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Singapore and Penta-Ocean Construction – 60 Years of Strides and Local Business Strategies 1

Undertaking Construction of Landmark Buildings and Structures Engaged in the Construction of Approximately 40% of the Reclaimed Land Enjoying an Acclaimed Local Reputation

In 2025, Singapore marks 60 years of independence. As a thriving hub for global finance, trades and tourism, Singapore today boasts its world-class infrastructure, and the country has been expanding its land area by assidous reclamation. Penta-Ocean Construction (POC) has been playing a pivotal role in Singapore's national development. POC first entered into the Singapore market in 1964, one year prior to the country's independence, and since then, the company contributed to the expansion of about 40% of the reclaimed land. POC has also undertaken many iconic projects both in civil engineering and building construction, and the company is highly praised in the country for its stellar track record. In this report, we will cover the past stride of the company and introduce some of the construction that are currently underway.



The 60th year commemoration ceremony held in Singapore on December 6, 2024

POC's expansion into Singapore was spareheaded by the Jurong Shipyard Construction Project awarded in 1964. After the 1970s, the company was engaged in numerous reclamation works, which is POC's forte, contributing to the the exansion of the country's national land area. The company extended its business to the building construction arena in the 1980s, and then to the land civil enginnering arena including Mass Rapid Transit (MRT) and expressway projects in the late 1990s.

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Along with numerous reclamation projects including the Jurong Island and Tuas Reclamation Project, the company has been deeply involved in the development of various infrastructue, such as container terminals, railroad, and seweage tunnels. The Esplaneade Thetres on the Bay constructed by POC is featured in the new 5-cent coin of Singapore.

The projects undertaken by POC are mainly public works, awarded by clients including the Maritime and Port Authority of Singapore (MPA), the Housing and Development Board (HDB), the Land Transport Authority (LTA), Ministry of Health (MOH) and the Public Utilities Board (PUB). In the building construction arena, multiple large-scale hospital construction projects have been awarded by MOH, and POC successfully received order for the Immegration and Checkpoint Agency Buillding project from the Immegration Checkpoint Agency (ICA).

Takuzo Shimizu, President and CEO of POC, takes great pride in their past achievements, saying "Our initial marine civle engineering and reclamation busiensses expanded to building construction and land civil engineering businesses. Starting with the Suez Canal Dredging Project, we have been involved in many milestone projects overseeas including in Singapore."

In April 2015, POC transferred the headquaters' function of the International Business Unit to Singapore. By making Singapore a central hub for its international operations, the company pursues further localization and globalization of its business. POC is determined to continously commit to further expansion of the country, mainly through the development of social infrastructure. President Shimizu comments, "We have extensive experience, stellar track record and valuable human resources in Singapore. By tackling technically complex projects with top priorities placed on safety and high-quality, I am convinced that our distinguished abiliies will be duly recognized."



Pasir Panjang Container Terminal (By Courtesy of PSA Corporation Ltd)

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Construction of a Large-scale Hospital at its Peak Active BIM Utilization from Building Design to Maintenance & Management

Penta-Ocean Construction (POC) has undertaken a wide variety of land/marine civil engineering projects as well as building construction projects in Singapore, many of which are currently underway. In particular, the ECC & NDCS Project in building construction, and the N105 Project in civil engineering, are now moving full steam ahead.



Project site (taken onsite on December 5, 2024)

The former is a large-scale hospital construction project which consists of the Elective Care Centre (ECC) and the National Dental Centre of Singapore (NDCS), awarded by Ministry of Health Singapore (MOH). The ECC is a facility dedicated to non-emergency, elective surgeries and procedures which are to be performed by Singapore General Hospital. The NDCS, on top of general dental care services, will also provide training for future dental professionals and feature the integrate digital dentistry and technology in the services.

On a 20,000m² project site, the POC project team will construct an approximately 150,000 m² hospital with twenty stories above ground and four stories of basements. The maximum height will be about 113m, and the building will be RC and Steel structures, with composites structures consisting of precast (PCa) columns/ beams/floor slabs, steel beams, and deck slabs. The project will include the development of surrounding roads and the construction of new bridges connecting the new building to the existing neighboring hospital. The contract amount is approximately JPY 80.6 bn (at the time of the order).

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The project commenced on August 1, 2022. Currently, the construction of the superstructure, M&E works and architectural finishing works are in progress. In order to streamline the excavation and soil removal processes, the POC project team generated large temporary muck hole openings and adopted the semi top-down method, where the basement structure was first constructed in the top-down method ahead of other parts. As another technological initiative, Design for Manufacture and Assembly (DfMA) was introduced. The above-ceiling systems (ducts, pipes, and cable racks) were unitized, which were fabricated at a separate factory nearby and transported to the site. The units were then installed and integrated onsite, thereby expediting the processes.

In the project, the POC project team promotes effective consensus building with the client by providing mock-ups of the patient rooms, etc. Moreover, the active use of BIM in the project from design, construction to facility's maintenance & management is quite noteworthy. Yoshinori Yamano, Project Director and Executive General Manager of the International Building Construction Divisions Group of the International Business Unit, notes a significant difference from a domestic project, "In Singapore, for construction projects involving a GFA larger than 5,000m², authority submission of BIM has been made mandatory. Therefore, BIM application is much more common." Kazunari Ikeda, Project Manager, also comments, "BIM modelers are becoming harder to find in Singapore. In this project, we outsource BIM related services to Indian companies."

Currently, approximately 110 POC staff are working on the site, 70% of which are Singapore nationals. During the peak months, the number of workers will increase to over 2,500. PM Ikeda rolls up his sleeves, saying "With the completion of M&E installations, the progress rate should go up significantly."



Mr. Ikeda (left) and Mr. Yamano (right)

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Their future plan includes establishment of a locally incorporated subsidiary in Vietnam to aggressively pursue construction projects of Japanese-affiliated companies. Penta-Ocean Construction's overseas venture and endeavor will thus continue.

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Development of a Large-scale Tunnel underneath a Busy Throughfare Tackling a Complex Project with Japan's Technology and Achieving Efficient Construction

The N105 Project awarded by the Land Transport Authority of Singapore (LTA) is a megaproject that involves the construction of a transit corridor and tunnels. The project name comes the section N105 of the North South Corridor (NSC), a 21.5 km expressway corridor that travels from the north to the south of the country. The construction commenced on August 1, 2018, and as of the end of October 2024, the progress rate of the project is approximately 50%. The contract amount is JPY 64.2 bn (at the time of the order).



A Japan-made technology contributes to box culvert construction

The North-South Corridor project includes the construction of an elevated viaduct in the north and an underground tunnel beneath the general road in the city centre in the south. Penta-Ocean Construction (POC) will be in charge of the section N105, an underground expressway section in the south (total extension of 1km). In this section, an underground expressway will be constructed by using stacked box-culvert structures for a four-lane carriageway configuration. The surface level just above the site is a fully-developed, busy city centre packed with hospitals, schools and shopping centers in tight proximity to one another. Below the ground, the existing MRT line travels through the entire section, and in some parts, the MRT line directly interfaces with the new expressway.

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The construction work is performed immediately above and beneath the existing MRT line, and the minimum clearance of the culvert and the MRT line is as little as 1.5m. As the process demands extreme prudence, the team proposed alternatively using a Japanese patented technology called the Box Propulsion Method, which was subsequently approved by the client.

For the construction of the upper tunnel which travels above the MRT line, the Simple Faceless Tunnel (SFT) Method is adopted, which is characterized by jacking of a box culvert (box structure) to remove the soil mass, instead of the conventional tunnel-face excavation. The box culvert (box structure) and the same-shaped roof (made of rectangular propulsion steel tubes, 1.2mx1.2m each) installed around it are horizontally thrusted forward to extrude the soil mass inside and replace it with the culvert, eliminating the cutting process in underground structure construction.

Project Director Toshio Araki (General Manager of the Civil Engineering Division of the International Civil Engineering Divisions Group) comments, "The most significant aspect of the project is constructing structures directly above and beneath the live MRT line. This is a technically complex project."

In the bidding for the project, the client adopted an evaluation method which placed higher priority on the technical side of the proposals, including designs and construction methods, rather than a lower price. POC's proposal included a Japan-made innovative engineering method for the interface with the existing MRT line, which had been considered most challenging. The client also valued POC's excellent track record, and the project was successfully awarded to POC after an open tender. Project Director Araki enthusiastically comments, "This is no doubt a high-profile project, and we will do our utmost to live up to their expectations. We just want to prove the excellence of Japanese innovative technologies as well as Japanese people." For Ryo Tajima, Senior Staff Member who joined POC six years ago, this is his first project site ever. Driven by his aspiration to work in the International Business Unit, this is his fifth year working in Singapore. Tajima eagerly comments, "Safety first is the most critical principle above all. My job is to pay particular attention to potential risks and threats onsite while fulfilling my duties."

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Mr. Tajima (left) and Mr. Araki

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Proven Track Record Led to Successful Award of Railway Facility Construction Building Further Trust by Overcoming Challenging Conditions

The Contract T232, the construction of a railway across the border of Singapore and Malaysia (awarded by the Land Transport Authority of Singapore, or LTA), is an integrated project that involves both building construction and civil engineering works. Of the Rapid Transit System connecting the two countries, POC undertakes the construction of a new station building, railroad truck tunnels and the Customs, Immigration and Quarantine building. All this will be built on a thirty-hectare site adjacent to the existing Woodlands North Station (completed in 2019, POC's solo venture) on the Thomson East-coast Line (TEL). The new facilities will be directly connected to the existing station building by an underpass, providing convenient access to the city center.



During peak months of construction and M&E works, 2,000 staff will work on site

On an average day, the motorways connecting the two countries are frequented by 250-300 thousand people, tormenting them with chronic traffic congestion. Once the new RTS is up and running, the travel time will be reduced to 15-16 minutes, providing a pragmatic solution to the plaguing congestion. The contract amount is approximately JPY 71.4 bn. The project was awarded on November 26, 2020, thanks to the client's focus on POC's expertise and construction quality showcased by the successful construction of the adjacent Woodland North station, rather than a low price presented by competitors.

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The project is characterized by the large amount of excavated soil, which amounts to approximately 1,350,000 m³. In addition, the site was underlain with hard bed rock, and approximately 250,000m³ of bedrock needed to be blasted with explosives. As the site was in close proximity to public housing buildings, schools and other MRT stations, blasting work required meticulous adjustment of explosive's amount in order to reduce vibrations and minimize impact on surrounding structures. Furthermore, the team drove as many as 1,500+ cast-in-situ piles into the coarse soil underlain with hard bedrock and buried boulders.

Keiji Uchida, Executive General Manager of the International Civil Engineering Divisions Group of the International Business Unit, who oversees the entire project as Project Director, looks back. "The amount of excavated soil and the number of piles driven were unprecedented for one single project. These two scopes proved to be extremely challenging."

One more thing to note was that the project was launched after the COVID-19 outbreak. The team exercised extreme caution to mitigate risks of infection, including providing staff members with exclusive accommodation on the project site in order to reduce risks of infection outside.

As of December 2024, the team consists of 6 Japanese nationals and 120 local staff members. And going forward, as many as 2,000 members will be working onsite during the peak months, which will involve the building interior works and M&E works. Uchida enthusiastically comments, "In Singapore, more MRT-related projects from the LTA are expected to be out for bidding. We will commit ourselves to build a strong trust and enhance our presence further in Singapore."



From left to right, Mr. Kim, Mr. Uchida and Mr. Hoshi

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Human Resources Play a Pivotal Role in Successful Completion of Complex Projects Enhancing Alliances with Local Entities to Support Overseas Expansion

In the site offices and on the construction sites and of a large hospital construction project "ECC & NDCS", a large-scale tunnel construction project "N105" and the Rapid Transit System (RTS) Link Contract "T232", diverse human resources from Singapore, South Korea, Malaysia, Bangladesh, Indonesia and Vietnam diligently work day to day towards one common goal of completing and delivering high-quality structures without major incidents.



President Shimizu (at the 60th Anniversary Ceremony held on December 6, 2024)

Penta-Ocean Construction (POC) has been awarded many complex projects thanks to their stellar track record and advanced construction technologies. One of the key factors of their success in Singapore was human resources. Currently, POC Singapore employs approximately 700 people, of which 60% is Singapore nationals and permanent residency (PR) holders. For the successful undertaking of construction projects in Singapore, localization of organization is of particular importance, and this includes giving key positions to Singapore nationals. In addition, in order to drive further growth, the company has set up alliances with local companies which specialize in M&E work and building construction.

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In 2020, POC made "UG M&E" a wholly owned subsidiary to strengthen its capacity in the M&E Engineering field. In 2021, POC formed a capital alliance with a local contractor and started collaboration in the fields of civil engineering and building construction. By establishing a supply chain in the country, POC develops a framework which enables taking on highly complex construction works.

Takuzo Shimizu, President and CEO of POC, comments, "The construction industry of Singapore is no doubt a very tough market with fierce competition. If you want to run a successful business in Singapore, it is critical to ensure ongoing support from local subcontractors and suppliers". POC has been recently awarded a M&E work for a largescale data center from a leading Singaporean company. According to President Shimizu, POC leverages these achievements and expertise gained in Singapore when undertaking projects in Japan.

Number of project awards in Singapore has been rising steadily, and overseas businesses have been expanding for the last decade, says President Shimizu. Although the International Business Unit has been temporarily in the red due to some loss-making projects, President Shimizu confidently points out, "Those loss-making projects are now nearing completion, and we have been steadily securing projects that will lead us to the next phase. We are aiming for a V-shaved profit recovery." POC's overseas operations, based in Singapore, are also active in other Southeast Asian countries such as Hong Kong, Indonesia and Vietnam.

The development of their overseas businesses outside of Singapore has also been steady and unfaltering. In 2025, they will mark the 30th anniversary of entering into the market of Vietnam, and in 2026 the 40th anniversary of entering into the market of Hong Kong.



Lining with 100-year-service-life MIC concrete, resistant to sulfide gas (Deep Tunnel Sewage System)

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