

21 Civil engineering 2

A The functions of civil engineers fall into three categories:

1. before construction (**feasibility studies**, **site investigations**, and **design**),
2. during construction (dealing with clients, consulting engineers, and contractors),
3. after construction (**maintenance**).

Any major civil engineering project starts with a **feasibility study** to assess both financial and engineering aspects. During the feasibility study a preliminary **site investigation** is carried out. Once a scheme has been approved, a more extensive investigation is usually necessary to evaluate the **load-bearing** qualities and **stability** of the ground. This field is called **soil mechanics**. The design of engineering works may require the application of principles of **hydraulics**, **thermodynamics** and **nuclear physics**. During the construction phase, a consulting engineer is often employed to be responsible for **design** of the works, supplying **specifications**, **drawings**, and legal documents to get competitive **tender** prices. In a **turnkey** or package contract the **building contractor** undertakes to finance, design, specify, construct, and **commission** the whole project. **Maintenance** is normally carried out by the contractor as part of the agreement; if there are maintenance problems, it is the responsibility of the contractor to pay for any necessary work.

B Now look at the following statements about the pre-construction phase.

Preliminary feasibility study:

A series of **steps** by which all the **attributes** of each **proposal** are marked, resulting in two or three being selected.

Secondary feasibility study:

A **process** to determine the best of the two or three remaining **schemes**. Rough **dimensions** are put onto the structure at this stage, in order that a more accurate **costing system** can be implemented.

Feasibility study factors:

cost • aesthetic appeal • maintenance • ecology • disruption

Preliminary design:

Dimensions and quantities of materials are roughly **analysed** and calculations are performed to **estimate** prices and construction needs.

Detailed design:

At this stage of the design other factors are considered, such as the exact **geology** of the area. To determine this, **boreholes** and **trial pits** are sunk.

After all calculations have been worked out exactly and checked, detailed **technical drawings** are done. The result of these calculations is a **finished design** which can be built from the drawings produced. Once the detailed design is complete, construction can begin.

C Read the list of the *essential duties and responsibilities* of a civil engineer below:

- to provide detailed fact finding, research and analysis
- to provide support for less experienced staff
- to develop computer models, including detailed and potentially complex spreadsheet analyses
- to assist with engagement planning activities including the development of **draft work plans** and budgets
- to prepare client communications for senior level review

TASKS

1 Match the following words and phrases with their definitions.

feasibility study	building or installation which is built, supplied, or installed complete and ready to operate
site investigation	activities carried out after the project to ensure problems are solved
maintenance	detailed plan of proposed structures
soil mechanics	dimensions and measurements
specifications	extensive investigation to evaluate the load-bearing qualities and stability of the ground
technical drawings	investigation to assess both financial and engineering aspects of a project
commission a project	offer of a bid for an engineering contract
costing system	procedure to monitor the costs of a project so that management can get information on development
tender	study of the proposed location to assess geology of the area
turnkey project	to order a plan to be carried out

2 Put the following tasks into the appropriate phase of construction.

consulting engineer communications with client • extensive site investigation
 consulting engineer contact with contractors • feasibility study • detailed design
 maintenance • employment of consulting engineer • preliminary site investigation

Phase	Tasks
Before construction	
During construction	
After construction	

3 The following extract is from a letter written by a qualified civil engineer in response to a job advertisement. Complete the extract by unscrambling the letters in brackets.

I am writing in connection with the job advertisement for a civil (a) _____ (renigeen), which appeared in today's *Civil Engineering*.

I have a degree in (b) _____ (rnlutiasid) engineering. After graduation, I worked for four years at Locke Engineers in the field of (c) _____ (onscorutiten) consulting. During my time there, I specialized in (d) _____ (ilamsc) preparation and construction (e) _____ (ehdngulic). I am particularly interested in the opportunities to further develop my skills, especially in the following areas:

- development of (f) _____ (tdfar) work plans
- (g) _____ (etis) investigations
- preparation of (h) _____ (nictel) communications