SUSTAINABLE TALL BUILDING DESIGN PRINCIPLE

AHISKA GHULAM MADIAN

20th FEBRUARY 2017

1. INTRODUCTION
2. 5 GENERATIONS OF TALL BUILDING
3. WHAT MAKES A TALL BUILDING SUSTAINABLE?
4. MASTER DEGREE WORKS
5. WORK EXPERIENCE IN DP ARCHITECTS SINGAPORE & KPF LONDON





INSTITUT TEKNOLOGI BANDUNG • 1920 •

IMA Gunadharma ITB arsitektur

The University of Nottingham

UNITED KINGDOM • CHINA • MALAYSIA

PPIN
PERHIMPUNAN PELAJAR INDONESIA NOTTINGHAM
INDONESIAN STUDENT ASSOCIATION OF NOTTINGHAM

2006 — 2010 — 2011 — 2012 — 2015 — 2016

OLSA DESIGN INTERNATIONAL
ARCHITECTURE | PLANNING | LANDSCAPE

DPA DP ARCHITECTS PTE LTD

KPF





AHISKA GHULAM MADIAN

ST. M.Arch. LEED GA

EDUCATION AND WORK EXPERIENCE

HOLLAND VILLAGE

JAKARTA, INDONESIA

WORK EXPERIENCE IN DP ARCHITECTS, SINGAPORE

ICC TOWER
HONG KONG

20 HUDSON YARDS
NEW YORK, USA

HERON TOWER
LONDON, UNITED KINGDOM

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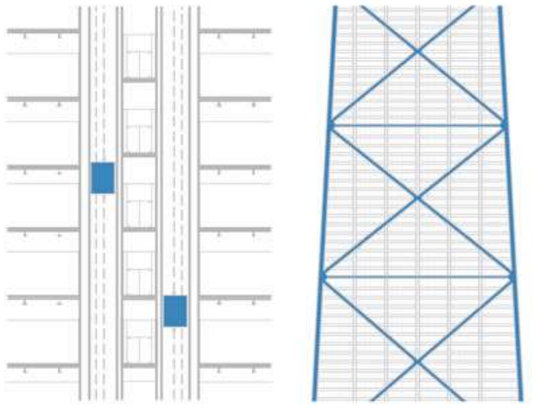
Council on Tall Buildings and Urban Habitat

HEIGHT RELATIVE TO CONTEXT

PROPORTION



TALL BUILDING
TECHNOLOGIES

TALL BUILDING
More than 14 storeys
More than 50% occupied usable floor

SUPER TALL BUILDING
More than 300m

MEGA TALL BUILDING
More than 600m

TALL BUILDING DEFINITION BY COUNCIL OF TALL BUILDING AND URBAN HABITAT(CTBUH)

Council on Tall Buildings and Urban Habitat

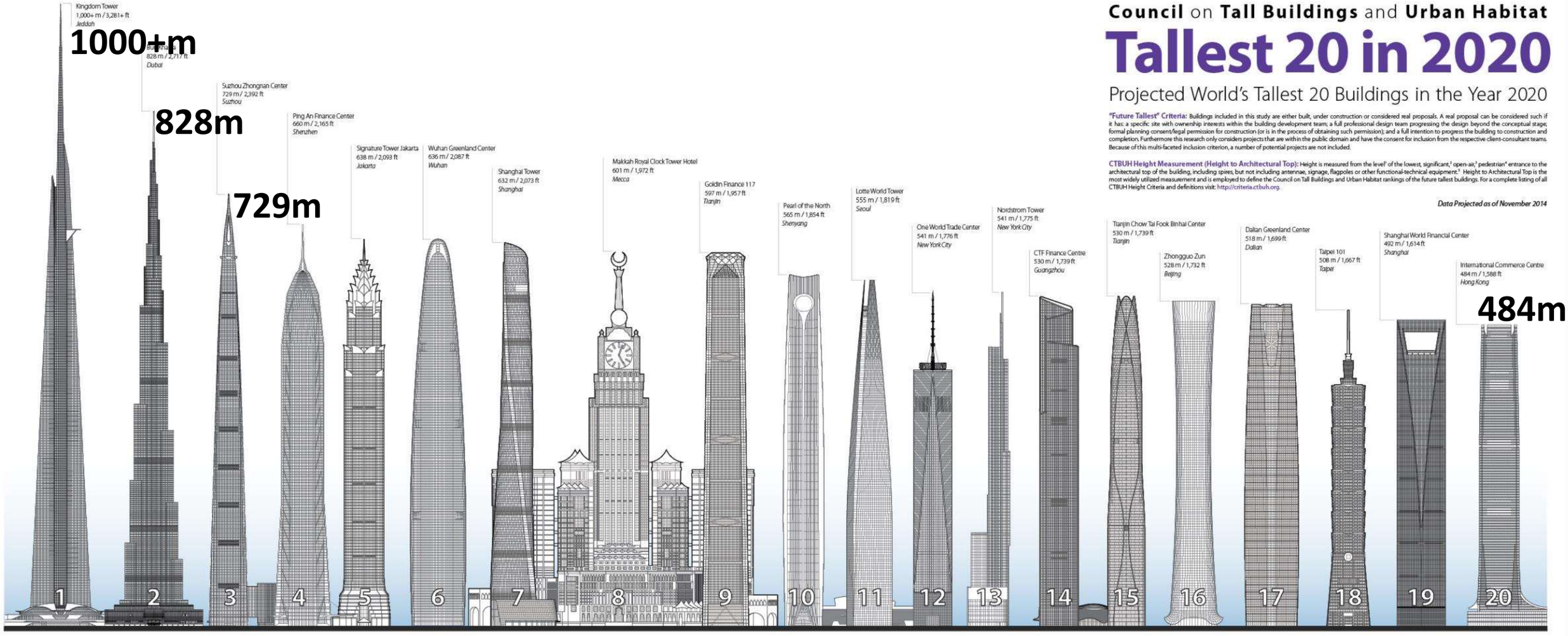
Tallest 20 in 2020

Projected World's Tallest 20 Buildings in the Year 2020

"Future Tallest" Criteria: Buildings included in this study are either built, under construction or considered real proposals. A real proposal can be considered such if it has: a specific site with ownership interests within the building development team; a full professional design team progressing the design beyond the conceptual stage; formal planning consent/legal permission for construction (or is in the process of obtaining such permission); and a full intention to progress the building to construction and completion. Furthermore this research only considers projects that are within the public domain and have the consent for inclusion from the respective client-consultant teams. Because of this multi-faceted inclusion criterion, a number of potential projects are not included.

CTBUH Height Measurement (Height to Architectural Top): Height is measured from the level[1] of the lowest, significant,[2] open-air,[3] pedestrian[4] entrance to the architectural top of the building, including spires, but not including antennae, signage, flagpoles or other functional-technical equipment.[5] Height to Architectural Top is the most widely utilized measurement and is employed to define the Council on Tall Buildings and Urban Habitat rankings of the future tallest buildings. For a complete listing of all CTBUH Height Criteria and definitions visit: http://criteria.ctbuh.org.

Data Projected as of November 2014



1 Kingdom Tower
Jeddah, Saudi Arabia
Height: 1,000+ m/3,281 + ft
Current Status: Under Construction
Completion Date: 2019
Building Use: Serviced Apartments/ Residential/Hotel/Office
Structural Material: Concrete
Total Floors: 167
Owner/Developers: Jeddah Economic Company; Kingdom Holding Company
Architects: Adrian Smith + Gordon Gill Architecture (design); Dar Al-Handasah Shair & Partners (architect of record)
Structural Engineer: Thornton Tomasetti
MEP Engineer: Environmental Systems Design
Project Managers: EC Harris; Mace
Main Contractor: Saudi Bin Ladin Group

2 Burj Khalifa
Dubai, UAE
Height: 828 m/2,717 ft
Current Status: Completed
Completion Date: 2010
Building Use: Office/Residential/Hotel
Structural Material: Steel/Concrete
Total Floors: 163
Owner/Developer: Emaar
Architect: Skidmore, Owings & Merrill LLP (design); Hyder Consulting (architect of record)
Structural Engineer: Skidmore, Owings & Merrill LLP
MEP Engineer: Skidmore, Owings & Merrill LLP
Project Manager: Turner Construction
Main Contractors: Samsung C&T Corporation; Arabtec; Besix Group

3 Suzhou Zhongnan Center
Suzhou, China
Height: 729 m/2,392 ft
Current Status: Under Construction
Completion Date: 2020
Building Use: Hotel/Residential/Office
Total Floors: 137
Developer: Zhongnan Group
Architects: Gensler (design); ECADI (architect of record)
Structural Engineers: Thornton Tomasetti (design); ECADI (engineer of record)
MEP Engineer: Skidmore, Owings & Merrill LLP
Main Contractors: China Construction Third Engineering Bureau Corp., Ltd; Jiangsu Zhongnan Construction Group Co., Ltd

4 Ping An Finance Center
Shenzhen, China
Height: 660 m/2,165 ft
Current Status: Under Construction
Completion Date: 2016
Building Use: Office
Structural Material: Composite
Total Floors: 115
Owner/Developer: Ping An Life insurance Company of China
Architects: Kohn Pedersen Fox Associates (design); China Construction Design International (architect of record)
Structural Engineer: Thornton Tomasetti
MEP Engineer: J. Roger Preston Group
Main Contractor: China Construction First Building Group Corp., Ltd

5 Signature Tower Jakarta
Jakarta, Indonesia
Height: 638 m/2,093 ft
Current Status: Proposed
Completion Date: 2020
Building Use: Hotel/Office
Structural Material: Composite
Total Floors: 113
Owner/Developer: PT Grahamas Adisentosa
Architects: Smallwood, Reynolds, Stewart, Stewart (design); PDW Architects (architect of record)
Structural Engineers: Thornton Tomasetti; PT Gistama Intisemesta
MEP Engineers: Beca Group; PT Hantaran Prima Mandiri

6 Wuhan Greenland Center
Wuhan, China
Height: 636 m/2,087 ft
Current Status: Under Construction
Completion Date: 2017
Building Use: Hotel/Residential/Office
Structural Material: Composite
Total Floors: 125
Owner: Wuhan Greenland Bin Jiang Property Co. Ltd
Developer: Greenland Group
Architects: Adrian Smith + Gordon Gill Architecture (design); ECADI (architect of record)
Structural Engineer: Thornton Tomasetti
MEP Engineers: Parsons Brinckerhoff Consultants Pte Ltd; PositivEnergy Practice

7 Shanghai Tower
Shanghai, China
Height: 632 m/2,073 ft
Current Status: Topped Out
Completion Date: 2015
Building Use: Hotel/Office
Structural Material: Composite
Total Floors: 128
Owner/Developer: Shanghai Tower Construction & Development
Architects: Gensler (design); Architectural Design & Research Institute of Tongji University (architect of record); ECADI (architect of record)
Structural Engineer: Thornton Tomasetti
MEP Engineers: Cosentini
Project Manager: Shanghai Jianke Project Management
Main Contractor: Shanghai Construction Group

8 Makkah Royal Clock Tower Hotel
Mecca, Saudi Arabia
Height: 601 m/1,972 ft
Current Status: Completed
Completion Date: 2012
Building Use: Other/Hotel
Structural Material: Steel/Concrete
Total Floors: 120
Owner/Developer: Saudi Bin Laden Group
Architect: Dar al-Handasah Shair & Partners
Structural Engineer: Dar al-Handasah Shair & Partners
MEP Engineer: Dar al-Handasah Shair & Partners
Main Contractor: Saudi Bin Laden Group

9 Goldin Finance 117
Tianjin, China
Height: 597 m/1,957 ft
Current Status: Under Construction
Completion Date: 2016
Building Use: Hotel/Office
Structural Material: Composite
Total Floors: 128
Owner/Developer: Goldin Properties Holdings Ltd
Architects: P & T Group (design); ECADI (architect of record)
Structural Engineer: Arup
MEP Engineer: Parsons Brinckerhoff Consultants Pte Ltd
Main Contractor: Third Bureau of CSCEC

10 Pearl of the North
Shenyang, China
Height: 565 m/1,854 ft
Current Status: Under Construction
Completion Date: 2018
Building Use: Office
Structural Material: Unknown
Total Floors: 111
Developer: Baoneng Real Estate Development
Architect: Atkins

11 Lotte World Tower
Seoul, South Korea
Height: 555 m/1,819 ft
Current Status: Under Construction
Completion Date: 2016
Building Use: Hotel/Office
Structural Material: Composite
Total Floors: 123
Owner/Developer: The Lotte Group
Architects: Kohn Pedersen Fox Associates (design); Baum Architects, Engineers & Consultants (architect of record)
Structural Engineer: Leslie E. Robertson Associates
MEP Engineer: SYSKA Hennessy Group
Main Contractor: Lotte Construction Management

12 One World Trade Center
New York City, USA
Height: 541 m/1,776 ft
Current Status: Complete
Completion Date: 2014
Building Use: Office
Structural Material: Composite
Total Floors: 94
Owner: 1 World Trade Center LLC
Developer: Durst Organization; Port Authority of New York and New Jersey
Architect: Skidmore, Owings & Merrill
Structural Engineers: WSP Cantor Seinuk; Schlaich Bergermann und Partner
MEP Engineers: Jaros Baum & Bolles
Project Manager: STV
Main Contractors: Tishman Construction

13 Nordstrom Tower
New York City, USA
Height: 541 m/1,775 ft
Current Status: Under Construction
Completion Date: 2018
Building Use: Residential/Hotel/Retail
Structural Material: Concrete
Total Floors: 92
Developer: Extell Development Corporation
Architect: Adrian Smith + Gordon Gill Architecture
Structural Engineer: WSP Cantor Seinuk
Main Contractor: Bovis Land Lease

14 CTF Finance Centre
Guangzhou, China
Height: 530 m/1,739 ft
Current Status: Topped Out
Completion Date: 2016
Building Use: Hotel/Residential/Office
Structural Material: Composite
Total Floors: 111
Owner: Chow Tai Fook Enterprises
Developer: New World Development Company Limited
Architects: Kohn Pedersen Fox Associates (Design); Dennis Lau & Ng Chun Man Architects & Eng. (Architect of Record)
Structural Engineers: Arup (Design)
MEP Engineer: Parsons Brinckerhoff Consultants Pte Ltd

15 Tianjin Chow Tai Fook Binhai Center
Tianjin, China
Height: 530 m/1,739 ft
Current Status: Under Construction
Completion Date: 2018
Building Use: Residential/Hotel/Office
Structural Material: Composite
Total Floors: 97
Owner/Developer: New World China Land
Architects: Skidmore, Owings & Merrill (design); ECADI (architect of record)
Structural Engineers: Skidmore, Owings & Merrill (design);
MEP Engineer: Parson Brinckerhoff Consultants Pte Ltd

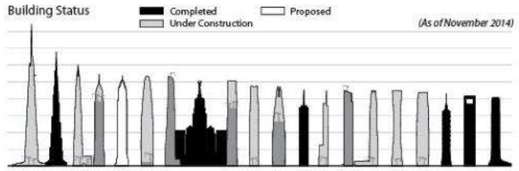
16 Zhongguo Zun
Beijing, China
Height: 528 m/1,732 ft
Current Status: Under Construction
Completion Date: 2018
Building Use: Office
Structural Material: Composite
Total Floors: 108
Owner/Developer: CITIC HEYE Investment CO., Ltd
Architects: TFP Farrells (concept); Kohn Pedersen Fox Associates (concept & design); Beijing Institute of Architectural Design (BIAD) (concept & architect of record); CITIC General Institute of Architectural Design & Research Co., Ltd (architect of record)
Structural Engineers: Arup; BIAD
MEP Engineers: Parson Brinckerhoff Consultants Pte Ltd; BIAD

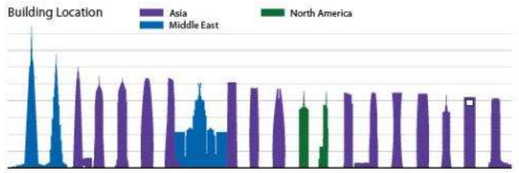
17 Dalian Greenland Center
Dalian, China
Height: 518 m/1,699 ft
Current Status: Under Construction
Completion Date: 2018
Building Use: Hotel/Residential/Office
Structural Material: Composite
Total Floors: 88
Owner/Developer: Greenland Group
Architects: HOK (design); ECADI (architect of record)
Structural Engineer: ECADI
MEP Engineer: ECADI
Project Manager: Greenland Group
Main Contractor: Shanghai Construction Group

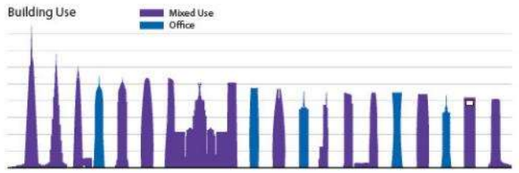
18 Taipei 101
Taipei, Taiwan, China
Height: 508 m/1,667 ft
Current Status: Completed
Completion Date: 2004
Building Use: Office
Structural Material: Composite
Total Floors: 101
Owner/Developer: Taipei Financial Center Corporation
Architect: C.Y. Lee & Partners Architects/Planners
Structural Engineers: Thornton Tomasetti; Evergreen Engineering
MEP Engineers: Continental Engineering Consultants, Inc.
Project Manager: Turner Construction
Main Contractors: Kumagai Gumi; RSEA Engineering; Ta-Hsiu-Wei Construction; Taiwan Kumagai; Samsung C&T Corporation

19 Shanghai World Financial Center
Shanghai, China
Height: 492 m/1,614 ft
Current Status: Completed
Completion Date: 2008
Building Use: Hotel/Office
Structural Material: Composite
Total Floors: 101
Owner: Shanghai World Financial Center Co. Ltd.
Developer: Mori Building
Architects: Kohn Pedersen Fox Associates; Mr. Miyake Architects and Engineers
Structural Engineer: Leslie E Robertson Associates
MEP Engineer: Kenchiku Setubi Sekkei Kenkyusho
Main Contractors: China State Construction; Shanghai Construction

20 International Commerce Centre
Hong Kong, China
Height: 484 m/1,588 ft
Current Status: Completed
Completion Date: 2010
Building Use: Hotel/Office
Structural Material: Composite
Total Floors: 108
Owner/Developer: Sun Hung Kai Properties
Architect: Kohn Pedersen Fox Associates (design); Wong & Ouyang (architect of record)
Structural Engineer: Arup
MEP Engineer: J. Roger Preston Group; Parsons Brinckerhoff Consultants Private Limited
Project Manager: Harbour Vantage
Main Contractor: Sanfield Building Contractors Limited







Council on Tall Buildings and Urban Habitat is the world's leading resource for professionals focused on the inception, design, construction, and operation of tall buildings and future cities. A not-for-profit organization based at the Illinois Institute of Technology, Chicago, with an Asian office at Tongji University, Shanghai, the group facilitates the exchange of the latest knowledge available on tall buildings around the world.

Its free database on tall buildings, The Skyscraper Center, is updated daily with detailed information, images, data, and news. The CTBUH also developed the international standards for measuring tall building height and is recognized as the arbiter for bestowing such designations as "The World's Tallest Building."

www.ctbuh.org www.skyscrapercenter.com

Footnotes:

[1] **Level:** finished floor level at threshold of the lowest entrance door.

[2] **Significant:** the entrance should be predominantly above existing or pre-existing grade and permit access to one or more primary uses in the building via elevators, as opposed to ground-floor retail or other uses which solely relate/connect to the immediately adjacent external environment. Thus entrances via below-grade sunken plazas or similar are not generally recognized. Also note that access to car park and/or ancillary/support areas are not considered significant entrances.

[3] **Open-air:** the entrance must be located directly off of an external space at that level that is open to air.

[4] **Pedestrian:** refers to common building users or occupants and is intended to exclude service, ancillary, or similar areas.

[5] **Functional-technical equipment:** this is intended to recognize that functional-technical equipment is subject to removal/addition/change as per prevalent technologies, as is often seen in tall buildings (e.g., antennae, signage, wind turbines, etc. are periodically added, shortened, lengthened, removed and/or replaced).

HOW HIGH

1st GENERATION
THE BIRTH
the Birth of Tall Buildings in 1885 to the 1916 Zoning Law

2nd GENERATION
ZONING LAW
1916 Zoning Law to the 1951 Glazed Curtain Wall Development

3rd GENERATION
CURTAIN WALL
1951 Glazed Curtain Wall Development to 1973 Energy Crisis

4th GENERATION
ENERGY CRISIS
1973 Energy Crisis to Present Day

5th GENERATION
GENERATE ENERGY
The Rise of Environmental Consciousness in 1997 to Present Day

5 GENERATION OF TALL BUILDING BY PHILLIP OLDFIELD & DARIO TRABUCCO

90 WEST STREET, NEW YORK, 1907

MUNICIPAL BUILDING, NEW YORK, 1914

EQUITABLE BUILDING, NEW YORK, 1915

1st GENERATION

1. COMPACT SHAPE
2. HIGH QUANTITIES OF THERMAL MASS IN FAÇADE
3. LOW PERCENTAGE OF FAÇADE TRANSPARENCY
4. NATURALLY VENTILATED
5. LOW ARTIFICIAL LIGHTING LEVEL
6. MAIN CONSUMER OF ENERGY: HEATING AND ELEVATORS

5 GENERATION OF TALL BUILDING BY PHILLIP OLDFIELD & DARIO TRABUCCO

CHRYSLER BUILDING, NEW YORK, 1930

500 5th AVENUE, NEW YORK, 1931

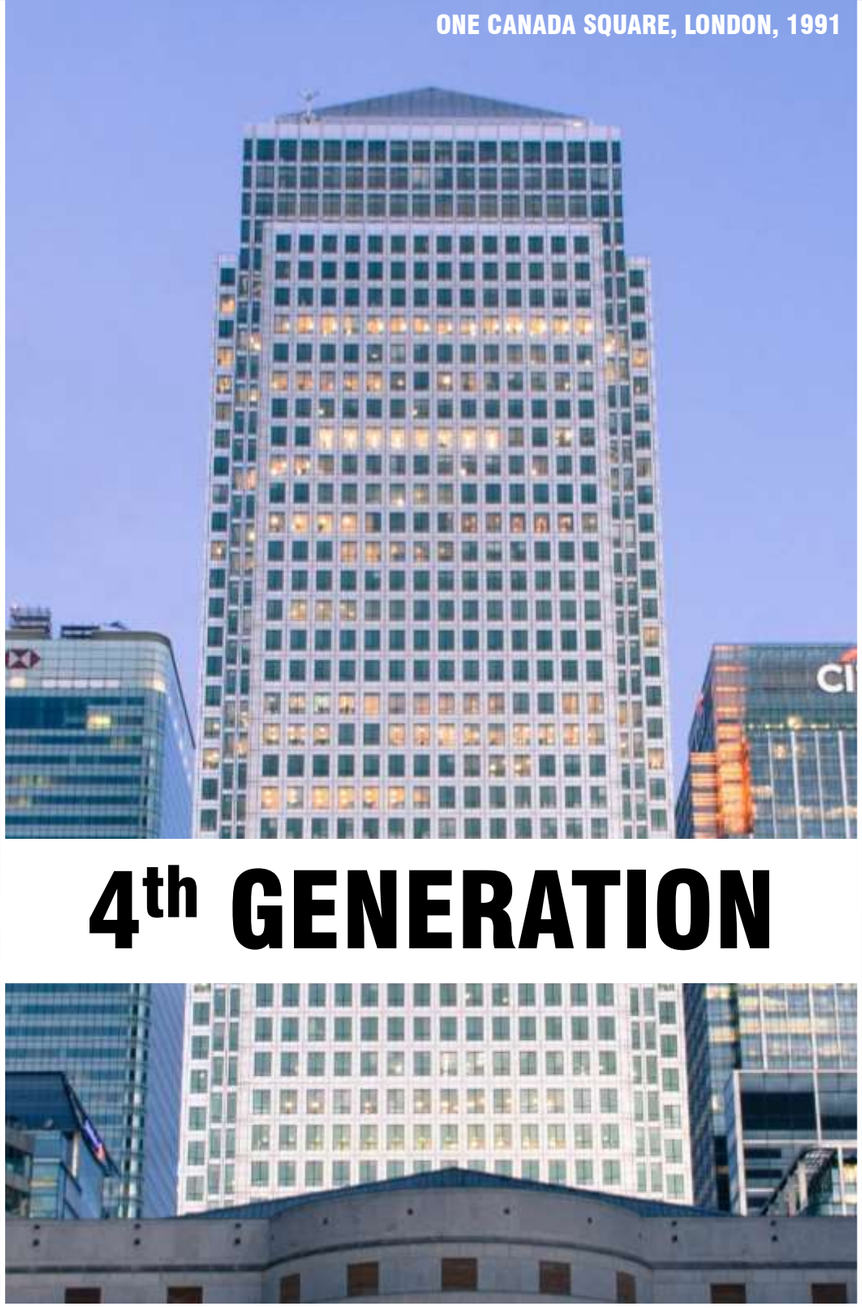
570 LEXINGTON AVENUE, NEW YORK, 1931

2nd GENERATION

1. SLENDER SHAPE
2. HIGH QUANTITIES OF THERMAL MASS IN FAÇADE
3. LOW PERCENTAGE OF FAÇADE TRANSPARENCY
4. AIR CONDITIONING BECOME COMMON
5. INCREASED LIGHTING REQUIREMENT

3rd GENERATION

1. COMPACT SHAPE
2. LOW PERFORMANCE SINGLE GLAZED CURTAIN WALL FAÇADE SYSTEM
3. HIGH QUANTITIES OF TINTED FAÇADE TRANSPARENCY
4. RELIANT ON FLUORESCENT LIGHTING
5. SEALED AND TOTALLY RELIANT ON MECHANICAL CONDITIONING
6. IMAGE OF “BLACK SKYSCRAPERS”



4th GENERATION

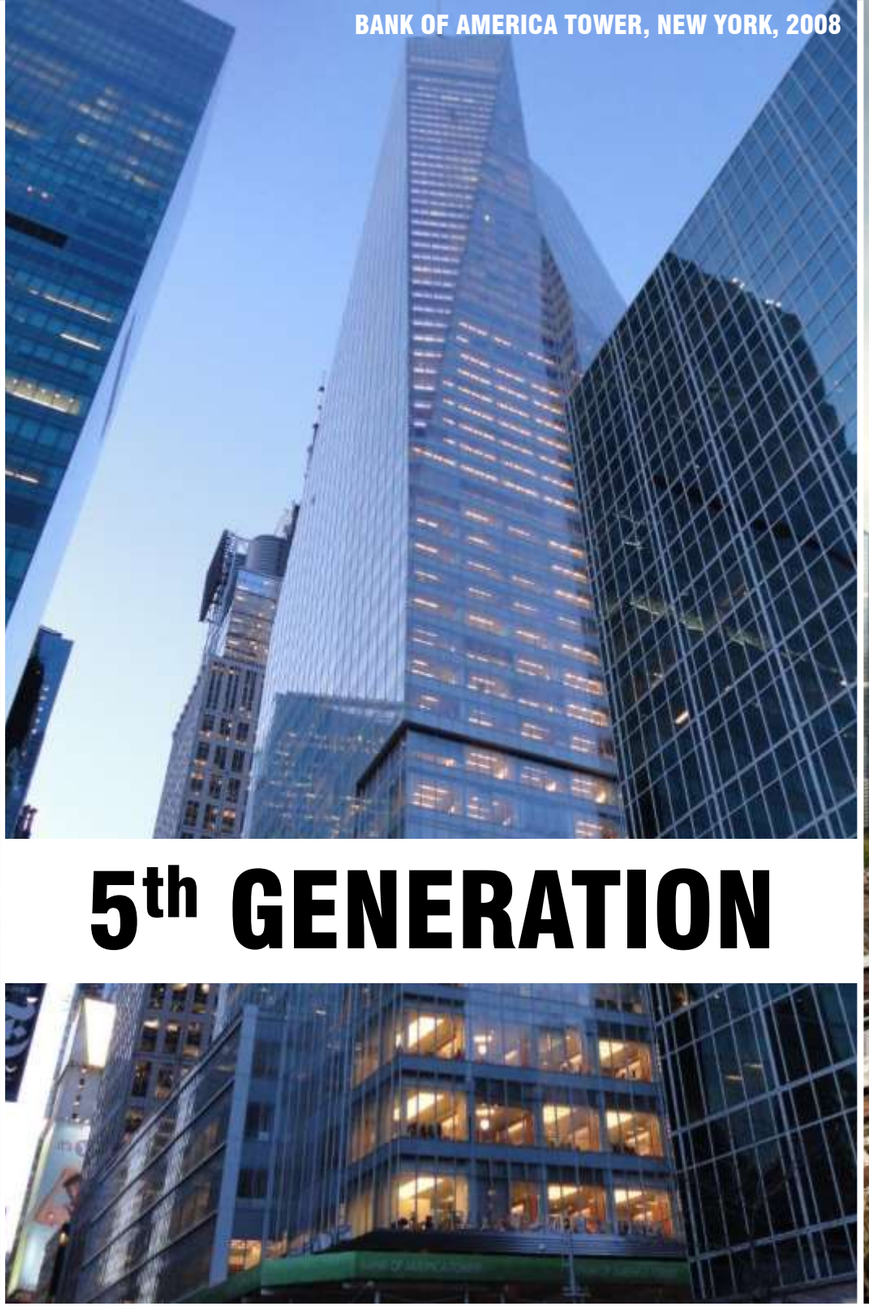
PROs

1. COMPACT SHAPE
2. GOOD PERFORMANCE DOUBLE GLAZED CURTAIN WALL FAÇADE SYSTEM
3. HIGH UANTITIES OF FAÇADE TRANSPARENCY WITH GOOD SOLAR TRANSMITTANCE
4. REDUCED RELIANCE ON ARTIFICIAL LIGHTING

CONs

1. SEALED AND TOTALLY RELIANT ON MECHANICAL CONDITIONING


COMMERZBANK TOWER, FRANKFURT, 1997


BANK OF AMERICA TOWER, NEW YORK, 2008


MAHANAKHON, BANGKOK, 2016

5th GENERATION

1. SLENDER SHAPE
2. NATURAL AIR AND LIGHT BY USING ATRIA
3. HIGH PERFORMANCE FAÇADE (DOUBLE SKIN, TRIPLE GLAZED CURTAIN WALL, ETC)
4. HIGH QUANTITIES OF FAÇADE TRANSPARENCY WITH GOOD SOLAR TRANSMITTANCE
5. MAXIMUM NATURAL LIGHT PENETRATION
6. NATURAL AND MIXED –MODE VENTILATION OPPORTUNITY
7. ON SITE ENERGY GENERATION

5 GENERATION OF TALL BUILDING BY PHILLIP OLDFIELD & DARIO TRABUCCO

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SOCIAL

WHAT MAKES A TALL BUILDING SUSTAINABLE?

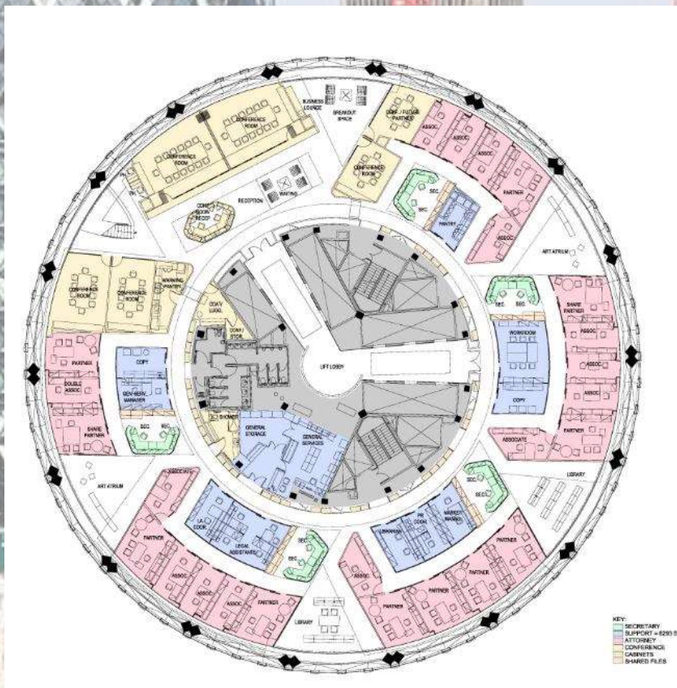
WALKIE TALKIE TOWER

20 FENCURCH, LONDON

THE GHERKIN

30 ST MARY AXE, LONDON

ECONOMIC

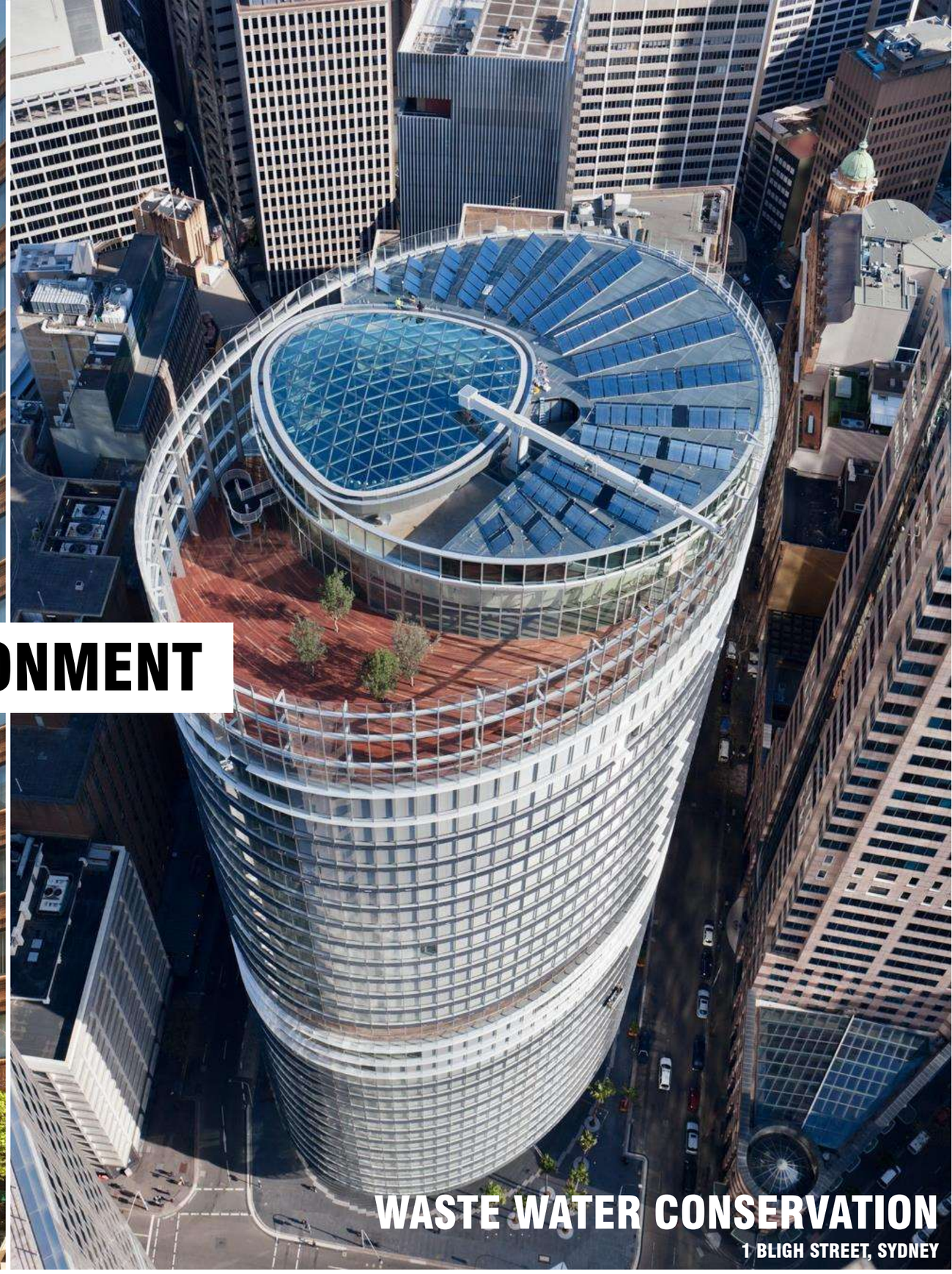


WHAT MAKES A TALL BUILDING SUSTAINABLE?

RAIN WATER COLLECTION

EDITH GREEN WENDELL WYATT, OREGON

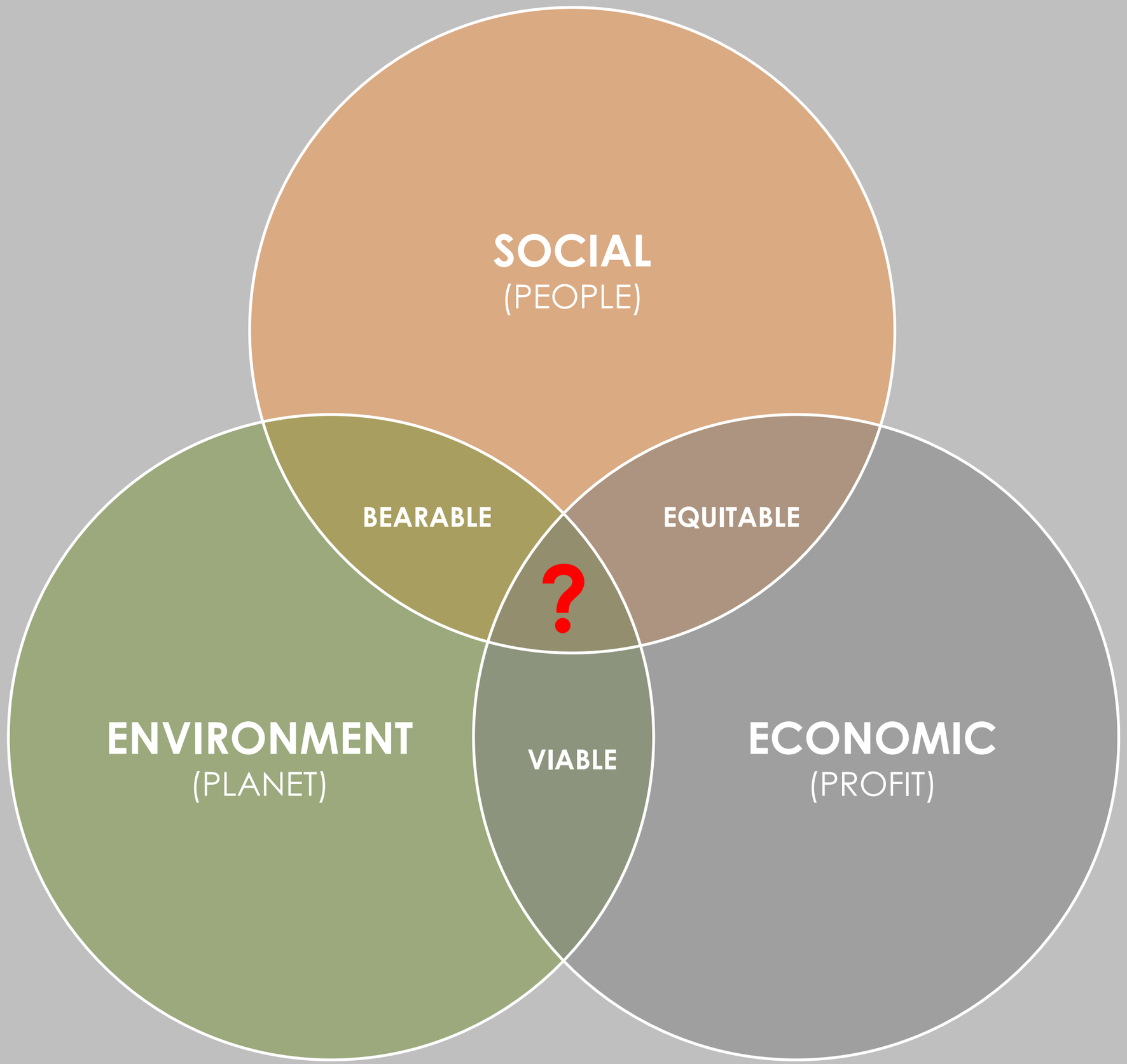
ENVIRONMENT



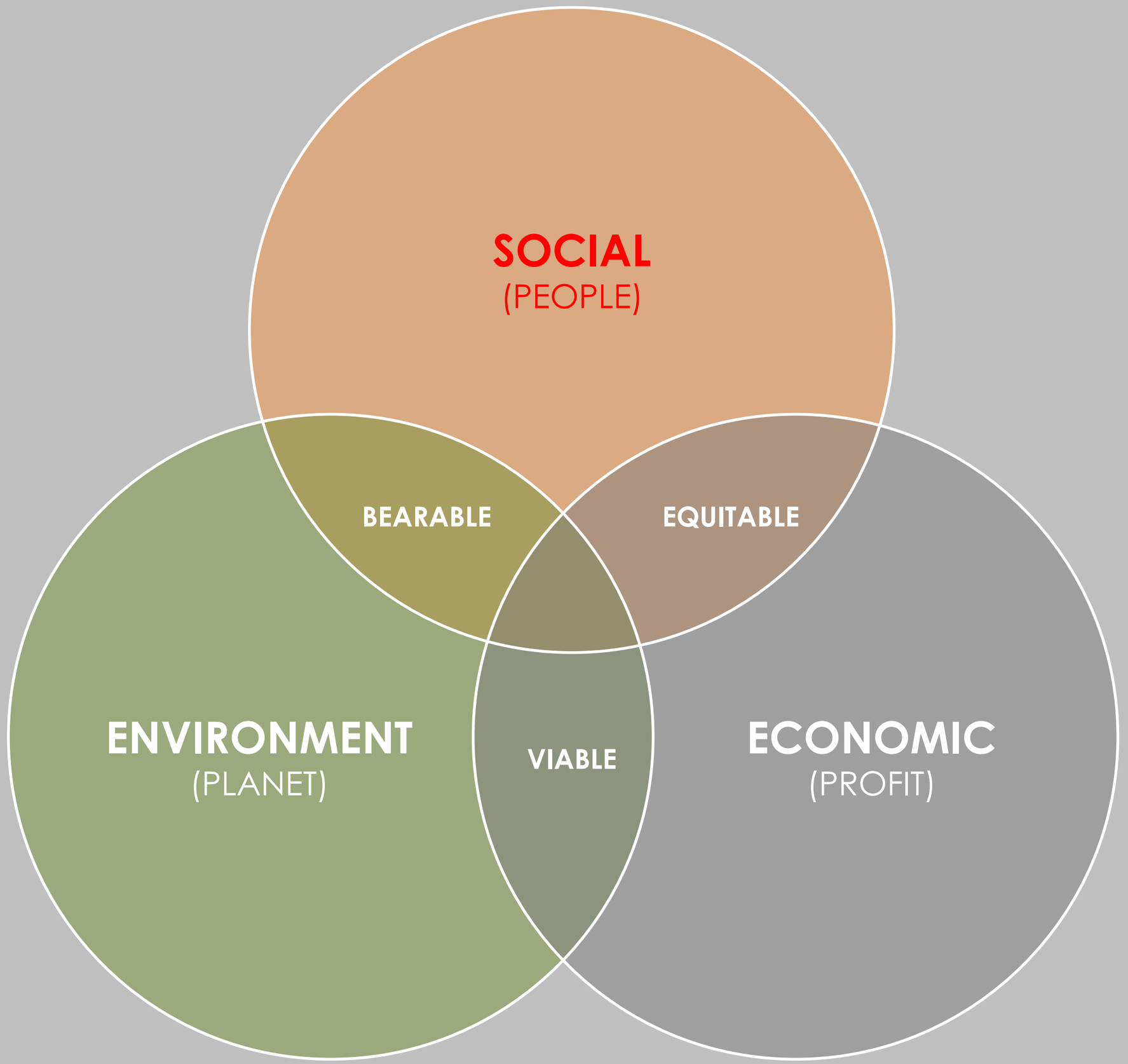
WASTE WATER CONSERVATION

1 BLIGH STREET, SYDNEY

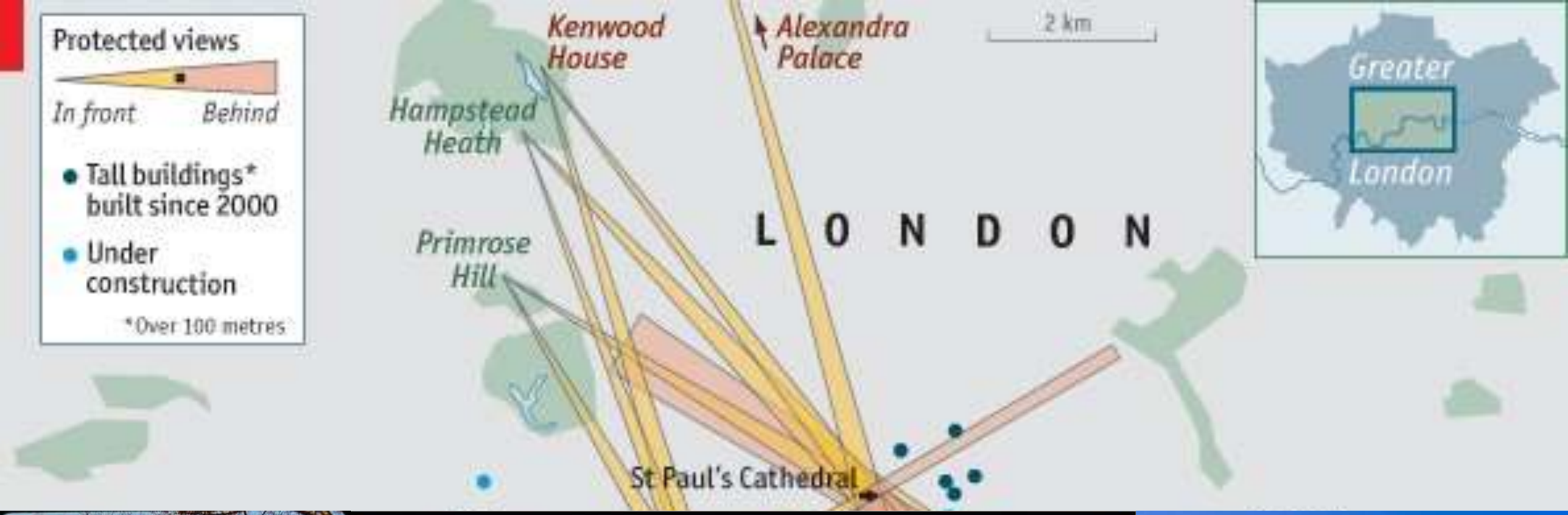
WHAT MAKES A TALL BUILDING SUSTAINABLE?



3 PILLARS OF SUSTAINABILITY



3 PILLARS OF SUSTAINABILITY



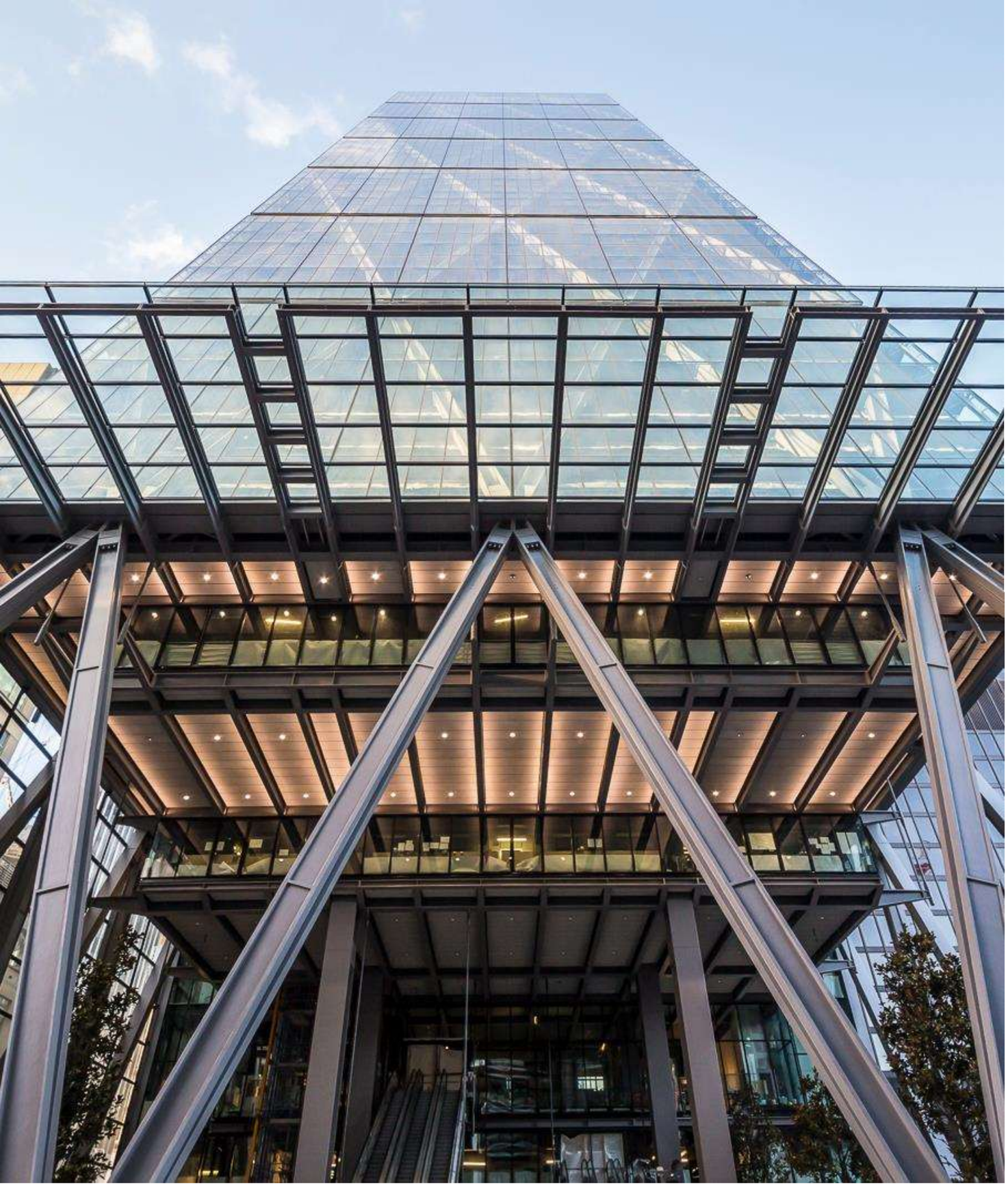
BUILDING CONSIDERATION: LONDON PROTECTED VIEWS OF ST PAUL CATHEDRAL AND WESTMINSTER PALACE

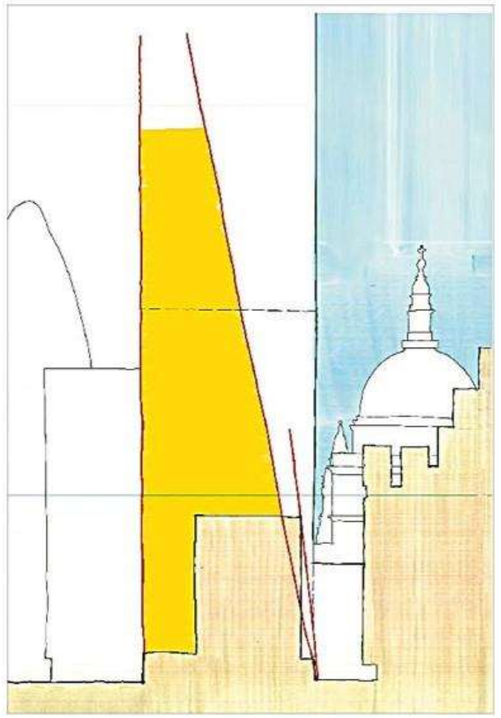
LIGHT AND AIR PREVENTED FROM REACHING THE STREETS BELOW

EQUITABLE BUILDING, NEW YORK

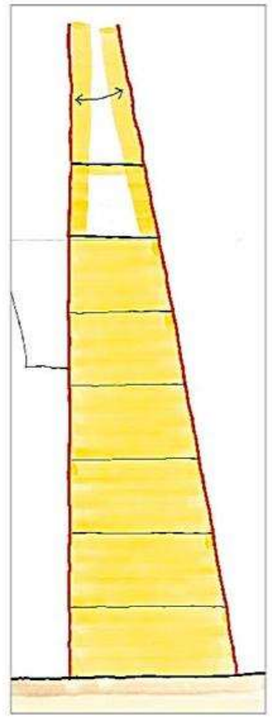
RESULTS OF ZONING RESOLUTION: SKYSCRAPERS WITH SETBACK

NEW YORK

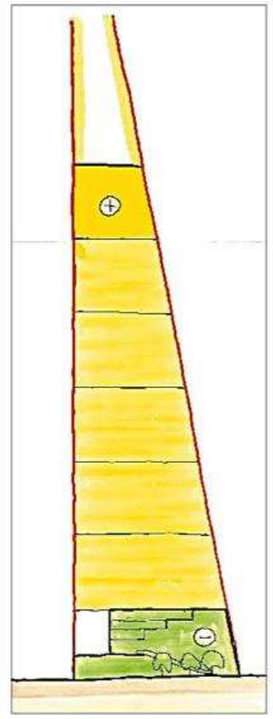




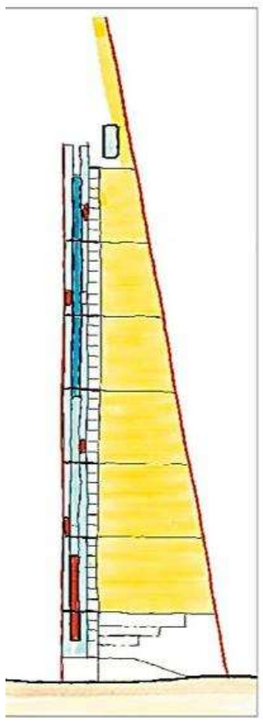
Site profile



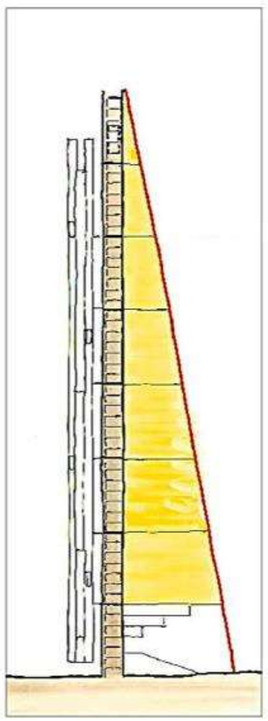
Envelope for potential development



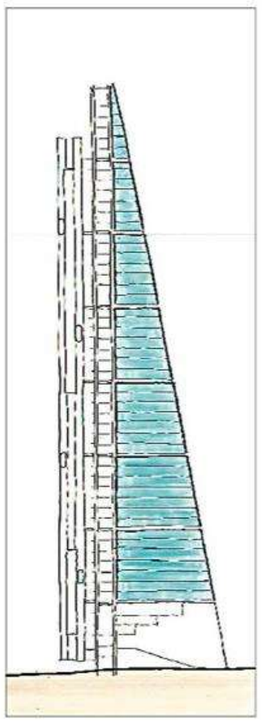
Public realm



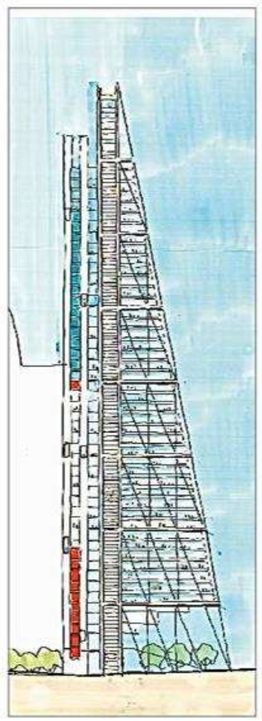
Northern support core



Ladderframe

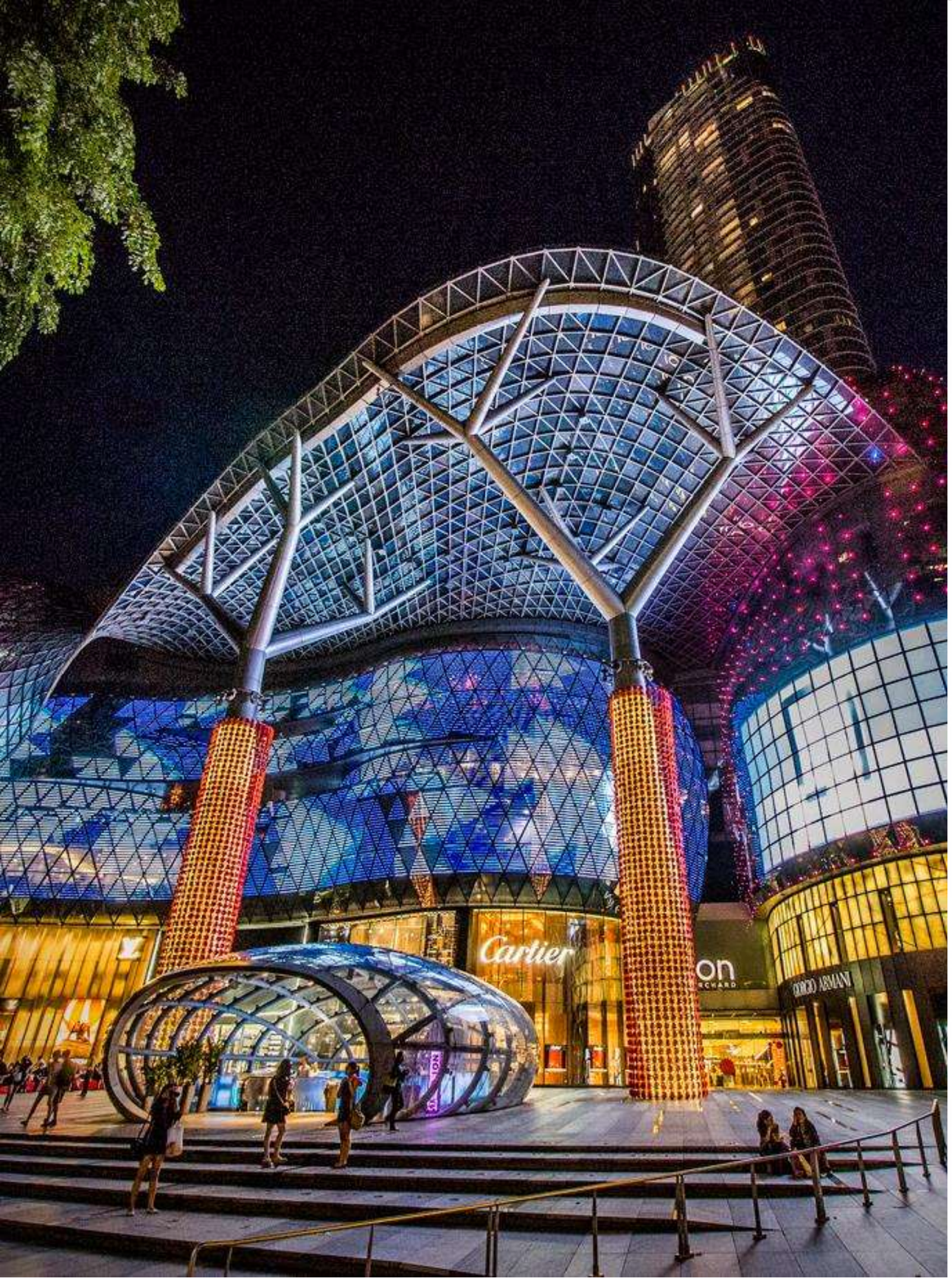


Offices



Envelope

PUBLIC AREA



ACCESS TO PUBLIC TRANSPORTATION

PLAIN FAÇADE

CENTREPOINT, LONDON

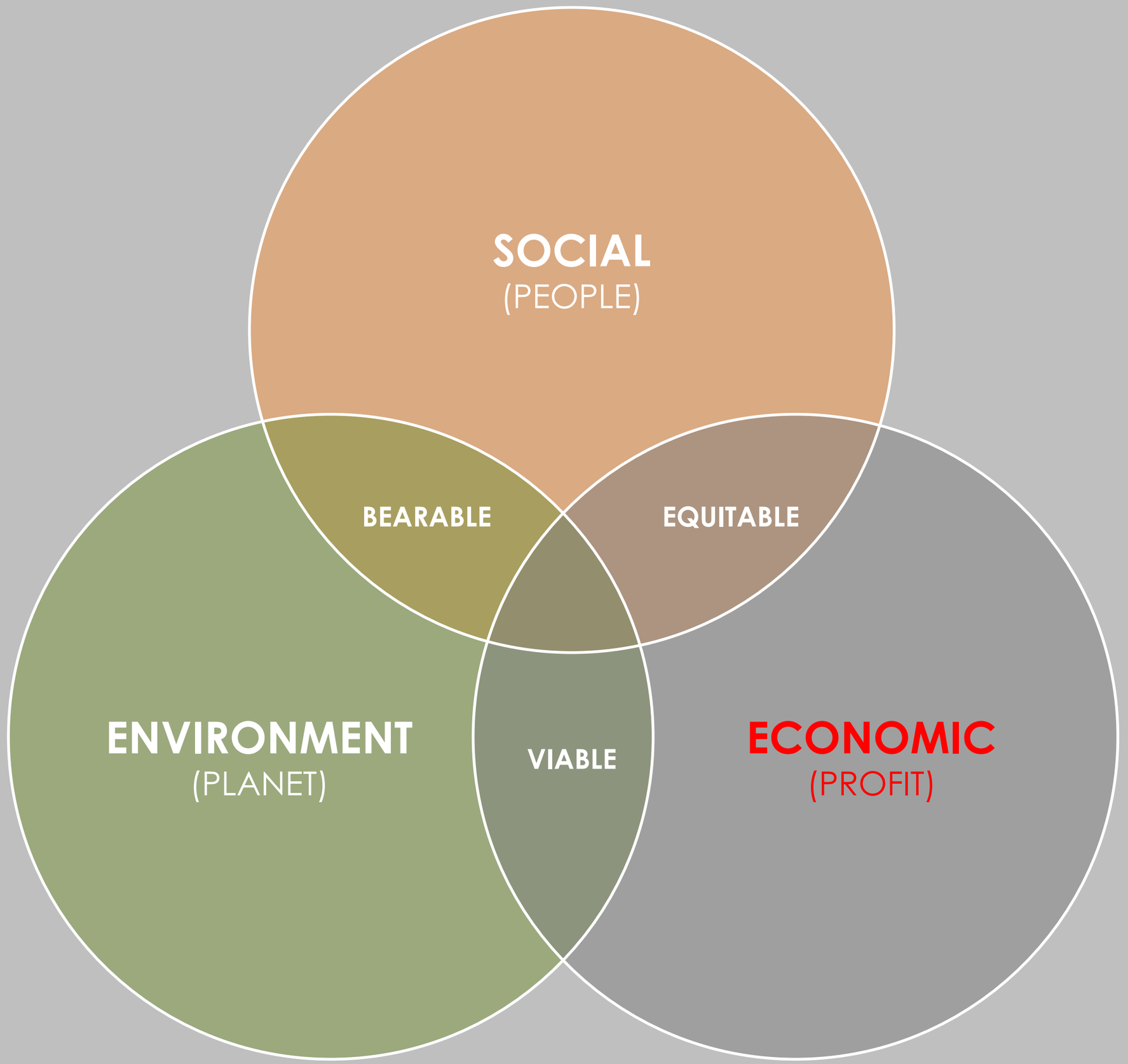
GREENERY

BOSCO VERTICALE, MILAN

FAÇADE GREENERY

NATURAL AIR AND LIGHT BY USING ATRIA

ROOF



3 PILLARS OF SUSTAINABILITY

RESIDENTIAL

OFFICE

RETAIL

OR

OFFICE

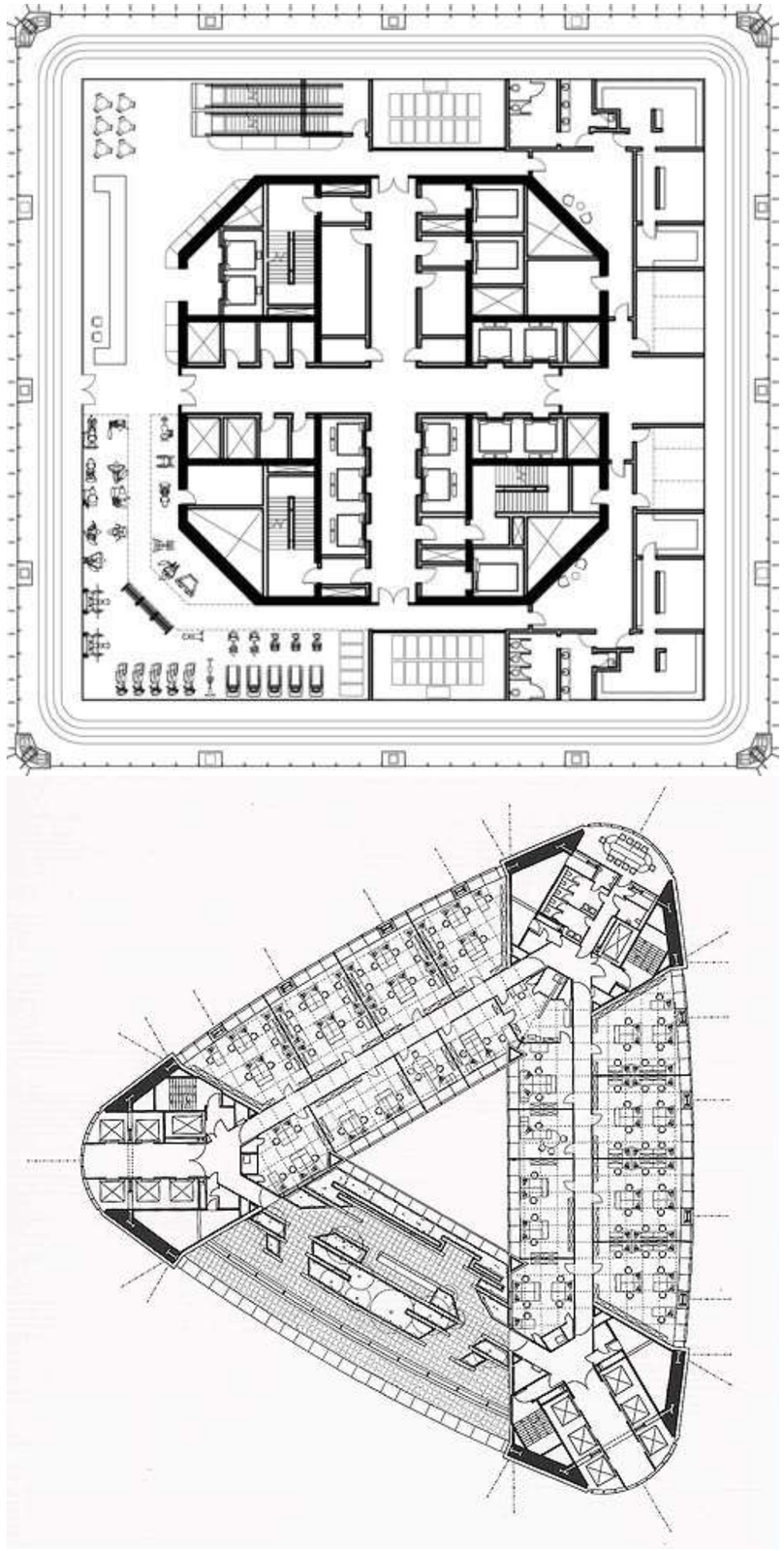
RESIDENTIAL

RETAIL

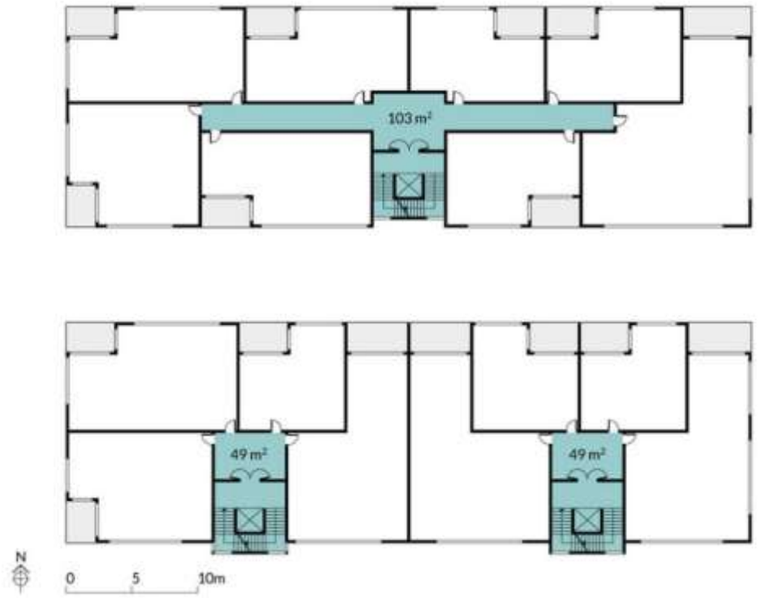
?

TYPICAL STACKING CONFIGURATION

OFFICE CORE



APARTMENT CORE



RESIDENTIAL

OFFICE

RETAIL

OR

OFFICE

RESIDENTIAL

RETAIL

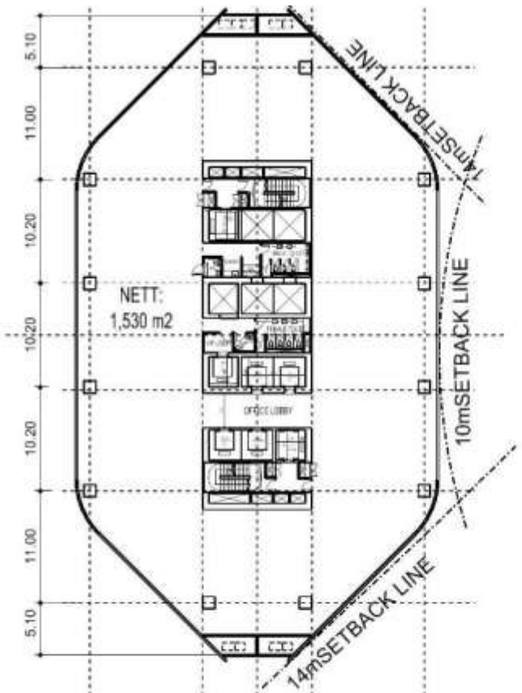
TYPICAL STACKING CONFIGURATION

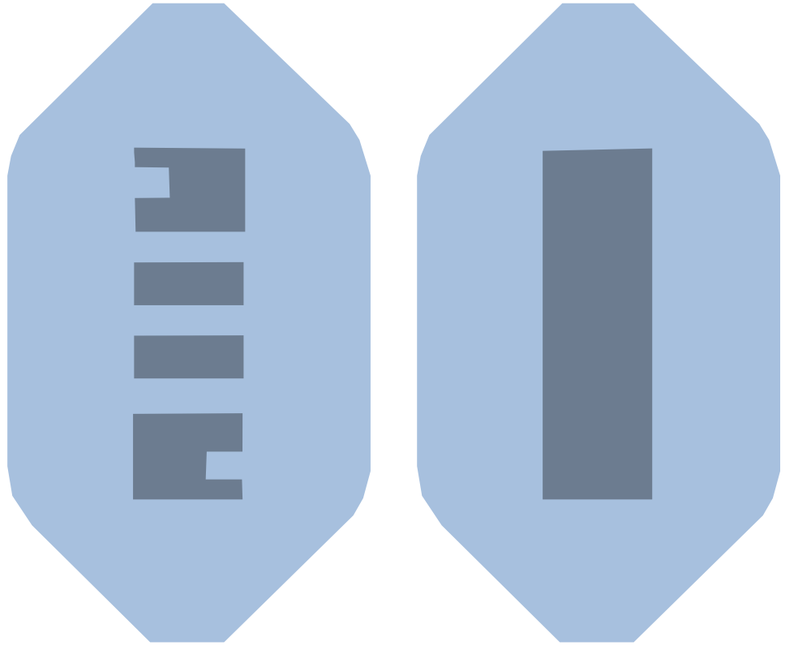
CONCRETE STRUCTURE FOR APARTMENT

STEEL STRUCTURE FOR OFFICE

CONCRETE AND STEEL

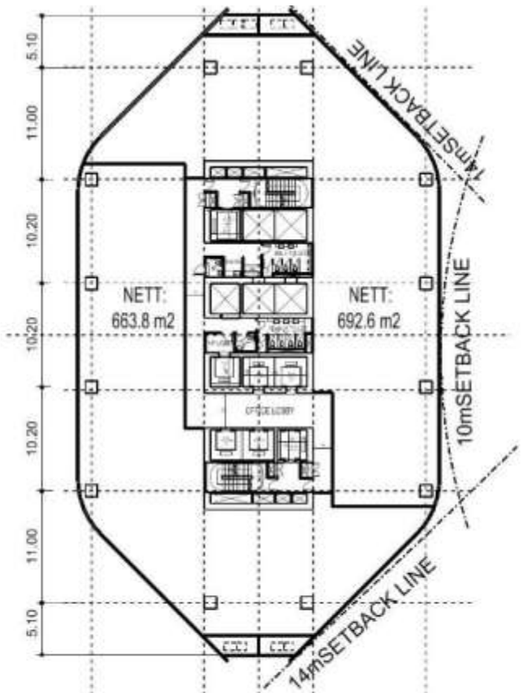
SINGLE TENANT

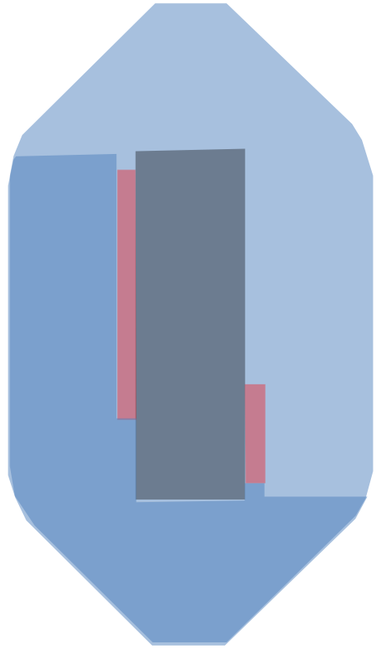




Semi Gross 1,615m2
Semi Gross Efficiency 87,5%
Nett **1,530m2**
Nett Efficiency **82.9%**

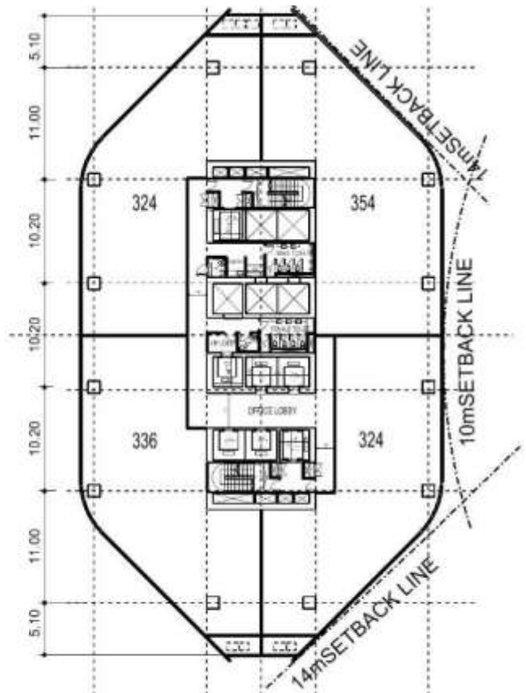
MULTI TENANT (2)

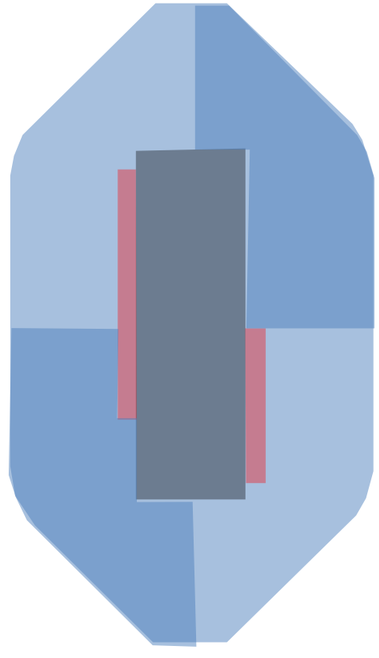




Nett **1,355m2**
Nett Efficiency **73.4%**

MULTI TENANT (4)



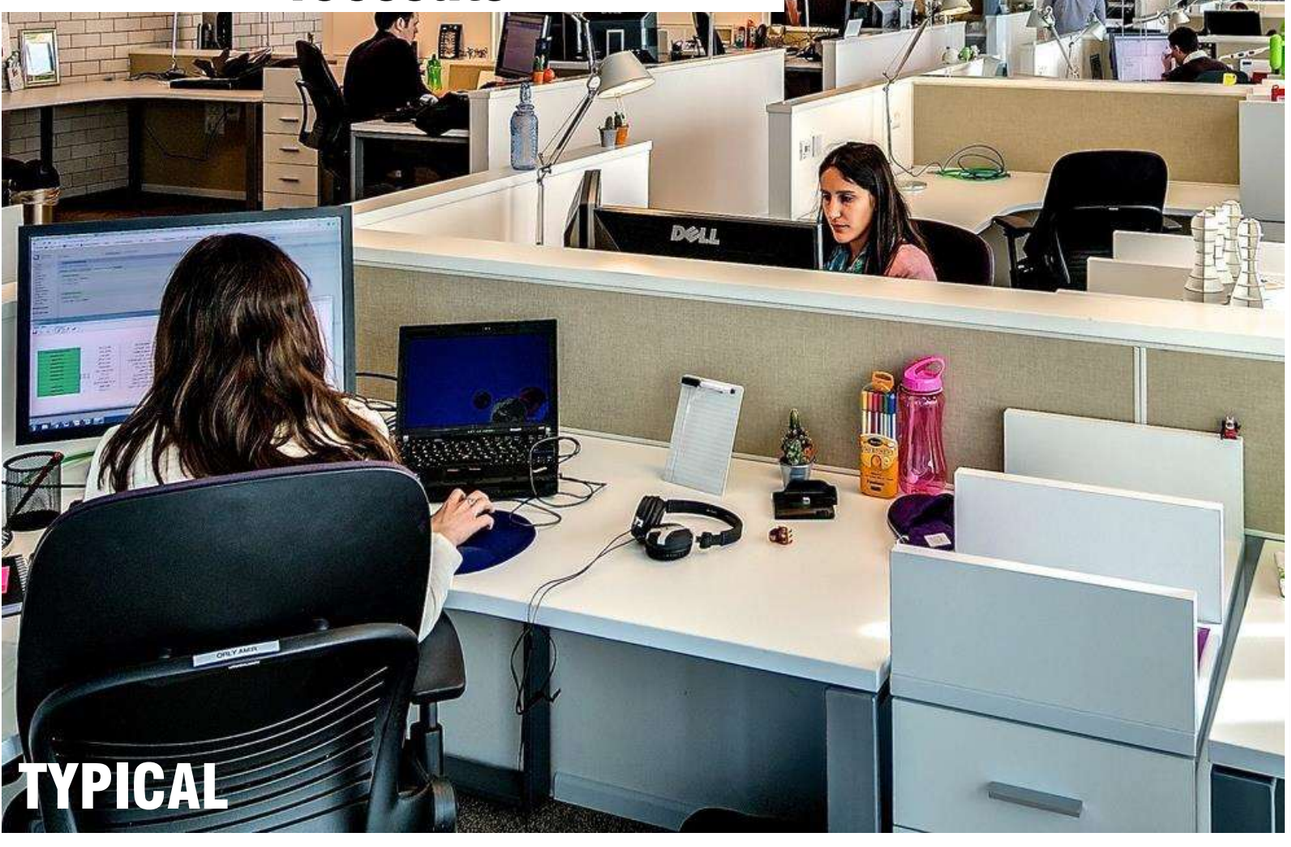


Nett **1,338m2**
Nett Efficiency **72.5m2**

OFFICE AND RESIDENTIAL EFFICIENCY COMPARISON

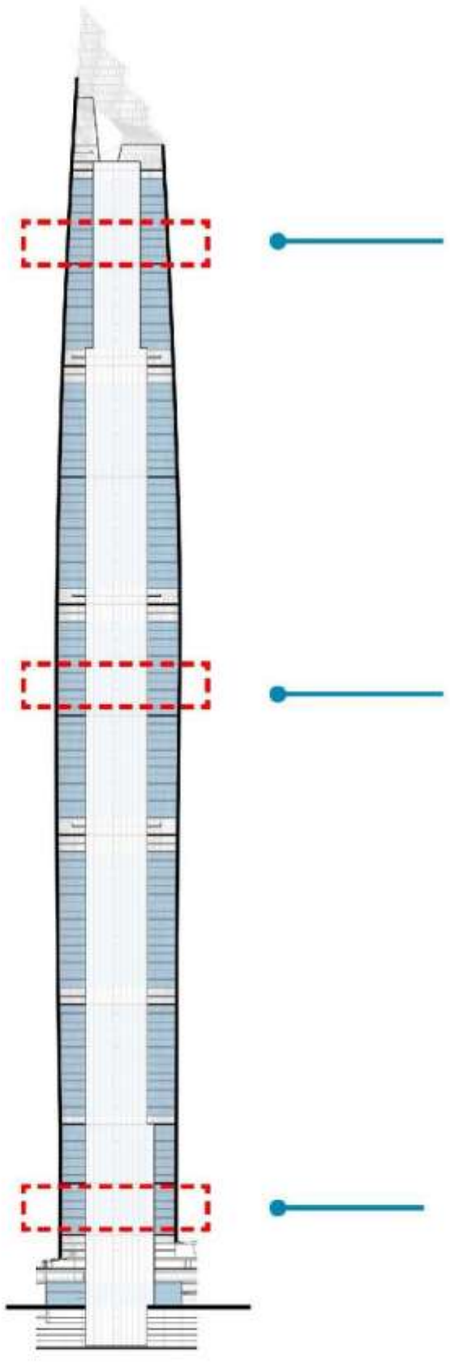
400seats

250seats

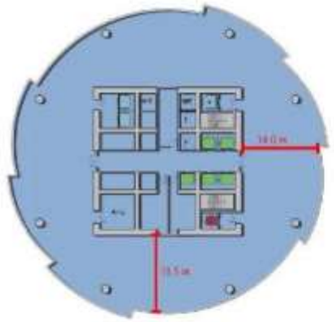


TYPICAL

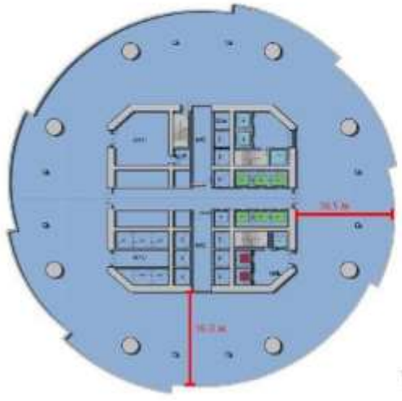
USERS EXPERIENCE



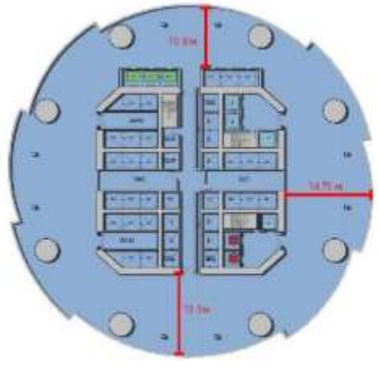
Tower M: Bunga Raya - Circular Plan



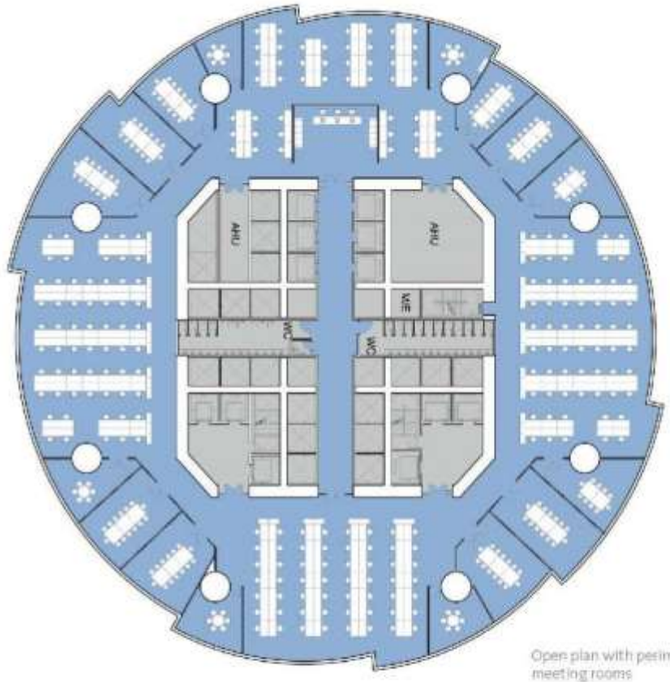
Typical Plan - High Zone



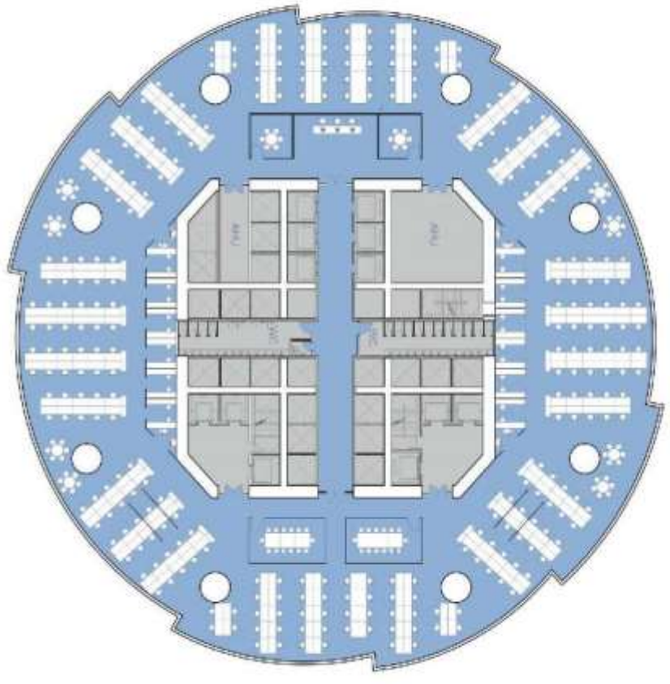
Typical Plan - Middle Zone



Typical Plan - Low Zone



Open plan with perimeter meeting rooms

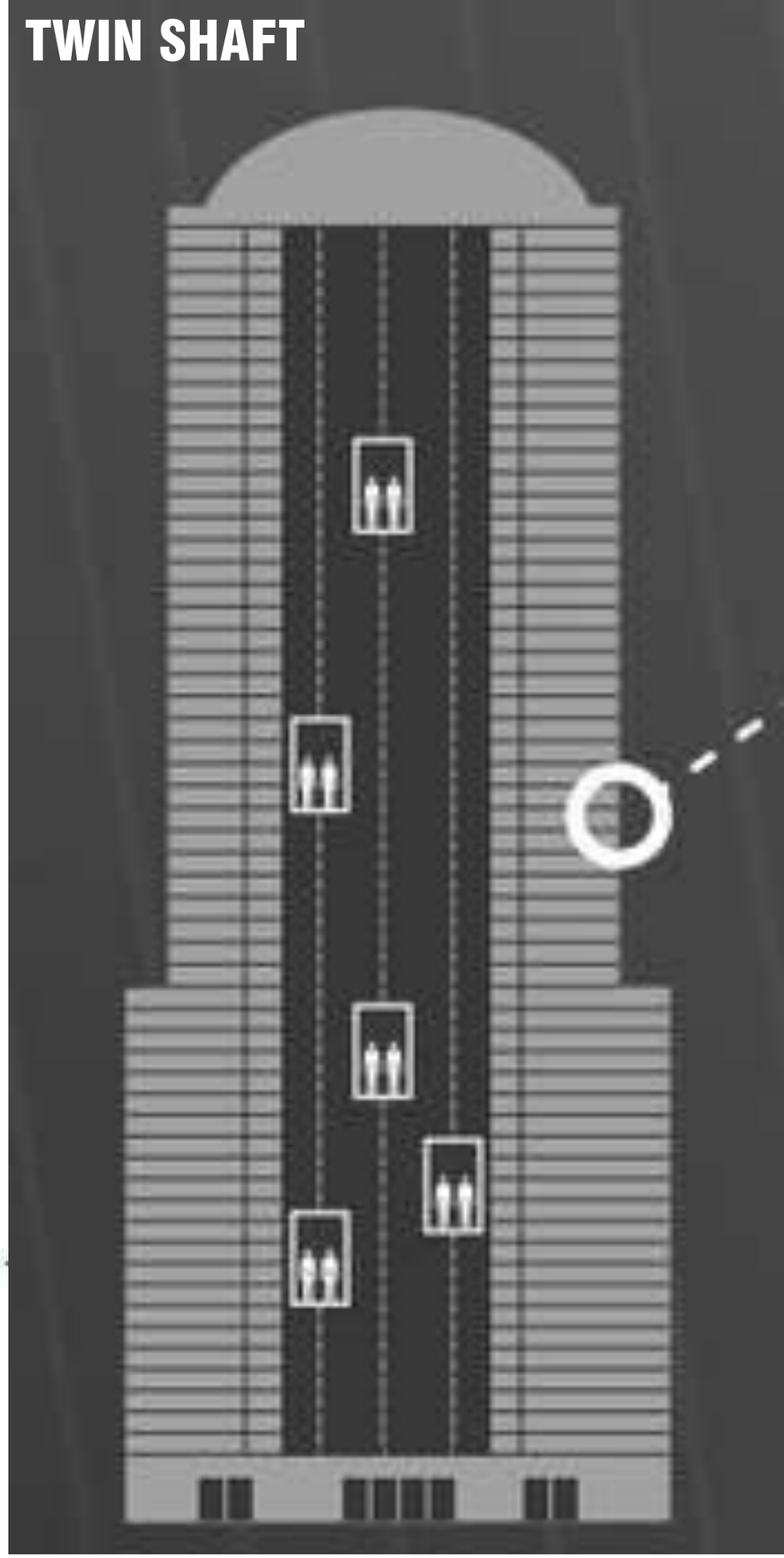


Open plan with cellular offices at core

DOUBLE DECKER

DESTINATION CONTROL

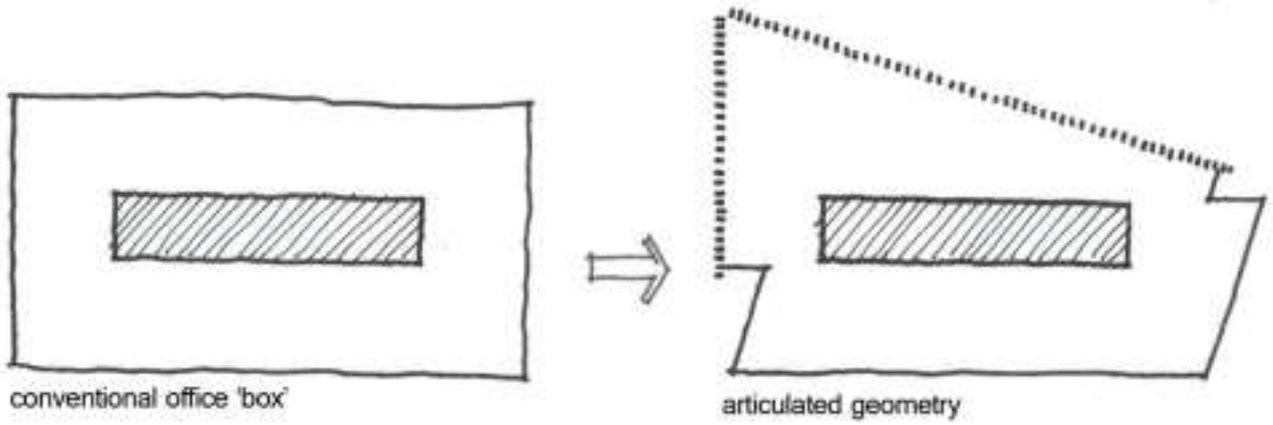
TWIN SHAFT



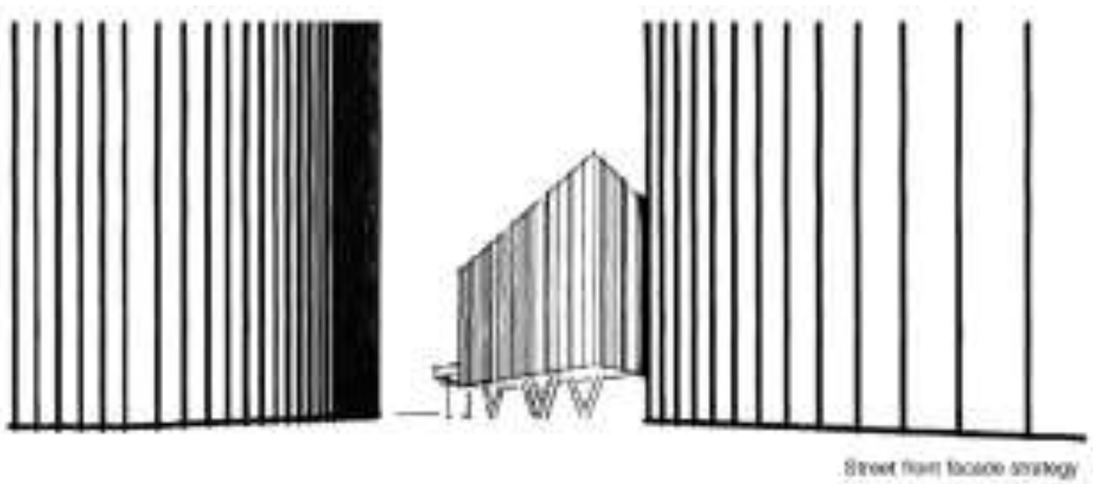

OUE
TUNG CENTRE
HSBC
CUSTOMS HOUSE

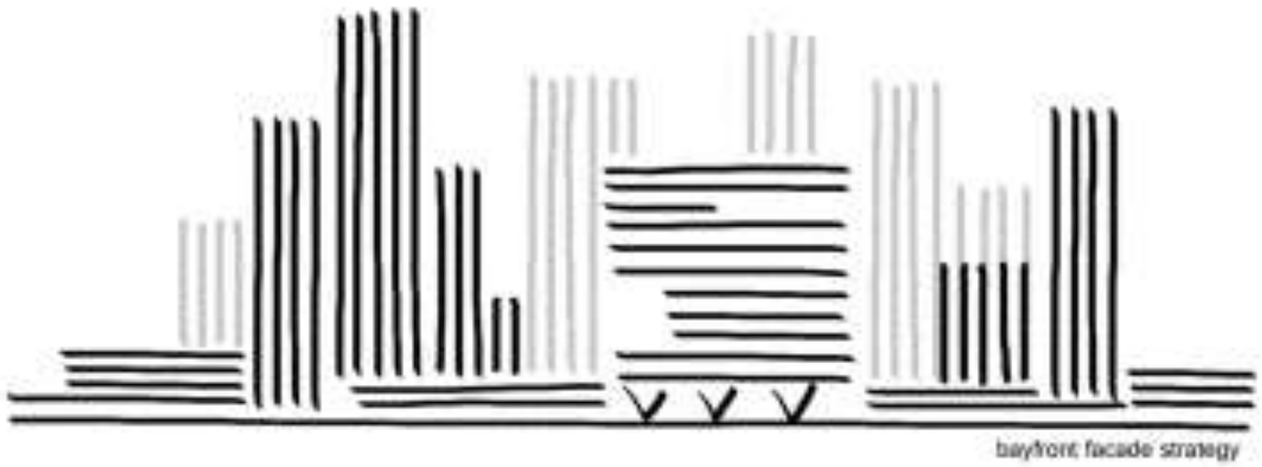

OUE


OUE

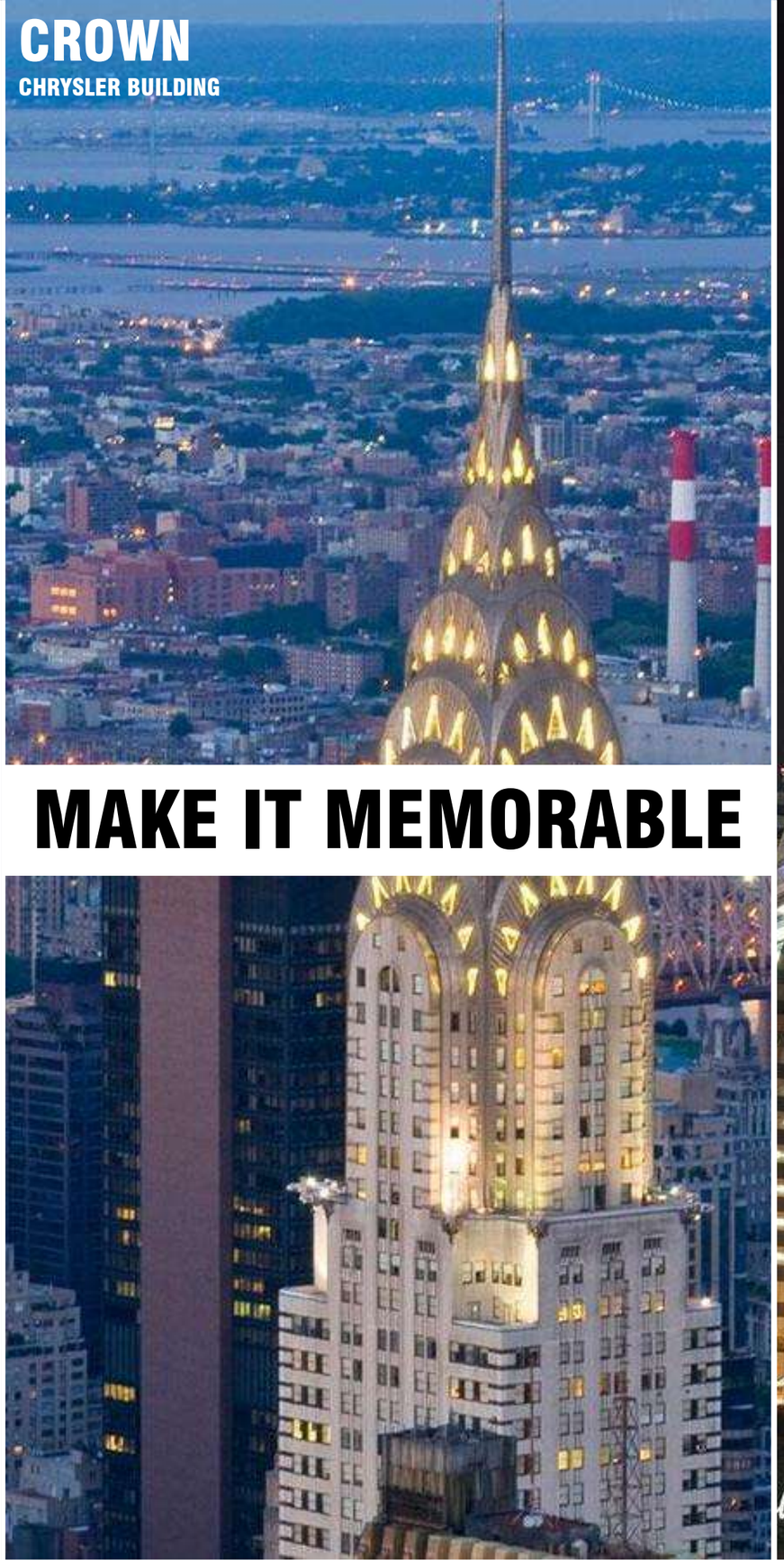


DEMOLITION FOR A BETTER CAUSE

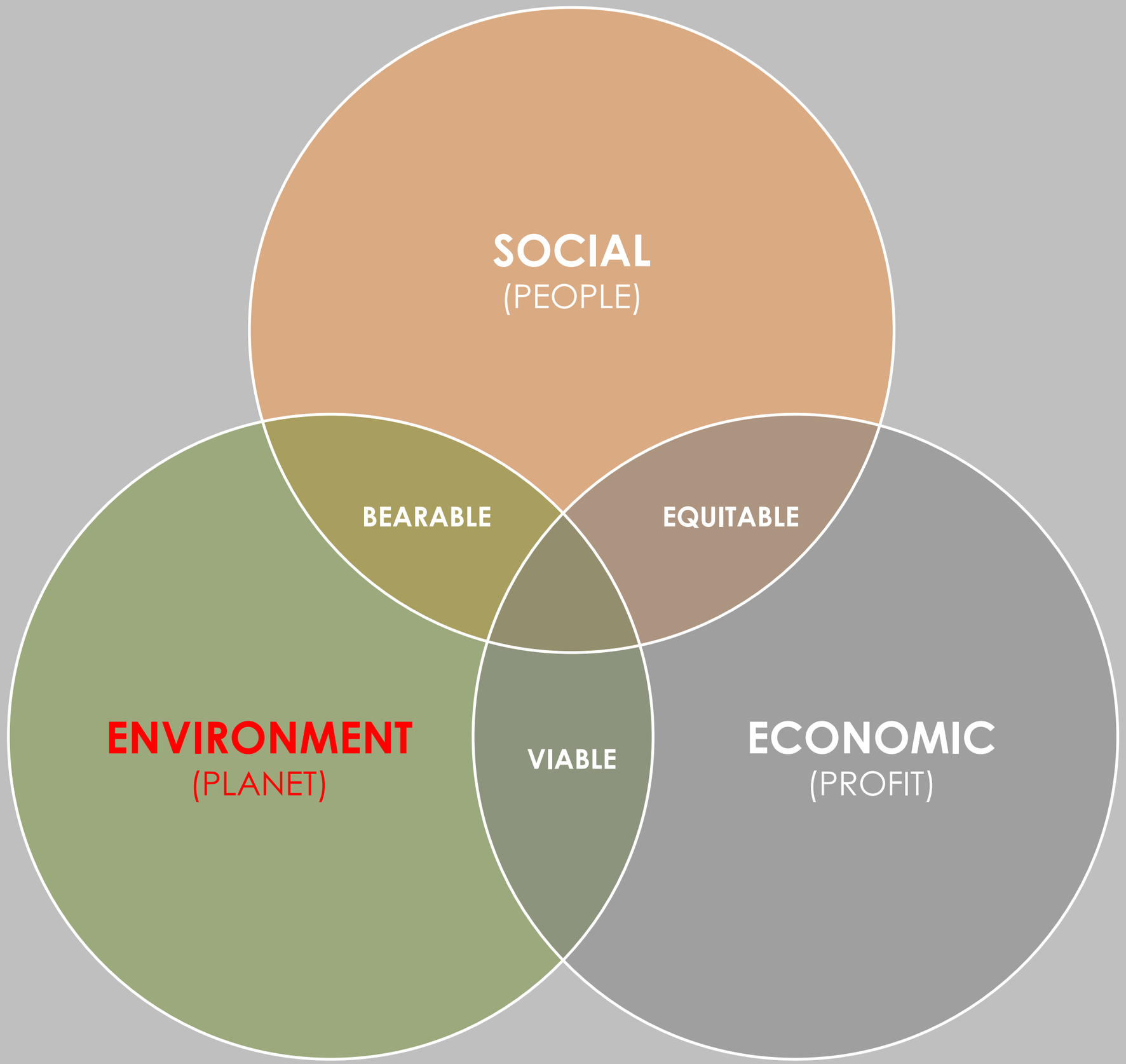




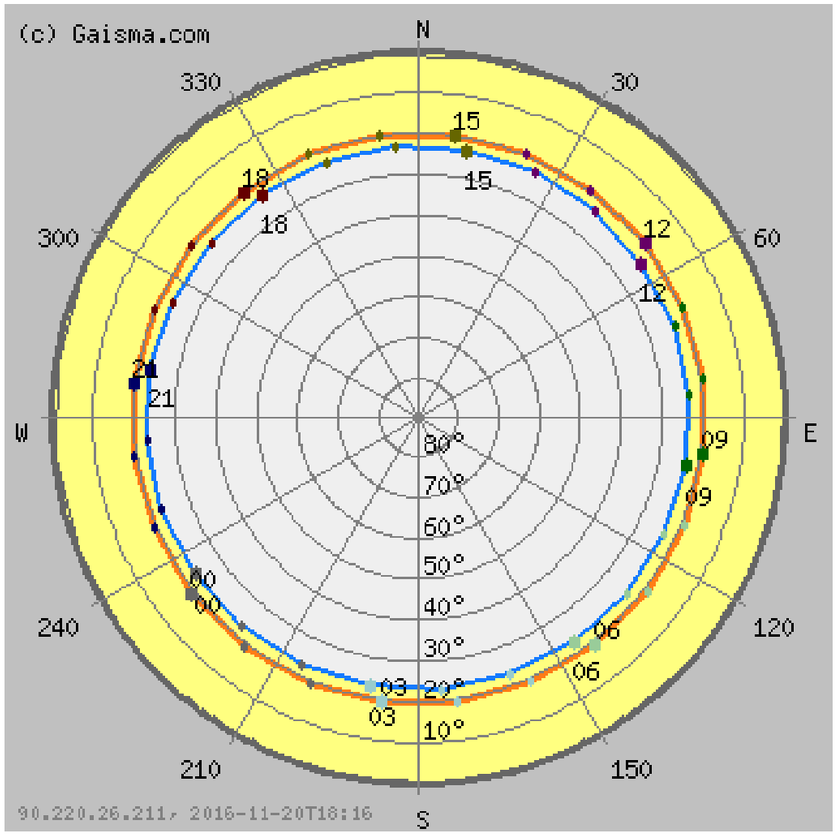

LIGHTING
BURJ AL ARAB


CROWN
CHRYSLER BUILDING
MAKE IT MEMORABLE

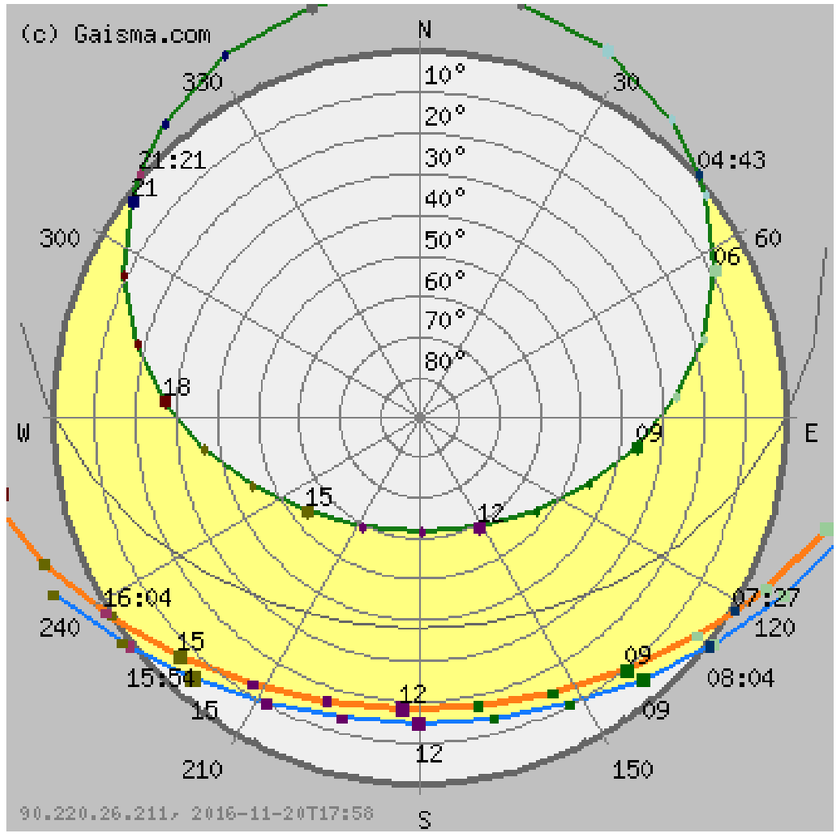

PAIRS
BAHRAIN WTC



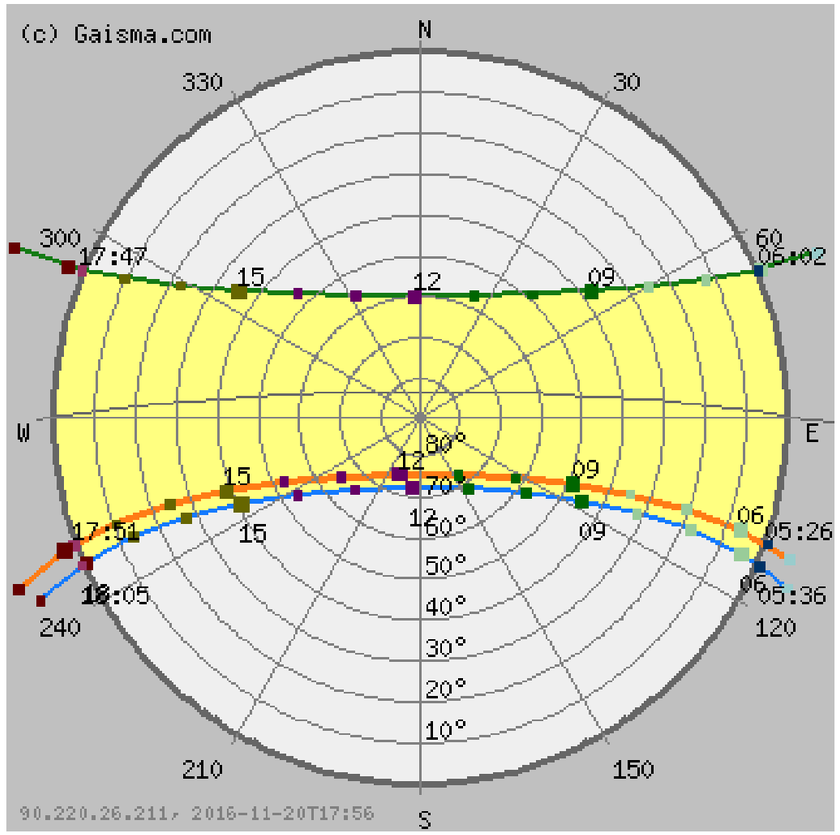
3 PILLARS OF SUSTAINABILITY



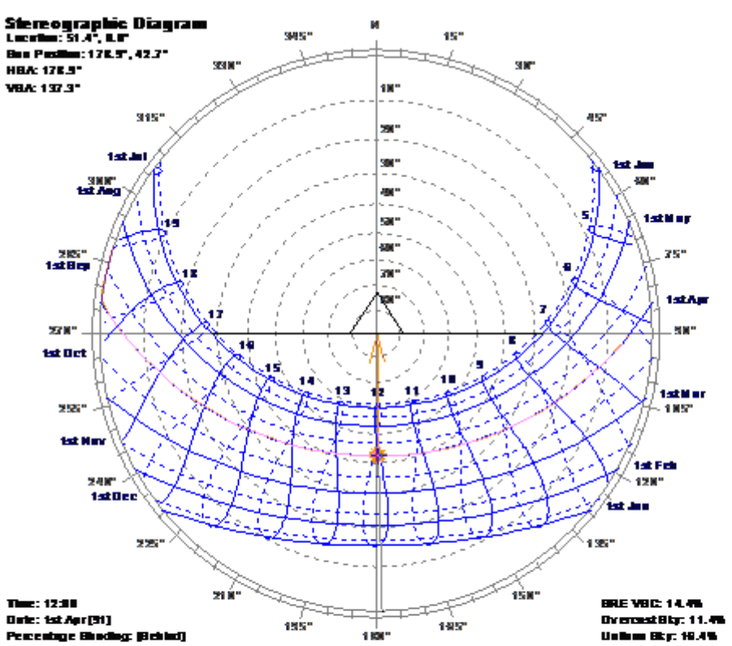
ANTARTICA



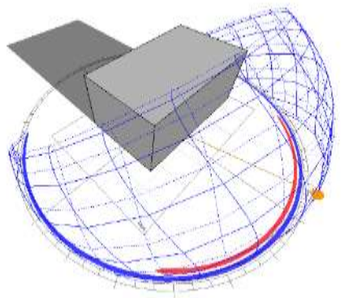
LONDON, UNITED KINGDOM



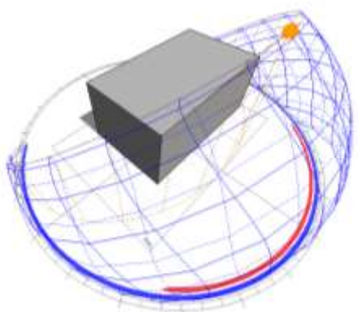
JAKARTA, INDONESIA



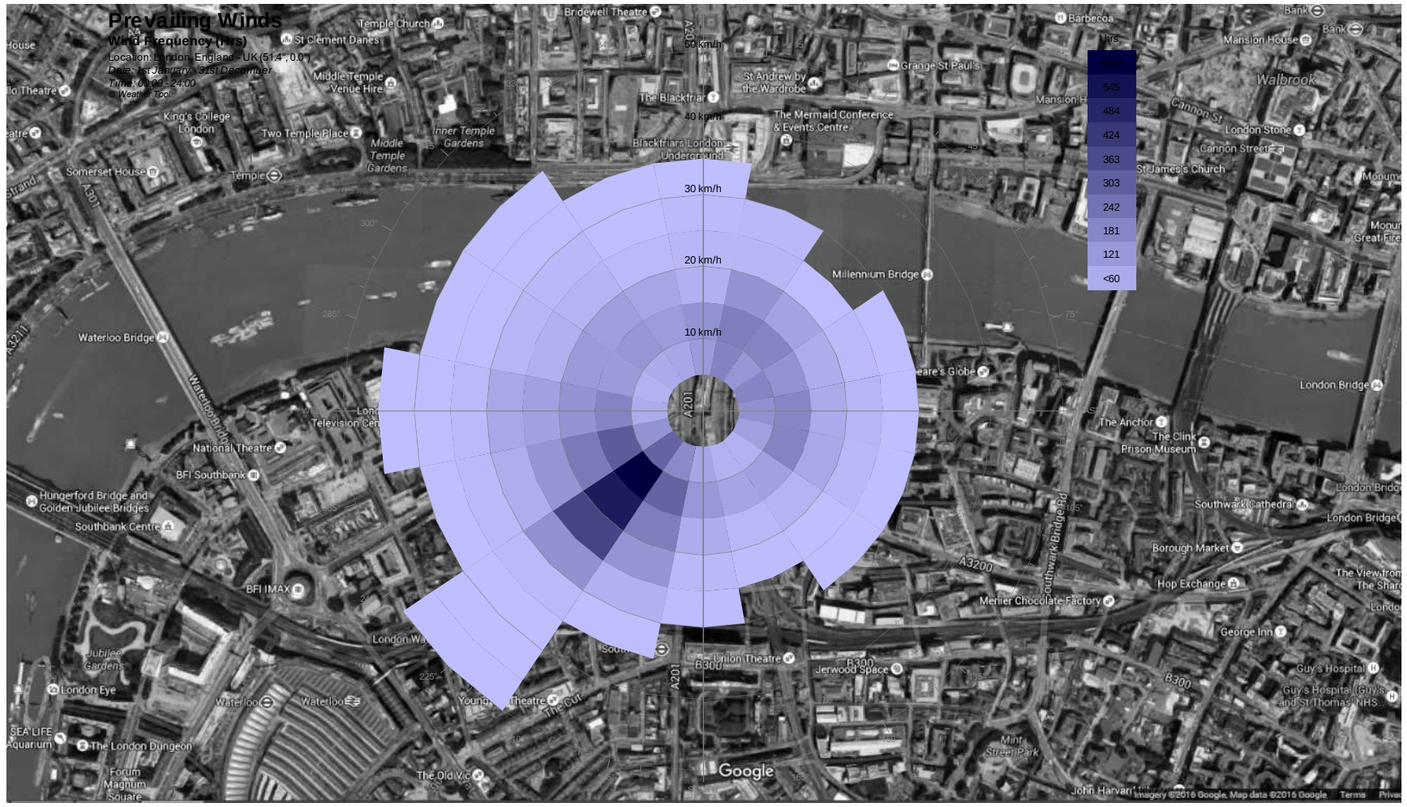
ANNUAL SUN PATH DIAGRAM



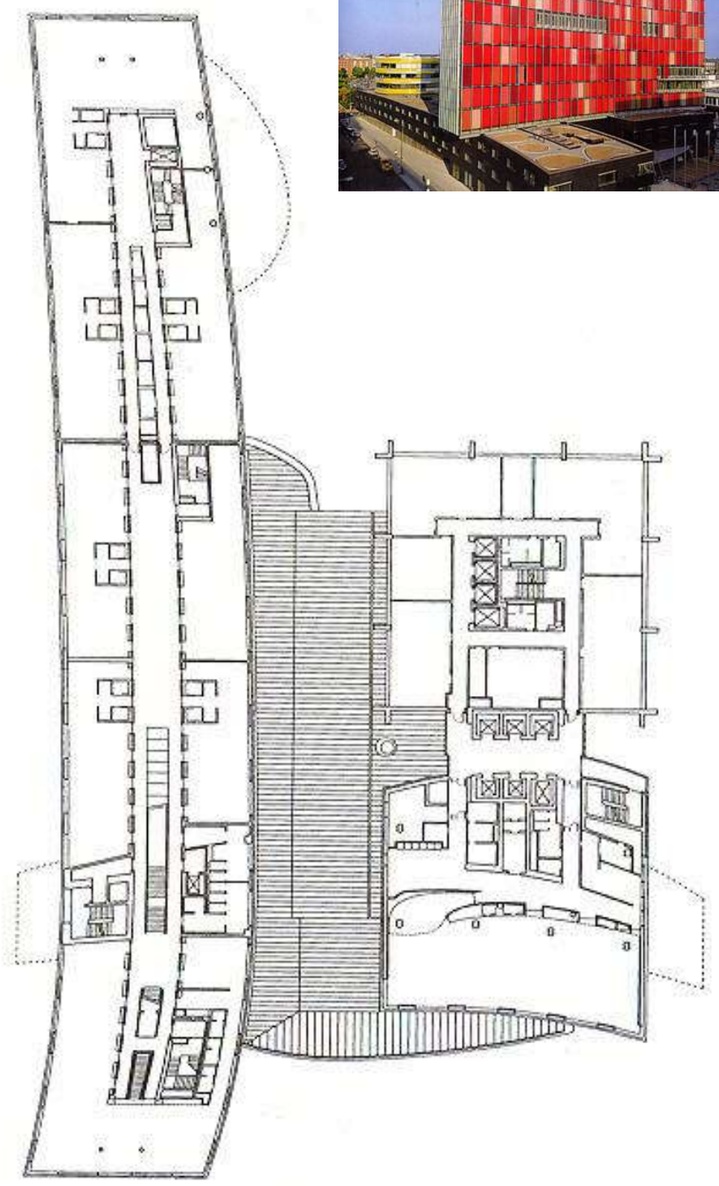
WINTER SOLSTICE 15°

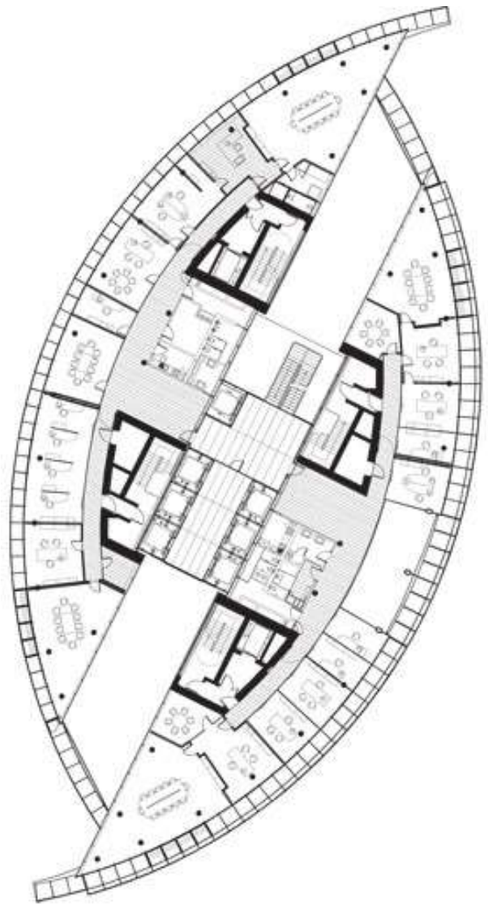


SUMMER SOLSTICE 62°



SOLAR POSITIONING & WIND DIRECTION





GERMANY

Smaller Floor Plates
Slender Towers

Natural Ventilation
Max Building Depth 8m

ASIA

Bulky Mass Due To Earthquake

DIFFERENT BUILDING TYPOLOGIES

FUEL CELLS

1 WORLD TRADE CENTER, NEW YORK

GEOTHERMAL

TURNING TORSO, SWEDEN

BIPV

HERON TOWER, LONDON

WIND TURBINE

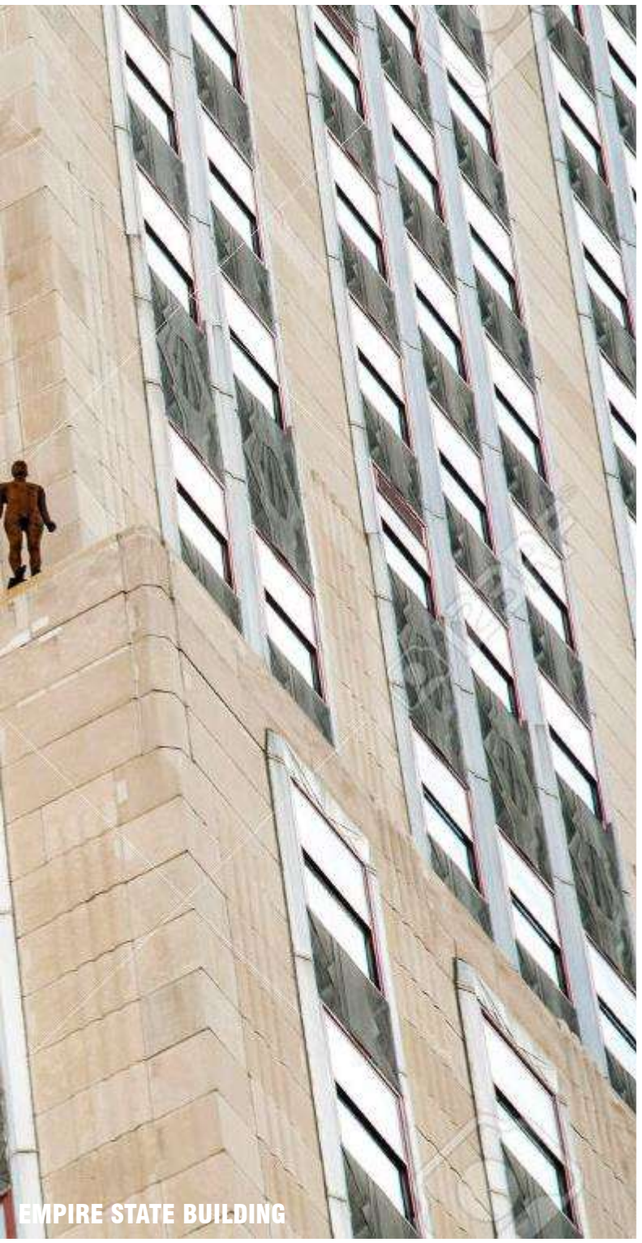
BAHRAIN TRADE CENTER

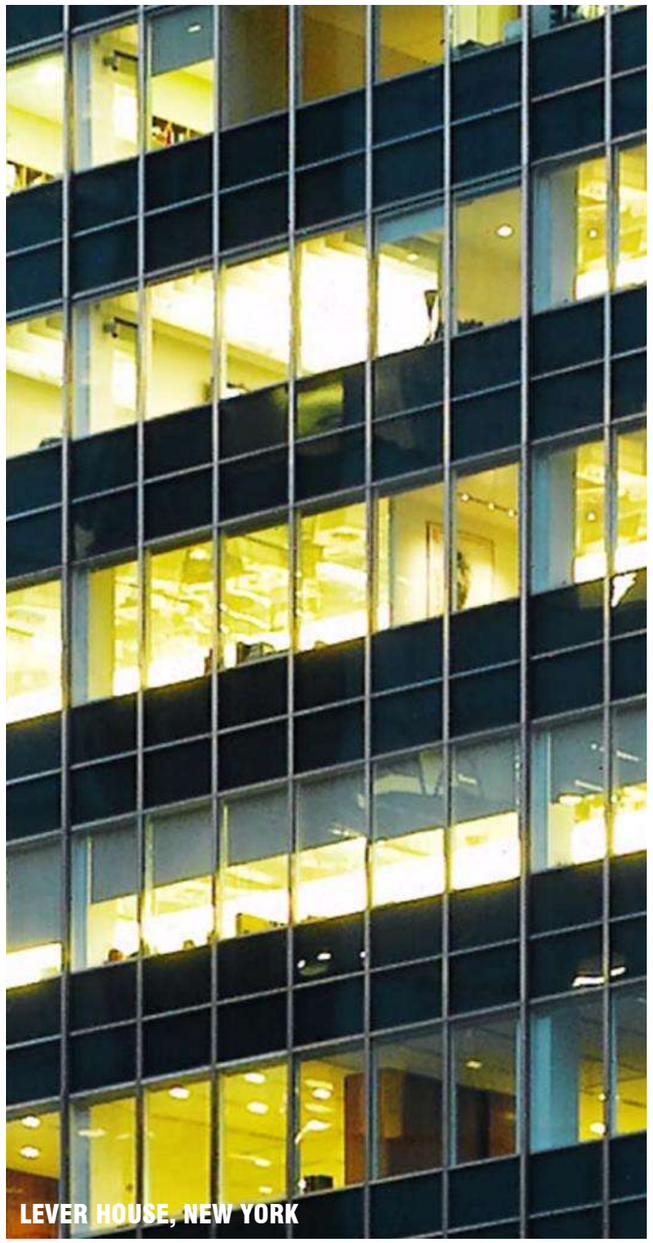
4 TIMES SQUARE, NEW YORK, 1999

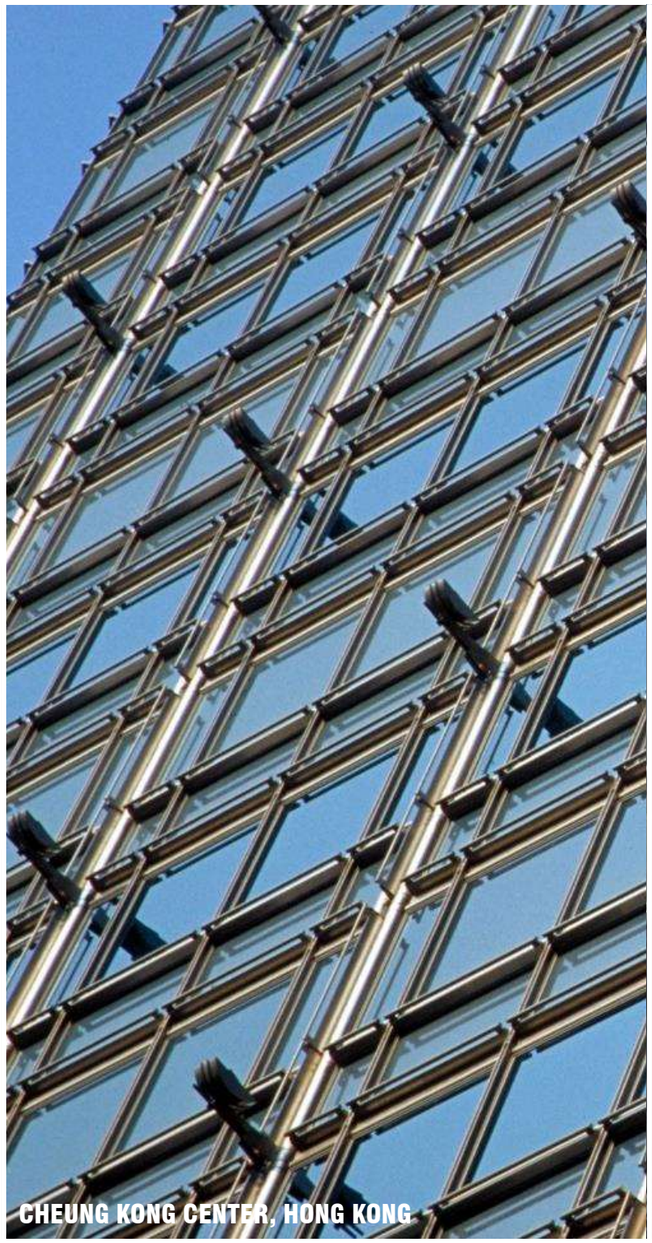
CIS TOWER, MANCHESTER, 1962 and 2006

BAHRAIN WORLD TRADE CENTER, MANAMA, 2008

CHEAP → EXPENSIVE


EMPIRE STATE BUILDING


LEVER HOUSE, NEW YORK


CHEUNG KONG CENTER, HONG KONG


DEUTSCH POST TOWER, GERMANY

50% WINDOW TO WALL

Façade Transparency = 23%
Average U-Value = 2.W/m2K

SINGLE GLAZED

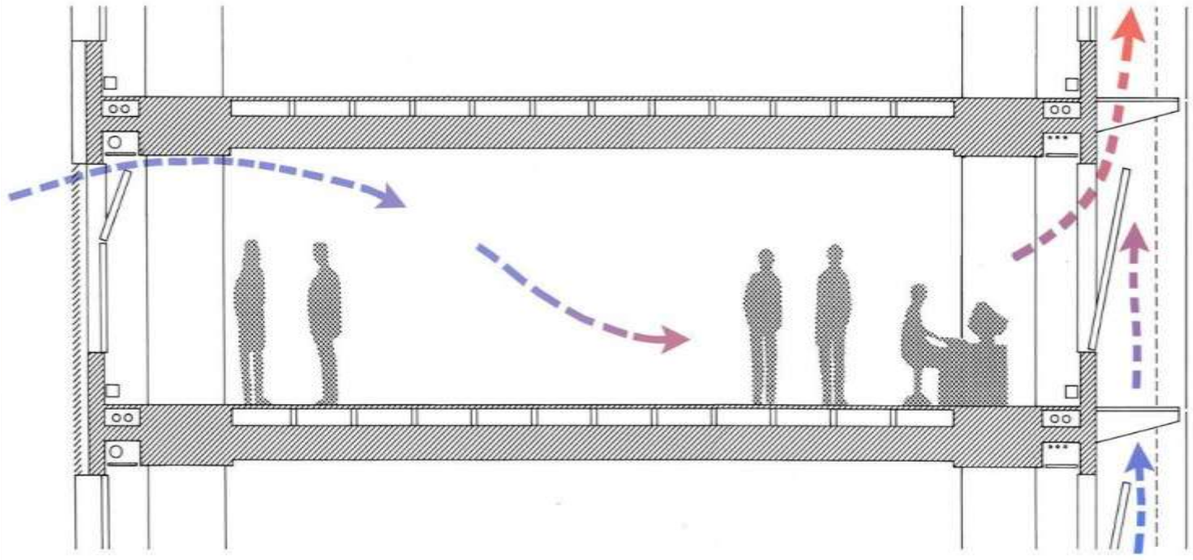
Façade Transparency = 53%
Average U-Value = 3.3W/m2K

DOUBLE GLAZED

Façade Transparency = 52%
Average U-Value = 0.9W/m2K

DOUBLE SKIN

HIGH QUANTITIES OF FAÇADE TRANPARENCY WITH GOOD SOLAR TRANSMITTANCE



querlüftung - großraum

cross ventilation - open plan

NATURAL AND MIXED-MODE VENTILATION OPPORTUNITY

BREEAM®

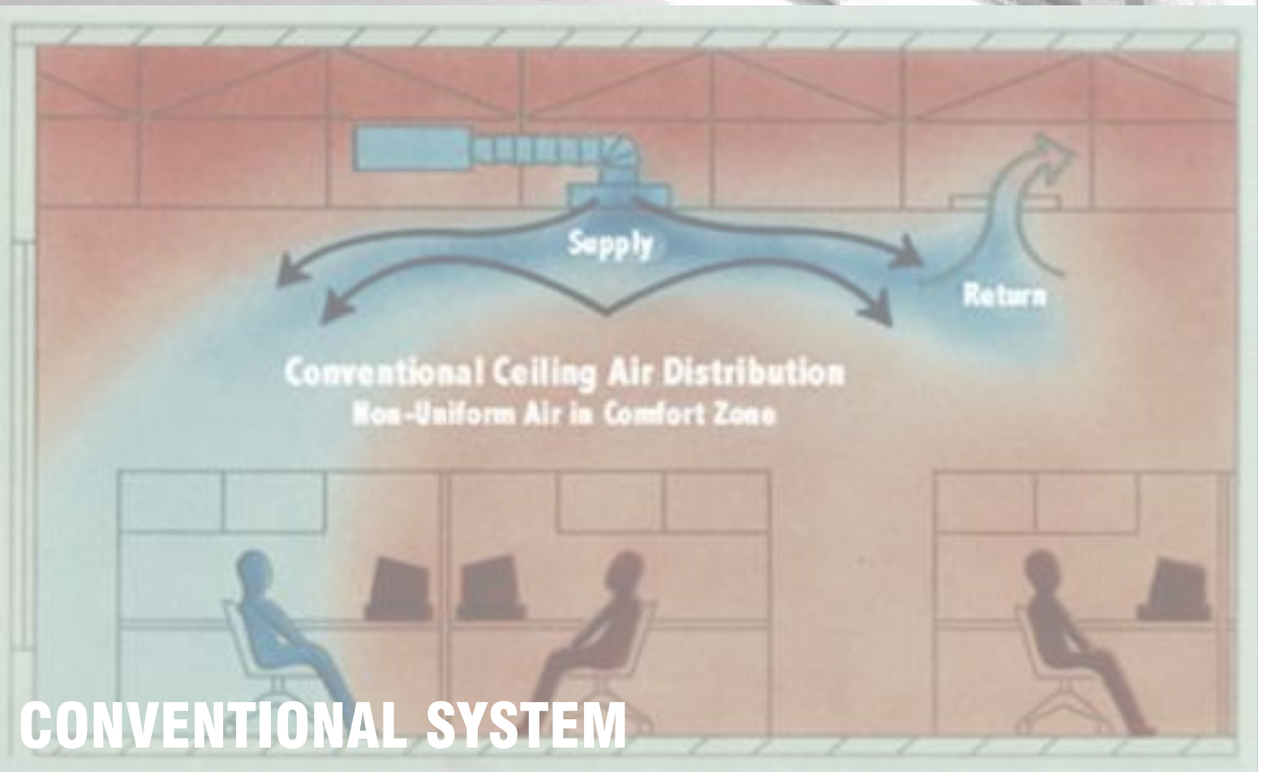
CASBEE®

Comprehensive Assessment System for Built Environment Efficiency

U.S. GREEN BUILDING COUNCIL
LEED
USGBC
™

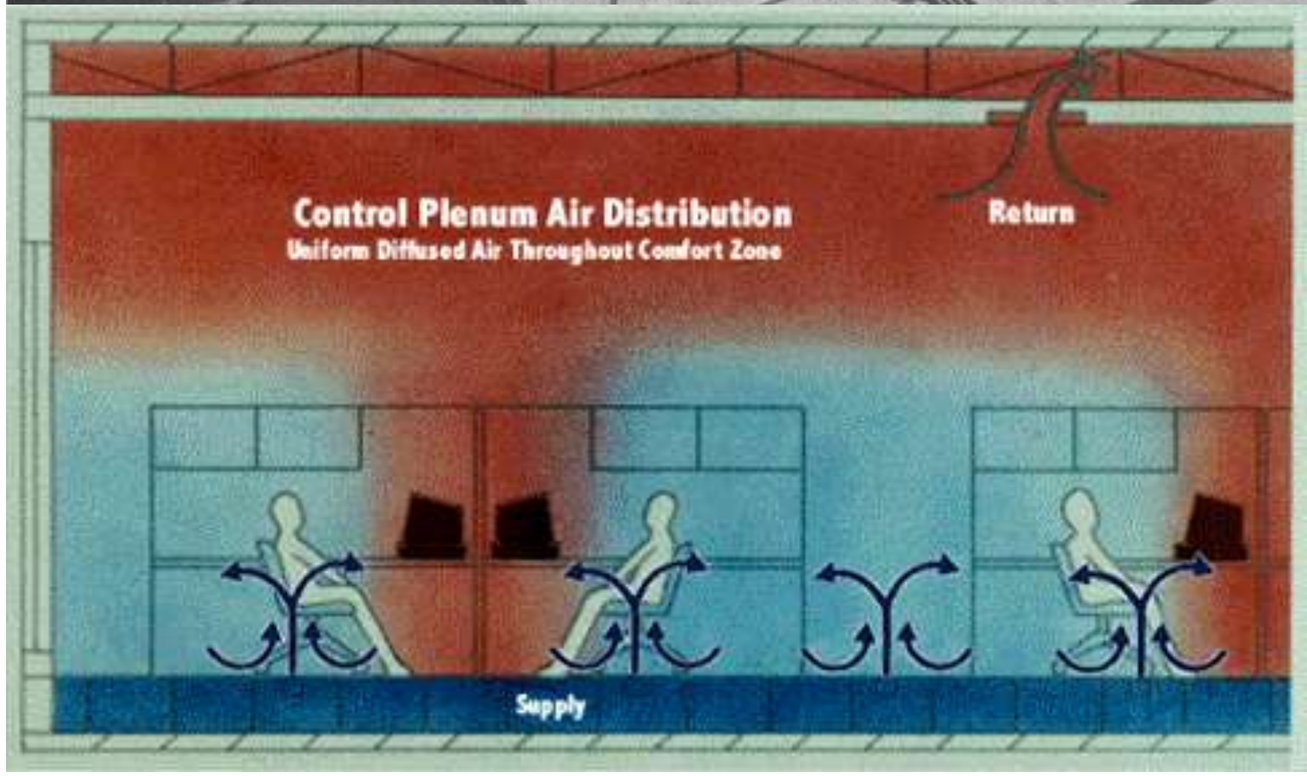
BCA GREEN MARK

GREEN BUILDING COUNCIL INDONESIA



CONVENTIONAL SYSTEM

UNDERFLOOR SYSTEM



OTHER CONSIDERATION: COOLING SYSTEM

OTHER CONSIDERATION: WASTE WATER MANAGEMENT

WIND TUNNEL TEST

TUNES MASS DAMPER

TAIPEI 101

OTHER CONSIDERATION: WIND LOADS PREVENTION

BASE ISOLATION SYSTEM

VISCOUS DAMPER

OTHER CONSIDERATION: EARTHQUAKE PREVENTION

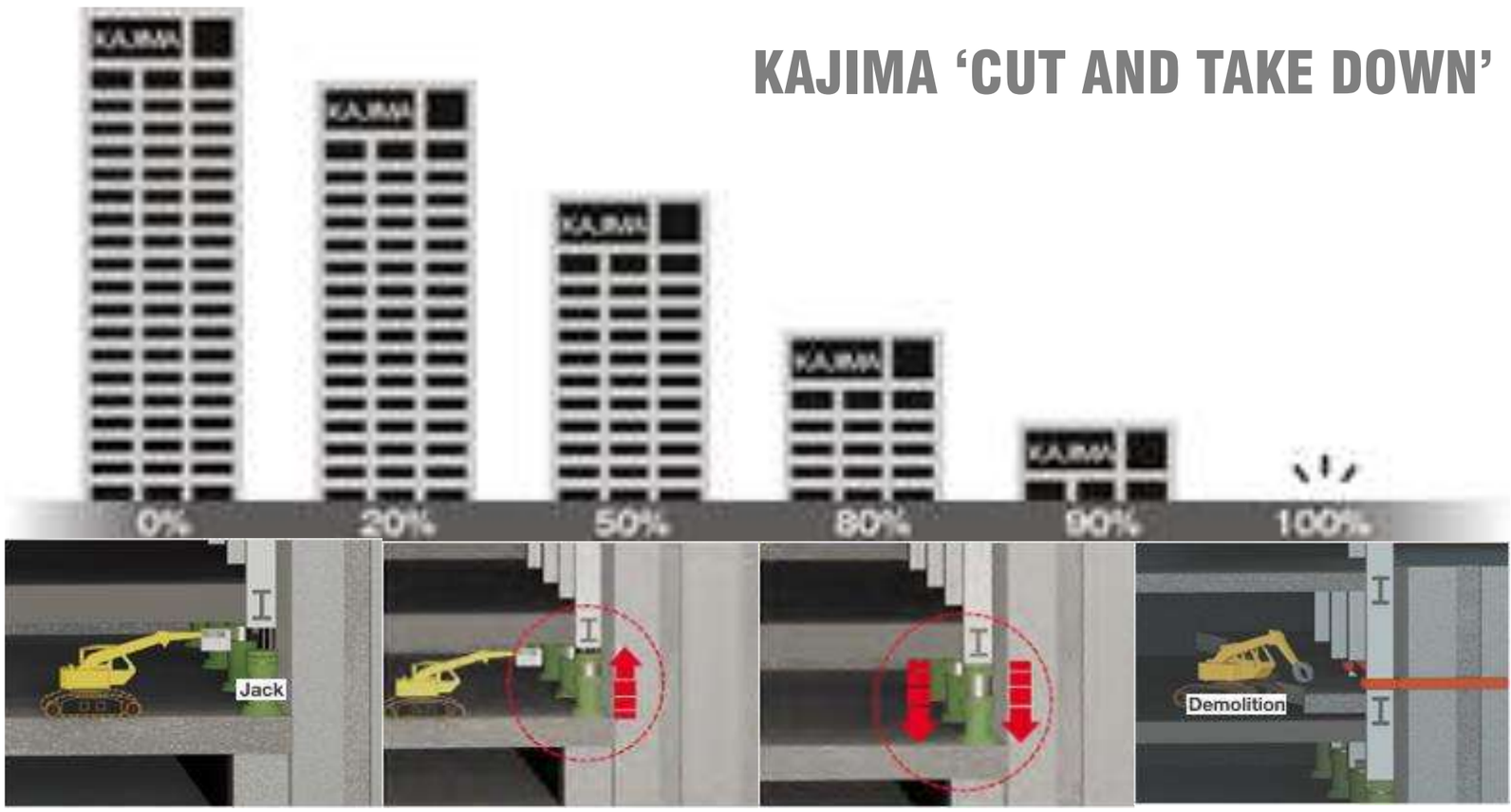
CONVENTIONAL SYSTEM

HIGH PERFORMANCE WATER FIXTURES

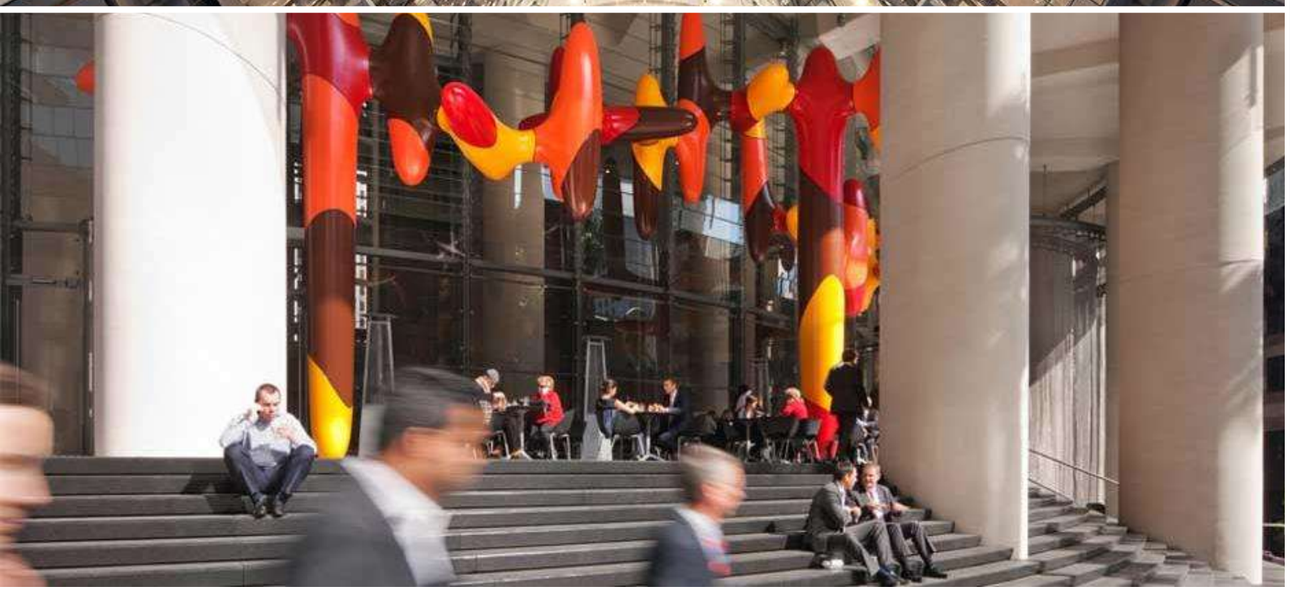
OTHER CONSIDERATION: WATER FIXTURES

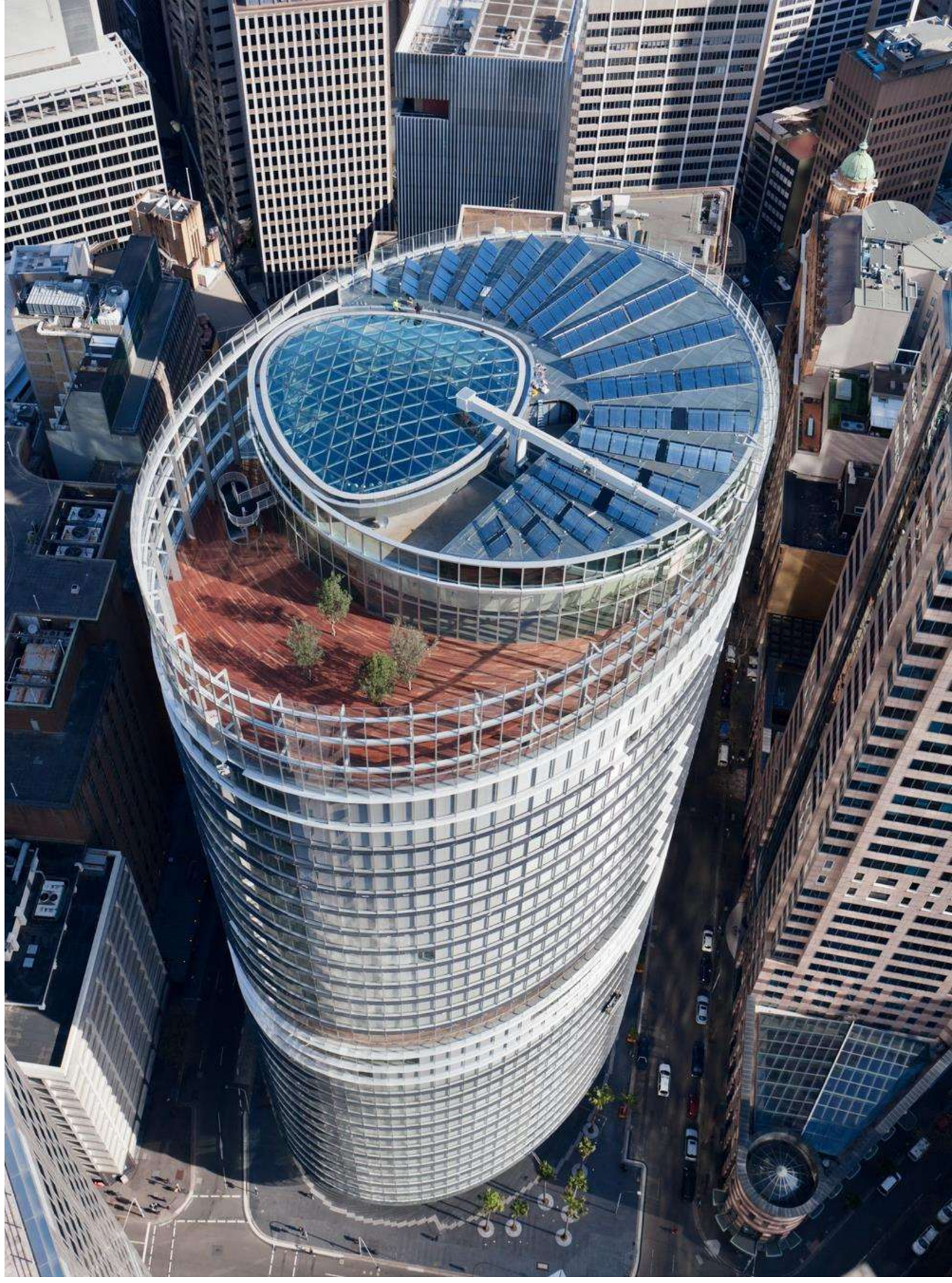
DESPE ‘TOP-DOWN WAY’

KAJIMA ‘CUT AND TAKE DOWN’

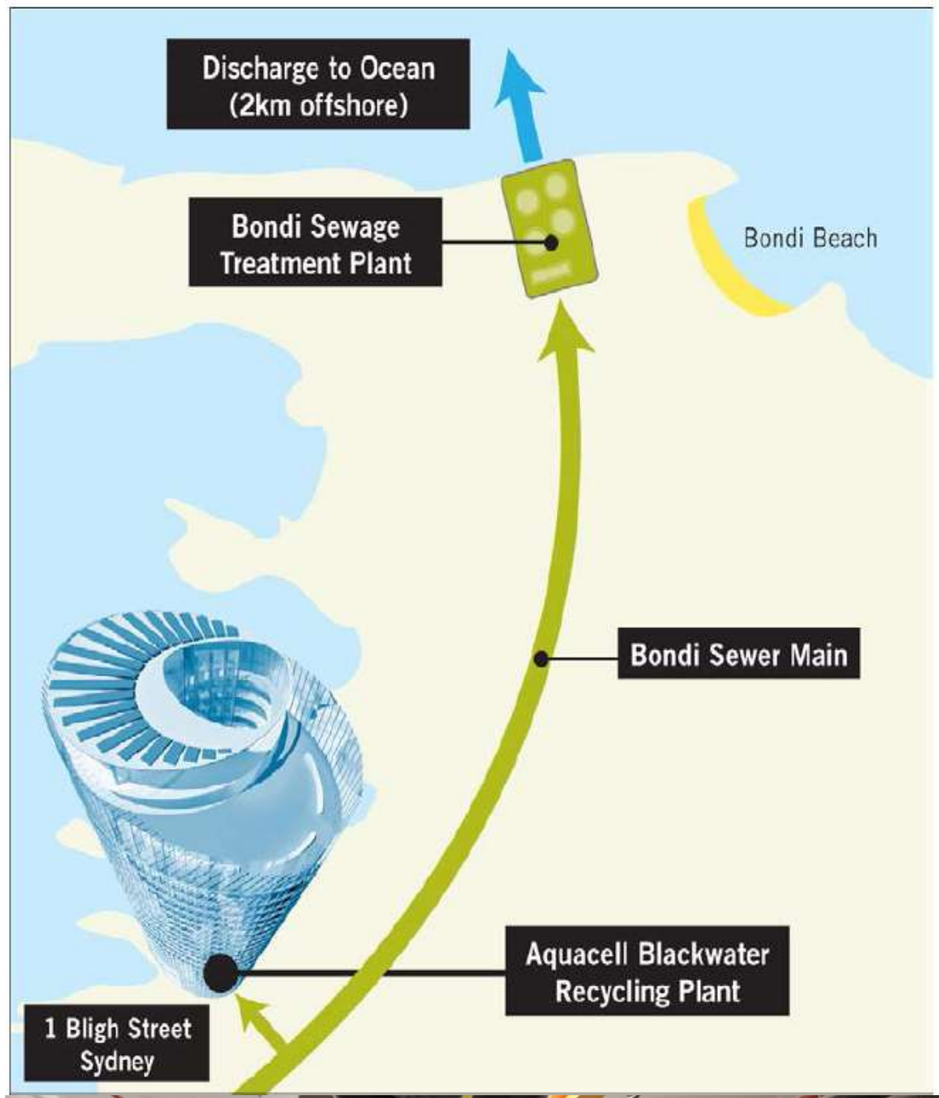


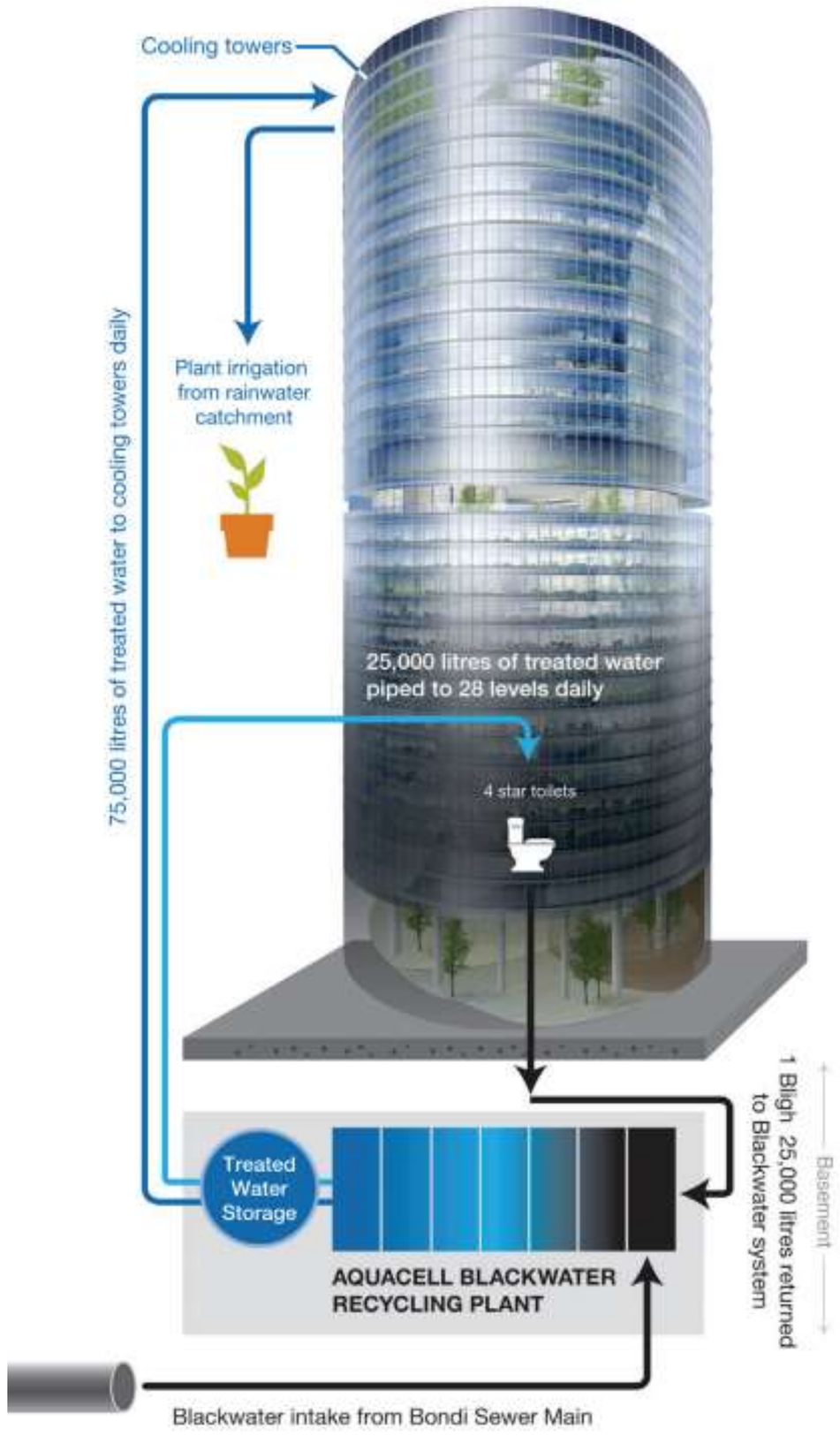
OTHER CONSIDERATION: SUSTAINABLE DEMOLITION METHOD



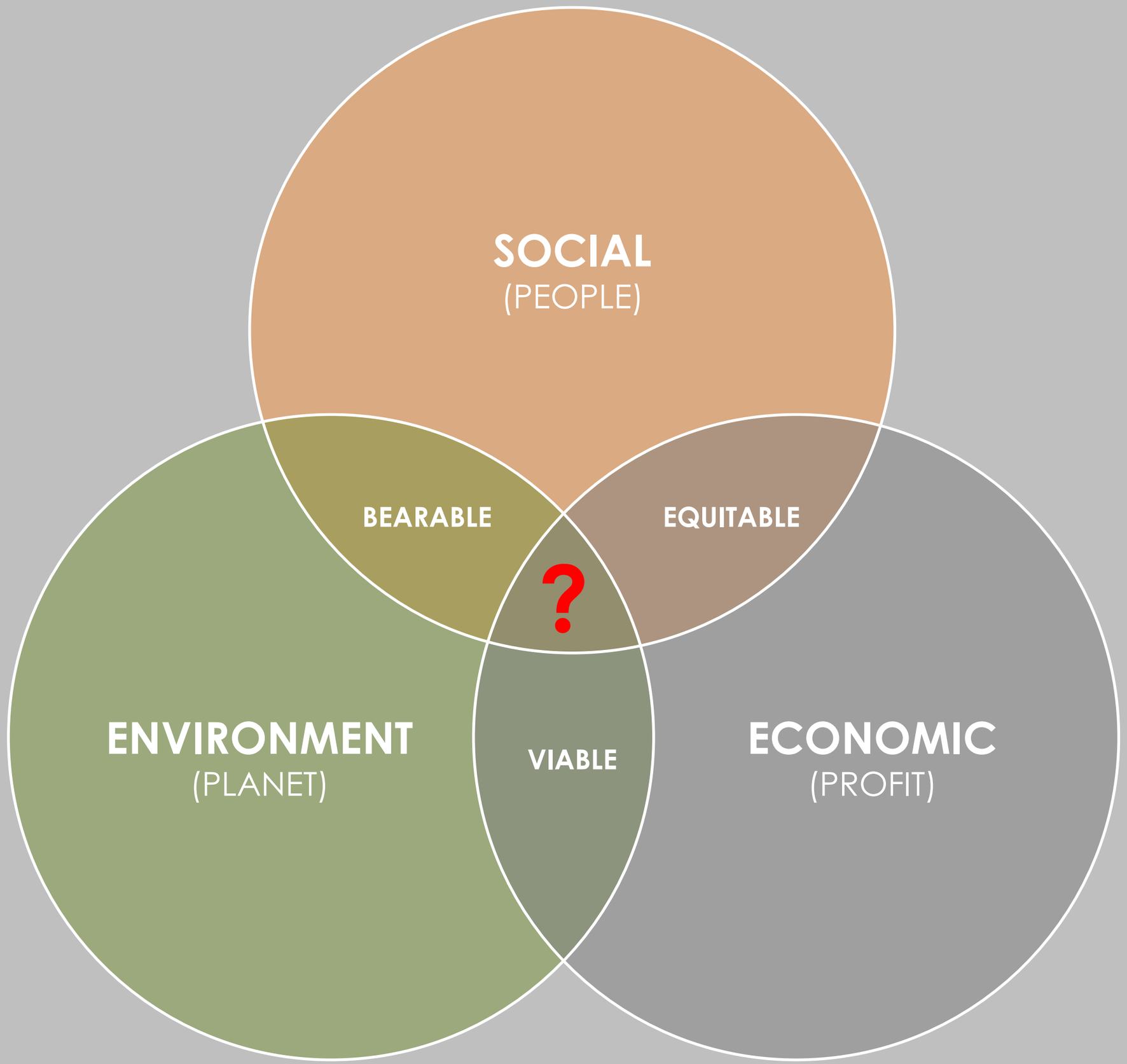


ENVIRONMENT FACTOR CASE STUDY (1 BLIGH STREET, SYDNEY)

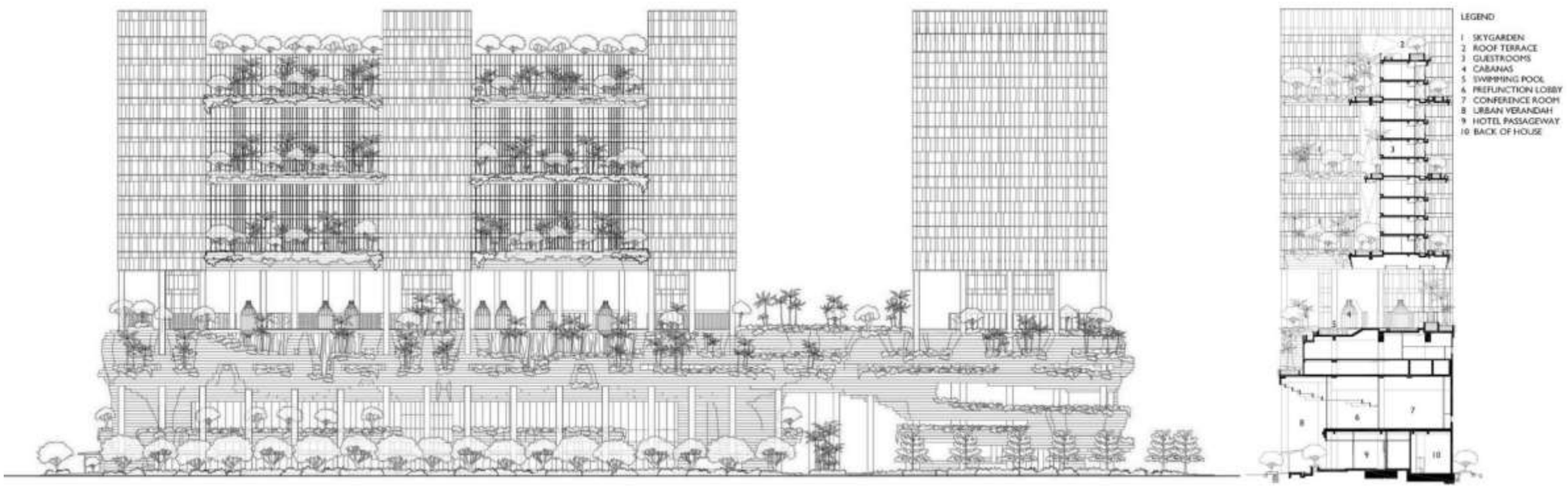




ENVIRONMENT FACTOR CASE STUDY (1 BLIGH STREET, SYDNEY)

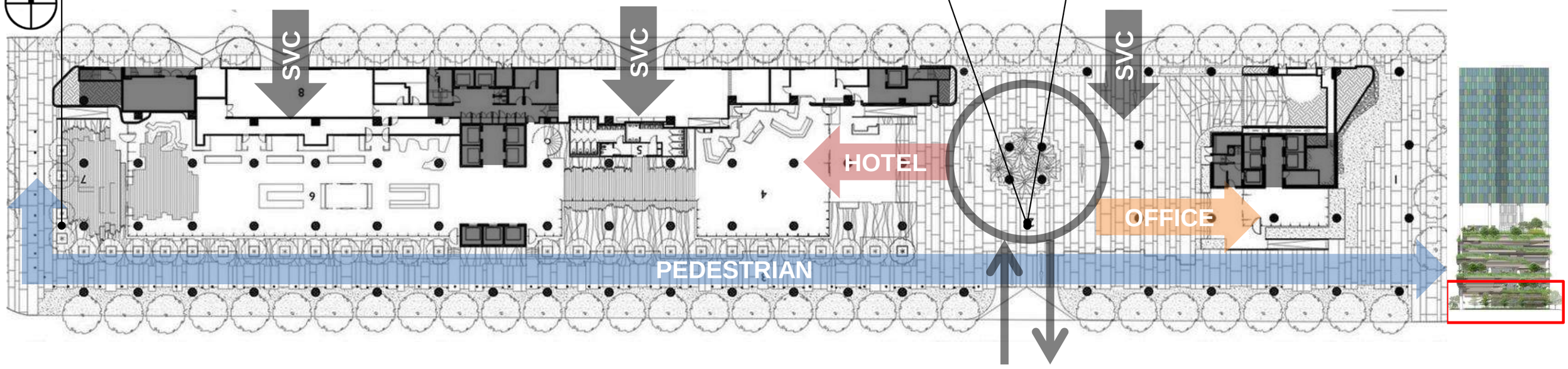


3 PILLARS OF SUSTAINABILITY



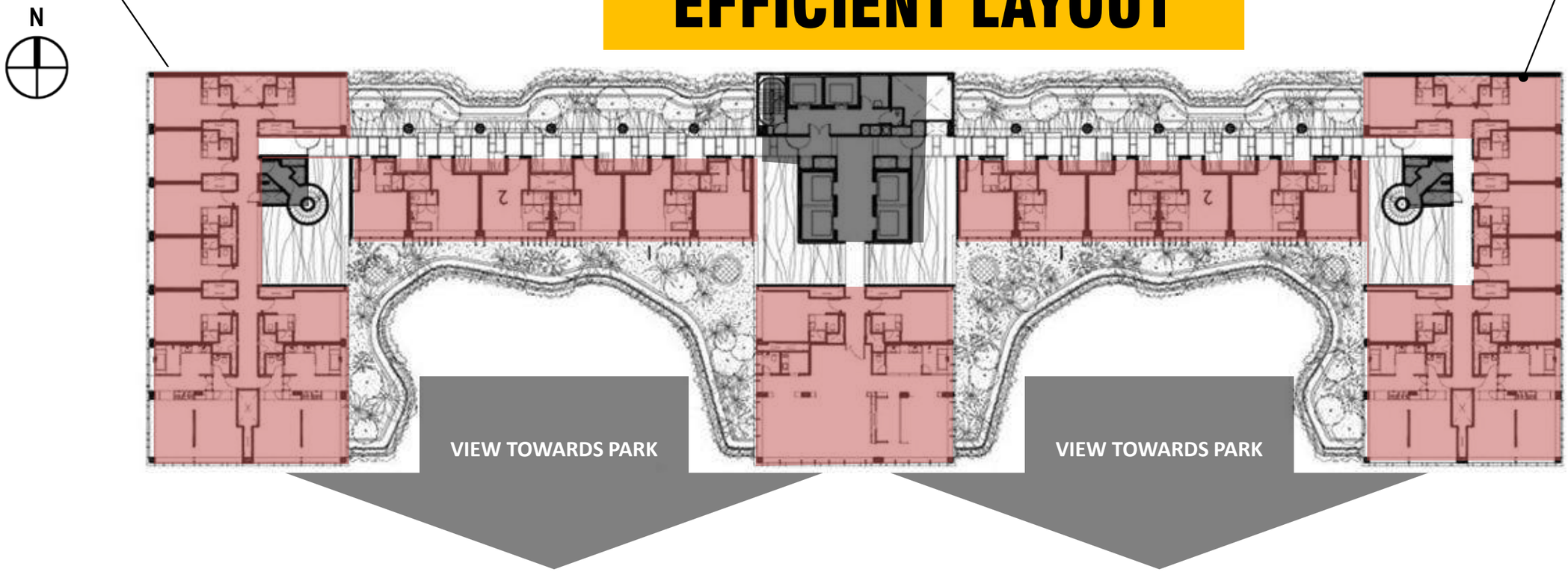
CASE STUDY (PARK ROYAL PICKERING, SINGAPORE)

GOOD SOCIAL SPACE



CASE STUDY (PARK ROYAL PICKERING, SINGAPORE)

EFFICIENT LAYOUT



CASE STUDY (PARK ROYAL PICKERING, SINGAPORE)

SKY GARDEN

GREENERY AT CARPARK

GREEN WALL

WATER CATCHMENT

HARVESTED RAINWATER USAGE

SKYLIGHT

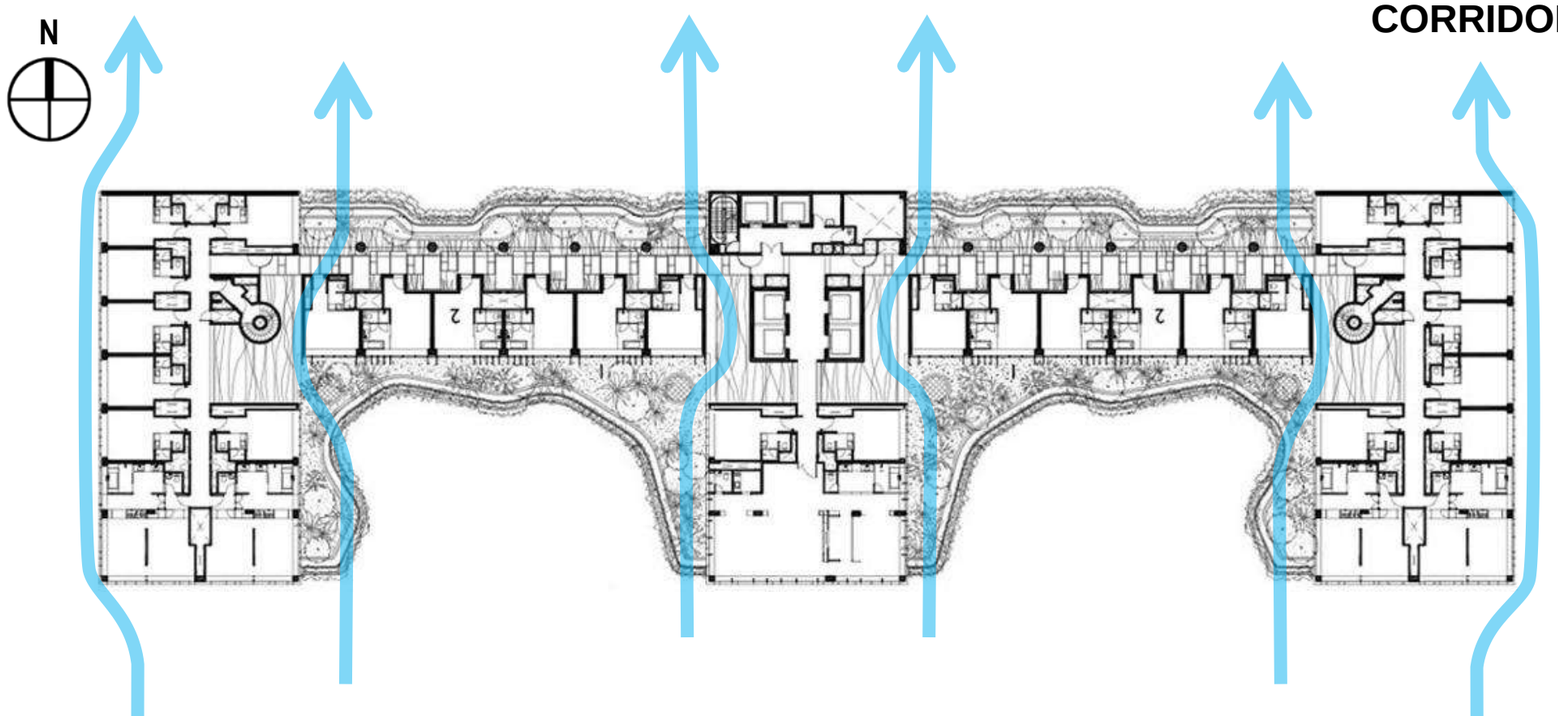
SUN SHADING

NATURAL VENTILATION

NATURALLY VENTILATED CORRIDORS

ORIENTATION

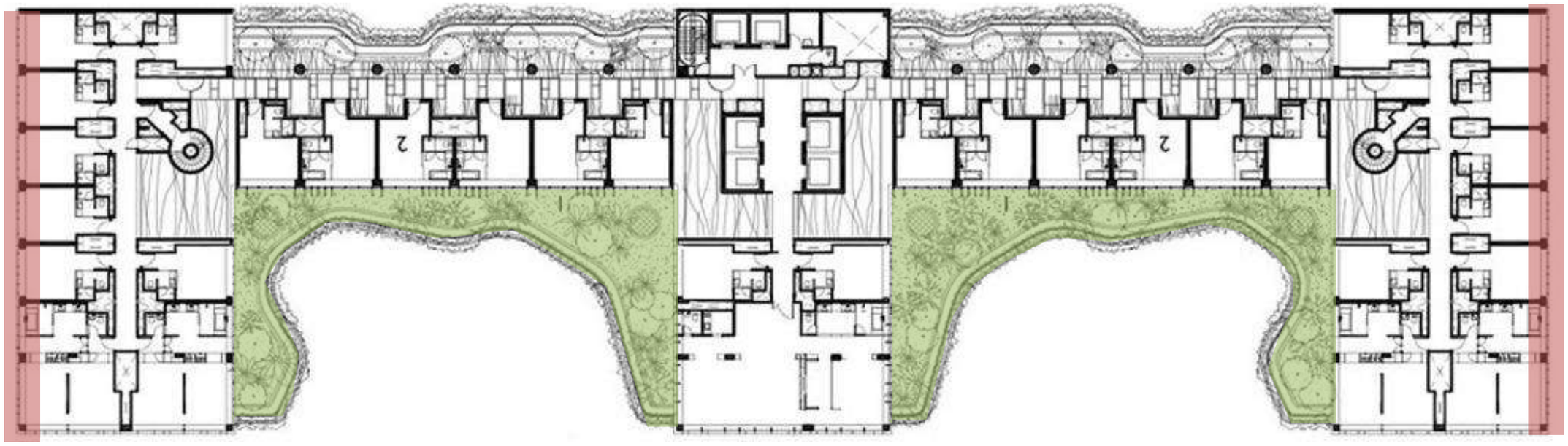
OPEN ROOF (SKY GARDEN)



ENVIRONMENTAL FRIENDLY

CASE STUDY (PARK ROYAL PICKERING, SINGAPORE)

CONTEXTUAL



SHADED BY NEIGHBORING CONTEXT

shade is cast at an urban level, by One George Green Street in the morning and by public housing blocks in the afternoon

GREENERY AND NATURAL LIGHTING

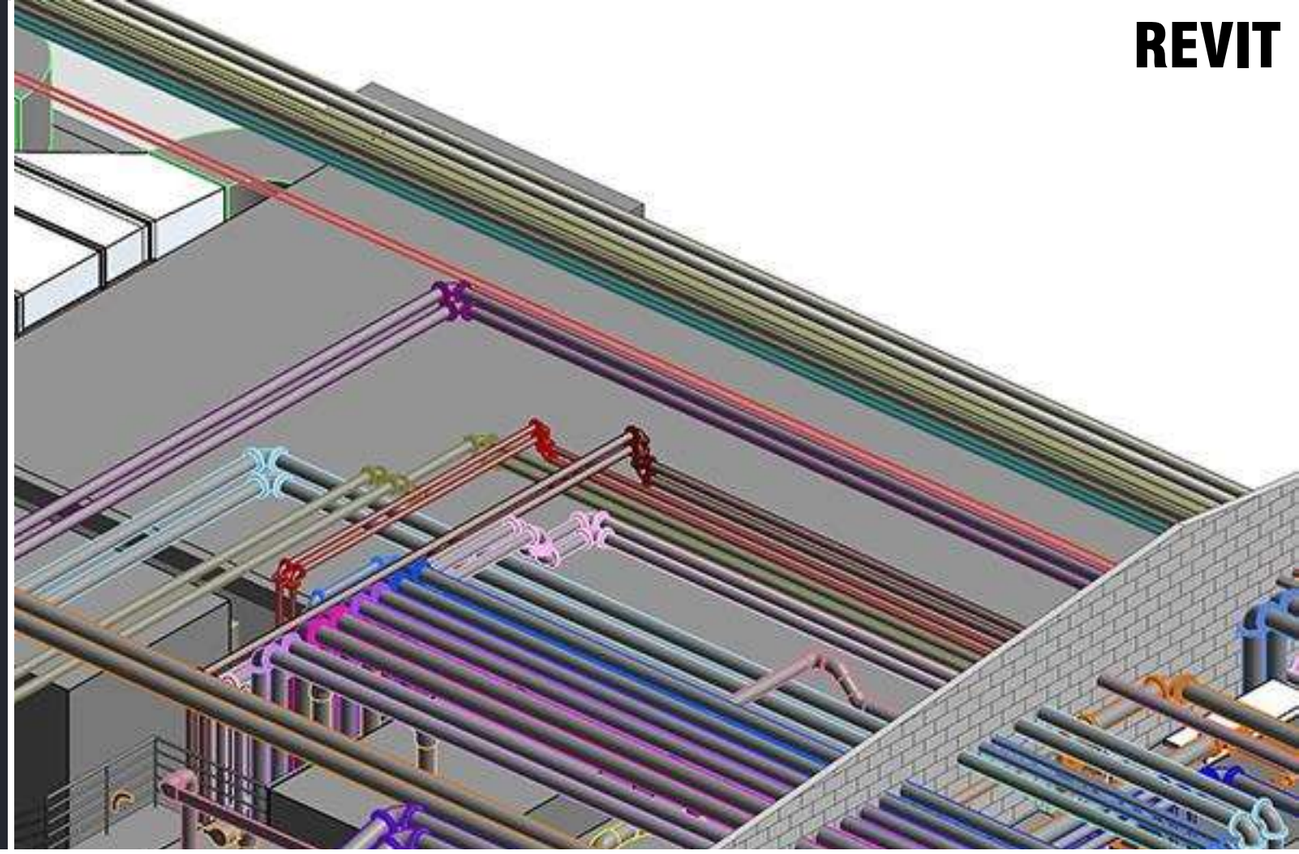
greeneries as sun shading device

greeneries to absorb sunlight and provides more oxygen

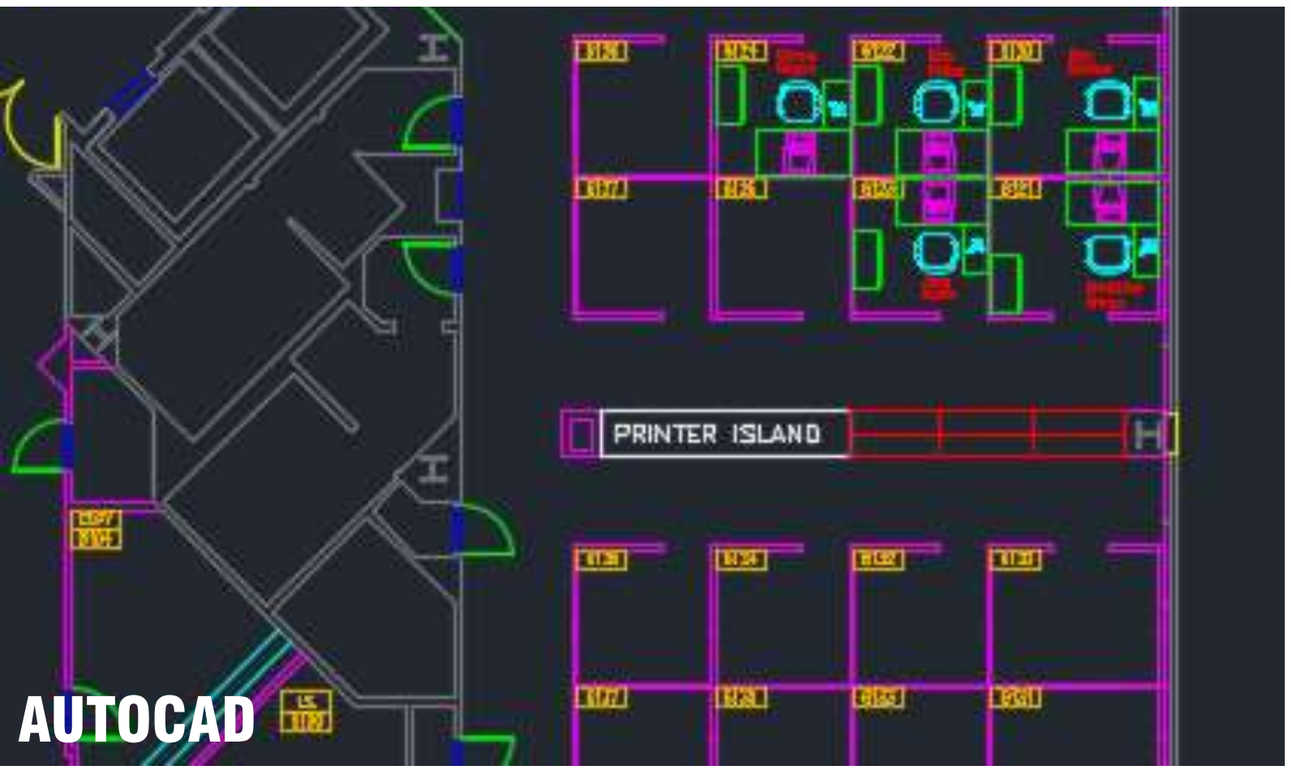
DOUBLE GLAZED LOW-E GLASS

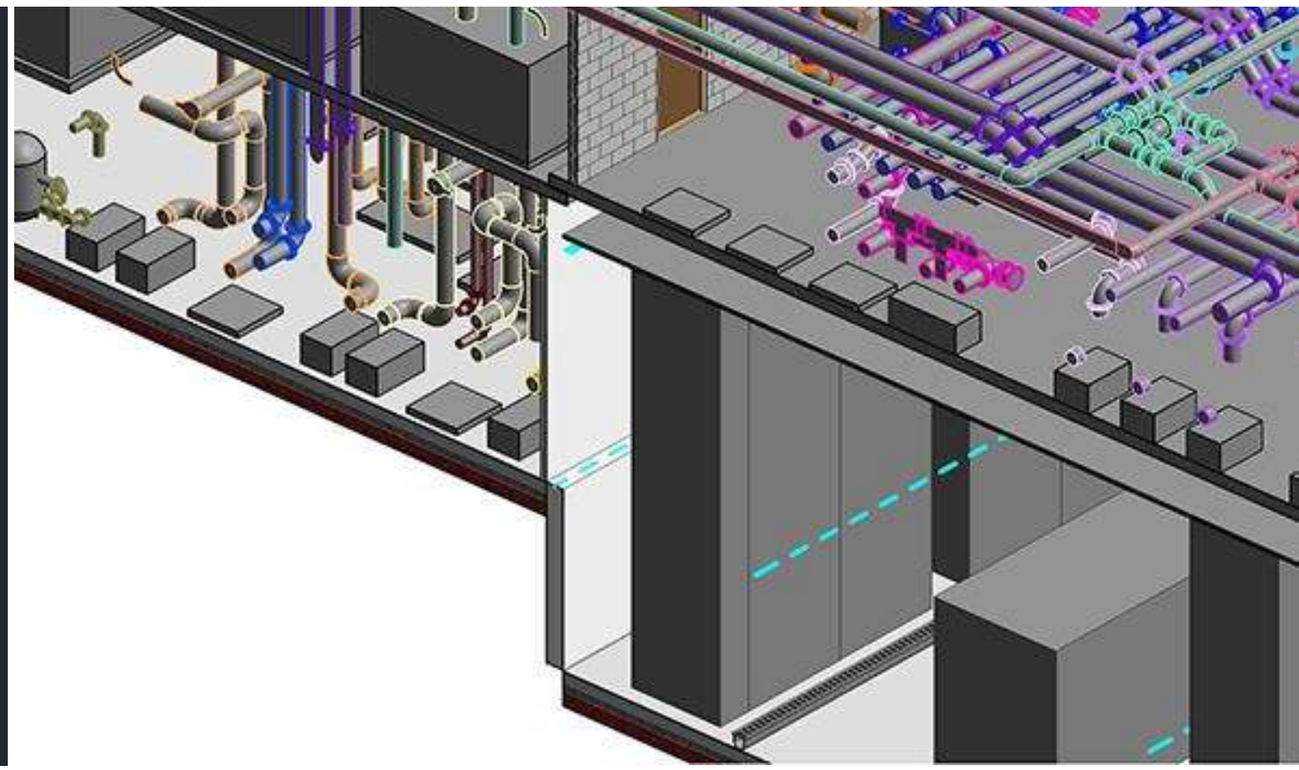
on west and east facing facade

THE FUTURE



BUILDING INFORMATION MODELLING IS A MUST





THE FUTURE

VERTICAL FARMING?

HOW GREEN?

image courtesy of http://intercongreen.com/2014/09/22/hive-farm-proposes-plug-and-play-vertical-farming/

THE FUTURE

THIS SHAPE?

WHAT SHAPE?

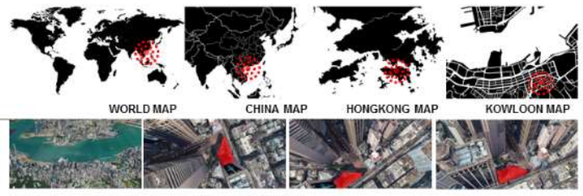
image courtesy of https://charlesayats.fr/project/speed-farming-2050/

THE FUTURE

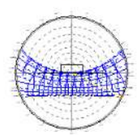
1. INTRODUCTION
2. 5 GENERATIONS OF TALL BUILDING
3. WHAT MAKES A TALL BUILDING SUSTAINABLE?
4. MASTER DEGREE WORKS
5. WORK EXPERIENCE IN DP ARCHITECTS SINGAPORE & KPF LONDON

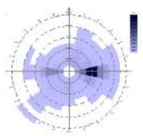
EARTH-WIND-WATER TOWER

WAN CHAI, HONGKONG



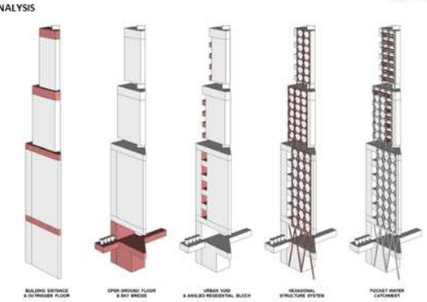
Hong Kong has extremely high residential densities exceeding 110,000 people per km². The responds of having very tall high-density development refers to mitigate scarce land availability is inevitable. The site is located in Wan Chai, Hong Kong. It is one of Hong Kong's major shopping districts. Having some advantage like convenient transportation, ventilation from 2 sides, direct sunlight from morning to afternoon, and good views, this site offers many opportunities to have a self-sufficient building that can provide it owns energy. Hong Kong is affected by both cool northeast monsoons and warm airstreams. Few of Hong Kong's weather phenomena are cyclones, strong winter, summer monsoon, and Thunderstorms.





SITE CONTEXT & CLIMATE ANALYSIS

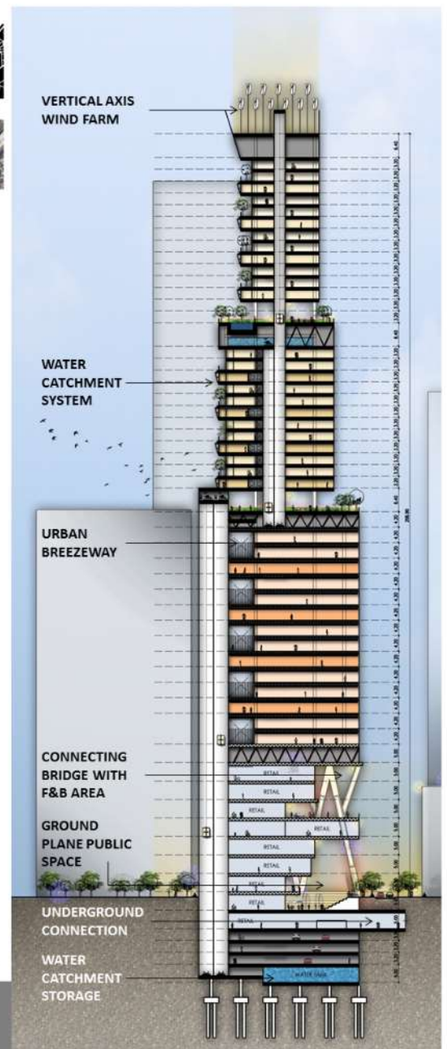
BUILDING FUNCTION



MASSING CONCEPT

AHISKA GHULAM MADIAN

AR'06/G'07



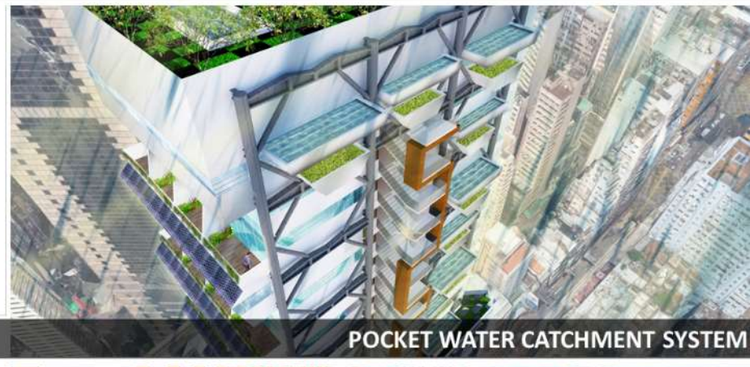
To utilize the wind in Hong Kong that comes from every direction, it uses Vertical Axis Wind Farm. It will allow the turbines not need to be pointed into the wind, which removes the need for wind-sensing and orientation mechanisms, so it can catch the wind from every direction.

LUXURY RESIDENTIAL 3rd FLOOR PLAN

VERTICAL AXIS WIND FARM

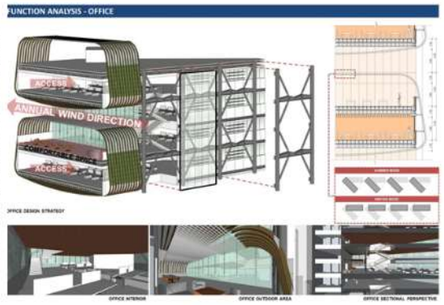
The pocket water catchment system is installed on each of residential unit, allowing them to maintain it independently. It will also make a distinguished façade pattern. With total of 14.400ft2 surface area, the pocket water catchment system will supply 764.000 gallons of water per year.

RESIDENTIAL 1st FLOOR PLAN



POCKET WATER CATCHMENT SYSTEM

The office area will have 75% net efficiency of space with an outdoor breakout space that being cut-out from the overall mass. This will allow annual wind to pass through the building, thus improving the urban environment and reducing the urban heat island effect.

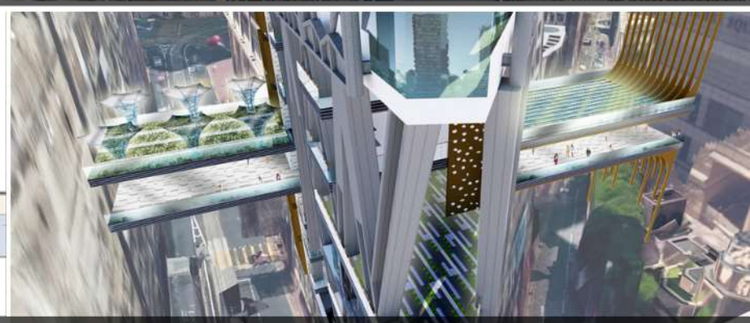


TYPICAL OFFICE 1st FLOOR

URBAN BREEZEWAY

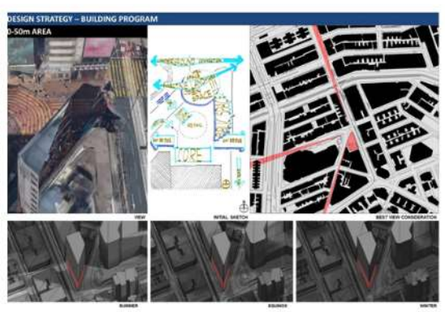
The retail consists of 9 story open space retail area with outdoor F&B space and connecting bridge to adjacent surrounding buildings. This open space will improve the pedestrian quality space, as it is usually very cramped in Hong Kong.

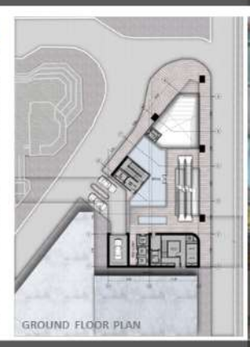
4th FLOOR PLAN



CONNECTING BRIDGE WITH F&B AREA

To support walking pattern condition, the ground plane is elevated and sunken, to provide more social space that open and accessible to people to walk by. To allow more people coming to the building, it will also connect on underground area that links to subway station.





GROUND FLOOR PLAN

GROUND PLANE PUBLIC SPACE

Cities to Megacities

Shaping Dense Vertical Urbanism

CTBUH 2016 International Student
Tall Building Design Competition

Semi-Finalist

"Water-Wind-Earth"

The student listed below participated in the CTBUH 2016 Student Design Competition and has been awarded the status of Semi-Finalist out of over 212 submissions received.

Ahiska Ghulam Madian

University of Nottingham

October 18th, 2016

David Malott
CTBUH Chairman

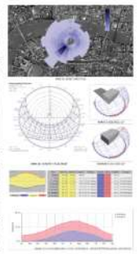
Antony Wood
CTBUH Executive Director

AWARD

THE LONDON HIVE

High-density Integrated Vertical Ecosystem

SITE LOCATION



The site is bounded by the Thames River walkway and the southern entrance to Blackfriars to the north, Hopton Street to the east, Southwark Street to the south-west and Blackfriars Road to the west. The site includes the viaduct of the Thameslink railway line.

The main concept for the ground plane is to maximise the permeability for residents, workers, shoppers and tourists. Tens of thousands of people walk past the site every day. Pedestrians can explore the opened-up Victorian railway viaduct, finding markets, shops, food and beverage, galleries and community spaces. All vehicle servicing is below, in the lower basement. The shopping arcade will emphasis the fresh food culture, aided by the vertical farming in the towers above. Hanging vines catch sunshine under the rooflights. They provide natural shading and bring nature and light powerfully into the public spaces.

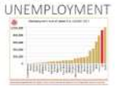
MAIN CONCEPT

To solve three main problems

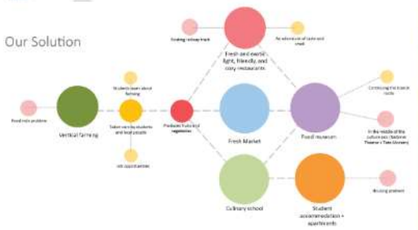
FOOD MILES

HOUSING SUPPLY

UNEMPLOYMENT



Our Solution



SECTION

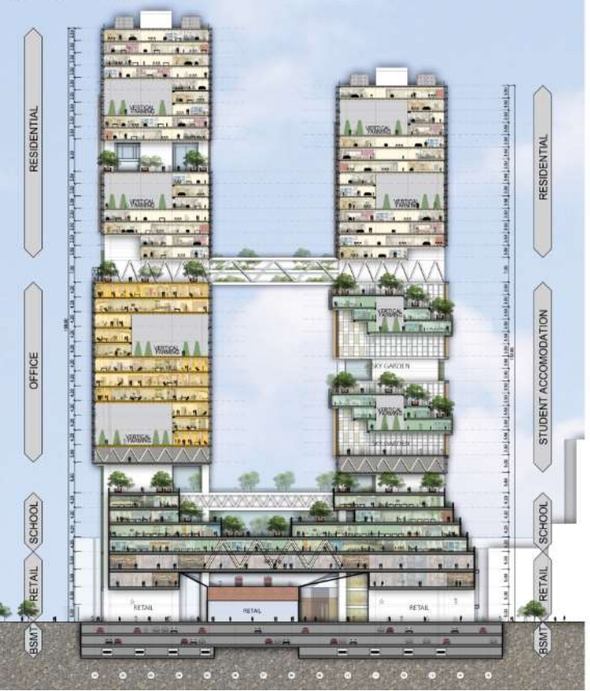
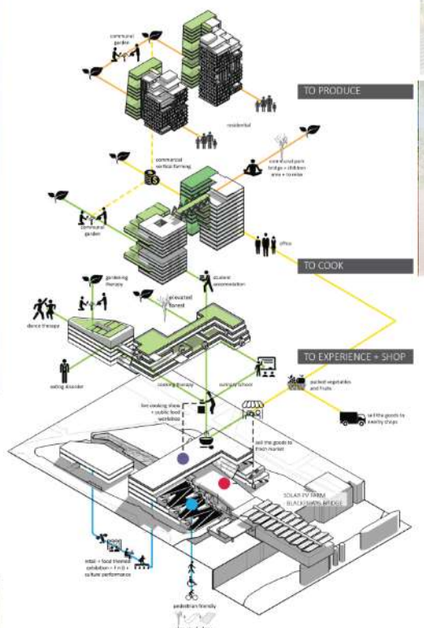
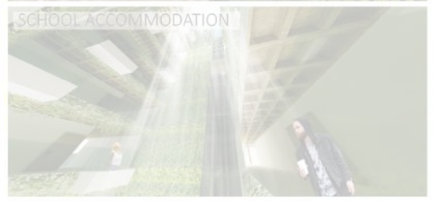


DIAGRAM ACTIVITY LOOP



THERAPY GARDEN

SCHOOL ACCOMMODATION



ELEVATED PARK

SOUTH ENTRANCE

TO PRODUCE

BUILDING ECOSYSTEM

The **vertical farming** will incorporate **Apiculture** and **Vermiculture** to create a self-sufficient system. The food **will** be distributed to the culinary school and other food outlets in the cluster.

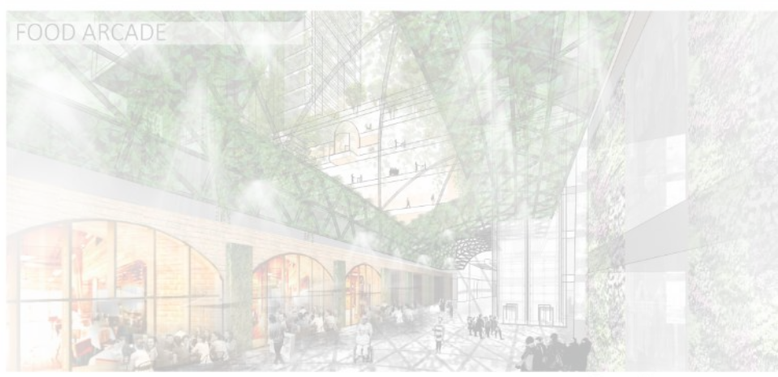
TO COOK

The culinary school will provides a place to minimize the food waste problem by providing a place for people to sell their goods on a school-owned restaurant. It will educate people for cooking and food preparation, either for professional chef or amateur enthusiast.

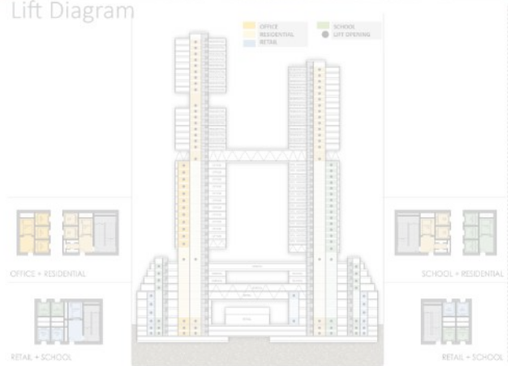
TO EXPERIENCE + SHOP

The main idea for the ground floor plan is to maximize the permeability for pedestrians to cross and to provide an exciting food culture environment by using the existing historic Victorian railway viaduct and a fantastic arcade with hanging vines within the structure - to create a shadow effect and bring green nature into the shopping experience.

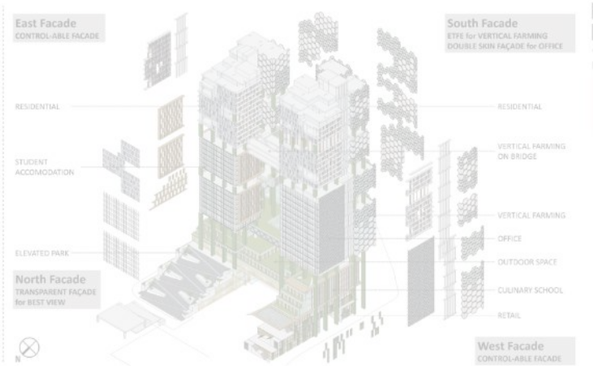
SITE PLAN



Lift Diagram



Structure Diagram



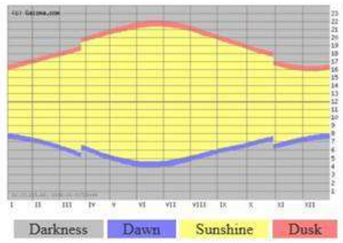
Facade Diagram

"Why honeycomb is composed hexagons, rather than any other shapes?"

(+) Maximum ETFE surface
(+) Easy to fabricate
(+) No gaps between cells
(+) Less steel frame being used

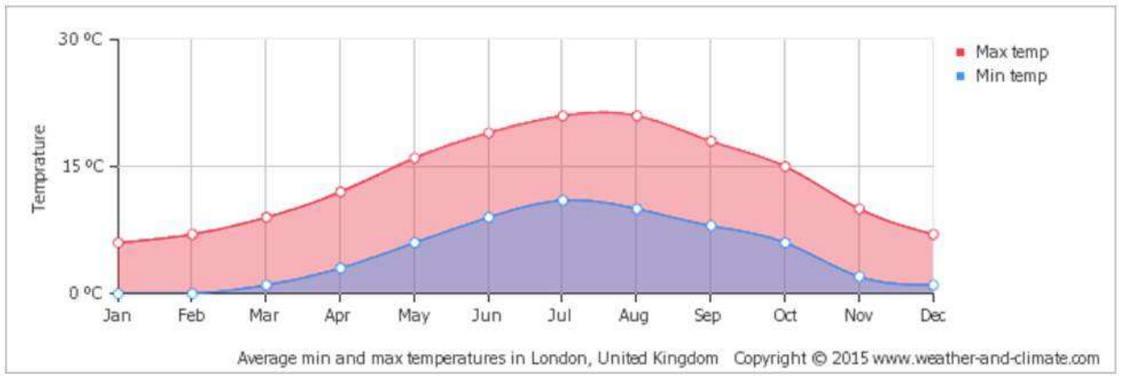
Climate Analysis

Introduction

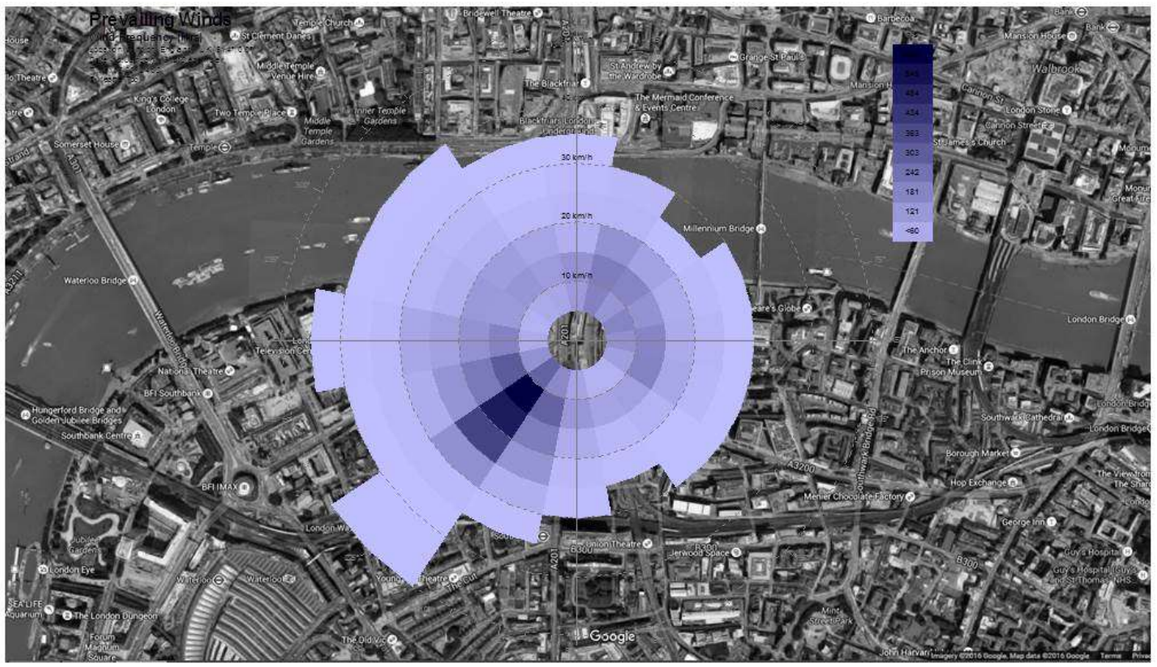


Date	Sunrise	Sunset	Length	Change	Dawn	Dusk	Length	Change
Today	07:40	16:49	9:09		07:03	17:25	10:22	
+1 day	07:38	16:51	9:13	00:04 longer	07:02	17:27	10:25	00:03 longer
+1 week	07:28	17:02	9:34	00:25 longer	06:53	17:37	10:44	00:22 longer
+2 weeks	07:16	17:14	9:58	00:49 longer	06:41	17:49	11:08	00:46 longer
+1 month	06:43	17:43	11:00	01:51 longer	06:09	18:17	12:08	01:46 longer
+2 months	*06:35*	*19:34*	12:59	03:50 longer	*06:01*	*20:08*	14:07	03:45 longer
+3 months	*05:32*	*20:24*	14:52	05:43 longer	*04:53*	*21:03*	16:10	05:48 longer
+6 months	*05:25*	*20:48*	15:23	06:14 longer	*04:44*	*21:28*	16:44	06:22 longer

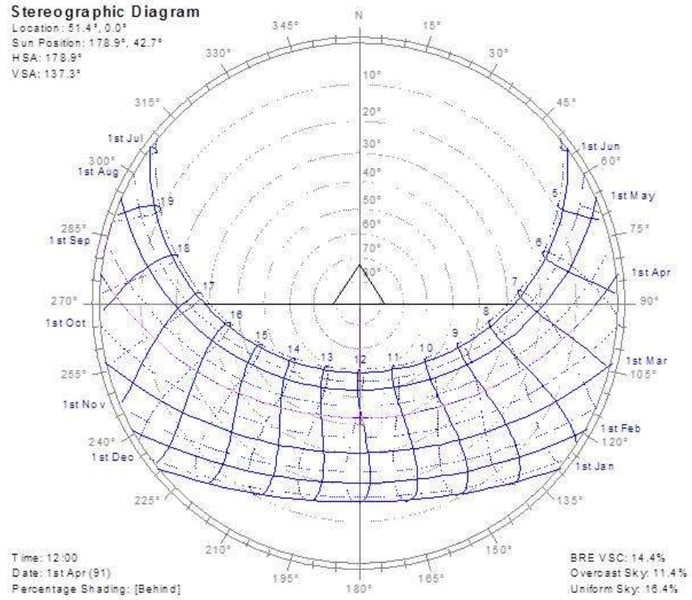
DAYTIME HOUR



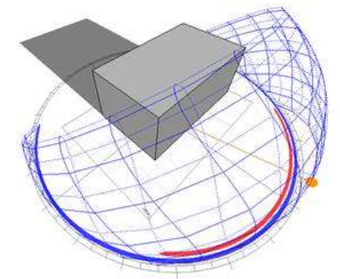
ANNUAL AVERAGE TEMPERATURE



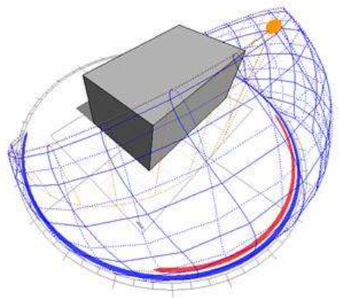
ANNUAL WIND DIRECTION



ANNUAL SUN PATH DIAGRAM



WINTER SOLSTICE 15°



SUMMER SOLSTICE 62°

As London is located at the northern hemisphere, it has four different seasons. Additionally, the weather can be unpredictable as heatwaves and out-of-season storms can occur throughout the year. Therefore, most tourists would usually visit London between April and October when the weather is warm and pleasant.

According to the annual sun path diagram above, the sun would typically move at the south. Moreover, the sun never moves to the northern hemisphere in autumn and winter; while it rises from North-East and sets North-West during spring and summer.

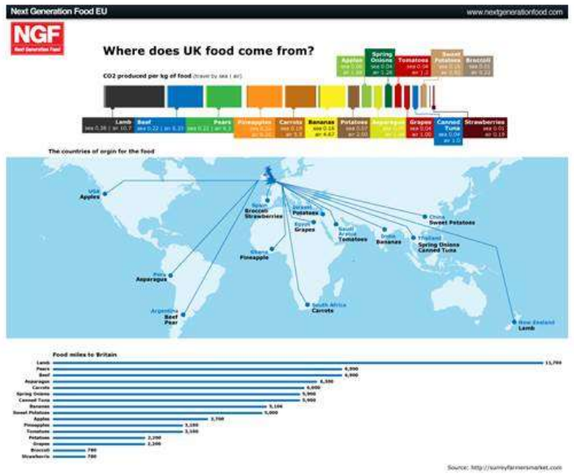
The prevailing wind is from the south-west with the average wind temperature around 10 – 20 degree Celsius which occurs almost everyday in a year.

Main Concept

Introduction

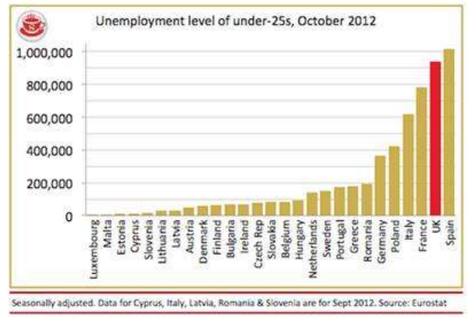
Three main problems

Food miles

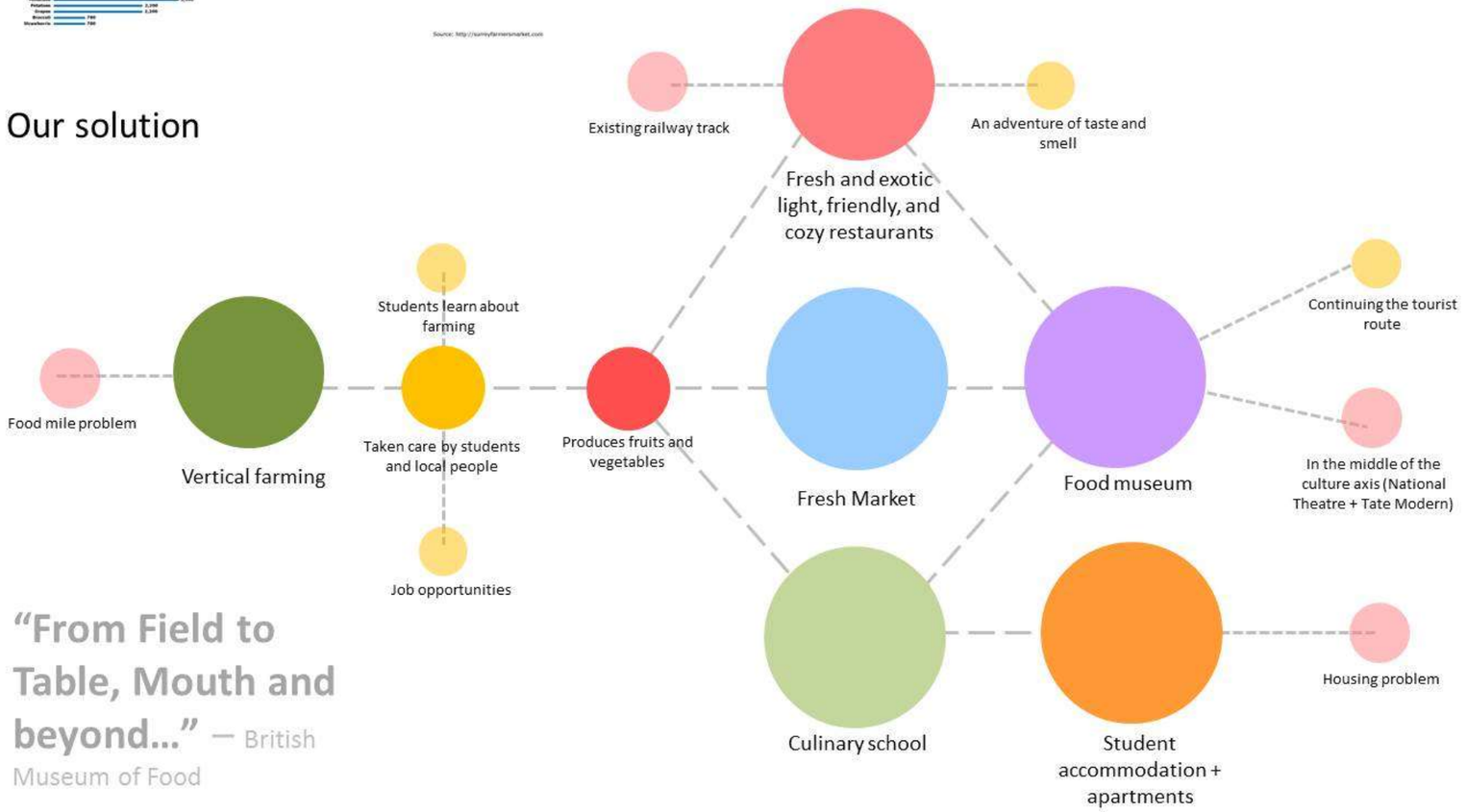


Housing supply

Unemployment



Our solution



"From Field to Table, Mouth and beyond..." — British Museum of Food

The food that people in the UK consume comes from overseas. Therefore, it has caused a broader range of sustainable issues from environmental, social, economic, and local food. Moreover, there is a 559,000 expected shortfall of housing supply in London by 2022. Additionally, London's employment rate is higher than other cities in the UK – the rate is 7.5 per cent, above the GB 6.6 per cent average.

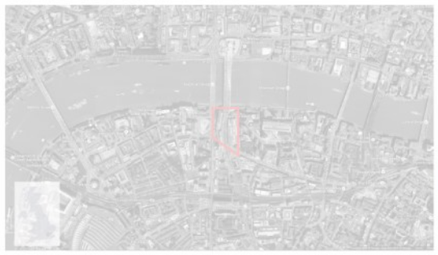
Therefore, this studio project will try to solve these three main problems by designing a mixed-use tower complex that consists of vertical farming, residential, culinary school, eating disorder unit, student accommodation and an impressive ground scape for the public to enjoy the experience food culture. Different uses within the complex will be expected to be connected (program wise), creating an activity loop that will benefit from each other and to promote a sustainable life style.

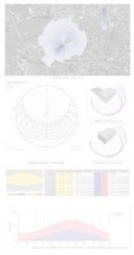
Sources:
https://www.eta.co.uk/environmental-info/food-miles/ Accessed on 12 April 2016
http://housinglondon.org/ Accessed on 12 April 2016
http://leftfootforward.org/2014/06/unemployment-figures-london-continues-to-pull-away-from-the-rest-of-the-country/ Accessed on 12 April 2016

THE LONDON HIVE

High-density Integrated Vertical Ecosystem

SITE LOCATION





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Our Solution

SECTION

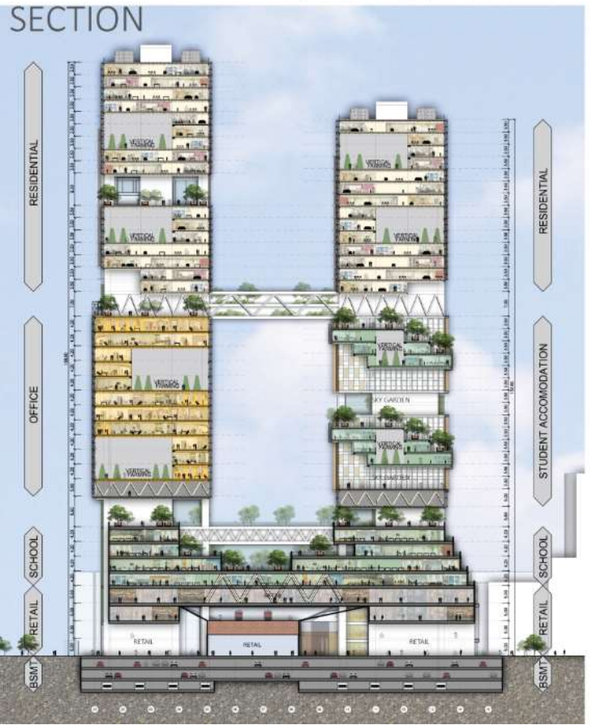
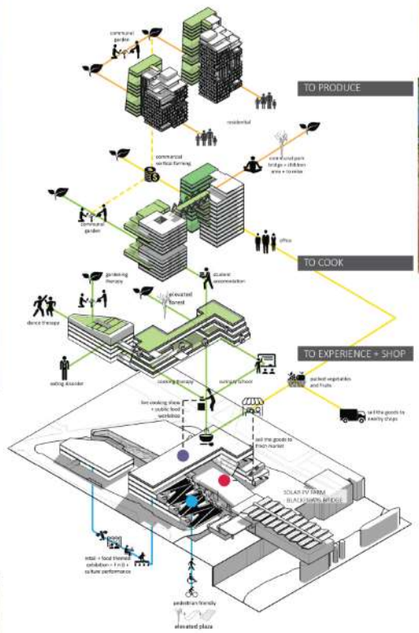


DIAGRAM ACTIVITY LOOP



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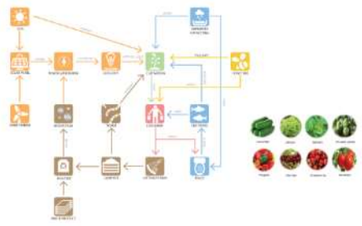

TO COOK

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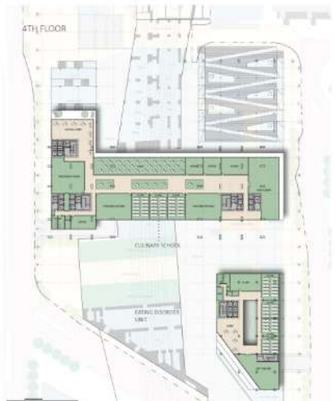

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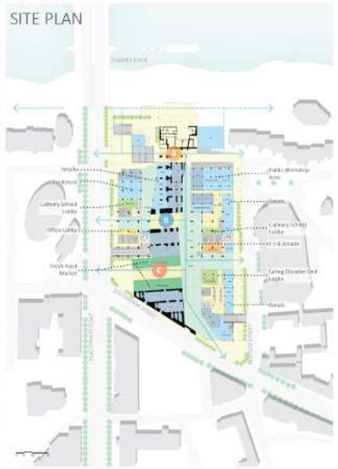
SITE PLAN



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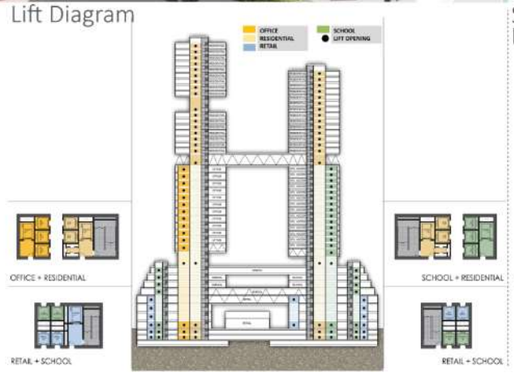
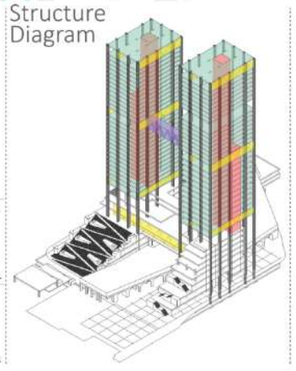


Structure Diagram



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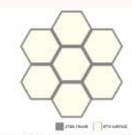
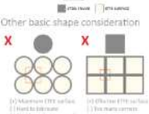


Other basic shape consideration



RETAIL | SCHOOL | OFFICE | RESIDENTIAL

168.90

5.00 5.00 5.00 5.00 4.20 4.20 4.20 4.20 8.60 5.00 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 7.00 3.50 3.50 3.50 3.50 3.50 3.50 3.50 9.30 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50

VERTICAL FARMING

RETAIL

5.00 5.00 5.00 5.00 4.20 4.20 4.20 4.20 5.80 5.00 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 7.00 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50

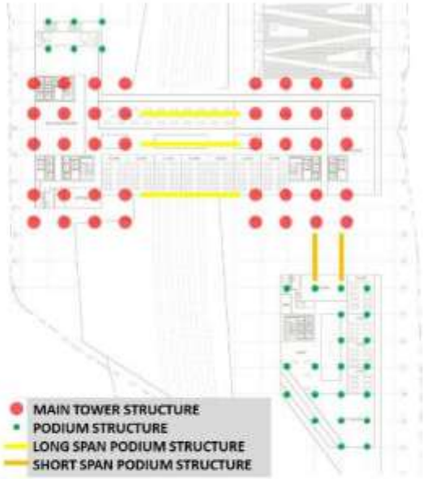
152.60

RETAIL | SCHOOL | STUDENT ACCOMODATION | RESIDENTIAL

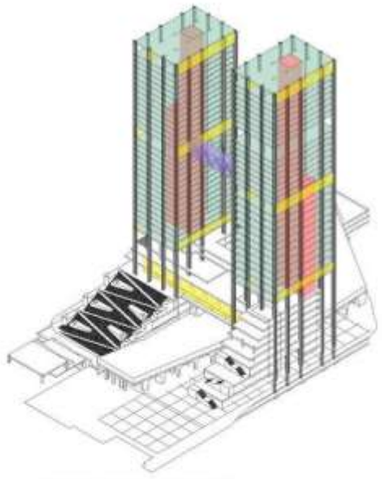
Structure Diagram

Structure

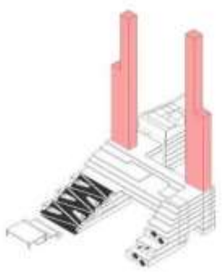
The development consist of 2 high-rise tower, in which have 164m and 150m height respectively. Besides the usual service core as the main structure, it will also have outrigger and bracing system to support the entire building. To mitigate the risk of future earthquake, an base isolation technology was used on the foundation.



Column and Slab Position



Sky bridge and Projection Structure



Reinforced Concrete Core

Steel Column

Holedeck System Floor

Outrigger and Base Isolation System

Arcade's structure: Diagrid structure

Structure

A Diagrid (literally means diagonal grid) is formed of many triangular pieces that make a strong 3D shape. In most applications, diagrids provide structural support to buildings that are non-rectilinear, adapting well to highly angular buildings and curved forms. The Diagrid acts as an exoskeleton, with much of its strength is on the outside in its shell. Diagrid systems are also used as roofs to create large column-free spans.

Advantages

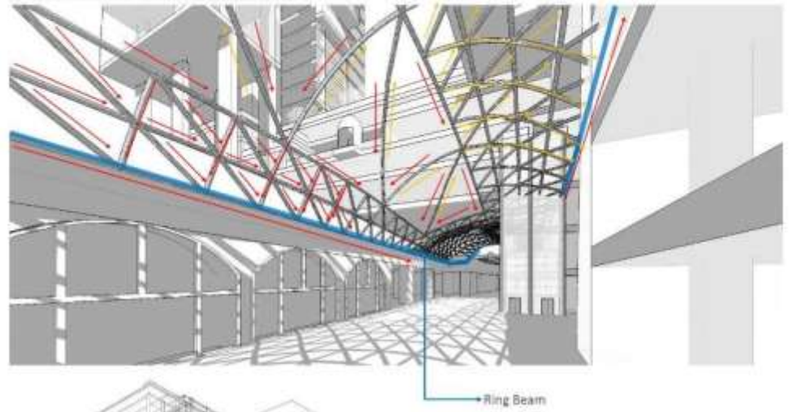
- Provides a column free interior and exterior space
- Abundance of day lighting
- 1/5 reduction in steel
- Simple construction techniques and similar design to a typical moment frame
- Flexibility in designing the floor plans
- Aesthetically unique and expressive

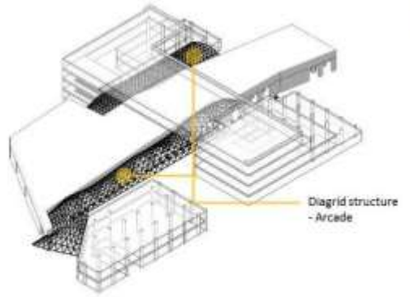
Ring beam has been added along the edge of the diagrid to make the structure more rigid and stronger – as the configuration does not look like a conventional shell diagrid structure.

Ring beams help to support the diagrid structure by connecting the walls together and increases the load capacity

To achieve a suitable diagrid structure for the arcade, the roof design was calculated and generated by Rhino 3D software.

ARCADE PERSPECTIVE – STRUCTURE LOAD DIAGRAM



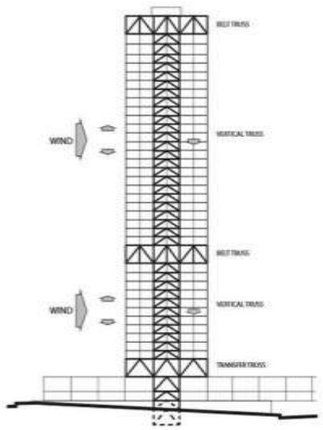


ROOF CONSTRUCTION PROCESS – welding

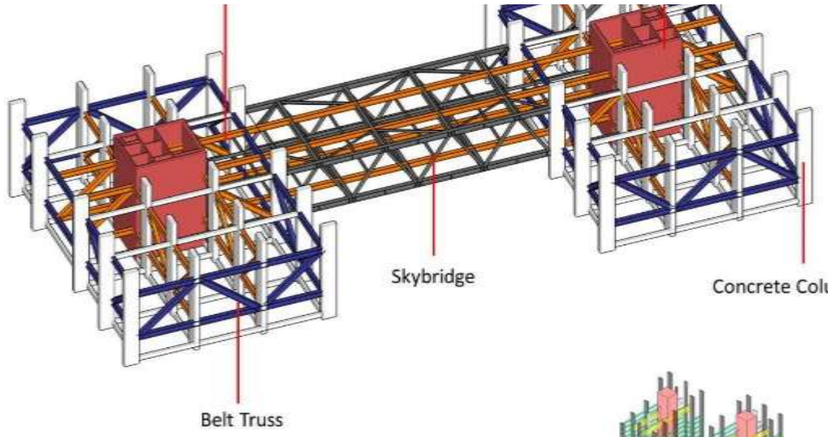
Sources:
http://structurallyfound.org.uk/diagrid/ Accessed on 12 April 2016
Terri Meyer Boake (23 January 2014). Diagrid Structures: Systems, Connections, Details. Birkhäuser. pp. 13–. ISBN 978-3-03821-482-3
Genduso, Brian. "Structural Redesign of a Perimeter Diagrid Lateral System: University of Cincinnati Athletic Center." Senior Thesis. Penn State University. Spring 2004

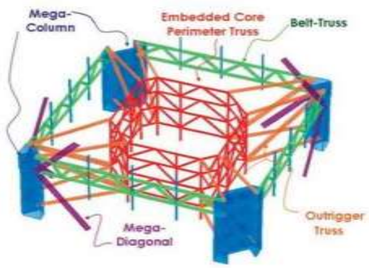
STRUCTURE

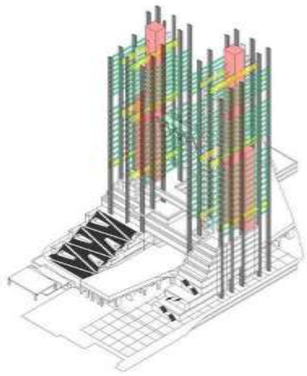
Outriggers are rigid horizontal structures designed to improve building overturning stiffness and strength by connecting the building core or spine to distant columns. By using outrigger it improves the building resistance to lateral force such as wind. The structure system consist of Belt truss which connect the outer column, and the outrigger which connect the outer column to the central core.

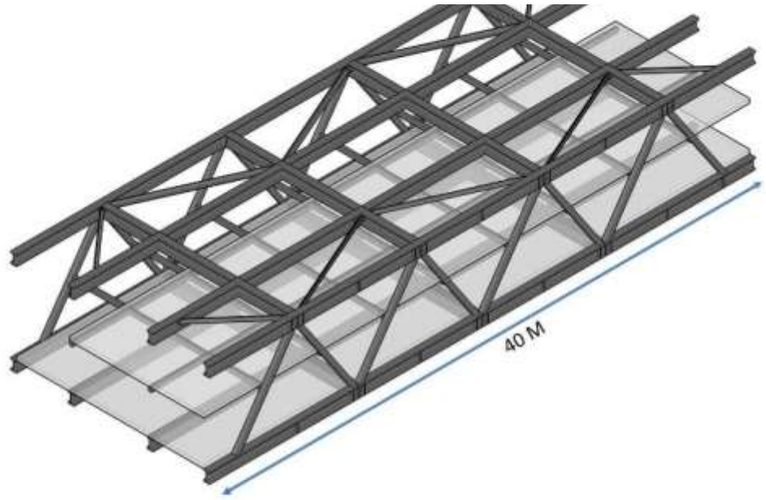


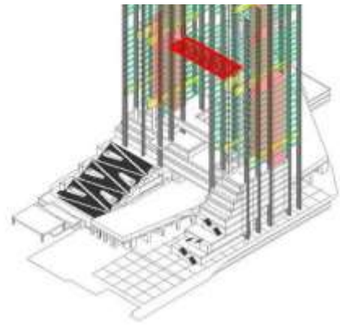
https://store.ctbuh.org/Books/2012_CTBUHOutriggerGuide.pdf



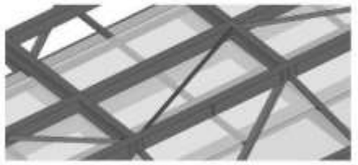




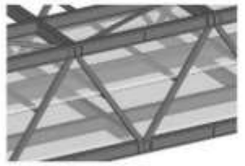




The skybridge that connects the two tower and also with the outrigger acts as a supporting structure that help stiffen both tower to increase the resistance from lateral force. The bridge will also helps the evacuation between the two towers.



Diagonal Stiffener

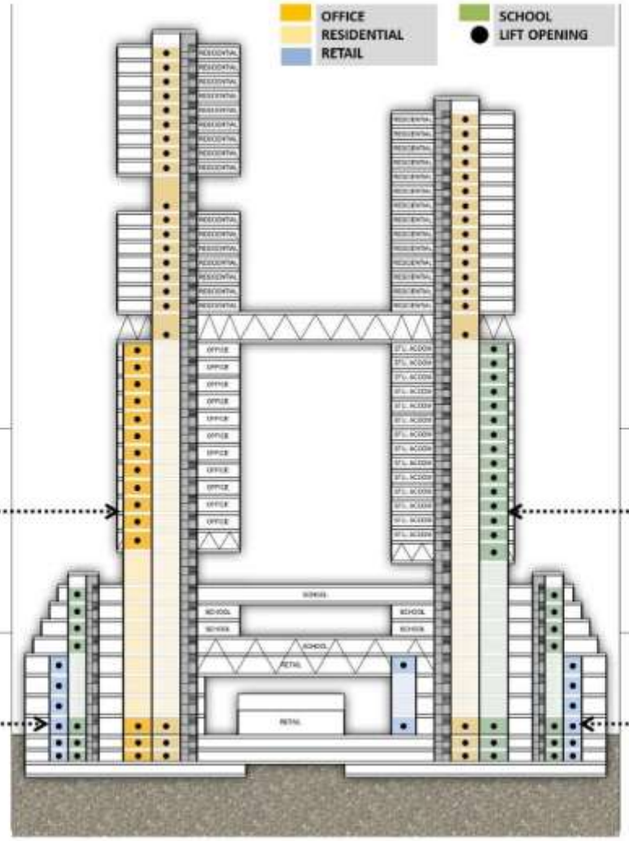


Joint Detail

http://www.dezeen.com/2016/02/09/sky-habitat-moshe-safdie-architects-singapore-housing/

BUILDING SYSTEM

Lift Strategy
Systems




GROUND FLOOR PLAN

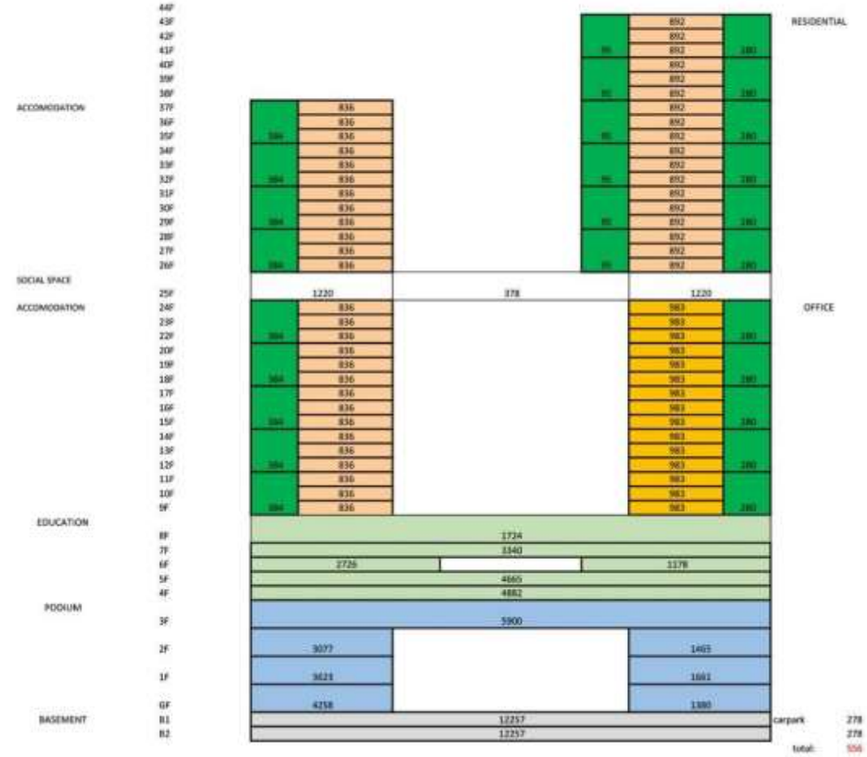

OFFICE + RESIDENTIAL


SCHOOL + RESIDENTIAL


RETAIL + SCHOOL


RETAIL + SCHOOL

Stacking diagram
Blackfriars, London

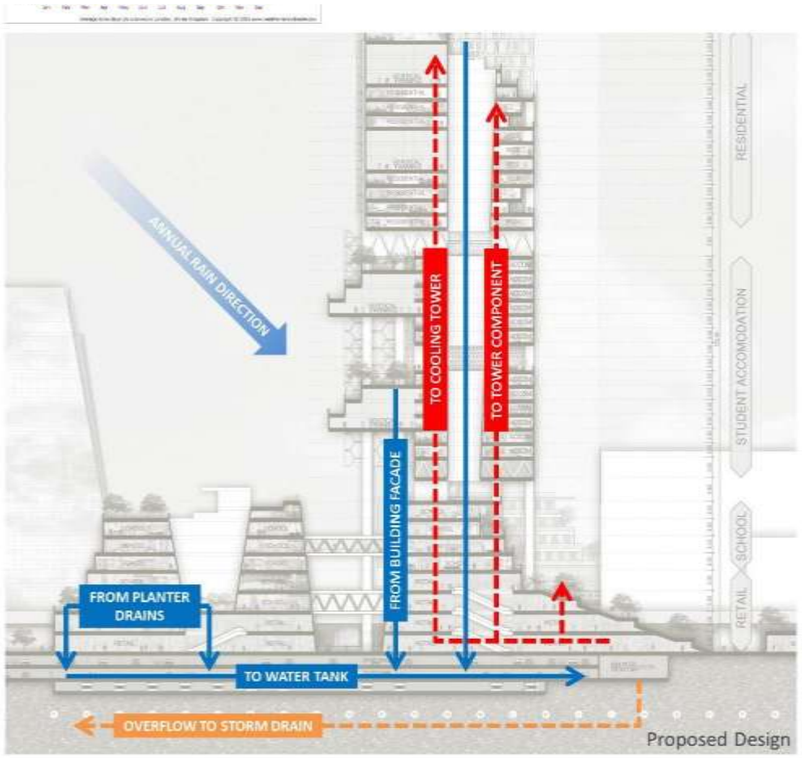


FUNCTIONS	GFA (sqm)	FLOORS
PODIUM	21364	4
EDUCATION	18515	5
ACCOMODATION	22572	27
RESIDENTIAL	16056	18
OFFICE	14745	15
VERTICAL FARMING	7106	11
BASEMENT	34514	2
SOCIAL SPACE	2818	1
total (without B):	101176	
total:	127690	

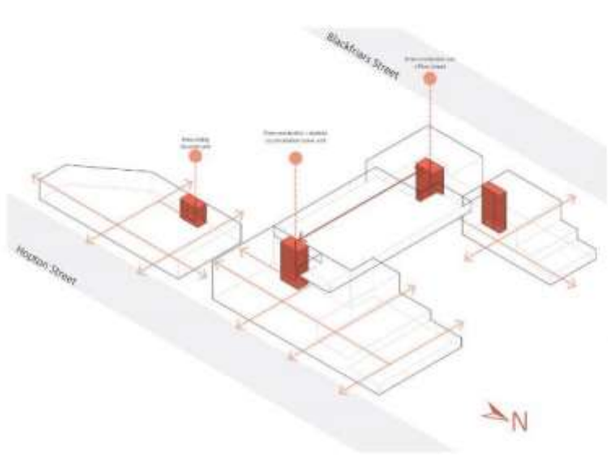
Perkins & Will Office Rainwater Harvesting System
Source : http://perkinswill.com/ (Accessed on 27th December 2015))

Edith Green Building Rainwater System
Source : http://www.aiatopten.org/node/354
Accessed on 22nd December 2015

Reference Image



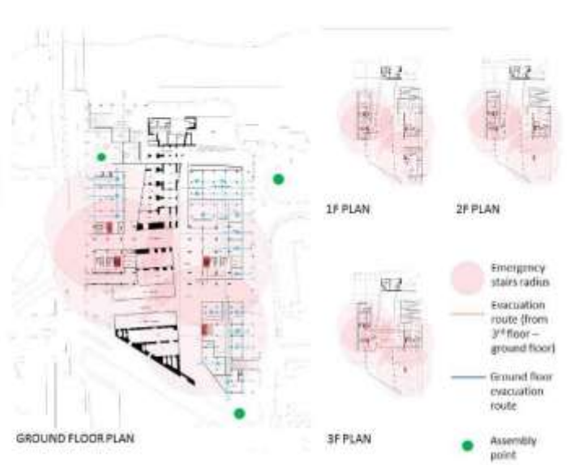
Proposed Design



The podium has a total of four fire escape escalators that runs along from different areas: two from the each towers, one from the health care unit, and one is within the podium itself. The position of the staircase has been calculated according to Neufret's standard which covers a radius of 45m of the area, therefore the podium has sufficient numbers of emergency staircases..

There will be plenty of exit signs to lead people to go towards the assembly point.

There are three assembly points: one at the northern part of Blackfriars street and each at the northern and southern part of Hopton street. These area are chosen because it has a large open space to accommodate a crowd of people and the place does not hinder the fire engineers route.



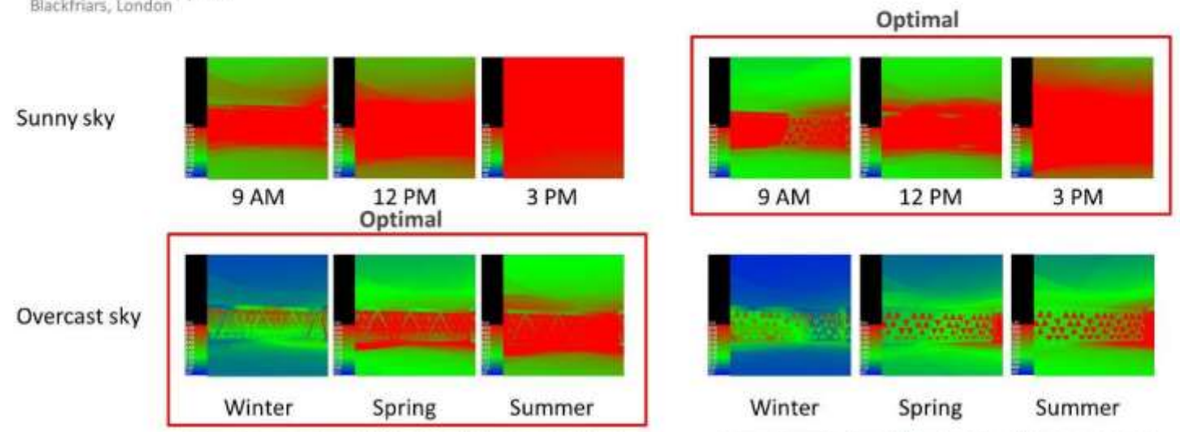
Evacuation signs that are placed accordingly throughout the Podium

http://stickeranse.co.uk/wp-content/uploads/2015/02/fire-exit-safety-sign-right-arrow-400x150mm-142-a.jpg

http://www.biltzmedia.co.uk/wp-content/uploads/signs-labels/DMEU_FH01MZ5x601b1.gif

Overall Façade Design
Proposed Design

Ecotect Analysis
Blackfriars, London



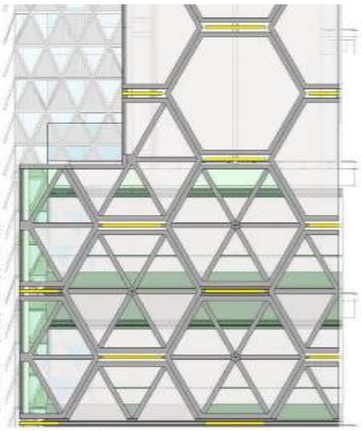
100% glazing is optimum for an overcast sky condition when the illumination is mostly uniform and to maximise the use of natural lighting.

50% glazing optimum at sunny sky condition to block excessive solar radiation and glare.

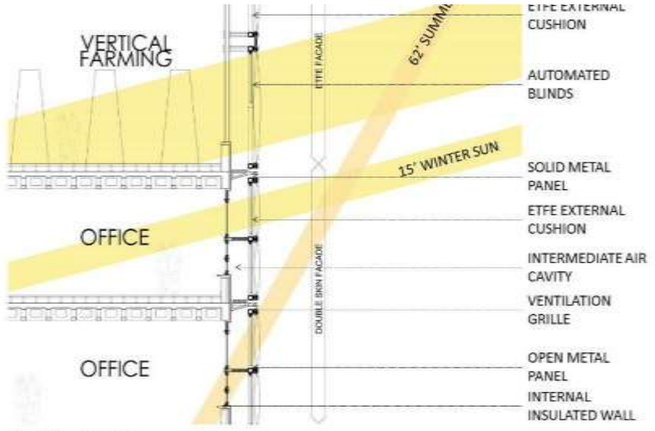
FACADE

The vertical farming area will have single skin ETFE Façade that have an exceptional light transmission that will allow UV light to pass through easily, thus will facilitate and improved the plant growth.

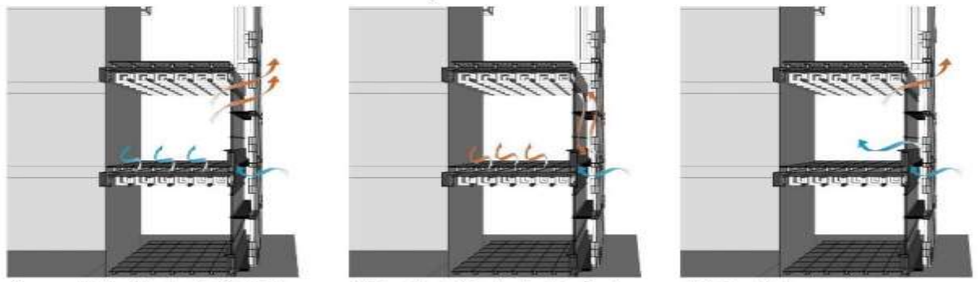
And for the office area, double skin façade with additional ventilation system is being used on the south facing façade, as it is the main wind and sun direction. It will improve the office productivity, as people will have full control of the ventilation, even in extreme climate condition.

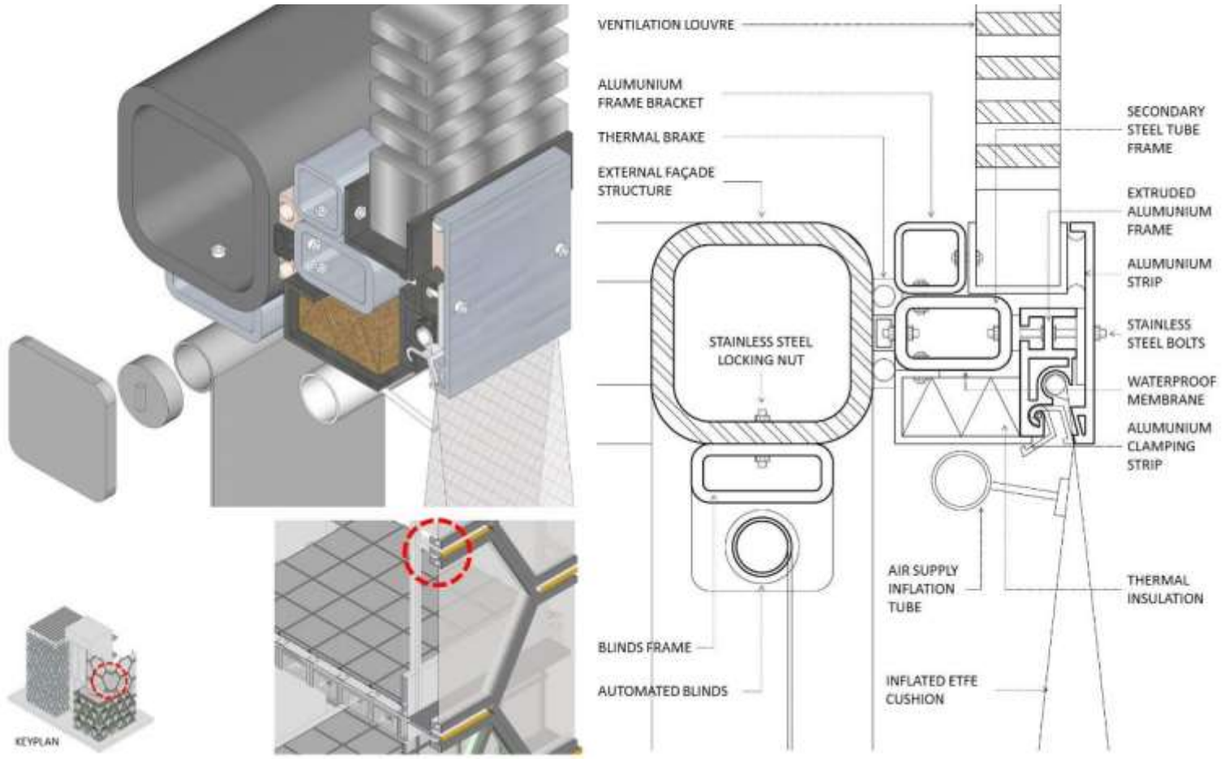


South Facade



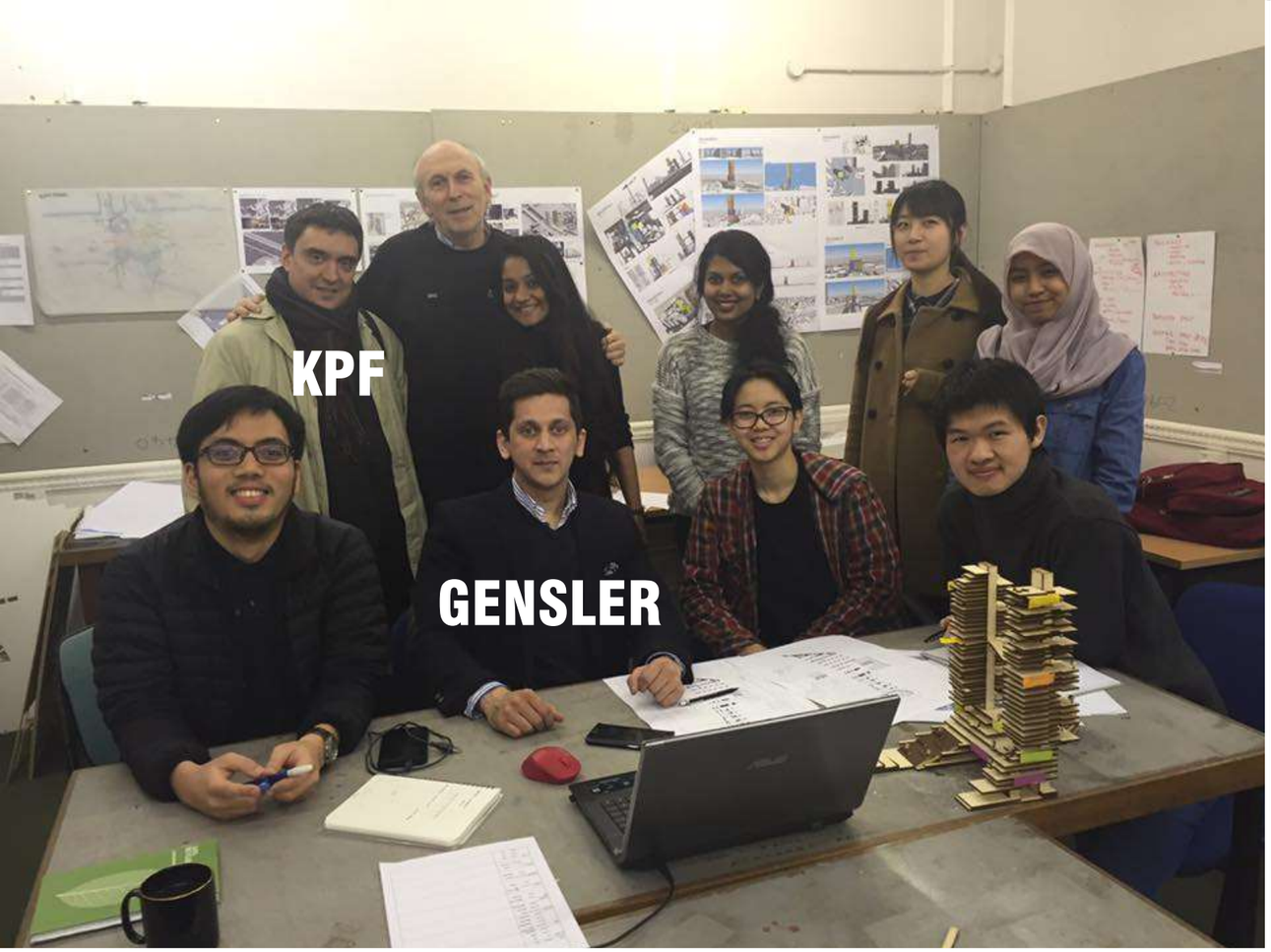
South Façade Section





GOOD MODELS = WELL THOUGHT DESIGN

MODEL PHOTO



STUDIO AND GROUP PHOTO

Canary Wharf
Best Sustainable Tall Building in a project

Ahiska Ghulam Madian

Dr Robin Wilson
Head of Department

The University of
Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

AWARD

1. INTRODUCTION
2. 5 GENERATIONS OF TALL BUILDING
3. WHAT MAKES A TALL BUILDING SUSTAINABLE?
4. MASTER DEGREE WORKS
5. WORK EXPERIENCE IN DP ARCHITECTS SINGAPORE & KPF LONDON

SEND PORTFOLIO VIA EMAIL → WAIT → INTERVIEW → WAIT → OFFERING → WORK

CONVENTIONAL WAY TO GET A JOB

SEND PORTFOLIO VIA EMAIL → WAIT → WAIT → WAIT → SEND PORTFOLIO VIA EMAIL → WAIT → INTERVIEW

WAIT → REJECTED → SEND PORTFOLIO VIA HARDCOPY → WAIT → INTERVIEW → OFFERING → WORK

HOW I GOT A JOB IN SINGAPORE

CREATE YOUR OWN OPPORTUNITY

SEND EMAIL FOR DISSERTATION INTERVIEW → GIVE PORTFOLIO DIRECTLY WHEN THE INTERVIEW ENDS → OFFERING → WORK

HOW I GOT A JOB IN KOHN PEDERSON FOX (KPF), LONDON

DP ARCHITECTS, SINGAPORE TEAM PHOTO

KLCC

KUALA LUMPUR, MALAYSIA

KOHN PEDERSON FOX (KPF), LONDON TEAM PHOTO

THANK YOU