

Chapter 6: Introduction to Engineering Drawing / Basic Drafting Concept (3 Marks)

1. Define civil engineering drawing.

Ans: Civil engineering drawing is a precise graphical language that uses standardized symbols and scales to communicate the exact design, dimensions, and construction details of physical structures.

2. Explain the types of civil engineering drawings.

Ans: The different types of civil engineering drawings are described as follows:

a. Architectural Drawings

These drawings focus on the appearance and functionality of the building. They show the arrangement of space, the thickness of walls, and the position of doors and windows.

- Floor Plans: A top-down view of each floor level.
- Elevations: External views of the building (Front, Side, Back).
- Sections: Vertical "slices" showing the internal layers of floors, roofs, and stairs.

b. Structural Drawings

These are the "skeleton" drawings. They provide details about the strength of the building and how it will stand up.

- Foundation Plans: Details of the footings and columns underground.
- RCC Details: Specific instructions on where to place steel reinforcement bars (rebar) in beams, slabs, and columns.

c. Service Drawings (MEP)

Also known as Mechanical, Electrical, and Plumbing (MEP) drawings, these show the "veins and nerves" of the building.

- Plumbing Drawings: Layout of water supply pipes, drainage, and sewage.
- Electrical Drawings: Placement of lights, switches, fans, and wiring circuits.

d. Site and Location Plans

These drawings explain where the building is situated in the real world.

- Location Plan: A small-scale map showing the project's position in the city or neighborhood.
- Site Plan: A detailed map showing the plot boundaries, driveways, and surrounding landscape.

e. Submission (Blueprints) and Working Drawings

- Submission Drawings: Prepared specifically for the local municipality or government to get legal permission to build (follows by-laws).
- Working Drawings: The highly detailed drawings used by the laborers and engineers on the actual construction site.

3. Define the following terms: a. Engineering symbols b. Right of way c. Setback

Ans: a. Engineering Symbols

Engineering symbols (also called Conventional Signs) are standardized graphical representations used to represent materials, objects, or features on a drawing.

b. Right of Way (ROW)

Right of Way is the total width of land acquired and reserved by the government or an authority for a specific purpose, usually for a road, railway, or pipeline.

c. Setback

A Setback (or Setback Line) is the minimum open distance required between a building and the boundary of the plot (the property line) or the edge of the road.

4. What is building bye law ? Write its objectives.

Ans: In Nepal, **Building By-laws** are the legal rules and regulations made by local authorities (like your local Municipality or Rural Municipality) to control and regulate the construction of buildings.

In our country, these laws work alongside the **Nepal National Building Code (NBC)** to ensure that every house or structure built is safe, especially because Nepal is in a high-earthquake zone.

Objectives of Building By-laws

The main reasons why we follow these rules in civil engineering are:

- **To Ensure Safety:** The most important goal in Nepal is to make buildings **earthquake-resistant** so they do not collapse and hurt people.
- **Health and Hygiene:** By-laws make sure every house has enough **sunlight and fresh air** (ventilation) by requiring gaps between buildings.
- **Organized Development:** They prevent people from building houses anywhere they want, which helps in keeping the city or village neat and well-planned.
- **Emergency Access:** They ensure roads are wide enough so that **fire trucks or ambulances** can reach a house quickly during an emergency.
- **Public Privacy:** They set distances between houses so that neighbors have their own private space.
- **Control over Land Use:** They define how much of a plot can be covered by a building (Ground Coverage) and how high a building can go.

5. What are building codes ? Write its objectives.

Ans: Building codes are sets of technical regulations that provide the minimum standards for the design and construction of structures to ensure they are safe and strong.

While the *By-laws* focus on where you can build and how big the house can be on your land, the **Building Code** focuses on the structural strength, the materials used, and the safety systems inside the building. In our country, the most important one is the **Nepal National Building Code (NBC)**.

Objectives of Building Codes

The main goals of these codes in the context of Nepal's civil engineering are:

- **Public Safety:** The #1 goal is to protect people's lives. Since Nepal is in a high-risk zone, the code provides strict rules for **earthquake-resistant design** (like NBC 105).
- **Structural Integrity:** It ensures that the building can handle the weight of the people, furniture, and environmental forces (like heavy wind or snow in the mountains) without collapsing.
- **Fire Safety:** It sets rules for fire-resistant materials, fire alarms, and clear **emergency exit paths** so people can escape quickly if there is a fire.
- **Health and Sanitation:** It ensures every building has proper plumbing, clean water supply, and waste disposal to prevent diseases.
- **Quality of Materials:** It sets standards for the quality of cement, steel (rebar), and bricks used in construction so that builders don't use weak or "cheap" materials.
- **Energy Efficiency:** Modern updates to the code also aim to make buildings use less electricity for heating and cooling, which is better for the environment.

6. Define: a. Floor Area Ratio (FAR) b. Foundation/ Trench Plan c. Floor Plan d. Site Plan e. Location Plan f. Elevation Drawing g. Section Drawing h. Ground Coverage

Ans: a. Floor Area Ratio (FAR)

Definition: Floor Area Ratio is the ratio of the total built-up floor area of a building to the total area of the plot on which it stands.

Objectives:

- To control the density of people living in a specific area of a city.
- To manage the height and bulk of buildings to ensure enough sunlight and air reach the streets.
- To limit the load on local infrastructure like water supply, electricity, and sewage systems.

b. Foundation/Trench Plan

Definition: A foundation plan is a top-down drawing that shows the location, size, and depth of the footings and trenches needed to support the building's walls and columns.

Objectives:

- To guide the workers on where to dig trenches for the building's base.
- To show the exact measurements and layout of structural supports underground.
- To ensure the weight of the building is safely distributed to the soil.

c. Floor Plan

Definition: A floor plan is a horizontal section of a building viewed from above, typically cut at a height of 1.5 meters, showing the arrangement of rooms, walls, doors, and windows.

Objectives:

- To show the internal layout and flow of the building.
- To provide dimensions for rooms and the thickness of walls.
- To indicate the position of furniture, plumbing fixtures, and electrical points.

d. Site Plan

Definition: A site plan is a detailed map of a specific plot of land that shows the location of the building in relation to the property boundaries, roads, and surrounding features.

Objectives:

- To show how much of the land is covered by the building and how much is left open.
- To mark the locations of driveways, septic tanks, water tanks, and gardens.
- To check if the building follows the local municipality's setback rules.

e. Location Plan

Definition: A location plan is a small-scale map that identifies the exact position of a construction site within a larger neighborhood or town using nearby landmarks and main roads.

Objectives:

- To help the municipality and contractors find the exact site location easily.
- To show the project's relationship with the surrounding public roads and infrastructure.
- To provide a "big picture" view for administrative and legal purposes.

f. Elevation Drawing

Definition: An elevation drawing is a flat view of one side of a building, showing how the exterior will look from the front, back, or sides.

Objectives:

- To show the total height of the building and the levels of each floor.
- To indicate the design and materials used for the roof, windows, and exterior walls.
- To help the owner and the municipality visualize the final appearance of the building.

g. Section Drawing

Definition: A section drawing is a vertical "slice" through a building that reveals the internal layers, floor heights, and structural details from the foundation to the roof.

Objectives:

- To show the vertical dimensions and heights of rooms and stairs.
- To explain the construction details of the floor slabs, roof, and foundation.
- To show how different parts of the building are connected internally.

h. Ground Coverage

Definition: Ground coverage is the percentage of the total plot area that is covered by the building's ground floor.

Objectives:

- To ensure there is enough open space left for natural drainage and gardening.
- To prevent overcrowding of buildings on a single piece of land.
- To maintain a healthy environment by allowing space for air circulation between houses.

7. Why is there a need for civil engineering drawings to be prepared ?

In the context of Nepal, these drawings are essential for the "Map Passing" (building permit) process in municipalities. When you prepare a set of drawings for a house in Kathmandu or any other city, you must include all these views in a single blueprint to show that your design follows the Nepal National Building Code. The site plan and ground coverage are checked strictly to ensure you have left enough "Setback" space, which is crucial for safety during earthquakes and for allowing sunlight to reach narrow streets.

8. Differentiate between Site Plan and Location Plan.

Ans:

Feature	Site Plan	Location Plan
Scale	Large scale (shows details clearly). Site plans are used to draw on a scale of 1:200 to 1:500.	Small scale (shows a large area). Location plans are used to draw on a scale of 1:1250 to 1:2500.
Area Covered	Covers only the specific plot.	Covers the surrounding neighborhood.
Details Shown	Shows the house, gates, and trees.	Shows main roads and landmarks.
Usage	Used for layout and construction.	Used to find the site location.