



MAA Bulletin

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Taiwan High Speed Rail Changhua Station - BIM Management

亞新工程顧問(集團)公司

MAA Group Consulting Engineers

BANGKOK BEIJING HONG KONG MACAU
SHANGHAI SINGAPORE TAIWAN YANGON

MAA Bulletin

Issue 53-54 April 2014

Founded in 1975, **MAA** is a leading Asian engineering and consulting service provider in the East and Southeast Asian region focused in the areas of infrastructure, environment, buildings, land resources, and information technology.

To meet the global needs of both public and private clients, **MAA** has a full range of engineering capabilities providing integrated solutions ranging from conceptual planning, general consultancy and engineering design to project management.

Today, **MAA** has over 1000 employees with companies in Beijing, Hong Kong, Macau, Shanghai, Taipei, Bangkok, Singapore and Yangon, creating a close professional network in East & Southeast Asia.

MAA's business philosophy is to provide professional services that will become an asset to our clients with long lasting benefits in a rapidly changing social-economic environment. **ASSET** represents five key components that underline **MAA's** principles of professional services:

project **A**dvanced Technology
client's **S**afety
client's **S**atisfaction
Economical Solution
Timely Completion

Produced By:
Moh and Associates Inc.
Oriental Technopolis Building A, 22 Fl., No.112, Xintai Wu Road, Section 1,
Xizhi District, New Taipei City 22102, Taiwan, R.O.C.
Tel: 886-2-2696-1555
Fax: 886-2-2696-1166
Email: maagroup@maaconsultants.com
Website: www.maaconsultants.com

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SUSTAINABLE ENGINEERING DEVELOPMENT

Sustainable development has become an important development strategy for countries around the world. MAA takes an active role in this trend by promoting sustainable city planning, green building and renewable energy solutions within the framework of environmental conservation, economic development and social justice. In order to achieve environmental protection, ecological conservation, energy saving and carbon reduction and maximize the benefits of the project construction, MAA encourages implementing innovative materials and methods, as shown in the following projects conducted in 2013:

SHEZI ISLAND INFRASTRUCTURE PLANNING AND ENVIRONMENTAL ASSESSMENT



Located at the confluence of the Tamsui River and Keelung River in Northwest Taipei, the 240 ha. Shezi Island has experienced several floods in its history. To protect residents, the Taipei City Government has raised and fortified the island dikes several times since 1970. The island will now be entirely redeveloped with new raised mixed-use urban areas and low-lying open space kept for organic farming, nature protection, recreation and education. Existing residents will be relocated in new housing on the island itself, and valuable temples and trees will be preserved and raised at higher elevations. The new Shezi Island, with 35,000 future residents and 11,000 workers, will be connected to the mainland by two bridges and one light rail line and equipped with smart technologies and pedestrian and cycling networks, offering a new lifestyle in the heart of Taipei and a new sustainable urban model for Asian cities.

DETAILED DESIGN ON THE HABITAT CONSTRUCTION FOR LITTLE TERN (STERNA ALBIFRONS) AT TAICHUNG POWER STATION

Taichung Power Station is one of the largest coal-fired power plant in the world and is located at the south end of Taichung Port. With the development of the industrial zone, the nearby Little Tern habitat is disappearing gradually. The goal of this project is to design and construct part of the station for Little Tern habitats.



The habitat total area is approximately 8,700 m², including warehouse roof and trapezoidal grassland. Key issues of this project include vegetation design, design to prevent flooding, predator problems and bird-luring and nestling shelter facilities design. Using non-woven fabrics, pebbles and oyster shells on the ground, installing electronic fences and placing fake birds and loudspeakers will improve habitat utilization and the Little Tern's reproduction rate. This artificial habitat will serve as an environmental education example, providing experience for other environmental protection projects in Taiwan.



ACADEMIA SINICA NATIONAL BIOTECHNOLOGY RESEARCH PARK

With the approval of the Executive Yuan, the Academia Sinica in Taiwan decided to build a National Biotechnology Research Park on a 25 ha. land freed by the 202 Defense Factory. The project includes the research park itself as well as an ecological research area. The buildings inside the park aim to fulfill five Taiwan Green Building indicators and achieve silver level certification. The park will be divided into three major areas: a research area, an artificial wetland restoration area, used for wetland preservation and flood detention, and an ecological reserve area. MAA was appointed as the PCM consultant for the project in 2013.



Picture provided by: RSEA Engineering Corporation, L&K Engineering Co., Ltd., Ricky Liu & Associates Architects+Planners

The project scope includes the following elements:

- **Project construction management**

The PCM process consists of proposing a complete set of planning requirements and design criteria for the project and in executing design review and construction supervision work with efficiency in order to achieve the goal of “lowest amount development and largest ecological maintenance”.

- **Landscape greening**

This landscaping work consists of designing an artificial wetland restoration area with tree-covered banks and adjacent buildings surrounding in order to create a diverse aquatic ecosystem making full use of native tree species and increasing the vegetation cover with multilayer planting.

- **Ecological conservation and restoration**

This work consists of creating an animal habitat corridor, restoring the Taipei Green Tree Frog habitat, promoting a topsoil and seed bank conservation plan as well as endangered plants protection.

- **Upon completion, the park will be open to the public and used to educate visitors about sustainable development**



ESTIMATION OF GREENHOUSE GAS EMISSIONS AND CARBON NEUTRALITY STRATEGIES



Concerned with global climate change impact and greenhouse gas reduction issues, Taiwan has held 3 national energy conferences on the topic. In these conferences, the Taiwan authorities have not only established energy savings & carbon reduction as a key policy but also introduced the goal of “reducing nationwide CO₂ emission” into Taiwan’s Sustainable Energy Policy in order to face the challenges of energy scarcity and global climate change. With this new policy, MAA has taken part in two projects for greenhouse gas & carbon footprint assessment and carbon management for constructions to estimate greenhouse gas emission quantity and carbon neutrality for 5 branches of Taiwan Fertilizer Co., Ltd. in Keelung, Hsinchu, Miaoli, Taichung, Kaohsiung and Hualien. The scope of services provided includes:

1. Survey the 5 factories according to the CNS-14064-1(ISO-14064) “standards for build greenhouse gas management system” and pass the third party investigation.
2. Estimate the greenhouse gas emission quantity in the Taichung main plant and establish a tool to calculate carbon footprint.
3. At the Environmental Impact Assessment review committee request, establish a carbon neutrality execution model and pass third party investigation.
4. Provide a “greenhouse gas emission quantity and carbon neutral” report to the Environmental Protection Administration.

2012 TAIWAN NATIONAL CLIMATE CHANGE SUMMIT



Besides the widespread adoption of green construction method and materials, MAA has attended domestic environmental protection activities while assisting the government in promoting sustainable engineering concepts and technologies in recent years, with events such as the 2012 National Climate Change Summit, which mobilized 2000 participants over 2 years with attendance by the highest levels of government officials (including, among others, President Ma, Minister Shen of EPA and Minister Lee of the Ministry of the Interior).

The National Climate Change Summit conference was held on 19th May 2012 and centered on informal roundtable discussions among the 580 participants, NGO representatives, government officials and industry, divided into 61 tables, each of them having two table leaders (one NGO representative and one government official), 4 to 6 members and a recorder. The discussion records were gathered and categorized and the main points instantly produced as reference for the follow-up national conference. MAA’s Vice President Mr. Chin Der Lin was invited to attend the conference. As table leader, Mr. Lin led the discussion of table members regarding issues of climate change in a step by step fashion, from partner relationship, communication establishment, joint participation and collective confrontation of ideas to the formulation of an agreement on the topic. The complete list of suggestions was summarized and provided to the government.



BIM AWARDS AND HSR CHANGHUA STATION DESIGN CASE STUDY

2013 CHINESE INSTITUTE OF CIVIL AND HYDRAULIC ENGINEERING BIM AWARD

On 22nd November 2013, MAA won two of the five second bi-annual BIM Awards awarded by the Chinese Institute of Civil and Hydraulic Engineering in recognition of the use of BIM technology by architecture and engineering companies. The awards went to the following MAA projects: the National Cheng Kung University Biotechnology Academic Building and the Taiwan High Speed Rail Changhua Station. A third project, the New Taipei City Library, was also nominated. This article describes the application of BIM to the Taiwan High Speed Rail Changhua Station project:

The THSR Changhua Station is a planned station of the Taiwan High Speed Rail located in Tianzhong Township, Changhua County. The elevated station will have two side platforms and is planned to open in 2015. The new station will significantly enhance the availability of inter-regional traffic and promote local industrial development.

CHANGHUA STATION DESIGN CONCEPT

1. Tianzhong means “in the middle of the fields” in Chinese. Changhua is famous for its yearly flora exposition and is known as the county of flowers, which explains why a floral theme was chosen as main design concept for the new high speed rail station.
2. The columns in the lobby are shaped like flowers opening their petals. The skylight lets daylight in and the columns are placed in a way that reflect indirect light and illuminate the lobby. Light, structure and floral theme are harmoniously combined.
3. The station also serves as greenhouse for plants and trees and is surrounded by gardens for the enjoyment of passengers.



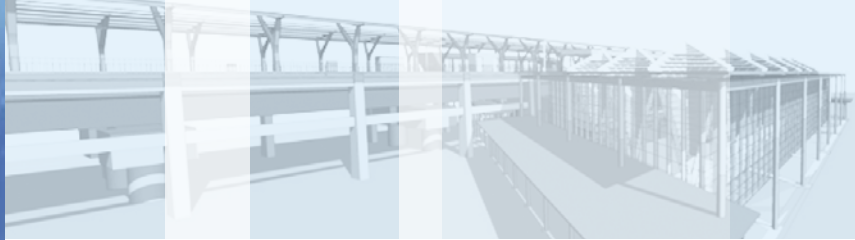
Taiwan High Speed Rail Changhua Station BIM Management



New Taipei City Library - BIM Design Integration



National Cheng Kung University Biotechnology Academic Building - BIM Design Integration



3. Incorporate BIM integration technology at the early planning phase to reduce the errors of traditional two dimensional CAD drawings, decrease the chances of design changes during the construction phase and increase the overall quality of the project.
4. Provide a 3D visualization platform to detect piping clashes, optimize work efficiency and reduce jobsite problems.
5. Incorporate architectural and MEP information (such as equipment manufacturer, useful life and maintenance schedule) through BIM technology to increase operational and management efficiency.

The introduction of BIM technology has changed the workflow of traditional building construction. In this project, BIM technology was introduced at the detailed design stage. A great amount of data was integrated to improve the efficiency and reduce the corrections and errors during construction (Fig 1.2). The Taiwan High Speed Rail Corporation understood the importance of integrating design outcomes of various disciplines and made it a priority during the planning stage of the project through the use of BIM technology. MAA's BIM Management and Integrating Center (BIM Center) was invited to provide BIM services and create architectural, structural and MEP BIM models to clarify problems and review conflicts between each discipline at an early stage.

The THSR Changhua station project incorporates BIM integration technology during design phase in order to guarantee the stability and safety of the railroad operation, enforce a high standard of precision and quality and comply with the tight construction schedule. The objectives of the project are (Fig 1.1):



Fig 1.1 Project objectives

1. Integrate the curvatures of petal-like columns.
2. Complete the project under a tight schedule. The construction period is only 31 months.

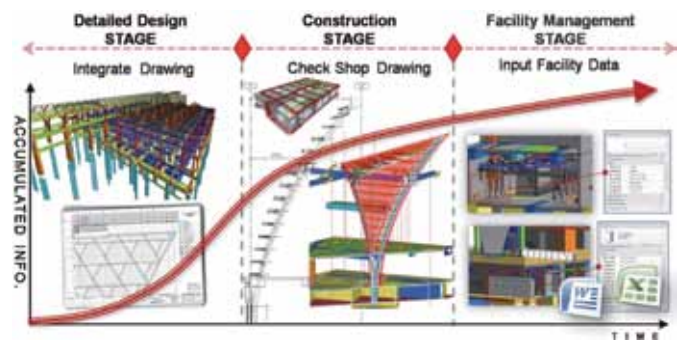


Fig 1.2 Building life cycle and BIM service flow chart

1. DESIGN PHASE - APPLICATION OF BIM TECHNOLOGY IN DESIGN DRAWING INTEGRATION

Previously, two-dimensional architecture, structural and MEP drawings were combined and organized on the construction site. Frequent errors and information gaps would occur while

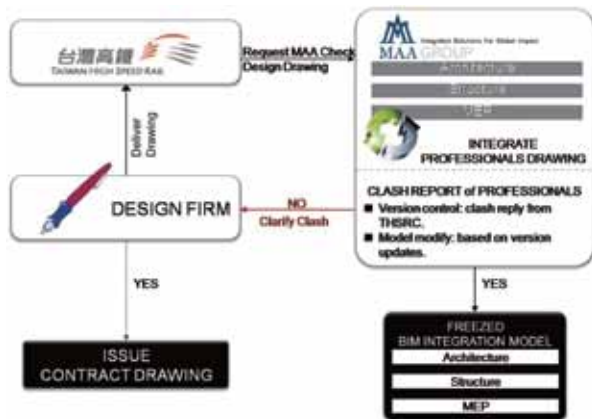


Fig 1.3 Design Integration Flowchart



Fig 1.4 Exchange Platform

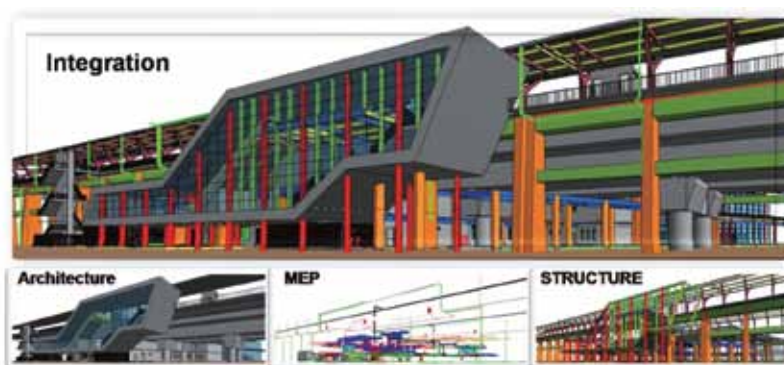


Fig 1.5 Integrating BIM models from various disciplines

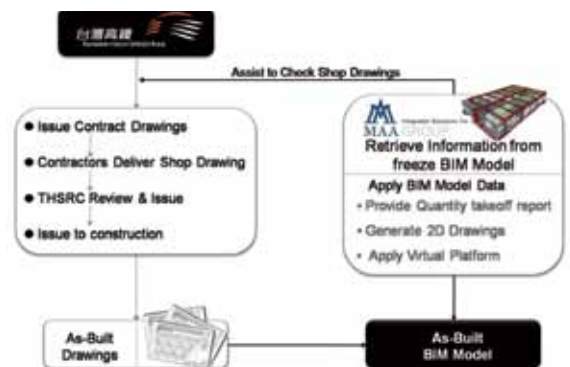


Fig 1.6 Construction Integration Flowchart

integrating various revised drawings, resulting in a waste of resource and decrease in productivity during the late construction phase. This project adopted BIM technology (Fig 1.3) and cloud computing interface (Fig 1.4) at the detailed design stage to assist THSRC in incorporating different types of drawings.

This interface enabled the integration of traditional 2D drawings and made it possible to manage 3D BIM models, 3D parameters, and BIM collaboration. Clash detection reports and clarification reports could be generated using the integrated BIM model. The 3D visualization model provided a useful tool for the examination and discussion with THSRC (Fig 1.5).

To successfully implement the signature flower blossom design concept, it was critical to integrate the curved columns with the roof curvature and MEP. The steel manufacturer pre-fabricated the steel structure of petal-like columns. BIM center provided the sections and perspective drawings generated from BIM model for the steel manufacturer to produce the curvature.

2. CONSTRUCTION PHASE - INTEGRATED DATABASE PRODUCTION AND APPLICATION

Application of BIM technology to information synchronization during construction

Prior to construction, a BIM model was created according to contract drawings approved by THSRC. The BIM model was used as a tool to coordinate various professional disciplines, share comments, report errors and discrepancies in the drawings and generate a clash detection report. Based on the clash report, THSR reviewed the drawings submitted by the contractor, subcontractors and manufacturers in order to collect and correct the mistakes in the contract drawings before construction started, allowing for fewer field problems, an enhanced construction quality and a better control of the project procedure (Fig 1.6).

The approved final version of BIM model was uploaded to the collaboration platform to make discussion between THSRC, contractors and other parties easier. With this platform, different sub-contractors and manufacturers were able to discuss and resolve potential issues consistently.

To minimize field problems and develop solutions, it was necessary to find out potential construction issues; for example, whether the elevation of piping was too high or too low, or to determine the clearance space between drainage pipelines and surrounding objects and the relationship between the drain pipe position and the elevation of catch basins.

Eighteen petal-like columns were designed to symbolize the characteristic of THSR Changhua station, twelve of them located in the high ceiling lobby and the other six in the maintenance area of the concourse floor. At the early planning stage, the petal-like steel columns were integrated with interior decoration detailing, MEP and other design elements such as the penetration of six petal-like steel columns through the floor slab, the connection details of petal-like columns and beams supporting the floor and the rebar arrangement between the steel column and the concrete beam. Such preventive discussions reducing the frequency of design modification during construction are indeed critical for early stage integration (Fig 1.7).

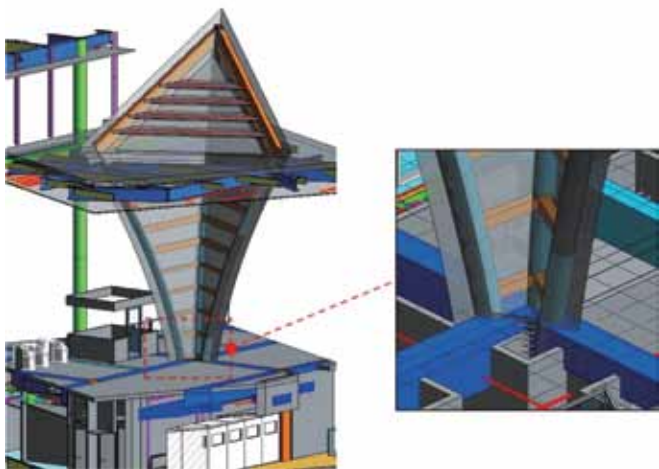


Fig 1.7 Integration of Petal-like Columns

During construction, drawings of petal-like columns and the ring girder from steel manufacturer were integrated with the sections generated from BIM model to examine the curvature of each petal-like columns and incorporate them with architectural and MEP models for clash detection. A feedback loop was created between steel manufacturer and THSRC.

Application of BIM technology for delivering clash report during construction

A frozen BIM model provided a virtual platform to generate different perspective views for the steel manufacturer. The

elevation of the ring girder was incorporated to the perspective views to improve the communication for resolving welding and on-site assembling issues. The ring girder elevation drawings from the manufacturer could also be included into the frozen structural BIM model and steel construction drawings for finding discrepancies. For THSRC, the project outcomes improved greatly because of the easier on-site checking and execution. Petal-like steel column checklist is shown in Fig 1.8.

<i>Integration of disciplines: clash detection of column A between structure and architecture design</i>	<i>Assistance for reviewing girder elevation</i>
<i>Import 2D CAD into BIM structure model</i>	<i>Column A section compared with 2D drawing</i>

Fig 1.8 Checking the Petal-like Steel Columns

BIM technology was adopted throughout the planning stage to the construction phase for the THSR Changhua Station construction project. This platform was used to improve communication, integrate different versions of drawings and database and have each team member work effectively at the same pace. Each team member’s design was coordinated to resolve interface issues and implement clarifications on the drawings. Information gaps and labeling errors were reduced significantly at the construction stage. The design delivery, construction quality, and project management were improved significantly.

The functions of BIM technology applied in this project at the planning and construction stages were:

1. Clarify confusions between drawings (of architectural, structural and piping).
2. Provide solutions for conflicts between architecture, structure and MEP.
3. Create a multi-disciplinary BIM model and provide 3D visual inspection for specific areas. Point out problem areas in advance.
Reduce blind spots of 2D integrated construction drawings.
4. Provide quantity reports of different disciplines to check quantity reports from the design team.
5. Provide a collaboration platform for filing, database sharing and preview. Assist in the management of various drawing versions.
6. Help clarify clashes and differences between architectural drawing and construction drawings.
7. Provide relevant construction drawings and information to the contractor.
8. Use the 3D BIM model to resolve interface issues during construction.
9. Improve control over project progress, material control, and on-site preparation.
10. Provide as-built BIM model for facility management.



Fig 1.9 Benefits of BIM Technology

After completion of the project, the as-built BIM model will be used for the operation and maintenance of THSR Changhua station. The model will be submitted according to owner and operator's requirements to increase the efficiency of management and maintenance work. In addition to the engineering applications implemented throughout the complete lifecycle of the building, BIM technology provided additional benefits such as assistance to the production of high-quality animation, simulation of construction progress, and visual communication platform for different sectors to understand the project structure in an efficient way. All these benefits gave the project a greater business value. The application of BIM technology for the THSR Changhua station improved the efficiency of the project management, and enhanced construction quality and speed of completion.

ACTIVITIES IN MYANMAR

ESTABLISHMENT OF MAA CONSULTANTS (MYANMAR) CO., LTD.

MAA is pleased to announce the establishment of MAA Consultants (Myanmar) Co., Ltd. in August 2013

Address: No(287), 3rd Fl., Shwe Gon Daing Road, Shwe Gon Daing (Middle) Ward, Bahan Tsp., Yangon, Myanmar

Tel: (95-1) 8604943 / E-mail: maagroup.myanmar@gmail.com

M TOWER PROJECT



MAA has been engaged in several projects in Myanmar since the office opened in Yangon. One of the projects, named M Tower, is a 27-storey steel frame building with a 2 levels reinforced concrete basement. The site area is about 3,800 m² and the total floor area about 54,500 m². The building height is 111.2 m and the depth of excavation 11.2 m. M Tower adopts green intelligent building design strategies and will become a new landmark building in Yangon upon completion and opening for occupancy in 2016. MAA was engaged by the client to provide multifaceted, all-stage project construction management services, including:

- Design review
- Assistance in procurement and contracting
- Construction and contract management
- Acceptance inspection and handover

MAA's associated firm, SURV (Shanghai) provides the architecture design service for the building.

SEMINARS IN YANGON, MYANMAR

MAA successfully co-organized 2 seminars in Yangon, Myanmar in 2013. The first seminar, "Construction Management and Geotechnical Engineering", held on 23rd March 2013, was organized by the Myanmar Engineering Society (MES), Committee for Quality Control of High Rise Building Projects (CQHP) and MAA. The second seminar, "Quality and Safety

Management for High-rise Building & Infrastructure Design and Construction", was held on 15th November 2013 and organized by CQHP, MES, Myanmar Construction Entrepreneurs Association (MCEA), AWEC Construction and MAA.



PROJECTS 1ST NOVEMBER 2012 TO 31ST DECEMBER 2013

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED DESIGN OF HIGH-SPEED RAIL PROJECT: BANGKOK - NAKHON RATCHASIMA ROUTE, THAILAND



Thailand High-speed Rail Station

The proposed Bangkok - Nakhon Ratchasima route of the high speed rail in Thailand has a total distance of about 630 kilometers and is divided into 3 sections:

- 1st section; Baan Pachee – Nakhon Ratchasima with 3 train stations on a 169.5 km route
- 2nd section; Kangkoi – Chacherngsao with 2 train stations on a 105 km route
- 3rd section: Nakhon Ratchasima – Nong Kai with 4 train stations on a 355 km route

The project involves building a high-speed rail line equipped with dual rail track of standard gauges. The minimum design speed is 250 km/h. Upon completion, the rail system will lower goods transportation costs as well as boost tourism between Thailand and Laos.

MAA was engaged by the Office of Transport and Traffic Policy and Planning to provide the following services:

- Undertake topographical survey, obtain relevant data, assess study results and other related projects operation
- Conduct feasibility study in terms of engineering, economical, social and financial data and identify the most suitable methods of funding/investment
- Undertake Definitive Engineering and Architectural Design, prepare tender documentation
- Prepare EIA report and PPP

The service started in November 2012.

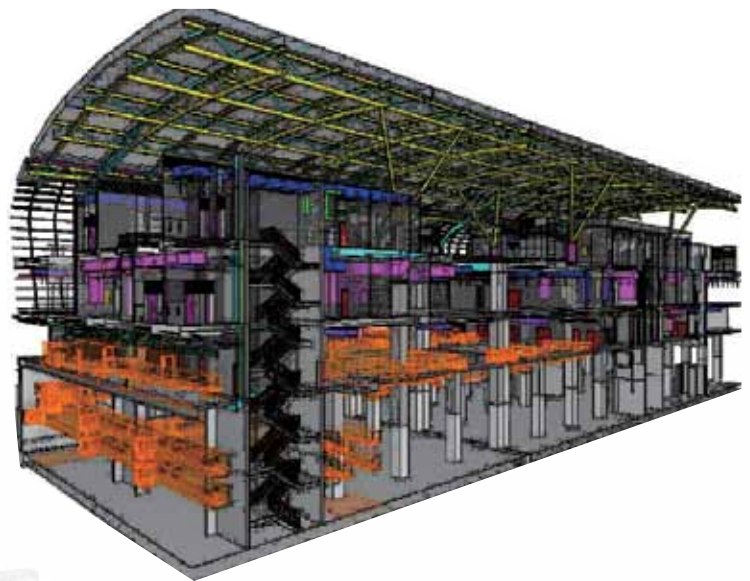
FIRST MIDFIELD SATELLITE BUILDING, SOUTH TUNNEL EXTENSION AND AUTOMATED PEOPLE MOVER, SUVARNABHUMI AIRPORT DEVELOPMENT PROJECT, BANGKOK, THAILAND



Midfield Satellite Building of Suvarnabhumi Airport

Based on the master plan of Suvarnabhumi Airport Expansion Project (SAEP), this project is the 1st phase of SAEP which consists of the construction of the first midfield satellite building (SAT-1), the automated people mover (APM), and the south tunnel extension linking the Main Terminal Building (MTB) and the SAT-1 building. The SAT-1 building is 1,052 meters long, 80 meters wide, and 4 stories tall with two stories basement. The roof structure is composed of steel truss structure and steel columns. The lower levels are composed of prestressed flat slab and reinforced concrete columns.

MAA, in association with D103, HOK, NACO, WPC, and BNP, was responsible for the development of preliminary and detailed engineering design, including structural, geotechnical, civil, and MEP engineering of SAT-1 building and fixed link bridges, structural engineering of utility tunnel, service road tunnel, and civil engineering of apron & taxiways. Other provided services include Building Information Modeling(BIM) of structure and MEP, management of Building Information Modeling, and preparation of tender documents. This is the first BIM services for government projects in Thailand. The project service started in May 2013 and is expected to be completed in May 2014.

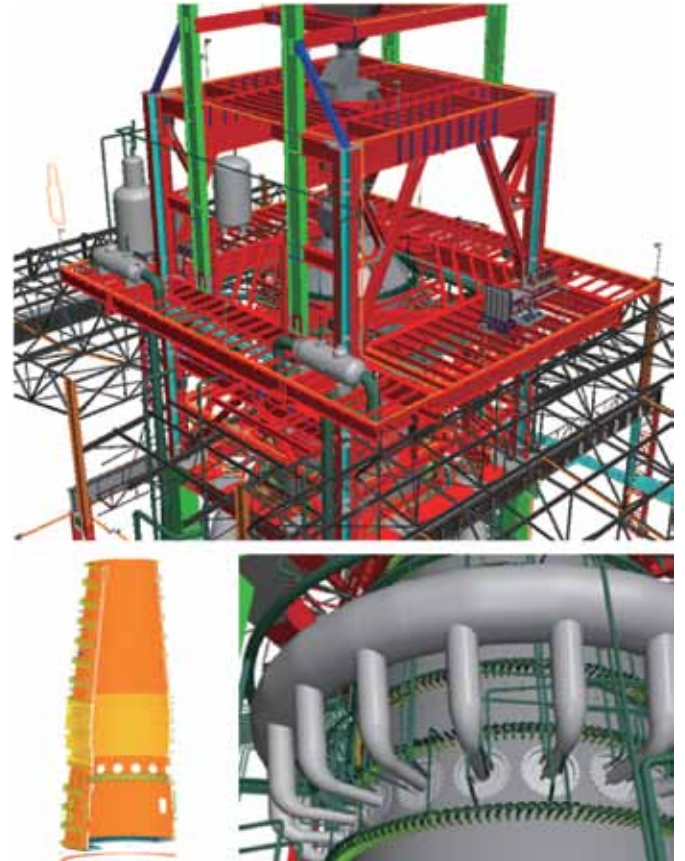


INTEGRATION OF BIM TECHNOLOGY INTO STRUCTURAL STEEL BLAST FURNACE CONSTRUCTION, TIANJIN, CHINA

The Tianjin 20th Metallurgical Construction Co. Ltd. plans to use the construction of the Structural Steel Blast Furnace project to integrate BIM technology and workflow into their construction process. MAA supported the integration of BIM technology by producing multi-disciplinary models and help the construction process through clash detection and advance construction planning. Detailed services provided by MAA were as follows:

- Produce multi-disciplinary models from the completed design of the structural steel blast furnace
- Introduction of BIM modeling standards, references, and processes
- BIM modeling review and modification support
- Integration of BIM workflows into the construction process
- Provide BIM technical support
- BIM education and training

The service period was from April to October 2013.



Structural Steel Blast Furnace

LINKOU PUBLIC HOUSING AND 2017 SUMMER UNIVERSITY GAMES ATHLETES VILLAGE, TAIWAN

This project provides new public housing for low-income families and increases the amount of affordable housing available in the Taipei metropolitan area. It also provides short-term housing accommodation for the 2017 Summer University Games.

The Linkou public housing complex features 34 buildings with 12-21 floors and 2 underground floors. The project is divided into 4 sites. The total area is 10 ha, with a total gross floor area of 514,285 m². The new housing will provide 11,000 beds during the 2017 Summer University Games and serve as Athletes Village. MAA was engaged by Taipei City Government to provide Professional Construction Management and Construction Supervision services for the project. The service project started in August 2013 and will be completed in December 2019.



Linkou Public Housing Complex

TURNKEY PROJECT OF UNDERGROUND TUNNEL AND KAOKANG COOLING PLANT FOR 345KV POWER CABLE CONNECTING TAILIN TO KAOKANG, TAIWAN



Underground Tunnel Alignment for 345kv Power Cable

The construction site of this project is located in Siaogang and Daliao districts, Kaohsiung City. The tunnel alignment starts from Nankung P/S, goes along Donglin road, Beilin road, Gaoping 22nd road and Gaoping D/S and continues along Sincuo road, Sincuo Bridge, Fenglin 2nd road to Kaokang E/S through an underground shield tunnel for a 345kV/161kV power cable with a total length of 7 km. MAA was commissioned by Taiwan Power Company to provide design services of following facilities:

- A 7,000 m long shield tunnel (inner diameter = 5.7m) for 345kV/161kV cables
- Two 32 m and 42 m deep shafts
- Two 27 m and 41 m deep exit shafts
- One cooling plant with 3 floors above ground and 2 floors underground
- 12,400 m long E&M system

The project service started in June 2013 and is to be completed in September 2016.

PROPOSED HOTEL DEVELOPMENT AT JURONG TOWN HALL ROAD, SINGAPORE

The proposed development comprises the construction of a 15-storey hotel with a swimming pool and a single level basement carpark with mechanical room to be developed by Resorts World at Sentosa of Genting Group. While the rooms at Sentosa's luxury hotels are intended for top-end guests, the four-star hotel in Jurong will cater to the mass market tour-and-travel segment. MAA Singapore was engaged to provide the geotechnical study service consisting of soil investigation works with regard to the foundation system and excavation work of the proposed hotel at Jurong Town Hall Road. MAA was also the consultant for the geotechnical study of the Integrated Resort Project in Sentosa. The project service started in December 2012 and was completed in February 2013.



Hotel at Jurong Town Hall Road, Singapore

PROPOSED Ngee ANN POLYTECHNIC CAMPUS EXPANSION (PHASE 7B), SINGAPORE



Ngee Ann Polytechnic Campus, Singapore

The proposed development consists of the construction of a 4-storey building with student lounge, staff office, food court, pedestrian walkway, an indoor sports hall and three tennis courts on the rooftop within the campus of Ngee Ann Polytechnic. MAA (Singapore) provided geotechnical engineering services including soil investigation work for the foundation system and basement excavation works for the proposed development. The service period was from January to May 2013.

MYANMAR BAGO GARMENT FACTORY PROJECT

Greatex International (HK) Co., Ltd. decided to invest in Myanmar and build a modern garment factory in Bago Province. The factory will start to be used progressively and its staff trained by the end of 2013. The facility will consist of a production plant, warehouses for finished products & raw materials, a restaurant, a scrap yard, a generator room, a guardroom, a parking lot, etc. MAA was engaged by the client to provide planning, design, and construction supervision for architecture, structure, electricity, potable water, sanitary drainage, fire hydrant system, HVAC system, land preparation, roadway, landscaping and planning & design of the factory monitoring system. The service period was from December 2012 to March 2014.



Bago Garment Factory, Myanmar

KAOHSIUNG METROPOLITAN RAILWAY UNDERGROUND PROJECT – INSTRUMENT MONITORING, STRUCTURAL AND GEOTECHNICAL SAFETY CONSULTANCY SERVICES FOR THE IN-OPERATION MRT BORED TUNNEL DURING THE ACL 212 KAOHSIUNG STATION UNDERGROUND WORKS

The construction of the MRT R11 station is part of the ACL 212 Kaohsiung station underground works. The up and down track MRT bored tunnels located on both sides of the MRT R11 Station construction site are in service. As the excavation depth runs as deep as 32 m and the clearance is as small as 1.2 m, the tunnels are subjected to great risks of structural breach and operational interruption. To reduce the risks, the interaction between the excavation and the bored tunnel was evaluated carefully before the excavation. Instrument monitoring and on site consultancy services were provided for all excavation stages. To update the risk information, feedback analyses were performed based on the data retrieved from the monitoring system. MAA was engaged by RSEA Engineering Corporation to provide the following services:

- Instrument monitoring, geotechnical and structural safety evaluation for the in-operation MRT bored tunnel;
- On site consultancy services;
- Engineering risk evaluation and response strategy suggestion;
- Engineering feedback analyses;
- Alternate construction methods evaluation.

The service period was from January to December 2013.



Kaohsiung MRT R11 Station Excavation

MIXED DEVELOPMENT PROJECT WITH 2-STOREY COMMERCIAL PODIUM AND RESIDENTIAL FLATS (HENRY PARK) AT HOLLAND GROVE ROAD, SINGAPORE

The proposed development consists of the construction of 5-storey residential buildings with a 2-storey commercial podium and basement carpark at a prime residential location besides the existing Henry Park of Holland Road. MAA Singapore provided geotechnical engineering services for the project, including soil investigation work consisting of 9 boreholes for the foundation system and basement excavation works of the proposed development. The service period was from November 2012 to April 2013.



Henry Park Village Plan, Singapore

CONTRACT MANAGEMENT PROFESSIONAL SERVICES REGARDING THE PROMOTION OF PRIVATE PARTICIPATION IN TAOYUAN AREA SEWER SYSTEM'S BUILD, OPERATE AND TRANSFER (BOT) PLAN

The project area includes Taoyuan City, Bade City, Dashi City, Guishan Township and Luzhu Township, with a total area of 7,610 ha. The construction works include a 284,989 m long piping network connecting 209,813 households and one water treatment plant (with 200,000 CMD of treated water on average). The major mission of the project consists of assisting the client in overseeing the concessionary company for the investment contract, the investment implementation plan and related documents and schedules and the associated implementation work. MAA was engaged by the Construction and Planning Agency of the Ministry of the Interior to provide the following services:

- Review, check and audit the mentioned documents of the concessionary company
- Audit, analyze and oversee the concessionary company for compliance with the rules mentioned in the contract regarding construction quality of the building and operation phases, work schedule, construction site safety, health and related matters
- Help manage other issues related to the present project's construction supervision and to the management of the implementation of contract clauses

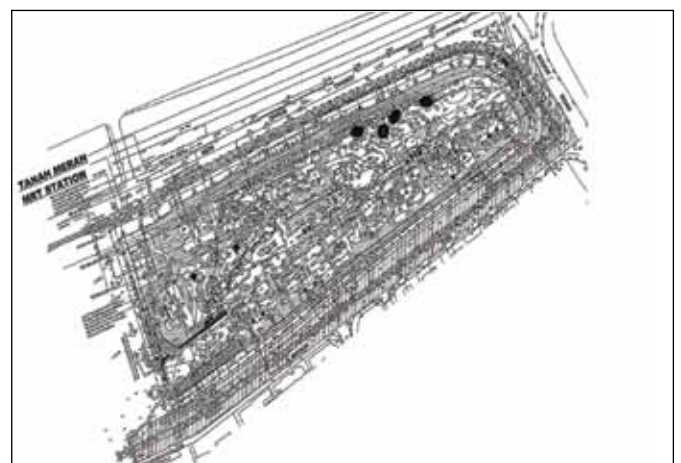
The project service started in March 2013 and is to be completed in March 2016.



Sewer System in Luzhu Township, Taoyuan

PROPOSED RESIDENTIAL DEVELOPMENT AT NEW UPPER CHANGI ROAD, SINGAPORE

The proposed development comprises the construction of 8 blocks of residential buildings with a 2 levels basement parking, a swimming pool and communal facilities near the existing MRT track/viaducts (East-West Line). Hence, the proposed development is subjected to the restrictions and safety requirements specified by the Land Transport Authority (LTA). Specialist geotechnical works consisting of large diameter bored piles through alluvium formation and deep excavation/retaining system along southern high ground are anticipated in this project. Geotechnical engineering services were provided by MAA Singapore, including soil investigation work consisting of 13 boreholes for the foundation system and basement excavation works of the proposed development. The service period was from January to March 2013.



Proposed Residential Development at New Upper Changi Road, Singapore

FIRST PHASE SEWAGE SYSTEM CONSTRUCTION IN YONGKANG DISTRICT, TAINAN CITY, TAIWAN

The project scope comprises two sewage collection areas, PAa and PAb, covering a total area of 770 ha. Construction includes main sewers, sub-main sewers, branch sewers, lateral sewers and household connection pipes. Pipes diameter varies between 300 mm and 1,350 mm. Total length will be 32,238 m. Household connection pipes will reach more than 14,619 households.

The construction method of main sewers, sub-main sewers, branch sewers and lateral sewers mainly uses the pipe-jacking method (pipes diameter ≥ 300 mm). Household connection pipe construction uses the open-cut method (pipes diameter ≤ 200 mm). MAA was commissioned by the Water Resource Bureau of Tainan City Government to provide services including:

- Exploration drilling and geotechnical investigation
- Basic design
- Detailed design
- Construction supervision

The project service started in March 2013 with an anticipated completion date in December 2017.



Tainan Yongkang Sewage System

P ROFESSIONAL ACTIVITIES

- Professional Activities
- Professional Awards
- International Meetings
- Seminars and Conferences
- Technical Publications

► Professional Activities

SINGAPORE BUILDING AND CONSTRUCTION AUTHORITY

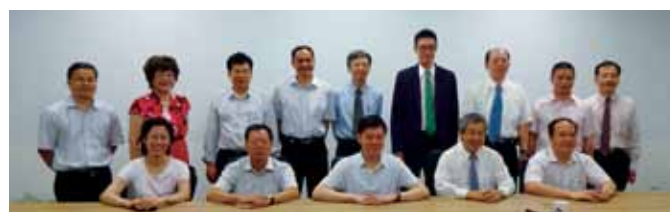


Delegation of Singapore BCA and GeoSS

On 20th March 2013, a delegation of 28 engineers led by Singapore Building and Construction Authority (BCA) Director Mr. Chew Keat Chuan and Geotechnical Society of Singapore (GeoSS) President Mr. Chua Tong Seng visited MAA for geotechnical technology exchange and experiences sharing. The Building and Construction Authority (BCA) is an agency under the Ministry of National Development, championing the development of an excellent built environment for Singapore. “Built environment” refers to buildings, structures and infrastructure where community activities take place.

GUANGZHOU RESOURCES & ENVIRONMENTAL PROTECTION INVESTIGATION GROUP

On 18th June 2013, Mr. Xiaodan Hsieh (謝曉丹), Vice Mayor of Guangzhou City Government, led a delegation of 29 people



Vice Mayor Hsieh of Guangzhou City Government at MAA office

to visit MAA. Both sides held fruitful discussions and shared their experience of waste disposal management, recycling and other environmental protection issues.

CHINA UNIVERSITY OF TECHNOLOGY INDUSTRY-ACADEMIC COOPERATION



Industry-academic cooperation Signing Ceremony at China University of Technology

On 30th April 2013, China University of Technology signed a MOU for industry-academic cooperation with 55 of the most famous companies of Taiwan. The purpose of this cooperation is to create a win-win situation for both university and industry. While firms need to continually adopt new knowledge and technologies in order to ensure long-term prosperity, universities also want to expose students and faculty to practical problems, create employment opportunities for their graduates and gain access to applied technological areas. The goal of China University of Technology is to teach and train graduates that can meet firms’ needs and social expectations, which explains why it has been ranked as the fifth “enterprises favorite” among all private technical & occupational college graduates in a survey conducted by Cheers Magazine in 2013. The 55 famous firms who joined the cooperation plan include Farglory Group, Fubon Life Insurance Company, Far Eastone Telecommunications Co., MAA, MOS Burger, etc. MAA’s Senior Vice President, Mr. Richard Moh, represented MAA at the signing ceremony.

THE PING-CHAO PROJECT OPENS TO TRAFFIC ON 25th JUNE 2013



MAA's President Mr. Chien-I Hsu (left 2) at the Ping-Chao Project Opening Ceremony

The Ping-Chao Project, which includes the reconstruction of six rail stations, a new depot at the southern Chaozhou Township, and the engineering for the elevated railway, was opened to traffic on the west rail line section on 25th June 2013. The total route length of the project from the Pingtung train station to the new depot in the southern Chaozhou Township is about 21 km. This project also comprises the extension of the electrified double-track railway from the Pingtung train station to Chaozhou. The construction cost of the project is about NTD 24.5 billion. Once the railroad viaducts are built, the 24 railroad crossings will be removed. Cycling paths under the viaducts are also planned. The existing depot location will be moved from Kaohsiung City to the southern Chaozhou Township, where the depot will become the new starting point of Taiwan's western rail line. Upon completion of the eastern line connection in 2015 at the same location, Chaozhou Township will constitute a key element of the southern Taiwan railroad.

MAA has been the main designer for the Ping-Chao project follow-up design work since 2009. MAA design work has been completed in 2011, including detailed design for viaducts and train stations along Guilai, Sishih, and Chaozhou Townships and for the depot in the southern Chaozhou Township. MAA is currently providing post-design service during the construction of the project until its completion in 2015.



Chaozhou Station

MAA's President, Mr. Chien-I Hsu, was invited as a guest of honor by the Railway Reconstruction Bureau Southern Region Engineering office to attend the ceremony for the inauguration of the western line connection of the Ping-Chao project. The ceremony was graced by attendance of the Minister of Transportation and Communications, the Commissioner of Pingtung county, local congressmen, the General Manager of BES Engineering Corporation and other personalities.

► Professional Awards

UNITED NATIONS ENVIRONMENT PROGRAMME 2013 LIVEABLE COMMUNITIES AWARD

In December 2013, the new Kaohsiung Exhibition and Convention Center was awarded the United Nations Environment Programme 2013 Liveable Communities (LivCom) Awards Gold Medal. The LivCom Awards were launched in 1997 and is the World's only Awards Competition focusing on International Best Practices regarding the management of the local environment. LivCom's objective is to develop and share international best practices, with the further objective of improving the quality of life of individual citizens through the creation of 'liveable communities'. The Kaohsiung Exhibition and Convention Center design and construction use sustainable techniques in the development of a modern yet local green architectural masterpiece. The design reflects the intimate relationship of mankind and water, with a curved roof and crisscrossing black-and-white pattern resembling waves, that embodies the nearby ocean and the very spirit of Kaohsiung as Taiwan's Maritime Capital. With a total area of 44,929 m², the new Exhibition and Convention Center will be able to welcome 1,500 exhibition booths, a 2,000 seat conference hall, two 800 seat conference rooms and several smaller venues suitable for 20 to 40 people. MAA performed construction management services for this major new facility which reinforces Kaohsiung's position as an important East Asian sustainable business hub.

<http://www.livcomawards.com/2013-awards/winners.htm>



THE 5TH CHINA BEST DESIGN HOTEL AWARD



In December 2013, Qing Wang Fu Club Suits & Serviced Residences in Tianjin China won the 5th China Best Design Hotel Award for Best Historical Heritage and Preservation. The award is China's top honor for boutique hotels and was founded in 2009 by The Bund, an urban lifestyle magazine with a wide readership in China. The China Best Design Hotel Awards are chosen by public vote and by a panel of international design experts tasked with identifying the best-designed properties in China. Qing Wang Fu (Prince Qing's Mansion) was built in 1922 and has been designated as a municipal-level cultural relic and a historic construction under special protection in Tianjin. With an almost hundred years old history, this ancient mansion has been endowed with a new meaning after its recent renovation. In May 2011, led by the Tianjin Municipal Bureau of Land Resources

and Housing Administration, the Tianjin Historical Architecture Restoration and Development Co., Ltd. (THARD) launched the restoration of Qing Wang Fu according to the principles of "protection first, reasonable utilization, restoration to original, safety and applicability". Shanghai-based SURV, MAA associated firm for architecture and urban planning, was part of the renovation team hired to perform design services for the project.

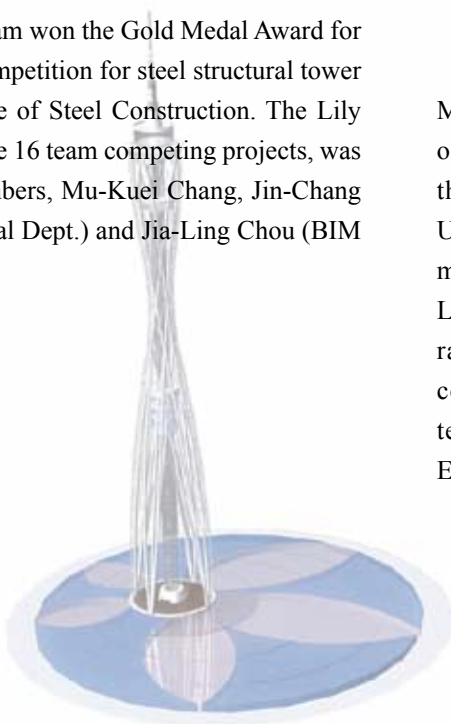
TAIPEI CITY GOVERNMENT 2013 PUBLIC WORKS EXCELLENCE AWARD



On 22nd August 2013, MAA Taiwan received two of the 2013 Public Works Excellence Awards awarded by Taipei City Government. The awards went to the following MAA projects: project construction management for Taoyuan International Airport MRT Line section construction from Sanchung Station to Taipei Station, and Design for Taipei MRT Xinzhuang Line Section Contract CK570H.

MAA TEAM WINS THE GOLD MEDAL AWARD IN THE 2012 CREATIVE DESIGN COMPETITION FOR STEEL STRUCTURAL TOWER FOR STEEL STRUCTURAL TOWER

On 14th June 2013, MAA team won the Gold Medal Award for the 2012 creative design competition for steel structural tower held by the Taiwan Institute of Steel Construction. The Lily Tower, the winner among the 16 team competing projects, was designed by four team members, Mu-Kuei Chang, Jin-Chang Fan, Sheng Zhang (Structural Dept.) and Jia-Ling Chou (BIM Center).



LETTER OF APPRECIATION

MAA received a Letter of Appreciation for completing the project ahead of time on the detailed design service for the “Transformation of the Taiwan Railway into a MRT-type railroad Plan- Chaozhou Project” from the Railway Reconstruction Bureau, MOTC in July 2013.



MAA received a Letter of Appreciation for its contribution on assisting the North District Project Office of the Department of Rapid Transit System in winning the 2012 Geotechnical Award by the Taiwan Geotechnical Society for the Taoyuan Airport MRT section contract CA450A shield tunnel construction project in March 2013.



MAA received a Letter of Appreciation from the National Tsing Hua University for its project management work for the Learning Resource Center, rated as A level by the construction inspection team of the Ministry of Education in April 2013.



► International Meetings

18 SEAGC CUM 1 AGSSEAC

The 18th SEAGC cum 1st AGSSEAC was held on 29-31 May 2013 in Singapore with more than 350 participants. The conference was organized by the Geotechnical Society of Singapore (GeoSS) under the auspices of the Southeast Asian Geotechnical Society (SEAGS) and the newly formed Association of Geotechnical Societies in Southeast Asia (AGSSEA) and co-organized by the Society for Rock Mechanics & Engineering Geology (Singapore) (SRMEG) and supported by the SIMSG and ISSMGE.

There were 7 keynote lectures. The first one entitled “Z.C. Moh Lecture” was delivered by Professor Brian Simpson of UK on Use of Numerical Analysis with Eurocode 7. This lecture was established at the time of the 17 SEAGC in honor of the Founding President of the SEAGS who is also the Honorary Founding Chairman of the AGSSEA. Dr. Moh is currently the Chairman of the MAA Group Consulting Engineers.



From left to right, Dr. Ooi Teik Aun, President of SEAGS and Prof. K.Y. Yong, Chairman of AGSSEA, Dr. Moh

In his introduction, Professor K.Y. Yong, Chairman of the AGSSEA and Vice President of the University of Singapore, attributed Dr. Moh as an Educator, Engineer and Mentor.

In addition to attending the conference, Dr. Moh also attended the General Committee Meeting of the SEAGS and Council Meeting of the AGSSEA. From MAA, Dr. J.F. Chang also attended the conference and presented a paper entitled “Safety Assessment and Construction Consideration for Shield Tunnels Passing Through Pile Foundations” (co-authored with C.R. Chou, Z.C. Moh, and N.T. Yu)



Photo taken after General meeting of members of SEAGS

► Seminars and Conferences

FORUM ON BIM INDUSTRY DEVELOPMENT BETWEEN TAIWAN AND GERMANY

On 5th November 2013, the National Taiwan University BIM Center held a forum named “BIM Industry Development between Taiwan and Germany”. BIM technology has been gradually applied in construction industry both in Taiwan and in Germany. There are a number of special experiences worthy of mutual exchange on BIM technology as a result of the different conditions in both countries development. Thus, the forum invited Prof. Wolfgang Huhnt, Vice President of the Technical University of Berlin, to share his experience on the development of BIM in Germany. Other invited specialists were:

1. Mr. Richard Moh (莫仁維), Senior Vice President of MAA
Speech entitled: Enabling BIM;
2. Mr. Charlie Chang (張建泰), President of Sansin Builders Co. Ltd.
Speech entitled: BIM-industry's challenges and opportunities;
3. Mr. Borden Tseng (曾柏庭), Design Director of Q-Lab
Speech entitled: Generative Design Methodology

The forum allowed participants to better understand BIM applications in different countries and uncover opportunities for cooperation.

► TECHNICAL PUBLICATIONS

Chang, J.F., Chen, D.J., Moh, Z.C., Yu, N.T. (2013) "Application of Ductile Segments to Tunnels in Close Proximity," *Proceedings of the 18th International Conference on Soil Mechanics and Geotechnical Engineering*, Paris, France, 2nd- 5th September

Chao, H.C., Yang G.R., Wu, P. J., Huang T.C. (2012), "Geotechnical Risk Management for the Construction of Double-O-Tube Shield Tunnel," *The 2nd Symposium of Engineering Risk & Insurance Research*, Beijing, China, 18 October (in Chinese)

Chao, H.C., Yang K.R., Chen H.T., Huang T.C. (2013) "Construction Risk Management for the Double-O Tube Bored Tunnel of the Taoyuan International Airport MRT Link," *The 11th Cross Strait Seminar on Tunnels and Underground Construction*, Xitou, Taiwan, 1st – 2nd November (in Chinese)

Chen, Y.H., Lin, C.D., Mao, S.S., Lee, C.M., (2012) "成功路污水幹管、人孔永遷復舊工程探討," 地下管道期刊, Taipei, Taiwan, No. 26, April, pp.27-36 (in Chinese)

Chiang, S.T., Kang, S.M., Moh, R.J.C., Shih, J.Y., Huang, W.J. (2013) "Case Study of BIM Application on Design Management," *2013 Conference on Computer Applications in Civil and Hydraulic Engineering*, Yilan, Taiwan, 5th- 6th September (in Chinese)

Chou, C.R., Moh, Z.C., Yu, N.T. (2013) "Safety Assessment and Construction Consideration for Shield Tunnels Passing Through Pile Foundations," *18th Southeast Asian Geotechnical & Inaugural AGSSEA Conference*, Singapore, 29th - 31st May

Kang, S.M., Moh, R.J.C., Chen, C.T. (2013) "BIM Application on Construction Management-Taking New Taipei City Library as an Example," *2013 Conference on Computer Applications in Civil and Hydraulic Engineering*, Yilan, Taiwan, 5th- 6th September (in Chinese)

Kang, S.M., Chen, Y.M., Kao, C.C. (2013) "Case Study of BIM Application on Construction Management – Central Library of New Taipei City," *6th Civil Engineering Conference in Asia Region (CECAR6)*, Jakarta, Indonesia, 20th – 22nd August

Kang, S.M., Kuo, Eros, Chen, Y.M. (2012), "Collaborative Engineering Requirements and Applications in a BIM Environment," *Rapid Transit System & Technology*, Taipei, Taiwan, No.47, August, pp.137-146 (in Chinese)

Kang, S.M., Yang, N.D., Zhang, S.M., Lee, S.R., Chiang, S.T. (2012), "BIM Application in the Design of Elevated Station Y19 of Taipei Circular MRT Line Package 113," *Rapid Transit System & Technology*, Taipei, Taiwan, No.47 August, pp.39-46 (in Chinese)

Lai, Y.F. (2013) "Protection Control for Adjacent Buildings and MRT Structures in Taipei Rapid Transit System," *2013 CIE-IEM-HKIE Tripartite Seminar*, Taipei, Taiwan, 15th November

Lo, H.T., Yang, C.T., Su, T.C., Hsu, C.C. (2013) "Automatic Monitoring System of Slopes on Keelung-Xizhi Section of National Freeway No. 3," *Sino-Geotechnics*, Taipei, Taiwan, No. 136, June, pp.47-58 (in Chinese)

Moh, R.J.C., Hsieh, S.H., Kang, S.M. Lee, W.L. (2012), "The Application of BIM to Facility Capacity Inspection for Underground MRT Stations," *Rapid Transit System & Technology*, Taipei, Taiwan, No.47, August, pp.55-64 (in Chinese)

Tseng, Y.Y., Kang, S.M., Moh, R.J.C., (2013) "BIM Application on the Signage System of Public Building at Design Stage," *1st International Conference on Civil and Building Engineering Informatics (ICCBEI 2013)*, Tokyo, Japan, 7th – 8th November

Wang, Y.T., Huang, S.Y., Chen, M.C., Yu, C.J., Huang, C.C. (2013) "The Investigation of Potential Debris Flow Torrents in Mountain Area," *Proceedings of the 15th Conference on Current Researches in Geotechnical Engineering* in Taiwan, Yunlin, Taiwan, 11th - 13th September

Yang, C.L., Lee, W.L., Moh, R.J.C., Kang, S.M., Wu, L.H., Hsieh, H.C., Shu, Z.H. (2013) "Application of BIM Coordination Technology to Taiwan High Speed Rail Chang Hua Station," *2013 Conference on Computer Applications in Civil and Hydraulic Engineering*, Yilan, Taiwan, 5th- 6th September

Yang, C.Y., Yang, N.T., Kang, S.M., Moh, R.J.C. (2013) "Tekla Structures BIM Application on the structure of engineering design and construction stages," *2013 Conference on Computer Applications in Civil and Hydraulic Engineering*, Yilan, Taiwan, 5th- 6th September (in Chinese)

Yang, G.R., Lin, Y.C., Huang, Y.C. (2012), "Case Study on Dewatering of Chingmei Gravels of A1 Station of International Airport Access MRT," *The 11th Cross Strait Seminar on Tunnels and Underground Construction*, Xitou, Taiwan, 1st – 2nd November (in Chinese)

Yang, G. R., Ferng, S.Y., You, C. F. (2013) "Case Study on Application of Casson Method to Crosspassage Construction," *Proceedings of the 15th Conference on Current Researches in Geotechnical Engineering* in Taiwan, Yunlin, Taiwan, 11th -13th September

P PERSONNEL PROFILES



Gwo-Jenn LIU

劉國鎮

Mr. Gwo-Jenn Liu was promoted to Deputy Manager of the Project & Construction Management Dept. in April 2013. He received his master degree in Geotechnical Engineering from National Chung Kung University in 1987. Mr. Liu joined MAA in 1989 as a geotechnical engineer and was promoted to senior geotechnical engineer in 2003. Major works undertaken by Mr. Liu include project management and construction supervision for many great buildings in Taiwan such as the National Convention and Exhibition Center (Nangang Exhibition Hall Expansion), the Xinzhuang Sports Center, the National Dong Hwa University campus, the Teaching Research Building of the National Taiwan University of Science and Technology, the National Central Library relocation project and the Taipei County Government Administration Center. Besides buildings, he has taken part in geotechnical consultancy for many infrastructure projects, including the Hsinyi Bypass project, the Taipei MRT Nangang Line Design Lot 173, the Chungho Line design lot CC560, the Taichung Fossil Fuel Power Plant and the Ilan Expressway (Nankang-Pingling Sec.). Mr. Liu is a Registered Professional Geotechnical Engineer, R.O.C. and received Basic Qualification Training Course for Professional Procurement Personnel and Labor Safety and Health Management (class C).



Jing-Fu HSU

許景富

Mr. Jing-Fu Hsu was promoted to Senior Engineering Geologist of the Geomatics Dept. in April 2013. Mr. Hsu received both bachelors and masters degree in geology from National Taiwan University in 1989 and 1992. Mr. Hsu joined MAA as an engineering geologist in 1994 whose major works undertaken include hydro-geological investigation and geological survey. Major projects include the Landslide - Landslip Geologically Sensitive Areas zoning project in Nantou County, The Investigation of Potential Debris Flow Torrent in 2012, Geological Hazards Mapping in Mountainous Areas of Miaoli, Taichung, Nantou and Hualien County, Studies and Investigation on Geological Hazard of Slope land in Eastern Taiwan, construction supervision for the Hsinyi branch of Taipei Expressway, design of the Eastern National Highway and detailed design of the Sinwei bridge in the Miaoli National Scenic Area. Mr. Hsu is a registered Professional Geologist, Taiwan, R.O.C. and a member of the Geological Society of China and Taiwan Association of Professional Applied Geologists. To date, he has participated in 4 published technical papers.



Yu-Chi LIN
林育祺

Mr. Yu-Chi Lin was promoted to Technical Manager of the Project & Construction Management Dept. in April 2013. Mr. Lin received both his bachelor's and master's degrees in structural engineering from National Taiwan University of Science and Technology in 1995 and 1997. Mr. Lin has worked for Ta-Hsing Engineering Consultant Co. (1995-1996), the National Defense Medical Center (1997-1999) and MAA (1999-current). His experience ranges from structural analysis and design to project construction management. Structural analysis and design projects include the Wan-Son Building, the Wan-Gar-Fu Shopping Mall fire damage assessment and the Grand Hotel fire damage assessment. His major projects for project construction management include the Taiwan Hakka Cultural Center Miaoli Park, the National Taiwan Technology University school building construction (turnkey contract), the relocation of the National Taichung Library and the Kaohsiung Indoor Stadium (BOT project), etc. As for professional registration, Mr. Lin is a Registered Professional Structural Engineer, R.O.C., a Professional Building Interior Decoration Personnel, R.O.C., a Professional Public Construction Quality Management Personnel, ROC. and Professional Procurement Personnel, ROC. He was nominated as Chairman of the Young Engineers Committee of the Chinese Association of Engineering Consultants (2012-2015). To date, he has co-authored 1 published technical paper.



Syh-Yang FERNG
馮賜陽

Mr. Syh-Yang Ferng was promoted to Senior Engineer of the Transportation & Civil Engineering Dept. in April 2013. He received his bachelor degree in Civil and Hydraulic Engineering from Chung Yuan University in 1986 and his master degree in Civil Engineering from National Chung Hsing University in 1988. Mr. Ferng joined MAA as a geotechnical engineer, whose major works undertaken include geotechnical investigation, drainage system design, bridge design, ground improvement, structural design and detailed design. Significant projects include the Sun Yat-sen freeway widening project, the Neihu extension line, the Songshan line, the Hsinyi line and the Tucheng extension line for the Taipei MRT system, the Chudung to Nanliao expressway, the Tempisque bridge in Costa Rica and Contract C296 of the Taiwan High Speed Rail Project. Since November 2007 until November 2012, Mr. Ferng has served as the geotechnical Professional Engineer on site for the construction of the Taipei Metropolitan Area Rapid Transits System Design Lot DG166 on the Songshan Line. Since December 2012, Mr. Ferng has served as project manager consultant for the construction of the Taipei MRT Circular Line Project Phase 1, Design Lot DF113. He is a registered Professional Engineer (Geotechnical), R.O.C. and a member of the Taiwan Geotechnical Society. To date, he has author/co-authored 4 published technical papers.



Yung-Feng LAI
賴永豐

Mr. Yung-Feng Lai was promoted to Senior Geotechnical Engineer of the Transportation and Civil Eng. Dept. in April 2013. Mr. Lai received his bachelor's degree from National Taiwan University in 1991 and his master in civil engineering from the University of Illinois at Urbana-Champaign, USA in 1995. After graduation, Mr. Lai worked for Taiwan Prospecting & Engineering Co., Ltd. (TPEC), Genesis Group/Taiwan and MAA. Major works with TPEC were ground anchors in 1996-1998. From 1998 to 2002, Mr. Lai worked for the Genesis Group/Taiwan and was responsible for analysis, design and budgeting of slope protection. In 2002, Mr. Lai joined MAA as a geotechnical engineer. He worked on various public projects as designer or plan reviewer. From 2004 to 2006, Mr. Lai served as Geotechnical Engineering Consultant and DORTS Professional Engineer Representative for the Taipei MRT Neihu Line Contract no. DB144A/B. In 2009, he served in the same position for the Taipei MRT Tucheng Line Contract no. DD170. Mr. Lai is a registered professional civil and geotechnical engineer in R.O.C. and a member of the Taipei Professional Geotechnical Engineers Association and the Chinese Institute of Geotechnical Engineering. To date, he has participated in 7 technical papers published in various engineering journals and research papers.



Kuo-Lone CHEN
陳國龍

Mr. Kuo-Lone CHEN was promoted to Senior Civil Engineer of Construction Supervision Dept. in April 2013. Mr. Chen received both bachelor's and master's degree in civil engineering from Chung Yuan University in 1991 and 1993. In 1993 Mr. Chen worked for the House & Urban Development (HUD) organization. Major works undertaken there included sewer engineering, retaining wall, all casing foundation, bridge engineering, segment of short-line construction, segment wind loss of balanceable and cantilever, U type and Box type prestressed beam construction. Mr. Chen joined MAA in 1999, representative projects include Taiwan's central second freeway Dajia – Changben section, Taiwan HSR Taoyuan viaduct section, Xinzhuang Secondary Center, the Hsinchu Science Park development and Taiwan Taoyuan International Airport pavement rehabilitation and navigation facilities upgrade engineering. Major works provided by Mr. Lai for the above projects include scheduling supervision, technical support, bridge engineering and construction supervision.



Kun-Sung CHEN

陳 坤 頌

Mr. Kun-Sung Chen was promoted to Senior Civil Engineer of MAA Taichung Office in April 2013. Mr. Chen received a bachelor's degree in civil engineering from National Chung-Hsing University in 1995 and a master of civil engineering from National Taiwan University in 1997. After that, he served as a Civil Engineering Officer in the Engineering Group of the ROC Air Force in 1997-1999. Soon after completing his National Service, he joined MAA and served as a structural engineer in the Structural Engineering Department. He is mainly responsible for the structural design of bridge and building structures. Major works undertaken at MAA includes the detailed design of abutment, retaining wall, isolated floor, steel bridge of THSRC and building structure for the HSR Taliao depot, OTI station, station entrance of KRTC, railway station of TRA, building structure of TPS, etc, as well as the review of structures for PCM. After that, he served as a coordinating engineer at the Taichung MRT Department. Presently, he works at the Taichung Office, in particular on PCM work for the Taichung Shueinan Economic & Trade Park project. To date, he has authored/co-authored 3 published technical papers.



Ming-Sung CHANG

張 明 順

Mr. Ming-Sung CHANG was promoted to Senior Civil Engineer of the Project & Construction Management Dept. in April 2013. Mr. Chang received his bachelor's degree in civil engineering from National Taiwan Institution of Technology in 1984. After graduation, Mr. Chang worked for Tsai Shin Tang Engineering, Co. (TSTE) as Manager of Engineering Dept, Yashin Technology Engineering, Inc. as Deputy Manager of Engineering Dept and MAA as Construction Engineer. At MAA's Project & Construction Management Dept., major works undertaken by Mr. Chang include project management and construction supervision work with examples such as the reconstruction of school campuses in Yunlin/Chiayi/Tainan counties and Chiayi/Tainan cities after the 921 Chi-Chi Earthquake, the TSMC Building at National Tsing-Hua University, the National Taipei University of Technology Technology & Studying Building, the construction of a sport & health center and graduate student's dormitory at National Chi-Nan University, etc. Mr. Chang is a member of the ROC Construction Management Association and attended the Basic Qualification Training Course for Professional Procurement Personnel.



Tien-Yu LEE

李天佑

Mr. Tien-Yu LEE was promoted to Senior Civil Engineer. Mr. Lee graduated from Chungcheng Institute of Science and Technology in 1971. A Lieutenant in the ROC Air Force, he worked as an engineer during his military career. The Air Force sent him to the Air Force Institute of Technology and an US Air Force Base for “Leadership and Advanced Tabletop” disciplines. During his 15 years military experience, Mr. Lee served as a Civil Engineering Officer, Engineer Leader, Engineer Captain and Chief Staff Officer at the Air Force General Headquarters. He took part in a large number of planning, design, contract and construction projects such as the Armed Forces General Hospital Building in Tainan, the Taichung Air Force Hospital Building, the Air Force ATC Communication Wing relocation project, airplane facility construction at the Hsinchu Air Force Base, construction of runway, hangar and camps. Thereafter he was commissioned to perform construction management business in non-governmental engineering companies, major works undertaken include consultation and coordination, planning and programming, time control, quality control and client satisfaction services for projects such as the Taichung Museum of Art, the Taipei MRT Beitou Depot - Project 107A, 107B earthworks, the Chungshan First Highway-Project 28, 29, the Wugu Section road widening project, the Moon Island Development Project in Changsha City, Hunan Province, the National Defense Medical Center Drainage and Road Works, the Tianmu Stadium Park Landscape project, the Er-Chong Floodway Landscape project and the Southern Science Park Underground Parking & Landscaping project. Mr. Lee joined MAA in 2009 and has mostly performed PCM works for projects such as the National United University - Bajia Branch and the National Convention and Exhibition Center.



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MAA GROUP

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MAA Engineering Consultants International Ltd.

Room 605, 6F, Opulent Building, 402-406 Hennessy Road, Wanchai, Hong Kong SAR, China
Tel: (852) 2527-0747 Fax: (852) 2861-2081 E-mail: maahk@netvigator.com

Moh and Associates, Inc.

Oriental Technopolis Building A, 22F, No.112, Xintai Wu Road, Section 1, Xizhi District, New Taipei City 22102, Taiwan, R.O.C.
Tel: (886-2) 2696-1555 Fax: (886-2) 2696-1166 E-mail: maagroup@maaconsultants.com

Taichung Office

7F-2, No. 241, Sec. 3, Wenxin Road, Xitun Dist., Taichung 40753, Taiwan, R.O.C.
Tel: (886-4) 2293-6497 Fax: (886-4) 2293-5911 E-mail: maatc@maaconsultants.com

Kaohsiung Office

6F, No.239, Yixin Yi Road, Qianzhen District, Kaohsiung City 80652, Taiwan, R.O.C.
Tel: (886-7) 536-8800 Fax: (886-7) 536-2200 E-mail: maakh@maaconsultants.com

MAA Engineering Consultants (Beijing) Co., Ltd.

Room 809-810, GuoTou Plaza, No 7 Fu Wai Street Xicheng District, Beijing 100037, China
Tel: (86-10) 6836-3461 Fax: (86-10) 6836-3460 E-mail: maabeijing@163.com

MAA Engineering Consultants (H. K.) Ltd.

Room 605, 6F, Opulent Building, 402-406 Hennessy Road, Wanchai, Hong Kong SAR, China
Tel: (852) 2527-0747 Fax: (852) 2861-2081 E-mail: maahk@netvigator.com

MAA Engineering Consultants (Shanghai) Co., Ltd.

5F, No. 89, Jiangsu North Road, Shanghai 200042, China
Tel: (86-21) 6120-3100 Fax: (86-21) 6120-3058 E-mail: maashanghai@sh.maaconsultants.com

MAA Consultadoria em Engenharia S.A. Sucursal de Macau / Macau Office

15-G Rua De Ferreira Do Amaral, Edif. Lau Luen 1/F, Macau
Tel: (853) 2852-8787 E-mail: maagroup@maaconsultants.com

MAA Consultants Co., Ltd.

221/1 Soi Prachachuen 37, Prachachuen Road, Bang Sue, Bangkok 10800, Thailand
Tel: (66-2) 975-9300, 975-9310 Fax: (66-2) 975-9312 E-mail: maa@maathai.com

Moh and Associates (S) Pte. Ltd.

#04-09 Golden Mile Complex, 5001 Beach Road, Singapore 199588
Tel: (65) 6295-0611, 6295-0608 Fax: (65) 6298-7653 E-mail: maaspl@singnet.com.sg

MAA Consultants (Myanmar) Co., Ltd.

No (287), 3F, Shwe Gon Daing Road, Shwe Gon Daing (Middle) Ward, Bahan Tsp Yangon, Myanmar
Tel: (95-1) 860-4943 E-mail: maagroup.myanmar@gmail.com

SURV

TAIPEI

Oriental Technopolis Building A, 22F, No.112, Xintai Wu Road, Section 1, Xizhi District, New Taipei City 22102, Taiwan, R.O.C.
Tel: (886-2) 2696-2807 Fax: (886-2) 2696-1782 E-mail: surv.tpe@urbanmatics.com

SHANGHAI

No.9 Lane 210 Taikang Road, Shanghai 200025, China
Tel: (86-21) 6415-9950 Fax: (86-21) 6472-0895 E-mail: surv.sha@urbanmatics.com