CHAPTER 1

INTRODUCTION

1.1 General:

Engineering is the professional art of applying science to the optimum conversion of the resources of nature to benefit man. As a career-oriented applied education, Civil Engineering Students Internship Program (CESIP) bridges the gap between theory and practice and provides students with practical, field based, real world experiences during their years of study. provide us the following opportunities:

a. Apply theoretical knowledge in industrial application.
b. Acquire knowledge of various stages of construction, project management and team-work.
c. Practice ethical and professional work culture.
d. Provide opportunity for students to work with industrial practitioners.
e. Implement Health Safety Environment (HSE) practices at workplace.

1.2 Introduction about Company

RAVI CONSTRECTION and Builder is a growing and leading construction company in Challakere, Karnataka.

The company currently maintains its office in CHALLKERE. The complete profile as follows,RAVI CONSTRECTION
Proprietor: M RAMESH BABU
4th Cross, Valmiki Nagara Challkere -577522

EmailId: rameshbabu.Clk99@Gmail.Com

Brief History

RAVI CONSTRECTION are building contractors established in 2004. Constructing various types of buildings and have been successful in completing these projects based on their respective contract termination periods. Due to vast experience; the firm has attained a well- organized organizational makeup for running the business. They own a wide variety of construction machineries, transport and various facilities. For instance; concrete mixers, dumpers, vibrators, excavators and compactors can be listed out of the construction machineries. Apart from this; theyhave experienced professional workers who are found at various sites andoffices.

Company Address:

The company currently maintains its office in CHALLKERE. The complete profile as follows,RAVI CONSTRECTION

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1.3 CIVIL ENGINEERING MEASUREMENTS & CONVERSION FACTORS

Measurement is one of the most important things in civil engineering and without measurements, we cannot complete any construction. Here I have listed some basic measurements and conversion factors which are most commonly used in civil engineering.Hope it will help you in your work.

1.4 BASIC QUANTITIES AND UNITS

BASIC STANDARDS

1 inch = 25.4 millimeters =

2.54cm. 1 meter = 39.37 inches

=1.09yards.

1 liter = 0.22 galls (imp.)

1 gallon (imp.) = 4.546 liters

1 gallon (US) = 3.785 liters

1 Kilogram (kg) = 2.2046 pounds (lb).

METRIC UNIT OF WEIGHT/MASS

1 tone = 1000 kilograms = 1,000,000 grams.

1 quintal = 100 kilograms = 100,000 grams.

1 Slug = 14.606 kg1 Slug = 32.2 lb

MEASUREMENTS OF LENGTH

1 foot = 12 inches.

1 yard = 3 feet.

1 furlong = 220 yards.

1 mile = 8 fulongs.

1 Kilometer (Km) = 1000 meters.

1 meter (m) = 100 centimeters (cm).

MEASUREMENTS OF AREA

1 Acre = 43560 sq. ft

1 Acre = 4046.46 sq. m

1 Acre = 8 Kanals.

1 Kanal = 20 Marlas.

1 Marla = 225 sq. ft (* in some regions 272 sq. ft) 1 Marla = 15.50 sq.m

1.5 TYPES OF BUILDINGS

To fulfill various purposes, buildings are divided as following types by international building code

1. Assembly Buildings
2. Business Buildings
3. Educational Buildings
4. Factory Buildings

5. Hazardous Building
6. Institutional Buildings
7. Mercantile Buildings
8. Residential Buildings
9. Storage Buildings
10. Utility & Miscellaneous

1.6 THE SITES VISITED

1. Udaygiri site
2. Satyamangala site
3. Near RTO site
4. Hemavathi nagar site
5. Shantinagar site
6. Vijayanagar site

CHAPTER-02

CONSTRUCTION MATERIALS AND SITE VISIT

2.1 Following are the materials used for the construction of a building:

1. Bricks.
2. Concrete Blocks.
3. Cement.
4. Stone.
5. Coarse Aggregates.
6. Fine Aggregates.
7. Timber.
8. Steel.
9. Floor Tiles.
10. Roof Tiles.
11. Metal.
12. Doors & Windows.
13. Paints & Varnishes.
14. Brick Ballast.
15. Sanitary Materials.
16. Electric materials
17. Water etc.

2.2 Steps in Construction of Residential Building

Construction of residential building required following paper work before the start of actual construction. These steps are;

1. Preparation of drawings as per requirements of consumers.
2. Estimation of material cost, labor cost & contingencies.
3. Approval of drawings & estimates from Client.

4. Approval of drawings from City Development Authority. It is most important because residential building drawings should meet the authority defined rules.
5. Start of construction work either through contractor or labour hired on daily basis.

After the completion of documentation work, the actual construction on plot begins. Following is thesteps

1. Site clearance
2. Demarcation of site
3. Grid line marking
4. Excavation
5. Laying of PCC
6. Bar binding and placement of foundation steel
7. Shuttering and Scaffolding
8. Concreting
9. Electrical and Plumbing
10. De-shuttering
11. Brick work
12. Doors and Windows frames along with lintels
13. Wiring for electrical purposes
14. Plastering
15. Flooring and Tiling work
16. Painting
17. Final completion and handing over the project.

.3 Site Review

Site review is the process of collecting information, assessment of data and reporting potential hazards beneath a site which are unknown.

- The nature and sequence of strata
- The ground water conditions at the site
- The physical properties of soil and rock underlying the site

- The mechanical properties such as strength of different soil or rock strata
- Drainage and water supply lines
- Obstructions like electric lines, trees etc.

2.4 Site Clearance

This is the first task of site preparation. The site should be in a cleared and graded condition. It involves the removal of trees, demolishing buildings, removing any and all old underground infrastructure, and any other obstacles that might affect the construction process in the future or hinder the project to be done.

Fig.2.1 Site Clearance

2.5 Demarcation of site

The whole area on which construction is to be done is marked so as to identify the construction zone. Initially the site may not exist in corrected alignment as per "Bye laws" fixed by concerned corporation or municipality. For ex: -

- If the site is in any arbitrary shape, then we have to make it to view as aperfect shape like rectangle, square etc.
- We need to leave some space between road and the entrance of the construction site.
- Some minimum space has to be left at both the ends from neighbor property.
- One of the faces of the site should be parallel to the road.

2.6 Grid line marking

Site marking is one of the starting points of construction

In this activity your Engineer and Maistry will identify pillar placements. Once pillars placement is identified based on soil condition earth work will start.

- Engineer will mark the area around the pillar.
- Earth workers will dig marked area.
- Depending on soil condition pillar depth will vary.

Fig. 2.2 Site Marking

CHAPTER-03

EXCAVATON

3.1 EXCAVATION

Excavation is the process of moving earth, rock or other materials with tools, equipment or explosives. It includes earthwork, trenching, wall shafts, tunneling and underground.

Fig: 3.1 Excavation

How does the process work?

Before the excavation process can begin, the site must be carefully examined to make sure that the natural habitat and artifacts surrounding it are persevered throughout excavation. Next, the plans for the size and depth of the site are made and the excavation company makes drawings from them to clearly mark the excavation site's boundaries. Once these two important steps have been taken, the excavation work can begin. The entire excavation process includes:

- Setting out corner benchmarks.
- Surveying ground and top levels
- Excavation to the approved
- depth Dressing the loose soil
- Making up to cut off level
- The construction of dewatering wells and interconnecting trenches Making boundaries of the building.
- The construction of protection bunds and drains.

3.2 SOLING

Soling consists of digging the earth to a required depth and laying the crushed stone quarries one adjacent to another and filling the gaps with the sand. After laying for the entire area, consolidating with the Heavy Rollers or by ramming is done. Over this either a pier or regular foundation is carried out.

It is one of the most common techniques used for soil stabilization. It helps in enhancing the bearing capacity of soil. Hard core soling can be done either by bricks or by rubble stones laid under floors / foundations, hand packed or as per specifications or requirement at site.

Fig: 3.2 Soling

3.3 Laying of Plain Cement Concrete

PCC is the mixture of cement, sand, aggregate and water in a proportion. PCC is strong in compression. It is used for providing level base for footing. It also can be used as Damp Proof Course. It does not possess any strength in tension. Proportioning of cement, sand and coarse aggregate shall be 1:2:4 or as specified.

The entire concrete used in the work shall be laid gently in layers not exceeding 15cm and shall be thoroughly vibrated by means of mechanical vibrators till a dense concrete is obtained.

Hand compaction shall be done with the help of punning rods and tamping rods and tamping with the wooden tampers so that concrete is thoroughly compacted and completely walked into the corners of the form work.

The layers of concrete shall be so placed that the bottom layer does not finally sit before the top layer is placed.

Compaction shall be completed before the initial setting starts that is within thirty minutes of addition of water to the dry mixture.

Fig: 3.3 P.C.C bed for footing

3.4 Bar bending and placement of foundation steel

It is intended to cut and bend rebar on site as per the bar bending schedules (BBS). Some footings are composed of top and bottom reinforcement, the bottom bars shall be supported with cover blocks(50mm) to maintain sufficient cover. Inspection Request (IR) would be submitted for steel reinforcement for checking and approval of the Engineer prior to concrete casting.

Fig: 3.4(a) Steel reinforcement for footing

Fig: 3.4(b) Provide Supporting Steel reinforcement for footing

Fig: 3.4(c) Steel reinforcement

3.5 Footing

Footings are structural elements that transmit column or wall loads to the underlying soil below the structure. Footings are designed to transmit these loads to the soil without

exceeding its safe bearing capacity, to prevent excessive settlement of the structure to a tolerable limit, to minimize differential settlement, and to prevent sliding and overturning. The settlement depends upon the intensity of the load, type of soil, and foundation level. Where possibility of differential settlement occurs, the different footings should be designed in such away to settle independently of each other.

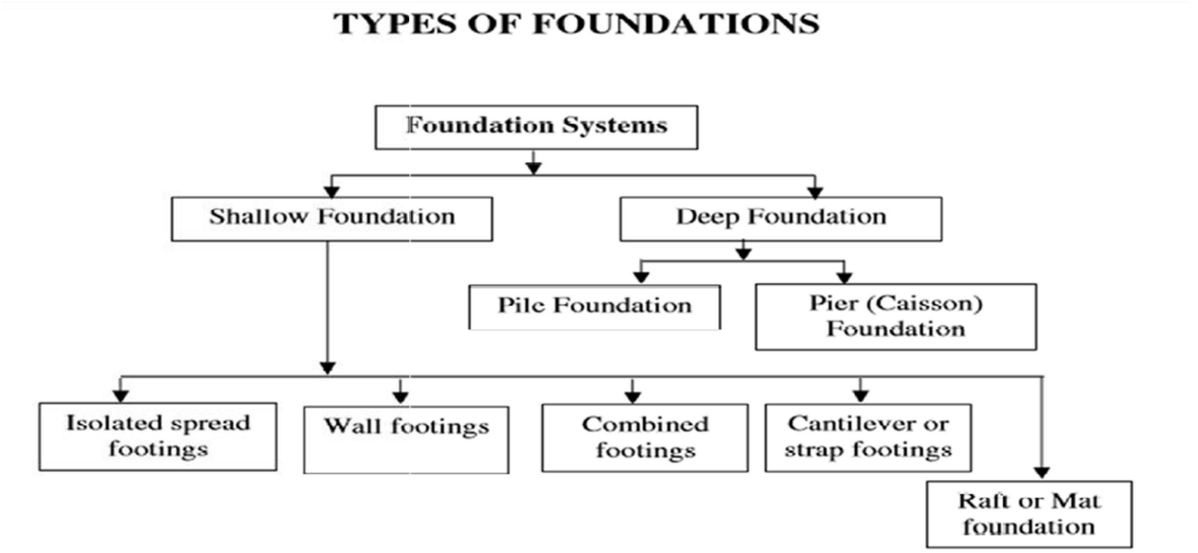


Fig: 3.5 Types of Foundation

3.6 Shallow Foundation

Strip Footing

A strip footing is provided for a load-bearing wall. A strip footing is also provided for a row of columns which are so closely spaced that their spread footings overlap or nearly touch each other. In such a case, it is more economical to provide a strip footing than to provide a number of spread footings in one line. A strip footing is also known as continuous footing.

Spread or Isolated Footing

A spread footing (or isolated or pad) footing is provided to support an individual column. A spread footing is circular, square or rectangular slab of uniform thickness. Sometimes, it is stepped to spread the load over a large area.

Combined Footing

A combined footing supports two columns. It is used when the two columns are so close to each other that their individual footings would overlap. A combined footing is also provided when the property line is so close to one column that a spread footing would be eccentrically loaded when kept entirely within the property line. By combining it with that of an interior column, the load is evenly distributed. A combined footing may be rectangular or trapezoidal in plan.

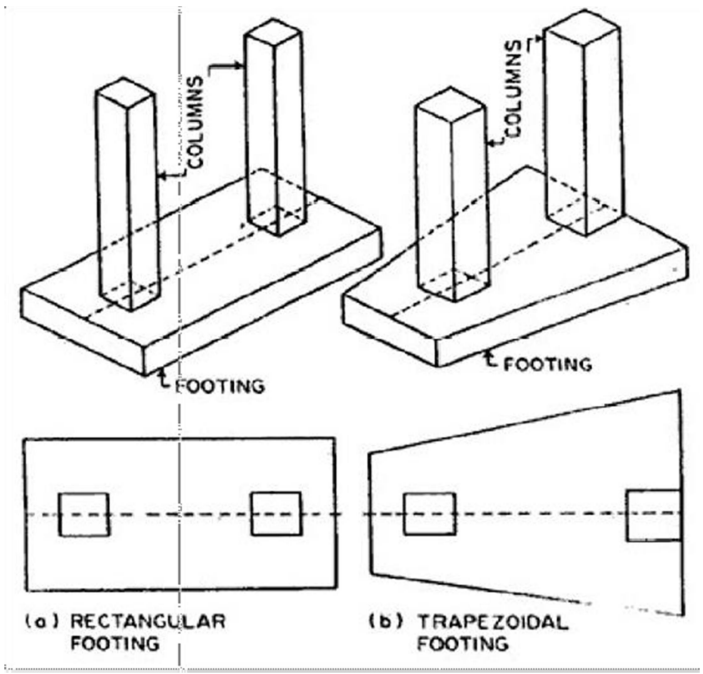


Fig: 3.6(a) Combined Footing

Strap or Cantilever Footing

A strap (or cantilever) footing consists of two isolated footings connected with a structural strap or a lever. The strap connects the two footings such that they behave as one unit. The strap is designed as a rigid beam. The individual footings are so designed that their combined line of action passes through the resultant of the total load. a strap footing is more economical than a combined footing when the allowable soil pressure is relatively high and the distance between the columns is large.

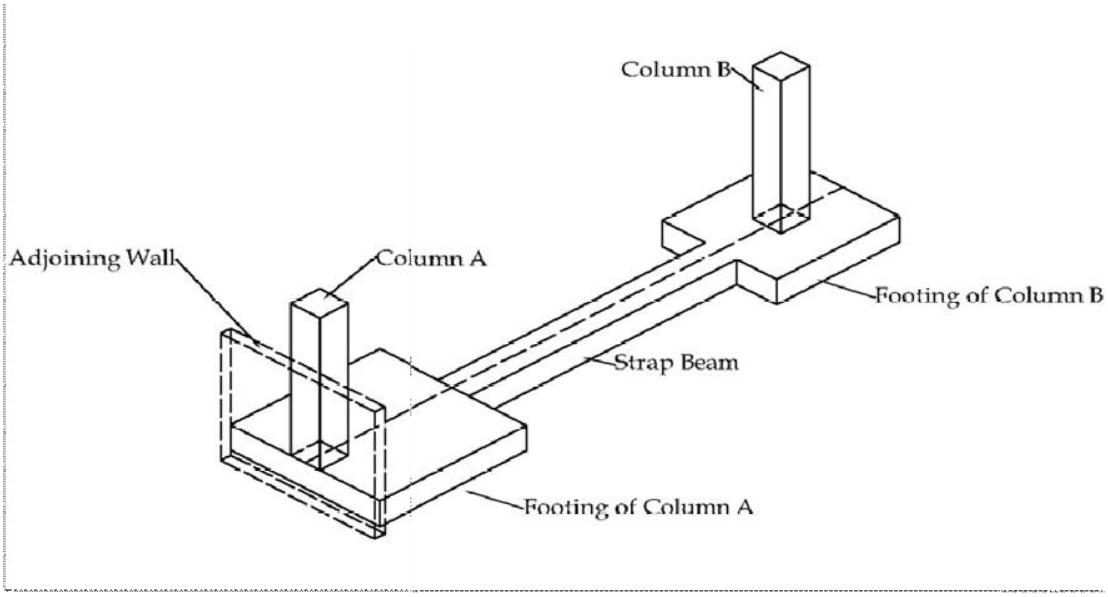


Fig: 3.6(b) Strap or Cantilever Footing

Mat or Raft Foundations

A mat or raft foundation is a large slab supporting a number of columns and walls under the entire structure or a large part of the structure. A mat is required when the allowable soil pressure is low or where the columns and walls are so close that individual footings would overlap or nearly touch each other.

Mat foundations are useful in reducing the differential settlements on non-homogeneous soils or where there is a large variation in the loads on individual columns.

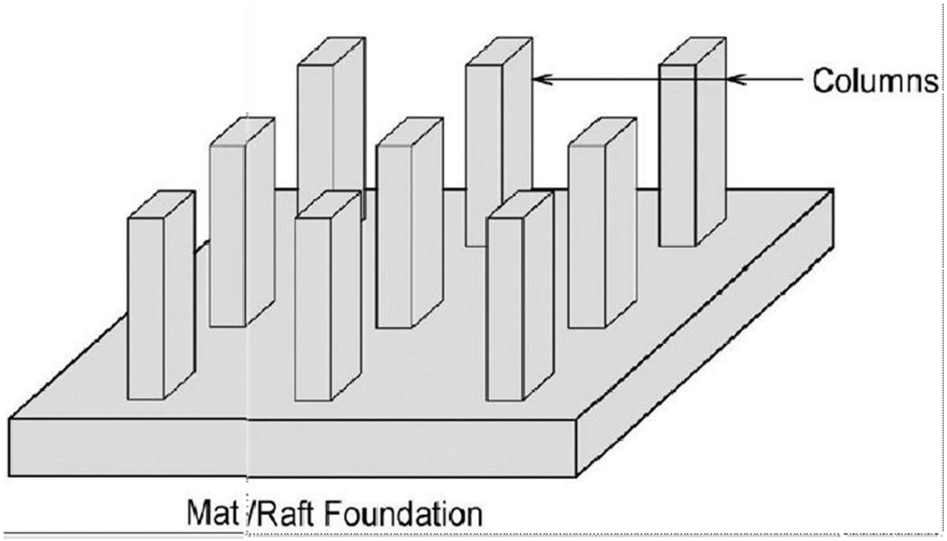


Fig: 3.6(c) Mat/Raft Foundation

CHAPTER-04

SHUTTERING AND SCAFFOLDING

4.1 Shuttering

Formwork (shuttering) in concrete construction is used as a mould for a structure in which fresh concrete is poured only to harden subsequently. Types of concrete formwork construction depends on formwork material and type of structural element.

Formworks can also be named based on the type of structural member construction such as slab formwork for use in slab, beam formwork, column formwork for use in beams and columns respectively etc.

A good formwork should satisfy the following requirements

1. It should be strong enough to withstand all types of dead and live loads.
2. It should be rigidly constructed and efficiently propped and braced both horizontally and vertically, so as to retain its shape.
3. The joints in the formwork should be tight against leakage of cement grout.
4. Construction of formwork should permit removal of various parts in desired sequences without damage to the concrete.
5. The material of the formwork should be cheap, easily available and should be suitable for reuse.
6. The formwork should be set accurately to the desired line and levels should have plane surface.
7. It should be as light as possible.
8. The material of the formwork should not warp or get distorted when exposed to the elements.
9. It should rest on firm base.

Table: Period of Removal of Formwork

S. No.	Description of structural member	Time Period
1	Walls, columns and vertical sides of beams	1 to 2 days
2	Slabs (props left under)	3 days
3	Beam soffits (props left under)	7 days
4	Removal of props to slabs	
	(a) For slabs spanning upto 4.5 m	7 days
	(b) For slabs spanning over 4.5 m	14 days
5	Removal of props to beams and arches	
	(a) Spanning upto 6 m	14 days
	(b) spanning over 6 m	21 days

Table No: - 4.1 Formwork

4.2 Formwork for Column

Fig: 4.2 Formwork for Column

4.3 Formwork for Slab

Fig: 4.3 Formwork for Slab

4.4 Scaffolding

Scaffolding, also called scaffold or staging, is a temporary structure used to support a work crew and materials to aid in the construction, maintenance and repair of buildings, bridges and all other manmade structures. Scaffolds are widely used on site to get access to heights and areas that would be otherwise hard to get to. Unsafe scaffolding has the potential to result in death or serious injury.

CHAPTER-05

CONCRETING

5.1 CONCRETING

Concrete is a construction material made from a mixture of cement, aggregate (sand or gravel), water and sometimes admixtures in required proportions. Following are the major steps which involved in concreting process:

Fig: 5.1 Concreting for RCC slab

5.2 Steps in Concreting

Batching

The process of measuring different concrete materials such as cement, coarse aggregate, sand, water for the making of concrete is known as batching. Batching can be done in two different ways.

- Volume Batching
- Weight Batching.

In volume batching the measurements of concrete materials are taken by volu e & On the other hand the measurements are taken by weight in weight batching.

5.2(a) Mixing

In this process, all the materials are thoroughly mixed in required proportions until the paste shows uniform color and consistency. Hand mixing and machine mixing are the two different methods of mixing.

Fig: 5.2(a) Mixing the concrete

5.2(b) Transportation

When the mixing is done properly the freshly made concrete is then transported to the construction site, this process is known as transportation. After that, the concrete is correctly placed on the formworks.

Concrete can be transported to the site location in two ways

- Manual Transportation.
- Mechanical Transportation

Fig: 5.2(b) Transportation of concrete to RCC slab

Types of transportation of concrete

1. Pans
2. Wheel
3. Barrows
4. Transit mixers
5. Chutes
6. Belt conveyors
7. Pumps
8. Tower cranes

5.3 COMPACTION

Compaction is the process in which the air bubbles are eliminated from the freshly placed concrete. It is required to increase the ultimate strength of concrete by enhancing the bond with reinforcement.

Fig: 5.3 Compaction using vibrator

5.4 CURING

Curing is the process in which the concrete keeps its moisture for a certain time period to complete the hydration process. Curing should be done properly to increase the strength of concrete.
Required Curing days:

Ordinary Sulphate Resistant Cement – 8 Days. Low Heat Cement – 14 Days.

Fig: 5.4 Curing

CHAPTER-06

BRICK WORK

6.1 BRICK WORK

Brickwork Construction Specifications

1. Ensure you are using good quality bricks
2. The bricks should not be soaked in water prior to use. However, a light moistening with water may be done to avoid absorption of water from the cement mortar.
3. Before commencing masonry work, the line out shall be carried out for the entire area using a steel tape. The dimensions shall be checked with GFC (Good For Construction) drawings.
4. The brick masonry shall be preferably laid in a composite mortar with mix ratio as mentioned in specification and drawing.
5. The mortar proportions shall be either 1:4 or 1:6. The mortar, when mixed, shall have a slump of 75mm.
6. The thickness of mortar joints shall be 10 mm both horizontally and vertically. The mortar shall be spread over the entire top surface of the brick.
7. The mortar shall be raked out from the joints with a trowel of each course and is laid to a depth of 10mm to 12 mm, so as to ensure the good bond for the plaster.
8. The height of the wall to be done in a day's work shall be restricted to 1 meter.
9. The first course of masonry shall be laid with great care, making sure that it is properly aligned, leveled and plumbed.
10. The bricks for this course shall first be laid dry, (that is without mortar) along with a string tightly stretched between properly located cornerstones. When the bricks are set in proper position, the two cornerstones shall be removed, a full mortar bedspread and these bricks laid back in place truly level and plumb.
11. The string shall then be stretched tightly along the faces of the two corner blocks and the faces of the intermediate ones adjusted to coincide with the line.
12. Thereafter each brick shall be removed and re-laid over a bed of mortar. After every three or four blocks have been laid, their correct alignment, level, and verticality shall be carefully checked.

13. As each course is laid at the end/corner, it shall be checked for alignment and level or straight – edge to make certain that the faces of the brick are all in the same plane. This precaution is necessary to ensure truly straight and vertical walls.

Fig: 6.1(a) Wall without plastering

Fig: 6.1(b) Wall Construction

Types of Bonds in Brick Masonry Wall Construction

The most commonly used types of bonds in brick masonry are

- Stretcher bond
- Header bond
- English bond
- Flemish bond

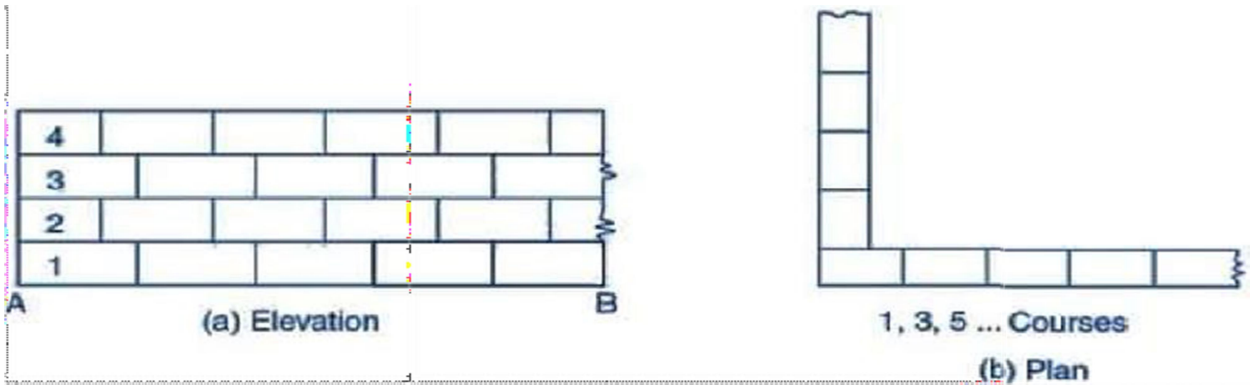
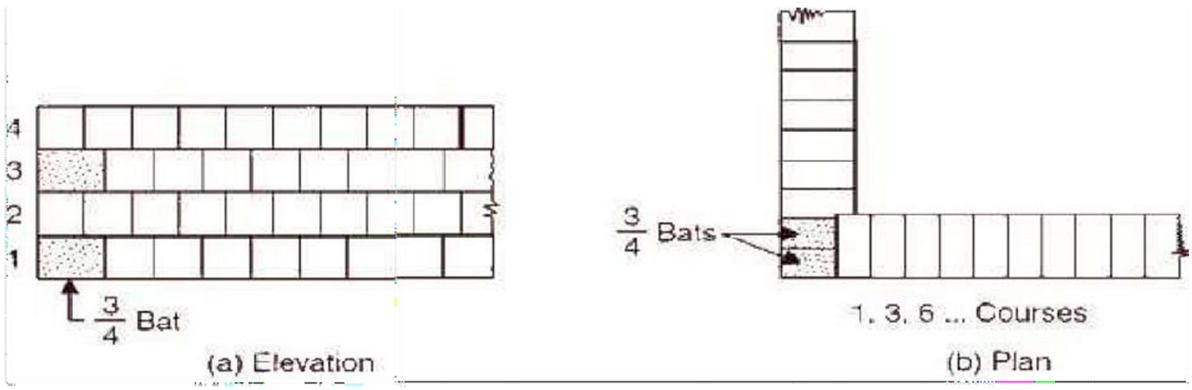


Fig: 6.1(a) Stretcher bond



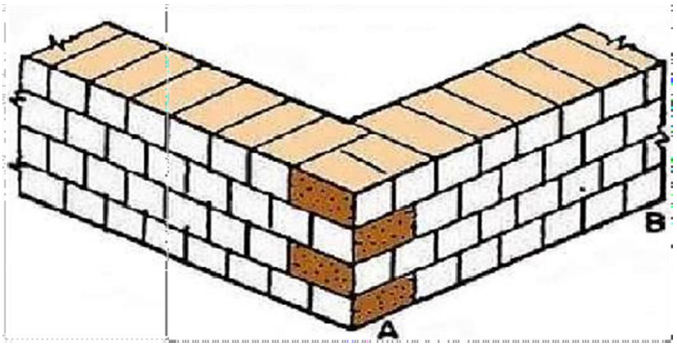


Fig: 6.1(b) Header bond

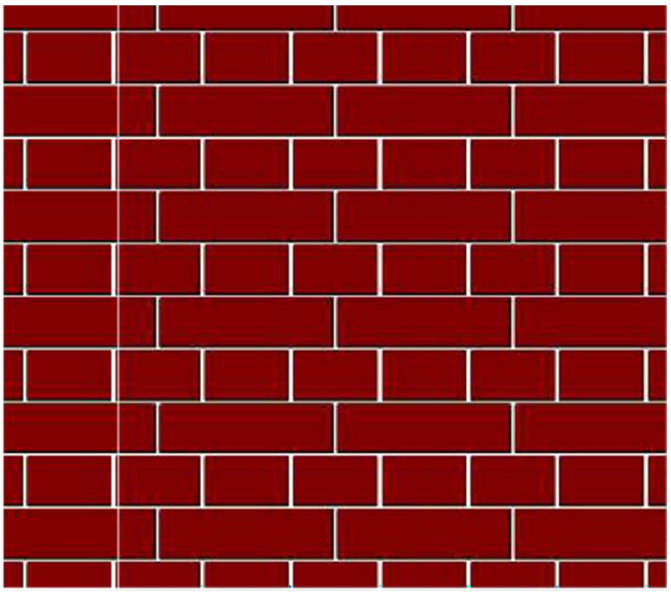


Fig: 6.1 (c)English bond

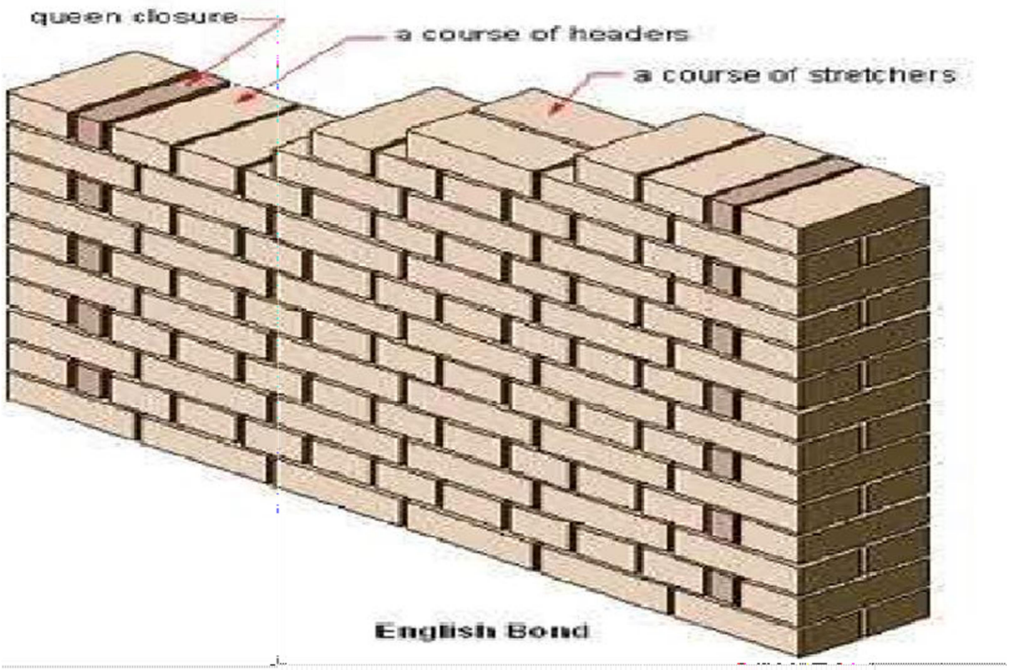
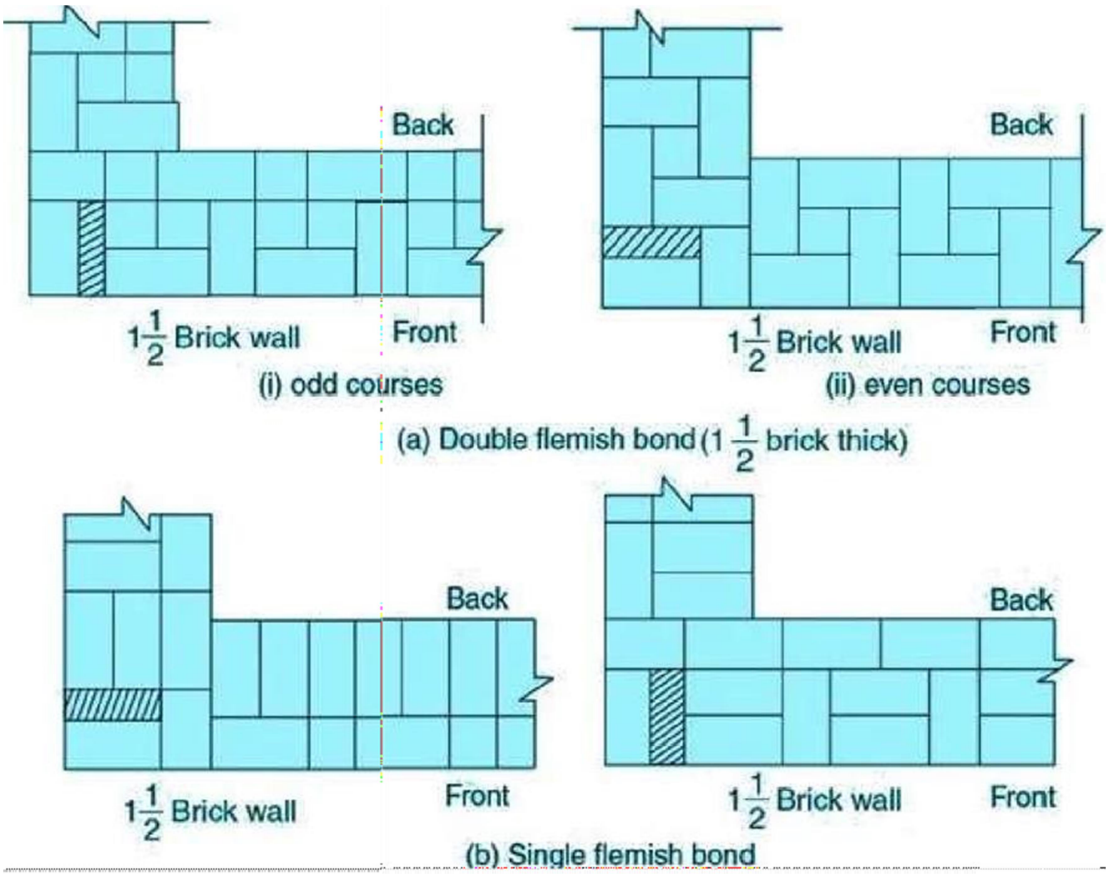


Fig: 6.1 (d)Isometric view of English bond



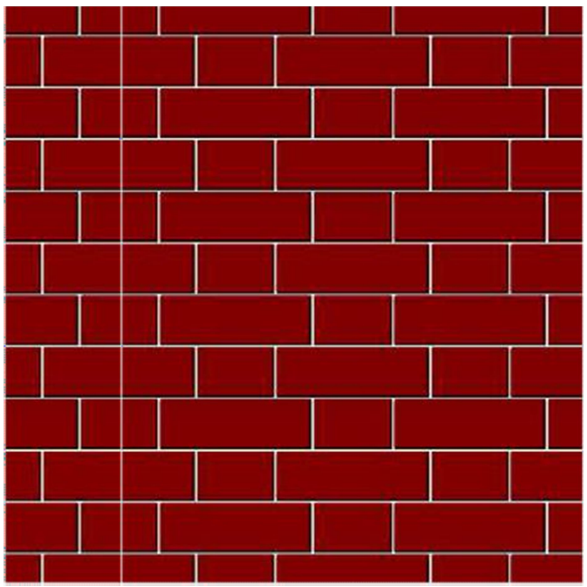


Fig: 6.1(e)Flemish Bond Front Appearance

6.2 Doors and windows frames with lintels

A lintel or lintel is a structural horizontal block that spans the space or opening between two vertical supports. It can be a decorative architectural element, or a combined ornamented structural item. It is often found over portals, doors, windows and fireplaces.

Fig: 6.2 Window

6.3 Fixing of Door and Window Frames

Frames are fixed in opening abutting masonry or concrete with iron hold fast.

Hold fasts are embedded in cement concrete block 1:3:6 ratios in the masonry walls.

While fixing frames it should be in plumb, level and in straight line.

Door and window frames can be fixed in masonry either at the time when work s in progress or in the opening left in masonry for fixing frames.Vertical members of door frames are embedded in the floor for full thickness of floor finish.

6.4 Plastering

Applying mortar coats on the surfaces of walls, columns, ceiling etc. to get smooth finish is termed as plastering. Mortar used for plastering may be lime mortar, cement mortar or lime-cement mortar. Lime mortar used shall have fat lime to sand ratio1:3 or 1:4. If hydraulic lime is used mix proportion (lime: sand) is 1:2. Cement mortar of 1:4 or 1:6 mix is very commonly used for plastering, richer mix being used for outer walls. To combine the cost effectiveness of lime mortar and good quality of cement mortar many use ortar lime-cement of proportion (cement: lime: sand) 1:1:6 or 1:1:8 or 1:2:8.

Fig: 6.4 Plastering to wall

6.4.1 The objectives of plastering are

1. To conceal defective workmanship
2. To give smooth surface to avoid catching of dust.
3. To give good look.
4. To protect the wall from rain water and other atmospheric agencies.

5. To protect surfaces against varmint.

6.4.2 Requirement of good plaster are

1. It should adhere to the background easily.
2. It should be hard and durable.
3. It should prevent penetration by moisture
4. It should be cheap.

6.5 Procedure for Plastering work

Prior to plastering ensure that wall is clean and free from dust and many loose parts of mortar from brick laying process. Sprinkle the water on the surface to ensure better sticking of plaster. Using trowel scoop an amount of plaster which could hold by hawk. Then collect half that amount from the hawk, onto the trowel, using slice and then flick of wrist to scoop it up with amortar mixture facing upwards. Then starting at the bottom of the wall, use nice and smooth strokes with the trowel and press the mortar onto the wall and try to distribute the plaster evenly on required area. Allow the plaster to dry. Scratching should be done after some hardness is achieved if in case another layer of plaster is needed or if wall tiles are to be laid.

6.6 Defects in plastering: There may be also defects in plastering such as

Cracks

This may be due to old surface is not properly dressed, bad workmanship, and due to expansionand shrinkage in plastering coat during drying.

Efflorescence

Sometimes soluble salts present in plaster making material and bricks. They appeared on the plastered surface in white patches and produce ugly appearance. It may be removed by brushing and washing several times.

Blistering of plastered surface- small patches swell out beyond the plastered surface like boils.

Falling out of plaster - Due to excessive thermal variation in plaster, in adequate bonding between coats of plaster and due to imperfection adhesion of the plaster to the background.

CHAPTER-07

FLOORING AND FINISHING

7.1 FLOORING:

Purpose of flooring is to get a good hard, level and beautiful surface for living. The floors directly resting on the ground are known as ground floors while the floors of each story are known as upper floors.

Types of Flooring

1. Tile Flooring
2. Stone Flooring
3. Wood Flooring or Timber Flooring
4. Terrazzo (Marble Chips)
5. Flooring Marble Flooring
6. Mosaic Flooring
7. PVC Flooring
8. Glass Flooring
9. Laminate Flooring
10. Carpet Flooring
11. Brick Flooring
12. Concrete Flooring
13. Mud Flooring
14. Cork Flooring
15. Acid Resisting Flooring
16. Linoleum Flooring
17. Rubber Flooring
18. Magnesite Flooring

Fig: 7.1 Mosaic Flooring

7.2 procedure of tiles laying

- Use cement and sand mortar in the ratio of 1:6. Add some water to create consistent paste.
- Soak the tiles in water for at least 30 minutes.
- Apply a 12-15mm of mortar, it should be spread evenly. Fine slurry should be applied to back of tile, place it on floor and press it gently.
- Epoxy grout is used to fill the gap between tiles (after 24 hours)
- Curing is done for 3 days

7.3 Skirting

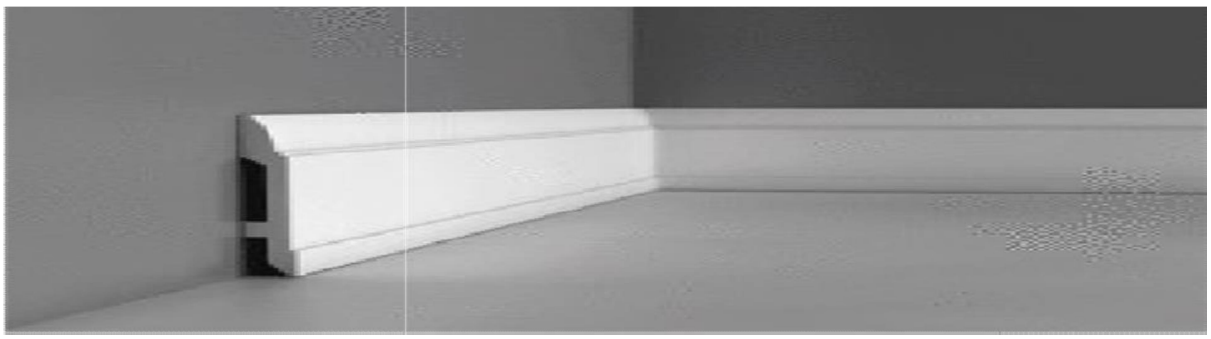


Fig: 7.3(a) Skirting

Fig: 7.3 (b) Skirting

7.4 Nosing

Types of nosing

- Full nosing
- Half nosing

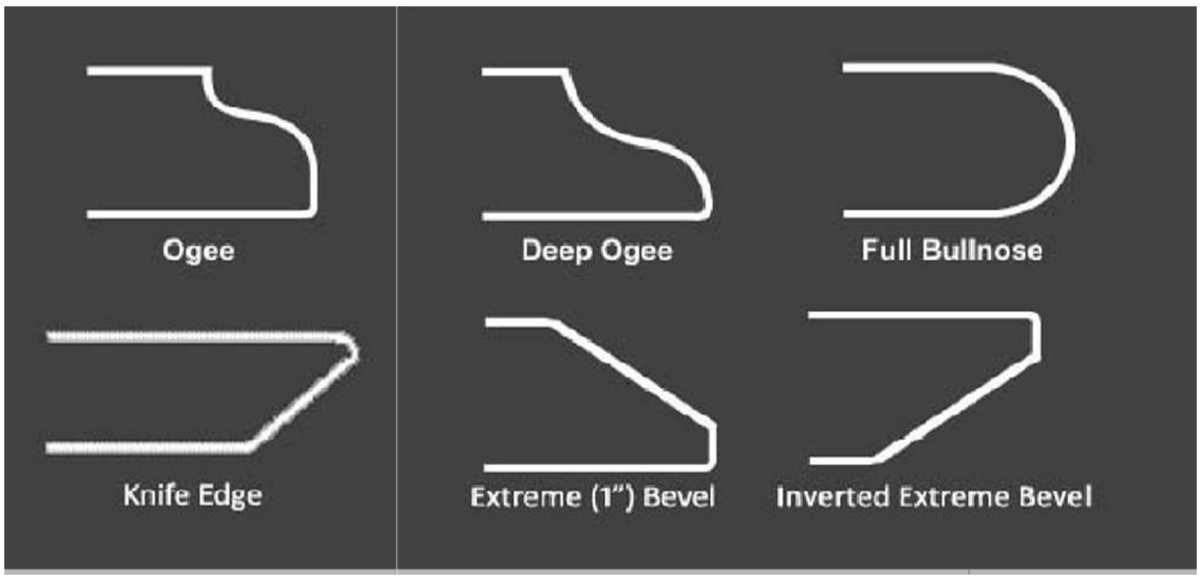


Fig: 7.4 (a) Nosing

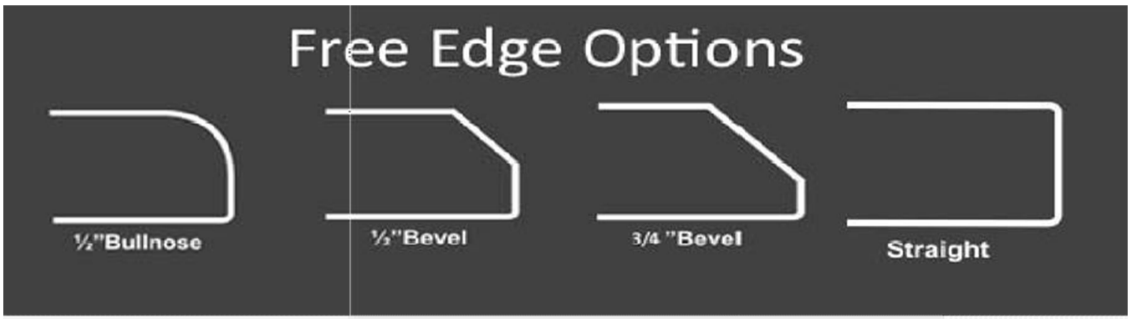


Fig: 7.4 (b) Nosing

Fig: 7.4 (c) Nosing

Fig: 7.4 (d) Shape the Nosing

7.5 Wall tiles

Fig: 7.5 (a) Tiles

Fig: 7.5 (b) Tiles for kitchen

7.6 Skylight

Skylights are light transmitting fenestration (elements filling building envelope openings) forming all, or a portion of, the roof of a building's space for daylighting purposes.

Materials

Skylight glazing is generally made from plastic or glass. Units with insulation tend to hold up longer than single-layer skylights.

Plastic glazing, often in the form of acrylics, is more economical and very sturdy. Unless it has a special coating, it can yellow over time and tends to allow more UV rays into the space. Glass glazing requires a slightly larger initial investment but provides long-lasting durability. Solar-heat control glazing adds energy efficiency.

Sky lighting types include roof windows, unit skylights, tubular day lighting devices (TDDs), sloped glazing, and custom skylights. Uses include: day lighting elements used to allow direct and/or indirect sunlight, via top lighting. providing a visual connection to the outdoor environment to interior occupants. sustainable building — passive solar heating, and with operable units; ventilation for passive cooling and fresh air exchange.

Types of Skylights

- Fixed skylight
- Tubular skylight
- Vented (aka roof or window) skylight

Fig: 7.6 (a) Skylight

Fig: 7.6 (b) Skylight

7.7 Bar Bending and Binding Reinforcement

Fig: 7.7(a) Slab Reinforcement

Fig: 7.7(b)Beam Reinforcement

Fig: 7.7(c) Plinth beam

7.8 Starter

A starter for a column is the lowest part of a column, which is cast before the casting of the whole column, on the top of each floor. Normally it is less than 100 mm in height. The main shuttering frame for casting of the column is fixed on this starter base for casting of the whole column.

Fig: 7.8 (a) Mould Starter

Fig: 7.8(b) Starter

7.9 Ceiling design

A ceiling is an overhead interior surface that covers the upper limits of a room. It is not generally considered a structural element, but a finished surface concealing the underside of the roof structure or the floor of a story above. Ceilings can be decorated to taste, and there are many fine examples of frescoes and artwork on ceilings especially in religious buildings.

Fig: 7.9 (a) Ceiling

Fig: 7.9 (b) Ceiling

CHAPTER-08

PAINTING

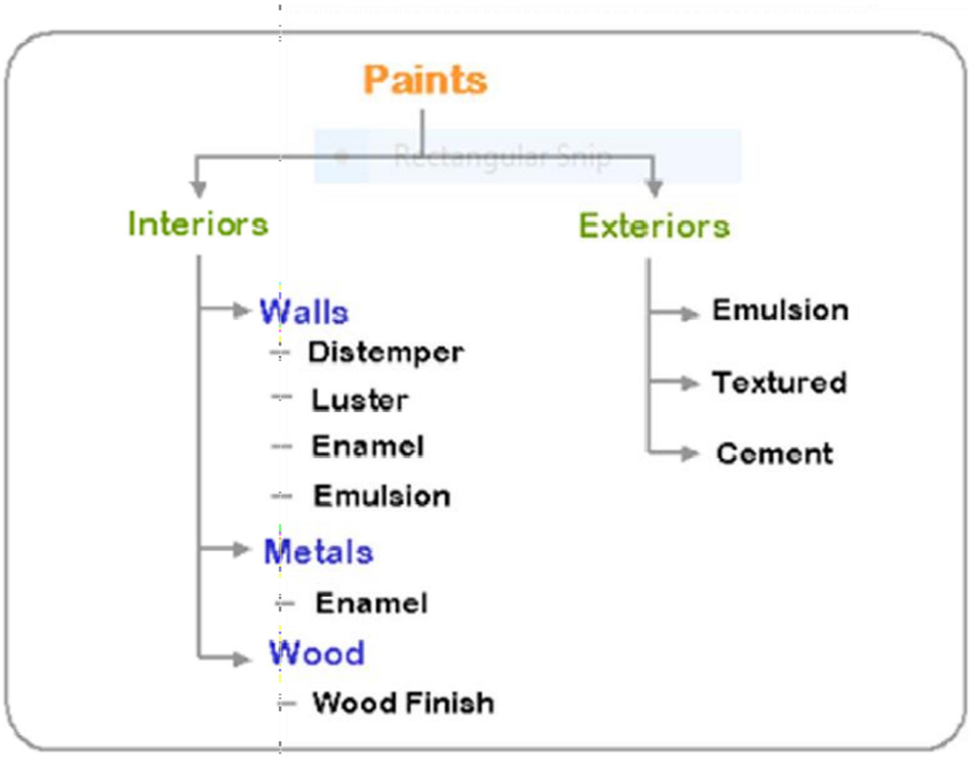


Fig: 8.1(a) Paints

Characteristics of Good Paints

1. Wear ability

Paint must be resistant to the wear and tear of the atmosphere and should maintain its color, smoothness and finish for a long time. See also Weathering of Rocks

2. Covering ability

Paints should cover the body uniformly and homogeneously on which it is applied and the finish should be smooth and uniform.

3. Ease of cleaning

When it is required to clean the paint, it should be easy to remove i.e A good paint should not react chemically with the materials but should only cover its surface.

4. Environmentally Friendly

Paint should be water based and must not have any plasticizers or biocides as solvents.

5. Aesthetic

It should provide a comfortable room climate and must not allow moulds and algae to grow on it.

6. Practical and cost effective

The other qualities of a good paint are that they must be cheap, ready to use, long lasting and should colour fast. In most cases Price is the decisive factor in selection of paints.

8.1 PAINTING

1. SURFACE PREPARATION

The surface should be cured and completely dry.

2. APPLYING PRIMER

It is applied to provide adhesion between surface and paint, it also makes the surface smooth. One coat of primer is applied.

3. APPLYING PUTTY

It is applied to repair cracks and to make smooth and level surface. Two coats of putty is applied and then it is rubbed. (Check for any undulations using light, if any undulations found, apply one coat of primer and touch up putty).

4. APPLYING PAINT

Paint is applied two or three coats on the surface. After completely drying up the putty the first coat of paint is applied by roller.

Fig: 8.1(b) Painting

8.2 Final completion and handing over theproject

The handover of the site to the client takes place once the contract administrator has confirmed that the works defined in the contract are complete. However, it should be planned well in advance, and any special requirements included in appointment documents and contracts.

Handover may take place during a handover meeting following an inspection of the site.

1. During handover the client should be issued with
2. Keys, fobs and transmitter controls for the development. The health and safety file.
3. The draft building owner's manual. The building log book.
4. A building user's guide.
5. Up to date testing and commissioning data.
6. All certificates and warranties in respect of the works.
7. As-built drawings from consultants and specialist suppliers and contractors (or as manufactured and installed). Or an as-constructed building information model.
8. Copies of statutory approvals, waivers, consents and conditions.
9. Equipment test certificates for lifts, escalators, lifting equipment, cradle systems, boilers and pressure vessels.
10. License such as licenses to store chemicals and gases and to extract groundwater from an artesian well.
11. The project may not be complete when delivered to the stakeholder. Some final project areas that may need to be considered are:
12. Documentation requirements Complete drawings.

Final report

Provision of people trained on operating product of facility Customer training

Project audit

Update risk and work registers Settle all invoices

Equipment and hire returns: Warranty and guarantees settled Update financial systems

8.3 Document lessons learned

Although the project close-out and handover are typically the final phase of the project this does not mean that the relevant activities should only commence when the previous stage is

complete. On the contrary, it can be seen by the list above that work such as as-built drawings should be developed as the project progresses through the earlier stages and be ready for handover as soon as the work is complete.

Fig: 8.3 (a) 3D Elevation

SITE VISIT PHOTOS, DURING MY INTERNSHIP:

CHAPTER-09

CONCLUSION

The main aim of studies within this project was to investigate how a structure is constructed within its desired properties. We get knowledge about the basic & advanced techniques of building construction as well as saw the challenges which a civil engineer has to face during construction i.e., labor problems, cost management, environmental challenges etc. We cleared our many doubts regarding building construction. We had seen dewatering system at project site for construction which is not used at our state anymore, so it was a new thing for us. Although are subjects more important for technicians, in the project we have been Studied some mechanic or electro-mechanic machinery such as the ready-mix plant because basic knowledge about their working is important for an engineer but also because was the opportunity to see and understand them.

The aim of a civil engineer is to plan and design various types of structures. This will not be possible unless he involves himself in ground-oriented tasks. A project engineer is mostly responsible for implementing the structural design on ground. He needs to have depth of knowledge and fore slightness so that his project does not stuck up for material scarcity, manpower, any special equipment or any other project related problem like requirement of dewatering in an excavation pit. This should be also theoretically covered along with practical orientation.