

A Brief Review of Hong Kong's Evolution in Construction Practice since 1950s

By Wong Wai-man, Raymond
City University of Hong Kong

Introduction

Hong Kong's construction industry was a traditional business dominated by Chinese-style family-run construction firms back in the 1950s. Overseas contractors entered the industry on a large scale in the mid-1970s, when Hong Kong started to construct the first MTR lines. Over the years, overseas contractors, backed by their expertise and adapting to the local market, has gradually become a strong work force in the construction industry in Hong Kong.

Construction technologies and practices have changed over the years as well. For instance, construction engineers of the younger generation may not be familiar with inches/feet or ounces/pounds, as the old measuring system was gradually replaced by the metric system using metres and kilograms. Hand-mixing of concrete is mostly replaced by ready-mix concrete based on precise mix design. The use of concrete hoist and labor-intensive method to place concrete can hardly be seen today. Concrete pump and tower crane are common equipment at most work sites. Traditional timber formwork is also replaced in most situations by system formwork. Precast and prefabricated construction is a common trend nowadays, not to mention the mega building structures and civil projects that are built deep underground or high above in super high-rise towers. The complexity of the working environment is more challenging than any layman can imagine. And these are only the beginning of ongoing changes as we advance in the new era of a cyber world.

This paper tries to give a brief review to what the Hong Kong construction industry has gone through in the past 50 years as we brace ourselves for a quantum jump that is awaiting the entire construction profession.

Family-based Construction Mode of the 1950s and 60s

Construction as a business was mainly run in the Chinese family-based manner during this early period. Nevertheless, contractors still needed to be registered under the Building Ordinance. Only a registered contractor could get into the business in spite of the company's scale, experience or financial capacity.

The major partners of a contracting firm usually managed the company using personal network and handled all construction related operations through

experience. For example, paper submissions required authorized signatures of a registered contractor, a job could be secured either with or without tendering, the contractor did the pricing, estimating and sub-letting, all alone. They also managed the whole project personally, starting from construction planning, carrying out all site works and supervision, resourcing management and controlling cost, handling all project coordination-related matters, controlling sub-contractors, taking care of payment and contract administration, if there was a formal contract, and finally, delivering the completed project and so forth. All these responsibilities would be taken care of by a small team of 3 or 4 persons, including the owner of the contracting firm himself depending on the scale of the job. Professional qualification was a remote concept for most of the contractors. Personal reputation and trade practices were the key guarantee factors for the success of a job.

In addition to local contractors, there were also some immigrant contractors from China (mainly Shanghai) who came to Hong Kong after 1949. Based on their experience and reputation established in the more internationalized city of Shanghai decades before, these contractors were undoubtedly in a better position and had better capability in handling construction projects during that period. They even set a standard for the development of the construction industry in Hong Kong.

The setting-up of the site was fairly free as there was lacking a strong mandatory or statutory framework to oversee site operations. Other than a work consent to be submitted by the contractor who promised to abide by all necessary regulations, other essential provisions, like the site layout setting, site access, fencing and hoarding or other safety set-ups, were provided on a discretionary basis for the convenience of the contractors. The situation for government projects was slightly better for the government still had some basic guidelines and practices to follow. Needless to mention, corruption was fairly common among project-control executives at almost all levels.

Staffing criterion was lax. An experienced site agent or simply a general foreman who could read construction drawings would be good enough to manage most of the projects. A building certificate was all that was needed in most cases to handle a government job. Professional qualification was needed only for such posts that required statutory needs, like the Authorized Person (usually the architect) that represented the clients, or the registered engineer for engineering-related submissions. The government itself, on the other hand, had a strong professional team composed of architects, engineers and surveyors in fulfilling the procurement and controls over all government projects. In a limited way, Hong Kong followed the UK system in principle in administering the entire construction process.

Except for a few key personnel managing the project for the contractor, like the site agent, general foreman, leveler, mechanic, site clerk etc., almost all site works were sub-let with workers under the control of the sub-contractors. These sub-contractors were usually further divided into various trades, like the excavator, caisson worker, concreter, steel bender, formworker, carpenter, plasterer, bricklayer, scaffolder, plumber, drain-layer... Except for the general laborers, all workers were trained under a 3 to 4-year apprenticeship system. This effectively guaranteed that workers were competent in their own trade of work after years of training.

Materials used in construction were traditional as well. Structural materials like cement, aggregate and reinforcing steel, had their specific standard. There were seldom any problems except in some cheating cases where figures were fabricated for illicit returns. For other materials like common bricks, metal works, timber or joinery products, or decorative materials, quality could fluctuate, depending on budget specifications, sub-contractors used, workmanship performance, inter-personal relationship and, sometimes, even the conscience of the work team and so forth.

Heavy equipment, like tower cranes, mobile cranes, excavating and rock breaking machines, heavy dumpers and lorries, was rare in those years unless for very large scale projects. Diesel or electric driven concrete mixers were almost the only equipment that could be found on site. Most of the jobs, such as transporting and placing of concrete even for multi-storey buildings, or excavation and rock cutting, were carried out in a labor-intensive manner. Hand tools were the most common and effective equipment used at construction sites. A simple hoisting rack powered by an electric winch equipped with a lifting rod was considered a good set-up. To sum it simply, things were done in the old way.

The imperial scale, like ounces and pounds, inches and feet, was used; temperature was measured in Fahrenheit. For people used to the metric system, the imperial scale might cause some inconvenience, yet people in the industry in those days were accustomed to using manuals, scale rules or calculation tables created with the imperial scale, which did not cause any trouble at all.



Photo 1a – Large amount of resettlement houses in identical 7-storey design being constructed during the 1950s.



Photo 1b – a view can be seen no more reflecting the simple building form and urban layout back to 1950s and 1960s.



Photo 2a – Typical set-up of a site batching plant in the 1960s – 70s



Photo 2b – labor-intensive arrangement of concreting using hoisting rack & wheel barrows.



Photo 3 – modern batching facility in a ready-mix concrete factory

It bears remembering that there were only a few high-rise buildings constructed during the entire 1950s. In order to construct affordable housing, most of the residential buildings were no more than 8 or 9 storeys at the tallest, for this could

be exempted from the requirement of providing an elevator. Office buildings had their own requirements but there were not so many of them. In order to build in the most economical way, simple in-situ RC frames using columns and beams with brick infilling for exterior and interior walls were the most popular form of construction.

In short, traditional construction technologies and practices of the 1960s can be characterized as labor intensive under strong influence of informal human relationship. But even during this early period, Government, with its strong professional team, played a key role in upholding a reasonable standard for government-related projects, which explains the transition to a more systematic construction practice in the 70s and 80s when a great number of public and private projects were kicked off in full scale hitting the coming climax of development.

Fast Development Years of the 1970s and 80s

In spite of the social-political riots of the 50s and 60s resulting from the political turmoil in mainland China, Hong Kong was able to seize the opportunity to develop into a world manufacturing center based on the rapid development of its light industry. Getting into the 70s, Hong Kong started to migrate from manufacturing to financial services. With the economic boom and tremendous changes, there was an urgent need to provide effective urban facilities to substantiate the onward development of Hong Kong. Out of these, investments into infrastructure were of the utmost importance.

Infrastructure development in Hong Kong included, in particular, transportation facilities ranging from highway and railway networks; port and airport facilities; establishment of new towns or other land formation projects; public works, including government facilities, medical, institutional and public housing; as well as other environmental and public utility-related support structures. In all these projects, the Hong Kong government and her representatives, as well as other civil and building contractors, were the main players.

Property developments, mainly in the form of residential and commercial developments, were a big business mostly carried out by private sectors during this period. Property developers with a clear profit-making objective were the pushing hands behind the development.

During this period, especially in the 1970s, the construction industry underwent such rapid development that it went full steam in various spheres of constructions, from the establishment of new towns of Shatin and Tuen Mun, to new reclamation areas in Wanchai, Central and Mong Kok, and countless new projects both from the government and private sectors. Contractors and consulting agents were in hot demand. Adding to that was the planning and

construction of the first mass transit railway lines during the 1970s-80s, followed by related real estate developments along these lines.



Photo 4 – The town centre of Kwun Tong as seen in late 2000s



Photo 5 – Shatin New Town under development as seen in early 1980s

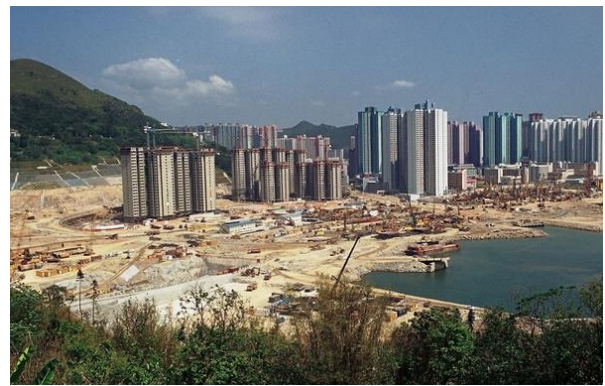


Photo 6 – Tseung Kwan O New Town under development as seen in late 1990s



Photo 7a & 7b – Tung Chung New Town as seen in 1996 and 2016

The business environment for the construction industry also changed in the 1970s with the establishment of the ICAC (Independent Commission Against Corruption) in 1974. The industry could not conduct their business or made easy money in the same way as before. Instead, they had to abide by the rules of the game. However, there was still a huge potential for growth. And the construction sector still enjoyed a lot of flexibility due to the complex structure of the industry. In this respect, the administrative system in running the construction business

was still relatively easy. Flaws could still be found everywhere. That was reflected in such areas as effectiveness of project procurement which safeguarded all stack-holders, quality of work output, cost control or contract administration matters and so forth.

In view of this, a major revision of the Building Ordinance was introduced in 1976 with the aim to avoid, prevent and eliminate flaws in the construction industry. This was also regarded as one of the results of the achievement of the ICAC. Besides, a significant portion of the revision was so made to enhance the quality of building design and to renew some of the old architectural practices and technical standards inherited from before WW2. Some major changes were introduced, aiming particularly to establish a tighter control on the building administration process and to eliminate all possibilities for corruption. This was only the first wave to upgrade the performance of the construction industry. But it was not enough.

Though there was the uncertainty of the handing over of the sovereignty in the early part of 1980s, Hong Kong was still able to undergo huge development due to the demand of more than 6 million local residents. Fulfilling their daily needs and providing better housing for a population of this scale created opportunities for the construction sector, which were as busy as before, even with the holdup of some long-term and mega-sized projects by the government and other investors.

The major projects that made the construction industry going as usual were general building works. By that period, a large number of public and private housing estates were constructed to satisfy the needs of a steadily growing population. The Oi Man Estate and many 2nd generation public estates all over the territory to replace early resettlement houses were typical examples of the government inputs, while Mei Foo Sun Chuen, Whampoa Estate and Tai Koo Shing represented major private residential developments.



Photo 8 –Taikoo Shing and Kornhill, projects of the redevelopment of Taikoo Dockyard and the MTR Island Line between 1970s and 1980's



Photo 9 – The Whampoa Garden, a redevelopment project of the Whampoa Dockyard after its removal in early 1980s.

The demand for housing was so great that the property market was skewed to be led by the developers. Home buyers needed to queue up in long lines for a quota to buy a new flat. The result was: the quality of the building, either in design, material and workmanship, was not a major concern for the developers. This was a simple supply and demand rule. The government understood the situation, but no immediate actions were taken to rectify it. This situation lingered.

Later on, however, some actions were initiated to enhance the performance standard of the industry. Such initiatives included the implementation of some quality/performance management systems like the ISO and the PASS (Performance Assessment Scoring System). It took almost two decades for such concepts to sink in and become the common practice which re-shaped the entire industry.

The Construction Boom in the 1990s

The cloud of uncertainty of Hong Kong's future lifted a bit after the signing of the Sino-British Joint Declaration at the end of 1984. The position of Hong Kong was further ensured after the announcement of the new airport projects in the early 1990s. By bringing-in the HK\$180-billion airport projects, all local and overseas investors were encouraged to put in capitals to buy for themselves a more prosperous future. The construction industry was booming with so many infrastructure projects and various building projects that no one in the industry was sitting idle. This cooled down a bit with the outbreak of the economic crisis that swept through Asia in 1998.

The construction scale was so huge and complex for the new air airport projects, the construction sectors were given more than 5 years to complete all the projects. Overseas expertise could give certain help, such as in the construction of the Tsing Ma Bridge, yet all the other projects, including the Western Harbour Crossing, the Airport Railway, the Terminal Building and related facilities, were handled by local contractors and their associates in the form of joint venture partnerships. Viewing from another angle, the construction of the new airport in fact was a practical knowledge transfer process that provided valuable eye-sight and experience to the construction industry.



Photo 10 – The newly formed West Kowloon District as a major part of the Airport Core Projects during the 1990s, composed of the West Kowloon Reclamation, Western Harbor Crossing, Airport Railway and the West Kowloon Expressway projects.



Photo 11 – Final fitting-out of the Chek Lap Kok Airport before its opening as seen in mid 1997.



Photo 12 – Construction of the Route 3 (Kwai Chung Section) as one of the Airport Core Projects as seen in 1995

At the same time, the private sectors were also very active. Mega projects like the International Financial Centre, Cheung Kong Center, the Hong Kong Convention and Exhibition Centre were being built almost at the same time as the new airport which was scheduled to be up and running in anticipation of the big day of handing over. The hot construction wave during this decade might be regarded as a warm-up period for the forth-coming wave in development after the millennium. As a result, the capacity of the local construction practitioners got expanded again after the 1990s.



Photo 13 – Cheung Kong Center, one of the mega tower constructed using RC-Structural Steel composite during the 1990s.



Photo 14 – Construction of the Hong Kong International Finance Centre, another mega structure located inside the city centre.



Photo 15 – Construction of the Hong Kong Convention and Exhibition Centre, opened in 1 July 1997 to receive the Handing Over.

Technologically speaking, the 1990s might still be viewed as an old-tech era. Except the use of a few modern machines like the hydraulic heavy jacking systems, launching gantries for highway construction, mechanical formwork system for super high-rise towers, everything were done in a traditional way in principle. Other than that, concerns toward the use of high-tech equipment in construction, safety, quality of work, protection of environment, welfare to human workers, were still somewhat being ignored. The industry did not have real motivation to make substantial improvement in those areas.

In view of this, some initiatives were taken with a wish to change or enhance the ecology of the construction industry in the coming decade, led by the government and some pro-active contractors who understood that the construction industry would lag further behind world standards in the new era.

The government's initiative has achieved at least toward one target: encouraging the use of more high-tech and environmentally friendly technique in construction. That is the use of more precast elements in building works. Other than the use of more precast elements to construct standard public houses like the Harmony or Concord blocks, the government also launched a series of projects specifying the use of a higher percentage of precast elements in the construction process. Typical examples included projects administered under the Architectural Services Department for the new 2000 school design, government quarters and other facilities like government warehouse and offices.



Photo 16 – Construction in Harmony design, a typical form for public housing being launched in 1980s-90s to replace the estates in the earlier generations.



Photo 17 – Construction in Concord design, an improved housing form to provide better living quality for public housing.

Transformation Years in the 2000s

By the end of 1990s, the Chief Executive, Mr Tung Chee Hwa, appointed Mr. Henry Tang to set up a “Construction Industry Review Committee” to conduct a review of the construction industry in Hong Kong. The objective of such a review was to understand more thoroughly the background and weaknesses of the industry and come up with suggestions to improve the overall performance of the industry in the long run. After a 2-year intensive investigation and studies, Mr Tang submitted a review report in January 2001.

The following was quoted from the introduction of Mr Tang's Executive Summary report:

“There are a number of shortcomings in the industry’s operations and in the quality of its products. Local construction activities are labour-intensive, dangerous and polluting. Built products are seldom defect-free. Construction costs are comparatively high. The industry is very fragmented and is beset with an adversarial culture. Many industry participants adopt a short-term view on business development, with little interest in enhancing their long-term competitiveness. There is a tendency to award contracts to the lowest bidders and delivery programmes are often unrealistically compressed. Accountability is undermined by the prevalence of non-value adding multi-layered subcontracting and lax supervision. An inadequately trained workforce also impairs the industry’s ability to adopt new technologies and to cope with new challenges”.

I believe no one in the construction industry would object to the statements made by Mr Tang in the report.

The report suggested a series of targets to be achieved so as to restructure the industry in a holistic manner. This included stipulating a vision for growth and development of the industry, fostering a quality culture, achieving distinctive value in construction procurement, nurturing a professional workforce, as well as creating an efficient, innovative, productive, safer, more environmentally friendly work environment. The report also came up with recommendations of an institutional framework for implementing these targets in a workable future.

Based on these recommendations, the Building Department representing the government in most cases took the lead in exercising such improvement plans through tighter control in construction, particularly in the contractor operation and site work levels. Other organizations including all the concerning professional institutions, contractors and trade associations, research and vocational institutions, or even the Construction Industry Council, were participating in this transforming process.

There were a number of actions taken to actualize such initiatives. One representative action was the launching of the Site Supervision Plan which made it mandatory by issuing a Technical Memorandum and Code of Practice under similar title. These documents stipulated the responsibility of the project teams and related stakeholders, as well as detailing the ways and practices to carry out site works as stipulated.

The other action was the formulation of a series of “Joint Practice Notes”, issued jointly by the Building Department, Lands Department and Planning Department. The objective was to encourage the design and construction of buildings that adopted a holistic life cycle approach, maximizing the use of renewable resources and green materials, minimizing the consumption of energy and reducing construction waste. By doing so, certain bonus in the form of extra gross floor areas was given to the developers as an encouragement for adopting

these practices. Besides introducing more innovative building designs to satisfy such criteria, using more precast elements was another way, an easy way as well, to get that bonus. Finally, it triggered a hot wave in the use of precast constructions, which were used even for super high-rise structures up to 60 to 70 storeys tall.



Photo 18 – After-fix precast facade widely used in 1980s & 90s for public houses.



Photo 19 – Large amount of precast elements including the facade, volumetric units for kitchen and bathroom, semi-slab, loss-form for some structural elements, are widely used after the 2000s for both private and public housings.



Photo 19a – Typical housing projects after 2000s, the redevelopment of the Lower Ngau Tau Kok Estate.



Photo 19b – construction using significant amount of precast elements becomes a typical design even for private development after the introduction of the Joint Practice Notes in 2002

The 2000s was also a milestone era for railway and highway developments. A total of 6 railway lines were completed and put into operation during the period. They were the West Rail, Tseung Kwan O Line, Ma On Shan Line, Disney Line, the Kowloon Southern Link and the Lok Ma Chau Spur Line. Highway projects including the improvement and widening of the Castle Peak Road, completion of the Deep Bay Link and Hong Kong–Shenzhen Western Corridor, Route 3, Route 5 and Route 8, were representative of the infrastructure projects being completed during the 2000s.



Photo 20 – West Rail, the first railway line completed in early 2000s. The photo shows the Long Ping Station of West Rail, located over a series of storm water discharge nullah that made construction with added difficulty.



Photo 21 – Ma On Shan Line, another railway line put into operation shortly after the West Rail and Tseung Kwan O Line



< Photo 22 – Construction of a new link bridge in Tai Lam to straighten the old roadway as a major part of the Castle Peak Road Improvement works.

Photo 23 – Provision of pedestrian facilities as part of the Castle Peak Road Improvement works. V





Photo 24 - Deep Bay Link at Lam Tei crossing the elevated track of West Rail. The Link finally joins the HK-Shenzhen Western Corridor crossing Deep Bay towards Nanshan of Shenzhen.



Photo 25 – The HK-Shenzhen Western Corridor crossing the Deep Bay under construction as seen in mid 2005



Photo 25a – Construction of the Stonecutters Bridge (as seen in 2008), one of the major section of the Route 8 Truck Road network



Photo 25b – Construction of the carriageway of Route 8 using launching gantry as seen in 2006 (location: the junction of Tai Po Road, Tai Wai Road and Shing Mun Tunnel Interchange)

In addition to providing work opportunities for the construction industry, these mega projects also produced a strong rippling effect that heated up developments from the private sectors.

The outbreak of SARS (Severe Acute Respiratory Syndrome) in 2003 was a major social event that affected the industry deeply in the 2000s. As a result of the epidemic, the entire community and related economy were slowed down causing serious economic impacts. People tried not to make physical contact with each other as far as possible to avoid possible infection. This situation lasted almost 2 years. Many construction practitioners and workers were laid off due to lack of jobs and many construction agencies closed down.

As one of the “rescue” actions to the economy, the government of Hong Kong successfully coordinated with the Central Government of the Mainland and launched the “Individual Visit and Multiple-Entry Permit Scheme”, which allows visitors from mainland China to enter Hong Kong mainly for tourism purposes. This scheme anticipated that thousands of visitors would visit Hong Kong daily and their consumption would help the local economy. It worked finally and stimulated investors to put in capitals in, say, constructing more hotels and shopping malls, upgrading existing tourist and commercial facilities, as well as other associated hardware infrastructures. By the end of the 2000s, even the property market heated up. Significant number of visitors, mainly from mainland China, came to Hong Kong and bought residential properties either for their own use or just as a kind of investment. All this created a multiplying effect and the entire construction sector benefited from that.

Meanwhile, after nearly 10 years of reform in the construction industry after the issuance of Mr Tang’s Review Report, many stake-holders in the industry transformed themselves in order to meet the anticipated challenges. To a certain

extent, the construction industry performed substantially better than the previous decade.

The 10 Infrastructure Projects since 2010

In order to drive the economy forward as well as to substantiate the long-term development of Hong Kong, the then Chief Executive Mr Donald Tsang launched a new scheme known as the “10 Major Infrastructure Projects” in 2007. These projects will draw in at least 30 billion dollars a year, spanning more than 10 years and covering 3 main core areas. They include projects for the Transportation Infrastructure, Cross Boundary Infrastructure and New Urban Development. The world-renowned projects, such as the Guangzhou-Shenzhen-HK Express Rail Link, Sha Tin Central Link and the HK-Zhuhai-Macao Bridge, are typical examples. Other projects of similar scale like the Central-Wanchai Bypass or some highway improvement projects are not even counted in this category.



Photo 26 – Main structure of the entrance canopy of the Express Rail Terminus in West Kowloon in shape as seen in early 2016

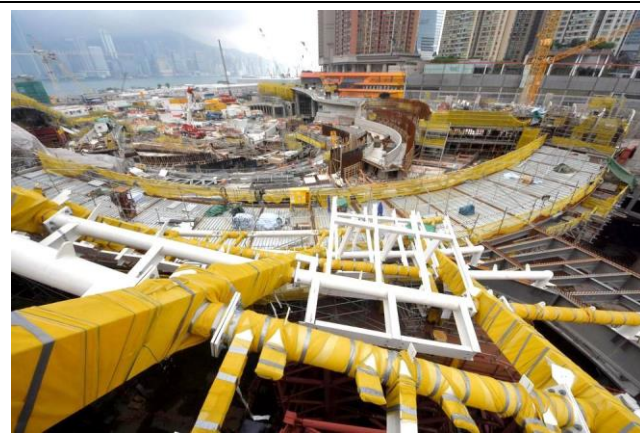


Photo 27 – a part view of the Terminus Plaza as seen on the truss frame of the canopy which was still under erection.

The majority of these infrastructure projects commenced in full-scale starting in 2010, except for a few that involved further coordination and more detailed

refining with the Mainland, like the Joint Development of the Lok Ma Chau Loop and the Hong Kong-Shenzhen Airport Co-operation projects.

Construction started in 2010 and continued up till mid-2015, with signs of a bit slowing down in early 2016 due to the completion of some of the projects. During the peak years, the entire construction sector faced serious shortage of work resources, including manpower at both site and managerial levels, materials, equipment and other logistic support. Manpower shortage drove up related expenses. Cost for materials and other supporting services were also rising to an uncontrollable level. Costs went up, efficiency dropped and construction was delayed, adversely affecting the projects.

Though this might not be a direct factor influencing the ecology of the construction industry since the new millennium, to a certain extent it caused some disturbances to the entire Hong Kong community. What we are talking is the “Operation Building Bright” scheme launched by the government in 2009. The objective of this scheme was to provide financial motivation to owners living in older buildings to maintain and upgrade their properties. The original idea was good for the entire society would be benefited from this initiative forming part of the urban upgrading and renewal process.

To make the scheme works it needed the support of contractors. However, contractors in a better business position did not have much interest in this scheme because of the tedious nature of such upgrading jobs. On the other hand, it created a good business opportunity for small and medium-size contractor firms. A few years into the scheme, a few contractors who were focusing on this kind of projects almost dominated the market, sometimes by taking advantage of the grey areas within the existing legal framework and controlled the cost of work in an unreasonable rate. This caused a lot of complaints from the actual users who were owners of the properties. Very often they were abided by a contract and needed to pay a much higher cost in upgrading their buildings.

At the same time, this also extracted quite a number of manpower in the work front which further upset the labor shortages within the construction industry.

The other concern is about accountability, safety, quality, and environmental protection issues that formed a prioritized work objective for all construction projects. With an ongoing request for addressing such concerns for more than 15 years, the construction sector was well established for safeguarding these interests. Strict and professional plans were mapped out for controlling all construction activities almost from the preliminary stage of a project. While this might not mean that everything was perfect, it was unquestionable that international standards were upheld.

Higher standards often came with a price. With the enhancement of quality and the enforcement of other construction “best-practices”, construction cost went up

tremendously within a relatively short period of time. Figures from the tender price index made by the Architectural Services Department indicated that the index went up about 3 times as compared to 2005. Construction cost tripled in just 10 years. Of course, the factors for such a sharp cost increase could be multiple, and yet it was something the construction industry in particular and the entire society at large had to face.

Technological evolutions in the construction industry

The changes in the past half century are not possible without the evolution of technologies, which can be divided into 3 major eras, the traditional era before 1980s, followed by the taking-off period up to the late 1990s and then the modern era since 2000s.

In the first era, constructions in Hong Kong were dominated by traditional technology. Except for the use of some mechanical equipment like tower cranes, hydraulic or pneumatic machines and other power hand tools, everything else depended on manual labor, not much different from the construction practices of the pre-war period. It was a very labor-intensive line of work.

During the taking-off period, super high-rise buildings were getting more popular. Office buildings using central air-conditioning with a core shaft and encased by a curtain wall envelop were becoming almost a standard design. Projects were getting larger and larger, covering hectares of land with clusters of towers forming an expansive estate driven by developers who sought economies of scale. The construction industry was compelled to adopt a more efficient way to build by improving its management and using more advanced technologies. Such demands became more acute in the early 1990s because of the new airport projects and other strategic developments in anticipation of the hand-over in 1997. The majority of the new technologies in construction during that period, however, were used for civil works, even though the tunneling techniques and technologies used in constructing a cable suspension bridge or building a new railway line could hardly be considered advanced at the time from a global point of view. Not to mention other technology applied to building construction.

Thanks to the government's initiative in promoting the concept of sustainability development and the recommendations from the Construction Industry Review Report, new construction technologies were introduced as we got into the new millennium to synchronize with global demand for advancement.

Quite a number of changes are introduced since the stepping into the new millennium.

Many mega building projects, in terms of demand of capital, scale, design and technical challenges, were started, including such mega structures like the

International Commerce Centre (ICC), Asia World Expo, K11 development, Extension to the Hong Kong Convention and Exhibition Centre and many other modern super high-rise office towers. The construction of these mega structures called for advanced technology, like hybrid composite works using structural steel and high-performance reinforced concrete and intensive use of tensioning. There was also demand for super long-span elements, extremely heavy structure or heavy lifting. Intelligent building, energy saving design, or procurement process involving BIM as part of the operations, was becoming almost the “must” factors.



Civil projects started in those years in Hong Kong also posed a challenge as the old ways did not work anymore. The scale and complexity of the projects were of course part of the issue. The difficulty to find space in the remaining buildable locations within the territory was the main concern. In other word, it became a challenge to find room to build new facilities to accommodate the needs of an ever growing community, whether it is a railway line, a highway, a water-treatment plant or other public facilities. To make it possible to build these facilities, various kinds of relocations, compensations and recovering work needed to be incorporated into the overall planning of the projects. And there was no exception with the projects included in the 10 Major Infrastructure

Projects launched in 2007 and many other related on-going projects. The West Island Line, Express Rail Link, Shatin-Central Link, HK-Zhuhai-Macao Bridge, Central Wanchai Bypass, and the soon-to-come Central Kowloon Route and the new tunnel to Tseung Kwan O, are typical examples.



Photo 29 – This sloppy site will locate the Hopewell Tower 2, a mega structure forming an icon landmark in the future Wanchai District. Complicated site formation is undergoing (it takes at least 30 months) as seen in the photo here in order to place this mega structure within this congested and sloppy site.

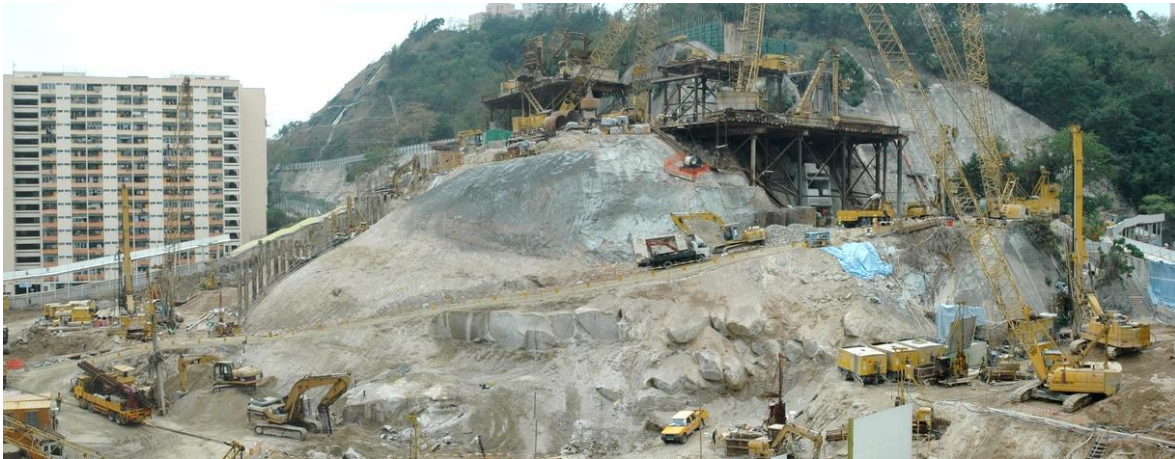


Photo 29a – Very large scale site formation as an advanced work for a residential development project in To Kwa Wan (the Celestial Height, 2006)

Take the Shatin-Central Link (SCL) project as an example for elaboration. The new railway line has at least two challenging locations to tackle. One is the diversion of the route as it cuts across the busiest junction between Chatham Road and Hong Chong Road, which is the main traffic entrance to the tolling plaza of the Cross Harbour Tunnel. It is also the interchange for more than 8 lines of traffic and a servicing rail line. The other location is the approach tunnel section entering the new harbour crossing tunnel of the SCL, where the existing tunnel tube for the Cross Harbour Tunnel is within less than 100m from the new tunnel tube. The Hong Kong side faces a similar situation where the tunnel lands in Causeway Bay. The photo below visually explains the situation.



Photo 30 – Complicated temporary traffic diversion work being carried out for a period of 3 years for the passing of the Shatin-Central Link at the Chatham Road and Hong Chong Road interchange.



Photo 31 – Forming the service shaft on the harbor-front of Hung Hom as part of the advance-works for the harbor-crossing tunnel of Shatin-Central Link.



Photo 32 – Location where the harbor crossing tunnel of the Shatin-Central Link will submerge (underneath the Hung Hom Bypass and about 100m from the ventilation shaft of the Cross Harbor Tunnel).

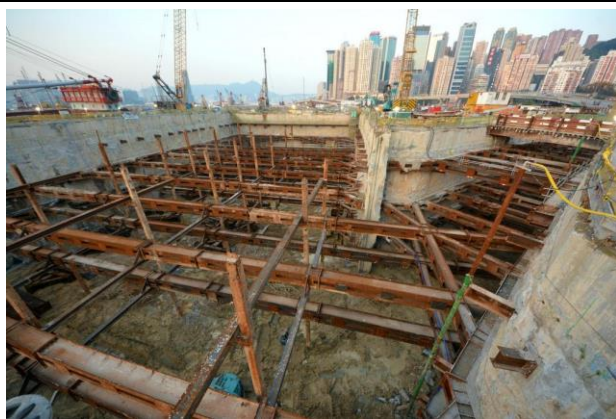


Photo 33 – Complicated ELS setting for the section of Central-Wanchai Bypass located inside the Causeway Bay Typhoon Shelter outside Victoria Park.



Photo 31a – part of the cut and cover tunnel for the HK-Zhuhai-Macao Bridge crossing the eastern coastline of Chek Lap Kok as seen in early 2016

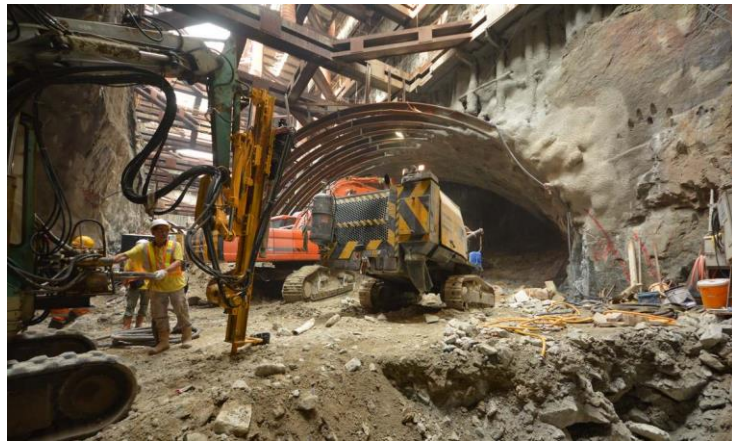


Photo 31a – other more difficult work spot un-noticed for the HK-Zhuhai-Macao Bridge project.

(the underground section crossing the Airport Road and the Airport Express Rail near the Cathay City Complex)

Even though the construction of buildings is not as challenging as civil engineering projects, the tendency in demanding more innovative designs in terms of architecture, visual impact, spatial layout, structural performance, or the call-in of multi-functional designs and building intelligence etc. poses other challenges. Hong Kong lags behind world standard due to our conservative mindset, particularly when it is confined by budget and profit returns. However, we cannot ignore the world trend that responds to the needs of an increasingly enhanced living standard in the modern era.

Judging from a global point of view, Hong Kong does not have many iconic buildings that are presentable in term of architecture or other innovative design that we can really proud of. We are just doing something accordingly without any specialty when compare to other overseas cases including those in Mainland China.

The International Commerce Centre, the Cruise Terminal in Kai Tak, and some marginal cases like the Langham Place Complex or Mega Box in Kowloon Bay, can hardly be described as magnificent examples. Similarly, the situation in areas of residential projects is rather dull lacking real innovations.



Photo 34 – Some innovative architecture in Hong Kong, the Opus in Stubbs Road.

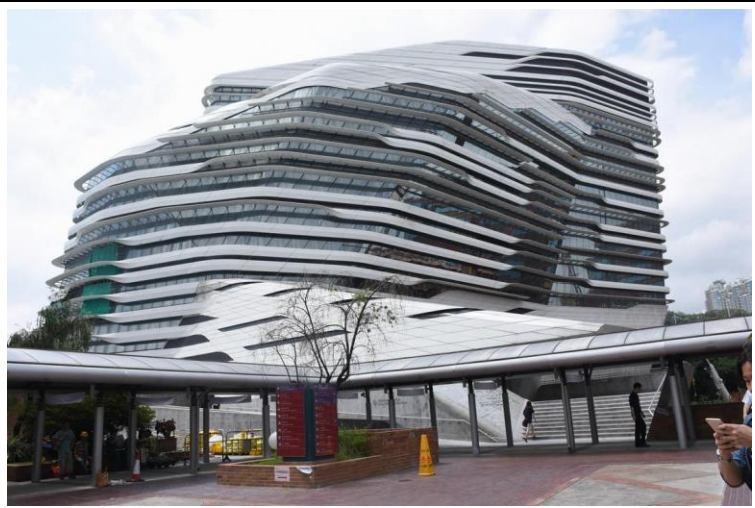


Photo 35 – Some innovative architecture in HK, the Jockey Club Innovation Tower in Polytechnic University.

The only thing special in Hong Kong is that many projects need a complicated site formation input in order to locate the land and the facilities due to Hong Kong's specific topographical condition. For the past 15 years the Butcher's in Kennedy Town, the Celestial Heights in Kowloon City, and the Parc Palais in Ho Man Tin, are examples that involved a large-scale and complicated site formation process that eye-marked some engineering challenges.

Conclusion

This paper attempts to give a brief review of the development of the construction industry of Hong Kong in the past 50 years, what the construction industry has gone through and what it has achieved. By recalling the major changes and milestones, the writer hopes to provide a side reference for practitioners in the industry as well as the general public towards an area what we called the construction profession that has been often neglected.

It is not easy to use a few thousand words to tell a story spanning more than 50 years. With the use of some record photos taken by the writer as a supplement to his writing, the writer hopes the impact and appeal of this paper can be further enhanced.