The information contained in this section, unless otherwise indicated, have been derived from various official government publications and other publications generally believed to be reliable and the market research report prepared by Frost & Sullivan which we commissioned. We believe that the sources of such information are appropriate sources for such information and have taken reasonable care in extracting and reproducing such information. We have no reason to believe that such information is false or misleading in any material respect or that any fact has been omitted that would render such information false or misleading in any material respect. None of our Company, the Sole Sponsor, the **[REDACTED]***, the* **[REDACTED]** *and the* **[REDACTED]** *or any of our or their respective directors, officers or representatives or any other person involved in the* **[REDACTED]***, except for Frost & Sullivan, has independently verified such information nor give any representation as to the accuracy or completeness of such information. As such, you should not unduly rely upon such information in making, or refraining from making, any investment decision.*

SOURCE OF INFORMATION

We have commissioned Frost & Sullivan, an independent market research and consulting company, to conduct an analysis of, and to prepare a report on the civil and electrical engineering industries in Hong Kong. The report prepared by Frost & Sullivan for us is referred to in this **[REDACTED]** document as Industry Report. We agreed to pay Frost & Sullivan a fee of HK$350,000 which we believe reflects market rates for reports of this type.

Founded in 1961, Frost & Sullivan has 40 offices with more than 2,000 industry consultants, market research analysts, technology analysts and economists globally. Frost & Sullivan's services include technology research, independent market research, economic research, corporate best practices advising, training, client research, competitive intelligence and corporate strategy.

We have included certain information from the Industry Report in this **[REDACTED]** document because we believe this information facilitates an understanding of the civil and electrical engineering industries in Hong Kong for the **[REDACTED]**. The Industry Report includes information of the civil and electrical engineering industries in Hong Kong as well as other economic data, which have been quoted in the **[REDACTED]** document. Frost & Sullivan's independent research consists of both primary and secondary research obtained from various sources in respect of the civil and electrical engineering industries in Hong Kong. Primary research involved in-depth interviews with leading industry participants and industry experts. Secondary research involved reviewing company reports, independent research reports and data based on Frost & Sullivan's own research database. Projected data were obtained from historical data analysis plotted against macroeconomic data with reference to specific industry-related factors. Except as otherwise noted, all of the data and forecasts contained in this section are derived from the Industry Report, various official government publications and other publications.

In compiling and preparing the research, Frost & Sullivan assumed that the social, economic and political environments in the relevant markets are likely to remain stable in the forecast period, which ensures the steady development of the civil and electrical engineering industries in Hong Kong.

MACRO ECONOMY OVERVIEW IN HONG KONG

Gross Value of Construction Work Performed

According to Census and Statistics Department, the gross value of construction works performed in Hong Kong by broad trade group has slightly increased from approximately HKD252.2 billion in 2018 to approximately HKD271.0 billion in 2023, representing a CAGR of 1.5%. However, a recession during 2019 and 2020 contributed by the social unrest and COVID-19 pandemic has occurred which led to (i) the suspension of construction work; and (2) worldwide lockdowns, thus affecting the supply of raw materials, resulting in delay to progress of the ongoing projects and commencement of new projects in Hong Kong. Nevertheless, the Government is keen to promote economic growth through infrastructural development, namely Kwu Tung North (KTN) and Fanling North (FLN) New Development Area (NDA) development, Kau Yi Chau Artificial Island under the Lantau Tomorrow Vision, which will foster the construction industry development in the future.

Government Expenditure on Infrastructure

By 2023, the government's expenditure on infrastructure had increased to HK$88.6 billion, from HK$66.8 billion. The upward trajectory in spending demonstrates the government's commitment to enhancing the region's infrastructure and addressing the evolving needs of the population. It is important to note that the COVID-19 pandemic, which emerged in 2020, had an impact on economic activities and supply chains in the region. However, despite these challenges, the Government remained focused on infrastructure development and continued to allocate substantial funds to such projects such as the Northern Metropolis Development, Hung Shui Kiu/Ha Tsuen New Development Area, Hong Kong-Shenzhen Innovation and Technology Park, Tung Chung Line Extension, site formation and infrastructure works for public housing development in Wang Chau etc. outlined in the Policy Address 2023 and the 2024/2025 Budget. Looking ahead, the government's commitment to infrastructure investment is expected to persist. Annual capital works expenditure is anticipated to rise, with an expenditure of HKD106.1 billion to be recorded in 2024 according to the Government Budget.

OVERVIEW OF CIVIL ENGINEERING MARKET IN HONG KONG

Definition and Segmentation of Civil Engineering

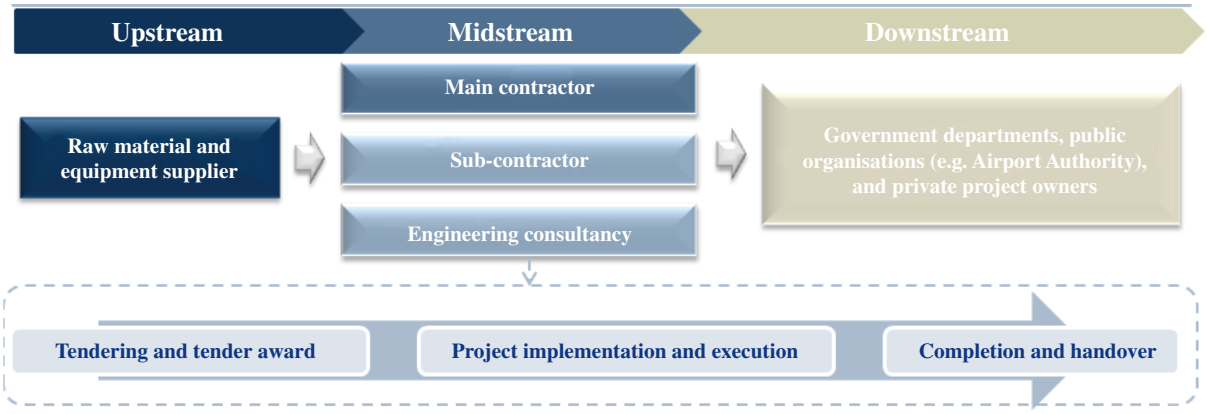
Civil engineering encompasses a wide variety of works that include the design, construction and maintenance of infrastructure, namely roads, bridges, tunnel, dams and power plants. According to Development Bureau, civil engineering works are generally classified into four segments, namely (i) ports works; (ii) roads and drainage; (iii) site formation; and (iv) waterworks. In particular,

- Roads works are usually grouped into two types, namely (i) construction of new roads, such as expressways, trunk roads, primary distributor roads, district distributor roads and local distributor roads, and (ii) maintenance of existing roads. Drainage and other works refer to construction, improvement and maintenance of sewage treatment facilities, storm water drainage facilities, as well as waste management and power plants.

- Site formation works include excavations on sloping land, filling, landslip preventive works, landslip remedial works, and ground water drainage works. These works are necessary to prepare a piece of land for foundation works and the subsequent construction of buildings and other structures through preparation of land with required orientation, shape or levels that can accommodate particularly buildings and facilities.

Value Chain Analysis

Below sets out the value chain of civil engineering works, comprising upstream raw materials and equipment supplier, midstream contractors and engineering consultancy and downstream clients such as government departments, public organisations and private project owners.



Source: Frost & Sullivan

Subcontracting is a common practice in civil engineering industry whereby main contractors subcontract the large scale projects to other contractors with specialist licences or capabilities in certain areas, including road and drainage works and site formation works, based on the track records, business relationship and capital requirements. In public sector, leading main contractors tender for the projects from the Government and government related organisations, which are then assigned to one or more subcontractors.

Joint venture, which refers to a business form that two or more person or entity engaged in a single defined project, is generally adopted by contractors for sizable civil engineering works. Key benefits of joint venture include enhancement of resources (e.g. capital and equipment) and technical expertise, as well as share the risk and costs involved. Establishment of joint venture is required for some large-scaled infrastructure projects by public owners.

Client concentration is a common occurrence within the civil engineering sector, in both public and private sector. The availability of construction works in Hong Kong depends on the Hong Kong Government's spending on construction and infrastructure in Hong Kong and its land supply policy, the approval of the Legislative Council of Hong Kong, and the investment plans and strategies of property developers.

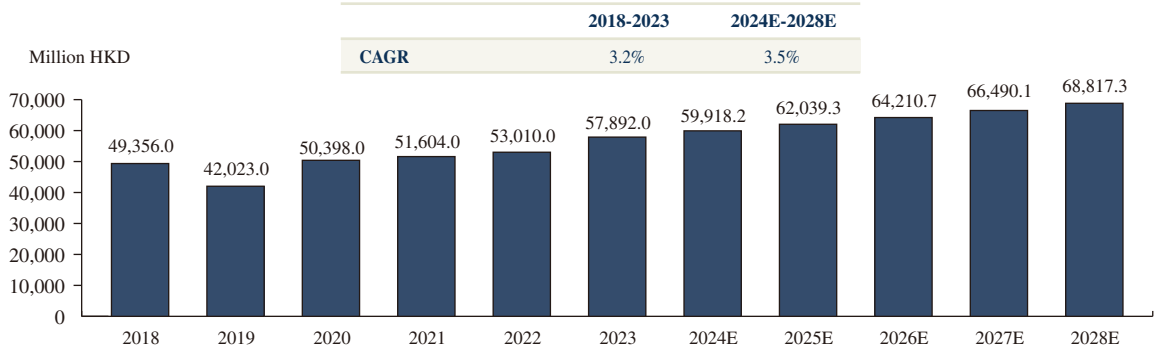
Gross Value of Civil Engineering Works

Since the completion of large scale infrastructure projects in 2018, such as Hong Kong–Zhuhai–Macau Bridge and Express Rail Link (Hong Kong section), along with the social unrest and the outbreak of COVID-19, the civil engineering industry in Hong Kong has become temporarily sluggish since 2019. However, the backlog of construction demand from previous years has been largely released in the last two years. According to the Census and Statistics Department, the gross value of civil engineering works performed by main contractors in Hong Kong recorded an overall incline from approximately HKD49,356.0 million in 2019 to HKD57,892.0 million in 2023, representing a CAGR of approximately 3.2%. The increase in 2023 was due to the Commencement of stage 2 of phrase 2 of Improvement works at Mui Wo and Phase 2 of Site Formation and Infrastructure Works for the Development of ex-Cha Kwo Ling Kaolin Mine Site.

The rollout and commencement of projects such as Kwu Tung North (KTN) and Fanling North (FLN) New Development Area (NDA), Kau Yi Chau Artificial Island under the Lantau Tomorrow Vision, Tung Chung New Town Extension in the coming few years, shall sustain demand for civil engineering works, the gross value of civil engineering works in Hong Kong is expected to increase at a CAGR of 3.5% during 2024 to 2028.

The Northern Metropolis development will have a significant impact on the civil engineering and construction sector in Hong Kong. In particular, the development of the "Northern Metropolis University Town" will require the construction of new campuses and facilities, with the government reserving more than 60 hectares of land in Hung Shui Kiu/Ha Tsuen, Ngau Tam Mei, and New Territories North New Town for this purpose. The construction of the Hong Kong-Shenzhen Innovation and Technology Park (HSITP) in the Loop and the adjacent Shenzhen I&T Zone will also involve substantial civil engineering work to develop the necessary infrastructure and buildings. Furthermore, the development of the four major zones, namely High-end Professional Services and Logistics Hub, I&T Zone, Boundary Commerce and Industry Zone, and Blue and Green Recreation, Tourism and Conservation Circle will necessitate the construction of various commercial, industrial, and recreational facilities. Lastly, the planned transport infrastructure projects, such as the Hong Kong-Shenzhen Western Rail Link (Hung Shui Kiu — Qianhai), Northern Metropolis Highway, and Route 11, will require extensive civil engineering work, contributing to the growth of the sector. As estimated by the Development Bureau, the total cost of projects in the Northern Metropolis will exceed HK$224.7 billion. The majority of this expenditure, HK$121.5 billion, is allocated for land resumption in four key areas: Kwu Tung North (古洞北), Fanling North, San Tin, and the San Tin Technopole. Site formation and infrastructure development make up a significant portion of the total cost, amounting to approximately HK$99.3 billion or 44% of the overall expenditure. Additionally, HK$3.1 billion has been set aside for detailed design work, while studies account for a further HK$610 million.

Gross Value of Civil Engineering Works by Main Contractors (Hong Kong), 2018-2028E

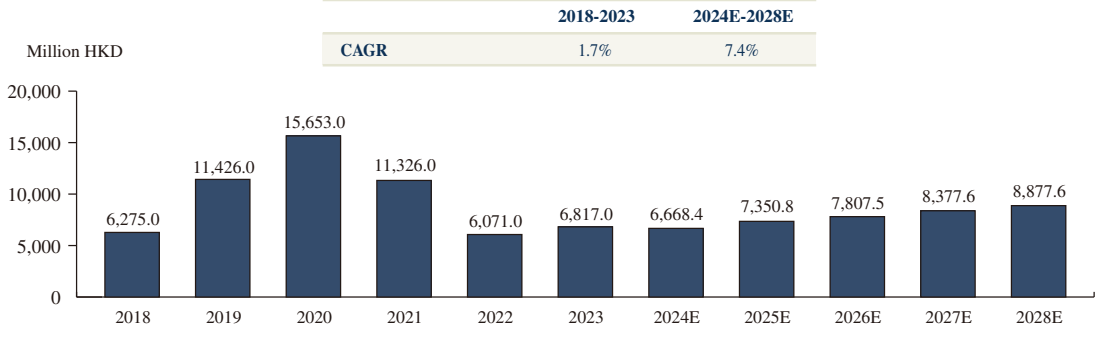


Source: Frost & Sullivan

Gross Value of Site Formation and Clearance Works

According to the Census and Statistics Department, the gross value of site formation and clearance works registered an overall growth from approximately HKD6,275.0 million in 2018 to HKD6,817.0 in 2023, representing a CAGR of 1.7%. The robust growth during 2019 and 2020 was mainly attributable to the tender award and commencement of site formation and associated infrastructural works for new development areas, such as Kwu Tung North and Fanling North New Development Area. The drop in 2022 and 2023 was due to the completion of site formation and infrastructure works at Yau Yue Wan and Pak Shing Kok, Columbarium Development at Sham Shui Kok and Public Housing Development at Cheung Muk Tau and ex-Mount Davis Cottage Area in Kennedy Town. The commencement of development projects and construction works, namely the Development of ex-Cha Kwo Ling Kaolin Mine Site, Queen's Hill Extension, Tuen Mun Central Phase 2, Kwok Shui Road, Choi Shun Street, Development of ex-Cha Kwo Ling Kaolin Mine Site (Phase 2) and Public Housing Developments at Chak On Road South, supports the market demand for site formation works. Attributable to the planned infrastructure development projects, the gross value of site formation and clearance works is forecasted to increase at a CAGR of 7.4% during the period from 2024 to 2028.

Gross Value of Site Formation and Clearance Works by Main Contractors (Hong Kong), 2018-2028E

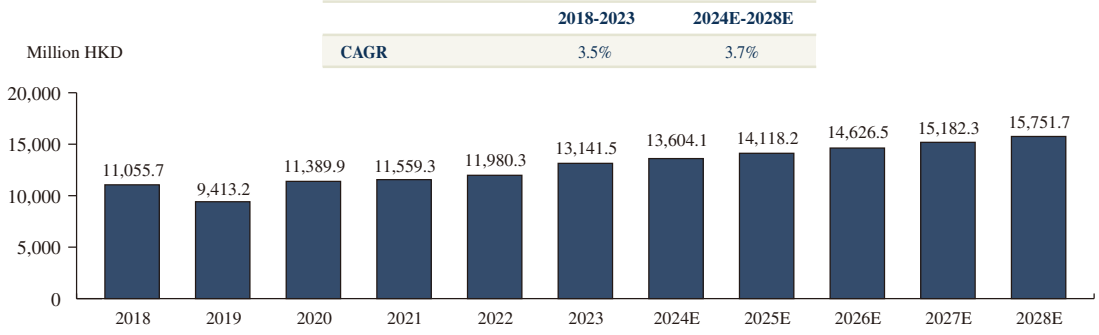


Source: Frost & Sullivan

Gross Value of Construction Works for Roads and Drainage

The gross value of roads and drainage in Hong Kong has witnessed a moderate increase from HKD11,055.7 million in 2018 to HKD13,141.5 million in 2023, mainly attributed to large-scale road construction and improvement projects, including the Central Kowloon Route, Widening of Western Section of Lin Ma Hang Road between Ping Yuen River and Ping Che Road, Braemar Hill Pedestrian Link, Flyover from Kwai Tsing Interchange Upramp to Kwai Chung Road, Improvement works at Tsuen Tsing Interchange and so on. The drop in 2019 was due to the completion of construction of dual 2-lane Connecting Road linking up the BCP with Fanling Highway. Looking forward, Development at Anderson Road and Kwok Shui Road are expected to boost the development of civil engineering sector in Hong Kong, and the gross value of roads and drainage in Hong Kong is expected to reach HKD15,751.7 million in 2028, at a CAGR of 3.7% from 2024 to 2028.

Gross Value of Roads and Drainage Works by Main Contractors (Hong Kong), 2018-2028E



Source: Frost & Sullivan

Market Drivers

1. Constant demand for infrastructural works

Government spending on infrastructure has demonstrated stability, increasing at a CAGR of 0.7% from HK$85.6 billion in 2018 to HK$88.7 billion in 2023. The Government intends to maintain its commitment to infrastructure investment, as stated in the 2024/2025 Budget Speech, and it is projected that annual capital works expenditures will increase to HKD105.8 billion in 2024/2025. Additionally, the average annual capital works expenditure will be about $90 billion in the next five years, representing an increase of about 17% over the average annual expenditure of $76 billion in the past five years, according to the latest speech in May 2024 from the Development Bureau. Much of the future works expenditure will be invested in the development of the Northern Metro Area and in taking forward other land creation projects. The expenditure limit for each minor project funded in relation to public facilities and various infrastructure sites was increased in the aforementioned policy address. The implementation of the Long Term Housing Strategy, which ensures a continuous supply of housing, and the development of new town extension projects such as Tung Chung, Kai Tak, Kwu Tung North (古洞北), Fanling North, Hung Shui Kiu, and Yuen Long South are anticipated to increase demand for the construction of related infrastructural facilities in the nearby. This includes the expansion of power and pumping stations, tunnels, bridges, and mass transit railway systems. As a result, it is anticipated that the rapid implementation of public infrastructure projects and urban development will provide Hong Kong's civil engineering sector with sustained growth.

2. Consistent government support

In response to personnel shortages and ageing workforces, which are obstacles in the construction industry, the Hong Kong government has increased its financial assistance efforts to improve industry standards. The Government of Hong Kong intends to allocate HK$100 million to the Construction Industry Council in the Budget for 2023—2024 in order to support manpower training. This funding will be used to increase the number of training places and the allowance for trades experiencing labour shortages in an effort to attract new entrants and job changers. In addition, in order to ensure an adequate workforce, the government implemented the Labour Importation Scheme for the Construction Sector. As a vital subsegment of the Hong Kong construction industry, the civil engineering works industry is anticipated to benefit from the aforementioned government initiatives, particularly those undertaken by the Construction Industry Council. According to Construction Industry Council, the labour shortage in construction section in Hong Kong would be 40,000 in 2027. The Supplementary Labour Scheme was introduced by the Hong Kong Government in 2023 to alleviate the manpower shortage across different sectors in Hong Kong. In particular, Hong Kong is set to import around 12,000 workers in a bid to alleviate the labour crunch in the construction sector, filling in approximately 30% of the shortage in 2027.

3. Sustainable development plan for transportation structure and facilities

Transport structure and facilities are essential in enhancing connectivity within and beyond the city and contributes significantly to Hong Kong's long-term competitiveness and citizen's quality of life. According to the "Hong Kong Major Transport Infrastructure Development Blueprint" announced in 2023, which proposed nearly 40 transport infrastructure projects, including 20 railway or smart green mass transport system projects, and 18 major arterial roads, including more than 30 projects are expected to be completed within the next 15 years. In particular, the mass transit railway is partly commenced in 2023 and 2024, including Tuen Mun South Extension, and the construction of Northern Link, Kwu Tung Station (古洞站), Tung Chung West Station, and Hung Sui Kiu Station. With well-planned expansion plan, the demand for transportation structure and facilities is expected to grow steadily.

4. Trend in Adoption of Electric Equipment in Construction Sector

Green construction is crucial for mitigating climate change, conserving resources, improving energy efficiency, promoting occupant health, and meeting regulatory requirements. It offers numerous benefits to the environment, occupants, and the economy, making it an essential practice for the future of the construction industry. There is a rising trend in introducing electric equipment in the construction sector in Hong Kong to reduce carbon emissions and transition to more sustainable practices. HK Electric introduced a new comprehensive service in April 2021. This service aims to assist construction sites in achieving zero carbon emissions by replacing diesel generators with a reliable and sufficient supply of electricity from the grid. By doing so, it completely eliminates the negative effects of air and noise pollution caused by diesel generators on site workers and the surrounding community. Additionally, this initiative contributes to reducing the overall carbon footprint associated with the construction process. Sun Hung Kai Properties Limited made a notable announcement in February 2024, revealing their acquisition of nine electric construction equipment units. These newly acquired machines are intended to replace their existing diesel-powered counterparts. This strategic decision to transition towards electric equipment marks a significant milestone in the advancement of sustainable and environmentally-friendly construction practices. Sun Hung Kai Properties Limited's initiative also serves as a noteworthy example for the wider construction industry to follow in their pursuit of

decarbonization and greener operations. The adoption of electric equipment produces fewer emissions compared to traditional diesel-powered machinery. This can help reduce air pollution and contribute to improved air quality in Hong Kong.

Market Trends and Opportunities

1. Consistent Transition to Green Building

With the increasing awareness of environmental protection, the government has issued and continuously revised Buildings Energy Efficiency Ordinance (BEEO) to raise industry standards and promote market demand for energy efficiency solutions. Besides, the government is also continuously promoting sustainable building methods, such as modular integrated building (MiC) methods, to reduce construction waste. The industry is also actively involved, for instance, the Hong Kong Green Building Council (HKGBC) has also introduced the first-ever "Climate Change Framework for Built Environment" and "Zero-Carbon-Ready Building Certification Scheme" in 2023 to encourage the industry to adopt systematic and benchmark-driven approaches to reduce energy consumption. Therefore, green buildings will be a key development trend in the civil engineering industry.

2. Accelerating digitalization of construction industry

Hong Kong's construction industry to gradually move towards digitalisation. The Hong Kong Civil Engineering and Development Department (CEDD) has initiated the "BIM Horizontal Harmonization for BIM/GIS Integration" in the initial phase of the Kwu Tung North (古洞北) and Fanling North New Development Areas (NDAs) project that encourage all organisations engaged in public works in Hong Kong to adopt, which is expected to extend to future capital works projects or even private projects to support the development of smart cities. Furthermore, the Hong Kong Institute of Architects (HKIA) is actively engaged in advocating for the industry's integration of construction digitisation technology through its provision of training, accreditation of Building Information Modelling (BIM) credentials, and accreditation of training programmes, among other initiatives. Digital transformation of Hong Kong's infrastructure will proceed at an accelerated rate in the future.

OVERVIEW OF ELECTRICAL ENGINEERING INDUSTRY IN HONG KONG

Definition and Segmentation of Electrical Engineering Works

Electrical engineering works refer to the installation, upgrading, and maintenance of electrical systems in infrastructures, buildings and facilities. The scope of electrical engineering works includes (i) installation of electrical wiring systems, such as conduits, cables, and associated components, to distribute electrical power and signals across cities and regions or throughout a building or facility, and (ii) the installation of various electrical equipment and devices, such as switchgear, transformers, circuit breakers, lighting fixtures, power outlets, and control systems. Electrical engineering works could be further divided into electrical wiring, general electrical installation, and electrical control and power panel assembly. Among various forms of electrical engineering works, electrical cable works refer to the specialised and infrastructural activities and processes involved in the installation, maintenance, and repair of underground cables used for electrical power transmission and distribution, as well as telecommunications purposes. These works can be further classified by installation method, voltage level, and usage. The process typically involves cable trenching, which entails digging trenches in the ground to create a protected pathway for electrical cables, followed by cable laying, which involves the careful

placement of electrical cables within the prepared trenches to maintain their integrity and functionality. Finally, cable jointing is performed to connect individual sections of electrical cables, forming a continuous electrical conduit while ensuring durable and reliable connections through specialised techniques, ultimately maintaining the electrical conductivity and performance of the network.

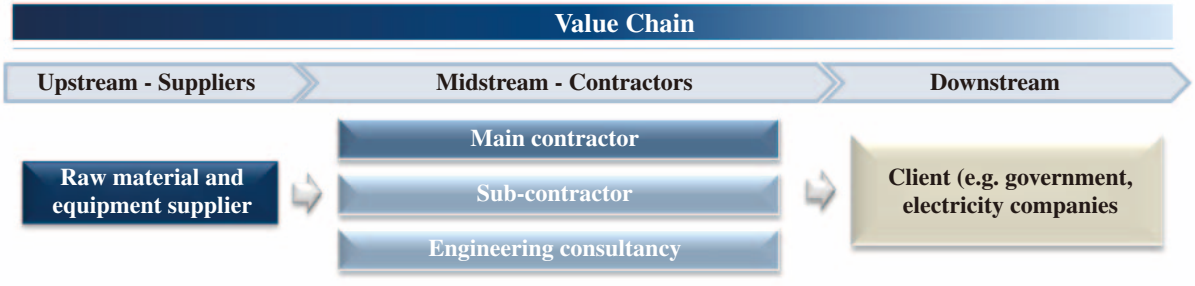
Value Chain Analysis

In the upstream phase, the primary activity is material sourcing which involves procuring high-quality, durable materials necessary for electrical installations, such as copper wires, photovoltaic panels, turbines, and various electrical components. Establishing and maintaining strong relationships with suppliers is crucial to ensure a continuous supply of these materials at competitive prices.

The midstream segment is concerned with the physical construction and installation, which are central to establishing electrical infrastructure. The segment encompasses a broad scope of services provided by construction contractors, including the integrated process of cable trenching, laying, and joining. These contractors are responsible for ensuring that all aspects of the electrical installation meet the technical requirements and comply with local safety standards. The role of efficient project management is crucial here, as it involves overseeing the construction activities from start to finish, ensuring that the projects adhere to predetermined schedules, budgets, and regulatory compliances.

In the downstream phase, the primary clients are electricity companies and government departments that delegate construction work to the midstream providers. These clients play a pivotal role in planning and commissioning projects. In the electrical construction works industry, the relationship between midstream contractors and their downstream clients, including government departments, CLP Holdings, HK Electric, and private developers, is integral to secure new and recurring project. Besides, some electrical construction works industry players acting as subcontractors who establish sound relationship with main contractor are gain competitive advantage as well.

In recent years and for example, Yee Hop Engineering is having HK Electric, CLP Holdings and Swire Property as their downstream client. Kum Shing Group and CLPe Solutions are having CLP Holdings as their downstream client.

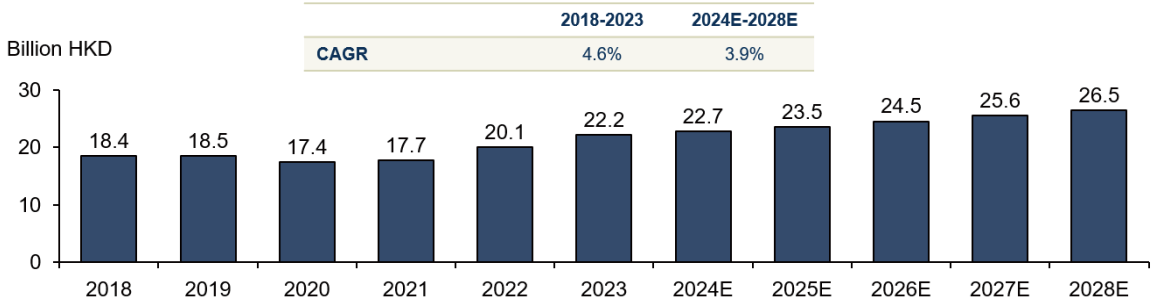


Source: Frost & Sullivan

Gross Value of Overall Electrical Works

Electrical works encompass a wide range of activities related to low voltage and high voltage fixed electrical systems. These activities include installation, commissioning, inspection, testing, maintenance, modification, and repair, as well as the supervision and certification of the work performed. The market size of overall electrical works in Hong Kong has increased from HK$18.4 billion in 2018 to HK$22.2 billion in 2023, representing a CAGR of approximately 4.6% during 2018 to 2023, and is projected to further climb to HK$26.5 billion by 2028, maintaining a CAGR of around 3.9% between 2024 and 2028. The steady growth can be attributed to several factors, including the ongoing development of new residential and commercial buildings, the expansion and upgrade of existing electrical infrastructure, and the increasing adoption of smart building technologies. Additionally, the Hong Kong government's initiatives to promote energy efficiency and sustainable development are expected to drive the demand for advanced electrical systems and solutions, further contributing to the market's growth.

Gross Value of Overall Electrical Works (Hong Kong), 2018-2028E

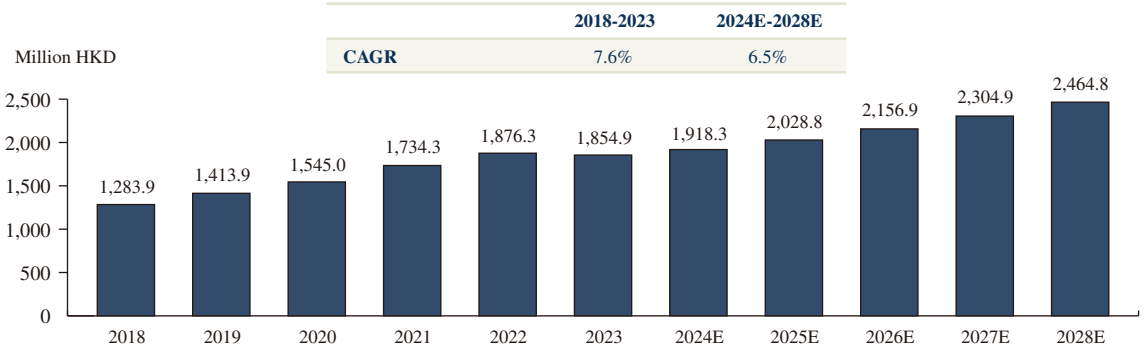


Source: Census and Statistics Department of Hong Kong, Frost & Sullivan

Gross Value of Power Cabling and Civil Pipeline Installation, and Solar System Construction and Maintenance

The Gross Value of Power Cabling and Civil Pipeline Installation, and Solar System Construction and Maintenance in Hong Kong is has witnessed a steadily increase during past few years., with the value rising from HK$1,283.9 million in 2018 to HK$1,854.9 million in 2023, representing a CAGR of approximately 7.6% during 2018 to 2023, and the gross value is expected to further rise to HK$2,464.8 million in 2028, representing a CAGR of approximately 6.5% during 2024 to 2028. The growth is mainly attributable to the rollout of extensive electricity infrastructure development projects including the CLP Power's and HK Electric's 2024-2028 Development Plan, as well as new town development in the Northern Metropolis and Lantau Island, Besides, supportive government initiatives promoting renewable energy, such as the Feed-in Tariff (FiT) Scheme and the Renewable Energy Certificate (REC) Scheme, are driving the adoption of solar PV systems, propelling the market size.

Gross Value of Power Cabling and Civil Pipeline Installation, and Solar System Construction and Maintenance (Hong Kong), 2018-2028E



Source: Frost & Sullivan

Market Drivers

1. Infrastructure Development Projects of Major Electricity Corporates

Hong Kong's commitment to upgrading and expanding its power transmission infrastructure is driving the cable laying, trenching, and joining industry. In 2023, CLP Holdings launched a $52.9 billion development plan for 2024-2028, which includes investments in electrical cable, power generation facilities, substations, and renewable energy projects. This plan will support the development of new areas, housing growth, data centres, district cooling systems, railway projects, hospitals, and other infrastructure, all requiring extensive cable work. Similarly, HK Electric announced a $22 billion investment plan for 2024-2028 to address climate challenges, sustain decarbonization efforts, strengthen the power grid, upgrade the distribution system, deploy smart metres, and enhance system resilience. These projects will involve substantial cable laying, trenching, and joining work, as well as specialised services to support grid intelligence and automation.

2. Expedite New Town Developments

The Hong Kong government's commitment to new town development projects, as outlined in the Policy Address 2023, is a significant driver of demand for electrical cable works. The Civil Engineering and Development Department is overseeing projects such as the Hung Shui Kiu/Ha Tsuen New Development Area, Northern Metropolis, and Kau Yi Chau Artificial Island under the Lantau Tomorrow Vision. These developments will require extensive cable laying, trenching, and joining services to support power supply, communication systems, and smart city initiatives. The government's focus on infrastructure modernization and integration with the Greater Bay Area further bolsters the growth of the cable construction industry, ensuring a strong pipeline of opportunities in the coming years.

3. Supportive Government Initiatives

In line with Hong Kong's Climate Action Plan 2050, the government aims to increase the share of renewable energy in the fuel mix for electricity generation to 7.5% to 10% by 2035 and 15% by 2050, despite geographical and environmental constraints. To achieve these goals, the government offers incentives such as the Feed-in Tariff (FiT) Scheme, allowing businesses and households to sell electricity generated by their solar PV systems to the grid at a preferential rate,

and the Renewable Energy Certificate (REC) Scheme, enabling companies and individuals to purchase RECs to demonstrate their commitment to sustainability. These policies have driven demand for companies specialising in the design, supply, installation, and maintenance of solar PV systems, with FiT scheme applications increasing from 60 in 2018 to over 18,000 in 2021. As a result, solar energy among renewable energy sources significantly increased from 47 TJ in 2018 to 432 TJ in 2021, mainly due to the FiT scheme.

4. Corporate and Organisations Sustainability Initiatives

In Hong Kong, owing to rising environmental awareness and the enforcement of the Building (Energy Efficiency) Regulation, many organisations are recognising the importance of reducing their carbon footprint and are setting ambitious targets to minimise their environmental impact. Installing solar PV systems on commercial buildings, educational facilities, and other institutional properties is becoming an increasingly popular way for these organisations to demonstrate their commitment to sustainability and reduce their energy costs. Moreover, the long-term cost savings associated with solar PV systems make them an attractive investment for organisations. As more institutions in Hong Kong embrace sustainability as a key priority, the demand for solar PV systems and related services is expected to grow. The Solar Harvest programme was introduced by the Government of Hong Kong to subsidise and assist schools and welfare non-governmental organisations (NGOs) that receive recurrent subventions from the Social Welfare Department, in installing small-scale solar energy generation systems at their premises. Such government policies would further promote the use of solar energy in Hong Kong.

Market Trends and Opportunities

1. Adoption of Smart Grid Technologies in Electricity Supply

The adoption of smart grid technologies in Hong Kong is driving significant demand for underground electricity cable works, as the transition to a more intelligent, efficient, and sustainable power network requires substantial upgrades and expansions to the existing infrastructure. The deployment of smart metres, integration of renewable energy sources, implementation of advanced automation systems, and expansion of electric vehicle charging infrastructure all necessitate extensive underground electricity cable installations, trenching, and maintenance services. As major electricity companies like CLP Power continue to invest in smart grid technologies to improve energy efficiency, reliability, and sustainability, the demand for underground electricity cable works will remain strong, presenting substantial opportunities for companies specialising in this field and playing a critical role in realising Hong Kong's smart grid ambitions.

2. Technological Advancement in Electrical Cable Works

Technological advancements are driving market trends in Hong Kong's underground electricity cable works industry. The adoption of high-temperature superconducting cables enables the transmission of larger amounts of electricity in a smaller footprint, reducing environmental impact. The use of robotics and automation in cable installation and maintenance processes improves efficiency, safety, and precision while reducing costs and project timelines. Smart sensors and monitoring technologies enhance the reliability and longevity of the power network. As Hong Kong prioritises innovation and sustainability in its energy infrastructure, the adoption of these technological advancements will remain a key market trend, driving demand for specialised skills and services in the underground electricity cable works industry.

3. Cost of Solar PV Systems is diminishing

In recent years, the prices of solar PV panels and related components have fallen constantly, attributable to advancements in manufacturing processes, increased production scale, and intense competition among suppliers, making solar PV systems more affordable and cost-competitive with traditional energy sources. In turn, the lower upfront costs and shorter payback periods associated with solar PV installations have made them an attractive investment option, driving demand for design, supply, installation, and maintenance services in the city. As the cost of solar PV technology is expected to continue declining in the future, this market trend will likely persist, creating significant opportunities for companies operating in the solar PV sector to capitalise on the growing demand for affordable and sustainable energy solutions in Hong Kong.

4. Technological Advancement in Solar PV Systems

Technological advancements in the solar PV industry are driving significant improvements in the performance, efficiency, and attractiveness of solar PV systems. For instance, the introduction of higher efficiency solar PV panels, which can convert a greater portion of the sun's energy into electricity compared to earlier generations of panels. Moreover, the integration of smart monitoring systems and data analytics tools allows for real-time performance tracking, fault detection, and predictive maintenance, enhancing the reliability and optimising the performance of solar PV installations. Another significant technological advancement is the development of energy storage solutions, such as high-capacity batteries, which enable the storage of excess solar energy generated during the day for use during periods of low or no sunlight.

Introduction of Smart Site Safety System ("SSSS")

The Hong Kong government has been promoting the adoption of smart safety systems in the construction industry to enhance site safety. In March 2023, the Development Bureau issued a circular outlining the implementation of the Smart Site Safety System (SSSS) in public works contracts. The SSSS covers 10 main categories, including centralised management, digitalized tracking, and AI-powered safety monitoring. The government aims to have 100 sites using the SSSS by July 2023 and 500 sites by the end of the year. To support the adoption of SSSS in private projects, the Construction Industry Council has introduced a funding scheme under the Construction Innovation and Technology Fund, providing subsidies for the purchase of pre-approved smart safety products. The government also plans to expand the scope of the subsidy to include IT and sourcing support. Construction companies are actively developing and applying SSSS in their projects, collaborating with universities, research institutions, and technology companies to create innovative solutions. With the government's support and the industry's proactive approach, the widespread implementation of SSSS is expected to drive significant improvements in construction safety and efficiency in the coming years.

Market Challenges and Threats of Civil and Electrical Engineering Works Industries

1. Higher labour cost and shortage of labour

As a result of immigration and the difficulty in attracting young people to enter the industry, declining birth rates, an ageing population, the civil and electrical engineering works industries in Hong Kong has been confronted with severe shortages of skilled and experienced labour, which may result in increased construction costs and schedule delays. While the foreign labour importation scheme has been able to alleviate the labour shortage to a certain extent, there is still a need to take into account the 4-6 month processing cycle and the unfilled labour positions, as the

Construction Industry Council projects that the qualified labour shortage in Hong Kong's construction sector is expected to rise from approximately 10,000 in 2023 to 40,000 in 2027. Hence, to retain and attract competent personnel, market participants might be required to implement strategies such as offering competitive compensation packages and providing flexible work schedules. The escalating competition for skilled personnel will lead to elevated labour expenses and present a hindrance to the growth of the civil engineering and electrical construction works sector in Hong Kong.

2. Higher material cost

Over the past five years, prices of major raw materials used in civil engineering and electrical construction works have generally experienced an increase. For example, prices of portland cement, bitumen and diesel fuel have increased from 2018 to 2023, representing CAGRs of approximately 5.2%, 5.6% and 8.1% respectively. Such increases in material cost will result in higher expenditures of civil engineering works, which may further negatively impact their profit margin.

3. Rising project complexity

After the end of the epidemic, construction projects in Hong Kong quickly resumed. In addition to facing tight project delivery dates, the civil engineering and electrical construction works industry in Hong Kong is also facing an increasing trend of engineering complexity, and customer demands are becoming increasingly complex, which may include higher requirements for building materials. Therefore, this leads to additional workload and expenses for market participants, including but not limited to the procurement of specific materials, increasing the number of employees, and recruiting relevant professionals.

Cost Analysis of Civil Engineering and Electrical Construction Works

Labour Cost

The civil engineering sector commonly involves various types of labour, such as Concreters, Drainlayers, Bar bender and fixer, Metal Workers, General Welders, Structural Steel Welders, and so forth. The Labour Wage Index has demonstrated a mild increase from 100 in 2018 to 102.1 in 2023, at a CAGR of 0.4%. The primary factor contributing to the moderate increase observed in 2020 is labour shortages caused by the epidemic. Overall speaking, the public sector construction labour wage index has exhibited a relatively restrained climb, primarily propelled by social unrest in 2019, a decline in the completion of significant infrastructure projects subsequent to 2018, and the repercussions of the epidemic from 2020 to 2022, which have been compounded by inflationary pressures. The price index of labour wages for civil engineering contracts in Hong Kong is expected to rise at a CAGR of 0.5% from 2024 to 2028, driven by the sustained growth of civil engineering works and the associated demand for workers in Hong Kong.

The average daily wages of workers engaged in electrical construction works such as cable trenching, laying and joining, and installation of solar panels in Hong Kong have demonstrated a positive trend between 2018 and 2023. All three key occupations including electrical fitters (including electricians), cable jointers (power), and plant & equipment operators (load shifting) has experienced a steady increase in their average daily wages over the five-year period, recording CAGRs of approximately 1.2%, 1.8% and 1.0% respectively. Cable jointers (power) witnessed the most significant growth. The upward trend in wages reflects the growing demand for skilled workers in the electrical construction works sector and the recognition of their expertise and

contribution to the industry. With the increasing demand for electrical engineering works, the average daily wages of workers engaged in electrical engineering works in Hong Kong are expected to record positive growth from 2024 to 2028.

Index of Labour Wages For Civil Engineering Contracts (Hong Kong), 2018–2023

2018=100	2018	2019	2020	2021	2022	2023	CAGR (2018–2023)	CAGR (2024E–2028E)
Electrical fitter (incl. electrician)	100.0	101.8	102.2	101.3	101.3	102.1	0.4%	0.5%

Average Daily Wages of Workers Engaged in Electrical Engineering Works (Hong Kong), 2018–2023

HK$	2018	2019	2020	2021	2022	2023	CAGR (2018–2023)	CAGR (2024E–2028E)
Electrical fitter (incl. electrician)	1,236.6	1,207.3	1,247.4	1,234.9	1,255.3	1,309.5	1.2%	1.0%
Cable jointer (power)	1,119.4	1,393.1	1,330.8	1,202.3	1,327.2	1,226.7	1.8%	1.6%
Plant & equipment operator (load shifting)	1,241.8	1,221.0	1,222.0	1,237.6	1,282.9	1,303.0	1.0%	0.8%

Source: Census and Statistics Department of Hong Kong, Frost & Sullivan

Material Cost

According to Census and Statistics Department, the price indices of major raw materials in civil engineering works, including steel reinforcement, Portland cement, bitumen, diesel fuel demonstrated stable increases during 2018 to 2023. The increase in the price index of steel reinforcement was mainly attributable to an exponential increase in downstream industries' demand such as demand for electrical products along with the resumptions of global economic activities since 2021. As the major element for Bitumen production, the rebound in crude oil price underpinned the significant increase in price of bitumen. The rise in price of cement is associated with the inputs commodity cost pressure such as coal and diesel. The gradual increase in diesel fuel is attributable to the increase substitution demand for natural gas given the fact of the high natural gas price in recent years.

Advancements in technology may lead to more efficient and cost-effective machinery and equipment. This can contribute to lower rental prices as newer equipment may require less maintenance, have lower operating costs, or offer improved productivity. The producer price index of rental of machinery and equipment decreased slightly during 2018 to 2023 with a CAGR of -1.7%. Going forward, the rising commodity prices and inflation rates, and sustained demand for construction works would continue to drive the prices of raw materials in civil engineering works in Hong Kong.

Price Trends of Major Raw Materials in Civil Engineering Works (Hong Kong), 2018–2023

(2017=100)	2018	2019	2020	2021	2022	2023	CAGR (2018–2023)	CAGR (2024E–2028E)
Steel reinforcement	139.6	133.5	128.6	205.4	196.5	163.4	3.2%	2.7%
Portland cement	93.2	96.2	98.7	106.2	120.7	120.2	5.2%	4.0%
Bitumen	131	139.4	133.7	150.5	172.7	171.7	5.6%	4.2%
Diesel fuel	132.2	139.1	137.7	158.5	191.5	194.7	8.1%	5.1%

Source: Census and Statistics Department of Hong Kong, Frost & Sullivan

COMPETITIVE LANDSCAPE OF CIVIL ENGINEERING MARKET IN HONG KONG

The civil engineering market in Hong Kong is relatively concentrated. As estimated, the aggregate market share of top three market participants in civil engineering industry in Hong Kong in 2023 was approximately 22.4%. The Group recorded the revenue of HKD365.5 million, accounting for a market share of approximately 0.6% in the overall civil engineering industry in Hong Kong in 2023.

Ranking and Market Share of Leading Civil Engineering Works Contractor in Hong Kong by Revenue, 2023

Rank	Market participant	Headquarter	Listed	Background	Estimated revenue in 2023 (HKD billion)	Estimated market share in 2023 (%)
1	**Build King Holdings Ltd.**	Hong Kong	Yes	The subsidiary of a Hong Kong-based construction group listed on the Hong Kong Stock Exchange, with a focus on civil engineering	7,186.0	12.4%
2	**Bouygues Travaux Public**	France	No	A subsidiary of a French industrial group listed on the Euronext Paris exchange, specializing in civil engineering, real estate development, media, telecommunications services	3,428.9	5.9%
3	**China Road and Bridge Corporation**	The PRC	No	A wholly-owned subsidiary of an infrastructure development group listed on the Hong Kong Stock Exchange	2,333.2	4.0%
N/A	**The Group**				365.5	0.6%

Source: *Frost & Sullivan*

Note: The ranking is based on the revenues for the year ended 31 March 2024.

COMPETITIVE LANDSCAPE OF ELECTRICAL ENGINEERING INDUSTRY IN HONG KONG

The electrical engineering works in Hong Kong is relatively fragmented. According to Construction Industry Council ("**CIC**"), there were approximately 1,778 subcontractors on the List of Registered Subcontractors under the trade code of Electrical of CIC as of April 2024. Among the registered contractors, it is estimated that there were approximately 600 market participants in the power cabling & civil pipeline installation market in Hong Kong in 2023 and there were approximately 300 market participants in the solar system construction and maintenance market in Hong Kong in 2023. The Group is the largest power cabling & civil pipeline installation subcontractor in Hong Kong in 2023 with the market share of 13.6%.

The solar system construction and maintenance in Hong Kong is relatively fragmented. The solar system construction and maintenance market is competitive with the market participants focusing on different customers group in Hong Kong, namely government institutions, public housings, schools, village houses and other buildings. In particular, the project scale of government institutions, public housings, schools tend to be greater than village houses and other buildings. Companies that demonstrate superior technical and project execution capabilities are more likely to bid large scale projects and succeed in this market in Hong Kong.

Ranking and Market Share of Leading Power Cabling & Civil Pipeline Installation Subcontractor in Hong Kong by Revenue, 2023

Rank	Market participant	Headquarter	Listed	Background	Estimated revenue in 2023 (HKD billion)	Estimated market share in 2023 (%)
1	**The Group**	Hong Kong	No	NA	113.2	13.6%
2	**Yat Cheong Civil Engineering Company Limited**	Hong Kong	No	A sub-contractor engaged in civil engineering works and electrical works	60.0	7.2%
3	**Wang Yu Engineering Company Limited**	Hong Kong	No	A contractors specializing in public road excavation and cable laying works in Hong Kong	45.0	5.4%

Source: *Frost & Sullivan*

Note: The ranking is based on the revenues for the year ended 31 March 2024.

The Group is one of the pioneer in introducing electric equipment in the construction industry in Hong Kong. Electric equipment generally has lower emissions and a smaller carbon footprint compared to traditional diesel-powered equipment. This can help construction companies reduce their environmental impact and contribute to more sustainable construction practices. This also produces little to no direct emissions on-site, leading to cleaner air quality for construction workers and surrounding communities and tends to be quieter in operation compared to diesel-powered machinery. By introducing electric equipment, the Group is positioned as an innovative leader in the construction industry, which helps the Group gain a competitive edge and attract clients seeking more environmentally-friendly construction solutions.

The Group also has a higher direct labour ratio other contractors in the construction industry in Hong Kong. A higher direct labour ratio enables the Group to have higher productivity, specialised expertise, operational flexibility, and the ability to deliver high-quality services to its clients. Direct workers are responsible for the hands-on execution of tasks, which can improve the efficiency and pace of the construction process. With a focus on direct labour, the Group can attract and retain highly skilled workers with specialised expertise in various construction trades. This can lead to better quality workmanship and the ability to handle more complex or specialised construction tasks. In addition, having a larger direct labour force allows the Group to be more responsive to changes in project requirements or unexpected challenges. Direct workers can be quickly reassigned or redeployed to address emerging needs, improving the Group's overall flexibility.

Entry Barrier of Civil Engineering and Electrical Construction Works

1. Registration requirement

Civil engineering and electrical construction works contractors are required to demonstrate expertise and proven track record in undertaking relevant projects. In particular, portfolio and cumulative contract value of civil engineering and electrical construction works projects are key requirements for registration and categorization of contractors based on their capabilities and scale of operation in respective works categories, namely port works, roads and drainage works, and site formation works. In addition, strong track record is required for advancement of registered contractors to higher level of work group with eligibility of tendering for civil engineering and electrical construction works projects of higher contract value. Hence, new entrants without proven track record are hindered from undertaking sizeable projects.

2. Capital requirement

High capital investment is one of the key barriers for new entrants. Sufficient capital is generally required for purchase of a wide variety of specialised machinery such as excavators, dozers, scrapers, drum rollers, loaders, asphalt distributors and graders for relevant civil engineering works, on top of other key cost items such as procurement and labour cost. Furthermore, contractors are required to have sufficient initial capital reserve during the early stage of construction works in view of the fact that payment is generally settled according to the progress of construction works. Maintaining a sufficient cash flow is also a key criterion for contractors to tender and undertake sizeable civil engineering and electrical construction works projects from the Government.

3. Technical expertise and project experience

Civil engineering and electrical construction works are considered as a specialised engineering area which requires extensive knowledge in geology and structural engineering which are essential for planning, environmental impact analysis, design and construction of structures. In addition, solid experience in project management and execution is considered pre-requisite for civil engineering and electrical construction works in on-site environment.