- Civil Engineers plan, design, construct and operate the facilities essential to modern life like bridges, highways, water treatment plant etc
- Civil Engineers are problem solvers – meet challenges of pollution, traffic congestion, drinking water and energy needs, urban redevelopment, and community planning

1. VARIOUS DISCIPLINES

- Construction Engineering
- Structural Engineering
- Geotechnical Engineering
- Environmental Engineering
- Transportation Engineering
- Water resources Engineering
- Surveying and Remote Sensing

2. Relevance of Civil Engineering in the overall infrastructural development of the country

- All structures constructed in the past exhibit the path of civilization
- Current infrastructures development express the practices followed by civil engineers
- Infrastructure can be defined as basic systems (structures) and services that a country or organisation uses in order to work effectively
- In a country like India, the major infrastructural factors for economic development are energy, transport, irrigation, communications, education, and health
- The knowledge of basic areas of civil engineering can be of great use in providing the infrastructural facilities where constructional aspects are involved for development of regions

Infrastructure facilities include:

- Good surface communication links such as tar or concrete roads
- Provision of water supply distribution system i.e. construction of water storage reservation, laying of underground pipes etc.
- Provision of a drainage system which may include construction of surface drains and

subsurface drains for the disposal of wastewater.

- Supply of electrical power for which construction of transmission line towers, construction of electrical substations.
- Providing inland communications lines, ie. telephone lines etc.
- Construction of recreational places eg. gardens, parks etc
- Infrastructure development in any country - economic development of a particular nation
- Higher the infrastructure facilities higher will be the growth prospects.
- India is on the verge of change
- observed on several basis such as higher standard of living, globalization, infrastructure expansion etc
- our country is witnessing a massive growth in the development of structures
- includes building of new structures in addition to the renovation of the already existing ones
- the intention is not only to make the place we live beautiful but a safer one to live in

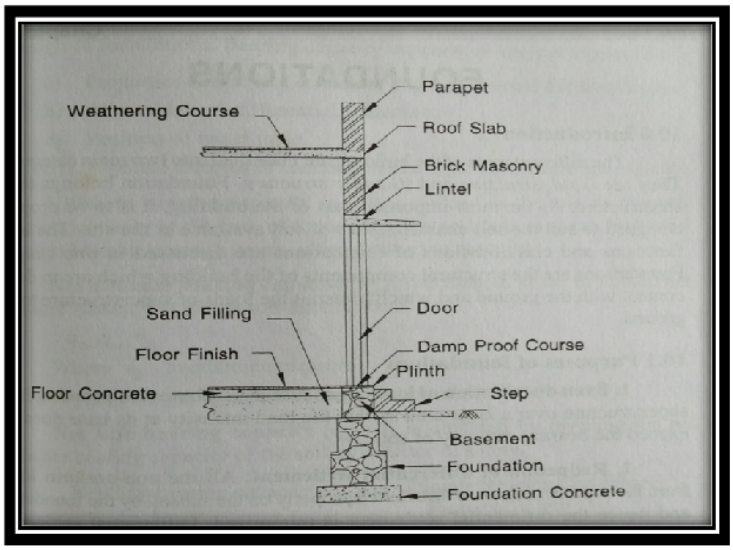
3. COMPONENTS OF A RESIDENTIAL BUILDING

A building has two important components

Sub-structure or foundations

Superstructure

- ➢ Substructure or foundation – Portion of building below ground level, which transmits the load of super structure to the soil
- ➢ Superstructure – Component of the building which is constructed above the substructure



FOUNDATION

- Foundation belongs to substructure
- It should be designed to suit the characteristics of soil available in the site

PURPOSES OF FOUNDATIONS

➢ Even distribution of load

- It distribute the total load coming on the structure over a large bearing area so that the load intensity at its base does not exceed the bearing capacity of soil and to prevent it from any movement.

➢ Safety against sliding and overturning

It ensure the stability of the structure as a whole to prevent it from overturning or sliding against the disturbing forces such as wind, rain and frost.

➢ Provides a level and firm surface for the construction of superstructure.

➢ It prevents unequal or differential settlement of the structure.

➢ It ensure the stability of the building against undermining due to floodwater or burrowing animals

BASEMENT

➢ Part of the building which lies between ground level and plinth level

PLINTH

Its the top outer edge of basement around the building

- The thickness of the plinth wall depends upon the weight of the superstructure
- The minimum height of the plinth with basement is usually kept as not less than 45cm
- To transmit the load of the superstructure to the foundation.

To enhance the architectural appearance of the building

DAMP PROOF COURSE

➢ A layer of waterproof material provided on the top of the basement to prevent dampness on the wall is called damp proof course (D.P.C)

➢ **FLOORS**

➢ The main function of a floor is to provide support for occupants, furniture, and equipment of a building

➢ To divide the building into different levels/stories for creating more accommodation

➢ The exposed top surface of the floor prepared with a covering is called floor covering

The floors should be

➢ strong enough to support the floor covering and other superimposed loads

➢ smooth, impervious, durable , wear- resistant, fire resistant, heat and sound insulation

➢ Flooring material like marble, tile, mosaic etc are provided over sub floor as finishing layer

WALLS

➢ The main function of walls is to divide the space into different rooms.

➢ Walls support the loads from the roof/ upper floors to the foundations.

➢ The external walls should provide sufficient resistance against weather agencies like sun, wind, rain and snow.

➢ Walls should have sufficient heat and sound insulation.

➢ Walls should provide sufficient privacy and security against burglary or theft

- It should be stable against overturning by lateral forces.

PARTITION

- An interior non load bearing wall of full wall height or part storey height used for dividing floor area into different sections

DOORS and WINDOWS

- The main function of doors in a building is to serve as a connecting link between internal parts and to allow free movement to the outside of the building.
- Windows are generally provided for proper ventilation and lighting and their number should be determined according to the requirements.
- They should be strong enough to resist the adverse effects of weather.
- They should be capable of being made air tight to achieve insulation against sound and heat.
- They should not be affected by white ants and the moisture penetration as this will reduce the strength and durability
- They should offer sufficient privacy without inconvenience or trouble and security against theft
- Ventilators are openings provided in the outer walls for the escape of foul gases from the room

BEAMS, LINTELS & SUNSHADES

- Beam is a horizontal structural member, which carries floor slab or roof.
- Lintel is a beam (RCC) that supports the masonry work over openings in the walls.
- Sunshade is a projection (slab) provided outside a building above the doors and windows to prevent direct sunlight and rains to the rooms.

ROOFS

- A roof is the uppermost part of a building whose main functions is to **enclose** the space and to **protect** the same from the effects of weather elements.
- The roof structure should be **strong and stable** enough to take up the anticipated **loads** safely.
- The **roof covering** should have adequate resistance to resist the effects of **weather** elements.
- The roof should provide **adequate insulation against heat, sound and fire**

STEPS & STAIRS

- Steps are provided for **access to the building**
- A stair is a structure used to **climb from one floor to another**
- Height of a step is 15 cm & width varies from 25 to 30 cm
- **Location of stairs** in all types residential and public buildings should be such as afford the **easiest and quickest service possible to the building**
- It also acts as an escape from the upper floors in the event of fire

PARAPET

- A short masonry wall built on top of the roof of a building is called parapet. It serves as an enclosure above the roof (safety) and as an element for good appearance

WEATHERING COURSE

- It is the layer provided over the roof slab to protect the roof from weathering agencies

like sunlight, rain and wind

FINISHES OF WALLS

- Finishes for walls are pointing, plastering, painting, distempering etc.
- These finishes protect walls from effects of weather
- It covers the defective materials or poor workmanship to some extent.
- It improves the aesthetic appearance of the building

Relevance of NBC, KBR and CRZ

N B C – National Building Code

K B R – Kerala Building Rule

C R Z – Coastal Regulation Zone

- building codes – they are set of rules which specify the minimum standards for buildings
- Main purposes of building codes are to protect public health, safety and welfare as they relate to construction and occupancy. Ex Nbc , fire codes

RELEVANCE OF NBC

- NBC provides guidelines for regulating building construction activities across country
- It serves as a model for adoption by all agencies involved in construction like government, local bodies or private agencies
- Mainly contain :
  - Administrative regulations
  - Building requirements and Development control rules

- Fire and safety requirements
- Specified requirements for building materials, design and construction, services

RELEVANCE OF KBR

- NBC act as a reference for local bodies in framing byelaws
- Code exclusively for the construction activities within the state of Kerala
- It includes :
  - General requirement regarding plots
  - Exterior and interior open spaces
  - Built up areas of buildings, coverage, floor area
  - Size , height and ventilation of rooms
  - Water supply and sanitary provisions
  - Specification of parts of the building

RELEVANCE OF CRZ

- Under the Environment protection act 1986, a notification was given my Ministry of Environment and forest for regulation of activities in coastal area
- Objectives : protect coastal stretches
  - Take care of fishing and local communities
  - Sustainable development of coasts
- As per notification coastal land upto 500m from high tide line and a stage of 100m along the banks of creeks, rivers, backwaters subject to tidal fluctuations is called coastal regulation zone

- Categorised into 4 zones as CRZ 1, CRZ 2, CRZ 3, CRZ 4
- **CRZ 1 – ecologically sensitive areas essential in maintaining the ecosystem of the coast**

  ACTIVITIES PERMITTED : Exploration of natural gas and extraction of salt

- **CRZ 2 – urban areas located in coastal area**
  - Buildings are permitted on landward side
  - ACTIVITIES PERMITTED : Desalination plants
- **CRZ 3 – Areas that are relatively undisturbed and do not fall under cat 1 and 2 also include rural and urban areas that are not substantially developed**
  - ACTIVITIES PERMITTED : agriculture, forestry, projects of Department of Atomic Energy, mining of rare minerals

CRZ 4 –aquatic area from low tide line upto territorial limits

- ACTIVITIES PERMITTED : traditional fishing by local communities

  BANNED : no untreated sewage or solid waste shall be let off or dumped in these area