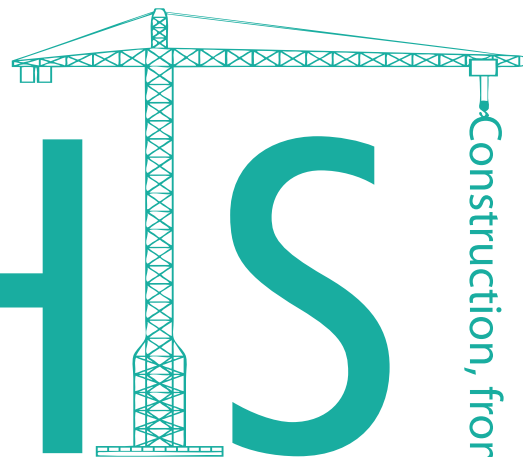




HEIGHTS

Volume 2 | 2015

Procurement Processes

Helping or Hindering Sustainable Construction?

Careers in Construction

Become a Green Landscape Architect

From Solar to Smart Glass

Green Tech in Construction

The Green Icon

Dato' Dr Ar Kenneth Yeang King Mun
Prominent Player of the Year Winner,
Malaysian Construction Industry Awards
(MCIEA) 2015

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Sustainability is becoming an important factor in the Malaysian construction industry. This is best seen in how the *Construction Industry Transformation Programme 2016 – 2020* (CITP) has identified environmental sustainability as one of the strategic areas which will drive the sector into becoming world-class by the year 2020.

In fact, our cover feature this article focuses on that aspect of the CITP, which was launched by Prime Minister Datuk Seri Najib Tun Razak on the 10th of September 2015. Incidentally, the CITP's unveiling and International Construction Week – where it took place – is also featured in this issue.

As the agency entrusted with the execution and delivery of the CITP, the Construction Industry Development Board of Malaysia (CIDB) is placing strong emphasis on ensuring its success. While greater sustainability in construction is one of the end goals, the path there is also full of benefits. By improving practices and processes to become more efficient and less wasteful, construction companies can not only ensure reduction of time and costs, it also helps in the long-term maintenance of the buildings and structures.

Of course, one of the main obstacles as to why so few contractors in Malaysia have yet to adopt such practices

is because of the belief that it is expensive. We also look at this conception in this issue, and as you will see from our report, while initial costs may be high, the long-term advantages far outweigh whatever early problems that may be encountered.

Ultimately, as the construction sector around the world become more aware of its environmental impact and the importance of safeguarding the environment, the industry in Malaysia must not be left behind. This is because demand for environmentally-friendly and sustainable solutions will grow.

Also in this issue, we showcase highlights from the *Malaysian Construction Industry Excellence Awards* (MCIEA), where the cream of the local construction industry were honoured for their achievements.

The winners of the MCIEA have shown leadership in their respective fields, and it is this quality that the CIDB has been encouraging and helping the construction industry to develop for two decades. As it celebrates its 20th anniversary this year, the CIDB hopes that Malaysian construction players will continue to make new grounds in excellence.

GETTING SUSTAINABLE



▲ Through the use of industrialised building systems (IBS) where building components are manufactured off-site and then assembled on-site, contractors and sub-contractors can reduce waste and attain greater sustainability.

KL-Singapore Fast Track

The Kuala Lumpur-Singapore High Speed Rail (HSR) project, the first of its kind in Southeast Asia, will see high-speed trains speeding between both cities at speeds of more than 250kph, upon completion. Initial construction of the project is expected to begin in the first quarter of 2016, and is expected to be completed in 2022. The project will involve the laying of a 330km HSR line and development of supporting infrastructure.

A project delivery company called MyHSR (Malaysia HSR) has been set up

by the Malaysian government to manage its share of the project. According to MyHSR's CEO, Mohd Nur Ismail Mohamed Kamal, a major timeline in the project will be the signing of a bilateral agreement between Malaysia and Singapore in the first quarter of 2016. He said, "The agreement will outline the basis of how this railway operates, the security features, Customs and Immigration procedures, service



MALAYSIA



▲ Mohd Nur Ismail Mohamed Kamal, MyHSR's CEO

level and the operating structure. All of these will be discussed, negotiated and agreed upon."

More than 70 companies and consortiums, both local and foreign, have also expressed interest in participating in the HSR project. One of the largest being a Korean consortium comprising of 50 public and private enterprises, including the Korea Rail Network Authority (KR), the Korea Land and Housing Corporation, and the Korea Railroad Research Institute, is among the interested parties. Other parties include a Japanese consortium comprised of the East Japan Railway Company, Sumitomo Corporation, Hitachi and Mitsubishi Heavy Industries. The Asia Pacific branch of the French company, Alstom Transport, has also expressed its keenness in participating in the project.



SWEDEN

▲ A SJ (Swedish Railways) high-speed train, at the central station in downtown Gothenburg, Sweden. Sweden's National Negotiation on Housing and Infrastructure has been tasked to rapidly implement the construction of a 320kph high-speed rail project to link the cities of Stockholm, Gothenburg and Malmö.

High-Speed Rail

The Swedish Parliament has tasked a group of negotiators, known as the National Negotiation on Housing and Infrastructure (Sverigeförhandlingen), to rapidly implement the construction of high-speed rail (HSR) lines to link three of Sweden's major cities – Stockholm, Gothenburg, and Malmö. The proposed 320kph HSR project is an effort to reduce carbon dioxide emissions, improve accessibility of public transport, and stimulate housing construction in these cities.

Currently, a fact-finding phase conducted by the group is expected to change over to a negotiation phase in 2016, and conclude by autumn 2017. The group will present their final report to the Swedish

parliament no later than the end of December 2017. Discussions will then take place between the Swedish government, its regions and municipalities, and its business sector. These are expected to identify the parties responsible for the financing of infrastructure in Sweden's major cities, the funding and the mapping-out of the new high-speed railway lines, and where new homes will be built.

The National Negotiation's aim is for the high-speed railways to be completed around 2035 and that at least 100,000 new homes will be constructed throughout the country, as a result of the active involvement of multiple parties in co-financing Sweden's infrastructure projects.

Highway Projects at Risk

About 53% of India's highway projects under the Build, Operate and Transfer (BOT) framework run the risk of not being completed on time. This is despite the Indian government's recent efforts to curb problems within its road construction sector, according to a report by Credit Rating Information Services of India Limited (CRISIL).

The CRISIL report, titled *No Smooth Ride*, found that about 5,100km of India's BOT highway projects under construction, or around 53%, risked incompleteness, due to delays in land acquisition and

clearances, and financial weakness from their sponsors.

The report also found that 37% of BOT projects, or 3,520km, were in the "high implementation risk" category, meaning that less than 70% of the project had been completed and the delay in completion was expected to last from 12 to 18 months. Additionally, the report noted that about 2,400km, or 40% of the total length of operational BOT highways, were unable to service their debt on their own due to lower-than-estimated traffic and resultant

toll collections. Cumulatively, a total of 7,500km of India's highway projects, both under construction and already operational, are at risk.

Another problem cited by the CRISIL report was the timing of the highway project bids, which led to acquisitions of large swathes of land between 2010 and 2012. Aggressive bids for these acquisitions led to high premium payments. As a result of lower-than-estimated traffic, the sponsors' funding avenues tapered out, leaving them unable to finance the premiums of their projects.

INDIA



Stranded vehicles waiting for the opening of the Jammu-Srinagar national highway, on the outskirts of Jammu, the winter capital of Kashmir, India. ▲ According to a report by CRISIL, about 53% of India's highway projects under construction are at risk of not being completed on time.

International Approval

MOU SIGNING BETWEEN CIDB AND MCCONNELL DOWELL (MALAYSIA)

The Construction Industry Development Board of Malaysia (CIDB) received a boost in early September when McConnell Dowell (Malaysia) became the first international construction firm to adopt the Quality Assessment System in Construction (QLASSIC) and the Safety and Health Assessment System in Construction (SHASSIC), which were developed by CIDB. This was sealed in a Memorandum of Understanding (MoU) signed by McConnell Dowell and CIDB Holdings – the subsidiary of CIDB dedicated to advancing quality and performance in construction – at the Putra World Trade Centre (PWTC) on the 10th of September, during *International Construction Week 2015*.



▲ Sr Abdul Latif Hatim and Murray Dundas exchanging documents after the MoU Signing.



◀ The MoU signing ceremony – From left to right CIDB Holding Deputy CEO Marziah Manap, CIDB Holdings CEO Sr Abdul Latif Hatim, McConnell Dowell (Malaysia) Project Manager Murray Dundas and McConnell Dowell Southeast Asia Managing Director, Stephen Tindal.

An Australian-based firm with operations in the Asia-Pacific and the Middle East, McConnell Dowell is the second largest construction company in Southeast Asia. Its Malaysian subsidiary has been contracted to build the country's second IKEA mall, which will be located in Cheras, Kuala Lumpur, with completion and launch by the end of the year. This IKEA will also be the eighth largest in the world.

The event kicked off with a welcome speech by CIDB's Senior General Manager for the Management Sector Ir Elias Ismail. In his address, Ir Elias noted that the Malaysian construction sector is experiencing exciting times with the Construction Industry Transformation Programme (CITP) coming into force.

He also acknowledged the importance of the MoU as it will strengthen the cooperation between CIDB and McConnell Dowell in the areas of safety and quality assessment. He

► CIDB's Senior General Manager for the Management Sector Ir Elias Ismail giving the welcome speech.



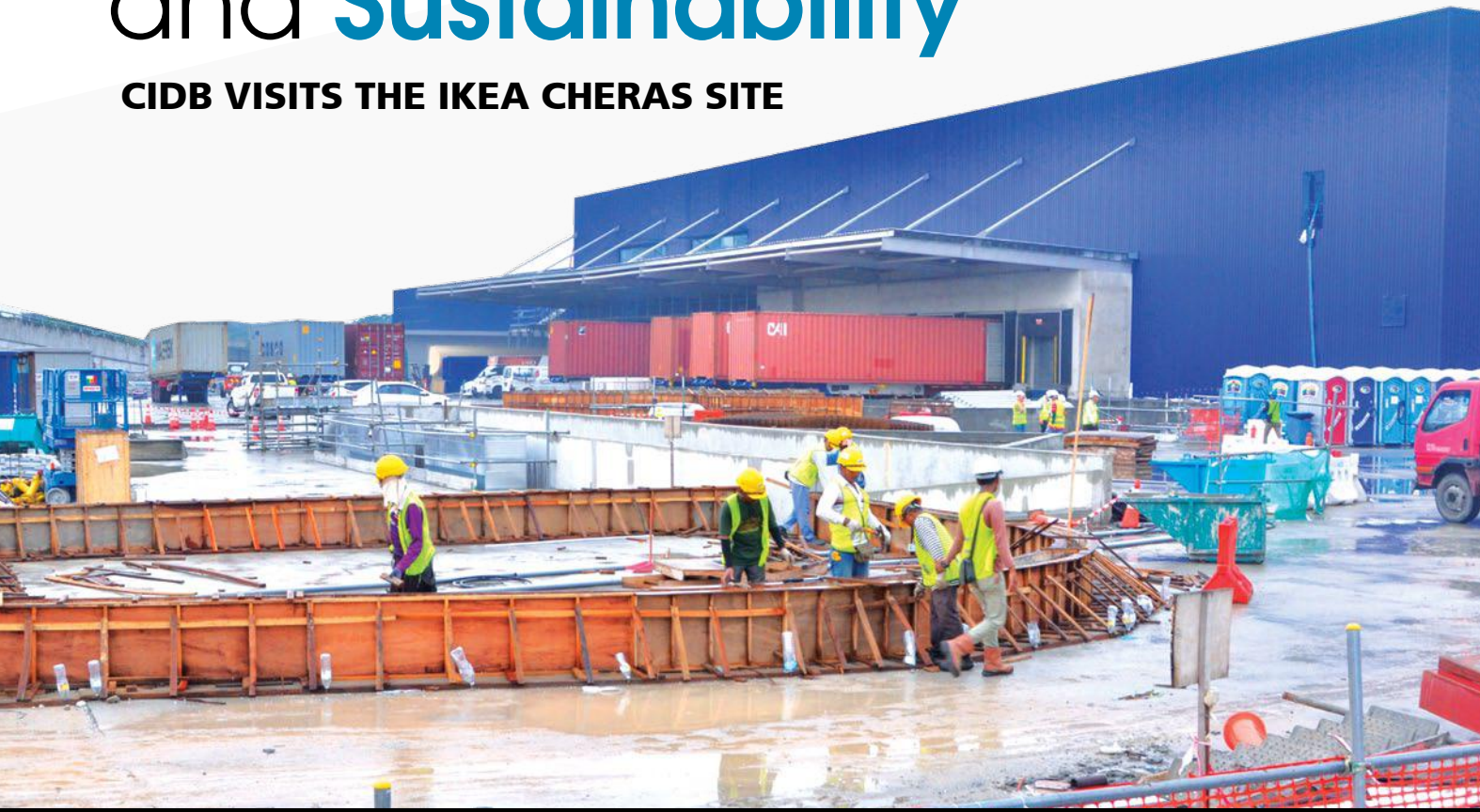
also noted McConnell Dowell's storied history and experience, which goes back as far as the 1960s. As such, the decision to adopt QLASSIC and SHASSIC in the IKEA construction process is a vote of confidence for those two CIDB-developed assessment tools.

Ir Elias was followed to the podium by McConnell Dowell (Malaysia)'s project manager Stephen Tindal, who gave an introduction to the company, as well as to the IKEA Cheras project. After which, McConnell Dowell Southeast Asia's Managing Director Murray Dundas took the stand, where he spoke on how CIDB and McConnell Dowell can share best practices through this collaboration.

The event concluded with the signing of the MoU and an exchange of documents by Dundas and CIDB Holdings CEO Sr Abdul Latif Hitam. More can be read about IKEA Cheras on pg 8 of this issue of *Heights*. ■

An eye on Quality, Safety and Sustainability

CIDB VISITS THE IKEA CHERAS SITE



▲ Located along Jalan Cochrane in Cheras, construction is well underway for the nation's newest IKEA store, which is being erected using Industrialised Building System (IBS).

The CIDB team comprised of officers from the Safety and Quality Division, Corporate Communications Division and CIDB Holdings, a subsidiary of CIDB. The group was subsequently given a quick but thorough glimpse of McConnell Dowell (Malaysia)'s work behind the setting up of the Swedish furniture giant's latest store in Malaysia.

Noah Devanson, one of the two McConnell Dowell (Malaysia) construction managers of the project spoke about standards in practice at the site, pointing out that they comply with

CIDB's Quality Assessment System in Construction (QLASSIC) and Safety and Health Assessment System in Construction (SHASSIC). "During this project, 67 local contractors were trained to work with high standards of quality and safety so they meet QLASSIC and SHASSIC criteria," he disclosed.

The second construction manager, Thomas Gill, then provided an insight on the green aspect of the build. According to him, there are certain sustainability targets that have to be met during construction. "This includes waste management, where we have to recycle a minimum of 80% of the project waste," he explained. Concrete, steel, timber and general waste are separated and recyclable material extracted from them.

Additionally, there is a clean air policy which maintains the air quality in the building. This, Gill said, not only ensures that the workers breathe clean air, but also eliminates the chance of construction dust and debris lingering within the building once it is opened. "We achieve this by attaching plastic sheeting that separate incomplete sections from the completed ones, thus creating a seal in between the two," he revealed. Low volatile organic compounds in the glues and paints also drastically reduce the risk of harmful chemicals being released into the air.

In keeping with the sustainability theme, a large amount of the construction materials was obtained locally. "50% of all the material used in the project was sourced within 500 kilometres from the site, which encourages local industry and saves on energy consumption for transportation," Gill elaborated. "We even managed to procure the iconic blue paint, which is the trademark

"As observed in this scene at the IKEA site, among the fundamental SHASSIC requirements to which these workers have to adhere is the use of personal protective equipment such as helmets, safety goggles and reflective vests."

colour of an IKEA building, from a local source."

Just like the furniture that is offered for sale in its showrooms, the IKEA building started off as a collection of pre-fabricated pieces that were carted to the Cheras site. Known as Industrialised Building System (IBS), this construction method slashes months off conventional project timelines. "We source our IBS components from a Malaysian company that specialises in precast elements, and assemble the segments on-site," Devanson stated. "We started erecting the building in late 2014, and we anticipate a 12-month timeline to completion. A similarly-sized building constructed the traditional way may take 18 to 20 months to finish."

The CIDB team was then taken for a site tour, following the lead of the two construction managers, who proclaimed that although similar in layout with its 12-year-old Mutiara Damansara sibling, the new IKEA store is 20% larger and employs mechanical, electrical as well as heating, ventilation and air-conditioning (HVAC) systems that are more up-to-date. This, as well as a rainwater harvesting system, will help conserve energy consumption during its operation.

In the course of the tour, Gill and Devanson took turns drawing the visitors' attention to the various aspects of construction practices in use, particularly those pertaining to QLASSIC and SHASSIC, and entertained the CIDB team's questions and observations. ■

Noah Devanson (left) and Thomas Gill (right), the construction managers on duty at the site, ensure that the build progresses smoothly without running afoul of the strict CIDB's QLASSIC and SHASSIC standards. ▼



BIM for the Future

NATIONAL BUILDING INFORMATION MODELING (BIM) DAY 2015

On the 7th of September 2015, Deputy Works Minister Datuk Rosnah Abdul Rashid Shirlin officiated the opening of the *National Building Information Modeling (BIM) Day 2015*, at the Tun Dr Ismail Hall in Putra World Trade Centre. The event, themed *Cradle to Cradle Construction Through Building Information Modeling*, was held by the Construction Industry Development Board of Malaysia (CIDB) to promote BIM as one of its new emerging technologies to improve cost efficiency and reduce wastage. This event was held in conjunction with the *International Construction Week (ICW)*, which ran from the 7th to the 11th of September 2015.

In the opening remarks addressed on behalf of Works Minister Datuk Sri Fadillah Yusof, Datuk Rosnah expressed confidence for BIM to become an important enabler and tool for optimising the efficiency of the construction industry and related sectors.

Datuk Rosnah also expressed the need for Malaysia's construction industry to embrace such game-changing and innovative technologies to ensure that it remains ahead and successfully keeps pace with its competition. She added that a major challenge faced by the industry today was to constantly maintain its relevance in terms of capability and capacity, and that it was important for it to improve in terms of quality and productivity.

Deputy Works Minister, Datuk Rosnah Abdul Rashid Shirlin (second from left), launching the *National BIM Day 2015* event. Also present are (from left to right): CIDB CEO Dato' Sri Ir Dr Judin Bin Abd Karim, CIDB Senior General Manager of Technology Ir Elias Ismail, and Public Works Department Senior Director Ir Mohd Daud Harun.

Deputy Works Minister, Datuk Rosnah Abdul Rashid Shirlin, reading the opening address by on behalf of Works Minister, Datuk Sri Fadillah Yusof.



"This is where BIM, which is arguably the most significant integrated digital technology used globally, can play a crucial role in the delivery of major construction and infrastructure projects," she explained, adding that the construction industry generally employs technology in isolation, unlike BIM which employs technology in collaboration.

Delegates at the Tun Dr Ismail Hall, during the presentation by CIDB Senior Manager of Construction IT, Mohd Harris Mohd Ismail.



The Deputy Works Minister also acknowledged the need for a centralised platform to deliver BIM-related information, services, and training courses, due to the exponential increase in demand for BIM talents. Datuk Rosnah expressed confidence that CIDB would be able to meet the requirements and expectations of Malaysia's construction industry, through strategic collaboration with relevant government agencies and other supporting partners.

Separately, in a press conference held at the same venue, CIDB Chief Executive Officer Dato' Sri Ir Dr Judin Bin Abdul Karim affirmed the need for Malaysia's construction industry to invest in both software and human capital training to implement BIM in their projects. He added, "We are in talks with Master Builders Association Malaysia (MBAM) and Malaysian Institute of Architects (PAM) to set up a centre of excellence for BIM."

Deputy Works Minister, Datuk Rosnah Abdul Rashid Shirlin, during the press conference. Also present are (from left to right): CIDB CEO Dato' Sri Ir Dr Judin Bin Abdul Karim, Public Works Department Senior Director Ir Hj Mohd Daud Harun, and CIDB Senior Manager of Construction IT, Mohd Harris Mohd Ismail.



Dato' Sri Ir Dr Judin also explained that the centre would be set up to promote and encourage construction companies to participate in BIM and to bring down the cost of BIM software through the use of a shared-cost concept. ■



The International Construction Week 2015

SOUTHEAST ASIA'S BEST

Construction is one of the drivers of the Malaysian economy – and has been identified as an enabler and catalyst for the National Key Economic Areas (NKEAs) under the Economic Transformation Programme (ETP). It was therefore apt that Malaysia should play host to the largest construction event in the region – the *International Construction Week (ICW) 2015*. Held at Putra World Trade Centre from the 7th to 11th of September, it brought together government officials, industry leaders, academics and students of construction and related industries from across Southeast Asia.

(From left to right) CIDB Chief Executive Dato' Sri Ir Judin Abdul Karim, Deputy Works Minister Datuk Roshnah Abdul Rashid Shirlin, Works Minister Datuk Seri Fadillah Yusof, Prime Minister Datuk Seri Najib, and Secretary-General of the Ministry of Works Datuk Zohari Akob, at the launch of the CITP.

Co-organised by the Construction Industry Development Board (CIDB) and UBM Asia, and themed *Building A Greener Future*, the opening ceremony of ICW 2015 took place on the 10th of September, with Prime Minister Datuk Seri Najib Tun Razak as the guest of honour.

Also present were the Minister of Works Datuk Seri Fadillah Yusof, Deputy Minister of Works Datuk Roshnah Abdul Rashid Shirlin, the Secretary-General of the Ministry of Works Datuk Zohari Akob, the Director-General of the Public Works Department Datuk Ir Adanan Mohamed Hussain, and CIDB Chief Executive Dato' Sri Ir Dr Judin Abdul Karim.

Giving the opening address, Datuk Seri Fadillah thanked Prime Minister Datuk Seri Najib for agreeing to officiate the launch of ICW, noting that "It is an honour for the construction industry" and that it reflects the importance of the sector for the country.

The position of the industry was reaffirmed by Datuk Seri Najib in his keynote address where he acknowledged it achieving "an astounding average growth of 11.1% over five years, which surpasses the performance of all other economic sectors in the country." Additionally, construction was responsible for RM102 billion worth of projects in 2011 and that figure grew to RM157 billion in 2014.

As such, the Prime Minister is optimistic that construction will be a key sector under the recently initiated

11th Malaysia Plan, which he noted is the final leg towards becoming a high-income nation by the year 2020.

In order for the industry to do so, a direction has to be set. Hence, aside from officiating the opening of ICW 2015, the Prime Minister also concurrently launched the *Construction Industry Transformation Programme (CITP)* which laid down the strategy for the sector from 2016 to 2020.

Describing it as a "comprehensive implementation plan," Datuk Seri Najib revealed that the CITP has 18 initiatives and four strategic thrusts. These are Quality Safety and Professionalism (QSP), Environment Sustainability, Productivity and Internationalisation, and "seeking to transform and improve the public

and international image of the industry."

Already steps to implement the CITP are taking place. As highlighted by the Prime Minister, these include the setting up of a Centre of Excellence for Sustainable Construction, the streamlining of industry training, and the establishment of a specialist apprenticeship programme.

Furthermore, the transformation plan also seeks to increase the utilisation of industrialised building systems among builders in the country. This, Datuk Seri Najib noted, will be a development which, "together with the use of other technologies already available, as well as, a healthy dose of innovation, will place Malaysia's construction industry in good stead to achieve continuous growth whilst providing a good

CIDB Chief Executive Dato' Sri Ir Dr Judin Abdul Karim with compere Raymond Goh, and Raja, the digital tiger whom Datuk Seri Ir Judin 'brought' on stage with him as he showcased the proudest milestones in Malaysian construction.



foundation for (our) construction players to expand internationally.”

Malaysia's Crowning Achievements

The opening gambit followed Datuk Seri Najib's address. In a stunning display of augmented reality using digital 3D models – including a Malayan tiger named Raja – CIDB Chief Executive Dato' Sri Ir Dr Judin Abdul Karim went on to reveal the four construction projects which have made the biggest positive impact on the industry and the economy as a whole.

These are the KL International Airport – one of the busiest airports in the

region and a key gateway to the country, the Petronas Twin Towers – the world's tallest twin towers which have become an international symbol of Malaysia, the Penang Bridge – one of the longest bridges in Southeast Asia and a mark of engineering excellence, and the Bintulu Oil and Gas Complex – a key player in establishing the country as an oil and gas hub.

Although, Dato' Sri Ir Dr Judin 'unveiled' four, there are actually five key projects. Datuk Seri Najib was invited back on stage to flag it off, and it was none other than the Klang Valley Mass Rapid Transit (KV MRT) project, which – when completed – will enhance transportation across Malaysia's main urban hub.



▲ Students from the Malaysian Building Academies show off their projects

And with that quick yet informative and engaging run-through of the past, present and future triumphs of the Malaysian construction sector, *International Construction Week 2015* was launched. ■

INSIDE ICW

ICW 2015 combined several different events under one umbrella. The main component *Ecobuild Southeast Asia*, which was held from the 9th to the 11th of September, and comprised an exhibition, a showcase and seminars.

These seminars, which were free-to-attend for all visitors, were divided into three categories – Building, Infrastructure, and Energy & Power – and presented by experts in their field. Among some of the topics discussed were Building Information Management (BIM), productivity in the Malaysian construction sector, and creating links between the industry and universities.

Aside from the free seminars, there were also the main conference sessions, where industry players gathered to discuss pertinent matters related to the construction sector. Among these were the *National BIM Day 2015* organised by the CIDB, the *2nd AWAM International Conference in Civil Engineering 2015* by Universiti Sains Malaysia, and the *1st ASEAN Construction Summit*, which was jointly hosted by the CIDB and the Masters Builders Association of Malaysia.

Also held concurrently with *Ecobuild Southeast Asia* were other events touching on other aspects of the construction industry, such as *Greenbuild Asia*, *Ecolight Asia*, *Solar Asia Expo*, the *Construction Showcase* and the *Malaysian International IBS Exhibition*.

In addition, the Malaysian External Trade Development Corporation (MATRADE) organised business-matching meetings between Malaysian construction firms and potential clients from Europe, Australasia, Africa, the Middle East, South Asia and Asean.

A similar event was organised by the EU-Malaysia Chamber of Commerce and Industry (EUMCCI) together with other European chambers of commerce in the country for European construction and engineering SMEs to meet with would-be partners from Malaysia.

MCIEA Catalyses Malaysia's Construction Industry

BEST OF THE BEST



◀ Minister of Works, Dato' Sri Fadillah Yusof presents the Malaysian Construction Industry Excellence Awards to (clockwise from top) IJM Construction Sdn Bhd for *Builder of the Year* (received by Managing Director Liew Hau Seng.); Ar Tan Pei Ing of PI Architect for *Construction Leading Lady*, Tan Sri Datuk Eddy Chen of MKH Berhad for *CEO of the Year*, and Dato' Dr Ar Kenneth Yeang King Mun of TR Hamzah and Yeang Sdn Bhd for the *Prominent Player Award*.

One of the most important sectors of the Malaysian economy, the construction industry is a cornerstone of the country's economic development, outperforming other sectors in the last five years, with an average annual growth of 11.1%, accounting for 4.5% of domestic growth and employing up to 8% of the workforce. To ensure the continued improvement of the sector, the Malaysian government has implemented a number of initiatives, including the recently released *Construction Industry Transformation Programme* (CITP), a 5-year enhancement roadmap to enhance the industry and the players. It is these companies and individuals who contribute to the overall growth of the industry that the *Malaysian Construction Industry Excellence Awards* (MCIEA) aims to recognise.

According to the Construction Industry Development Board (CIDB), organiser of the annual event that was first held in 2000, the MCIEA aims to “recognise construction industry players that have demonstrated excellence in improving, and enhancing the image and performance of the industry.” In addition, the awards provide companies and individuals with a platform for healthy competition, in the quest for excellence in the entire sector.

Fair Play

On the 11th of September 2015, construction industry players converged at the Mandarin Oriental Hotel Kuala Lumpur for the 15th iteration of the MCIEA, where 21 companies and individuals were given the prestigious awards under six main categories: *Best Contractor*, *Best Project*, *International Achievement*, *Special*, *Individual*, and *Builder of the Year Awards*. The event—the longest running and most distinguished recognition of excellence in Malaysia’s

construction industry—was attended by a number of dignitaries, including Minister of Works, Datuk Seri Fadillah Yusof; Secretary General of the Ministry of Works, Datuk Sri Zohari Akob; and the Chief Executive of CIDB, Dato’ Sri Ir Dr Judin Abdul Karim.

Divided into two categories (Infrastructure and Building), the awardees are selected based on a number of factors, such as concept, design, and planning, as well as safety and health practices, workmanship and quality of construction works. To ensure that industry players are on a level playing field, nominees (by the public) are made to compete with others in the same grade—determined by a number of criteria, including their paid up capital and net capital worth.

The Industry’s Finest

Winners of the *Best Contractor Awards* from Grade 1 to 6 were Double R Enterprise, Permata Bactris Enterprise, Straits Electrical, Golden Channel Services,

Mamidor Reka Bina and Putra Sentosa Enterprise.

The *Best Project Awards* are further divided into three categories each under Infrastructure and Building, Small (for projects under RM20 million), Medium (between RM20 million and RM100 million) and Major (for developments over RM100 million). While there were no recipients in the Small and Medium Infrastructure category, BAM Malaysia, McConnell Dowell (Malaysia), See Yong & Son Construction and UEM Builders Berhad were named the winners in the Major Infrastructure development category.

On the other end, Paramount Property Construction received the award in the Small Building Project tier, Damaikon took the Medium Building Project award and Kiara Teratai-IJM JV, got the Major Building Project award.

Other highlights of the MCIEA include the recognition of Gamuda

Engineering with the *International Achievement Award* (for a number of milestones, such as developing the world’s first Tunnelling Training Academy to enhance the skills of young Malaysians). Dato’ Dr Kenneth Yeang, TR Hamzah and Yeang Principal was also accorded the highly coveted *Prominent Player Award* (for more than 25 years of contribution to industry advancement). Even as the construction industry is seen as male-dominated, the MCIEA side-stepped the stereotype to acknowledge Ar Tan Pei Ing, PI Architects Managing Director with the *Construction Leading Lady Award* as a major female influencer and developer in the construction sector.

Marking the climax of the event was the announcement of the winners of the two most respected awards, *CEO of the Year* and *Builder of the Year*. The first went to Tan Sri Eddy Chen while the latter went to IJM Construction. The CEO of the Year is selected based on their strategic management of their organisations and contribution to the advancement of the country’s construction industry.

Even as the Malaysian economy goes through tumultuous times, the construction industry continues to maintain its performance. In recognising the organisations and individuals that have helped and are contributing to the growth of the construction industry, the CIDB through the MCIEA aims to attract increased beneficial input into the industry to ensure continued advancement, through quality and excellence.

Awards & Winners

THE BEST CONTRACTOR AWARDS

Grade G1 Double R Enterprise
Grade G2 Permata Bactris Enterprise
Grade G3 Straits Electrical Sdn. Bhd.
Grade G4 Golden Channel Services Sdn. Bhd.
Grade G5 Mamidor Reka Bina Sdn. Bhd.
Grade G6 Putra Sentosa Enterprise

Special Mention

Grade 1 Hadiah General Trading

THE BEST PROJECT AWARDS

Infrastructure

Major Project (Above RM100 million)

BAM Malaysia Sdn Bhd, McConnell Dowell (Malaysia) Sdn Bhd, and See Yong & Son Construction Sdn Bhd

Project: Vale Malaysia Manufacturing Project - EPC Main Jetty Phase 1A

Major Project (Above RM100 million)

UEM Builders Berhad

Project: The Second Penang Bridge Package 2, Pulau Pinang

Special Mention

Major Project (Above RM100 million)

MMC-Gamuda Joint Venture Sdn Bhd

Project: The Ipoh – Padang Besar Electrified Double Track

Building

Small Project (Below RM20 million)

Paramount Property Construction Sdn. Bhd

Project: Chengal House of Sejati Residences, Cyberjaya

Medium Project (RM20 million - RM100 million)

Damaikon Sdn Bhd

Project: Giant Panda Conservation and Exhibition Centre, Zoo Negara

Major Project (Above RM100 million)

Kiara Teratai-IJM JV

Project: National Cancer Institute, Putrajaya

INTERNATIONAL ACHIEVEMENT AWARDS

Gamuda Engineering Sdn Bhd

Special Mention

Scomi Engineering Bhd
Pestech Sdn Bhd

SPECIAL AWARDS

Green Construction

Paramount Property Construction Sdn Bhd

Project: Chengal House of Sejati Residences, Cyberjaya

Industrialised Building System (IBS)

UEM Builders Berhad

Project: Student Accomodations of Kolej Yayasan UEM, Lembah Beringin, Selangor

Innovation

LRC TECH (M) Sdn Bhd

Project: Vacuum Compaction Concrete (VCC)

INDIVIDUAL AWARDS

CEO of the Year Award

Tan Sri Datuk Eddy Chen, MKH Berhad

Construction Leading Lady

Ar Tan Pei Ing, PI Architect

Prominent Player Award

Dato’ Dr Ar Kenneth Yeang King Mun
TR Hamzah and Yeang Sdn Bhd

BUILDER OF THE YEAR AWARD

Grade 7 IJM Construction Sdn Bhd



▲ Members of the IJM team celebrating IJM Construction Sdn Bhd being named Builder of the Year at the MCIEA 2015.

Paving the Road Ahead

CIDB'S PIONEERS



20 years ago, a group of pioneers reported for duty with a newly-founded organisation – the *Construction Industry Development Board* of Malaysia (CIDB). Their task was to improve Malaysia's construction industry, which was in need of proper regulation.

Despite the challenges faced during the early years, they persevered, and saw CIDB through its growth. Once a small organisation with only twenty staff, CIDB has now become an efficient and credible regulator of the construction industry, with over 700 staff, and several subsidiaries and training academies across Malaysia.

Of the original 20 staff who became the pioneers of CIDB throughout its growth, eight of them still remain with the board. In celebration of CIDB's 20th anniversary, Heights spoke with these pioneers to share their stories of CIDB's growth.

▲ CIDB signed its first Memorandum of Understanding (MoU) with Standards and Industrial Research Institute of Malaysia (SIRIM) on the 9th January 1996. In attendance were then SIRIM Director-General Tan Sri Ahmad Tajuddin Ali (left), then Minister of Works Tan Sri S. Samy Vellu (second from left), and then Chief Executive of CIDB Datuk Abdul Rahman Abdullah (right).

CIDB was officially established in July 1994, by the Ministry of Works (*Kementerian Kerja Raya* - KKR), through the Cabinet Committee on Skilled Workers. The quantity surveying department of the Public Works Department (*Jabatan Kerja Raya* - JKR), then the secretariat of the Committee, was tasked to look into the



▲ Then Chief Executive of CIDB Datuk Abdul Rahman Abdullah (left, front) during the first MOU signed between CIDB and SIRIM.

establishment of what was to become CIDB.

"One of the recommendations under the Cabinet Committee was to address the issue of skilled workers and to have a body that would provide skills training to workers. That's how I became involved in CIDB from the very beginning, even before 1994 when the CIDB Act was enacted in December," said Sr Sariah Abdul Karib, Senior General Manager, Business and Corporate Sector, who was working in JKR's quantity surveying department during that time. She added that plans to establish the CIDB went as far back as 1992.

"We then went to Hong Kong to learn about how they operated their training centre. That's how we came up with the idea of collecting levies, which is what Hong Kong did," she explained. At the time, the Malaysian government did not wish to increase its expenditure by creating a new organisation, and by allowing CIDB to collect levies, it became a self-financing organisation.

A Challenging Road

Besides financial challenges, the other initial challenges faced by CIDB included

staff recruitment, regulations, and the scheme of service, notably to establish CIDB as a separate scheme from the government. There were other challenges as well.

"We neither had a proper office, nor equipment such as personal computers, typewriters, and stationery. Therefore, we had to borrow these items from our friends in the Public Works Department (JKR) at that time, so that we could do our work," said Suhaimi Arifin, Senior Assistant Manager, Facilities Department, sharing his experience from his first month on the job. "Later on, we moved to the 19th floor of the Putra World Trade Centre (PWTC), and began buying equipment. It was still a struggle for us, as we had to rely on our own transportation to conduct our business affairs."

"We didn't even have enough tables and to use the phone, we had to walk to Telekom Malaysia to make calls. In those days, there were no mobile phones like the ones we have today. Instead, we only had the giant brick phones," explained Misbah Rembum, Senior Manager, Contractor Registration, recounting his experiences.



“The Government said, ‘If you want to have a new organization, be self-financing!’ So we had to look into everything – the regulations and the financing. We had to prepare the scheme of service, get the office, and staff it, and there were only two of us at that time.”

– Sr Sariah Abdul Karib
Senior General Manager

“After CIDB was established, the construction industry is now well taken of and industry players have a one-stop centre to refer to matters pertaining to the industry.”

– Baharuddin Itam Karib,
Senior Administrative Assistant



“I had the opportunity to assist my former boss, who was one of the first general managers, in handling road shows,” said Zahanim Mohd Zain, Administrative Assistant, sharing her experiences during the earliest years of CIDB’s inception. “At that time, not many people knew about us and we were responsible for creating awareness of the existence of CIDB and its functions,” she added.

Despite these challenges, and only 20 employees initially, everyone in CIDB worked as a team. “It didn’t matter what it was – training, registration – everybody was working on everything. All of us were very close,” explained Sr Sariah.

Baharuddin Itam Karib, Senior Administrative Assistant, agreed. “The tough times we faced together in setting up this organisation made us closer to each other, because there were not a lot of us back then,” he said. “Sometimes, during the toughest times, we would feel satisfied and proud when we achieved our aims.”

Fuziah Mohd Saat, Administrative Assistant, Finance Department, first joined CIDB as a typist for the contractor registration department in 1995. “In the early days, we had to work together to get things done, especially with regards to the contractor registrations,” she noted. “In those days, we had to

multitask as there was a lot of work to do. In fact, my boss had to sign each registration letter individually!”

Getting on Track

CIDB then expanded six months later, as it began recruiting more people into its ranks, including 20 personnel from the JKR. Those who demonstrated tremendous professionalism were favoured highly by CIDB, according to Sr Sariah, who added that high standards and good quality were two other important recruitment criteria.

“After that we moved to Subang Jaya, as we wanted a lot of space for

exhibitions. But we had to move when the building we occupied was to be demolished,” explained Sr Sariah. CIDB then moved to the Grand Seasons Hotel in Kuala Lumpur, and it was not until 2012 that CIDB eventually moved back to the PWTC.

One of the most memorable experiences shared by the pioneers was the events that occurred during the final day of contractor registration. Prior to the introduction of Act 520 in 1994 – the Act that made contractor registration mandatory – Malaysia’s construction industry did not have a proper set of guidelines to follow. After the Act was introduced, contractors scrambled to register.

“On that day, there were so many contractors, from all over Malaysia, who turned up to register because CIDB only had one office then. They pushed and shoved their way to get into the office until even the door to the counters was broken!” said Misbah. Sathasivan a/l Manim, Administrative Assistant, was

not spared from the chaos either. “The contractors were quite aggressive back then, up to the point that they pulled and tore my shirt off as they hastened to register,” he said.

The police were eventually called in to restore order, due to the considerable

“Nowadays, CIDB is coming up with more stringent regulations for compliance by the industry players, and new training and opportunities.”

– Zahanim Mohd Zain,
Administrative Assistant



number of contractors that came for registration on that day. Nevertheless, according to Sr Sariah, the incident showed that the contractors were eager to adhere to the new regulation.

As a result of both CIDB’s inception and the implementation of Act 520,

▼ The first International Construction Week (ICW) in 1996 was the first event handled by CIDB. Giving the opening address was the then Chief Executive of CIDB Datuk Abdul Rahman Abdullah.





“Discipline is important. It’s not easy to do someone else’s work, but it has to be done. Work is constant, as there’s always something to do and people will keep coming in with things to do.”

– Fuziah Mohd Saat,
Administrative Assistant,
Finance Department

“Events such as the International Construction Week (ICW) provide industry players an opportunity to create awareness, especially among the youth, about job options available in the industry.”

– Sathasivan all Manim,
Administrative Assistant



Malaysia’s construction industry has become much more structured than it once was. CIDB continues to improve the industry, in terms of contractors, workers, material standards, payment, safety and other important areas, and has become a one-stop centre for all information pertaining to the industry. Additionally, CIDB continues to cultivate and enhance both new and existing construction personnel with vital skills for the industry, through its training arm, the Construction Academy of Malaysia (Akademi Binaan Malaysia, or ABM), as well as its other training programmes and events such as the International Construction Week (ICW).

For some of the original pioneers, working at CIDB has also been a learning experience in and of itself. In the case of Suhaimi, formerly from KKR and an introvert when he first joined CIDB, he became far more confident in himself and in his abilities. “After five years of service, I wanted to move back to KKR

as I wanted to continue my studies. However, CIDB refused to let me go and instead promoted me from Assistant Manager to Senior Assistant Manager, which made me feel appreciated,” he noted. His former boss also helped Suhaimi become an ABM trainer, which boosted his confidence as well.

Through the efforts of these pioneers, and many more like them, CIDB has grown into the organisation it is today. As CIDB celebrates its 20th anniversary, it is important to remember that these people laid the groundwork for many others to follow. ■

Building the Industry

TAILORED ENHANCEMENT PROGRAMMES AT THE MALAYSIAN CONSTRUCTION ACADEMY

The construction industry is one of the country’s most resilient sectors, and is expected to continue to register double-digit growth in 2015. According to the Construction Industry Development Board (CIDB), productivity in the sector is expected to increase 2.5 times to US\$16,500 (RM70,997 at current prices) per worker by 2020. This continued strong advancement is on the back of massive government and private projects across the country. To achieve this however, the industry needs human capital. This is where CIDB’s *Akademi Binaan Malaysia* - ABM (Malaysian Construction Academy) comes in.

CIDB is tasked with developing and enhancing the quality and productivity of Malaysia’s construction industry, and it does this through encouraging innovation, professionalism, and imparting knowledge via skills training to build human capital resources. This is done through the agency’s training arm, ABM, which was established in 1997 as a centre to provide training and assessment to create and enhance skilled construction workers.

Wide Reach

To ensure maximum impact, ABM targets three primary groups of participants: school leavers and youth above 16, personnel already involved in the industry, and contractors looking to improve their skills. The centre also accepts unskilled, semi-skilled and skilled local and international construction workers and participants. Malaysian students are sponsored fully by CIDB, while foreigners are required to pay fees.

Although the construction industry encompasses a wide range of

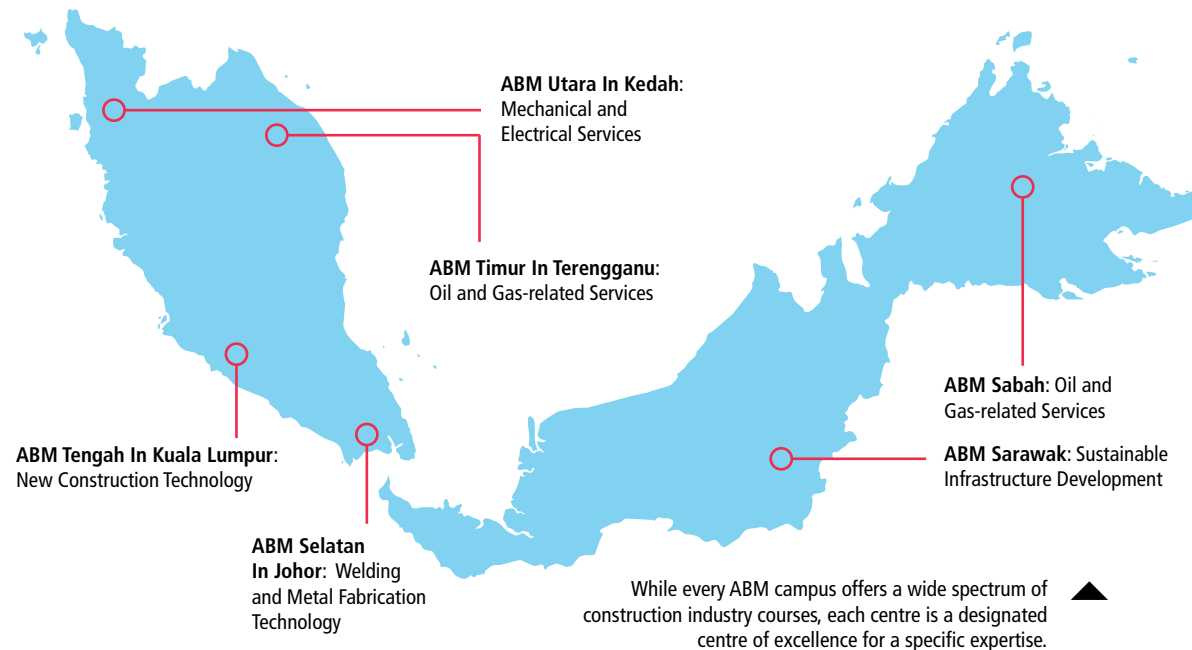


Shahrul Zaimir Nor Zamberi (left), Habitat Technician and graduate of the ABM Eastern Malaysia monitors a welding procedure. ▲

disciplines—from engineering and plumbing to plant operations and wiring—ABM identifies and trains participants in strategic subsectors that are essential to the advancement of the industry. These include building works, architectural drafting, mechanical, civil and electrical works, painting, industrial building systems and welding. Others are non-

destructive testing, crane operations, blasting, and many more.

The courses offered are structured to the group participating. For instance, school-leavers and young people between 18 and 35 years old who do not have experience in the construction sector start with the Youth Training Programme. The course



is designed to equip the students with theoretical knowledge and understanding, as well as practical skills. Meanwhile, two courses, the Accreditation Programme and the Construction Personnel Programme, are tailored to certify and meet the requirements of existing industry workers respectively. In addition, ABM offers customised programmes and courses on health and safety.

Hand-on Experience

With the understanding that the construction industry is one that requires a hands-on approach, CIDB created the training modules used by ABM based on the National Occupational Skills Standards, which is commensurate with international skills standards. The modules are also reviewed constantly to ensure that students learn useful skills and the training centres are equipped with laboratories and simulators to allow participants have a real-world experience of the industry.

More than simulators however, ABM's six campuses—Johor Baru, Kedah, Kota Kinabalu, Kuching, Kuala Berang and Kuala Lumpur—are strategically located in major geographical regions and areas with high concentration of construction activities. In addition, the centre maintains high-impact collaborations with a number of industry partners, including certification and e-learning organisations, product and material manufacturers, and technology

providers. These include PETRONAS, Lafarge, Public Works Department, Sime Darby Industrial and FELDA.

Delivering Results

As at 2014, ABM had certified more than 100,000 workers in various specialisations in the construction industry. However, one of the most promising sectors in the

► Chief Operation Officer of ABM Eastern Region, Maliki Endut.



◀ Jamali Aziz, (fourth from left) graduated from the ABM Eastern Malaysia's Steel Structure Installation, Erection and Fabrication (STF1) programme in 2005 and is currently employed in the oil and gas-based construction sector.

constraints and had to resolve to petty jobs before commencing the 3-month ABM programme. Currently, he is employed in oil and gas-related construction, which he notes has massive potential.

Concurring, Shahrul Zaimir Nor Zamberi—an ABM East Malaysia graduate who is currently a Habitat Technician in the oil and gas sector—explained that his responsibilities include oil rig regulation and installation. In addition, he noted that Habitat Technicians help ensure that welding works are implemented in a clean, safe and hazard free manner to avoid shutting-down the platform or operation.

oil and gas industry. According to Chief Operation Officer of ABM Eastern Region, Maliki Endut, the full-time Youth Training Programme has produced 18,510 workers between 1999 and 2015, 7,404 of whom were involved in the oil and gas sector in fields such as gas pipe fitting and welding.

Meanwhile, 29,076 participants have gone through the 1-day Assessment or Skill Test Programme between 2002 and this year, with 11,630 of them involved in the oil and gas field. "The 5 to 10-day Construction Personnel Programme has produced around 28,786 skilled personnel between 1998 and 2015. 40% or 11,514 of whom were from the oil and gas field," Maliki said.

A graduate of ABM Eastern Region, in 2005 Jamali Aziz was trained and certified with a *Sijil Kecekapan Kemahiran - SKK* (Skill

Competency Certificate) in Steel Structure Installation, Erection and Fabrication (STF1). Jamali revealed that he was unable to further his conventional studies after the *Sijil Pelajaran Malaysia - SPM* (Malaysian Certificate of Education) examination due to financial

Underlining a commitment to produce industry-ready workers to help advance the industry and reduce its dependency on foreign labour, ABM trainers have themselves undergone rigorous training, with experience in the industry to ensure that they are qualified to transfer knowledge and share their experience. The learning process comprises about 40% of theoretical and simulated training, while the 60% of the time is spent acquiring field experience. To mark the completion of the programme, successful students and participants receive the ABM Certificate of Achievement and the CIDB Certificate of Competency. ■

Dato' Dr Ar Ken Yeang

PRIME MOVER IN GREEN ARCHITECTURE AND SUSTAINABLE CONSTRUCTION

An architect by profession, Dato' Dr Ar Ken Yeang of T.R.Hamzah & Yeang, is also an ecologist and author, well-known for his signature eco-architecture and eco-masterplans. A pioneer of ecology-based green design and master-planning, with experience in the field since 1971, he is internationally recognised as a leading proponent of ecological design and architecture. In 2008, The Guardian named him as one of the "50 People Who Could Save the Planet." His 2011 book, *Eco-Architecture: The Work of Ken Yeang*, is a definitive showcase of his work over the course of four decades. In 2015, he received a Prominent Player Award during the *Malaysian Construction Industry Excellence Awards* (MCIEA) 2015. In light of these achievements, **Heights** speaks with Dato' Dr Ar Ken Yeang to get his insights as a **Prime Mover** in the field of Green Architecture.

Please tell us more about yourself and how you came to pursue architecture as a profession.

"I was four years old when my father took me to visit a construction site in Penang, where he was building a house for my mother. While I was there, I saw the setting-up of timber formwork and steel reinforcements, and concrete being poured. After that experience, I wanted to make big things, like buildings.

When I was 12, I left Malaysia and attended boarding school in Cheltenham College in the United

Kingdom which was the norm in the family. While I was in London, I met three of my uncles, who were architects by profession. I became inspired by them to become an architect, instead of becoming a doctor like my father.

I followed the footsteps of one of my uncles, who went to London's Architectural Association School of Architecture, which back then, was regarded as the best design school

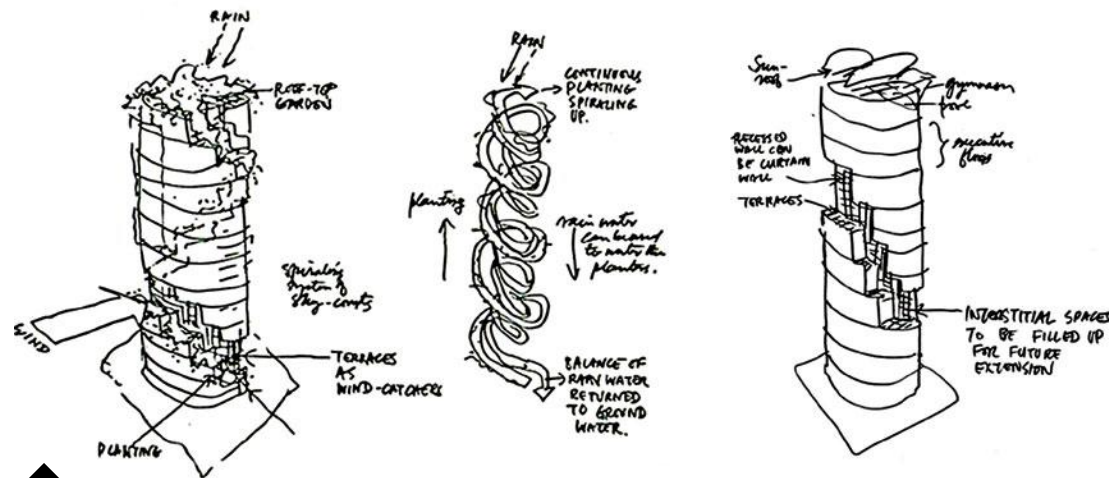


in the world. I completed my course requirements early in four and half years. I then managed to use the remainder of the educational grant money from the Camden local authority to pursue a doctorate at Cambridge University."

What is a Green Architect and how is it different from being a conventional architect? Why did you decide to concentrate on it as a discipline?

"A Green Architect designs to bio-integrate his designed systems, physically and systemically, with the natural environment in a seamless and benign way. The conventional architect, on the other hand, designs and builds without considering the ecological impact of his built systems on the natural environment. Most architects do have some consideration for the environment, but they tend to have incomplete or partial ecological knowledge, or are not environmentally comprehensive enough in their approach.

My motivation for Green Design stems from a sense of conscience for the consequences of society's activities on the natural environment. I researched and wrote my dissertation at Cambridge University on the theory and practice of ecological design and planning. This, afterwards, became my life's agenda."



Initial sketches of what would later become the Mesiniaga building. Dato' Dr Ar Ken Yeang designed this building for IBM in 1989, which serves as their headquarters. The Mesiniaga building was completed in 1992, and was Dato' Dr Yeang's first bioclimatic high-rise building.

How popular or widespread is Green Architecture in Malaysia?

DiGi Technology Operation Centre, located in Subang High Tech Park, Shah Alam, Malaysia. The data centre, designed by Dato' Dr Ar Ken Yeang and completed in July 2010, houses a rainwater harvesting system to irrigate its surrounding vegetation, a vegetated green wall to provide natural air filtration and thermal performance, and an array of photovoltaic panels to provide solar energy to offset its energy-intensive demands.

"Green Architecture is quite popular, not just in Malaysia, but worldwide. Ask any architect today, Malaysian or not, and you will find that just about every one of them will claim that they are able to perform green and sustainable Green Architecture. In actuality, however, while many of them are indeed capable of doing so, most of them are ecologically inadequate and merely able to achieve a greater or lesser extent of authenticity to the tenets of Green Architecture."

What are some examples of Green Architecture processes? What projects, which you have worked on, use such processes?

"Green Architecture is the designing to bio-integrate several important aspects into a whole system. The first aspect is our human acts and activities, including our societal laws and regulations. The next aspect is our human-built environment, which consists of everything that we build, make and grow. This includes our use of energy, our energy systems, and our use of materials and natural resources. Finally, our management of the hydrology of our built environment, and our activities, form one of the other important aspects to green architecture.

We design with these principles in all our projects. Some of our latest buildings include the Solaris in Singapore, the DiGi Data Centre in Kuala Lumpur, the Great Ormond Street Children's Hospital Extension in the UK, the Spire Edge Tower in Gurgaon, India, and the Precinct 2C5 Office and Retail Complex in Putrajaya, Malaysia."



Solaris, located in central Singapore's One-North research and business park. The 15-storey office building, designed by Dato' Dr Ar Ken Yeang, received the BCA Green Mark Platinum certification, the highest possible green certification granted by the Singapore Building Control Authority, and sports a climate-responsive façade that reduces external heat transfer, as well as a rainwater harvesting system that provides irrigation for its vegetated areas.

What do you see to be the major trends of Green Architecture in Malaysia and globally?

"One of the next major development directions lies in seeking better bio-integration of the organic with the inorganic in our built environment. Other possible trends lie in the increased use of renewable energy and resources through new systems, such as artificial photosynthesis. There is also a need for a nation-wide materials and waste management system, engineered towards net reuse and recycling.

Designing to enhance biodiversity, designing for reuse, recycling and bio-integration, net zero energy design, net water, and net waste are some of the other major trends that will propel green architecture forward."

Would you care to share your thoughts on the Construction Industry Transformation Programme (CITP), particularly the area of sustainable construction? And what should be done, from an architecture point of view, to help in its realization?

"What has been achieved thus far is excellent. I hope it will encourage more architects to be increasingly authentically green and to design and build more ultra-green systems and structures. However, we need to teach ecology to students of architecture and to re-educate existing architects in ecology. By doing this, we will be able to achieve more in this vital area."

Indeed, as Dato' Dr Ar Ken Yeang has pointed out, much can be done to improve the adoption of green and sustainable architecture in Malaysia. However, there are two important things for aspiring or existing green architects today. First, they must continuously pursue knowledge to constantly improve themselves and their projects. Second, they must build in harmony with Earth's ecosystems, its biosphere and its natural resources to ensure the future of successive generations. ■

Greening the Industry

CITP AND SUSTAINABLE CONSTRUCTION

Malaysia's ambitions of becoming a developed nation by the year 2020 is not a goal that will be achieved in a vacuum. Instead, it requires the participation of key industrial sectors, and the construction industry is one of those. Currently contributing 4% to the GDP, it is targeted to make up 5.5% by 2020. In order to bring about these and other aims, the government has formulated the *Construction Industry Transformation Programme 2016 – 2020 (CITP)*. A five-year action plan, the CITP is geared at driving the Malaysian construction sector into being world-class, particularly in four strategic areas – quality, safety and professionalism; environmental sustainability; productivity; and internationalisation.

Aside from its direct impact on the economy, the construction sector also has an effect on 120 other industries and is responsible for employing 1.2 million workers or 9.5% of the total workforce – not just blue-collared site workers, but also engineers, architects and surveyors. In fact, 75% of those working in construction are Malaysians.

As part of the last leg on the race towards Vision 2020, the 11th Malaysia Plan has placed particular

emphasis on a number of high-impact construction and engineering projects. These include the Klang Valley mass rapid transit line (KV MRT), the light rail transit line (LRT) extension, the Pan-Borneo Highway, and the Pengerang Integrated Petroleum Complex, to name a few.

These projects are expected to make a significant and positive mark on the economy. However, there is also



concern over the environmental cost of such projects, as high-intensity construction work will require the usage of a lot of materials and generate even more waste as well as emissions of greenhouse gases.

Since not proceeding with the projects is out of the question, the best solution is to focus on ways to enhance the construction industry and methods, so that the environmental impact is kept to a minimum or even eliminated.

Further driving this is the pledge made by Prime Minister Datuk Seri Najib

Tun Razak at the 2009 UN Climate Change Conference in Copenhagen that Malaysia will reduce its carbon emissions by 40% of 2005 levels by the year 2020.

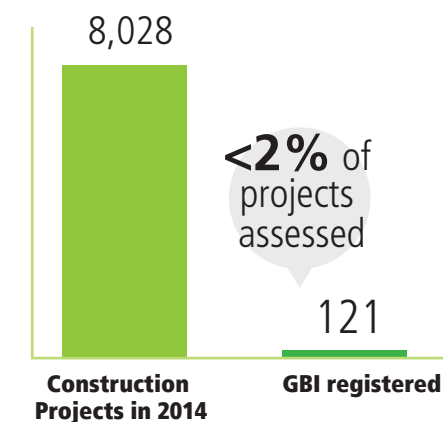
Identifying Challenges

The CITP's Environmental Sustainability thrust has been formulated to take the Malaysian construction industry from a situation where inefficient and wasteful practices are common, to one with an environmentally-sustainable model that will be emulated by emerging markets.

Lack of Sustainability Assessment Practices

Low adoption of sustainability rating

Local projects registered for GBI rating



According to the Construction Industry Transformation Programme (CITP), the lack of assessment programmes for sustainable construction has contributed to the slow take-up of green practices in the country.

Source: The Construction Industry Transformation Programme (CITP) 2016 – 2020

A Company's Perspective

Ramesh Subramaniam, Senior Manager (Quality System), IJM Construction



Being one of the largest construction firms in the country, IJM Construction has a substantial role to play in encouraging sustainability in the construction sector. Heights speaks to Ramesh Subramaniam, the Senior Manager (Quality System) at IJM to learn more about the company's efforts in the drive for sustainability.

Could you highlight some of the sustainable practices in use by IJM?

The company is highly committed to environmental sustainability. For starters, we have adopted ISO 14001,

which is an international standard for environmental management. We have been ISO 14001 certified since 2006. Therefore, it is a must to have this standard system implemented in all our construction sites, where it serves as a guide to engage in good environmental and sustainable practices.

Additionally, we also have an in-house project environmental plan, consulted to deal with issues such as construction and demolition waste management, where all site refuse and waste is segregated prior to being sent through proper channels of disposal. This plan mirrors the waste

management template produced by CIDB, and is also highlighted in their Construction Industry Transformation Programme (CITP) 2016-2020. The government agency's recommendations are widely employed within IJM, as we have pledged to conform to CIDB's sustainable measures, spelled out in the CITP, to further enhance our environmentally-friendly practices.

IJM has an extensive knowledge-sharing relationship with CIDB, and has worked with the agency to draft up sustainability tools such as Malaysian Carbon Reduction and Environmental Sustainability (MyCREST), which assesses and rates the carbon footprint of projects and Envision, which is a sustainable infrastructure rating system. Other CIDB tools such as Quality Assessment System in Construction (QLASSIC) and Safety and Health Assessment System in Construction (SHASSIC) are also familiar acronyms in IJM.

Looking at things from the design stage, we use Building Information Modelling (BIM) to detect anomaly in the engineering drawings, thus helping to weed out possible defects. This will lessen wastage as it removes the need to preform re-working activities down the line to address the problem. Constructing by utilising the Industrialised Building System (IBS) is also something we are pursuing, as it reduces time and energy that needs to be invested in a project.

Aside from that, we believe that social obligation plays a part in sustainability. Being a construction company, we have to ensure that our obligation to the office employee and field workers is taken care

of. If we fail to uphold their well-being, they will cease to perform satisfactorily. For example, we strive to provide the best facilities possible for our workers at the sites, be it accommodation, food canteens or proper lavatories. We remind the contractors we engage to do the same as well.

What were the challenges in implementing such processes and how were they overcome?

The greatest challenge, in my view, is creating awareness and acceptance of these practices at all levels. This effort requires people not only to believe it in, but also be passionate about it. It is not so much the case of the company's direction or vision, rather it is the inclusiveness of the people in moving towards sustainable practices. We can come up with systems and policies, but if we can't win the participation of the masses, it will be lost in futility. It is the sustainable mind-set that needs to be incorporated among the crowd.

One way to overcome this is to include sustainable teachings in the young, mainly through education, whether at school or at home. Impress upon them the importance of these practices, and they will carry it with them to a later age, and into the corporate world once they reach working age.

On average, how much has IJM gained from carrying out such practices?

Financially, we estimate around 1 to 2% savings in cost with our waste management system alone, but personally I think the real gain is in the favourable reputation we are building for ourselves, as we are being increasingly viewed as a company that infuses sustainability in its practices.

Environmental sustainability calls for compliance with environmentally sustainable practices in order to showcase Malaysia as a low carbon, sustainable building and infrastructure hub. Irresponsible dumping of construction and demolition waste as well as damage and repair expenditure after natural disasters are key issues to be addressed.

– The Construction Industry Transformation Programme (CITP) 2016 – 2020

Three main obstacles towards greater sustainability in construction have been identified. For instance, there is a lack of sustainable construction processes and materials. In addition, buildings in Malaysia have high levels of carbon emissions and energy usage, as well as huge volumes of waste from construction and demolitions.

Expanding further on the challenges, the CITP noted that owing to the lack of policies and regulations, sustainability in Malaysian buildings and infrastructure is very low. To illustrate, less than 2% of buildings in the country undergo assessments for sustainability, and there is a dearth of rating tools for buildings, while infrastructure does not even have any.

Furthermore, there are no initiatives or requirements for projects to hire contractors with environmental management standards, such as ISO 14000 certification. This is also reflected in the fact that very few construction companies – namely 150 out of 66,000 – are certified ISO-14000 compliant.

The CITP notes that because of this, sustainable materials and processes are not used. This has resulted in buildings and infrastructure unable to withstand natural calamities such as floods and heavy rains, which are most common in Malaysia. This leads to further construction and more waste, which is – as aforementioned – a worrisome problem in the Malaysian construction sector.

Setting Solutions

To address these problems, five initiatives have been proposed which seek to:

- 1** Drive innovation in sustainable construction
- 2** Drive compliance to environmental sustainability ratings and requirements
- 3** Focus on public projects to lead the charge on sustainable practices
- 4** Facilitate industry adoption of sustainable practices
- 5** Reduce irresponsible waste during construction

Under initiative 1, there are plans to set up a Centre of Excellence (CoE) for Sustainable Construction, which will be tasked with developing, promoting and implementing sustainability in construction. In addition, this Centre will also offer training and leadership development programmes for such disciplines for the construction industry.

According to CIDB's Senior General Manager for the Management Sector Ir Elias Ismail, the CoE will, "improve long-term economic sustainability, social sustainability by preserving required resources for the society, and environmental sustainability by protecting natural functions and the ecosystem."

"The CoE will also promote and pilot the application of the Envision rating system, which was developed by a joint collaboration between Zofnass Program for Sustainable Infrastructure at Harvard University Graduate School of Design and the Institute for

Sustainable Infrastructure, and adapted for Malaysia," he explained.

This is in line with the aims of 2 initiative which recommends the development of infrastructure sustainability ratings. In addition, it calls for efforts to be taken to encourage the adoption and use of sustainability rating tools such as the Green Building Initiative (GBI) and MyCREST, as well as making it mandatory for large public projects to undergo ratings.

Speaking about initiative 3, Ir Elias revealed that the CIDB is setting up a working group to define the sustainability requirements of public buildings and infrastructure, as well as conduct a study to set the baseline CO₂ emissions of such structures.

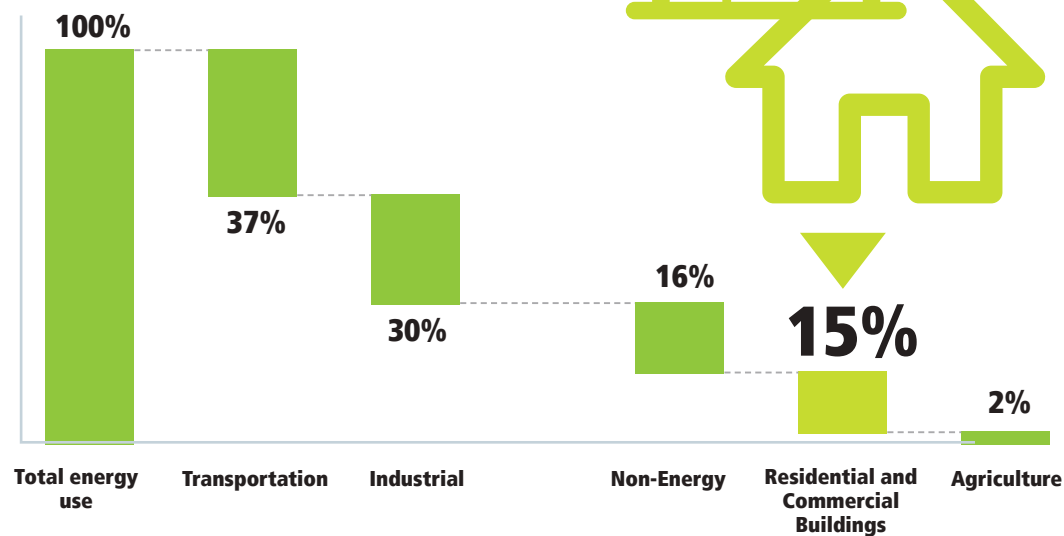
Setting these specifications will also allow the construction industry regulator to carry out training for consultants, contractors and



Buildings are one of the biggest users of energy (see graph below). However, sustainable construction practices can help reduce and eliminate this, for example the Energy Commission of Malaysia's Diamond Building was designed and built with materials that help reduce demand for electricity.

Buildings in Malaysia are a Key Consumer of Energy (2012)

Percentage of total energy use by sector, 2012



Source: The Construction Industry Transformation Programme (CITP) 2016 – 2020

developers on these new requirements. This is part of initiative 4, and aside from training and accreditation, the CIDB is also setting up a working group to formulate incentives for construction stakeholders to adopt these requirements.

Last but not least, in order to reduce the amount of construction waste, the CIDB will be carrying out a study to "determine the baseline of landfill waste generated by the construction industry." Also in the works are efforts to amend policy so that recycled material can be used for construction.

Overcoming Obstacles

The CIDB recognises that there are challenges ahead. For instance, Ir Elias highlighted that the four main obstacles anticipated are, "The lack of awareness because of little commitment from the key stakeholder, the lack of consistent policy direction, the lack of leadership leading to poor or no implementation, and the lack of understanding about sustainability."

Elaborating, Ir Elias pointed out that there are times when contractors

and other stakeholders have the misconception that being sustainable is expensive, leading to them thinking that they cannot afford to implement such initiatives.

Incidentally, the CIDB has been actively promoting one process which can significantly reduce construction cost and waste, namely Industrial Building Systems (IBS) – better known as prefabrication outside Malaysia. In fact, the Ministry of Finance issued a circular in 2008 stating that public sector construction projects valued above RM10 million must have at least 70% IBS content.

Ir Elias revealed that the private sector may also be roped in. For instance, private projects valued over RM10 million in the Klang Valley may be required to have 50% IBS content, and this requirement will then be extended to the rest of the country.

Aside from that, other incentives are being mooted to encourage more construction stakeholders to take up IBS. These include the lifting on import duties for machinery and heavy equipment for projects using IBS and extending loans to IBS contractors.

The CITP aims to have every large infrastructure and building projects in the country exceed sustainability requirements and to reduce carbon emissions by an equivalent of 4 Mt (million metric tonnes) of CO₂ per year. This will not only enhance the construction sector in Malaysia, but also free up funds that can be allocated to other uses. Going Green in construction is no longer an option, it is a must that will contribute to the long-term future and viability of both the industry and the country as a whole. ■

SO YOU WANT TO BE... A LANDSCAPE ARCHITECT

In our bid to encourage more interest in the construction sector among students, **Heights** showcases professionals in various fields related to the construction sector – from architects to engineers, from project managers to site inspectors. Taking readers behind the scenes to find out more about what working in the construction and other related fields, we speak with **Mohamad Ekhsan Che Ros** on being a **Landscape Architect**.

A graduate of Universiti Teknologi MARA (UiTM), Ekhsan was invited by the CIDB to further his studies at one of the *Akademi Binaan Malaysia* (ABM – Malaysian Construction Academies) after his SPM (Malaysian school leaving certificate). It was during this time that he came across a documentary on landscaping, which piqued his interest in the subject.

After a six-month certification course in landscape construction at the ABM, he then pursued a diploma at UiTM Perak, followed by a degree in landscape architecture at UiTM Shah Alam. Having graduated in early 2015, Ekhsan has been working as a full-time landscape architect while also running his own design-and-build consultancy.

For Ekhsan, his passion for landscape architecture stems from his belief



▲ Mohamad Ekhsan Che Ros believes that landscape architecture is the profession of the future and notes that the landscape architect has to come first for any project to succeed.

that, “we need more greenery in our landscape and we need to learn how to sustain the environment.” As he explained, the discipline involves responsibility for the design, planning and management of landscapes and, achieving balance between the natural and built environment.

Promoting Sustainability

With so much focus being placed on sustainability, it is worth noting that landscape architecture plays a major role in the greening of the construction sector, and effective landscape architecture can help reduce long-term costs.

For instance, if roads and sidewalks are paved using materials that reduce heat, then the surrounding buildings can cut down on their cooling overheads. Similarly, trees can act as a natural canopy against sunlight; as such they too can help insulate buildings against the heat.

Landscape architects also help ensure that public amenities are fully utilised as they are involved in the planning or zoning of a development. For instance, a township may offer both residential and retail facilities, and it



▼ Ekhsan's sketches of his award-winning final year project to revitalise the community living near Sungai Banjar in Perak, by using the river as a focal point for a residential development.

“Aside from taking on more projects and gaining experience, I intend to be certified as a Chartered Landscape Architect (CLR), which will mark me reaching the top of the profession.”

is up to the landscape architect to decide where to place them.

If they are too close to each other, then the people staying in the residences will experience the inconvenience of heavy commercial traffic near their homes. On the flip side, if the homes are too far from the shops, not only will that be bothersome to both residents and retailers, it also increases the carbon footprint because people will need to drive a longer distance.

Landscape architecture is therefore both an art and a science, requiring a fine balance of both. Interestingly, Ekhsan revealed that in many other countries, the landscape architect has to have first look at any project before the other pieces can fall into place. This is because he is the one who sets the basic template for the development, as he is required to calculate the risks and benefits of the project up to a 5km radius of its outskirts.

That being said, such a practice is not common in Malaysia. Here landscape architects might be called in only towards the end of the development and construction phase. For Ekhsan, this approach is inefficient because by then, it is usually too late to make any significant changes to reduce costs and/or increase sustainability.

Working Experience

Steps are being taken to change that though, spearheaded by the Institute of Landscape Architects Malaysia (ILAM), which is the professional association for the industry in the country. Incidentally, Ekhsan himself is



An artist impression of the Miri Theme Park which is being designed by Ekhsan. As can be seen, the role of the landscape architect also involves input into buildings.

a recipient of an award from ILAM for his final year project at UiTM, where he conceptualised the revival of the Banjar riverfront off the coast of Perak.

This plan calls for the development of a township in the vicinity while using the river itself as a centre-point of activity, including water taxis and floating markets. As Ekhsan explained, this is very much in line with the role the river played in the past.

Other projects in which he is also involved are the planning of a theme park in Miri, Sarawak; as well as one

for ASTRO to help the broadcaster reflect their corporate identity through their headquarters. In addition, Ekhsan has also been involved in several build-and-design projects for homeowners.

In terms of career development, Ekhsan explained that being a recent graduate, he still has some way to go in his professional life. Aside from taking on more projects and gaining experience, he is also aiming to further his studies and be certified as a Chartered Landscape Architect (CLR), which will mark him at the top tier of the profession.

Ultimately, for Mohamad Ekhsan Che Ros, landscape architecture is the profession of the future. As space becomes more limited and the urge to find a balance between our natural heritage and our development needs increases, it is there and then that landscape architects will come to the fore, making use of space in the best way possible. ■

A DAY IN THE LIFE

What is the work of a landscape architect like on a daily basis?

It really depends on whether you are focused mainly on the private or public sector. In the private sector, the hours are longer and the responsibility is greater because you work closer with the project owner. So on any given day, you might see yourself managing different projects of various sizes, going to meetings, planning out the details, and a typical week might take up 50 to 70 hours. It is important to manage your time, stay on track and keep within the budget.

Things are less hectic in the public sector, mostly because the budget is usually not as strictly set as it is in the private sector. However, the landscape architect still has to deliver, although the working week is shorter, around 40 to 50 hours.

Both are responsible for creating the landscape around us, which means planning, designing and managing both the natural and built environments. So on a typical day, you might be doing several different things such as meeting with clients to establish landscape requirements, assessing a site's potential, coordinating with manufacturers and suppliers, preparing plans and drawings using tools such as computer-aided design.

What advice do you have for anyone who wants to be a landscape architect?

The most important thing is that you have to be sure that this is the right career for you. If you like working with your hands, appreciate the natural environment, or just like to plan out landscape, then this is the choice for you. It is also good to want to create a better future, because this really the profession of tomorrow.

Whether you want to focus on the design aspects of landscape or you are more into the ecological and scientific aspects, it is always good to have some experience of the field before you start. So, an internship with an established landscape architecture firm will give valuable experience.

How much can a fresh graduate expect to earn as a landscape architect?

The basic starting salary is around RM2,000 a month, although some fresh graduates can earn up to RM3,000. With experience, a landscape architect can command a salary of more than RM6,000. But of course, it all depends on the employer and other factors.

MATERIALS AND TECHNOLOGIES OF INNOVATIVE SUSTAINABILITY

Sustainable or Green Construction refers to the use of processes that are environmentally responsible and resource efficient throughout a building's life cycle. In other words, sustainable construction aims to reduce the overall impact of building construction against the natural environment, through more efficient use of the natural environment's resources.

Several systems play a crucial part in effective sustainable construction. Heat and temperature regulation assists in the reduction of energy needed to cool down or warm up a building. Retention of resources, such as clean water or energy, allows these resources to be used later on, when necessary. Additionally, using environmentally-friendly building materials can reduce both the cost and energy needed during construction of a building, as some of these materials require less energy to produce, therefore reducing their overall impact on the natural environment. A rather interesting example that applies all these systems is the first Heliotrope house, built by Rolf Disch, a German architect, solar energy pioneer and environmental activist.

Cooler Buildings

In 1994, Disch designed and built a very unusual home for himself in his hometown of Freiburg – the very first Heliotrope building, which physically rotates with the movement of the sun

to maximize sunlight and natural heat use. Aside from being able to rotate with the sun, the Heliotrope house also possesses several different energy generation modules, including a 56 m² dual-axis solar photovoltaic tracking panel, a geothermal heat exchanger, a combined heat and power unit (CHP) and solar-thermal balcony railings to provide heat and warm water.

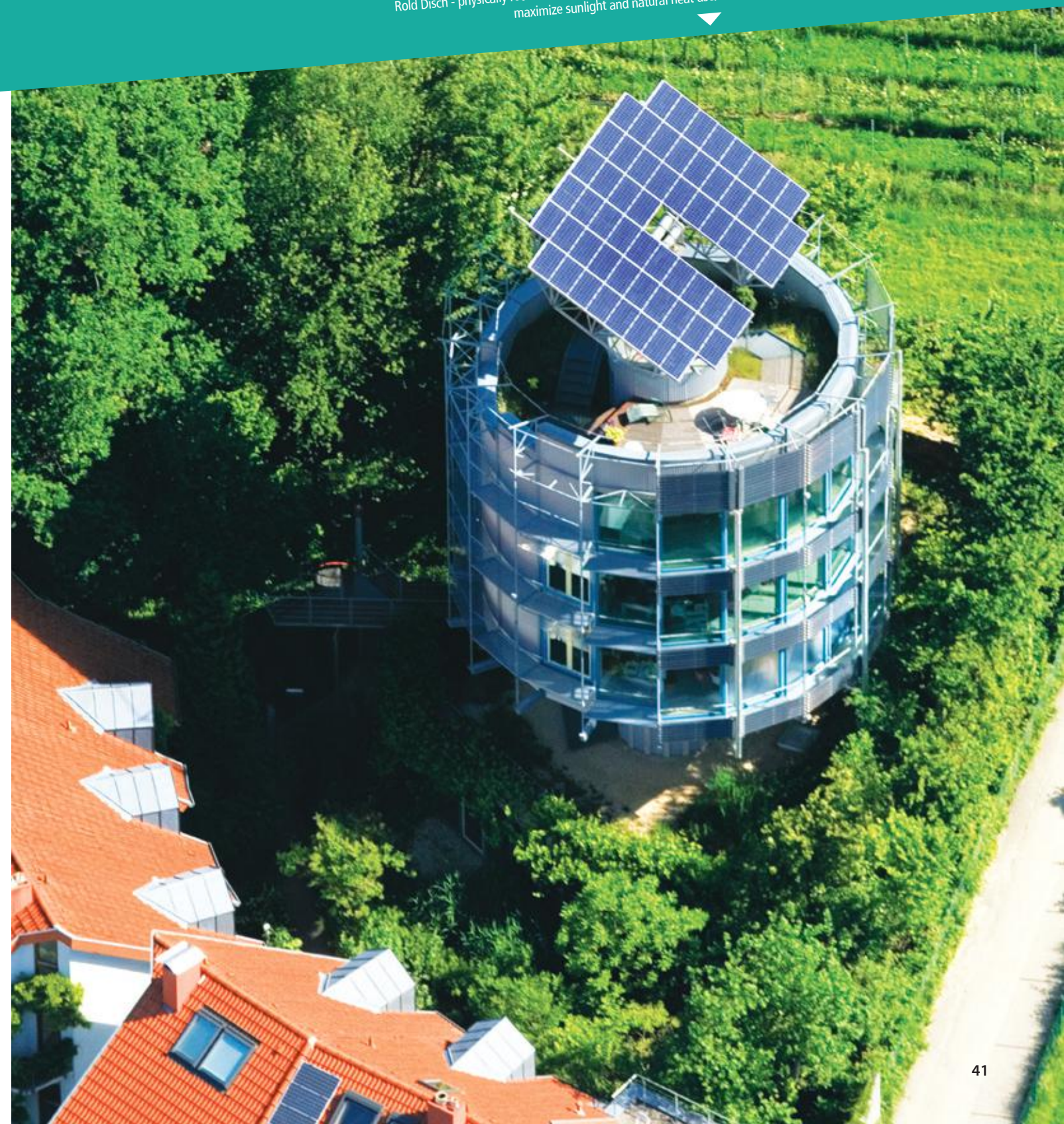
These innovations, in combination with the superior insulation of the residence itself, allow the Heliotrope to produce about four to six times its energy usage, depending on the time of year. It is also the first building worldwide to have a positive energy balance, which means that it generates more energy than it uses, and is an excellent example of sustainable construction.

Cool roofs help to keep buildings cool by reflecting sunlight and by emitting absorbed heat. One of the easiest ways to achieve this is by painting roofing surfaces white, as light surfaces absorb less solar radiation than dark surfaces. However, it is possible to use special

reflective paint, or specially-painted roofing materials, to achieve the same effect without sacrificing aesthetics. Alternatively, using roofing materials such as stainless steel and aluminium accomplishes the same effect.

Geothermal heating, ventilation and air-conditioning (HVAC) systems transfer heat to and from an underground geothermal system, which typically consists of an indoor handling unit and a buried system of pipes called an earth loop. In colder climates, fluid circulated through the earth loop absorbs stored heat from the earth and brings it indoors, where it is compressed to a higher temperature by the indoor handling unit and distributed throughout a building. In hotter climates, the indoor handling unit pulls heat from the building and transfers it, via the fluid, through the earth loop, allowing the cooler earth to absorb the heat. If an underground aquifer or other water source is available, it is possible to use the water source to cool the pipes directly.

Located in Freiburg, Germany, the Heliotrope – designed by Rolf Disch – physically rotates with the movement of the sun to maximize sunlight and natural heat use.



Malaysia's Sustainable Options

According to the Construction Industry Transformation Programme (CITP) 2016-2020, Malaysia's buildings and infrastructure have limited adoption of sustainable materials and practices. This is due, in part, to insufficient comprehensive policies and regulations that require buildings to be rated and assessed for environmental sustainability. Additionally, green construction is often perceived to be more expensive than conventional construction. Apart from encouraging compliance to sustainable construction standards, it is important to promote the use of green construction methods as a measure that will provide long-term returns in the future.

One such method, which was once introduced almost 40 years ago, is the Industrialised Building System (IBS), which involves the use of pre-fabricated components and on-site installation. Among the advantages of the IBS process is the minimization of on-site waste and less wastage of construction materials. Further advantages can be acquired through the use of sustainable materials and techniques in the IBS material construction process, which will result in the reduction of the energy required to produce these construction components. For example, by using fly ash as a component in brick manufacturing, the heat required to produce such bricks can be reduced.

Another promising method is the use of geothermal cooling. By transferring heat from a building into an underground geothermal system, it is possible to cool it down without relying on air-conditioning. In turn, this reduces the amount of energy needed to regulate air temperature. Although geothermal cooling has yet to be fully adopted by the Malaysian construction industry, there have been a few studies conducted by local universities on the possibilities of using it. According to a 2014 study, conducted by students of the International Islamic University in collaboration with the University of Reading in the UK, it is possible to reduce a building's temperature by up to 7°C through the use of an earth loop that is buried 1 metre underground.

Zero energy design is one other sustainable construction method. A building that is constructed according to zero-energy design principles takes benefits from the natural environment in various ways. Passive daylighting, for example, optimises the amount of sunlight needed to illuminate a building, while reducing the need for artificial lighting. Natural ventilation, coupled with mechanical cooling means such as fans, can also assist in reducing a building's internal temperature.

The adoption of sustainable construction methods will enhance the Malaysian construction industry in the long run. However, it is important to encourage contractors to comply with sustainable construction standards and use green construction methods, which will ultimately benefit Malaysia in the long run.

Electrochromic smart glass windows change their opacity in response to electrical voltage, which allows for control over the amount of heat and light passing through them. A typical electrochromic glass window consists of two glass panes, with several layers sandwiched in between them. By passing a low-voltage electrical charge across a microscopically-thin coating on the glass's surface, an electrochromic layer activates, which changes the colour of the glass from clear to dark. The electric current can be either activated manually, or through the use of sensors which react to light intensity. Furthermore, an electrochromic smart glass window only requires electricity to change its opacity, but not to maintain a certain shade.

Smart appliances can also play a part in temperature regulation. Such devices, connected to the Internet and the electrical grid, will be able to adjust their energy needs automatically, in accordance with the needs of a building's inhabitants. Smart air-conditioners, for example, can switch themselves on or off depending on whether a person is in a room or not, and can also adjust their temperatures to provide the right amount of cooling without wasting energy.

Stocking Up on Resources

Another important part of sustainable construction is the retention and possible generation of resources, such as clean water and energy. This reduces the impact on the Earth's dwindling resources, and allows for the use of previously retained resources, in times of need.

One useful system is rainwater harvesting. This involves the collection of rainwater from roofs, which can then be treated and stored in reservoirs for future use. An added benefit of rainwater harvesting is that it reduces the risks of soil erosion and flooding, which are caused by the rapid runoff of rainwater from roofs, pavements, and drains. The costs of installing a

rainwater harvesting system may vary according to the size of the rainwater storage tank, and the types of rainwater treatment systems chosen, and if the rainwater is meant for household or industrial use.

However, the initial set-up costs can be mitigated over time, if the rainwater management system is constructed properly. In the case of a two-storey house with a 100 m² roof, a full rainwater recycling reservoir can supply enough water for about 200 toilet flushes and about 30 full washing machine cycles, which would help the average household save considerably on water bills. Furthermore, rainwater may also be consumed as potable water, if it is properly treated.

Solar energy is another valuable resource which can be harvested through the use of solar panels and converted into clean electricity. However, the use of efficiently-constructed solar panels to gather more of the sun's valuable energy is only part of the solution. It is also important to construct effective solar energy retention systems that can store solar energy for future use.

An example of such a system is the Andasol solar power station in Guadix, Spain, where a thermal storage system absorbs the sun's heat and stores it in a molten salt mixture. The stored heat powers a turbine to produce electricity during the evening or overcast days, and a fully loaded storage system contains about 1,010 MWh of heat, which can run the turbine for about 7.5 hours at full load.

Recycling the Green

The use of biodegradable construction materials, such as bamboo, reclaimed lumber, or jute, usually can reduce environmental impact. This is



The Andasol solar power station in Guadix, Spain. Its thermal storage system absorbs the sun's heat and stores it in a molten salt mixture for future use. When the storage system is fully loaded, the stored heat can power a turbine to produce about 7.5 hours of electricity, during the evening or overcast days.

because once such materials are either demolished or become waste materials, they will decay over time if left untreated. However, it is important to ensure that such construction materials do not decay while they are still in use. Ironically, the use of treatments and chemicals to ensure their durability and long life happens to be far less environmentally friendly than the construction materials used. For example, although untreated timber is biodegradable, timber that has been treated with either creosote or chromated copper arsenate (CCA) is considered as hazardous waste and cannot be burnt because of the

poisonous chemicals it could release into the environment.

With that said, however, a few possible options exist for the use of biodegradable construction materials. The first is to live with short life spans for built structures, which is not always acceptable. Another way is to use only durable renewables for structural components, and restrict the use of less durable renewables for components which are more easily replaced, less critical, or both. A third option is to ensure that non-durable materials used in construction are protected from degradation.

In the world of construction, buildings have the capacity to make a major contribution to a more sustainable future for our planet. Sustainable construction materials and technologies, such as the ones mentioned earlier, will be crucial to the construction of more efficient buildings. ■

Accounting for Sustainability



Although it is vigorously encouraged, the introduction of the sustainability ethos in the construction industry has been met by some players with a wary eye. This is because, despite the advantages promoted by advocates in the field – benefits such as lower environmental impact and material savings – there has been a big question mark hovering over the potential savings, if any, of embracing the sustainable mentality. **Heights** explores this subject to establish the economics at play behind the scenes of such a development.

Previously, environmental concerns were not usually on the list of considerations when a construction project was being designed and implemented. However, with increasing weight being granted to the welfare of natural surroundings in recent decades, the implications that conventional methods of construction have towards the environment have been brought ever closer to the forefront.

Designers and builders making use of conventional construction methods rarely concern themselves with employing systems and planning to imbibe a sustainable backbone into the projects, resulting in finished products that lack efficiency during their service life. Eyebrows have also started to rise at issues such as construction waste, including timber, plastic and concrete debris, that have been piling up at countless dump sites. It did not take much sleuthing to discover that the inefficient use of these materials during the building process has been contributing to the excessive waste generated.

Cost Contributors

It is hardly a secret that sustainable construction projects warrant a larger amount of upfront investment compared to conventional ones. As a result, many construction players shy away from dipping a toe in what they assume are uncharted waters.

The dearer cost that scares them away mainly goes towards a higher initial investment, brought about by factors such as more expensive design work – for example, the incorporation of a bespoke heating, ventilation and air conditioning (HVAC) system that complements the building's architecture and therefore more frugal on power, rather than a run-of-the-mill one that has been lifted from another set of blueprints, modified slightly and shoehorned within the building's walls.

Other drivers of this increased early spend include pricier materials, where a higher standard of insulation is required for instance, and financing associated with third-party certification to ensure they are on board with environmental standards. Costs arising from minimising the environmental impact of the construction process – waste management, noise reduction, reducing ramifications on nature – and specific contractual provisions can also result in higher price.

Salient Savings

On the other side of the coin, buildings designed with a high regard to sustainability shine in the medium-to-long run, as reduced operating costs become apparent. This is when the

efficient designs which consume less energy come into play, resulting in a lower life-cycle bill to run and maintain the building.

Looking at the aforementioned example, the HVAC system is responsible for the largest portion of electricity usage in most buildings. Although a conventional setup might be cheaper to design than an energy-sipping system, it will be ill-configured for the building and cool it inefficiently, negating the lower initial investment.

Prudent use of resources, such as reusing materials already available on site wherever possible and managing manpower and machinery to conjure the best possible outcome for productivity at any given time are great practices in the spirit of sustainability during the construction process as they save both cost and time.

Interesting Incentives

Launched in the middle of 2009, the Green Building Index (GBI) became the official green rating tool in the Malaysian construction industry. Tweaked to adapt to the country's warm climate, this rating has helped to put sustainability in the limelight and educate the entities in the industry about its benefits and importance. Six criteria are considered – energy efficiency, indoor environmental

Savings in Time

Datuk Lim Keng Cheng, Managing Director Ekovest



With a portfolio stretching from buildings to highways, Ekovest is a name well-known in the construction sector for its substantial achievements in infrastructure. To find out about the potential savings from applying sustainable practices in the industry, Heights talks to its Managing Director, Datuk Lim Keng Cheng.

What would you say constitutes a sustainable development, and could you detail some of its benefits?

We are no strangers to sustainable developments, having done a few ourselves, and recently pledging to abide by the Construction Industry Transformation Programme (CITP) 2016-2010 set by CIDB. A sustainable development should be energy-efficient, and I believe that the sustainability theme should be instilled in the design state of the project. During this period, considerations should be made to come up with a design that does not consume excessive amounts of energy. If you look at the stats today, Malaysia is rich in resources, with more than sufficient gas, water and electricity to satisfy demand.

The cost of these and other materials are relatively cheap here compared to neighbouring nations in the region, which may encourage a wasteful mindset.

However, down the road, this cost will soar as reserves dwindle. Therefore, designers should not take the liberty of adding, say, provisions for more air-conditioning than is necessary in a building. Instead, the use of other methods such as expelling hot air via smart ventilation-friendly designs reduces the load of the air-conditioning system, and consequently saves energy and operational costs.

Recycling waste material into other parts of the construction is another example of promoting sustainability. For instance, when we were building the Duta-Ulu Klang Expressway (DUKE), we encountered unsuitable soil in some stretches. Instead transporting this unwanted material to a dumpsite, we opted instead to deposit it on the shoulder reserve where the highway runs past populated areas, and plant vegetation on it. Hence, instead of installing metal panels as a traffic noise buffer, a natural sound barrier is created.

Looking at this example, you will find many areas where sustainability is apparent. Firstly, the removal of the need to cart the waste material off-site reduces not only time and energy, but transportation cost and pollution as well. Additionally, the

natural barrier created means there is no need to fabricate metal sheeting – itself a process that consumes substantial amounts of resources and energy – to serve as the panels, further saving on costs for installation.

What is difference in the cost of a sustainable development compared to a conventional one, and are these sustainable measures financially worth the investment in the long term?

I would say that the initial cost for a sustainable development is marginally higher, primarily because its design stage requires more time and financial commitment to execute compared to a conventional development. You cannot simply apply a design from a piece of software and claim that it has sustainable measures ingrained in it, as such software has not been written yet as of today. Most of the sustainable elements have to be incorporated manually.

That being said, these sustainable measures show their worth in the long run, as the savings over time negate the extra outlay. The value engineering imparted in the designs makes them more efficient, which is evident in the careful use of

materials and resources, ultimately resulting in cheaper building and running costs relative to conventional developments. For example, the use of wire-mesh instead of steel bar for reinforcement in terms of material, and the usage of heavy machinery and skilled operators to do the job of multiple general workers.

What sort of government practices would you say would support sustainable development?

In this regard I think it is better if the government encourage a design-and-build approach when awarding contracts, as opposed to conventional tendering. This is because the former would give the full responsibility of the project to the company that the project is given to, which would pare down on the inter-company friction between sub-contractors. As often seen, this would cause the project timeline and cost to balloon as delays and discrepancies between parties set in. Furthermore, if the single company assumes ownership of the project, they will be more inclined to perform the work in best way possible, which is the sustainable way, while keeping costs under budget.

quality, sustainable site planning and management, material resources, water efficiency and innovation.

Following that, in Budget 2010, the government-initiated tax incentives for buildings with GBI certification to boost the adoption of sustainable practices in the sector. These come in the form of exemptions of income tax (on additional capital expenditure to obtain GBI certification) and stamp duty (based on additional cost to obtain GBI certification).

A list of conditions, listed out by the Ministry of Energy, Green

Technology and Water (KeTTHA) need to be met before the exemptions can be claimed. It also has to be noted that the former only applies for building that have been awarded GBI certification between 24th of October 2009 and 31st December 2014, and the latter only for sales and purchase agreements executed within this same period.

In addition to this, the government is in the midst of introducing further impetus to encourage more players to go down this path. In its Construction Industry Transformation Programme (CITP) 2016-2020, the

Construction Industry Development Board (CIDB) advocates that mechanisms and incentives are introduced to spur private stakeholders in the construction sector to espouse environmentally sustainable development.

In the recommendation, these incentives include non-financial, as well as financial incentives which will facilitate the foothold of environmentally conscious development in the country. Strategic thrusts have been identified in order to catalyse this adoption, including defining the types of developments to facilitate

sustainability, outlining the extent of the financial incentives by analysing economic return on investment and designing a disbursement mechanism accordingly.

Examples of successful financial incentives in other parts of the globe include the Green Deal in the United Kingdom and the Brownfield Tax in the United States. In the Green Deal, house buyers have their abodes fitted with energy-saving features such as better insulation, and are billed for the cost in their energy bills. The Brownfield Tax encouraged the clean-up and reuse of brownfields (existing developments) and was in effect between 1997 and 2011.

With a return on investment that outweighs the initial cost and government-based incentives laying to rest worries about the cost implications of environmentally friendly developments, it is now a matter of when, not if, this sustainable movement will be part and parcel of the construction sector in Malaysia. This spells good news for not only the bank balances of stakeholders – from the developer to the end user – but also for the preservation of perhaps the most important resource of all, Mother Nature. ■

Indonesia's Lofty Ambitions



Indonesia. An archipelago consisting of 17,508 islands covering an area of approximately 1.9 million square kilometers and an estimated 2015 population of 255 million people, making it the fourth most populous country in the world. As the 16th largest economy in the world, according to the International Monetary Fund, its size is matched by the lofty ambitions of its President, Joko Widodo, to improve its infrastructure and bring the nation to greater heights of prosperity.

In this issue of **Heights**, we continue our Going Global series with a closer look at Indonesia's construction sector, and the opportunities that it has in store for foreign investors.

Indonesia's Potential

With a workforce population of 118.1 million, and a construction workforce of 6.1 million, Indonesia is poised to become the second most profitable construction market in Asia, behind China, over the medium term. Its capital city, Jakarta, is expected to be the second most profitable construction market in Asia, rivalled only by Singapore. As of 2013, Indonesia's total construction spending is US\$267 billion, and is predicted to grow by 5.2% over the period of 2014 to 2019.

According to a 2012 report by the McKinsey Global Institute, Indonesia's current urbanisation rate of 53% could easily reach 71% in 2030, with an estimated 32 million people expected to move from rural to urban areas between 2010 and 2030. By 2030, an additional 72 million people could live in urban areas, raising the possibility of Jakarta becoming a mega-city of approximately 12 million people.

With this in mind, President Widodo has taken several steps to improve the country's infrastructure. The most notable of these is the reallocation of funds towards Indonesia's infrastructure, following the scrapping of fuel subsidies in early January 2015. Additionally, in March 2015, the President signed two new regulations to address two significant issues: the difficulty in acquiring land for public infrastructure purposes, and the legal

framework needed to support public private partnerships (PPPs).

Under the latter regulation, known as the Presidential Regulation No. 38 of 2015 (PR 38/2015), much newer infrastructure development opportunities for PPPs are now available, including the development of education facilities, sports and art facilities, healthcare and public housing. Furthermore, PR 38/2015 also allows

“We must address shortcomings in infrastructure. When our economy grows more than 7%, I am very confident it will strengthen Indonesia’s role in international forums.”

– Joko Widodo, President of Indonesia



for development of commercial facilities in a PPP project, although specific examples have not yet been revealed at this time.

With this new regulation in place, a new world of opportunities is now open to foreign infrastructure developers who wish to capitalise on Indonesia’s future potential. Nonetheless, it is still crucial to plan ahead to ensure success.

Setting up Shop

Prior to January 2006, foreign investments in Indonesia were subject to a significant amount of paperwork and delays, largely due to the number of government agencies needed to

sign a single business permit. In more recent times, the Capital Investment Coordinating Board (*Badan Koordinasi Penanaman Modal* or *BKPM*) has been streamlining foreign business permit approvals, reducing the amount of time it takes to obtain one.

Generally, Malaysian investors have two options to set up a business entity. The most restrictive of these is the **foreign representative office**, which is more of a liaison office and is prohibited from revenue-generating activities. No paid-up capital is required. The alternative is the **limited liability company (PT PMA)**, which allows for up to 100% foreign ownership and is not restricted from revenue-generating activities. Only a select number of industries allow for foreign investment, the construction industry among them, with certain shareholding restrictions. Furthermore, either a minimum investment of US\$250,000, or US\$100,000 in paid-up capital, is required for set-up.



Published by CIDB, *Doing Business in Indonesia* is a handbook that provides information on the status, opportunities and risks of the Indonesian construction sector, and is available for download on the CIDB website.



The Suramadu Bridge, built by a consortium of Indonesian companies comprised of PT Adhi Karya and PT Waskita Karya working together with China Road and Bridge Corporation and China Harbor Engineering Co. Ltd. The total cost of the project, including connecting roads, has been estimated at US\$445 million. Its construction began in 2003 and was completed in mid-2009.

Involving a local joint venture partner in a PT PMA greatly improves the chances of success in Indonesia’s construction industry, notably due to contacts and local knowledge of the industry. It is crucial, however, to choose the partner carefully based on both business skill and mutual understanding. Additionally, a clearly-written legal agreement will help to mitigate the risks associated with the partnership.

Risks vs Rewards

Although Indonesia has many opportunities for construction firms, a number of serious challenges exist. These have been highlighted in *Doing Business in Indonesia* – a guidebook

produced by the Construction Industry Development Board (CIDB) of Malaysia – and will be explained briefly in this article, along with the actions taken to resolve them.

Insufficient investment in Indonesia’s infrastructure was once a major concern in past years. However, after fuel subsidies were scrapped in January 2015, more funds were allocated towards the Indonesian government’s capital budget of US\$542.8 million this year, and 25% of that amount has already been spent. Furthermore, according to the research agency PricewaterhouseCoopers (PWC) Indonesia, its infrastructure spending is expected to rise from US\$57 billion in 2014 to US\$90 billion in 2019 and US\$139 billion in 2025.

Land acquisition, for the purposes of developing infrastructure, was once hampered by complex procedures caused by a law established in 1960. In 2015, this law was revised a second time following a previous revision in 2012, allowing the Indonesian government to relax land acquisition and financing procedures. Prior to the revision, land acquisition was implemented by various government agencies, but under the new ruling, private developers are now able to acquire land on their own, without needing to wait for reimbursement from the state budget. Furthermore, private developers can now be assigned to work on infrastructure projects, either through a tender

process or under PPPs with the Indonesian government.

Bureaucratic slowdown remains a significant obstacle in Indonesia, and has been responsible for many delays in obtaining business permits and fulfilment of other business transactions. Although the Capital Investment Coordinating Board (BKPM) has helped in some ways, prolonged and concerted efforts by Indonesia’s government are necessary for bureaucratic improvement.

Project financing is another barrier to progress. In the PPP model, it is expected that the Indonesian government would not need to provide financing for a particular project. However, the model does not have a clear revenue collection method to make up for the project’s costs and to provide profit to the private sector. In response to this, Indonesia’s Ministry of Finance drafted a decree for a source of funding known as the Viability Gap Funding Mechanism, which plans to provide funding from the central government to cover up to 40% of a project’s upfront costs and reduce the budget impact for the regional government. Other existing entities that play a role in infrastructure finance include the 100% state-owned Indonesia Infrastructure Guarantee Fund (IIGF), the quasi-independent entity Indonesia Infrastructure Finance (PT IIF), and the 100% state-owned Sarana Multi Infrastruktur (PT SMI).

Regardless of these challenges, and many others that may be lying in wait, President Joko Widodo is courageous enough to bring Indonesia to greater heights, in line with his ambition to make Indonesia the next Asian powerhouse. Malaysian investors must also be courageous and persevere through to the end to achieve success. ■

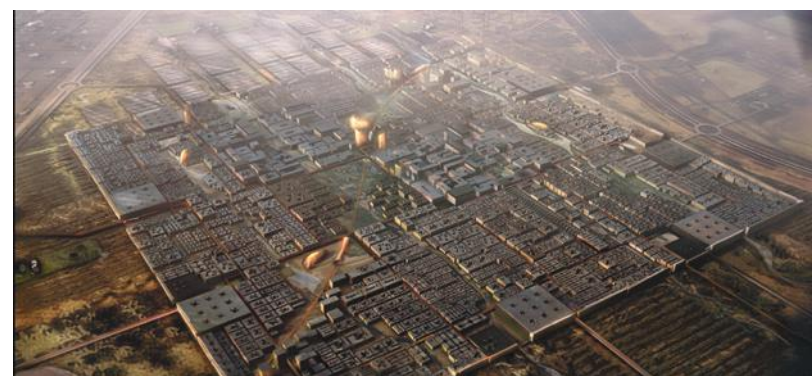
Energy efficiency is increasingly transforming from buzzword to physical manifestations in sustainable developments and infrastructure globally. From Green buildings and cities to environment-friendly road construction: power generating waste management systems to solar photovoltaic plants, this issue of **Heights** highlights ten of the leading sustainable infrastructural projects from around the world that have impacted the construction industry significantly through innovative application of materials and the natural environment.

Top 10 Green Construction Projects

1 Masdar City, United Arab Emirates

Distancing itself from the massive fossil fuel footprint across the Middle East, Masdar City is spread out across 6 km² in Abu Dhabi, UAE and designed to be a zero-carbon, mixed-use municipality project. The city will comprise residential, office and retail, light industry, institutional, R&D, hospitality, and religious buildings, all of which will be powered by a 22-hectare, 87,777-panel solar plant. Other sustainable features of the city include an all-electric transportation system and environment-friendly architecture.

Inside, residents will have the option of commuting via electric-powered cars, Personal Rapid Transit (PRT) and Freight Rapid Transit (FRT). PRTs are driverless pod-like hybrids between cars and trains that can carry up to five persons along an established network of paths, while FRTs (also driverless) are flatbed platforms angled towards moving goods and loads along the network.



Meanwhile, the buildings, conceptualised by British architectural firm Foster and Partners, help cool the streets in the city via a number of designs. These include raising the site above the surrounding land, building a 45-metre wind tower that sucks air from the top and pushes it out from the bottom, and clustering the buildings close together to shield the streets and walkways from direct sunlight. Inside the buildings, the air-cushioned walls reduce the need for air-conditioning, while movement sensors control water and lighting, which have helped save 51% and 55% of respectively according to Masdar authorities.

2 Indira Gandhi International Airport, India

The airport's Terminal 3 was the first in the world to be awarded the Leadership in Energy & Environmental Design (LEED) New Construction Gold certification in 2010. The 501,676m² integrated international and domestic terminal—designed to handle up to 34 million passengers annually—was



built using sustainable construction materials and interior finishes, and features the use of natural lights during the daytime.

Terminal 3 also features 215 electric charging stations, 1,200 energy-efficient LCD screens, while the airport, which is the second biggest in India and the eighth largest in the world, uses battery-powered vehicles to transport passengers between terminals and has more than 300 water harvesting stations and storm drains that control erosion.

3 The Cube, UK

Winner of the *London Evening Standard New Homes Award* for Developments of Outstanding Architectural Merit in 2015, the wood- and steel-based The Cube is the tallest building in Europe to use cross-laminated timber. Featuring a cruciform or twisted cube stack layout, the materials for construction—including the Cross Laminated Timber (CLT) panels and steel elements—were manufactured off-site and assembled on-site to reduce time and energy use. The combination of both materials also ensures that the building achieves a lower carbon emission level than an equivalent concrete structure.

The 6,750m², 49-unit residential building developed by architectural firm Hawkins\Brown, was designed in a way that ensures that every apartment in the building has a stunning panoramic view of the east or the west sides of the building. The significance of The Cube is that it highlights an innovative use of CLT

as a construction material that saves time and has minimal impact on the environment. The design is also important as three external walls of each apartment has access to natural light and ventilation, allowing them to be suitable in hot weather and tropical countries like Malaysia.



4 Advanced Wastewater Treatment Plant, USA

In the US, the District of Columbia (D.C.) Water and Sewer Authority has announced the world's largest waste-to-energy system that converts solid sludge (human waste) into clean, renewable energy. Since it commenced operations in September 2015, the 370 million gallons per day process has been generating 10 megawatts of electricity—enough to supply electricity to one-third of the Wastewater Treatment Plant—as well as reduce emissions by the same amount and save the plant up to US\$10 million (RM43 million) annually in power bills.

An additional US\$2 million (RM 8.6 million) of savings annually will be seen from reduced purchase of treatment chemicals, while US\$11 million (RM 47.3 million) will be recovered from trucking expenses. Prior to the development of the D.C. Water's Blue Plains Advanced Wastewater Treatment Plant, sewage had to be carried 120.7km in 60 truckloads to farms in another city.

The system, which was built by Norwegian manufacturer Cambi AS, uses a process called thermal hydrolysis that combines extreme high temperatures and pressure to heat the solid waste after enormous centrifuges spin off the water. The solids are then fed into four anaerobic digesters—3.8 million-gallon, 80-foot concrete cylinders—where microbial organisms convert the organic matter into methane gas, which is captured and pushed into three jet-sized turbine engines to produce renewable power.



5 Kurilpa Bridge, Australia

Initially known as the Tank Street Bridge, Brisbane's Kurilpa Bridge takes advantage of the city's more than 2,800 hours of sunshine. The 470-metre long pedestrian and bicycle bridge connects Kurilpa Point in South Brisbane to Tank Street in the Brisbane central business district and is the world's largest hybrid tensegrity bridge, with two large viewing and relaxation platforms, two rest areas, and a full-length all-weather canopy for the entire length of the bridge. It also features a sophisticated LED lighting system, which can be programmed to produce different lighting effects.

These LEDs are powered by solar panels installed along the structure

that provide between 75% and 100% of the electricity that the lighting system needs at night. The extra power will be pushed to the main grid,

estimated to save Brisbane around 37.8 tonnes of CO₂ emissions annually and making the bridge one of the greenest in the world.



6 Clay Fields, UK



Comprising 26 homes, Clay Fields is timber-framed covered with the UK's first application of a spray-on mix of lime and hemp (called Hemcrete®) that absorbs carbon from the environment and makes it a less-than-zero carbon material. To maximise the sun's heat and generate the optimised lighting, the buildings are orientated north-south,

while the windows, positioned differently on each building, were determined by engineers based on the positions of the sun for optimal solar gain and daylight, as well as for best views of the countryside.

On the outside, the homes feature continuous wooden boards on the facades, with a low visual

appearance to blend into the surrounding to avoid overshadowing other buildings. Sustainable landscapes are part of the Clay Fields housing scheme, which is surrounded by four mixed communal green spaces—in a series of dips and hollows to provide natural drainage to the site, which was previously prone to water-logging—for residents and neighbouring communities.

Heating the interior spaces is done by a biomass system, powered using locally sourced woodchips, which warms all the homes from a central boiler. Floors spaces staggered with open stairwells help enhance ventilation, while a mechanical system removes 80% of the heat from outgoing air and uses it to warm incoming air in the winter.

7 Aquapolo Ambiental Water Reuse Project, Brazil

Located in São Paulo, the Aquapolo Ambiental water reuse project was developed by Brazilian conglomerate Foz do Brasil, and state-owned utility Sabesp, to provide a more sustainable water management system in the ABC Paulista region of the country. The project is the largest industrial water reuse project in the Southern Hemisphere and was initiated to enhance supply of water in the region where water availability was below 10% of the UN recommended levels of 2,500m³ cubic metres per person annually.

The Aquapolo Ambiental water reuse project, designed to process 1,000 litres of reuse water per second (using bioreactor modules and reverse osmosis membranes), will save around 2.58 billion litres of potable water monthly, enough for more than 500,000 people. The project will also reduce the amount of contaminants that enter the water by including a tertiary sewage treatment system, which can eliminate up to 584,000kg of ammonia and 31,390kg of phosphorus annually from water obtained from the Tietê River.

In recognition of the project's significant contribution to the lives of the people in the region, the Aquapolo Ambiental water reuse project has been given a number of awards, including the *Inter-American Development Bank (IDB) 2015 Infrastructure 360° Award*. The accolade is given to sustainable infrastructural projects that are seen as role models while also enhancing the lives of people.

8 Cerro Dominador Concentrated Solar Plant, Chile

In line with the Chilean government's drive to promote the development of Non-Conventional Renewable Energy (NCRE) sources in the country's energy mix, it began the development of the Cerro Dominador Concentrated Solar Plant (CSP)—projected to be the largest in Latin America when it is completed in 2017. Spread across 700 hectares, the circular field comprises 10,600 two-axis heliostats that track the sun with 140m² of reflective surfaces each. These surfaces concentrate all the sun's power on a central 250m receiver, which transfers it to molten salts that heat water to create steam to drive a 110MW electricity-generating turbine.

The system features two separate salt tanks—hot and cold—with the thermal energy stored in the allowing the system to produce energy in the absence of sunlight for up to 18 hours. The storage system also allows the plant to run 24 hours and customise its generation according to the demand of consumers. In addition, the Cerro Dominador CSP is expected to prevent the emission of up to 643,000 tonnes of CO₂ annually, the equivalent pollution from 357,000 vehicles every year.



9 Mill Junction Project, South Africa

Repurposing is the part of the sustainability process and South Africa’s Citiq Property Developers are tapping



into it with its Mill Junction Project – an accommodation for up to 400 university students from neighbouring universities – it combines two abandoned grain silos with four storeys of colourfully painted shipping containers. In addition to giving the shipping containers a new purpose, the Mill Junction Project apartments also feature a number of energy-saving characteristics.

These include motion-sensors to control the lighting – projected to reduce electricity use by up to 50% compared with conventional buildings. Other features include an astro-turf on the

roof with greenery, water management system to reduce the amount of water consumed, as well as ‘Earthwise’ educational programmes to educate the students on sustainability.



10 Northeast 120th Street Extension, USA

Recently awarded the *Silver Certification for Greenest Road in the World* by US-based sustainable transportation agency Greenroads Foundation, the 880-foot road extension in Kirkland, Washington scored 46 of 118 possible points. The new road is lined with trees that are planted over storm drains to help filter storm water on its way to the lake. In addition, the streetlights are all LED, while 20% of the road was made using recycled warm-mix asphalt as opposed to hot mix, with up to 30% lower emissions in production.

AD

HONOURABLE MENTION: Topmix Permeable Concrete, UK

As temperatures rise around the world, cities and nations are seeing an increase in rainfall and flooding owing to drainage systems that may not have been designed for the amount of rainfall being witnessed currently. A new kind of concrete promises to change the way drains are designed and implemented in urban centres and metropolises. While this is not a project by itself, it is noteworthy as it can create significant changes in the building and construction industry.

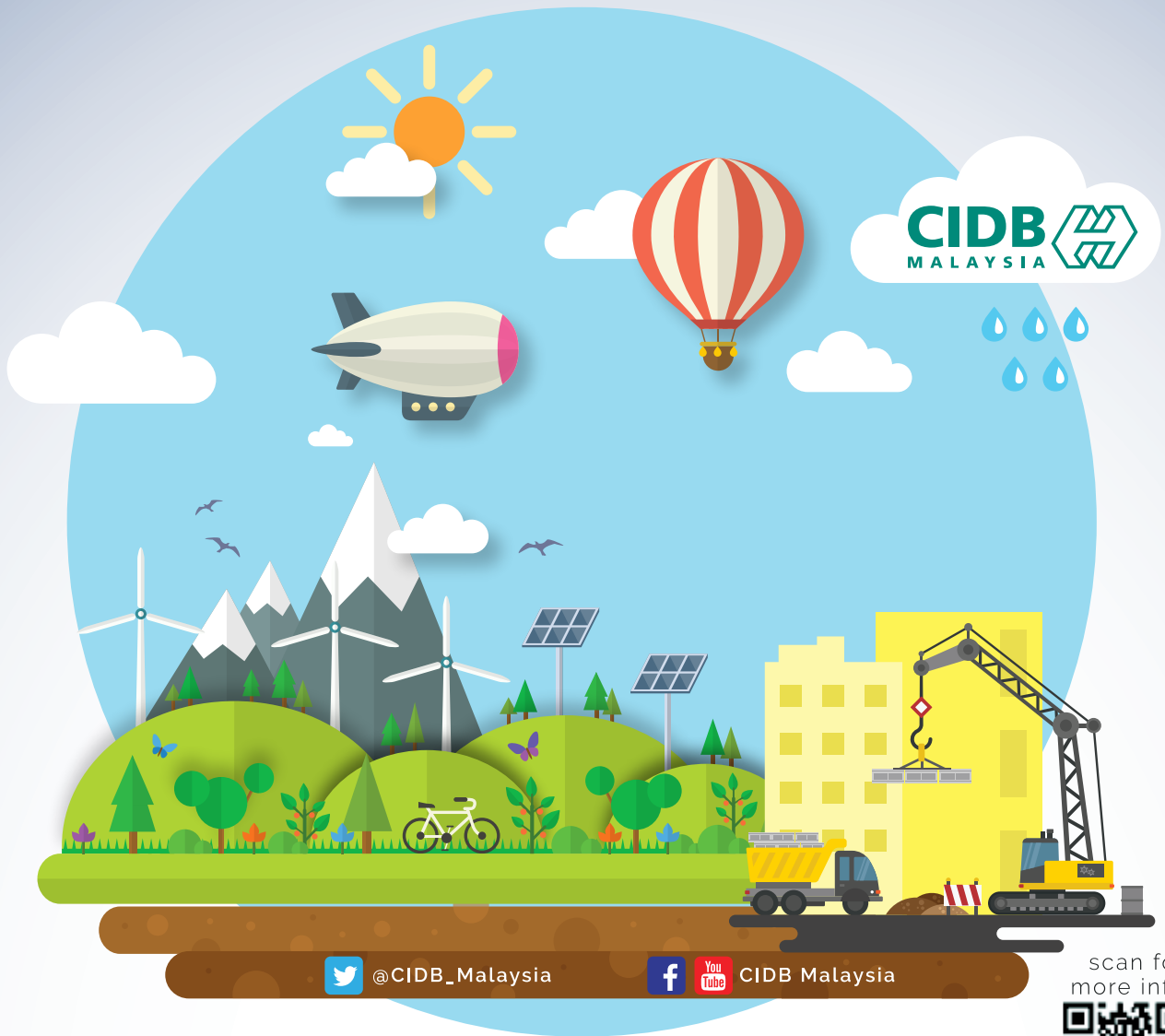
One of the most used materials around the world, concrete has seen a number of advancements in recent times that are

pushing the way that it can be applied in the construction industry. While environmentalists revile concrete for its large footprint, modifications such as the infusion of self-healing properties (highlighted in the first issue of *Heights*)



or more recently Topmix Permeable, with high water-absorbing qualities, may be able to change some minds.

‘Thirsty’ concrete is developed by Tarmac, a UK-based company, features a top permeable layer composed of relatively large pebbles, followed by an attenuation layer that acts as a reservoir (from where a drainage system can capture the water for other uses). These characteristics allow the concrete to absorb up to 4,000 litres of water in the first 60 seconds, and an average of 600 litres per minute, per square metre – in essence, an end to flooded streets and overfilled sewerage.



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The Construction Industry Development Board was established under the Construction Industry Development Act (Act 520) to develop the capacity and capability of the construction industry through enhancement of quality and productivity by placing great emphasis on professionalism, innovation and knowledge in the endeavour to improve the quality of life.