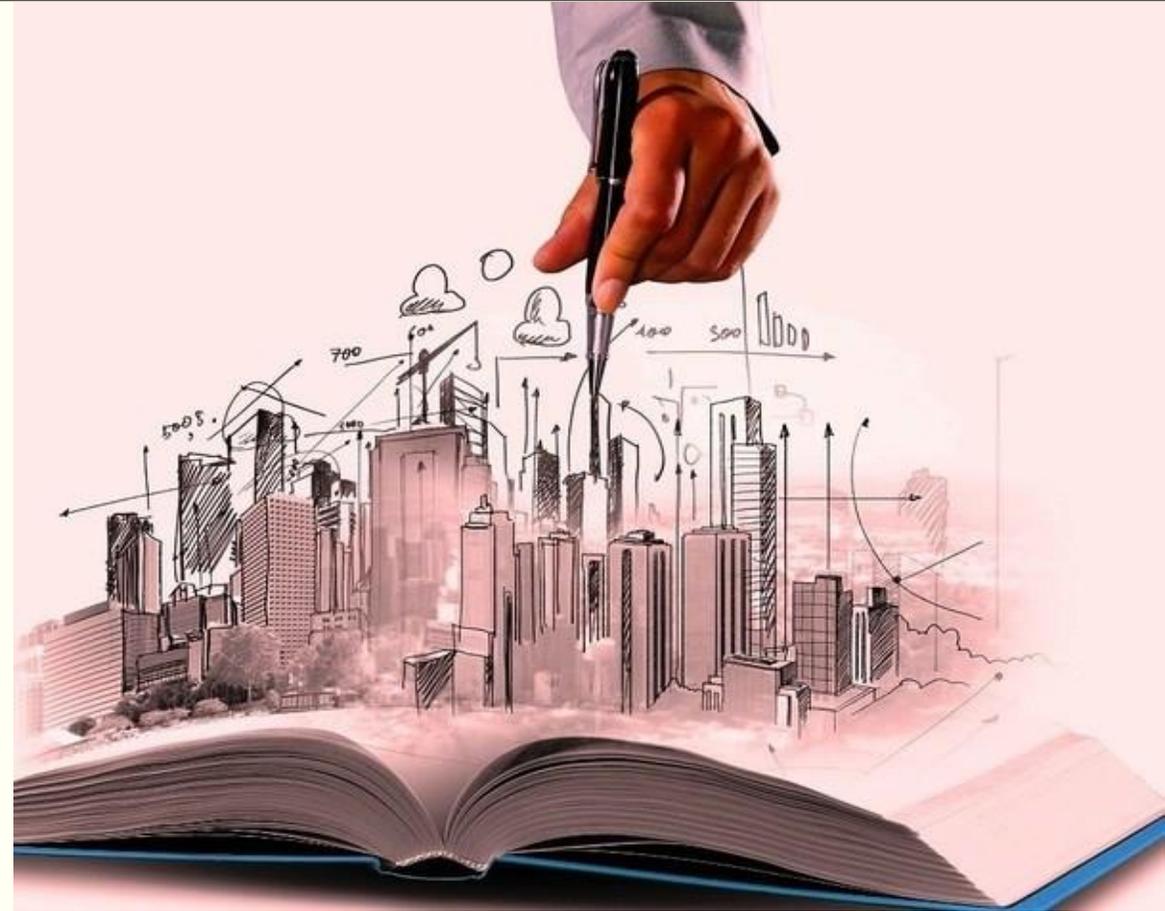


CHAPTER 2

2.1 HISTORY OF CIVIL ENGINEERING

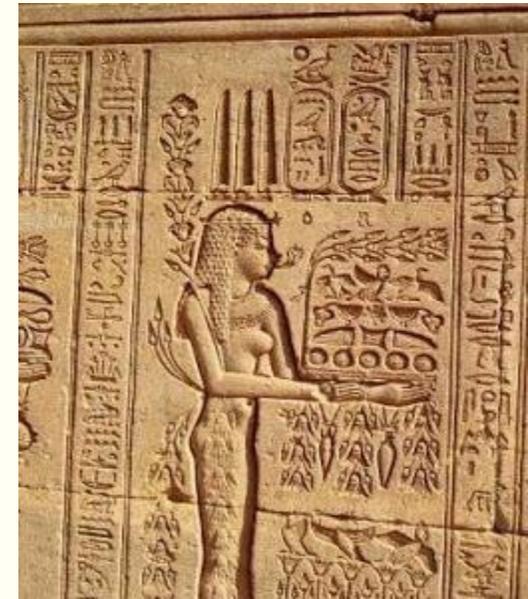
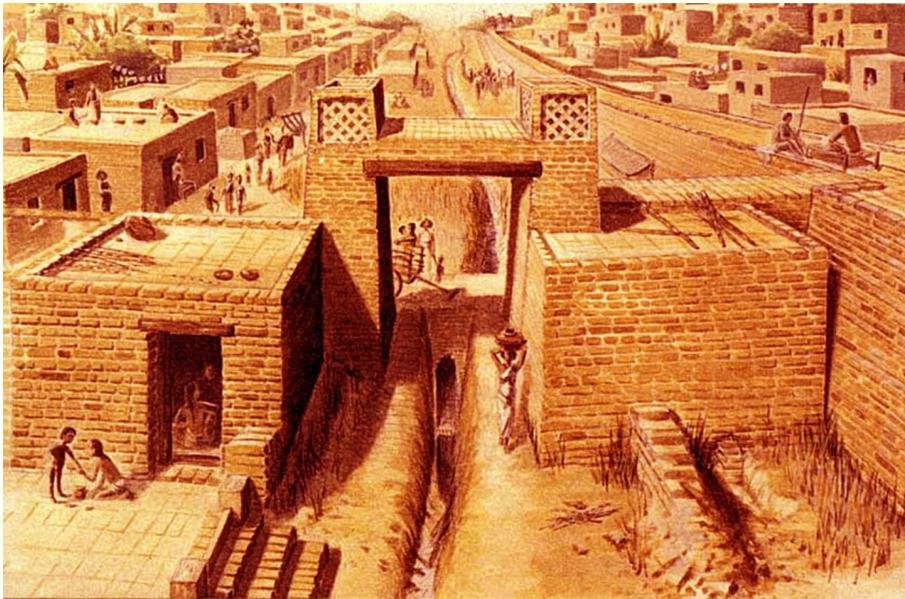
2.2 CIVIL ENGINEERING FUNCTIONS

2.3 CODE OF ETHICS



2.1 History of Civil Engineering

Civil engineering is the oldest branch of engineering which is growing right from the stone age civilization, *next to Military engineering, all engineering works other than for military purposes were grouped in to Civil Engineering. Mechanical, Electrical, Electronics & present day Information technology followed it, Began b/w 4000 BC and 2000 BC (during Ancient Egypt, Mesopotamia, Indus Valley Civilizations).*



2.1 History of Civil Engineering

- American Society of Civil Engineering *defines Civil Engineering as the profession in which a knowledge of the mathematical and physical science gained by study, experience and practice is applied with judgment to develop ways to utilize economically the material and forces of nature for the progressive well-being of man.*
- *The beginnings of civil engineering as a separate discipline may be seen in the foundation in France in 1716 of the Bridge and Highway Corps, out of which in 1747 grew the École Nationale des Ponts et Chaussées (“National School of Bridges and Highways”).*

2.1 History of Civil Engineering

John Smeaton, the first man to call himself a civil engineer, began as an instrument maker. His design of Eddystone Lighthouse (1756–59), with its interlocking masonry, was based on a craftsman's experience. Smeaton's work was backed by thorough research, and his services were much in demand. In 1771 he founded the Society of Civil Engineers (now known as the Smeatonian Society).



2.2 Civil engineering functions

The functions of the civil engineer can be divided into three categories: those performed before construction (feasibility studies, site investigations, and design), those performed during construction (dealing with clients, consulting engineers, and contractors), and those performed after construction (maintenance and research).

2.2 Civil engineering functions

- **Feasibility studies**

No major project today is started without an extensive study of the objective and without preliminary studies of possible plans leading to a recommended scheme, perhaps with alternatives. Feasibility studies may cover alternative methods—*e.g.*, bridge versus tunnel, in the case of a water crossing—or, once the method is decided, the choice of route. Both economic and engineering problems must be considered.

2.2 Civil engineering functions

- **Site investigations**

A preliminary site investigation is part of the feasibility study, but once a plan has been adopted a more extensive investigation is usually imperative. Money spent in a rigorous study of ground and substructure may save large sums later in remedial works or in changes made necessary in constructional methods.

2.2 Civil engineering functions

- **Site investigations**

Since the load-bearing qualities and stability of the ground are such important factors in any large-scale construction, it is surprising that a serious study of soil mechanics did not develop until the mid-1930s. Karl von Terzaghi, the chief founder of the science, gives the date of its birth as 1936, when the First International Conference on Soil Mechanics and Foundation Engineering was held at Harvard University and an international society was formed. Today there are specialist societies and journals in many countries, and most universities that have a civil engineering faculty have courses in soil mechanics.

2.2 Civil engineering functions

- Design

The design of engineering works may require the application of design theory from many fields—*e.g.*, hydraulics, thermodynamics, or nuclear physics. Research in structural analysis and the technology of materials has opened the way for more rational designs, new design concepts, and greater economy of materials. The theory of structures and the study of materials have advanced together as more and more refined stress analysis of structures and systematic testing has been done. Modern designers not only have advanced theories and readily available design data, but structural designs can now be rigorously analyzed by computers.

2.2 Civil engineering functions

Construction

- The promotion of civil engineering works may be initiated by a private client, but most work is undertaken for large corporations, government authorities, and public boards and authorities. Many of these have their own engineering staffs, but for large specialized projects it is usual to employ consulting engineers.
- The consulting engineer may be required first to undertake feasibility studies, then to recommend a scheme and quote an approximate cost. The engineer is responsible for the design of the works, supplying specifications, drawings, and legal documents in sufficient detail to seek competitive tender prices. The engineer must compare quotations and recommend acceptance of one of them. Although he is not a party to the contract, the engineer's duties are defined in it; the staff must supervise the construction and the engineer must certify completion of the work. Actions must be consistent with duty to the client; the professional organizations exercise disciplinary control over professional conduct. The consulting engineer's senior representative on the site is the resident engineer.

2.2 Civil engineering functions

- Construction
- A phenomenon of recent years has been the turnkey or package contract, in which the contractor undertakes to finance, design, specify, construct, and commission a project in its entirety. In this case, the consulting engineer is engaged by the contractor rather than by the client.
- The contractor is usually an incorporated company, which secures the contract on the basis of the consulting engineer's specification and general drawings. The consulting engineer must agree to any variations introduced and must approve the detailed drawings.

2.2 Civil engineering functions

- **Maintenance**
- The contractor maintains the works to the satisfaction of the consulting engineer. Responsibility for maintenance extends to ancillary and temporary works where these form part of the overall construction. After construction a period of maintenance is undertaken by the contractor, and the payment of the final installment of the contract price is held back until released by the consulting engineer. Central and local government engineering and public works departments are concerned primarily with maintenance, for which they employ direct labor.

2.2 Civil engineering functions

- **Research**
- Research in the civil engineering field is undertaken by government agencies, industrial foundations, the universities, and other institutions. Most countries have government-controlled agencies, such as the United States Bureau of Standards and the National Physical Laboratory of Great Britain, involved in a broad spectrum of research, and establishments in building research, roads and highways, hydraulic research, water pollution, and other areas. Many are government-aided but depend partly on income from research work promoted by industry.

2.3 Code of Ethics (from the American Society of Civil Engineers)

▪ Fundamental Principles

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

- 1. Using their knowledge and skill for the enhancement of human welfare;
- 2. Being honest and impartial and serving with fidelity the public, their employers and clients;
- 3. Striving to increase the competence and prestige of the engineering profession; and
- 4. Supporting the professional and technical societies of their disciplines.

2.3 Code of Ethics (from the American Society of Civil Engineers)

- **Fundamental Canons**
- Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.
- Engineers shall perform services only in areas of their competence.
- Engineers shall issue public statements only in an objective and truthful manner.
- Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.

2.3 Code of Ethics (from the American Society of Civil Engineers)

- **Fundamental Canons**
- Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
- Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the engineering profession.
- Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.

Role of Civil Engineers

1. Measure and map the earth's surface.
2. Plan and develop extensions of towns and cities.
3. Build the suitable structures for the rural and urban areas for various utilities.
4. Build the tanks and dams to exploit water resources.
5. Build river navigation and flood control projects.
6. Build canals and distributaries to take water to agricultural fields.

Role of Civil Engineers

7. Purify and supply water to needy areas like houses, schools, offices etc.
8. Provide and maintain communication systems like roads, railways, harbors and airports.
9. Devise systems for control and efficient flow of traffic.
10. Provide, build and maintain drainage and waste water disposal system.
11. Monitor land, water and air pollution, and take measures for the control and treatment.