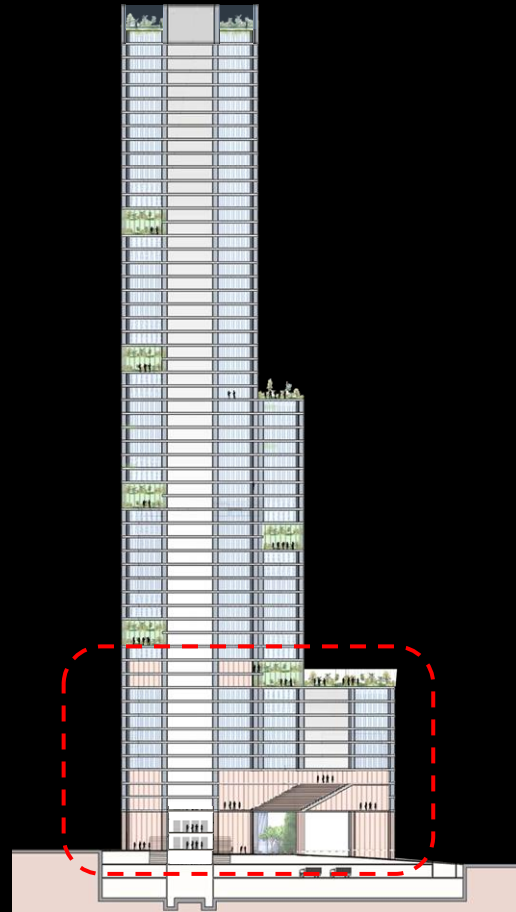
CURATING THE SKYLINE

Activating External Amenity Spaces for the Workplace



ENHANCING THE WORKPLACE EXPERIENCE

External/Internal Green Space for All Users





ZONE 01
LEVELS 01 - 09
27,150 sq ft

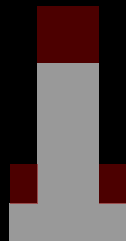


ZONE 05
LEVELS 50 - 57
12,000 sq ft



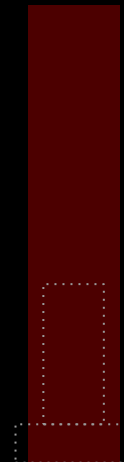
WINTER GARDENS
Various Levels
Double height spaces



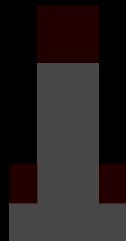


RETROFIT

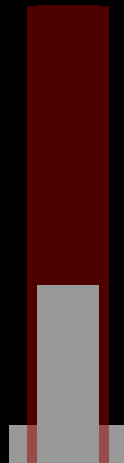
?



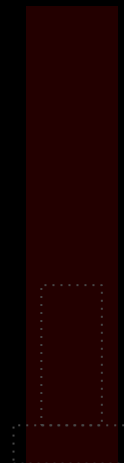
NEW BUILD



RETROFIT



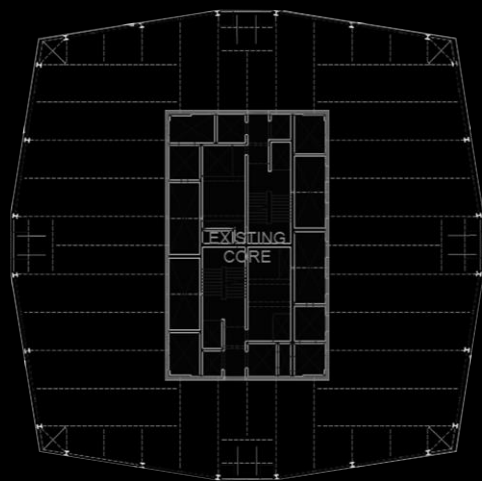
OVER BUILD

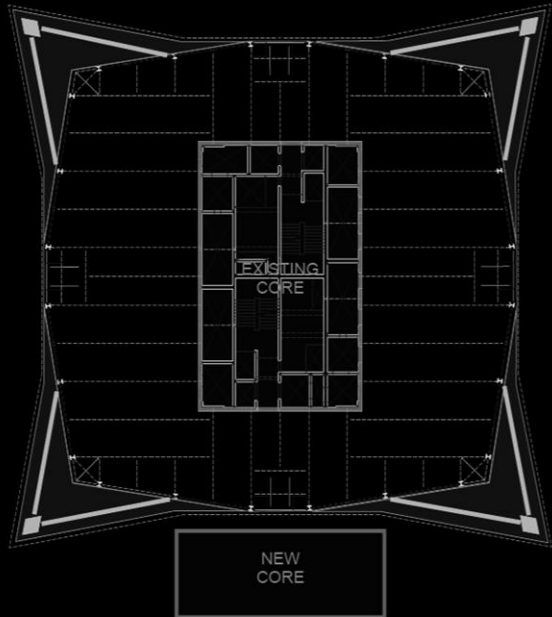


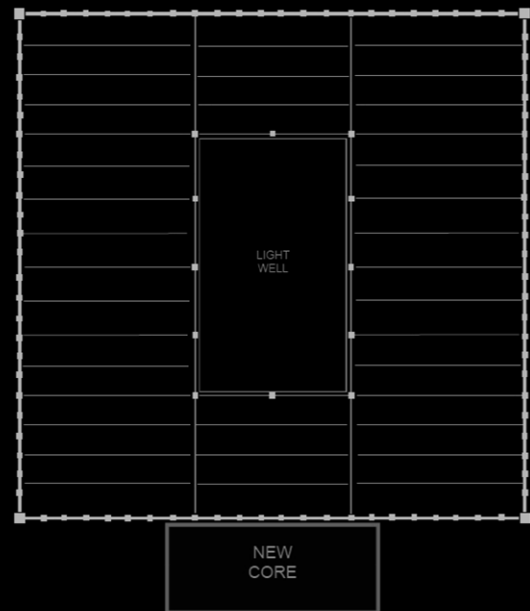
NEW BUILD

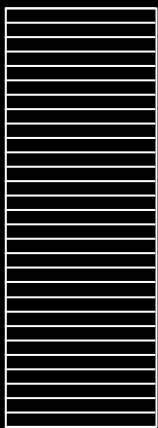
OVERBUILD

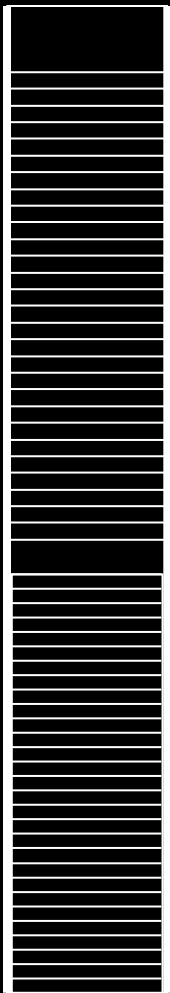
How can we give **a second life**
to an existing building without demolition?

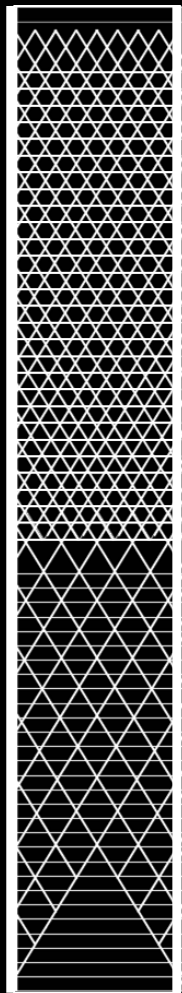


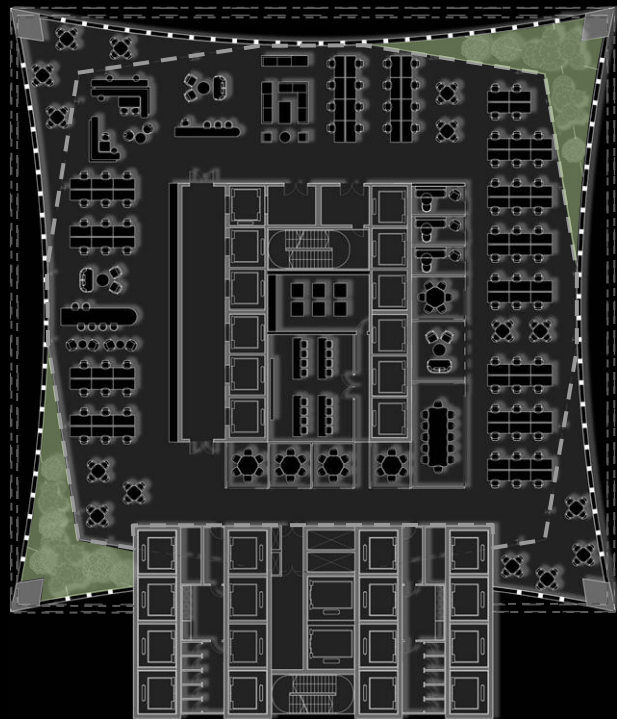


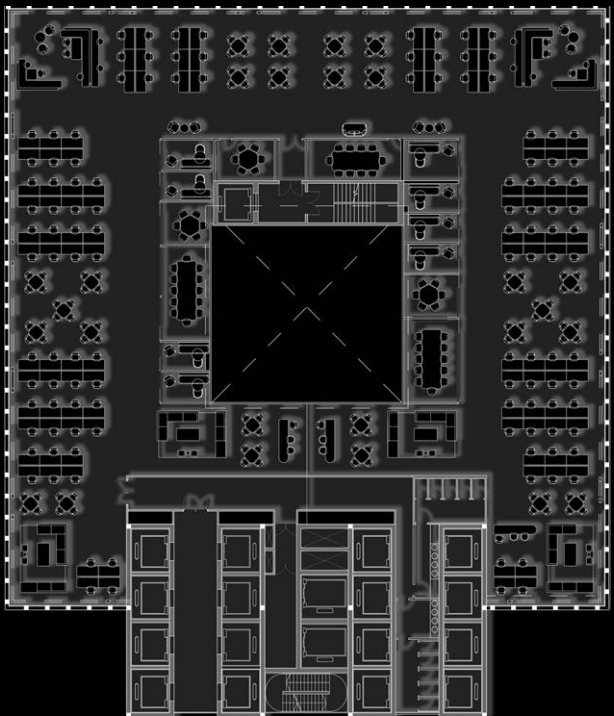








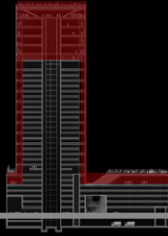








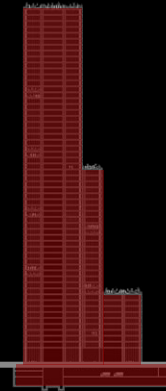
RETROFIT



OVER BUILD



NEW BUILD



Upfront Embodied Carbon
(A1 - A5)

325 kgCO₂e/m²

390 kgCO₂e/m²

600 kgCO₂e/m²

Whole Life Carbon
(A1 - C4 excl. B6-B7)

950 kgCO₂e/m²

1030 kgCO₂e/m²

970 kgCO₂e/m²

Operational Energy Usage

70 kWh/m²

70 kWh/m²

35 kWh/m²

Area Uplift

65%

115%

150%

Amenity Uplift

2%

2%

2%

Daylight Uplift

15%

18%

22%



Karlatornet

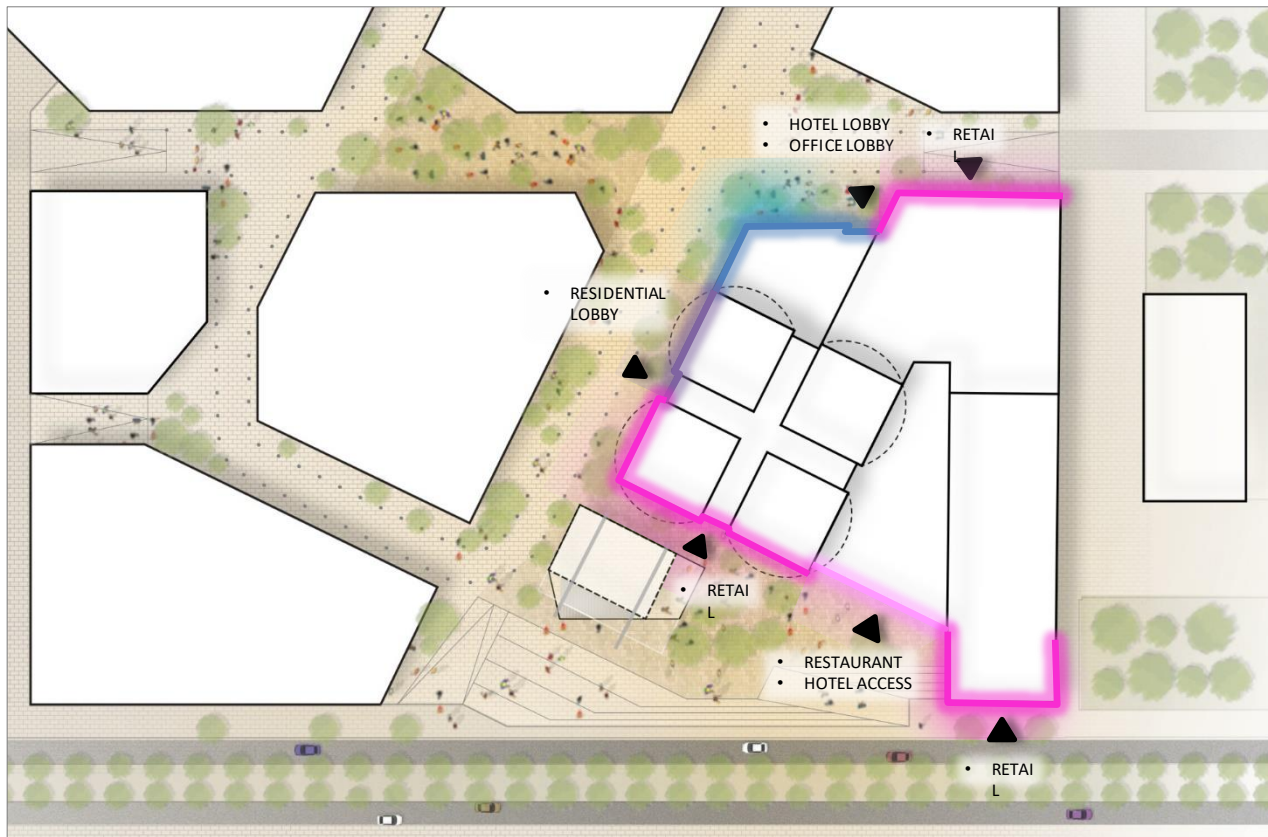
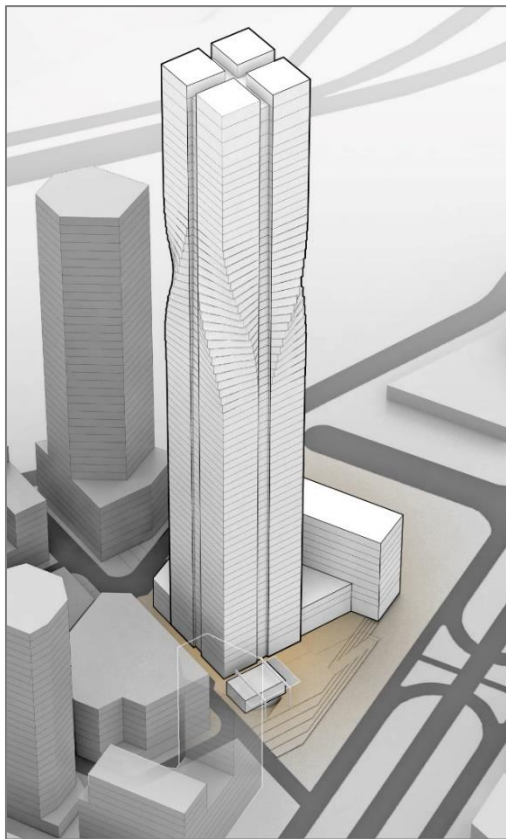
Gothenburg, Sweden

Google Earth













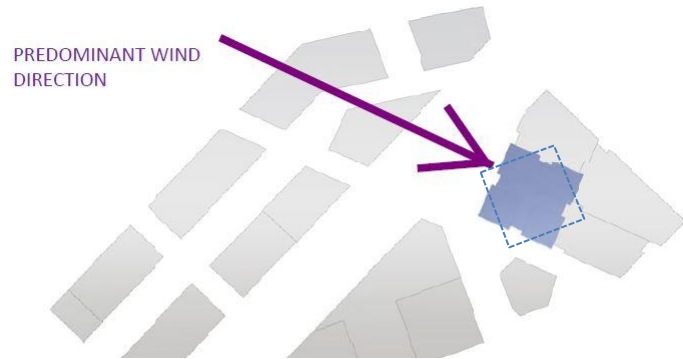
wind tunnel **testing**

NOVEMBER 2015 WIND TUNNEL TEST:

REVEALED THAT THE PREDOMINANT WIND DIRECTION
AGAINST THE INITIAL ORIENTATION OF THE TOWER

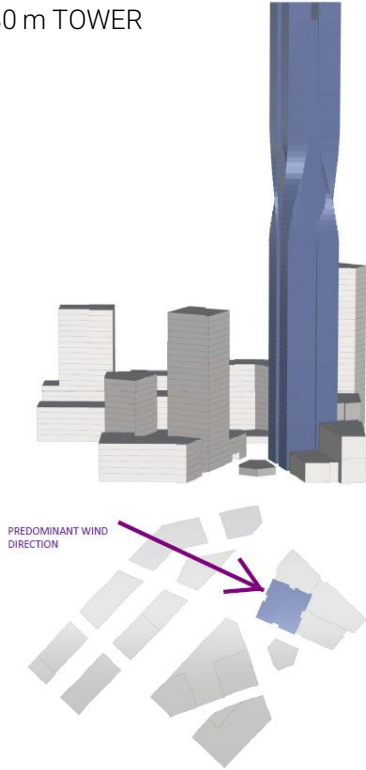
ADDITIONAL STRUCTURAL STIFFENING AND DAMPING
IN ORDER TO MAINTAIN NECESSARY COMFORT LEVELS

45 DEGREE ROTATION OF THE TOWER SIGNIFICANTLY
REDUCED THE WIND LOAD!

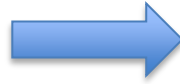


wind tunnel **testing**

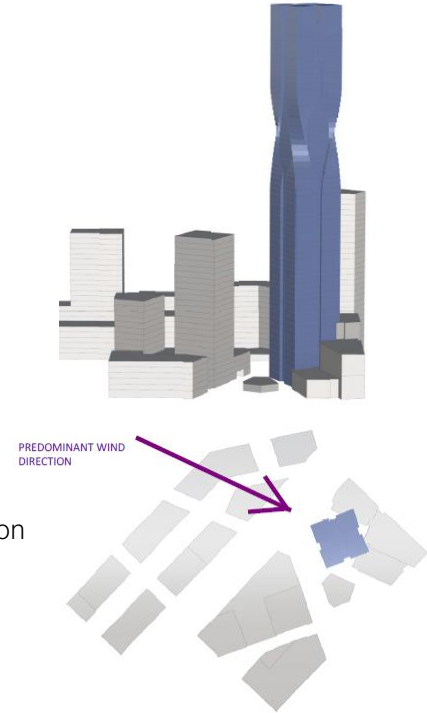
NOVEMBER 2015 – 280 m TOWER



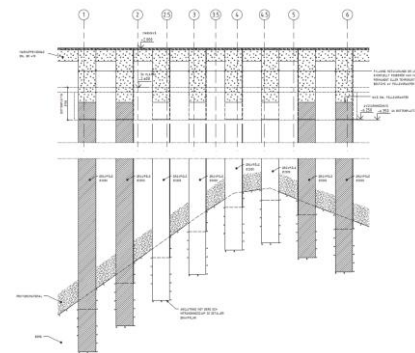
MAY 2016 – 245 m TOWER



45 degree rotation



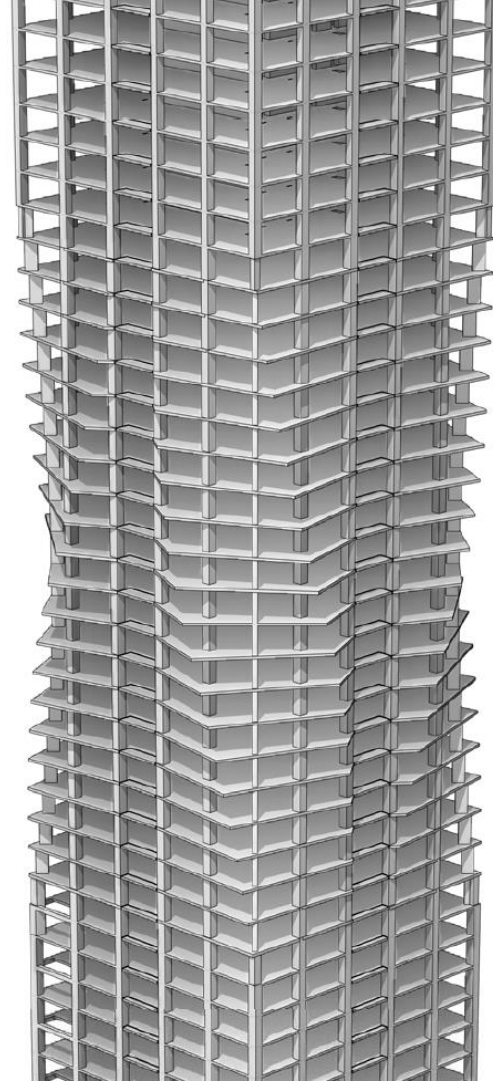
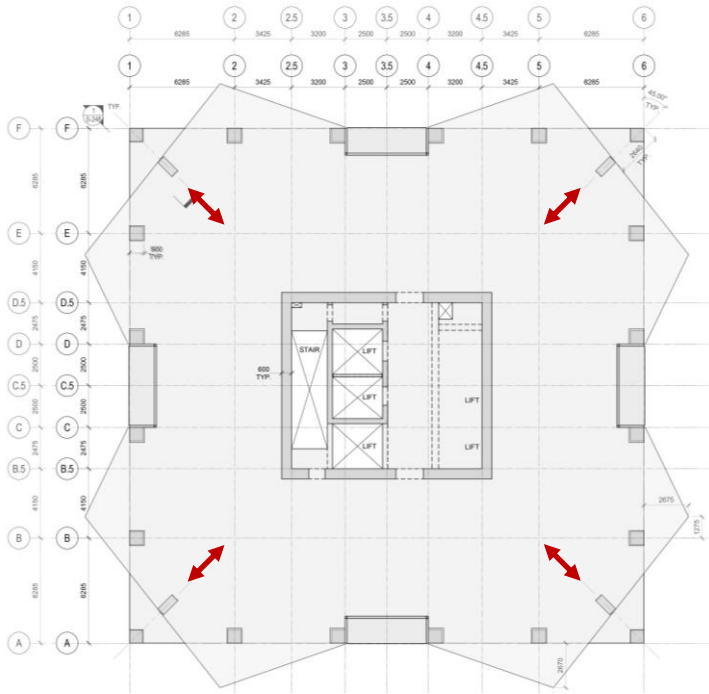




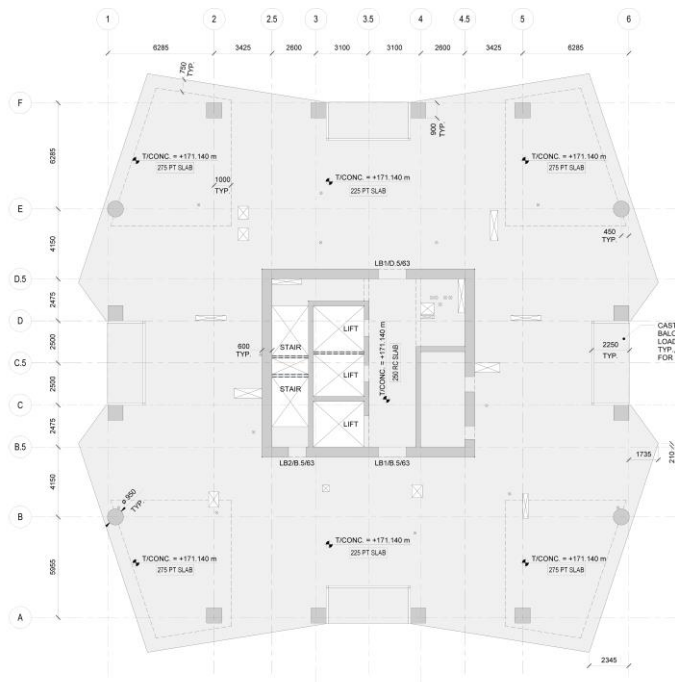
~1 WEEK PER PILE
APPROX. £250-300K PER PILE

structure at **twisting** floors

WALKING COLUMN CONCEPT

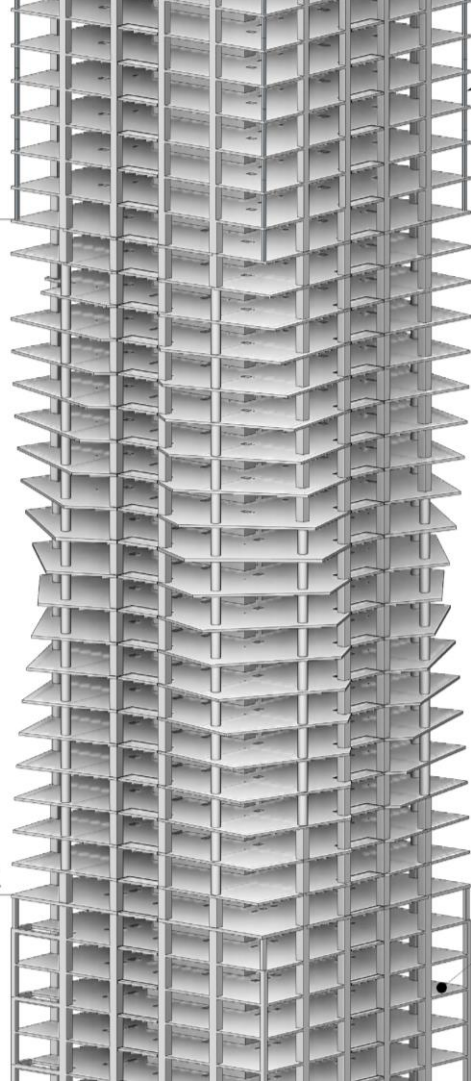


NEW TWIST / HANGING FLOORS



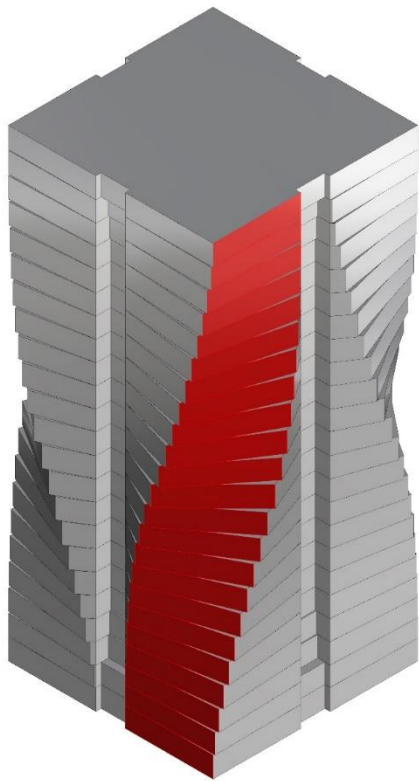
LEVEL 68 (L.58)
LAST TWIST FLOOR
+186.640 m

LEVEL 48 (L.38)
FIRST TWIST FLOOR
+124.750 m

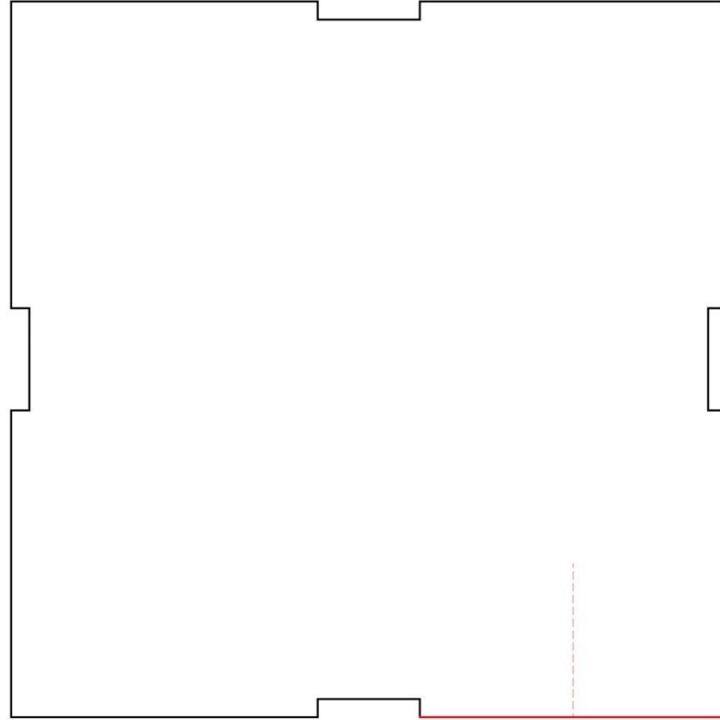
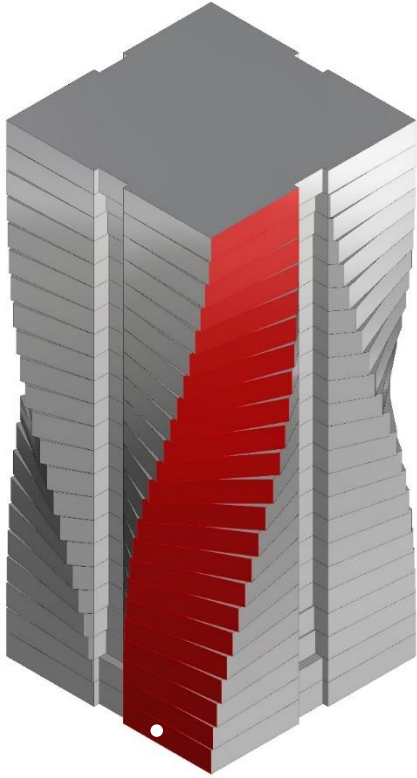




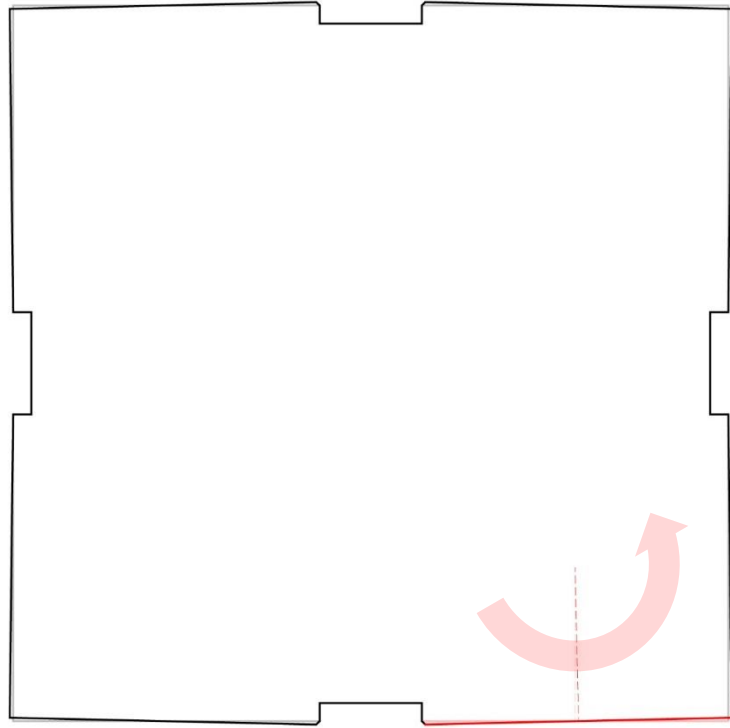
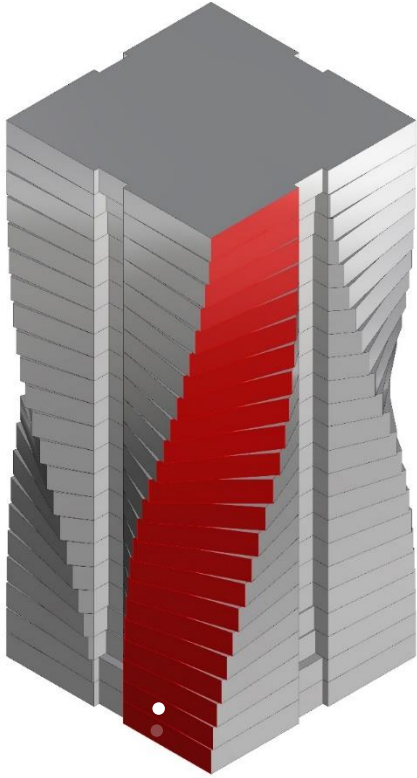
twisting concept



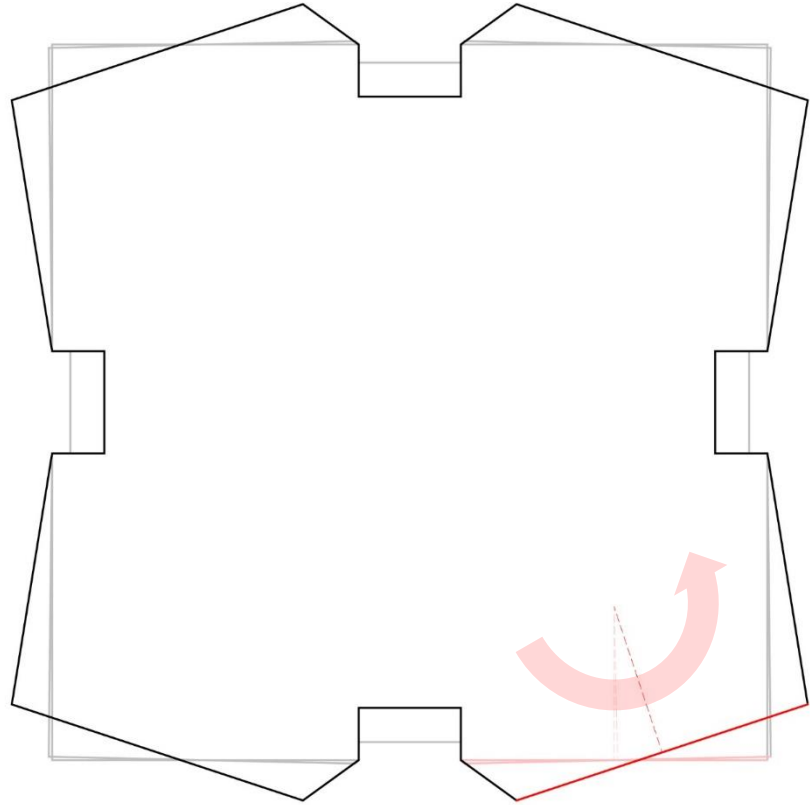
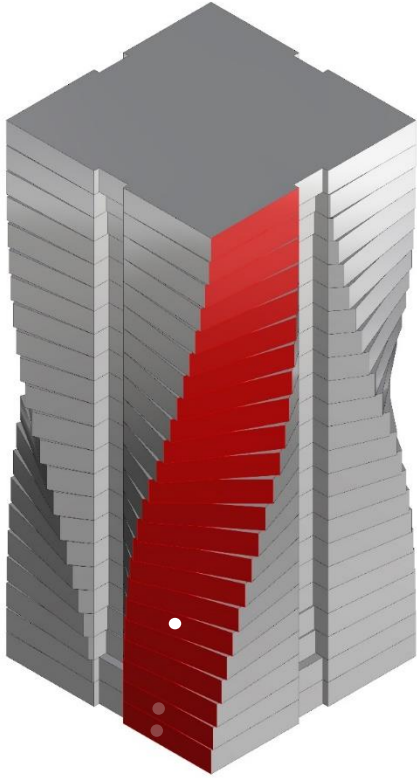
twisting concept



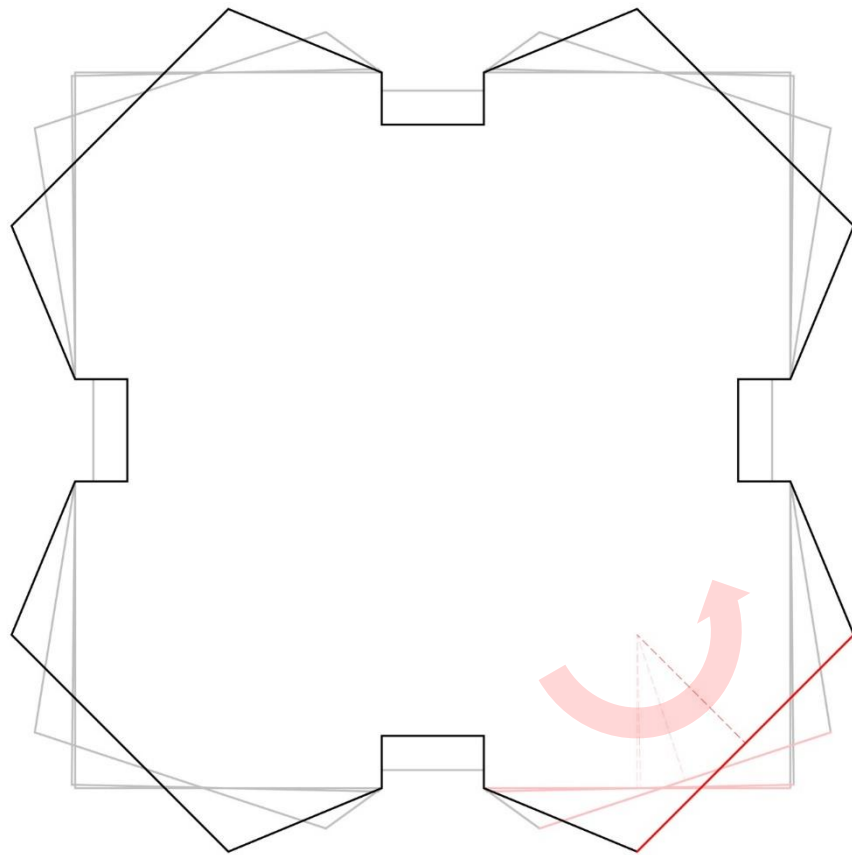
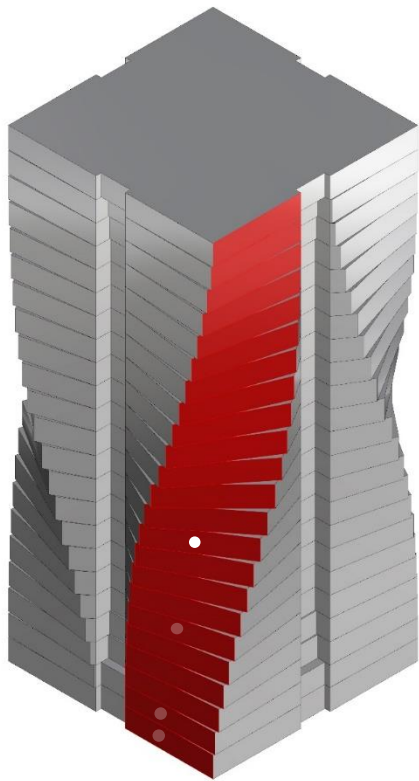
twisting concept



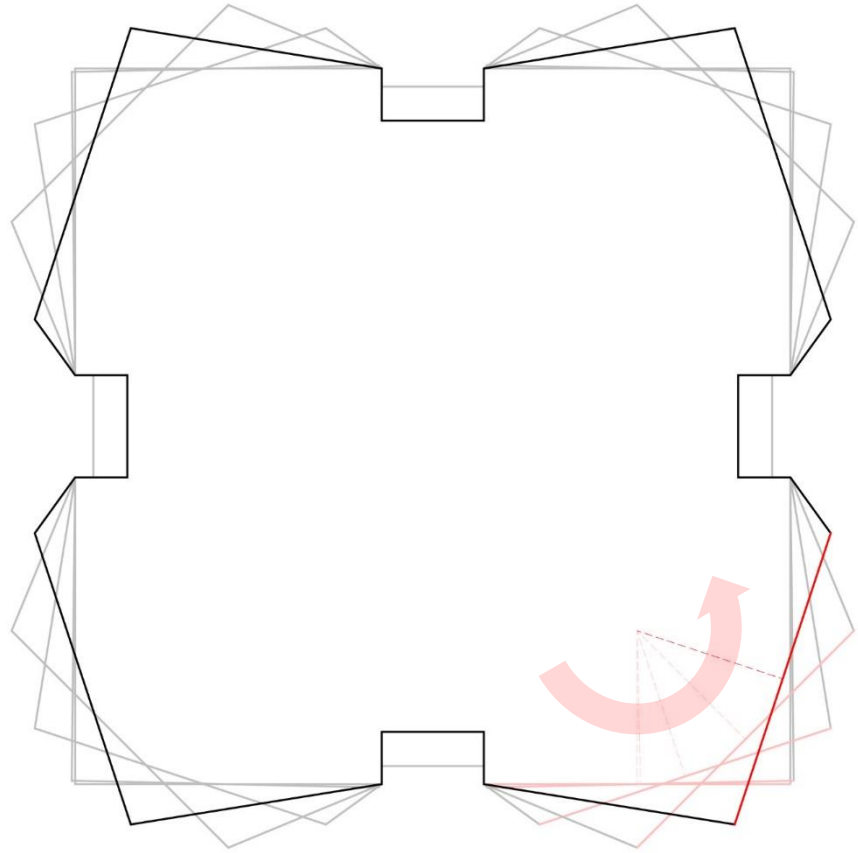
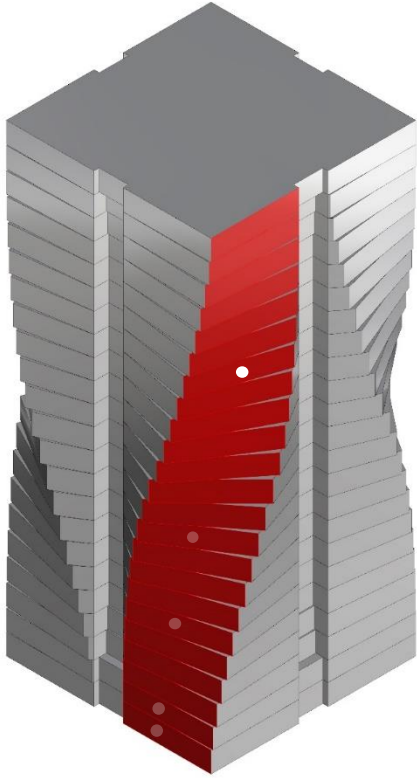
twisting concept



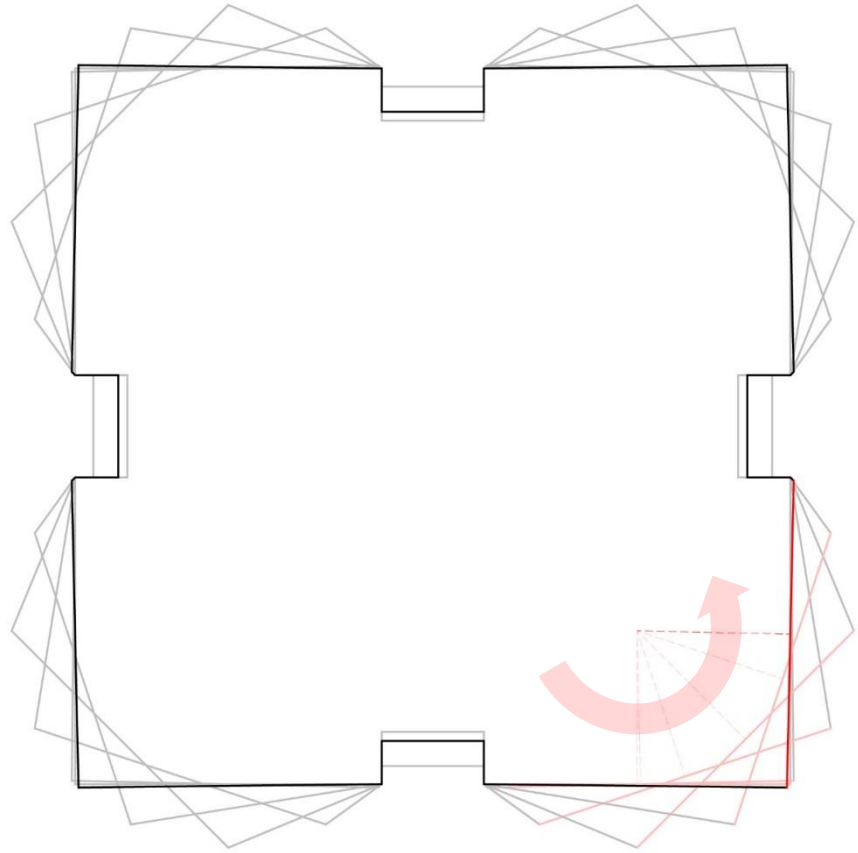
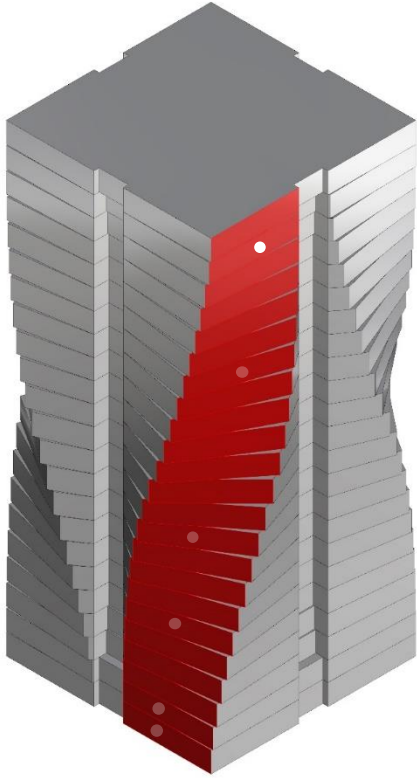
twisting concept



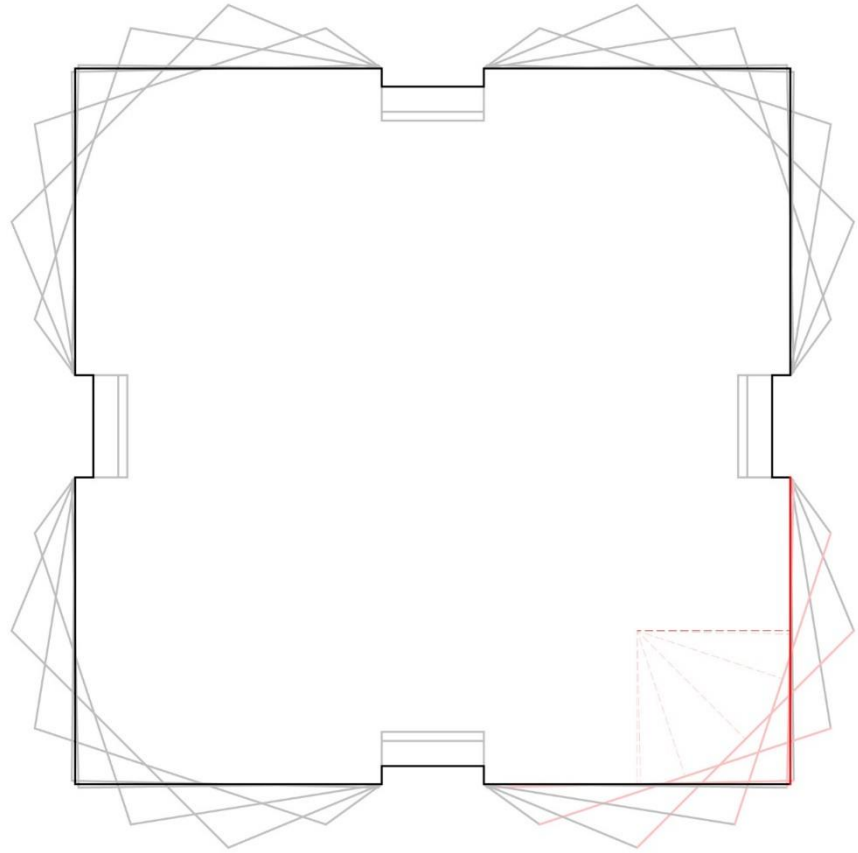
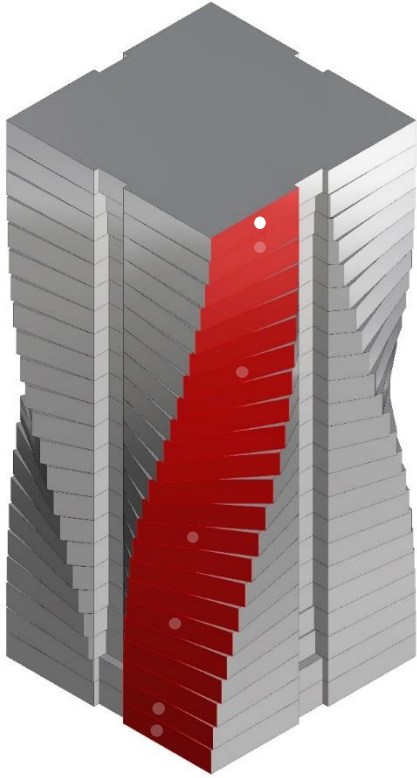
twisting concept



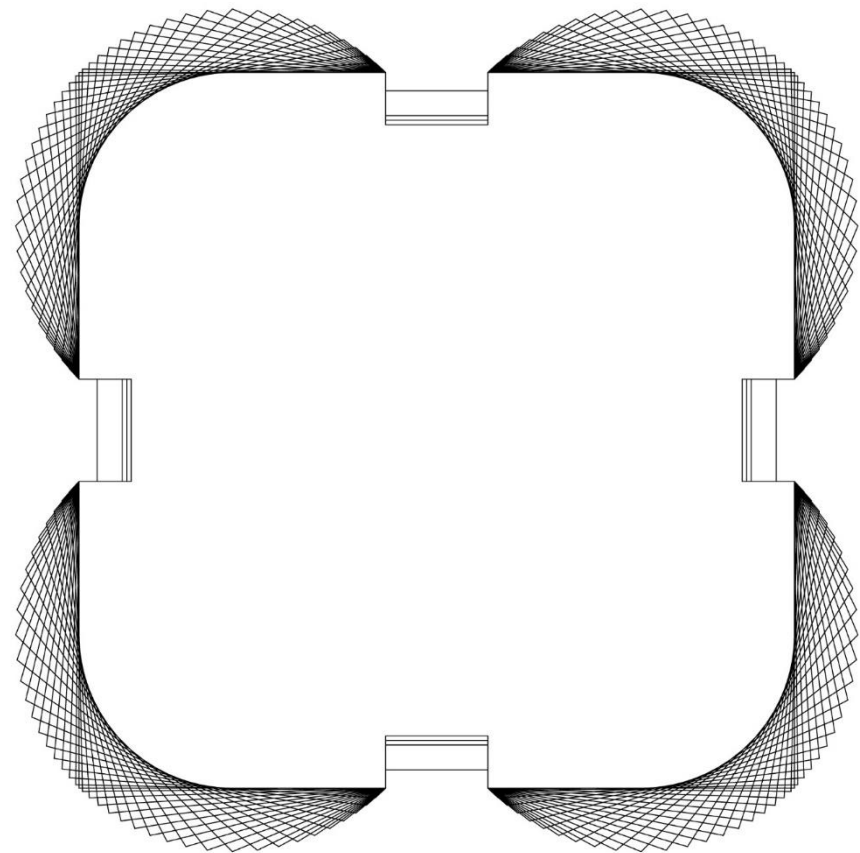
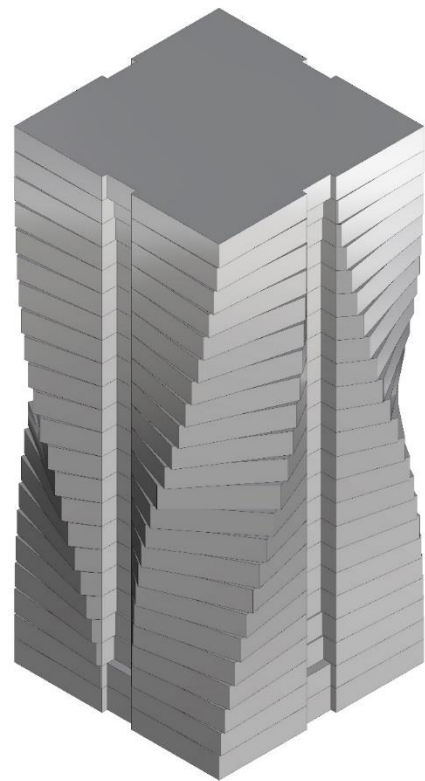
twisting concept



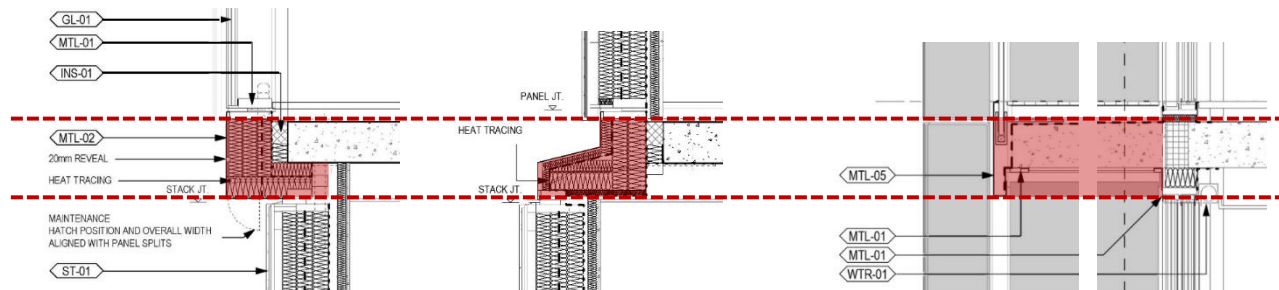
twisting concept



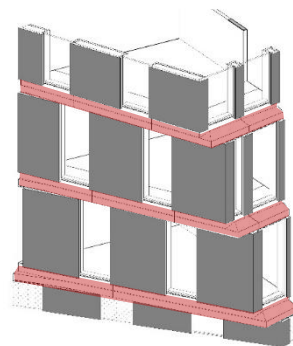
twisting concept



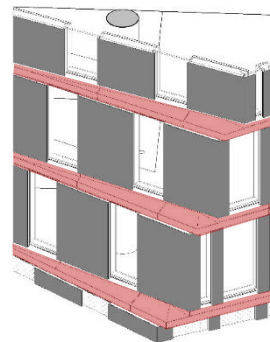
twisting **detailing**



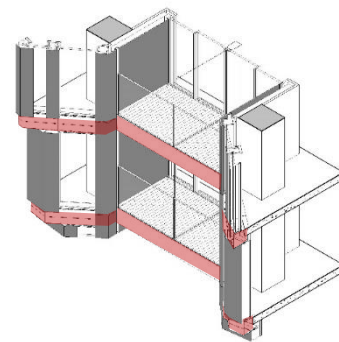
TWIST SOFFIT CONDITION



TWIST ROOF CONDITION



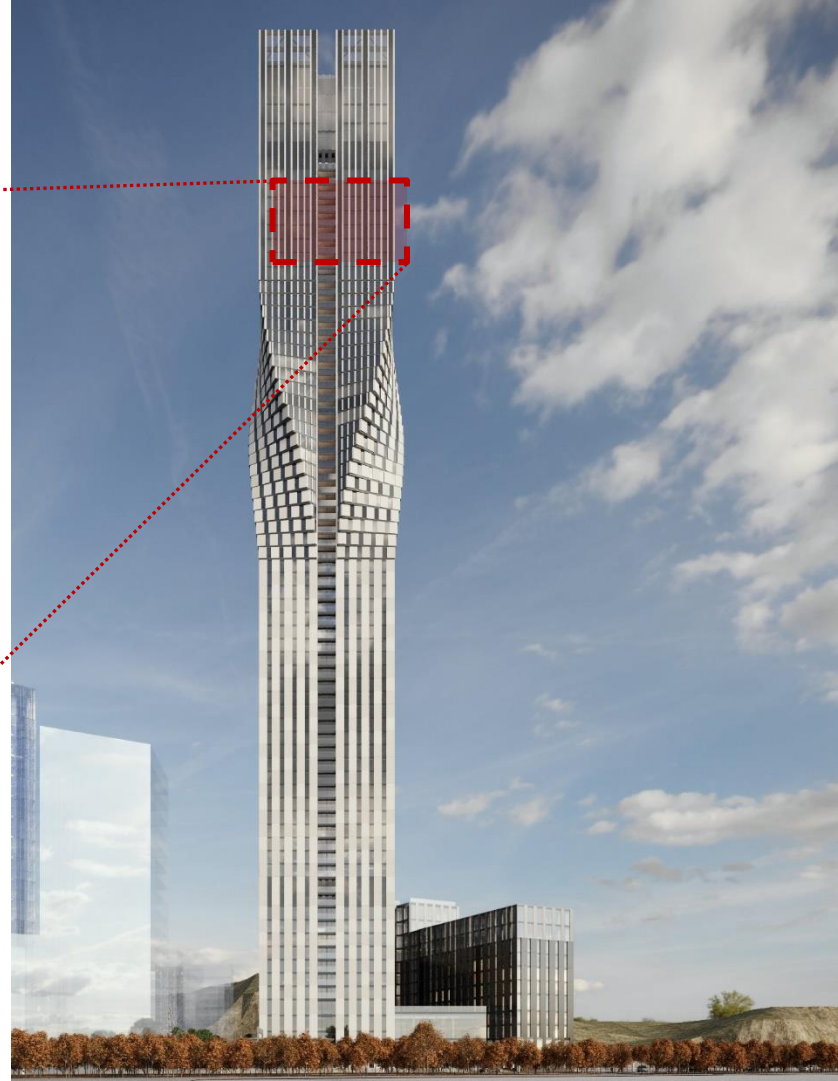
TWIST BALCONY CONDITION



materiality



TYPICAL FACADE



materiality



TYPICAL FACADE

Low-iron vision glass

GRC

External panel frames RAL7024

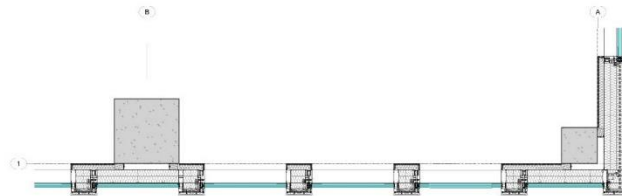
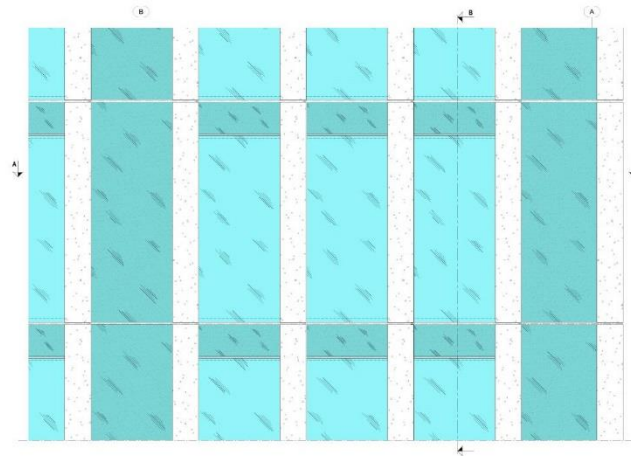
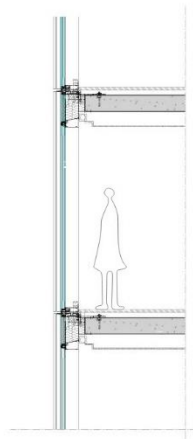
Low-iron balustrade glass

Fascia panel RAL7024

Back-painted glass RAL7024

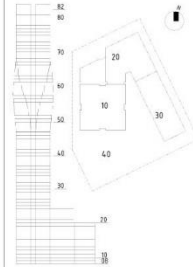
Internal panel frames RAL7021





PART ELEVATION 01000

KARLSTADEN



- Note:
- For joint size, refer to dwg YE16002-00-ZZ-QR-00950 and to M&T & Tolerances report YE16002-00-L&S-ZA-011
 - Dimensions are typical

FOR CONSTRUCTION

11	16/01/16	For construction
10	01/01/16	First Review under Phase 2
04	01/01/17	First submission Phase 2
03	11/01/17	Final submission for PCA
02	01/01/17	Approved according comments
13	01/01/17	Approved according comments
12	01/01/17	Approved according comments
01	01/01/17	01/01/17

SERNEKE SOM

KARLA TOWER, GÖTEBURG

yuanda
SUBMIT



Project Name: KARLA TOWER
Project Number: YE16002-01-ZZ-QR-01000
Project Location: GÖTEBURG, SWEDEN
Project Date: 01/01/17

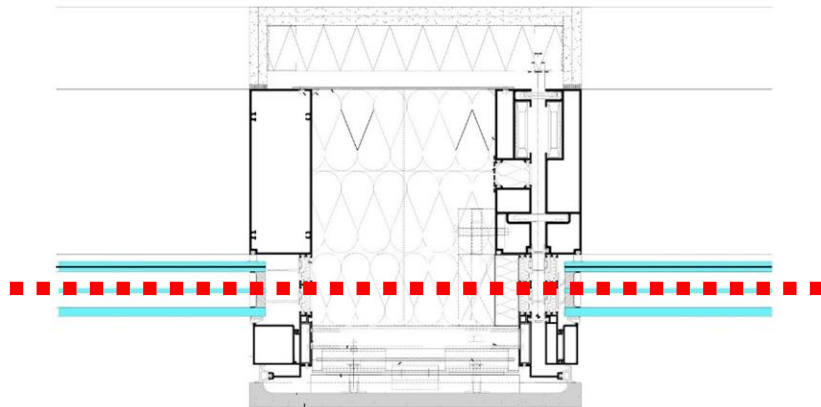
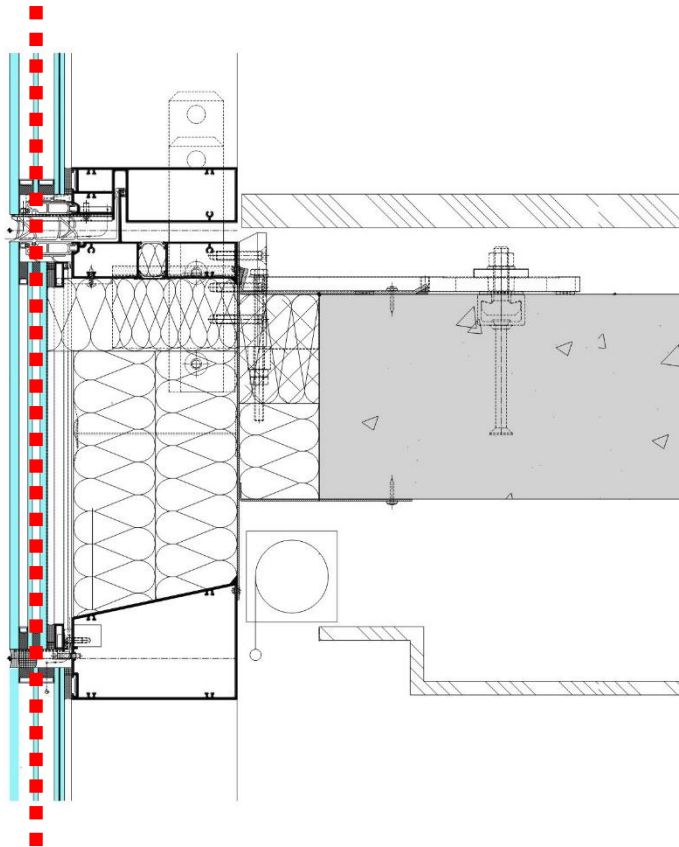
Project Manager: A. Arnborg 25/01/2017 1:15

Project Name: KARLA TOWER

Project Number: YE16002-01-ZZ-QR-01000

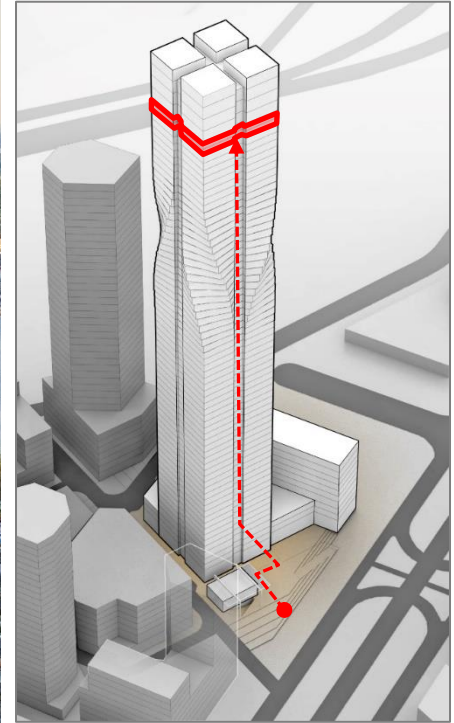
Project Location: GÖTEBURG, SWEDEN

Project Date: 01/01/17





observation deck 179





SOM



Thank you!