

## **Engineering Tripos Part IIA Project, GD4: Civil Engineering Design Project, 2022-23**

### **Leader**

[Dr S Stanier](#) [1]

### **Timing and Structure**

Tuesdays 11-1pm, and Fridays 9-11am plus afternoons

### **Prerequisites**

3D1

### **Aims**

The aims of the course are to:

- To understand the major components and working principles of a quay;
- To understand astronomical tides and storm surges;
- To deduce strength parameters of soils from test data;
- To design retaining walls in complex situations using hand calculations and the finite element method;
- To specify a capping beam, fenders and bollards;
- To decide the construction procedure and calculate the project cost;
- To appreciate the multi-disciplinary nature and the environmental impact of an engineering project.

### **Content**

The project involves the design of an anchored sheet pile wall on one side of an estuary to create berthing for ships and retain a section of river bank for storage and traffic. It aims to show how structural, geotechnical and hydraulic concepts can be applied in the design of facilities.

### **FORMAT**

Students normally work in groups of four, but are responsible for and author specific parts of the reports. Groups can capitalise on a broader range of ideas for the overall conceptual designs, and can deal more comprehensively with the detailed design.

#### **Week 1**

Site characterisation – tide and storm surge, ships, quay dimensions, soil properties.

#### **Week 2**

Conceptual design – selection of the quay location, possible structural forms of the quay wall and ancillary components, construction procedures, other things that need to be considered. (Interim report is due.)

#### **Week 3**

Design a sheet pile wall remaining in equilibrium under earth pressure, water pressure and surcharge exerted by cargo, vehicles and cranes.

### Week 4

Complete the detailed design of the quay wall, and decide an overall configuration of the quay together with scour prevention measures and berthing and fendering facilities. (Final report is due.)

### Coursework

Coursework	Due date	Marks
Interim Report	TBA	30  (15 for individual and 15 for group work)
Final report	4pm, Friday 9 June 2023	50  (35 for individual and 15 for group work)

### Examination Guidelines

Please refer to [Form & conduct of the examinations](#) [2].

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### Links

[1] <mailto:sas229@cam.ac.uk>

[2] <https://teaching22-23.eng.cam.ac.uk/content/form-conduct-examinations>