

BCA AWARDS
2021

Recognising Excellence in the Built Environment



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DESIGN EXCELLENCE & SAFETY AWARD

The BCA Design and Engineering Safety Award 2021 gives recognition to the Qualified Person for Structural Works [QP(ST)], QP(ST)'s firm and the project team for ingenious design processes and solutions in overcoming project challenges to ensure safety in design, construction and maintenance of building and civil engineering projects locally and overseas.

The Award aims to:-

- a) Inculcate a strong safety culture among building professionals in developing our built environment
- b) Give recognition to QP(ST)s and their firms for engineering achievements
- c) Provide an avenue through which competition for work excellence can be enhanced.

The Awards will be given out for the following categories:

- Residential
- Commercial
- Institutional and Industrial
- Civil Engineering
- Small Scale Projects (Project cost < \$30 million)
- Overseas

TEKKA PLACE

Commercial Category

BCA DESIGN AND ENGINEERING SAFETY AWARD | EXCELLENCE



Qualified Person

Engineer Aaron Foong Kit Kuen

C&S Consultant

KTP Consultants Pte Ltd

Builder

Lum Chang Building Contractors Pte Ltd

Developer

Corwin Holding Pte Ltd

Architectural Consultant

ONG&ONG Pte Ltd

KEY CHALLENGES

- To achieve sustainable redevelopment of the Main Block into a new mixed use commercial hotel and retail by way of overcoming the constraints from the existing building with two basements seated on soft soil geology located within the LTA Railway Protection Zone and hemmed by conserved shophouses
- To achieve sustainable retention of the existing Annex Block structures by informed focus on the upgrading of the spatial quality with double volume spaces on the lowest floor for commercial activities and increasing the load carrying capacity at the roof level supported limited by the existing critical prestressed transfer structures at the lower levels

SOLUTIONS

- Rigorous engineering analysis with carefully considered loading scenarios and innovative re-designing out of the as-built structural capacities to drive an overall sustainable approach in the re-development.
- On the Main Block, the engineering-driven solution by informed repurposing of the existing basement diaphragm wall and capping beam structures achieved a sustainable design of the new sub-structure works with flexibility to support new load intensities from the perimeter columns of the new superstructures.
- On the retained Annex Block, in enabling the increased loadings from an entirely new rooftop deck, innovative engineering solution by stitching of existing prestressed structures have avoided the need to disrupt and reconstruct the existing system of prestressed transfer beam, transfer column and foundation.

BCA DESIGN AND ENGINEERING SAFETY AWARD | EXCELLENCE



Qualified Person

Engineer Ee Hwee San
Joanne

C&S Consultant

CPG Consultants Pte Ltd

Builder

Kimly Construction Pte Ltd

Developer

Ministry of Education

Architectural Consultant

CPG Consultants Pte Ltd

KEY CHALLENGES

- 10 and 12-storey building, with a 5-storey high elevated sport running track and field, located next to Kallang River.
- Design and construct the elevated sport running track and field over future Cross Island Line Rail tunnels and overhangs the Kallang River with 3 mega tree columns siting in the river.

SOLUTIONS

- Innovative hybrid Timber – Concrete slab system Cree and unitized façade system with internal Cross Laminated Timber, adopting extensive off-site fabrication for the superstructure of the teaching blocks. The prefabricated components were erected on site with simple connections. These systems are extremely light weight, highly buildable and productive. They are highly environmentally sustainable as well as meeting the specific requirements such as strength, fire, waterproofing and durability.
- Design transfer piled raft system with tensioned piles located at the zones available for piling to support the elevated sport track and field. The piles were designed to accommodate future tunnelling and any volume lost effect.
- Long span (up to 36m) precast half-shell post-tensioned beams were adopted, to give more column free space below the sports running track and field.
- Adopt precast with cast-in I-beam for bolted connection for the 13.3m branch columns to the mega tree columns supporting the sports running track and field.
- Extensive use of precast such as double-tee slabs and planks at the elevated field deck and beam, slab, column, and wall system for teaching blocks.

STATE COURTS, SINGAPORE

Institutional and Industrial Category

BCA DESIGN AND ENGINEERING SAFETY AWARD | EXCELLENCE



Qualified Person

Engineer Loh Kar Kheng

C&S Consultant

CPG Consultants Pte Ltd

Builder

Samsung C&T Corporation

Developer

State Courts, Singapore

Architectural Consultant

CPG Consultants Pte Ltd

Architectural Design Consultant

Serie + Multiply Consultants
Pte Ltd

KEY CHALLENGES

- The new 35-storey State Courts Towers comprises two towers, the 'Court Tower' and a very slender 'Office Tower'.
- The Court Tower has an open frame building facade, with courtrooms stacked on each other, resulting in aesthetically-pleasing slender Court Tower Columns, consisting of long span floor slabs/beams and columns sizes befitting the facade.
- In close proximity to a conserved building, an underground MRT station, and a building which is gazetted as a National Monument, deep basement construction (consisting of 3 basements)

SOLUTIONS

- Circulation spaces linking the two towers are utilised structurally with 39 link bridges linking the two towers together, with the Court Tower providing lateral stability to the Office Tower.
- The link bridges are prefabricated and delivered to site as one unit before being hoisted and placed in position on temporary supporting corbels before final connections are made safely.
- Steel-Concrete composite columns with twin H-sections orientated along weaker axis were used for slender Court Tower columns. Grade 460 steel was used for columns and was cast with high strength self-compacting concrete.
- A deep deck system (CAP Deck) which can span longer, was used for floor system supported by composite beams resulting in material/cost savings and reduced construction time.
- A robust earth retaining structure comprising of Diaphragm walls and a semi-top down construction method was adopted for basement construction to minimise wall deflection, ground movement and water drawdown. This had resulted in safe construction of 3 levels of basement, without adversely affecting the neighbouring buildings which are sensitive.

THE CLEMENT CANOPY

Residential Category

BCA DESIGN AND ENGINEERING SAFETY AWARD | EXCELLENCE



Qualified Person

Engineer Wong Seng

C&S Consultant

TW-ASIA Consultants Pte Ltd

Builder

Dragages Singapore Pte Ltd

Developer

United Venture Development
(Clementi) Pte Ltd

Architectural Consultant

ADDP Architects Pte Ltd

KEY CHALLENGES

- World tallest residential tower using RC PPVC technology at the time of project completion.
- First RC PPVC residential tower using the innovative RC Composite Shear Wall System (patented)
- Changing people's mindset in embracing new PPVC modular construction technology
- Confirmation of Architectural layout to Client's requirements in consideration of PPVC modular technology

SOLUTIONS

- Laboratory PPVC Wall prototype load tests were carried out to verify performance of Composite Shear Wall System
- Early planning of PPVC modules size & weight in consideration of LTA transportation & logistics constraints and crane-lifting capacity
- Early planning of transportation routing and logistics space to ensure seamless supply of PPVC modules from off-site modules fabrication to final on-site installation
- Early procurement of heavy-duty tower crane from overseas for lifting of the heavy PPVC modules

BCA DESIGN AND ENGINEERING SAFETY AWARD | EXCELLENCE



Qualified Person

Engineer Kam Mun Wai

C&S Consultant

Meinhardt (Singapore) Pte Ltd

Builder

Tiong Seng Contractors (Pte) Ltd

Developer

FEC Skyline Pte Ltd

Architectural Consultant

JGP Architecture (S) Pte. Ltd.

KEY CHALLENGES

- Slender high-rise tower with Deep basement construction in highly-variable Jurong Formation
- Fact track construction in tight site in close proximity to Redhill MRT Station and in a densely-populated mature estate of residential buildings

SOLUTIONS

- Smart Earth Retaining/Stabilising Structures (ERSS) adopting Secant Bored Piles (SBP) and hybrid excavation methods which provides efficient open cut with cantilever SBP wall to enable strut-free excavation to Basement 2 to construct tower pilecap. This permits early jumpstart of tower construction, independent and ahead of other basement and podium work. Robust Semi-Top Down for excavation adjacent the MRT structures and rest of podium construction, which minimises wall deflection, ground movement & impact to the MRT structures.
- First project in Singapore to adopt state-of-the-art DfMA Advanced Precast Concrete System (APCS) for highrise superstructure design and construction with innovative connection design and detailing that are simple, easy to install and reduce reinforcement congestion at joints
 - Single integrated elements and volumetric components for lift cores, water tanks, planter boxes, riser shafts and prefabricated bathroom units.
 - Use of high performance cranes and system falsework, with APCS, to achieve 6-day floor cycle.
- Timely project completion with overall manpower saving and productivity improvement of 18% and 21% respectively.

BCA DESIGN AND ENGINEERING SAFETY AWARD | MERIT

**Qualified Person**

Engineer Chen Yue Feng

C&S Consultant

KCL Consultants Pte Ltd

Builder

Tiong Seng Contractors (Pte) Ltd

Developer

MCL Land (Brighton) Pte Ltd

Architectural Consultant

Consortium 168 Architects
Pte Ltd

KEY CHALLENGES

- Singapore's largest EC development comprising of 13 blocks with 1327 units in a congested site
- With very tight construction period (35months), the proximity of site to Bukit Panjang LRT Viaduct and ITE College

SOLUTIONS

- To speed up construction progress and minimize construction noise, except staircase storey shelters, all vertical members have been designed as precast members even including lift core walls. Further more, 100% PBUs have been designed and prefabricated.
- Mobile Battery Mould (MBM) has been used on site for precast members. By using MBM, the transportation time & cost of precast members has been reduced substantially.
- Cobiax system (void formers) has been adopted for multi-storey carpark to achieve the big span and save construction time and cost.

HOMETEAMNS KHATIB CLUBHOUSE

Institutional and Industrial Category



BCA DESIGN AND ENGINEERING SAFETY AWARD | MERIT



KEY CHALLENGES

- Fast-track program, to complete the piling, 1 storey basement, and 5 storey superstructures within twenty-one (21) months.
- The clubhouse is very near to the Khatib MRT's viaduct. Hence, the design and construction was carried out with prime regard to the safeguarding of the MRT structures.
- The clubhouse is housing various spacious recreational facilities which require long span, column free spaces.

SOLUTIONS

- Steel structures are adopted for the superstructures to ensure speedy construction.
- The lifting operation and cranes' movement near to MRT viaduct were carefully studied with rigorous toppling analysis. The long-span structures within the MRT protection zone were erected during the night to protect the MRT structures.
- A pair 31m (L) x 5.6m (D) mega trusses is placed at 3rd storey above the banquet hall (2nd storey) to meet its spacious (column-free) need. The mega trusses are then hidden by the partition walls and blended into the surrounding seamlessly.
- The roof frame for the bowling alley uses a combination of long-span plate girders and steel trusses. The voids in the trusses and the dedicated web openings in the plate girders are fully utilized for the running of M&E services.

Qualified Person

Engineer Liu Shao Yong

Builder

CMC Construction Pte Ltd

C&S Consultant

KTP Consultants Pte Ltd

Developer

HomeTeamNS

Architectural Consultant

DP Architects Pte Ltd

CHANGI GENERAL HOSPITAL MEDICAL CENTRE

Institutional and Industrial Category



BCA DESIGN AND ENGINEERING SAFETY AWARD | MERIT



Qualified Person

Er. Dr. Yong Wee Loke

Builder

Kimly-Shimizu Joint Venture

C&S Consultant

WSP Consultancy Pte Ltd

Developer

Ministry of Health Singapore

Architectural Consultant

RDC Architects Pte Ltd

KEY CHALLENGES

- Construction within proximity of existing operating hospital facilities to ensure that the project could be completed safely with minimum disruption to the hospital's 24/7 operations.
- Design and construction of deep basement in close proximity to existing operating CGH supported on a raft foundation.

SOLUTIONS

- The adoption of a robust ERSS using a CBP wall with semi top down construction methodology for basement construction has controlled ground movement effectively and minimized impacts to the existing CGH main building.
- To optimize foundation design, bored piles supporting temporary construction loading via kingpost were considered to act together with the raft slab to support the entire building loads.
- A flat plate system was introduced for the superstructure to facilitate construction using system formworks while maximizing ceiling height. To further improve site productivity, prefabricated steel staircase flight was adopted.
- Long span steel girder and truss for link bridges connecting two buildings at multiple Podium levels were prefabricated in the factory and delivered to site for installation using bolted connection.
- Comprehensive instrumentation and monitoring plan including real time vibration monitoring was provided to mitigate impact to the hospital's operation.

WIDENING TO KEPPEL VIADUCT

Civil Engineering Category

BCA DESIGN AND ENGINEERING SAFETY AWARD | MERIT



Qualified Person

Engineer Chew Boon Fei

C&S Consultant

YWL Engineering Pte Ltd

Builder

Singapore Engineering &
Construction Pte Ltd

Developer

Land Transport Authority

Architectural Consultant

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KEY CHALLENGES

- Convert dual 3 lanes into dual 4 lanes carriageway viaduct.
- Upgrade existing viaduct (completed in 1985) to a more current and stringent design criteria.
- Widening and strengthening works were executed above live Keppel Road and with live traffic on Keppel Viaduct.

SOLUTIONS

- Use of independent erected foundation and sub-structures to eliminate risky modification and integration work that may affect the existing structural integrity.
- Design construction sequences with load transfer implementation between old and new structures at various points to ensure loadings are within allowable limits. Load transfer aims to achieve preloading into the structural system to minimize differential settlement and allow load distribution according to designated path to yield a more optimal structural utilization and thus minimize strengthening works on existing structures.

BCA DESIGN AND ENGINEERING SAFETY AWARD | EXCELLENCE

PROJECT NAME	CATEGORY	QP / QP COMPANY
Tekka Place	Commercial	Engineer Aaron Foong Kit Kuen KTP Consultants Pte Ltd
Eunoia Junior College	Institutional & Industrial	Engineer Ee Hwee San Joanne CPG Consultants Pte Ltd
State Courts, Singapore	Institutional & Industrial	Engineer Loh Kar Kheng CPG Consultants Pte Ltd
The Clement Canopy	Residential	Engineer Wong Seng TW-Asia Consultants Pte Ltd
The Artra	Residential	Engineer Kam Mun Wai Meinhardt (Singapore) Pte Ltd

BCA DESIGN AND ENGINEERING SAFETY AWARD | MERIT

PROJECT NAME	CATEGORY	QP / QP COMPANY
Sol Acres EC	Residential	Engineer Chen Yue Feng KCL Consultants Pte Ltd
HomeTeamNS Khatib Clubhouse	Institutional & Industrial	Engineer Liu Shao Yong KTP Consultants Pte Ltd
Changi General Hospital Medical Centre	Institutional & Industrial	Engineer Dr. Yong Wee Loke WSP Consultancy Pte Ltd
Widening Of Keppel Viaduct	Civil Engineering	Engineer Chew Boon Fei YWL Engineering Pte Ltd

Organiser



An Initiative Under

