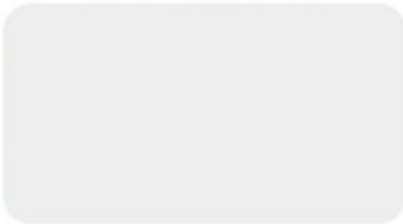




Integrated Solutions For Global Impact
MAA GROUP





CONTENTS

1 GENERAL INTRODUCTION

2 MAA VALUES

4 CORPORATE DATA

6 MARKETS AND SERVICES

MARKET SEGMENTS

EXPERTISE

SCOPE OF SERVICES

11 EXPERIENCES

INFRASTRUCTURE

ENVIRONMENT

BUILDINGS & FACILITIES

LAND DEVELOPMENT

ENGINEERING DIGITALIZATION

BIM

33 MAA GROUP OFFICES



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 1200 employees with companies in Beijing, Hong Kong, Macau, Shanghai, Taipei, Bangkok, Singapore and Yangon, creating a close professional network in East & Southeast Asia.

MAA VALUES

Integrated Solutions for Global Impact

Since 1975, MAA has played a key role in technology transfer and professional engineering service provider to many developing countries in Asia. MAA has participated in many projects that are major breakthroughs for these countries. Examples include the then largest BOT project in the world, the Taiwan High Speed Rail project; and the Suvarnabhumi International Airport in Bangkok, Thailand, etc. MAA was also the pioneer in bringing various technologies to local cities and countries. Examples include the Common Utility Ducts in Taiwan and the use of Endless Self Advancing method of tunneling in the Fushing North Road Underpass through Taipei Songshan International Airport. Such projects, including many others, have all played a role, whether directly or indirectly, in bringing the countries into one of the global players in the world economy.

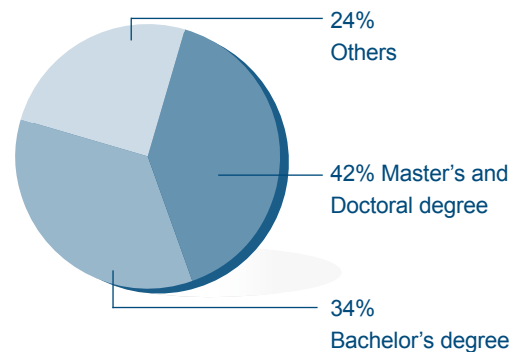
As the world develops, projects become more complex, requiring the integration of various disciplines and expertise. Often clients expect companies to provide an integrated solution with international standards to meet their local needs. MAA will remain as an ASSET to the clients, and continue to be a preferred local provider of Integrated Solutions for Global Impact to these countries.

People

The professional expertise of the MAA results from the accumulation and integration of knowledge, experience, and information systems by hundreds of professionals. Thus, people are the most important asset of the company. Currently MAA has 1200 professionals on staff, of which 57% have over 10 years experience, 40% have Master's and Doctoral Degrees, and 41% hold local professional licenses in all categories. More importantly, MAA team is ready to tackle and solve any problem at any given time, with full capability to grasp and understand technical, social and cultural characteristics of any particular location. With technical and database support from the Group network, MAA companies are fully equipped to provide efficient and economic solutions to many engineering problem.



MAA Technical Papers



MAA Group Staff Education Percentage

Service and Quality

To meet the demands of a modern construction project, MAA is committed to the development and improvement of engineering technology and information systems. However, with the increasing variety of projects and diversified requirements of society, the process of delivering professional services is equally as important as the engineering technology itself, making communication exchange a critical component of MAA's consulting services. MAA publishes a collection of technical papers every five years. Up to the present, seven volumes including more than 400 technical articles written by MAA staff members have been published, representing MAA's contribution to technology.

The MAA Civil Engineering Technology Science and Research and Development Foundation was established in 1996 to promote technology communication and development. Communication is the basis of efficiency in any professional business. The diversified organization and certified ISO 9001 Quality System provide the mechanism to enhance effective communication, which in turn will induce the most suitable interpretation of project requirements.

The service is transformed into an ASSET of the client with long lasting benefits. ASSET represents five key components that underlies MAA's principles of professional service:

Advanced technology
project Safety
client's Satisfaction
Economical solution
Timely completion



ISO 9001

Sustainable Development

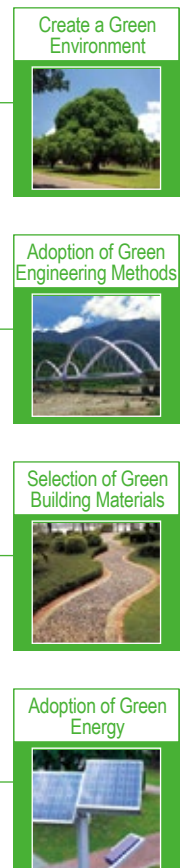
Sustainable development has become a paragon abided by various countries in the world in pursuit of national developments. As an advanced and leading consulting firm, MAA Group in recent years has been executing engineering design following the principle of sustainable development to achieve the balance of social, environmental and economic developments while enhancing quality of engineering.

MAA's "Sustainable Engineering" emphasizes that engineering must consider all three aspects of "environmental conservation", "economic development" and "social justice" at the same time. Meanwhile, new technology applications in innovative materials and construction methods are encouraged in order to enhance innovative capability and competitiveness while achieving goals of environmental protection, energy saving, and carbon emission reduction.

Sustainable engineering is an interdisciplinary and cross-sectoral work. MAA Group integrates planning, review, coordination, and supervision of various engineering works from a professional macro point of view. In addition to promoting implementation plans and procedures, MAA is also working towards establishing a sustainable engineering information system which involves improvement of knowledge domain, and information exchange among engineers. To promote sustainable engineering awareness, MAA carries out a series of green management under three MAA Green Actions – Green Design, Green Culture, Green Communication.



MAA Group's Concepts on Sustainable Development



CORPORATE DATA

Organization

MAA Consultants Holding Ltd.	British Virgin Island	1982
MAA Engineering Consultants International Ltd.	Hong Kong SAR, China	1979
Moh and Associates Inc.	Taipei, Taiwan	1975
MAA Engineering Consultants (HK) Ltd.	Hong Kong SAR, China	1977
Beijing AGILETECH Engineering Consultants Co., Ltd.	Beijing, China	2007
MAA Engineering Consultants (Beijing) Co., Ltd.	Beijing, China	1993
MAA Consultadoria em Engenharia S.A. Sucursal de Macau	Macau, China	2011
MAA Consultants Co., Ltd.	Bangkok, Thailand	1990
MAA Consultants (Myanmar) Co., Ltd.	Yangon, Myanmar	2013
Moh and Associates (S) Pte. Ltd.	Singapore	1975
SURV Inc. (Shanghai)	Shanghai, China	2002
SURV Ltd.	Taipei, Taiwan	2001

Affiliated Companies

MAA Publishing Co., Ltd.	Taipei, Taiwan	1977
Lihsin Engineering Testing Consultants, Inc.	Taipei, Taiwan	1990
Civil Engineering Technology Science and Research and Development Foundation	Taipei, Taiwan	1996

MAA Management

MAA GROUP BOARD MEMBERS	
MAA Consultants Holding Ltd.	Dr. Za-Chieh Moh, Chairman and Co-Founder Dr. Za-Lee Moh, Co-Founder Mr. Chien-I Hsu Mr. Wichien Wilaingam Mr. Richard Moh Mr. Travis Chien (Secretary)
MAA COMPANIES	
Moh and Associates Inc.	Non Executive Chairman: Dr. Za-Chieh Moh Co-Founder: Dr. Za-Lee Moh Chairman / CEO: Mr. Richard J. Moh Vice Chairman: Mr. Chung-Cheng Kao President / COO: Mr. Chen-Hui Hsieh Senior Vice President, General Administration: Mr. Shaw-Wei Duann Senior Vice President, Corporate Development Center: Mr. Travis Chien Senior Vice President, Engineering Design Group: Mr. Ting-Chiun Su Senior Vice President, Construction Supervision & Management Group: Mr. Shih-Chang Huang Senior Vice President, Building & Facilities Group: Mr. Ta-Hsing Lee
MAA Engineering Consultants (HK) Ltd.	Managing Director: Dr. Za-Chieh Moh
MAA Engineering Consultants (Beijing) Co., Ltd.	Managing Director: Dr. Za-Chieh Moh
SURV Inc. (Shanghai)	Director: Mr. Alexander Moh
SURV Ltd.	Director: Mr. Alexander Moh
MAA Consultants Co., Ltd.	Chairman: Mr. Wichien Wilaingam Executive Chairman: Mr. Narit Namchantra Managing Director: Dr. Sirisin Janrungautai
Moh and Associates (S) Pte. Ltd.	Managing Director: Dr. Za-Chieh Moh
MAA Consultants (Myanmar) Co., Ltd.	President: Mr. Richard Moh
MAA Consultadoria em Engenharia S.A. Sucursal de Macau	Representative: Mr. Richard Moh
Beijing AGILETECH Engineering Consultants Co., Ltd.	President: Dr. Pei-Yin Lu

MARKETS & SERVICES / MARKET SEGMENTS

INFRASTRUCTURE



- ROADS & HIGHWAYS
- RAIL
- AIRPORTS
- HARBORS
- BRIDGES
- TUNNELS
- PIPELINES
- COMMON UTILITY DUCTS
- SEISMIC HAZARD MITIGATION
- POWER PLANTS
- DAMS
- MILITARY FACILITIES
- PUBLIC PRIVATE PARTNERSHIP (PPP)

ENVIRONMENT & WATER



- WATER RESOURCES
- EFFLUENT RECLAMATION AND REUSE
- WATER SUPPLY ENGINEERING
- PREVENTION AND TREATMENT FOR RIVER POLLUTION
- SOIL POLLUTION SURVEY AND REMEDIATION
- SOLID WASTE MANAGEMENT
- CONTROL OF ENVIRONMENTAL POLLUTION
- SUSTAINABLE ENGINEERING
- ENVIRONMENTAL MONITORING
- ENVIRONMENTAL IMPACT ASSESSMENT

BUILDING & FACILITIES



- RESIDENTIAL AND OFFICES
- COMMERCIAL
- ARTS, SPORTS & CULTURE
- HEALTHCARE
- EDUCATION & RESEARCH
- LOGISTICS CENTER
- INDUSTRIAL
- PARKING

LAND DEVELOPMENT



- NEW TOWNS AND COMMUNITIES
- RESORT AND RECREATION
- SLOPELAND DEVELOPMENT
- URBAN REGENERATION
- SOIL & WATER CONSERVATION
- LAND RECLAMATION
- BROWNFIELD REDEVELOPMENT
- INDUSTRIAL AND BUSINESS PARKS

GEOMATICS



- UTILITY MANAGEMENT
- HAZARD/RISK MANAGEMENT
- PROJECT MANAGEMENT
- REAL-TIME MONITORING
- BIG DATA AND INFORMATION SYSTEMS

ENGINEERING DIGITALIZATION



- INTEGRATED BIM ADOPTION
- 3D CIVIL MODELING
- CONSTRUCTION PROJECT MANAGEMENT PLATFORM
- GEOINFORMATICS
- PUBLIC AFFAIR INFORMATION PLATFORM
- FACILITY MANAGEMENT

Geotechnical Engineering

- FOUNDATION AND DEEP EXCAVATION
- SLOPE PROTECTION AND EARTH RETAINING WORKS
- SEISMIC RISK
- TUNNELS
- GEOENVIRONMENTAL ENGINEERING
- IN-SITU AND LABORATORY TESTING
- GROUND IMPROVEMENT AND LAND RECLAMATION
- COASTAL ENGINEERING
- RISK MANAGEMENT
- INSTRUMENT INSTALLATION & MONITORING

Structural Engineering

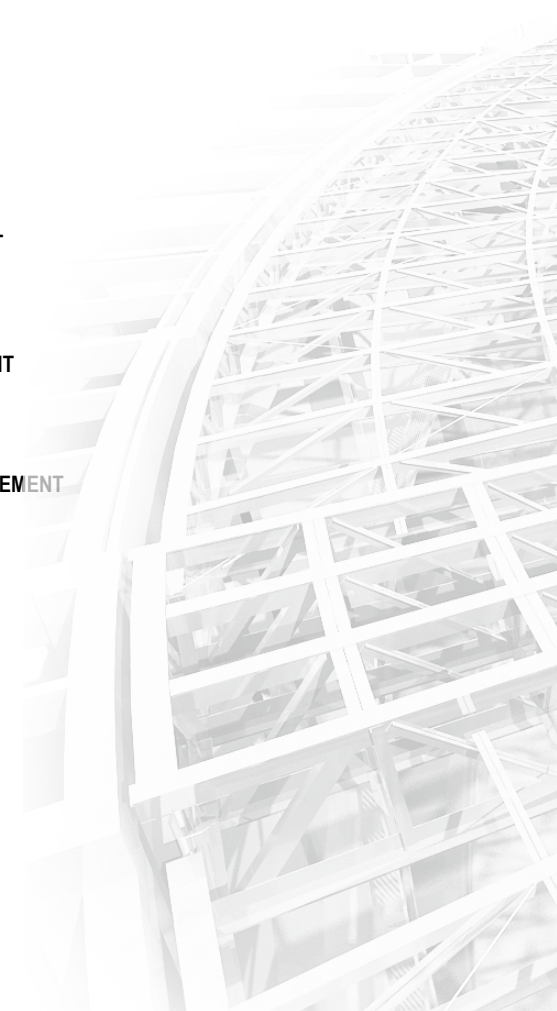
- BUILDINGS & FACILITIES
- BRIDGES AND VIADUCTS
- UNDERGROUND STRUCTURES
- STRUCTURAL ASSESSMENT AND REHABILITATION
- MICROVIBRATION ASSESSMENT AND SUPPRESSION

Transportation & Civil Engineering

- ROADS AND HIGHWAYS
- RAIL
- AIRPORTS
- PORTS

Environmental Engineering

- WATER AND WASTEWATER TREATMENT
- WATER SUPPLY AND SEWAGE
- SOLID WASTE MANAGEMENT
- SOIL AND GROUNDWATER MANAGEMENT
- LANDSCAPE ENGINEERING
- ECOLOGICAL ENGINEERING
- ENVIRONMENTAL STUDIES AND MANAGEMENT
- GREENHOUSE GAS INVENTORY
- GREEN CERTIFICATION
- SOIL POLLUTION SURVEY
- SOIL REMEDIATION
- ENVIRONMENTAL MONITORING



Project and Construction Management

- PROJECT MANAGEMENT
- CONSTRUCTION MANAGEMENT & SUPERVISION

Architecture, Planning, Landscape and Interior Design

- ARCHITECTURE
- URBAN PLANNING AND DESIGN
- LANDSCAPE DESIGN
- INTERIOR DESIGN

Mechanical, Electrical and Plumbing Engineering

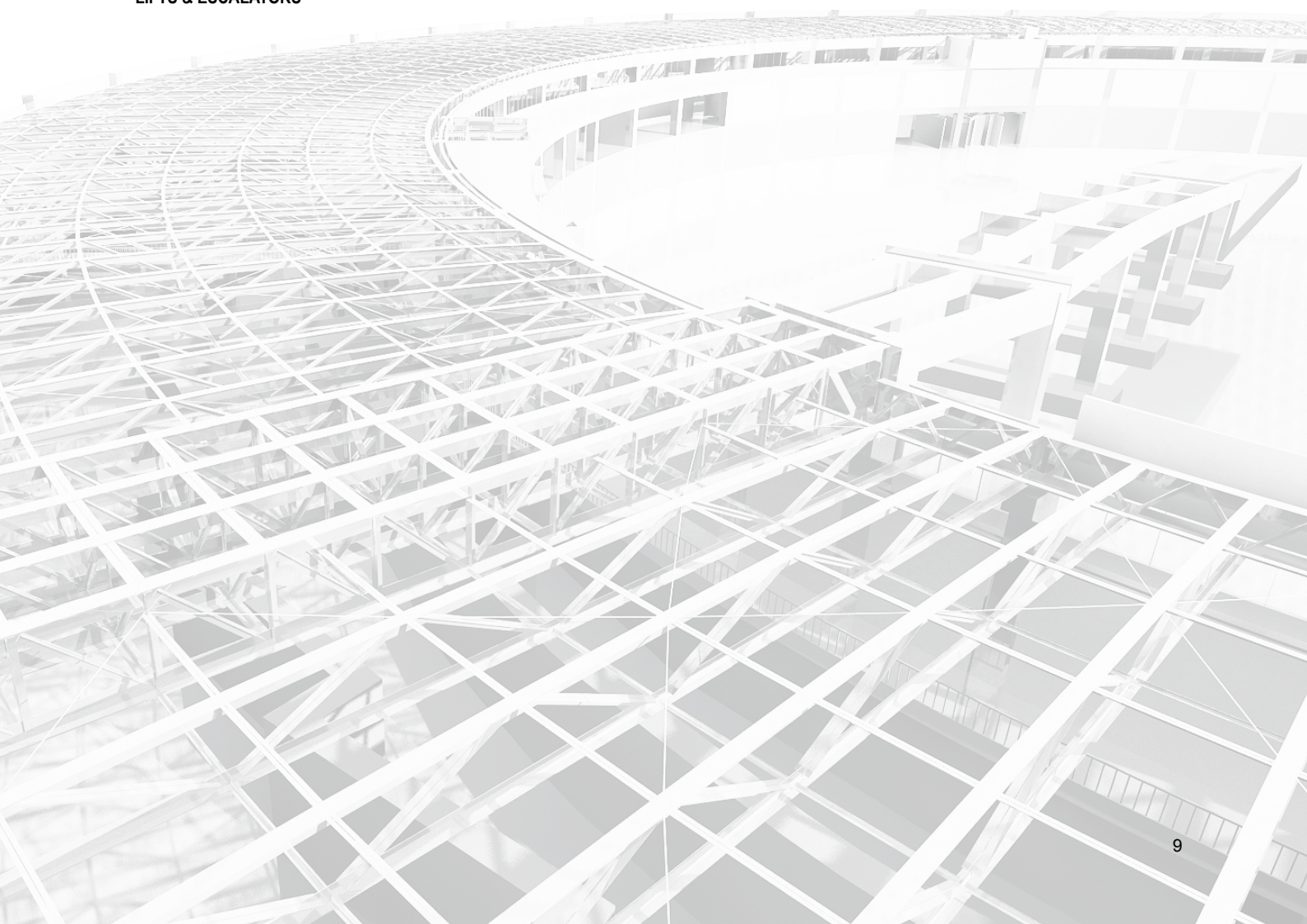
- ELECTRICAL SYSTEM
- INSTRUMENT & CONTROL SYSTEM
- ELECTRONIC TOLL COLLECTION FACILITIES
- PLUMBING SYSTEM
- FIRE PROTECTION SYSTEM
- HVAC SYSTEMS
- LIFTS & ESCALATORS

Engineering Digitalization

- BUILDING INFORMATION MODELING(BIM) & 3D CIVIL MODELING
- GEOGRAPHIC INFORMATION SYSTEM(GIS)
- MANAGEMENT INFORMATION SYSTEM(MIS)
- SYSTEM ANALYSIS, DESIGN & DEVELOPMENT
- REMOTE SENSING IMAGERY
- UNMANNED AERIAL VEHICLE(UAV), UNMANNED AIRCRAFT SYSTEM(UAS)
- AUGMENTED REALITY, VIRTUAL REALITY
- INTERNET OF THINGS(IOT) APPLICATION

Geomatics

- UTILITY MANAGEMENT
- HAZARD/RISK MANAGEMENT
- CONSTRUCTION MANAGEMENT



MARKETS & SERVICES / SCOPE OF SERVICES

- PROJECT DEVELOPMENT
- FEASIBILITY STUDIES
- PROGRAM MANAGEMENT
- CONCEPTUAL/MASTER PLANNING
- GENERAL CONSULTANCY
- ENGINEERING PLANNING
- SITE RECONNAISSANCE & INVESTIGATION
- BASIC DESIGN
- DETAILED DESIGN
- CONSTRUCTION MANAGEMENT
- BIM INSTALLATION AND APPLICATION
- CONSTRUCTION SUPERVISION
- PROJECT MANAGEMENT
- RISK MANAGEMENT
- DESIGN REVIEW
- EXISTING WORKS EVALUATION
- IN-SITU/LAB TESTING
- MODELING & ANALYSIS
- INSTRUMENT INSTALLATION AND MONITORING
- COMMISSION & OPERATION TESTING
- ENVIRONMENTAL IMPACT ASSESSMENT
- FACILITY MANAGEMENT CONSULTANCY



EXPERIENCES / INFRASTRUCTURE

High Speed Rail

The Taiwan High Speed Rail (THSR) Project, with a US \$ 14.9 billion capital investment, is the biggest BOT project in the world at the time of inception. The THSR will shorten the travel time between Taipei and Kaohsiung of Taiwan to a short 90 minutes. Similar to Shinkansen of Japan, the THSR is designed at a 350km/hr speed, with an adequate safety system and minimal pollution. Once completed, it will become a highly competitive transportation mode alternative for travelers. The 345 km long system is built through 12 turnkey packages awarded to joint ventures comprised of international and local contractors. There are 10 stations, 1 workshop station, 2 maintenance bases, and 3 depots.

Since the 1990s, MAA has been heavily involved in THSR including providing design services for 8 packages with 115km line structure, and independent checking service for 2 packages with 80km line structure, one depot, and one station. All these services involve the construction of a 174 km viaduct, 13km tunnel, and 8km at-grade section.

In recent years, MAA has integrated BIM into HSR station projects, notably for Taiwan HSR's Changhua Station. By adopting BIM, MAA lowered construction timescales and prevented clashes during construction, and received AutoCAD's BIM awards for the effort. MAA can assist clients by virtually reconstructing architecturally complicated high speed rail stations and ensure deliverables through the use of BIM services.



Thailand High Speed Rail



Taiwan High Speed Rail Construction



Changhua HSR Station Project Management & BIM



Taiwan High Speed Rail

TRACK RECORDS

- Alignment Studies
- Preparation of Investment Proposal
- Detailed Design of Civil Contracts C220, C230, C240, C250, C280, C291, C295, C296 and depot D250
- Independent Checking of C260, C270, and depot D250 and Hsinchu Station S220
- Inspection and Maintenance Program Consultancy
- Changhua HSR Station Project Management Consultancy and BIM
- Vibration Mitigation Measurements Planning and Design for Trains Passing through Tainan Science Park
- Thailand HSR
- Feasibility Study and Detailed Design of High Speed Rail Project : Bangkok - Nakhon Ratchasima Route

Mass Rapid Transit System

Due to the rapid development of the urban area in East/Southeast Asia, the road transportation system can no longer meet the public's expectation for safer, more convenient, and more comfortable transportation. As a result, mass rapid transit systems are needed to meet the needs of more advanced public transportation systems after all the roads and highways are constructed. MAA has been engaging in many MRT systems in Asia.



Sanying MRT System



Bangkok Mass Transit (BTS) Extension



Y16 Station of Taipei MRT Circular Line



Bangkok MRT System Blue Line



Danhai LRT System



Bangkok MRT System Blue Line

TRACK RECORDS

TAIWAN MRT

- Geotechnical Engineering Specialty Consultancy (Comprehensive Safety and Risk Management of Taipei MRT System and Taoyuan International Airport Access MRT System), Taiwan
- Taipei MRT - Detailed Design for Nangang Line, Mucha Line, Xinyi Line, Songshan Line, Tucheng Line, and Circular Line
- Construction Supervision for the Danhai LRT System Phase 1 and Ankeng LRT Project
- Sanying MRT System Turnkey Project
- Taichung MRT General Consultancy (phase 1, 2 and 3) and basic design
- Taoyuan, Hsinchu and Tainan MRT System Engineering Planning
- Kaohsiung MRT Detailed Design for Orange Line and Red Line CR6
- Kaohsiung MRT Detailed Design for Gangshan - Luzhu Extension Line
- General Consultancy for Taoyuan International Airport MRT System

SINGAPORE MRT

- Design and Construction Supervision for Jurong Bird Park Monorail System

TRACK RECORDS

THAILAND MRT

- General Consultancy for Bangkok MRT System Phase 2 Project (Blue Line: Bang Sue - Tha Phra, Orange Line: Bang Kapi - Bang Bamru, Purple Line: Bang Yai - Rat Burana)
- Feasibility Study and Construction Supervision for Bangkok LRT (BTS) Extension (Sukhumvit Line Section 1)
- Third Party of Safety and System Assessment Consultancy for Suvarnabhumi Airport Rail Link
- Construction Supervision for Yellow Monorail Line Project: Lat Phrao - Samrong Section

CHINA MRT

- Beijing MRT- Engineering Safety and Risk Management (Line 6, 8, 9, 10, Yi-Zhuang Line and Da-Shin Line)
- Guangzhou MRT- Civil Engineering Safety and Risk Management (Line 2, 3, 5, 6 and 8)
- Macau LRT Project Phase 1 Design Contract C220

Highways and Expressways

In the last four decades, investments in the construction and improvement of local, regional and national roads, freeways and highways increased greatly in many East/Southeast Asian countries. The main reason is to meet the heavy demands of economic and traffic growth between major cities. Over the years, MAA has been engaged to provide design, construction supervision, environmental impact studies, ecological issues, architecture design for various roads and highways including viaducts, flyovers, interchanges and electronic toll collection systems.



National Freeway No. 3 Liuying interchange, Tainan, Taiwan

TRACK RECORDS

- Electronic Toll Collection Project (BOT), Taiwan
- National Freeway No. 1 and No. 3, Taiwan
- East-West Expressway, Taiwan
- Nanliao-Chutong Expressway, Taiwan
- Chungtuo Highway and Access Road
- Fuhsing North Road Underpass of Songshan International Airport, Taiwan
- Traffic Network and Public Transportation System Planning, Xian, China
- San Carlos Highway, Costa Rica
- Chonburi New Motorway, Bangkok, Thailand
- The Ramindra-Outer Ring Road Expressway and Taksin-Ratchadapisek Road, Thailand
- Highway No.6 - Bang Pa In Route to Nakornrat Srima Section 2, Thailand
- Toll Collection System and Traffic Safety Control System for Expressway Route Bang Plee - Suksawat and Highway, Thailand
- Braddel Road Flyover and Central Expressway, Singapore
- Long Thanh-Dau Giay Expressway, HCMC, Vietnam
- Nguyen Van Linh Parkway, HCMC, Vietnam

Bridges

MAA has strived to the acquisition of new bridge technology and construction methods in the past 2 decades. The incremental launching method used in the Touchien and Fengshan River Bridge on the National Freeway No. 3 is the first time that MAA has been introduced to Taiwan. In addition, MAA pays great attention to the style and appearance of the bridge. For example, the through arch bridge across Dongshan River with the riverbank park has become a landmark in Yilan County. The Luofu Bridge with a 230-meter span, which is shaped with a strong steel arch, has been in contrast with the elegant environment nearby. The Atayal Bridge in Yilan shows the aboriginal arts with a special architectural technique. Others such as the Tempisque bridge in Costa Rica, which is the first cable-stayed bridge in Central and South America. The scope of services includes construction supervision, structural safety evaluation, and retrofitting techniques.



Nga Moe Yeik Bridge II



Tempisque Bridge, Costa Rica



Shinwei Butterfly Bridge, Kaohsiung

TRACK RECORDS

- Touchien, Fengshan, Zhuoshui and Qingshui River Bridges along National Freeway No. 3
- Through Arch Bridge across Dongshan River, Yilan, Taiwan
- Cross-Sea Bridge, Penghu, Taiwan
- Luofu Bridge, Taoyuan, Taiwan
- Widening of Dazhou, Wanchangchun and Beicheng Bridges
- Shinwei Butterfly Bridge, Kaohsiung, Taiwan
- Yiqun Bridge, Kaohsiung, Taiwan
- Reconstruction Project for Los Angeles Badger Avenue Bridge (1996 Distinguish Engineering Award)
- Tempisque Bridge
- Wat Nakorn-In Bridge
- Rupsa Bridge
- Kuala Highway Bridge
- Design and Construction Consultancy Service for Salin Chaung Bridge, Myanmar
- Nga Moe Yeik Bridge & Nga Moe Yeik Bridge (KaMar Kyi 2) Project

Airports

MAA has been engaged in various airport-related facilities including passenger & cargo terminals, runway & taxiway, landside & airside roads, fire rescue stations, and service buildings, providing services from site selection & feasibility study, master planning, preliminary & detailed design, independent design check, construction supervision, and project management in Taiwan, Thailand, and Cambodia. Most notably the construction of Suvarnabhumi Airport (Second Bangkok International Airport) of Thailand. MAA has participated in the project with over 20 awarded contracts since the 1980s.



1st Midfield Satellite Building, Suvarnabhumi Airport, Thailand



Pavement and PCN Check of Twelve Airports in Taiwan



Taoyuan International Airport Pavement Rehabilitation, Taiwan

TRACK RECORDS

- Design and Planning for Suvarnabhumi Airport, Thailand
- Evaluation for Southern International Airport, Taiwan
- Pavement and PCN Check for 12 Airports in Taiwan
- Taoyuan International Airport Pavement Rehabilitation and Navigation Facilities Upgrading Project
- Kaohsiung International Airport New Air Cargo Terminal & Songshan Airport Runway Rehabilitation, Taiwan
- Extension of Chiang Mai International Airport and Domestic Airports in Provinces of Petchaboon, Chanthaburi, Phrae, Lumpang & Mae Hong Son, Thailand
- Extension of Sihanoukville International Airport, Cambodia
- New Parallel Taxiway and Apron Extension in Phnom Penh International Airport, Cambodia
- 1st Midfield Satellite Terminal, South Tunnel Extension and Automated People Mover in Suvarnabhumi Airport, Thailand

Tunnels

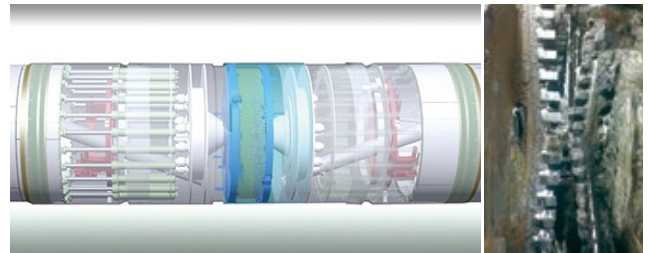
Tunneling is a critical component of any transportation system. With MAA's substantial knowledge and experience in geotechnical, structural and construction engineering, MAA has been providing full service in tunneling design (including the use of seismic, FEM, geological and structural analyses) under many different soil and rock conditions. One of the most notable projects is the Fushing North Road Underpass through Taipei Songshan Airport. The project is the first of its kind in the world where a tunnel will cross under an operating runway with a very strict settlement control of less than 2.5 cm. The project utilized the Endless Self Advancing method, which is the first of its kind in Taiwan. Other projects include Hsinyi Bypass of the second National Freeway, Taiwan High Speed Rail, and Chiping Tunnel of No. 102 county highway.



161 Kv Cable Transmission Link (Anan to Fucheng)



Fushing North Road Underpass through Taipei Songshan Airport



Turnkey Project of the 345kV Underground Cable Route Connecting Dalin to Gaogang

TRACK RECORDS

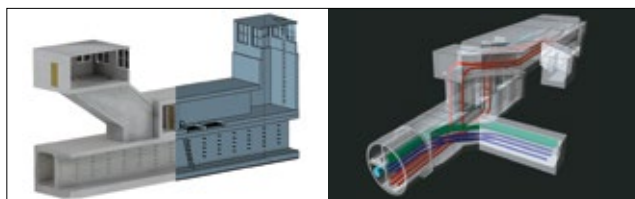
- Taiwan High Speed Rail (19 tunnels), Taiwan
- Taipei and Kaohsiung MRT
- Fushing North Road Underpass through Taipei Songshan Airport, Taiwan
- Taipei Railway Underground Project, Taiwan
- Kaohsiung Railway Underground Project, Taiwan
- Xinyi Bypass of the second National Freeway, Taiwan
- Mudan Dam Diversion Tunnel Construction, Pingtung, Taiwan
- Kaohsiung Cross-Harbor Tunnel, Taiwan
- Chiping Tunnel of No. 102 County Highway, Taiwan
- 161 Kv Cable Transmission Link (Anan to Fucheng)
- Turnkey Project of the 345kV Underground Cable Route Connecting Dalin to Gaogang

Common Utility Duct

Common utility duct stores all the major utilities in one common duct. There are many advantages for cities and towns to adopt such a system, such as maximizing the efficiency of underground ground space usage, decreasing costs of maintenance of utilities, decreasing above-ground construction which may disrupt traffic, and creating an area for easy access to utility repair. Furthermore, protection of all utilities can be done under the common utility duct during natural disasters. Since the early to mid-1990s, MAA has been the pioneer in implementing the common utility duct concept throughout Taiwan. For example, the Taipei Metro Xinyi line was the first common duct project to be designed along an MRT line and also was the first common duct to utilize the Shield Tunneling System. With the knowledge and experiences in geological information system (GIS), development engineering, engineering design, and legal understanding, MAA has provided the government feasibility studies as well as planning, organization, and implementation of common utility duct systems. MAA has written many specifications for the government to regulate, maintain, control, and design these systems.



Common utility duct for Taipei Metro Xinyi Line



Common utility duct

TRACK RECORDS

COMMON DUCT

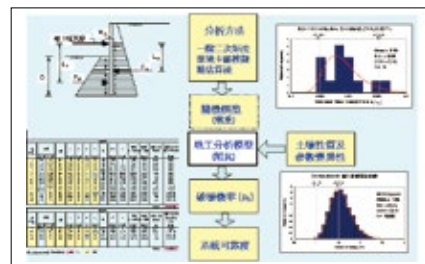
- Common Utility Duct System Planning for Taipei, Kaohsiung, Hsinchu and Chiayi City, Taiwan
- Nangang Economic and Trade Park Common Utility Duct, Taiwan
- Keelung River New Community Common Utility Duct, Taiwan
- Kaohsiung Multi-functional Commerce and Trade Park Common Utility Duct, Taiwan
- Dadu Road & MRT Xinyi and Songshan Line Common Utility Duct, Taipei, Taiwan
- Special District of Taiwan High Speed Rail Hsinchu Station Common Utility Duct, Taiwan
- Shuinan Trade and Economic Park Common Utility Duct, Taichung, Taiwan
- Taichung urban land consolidation (Phase XIV) Common Utility Duct, Taiwan
- The Knowledge Industry Park in North of Xinzhuang Common Utility Duct, Taiwan
- Nhon Trach New Town Common Utility Duct, Vietnam

BROADBAND DUCT

- Broadband Channel Design for Yilan Sport Park
- Broadband Channel Design for Lienchiang County
- Broadband Duct Planning in Taoyuan, Hsinchu, Chiayi, Tainan and Kaohsiung

Underground Construction Risk Management - Geotechnical Engineering Specialty Consultancy (GESC)

Geotechnical engineers have played a vital role in the construction of the Taipei Rapid Transit System (TRTS). Due to the complex geological structures of Taipei city, the planning route of the TRTS will pass through the buildings nearby. To reduce the risk caused by geotechnical problems during the construction of TRTS, the Department of Rapid Transit of the Taipei City Government (DORTS) commissioned MAA as a Geotechnical Engineering Specialty Consultant (GESC) to advise and assist DORTS on the matter of geotechnical concern. The scope of services included the review of detailed design material, tender documents, geotechnical design summary, and special provisions rendered by Detail Design Consultants (DDC) in the design stage. In the construction stage, GESC was responsible for the review of geotechnical design and construction documents, the establishment of Integrated Data Storage Center, and collection, maintenance, and analysis of monitoring data. In addition, MAA organized the experience and information during the construction and published articles in several domestic and foreign academic seminars, as well as assisted in providing academic explanations when DORTS encounter any complaints or claims.



災害事件	專案A			專案B			專案C			專案D		
	發生頻率	後果	風險等級	發生頻率	後果	風險等級	發生頻率	後果	風險等級	發生頻率	後果	風險等級
D-07	III	3	II	IV	3	II	V	4	III	II	3	II
D-08	IV	4	III	IV	3	II	IV	3	II	II	3	II
D-09	III	3	II	IV	4	III	V	4	III	V	2	II
D-10	III	3	II	III	3	II	III	3	II	II	3	II

Observed Settlement from Shield Tunneling

TRACK RECORDS

TAIWAN

- Taiwan Taoyuan International Airport MRT Geotechnical Risk Consultancy
- Taipei MRT Tucheng Line Dingpu Section Contract DD170
- Taipei MRT Xinyi Line East Extended Section Contract DR149

CHINA

- Beijing MRT- Engineering Safety and Risk Management (Line 6, 8, 9, 10, Yi-Zhuang Line and Da-Shin Line)
- Guangzhou MRT- Civil Engineering Safety and Risk Management (Line 2,3,5,6 and 8)
- Macau LRT Project Phase 1 Design Contract C220

VIETNAM

- Hydrogeological Consultancy Service for Hanoi Metro System, Vietnam

Ports and Harbors

Limited on its geographic condition, sea cargo is the major trading channel in Taiwan. Currently, there are three international ports along the west coast: Kaohsiung, Taichung, and Keelung ports. Due to the economic and international trade conditions as well as the geographical advantages of Kaohsiung Port, The government is actively promoting the Port of Kaohsiung's emergence as a key transshipment center for Asia-Pacific container shipping and global logistics. MAA has assisted the Institute of Transportation, MOTC in "Kaohsiung International Port Overall Development Project" (the target year of 2020), covering transportation, shipping, engineering, environment, economics, finance, and project management. Other projects included the planning of Keelung Harbor Maritime Information Center and the general consultant for the Matsu Fuaao Commercial Port Project.



Kaohsiung International Port Overall Development Project



44 Hectares Reclaimed Land at The South Port Area of Taipei Harbor

TRACK RECORDS

- Surveillance System & Maritime Information Center for Keelung Harbour, Taiwan
- Kaohsiung International Port Overall Development Project
- Sea-cargo Container Station Development of Keelung Harbor, Taiwan
- General Consultancy of the Construction of Matzu Fuaao Harbor, Lienchiang County, Fujian Province, Taiwan
- Integration of Airport and Seaport Transportation, Kaohsiung, Taiwan
- Feasibility Study on developing large scale cargo collection and distribution hub in Ma Ling Keng, Qidi, Keelung, Taiwan
- Dock construction in Kaohsiung and Zuoying Harbors, Taiwan
- Changhua Fishing Port Phase 1, Taiwan
- Ground Improvement of the 44 ha Reclaimed Land at the South Port Area of Taipei Harbor, Taiwan
- Laem Chabang Deep Sea Port, Thailand
- Stability & Remedial Study for Suva Port Development, Fiji
- Mombasa Port Development Project, Africa
- Shiplift performance improvement ,Cijin District, Kaohsiung, Taiwan

Power Plants

Due to the limitation of its natural resources, Taiwan has to build power plants to obtain sufficient power supply for the economic development. In planning the power plant construction, safety and environmental issues such as geological condition, earthquake, structure, groundwater, etc. have to be carefully considered and planned. MAA has provided planning, environmental study & monitoring, design and construction supervision services on public and private-invested power plant projects.



Taichung Thermal Power Plants



Talin Power Plant Project, Kaohsiung

TRACK RECORDS

- Talin Power Plant Project, Kaohsiung
- Hsinta Thermal Power Plants, Taiwan
- Taichung Thermal Power Plants, Taiwan
- Shinyu Cogeneration Power Plant (Private Investment), Taiwan
- Nanke Cogeneration Power Plant (Private Investment), Taiwan
- Chang Sheng Hydro Power Plants, Taiwan
- Mailiao Thermal Power Plants, Taiwan
- Shenao Thermal Power Plants, Taiwan
- Gueishan Hydro Power Plants, Taiwan
- Hoping Power Plants (Private Investment) Power Plant, Taiwan
- Hsintao Power Plants (Private Investment) Power Plant, Taiwan
- Tuas Power Plant, Singapore
- Sungai Piah Hydro Power, Malaysia
- Surlaya Power Plant, Indonesia

Dam

Reservoirs and dams are important for Taiwan to ensure sufficient water supply during dry season and are needed to be periodically assessed for their safety. MAA has conducted safety evaluation including field inspection, stability & stress analysis, dam break analysis, and preparation of emergency action plan for many dams. MAA has also carried out extensive investigations to detect leakage of Fungshan Reservoir that is underlain by gravel and calcite. Proposal for remedial measures and design of cutoff wall were prepared based on the result of investigations.



Reservoir Safety Evaluation

TRACK RECORDS

- Guishan Hydraulic Power Plant, Taiwan
- Fungshan Reservoir, Taiwan
- Yunghoshan Reservoir, Taiwan
- Luliao Creek Reservoir, Taiwan
- Chipan Reservoir, Taiwan
- Techí Reservoir, Taiwan

Military Engineering

Military engineering deals with national security, which is far more importance than any general engineering works. MAA Bangkok office had provided "Detailed Design and Construction Supervision Consultancy Services" for The Royal Thai Air Force to establish the Air Defense System in southern Thailand. The system included three radar and an operation control center. There are a total of 16 different engineering locations. The defense area covers more than 1,000 kilometers in the southern region. The total construction expenditure exceeds one billion baht (approximately 25 million US dollars). MAA had provided on-site investigation and survey, coordination, design, bidding, construction supervision, and project management for 16 facilities. In addition, MAA has participated in several naval and army engineering projects in Taiwan.



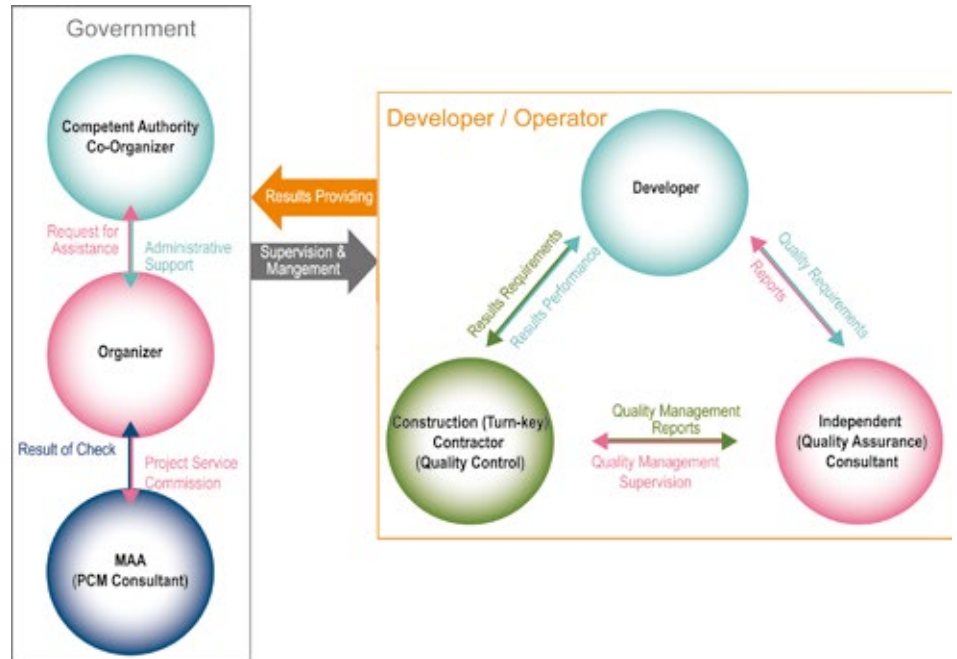
Royal Thai Air Defense System

TRACK RECORDS

- Royal Thai Air Defense System - Phase III, Thailand
- New Construction of Sen-O Naval Base, Taiwan
- Taoyuan Naval Base demolition and rebuild(Cijin camp) project, Taiwan
- The Army Artillery Training Command SinHushan training course, course connecting roads, and Reroute of South county road no. 169, Taiwan
- Shiplift performance improvement Project Management, Cijin District, Kaohsiung, Taiwan
- Keelung Port Camp Relocation Project, Taiwan

Feasibility Study and Tender Services for PPP (Public Private Partnership) Projects

Large-scaled projects are needed to meet the demands of growing cities. Such projects often involve various parties to successfully carry out complex engineering works. Due to the limit of the government budget, the private sector has been substantially involved in the construction and funding of public infrastructure work. The involvement of the private sector in the development of infrastructure can be classified into the following types: BOT (build-operate-transfer), BTO (build-transfer-operate), ROT (rehabilitate-operate-transfer), OT (operate-transfer), or BOO (build-own-operate). It is proving to be a challenging exercise. Parties include the public (government) and private entities (developers, investors, legal parties and engineering, etc). Managing and planning the contractual relationships between public and private entities, consortium formation, and risk management are keys to a successful takeoff of the project.



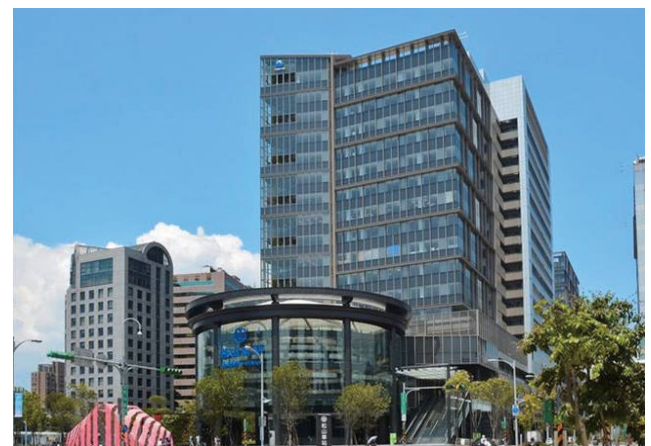
MAA has extensive experience in the public-private partnership, including the Taoyuan Airport MRT (total length 35.7 kilometers), electronic toll collection system (ETC) for highway network, Taiwan High Speed Rail project, Kaohsiung mass rapid transit project, and many BOT environmental projects. The scope of services includes feasibility study, tender documents preparation, and contract negotiation service. At the same time, MAA has assisted investors in preliminary and conceptual design, design review, quality control, project management, operation testing and management, etc.



Kaohsiung BOT Modern Multi- Functional Gymnasium



Tamsui Sewage System Project, Taipei



Songshan Station Building and Parking Tower , Taipei

EXPERIENCES / ENVIRONMENT

Sustainable Design

-Green Construction, Ecological Engineering, and Green Building

According to the report published by the Intergovernmental Panel on Climate Change (IPCC) of the United Nations on 02 February 2007, it has been unarguably true that the mean annual temperature of Earth is increasing by each year. To solve the global warming problem, countries all over the world are promoting the policy of “energy efficiency and carbon reduction”, and has set “The coexistence and co-prosperity of men and environment” as the principle of building infrastructures. According to this, the government also dedicates to promote the policies of green construction, ecological engineering, and green building, etc. recently, and popularize the usage of renewable energy, increasing the variety of energy types and improving the environmental quality to simulate the related industries and promote sustainable development of the country. To tie in the trend of protecting Earth, MAA also dedicates to develop the related technologies and business lines in recent years, and uses the newest technologies of renewable energy, bridge engineering, green building, green construction, etc., to carry out the construction promises of energy efficiency, reduction of carbon-dioxide emissions and sustainable development.



Taiwan Hakka Cultural Center Miaoli Park
(Gold-Rated Green Building Label)



New Taipei City Xinzhuang Civil Sports Center
(Silver-Rated Green Building Label)



Zhonggang Drainage



National Nanke International Experimental High School
(Diamond-Rated Green Building Label)



Neihu Solid Waste Dumpsite, Taipei City

TRACK RECORDS

- Taipei MRT Circle Line Phase I Contract DF113 Detailed Design, Taiwan
 - Building integrated photovoltaics system(BIPV); Wind power application, mechanical bicycle parking tower, self-compact concrete (SCC)application.
- Pollution improvement and environmental planning of stream side corridor on Zhonggang Drainage, Taiwan
 - Environmental improvement construction
- The Modern Multi-Functional Gymnasium in Kaohsiung (Kaohsiung Arena)
 - Building integrated photovoltaic system(BIPV)
- Xinzhuang Civil Sports Center- Silver-Rated Green Building Label
- National Nanke International Experimental High School, Taiwan
 - Diamond-Rated Green Building Label
- Changbin Offshore Wind Farm O&M Base

Environmental Engineering

More and more countries in Southeast Asia devote resources to improve the quality of urban living. Environmental protection works including establishing and upgrading water supply and wastewater treatment facilities, solid waste management, noise, air pollution control, etc. have become the most important mission for many city governments. For example, wastewater collection and treatment is one of the most important tasks in "Challenge 2008" National Development Program of Taiwan. Apart from Taipei and Kaohsiung city which are selected as priority projects to promote private participation in infrastructure projects, the Construction and Planning Agency plan to commit 36 Wastewater collection and treatment systems on a BOT (Build-Operate-Transfer) basis. MAA has carried out the investigation, planning, design and construction supervision services for many wastewater treatment plants as well as financial, technical and legislation feasibility study and the pre-design of construction and operation's method of sewer systems.

To mitigate the vibration effect of High Speed Rail on high-tech manufacturers in Southern Taiwan Science Park, MAA was engaged to provide services of planning, detailed design and construction supervision of vibration mitigation work. The target of the project is to reduce the vibration values in areas surrounding factory buildings to 48 dB.



Fongshan River Wastewater Treatment Plant Project (BTO), Kaohsiung



Chiayi Sewer System and Sewage Treatment Plant

TRACK RECORDS

- Wastewater Treatment Plant and Sewer System (Design-Build) in Sun Moon Lake National Park, Taiwan
- Wastewater Treatment Plants in Pingzhen, Yongkang, Minsyong, Dawulun and Guantian, Taiwan
- Sewer System Construction (Build-Operate-Transfer) in Cities of Tamsui, Pudín, Yanshuei, Beigang, Dounan, Yuli and Luodong, Taiwan
- The First Phase Construction of Sewer System in Yangmei, Taoyuan County, Taiwan
- The Second Phase Construction of Sewage System in Banqiao, Taiwan
- Taipei city wastewater treatment project Phase I, Taiwan.
- Sewer System and house connections for Dazhuang, Wuling and Guangfu Roads of Hsinchu City, Taiwan
- Taipei city 2006 and 2008 water System Design, Taiwan.
- Rainwater Drainage System in Tainan City
- Taiwan High Speed Rail noise barrier and minimization of vibration impact from Tainan High-Tech Science Park
- Taipei Nangang Economic and Trade Park construction and demolition waste reutilization, Taiwan.
- Neihu Solid Waste Dumpsite Clean up, Taiwan.
- Chiayi City Sewer System Design Phase I, Taiwan.



The Sewage Treatment Plant in Yangmei district, Taoyuan

Environmental Impact Assessment

Due to increasing attention and care for environmental protection, Environmental Impact Assessment (EIA) has become an essential prerequisite for major development projects. EIA includes the collection of base data, model analysis and prediction of adverse environmental impact, avoidance or minimization approaches, monitoring and management. MAA has completed Environmental Impact Assessment and Monitoring for several infrastructures and industry park projects.



Syue Gu Line Cable Car Construction, Taichung, Taiwan



Shezi Island Development



Xibao Water Power

TRACK RECORDS

- The Second National Freeway, Taiwan
- East-west Expressway, Taiwan
- Xinyi Bypass of The Taipei Connecting Highway
- Mass Rapid Transit System, Taoyuan and Kaohsiung, Taiwan
- The Underpass through Taipei Song Shan International Airport, Taiwan
- Hsinchu Science City and Science-Based Industrial Park, Taiwan
- Shezi Island Development, Taipei, Taiwan
- Nangang Software Park, Taipei, Taiwan
- Provincial Highway No. 9 from 38k+000-58k+200 to Yilan
- Kaohsiung Multiple-Functions Economic & Industry Park, Taiwan
- Bajia Campus of National United University, Taiwan
- Xibao Water Power Project, Hualian, Taiwan
- Da-Nan-Ao Hydraulic Power Plant, Taiwan
- Western Coast Expressway (Provincial Highway No. 61) - Dapai, Yuanlin township to West-coast Bridge
- Syue Gu Line Cable Car Construction, Taichung, Taiwan
- Dapeng bay BOT Development Project
- Shengang and Lukang Townships, Changhua County, Taiwan.
- Oil and Gas Exploration Project for No.2 Dahedi in Miaoli County, Taiwan.

Eco- and Geo-Environmental Technology

The main purpose of Eco and Geo-environmental technology is to protect the nature and develop the environmental capacity. The ecosystem can be easily disappeared due to the destruction of the large-scale infrastructure. For sustainable development, ecological study are needed to ensure the maintenance of the environment and pay attention to the construction methods that are more safe, natural, and eco-friendly. To reduce the impact on the environment, the concrete construction method has been gradually replaced. The maintenance of air quality and water resources and soil pollution prevention are required to achieve the goal of economic development and environmental protection. Before the construction start, MAA has involved in several ecological surveys and is committed to the application of ecological engineering methods in soil and water conservation and slope development. In geo-environmental technology, MAA provides full services in soil and groundwater contamination investigation and site remedial works. Completed projects in Taiwan, Singapore and China include hydrogeological investigation and groundwater monitoring for industrial parks, contamination assessment for sanitary landfill sites, investigation of sites contaminated by chemicals and a study on groundwater protection policies and regulations.



Habitat Construction for Little Tern at Taichung Power Plant

TRACK RECORDS

- Taiwan High Speed Rail Access Road improvement works- Fazi River Embankment Ecological Engineering Method Planning and Design
- Habitat Construction for Little Tern at Taichung Power Plant
- Research on Localized Water Eco-Technology Application on Road Construction, Taiwan
- Shanzhuku Landfill
- Landfill Liner System Research Project
- Taiwan High Speed Rail Project C220 and C230
- Provincial Highway No. 27, Taiwan
- Environmental Monitoring for Danhai New Town Community and Land Reclamation
- Yuanlin to Tianzhong Road Construction Environmental Monitoring, Taiwan
- Environmental Monitoring for Ankeng Road No. 1 (Phase II) in Xindian District, New Taipei City, Taiwan.
- Tamkang Bridge and its extension road environmental monitoring before, during and after construction, Taiwan.
- Fuao Port Expansion Works

EXPERIENCES / BUILDINGS & FACILITIES

Residential and Commercial Buildings

Residential and commercial facilities, with their outstanding heights and architecture, are one of the major structures that give cities their unique characteristics. With limited area for building construction in modern cities, trends to construct high-rise building is getting popular and special attention are needed for resistance to earthquake and wind-induced forces. MAA has provided consulting services in many residential and commercial structures, including Taipei 101, Shin Kong Life Tower, Taipei Far Eastern Plaza, Marina Boulevard Resident and Le Meridien Hotel in Singapore, St. John's Building in Hong Kong, Netherlands Embassy and Hampton Thonglor Luxury Condominium in Thailand, Golden Leaf Tower in Vancouver, Canada, and Coastal Tower in Penang, Malaysia.



China Life Insurance Taipei Hostel



Linkou National Housing
(2017 World University Games Athletes Village)



Kaohsiung Exhibition and Convention Center

TRACK RECORDS

- Taipei 101, Shin Kong Life Tower, Taipei Far Eastern Plaza, Taiwan
- New Taipei City Government Headquarters, Taiwan
- Taipei Information Park and Parking Lot Building, Taiwan
- Marina Boulevard Residence, Singapore
- Carlton Hotel new wing and Le Meridien Hotel, Singapore
- Singapore Business and Financial Center
- St. John's Building (Awarded on Silver Prize in Architectonic Design by H.K. Government), Hong Kong
- Netherlands Embassy, Thailand
- Hampton Thonglor Luxury Condominium, Thailand
- Taman Ratu & Coastal Tower, Penang, Malaysia
- Headquarter Buildings of Hwayin Industry Zone, Kunshan and Wuxi, China
- Sassoon Park, Shanghai, China
- M Tower Project, Yangon, Myanmar
- PME office Tower Project, Yangon, Myanmar
- Light Era Development Residential Apartment in Chin-Pu, Taoyuan, Taiwan
- Linkou National Housing & the 2017 Taipei Summer University Games Athletes Village, Taiwan
- Manila's IBP Office Tower, Philippines
- Taiwan Life Insurance Nangang C3 Building
- China Life Insurance Taipei Hostel

Shopping Malls & Parking Facilities

The increase in demands for large-scale Shopping Malls and Hypermarkets as well as Parking Facilities is due to the economic boom in many Asian countries. Many consumers nowadays wish to stop over only one place for various shopping purposes. The intense market competition requires the incorporation of special architectural design and multi-functional elements into the design and construction of such facilities. MAA was engaged to provide various services including engineering design, construction management, and supervision for various shopping malls and hypermarkets.



Taipei Information Park and Parking Lot Building



Chonpuri Central Plaza Mall, Thailand



Mingalar Market Building Project, Myanmar

TRACK RECORDS

- Core Pacific City Shopping Mall, Taipei, Taiwan
- Far Eastern Shopping Center, Panchiao, Taiwan
- Big C Shopping Center in Bang Na, Pattaya, Hat Yai, Hua Mark, Thailand
- Chonpuri Central Plaza Mall, Thailand
- Chongshan Hall Underground Parking Lot, Taipei
- Chungho Park No. 4 Underground Parking Lot, New Taipei City, Taiwan
- National Taiwan University Underground Parking Lot, Taiwan
- Zhonghe Land and Tax Office United Building and Underground Parking Lot, Taiwan
- Linkou Mitsui Outlet Park, Taiwan
- Multi-function Building & Parking Lots Building of Songshan Station, Taiwan
- Taipei Information Park and Parking Lot Building Project, Taiwan
- Mingalar Market Building Project, Myanmar
- Old Dongang House and East Side of Hengchun Township Office Parking Garages

Hospitals, Medical and Pharmaceutical Facilities

With the improvement of economic development and society, the community had raised awareness of the importance of health. The government and private sectors are willing to investing in building hospitals, medical and pharmaceutical facilities. The hospital requires a safe and hygienic environment, easy access, and adequate emergency systems, sanitary systems and storage, etc. MAA has been engaged to provide the engineering process of production, selection or design of manufacture equipment, design of utilities for production, design of building and building services, and commissioning of various hospitals in Taiwan, Thailand, Singapore, and China.



Hsinchu MacKay Memorial Hospital



Shanghai's Longhua Chinese Medicine Hospital



Emergency and Critical Care Building of New Taipei City Hospital Sanchung Branch

TRACK RECORDS

- Emergency and Critical Care Building of New Taipei City Hospital Sanchung Branch
- National Taiwan University Hospital, Taiwan
- National Cheng Kung University Hospital, Taiwan
- Mackay Memorial Hospital, Taiwan
- Veterans General Hospital, Kaohsiung Branch, Taiwan
- Taipei Municipal Guandu Hospital
- Shanghai's Longhua Chinese Medicine Hospital, China
- New Tan Tock Seng Hospital, Singapore
- Phayathai 2&3 Hospitals, Vibhavadi 2 & Phayathai-Ubon Hospitals, Thailand
- Ya Hu Pharmaceutical Co. Ltd., Shanghai
- Fudan-Zhangjiang Bio-Pharmaceutical Co. Ltd., Shanghai

Educational and Cultural Facilities

Educational and cultural facilities composition must be designed and constructed according to the specifications of the users and owners. Due to specific requirements from clients, special attention is needed during the project management and design of such facilities. MAA has participated in design and construction management of many educational and cultural facilities such as administration & education building, stadium, research & information center, library, parking etc. in many well-known universities, museums and libraries in Asian countries. MAA was also involved in the reconstruction of 22 elementary & junior high schools which were damaged by the Taiwan 921 Chi Chi Earthquake in 1999.



The National Biotechnology Research Park of Academia Sinica



Ling-Jiou Mountain Dashanyuan Temple, Myanmar Taichung City Cultural Center

TRACK RECORDS

- National Taiwan University, Taiwan
- National Taiwan University of Science and Technology, Taiwan
- National Dong Hwa University, Taiwan
- Post-Earthquake Reconstruction of 22 Schools
- Relocation of National Taichung Library, Taiwan
- Taiwan Hakka Cultural Center Miaoli Park
- Liudui Hakka Cultural Park, Pingtung, Taiwan
- Chulalongkorn University, Bangkok, Thailand
- Maitreya Monastery at O-Mei
- Tainan Museum of Fine Arts
- The National Biotechnology Research Park of Academia Sinica
- Taichung City Cultural Center, Taiwan
- Ling-Jiou Mountain Dashanyuan Temple, Myanmar

Industrial and Service Facilities

Economic booms in Asia triggered huge demand for pharmaceutical, automobile, telecommunication and computer-related products. Facilities for manufacturing, sales and services of these products are, as a result, in high demand. MAA was engaged to provide various services including engineering design, construction management and supervision for various industries.



Myanmar Bago Garment Factory Project



Chunghwa Post Logistics Park

TRACK RECORDS

- Steel mill for China Steel Corporation in Kaohsiung, Taiwan./
- Xin Da Thermal Power Plant, Taiwan
- Copper Plant (50,000 Ton Capacity) of Taiwan Metal and Mining Corp., Taiwan
- Taiwan Photon Source of National Synchrotron Radiation Research Center
- AT&T Manufacturing Plant, Hsinchu, Taiwan / Bangkok & Pathumthani, Thailand
- Macronix / Vanguard Semiconductor Plant, Hsinchu, Taiwan
- Heavy Machinery Plant of the Sixth Naphtha Cracking Project, Yulin, Taiwan
- Nangang Software Park, Taiwan
- Auto Warehouse Building in Zhongli Industrial Area, Taiwan
- Kwun Tong Taijiang Software Park Phase 1, China
- TPN Flexpak Printing Factory, Thailand (2001 Outstanding Design Award)
- G.E. Elano Asia Facility, Thailand
- CPI Factory, Malaysia
- Refinery Plant, Melbourne, Australia
- Hong Kong Teak Company Warehouse Building Expansion Project, Hong Kong
- Myanmar Bago Garment Factory Project
- Chunghwa Post Logistics Park / Yangmei Taoyuan Distribution Park

EXPERIENCES / LAND DEVELOPMENT

New Towns and New Communities

New towns and new communities are developed near urban cities to create new living areas and to relieve congestions in the cities. A carefully planned infrastructure system and a well-planned development scheme are keys to success to the development of new towns and new communities. Infrastructure system includes site preparation, roadway and parking, storm drainage, power supply and distribution, water supply and distribution, sewage network and treatment plant, garbage collection and incinerator, telecommunication networks, etc. Common duct network to store all utilities in one structure is often used for easy installation as well as inspection and maintenance. A well-planned development scheme involves the support from public sector to create incentives for private developers to build in retail areas, commercial buildings, and residential buildings. In the past decade, MAA was engaged by both public and private sectors to provide feasibility studies, planning, design and construction management services for new towns and new communities.



Danhai New Town Development, Taiwan



Saigon South New Town Development, Vietnam



Beitou Shilin Technology Park

TRACK RECORDS

- Hsinchu Science City Development, Taiwan (Covering area of 660 km²)
- Danhai, Kaohsiung and Linko New Town Development, Taiwan
- Supervision Work on Land Acquisition of Beitou Shilin Technology Park
- Hsinchu and Miaoli Station Development of Taiwan High Speed Rail, Taiwan
- Great Taipei City Community
- Xinzhuang Fuduxin Urban Land Consolidation
- Zonal Expropriation Development of Knowledge Industry Park in Northern Xinzhuang, New Taipei City
- Saigon South New Town Development, Ho Chi Minh, Vietnam
- Penang Desa Mar Vista and Ratu Mutiara Community, Malaysia
- Jiaxing Alliance Development, Zhejiang, China
- Taichung Urban Land Consolidation (Phase XIV), Taiwan

Urban Planning & Land Use Development

Both urban sprawl and land development need to be carefully evaluated and planned. At the same time, to control the population distribution in the urban area, balance between urban and rural development, and achieve the goal of sustainability, various impact issues must be considered, such as environmental, engineering, economic, and transportation. MAA has been involved in many large-scale infrastructures and urban development projects, including the Kaohsiung International Airport, Saigon south urban development in Vietnam, and the Second Bangkok International Airport.



Turnkey Project for the Redevelopment of Caota Area Sections 1, 3, and 6, at Guanyin District, Taoyuan City



Guolin Urban Land Consolidation, Taoyuan

TRACK RECORDS

- Saigon South New Town Development, Ho Chih Minh City, Vietnam
- Airport City Master Plan of Suvarnabhumi Airport, Bangkok, Thailand
- Various Studies on Urban Development & Planning and Land Development Modeling in Asian Developing Countries
- Land Levy for Special District of Taiwan High Speed Rail Changhua Station
- Public Facility Project for Special District of Taiwan High Speed Rail Miaoli Station
- Urban land consolidation of the first industrial zone in Linkou District, New Taipei City, Taiwan
- Urban Land Consolidation of District 1 of Xinzhuang Taishan Wen Zi Zun Area in New Taipei City, Taiwan
- Turnkey Project for the Redevelopment of Caota Area Sections 1, 3, and 6, at Guanyin District, Taoyuan City
- Guolin Urban Land Consolidation, Taoyuan

Slopeland Development and Soil & Water Conservation

Due to scarcity of land in Taiwan, Hong Kong and other countries in Southeast Asia, many developments are being limited by the surrounding hillsides to flatlands, which are causing great loss of life and properties during raining and typhoon seasons. However, with improved technology in dealing with stability and erosion, slopeland developments are now possible. MAA has devoted great efforts in carrying out hundreds of project with slope development and soil & water conservation problems. One of the most successful cases is the Great Taipei City in suburban Taipei, which is a 500 hectares highend residential development area. Recently, MAA assisted the Taiwan government to establish the geological hazard information including debris flows, rock falls, landslides, erosions, abandoned mines and cavities, etc. into a GIS system as part of national hazard mitigation program.



Great Taipei City

TRACK RECORDS

- The Great Taipei City, Taipei, Taiwan
- Nuannuan Slopeland Development, Keelung, Taiwan
- Chinese Petroleum Taoyuan Plant Expansion Project, Taiwan
- Overall Slopeland Development Plan, New Taipei City, Taiwan
- Studies and Investigation on Geological Hazard of Hill Slopes, Taiwan
- Geological Investigation, Landslide - Debris Flow Investigation and Susceptibility Evaluation on Watershed in Taiwan
- Geological Hazards Mapping in Mountain Area, Taiwan
- Home Ownership Scheme and Landslide Preventive Measures Project, Hong Kong

Sports and Leisure Facilities

Sports and leisure facilities include stadiums, golf courses, theme parks and recreation areas, etc. Theme parks are often the driving force for commercial and/or mixed developments in surrounding areas. MAA has been engaged in National Stadium Project of The World Games 2009 in Kaohsiung and the stadium of The Universiade 2017 (includes 53 refurbishment stadiums and 2 new-built stadiums).



XinZhuang Sports and Recreational Center



The Universiade stadium in 2017

TRACK RECORDS

- 2009 World Games Main Stadium (BOT Project), Kaohsiung, Taiwan
- Kaohsiung Arena
- Sport Facilities including Stadium & Swimming Pool for National Taiwan University, National Central University, National Chunghsing University, Central Police University, National Kaohsiung Normal University etc., Taiwan
- Green Bay Beach Resort, Taiwan
- Dashi / Linkou / Bali / Changyi Golf & Country Club, Taiwan
- Resorts World at Sentosa, Singapore
- Nakomnayok Prime City Golf Course, Thailand
- Xinzhuang Sports and Recreational Center, New Taipei City, Taiwan
- Venues Construction for Taipei 2017 Summer Universiade, Taiwan

Reclamation

Under the land-locked environment, reclamation lands have been created through landfill technique at river/sea side and swamp areas. The reclamation area can be planned as a public infrastructure, recreational, industrial, commercial or residential uses through ground improvement works. Due to the complication of the engineering characteristics, various engineering disciplines such as environmental, geotechnical, drainage, etc. will be involved in the process of development of reclamation land. MAA has involved in several large scale land reclamation development projects in providing planning, design, construction supervision and project management services.



Reclamation of Keelung River, Taipei



Ground Improvement of the 44 ha Reclaimed Land at the South Port Area of Taipei Harbor

TRACK RECORDS

- Reclamation of Keelung River, Taipei, Taiwan
- The No. 6 Naphtha Cracker Complex of Formosa Petrochemical Corp., Taiwan
- Reclamation of Shen-Ao Port for Chinese Petroleum Corp., Taiwan
- Shezih Island Development, Taipei, Taiwan
- Kaohsiung Nansing Offshore Airport, Taiwan
- Ground Improvement of the 44 ha Reclaimed Land at the South Port Area of Taipei Harbor, Taiwan
- Suvarabhumhi Airport, Bangkok, Thailand
- B.T. Roadway, Vietnam
- Suralaya Steam Power Plant Unit 3 & 4, Indonesia

Industrial and Commercial Park

Over the years, industrial parks and high-tech parks are economic drivers by providing a common area as a means of promoting the economy of scale for companies of similar industries. Take the Hsinchu Science Park as an example. Due to the comprehensive software and hardware and related infrastructure planning, many high-tech factories have been attracted to settle in. In the early 1990s, MAA has been engaged to provide consulting services for the expansion plan of the Hsinchu Science Park. Today, Taiwan's economic trends have gradually shifted from hardware manufacturing to software, marketing, and finance. The Taipei Nangang Economic and Trade Park and Nangang Software Park are major projects under the new trend of industrial development. The project consists of the Taipei Second World Trade Center, a shopping mall, and a five-star hotel, and will have express roads and an MRT system to provide convenient transportation services. MAA has been involved in the design works of basic facilities and infrastructure.



Taipei Nangang Exhibition Center

TRACK RECORDS

- Nangang Economic and Trade Park and Nangang Software Park, Taiwan
- Tainan Science-Based Industrial Park, Taiwan
- Keelung Dawulum, Taoyuan Guanyin and Datan, Jungli Pingji, Changhua Jhangbin, Yunlin Lida, Chiayi Minsyong, Tainan Yongkang, Kaohsiung Daliao Industrial Parks, Taiwan
- Oriental Industrial Park, Paraguayos
- Songjiang, Wuxi and Kuenshan Hi-Tech Industrial Parks, China
- Sweet Grass and Herbs Biological and Technical Park BOT in Chiayi, Taiwan
- Kaohsiung Exhibition and Convention Center, Taiwan
- National Conference and Exhibition Center in Nangang, Taipei, Taiwan
- Shuei-Nan Economic and Trade Park, Taiwan
- Taichung Urban Land Consolidation (Phase XIV)
- Beitou Shilin Technology Park
- Design and Construction Supervision Technical Services for Zonal Expropriation Development of Knowledge Industry Park in Northern Xin-zhuang, New Taipei City
- Taichung Qingshui Jianan Industrial Park Phase I Development Approval Process Management, Taiwan
- Yangon Htantbin Technology Park, Myanmar
- Project Construction Management for Kaohsiung Renwu Industrial Park



Project Construction Management for Kaohsiung Renwu Industrial Park



Yangon Htantbin Technology Park



Shuei-Nan Economic and Trade Park, Taiwan



Zonal Expropriation Development of Knowledge Industry Park in Northern Xin-zhuang, New Taipei City

EXPERIENCES / ENGINEERING DIGITALIZATION

Geomatics and Smart City

Geomatics is the utilization of information and data management tools such as Geographic Information System (GIS), remote sensing, Global Positioning System (GPS) to store data for research, planning and analysis for various profession and industries. MAA has used GIS in combination with remote sensing, global positioning system, and data management to provide integrated services for city planning, land development and management, transportation planning, hazard mitigation system, ground settlement analysis, and project management to various types of clients. System operators and users are able to access GIS systems through Internet as a highly efficient platform for information retrieval. Smart city has integrated Geomatics and BIM to digitize the construction and management of the cities.



iRoad - Smart Cloud Road Information Center

TRACK RECORDS

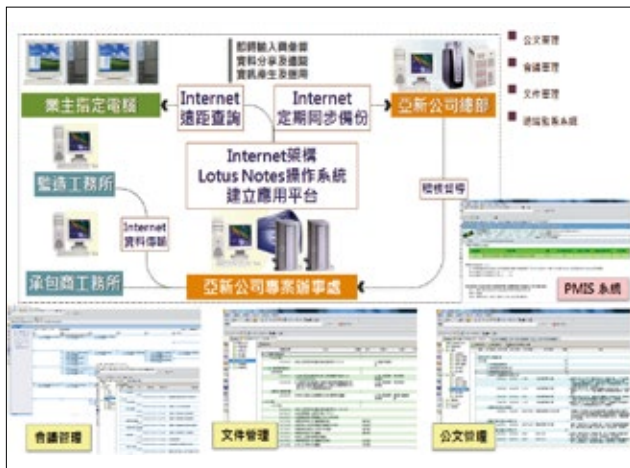
- Island Wide Geological Investigation and Database Construction for the Upstream Watershed of Flood-Prone Area - Central Geological Survey, MOEA
- Establish Project Management and Budget Review System for Public Construction Commission - Public Construction Commission, Taiwan
- Establish Road Information GIS Database and Applications for 18 Metropolitan Areas of Taiwan. - The Construction and Planning Agency, MOI
- Implement on Underground Utilities Database and GIS Management System for New Taipei City
- Feasibility Study on Real Estate Management GIS system for Taiwan Power Company - Taiwan Power Company
- Establish Public Construction Project Management Information System for Taoyuan County Government - Taoyuan City Government
- Geological Investigation and Database Construction for The Upstream Watershed of Flood-Prone Area
- Establish the Existing Landway GIS Management System for Non-Urban Area of New Taipei City - New Taipei City Government
- Underground Utilities Database and GIS Management System for Chiayi City
- The Investigation of Debris Flow Potential Creeks
- iRoad - Smart Cloud Road Information Center

Management Information System (MIS) in Project Management

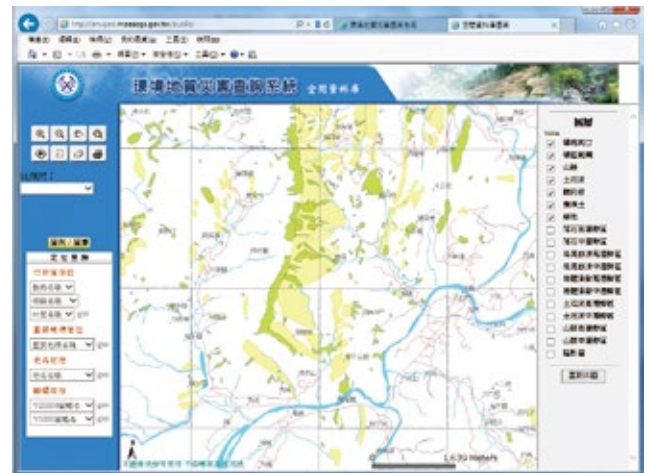
Project management often involves the management of large quantity of data such as design information, correspondences, reports, contracts, cost estimates, regulations, meeting minutes, etc. With today's MIS technology, data can be easily stored, searched, accessed and thereby used instantaneously. For over 30 years, MAA has been developing the most up-to-date MIS to not only manage data but also systemize work processes, including budget updating, administrative tasks, quality control, payment control, and project scheduling. Systems are created not only internally, but also for various clients to help increase their project management and control efficiency.

Risk Management System: IDEAL, RiskMAS, and DynaRISK Supervision

IDEAL (Integrated Databases and Engineering Application Library) is a risk management system integrating the software and data of soil investigation, design analysis, site monitoring, and construction feedback analysis. It was used for supporting design review, construction plan review, data monitoring, construction risk assessment, and early warning. Respond to the complicated interface requirements from risk management in engineering fields, MAA integrated the standard operating procedure for engineering risk assessment, as well as risk identification, control, and reliability analysis to establish RiskMAS, which is used for risk assessment and management operations in the planning and design. Considering that engineering risk management must be implemented in the full life cycle to show its maximum effectiveness, MAA integrated occupational safety, schedule, cost, and interface into RiskMAS and introduced BIM Digital Twin Technology and Dynamic system to establish DynaRISK Supervision, which has been used for construction supervision and project management.



Project Management Information System



Integrated Environmental and Engineering Geologic Information System



Project Management Information System (Cloud Platform)

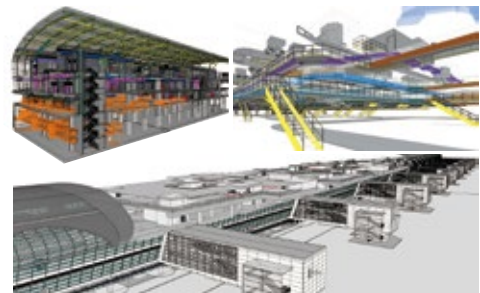
EXPERIENCES / BIM

Planning & Design

In the planning stage, BIM can rapidly analyze the environment and green energy to provide the best design choice and reduce the time and cost of design. With accurate models, it assists the designers to determine the location, materials and size of construction elements, and the development of detailed design. MAA provides professional structural and MEP services for design integration. With the introduction of BIM in planning and design, the project can be completed ahead of schedule.



Sanying MRT System, New Taipei City



Suvarnabhumi Airport, Thailand

TRACK RECORDS

- Y15 MRT Station Circular Line, Taiwan
- 1st Midfield Satellite Building, Suvarnabhumi Airport, Thailand
- Turnkey Project of Underground Tunnel and Kaokang Cooling Plant for 345kv Power Cable Connecting Tailin-Kaokang
- IBP Office Tower, Manila, Philippines
- Taichung Shuinan International Convention and Exhibition Center, Taiwan
- Tainan Museum of Fine Arts, Taiwan
- Urban land consolidation of the first industrial zone in Linkou District, New Taipei City
- Sanying MRT System Turnkey Project

Facility Management

BIM can be extended from construction phase into O&M phase to lengthen building life cycle, because BIM models contain complete engineering information. Through BIM-Based Facilities Management System (FM), it simplifies facilities management interface and integrates different professional drawings. The system can report and repair malfunction immediately via remote control. BIM FM records all maintenance history, which benefits data management and documentation. The main advantage of BIM is obtained by BIM data analysis, which assists decision making and turns analysis results into particular know-how.



Steel Structural Construction (Blast Furnace) BIM information management import services

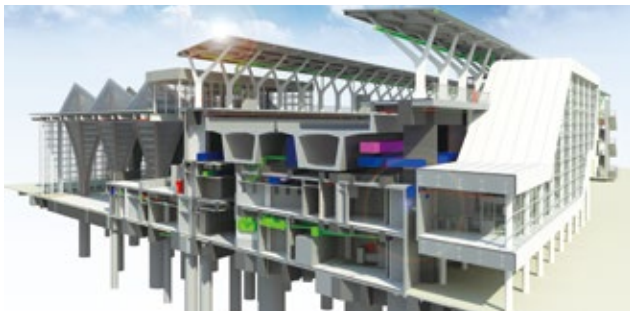


TRACK RECORDS

- New Taipei City Library, Taiwan
- Steel Structural Construction (Blast Furnace) BIM information management import services Tianjin, China
- New Construction of Industry Innovation and R&D Special District in Central Taiwan BIM Service at Construction Stage

Project Management

Since BIM has fully digitized 2D design, it assists owners to check project documents easily and to notice design conflicts rapidly before they cause actual damage. Moreover, the high visualization and reliable data from BIM models makes owners easier to participate and involve in decision making. BIM plays a vital role in controlling schedule, cost and quality of the project.



Taiwan High Speed Rail Changhua Station



Sanxia Youth Social Housing Construction



Tucheng Social Housing Construction

TRACK RECORDS

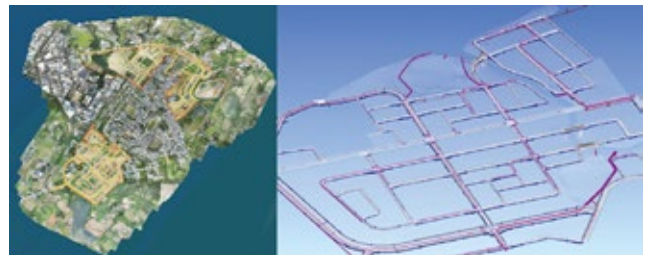
- The Construction Management Consultancy Service for the New Changhua High Speed Rail Station Project
- PCM and Construction Supervision for Linkou Public Housing and the 2017 Taipei Summer Universiade Athletes' Village, Taiwan
- The National Biotechnology Research Park of Academia Sinica
- National Chiao Tung University Bo-ai Campus Biomedical Experiment Building BIM Management Technology Services
- Kwun Tong Taijiang Software Park Phase 1 Technology Exhibition Hall, China
- Project Construction Management for the Chunghwa Post Logistics Park
- Social Housing Construction at Sanxia, Xindian and Tucheng
- Civil Sports Center, Local Police Station, Badminton Stadium

Construction Management

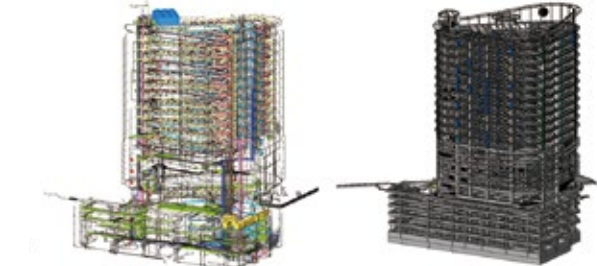
With construction simulation from integrated BIM models, it can successfully find and solve possible design conflicts before construction phase. In addition, the precision of quantity calculated by BIM software reduces time and money for contractors. MAA BIM Center also provides cloud integrated platform to fasten data integration and delivery under safety control.



Huilanwan Sunrise Village BIM Consulting Services



Turnkey Project for the Redevelopment of Caota Area Sections 1, 3, and 6, at Guanyin District, Taoyuan City



Taiwan Power Company Fuhe D/S Building Construction

TRACK RECORDS

- Lung Yen Corporate Headquarters, Xizhi, Taiwan
- Tucheng and Zhonghe National Sports Center for the Construction of Turnkey Engineering BIM Management Technology Services
- National Tax Administration of Central Taiwan Province, Ministry of Finance, Miaoli County Branch BIM Construction Management Services
- Myanmar PME Office Tower
- Chunghwa Telecom Banqiao IDC Project for the Design of BIM Technology Services
- Beijing Tian Tan Hospital, China
- Taiwan Power Company Fuhe D/S Building, Taiwan
- Songhu-Da'an & Shenmei-Da'an 345 kV Power Cable Tunnel Including MEP System BIM Modeling
- Ping Zhen Sports Center BIM Management Consulting Services
- Turnkey Project for the Redevelopment of Caota Area Sections 1, 3, and 6, at Guanyin District, Taoyuan City

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