**Annex A – About the BCA Design Engineering and Safety Awards 2020**

The BCA Design and Engineering Safety Award 2020 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

**Annex B – BCA Design Engineering and Safety Awards winners**

Commercial Category

1) **Maxwell Chambers Suites** – Excellence

| | |
|---|---|
| Qualified Person | Engineer Aaron Foong Kit Kuen |
| C&S Consultants | KTP Consultants Pte Ltd |
| Builder | Guan Ho Construction Co (Pte) Ltd |
| Developer | Ministry of Law, Singapore |
| Architectural Consultants | W Architects Pte Ltd |

Gazetted as a conservation building in 2007, Maxwell Chambers Suites has a rich heritage and historical significance. Built in 1928, the building was first used as barracks for the police force, until it became the Traffic Police headquarters between the 1930s to 1999. After the building was vacated, the building underwent a refurbishment and reopened as the Red Dot Traffic Building with a signature red façade in 2005. The extensive restoration of Maxwell Chamber Suites started in 2017 and preserved the building's heritage character while repurposing it for its use today as a global dispute resolution centre.

**KEY CHALLENGES**

- Sensitive restoration of a century old heritage building with stringent conservation requirements to create new connectivity, improve accessibility and spatial specifications for modern commercial use

- Intricate structural strengthening solution to enable a new overhead link bridge structures through two (2) conserved heritage buildings' façade without removal of any periphery façade elements around the connection

- Strengthening of existing foundations within the live electrical sub-station in a safe manner

**SOLUTIONS**

- Rigorous engineering analysis with carefully considered loading scenarios and designing detailed construction sequences ensured high margin of safety for the structural integrity of the newly integrated structures while maintaining the key historical features intact at all times

- Innovative bonded “Z” steel plate detailing served as an elegant composite strengthening solution to support the new overhead link bridge without encroaching into the conserved façade of the heritage buildings and enabling works to be done safely from the inside of the secured buildings

- Combined foundation strengthening with micro-pile composite foundation cored through the existing shallow foundation that achieved a robust integrated foundation and safe working space with zero disruption to the critical electrical substation operations

- A highly modular and optimum composite structural steel system using a single beam and single column element type was designed for the two (2) new-built Annex blocks

Institutional and Industrial Category

2) **Singapore Management University (SMU) Connexion** – Excellence

| | |
|---|---|
| Qualified Person | Engineer Kam Mun Wai |
| C&S Consultants | Meinhardt (Singapore) Pte Ltd |
| Builder | Lian Ho Lee Construction (Private) Limited |
| Developer | Singapore Management University |
| Architectural Consultants | MKPL Architects Pte Ltd |

**KEY CHALLENGES**

- 1st On-site Net Zero Energy and WELL Pre-certified Building [1]in City

- Fast track programme – 15 months construction including piling, main building and ID fitting out work

- Construction of a 2-storey Link Building over Fort Canning Link carriageway, to connect to SMU School of Law

- Extremely tight site & close proximity to sensitive buildings and services

**SOLUTIONS**

- Innovative hybrid Structural Steel – Cross Laminated Timber (**SSCLT**) System, adopting extensive off-site fabrication of steel frames and CLT floor slabs for the superstructure. The pre-fabricated components were erected on site with simple mechanical connections. This system is extremely light

[1] For more info on WELL certification: www.wellcertified.com

weight, highly buildable and productive. SMUC is the 1st project in Singapore to adopt this hybrid system.

- Structural design innovation adopting the light-weight, highly buildable **SSCLT** system, coupled with a well-strategised sequence enabled the successful erection of the Link Building structure within 7 days over the Fort Canning Link.

- Safeguarding and integration of critical underground infrastructure services into the new building design to avoid diversion and saved time.

- Adoption of Design for Manufacturing and Assembly (**DfMA)** to other major components like staircases, steel roof, modular M&E and building facade further improved manpower productivity on site.

Institutional and Industrial Category

3) **Outram Community Hospital** – Excellence

| | |
|---|---|
| Qualified Person | Engineer Jason Tan Bok Leng |
| C&S Consultants | Arup Singapore Pte Ltd |
| Builder | Penta-Ocean Construction Co., Ltd. |
| Developer | Ministry of Health, Singapore |
| Architectural Consultants | B+H Architects<br>CIAP Architects Pte Ltd |
| Specialist Consultant | WSP Consultancy Pte Ltd |

**KEY CHALLENGES**

- 19-storey building, with four basement levels, located next to a live hospital campus and critical roads used by ambulances

- Site was constrained by railway reserve line restrictions, and soil strata composing of Jurong Formation made excavation challenging

- 300m underground tunnel linking OCH's basement to an existing basement meandering under structures such as the 100-year-old Bowyer Block, a National Monument of Singapore

**SOLUTIONS**

- A structural steel system was adopted for the superstructure – with steel columns designed in tiers of three floors – reducing cranage requirements,

improving productivity, and avoiding site-welding and prolonged work at-height

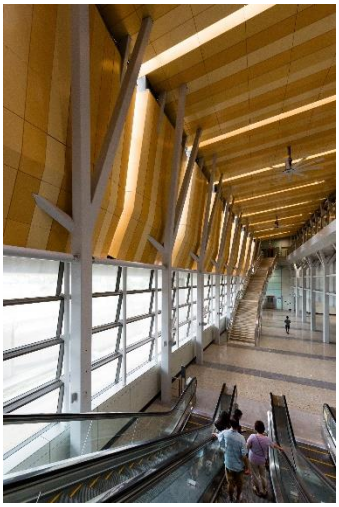
- Pushing boundaries with high-strength Grade 100 concrete-encased steel composite columns adopted, improving productivity, construction speed, and reducing column footprints

- Earth Retaining Stabilising Structures (ERSS) design, with rigorous site monitoring and numerical analyses, ensured the hospital and MRT operations remained unaffected. A semi top-down method was also adopted for basement construction, primarily to achieve speed of excavation and for the stiffness the ERSS required to limit ground movement

- Bold designs were also adopted for the 300m underground tunnel including: excavations under and next to existing roads, skybridge, buildings, tunnels and a historic building; carefully considered road diversions, underpinning works, and modifications to existing structures

Civil Engineering

4) **Thomson-East Coast Line Contract T203 TE2 Woodlands Station** – Excellence



| | |
|---|---|
| Qualified Person | Engineer Tan Yoong Heng |
| C&S Consultants | Arup Singapore Pte Ltd |
| Builder | GS Engineering & Construction Corp. |
| Developer | Land Transport Authority |
| Architectural Consultants | Aedas Pte Ltd |

**KEY CHALLENGES**

- TE2 is a two-level underground station with crossover tunnels connected to Woodlands station NS9 interchange via an elevated transfer link. It is also one of the biggest Civil Defence stations in Singapore

- Constructing the station founded in mixed-face geology profile and around social and transport infrastructure that are operational

- Designing around and next to a greenfield earmarked for future development

**SOLUTIONS**

- Optimising the rail alignment on both ends of TE2 to reduce potential construction risks from the outset, and achieved considerable benefits and conveniences for commuters

- Placing commuter convenience at the heart of TE2's design, a seamless intermodal transport ambition was achieved with two critical links: an optimised alignment of a slender transfer link bridge between TE2 and NS9, and an underground link from the MRT stations to the bus interchange

- Considering circular economy principles for the adjacent greenfield, the ERSS wall was designed to be reusable for future excavation and additional knock-out panels were also catered for future construction. This would reduce costs and carbon footprint for future developers

- As part of the excavation works, maximum safety during detonation was achieved with a rock blasting simulation, and enhanced vibration monitoring at potentially impacted structures. A solid protection system was also implemented to prevent and control fly rock