

Plan
Build
Improve
A Better
Tomorrow!



Construction

Handwritten Notes

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Small
Steps Create
Big
Structures!



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Learn
Practice
Build
Grow!

Good Planning
Stronger Communities!

"Construction Builds Brighter Futures!"



Chapter 6

Construction

Plan
Build
Improve
A Better
Tomorrow!

Build
Today
for a Stronger
Tomorrow!

Structures for a Better Life



Tehri Dam,
Uttarakhand

- India has built over 6,000 dams since Independence (as per Ministry of Jal Shakti).
- Dams help in irrigation, generate electricity, control floods and provide drinking water.
- Tehri dam is one of the highest dams in India with a height of 261 m, built across the Bhagirathi river in Uttarakhand.

Construction
Creates
Opportunities
Builds
Communities
Drives Progress!

"Strong Structures Build Stronger Societies"

In this Chapter, You Will Learn...

Prepare a technical drawing of a structure



Prepare a bill of materials



Mark the drawing on the field



Prepare the foundation



Lay bricks to construct the selected structure



Complete the structure with curing, plastering, finishing and painting



6.1 Introduction

- Construction means building structures that we use in daily life.
- It helps us live safely, work comfortably and protects us from heat, rain and other weather conditions.
- From simple shelters in caves to modern multi-storey buildings, construction has evolved with time.
- Today, we use modern tools and materials along with traditional skills to build stronger and longer-lasting structures.
- The construction sector plays an important role in our daily lives and the development of the country.

Construction
Turns
Ideas into
Reality!



Evolution of Construction

3



Caves
(natural shelters)



Huts
(mud, grass, wood)



Houses
(bricks, stones)



Modern buildings
(cement, steel,
multi-storey)

Better materials + new techniques = stronger and safer structures

Basic Elements of a Building

Roof
(protects from weather)

Beams
(carry load of slab/roof)

Columns
(vertical support)

Walls
(enclose the space)

Foundation
(transfers load to ground)

Doors and Windows
(entry, ventilation, light)



"Every part has a role in making the structure strong!"



Types of Construction

Load-bearing Construction



- Walls carry the load of the roof/slab.
- Usually made with bricks or stones.
- Suitable for small buildings (houses, small sheds).

Reinforced Cement Concrete (RCC)



- Columns and beams (with steel) carry the load.
- Stronger and suitable for multi-storey buildings.
- Commonly used in modern construction.

6.2 Process Chart

1. Plan and decide the scope

2. Choose the structure and materials

3. Prepare technical drawing

4. Mark on site and prepare ground

5. Construct (step by step)

6. Finish (curing, plastering, painting)

6.2.1 Scoping Work

- Decide what to construct (based on need).
- Check availability of materials, tools and labour.
- Consider usefulness and location.
- Keep the design simple, safe and within budget.

Plan Well
Build Right
Use Resources
Wisely!



6.3 Technical Drawing in Construction

- Technical drawing is a universal language used in construction.
- It shows the shape, size, dimensions and details of a structure.
- It helps in planning, estimating materials and guiding the construction work.
- Every drawing follows standard symbols and measurements.

A Good Drawing Turns Ideas into Reality!



Importance of Technical Drawings

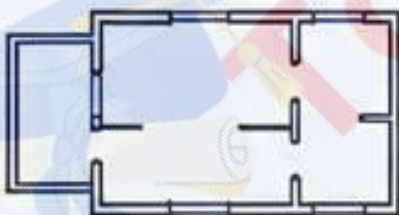
- ✓ Helps to visualise the final structure
- ✓ Ensures accurate construction
- ✓ Reduces mistakes and rework
- ✓ Useful for estimation of materials and cost
- ✓ Helps all team members (engineers, masons, workers) to understand
- ✓ Required for approvals and records

Common Symbols Used

Wall	
Door	
Window	
Column	
Staircase	
Centre line	

Types of Views

Plan View (Top View)



Shows the layout of the structure as seen from above.

Front Elevation



Shows the front appearance (height and width).

Side Elevation



Shows the side view of the structure.



Same building - different views!



6.4 Scale in Drawing

- A drawing is usually smaller than the actual structure. So, a scale is used to maintain the correct proportion between the drawing and the real size.
- Common scales: 1:50, 1:100, 1:200 etc.

Example

Scale 1 : 100 means 1 unit on drawing = 100 units in actual.

If the length on drawing is 5 cm, then actual length = $5 \times 100 = 500 \text{ cm} = 5 \text{ m}$

Use Correct
Scale
Measure Right
Build Right!

Scale Conversion

Scale	Meaning	Use
1 : 50	1 cm = 50 cm (0.5 m)	Small structures, interiors
1 : 100	1 cm = 100 cm (1 m)	Houses, buildings
1 : 200	1 cm = 200 cm (2 m)	Large buildings, sites

Drawing Instruments



Pencil



Scale



Set square



Compass



Eraser



Protractor

6.4.1 Introduction to CAD

- CAD (Computer-Aided Design) is a software used to create accurate technical drawings on a computer.
- It helps in making 2D and 3D models of structures.
- It is widely used by architects, engineers and designers.
- Drawings can be easily edited, saved and shared.

From
Sketch to Screen
CAD Makes
Design Easy!



Good planning today leads to better construction tomorrow!

6.5 Construction Materials

- The choice of material depends on strength, durability, cost, availability and purpose.
- Good quality materials make the structure safe and long-lasting.

Common Construction Materials



Bricks
(used for walls)



Cement
(binding material)



Sand
(filling material)



Gravel
(strong and durable)



Steel
(for strength)



Water
(for mixing)

Mortar vs Concrete

Mortar

- Made by mixing cement + sand + water (in a specific ratio, e.g. 1:4).
- Used for joining bricks/blocks and plastering.
- Less strong than concrete.



Concrete

- Made by mixing cement + sand + gravel (coarse aggregate) + water (e.g. 1:2:4).
- Used for foundations, columns, beams, slabs, floors, etc.
- Stronger and more durable than mortar.



Factors in Selecting Materials

- ✓ Strength and durability
- ✓ Availability in local area
- ✓ Cost and budget
- ✓ Suitability for purpose
- ✓ Weather and environmental conditions
- ✓ Ease of workability

Right Material
Right Strength
Safer Structures!

Quality materials today, a stronger tomorrow!

6.6 Construction Tools



Trowel
(apply and spread
mortar)



Hammer
(fixing and
breaking)



Spirit level
(check level)



Plumb bob
(check vertical
alignment)



Measuring tape
(measure length)



Shovel
(mixing materials)



Wheelbarrow
(carry materials)



Brick cutter
(cutting bricks)



Mason's square
(check right angle)



Bucket
(carry water)

Use the
Right Tool
for the
Right Job!

6.7 Estimating Bricks

- Standard brick size (with mortar) $\approx 20 \text{ cm} \times 10 \text{ cm} \times 10 \text{ cm}$
- Number of bricks in 1 m^3 of brickwork = 500 (approx.).

Example: For a wall of 5 m (length) $\times$ 0.2 m (thickness) $\times$ 3 m (height)
 Volume = $5 \times 0.2 \times 3 = 3 \text{ m}^3$
 Bricks required = $3 \times 500 = 1500$ bricks (approx.)

Measure
Calculate
Plan Ahead
Save Resources!

6.8 Estimating Mortar

- A common mortar ratio is 1:4 (cement : sand).
- For 1 m^3 of brickwork, mortar required $\approx 0.3 \text{ m}^3$ (30% of total volume).
- Example: For 3 m^3 brickwork $\rightarrow$ Mortar = $3 \times 0.3 = 0.9 \text{ m}^3$
- Cement required = $0.9 \times \frac{1}{5} = 0.18 \text{ m}^3$ (≈ 6 bags of 50 kg)
- Sand required = $0.9 \times \frac{4}{5} = 0.72 \text{ m}^3$



Plan
Estimate
Build
Successfully!



6.7 Bill of Materials (BoM)

- A Bill of Materials is a list of all materials, tools and their quantities required for construction.
- It helps in planning, budgeting and avoiding wastage.
- Prepare BoM after finalising the design and measurements.

Plan
Calculate
Estimate
Build
Smart!

Sample Bill of Materials (Example: Small Boundary Wall)

S. No.	Item	Specification	Unit	Quantity
1	Bricks	Standard size	Nos.	500
2	Cement	OPC 50 kg	Bag	10
3	Sand (fine)	Clean	m ³	0.5
4	Stone aggregate	20 mm	m ³	0.8
5	Water	Clean	Litre	As required
6	Steel (if needed)	8 mm	kg	20

Quantities may vary depending on the size and design of the structure.

Labour and Cost Estimation

- Total cost = Material Cost + Labour Cost + Other Charges
- Labour cost depends on the type of work and local rates.
- It is good to take help from a mason or supervisor for accurate estimation.

Plan
Your Budget
Build
Your Future!



6.8 Minor Repairs and Maintenance

- Small repairs help in increasing the life of a structure.
- Common repairs include fixing cracks, replacing damaged bricks or tiles, repairing plaster, cleaning and repainting.
- Regular maintenance keeps the structure safe and strong.

Common Problems and Solutions

Cracks in walls



- Clean the crack
- Fill with cement mortar
- Apply plaster and paint

Damaged plaster



- Remove loose plaster
- Apply fresh mortar
- Finish with paint

Leakage (roof/wall)



- Find the source
- Seal with mortar
- Use waterproof coating

Small Repairs Make a Big Difference!

Curing Today Strong Structure Tomorrow!

6.9 Curing

- Curing means keeping the newly constructed structure moist for some time.
- It helps in increasing strength and prevents cracks.
- Usually, brickwork and plastering should be cured for at least 7-14 days by sprinkling water regularly.



6.10 Brick Bonds

- Bricks are laid in a specific pattern called a bond to make the wall strong and stable.
- Different bonds are used for different purposes.

Stretcher Bond



- Bricks laid lengthwise
- Simple and common
- Used for 1/2 brick thick walls

Header Bond



- Bricks laid widthwise
- Stronger bond
- Used for curved walls and foundations

English Bond



- Alternate layers of stretchers and headers
- Very strong
- Used for load-bearing walls

Flemish Bond



- Alternate header and stretcher in same layer
- More attractive
- Used for facing walls

6.11 Preparing the Site

- Clear the area of debris, plants and unwanted material.
- Ensure the ground is firm and level.
- Mark the layout as per the drawing using pegs and string.
- Dig the foundation as per the required depth and width.

A Strong Building Starts with a Well Prepared Site!

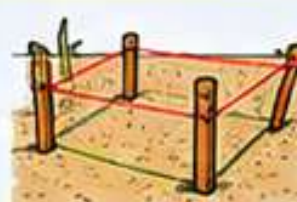
Steps for Site Preparation



Clear the site



Level the ground



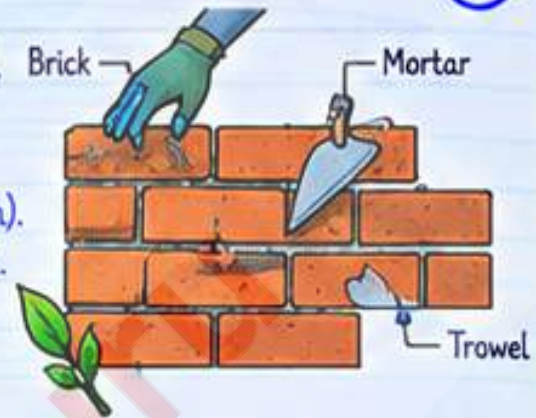
Mark the layout



Dig foundation

6.12 Laying Bricks

- Bricks are laid using cement mortar in proper alignment.
- Use a trowel to spread mortar evenly.
- Check alignment using a spirit level and plumb bob.
- Maintain uniform thickness of mortar joints (about 10 mm).
- mortar and keep checking the line and level.



Right
Alignment
Strong Walls!

6.13 Plastering and Finishing

- Plastering gives a smooth surface and protects the wall from weather.
- Steps: clean surface → apply mortar → level → finish.
- After plastering, the surface can be painted or given a different finish.
- Finishing works include plastering, painting, fixing doors/windows, plumbing and electrical work.



6.14 Construction Guidelines

- ✓ Use good quality materials.
- ✓ Follow safety rules while working.
- ✓ Keep the site clean and organised.
- ✓ Use correct tools and measurements.
- ✓ Avoid wastage of materials.
- ✓ Take help from experienced persons.
- ✓ Protect the environment.
- ✓ Complete the work within time and budget?

Work
Safe
Build
Better!



6.15 Assess Your Learning

- 1 What is the purpose of a bill of materials?
- 2 Why is curing important?
- 3 Name different types of brick bonds.
- 4 List the steps in site preparation.
- 5 How do you ensure correct alignment while laying bricks?
- 6 What are the finishing works in construction?
- 7 Why is regular maintenance necessary?