

# PHOTOGRAPHS OF CHARTS ON BUILDING CONSTRUCTION

## BUILDING CONST. (BC - 1)

### TYPES OF BUILDINGS

**THE BUILDING:** The building is defined as any structure for whatsoever purpose and of whatsoever materials constructed and every part thereof whether used as human habitation or not and includes foundations, plinth, walls, floors, ceilings, stairways and building services. Tiled platforms, verandah, balcony cornice or projection, part of a building or anything affixed thereto or any wall enclosing or intended to enclose any land or space and signs and outdoor display structures according to National Building Code of India.

As per National Building Code of India, buildings are classified into nine groups based on occupancy as follows:

## BUILDING CONST. (BC - 2)

### RESIDENTIAL BUILDINGS

The building which is provided with sleeping accommodation for normal residential purposes, with or without cooking or dining or both the facilities, except any building classified under Group C.

**THE RESIDENTIAL BUILDINGS ARE FURTHER SUB-DIVIDED INTO FIVE GROUPS AS FOLLOWS:**

- 1. LODGING OR ROOMING HOUSES:** Any building or group of buildings under the same management, provided with separate sleeping accommodation for a total of not more than 10 persons, on either a rented or permanent basis, with or without dining facilities, but without sleeping quarters for individuals, are included in this sub-group.
- 2. ONE OR TWO FAMILY PRIVATE DWELLINGS:** This sub-group includes any private dwelling which is occupied by members of one family and has a total sleeping accommodation for not more than 20 persons. Planning is restricted to 20 persons as provided in any residential building is included in this sub-group. It is divided into sub-groups A, B and C as follows:
  - A:** One or two family private dwellings.
  - B:** One or two family private dwellings with attached garages.
  - C:** One or two family private dwellings with attached garages and swimming pools.
- 3. DOMESTIC QUARTERS:** This sub-group includes any building or structure in which sleeping accommodation is provided, with or without dining facilities, for persons who are not members of the same family, in any one room or a series of rooms, for the purpose of providing sleeping quarters for other persons.
- 4. INSTITUTIONAL QUARTERS:** This sub-group includes any building or structure in which sleeping accommodation is provided, with or without dining facilities, for persons who are not members of the same family, in any one room or a series of rooms, for the purpose of providing sleeping quarters for other persons.
- 5. HOSTELS:** This sub-group includes any building or structure in which sleeping accommodation is provided, with or without dining facilities, for persons who are not members of the same family, in any one room or a series of rooms, for the purpose of providing sleeping quarters for other persons.

## BUILDING CONST. (BC - 3)

### EDUCATIONAL AND INSTITUTIONAL BUILDINGS

**EDUCATIONAL BUILDINGS:** Any School, college building or city-center used for educational purposes for more than 6 hours a week involving assembly for instruction, education or recreation and which is not covered by Group D comes under this group.

**INSTITUTIONAL BUILDINGS:** These include any building or part thereof, which is used for purposes like medical or other treatment or care of persons suffering from physical or mental illness, diseases or infirmity, care of infants, aged persons, etc.

This group is further divided into three sub-groups as mentioned below:

- Hospitals and Sanitaria
- Custodial Institutions
- Penal Institutions

## BUILDING CONST. (BC - 4)

### CLASSIFICATION OF DWELLINGS - I

A dwelling can further be classified under following six different types:

- 1. DETACHED HOUSES:** It is the usual tendency of any family to have a house surrounded by its own land. This has led to the formation of detached houses. The design of a detached house can be made by considering the individual requirements of the family to be accommodated in that house.

## BUILDING CONST. (BC - 5)

### CLASSIFICATION OF DWELLINGS - II

- 2. SEMI-DETACHED HOUSES:** A common boundary wall in the form of structural barrier divides an independent plot into two units. Such a construction helps in securing many advantages of the detached type of houses and in addition, economy may be achieved by sharing expenses of common amenities such as water lines, drainage lines, electric cables, etc.

## BUILDING CONST. (BC - 6)

### CLASSIFICATION OF DWELLINGS - III

#### 3. ROW OF HOUSES

The main purpose of row housing is to yield more net residential density and it is preferred for the low-income group of families.

## BUILDING CONST. (BC - 7)

### CLASSIFICATION OF DWELLINGS - IV

#### 4. APARTMENTS OR FLATS

An apartment or a flat consists of three or four storeys and each floor or storey may accommodate one or more flats or apartments. The idea of ownership flats is becoming popular day by day in big cities. The land and other common amenities, apartment to flat are shared by all the occupants. The individual flat owner has no future scope either of vertical or horizontal expansion.

## BUILDING CONST. (BC - 8)

### CLASSIFICATION OF DWELLINGS - V

#### 5. DUPLEX TYPE APARTMENTS

Duplex is an apartment having rooms on two adjoining floors, connected by an internal staircase. It is a one type of modern thereby having split levels. In such houses, living room, family room, kitchen, study room and bed rooms are located at different levels.

## BUILDING CONST. (BC - 9)

### CLASSIFICATION OF DWELLINGS - VI

#### 6. SKYSCRAPERS

**ADVANTAGES:**

- It gives sunlight and pure air to the residents and gives them better apartment room maintenance.
- It permits more open space around the building and the open space can be used for various purposes such as tennis court, swimming pool, basketball court, recreation area, etc.
- It results in reduction of cost of various services such as water supply, transport, electrification, drainage, etc.
- It saves precious land which can be utilized for agricultural purpose or developed for industrial use.

**DISADVANTAGES:**

- It becomes difficult for all people to undertake vertical travel when the lot or area of the building flats.
- The benefit of enjoying the charm of a green garden cannot be obtained by the residents.
- It requires the sunlight and air of shares. It is quite likely that a skyscraper may cause an obstruction to air traffic and inter-urban transmission.
- There is a fear of panic in case of emergency such as fire and earthquake.

## BUILDING CONST. (BC - 10)

### STRUCTURAL SYSTEM OF BUILDING

According to Structural system, there are three types of buildings:

- Load Bearing Structure
- Framed Structure
- Composite structure

## BUILDING CONST. (BC - 11)

### BUILDING COMPONENTS - I

A building is divided into three parts:

- 1. FOUNDATION:** It is the part of a building constructed below ground level and which is in direct contact with soil-stones and transmits all the load to the soil.
- 2. PLINTH:** It is the walling above the ground level and acts as the base of the building.
- 3. SUPERSTRUCTURE:** It is the part of the building constructed above the plinth level. Following are the structural components of a building:
  - (i) Foundation
  - (ii) Pillars
  - (iii) Masonry or R.C.C. walls and columns in superstructure
  - (iv) Beams, Ground floor and upper floors
  - (v) Stairs, lobbies and weather sheds
  - (vi) Doors, windows and ventilators
  - (vii) Roofs, terraces, verandahs, etc.
  - (viii) Lifts, lifts, ramps, and escalators
  - (ix) Building services like plumbing, painting, whitewashing, lighting, etc.
  - (x) LIFTY features

## BUILDING CONST. (BC - 12)

### BUILDING COMPONENTS - II

**1. FOUNDATION:** It is the part of a building constructed below ground level and which is in direct contact with soil-stones and transmits all the load to the soil.

**2. PLINTH:** It is the walling above the ground level and acts as the base of the building.

**3. SUPERSTRUCTURE:** It is the part of the building constructed above the plinth level. Following are the structural components of a building:

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- (x) LIFTY features

## BUILDING CONST. (BC - 13)

### METHODS OF SITE EXPLORATION - I

- 1. OPEN TEST PITS OR TRENCH PITS:** This is the most common and probably the simplest and the best method for securing reliable information about the soil conditions. It permits the examination of the soil in its natural and undisturbed state.
- 2. SUB-SURFACE SOUNDING:** These penetrometers sounding techniques are used for investigation of those layers which have a varying soil nature. They are used to determine the consistency of cohesive soils, and the relative density of cohesionless soils. These methods are also used in principle for the measurement of the resistance offered by a soil to the penetration of a device having a conical and a cylindrical tip, called penetrometer.

## BUILDING CONST. (BC - 14)

### METHODS OF SITE EXPLORATION - II

- 3. PROBING OR ROD DRIVING:** This method of soil investigation is adopted when the ground is hard or very soft. It consists of driving a rod or a probe into the soil to a certain depth and then withdrawing it and the material caught in the soil is inspected.
- 4. AUGER BORING:** Cylindrical augers and shafts with cutting edge or teeth at lower end can be used for making deep borings. Augers are suitable for soil to soft clays, shells for very stiff and hard clays, and shafts or sand jumps for sandy soils.

## BUILDING CONST. (BC - 15)

### METHODS OF SITE EXPLORATION - III

#### WASH BORING

Wash boring is a fast and simple method for advancing holes in all types of soils. It consists of driving a casing through which a hollow drilled rod with a sharp chisel or chopping bit at the lower end is inserted. Water is forced under pressure through the drill rod which is alternately raised and dropped, and also rotated. The resulting churning and jetting action of the bit and water disintegrates the soil. The slurry collected by means of samplers is examined at various depths. Finally, a sectional profile of the different strata indicating the nature of soil is plotted.

## BUILDING CONST. (BC - 16)

### METHODS OF DETERMINING THE BEARING CAPACITY OF SOIL - I

#### GRAVITY LOADING PLATFORM METHOD

In case of gravity loading method, a platform is constructed over a vertical column resting on the soil and the loading is done with the help of sand bags, stones or concrete blocks. The general arrangement of test set up for this method is shown in figure. For square plate, two dial gauges are used. The dial gauges are mounted on independently supported column base. As the plate settles, the top of the dial gauge moves down and settlement is recorded. The load is indicated on the load gauge of the hydraulic jack.

## BUILDING CONST. (BC - 17)

### METHODS OF DETERMINING THE BEARING CAPACITY OF SOIL - II

#### PLATE LOAD TEST: REACTION BY TRUSS

The reaction truss is usually made of mild steel sections. Guy ropes are used for the lateral stability of truss.

## BUILDING CONST. (BC - 18)

### EXCAVATOR'S AND CONCRETOR'S AND CONCRETOR'S TOOLS

## BUILDING CONST. (BC - 19)

### EXCAVATION EQUIPMENTS - I

#### POWER SHOVEL

These are one of the most useful classes of earth moving equipment. It is one of the basic equipment employed to excavate the earth and to load the trucks. Power shovels are capable of excavating all types of earth, except hard rock.

**APPLICATIONS:**

- It is the most suitable equipment for large range of work.
- It is capable of digging very hard materials and can remove big-sized boulders.
- It is used in various types of jobs, such as, digging in gravel banks, clay pits, digging out in road works, road-side berms, etc.

## BUILDING CONST. (BC - 20)

### EXCAVATION EQUIPMENTS - II

#### BACK HOE

Back hoe is also termed as hoe, back shovel, and just shovel. It is an excavating machine of the power shovel group. It is generally used to excavate below the natural surface on which it rests. Hoes are used to excavate trenches, pits for basements and grading work, which requires precise control of work.

**APPLICATIONS:**

- It can be efficiently used to dress or trim the surface avoiding the use of manual effort for dressing the excavated surface.

### BUILDING CONST. (BC - 21)

#### EXCAVATION EQUIPMENTS - III

##### DRAG LINE

The drag line is so named because of its prominent operation of dragging the bucket against the material to be dug. Unlike the shovel, it has a long light crane boom and the bucket is loosely attached to the boom through cables. Because of this construction a drag line can dig and dump over larger distances than a shovel can do.

##### APPLICATIONS

- It is most suitable machine for digging softer material and below its track level.
- It is very useful for excavating trenches when the sides are permitted to establish their angle of repose without shoring.
- It has long reaches.
- It is mostly used in the excavation for canals and deepening on the embankment without hauling units.

##### APPLICATIONS

- Clamshells are commonly used for handling loose material such as crushed stone, gravel, coal, etc.
- The main feature of a clamshell is the vertical lifting of material from one location to another.
- Clamshells are mainly used for removing material from cofferdams, sewer manholes, well foundations, etc.

### BUILDING CONST. (BC - 22)

#### EXCAVATION EQUIPMENTS - III

##### CLAMSHELL

This machine is so named due to the resemblance of its bucket to a clam which is like a shell-fish with a hinged double shell. The front end is essentially a crane boom with a specially designed bucket loosely attached at the end through cables as in a drag line. The capacity of a clamshell bucket is usually given in cubic meters.

##### APPLICATIONS

- Clamshells are commonly used for handling loose material such as crushed stone, gravel, coal, etc.
- The main feature of a clamshell is the vertical lifting of material from one location to another.
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### BUILDING CONST. (BC - 23)

#### EXCAVATIONS AND EARTH MOVING EQUIPMENTS

##### SCRAPER

It is a unique machine for digging and long-distance hauling of granular materials. It is a self-operating machine which digs and picks up its soil through scraping the ground, hauls it over the required distance, discharging and spreading the material and then returning back to the pit for scraping up the next load.

##### BULL DOZER

Bull dozers are mainly used for the following operations:

- (i) spreading the earth fill,
- (ii) for opening up pit roads through mountainous and rocky terrain,
- (iii) clearing construction sites,
- (iv) maintaining haul roads,
- (v) clearing land from the trees and stumps,
- (vi) back-filling trenches at construction sites by dragging the earth from one place to another.

### BUILDING CONST. (BC - 24)

#### TIMBERING OF TRENCHES

When the depth of trench is large, or when the sub-soil is loose, the sides of the trench may cave in. The problem can be solved by adding a suitable method of timbering.

##### STAY BRACING

This method is used for supporting the sides of a trench excavated in soft soil. It consists of vertical struts placed very near to each other and bracing them in position by longitudinal rods.

##### BOX SHEETING

This method is adopted in loose soils, when the depth of excavation does not exceed about 1.5 to 2 m.

##### VERTICAL SHEETING

This method is adopted for deep trenches upto 10 m depth in soft ground.

##### RUNNER SYSTEM

This system is used in extremely loose and soft ground, which makes immediate support an essential requirement.

### BUILDING CONST. (BC - 25)

#### EXCAVATIONS IN GROUND WITH SUB-SOIL WATER

##### FOUNDATION Dewatering can be done by the following methods:

1. OPENING AND BUMPERS
2. WELL POINT SYSTEM
3. VACUUM METHOD
4. DEEP WELL SYSTEM
5. FORCED FLOW
6. ELECTRO-OSMOSIS METHOD

### BUILDING CONST. (BC - 26)

#### TYPES OF FOUNDATIONS - I

##### FOUNDATIONS

SHALLOW FOUNDATIONS (A foundation is shallow if its depth is equal to or less than its width.)

DEEP FOUNDATIONS (A foundation is deep if its depth is equal to or greater than its width.)

##### SHALLOW FOUNDATIONS

1. Spread footing
2. Combined footing
3. Strip footing
4. Mat foundation

##### VARIOUS TYPES OF SHALLOW FOUNDATIONS

### BUILDING CONST. (BC - 27)

#### TYPES OF FOUNDATIONS - II

##### SPREAD FOOTINGS

Spread footings are those which spread the super-imposed load of wall or column over a large area. Spread footings support either a column or wall.

##### SPREAD FOOTINGS FOR COLUMNS

##### SPREAD FOOTINGS FOR WALLS

##### GRILLAGE FOUNDATION

It provides a steel grating for foundation for a wall. It is a special type of isolated footing generally provided for heavily loaded steel structures and used in those locations where bearing capacity of soil is poor.

### BUILDING CONST. (BC - 28)

#### TYPES OF FOUNDATIONS - III

A spread footing which supports two or more columns is termed as combined footing.

##### COMBINED FOOTINGS FOR COLUMNS

The combined footing for columns will be rectangular in shape if they carry equal loads. The design of rigid rectangular combined footing should be done in such a way that centre of gravity of column loads coincide with the centroid of the footing area.

##### COMBINED FOOTINGS FOR COLUMNS AND WALL

Sometimes, it may be required to provide a combined footing for columns and a wall. Rectangular design is used when the columns carry equal loads. Trapezoidal design is used when the columns carry unequal loads.

### BUILDING CONST. (BC - 29)

#### TYPES OF FOUNDATIONS - IV

##### STRAP FOOTINGS

If the independent footings of two columns are connected by a beam, it is called a strap footing.

##### RAFT FOUNDATIONS

This method of increasing the bearing power of soil becomes very useful when the load coming on the soil is practically uniform, while the soil is of yielding nature, (e.g. Soft clay or reclaimed soil).

### BUILDING CONST. (BC - 30)

#### TYPES OF FOUNDATIONS - V

##### PILE FOUNDATIONS

A pile foundation is an example of deep foundation. A pile is a slender column made of wood, concrete or steel. The pile is either driven into the soil or formed in situ by casting in concrete in the ground and then filling it with concrete. Pile foundations work best to be economical if the support is not capable of taking the load over at its depth.

##### CLASSIFICATION OF PILES ACCORDING TO METHOD OF LOAD TRANSFER

1. END BEARING PILE
2. FRICTION PILE
3. COMBINED END BEARING AND FRICTION PILE
4. COMPACTION PILE

### BUILDING CONST. (BC - 31)

#### GRILLAGE FOUNDATIONS - I

##### TYPICAL GRILLAGE FOUNDATION FOR STEEL STANCHION

Steel grillage foundation is constructed of steel beams, structurally known as rolled steel joists (R.S.J.). Provided in two or more tiers. In the case of double tier grillage (which is commonly provided), the top tier of double beams is laid at right angles to the bottom tier. The joists or beams of each tier are held in position by 20mm diameter spacer bars with 20mm diameter pipe separators.

### BUILDING CONST. (BC - 32)

#### GRILLAGE FOUNDATIONS - II

##### STEEL GRILLAGE FOUNDATIONS FOR WALLS

Steel grillage foundation may also be provided for a masonry wall on soils of low bearing capacity. The grillage foundation for such a case consists of only one tier, though in some circumstances when the wall is wider and it carries heavy loads, two tiers may also be provided.

### BUILDING CONST. (BC - 33)

#### GRILLAGE FOUNDATIONS - III

##### TIMBER GRILLAGE FOUNDATION FOR WOODEN POST

Timber grillage foundation is provided for heavily loaded timber columns or masonry wall. The foundation uses timber planks and timber beams in the place of steel joists. This foundation is especially useful in waterlogged areas where the bearing power of the soil is very low, and where the steel beams may get corroded due to subsoil water.

##### TIMBER GRILLAGE FOUNDATION FOR MASONRY WALL

Figure shows the timber grillage foundation for a wall. The foundation consists of two layers of wood planks, separated by rectangular sections (beams) of timber placed at right angles to the direction of the wall.

### BUILDING CONST. (BC - 34)

#### TYPES OF FOUNDATION IN BLACK COTTON SOILS - I

##### STRIP FOOTING WITH SPECIAL TREATMENT

- (A) SIMPLE SAND-FILL
- (B) FILL OF ALTERNATE LAYERS OF SAND AND MOORUM
- (C) MOORUM AND BALLAST RAMMED INTO SOIL WITH SAND FILL
- (D) SAND FILL AND CONCRETE BLOCKS AT THE BOTTOM

### BUILDING CONST. (BC - 35)

#### TYPES OF FOUNDATION IN BLACK COTTON SOILS - II

##### PIER FOUNDATION WITH ARCHES

Figure shows a typical pier foundation for a wall carrying heavy loads. Piers are dug at regular intervals and filled with cement concrete. The piers may rest on good bearing strata. These piers are connected by concrete or masonry arch, over which the wall may be constructed. If required, a concrete beam may be provided over the arch if the arch is constructed of masonry. The arches are constructed with a gap above the ground level.

### BUILDING CONST. (BC - 36)

#### TYPES OF FOUNDATION IN BLACK COTTON SOILS - III

##### UNDER REAMED PILE FOUNDATION

An under-reamed pile is a pile of shallow depth (1 to 1.5 m) having one bulb or two bulb ends. If this bulb is larger or provided at a lower level than the critical depth of maximum movement on expansion side, the foundation will be anchored to the ground and it would not move with the movement of the soil. These piles may vary from 75 mm dia. to 300 mm dia. and are usually spaced 2 to 3 m apart. Reinforcing bars are provided with the bulb which may be 20mm dia. and are spaced 100 mm.

### BUILDING CONST. (BC - 37)

#### FOOTINGS AT DIFFERENT LEVELS : STEPPED FOOTINGS

##### STEPPED FOOTING ON SLOPING GROUND

When the existing ground is sloping and a wall is to be founded over it, a stepped footing is necessary to provide the base of the footing at same level all along the length of the wall. In such a case, a stepped footing is provided, such as shown in figure may be provided.

##### WALL FOOTINGS AT DIFFERENT LEVELS

Figure shows a case of footing at different levels when a wall footing is to be founded on a sloping ground. It is a common practice to lower the ground level footing on gradual slopes, down to the level of the footing to be shown. By doing so, the vertical side of the substrate is considered avoided.

##### ADJACENT FOOTINGS AT DIFFERENT LEVELS

If sloping site, the line (ABC) drawn between the lower edge of the footing of the lower level and upper adjacent edge of the lower footing should not have a steeper slope than the natural slope of the soil, when it is equal to 1:1. If the slope is steeper, the line (ABC) should not have a steeper slope than 1:1, when it is equal to 1:1.

### BUILDING CONST. (BC - 38)

#### MACHINE FOUNDATION

##### DIFFERENT TYPES OF FOUNDATION SUPPORTS FOR IMPACT TYPE MACHINES

1. FOUNDATION HAVING AN ELASTIC SUPPORT
2. FOUNDATION RESTING DIRECTLY ON SOIL
3. FOUNDATION RESTING ON PILES

### BUILDING CONST. (BC - 39)

#### CLASSIFICATION OF PILES

##### CLASSIFICATION OF PILES ACCORDING TO MATERIALS USED

1. PRE-CAST CONCRETE PILES
2. TIMBER PILES
3. STEEL PILES
4. SAND PILES

### BUILDING CONST. (BC - 40)

#### CASED CAST-IN-SITU CONCRETE PILES

##### RAYMOND PILES

##### SWAGE PILE CONSTRUCTION

##### MC-ARTHUR CASED PILE

##### STAGES IN BOTTOM-BOTTOM PILE CONSTRUCTION

### BUILDING CONST. (BC - 41)

#### UNCASSED CAST-IN-SITU CONCRETE PILES - I

##### SIMPLEX STANDARD PILE

Simplex pile can be driven through soft or hard soils. In this pile, a steel tube fitted with a cast iron shoe is driven into the ground up to the required depth, as shown in figure. Reinforcement, if necessary, is put inside the tube. Concrete is then poured into the tube.

In the alternate method, if the soil is firm enough to stand, the cast iron shoe is provided with self-aligning jaw point. This jaw point is brought in the shaft. This jaw point is brought to the shaft. When the concrete is poured, the jaw caps and allows concrete to flow out down into the hole. The jaw point is withdrawn gradually along with steel tube as concrete is filled in.

##### STAGES IN THE FORMATION OF FRANKI PILE

This pile has an enlarged base of mushroom shape, which gives the effect of a spread footing.

The pile is made of steel which is bearing a load of timber thickness can be reached at reasonable depth. Also, this type of pile is best suited to granular soil.

### BUILDING CONST. (BC - 42)

#### UNCASSED CAST-IN-SITU CONCRETE PILES - II

##### STAGES IN THE FORMATION OF STANDARD VIBRO-PILES

These piles are used where the ground is soft, thus offering little resistance to the flow of concrete. Both standard and expanded piles are formed by the vibro process. Vibro piles are formed by driving a steel tube and shoe, fitted with concrete, and extracting the tube, using upward vibrating and downward tamping action alternately.

##### STAGES IN FORMING VIBRO-EXPANDED PILE

Vibro-expanded piles are used where the desired driving resistance is not obtained at reasonable depth due to the bearing capacity of soil its bearing capacity is increased by enlarging its diameter at the bottom.

##### STAGES IN THE FORMATION OF Mc-ARTHUR PADESTAL PILES

The pile is used where the bearing stratum is reached with reasonable depth.

### BUILDING CONST. (BC - 43)

#### PRESSURE PILES / COMPOSITE PILES

##### PRESSURE PILES

These piles are especially suitable for those congested sites where heavy vibrations and noise are not permissible, and also where heavy pile driving machinery can not move in.

##### TIMBER-CONCRETE COMPOSITE PILES

In the timber and concrete composite pile, timber jacket is used below the permanent or lowest water level, while concrete pile, usually cast-in-situ, is thrust down it. Due to the combination, the advantages of both the types of piles are combined.

### BUILDING CONST. (BC - 44)

#### PILE DRIVING

The process of forcing a pile into the ground without excavation is termed as the pile driving. The piles should be driven vertically. However, a tolerance of 2% of the pile length is permissible.

##### EQUIPMENTS REQUIRED FOR PILE DRIVING

###### PILE FRAMES

Depending upon the nature of work, suitable type of pile frame is to be selected. The pile frame should be light and easily transportable.

###### DROP HAMMERS

A drop hammer is a solid mass of metal, usually cast iron, which is lifted and allowed to fall on the head of a pile. It is provided with legs so that it can slide on the shafts and a strong jaw on each side. The weight of hammer varies from 10 kN to 40 kN and the height of fall varies from 1.50 meters to 3 meters.

###### PILE HAMMERS

(A) Side elevation (B) Front elevation

### BUILDING CONST. (BC - 45)

#### PILE CAP AND PILE SHOE

##### PILE DRIVE CAP OR HELMET

During pile driving, heads, helmets or caps are placed on the top of the pile to receive the blows of hammer and to prevent damage to the head of pile.

##### PILE SHOE

The pile shoes are provided at the tips of piles to facilitate the process of driving piles through hard strata.

### BUILDING CONST. (BC - 46)

#### STONES FOR THE MASONRY

- 1. GRANITE**  
It is a heavy and hard stone, strong and durable. They are available in pink, grey or black colors. It is used for constructing heavy walls, water retaining walls, dams, etc. It is available in various sizes. Granite is a hard stone and is difficult to work.
- 2. SANDSTONE**  
It is a sedimentary rock, composed of sand and other minerals. It is sufficiently strong and is used for walls, chimneys, etc. It is available in various sizes. Sandstone is a hard stone and is difficult to work.
- 3. LIMESTONES**  
These are sedimentary rocks. They are available in various colors and are used for walls, etc. They are used for walls, etc. They are used for walls, etc. They are used for walls, etc.
- 4. MARBLE**  
These are metamorphic rocks. They are available in various colors and are used for walls, etc. They are used for walls, etc. They are used for walls, etc.
- 5. SLATE**  
It is a hard and compact metamorphic rock. It is used for walls, etc. It is used for walls, etc. It is used for walls, etc.
- 6. LATERITES**  
These are sedimentary rocks. They are available in various colors and are used for walls, etc. They are used for walls, etc. They are used for walls, etc.

### BUILDING CONST. (BC - 47)

#### STONE MASONRY TERMINOLOGY - I

##### THROUGH STONES

THROUGH STONE: A through stone is a stone header. Through stones are placed across the wall at regular intervals. If the thickness of the wall is small, through stones may be through equal to the full width of the wall.

##### JAMBS AND REVEALS

JAMBS: Jamb is the vertical sides of a framed opening for the door, window or fire place etc. Jamb may be plain or splayed or may be provided with the recess to receive the frames of doors and windows.

REVEALS: These are the exposed vertical surfaces left on the sides of an opening after the door or window frame has been fitted in position.

### BUILDING CONST. (BC - 48)

#### STONE MASONRY TERMINOLOGY - II

##### CONSOLE

CONSOLE: A console is a projecting stone which is usually provided to serve as support for gas, truss, weather stone etc.

##### COPING

COPING: It is a covering of stone, concrete, brick or terrazzo, placed on the exposed top of a wall to prevent leakage of water.

##### JAMBS

JAMBS: Jamb is the vertical sides of a framed opening for the door, window or fire place etc.

##### PARAPET WALL

PARAPET WALL: It is the portion of low height wall constructed above the edge of the roof to protect the roof.

##### BLOCKING COURSE

BLOCKING COURSE: It is another course of stone placed immediately above the cornice.

##### CORNICE

CORNICE: It is a projecting ornamental course near the top of wall or at the junction of wall and the ceiling.

##### FRISK

FRISK: It is a course of stone placed immediately below the cornice, along the external face of the wall, intended to improve the appearance of the wall.

##### STING COURSE

STING COURSE: It is a horizontal course of masonry, projecting from the base of the wall for chalking out lines of the floor.

##### LATEL

LATEL: It is a horizontal member of stone, brick, wood, metal or reinforced concrete, used to support the masonry and the water-tightness seal above an opening.

### BUILDING CONST. (BC - 49)

#### STONE MASONRY TERMINOLOGY - III

##### COPING

COPING: It is a covering of stone, concrete, brick or terrazzo, placed on the exposed top of a wall to prevent leakage of water.

##### ARCH

ARCH: It is a structural construction of masonry, concrete, metal or steel, designed to bridge openings in a wall or to support a load. It is supported by abutments or piers on either side.

##### WEDGES

WEDGES: It is the term used to describe the stones which are used in the construction of an arch.

##### STONE CABLE

STONE CABLE: It is a horizontal member of stone, brick, wood, metal or reinforced concrete, used to support the masonry and the water-tightness seal above an opening.

##### LACING COURSES

LACING COURSE: It is the horizontal course of masonry, projecting from the base of the wall for chalking out lines of the floor.

### BUILDING CONST. (BC - 50)

#### STONE MASONRY TERMINOLOGY - IV

##### BUTTRESS

BUTTRESS: It is a strong or ornamental masonry projection from a tall wall intended to strengthen the wall against the thrust of a roof or arch.

##### THRESHOLD

THRESHOLD: It is a horizontal member of stone, brick, wood, metal or reinforced concrete, used to support the masonry and the water-tightness seal above an opening.

##### OFFSETS

OFFSETS: These are the vertical horizontal surfaces which are formed by adding the thickness of the wall, back of the wall. They are used to support the masonry and the water-tightness seal above an opening.

### BUILDING CONST. (BC - 51)

#### JOINTS IN STONE MASONRY

- 1. BUTT JOINT**  
In this type of joint, the square surface of one stone is placed against the square surface of another stone.
- 2. REBATED JOINT**  
In this type of joint, the square surface of one stone is placed against the square surface of another stone.
- 3. JOGGLE JOINT**  
In this type of joint, a projection is made on one stone and a corresponding recess is made in another stone.
- 4. TABLED JOINT**  
In this type of joint, a table is provided on one stone and a corresponding recess is made in another stone.
- 5. SACLED JOINT**  
In this type of joint, a sacled joint is provided on one stone and a corresponding recess is made in another stone.
- 6. BUTTICATED JOINT**  
In this type of joint, a projection is made on one stone and a corresponding recess is made in another stone.
- 7. PLUGGED JOINT**  
In this type of joint, a projection is made on one stone and a corresponding recess is made in another stone.
- 8. DOWELLED JOINT**  
In this type of joint, a projection is made on one stone and a corresponding recess is made in another stone.
- 9. CRAMPED JOINT**  
In this type of joint, a projection is made on one stone and a corresponding recess is made in another stone.