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THE PROJECT MANAGER

Society of Project Managers Singapore

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HIGHLIGHTS

SPM OUTSTANDING PROJECT MANAGER AWARDS 2018

From left: Mr Zaqy Mohamad, Mr Lee Yun Sang (Samsung C&T Corporation), Mr Chang Kin Boon (LTA), Dr Ting Seng Kiong

Every two years, the Society of Project Managers celebrates the achievements of individuals who have demonstrated exceptional qualities and success in their respective fields of Project Management by conferring Outstanding Project Manager (OPM) awards to show recognition of distinguishing achievements in project management in the construction industry.

This Award aims to highlight the multi-faceted leadership role of a Project Manager. Apart from meeting the many project objectives of the client, the Project Manager has to be knowledgeable in design and construction matters and uphold a high standard of professionalism to earn the respect of all parties in a project.

The leadership role of a Project Manager is key to project delivery.

A proficient Project Manager is a valuable asset to the organization and the construction industry, and should be encouraged with due recognition for the contribution towards realising our built environment. The Society wants to inspire the growing pool of Project Managers in Singapore to raise their level of professional practice and provide even better service in their work with consultants, client and contractor.

In April 2018, SPM invited its members and organisations under the Construction Industry Joint Committee, government agencies and statutory boards for nominations of candidates for the OPM Award under the Senior and Junior categories. The award winners in 2018 and their distinguishing contributions are showcased in The Project Manager.

The Award was presented during the SPM Annual Dinner, and in celebration of our 23 Anniversary. Two awards were handled out for 2 categories – Senior (Developer) and Senior (Contractor) as each recipient brings with him more than 15 years of experience. These award winners have delighted the Judging Panel in their calibre and outstanding qualities; and made their mark in their projects and to the industry as a whole. We are highlighting their projects and achievements in this Newsletter.

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SPM TECHNICAL TALK SERIES ON CIVIL INFRASTRUCTURE PROJECTS

GOH Dr Teo Ho Pin (3rd from left)

Guest of Honour, (GOH) for the above talk was North West Mayor, Dr Teo Ho Pin who whole-heartedly welcomed all participants and speakers. He shared that good project managers don't just hail from the built environment industry and there are other great project managers as well from other industries. The community acknowledged and has provided full support in recognising these good project managers.

Speaker Mr Lee answering the Q&A session

Having limited land area, constructing infrastructure now goes deeper and building went higher. We were fortunate to have following 2 meticulous speakers to share their portfolios experience on their downtown line project sharing with us at Singapore Recreation Club.

- **Mr Lee Yun Sang**, Project Manager for the Completion of Downtown Line 3 C922
- **Mr Chang Kin Boon**, Deputy Group Director of Rail Infrastructure and Expansion Group in LTA, also Project Director for Bencoolen Station, Downtown Line Phase 3A (DTL3A)

Speaker Mr Chang delivering his presentation

Mr Lee shared the 6 key challenges of the project & introduced 5 mitigation plans. *(See SPM's Feature Article in Page 8)*

Mr Chang presented in a light tone on the importance to protect the Singapore River while constructing the reinstatement works between Chinatown and Geylang Bahru. He cited the technology adopted such as the hydraulic flow and geo bag strategy. *(See SPM's Feature Article in Page 6)*

PRESIDENT'S MESSAGE

"2018 Has Been a Landmark Year for SPM.

On 25 March 2019, we presented the **SPM Construction ITM Action Plan to the Future Economy Council Built Environment Cluster Sub-committee** chaired by Minister Desmond Lee.

In it we highlighted three areas that SPM would pursue, namely:

1 Levelling up Standard of PM Skills and Practice through the SPM accreditation

2 Leading Collaboration and Partnership with other trade associations.

3 Leveraging on Technology and Innovation in alignment with BCA drive on Integrated Digital Delivery (IDD) and Design for Manufacturing and Assembly (DfMA).

They welcomed our efforts in effecting industry transformation. Other ideas that were floated were the opening up of our accreditation scheme to non-members as well as introducing different tiers of our accreditation scheme to allow for progression. Our council is actively examining these options.

As part of our Professional Technical Talk Series, we have organized a dinner talk on Design for Safety 101 – understanding the essentials for project managers on 23 May 2019 at the Singapore University of Social Sciences.

We have also firmed up our annual dinner on 20 September 2019.

We look forward to seeing all of you that evening.

Dr. Ting Seng Kiong
President (12th Council)
Society of Project Managers

Welcome! New SPM Members

We extend warm welcome to the following new members into SPM :

S/N	Name	Membership	Place of Practice
1	Chua Soo Hoon	Ordinary Member	JTC Corporation
2	Ngor Soo Sim	Associate Member	Shimizu Corporation
3	Yip Shaw Chong	Associate Member	Shimizu Corporation
4	Veronica Ng Hui Hong	Ordinary Member	Jurong Primewide Pte Ltd
5	Tan Mei Ling	Ordinary Member	JTC Corporation
6	Ray Lim Kok Tiong	Ordinary Member	Nakano Singapore (Pte)Ltd
7	Charlton Yeo Sin Yan	Ordinary Member	Nakano Singapore (Pte)Ltd
8	Kevin Kwan Ka Wing	Ordinary Member	Nakano Singapore (Pte)Ltd
9	Bijay Joseph	Ordinary Member	Chuan Lim Construction Pte Ltd
10	Ramesh Shanmugan	Ordinary Member	Success Engineering & Steel Pte Ltd
11	Tan Chun Haw	Associate Member	UES Holdings Pte Ltd
12	Lim Fei Liang	Associate Member	C+H Associates Pte Ltd
13	Yvonne Ang	Associate Member	CPG Facilitis Management Pte Ltd
14	Koh Thong Hng	Associate Member	Nakano Singapore (Pte)Ltd
15	Baskaran Kathirgamathamby	Ordinary	Takenaka Corporation
16	Chan Soon Chy Michael	Ordinary	In Transition
17	William Heng	Ordinary	Takenaka Corporation
18	Du Jianhong	Associate Member	In Transition
19	Flora Foo	Associate Member	SMM Pte Ltd
20	Michael Malonzo	Associate Member	SMM Pte Ltd
21	Shen Yuhe	Associate Member	Takenaka Corporation
22	Tan Huk Yeow	Associate Member	SMM Pte Ltd
23	Tang Lai Ying	Associate Member	SMM Pte Ltd
24	Wong Wan Ai	Associate Member	SMM Pte Ltd

SOCIETY OF PROJECT MANAGERS ANNUAL DINNER 2018

SPM President, Dr. Ting Seng Kiong, delivering his welcome address

The Society of Project Managers celebrated its 23rd anniversary on 28 September 2018 at the Shangri-la Hotel. The event was attended by about 600 guests and members.

Dr Ting Seng Kiong, President of the SPM, welcomed all to the evening's celebrations.

The guest of honour of the evening was Minister of State for National Development and Manpower; Member of Parliament for Choa Chu Kang GRC, is Mr Zaqy Mohamad. In his speech, Mr Zaqy covered a wide range of topics such as the need for building capabilities of Project Managers – one area being the building proficiencies in the latest construction technologies such as DfMA and IDD, and working closely with BCA to develop progression pathways for project managers, and to identify skills and competencies needed based on construction trends. Mr Zaqy also expressed appreciation to the SPM for leading the project management profession in the transformation of the industry by contributing actively in the BuildSG Tripartite Committee.

The SPM Book Prize Winners: From left: Ms Khoo Hay Guek (SUSS), Ms. Teo Jing Wen Evelyn (NTU), Ms. Png Shi Min (NUS)

The evening saw SPM handed out 3 Book Prize awards to Master of Science students, Ms. Png Shi Min for Best Student from NUS for MSc Project Management Programme, Ms. Teo Jing Wen Evelyn for Best Student from NTU for MSc International Construction Management and Ms Khoo Hay Guek for Best Student from SUSS University for Bachelor of Building and Project Management. The society would certainly be looking forward to their contributions in the field of project management in the future.

This year, the Society also organised the biennale Outstanding Project Manager (OPM) Award 2018. The winner for the Senior Category (Developer) is Mr Chang Kin Boon, Deputy Group Director (Rail Infrastructure & Expansion) of the Land Transport Authority for his successful involvement of the Downtown Line Fort Canning Station project.

The other Award winner Senior Category (Contractor) is Mr Lee Yun Sang, Project Manager (Civil Infra-structure Business Unit) of Samsung C&T Corporation for his successful involvement of the Downtown Line Expo Station project.

From left: Mr Zaqy Mohamad, Mr Chia Boon Khiang, Senior Director for the Singapore Children's Society, Dr Ting Seng Kiong

As part of the SPM's corporate social responsibility and keeping to our tradition of giving, the Society once again made a generous donation to the Singapore Children's Society.

Performance by JESS SHOWBIZ entertaining the guests

Amidst the celebratory mood of the evening, the sumptuous 8 course dinner and the music provided by the live band and performances by JESS SHOWBIZ, it was an opportune time to catch up with fellow professionals in the industry. Old friendships were rekindled and new contacts were made as member and guests mingled among each other. Music, performances, good food and great company created a convivial atmosphere for the evening. All too soon, the evening came to an end. As the good byes were said, it was time to look forward to next year's Dinner.

SOCIETY OF PROJECT MANAGERS ANNUAL DINNER 2018 GUEST OF HONOR'S SPEECH

Speech by Mr Zaqy Mohamad, Guest of Honour for SPM Annual Dinner

The Guest of Honour, Minister of State for National Development and Manpower, Mr Zaqy Mohamad, giving his speech.

A very good evening. It is my pleasure to join you at your annual dinner today.

Let me start by congratulating you on your 23rd anniversary. Over two decades, you have helped to raise standards of the project management profession in Singapore. You have also played an active role in promoting environmental sustainability, and workplace health and safety, which are important aspects in construction. As our projects grow in complexity and scale, there is an even stronger impetus for us to continue to build up our project management capabilities, and all of you, as project management professionals, play a key role in this regard.

Good project management is critical to the success of our projects. Project managers take on the important and complex task of integrating work across the entire construction value chain. The winners of the Outstanding Project Manager Award this year, Mr Chang Kin Boon and Mr Lee Yun Sang, exemplify the competency and innovativeness of good project managers. Coincidentally, both their projects are part of the development of the MRT Downtown Line Stage 3, which is in itself a major engineering feat.

Take for example, the construction of Fort Canning Station, which was managed by Mr Chang. The project was made even more challenging by the fact that the construction had to be carried out underneath a water body, amidst the crowded areas at Clarke Quay. With ingenuity and deft planning, Mr Chang was able to deliver the project safely and with minimal impact to the environment and the public, while keeping to the demanding timeline.

As for Mr Lee, his project was not any easier! He was involved in the construction of the Expo Station for the Downtown Line. Mr Lee had to ensure the safety of commuters using the Expo Station on the East-West Line while building the underground interchange, electrical substation and a rail facility building. In doing so, Mr Lee not just completed his job, but he developed many innovative solutions which resulted in significant time and cost savings. As a result, the project received six awards at the LTA Annual Safety Award Conventions from 2014 to 2016.

Join me in congratulating both winners!

Transforming the Sector

As Singapore continues to develop, we need to constantly find new ways to improve our processes and build new capabilities. This will help our local firms differentiate themselves and develop a competitive edge to thrive not just locally but regionally, amidst intensifying global competition.

In this regard, we launched the Construction Industry Transformation Map (ITM) in October last year. One of our strategies is to improve productivity through the use of technologies such as Design for Manufacturing and Assembly (DfMA). We also aim to optimise our processes across the construction value chain through Integrated Digital Delivery, or IDD. IDD allows for upfront integration at the design stage across various disciplines, including facilities management. That is a new thinking we are trying to do – to bring forward the design for maintainability to ensure that whatever we design has been thought through upfront rather than finding it not practical after designing and building it. IDD helps with that. This leads to more efficient and quality construction with less dis-amenities and less downstream maintenance issues.

Building Capabilities of Project Managers

In tandem with our efforts to improve productivity, project managers also need to build proficiencies in the latest construction technologies, such as DfMA and IDD. This will help project managers meet clients' rising expectations and the need to achieve better project outcomes.

BCA will continue to work with you to develop progression pathways for project managers, and to identify skills and competencies needed based on construction trends. With clearer progression opportunities, the profession will become more attractive to potential young entrants as well as in-service personnel. To complement this push, BCA will also work with you to encourage employers in the fraternity to offer structured internships, and joint scholarships and sponsorships for further training.

Leading the Profession forward

As a representative of project managers, you are well-placed to lead the project management profession as we transform the industry. I am happy to note that you are already part of this transformation effort by contributing actively in the BuildSG Tripartite Committee. BCA's BuildSG office will also continue to support your efforts through your ITM action plan. Together, we can push the technological frontiers and revolutionise the way we build, manage and maintain our buildings. I look forward to your continued contribution in this exciting journey. And once again, congratulations on your 23rd anniversary and I hope that you have many more decades to come.

I hope you have a wonderful evening ahead. I wish you all the best in your careers and projects. Thank you for having me here.

SPM OUTSTANDING PROJECT MANAGER AWARDS 2018

Winner of the OPM Award (Contractor Category)

Mr. Lee Yun Sang is the director of Civil Infra-structure Business Unit of Samsung C&T Corporation. He graduated with a Bachelor's degree and continuously obtained a Master's degree in Civil Engineering from Inha University in Korea in 1989. After 3 years of experience in a design consultants he has worked for Samsung C&T Corporation since 1991.

He has over 30 years of experience in a variety of civil infrastructure projects with 22 years of his career spent in Singapore since 1997.

As a design manager, he successfully managed the design and construction methodologies of 4 mega design & build projects of North East Line C703, Kallang Paya Lebar Expressway C423, Downtown Line C908 and Marina Costal Expressway C483 consecutively in Singapore which were well proven through various excellence awards from Land Transport Authority and Building & Construction Authority even though these projects were executed under unusually challenging and complicated conditions. He subsequently led Downtown Line 3 C922 project management team as a project manager for 6 years and completed the project in 2017 with excellent safety records, which resulted in receiving various awards from the Annual Safety Award Conventions conducted by LTA.

He is currently leading NSC N107 project team for Land Transport Authority as a project manager with a contract sum of S$602 million. This is design and construction of North-South Corridor (Tunnel) between Toa Payoh and Marymount Lane.

Winner of OPM Award (Developer Category)

Mr Chang Kin Boon is the Deputy Group Director (Civil) of Rail Infrastructure and Expansion Group of Land Transport Authority.

Kin Boon graduated with a Bachelor's degree in Civil Engineering from the Nanyang Technological University in 1998. He obtained a Master of Science (Civil Engineering) from National University of Singapore in year 2002 and awarded a Sponsorship and completed a Master of Science (Urban Transport Management) in year 2012 from SIM University.

Kin Boon joined Land Transport Authority in June 1998 as a Project Engineer (Project management) and later took on project management roles, overseeing projects such as NEL, CCL, DTL1.

With his experience in complex, large scale projects, he was tasked to lead and complete DTL3 package A where it consists of 5 new stations and tunnels, joining from Downtown Line 1, Chinatown station to Geylang Bahru Station.

Notably some of the challenges includes the deepest station in Singapore, Bencoolen Station, the highly challenging tunnelling works which undercrossed in-service MRT Lines at close proximity and the construction of tunnels under Singapore River.

In his current portfolio of Deputy Group Director (Civil), he overseas several subgroups such as JRL, CCL6, Tunnelling division and holding concurrent position as Project Director of North East Line extension and RTSLink, which is a metro line connecting Singapore to Johor Bahru.

He continues to be active in project management, being currently a committee member of Tunnelling and Underground Construction Society (Singapore) TUCSS as well as Co-chairing LTA's Civil Project Safety Risk Committee.

INTERVIEWS OF OPM 2018 WINNERS

1) What was your thought when you were one of the two winners?

Mr Chang Kin Boon: "The winning of this award is an affirmation and recognition of the contribution to SG's transport infrastructure from civil engineers like me. I am deeply honoured and at the same time humbled as there are many more project managers working tirelessly to make Singapore a better built environment. I dedicate this award to my team members and project partners, without which, this project would not have been successfully completed."

Mr Lee Yun Sang: "I was very pleased with the news that I was one of the winners. However, I was pleasantly surprised when I realized that there were only two winners. I believed that many project managers deserved to win the award. I thought I was fortunate to get the award and would like to send my sincere appreciation to all of my team members."

2) What are your current work scope and nature?

Mr Chang Kin Boon: "I was a project director in charge of MRT construction. My span of works has recently widened to include the managing of the implementation of the Circle Line 6, which covers non-civil works such as systems and building services, in addition, I'm also in charge of RTSLink Singapore-Johor Bahru project."

Mr Lee Yun Sang: "I am currently the project manager for N107, which is one of the projects in the North-South Corridor contracts by Land Transport Authority awarded to Samsung C&T Corporation with a contract sum of S$602 million. It comprises the design, construction and completion of 1.37km of twin-cell vehicular tunnel structure including slip tunnel, facility building and at grade infrastructures."

3) What is your thought of project managers can play a part in the Singapore construction industry?

Mr Chang Kin Boon: "Project managers are playing and will continue to play a big part in the Singapore construction industry as Singapore is still actively developing her infrastructure projects. Project managers are valuable asset to both the companies and Singapore construction industry as we delicately balance the 5 corner stones of the project and delivered them successfully. Project Managers should share and learn from the experiences of one another so as to push the standard of project delivery in Singapore to a higher level."

Mr Lee Yun Sang: "A lot of construction projects are being awarded to contractors and led by the project managers in Singapore. It is very much dependent on their leaderships whether the projects are managed safely, timely and cost-effectively. They also can contribute to train their teams more competitively towards more improved performance."

4) How the award will influence you to advance your career in project management?

Mr Chang Kin Boon: "I am deeply honoured to receive this award, and it's an important motivation for me and my fellow colleagues to continue to give our best, to always manage and deliver projects successfully".

Mr Lee Yun Sang: "The award gives me not only an advantage in my career but also a motivation to improve myself continuously in my project management abilities and to uphold the honour of the award/"

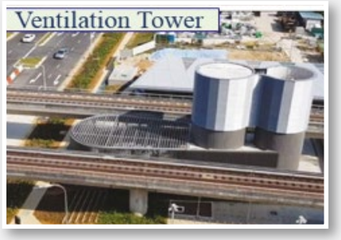
PROJECT MANAGEMENT FEATURE PROJECT: DOWNTOWN LINE STAGE 3

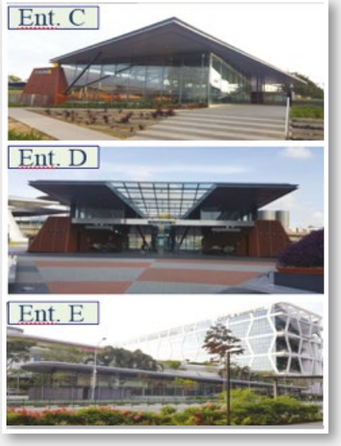
Mr. Lee Yun Sang

In this issue, Winner of the SPM's Outstanding Project Manager Award 2018 (Contractor), Mr Lee Yun Sang shares with SPM one of his milestone projects – Downtown Line Stage 3- and the key challenges and lessons that could be gleaned from this project.

The Downtown Line Stage 3(DTL3) consists of 16 stations spanning River Valley Station and Expo Station, with a total route length of about 21kms. Contract 922 was awarded to Samsung C&T Corporation.

C922 project comprises EXPO Station, Electrical Substation and a Rail Facility building constructed above overrun tunnels. The Station is an interchange station with the EXPO Station on the East-West Line, and the project is surrounded by hotels and commercial/business buildings.



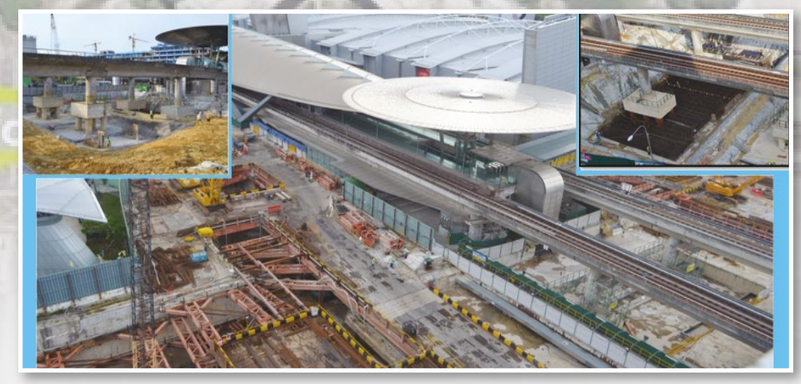


Construction of C922 Station required supporting two operating viaducts of EWL MRT immediately adjacent to the existing EXPO Station. Therefore half of the Station was constructed by Top-Down method with underpinning below the existing MRT viaducts during construction, the other half by Bottom-Up.

The protection methodology of the viaducts required installation of barrette piles for the substitution of existing piles, followed by a transfer beam with 8 nos. of synchronised 100 ton-hydraulic jacks to provide preloading in order to prevent displacement. Existing RC piles supporting each footing were cut away during excavation. By a delicate control of all the process this challenge was met safely without any disturbance of the operation of EWL MRT.

The station is a three level Civil Defence (CD) shelter station which required a heavy and complicated arrangement of reinforcement-bars and numerous system openings on the RC structure. Furthermore, even the partition walls inside the CD Station were, necessarily, RC structure. In order to avoid extensive rectification works, coordination with System Wide Contractors (SWCs) was a critical issue for construction progress and quality control. C922 introduced BIM models, and provided the structure models including system openings to System-Wide-Contractors for their final review. This was not a contractual requirement and not popularly used in civil projects circa 2011.

One of the other unusual features of the project was the several instructions issued midway through the contract period for major additional works, by way of an additional underground link way between the two stations, two more entrances, an additional exit and trellis. Minimizing the time impact to the schedule under these circumstances was another challenge of the project. In order to overcome this, the project team proposed and implemented various mitigation measures continuously and proactively.



One of these measures was omission of the installation of the last level of struts during the excavation stage as a value engineering proposal. This type of value engineering is difficult to study and conduct during the construction stage especially in a build-only project, but this was realized through close monitoring of the behavior of ERSS and timely preparing the revised design. This saved the lead time for the installation and dismantling of struts as well as reducing the cost.

Another solution implemented successfully was the removal of kingposts level by level sequentially during structural works whereas the client's design could only have been done after completion of all the structures. Since the kingposts supported the load from heavy vehicles, it needed a serious verification for the implementation. This resulted in saving significant time and making possible the handing over of rooms earlier to System Wide Contractors. Together with other innovative ideas, C922 minimized the time impact caused by the significant additional works and enabled delivery of the project on-time to the client.

In the middle of the project, the project team faced a serious challenge on the structural works as the structural subcontractor was debarred from hiring or renewing workers due to their violation of Government Act outside the project and greatly affect their ability to carry out its contract. The project team reviewed various mitigation options for the solution, and eventually decided to supply all the workers and materials to the subcontractor, not terminating the subcontract. They managed to complete the works, but that was a lessons learnt to avoid that kind of situation in the future by evaluating the condition of tenders in depth during the tendering stage and monitoring the status regularly.

It took about 11.4 million man-hours of manpower for the completion of project. We managed the site safety by putting more effort on risk management, training for staff and workers, site supervision and safety initiatives. With those efforts, C922 had only one MOM reportable case, which was a finger injury with 5 days MC.

C922 recorded AFR 0.09 and ASR 0.45, which were well below the client's targets of 0.81 and 18 respectively. C922 received 6 awards in LTA Annual Safety Award Conventions as a recognition of our excellent records and effort to manage the safety and environmental aspect of the project.

PROJECT MANAGEMENT FEATURE PROJECT 2: DOWNTOWN LINE STAGE 3 – CONTRACT 937 CONNECTING TUNNELS UNDER SINGAPORE RIVER

Mr Chang Kin Boon

Winner of the SPM's Outstanding Project Manager Award 2018 (Developer), Mr Chang Kin Boon shares with SPM his signature project– Downtown Line Stage 3-Contract 937 and how the team successfully delivered the project despite the numerous technical and schedule challenges.

Introduction

The Downtown Line (DTL) is the fifth major Mass Rapid Transit line completed after the Circle Line. The 42 km long DTL is the longest fully automated underground transit system in Singapore and was completed in three stages. With DTL stage 3 joining to DTL stage 1 serving the northwest and the east, it saves the commuters time and adds convenience in their daily commuting.

With its connection to the city centre, DTL also promotes greater use of public transport and thereby brings about social benefits such as reducing congestion and environmental cost.

Downtown Line Stage 3 – Contract 937 Connecting Tunnels under Singapore River

One of the most challenging sections of works in DTL3 involved the construction of connecting tunnels under the Singapore River. The multitude of challenges encountered in constructing the tunnels were wide-ranging and diverse in nature.

Challenges

The stretch of the DTL3 tunnels had to pass under the Singapore River at just an arm's length from the Central Expressway Tunnel (CTE).

Constructing next to the existing CTE structure posed an unusually high risk of causing damage to the CTE structure due to the close proximity of the piling works to the CTE structure. The piles were to be installed within 1.3m clearance from the existing CTE temporary works.

There was also great concern over the possibility of encountering submerged obstructions in the riverbed. From the study of the historical land use information, it is likely that the Singapore River has an accumulation of debris from decades of abandoned materials such as sunken boats, anchors and possibly construction materials and temporary works left behind during the construction of CTE.

The construction of the tunnels took place in the heart of the tourist belt, in the river that flows to the reservoir. In a bid to prevent disruption and pollution that could be caused by the construction works, the various authorities imposed stringent requirements to the construction works, such as to maintain hydraulic flow to prevent flooding upstream, to maintain the quality of water of the Singapore River, to minimize impact to surrounding businesses stakeholders in Clark Quay and to maintain the waterway for the river cruise for the tourist. This added complexities to the already arduous tasks of constructing the tunnels underneath the river.

To add to these physical construction challenges, this section of work was to be completed within aggressive timeline to support the line opening.

Project Managing the Challenges

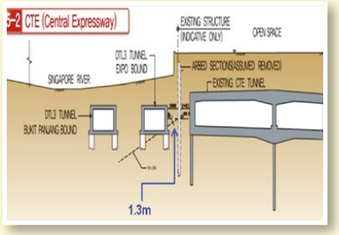
Multifaceted know-how and effort were required to overcome the multitude of construction challenges inherited in this project. Partnerships with various project parties, sound project management skills and knowledge, the courage to embark on innovative solutions and detailed planning with many iterative brainstorming sessions are some of the effort and risking-taking venture put in in the pursue of ways to deal with the challenges.

The various project partners, Project Management Team (LTA Project Team), Builder (GS E&C) and Consultants (Arup, Motts Macdonald, CDM Smith) worked together to address the concerns at the onset of the project.

The original scheme for constructing these tunnels was to use the cut and cover cofferdam method. Recognizing the huge engineering safety risks, possibility of program overrun, potential environmental impact and disruption to the tourist area, a plan was conceptualized to divert the full width of the river in one operation (instead of diverting in phases), followed by clearing the obstructions in the riverbed, and the use of Bore Tunneling method to construct the connecting tunnels.

With a complete listing of activities and the corresponding milestones and resources, the project schedule was drawn up which showed in certainty that the new proposal was able to address the program risks.

The next task was to seek the approval of the relevant agencies and authorities such as PUB, BCA, DBC, Project Owner etc for this scheme.



Historical Land Use - High possibility of abandoned debris in the riverbed (Source: robertsonquay.com, pub.gov.sg).

The relevant agencies and authorities were concern over the negative impacts that could be brought about by any incidents caused by the construction works. Both the BCA and DBC were especially worried over the engineering safety of the works and its impact to CTE while PUB has concern over the possible pollution and restriction to the hydraulic flow of the river. STB too was mindful that the construction could potentially caused disruption to the tourist belt in Clark Quay. As for the Project Owner, they too were also concern if the team could deliver the project timely, safely and within budget.

With convincing hydraulic modelling data, the team managed to convince the relevant authorities (PUB) in giving approval to allow a full width river diversion. In addition, the team proposed a more productive approach of using mechanized bore tunneling machines instead of the original planned method of cast in-situ concrete coupled with double pipe piles cofferdam strutted excavation. Pre-cast technology was also adopted coupled with ground improvement to reduce the width of excavation and cast in-situ concrete, along the river by-pass alignment. This significantly reduced the construction duration, and ensured a safer engineering construction with lesser environmental impact. With these, the various authorities were convinced that the plan scheme was workable and gave support and approval to it.

Mitigating Engineering Risks

Recognizing one of the major risks in bore tunneling was in riverbed obstructions, scheme was drawn up to overcome this risk. With the approval to divert the full width of the river to the river bank on the west (at Liang Court side), a full stable embankment was constructed along the tunnel alignment on the Singapore River. The embankment was constructed using Geobag at the sides to prevent soil erosion and contaminating the waters. With this embankment, heavy machineries such as boring rigs and hydraulic grabs can be sited on it to remove obstructions, keeping the tunnel alignment cleared for the TBM drives.

The use of TBMs also created additional clear distance away from the existing underground CTE tunnels. In contrast, the original cofferdam method entails the pipe piles to be constructed just three metres away from the CTE, which had a risk of causing structural damage to the CTE during the installation and extraction of the pipe piles.

Beyond technical advantages, this method makes possible the omission of the launching shaft on the west bank and replace this with a slight enlargement of the cut and cover tunnels at the east bank. This brought about material savings (reduction in carbon footprint) and cost efficiency to the project.

Successes Factors

The successful construction of connecting tunnels underneath Singapore River, to join DTT3 tunnels to that of DTL1, in the midst of top tourists spot at Clark Quay, with an aggressive timeline was described as an heculeen task and an engineering feat by Straits Times and IES SG50.

The key success ingredients were the close coordination among the various project parties and the sharing of a clear objective by all project parties. For example, in dealing with the water element, the project parties envisaged the importance of a river dam and worked to ensure that the design caters for zero movement as any deflection would render the erected river dam ineffective.

Having contingency plans ready are also part of the Project Management team's DNA. In project monitoring, when any planned actions are not performing as expected, contingency plans must be ready to manage the unforeseen events. In this project, the Builder committed to build and deliver a TBM shield from overseas should the program indicates the progress was falling behind time. This gave certainty that the overall master program would still be met should there be delayed encountered during Singapore River diversion works as the back up measure was put in place well before the need for it arises.

Having relevant information, geographically and historically, was also an important factor contributing to the success of the project. As CTE and Liang Court were constructed in the last 2 decades, the project team was able to obtain pertinent information from the project teams that did these earlier constructions. With the information on CTE and Liang Court, the project team was able to visualize the expected risks in constructing in close proximity to these structures and worked out mitigation measures to overcome the risks. Historical land use information about the river bank was also sourced and obtained, making it apparent that there is high possibility of presence of abandon boats within the riverbed and the risks of encountering these obstructions needed to be planned for.

Geotechnical information such as ground anchors, temporary works, ground condition on the presence of thick valley of marine clay, which was critical for underground works, was also taken into consideration when scoping the Fort Canning Station and Tunnels contract.

Hydraulic flow information of the Singapore River and the Marina Barrage pumping levels were equally important information and have to be design for to meet the authorities' requirements.

With an exhaustive list of information on the structures within the influence zone of the works and the geotechnical information along the tunnel alignment, the team was able to draw up a comprehensive risks registers for monitoring during construction. With this, the team was quietly confidentthat the construction risks could be managed.

The Project Management Team contributed no less. The team planned, executed, monitored, innovated and adapted at each step of the Works to ensure the success.

With the safe execution of the works, adhering to the programs, keeping the construction cost within budget, the tunneling works crossing the Singapore River and connects to DTL1 Chinatown Station were completed on time and open for revenue service on 21st Oct 2017.

This convincingly met the goals set by the Project Owner, of completing the project Safely, timely, in the most economical and effective manner while meeting community expectations during the construction phase.

Kin Boon was appointed as the Deputy Group Director of Rail Infrastructure and Expansion Group in Land Transport Authority in Jan 2018, overseeing several subgroups such as Jurong Regional Line, Circle Line 6, and Tunneling division while holding concurrent position as Project Director for RTS Link, which connects Singapore to Johor, and North East Line extension.

Shaping the Times with Care

OBAYASHI
Singapore

CPD ANNOUNCEMENT

Dear Members,

With effect from 1 January 2019, the CPD framework will be introduced by SPM for its members, particularly for PPMs.

The objective of SPM introducing a CPD framework is to reinforce the need for lifelong learning and to provide a means for SPM members and Professional Project Managers (PPM) to systematically maintain and enhance their competency to carry out their role as project managers.

- To enable and encourage SPM members to update and acquire knowledge and skills to stay relevant
- To assist PPMs in maintaining their competence and achieving their professional goals

For more information on the SPM CPD Programme Handbook, kindly visit our website *www.sprojm.org.sg/Accreditation*

Calling for feature Articles and Sponsorship!

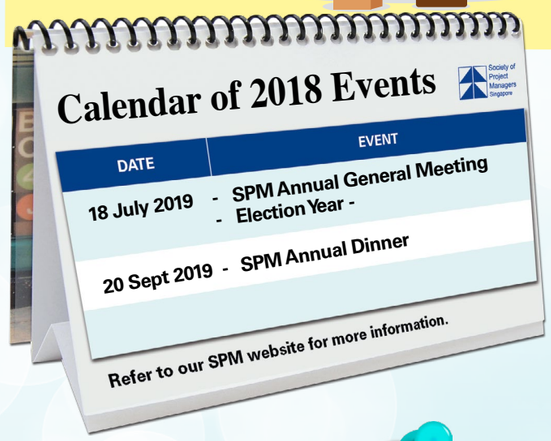
Dear Readers,

We invite you to contribute articles of Project Management interest so that this can be shared with the project management fraternity.

We also invite you and your esteemed company to place an advertorial under our sponsorship scheme. The cost of sponsorship is $3,000 for one full page or $2,000 for a half page. Your advertorial can be in the form of a feature article such as a write-up on a project or projects undertaken by the sponsor or on any subject of project management interest and practice.

You can convey your interest to societyofprojectmanagers@gmail.com
We sincerely looking forward to your contributions and support.

Editorial Team



ARCHXPO 2018:

The International Exhibition for Architecture & The Built Environment, 2-4 October 2018

Marina Bay Sands – Co-organized by Singapore Institute of Architects (SIA) and Conference & Exhibition Management Services Pte Ltd (CEMS), the 5th edition of ArchXpo was successfully convened on 2—4 Oct 2018 and SPM are proud to have participated in this annual convention. Held in 10,000sqm of floor space, ArchXpo is the key showcase of relevant technologies, products and related services in the architectural and built environment. It is also a congregation of industry experts and an important platform for the exchange of research and innovation practices.

As one of the exhibitors in this event, SPM sought to promote the awareness and objectives of our organization to the wider community. SPM also conducted the second APM Seminar of 2018 – the Accreditation of Project Managers Seminar and Workshop - Guidance on APM Application where the facilitators shared on the "Why, What & How of Application" and a hands-on workshop on the APM application.

More than 230 exhibitors from 18 countries and more than 10,000 visitors from 44 countries participated in this event. We are sure the SPM has garnered even more awareness and support from the architectural and built environment professionals!

ArchXpo 2018
The 5th International Exhibition of Architecture & The Built Environment

A GLIMPSE OF SINGAPORE CONSTRUCTION ITM IN CHINA

at 17th China International Construction Project Management Summit Meeting

SPM shared the **Singapore Construction Industry Transformation Map** with 500 Project Management professionals from all over China and overseas at the 17th China International Construction Project Management Summit Meeting. Held from **27 to 28 October 2018** in **Qingdao, China,** the Summit Meeting was organized by the **China Construction Industry Association (CCIA).**

The opening session of the Summit Meeting. A very strong turnout.

Under the Summit Meeting's theme, **"New Construction Methods and Project Management Innovation in the context of modernization of Construction Industry",** SPM's former 2nd Vice-President **Er. Tan Joo Chuah** in his keynote address articulated the vision of the Construction ITM, that is, *"An advanced and integrated sector with widespread adoption of leading technologies, led by progressive and collaborative firms well-poised to capture business opportunities, and supported by a skilled and competent workforce offering good jobs for Singaporeans".*

Er. Tan Joo Chuah of SPM delivering the keynote address at the Summit Meeting.

Er. Tan further elaborated on the key strategies identified in the ITM:

(1) To increase adoption of **Design for Manufacturing and Assembly (DfMA) and Integrated Digital Delivery (IDD);**

(2) To build progressive and collaborative firms; and

(3) To support the needs and aspiration of the construction workforce.

Using the **Crowne Plaza Changi Airport Hotel Extension** project, he showcased how **Prefabricated Pre-finished Volumetric Construction (PPVC)** technology helped to achieve higher productivity and shorter construction time.

The Summit Meeting participants were treated to a visit of the **Qingdao International Convention Center,** venue for the **18th Shanghai Cooperation Organization (SCO) Summit,** held from 9 to 10 June. It was a summit involving heads of states of SCO members, presided by China's President Xi Jinping.

Highly commended by President Xi, the convention centre was completed recently at a challenging short development period of 7 months from demolition of existing buildings and design, to construction, fitting out and commissioning. A project of such scale and complexity would normally take 24 months to complete. Only one-eighth of the time was taken - an impressive feat indeed!

Located at the shore of Qingdao, the unique 54,000 m^2 building (4 storey with one basement) and its surroundings reflect the idea of combining "the Chinese air, the international quality, the Shandong Style, and the Qingdao elements."