MEDIA RELEASE

FOUR FIRMS RECOGNISED FOR DRIVING CONSTRUCTION PRODUCTIVITY

- P&T Consultants clinches two awards for advocating construction productivity
- 11 awards given to projects that embrace productive technologies

7 May 2015 – Two consultancy firms and two builders have been lauded for driving productivity in the built environment sector. One of the firms, P&T Consultants Pte Ltd, will receive two of the five awards under the Construction Productivity Award – Advocates category. It was recognised for pioneering and advocating the adoption of game-changing technologies to significantly improve construction productivity.

2. P&T Consultants is the architect of the new student hostel at the Nanyang Technological University (NTU) North Hill precinct which will be constructed using Prefabricated Pre-finished Volumetric Construction (PPVC). PPVC is a modular system where whole rooms or apartment units complete with internal fixtures are produced off-site and assembled on site in the manner of Lego blocks.

3. Compared to conventional construction methods, the use of PPVC will not only reduce the manpower required by 25% to 40%, but also reduce the completion time by 15% to 20%. With most construction prefabricated, building quality is enhanced and on-site construction would also be less dusty and noisy.

4. P&T Consultants had built up capabilities in handling such advanced construction technologies, through research, collaboration with technology specialists and manufacturers, as well as investment in manpower and training.

5. “P&T Consultants has always been adopting innovative and productive construction technologies. We embrace these technologies as it allows us to be at the
forefront of the design and construction industry. Improvement in construction productivity ultimately benefits us as well, as a shorter construction period helps us save on our manpower cost,” said Mr Richard Soon, Director of P&T Consultants.

6. “Projects can leverage on the benefits of different building systems to achieve higher productivity while retaining its architectural intent. An example is the NTU student hostel at North Hill which is a hybrid building comprising PPVC modules for hostel rooms and reinforced concrete construction for its foundation and ground floor. As with all technologies, we need to understand and take full advantage of their different characteristics and plan for them early to reap maximum benefits during construction,” he added.

7. P&T Consultants is also involved in HDB’s West Terra project at Bukit Batok, which adopts Prefabricated Volumetric Construction (PVC) and prefabricated bathrooms. Cross Laminated Timber (CLT), or prefabricated wood structures, is also used to construct its Residents’ Committee Centre.

8. Local builder Unison Construction Pte Ltd will also be receiving the Gold award for its productivity initiatives. The firm had invested in research, development and demonstration (RD&D) for their construction projects. For instance, it had developed six types of prefabricated bathrooms using different wall materials like light weight aerated concrete panels and hollow core concrete panels. The firm also adopts productive technologies like flexible water pipes for its projects and emphasises staff training.
9. Merit winners under the Construction Productivity Award – Advocates category include Davis Langdon KPK (Singapore) Pte Ltd and Soil-Build (Pte) Ltd.

10. Another eleven projects are awarded for embracing productive technologies. The highest accolade – the Platinum award, will be given to City Developments Limited’s residential projects the Tree House Condominium, Cube 8 and 368 Thomson. These projects had designs that were easy to build, and the project team had adopted labour-efficient construction methods such as an extensive use of precast, prefabricated bathrooms, drywall and system formwork for construction.

11. For the construction of the award-winning 24-storey high-rise vertical green wall at the Tree House Condominium, the main steel structure and access for maintenance were produced in a modular system off-site and assembled with a bolting system on site. This reduced the amount of welding works required for installation and shortened the construction duration. The planter boxes and ledges were also prefabricated, removing the need for scaffolding, formworks, concreting or reinforcement bars on site. Through the productive construction methods and extensive use of prefabricated components, an estimated manpower savings of about 50% and productivity improvement of close to 78% was achieved in the construction of the world’s largest vertical garden.

12. Other projects which were awarded Gold under the Construction Productivity Award – Projects category include The Metropolis, Asia Square Tower 2, improvement works to the Geylang River from Dunman Road to Guillemard Road, the redevelopment of Specialists’ Centre and Hotel Phoenix, Edward Boustead Centre and three HDB projects, namely Punggol Waves, Fernvale Foliage and Floral Spring @ Yishun.

13. “To significantly raise productivity, moving forward, industry firms must adopt a greater extent of Design for Manufacturing and Assembly (DfMA), with construction resembling a manufacturing process with greater prefabrication off site, as well as a greater degree of mechanisation on site. We also need to continuously enhance the quality of our construction workforce to support the sector's transformation. This year's winners show that the industry is moving in this direction and I encourage more firms to
adopt a mindset change towards higher productivity as it ensures their long-term sustainability and competitiveness,” said Dr John Keung, CEO of BCA.

14. The winners will be receiving their awards during the BCA Awards ceremony on 14 May 2015 at Resorts World Sentosa. Details of the winners are in the Annex.

Issued by the Building and Construction Authority on 7 May 2015

About BCA
The Building and Construction Authority (BCA) of Singapore champions the development of an excellent built environment for Singapore. BCA’s mission is to shape a safe, high quality, sustainable and friendly built environment, as these are four key elements where BCA has a significant influence. In doing so, it aims to differentiate Singapore’s built environment from those of other cities and contribute to a better quality of life for everyone in Singapore. Hence, its vision is to have "a future-ready built environment for Singapore“. Together with its education arm, the BCA Academy of the Built Environment, BCA works closely with its industry partners to develop skills and expertise that help shape a future-ready built environment for Singapore. For more information, visit www.bca.gov.sg.
Annex

**About Construction Productivity Awards**
The Construction Productivity Awards (CPA) recognise outstanding industry firms for going the extra mile to achieve construction productivity improvements and promote higher productivity in the industry.

**There are two award categories:**
- CPA – Advocates
- CPA – Projects

**CPA – Advocates**
The CPA – Advocates recognises outstanding developers, consultants, builders and subcontractors for their achievements in improving productivity at the firm level. Developers, consultants and builders are recognised for the adoption of designs, construction methods, processes and/or technologies that have significant productivity impact on their projects.

**CPA – Advocates has four sub-categories:**
1. Developer
2. Consultant
3. Builder (Open)
4. Builder (Prime)

**Assessment Criteria**
1. Buildable design score
2. Constructability score
3. Productivity performance (physical and value-added productivity)
4. Productivity initiatives

**CPA – Projects**
The CPA – Projects is awarded to project teams that have demonstrated productivity in their projects from the design to the end of construction. The award aims to:
- Encourage designers to come up with labour-efficient designs;
- Encourage the adoption of labour-efficient construction methods; and
- Recognise project teams for their excellent project planning and coordination in enhancing productivity.

The award has nine sub-categories:
- Residential Landed Buildings
- Residential Non-landed Buildings (for projects with Gross Floor Area of less than 25,000m²)
- Residential Non-landed Buildings (for projects with Gross Floor Area of more than or equal to 25,000m²)
- Commercial and Office Buildings
- Institutional Buildings
- Industrial Buildings
- Mixed Development Buildings
- Additions & Alterations / Upgrading Buildings
- Civil Engineering Projects
Assessment Criteria
Building projects are assessed based on their buildable design score, constructability score, simplicity of construction, integration of design and construction, and aesthetics.

Civil engineering projects are assessed based on design for ease of construction, the use of construction technology, site management, integration of design and construction, and the adoption of innovative designs and products.

CPA – Advocates:

**Consultant Category (Architectural)**

The firm advocated the use of Prefabricated Volumetric Construction (PVC) and Prefabricated Bathroom Units (PBU) for the HDB project, West Terra, at Bukit Batok.

P&T Consultants Pte Ltd (Gold)
P&T Consultants Pte Ltd is a leading multidisciplinary consultancy firm in Singapore. Over the past decade, the firm has been constantly evolving and innovating to ensure its relevance to the contemporary market and the industry’s demands. P&T Consultants strongly believes in maintaining a high standard of work through efficient work processes like utilising technology to drive new creative processes and continued upgrading of their employees.

**Key Productivity Initiatives:**

- **P&T Consultants Pte Ltd** is the architect for the first high rise building project, the Residential Halls at North Hill for Nanyang Technological University that used Prefabricated Pre-finished Volumetric Construction (PPVC). The adoption of PPVC could achieve manpower savings of an estimated 25% to 40% for the project. The firm is also the architect for the HDB project, West Terra, at Bukit Batok, which used Prefabricated Volumetric Construction (PVC) and Prefabricated Bathroom Units (PBU). For the same project, the firm also made use of Cross Laminated Timber (CLT) technology to construct the Residents’ Committee Centre.

- P&T Consultants Pte Ltd has been utilising BIM technology for their projects as early as 2009. The usage of BIM has helped the firm to reap benefits like better visualisation which made...
design production more effective and improved coordination across multiple disciplines and companies working together on complex projects.

Consultant Category (Civil & Structural)

<table>
<thead>
<tr>
<th>P&amp;T Consultants Pte Ltd (Gold)</th>
<th>P&amp;T Consultants Pte Ltd is a leading multi-disciplinary consultancy firm in Singapore. The firm is committed to the pursuit of excellence in the field of Structural &amp; Civil Engineering and great emphasis is placed on developing engineering solutions in buildings sympathetic to architecture, end user and clients' requirements while enhancing construction productivity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Productivity Initiatives:</td>
<td></td>
</tr>
<tr>
<td>• P&amp;T Consultants is the Civil &amp; Structural Engineer for the HDB project, West Terra, at Bukit Batok, which used Prefabricated Volumetric Construction (PVC) and Prefabricated Bathroom Units (PBU).</td>
<td></td>
</tr>
<tr>
<td>• P&amp;T Consultants Pte Ltd utilised the Alveodeck System in their project at The Crest at Prince Charles Crescent. The system reduced the amount of concrete needed in the slabs and resulted in a shorter construction time during the structural construction stage.</td>
<td></td>
</tr>
<tr>
<td>• In one of the firm’s residential projects, Saint Ritz Condominium, the show flat was constructed using portable prefabricated modules. These portable modules could be transported easily and it facilitated re-location of the show flat, when necessary.</td>
<td></td>
</tr>
</tbody>
</table>
reduced the amount of concrete needed in the slabs and resulted in shorter construction time.

The show flat for Saint Ritz Condominium was constructed using portable prefabricated modules and it facilitated re-location of the show flat, whenever necessary.

Consultant Category (Quantity Surveying)

The CostX software automatically extracts and generates quantities from BIM model of projects thus enhancing the efficiency of cost planning.

Davis Langdon KPK (Singapore) Pte Ltd (Merit)

Davis Langdon KPK, an AECOM company, is a leading global construction consultancy, providing cost and program management solutions as well as a range of specialist consultancy services for clients investing in infrastructure, property and construction.

Key Productivity Initiatives:
- Davis Langdon KPK utilised a global cost and project database known as Global Unite. The database enabled them to give clients more timely and accurate advice and better cost benchmarking by comparing projects.
Davis Langdon KPK place great emphasis on the skills development of their staff and BIM courses are part of their staff learning.

- The firm also used CostX, a software that automatically extracts and generates quantities from BIM models. CostX has enhanced the efficiency of cost planning and reduced the time taken to prepare cost estimates by 50% when compared to taking off quantities from 2D drawings.
- Davis Langdon KPK also places high priority on skills development through professional learning and training camps on BIM and CostX as well as thought leadership excellence on productivity-centric issues.

**Builder – Open Category**

**Unison Construction Pte Ltd (Gold)**

Unison Construction Pte Ltd was incorporated in Singapore in 2009 and the firm’s key personnel has more than 20 years of experience in the construction industry. The firm places great emphasis on good management skills and innovative solutions. Unison Construction strives for productivity improvement in their projects through key areas like workforce development and skill upgrading, technology adoption and capability development.

**Key Productivity Initiatives:**

- Unison Construction has pioneered the process of Research, Development & Demonstration (RD & D) for their construction projects. One example is the development of 6 types of Prefabricated Bathroom Units (PBU) using different wall materials like light weight aerated concrete panels and hollow core concrete panels.

Unison Construction has pioneered the process of Research, Development & Demonstration (RD & D) for their construction projects. The firm developed different types of Prefabricated Bathroom Units (PBU) globally.
using different wall materials e.g. lightweight aerated concrete panels

Unison Construction has advocated the use of innovative technologies like the flexible water pipes that achieved about 30% manpower savings compared to copper pipes.

- The firm has advocated the use of innovative technologies to help improve the productivity of their projects. An example is the use of integrated formwork systems like aluminum table form and jump form system formwork which achieved about 60% manpower savings compared to conventional timber formwork. Another example is the adoption of the flexible water pipes that achieved about 30% manpower savings compared to copper pipes.

- Unison Construction also emphasised on staff training and has participated in many learning journeys organised by BCA for the industry.

Builder – Open Category

Soil-Build (Pte) Ltd (Merit)

Established in 1976, Soil-Build (Pte) Ltd is a wholly-owned subsidiary of Soilbuild Construction Group Ltd. The firm has delivered a wide range of projects for both private and public sectors encompassing building types of residential, institutional, industrial and commercial categories.

Key Productivity Initiatives:

- Soil-Build emphasised on developing their capability in Building Information Modelling (BIM) and has utilised BIM in areas like detecting and resolving clashes.

- The firm advocated the wide use of mechanization to improve productivity on
The firm advocated the wide use of mechanization e.g. the concrete placing boom to improve productivity on the construction site.

The equipment and machinery used on their project sites included concrete placing boom, concrete distributor, telescopic forklift, storey crane, scissors lift and boom lift.
368 Thomson is a freehold luxury condominium development comprising 1 tower of 36-storey residential flats with 5 units per floor, 1 basement car park, 1 covered car park at the 1st and 2nd storey and
environmental deck with sky terraces, swimming pools, club house, gymnasium and ancillary buildings. The project is situated at Thomson Road.

**Key Features:**
- Repetitive unit design enabled the standardisation of precast elements.
- A combination of sheet piling and open cut methods were employed for basement excavation, optimising both cost and time.
- Wide adoption of system formwork for basement construction of pile caps, retaining wall and columns to suit the structure configuration.
- Extensive use of precast beams and precast slabs throughout the whole project to reduce workers on site.
- Off-site production of prefabricated bathroom units (PBUs) led to savings in time and manpower. Piping works for PBUs were completed in the factory and improvements in trades finishes such as waterproofing works, tiling works and fitting works were completed at the PBU factory before delivery and installation on site.
- Adoption of buildable trades such as drywall partition, screedless flooring, rebated door with lift-off hinges and prefabricated bathrooms to increase efficiency and speed of construction.
- Prevalent use of precast elements for superstructure works coupled with precasting done at the precast yard on site helped to accelerate the speed of superstructure construction and eliminate logistics problems. This reduced the need to buffer for storage space as precast elements were cast in the evening, and demoulded and installed the following morning. On-site precast facility was separated for each tower for better synchronisation with the progress of each tower, thereby increasing productivity.
- The use of system formwork for the construction of shear walls eliminated the need for plastering works.
Cube 8
Platinum Award
(Residential Non-Landed Buildings Category < 25,000 m²)

<table>
<thead>
<tr>
<th>Developer</th>
<th>City Developments Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Consultant</td>
<td>ADDP Architects LLP</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>Meinhardt (Singapore) Pte Ltd</td>
</tr>
<tr>
<td>M&amp;E Consultant</td>
<td>Conteem Engineers Pte Ltd</td>
</tr>
<tr>
<td>Design and Build Contractor</td>
<td>Dragages Singapore Pte Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$83,459,310.00</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>20,804.76 m²</td>
</tr>
</tbody>
</table>

Cube 8 is a freehold luxury condominium development comprising one 36-storey block with two basement car parks, swimming pool and communal facilities. The 177 units start from level 5 onwards and range from studios apartments to 4-bedroom units and with four units of double storey sky villas at level 36. The project is located along Thomson Road and Pan Island Expressway.
Key Features:

- A hybrid construction method consisting of cast-in-situ vertical columns/walls with horizontal precast elements like planks and beams helped the project to achieve an average of 6-day cycle time.

- Extensive use of precast elements such as precast beams, precast slabs, precast balconies, precast staircases and precast planters helped the project achieve high construction productivity.

- Prefabricated bathroom units (PBU) were installed in this development resulting in a reduction in construction time.

- Extensive use of drywall partition system was adopted, contributing to labour efficiency, waste minimisation, better finishing quality and shorter construction time.

- Use of external cantilevered façade platform, stair platform, working platform and internal shaft platform eliminated the need for full height scaffolding while providing the required safety.

- A vertical reinforcement prefabrication yard on site allowed faster speed of construction and helped to reduce rebar wastage since double height reinforcement bars could be prefabricated on site.
## CPA – Projects

### Tree House Condominium

**Platinum Award**

*(Residential Non-Landed Buildings Category > 25,000 m²)*

<table>
<thead>
<tr>
<th>Developer</th>
<th>Chestnut Avenue Developments Pte Ltd (City Developments Limited)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Consultant</td>
<td>ADDP Architects LLP</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>DE Consultants (S) Pte Ltd</td>
</tr>
<tr>
<td>M&amp;E Consultant</td>
<td>United Project Consultants Pte Ltd</td>
</tr>
<tr>
<td>Design and Build Contractor</td>
<td>Tiong Seng Contractors (Pte) Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$143,926,000.00</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>52,437.92 m²</td>
</tr>
</tbody>
</table>
Tree House Condominium is a housing development comprising 4 blocks of 24-storey apartments with landscaped deck, common basement carparks and communal facilities at Chestnut Avenue and Petir Road.

**Key Features:**

- Use of full precast envelope system eliminated the need for external scaffolding and helped the project to achieve a typical floor cycle of 7 days. Productivity was enhanced and high quality was achieved.

- A flat plate system with precast perimeter beams was adopted which increased site productivity as system formwork could be utilised with ease for a flat soffit.

- Modularised heavy-duty but lightweight aluminium system formwork was adopted. Its light weight nature made handling of formwork easier and faster for workers. The heavy-duty aluminium alloy allowed spacing between props to be wider as compared to a conventional system, thus reducing the number of props to be set up.

- Most of the internal walls were drywall partitions instead of the conventional brickwall system which allowed for easy installation. Prefabricated bathroom units were also used, improving productivity and quality.

- Use of screedless floor enabled direct tiling and laminated floor installation, thereby reducing the time needed for extra topping and levelling works.

- Use of a mobile platform and working platform for the construction of the lift core was specially designed for vertical access in the lift core without any scaffolding. This contributed to productivity improvement in on-site precast installation.

- Pile raft system was used instead of bored pile foundation for the construction of the basement to simplify the excavation profile, formwork erection and reinforcement connection detail.

- For the construction of the award-winning high-rise vertical green wall, the main steel structure and access for maintenance were produced in a modular system off-site and assembled with bolting system on site. This reduced the amount of welding works required for installation and shortened the construction duration.

- The Chestnut Pavilion was constructed using steel structure and aluminium infill. The steel framing was spaced equally for modular fabrication in full length. Full length aluminium infill was used to reduce unnecessary load for easy installation. This reduced the manpower required at a reasonable cost.
CPA – Projects

Punggol Waves
Gold Award
(Residential Non-Landed Buildings Category > 25,000 m²)

<table>
<thead>
<tr>
<th>Developer</th>
<th>Housing &amp; Development Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Consultant</td>
<td>ADDP Architects LLP</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>DE Consultants (S) Pte Ltd</td>
</tr>
<tr>
<td>M&amp;E Consultant</td>
<td>United Project Consultants Pte Ltd</td>
</tr>
<tr>
<td>Builder</td>
<td>China Construction (South Pacific) Development Co Pte Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$78,600,000.00</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>72,300 m²</td>
</tr>
</tbody>
</table>
Punggol Waves is a 573 residential unit development located at the high slope beside Tampines Expressway, surrounded by school and residential developments with an MRT tunnel and LRT viaduct in close proximity. There are a total of 5 residential blocks and a multi-storey carpark which includes a half basement.

**Key Features:**

- Extensive use of precast and prefabricated elements was adopted which helped to reduce manpower usage on site.
- Standardisation of components such as door and window sizes resulted in better quality and less wastage in production.
- Standardisation of floor height facilitated easy on-site construction and precast production.
- Adopted “press-fit” method of joining copper piping helped to enhance productivity as it was faster as compared to welding.
- Use of a steel structure roof instead of a reinforced concrete linkway roof, helped improve productivity.
- Pre-assembly of steel roof on site which was hoisted up using a mobile crane reduced labour and increased quality and speed of construction.
- The use of a ‘skin wall” that was precast together with the external side of the beam pocket provided a fast and safe method that enhanced productivity as the closing of side formwork was not needed. This eliminated the shifting of external climbing platform.
- Use of precast external wall with cast in window minimised defects and rectification work.
## CPA – Projects

### Fernvale Foliage

**Gold Award**

*(Residential Non-Landed Buildings Category > 25,000 m²)*

<table>
<thead>
<tr>
<th>Developer</th>
<th>Housing &amp; Development Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Consultant</td>
<td>Architects Vista Pte Ltd</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>TH Chuah &amp; Partners LLP</td>
</tr>
<tr>
<td>M&amp;E Consultant</td>
<td>Rankine &amp; Hill (S) Pte Ltd</td>
</tr>
<tr>
<td>Builder</td>
<td>Straits Construction Singapore Pte Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$72,000,000.00</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>63,043 m²</td>
</tr>
</tbody>
</table>
Fernvale Foliage is a public housing development comprising two 23-storey residential blocks, two 23 and 24-storey residential blocks, one 5/6-storey multi-storey carpark, one precinct pavilion and 504 dwelling units.  

**Key Features:**

- Extensive use of precast structural elements and non-structural elements such as staircases, refuse chutes, facades, parapet walls and air-con ledges helped to minimise formwork construction and improve productivity.

- Integration of precast beams with precast facades and precast gable-end walls minimised the number of hoists required for the installation of precast components per floor and optimised crane resources.

- A precast skin was introduced to the precast two-tier column to eliminate the need to install formwork on the external face of the gap between the top and bottom segments of the columns. This improved site safety and increased productivity in the form of a shorter cycle time.

- The simple design adopted for the roof fascia, with minimal cantilevered and protruding architectural features was a key factor in the completion of the superstructure work within 16 months from the date of commencement.

- A specially designed steel rack was mass produced and used for the hoisting of the precast lightweight walls to the uppermost floor under construction, and served as a storage rack for the precast partition walls prior to installation, thus saving time.
### CPA – Projects

**Floral Spring @ Yishun**

*Gold Award*

*(Residential Non-Landed Buildings Category > 25,000 m²)*

---

<table>
<thead>
<tr>
<th>Developer</th>
<th>Housing &amp; Development Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Consultant</td>
<td>Ong&amp;Ong Pte Ltd</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>Meinhardt (Singapore) Pte Ltd</td>
</tr>
<tr>
<td>M&amp;E Consultant</td>
<td>Rankine &amp; Hill (S) Pte Ltd</td>
</tr>
<tr>
<td>Builder</td>
<td>Ho Lee Construction Pte Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$89,210,000.00</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>72,341.29 m²</td>
</tr>
</tbody>
</table>
The development is a public housing project located at Yishun Ave 11, comprising 6 residential blocks of 13 storeys and 1 multi-storey block of 7 decks. There are a total of 600 dwelling units. The residential blocks are located alongside the periphery of the site, creating a large central landscape space where a multitude of activities can take place. All blocks are orientated north or south with units either facing internal landscape car park roofs, adjacent precinct or unobstructed view of the common green.

Key Features:

- Extensive use of precast components increased productivity. Use of precast columns and façade walls eliminated the use of external scaffold, external formwork and platform system.

- Use of household shelter and storey shelter that were volumetric with hollow cores enabled ease of hoisting and installation with tower crane. Vertical load bearing components such as columns and walls were designed with either spiral connector or splice sleeve for connection detailing, which enabled fast installation.

- Standardisation of beams and column was adopted for efficient fabrication and construction.

- Use of stainless steel press-fit system increases the productivity in installing domestic water pipes and reduced the tendency of possible leaking.
**Edward Boustead Centre**

**Gold Award**

*(Industrial Buildings Category)*

<table>
<thead>
<tr>
<th>Developer</th>
<th>BP-Ubi Industrial P/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Consultant</td>
<td>HA Architects P/L</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>BC Koh &amp; Partners LLP</td>
</tr>
<tr>
<td>Design and Build Contractor</td>
<td>Boustead Projects P/L</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$17,000,000.00</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>8,758.75 m²</td>
</tr>
</tbody>
</table>
The Edward Boustead Centre is an 8-storey building located in the Ubi district. The Centre consists of 5 floors of production/ancillary office space (1st, 5th to 8th storey) and 3 floors of car parking (2nd to 4th storey). A central core system is adopted to provide amenities and services through the middle, linking the 5th, 6th, 7th and 8th stories together. A concrete roof has been designed as a relaxation area with landscaping and sun shading, to allow staff within the building to have a space to unwind.

**Key Features:**

- Design of uniform gridline of approximately 8m per grid allowed the system formwork and façade materials to be repeated throughout all the floors and elevations.

- Use of lightweight wall panels in regular and modular-dimensions sped up construction time and required less manpower.

- Standardisation of warehouse column dimension and floor height allowed full reuse of formwork.

- Design of external driveway as a non-suspended slab using steel fibre reduced time and improved productivity.

- Self-compacting concrete was used to reduce time and manpower.

- Use of prefabricated ducting eased the installation on site and reduced the amount of loose materials.

- Use of cast-in ceiling inserts for the air-conditioning ducting and the main sprinkler pipe for the uppermost floor of the project ensured minimal work during installation.
CPA – Projects

The Metropolis
Gold Award
(Commercial Buildings Category)

<table>
<thead>
<tr>
<th>Role</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer</td>
<td>Ho Bee Land Limited</td>
</tr>
<tr>
<td>Architectural Consultant</td>
<td>DCA Architects Pte Ltd</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>KTP Consultants Pte Ltd</td>
</tr>
<tr>
<td>M&amp;E Consultant</td>
<td>KTP International Pte Ltd</td>
</tr>
<tr>
<td>Design and Build Contractor</td>
<td>Lum Chang Building Contractors Pte Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$297,695,000.00</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>115,394.66 m²</td>
</tr>
</tbody>
</table>
Strategically located along North Buona Vista Drive, The Metropolis was conceptualised to become the gateway to the iconic One North. The development comprises 2 Grade-A office tower blocks of 21 and 23 storeys, 3 car park basements with 491 carpark lots and 2 levels of retail units at 1st & 2nd storey. The two office towers are linked up by a skywalk at the 2nd storey and the development is also linked to Biopolis development via a pedestrian overhead bridge at 2nd storey (Tower 2). There are sky gardens at the 11th, 13th & 23rd storey at Tower 1 and at 6th, 8th, 9th, 11th & 21st storey at Tower 2.

**Key Features:**

- Extensive use of precast and prefabricated components was adopted.
- Large extent of repetition of floor heights and structural floor layouts increased efficiency of downstream structural works.
- Dry walls and lightweight concrete panels were adopted with no usage of brick walls. The drywalls sped up the wall installation time, reducing the number of manual workers and ensured higher quality.
- Use of off-site fabricated unitised glazing panels with shading fins integrated into the panel design eliminated the need for external scaffolding and required less workers.
- Pre-insulated chilled water pipes and mechanical joints (instead of welding) for fire protection piping helped to enhance the buildability of mechanical and electrical systems.
- Strut-free excavation method whereby the permanent slab was cast to act as struts resulted in no temporary steel struts needed, reducing the time and manpower required. Basement excavation was easier and could be speeded up without obstruction of the steel struts.
- Use of remote controlled hydraulic system for lifting up the core wall formwork increased safety and speed, and reduced the number of workers required.
- Use of table lift to transfer modules of the table formwork from cast floor to new floor improved productivity and safety, and reduced the usage of the tower crane.
CPA – Projects

Asia Square Tower 2

Gold Award

(Commercial Buildings Category)

<table>
<thead>
<tr>
<th>Developer</th>
<th>Asia Square Tower 2 Pte Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Consultant</td>
<td>Architects 61 Pte Ltd</td>
</tr>
<tr>
<td>Structural and M&amp;E Consultant</td>
<td>Meinhardt (Singapore) Pte Ltd</td>
</tr>
<tr>
<td>Design and Build Contractor</td>
<td>Hyundai Engineering &amp; Construction Co. Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$437,305,025.65</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>113,580.00 m²</td>
</tr>
</tbody>
</table>
The project is the last of the two parcels that will complete the comprehensive mixed used development at Marina View (Downtown Core Development Guide Plan). The Asia Square Tower 2 is a 46-storey integrated mixed use building comprising 26 office floors and 17 hotel floors totalling 305 guest rooms and associated facilities.

**Key Features:**
- The original conventional two-way beam system was modified to a one-way beam system for the typical office floors. This helped to save manpower.
- Extensive use of drywall and the location and sizes of curtain wall were coordinated with the drywall design, increasing efficiency.
- Use of system formwork and concrete placing booms improved the productivity and shortened the overall construction period.
  - Extensive triple low-emissivity coating double glazed curtain wall was adopted and the use of self-climbing system formwork removed the need for scaffolding to the external facade.
- Use of scissor lifts eliminated the need for scaffolding for mechanical and electrical works.
Redevelopment of Specialists' Centre and Hotel Phoenix  
Gold Award  
(Commercial Buildings Category)

<table>
<thead>
<tr>
<th>Developer</th>
<th>Orchardgateway Private Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Consultant</td>
<td>AWP Pte Ltd</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>Meinhardt (Singapore) Pte Ltd</td>
</tr>
<tr>
<td>M&amp;E Consultant</td>
<td>Alpha Consulting Engineers Pte Ltd</td>
</tr>
<tr>
<td>Builder</td>
<td>Hyundai Engineering &amp; Construction Co. Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$450,374,696.54</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>50,057 m²</td>
</tr>
</tbody>
</table>
The redevelopment of the Specialist Centre and Phoenix Hotel is one of the 2 strategic parcel developments across Orchard Road at the heart of Singapore’s major premier shopping street. The project is a 20-storey integrated mixed use development comprising 2 basements, retail floors, hotel floors totalling 502 guest rooms and associated facilities. It has restaurants and retail shops from the basement to level 4, car parks from level 5 to 8 totalling 273 lots and hotel from level 9 to level 20 as well as an exciting range of facilities at the environmental deck at level 3, 10 and 19. These include relaxing sky garden green roofs and green wall at level 10 and 19 creating a blissful greenery ambience.

**Key Features:**
- Use of fire-rated autoclaved aerated concrete (AAC) panels helped to reduce labour and increase speed of installation. It also eliminated the need for external scaffolding, reducing the manpower required.
- Extensive use of one-way beam system to typical office floors was adopted for ease of construction.
- For the construction of the underpass underneath the Stamford Canal linking the Specialist Shopping Centre basement 2 and the Phoenix hotel basement, a top down method with the use of precast beams and slab together with the support of circular hollow section micro piles was carried out to overcome limited construction space.
- The use of the system formwork and concrete placing booms enhanced productivity and reduced the overall construction period.
- Use of scissor lifts and boom lifts eliminated the requirement for scaffolding for the architectural and mechanical and electrical works.
CPA – Projects

Improvement to Geylang River from Dunman Road to Guillemard Road Project

Gold Award

(Civil Engineering Category)

<table>
<thead>
<tr>
<th>Developer</th>
<th>Public Utilities Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural, Structural and M&amp;E Consultant</td>
<td>Surbana International Consultant Pte Ltd</td>
</tr>
<tr>
<td>Alternative Design Contractor</td>
<td>Koh Brothers Building &amp; Civil Engineering Contractor (Pte.) Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$37,324,000.00</td>
</tr>
</tbody>
</table>
The river project entailed the construction of an estimated 830 metres long by 26 metres wide drain, reconstruction of two 3 cell box culverts and with PUB's Active, Beautiful, Clean Waters (ABC Waters) design features. Landscaping and other amenities were done to enhance the Geylang River bank, creating more spaces for the community to enjoy. The widening of the drain also helped to improve the drainage of area, and is part of PUB's long term flood alleviation program.

**Key Features:**

- Construction using Jet Grout Piles (JGP) forming into an inverted arch across the entire section of the U-drain helped to increase speed of construction and productivity, reduce cost and require fewer resources.

- A water control gate was used at the downstream of the project to control the water level and to enable construction in a dry environment, reducing manpower needed to operate the water gates, enabling a safer working environment and increasing efficiency.

- A girder system for jet grouting in the river bed enabled work within tight areas to be carried out, improving productivity.

- Less machinery were deployed in the river bed as the JGP machines were able to move along on the girder straddling the width of the river so that the flow of the water from upstream was not affected.

- Use of prefabricated mesh and cut/bend reinforcement bar increased productivity and speed in forming the concrete canal base and wall.

- Change of the reinforcement of the permanent drain to prefabricated mesh which was repetitive and could be easily installed.