Bar bending& concreting

Level II

Learning Guide 35

Unit of Competence: produce cement concrete casting

Module Title: producing cement concrete casting

LG Code: EIS BBC2 M10 LO2-LG35

TTLM Code: EIS BBC2 TTLM 1019V1

LO2:- Fabricate cement castings

Instruction Sheet	Learning Guide 35

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

LO2. Fabricate cement castings

- Preparing formwork/molds and reinforcements
- Mixing, placing and compacting materials
- Removing castings
- curing

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to**

- prepare formwork and reinforcements as per specification
- cast materials to make mixed, placed and compacted to contractor's working instructions
- Cast removed and cured to requirement and specifications

Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information "Sheet 1, Sheet 2, Sheet 3 , Sheet 4," **in page 3 , 11, ,27 , 37 and** .
4. Accomplish the "Self-check 1, Self-check t 2, Self-check 3 , Self-check.4 **in page 17, , 27 , 31, 40 and 43** respectively
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 " **in page -34--.**
6. Do the "LAP test" **in page – ---**

Information Sheet-1	Preparing formwork/molds and reinforcements

Lo2.1 Formwork, sometimes known as **shuttering** or **casing**, is the boarding or sheeting which is erected to contain and mould the wet concrete during placing and the initial hardening period

- **Formwork** is a temporary structure that is required to support and Form concrete members.
- **Form work** is the complete structure erected to support the wet concrete.

Type of form work

- Timber form work**:** used for shuttering exposed concrete work should have smooth and even surface on all faces, which are to come in contact with concrete
- Plywood form work **:**use of plywood instead of timber planks is getting popular these days. ensures quality surface finish and is especially recommended in works where large exposed areas of the concrete are to be constructed such as floor slab, faces of retaining walls, etc.
- **Steel formwork:** There is no danger of the formwork absorbing water from the concrete and hence the chances honey combing are minimized. They are not liable to shrink or distort an hence it is possible to achieve better workmanship and higher accuracy by use of steel forms.
- **Aluminum formwork** enables the walls and slab to be placed monolithically in the same operation

Consistent concrete shapes and finishes are obtained The smooth finish of the concrete greatly reduces or eliminates the need for costly plastering.

- Formwork for column

Column Formwork is to be designed to be able to accommodate relatively high fresh concrete pressures as comparatively small cross-sections are concreted quickly **Column formwork** is comprised of panel **formwork** elements or based on individual **formwork** girders; steel **formwork** is also availabl

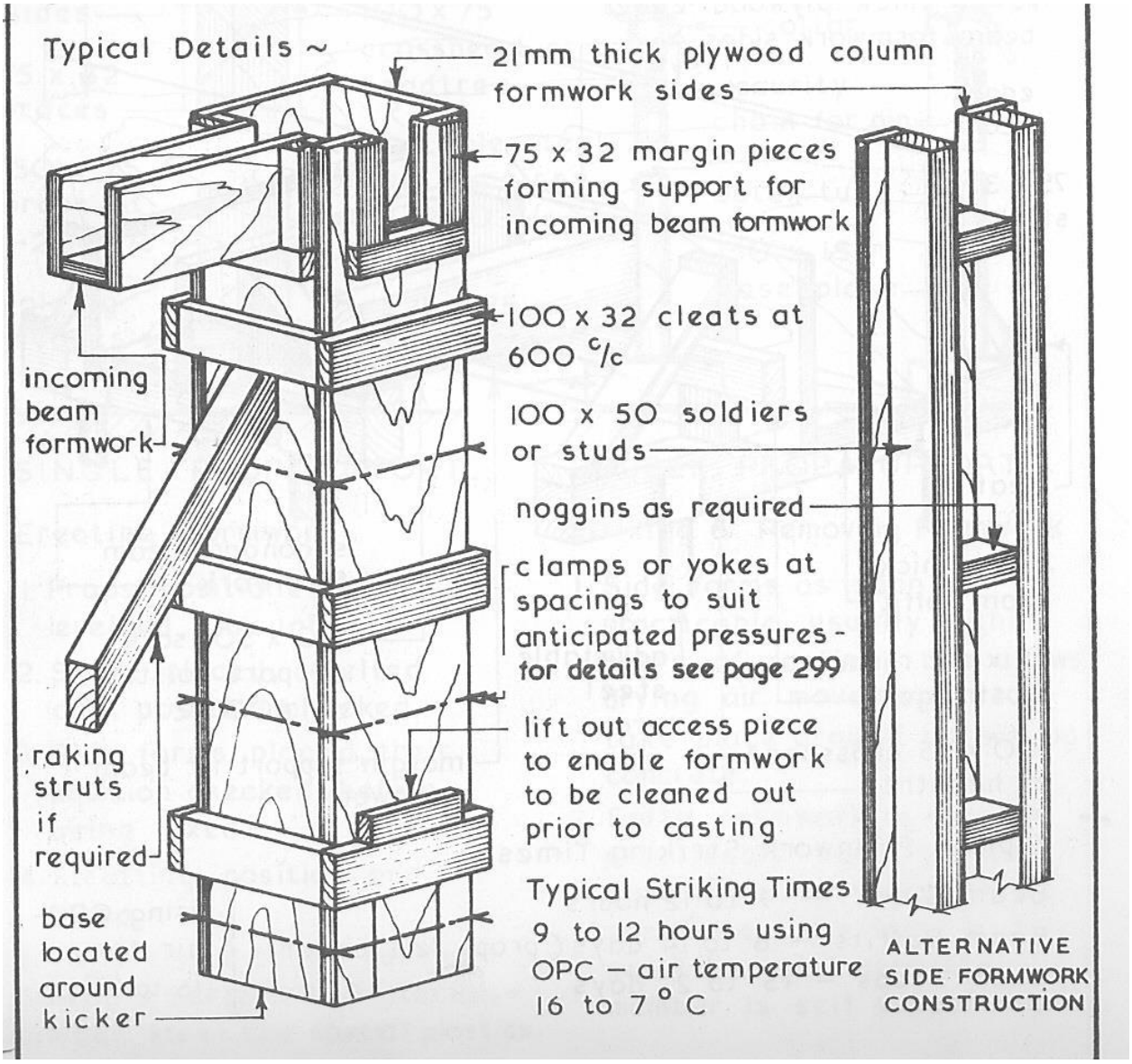
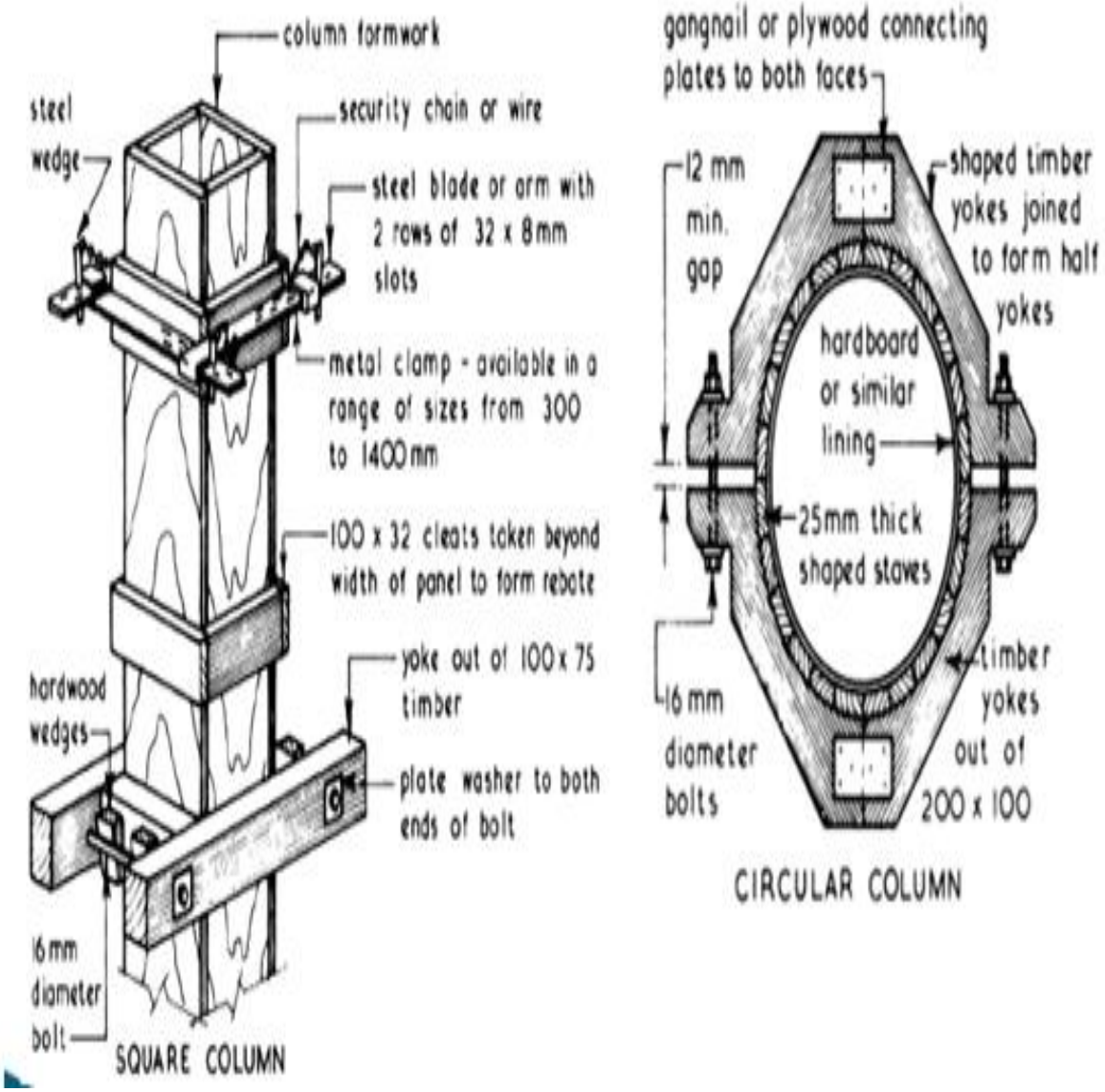


Fig.1 Timber form work

FORMWORK FOR COLUMNS



Still form work Fig.2

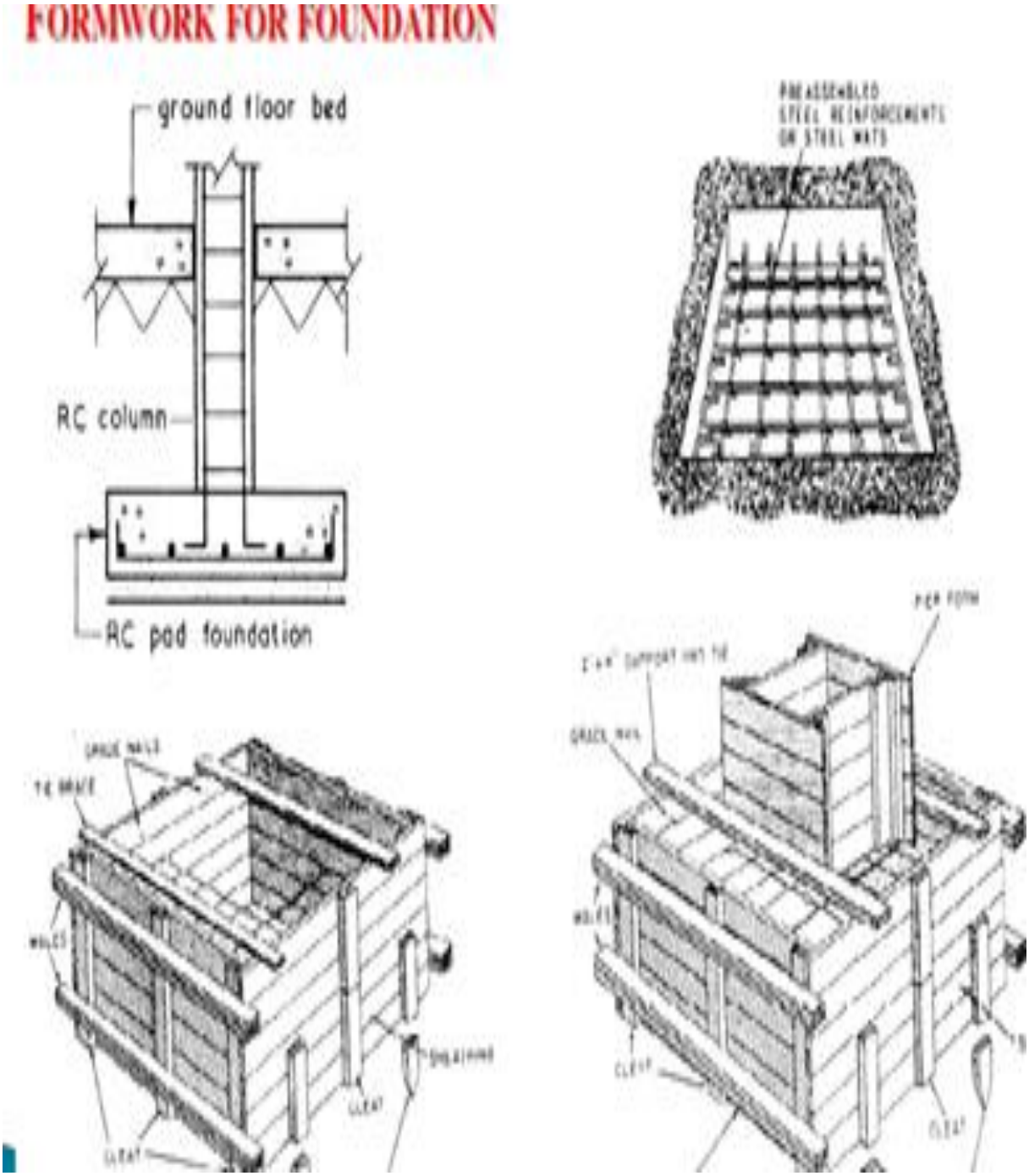


Fig. 2 Form work Foundation

FORMWORK FOR BEAMS

this is basically a three sided box supported and propped in the correct position and to the desired level.

- The beam formwork sides have to retain the wet concrete in there quire shape and be able to withstand the initial hydro static pressure of the wet concrete,
- Whereas the formwork soffit apart from retaining the concrete has to support the initial load of the wet concrete and finally the set concrete until it has gained sufficient strength to be self supporting.
- It is essential that all joints in the formwork are constructed to prevent the escape of grout which could result in honey combing and/or feather edging in the cast beam.

- The design of the shuttering should allow the slab and beam side forms to be removed while the beam soffit remains supported.

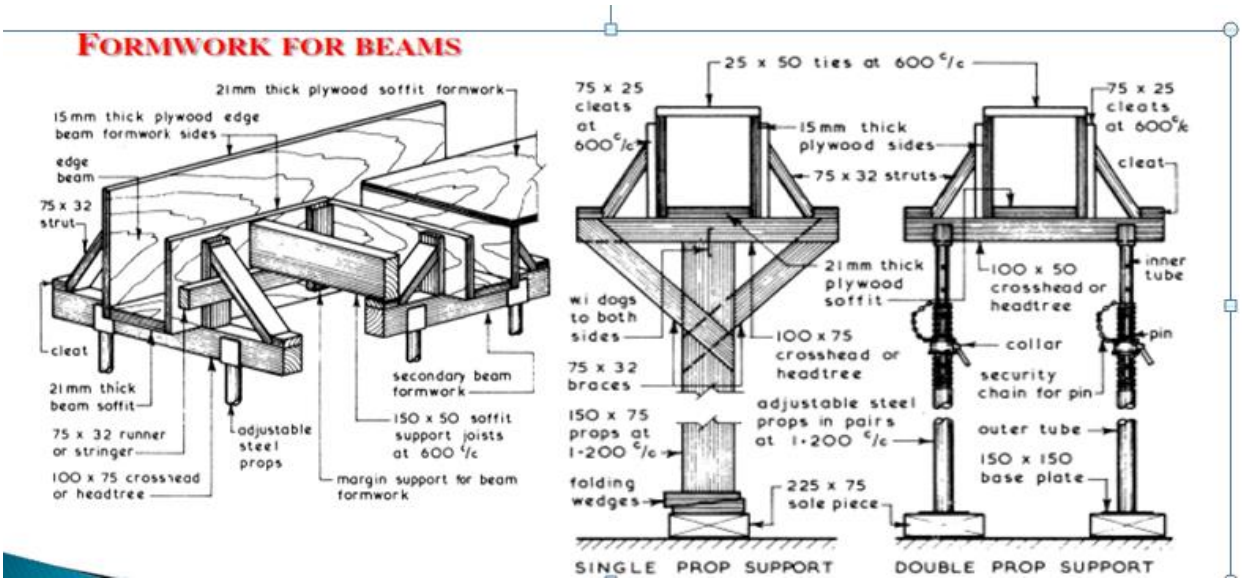
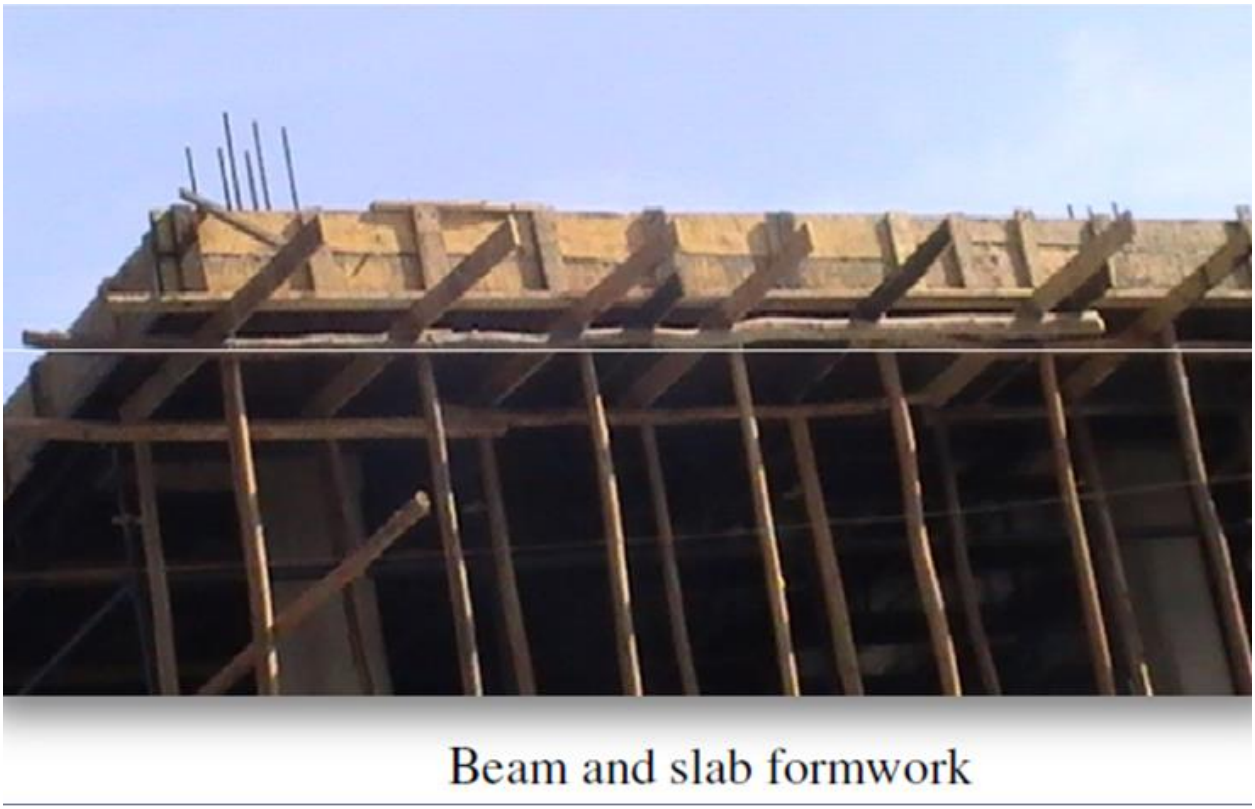


Fig.3



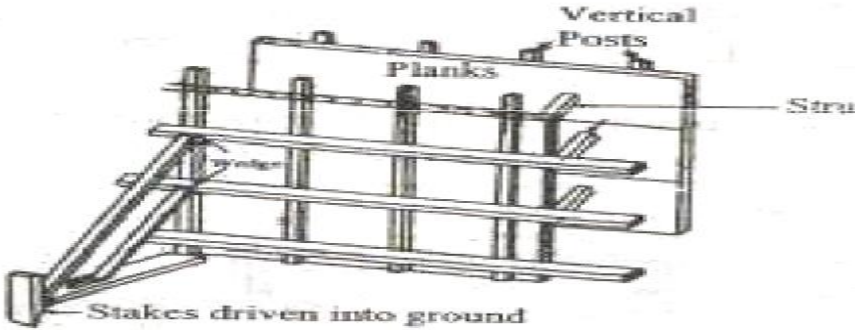
Beam and slab formwork

Fig.5

FORMWORK FOR WALLS

This type of form work consists of timber sheeting supported by vertical studs or posts and horizontal struts or walls

Fig 6



FORMWORK FOR STAIRS

- The landing is first set in position. The process for constructing the landing is the same as that of floors.
- After the landing has been set, the flight will be constructed.

8. RELEASING AGENT

- Facilitate the striking or removal of the formwork.
- Prevent the concrete adhering to the form face.
- Most oils will fulfill the function of a release agent, but different oils can produce ***blow holes*** or ***variations in the color*** of concrete, affect ***efflorescence***, or ***retard the hardening*** of the surface.

FIG.8

1. REINFORCEMENT STEEL

1.1 introduction

Prevents concrete bad effects of temperature and shrinkage by providing distribution reinforcement perpendicular to the main tensile reinforcement.

Good property of reinforcing bar

The reinforcement bar should be able to develop good bond with the concrete so that the stresses may be transferred from one material to another.

It should have high tensile strength It should have the same temperature coefficient of expansion and contraction as concrete that thermal stresses do not develop.It should be cheap and available.

1.2 Type of steel bar

- **1,2.1plain (round) bar (mild steel bars) diameter 6 -32mm** ordinary steel bars are used for reinforcing concrete .It develops bond with concrete .The grip depend up on the grades of concrete ,ribs(lugs)provided around the reinforcement and degree of compaction. The yield stress of round (ms) steel is 50% -60% of the ultimate tensile strength. When structure of a building is designed using mild steel large quantity of reinforcement are required because of less yield stress. This also affects the cost of a **Grade beam**.

- A **grade beam** or **grade beam** footing is a component of a building's foundation. It consists of a reinforced concrete **beam** that transmits the load from a bearing wall into spaced foundations such as pile caps or caissons. building.

Grade beam bar Fig.7

- A **column** or **pillar** in architecture and **structural** engineering is a **structural** element that transmits, through compression, the weight of the **structure** above to other **structural** elements below. In other words, a **column** is a compression member.

Column reinforcement

- **Slab** supported directly by columns are called flat **slab**. **Slab** supported on two sides and bending takes place predominantly in one direction only is called One Way **Slab**. ... In one way **slab** main **reinforcement** is parallel to shorter direction and the **reinforcement** parallel to longer direction is called distribution steel.

Two way slab

one way slab

- Star. It is a structure consisting of steps leading from one floor to another. This may have a series of steps or flights of steps connected by loadings, for passing from one level to another.
- It is arrangements of treads, risers, stringers, newel parts, hand rails and balustrades so designed and constructed as to provide an easy, safe, and quick access to the users of different floors.

Ramp stair

Fig.11

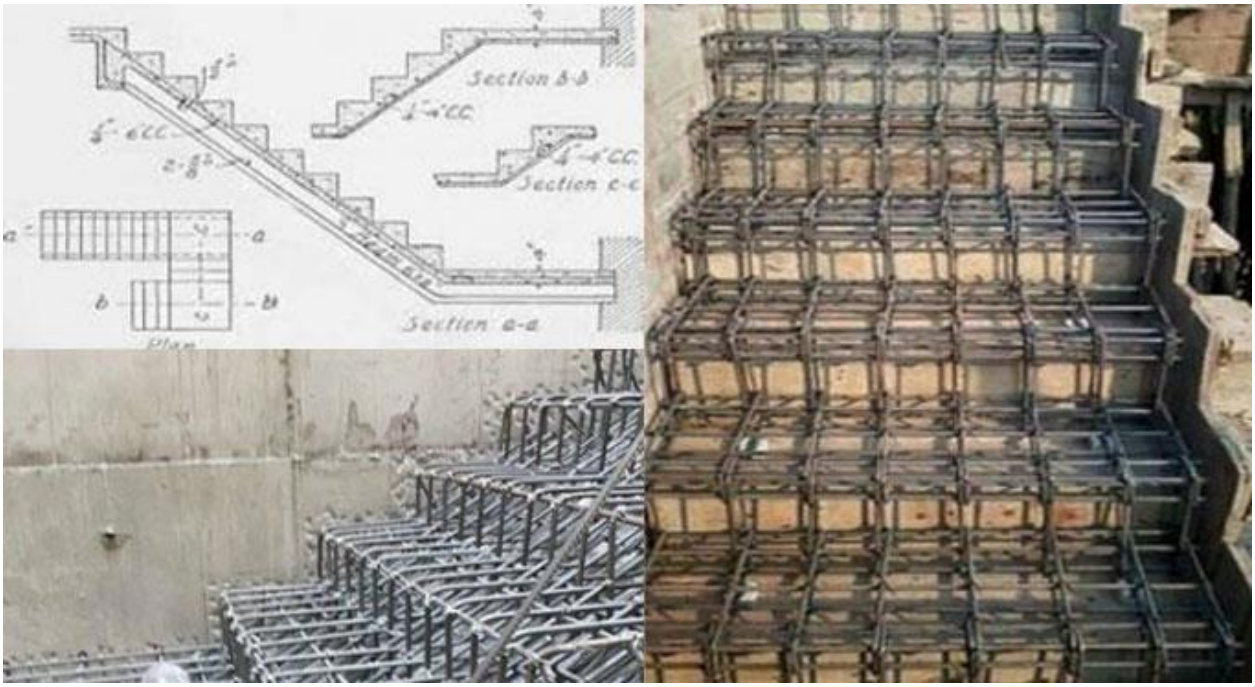


Fig 12 Dog lag stair

Fig 12 Curved stair concrete

Self-Check 1	**Choice**

Instruction Choice the correct answer from given question (2 mark each)

1. indicates a temporary structure erected to receive wet concrete
   A. form work B. **Scaffolding** C. concrete D none
2. the formwork is to be used for small works and that took a few times
   A. still form work B. Timber form work C .play wood form work D. none
3. The smooth finish of the concrete greatly reduces costly plastering.

A. Timber form work B. Aluminum form work C. Still form work

4. Are typically patented, and allowable loads are generally published by the manufacturers

A. still form work B. Timber form work C .play wood form work D. none

5. Is used as sheathing that contacts concrete for job-built forms and prefabricated form panels.

A. still form work B. Timber form work C .play wood form work D. none

6. **Prevents concrete bad effects of temperature and shrinkage**

A. still form work B. Timber form work C Reinforced bar D. n

Answer sheet

Name _____ **Date**_____

1.

2.

3.

4.

5.

6.

Note: **Satisfactory rating – abave6 points** **Unsatisfactory - below 6 points**

Information Sheet-2	Mixing, placing and compacting materials

Batching is the process of measurement of cement, coarse aggregate, fine aggregate and water for each operation of concrete making.

2.1Method of batching

Batching is done in two ways

I. By volume (volume batching)

II. By weight (weight batching)

I. Volume batching

A) **Batching of cement**. Cement is always measured by weight. Mostly it is used in terms of bags. One bag of cement weights 50 Kg as a volume of 35 letters. ($0.035m^3$) Cement should not be batch by volume because its weight per unit volume varies according to the way the container is filled.

B) **Batching of aggregate by volume** a gauge box is used for batching of fine and coarse aggregate by volumes is shown in the figure below. The box should not be too shallow. It should be completely filled with the aggregate s. The top of the materials should be struck of f level with a straight edge. The ratio of materials of concrete decides the capacity of the box. enerally capacity equal to the volume of one bag of cement. Convenient sizes of gauge boxes to suite different proportion given in the table below

Capacity in liter	Inside measurement in cm		
	Length	Breadth	Depth
25	25	25	40
30	25	25	48
35	27	27	48
40	29	29	48
45	30	30	50
50	31	31	52

Concrete		Material required to produce 1 m^3 concrete		
Mix	Class	Cement (kg)	Sand (m^3)	Gravel (m^3)
1:4:8	C10	3 bags (150 kg)	0.48	0.96
1:3:6	C15	4 bags (200kg)	0.48	0.96
1:2:4	C20	5.5 bags (275kg)	0.44	0.88
1:2:3	C25	6.5 bags (325 kg)	0.52	0.78

II. Weight batching: -

Modern ready mixed concrete plant.

In weight batching the ingredient of concrete are measured by weight. Generally, weight batching is in practice for constructions where high quality concrete is required. Weight batching is much more accurate than volume batching. Different types of weight batching is available the particular type to be used depends up on the nature of the job. Large weight batching plants have automatic weighting equipment. These are supervised by a qualified and experienced engineer.

Batches of concrete are based either on one bag of cement or its multiples unless bulk cement is used and weighed separately. In this type of batching, no correction is needed to allow for the bulking of sand, but an allowance should be made for weight of water contained by the weight aggregate. For comparatively smaller works weight batch can be done by:-

1. Simple spring balances
2. Plate form weighing machines
3. Automatic weighing mach

1.2.1. **Mixing and discharging of concrete**

Hand mixing For hand mixing, a water – tight platform at least 2m and 3.5 m long or hard concrete surface should be provided. Since a platform should preferably be made of boards 3 to 5 can thick, tongued and grooved so that joints are tight and the platfo4rm is rigid.

Working procedure

Following is the stepwise procedure for mixing concrete by hand.(mixing procedure)

a) Spread out a measured quantity of sand evenly on the mixing platform
b) Spread to cement uniformly on this sand and mix it till the color of the mixture is uniform
c) Spread this mixture evenly again on the platform.
d) Spread on the platform the course aggregate evenly on the surface Mix the material dry by turning with should until the stones have been uniformly distributed throughout the mixture of cement and sand.
e) Spread this day mixture again and make a hollow in the middle of the mixed pile and pour water slowly into it half to three quarters of the total quantity required and start remixing taking care to see that no water escapes the mixture.
f) Normally mixing time should not exceed 3 minutes

g) At the end of the day do not forget to wash the mixing platform or surface and hand tools clean of all concrete so that it is sandy for re – use next morning.-

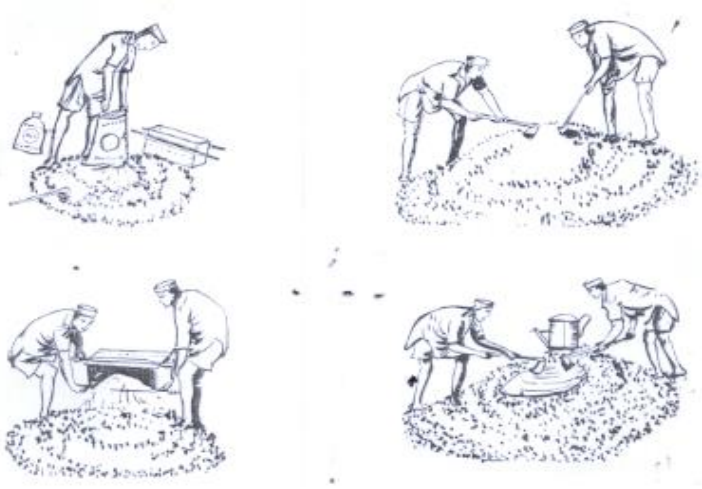


Fig.13

Concrete placement is an important process in the construction that determine the success of the structure and its life. Technical and environmental conditions are taken into strict consideration while **placing** the **concrete**. ... The **concrete** is transported, poured, vibrated, matured, form removed and cure

Modern **Concrete placement Method** **fig.13**

Before you can place your concrete, you need

- Formwork ready and checked
- Batches of mixed concrete arriving quickly and regularly
- All the material and equipment ready.

Basic Requirements for Placing Concrete

- Preserve concrete quality
- Water-cement ratio
    - Slump
    - Air-content
    - Homogeneity
- Avoid separation of aggregate and mortar
- Avoid excessive horizontal movement
- Consolidate adequately
- Maintain sufficient placement capacity
- Choose the right equipment for the concrete

Transporting of concrete transporting the concrete mix is defined as the transferring of concrete from the mixing plant to the construction site.

- Mortar Pan. It is a labor intensive method and generally used for small works. ...
- Wheel barrow or Hand cart. ...
- Bucket and Ropeway. ...
- Truck Mixer and Dumper. ...
- Belt Conveyor. ...
- Chute. ...
- Skip and Hoist. ...
- Pump and Pipe-line method

The precaution to be taken while transporting concrete is that the homogeneity obtained at the time of mixing should be maintained while being transported to the final place of deposition. There are different ways of handling concrete, and the choice will depend mostly on:

a) The amount of concrete involved

b) The size and type of construction

c) The topography of the job site

d) The location of the batch plant

e) The relative cost

Compaction of concrete

Compaction of concrete of removes entrapped air from freshly poured concrete. It also packs the aggregate particles of the concrete mix together. The result is a stronger, denser concrete with low permeability.

How is Compaction Done?

Tamping concrete is a common compaction method on many job sites, but using vibration is by far the most efficient method for long-lasting concrete that looks great. Concrete construction projects often use external, surface, or internal vibrators for concrete compaction

Internal Vibrators

Internal vibrators are the most common means of compacting concrete through vibration.

These vibrators must be placed vertically into poured concrete. The vibration action helps bring air bubbles to the surface of a poured slab. Once the air bubbles stop surfacing, place the machine in another area of the concrete slab.

External Vibrators

External vibrators are frequently electric or pneumatic devices mounted to the exterior of a work form. These cover a much larger area than other vibrators and are usually spaced 6 feet apart from each other.

Surface Vibrators

Surface vibrators work from the top surface of the concrete, compacting the surface and what's immediately below it. Contractors may use these with a screed to help level and

Fig 5 way of compaction

Self-Check 2	Choice

Choose exam

1.carried out by hand it requires a suitable surface to ensure that the mix is not contaminated

. A Machine mix B. hand mix C .none

2. the most commonly found type on construction sites is the tilting drum mixer

A Machine mix B. hand mix C .none

Self-Check 2	Machining

Machining (2point each)

3. C.10 A. 5.5bag(275K.g)

4.C.15 B,6.5 bag(325 K.G)

5. C.20 C.4.bag (200 k.g)

6. C.25 D.3 bag(150K.

Answer sheet

Name_____

date _____

1.

2.

3.

4.

5.

6.

Note: **Satisfactory rating – abave6 points** **Unsatisfactory - below 6**

OPERATION SHEET-2.1

OPERATION TITLE:- place and mix concrete

PURPOSE: the purpose of this practice is :

- To apply good quality mix and compact
- To develop practical skills

CONDITIONS OR SITUATIONS FOR THE OPERATIONS:-

- ✓ Safe working area environment
- ✓ Availability of proper tools and equipments
- ✓ To avoid segregation and wastage of concrete

EQUIPMENT AND TOOLS

- ✓ **mould**
- ✓ **trowel**
- ✓ **Mixer**
- ✓ **Shovel**

CONSUMABLE MATERIALS

- **Cement -water**
- **Sand**
- **Aggregate**

PROCEDURE,

1.Secure workshop manuals, Specifications, and tools and equipment;

2.Prepare the mix area

3.Select appropriate materials

4. measuring or batch the concrete material

5.mix concrete

6.place the concrete on the structure

PRECAUTIONS:-

- ✓ Wear appropriate clothes, shoe, helmet etc ...
- ✓ Ensure the work area hazard free
- ✓ Make workstation comfortable
- ✓ Avoid horse play

QUALITY CRITERIA:

Assured the performance of all the activities according specifications and mix ratio

Information Sheet-3	Removing castings

Removal of formwork is also important as erecting it. As soon as concrete gains enough strength to eliminate immediate distress or deflection under loads resulting from its own weight and some additional loads, formwork should be stripped to allow other construction activities to start. The operation of removing the forms is called **stripping or wrecking** the forms. Formwork can either be partially stripped by removing small areas to prevent the slab from deflecting or completely stripped to allow the slab to deflect. As a general rule, formwork supporting members should not be removed before the strength of concrete has reached at least 70 percent of its design value.

Formwork should be stripped or removed with care so as not to damage the concrete. Wedges should be slacken (loosened) gradually to avoid sudden imposition of loads on the structure. In normal circumstances and where ordinary Portland cement is used, forms may generally be removed after the expiry of the following periods:

FORMWORK STRIPPING PERIODS

OPC CONCRETE (FROM BS 8110)		
	Surface temperature of concrete	
	7⁰ C	**16⁰ C and above**
Formwork for columns, walls	18 hours	12 hours
Soffit formwork to slabs	6 days	4 days
Soffit formwork to beams and props to slabs	15 days	10 days
Props to beams	21 days	14 days

OPC CONCRETE (FROM EBCS 1995)	
	Stripping time
Formwork for columns, walls	18 hours
Soffit formwork to slabs	7days
Props to slabs	14days
Soffit formwork for beams	14days
Props to beams	21days

For other cements, the stripping time recommended for ordinary Portland cement may be suitably modified. The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slab, beam or arch as the case may be with any live load likely to occur during curing or further construction.

You may also observe following general points during stripping

- As formwork is stripped, it should be cleaned and properly stacked.
- All small parts such as wedges and bolts etc. should be stored immediately in separate containers. Such a practice reduces loss of material.
- Steel forms should be greased immediately after cleaning and before stacking.

FACTORS AFFECTING FORMWORK STRIKING

- Ambient Temperature
- Layout of concrete viz. horizontal, vertical or inclined

- Type of cement used
- Grade of concrete
- Use of retarders, plasticizers, etc.
- Feasibility of removal with props left under
- Feasibility with re-propping
- Standards of finish required
- Structural configuration e.g. simply supported or cantilever
- Curing procedures adopted

3.3 METHOD OF REMOVING FORMWORK

Pouring concrete usually requires that you construct a set of forms beforehand. The formwork serves as a frame for the shape of the concrete, holding the poured material in place as it cures. Once the concrete achieves a state of hardness that's capable of supporting its own weight you can remove the forms. Removing forms isn't a difficult process, but it is labor-intensive. It will require the use of a hammer and pry bar, but once you get started the forms just fall away from the slab, leaving you with nothing but the finished product.

Step 1

Allow the concrete to dry before removing the forms. You'll want the concrete to be hard and strong so that removing the forms does not result in a sagging surface. Allow the concrete to cure overnight.

Step 2

Remove forms starting at the top of sloping slabs. Use a hammer to remove nails from the stakes holding the forms in place.

Step 3

Remove the stakes from the ground that support the forms with a stake puller to avoid damaging the stakes or the forms.

Step 4

Pull the forms away from the sides of the concrete slab using as little force as necessary. If a form sticks to the slab or is difficult to remove, use the pry bar to pry the form upward from the ground, loosening the form from the concrete in the process. Pull the loosened form from the concrete. Be careful not to gouge the slab with the pry bar in the process.

Step 5

Remove forms on alternating sides of the slab to maintain the structural balance. For example, with a square slab start at the upper left corner, then remove the form from the lower right corner, then the upper right followed by the lower left. Remove all forms in this manner. If the forms are reusable, clean them and store them in a dry place. Otherwise dispose of the forms.

RELEASING AGENT

. Barrier **release agents** prevent adhesion by the development of a physical film or barrier between the forming surface and the **concrete**. Reactive **release agents** are chemically active and **work** by the process of a chemical reaction between the **release agent** and the free limes available in fresh **concrete**.

.

Fig.2 RELEASING AGENT oil

Self cheek 4	True or False

Write true if the statement is correct or false if the statement is wrong

1: After concrete gains enough strength to eliminate immediately formwork

2 Releasing agent removal of the formwork by preventing the concrete from adhering

3Un safe form work removing way is better practice

Matching

4. Walls, columns and vertical faces of all structural members	A.7 days
5. Soffit formwork to slabs	B.14 days
6. Beam soffits	C.18 hours
7. Removal of props under slabs :	D. 21 days
8. Removal of props under beams and arches	E.14 days

Answer sheet

Name_____ Date_____

1

2.

3.

4.

5.

6.

7.

Information Sheet-4	Curing

Curing is the name given to procedures for promoting the hydration of cement. It may be defined as the act of maintaining controlled condition for freshly placed concrete for some definite period following the depositing and finishing operations to assume the proper hydration of cement and proper hardening of concrete.

2.4.1 Advantage of Curing

i) Improves wearing quality of the concrete

ii) Improves the strength of the concrete

iii) Improves the impermeability of the concrete depending on the grade of the concrete.

i) Improves the durability of the concrete

ii) If chemicals are used it shortens the removing time of the form work

2.4.2 Methods of curing

When making provision for the two extremes, frost and heat, the factors to consider are those which influence the gain of strength, i.e. cement and water. Water is needed to provide workability and commence the hardening process, and the proportion used, known as water / cement ratio (W/C), must be sufficient for these two tasks. The ratio will need to be varied to suit climatic variations.

In cold weather the water / cement ratio needs to be kept to the minimum necessary to provide the desired workability. Since cement and water react more rapidly as the

temperature increases, it is an advantage to use warm water to assist early setting as a precaution against frost damage. In hot weather the water will have a tendency to evaporate more rapidly because the speeded up hardening process produce more heat. To increase the water / cement without taking additional precautions would only create problems of cracking and loss of strength. To overcome these problems there are different methods of curing and are mentioned few of then below.

A. Shading of concrete work

B. Covering concrete surface with wet material

C. Continuous sprinkling of exposed surfaces

D. Pending method

A) SHADING OF CONCRETE WORK

This method consists of curing surfaces by canvas stretched on frames in initial stages of hardening even prior to setting when the concrete is mechanically weak. In very hot and dry climates, it is necessary to prevent the evaporation of water. In cold climates, it is necessary to preserve the heat of hydration.

This method has a limited application. Firstly, it is hard to handle in strong winds. Wherever possible, the canvas or burlap should be placed directly on the surface of the concrete unless a very smooth finish is required. This method is inefficient when w/c ratios are low. In the case of slabs where smooth finish is important, the suspension of canvas on the frames is an expensive affair.

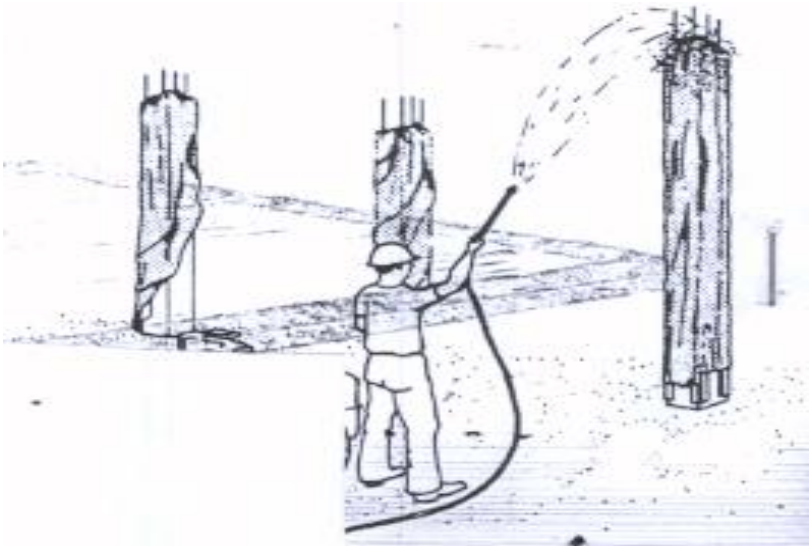


Fig 22

B) COVERING CONCRETE SURFACES WITH WET MATERIAL

This is the most widely used method. It is done by covering the concrete surfaces by wet Hessian cloth, canvas or sacking and is kept constantly wet for at least 7 days from the date of placing of concrete. Normally, for the first 24 hours, the concrete is protected by formwork. In structural concrete formwork supporting the vertical surfaces are struck of after 24 hours. These surfaces such as those of columns and walls are then kept moist by surrounding it with Hessian cloth. Horizontal surfaces such as those of road-slabs, house floors, etc. are covered by wet Hessian, damp sand or damp sawdust. A layer of at least 5 cm of earth and sand or sawdust or 15 cm of straw is spread and is kept wet.

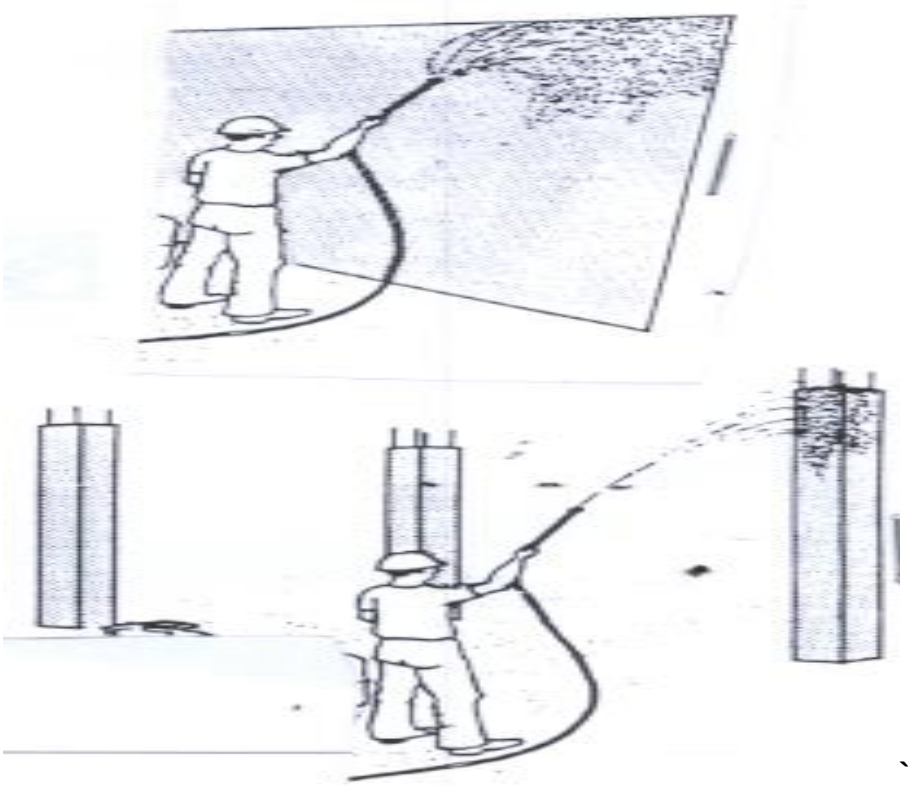
Fig.22

CONTINUOUS SPRINKLING OFEXPOSED SURFACES

Continuous sprinkling is done by spraying water through hose. In this type, it is important to ensure that the surface is continuously kept wet for three days and later on, the spraying may be intermittent. Floor slabs can be kept wet by a single hose pipe. But for long walls or sloping surfaces of large areas and columns the spraying is done by a perforated hose-pipe, allowing the water to trickle from the top along the surface.

Sprinkling of water starts when the concrete surface has initially sufficiently hardened. The efficiency of this method is the same as that of pending, but the total water

requirement is higher. It should, therefore, be used only when the pending method is not feasible



`**Fig.23**

D.PONDING METHOD

This is the most efficient method of curing. For the first 18 to 24 hours. The exposed surface is covered with moist Hessian or canvas. After that small banks of dykes of clay or earth are built across and along the slab, dividing the slab into number of rectangular ponds. These ponds are filled with water. This method is suitable for the construction of floors, roof slabs, roads and airfields. This method is very efficient especially when the concrete has a low w/c ratio below0.4.

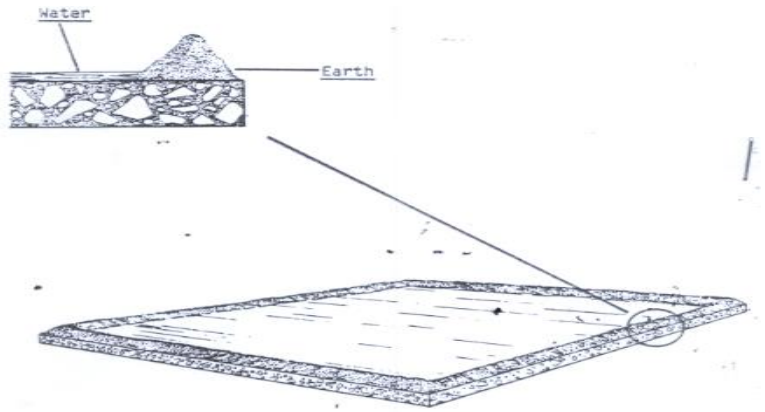


Fig.24

Concrete mix design strength is determined on specimens cured under water for 28 days. The test samples for quality control of construction are also cured for 28 days. For the development of the stipulated design strength therefore, the same curing period of 28 days should be specified. From practical considerations, however, this is rarely done. The exposed surfaces of concrete should be kept continuously in a damp or west condition for at least 7 days from the date of placing concrete. For concrete roads stipulates moist curing with west Hessian for the first day, and thereafter 14 days curing by bonding water in earthen dykes made on the slab. The dykes are to be filled with water on the fourteenth day; and the wet earth cover left in place till such time that the required strength of concrete is attained.

Self-Check .4	Choice Test

Instructions: Answer all the questions listed below. Give the short answer.

1. Procedures for promoting the hydration of cement

   A. form working B placing C curing

2. the most efficient method of curing

   A. Shading of concrete work

   B. Covering concrete surface with wet material

   C Continuous sprinkling of exposed surfaces

   D Pending method

3. Consists of curing surfaces by canvas stretched

   A. Shading of concrete work

   B. Covering concrete surface with wet material

   C Continuous sprinkling of exposed surfaces

   D Pending method

4. Sprinkling is done by spraying water through hose

   A. Shading of concrete work

   B. Covering concrete surface with wet material

   C Continuous sprinkling of exposed surfaces

   D Pending method

5. Covering the concrete surfaces by wet Hessian cloth covering the concrete surfaces .

   A. Covering concrete surface with wet material

   B. Continuous sprinkling of exposed surfaces

Answer sheet

1.

2.

3.

4.

5.

***Note:*Satisfactory rating – above 5 points Unsatisfactory - below 5 points**

LAP Test 1	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates /guide, tools and materials you are required to perform the following tasks within 45 minutes

Task 1. Prepare the mould according to the specification and drawing

Task 2. Mixed, placed and compacted the concrete according to the speciation

Annex I

Answer keys for learning guide -10

Answer key

Self check

Information Sheet-1

1, A 2, B 3, B 4, A 5.C 6.C

Information Sheet-2

1, B 2, A 3, D 4.A 5.D 6.C 7.B 8.A

Information Sheet-3

1, True 2, True 3.False 4.C 5.B 6.A 7.D 8.E

Information Sheet-4

1, C 2.B. 3.B 4.A

Annex 3

Answer keys for learning guide -10

Answer key

Self check

Information Sheet-1

1, True 2, False 3, True 4, True

Information Sheet-2

1, A 2, C 3, D 4.D 5.E

Information Sheet-3

1, True 2, True 3.True

Reference Internet

1. “construction hand book Details: Caps and Copings, Corbels and Racking,” Technical Notes on Construction, 36A Revised, concrete Institute of America, 11490 Commerce Park Dr., Reston, VA 22091.