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## Proposed A Centre of Technology for Architecture, Polytechnic Malaysia (COTA)

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### Abstract

The Centre of Technology for Architecture (COTA) is proposed as a platform to build public awareness of the architecture role in society, to promote scholarly research in the field and to stimulate innovation in design practice. The project is seen as an opportunity for the Polytechnic to achieve strategic objectives relating to the positioning of COTA, with a commitment to innovation in relation to the design and delivery of an outstanding building. The aspiration of the school and the Polytechnic is that the new building will demonstrate an outstanding level of quality in both the processes of design and development in the end product. The resulting design will provide an excellent working environment to encourage high quality research, teaching, learning and linking advanced research with public engagement in architecture. The building will establish an exceptional level of environmental performance, expected to be concurrently with Green Building Index (GBI) of Malaysia rating system. The building will enable teaching and learning opportunities, with users being able to actively monitor and adjust the environmental features of the building in order to appreciate their impacts on the indoor environment as well as research opportunities for the broader School agenda.

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*Key-word: - COTA, Architecture, Technology, GBI*

### 1. Introduction

The Centre of Technology (COT) is an initiative by the Education Ministry's polytechnic education and community college department (JPPKK) to realize its goal of becoming the main Technical and Vocational Education Training (TVET) institute for higher education in the country (Mstar, 2019). Polytechnic Malaysia have a transformation plan to be one of the top in TVET learning provider. In 2015, Politeknik Port Dickson has been chosen as Centre of Technology for Architecture Programme and recognized by JPPKK on 2018.

The main objective of COT is to cultivate the sharing of expertise, research, innovation and high quality training services in the niche areas. It is focus on expert consultation, implementation of research and innovation activities, excellence in teaching and learning as well as reference centre for the community and relevant industries. Students also get benefits by this initiative in producing top quality, innovative, entrepreneurial, highly employable and competitive graduates (JPPKK, 2018).

There are eight COT polytechnics that have been recognized which are Politeknik Ungku Omar (Centre of Technology in Marine Engineering (CTME) & Centre of Air-conditioning & Refrigeration (CARE)), Politeknik Sultan Salahuddin Abdul Aziz Shah (Centre for Medical Electronic Technology (CMET)), Politeknik Ibrahim Sultan (Creative Design Centre (CDeC)), Politeknik Sultan Azlan Shah (Polytechnic Centre Of Technology in Automotive and Manufacturing (PolCAM)), Politeknik Sultan Haji Ahmad Shah (Centre of Food Science and Technology), Politeknik Sultan Abdul Halim Mu'adzam Shah (Centre of Town and Regional Planning), Politeknik Port Dickson (Centre of Architecture technology), (JPPKK, 2018).

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The Centre of Technology for Architecture (COTA) in Politeknik Port Dickson is headed by a Director who reports to the Director of Politeknik Port Dickson. The centre has divided into two divisions which are Pembina and Kawans. The Pembina focus on advanced technology of construction industries meanwhile the Kawans aim for conservation of Traditional Malay Architecture. The services offered involve courses and training, consultation and services, research and innovation.

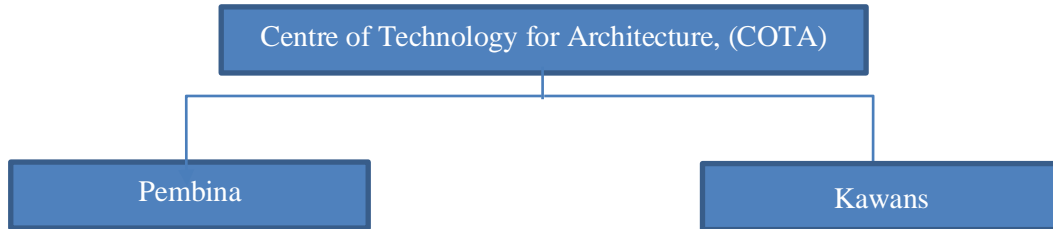


Figure 1: The COTA Programme

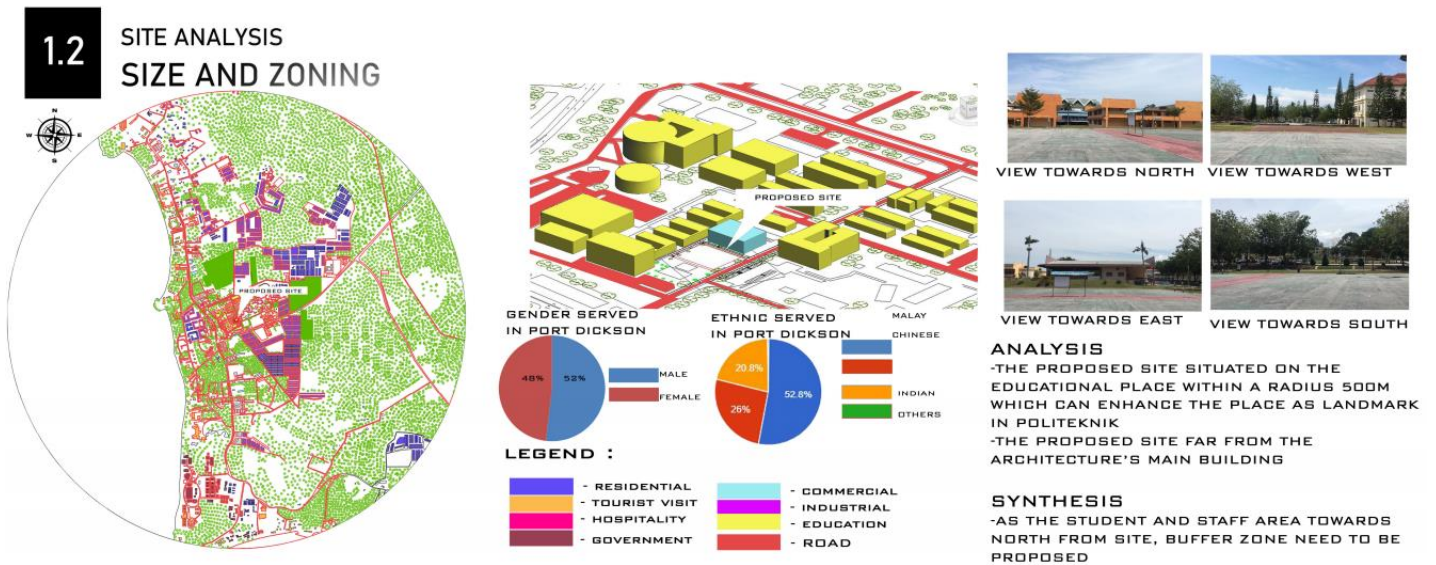


Figure 2: The proposed site is Politeknik Port Dickson

## 2.3 SITE ANALYSIS NEIGHBOURHOOD CONTEXT

Neighbourhood context : polytechnic area



- DEWAN WAWASAN
- JHEP
- BLOK PENTADBIRAN
- BLOK AKADEMIK
- KANTIN
- DEWAN KULIAH
- BLOK JABATAN KEJURUTERAAN AWAM
- BENGKEL KEJURUTERAAN AWAM
- GARAJ KEBUN
- MAKMAL KEJURUTERAAN ELEKTRIK
- BLOK JABATAN MATEMTIK,SAINS & KOMPUTER
- BENGKEL AUTOMOTIF
- JABATAN KEJURUTERAAN MEKANIKAL

### BUILDING CHARACTERISTIC

- IN PORT DICKSON POLYTECHNIC THERE IS BUILDING TO USE ELEMENT HORIZONTALLY LIKE BLOK AKADEMIK. THE SPARTIAL ORGANIZATION OF ALL THE BUILDING IS GRID.
- FOR THE STYLE OF THE BUILDING IN SITE AREA IS POST MODERN. LIKE BLOK AKADEMIK , BLOK JHEP OR BLOK PENTADBIRAN.
- WINDOW STYLE HAVE INSIDE THE POLYTECHNIC PORT DICKSON USE SINGLE HUNG AND DOUBLE HUNG.



THE PROPOSED SITE THAT SURROUNDED BY EDUCATIONAL BUILDING, MANAGEMENT AND SPORT FACILITIES.

Figure 3: Existing site condition.

## 2.2 SITE ANALYSIS CIRCULATION

### VEHICULAR MOVEMENT



- CAR MOVEMENT**
- THERE ARE THREE ROADS TO THE POLYTECHNIC



- MOTORCYCLE MOVEMENT**
- MOSTLY STUDENT USE MOTORCYCLE TO POLITEKNIK

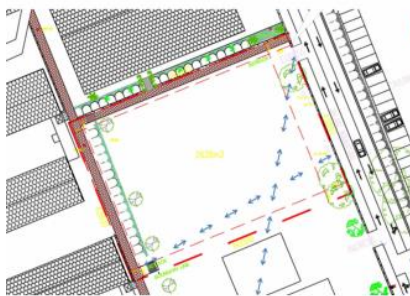


- PEDESTRIAN MOVEMENT**
- PEDESTRIAN ROUTES ARE ALWAYS USED BY POLYTECHNIC STUDENTS



- BUS MOVEMENT**
- MYBUS SERVICES PROVIDED FROM PD-POLYMALL
  - EVERY ONE HOUR MYBUS BUS WILL ARRIVE

### ANALYSIS



### MAIN, SECONDARY, TERIARY



- SHORT ROAD TO TELUK KEMANG
- JALAN PERDANA



- JALAN PANTAI FROM SUNGGALA GATWAY, PORT DICKSON



- JALAN PASIR PANJANG

### LEGEND

- PEDESTRIAN MOVEMENT
- SHORTCUT WALKWAY

### ANALYSIS

- DO NOT HAVE INGRESS ON SITE
- PARKING IS NOT PROVIDE FOR USERS
- PEDESTRIAN WALK IS NOT ATTRACTIVE , SAFE AND NOT SUITABLE FOR ALL INTANDED USERS.

### LEGEND

- CAR MOVEMENT
- MOTORCYCLE MOVEMENT
- PEDESTRIAN MOVEMENT
- BUS MOVEMENT
- BUS STOP
- KE PROPOSE SITE
- KE PARKIN KENDERAAN
- KE BLOCK ASRAMA

Figure 4: Site circulation.

## 1.1 Problem Statements

The Politeknik Port Dickson also has commencing bachelor degree since 2015. The school needs expansion to provide facilities and infrastructure for the additional programme. Consequently, the facilities provided is not enough because of shared with other department. The location of the facilities also scattered within Politeknik Port Dickson. Students and lecturers need to walk or drive to reach the facilities that time consuming. Throughout the research regarding social boundaries and education, it is surprising to find that Politeknik Port Dickson communities do not blend well with the locals intellectually and culturally. Thus, does not encourage collaboration as well. Hence, the aim of this study is to propose a model for the establishment of the Centre of Technology for Architecture in Politeknik Port Dickson.

## 1.2 Project Objectives

This proposal of Centre of Technology for Architecture is design for Politeknik Port Dickson to provide dedicated area meant for research and innovation events. Act as one stop centre, complete with high technology and new innovation equipment such as augmented reality (AR), virtual reality (VR), and research area such as laboratories to study on environmental performance supporting by high specification of computer set and secure working environment.

With this new centre user can easily access the facilities and used the equipment available and save their time. The spaces carefully design not only to promote teaching and learning activities but also to allow collaboration. The main design strategies for this building to achieve the green standard is by using Green Building Indeks (GBI).

Sustainable building design is the approach used for this project. The six main basic elements consist of site and land use, energy, water, materials, indoor environment quality and innovation was a sustainable building guidelines used in the early design stage. (MHM Zain, 2012)

## 2. Methodology

Methods used in this project proposal are site analysis, literature review and computer aided design. The data collected through site inventory and analyze using computer software. Synthesis and building design was model in 3 Dimension (3D) modelling software as a result.

### 2.1 Site Analysis

Site analysis is a method used to collect the data and information of the site which is Politeknik Port Dickson. Site visit was conducted and practical work was done to study on site condition like sun path, wind direction, the vehicle and pedestrian circulation, weather, climate and existing vegetation. The site boundaries were measured using measuring tape for accuracy and google earth as alternative.

### 2.2 Case Study

It is necessary to view technology development centre from other higher education institutions to study more on facilities and physical spaces required for the propose technology centre. Centre for the Study of Built Environment in The Malay World (KALAM), Universiti Teknologi Malaysia and Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia are the example of higher education institutions who have implemented full service as technology developments centre. These centre provide support to the faculty with facilities available and supported by one higher education institution to promote research and innovation activities.

### 2.3 Computer Aided Design

The Revit Architecture and AutoCAD are the software used to ease the design process. Its help on synthesis of the data and model simulation. The design idea was transfer and model using this software to get the visual simulation for evaluation and finalized the design idea.

## 3. Conceptual Design Approach

The sustainable design approach was used as design concept. The idea is to implement passive design strategies. Passive design is about taking advantage of existing site condition and used to maintain thermal comfort. Its cover from choose appropriate building orientation, building materials selection and site planning (H. Atan et al, 2016). From the finding, to minimize the heat gain, the building should be properly oriented and the openings should cover with screen, louvres and large overhang.

The site proposed placed within the Polytechnic Campus. Its oblique orientation following grid organization cutting across horizontal axis of west and east which is also the path of the sun, and the path of prevailing winds provide brilliant opportunity for passive design implementation such as tunnel effect and systemic shading pattern provision. The main road linearly provides the building its main exposition to occupants and non-occupants alike circulating along the path.



**Figure 5:** Proposed masterplan for COTA



**Figure 6:** Artist's impression of the building from the main road.

### **3.1 Creating Awareness**

The first step in creating awareness have always revolved around the precise instigation of something new and unique in a place of accustomed mundanity. Architecture surrounding Politeknik Port Dickson reflects a pattern of bright colours and simplistic modern style. Protruding those architectural customization, the new COTA express dark and cool colours through the complex depths of shadow patterns surrounding the dark coloured structural materials and highly foliated landscape. This is what genius loci really mean. By injecting these new and unique visualization of architecture, the societies perception of architecture could really evolve into a true appreciation of artistic building impression and then a learning experience can truly be developed throughout further engagement inside and outside of COTA.

### **3.2 Breaking Social Boundaries**

COTA aims to focus on breaking social boundaries by design. Through high level of transparency can a certain hierarchical social communities mingled together in expanse of vast intellectual engagement. The ground floor design emphasizes high visual connectivity. There are no obstructing walls, everyone on the floor should feel as if they were inside one singular space and this singularity really gave a conducive learning, researching and working environments.

### **3.3 Modular Construction**

With high regards for qualitative materialization process, modular construction exemplifies three significant advantages over conventional structures. First its green because the factory controlled process generate less waste, creates fewer site disturbance and allow for tighter construction conditions. Secondly its faster compare to the conventional construction method. Construction of modular buildings occurs simultaneously with site work, allowing project to be completed in half of the time of conventional construction. Finally, it's smarter, with high technological prerequisites and detailed construction analysis, modular system makes for precise design production.

### **3.3 Raw Materials Aesthetic**

Closely related with philosophical movement of "skins and bones" architecture by Mies Van Der Rohe, COTA implements direct aestheticization techniques with no unnecessary gratuitous façade structure. Hierarchical patterns of complex and details nuances and steel construction paired with simple unpainted modular precast concrete panels allegorically describes the duality of the complex and simple look. The balance was achieved through physical predisposition of human implicitly seeking for calmness in a hocus pocus setting, a sense of cool in hot and humid environment that shifts consistently for equilibrium.



**Figure 7:** The frontal courtyard design to allow natural cross ventilation and lighting.



**Figure 8:** Right elevation facing main road.



**Figure 9:** Left elevation.

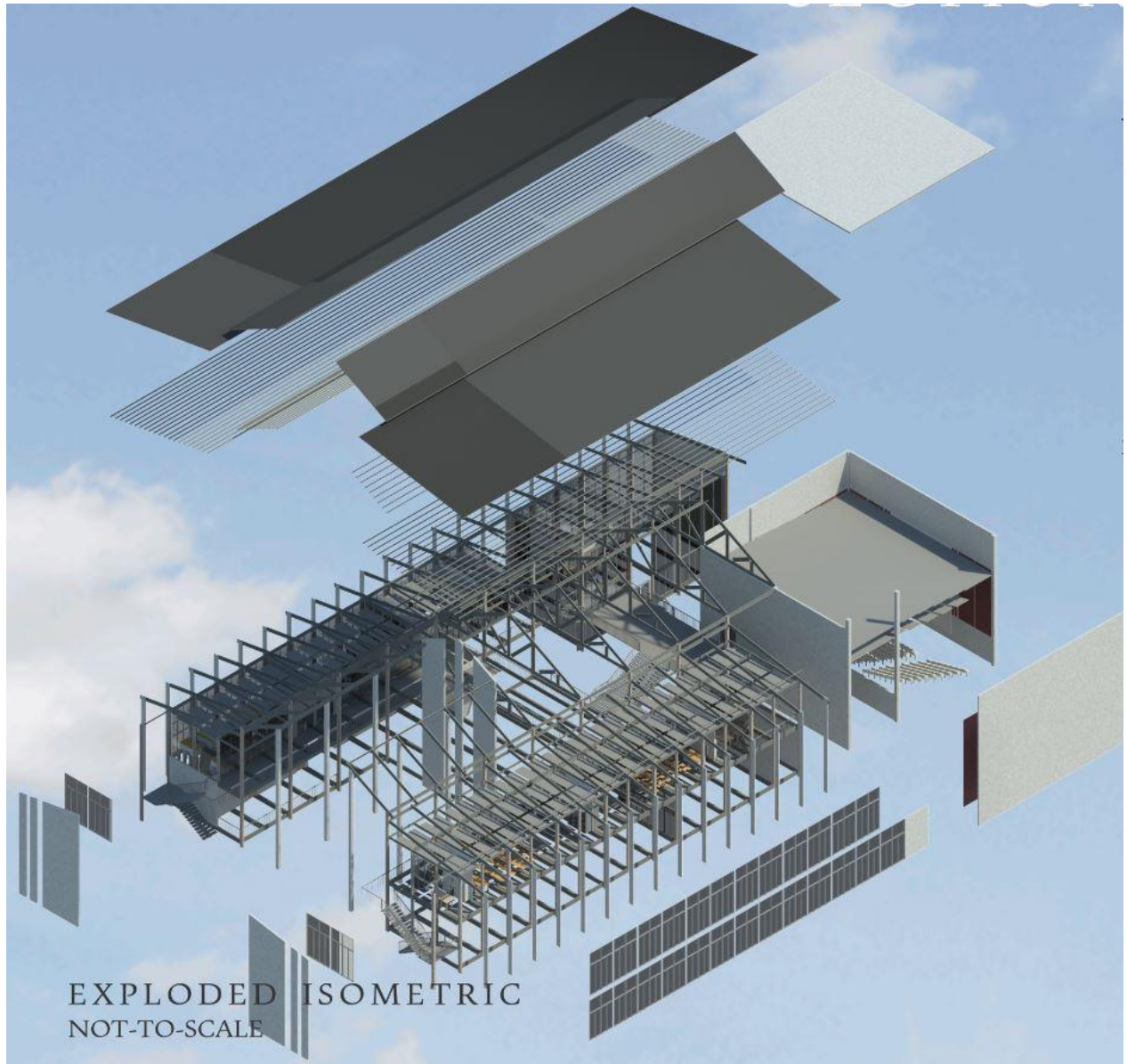


**Figure 10:** Lobby



**Figure 11:** Exhibition area.





**Figure 12:** Exploded isometric view show the modular construction.

#### 4. Conclusion

The aspiration of the school and the Polytechnic is that the new building will demonstrate an outstanding level of quality in both the processes of design and development in the end product. The resulting design will provide an excellent working environment to encourage high quality research, teaching, learning and linking advanced research with public engagement in architecture.

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