SCHOOL OF CIVIL ENGINEERING
ENGINEERING CAMPUS
UNIVERSITI SAINS MALAYSIA

ACADEMIC SESSION: SEMESTER 1 2021/2022
EAL 431 HIGHWAY DESIGN

PROJECT: ROAD GEOMETRIC DESIGN AND SAFETY FEATURES

Universiti Sains Malaysia (USM) Engineering Campus is located in Transkrian, Nibong Tebal, Seberang Perai Selatan, Penang. The campus covers an area of about 320 acres. Recently, quick developments have taken place in the surrounding area of the campus.

In line with the future engineering gateway (*Gerbang Kejuruteraan*) development plans and the university's intention to make the campus open to the public, several infrastructure improvements are required to ensure safety and well-being for both students and public. The improvement of the infrastructure needs crucial attention, especially with regard to the road infrastructure for daily commute.

Recent observations on the access points (entrance to campus) and road networks within the USM Engineering campus reveal the needs to consider the reassessment on existing road geometric design. Insufficient junction geometry, road width, sharp turning radius, and improper signage are among the common problems noticed and require alteration of the existing road geometric design.

This project is intended to evaluate student's ability to clarify possible problems related to the geometric design and safety features (road furniture, road marking and signage). Each group is expected to propose the best solution for the related problems within the assigned location.

Figure 1 shows the entrance points, road network within the campus and the designated locations (numbered). By referring to ATJ 8/86 (Revised 2015) and other related specifications to Malaysian standard guidelines, the road geometric should be designed based on the Standard R3, flat terrain and SU design vehicle (as the largest vehicle dimension entering the campus, e.g. Rapid Penang Bus).

Figure 2 shows the working area for each group (refer to Table 1). All elements (roads, junctions, roundabouts, pedestrian, and cycle lanes) within the specified location and surrounding area should be taken into consideration. Each group is also required to incorporate at least 3 elements to support the **SMART CAMPUS** concept agenda (may refer to: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7207122/).

A group report should be submitted before 5:00PM, 14th January 2022. Apart from reporting, engineering drawings using AutoCAD software are required to illustrate current problematic road sections and proposed solutions. Additionally, the traffic analysis using SIDRA and drawings that illustrate altered road cross section and geometric design at specific location must be provided to assess student's ability to propose reasonable changes that are comply to the measures stipulated in the ATJ 8/86 (Revised 2015) and other related specifications to Malaysian standard guidelines.

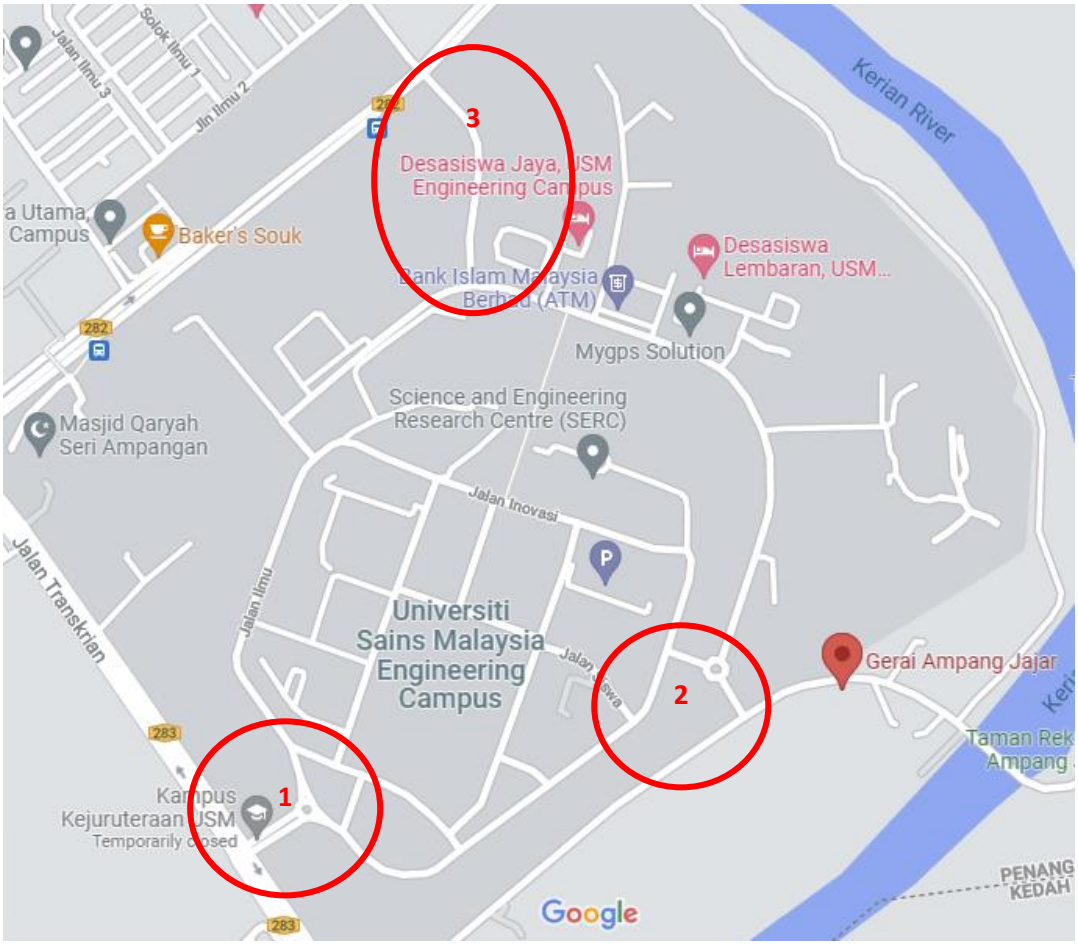
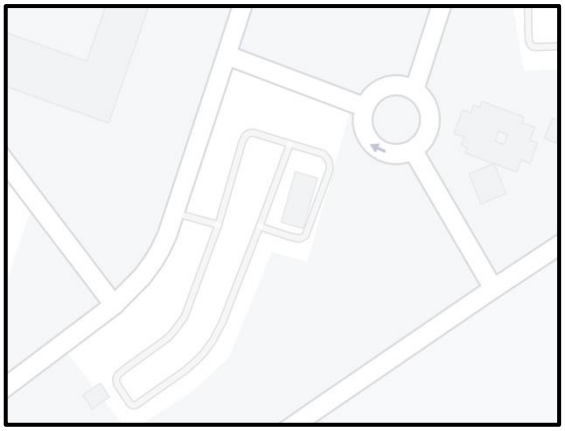


Figure 1: Access points and road network within USM Engineering Campus with the designated number for each working area

Study Area 1



Study Area 2

Study Area 3

*Note: There are inaccuracies of the road network presented by Google Map (please use your discretion)

Figure 2: Study Area Assigned for Each Group

Your report should comply to the following instructions:

- Evaluations of the current design and propose a new design based on the specified guidelines to cater the needs for increasing traffic within campus (also consider presence of Rapid Penang bus (SU Design Vehicle) in campus). Information that you should consider are:
    - Road alignments and junctions
    - Road dimension including road shoulder (e.g. length, width, etc)
    - Conformity to the standards
    - Physical structure requirements or any specialized structures
    - Road safety aspect, may suggest mitigation measures (road lighting, marking and signage)
    - Pedestrian facilities (walkway, cycle lane)
    - Solutions to current design is needed pressing
- Junction analysis (only at the entrance to campus) and mitigation measures.
    - Junction geometry (new junction as a consequence of development with consideration on the projected traffic)
    - Junction type selection from traffic analysis using SIDRA based on projected existing traffic and trip generated traffic.
- Incorporate at least 3 elements to support the SMART CAMPUS concept agenda for the USM Engineering Campus.
- Present sample photos, sketches and detailed drawings
- Drawings
    - Plan of the site
    - Cross-section for selected road, junction, roundabout, and pedestrian and cycle lane
    - Design elements including dimensions (e.g. traffic island, lanes, road markings, road sign, etc)
    - Use AutoCAD software

- Total number of pages: 15-35 pages (including cover, table of contents, photos, references and appendices)

Based on the above deliberation, you are required to produce a report that meets the following objectives:

1. To identify the potential road geometry and road safety deficiencies
2. To identify the needs of the pedestrians and cyclists
3. To design a proper road geometric design for the assigned location within USM Engineering Campus
4. To recommend the proper mitigation measures for the road safety deficiencies
5. To propose crucial elements to support the Smart Campus agenda

Table 1: Grouping for EAL431 Project

Area	Group No.	Group Members
1	1	1. Mardhiah Binti Muhammad Suhailmi 2. Daniel Lim Wei Ping 3. Durgeshwar A/L Theenathayalan 4. Mohammad Faizul Aman Bin Mohammed Habib
	4	1. Lim Ewe Loon 2. Muhammad Nauwar Bin Amir Najib 3. Nik Nadia Nazurah Binti Nik Arshad 4. Tiew Ming Jie 5. Muhammad Muhaimin Azhad Bin Noor Hadi
2	2	1. Lim Teik Jin 2. Karam Shamdeen Yasser 3. Tan Hong Yang 4. Nurain Soleha Binti Kamaruddin 5. Mohd Khairul Akmal Bin Md Zahir
	5	1. Sazrul Ariff Bin Mat Zan 2. Meow Lian Ke 3. Abdul Safiq Bin Mohamed Ali 4. Nurul Hidayah Binti Mat Zali
3	3	1. Tan Jeff Fei 2. Mifzal Thaqif Bin Md Tajudin 3. Yeo Li Qun 4. Nur Alia Binti Ahmad Fauzi
	6	1. Fuad Dellany Bin Shubandrio 2. Si Kian Shen 3. Siveraj A/L Sankar 4. Intan Shafinaz Binti Isman

Submission date: 14/1/2022 before 5:00PM