UNDERSTAND THE FUNCTION OF CAD COMMANDS

JOY BISWAS

JR. INSTRUCTOR

DEPARTMENT OF CIVIL

IVC

SECOND YEAR

WATER SUPPLY AND SANITARY ENGINEERING

CIVIL ENGINEERING DRAWING

STATE INSTITUTE OF VOCATIONAL EDUCATION
DIRECTOR OF INTERMEDIATE EDUCATION
GOVT. OF ANDHRAPRADESH

CHAPTER 1

CONVENTIONAL SIGNS, DOORS, WINDOWS, FOOTINGS

INTRODUCTION :

Drawing is the language of engineers. An engineer must be well conversant with drawings. Drawings represent reduced shape of structure and the owner will be able to see what is going to happen. Drawings are prepared as per the requirements of owner. In case of public buildings, the functional aspects are studied and accordingly the drawings are prepared as per recommendations laid down in National Building Code (N.B.C) or as per Indian Standard specifications. Any modifications like additions or omissions can be suggested from a study of the drawings before actual construction of the structure is started. Drawings provide a language with specific data to Architects, Engineers and workmen at the site to construct the structure accordingly.

In case of public buildings or any other civil engineering works, it is essential to work out different items of construction with their quantities for estimating the total cost of construction project. For this purpose, drawings of different parts and different views are essential so that the approval of work from the sanctioning authority can be obtained. Further, the detailed drawings form an essential contract documents, when the work is handed over to a contractor. Hence it is necessary to prepare detailed drawings, which will inform the contractor, the exact information, which he needs during the construction of different items of work. Drawings, thus prepared should be carefully even after the completion of work. Thus, it becomes asses the possibility of further vertical expansion by referring to the foundation details initially provided.

REQUIREMENTS OF GOOD DRAWING:

1. Drawing should be clear, simple and clean
2. Should agree with the actual measurements by the accurately drawn scaled measurements.

3. Exact information should be provided in order to carry out the work at site without scaling for missing measurements.
4. Only minimum notes to support the drawings should be indicated in the drawings.
5. Sufficient space should be provided between the views so as to mark the dimensions without crowding.

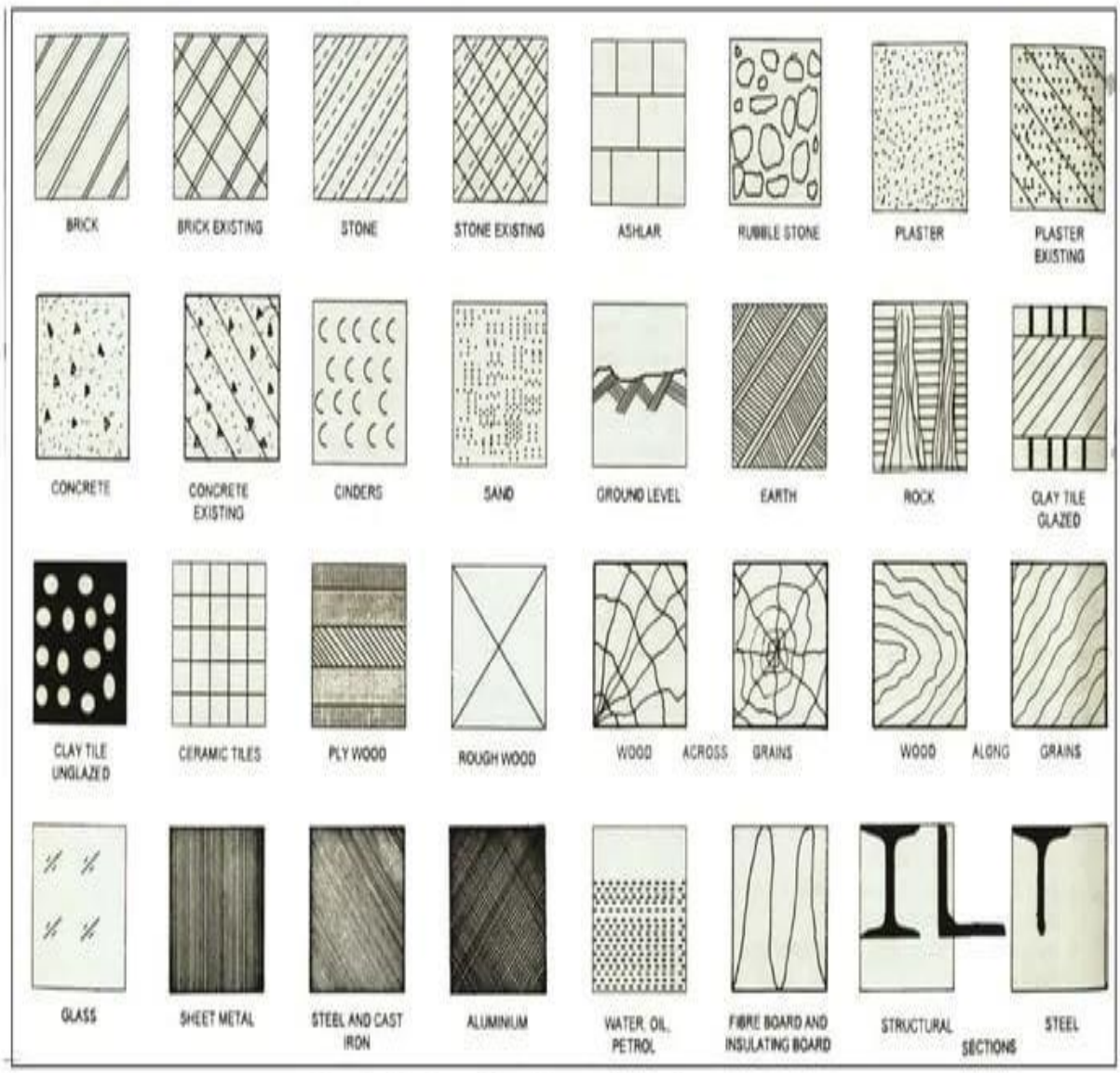
1.0 CONVENTIONAL SIGNS AND SYMBOLS:

Conventional signs are used to represent the particular item like stone masonary, brick masonary, concrete etc in the section of drawing. (i.e.,) when the materials are cut by any imaginary plane. Conventional symbols are provided to indicate doors, windows, their fixing, movement of shutters. When they are cloud or opened, various water supply and sanitary fixtures like tap, wash basin, W.C., urinals, Kitchen sink, shower etc, symbols are used to indicate the position of electrical fittings like lamp, switch, power socket, fan etc. To indicate positions of furniture on drawing room, bedroom, suitable symbols are used.

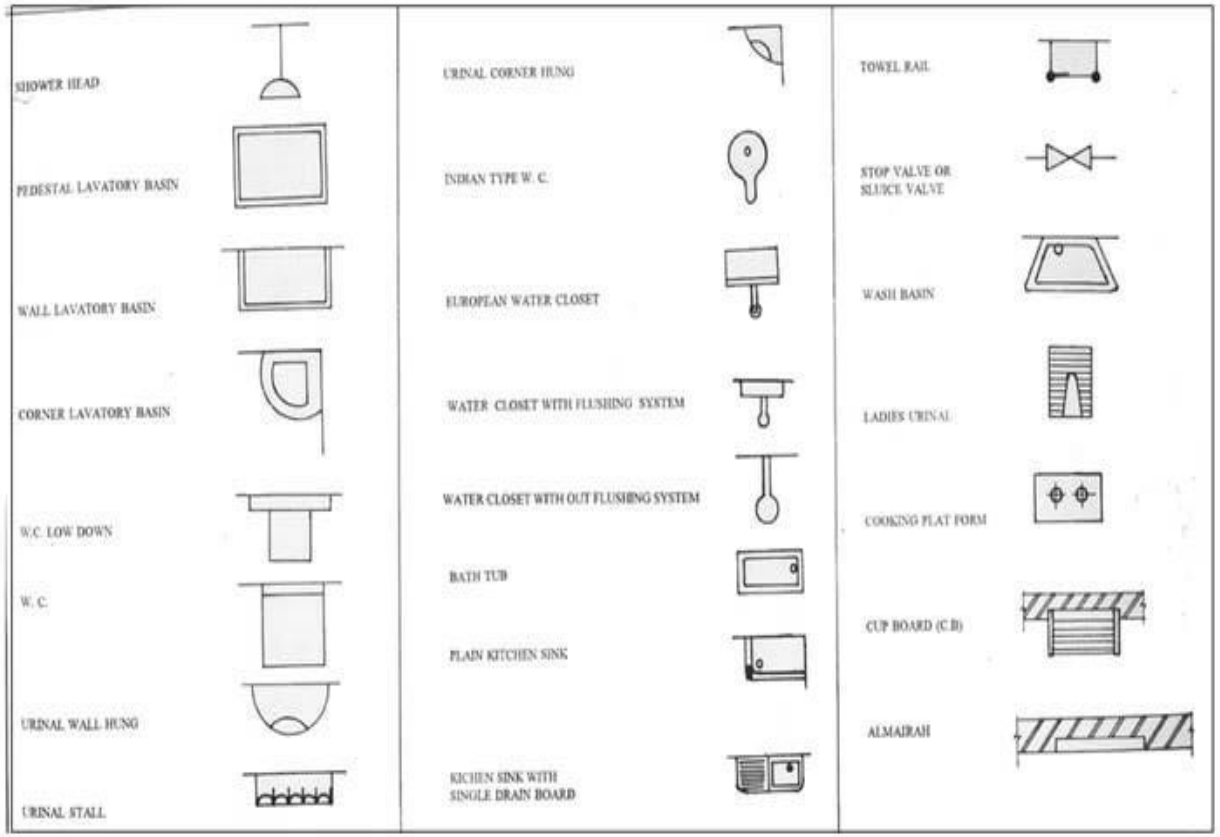
The Bureau of Indian standards (B.I.S) has recommended the conventional signs and symbols for the following purposes.

1. Avoid confusion and to understand the drawings
2. Save the time in making out various details in the drawing
3. Identify the various details of materials, Electrical fixtures, water-supply and sanitary fittings, Position of furniture's etc.
4. To prevent any dispute between contractor and owner in the actual construction of the structure.

The conventional signs for civil engg. materials as shown



Practical 1. Engg. Materials symbols - diagrams



Practical 2. Water supply and Sanitary fixtures - diagrams

Practical 3. Electrical Installations – diagrams

1.2 DOORS:

Doors are the means to provide access to the rooms of a building. A door consists of a frame and one or two shutters or leaves. Accordingly they are called as single shuttered or double shuttered door.

Door frame consists of two vertical members called styles and two horizontal members one at top called top rail and one bottom rail or sill or threshold. Now-a-days the bottom rail is omitted and made to flush with floor level. The top tail is projected beyond the styles by about 150mm and these projections are known as horns. These are built into masonary fro keeping in position. M.S. Clamps of flat iron about 300mm × 50mm × 6mm are fixed to the vertical styles on the outerside known as "Hold Fasts" in the shape of letter 'Z'. These are embedded into the masonary wall to hold the frame in position. When bottom member (sill) is not provided, the vertical members (styles) should be inserted in the floor finish by about 40 mm to 50mm

Shutter for the door frame may be fully panelled or partly glazed and partially panelled with one or two leaves or shutters. In fully panelled shutter the no. of panels may be 3,4 or 6 as per the design and other practical considerations. In the case of door shutters, the horizontal members are called as rails (top, bottom, lock and frieze). All other rails fixed between the lock rail and top rail are called frieze rail. The continuous vertical members of door frame called as styles or stiles. These styles and rails jointed to each other at both ends by mortise and tenon joints. The bottom and lock rails are made wider than the top or frieze rails. The center of the lock rail shall be so placed that its center line is at a height of 850mm from the bottom of the shutter.

The joints between the panel and frame shall be tongued and grooved joints. Grooves are formed along the inner edges of the stiles and rails to receive the panel. The depth of groove is equal to the thickness of panel. As per IS1003; the minimum width and thickness of panel shall be 100mm and 15mm respectively. For double leaf shutter, when closed, one leaf overlaps the other vertically as a rebated joint. In order to keep the both shutters in the same plane, rebates 8 to 10mm wide and in depth equal to half thickness of a shutter for a square type are cut as for IS:6198.

I.S.1003 RECOMMENDED SIZES FOR DOORS AND WINDOWS:

a)	Vertical stile, top and frieze rail width	:	150 ± 3mm
b)	Lock rail width	:	150 ± 3mm
c)	Bottom rail width	:	200 ± 3mm
d)	Mounting width	:	100 ± 3mm

e) Glazing bar : 40 ± 1mm

f) Thickness for all members : 35 ± 1 or 40 ± 1mm

As per A.P.D.S.S. (Andhra pradesh detailed standard specifications) doors and windows are indicated by following letters.

D = Door	W = Window
V = Ventilator	S = Single shutter
T = Double Shutter	P = Two Panels
R = Three Panels	Q = Four Panels

FOOTINGS:

The portion of the building constructed above the ground level is super structure and below the ground level is substructure or foundation, which will distribute the structural load over the large area. In the case of load bearing walled structure, the size of wall is increased by means of footings of stone masonary or brick masonary and finally rest on concrete bed of required size.

Footings are the steps provided under the load bearing walls by equal increase on eitherside. The number of footings depends upon the depth of foundation. The increase in width provided on either side of wall face is known as off-set. The depth of the foundation is the vertical height below ground level upto the bottom of the concrete bed.

Individual masonary pillars are constructed with offsets on all four sides to provide number of footings. This entire masonary structure rests on concrete bed of required size, which distribute the load intensity on the sub-soil at low magnitude than the safe bearing capacity of subsoil. Such a foundations are known as isolated footing foundation.

Plinth is the portion of the structure between the surrounding ground level and the surface of the floor level immediately above the ground is termed as plinth. The level of the plinth is usually called as plinth level and the built up area at the floor level is known as plinth area. The plinth height in any case shall not be less than 450mm.

The depth of the foundation depends upon as per NBC and shall not be less than 500mm.

1. Bearing capacity
2. Shrinkage and swelling properties of soil
3. Depth of water-table
4. Depth of frost penetration

The width of the foundation depends upon the safe bearing capacity, load coming on the soil. The width of foundation B=2T+2f where 'f' offset provided.

Generally the concrete offset 'f' shall be 150mm. In case of brick masonary offset 1/4 th brick length (i.e., 50mm) and thickness shall be multiples of brick thickness (100mm, 200mm, 300mm, 400mm etc).

In case of stone masonary offset 'f' shall be 75 to 100mm and thickness may be 150 to 200mm.

Thickness of concrete foundation:

By thumb rule d = 5/6 T where 'T' Thickness of wall in super structure.

Super structure:

The portion of building above ground level is called super structure. This includes masonary walls, columns, steps, doors, windows, ventilators, lintels, sunshades (chajjas), staircase, roof, weather proof course, parapet wall etc.

Lintels:

Lintels are small beams, which are of reinforced cement concrete in present construction provided over small opening like door, window, almairahs etc. Generally 150mm thick and width equal to wall width are provided.

Sunshade:

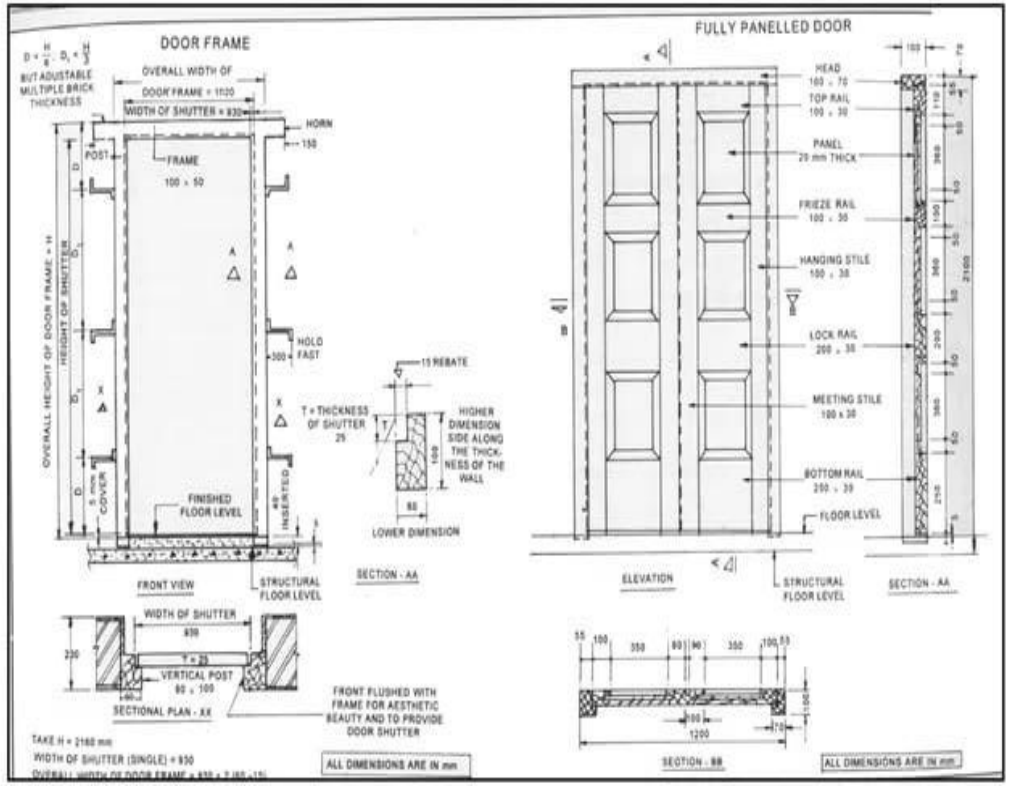
Sunshade is sloping or horizontal R.C.C. cantilever slab provided over openings on external walls to provide protection from sun and rain.

Balcony:

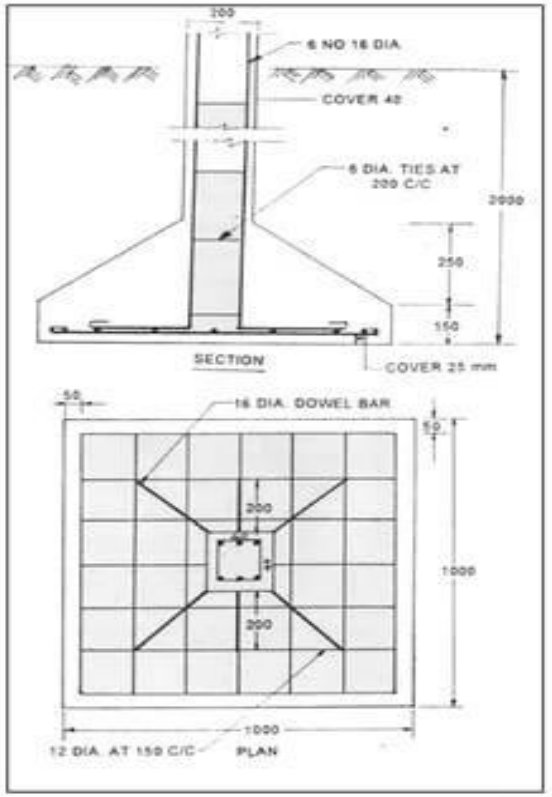
Balcony is horizontal projection including a handrail or balustrade to serve as passage or sitting out place. As per IS:4912, the vertical height of handrail for balconies and verandahs shall be 1000mm.

Portico:

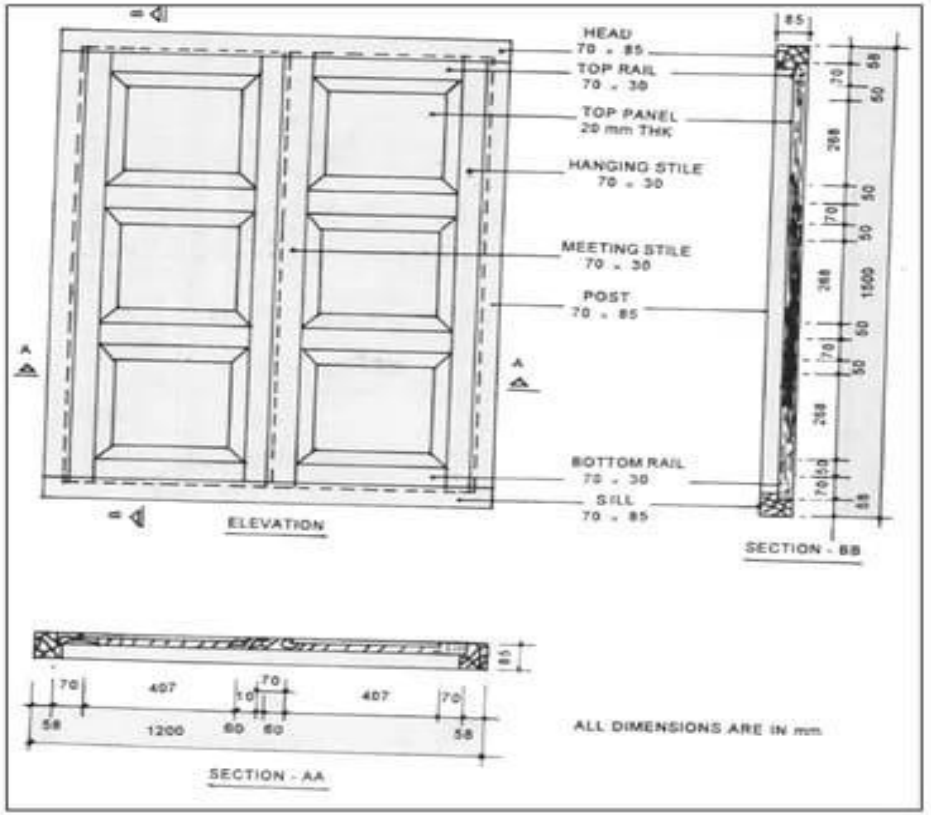
Portico or porch canopy is covered surface supported on pillars or otherwise for the purpose of pedestrian or vehicular approach. Generally the height of portico slab shall be 2.1m.



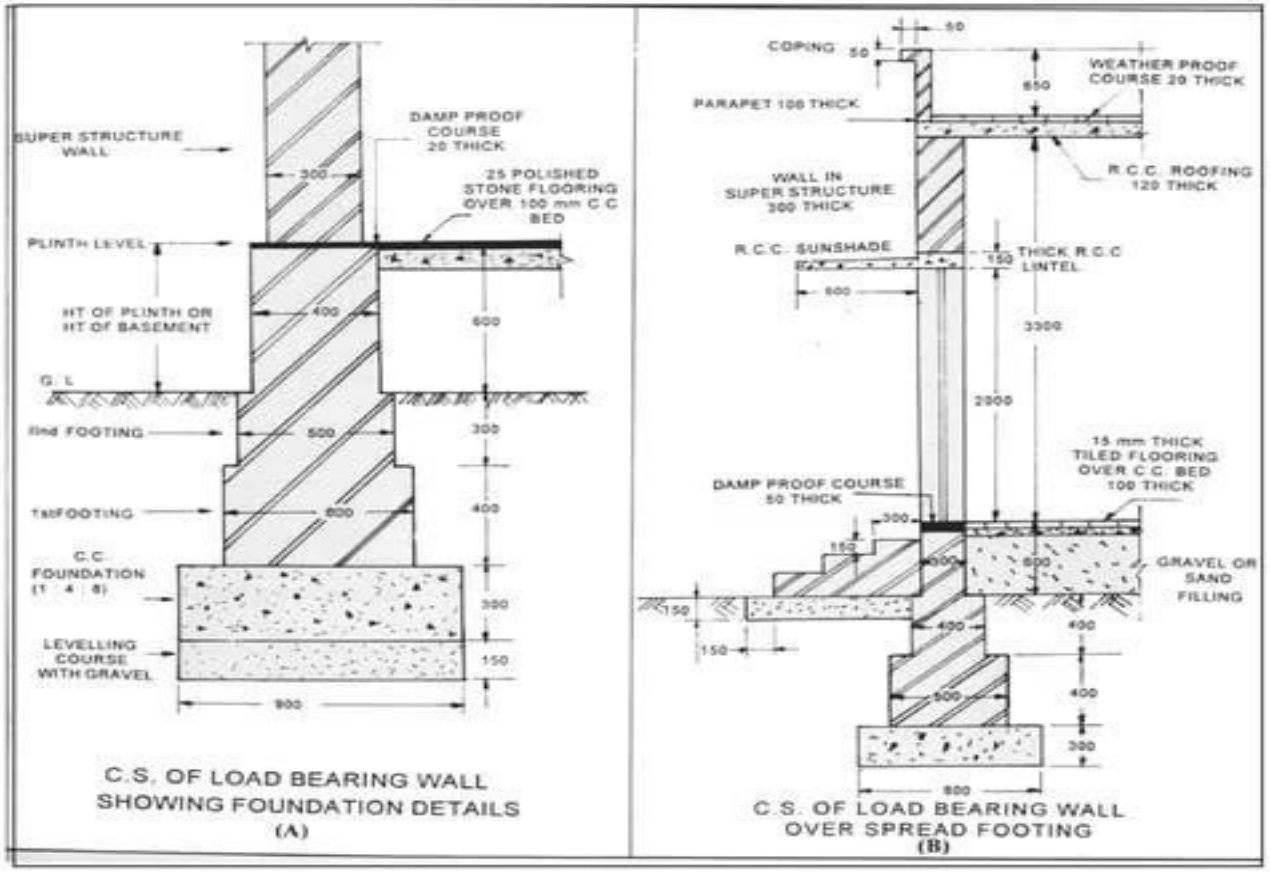
PRACTICAL 4 : Draw the following FULLY PANELLED DOOR



PRACTICAL 6 –Isolated R.C.C. Square Footing



PRACTICAL 5 - Fully Panelled Window



PRACTICAL 7 - cross section of load bearing wall