MEDIA RELEASE

MORE COMPANIES HONOURED FOR DRIVING PRODUCTIVITY IN THE BUILT ENVIRONMENT SECTOR

- Nine firms comprising builders, consultants and a sub-contractor recognised for productivity efforts compared to six winners last year
- Residential projects make up seven out of nine winning projects that embrace productive technologies

14 May 2014 – With fewer than 50 employees, local sub-contractor Sterling Engineering Pte Ltd is a small firm recognised by the Building and Construction Authority (BCA) for driving productivity in the built environment sector. It joins six builders and two consultants in winning the BCA Construction Productivity Award (CPA) – Advocates this year.

Introduced in 2013, the CPA – Advocates recognises outstanding developers, consultants, builders and sub-contractors for their achievements in improving productivity at the firm level.

“Unlike last year, this year’s winners demonstrate a wider variety of productivity initiatives, ranging from the use of high-tech and precast technology, adoption of good industry practices, workforce development and collaboration among project parties. This reflects greater industry awareness of solutions to improve productivity, which is important in enabling the sector to transform into one that is integrated, efficient and technologically-advanced”, said Dr John Keung, CEO of BCA.

Sterling Engineering has advocated the need for skills upgrading to form an experienced, skilled pool of workforce. It had tapped on the Workforce Training and Upgrading (WTU) scheme under BCA’s Construction Productivity and Capability Fund (CPCF), to help defray the costs of training and upgrading its workers.
Utilising the Mechanisation Credit Scheme under BCA’s CPCF, the firm had purchased equipment such as the Computer Numerical Control (CNC) plasma cutting machine to mechanise its processes and improve productivity. The machine enables one worker to cut 147 more pieces of steel plates in 52 hours compared to two workers in 176 hours previously.

“It makes business sense for companies, big and small, to optimise their productivity so that they can continually improve their business and stay competitive. There are various forms of assistance such as the BCA Construction Productivity and Capability Fund for companies to tap on, if they want to improve and upgrade”, said Mr Marc Sim, Business Development Manager of Sterling Engineering.

As a main contractor, Hua Siah Construction strives to ensure all their sub-contractors embark on their productivity journeys through the mechanisation of site processes. It also adopted productive technologies such as mast climbing platforms to replace traditional scaffolding. As a result, workers do not have to erect scaffolding at every floor, saving time as well as enhancing workplace safety.

Other productivity innovations include Antara Koh Private Limited’s use of the Real Time Kinematic (RTK) Global Positioning System (GPS) for marine pile positioning. This allows piling to be conducted at night and in all weather conditions. Only one man is required to operate the system on the barge, removing the need to employ shore-based surveyors to position the marine piles. This enables pile installation to be twice as fast.

Samwoh Corporation was also recognised for introducing many innovative productivity initiatives, many of which are the first of its kind to be implemented in Singapore. These include a crack measurement system which uses a laser and image recognition technology to collect road condition data for road maintenance, as well as an ultra high pressure water-blasting technology which is able to consistently remove pavement markings without the need to grind and damage the road surface. These technologies not only improve the quality of work, but result in a more efficient use of labour.
In addition, Arup Singapore Pte Ltd was lauded for adopting Building Information Modelling (BIM) extensively in its projects to manage large amounts of data and combine structural, mechanical and electrical and system services, as well as architectural finishes in a coordinated manner.

Other winners include Langdon & Seah Singapore Pte Ltd, Straits Construction Singapore Pte Ltd, Tiong Seng Contractors Pte Ltd and Koh Brothers Building & Civil Engineering Contractor (Pte) Ltd (please refer to Annex A).

Under the Projects sub-category, 9 teams were recognised for their efforts in improving the productivity of their projects; out of which 7 were residential projects (please refer to Annex B).

Winning the Platinum awards were City Developments Limited’s condominium projects – NV Residences and Hundred Trees, as well as HDB’s Punggol Breeze and Casa Clementi.

Despite its complex design, the project team for the Conservatory Complex at Gardens by the Bay won the Gold Award for the CPA – Projects for its extensive use of prefabrication, such as structural steel frames, steel segmental arches and a glass facade. It had also used BIM to detect clashes early.

Issued by the Building and Construction Authority on 14 May 2014

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 A

**CPA – Advocates**
The Construction Productivity Award (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 which is a combination of the previous CPA – Best Practices and Innovations and the CPA – Value Added Productivity (VAP), now gives more focus and better recognises the contributions of various stakeholders.

**CPA – Advocates has four sub-categories:**
i) Developer
ii) Consultant
iii) Builder (Open)
iv) Builder (Prime)

**Assessment Criteria included:**
1. Buildable design score
2. Constructability score
3. Productivity performance (physical and value-added productivity)
4. Productivity initiatives
Arup Singapore was a consultant for the iconic Marina Bay Sands project.

Steel Fibre Reinforced Concrete (SFRC) bored tunnel precast segmental lining was adopted for the Land Transport Authority Downtown Line Stage 3 project.

Arup Singapore used Building Information Modelling (BIM) on notable projects such as the Downtown Line 3 MRT stations.

Arup Singapore Pte Ltd (Gold)

Established in Singapore since 1968, Arup is a global design, engineering and business consultancy with more than 11,000 staff spanning 90 offices in 38 countries around the globe. Arup pursues quality and excellence which is reflected in its impressive portfolio of iconic and award-winning developments including Marina Bay Sands, The Helix, Singapore Flyer, Sydney Opera House, and the Beijing National Stadium.

In Singapore, Arup’s success is founded on delivering their global expertise locally and they now have over 300 staff offering a range of specialist disciplines unparalleled in this market.

Key Productivity Initiatives:

- The adoption of Steel Fibre Reinforced Concrete (SFRC) bored tunnel precast segmental lining for the Land Transport Authority Downtown Line Stage 3 was a first in South East Asia. By using SFRC, construction productivity was improved by about 25% as compared to traditional steel bar reinforced concrete precast segmental lining. This method also reduced the required factory space, facilitated rapid automated segment carousel production, and delivered more durable and cost-saving tunnels.

- Arup extensively used Building Information Modelling (BIM) on notable projects such as Downtown Line 3 MRT stations, the upcoming Singapore Sports Hub and Marina Bay Sands Integrated Resort. BIM allowed the management of large amounts of data and combined the structural, Mechanical and Electrical (M&E) and system services, and architectural finishes in a coordinated manner. The collaborative environment made possible the integration of design, clash detection, virtual interactive resolution, parametric design that maximise the standardisation of large numbers of truss connections and facade panels, generating unfolded models of fabrication drawings. This initiative has improved productivity across multiple disciplines and companies working together on substantial and complex projects in the design and construction phases.
Consultant Category (Quantity Surveying)

Langdon & Seah Singapore Pte Ltd (Gold)

Langdon & Seah Singapore Pte Ltd has vast experience in providing cost, contract and project management services for construction projects.

Key Productivity Initiatives:
- Langdon & Seah has advocated the adoption of Early Contractor Involvement (ECI) where contractors are involved in the early stages of design to contribute their expertise towards areas such as construction scheduling and planning. This extensively reduces potential risks whilst harnessing the latest knowledge and technologies from contractors. ECI has been adopted in several prestigious projects such as South Beach, the Bedok Integrated Project and Changi Airport Terminal 4.
- Langdon & Seah continues to engage and conduct research on the various aspects of Building Information Modelling (BIM).

Builder – Open Category

Antara Koh Private Limited (Gold)

Antara Koh Private Limited specialises in civil engineering and marine structure construction. Established in 1974, Antara Koh relentlessly kept up and developed their technology and resources to handle larger and technically demanding projects in the field of foundation, civil engineering and marine projects.

Key Productivity Initiatives:
- Antara Koh has advocated the use of Real Time Kinematic (RTK) Global Positioning System (GPS) for their marine pile positioning. Equipped with this technology, such system allowed piling to be conducted at night and in all weather conditions. Traditionally, marine piles positioning were carried out by three shore-based surveyors equipped with theodolite using triangulation method. By adopting this technology, it has
The firm advocated the use of Real Time Kinematic (RTK) Global Positioning System (GPS) for their marine pile positioning.

- Antara Koh is equipped with the expertise in drilling land or marine bored piles with the combination of Down The Hole (DTH) Hammer drilling tool and Reverse Circulation Drill (RCD) machine which results in higher productivity when drilling in rocks.

Hua Siah Construction Pte Ltd (Gold)

Hua Siah Construction Pte Ltd’s core expertise is in the construction of industrial developments. To date, Hua Siah had completed more than 100 industrial buildings in Singapore.

**Key Productivity Initiatives:**

- With the co-funding from the Mechanisation Credit (MechC) Scheme, Hua Siah has adopted productive technologies such as mast climbing platforms to replace traditional scaffolding. As a result, workers do not have to erect scaffolding at every floor, saving time as well as enhancing workplace safety.

- As a main contractor, Hua Siah strives to ensure all their sub-contractors embark on their productivity journeys through mechanisation of site processes e.g. through deployment of productive technologies such as the boom lift and scissor lift.
Samwoh adopted a productive crack measurement system which uses laser and image recognition technology to collect road condition data for road maintenance.

Using the water blasting method, the firm is able to remove pavement markings without the need to grind and damage the road surface.

Key Productivity Initiatives:
- Samwoh advocates productivity by actively participating in seminars to share its technologies. The Samwoh R&D Center is open to both public and private visitors where a behind-the-scenes tour of the research center and new innovative technologies used by Samwoh to improve productivity are shared.
- Samwoh’s productivity mission is to re-design, re-engineer and re-invent new technology and know-how. This saw the company introducing many new initiatives to improve construction productivity, with the support of the BCA Construction Productivity and Capability Fund (CPCF). Many of these productivity initiatives that are the first to be implemented in Singapore involved in-depth technical study and innovation. These include the multi-laser scanning technology for road and airport pavement and ultra high pressure water-blasting method for lane marking removal.

Straits Construction has adopted the Site Access System (SAS) which utilised biometric identification, a contactless facial scanner to regulate faster entry and exit at the site.

Key Productivity Initiatives:
- Straits Construction has adopted the Site Access System (SAS) which utilised biometric identification, a contactless facial scanner to regulate faster entry and exit at site. This system also helps to generate various manpower and productivity reports. Prior to this system, the calculation of staff and workers mandays had to be done.
Building Information Modelling (BIM) enhanced buildability and cost-efficiency. It also allows early planning and detection of clashes which improves site coordination works.

- Since 2011, Straits Construction has embarked on the use of Building Information Modelling (BIM). This enhances buildability and cost-efficiency. BIM also allows early planning and detection of clashes which improves site coordination works.

Tiong Seng Contractors Pte Ltd (Gold)

Over the years, Tiong Seng has evolved from a local builder that handles infrastructure and school projects into one that possesses established track records in notable projects such as the Sentosa Integrated Resorts, Marina Bay Financial Centre, Capella Hotel, St. Regis Hotel & Residences, Park Royal Hotel and private residential projects such as Parc Emily, Sky @ Eleven and Shelford Suites.

Key Productivity Initiatives:
- To push construction productivity to a greater height, Tiong Seng developed the first Prefab Hub in Singapore. The Prefab Hub stands out as being truly multi-purpose. The facility not only houses the automated precast plant, it has space for building prefabricated bathroom units and for pre-assembling, storing and maintaining advanced formwork systems. It also has a training centre, a Building Information Modelling (BIM) Centre and a workers’ dormitory. The co-existence of all these related activities and facilities under one roof makes it easier for managing resources, while improving land productivity.

- Tiong Seng actively shares their experience and knowledge with the industry through seminars and conferences like the BCA Build Smart conference.
Compared to the conventional way of using bricks for the building envelop, Tiong Seng adopted a full precast envelope system, which used full precast components for the external walls. This eliminated the need for scaffolding which is time consuming and labour intensive. A full precast envelop system also helps address issues such as site space constraints when having to stock up materials required for conventional wet work and keeping the site tidy and clean. As the precast facade is done in a factory controlled environment, the finish quality is consistent.

Koh Brothers Building & Civil Engineering Contractor (Pte) Ltd (Merit)

Koh Brothers has advocated the use of precast concrete, drywall, system formwork and Building Information Modelling (BIM) in their construction projects to improve productivity.

**Key Productivity Initiatives:**
- To build up Koh Brothers’ capability in precast, a precast plant was set up in Oct 2013 at Johor Bahru to support Singapore’s production capacity of ready mixed concrete and precast components.
- Koh Brothers places great emphasis on staff training by getting their staff to attend productivity-related courses. The company also recognises workforce development as an important value chain to improve productivity.
- It has also established a $1 million Productivity Improvement Scheme (PIS) fund for five years beginning 2013 for its company’s productivity initiatives, to be aligned with the government’s effort to improve productivity in the construction sector.

**Builder – Prime Category**

Sterling Engineering Pte Ltd (Gold)

Since 1994, Sterling Engineering has been providing structural steel engineering and pre-fabrication solutions to Singapore’s construction sector. Sterling Engineering is committed to reduce its labour by 25% within 3 years from 2011 through the use of technology adoption.
Sterling Engineering specialises in structural steel fabrication and installation.

The automatic hydraulic shearing machine it purchased with funding support from the BCA Construction Productivity and Capability Fund produces better quality work and also reduced manpower required.

Key Productivity Initiatives:

- Sterling Engineering utilised the Mechanisation Credit scheme under BCA’s Construction Productivity and Capability Fund to purchase productive equipment such as the automatic hydraulic shearing machine, CNC plasma cutting machine, gantry crane and the automatic pipe profile cutter. With such technologies, it was able to produce better quality work and also reduce manpower required.

- Sterling Engineering has also advocated the need for skills upgrading to form an experienced, skilled pool of workforce. This was achieved by tapping on the Workforce Training and Upgrading (WTU) scheme under BCA’s Construction Productivity and Capability Fund (CPCF), which helped the firm to defray the costs of training and upgrading its workers.
ANNEX B

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.
**Punggol East Contract 33 (Punggol Breeze)**

**Platinum Award**

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

<table>
<thead>
<tr>
<th>Developer</th>
<th>Housing &amp; Development Board</th>
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<tbody>
<tr>
<td>Architectural, Structural and M &amp; E Consultant</td>
<td>Surbana International Consultants Pte Ltd</td>
</tr>
<tr>
<td>Builder</td>
<td>Qingjian International (South Pacific) Group Development Co., Pte Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$ 154,300,000.00</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>122,236.72 m²</td>
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</tbody>
</table>
Punggol Breeze is located at the junction of Punggol Drive and Edgefield Plains. The HDB project consists twelve 15/17-storey residential blocks with 964 units of 4/5-rooms, a multi-storey carpark with roof garden, 2 electrical sub-stations, 2 precinct pavilions and a common green.

**Key Features:**

- Adopted extensive use of precast and prefabricated components for the construction of the structural elements. Most of the structural vertical columns and walls for the project were designed as precast solid components. Through the use of a full precast construction system and prefabricated wire mesh and beam/column cages, coupled with the standardisation of precast installation methods, the reliance on labour intensive and time consuming erection of external scaffold, external formwork, and platform system were eliminated.

- Precast ring water tanks, being much lighter than the standard water tanks, were adopted to allow hoisting in ring forms by site tower cranes instead of high capacity mobile cranes, resulting in productivity savings.

- Scaffold-less construction is achieved using precast concrete skin for precast columns, eliminating external formwork and external climbing scaffolding.

- Structural steel design was opted for in contrast to conventional reinforced concrete design for the crash barrier for multi-storey carpark, the construction of site structures and use of composite roofing panels.

- The use of spray painting increased productivity and helped to achieve consistent and uniform surface texture with less material wastage.

- Bioswales Stormwater Retention System was utilised to replace conventional stormwater drainage system, through retention, filtration and biological uptake. This minimized the manpower required for construction, and achieved an aesthetically pleasing design.
Clementi Neighbourhood 4 Contract 8 (Casa Clementi)

Platinum Award

(Residential Non-Landed Buildings Category > 25,000 m$^2$)

<table>
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<tr>
<th>Developer</th>
<th>Housing &amp; Development Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural, Structural</td>
<td>Surbana International Consultants Pte Ltd</td>
</tr>
<tr>
<td>and M &amp; E Consultant</td>
<td></td>
</tr>
<tr>
<td>Builder</td>
<td>Straits Construction Singapore Pte Ltd</td>
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<tr>
<td>Construction Cost</td>
<td>$370,659,000</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>221,959.50 m$^2$</td>
</tr>
</tbody>
</table>
Clementi N4 C8, also known as Casa Clementi, is the largest public housing project in Singapore, in terms of the number of dwelling units and contract value. The multi-storey carpark is also the largest of its kind in Singapore, in terms of floor area.

**Key Features:**

- Extensive use of precast technology for the construction of the structure was adopted, which helped to increase site productivity.

- Standardisation of the facade layout for the external wall and the floor height of the buildings enhanced the buildability of the project substantially.

- Identical unit and facade layout for elevation helped to ease construction.

- Replication for all residential building blocks minimised the number of precast moulds and the manpower and time to coordinate the installation of precast components.
NV Residences

Platinum Award

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

<table>
<thead>
<tr>
<th>Developer</th>
<th>City Developments Limited / Hong Realty (Pte) Ltd / Hong Leong Holdings Ltd</th>
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</thead>
<tbody>
<tr>
<td>Architectural Consultant</td>
<td>Architects 61 Pte Ltd</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>TEP Consultants Pte Ltd</td>
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<tr>
<td>M &amp; E Consultant</td>
<td>Meinhardt (Singapore) Pte Ltd</td>
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<tr>
<td>Design and Build Contractor</td>
<td>Hyundai Engineering &amp; Construction Co. Ltd</td>
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<tr>
<td>Construction Cost</td>
<td>$ 178,800,000</td>
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<tr>
<td>Gross Floor Area</td>
<td>64,036.00 m²</td>
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</table>
NV Residences is a condominium comprising 8 blocks of varying heights of 12, 14 and 15-storey residential apartments totalling 642 units, with a two-level basement car park and a rain garden nature reserve.

**Key Features:**

- Precast concrete facade system was integrated with the system formwork horizontal in-situ concrete slab. Precast concrete panels were carefully designed to minimise the variations in panel size, while ensuring that the architectural aesthetics were not compromised. This approach enhanced the ease of construction, and removed the usage of external scaffolding, which contributed to savings in manpower, and led to a clean site and the elimination of tedious housekeeping.

- Strut free excavation method was employed, by using Contiguous Bored Piles (CBP), and a value engineering approach, to optimise working space and increase productivity.

- System formwork was adopted for the slab construction. This allowed the construction time and manpower to be reduced.

- Drywall partition was used for most internal walls. Drywall partition can easily be installed, hence requiring less labour.

- Prefabricated Bathroom Units (PBU) were adopted which helped to reduce the construction time.
Hundred Trees

Platinum Award

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

<table>
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<th>City Developments Limited</th>
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<td>Architectural Consultant</td>
<td>Ong&amp;Ong Pte Ltd</td>
</tr>
<tr>
<td>Structural Consultant</td>
<td>KTP Consultants Pte Ltd</td>
</tr>
<tr>
<td>M &amp; E Consultant</td>
<td>Squire Mech Pte Ltd</td>
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<tr>
<td>Design and Build Contractor</td>
<td>Tiong Seng Contractors Pte Ltd</td>
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<tr>
<td>Construction Cost</td>
<td>$ 121,355,000</td>
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<tr>
<td>Gross Floor Area</td>
<td>43,729.65 m²</td>
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</table>
The Hundred Trees condominium was the result of a concerted effort by all stakeholders’ i.e developer, architect, consultants and the builder, to create a green and desirable living space for home owners. In the construction phase, the key driving factor was to achieve efficiency and productivity. Labour-efficient design and productive construction methods were employed to speed up the construction process. The team paid special attention to designing the precast components and prefabricated bathroom units to ease installation and speed up the construction process.

**Key Features:**

- Extensive use of precast elements.
- Efficient block layout with maximisation on repetition in unit layout.
- Repetition in floor height and facade design features such as refuse chute, air-con ledge, long bay-window and balcony.
- Standardisation of components such as window and door sizes.
- Prefabricated Bathroom Units (PBUs) for all the dwelling units and use of drywall for greater productivity.
- Screed-less floor system to allow direct installation of marble or tile.
- Flexible water pipes which required fewer joints as compared to conventional copper pipes.
- System formwork and mechanisation widely adopted during construction.
Jetty of Singapore LNG Terminal Project at Meranti Crescent, Jurong Island

Gold Award

(Civil Engineering Projects Category)

<table>
<thead>
<tr>
<th>Developer</th>
<th>Singapore LNG Corporation Pte Ltd</th>
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<tbody>
<tr>
<td>Structural Consultant</td>
<td>Steen Consultants Pte Ltd</td>
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<tr>
<td>Design and Build Contractor</td>
<td>Antara Koh Private Limited</td>
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<td>Construction Cost</td>
<td>$21,560,000</td>
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<tr>
<td>Statistical Gross Floor Area</td>
<td>4,333.5 m²</td>
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</tbody>
</table>
Located on a 40-hectare plot at the Meranti seafront on Jurong Island, Singapore LNG terminal is the first LNG terminal in Asia capable of importing and re-exporting LNG from multiple suppliers. This LNG terminal is the core infrastructure that will support Singapore’s energy diversification strategy and also make Singapore a LNG trading hub.

**Key Features:**

- Value engineering approach through redesigning from the beginning.

- Reduction in concrete and steel required in construction thereby saving manpower and time.

- Use of Down the Hole (DTH) hammer drilling tool instead of conventional drill hammer thereby increasing productivity. The DTH drilling rate can achieve 1m to 3m of drilling per hour in comparison with 0.2m to 0.5m of drilling by using the conventional drilling tool.

- The design requires less material which resulted in the use of less energy and labour, leading to a more productive and greener project, especially from the reduced number of piles needed and the savings in concrete.
Conservatory Complex at Gardens by the Bay

Gold Award

(Institutional Buildings Category)

<table>
<thead>
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<th>Developer</th>
<th>National Parks Board/Gardens by the Bay</th>
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<tr>
<td>Architectural Consultant</td>
<td>CPG Consultants Pte Ltd and Wilkinson Eyre Architects</td>
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<tr>
<td>Structural Consultant</td>
<td>Meinhardt Infrastructure Pte Ltd and Atelier One</td>
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<tr>
<td>M &amp; E Consultant</td>
<td>CPG Consultants Pte Ltd and Atelier Ten</td>
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<tr>
<td>Builder</td>
<td>Woh Hup (Private) Ltd</td>
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<td>Construction Cost</td>
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<tr>
<td>Gross Floor Area</td>
<td>45,875.00 m²</td>
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</table>
The project is located at Marina Boulevard (Marina South Planning Area). The conservatory complex comprises two biomes - Cool Dry and Cool Moist - and is enveloped by glass facade supported by arches and grid-shell. In addition, it also comprises a 200m long service tunnel, a visitors' hub and 3 Supertrees.

**Key Features:**

- Use of Building Information Modelling (BIM) to detect clashes early.
- Extensive use of prefabricated structural steel frames and curtain walls.
- Replaced the use of conventional slab to post tensioned slab.
- Adopted prefabricated air-con ducts and prefabricated segmented arches.
- System formwork adopted for lift core wall.
- Scissor lift/boom lift in lieu of scaffolding for all internal and external works.
Lush on Holland Hill

Gold Award

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

<table>
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<th>Developer</th>
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<tr>
<td>Architectural Consultant</td>
<td>Liu &amp; Wo Architects Pte Ltd</td>
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<tr>
<td>Structural Consultant</td>
<td>Fong Consult Pte Ltd</td>
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<tr>
<td>M &amp; E Consultant</td>
<td>Rankine &amp; Hill (S) Pte Ltd</td>
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<tr>
<td>Design and Build Contractor</td>
<td>Singa Development Pte Ltd</td>
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<tr>
<td>Construction Cost</td>
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<tr>
<td>Gross Floor Area</td>
<td>8,675.41 m²</td>
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</table>
Lush on Holland Hill project is a condominium with two blocks of 12-storey residential flats with an attic, sky terrace at the 3rd storey, 2 basement carparks, swimming pools and communal facilities.

**Key Features:**
- Use of self-compacting concrete.
- Use of system formworks for vertical and horizontal structural components such as climbing form and table form.
- Use of precast components such as refuse chute, planter box, bay window.
- Drywall and prefabricated air-con ducting were adopted to increase the productivity of the whole project.
**Bukit Merah RC23 (Havelock View)**

**Gold Award**

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

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<td>Surbana International Consultants Pte Ltd</td>
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<td>Builder</td>
<td>China Construction (SP) Dev Co P/L</td>
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<tr>
<td>Construction Cost</td>
<td>$166,888,000.00</td>
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<tr>
<td>Gross Floor Area</td>
<td>139,700.00 m²</td>
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</table>
Bukit Merah RC 23 or Havelock View is a high density public housing development with commercial and communal facilities. There are a total of 7 high-rise residential blocks and a multi-storey carpark which includes one eating house and 5 shops.

**Key Features:**

- Extensive use of precast and prefabricated components for the construction of the structural elements.
- Standardisation of door and window sizes for better quality and less wastage in production.
- Use of external climbing platform for improved productivity.
- Use of structural steel for precinct pavilion roofs, linkways and shelter walkways and drop-off porch.
NUS Kent Vale II Staff Housing Development

Gold Award

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

<table>
<thead>
<tr>
<th>Developer</th>
<th>National University of Singapore - Office of Estate Development</th>
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<tbody>
<tr>
<td>Architectural Consultant</td>
<td>MKPL Architects Pte Ltd</td>
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<tr>
<td>Structural Consultant</td>
<td>KTP Consultants Pte Ltd</td>
</tr>
<tr>
<td>Builder</td>
<td>Tiong Seng Contractors Pte Ltd</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$149,688,000</td>
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<tr>
<td>Gross Floor Area</td>
<td>54,300.00 m²</td>
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NUS Kent Vale II comprises a proposed covered link way on the 1st storey, two 24-storey blocks, one 25-storey residential building, one 3-storey communal Block A with a swimming pool, one single storey communal Block B with swimming pool to existing Kent Vale staff housing.

**Key Features:**
- Extensive use of precast components for faster installation on site.
- Use of structural steel for roof top, sky garden and communal block verandah.
- Advanced system formwork was used for both vertical and horizontal components.
- Off-form finishes for the facade was adopted which did not require any plastering and painting works.
- Use of climbing formwork systems and concrete placing boom to increase productivity on site.