

20 Civil engineering 1

A The term civil engineering describes engineering work performed by civilians for non-military purposes. In general it describes the profession of designing and executing **structural works** for the general public and the **communal environment**. Civil engineering covers different areas of engineering, including the design and construction of large buildings, **roads, bridges, canals, railway lines, airports, water-supply systems, dams, irrigation, harbours, docks, aqueducts, and tunnels**.

The civil engineer needs a thorough knowledge of **surveying**, of the properties and mechanics of construction materials, of the **mechanics of structures and soils**, and of **hydraulics and fluid mechanics**. Today civil engineering includes the production and distribution of **energy**, the development of **aircraft** and airports, the construction of **chemical process plants** and **nuclear power stations**, and **water desalination**.

B A range of *civil engineering tools and equipment* is used in the construction of *roads, bridges* and *waterways*.

Roads

camber • crown • culvert • kerb/curb • macadam
main • manhole • metal • pavement • pedestrian crossing
pothole • sewer • soft shoulder • tarmac • underdrain

Bridges

arch • bascule • cable • cantilever • clapper • crossover • lift
footbridge • span • suspender • suspension • swing • viaduct

Canals, rivers and other waterways

aqueduct • barrage • dam • dike • drainage
flume • lock • paddle • pier • sluice
watercourse • water main • weir • well

Civil engineering tools and equipment

bulldozer • dredger • earthmover • excavator
plate girder • pylon • road roller • shovel

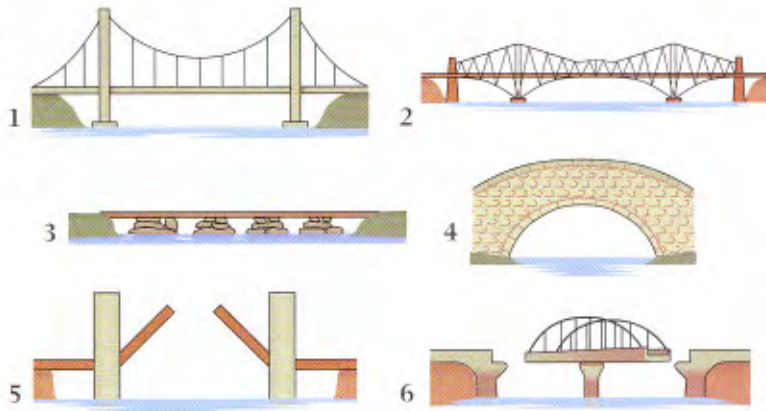
C Here are the vital statistics of the famous *Golden Gate Bridge* in San Francisco:

Total length of bridge	2,737 m	Length of suspension span	1,966 m
Length of main span	1,280 m	Length of one side span	343 m
Width of bridge	27 m	Width of road between curbs	19 m
Width of pavement			3 m
Clearance above mean higher high water			67 m
Deepest foundation below mean low water			34 m
Total weight of bridge, anchorages and north and south approaches (1994)			887,000 tons

TASKS

- 1** Name the bridges opposite. Choose from the following.

masonry arch
cantilever
swing
suspension
clapper
bascule



- 2** What is being described? Choose from the words on the opposite page.

- 1 This structure is built across a river to hold back the water to produce power, improve navigation or control flooding.
- 2 This structure is built along the banks of a river or along the coast to hold back water and prevent flooding.
- 3 This carries a road or railway across water.
- 4 This carries water (canal or river) across land, usually over a valley.
- 5 The section of a canal where the water level changes to raise boats from one level to the next.
- 6 These allow water to flow in or out in order to change the water level in a canal.
- 7 A deep hole in the ground where people can get water.
- 8 These are dug underground for roads and railways.
- 9 This is the process of removing salt from sea water.
- 10 This large powerful vehicle uses a large blade to move earth and rocks.
- 11 This machine or ship is used for removing sand and mud from the bottom of a river or a harbour.
- 12 This machine is used for rolling tarmac or asphalt flat on a road surface.

- 3** A civil engineer is showing an international visitor around. Complete the text with words from *Roads* from the opposite page.

Here we are on one of our town streets. As you can see the road is not flat, it has a (a) _____. This is to allow rain water to run off the surface and into the drains at the side. The highest part of the road is the (b) _____ in the centre. A (c) _____ carrying waste water runs below the surface of the road. At certain points along the road you'll find large (d) _____ which allow engineers to go down and inspect electricity and telephone cables which also run below the road. On either side of the road there is a raised (e) _____ for pedestrians which is

edged with (f) _____ stones. The black surface we use nowadays is a variety of (g) _____. It was invented by a man of that name whose company was later called Tarmac. As you can see this road needs to be resurfaced. There are a number of (h) _____ following the heavy rain we had last month.

Now, here we are on a (i) _____ road out of town. There are no pavements here. Grass is allowed to grow along the edges and provides a (j) _____. Over there you can see a (k) _____ carrying a small stream under the road.