

# CKMbT International Pte. Ltd.

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# WHO WE ARE?

CKMbT International Pte Ltd (CKMbT) is one of Singapore's established multi-disciplinary engineering consultancy companies offering Civil & Structural Engineering and Mechanical & Electrical Engineering Professional Engineering Services Consultancy Companies. It was founded by Dr Chitaldroog Keshava Murthy in 1989 as CKM Consultants Pte Ltd to satisfy the demand for independent technical services in the fields of building appraisal, restoration and rehabilitation. Prior to setting up the company, Dr C. K. Murthy had served at the National University of Singapore for 20 years, where he lectured in the Faculties of Architecture, Building, Building Science and Civil Engineering. His areas of research included Computer Applications in Structural Engineering, Tall Building Structures, Economics of Building Structures and Structural Defects. Whilst there, he had provided consultancy services to statutory boards, renowned consulting firms and contractors. With a growing need for his consultancy services and a desire to serve the building industry better, Dr C. K. Murthy left the University and established CKM Consultants Pte Ltd.

The Company was originally formed to offer consultancy services in diagnosis, repair and protection of concrete and masonry structures using modern techniques and has since diversified into other areas. With our staff highly experienced in research, design, construction support & management, we have over the years taken on a project-management role to deliver an integrated package of services covering every aspect of the project and handling complex projects.

In 2013, a part of CKM Consultants was sold to Bureau Veritas and the remaining entity in CKM was renamed as CKMbT International Pte Ltd which is us and has grown strength to strength.

Presently, our main areas of focus are in building projects, industrial projects, infrastructure projects and structural appraisal, investigation, strengthening & retrofitting. We support our Clients through our offices in Singapore, India, Myanmar and Malaysia.

We provide the following services covering all stages of an asset's lifecycle, from feasibility to retrofitting:

- Feasibility Studies
- Detailed Engineering
- Permitting Services
- Pre-bid Engineering
- Project Management
- Construction Support Services
- Structural Retrofitting
- AC
- PSI

CKMbT has won several Design Excellence Awards and Recognition for setting performance benchmarks in the sectors that we operate.

# Vision & Mission

"We strive to become a leading company in the built environment industry, deliver superior value to our customers, partners & shareholders, through innovative total solutions."

At CKMbT, we firmly believe that the purpose of our services is not just to assist our clients to obtain regulatory approvals but much more. This mission statement expresses our company's desire to capture and complete our clients' experience of realising their construction & construction related projects right from the feasibility study stage to the handing over stage.

# **Our Culture and Behaviours**

# **Customer Centric**

We partner with our customers; they are at the centre of what we do.

### **Greater Together**

We collaborate across teams to build on our strengths and diversity, and work towards our shared goal.

#### Take Ownership

We think about customer and company first and never hesitate to stand up.

# **PROFESSIONAL REGISTRATIONS**

#### Singapore

Licensed Corporation with the Professional Engineers Board, Singapore for C&S and M&E works

ACO and Specialist AC Services

Public Procurement Panel of Consultants – Grade CS02

Panel of prequalified consultants with Public Utilities Board (PUB) which enables CKMbT International to tender for all PUB consultancy projects including sewerage, water and drainage projects.

Government Supplier Registration EPPU Grade S7 for providing Consultancy Services (SER34) and Services (Data Entry, Supply Manpower) (SER19) which enables CKMbT International to take on consultancy contracts of values up to S\$5 million.

# Malaysia

Certificate of Registration for Engineering Consultancy Practice with Board of Engineers, Malaysia.

# INDIA

Registered Peer Review Consultant for ITC Limited & Titan Company Limited, India.

# SERVICES

# 1. Feasibility Studies

- Evaluation of engineering aspects of a project
- Siting studies to evaluate geotechnical, seismic and marine aspects of a development
- Front End Engineering Design (FEED) to develop engineering concepts
- Extensive database to develop cost estimates with minimum effort
- Assistance to financial modellers to estimate realistic NPV / IRR returns from the project
- Project Advisory services to optimise contract packaging and develop realistic schedules

# 2. Civil and Structural Engineering

- Design of Concrete Structure to various international code of practices
- Design of Steel Structures
- Design of Prefabricated Prefinished Volumetric Construction and Pre-Engineered Buildings.
- Design of precast and pre-stressed structures.
- Design of marine and coastal structures.
- Repair and Retrofitting designs
- Design of temporary structures and enabling works.
- Design of specialised structures
- Delivery using BIM Capability
- Peer Reviews and Expert Witness Services.

#### 3. Geotechnical Engineering

- Investigations
- Specifications for Investigation and Testing
- Recommendation of design parameters
- o Geotechnical Interpretative Baseline Report (GIBR)
- o Specifications for Instrumentation and Monitoring

#### • Deep Excavations

- Finite element modelling and analysis (both 2D and 3D)
- Design of temporary earth retaining systems Prediction of ground deformation
- o Assessment of effect of excavation works on adjacent structures
- o Planning of instrumentation system and monitoring
- Instrumentation review and back analysis

#### Tunnels

- o Planning and design of bored tunnel/ mined tunnel geometry and alignment
- o Analysis and design of tunnel segmental lining under normal and seismic conditions
- o Analysis and design of mined tunnel with sequential stages of excavation
- o Design of pre-excavation supports such as piperoofing and fore-poling systems
- Design of primary support such as sprayed concrete lining, steel arches, steel frame support and rock bolts
- Prediction of ground and tunnel deformations
- Assessment of effect of tunnel excavation works on adjacent structures
- o Planning for instrumentation system and monitoring
- Instrumentation review and back analysis
- o Construction advisory services

#### • Slope Stability Assessments

- o Assessment of slope stability (using both saturated and unsaturated soil mechanics)
- o Slope appraisal and slope protection studies
- o Design of slope stabilisation/ strengthening/ improvement
- Planning for real time and manual instrumentation systems as well as monitoring program for slopes
- o Risk management for slopes adopting hazard-risk matrix

#### • Ground Improvement

- Assessment of pre-treatment ground condition and selection of suitable ground improvement methods
- o Design of ground improvement works
- o Prediction of short-term and long-term ground settlements
- o Planning of instrumentation system and monitoring
- o Construction advisory services

#### • Foundations

- Shallow Foundations
- Deep Foundations
- Machine Foundations
- Peer Reviews and Expert Witness Services

# 4. Project Management Services

- Scope Management
- Project Scheduling and Planning
- Cost Management
- Risk Management
- Construction Management
- Contracts Administration
- Reporting and Monitoring
- Quality Assurance
- Peer Reviews and Expert Witness Services

# 5. Permitting Services

- One stop solution for all Permits and Approvals covering C&S, Mechanical, Fire, and Electrical Approvals.
- Pre-Consultations
- Qualified Person (QP) Civil, Structural
- Qualified Person Geotechnical (QP Geo)
- Qualified Person Mechanical and Electrical
- Accredited Checker Services
- Empanelled Peer Reviewers for various Organisations
- Design for Safety (DFS) Professional Services
- Developmental Clearances (DC) Submission and Building Plan Submission (BP),
- Building Structural Plan (ST) Approval
- Foreshore Submission s for marine and coastal structures
- Registered Inspectors (RI) Services
- TOP and CSC Clearances
- Repository services for as-built documents.

# 6. Accredited Checker Services

- Review the Basis of design
- Establish design standards and Loads
- Independent Analysis and design check
- Value engineering services for over/conservative design
- Preparation of evaluation report
- Accredited checker endorsement services
- Safety Assessment

# 7. Periodic Structural Inspection

- Purchase as-built plans from Authority
- Structural assessment of the building by Visual Inspection
- Preparation of Inspection Report
- PE endorsement and submission of report to Authority for Approval
- PE Services for Repair works

# NEWS & EVENTS

Date	Event		
1989	CKM is founded by Dr C. K. Murthy (comprising of 3 staff) and located in a small unit in Kheng Chiu Building.		
1989	URA awards CKM the consultancy contracts for the preservation of City Hall and Stamford House, the pioneer conservation projects under URA.		
1992	CKM is awarded a turnkey contract to rehabilitate and strengthen a school buildin Bahau, Malaysia using CKMX polymer technology. This is a first for CKM in Malaysi and a first for the use of the polymer technology developed by CKM.		
1993	CKM is awarded a turnkey contract to rehabilitate and strengthen a large shopping building in Jakarta, Indonesia using CKMX polymer technology. This is a first for CKN Indonesia.		
1994	CKM moves to a larger premise at Golden Wall Centre with staff strength of 15.		
1995	CKM is awarded a turnkey contract to rehabilitate and strengthen two large casino hotels in Seychelles Islands, a first for CKM in Seychelles.		
1999	CKM obtains ISO9001 certification.		
2000	Completion of the 14-storey office extension above the Amara Hotel & Shopping Centre, a first in the world.		
2001	CKM receives the ACES Design Excellence Award for the "14-storey Office Extension t Amara Hotel & Shopping Centre" project.		
2002	Completion of the preservation of Abdul Gaffoor Mosque which involved the construction of a basement beneath the national monument, a first in the world.		
2002	CKM receives the ACES Design Excellence Award for the "Preservation of Abdul Gafoo Mosque" project.		
2003	CKM receives the URA Architectural Heritage Award for the "Preservation of Abdul Gafoor Mosque" project.		
2004	CKM is awarded a turnkey project to lift and strengthen four 8-storey apartment bloc in Mumbai, India.		
2007	CKM secures a multi-disciplinary consultancy services contract at Jurong Island for the largest biodiesel plant in the world.		
2008	CKM expands into more units in Golden Wall Centre with staff strength of 70.		
2008	CKM secures consultancy services contract for the Marina Bay MRT station and Tunnels. Its first MRT project.		
2009	CKM secures its first project in Oman.		
2009	CKM celebrates its 20th anniversary.		
2010	CKM Consultants (India) Pvt Ltd, a wholly-owned subsidiary of CKM, is incorporated in India.		

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# **OUR TRACK RECORDS**

#### Erection of Industrial Complex at Tuas South Avenue 5, Singapore

Client: AMEC Foster Wheeler

Schedule: October 2013 to November 2017

Structural System: Conventional Structural Steel Frame System



#### Summary

AMEC Foster Wheeler Asia Pacific Pte. Ltd. was appointed by Shell Eastern Petroleum Pte. Ltd. (Project Owner) to design and build an industrial complex comprising of a Lube Oil Blending Plant (LOBP) and Grease Manufacturing Plant (GMP) at Tuas South Avenue 5, Singapore. This is a hugely strategic project by the Project Owner and when completed is expected to increase capacity by approximately 40% in comparison to its existing plant at Woodlands North. The Plant will produce Shell's major brands like Shell Helix, Shell Advance, Shell Rimula, Shell Tellus, Shell Spirax and Shell Omala, to supply to its customers in more than 30 countries in the Asia Pacific region.

#### Scope

CKMbT was appointed as the architectural, civil and structural consultant for this project to act as the Project's Qualified Person (QP) and Professional Engineer (PE).

- Preparing and reviewing the building civil and structural plans
- $\circ$  Submission of forms, design calculations etc. and make submissions to all relevant Authorities
- Pre-consultations, meetings and liaising with all relevant Authorities until all clearances and approvals such as TOP & CSC have been obtained

# Erection of Lube Oil Blending Plant at Tuas South Avenue 14, Singapore

Client: Rotary Engineering Ltd; Total Oil Asia-Pacific Pte LtdSchedule: December 2012 to April 2015Structural System: Conventional Structural Steel Frame System



#### Summary

Total Oil Asia Pacific Pte. Ltd., engaged Rotary Engineering Ltd, to design and build their biggest Lube Oil Blending Plant in the world in Tuas, Singapore. The Plant would have an annual production capacity of 310,000 metric tons, equivalent to 62 million car oil changes when completed. It will meet demand from various industries including automotive, industrial and marine.

#### Scope

CKMbT was appointed as the architectural, civil and structural consultant for this project to act as the Project's Qualified Person (QP) and Professional Engineer (PE).

- Preparing and reviewing the building civil and structural plans
- Submission of forms, design calculations etc. and make submissions to all relevant Authorities
- Pre-consultations, meetings and liaising with all relevant Authorities until all clearances and approvals such as TOP & CSC have been obtained
- o Construction supervision and support for the buildings and infrastructure works

### 14-Storey Office Extension to the Existing Amara Hotel & Shopping Centre

Client: Amara Holdings Limited (The Amara Group) Schedule: April 1997 to November 2001 Structural System: Conventional Reinforced Concrete System



#### Summary

Amara Singapore Hotel is one of the Client's flagship asset. When they won the right to increase their floor ratio they had a difficult choice to make. The new floor ratio allocated to them enabled construction of another 14 floors, but it also meant that they had to forgo the existing 4-storey building and lose revenue from operations until the new construction was completed.

While they prepared for a standard demolition and rebuilding contract, CKMbT proposed a retrofitting scheme that allowed for construction of the additional 14 floors on top of the existing 6 floors without hampering any of the on-going operations. CKMbT's innovative proposal was accepted and the project was successfully completed as a world's first structure where the loading in the original structure was increased 300% without demolition. This lead to the setting of a new industry standard for building retrofitting in Singapore. This project was completed in 2001.

This project is a good example of how CKMbT achieves its mission of creating sustainable value for customers by combining the best of engineering practice with latest advances in construction technology. CKMbT was awarded the ACES Design Excellence Award for this project.

#### **Stamford American International School**

Client: Stamford American International School Pte Ltd

Schedule: Completed in April 2014

**Structural System:** Conventional Reinforced Concrete Frame System and Steel Trust/Rafters and Purlins Supporting Metal Roof



#### Summary

The campus of Stamford American International School located at Upper Serangoon Road would offers world-class learning facilities with the latest in classroom technology and IT infrastructure. It can cater to students in nursery through grade 12. The state-of-the-art facility supports learning, athletic and recreational facilities such as cluster-style classrooms, specialist learning environments, library, theatre, swimming pool, sporting fields, gymnasiums, as well as a bus bay and underground parking lots. There were two phases for this project

For Phase 1, the project involves a new campus for Stamford American International School comprising of five storey block A & six storey blocks B, C & D together with car park and play area structure. The blocks A, B, C & D include teaching rooms, laboratories, staff rooms, gymnasium, study areas, plant rooms, toilets and other facilities. A link bridge would connect the blocks B & C. A swimming pool was also provided. The play area above the car park was to be located beside the blocks B & C.

For Phase 2, the project involves the expansion of the construction of Phase 1. Phase 2 works comprise of blocks E, F and G. The blocks include teaching rooms, laboratories, staff rooms, multipurpose hall, theatre, study areas, plant rooms, toilets and other facilities. A link bridge connects the blocks E to G. a swimming pool is also provide and there would be tennis courts on the roof. This project was completed in April 2014.

#### Monarch Service Apartments, Sri Lanka

Client: Monarch Residency

Schedule: Completed in 2006

Structural System: Conventional Reinforced Concrete Frame System



#### Summary

Monarch Service Apartments in Crescat City is a super-luxurious fully-serviced residence adjoining Cinnamon Grand 5-star Hotel. It is a 24-storey building sitting above Crescat Boulevard Shopping Mall. Similar to the 14-storey office extension of Amara Hotel & Shopping Centre in Singapore, Monarch was built on top of an existing shopping centre.

CKMbT provided its advisory services on the use of state-of-the-art construction technology and methods of structural strengthening and foundation underpinning such that the shopping centre and the adjoining hotel remained opened throughout the construction. This became a huge benefit to the owners, not only financially but also in terms of goodwill with their existing customers. Additionally, CKMbT value-engineered the design of the structural system of the building which brought huge commercial benefits to the owner. This project was completed in 2006.

# **Upgrading of Farrer Park Primary School**

Client: Ministry of Education, Singapore

Schedule: Completed in September 2014

**Structural System:** Conventional Reinforced Concrete Frame System and Steel Trust/Rafters and Purlins Supporting Metal Roof



#### Summary

The upgrading of the Farrer Park Primary School involved the construction of a new teaching block and a shared multi-purpose facility building. This was the first time in Singapore where the school and a community centre have come together to build a shared facility building which included an indoor sports hall and community centre. The project also involved the extension of existing teaching blocks. It was completed at the end of 2014.

#### **Upgrading of Mee Toh Primary School**

Client: Ministry of Education, Singapore

Schedule: Completed in March 2014

**Structural System:** Conventional Reinforced Concrete Frame System and Steel Trust/Rafters and Purlins Supporting Metal Roof



#### Summary

This upgrading of this school project involved the construction of a new teaching block and an indoor sports hall building (which also accommodates indoor extra-curricular activities). Additional amenities were also added in the upgrading works. This project was completed in March 2014.

#### Process Upgrading and Equipment Replacement at Woodliegh Waterworks

Client: UGL Singapore Pte Ltd, Singapore

Schedule: Completed in September 2019

**Structural System:** Conventional Reinforced Concrete Frame System and Conventional Structural Steel Frame System





#### Summary

The Public Utilities Board (PUB), Singapore, operates the Woodleigh Waterworks (WLWW) at 65 Woodleigh Park Singapore 357875. The proposal is to increase treatment process robustness at WLWW by providing additional treatment processes including Ozonation and biologically activated carbon (BAC) filters. The new treatment processes are located on sloped land southwest of the existing WLWW plant.

CKMbT was involved in the design and supervision of temporary works (ERSS Works) and detailed engineering services for Design and Build scope under contractor UGL. This project was completed in September 2019.

The works under the D&B scope are demolition of the existing transport facilities, temporary works for chambers within plant, underground structures, chambers for 600mm sludge pipe, yard piping, temporary construction decking design & temporary support for utilities and permanent works for Lime and Fluoride Building, Sludge Pumping Main & Miscellaneous Structures.

#### **Evonik ME6 Expansion Works**

Client: Evonik (SEA) Pte Ltd Schedule: Completed in February 2019 Structural System: Conventional Structural Steel Frame System



#### Summary

This is EVONIK METHIONINE (SEA) PTE LTD additional world-scale plant complex in Singapore. The facility produces the amino acid DL-methionine for animal nutrition, which have an annual production capacity of 150,000 metric tons. The new plant complex by German specialist chemicals manufacturer Evonik Industries is the company's second in Singapore and was constructed next to its existing plant on Jurong Island, which has been in operation since 2014.

The scope of services requested from CKMbT is to provide QP Supervision and Qualified Site Supervisor Services for supervision of Structural Construction Works for this new plant.

#### LONZA LBT Expansion Works

Client: LONZA Biologics Tuas Pte. Ltd Schedule: Completed in November 2018 Structural System: Conventional Structural Steel Frame System with bondek slab



#### Summary

This is LONZA Biologics Tuas Pte. Ltd expansion project involving extension of existing 3 story process and lab facility building.

#### Scope

CKMbT was appointed as the architectural, Civil and Structural, consultant for this project to act as the Project's Qualified Person (QP) and Professional Engineer (PE).

- Preparing and reviewing the building civil and structural plans
- Submission of forms, design calculations etc. and make submissions to all relevant Authorities
- Pre-consultations, meetings and liaising with all relevant Authorities until all clearances and approvals such as TOP & CSC have been obtained
- o Construction supervision and support for the buildings and infrastructure works

#### SEWERAGE PROJETS

Client: Public Utilities Board, Singapore

Summary: PROFESSIONAL ENGINEERING SERVICES FOR PROPOSED SEWER WORKS which covers the followings:

- Provision RE and RTO supervisions
- Project Management that covers the phase of construction, demolition, connections, alignment and designing.



SEWERAGE PIPING PROJECTS			
SN	Project Title	Completion Date	
1	Sewerage Scheme to Serve Jurong Eastern Catchment Package A and B	Dec 2015	
2	Proposed Sewers in Bukit Batok Road and Enterprise Road Areas	Sep 2016	
3	Proposed Sewers in Buangkok Link & Ang Mo Kio Ave 5 Areas	Mar 2018	
4	Proposed Sewers in Bedok Reservoir & Changi Business Park Areas	Nov 2018	
5	Proposed Sewers in Tagore Drive, Mandai Quarry Road & Lorong Lada	Nov 2018	
	Hitam Areas		
6	Proposed Sewers in Sembawang Area For Used Water Network Projects	Mar 2020	
	Batch 2013/02 Schedule I		
7	Proposed Sewers in Yishun Avenue 7 Area For Used Water Network	Sep 2020	
	Projects Batch 2013/01 Schedule I		
8	Sewerage Scheme to Serve Marina South - Contract 2, Singapore	Dec 2020	
9	Proposed Sewers In Bukit Batok And Toh Tuck Areas For Used Water	Jun 2021	
	Network Projects Batch 2014/01		
10	Proposed Sewers in Tanah Merah Coast Road Area and Grouting of	Oct 2021	
	Abandoned Pumping Mains/Sewers at Various Locations		
11	Proposed Sewers in Marina South Sub-Zone	Aug 2022	
12	Proposed Sewers to Serve Tengah New Town	Aug 2023	
13	Link Sewers for the Deep Tunnel Sewerage System Phase 2 Project -	Aug 2024	
	Schedule I, Singapore		

### **Detailed Engineering in Restoration Project**

Client: Abdul Gafoor Mosque

Location: Dunlop Street, Singapore

End Date: September 2003



Abdul Gafoor Mosque is a National Monument built in 1857. In its original form, it had had been a single-storey masonry structure with the terrace roof of a madrasah. The foundation system had had consisted of shallow masonry footings underlain by compressible marine clay approximately 30 metres deep. The structure had progressively undergone differential settlement due to ongoing construction in the vicinity since the late 1980s. There had come a pressing need to provide a solution before any serious damage occurred.

CKMbT was appointed as to provide engineering consultancy services for stabilizing the invaluable monument. The typical solution for this settlement is underpinning and was proving to be very costly for the client. CKMbT came up with a value added proposal to create a basement beneath the existing building along with the underpinning solution. The possibility of adding extra floor space made the project financially viable.

CKMbT designed an underpinning system consisting of micropiles, steel frames and the proposed grid of first-storey reinforced concrete beams. The underpinning system transferred all loads carried by the existing masonry footings to the micropiles foundation system.

CKMbT had taken into consideration any anticipated movements during the execution works which could have undermined the structural stability of the Mosque. Bracings, props, jacks and elaborate building & ground instrumentation had been put in place to restrict and monitor any large differential movements. This project was completed in 2003.

CKMbT was awarded the URA Heritage Award for this project.

# **Detailed Engineering in Demolition Project**

Client: Kajima Overseas Pte. Ltd. Location: Singapore End Date: August 2016 Type of Service: Detailed Engineering, Construction Support



Kajima Oversea Asia Pte. Ltd. was appointed as the design and build contractor for the addition and alteration to the existing building at 6 Shenton Way (Previously known as DBS building).

CKMbT was appointed as the Professional Engineers for design of the demolition works. CKMbT reviewed the method statement for demolition from the specialist contractors and developed the engineering design for carrying out the demolition in a safe and sound manner. We also designed the temporary works required for the demolition. CKMbT developed a set of detailed structural drawings and information for submission to authorities such as Building and Construction Authority for approval.

The key challenge in this project was to develop a methodology to safely demolish the building in the middle of the CBD area, minimizing hazards and pollution.

#### **Detailed Engineering in Construction Project**

Client: AMEC Foster Wheeler Asia Pacific Pte. Ltd.

Location: Singapore

End Date: In progress



AMEC Foster Wheeler Asia Pacific Pte. Ltd. was appointed by Aventis Pharma Manufacturing Pte. Ltd. (Project Owner/Developer) to design and build major changes to the existing plant at Gul Circle, Singapore. The project involves additional new tanks, pipe racks and bund walls to the existing tank farm.

CKMbT was appointed as the civil and structural consultant for this project. As project's Qualified Person (QP) and Professional Engineers (PE), CKMbT reviewed the engineering plans, submission forms, design calculations, documents etc. and made submissions to all relevant Authorities (URA, ENVCBPU, BCA, FSSD, LTA, NParks, PUB, etc.). CKMbT's scope of works includes pre-consultations, meetings and liaising with all relevant Authorities until all DC, BP, TOP and CSC clearances and approvals are obtained.

The key challenge in this project was developing a design complying with current regulations while considering the serious constraints of a plant built to previous versions of regulations.

### Feasibility Study and Geotechnical Services Project

Client: Singapore Land Authority (SLA)

Location: Singapore

End Date: Oct 2018



The Singapore Land Authority (SLA) is a statutory board under the Ministry of Law whose mission is to optimize land resources for the economic and social development of Singapore.

CKMbT was awarded term contract for 36 months by SLA for site inspection of slope failure sites or potential slope failing sites and to provide consultancy services for rectification works to failed slope sites or potential slope failing sites within Singapore.

Slope rectification works successfully completed under this contract up to date:

- 1. Slope Failure on State Land Lot MK 04 00249W (Ewart Park).
- 2. Slope Failure on State Land Lot 01337X (Commonwealth Drive).
- 3. Slope Failure at Temenggong Road.

# **Detailed Engineering in Building Construction Project**

Client: ITC Limited

Location: Mysore, India

Project Status: In Progress



The project involves residential building for ITC Limited at Mysore. CKM India Private Ltd, CKMbT's subsidiary was involved in peer review services for the building with value added services that can comply with the economical design.

The structural system adopted in this project was RC beam slab system. The proposed foundation system for this development consists of isolated and raft foundation.

The design and checking were done in accordance of IS Codes. The checking established the compliance of design to the project specifications and identified areas of optimization for design.

# Klang Valley Mass Rapid Transit UG1 and UG2 Line Project

Client: MMC Gamuda (MMC Corporation Bhd and Gamuda Bhd Joint Venture)

Location: Klang Valley Malaysia

End Date: June 2012 – June 2016



This project is part of the Klang Valley Mass Transit Project – Jajaran Sungai Buloh-Kajang (SBK) UG1 & UG2 Line. The underground works consists of 9.5km of underground tunnels and seven underground stations. The bored tunnels extend between the North Portal at Semantan and the South Portal at Maluri. The stations are generally of island platform configuration and include new interchanges which link to existing or proposed railway and transit lines.

Our scope is to act as CICE to perform independent review, checking and certification of all the major temporary works design involving the entire length of tunnels and Underground Package UG2 (i.e. Plaza Rakyat Station, Cochrane Station, Maluri Station, Escape Shaft 3 and South Portal) for the safety and design adequacy.

The temporary work scope involves:

- Any excavation and lateral support to resist horizontal earth and water pressure arising from subsoil conditions.
- Foundations for heavy lifting cranes and support gantries.
- Temporary diversion schemes for existing watercourses affected by the temporary works, temporary road decking and temporary support of utilities.
- Tunnel segmental lining subjected to construction load and breaking out of tunnel lining to construct cross passage.
- Launch Shaft Elements thrust frame / block /foundation for thrust frame.
- Face pressure / cutter-head intervention, cross passages and mined adits including temporary bracing support for bored tunnel.
- Impact assessment on the nearby structures due to the temporary works.

# Klang Valley Mass Rapid Transit Line 2 Project

Client: MMC Gamuda (MMC Corporation Bhd and Gamuda Bhd Joint Venture)

Location: Klang Valley Malaysia

Project Status: On going

Sector: Infrastructure



NOTE: The above map is a proposed alignment and is subject to change before finalization

This project is part of the Klang Valley Mass Rapid Transit Project Line 2 – Sungai Buloh-Serdang-Putrajaya (SSP) Line. The underground works consists of 13.5km underground tunnels and five underground stations.

Our scope is to act as Contractor's Independent Checking Engineer (CICE) to perform independent review, checking and certification of all the major temporary works design involving the entire length of tunnels and Underground Package (i.e. Titiwangsa Station, Hospital Kuala Lumpur Station, Bandar Malaysia North Station, Bandar Malaysia South Station and Sentul West Station).

The temporary work scope involves:

- Any excavation and lateral support to resist horizontal earth and water pressure arising from subsoil conditions.
- Foundations for heavy lifting cranes and support gantries.
- Temporary diversion schemes for existing watercourses affected by the temporary works, temporary road decking and temporary support of utilities.
- Tunnel segmental lining subjected to construction load and breaking out of tunnel lining to construct cross passage.
- Launch Shaft Elements thrust frame / block /foundation for thrust frame.
- Face pressure / cutter-head intervention, cross passages and mined adits including temporary bracing support for bored tunnel.
- Impact assessment on the nearby structures due to the temporary works.

# St Regis Hotel to Muzium Negara MRT Station Link, KL, Malaysia Project

Client: McConnell Dowell Sdn Bhd

Location: Kuala Lumpur, Malaysia

Project End Date: December April 2016



AEM Consultants, a subsidiary of CKMbT was appointed by McConnel Dowell, Malaysia for providing Detailed Design of Underground Tunnel Link between St Regis Hotel and Muzium Negara MRT Station.

The project involved detailed design of structural and geotechnical works which included the detailed design of tunnel box.

AEM also conducted an assessment of the tunnel link on the existing MRT Tunnels located within the 2nd Reserve and also monitored instrumentation data during the construction of the tunnel link.

#### **Traffic Enhancement Works Project**

Client: Jurong Town Corporation (JTC)

Location: Singapore

End Date: July 2018



Jurong Island has a land area of 30 sq.km and is home to many companies such as <u>LANXESS</u>, <u>Afton</u> <u>Chemical</u>, <u>BASF</u>, <u>BP</u>, <u>Celanese</u>, <u>Evonik</u>, <u>ExxonMobil</u>, <u>DuPont</u>, <u>Mitsui Chemicals</u>, <u>Chevron</u> <u>Oronite</u>, <u>Shell</u>, <u>Singapore Petroleum Company</u> and <u>Sumitomo Chemical</u>.

CKMbT International was appointed by Jurong Town Corporation (JTC) as the consultant for the proposed traffic enhancement works on Jurong Island.

The main highways of the Island has a heavy load of industrial traffic that is increasing every year. The project involves optimizing and modifying the junctions in Jurong Island to improve the capacity and safety performance of the roads using appropriate traffic analysis such as vehicle swept path analysis. Various options such as regularization of U-turn, change traffic light phasing, develop and regularize new signalized junctions and modification to the existing infrastructure were explored by the design team.

CKMbT's scope also includes obtaining all approvals for the design, calling of construction tender, project management and contract administration of works.