

BASICS OF CIVIL ENGINEERING- CV0121

UNIT 1



**Indus Institute of Technology Engineering
Department of Civil Engineering**

BASIC NECCESITIES OF LIFE



Roti



Kapda



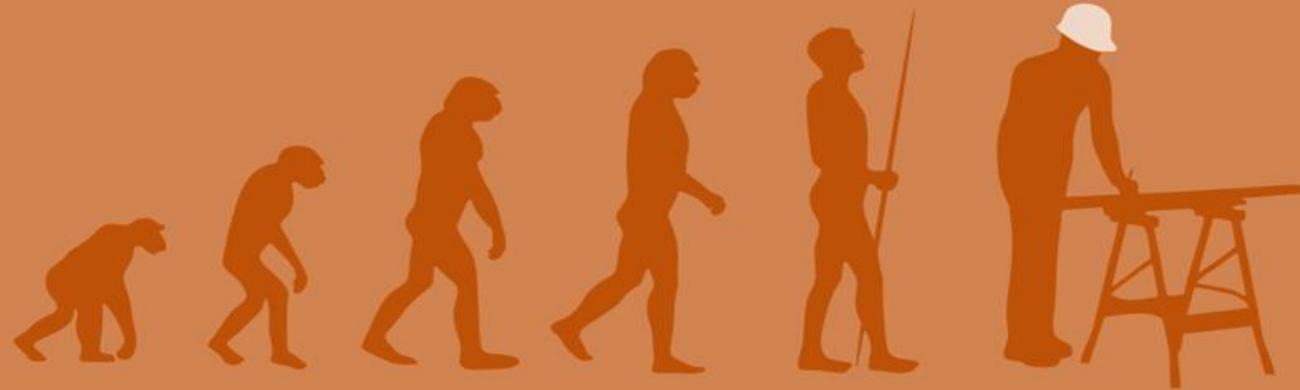
Makan



CIVIL
ENGINEERING

UNIT – I

INTRODUCTION TO Civil ENGINEERING



CIVIL ENGINEERS. CONTINUING CREATION.
DEPT. OF CIVIL ENGG.
IIT BOMBAY.

What is Civil Engineering?

- **Civil ENGINEERING** is a professional engineering discipline that deals with the **design, construction, and maintenance of the physical and naturally built environment**, including works like **roads, bridges, canals, dams, and buildings**.



Branches of Civil Engineering

Civil Engineering is a wide field and includes many types of structures such as residential buildings, public buildings , industrial buildings, roads, bridges, tunnels, railways, dams, canal, and canal structures etc.

Surveying and Levelling

Building, planning & Construction

Advance Construction

Structural Engineering

Geotechnical Engineering

Water resources Engineering

Transportation Engineering

Environmental Engineering

Town Planning

SURVEYING AND LEVELLING

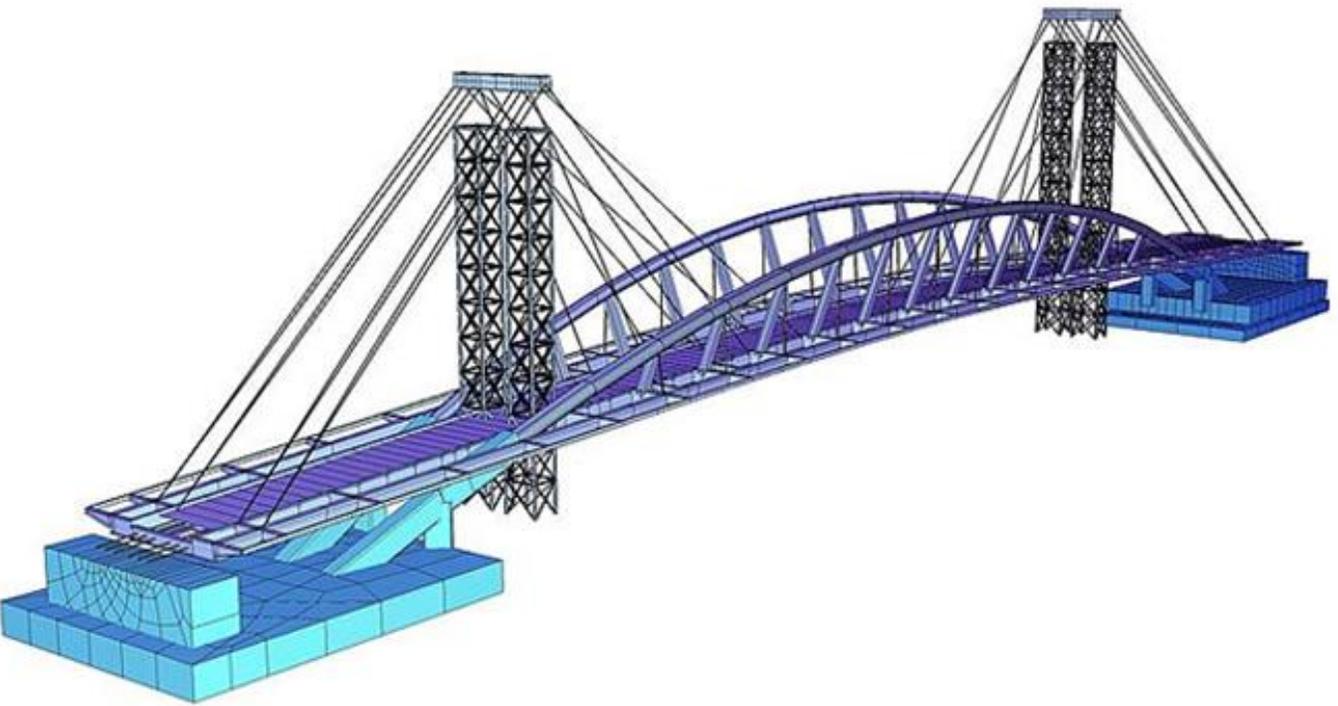


BUILDING PLANNING AND CONSTRUCTION

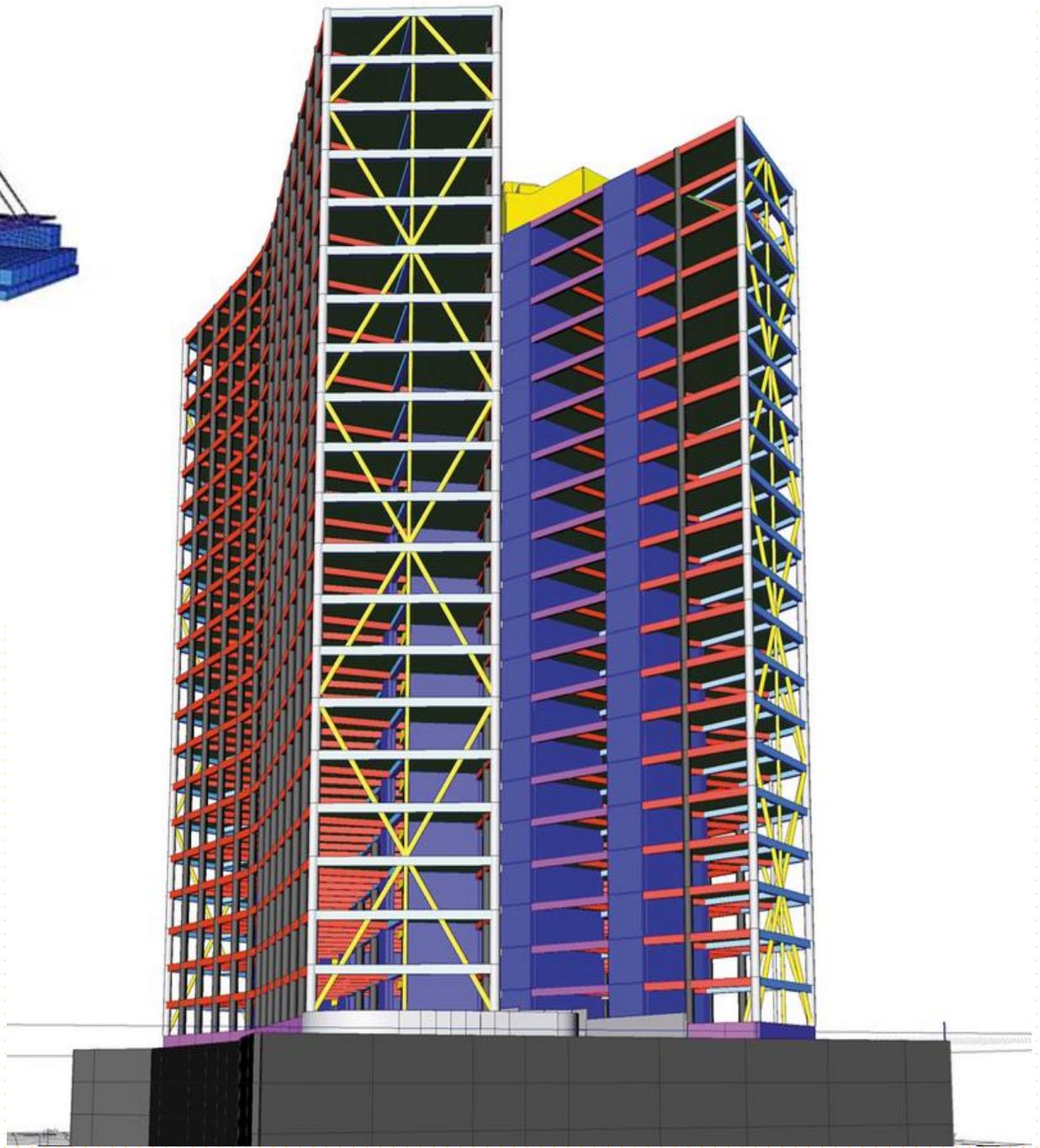


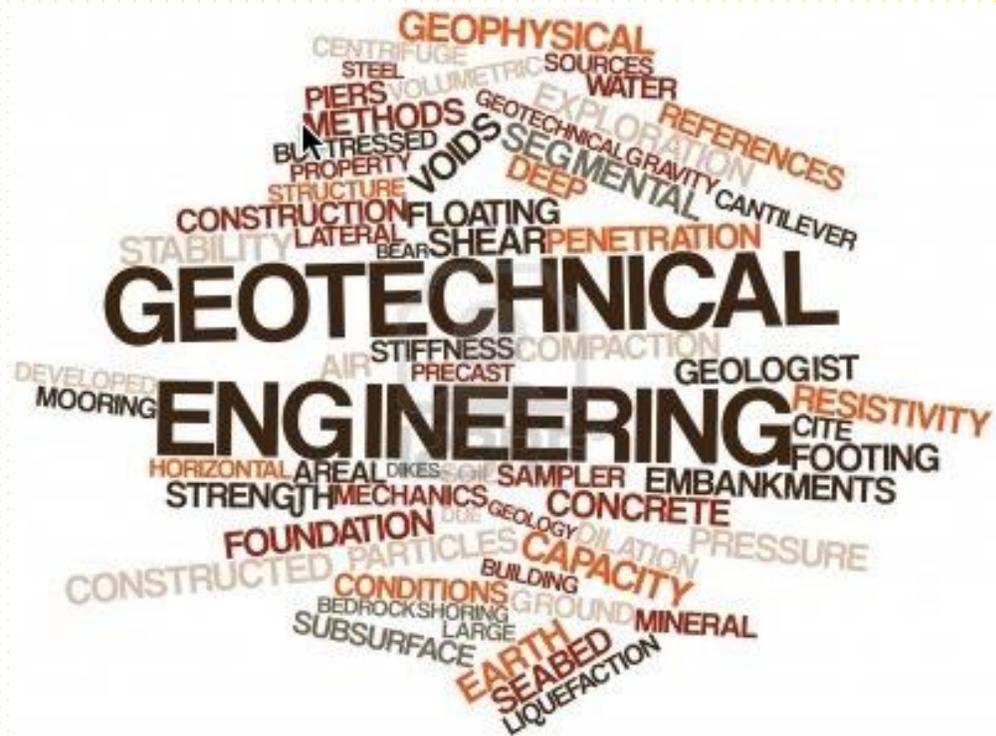
ADVANCE CONSTRUCTION

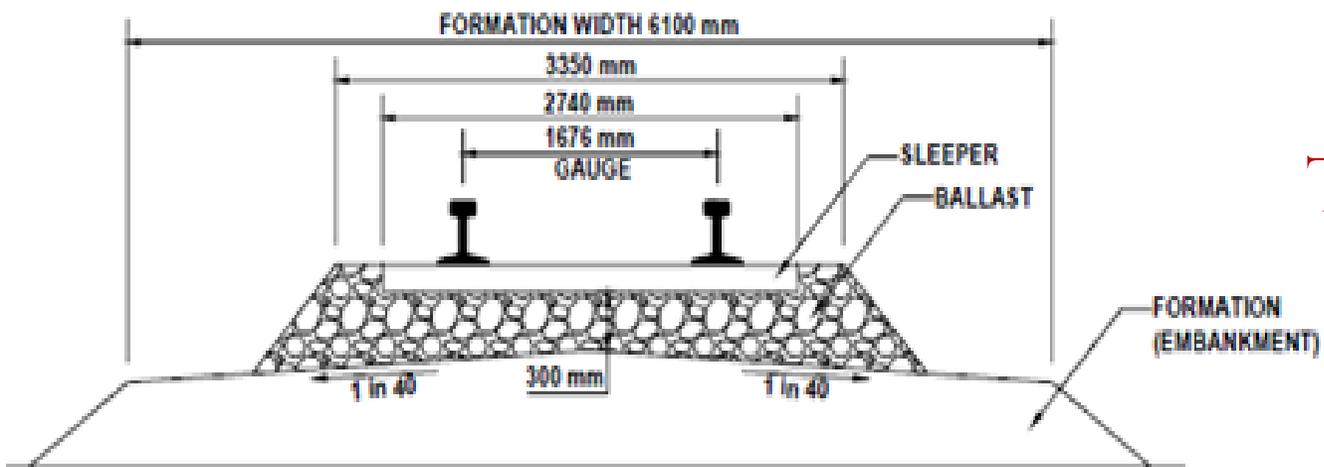




STRUCTURAL ENGINEERING

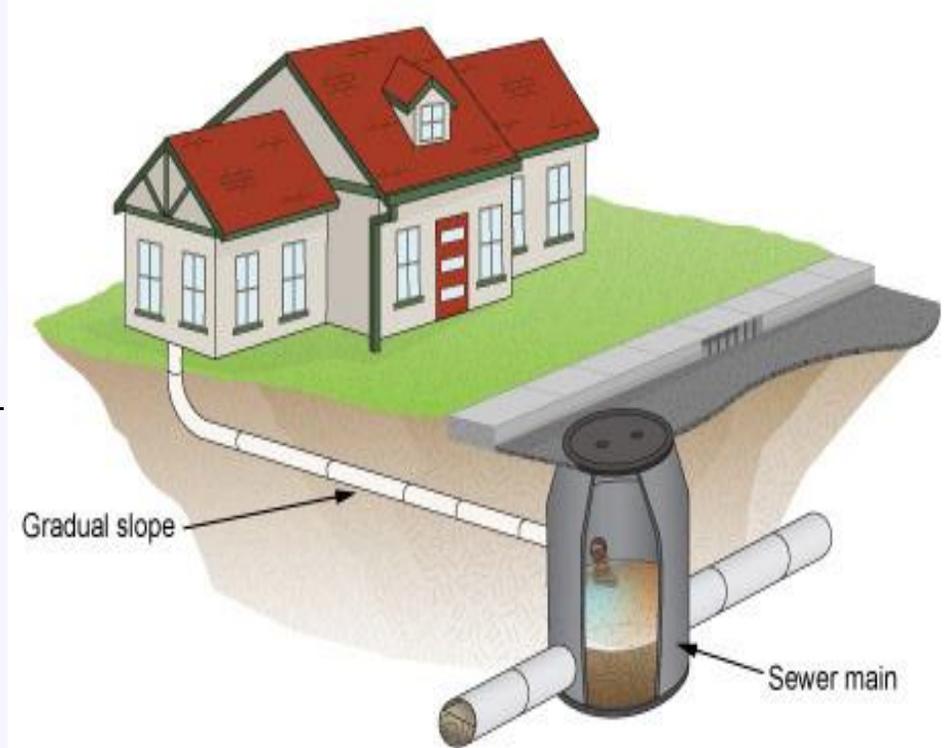
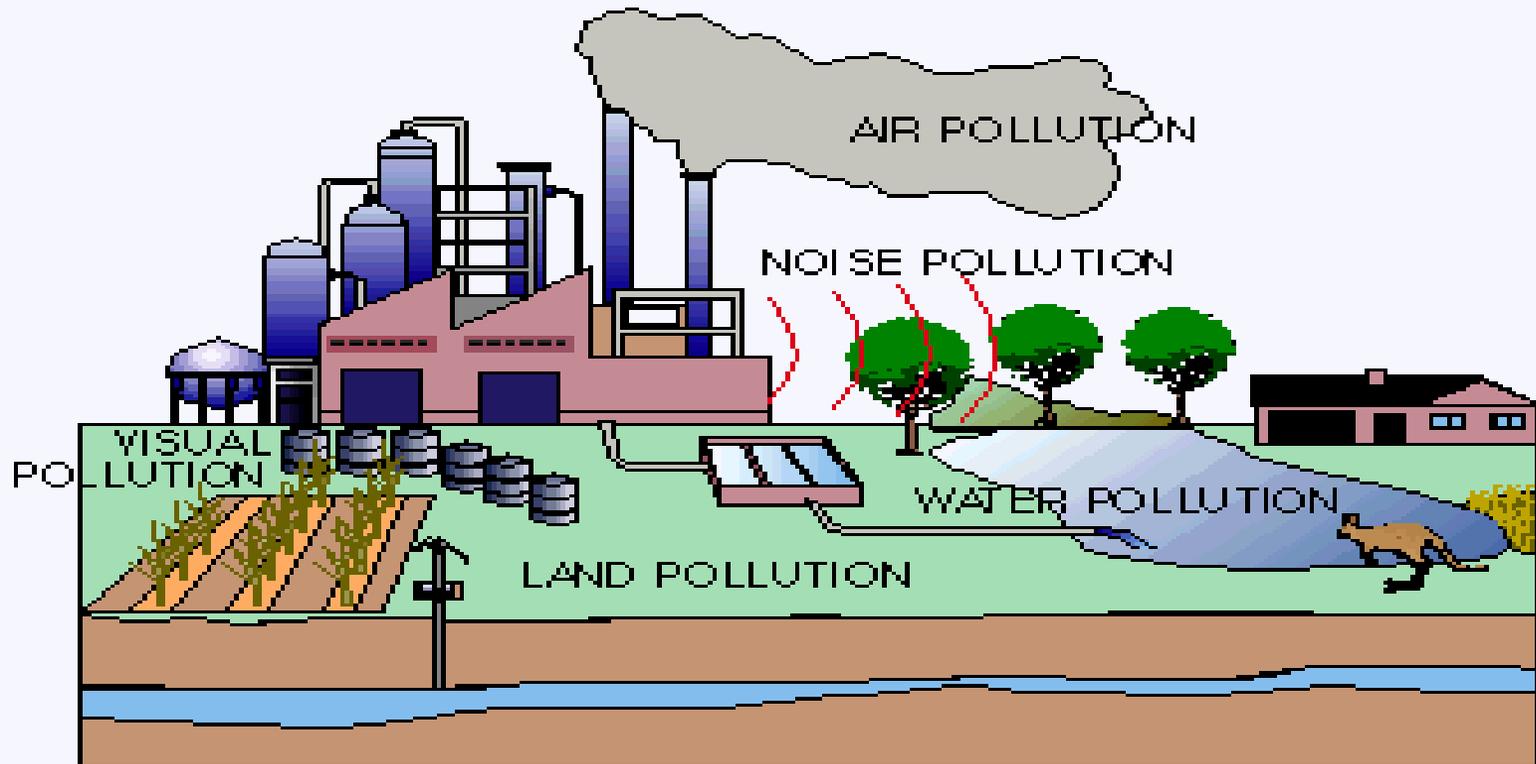
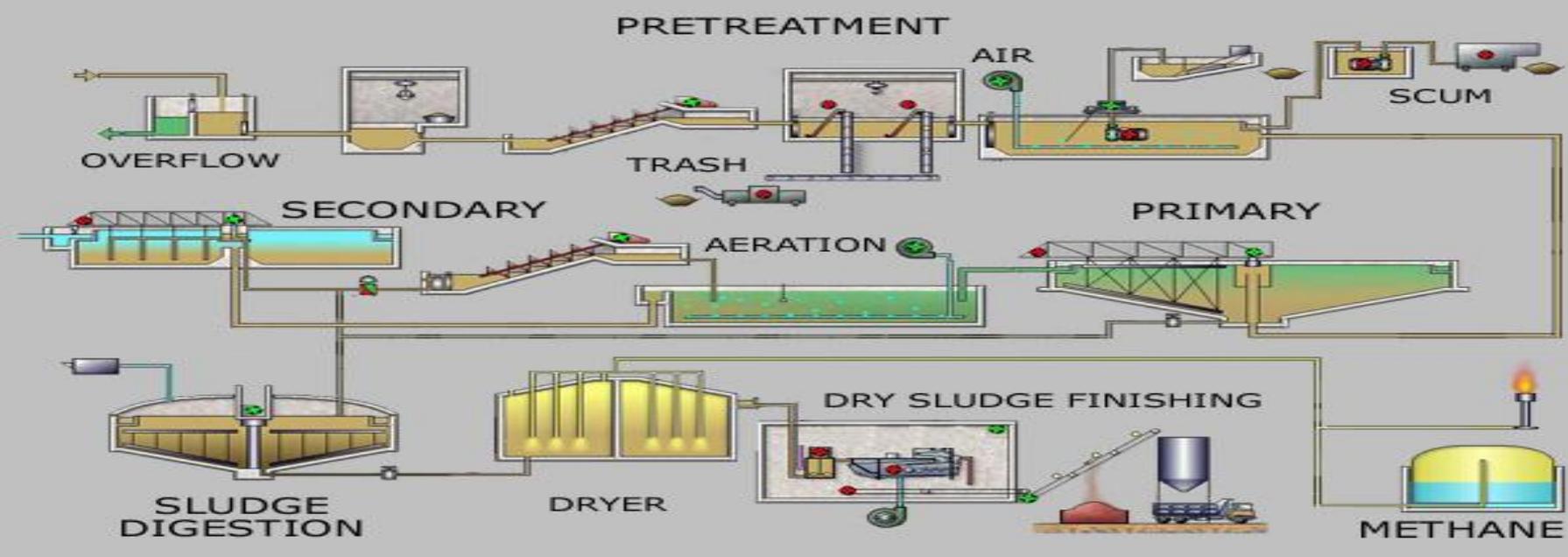


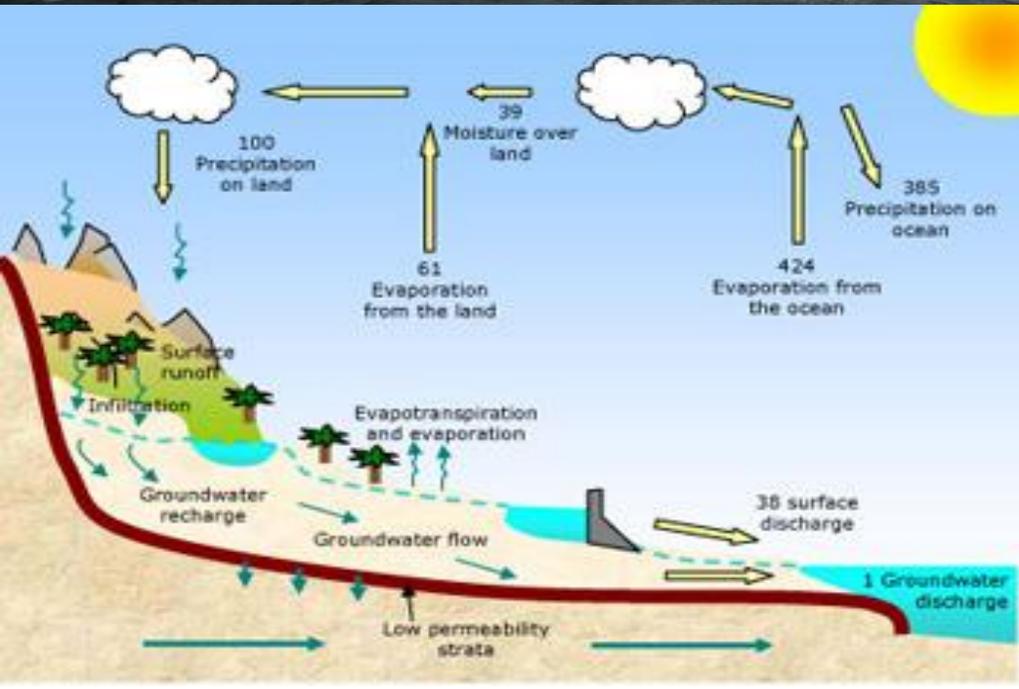
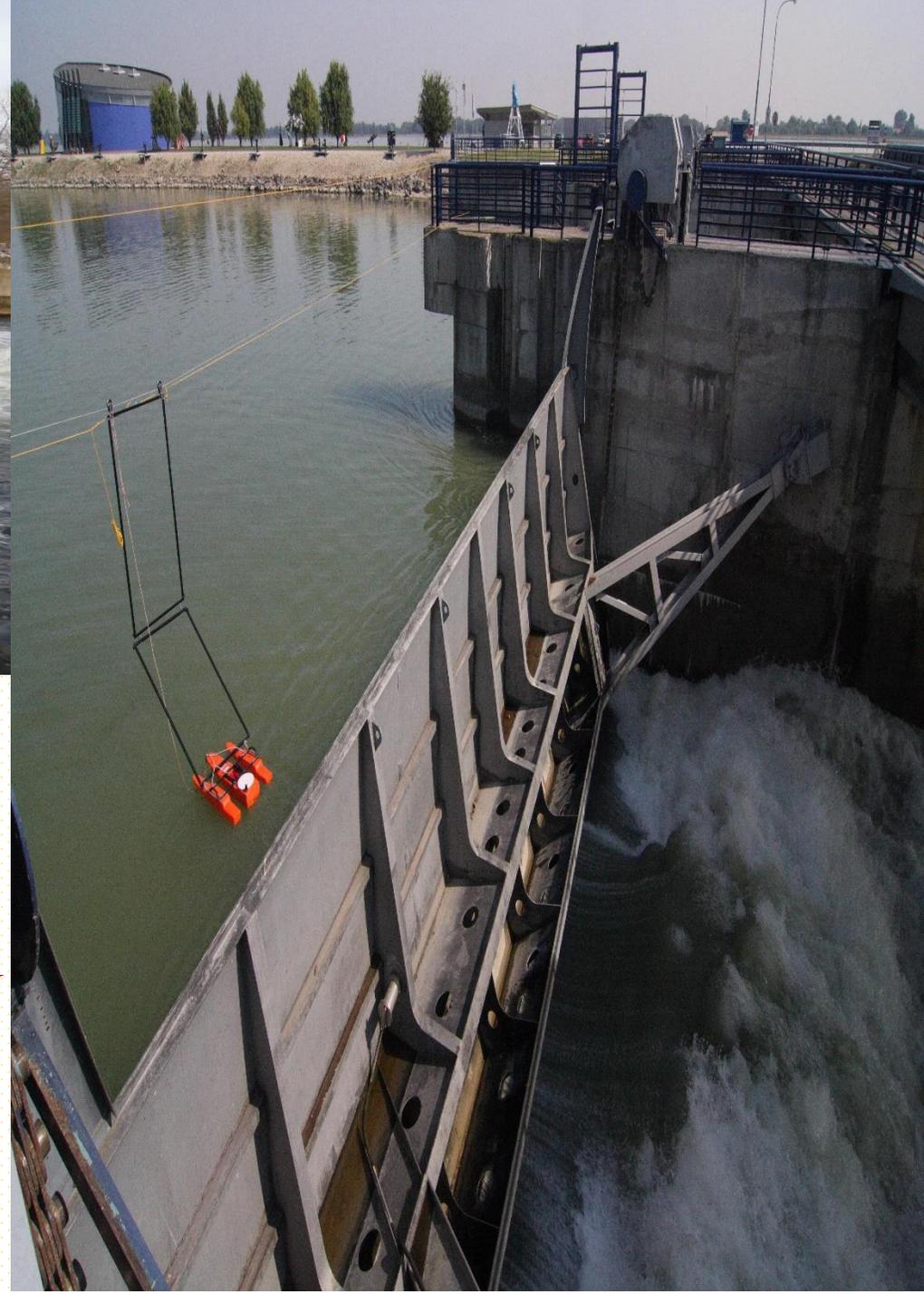




TRANSPORTATION ENGINEERING

ENVIRONMENT ENGINEERING

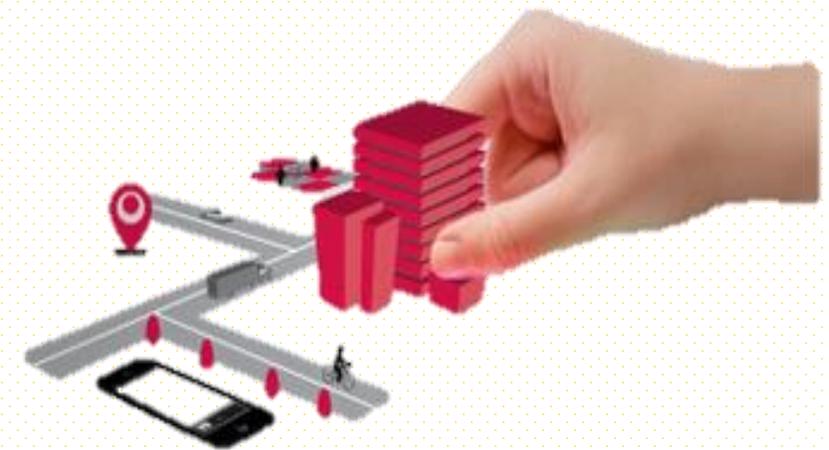




WATER RESOURCE ENGINEERING



TOWN PLANNING



Role of Civil Engineer in society

- Main role of Civil engineers is in **surveying, planning, designing, estimation and execution** of structures.
- To solve different engineering problems with the help of **field experience, laboratory techniques, numerical methods, mathematical models, using computer and information technology.**
- To implement management techniques for better **management of man, material, machine and money.**
- To carry out **soil investigation** for design of foundations of structures.
- To invite **tenders** and to select **contractor** for the work.

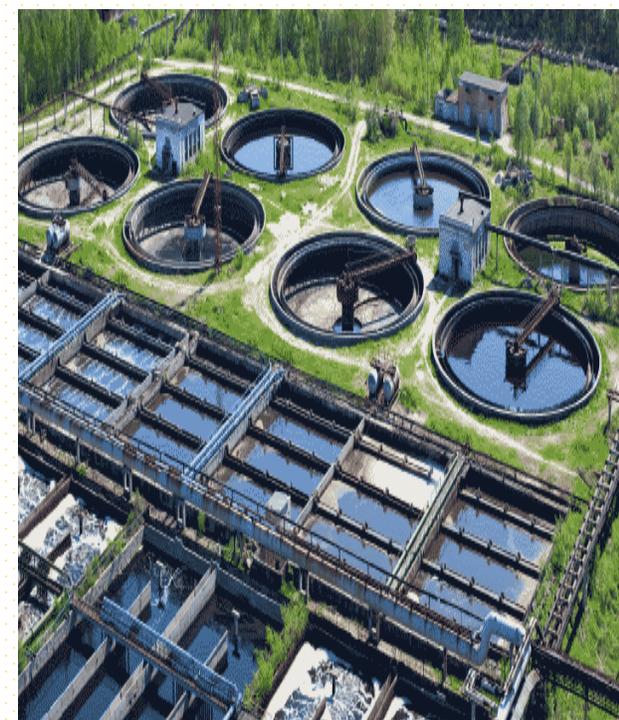
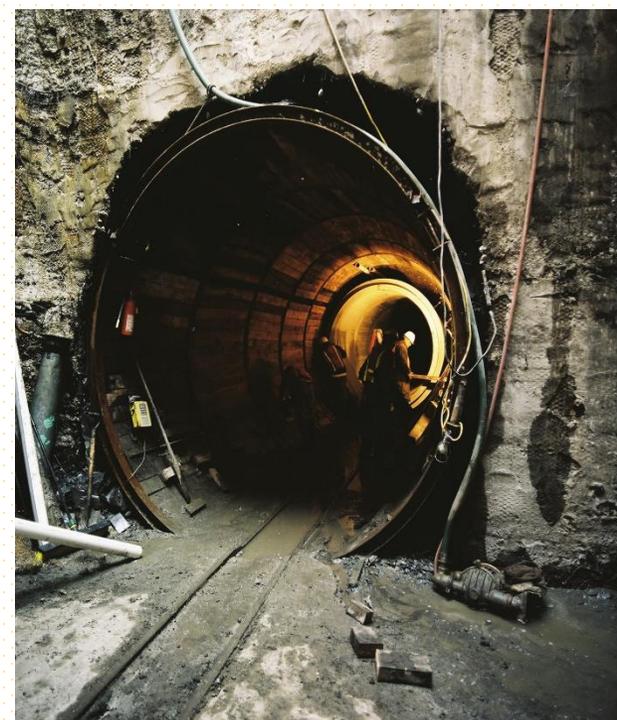
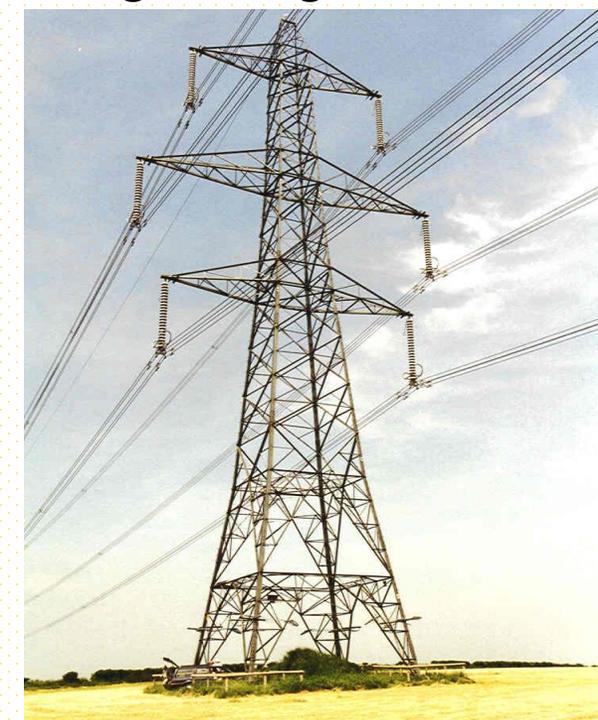


- To carry out **surveying and levelling** and fixing the alignments (center-line) of roads, railways, canals, tunnels, pipes etc.
- To carry out **planning of buildings** as per its functional needs and also has role in **town and regional planning**.



- To carry out the design of structures as per the principles of structural analysis and design. Civil engineer should ensure that design is **safe, durable and economic**.
- To **supervise** the work during execution and to ensure **progress of work**.
- To carry out **valuation of land or building** for the purpose of finding its sale or purchase price or taxation.

- Civil engineers has to maintain public health by providing pure water for drinking, treating **waste water** before **disposing** in to water course and to **collect the solid waste of town and disposing** it.
- Civil engineer has to provide basic infrastructure of the structures for projects of many other engineering disciplines, like to design machine foundations and to provide steel frame structure and **sheds for industries** for the mechanical engineering project. To construct **tunnels for hydropower station**, to construction cooling tower for thermal power stations and to erect **transmission towers for electrical lines** for electrical engineering.



Scope of Civil Engineering

- The main scope of Civil engineering or the task of Civil engineering is planning, designing, estimating, supervising construction, managing construction, execution and maintenance of structures.
- The scope of Civil engineering is two fold :
 - ✓ According to the field of work, area of services and type of structures
 - ✓ Functions of Civil engineering



Scope according to the field of work, area of services and type of structures

- Building Construction
- Construction of Heavy Structures
- Geotechnical Engineering
- Transportation Engineering
- Water Resources Engineering
- Environmental Engineering
- Town Planning



Building Construction:

- Constructing Residential buildings like apartments, tenements, flats, raw houses, bungalows, villas, quarters etc.
- Constructing Public buildings like schools, colleges, government offices, post offices, hospitals, shopping complexes, hostels etc.
- Constructing Industrial buildings like workshops, ware houses, stores and industrial sheds.

Construction of Heavy Structure:

- Constructing bridges, dams, ports, airports, underwater construction, tunnels, cofferdams, caissons, pile foundations etc. with Advanced Construction Techniques.
- It also includes study of several advanced techniques, modern equipment and materials.



CONSTRUCTION OF HEAVY STRUCTURE



BUILDING CONSTRUCTION



Geotechnical Engineering:

- Constructing several types of foundations like simple footing, well foundation, pile foundation, cofferdams and foundations of machines subjected to vibrations is the main scope of geotechnical engineering.
- It further includes constructing tunnels, earthen dams, earth work for highways and railways. It also includes soil investigation and soil testing.

Transportation Engineering:

- Constructing structures related to the transportation engineering like roads, railways, bridges, tunnels, ports, harbors, runways and airports.
- It also includes traffic engineering and study of highway materials.



GEOTECHNICAL ENGINEERING



TRANSPORTATION ENGINEERING



WATER RESOURCE ENGINEERING

Water Resource Engineering:

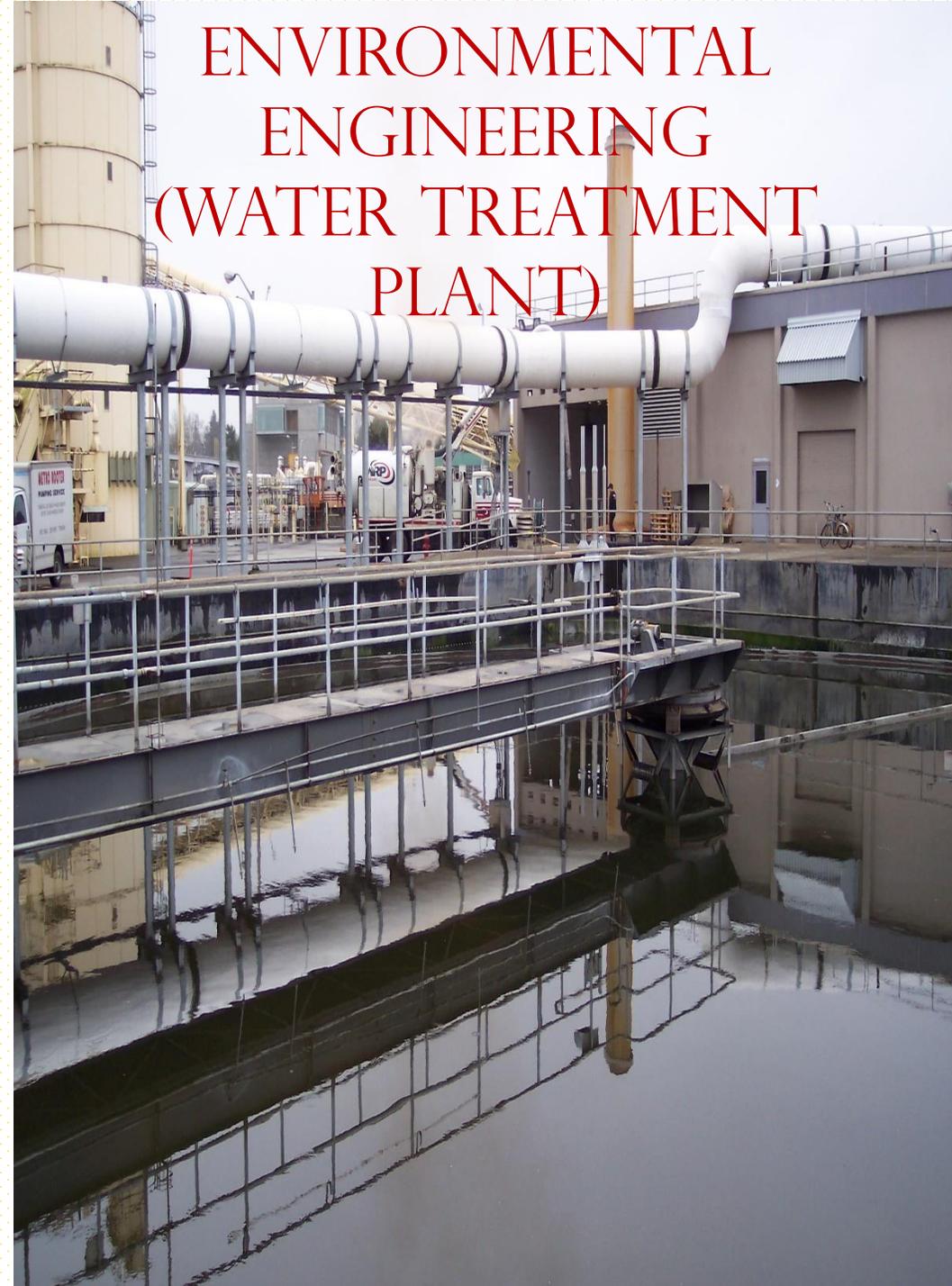
- Constructing structures relating to water resources engineering like dams, barrages, canals, canal structures and hydropower station.
- It also includes irrigation methods, water shed management, rain water harvesting, soil conservation, open channel hydraulics, flow measurement, hydrology, flood control and water power engineering.

Town Planning:

- Planning of the town by zoning of the land, planning road network, planning other services like water supply and drainage.
- Preparing master plan of town planning schemes and regulating construction by building byelaws.



TOWN PLANNING



ENVIRONMENTAL
ENGINEERING
(WATER TREATMENT
PLANT)

Environmental Engineering:

- Constructing structures relating to public health engineering like units of water treatment plant (like intake, Clariflocculator, rapid sand filter etc.), water distribution network, underground sump, overhead tank, units of wastewater treatment plant (like pumping well, screen chamber, grit chamber, primary settling tank, trickling filter, activated sludge unit, sludge unit, sludge digester, sludge drying beds etc.) sewerage and drainage system and pumping stations.
- It also includes pollution control and solid waste collection from the town and its disposal.

Scope according to the Functions of Civil engineering

- **Surveying**

- **Planning**

- **Structural analysis and design**

- **Professional Practice**

(A) ESTIMATING (B) COSTING AND ACCOUNTS (C) VALUATION (D) CONTRACTS

- **Construction management**

(A) PLANNING AND SCHEDULING (B) CONSTRUCTION EXECUTION AND SUPERVISION

- **Quality control and research**

- **Maintenance of structure**

Surveying:

- To carry out surveying for setting out of works and for preparing map of land. Leveling is carried out to measure levels and to prepare contour map. Measurements of distances and angles are taken with the help of surveying instruments. Maps are useful for planning of the construction project.

Planning:

- To carry out planning of the different units according to their functional needs. Say for example buildings are constructed to create living space and roads are constructed for transportation of vehicles over them. Technical feasibility study, economic viability study, environmental impact analysis, surveying and soil investigations are the different planning activities. On the bases of the data collected and map prepared by surveying, planning of the project is made.

Structural Analysis and design:

- To carry out structural design of the structure by selecting the type of material like concrete or steel and fixing the size and shape of various structural components like slab, beam column etc. Structural analysis is required prior to the designing of the structure.

Quality control and research:

- To have a quality check by testing of material and checking workmanship. During the actual construction, quality of the materials can be checked by testing the various properties of the materials. Materials should comply the needs of specifications.
- Workmanship like dimensions, lines and levels, finishing etc. is also required to be checked. To carry out research for improvement in the quality, strength, durability and look of the structure through innovative practices.

Professional Practice:

- **Estimating** : To prepare estimate of work. Estimates are prepared from data of drawings, specifications, rates etc. The procedure for preparing estimate is known as estimating.
- **Costing and accounts** : To carry out costing to know the actual expenditure in the payment of bills to the contractor, and many other expenditure, during construction of the work.
- **Valuation** : To carry out valuation of the property like land or land with building. Valuation is carried out for the purpose of knowing the fair and just price or market value of the property for the purpose of sales, purchases, insurance, taking loans and other purposes.
- **Contracts**: To carry out the construction of work through contractor according to the conditions of the contract. On the bases of the contractor's qualification, past performance and rates filled in the tender papers, work is allocated to the contractor.

Construction Management:

- **Planning and Scheduling** : To carry out project planning and prepare different schedules. Scheduling is the procedure of fixing the order of execution of different activities during construction. For preparing schedules methods like bar chart and critical path methods are generally used. Economic analysis is also carried out to know the economic viability and to select one alternative among several other options.
- **Construction execution and Supervision** : To carry out the actual execution of the construction of the structure and to supervise the progress of the work as per plan, design and specification and condition of the contract. During the actual construction engineer has to provide technical guidance to the contractor and monitor the progress. Management practices during construction also includes handling of the equipment and storing of material. It also includes observing labor laws and safety precautions.

Maintenance of Structure:

- To carry out the maintenance of the structure after the construction is over. Structures need maintenance and proper care. Due to continuous utilization of structure, wear and tear occur hence maintenance of the structure is required. Repair works are required to protect the structures to make them free from the effects of damage or deterioration. Some maintenance works are carried out annually like white washing and painting. Different types of the repair works are current repairs, special repairs and major according to the type of the repair.

Impact of Infrastructural Development on the Economic of country

- The infrastructural facilities mainly such as transport, power, communication, water resources, banking, science and technology create environment in which industries and business can grow.
- Industrial growth is accelerated as basic facilities required for them is provided by Infrastructure.
- Per capita income and GDP are the economic measures for assessment of development.



○ Per Capita Income

- ✓ Per capita income is the average income of normal resident of a country in a particular year.
- ✓ It is obtained by dividing national income of a country by its population.

○ Gross Domestic Product (GDP)

- ✓ GDP at market prices is the value of all fixed goods and services at prices prevailing in the market produced in the domestic territory of country during a given year.

Details of Per Capita Income and GDP

Year	2012-13	2013-14	2014-15
Per capita Income in Rs.	71593 (12.3%)	80388 (11.5%)	88533 (10.1%)
GDP in Rs. Crore	93.9	99.21	106.57

- Due to the acceleration of progress of Infrastructural projects overall development and up liftment of common people can be done.

THANK YOU