

SBS5397 Final Year Project 1 (BSE Conceptual Design)

<http://ibse.hk/SBS5397/>

Design Project Brief: Development of a New Academic Building at THEi Tsing Yi Campus

1. Background Information

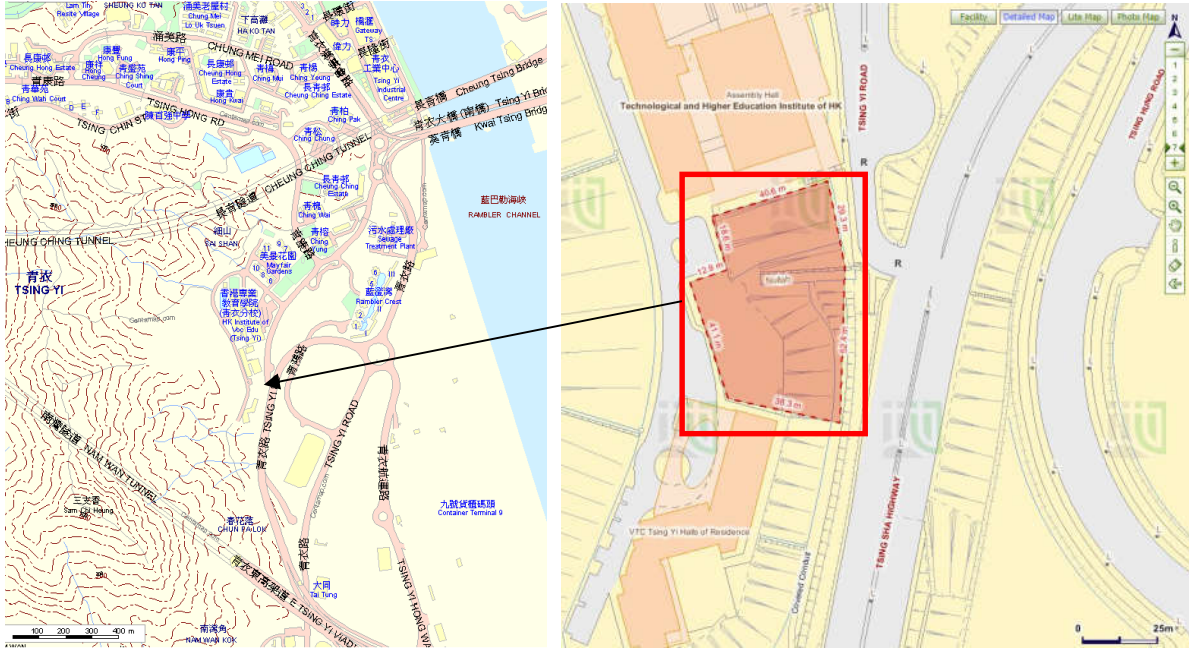


Figure 1. Site map and location (site area: 3,053 m²)

[sources: CentaMap <http://www.centamap.com/> and GeolInfo Map (HK) <http://www.map.gov.hk>]

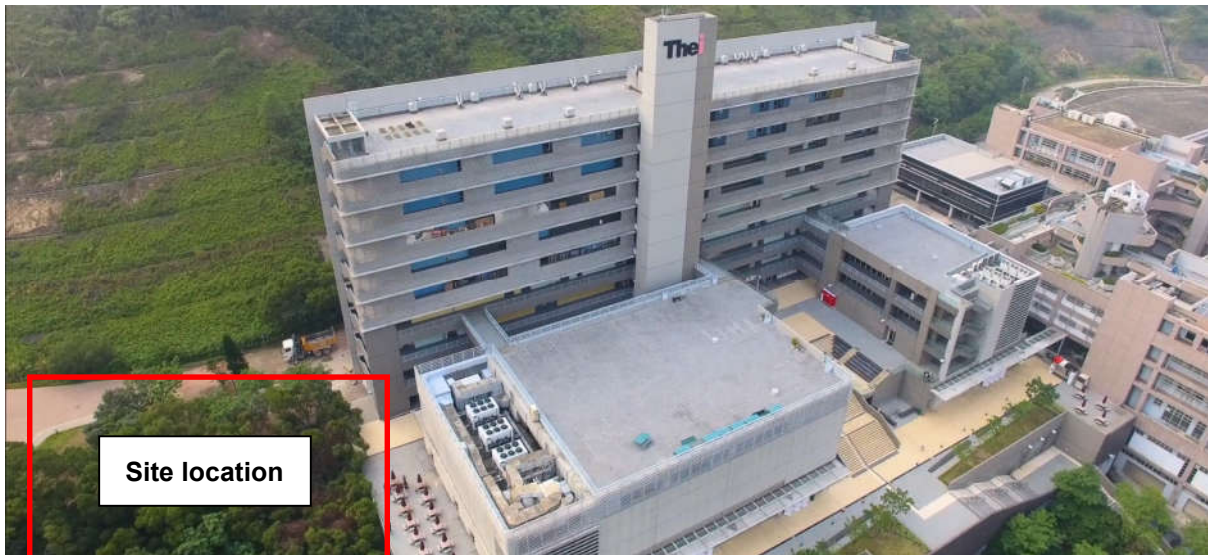


Figure 2. Aerial photo of THEi Tsing Yi Campus

Technological and Higher Education Institute of Hong Kong (THEi) was set up in 2012 by the Vocational Training Council of Hong Kong. The institute has grown very fast and now has two major campuses located in Chai Wan and Tsing Yi, respectively. To cope with the future development, a new academic building is proposed to be built at Tsing Yi Campus. At present, the Tsing Yi Campus is used mainly by the Faculty of Science and Technology (FST) of THEi.

2. Purpose and Scope of the Project

The aim of this design project is to investigate/explore possible options and develop the technical design of Building Services systems for the development of the new academic building at THEi Tsing Yi Campus. The students should study the important factors and limitations affecting the planning and design of the building project and its building services systems so as to develop appropriate design solutions and development strategies for the project.

After the construction, the new academic building will provide space for the functions as described in Table 1. The exact location and arrangement of the rooms shall be proposed by the design team with clear evaluation and justification. The project development and building design should demonstrate good practices in sustainable and energy efficient design with environmentally-friendly and cost-effective design solutions.

Table 1. Proposed space requirements (total usable floor area = 8,000 m²)

Space	Area (m ²)	Description
Laboratories	3,000	For experiments, research projects and demonstrations
Staff offices	2,000	For academic, administrative and supporting staff
Classrooms	1,000	For teaching, examination and seminars
Computer rooms	1,000	For computer-aided learning and student working
Plant rooms	1,000	For the Building Services systems

The initial estimate of the total cost for this project is HK\$200 millions. The preliminary timeline for the project construction is 24 months. It is expected that the construction work may commence in 2020. The design team might also propose some reasonable assumptions for the design and construction of the project. These assumptions should be confirmed with the design tutors.

3. Client Requirements

The project should include effective and flexible spaces for use by the Faculty of Science and Technology and other related units of THEi. The academic building is scheduled for completion in 2022. The design and construction of the project will follow the requirements of the BEAM Plus assessment method for new buildings and major renovations (see the weblink below for details). The major assessment categories are shown below. Planning and design for obtaining a suitable level of BEAM Plus certification should be demonstrated.

BEAM Plus <http://www.hkgbc.org.hk/eng/BEAMPlus.aspx>



[Platinum – Gold – Silver – Bronze]



The laboratories and facilities in the new academic building are designed mainly for use by the two Departments of the Faculty of Science and Technology, namely, Department of Construction Technology and Engineering (CTE) and Department of Food and Health Sciences (FHS). Further information about these two departments and the Faculty can be found on the website <https://www.thei.edu.hk/faculty/science-and-technology>.

4. Design Process and Tasks

Students will form groups of 4 or 5 members to work as a team on the design project. The design process is divided into three main stages according to the RIBA Outline Plan of Work (see Appendix I for details) and the major design tasks are shown to give guidelines for the students to develop their design solutions in a systematic way.

(a) Appraisal

- Analysis and investigation of site environment
- Study of client requirements and objectives
- Evaluation of constraints, feasibility and options

(b) Design Brief

- Confirmation of key requirements, criteria and scope
- Consideration of design strategies for building services systems
- Development of design brief and preparation for interim review

(c) Concept

- Implementation of design brief and preparation of additional data
- Preparation of concept design (outline proposals, specifications, cost plan)
- Writing of design report and preparation for final presentation

At each design stage, students are required to search and collect information, carry out assessments and evaluations, perform design analyses and calculations, prepare technical drawings, etc. for developing the design solutions. Seminars and design tutorials will be arranged to allow students to interact and discuss with the design tutors and other professionals. This will enhance their understanding and arouse their interest in the building design process.

Students should consider the specific types of design information appropriate to their project and try to organize them in a logical and systematic way. Common types of building design information that are essential to building services engineers include:

- Site conditions and environment (site access, circulation, surroundings, climate, etc.)
 - Site characteristics, topography, surrounding land use, vehicular access & traffic
 - Environmental impacts: noise, air, pedestrian wind environment, landscape, visual
 - Utilities: water supply, drainage and sewage, electricity, telephone, gas
- Architectural design drawings (site plan, floor plan, elevations, sections)
- Building services design drawings and conceptual diagrams
 - System schematic diagrams
 - Plant room location and services distribution plans
 - Conceptual utility connection diagrams
 - Conceptual zoning and coordination diagrams
- Design requirements (the client, local regulations, authorities) and design criteria
- Initial design calculations (load estimation and assessment, basic assumptions)
- System descriptions and design concepts
- Cost implications and project duration

Students should identify the site constraints, infra-structure, and micro-environment/climate through the site investigation. They should plan, manage and master the design activities by cooperating and communicating with their teammates.

5. Assessment Methods

Assessment will be based on the following components:

- Business Plan Proposal (20%)
- Site Investigation Report (20%)
- Final Report (30%)

- Progress (10%)
- Oral Presentation (20%)

Submissions of reports should be punctual. Late submission may receive reduction in marks. The general assessment criteria include quality of the content, organization, clarity of thought, teamwork skills, communication skills (oral, graphic and written), report writing, innovation and creativity.

Useful References:

- Bownass, D. A., 2001. *Building Services Design Methodology: A Practical Guide*, Spon Press, London & New York.
- Churcher, D., 2009. *A Design Framework for Building Services: Design Activities and Drawing Definitions*, 2nd ed., Building Services Research and Information Association, Bracknell, Berkshire, England.
- Hall, F. and Greeno, R., 2013. *Building Services Handbook*, 7th ed., Butterworth-Heinemann, Oxford, U.K.
- Hawkins, G. (ed.), 2011. *Rules of Thumb: Guidelines for Building Services*, 5th ed., Building Services Research and Information Association, Bracknell, Berkshire, England.
- Langmaid, J., 2004. *Choosing Building Services: A Practical Guide to System Selection*, Building Services Research and Information Association, Bracknell, Berkshire, England.
- Pennycook, K., 2007. *Design Checks for HVAC: A Quality Control Framework*, BSRIA Guide BG 4/2007, 2nd ed., Building Services Research and Information Association, Bracknell, Berkshire, England.
- Pennycook, K. 2006. *Design Checks for Electrical Services*, Application Guide BG 3/2006, Building Services Research and Information Association, Bracknell, Berkshire, England.
- Pennycook, K. 2006. *Design Checks for Public Health Engineering*, Application Guide BG 2/2006, Building Services Research and Information Association, Bracknell, Berkshire, England.
- Portman, J., 2014. *Building Services Design Management*, Wiley Blackwell, Chichester, West Sussex, UK.

Useful Websites:

Briefing documents for building design

http://www.designingbuildings.co.uk/wiki/Briefing_documents_for_building_design

Concept design - Designing Buildings Wiki https://www.designingbuildings.co.uk/wiki/Concept_design

Concept design report - Designing Buildings Wiki

https://www.designingbuildings.co.uk/wiki/Concept_design_report

Design Documentation Guidelines (New Zealand Construction Industry Council)

http://ibse.hk/Design_Documentation_Guidelines-FULL.pdf

Design Guidelines (New Zealand Construction Industry Council)

<http://nzcic.co.nz/resources/guidelines/>

Site Analysis [BRANZ] <http://www.level.org.nz/site-analysis/>

Site analysis - Wikipedia http://en.wikipedia.org/wiki/Site_analysis

Sustainable Design for Buildings [ArchSD] <http://www.archsd.gov.hk/archsd/html/teachingkits/TK1/>

Whole Building Design Guide (WBDG) Sustainable <http://www.wbdg.org/design/sustainable.php>

Appendix I

Stages of Design Process

(a) Appraisal:

1. Identify client's needs and objectives
2. Evaluate business case and possible constraints on development
3. Prepare feasibility studies and assess options

(b) Design Brief:

4. Develop initial statement of requirements
5. Confirm key requirements and constraints
6. Identify procurement method and organisational structure

(c) Concept:

7. Implement design brief and prepare additional data
8. Prepare concept design (outline proposals, specifications, cost plan)
9. Review procurement route

RIBA Outline Plan of Work (Work Stages A to E and Key Tasks)*

RIBA Work Stages		Description of key tasks	OGC Gateways
Preparation	A	<p>Appraisal</p> <p>Identification of client's needs and objectives, business case and possible constraints on development.</p> <p>Preparation of feasibility studies and assessment of options to enable the client to decide whether to proceed.</p>	1 Business justification
	B	<p>Design Brief</p> <p>Development of initial statement of requirements into the Design Brief by or on behalf of the client confirming key requirements and constraints. Identification of procurement method, procedures, organisational structure and range of consultants and others to be engaged for the project.</p>	2 Procurement strategy
Design	C	<p>Concept</p> <p>Implementation of Design Brief and preparation of additional data.</p> <p>Preparation of Concept Design including outline proposals for structural and building services systems, outline specifications and preliminary cost plan.</p> <p>Review of procurement route.</p>	3A Design Brief and Concept Approval
	D	<p>Design Development</p> <p>Development of concept design to include structural and building services systems, updated outline specifications and cost plan.</p> <p>Completion of Project Brief.</p> <p><i>Application for detailed planning permission.</i></p>	
	E	<p>Technical Design</p> <p>Preparation of technical design(s) and specifications, sufficient to co-ordinate components and elements of the project and <i>information for statutory standards and construction safety.</i></p>	3B Detailed Decision

* Source: Royal Institute of British Architects (RIBA)

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Schedule of Activities

Date, Time and Venue: Friday, 14:00-17:00, LT3

Work Stages	Week	Date	Description
Appraisal	1	07-Sep-2018 (Fri)	Introduction and Project Briefing • Student grouping should be completed by 14 Sep 2018
	2	14-Sep-2018 (Fri)	Seminar • Site investigation
	3	21-Sep-2018 (Fri)	Seminar • Building Services Design Guides
	4	28-Sep-2018 (Fri)	Design Review and Tutorials • Submit site investigation report
Design Brief	5	05-Oct-2018 (Fri)	Design Review and Tutorials • Student team working
	6	12-Oct-2018 (Fri)	Design Review and Tutorials • Student team working
	7	19-Oct-2018 (Fri)	Interim Review • Submit business plan proposal
	8	26-Oct-2018 (Fri)	Design Review and Tutorials • Student team working
	9	02-Nov-2018 (Fri)	Design Review and Tutorials • Student team working
Concept Design	10	09-Nov-2018 (Fri)	Design Review and Tutorials • Submit progress report
	11	16-Nov-2018 (Fri)	Design Review and Tutorials • Student team working
	12	23-Nov-2018 (Fri)	Design Review and Tutorials • Student team working
	13	30-Nov-2018 (Fri)	Oral Presentation • Time schedule to be confirmed
	14	07-Dec-2018 (Fri)	Final Report • Submit final report