MEINHARDT SINGAPORE 45TH ANNIVERSARY

TRANSFORMING

PERSPECTIVES

In the last 45 years, Meinhardt has helped Singapore progress from a third world country to a global city.

We challenge conventional thinking through our engineering, redefining what's buildable. Architects dream it, we make it buildable. Our work has transformed the cityscape and reshaped the built environment.

As we celebrate 45 years in Singapore, we remember our humble beginnings and trace the trail we blazed.

The custom designed geometric shape bordering this writeup bears a 45-degree angle - commemorating 45 years in Singapore and, more importantly, signifying how we are transforming perspectives and seeing things from a different angle.

Happy reading.

CONTENTS

MANY URBAN & INFRASTRUCTURE DEVELOPMENTS THAT **EXCITE OUR VISUAL SENSES** ARE INFUSED WITH MEINHARDT'S ENGINEERING DNA.

HAVING COMPLETED CLOSE TO **4000 PROJECTS**, WE ARE SINGAPORE'S **PREMIER ENGINEERING CONSULTANCY.**

FROM **SINGAPORE'S FIRST SKYSCRAPER,** THAT WAS ONCE **THE TALLEST BUILDING IN THE WORLD** OUTSIDE NORTH AMERICA, TO MULTIPLE MRT PROJECTS, TO THE **ICONIC GARDENS BY THE BAY,** MEINHARDT HAS LEFT AN **INDELIBLE MARK** ON SINGAPORE.

WE HAVE ALWAYS APPROACHED
PROJECTS WITH THE SAME MINDSET

CAN WE DO THINGS BETTER, FASTER AND MORE COST EFFICIENTLY?

DISCOVER HOW WE HAVE **RESHAPED ENGINEERING**
IN SINGAPORE **OVER THE LAST 45 YEARS.**

STANDING TALL STANDING PROUD

Skyscrapers - concrete giants that define city skylines.

Built at dizzying heights, they require sophisticated design and smart engineering.

We take you behind the scenes and reveal the engineering secrets of some of our iconic Singapore projects.

ONE RAFFLES PLACE

1 Raffles Place (Previously named OUB Centre)

A COMPOSITE STEEL STRUCTURE RISING 280 metres UP INTO THE SKY

boasting high speed elevators, column free floor plates and integrated building services was transcendental back in 1981. The One Raffles Place Tower (then known as the OUB Centre) was breaking new grounds, making it the tallest building in the world outside North America.

The First High-Rise Building In Singapore

TO REACH MAXIMUM PERMISSIBLE HEIGHT

“

“It was a very exciting time for Meinhardt’s engineers.

We were tasked to engineer the tallest building in Singapore and indeed in Asia when the country’s Central Business District (CBD) was just beginning to take shape

We were the pioneers that contributed to setting the benchmark for the skyline of today’s CBD.

Dr S. Nasim
Meinhardt Group Chairman

THE CHALLENGE

to engineer the tallest building in Singapore was exacerbated by several factors - the Feng Shui indicated tower position in the middle of a densely built up area, the requirement to build four levels of basements (the deepest in those days) and to build at a height that had never been built in Singapore and most parts of the world then.

THE ICONIC ARCHITECTURAL DESIGN

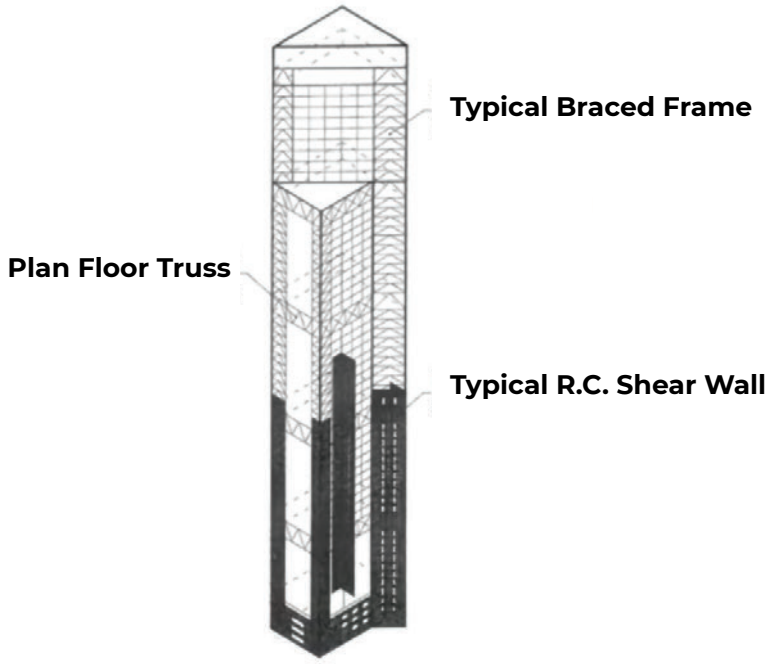
of the Tower by world renowned architect Kenzo Tange from Japan necessitated an asymmetric design to maximise efficiency of the smaller floor plates.

"While the task was daunting, it spurred us to devise the best engineering solution from around the world. In the process of solving our most pressing engineering challenges, we blazed the trail and set the precedence and standard for tall buildings in Singapore."

Dr S. Nasim

TO ENSURE A COST-EFFECTIVE DESIGN

for such a tall building, Meinhardt pioneered the use of a composite steel building using a mega frame for the very first time in Singapore. A Japanese consortium of 3 Japanese contractors led by Kajima and their specialist steel sub-contractor - NKK brought prefabricated steel, specially skilled workers from Japan to construct the building. Japan was the leader in tall steel buildings in those days.



Mega Frame System for the Building

Additionally, we pioneered the deepest foundation going down to a depth of up to 110m using caissons (5-7m in diameter) to support this slender giant. In addition to the deep foundations, there was a need to make provisions for a future adjacent and connected MRT station – which eventually became the deepest MRT station in Singapore.

Meinhardt worked with the architects to pioneer the concept of column free floor plates for this building, **which later became the norm for tall office buildings in Singapore today.**

FOR A VERY TALL BUILDING

we had to ensure that the lifts were able to travel fast to minimise waiting intervals for passengers.High speed elevators were specially brought in from Japan and used for the very first time in Singapore for this building.

Dr S. Nasim

Meinhardt Group Chairman


FIRST
COMPOSITE STEEL BUILDING IN SINGAPORE
TALLEST
BUILDING OUTSIDE NORTH AMERICA (1981)
HAD THE DEEPEST FOUNDATION IN THE WORLD
OUB Centre
CIDB Award for Construction Excellence, 1989

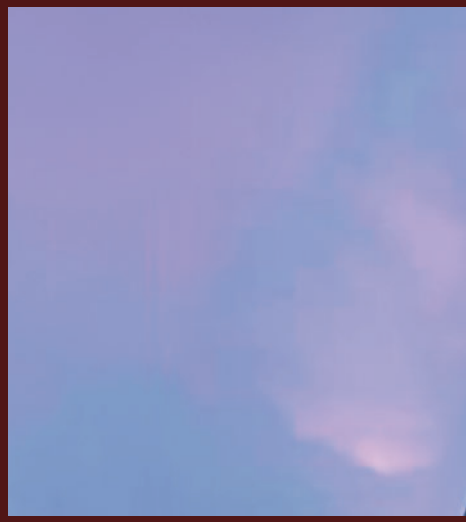
A MAGNIFICENT VIEW
FROM THE TOP OF ONE
RAFFLES PLACE: TOWER 1

Frasers Tower Tower

A TESTIMONY TO MODERN ENGINEERING IN SINGAPORE

ONE OF THE NEWEST

kids on the block in Singapore's Central Business District, Frasers Tower is a unique slender high-rise tower with a slopping façade that appears slim at the bottom, broadens in the middle and tapers off at the top. This towering visual masterpiece required some clever engineering to make it a reality.



235 METRE HIGH SKYSCRAPER
WITH SLOPING COLUMNS

FINDING INNOVATIVE ENGINEERING SOLUTIONS for this 235m skyscraper was no mean feat.

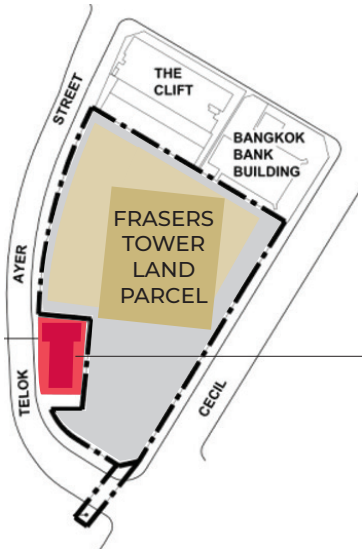
Main challenges in the design and construction:

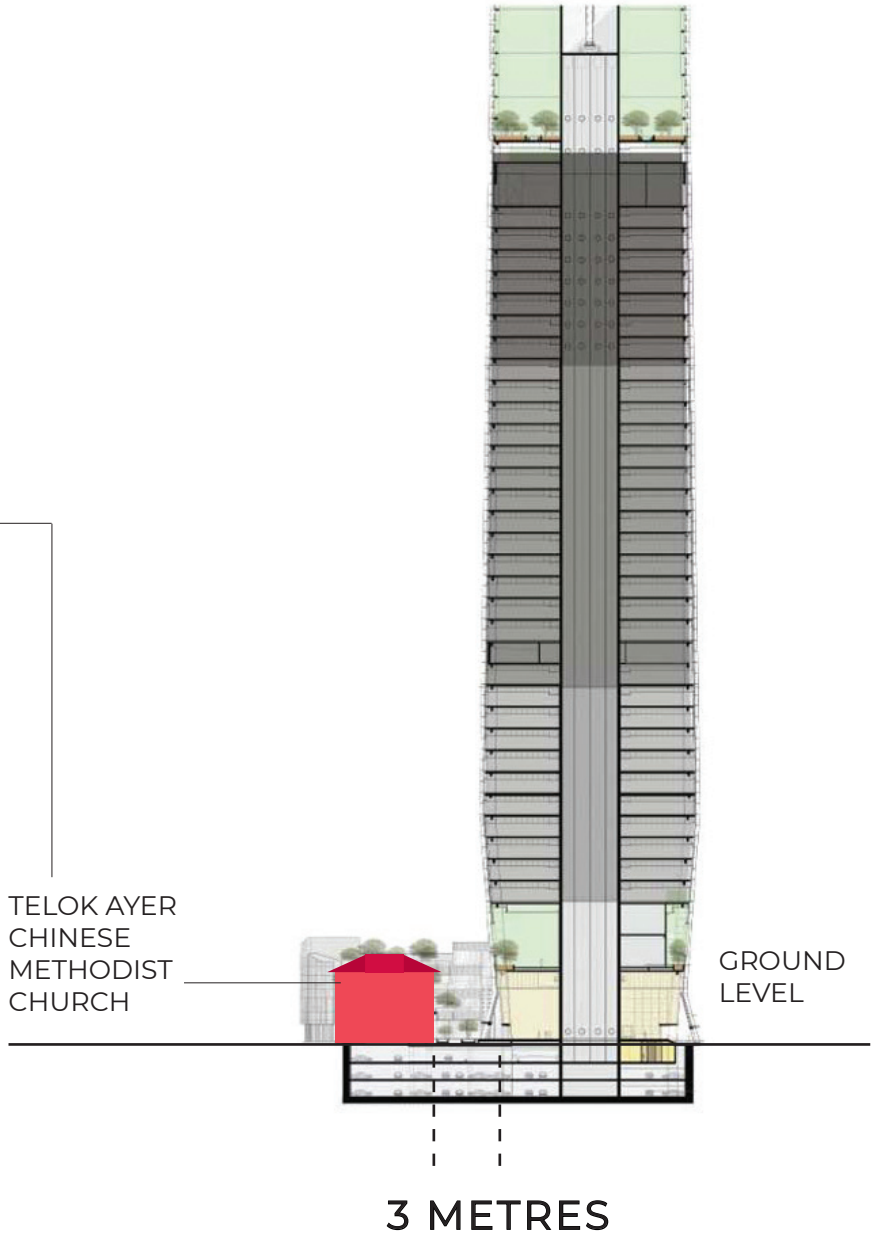
Creating an iconic and slender high-rise tower with a sloping façade and columns

Deep basement construction in highly variable Jurong Formation

Constructing an underground pedestrian walkway below Telok Ayer Street to Tanjong Pagar MRT Station underpass

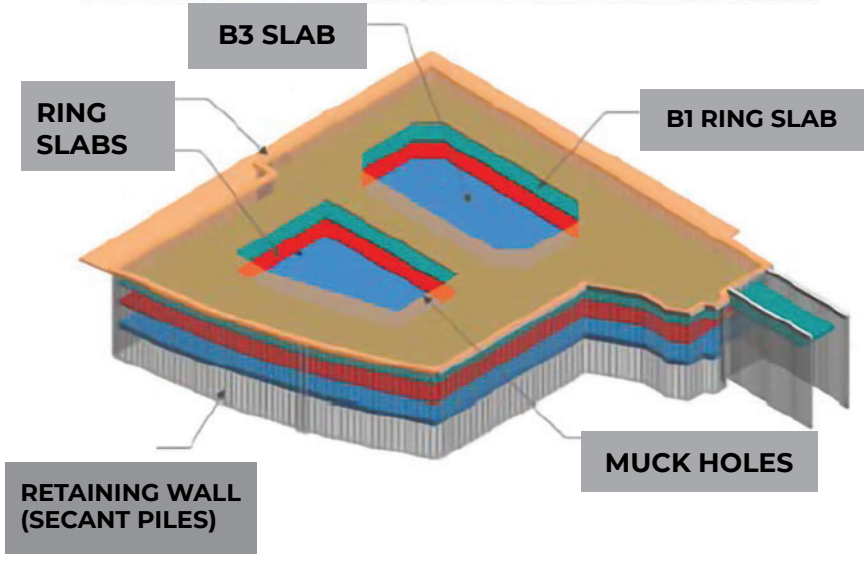
LOCATED JUST **3 METRES** AWAY FROM A NATIONAL MONUMENT, CONSTRUCTED IN 1924 ON A PLOT OF LAND ABOUT THE SIZE OF A FOOTBALL FIELD





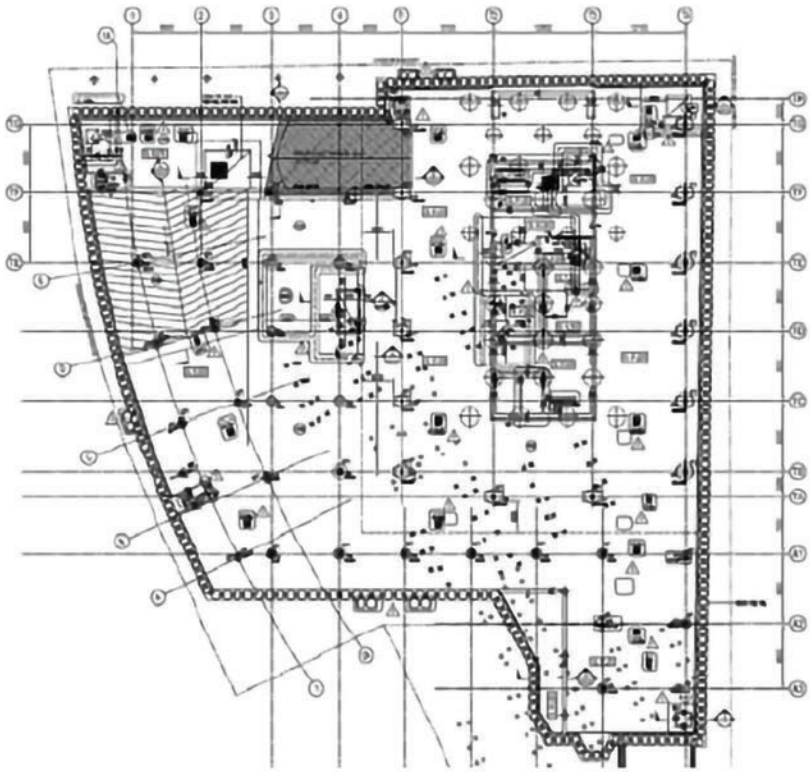
> **As a high-rise building, it had inherent challenges - supporting gravity loads and lateral loads from the wind while maintaining an unusual sloping structure**. The second challenge is that it is being designed in the city centre close to a national monument - the Telok Ayer Chinese Methodist Church. We needed to excavate 40m deep 3m away from this monument

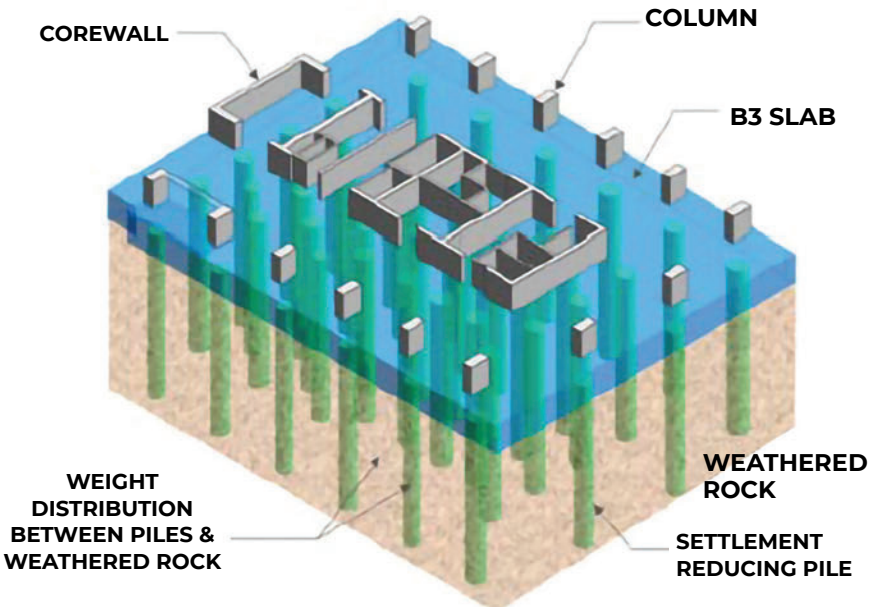
Er. Kam Mun Wai
Senior Executive Director
Meinhardt Singapore



ADOPTING A ROBUST, PRACTICAL AND YET COST-EFFICIENT

Earth Retaining and Stabilising Structure (ERSS) system comprising secant pile wall and top-down construction
method to minimise wall deflection, ground movement and water drawdown. This resulted in the safe execution of the 3-level basement construction, without
adversely affecting the integrity of sensitive adjacent properties and structures.





SUSTAINABLE RAFT FOUNDATION SYSTEM

with settlement-reducing piles for the high-rise tower and tension piles for the podium.

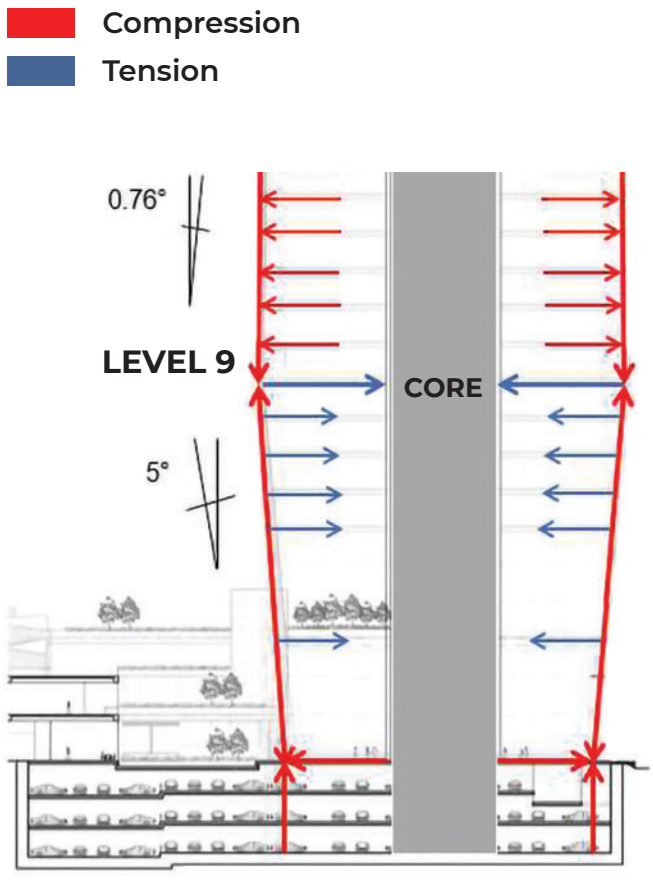
The favourable ground stratum below the basement was strategically considered to provide support to the building structure. Piles were introduced to reduce stress concentration and control settlements.

The use of this innovative hybrid foundation system for a high-rise building resulted in substantial time and cost savings, compared to a conventional fully-piled foundation system.

FLAT PLATE SYSTEM for basement and podium to facilitate top-down construction and enhance buildability and productivity.

HIGHLY BUILDABLE, REPETITIVE AND STANDARDISED post-tensioned band beam system for the typical office floors, enabling the adoption of light-weight table forms for faster construction.

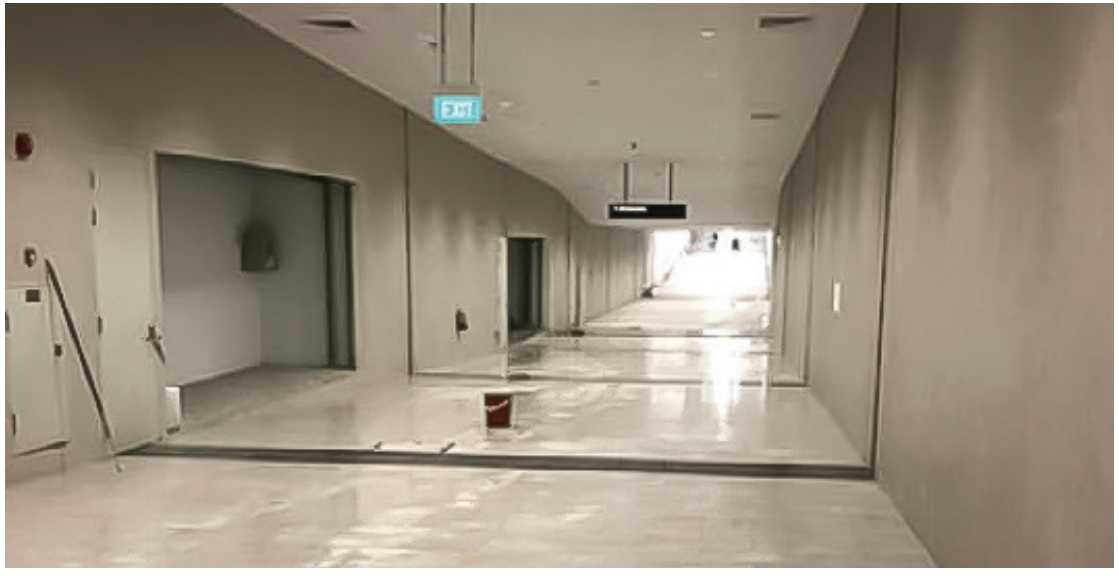
INNOVATIVE, WELL-DEFINED STRUCTURAL LOAD PATHS AND DESIGN AND DETAILING OF KEY STRUCTURAL ELEMENTS, taking into due consideration the gravity loads, high wind loads and additional horizontal forces as a result of the sloping columns and slenderness of the high-rise tower.



SAFE AND PRACTICAL TOP-DOWN METHOD

for the construction of the underground pedestrian walkway to Tanjong Pagar MRT Station Underpass, involving temporary traffic diversion away from Telok Ayer Street and suspension of underground services.

For the innovations, Er. Kam was duly awarded the 2019 Excellence Award for Design & Engineering Safety by the Singapore Building and Construction Authority.



THE SAIL

ONE OF THE WORLD'S SLENDEREST SKYSCRAPERS

RESEMBLING THE SAILS OF A BOAT,

paying homage to Singapore's history as an entrepot port, the Sail at Marina Bay is a twin-tower 6-star waterfront lifestyle condominium right in the middle of Singapore's Central Business District. Viewed from different angles, this architectural beauty boasts a remarkably slender silhouette that befits its status as one of Singapore's most prestigious residential addresses.

SINGAPORE'S TALLEST RESIDENTIAL BUILDING

AS ONE OF THE SLENDEREST,

tall residential buildings in the world, built above a live MRT tunnel and a common services utility tunnel, this project pushed the limits of our engineers' creativity.

THE CHALLENGE WAS TWO-FOLD

to ensure the safety of the live MRT line and underground structures (common services tunnel) during construction on reclaimed land with variable subsoil conditions; and create a functional, comfortable living abode while maximising views of the bay and preserving the building's unusually slender and sleek profile.

MEINHARDT PIONEERED THE USE **of an innovative strut-free, multi-cellular diaphragm wall, temporary earth retention system to eliminate any potential disruption to MRT operations arising from vibrations from piling and construction.**

Affectionately known as the 'Peanut' because of its resemblance to the nut, it consists of three overlapping curved retention structures and is stronger and more stable than traditional retention systems.

"We had to find a retention structure that could fit within the longish plot location where we were building the tallest tower. We wanted a circular structure as it is more robust and has less ground obstructions. So we creatively put together three overlapping concentric circles to form a longish peanut shape that fit in that area."

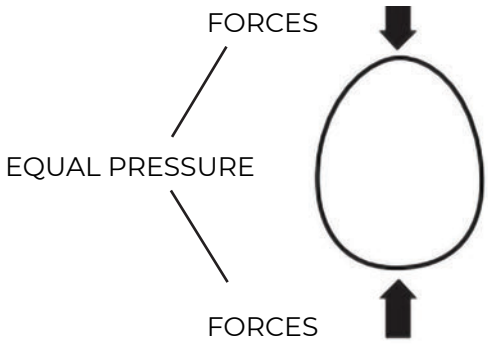
To further protect the MRT tunnels, Meinhardt creatively re-orientated the buildings to avoid locating the twin residential towers directly above the MRT line, while maximising the beautiful views of the Marina Bay.

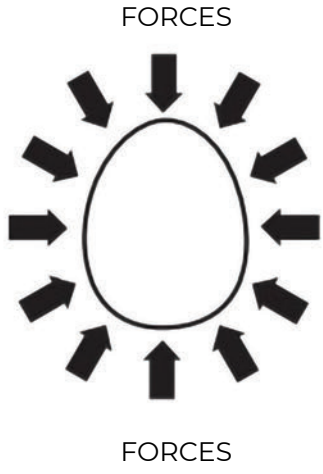
All this resulted in reducing MRT tunnel movements and 3-months savings in construction time.

WHY ARE CURVED STRUCTURES STRONGER & MORE STABLE?

An egg (which has a curved shape) has a robust structure due to the dome shapes at its long ends – making it extremely difficult, if not impossible, to crush between the palms of our hands. The dome shape at both ends distribute weight and pressure evenly to the entire structure.

THE IMPOSSIBLE EGG CRUSH EXPERIMENT





EQUAL PRESSURE ALL ROUND THE EGG

AS LONG AS THERE IS EQUAL PRESSURE EXERTED ON THE EGG SHELL, IT IS IMPOSSIBLE TO BREAK IT WITH YOUR BARE HANDS

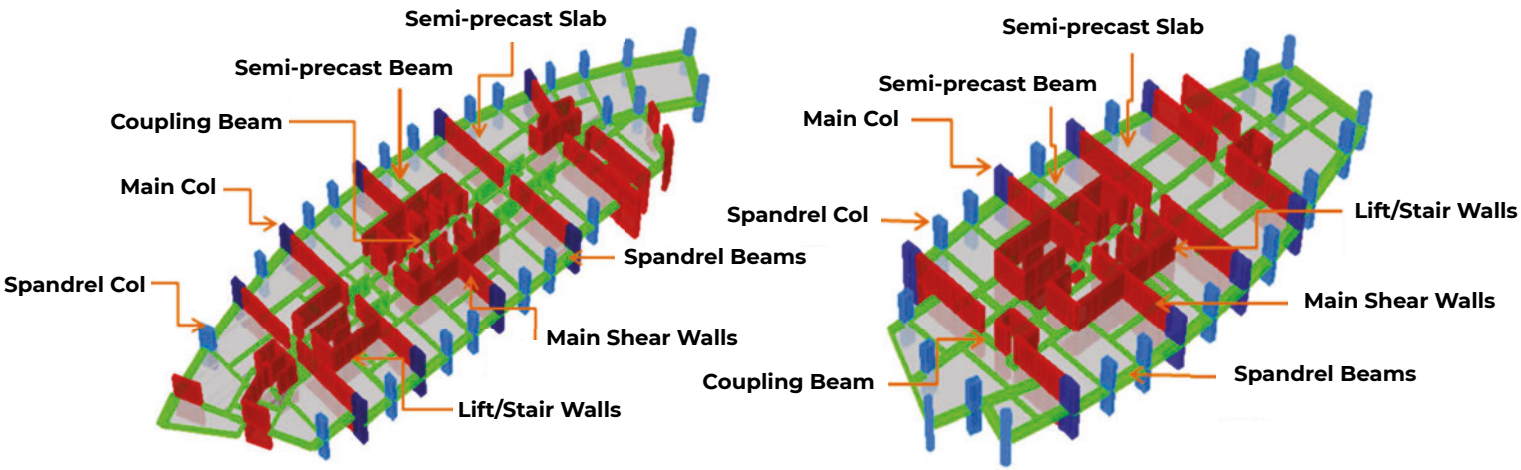
In the same way, Meinhardt's 'Peanut' shaped retention structure takes advantage of curved edges to fortify its retention walls.

DID YOU KNOW?

In addition to the vertical force of gravity, skyscrapers also have to deal with the horizontal force of wind. Most skyscrapers can easily move several feet in either direction, like a swaying tree, without damaging their structural integrity.

To limit movement and potential seismic vibrations on this super slender structure, our engineers devised an innovative parallel-coupled-shear-wall system. High strength (Grade 80) concrete with silica fumes was also specially developed to mitigate vertical movements between various elements in the building while reducing perimeter column sizes, enabling us to maximise space for the residential units.

Wind tunnel tests were also conducted on the building model as an added precaution to ensure that our technical calculations for the building's movement were precise.



HIGH STRENGTH CONCRETE (GRADE 80)
for the towers was utilised for the first time in Singapore.

“Engineers rarely come across a project with so many unprecedented challenges. **It has been our privilege to work on this prestigious development, being the tallest residential development in Singapore when first built.**

Dr S. Nasim
Meinhardt Group
Chairman

“Through each stage of design and implementation, the entire project team of NBBJ, Team Design Architects, Dragages and Precast Design Consultants Pte Ltd, contributed to address the unique challenges through innovative ideas and solutions, especially during the concept stage, **whilst maintaining safety as the primary consideration.**

Dr S. Nasim
Meinhardt Group
Chairman

GUOCO TOWER

PREVIOUSLY KNOWN AS TANJONG PAGAR CENTRE

Meinhardt are the Design Engineers and Qualified Person for the mechanical and electrical (M&E) systems for this project.

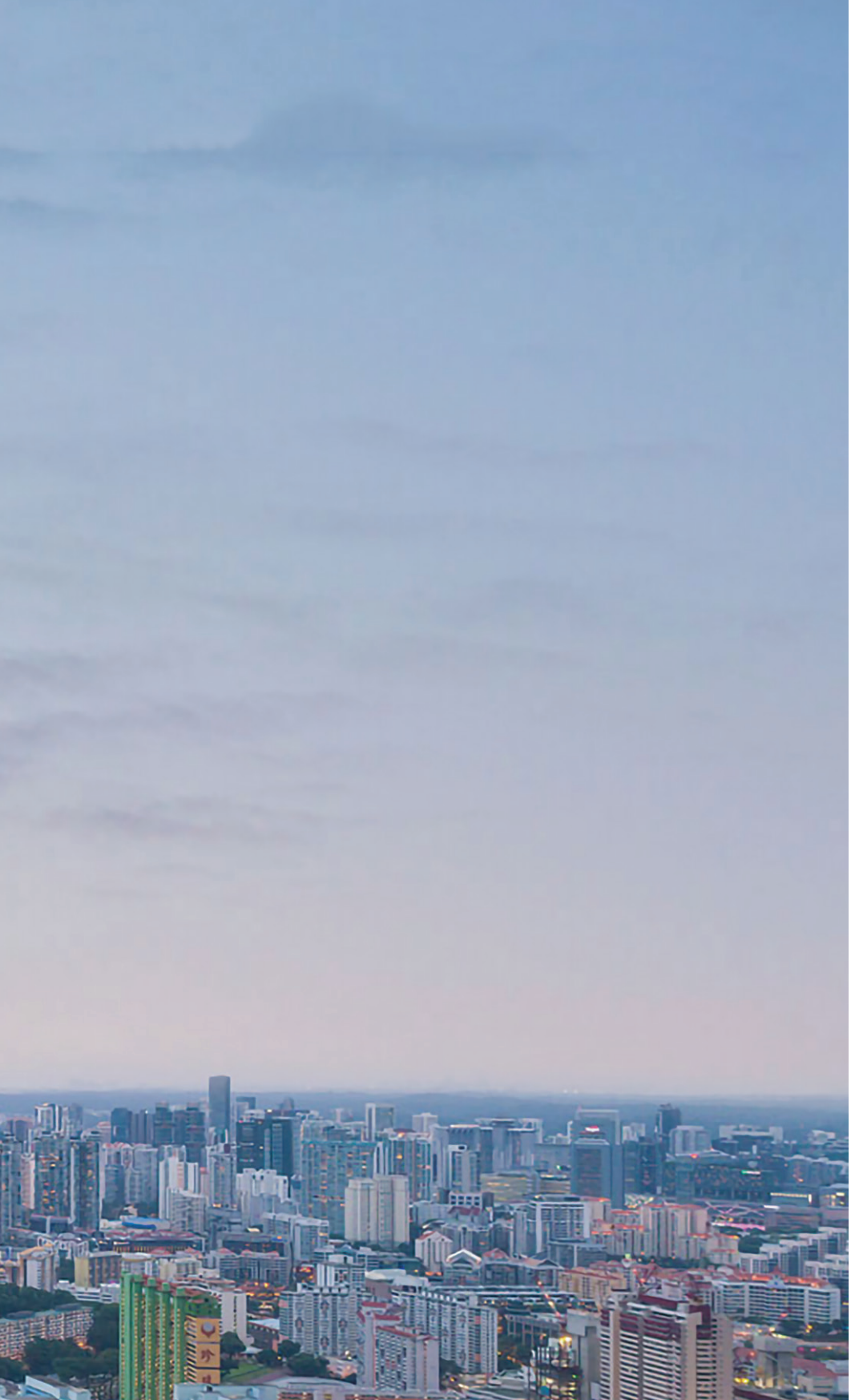
The design meets the multi-tier requirements for minimised Gross Floor Area (GFA) for M&E services plant rooms and also ensures flexibility for future tenancy works. The team's design for the proposed electrical sub-station also includes a contestable scheme for commercial purposes.

Our M&E services also meet Green Mark Platinum and LEED requirements, striking a delicate balance between engineering excellence and sustainability for the future.


TALLEST
BUILDING
in Singapore
(290m)


SOFITEL

S$3.2
BILLION
mixed-use
development



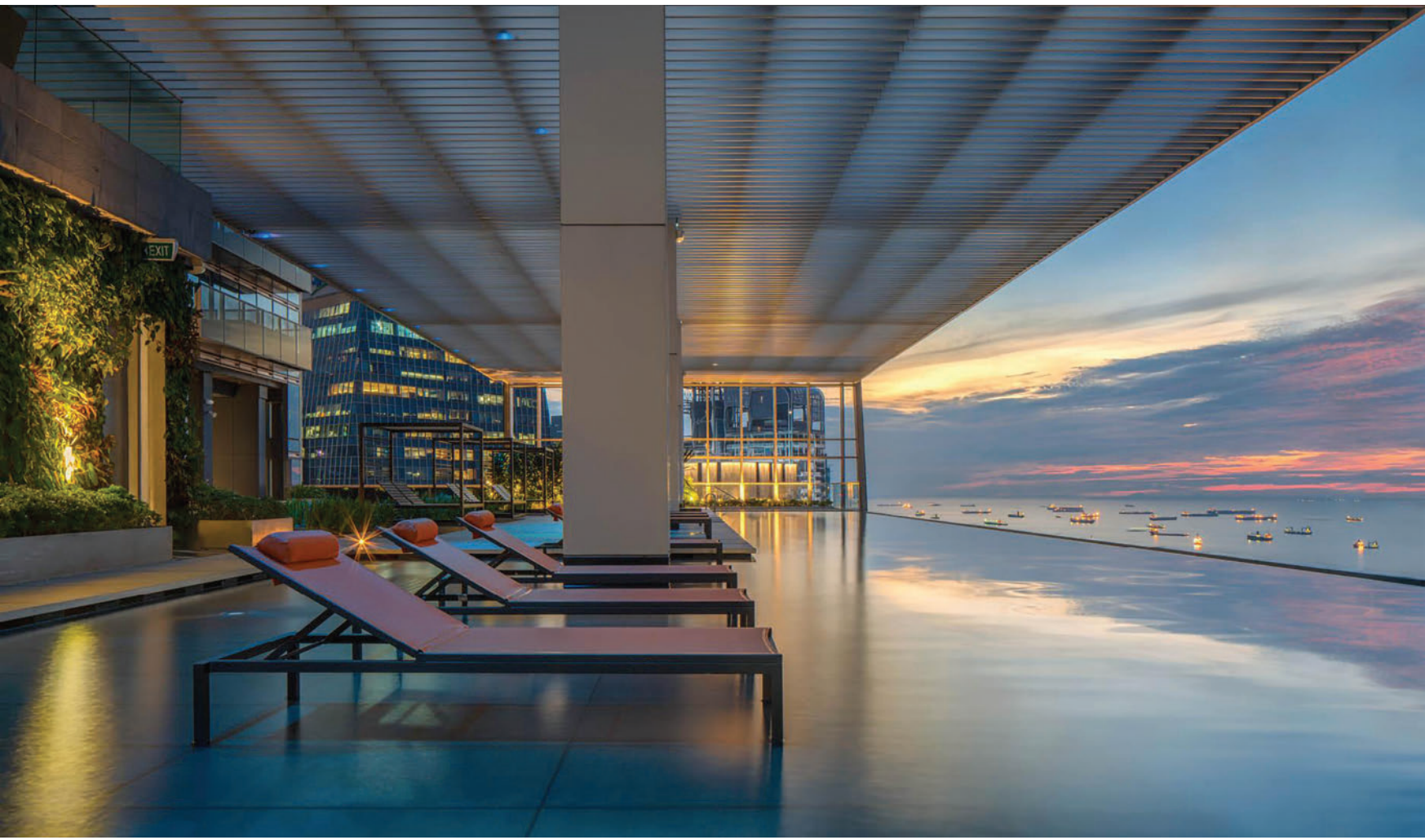
THE ONLY SINGAPORE WINNER
among 11 projects recognised at the 2019 Urban Land Institute (ULI) Global Awards for Excellence

THE SUPER PENTHOUSE

by Wallich Residences right at the top of Guoco Tower is Singapore's most expensive penthouse

JAMES DYSON

- the British billionaire, bought the super penthouse apartment in July 2019 for £43 million



MEINHARDT - ENGINEERS BEHIND MANY OF SINGAPORE'S ICONIC SKYSCRAPERS

MARINA BAY FINANCIAL CENTRE

245m

ASIA SQUARE TOWERS

229m
221m

THE SAIL @MARINA

245m

ONE RAFFLES QUAY

245m

GUOCO TOWER

290m

ONE RAFFLES PLACE

280m

SHAPING OUR URBAN LANDSCAPE

Meinhardt has engineered many iconic developments in Singapore.

Providing a full suite of engineering, design and project management services, we are Singapore's preeminent engineering consultancy.

GARDENS BY THE BAY

THE GARDEN IN A CITY

SURREAL, A JUXTAPOSITION OF NATURE & MAN-MADE,

an engineering marvel – welcome to Gardens by the Bay, awarded the 2019 Certificate of Excellence - Hall of Fame (2015 - 2019) by Tripadvisor.

COMPRISING THREE DISTINCT SPACES OVER 101 HECTARES

– Bay South Garden, Bay East Garden and Bay Central Garden – this oasis of lush greenery includes the world's largest glass greenhouse – the Flower Dome (2015 Guinness World Records), Cloud Forest Dome and 18 man-made 'Supertrees'

ENGINEERING A WORLD ICON

Masterplan of

Gardens
by the Bay

Meinhardt with its UK partners was involved with infrastructure masterplanning portions of the gardens, the Flower Dome, Cloud Forest Dome as well as the civil & structural works for the supertrees.

1 Flower Dome

2 Cloud Forest

3 Visitor Centre

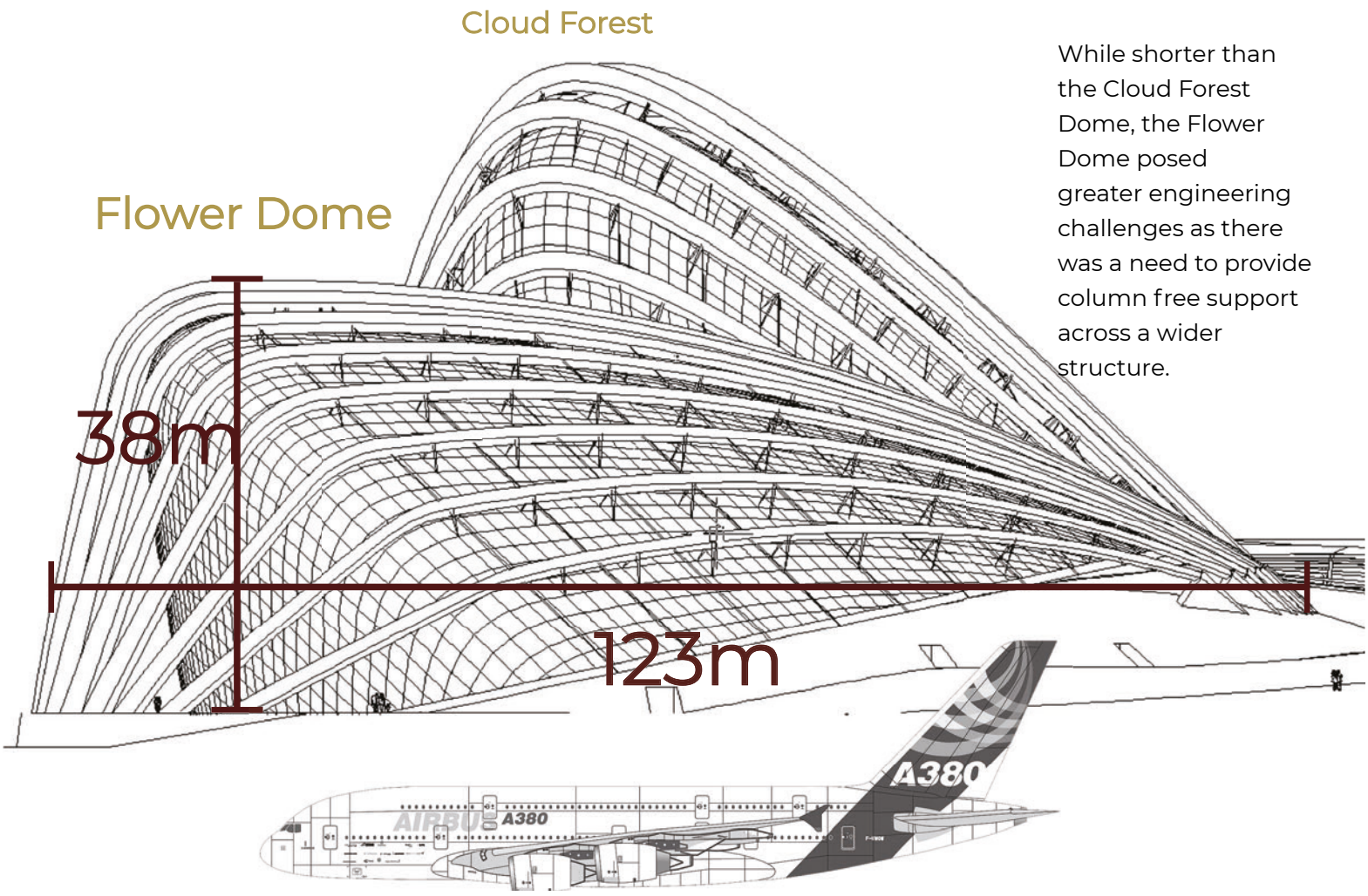
4 SuperTrees Cluster

“We had the privilege of being involved in such a world iconic project in Singapore’s tourism sector. Together with our UK partners, we were able to devise engineering solutions for a seemingly simple yet super complex structure that had many unique requirements which include many firsts **- like the world’s largest greenhouse and climate-controlled area.** While the task was daunting as such a project had never been done before in the world, we put on our thinking caps and took a systematic approach to creative problem solving this engineering marvel.

Foo See Lim
Director
Meinhardt Infrastructure.

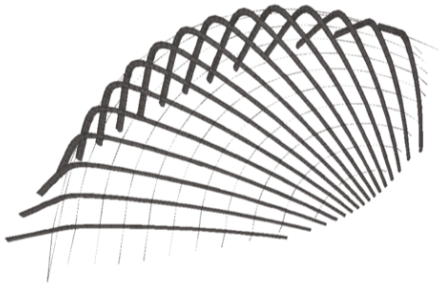
THE WORLD'S LARGEST GREENHOUSE

The two domes were designed by UK architecture firm Wilkinson Eyre. Unlike most temperate greenhouses which have a warm interior, both domes have a perpetual cool spring climate throughout the year, controlled in a sustainable, energy-efficient way. The structural system was conceptualised by UK consultant firm, Atelier One. Boasting a large span, column-free dome, it took some creative design and engineering to create this record-breaking dome.

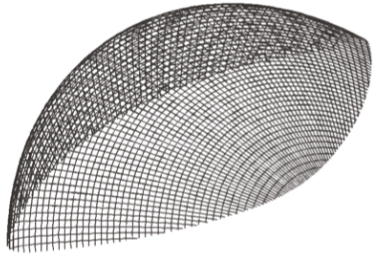


While shorter than the Cloud Forest Dome, the Flower Dome posed greater engineering challenges as there was a need to provide column free support across a wider structure.

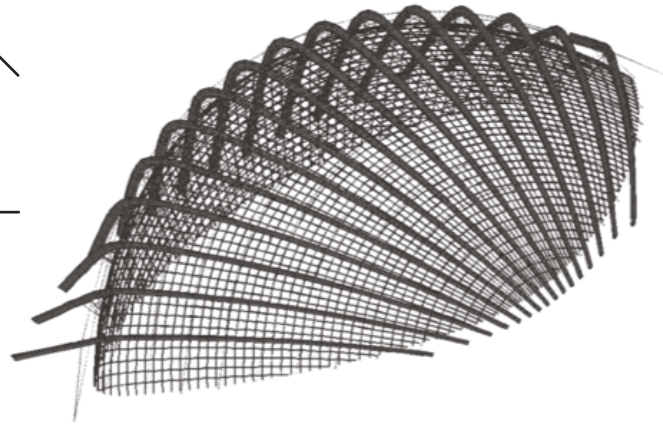
THE ROOF:
DECONSTRUCTED

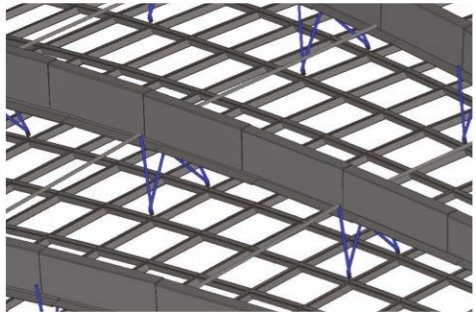


Arches & Tie rods



Gridshell

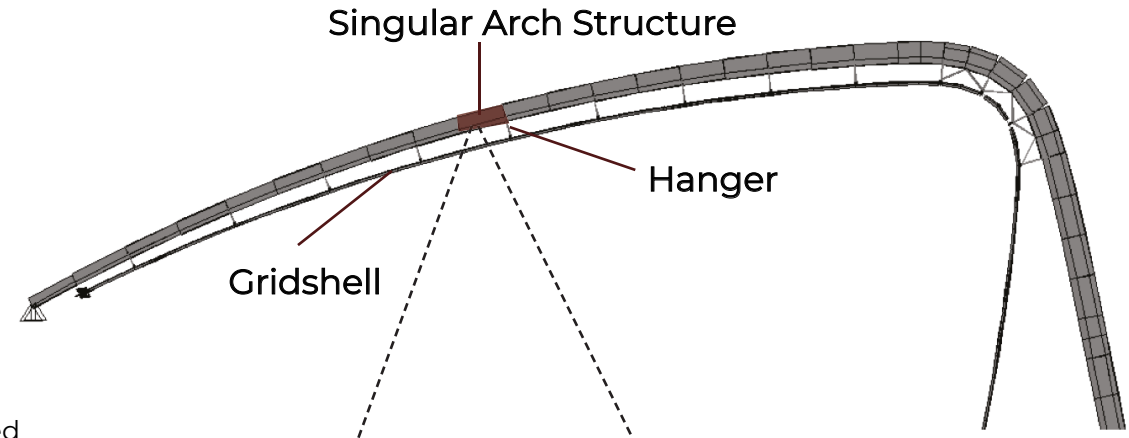




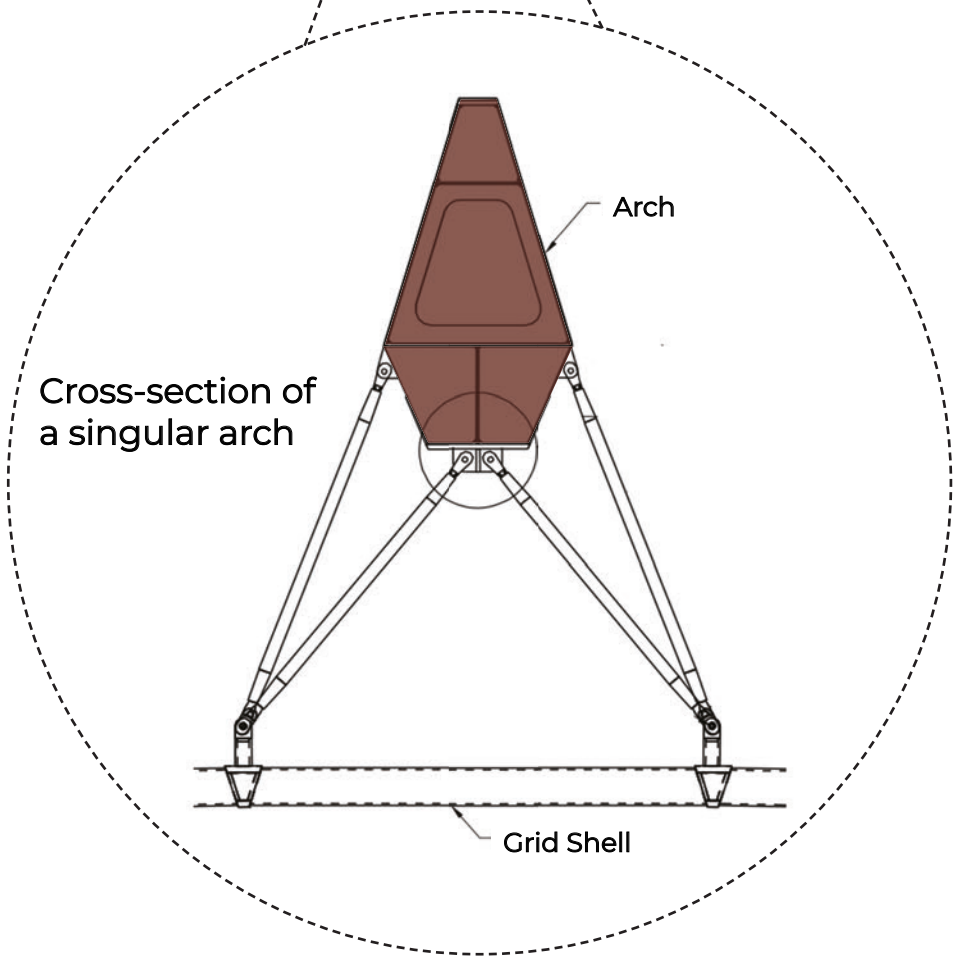
Hanger Connectors

The structural roof system was a unique complex structure made of arches, tie rods, gridshells and hanger connectors.

THE ROOF:
DECONSTRUCTED



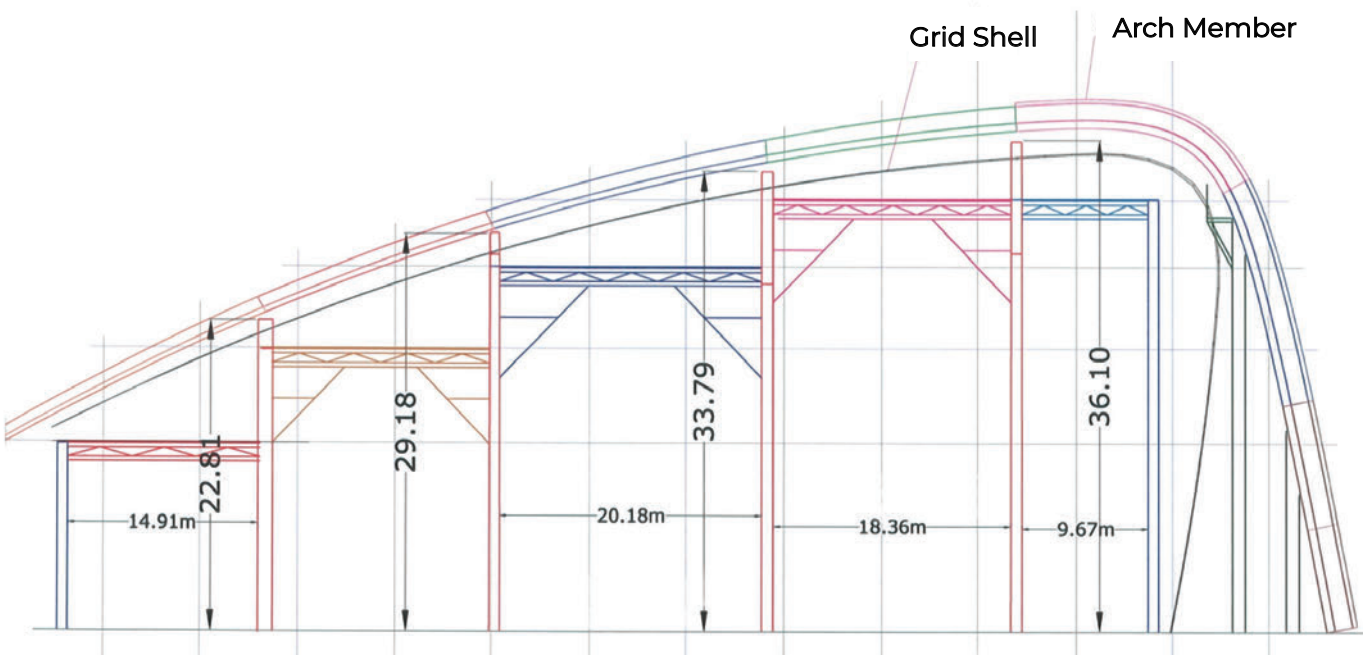
Arches are attached to each other to form the roof line



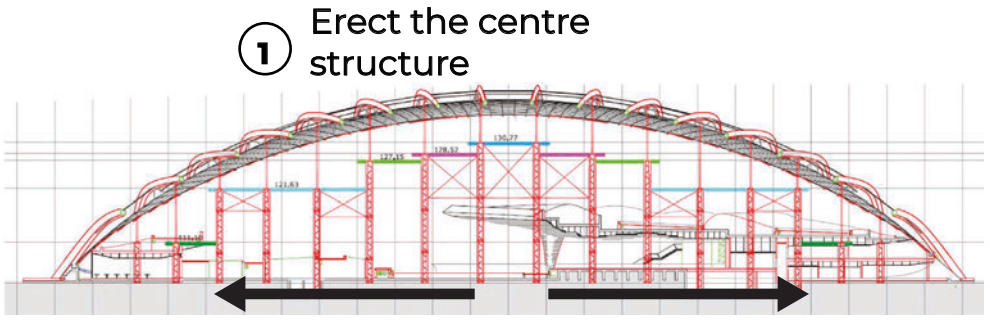
The gridshells are then attached to the roof arches by a hanger.

Day & night: Climate control is partially managed through the unique roof system which can control the amount of light into the Flower Dome.

PUTTING
IT ALL TOGETHER



Erecting the column free dome required some clever engineering and methodology, developed with Woh Hup Pte Ltd (Contractor) which prevented unbalanced impact to the permanent structures.



FIRM FOUNDATIONS

DID YOU KNOW?

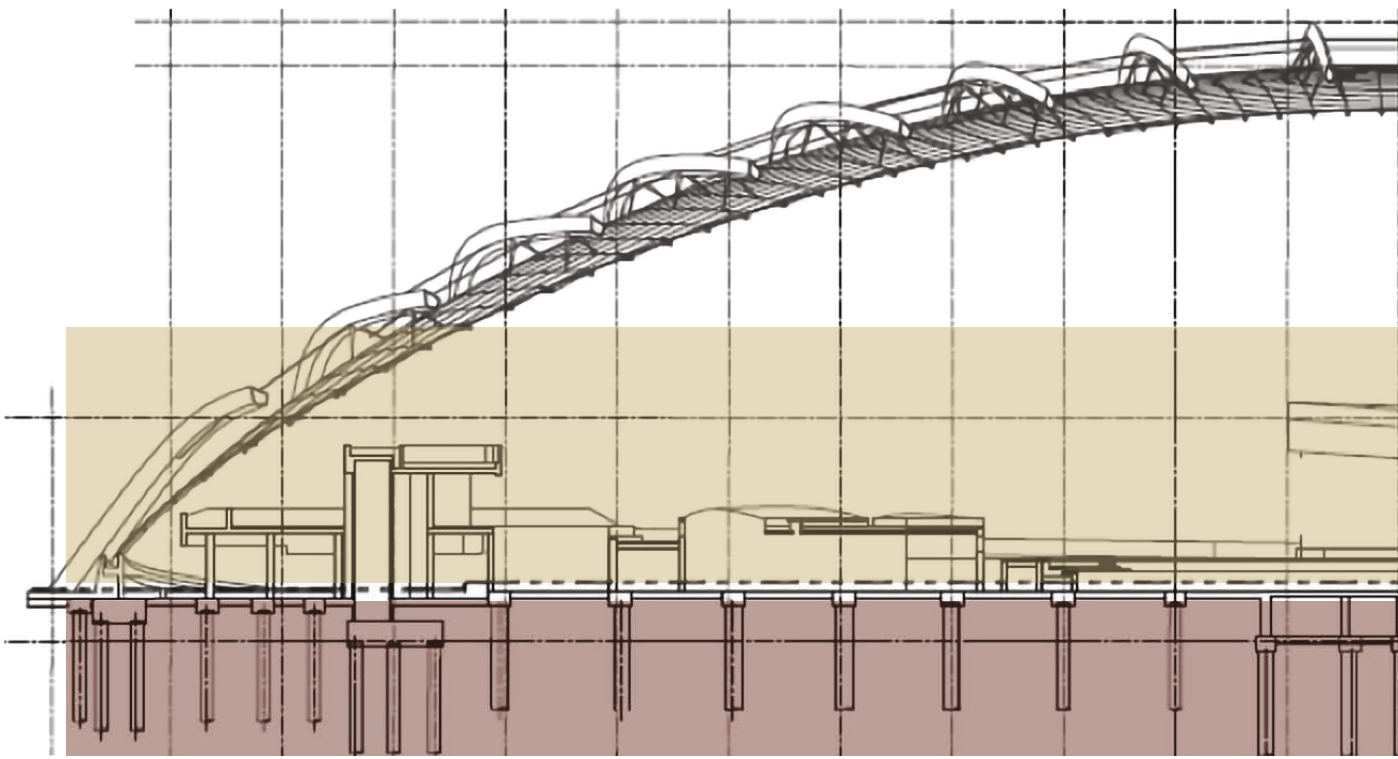
Although the Flower Dome seems like a simple structure, it has more piles than a typical skyscraper. All in over 1000 piles were needed for both domes, of which more than 500 were used for the Flower Dome's foundation.

WHY?

The whole GBB, including the Flower Dome, sits on reclaimed land so there was a need to further reinforce the ground. It had to be as robust as any other supporting a taller and heavier building.

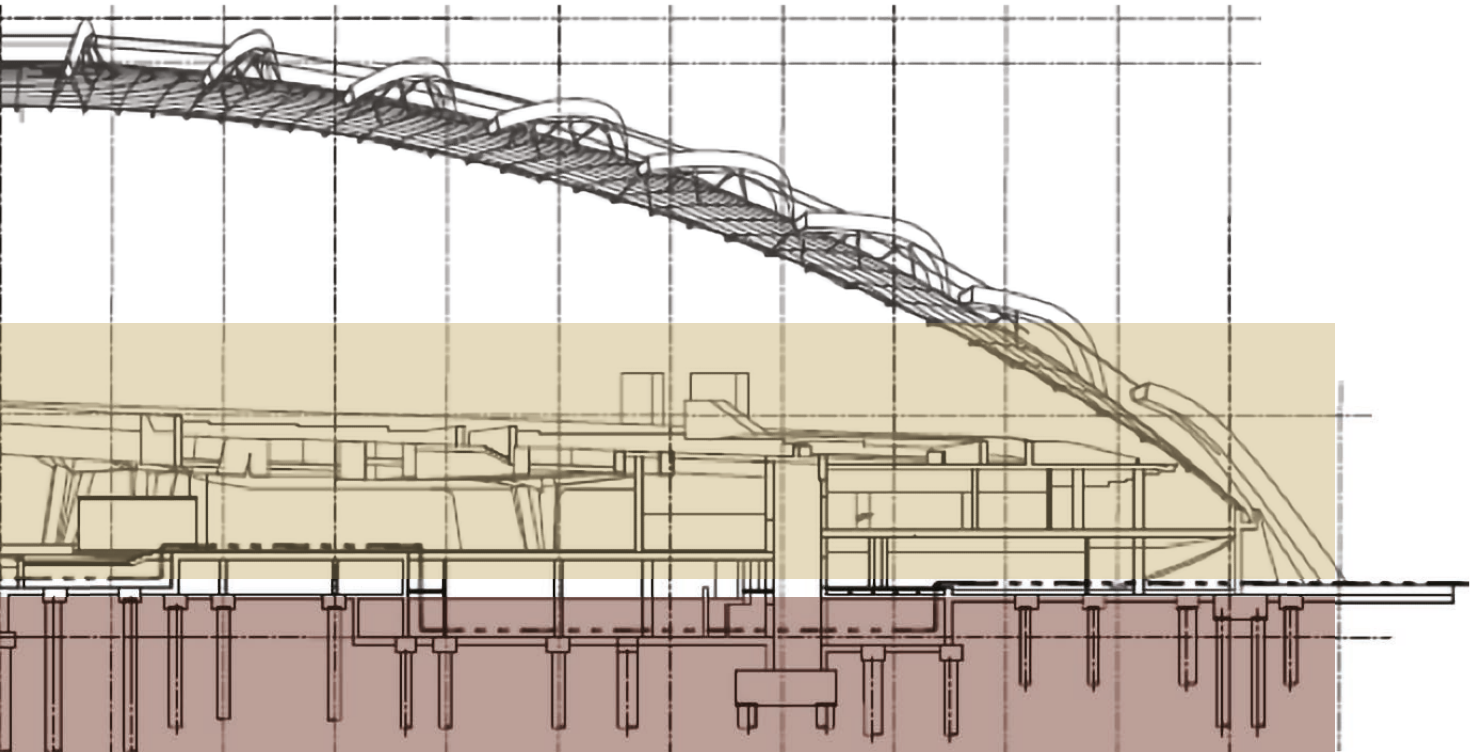
Internal Structures

Piling for the dome's foundation

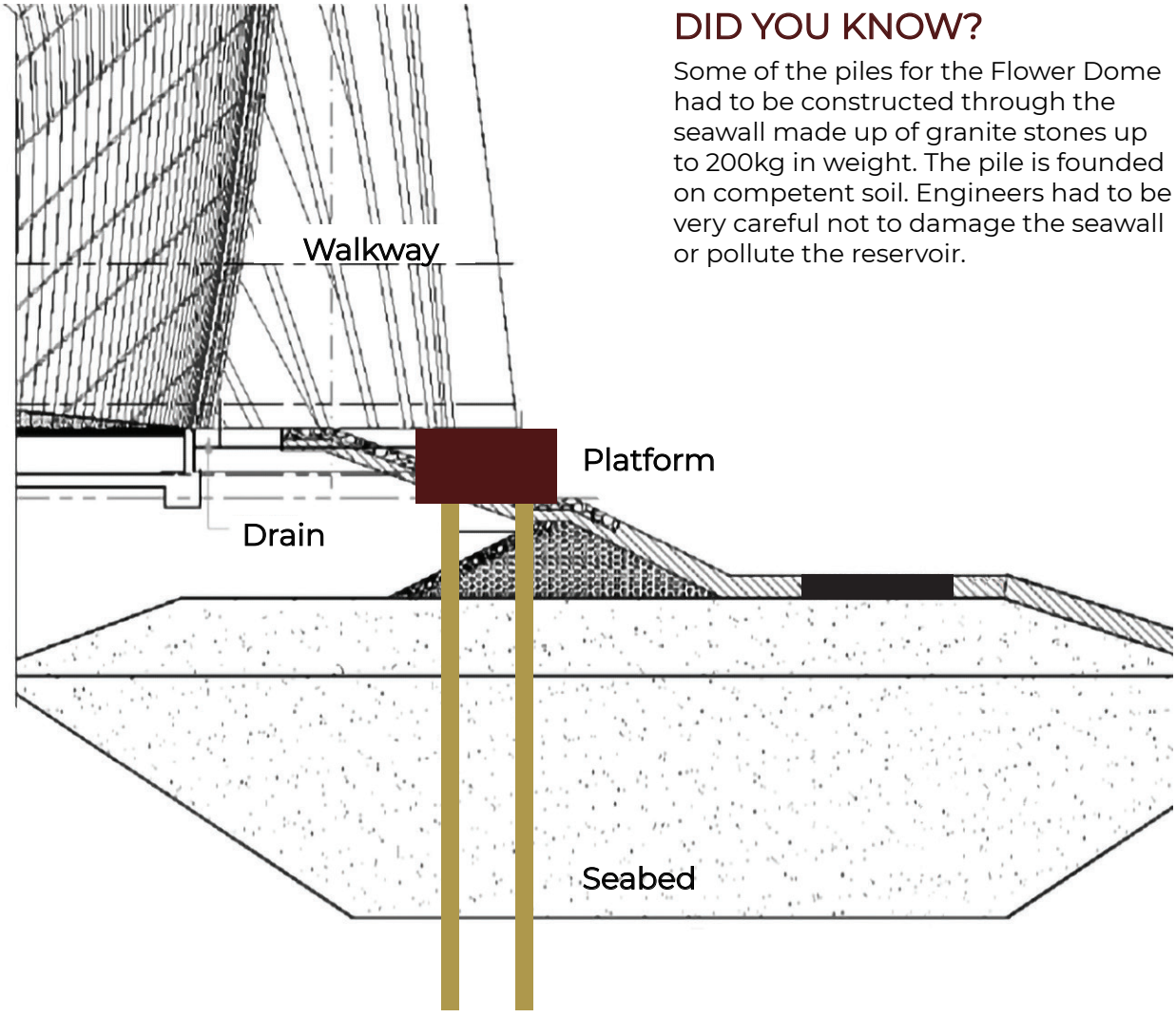


> As we needed to control the climate within the dome, the foundation had to be impermeable **– we could not afford any form of water seepage or humidity entering the dome though the ground.**

Foo See Lim
Director
Meinhardt Infrastructure.



PILING REDEFINED



DID YOU KNOW?

Some of the piles for the Flower Dome had to be constructed through the seawall made up of granite stones up to 200kg in weight. The pile is founded on competent soil. Engineers had to be very careful not to damage the seawall or pollute the reservoir.

BUGIS JUNCTION

IN THE HEART OF SINGAPORE'S CIVIC & CULTURAL DISTRICT

A COLOURFUL HISTORY

With its past reputation as an entertainment district which many people don't know about, Bugis Junction has a colourful history and storied past in many ways, including the engineering innovations behind the project and its surrounding area.

UNKNOWN TO MOST PEOPLE IN SINGAPORE, THE PRESENT DAY SHOPHOUSES IN THE BUGIS JUNCTION PROJECT ARE

ACTUALLY 1:1 REPLICAS OF THE ORIGINAL BUILDINGS.

THE UNASSUMING BUGIS JUNCTION BUILDING BELIES THE ENGINEERING INNOVATIONS BEHIND IT.

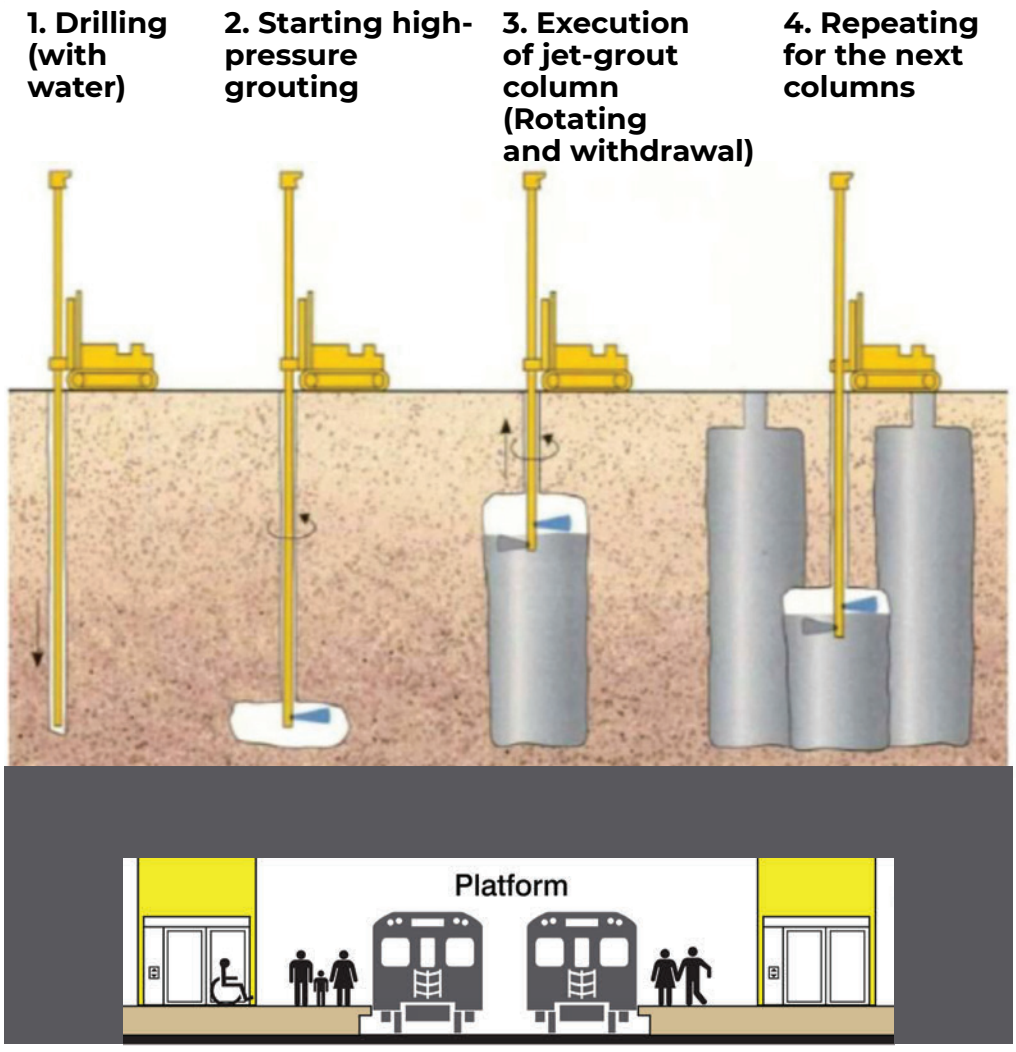
The project presented significant engineering challenges as the site had some of the deepest soft marine clay in Singapore. Meinhardt had to devise a system for ground retention and basement construction, without causing any disruption to the North South MRT tunnels, floating in marine clay.


BABY GROOT
GUARDIANS OF THE GALAXY
IN CINEMAS APR 27
bossini
bossini
U-PLUS
MALAY STREET
RESTAURANTS

The tunnels are not allowed to move more than 15mm (or 1.5 cm) during construction. Notwithstanding the soft clays, we had to excavate for the basement construction and yet were constrained by the minuscule movement limits. Just imagine the onerous piling work and excavation close to the tunnels and the amount of vibrations it can cause, yet the tunnels were only allowed to move a distance equal to the diameter of a Singapore 10-cent coin!

(Actual size of a Singapore 10 cent coin)

PIONEERED THE USE OF
JET GROUTING TO IMPROVE
GROUND STABILITY



"We literally had to create a cocoon effect beside the MRT lines through a ground improvement process called 'Jet Grouting' where a layer of concrete created below the proposed excavation level formed a buttress, to limit wall movement during excavation. This was the first time it was used in Singapore. We also pioneered the use of an Automated Tunnel Monitoring System in Singapore to ensure the safety of the live MRT line during construction. The LTA were so pleased with this innovation that they decided to make the use of a tunnel monitoring system mandatory for all similar future projects and it also became part of the building railway code.

Dr S. Nasim
Meinhardt Group Chairman

“

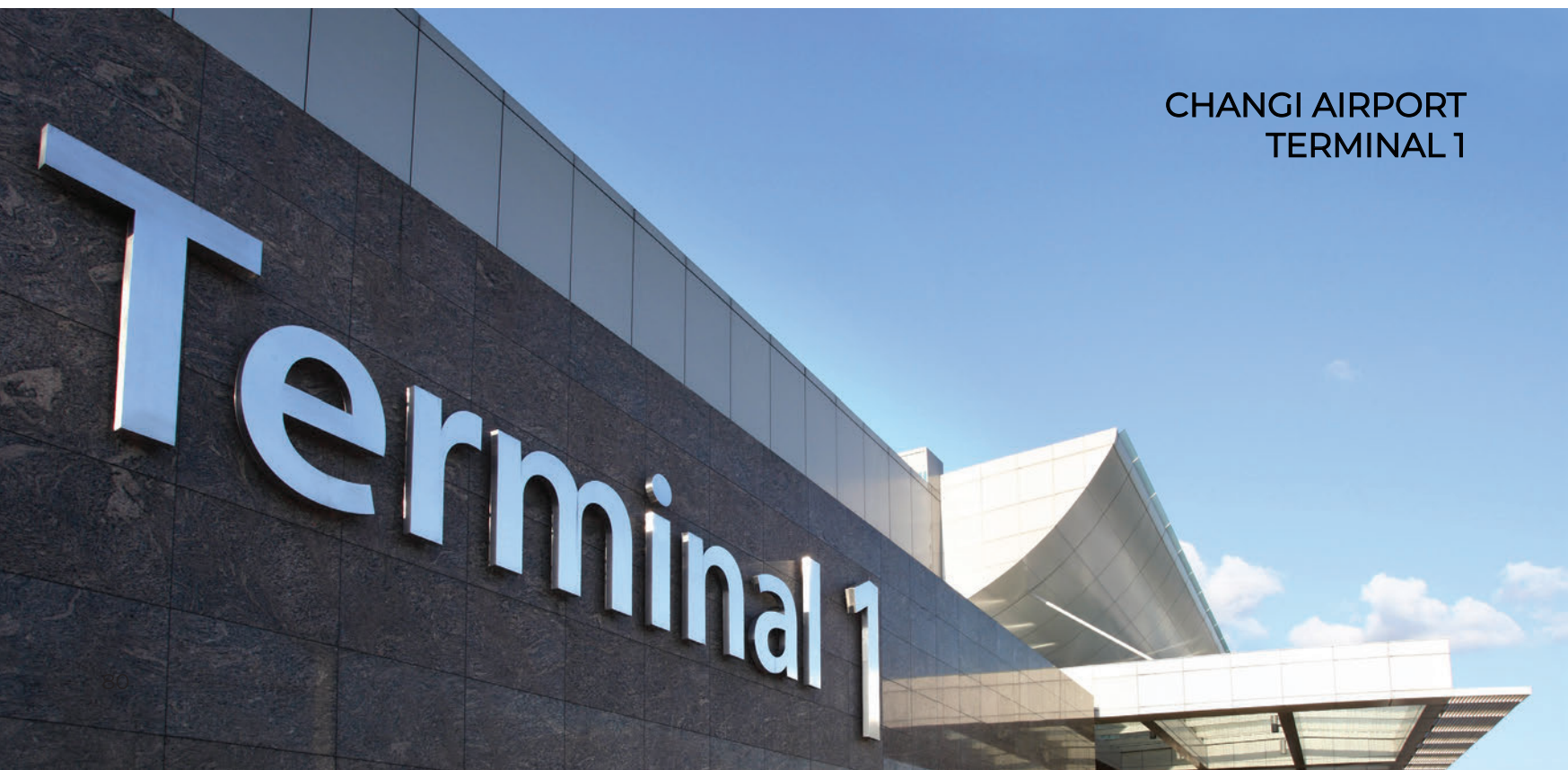
Long before 3D scanning and modelling became the norm, the project design team (architects and us) was already pioneering the use of photogrammetry which was the predecessor of present-day technology.

Dr S. Nasim
Meinhardt Group Chairman

When Meinhardt was commissioned for the Bugis Junction project, we also had to look into the preservation of the existing shophouses. After a technical survey, Meinhardt recommended that the original shophouses be torn down and rebuilt as they were technically unsalvageable and could not withstand the disruption of proposed construction work or satisfy the life expectancy of the new project.

"To URA's credit, they agreed it was the best approach from a safety point of view. The shophouses were literally photographed from multiple angles using photogrammetry and were rebuilt exactly as per the originals."

Dr S. Nasim
Meinhardt Group Chairman



CHANGI AIRPORT
TERMINAL 1

UPGRADING A WORLD ICON

Meinhardt was instrumental in upgrading Changi Airport's Terminal 1 (T1). Approximately 240,000 square feet of floor area was added to the building. Improvements to the façade and terminal facilities were done to improve the passenger experience. Higher ceilings, improved lighting, wider thoroughfares and thoughtful landscaping all contributed to a high-quality experience.

PROJECT MANAGEMENT FOR A ‘LIVE’ AIRPORT

Our project engineers were able to deliver the project efficiently despite having to carry out the upgrading whilst the terminal remained operational. Our team’s project managers were able to phase out the work during the four-year period to accommodate the different operational requirements of the terminal’s users.

RESORTS WORLD SENTOSA SINGAPORE (RWS)

A mega 24/7 integrated resort comprising multiple facility types across 49-hectares (66 football fields). RWS features the region's 1st Universal Studios, S.E.A Aquarium with one of the world's largest oceanariums, hotels, a casino and meeting venues. Home to the world's only Hotel Michaels that is designed by one of America's best-known architects, Michael Graves, the project received the BCA Green Mark District - Gold Plus Award (2009).

CHALLENGES

Keeping the mega development cool in-spite of Singapore's humid weather as well as the unique energy requirements of the casino operations (24/7, uninterrupted power supply) were some of the challenges.

SOLUTIONS

Meinhardt provided mechanical, electrical & plumbing, civil & structural and value engineering for this tourism icon

We employed highly efficient and the most advanced technology for building services, including a canopy cooling system for outdoor areas to save 2.9 million kilowatt-hour per year.


DIDO
JOURNEY
REWARD

Given the requirement to maintain sustainable casino operations during any power supply interruption, high capacity dynamic uninterruptible power supply was used as a cost and space effective solution. High voltage generators with high voltage essential power distribution networks were also deployed to remotely locate all the generators.

This multi facility type mega development, including Singapore's 1st large scale branded theme park, casino and oceanarium, was a major project that brought out the best in Meinhardt's creative engineering solutions.

MARINA BAY FINANCIAL CENTRE

A purpose-built development designed to be the epicentre of Singapore's financial and banking hub.

Five high-rise towers and generous underground parking constitute the six million square feet complex: two towers of 66 and 55 storeys are for residential


DBS


EXIT

use, while the remaining three towers, ranging from 33 to 50 storeys, are for commercial use.

Meinhardt provided integrated engineering for the mega development – working closely with the architect to ensure perfect integration of the building structure and technical services with the design.


HSBC
THE FULLERTON HOTEL

WE DEVELOPED HIGHLY EFFICIENT AND ROBUST STRUCTURAL SOLUTIONS, utilising dual lateral load resisting systems coupled with hybrid pre-stressed in-situ and precast concrete floor systems to achieve exceptional building structural performance with high constructability and cost benefits.

FOR EXCAVATION, AN INNOVATIVE ISLAND CONSTRUCTION METHOD WAS DEVISED

Comprising contiguous bored secant pile walls, deep cement mixed soil and treated perimeter soil berms. The system significantly reduced the quantity and extent of strutting, enabling excavation and superstructure works to proceed concurrently.

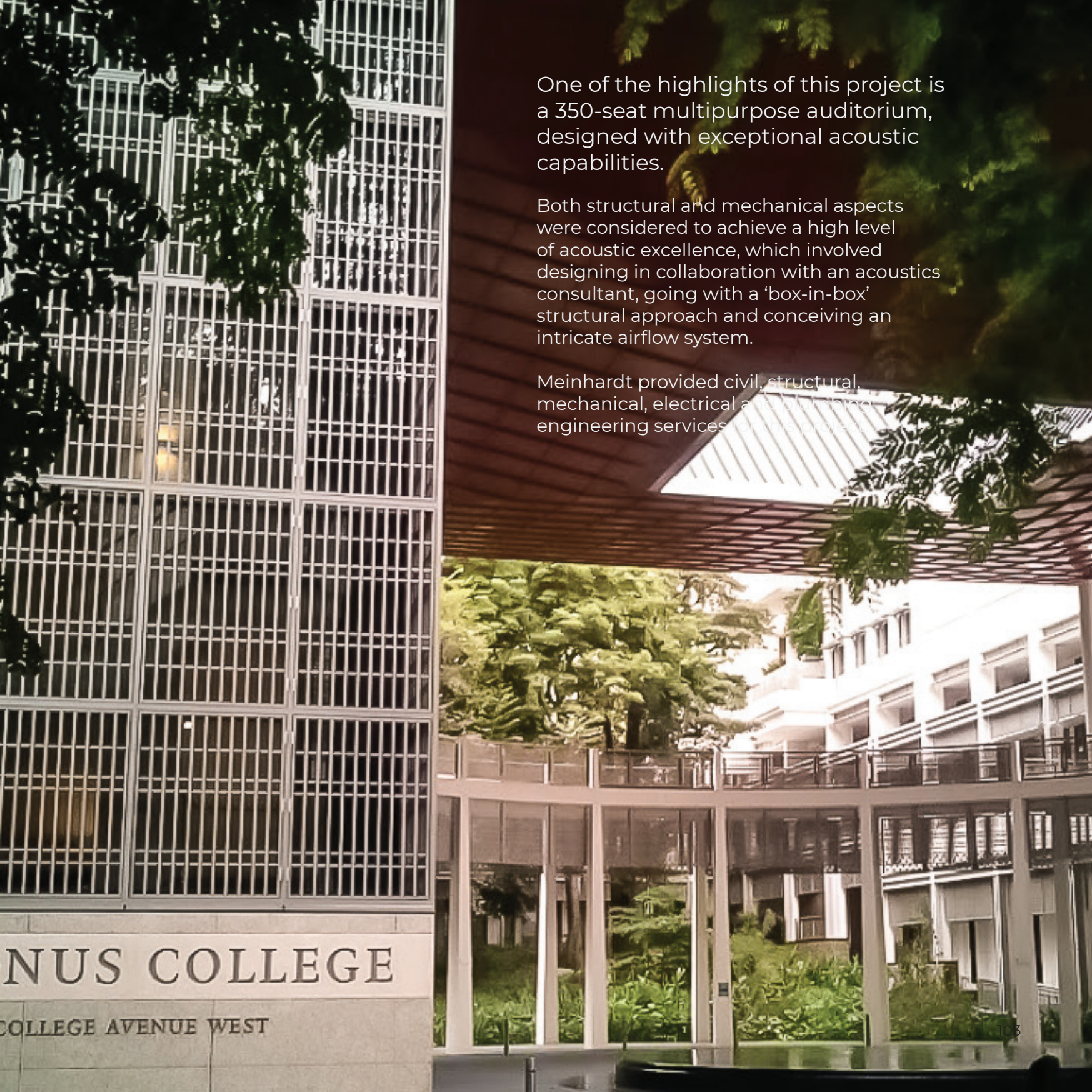
YALE - NUS COLLEGE CAMPUS

The Yale-NUS College campus was designed to be an academic village for living and learning.

Emphasising social learning among peers, it was designed with communal areas for interaction. Dining commons, nested communities, signature courtyards and sky gardens allowed students, faculty and staff in each of the three residential colleges to experience the intimacy and character of a small school while enjoying the resources of a large university.


YaleNUSCollege


YALE-



One of the highlights of this project is a 350-seat multipurpose auditorium, designed with exceptional acoustic capabilities.

Both structural and mechanical aspects were considered to achieve a high level of acoustic excellence, which involved designing in collaboration with an acoustics consultant, going with a ‘box-in-box’ structural approach and conceiving an intricate airflow system.

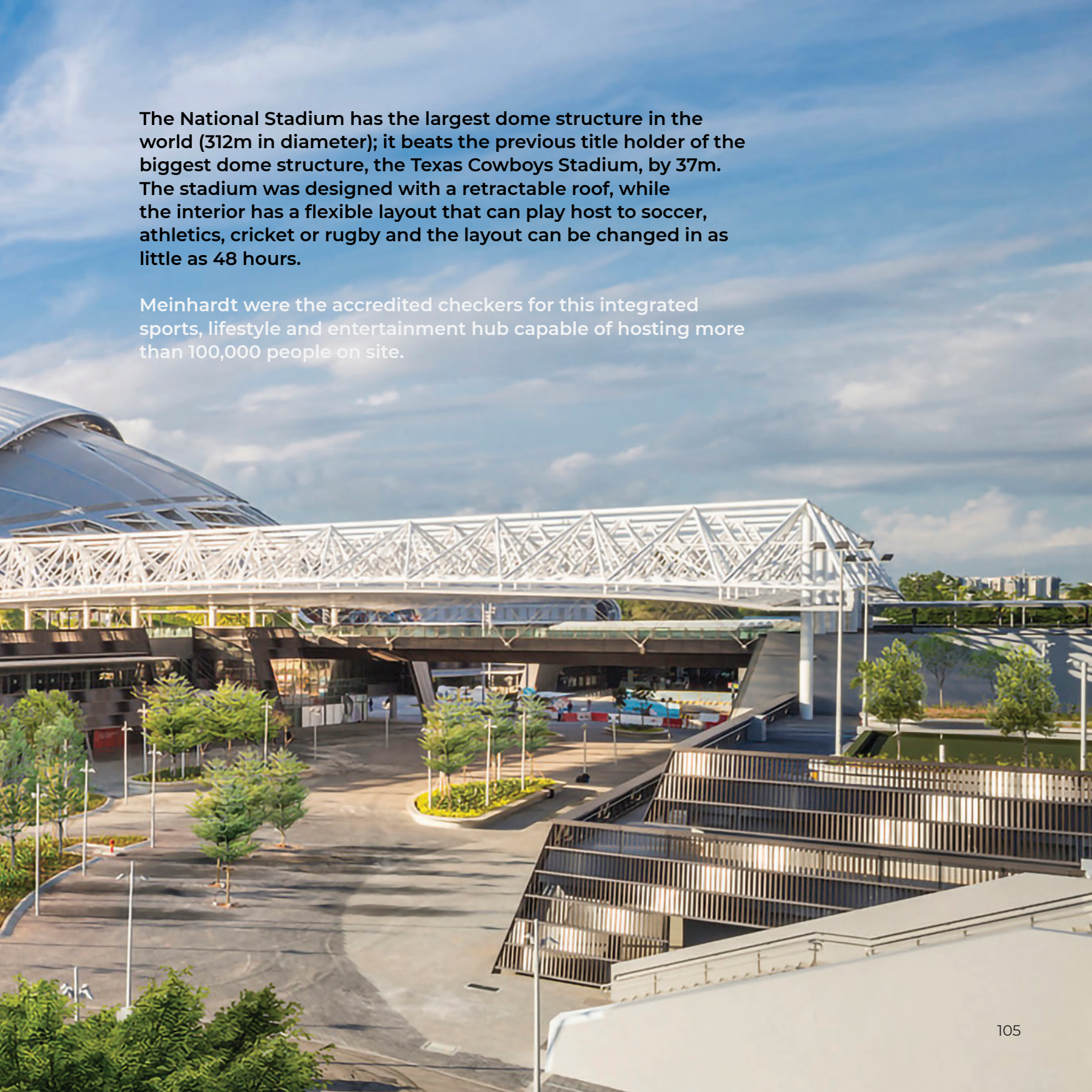
Meinhardt provided civil, structural, mechanical, electrical and public health engineering services for the project.

SINGAPORE SPORTS HUB

The world's largest dome structure

The National Stadium has the largest dome structure in the world (312m in diameter); it beats the previous title holder of the biggest dome structure, the Texas Cowboys Stadium, by 37m. The stadium was designed with a retractable roof, while the interior has a flexible layout that can play host to soccer, athletics, cricket or rugby and the layout can be changed in as little as 48 hours.

Meinhardt were the accredited checkers for this integrated sports, lifestyle and entertainment hub capable of hosting more than 100,000 people on site.




NATIONAL
STADIUM


VIVO city
mapletree
commercial
commercial
GOLDEN VILLAGE

VIVOCITY

VivoCity is Singapore's largest shopping mall. It was designed by famed Japanese architect Toyo Ito.

It was built on the site of the exhibition halls of the former World Trade Centre in June 2003. It has 1,500,000 square feet (18 football fields) of gross floor area and 1,077,000 square feet (13 ½ foorball fields) of retail space, larger than Suntec City and Ngee Ann City

Meinhardt were the civil & structural engineers for this iconic shopping mall


L1
SINCERE

REFLECTIONS
AT KEPPEL BAY

is an ultra-luxury waterfront condominium designed by Daniel Libeskind.

It won the FIABCI Prix D'Excellence Awards (Residential High-Rise) in 2013 and The Chicago Athenaeum International Architecture Award in 2012.

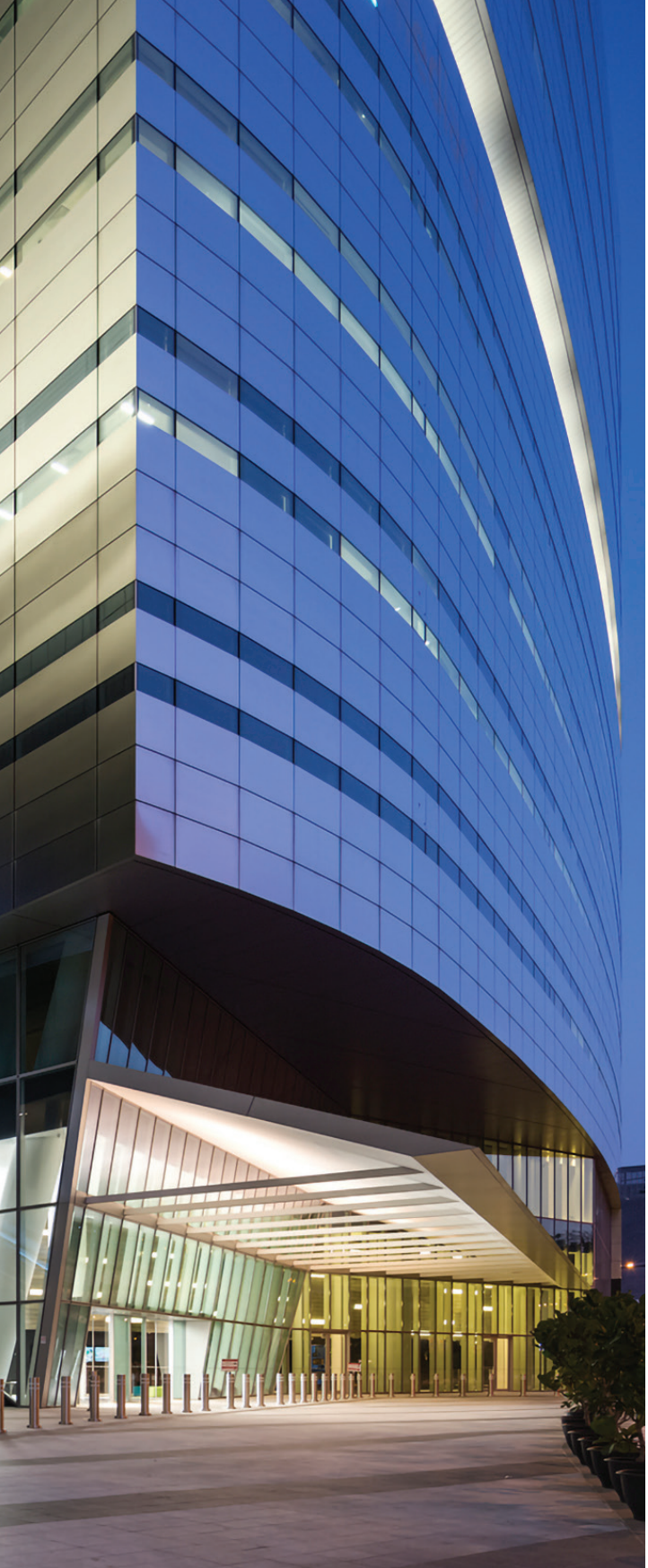
Meinhardt provided construction engineering analysis for this project

MEDIAPOLIS

Meinhardt are the structural and Earth Retaining and Stabilising System engineers for Southeast Asia's 800,000 square feet iconic broadcast complex

State-of-the-art facilities

- Digital production and post-production facilities
- Broadcasting and distribution facilities
- Interactive digital media labs and R&D activities
- Recording studios and audio suites
- Work lofts and incubators
- Awarded the Building & Construction Authority's Green Mark Platinum (top) rating for its eco-friendly building technology



BIOPOLIS

Asia's leading biomedical sciences research and development (R&D) hub for biomedical R&D activities. It has an environment that fosters a collaborative culture among the private and public research community.

Meinhardt provided alternative superstructure designs for the 9-storey Bioinformatics Institute (Block 2) and Bioprocessing Technology Centre (Block 3) and alternative foundation design for a 12-storey building for Private Research Institute / Companies (Block 7).

HENDERSON WAVES

Meinhardt are the accredited checkers for Singapore's highest pedestrian bridge (36m).

The bridge mimics the undulating shape of a wave, curving and twisting along its entire 274-metre length. Its form is anchored by steel arches and filled in with curved 'ribs'—slats of Balau wood, a dense hardwood used which is found only in Southeast Asia.

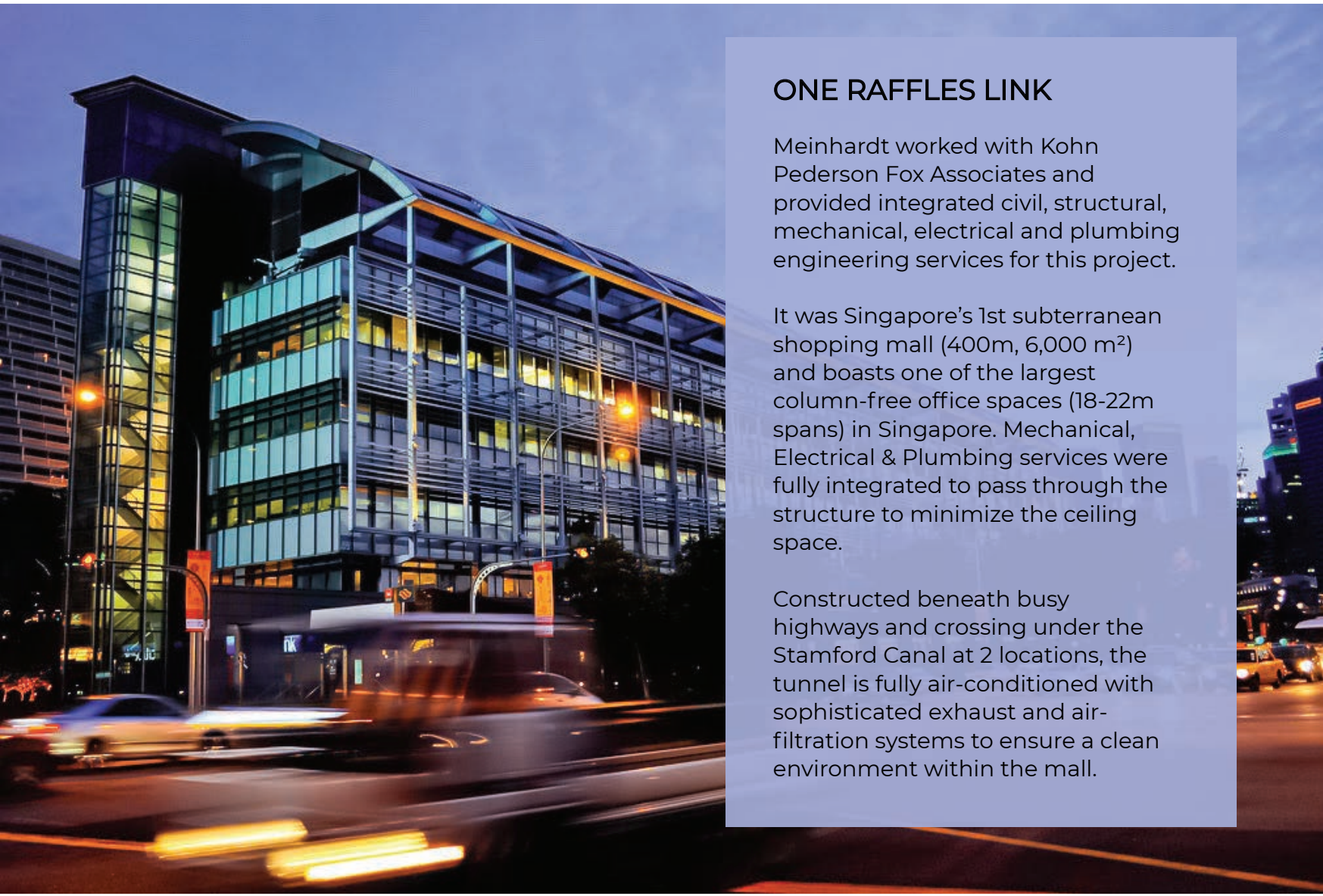
As dusk falls, the bridge is illuminated to stunning effect by light-emitting diode (LED) lighting.

MARINA BAY HELIX BRIDGE

Opened in 2010, the Helix Bridge is the longest pedestrian bridge in Singapore and its form is modelled after the double helix DNA, symbolising “life and continuity, renewal and growth”.

Meinhardt provided accredited checking services for this unique landmark.


ONE
RAFFLES
LINK
NORTH
Concierge



ONE RAFFLES LINK

Meinhardt worked with Kohn Pederson Fox Associates and provided integrated civil, structural, mechanical, electrical and plumbing engineering services for this project.

It was Singapore's 1st subterranean shopping mall (400m, 6,000 m^2) and boasts one of the largest column-free office spaces (18-22m spans) in Singapore. Mechanical, Electrical & Plumbing services were fully integrated to pass through the structure to minimize the ceiling space.

Constructed beneath busy highways and crossing under the Stamford Canal at 2 locations, the tunnel is fully air-conditioned with sophisticated exhaust and air-filtration systems to ensure a clean environment within the mall.

NATIONAL CENTRE FOR INFECTIOUS DISEASES

The urgency, complexity and creativity of work that is carried out at the new National Centre for Infectious Diseases & Centre for Healthcare Innovation has many parallels with Meinhardt's experience in managing this very important project in Singapore's healthcare defence.

THE CHALLENGES

- Deep basement construction (up to 24m) in highly variable Jurong Formation
- Unbalanced excavation due to undulating ground terrain of 15m across site
- Construction of three deep underpasses below Jalan Tan Tock Seng
- Erection of three bridges to provide inter-building connectivity to Tan Tock Seng Hospital and Lee Kong Chian (LKC) School of Medicine
- Close proximity to existing hospitals, LKC conservation building and surrounding residential developments
- Fast-track programme


NATIONAL CENTRE
FOR INFECTIOUS DISEASES
DROP OFF & PICK UP ONLY
STRICTLY NO WAITING

THE SOLUTIONS

- Innovative and robust ERSS system, comprising contiguous bored pile wall and full top-down construction method to minimise wall deflection, ground movement and water drawdown. This resulted in the safe execution of the 4-level basement construction, without adversely affecting the integrity of adjacent sensitive properties and structures
- Adoption of full top-down method, to enable excavation and superstructure construction concurrently, due to the fast-track programme

WE KEEP SINGAPORE MOVING

World class infrastructure is the backbone of Singapore's thriving economy.

For 45 years' Meinhardt has engineered world class land and underground transport and sewerage infrastructure.

Discover Singapore's complex infrastructure and find out how Meinhardt's solutions keep Singapore moving.

MOVING THE MASSES

Singapore's Mass Rapid Transit (MRT) network is the backbone of our transport sector for the masses. Every day, more than 3 million people rely on the MRT for work and leisure. Meinhardt is proud to have engineered many MRT stations and tunnels along the Downtown Line, Circle Line and Thomson-East Coast line.

> "Over the last 45 years, Meinhardt is proud to have been involved in **many major road, highway and MRT projects** and we are glad to be part of Singapore's evolving transport development.
>
> **Foo See Lim**
> Director
> Meinhardt Infrastructure

CIRCLE LINE

1. Habourfront C870D
2. Telok Blangah C856
3. Labrador Park C856
4. Pasir Panjang C856
5. Haw Par Villa C856
6. Kent Ridge C855
7. One North C870H
8. Buona Vista C855
9. Holland Village C855
10. Bartley C851A

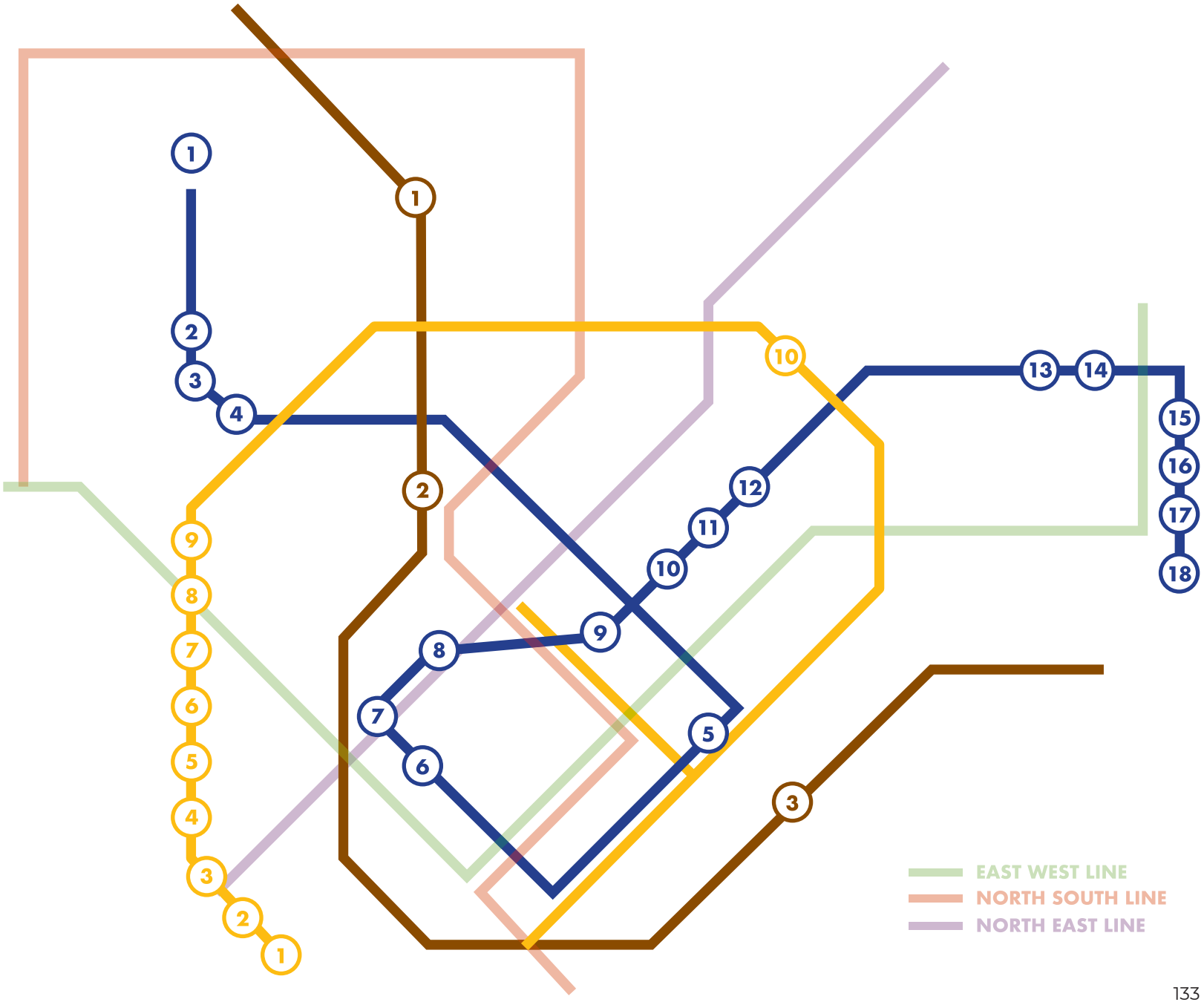
DOWNTOWN LINE

1. Gali Batu Depot C911
2. King Albert Park C917A
3. Sixth Avenue C917A
4. Tan Kah Kee C918A
5. Promenade
6. Telok Ayer C908
7. Chinatown C909
8. Fort Canning C937
9. Bencoolen C936
10. Jalan Besar C935
11. Bendemeer C933
12. Geylang Bahru C932A
13. Bedok Reservoir C927
14. Tampines West C926
15. Tampines Central C925A
16. Tampines East C925
17. Upper Changi C923
18. Expo C922

THOMSON EAST COAST LINE

1. Mayflower T210
2. Orchard Boulevard T218
3. Katong Park T305

Meinhardt has provided various engineering services for multiple MRT projects across three major lines - Downtown, Circle, Thomson & Tuas West Extension. This includes Lead Consultancy, Qualified Person (QP), Accredited Checker, Earth Retaining or Stabilising Structures (ERSS) Design, Traffic Diversion services and etc.



MISSION IMPOSSIBLE

Sitting underground, in between and right next to a live train track, existing above ground MRT station and two large operational buildings, the Downtown Line Expo station was one of Meinhardt's greatest engineering challenges over its 45-year history in Singapore.


Changi South Ave 1

> **The challenge before us was phenomenal. How do we safely construct a new underground station that lies in between so many existing large and critical structures without disrupting day to day life in such a busy district? In addition, we had to create a new foundation system for the existing above ground train tracks while the trains continued to run.**

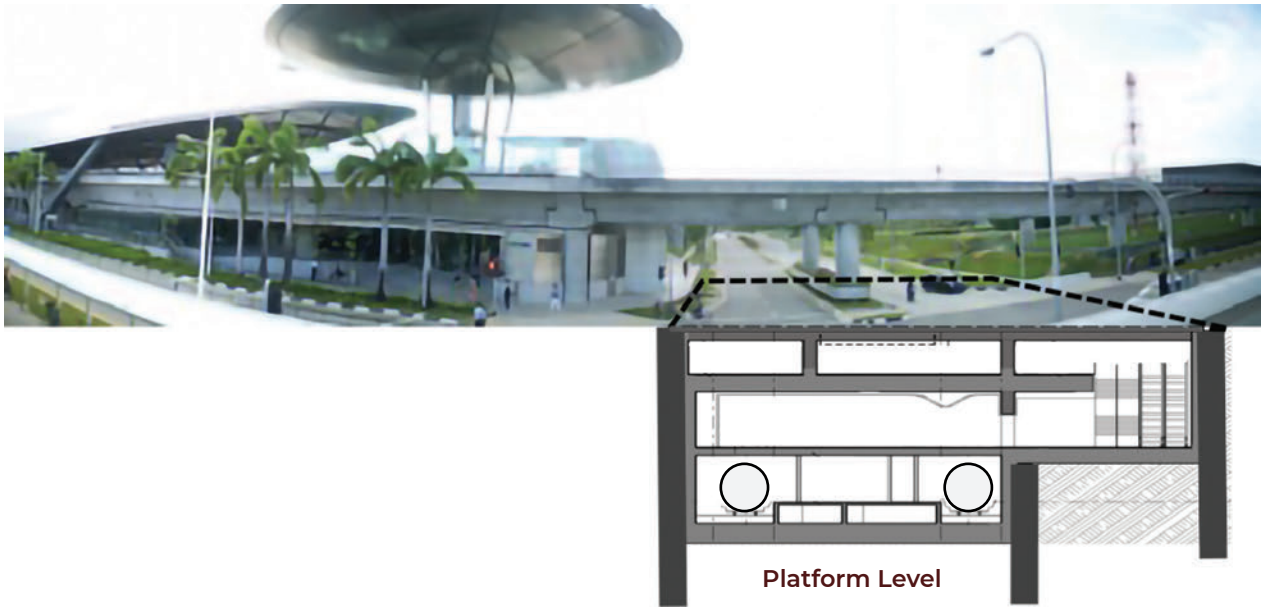
Foo See Lim
Director
Meinhardt Infrastructure.

FAST FACTS

Downtown Line (EXPO Station)

Project reference
A1967-19181-2009

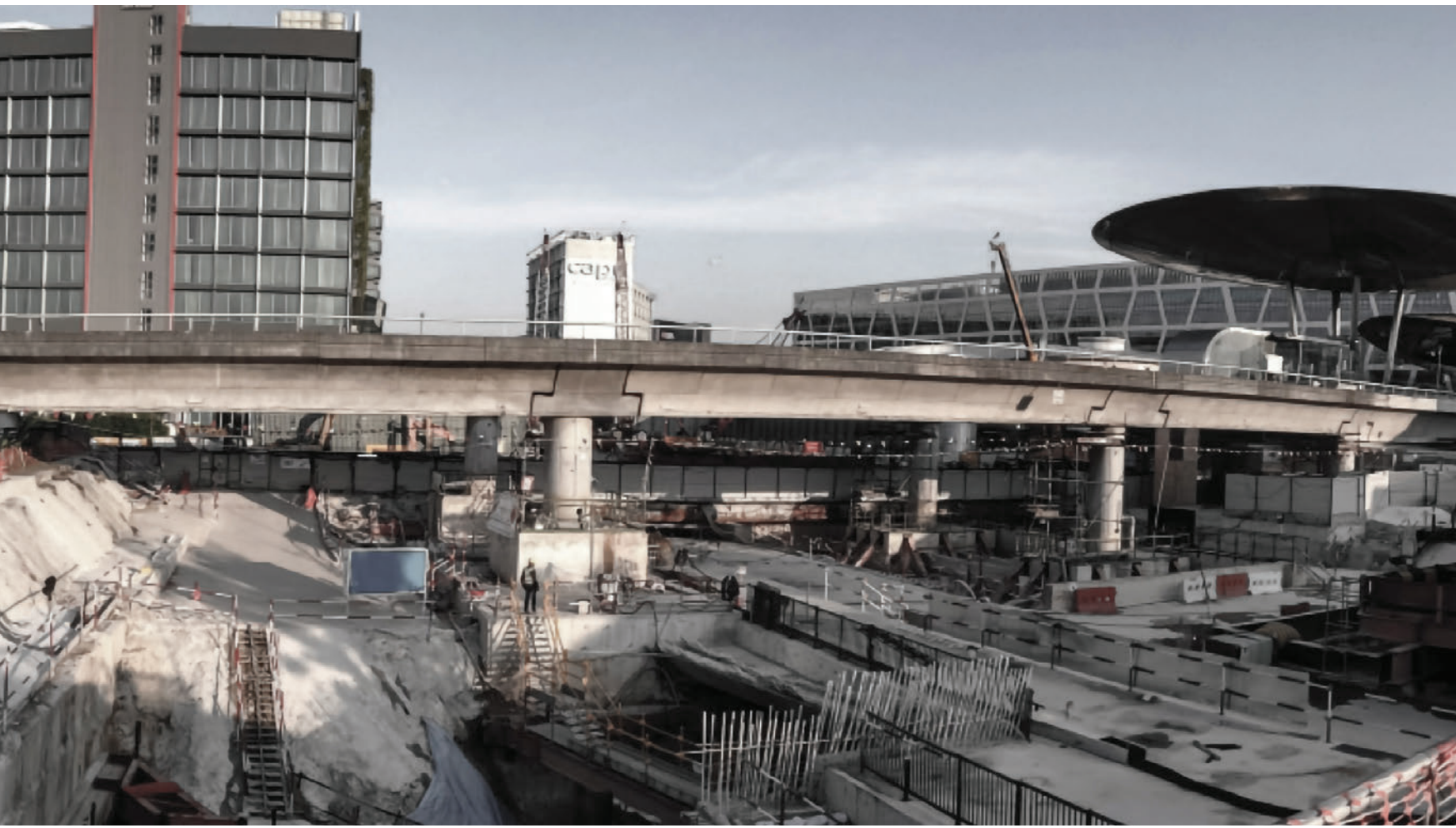
Type	Levels	Maximum Length	Maximum Depth	Maximum Width	Number of Connections
Interchange station with East-West Line Expo station	3 under-ground	175.6m	25m	72m	5 above ground 2 underground



Location of the underground station

THE BIGGEST CHALLENGE

our engineers faced was to build the underground station below and in between existing piles of the viaducts supporting the train tracks. This required careful design of the retaining structures and lots of measuring and testing along the way to ensure the integrity of the existing underground structures were not compromised.



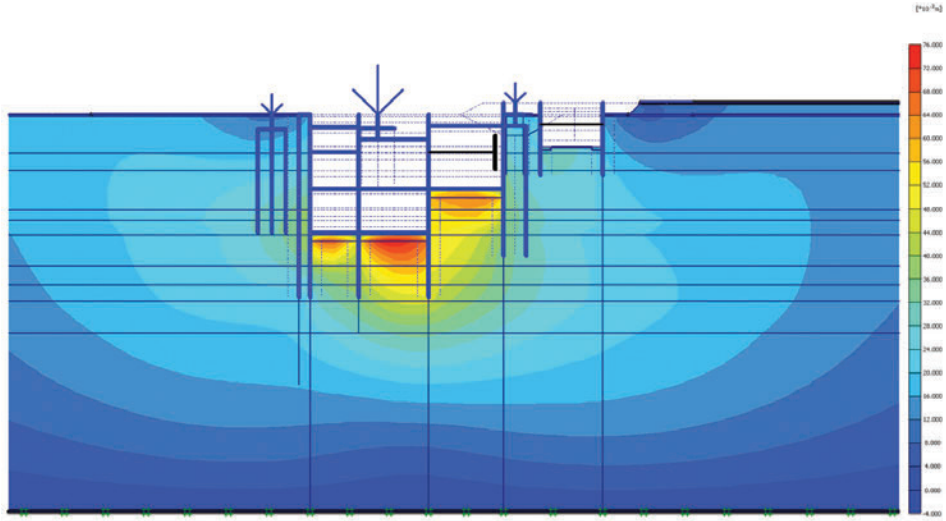
Overview of the construction site at the EXPO viaduct

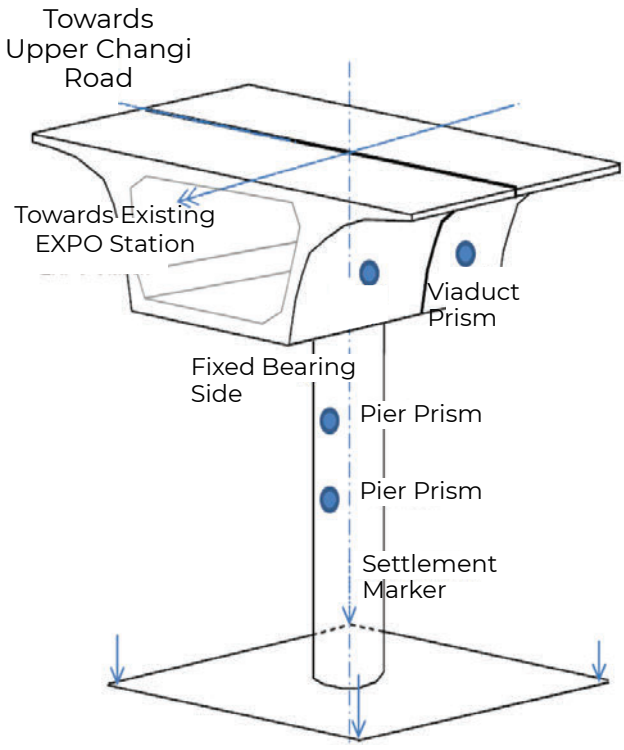
RELENTLESS ATTENTION TO DETAIL, SAFETY & PRECISE EXECUTION

> **“We had a relentless emphasis on safety planning and execution, pinpoint project management and surgical precision** in executing every step of the engineering and construction process. We used technology extensively to check, recheck, calibrate and adjust every single piling, cutting, boring, excavation and filling process along the way

Foo See Lim
Director
Meinhardt Infrastructure.

Analytical models were set up to analyse and predict structural settlement and forces induced under various stages of construction. Using 2-D Plaxis FEM analysis and 3-D StaadPro FEM analysis, we were able to accurately predict the amount of ground movement expected during the entire construction process and adjust accordingly for safe execution.





Typical Instrumentation Layout on Viaduct

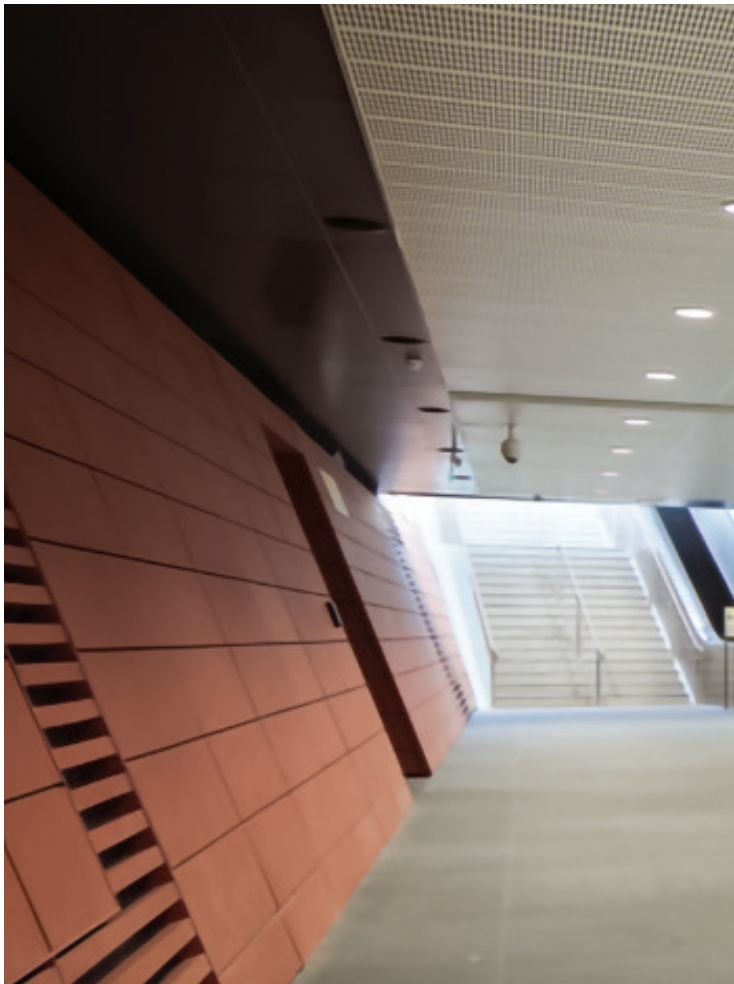
We used a real-time monitoring system that utilised an electro-level beam sensor to check any movement of the viaduct support structures in all directions.

We also used settlement markers, tilt meters, rail gauges to monitor every single movement of the construction site and viaduct arising from excavation and construction works.

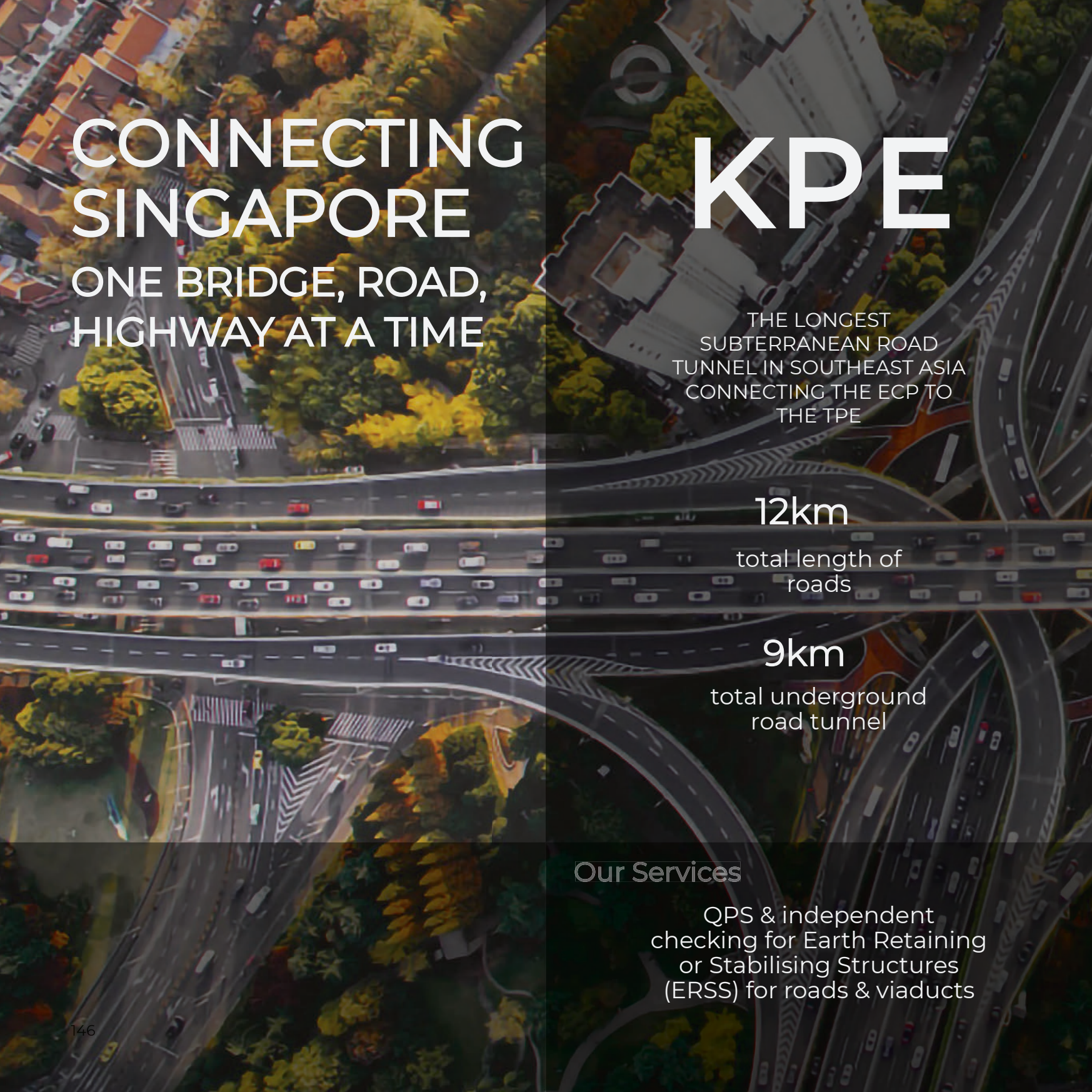

Expo
D


SUB
UNDERGROUND


capri



> “Completing this project successfully and safely within budget and time gave us and our partners an immense sense of satisfaction. It was our privilege to have been involved in such a technically challenging project that tested our engineering capabilities to the limit. **This showed that nothing is impossible if we put our thinking hats on and find creative solutions for our clients.**
>
> **Foo See Lim**
> Director
> Meinhardt Infrastructure.



CONNECTING SINGAPORE

ONE BRIDGE, ROAD, HIGHWAY AT A TIME

KPE

THE LONGEST SUBTERRANEAN ROAD TUNNEL IN SOUTHEAST ASIA CONNECTING THE ECP TO THE TPE

12km

total length of roads

9km

total underground road tunnel

Our Services

QPS & independent checking for Earth Retaining or Stabilising Structures (ERSS) for roads & viaducts

MCE

LINKING THE EASTERN AND WESTERN PARTS OF SINGAPORE TO THE NEW DOWNTOWN

5km

total length of roads

Singapore's FIRST undersea tunnel

420m

of the 3.6km underground tunnel lies under the Marina Bay seabed

QPS, engineering review for roads & viaducts

AYE

CONNECTING THE WESTERN END OF THE EAST COAST PARKWAY (ECP) TO TUAS IN THE WEST AND MALAYSIA VIA THE TUAS SECOND LINK

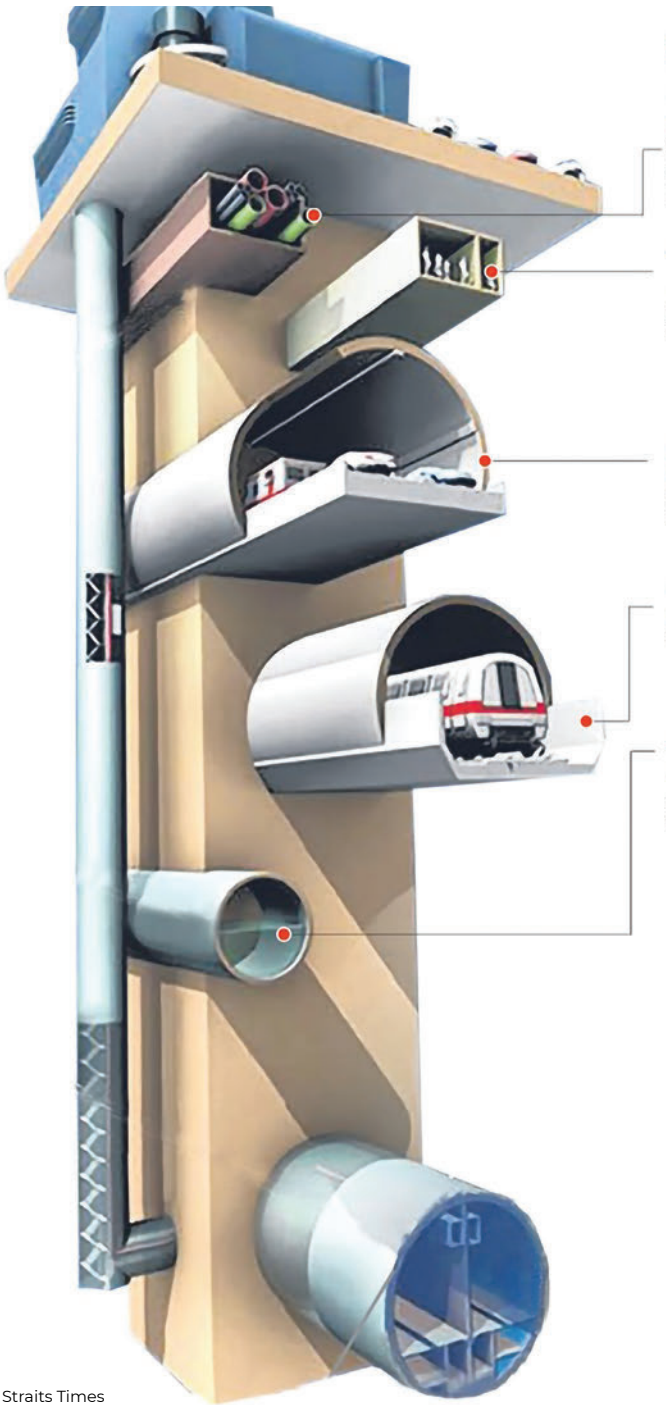
26.5km

total length of roads

Detailed Design for some viaducts

THE NEXT FRONTIER

In land scarce Singapore, looking underground to meet Singapore's future land needs has become a necessity for survival as the country grows its population to sustain economic growth. Singapore is already using underground spaces extensively for transport, storage, wastewater and utilities infrastructure. Meinhardt and its partners have completed many underground sewerage, MRT, expressway projects.



UNDERGROUND TUNNELS

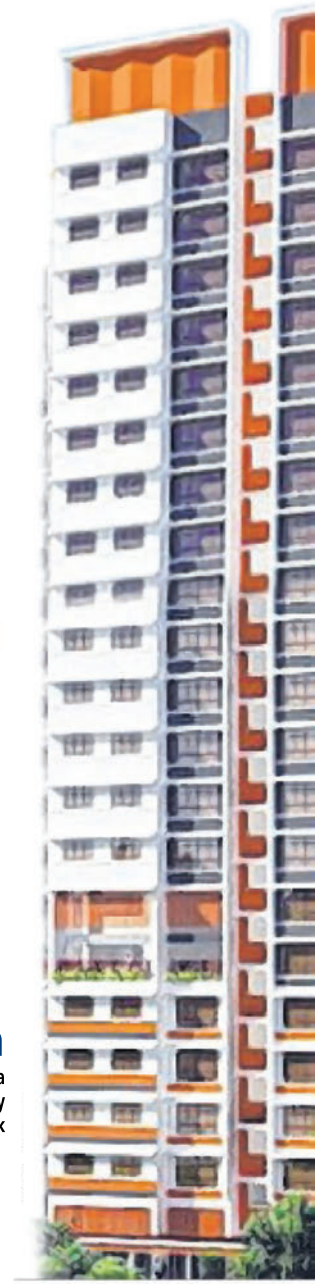
3m
Sewage and current power grids

12m
Underpass and malls

8-25m
Underground expressways

30m
MRT tunnels

20-55m
Deep tunnel sewerage system



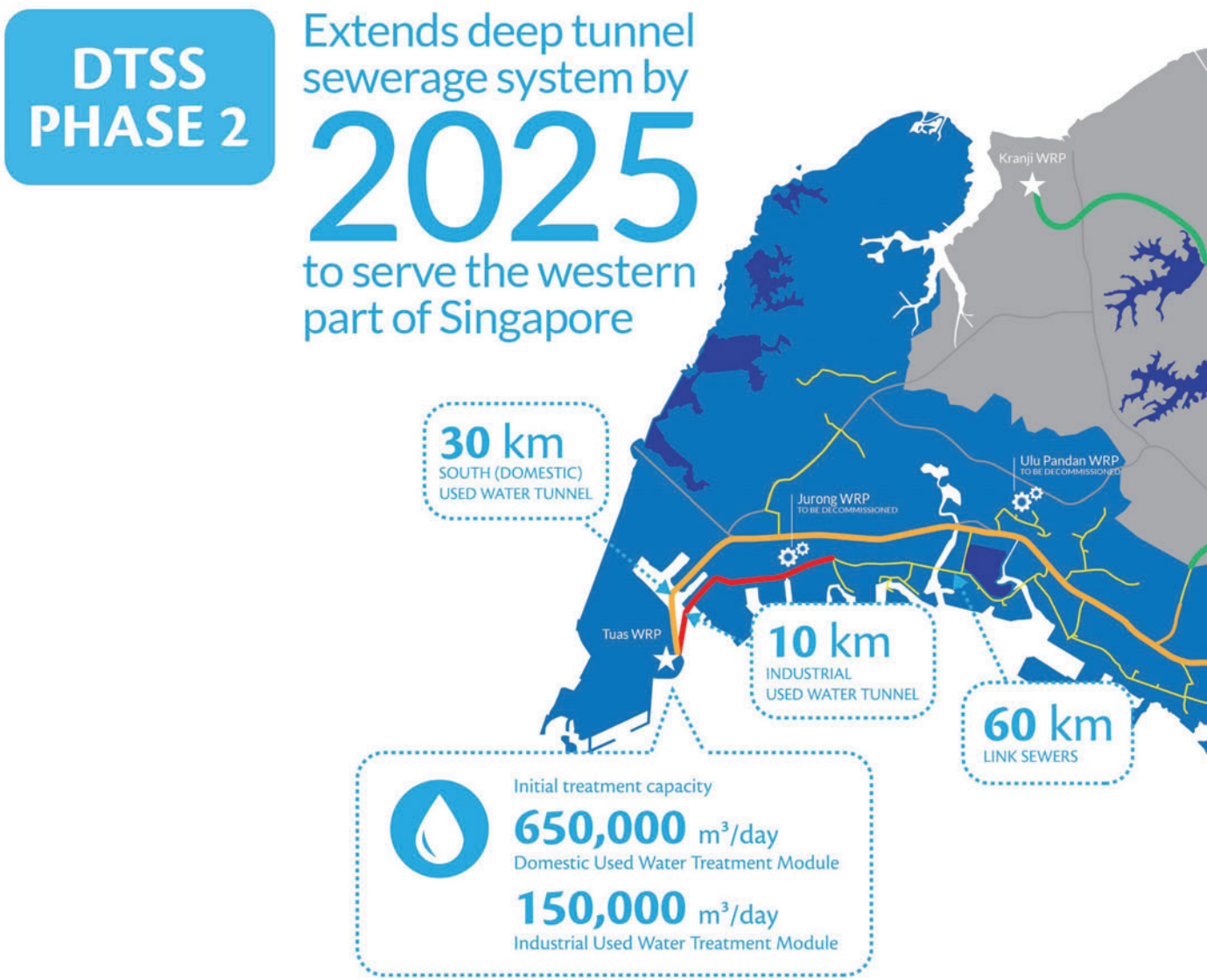
60m
Height of a 20-storey HDB block

Image taken from: Straits Times

MEET THE MOLE

Tunnel Boring Machines (TBM), also known as moles, have been used extensively in Singapore to burrow tunnels for our underground MRT and expressway tunnels. Able to create tunnels ranging from 1m to 17m in diameter, these mechanical giants speed up the process for underground engineering works. Meinhardt and its partners have used TBMs in many of its MRT and expressway projects.

WHAT IS THE DEEP TUNNEL SEWERAGE SYSTEM (DTSS) ?



Singapore's used water superhighway for the future. A cost-efficient and sustainable solution conceived by PUB to meet Singapore's long-term needs for used water collection, treatment, reclamation and disposal. DTSS uses deep tunnel sewers to convey used water by gravity to centralised water reclamation plants located at the coastal areas.

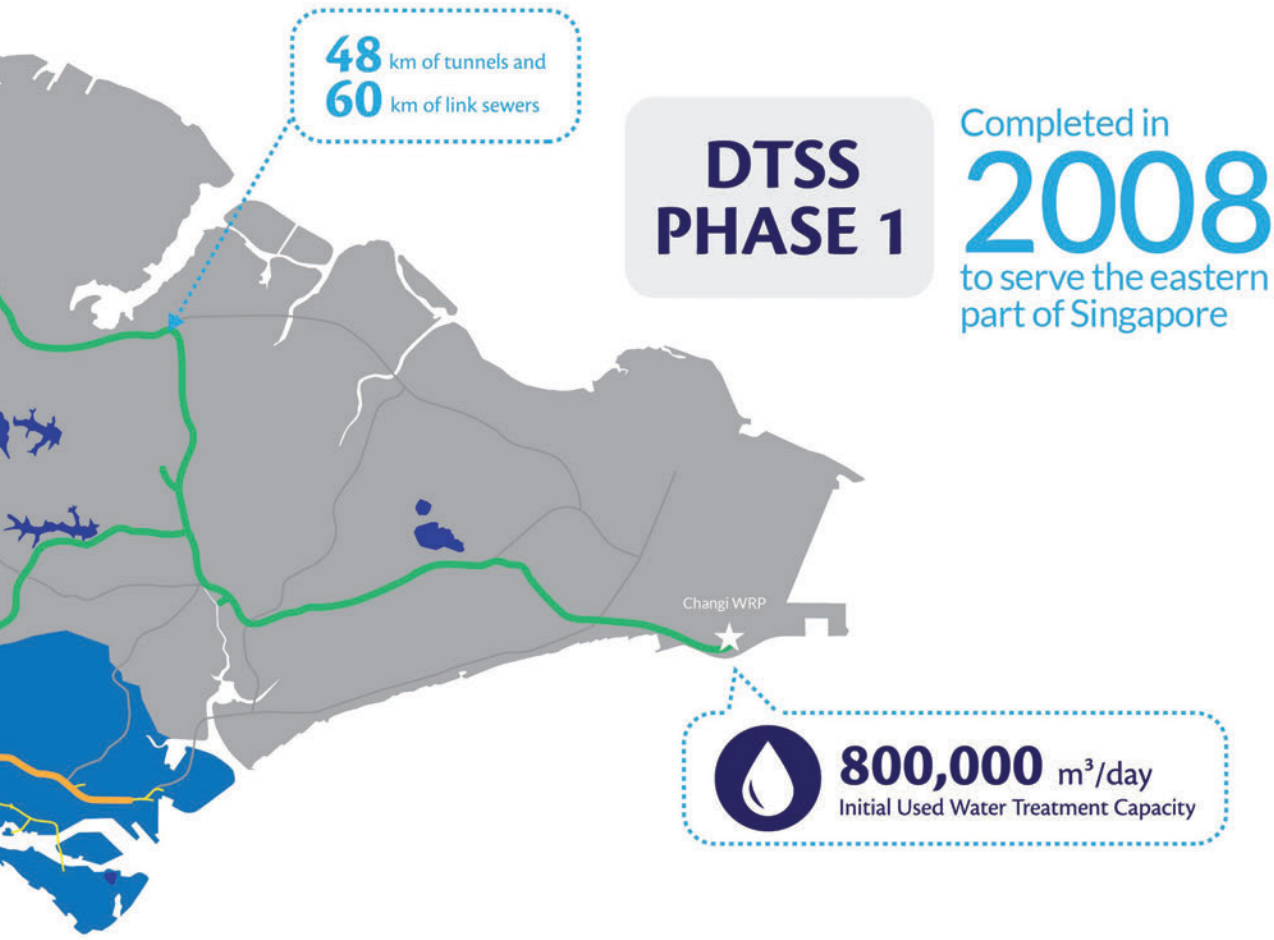


Image taken from: PUB Singapore

DEEP TUNNEL SEWERAGE SYSTEM

Meinhardt is providing civil & infrastructure services for Phase I (2 packages) & Phase II (1 Package)of this mega project.

BEYOND SKIN DEEP

Enter the world of building facades and be fascinated by the science and art behind building skins.

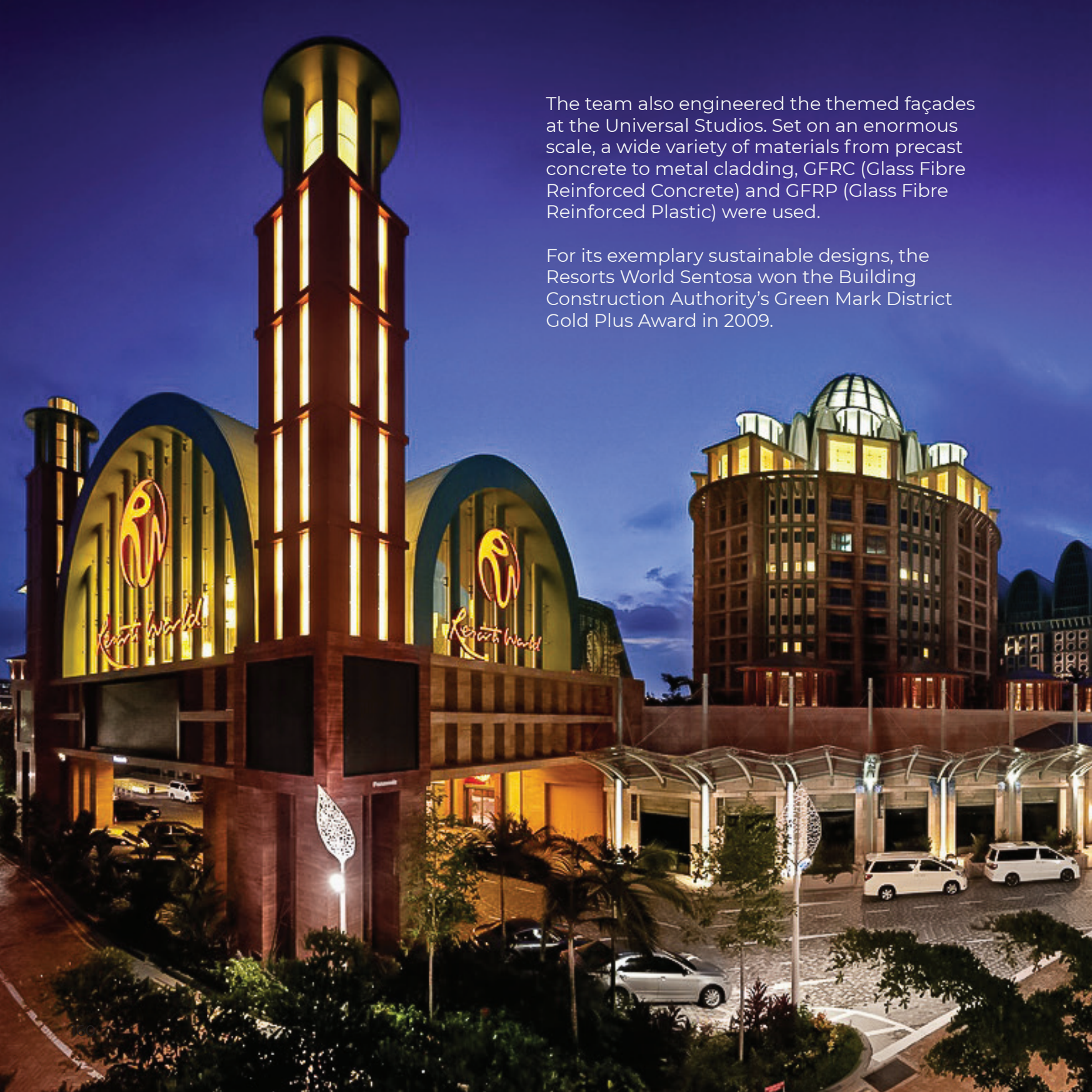
As one of the world's largest and most respectable Façade engineering companies, our expertise goes beyond skin deep.

We have been helping Singapore building owners clad their buildings, creating aesthetic masterpieces which are safe and a sight to behold.

RESORTS WORLD SENTOSA SINGAPORE

Meinhardt deployed its expertise for the façade and roof designs for the entire project.

The works cover stone cladding, window walls, high performance sliding doors, aluminium roofing with built-in green features, glass walls and shopfronts, roof slate tiles, glass skylights, and over 25,000 square metres of Ethylene tetrafluoroethylene (ETFE - a fluorine-based plastic designed to have high corrosion resistance and strength over a wide temperature range) and Polytetrafluoroethylene (PTFE - a fluorocarbon solid known for its water repellent properties) canopies. The cooling system integrated within these canopies contributes to energy savings of 2.9 million kWh per year.



The team also engineered the themed façades at the Universal Studios. Set on an enormous scale, a wide variety of materials from precast concrete to metal cladding, GFRC (Glass Fibre Reinforced Concrete) and GFRP (Glass Fibre Reinforced Plastic) were used.

For its exemplary sustainable designs, the Resorts World Sentosa won the Building Construction Authority's Green Mark District Gold Plus Award in 2009.


FTH AVE.
SAFARI OUTFITTERS LIMITED
CHRYSLER
APPROVED
SERVICE
PLYMOUTH

ROBINSON TOWER

Meinhardt faced many challenges such as unique angular and non-uniform structures posing challenges for façade application and stringent design requirements to maximise visual impact.

“

Viewed at any angle, the building looks like a carefully chiselled crystal sculpture in the air, with the façade accentuating light reflections, creating an architectural art piece to behold.

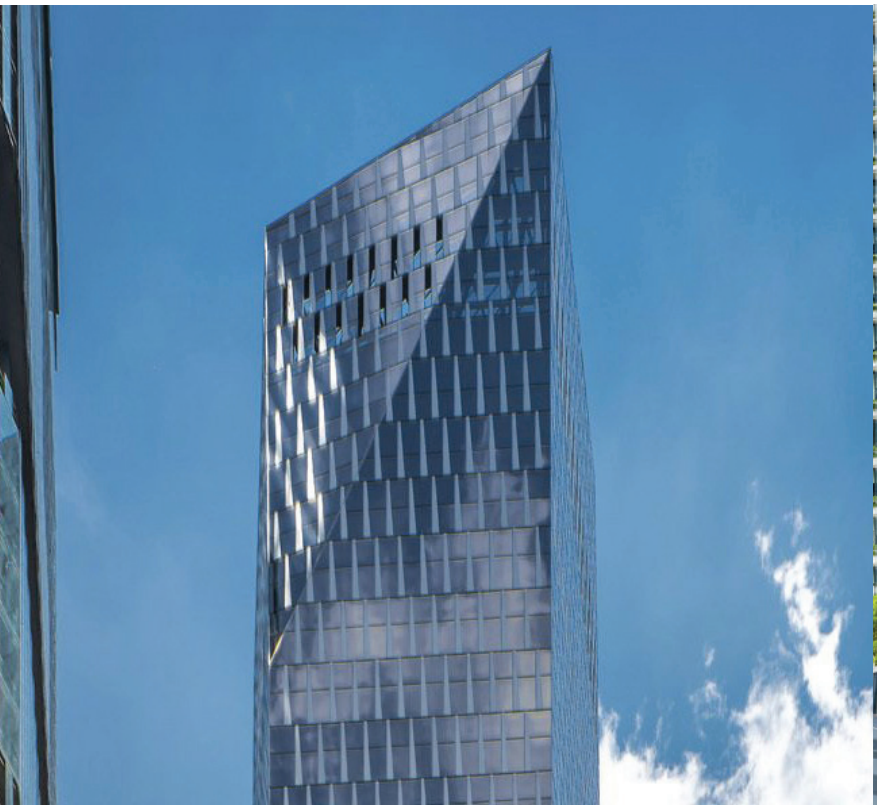
Timothy Soebroto
Associate Director
Meinhardt Façade Singapore

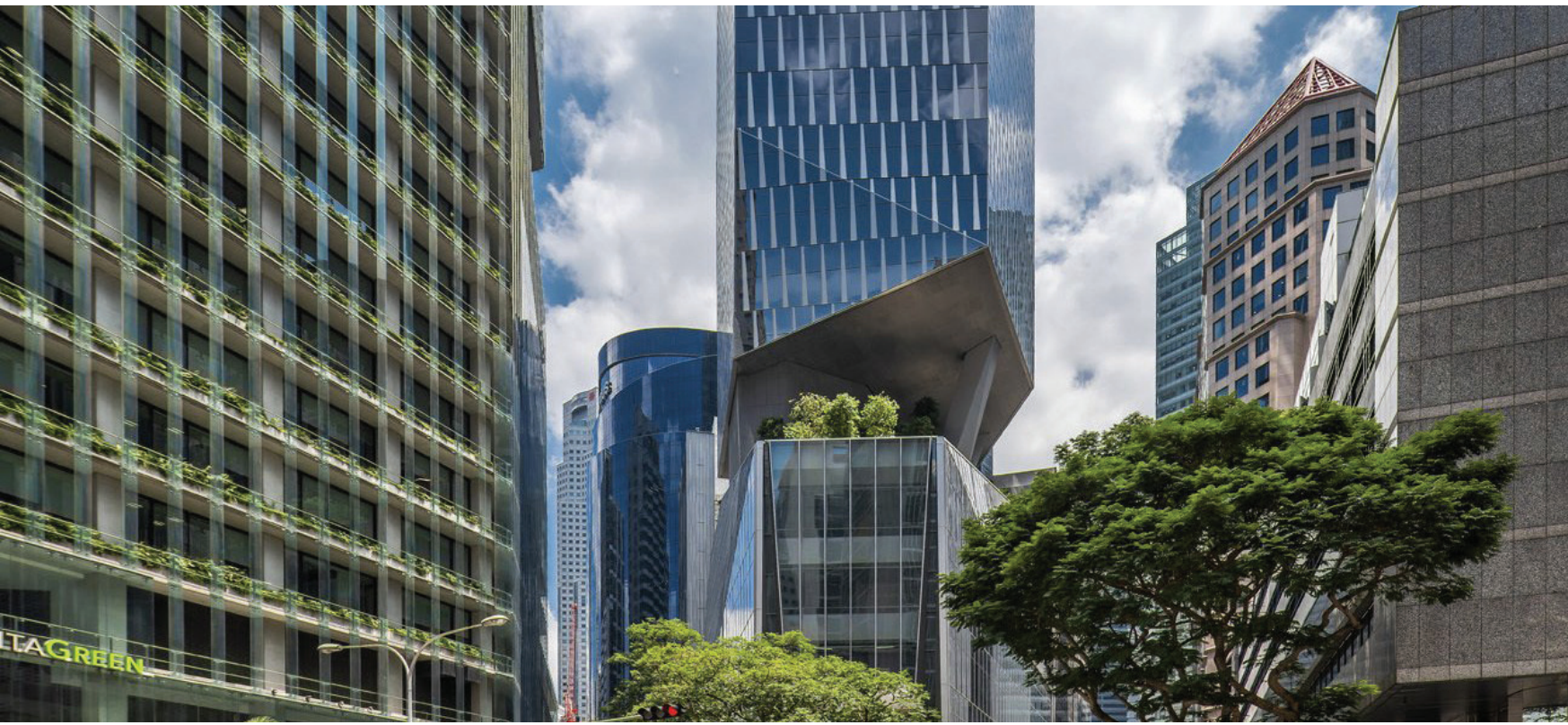
“

The biggest challenge we faced was maintaining the slim and sleek appearance of the building façade while ensuring that the building was safe.

For instance, for certain parts of the building, the façade had to be very slim so as not to block certain views. We carefully selected a unique blend of materials combined with innovative designs that were slim yet strong and able to take very heavy weight stresses.

Timothy Soebroto
Associate Director
Meinhardt Façade Singapore




LTAGREEN

PARKROYAL ON PICKERING

is a 'hotel-in-a-garden' featuring 15,000 square metres of lush gardens, waterfalls and planter walls, which constitute more than twice the hotel's total land area.

It is Singapore's first zero-energy sky gardens powered by solar energy cells and uses comprehensive energy and water conservation features such as light, rain and motion sensors, as well as rain harvesting and using NEWater (recycled water).

It was awarded the Building & Construction Authority's Green Mark Platinum, Singapore's highest rating for green buildings and is also the Winner of the Solar Pioneer Award for being the first in the country's hospitality sector to use a solar energy system.

Meinhardt provided full façade and BMU consultancy professional services including concept design, tender drawings and technical specification, tender, shop drawing review, material submissions, prototype testing, manufacturing inspections and site installation inspections.

A low-iron insulated glass with stainless steel mirror finish frame was designed for the 15m high lobby panel to offer visual transparency. A glazed curtain wall with high performing low-E coated insulated glass and a unique system of sun shading helped to save a considerable amount of energy.


VICTORIA THEATRE

VICTORIA CONCERT HALL

Meinhardt Façade was appointed by W Architects as the façade consultant for the refurbishment of the historical Victoria Theatre and Victoria Concert Hall. The 151-year-old icons were closed in June 2010 for refurbishment works to preserve its heritage elements while providing new facilities and technologies to improve and enhance the acoustics.

A rigorous design process and coordination between the architect and Meinhardt façade helped to dissolve visual barriers to the main façade walls of the two buildings. Glass panel sizes were also optimised to provide a transparent connection between the observer and the theatre or music lover.

For the large façade areas such as the theatre and concert hall level two lobbies and the atrium skylight, double glazed units filled with argon gas contributed to the 25% energy savings requirement for the building to achieve a Green Mark rating of Gold Plus for existing buildings.

AND THERE WAS LIGHT

A building's design gives it form, lighting accentuates its beauty and soul.

Buildings in Singapore have evolved from just being functional structures to ones that evoke emotions.

Meinhardt Light Studio, Meinhardt's specialist lighting unit, has brought to light many iconic projects in Singapore.

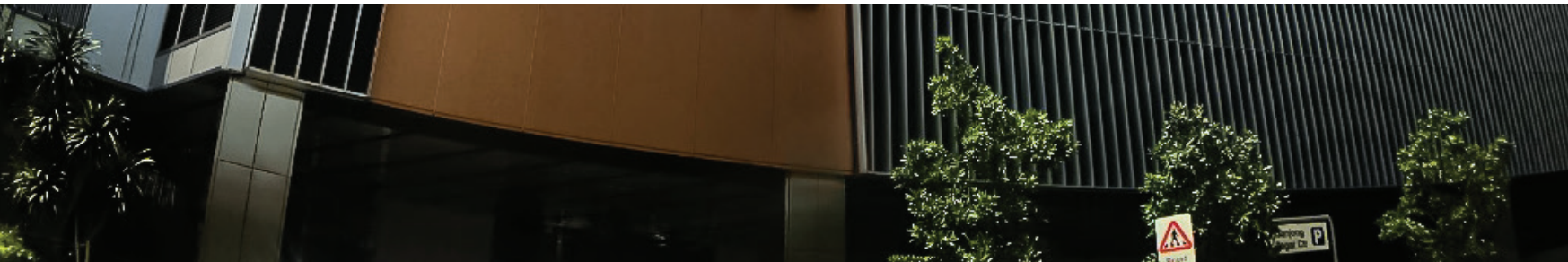

Casino supports responsible gaming. Ca

RESORTS WORLD SENTOSA SINGAPORE CASINO

Meinhardt Light Studio was commissioned to revamp and enhance the interior lighting of the Casino in Resorts World Sentosa.

Services provided: interior design consultancy from conceptualisation, detail design tender documentation, specification, contract administration, through to handover

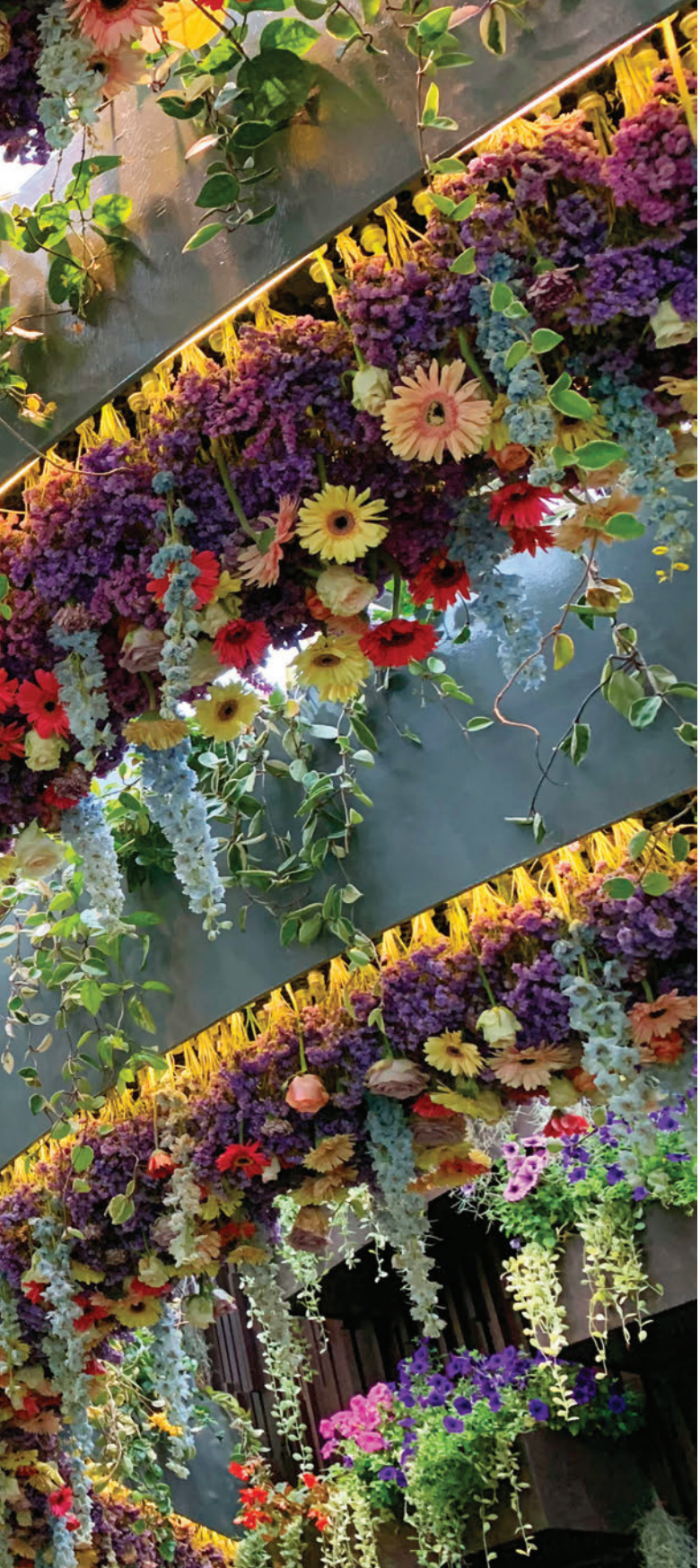

SOFITEL



SOFITEL SINGAPORE

is a luxury boutique hotel located in the central business district, fusing old-world charm with a dash of playfulness for a delightful hotel experience.

Services provided: full Interior and landscape lighting design including concept, detail design, site supervision and commissioning



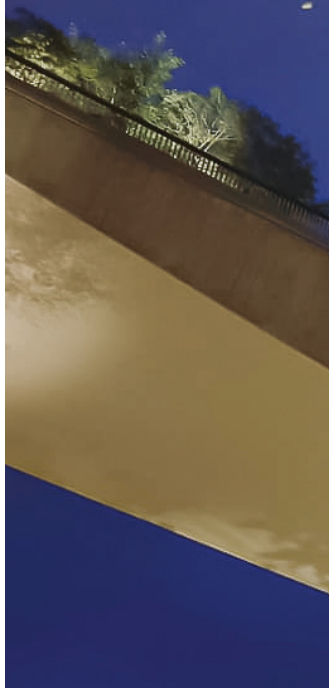
FLORAL FANTASY

is a thematic attraction at Gardens by the Bay that features four themed concepts namely Dance, Float, Waltz, and Drift.

Services provided: interior, exterior lighting design services including concept, schematic, detail design, construction and commissioning.

Awarded Green Mark Platinum


Bayfront
Pavilion

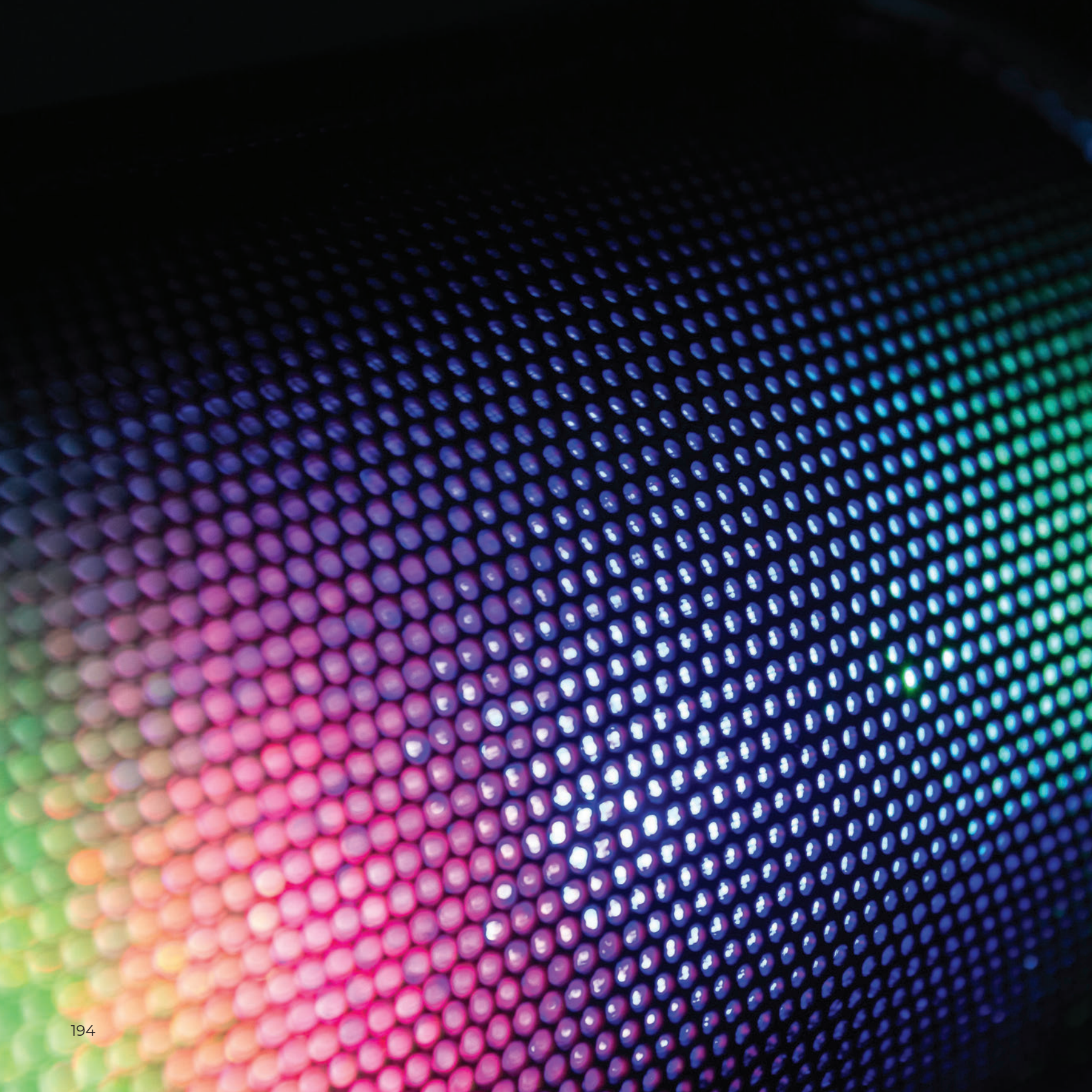


HIGHLINE RESIDENCES

is a high-end luxury condominium bordering Tiong Bahru district with integrated lighting to multiple mixed-use spaces and complex water features. The lighting treatment provides a warm opulent night setting for residents and guests.

Services provided: lighting design consultancy for interior, exterior and façade concept design through to handover

Awarded Green Mark Platinum



TRANS FORMING INDUSTRY 4.0

AI, robotics, the 4th industrial revolution, supply chains and data centres - buzz words that are shaping Singapore's ever-evolving industrial sector.

Industrialists face competing demands of low cost, efficient manufacturing and supply chains, while maintaining health and safety standards.

Meinhardt's deep experience in the industrial sector puts us front and centre in helping companies remain competitive.

TELIN-3 DATA CENTRE

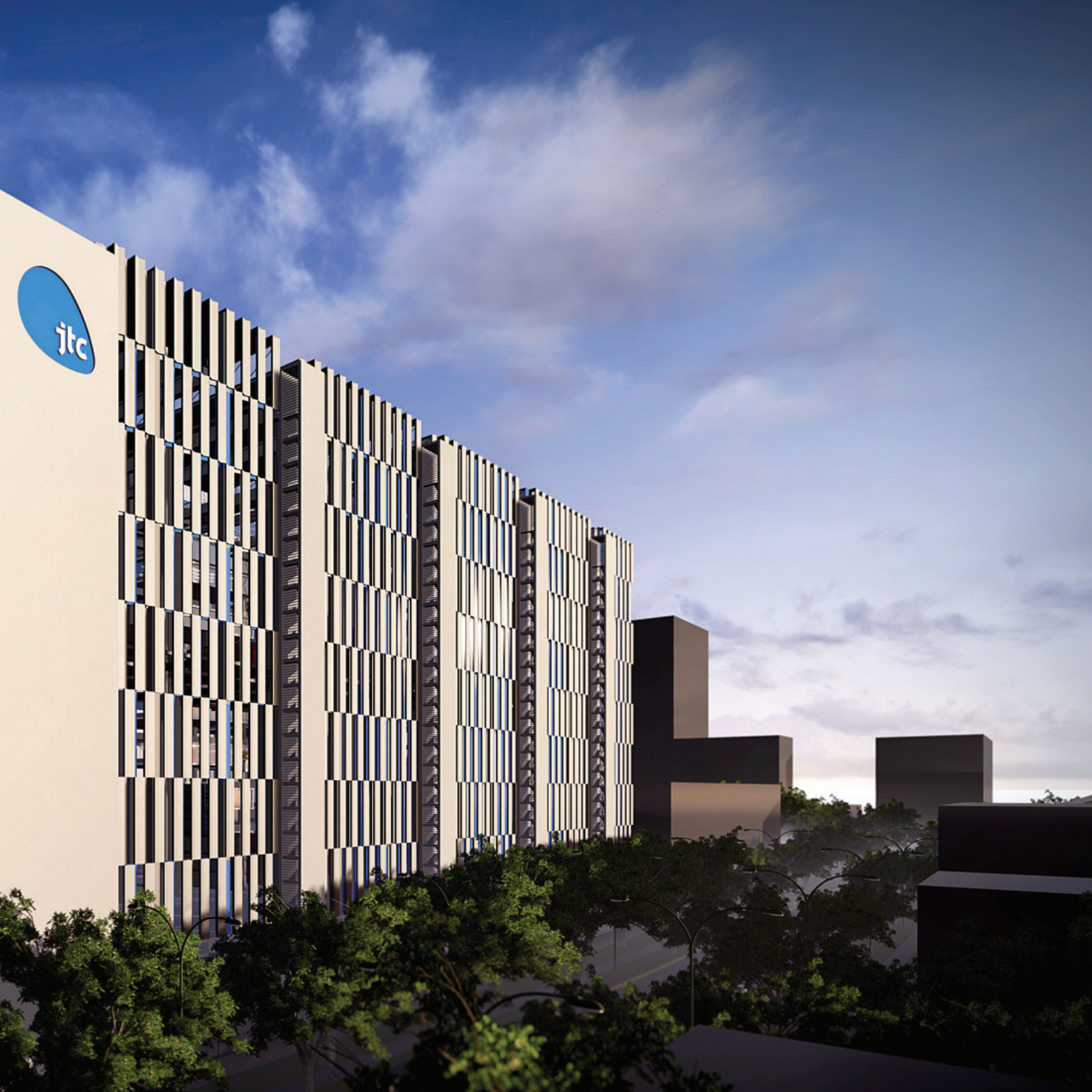
is a 5-storey data centre designed and built to meet Uptime Institute's Tier 3 standards incorporating a multi-tier design with the flexibility to meet the desired operational requirements.

Meinhardt was the lead consultant for this project which provides east-west dual site redundancy and international reach through cutting-edge, fully redundant and resilient domestic and international network infrastructure. It was certified ISO 50001 for its Energy Management System.

JTC INTEGRATED LOGISTICS HUB @ GUL

is a next-generation innovative logistics facility co-locating empty container depots, warehouses and a heavy vehicle park. The new integrated development is set to improve operational efficiency and productivity for logistics companies, thereby catalysing the growth and transformation of the industry.

Meinhardt provided- civil, structural, mechanical, electrical engineering, facade & environmentally sustainable design services for this project


jtc


jtc
jtc Food Hub @ Senoko

JURONG ROCK CAVERNS

The first commercial underground rock caverns facility for storage of liquid hydrocarbons in Southeast Asia, the Jurong Rock Caverns is located 150m below the ground,.

Services provided: accredited checking

JURONG ISLAND PIPELINE

Jurong Island serves as a major petrochemical and specialty chemical activity hub. Since its opening in 2000, it has attracted over S$50 billion worth of investments. The island is home to major players such as Exxon Mobil, Shell and Cargill. In just over 20 years, Jurong Island has made Singapore the 7th largest exporter of chemicals globally.

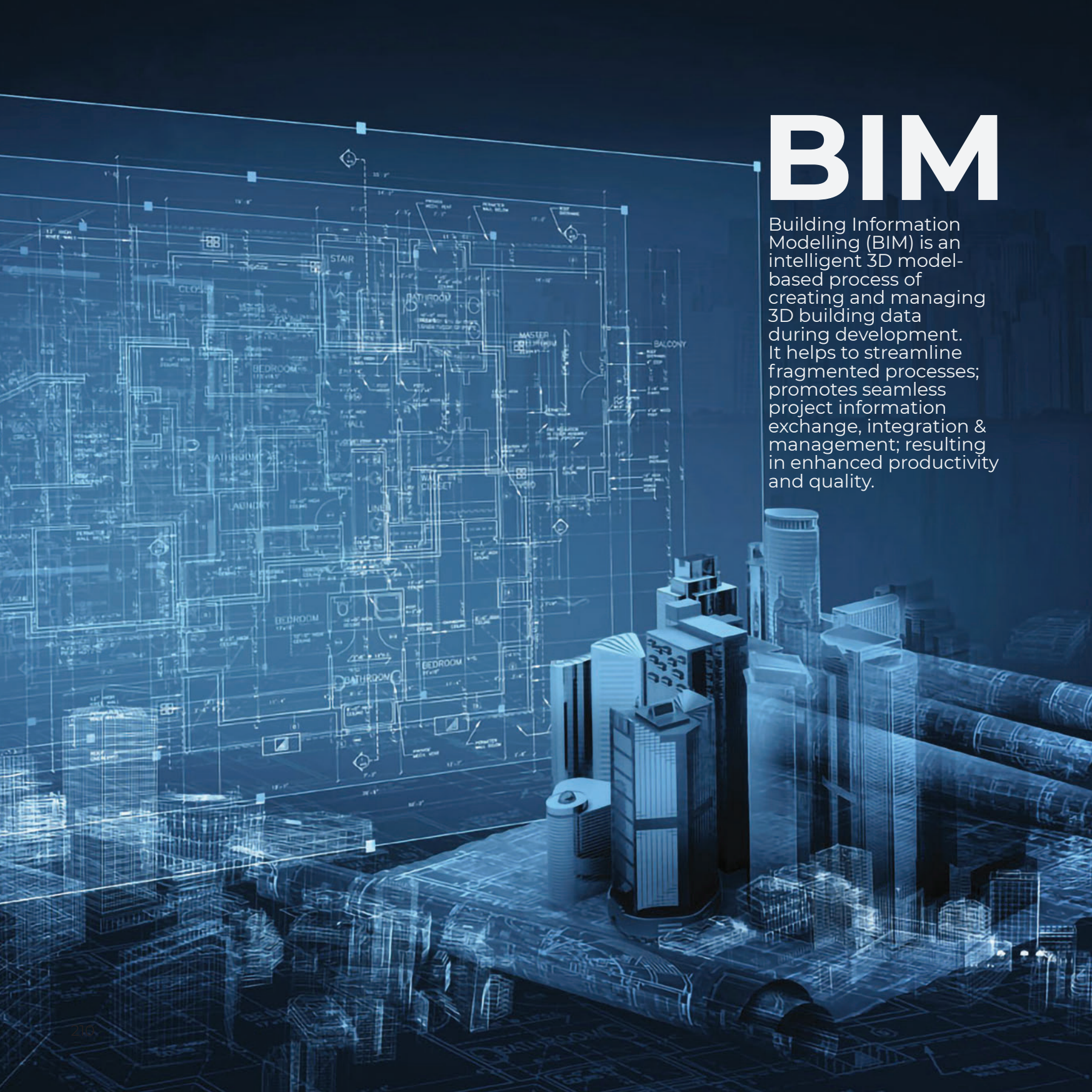
Meinhardt provided engineering services for the design & construction of the oil pipeline, piping system & associated structures.

BUILD TECH 2.0

The relentless pursuit to improve productivity in Singapore's built sector is here to stay.

Meinhardt shares how it has been blazing the technological innovation trail in the built sector over the last 45 years.

Our Building Information Modelling capabilities are delivering more value to our customers.



BIM

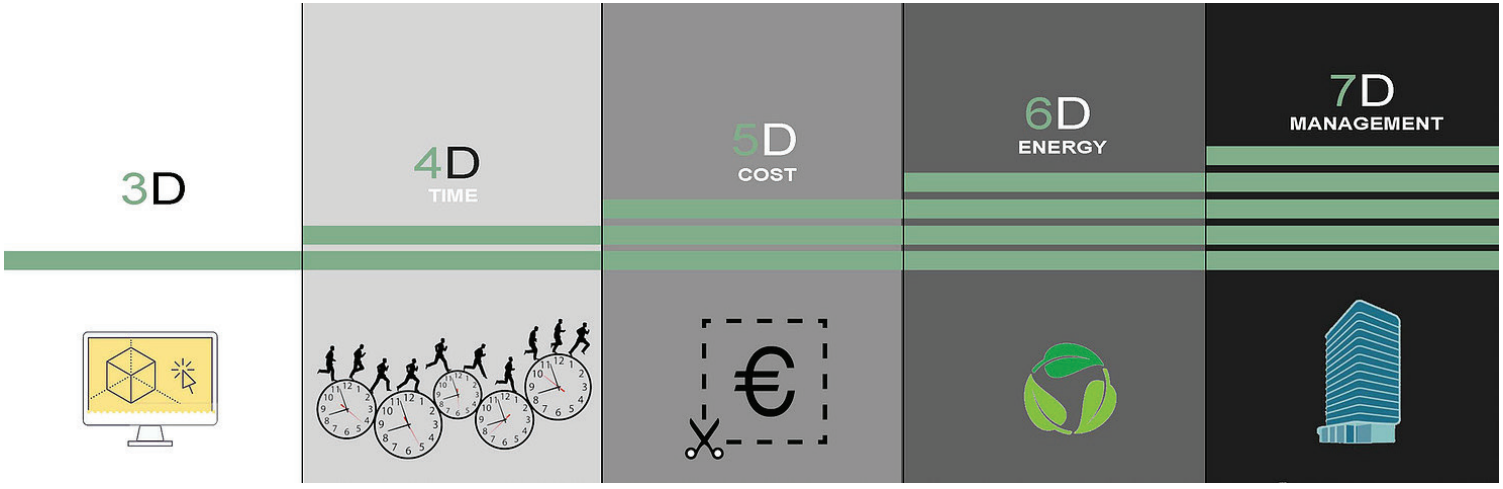
Building Information Modelling (BIM) is an intelligent 3D model-based process of creating and managing 3D building data during development. It helps to streamline fragmented processes; promotes seamless project information exchange, integration & management; resulting in enhanced productivity and quality.

“ 30% of construction cost in the field is wasted due to coordination errors, wasted material, labour inefficiencies. **BIM turbo charges productivity by removing the elements of uncertainty early in the planning process even before the first brick is laid.** It also helps us save up to 25% in construction time when all parties in the construction process – architects, engineers, project managers etc are able to manage information chaos. It is a more sustainable model of building procurement

Waqar U Zaman
Director
Meinhardt BIM Studios

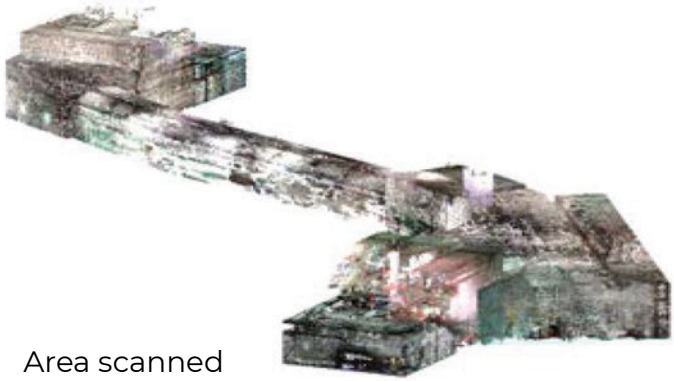
OUR BIM EXPERTISE

60 multi-disciplinary BIM modellers, qualified BIM managers & coordinators in Meinhardt BIM studios

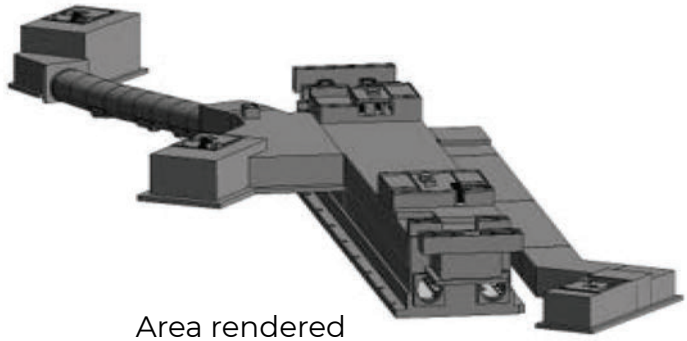


Source: breakwithanarchitect

DESIGN	TIME	COST	ENERGY	MANAGEMENT
3D digital modelling	3D digital modelling with built in time/schedule management function	3D digital modelling with built in cost management and procurement function	3D digital modelling with built in sustainability & energy analysis modelling	3D digital modelling with built in facilities management function with a focus on predictive rather than reactive asset management



Area scanned



Area rendered

LASER SCANNING

We provide laser scanning services that create 3D images of existing structures. It is a non-intrusive way to collect detailed and accurate as-built data rapidly. Laser scanners send out a laser beam that is reflected off the structure or environment being scanned, the distance and reflectivity of each return signal is measured and recorded creating a virtual

BIM VIRTUAL REALITY

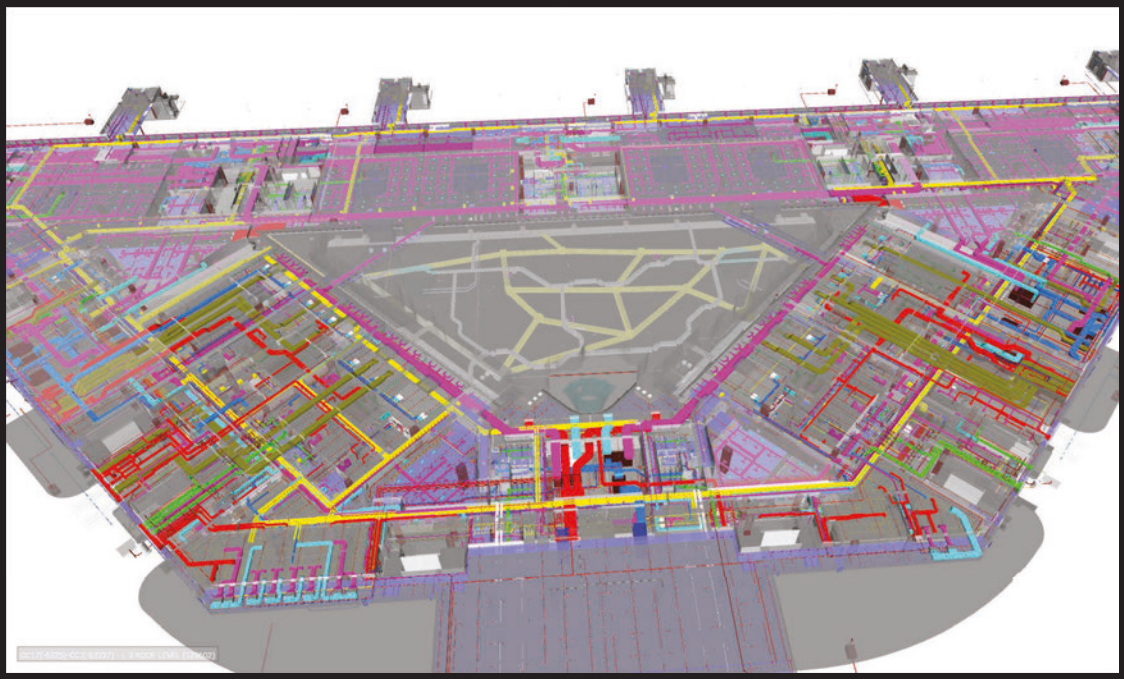
We provide integration of BIM with virtual reality (VR) where the user visualizes a virtual world and can interact with it.

OUR TRACK RECORD

Guoco Midtown (Singapore)

BIM Scope: LOD 300 BIM Modelling (MEP)

- BIM model generation from design drawings / Schematics for tender stage
- BIM model coordination
- Tender drawing preparation



Hamad International Airport Expansion (Qatar)

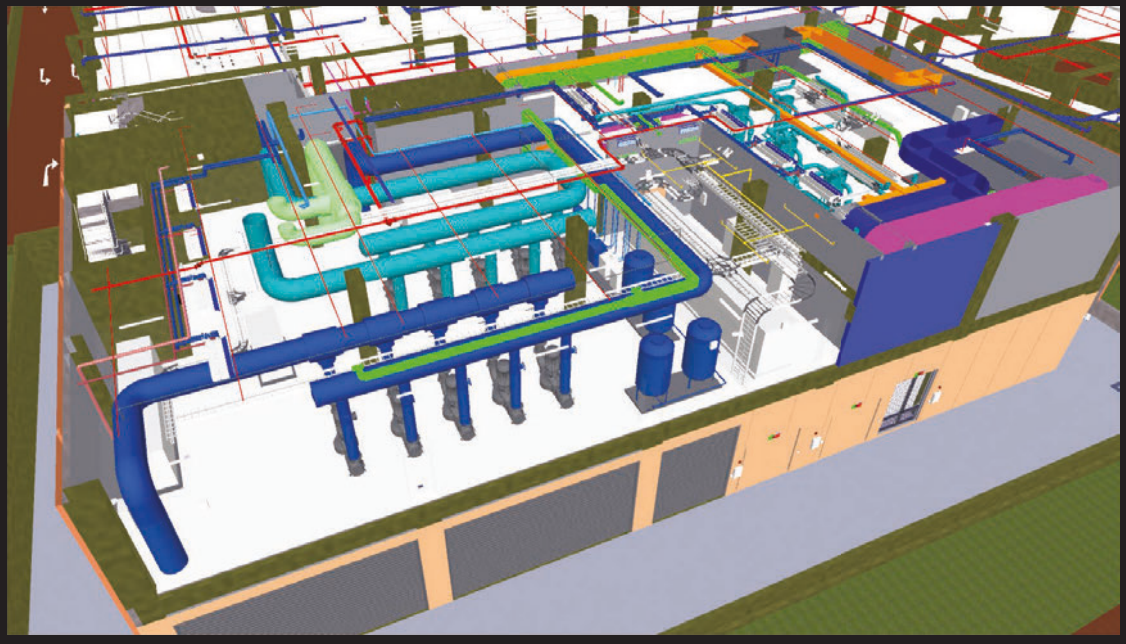
BIM Scope: LOD 300 Detailed Design/IFT BIM Modelling for STR & MEP services.

- Fully coordinated BIM models for MEP
- Fully coordinated BIM models for STR
- Detail design drawings generated from fully coordinated models.
- Clash detection reports
- Preparation of IFT drawings

City Centre Mall (Saudi Arabia)

BIM Scope
LOD 300 BIM Modelling

- BIM MEP model generation for tender stage from engineering design mark-ups
- BIM model coordination
- Detailed design drawing preparation



TOWARDS A SUSTAINABLE FUTURE

The impact of climate change continues unabetted.

Businesses have to embrace sustainable solutions in the built environment.

Meinhardt recognises this heavy responsibility we owe to future generations.

See how we are helping Singapore companies reduce their carbon footprint, minimise waste, save energy, water, and lower operational costs in a sustainable way.

OUR TAMPINES HUB

5000 Seat
FIFA - approved football stadium

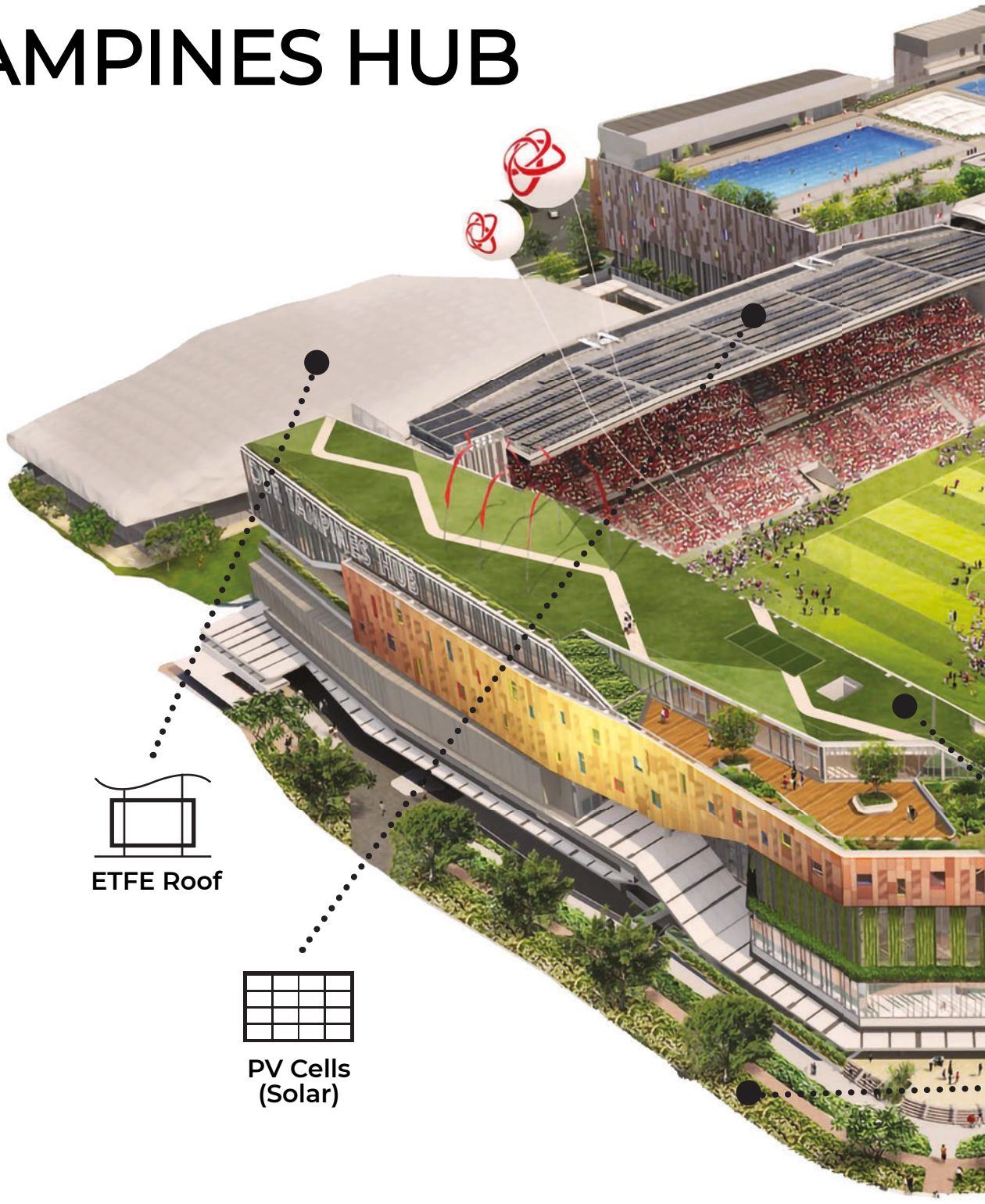
400 Seat
Performing arts auditorium that can be converted into a movie theatre

43 Food Stalls
Hawker centre

32 Lane
Bowling Centre

6 Rooftop
Swimming pools

1.6 km
Running track



WATER SAVINGS PER YEAR

143

Olympic-size Swimming Pools

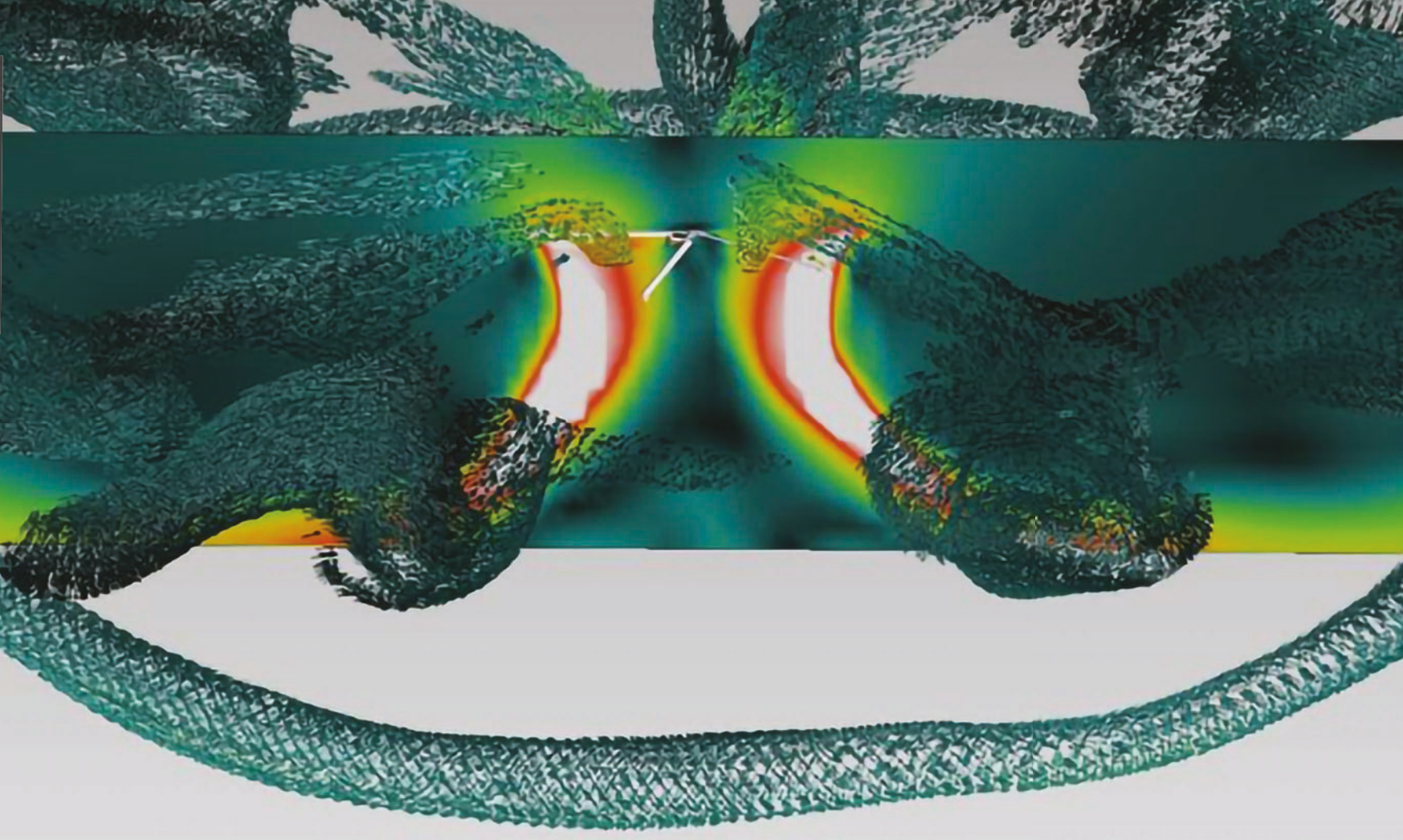
PROJECTED OVERALL SAVINGS PER YEAR

$1.85 **Million**

Meinhardt provided ESD Services for this iconic project

Ventilation Innovations

Big Ass Fans - as the name speaks for itself, allows air movement for large spaces to be effectively circulated. As part of Our Tampines Hub's effort to reduce our carbon footprint, this reduced the need for placing multiple fans in many places.

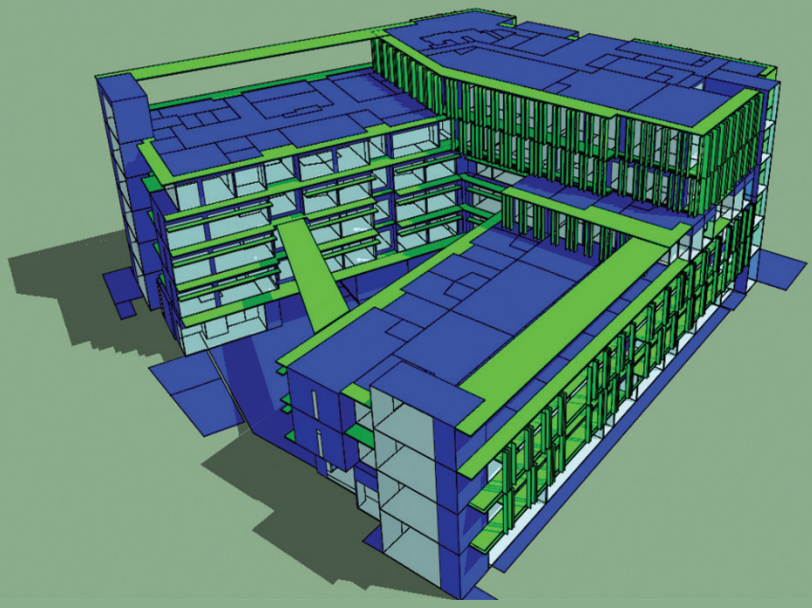


“We studied the wind flow patterns under the big ass fans based on factors such as **energy consumption & effective circulation** so that we could locate them efficiently, **saving energy & costs.**”

ASSISI HOSPICE

Designed by New Space Architects and Keppie, the new hospice focuses on compassionate and personalised palliative care. With a strong sustainability agenda, the hospice received Green Mark Platinum Certification.

The new building is nestled within a richly landscaped environment, allowing individual bed spaces a view of nature and for those who are able, the ability to move through the new courtyard and surrounding gardens.



SOLAR STUDIES

The ESD team performed solar studies and energy modelling for the project and came up with design solutions to save energy and water.

The overall annual energy saving was estimated as 1169305.49 kWh, this is equivalent to $233,861 (based on tariff of $0.20/kWh).

Façade Systems

The building façade is well shaded with the use of horizontal and vertical fins. The façade system used energy efficient / high performance glazing as well as durable and permeable material to effectively optimise natural ventilation and daylight in campus areas, meeting Green Mark Platinum standards.

Low energy and smart systems for environmental control

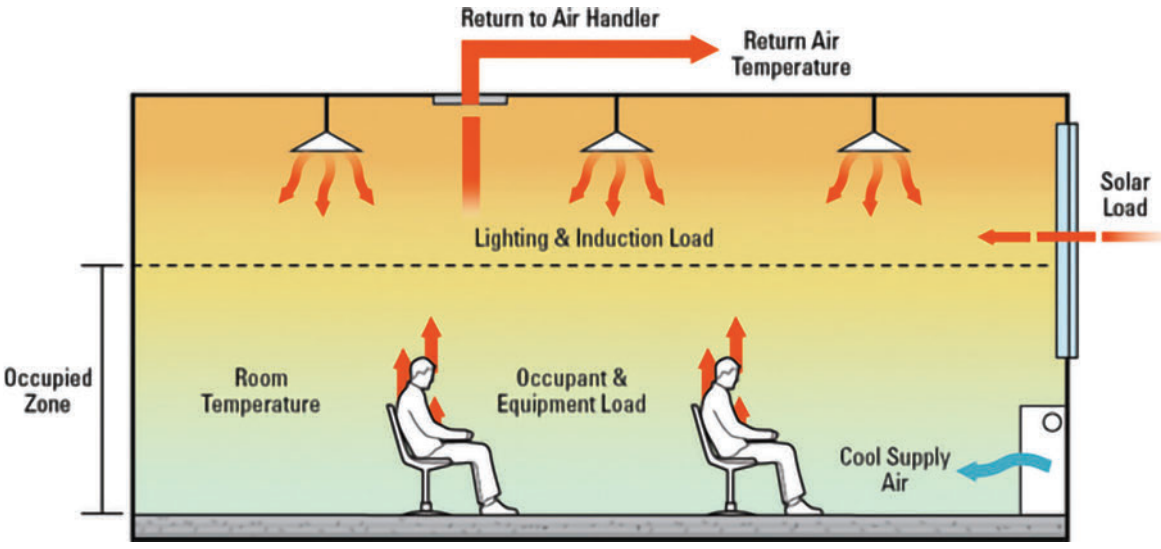
The new campus incorporated low energy and smart systems for environmental control to manage energy and water consumption including:

- The air-conditioning chiller plant efficiency meets platinum certification requirement
- An automatic tube cleaning system enhances energy efficiency
- Motion sensors in staircases save significant amounts of lighting energy
- Sun pipes harvest natural daylight and reduce artificial light consumption
- Energy efficient water fittings save water
- Energy efficient lifts with sleep mode optimise energy savings
- An automatic water efficient irrigation system with rain sensors that covers 74 % of the total area saves energy and water

PASSIVE DISPLACEMENT VENTILATION (PDV)

is an innovative fan-less air distribution system which makes use of the natural movement of hot and cold air to cool a room.

Diagram showing how PDV systems work in a typical indoor environment



WHAT'S UNIQUE ABOUT PDV?

- No ducts, no diffusers to hide away
- No fans or motors, the PDV System is silent and uses less electricity
- No aircon drafts so occupants experience a new level of thermal comfort

Meinhardt, together with our technology partners, has helped our clients implement PDV systems in their projects, including the upcoming SMU-X Tahir Foundation building.


Cool Supply Air Vent
of an in-built Passive Displacement System
(such vents are either mounted on the floor or the wall close to the floor)

GLOBAL AMBITIONS

As a connected global city, business and financial hub, Singapore is Meinhardt's base for its internationalisation efforts.

From Singapore, we have grown Meinhardt's global footprint into Asia and beyond.

Many projects were undertaken with expertise from Singapore's global headquarters.

“From a 10-man team in Singapore with less than five projects in hand when we first started, the Singapore office has grown tremendously to be a leading multi-disciplinary design firm in the country. From a humble start in Singapore, **Meinhardt Singapore has spearheaded the Group’s international expansion which today spans 51 offices around the world,** handling over USD$25 billion worth of projects globally. We have been ranked the Largest Privately held Engineering Consulting Firm in Asia in 2019.

Omar Shahzad
Meinhardt Group
CEO

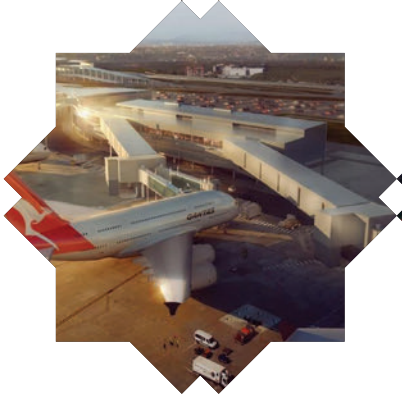
SOUTHEAST ASIA & AUSTRALIA

98 Wireless
Thailand

Banyan Tree Residence Riverside
Thailand

Kuala Lumpur Sentral
Malaysia

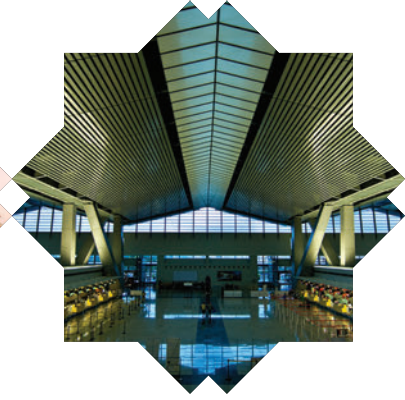
Marriott Courtyard
Myanmar



Brisbane International Airport Expansion
Australia

Ciputra World 2
Indonesia

Magnolia Ratchadamri Boulevard
Thailand



NAIA International Passenger T3
Philippines

Okada Manila
Paranaque City
Philippines

PNB118
Malaysia

Premier Tower
Australia

TNB HQ Campus
Malaysia

The Garden
Myanmar

The Heights
Pimpama
Australia

The Hundred
Indonesia

Yoma Central
Myanmar

NORTH ASIA

Cathay Pacific Cargo Terminal, HKIA
Hong Kong

Das Tower Shenzhen
China

Hysan Place
Hong Kong

MTR C704 Kennedy Town Station, Overrun Tunnel & Sheung Wan Station
Hong Kong

Central Government Offices
Hong Kong

Hong Kong Children's Hospital
Hong Kong

Liantang & Heung Yuen Wai Boundary Control Point Site Formation Contract 3
Hong Kong

Organic Waste Treatment Facility Phase 1
Hong Kong

Procter & Gamble Beijing Technical Center
China

Studio City
Macau

Tuen Mun - Chek Lap Kok Link - Northern Connection Toll Plaza & Associated Works
Hong Kong

Wuxi International Finance Square
China

Shanghai International Commerce Center
China

Tianjin Medical University General Hospital Airport Hospital
China

West Kowloon Terminus Hong Kong High Speed Rail
Hong Kong

Yanlord Marina Center Zhuhai
China

MIDDLE EAST & AFRICA

Aladdin City
United Arab Emirates

Dubai Mall
United Arab Emirates

J One
United Arab Emirates

King Abdullah Financial District
Saudi Arabia

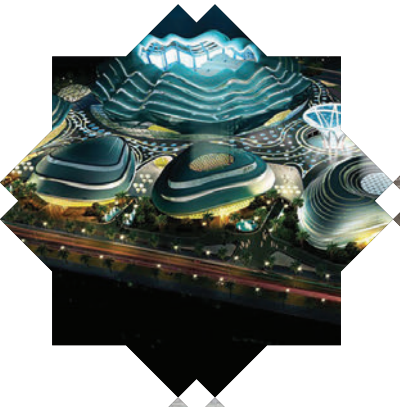
City Centre Ishbiliyah Shopping Mall
Saudi Arabia

Hamad International Airport Expansion
Qatar

Kifaf Phase 5
United Arab Emirates

King Abdullah Medical Centre
Bahrain

Kuwait Olympic Village
Kuwait



Ras Abu Aboud 40K Stadium (2020 FIFA)
Qatar

Tatweer School Development Programme
Saudi Arabia

Tornado Tower
Qatar

Muscat International Airport
Oman

South Border Housing & South Border Housing Extension
Saudi Arabia

The Pinnacle
Kenya

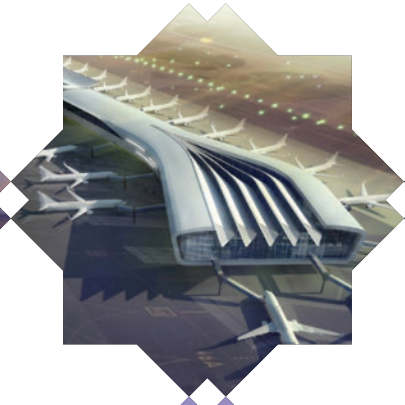
Vendome Shopping Mall
Qatar

SOUTH ASIA

Apollo Hospital
Bangladesh

Emaar Canyon View
Pakistan

Hyderabad International Airport Expansion
India

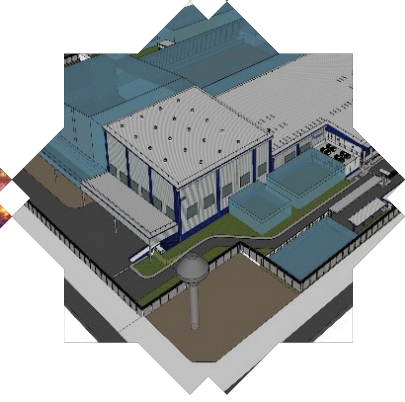


Keels City Resort
Sri Lanka

Delhi Aerocity
India

Forum One
Bangladesh

Karachi Oil Pier
Pakistan



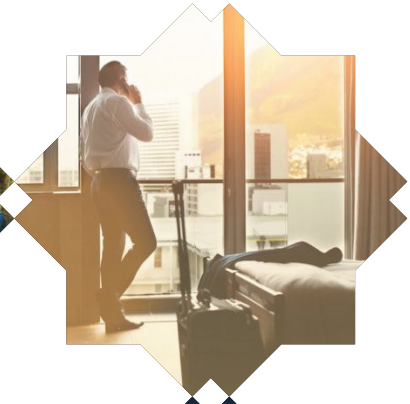
Pepsico Industrial Facility
Pakistan

Pragati Maidan Convention Centre
India

Ravi Riverfront Development
Pakistan

Shangri-La Resort and Spa
Maldives

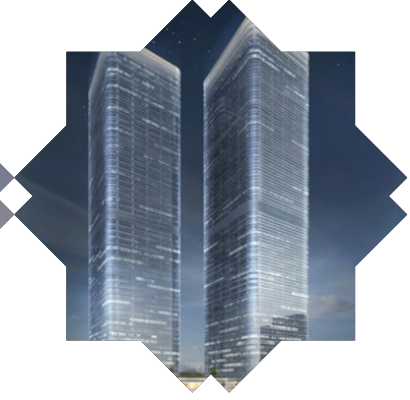
The Hub Hotel
Nepal



Project Eighteen
Pakistan

SAS iTower
India

Statue of Unity
India



World Export Centre
Sri Lanka

EUROPE

22 Grosvenor Square,
United Kingdom

250 City Road
United Kingdom

Brighton Marina
United Kingdom

Coal Drops Yard
United Kingdom

145 City Road
United Kingdom

Battersea Power Station
United Kingdom

Chelsea Island
United Kingdom

Greenwich Peninsula
United Kingdom

Harbour Central
United Kingdom

John Lewis at Home
United Kingdom

National Tennis Academy,
United Kingdom

Ram Brewery
United Kingdom

Islington Square
United Kingdom

Manhattan Loft Gardens
United Kingdom

One Tower Bridge
United Kingdom

The Gates
United Kingdom

OUR GLOBAL PRESENCE

51
Global
Office

4500
Staff Worldwide

EastAsia (China & Sea)	2,950
South Asia	600
Middle East & Africa	450
Australia	300
Europe	200

ACCOLADES

Largest (ENR 2019) Independent Engineering consulting firm in asia

50% Returning Custoemrs in the last 10 years

Annual Project Value
US$25b

60+ Years Globally

450+ Global Awards

450+ Global Awards

90+ Green Mark Awards

45 Years in Singapore

220+ in Singapore

Our Notable Award

2019 3G Leadership Award for Corporate Sector 3G Creativity & Innovations Award

2018 Asia Corporate Excellence & Sustainability Award

2017 Best Multi-Diciplinary Engineering Consultancy

2017 Built Environment Leadership Award (BEL)

OUR MAJOR CLIENTS


CITY
DEVELOPMENTS
LIMITED


DSTA
Defence Science &
Technology Agency


GENTING
BERHAD


Hyflux™


IKANO

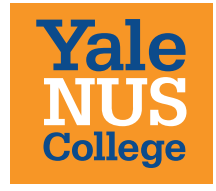

Land Transport Authority
We Keep Your World Moving


MINISTRY OF HEALTH


NLB
National Library Board
Singapore


SIEMENS


SMU
SINGAPORE MANAGEMENT
UNIVERSITY


Yale
NUS
College