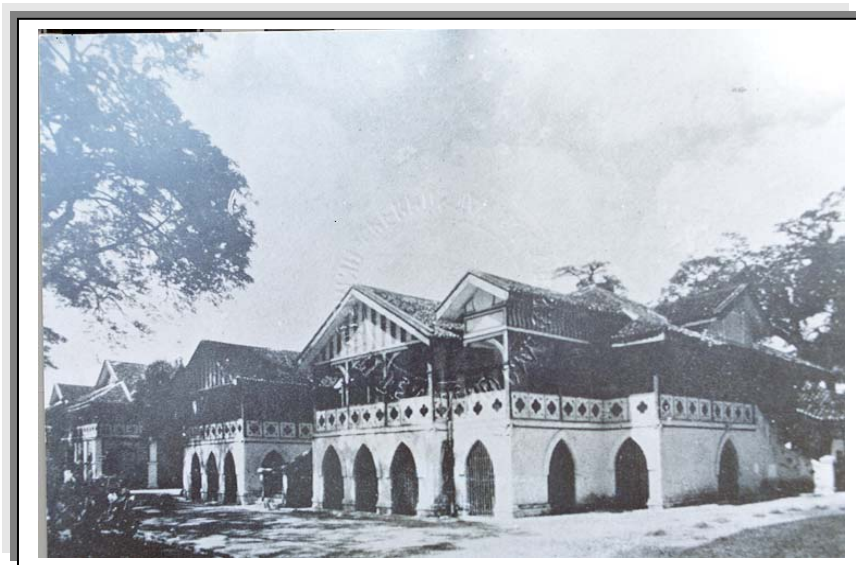


## CHAPTER 1 : INTRODUCTION

### 1.1 Brief History

The history of the Faculty of Civil Engineering, Universiti Teknologi (UTM) started way back in 1904 as a class for technical studies at the Kuala Lumpur City

In 1925, the Technical school started to extend its courses to staff of the Public Work Department, the Railway Department, the Survey Department and the Drainage and Irrigation Department.



*The Old Building of Technical School at Jalan Brickfields, Kuala Lumpur in 1925*

Council Building. Two years later, the class became a Technical School, based at the Batu Lane Malay School. It was then moved to the Museum Building at Bukit Nenas. The main role of the school was to train local personnel for manning expanding infrastructures such as cart-roads and railway lines connecting the mining centres from Taiping, Kuala Lumpur and Seremban to the Strait of Malacca.

The courses were conducted together with the Public Work Department. Within five years, the school was relocated twice. First, to a new building at Jalan Brickfields (now Jalan Tun Sambanthan), Kuala Lumpur, and in 1930 to High Street (now Jalan Bandar). Graduates from the Technical School received Certificate of Civil Engineering which enable them to take professional examination conducted by the City and Guild, UK. Successful

candidates could then proceed to Part I and Part II professional examinations conducted by the Institution of Civil Engineering (ICE), U.K. to be qualified as a “pupil engineer” or graduate engineer.

With the growing needs for more competent technical personnel, a proposal was forwarded in 1941 to upgrade the Technical School to a college status. This, however, was not materialised until after the Second World War in 1946. The school was then known as the Technical College, Kuala Lumpur. It offered a three-year Diploma courses in Civil, Mechanical and Electrical Engineering, Architecture, Town and Country Planning, Land Surveying and Quantity Surveying. Diploma holders in engineering courses were exempted from Part I Examination by the Institution of Civil Engineering (ICE), UK.

The college made another history with the construction of new campus in 1951 on 18 ha. land at Jalan Gurney (now Jalan Semarak). By March 1955, the construction was completed and fully operational.

The university era began from 14<sup>th</sup> March 1972 when the college was granted a university status under section (1) of the University and College Act 1971 and it was named as Institut Teknologi Kebangsaan (National Institute of Technology). Both Diploma and Degree courses were offered with Bahasa Malaysia being the main medium. Engineering courses were taught under the Faculty of Engineering, and Civil Engineering was one of the departments in the Faculty. The major landmark took place on the 1<sup>st</sup> April 1975 when the ITK was finally declared a university and took the present name,



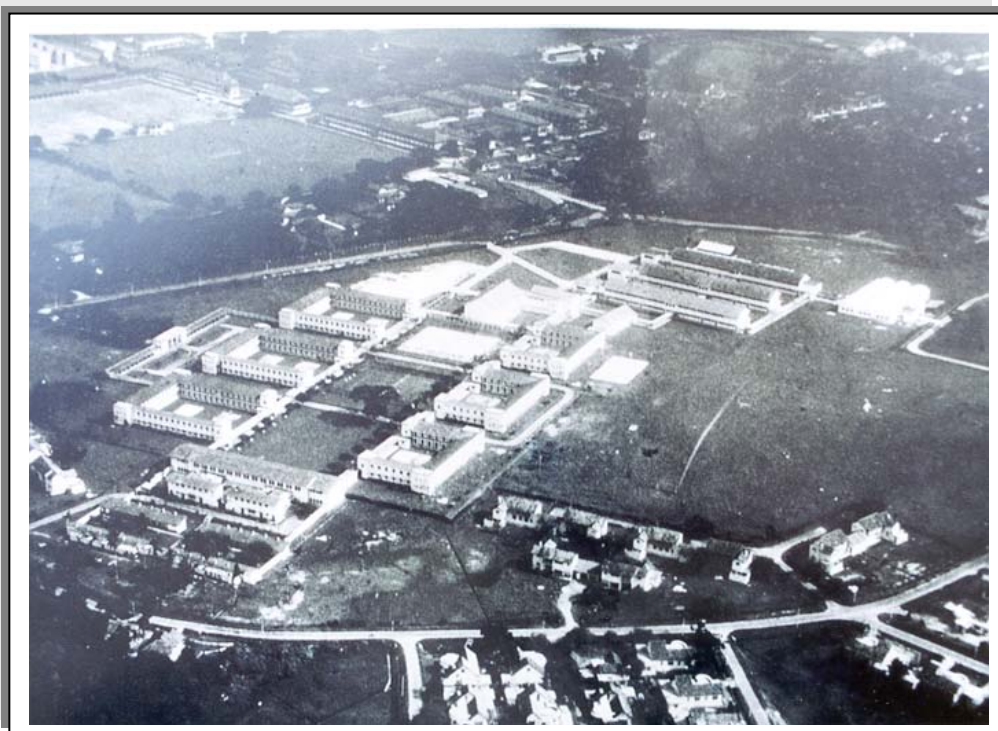
*The Ex-Building of Technical College at Jalan Bandar, Kuala Lumpur in 1941*

Universiti Teknologi Malaysia. On the same day, the Department of Civil Engineering was upgraded to a Faculty, administered by a Dean and a Deputy Dean.

The Faculty started with only eleven lecturers and eight assistant lecturers, some were seconded from the Department of Public Work and the Department of Irrigation and Drainage. Amongst the more prominent staff who pioneered the Faculty include Prof. Dato Aziz Din, Tan Sri Ir. Jamilus Hussein (now the Managing Director of KLIA Bhd.), Dato' Prof. Ir. Dr. Mohd. Noor Hj. Salleh (now the Vice Chancellor of University Utara Malaysia),

Tan Sri Dato' Ir. (Dr.) Wan Abdul Rahman Wan Ya'acob (Former Director General of the Public Work Department) and Professor Ir. Ishak Abdul Rahman, the former Director of UTM at Kuala Lumpur campus.

Between 1976 and 1986, the Faculty received tremendous support through international co-operation, including the Fulbright Exchange Programme, State University of New York (SUNY) and the British Council. Several Professors from universities in the United Kingdom and United States were attached to the Faculty to help formulate and assess the curriculum and teaching materials.



*Technical College Campus, Kuala Lumpur at Jalan Gurney 1955*

Besides, the Faculty also appointed external examiners and visiting professors on a regular basis.

In the pursuance of high teaching standards, a Curriculum Advisory Committee was formed in 1972 under the chairmanship of the First Vice Chancellor, Tan Sri Dato' Ir. Ainuddin Abdul Wahid. Eight other members of the Committee were appointed amongst prominent technical personnel and representatives from the Department of Public Work and Department of Irrigation and Drainage. In 1977, another milestone was achieved by the Faculty when its degree courses obtained recognition from the Institute of Engineer Malaysia (IEM).



Tan Sri Dato' Ir. Ainuddin Abdul Wahid, the First Chairman of the Curriculum Advisory Committee of the Faculty

Until the mid-eighties the faculty had placed large emphasis on strengthening its critical mass to be excel in teaching. The campus move from Jalan Gurney (now

Jalan Semarak) to Skudai, Johor, about 300 km to the south, in 1989, marked another crucial development. The Kuala Lumpur campus is retained as a branch campus

With a much bigger space, covering 1122 hectares and better teaching and research facilities, the new campus serves as an impetus for the Faculty to reach a greater height in engineering research and practices. It also provided catalyst for development for the southern region. Through research and consultancy, the Faculty has developed magnificent linkages with the industries.

In the early nineties, the faculty has expanded its role. While education is still the core business, research has become a more important pillar for the Faculty's future. The number of post-graduate students also showed a dramatic rise. This has led to the creation of centres of excellence to coordinate and optimise the vast expertise available in the faculty. To date there are four such centres, namely Coastal and Offshore Engineering Institute (COEI) --located at Kuala Lumpur campus, Steel Technology Centre (STC) and Construction Technology and Management Centre (CTMC), and Institute of Environment and Water Resources Management (IEWRM).



*The Present Civil Engineering Faculty at Universiti Teknologi Malaysia, Skudai, Johor.*

After nearly three decades since its establishment in 1975, the faculty has transformed itself into one of the biggest and most reputed engineering faculties in this region. Now there are over 130 academic staff with annual enrolment of about 2700 students. The achievements have been attributed to the strong and enthusiastic leaderships with a continuous support from members of the faculty. Until now, the faculty has been in the good hands of six very able Deans. During their tenure-ship they had made remarkable contributions to the development of the faculty.

## **1.2 Faculty's Vision and Mission**

In achieving our goal as a world class centre of excellence, the faculty members are strongly inspired by our vision and mission.

Our Vision

***To be a world class centre for professional education and research in civil engineering***

## Our Mission

***To be ahead in academic excellence and technological development through creativity***

To achieve the above vision and mission the faculty has set the following objectives

- To pursue excellence in teaching, research, consultancy, services and scholarship;
- To offer through its departments and institutes and other facilities, an unsurpassed range of opportunities for education and training;
- To enhance public welfare, prosperity and culture by encouraging the process of learning and application of research findings;
- To secure and manage resources effectively.



**Dato' Prof. Ir. Aziz Din** - The first dean who administered the faculty between May 1975 to August 1979. He established the faculty's administration structure and the civil engineering course curriculum leading to the degree recognition by the Board of Engineers Malaysia, Institution of Engineers Malaysia and Public Services Department. He initiated the appointment of external examiners and external moderators for the faculty. He is also the initiator of IEM Log Book for the training scheme of IEM Professional Development & Professional Interview.



**Prof. Ir. Ishak Abdul Rahman** - Appointed as the dean twice between 1<sup>st</sup> March – 31<sup>st</sup> March 1982 and 1<sup>st</sup> April 1990 to 31<sup>st</sup> August 1992. During his first term as Dean, he recruited ex-graduates of UTM and professionals from Public Work Department and Drainage and Irrigation Department in order to strengthen the teaching capabilities. Through Memorandum of Understanding with Strathclyde University, academic staff (ex-graduates of UTM) furthered their studies at Strathclyde University with special admission provision and several expatriates were hired as academic staff. He strengthened the Academic Advisory Board with additional members from the public and industrial sectors. He was also involved in the planning stages of the new campus at Skudai. During his second deanship, he focused on the project or research collaboration between the faculty, the public and industry sectors.



**Assoc. Prof. Ir. Mohd. Zain Hj. Yusof -**

The third dean, ran the faculty from 1<sup>st</sup> April 1982 to 31<sup>st</sup> March 1986. He has strengthened the academic standards of the Faculty especially for the undergraduates. Through his initiative, a number of prominent Professors from UK and the US universities were attached to UTM. During his time, the Civil Engineering program of the Faculty received recognition from the Institute of Engineer Malaysia (IEM) for the second term between 1982 and 1990. He was also involved in the planning and construction of the new campus at Skudai.



**Dato' Prof. Ir. Dr. Mohd. Noor Salleh**

- Appointed as the dean between 1<sup>st</sup> April 1986 and 31<sup>st</sup> March 1988. During his deanship, he introduced several elective subjects in the curriculum for the undergraduate course based on the expertise of the lecturers and in line with the industry needs. He promoted the use of computers in administration and set up computer laboratories, leading to the formation of the AutoCAD Training Centre in UTM, Jalan Semarak, Kuala Lumpur. In addition, the first regional conference organised by the faculty, i.e., '*Regional Conference in Computer Applications in Civil Engineering (RCCACE)*' was held in February, 1988. He formed the first publication committee in 1987. As a result, the first issue of the Civil Engineering Journal was published in 1988.





**Professor Dr. Zainai Mohamed** - In charge of the faculty between 1<sup>st</sup> April 1988 and 31<sup>st</sup> March 1990 as the fourth dean. He was directly involved in the planning and implementation of campus shift from Jalan Semarak, Kuala Lumpur to Skudai, Johor. At the new campus, the faculty saw rapid expansions in term of facilities and human resources. A number of new machine and equipment were purchased and 36 academic staff were recruited. He strengthened various administrative procedures and set-up two committees, namely Administration Board and Academic Board. The semester system which was adopted in 1983-1984 was reviewed and strengthened during his time. With the better facilities, the Faculty start to endeavour research and consultancy services in a more rigorous way. He also initiated Post-Graduate System and a Panel Expert group for the Faculty.



**Professor Ir. Dr. Mohd. Zulkifli Tan Sri Mohd Ghazali** was appointed as the dean between 1<sup>st</sup> Sept. 1992 and 14<sup>th</sup> October 1997. He placed strong emphasis on the research and scientific achievement, and inculcated academic culture. He also promotes a strong synergy between the faculty and the industries. During his tenure-ship, the Steel Technology Center (STC) and Institute of Environmental Study (now Institute of environment and Water Resources Management, IEWRM) were established. Important conferences such as National Structural Engineering Conference (NASEC) and Asia Pacific Structural Engineering Conference (APSEC) were initiated during his deanship and now become an annual affair. His management philosophy is to question strategies and resetting direction for the purpose of change.

### **1.3 Organisational Structure**

In 1975, the faculty started with three Departments, namely Structures and Materials, Hydraulics and Water Resources, and Soil Mechanics and Geology. The Department of Environmental Engineering was created a year later in anticipation of the increasing challenge and complexity in handling environmental issues.

Over the years the faculty has assumed increasing responsibilities especially in teaching and rendering its services to the industries and the public at large. Currently, the Faculty is run by a Dean and assisted by two Deputy Deans, one in charge of academic affairs and the other in research and post graduate studies. The present structure has six departments and four centres of excellence (FIGURE 1.1). Each department is administered by a Head of Department, or by a Director, for the Centres of Excellence. Matters related to the human resource development and the general administration is under the charge of a Deputy Registrar.

### **1.4 Staffing and Field of Expertise**

The faculty has over one hundred and thirty academic staff and sixty non-academic staff. In line with the need for a holistic and integrated approach in tackling many of the civil engineering problems, the faculty has a large pool of expertise of diverse background as shown in APPENDIX A. The main thrusts, however, are on structural and design appraisal, construction materials, water resources, highway and transport, geotechnical engineering, and water and wastewater treatment. The large pool of expertise enable the faculty to undertake various kinds of research and consultancy services.

Organization Structure

## 1.5 Facilities

### 1.5.1 Resource Center

The faculty has a Resource Centre that serves as a reference sources. Information on activities and development of the faculty is placed in the Centre. In addition, the Resource Centre provides services for improving teaching technique. These include production of slides, collection of photograph, video recording and editing, and preparation of PA systems and other equipment for seminars and conferences. The centre holds a collection of journals, proceedings and conference papers of the faculty's staff, and student industrial reports.

### 1.5.2 Laboratory

The Faculty has the biggest civil engineering laboratory in this country with a variety of first class facilities. The laboratory technicians are highly trained and specialised in specific fields. Besides providing facilities for teaching and research purposes, the laboratories also provide services in terms of material testing and sample analysis to the industries and the publics. Today there are seven main laboratories as follows.



Strong Floor System - the largest in the region

#### (i) Structures Laboratory

This laboratory provides testing facilities of structural elements such as columns, beams, frames, trusses and bridge bearings. The combination of multipurpose testing frames, strong floor and high loading capacity actuators allows various forms of full scale testing. These tests can be carried-out under tensile, compression, bending and dynamic loadings. The main facilities in this laboratory include ;

##### Strong Floor System

The system is one of the largest strong floor reinforced concrete in this region, measuring 13 m x 27 m., with one meter anchor points. Every anchor point has a carrying capacity of 500 kN and 350 kN in the vertical and horizontal direction, respectively.

### Various Type of Testing Machines :

- A 500 tonne Universal Testing Machine with a capacity of 500 kN and 2000 kN in compression and tension, respectively. The loading actuator is servo-controlled for consistent load increment for static and dynamic testing.
- A 25 tonne Dynamic Testing Machine for testing smaller materials.
- Two units of compression machine with 300 tonne capacity.



### Loading Actuators and Load Cells

The system has various capacity of static and dynamic actuators servo-controlled and screw jacks with capacity up to 1200 kN; load cells with capacity of 100 kg to 300 tonne, and three modular controller-DARTEC-acquisition system.

### Other Facilities

- Data logging system : two units TML-TDS 301 with 50 channels and

one unit Orion data logger up to 400 channels.

- High speed data acquisition system up to 100 kHz interval.
- Computerised data acquisition system - 6 independent units, 30 kHz maximum
- Various gauges for static and dynamic testing such as strain gauges, linear and direct measurement transducers and accelerometers.

### Computer Software

- COSMOS/M - Finite element package for static and dynamic analyses
- QSE - Structural engineering package for analysis and design of steel and concrete structures
- AtstructE - Structural engineering package for analysis and design of concrete structures
- A Syst & DADisp - Analog to digital software for data acquisition
- Hypersignal - Analog to digital software for high speed data acquisition

### **(ii) Material Engineering Laboratory**

This laboratory has been specialising in testing, evaluation and verification of cement, aggregate and mortar under

controlled humidity and temperature. A wide range of sophisticated non-destructive testing (NDT) equipment is available for structural appraisal of hardened concrete. The portability of this equipment is particularly suitable for site testing. Besides, the laboratory also offers destructive testing of hardened concrete, bricks, bridge bearing and other construction materials. The main facilities available are:

#### Curing and Testing Facilities

The unit comprises of humidity chamber to control temperature and humidity, accelerated bath tanks, furnace for producing bricks, and two units of compression machines with 300 tonne capacity.

#### Various kinds of Non-Destructive Testing :

- CAPO - pull out test for concrete strength
- PUNDIT - concrete strength and crack depth
- Schmidt/rebound hammer
- Windsor probe - bullet penetration for concrete strength and surface hardness
- Cover meter - concrete cover, reinforcement size and position
- Half-Cell corrosion test
- Potential wheel corrosion meter
- Crack measurement

- Concrete core drilling machine with various bit sizes

Timber Testing Machine : capable of running full scale tests of frame of trusses, production of glue-laminated timber and timber strength (bending, compression and tension).

Steel Testing Facilities : capable of performing scale test of steel frames and trusses and model testing structure.

Prestressed Concrete Test : equipped with a 1000 ton pretensioned and prestressing bed complete with jacking and anchorage facilities.

Photo-Stress Instrument System : capable of studying stress distribution of structural components.

#### **(iii) Geotechnical Engineering Laboratory**

A complete range of testing equipment is available for conducting tests for local Geotechnical Environment. The laboratory is well equipped with state-of-the art equipment dedicated for laboratory testing. To ensure a smooth progress of activities, the laboratory is divided into several sections such as basic Soil Mechanics Laboratory, Soil Chemistry Laboratory, Geotechnical Modeling Laboratory, Advanced Geotechnical

Laboratory and Geology and Rock Mechanic Laboratory. The laboratory has provided services to either government or private sector in solving geotechnical problems around the region. The laboratory is reinforced with its Geotechnical Engineering Research Group (GERG) comprises of the academic staff in its Department. The group is responsible in providing a well-planned and systematic research programmes, to establish a systematic and comprehensive data base of Malaysian soil characteristics for engineering purposes and providing advisory and consultancy services to both the government and private sectors with regard to local soil characteristics.



loading during undrained or drained condition.

- Large strain consolidation cells specially designed for highly compressible soil such as ex-mined slurry and peat
- Auto compaction equipment
- Auto Direct Shear equipment
- Pressure Meter
- Pinhole erosion meter
- Seismic refraction equipment
- Various software for Geotechnical Modeling



Some of the laboratories facilities are:

- Fully-automated Rowe's Hydraulic and Oedometer consolidation cells.
- Full Automated Triaxial Test Machines including hydraulic Stress Path cell which are able to perform isotropic or anisotropic consolidation, compression or extension and monotonic or cyclic

#### **(iv) Traffic and Transportation Laboratory**

This laboratory focuses on providing services in transportation sectors such as in designing and management of road traffic and infrastructure and material testing. A complete range of testing equipment are available for conducting

specialised tests in accordance with the British, American and Malaysian Standards. The main facilities include :



- Commercial Software packages for traffic analysis
- HISTAR - Automatic traffic counter
- TRANSCAD GIS - transportation computer aided design
- Various equipment for laboratory and field tests such as California Bearing Ration (CBR), Polished Stone Value (PSV), Aggregate Crushing Value (ACV), flakiness, Los Angeles/Dory Abrasion, Coring Machines, Bitumen Extractor, Marshal Stability and Wheel Tracking



#### (iv) Hydraulics and Hydrology Laboratory

This laboratory specialise in conducting research and monitoring of various hydro-meteorological parameters for surface and subsurface hydrology, groundwater, coastal and off-shore engineering and hydraulics. The main facilities available in the laboratory are:



- Various kind of current meters for surface and coastal uses, including the latest model of Acoustic Doppler Velocimeter (ADV)
- Flowmeter
- Automatic water sampler
- Infiltrometer and permeability meter
- Current meter calibration system
- Soil moisture measuring system
- A number of Automatic and Manual Raingauges
- A complete meteorological station
- Various hydrological and hydraulic software e.g. MIKE 11 (Modelling System for River and Channel), RORB (Runoff Routing Model), IDRISI (GIS



Software), HEC-3 (Water Surface Profile), HEC-3 (Reservoir System Analysis for Conservation, HEC-6 (Scour and Deposition in River and Reservoir) and etc.



- Atomic Absorption Spectrophotometers (AAS)
- High Performance Liquid Chromatography (HPLC)
- Total Organic Carbon (TOC) Analyser
- Gas Chromatograph
- Ion Analyser
- High Volume Sampler
- Double Beam Spectrophotometer
- Flame Spectrophotometer
- Various types of water quality test kits for field observations
- Microbiology Analysis Equipment
- Rotating Biological Contractor

#### **(vi) Environmental Laboratory**

This laboratory is equipped with a wide range of facilities for testing and analysis of environmental parameters especially for water, air pollution and solid waste researches. The major equipment available in this laboratory are:



**(vii) Computer and Graphic  
Laboratory**

The computer laboratory has undergone rapid expansion in the recent years. Now there are about 300 PCs in the faculty, stationed mainly in four laboratories. About 90% of these PCs are connected to the network facilities. Printing facilities include laser printers from network and local system, plotter for A1, A2 and A3 sizes, scanners and colour printer.

Major software available include Microsoft Office, Various Data Base Systems and AUTOCAD for engineering drawing.

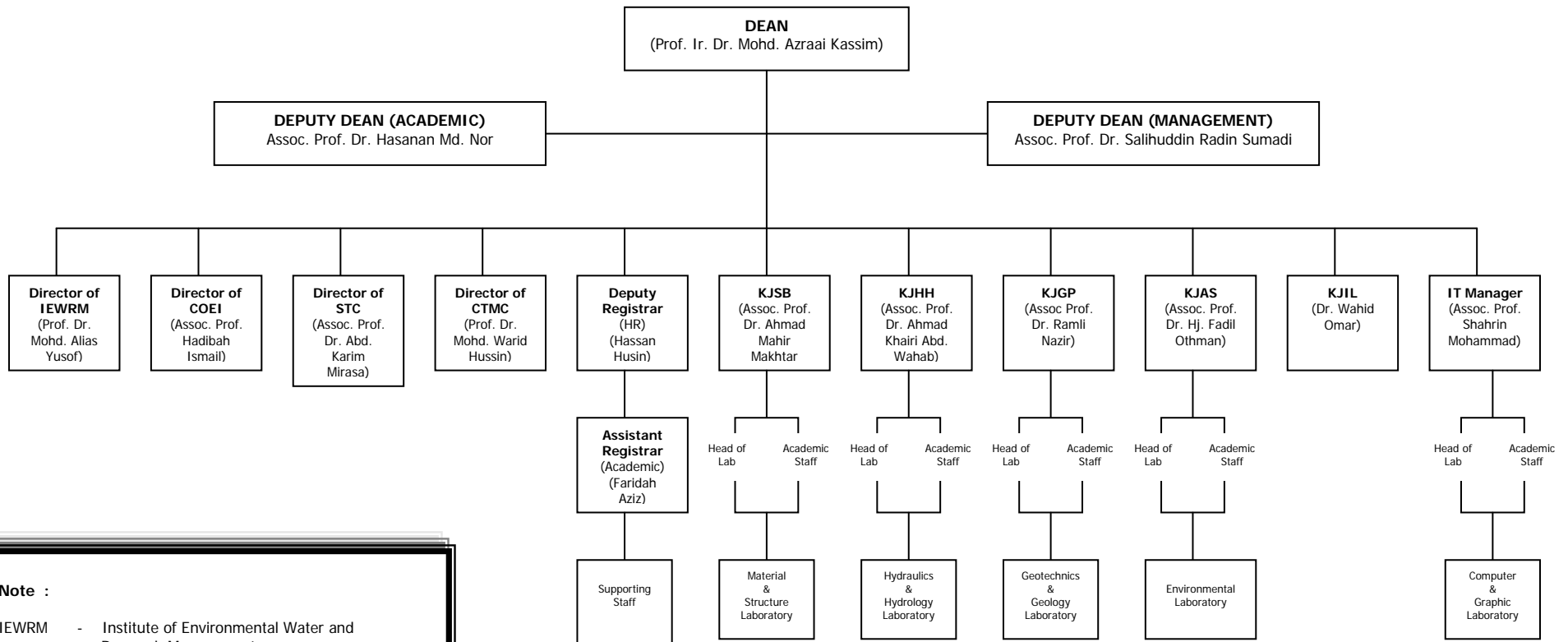
Some lecture rooms are also equipped with LCD projectors. The present serial networking system will be upgraded to parallel system which is more efficient and easier to maintain.



Photos : Laboratories and Facilities



# ORGANISATION STRUCTURE IN 1999



**Note :**

- IEWRM - Institute of Environmental Water and Research Management
- COEI - Coastal and Offshore Engineering Institute
- STC - Steel Technology Centre
- CTMC - Construction Technology & Management Centre
- KJSB - Head of Dept. Structure and Materials
- KJHH - Head of Dept. Hydraulics and Hydrology
- KJGP - Head of Dept. Geotechnics and Transportation
- KJAS - Head of Dept. Environmental Engineering
- KJIL - Head of Dept. Postgraduate Study